

Hospital Heliports

Safety, Regulatory and Liability Issues
Hospitals Must Know & Consider

Provided by the
National EMS Pilots Association



Disclaimer

- This presentation is intended to provide architects, contractors, hospital administrators, hospital staff, risk managers, safety officers, insurance underwriters, air medical providers and aviators with important information and guidelines that must be considered when having a heliport which will be utilized for transporting patients either to or from a hospital by helicopter. This presentation should not be considered or used as a substitute for actual Federal Aviation Administration (FAA) and or Department of Transportation (DOT) regulations in regards to heliport design, construction or aviation operations. This presentation should be used for education and information only and when regulatory issues or questions arise regarding heliports or aviation operations consult your local FAA Flight Standards District Office (FSDO) and State DOT Aeronautics Department representatives. Due to the constant changing and updating of Federal, State & Local regulations and Advisory Circulars referenced within this presentation you should always check the FAA's online data base to insure that you are using the most up to date and current regulations and advisory circulars available. If you need assistance in finding information or have questions regarding hospital heliport construction, air medical helicopter operations, safety standards, emergency action plans or transport criteria as they pertain to the air medical industry please feel free to contact NEMSPA and we will be more than happy to help you find the answers to your questions.

Questions

- All questions or comments in regards to this presentation and the information presented here in should be referred to the author;

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Objectives

- Learn what agencies are involved
- Know what regulations apply
- Identify what forms must be filed
- Identify best practices
- Understand location importance
- Understand basic design & safety principles
- Recognize & address liability issues
- Understand training and education needs

Best Practices

- To help identify some of the best practices in the industry, you will see the symbol below on specific slides. These are not necessarily regulatory requirements but rather practices that have been proven to improve safety and enhance operations.



Agencies, Organizations and Individuals that need to be Involved and Consulted

- **Federal Aviation Administration (FAA)**
- **Department Of Transportation (DOT)**
- **National Fire Protection Association (NFPA)**
- **Occupational Safety and Health Association (OSHA)**
- **State & Local Fire Marshalls**
- **State Air Medical Associations**
- **Pilots from your Local Air Medical Providers**
- **Insurance Underwriters**
- **Risk Management & Safety Departments**
- **Local Zoning Commissions**
- **City Councils**
- **Neighborhood Associations**

Who To Contact

- Any time a heliport is to be constructed, updated, changed, moved or closed you should always advise your State DOT and Regional FAA offices as soon as possible and insure that the appropriate paperwork is completed and filed.
- State Department of Transportation
 - Aeronautics Section
<http://www.fhwa.dot.gov/webstate.htm>
 - FAA Flight Standards District Office
In your area go to:
http://www.faa.gov/about/office_org/field_offices/fsdo/



Hire a Consultant!

Best
Practices

- All too often organizations contract with architectural and building firms that have never built or designed a heliport. Due to the many special idiosyncrasies, specific regulations and the multiple agencies involved this approach has resulted in significant delays, unsafe conditions and extremely high cost overruns.
- When going out for contract to design and build a heliport, project managers should always insist that whomever is awarded the contract hire a qualified heliport consultant for the project.

Permanent Sites

The Federal Aviation Administration (FAA), Department Of Transportation (DOT), as well as many insurance underwriters and industry safety experts highly recommend that all hospitals construct a Permanent, Licensed heliport on their property to enhance safety, reduce liability and expedite transport.

**Regulated by the
FAA & DOT**

Heliport Design Guide

AC 150/5390-2B



Federal Aviation Regulations 157

- **FAR 157.1 Applicability**

- C) The intermittent use of a site that is not an established airport which is used or intend to be used for less than one year and at which flight operations will be conducted only under VFR. For the purposes of this part, intermittent use of a site means:

- 1) The site is used or is intended to be used for no more than 3 days in any one week; and
 - 2) No more than 10 operations will be conducted in any one day at that site.
 - This indicates that any site used for more than one year, and or more than three days a week, and or with more than 10 operations (landings + takeoffs) per any given day for anything other than VFR flight, can not be considered intermittent and therefore should be licensed. Check with your State DOT Aeronautics Dept. for the requirements in your area.

Before You Begin

- **Federal Aviation Regulation: FAR Part 157**
 - Requires notification to the appropriate FAA Airport District/Field Office or Regional Office at least **90 days before** construction, alteration, deactivation, or the date of the proposed change in use.
 - FAA Notification includes
 1. A completed [FAA Form 7480-1](#)
 2. A heliport layout diagram
 3. A heliport location map
 - Penalty for failure to provide notice; persons who fail to give notice are subject to civil penalty under 49 CFR 46301.
 - **References:**
 - **AC 150/5390-2B Section 104**
 - **FAR Part 157**

Completion

Best
Practices

- **NOTICE OF COMPLETION**

- Within 15 days after completion of any airport project covered by this part, the proponent of such project shall notify the FAA Airport District Office or Regional Office by submission of FAA Form 5010-5 or by letter. A copy of FAA Form 5010-5 will be provided with the FAA determination. Insure that FAA Form 5010-5 has been signed by the hospital administration prior to submission.
- * *By completing and submitting this form to the FAA you are allowing your information to be disseminated to the public and to be included in aviation GPS data bases utilized for navigation.*

– **Reference: FAR Part 157.9**

Definitions

- **Heliport**. The area of land, water or a structure used or intended to be used for the landing and takeoff of helicopters, together with appurtenant buildings and facilities.
 - **Hospital Heliport**. A heliport limited to serving helicopters engaged in air ambulance, or other hospital related functions.
 - **Medical Emergency Site**. An unprepared site at or near the scene of an accident or similar medial emergency on which a helicopter may land to pick up a patient in order to provide emergency medical transport.
 - **Note: A designated helicopter landing area located at a hospital or medical facility is a heliport and not a medical emergency site.*
- **References: AC 150/5390-2B chapter 1**

Decision #1

ROOFTOP



OR

GROUND BASED



Some Pros and Cons

Rooftop Heliport

PROS	CONS
*SAFETY	*SAFETY
More Privacy	Higher Complexity
No Foot or Vehicle Traffic	Longer Construction Time
Better Security	Higher Cost
Less Obstructions	More Difficult to Install Fuel

Ground Heliport

PROS	CONS
*SAFETY	*SAFETY
Simpler Design	More Obstructions
Shorter Construction Time	More Foot & Vehicle Traffic
Lower Cost	Less Private
Easier to install Fuel	Harder to Secure

*How safety is ultimately influenced will be predicated on the decisions an institution makes during planning and construction and the safety protocols they set in place for future operations.

Heliport Location

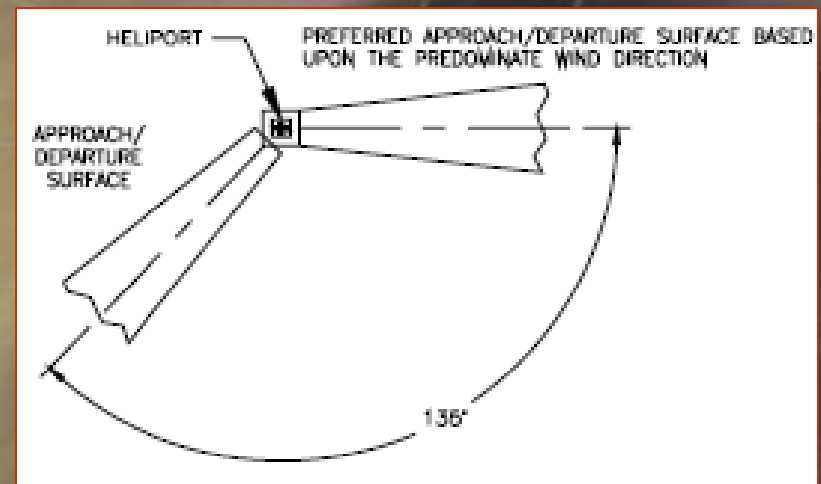
- Where a heliport is located in relationship to the hospital is critical to safe & effective operations.
 - At least two unobstructed flight paths into and out of the designated landing area are critical for safe operations.
 - Insure maximum clearance for helicopter operations. Do not locate the heliport too close to the hospital or other structures.
 - Whenever possible do not locate a heliport too far from the hospital. Long walking distances or distances requiring ambulance transport may negatively affect patient outcomes.
 - Do not allow a heliport to be surrounded by vertical hazards such as buildings, power lines, trees or parking garages.
 - Dependent on urban environment or future construction a rooftop heliport may be the better option for safe operations.

References: AC 150/5390-2B chapter 4, sections 401, 402, 403, table 4-1, Figure 4-1 & Figure 4-2

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 path.
- The preferred flight approach/departure path should, to the extent feasible, be aligned with the predominate prevailing winds.
- 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.

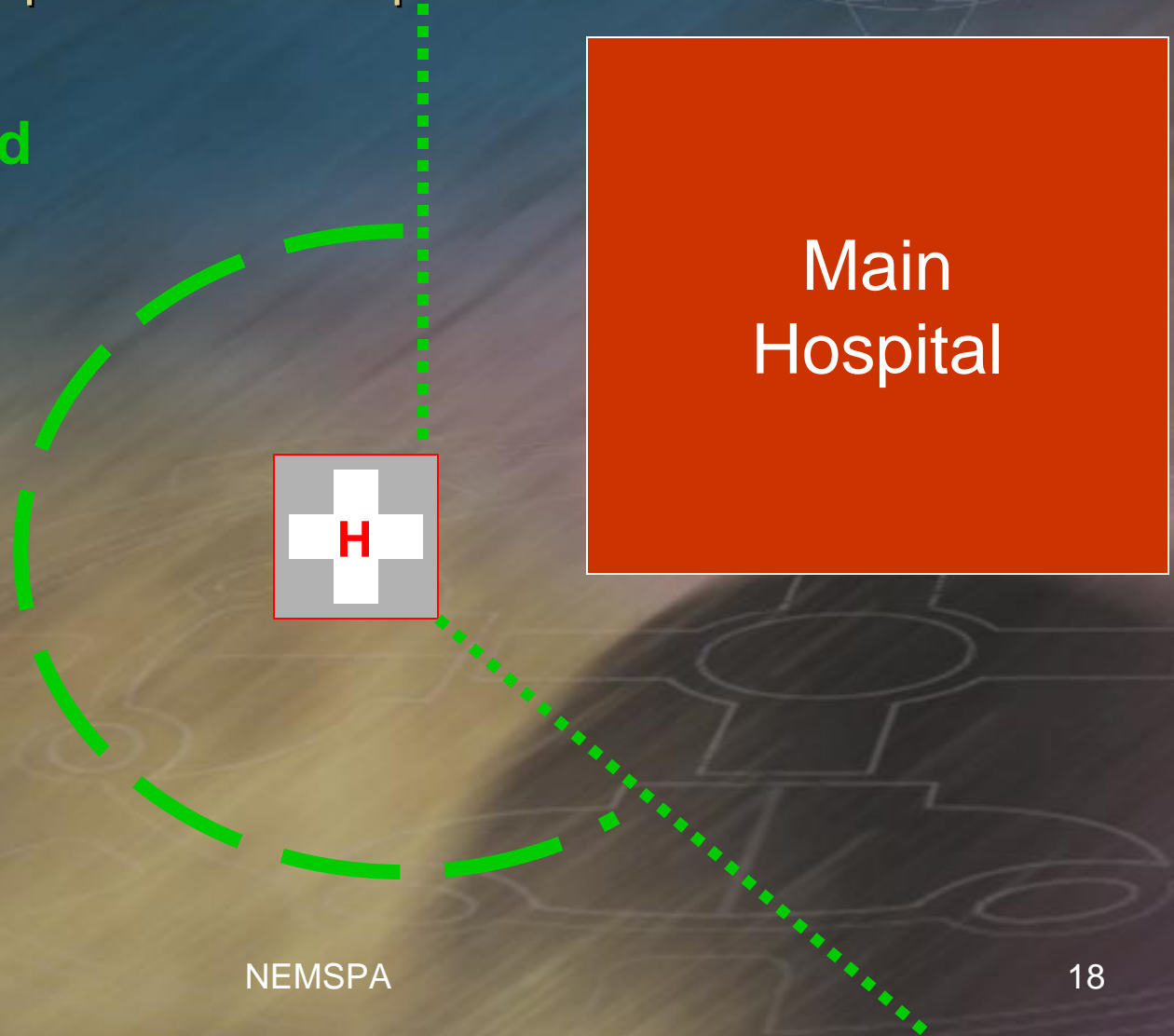
– **References:**
AC 150/5390-2B chapter 4
section 404a & figure 4-6



