HeliExperts International LLC

Vail Valley Medical Center
Vail, Colorado

Preliminary Heliport Feasibility & Design Study Report

October 27, 2014

10/29/2014

HeliExperts International LLC.
Formerly Raymond A. Syms & Associates

Veteran Owned and Operated

HeliExperts Experience

- A combined 75+ years of rotary wing and fixed wing aviation piloting, maintenance and management experience with an extensive background in military, corporate, offshore, and air medical operations.
- 35+ years in aeronautical consulting, safety, heliport development, education, and litigation support services.
- 500+ heliports designed and over 3,000 heliports visited or audited worldwide.
- Clients include: FAA, DOD, Department of Energy, Transportation Safety Institute, Department of Justice, U.S. Army, U.S. Air Force, U.S. Navy, U.S. Army Corp of Engineers, States of New York, New Jersey, Hawaii and Illinois as well over 400 corporations, organizations and individuals.
- Only independent professionals from industry requested to meet with the FAA on the redrafting of the current heliport advisory circular.

Raymond A. Syms

45+ years of Professional Aviation Experience

- **Senior Member of the Helicopter Association International heliport and FAA/Industry Heliport /Vertiport Design A/C working groups.**
- **Designer and primary author of the HAI Heliport Development Guide.**
- **Industry Contributor and Consultant to the Transportation Safety Institutes Heliport Evaluation Training Program for FAA Inspectors.**
- **One of the most senior and now Chairman of National Fire Protection Association NFPA 418 Committee – Fire Protection Standards for Heliports.**
- **FAA Heliport Advisory Circular Industry Contributor.**

Rex J. Alexander

34 + years of Professional Aviation Experience

- Member NFPA-418 Committee Fire Protection Standards for Heliports.
- Industry Contributor and Consultant to the Transportation Safety Institutes Heliport Evaluation Training Program for FAA Inspectors.
- FAA Heliport Advisory Circular Industry Contributor.
- Author and designer International Heliport Risk and Liability Assessment Toolkit.
- Author and designer of the NEMSPA Hospital Heliport Safety Program.

Primary Guidance for Heliports

U.S. Department of Transportation

Federal Aviation Administration

Advisory Circular

Subject: Heliport Design	Date: 4/24/2012	AC No: 150/5390-2C
	Initiated by: AAS-100	Change:

1. **Purpose.** This advisory circular (AC) provides standards for the design of heliports serving helicopters with single rotors. Apply basic concepts to facilities serving helicopters with tandem (front and rear) or dual (side by side) rotors, however many standards will not apply.

2. **Cancellation.** This AC cancels AC 150/5390-2B, Heliport Design, dated September 30, 2004.

3. **Application.** The Federal Aviation Administration (FAA) recommends the guidelines and specifications in this AC for materials and methods used in the construction of heliports. In general, use of this AC is not mandatory. However, use of this AC is mandatory for all projects funded with federal grant monies through the Airport Improvement Program (AIP) and with revenue from the Passenger Facility Charge (PFC). See Grant Assurance No. 34, Policies, Standards, and Specifications, and PFC Assurance No. 9, Standards and Specifications. For information about grant assurances, see http://www.faa.gov/airports/aip/grant_assurances/. The use of terms implying strict compliance applies only to those projects. Other federal agencies, states, or other authorities having jurisdiction over the construction of other heliports decide the extent to which these standards apply.

4. **Principal changes.**

   a. Changed the term for the helicopter overall length (OL) to 'D' or 'D-value.'

   b. Added definitions for design loads for static and dynamic load-bearing areas (LBA).

   c. Added guidance for pavement or structure larger than the touchdown and liftoff area (TLOF), but less than the size of the final approach and take off (FATO).

   d. Added guidance for turbulence effects.

   e. Added guidance to provide adequate clearance between parking areas and taxi routes and within parking areas.

   f. Added guidance for minimum dimensions of curved approach/departure airspace.

   g. Added guidance for Touchdown/Positioning Circle (TDPC) Marking.

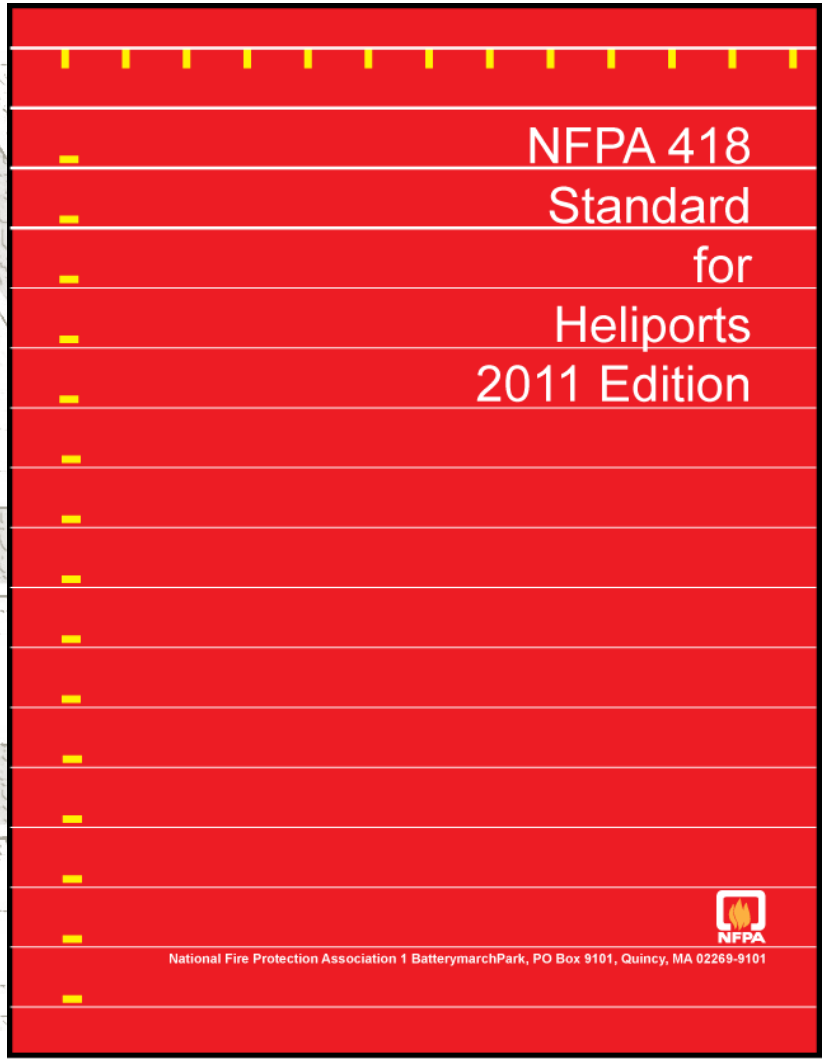
   h. Added guidance for Flight Path Alignment Guidance markings and lights.

   i. Added an appendix providing guidance for Emergency Helicopter Landing Facility Requirements (EHLF).

   j. Added FATO to FATO separation distance for simultaneous operations.

   k. Revised standards for size of "II" for general aviation heliports.

   l. Added increased TLOF size when the FATO of a hospital heliport is not load bearing.



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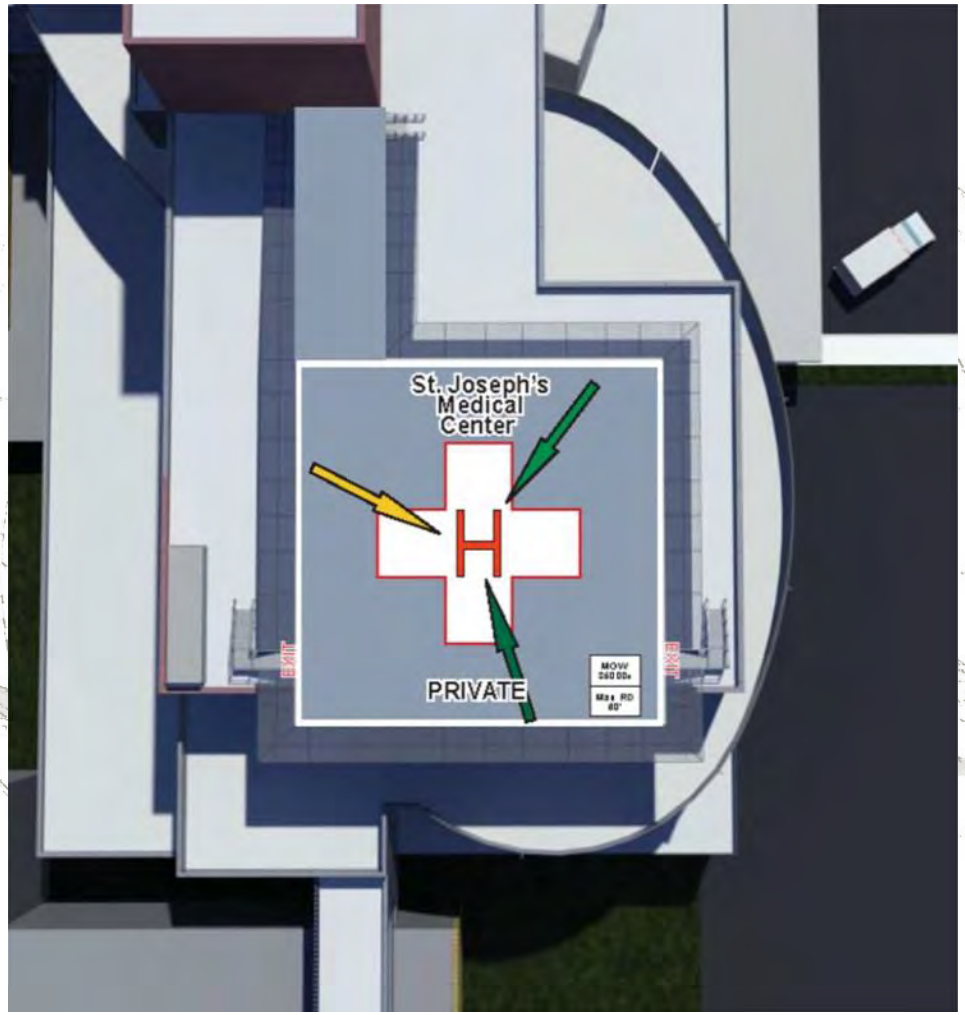
Agencies and Organizations Providing Guidance on Heliports

