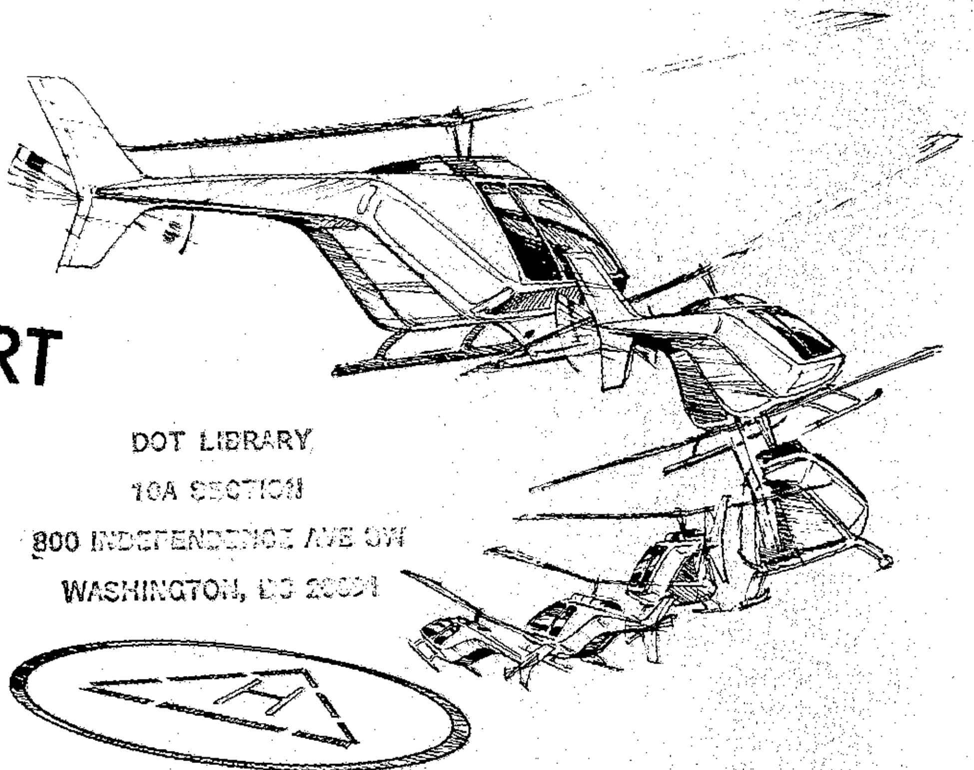
AC NO: 150/5390-1B
DATE: August 22, 1977

ADVISORY CIRCULAR



HELIPORT DESIGN GUIDE

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Initiated by: AAP-560

AC NO: 150/5390-1B
DATE: August 22, 1977

ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SUBJECT: HELIPORT DESIGN GUIDE

1. PURPOSE. This advisory circular contains general and technical information pertaining to the establishment or improvement of a heliport.

2. CANCELLATION. Advisory Circular 150/5390-1A, Heliport Design Guide, dated November 5, 1969, is cancelled.

3. SCOPE. THE HELIPORT DESIGN GUIDANCE CONTAINED HEREIN IS ADVISORY IN NATURE AND IS BASED ON SOUND OPERATING PRACTICES IN EFFECT AT THE TIME OF PUBLICATION. When Federal aid is involved in the development of the heliport, the design criteria herein are the standard for complying with the requirements of Section 16(a) of the Airport and Airway Development Act of 1970, as amended.

4. ACKNOWLEDGEMENTS. This advisory circular incorporates a number of suggestions from the Heliport Research and Development Council of the Helicopter Association of America. Their contributions and cooperation in this endeavor are acknowledged.

5. EXPLANATION OF CHANGES. In addition to editorial and format changes and updating of references and helicopter data, this revision has incorporated the following significant actions:

   a. Chapter 3. The terms "public-use," "private-use," and "personal-use" have been adopted to classify non-Federal heliports. These terms are consistent with the terminology of FAR Part 157. They are also descriptive of the types of heliport usage.

   b. Chapter 4. A figure has been included to show the recommended separation between an airport helicopter takeoff and landing area and a runway.

Initiated by: AAP-560

c. Chapter 5. Dimensional criteria for the three heliport classifications have been consolidated into this chapter. The dimensions of the takeoff and landing area are fixed at 1.5 times the overall length of the largest helicopter expected to use the facility. The concept of a structurally stressed touchdown pad proportionate to the dimensions of the landing gear has been introduced.

d. Chapter 7. An exception to the standard heliport marking is the hospital marker, which has been revised to reflect an adjustment in colors. The chapter also suggests ways to mark a turfed heliport, paved helicopter parking positions, weight limited facilities, and closed heliports.

e. Chapter 8. The latest fire protection requirements of the National Fire Protection Association have been incorporated for both ground-level and elevated heliports.

f. Chapter 10. This chapter has been added to cover recommendations for the design of permanently fixed offshore helicopter facilities located in U.S. waters.

6. METRIC UNITS. To promote the orderly transition to metric units, the text and figures include both customary and metric units of measure. However, the metric unit may not be an exact conversion of the customary unit.

7. HOW TO OBTAIN ADDITIONAL COPIES OF THIS PUBLICATION. Additional copies of this advisory circular, AC 150/5390-1B, Heliport Design Guide, may be obtained free of charge from the Department of Transportation, Publications Section, TAD-443.1, Washington, D.C. 20590.

Joseph A. Foster

JOSEPH A. FOSTER
Assistant Administrator
Office of Airports Programs

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CHAPTER 1. INTRODUCTION

1. GENERAL. Heliports range from the minimal personal-use facility to the fully developed public-use facility capable of accommodating many helicopters. This advisory circular describes physical, technical, and public interest matters which should be considered in the planning or establishment of a heliport. Guidance is based on known helicopter performance and sound engineering and operating practices. It represents a summation of many years' experience at different types of heliports throughout the United States. VARIATIONS IN PROPOSED SITES MAY JUSTIFY REASONABLE DEVIATIONS FROM THE DIMENSIONAL VALUES CONTAINED HEREIN. Any justification for deviation must be balanced against the effect it would have on the safe use of the heliport when compared to other advantages of the site.

2. BACKGROUND. The first operationally practical American helicopter was developed just prior to World War II. In 1946, following wartime services with the military, helicopters were certificated for civilian operations. Continued advances in helicopter technology have encouraged helicopter operators to engage in a number of activities that capitalize on the helicopter's unique flight characteristics. Some of the more prominent civil activities are listed herewith and are depicted in Figures 1-1 through 1-7.

   a. Law Enforcement. State and municipal police and sheriffs' departments make extensive use of helicopters to monitor rush hour and special event traffic; routine patrol of commercial, industrial, and residential areas; and other crime abatement activities.

   b. Firefighting and High-Rise Evacuation. Helicopters are an invaluable aid in directing firefighting operations and in evacuating people from high-rise buildings. In fact, several United States cities have enacted ordinances requiring developers of high-rise structures to provide emergency landing facilities to facilitate helicopter evacuation.

   c. Air Ambulance. Helicopters are used in many areas to transport accident victims to hospitals and for interhospital transfer of the critically ill and injured.

   d. Search and Rescue. Helicopters are used in both land and sea search and rescue activities conducted by the U.S. Coast Guard and police and sheriffs' departments.

   e. Civil Emergencies. The helicopter is often the only vehicle capable of carrying out evacuation activities or for bringing in emergency supplies and personnel in times of major disaster such as flood, fire, earthquake, etc.

f. Executive and Business. Many firms are turning to the helicopter for both intracity and intercity transportation of executives, key employees, and high priority cargo.

g. Forestry. Federal and state forest services use helicopters extensively in their firefighting, reseeding, insect control, and forest management activities.

h. Aerial Application. Farmers and ranchers find helicopters to be effective in applying insecticides and herbicides to their crops and grazing lands. Helicopters are also used in public health disease control programs requiring large or less accessible areas to be sprayed with a specific insecticide.

i. Developing Mineral Resources. The mining and petroleum industry uses helicopters in exploration and production activities. The helicopter is frequently the fastest and most practical means of reaching a distant, offshore, or inaccessible site.

j. Construction. Construction firms use helicopters to visit job sites. Several helicopter operators provide the construction industry with "flying crane" services to lift, move, and place building air conditioning equipment, power lines, antennas, concrete, etc., in locations that are difficult or impossible to reach with conventional hoisting equipment. Utility companies use helicopters for transmission and pipeline patrol.

k. Public Transportation. Helicopter air taxi service is available in a number of U.S. metropolitan areas.

3. AERODYNAMIC PRINCIPLES. The operational characteristics of a helicopter differ considerably from those of an airplane, yet both employ the aerodynamic principle of moving an airfoil through the air to achieve lift. An airplane utilizes forward motion to attain airflow over the airfoil (wings) for lift while the helicopter rotates the airfoil (rotor blades) to achieve the same condition. A relatively large ground area is required for an airplane takeoff run and landing roll. The helicopter, however, is capable of initiating and terminating forward flight from a hover position over a ground area little larger than itself. This difference in area requirements has a significant impact upon heliport design.

4. HELICOPTER AIRWORTHINESS. All civil helicopters manufactured or operated in the U.S. must meet the airworthiness requirements of the FAA before being certificated for operation. In addition, every operating civil helicopter must, at all times, have a valid airworthiness certificate indicating that it meets the safety standards prescribed by the regulations.

5. HELICOPTER CONFIGURATIONS. Helicopter designs vary considerably. The more usual terms used in describing helicopters are: single or tandem rotored, single engined or multiengined, piston or turbine engined. Figures 1-8 through 1-11 illustrate some of these configurations. Appendix 2 contains dimensional and design information on the latest helicopter models.

6. HELICOPTER WEIGHTS. Helicopter weights are indicative of physical size and load-carrying ability. Helicopters vary from 1-place machines with gross weights of 750 pounds (340 kg) to 47-place machines with gross weights of 50,000 pounds (22 680 kg) with even larger helicopters predicted for the future. The majority of helicopters in the current civil fleet are of the 2- to 5-place category.

7. HELICOPTER SPEEDS AND ALTITUDES. Helicopters are capable of operating at speeds ranging from zero (hovering flight) to in excess of 200 miles per hour (320 km/h). This wide range of operating speeds permits helicopters to operate safely under weather conditions that would normally limit the airplane. Many helicopters have the capability to operate at elevations in excess of 10,000 feet (3 000 m) above mean sea level. However, most helicopter flights are conducted within 1,500 feet (450 m) of the earth's surface.

8. HELICOPTER OPERATIONS. Generally, helicopters make an approach to, or a departure from, a hover position a few feet (meters) above the heliport's designated takeoff and landing area. While hovering, the helicopter may be moved forward, backward, or sideways, or may be turned about. These maneuvers are used to place the arriving helicopter in the most desired position for touchdown. These maneuvers are also used by the pilot of the departing helicopter to position the helicopter prior to accelerating forward and upward. When the heliport is designed to have separate parking facilities, helicopters will normally be hover taxied between the designated takeoff and landing area and the individual parking positions.

9. SAFETY FEATURES. The helicopter has several unique safety features. A major one is the ability to hover within a few feet (meters) of the ground while the pilot determines that all systems are functioning properly and that the helicopter is properly loaded for safe flight. Another safety feature, autorotation, permits a helicopter to be flown to a safe landing in the event of engine failure. In autorotation the main rotor continues to turn producing lift as the air passes upward through the rotor. The kinetic energy stored in the freewheeling rotor allows the rate of descent and forward motion to be reduced permitting a safe landing.

10. DEFINITIONS. The following definitions apply to terms used in this publication. (Definitions of FAR terms have been reprinted verbatim.)

a. Aircraft. A device that is used or intended to be used for flight in the air. (FAR Part 1)

b. Airport. An area of land or water that is used or intended to be used for the landing and takeoff of aircraft, and includes its buildings and facilities, if any. (FAR Part 1)

c. Approach-Departure Path. The flight track of the helicopter as it approaches or departs from the heliport's designated takeoff and landing area.

d. Autorotation. A rotorcraft flight condition in which the lifting rotor is driven entirely by action of the air when the rotorcraft is in motion. (FAR Part 1) (See paragraph 9.)

e. Downwash. The volume of air moved downward by the action of the rotating main (lift) rotor. When downwash strikes the ground or some other solid surface, it causes a turbulent outflow of air from beneath the helicopter.

f. Enroute Altitude. The cruising altitude maintained by the helicopter along the route of flight between origin and destination.

g. Ground Effect. An improvement in flight capability that develops whenever the helicopter flies or hovers near the ground or other surface. It results from the cushion of denser air built up between the ground and the helicopter by the air displaced downward by the rotor.

h. Helicopter. A rotorcraft that, for its horizontal motion, depends principally on its engine-driven rotors. (FAR Part 1) (See paragraphs 3 and 8.)

i. Helicopter Landing Site. A location used for helicopter takeoffs and landings on a one-time, a temporary, or an infrequent basis.

j. Heliport. An area of land, water, or structure used or intended to be used for the landing and takeoff of helicopters. (FAR Part 1)

k. Heliport 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 for civil heliports and 10 to 1 for military heliports. (FAR Part 77) (See paragraph 55.)

l. Heliport Elevation. The elevation of the takeoff and landing area and the heliport primary surface.

m. Heliport Primary Surface. The area of the primary surface coincides in size and shape with the designated takeoff and landing area of a heliport. This surface is a horizontal plane at the elevation of the established heliport elevation. (FAR Part 77)

n. Heliport Transitional Surfaces. These surfaces extend outward and upward from the lateral boundaries of the heliport primary surface and from the 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. (FAR Part 77) (See paragraph 55.)

o. Hover. A flight characteristic peculiar to helicopters and certain other aircraft which enables them to remain motionless above a fixed point on the earth's surface.

p. Hover Taxi. The very low level, slow flight of a helicopter.

q. Instrument Approach Procedure. A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made using visual procedures.

r. Instrument Flight Rules (IFR). Rules that govern the procedures for conducting instrument flight.

s. Parking Area (Apron or Ramp). A defined area on the heliport intended to accommodate helicopters for purposes of loading or unloading passengers or cargo, refueling, parking, or maintenance.

t. Perimeter Lights. A system of lights defining the perimeter of a heliport takeoff and landing area.

u. Peripheral Area. An obstruction-free area adjacent to the takeoff and landing area serving as a safety zone.

v. Takeoff and Landing Area. A designated area on the heliport which is coincident with the heliport primary surface and the boundaries of which are used to establish the FAR Part 77.29 imaginary surfaces. These surfaces are used for determining obstructions to air navigation (see paragraph 55). As such, it is the heliport area from which helicopter departures and approaches are intended to originate or terminate.

w. Taxiing. The powered movement of the helicopter from one area to another; i.e., from the takeoff and landing area to the parking area. Helicopters equipped with skid- or float-type landing gear must hover taxi, while helicopters equipped with wheeled landing gear may taxi with wheels in contact with the ground.

x. Taxiway. A designated, but not necessarily paved, path or route for helicopters to taxi from one heliport area to another.

y. Terminal Instrument Procedures. Procedures for instrument approach and departure of aircraft to and from civil and military airports.

z. Touchdown Pad. The load-bearing portion of the heliport's designated takeoff and landing area on which a helicopter may alight.

aa. UNICOM. An air-to-ground radio communication facility providing advisory information on airport and heliport services and utilization. Locations and frequencies of UNICOMs are shown on aeronautical charts and publications.

bb. Visual Flight Rules (VFR). Rules that govern the procedures for conducting flight under visual conditions.

11-19. RESERVED.

FIGURE 1-1. POLICE HELICOPTER PATROL PASSING OVER A PUBLIC BEACH

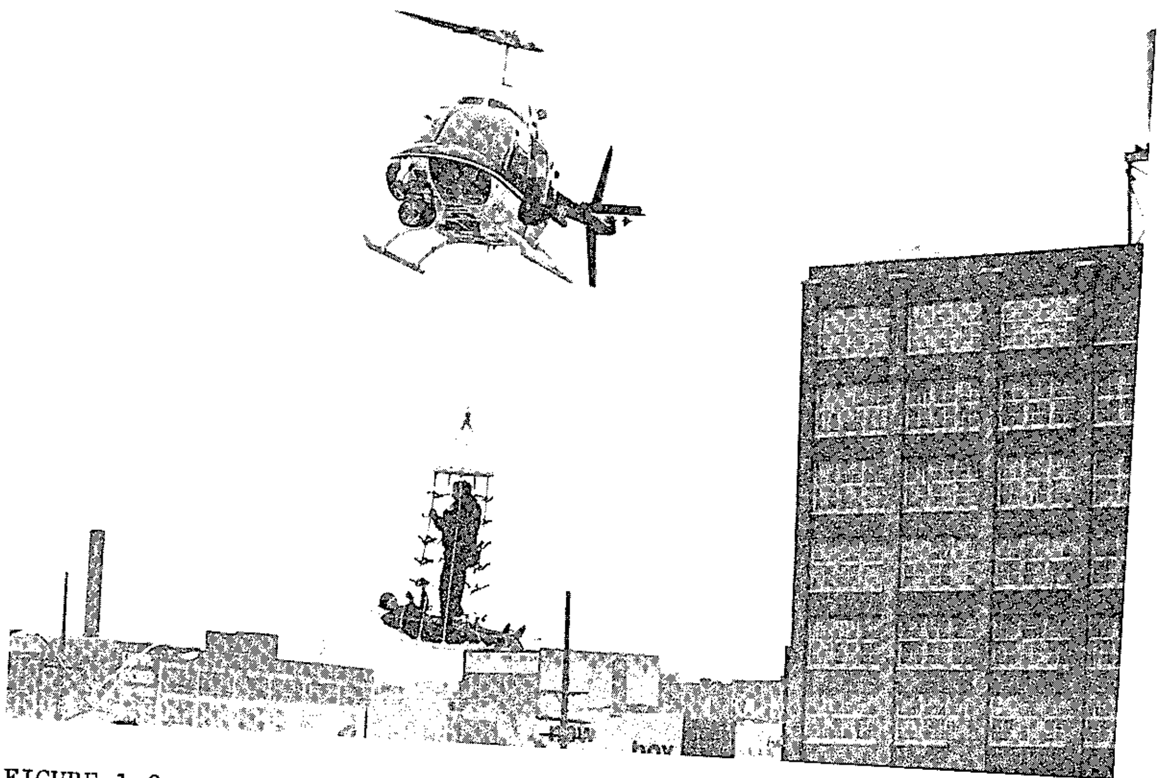


FIGURE 1-2. ACCIDENT VICTIM BEING EVACUATED WITH THE "BILLY PUGH" RESCUE NET

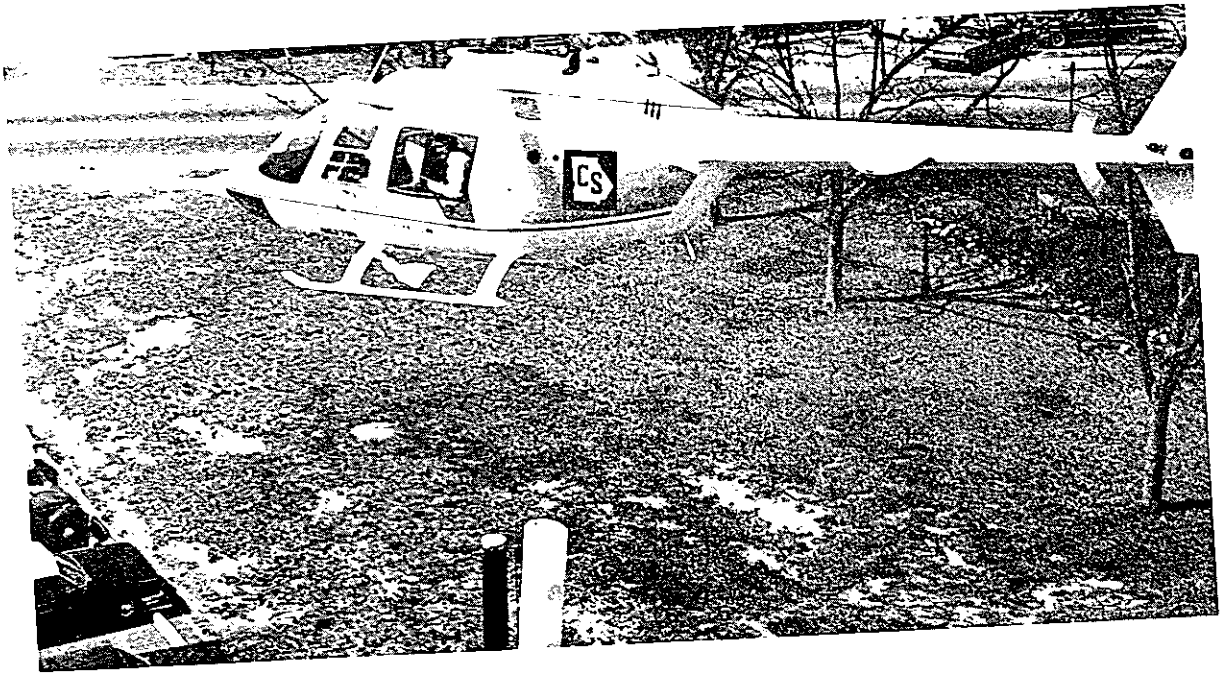


FIGURE 1-3. A HELICOPTER PICKUP AND DELIVERY SERVICE

FIGURE 1-4. HELICOPTER DISPENSING INSECTICIDES

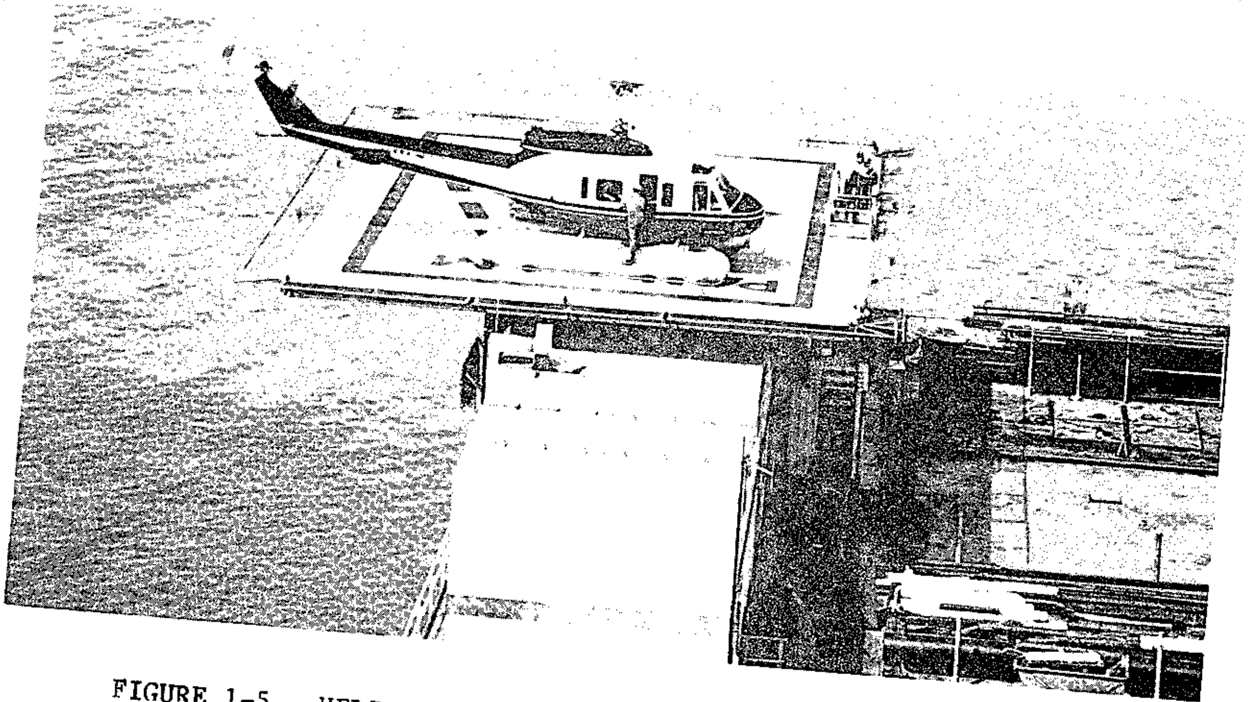


FIGURE 1-5. HELICOPTER TRANSPORTING OFFSHORE DRILLING CREW

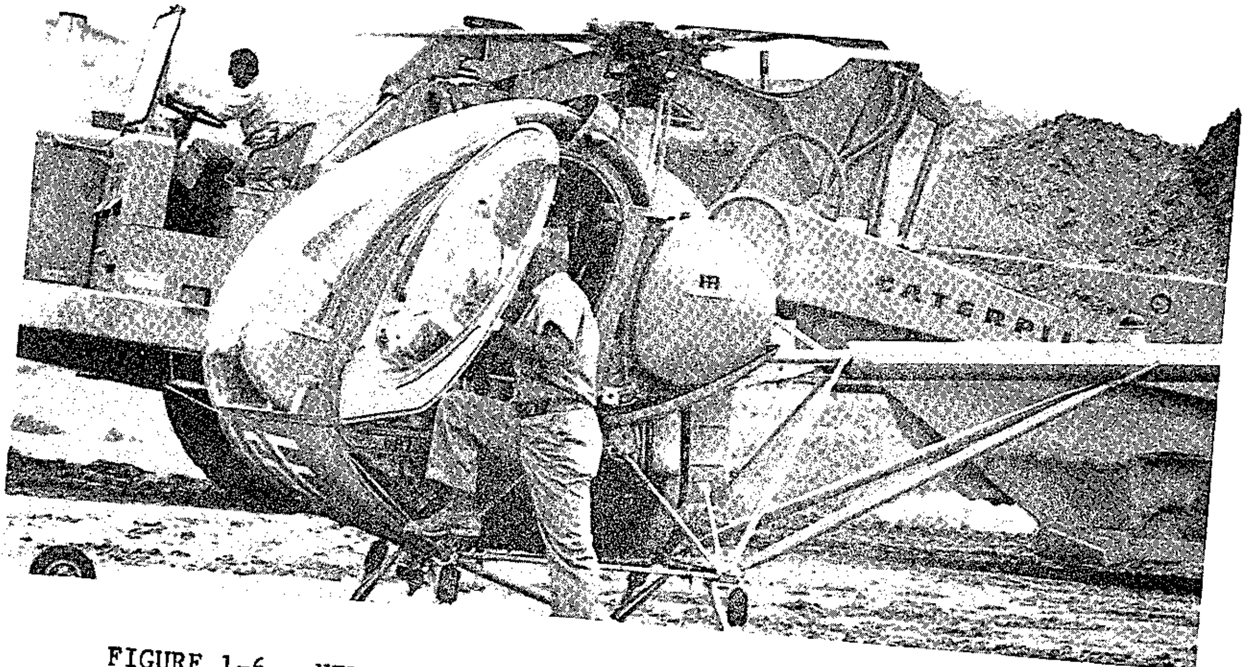


FIGURE 1-6. HELICOPTER PROVIDING TRANSPORTATION TO A CONSTRUCTION SITE

FIGURE 1-7. HELICOPTER MOVING CARGO FROM SHIP TO SHORE

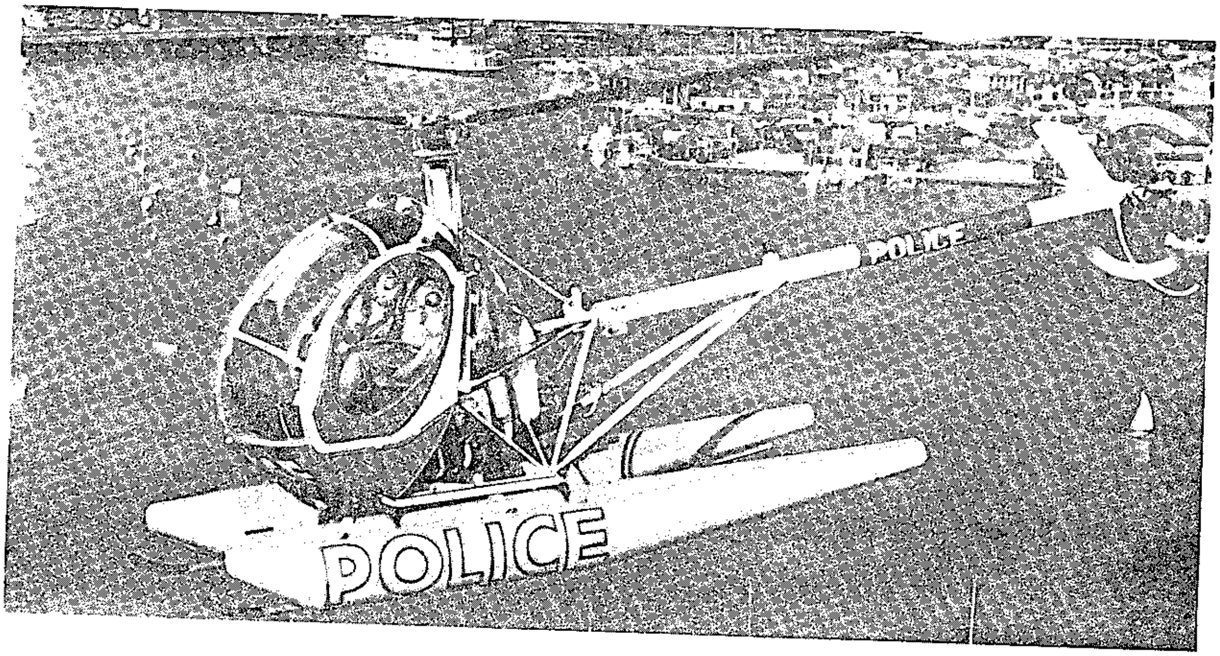


FIGURE 1-8. A SINGLE ROTORED, PISTON ENGINED HELICOPTER ON FLOATS

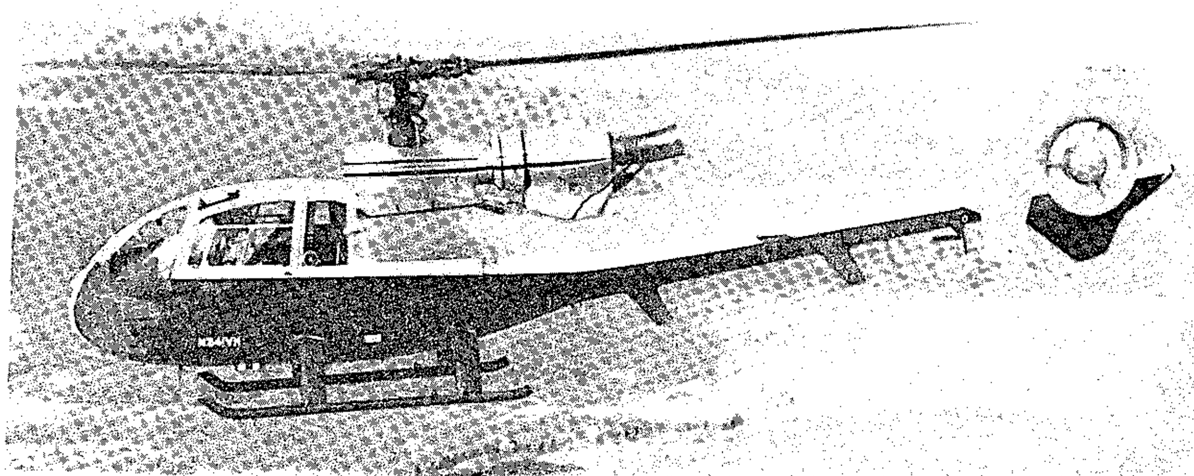


FIGURE 1-9. A SINGLE ROTORED, TURBINE ENGINED HELICOPTER ON SKIDS

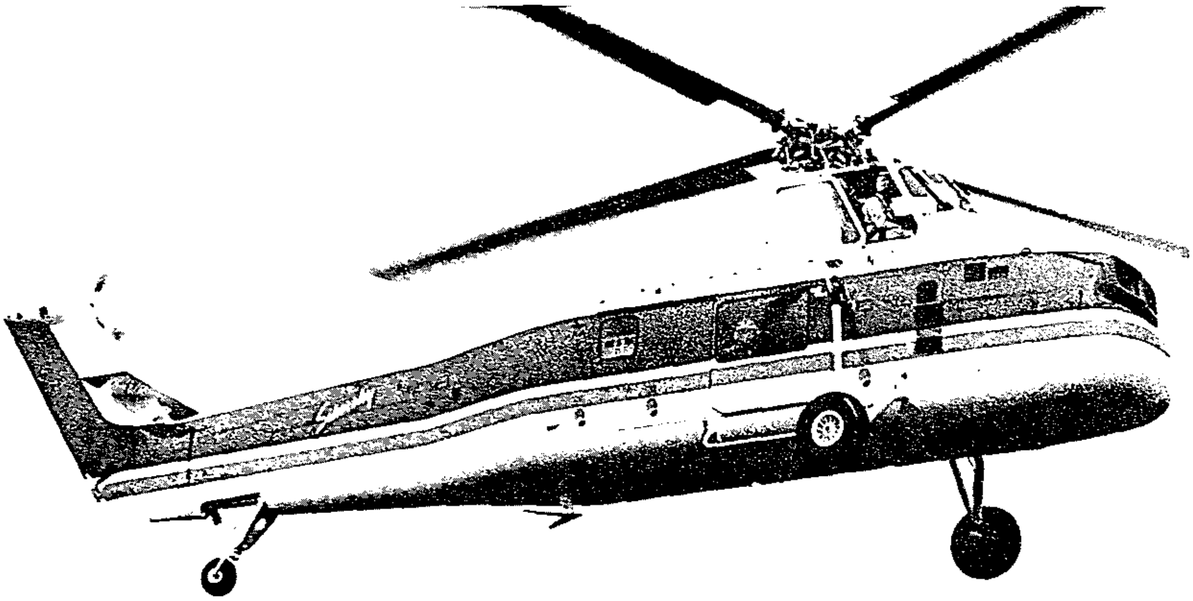


FIGURE 1-10. A SINGLE ROTORED, MULTITURBINE ENGINED HELICOPTER WITH WITH WHEELED GEAR

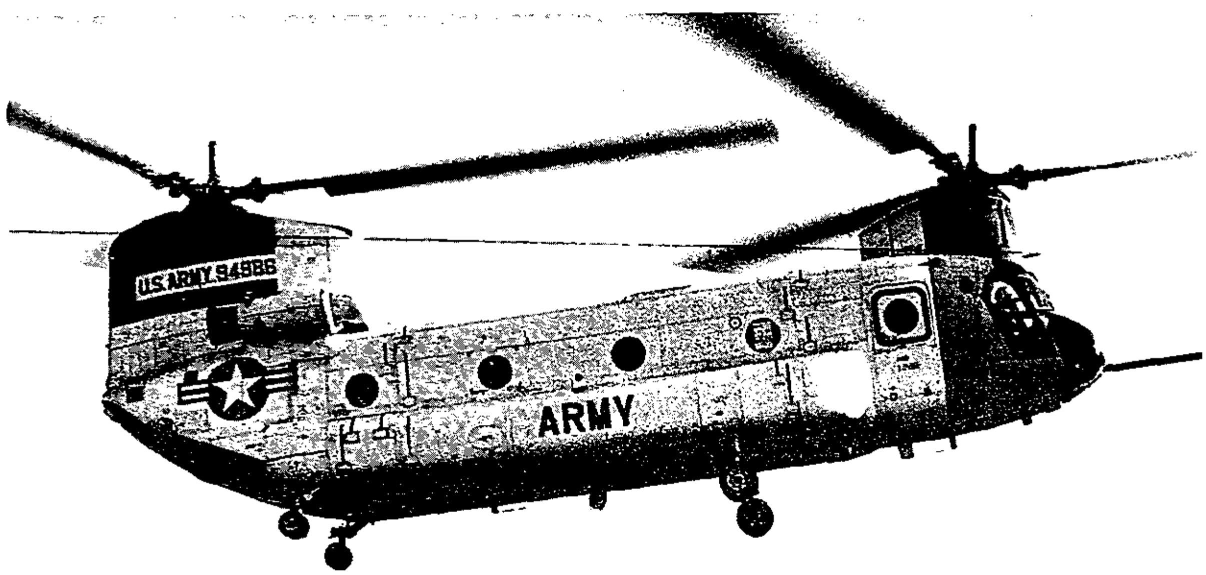


FIGURE 1-11. A TANDEM ROTORED, MULTITURBINE ENGINED HELICOPTER WITH QUADRICYCLE WHEELED GEAR

CHAPTER 2. GOVERNMENTAL ROLE

20. GENERAL. Federal, state, and local governments have related but somewhat differing roles in the field of heliport development. Each has an obligation to assure that the public's interests are protected, yet each also has the responsibility to assist the public in developing a safe, efficient, and comprehensive transportation system. It is essential that heliport proponents contact FAA, state, and local authorities early in the planning stage in order to proceed with full knowledge of any regulatory requirements, assistance programs, or probable operational limitations. FAA offices and many state aviation departments are able to provide technical advice on heliport development and operations. Local governments frequently do not have heliport expertise, and proponents may find it necessary to explain the special nature of helicopter operations and how local approval will benefit the community. Locations of FAA Airports offices are found in AC 150/5000-3, Address List for Regional Airports Divisions and Airports District Offices.

21. FEDERAL ROLE. The Federal Government, through the FAA, has established standards for heliport development and rules for helicopter operations. Through its Federal Aviation Regulations (FAR), the FAA prescribes various requirements that must be observed by the heliport owner and helicopter operator which affect heliport development. The regulations are comprehensive and concern such matters as minimum safe altitudes, ceiling and visibility limitations, aircraft and pilot licensing, and related standards appropriate to assure the safety of persons and property both in the air and on the ground. The purpose for such broad regulations is to achieve safety through the uniform and standardized control of aviation operations.

22. FEDERAL AVIATION REGULATIONS (FAR). Specific regulations of interest to heliport developers are as follows:

    a. FAR Part 157. Section 309 of the Federal Aviation Act of 1958 states, "In order to assure conformity to plans and policies for, and allocations of, airspace by the Secretary of Transportation under section 307 of this Act, no airport or landing area not involving expenditure of Federal funds shall be established, or constructed, or any runway layout substantially altered unless reasonable prior notice thereof is given the Secretary of Transportation, pursuant to regulations prescribed by him, so that he may advise as to the effects of such construction on the use of airspace by aircraft." The FAA has published FAR Part 157, Notice of Construction, Alteration, Activation, and Deactivation of Airports, to carry out this responsibility. The notification requirement applies to heliports. Failure to provide notice as required would violate Section 901 of the Federal Aviation Act and subject the violator to a civil penalty not to exceed $1,000.

(1) Notification Procedure. FAA Form 7480-1 which is used in giving notice is available from any FAA regional or Airports District Office. The completed form, together with a sketch of the proposed heliport and a map showing its location, should be returned to the regional or district office at least 90 days before construction is to begin. A ground inspection and a flight check may be made by the FAA. The submitted information and inspection report will be used by the FAA in evaluating the effect of the proposed heliport on the safe and efficient use of the Nation's navigable airspace. Figures 2-1 through 2-3 illustrate a form, sketch, and location map submission for a hypothetical heliport development. It is recommended that a location map comparable to the U.S. Geological Survey quadrangle map be used so that the exact location of the heliport can be determined.

(2) Notification Exception. A helicopter landing site which is temporary in nature and intended to be used only in visual flight rules (VFR) weather conditions for a period of less than 30 consecutive days with not more than 10 operations a day is exempt from the requirement to give notice. The exemption is limited to the requirement of filing Form 7480-1 with the FAA and does not negate any notification required by state or local law.

(3) Explanatory Guidance. Advisory Circular 70-2, Airspace Utilization Considerations in the Proposed Construction, Alteration, Activation and Deactivation of Airports, points out the importance of giving notice and describes some of the airspace utilization consideration factors. The circular also lists addresses of FAA regional and FAA Airports District Offices.

b. FAR Part 77. Section 307(a) of the Federal Aviation Act of 1958 states, "The Secretary of Transportation is authorized and directed to develop plans for and formulate policy with respect to the use of the navigable airspace; and assign by rule, regulation, or order the use of the navigable airspace under such terms, conditions, and limitations as he may deem necessary in order to insure the safety of aircraft and the efficient utilization of such airspace. He may modify or revoke such assignment when required in the public interest." The FAA has published FAR Part 77, Objects Affecting Navigable Airspace, to carry out this responsibility. Notice is required by 72 Stat. 797, 49 U.S.C. 1501 as implemented through Subchapter E, Airspace, of Title 14 of the Code of Federal Regulations, Part 77. Persons who knowingly and willfully fail to comply with the provisions of FAR Part 77 are liable to a fine of $500 for the first offense with increased penalties thereafter as provided by Section 902(a) of the Federal Aviation Act of 1958 as amended.

(1) Notification Procedure. FAA Form 7460-1 which is used in giving notice is available from any FAA regional or Airports District Office. The completed form should be returned to the appropriate FAA regional Air Traffic Division office at least 30 days before the start of construction or application for a building permit. The proposal is studied and the proponent is advised as to the effect the intended structure would have on the navigable airspace. Figures 2-4 and 2-5 illustrate a Form 7460-1 and sketch submission for the erection of a sign using the heliport example of Figure 2-2.

(2) Notice Requirements. Notice is required of anyone proposing the construction or alteration of any structure of more than 200 feet (61 m) in height above the ground level at its site, or which would penetrate an imaginary surface that extends outward and upward at a slope of 25 to 1 (horizontal to vertical) for a horizontal distance of 5,000 feet (1 524 m) from the nearest edge of the landing and takeoff area of any heliport available for public use. Public-use heliports are listed in the Airman's Information Manual and are shown on aeronautical charts.

(3) Explanatory Guidance. Advisory Circular 70/7460-2, Proposed Construction or Alteration of Objects That May Affect the Navigable Airspace, provides advice to persons proposing to erect or alter an object that may affect the navigable airspace of the requirement to submit a notice to the FAA. It also contains the addresses of FAA regional offices.

c. FAR Part 139. Heliports serving Civil Aeronautics Board-certificated helicopter air carriers are obligated to meet the requirements of FAR Part 139, Certification and Operations: Land Airports Serving CAB-Certificated Air Carriers.

d. FAR Parts 27 and 29. These parts set out airworthiness standards for normal and transport category rotorcraft (see Bibliography for titles of the parts).

e. FAR Parts 91, 121, 127, 133, and 135. These parts prescribe operating rules that are to be followed by helicopter operators (see Bibliography for titles of the parts).

f. FAR Part 152. This part, Airport Aid Program, prescribes policies and procedures for administering Federal funds for Airport Development Aid Program (ADAP) and Planning Grant Program (PGP) projects under the Airport and Airway Development Act of 1970, as amended. The program provides grant funds to public agencies such as states, territories, counties, municipalities, or other tax-supported organizations to plan, construct, or improve a public-use airport. A project for heliport development may be approved if it is listed or could be listed in the current National Airport System Plan (NASP), which identifies locations and project development considered necessary to the national airport system. FAA Airports Divisions or Airports District Offices should be contacted for NASP, ADAP, or PGP guidance.

23. ENVIRONMENTAL CONSIDERATIONS. An environmental assessment is required for all federally assisted heliport development in accordance with the requirements of the National Environmental Policy Act of 1969 and the Airport and Airway Development Act of 1970, as amended. Consult with an FAA Airports office for guidance on this important aspect of heliport development.

24. STATE ROLE. Many state aeronautics commissions or similar authorities require prior approval, and in some instances a license, for the establishment and operation of a heliport. Requirements will vary from state to state. Some state requirements apply only to public-use heliports, whereas others apply to any heliport. A few states administer financial grant programs similar to the Federal program for airport development. Heliport proponents should contact their respective state aviation departments for particulars on licensing or assistance programs.

25. LOCAL ROLE. Most communities have zoning laws, building codes, fire regulations, or similar ordinances. Some have, or are in the process of developing, ordinances covering environmental matters such as noise and air pollution. A few may have specific rules or regulations governing the establishment and operation of airports (heliports). Therefore, a careful study should be made to determine whether local laws, rules, and regulations permit the establishment and operation of a heliport. It is also important to determine if these same laws permit helicopter landings to be made at places other than a heliport on a one-time, temporary, or infrequent basis without formally declaring the site a heliport.

26-29. RESERVED.

Form Approved. OMB No. 04-R0094

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

NOTICE OF LANDING AREA PROPOSAL

X ESTABLISHMENT OR ACTIVATION
☐ ALTERATION
☐ DEACTIVATION OR ABANDONMENT
☐ CHANGE OF STATUS

OF ☐ AIRPORT X HELIPORT ☐ SEAPLANE BASE

NAME OF PROPONENT, INDIVIDUAL OR ORGANIZATION	ADDRESS (No., Street, City, State, Zip Code)
HAAP Company	7090 Richardson Road, Stand, DV. 00560

A. LOCATION OF LANDING AREA

1. NEAREST CITY OR TOWN	2. COUNTY	3. STATE	4. DISTANCE & DIRECTION FROM NEAREST CITY OR TOWN
Stand	Ards	DV.	

5. NAME OF LANDING AREA	6. LATITUDE	7. LONGITUDE	8. ELEVATION	MILES	DIRECTION
HAAP Company Heliport	28 ° 25 ' 02 "	76 ° 10 ' 12 "	50 feet	2	East

B. PURPOSE

TYPE USE	TYPE OWNERSHIP	LOCALITIES SERVED	IF CHANGE OF STATUS OR ALTERATION, DESCRIBE CHANGE.	CONSTRUCTION DATES
☐ PUBLIC X PRIVATE ☐ PERSONAL	☐ PUBLIC X PRIVATE	None	Not Applicable	TO BEGIN/BEGAN 6/1/76 EST. COMPLETION 7/1/76

C. OTHER LANDING AREAS (REF. AS ABOVE)

	DRCT. FROM LANDING AREA	DIST. FROM LANDING AREA
Stand-Ards Field	S	9mi.
Meehan Hospital Heliport	NNE	4500'

D. LANDING AREA DATA

1. AIRPORT OR SEAPLANE BASE

	EXISTING (If any)	PROPOSED
MAGNETIC BEARING OF RUNWAY(S) OR SEALANE(S)		
LENGTH OF RUNWAY(S) OR SEALANE(S) IN FEET		
WIDTH OF RUNWAY(S) OR SEALANE(S) IN FEET		
MAGNETIC BEARING OF PRIMARY LANDING DIRECTION		
TYPE OF RUNWAY SURFACE (Concrete, Asphalt, Grass, Etc.)		

2. HELIPORT

	EXISTING	PROPOSED
DIMENSIONS OF LANDING AND TAKEOFF AREA IN FEET		100'x100'
DIMENSIONS OF TOUCHDOWN AREA IN FEET		50'x50'
MAGNETIC DIRECTION OF INGRESS/EGRESS ROUTES		80°-260°
TYPE OF SURFACE (Turf, rooftop, etc.)		Asphalt

3. ALL — DESCRIPTION OF LIGHTING (If any): None — DIRECTION OF PREVAILING WIND: N/S

E. OBSTRUCTIONS

TYPE	HEIGHT ABOVE LANDING AREA	DRCT. FROM LANDING AREA	DIST. FROM LANDING AREA
Office Building	30'	E	100'
Trees	25'	S	200'
Factory Building	30'	N	200'

F. OPERATIONAL DATA

		PRESENT (If est. indicate by letter "E")	ANTICIPATED 5 YRS. HENCE
1. EST. OR ACTUAL NO. BASED ACFT.			
AIRPORTS	MULTIENGINE		
	SINGLE-ENGINE		
HELIPORTS	UNDER 3500 LBS. MGW	0	0
	OVER 3500 LBS. MGW	0	0
2. AVERAGE NO. MONTHLY LANDINGS			
AIR CARRIER			
GENERAL AVIATION		20 E	20 E
OTHER (Military, glider, etc.)			

3. ARE IFR OPERATIONS ANTICIPATED X NO ☐ YES WITHIN_______YEARS TYPE NAVAID:

G. NOISE CONSIDERATIONS

IDENTIFICATION	DRCT. FROM LANDING AREA	DIST. FROM LANDING AREA
Meehan Hospital	NNE	4500'
St. Butler's Church	SSE	3000'
Mudd School	SW	4200'
Residences (All directions)		2000'

H. APPLICATION FOR AIRPORT LICENSING

X HAS BEEN MADE ☐ NOT REQUIRED ☐ COUNTY
☐ WILL BE MADE X STATE X MUNICIPAL AUTHORITY

I. CERTIFICATION: *I hereby certify that all of the above statements made by me are true and complete to the best of my knowledge.*

8. NAME AND TITLE OF PERSON FILING THIS NOTICE (Type or Print)	9. SIGNATURE (In ink)	
Lauretta Foy Chief Pilot, HAAP Co.	Lauretta Foy	
	10. DATE OF SIGNATURE: 2/25/76	11. TELEPHONE NO. (Precede with area code): (817) 362-4202

FAA FORM 7480-1 (1-77)

FIGURE 2-1. EXAMPLE OF NOTICE REQUIRED BY FAR PART 157

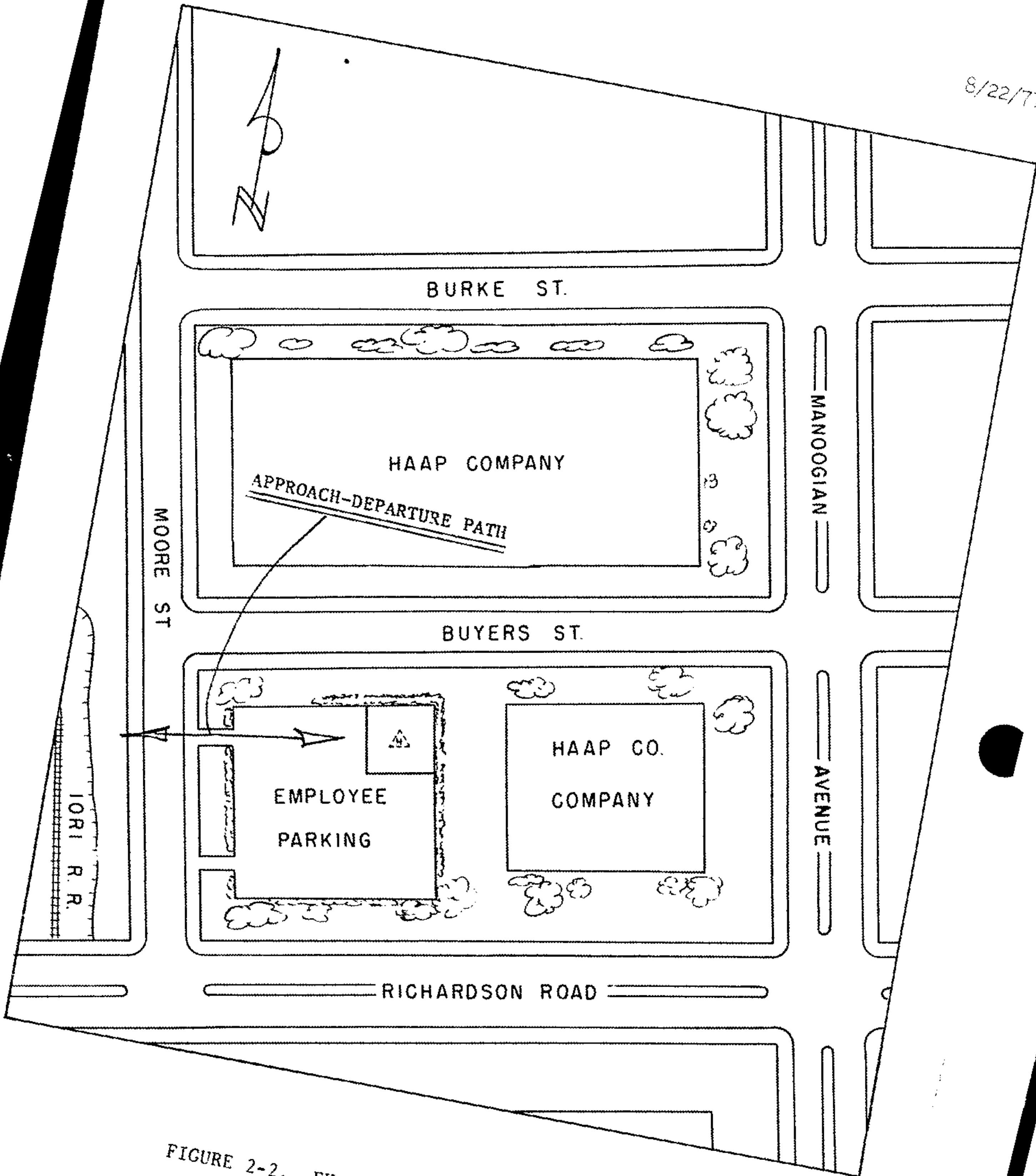


FIGURE 2-2. EXAMPLE - HELIPORT LAYOUT SKETCH

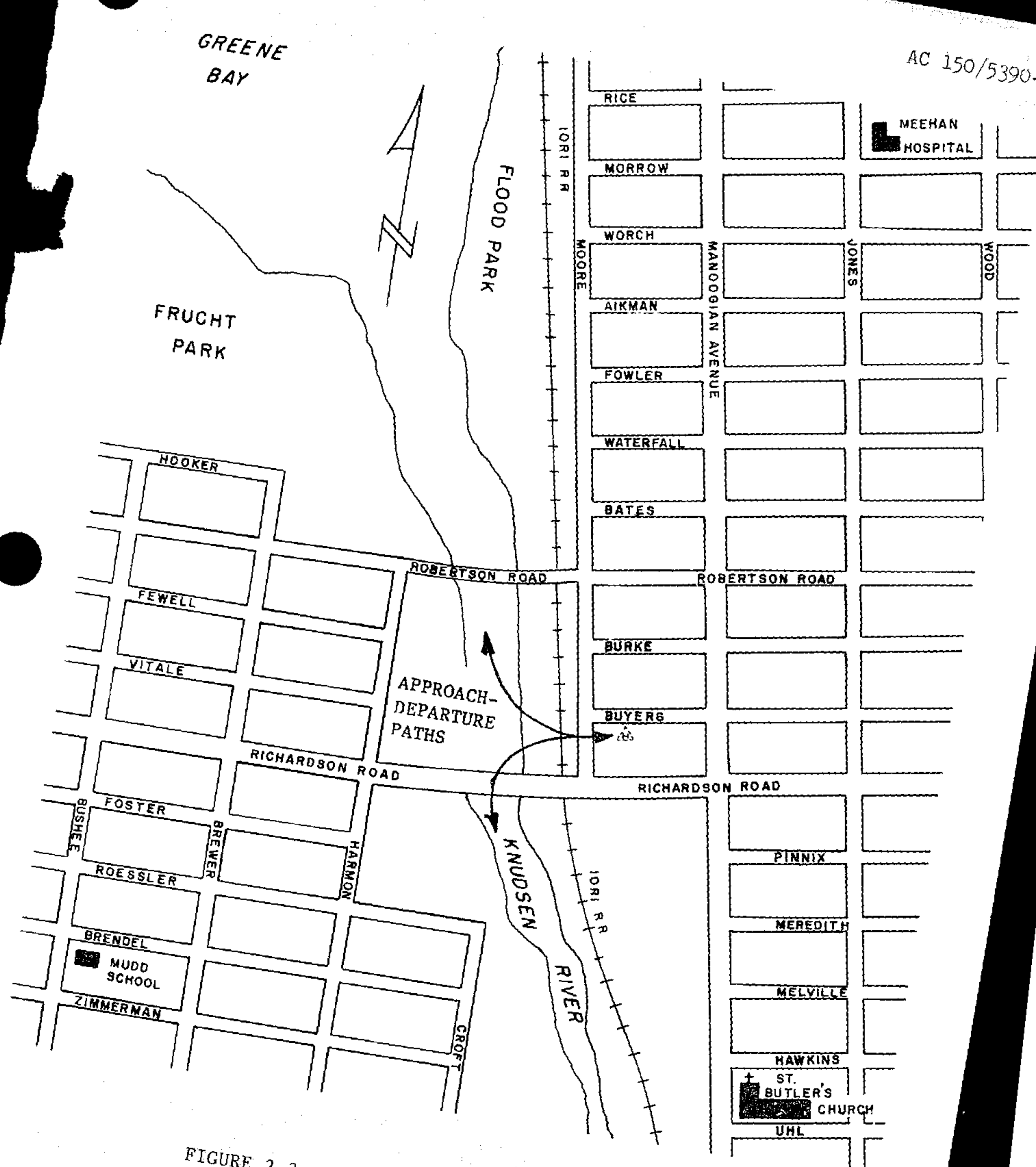


FIGURE 2-3. EXAMPLE - HELIPORT LOCATION MAP

DO NOT REMOVE CARBONS

Form Approved. O.M.B. No. 004-R0001

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION

FOR FAA USE ONLY
AERONAUTICAL STUDY NO.

