CHAPTER 4. HOSPITAL HELIPORTS

400. GENERAL. Helicopters have proven to be an effective means of transporting injured persons from the scene of an accident to a hospital and in transferring patients in critical need of specialized services from one hospital to another hospital having that capability. A functional hospital heliport may be as simple as a cleared area on the ground, together with a windsock and a clear approach/ departure path. Figure 4-1 illustrates the essential elements of a ground-level hospital heliport.

The heliport consists of a touchdown and lift-off area (TLOF) surrounded by a final approach and takeoff area (FATO). A safety area is provided around the FATO.

The relationship of the TLOF to the FATO and the Safety Area is shown in Figure 4-2. A FATO may NOT contain more than one TLOF.

Appropriate approach/ departure airspace, to allow safe approaches to and departures from landing sites is required. (See Paragraph 404.)

NOTE: *The design recommendations given in this Chapter are based on the understanding that there will never be more than one helicopter within the FATO and the associated safety area. If there is a need for more than one TLOF at a heliport, each TLOF should be located within its own FATO.*

a. Hospital Heliports. This chapter addresses issues that are unique to hospital heliports and issues for which the design recommendations are different than what is recommended for other categories of heliports. These recommendations address the design of a heliport that will accommodate air ambulance helicopter operations and emergency medical service (EMS) personnel and equipment.

b. Heliport Site Selection. Public agencies and others planning to develop a hospital heliport are encouraged to select a site capable of supporting instrument operations, future expansion, and military helicopters that will be used in disaster relief efforts.

NOTE: *To the extent that it is feasible and practical to do so, the standards and recommendations in this AC should be used in planning and designing improvements to an existing heliport when significant expansion or reconstruction is undertaken. However, existing hospital heliports may continue to follow the recommendations and standards applicable at the time of design.*

NOTE: *If Federal funds are used to build or modify a hospital heliport, the facility should meet the applicable sections in chapter 2 as well as the additional recommendations in this chapter. In addition, the facility should have sufficient size and weight-bearing capability to support the nominal-sized military medevac helicopter that might land at the heliport during emergencies.*

401.TOUCHDOWN AND LIFT-OFF AREA (TLOF).

a. TLOF Location. The TLOF of a hospital heliport may be at ground level, on an elevated structure, or at rooftop level. The TLOF is normally centered within the FATO.

b. TLOF Size. The minimum TLOF dimension (length, width, or diameter) should be 1.0 rotor diameter (RD) of the design helicopter but not less than 40 feet (12 m).

c. Elongated TLOF. An elongated TLOF can provide an increased safety margin and greater operational flexibility. An elongated TLOF may contain a landing position located in the center and two takeoff positions located at either end as illustrated in Figure 4-3. The landing position should have a minimum length of 1.0 times the RD of the design helicopter

NOTE: *If an elongated TLOF is provided an elongated FATO will also be required. See Figure 4-3.*

d. Ground-level TLOF Surface Characteristics. The entire TLOF must be load bearing, either a paved surface or aggregate turf (see AC 150/5370-10, Item P-217). A paved surface is preferable to provide an all-weather wearing surface for helicopters and a firm working surface for hospital personnel and the wheeled equipment used for moving patients on gurneys. The TLOF should be capable of supporting the support the dynamic loads of the helicopter intended to use the parking area (Paragraph 806b). Portland Cement Concrete (PCC) is recommended for ground-level facilities. (An asphalt surface is “less desirable” for heliports as it may rut under the wheels or skids of a parked helicopter, a factor in some rollover accidents.) Pavements should have a broomed or other roughened finish that provides a skid-resistant surface for helicopters and non-slippery footing for people and for moving patients on gurneys.

e. Rooftop and Other Elevated TLOFs. Elevated TLOFs and any TLOF supporting structure should be capable of supporting the dynamic loads of the helicopter intended to use the facility (Paragraph 806b).

(1) Elevated Hospital Heliports. The TLOF should be elevated above the level of any obstacle, in either the FATO or the Safety Area that can not be removed. [Exception: This does not apply to frangibly mounted objects that, due to their function, must be located within the Safety Area (see paragraph 403d).

(2) Obstructions. Elevator penthouses, cooling towers, exhaust vents, fresh-air vents, and other raised features can impact heliport operations. Helicopter exhausts can impact building air quality if the heliport is too close to fresh-air vents. These issues should be resolved during facility design. In addition, control mechanisms should be established to ensure that obstruction hazards are not installed after the heliport is operational.

(3) TLOF Surface Characteristics. Rooftop and other elevated heliport TLOFs should be constructed of metal or concrete (or other materials subject to local building codes). TLOF surfaces should have a broomed pavement or other roughened finish that provides a skid-resistant surface for helicopters and non-slippery footing for people.

(4) Safety Net. When the TLOF is on a platform elevated more than 30 inches (76 cm) above its surroundings, a safety net, not less than 5 feet (1.5 m) wide, should be provided. A railing or fence should not be used since it would be a safety hazard during helicopter operations. The safety net should have a load carrying capability of 25 lb/ft^2 foot (122 kg/m^2). The net, as illustrated in Figure 4-4, should not project above the level of the TLOF. Both the inside and outside edges of the safety net should be fastened to a solid structure.

NOTE: *Designers should consider state and local regulations when determining the width required for the safety net.*

(5) Access to Elevated TLOFs. OSHA requires two separate access points for an elevated structure such as a elevated TLOF. Hospital heliports should provide access to and from the TLOF via a ramp in order to provide for quick and easy transportation of a patient on a gurney. Ramps should be built in accordance with state and local requirements. The width of the ramp, and any turns in the ramp, should be wide enough to accommodate a gurney with a person walking on each side. Straight segments of the ramp should be not less than 6 feet (1.8 m) wide. Additional width may be required in the turns. The ramp surface should provide a slip-resistant surface. The slope of the ramp should be no steeper than 12:1 (12 unit horizontal in 1 units vertical). Inside the FATO and safety area, any handrails should not extend above the elevation of the TLOF. Where a handrail complying with Appendix A of 49 CFR 37, Section 4.8, is not provided, other means should be provide to protect personnel from fall hazards.

(6) Stairs should be built in compliance with regulation 29 CFR 1910.24.

(7) Access by individual with disabilities. Heliports operated by public entities and those receiving Federal financial assistance should provide reasonable accommodation for individual with disabilities if they do not impose undue hardship (significant difficulty or expense) on the operation of the organization. Refer to paragraph 112 and AC 150/5360-14 for additional guidance.

NOTE: *While it is possible to move a gurney to and from the TLOF using a lift, this is not recommended since it invariably results in a delay in the movement of patients with time-critical conditioning.*

f. TLOF Gradients. Recommended TLOF gradients are defined in Chapter 8.

402.FINAL APPROACH AND TAKEOFF AREA (FATO). A hospital heliport should have at least one FATO. The FATO should contain a TLOF within its borders at which arriving helicopters terminate their approach and from which departing helicopters takeoff.

a. FATO Location. The hospital FATO may be at ground level, on an elevated structure, or roof top level. To avoid or minimize the need for additional ground transport, the FATO location should provide ready access to the hospital's emergency room. However, the heliport should be located so buildings and other objects are outside the Safety Area.

b. FATO Size.

(1) The length and width of the FATO should not be less than 1.5 times the overall length (OL) of the design helicopter. At elevations well above sea level, a longer FATO can provide increased safety margin and greater operational flexibility.

(2) The minimum distance between the TLOF perimeter and the FATO perimeter should be not less than the distance [0.5 x (1.5 OL – 1.0 RD)] where OL is the overall length and RD is the rotor diameter of the design helicopter.

c. FATO Surface Characteristics. The FATO outside of the TLOF need not be load bearing. There are some helicopter performance benefits and increased operational flexibility if the FATO outside the TLOF is load bearing. If the TLOF is marked, the FATO outside the TLOF and the Safety Area may extend into the clear airspace. If the TLOF is not marked (see Paragraph 409a) and/or it is intended that the helicopter can land any where within the FATO, the FATO outside the TLOF should, like the TLOF, be capable of supporting the dynamic loads of the design helicopter (Paragraph 806 b).

If the FATO is load bearing, the portion abutting the TLOF should be continuous with the TLOF and the adjoining edges should be at the same elevation. If it is unpaved, the FATO should be treated to prevent loose stones and any other flying debris caused by rotorwash.

d. Mobile Objects within the FATO and the Safety Area. The FATO and Safety Area design recommendations in this AC are based on the assumption that the FATO is closed to other aircraft if a helicopter or other mobile object is within the FATO or the associated Safety Area.

e. FATO/FATO Separation. If a heliport has more than one FATO, the separation between the perimeters of the two FATOs should be such that the respective safety areas do not overlap. This separation is based on the assumption that simultaneous approach/ departure operations will not take place.

NOTE: *If simultaneous operations are planned, greater separation will be required.*

f. FATO Gradients. Recommended FATO gradients are defined in Chapter 8.

403.SAFETY AREA. A Safety Area surrounds a FATO and should be clear of all obstacles except small, frangible objects that, because of their function, must be located there.

a. Safety Area Width. The minimum recommended width of a Safety Area is dependent upon the heliport markings. The Safety Area width is dependent upon the use of the TLOF perimeter markings (paragraph 409a(1)), the FATO edge perimeter (paragraph 409a(2) and 409a(3)), and the hospital heliport identification marking in paragraph 409b. Table 4-1 shows how the minimum recommended Safety Area width varies as a function of heliport markings. The recommended size of the Safety Area in Table 4-1 is increased if the TLOF perimeter is not marked. The minimum recommended width of the Safety Area is the same on all sides.

b. IFR Safety Area Width. RESERVED.

c. Mobile Objects within the Safety Area. See paragraph 402d.

d. Fixed Objects within a Safety Area. No fixed object should be permitted within a Safety Area, except for frangibly mounted objects that, due to their function, must be located there. Those objects whose functions require them to be located within the Safety Area should not exceed a height of 8 inches (20 cm) nor penetrate the approach/ departure surfaces or transitional surfaces.

e. Safety Area Surface. The Safety Area need not be load bearing. Figure 4-5 depicts a non-load-bearing Safety Area. If the Safety Area is load bearing, the portion abutting the FATO should be continuous with the FATO and the adjoining edges should be at the same elevation. This is needed in order to avoid the risk of catching a helicopter skid or wheel. The Safety Area should be treated to prevent loose stones and any other flying debris caused by rotor wash.

f. Safety Gradients. Recommended Safety Area gradients are defined in Chapter 8.

404.VFR APPROACH/ DEPARTURE PATHS. The purpose of approach/ departure airspace as shown in Figure 4-6 is to provide sufficient airspace clear of hazards to allow safe approaches to and departures from landing sites.

a. Number of Approach/ Departure Paths. Approach/ departure paths should be such that downwind operations are avoided and crosswind operations are kept to a minimum. To accomplish this, a heliport should have more than one approach/ departure paths. The preferred flight approach/ departure path should, to the extent feasible, be aligned with the predominate wind. Other approach/ departure paths should be based on the assessment of the prevailing winds or when this information is not available the separation between such flight paths and the preferred flight path should be at least 135 degrees. (See Figure 4-6).

Hospital facilities may have only single approach/ departure path although a second flight path provides additional safety margin and operational flexibility.

b. VFR Approach/ Departure and Transitional Surfaces. An approach/ departure surface is centered on each approach/ departure path. Figure 4-6 illustrates the approach/ departure (primary and transitional) surfaces.

The approach/ departure path starts at the edge of the FATO and slopes upward at 8:1 (8 units horizontal in 1 unit vertical) for a distance of 4000 ft (1219 m) where the width is 500 ft (152 m) at a height of 500 ft (152 m) above the elevation of TLOF surface.

The transitional surfaces start from the edges of the FATO parallel to the flight path center line, and from the outer edges of approach/ departure surface, and extend outwards at a slope of 2:1 (2 units horizontal in 1 unit vertical) for a distance of 250 ft (76 m) from the centerline. The transitional surfaces start at the edge of the FATO opposite the approach/ departure surfaces and extend to the end of the approach/ departure surface. See Figure 4.6.

NOTE: *The transitional surface is not applied on the FATO edge opposite the approach/ departure surface.*

The approach/ departure surface should be free of penetrations. Any penetration of the transitional surface should be considered a hazard unless an FAA aeronautical study determines that it will not have a substantial adverse effect upon the safe and efficient use of this airspace. Paragraph 108b provides guidance on how to identify and mitigate such hazards to air navigation.

The transitional surfaces need not be considered if the size of the approach/ departure surface is increased for a distance of 2000 ft. (610 m) as shown in Figure 4-7. The lateral extensions on each side of the 8:1 approach/ departure surface starts at the width of the FATO and is increased so that at a distance of 2000 ft (610 m) from the FATO it is 100 ft (30 m) wide. Penetrations of area A or area B, but not both, shown on Figure 4-7 by obstacles may be allowed providing the penetrations are marked or lighted and not considered a hazard.

NOTE: *When the standard surface is incompatible with the airspace available at the heliport site, no operations may be conducted unless helicopter performance data supports a capability to safely operate using an alternate approach/ departure surface. The site would be limited to those helicopters meeting or exceeding the required performance and approved by the FAA.*

c. Marking and Lighting of Objects that are Difficult to See. See paragraph 411.

d. Periodic Review of Obstructions. Heliport operators should reexamine obstacles in the vicinity of approach/ departure paths on at least an annual basis. This reexamination should include an appraisal of the growth of trees in close proximity to approach and departure paths. Paragraph 108 provides guidance on how to identify and mitigate obstruction hazards.

e. Curved VFR Approach/ Departure Paths. VFR approach/ departure paths may curve in order to avoid objects or noise-sensitive areas. More than one curve in the path is not recommended. Heliport designers are encouraged to use the airspace above public lands, such as freeways or rivers.

NOTE: *In the next revision of this AC, the FAA intends to provide details on the minimum dimensions of curved approach/ departure airspace.*

405.MAGNETIC RESONANCE IMAGERS (MRI). Hospital equipment, such as an MRI used in diagnostic work, can create a strong magnetic field that will cause temporary aberrations in the helicopter's magnetic compass and may interfere with other navigational systems. Heliport proponents should be alert to the location of any MRI with respect to the heliport location. A warning sign alerting pilots to the presence of an MRI is recommended. Steps should be taken to inform pilots of the locations of MRIs and other similar equipment. For additional information, see reference 42 in Appendix 4.

406.WINDSOCK.

a. Specification. A windsock conforming to AC 150/5345-27, *Specification for Wind Cone Assemblies*, should be used to show the direction and magnitude of the wind. The windsock should provide the best possible color contrast to its background.

b. Windsock Location. The windsock should be located so it provides the pilot with valid wind direction and speed information in the vicinity of the heliport under all wind conditions.

(1) The windsock should be sited so it is clearly visible to the pilot on the approach path when the helicopter is at a distance of 500 feet (152 m) from the TLOF.

(2) Pilots should also be able to see a windsock from the TLOF.

(3) To avoid presenting an obstruction hazard, the windsock should be located outside the Safety Area and it should not penetrate the approach/ departure or transitional approach/ departure surfaces.

(4) At many landing sites, there may be no single, ideal location for the windsock. At other sites, it may not be possible to site a windsock at the ideal location. Consequently, more than one windsock may be required in order to provide the pilot with all the wind information needed for safe operations.

c. Windsock Lighting. For night operations, the windsock should be internally lighted, or externally illuminated to ensure that it is clearly visible.

407.TAXIWAYS AND TAXI ROUTES. At hospital heliports with no parking or refueling area outside the TLOF(s), no taxi route or taxiway is required. If helicopters taxi outside the TLOF(s), the recommendations on paragraph 207 should be followed.

408.HELICOPTER PARKING. A separate helicopter parking area is required at heliports that will accommodate more than one helicopter at a time. At hospital heliports with a parking or refueling area outside the safety area, the recommendations in paragraph 208 should be followed.

409.HELIPORT MARKERS AND MARKINGS. Markers and/or surface markings should identify the facility as a heliport. Surface markings may be paint, reflective paint, reflective markers, or preformed material. Lines/markings may be outlined with a 6-inch wide (15 cm) line of a contrasting color to enhance conspicuity. The following markers and markings should be used.

a. TLOF and FATO Perimeter Markings. The perimeter of the TLOF and/or FATO should be marked. The perimeter of the FATO should be defined with markers and/or lines. It is suggested that the TLOF perimeter should also be defined with markers and/or lines since this provides a greater safety margin than marking only one perimeter. However, this greater safety margin may also be achieved by increasing the size of the Safety Area. Paragraph 403a and Table 4-1 recommend that the size of the Safety Area should be increased if the TLOF perimeter is not marked. [Exception: It is recognized that the FATO perimeter will not be marked a portion of the FATO is NOT a load-bearing surface. In such cases, the TLOF perimeter should be marked.]

(1) TLOFs. The perimeter of a paved or hard- surfaced TLOF should be defined with a continuous, 12-inch wide (30 cm) white line (see Figures 4-8 and 4-9). The perimeter of an unpaved TLOF should be defined with a series of 6-inch (15 cm) wide, flush, in-ground markers, each approximately 5 feet (1.5 m) in length with end-to-end spacing of not more than 6 inches (15 cm). While a paved TLOF is not required, it is suggested in order to provide an all-weather wearing surface for helicopters and a firm working surface for hospital personnel and the wheeled equipment used in moving patients.

(2) Unpaved FATOs. The perimeter of an unpaved FATO should be defined with 12-inch-wide (30 cm) flush, in-ground markers. The corners of the FATO should be defined and the perimeter markers should be 12 inches (30 cm) in width, approximately 5 feet (1.5 m) in length, and with end-to-end spacing of approximately 5 feet (1.5 m). (See Figure 4-8).

(3) Paved FATOs. The perimeter of a paved FATO should be defined with a 12-inch wide (30 cm) dashed white line. The corners of the FATO should be defined, and the perimeter marking segments should be 12 inches (30 cm) in width, approximately 5 feet (1.5 m) in length, and with end-to-end spacing of approximately 5 feet (1.5 m). (See Figure 4-9.)

b. Hospital Heliport Identification Marking. The identification marking is intended to identify the location as a hospital heliport, mark the TLOF, and provide visual cues to the pilot.

(1) Standard Marking. A red H in a white cross, with a white border if required, should mark the TLOF. The H should be oriented on the axis of the preferred approach/ departure path. A bar may be placed under the H when it is necessary to distinguish the preferred approach/ departure direction. Arrows and/or landing direction lights (see paragraph 410d) may also be used to indicate one or more preferred approach/ departure directions. Figure 4-10a illustrates the requirements of the standard hospital marking. The cross may, as an option, have a 12 inch (30 cm) red border and the background TLOF area outside the white cross can be red.

(2) Alternative Marking. As an alternative to the standard marking, a red H with a white 6 inch (15 cm) wide border within a red cross with a 12 inch (30 cm) wide white border and a surrounding red TLOF may be used. Where it is impractical for the whole TLOF to be painted red, the minimum dimension (length, width, or diameter) of the outer red area should be 1.0 RD of the design helicopter but not less than 40 feet (12.2 m). Figure 4-10b illustrates this alternative marking.