- **FAA:** Federal Aviation Administration
- **NFPA:** National Fire Protection Association
- **IBC** International Building Codes
- **IFC** International Fire Codes
- **OSHA:** Occupational Safety & Health Administration
- **NTSB:** National Transportation & Safety Board
- **HAI:** Helicopter Association International
- **NEMSPA:** National EMS Pilots Association
- **CAMTS:** Commission on Accreditation of Medical Transport Systems

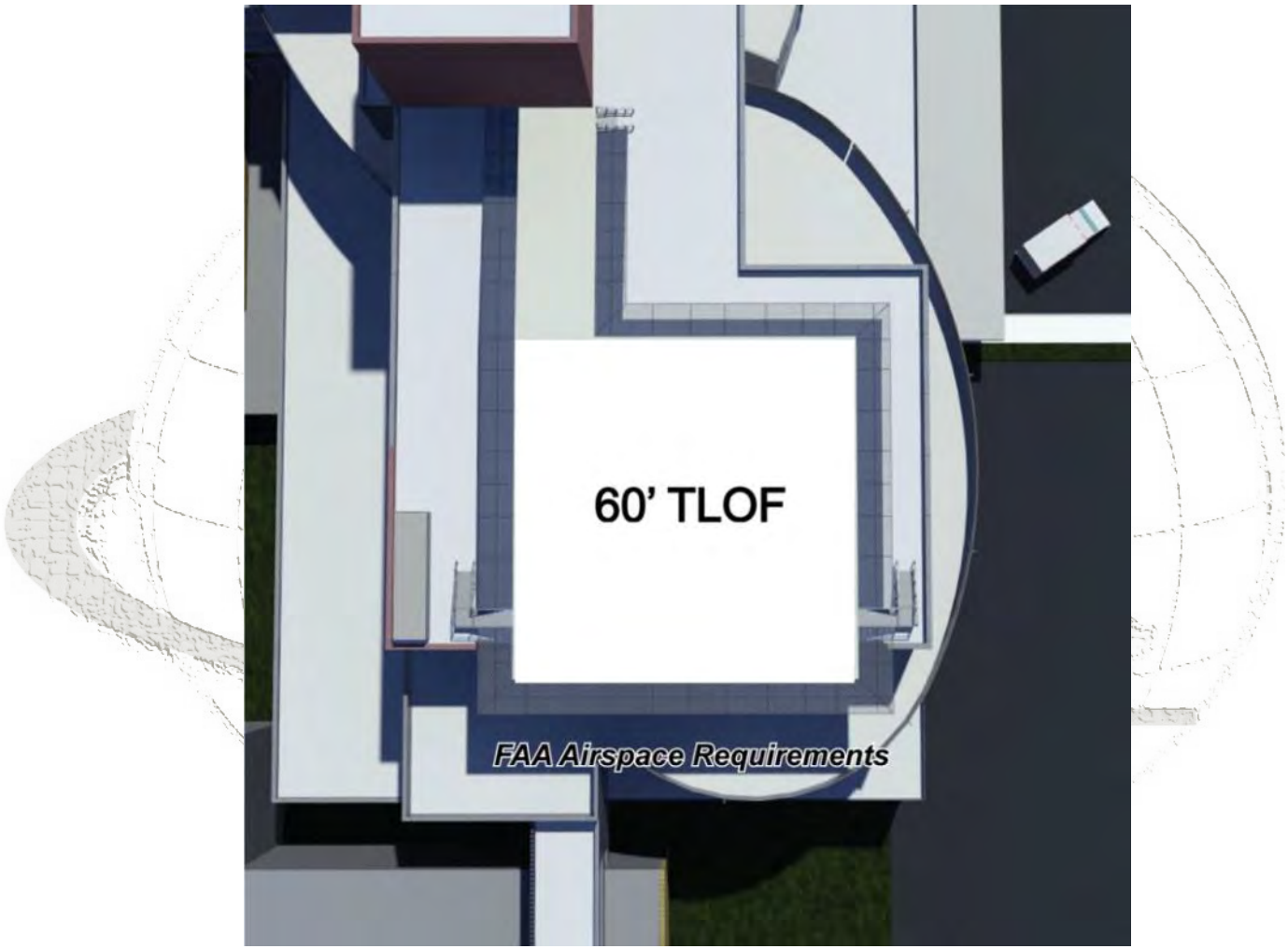
Adopted Standards

- Regulations
- Advisory Circulars
- Best Practices
  - Adopting the most conservative standards