FAA will either return this form or issue a separate acknowledgement.
A. The proposed structure:
☐ Does not require a notice to FAA.
☐ Would not exceed any obstruction standard of Part 77 and would not be a hazard to air navigation.
☐ Should be obstruction ☐ marked ☐ lighted per FAA Advisory Circular 70/7460-1, Chapter(s) ______
☐ Obstruction marking and lighting are not necessary.
☐ Requires supplemental notice. Use FAA form enclosed.
B. FCC was ☐ was not ☐ advised.
REMARKS:
ISSUING OFFICE:
REVIEWING OFFICES: DATE:

1. NATURE OF STRUCTURE (*Complete both A and B below*)

A. (*Check one*)
[X] NEW CONSTRUCTION ☐ ALTERATION

B. (*Check one*)
[X] PERMANENT ☐ TEMPORARY (*State length of time*) ______ Mos.

2. NAME AND ADDRESS OF INDIVIDUAL, COMPANY, CORPORATION, ETC. PROPOSING THE CONSTRUCTION OR ALTERATION (Number, Street, City, State and Zip Code)

TO
HAAP Company
7090 Richardson Road
Stand, DV. 00560

3. TYPE AND COMPLETE DESCRIPTION OF STRUCTURE

Erect a lighted company sign.

4. LOCATION OF STRUCTURE

A. COORDINATES (*To nearest second*)

LATITUDE °	'	"	LONGITUDE °	'	"
28	25	02	76	10	11

B. NEAREST CITY OR TOWN, AND STATE: Stand, DV.
(1) DISTANCE FROM 4B: 2 MILES
(2) DIRECTION FROM 4B: East

C. NAME OF NEAREST AIRPORT, HELIPORT, OR SEAPLANE BASE: HAAP Company Heliport (PvT)
(1) DISTANCE FROM NEAREST POINT OF NEAREST RUNWAY: 400 feet
(2) DIRECTION FROM AIRPORT: East

D. DESCRIPTION OF LOCATION OF SITE WITH RESPECT TO HIGHWAYS, STREETS, AIRPORTS, PROMINENT TERRAIN FEATURES, EXISTING STRUCTURES, ETC. (*Attach a highway, street, or any other appropriate map or scaled drawing showing the relationship of construction site to nearest airport(s). If more space is required, continue on a separate sheet of paper and attach to this notice.*)

Sign will be located on the far corner of the HAAP Company office building roof as per the attached sketch.

5. HEIGHT AND ELEVATION (*Complete A, B and C to the nearest foot*)

A. ELEVATION OF SITE ABOVE MEAN SEA LEVEL	50'
B. HEIGHT OF STRUCTURE INCLUDING APPURTENANCES AND LIGHTING (if any) ABOVE GROUND, OR WATER IF SO SITUATED	40'
C. OVERALL HEIGHT ABOVE MEAN SEA LEVEL (A+B)	90'

6. WORK SCHEDULE DATES

A. WILL START: 12/1/76
B. WILL COMPLETE: 12/31/76

7. OBSTRUCTION MARKED AND/OR LIGHTED IN ACCORDANCE WITH CURRENT FAA ADVISORY CIRCULAR 70/7460-1, OBSTRUCTION MARKING AND LIGHTING

	YES	NO
A. MARKED		X
B. AVIATION RED OBSTRUCTION LIGHTS		X
C. HIGH INTENSITY WHITE OBSTRUCTION LIGHTS		X
D. DUAL LIGHTING SYSTEM		X

I HEREBY CERTIFY that all of the above statements made by me are true, complete, and correct to the best of my knowledge.

8. NAME AND TITLE OF PERSON FILING THIS NOTICE (*Type or Print*)
Jean Ross Howard
Secretary-Treasurer
HAAP Company

9. SIGNATURE (*In ink*): Jean Ross Howard

10. DATE OF SIGNATURE: 10/6/76

11. TELEPHONE NO. (*Precede with area code*): (718) 362-4202

Persons who knowingly and willfully fail to comply with the provisions of the Federal Aviation Regulations Part 77 are liable to a fine of $500 for the first offense, with increased Penalties thereafter as provided by Section 902(a) of the Federal Aviation Act of 1958 as amended.

FAA Form 7460-1 (11-72) SUPERSEDES PREVIOUS EDITION

DO NOT REMOVE CARBONS

FIGURE 2-4. EXAMPLE OF NOTICE REQUIRED BY FAR PART 77

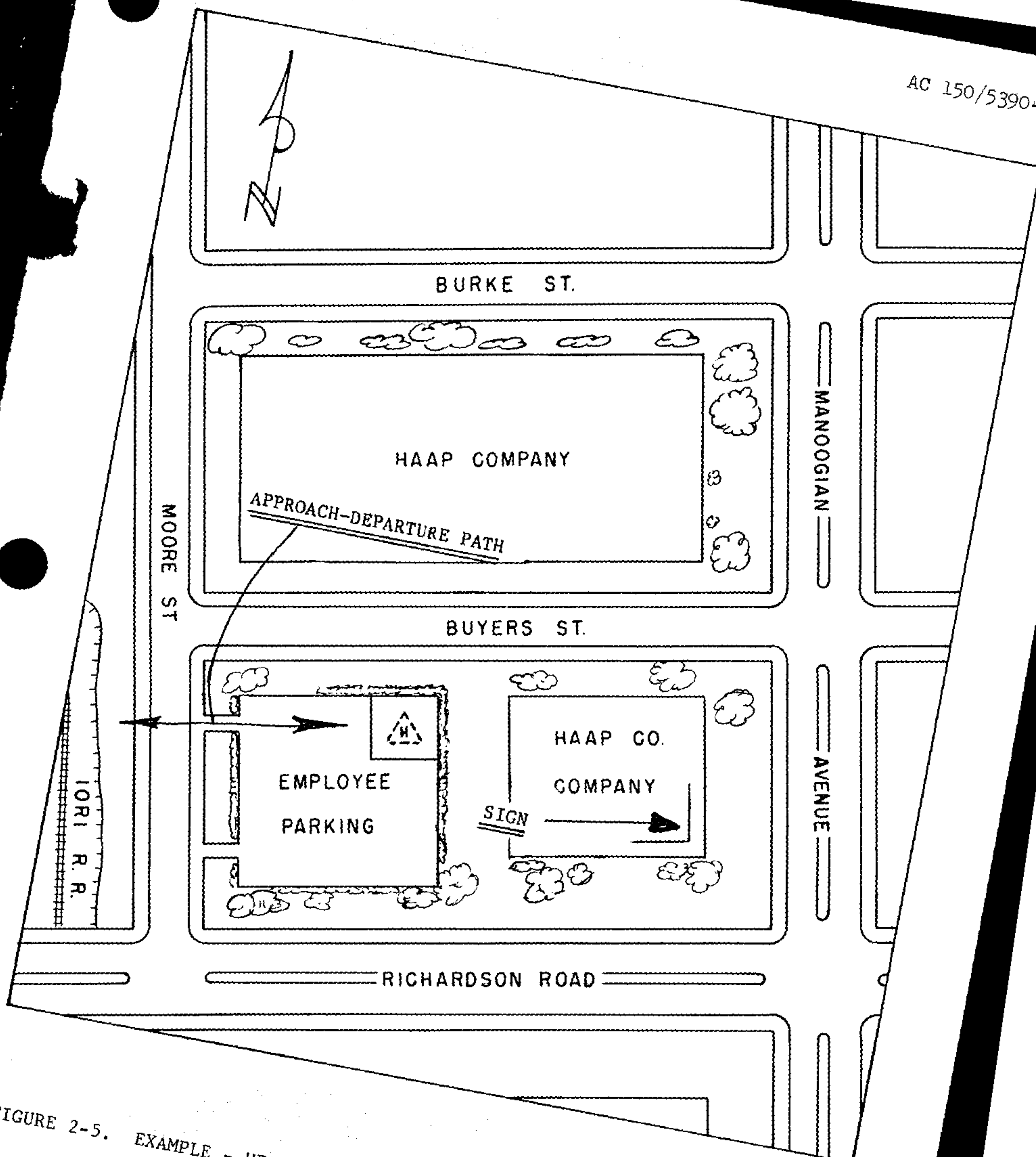


FIGURE 2-5. EXAMPLE - HELIPORT SKETCH SHOWING PROPOSED CONSTRUCTION LOCATION

CHAPTER 3. HELIPORT CLASSIFICATION

30. GENERAL. The terms used to classify United States heliports are descriptive of the class of user allowed to conduct flight operations from the facility. Photographs of representative heliport types are included as Figures 3-1 through 3-9.

31. MILITARY HELIPORT. The term "military heliport" is applied to heliport facilities operated by one of the uniformed services. Military heliports are developed in accordance with the design criteria of the applicable service and generally prohibit nonmilitary usage.

32. FEDERAL HELIPORT. The term "Federal heliport" is applied to heliport facilities operated by a nonmilitary agency or department of the United States Government. Most Federal heliports are operated by the Departments of Agriculture (DOA) and Interior (DOI). DOA and DOI heliports are located in national forests or national parks and are used to carry out departmental responsibilities for land management and fire suppression activities. Generally, DOA and DOI heliports are restricted to departmental usage.

33. PUBLIC-USE HELIPORT. The term "public-use heliport" is applied to any heliport that is open to the general public and does not require prior permission of the owner to land. However, the extent of facilities provided may limit operations to helicopters of a specific size or weight. A public-use heliport may be owned by a public agency, an individual, or a corporation so long as it is open for public use. Public-use heliports are listed in the Airman's Information Manual (AIM) and may be depicted on appropriate aeronautical charts.

34. PRIVATE-USE HELIPORT. The term "private-use heliport" is applied to any heliport that restricts usage to the owner or to persons authorized by the owner. Most private-use heliports are owned by individuals, companies, or corporations. However, a heliport designated as "private-use" may be owned by a public body. In this case, the private-use classification is applicable because the facility is restricted to a specific type of user, such as the police department, or because the owner requires prior permission to land. Hospital heliports are considered private-use facilities since operations are normally restricted to medical-related activities. Private-use heliports are not listed in the AIM but may be depicted on aeronautical charts.

35. PERSONAL-USE HELIPORT. The term "personal-use heliport" is applied to any heliport that is used exclusively by the owner. Personal-use heliports are owned by individuals, companies, or corporations. Personal-use heliports are not listed in the AIM but may be depicted on aeronautical charts.

36. HELICOPTER LANDING SITE. As noted previously, helicopters are capable of being operated into cleared areas only slightly larger than the helicopter itself. It is this versatility that enables the pilot of a helicopter to land at the scene of an accident, on the roof of a burning building, near a construction site, etc. In each case the decision to land is made by the pilot who must weigh the operational necessity for the landing against the helicopter's performance capabilities, physical limitations of the site, and his or her piloting skills. For the most part, these are one-time, temporary, or infrequent operations, and the landing site should not be considered a heliport.

37-39. RESERVED.

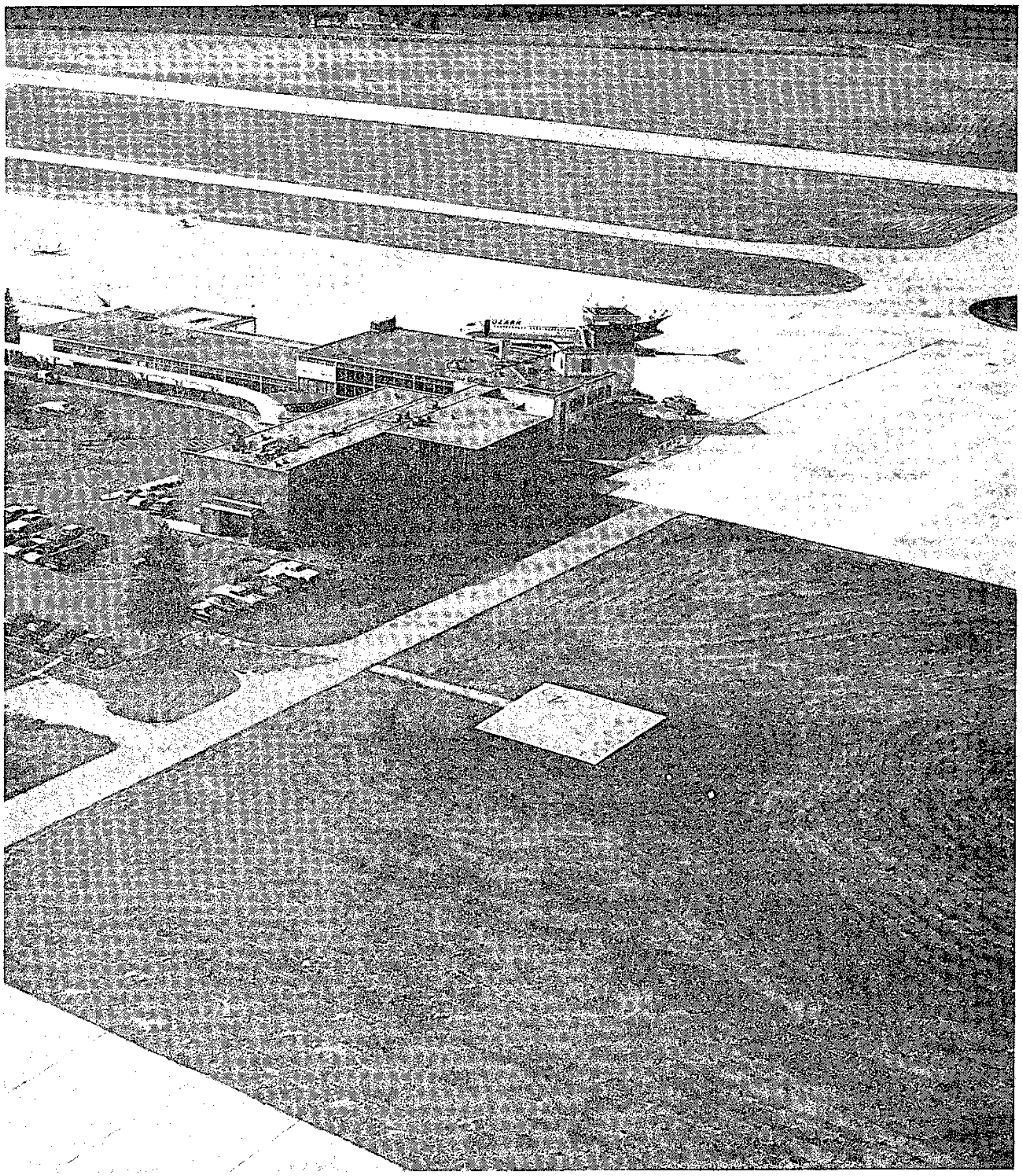


FIGURE 3-1. PUBLIC-USE HELIPORT, CAPITAL AIRPORT, SPRINGFIELD, ILLINOIS

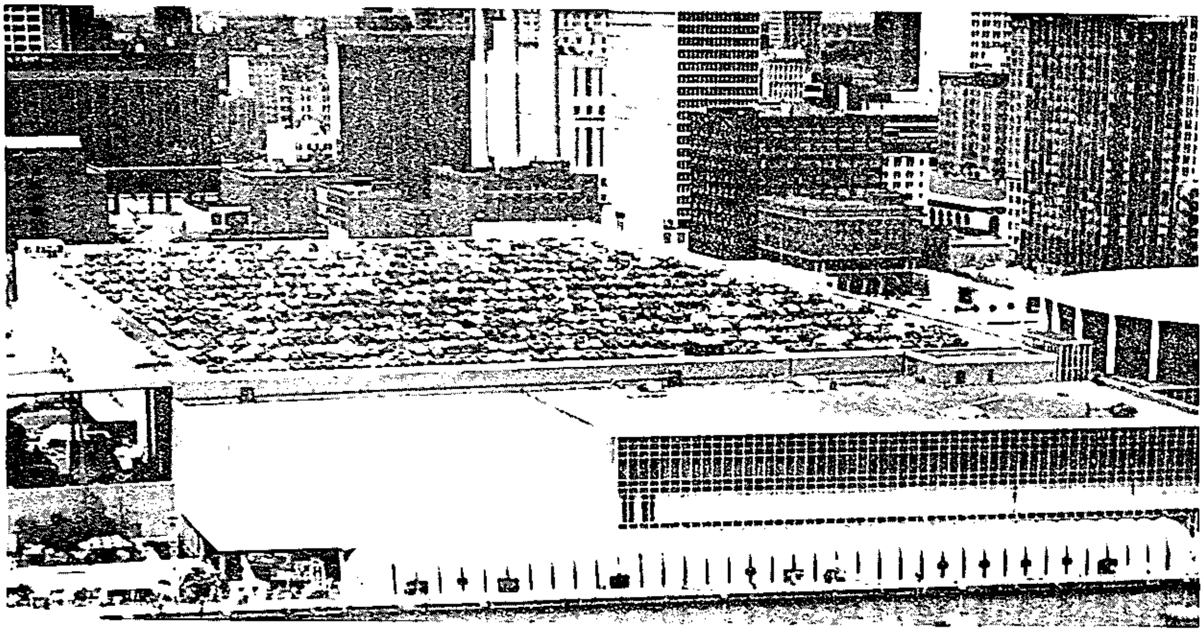


FIGURE 3-2. ELEVATED PUBLIC-USE HELIPORT, COBO HALL CONVENTION CENTER, DETROIT, MICHIGAN

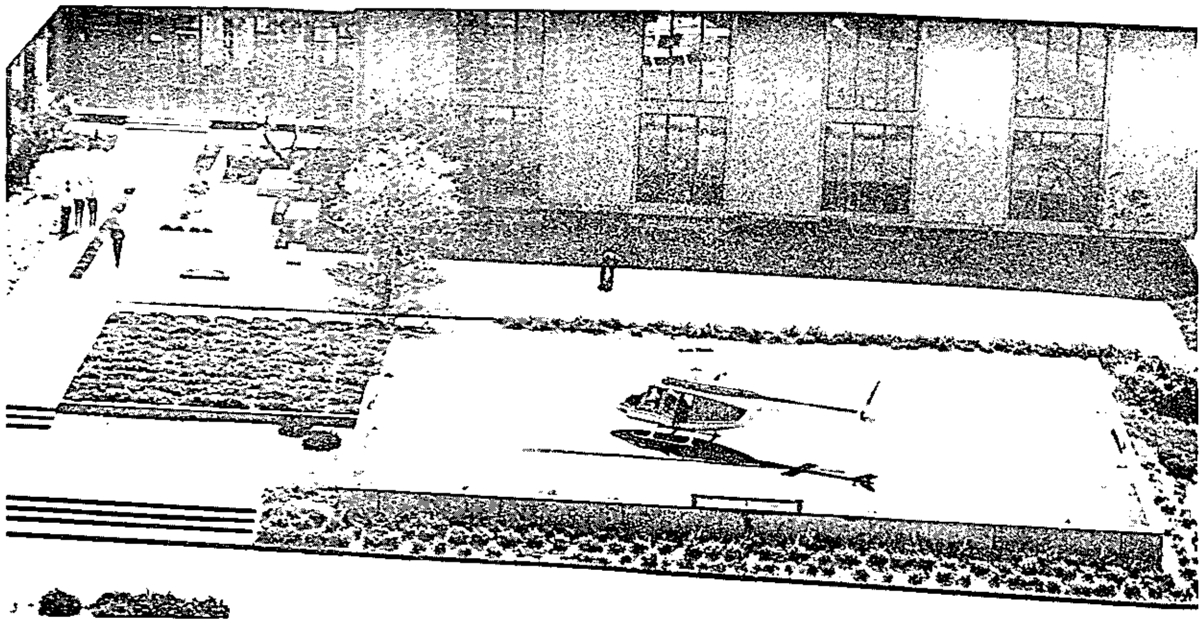


FIGURE 3-3. PRIVATE-USE HELIPORT, PARK FOREST, ILLINOIS

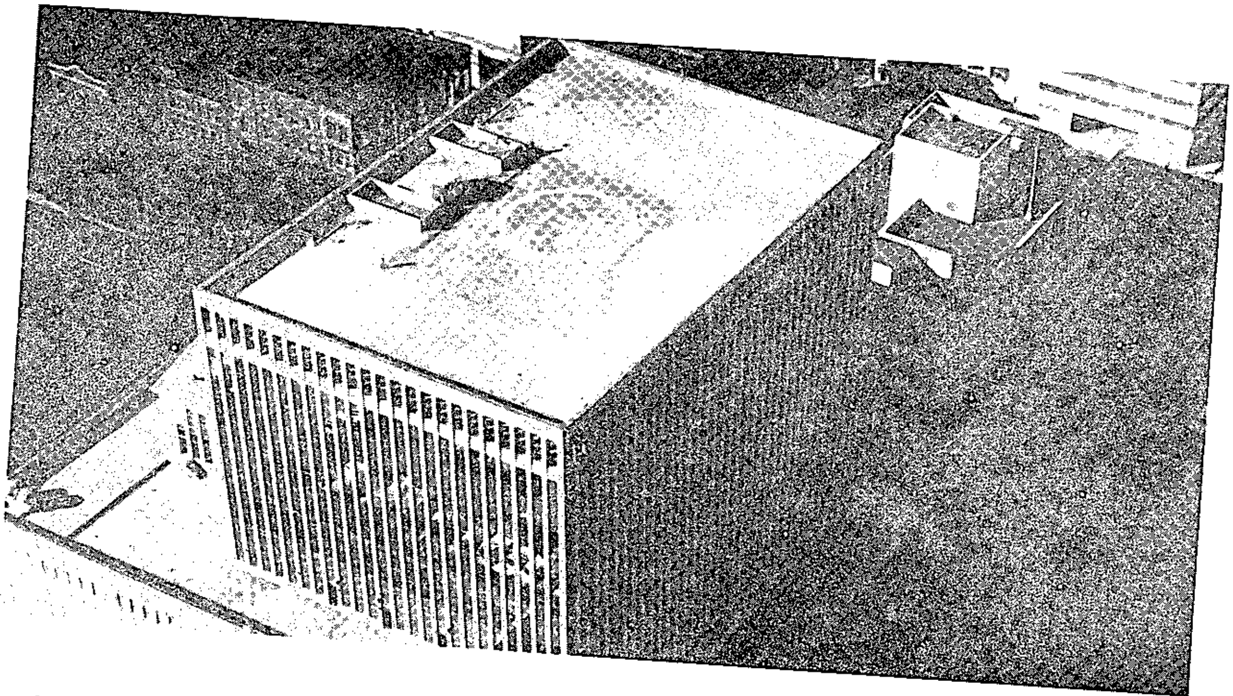


FIGURE 3-4. ROOFTOP PRIVATE-USE POLICE DEPARTMENT HELIPORT, BALTIMORE, MARYLAND

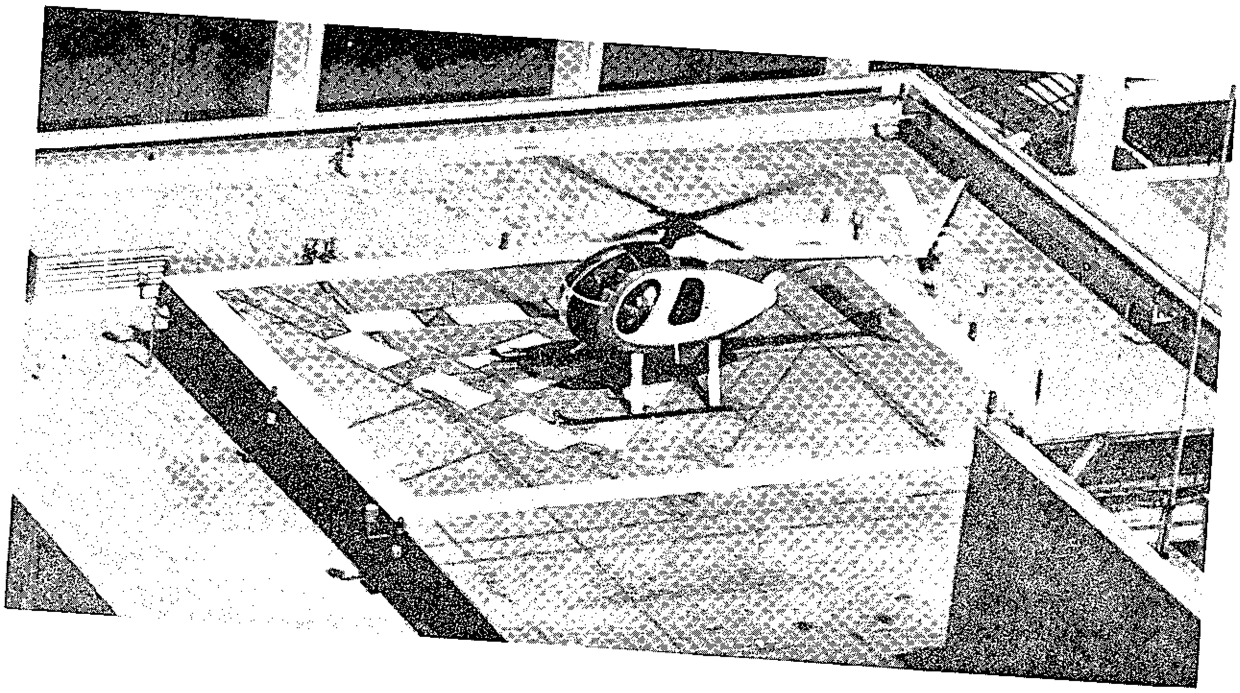


FIGURE 3-5. ELEVATED PLATFORM PRIVATE-USE HELIPORT, LOS ANGELES, CALIFORNIA

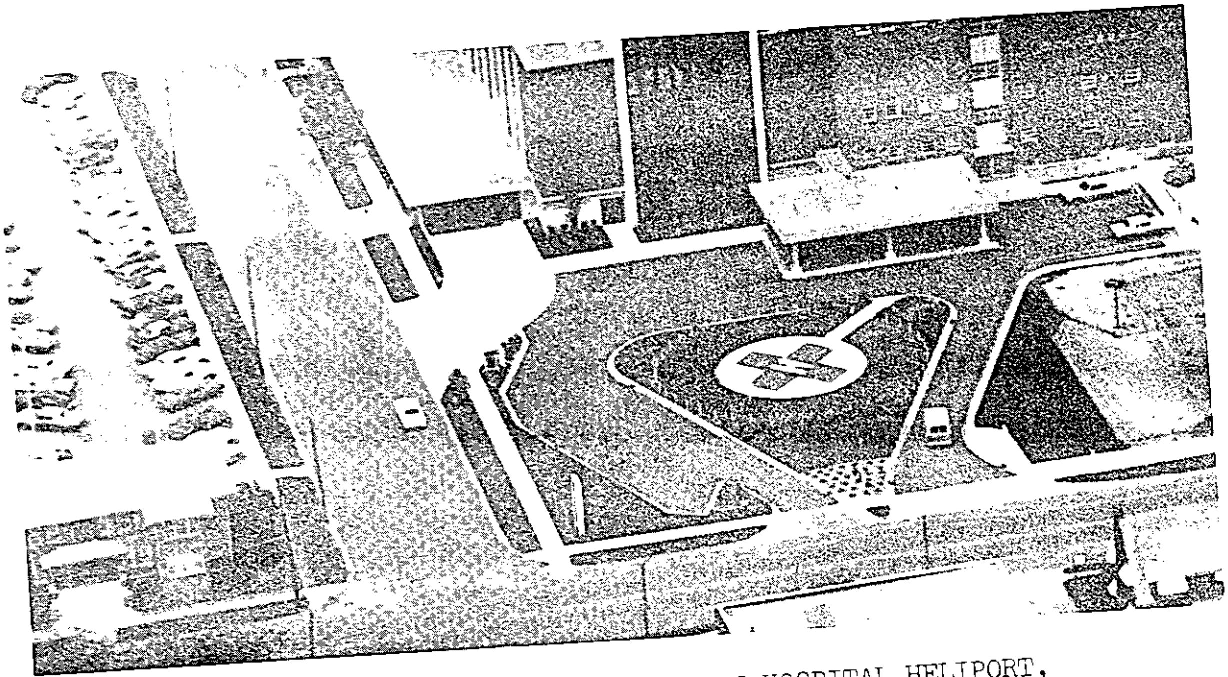


FIGURE 3-6. GROUND-LEVEL, PRIVATE-USE HOSPITAL HELIPORT, COTTAGE HOSPITAL, GALESBURG, ILLINOIS

(Note: Figure depicts old style marking, see paragraph 71a.(2))

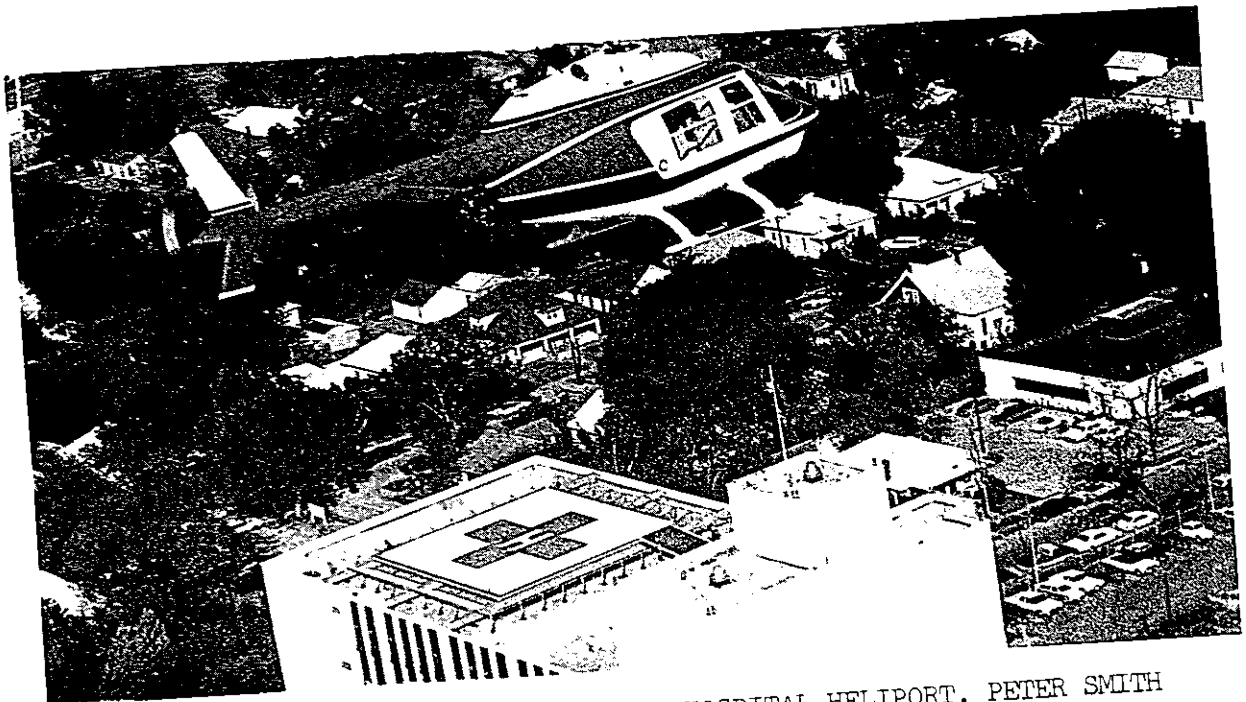


FIGURE 3-7. ROOFTOP PRIVATE-USE HOSPITAL HELIPORT, PETER SMITH HOSPITAL, FORT WORTH, TEXAS

(note: Figure depicts old style marking, see paragraph 71a.(2))

FIGURE 3-8. A ROADSIDE SERVES AS A HELICOPTER LANDING SITE TO ASSIST IN THE TREATMENT AND MOVEMENT OF AN ACCIDENT VICTIM

FIGURE 3-9. A MOUNTAIN MEADOW SERVES AS A HELICOPTER LANDING SITE TO AIRLIFT FIREFIGHTING CREWS AND EQUIPMENT

CHAPTER 4. SELECTING A HELIPORT SITE

40. GENERAL. Increased public awareness of helicopter capabilities has enhanced its prominence as an important vehicle in the national transportation system. Continuing advances in helicopter productivity and operating economics make it reasonable to anticipate increasing public and private usage for intra- and interarea transportation. However, optimum public benefits cannot be realized without an adequate system of public-use heliports. Stage development is encouraged when it is unnecessary or uneconomical to construct the ultimate heliport. Early coordination with FAA Airports offices on adequacy of the proposed stage construction and ultimate design of the heliport and with FAA Flight Standards offices on operational procedures and limitations is encouraged.

41. LOCATION. To be most effective, heliports should be located as close as conditions or circumstances permit to the actual origins and destinations of the potential users. In some communities, this might require a heliport to be located in an area that could be described as congested or highly developed. In many instances, a practical, safe, and economical ground-level heliport can be established on a portion of an automobile parking lot that is fenced off to control access. If a ground-level site is unavailable, it is possible to locate the heliport on the roof of a building or on an unused pier or wharf. Elevated or overwater heliport sites will have in many instances an advantage over ground-level heliport sites since public access can be more easily controlled and unobstructed approach-departure paths may be easier to obtain. Other considerations in heliport siting are the locations of populated areas, noise-sensitive developments, and the existence of objects in the proposed approach-departure paths.

42. LAYOUT. The physical layout of the heliport is primarily dependent upon the operating characteristics of the helicopters to be accommodated and the type of support facilities desired. A relatively modest site will suffice if a minimum takeoff and landing facility capable of accommodating one small helicopter is all that is desired. Even though helicopters can maneuver in relatively high crosswinds, the approach-departure paths should be oriented to permit operations into the prevailing winds.

43. HELIPORTS AT AIRPORTS. The location and extent of separate takeoff and landing facilities to serve helicopter operations will vary from airport to airport. Most airports would probably find it advantageous to establish facilities and procedures to separate helicopter and airplane traffic. These helicopter takeoff and landing facilities may be developed on a portion of the apron or on an infield site adjacent to an apron or taxiway. When helicopters are scheduled to connect with airline flights, the helicopters should be allowed to board and discharge passengers in close proximity to the airline check-in areas.

To the extent possible, locate facilities to avoid mixing helicopter operations with airplane operations. Clearance between the helicopter takeoff and landing facility and the airport's active runway(s) should be in accordance with the heliport-to-runway separations of Figure 4-1.

44. TRANSPORTATION STUDIES. The proponent of a public-use heliport should review all transportation studies for the area. These studies frequently identify area origin-destination patterns and provide descriptions of existing and proposed public transportation systems. The studies may also describe existing and projected land development patterns for commercial, industrial, public, and residential usage and zoning actions taken to permit or to encourage such usage. Some studies may have identified tentative public-use heliport locations. Communities planning urban renewal projects may find the inclusion of a public-use heliport to be the catalyst needed to attract desirable commercial or industrial development.

45. OPERATIONAL SAFETY. A major consideration in heliport siting is the availability of suitable approach-departure paths. It is preferable for helicopters to make takeoffs and landings into the prevailing winds but in some situations this may not be possible. In congested areas it may not be possible to develop a straight-in approach or departure procedure and a curved approach-departure path may be necessary to avoid obstacles. In other situations special letdown and climbout procedures may be desired to confine helicopter sounds to a small area near the heliport. Helicopter approach or departure procedures are developed for each heliport on the basis of site conditions, helicopter capabilities, and the type and number of activities to be conducted therefrom. When necessary, the FAA may condition an airspace decision by requiring special flight routes, altitudes, or approach and departure procedures in the interest of user safety and airspace compatibility.

46. LOCAL REGULATION. Because helicopters can operate safely at sites of limited size, it is quite likely that heliports may be suggested for areas that have not been exposed to significant aviation activity. Consequently, the heliport proponent may have to take a substantial and active role in educating the public about heliports and helicopters.

a. Local Laws. The rules, regulations, and ordinances (collectively called local laws) which control airport development may impose restrictive conditions which would be inappropriate when applied to heliport proposals. It is not intended to suggest that any community will have to revise its local laws; however, some laws may need to be reexamined when heliport development is under consideration. Helicopter operators, manufacturers, industry associations, state aviation authorities, and the FAA should be contacted for advice before laws which regulate heliports are initiated or changed.

b. Land-Use Zoning. Zoning ordinances should be written to permit heliports as an accepted land use in areas identified for industrial, commercial, manufacturing, or agricultural uses and in any area that is unzoned. Some heliports, especially those without support facilities, could be a permitted use in certain residentially zoned areas. Language that permits occasional or infrequent helicopter landings at a site that is not a formally designated heliport should be encouraged.

c. Height Restriction Zoning. The desire for clear approach-departure paths is an important consideration in selecting a heliport site. When state-enabling legislation permits, communities are encouraged to protect heliport approach and departure paths by enacting height restriction zoning. Advisory Circular 150/5190-4, A Model Zoning Ordinance to Limit Height of Objects Around Airports, contains general guidance for preparing an ordinance restricting the height of objects around a heliport.

47. ENVIRONMENTAL AND OTHER CONSIDERATIONS. The establishment of a heliport may have an impact on the community in terms of noise, exhaust emissions, public safety, ground traffic, aesthetics, and attitude. When Federal aid is used, an environmental impact assessment report is required to assist the Federal agency in making the environmental decision. A similar report may be required by state or local authorities.

a. Noise. The impact of helicopter engine and rotor sounds upon populated areas is an important consideration in selecting a heliport site. Since helicopter sounds are greatest directly beneath the takeoff and landing paths, these paths should be located over sparsely populated areas; over areas that have an already high level of background sounds; or over areas that would be expected to have a high tolerance level to helicopter sounds. Improvements resulting from ongoing research activities to reduce the sounds generated by engines and rotors will be incorporated in future helicopters as quickly as economic and technological conditions permit.

b. Exhaust Emissions. Relatively few civil-use heliports have sufficient flight operations for exhaust emissions to be considered a significant problem. Research on aircraft fuels and engines to reduce pollutant levels will also be applicable to helicopters.

c. Public Safety. Heliport sites and approach-departure paths should be selected to avoid areas of public concentration. The approach-departure paths should also be free, and capable of being maintained free, of objects that interfere with helicopter movement to and from the heliport.

d. Ground Traffic. Potential problems with passenger ground ingress or egress to a heliport may be minimized if there is direct access to an adjacent major roadway. Access to one or more modes of public mass transit is desirable. A heliport in a freeway environment has some inherent advantages over other sites. First, helicopter sounds may be undetectable over the existing background noises. Second, approach-departure paths can frequently follow the freeway right-of-way which is generally unencumbered with objects that would be hazardous to flight safety.

e. Aesthetics. Community acceptance of ground-level heliports can be enhanced if the facility has an attractive appearance. Attractive buildings and carefully planned walls, fences, hedges, etc., are to be encouraged.

f. Attitude. Community acceptance or rejection of a heliport site proposal is difficult to predict. An opportunity for a public hearing to obtain citizen input is required for Federal aid projects. A well prepared presentation to citizen groups on the positive and negative aspects of the proposed heliport together with patience, honesty, and an attitude of willing cooperation in responding to questions will help to influence public opinion.

48. PROJECT ACTIVITIES. Heliport proponents may find a checklist helpful in pursuing their objective. Any checklist must be developed to meet local conditions which will vary from one location to another. The following items are representative of the activities that are carried out in any heliport development and may be added to or subtracted from as the situation warrants.

a. Review Regulations. Review local regulations of the city and county concerning land usage, building codes, aircraft operations, noise limits, fire protection, etc., for possible impact.

b. Select Sites. Select potential sites which would not be subject to zoning restrictions, will provide ample room for current and future needs, and will have clear approaches.

c. Seek Advice. Contact appropriate Federal and state aviation offices, local helicopter operators, aviation consultants, or helicopter manufacturers as to the operational feasibility of the sites being considered, including approach-departure paths and operating procedures.

d. Submit Notices. Submit required notices and applications to appropriate Federal, state, and local agencies. If a variance of a local zoning ordinance is needed, provide sufficient details in the request to answer probable questions about intended operations.

49. RESERVED.

Heliport-to-Runway Separations (By Airplane Category)		
Single Engine Propeller Airplanes	Twin Engine Propeller Airplanes	All Other Airplanes
300 Feet (90 m)	500 Feet (150 m)	700 Feet (210 m)

NOTES:

1. The above table shows the minimum recommended separations between a separate heliport facility and an airport runway for simultaneous operations in VFR conditions.

2. FAA wake turbulence avoidance procedures must be followed with heliport-to-runway separations under 2,500 feet (750 m).

3. At controlled airports, two-way radio communication is required to be maintained with the aircraft involved so that pertinent traffic information may be issued.

4. When airplanes of different categories are involved, use the separation required for the larger airplane category.

FIGURE 4-1. HELIPORT-TO-RUNWAY SEPARATIONS AT AIRPORTS

CHAPTER 5. GROUND-LEVEL HELIPORT DESIGN

50. GENERAL. The need for adequate heliport facilities is not limited to the centers of large cities. Public acceptance of the helicopter has encouraged heliport developments in suburban areas, in communities of quite moderate size, and in locations that are difficult to reach by other modes of transportation.

51. HELIPORT LAYOUT. The size, shape, and appurtenances of a heliport are determined by a number of interrelated factors, principal among them are the size and nature of the proposed site; the size, number, and performance capabilities of the helicopters expected to use the facility; the type and extent of services to be provided; and the location and height of buildings or other objects in the heliport area. The recommended minimal heliport facility consists of a takeoff and landing area, a peripheral area, and an approach-departure path. A large heliport may have several takeoff and landing areas and approach-departure paths, separate parking positions, and extensive passenger and helicopter servicing facilities. A takeoff and landing area may take any shape necessary to fit the site, but most heliports are configured as squares, rectangles, or circles. Figures 5-1 through 5-3 illustrate the relationship of heliport surfaces. With few exceptions, heliport dimensions are expressed in units of helicopter length or rotor diameter. Pertinent dimensional information for typical helicopters is found in Appendix 2. Heliport dimensions are summarized in Appendix 1.

52. TAKEOFF AND LANDING AREA. For ground-level heliports, the length and width or diameter of the takeoff and landing area is recommended to be at least 1.5 times the overall length of the largest helicopter expected to use the facility. Under some design conditions (Figure 5-4), the definable and designated takeoff and landing area may be physically incapable of supporting a helicopter and/or may be impossible or impractical to mark or light.

53. PERIPHERAL AREA. The peripheral area is intended as an obstacle-free safety area surrounding the takeoff and landing area. It is recommended that the peripheral area width be one-fourth of the overall length of the largest helicopter expected to use the facility, but not less than 10 feet (3 m).

54. APPROACH-DEPARTURE PATHS. Approach-departure paths are selected to provide the best lines of flight to and from the takeoff and landing area considering prevailing winds; the location and heights of buildings or other objects in the area; and the environmental considerations discussed in paragraph 47. It is desirable for a heliport to have two approach-departure paths separated by an arc of at least 90 degrees. However, under some conditions, operations at heliports with one approach-departure path may be conducted safely. Curved approach-

departure paths are permitted and may be necessary in some cases to provide a suitable obstruction-free path. The radius of the curve is dependent upon the performance capabilities of the helicopters using the facility and the location and height of existing objects. Areas suitable for an emergency landing are desired along the approach-departure path unless the heliport is used exclusively by multiengined helicopters with proven capabilities to continue flight with one engine inoperative.

55. HELIPORT IMAGINARY SURFACES. The imaginary surfaces of subparagraphs b and c below represent idealized heliport design standards. They are not operationally limiting in cases where an onsite evaluation concludes that surfaces steeper than those recommended would not have an adverse effect upon the safety of a particular operation. However, any object which would exceed the published standards for defining heliport imaginary surfaces as described in Subpart C of FAR Part 77 is considered an obstruction to air navigation. These surfaces are described below and are depicted on Figures 5-1 through 5-4. When an aeronautical study concludes that the obstruction would have no adverse effect upon aeronautical operations, the object need not be removed or altered. Obstructions which are not removed or altered may require marking and lighting. (See paragraph 76.)

a. Heliport Primary Surface. The area of the primary surface coincides in size and shape with the designated takeoff and landing area of a heliport. This surface is a horizontal plane at the elevation of the established heliport elevation.

b. Heliport 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 (1 220 m) where its width is 500 feet (152 m). The slope of the approach surface is 8 to 1 for civil heliports.

c. Heliport Transitional Surfaces. These surfaces extend outward and upward from the lateral boundaries of the heliport primary surface and from the approach surfaces at a slope of 2 to 1 for a distance of 250 feet (76 m) measured horizontally from the centerline of the primary and approach surfaces.

d. Heliport Instrument Procedure Surfaces. In addition to the surfaces described above, heliports having an approved instrument procedure shall conform to the criteria for helicopters set forth in FAA Order 8260.3, United States Standards for Terminal Instrument Procedures (TERPS).

e. Aeronautical Studies. Aeronautical studies, which consider helicopter operational capabilities, are conducted by the FAA whenever there is a need to determine the physical or electromagnetic effect of existing obstructions upon aeronautical operations or procedures. Requests for an FAA study may be initiated by anyone with a valid interest in matters including but not necessarily limited to the following:

(1) A change in an aeronautical procedure.

(2) A proposal to construct or enlarge heliport facilities.

(3) A request for technical assistance in the design and development of a heliport.

(4) A determination as to whether an existing object should be altered, removed, marked, or lighted.

(5) A determination as to whether existing marking and lighting can be reduced or removed without adversely affecting aviation safety, or whether marking and lighting should be intensified or increased to more effectively make airmen aware of an object's presence.

(6) A determination of an existing activity's electromagnetic effects upon a navigational aid.

(7) A recommendation to the Federal Communications Commission concerning the erection or dismantling of an antenna structure.

56. PAVED TAKEOFF AND LANDING AREAS. Paved takeoff and landing areas at ground-level heliports are usually developed to support heavier helicopters or to accommodate greater traffic volumes. While it is desirable to pave the entire takeoff and landing area, there is no operational requirement to do so. When it is intended for the helicopter to touch down on a designated takeoff and landing area, a paved touchdown pad located in the center of the area, the size of either "a" or "b" below, will suffice.

a. Touchdown Pad. The recommended dimension of a touchdown pad is equal to the rotor diameter of the largest helicopter expected to operate from the facility.

b. Minimum Touchdown Pad. At a heliport that has an extremely low level of activity or is subject to economic or aesthetic pressure, smaller paved areas may be used. Pad dimensions are based on rectangular configurations. A circular pad having a diameter equal to the longer side of the rectangular configuration set forth in (1) or (2) below is acceptable. Skid or float length should be substituted for wheelbase as appropriate.

(1) Public-Use Heliports. The minimal sized touchdown pad for a public-use heliport should have a length and width at least 2.0 times the wheelbase and tread, respectively, or a diameter of 2.0 times the wheelbase of the largest helicopter expected to use the facility.

(2) Private-Use or Personal-Use Heliports. The minimal sized touchdown pad for a private-use or personal-use heliport should have a length and width at least 1.5 times the wheelbase and tread, respectively, or a diameter of 1.5 times the wheelbase of the largest helicopter expected to use the facility.

57. PARKING AREAS. Requirements for physically separated helicopter parking areas will be based on operational needs. Each parking position, whether used for passenger boardings, helicopter servicing, or extended parking, is recommended to have a length and width or diameter equal to the overall length of the largest helicopter expected to use the facility. A minimum clearance of 10 feet (3 m) is recommended between adjacent parking positions or between a parking position and a fence or other object.

58. TAXIWAYS. Taxiways connect one operational area on a heliport with another. Most often, taxiways connect the takeoff and landing area with helicopter parking positions. Helicopters with wheel undercarriages normally are taxied in ground contact. Helicopters with skid or float gear must hover taxi. The minimum recommended paved taxiway width is 20 feet (6 m). Paved taxiways are not required for hover taxiing. A lateral clearance of at least 10 feet (3 m) is recommended between the blade tip of the taxiing helicopter and any building or object.

59. HELIPORT BUILDINGS. Heliports may require an administration or passenger service building, service and storage hangars, or maintenance buildings. The location and space requirements of heliport buildings will depend upon the extent of current and projected operations.

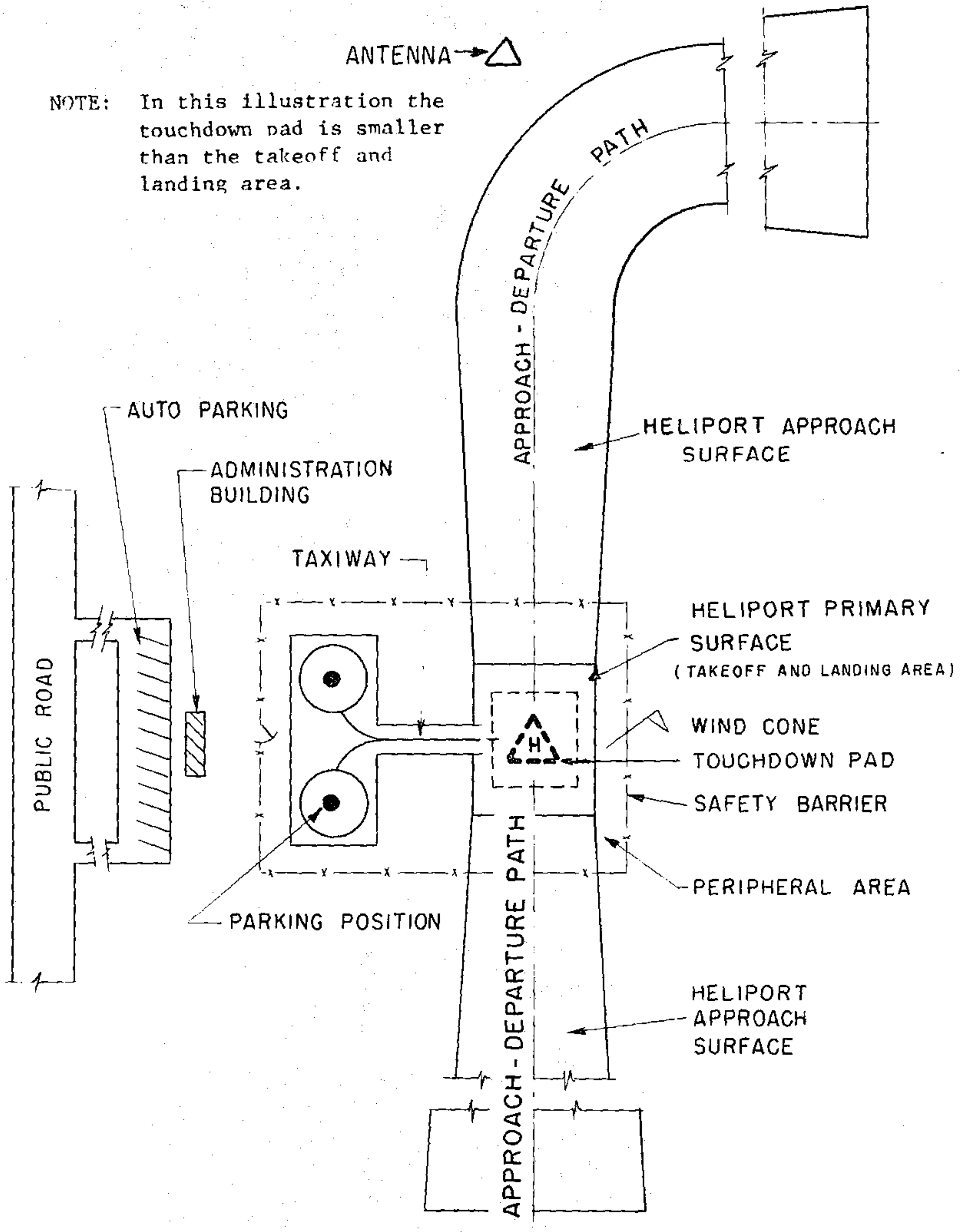
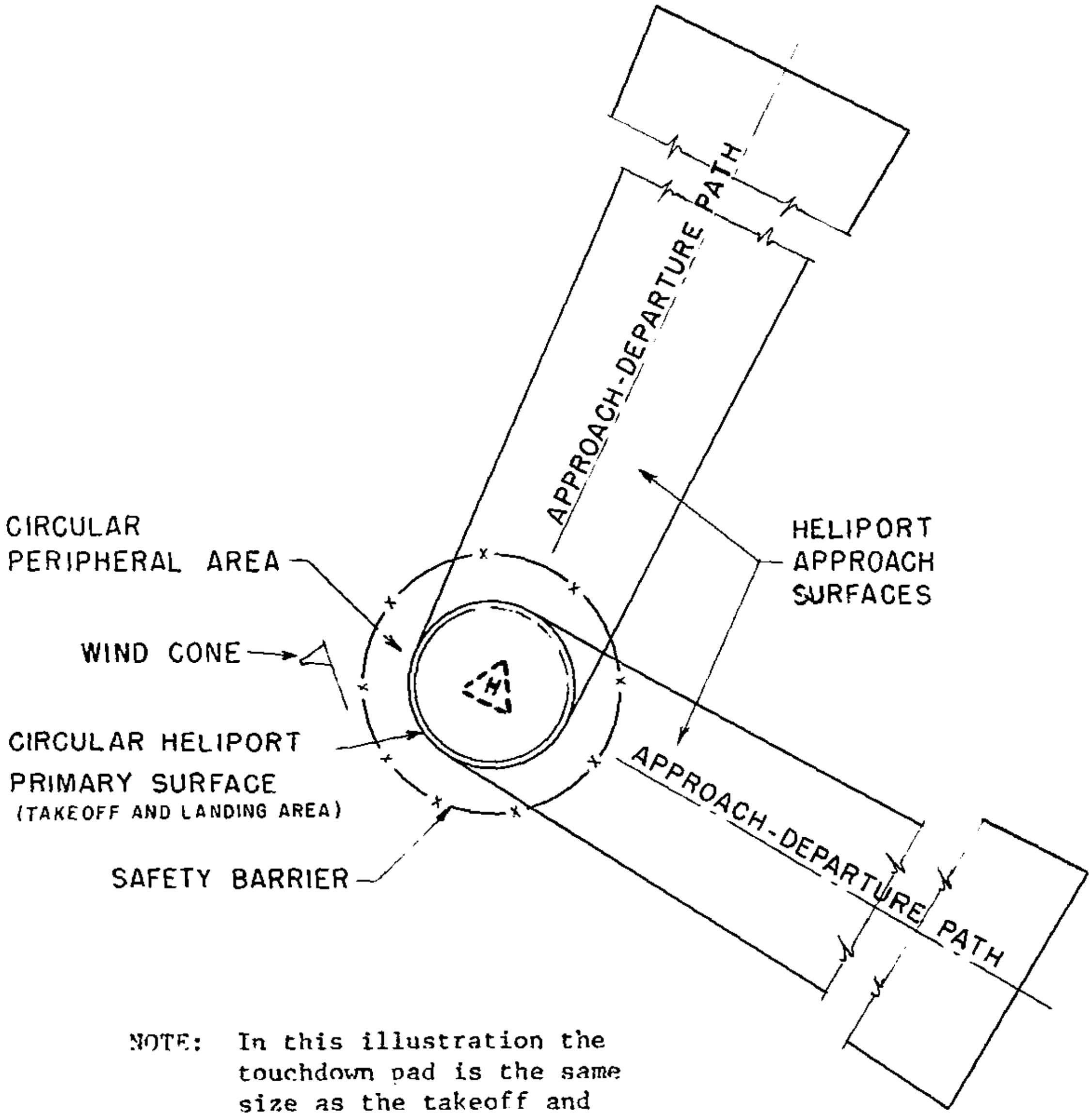


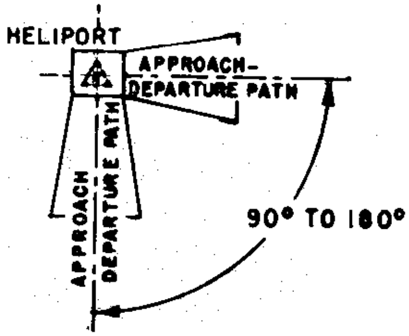
FIGURE 5-1. RELATIONSHIP OF HELIPORT SURFACES



NOTE: In this illustration the touchdown pad is the same size as the takeoff and landing area.