NOTE: *In winter weather at a heliport with a dark TLOF surface, the marking in Figure 4-10b will absorb more heat from the sun and more readily melt residual ice and snow. In contrast, the white area in upper figure in Figure 4-10a is more likely to be icy during winter weather. Consequently, in areas that experience ice and snow, the markings of in Figure 4-10b should be used for unheated TLOFs.*

c. Taxi Route and Taxiway Markings. If a hospital heliport has a taxiway or taxi route, the recommendations of paragraph 207 should be followed.

d. Apron Markings. If a hospital heliport has an apron area, the recommendations of paragraph 209d should be followed.

e. Parking Position Markings. If a hospital heliport has a parking position the recommendations of paragraph 208 should be followed.

f. Closed Heliport. All markings of a permanently closed heliport, FATO, or TLOF should be obliterated. If it is impractical to obliterate markings, a yellow X should be placed over the H, as illustrated in Figure 4-11. The yellow X should be large enough to ensure early pilot recognition that the heliport is closed. The windsock(s) and other visual indications of an active heliport should also be removed.

g. TLOF Size Limitations. The TLOF should be marked to indicate the rotor diameter of the largest helicopter for which the TLOF is designed. (The rotor diameter should be given in feet. Metric equivalents should NOT be used for this purpose.) This marking should be centered in the lower section of a TLOF size/weight limitation 'box'. The numbers should be should be 3 ft (0.9 m) high (see Appendix Figure A3-1). The numbers should be black with a white background. When viewed from the preferred approach direction, this TLOF size/weight limitation 'box' should be located in the TLOF in the lower right-hand corner, or the on right-hand of a circular TLOF. (see Figure 4-12)

h. Elevated TLOF Weight Limitations. If a TLOF has limited weight-carrying capability, it should be marked, in units in thousands of pounds. (A number 12 indicates a weight-carrying capability of up to 12,000 pounds. Metric equivalents should NOT be used for this purpose.) This marking should be located in the center of the upper section of a TLOF size/weight limitation 'box' of dimensions indicated in Figure 4-12. The numbers should be 3 ft (0.9 m) high (see Appendix Figure A3-1). The numbers should be black with a white background. If the TLOF does not have a weight limit a diagonal line, extending from the lower left hand corner to the upper right hand corner, should be added to the upper section of the TLOF size/weight limitation 'box'. When viewed from the preferred approach direction, this marking should be located on the TLOF in the lower right-hand corner, as illustrated in Figure 4-12 or the lower right-hand quadrant of a circular TLOF.

i. Equipment/Object Marking. Heliport maintenance and servicing equipment, as well as other objects used in the airside operational areas, should be made conspicuous with paint, reflective paint, reflective tape, or other reflective markings. Particular attention should be given to marking objects that are hard to see in marginal visibility, such as at night, in heavy rain, or in fog.

j. Marking Obstructions Outside the Approach/ Departure Airspace. See paragraph 411.

k. Marking Proportions. See Appendix 3 for guidance on the proportions of painted numbers.

410. HELIPORT LIGHTING. For night operations, the TLOF, the FATO, taxiways and taxi routes, and the windsock need to be lighted as described within this paragraph. AC 150/5340-28, *Low Visibility Taxiway Lighting System*; AC 150/5340-24, *Runway and Taxiway Edge Lighting System*; and AC 150/5345-46, *Specification for Runway and Taxiway Light Fixtures*; contain technical guidance on lighting equipment and installation details. Heliport lighting ACs are available at http://faa.gov/arp

a. Ground-level TLOF–Perimeter Lights. Flush green lights should define the TLOF perimeter. A minimum of three flush light fixtures is recommended per side of a square or rectangular TLOF. A light should be located at each corner with additional lights uniformly spaced between the corner lights with a maximum interval of 25 feet (8 m) between lights. An even number of lights (at least eight should be used) uniformly spaced, with a maximum interval of 25 feet (8 m) between lights may be used to define a circular TLOF. Flush lights should be located within 1 foot (30 cm) inside or outside of the TLOF perimeter. Figure 4-13 illustrates these lights.

If only the TLOF is load bearing flush lights are recommended, but raised green omni-directional lights may be used. Raised lights should be located outside and within 10 foot (3m) of the edge of the TLOF and should not penetrate a horizontal plane at the TLOF elevation by more than 2 inches (5 cm).

b. Elevated TLOF-Perimeter Lights. The TLOF perimeter should be lit with green lights. If flush lights are used, they should be located within 1 foot of the TLOF perimeter. If raised omni-directional lights are used, they should be located on the outside edge of the TLOF or outer edge of the safety net, as shown in Figure 4-4. The raised lights should not penetrate a horizontal plane at the TLOF elevation by more than 2 inches (5 cm). In areas where it snows in the winter, the outside edge is the preferred location. (Lights on the inside edge of the safety net are prone to breakage during snow removal.) Lighting on the outside edge also provides better visual cues to pilots at a distance from the heliport since they outline a larger area.

c. Load Bearing FATO-Perimeter Lights. Green lights should define the perimeter of a load-bearing FATO. A minimum of three flush or raised light fixtures is recommended per side of a square or rectangular FATO. A light should be located at each corner with additional lights uniformly spaced between the corner lights, with a maximum interval of 25 feet (7.6 m) between lights. An even number of lights (at least eight should be used) uniformly spaced with a maximum interval of 25 feet (7.6 m) between lights may be used to define a circular FATO.

NOTE: *In the case of an elevated FATO with a safety net, the perimeter lights should be mounted in a similar manner as discussed in Paragraph4-10b.*

(1) At a distance during nighttime operations, a square or rectangular pattern of FATO perimeter lights provides the pilot with better visual cues than a circular pattern. Thus, a square or rectangular pattern of FATO perimeter lights is preferable even if the TLOF is circular.

(2) If flush lights are used, they should be located within 1 foot (30 cm) inside or outside of the FATO perimeter. See Figure 4-13.

(3) If raised light fixtures are used, they should be no more than 8 inches (20 cm) high and should be located 10 feet (3.05 m) out from the FATO perimeter. (See Figure 4-14.)

d. Landing Direction Lights. Landing direction lights are an optional feature to be installed when it is necessary to provide directional guidance. Landing direction lights are a configuration of five yellow, omni-directional L-861 lights on the centerline of the preferred approach/ departure path. These lights are spaced at 15ft (4.6 m) intervals beginning at a point not less than 20 feet (6 m) and not more than 60 feet 8 m) from the TLOF perimeter and extending outward in the direction of the preferred approach/ departure path, as illustrated in Figure 4-15.

e. Taxi Route and Taxiway Lighting. See paragraph 407.

f. Heliport Identification Beacon. A heliport identification beacon is optional equipment. It should be installed when it is needed to aid the pilot in visually locating the heliport. When installed, the beacon, flashing white/green/yellow at the rate of 30 to 45 flashes per minute, should be located on or close to the heliport. Guidance on heliport beacons is found in AC 150/5345-12, *Specification for Airport and Heliport Beacon*. There may be merit in making operation of the beacon controllable from the approaching helicopter to ensure it is “on” only when required.

g. Floodlights. Floodlights may be used to illuminate the TLOF, the FATO, and/or the parking area. To eliminate the need for tall poles, these floodlights may be mounted on adjacent buildings. Care should be taken, however, to place floodlights clear of the TLOF, the FATO, the Safety Area, and the approach/ departure surfaces and any required transitional surfaces. Care should be taken to ensure that floodlights and their associated hardware do not constitute an obstruction hazard. Floodlights should be aimed down and provide a minimum of 3-foot candles (32 lux) of illumination on the apron surface. Floodlights that might interfere with pilot vision during takeoff and landings should be capable of being turned off.

h. Lighting of Obstructions. See paragraph 411.

411. MARKING AND LIGHTING OF OBSTRUCTIONS. Marking and lighting of obstructions within the approach/ departure airspace is discussed in paragraph 108b. This paragraph discusses marking and lighting of obstructions in close proximity but outside and below the approach/ departure surface.

a. Background. Unmarked wires, antennas, poles, cell towers, and similar objects are often difficult to see, even in the best daylight weather, in time for a pilot to successfully take evasive action. While pilots can avoid such objects during en route operations by flying well above them, approach and departure require operation near the ground where obstacles may be in close proximity.

b. Airspace. If difficult-to-see objects penetrate the object identification surfaces illustrated in Figure 4-16, these objects should be marked to make them more conspicuous. If operations are conducted at a heliport between dusk and dawn, these difficult-to-see objects should be lighted. Guidance on marking and lighting objects is contained in AC 70/7460-1, *Obstruction Marking and Lighting*. The object identification surfaces in Figure 4-16 can also be described as follows:

(1) In all directions from the Safety Area, except under the approach/ departure paths, the object identification surface starts at the Safety Area perimeter and extends out horizontally for a distance of 100 feet (30.5 m).

(2) Under the approach/ departure surface, the object identification surface starts from the outside edge of the FATO and extends horizontally out for a distance of 800 feet (244 m). From this point, the object identification surface extends out for an additional distance of 3,200 feet (975 m) while rising on a 8:1 slope (8 units horizontal in 1 unit vertical). From the point 800 feet (244 m) from the FATO perimeter, the object identification surface is 100 feet (30.5 m) beneath the approach/ departure surface.

(3) The width of the safety surface increases as a function of distance from the Safety Area. From the Safety Area perimeter, the object identification surface extends laterally to a point 100 feet (30.5 m) outside the Safety Area perimeter. At the upper end of the surface, the object identification surface extends laterally 200 feet (61 m) on either side of the approach/ departure path.

c. Shielding of Objects. If there are a number of obstacles in close proximity, it may not be necessary to mark all of them if they are shielded. To meet the shielding guidelines a object would be shielded by existing structures of a permanent and substantial character or by natural terrain or topographic features of equal or greater height, and would be located in the congested area of a city, town, or settlement where it is evident beyond all reasonable doubt that the structure so shielded will not adversely affect safety in air navigation. Additional guidance on this topic may be found in 14 CFR Part 77.15(a), Construction or alterations not requiring notice.

412. SAFETY ENHANCEMENTS. Some safety enhancements to be considered in the design of a heliport are discussed below. Other areas such as the effects of rotor downwash may need to be addressed based on site conditions and the design helicopter.

a. Access Limitations. The operational areas of a hospital heliport should be kept clear of people, animals, and vehicles. The method used to control access depends upon the helicopter location and types of potential intruders.

(1) Safety Barrier. At ground-level hospital heliports, one method is to erect a safety barrier around the helicopter operational areas. This barrier may take the form of a fence, wall, or hedge. It should be no closer to the operating areas than the outer perimeter of the Safety Area. Barriers should not penetrate any approach/ departure (primary or transitional) surface. Thus, in the vicinity of the approach/ departure paths, the barrier may need to be well outside the outer perimeter of the Safety Area.

(2) Any barrier should be high enough to present a positive deterrent to persons inadvertently entering an operational area and yet low enough to be non-hazardous to helicopter operations.

(3) Guards and barriers. Hospital heliport operators may choose to secure their operational areas via the use of security guards and a mixture of fixed and movable barriers. Training of personnel should be considered as a part of any security program.

(4) Access. At some locations, it may be appropriate to restrict access to airside areas through controlled entryways. Entryways should display a cautionary sign similar to that illustrated in Figure 4-17. Training of personnel should be considered as a part of any security program.

b. Rescue and Fire Fighting Services. Heliports should meet the criteria of NFPA 418, Standards for Heliports, and NFPA 403, Aircraft Rescue Services and applicable state/local codes. A fire hose cabinet or extinguisher should be provided at each access gate/door and each fueling location. At elevated TLOFs, fire hose cabinets, fire extinguishers, and other fire fighting equipment should be located adjacent to, but below the level of, the TLOF. NFPA standards are available at National Fire Protection Association web site http://www.nfpa.org.

c. Turbulence. Air flowing around and over buildings, stands of trees, terrain irregularities, etc. can create turbulence that may affect helicopter operations. (Reference 41 in Appendix 4.)

(1) Ground-level Heliports. Helicopter operations from sites immediately adjacent to buildings and other large objects are subjected to air turbulence effects caused by such features. Therefore, it may be necessary locate the TLOF away from such objects in order to minimize air turbulence in the vicinity of the FATO and the approach/ departure paths.

(2) Elevated Heliports. Elevating heliports 6 feet (1.8 m) or more above the level of the roof will generally minimize the turbulent effect of air flowing over the roof edge. While elevating the platform helps reduce or eliminate the air turbulence effects, a safety net may be required (see paragraph401e (4)).

d. Communications. A UNICOM radio may be used to provide arriving helicopters with heliport and traffic advisory information but may not be used to control air traffic. The Federal Communications Commission (FCC) should be contacted for information on UNICOM licensing.

e. Weather Information. An AWOS measures and automatically broadcasts current weather conditions at the heliport site. When an AWOS is installed, it should be located at least 100 feet (30.5 m) and not more than 700 feet (213 m) from the TLOF perimeter. Locate the AWOS so that its instruments will NOT be affected by rotor wash from helicopter operations. Guidance on AWOS systems is found in AC 150/5220-16, *Automated Weather Observing Systems (AWOS) for Non-Federal Applications.*

f. Winter Operations. Swirling snow raised by a helicopter's rotor wash can cause the pilot to lose sight of the intended landing point. Swirling snow on takeoff can hide objects that need to be avoided. At least the TLOF, the FATO, and as much of the Safety Area as practical should be kept free of snow. Heliport design should take into account the methods and equipment to be used for snow removal. The heliport design should allow the snow to be removed sufficiently so the snow will not present an obstruction hazard to either the tail rotor or the main rotor. Guidance on winter operations is found in AC150/5200-30, *Airport Winter Safety and Operations*. (Exception: In cases where the FATO is much larger than the minimum requirement, it may not be necessary to clear all of this additional area.)

413.ZONING AND COMPATIBLE LAND USE. Where state and local statutes permit, the hospital heliport sponsor is encouraged to promote the adoption of the following zoning measures to ensure that the heliport will continue to be available and to protect the investment in the facility.

a. Zoning to Limit Building/Object Heights. General guidance on drafting an ordinance that would limit building and object heights is contained in AC 150/5190-4, *A Model Zoning Ordinance to Limit Height of Objects Around Airports*. The ordinance should substitute the heliport surfaces on the model ordinance.

b. Zoning for Compatible Land Use. A zoning ordinance may be enacted, or an existing ordinance modified, to control the use of property within the heliport approach/ departure path environment. The ordinance should restrict activities to those that area compatible with helicopter operations.

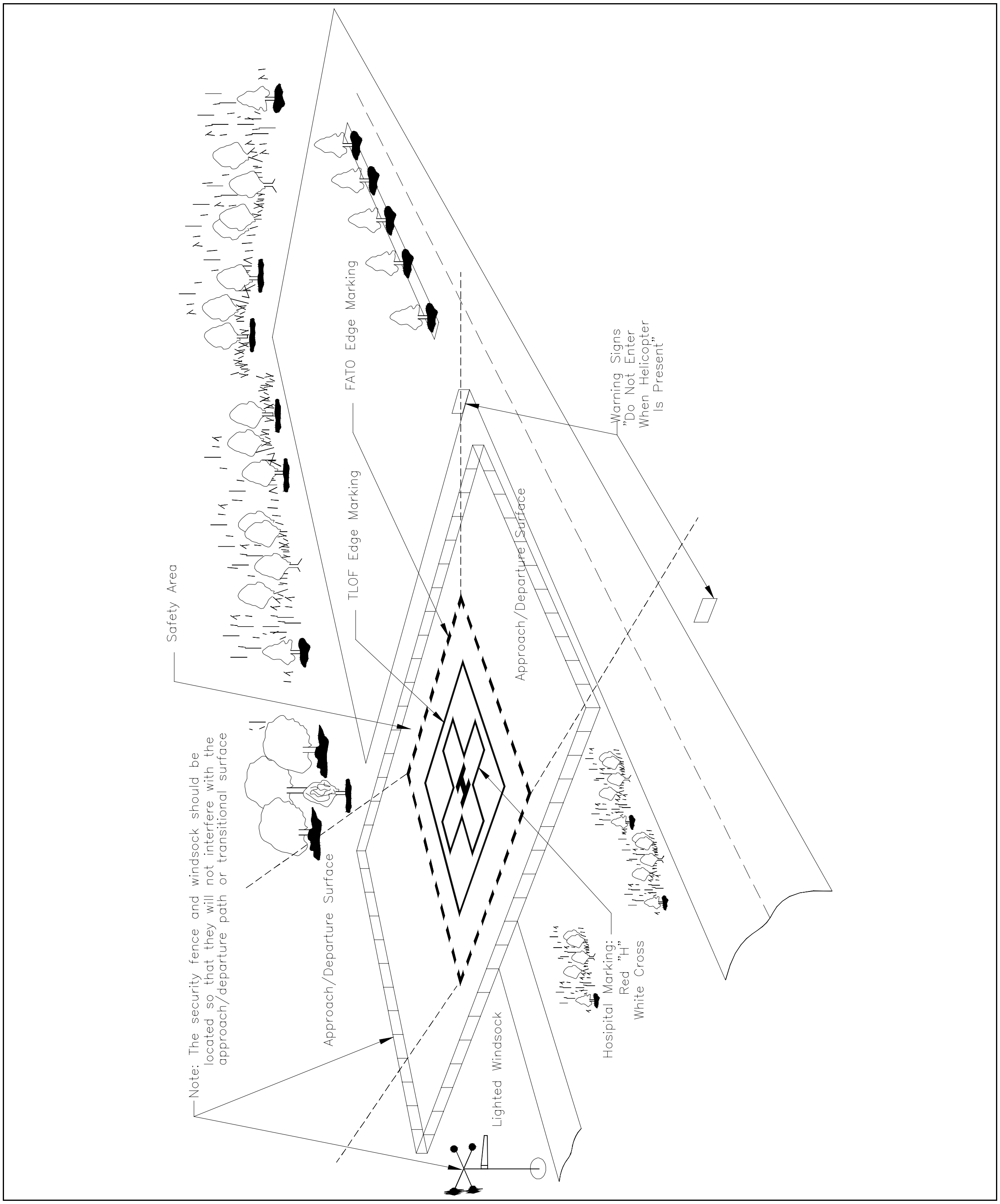
c. Air Rights and Property Easements are options that may be used to prevent the encroachment of obstacles in the vicinity of a heliport.

Table 4-1. Minimum VFR Safety Area Width as a Function Hospital Heliport Markings

TLOF perimeter marked:	Yes	Yes	No	No
FATO perimeter marked:	Yes	Yes	Yes	Yes
Standard Hospital marking symbol:	Yes	No	Yes	No
Hospital heliports:	1/3 RD but not less than 10 ft (3 m)**	1/3 RD but not less than 20 ft (6 m)**	½ OL but not less than 20 ft (6 m)	½ OL but not less than 30 ft (9 m)

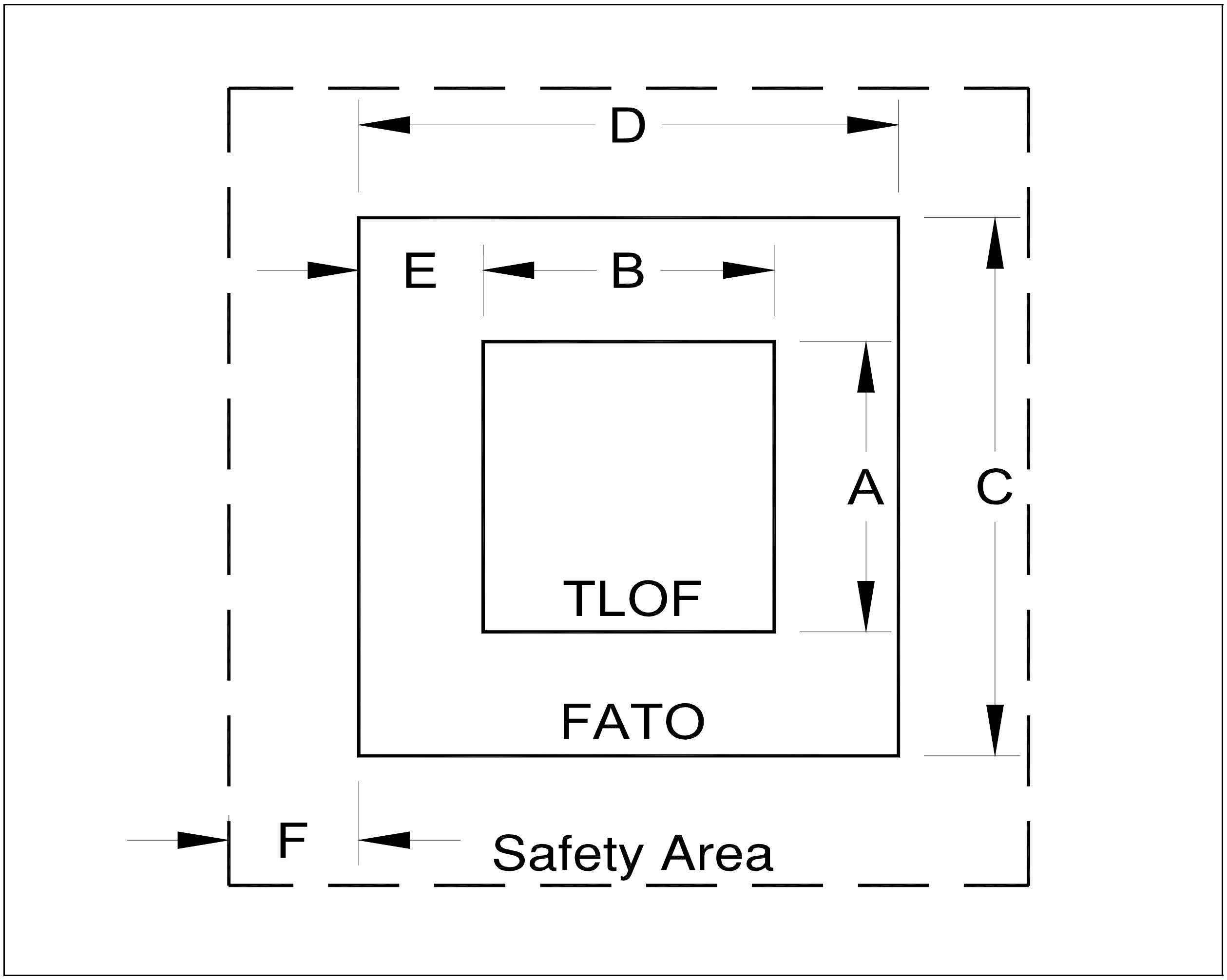
OL: overall length of the design helicopter
RD: rotor diameter of the design helicopter

** Also applies when the FATO is NOT marked. The FATO should not be marked if (a) the FATO (or part of the FATO) is a non-load bearing surface and (b) the TLOF is elevated above the level of a surrounding load bearing area.