Planning for Growth

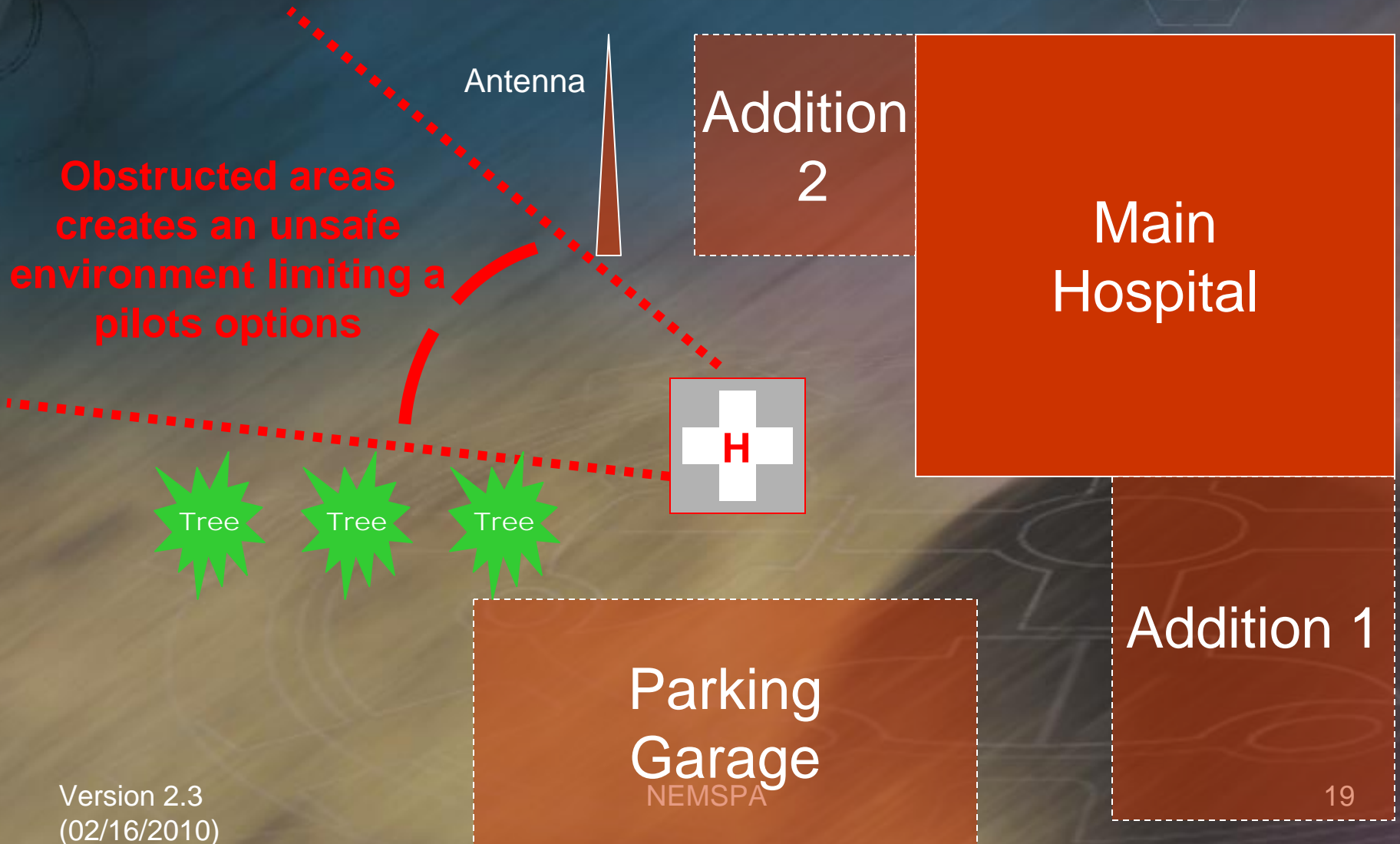
Maximized Approach / Departure Path Fan

Large unobstructed areas create a much safer environment providing pilots multiple options



Planning for Growth

Reduced Approach / Departure Path Fan



Heliport Location

- **VENTILATION SYSTEMS**

- Insure that you identify the location of all heating, ventilation and air conditioning (HVAC) systems prior to construction. Avoid locating a heliport near these. Exhaust fumes from a helicopter's engines can cause serious problems for a hospital and their staff if ingested into the hospital's ventilation system.
- Pay particular attention to which way the prevailing winds will carry any exhaust fumes from the proposed heliport site.



Heliport Location

Best
Practices

- **Exhaust Fumes**

- **Rotor-Wash**; a column of accelerated downward moving air, that all helicopters produce at slow airspeeds during the approach and departure phase of flight can carry helicopter exhaust fumes several hundred feet below a rooftop heliport. This coupled with the influence that the architecture of a building may have on the air flow patterns must be closely scrutinized and studied when evaluating the potential impact a heliport may have on any hospital or any surrounding buildings and their fresh air intake system.

Some Definitions

- **Final Approach and Takeoff Area (FATO)**: A defined area over which the final phase of the approach to a hover, or a landing is completed and from which the takeoff is initiated.
- **Safety Area**: A defined area on a heliport surrounding the FATO intended to reduce the risk of damage to helicopters accidentally diverging from the FATO. This area should be free of objects, other than those frangible mounted objects required for air navigation purposes.
- **Touchdown and Lift-off Area (TLOF)**: A load bearing, generally paved area, normally centered in the FATO, on which the helicopter lands or takes off.

– **References: AC 150/5390-2B chapter 1**

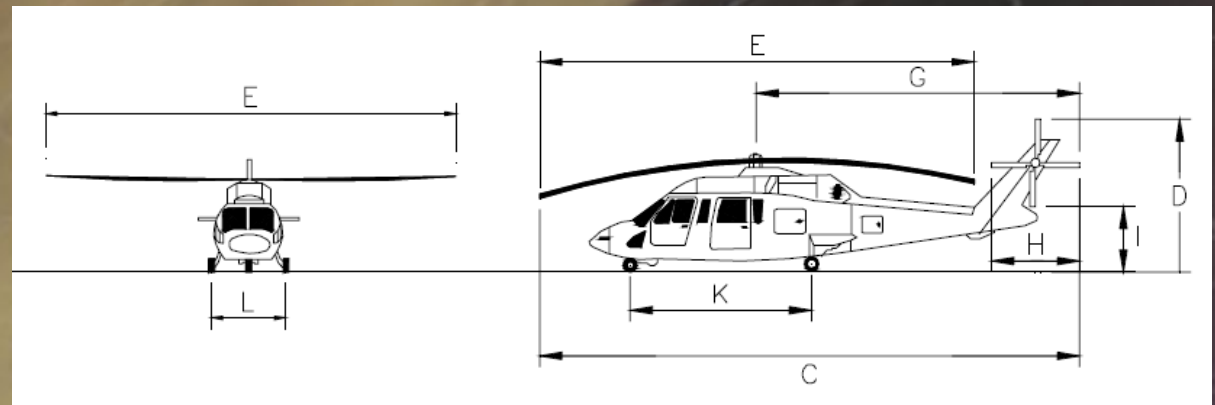
Some Definitions

- **Heliport**: The area of land, water or a structure used or intended to be used for the landing and takeoff of helicopters, together with appurtenant buildings and facilities.
- **Hazard to Air Navigation**: Any object having a substantial adverse effect upon the safe and efficient use of the navigable airspace by aircraft, upon the operation of air navigation facilities, or upon existing or planned airport/heliport capacity.
 - NOTE: *Obstructions to air navigation are presumed to be hazards to air navigation until an FAA study determines otherwise.*
 - **References: AC 150/5390-2B chapter 1**

Information Needed

- There are three pieces of information that will need to be ascertained from the air medical service providers that will utilize any given heliport before the design phase can be initiated.
 1. Max Gross Weight of the heaviest helicopter
 2. Rotor Diameter of the largest helicopter
 3. Longest overall length of the largest helicopter

Refer to Appendix-1
AC 150/5390-2B



How big to make the pad?

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

- **b. TLOF Size.** The minimum TLOF dimension (length, width, or diameter) should be 1.0 rotor diameter (RD) of the design helicopter.

- * **Hospital heliports should never have a TLOF less than 40' X 40' or (12 meters).**

Reference: AC 150/5390-2B Chapter 4, section 401b

**MINIMUM
40' X 40'**

TLOF Size

Best Practices

- Although 40' X 40' is the absolute minimum for a hospital heliport, it should be noted that due to different helicopter designs & sizes, specifically for loading and unloading patients a TLOF that is at least 45' to 50' in size is much more conducive to helicopter and patient safety.

–Note: considerations must still be given for larger helicopters and multiple landing areas. 50' X 50' may be too small for some larger helicopter models and is definitely too small for multiple helicopter operations.

PREFERRED
50' X 50'

Hospital Heliport Layout

• Ref: AC 150/5390-2B

Figure 4-2

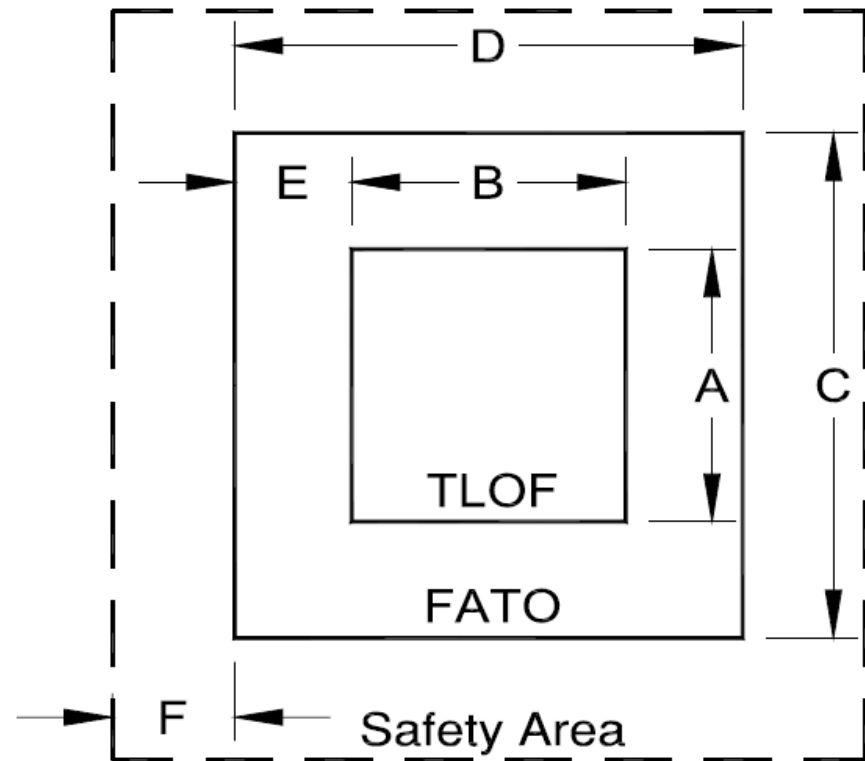
– TLOF/FATO/Safety Area Relationships and Minimum Dimensions: HOSPITAL

– **Example:**

S-76 Helicopter

- Rotor Diameter = 44 ft
- Overall Length = 52.5 ft
- Max Gross Wt = 11,700

- A & B = 44 ft
- C & D = 81 ft
- E = 17.4 ft
- F – see fig. 4-1



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

Hospital Helicopter Safety Area

- Reference: AC 150/5390 2B

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

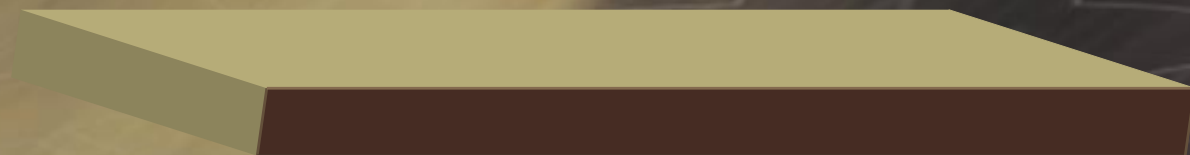
** Also applies when the FATO is NOT marked. The FATO should not be marked if (a) the FATO (or part of the FATO) is a non-load bearing surface and (b) the TLOF is elevated above the level of a surrounding load bearing area.