FIGURE 5-2. RELATIONSHIP OF HELIPORT SURFACES FOR A MINIMAL "CIRCULAR" FACILITY

ACCEPTABLE RANGE OF ANGLES BETWEEN APPROACH-DEPARTURE PATHS WHEN MORE THAN ONE APPROACH-DEPARTURE PATH IS PROVIDED



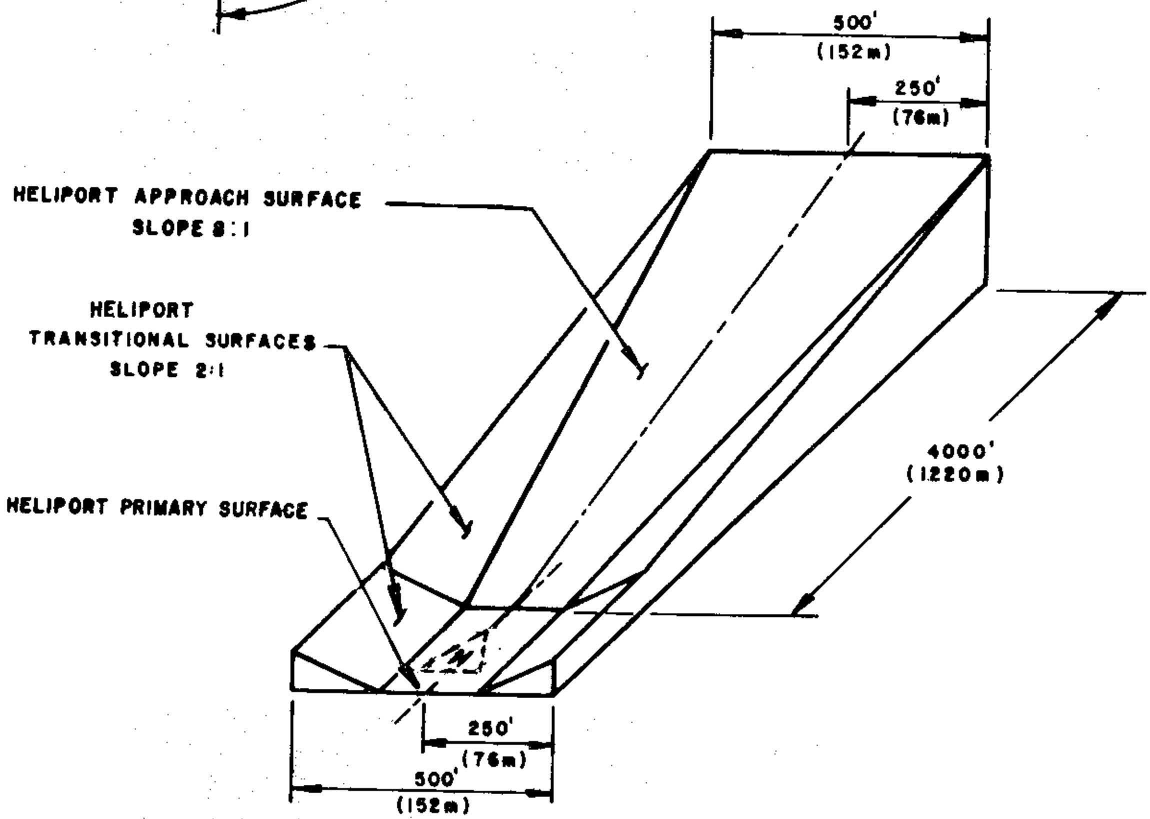
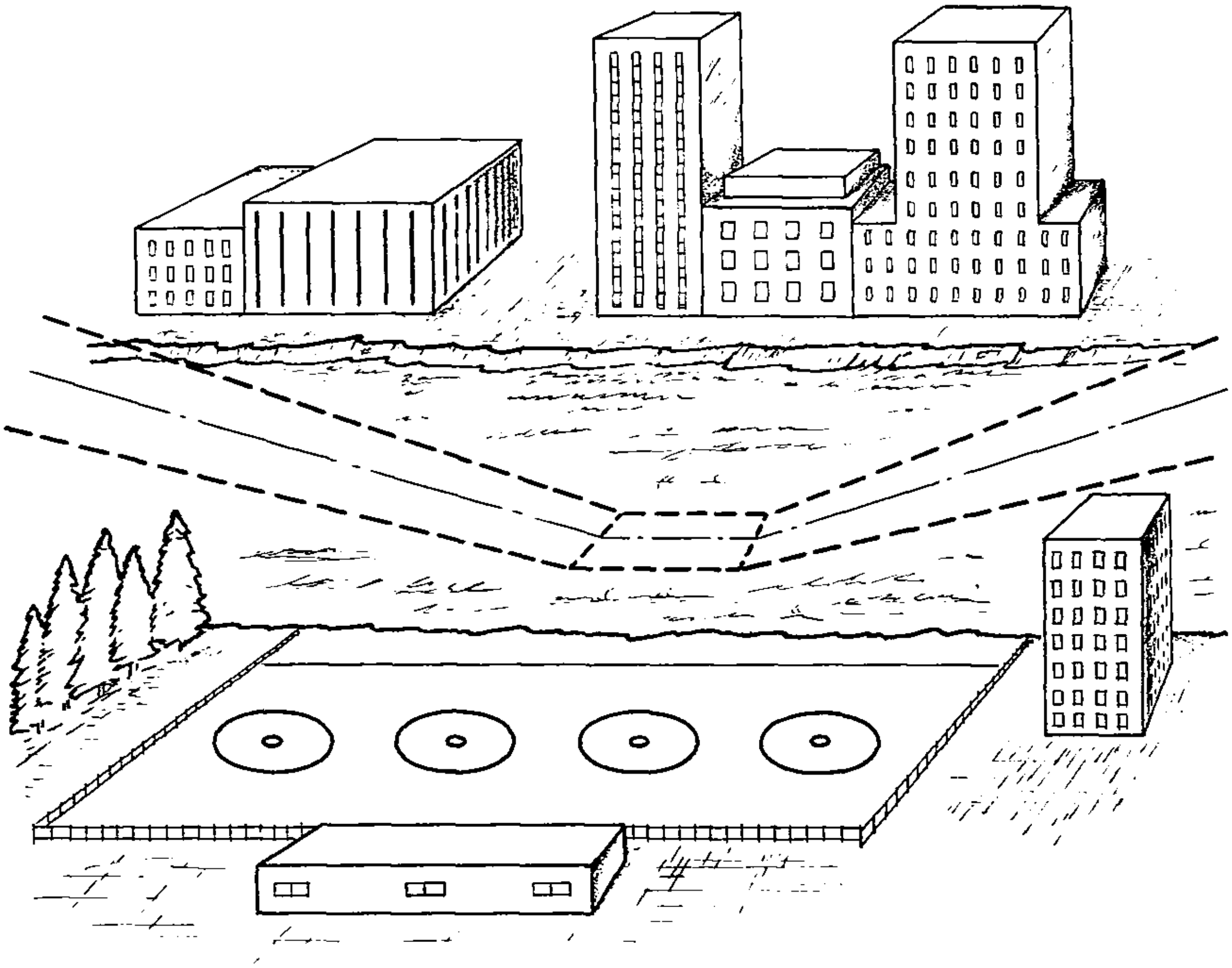


FIGURE 5-3. PERSPECTIVE OF HELIPORT SURFACES



NOTE: This figure illustrates the application of heliport FAR Part 77 imaginary surfaces to a situation where the approach is made to a designated takeoff and landing area located over water. Using helicopters hover taxi from the takeoff and landing area to the marked parking positions.

FIGURE 5-4. APPLICATION OF HELIPORT SURFACES

CHAPTER 6. SURFACE STABILIZATION & PAVEMENT DESIGN

60. GENERAL. Heliport operating surfaces (takeoff and landing areas, taxiways, and parking positions) should be level, smooth, and free of dirt and debris that could be picked up or blown about by rotor downwash. Stabilization or paving of any surface subjected to the landing, takeoff, or hovering phase of helicopter operations is desired to permit wet-weather usage; to improve the load-carrying capability of the soil underlying the heliport; and to minimize the erosive effect of rotor downwash. Heliport proponents anticipating a limited number of operations by small helicopters may find stabilized surfaces adequate. Heliport proponents opting for paved operating surfaces because of greater helicopter weights or operational frequencies may find it desirable to stabilize the nonload-bearing areas. More explicit guidance on the subjects of soils, soil stabilization, or pavements is in FAA Advisory Circulars 150/5320-6, Airport Pavement Design and Evaluation, and 150/5370-10, Standards for Specifying Construction of Airports.

61. SOIL EVALUATION. The soils underlining the heliport must bear the loads imposed by the helicopters and the equipment or vehicles providing ground support. Surface stabilization and pavements are merely methods of improving the soil's supportive ability by distributing the loads over a greater area. Soils should be identified and evaluated prior to development of a stabilization plan or pavement design.

62. SURFACE STABILIZATION. Factors to be considered in selecting the extent of surface stabilization include helicopter weight, operational frequency, soil analysis, and climatic conditions. To minimize rotor downwash effects, it is recommended that all operating areas of the heliport be paved or stabilized.

63. TURF STABILIZATION. A well-drained and well-established turf that presents a smooth, dense surface is generally considered the most desirable and economical surface stabilization available. Turfed surfaces are capable of supporting moderate loads and provide reasonable protection against wind or water erosion. Climatic and soil conditions at the site dictate the choice of grass species to be used. Sources of advice on establishing and maintaining turf are local nurseries, park departments, ground keepers, and county agents.

64. AGGREGATE TURF STABILIZATION. Heliports located on soils that have poor load-carrying capabilities when wet may be able to overcome this deficiency if selected granular materials are mixed into the upper 12 inches (30 cm) of soil. Suitable granular materials for this purpose are crushed stone, pit-run gravel, coarse sand, or oyster shell. Sufficient granular material is added to the soil to achieve the desired stability with enough soil retained in the mix to insure a good stand of turf. A properly designed and constructed aggregate turf should be capable of supporting a 10,000-pound (4 500 kg) helicopter under moderate usage.

65. PAVEMENTS. Pavements are manmade surfaces designed to do two things. First, they provide a water impervious and dirt-free wearing surface. Second, and most importantly, they allow the load of the helicopter to be distributed over a larger soil area. Obviously, the loads to be supported and the ability of the soil to support these loads influence the thickness of pavement required. Advisory Circular 150/5320-6 contains guidance on the design of rigid and flexible pavements.

a. Rigid Pavements. The FAA recommended 6-inch (15 cm) minimum thickness of portland cement concrete pavement is capable of supporting the static and dynamic loads of helicopters up to 20,000 pounds (900 kg) gross weight. A design analysis is not usually necessary unless heavier helicopters are expected to operate at the heliport or the supportive quality of the underlying soil is questionable.

b. Flexible Pavements. A design analysis is always recommended when an asphaltic or bituminous concrete pavement is proposed. To reduce pavement deterioration, it is also recommended that a tar emulsion sealer be applied to asphaltic or bituminous concrete pavements in operational areas subject to aircraft fuel or solvent spillage. Extra care should be taken in the design and construction of flexible pavements subjected to skid-equipped helicopter operations. Skids being relatively long but having little cross sectional area can cause denting or rutting in improperly designed or constructed pavements.

66. PAVEMENT DESIGN. Heliport pavements should be designed by a qualified engineer after an analysis of the underlying soils and a determination of the static and dynamic loads to be supported. In some instance, loads imposed by the ground support vehicles may exceed those of the largest helicopter expected to use the facility. Weights, gear configurations, and dimensional data of the newer helicopter models may be found in Appendix 2. Load application through single- or dual-wheeled landing gear configurations is illustrated in Figure 6-1.

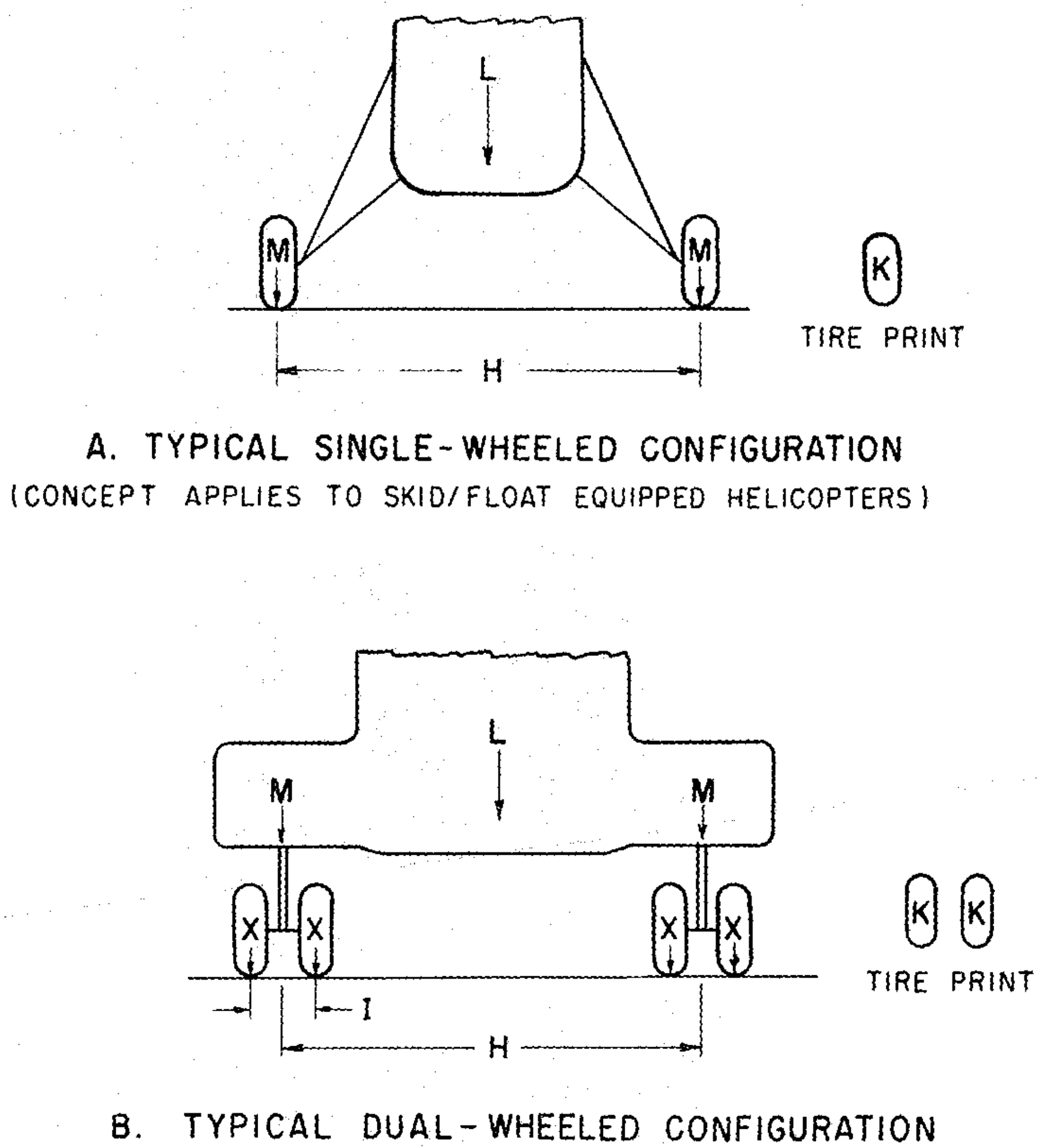
a. General. The strength requirements of the takeoff and landing area pavements are determined through analysis of the static and dynamic loads imposed through the helicopter landing gear. Most small helicopters are equipped with skid-type landing gear while the larger helicopters are usually equipped with wheeled landing gear. Normally, wheeled landing gear is mounted on "oleo" struts which absorb and dissipate a portion of the impact energy from a hard landing. Float-type landing gear offers some cushioning effect due to float deformation, whereas skid-type landing gear is generally rigidly mounted to the helicopter airframe and offers limited resilience or cushioning effect.

b. Static Loads. For pavement design purposes, helicopter static loads may be analyzed as concentrated "dead" loads applied equally through skid-type or float-type landing gear. An analysis of data provided by helicopter manufacturers indicates that anywhere from 60 to 90 percent of the helicopter's weight is distributed through the main gears of wheel-equipped helicopters. When specific information is not available, it is suggested that 85 percent of the helicopter's gross weight be assumed to be transmitted through the main gears.

c. Dynamic Loads. Critical dynamic loading occurs during a hard helicopter landing when the vehicle, acting as a moving body, applies impact forces that are proportional to its weight, velocity, and probable contact area. In these landings, loads of short (less than 1/5 second) duration may occur. The dynamic load, assumed to be 150 percent of the helicopter's gross weight, is imposed equally through two contact points. The area of each contact point is the footprint of the main gear wheel or a point on the skid since it cannot reasonably be assumed that a landing skid will make contact simultaneously over its entire length.

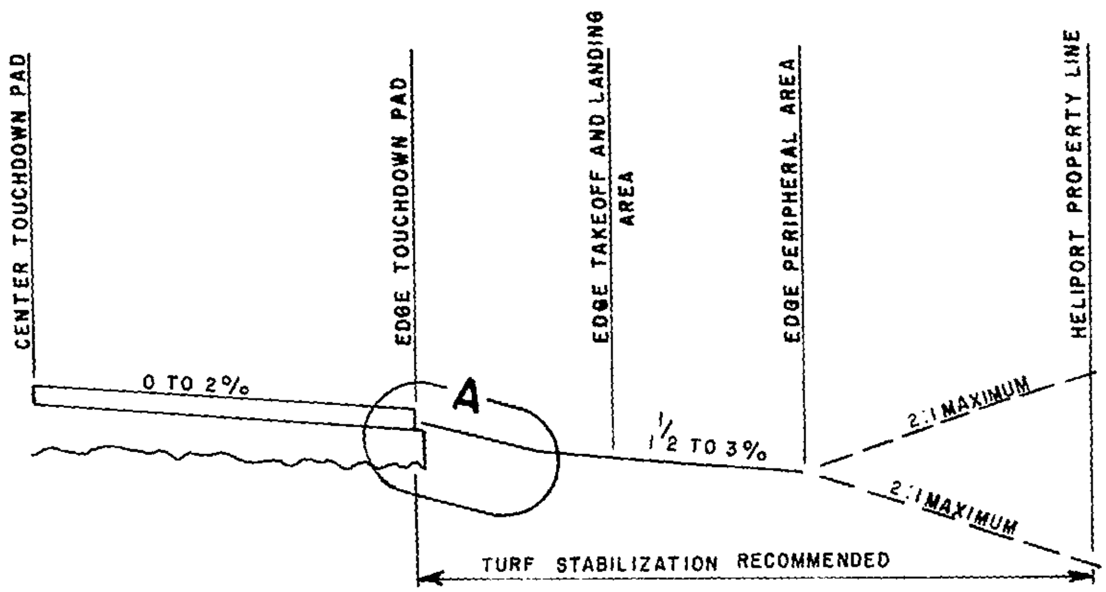
67. HELIPORT GRADES. Heliport operational areas should be graded to present a smooth, well drained, reasonably level takeoff and landing surface. Figure 6-2 illustrates typical cross sections for heliport grading.

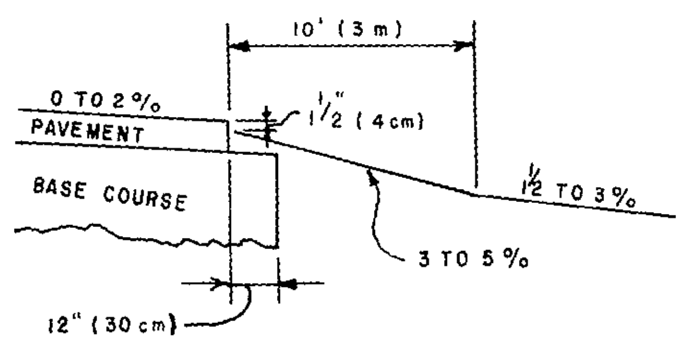
68-69. RESERVED.



L = GROSS WEIGHT
M = GROSS WEIGHT/GEAR
X = GROSS WEIGHT/WHEEL
H = TREAD
I = WHEEL SPACING
K = TIRE CONTACT AREA

FIGURE 6-1. ILLUSTRATION OF HELICOPTER LOADING APPLICATIONS





DETAIL "A"

(RAPID RUNOFF SHOULDER)

NOTE: Rapid runoff shoulders may be used adjacent to taxiway pavement and parking apron pavement.

FIGURE 6-2. HELIPORT GRADES

CHAPTER 7. HELIPORT VISUAL AIDS

70. GENERAL. Recommendations for marking and lighting of ground-level heliports are based on tests conducted for the FAA with the cooperation and involvement of civil and military helicopter pilots. For day VFR operations, it is recommended that the takeoff and landing area be marked and that the heliport be equipped with a suitable wind direction indicator. For night VFR operations, it is recommended that the takeoff and landing area and the wind direction indicator also be lighted and a heliport identification beacon be installed.

71. MARKING. FAA standards for marking heliports serve two purposes. One type of marking serves to identify the heliport's designated takeoff and landing area and provides visual approach cues to the pilot. The second type of marking provides guidance for ground movement and helicopter parking. Markings may be painted on paved surfaces using reflective or nonreflective paint of the recommended color. A 6-inch (15 cm), or wider, black (red for hospital heliports) border may be used to enhance painted markings. The marking of turfed heliports may be accomplished in a variety of ways.

a. Identification Markings. Heliport markings identifying the takeoff and landing area are white. They are centered on the designated takeoff and landing area. Dimensions for these markings are shown on the referenced figures.

(1) Standard Heliport Marker. The standard heliport marker (Figure 7-1) is recommended to identify the designated takeoff and landing area of a heliport. While this symbol is widely used throughout the helicopter industry, a number of private-use and personal-use heliports are either not marked at all or utilize a company logo or some other marking recognized by the helicopter pilots authorized to use the facility.

(2) Hospital Heliport Marker. A red letter "H" imposed in the middle of a white cross (Figure 7-2) is recommended as the identifier of a hospital heliport. Existing hospital heliports should convert to this color pattern at the first opportunity since the previous standard of a white "H" on a red cross background is no longer recommended. The color reversal is necessary to prevent conflict with the symbol of the American Red Cross.

b. Touchdown Pad Boundary Markings. Boundary markings are white and are used to delineate the limits (edges) of the portion of the takeoff and landing area capable of supporting the helicopter. Paved surfaces may be marked by a solid or segmented white paint stripe at least 18 inches (45 cm) in width. Black edging may be used to improve contrast. Turf heliport takeoff and landing areas may be delineated in a variety of ways. Figure 7-3 illustrates possible methods. Individual markers are spaced from 25 feet (7.5 m) to 100 feet (30 m) apart as site conditions dictate. A soil sterilant or an impervious membrane should be used to deter vegetation when a 3- to 4-inch (7 to 10 cm) thickness of crushed stone is used for markings.

c. Guidance or Position Markings. All painted heliport guidance and positioning markings are yellow. These markings are primarily intended to assist pilots in ground movement and to aid in judging clearances between turning rotors and other aircraft or fixed objects. The markings are illustrated in Figure 7-4.

(1) Taxiways. The centerline of a designated taxiway connecting a takeoff and landing area with a parking position should be marked with a 12-inch (30 cm) wide continuous line. The centerline should begin at the edge of the touchdown pad boundary marking and end at the edge of the parking position marking.

(2) Parking Position. A simple, yet easily recognized marking is desired to indicate positions for fueling, passenger loading, parking, etc. A suggested marking is a solid yellow circle, of at least 3-foot (1 m) diameter, to indicate the desired spot for the helicopter to stop. A 6-inch (15 cm) wide yellow stripe is suggested to mark the periphery of the parking position. The stripe marking the periphery of a circular or square parking position should have the diameter or side equal to the overall length of the largest helicopter expected to use the facility.

d. Weight Limit Markings. When a heliport is restricted to helicopters under a certain weight, this fact should be made known to the pilot. A method of doing this is to indicate the allowable weight in thousands of pounds (metric equivalents are not to be used for this purpose). It is suggested that a red numeral on a white square-shaped background, located to the right and above the heliport symbol as viewed from the principal direction of approach, be used to indicate this condition. The square and numeral should be of such size as to be readily discernible by the pilot of the approaching helicopter in sufficient time to effect a go-around if necessary. Figure 7-5 illustrates this suggested marking.

e. <u>Closed Heliport</u>. To the extent possible, markings of permanently closed or abandoned heliports should be completely obliterated. When obliteration is not possible or practical, a yellow "X" should be painted over the identification symbol. Figure 7-6 illustrates the closed heliport "X" applied to commonly used heliport markings. The yellow "X" should be large enough to insure recognition. Bars 5 feet by 30 feet (1.5 m by 9 m) are considered adequate for most situations. Adjustments in bar length and width may be necessary for smaller or larger figures. A nonpermanent material such as lime or whitewash may be used to make the "X" when the heliport closing is of a temporary or short term nature. Temporary markings should not be constructed using materials that could be blown about by helicopter downwash.

f. <u>Landing Direction Arrow</u>. Landing direction arrows may be used to identify preferred approach-departure paths to the heliport. The arrow may be used in conjunction with or in place of landing direction lights (paragraph 77a). Figures 7-7 and 7-8 show landing direction arrows used with landing direction lights.

g. <u>Other Markings</u>. Passenger walkways and fire extinguisher locations should be appropriately marked.

(1) <u>Walkways</u>. Passenger ingress and egress routes must be marked to indicate the safe walkway. The width, location, color, and marking are at the owner's discretion. Figure 7-4 illustrates one method of marking. Walkways should be textured to insure positive footing.

(2) <u>Fire Extinguisher Locations</u>. Fire extinguisher locations should be marked for ready identification. A bright red circle of 3 feet (1 m) in diameter is suggested. Figure 7-4 illustrates one method of marking a fire extinguisher position on an access controlling fence.

72. <u>WIND DIRECTION INDICATOR</u>. A wind direction indicator is recommended for heliport operations. An L-807, 8-foot (2.5 m) wind cone is recommended in accordance with AC 150/5345-27, Specification for L-807 Eight-Foot and Twelve-Foot Unlighted or Externally Lighted Wind Cone Assemblies. The wind cone should be located adjacent to the takeoff and landing area. However, it should not be a hazard to helicopter flight or taxiing operations nor should it be shielded from giving a true indication of wind direction by a building or other structure. The fabric of the wind cone should be of a color that makes it readily discernible. Heliports in congested locations may need more than one wind direction indicator. One indicator should be sited so that it will show the direction of the undisturbed wind with the second sited to show the direction of the wind actually blowing across the touchdown pad.

73. LIGHTING. A lighted touchdown pad, a lighted wind direction indicator, and a heliport identification beacon are recommended for night operations. Brightness control of the touchdown pad lighting may be desirable. FAA approved L-860 or 861 lighting fixtures per AC 150/5345-48, Specification for Runway and Taxiway Edge Lights, are recommended. Any lighting fixture used should present a low profile to minimize interference with ground maneuvering and flight operations.

74. PERIMETER LIGHTING. Yellow omnidirectional perimeter lights are used to define the boundary of the takeoff and landing area. Perimeter lights are positioned up to 10 feet (3 m) outboard from the edge of this area. An odd number, but not less than five, lighting fixtures should be equally spaced along each edge of a square or rectangular takeoff and landing area. At least eight lighting fixtures should be uniformly spaced around a circular takeoff and landing area. The recommended maximum spacing between light fixtures should not exceed 50 feet (15 m). Figures 7-7 and 7-8 illustrate square and circular lighting configurations. Perimeter lights have an omnidirectional light distribution pattern and use lamps rated at 15 to 45 watts.

75. IDENTIFICATION BEACON. A heliport identification beacon (Advisory Circular 150/5345-12, Specification for L-801 Beacon) is recommended and should be located within a quarter of a mile (0.4 km) of the heliport. A heliport identification beacon is not required for heliport facilities located on a lighted airport. Provisions should be made in the circuitry to permit its operation during periods of reduced visibility as well as at night.

76. OBSTRUCTION LIGHTS. A survey should be made of the heliport area to identify objects such as buildings, smokestacks, powerlines, antennas, etc., that penetrate the heliport approach and transitional surfaces. Penetrating objects should be marked and lighted in accordance with the guidance set forth in Advisory Circular 70/7460-1, Obstruction Marking and Lighting, unless an FAA aeronautical study has determined that the absence of such marking and lighting will not impair safety to air navigation.

77. USEFUL VISUAL AIDS. Other visual aids have been developed and have proven useful when applied to certain heliport situations. Landing direction lights, floodlights, and taxiway lights fall into this category.

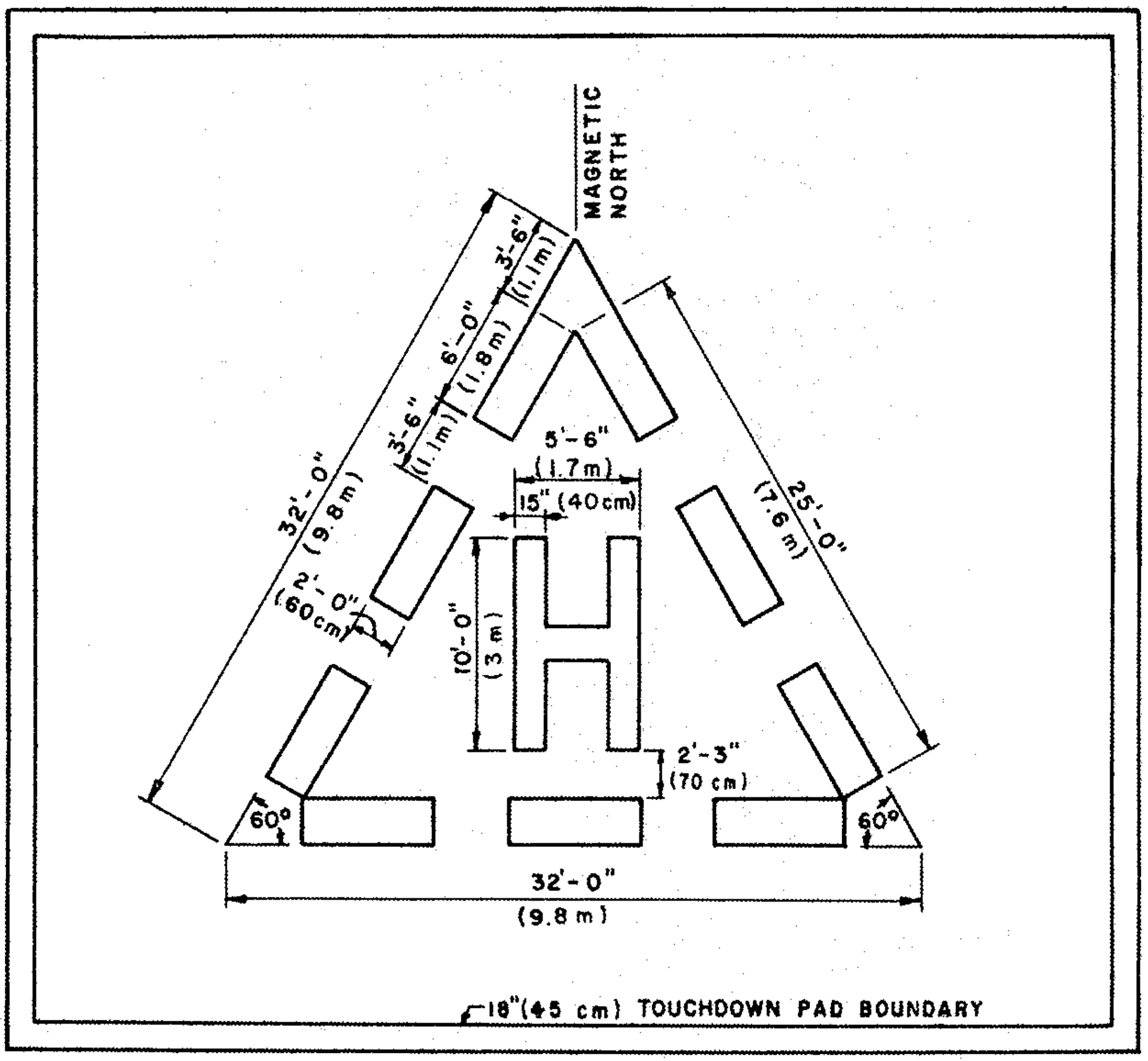
a. Landing Direction Lights. Landing direction lights consist of a line of five L-860 or L-861 fixtures with omnidirectional yellow lenses. Landing direction lights are spaced from 2 feet (0.6 m) to 15 feet (4.5 m) apart and are aligned in the direction of the preferred approach path. More than one approach-departure path may be lighted. Figures 7-7 and 7-8 illustrate landing direction light installations. To enhance their conspicuity in locations with excessive background lighting, landing direction lights may flash in sequence.

b. Floodlights. Floodlighting of the takeoff and landing area, in lieu of perimeter lighting, has proven effective for night operations. When floodlighting is used, the heliport markings should be painted with reflective paint and be maintained in good condition. Floodlighting stanchions should be located to avoid interference with flight operations, and to not blind the pilot with undesirable glare during the approach, departure, or taxiing operation. It is suggested that floodlights produce at least 3 footcandles (32 lux) of illumination over the entire landing area. Floodlighting of loading and servicing aprons may be accomplished with standard floodlighting fixtures and installation practices; however, there should be no interference with helicopter flight operations.

c. Taxiway Lights. A taxiway edge lighting system consists of omnidirectional blue lights outlining the usable limits of the taxi route. Taxiway edge lights may be located up to 10 feet (3 m) beyond the edge of the paved taxiway. Advisory Circular 150/5340-24, Runway and Taxiway Edge Lighting System, provides guidance on recommended spacing between light fixtures. Alternatives to taxiway edge lights are a taxiway centerline lighting system as described in AC 150/5340-19, Taxiway Centerline Lighting System, or the reflective markers described in AC 150/5340-20, Installation Details and Maintenance Standards for Reflective Markers for Airport Runway and Taxiway Centerlines.

78. LIGHTING CONTROL. Control of the heliport lighting systems may be accomplished in several ways. The simplest is a manual on-off switch to turn on the system or system components as needed. Other systems use an automatic control such as a photoelectric cell to turn lights on and off. More sophisticated systems permit remote control of the lights by direct wire and relays or by use of an L-854 radio control system (AC 150/5345-49, Specification L-854, Radio Control Equipment) allowing air-to-ground or ground-to-ground activation. Regardless of the control system used, each should be capable of manual override to insure operation in cases of control malfunction.

79. RESERVED.



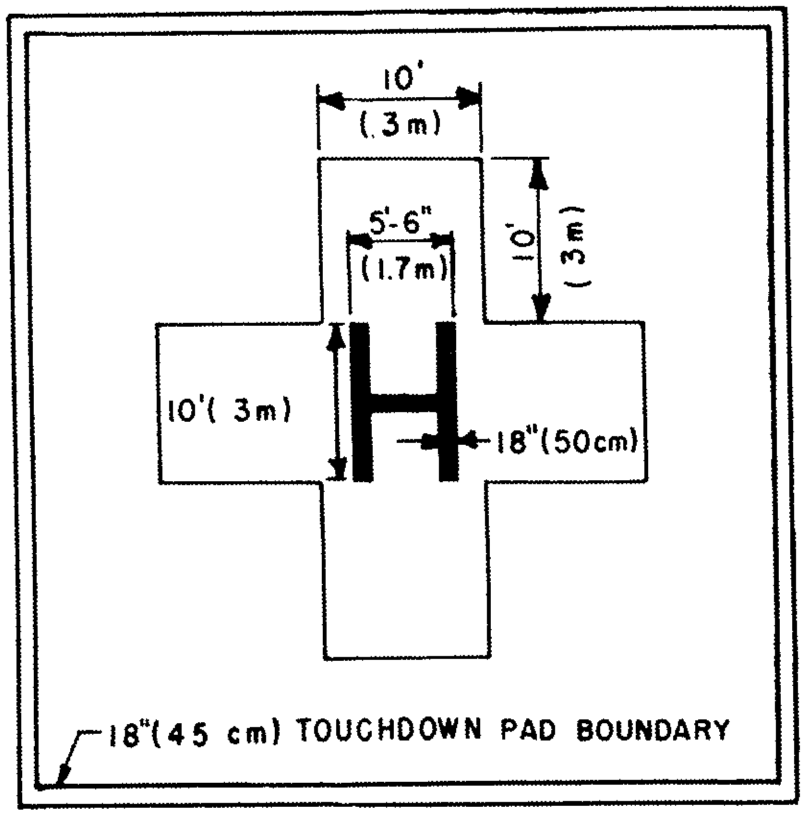
NOTES:

1. The triangle, letter "H," and boundary markings are white and may be edged with a 6-inch (15 cm) black border to improve contrast. The boundary marking may be either a solid or segmented line.

2. The triangle is centered in the middle of the touchdown pad with the solid apex pointing magnetic north. The letter "H" is centered within the triangle.

3. Dimensions shown are appropriate for touchdown pads 60 feet (18 m) or larger. Dimensions should be reduced proportionally for smaller touchdown pads.

FIGURE 7-1. STANDARD HELIPORT MARKING SYMBOL

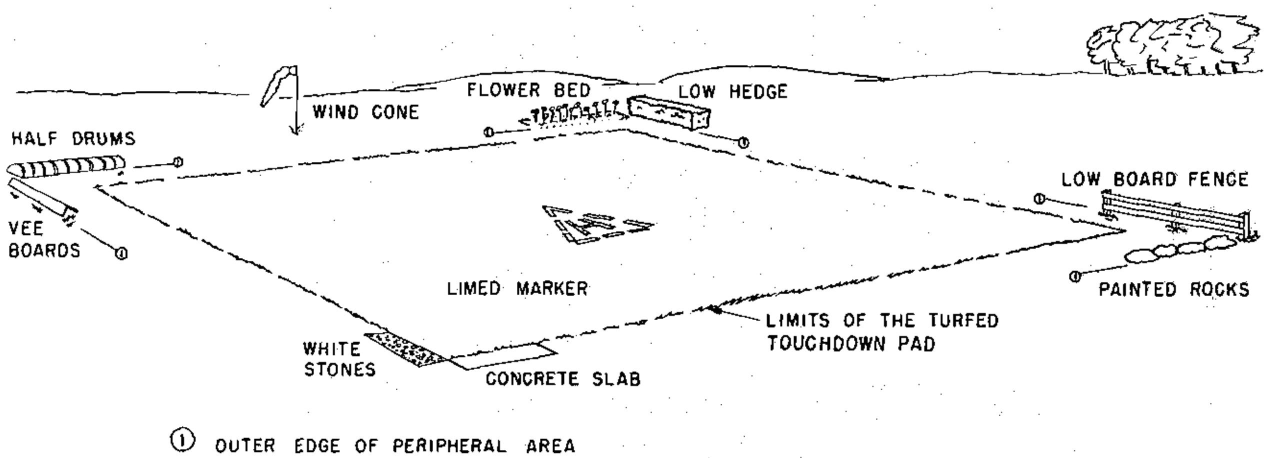


NOTES:

1. The cross and touchdown pad boundary markings are white and may be edged with a 6-inch (15 cm) red border to improve contrast. The letter "H" is red.

2. The touchdown pad boundary marking may be either a solid or segmented line.

FIGURE 7-2. RECOMMENDED HOSPITAL HELIPORT MARKINGS



NOTES:

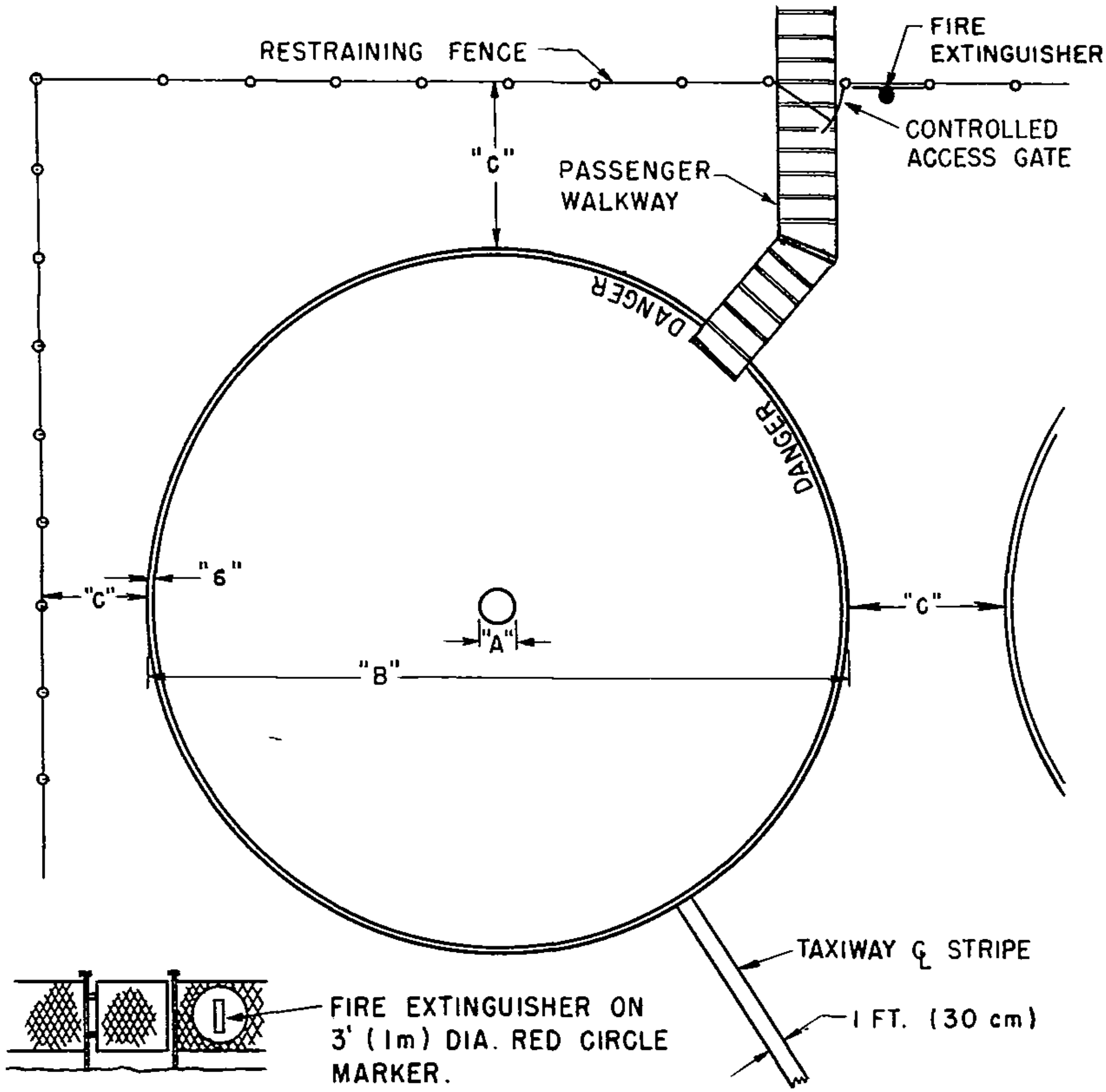
1. Markers used to define the takeoff and landing area of a turfed heliport should provide visible contrast against the natural background of the site.

2. Flush-type markers may be located at the edge of the touchdown pad.

3. Above-ground markers should not project more than 18 inches (45 cm) above the surface of the ground. Manmade markers should be solidly anchored to the ground to prevent their being blown about by rotor downwash. Raised markers should be located at the outer edge of the peripheral area.

4. This drawing illustrates numerous types of markings that could be used to identify limits of a turfed heliport. It is not intended that a heliport owner use more than one type of marker.

FIGURE 7-3. EXAMPLES OF MARKINGS FOR A TURFED HELIPORT



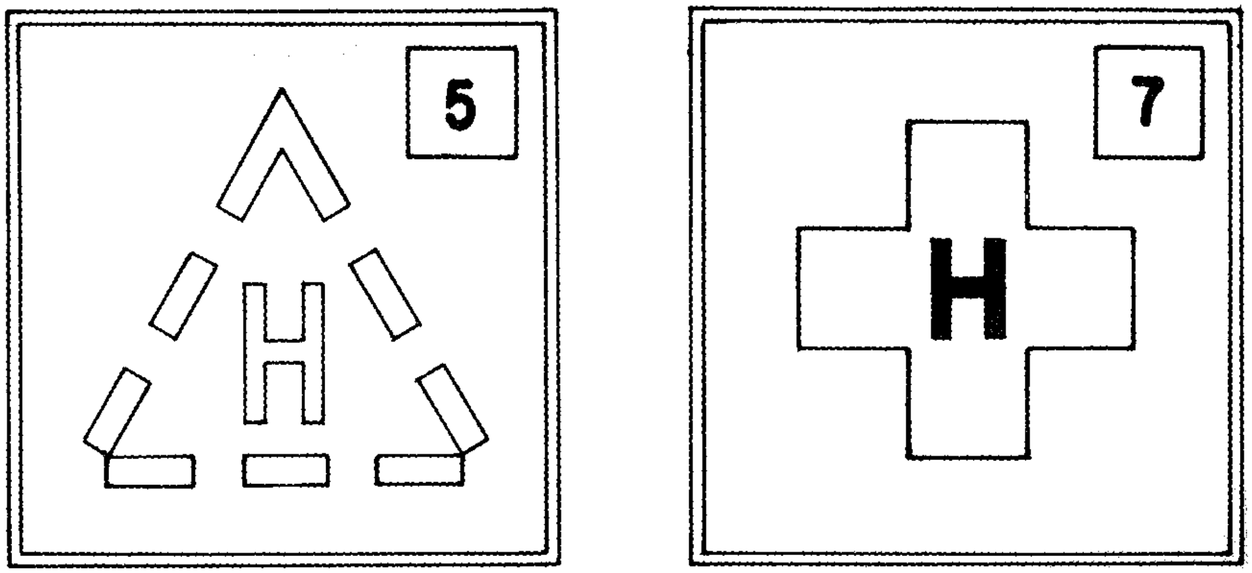
NOTES:

1. All markings for helicopter parking or ground guidance are in yellow.

2. Stopping circle "A" is at least 3 feet (1 m) in diameter. Diameter of the parking circle "B" is equal to the overall length of the design helicopter. Clearance to objects "C" is at least 10 feet (3 m).

3. Passenger walkway widths, locations, and markings are at the owner's discretion, the intent being to clearly delineate safe passageways.

FIGURE 7-4. HELIPORT GUIDANCE, POSITION, AND OTHER MARKINGS



NOTES:

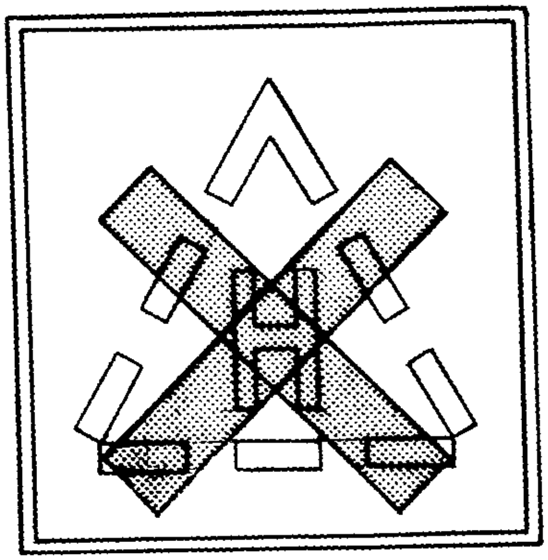
1. Helicopter weight limitations are stated in thousands of pounds. Pending adoption of metric units, weight limitations should be stipulated in pound units.

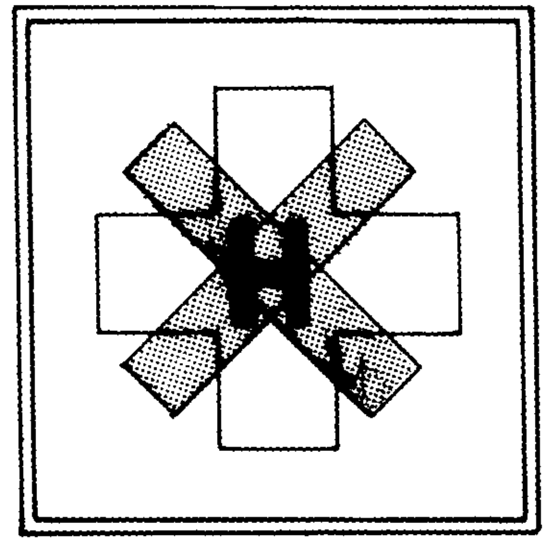
2. Limiting numerals are in red on a white background.

3. The square and number must be large enough to be seen by the pilot of the helicopter making an approach to land.

4. The weight limit marking should be located in the upper right corner of the designated takeoff and landing area as viewed from the primary direction of approach.

FIGURE 7-5. RECOMMENDED HELIPORT MARKING TO SHOW AN IMPOSED WEIGHT LIMITATION



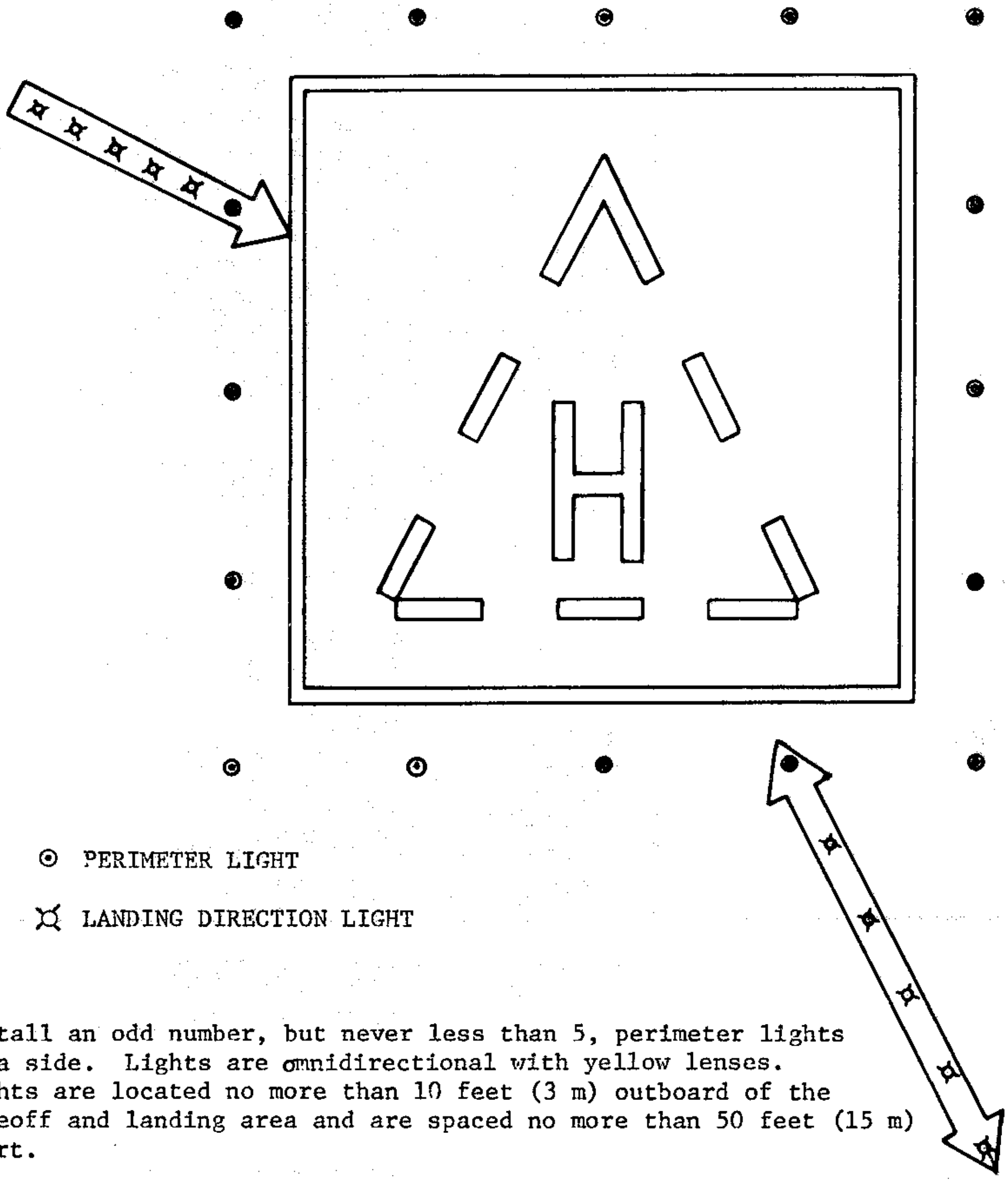


NOTES:

1. Whenever possible, the existing heliport marking should be removed or obliterated.

2. When removal or obliteration is not practical, a yellow cross symbol is to be used to indicate that [the he]liport is closed.

... of the cross are on the ... by 9 m). The ... average



⊙ PERIMETER LIGHT

⌑ LANDING DIRECTION LIGHT

NOTES:

1. Install an odd number, but never less than 5, perimeter lights on a side. Lights are omnidirectional with yellow lenses. Lights are located no more than 10 feet (3 m) outboard of the takeoff and landing area and are spaced no more than 50 feet (15 m) apart.

2. Locate a row of 5 yellow omnidirectional landing direction lights along the centerline of the principal approach and departure paths used for night operations. Lights may be spaced from 2 to 15 feet (0.6 to 4.5 m) apart and may be located outboard or inboard, or both, of the perimeter lights as space permits.

3. White painted arrows may be used to identify preferred approach and departure paths. Arrows should be large enough to be readily visible.

FIGURE 7-7. RECOMMENDED HELIPORT LIGHTING

CHAPTER 8. OPERATIONAL CONSIDERATIONS

80. GENERAL. The proponent of a heliport must consider possible measures to assure the safety of persons using the heliport. Considerations include, but are not limited to, such features as safety barriers, fire and crash rescue services, radio communications, and heliport zoning ordinances.

81. SAFETY BARRIERS. The owner of the heliport should erect a safety barrier around helicopter operational areas. The barrier may take the form of a fence, wall, or hedge. It should be no closer to the operating areas than the outer edge of the peripheral area surrounding the takeoff and landing area and at the recommended fixed object clearance distance from heliport taxiways and helicopter parking positions. Any barrier used should be high enough to present a positive deterrent to persons inadvertently entering an operational area and yet be low enough to be nonhazardous to helicopter operations.

82. FIRE PROTECTION. Helicopters operating at an airport are afforded the same degree of fire and crash rescue protection provided to all aircraft. Heliports, however, are generally limited in area and normally will not require based fire engines. The degree of fire protection required will depend upon the size and number of helicopters to be accommodated; the number of occupants; and the fuel load of the helicopter. Heliport personnel should be trained in rescue and fire-fighting skills. The National Fire Protection Association (NFPA) recommended fire protection capabilities for heliport facilities are based on the following heliport categorization. (References NFPA Pamphlets 403 and 418.)

a. The H-1 category includes all heliports where the helicopters using the facility carry less than six persons and have operational fuel loads of less than 100 gallons (380 liters).

b. The H-2 category includes all heliports where the helicopters using the facility normally carry less than 12 passengers, have operational fuel loads of less than 200 gallons (760 liters), and where the number of movements exceeds an average of four movements per day over any 3-month period.

c. The H-3 category includes all heliports where the helicopters using the facility normally carry 12 or more passengers and have operational fuel loads of more than 200 gallons (760 liters), regardless of the frequency of movements.

Heliport Category	Water for Foam Production Using Protein or Fluoroprotein Foam Concentrates††				Foam Concentrate		Dry Chemical*			
	Amount of Water		Total Discharge Rate		Gals	Ltrs.	Amount		Discharge Rates	
	Gallons	Liters	GPM	Liters/Min.			Lbs.	Kgs.	Lbs/Min.	Kgs/Min.
H-1	none**	none**	none**	none**	none**	none**	100	50	100	50
H-2	300†	1140†	150	600	40	160	200	90	200	90
H-3	500†	1900†	300	1000	90	350	300	135	300	135

*Dry chemical of approved foam-compatible types in containers weighing in excess of 50 lbs. should be equipped with auxiliary wheeled carriers, either non- or self-propelled. See Paragraph 312.a. and b. when alternate use of carbon dioxide is to be used. (See also Standard on Installation of Portable Fire Extinguishers — NFPA No. 10; ANSI Z112.1).

**Many times a water supply meeting the recommendations for Category H-2 may be readily available. In such cases, it should be made available assuming personnel are *assigned* to utilize the equipment in the event of an emergency.

†This amount of water should be immediately available from a hydrant (standpipe), pressurized tank, reservoir, cistern, or mobile vehicle so that it can be dispensed at the discharge rate indicated and at a satisfactory pressure. Additional water should be available to provide a continuing rescue and fire fighting capability wherever feasible.

††The quantity of water, foam concentrate and discharge rates may be reduced one-third when aqueous-film-forming-foam concentrate is used.