NOTE: Rotor diameter and weight limitation markings are not shown for simplicity.

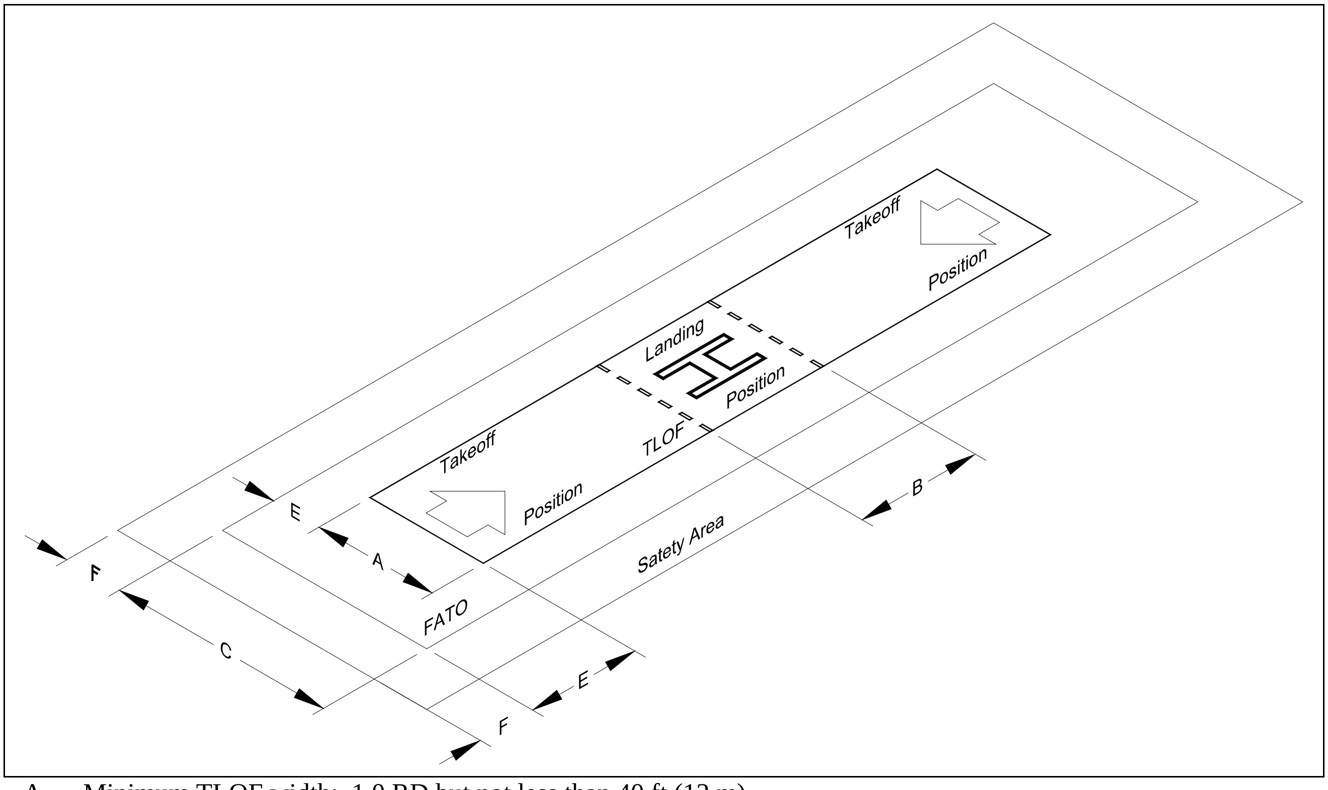
Figure 4-1. Essential Elements of a Ground-level Hospital Heliport: HOSPITAL



A – Minimum TLOF Width: 1.0 RD but not less than 40 ft. (12 m)
B – Minimum TLOF Length: 1.0 RD but not less than 40 ft. (12 m)
C – Minimum FATO Width: 1.5 OL
D – Minimum FATO Length: 1.5 OL
E – Minimum separation between the perimeters of the TLOF and the FATO [0.5(1.5 OL – 1.0 RD)]
F – Minimum Safety Area Width: See Table 4-1

RD: Rotor diameter of the design helicopter
OL: Overall length of the design helicopter

Figure 4-2. TLOF/FATO/Safety Area Relationships and Minimum Dimensions: HOSPITAL

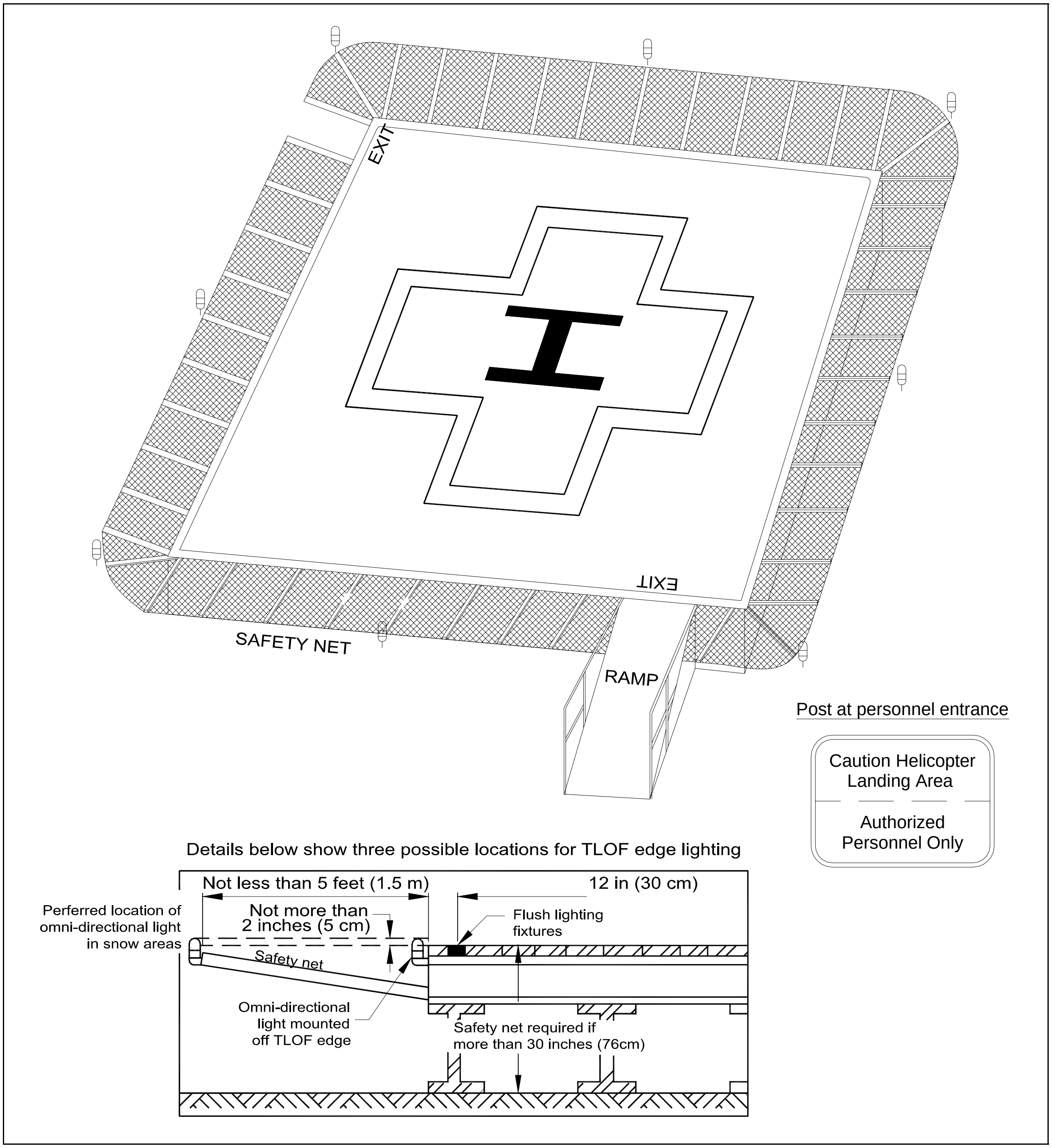


A. Minimum TLOF width: 1.0 RD but not less than 40 ft (12 m)
B. Minimum landing position length: 1.0 RD but not less than 40 ft (12 m)
C. Minimum FATO width: 1.5 OL
E. Minimum separation between the perimeters of the TLOF and the FATO [0.5(1.5 OL – 1.0 RD)]
F. Minimum Safety Area width: See Table 4-1

RD: Rotor diameter of the design helicopter
OL: Overall length of the design helicopter

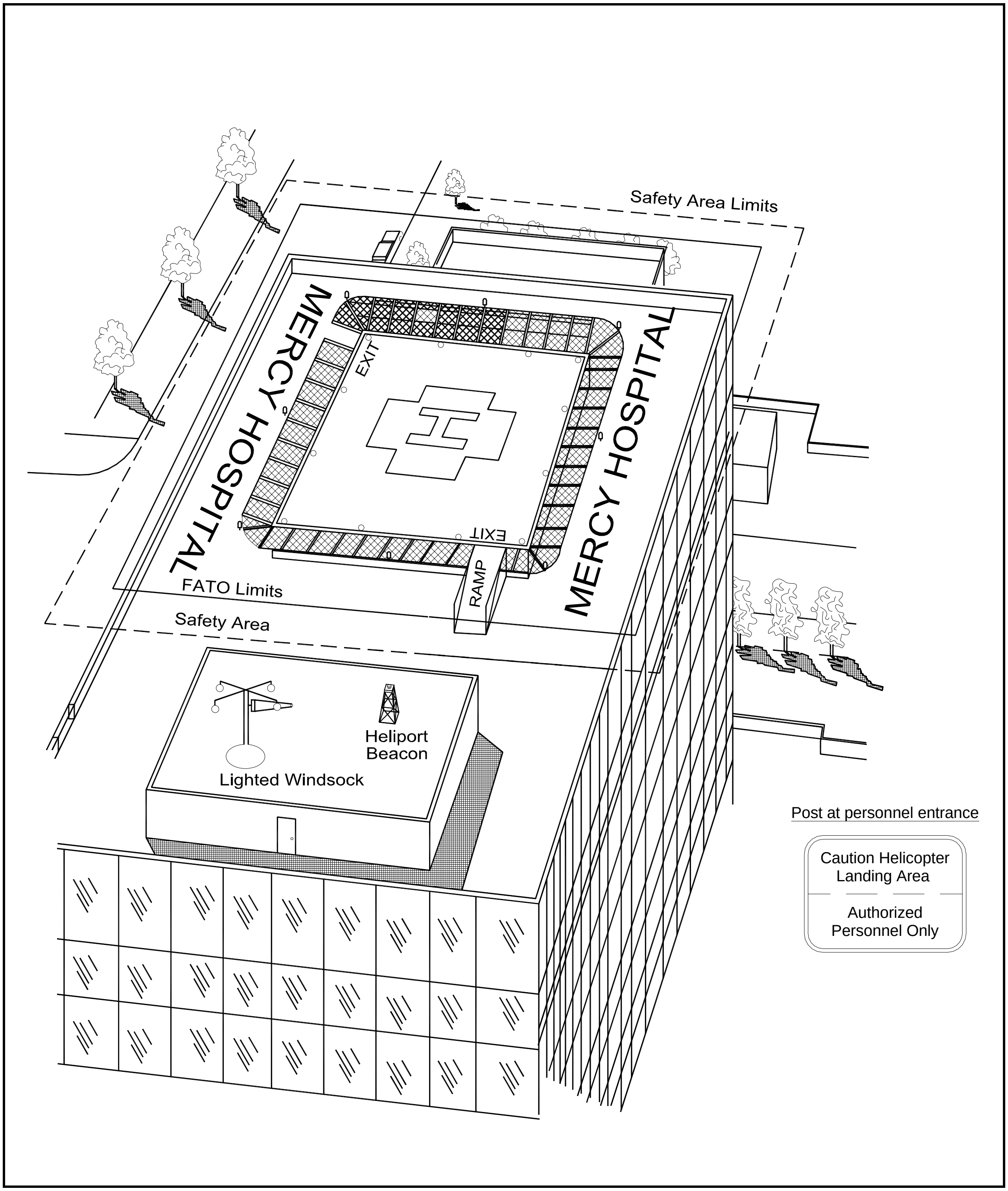
NOTE: Rotor diameter and weight limitation markings are not shown for simplicity.

Figure 4-3. An Elongated FATO/TLOF with Two Takeoff Positions: HOSPITAL



NOTE:
Rotor diameter and weight limitation markings are not shown for simplicity.

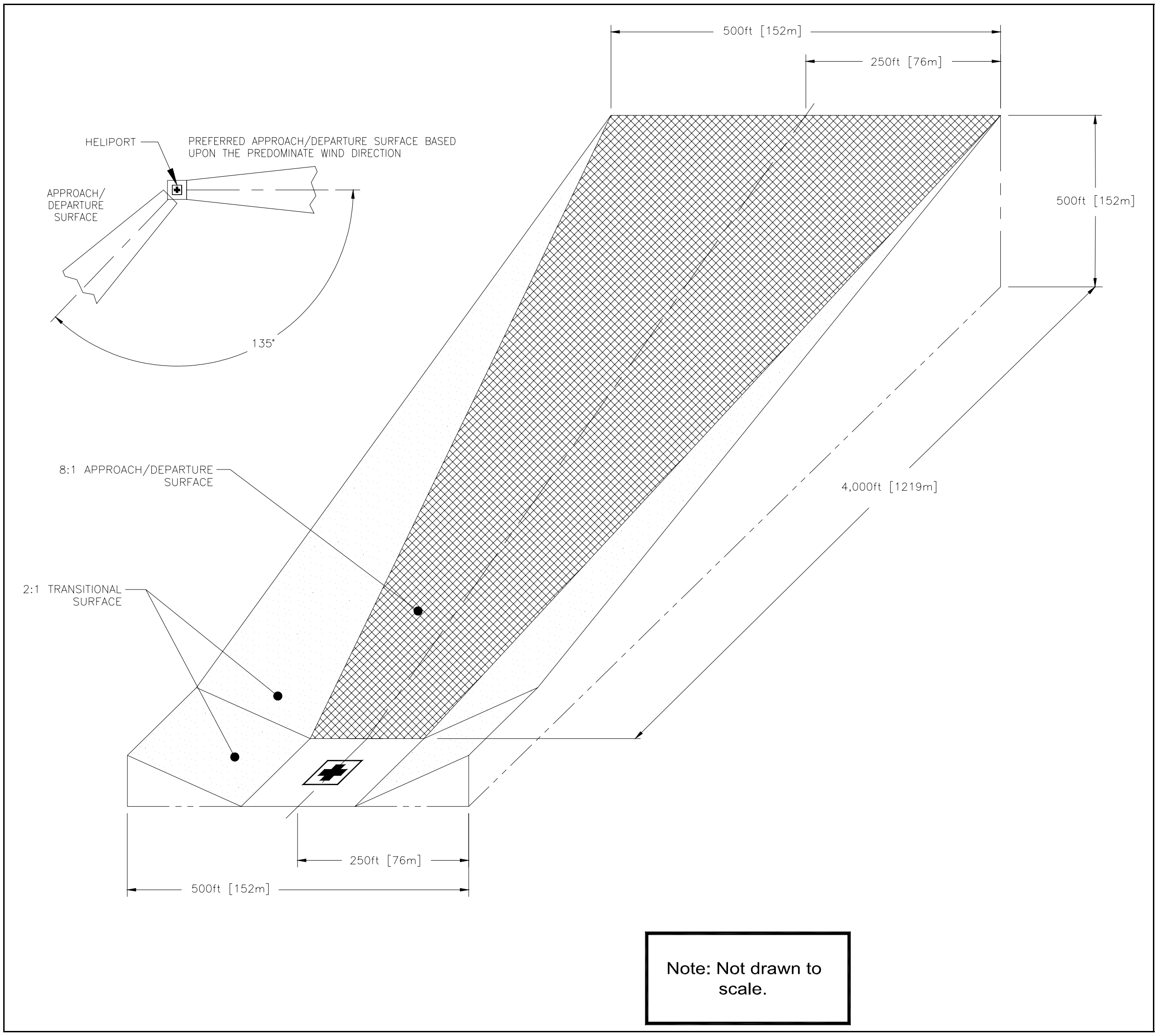
Figure 4-4. Elevated TLOF, Safety Net and Lighting: HOSPITAL



NOTE:

Rotor diameter and weight limitation markings are not shown for simplicity.

Figure 4-5. A Rooftop Hospital Heliport:
HOSPITAL



NOTE: Rotor diameter and weight limitation markings are not shown for simplicity.