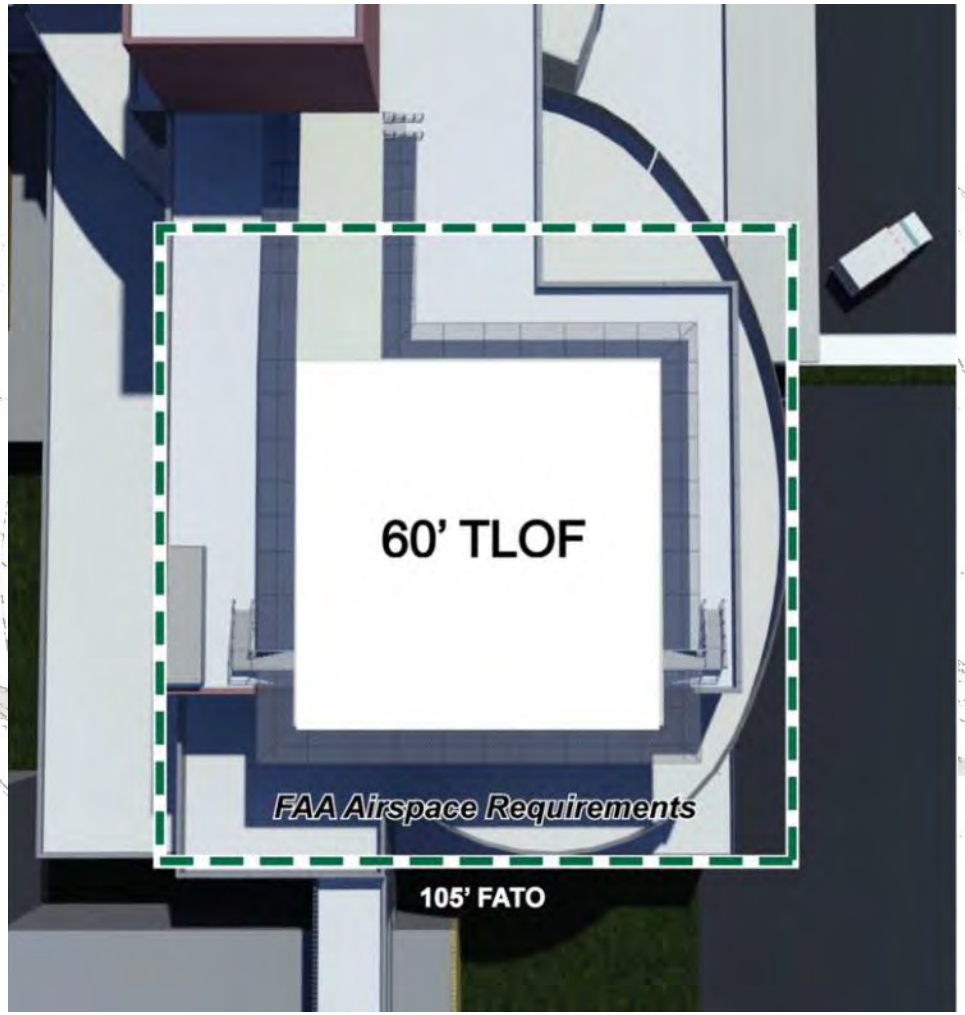
Anatomy of a Heliport



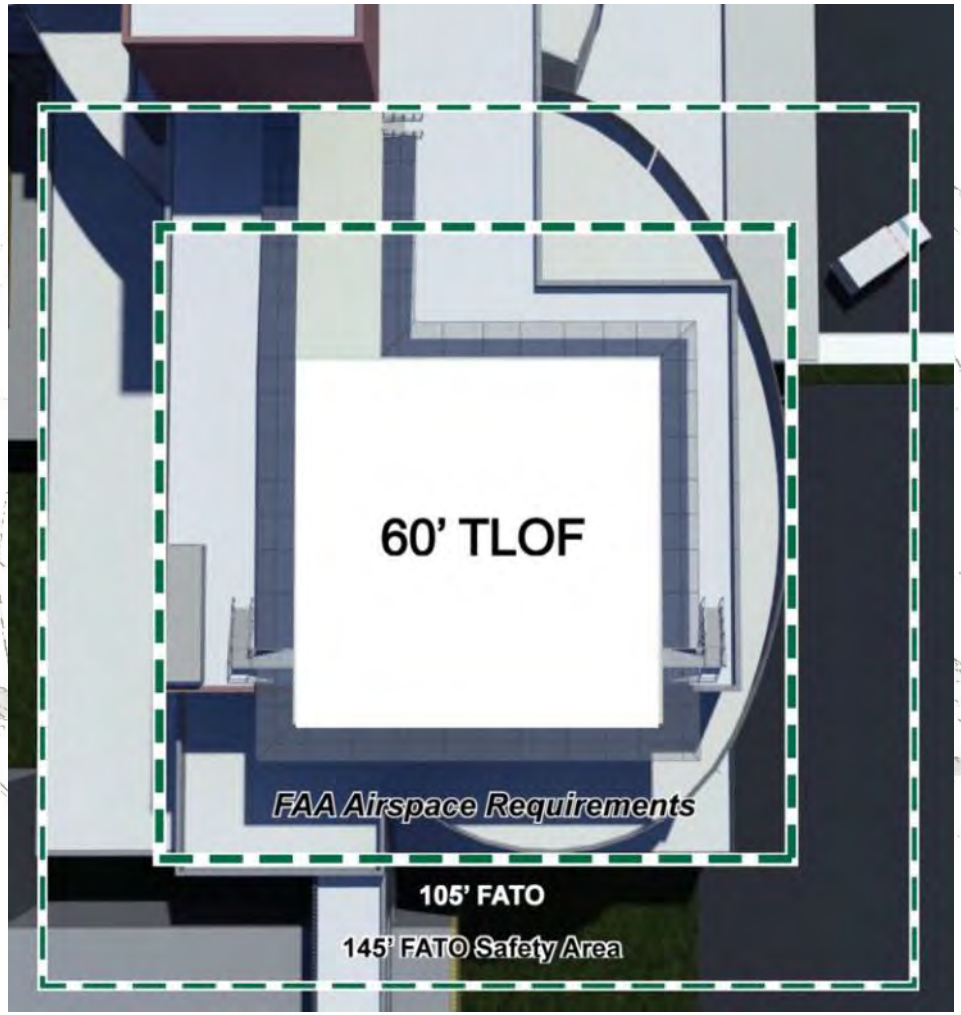
Touchdown and Liftoff Area



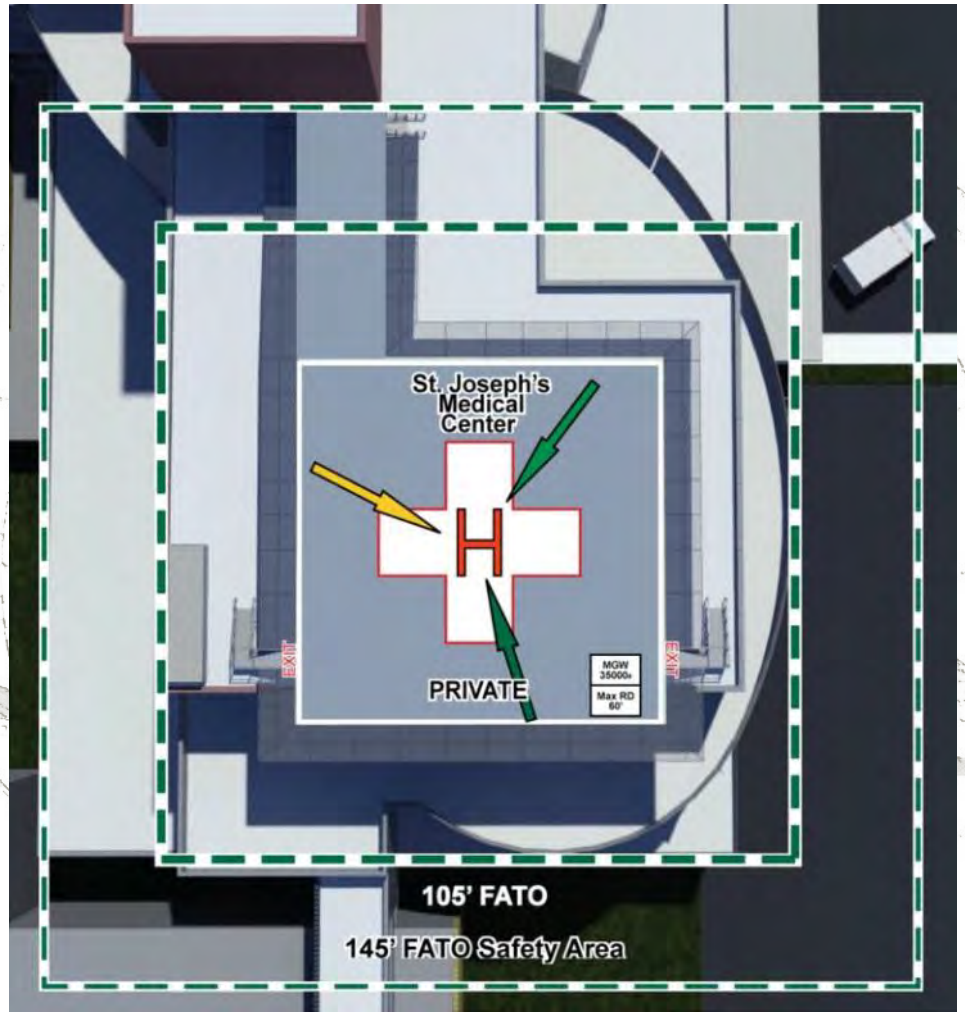
Final Approach and Takeoff Area



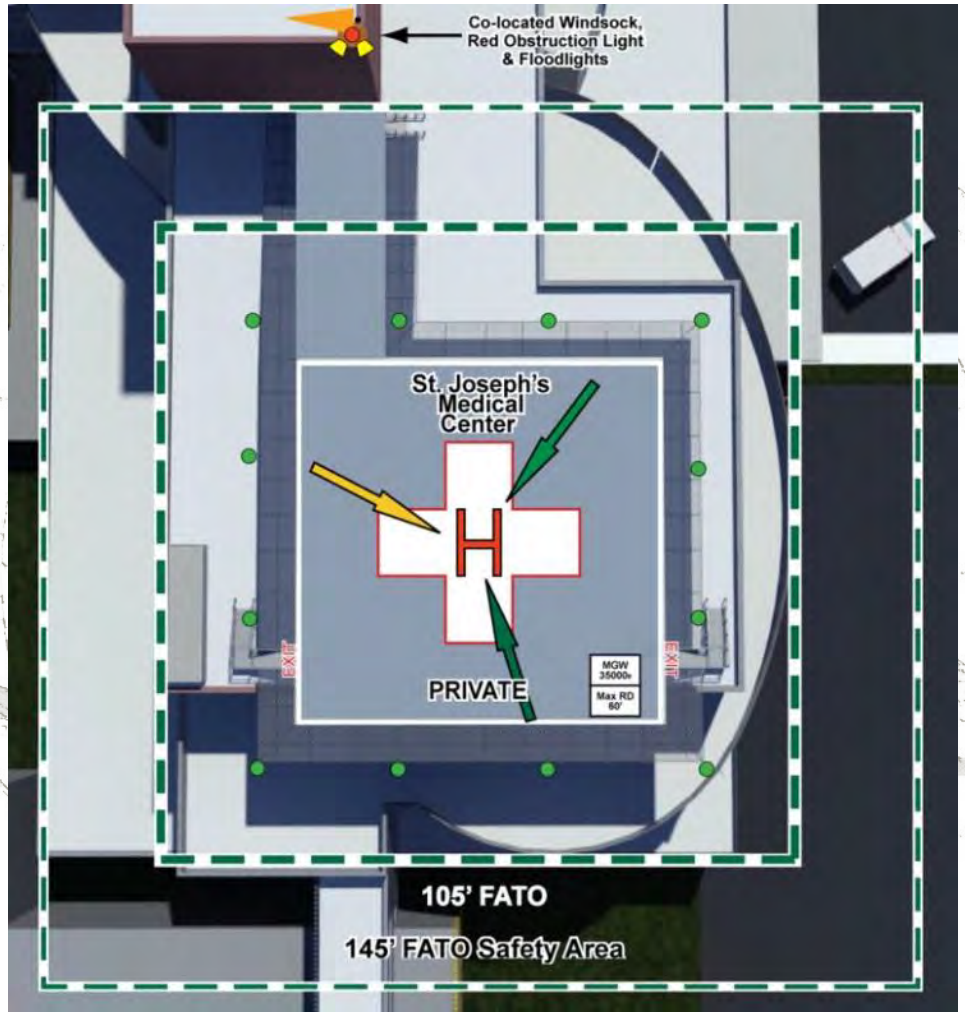
FATO Safety Area



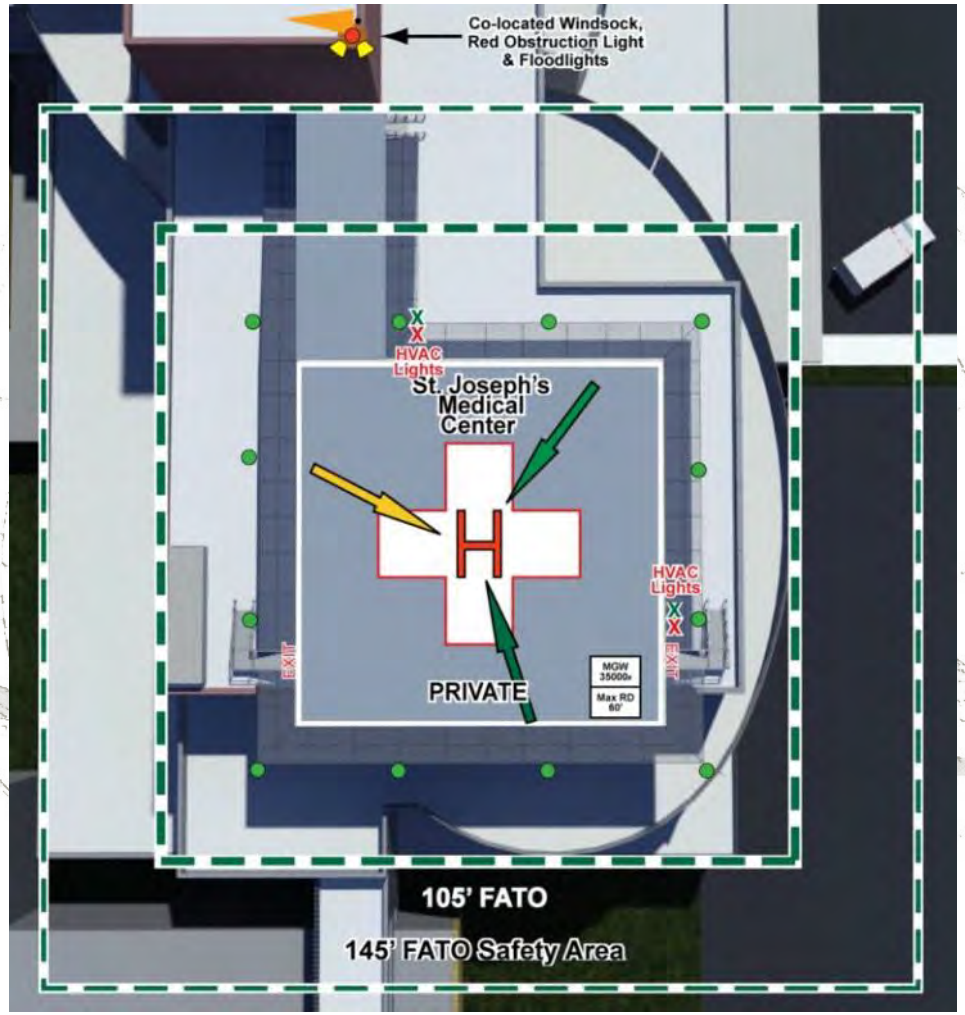