GROUND-LEVEL HELIPORTS (NFPA-403, 1975 Edition)

Heliport Category	Water for Foam Production Using Protein or Fluoroprotein Foam Concentrates††				Foam Compatible Dry Chemical (Rating)*	Additional Water for Foam if Heliport Is Elevated	
	Amount of Water		Total Rate of Discharge				
	Gallons	Liters	GPM	Liters		Gallons	Liters
H-1	None**	None**	None**	None**	2-80B:C Extinguishers	None**	None**
H-2	500†	1,900†	100	380	2-80B:C Extinguishers or 1-160B:C Wheeled Extinguisher	1000†	3,800†
H-3	1500†	5,700†	200 from two 100 gpm nozzles or from one mobile unit with a turret	760	2-80B:C Extinguishers and 1-160B:C Wheeled Extinguisher	1500†	5,700†

*See Standard on Installation of Portable Fire Extinguishers (NFPA No. 10; ANSI Z112.1).

**Many times a water supply meeting the suggestions for Category H-2 may be readily available. In such cases it should be made available assuming personnel are available to utilize the equipment in event of an emergency.

†This amount of water should be immediately available from a hydrant (standpipe), pressurized tank, reservoir, or mobile vehicle so that it can be dispensed at the rates indicated and at a satisfactory pressure. Additional water should be available to provide a continuing rescue and fire fighting capability wherever feasible.

††The quantity of water may be reduced one-third when aqueous film-forming foam concentrate is used.

ROOF-TOP HELIPORTS (NFPA-418, 1973 Edition)

NOTE: Deviations and or equivalent substitutions may be authorized by competent authority to comply with local fire codes or to meet unusual site or operational conditions.

FIGURE 8-1. NFPA RECOMMENDATIONS FOR HELIPORT FIRE PROTECTION

CHAPTER 9. ELEVATED HELIPORT DESIGN

90. GENERAL. An elevated heliport, whether it be located on the roof of some building or parking structure or on a waterfront pier, presents unique design problems. Developing structural design and construction specifications for elevated heliports requires the services of qualified architects and engineers. This chapter is limited to covering, in general terms, the basic design features that are peculiar to an elevated heliport.

91. SITING. When a suitable ground-level site is unattainable, the alternative may be the development of an elevated heliport. Elevated heliports are found in many cities. Most would be classified as private-use or personal-use facilities. An elevated facility has two advantages for the proponent of a private-use or personal-use heliport. First, the facility provides more privacy and security than a ground-level site. Second, with the heliport at or above the level of most buildings in the vicinity, there are fewer problems in providing and maintaining suitable approach-departure paths. (See Figure 9-1.)

92. CODES AND REGULATIONS. Local, state, and national safety codes pertaining to building construction, occupancy, ingress-egress, fire safety, etc., should be carefully reviewed to determine their impact on establishing and operating an elevated heliport. Early coordination of a proposed elevated heliport facility with FAA, state, and local authorities is recommended to insure that no pertinent code or regulation is overlooked.

93. TAKEOFF AND LANDING AREA. The dimensions of the takeoff and landing area of an elevated heliport are keyed to the size of the helicopter expected to operate therefrom. To the extent that circumstances permit, the recommended dimensions of the takeoff and landing area are identical to those of a ground-level facility. (See paragraph 52.) The takeoff and landing area, together with the associated peripheral area, may require the entire roof area or only a part of it. Elevated takeoff and landing areas having a long axis should have that axis oriented in the direction of the prevailing winds.

a. Peripheral Areas. In some instances, it is neither possible nor practical to provide the surface area required to permit the development of a takeoff and landing area and associated peripheral area. In some of these cases, it is reasonable to presume that the natural open space surrounding an elevated heliport will suffice as an obstruction-free area and the peripheral area requirement may be eliminated. To take full advantage of ground effect, the dimensions of the minimal takeoff and landing area should be 1.5 times the rotor diameter of the largest helicopter expected to operate therefrom. A surface smaller than this may subject using helicopters to operational restrictions.

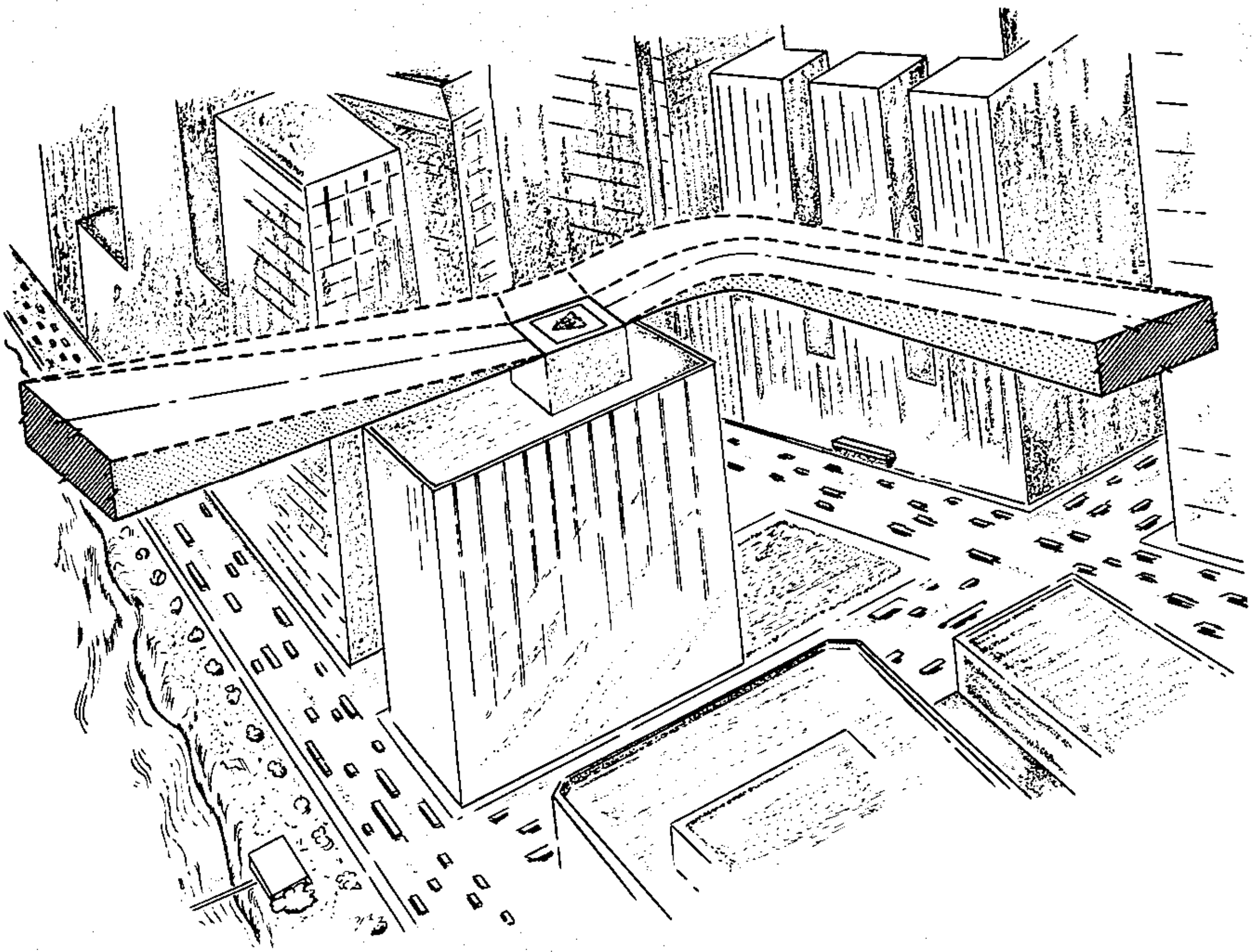
b. Perimeter Protection. Safety nets, guard rails, or fences should meet requirements of local or state building codes. Guard rails or fences should not penetrate heliport primary, approach, or transitional surfaces nor should the installation create an actual or perceived psychological obstacle to pilots using the heliport. A safety net, Figure 9-2, is recommended for touchdown pads raised above the level of the roof. These nets should be located below, and not rise above, the plane of the heliport primary surface. A net width of at least 5 feet (1.5 m) is recommended.

c. Surface Drainage. The takeoff and landing area should be designed with gutters that would isolate the runoff of any spilled liquids. It is essential that these liquids be prevented from discharging into the building's drainage system. Local building codes should be reviewed to determine whether the proposed collection system complies with the applicable code provisions.

d. Structural Implications. The surface used for takeoffs and landings on elevated heliports should be an integral part of the building's design whether it is incorporated as a roof-level or platform facility. The actual landing surface should be constructed of materials that will not yield under hard landings. However, the heliport designer may take advantage of any energy-absorbing properties inherent in roof-decking materials or structural-framing techniques. Helicopter static and dynamic loading calculations are identical to those of paragraph 66. Design loads other than those applied by the helicopter, such as snow, rainfall, wind, passengers and cargo, flight supporting equipment, additional weight of the heliport, etc., should be calculated in accordance with applicable building codes. An analysis of this magnitude requires the professional services of a qualified architect or engineer. Proponents of elevated heliports should consider the probability of future operations by larger helicopters when designing the facility.

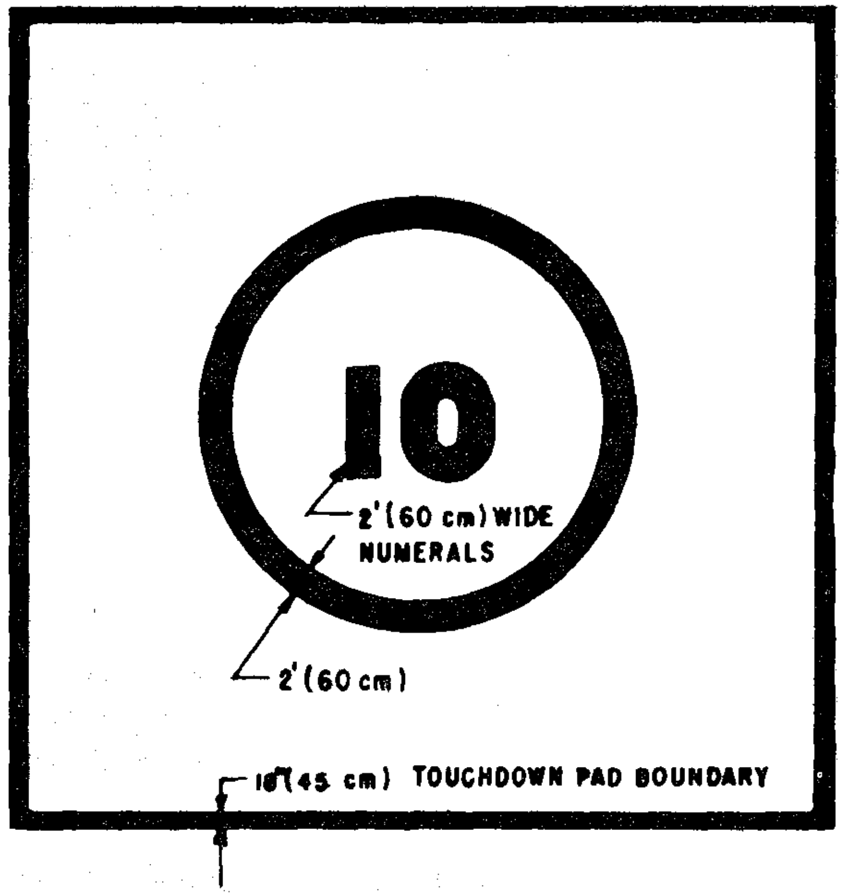
96. MARKING AND LIGHTING. The basic marking and lighting for an elevated heliport are identical to that of a comparable ground-level facility.

a. Marking. An elevated heliport may be subject to an operational weight limitation. A red numeral on a white square (see paragraph 71d) is recommended to convey this information to the pilot of the approaching helicopter. A red circle around a red number is recommended to mark a rooftop landing facility intended solely to permit helicopter evacuation of building occupants in case of fire. The number indicates the helicopter gross weight the facility is capable of supporting. Figures 9-3 and 9-4 illustrate the recommended marking.



NOTE: The transitional surface is not depicted on the near side of the sketch for purposes of clarity.

FIGURE 9-1. ILLUSTRATION OF AN ELEVATED HELIPORT WITH CURVED APPROACH-DEPARTURE PATH



NOTES:

1. The numeral, circle, and touchdown pad boundary markings are in red. The preferred background color is white.

2. The red numeral indicates the allowable weight, in thousands of pounds, that the facility is capable of supporting.

3. DO NOT show allowable weight in metric (kg) units.

FIGURE 9-3. MARKING FOR AN EMERGENCY-USE HELICOPTER LANDING FACILITY ON BUILDING ROOF

CHAPTER 10. OFFSHORE HELICOPTER FACILITIES

100. GENERAL. The oil industry makes extensive use of helicopters to move people and equipment between shore heliports and drilling platforms located up to 200 miles (320 km) from shore. The facilities recommended for helicopter operations on offshore platforms will vary from those recommended for either ground-level or elevated heliports. This chapter identifies pertinent design features applicable to permanently fixed offshore helicopter facilities located in U.S. territorial waters. Guidance for mobile platforms or for shipboard facilities is found in U.S. Coast Guard publications. Designers of platforms to be operated in foreign waters should contact the appropriate agency of the nation(s) involved. Figure 10-1 pictures typical platform and shipboard helicopter facilities. Figure 10-2 depicts the layout of a simple offshore helicopter facility.

101. TAKEOFF AND LANDING AREA. The important surface for any helicopter facility is the takeoff and landing area. The takeoff and landing area, or "deck," should be sufficient size to accommodate the largest helicopter expected to use the facility. The takeoff and landing deck should have a diameter at least equal to the overall length of the largest helicopter. A larger deck is required if more than one helicopter is expected to use the facility at the same time. A smaller deck area may result in the imposition of an operational penalty.

102. CLEARANCES. The takeoff and landing deck should be located to provide at least 180 degrees of obstacle-free area for approaches and departures under the most severe weather conditions permitted for operations. The base of the approach and departure sector is tangent to the periphery of the takeoff and landing deck as illustrated in Figure 10-2. Outside of the approach and departure sector, objects within one-third rotor diameter of the takeoff and landing deck should not penetrate a surface commencing at the edge of the deck and rising at a slope of one unit vertical to two units horizontal. No object should penetrate the plane of the takeoff and landing deck unless it is necessary for flight operations or safety.

103. LIGHTING. Lights on an offshore helicopter facility serve to locate and outline the takeoff and landing deck. Since most working offshore platforms are brightly lighted islands in a dark ocean, there normally is no need for a heliport beacon. Alternating amber and blue omnidirectional lights should be installed around the periphery of the takeoff and landing deck not more than 10 feet (3 m) apart. Light fixtures should not rise more than 6 inches (15 cm) above the level of the takeoff and landing deck. Adequate shielding should be used on any of the platform lights that could interfere with the pilot's vision as he or she conducts an approach to land.

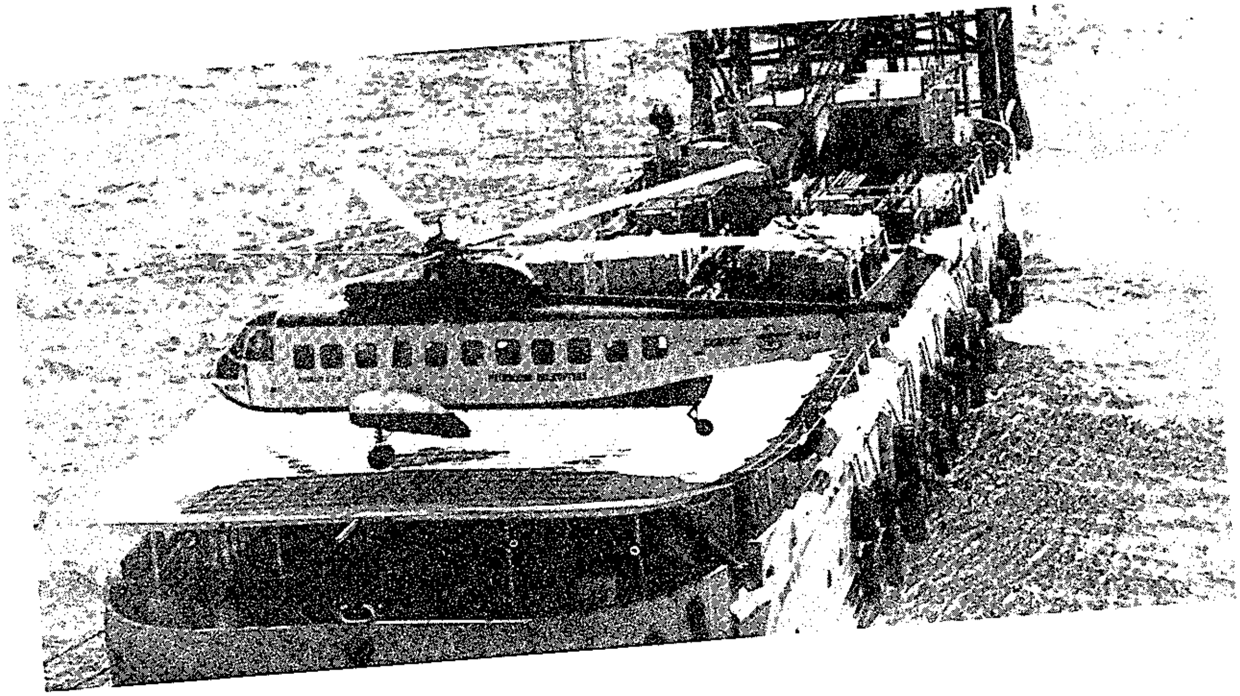


FIGURE 10-1. OFFSHORE HELICOPTER FACILITIES

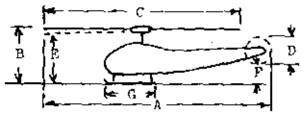
APPENDIX 1. SUMMARY OF RECOMMENDED DESIGN CRITERIA

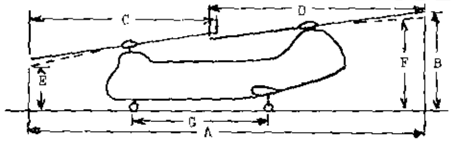
APPENDIX 1. SUMMARY OF RECOMMENDED DESIGN CRITERIA

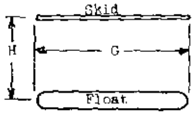
	HELIPORT CLASSIFICATION		
	PUBLIC-USE	PRIVATE-USE PERSONAL-USE	
DESIGN FEATURE	DIMENSION		COMMENT
TAKEOFF & LANDING AREA Length, width, diameter	1.5 x helicopter overall length		To preclude premature obsolescence, consider the possibility of larger helicopters in the future.
TOUCHDOWN PAD Length, width, diameter	1.0 x rotor diameter		Elevated touchdown pads less than 1.5 rotor diameters in size may subject using helicopters to operational penalties due to loss of rotor downwash ground effect. Minimally sized touchdown pads are not encouraged, but may be used in cases of economic or aesthetic necessity. Touchdown pads less than one rotor diameter in size should have additional nonload-bearing area for downwash ground effect.
Minimum ground-level Length, diameter Width	2.0 x wheelbase 2.0 x tread	1.5 x wheelbase 1.5 x tread	
Minimum elevated Length, diameter Width	1.0 rotor dia. 1.0 rotor dia.	1.5 x wheelbase 1.5 tread	
PERIPHERAL AREA Recommended width Minimum width	1/4 helicopter overall length 10 feet (3 m)		An obstacle-free area surrounding the takeoff and landing area. Keep the area clear of parked helicopters, buildings fences, etc.
TAXIWAY Paved width	Variable, 20-foot (6 m) minimum		Paved taxiways are not required if helicopters hover taxi.
PARKING POSITION Length, width, diameter	1.0 x helicopter overall length		Parking position should be beyond the edge of the peripheral area. Parked helicopters should not violate the 2:1 transitional surface.
PAVEMENT GRADES Touchdown pad, taxiways, parking positions	2.0 percent maximum		
OTHER GRADES Turf shoulders, infield area, etc.	Variable, 1-1/2 to 3 percent		A 10-foot (3 m) wide rapid runoff shoulder of 5 percent slope is permitted adjacent to all paved surfaces.
CLEARANCES, ROTOR TIP TO OBJECT Taxiways, parking positions	10-foot (3 m) minimum		Consider possibility of larger helicopters in the future.
HELICOPTER PRIMARY SURFACE Length, width, diameter Elevation	1.5 x helicopter overall length Elevation highest point takeoff & landing area.		Imaginary plane overlying the takeoff and landing area. Area to be free of all obstacles.
HELICOPTER APPROACH SURFACE Number of surfaces Angular separation Length Inner width Outer width Slope	Two 90° min., 180° preferred 4,000 feet (1 220 m) 1.5 x helicopter overall length 500 feet (152 m) 8:1		Protection for helicopter approaches and departures. The surface should not be penetrated by any objects that are determined to be hazards to air navigation.
HELICOPTER TRANSITIONAL SURFACE Length Width Slope	Full length of approaches and primary surface. 250 feet (76 m) measured from approach & primary surface centerline. 2:1		Surface should not be penetrated by objects.

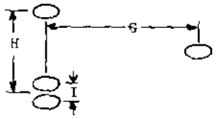
NOTE: Above criteria does not apply to offshore helicopter facilities.

APPENDIX 2. HELICOPTER DIMENSIONAL DATA



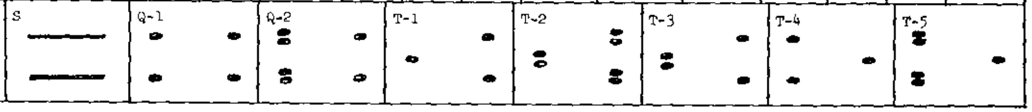


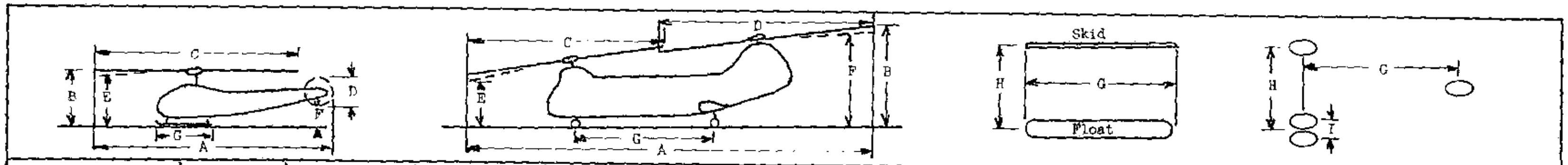




MANUFACTURER	MODEL NO.	COMMON NAME	A (FT.)	B (FT.)	C (FT.)	D (FT.)	E (FT.)	F (FT.)	LANDING GEAR CONFIG.	G (FT.)	H (FT.)	I (IN.)	CONTACT AREA (SQ. IN.)	MAX. WEIGHT (LBS)	STATIC WEIGHT (LBS)	DOWN-WASH (LBS/SF)	NO. TYPE ENG.	NO. CREW PASS.	FUEL (GAL)
AEROSPATIALE	315-B	Lama	42.4	10.1	36.2	6.4	:	3.2	S	10.8	7.8	NA	:	4,300	2,150	4.94	1-TS	1+4	146
	318-C	Alouette II	39.3	9.0	33.5	6.3	:	:	S	:	7.5	NA	:	3,650	1,825	4.17	1-TS	1+4	149
	319-B	Alouette III	42.1	9.8	36.1	6.3	:	:	T-1	:	8.5	NA	:	4,960	:	4.85	1-TS	1+6	152
	330-G	Puma	59.6	16.9	49.2	10.0	14.4	6.9	T-2	13.3	:	:	:	14,770	:	7.77	2-TS	2+18	410
	341-G	Gazelle	39.3	10.4	34.5	NA	8.9	2.3	S	:	6.6	NA	:	3,970	1,985	4.26	1-TS	1+4	120
	360	Dauphin	44.1	11.5	37.7	NA	10.0	:	T-4	23.7	6.5	NA	:	6,170	:	5.53	1-TS	1+9	170
AUGUSTA/ATLANTIC	A-109	Hirando	42.9	10.9	36.1	6.6	7.0	2.3	T-1	11.6	7.5	NA	20	5,402	2,701	5.28	2-TS	1+7	156
BELL HELICOPTER	47-G-5A	--	43.6	9.3	38.0	5.8	9.5	3.0	S	9.9	7.5	NA	:	2,850	1,425	2.63	1-P	1+2	57
	205-A-1	--	57.1	14.4	48.2	8.5	6.8	5.9	S	12.1	9.0	NA	:	9,500	4,750	5.21	1-TS	1+14	220
	206-B	Jet Ranger	38.8	9.5	33.3	5.2	6.0	1.6	S	7.8	6.3	NA	:	3,200	1,600	3.67	1-TS	1+4	76
	206-L	Long Ranger	42.4	11.7	37.0	5.2	6.2	2.9	S	9.9	7.7	NA	:	4,000	2,000	3.72	1-TS	1+5	98
	212	Twin	57.3	14.4	48.2	8.5	7.0	4.4	S	12.1	8.8	NA	:	11,200	5,600	6.09	2-TS	1+14	183
	214-B	Big Lifter	60.2	13.5	50.0	9.6	9.4	3.7	S	12.1	8.6	NA	:	16,000	8,000	8.15	1-TS	1+15	207
BOEING VERTOL	BO-105-C	--	38.8	10.1	32.2	6.2	9.0	6.1	S	:	8.5	NA	:	5,070	2,535	6.2	2-TS	1+4	154
	CH-47-234	--	98.9	19.0	60.0	60.0	7.4	16.2	Q-2	22.5	11.2	:	78	50,000	15,967	8.1	2-TS	3+44	1,129
	107-II	--	83.1	16.9	50.0	50.0	9.9	16.9	T-2	24.8	12.9	13	25	22,000	7,000	4.8	2-TS	3+25	350
	179	--	59.5	16.6	49.0	10.2	8.0	6.4	T-3	15.3	8.8	15	82	18,700	7,030	9.9	2-TS	2+19	486

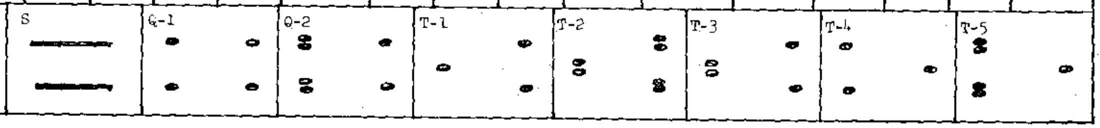
: Data not provided.
NA Data not applicable.
TS Turboshaft engine.
P Piston engine.
PT Turbocharged piston engine.

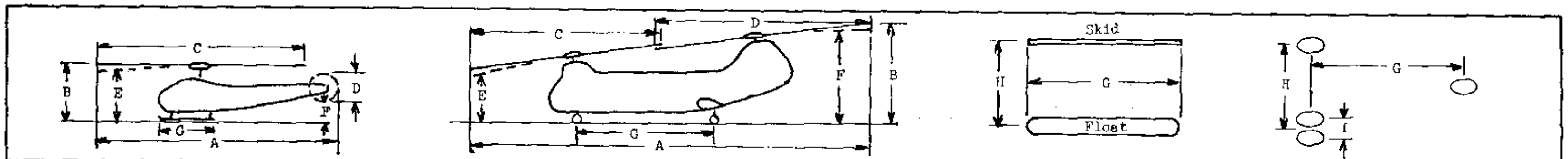




MANUFACTURER	MODEL NO.	COMMON NAME	A (FT.)	B (FT.)	C (FT.)	D (FT.)	E (FT.)	F (FT.)	LANDING GEAR CONFIG.	G (FT.)	H (FT.)	I (IN.)	CONTACT AREA (SQ. IN.)	MAX. WEIGHT (LBS)	STATIC WEIGHT (LBS)	DOWN-WASH (LBS/SF)	NO. TYPE ENG.	NO. CREW PASS.	FUEL (GAL)
SIKORSKY	S-55-T	--	62.2	15.3	53.0	8.8	8.2	6.5	Q-1	10.5	11.0	NA	40	7,200	2,100	3.3	1-TS	2+10	185
	S-58-T	--	65.8	15.9	56.0	9.5	11.4	6.4	T-4	28.3	14.0	NA	:	13,000	5,750	5.3	2-TS	2+16	283
	S-61 N/L	--	73.0	18.6	62.0	10.6	12.3	8.3	T-5	23.5	14.0	13	54	19,000	8,115	6.3	2-TS	3+28	410
	S-62	--	62.3	16.0	53.0	8.8	9.2	7.3	T-4	17.8	12.2	NA	54	7,900	3,480	3.6	1-TS	2+12	
	S-64	Skycrane	88.5	25.4	72.3	16.0	13.2	9.3	T-1	24.4	19.8	NA	:	42,000	17,700	10.3	2-TS	3+1	880
	S-65-C	--	88.2	24.9	72.3	16.0	10.3	8.8	T-2	27.0	13.0	17	77	42,000	14,700	10.3	2-TS	3+44	630
	S-76	--	57.5	14.5	44.0	6.0	5.8	6.5	T-1	16.4	8.0	NA	21	9,700	3,425	6.4	2-TS	2+12	276
	S-78-C	--	64.8	16.8	53.7	11.0	7.5	6.5	T-4	28.9	9.0	NA	73	20,000	8,700	8.9	2-TS	2+20	463

: Data not provided.
NA Data not applicable.
TS Turboshaft engine.
P Piston engine.
PT Turbocharged piston engine.

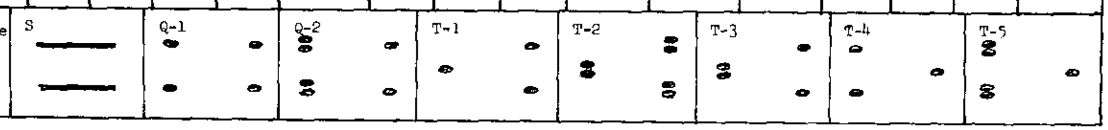




MANUFACTURER	MODEL NO.	COMMON NAME	A (M)	B (M)	C (M)	D (M)	E (M)	F (M)	LANDING GEAR CONFIG.	G (M)	H (M)	I (CM)	CONTACT AREA (CM^2)	MAX. WEIGHT (KG)	STATIC WEIGHT (KG)	DOWN-WASH (KG/M^2)	NO. TYPE ENG.	NO. CREW PASS.	FUEL (L)
BRANTLY-HYNES	B-2-B	--	8.5	2.1	7.2	1.3	2.1	0.9	S	:	1.7	NA	::	758	379	18.44	1-P	1+1	117
	305	--	10.0	2.4	8.7	1.3	2.5	1.2	T-3	2.1	2.1	:	116	1 315	438	22.70	1-P	1+4	163
ENSTROM	F-28A/280	Shark	11.9	2.7	9.8	1.4	1.8	0.9	S	2.4	2.2	NA	:	975	488	13.04	1-P	1+2	114
	F-28C/280C	Shark	11.9	2.7	9.8	1.4	1.8	0.9	S	2.4	2.2	NA	:	998	499	13.33	1-P	1+2	151
FAIRCHILD	FH-1100	--	12.7	2.8	10.8	1.8	2.0	0.7	S	2.4	2.2	NA	:	1 247	624	13.67	1-TS	1+4	257
HILLER	UH-12-L-4	Hiller	12.4	3.1	10.8	1.7	3.1	1.0	S	2.5	2.3	NA	:	1 406	703	16.11	1-P	1+3	174
	UH-12E/E-4	Hiller	12.4	3.3	10.8	1.7	3.3	1.2	S	2.5	2.3	NA	:	1 270	635	14.16	1-P	1+3	174
HUGHES	269-A/B	Hughes 300	8.8	2.5	7.7	1.2	2.0	0.8	S	2.5	2.0	NA	:	758	379	16.21	1-P	1+1	114
	269-C	Hughes 300C	9.4	2.7	8.2	1.3	2.1	0.8	S	2.5	2.0	NA	:	930	465	17.73	1-P	1+2	114
	369HS (Std)	Hughes 500C	9.2	2.5	8.0	1.3	2.1	0.7	S	2.5	2.1	NA	:	1 158	579	22.95	1-TS	1+4	242
	369HS (Ext)	Hughes 500C	9.2	2.5	8.0	1.3	2.1	0.7	S	2.5	2.1	NA	:	:	:	22.95	1-TS	1+4	242
	369-D	Hughes 500D	9.3	2.7	8.1	1.4	2.1	0.8	S	2.2	2.1	NA	:	1 362	686	26.76	1-TS	1+4	242
KAMEN	HH-43F	Huskie	14.3	5.9	14.3	NA	2.2	0.7	Q-1	2.5	1.8	NA	:	4 150	:	12.89	1-TS	1+11	1 325
ROTORWAY	--	Scorpion Too	8.4	2.2	7.3	1.1	2.0	0.9	S	2.3	1.6	NA	:	544	272	10.99	1-P	1+1	38

: Data not provided.
NA Data not applicable.
TS Turboshaft engine.
P Piston engine.
PT Turbocharged piston engine.

Kamen has side-by-side rotors for oper. width 5.4 M



APPENDIX 3. BIBLIOGRAPHY

1. Advisory Circular (AC) 00-2, Advisory Circular Checklist and Status of Federal Aviation Regulations, updated triannually, contains the listing of current issuances of advisory circulars and changes thereto. It explains the circular numbering system and gives instructions for ordering advisory circulars that are for sale as well as those distributed free of charge. AC 00-2 also gives instructions for ordering the Federal Aviation Regulations (FAR).

a. The following free advisory circulars may be obtained from the Department of Transportation, Publications Section, TAD-443.1, Washington, D.C. 20590.

(1) AC 00-2, Advisory Circular Checklist and Status of Federal Aviation Regulations.

(2) AC 00-44, Status of Federal Aviation Regulations.

(3) AC 70-2, Airspace Utilization Considerations in the Proposed Construction, Alteration, Activation and Deactivation of Airports.

(4) AC 70/7460-1, Obstruction Marking and Lighting.

(5) AC 70/7460-2, Proposed Construction or Alteration of Objects That May Affect the Navigable Airspace.

(6) AC 150/5000-3, Address List for Regional Airports Divisions and Airports District Offices.

(7) AC 150/5190-4, A Model Zoning Ordinance to Limit Height of Objects Around Airports.

(8) AC 150/5320-6, Airport Pavement Design and Evaluation.

(9) AC 150/5340-19, Taxiway Centerline Lighting System.

(10) AC 150/5340-20, Installation Details and Maintenance Standards for Reflective Markers for Airport Runway and Taxiway Centerlines.

(11) AC 150/5340-24, Runway and Taxiway Edge Lighting System.

(12) AC 150/5345-12, Specification for L-801 Beacon.

(13) AC 150/5345-27, Specification for L-807 Eight-foot and Twelve-foot Unlighted or Externally Lighted Wind Cone Assemblies.

(14) AC 150/5345-48, Specification for Runway and Taxiway Edge Lights.

2. The following publications may be obtained from the National Fire Protection Association, Publications Sales Department, 470 Atlantic Avenue, Boston, Massachusetts 02210.

   a. NFPA Booklet Edition 403, Recommended Practice for Aircraft Rescue and Fire Fighting Services at Airports and Heliports.

   b. NFPA Booklet Edition 418, Standard on Roof-top Heliport Construction and Protection.

3. Requests for information on shipboard and mobile offshore helicopter facilities should be addressed to Chief, Office of Merchant Marine Safety, U.S. Coast Guard, 400 Seventh Street SW, Washington, D.C. 20590.

4. The following publications may be obtained from the Aerospace Industries Association, 1725 DeSales St. N.W., Washington, D.C. 20036.

   a. Directory of Helicopter Operators in the United States and Canada.

   b. Directory of Heliports in the United States, Canada, Puerto Rico, and Directory of Hospital Heliports.

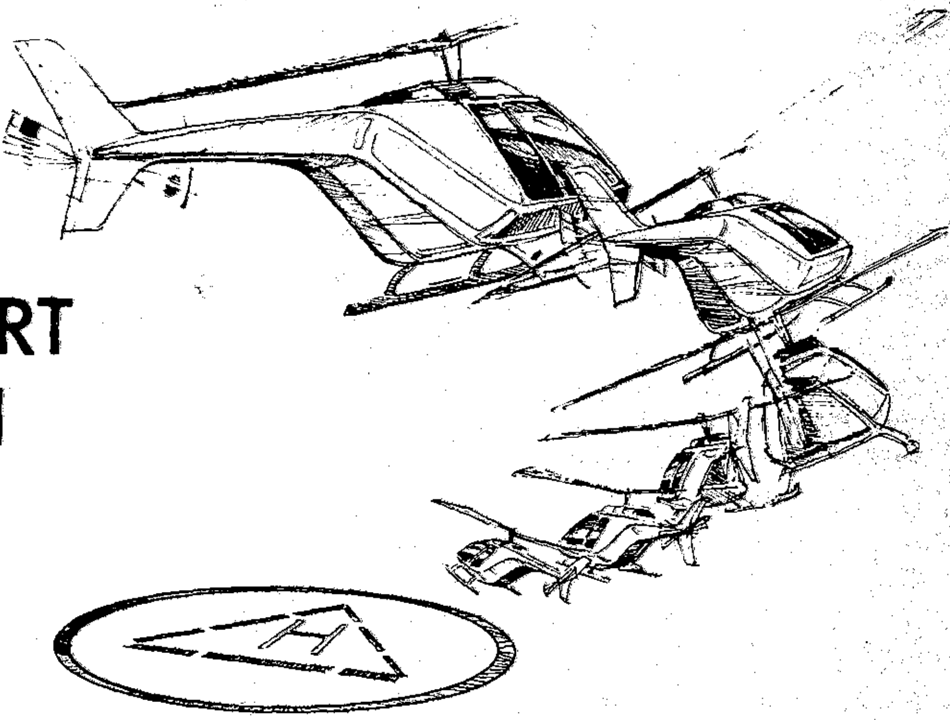
CONSOLIDATED REPRINT

This consolidated reprint incorporates Change 1

AC NO: 150/5390-1B

DATE: August 22, 1977

ADVISORY CIRCULAR



HELIPORT DESIGN GUIDE

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Initiated by: AAS-100

AC NO: 150/5390-1B

DATE: August 22, 1977

ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

SUBJECT: HELIPORT DESIGN GUIDE

1. PURPOSE. This advisory circular contains general and technical information pertaining to the establishment or improvement of a heliport.

2. CANCELLATION. Advisory Circular 150/5390-1A, Heliport Design Guide, dated November 5, 1969, is cancelled.

3. SCOPE. THE HELIPORT DESIGN GUIDANCE CONTAINED HEREIN IS ADVISORY IN NATURE AND IS BASED ON SOUND OPERATING PRACTICES IN EFFECT AT THE TIME OF PUBLICATION. When Federal aid is involved in the development of the heliport, the design criteria herein are the standard for complying with the requirements of Section 16(a) of the Airport and Airway Development Act of 1970, as amended.

4. ACKNOWLEDGEMENTS. This advisory circular incorporates a number of suggestions from the Heliport Research and Development Council of the Helicopter Association of America. Their contributions and cooperation in this endeavor are acknowledged.

5. EXPLANATION OF CHANGES. In addition to editorial and format changes and updating of references and helicopter data, this revision has incorporated the following significant actions:

   a. Chapter 3. The terms "public-use," "private-use," and "personal-use" have been adopted to classify non-Federal heliports. These terms are consistent with the terminology of FAR Part 157. They are also descriptive of the types of heliport usage.

   b. Chapter 4. A figure has been included to show the recommended separation between an airport helicopter takeoff and landing area and a runway.

Initiated by: AAP-560

c. Chapter 5. Dimensional criteria for the three heliport classifications have been consolidated into this chapter. The dimensions of the takeoff and landing area are fixed at 1.5 times the overall length of the largest helicopter expected to use the facility. The concept of a structurally stressed touchdown pad proportionate to the dimensions of the landing gear has been introduced.

d. Chapter 7. An exception to the standard heliport marking is the hospital marker, which has been revised to reflect an adjustment in colors. The chapter also suggests ways to mark a turfed heliport, paved helicopter parking positions, weight limited facilities, and closed heliports.

e. Chapter 8. The latest fire protection requirements of the National Fire Protection Association have been incorporated for both ground-level and elevated heliports.

f. Chapter 10. This chapter has been added to cover recommendations for the design of permanently fixed offshore helicopter facilities located in U.S. waters.

6. METRIC UNITS. To promote the orderly transition to metric units, the text and figures include both customary and metric units of measure. However, the metric unit may not be an exact conversion of the customary unit.

7. HOW TO OBTAIN ADDITIONAL COPIES OF THIS PUBLICATION. Additional copies of this advisory circular, AC 150/5390-1B, Heliport Design Guide, may be obtained free of charge from the Department of Transportation, Publications Section, TAD-443.1, Washington, D.C. 20590.

Joseph A. Foster

JOSEPH A. FOSTER
Assistant Administrator
Office of Airports Programs

TABLE OF CONTENTS

CHAPTER 1. INTRODUCTION

1. GENERAL. Heliports range from the minimal personal-use facility to the fully developed public-use facility capable of accommodating many helicopters. This advisory circular describes physical, technical, and public interest matters which should be considered in the planning or establishment of a heliport. Guidance is based on known helicopter performance and sound engineering and operating practices. It represents a summation of many years' experience at different types of heliports throughout the United States. VARIATIONS IN PROPOSED SITES MAY JUSTIFY REASONABLE DEVIATIONS FROM THE DIMENSIONAL VALUES CONTAINED HEREIN. Any justification for deviation must be balanced against the effect it would have on the safe use of the heliport when compared to other advantages of the site.

2. BACKGROUND. The first operationally practical American helicopter was developed just prior to World War II. In 1946, following wartime services with the military, helicopters were certificated for civilian operations. Continued advances in helicopter technology have encouraged helicopter operators to engage in a number of activities that capitalize on the helicopter's unique flight characteristics. Some of the more prominent civil activities are listed herewith and are depicted in Figures 1-1 through 1-7.

   a. Law Enforcement. State and municipal police and sheriffs' departments make extensive use of helicopters to monitor rush hour and special event traffic; routine patrol of commercial, industrial, and residential areas; and other crime abatement activities.

   b. Firefighting and High-Rise Evacuation. Helicopters are an invaluable aid in directing firefighting operations and in evacuating people from high-rise buildings. In fact, several United States cities have enacted ordinances requiring developers of high-rise structures to provide emergency landing facilities to facilitate helicopter evacuation.

   c. Air Ambulance. Helicopters are used in many areas to transport accident victims to hospitals and for interhospital transfer of the critically ill and injured.

   d. Search and Rescue. Helicopters are used in both land and sea search and rescue activities conducted by the U.S. Coast Guard and police and sheriffs' departments.

   e. Civil Emergencies. The helicopter is often the only vehicle capable of carrying out evacuation activities or for bringing in emergency supplies and personnel in times of major disaster such as flood, fire, earthquake, etc.

f. Executive and Business. Many firms are turning to the helicopter for both intracity and intercity transportation of executives, key employees, and high priority cargo.

g. Forestry. Federal and state forest services use helicopters extensively in their firefighting, reseeding, insect control, and forest management activities.

h. Aerial Application. Farmers and ranchers find helicopters to be effective in applying insecticides and herbicides to their crops and grazing lands. Helicopters are also used in public health disease control programs requiring large or less accessible areas to be sprayed with a specific insecticide.

i. Developing Mineral Resources. The mining and petroleum industry uses helicopters in exploration and production activities. The helicopter is frequently the fastest and most practical means of reaching a distant, offshore, or inaccessible site.

j. Construction. Construction firms use helicopters to visit job sites. Several helicopter operators provide the construction industry with "flying crane" services to lift, move, and place building air conditioning equipment, power lines, antennas, concrete, etc., in locations that are difficult or impossible to reach with conventional hoisting equipment. Utility companies use helicopters for transmission and pipeline patrol.

k. Public Transportation. Helicopter air taxi service is available in a number of U.S. metropolitan areas.

3. AERODYNAMIC PRINCIPLES. The operational characteristics of a helicopter differ considerably from those of an airplane, yet both employ the aerodynamic principle of moving an airfoil through the air to achieve lift. An airplane utilizes forward motion to attain airflow over the airfoil (wings) for lift while the helicopter rotates the airfoil (rotor blades) to achieve the same condition. A relatively large ground area is required for an airplane takeoff run and landing roll. The helicopter, however, is capable of initiating and terminating forward flight from a hover position over a ground area little larger than itself. This difference in area requirements has a significant impact upon heliport design.

4. HELICOPTER AIRWORTHINESS. All civil helicopters manufactured or operated in the U.S. must meet the airworthiness requirements of the FAA before being certificated for operation. In addition, every operating civil helicopter must, at all times, have a valid airworthiness certificate indicating that it meets the safety standards prescribed by the regulations.

5. HELICOPTER CONFIGURATIONS. Helicopter designs vary considerably. The more usual terms used in describing helicopters are: single or tandem rotored, single engined or multiengined, piston or turbine engined. Figures 1-8 through 1-11 illustrate some of these configurations. Appendix 2 contains dimensional and design information on the latest helicopter models.

6. HELICOPTER WEIGHTS. Helicopter weights are indicative of physical size and load-carrying ability. Helicopters vary from 1-place machines with gross weights of 750 pounds (340 kg) to 47-place machines with gross weights of 50,000 pounds (22 680 kg) with even larger helicopters predicted for the future. The majority of helicopters in the current civil fleet are of the 2- to 5-place category.

7. HELICOPTER SPEEDS AND ALTITUDES. Helicopters are capable of operating at speeds ranging from zero (hovering flight) to in excess of 200 miles per hour (320 km/h). This wide range of operating speeds permits helicopters to operate safely under weather conditions that would normally limit the airplane. Many helicopters have the capability to operate at elevations in excess of 10,000 feet (3 000 m) above mean sea level. However, most helicopter flights are conducted within 1,500 feet (450 m) of the earth's surface.

8. HELICOPTER OPERATIONS. Generally, helicopters make an approach to, or a departure from, a hover position a few feet (meters) above the heliport's designated takeoff and landing area. While hovering, the helicopter may be moved forward, backward, or sideways, or may be turned about. These maneuvers are used to place the arriving helicopter in the most desired position for touchdown. These maneuvers are also used by the pilot of the departing helicopter to position the helicopter prior to accelerating forward and upward. When the heliport is designed to have separate parking facilities, helicopters will normally be hover taxied between the designated takeoff and landing area and the individual parking positions.

9. SAFETY FEATURES. The helicopter has several unique safety features. A major one is the ability to hover within a few feet (meters) of the ground while the pilot determines that all systems are functioning properly and that the helicopter is properly loaded for safe flight. Another safety feature, autorotation, permits a helicopter to be flown to a safe landing in the event of engine failure. In autorotation the main rotor continues to turn producing lift as the air passes upward through the rotor. The kinetic energy stored in the freewheeling rotor allows the rate of descent and forward motion to be reduced permitting a safe landing.

10. DEFINITIONS. The following definitions apply to terms used in this publication. (Definitions of FAR terms have been reprinted verbatim.)

a. Aircraft. A device that is used or intended to be used for flight in the air. (FAR Part 1)

b. Airport. An area of land or water that is used or intended to be used for the landing and takeoff of aircraft, and includes its buildings and facilities, if any. (FAR Part 1)

c. Approach-Departure Path. The flight track of the helicopter as it approaches or departs from the heliport's designated takeoff and landing area.

d. Autorotation. A rotorcraft flight condition in which the lifting rotor is driven entirely by action of the air when the rotorcraft is in motion. (FAR Part 1) (See paragraph 9.)

e. Downwash. The volume of air moved downward by the action of the rotating main (lift) rotor. When downwash strikes the ground or some other solid surface, it causes a turbulent outflow of air from beneath the helicopter.

f. Enroute Altitude. The cruising altitude maintained by the helicopter along the route of flight between origin and destination.

g. Ground Effect. An improvement in flight capability that develops whenever the helicopter flies or hovers near the ground or other surface. It results from the cushion of denser air built up between the ground and the helicopter by the air displaced downward by the rotor.

h. Helicopter. A rotorcraft that, for its horizontal motion, depends principally on its engine-driven rotors. (FAR Part 1) (See paragraphs 3 and 8.)

i. Helicopter Landing Site. A location used for helicopter takeoffs and landings on a one-time, a temporary, or an infrequent basis.

j. Heliport. An area of land, water, or structure used or intended to be used for the landing and takeoff of helicopters. (FAR Part 1)

k. Heliport 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 for civil heliports and 10 to 1 for military heliports. (FAR Part 77) (See paragraph 55.)

l. Heliport Elevation. The elevation of the takeoff and landing area and the heliport primary surface.

m. Heliport Primary Surface. The area of the primary surface coincides in size and shape with the designated takeoff and landing area of a heliport. This surface is a horizontal plane at the elevation of the established heliport elevation. (FAR Part 77)

n. Heliport Transitional Surfaces. These surfaces extend outward and upward from the lateral boundaries of the heliport primary surface and from the 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. (FAR Part 77) (See paragraph 55.)

o. Hover. A flight characteristic peculiar to helicopters and certain other aircraft which enables them to remain motionless above a fixed point on the earth's surface.

p. Hover Taxi. The very low level, slow flight of a helicopter.

q. Instrument Approach Procedure. A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made using visual procedures.

r. Instrument Flight Rules (IFR). Rules that govern the procedures for conducting instrument flight.

s. Parking Area (Apron or Ramp). A defined area on the heliport intended to accommodate helicopters for purposes of loading or unloading passengers or cargo, refueling, parking, or maintenance.

t. Perimeter Lights. A system of lights defining the perimeter of a heliport takeoff and landing area.

u. Peripheral Area. An obstruction-free area adjacent to the takeoff and landing area serving as a safety zone.

v. Takeoff and Landing Area. A designated area on the heliport which is coincident with the heliport primary surface and the boundaries of which are used to establish the FAR Part 77.29 imaginary surfaces. These surfaces are used for determining obstructions to air navigation (see paragraph 55). As such, it is the heliport area from which helicopter departures and approaches are intended to originate or terminate.

w. Taxiing. The powered movement of the helicopter from one area to another; i.e., from the takeoff and landing area to the parking area. Helicopters equipped with skid- or float-type landing gear must hover taxi, while helicopters equipped with wheeled landing gear may taxi with wheels in contact with the ground.

x. Taxiway. A designated, but not necessarily paved, path or route for helicopters to taxi from one heliport area to another.

y. Terminal Instrument Procedures. Procedures for instrument approach and departure of aircraft to and from civil and military airports.

z. Touchdown Pad. The load-bearing portion of the heliport's designated takeoff and landing area on which a helicopter may alight.

aa. UNICOM. An air-to-ground radio communication facility providing advisory information on airport and heliport services and utilization. Locations and frequencies of UNICOMs are shown on aeronautical charts and publications.

bb. Visual Flight Rules (VFR). Rules that govern the procedures for conducting flight under visual conditions.

11-19. RESERVED.