Figure 4-6. VFR Heliport Approach/ Departure and Transitional Surfaces: HOSPITAL

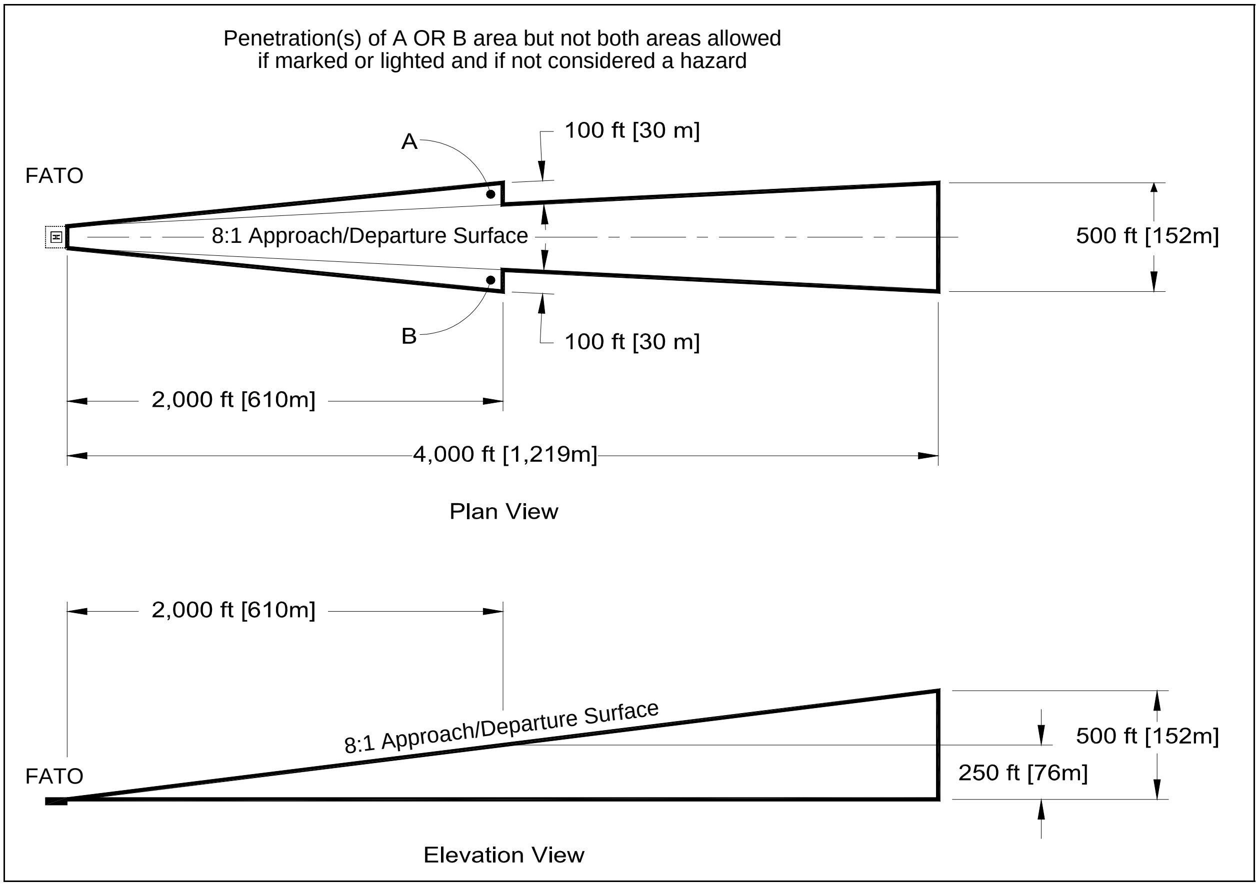
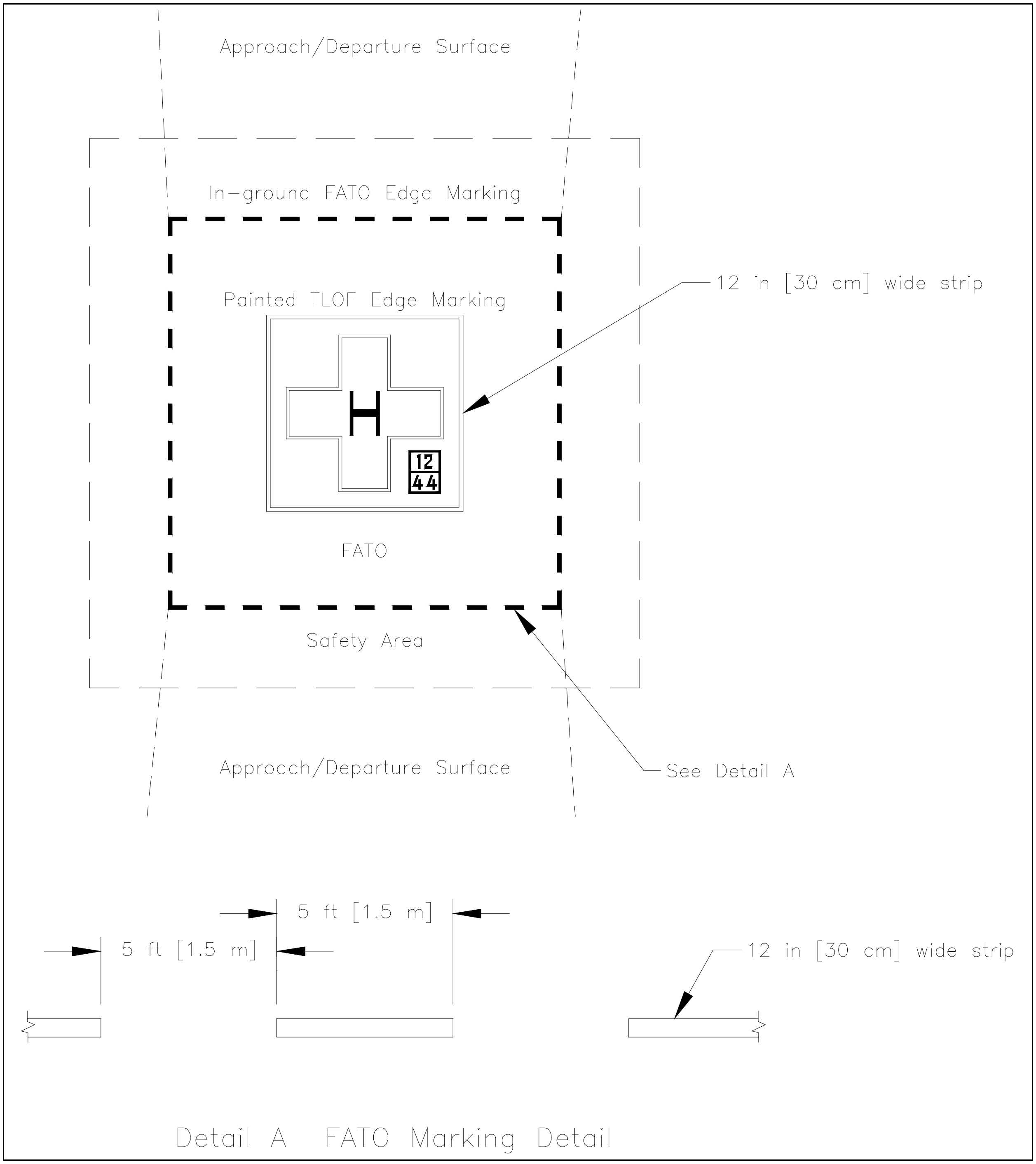


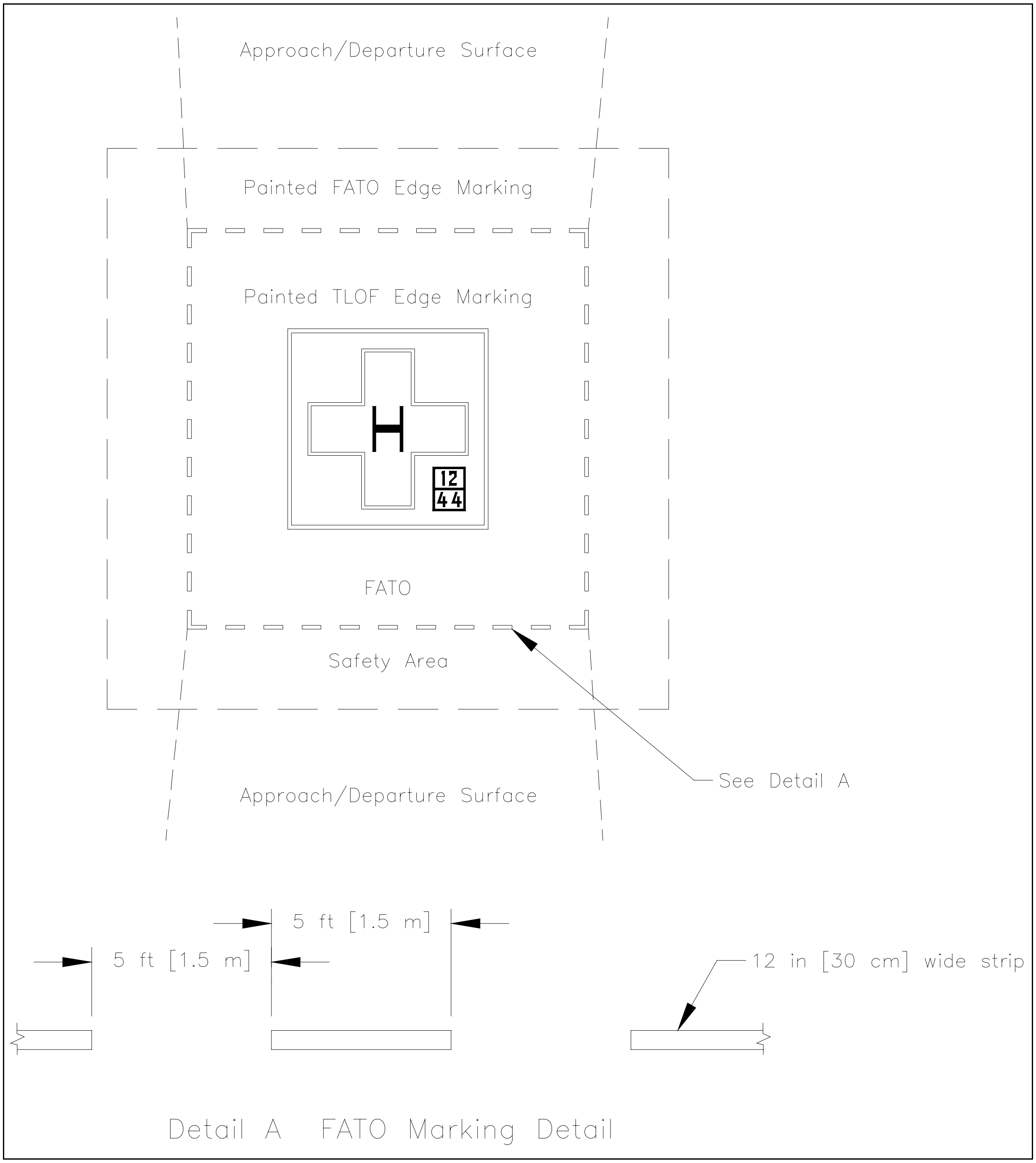
Figure 4-7. VFR Heliport Lateral Extension of the 1:8 Approach/ Departure Surface: HOSPITAL



NOTES:

1. The H should be oriented on the axis of the preferred approach/ departure path.
2. The perimeter of a paved or hard- surfaced TLOF should be defined with a continuous, 12-inch wide (30 cm) white line.
3. The perimeter of an unpaved FATO should be defined with flush, in-ground markers. (See detail A) The corners of the FATO should be defined.
4. See Figure 4-12 for markings for weight and rotor diameter limitations.

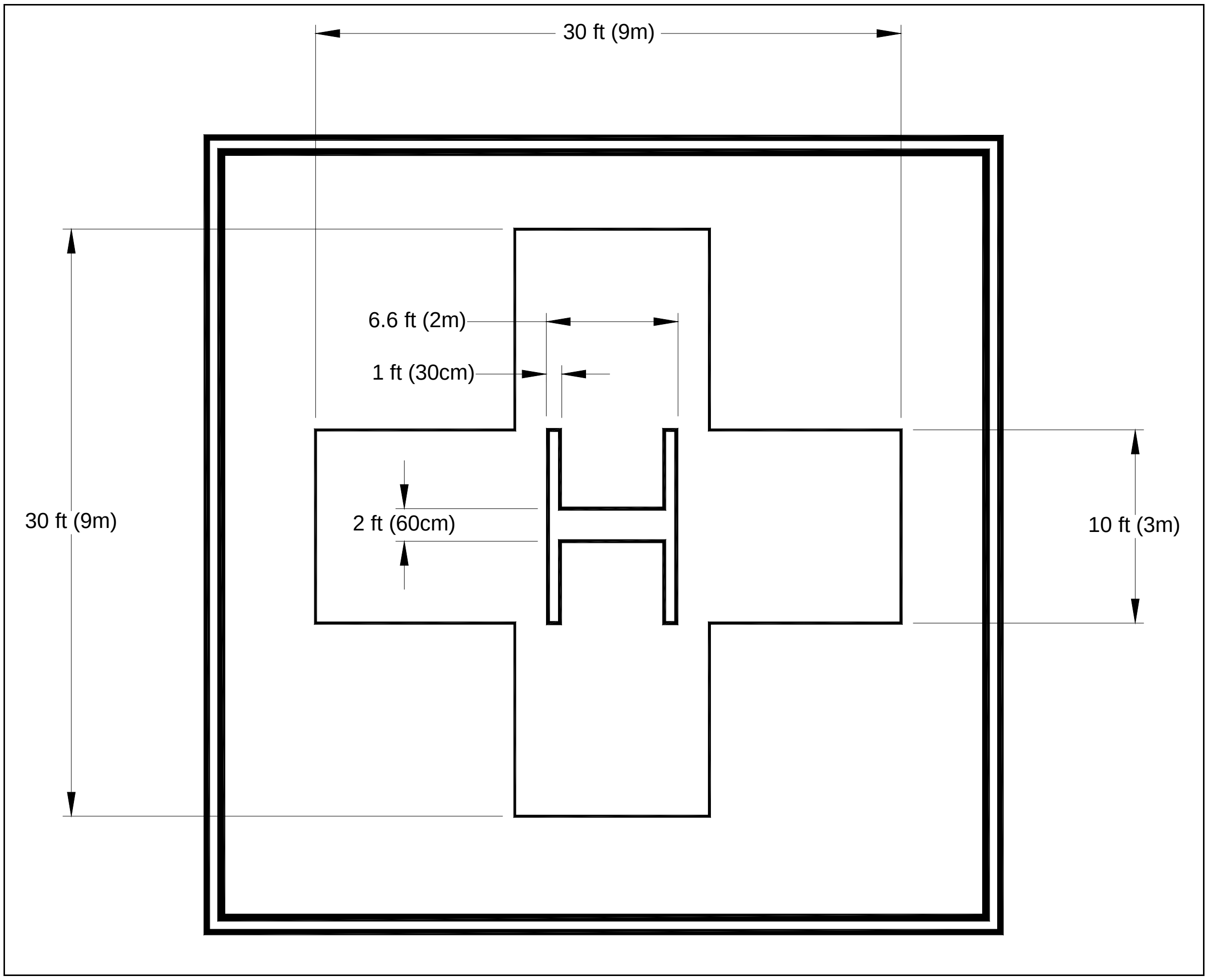
Figure 4-8. Paved TLOF/Unpaved FATO – Markings: HOSPITAL



NOTES:

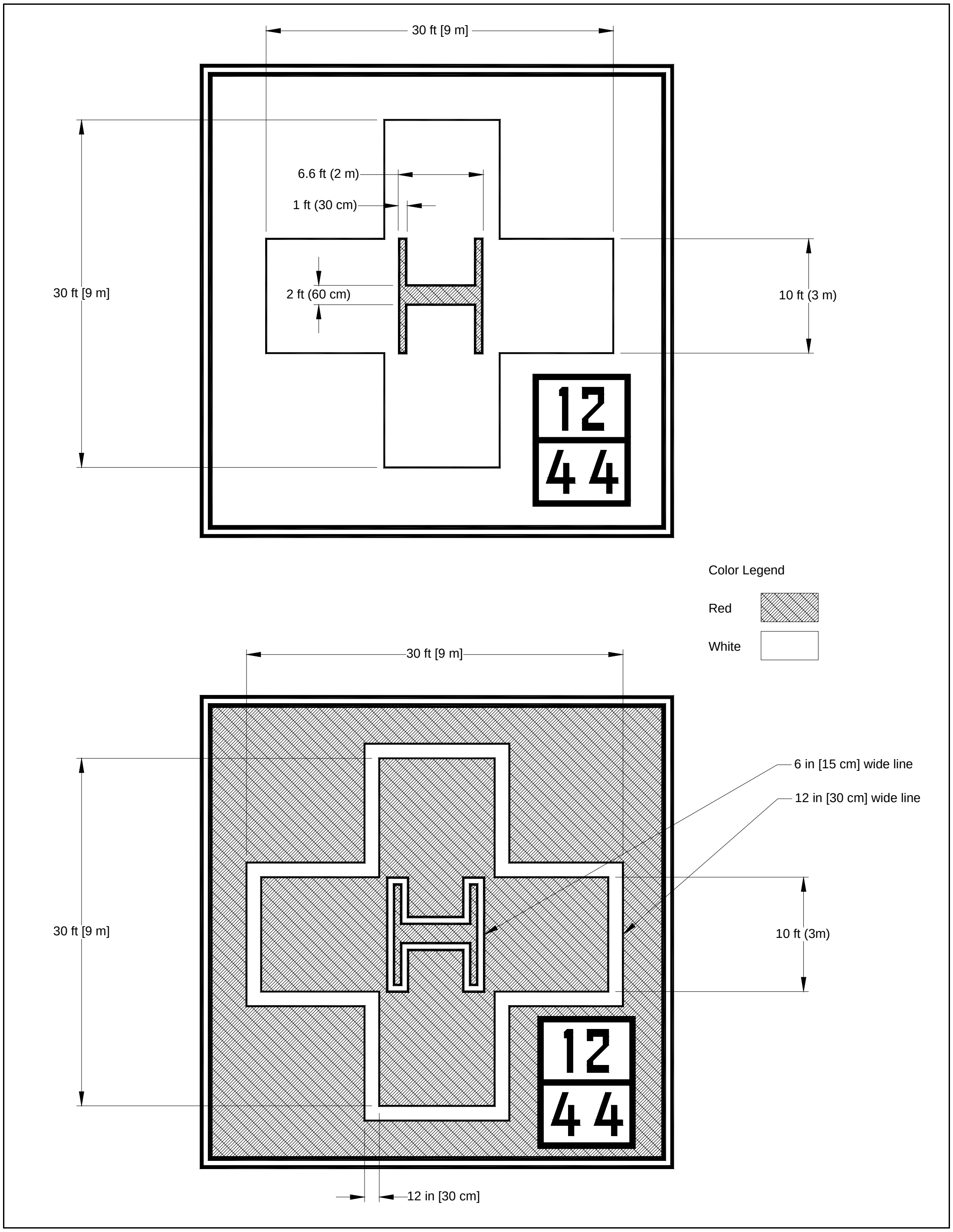
1. The **H** should be oriented on the axis of the preferred approach/ departure path.
2. The perimeter of a paved or hard-surfaced TLOF should be defined with a continuous, 12-inch wide (30 cm) white line.
3. The perimeter of a paved FATO should be defined with a 12-inch wide (30 cm) dashed white line approximately 5 feet (1.5 m) in length, and with end-to-end spacing of approximately 5 feet (1.5 m). The corners of the FATO should be defined. (See detail B)
4. See Figure 4-10 for dimensions for the **H** and hospital cross markings.

Figure 4-9. Paved TLOF/Paved FATO – Markings: HOSPITAL



NOTES:
1. The standard hospital identification is a red **H** surrounded by a white cross.
2. An option may be a red **H** within a white cross surrounded by a 12 inch (30 cm) wide red border. (not illustrated)
3. The area outside of the cross may be colored red.
4. The surrounding box is a continuous 6 inch (15 cm) wide white TLOF perimeter marking.

Figure 4-10a. Standard Hospital Heliport Identification Symbols: HOSPITAL



NOTES:

1. An alternative hospital heliport marking may be a red H with a white 6 inch (15 cm) wide border within a red cross with a 12 inch (30 cm) wide white border and a surrounding red TLOF.
2. The surrounding box is a continuous 6 inch (15 cm) wide white TLOF perimeter marking.