Ground Based Heliport Thickness

- For ground based heliports; 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). Larger helicopters will require a thicker concrete TLOF. Consult the appropriate advisory circular for additional information.
 - **NOTE: DO NOT USE** asphalt for the TLOF, helicopters can sink into asphalt during hot weather causing a serious safety hazard.

Reference : AC 150/5390-2b Chapter 8, 807 a

6" {



Heliport Surface Design

Best Practices

- Insure that when applying paint that the surface is properly prepared for a non-slip surface.
- When re-applying paint add silica sand to the paint to maintain the integrity of the non-slip surface.
- The addition of reflective glass beads into limited portions of the painted heliport surface, specifically boundary markings, helps to identify these areas more clearly at night. Include silica sand to insure a non-slip surface is maintained at these locations.
- Do not cover the entire heliport in reflective material, this can cause the helipad to actually blind the pilot under the right conditions.



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NEMSPA



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Rooftop Heliports

- **National Fire Protection Association**

- ***NFPA 418 Standards for Heliports***

- 5.4.1 “The rooftop landing pad surface shall be constructed of approved noncombustible, nonporous materials.”
 - 5.4.2 “The contiguous building roof covering within 50 ft (15.2m) of the landing pad edge shall have a Class A rating.”
 - (UL 790 Class A roof coverings are effective against severe fire test exposures. Under such exposures, roof coverings of this class afford a high degree of fire protection to the roof deck, do not slip from position, and are not expected to produce flying brands.)

Rooftop Heliports

- **National Fire Protection Association**
NFPA 418 Standards for Heliports
 - Access and Exits

Drainage

– Ground-based

- The heliport shall be pitched or sloped so that drainage flows away from access points and passenger holding areas.

– Rooftop

- The rooftop landing pad shall be pitched to provide drainage at a slope of 0.5 percent to 2 percent.
- Drains on and surrounding the heliport should restrict the spread of fuel in order to reduce fire and explosion hazards from fuel spillage. A fuel/water separating system is a very important safety addition to all rooftop heliport drainage systems.

Reference:

- **AC 150/5390-2B section 801 b.**
- **NFPA 418 4.7**

Wind Indicator

- A windsock that indicates the direction and magnitude of the wind is highly recommended and an important safety feature for all heliports.

- Minimum of 6-8 feet in length .
- Lighted for night operations.
- Not too close to the heliport.
- Ground based, elevated at least 10-15 feet above ground level and not blocked by any structures or vegetation.
- Rooftop based, not blocked by any architectural structures and elevated at least 10 -15 feet above the surrounding structures.
- Placement to reflect accurate wind speed and direction.

- **Reference:**

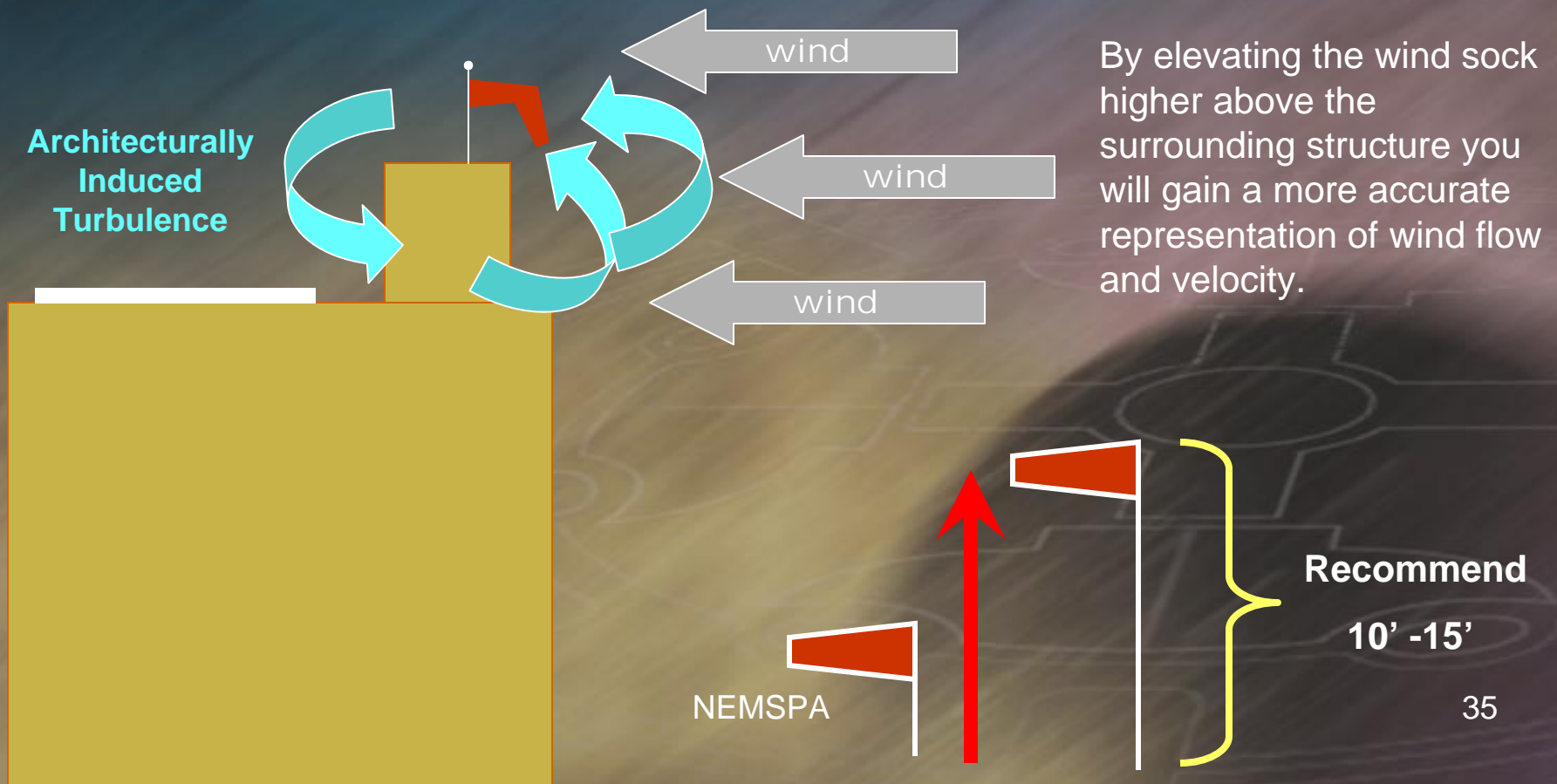
- **AC 150/5345-27d, Specifications for wind cone assemblies**

- **AC 150/5390-2B section 406, Heliport Design Guide**



Wind Indicator Location

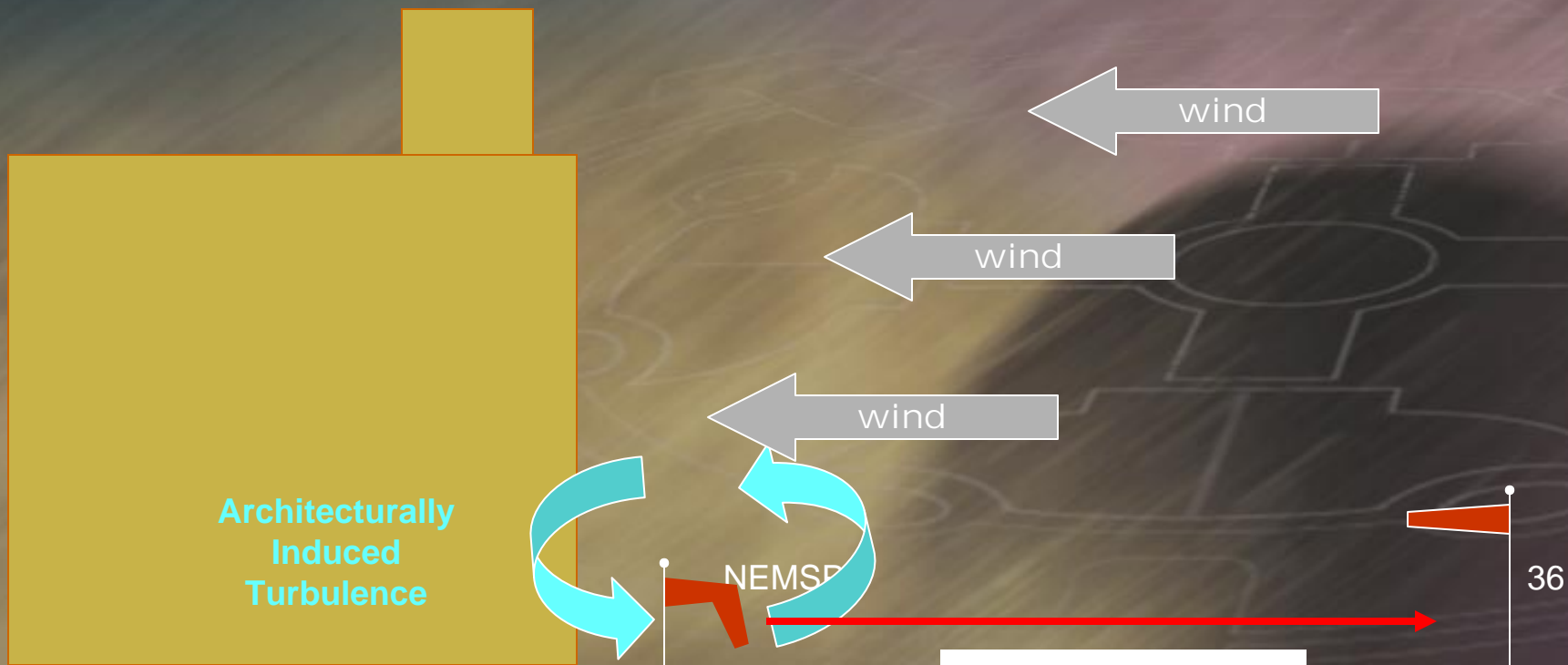
At many locations windsocks are not elevated high enough for accurate indications. Windsocks need to be in free open air to indicate the correct wind direction & velocity.



By elevating the wind sock higher above the surrounding structure you will gain a more accurate representation of wind flow and velocity.