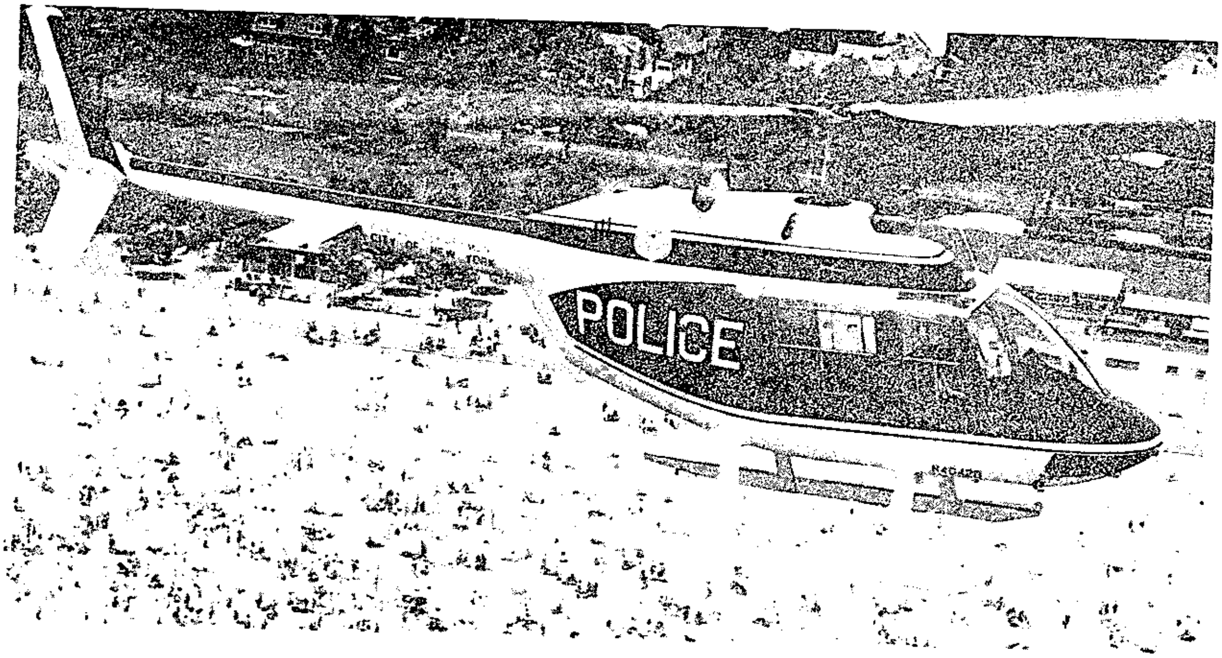


FIGURE 1-1. POLICE HELICOPTER PATROL PASSING OVER A PUBLIC BEACH

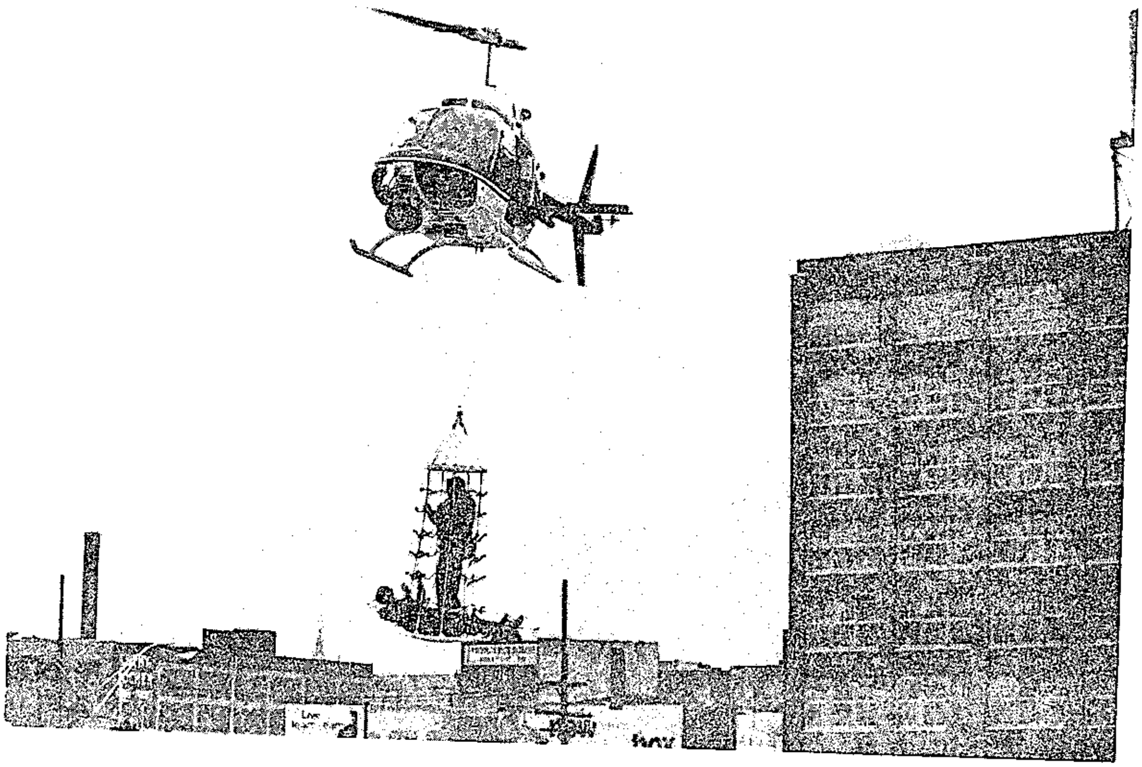


FIGURE 1-2. ACCIDENT VICTIM BEING EVACUATED WITH THE "BILLY PUGH" RESCUE NET

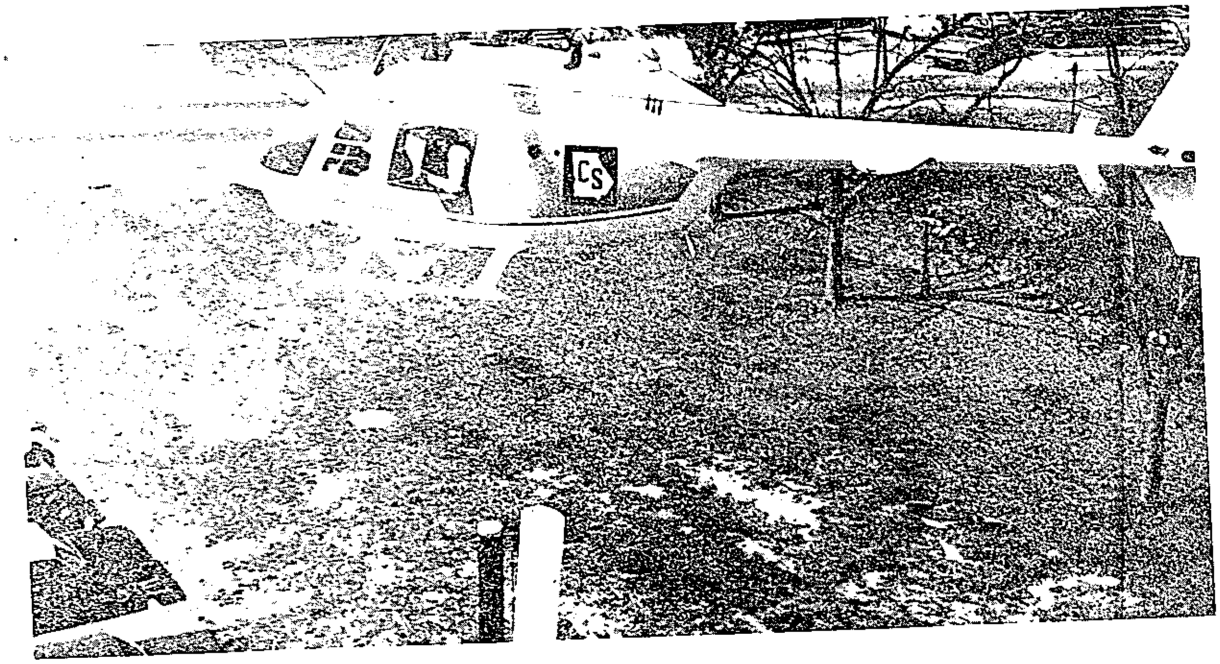


FIGURE 1-3. A HELICOPTER PICKUP AND DELIVERY SERVICE

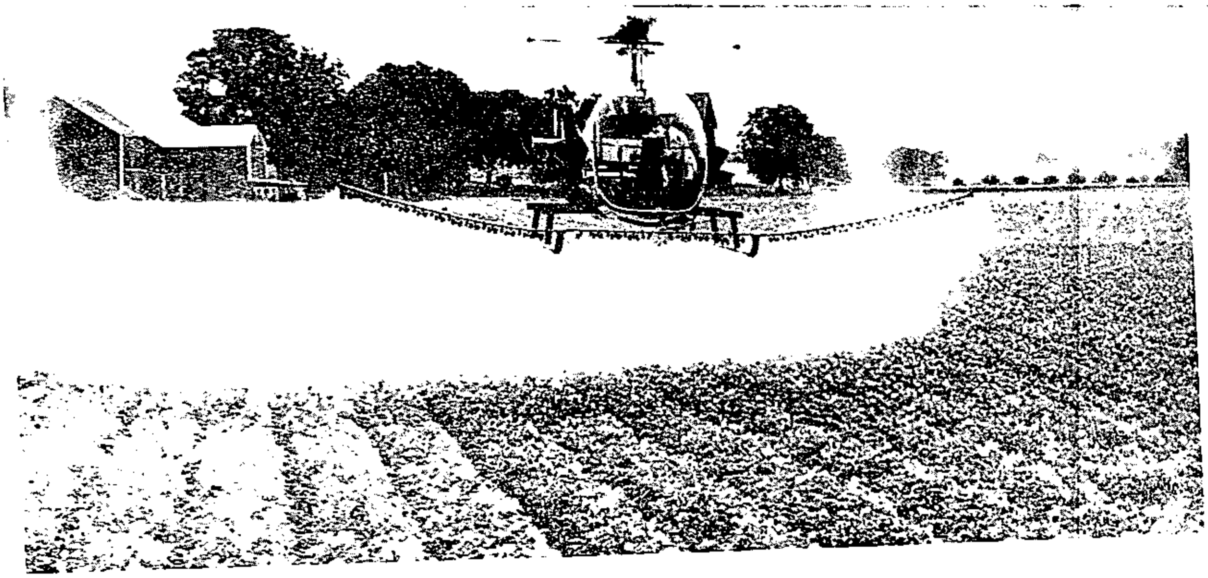


FIGURE 1-4. HELICOPTER DISPENSING INSECTICIDES

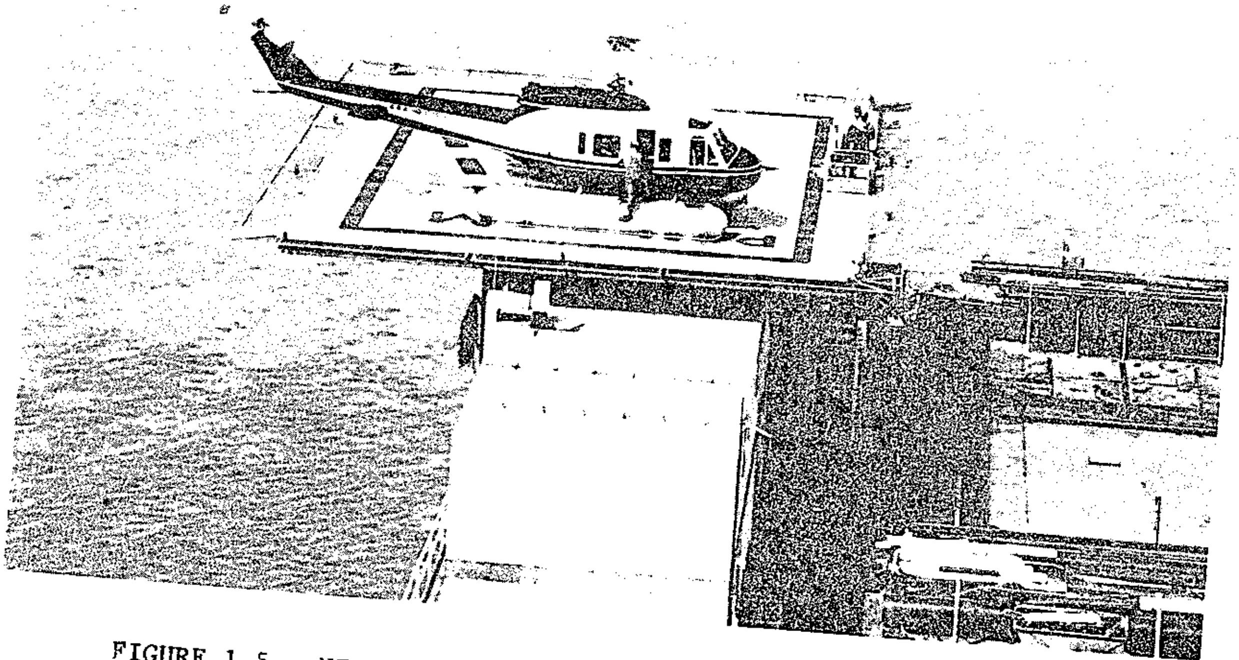


FIGURE 1-5. HELICOPTER TRANSPORTING OFFSHORE DRILLING CREW

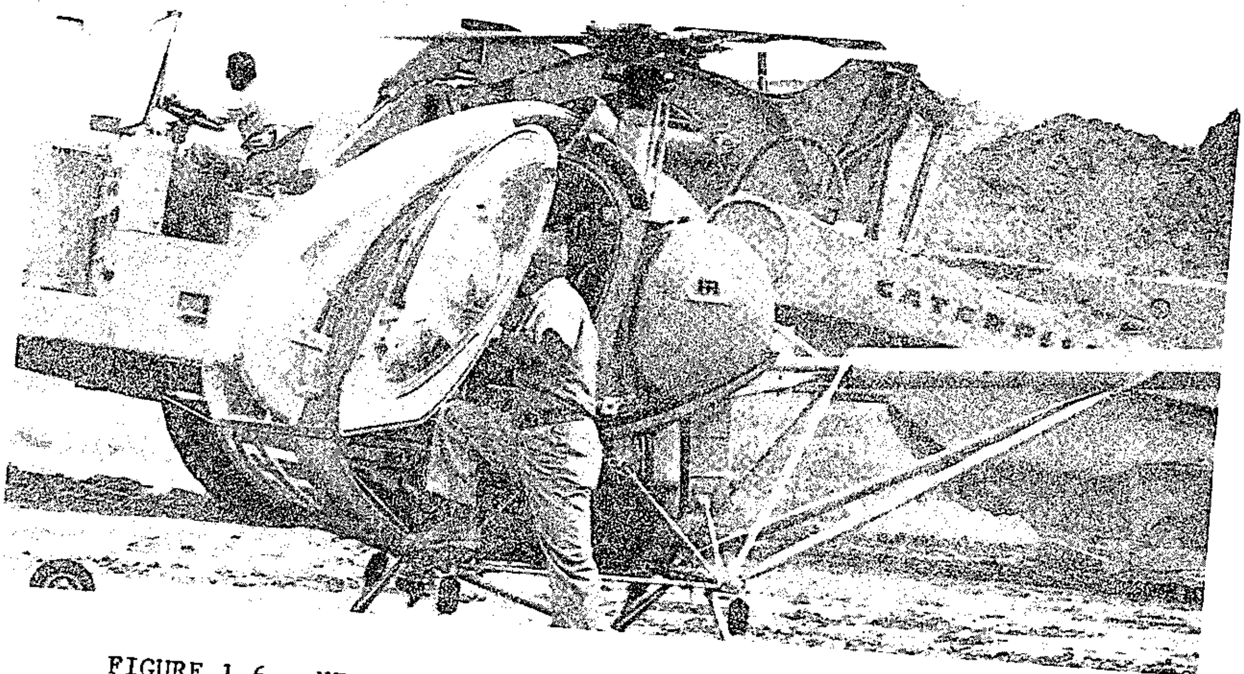


FIGURE 1-6. HELICOPTER PROVIDING TRANSPORTATION TO A CONSTRUCTION SITE

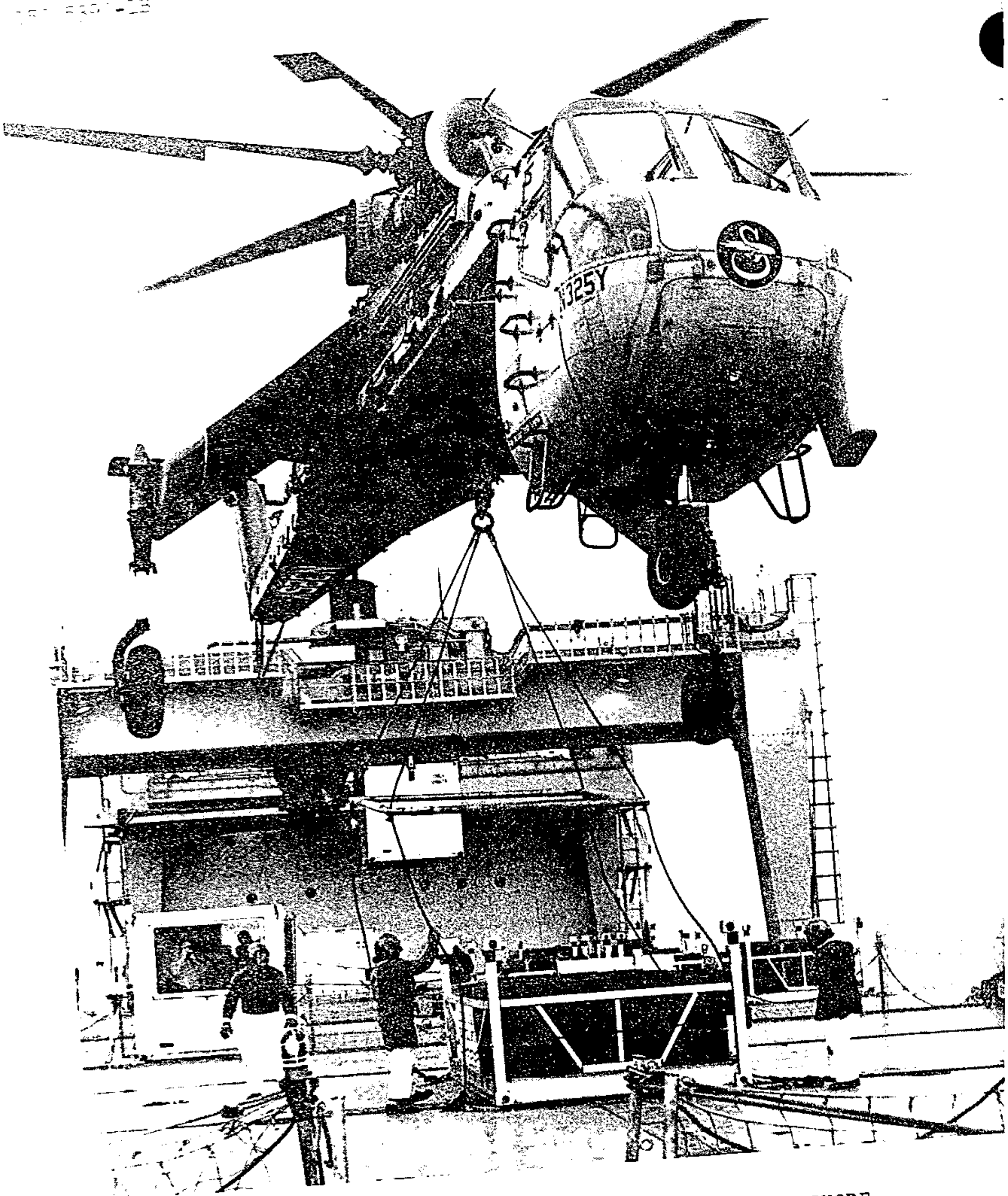


FIGURE 1-7. HELICOPTER MOVING CARGO FROM SHIP TO SHORE

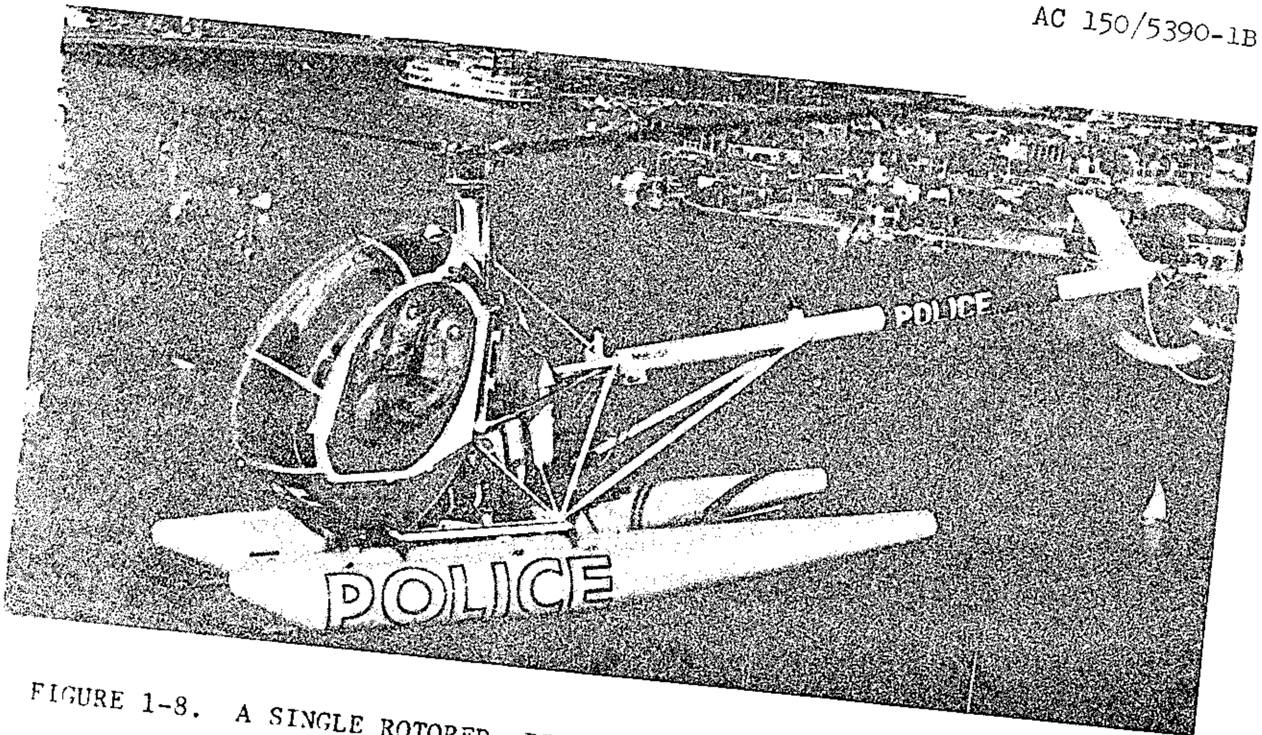


FIGURE 1-8. A SINGLE ROTORED, PISTON ENGINED HELICOPTER ON FLOATS

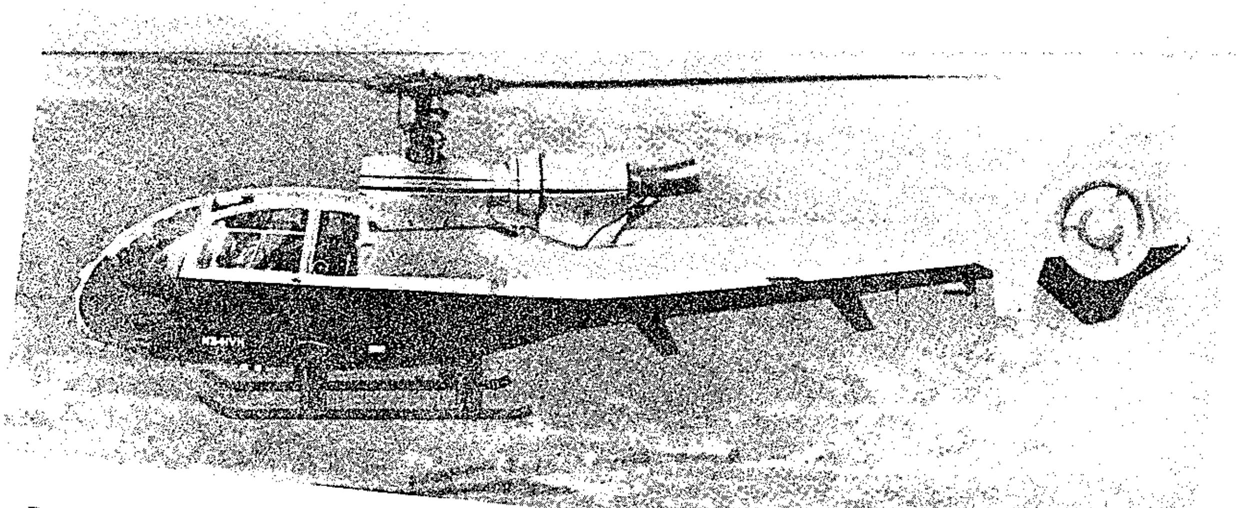


FIGURE 1-9. A SINGLE ROTORED, TURBINE ENGINED HELICOPTER ON SKIDS

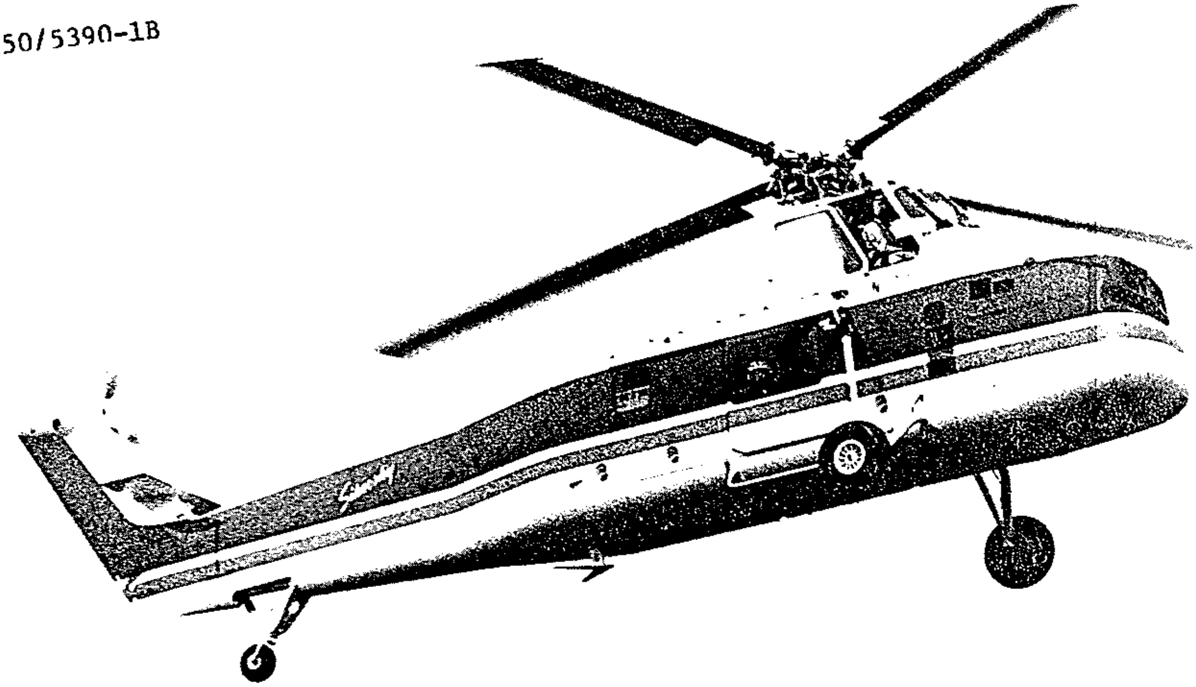


FIGURE 1-10. A SINGLE ROTORED, MULTITURBINE ENGINED HELICOPTER WITH WITH WHEELED GEAR

FIGURE 1-11. A TANDEM ROTORED, MULTITURBINE ENGINED HELICOPTER WI QUADRICYCLE WHEELED GEAR

CHAPTER 2. GOVERNMENTAL ROLE

20. GENERAL. Federal, state, and local governments have related but somewhat differing roles in the field of heliport development. Each has an obligation to assure that the public's interests are protected, yet each also has the responsibility to assist the public in developing a safe, efficient, and comprehensive transportation system. It is essential that heliport proponents contact FAA, state, and local authorities early in the planning stage in order to proceed with full knowledge of any regulatory requirements, assistance programs, or probable operational limitations. FAA offices and many state aviation departments are able to provide technical advice on heliport development and operations. Local governments frequently do not have heliport expertise, and proponents may find it necessary to explain the special nature of helicopter operations and how local approval will benefit the community. Locations of FAA Airports offices are found in AC 150/5000-3, Address List for Regional Airports Divisions and Airports District Offices.

21. FEDERAL ROLE. The Federal Government, through the FAA, has established standards for heliport development and rules for helicopter operations. Through its Federal Aviation Regulations (FAR), the FAA prescribes various requirements that must be observed by the heliport owner and helicopter operator which affect heliport development. The regulations are comprehensive and concern such matters as minimum safe altitudes, ceiling and visibility limitations, aircraft and pilot licensing, and related standards appropriate to assure the safety of persons and property both in the air and on the ground. The purpose for such broad regulations is to achieve safety through the uniform and standardized control of aviation operations.

22. FEDERAL AVIATION REGULATIONS (FAR). Specific regulations of interest to heliport developers are as follows:

    a. FAR Part 157. Section 309 of the Federal Aviation Act of 1958 states, "In order to assure conformity to plans and policies for, and allocations of, airspace by the Secretary of Transportation under section 307 of this Act, no airport or landing area not involving expenditure of Federal funds shall be established, or constructed, or any runway layout substantially altered unless reasonable prior notice thereof is given the Secretary of Transportation, pursuant to regulations prescribed by him, so that he may advise as to the effects of such construction on the use of airspace by aircraft." The FAA has published FAR Part 157, Notice of Construction, Alteration, Activation, and Deactivation of Airports, to carry out this responsibility. The notification requirement applies to heliports. Failure to provide notice as required would violate Section 901 of the Federal Aviation Act and subject the violator to a civil penalty not to exceed $1,000.

(1) Notification Procedure. FAA Form 7480-1 which is used in giving notice is available from any FAA regional or Airports District Office. The completed form, together with a sketch of the proposed heliport and a map showing its location, should be returned to the regional or district office at least 90 days before construction is to begin. A ground inspection and a flight check may be made by the FAA. The submitted information and inspection report will be used by the FAA in evaluating the effect of the proposed heliport on the safe and efficient use of the Nation's navigable airspace. Figures 2-1 through 2-3 illustrate a form, sketch, and location map submission for a hypothetical heliport development. It is recommended that a location map comparable to the U.S. Geological Survey quadrangle map be used so that the exact location of the heliport can be determined.

(2) Notification Exception. A helicopter landing site which is temporary in nature and intended to be used only in visual flight rules (VFR) weather conditions for a period of less than 30 consecutive days with not more than 10 operations a day is exempt from the requirement to give notice. The exemption is limited to the requirement of filing Form 7480-1 with the FAA and does not negate any notification required by state or local law.

(3) Explanatory Guidance. Advisory Circular 70-2, Airspace Utilization Considerations in the Proposed Construction, Alteration, Activation and Deactivation of Airports, points out the importance of giving notice and describes some of the airspace utilization consideration factors. The circular also lists addresses of FAA regional and FAA Airports District Offices.

b. FAR Part 77. Section 307(a) of the Federal Aviation Act of 1958 states, "The Secretary of Transportation is authorized and directed to develop plans for and formulate policy with respect to the use of the navigable airspace; and assign by rule, regulation, or order the use of the navigable airspace under such terms, conditions, and limitations as he may deem necessary in order to insure the safety of aircraft and the efficient utilization of such airspace. He may modify or revoke such assignment when required in the public interest." The FAA has published FAR Part 77, Objects Affecting Navigable Airspace, to carry out this responsibility. Notice is required by 72 Stat. 797, 49 U.S.C. 1501 as implemented through Subchapter E, Airspace, of Title 14 of the Code of Federal Regulations, Part 77. Persons who knowingly and willfully fail to comply with the provisions of FAR Part 77 are liable to a fine of $500 for the first offense with increased penalties thereafter as provided by Section 902(a) of the Federal Aviation Act of 1958 as amended.

(1) Notification Procedure. FAA Form 7460-1 which is used in giving notice is available from any FAA regional or Airports District Office. The completed form should be returned to the appropriate FAA regional Air Traffic Division office at least 30 days before the start of construction or application for a building permit. The proposal is studied and the proponent is advised as to the effect the intended structure would have on the navigable airspace. Figures 2-4 and 2-5 illustrate a Form 7460-1 and sketch submission for the erection of a sign using the heliport example of Figure 2-2.

(2) Notice Requirements. Notice is required of anyone proposing the construction or alteration of any structure of more than 200 feet (61 m) in height above the ground level at its site, or which would penetrate an imaginary surface that extends outward and upward at a slope of 25 to 1 (horizontal to vertical) for a horizontal distance of 5,000 feet (1 524 m) from the nearest edge of the landing and takeoff area of any heliport available for public use. Public-use heliports are listed in the Airman's Information Manual and are shown on aeronautical charts.

(3) Explanatory Guidance. Advisory Circular 70/7460-2, Proposed Construction or Alteration of Objects That May Affect the Navigable Airspace, provides advice to persons proposing to erect or alter an object that may affect the navigable airspace of the requirement to submit a notice to the FAA. It also contains the addresses of FAA regional offices.

c. FAR Part 139. Heliports serving Civil Aeronautics Board-certificated helicopter air carriers are obligated to meet the requirements of FAR Part 139, Certification and Operations: Land Airports Serving CAB-Certificated Air Carriers.

d. FAR Parts 27 and 29. These parts set out airworthiness standards for normal and transport category rotorcraft (see Bibliography for titles of the parts).

e. FAR Parts 91, 121, 127, 133, and 135. These parts prescribe operating rules that are to be followed by helicopter operators (see Bibliography for titles of the parts).

f. FAR Part 152. This part, Airport Aid Program, prescribes policies and procedures for administering Federal funds for Airport Development Aid Program (ADAP) and Planning Grant Program (PGP) projects under the Airport and Airway Development Act of 1970, as amended. The program provides grant funds to public agencies such as states, territories, counties, municipalities, or other tax-supported organizations to plan, construct, or improve a public-use airport. A project for heliport development may be approved if it is listed or could be listed in the current National Airport System Plan (NASP), which identifies locations and project development considered necessary to the national airport system. FAA Airports Divisions or Airports District Offices should be contacted for NASP, ADAP, or PGP guidance.

23. ENVIRONMENTAL CONSIDERATIONS. An environmental assessment is required for all federally assisted heliport development in accordance with the requirements of the National Environmental Policy Act of 1969 and the Airport and Airway Development Act of 1970, as amended. Consult with an FAA Airports office for guidance on this important aspect of heliport development.

24. STATE ROLE. Many state aeronautics commissions or similar authorities require prior approval, and in some instances a license, for the establishment and operation of a heliport. Requirements will vary from state to state. Some state requirements apply only to public-use heliports, whereas others apply to any heliport. A few states administer financial grant programs similar to the Federal program for airport development. Heliport proponents should contact their respective state aviation departments for particulars on licensing or assistance programs.

25. LOCAL ROLE. Most communities have zoning laws, building codes, fire regulations, or similar ordinances. Some have, or are in the process of developing, ordinances covering environmental matters such as noise and air pollution. A few may have specific rules or regulations governing the establishment and operation of airports (heliports). Therefore, a careful study should be made to determine whether local laws, rules, and regulations permit the establishment and operation of a heliport. It is also important to determine if these same laws permit helicopter landings to be made at places other than a heliport on a one-time, temporary, or infrequent basis without formally declaring the site a heliport.

26-29. RESERVED.

Form Approved. OMB No. 04-R0094

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

NOTICE OF LANDING AREA PROPOSAL

☒ ESTABLISHMENT OR ACTIVATION
☐ ALTERATION
☐ DEACTIVATION OR ABANDONMENT
☐ CHANGE OF STATUS

OF ☐ AIRPORT ☒ HELIPORT ☐ SEAPLANE BASE

NAME OF PROPONENT, INDIVIDUAL OR ORGANIZATION	ADDRESS (No., Street, City, State, Zip Code)
HAAP Company	7090 Richardson Road, Stand, DV. 00560

A. LOCATION OF LANDING AREA

1. NEAREST CITY OR TOWN	2. COUNTY		3. STATE	4. DISTANCE & DIRECTION FROM NEAREST CITY OR TOWN	
Stand	Ards		DV.		
5. NAME OF LANDING AREA	**6. LATITUDE**	**7. LONGITUDE**	**8. ELEVATION**	**MILES**	**DIRECTION**
HAAP Company Heliport	28 °25 '02"	76 °10 '12"	50 feet	2	East

B. PURPOSE

TYPE USE	TYPE OWNERSHIP	LOCALITIES SERVED	IF CHANGE OF STATUS OR ALTERATION, DESCRIBE CHANGE.	CONSTRUCTION DATES
☐ PUBLIC ☒ PRIVATE ☐ PERSONAL	☐ PUBLIC ☒ PRIVATE	None	Not Applicable	TO BEGIN/BEGAN: 6/1/76 EST. COMPLETION: 7/1/76

C. OTHER LANDING AREAS (REF. AS ABOVE)

	DRCT. FROM LANDING AREA	DIST. FROM LANDING AREA
Stand-Ards Field	S	9mi.
Meehan Hospital Heliport	NNE	4500'

D. LANDING AREA DATA

1. AIRPORT OR SEAPLANE BASE

	EXISTING (If any)	PROPOSED
MAGNETIC BEARING OF RUNWAY(S) OR SEALANE(S)		
LENGTH OF RUNWAY(S) OR SEALANE(S) IN FEET		
WIDTH OF RUNWAY(S) OR SEALANE(S) IN FEET		
MAGNETIC BEARING OF PRIMARY LANDING DIRECTION		
TYPE OF RUNWAY SURFACE (Concrete, Asphalt, Grass, Etc.)		

2. HELIPORT

	EXISTING (If any)	PROPOSED
DIMENSIONS OF LANDING AND TAKEOFF AREA IN FEET		100'x100'
DIMENSIONS OF TOUCHDOWN AREA IN FEET		50'x50'
MAGNETIC DIRECTION OF INGRESS/EGRESS ROUTES		80°-260°
TYPE OF SURFACE (Turf, rooftop, etc.)		Asphalt

3. ALL — DESCRIPTION OF LIGHTING (If any): None — DIRECTION OF PREVAILING WIND: N/S

E. OBSTRUCTIONS

TYPE	HEIGHT ABOVE LANDING AREA	DRCT. FROM LANDING AREA	DIST. FROM LANDING AREA
Office Building	30'	E	100'
Trees	25'	S	200'
Factory Building	30'	N	200'

F. OPERATIONAL DATA

		PRESENT (If est. indicate by letter "E")	ANTICIPATED 5 YRS. HENCE
1. EST. OR ACTUAL NO. BASED ACFT.			
AIRPORTS	MULTI-ENGINE		
	SINGLE-ENGINE		
HELIPORTS	UNDER 3500 LBS. MGW	0	0
	OVER 3500 LBS. MGW	0	0
2. AVERAGE NO. MONTHLY LANDINGS			
	AIR CARRIER		
	GENERAL AVIATION	20 E	20 E
	OTHER (Military, glider, etc.)		

3. ARE IFR OPERATIONS ANTICIPATED ☒ NO ☐ YES WITHIN____YEARS — TYPE NAVAID:

G. NOISE CONSIDERATIONS

IDENTIFICATION	DRCT. FROM LANDING AREA	DIST. FROM LANDING AREA
Meehan Hospital	NNE	4500'
St. Butler's Church	SSE	3000'
Mudd School	SW	4200'
Residences (All directions)		2000'

H. APPLICATION FOR AIRPORT LICENSING

☒ HAS BEEN MADE ☐ NOT REQUIRED ☐ COUNTY
☐ WILL BE MADE ☒ STATE ☒ MUNICIPAL AUTHORITY

I. CERTIFICATION: *I hereby certify that all of the above statements made by me are true and complete to the best of my knowledge.*

8. NAME AND TITLE OF PERSON FILING THIS NOTICE (Type or Print)	9. SIGNATURE (In ink)	
Lauretta Foy Chief Pilot, HAAP Co.	Lauretta Foy	
	10. DATE OF SIGNATURE	**11. TELEPHONE NO. (Precede with area code)**
	2/25/76	(817) 362-4202

FAA FORM 7480-1 (1-77)

FIGURE 2-1. EXAMPLE OF NOTICE REQUIRED BY FAR PART 157

p 2

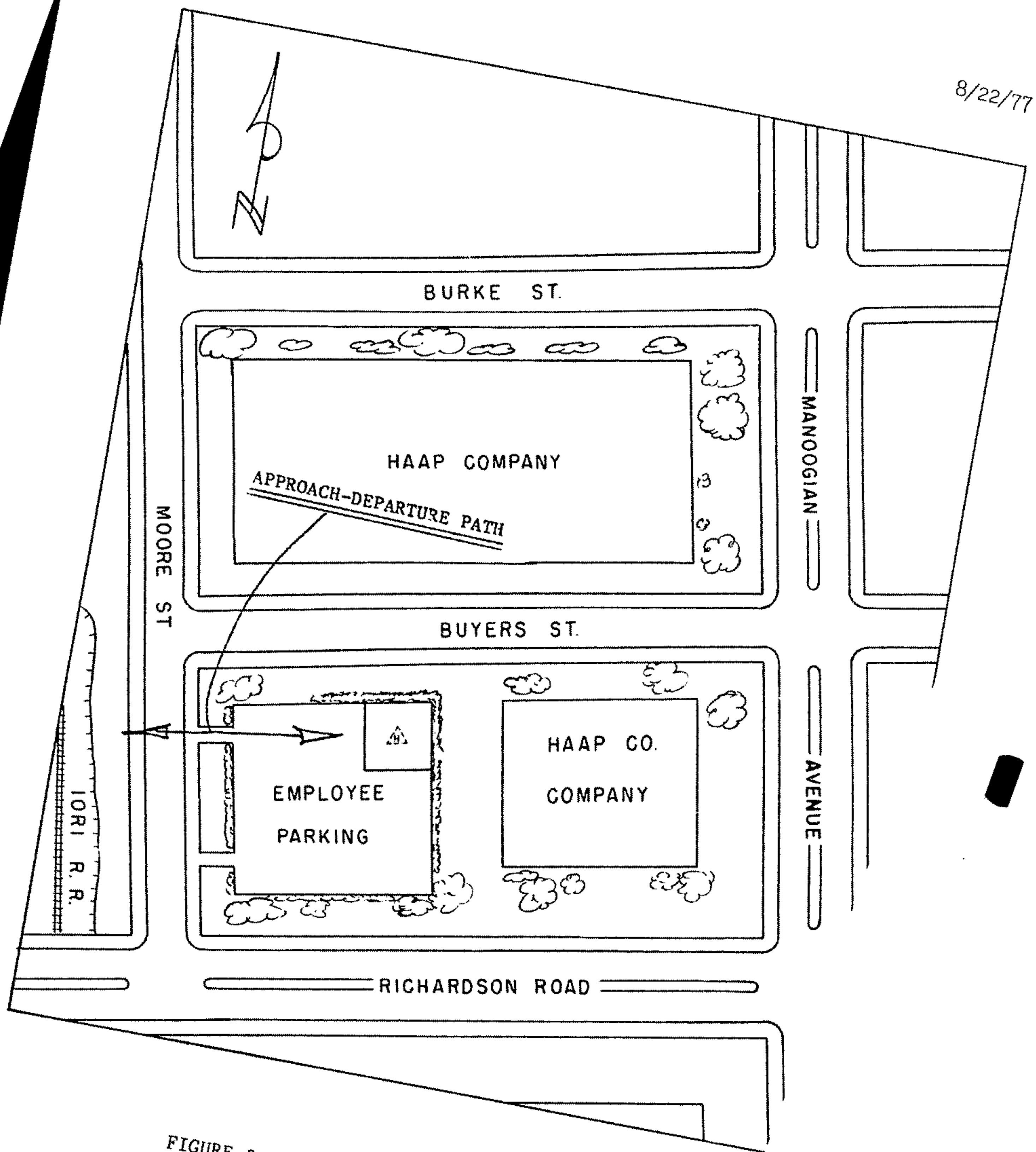


FIGURE 2-2. EXAMPLE - HELIPORT LAYOUT SKETCH

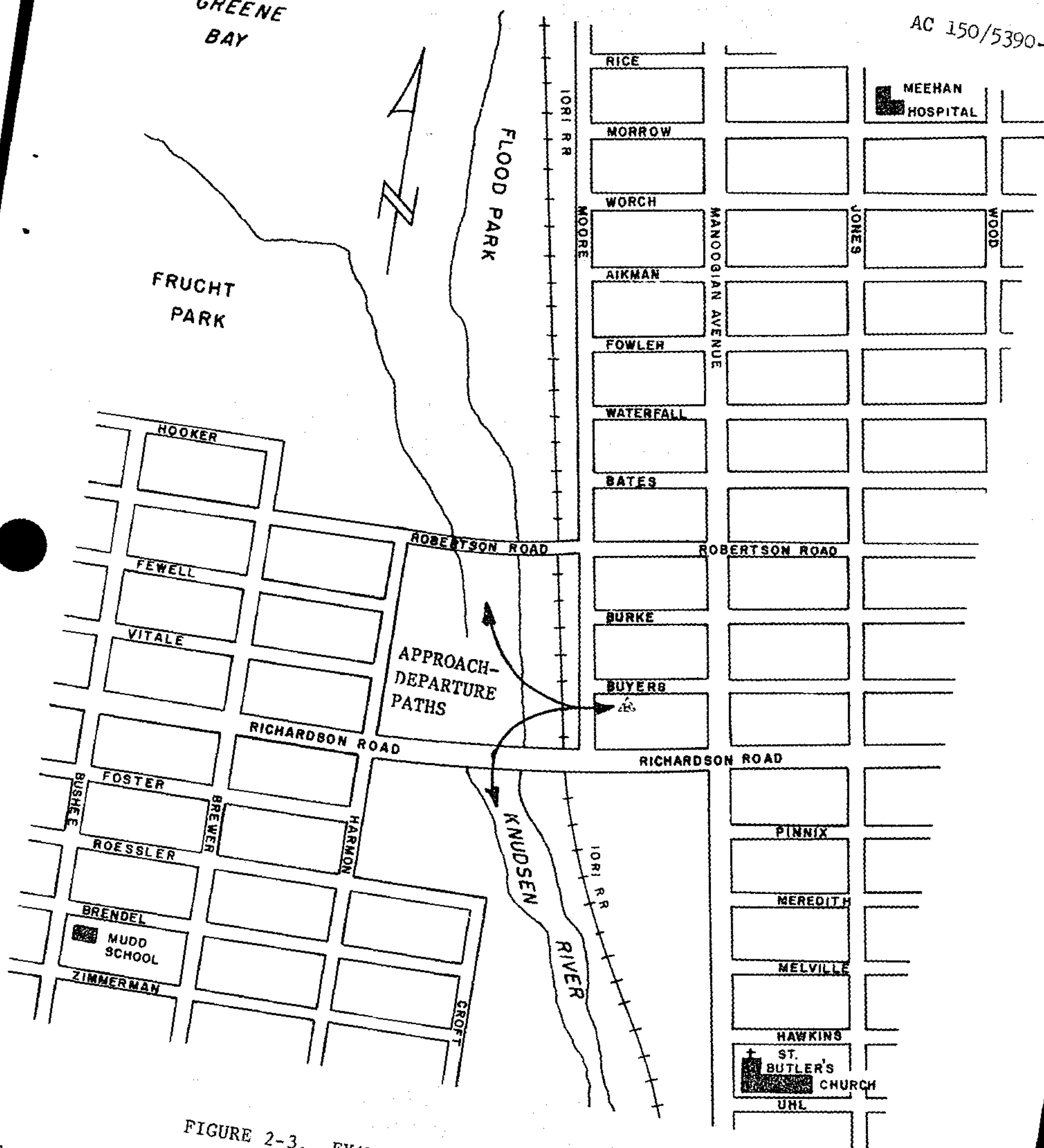


FIGURE 2-3. EXAMPLE - HELIPORT LOCATION MAP

DO NOT REMOVE CARBONS

Form Approved. O.M.B. No 004-R0001

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION

FOR FAA USE ONLY
AERONAUTICAL STUDY NO.

FAA will either return this form or issue a separate acknowledgement.
The proposed structure:
☐ Does not require a notice to FAA.
☐ Would not exceed any obstruction standard of Part 77 and would not be a hazard to air navigation.
☐ Should be obstruction ☐ marked ☐ lighted per FAA Advisory Circular 70/7460-1, Chapter(s)
☐ Obstruction marking and lighting are not necessary.
☐ Requires supplemental notice. Use FAA form enclosed.
FCC was ☐ was not ☐ advised.
REMARKS:
ISSUING OFFICE:
REVIEWING OFFICER: DATE:

1. NATURE OF STRUCTURE (*Complete both A and B below*)

A. (*Check one*)
☒ NEW CONSTRUCTION ☐ ALTERATION

B. (*Check one*)
☒ PERMANENT ☐ TEMPORARY (*State length of time*) ______ Mos.

2. NAME AND ADDRESS OF INDIVIDUAL, COMPANY, CORPORATION, ETC. PROPOSING THE CONSTRUCTION OR ALTERATION (*Number, Street, City, State and Zip Code*)

TO HAAP Company
7090 Richardson Road
Stand, DV. 00560

3. TYPE AND COMPLETE DESCRIPTION OF STRUCTURE

Erect a lighted company sign.

4. LOCATION OF STRUCTURE

A. COORDINATES (*To nearest second*)

LATITUDE °	'	"	LONGITUDE °	'	"
28	25	02	76	10	11

B. NEAREST CITY OR TOWN, AND STATE: Stand, DV.
(1) DISTANCE FROM 4B: 2 MILES
(2) DIRECTION FROM 4B: East

C. NAME OF NEAREST AIRPORT, HELIPORT, OR SEAPLANE BASE: HAAP Company Heliport (PvE)
(1) DISTANCE FROM NEAREST POINT OF NEAREST RUNWAY: 400 feet
(2) DIRECTION FROM AIRPORT: East

D. DESCRIPTION OF LOCATION OF SITE WITH RESPECT TO HIGHWAYS, STREETS, AIRPORTS, PROMINENT TERRAIN FEATURES, EXISTING STRUCTURES, ETC. (*Attach a highway, street, or any other appropriate map or scaled drawing showing the relationship of construction site to nearest airport(s). If more space is required, continue on a separate sheet of paper and attach to this notice.*)

Sign will be located on the far corner of the HAAP Company office building roof as per the attached sketch.

5. HEIGHT AND ELEVATION (*Complete A, B and C to the nearest foot*)

A. ELEVATION OF SITE ABOVE MEAN SEA LEVEL	50'
B. HEIGHT OF STRUCTURE INCLUDING APPURTENANCES AND LIGHTING (if any) ABOVE GROUND, OR WATER IF SO SITUATED	40'
C. OVERALL HEIGHT ABOVE MEAN SEA LEVEL (A+B)	90'

6. WORK SCHEDULE DATES
A. WILL START: 12/1/76
B. WILL COMPLETE: 12/31/76

7. OBSTRUCTION MARKED AND/OR LIGHTED IN ACCORDANCE WITH CURRENT FAA ADVISORY CIRCULAR 70/7460-1, OBSTRUCTION MARKING AND LIGHTING

	YES	NO
A. MARKED		X
B. AVIATION RED OBSTRUCTION LIGHTS		X
C. HIGH INTENSITY WHITE OBSTRUCTION LIGHTS		X
D. DUAL LIGHTING SYSTEM		X

I HEREBY CERTIFY that all of the above statements made by me are true, complete, and correct to the best of my knowledge.

8. NAME AND TITLE OF PERSON FILING THIS NOTICE (*Type or Print*)
Jean Ross Howard
Secretary-Treasurer
HAAP Company

9. SIGNATURE (*In ink*): Jean Ross Howard

10. DATE OF SIGNATURE: 10/6/76

11. TELEPHONE NO. (*Precede with area code*): (718) 362-4202

Persons who knowingly and willfully fail to comply with the provisions of the Federal Aviation Regulations Part 77 are liable to a fine of $500 for the first offense, with increased Penalties thereafter as provided by Section 902(a) of the Federal Aviation Act of 1958 as amended.

FAA Form 7460-1 (11-72) SUPERSEDES PREVIOUS EDITION

DO NOT REMOVE CARBONS

FIGURE 2-4. EXAMPLE OF NOTICE REQUIRED BY FAR PART 77

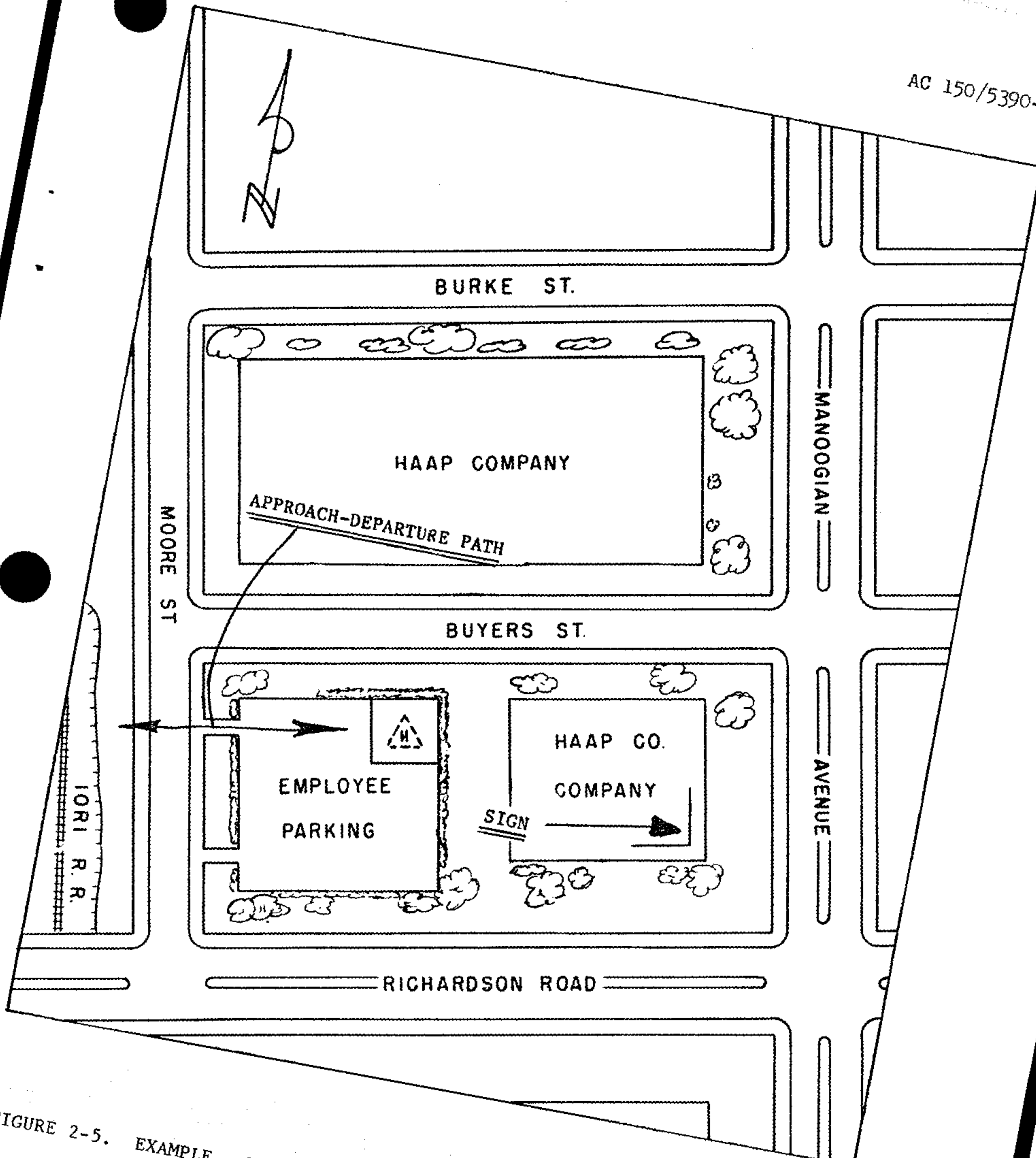


FIGURE 2-5. EXAMPLE - HELIPORT SKETCH SHOWING PROPOSED CONSTRUCTION LOCATION

CHAPTER 3. HELIPORT CLASSIFICATION

30. GENERAL. The terms used to classify United States heliports are descriptive of the class of user allowed to conduct flight operations from the facility. Photographs of representative heliport types are included as Figures 3-1 through 3-9.

31. MILITARY HELIPORT. The term "military heliport" is applied to heliport facilities operated by one of the uniformed services. Military heliports are developed in accordance with the design criteria of the applicable service and generally prohibit nonmilitary usage.

32. FEDERAL HELIPORT. The term "Federal heliport" is applied to heliport facilities operated by a nonmilitary agency or department of the United States Government. Most Federal heliports are operated by the Departments of Agriculture (DOA) and Interior (DOI). DOA and DOI heliports are located in national forests or national parks and are used to carry out departmental responsibilities for land management and fire suppression activities. Generally, DOA and DOI heliports are restricted to departmental usage.

33. PUBLIC-USE HELIPORT. The term "public-use heliport" is applied to any heliport that is open to the general public and does not require prior permission of the owner to land. However, the extent of facilities provided may limit operations to helicopters of a specific size or weight. A public-use heliport may be owned by a public agency, an individual, or a corporation so long as it is open for public use. Public-use heliports are listed in the Airman's Information Manual (AIM) and may be depicted on appropriate aeronautical charts.

34. PRIVATE-USE HELIPORT. The term "private-use heliport" is applied to any heliport that restricts usage to the owner or to persons authorized by the owner. Most private-use heliports are owned by individuals, companies, or corporations. However, a heliport designated as "private-use" may be owned by a public body. In this case, the private-use classification is applicable because the facility is restricted to a specific type of user, such as the police department, or because the owner requires prior permission to land. Hospital heliports are considered private-use facilities since operations are normally restricted to medical-related activities. Private-use heliports are not listed in the AIM but may be depicted on aeronautical charts.

35. PERSONAL-USE HELIPORT. The term "personal-use heliport" is applied to any heliport that is used exclusively by the owner. Personal-use heliports are owned by individuals, companies, or corporations. Personal-use heliports are not listed in the AIM but may be depicted on aeronautical charts.

36. HELICOPTER LANDING SITE. As noted previously, helicopters are capable of being operated into cleared areas only slightly larger than the helicopter itself. It is this versatility that enables the pilot of a helicopter to land at the scene of an accident, on the roof of a burning building, near a construction site, etc. In each case the decision to land is made by the pilot who must weigh the operational necessity for the landing against the helicopter's performance capabilities, physical limitations of the site, and his or her piloting skills. For the most part, these are one-time, temporary, or infrequent operations, and the landing site should not be considered a heliport.

37-39. RESERVED.