Figure 4-10b: Alternative Hospital Heliport Identification Symbols: HOSPITAL

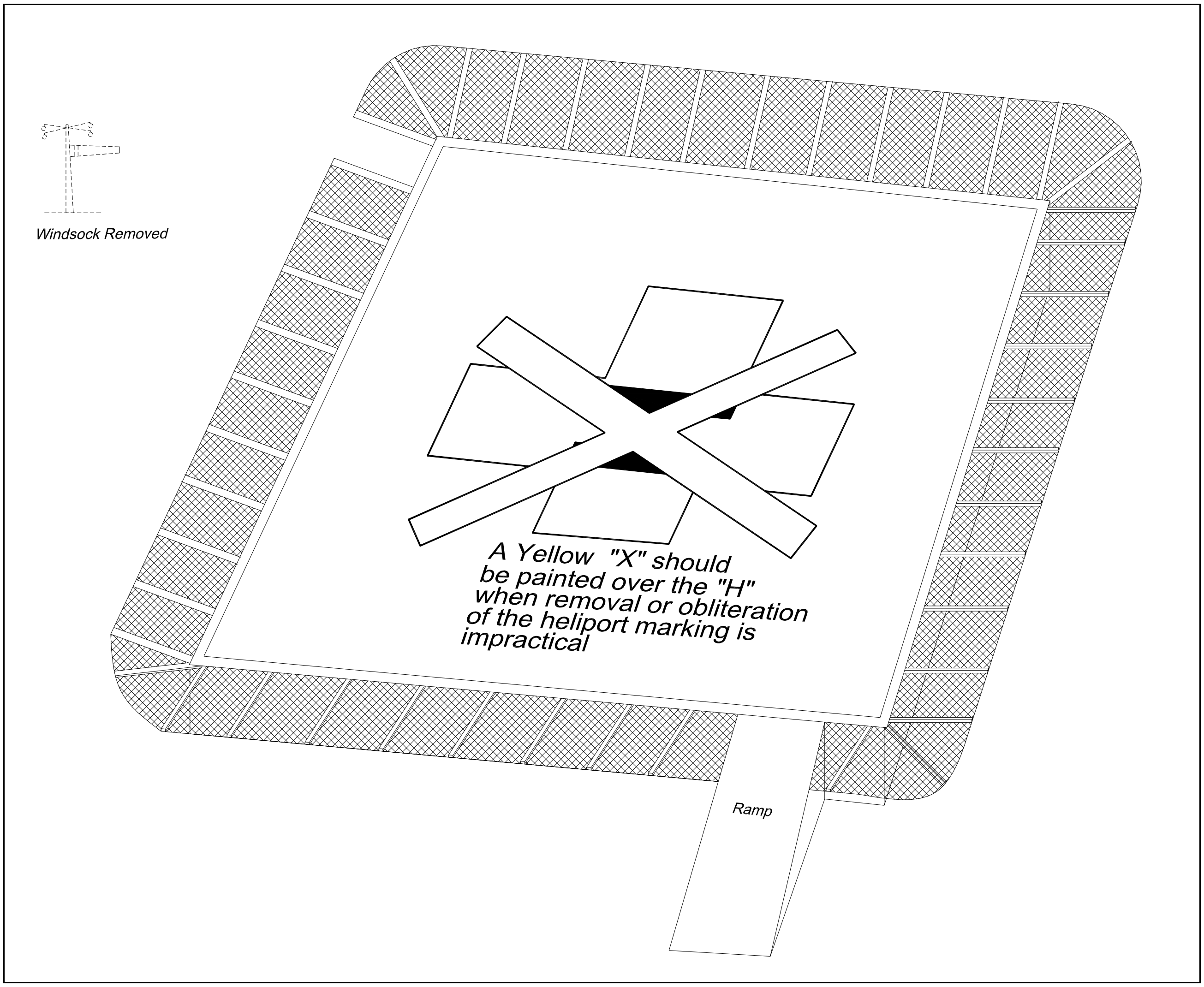
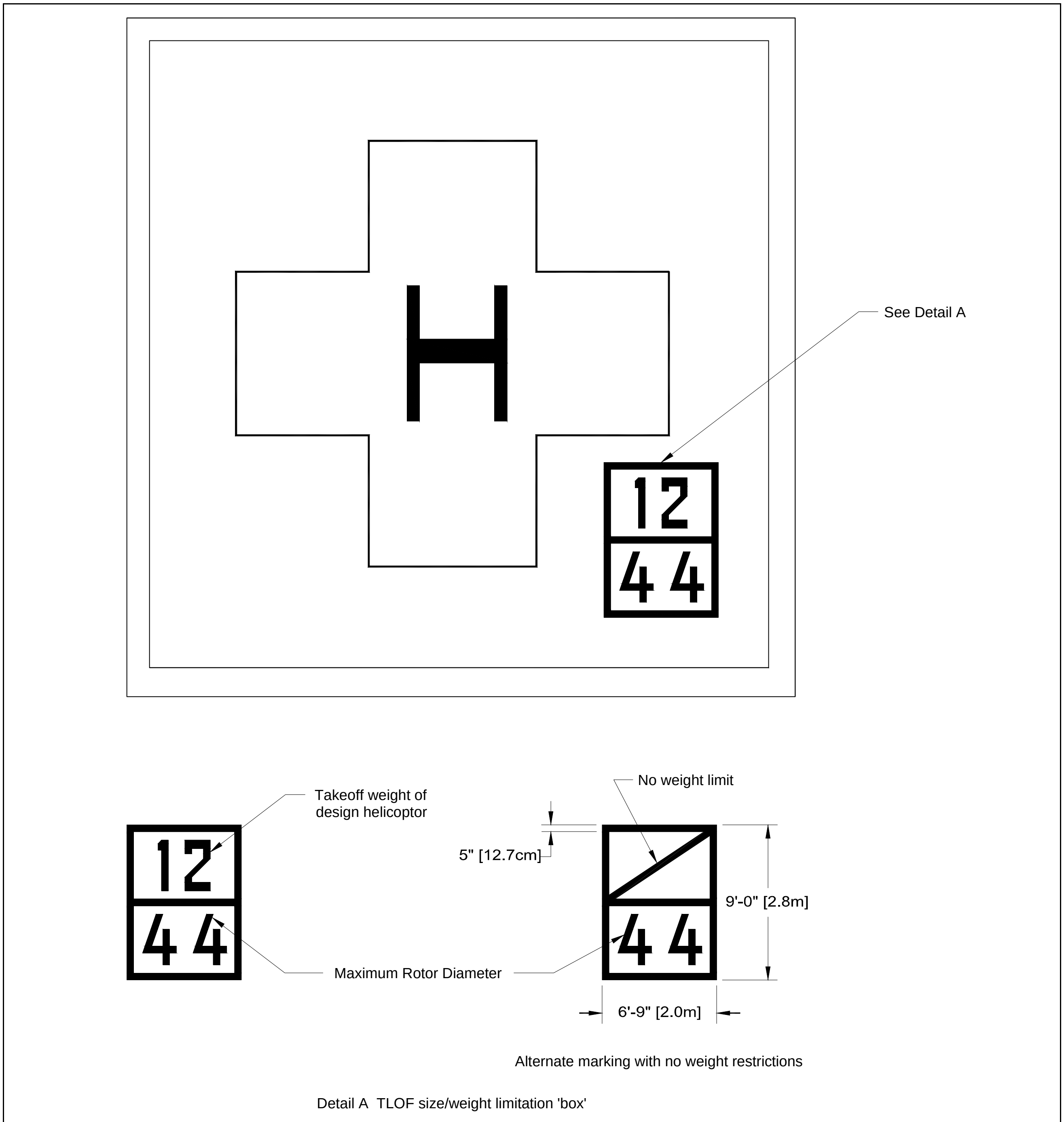


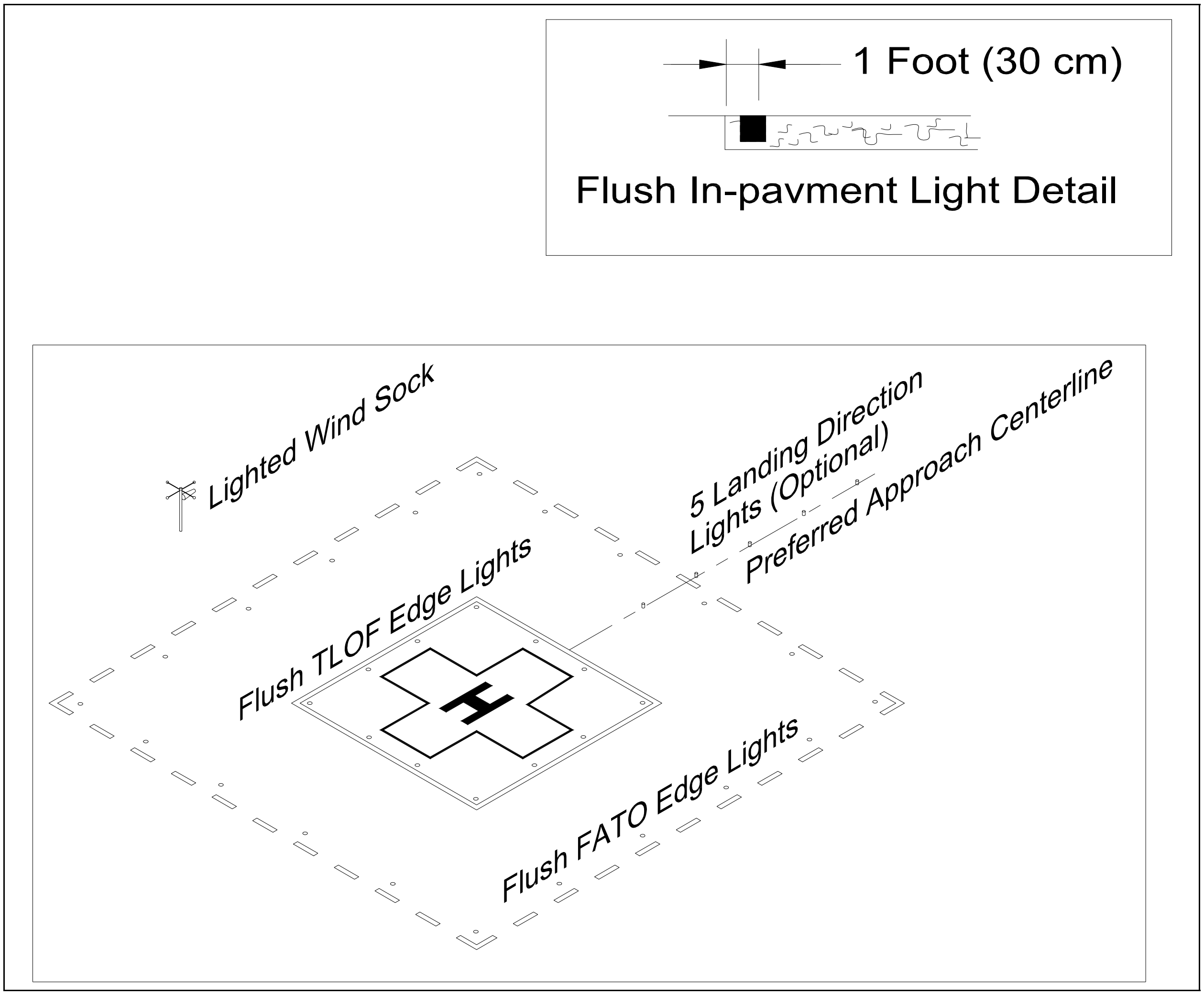
**Figure 4-11. Marking a Closed Heliport:
HOSPITAL**



NOTES:

1. See Appendix 3 for the form and proportion of the numbers used on the size and weight limitations.
2. **<u>12</u>** Indicates the TLOF has limited weight-carrying capability shown in thousands of pounds.
3. **44** indicates the rotor diameter of the largest helicopter for which the TLOF is designed.

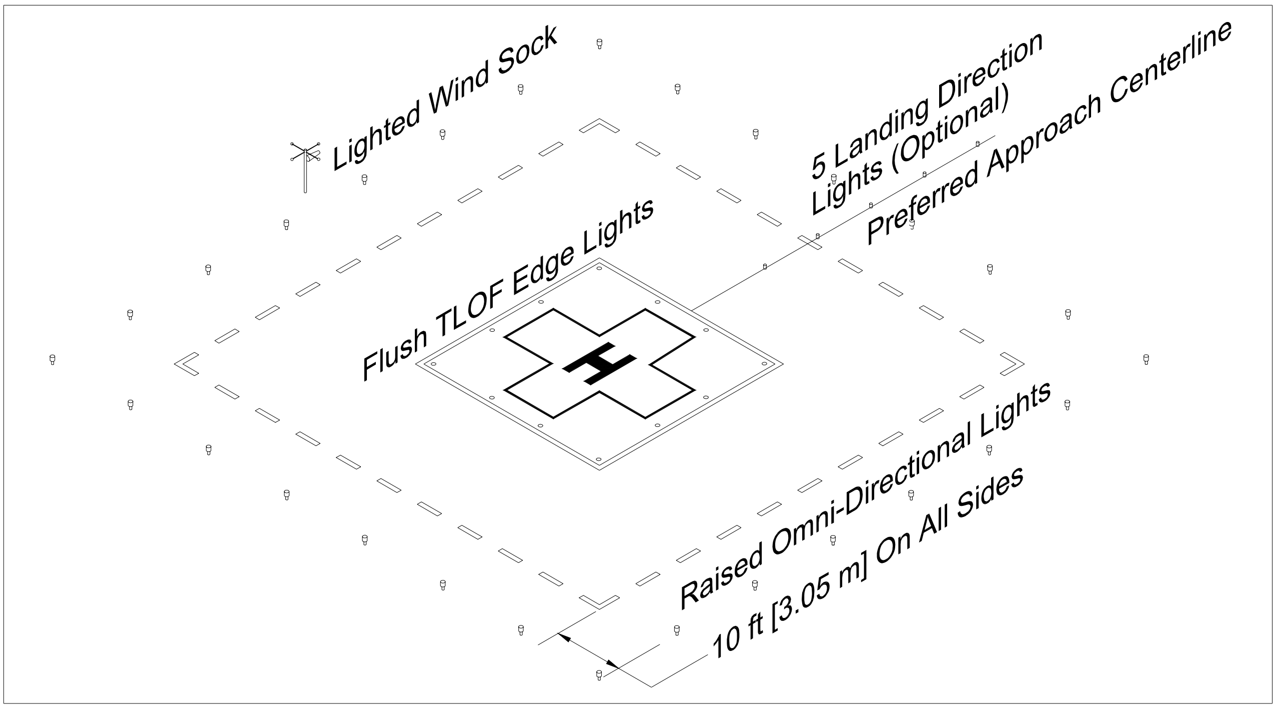
Figure 4-12. TLOF Size and Weight Limitations: HOSPITAL



NOTES:

1. Flush FATO and TLOF lights may be installed inside or outside ± 1-foot of the FATO and TLOF respective perimeters.
2. Rotor diameter and weight limitation markings are not shown for simplicity.

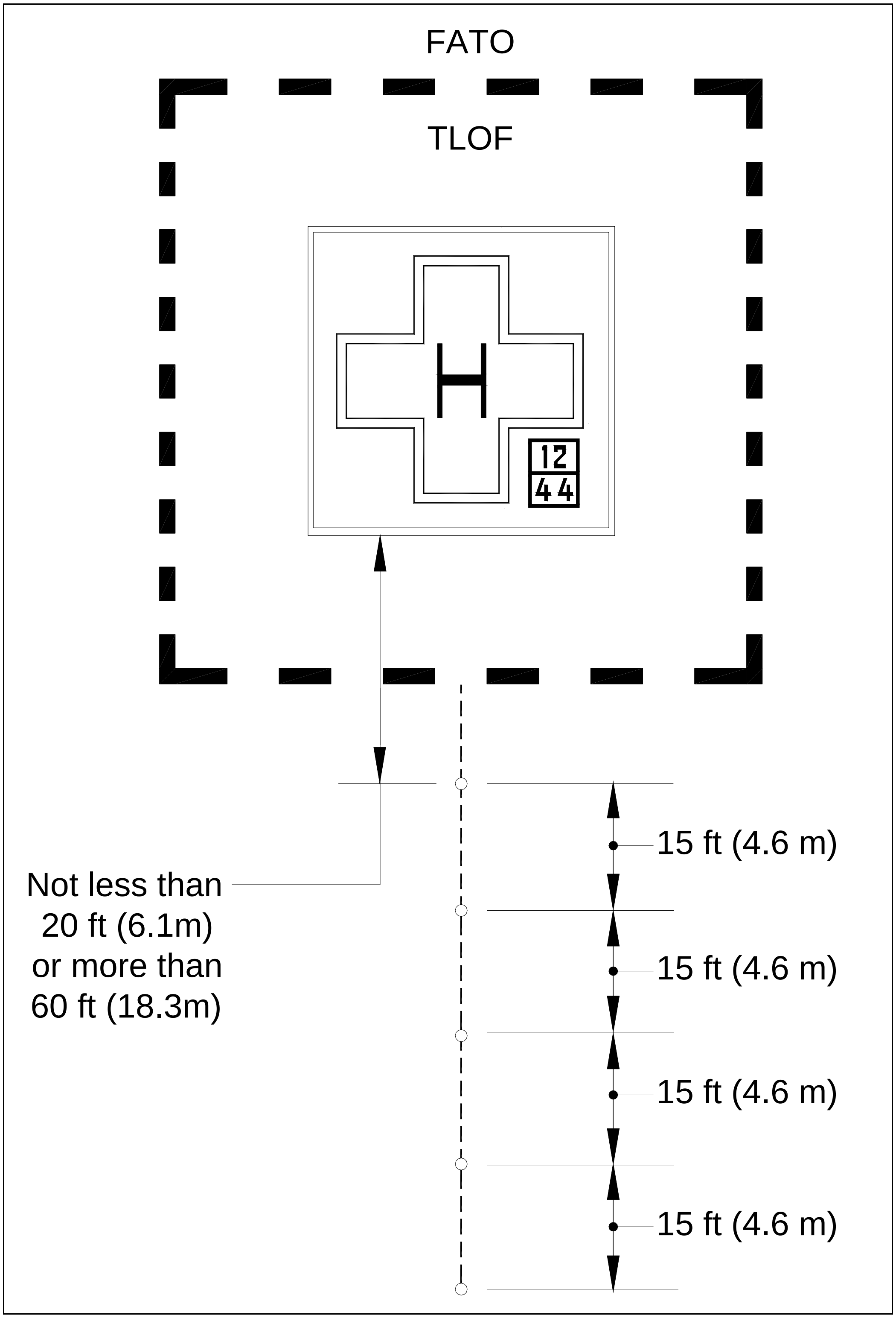
Figure 4-13. Flush FATO and TLOF Perimeter Lighting: HOSPITAL



NOTES:

1. Flush TLOF lights may be installed inside or outside ± 1-foot of the TLOF perimeter.
2. Raised FATO lights may be installed 10 ft (18.3 m) outside the perimeter of the FATO.
3. Rotor diameter and weight limitation markings are not shown for simplicity.