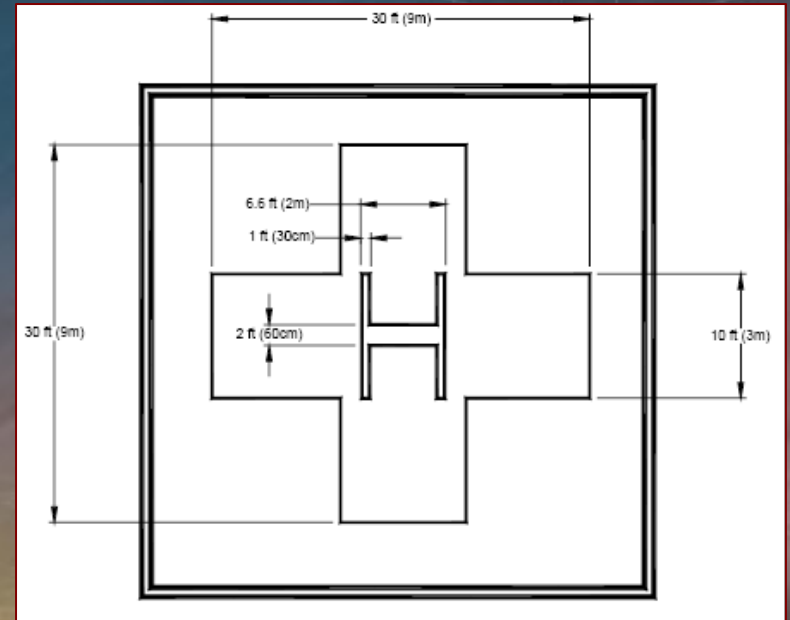
Wind Indicator Location

Ground based wind sock need to be located in an unobstructed location. Wind socks located too close to buildings, trees or other structures will give erroneous indications.



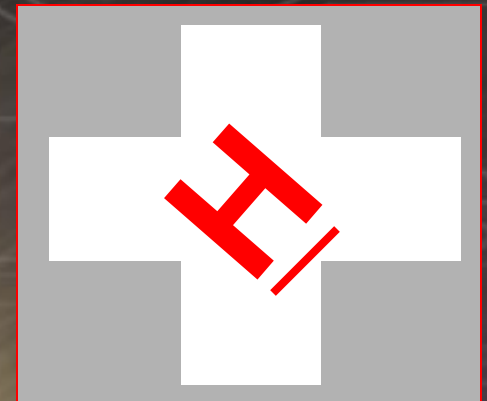
Hospital Heliport Marking

A red capital letter **H** should be located in the center of the **cross** oriented in the preferred direction of takeoff and landing taking into account obstacles and prevailing winds. A line under the H can also be utilized to indicate the preferred approach direction.



Reference: AC 150/5390-2b Figure 4-10a

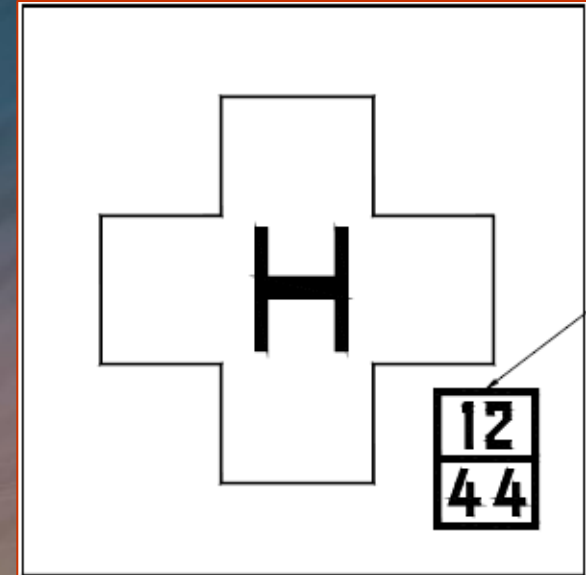
Example: Orientation of the H tells pilots the preferred direction of approach and departure.



Hospital Heliport Markings

- Max Weight

- Is indicated by the upper number and is in thousands of pounds.

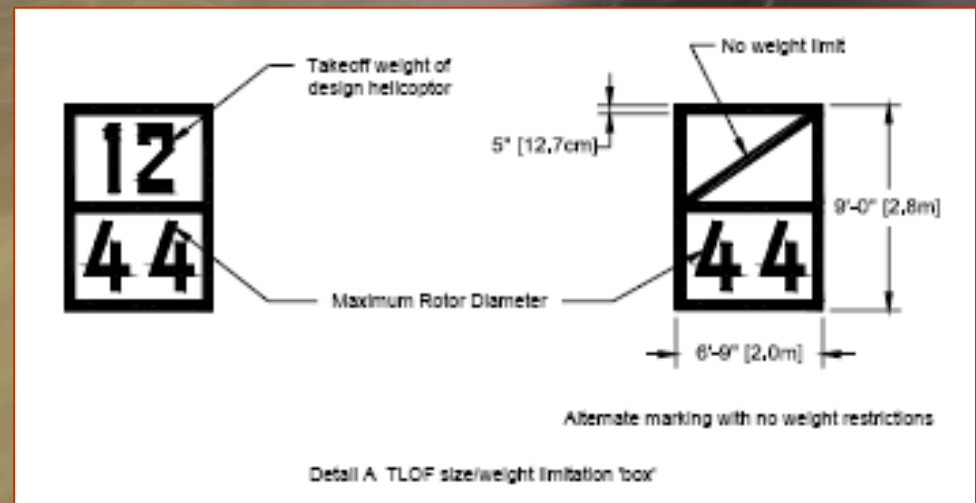


Max Rotor Diameter

- Is indicated by the lower number and is in feet.

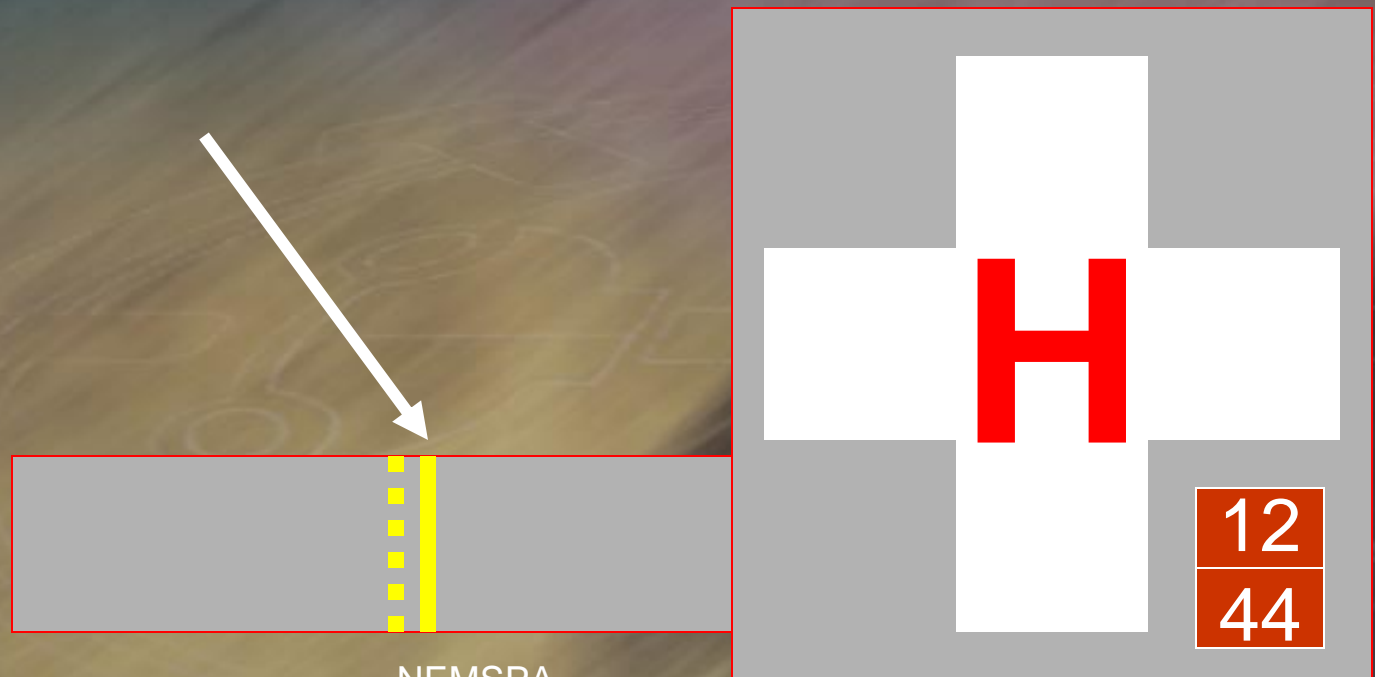
Reference: AC 150/5390-2b

Figure 4-12



Hospital Heliport Markings

- Painting a “Marshalling Line” to indicate the location at the heliport that individuals should not pass without permission is a good safety practices.



Hospital Heliport Markings

- Painting the name of the hospital on the heliport to include a radio frequency for communications or for pilot controlled lighting is another good safety practices.



Closing a Heliport

- If for any reason you need to close a heliport landing area either temporarily or permanently. Placing a large yellow X over the TLOF area is the preferred method and will signal to all pilots not to land at this location.

- **Reference:**

- **AC 150/5390-2B Section 409 e,
and figure 4-11**

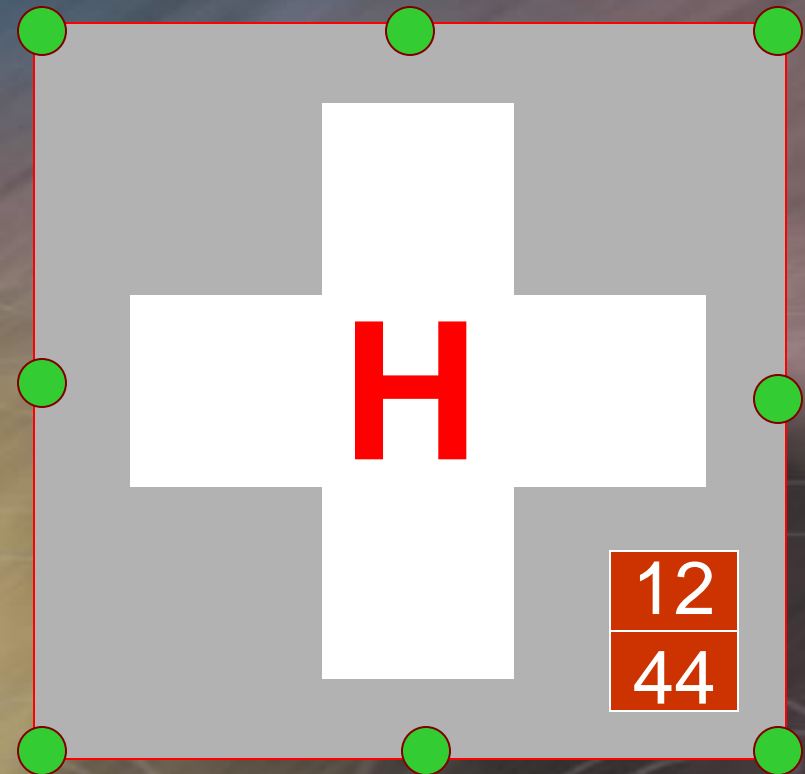


Heliport Lighting

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.