Heliport Markings



Heliport Lighting

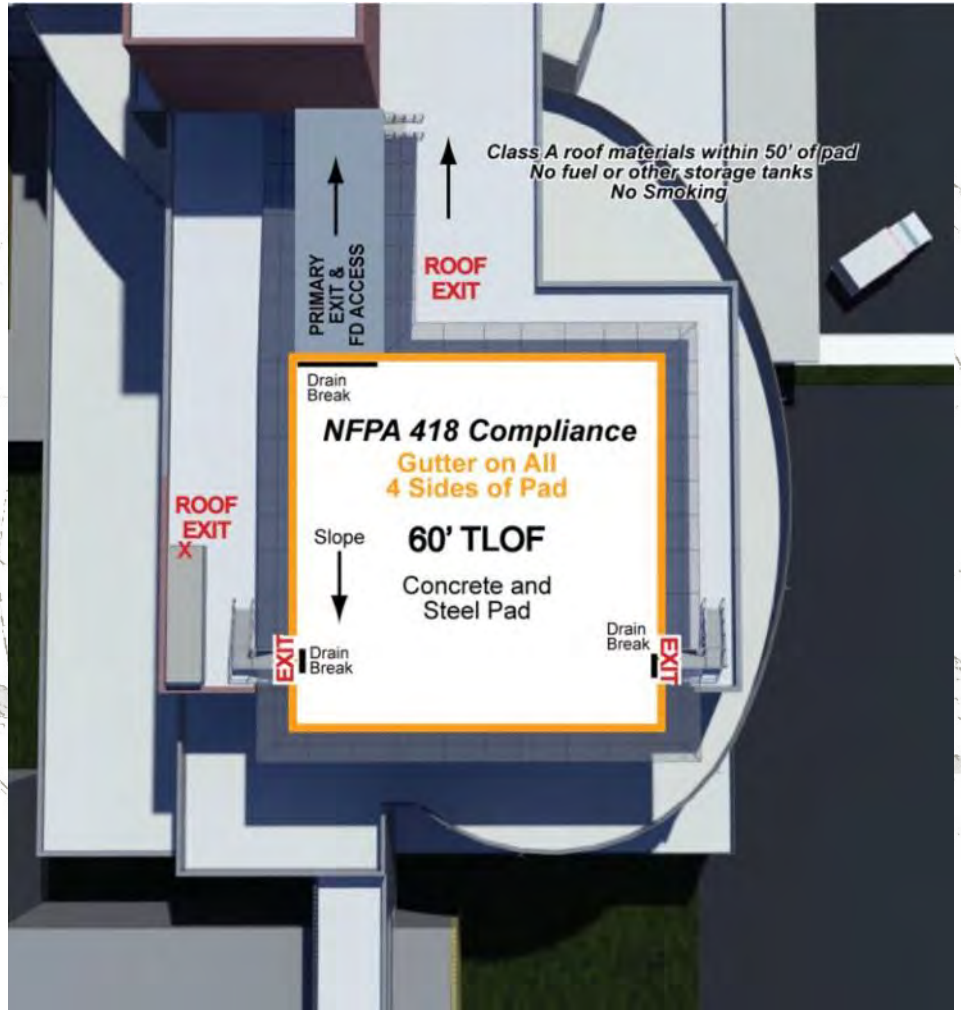


HVAC Provisions

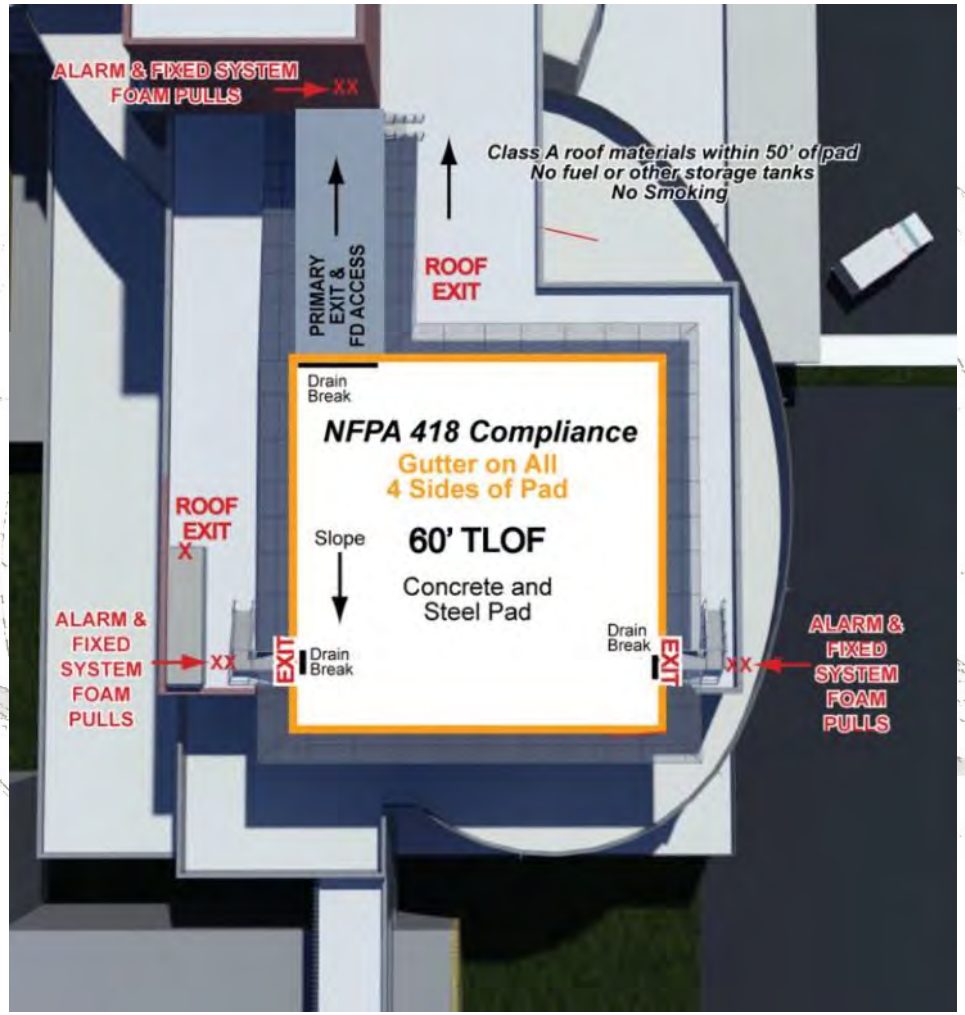


Heliport Slope, Drainage & Surrounding Roofing material

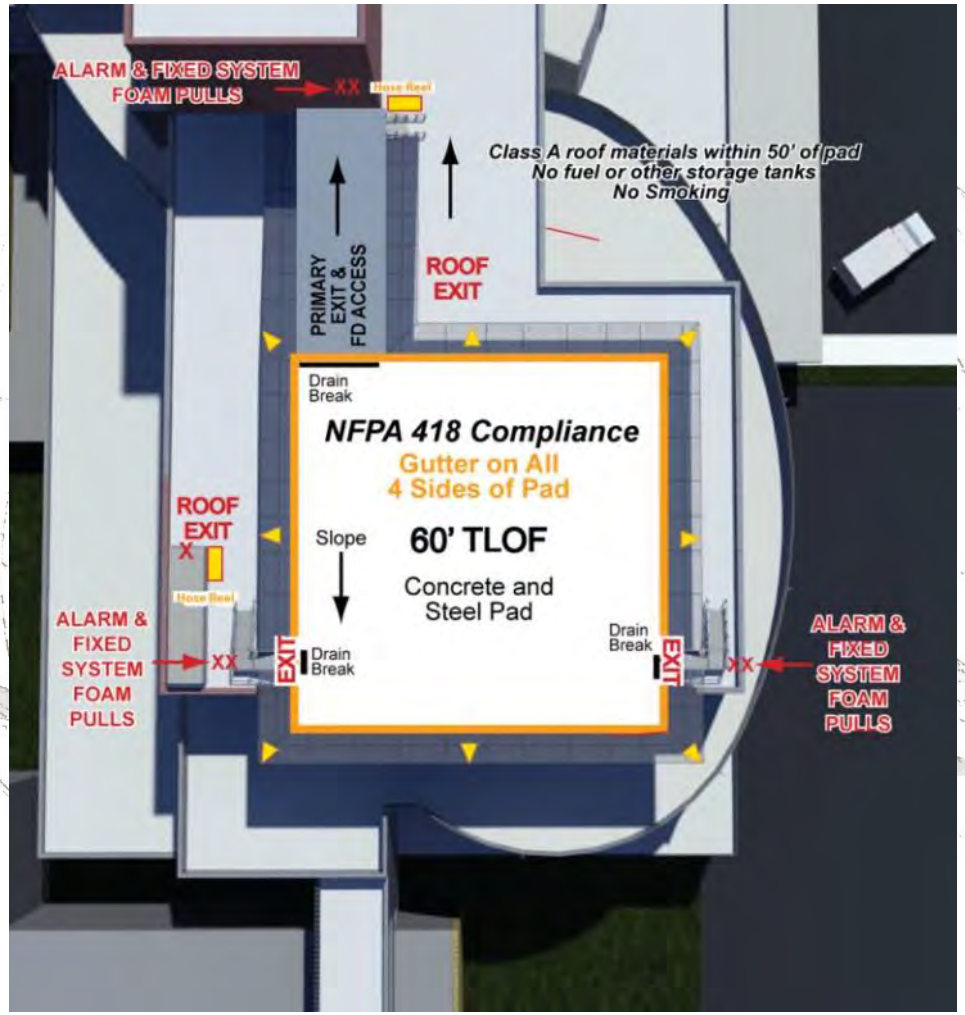
Heliport Ingress/Egress & Emergency Exits