Figure 4-14. Flush TLOF and Raised FATO Perimeter Lighting: HOSPITAL



NOTE: yellow omni-directional lights

Figure 4-15. Landing Direction Lights: HOSPITAL

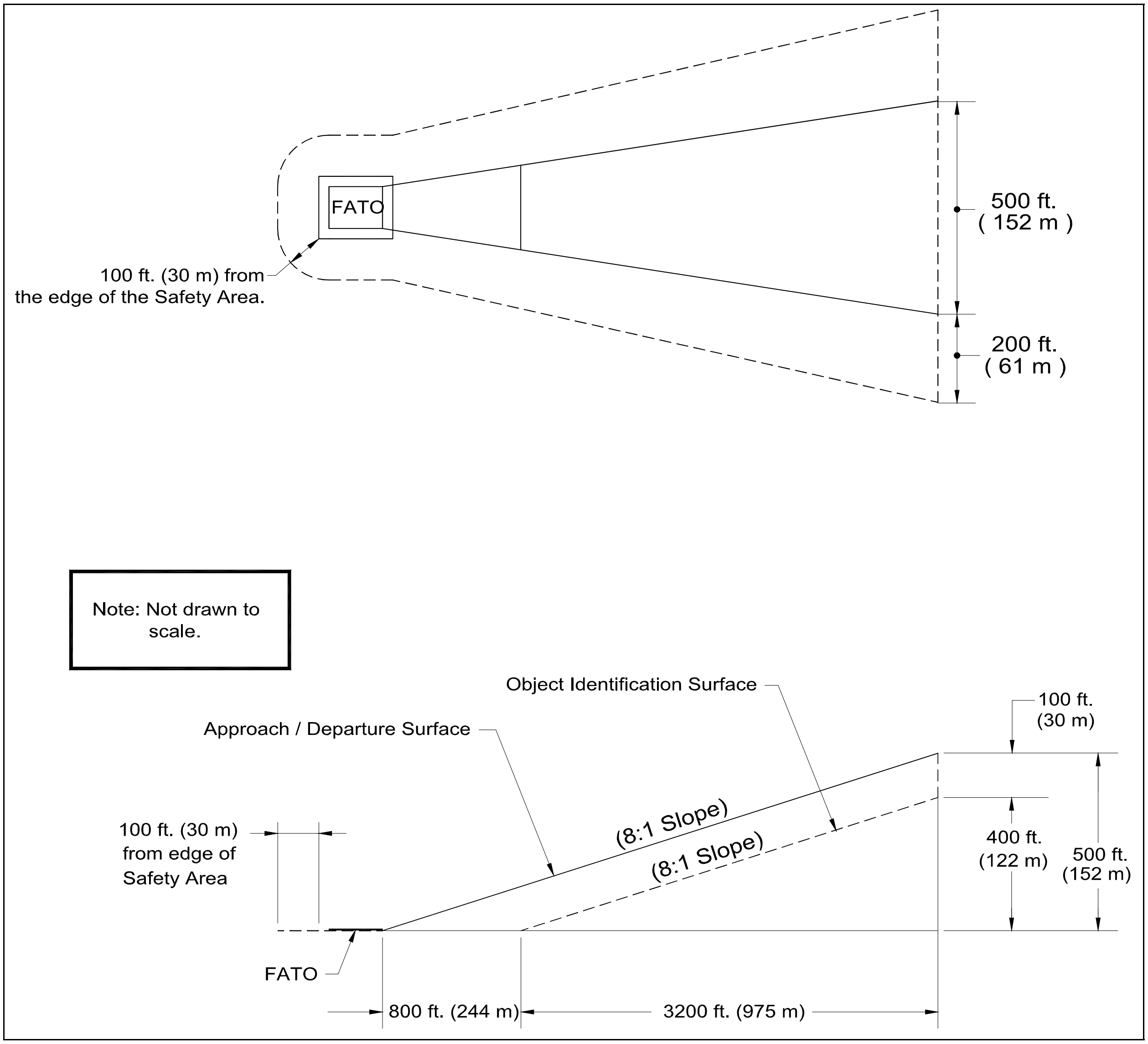


Figure 4-16. Airspace Where Marking and Lighting Are Recommended: HOSPITAL

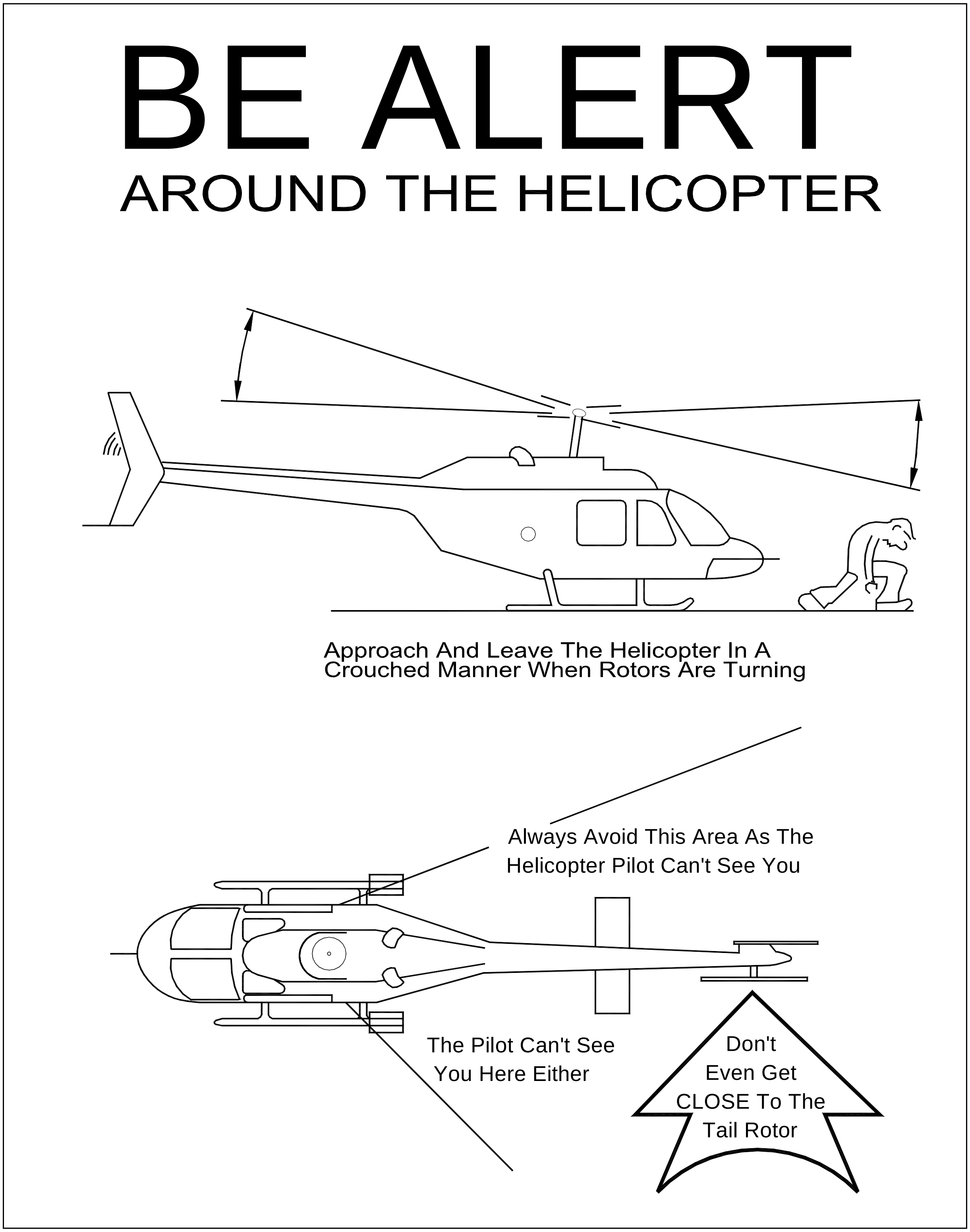


Figure 4-17. Caution Sign:
HOSPITAL

CHAPTER 5. HELICOPTER FACILITIES ON AIRPORTS

500.GENERAL. Helicopters are able to operate on most airports without unduly interfering with airplane traffic. Separate facilities and approach/ departure procedures may be necessary when the volume of airplane and/or helicopter traffic impacts operations. At airports with interconnecting passenger traffic, the terminal apron should provide gates for helicopter boarding. Persons who use a helicopter to go to an airport generally require convenient access to the airport terminal and the services provided to airplane passengers. The airport layout plan (ALP) should be amended or revised to identify the location of the exclusive-use helicopter facilities, TLOFs, FATOs, Safety Areas, approach/ departure paths, and helicopter taxi routes and taxiways. This chapter addresses design considerations for providing separate helicopter facilities on airports. Figure 5-1 shows an example of a heliport located on an airport. Other potential heliport locations are on the roofs of passenger terminals or parking garages serving passenger terminals.

501.TOUCHDOWN AND LIFT-OFF AREA (TLOF). The TLOF should be located and designed to provide ready access to the airport terminal or to the helicopter user's origin or destination. TLOF dimensions and clearances described in Chapter 2 should be applied to facilities being developed for GA helicopter usage on an airport. TLOF dimensions and clearances given in Chapter 3 should be applied to facilities being developed for transport helicopter usage on an airport.

502.FINAL APPROACH AND TAKEOFF AREA (FATO).

a. FATO dimensions. FATO dimensions and clearances described in Chapter 2 should be applied to facilities being developed for GA helicopter usage on an airport. FATO dimensions and clearances given in Chapter 3 should be applied to facilities being developed for transport helicopter usage on an airport.

b. Spacing Criteria. The recommended distance between the centerline of an approach to a runway and the centerline of an approach to a FATO for simultaneous, same direction, VFR operations is provided in Table 5-1.

503.SAFETY AREA. Safety Area dimensions and clearances described in Chapter 2 should be applied to facilities being developed on an airport for GA helicopter usage. Safety Area dimensions and clearances given in Chapter 3 should be applied to facilities being developed on an airport for transport helicopter usage.

504.VFR APPROACH/ DEPARTURE PATHS. For GA helicopter operations, each FATO/TLOF should have at least two approach/ departure paths meeting the criteria in Chapter 2. For transport helicopter operations, each FATO/TLOF should have at least two approach/ departure paths meeting the criteria in Chapter 3. To the extent practical, helicopter approach/ departure paths should be independent of approaches to and departures from active runways.

505.PROTECTION ZONE. The protection zone is the area under the approach/ departure path starting at the FATO perimeter and extending out for a distance of 280 feet (85.3 m) for GA facilities and 400 feet (122 m) for Transport facilities, as illustrated in Figures 2-8 and 3-7. In the event of an engine failure, the protection zone provides an emergency landing site that would minimize the risk of injury or damage to property on the ground. The heliport proponent should own or control the property containing the protection zone. This control should include the ability to clear incompatible objects and to preclude the congregation of people.

506.WINDSOCK. The recommendations in Chapter 2 should be applied to facilities being developed on an airport for GA helicopter usage. The recommendations in Chapter 3 should be applied to facilities being developed on an airport for Transport helicopter usage.

507.TAXIWAYS AND TAXI ROUTES. Facilities being developed for GA helicopter usage on an airport should meet or exceed the taxiway and taxi route dimensions and clearances in Chapter 2. Facilities being developed for Transport helicopter usage on an airport should meet or exceed the taxiway and taxi route dimensions and clearances in Chapter 3.

a. Ground Taxiing and Hover Taxiing. When exclusive helicopter taxiways or taxi routes are developed at an airport, they should be located to minimize interaction with airplane operations.

b. Air Taxiing. Air taxiing at elevations approximately 100 feet (30.5 m) above the surface is often preferred when helicopters must traverse long distances across an airport.

508. HELICOPTER PARKING. Helicopter parking positions should be located as close to the intended destination or origination of the passengers as conditions and safety permit. Parking area dimensions and clearances given in Chapter 2 should be applied to facilities being developed for GA helicopter usage on an airport. Parking area dimensions and clearances described in Chapter 3 should be applied to facilities being developed for Transport helicopter usage on an airport. Parking positions should be located to minimize the risk of damage from helicopter rotor wash.

509. HELIPORT MARKERS AND MARKINGS. The recommendations in Chapter 2 should be applied to facilities being developed on an airport for GA helicopter usage. The recommendations in Chapter 3 should be applied to facilities being developed on an airport for Transport helicopter usage.

510. HELIPORT LIGHTING. The recommendations in Chapter 2 should be applied to facilities being developed on an airport for GA helicopter usage. The recommendations in Chapter 3 should be applied to facilities being developed on an airport for Transport helicopter usage.

511. MARKING AND LIGHTING OF OBSTRUCTIONS. The recommendations in Chapter 2 should be applied to facilities being developed on an airport for GA helicopter usage. The recommendations in Chapter 3 should be applied to facilities being developed on an airport for Transport helicopter usage

512. SAFETY ENHANCEMENTS.

a. Security. The operational areas of a heliport need to be kept clear of people, animals, and vehicles. Ground-level general aviation heliports may require fenced operational areas to prevent the inadvertent or unauthorized entry of persons, animals, or vehicles. Fences should be as low as possible and located as far as possible from the FATO. Fences should not penetrate any approach/ departure (primary or transitional) surface. Access to airside areas should be through controlled and locked gates or doors that display a cautionary sign similar to that illustrated in Figure 2-27.

b. Rescue and Fire Fighting Services. Heliports should meet the criteria of NFPA Pamphlet 418, Standards for Heliports, and NFPA Pamphlet 403, Aircraft Rescue Services. A firehose cabinet or extinguisher should be provided at each access gate and each fueling location. Firehose cabinets, fire extinguishers, and other fire fighting equipment at elevated TLOFs should be located adjacent to, but below the level of, the TLOF. NFPA standards are available at National Fire Protection Association web site http://www.nfpa.org.

c. Communications. A UNICOM radio may be used to provide arriving helicopters with heliport and traffic advisory information but may not be used to control air traffic. The Federal Communications Commission (FCC) should be contacted for information on UNICOM licensing.

d. Weather. An AWOS measures and automatically broadcasts current weather conditions at the heliport site. When an AWOS is installed, it should be located at least 100 feet (30.5 m) and not more than 700 feet (213 m) from the TLOF perimeter. Locate the AWOS so its instruments will NOT be affected by rotor wash from helicopter operations. Guidance on AWOS systems is found in AC 150/5220-16, *Automated Weather Observing Systems (AWOS) for Non-Federal Applications*.

e. Winter Operations. Swirling snow raised by a helicopter's rotor wash can cause the pilot to lose sight of the intended landing point. Swirling snow on takeoff can hide objects that need to be avoided. At least the TLOF, the FATO, and as much of the Safety Area as practical, should be kept free of snow. Heliport design should take into account the methods and equipment to be used for snow removal. The heliport design should allow the snow to be removed sufficiently so the snow will not present an obstruction hazard to either the tail rotor or the main rotor. Guidance on winter operations is found in AC 150/5200-30, *Airport Winter Safety and Operations*. [Exception: In cases where the FATO is much larger than the minimum requirement, it may not be necessary to clear all of this additional area.]

513. VISUAL GLIDESLOPE INDICATORS. The recommendations in Chapter 2 should be applied to facilities being developed on an airport for GA helicopter usage. The recommendations in of Chapter 3 should be applied to facilities being developed on an airport for Transport helicopter usage.

514.PASSENGER SERVICES. The heliport terminal requires curbside access for passengers using private autos, taxicabs, and public transit vehicles. Public waiting areas need the usual amenities, and a counter for rental car services may be desirable. Passenger auto parking areas should accommodate current requirements and have the capability of being expanded to meet future requirements. Readily available public transportation may reduce the requirement for employee and service personnel auto parking spaces. The heliport terminal building or sheltered waiting area should be attractive and functional. AC 150/5360-9, *Planning and Design of Airport Terminal Facilities at Non-Hub Locations*, contains guidance on designing terminal facilities. The AC is available at the Airports web site http://faa.gov/arp.

Unless screening was carried out at the helicopter passengers' departure location, Transportation Security Administration regulations may require that a screening area and/or screening be provided before passengers enter the airport's secured areas. Multiple helicopter parking positions and/or locations may be needed in the terminal area to service helicopter passenger screening and/or cargo interconnecting needs. Information about passenger screening is available at Transportation Security Administration web site http://www.tsa.gov/public/.

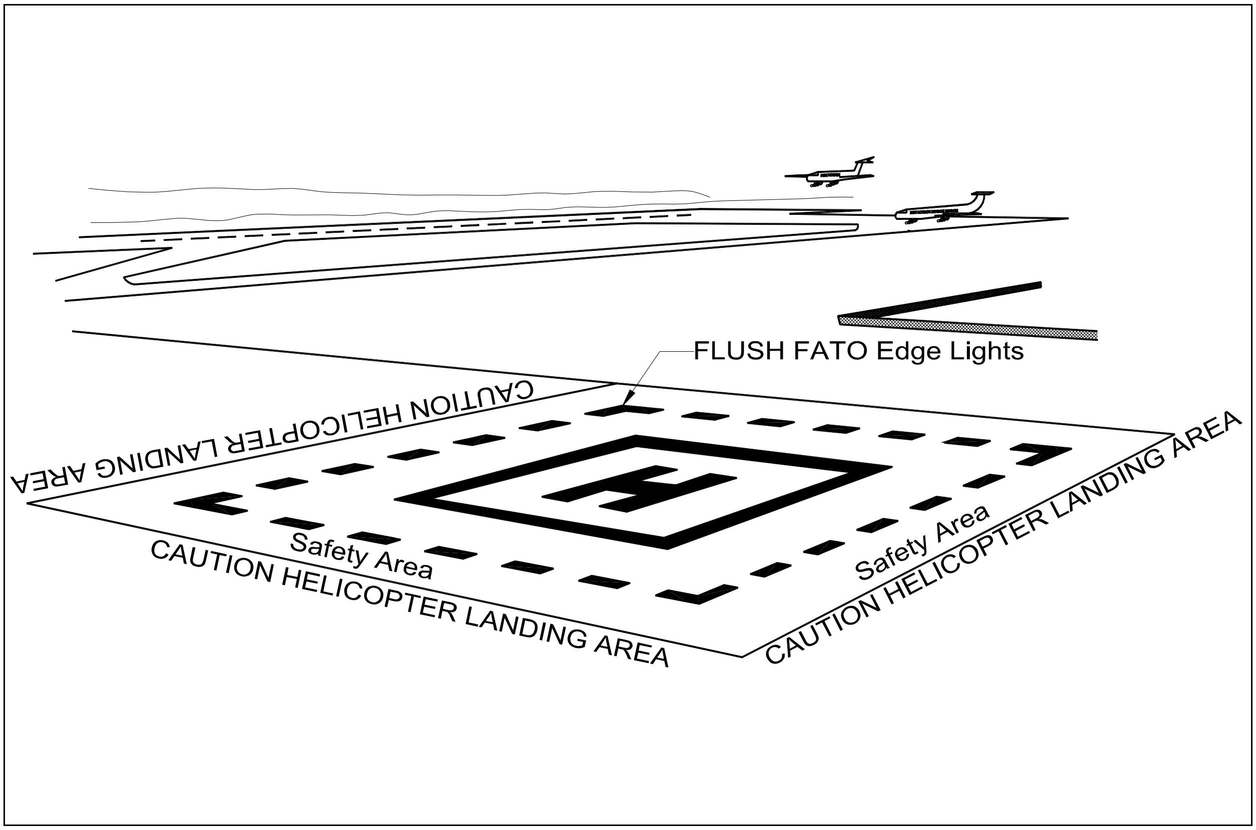


Figure 5-1. A Heliport Located on an Airport: ON AIRPORT

Table 5-1. Recommended Distance Between FATO Center to Runway Centerline for VFR Operations

Column 1	Column 2	Column 3	Column 4
	Small Helicopter 6,000 lbs or less	Medium Helicopter 6,001 to 12,000 lbs	Heavy Helicopter over 12,000 lbs
Small Airplane 12,500 lbs or less	300 feet (91 m)	500 feet (152 m)	700 feet (213 m)
Large Airplane 12,000 lbs to 300,000 lbs	500 feet (152 m)	500 feet (152 m)	700 feet (213 m)
Heavy Airplane Over 300,000 lbs	700 feet (213 m)	700 feet (213 m)	700 feet (213 m)

CHAPTER 6. NONPRECISION INSTRUMENT OPERATIONS

600.GENERAL. Non-precision approach/ departure missed approach procedures permit helicopter operations to continue during periods of reduced visibility. Non-precision procedures are established in accordance with FAA Order 8260.3. Volume 5 United States Standard for Terminal Instrument Procedures (TERPS) and FAA Order 8260.42, *Helicopter Non-precision Approach Criteria Utilizing the Global Positioning System (GPS).* The FAA Orders are available at the AFS 420 web site http://av-info.faa.gov/terps/.

The following criteria for the improved lighting system and increased airspace are recommended.

a. Early FAA Contact Urged. This chapter addresses issues that heliport owners should consider before requesting the development of non-precision approach/ departure/missed approach procedures. The recommendations and standards in this AC are not intended to be sufficient to design an instrument procedure. Heliport owners desiring instrument procedures are urged to initiate early contact with the appropriate FAA Flight Procedures Office.

b. Non-precision Approach Airspace. Those who design non-precision approach/ departure/missed approach procedures have some flexibility in the design of such procedures. For this and other reasons, the clear airspace required to support non-precision operations is complex, and it does not lend itself to simple description, even using figures. Consequently, the figures in this chapter do NOT describe the full range of possibilities in this regard. Refer to the latest revision of FAA Order 8260.42 for more detailed information.

601.IMPROVED LIGHTING SYSTEM. Perimeter lighting enhancement and the Heliport Instrument Lighting System (HILS), illustrated in Figure 6-1, are recommended.

NOTE: *Lower visibility minimums may be possible if a Heliport Approach Lighting System (HALS) is installed (see Figure 7-2).*

a. FATO Perimeter Lighting Enhancement. An additional raised, green L-861SE light is inserted between each light in the front and rear rows of the raised perimeter lights to enhance the definition of the FATO.

b. HILS Lights. The HILS consists of 24 uni-directional PAR 56, 200-watt white lights that extend the FATO perimeter lights. The system extends both the right and left edge lights as “edge bars” and both the front and rear edge lights as “wing bars,” as shown in Figure 6-1.

(1) Edge Bars. Edge bar lights are spaced at 50-foot (15.2 m) intervals, measured from the front and rear row of the FATO perimeter lights.

(2) Wing Bars. Wing bar lights are spaced at 15-foot (4.57 m) intervals, measured from the line of FATO perimeter (side) lights.

c. Optional TLOF Lights. An optional feature is a line of seven white flush L-850A lights spaced at 5-foot (1.5 m) intervals installed in the TLOF pavement. These lights are aligned on the centerline of the approach course to provide close-in directional guidance and improve TLOF surface definition. These lights are illustrated in Figures 6-1.

602.OBSTACLE EVALUATION SURFACES. The following surfaces are evaluated for object penetrations.

a. Final Approach Segment Surfaces. Figure 6-2 illustrates these surfaces.

(1) FAA Order 8260.42 defines a Waypoint Tolerance Area around the Missed Approach Point (MAP). This area extends from a line 0.3 nmi [1823 feet] (556 M) prior to the MAP (known as the Earliest Point MAP) to a line 0.3 nmi [1823 feet] (556 m) past the MAP (known as the Latest Point MAP). Within this area and laterally to the primary course boundary, the obstacle evaluation surface is 250 feet (76.2 m) beneath the elevation of the MAP.

(2) Primary Area Obstacle Evaluation Surfaces. The obstacle evaluation surface extends longitudinally from the Final Approach Fix (FAF) to the Earliest Point MAP and laterally to the primary boundaries on each side of the final course centerline. At the FAF, the obstacle evaluation surface is at an elevation 250 feet (76.2 m) below the FAF. At the Earliest Point MAP, the obstacle evaluation surface is at an elevation 250 feet below (76.2 m) the MAP.