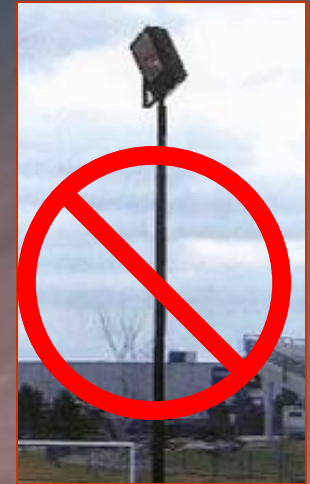
Reference: AC 150/5390-2B

Chapter 4 Section 410a



Heliport Lighting

- Flood lights should never be located high above the heliport, they can blind pilots during night operations, creating very unsafe conditions.
- Flood lights should be installed at pad level and aimed down so as not to interfere with a flight crews night vision.



Hospital Beacons

- When a beacon is provided it should:
 - Be located on the highest point of the hospital.
 - Not be blocked by any portions of the surrounding architecture.
 - Be on during the hours of darkness.
 - Flash white/green/yellow for hospital heliports. ● ● ●
 - Be regularly checked on a preventive maintenance schedule.
 - If located in a neighborhood sensitive area it may be prudent to use pilot controlled lighting.

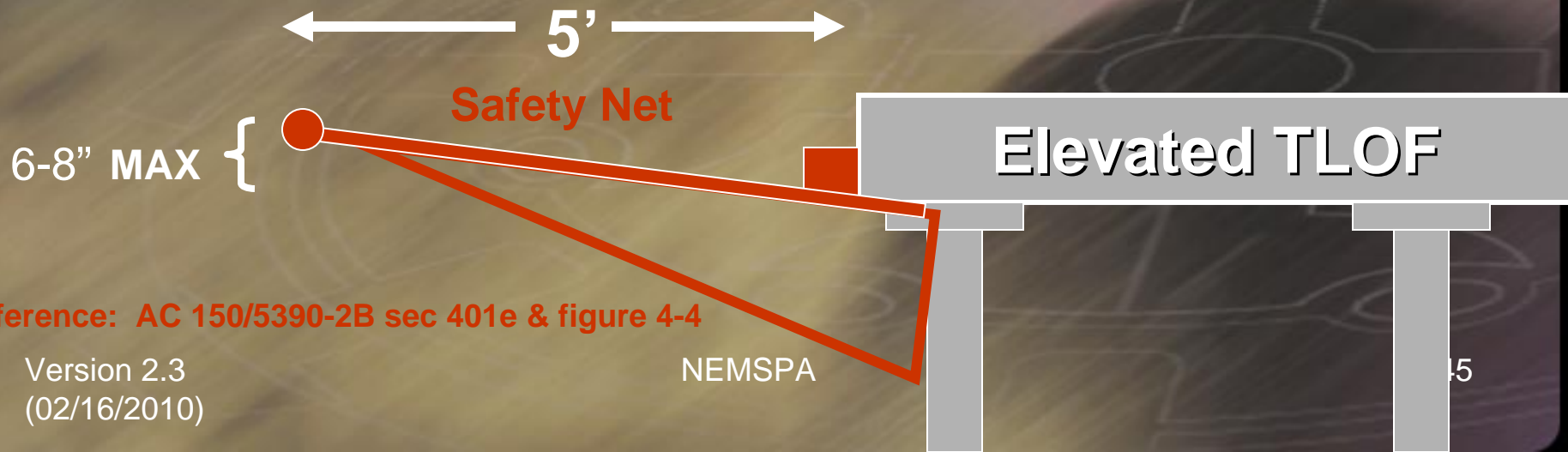
- **Reference:**
**AC 150/5345-12E, Specifications for
Airport and Heliport Beacons.**



Elevated Heliports

• Safety Net

- When the Touchdown and Lift-Off (TLOF) area is on a platform elevated more than 30 inches (76 cm) above its surroundings, a safety net, not less than 5 feet wide from the edge of the pad (1.5 m), should be provided around the entire pad.
- **The safety net should:**
 - Have a load carrying capability of 25 lb/ft² (122 kg/m²) or greater.
 - Be anchored and secured on all sides.
 - Be made of materials that resist deterioration from environmental factors.
 - Maintain its original shape and resist deformity when weight is applied to the surface.
 - Be fire resistant.



•Reference: AC 150/5390-2B sec 401e & figure 4-4

Safety Net

Best Practices

- **GOOD**



- **BAD**



The safety net should not be installed more than 6 - 8 inches below the perimeter of the TLOF, this will help prevent serious injury from falls. The safety net supporting structure should be attached below the net area to help reduce the possibility of injury.

Elevated Heliports

- Access to Elevated TLOFs.
 - The Occupational Safety and Health Administration (OSHA) requires two separate access points for an elevated structure such as an elevated TLOF.
 - If stairs are used, they should be built in compliance with regulation 29 CFR 1910.24.
 - When ramps are required, they should be built in compliance with Appendix A of 49 CFR Part 37, Section 4.8 and state and local requirements.
 - The ramp surface should provide a slip-resistant surface.
 - The slope of the ramp should be no steeper than 12:1 (12 units horizontal in 1 unit vertical).
 - The width of the ramp should not be less than 4 feet (1.2 m) wide.
 - All turn radiuses should accommodate the specific type of gurneys and stretchers that will be utilized.

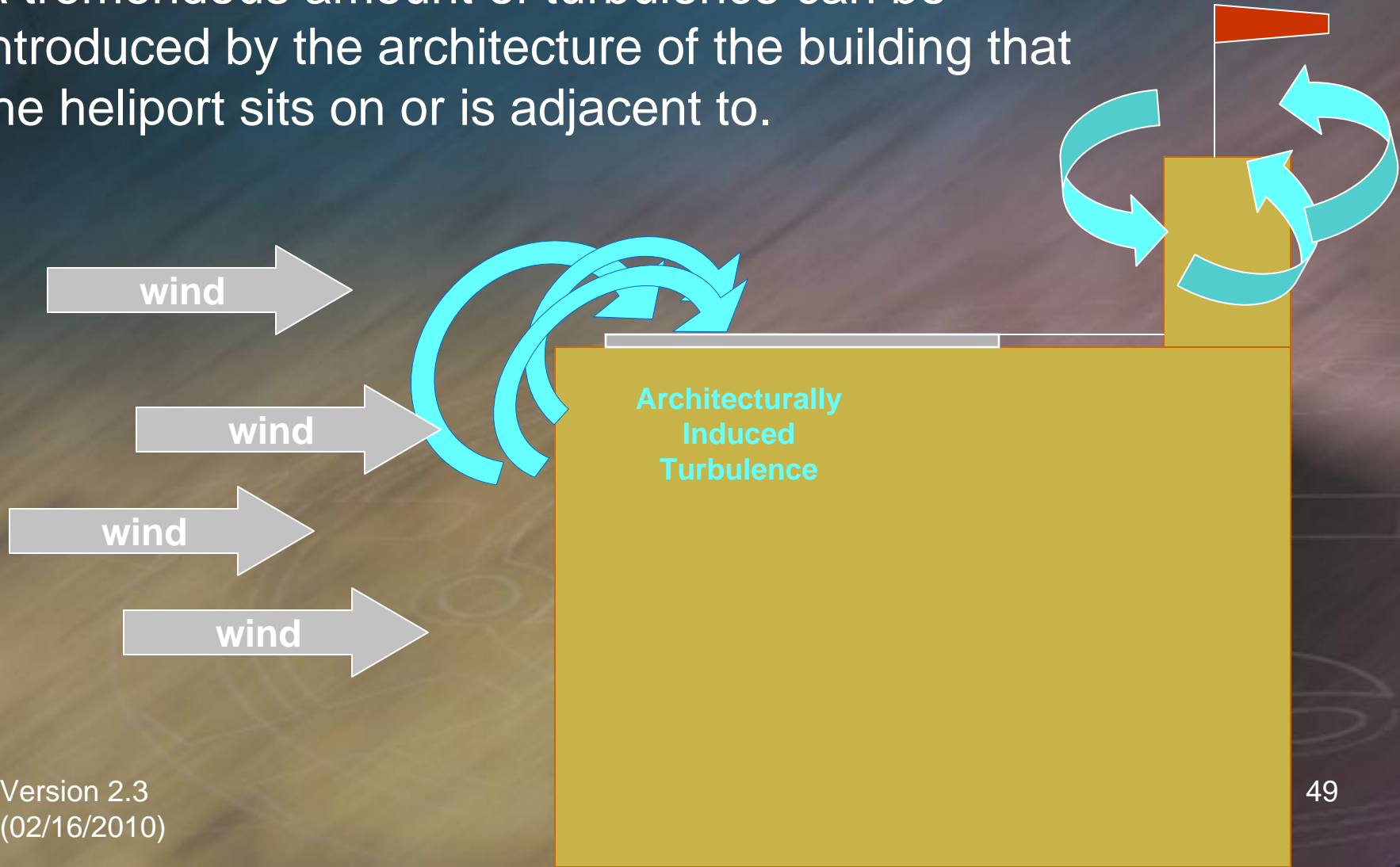
Turbulence

- Air flowing around and over buildings, stands of trees, terrain irregularities, etc. can create turbulence that can affect safe helicopter operations.
 - **Ground-Level:** Helicopters operating from sites immediately adjacent to buildings and other large objects are susceptible to air turbulence caused by such features. Therefore, it may be necessary to locate the TLOF away from such objects in order to minimize air turbulence in the vicinity of the FATO and the approach/ departure paths.
 - **Elevated Heliports:** Elevating a heliport 6 feet (1.8 m) or more above the level of the roof will help minimize the turbulence caused by air flowing over the roof edge. While elevating the platform helps reduce or eliminate the affect of air turbulence it may require a safety net to be installed.
 - Reference: AC 150/5390-2B sec 412 c (2)**

Turbulence



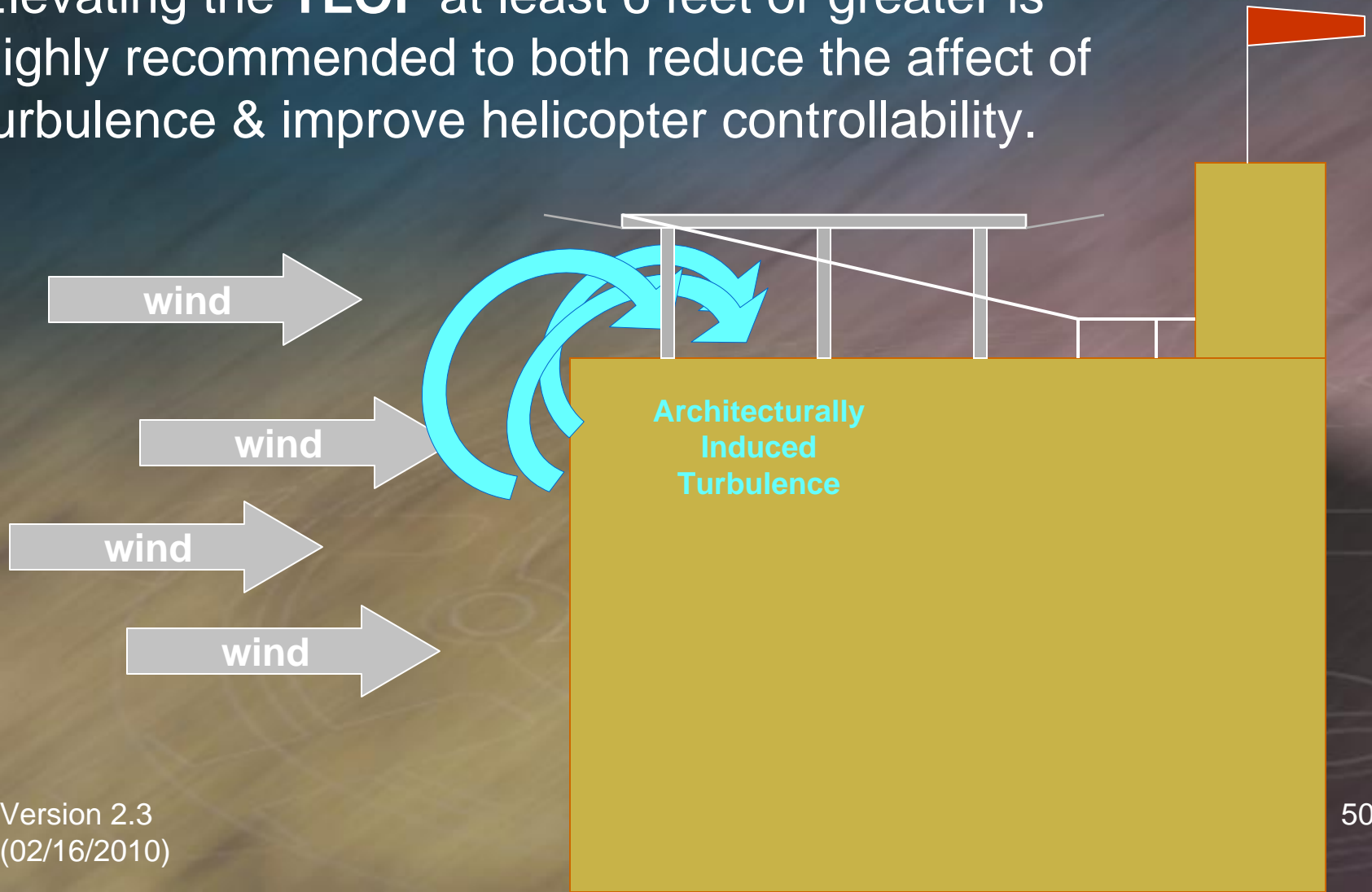
A tremendous amount of turbulence can be introduced by the architecture of the building that the heliport sits on or is adjacent to.