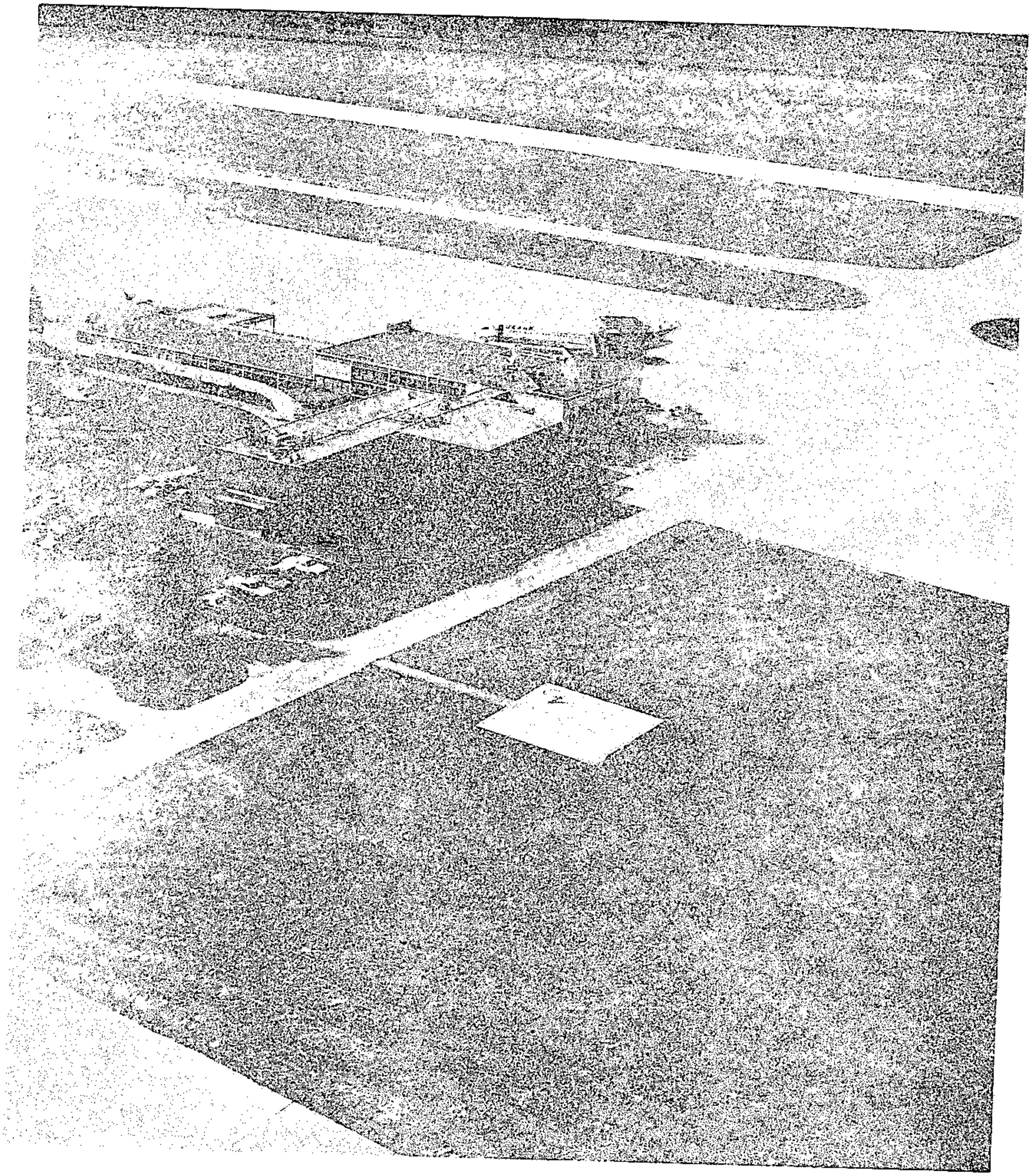


FIGURE 3-1. PUBLIC-USE HELIPORT, CAPITAL AIRPORT, SPRINGFIELD, ILLINOIS

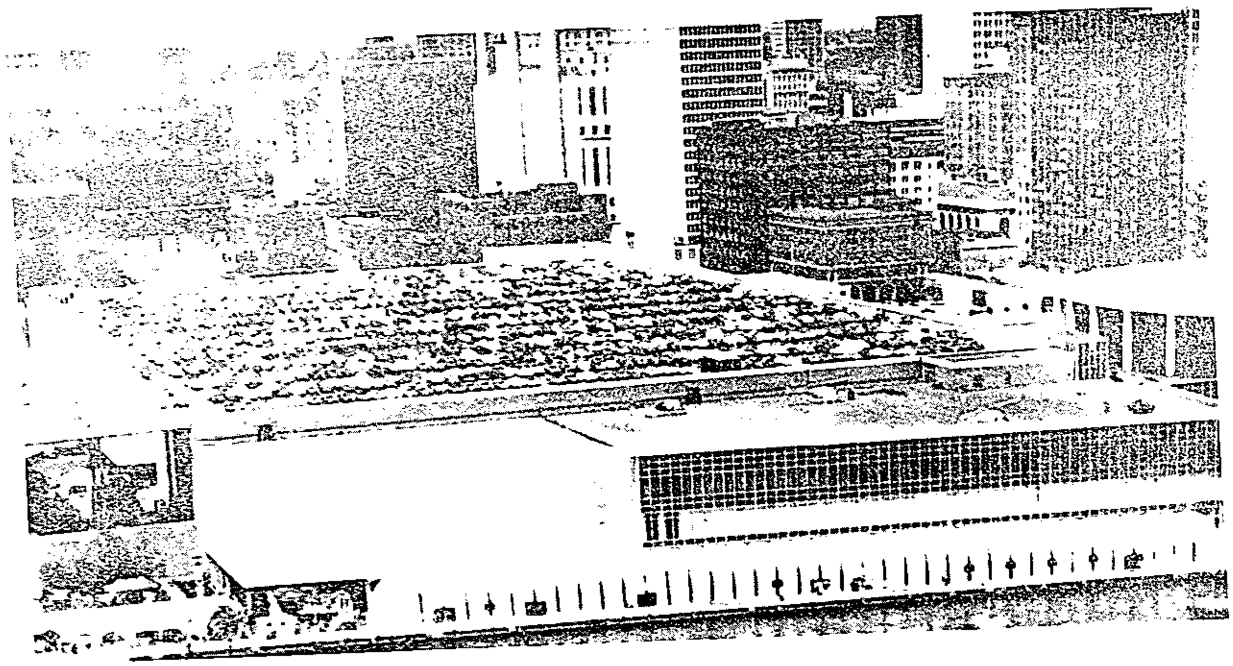


FIGURE 3-2. ELEVATED PUBLIC-USE HELIPORT, COBO HALL CONVENTION CENTER, DETROIT, MICHIGAN

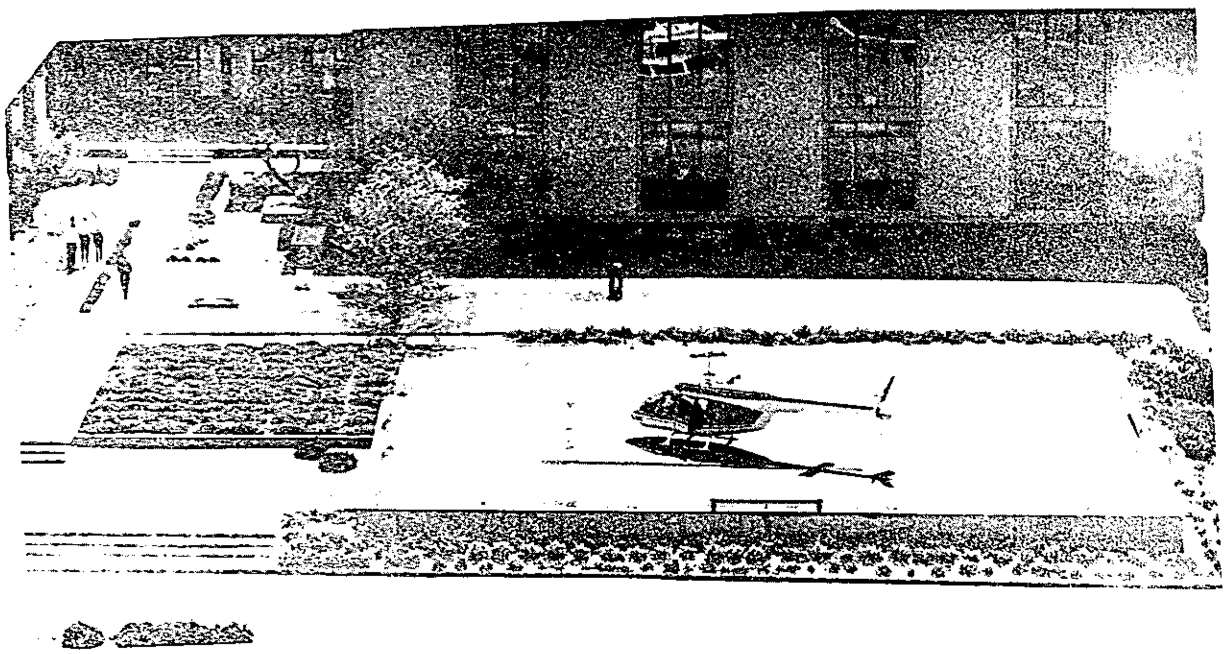


FIGURE 3-3. PRIVATE-USE HELIPORT, PARK FOREST, ILLINOIS

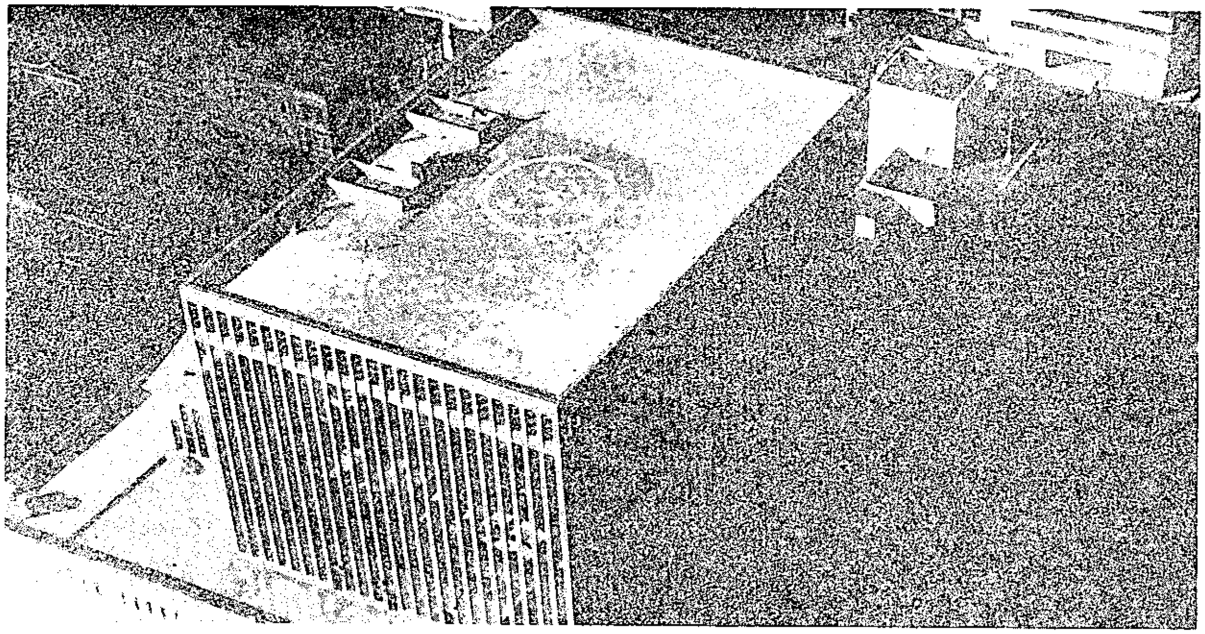


FIGURE 3-4. ROOFTOP PRIVATE-USE POLICE DEPARTMENT HELIPORT, BALTIMORE, MARYLAND

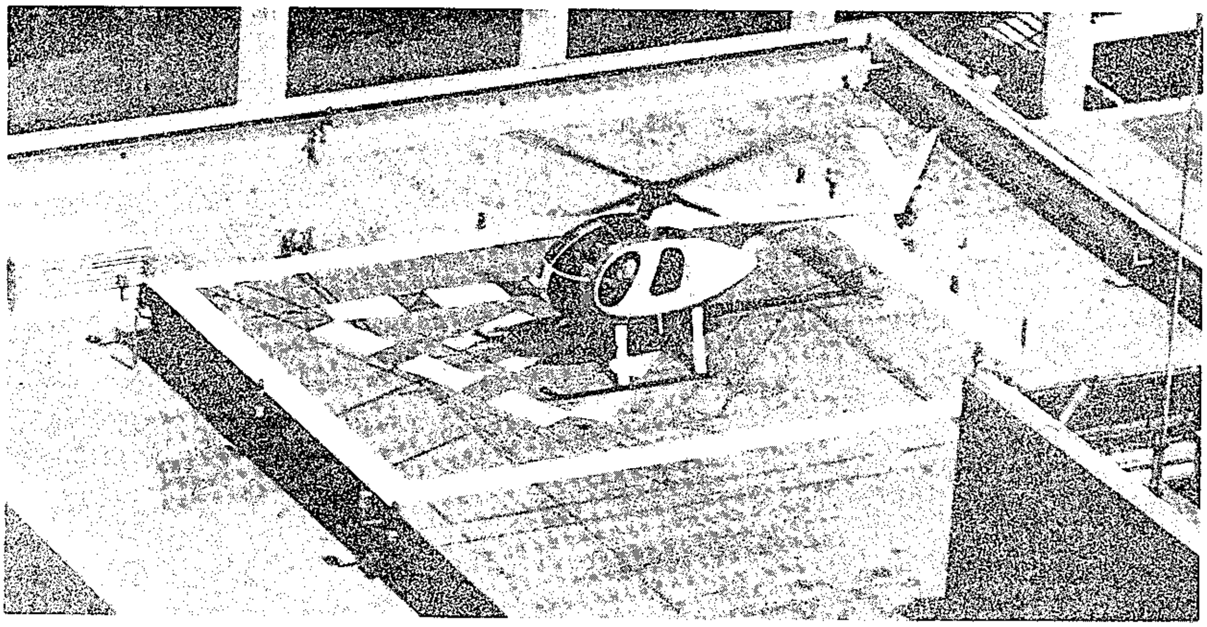


FIGURE 3-5. ELEVATED PLATFORM PRIVATE-USE HELIPORT, LOS ANGELES, CALIFORNIA

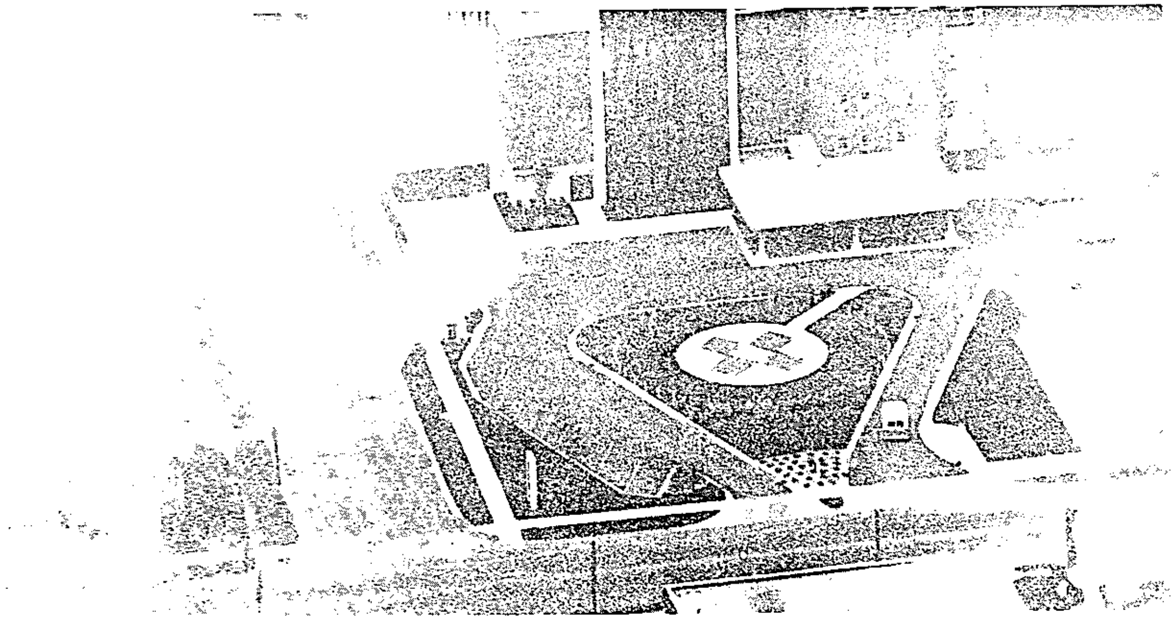


FIGURE 3-6. GROUND-LEVEL, PRIVATE-USE HOSPITAL HELIPORT,
COTTAGE HOSPITAL, GALESBURG, ILLINOIS

(Note: Figure depicts old style marking, see paragraph 71a.(2))

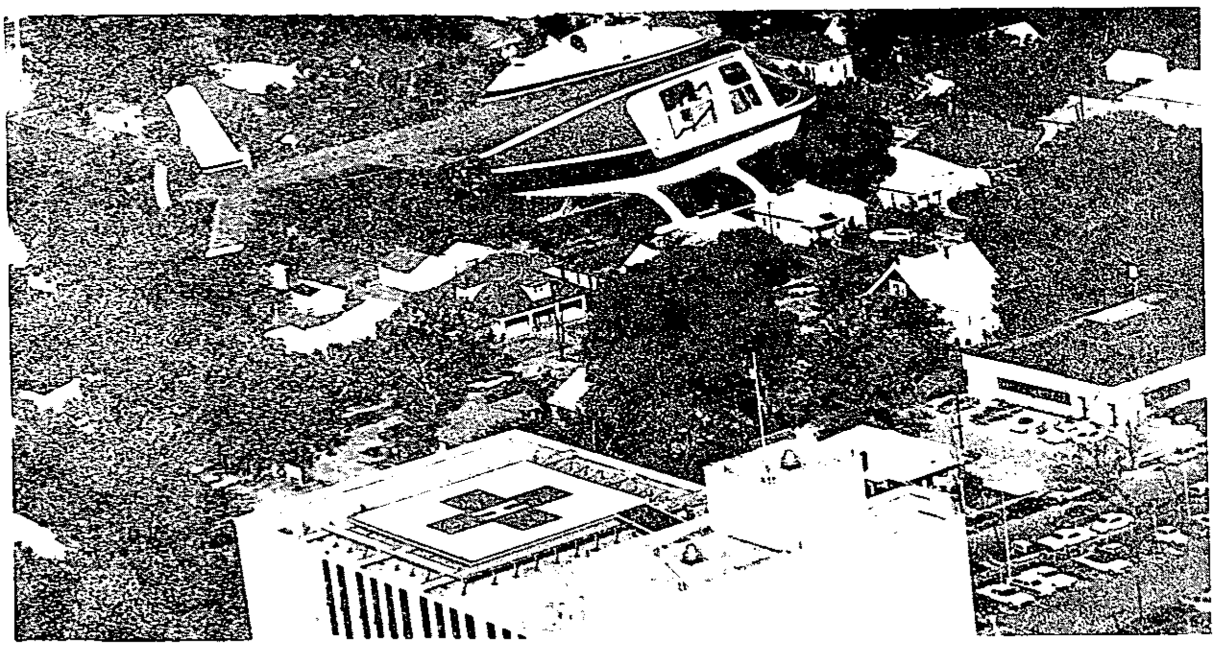


FIGURE 3-7. ROOFTOP PRIVATE-USE HOSPITAL HELIPORT, PETER SMITH
HOSPITAL, FORT WORTH, TEXAS

(note: Figure depicts old style marking, see paragraph 71a.(2))

FIGURE 3-8. A ROADSIDE SERVES AS A HELICOPTER LANDING SITE TO ASSIST IN THE TREATMENT AND MOVEMENT OF AN ACCIDENT VICTIM

FIGURE 3-9. A MOUNTAIN MEADOW SERVES AS A HELICOPTER LANDING SITE TO AIRLIFT FIREFIGHTING CREWS AND EQUIPMENT

CHAPTER 4. SELECTING A HELIPORT SITE

40. GENERAL. Increased public awareness of helicopter capabilities has enhanced its prominence as an important vehicle in the national transportation system. Continuing advances in helicopter productivity and operating economics make it reasonable to anticipate increasing public and private usage for intra- and interarea transportation. However, optimum public benefits cannot be realized without an adequate system of public-use heliports. Stage development is encouraged when it is unnecessary or uneconomical to construct the ultimate heliport. Early coordination with FAA Airports offices on adequacy of the proposed stage construction and ultimate design of the heliport and with FAA Flight Standards offices on operational procedures and limitations is encouraged.

41. LOCATION. To be most effective, heliports should be located as close as conditions or circumstances permit to the actual origins and destinations of the potential users. In some communities, this might require a heliport to be located in an area that could be described as congested or highly developed. In many instances, a practical, safe, and economical ground-level heliport can be established on a portion of an automobile parking lot that is fenced off to control access. If a ground-level site is unavailable, it is possible to locate the heliport on the roof of a building or on an unused pier or wharf. Elevated or overwater heliport sites will have in many instances an advantage over ground-level heliport sites since public access can be more easily controlled and unobstructed approach-departure paths may be easier to obtain. Other considerations in heliport siting are the locations of populated areas, noise-sensitive developments, and the existence of objects in the proposed approach-departure paths.

42. LAYOUT. The physical layout of the heliport is primarily dependent upon the operating characteristics of the helicopters to be accommodated and the type of support facilities desired. A relatively modest site will suffice if a minimum takeoff and landing facility capable of accommodating one small helicopter is all that is desired. Even though helicopters can maneuver in relatively high crosswinds, the approach-departure paths should be oriented to permit operations into the prevailing winds.

43. HELIPORTS AT AIRPORTS. The location and extent of separate takeoff and landing facilities to serve helicopter operations will vary from airport to airport. Most airports would probably find it advantageous to establish facilities and procedures to separate helicopter and airplane traffic. These helicopter takeoff and landing facilities may be developed on a portion of the apron or on an infield site adjacent to an apron or taxiway. When helicopters are scheduled to connect with airline flights, the helicopters should be allowed to board and discharge passengers in close proximity to the airline check-in areas.

To the extent possible, locate facilities to avoid mixing helicopter operations with airplane operations. Clearance between the helicopter takeoff and landing facility and the airport's active runway(s) should be in accordance with the heliport-to-runway separations of Figure 4-1.

44. TRANSPORTATION STUDIES. The proponent of a public-use heliport should review all transportation studies for the area. These studies frequently identify area origin-destination patterns and provide descriptions of existing and proposed public transportation systems. The studies may also describe existing and projected land development patterns for commercial, industrial, public, and residential usage and zoning actions taken to permit or to encourage such usage. Some studies may have identified tentative public-use heliport locations. Communities planning urban renewal projects may find the inclusion of a public-use heliport to be the catalyst needed to attract desirable commercial or industrial development.

45. OPERATIONAL SAFETY. A major consideration in heliport siting is the availability of suitable approach-departure paths. It is preferable for helicopters to make takeoffs and landings into the prevailing winds but in some situations this may not be possible. In congested areas it may not be possible to develop a straight-in approach or departure procedure and a curved approach-departure path may be necessary to avoid obstacles. In other situations special letdown and climbout procedures may be desired to confine helicopter sounds to a small area near the heliport. Helicopter approach or departure procedures are developed for each heliport on the basis of site conditions, helicopter capabilities, and the type and number of activities to be conducted therefrom. When necessary, the FAA may condition an airspace decision by requiring special flight routes, altitudes, or approach and departure procedures in the interest of user safety and airspace compatibility.

46. LOCAL REGULATION. Because helicopters can operate safely at sites of limited size, it is quite likely that heliports may be suggested for areas that have not been exposed to significant aviation activity. Consequently, the heliport proponent may have to take a substantial and active role in educating the public about heliports and helicopters.

a. Local Laws. The rules, regulations, and ordinances (collectively called local laws) which control airport development may impose restrictive conditions which would be inappropriate when applied to heliport proposals. It is not intended to suggest that any community will have to revise its local laws; however, some laws may need to **be reexamined when heliport development is under consideration.** Helicopter operators, manufacturers, industry associations, state aviation authorities, and the FAA should be contacted for advice before laws which regulate heliports are initiated or changed.

b. Land-Use Zoning. Zoning ordinances should be written to permit heliports as an accepted land use in areas identified for industrial, commercial, manufacturing, or agricultural uses and in any area that is unzoned. Some heliports, especially those without support facilities, could be a permitted use in certain residentially zoned areas. Language that permits occasional or infrequent helicopter landings at a site that is not a formally designated heliport should be encouraged.

c. Height Restriction Zoning. The desire for clear approach-departure paths is an important consideration in selecting a heliport site. When state-enabling legislation permits, communities are encouraged to protect heliport approach and departure paths by enacting height restriction zoning. Advisory Circular 150/5190-4, A Model Zoning Ordinance to Limit Height of Objects Around Airports, contains general guidance for preparing an ordinance restricting the height of objects around a heliport.

47. ENVIRONMENTAL AND OTHER CONSIDERATIONS. The establishment of a heliport may have an impact on the community in terms of noise, exhaust emissions, public safety, ground traffic, aesthetics, and attitude. When Federal aid is used, an environmental impact assessment report is required to assist the Federal agency in making the environmental decision. A similar report may be required by state or local authorities.

a. Noise. The impact of helicopter engine and rotor sounds upon populated areas is an important consideration in selecting a heliport site. Since helicopter sounds are greatest directly beneath the takeoff and landing paths, these paths should be located over sparsely populated areas; over areas that have an already high level of background sounds; or over areas that would be expected to have a high tolerance level to helicopter sounds. Improvements resulting from ongoing research activities to reduce the sounds generated by engines and rotors will be incorporated in future helicopters as quickly as economic and technological conditions permit.

b. Exhaust Emissions. Relatively few civil-use heliports have sufficient flight operations for exhaust emissions to be considered a significant problem. Research on aircraft fuels and engines to reduce pollutant levels will also be applicable to helicopters.

c. Public Safety. Heliport sites and approach-departure paths should be selected to avoid areas of public concentration. The approach-departure paths should also be free, and capable of being maintained free, of objects that interfere with helicopter movement to and from the heliport.

d. Ground Traffic. Potential problems with passenger ground ingress or egress to a heliport may be minimized if there is direct access to an adjacent major roadway. Access to one or more modes of public mass transit is desirable. A heliport in a freeway environment has some inherent advantages over other sites. First, helicopter sounds may be undetectable over the existing background noises. Second, approach-departure paths can frequently follow the freeway right-of-way which is generally unencumbered with objects that would be hazardous to flight safety.

e. Aesthetics. Community acceptance of ground-level heliports can be enhanced if the facility has an attractive appearance. Attractive buildings and carefully planned walls, fences, hedges, etc., are to be encouraged.

f. Attitude. Community acceptance or rejection of a heliport site proposal is difficult to predict. An opportunity for a public hearing to obtain citizen input is required for Federal aid projects. A well prepared presentation to citizen groups on the positive and negative aspects of the proposed heliport together with patience, honesty, and an attitude of willing cooperation in responding to questions will help to influence public opinion.

48. PROJECT ACTIVITIES. Heliport proponents may find a checklist helpful in pursuing their objective. Any checklist must be developed to meet local conditions which will vary from one location to another. The following items are representative of the activities that are carried out in any heliport development and may be added to or subtracted from as the situation warrants.

a. Review Regulations. Review local regulations of the city and county concerning land usage, building codes, aircraft operations, noise limits, fire protection, etc., for possible impact.

b. Select Sites. Select potential sites which would not be subject to zoning restrictions, will provide ample room for current and future needs, and will have clear approaches.

c. Seek Advice. Contact appropriate Federal and state aviation offices, local helicopter operators, aviation consultants, or helicopter manufacturers as to the operational feasibility of the sites being considered, including approach-departure paths and operating procedures.

d. Submit Notices. Submit required notices and applications to appropriate Federal, state, and local agencies. If a variance of a local zoning ordinance is needed, provide sufficient details in the request to answer probable questions about intended operations.

49. RESERVED.

Heliport-to-Runway Separations (By Airplane Category)		
Single Engine Propeller Airplanes	Twin Engine Propeller Airplanes	All Other Airplanes
300 Feet (90 m)	500 Feet (150 m)	700 Feet (210 m)

NOTES:

1. The above table shows the minimum recommended separations between a separate heliport facility and an airport runway for simultaneous operations in VFR conditions.

2. FAA wake turbulence avoidance procedures must be followed with heliport-to-runway separations under 2,500 feet (750 m).

3. At controlled airports, two-way radio communication is required to be maintained with the aircraft involved so that pertinent traffic information may be issued.

4. When airplanes of different categories are involved, use the separation required for the larger airplane category.

FIGURE 4-1. HELIPORT-TO-RUNWAY SEPARATIONS AT AIRPORTS

CHAPTER 5. GROUND-LEVEL HELIPORT DESIGN

50. GENERAL. The need for adequate heliport facilities is not limited to the centers of large cities. Public acceptance of the helicopter has encouraged heliport developments in suburban areas, in communities of quite moderate size, and in locations that are difficult to reach by other modes of transportation.

51. HELIPORT LAYOUT. The size, shape, and appurtenances of a heliport are determined by a number of interrelated factors, principal among them are the size and nature of the proposed site; the size, number, and performance capabilities of the helicopters expected to use the facility; the type and extent of services to be provided; and the location and height of buildings or other objects in the heliport area. The recommended minimal heliport facility consists of a takeoff and landing area, a peripheral area, and an approach-departure path. A large heliport may have several takeoff and landing areas and approach-departure paths, separate parking positions, and extensive passenger and helicopter servicing facilities. A takeoff and landing area may take any shape necessary to fit the site, but most heliports are configured as squares, rectangles, or circles. Figures 5-1 through 5-3 illustrate the relationship of heliport surfaces. With few exceptions, heliport dimensions are expressed in units of helicopter length or rotor diameter. Pertinent dimensional information for typical helicopters is found in Appendix 2. Heliport dimensions are summarized in Appendix 1.

52. TAKEOFF AND LANDING AREA. For ground-level heliports, the length and width or diameter of the takeoff and landing area is recommended to be at least 1.5 times the overall length of the largest helicopter expected to use the facility. Under some design conditions (Figure 5-4), the definable and designated takeoff and landing area may be physically incapable of supporting a helicopter and/or may be impossible or impractical to mark or light.

53. PERIPHERAL AREA. The peripheral area is intended as an obstacle-free safety area surrounding the takeoff and landing area. It is recommended that the peripheral area width be one-fourth of the overall length of the largest helicopter expected to use the facility, but not less than 10 feet (3 m).

54. APPROACH-DEPARTURE PATHS. Approach-departure paths are selected to provide the best lines of flight to and from the takeoff and landing area considering prevailing winds; the location and heights of buildings or other objects in the area; and the environmental considerations discussed in paragraph 47. It is desirable for a heliport to have two approach-departure paths separated by an arc of at least 90 degrees. However, under some conditions, operations at heliports with one approach-departure path may be conducted safely. Curved approach-

departure paths are permitted and may be necessary in some cases to provide a suitable obstruction-free path. The radius of the curve is dependent upon the performance capabilities of the helicopters using the facility and the location and height of existing objects. Areas suitable for an emergency landing are desired along the approach-departure path unless the heliport is used exclusively by multiengined helicopters with proven capabilities to continue flight with one engine inoperative.

55. HELIPORT IMAGINARY SURFACES. The imaginary surfaces of subparagraphs b and c below represent idealized heliport design standards. They are not operationally limiting in cases where an onsite evaluation concludes that surfaces steeper than those recommended would not have an adverse effect upon the safety of a particular operation. However, any object which would exceed the published standards for defining heliport imaginary surfaces as described in Subpart C of FAR Part 77 is considered an obstruction to air navigation. These surfaces are described below and are depicted on Figures 5-1 through 5-4. When an aeronautical study concludes that the obstruction would have no adverse effect upon aeronautical operations, the object need not be removed or altered. Obstructions which are not removed or altered may require marking and lighting. (See paragraph 76.)

a. Heliport Primary Surface. The area of the primary surface coincides in size and shape with the designated takeoff and landing area of a heliport. This surface is a horizontal plane at the elevation of the established heliport elevation.

b. Heliport 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 (1 220 m) where its width is 500 feet (152 m). The slope of the approach surface is 8 to 1 for civil heliports.

c. Heliport Transitional Surfaces. These surfaces extend outward and upward from the lateral boundaries of the heliport primary surface and from the approach surfaces at a slope of 2 to 1 for a distance of 250 feet (76 m) measured horizontally from the centerline of the primary and approach surfaces.

d. Heliport Instrument Procedure Surfaces. In addition to the surfaces described above, heliports having an approved instrument procedure shall conform to the criteria for helicopters set forth in FAA Order 8260.3, United States Standards for Terminal Instrument Procedures (TERPS).

e. Aeronautical Studies. Aeronautical studies, which consider helicopter operational capabilities, are conducted by the FAA whenever there is a need to determine the physical or electromagnetic effect of existing obstructions upon aeronautical operations or procedures. Requests for an FAA study may be initiated by anyone with a valid interest in matters including but not necessarily limited to the following:

(1) A change in an aeronautical procedure.

(2) A proposal to construct or enlarge heliport facilities.

(3) A request for technical assistance in the design and development of a heliport.

(4) A determination as to whether an existing object should be altered, removed, marked, or lighted.

(5) A determination as to whether existing marking and lighting can be reduced or removed without adversely affecting aviation safety, or whether marking and lighting should be intensified or increased to more effectively make airmen aware of an object's presence.

(6) A determination of an existing activity's electromagnetic effects upon a navigational aid.

(7) A recommendation to the Federal Communications Commission concerning the erection or dismantling of an antenna structure.

56. PAVED TAKEOFF AND LANDING AREAS. Paved takeoff and landing areas at ground-level heliports are usually developed to support heavier helicopters or to accommodate greater traffic volumes. While it is desirable to pave the entire takeoff and landing area, there is no operational requirement to do so. When it is intended for the helicopter to touch down on a designated takeoff and landing area, a paved touchdown pad located in the center of the area, the size of either "a" or "b" below, will suffice.

a. Touchdown Pad. The recommended dimension of a touchdown pad is equal to the rotor diameter of the largest helicopter expected to operate from the facility.

b. Minimum Touchdown Pad. At a heliport that has an extremely low level of activity or is subject to economic or aesthetic pressure, smaller paved areas may be used. Pad dimensions are based on rectangular configurations. A circular pad having a diameter equal to the longer side of the rectangular configuration set forth in (1) or (2) below is acceptable. Skid or float length should be substituted for wheelbase as appropriate.

(1) Public-Use Heliports. The minimal sized touchdown pad for a public-use heliport should have a length and width at least 2.0 times the wheelbase and tread, respectively, or a diameter of 2.0 times the wheelbase of the largest helicopter expected to use the facility.

(2) Private-Use or Personal-Use Heliports. The minimal sized touchdown pad for a private-use or personal-use heliport should have a length and width at least 1.5 times the wheelbase and tread, respectively, or a diameter of 1.5 times the wheelbase of the largest helicopter expected to use the facility.

57. PARKING AREAS. Requirements for physically separated helicopter parking areas will be based on operational needs. Each parking position whether used for passenger boardings, helicopter servicing, or extended parking, is recommended to have a length and width or diameter equal to the overall length of the largest helicopter expected to use the facility. A minimum clearance of 10 feet (3 m) is recommended between adjacent parking positions or between a parking position and a fence or other object.

58. TAXIWAYS. Taxiways connect one operational area on a heliport with another. Most often, taxiways connect the takeoff and landing area with helicopter parking positions. Helicopters with wheel undercarriages normally are taxied in ground contact. Helicopters with skid or float gear must hover taxi. The minimum recommended paved taxiway width is 20 feet (6 m). Paved taxiways are not required for hover taxiing. A lateral clearance of at least 10 feet (3 m) is recommended between the blade tip of the taxiing helicopter and any building or object.

59. HELIPORT BUILDINGS. Heliports may require an administration or passenger service building, service and storage hangars, or maintenance buildings. The location and space requirements of heliport buildings will depend upon the extent of current and projected operations.

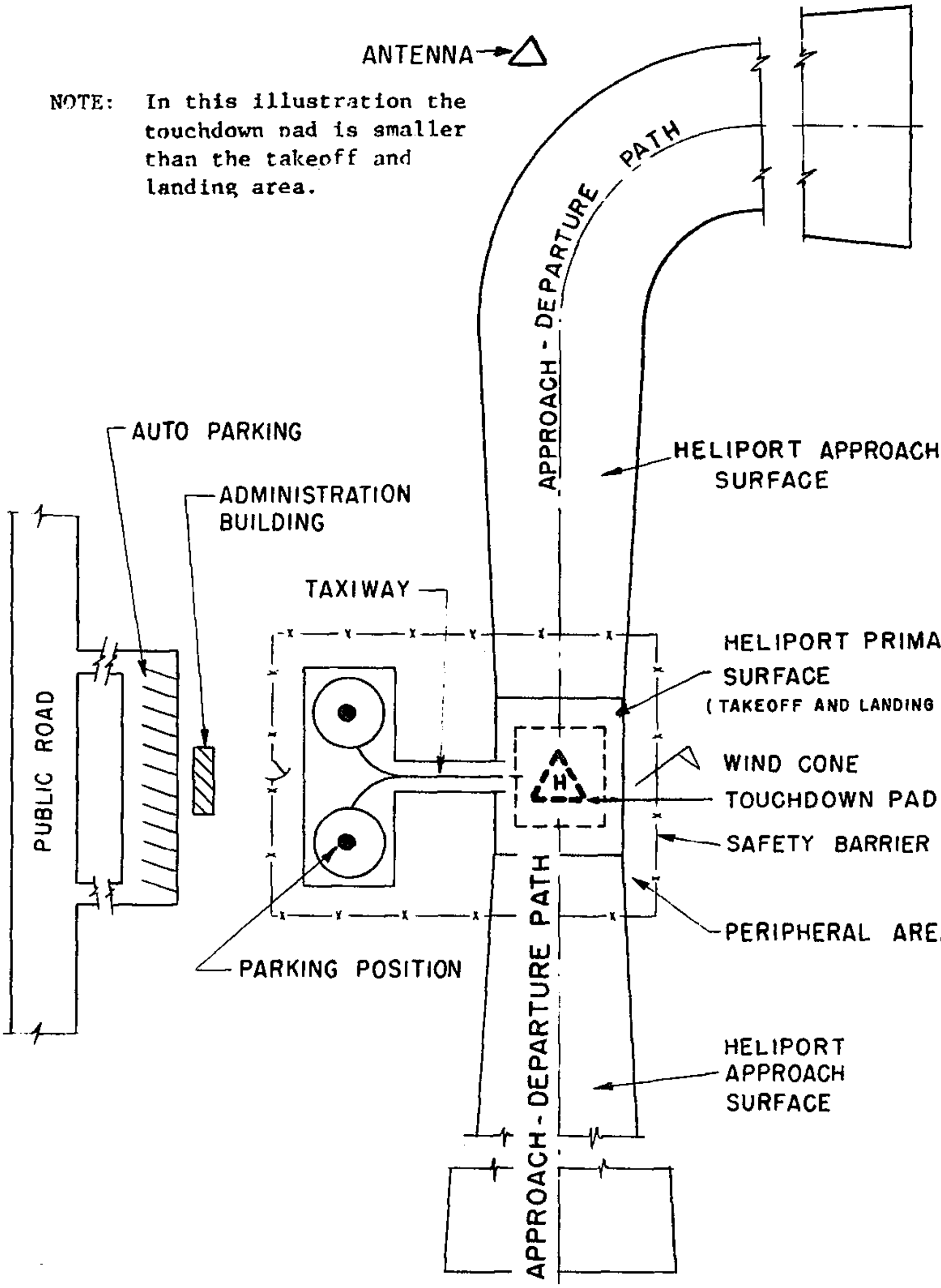
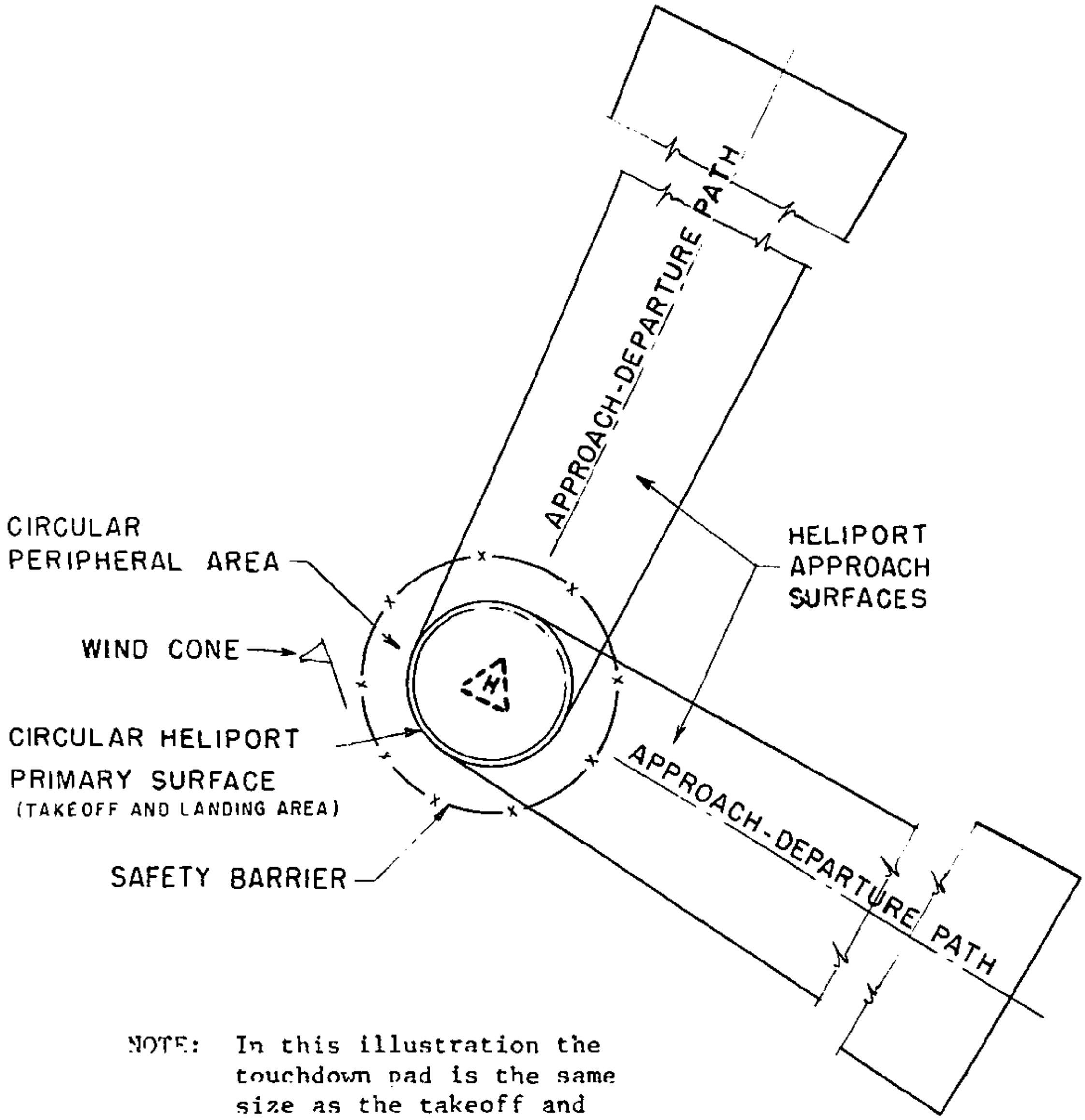


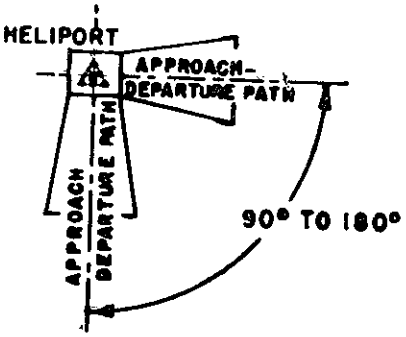
FIGURE 5-1. RELATIONSHIP OF HELIPORT SURFACES



NOTE: In this illustration the touchdown pad is the same size as the takeoff and landing area.

FIGURE 5-2. RELATIONSHIP OF HELIPORT SURFACES FOR A MINIMAL "CIRCULAR" FACILITY

ACCEPTABLE RANGE OF ANGLES BETWEEN APPROACH-DEPARTURE PATHS WHEN MORE THAN ONE APPROACH-DEPARTURE PATH IS PROVIDED



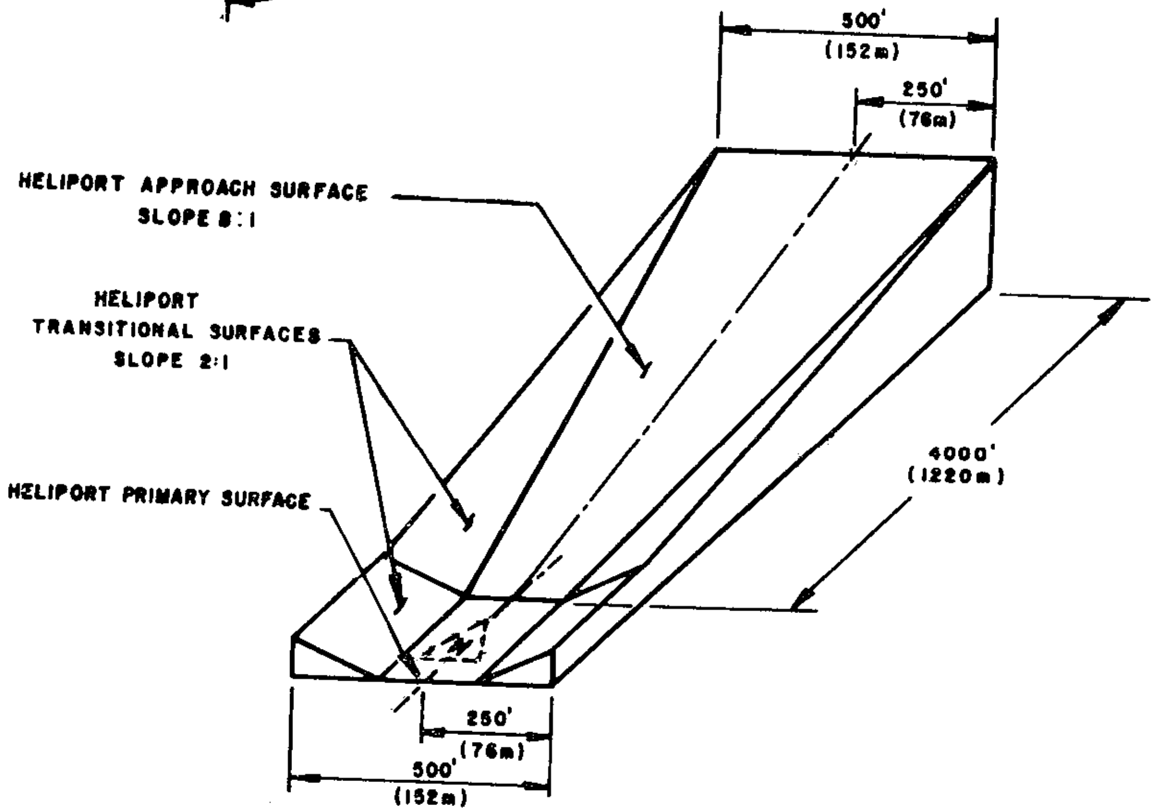
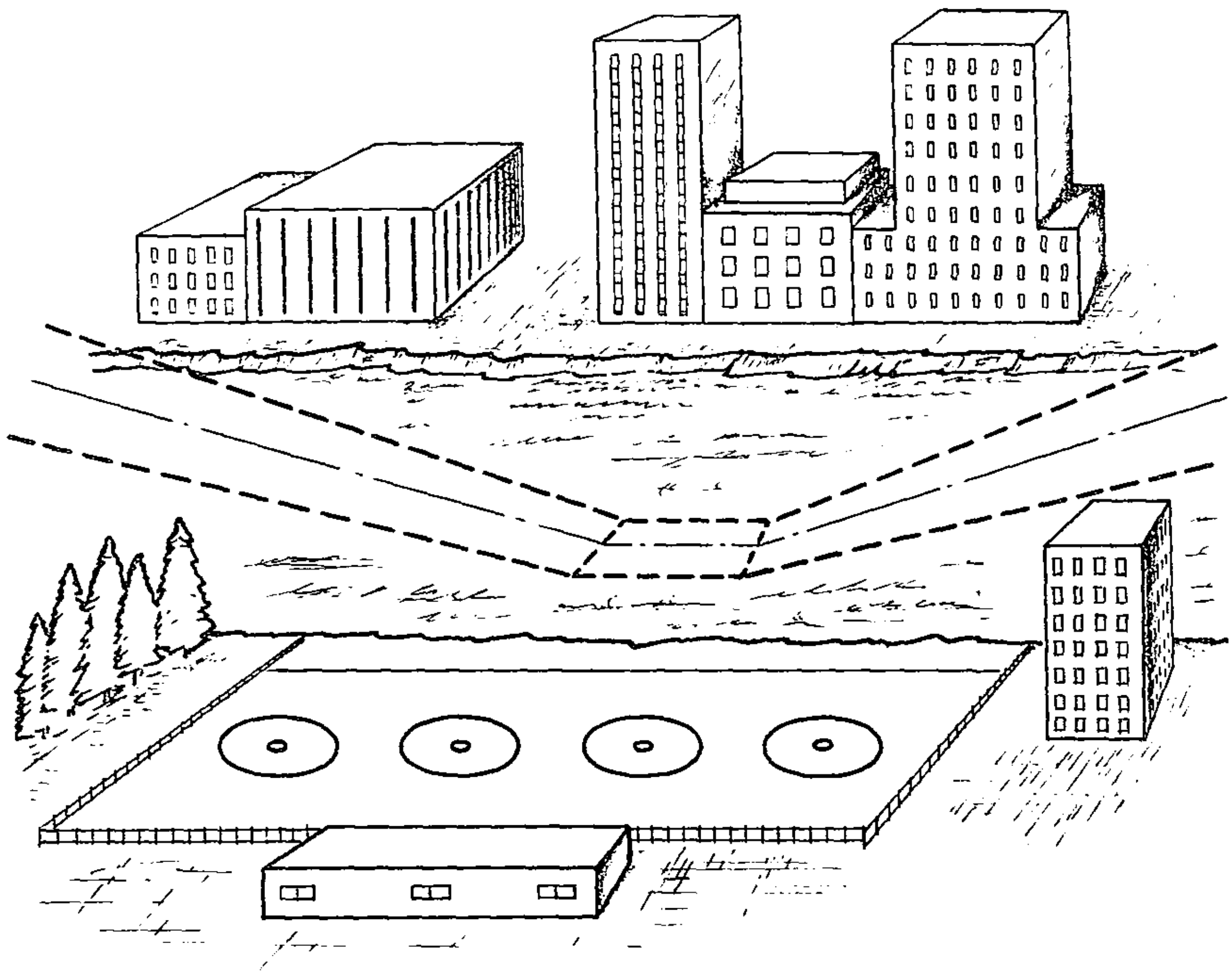


FIGURE 5-3. PERSPECTIVE OF HELIPORT SURFACES



NOTE: This figure illustrates the application of heliport FAR Part 77 imaginary surfaces to a situation where the approach is made to a designated takeoff and landing area located over water. Using helicopters hover taxi from the takeoff and landing area to the marked parking positions.

FIGURE 5-4. APPLICATION OF HELIPORT SURFACES

CHAPTER 6. SURFACE STABILIZATION & PAVEMENT DESIGN

60. GENERAL. Heliport operating surfaces (takeoff and landing areas, taxiways, and parking positions) should be level, smooth, and free of dirt and debris that could be picked up or blown about by rotor downwash. Stabilization or paving of any surface subjected to the landing, takeoff, or hovering phase of helicopter operations is desired to permit wet-weather usage; to improve the load-carrying capability of the soil underlying the heliport; and to minimize the erosive effect of rotor downwash. Heliport proponents anticipating a limited number of operations by small helicopters may find stabilized surfaces adequate. Heliport proponents opting for paved operating surfaces because of greater helicopter weights or operational frequencies may find it desirable to stabilize the nonload-bearing areas. More explicit guidance on the subjects of soils, soil stabilization, or pavements is in FAA Advisory Circulars 150/5320-6, Airport Pavement Design and Evaluation, and 150/5370-10, Standards for Specifying Construction of Airports.

61. SOIL EVALUATION. The soils underlining the heliport must bear the loads imposed by the helicopters and the equipment or vehicles providing ground support. Surface stabilization and pavements are merely methods of improving the soil's supportive ability by distributing the loads over a greater area. Soils should be identified and evaluated prior to development of a stabilization plan or pavement design.

62. SURFACE STABILIZATION. Factors to be considered in selecting the extent of surface stabilization include helicopter weight, operational frequency, soil analysis, and climatic conditions. To minimize rotor downwash effects, it is recommended that all operating areas of the heliport be paved or stabilized.

63. TURF STABILIZATION. A well-drained and well-established turf that presents a smooth, dense surface is generally considered the most desirable and economical surface stabilization available. Turfed surfaces are capable of supporting moderate loads and provide reasonable protection against wind or water erosion. Climatic and soil conditions at the site dictate the choice of grass species to be used. Sources of advice on establishing and maintaining turf are local nurseries, park departments, ground keepers, and county agents.

64. AGGREGATE TURF STABILIZATION. Heliports located on soils that have poor load-carrying capabilities when wet may be able to overcome this deficiency if selected granular materials are mixed into the upper 12 inches (30 cm) of soil. Suitable granular materials for this purpose are crushed stone, pit-run gravel, coarse sand, or oyster shell. Sufficient granular material is added to the soil to achieve the desired stability with enough soil retained in the mix to insure a good stand of turf. A properly designed and constructed aggregate turf should be capable of supporting a 10,000-pound (4 500 kg) helicopter under moderate usage.

65. PAVEMENTS. Pavements are manmade surfaces designed to do two things. First, they provide a water impervious and dirt-free wearing surface. Second, and most importantly, they allow the load of the helicopter to be distributed over a larger soil area. Obviously, the loads to be supported and the ability of the soil to support these loads influence the thickness of pavement required. Advisory Circular 150/5320-6 contains guidance on the design of rigid and flexible pavements.

a. Rigid Pavements. The FAA recommended 6-inch (15 cm) minimum thickness of portland cement concrete pavement is capable of supporting the static and dynamic loads of helicopters up to 20,000 pounds (900 kg) gross weight. A design analysis is not usually necessary unless heavier helicopters are expected to operate at the heliport or the supportive quality of the underlying soil is questionable.

b. Flexible Pavements. A design analysis is always recommended when an asphaltic or bituminous concrete pavement is proposed. To reduce pavement deterioration, it is also recommended that a tar emulsion sealer be applied to asphaltic or bituminous concrete pavements in operational areas subject to aircraft fuel or solvent spillage. Extra care should be taken in the design and construction of flexible pavements subjected to skid-equipped helicopter operations. Skids being relatively long but having little cross sectional area can cause denting or rutting in improperly designed or constructed pavements.

66. PAVEMENT DESIGN. Heliport pavements should be designed by a qualified engineer after an analysis of the underlying soils and a determination of the static and dynamic loads to be supported. In some instance, loads imposed by the ground support vehicles may exceed those of the largest helicopter expected to use the facility. Weights, gear configurations, and dimensional data of the newer helicopter models may be found in Appendix 2. Load application through single- or dual-wheeled landing gear configurations is illustrated in Figure 6-1.

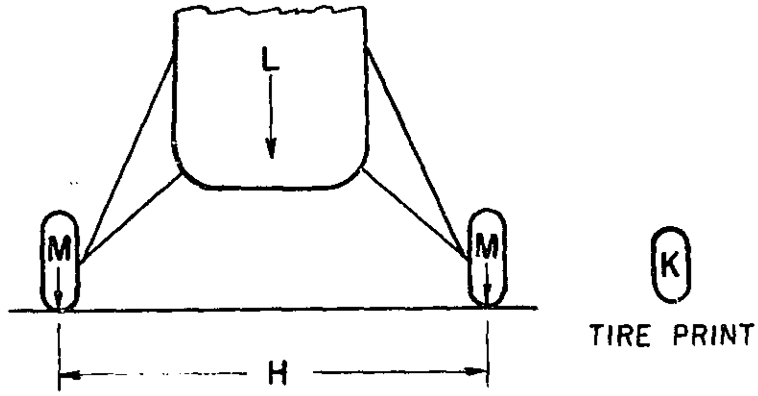
a. General. The strength requirements of the takeoff and landing area pavements are determined through analysis of the static and dynamic loads imposed through the helicopter landing gear. Most small helicopters are equipped with skid-type landing gear while the larger helicopters are usually equipped with wheeled landing gear. Normally, wheeled landing gear is mounted on "oleo" struts which absorb and dissipate a portion of the impact energy from a hard landing. Float-type landing gear offers some cushioning effect due to float deformation, whereas skid-type landing gear is generally rigidly mounted to the helicopter airframe and offers limited resilience or cushioning effect.

b. Static Loads. For pavement design purposes, helicopter static loads may be analyzed as concentrated "dead" loads applied equally through skid-type or float-type landing gear. An analysis of data provided by helicopter manufacturers indicates that anywhere from 60 to 90 percent of the helicopter's weight is distributed through the main gears of wheel-equipped helicopters. When specific information is not available, it is suggested that 85 percent of the helicopter's gross weight be assumed to be transmitted through the main gears.

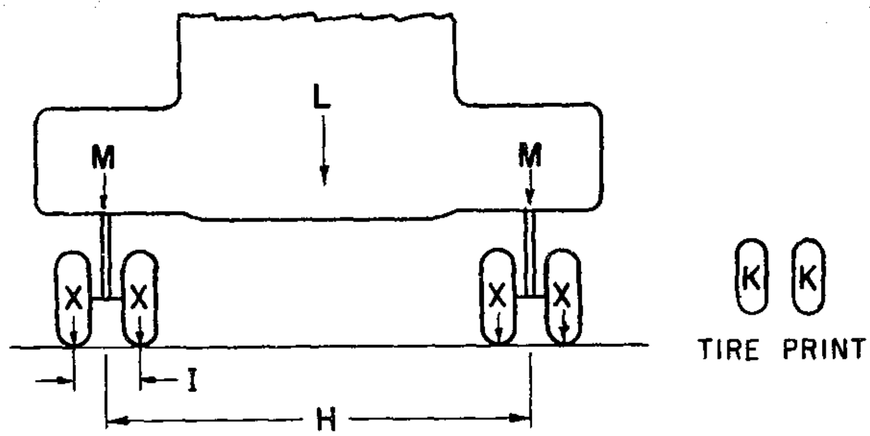
c. Dynamic Loads. Critical dynamic loading occurs during a hard helicopter landing when the vehicle, acting as a moving body, applies impact forces that are proportional to its weight, velocity, and probable contact area. In these landings, loads of short (less than 1/5 second) duration may occur. The dynamic load, assumed to be 150 percent of the helicopter's gross weight, is imposed equally through two contact points. The area of each contact point is the footprint of the main gear wheel or a point on the skid since it cannot reasonably be assumed that a landing skid will make contact simultaneously over its entire length.

67. HELIPORT GRADES. Heliport operational areas should be graded to present a smooth, well drained, reasonably level takeoff and landing surface. Figure 6-2 illustrates typical cross sections for heliport grading.

68-69. RESERVED.