Heliport Fire Alarm System

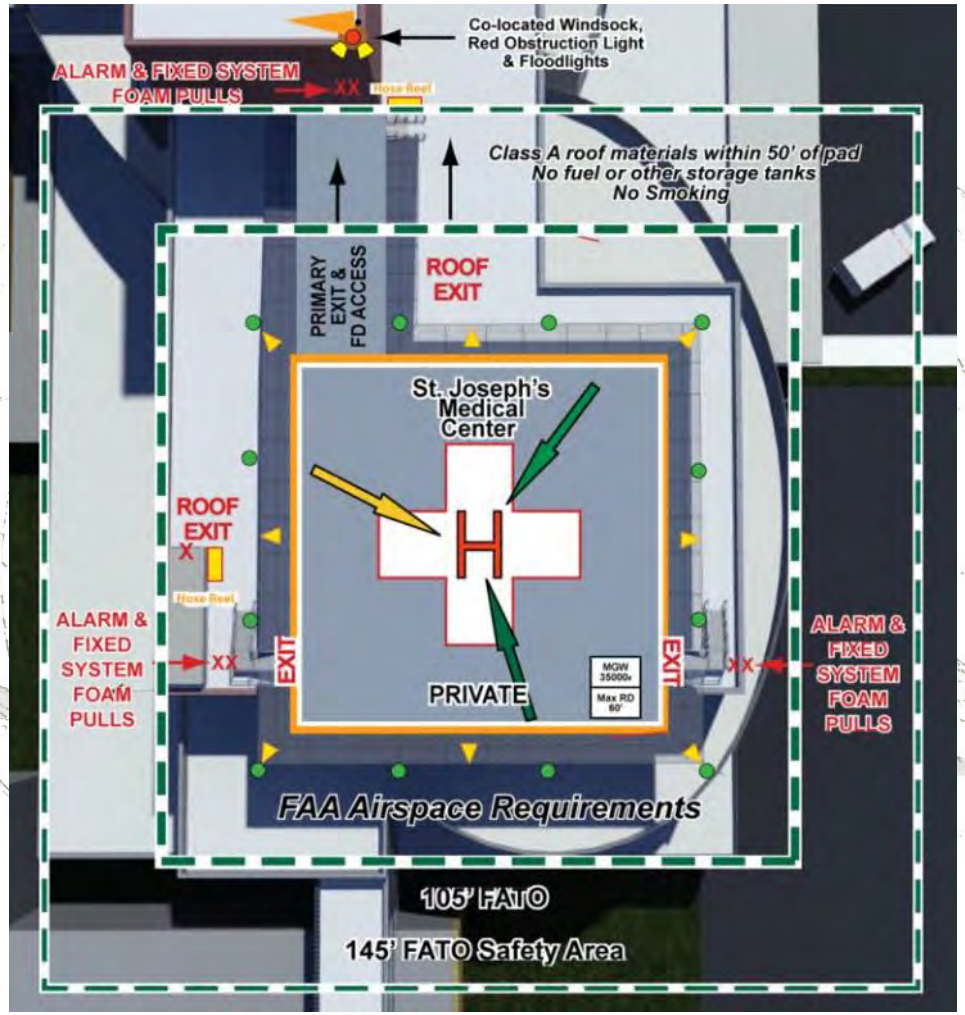


Heliport Fire Suppression



Activated Foam Fire Suppression System

A Compliant Heliport



Other Metropolitan and Urban Hospital Heliports in the U.S.

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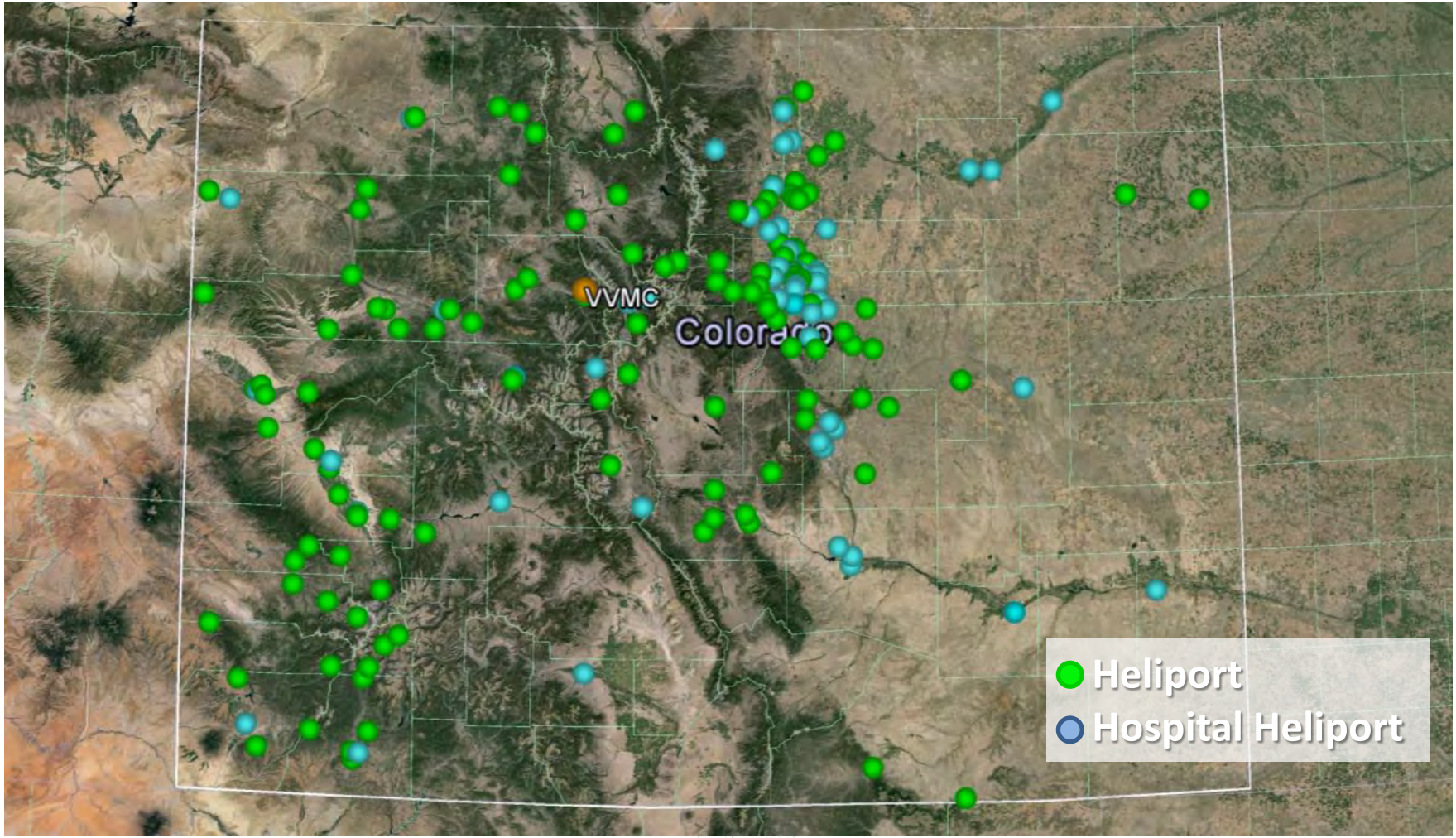
Colorado Heliport s FAA Historical Data

- **Per the current FAA Airport Master Record Database.**

  http://www.faa.gov/airports/airport_safety/airportdata_5010

- **179 Total heliports listed in Colorado**
- **98 Heliports in Colorado above 6,000 feet**
- **43 Heliports in Colorado above 8,200 feet**
- **59 Hospital heliports in Colorado**
- **16 Hospital heliports in Colorado above 6,000 feet**
- **4 Hospital heliports in Colorado above 8,200 feet**

Heliports in Colorado with FAA 5010 master Records on File



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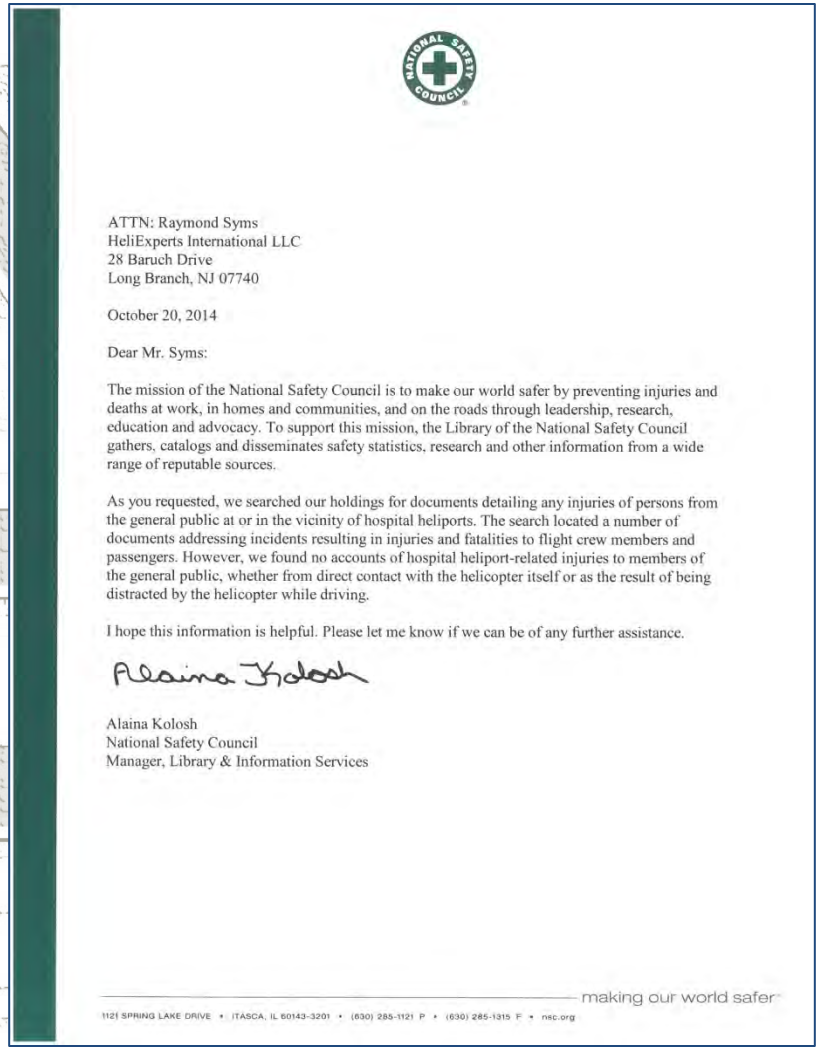
Hospital Heliport Safety Record for the General Public

- **National Safety Council**

"we found no accounts of hospital heliport related injuries to members of the general public, whether from direct contact with the helicopter itself or as the result of being distracted by the helicopter while driving."