Turbulence



Elevating the **TLOF** at least 6 feet or greater is highly recommended to both reduce the affect of turbulence & improve helicopter controllability.



Turbulence

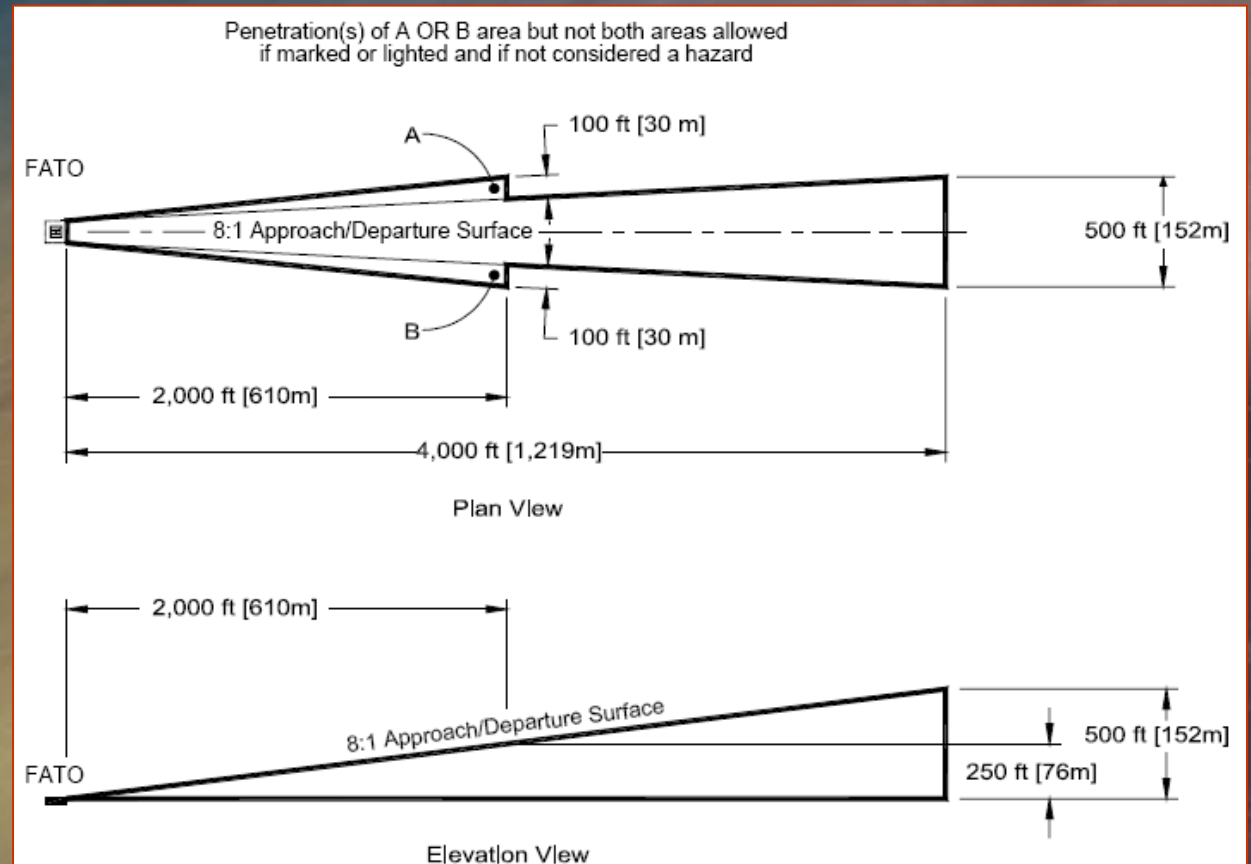
- In those cases where local building codes require rooftop skirting on top of a building, louvered or perforated skirting that allows 50% or greater airflow to occur through the skirting can help reduce turbulence that may be introduced by the skirting surrounding an elevated heliports.



Is It A Hazard

- An **8:1** ratio from the edge of the Final Approach and Takeoff Area (FATO) out to 4,000 feet is what the FAA uses to determine if an object is a potential hazard to the airspace around a helicopter landing area. If a hazard penetrates this area it will either need to be removed or properly marked.

- Reference:**
AC 150/5390-2B
section 404b
figure 4-7



Marking Hazards

- All structures 200' and above or any vertical hazard within 5,000 feet of a heliport such as the hospital, antennas, towers or other structures that are deemed to be a hazard to navigable airspace need to be illuminated with red obstruction lights.
- All power lines & guide wires in the vicinity of the landing zone should either be moved, buried or at the very least marked with the appropriate orange markers.
- The addition of reflective tape to any hazard marker is highly effective for night operations and allows pilots to see and avoid hazards.

**Reference: AC 150/5390-2B section 404, 411 & figure 4-7
AC 70/7460-1K Obstruction Marking and Lighting**



FAA & Navigable Airspace

- **Obstruction Evaluation / Airport Airspace Analysis (OE/AAA)**
- If your organization is planning to sponsor any construction or alterations which may affect navigable airspace, you must file a Notice of Proposed Construction or Alteration ([Form 7460-1](#)) with the FAA.
 - Any construction or alteration exceeding 200 ft above ground level.
 - within 5,000 ft of a heliport which exceeds a 25:1 surface.
- FAA web site for Obstruction Evaluation and Airport Airspace Analysis
 - <https://oeaaa.faa.gov/oeaaa/external/portal.jsp>

Cranes

- Flags should always be placed on top of cranes in the vicinity of heliports for daylight operations.
- The top of all construction cranes should be lighted during the hours of darkness.
- If possible cranes should be lowered at night if not in use.
- Always notify helicopter programs in your area when you have cranes or construction sites in the vicinity of a heliport.

*** Many tower cranes are designed to weathervane when not in use and may require the closing of a heliport until removed.**



Cranes

Best
Practices

- **Proactive Safety Steps**

- Apply reflective tape on the upper most 50 feet of the crane boom.
- Paint the upper most 30 feet of the crane boom white and add reflective glass beads to the paint.
- Insure all obstruction lighting is visible from altitude as well as the ground.
- For cranes in close proximity to heliports give the crane operator a radio to communicate with inbound and departing helicopters.
- Provide alternate landing areas and close heliports when necessary.



NEMSPA



Trees

- **DO NOT** plant trees near the heliport landing area. Over time they will grow and create an unsafe situation. This may require the heliport to be closed until the trees can be removed.
 - Utilizing the 8:1 ratio for hazards when considering whether a tree is or will become a hazard to navigation.
 - A 10 foot tree would be considered a hazard out to 80'
 - A 30 foot tree would be considered a hazard out to 240'
 - A 60 foot tree would be considered a hazard out to 480'



Fences

Best
Practices

- A fence installed as a perimeter for a helicopter landing area is a potential hazard to flight operations.
- To help keep people away from the landing zone and maintain safety, a natural low lying vegetative barrier of plant material such as boxwood, holly or other evergreen type shrub is highly recommended.



Fences

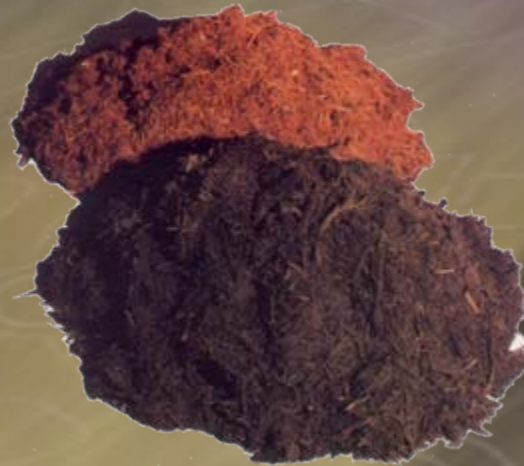
- In those situations where due to the location of the heliport a fence is required to insure a higher level of security and safety one alternative is to elevate the TLOF above the surrounding fenced in area. This will insure that the tail rotor and landing gear remain above the obstruction.



Landscaping

Best Practices

- Decorative bark, woodchips and small stone should never be used around the perimeter of a heliport. The helicopter's rotor wash can cause these items to become dangerous projectiles and the wood material is a fire hazard.

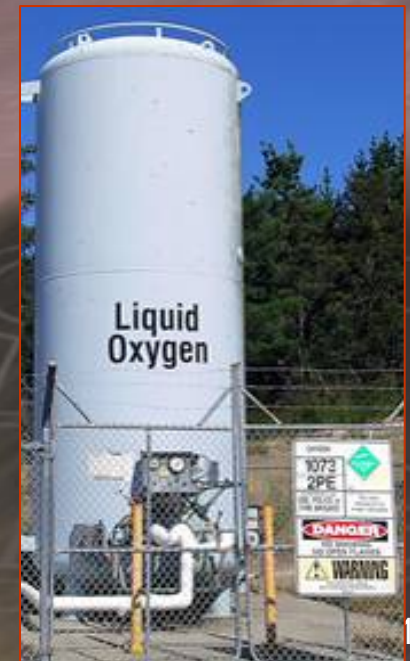


Hazards

Best Practices

- **DO NOT** locate a helicopter landing area next to flammable liquid storage tanks, compressed gas storage tanks, and or liquefied gas storage tanks. You must maintain a lateral distance of no less than 50 feet from the Final Approach & Takeoff Area (FATO), farther is recommended.

Reference: NFPA 418 3.2.3



National Fire Protection Codes

• Pertinent NFPA Standards

- **NFPA 10** Portable Fire Extinguishers
- **NFPA 403** Aircraft Rescue Services
- **NFPA 407** Aircraft Fuel Servicing
- **NFPA 409** Aircraft Hangars
- **NFPA 410** Aircraft Maintenance
- **NFPA 412** Aircraft Rescue and Fire-Fighting Foam Equipment
- **NFPA 418** Standards for Heliports
- **NFPA 422** Aircraft Accident Response Guide



<http://www.nfpa.org>

* It should be noted that unlike the FAA and DOT advisory circulars NFPA codes are generally mandatory in most states.