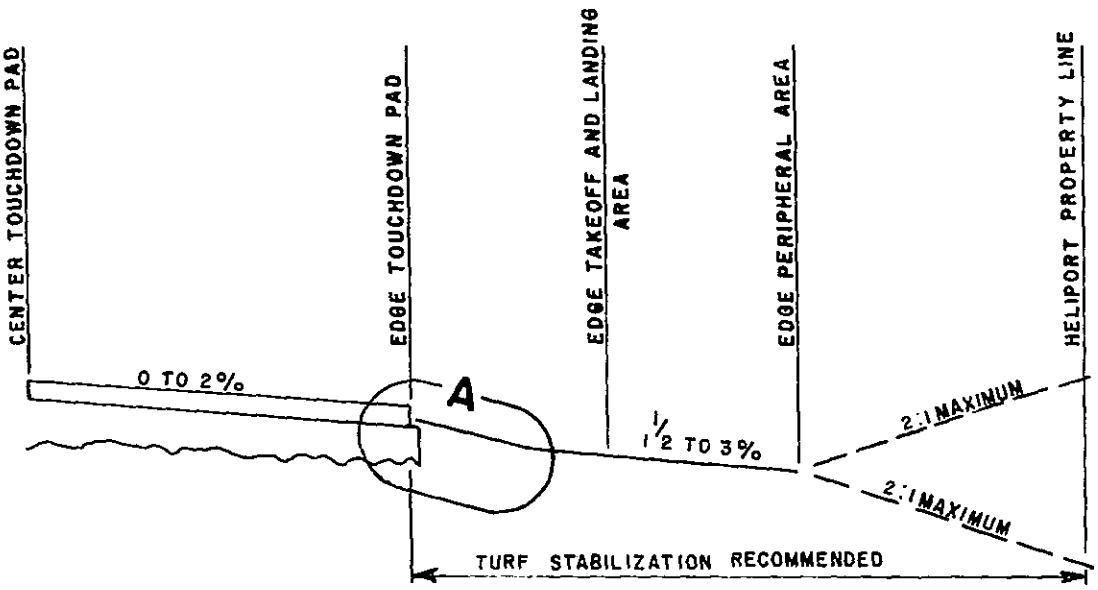
A. TYPICAL SINGLE-WHEELED CONFIGURATION
(CONCEPT APPLIES TO SKID/FLOAT EQUIPPED HELICOPTERS)

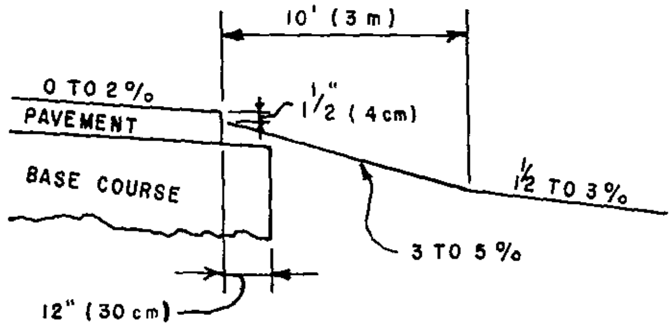


B. TYPICAL DUAL-WHEELED CONFIGURATION

L = GROSS WEIGHT
M = GROSS WEIGHT/GEAR
X = GROSS WEIGHT/WHEEL
H = TREAD
I = WHEEL SPACING
K = TIRE CONTACT AREA

FIGURE 6-1. ILLUSTRATION OF HELICOPTER LOADING APPLICATIONS





DETAIL "A"

(RAPID RUNOFF SHOULDER)

NOTE: Rapid runoff shoulders may be used adjacent to taxiway pavement and parking apron pavement.

FIGURE 6-2. HELIPORT GRADES

CHAPTER 7. HELIPORT VISUAL AIDS

70. GENERAL. Recommendations for marking and lighting of ground-level heliports are based on tests conducted for the FAA with the cooperation and involvement of civil and military helicopter pilots. For day VFR operations, it is recommended that the takeoff and landing area be marked and that the heliport be equipped with a suitable wind direction indicator. For night VFR operations, it is recommended that the takeoff and landing area and the wind direction indicator also be lighted and a heliport identification beacon be installed.

71. MARKING. FAA standards for marking heliports serve two purposes. One type of marking serves to identify the heliport's designated takeoff and landing area and provides visual approach cues to the pilot. The second type of marking provides guidance for ground movement and helicopter parking. Markings may be painted on paved surfaces using reflective or nonreflective paint of the recommended color. A 6-inch (15 cm), or wider, black (red for hospital heliports) border may be used to enhance painted markings. The marking of turfed heliports may be accomplished in a variety of ways.

a. Identification Markings. Heliport markings identifying the takeoff and landing area are white. They are centered on the designated takeoff and landing area. Dimensions for these markings are shown on the referenced figures.

(1) Standard Heliport Marker. The standard heliport marker (Figure 7-1) is recommended to identify the designated takeoff and landing area of a heliport. While this symbol is widely used throughout the helicopter industry, a number of private-use and personal-use heliports are either not marked at all or utilize a company logo or some other marking recognized by the helicopter pilots authorized to use the facility.

(2) Hospital Heliport Marker. A red letter "H" imposed in the middle of a white cross (Figure 7-2) is recommended as the identifier of a hospital heliport. Existing hospital heliports should convert to this color pattern at the first opportunity since the previous standard of a white "H" on a red cross background is no longer recommended. The color reversal is necessary to prevent conflict with the symbol of the American Red Cross.

b. Touchdown Pad Boundary Markings. Boundary markings are white and are used to delineate the limits (edges) of the portion of the takeoff and landing area capable of supporting the helicopter. Paved surfaces may be marked by a solid or segmented white paint stripe at least 18 inches (45 cm) in width. Black edging may be used to improve contrast. Turf heliport takeoff and landing areas may be delineated in a variety of ways. Figure 7-3 illustrates possible methods. Individual markers are spaced from 25 feet (7.5 m) to 100 feet (30 m) apart as site conditions dictate. A soil sterilant or an impervious membrane should be used to deter vegetation when a 3- to 4-inch (7 to 10 cm) thickness of crushed stone is used for markings.

c. Guidance or Position Markings. All painted heliport guidance and positioning markings are yellow. These markings are primarily intended to assist pilots in ground movement and to aid in judging clearances between turning rotors and other aircraft or fixed objects. The markings are illustrated in Figure 7-4.

(1) Taxiways. The centerline of a designated taxiway connecting a takeoff and landing area with a parking position should be marked with a 12-inch (30 cm) wide continuous line. The centerline should begin at the edge of the touchdown pad boundary marking and end at the edge of the parking position marking.

(2) Parking Position. A simple, yet easily recognized marking is desired to indicate positions for fueling, passenger loading, parking, etc. A suggested marking is a solid yellow circle, of at least 3-foot (1 m) diameter, to indicate the desired spot for the helicopter to stop. A 6-inch (15 cm) wide yellow stripe is suggested to mark the periphery of the parking position. The stripe marking the periphery of a circular or square parking position should have the diameter or side equal to the overall length of the largest helicopter expected to use the facility.

d. Weight Limit Markings. When a heliport is restricted to helicopters under a certain weight, this fact should be made known to the pilot. A method of doing this is to indicate the allowable weight in thousands of pounds (metric equivalents are not to be used for this purpose). It is suggested that a red numeral on a white square-shaped background, located to the right and above the heliport symbol as viewed from the principal direction of approach be used to indicate this condition. The square and numeral should be of such size as to be readily discernible by the pilot of the approaching helicopter in sufficient time to effect a go-around if necessary. Figure 7-5 illustrates this suggested marking.

e. Closed Heliport. To the extent possible, markings of permanently closed or abandoned heliports should be completely obliterated. When obliteration is not possible or practical, a yellow "X" should be painted over the identification symbol. Figure 7-6 illustrates the closed heliport "X" applied to commonly used heliport markings. The yellow "X" should be large enough to insure recognition. Bars 5 feet by 30 feet (1.5 m by 9 m) are considered adequate for most situations. Adjustments in bar length and width may be necessary for smaller or larger figures. A nonpermanent material such as lime or whitewash may be used to make the "X" when the heliport closing is of a temporary or short term nature. Temporary markings should not be constructed using materials that could be blown about by helicopter downwash.

f. Landing Direction Arrow. Landing direction arrows may be used to identify preferred approach-departure paths to the heliport. The arrow may be used in conjunction with or in place of landing direction lights (paragraph 77a). Figures 7-7 and 7-8 show landing direction arrows used with landing direction lights.

g. Other Markings. Passenger walkways and fire extinguisher locations should be appropriately marked.

(1) Walkways. Passenger ingress and egress routes must be marked to indicate the safe walkway. The width, location, color, and marking are at the owner's discretion. Figure 7-4 illustrates one method of marking. Walkways should be textured to insure positive footing.

(2) Fire Extinguisher Locations. Fire extinguisher locations should be marked for ready identification. A bright red circle of 3 feet (1 m) in diameter is suggested. Figure 7-4 illustrates one method of marking a fire extinguisher position on an access controlling fence.

72. WIND DIRECTION INDICATOR. A wind direction indicator is recommended for heliport operations. An L-807, 8-foot (2.5 m) wind cone is recommended in accordance with AC 150/5345-27, Specification for L-807 Eight-Foot and Twelve-Foot Unlighted or Externally Lighted Wind Cone Assemblies. The wind cone should be located adjacent to the takeoff and landing area. However, it should not be a hazard to helicopter flight or taxiing operations nor should it be shielded from giving a true indication of wind direction by a building or other structure. The fabric of the wind cone should be of a color that makes it readily discernible. Heliports in congested locations may need more than one wind direction indicator. One indicator should be sited so that it will show the direction of the undisturbed wind with the second sited to show the direction of the wind actually blowing across the touchdown pad.

73. LIGHTING. A lighted touchdown pad, a lighted wind direction indicator, and a heliport identification beacon are recommended for night operations. Brightness control of the touchdown pad lighting may be desirable. FAA approved L-860 or 861 lighting fixtures per AC 150/5345-48, Specification for Runway and Taxiway Edge Lights, are recommended. Any lighting fixture used should present a low profile to minimize interference with ground maneuvering and flight operations.

74. PERIMETER LIGHTING. Yellow omnidirectional perimeter lights are used to define the boundary of the takeoff and landing area. Perimeter lights are positioned up to 10 feet (3 m) outboard from the edge of this area. An odd number, but not less than five, lighting fixtures should be equally spaced along each edge of a square or rectangular takeoff and landing area. At least eight lighting fixtures should be uniformly spaced around a circular takeoff and landing area. The recommended maximum spacing between light fixtures should not exceed 50 feet (15 m). Figures 7-7 and 7-8 illustrate square and circular lighting configurations. Perimeter lights have an omnidirectional light distribution pattern and use lamps rated at 15 to 45 watts.

75. IDENTIFICATION BEACON. A heliport identification beacon (Advisory Circular 150/5345-12, Specification for L-801 Beacon) is recommended and should be located within a quarter of a mile (0.4 km) of the heliport. A heliport identification beacon is not required for heliport facilities located on a lighted airport. Provisions should be made in the circuitry to permit its operation during periods of reduced visibility as well as at night.

76. OBSTRUCTION LIGHTS. A survey should be made of the heliport area to identify objects such as buildings, smokestacks, powerlines, antennas, etc., that penetrate the heliport approach and transitional surfaces. Penetrating objects should be marked and lighted in accordance with the guidance set forth in Advisory Circular 70/7460-1, Obstruction Marking and Lighting, unless an FAA aeronautical study has determined that the absence of such marking and lighting will not impair safety to air navigation.

77. USEFUL VISUAL AIDS. Other visual aids have been developed and have proven useful when applied to certain heliport situations. Landing direction lights, floodlights, and taxiway lights fall into this category.

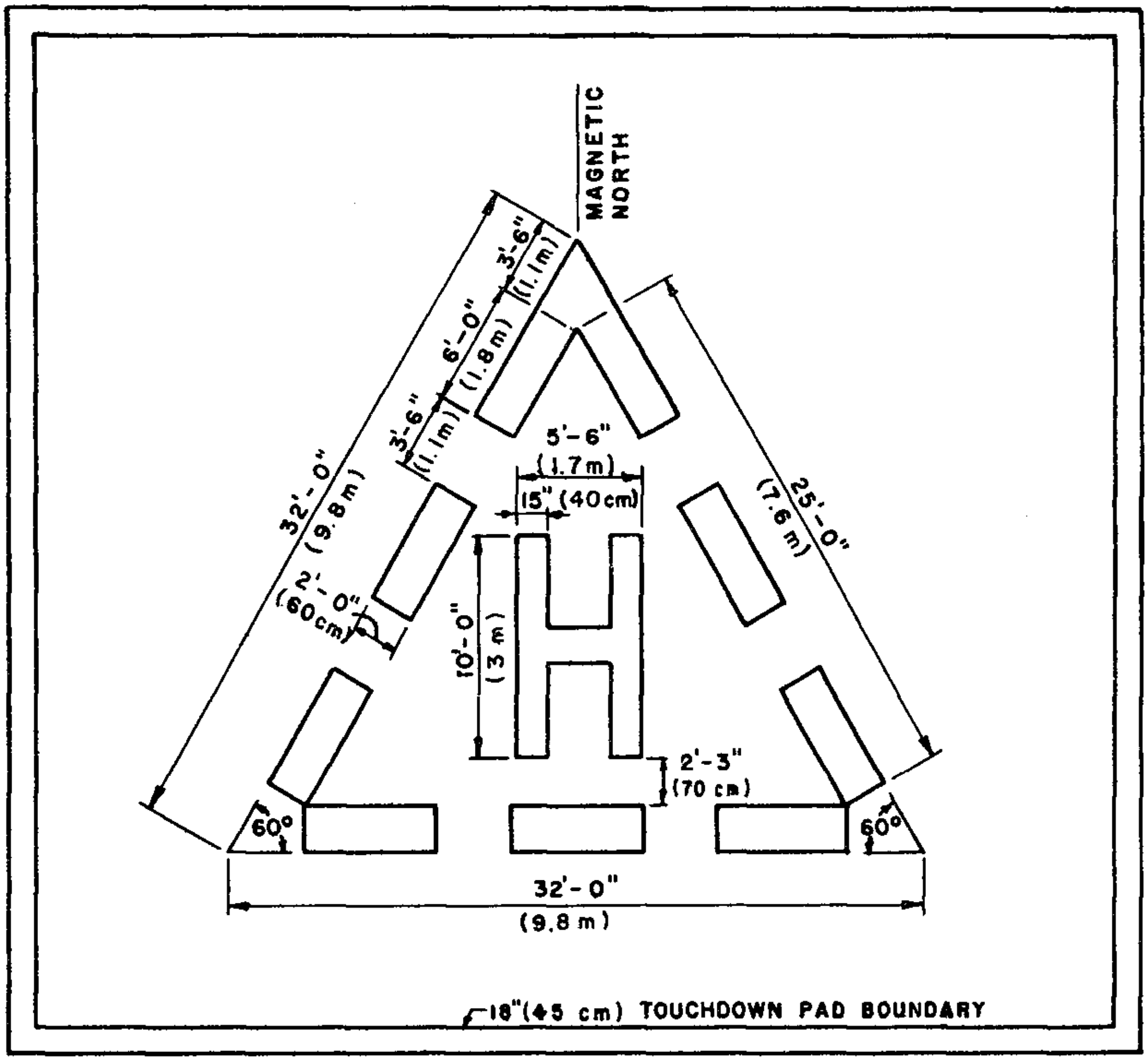
a. Landing Direction Lights. Landing direction lights consist of a line of five L-860 or L-861 fixtures with omnidirectional yellow lenses. Landing direction lights are spaced from 2 feet (0.6 m) to 15 feet (4.5 m) apart and are aligned in the direction of the preferred approach path. More than one approach-departure path may be lighted. Figures 7-7 and 7-8 illustrate landing direction light installations. To enhance their conspicuity in locations with excessive background lighting, landing direction lights may flash in sequence.

b. Floodlights. Floodlighting of the takeoff and landing area, in lieu of perimeter lighting, has proven effective for night operations. When floodlighting is used, the heliport markings should be painted with reflective paint and be maintained in good condition. Floodlighting stanchions should be located to avoid interference with flight operations, and to not blind the pilot with undesirable glare during the approach, departure, or taxiing operation. It is suggested that floodlights produce at least 3 footcandles (32 lux) of illumination over the entire landing area. Floodlighting of loading and servicing aprons may be accomplished with standard floodlighting fixtures and installation practices; however, there should be no interference with helicopter flight operations.

c. Taxiway Lights. A taxiway edge lighting system consists of omnidirectional blue lights outlining the usable limits of the taxi route. Taxiway edge lights may be located up to 10 feet (3 m) beyond the edge of the paved taxiway. Advisory Circular 150/5340-24, Runway and Taxiway Edge Lighting System, provides guidance on recommended spacing between light fixtures. Alternatives to taxiway edge lights are a taxiway centerline lighting system as described in AC 150/5340-19, Taxiway Centerline Lighting System, or the reflective markers described in AC 150/5340-20, Installation Details and Maintenance Standards for Reflective Markers for Airport Runway and Taxiway Centerlines.

78. LIGHTING CONTROL. Control of the heliport lighting systems may be accomplished in several ways. The simplest is a manual on-off switch to turn on the system or system components as needed. Other systems use an automatic control such as a photoelectric cell to turn lights on and off. More sophisticated systems permit remote control of the lights by direct wire and relays or by use of an L-854 radio control system (AC 150/5345-49, Specification L-854, Radio Control Equipment) allowing air-to-ground or ground-to-ground activation. Regardless of the control system used, each should be capable of manual override to insure operation in cases of control malfunction.

79. RESERVED.



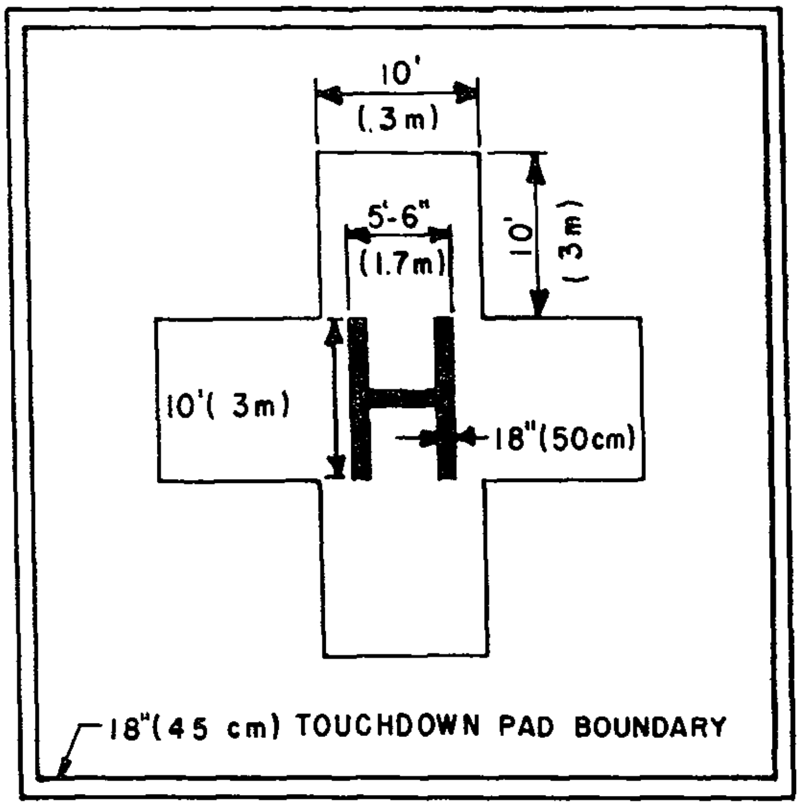
NOTES:

1. The triangle, letter "H," and boundary markings are white and may be edged with a 6-inch (15 cm) black border to improve contrast. The boundary marking may be either a solid or segmented line.

2. The triangle is centered in the middle of the touchdown pad with the solid apex pointing magnetic north. The letter "H" is centered within the triangle.

3. Dimensions shown are appropriate for touchdown pads 60 feet (18 m) or larger. Dimensions should be reduced proportionally for smaller touchdown pads.

FIGURE 7-1. STANDARD HELIPORT MARKING SYMBOL

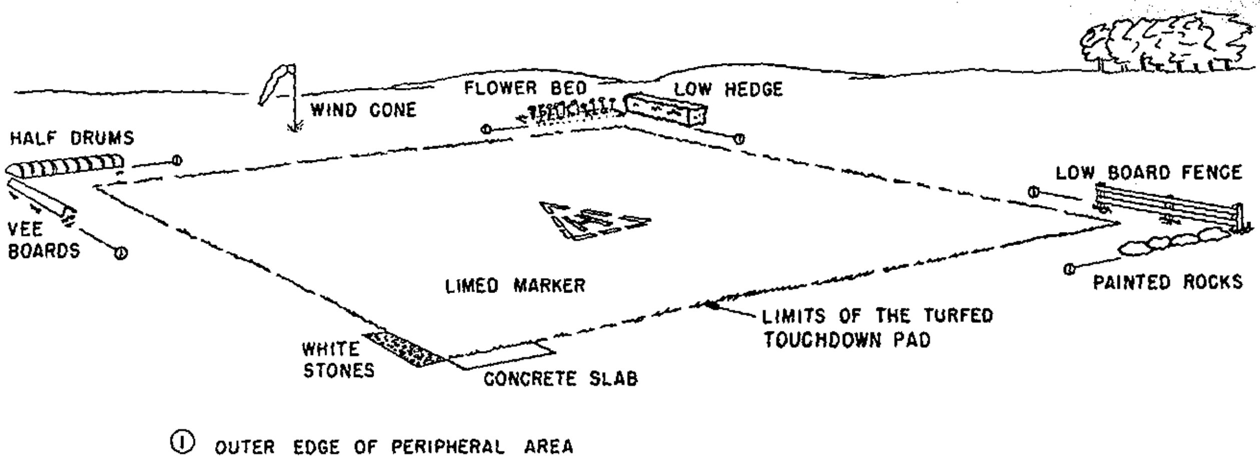


NOTES:

1. The cross and touchdown pad boundary markings are white and may be edged with a 6-inch (15 cm) red border to improve contrast. The letter "H" is red.

2. The touchdown pad boundary marking may be either a solid or segmented line.

FIGURE 7-2. RECOMMENDED HOSPITAL HELIPORT MARKINGS



NOTES:

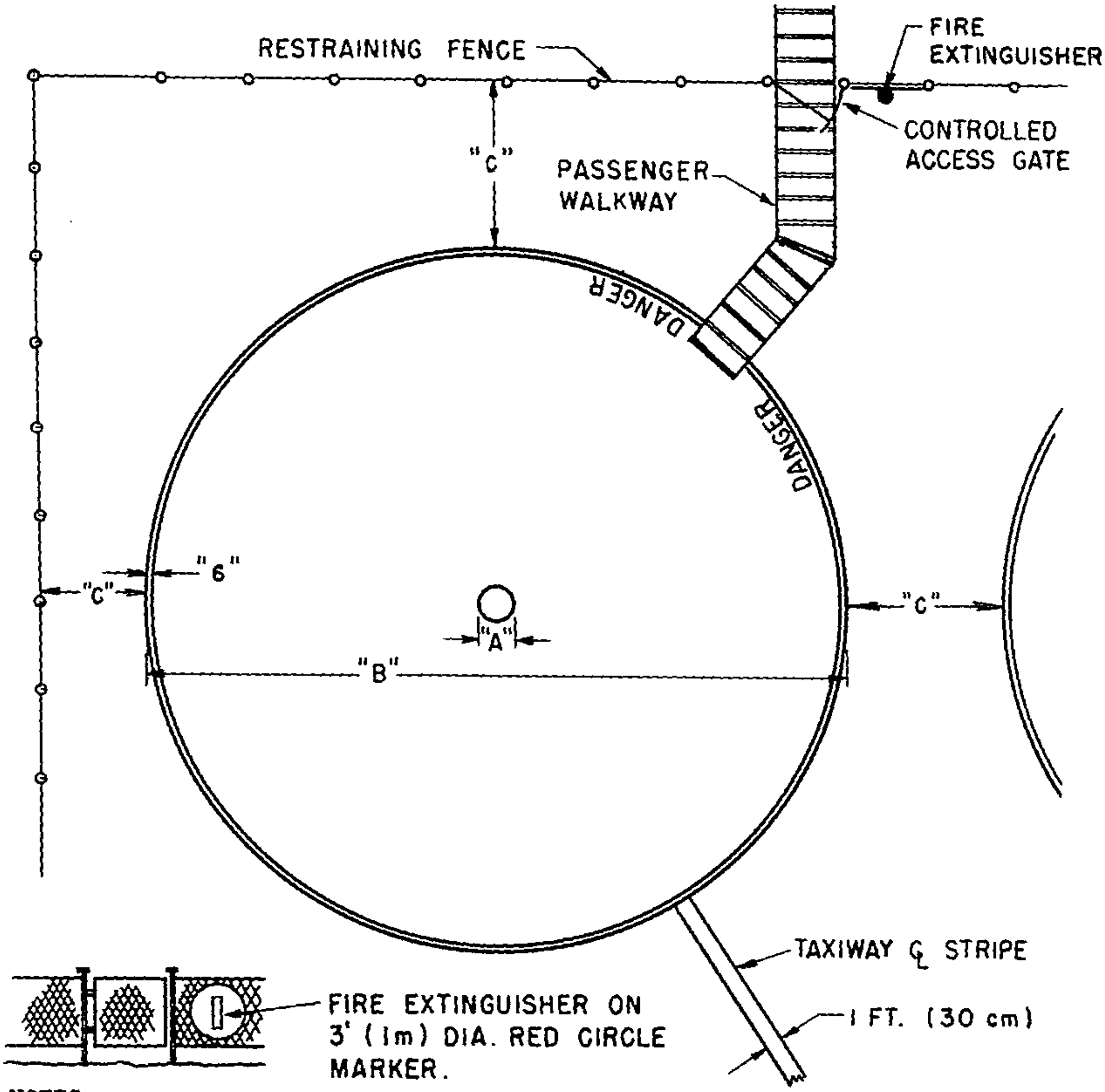
1. Markers used to define the takeoff and landing area of a turfed heliport should provide visible contrast against the natural background of the site.

2. Flush-type markers may be located at the edge of the touchdown pad.

3. Above-ground markers should not project more than 18 inches (45 cm) above the surface of the ground. Manmade markers should be solidly anchored to the ground to prevent their being blown about by rotor downwash. Raised markers should be located at the outer edge of the peripheral area.

4. This drawing illustrates numerous types of markings that could be used to identify limits of a turfed heliport. It is not intended that a heliport owner use more than one type of marker.

FIGURE 7-3. EXAMPLES OF MARKINGS FOR A TURFED HELIPORT



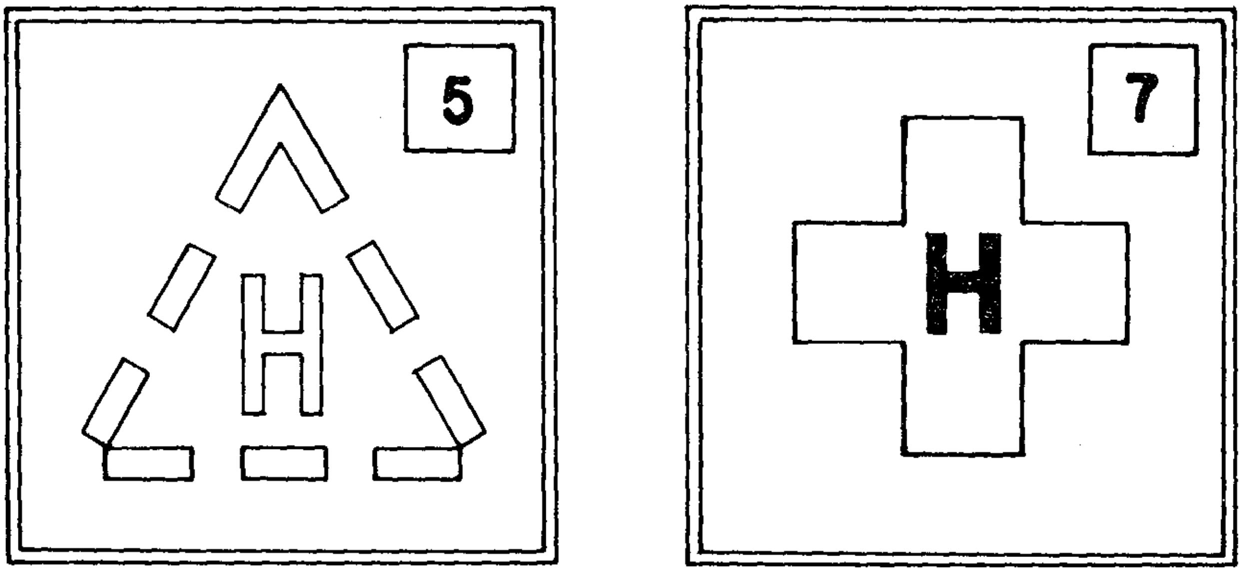
NOTES:

1. All markings for helicopter parking or ground guidance are in yellow.

2. Stopping circle "A" is at least 3 feet (1 m) in diameter. Diameter of the parking circle "B" is equal to the overall length of the design helicopter. Clearance to objects "C" is at least 10 feet (3 m).

3. Passenger walkway widths, locations, and markings are at the owner's discretion, the intent being to clearly delineate safe passageways.

FIGURE 7-4. HELIPORT GUIDANCE, POSITION, AND OTHER MARKINGS



NOTES:

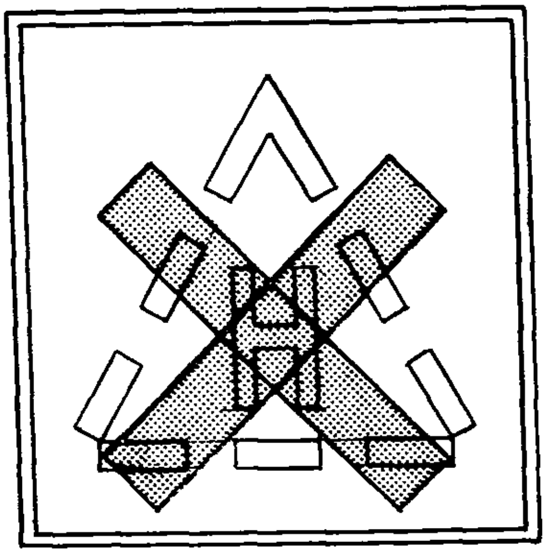
1. Helicopter weight limitations are stated in thousands of pounds. Pending adoption of metric units, weight limitations should be stipulated in pound units.

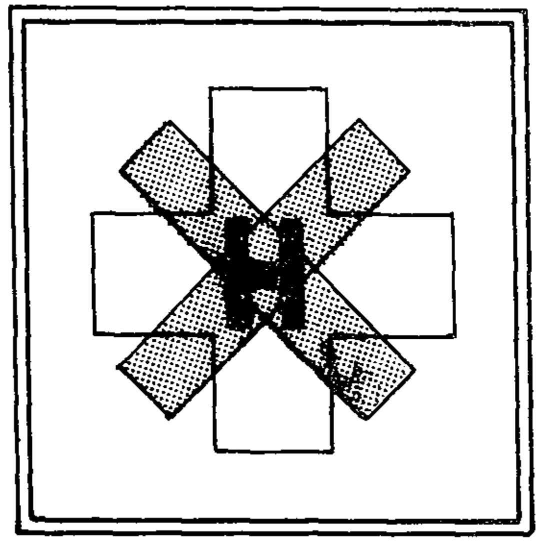
2. Limiting numerals are in red on a white background.

3. The square and number must be large enough to be seen by the pilot of the helicopter making an approach to land.

4. The weight limit marking should be located in the upper right corner of the designated takeoff and landing area as viewed from the primary direction of approach.

FIGURE 7-5. RECOMMENDED HELIPORT MARKING TO SHOW AN IMPOSED WEIGHT LIMITATION





NOTES:

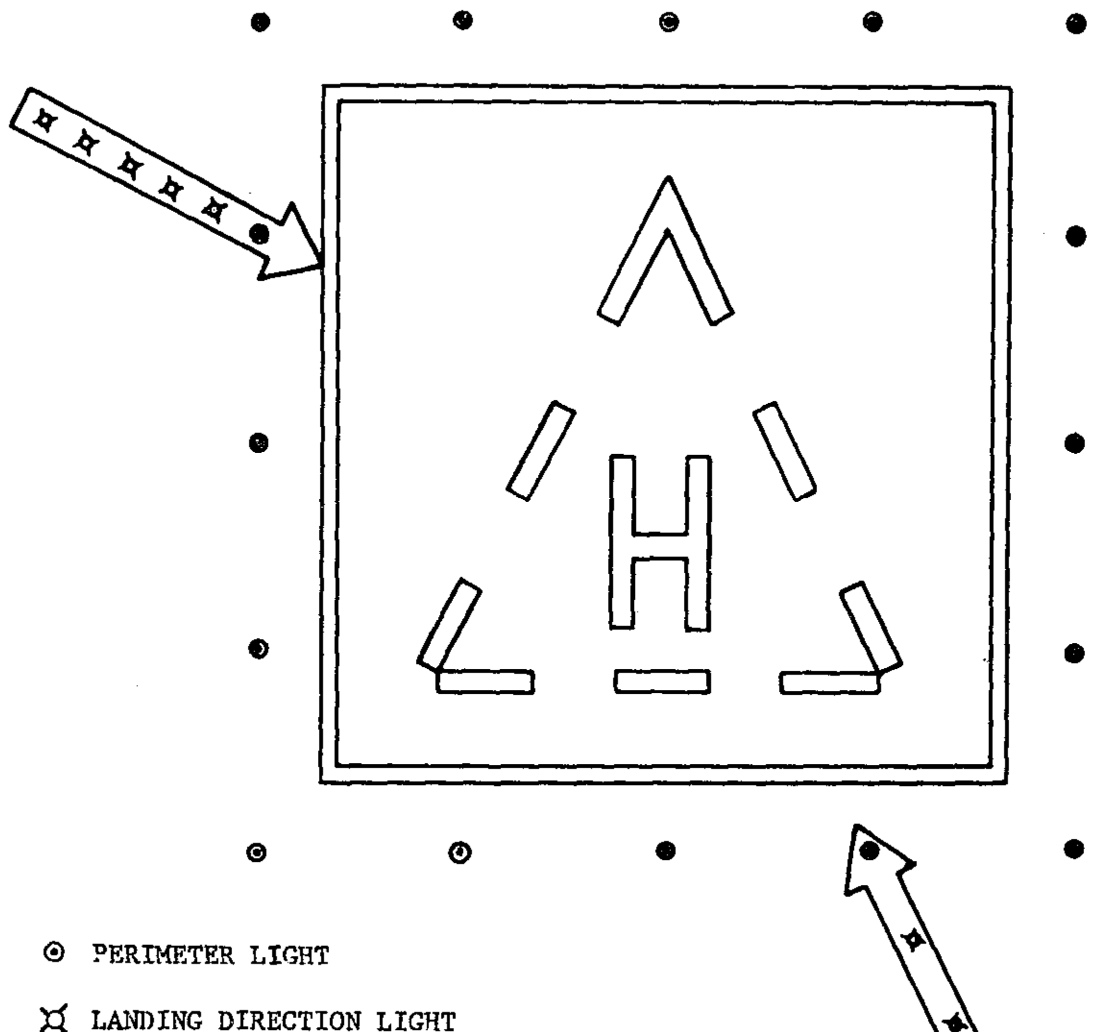
1. Whenever possible, the existing heliport marking should be removed or obliterated.

2. When removal or obliteration is not practical, a yellow cross symbol is to be used to indicate that the heliport is closed.

3. The dimensions of a "bar" of the cross are on the order of 5 feet by 30 feet (1.5 m by 9 m). The above drawings indicate the approximate coverage desired.

4. Colored "wash" or lime may be used to mark temporary heliport closings.

FIGURE 7-6. RECOMMENDED MARKING OF CLOSED HELIPORTS



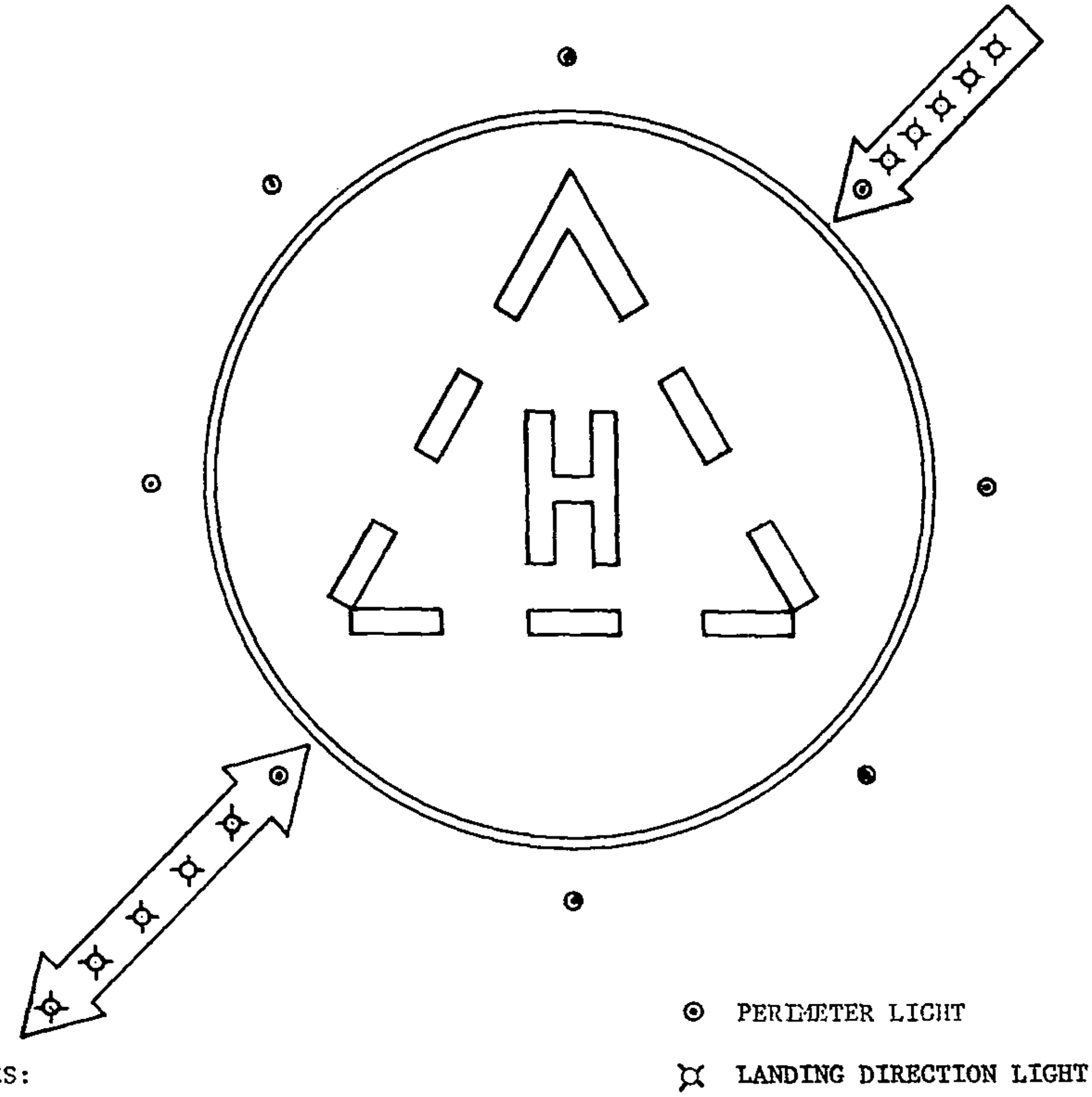
NOTES:

1. Install an odd number, but never less than 5, perimeter lights on a side. Lights are omnidirectional with yellow lenses. Lights are located no more than 10 feet (3 m) outboard of the takeoff and landing area and are spaced no more than 50 feet (15 m) apart.

2. Locate a row of 5 yellow omnidirectional landing direction lights along the centerline of the principal approach and departure paths used for night operations. Lights may be spaced from 2 to 15 feet (0.6 to 4.5 m) apart and may be located outboard or inboard, or both, of the perimeter lights as space permits.

3. White painted arrows may be used to identify preferred approach and departure paths. Arrows should be large enough to be readily visible.

FIGURE 7-7. RECOMMENDED HELIPORT LIGHTING



NOTES:

1. Install a minimum of 8 equally spaced perimeter lights around the takeoff and landing area. Lights are omnidirectional with yellow lenses. Lights are located no more than 10 feet (3 m) outboard of the takeoff and landing area and are spaced no more than 50 feet (15 m) apart.

2. Locate a row of 5 yellow omnidirectional landing direction lights along the centerline of the principal approach and departure paths used for night operations. Lights may be spaced from 2 to 15 feet (0.6 to 4.5 m) apart and may be located outboard or inboard, or both, of the perimeter lights as space permits.

3. White painted arrows may be used to identify preferred approach and departure paths. Arrows should be large enough to be readily visible.

FIGURE 7-8. RECOMMENDED LIGHTING FOR A CIRCULAR HELIPORT

CHAPTER 8. OPERATIONAL CONSIDERATIONS

80. GENERAL. The proponent of a heliport must consider possible measures to assure the safety of persons using the heliport. Considerations include, but are not limited to, such features as safety barriers, fire and crash rescue services, radio communications, and heliport zoning ordinances.

81. SAFETY BARRIERS. The owner of the heliport should erect a safety barrier around helicopter operational areas. The barrier may take the form of a fence, wall, or hedge. It should be no closer to the operating areas than the outer edge of the peripheral area surrounding the takeoff and landing area and the recommended fixed object clearance distance from heliport taxiways and helicopter parking positions. Any barrier used should be high enough to present a positive deterrent to persons inadvertently entering an operational area and yet be low enough to be nonhazardous to helicopter operations.

82. FIRE PROTECTION. Helicopters operating at an airport are afforded the same degree of fire and crash rescue protection provided to all aircraft. Heliports, however, are generally limited in area and normally will not require based fire engines. The degree of fire protection required will depend upon the size and number of helicopters to be accommodated; the number of occupants; and the fuel load of the helicopter. Heliport personnel should be trained in rescue and fire-fighting skills. The National Fire Protection Association (NFPA) recommended fire protection capabilities for heliport facilities are based on the following heliport categorization (references NFPA Pamphlets 403 and 418).

a. The H-1 category includes all heliports where the helicopters using the facility carry less than six persons and have operational fuel loads of less than 100 gallons (380 l).

* b. The H-2 category includes all heliports where the helicopters using the facility normally carry more than 6 and less than 12 passengers and have operational fuel loads of less than 200 gallons (760 l).

c. The H-3 category includes all heliports where the helicopters using the facility normally carry 12 or more passengers and have operational fuel loads of more than 200 gallons (760 l).

d. Fire extinguishing agents are not required at unattended heliports.*

83. EXTINGUISHER REQUIREMENTS. The NFPA National Fire Code standards set forth in Figure 8-1 are recommended. Extinguishers, hoses, etc., should be located in weatherproof, above grade, cabinets clearly marked as to the contents. Extinguisher cabinets may be located in the peripheral area and within 5 feet (1.5 m) of the line defining the takeoff and landing area. However, cabinets should not be located where they would penetrate an approach-departure path. Cabinets should also be located adjacent to helicopter parking positions. The applicant for a heliport requiring FAR Part 139 certification must show that it has at least the required firefighting and rescue equipment assigned for Index A aircraft, with a 3-minute response time. Firefighting requirements for Index A aircraft (aircraft not more than 90 feet (27 m) long) must be capable of providing at least 500 pounds (230 kg) of dry chemical extinguishing agents, or 450 pounds (205 kg) of dry chemicals and 50 gallons (190 l) of water for aqueous film-forming foam.

84. RADIO COMMUNICATIONS. There is no Federal requirement for radio communication facilities at a heliport. However, many heliport operators have installed a "UNICOM" radio system which operates on frequencies of 123.05 or 123.075 megahertz. It is used for communications between the heliport and the helicopter to give traffic and weather information and for company dispatching purposes. Helicopters operating into controlled airports or in controlled airspace must be able to communicate with the appropriate FAA air traffic control facility.

85. HELIPORT ZONING. To preserve the public's investment, the FAA recommends that the approaches to all publicly owned heliports be protected. Protection can be accomplished through the adoption of a zoning ordinance which regulates the height of objects in the vicinity of the heliport. (See Advisory Circular 150/5190-4, A Model Zoning Ordinance to Limit Height of Objects Around Airports.) Owners of private-use and personal-use heliports normally would not have the legal authority to enact zoning ordinances; therefore, they must rely on good planning and community cooperation to achieve the desired approach protection. Siting a heliport to take maximum advantage of unused airspace above rivers, lakes, public roads, railroads, etc., can minimize the possible adverse impact of not being able to enact a protective zoning ordinance.

86-89. RESERVED.

*

Heliport Category	Water for AFFF Production				Water for Protein Fluoroprotein Foam Production				Dry Chemical*			
			Discharge Rates				Discharge Rates				Discharge Rates	
	Gals (U.S.)	Liters	GPM	Liters/Min	Gals (U.S.)	Liters	GPM	Liters/Min	Lbs	Kgs	Lbs/Min	Kgs/Min
H-1	**	**	**	**	**	**	**	**	100	45	100	45
H-2	200†	760†	100	380	300†	1140†	150	570	200	90	200	90
H-3	335†	1265†	200	760	500†	1900†	300	1140	300	135	300	135

*When used with protein or fluoroprotein foam, foam compatible type dry chemical is required. Dry chemical in containers weighing in excess of 50 lbs (2.25 kgs) should be equipped with auxiliary wheeled carriers. See 3-1.2.3 when alternate use of carbon dioxide is to be used. (*See also Standard on Installation of Portable Fire Extinguishers, NFPA 10 (ANSI).*)

**Many times a water supply meeting the recommendations for Category H-2 may be readily available. In such cases, it should be made available assuming personnel are *assigned* to utilize the equipment in the event of an emergency.

†This amount of water should be immediately available from a hydrant (standpipe), pressurized tank, reservoir, cistern, or mobile vehicle so that it can be dispensed at the discharge rate indicated and at a satisfactory pressure. Additional water should be available to provide a continuing rescue and fire fighting capability wherever feasible.

GROUND-LEVEL HELIPORTS (NFPA-403, 1978 Edition) *

Heliport Category	Water for Foam Production Using Protein or Fluoroprotein Foam Concentrates††				Foam Compatible Dry Chemical (Rating)*	Additional Water for Foam if Heliport Is Elevated	
	Amount of Water		Total Rate of Discharge				
	Gallons	Liters	GPM	Liters		Gallons	Liters
H-1	None**	None**	None**	None**	2-80B:C Extinguishers	None**	None**
H-2	500†	1,900†	100	380	2-80B:C Extinguishers or 1-160B:C Wheeled Extinguisher	1000†	3,800†
H-3	1500†	5,700†	200 from two 100 gpm nozzles or from one mobile unit with a turret	760	2-80B:C Extinguishers and 1-160B:C Wheeled Extinguisher	1500†	5,700†

*See Standard on Installation of Portable Fire Extinguishers (NFPA No. 10; ANSI Z112.1).

**Many times a water supply meeting the suggestions for Category H-2 may be readily available. In such cases it should be made available assuming personnel are available to utilize the equipment in event of an emergency.

†This amount of water should be immediately available from a hydrant (standpipe), pressurized tank, reservoir, or mobile vehicle so that it can be dispensed at the rates indicated and at a satisfactory pressure. Additional water should be available to provide a continuing rescue and fire fighting capability wherever feasible.

††The quantity of water may be reduced one-third when aqueous film-forming foam concentrate is used.

ROOF-TOP HELIPORTS (NFPA-418, 1973 Edition)

NOTE: Deviations and or equivalent substitutions may be authorized by competent authority to comply with local fire codes or to meet unusual site or operational conditions.

FIGURE 8-1. NFPA RECOMMENDATIONS FOR HELIPORT FIRE PROTECTION

CHAPTER 9. ELEVATED HELIPORT DESIGN

90. GENERAL. An elevated heliport, whether it be located on the roof of some building or parking structure or on a waterfront pier, presents unique design problems. Developing structural design and construction specifications for elevated heliports requires the services of qualified architects and engineers. This chapter is limited to covering, in general terms, the basic design features that are peculiar to an elevated heliport.

91. SITING. When a suitable ground-level site is unattainable, the alternative may be the development of an elevated heliport. Elevated heliports are found in many cities. Most would be classified as private-use or personal-use facilities. An elevated facility has two advantages for the proponent of a private-use or personal-use heliport. First, the facility provides more privacy and security than a ground-level site. Second, with the heliport at or above the level of most buildings in the vicinity, there are fewer problems in providing and maintaining suitable approach-departure paths. (See Figure 9-1.)

92. CODES AND REGULATIONS. Local, state, and national safety codes pertaining to building construction, occupancy, ingress-egress, fire safety, etc., should be carefully reviewed to determine their impact on establishing and operating an elevated heliport. Early coordination of a proposed elevated heliport facility with FAA, state, and local authorities is recommended to insure that no pertinent code or regulation is overlooked.

93. TAKEOFF AND LANDING AREA. The dimensions of the takeoff and landing area of an elevated heliport are keyed to the size of the helicopter expected to operate therefrom. To the extent that circumstances permit, the recommended dimensions of the takeoff and landing area are identical to those of a ground-level facility. (See paragraph 52.) The takeoff and landing area, together with the associated peripheral area, may require the entire roof area or only a part of it. Elevated takeoff and landing areas having a long axis should have that axis oriented in the direction of the prevailing winds.

a. Peripheral Areas. In some instances, it is neither possible nor practical to provide the surface area required to permit the development of a takeoff and landing area and associated peripheral area. In some of these cases, it is reasonable to presume that the natural open space surrounding an elevated heliport will suffice as an obstruction-free area and the peripheral area requirement may be eliminated. To take full advantage of ground effect, the dimensions of the minimal takeoff and landing area should be 1.5 times the rotor diameter of the largest helicopter expected to operate therefrom. A surface smaller than this may subject using helicopters to operational restrictions.

b. Load-bearing Surfaces. The entire rooftop surface designated as the takeoff and landing area, plus any helicopter parking positions, should be designed to support the static and dynamic loads imposed by the largest helicopter expected to use the facility. Where a touchdown pad or parking position is to be provided, and it is impractical to structurally stress the entire takeoff and landing area, then an area of at least the size of (1) or (2) below should be provided.

(1) Public-Use Heliports. A load-bearing area at least one rotor diameter in length and width, or a diameter of the largest helicopter expected to use the facility, is the minimum recommended.

(2) Private-Use and Personal-Use Heliports. A load-bearing area having a length and width at least 1.5 times the wheelbase and tread, respectively, or a diameter 1.5 times the wheelbase of the largest helicopter expected to use the facility, is the minimum recommended. Skid or float length should be substituted for wheelbase as appropriate.

94. APPROACH CLEARANCES. Elevated heliports have the same requirements for approach clearances as a ground-level heliport (see paragraph 55). At an elevated facility, it is usually easier to secure unobstructed approach and transitional surfaces. This benefit alone may be quite significant to privately owned heliports since approach and transitional surfaces usually cannot be protected under the zoning powers of the community. In many instances, it will be difficult to prevent obstructions within the entire rooftop takeoff and landing area. Therefore, special consideration may have to be given to the presence of penthouses, air conditioning towers, exhaust stacks, antennas, etc. The FAA should be contacted early in the planning stages to undertake a study to determine the effect of such objects upon aeronautical operations. Elevated heliports may also be subjected to turbulence. Flight tests are recommended to ascertain the effect of different wind conditions on the safety of flight operations.

95. CONSTRUCTION-GENERAL. Elevated heliport takeoff and landing areas present some special problems to the heliport designer who must consider the following:

a. Construction Materials. All materials used in the construction of the heliport should be noncombustible or fire-retardant. Most frequently used materials are portland cement concrete, asphaltic concrete, steel plates, or treated wood. Synthetic and resilient plastic coatings of different compositions have proven to possess excellent characteristics for operating surfaces. All surfaces should be textured to have nonskid properties or have a nonskid coating applied. If night operations are contemplated, a light-colored surface is recommended to improve pilot depth perception. Treat the decking and supporting structure of a wood or metal load-distribution platform to make it weather resistant.

b. Perimeter Protection. Safety nets, guard rails, or fences should meet requirements of local or state building codes. Guard rails or fences should not penetrate heliport primary, approach, or transitional surfaces nor should the installation create an actual or perceived psychological obstacle to pilots using the heliport. A safety net, Figure 9-2, is recommended for touchdown pads raised above the level of the roof. These nets should be located below, and not rise above, the plane of the heliport primary surface. A net width of at least 5 feet (1.5 m) is recommended.

c. Surface Drainage. The takeoff and landing area should be designed with gutters that would isolate the runoff of any spilled liquids. It is essential that these liquids be prevented from discharging into the building's drainage system. Local building codes should be reviewed to determine whether the proposed collection system complies with the applicable code provisions.

d. Structural Implications. The surface used for takeoffs and landings on elevated heliports should be an integral part of the building's design whether it is incorporated as a roof-level or platform facility. The actual landing surface should be constructed of materials that will not yield under hard landings. However, the heliport designer may take advantage of any energy-absorbing properties inherent in roof-decking materials or structural-framing techniques. Helicopter static and dynamic loading calculations are identical to those of paragraph 66. Design loads other than those applied by the helicopter, such as snow, rainfall, wind, passengers and cargo, flight supporting equipment, additional weight of the heliport, etc., should be calculated in accordance with applicable building codes. An analysis of this magnitude requires the professional services of a qualified architect or engineer. Proponents of elevated heliports should consider the probability of future operations by larger helicopters when designing the facility.

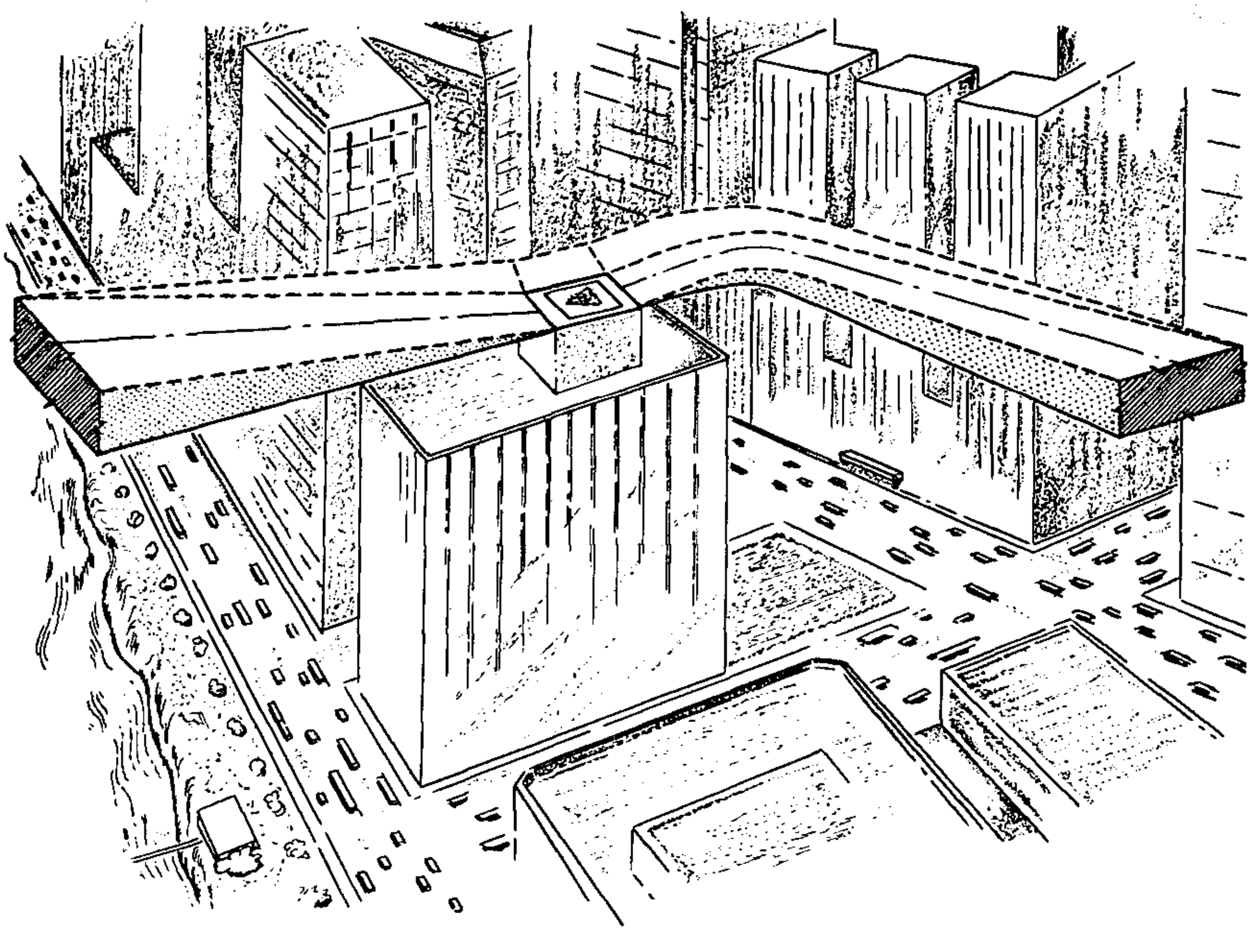
96. MARKING AND LIGHTING. The basic marking and lighting for an elevated heliport are identical to that of a comparable ground-level facility.

a. Marking. An elevated heliport may be subject to an operational weight limitation. A red numeral on a white square (see paragraph 71d) is recommended to convey this information to the pilot of the approaching helicopter. A red circle around a red number is recommended to mark a rooftop landing facility intended solely to permit helicopter evacuation of building occupants in case of fire. The number indicates the helicopter gross weight the facility is capable of supporting. Figures 9-3 and 9-4 illustrate the recommended marking.

b. Lighting. Because an elevated heliport takeoff and landing surface is likely to be size-limited, perimeter lights may be installed on supports extending beyond the edge of the touchdown pad. (See Figure 9-2.) Perimeter lights should be at or only slightly above the level of the touchdown pad. Under some conditions, a floodlighted touchdown pad with reflective markings may be acceptable as an alternative to perimeter lighting. Elevated heliport lighting plans should be discussed with the appropriate FAA Airports office. The recommended heliport beacon may be mounted on the same or on an adjacent building as conditions dictate.