ATTN: Raymond Syms
HeliExperts International LLC
28 Baruch Drive
Long Branch, NJ 07740

October 20, 2014

Dear Mr. Syms:

The mission of the National Safety Council is to make our world safer by preventing injuries and deaths at work, in homes and communities, and on the roads through leadership, research, education and advocacy. To support this mission, the Library of the National Safety Council gathers, catalogs and disseminates safety statistics, research and other information from a wide range of reputable sources.

As you requested, we searched our holdings for documents detailing any injuries of persons from the general public at or in the vicinity of hospital heliports. The search located a number of documents addressing incidents resulting in injuries and fatalities to flight crew members and passengers. However, we found no accounts of hospital heliport-related injuries to members of the general public, whether from direct contact with the helicopter itself or as the result of being distracted by the helicopter while driving.

I hope this information is helpful. Please let me know if we can be of any further assistance.

Alaina Kolosh

Alaina Kolosh
National Safety Council
Manager, Library & Information Services

making our world safer

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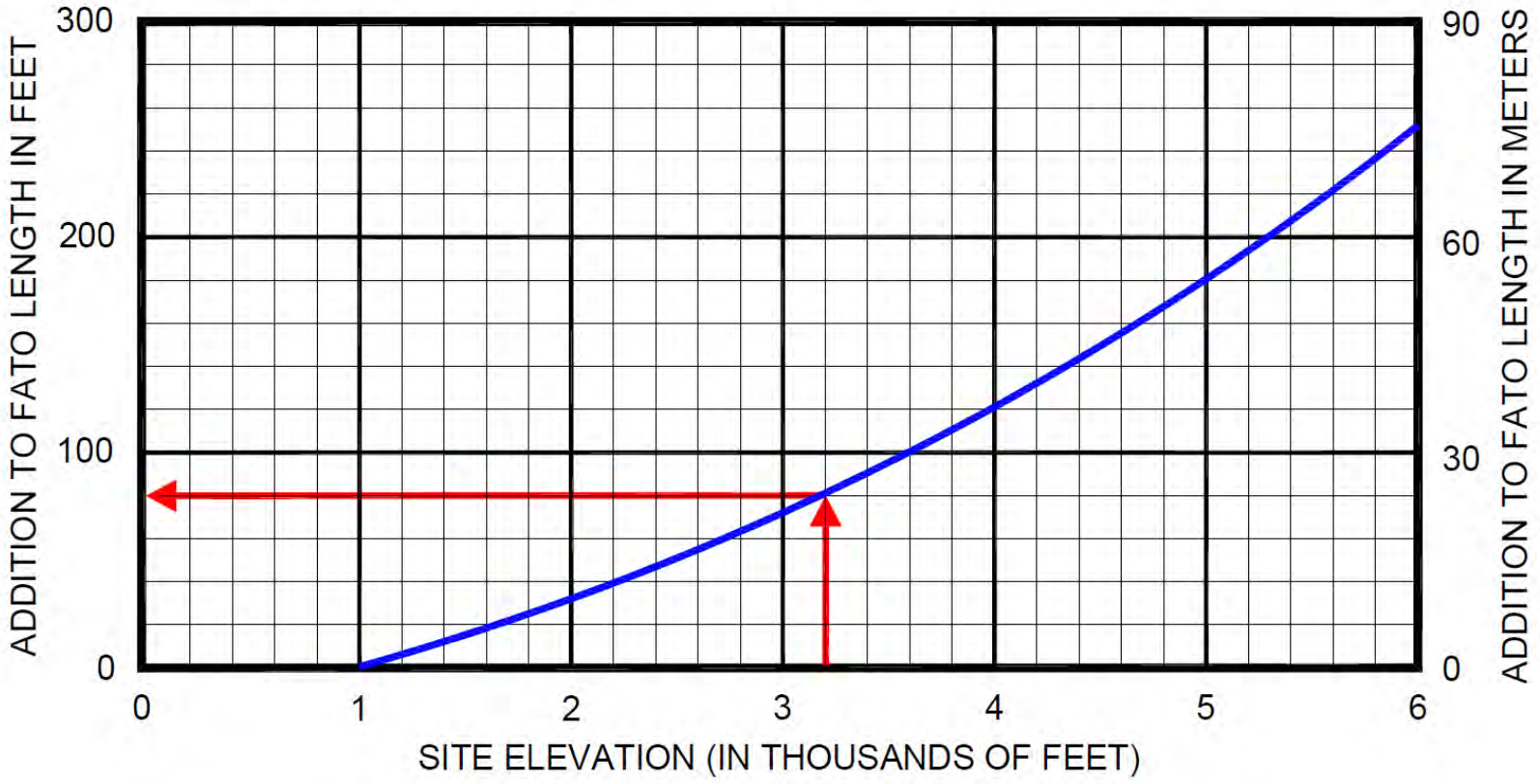
Elongated FATO

FAA AC 150/5390-2C (Fig 4-4)



Example: 80 feet is added to the basic FATO length for a site elevation of 3,200 feet.

Extrapolation of Elongated FATO Size for Vail based on Fig. 4-4

Extended FATO Extrapolation Chart

- The following chart is an estimated extrapolation for elevations above 6,000 feet MSL Based on FAA Heliport Advisory Circular A/C 150/5390-2C, Figure 4-4
  - At an estimated elevation of 8,200 feet MSL there would be a required increase of the overall FATO Length = 475'

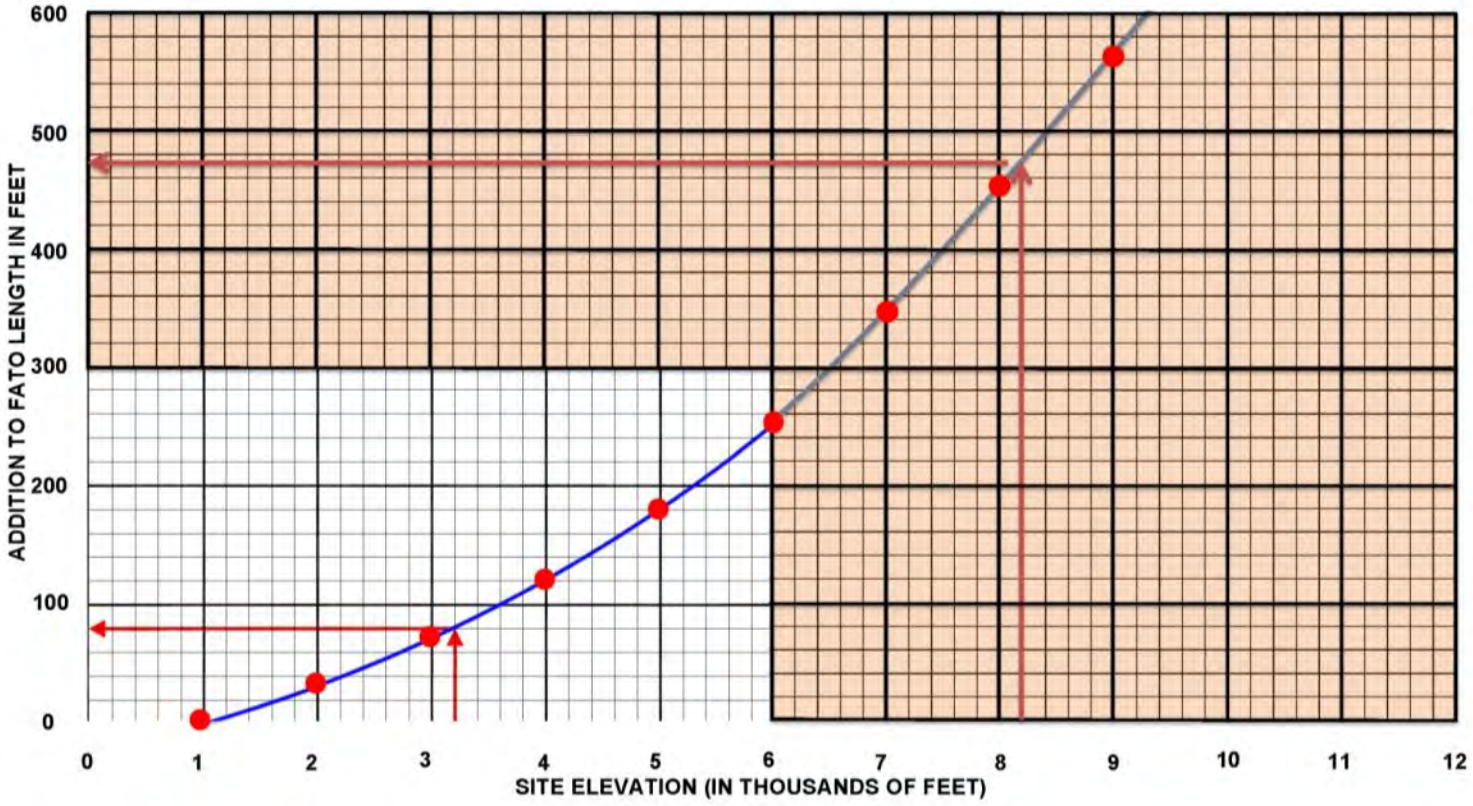


Fig 4-4 Additional FATO Length for Heliports at Higher Elevation: Hospital

Extrapolated Data

Extended FATO Calculations

Aircraft Make & Model Data			
Aircraft	Max Takeoff Weight (lbs.)	OL (feet)	RD (feet)
S-92	26,500	68.5	56.3
UH-60	22,000	64.8	53.8
AW-139	14,991	54.7	42.6
B-412	11,900	56.2	46.0
S-76	11,700	52.5	44.0
EC-145	7,904	42.7	36.1
AW-109E Pwr	6,283	42.8	36.1
EC-135	6,250	40.0	33.5
B-407	5,250	41.4	35.0
AS-350	4960	42.5	35.1

NOTES:
*This is only a partial representation of the potential EMS helicopters that could service a hospital heliport in the U.S. and is for illustration purposes only.

The estimated extended FATO for Vail, Colorado per extrapolation of the FAA AC chart is 475 feet.