Fire Extinguishers

Best Practices

- For safety purposes all heliports should be equipped with at least one fire extinguisher of the appropriate size and type.
- A fire hose cabinet or the appropriate extinguisher should be provided at each access gate/door and each fueling location.
- In cases where there is a refueling system involved a foam system may be the better option.
- Fire extinguishers should be installed so that they are accessible under all conditions.



Magnetic Resonance Imagers

- Due to the impact that an MRI has on a helicopter's instrumentation a warning sign alerting pilots to the presence of a nearby MRI is highly recommended.

Reference:
DOT/FAA/RD-92/15

Potential Hazards of Magnetic Resonance
Imagers to Emergency Medical Service
Helicopter Operations



Other Magnetic Hazards

Best Practices

- An MRI is one of the more obvious hazards, but some that may be overlooked are large motors for elevators or ventilation systems near or under the heliport area.
 - “Steps should be taken to inform pilots of the locations of MRIs and other similar equipment.”
 - Reference: AC 150/5390-2B section 405



Zoning

Best Practices

- To help insure that potential hazards to navigation, such as cell towers, radio towers or additional buildings are not constructed near a heliport. It is highly recommended that the area surrounding the heliport within 5,000 feet be rezoned to limit the height of any new construction.
- For any area surrounding a heliport to be rezoned it must first be appropriately licensed and on file with the FAA and DOT.

Reference:

AC 150/5390-2B; section 413, Zoning and compatible land use.

AC 150/5190-4A: A Model Zoning Ordinance to limit height of objects around airports

Construction Notification

- 14 CFR Part 77, *Objects Affecting Navigable Airspace*
 - Requires persons proposing any construction or alteration described in Section 77.13 (a) to give 30-day notice to the FAA of their intent.
 - Notification of the proposal should be made on FAA Form 7460-1, *Notice of Proposed Construction or Alteration*.
 - This includes any construction or alteration of more than 200 feet (61 m) above ground level (AGL) at its site or any construction or alteration of greater height than an imaginary surface located within 5,000 feet that penetrates a 25:1 sloping surface that extends outward and upward originating at the heliport.

Reference: AC 150/5390-2B Section 109

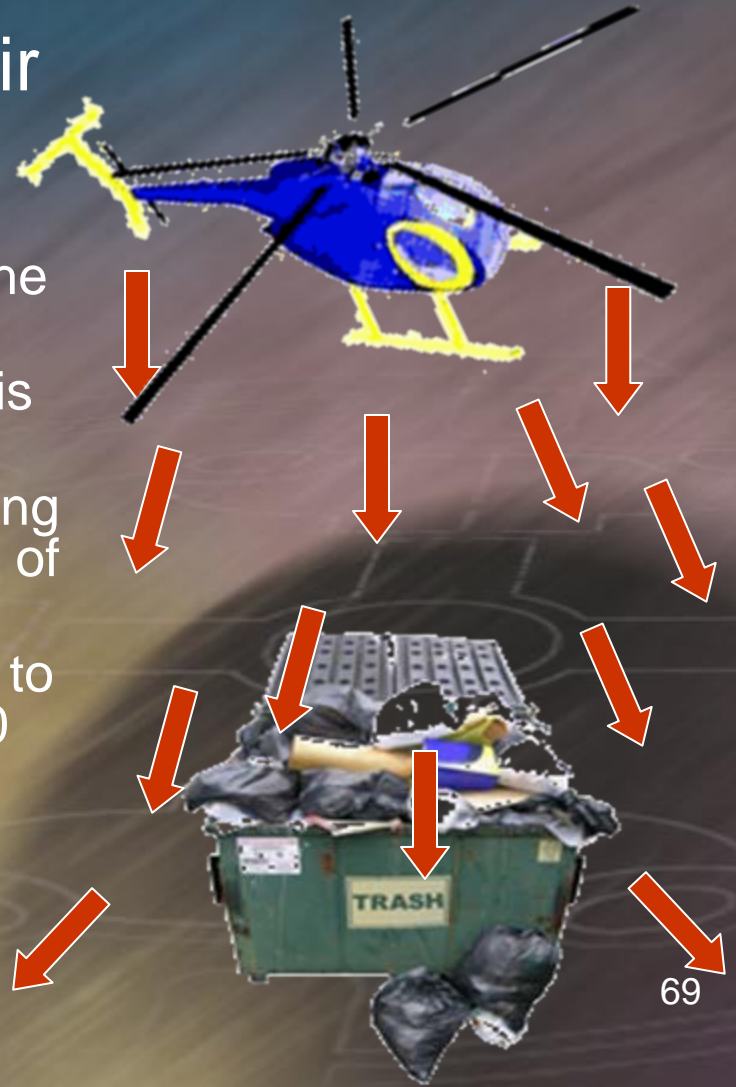
Checking Heliport Information Online

Best Practices

- It is a good practice for every organization who has filed an FAA form 5010 for their heliport to go online and check to see that the information on file for their heliport is current and correct. This should be accomplished at least on an annual basis.
- This information can be viewed at:
 - <http://www.gcr1.com/5010web/default.cfm>

Rotor Wash

- All helicopters produce a significant downward flow of air during landing and takeoff.
 - The larger and heavier the helicopter the greater the velocity of wind produced.
 - A 75 to 100 mph downward flow of air is common.
 - Dumpsters in close proximity to a landing area should have a mechanical means of securing the lid.
 - Helicopter rotor wash has been known to pick up full sheets of $\frac{3}{4}$ " plywood 30-40 feet into the air.



Rotor Wash Safety Considerations

- **Dumpsters**
- **Construction areas**
- **Sand and dirt**
- **Portable equipment**
- **Parking areas**
- **Pedestrian traffic**
- **Loose debris**



Rotor Wash Liability Concerns

- Falls
- Eye injuries
- Head injuries
- Hand injuries
- Flying debris
- Property Damage



Hospital Liability

- What the lawyers say...
 - “If the crash occurred at a hospital landing zone, problems with the zone may make the hospital liable to the victims.”
 - National Trial Lawyers Journal, 02/01/2006
 - “When Rescue Is Too Risky”
 - » Justin T. Green

Liability Reduction

- **How to Limit Liability**

- Permanently designated heliport
- D.O.T. Licensed heliport
- Physical barriers around heliport
- Posted warning signs
- Safety perimeter
- Written protocols
- Annual training
- Annual inspections



Signage

Best Practices

- For safety and to meet basic OSHA & NFPA requirements at a minimum all heliports should have the following signs posted.



To order this warning sign go to
<http://www.nemspa.org/mc/page.do?sitePageId=101398>

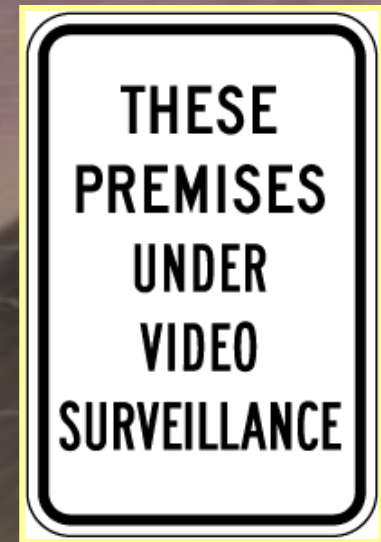


Security

- Keeping the area in and around a heliport secure is critical to safe operations. Helicopters in and of themselves are very tempting curiosities that attract the inquisitive.
 - Damaging or disabling any aircraft, whether it be done inadvertently, by accident or maliciously by stealing radios, navigation equipment, autopilots, engines, rotors, fuel or any other parts is in most cases, a federal offense punishable by fines of up to \$10,000, imprisonment for 20 years, or even death if such a theft causes an accident resulting in loss of life.

Security

- Security Enhancements
 - Monitored close circuit television cameras
 - Motion detectors at heliport entrances
 - Increased security patrols
 - Adequate lighting
 - Posted warning signs
 - Physical barriers



Security Personnel

Best Practices

- Train (annually) and designate personnel to provide security.
- Set up onsite security 7-10 minutes prior to arrival.
- Provide eye and hearing protection.
- Orient facing away from heliport.
- Block all traffic (vehicle & pedestrian) near the touchdown area during landing and takeoff.
- Whenever possible secure a 200 foot zone around the landing area for safety.
- Security personnel should stay on site until the helicopter has departed.



Communications

- Questions that air medical providers are going to ask a hospital.
 - Does your hospital use a privacy tone code (PL) on it's radio? If so what is the PL frequency?
 - Does your hospital use a **Dual Tone - Multi Frequency** process (DTMF) to open the radio system?
 - Do you use the standard Hospital Emergency Room Network (HERN) frequency for reports?
 - Do you use a different frequency for air medical communications?

-Answering these questions will help avoid problems when trying to communicate with air medical provider.

Gurneys and Stretchers

- Some helicopters require a gurney to move patients while others have their own portable stretcher system.



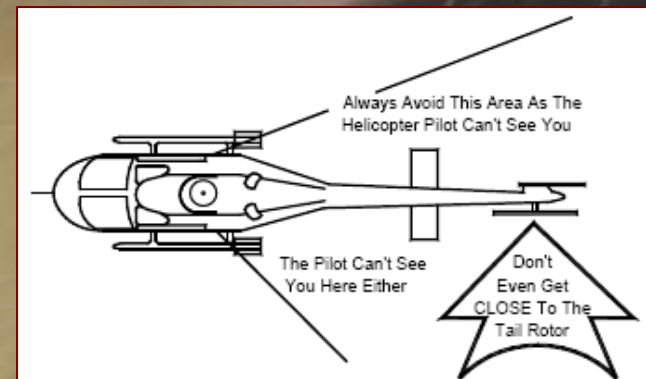
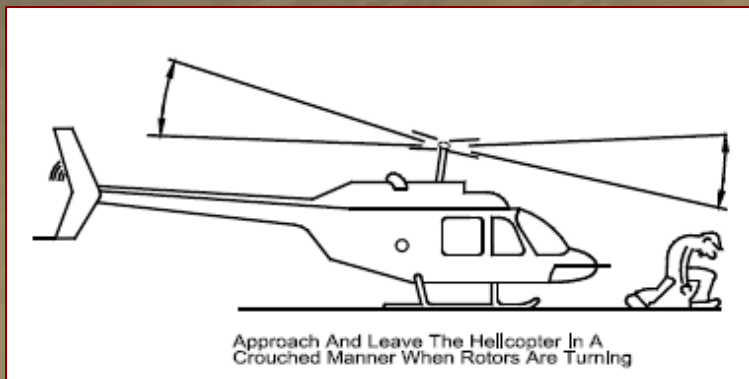
- Safety tips to remember
 - Ask if a bed or gurney is needed.
 - Don't leave gurneys unattended.
 - Lock wheels when loading and unloading
 - Keep sheets and blankets secure.
 - Allow flight teams to load and unload the helicopter.



Safety

Best Practices

- Recommendations:
 - Do not approach a running helicopter unless instructed to do so by the flight team.
 - Always approach from the front in full view of the pilot and only when the pilot says it is safe to do so.
 - Do not get involved with hot off-loading or on-loading of patients unless you have been properly trained to do so.
 - Secure all loose items in the vicinity of the landing area.



Incllement Weather

Best Practices

- Weather extremes such as snow, ice or heavy rain may make it impossible to use certain areas for landing zones. An alternate site or airport may be necessary. It is a good idea to have these locations and procedures in place before they are needed.