(3) Secondary Area Obstacle Evaluation Surfaces. The obstacle evaluation surface extends longitudinally from the FAF to the Latest Point MAP and laterally from the edge of the primary boundary to the edge of the secondary boundary. At the primary boundary, the secondary obstacle evaluation surface is at the same elevation as the primary obstacle evaluation surface. Moving laterally, the secondary obstacle evaluation surface rises uniformly to an elevation 250 feet (76.2 m) higher than its elevation at the primary boundary.

b. Visual Segment of the Non-precision Approach. The approach surface is a trapezoidally shaped plane starting at the visual segment reference line (VSRL) at the TLOF elevation. It begins at a width of 150 feet (46 m) and flares outward to a width of approximately 0.8 nmi [4,861 feet] (1,482 m). The surface rises upward on a slope that is one degree less than the visual segment descent angle (VSDA). Figure 6-3 illustrates these surfaces.

c. VFR Approach/ Departure Surfaces. The VFR approach/ departure surfaces described in paragraphs 204, 304, 404, and 504 also apply at a heliport with a non-precision instrument approach.

d. Missed Approach Surfaces. All instrument procedures require a missed approach procedure. The ability to support low-landing minima, even when the approach trapezoid is void of penetrations, may be controlled by objects in the missed approach segment of the procedure. Missed approach surfaces are complex and beyond the scope of this AC. Missed approach surfaces need to be discussed with an FAA airspace procedures specialist early in the effort to develop an instrument procedure.

NOTE: *When a heliport does not meet the criteria of this AC, FAA Order 8260.42A requires that a non-precision approach be published as a SPECIAL procedure with annotations that special aircrew qualifications are required to fly the procedure.*

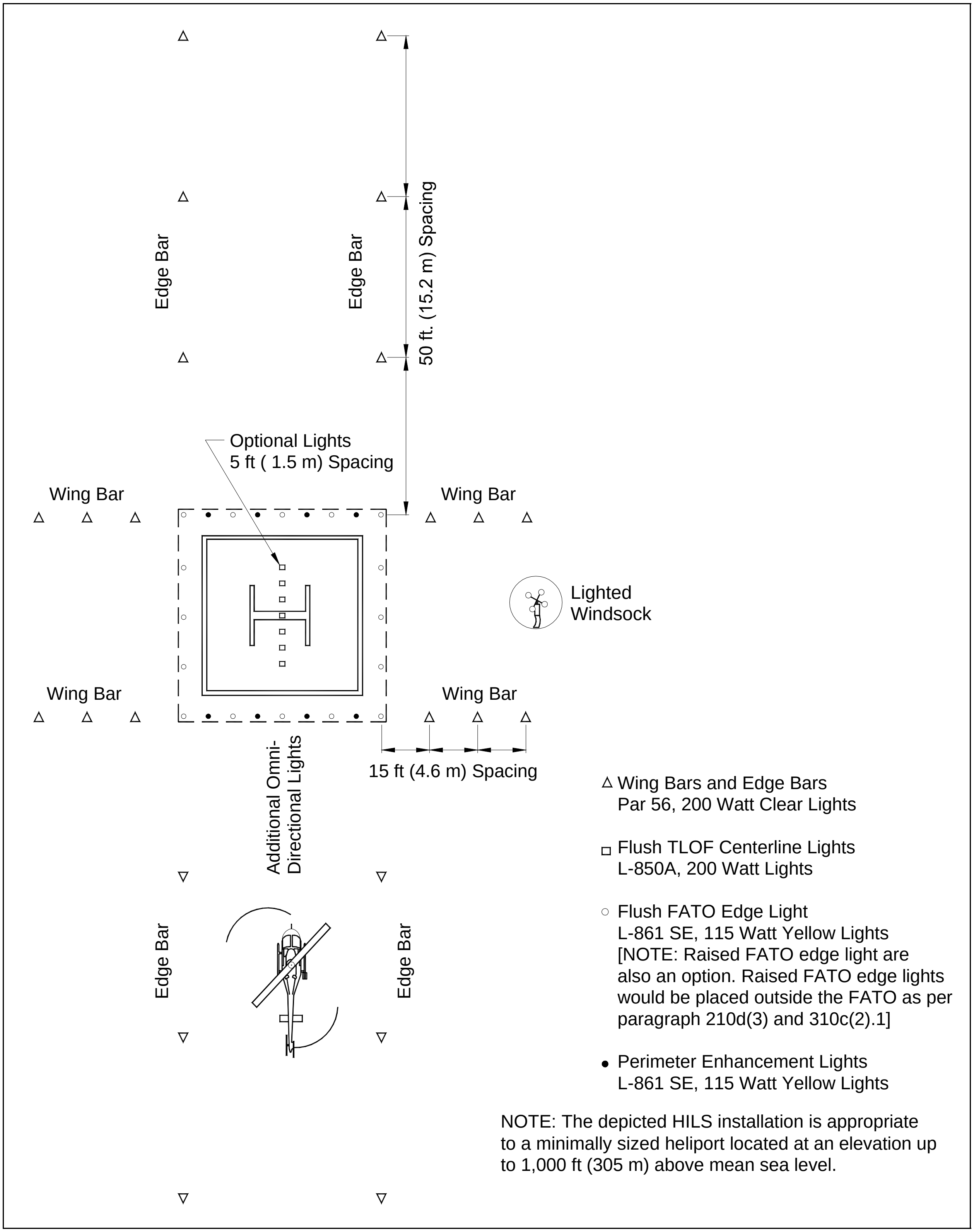


Figure 6-1. Heliport Instrument Lighting System (HILS): NONPRECISION

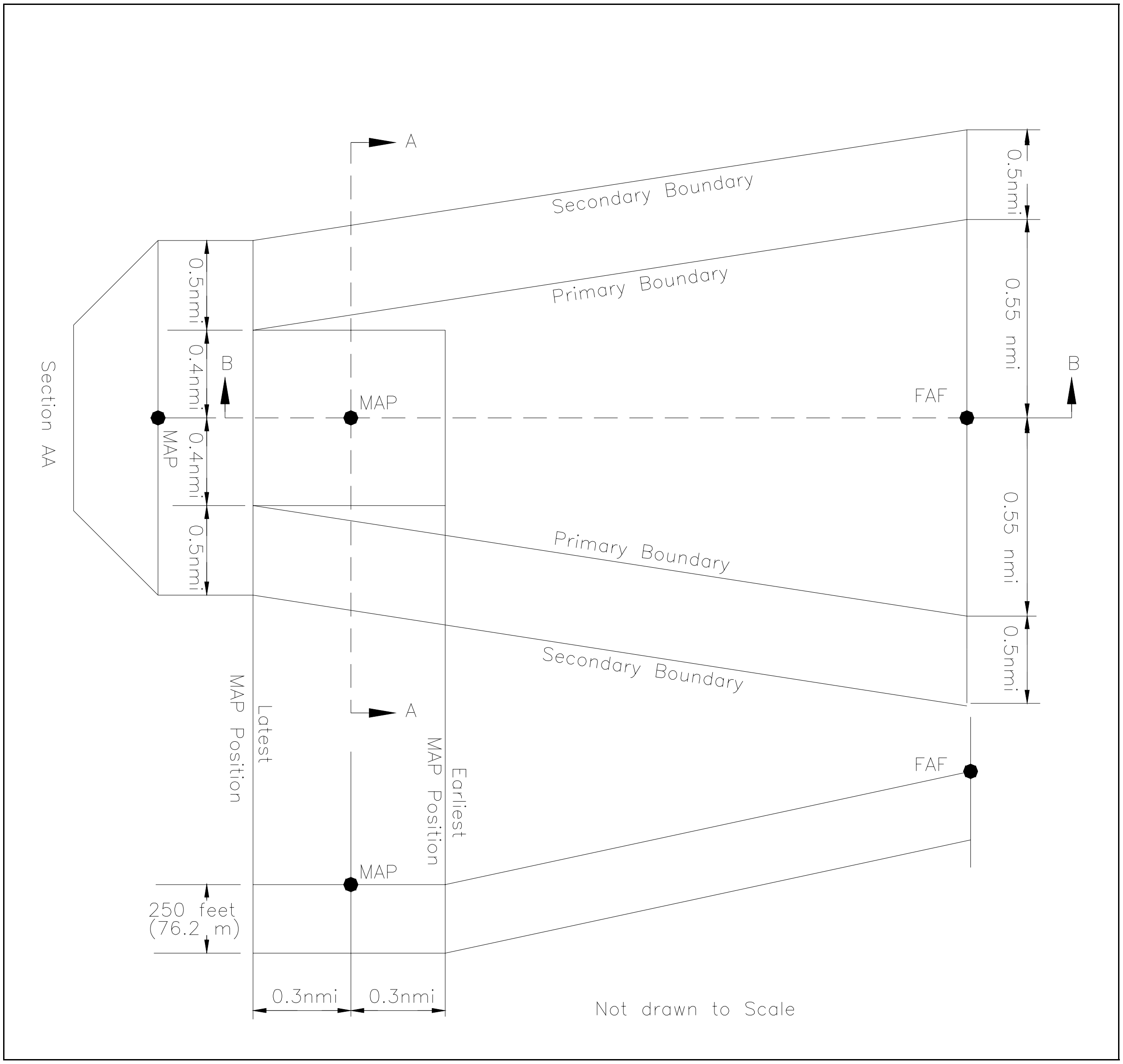


Figure 6-2. Non-precision Approach/ Departure Surfaces – Final Approach Segment: NONPRECISION

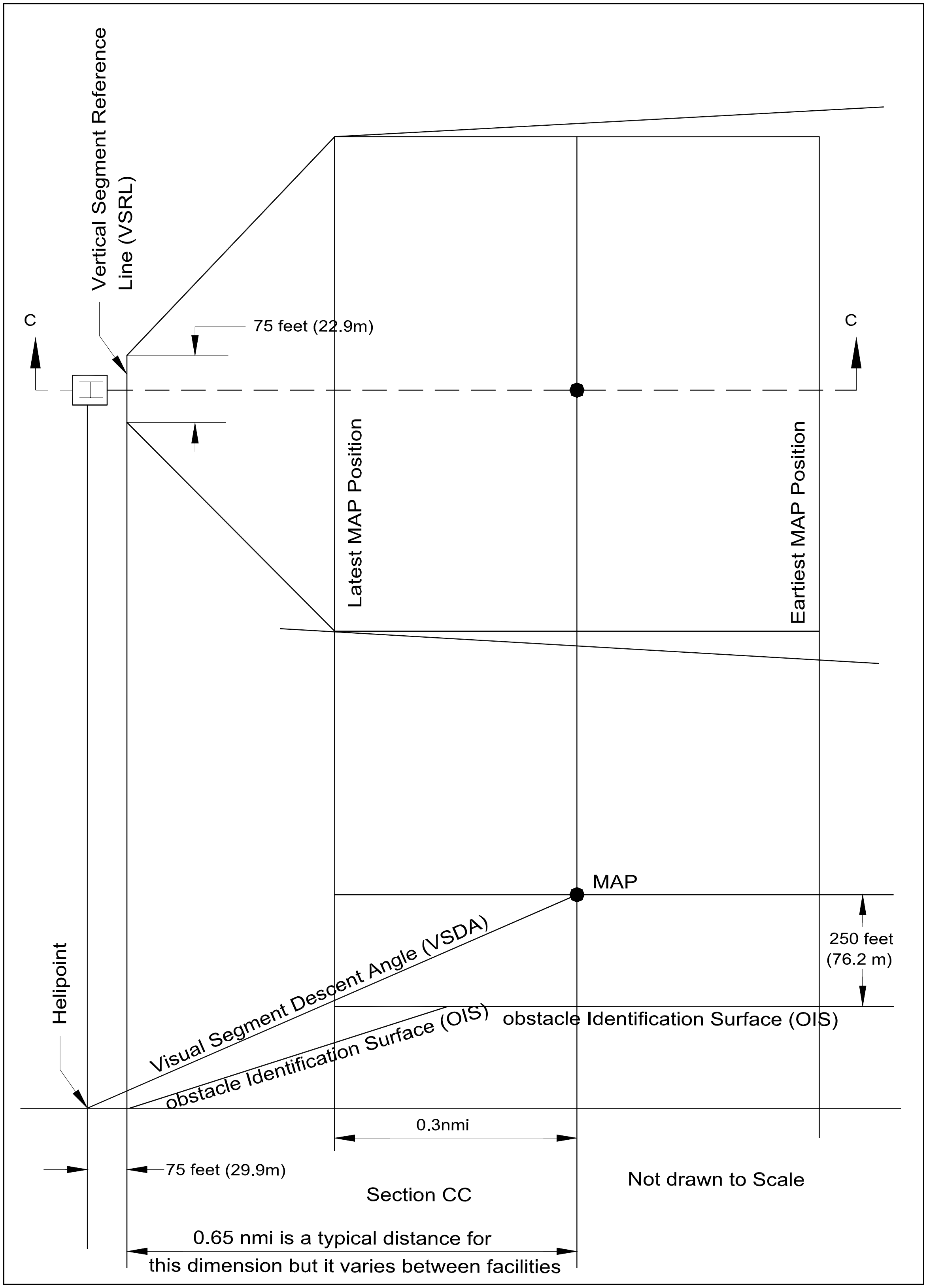


Figure 6-3. Non-precision Approach/ Departure Surfaces – Visual Segment: NONPRECISION

Intentionally Left Blank

CHAPTER 7. PRECISION APPROACH OPERATIONS

700. GENERAL. Precision instrument approach/ departure/missed approach procedures are necessary to provide the operational capability desired by many executive and corporate users. Such procedures are established in accordance with FAA Order 8260.3, *Volume 5, United States Standard for Terminal Instrument Procedures (TERPS)*, and are essential to ensure the all-weather reliability needed for a helicopter air carrier to be successful in offering scheduled service. This chapter describes the larger ground area (FATO) associated with precision instrument operations and describes the imaginary aerial surfaces that are evaluated for the impact of object penetrations. The FAA Order is available at the AFS 420 web site http://av-info.faa.gov/terps/.

a. Early FAA Contact Urged. This chapter addresses issues that heliport owners should consider before requesting the development of precision approach/ departure/missed approach procedures. The recommendation and standards in this AC are not intended to be sufficient to design instrument procedures. Heliport owners desiring instrument procedures are urged to initiate early contact with the appropriate FAA Flight Procedures Office.

b. Precision Airspace. Those who design precision approach/ departure/missed approach procedures have some flexibility in the design of such procedures. For this and other reasons, the clear airspace required to support precision operations is complex, and it does not lend itself to simple description, even using figures. Consequently, the figures in this chapter do NOT describe the full range of possibilities in this regard. Refer to FAA Order 8260.3, for more detailed information.

701. FINAL APPROACH REFERENCE AREA (FARA). A certificated helicopter precision approach procedure terminates with the helicopter coming to a hover or touching down within a 150-foot-wide (45 m) by at least 150-foot long (45 m) FARA. The FARA is located at the far end of a 300-foot-wide by 1,225-foot- long (91 m by 373 m) FATO required for a precision instrument procedure. Figure 7-1 illustrates the FARA/FATO relationship.

702. LIGHTING REQUIREMENTS. The following lighting systems are necessary for a helicopter precision instrument approach procedure with the lowest minimums.

a. The HALS installation, depicted in Figure 7-2, is a distinctive approach lighting configuration designed to prevent it from being mistaken for an airport runway approach lighting system.

b. Enhanced Perimeter Lighting System. The enhanced perimeter lighting system, as described in Chapter 6, strengthens the conspicuity of the front and back lines of perimeter lights.

c. Heliport Instrument Lighting System (HILS). The HILS system, described in Chapter 6, uses PAR-56 lights to extend the lines of perimeter lights fore and aft and right and left.

703. OBSTACLE EVALUATION SURFACES. The operational minimums, determined by the FAA in establishing a helicopter precision approach procedure, depend upon the extent that objects or structures penetrate the surfaces described below and depicted in Figure 7-3. The FAA needs to know the location and elevations of objects that penetrate the described surfaces to advise the heliport owner as to the lowest practical approach angle and prospective operational minimums.

a. Approach Surface. A precision approach surface is a trapezoidally shaped plane beginning at the near perimeter of the instrument FATO. The trapezoid extending outward for 25,000 feet (7,620 m) in the direction of the approach has an initial width of 1,000 feet (305 m) and flares to a width of 6,000 feet (1,829 m) at the far end. An approach surface rising upward on not more than a 34:1 slope (34 units horizontal to 1 unit vertical), as depicted in Figure 7-3, is required for a 3-degree glideslope approach angle. An approach surface rising upward on not more than a 22.7:1 slope (22.7 units horizontal in 1 unit vertical) is required for a 4.5- degree glideslope approach angle. An approach surface rising upward on not more than a 17.7:1 slope (17.7 units horizontal in 1 unit vertical) is required for a 6- degree glideslope approach angle. The glideslope approach angle can vary in increments of 0.1 degree from 3 degrees up to 6 degrees with corresponding adjustments to the slope of the approach surface and to the landing minimums.

b. Transitional Surfaces. A precision instrument approach has transitional surfaces associated with the instrument FATO and the certificated approach surface.

(1) FATO. Inner-transitional surfaces abut each side and, when there is no back approach, the non approach end of an instrument FATO. Transitional surfaces are 350 feet (107 m) wide and rise upward at right angles to the centerline of the instrument FATO on a 7:1 slope (7 units horizontal in 1 unit vertical).

(2) Approach Surface. Transitional surfaces abut each edge of the precision approach trapezoid. The surface is 600 feet (183 m) wide at the FATO end and flares to a width of 1,500 feet (457 m) at the far end of the approach trapezoid. Transitional surfaces rise upward at right angles to the centerline of the approach course on a 7:1 slope (7 units horizontal in 1 unit vertical).

c. Missed Approach Surfaces. All instrument procedures require a missed approach procedure. The ability to support low-landing minima, even when the approach trapezoid is void of penetrations, may be controlled by objects in the missed approach segment of the procedure. While Figure 7-3 illustrates the initial portion of a missed approach surface, missed approach surfaces are complex and beyond the scope of this AC. Missed approach need to be discussed with an FAA flight procedures specialist early in the effort to develop an instrument procedure.