Ground Based Heliport Dimensions			
TLOF (feet)	FATO (feet)	FSA (feet)	Ext. FATO Length at 8,200' MSL
56.3	102.8	18.8	577.8
53.8	97.2	17.9	572.2
42.6	82.1	14.2	557.1
46.0	84.3	15.3	559.3
44.0	78.8	14.7	553.8
36.1	64.1	12.0	539.1
36.1	64.2	12.0	539.2
33.5	60.0	11.2	535.0
35.0	62.1	11.7	537.1
35.1	63.8	11.7	538.8

NOTES:
TLOF= 1 x Rotor Diameter but not less than 40'

FATO = 1.5 x Overall Length

FSA = 1/3 RD but not less than 10'
*Measurements only apply if TLOF and FATO are marked and standard hospital markings are used.

An Extended FATO is centered on the TLOF

Rooftop Based Heliport Dimensions (Non-Load Bearing FATO)			
TLOF (feet)	FATO (feet)	FSA (feet)	Ext FATO Length at 8,200' MSL
68.5	102.8	18.8	577.8
64.8	97.2	17.9	572.2
54.7	82.1	14.2	557.1
56.2	84.3	15.3	559.3
52.5	78.8	14.7	553.8
42.7	64.1	12.0	539.1
42.8	64.2	12.0	539.2
40.0	60.0	11.2	535.0
41.4	62.1	11.7	537.1
42.5	63.8	11.7	538.8

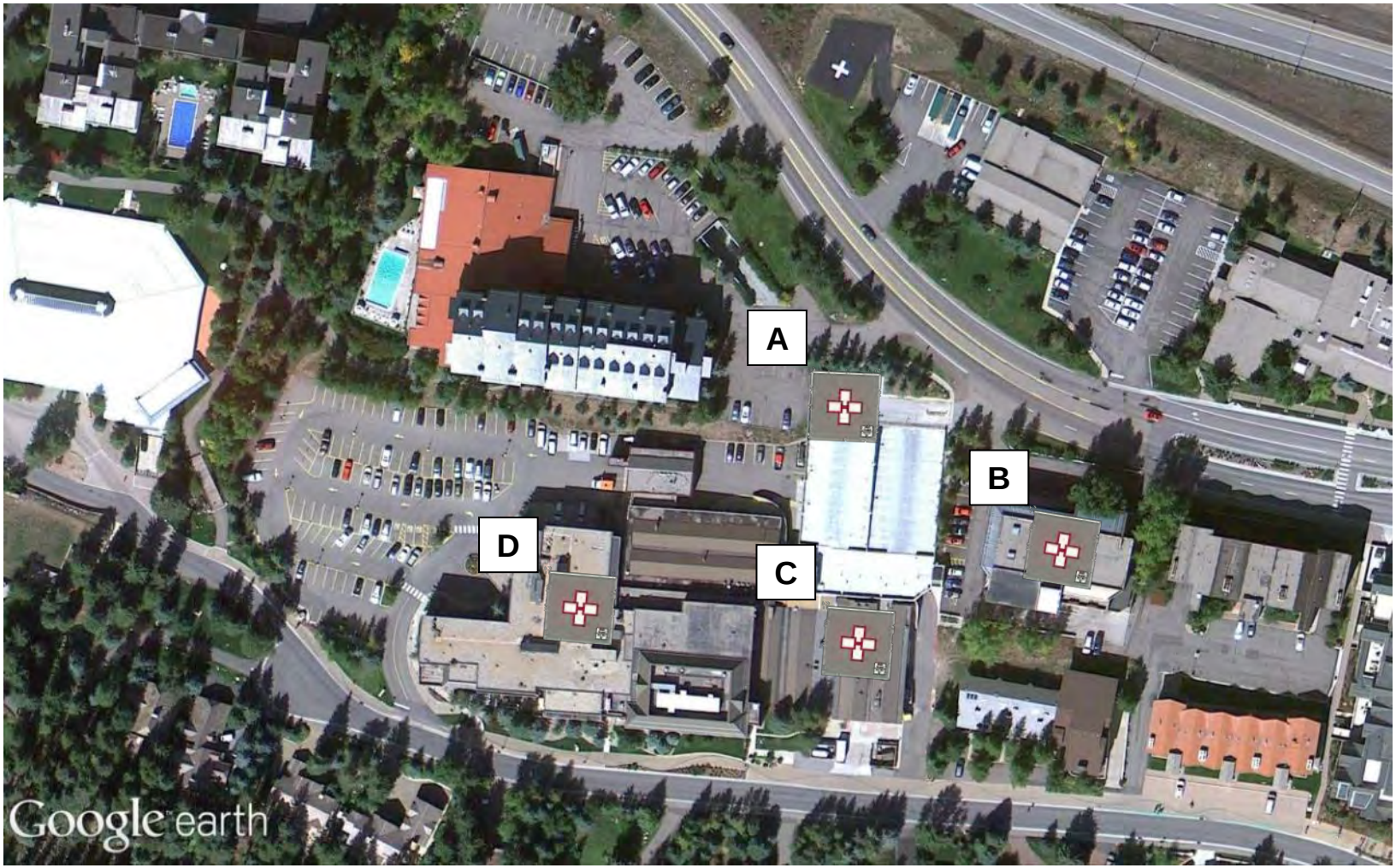
NOTES:
TLOF: *If the FATO outside the TLOF is non-load bearing increase minimum width, length or diameter to overall length (D) of design helicopter.

FATO=1.5 x Overall Length

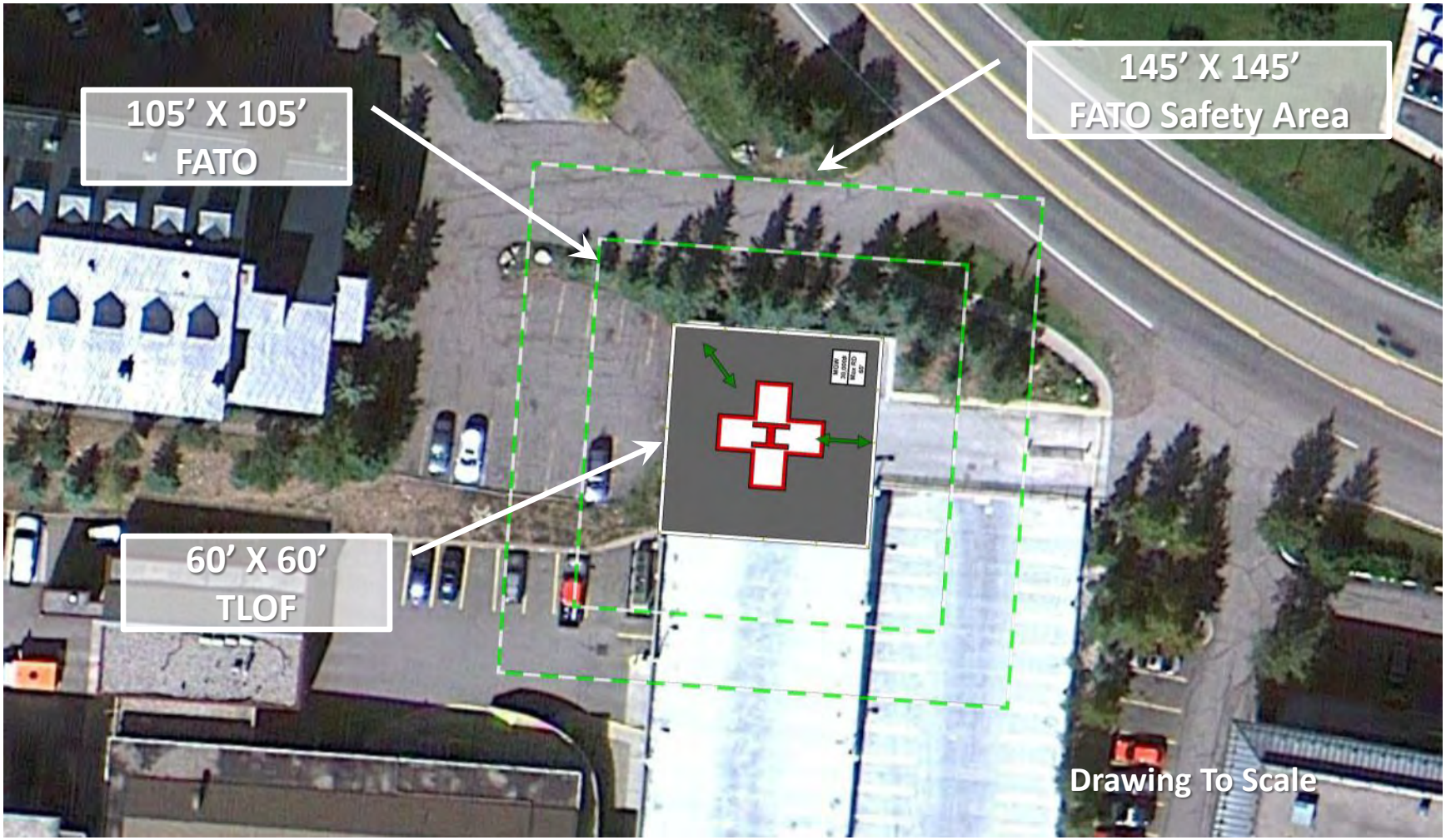
An Extended FATO is centered on the TLOF