Snow & Ice Removal

- To insure maximum safety in and around the landing area, snow and ice should always be removed prior to the helicopters arrival whenever possible. A helicopter's rotor wash can propel large pieces of ice with dangerous velocity and dry powder snow can create a dangerous whiteout conditions.
- Snow melt systems utilizing steam, heated glycol or electrical heating coils may be the best course of action for rooftop heliports and is also a viable option for ground based heliports.

• **DO NOT** use rock salt to remove snow or ice. Due to its size it can become a projectile and cause serious injury.

• Rock salt is also extremely corrosive and damaging to helicopters. Use a product containing urea or other noncorrosive aviation friendly alternative.



SOP

Standard Operating Procedures

- All agencies that work with air medical helicopters should have written procedures and protocols set in place for their employee's covering at a minimum the following items.
 - Who can call for air medical transport.
 - When to call for air medical transport.
 - How and when to prepare for arrival.
 - Information to communicate.
 - What to do in case of an emergency (EAP).
 - Utilize NFPA-418 appendix B as a guide

Regular Training

Best Practices

- Documented annual safety training for all employees and staff involved with helicopter operations is highly recommended. In most cases your local air medical program can assist with or provide this type of training.



EMERGENCIES

- **In case there is a helicopter emergency or accident at your facility:**
 - **First have a plan; utilize NFPA-418 Appendix B to help construct an emergency action plan and training guide.**
 - **Make the appropriate 911 calls to fire rescue.**
 - **Contact the helicopter operator.**
 - **Do not approach the helicopter until it has stopped moving.**
 - **Report & document all incidents.**

Prior education and training are the ultimate equalizer in an emergency situation. Contact the air medical provider in your area to help you outline a good emergency action plan.

Fixing Problems

Best
Practices

- If you have a problem or an incident occurs during an air medical transport use these rules of thumb.
 - Discuss the problem with the pilot and med team immediately.
 - Notify the flight program that day.
 - Follow up with a written detailed report within 48 hours to the transport agency.
 - Follow up again in 10 to 14 days to insure loop closure.

Communicating Hazards

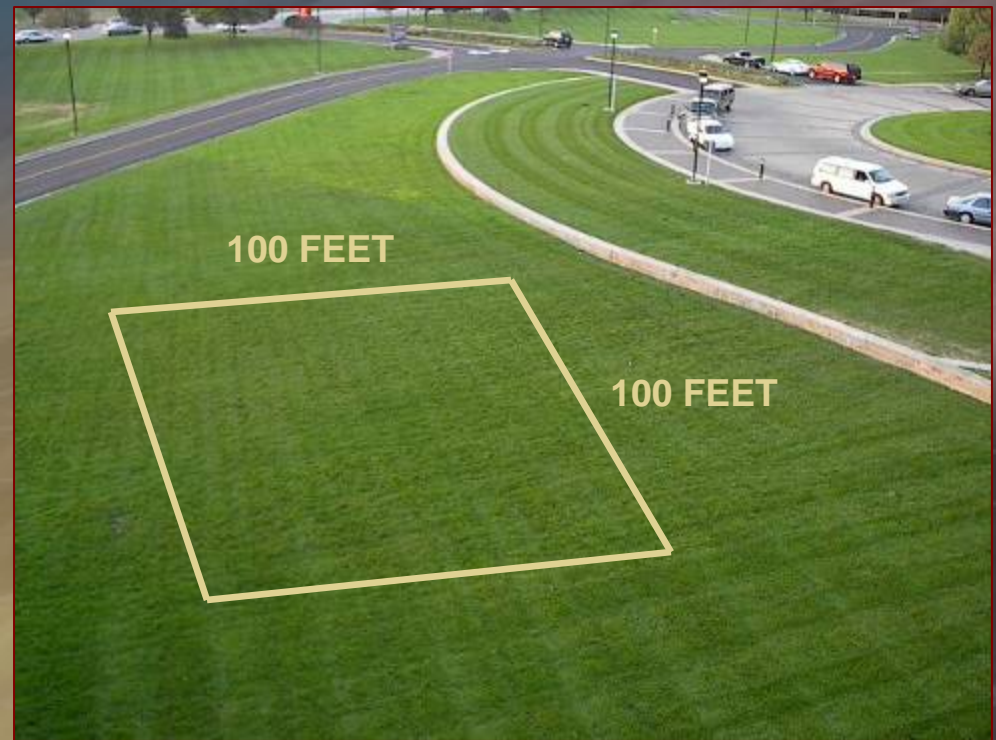
- Notify all helicopter operators that transport patients to or from your facility anytime:
 - There is any construction in the vicinity of the landing zone.
 - A large crane is erected within a ½ - 1 mile of a landing area.
 - An antenna is erected within 1-2 miles.
 - The landing site has been closed, changed or moved.

2 Helicopters and 1 Site

- If two helicopters are inbound to a facility at the same time but there is only one landing zone available, some solutions would be to.
 - Set up an alternate LZ onsite if possible.
 - Divert the second helicopter to an offsite LZ or airport if necessary.
 - Have the first helicopter depart as soon as their crew has been unloaded then land the second helicopter and unload their crew.
 - Always insure that both helicopters are aware of the other inbound helicopter as early as possible.

Temporary Non-Standard Landing Zone Selection

- **Level:** No more than a 5 degree slope.
- **Firm:** Concrete, asphalt or grass.
- **No loose debris** within 200 feet.
- **No overhead obstructions**



Marking and Identification



Non Permanent Locations:

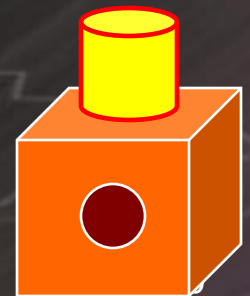
Mark all four corners of touchdown area, using;

- 4 Flares anchored to the ground, if you deem them safe.
- 4 Orange cones, weighted if possible.
- 4 Strobes, anchored to the ground.

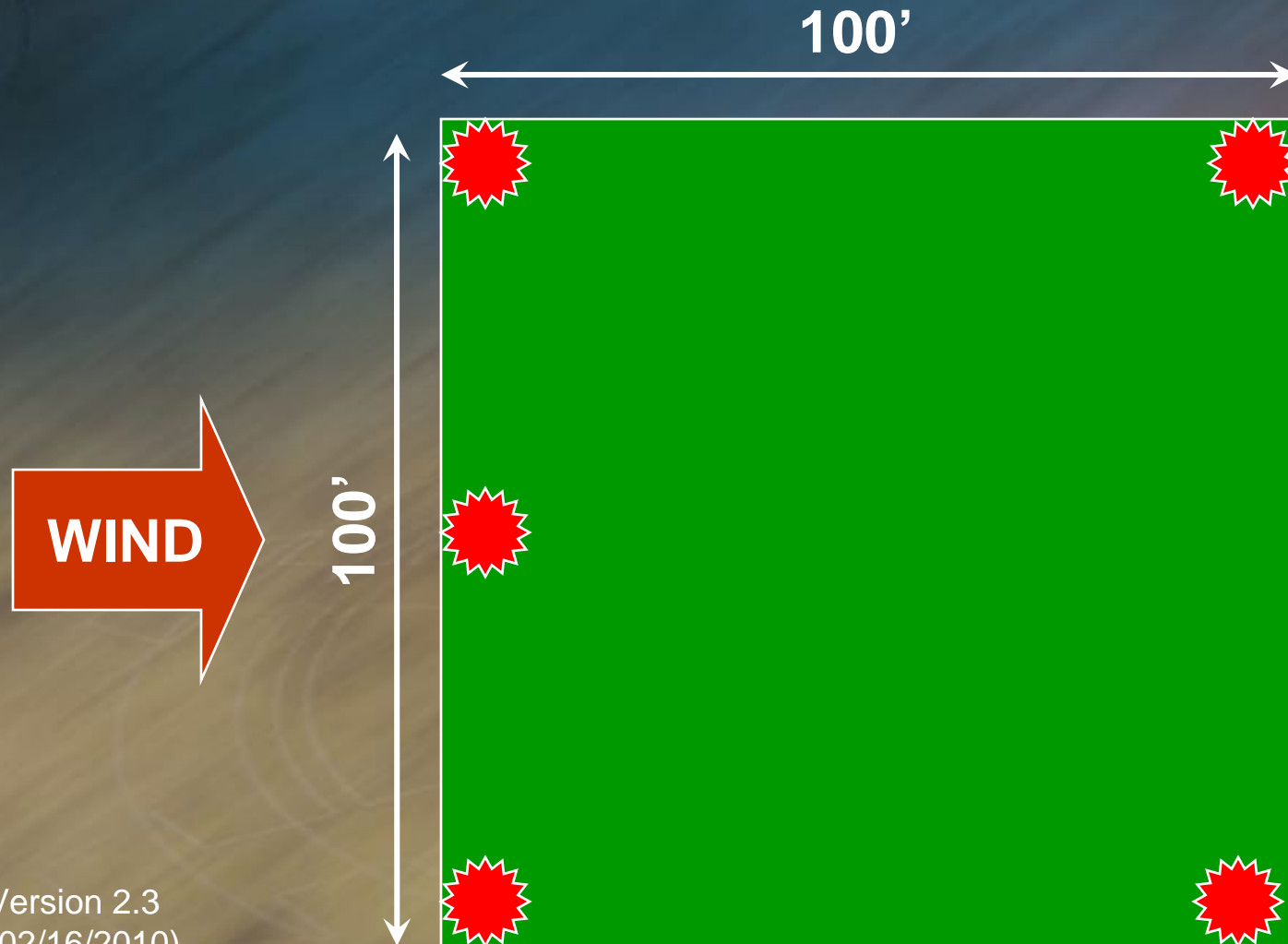
Use one additional marker on the side the wind is coming from.



Do Not Use:
*People, police tape or
fire hose to mark LZ*



Temporary landing zone setup



Sprinkler Systems

- Insure that any sprinklers that are in the vicinity of the temporary landing area are turned off before the helicopter arrives.



DANGEROUS PRACTICES

- **Weather Shopping** or calling multiple air medical programs after being turned down for weather without informing subsequently called operators of the weather turndown.
 - If you are ever turned down for transport by an air medical provider for weather or any other reason always inform any subsequently contacted providers of this fact so that they have this information to make an informed safe decision.

DANGEROUS PRACTICES

- Calling two air medical providers when there is only one patient to transport, to see who gets there first.
 - This is a true safety hazard and a recipe for disaster. It may also initiate additional billing directly to the hospital by the other air medical provider that does not transport a patient. Worst of all this practice takes assets away from other regions that may desperately be in need of air medical transport.

What can be done about a Dangerous Heliport?

Best Practices

- If after attempting to address and correct dangerous safety issues at a heliport there still exists an unacceptable level of risk the follow actions may be necessary.
 - Bring the shortcomings of the heliport with recommend corrective actions to the attention of the board of directors of the hospital in writing by certified mail.
 - Contact the state or regional air medical organization in your area to help address the issues with the hospital.
 - Contact your regional DOT and FAA officials for help.
 - Submit a NASA report on the heliport: <http://asrs.arc.nasa.gov>
 - Cooperative restriction of operations by all air medical providers.
 - Complete refusal to utilize facility.

Useful Links

ORGANIZATION	WEB ADDRESS
National EMS Pilots Association NEMSPA	http://www.nemspa.org
Air Medical Safety Advisory Council AMSAC	http://www.amsac.org
Federal Aviation Administration FAA	http://www.faa.gov
Department of Transportation DOT	http://www.dot.gov
National Fire Protection Association NFPA	http://www.nfpa.org
Occupational Safety & Health Administration OSHA	http://www.osha.gov
Helicopter Association International HAI	http://www.rotor.com

If you have additional questions or
need information on heliports or
helicopter operations please
contact the

National EMS Pilots Association

NEMSPA



<http://www.nemspa.org>