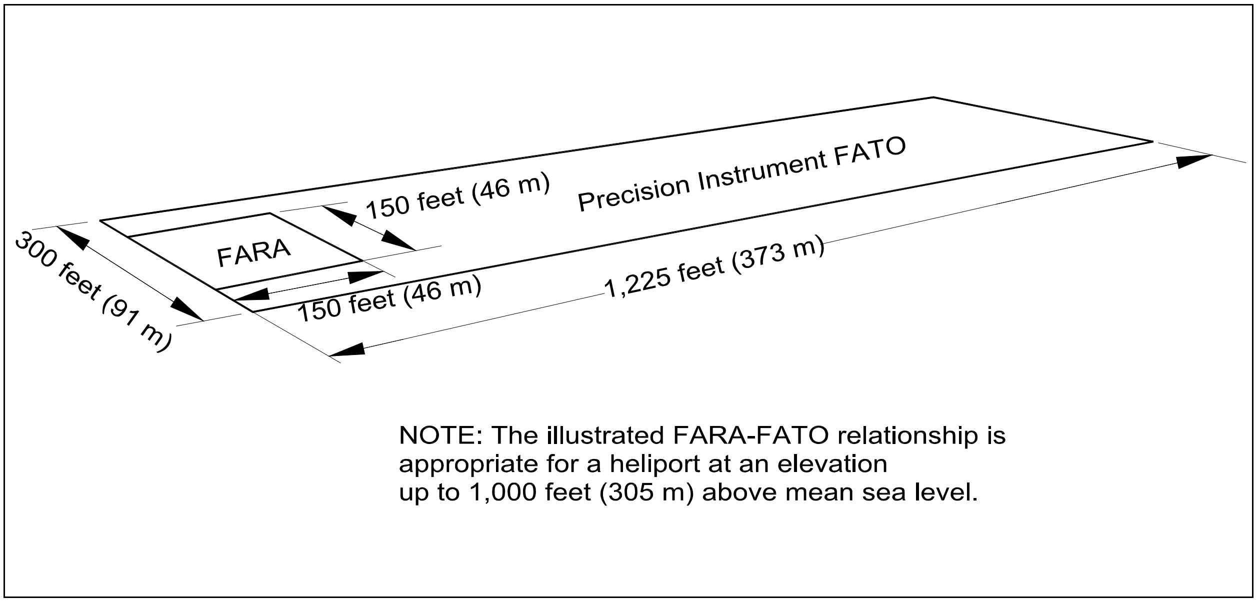


Figure 7-1. FARA/FATO Relationship: PRECISION

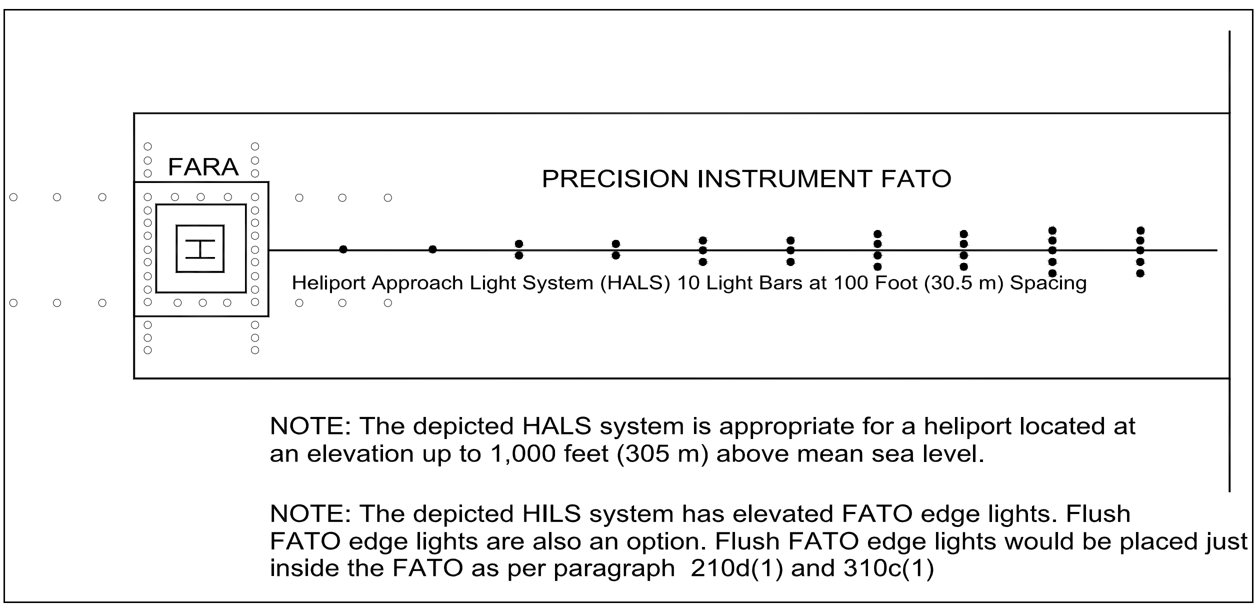


Figure 7-2. HALS Lighting System: PRECISION

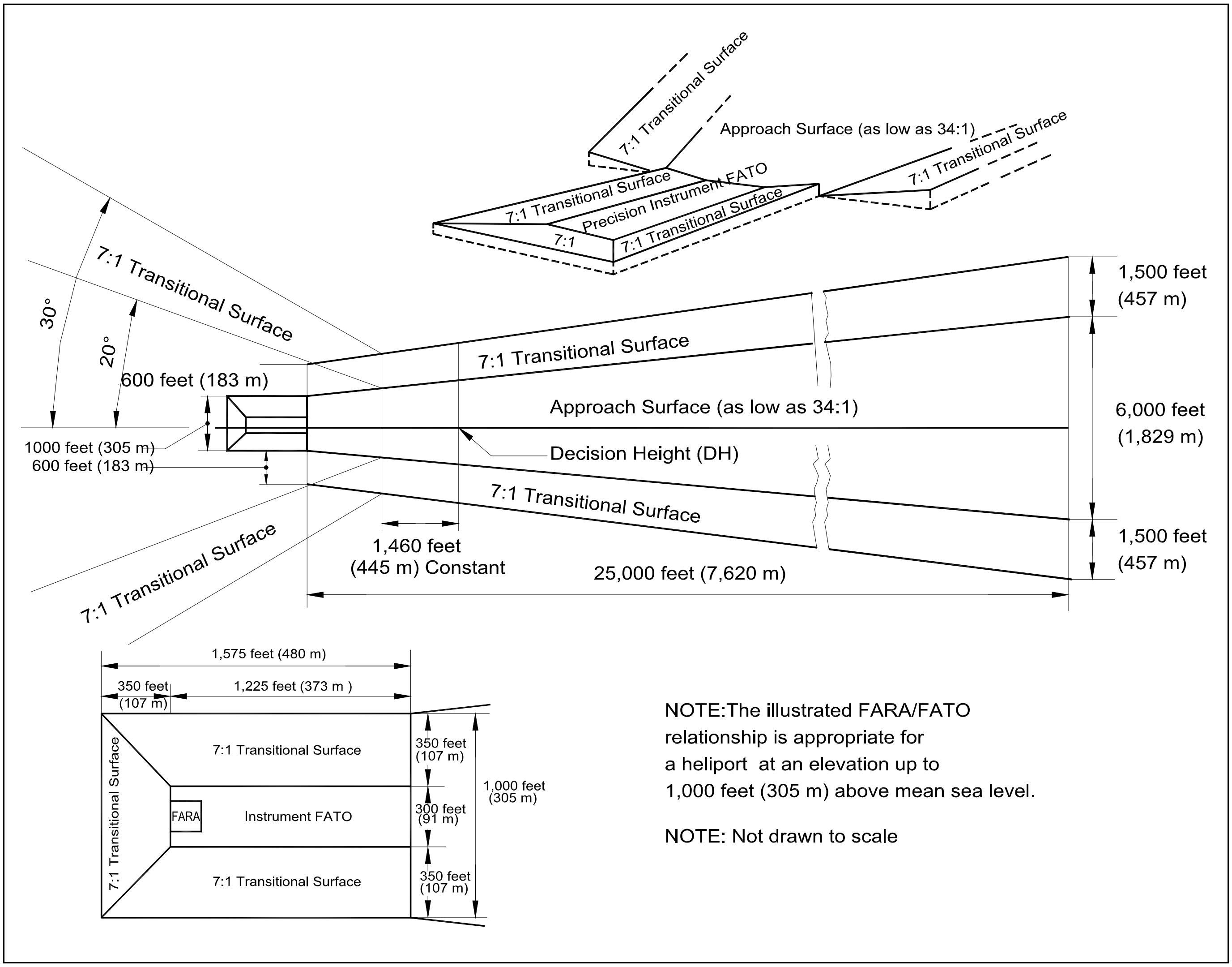


Figure 7-3. Precision Approach/ Departure Surfaces: PRECISION

CHAPTER 8. HELIPORT GRADIENTS AND PAVEMENT DESIGN

800.GENERAL. This chapter provides guidance on designing heliport pavements, including design loads, and addresses soil stabilization as a method of treating non paved operational surfaces. Operational surfaces such as the TLOF, FATO, Safety Areas, parking areas, taxi routes, and taxiways should present a reasonably smooth, uniformly graded surface. The surfaces of a heliport should be designed to provide positive drainage.

801.TLOF GRADIENTS.

a. General Aviation Heliport. To ensure drainage, the TLOF should have a minimum gradient of 0.5 percent and a maximum gradient of 2.0 percent.

b. Hospital Heliport. To ensure drainage, the TLOF should have a gradient between 0.5 and 1.0 percent and a maximum gradient of 2.0 percent.

c. Transport Heliport. To ensure drainage, the TLOF should have a longitudinal gradient between 0.5 and 1.0 percent and a transverse gradient between 0.5 and 1.5 percent.

802.FATO GRADIENTS. The recommended gradients for a load bearing FATO range from a minimum of 0.5 percent to a maximum of 5.0 percent. FATO grades in any areas where a helicopter is expected to land should not exceed 2.0 percent. To ensure TLOF drainage, gradients of rapid runoff shoulders should range between 3.0 and 5.0 percent. These recommendations are illustrated in Figure 8-1 for a concrete TLOF and stabilized turf FATO.

NOTE: *When the FATO is non-load bearing and/or not intended for use by the helicopter, there are no specific requirements for the gradient of the surface. In this case the gradient should be 5 percent or more to ensure adequate drainage away from the area of the TLOF.*

803.SAFETY AREA GRADIENTS. The surface of the Safety Area should not be steeper than a downward slope of 2:1 (2 units horizontal in 1 unit vertical). In addition, the surface of the Safety Area should not be higher than the FATO edge.

804.PARKING AREA GRADIENTS. Parking area grades should not exceed 2.0 percent in any area where a helicopter is expected to park.

805.TAXIWAY AND TAXI ROUTE GRADIENTS. Taxiway longitudinal gradients should not exceed 2.0 percent. Transverse gradients should not be less than 0.5 percent nor greater than 2.0 percent.

806.DESIGN LOADS. The TLOF and any load-bearing surfaces should be designed and constructed to support the weight of the design helicopter and any ground support vehicles. Loads are applied through the contact area of the tires for wheel-equipped helicopters or the contact area of the skid for skid equipped helicopters. Helicopter weights, landing gear configurations, and dimensional data are listed in Appendix 1.

a. Static Loads. For design purposes, the design static load is equal to the helicopter's maximum takeoff weight applied through the total contact area of the wheels or skids. Contact the manufacturers to obtain the contact area for the specific helicopters of interest.

b. Dynamic Loads. A dynamic load of one-fifth of a second or less duration may occur during a hard landing. For design purposes, dynamic loads should be assumed at 150 percent of the takeoff weight of the design helicopter. When specific loading data is not available, assume 75 percent of the weight of the design helicopter to be applied equally through the contact area of the rear two rear wheels (or the pair rear wheels of a dual-wheel configuration) of a wheel-equipped helicopter. For a skid equipped helicopter assume 75 percent of the weight of the design helicopter to be applied equally through the aft contact areas of the two skids of a skid-equipped helicopter. (See Figure 8-2.) The manufacturer should be contacted to obtain the aft contact area for a specific helicopter of interest.

c. Rotor Loads. Rotor downwash loads are approximately equal to the weight of the helicopter distributed uniformly over the disk area of the rotor. Tests have established that rotor downwash loads are generally less than the loads specified in building codes for snow, rain, or wind loads typically used in structural design calculations.

807.PAVEMENT DESIGN AND SOIL STABILIZATION. Pavements distribute the helicopters' weight over a larger area of the subsurface as well as provide a water-impervious, skid-resistant wearing surface. Paving TLOFs, FATOs, taxiways, and parking aprons is encouraged to improve their load carrying ability, minimize the erosive effects of rotor wash, and facilitate surface runoff. Stabilizing unpaved portions of the FATO and taxi routes subjected to rotor wash is recommended. In some instances, loads imposed by ground support vehicles may exceed those of the largest helicopter expected to use the facility. Guidance on pavement design and on stabilizing soils is contained in AC 150/5320-6, *Airport Pavement Design and Evaluation*, and AC 150/5370-10, *Standards for Specifying Construction of Airports*. The ACs are available at the Airports web site http://faa.gov/arp.

a. Pavements. In most instances, a 6-inch thick (15 cm) Portland Cement Concrete (PCC) pavement is capable of supporting operations by helicopters weighing up to 20,000 pounds (9,070 kg). Thicker pavements are required for heavier helicopters or where the quality of the subsurface soil is questionable. PCC pavement is recommended for all heliport surfaces used by helicopters.

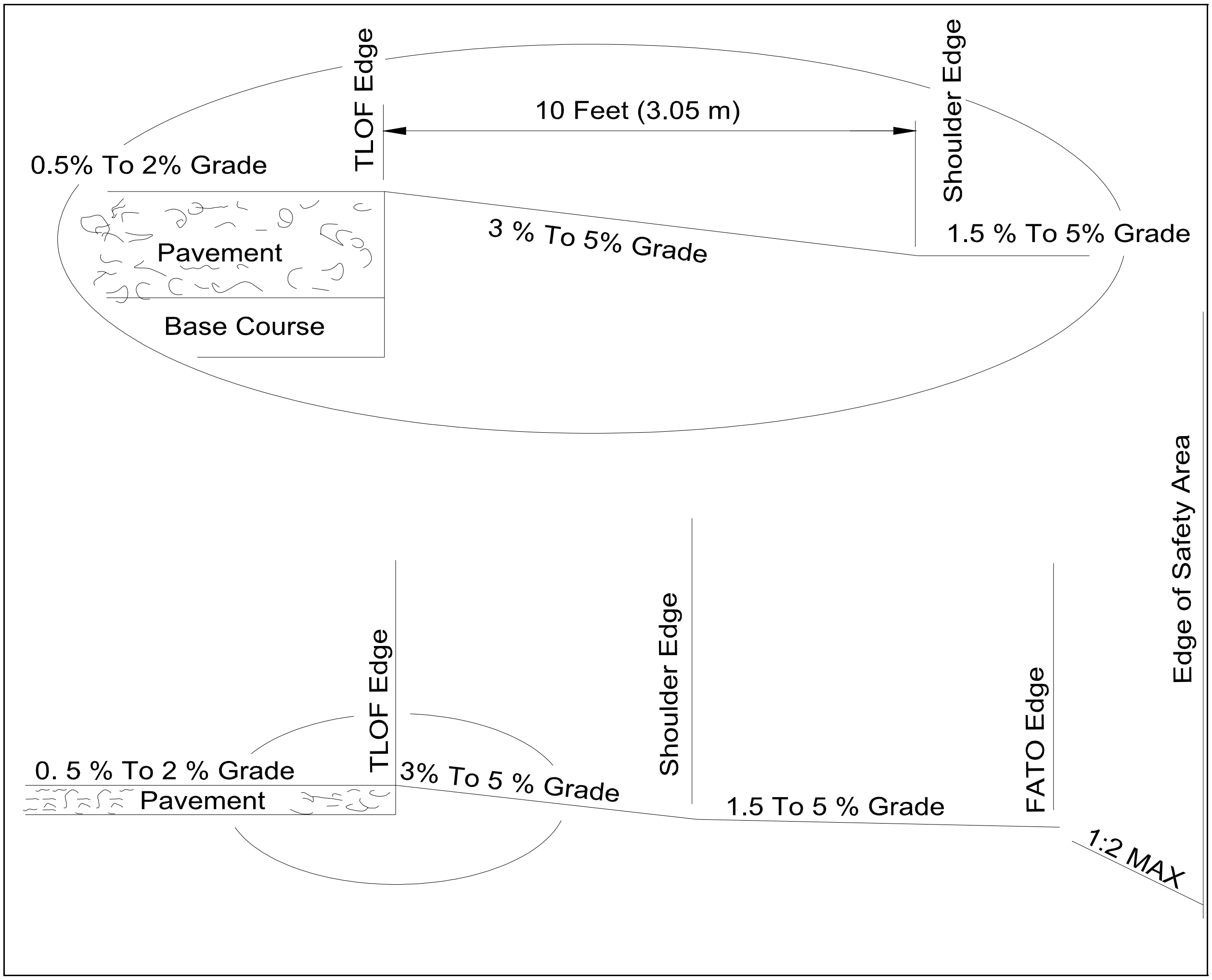
b. Stabilizing Soils. Different methods of soil stabilization may be used to meet different site requirements. Helicopter weight, ground support vehicle weight, operational frequency, soil analysis, and climatic conditions should be considered in selecting the method(s) and extent of surface stabilization.

(1) Turf. A well-drained and well-established turf that presents a smooth, dense surface is generally considered to be the most cost-effective surface stabilization available. In some combinations of climates and weather conditions, turf surfaces are capable of supporting the weight of many of the smaller helicopters for low frequency use by private and corporate operators during much of the year. Turf surfaces also provide reasonable protection against wind, rotor wash, or water erosion. Climatic and soil conditions dictate the appropriate grass species to use at the site.

(2) Aggregate Turf. Heliports located on soils that have poor load-carrying capabilities when wet may be able to overcome this deficiency by mixing selected granular materials into the upper 12 inches (30 cm) of the soil. Suitable granular materials for this purpose are crushed stone, pit-run gravel, coarse sand, or oyster shells. The ratio of aggregate to soil should be sufficient to improve the stability of the soil yet retain the soil's ability to support grass. For additional guidance, see Item 217 of AC 150/5370-10, *Standards for Specifying Construction of Airports*.

c. Formed Masonry Shapes. Precast masonry shapes vary in size and shape-from a brick paver to an open block. Pavers can be laid on a prepared bed to present a solid surface. Precast blocks can be embedded in the soil with grass growing in the natural openings. Architectural catalogs identify different masonry shapes that are commercially available for this purpose.

d. Pierced Metal Panels. Perforated metal panels that allow grass to grow through the openings can be laid on the ground to provide a hard surface for helicopter operations. Engineering catalogs identify commercially available panels.



NOTE: FATO non-loading bearing surfaces should be stabilized.

Figure 8-1. Heliport Grades and Rapid Runoff Shoulder: GRADIENTS AND PAVEMENT

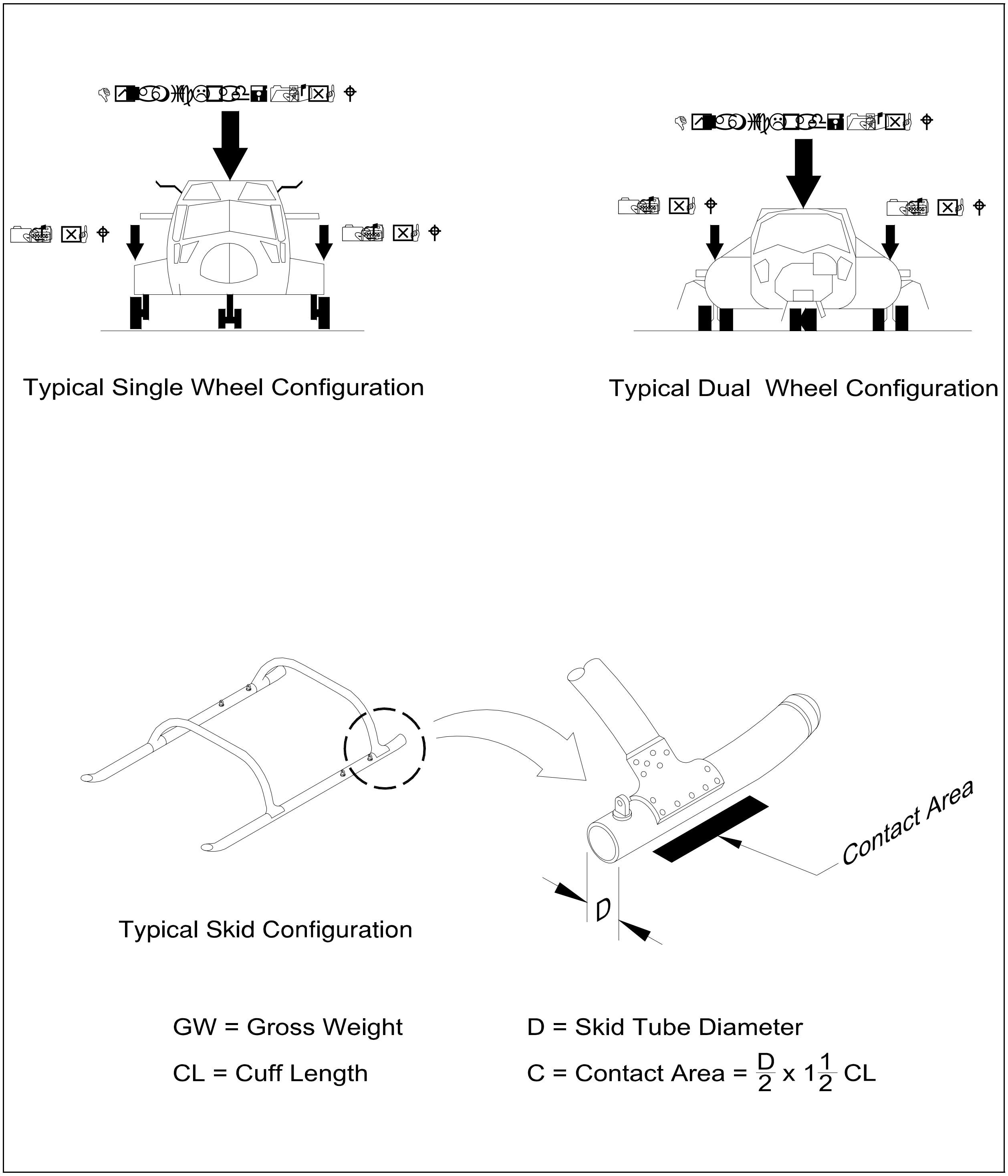


Figure 8-2. Helicopter Landing Gear Loading:
GRADIENTS AND PAVEMENT