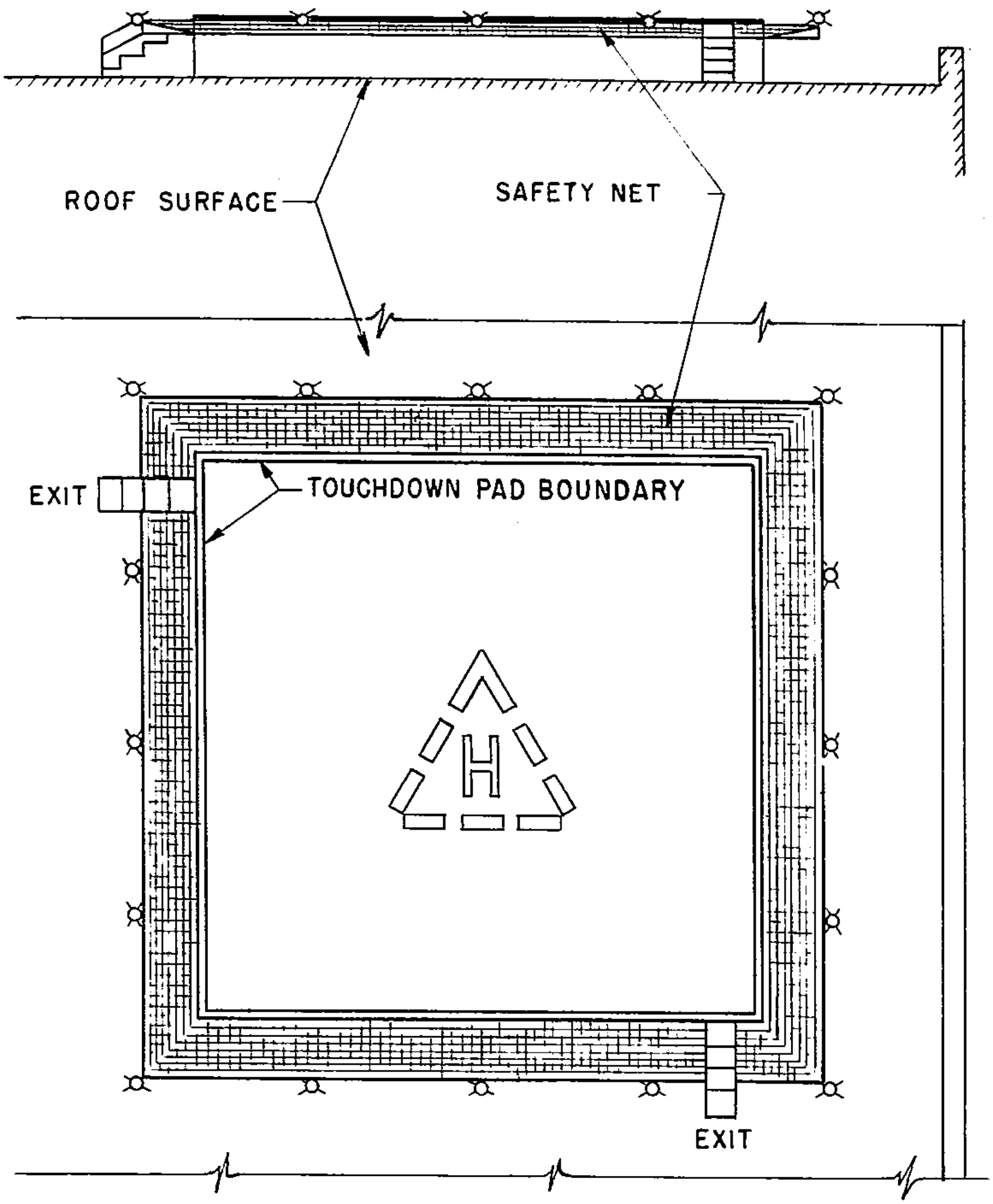
97. FIRE PROTECTION. Requirements for elevated and rooftop heliport fire protection are contained in the National Fire Protection Association's Booklet Edition 418. These requirements are set out in Figure 8-1. When local fire codes are more restrictive, the local code shall prevail. Personnel engaged in heliport operations should be instructed in the proper use of installed firefighting systems. The design, installation, and periodic performance testing of fire protection systems should be carried out by qualified persons.

98-99. RESERVED.



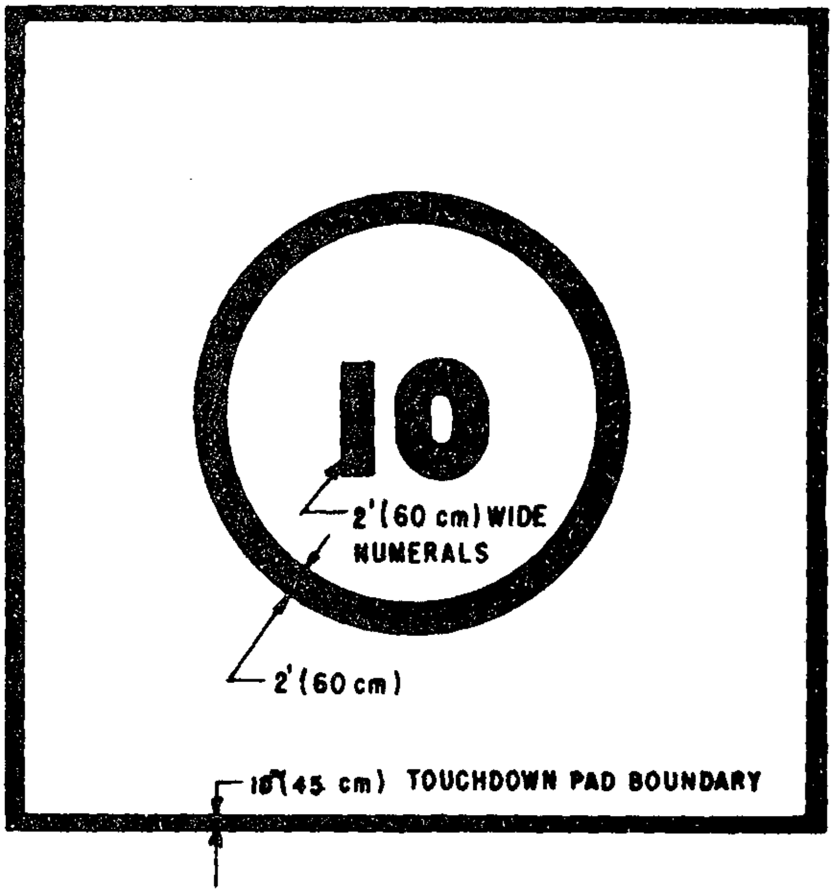
NOTE: The transitional surface is not depicted on the near side of the sketch for purposes of clarity.

FIGURE 9-1. ILLUSTRATION OF AN ELEVATED HELIPORT WITH CURVED APPROACH-DEPARTURE PATH



NOTE: Platform heliports shall have two entry-exit points. The heliport perimeter lights and safety net should not project above the level of the touchdown pad.

FIGURE 9-2. PLATFORM HELIPORT SHOWING LIGHTING AND SAFETY NET



NOTES:

1. The numeral, circle, and touchdown pad boundary markings are in red. The preferred background color is white.

2. The red numeral indicates the allowable weight, in thousands of pounds, that the facility is capable of supporting.

3. DO NOT show allowable weight in metric (kg) units.

FIGURE 9-3. MARKING FOR AN EMERGENCY-USE HELICOPTER LANDING FACILITY ON BUILDING ROOF

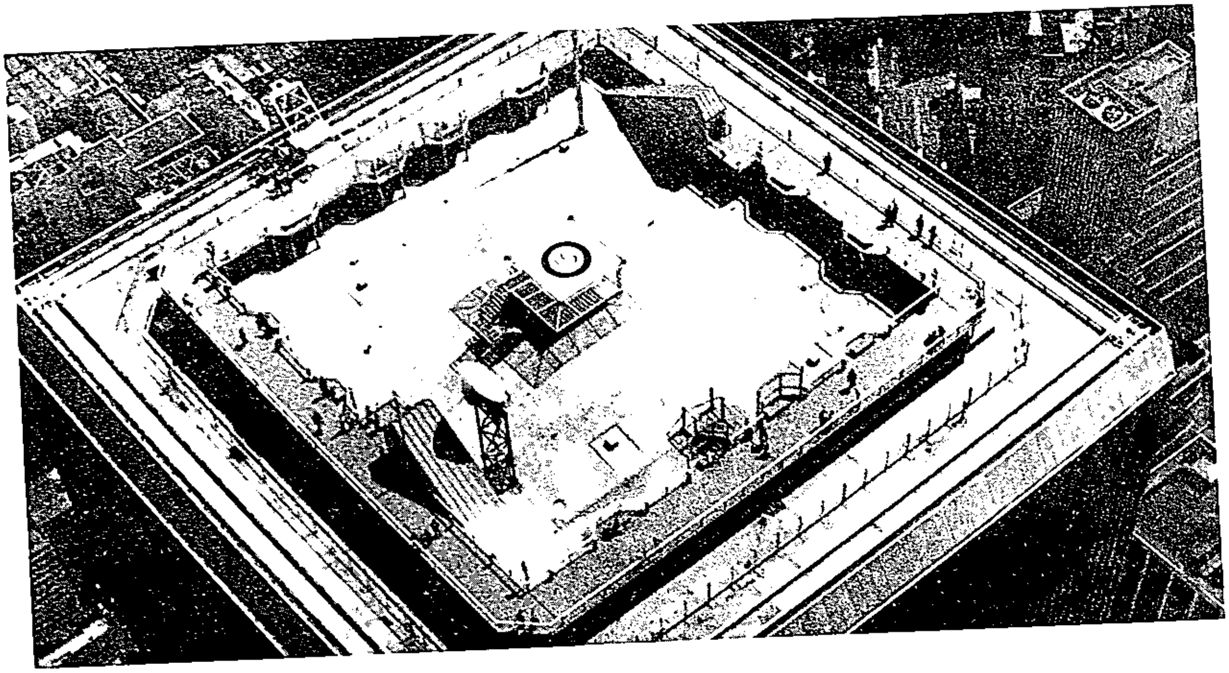


FIGURE 9-4. A ROOFTOP EMERGENCY-USE LANDING FACILITY

CHAPTER 10. OFFSHORE HELICOPTER FACILITIES

100. GENERAL. The oil industry makes extensive use of helicopters to move people and equipment between shore heliports and drilling platforms located up to 200 miles (320 km) from shore. The facilities recommended for helicopter operations on offshore platforms will vary from those recommended for either ground-level or elevated heliports. This chapter identifies pertinent design features applicable to permanently fixed offshore helicopter facilities located in U.S. territorial waters. Guidance for mobile platforms or for shipboard facilities is found in U.S. Coast Guard publications. Designers of platforms to be operated in foreign waters should contact the appropriate agency of the nation(s) involved. Figure 10-1 pictures typical platform and shipboard helicopter facilities. Figure 10-2 depicts the layout of a simple offshore helicopter facility.

*101. TAKEOFF AND LANDING AREA. The important surface for any helicopter facility is the takeoff and landing area referred to as the helicopter deck. The length and width of the helicopter deck should be at least equal to the rotor diameter of the largest single main rotor helicopter expected to use the facility. When the helicopter deck is designed to be used by tandem rotored helicopters, it should have a length at least 9/10 and a width at least 3/4 of the helicopter's overall length. A larger deck area is required if more than one helicopter is expected to use the facility at the same time. A deck area smaller than recommended could result in operational limitations being imposed.

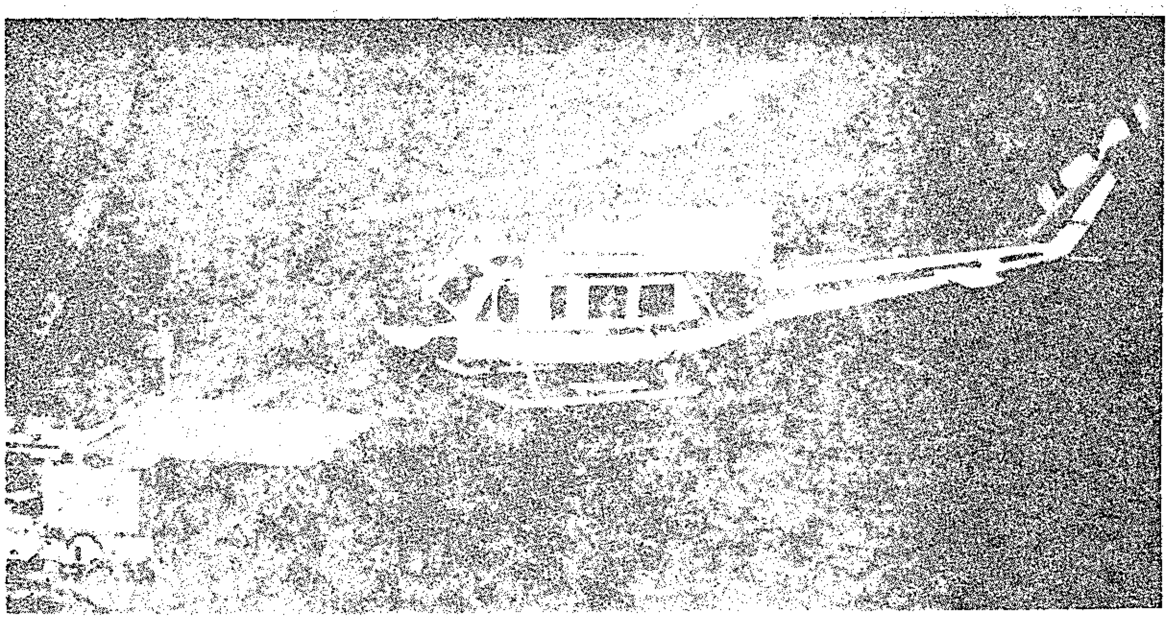
102. CLEARANCES. The helicopter deck should be located to provide a 180-degree obstacle-free area for approaches and departures. The recommended approach and departure area is illustrated in Figure 10-2. Outside of the approach and departure area, objects within 1/3 rotor diameter of the helicopter deck should not penetrate a surface commencing at the edge of the deck and rising at a slope of one unit vertical to two units horizontal. No object should penetrate the plane of the helicopter deck unless it is required for operational safety.

103. LIGHTING. Lights on an offshore helicopter facility serve to locate and outline the helicopter deck. Since most working offshore platforms are brightly lighted islands in a dark ocean, there normally is no need for a heliport beacon. Alternating yellow and blue omni-directional lights should be installed around the periphery of the helicopter deck not more than 10 feet (3 m) apart. Light fixtures should not rise more than 6 inches (15 cm) above the level of the helicopter deck. Adequate shielding should be used on any lights that could interfere with the pilot's vision as he or she conducts an approach to land. *

*104. MARKING. The helicopter deck should be marked with a 20-foot (6 m) diameter aiming circle, an edge stripe, a unit identification, and if appropriate, the weight limitation marking described in paragraph 71. Figure 10-2 illustrates these markings. Painted markings should be 16 inches (40 cm) wide and of a color that offers the greatest contrast to the deck color.

105. CONSTRUCTION. The helicopter deck should be designed to accommodate the static and dynamic loadings imposed by the largest helicopter expected to use the facility. (See paragraph 66.) To minimize the potential for structural failure, the designer should place these anticipated loadings in the most unfavorable positions for each member analyzed. The helicopter deck should have a nonskid surface. Drainage facilities should prevent the collection of liquids or the spreading or falling of the liquids onto other areas of the platform. The outer edge of the helicopter deck should be protected with a safety net or railing. The net or railing should be 5 feet (1.5 m) wide and should not project more than 6 inches (15 cm) above the level of the deck at its outer edge. The helicopter deck should have both a main and an emergency personnel access/egress route located as far apart from each other as practicable. *

106. OTHER FACILITIES. The helicopter facility should have a wind direction indicator located in an unobstructed area so that it is readily visible to the pilot of a helicopter approaching the facility. For night operations the wind indicator should be lighted. Fire protection equipment should be in accordance with the requirements promulgated by the U.S. Coast Guard for platform installations.



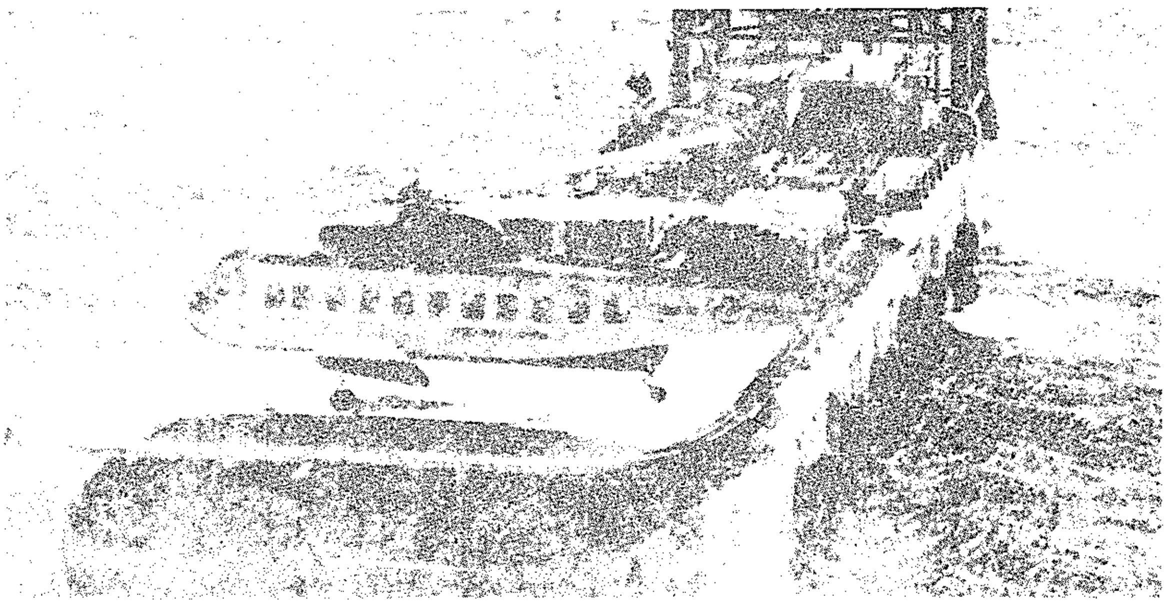


FIGURE 10-1. OFFSHORE HELICOPTER FACILITIES

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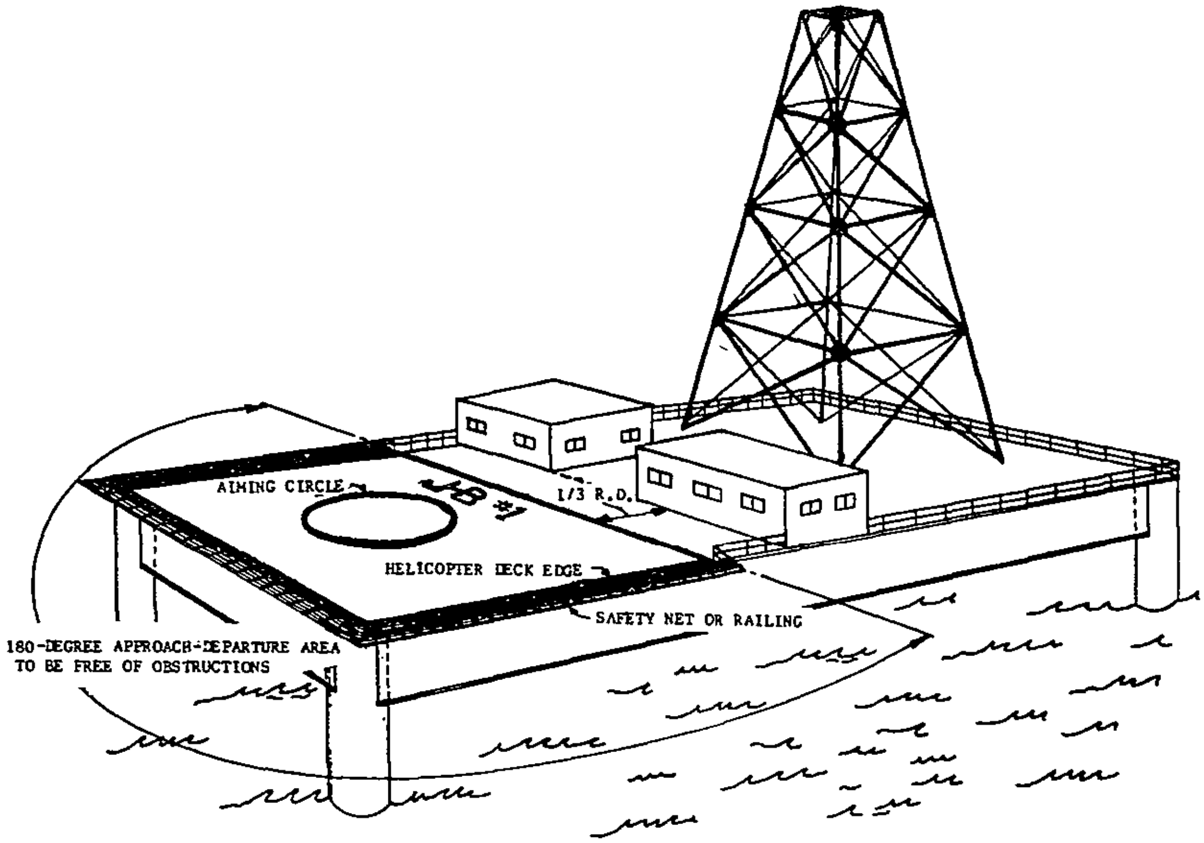


NOTES:

1. The length and width of the helicopter deck should be at least equal to the rotor diameter of the largest single main rotor helicopter expected to use the facility. For tandem rotored helicopters, see paragraph 101.

2. An additional area equal to 1/3 the rotor diameter should be kept free of objects that would penetrate a 2:1 (horizontal to vertical) surface commencing at the edge of the helicopter deck.

3. A 16-inch (40 cm) wide stripe should be used to mark the aiming circle and the helicopter deck edge. Unit identification and, if appropriate, the weight limitation marking should be added. Markings should be in a color that offers the greatest contrast to the deck color.

4. Neither the perimeter lights nor the outer edge of the safety net or railing should project more than 6 inches (15 cm) above the helicopter deck surface.

FIGURE 10-2. AN OFFSHORE HELICOPTER FACILITY *

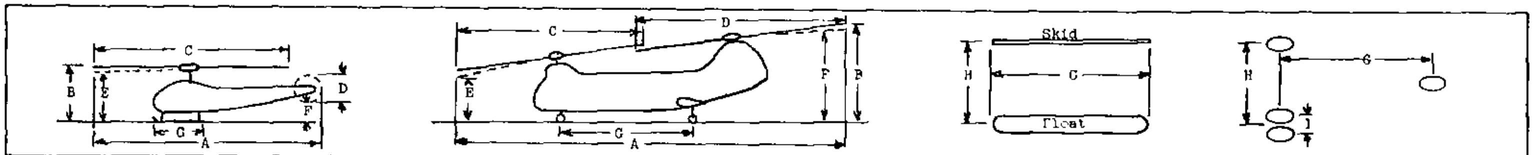
APPENDIX 1. SUMMARY OF RECOMMENDED DESIGN CRITERIA

APPENDIX 1. SUMMARY OF RECOMMENDED DESIGN CRITERIA

DESIGN FEATURE	HELIPORT CLASSIFICATION PUBLIC-USE DIMENSION	HELIPORT CLASSIFICATION PRIVATE-USE PERSONAL-USE DIMENSION	COMMENT
TAKEOFF & LANDING AREA Length, width, diameter	1.5 x helicopter overall length		To preclude premature obsolescence, consider the possibility of larger helicopters in the future.
TOUCHDOWN PAD Length, width, diameter	1.0 x rotor diameter		Elevated touchdown pads less than 1.5 rotor diameters in size may subject using helicopters to operational penalties due to loss of rotor downwash ground effect. Minimally sized touchdown pads are not encouraged, but may be used in cases of economic or aesthetic necessity. Touchdown pads less than one rotor diameter in size should have additional nonload-bearing area for downwash ground effect.
Minimum ground-level Length, diameter Width	 2.0 x wheelbase 2.0 x tread	 1.5 x wheelbase 1.5 x tread	
Minimum elevated Length, diameter Width	 1.0 rotor dia. 1.0 rotor dia.	 1.5 x wheelbase 1.5 tread	
PERIPHERAL AREA Recommended width Minimum width	 1/4 helicopter overall length 10 feet (3 m)		An obstacle-free area surrounding the takeoff and landing area. Keep the area clear of parked helicopters, buildings fences, etc.
TAXIWAY Paved width	Variable, 20-foot (6 m) minimum		Paved taxiways are not required if helicopters hover taxi.
PARKING POSITION Length, width, diameter	1.0 x helicopter overall length		Parking position should be beyond the edge of the peripheral area. Parked helicopters should not violate the 2:1 transitional surface.
PAVEMENT GRADES Touchdown pad, taxiways, parking positions	2.0 percent maximum		
OTHER GRADES Turf shoulders, infield area, etc.	Variable, 1-1/2 to 3 percent		A 10-foot (3 m) wide rapid runoff shoulder of 5 percent slope is permitted adjacent to all paved surfaces.
CLEARANCES, ROTOR TIP TO OBJECT Taxiways, parking positions	10-foot (3 m) minimum		Consider possibility of larger helicopters in the future.
HELICOPTER PRIMARY SURFACE Length, width, diameter Elevation	 1.5 x helicopter overall length Elevation highest point takeoff & landing area.		Imaginary plane overlying the takeoff and landing area. Area to be free of all obstacles.
HELICOPTER APPROACH SURFACE Number of surfaces Angular separation Length Inner width Outer width Slope	 Two 90° min., 180° preferred 4,000 feet (1 220 m) 1.5 x helicopter overall length 500 feet (152 m) 8:1		Protection for helicopter approaches and departures. The surface should not be penetrated by any objects that are determined to be hazards to air navigation.
HELICOPTER TRANSITIONAL SURFACE Length Width Slope	 Full length of approaches and primary surface. 250 feet (76 m) measured from approach & primary surface centerline. 2:1		Surface should not be penetrated by objects.

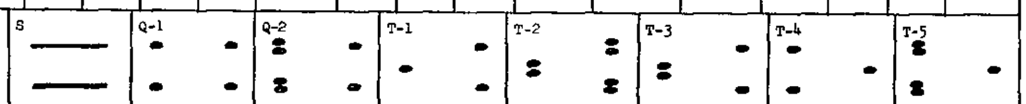
NOTE: Above criteria does not apply to offshore helicopter facilities.

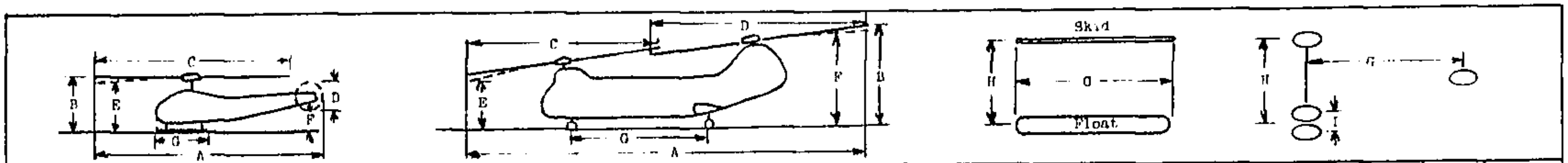
APPENDIX 2. HELICOPTER DIMENSIONAL DATA



MANUFACTURER	MODEL NO.	COMMON NAME	A (FT.)	B (FT.)	C (FT.)	D (FT.)	E (FT.)	F (FT.)	LANDING GEAR CONFIG.	G (FT.)	H (FT.)	I (IN.)	CONTACT AREA (SQ.IN.)	MAX. WEIGHT (LBS)	STATIC WEIGHT (LBS)	DOWN-WASH (LBS/SF)	NO. TYPE ENG.	NO. CREW PASS.	FUEL (GAL)
AEROSPATIALE	315-B	Lama	42.4	10.1	36.2	6.4	:	3.2	S	10.8	7.8	NA	:	4,300	2,150	4.94	1-TS	1+4	146
	318-C	Alouette II	39.8	9.0	33.5	6.3	:	:	S	:	7.5	NA	:	3,650	1,825	4.17	1-TS	1+4	149
	319-B	Alouette III	42.1	9.8	36.1	6.3	:	:	T-1	:	8.5	NA	:	4,960	:	4.85	1-TS	1+6	152
	330-G	Puma	59.6	16.9	49.2	10.0	14.4	6.9	T-2	13.3	:	:	:	14,770	:	7.77	2-TS	2+18	410
	341-G	Gazelle	39.3	10.4	34.5	NA	8.9	2.3	S	:	6.6	NA	:	3,970	1,985	4.26	1-TS	1+4	120
	360	Dauphin	44.1	11.5	37.7	NA	10.0	:	T-4	23.7	6.5	NA	:	6,170	:	5.53	1-TS	1+9	170
AUGUSTA/ATLANTIC	A-109	Hirando	42.9	10.9	36.1	6.6	7.0	2.3	T-1	11.6	7.5	NA	20	5,402	2,701	5.28	2-TS	1+7	156
BELL HELICOPTER	47-G-5A	--	43.6	9.3	38.0	5.8	9.5	3.0	S	9.9	7.5	NA	:	2,850	1,425	2.63	1-P	1+2	57
	205-A-1	--	57.1	14.4	48.2	8.5	6.8	5.9	S	12.1	9.0	NA	:	9,500	4,750	5.21	1-TS	1+14	220
	206-B	Jet Ranger	38.8	9.5	33.3	5.2	6.0	1.6	S	7.8	6.3	NA	:	3,200	1,600	3.67	1-TS	1+4	76
	206-L	Long Ranger	42.4	11.7	37.0	5.2	6.2	2.9	S	9.9	7.7	NA	:	4,000	2,000	3.72	1-TS	1+5	98
	212	Twin	57.3	14.4	48.2	8.5	7.0	4.4	S	12.1	8.8	NA	:	11,200	5,600	6.09	2-TS	1+14	183
	214-B	Big Lifter	60.2	13.5	50.0	9.6	9.4	3.7	S	12.1	8.6	NA	:	16,000	8,000	8.15	1-TS	1+15	207
BOEING VERTOL	BO-105-C	--	38.5	[illegible]	32.2	6.2	9.0	[illegible]	S	:	8.5	NA	:	5,070	2,535	6.2	2-TS	1+4	154
	CH-47-234	--	98.9	19.0	60.0	60.0	7.4	16.2	Q-2	22.5	11.2	:	78	50,000	15,967	8.1	2-TS	[illegible]	1,129
	107-II	--	83.4	16.9	50.0	50.0	9.9	16.9	T-2	24.8	12.9	13	25	22,000	7,000	4.8	2-TS	3+25	350
	179	--	59.5	16.5	49.0	10.2	8.0	6.4	T-3	15.3	8.8	15	82	18,700	7,030	9.9	2-TS	2+19	486

: Data not provided.
NA Data not applicable.
TS Turboshaft engine.
P Piston engine.
PT Turbocharged piston engine.

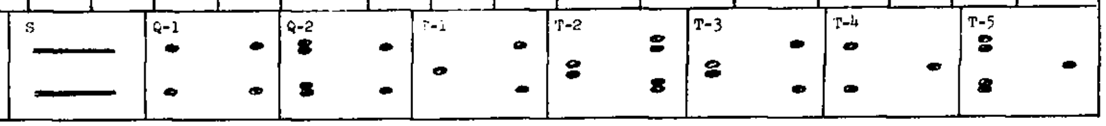


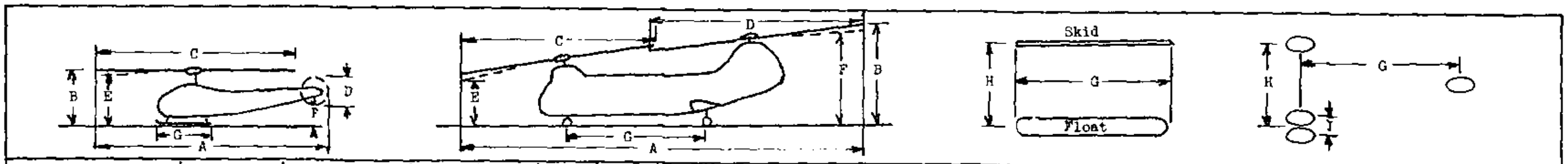


MANUFACTURER	MODEL NO.	COMMON NAME	A (FT.)	B (FT.)	C (FT.)	D (FT.)	E (FT.)	F (FT.)	LANDING GEAR CONFIG.	G (FT.)	H (FT.)	I (IN.)	CONTACT AREA (SQ. IN.)	MAX. WEIGHT (LBS)	STATIC WEIGHT (LBS)	DOWN-WASH (LBS/SF)	NO. TYPE ENG.	NO. CREW PASS.	FUEL (GAL)
BRANTLY-HYNES	B-2-B	--	28.0	6.8	23.7	4.3	4.8	3.0	S	:	6.5	NA	:	1,670	835	3.7	1-P	[illegible]	31
	305	--	32.9	8.0	28.5	4.3	6.2	3.0	T-3	6.2	6.8	:	15	2,900	967	4.5	1-P	1+4	43
ENSTROM	F-28A/280	Shark	39.0	9.0	32.0	4.7	6.0	3.1	S	8.0	7.3	NA	:	2,150	1,075	2.67	1-P	1+2	30
	F-28C/280C	Shark	39.0	9.0	32.0	4.7	6.0	3.1	S	8.0	7.3	NA	:	2,200	1,100	2.73	1-PT	1+2	40
FAIRCHILD	FH-1100	--	41.5	9.3	35.3	6.0	6.5	2.3	S	7.9	7.2	NA	:	2,750	1,375	[illegible]	1-TS	1+4	68
HILLER	UH-12-L-4	Hiller	40.7	10.1	35.4	5.5	10.0	3.3	S	8.3	7.5	NA	:	3,100	1,550	3.3	1-P	1+3	46
	UH-12E/E-4	Hiller	40.7	10.9	35.4	5.5	10.8	4.0	S	8.3	7.5	NA	:	2,800	1,400	2.9	1-P	1+3	46
HUGHES	269-A/B	Hughes 300	28.9	8.2	25.3	3.8	6.6	2.8	S	8.2	6.5	NA	:	1,670	835	3.32	1-P	1+1-2	30
	269-C	Hughes 300C	30.8	8.7	26.8	4.3	7.0	2.6	S	8.2	6.5	NA	:	2,050	1,025	3.63	1-P	1+2	30
	369HS (Std)	Hughes 500C	30.3	8.2	26.3	4.3	7.0	2.4	S	8.1	6.8	NA	:	2,550	1,275	4.70	1-TS	1+4	64
	369HS (Ext)	Hughes 500C	30.3	8.8	26.3	4.3	7.6	2.4	S	8.1	6.8	NA	:	:	:	4.70	1-TS	1+4	64
	369-D	Hughes 500D	30.5	8.9	26.4	4.6	7.0	2.7	S	7.4	6.8	NA	:	3,000	1,500	5.46	1-TS	1+4	64
KAMEN	HH-43F	Huskie	47.0	19.3	47.0	NA	7.2	2.3	Q-1	8.1	8.3	NA	:	9,150	:	2.64	1-TS	1+1	350
ROTORWAY	--	Scorpion Too	27.6	7.3	24.0	3.6	6.5	3.1	S	7.5	5.1	NA	:	1,200	600	2.25	1-P	1+1	10

: Data not provided.
NA Data not applicable.
TS Turboshaft engine.
P Piston engine.
PT Turbocharged piston engine.

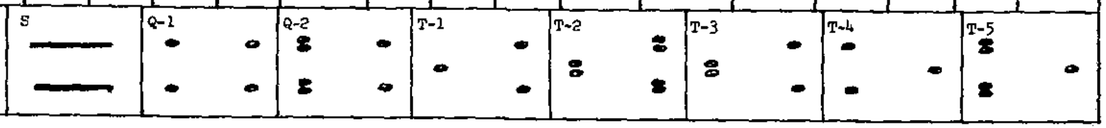
Kamen has side-by-side rotors for oper. width 51.5'

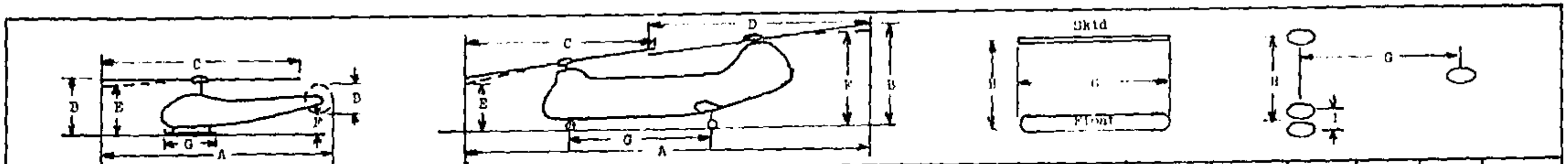




MANUFACTURER	MODEL NO.	COMMON NAME	A (FT.)	B (FT.)	C (FT.)	D (FT.)	E (FT.)	F (FT.)	LANDING GEAR CONFIG.	G (FT.)	H (FT.)	I (IN.)	CONTACT AREA (SQ. IN.)	MAX. WEIGHT (LBS)	STATIC WEIGHT (LBS)	DOWN-WASH LBS/SF)	NO. TYPE ENG.	NO. CREW PASS.	FUEL (GAL)
SIKORSKY	S-55-T	--	62.2	15.3	53.0	8.8	8.2	6.5	Q-1	10.5	11.0	NA	40	7,200	2,100	3.3	1-TS	2+10	185
	S-58-T	--	65.8	15.9	56.0	9.5	11.4	6.4	T-4	28.3	14.0	NA	:	13,000	5,750	5.3	2-TS	2+16	283
	S-61 N/L	--	73.0	18.6	62.0	10.6	12.3	8.3	T-5	23.5	14.0	13	54	19,000	8,115	6.3	2-TS	3+28	410
	S-62	--	62.3	16.0	53.0	8.8	9.2	7.3	T-4	17.8	12.2	NA	54	7,900	3,480	3.6	1-TS	2+12	
	S-64	Skycrane	88.5	25.4	72.3	16.0	13.2	9.3	T-1	24.4	19.8	NA	:	42,000	17,700	10.3	2-TS	3+1	880
	S-65-C	--	88.2	24.9	72.3	16.0	10.3	8.8	T-2	27.0	13.0	17	77	42,000	14,700	10.3	2-TS	3+44	630
	S-76	--	57.5	14.5	44.0	8.0	5.8	6.5	T-1	16.4	8.0	NA	21	9,700	3,425	6.4	2-TS	2+12	276
	S-78-C	--	64.8	16.8	53.7	11.0	7.5	6.5	T-4	26.9	9.0	NA	73	20,000	8,700	8.9	2-TS	2+20	463

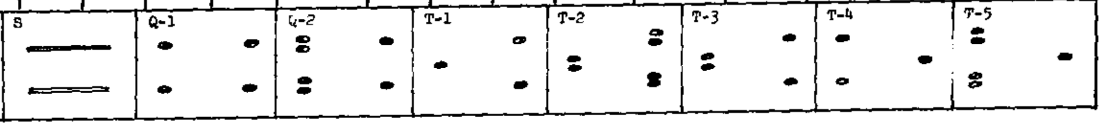
: Data not provided.
NA Data not applicable.
TS Turboshaft engine.
P Piston engine.
PT Turbocharged piston engine.

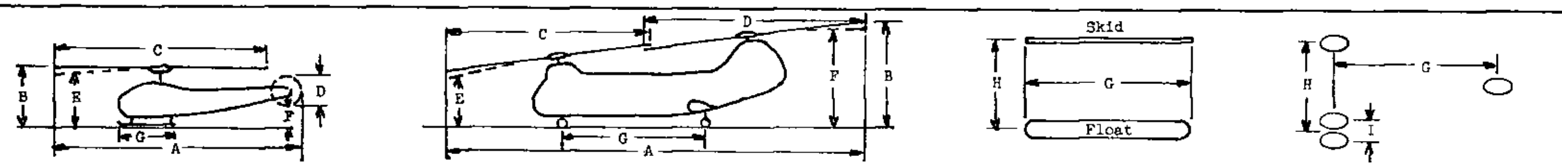




MANUFACTURER	MODEL NO.	COMMON NAME	A (M)	B (M)	C (M)	D (M)	E (M)	F (M)	LANDING GEAR CONFIG.	G (M)	H (M)	I (CM)	CONTACT AREA (CM^2)	MAX. WEIGHT (KG)	STATIC WEIGHT (KG)	DOWN-WASH (KG/M^2)	NO. TYPE ENG.	NO. CREW PASS.	FUEL (L)
AEROSPATIALE	315-D	Lama	12.9	3.1	11.0	1.9	:	1.0	S	3.3	2.4	NA	:	1 950	975	24.12	1-TS	1+4	553
	318-C	Alouette II	12.1	2.7	10.2	1.9	:	:	S	:	2.3	NA	:	1 656	828	20.36	1-TS	1+4	564
	319-B	Alouette III	12.8	3.0	11.0	1.9	:	:	T-1	:	2.6	NA	:	2 250	:	23.68	1-TS	1+6	553
	330-G	Puma	18.2	5.1	15.0	3.0	4.4	2.1	T-2	4.1	:	:	:	6 700	:	37.94	2-TS	2+18	2 256
	341-G	Gazelle	12.0	3.2	10.5	NA	2.7	0.7	S	:	2.0	NA	:	1 800	900	20.80	1-TS	1+4	454
	360	Dauphin	13.4	3.5	11.5	NA	3.0	:	T-4	7.2	2.0	NA	:	2 799	:	27.00	1-TS	1+9	644
AUGUSTA/ATLANTIC	A-109	Hirando	13.1	3.3	11.0	2.0	2.1	0.7	T-1	3.5	2.3	NA	129	2 450	1 225	25.78	2-TS	1+7	591
BELL HELICOPTER	47-G-5A	--	13.3	2.8	11.6	1.8	2.9	0.9	S	3.0	2.3	NA	:	1 293	646	12.84	1-P	1+2	215
	205-A-1	--	17.4	4.4	14.7	2.6	2.1	1.8	S	3.7	2.7	NA	:	4 309	2 155	25.44	1-TS	1+14	833
	206-B	Jet Ranger	11.8	2.9	10.1	1.6	1.8	0.5	S	2.4	1.9	NA	:	1 452	726	17.92	1-TS	1+4	288
	206-L	Long Ranger	12.9	3.6	11.3	1.6	1.9	0.9	S	3.0	2.3	NA	:	1 814	907	18.16	1-TS	1+6	371
	212	Twin	17.5	4.4	14.7	2.6	2.1	1.3	S	3.7	2.7	NA	:	5 080	2 540	29.73	2-TS	1+14	693
	214-B	Big Lifter	18.3	4.1	15.2	2.9	2.9	1.1	S	3.7	2.6	NA	:	7 258	3 629	39.79	1-TS	1+15	784
BOEING VERTOL	BO-105-C	--	11.8	3.1	9.8	1.9	2.7	1.9	S	:	2.6	NA	:	2 300	1 150	30.27	2-TS	1+4	583
	CH-47-234	--	30.2	5.7	18.3	18.3	2.3	4.9	Q-2	6.9	3.4	:	503	22 680	7 243	39.55	2-TS	3+44	4 274
	107-II	--	25.3	5.2	15.2	15.2	3.0	5.2	T-2	7.6	3.9	32	161	10 030	3 190	23.44	2-TS	3+25	1 325
	179	--	18.1	5.1	14.9	3.1	2.4	2.0	T-3	4.7	2.7	38	529	8 482	3 189	48.34	2-TS	2+19	1 840

: Data not provided.
NA Data not applicable.
TS Turboshaft engine.
P Piston engine.
PT Turbocharged piston engine.

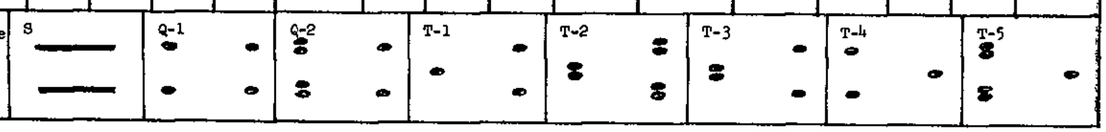


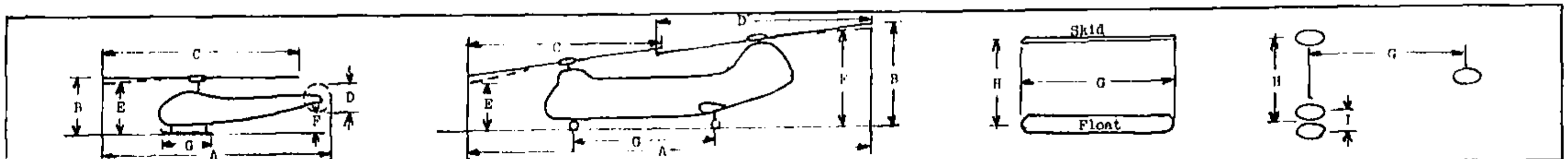


MANUFACTURER	MODEL NO.	COMMON NAME	A (M)	B (M)	C (M)	D (M)	E (M)	F (M)	LANDING GEAR CONFIG.	G (M)	H (M)	I (CM)	CONTACT AREA (CM²)	MAX. WEIGHT (KG)	STATIC WEIGHT (KG)	DOWN-WASH (KG/M²)	N[illegible] T[illegible]E E[illegible]	NO. CREW PASS.	FUEL (L)
BRANTLY-HYNES	B-2-B	--	8.5	2.1	7.2	1.3	2.1	0.9	S	:	1.7	NA	::	758	379	18.44	1-P	1+1	117
	305	--	10.0	2.4	8.7	1.3	2.5	1.2	T-3	2.1	2.1	:	116	1 315	438	22.70	1-P	1+4	163
ENSTROM	F-28A/280	Shark	11.9	2.7	9.8	1.4	1.8	0.9	S	2.4	2.2	NA	:	975	488	13.04	[illegible]	1+2	114
	F-28C/280C	Shark	11.9	2.7	9.8	1.4	1.8	0.9	S	2.4	2.2	NA	:	998	499	13.33	1-P	1+2	151
FAIRCHILD	FH-1100	--	12.7	2.8	10.8	1.8	2.0	0.7	S	2.4	2.2	NA	:	1 247	624	13.67	1-TS	1+4	257
HILLER	UH-12-L-4	Hiller	12.4	3.1	10.8	1.7	3.1	1.0	S	2.5	2.3	NA	:	1 406	703	16.11	1-P	1+3	174
	UH-12E/E-4	Hiller	12.4	3.3	10.8	1.7	3.3	1.2	S	2.5	2.3	NA	:	1 270	635	14.16	1-P	1+3	174
HUGHES	269-A/B	Hughes 300	8.8	2.5	7.7	1.2	2.0	0.8	S	2.5	2.0	NA	:	758	379	16.21	1-P	1+1	114
	269-C	Hughes 300C	9.4	2.7	8.2	1.3	2.1	0.8	S	2.5	2.0	NA	:	930	465	17.73	1-P	1+2	114
	369HS (Std)	Hughes 500C	9.2	2.5	8.0	1.3	2.1	0.7	S	2.5	2.1	NA	:	1 158	579	22.95	1-TS	1+4	242
	369HS (Ext)	Hughes 500C	9.2	2.5	8.0	1.3	2.1	0.7	S	2.5	2.1	NA	:	:	:	22.95	1-TS	1+4	242
	369-D	Hughes 500D	9.3	2.7	8.1	1.4	2.1	0.8	S	2.2	2.1	NA	:	1 362	686	26.76	1-TS	1+4	242
KAMEN	HH-43F	Huskie	14.3	5.9	14.3	NA	2.2	0.7	Q-1	2.5	1.8	NA	:	4 150	:	12.89	1-TS	1+11	1 325
ROTORWAY	--	Scorpion Too	8.4	2.2	7.3	1.1	2.0	0.9	S	2.3	1.6	NA	:	544	272	10.99	1-P	1+1	38

: Data not provided.
NA Data not applicable.
TS Turboshaft engine.
P Piston engine.
PT Turbocharged piston engine.

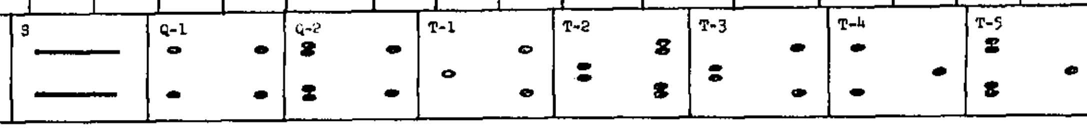
Kamen has side-by-side rotors for oper. width 5.4 M





MANUFACTURER	MODEL NO.	COMMON NAME	A (M)	B (M)	C (M)	D (M)	E (M)	F (M)	LANDING GEAR CONFIG.	G (M)	H (M)	I (CM)	CONTACT AREA (CM²)	MAX. WEIGHT (KG)	STATIC WEIGHT (KG)	DOWN-WASH (KG/M²)	NO. TYPE ENG.	NO. CREW PASS.	FUEL (L)
SIKORSKY	S-55-T	--	19.0	4.7	16.2	2.3	2.5	2.0	Q-1	3.2	3.4	NA	258	3 265	953	16.25	1-TS	2+10	703
	S-58-T	--	20.1	4.9	17.1	2.9	3.5	2.0	T-4	8.6	4.3	NA	:	5 897	2 608	25.88	2-TS	2+16	1 071
	S-61 N/L	--	22.3	5.7	18.9	3.2	3.7	2.5	T-5	7.2	4.3	33	348	8 618	3 681	30.76	2-TS	3+28	1 552
	S-62	--	19.0	4.9	16.2	2.7	2.8	2.2	T-4	5.4	3.7	NA	348	3 583	1 579	17.58	1-TS	2+12	:
	S-64	Skycrane	27.0	7.7	22.0	4.9	4.0	2.8	T-1	7.4	6.0	NA	:	19 050	8 029	50.29	2-TS	3+1	3 331
	S-65-C	--	26.9	7.6	22.0	4.9	3.1	2.7	T-2	8.2	4.0	43	496	19 050	6 668	50.29	2-TS	3+44	2 385
	S-76	--	17.5	4.4	13.4	2.4	1.8	2.0	T-1	5.0	2.4	NA	136	4 400	1 554	31.15	2-TS	2+12	1 045
	S-78-C	--	19.8	5.1	16.4	3.4	2.3	2.0	T-4	8.8	2.7	NA	471	9 072	3 946	43.45	2-TS	2+20	1 753

: Data not provided.
NA Data not applicable.
TS Turboshaft engine.
P Piston engine.
PT Turbocharged piston engine.



APPENDIX 3. BIBLIOGRAPHY

1. Advisory Circular (AC) 00-2, Advisory Circular Checklist and Status of Federal Aviation Regulations, updated triannually, contains the listing of current issuances of advisory circulars and changes thereto. It explains the circular numbering system and gives instructions for ordering advisory circulars that are for sale as well as those distributed free of charge. AC 00-2 also gives instructions for ordering the Federal Aviation Regulations (FAR).

a. The following free advisory circulars may be obtained from the Department of Transportation, Publications Section, TAD-443.1, Washington, D.C. 20590.

(1) AC 00-2, Advisory Circular Checklist and Status of Federal Aviation Regulations.

(2) AC 00-44, Status of Federal Aviation Regulations.

(3) AC 70-2, Airspace Utilization Considerations in the Proposed Construction, Alteration, Activation and Deactivation of Airports.

(4) AC 70/7460-1, Obstruction Marking and Lighting.

(5) AC 70/7460-2, Proposed Construction or Alteration of Objects That May Affect the Navigable Airspace.

(6) AC 150/5000-3, Address List for Regional Airports Divisions and Airports District Offices.

(7) AC 150/5190-4, A Model Zoning Ordinance to Limit Height of Objects Around Airports.

(8) AC 150/5320-6, Airport Pavement Design and Evaluation.

(9) AC 150/5340-19, Taxiway Centerline Lighting System.

(10) AC 150/5340-20, Installation Details and Maintenance Standards for Reflective Markers for Airport Runway and Taxiway Centerlines.

(11) AC 150/5340-24, Runway and Taxiway Edge Lighting System.

(12) AC 150/5345-12, Specification for L-801 Beacon.

(13) AC 150/5345-27, Specification for L-807 Eight-foot and Twelve-foot Unlighted or Externally Lighted Wind Cone Assemblies.

(14) AC 150/5345-48, Specification for Runway and Taxiway Edge Lights.

(15) AC 150/5345-49, Specification L-854, Radio Control Equipment.

b. The following publications may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

(1) AC 150/5370-10, Standards for Specifying Construction of Airports.

(2) FAR Part 1, Definitions and Abbreviations.

(3) FAR Part 27, Airworthiness Standards: Normal Category Rotorcraft.

(4) FAR Part 29, Airworthiness Standards: Transport Category Rotorcraft.

(5) FAR Part 77, Objects Affecting Navigable Airspace.

(6) FAR Part 91, General Operating and Flight Rules.

(7) FAR Part 121, Certification and Operations: Domestic, Flag, and Supplemental Air Carriers and Commercial Operators of Large Aircraft.

(8) FAR Part 127, Certification and Operations of Scheduled Air Carriers with Helicopters.

(9) FAR Part 133, Rotorcraft External-Load Operations.

(10) FAR Part 135, Air Taxi Operators and Commercial Operators of Small Aircraft.

(11) FAR Part 139, Certification and Operations: Land Airports Serving CAB-Certificated Air Carriers.

(12) FAR Part 152, Airport Aid Program.

(13) FAR Part 157, Notice of Construction, Alteration, Activation, and Deactivation of Airports.

(14) Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS).

(15) Airman's Information Manual, Part 2, Airport Directory.

(16) The National Airport System Plan.

2. The following publications may be obtained from the National Fire Protection Association, Publications Sales Department, 470 Atlantic Avenue, Boston, Massachusetts 02210.

   a. NFPA Booklet Edition 403, Recommended Practice for Aircraft Rescue and Fire Fighting Services at Airports and Heliports.

   b. NFPA Booklet Edition 418, Standard on Roof-top Heliport Construction and Protection.

3. Requests for information on shipboard and mobile offshore helicopter facilities should be addressed to Chief, Office of Merchant Marine Safety, U.S. Coast Guard, 400 Seventh Street SW, Washington, D.C. 20590.

4. The following publications may be obtained from the Aerospace Industries Association, 1725 DeSales St. N.W., Washington, D.C. 20036.

   a. Directory of Helicopter Operators in the United States and Canada.

   b. Directory of Heliports in the United States, Canada, Puerto Rico, and Directory of Hospital Heliports.