Vail Valley Area

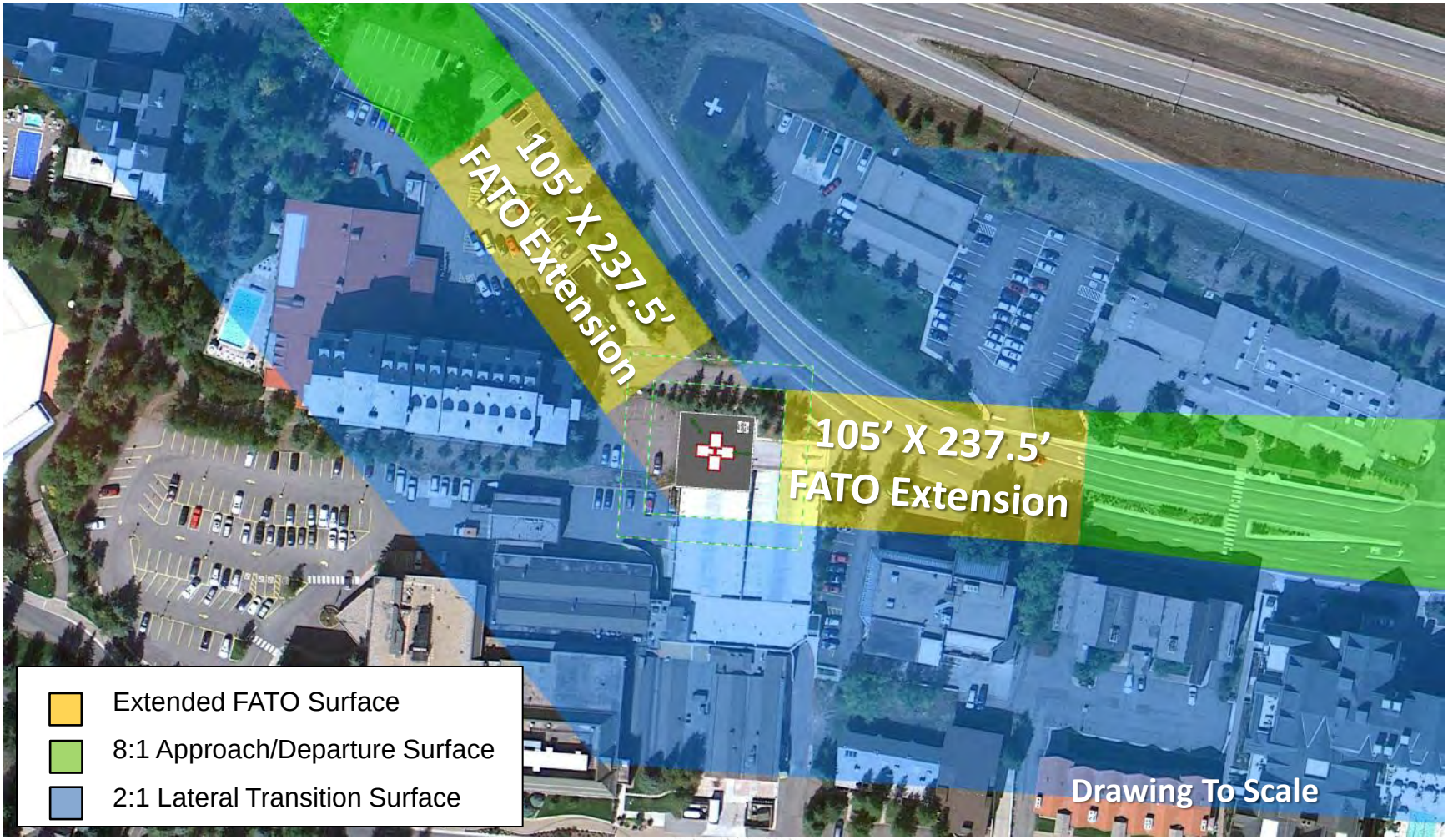
On Campus Locations Evaluated



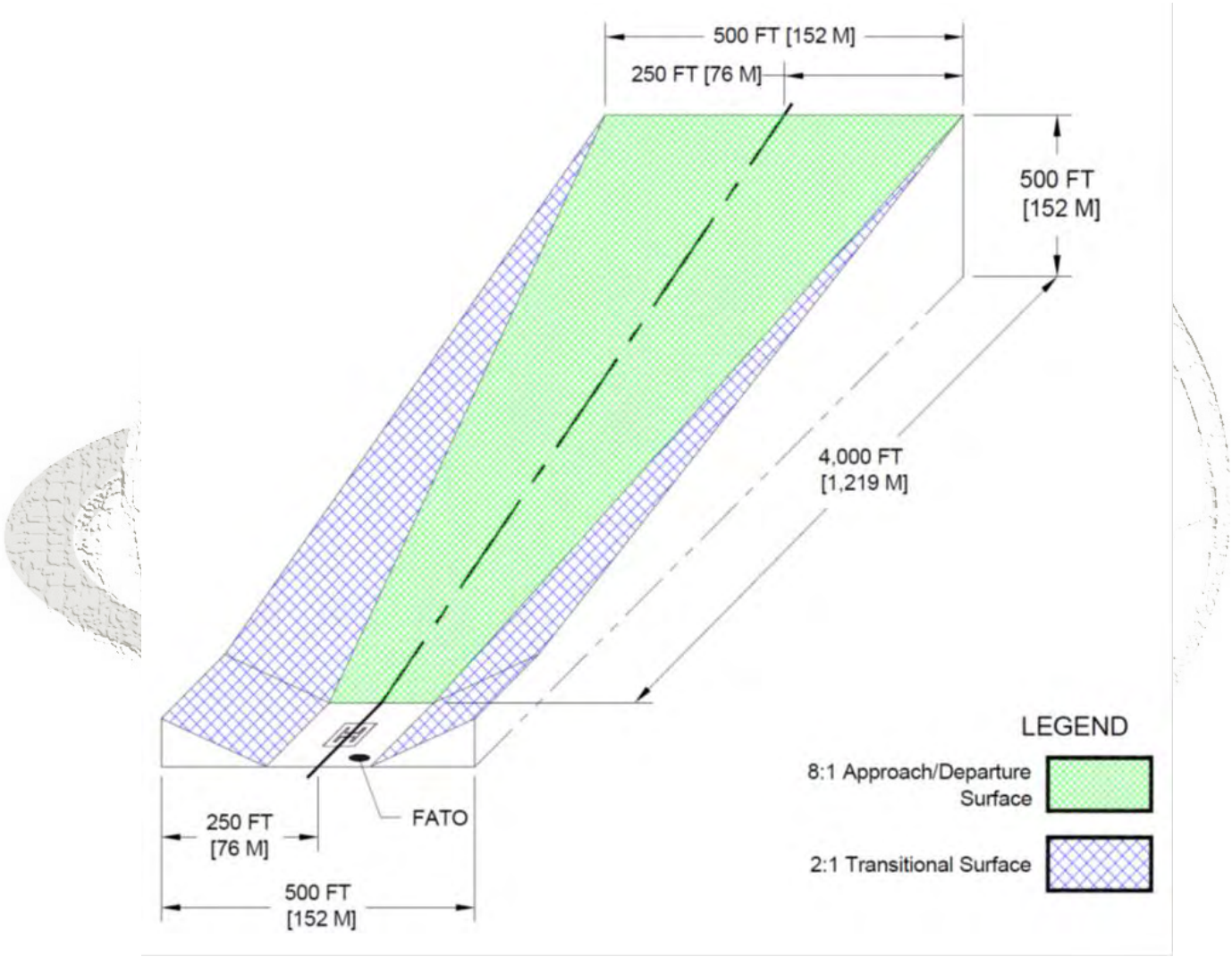
Heliport Site Location



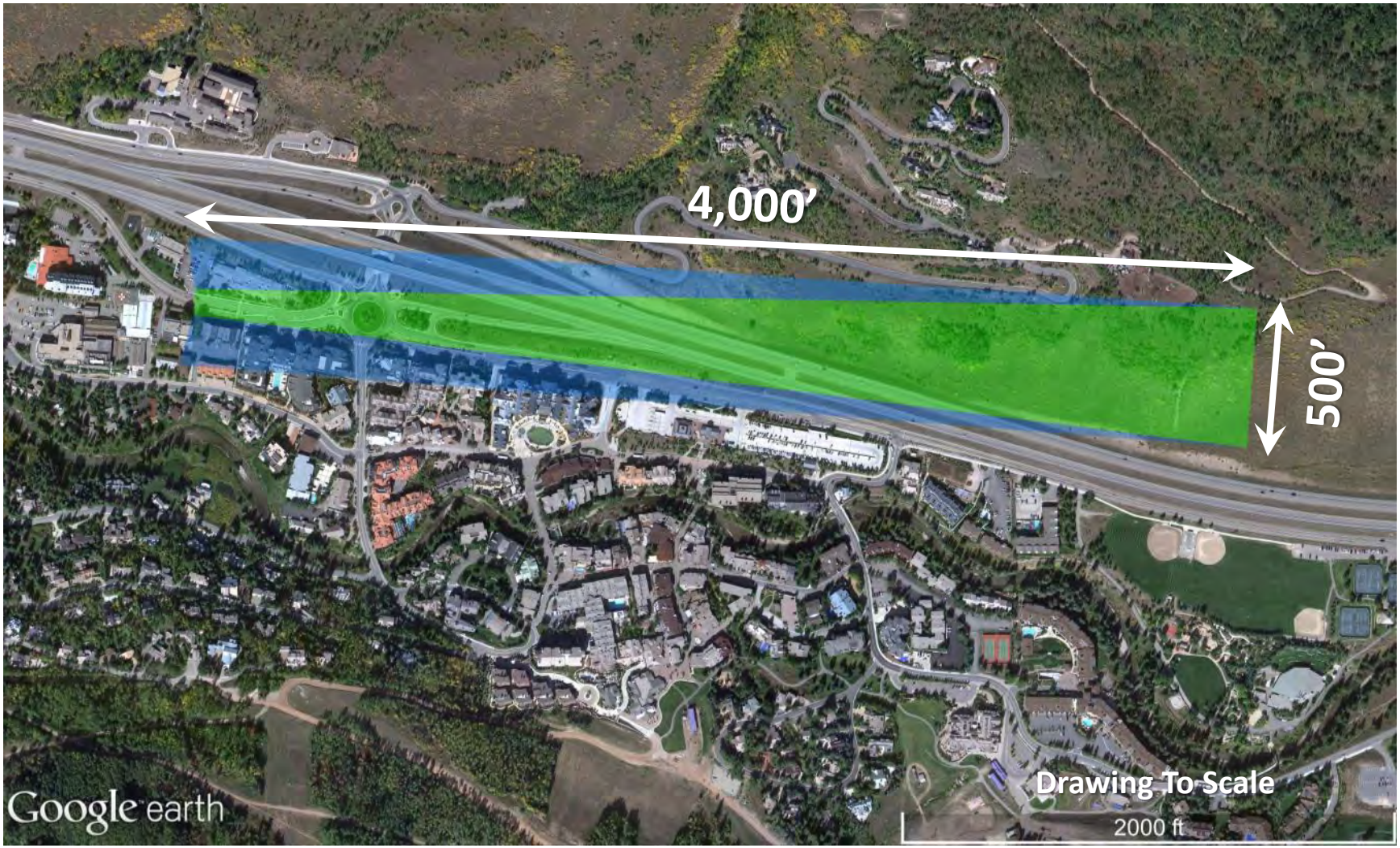
TLOF with Extended FATO



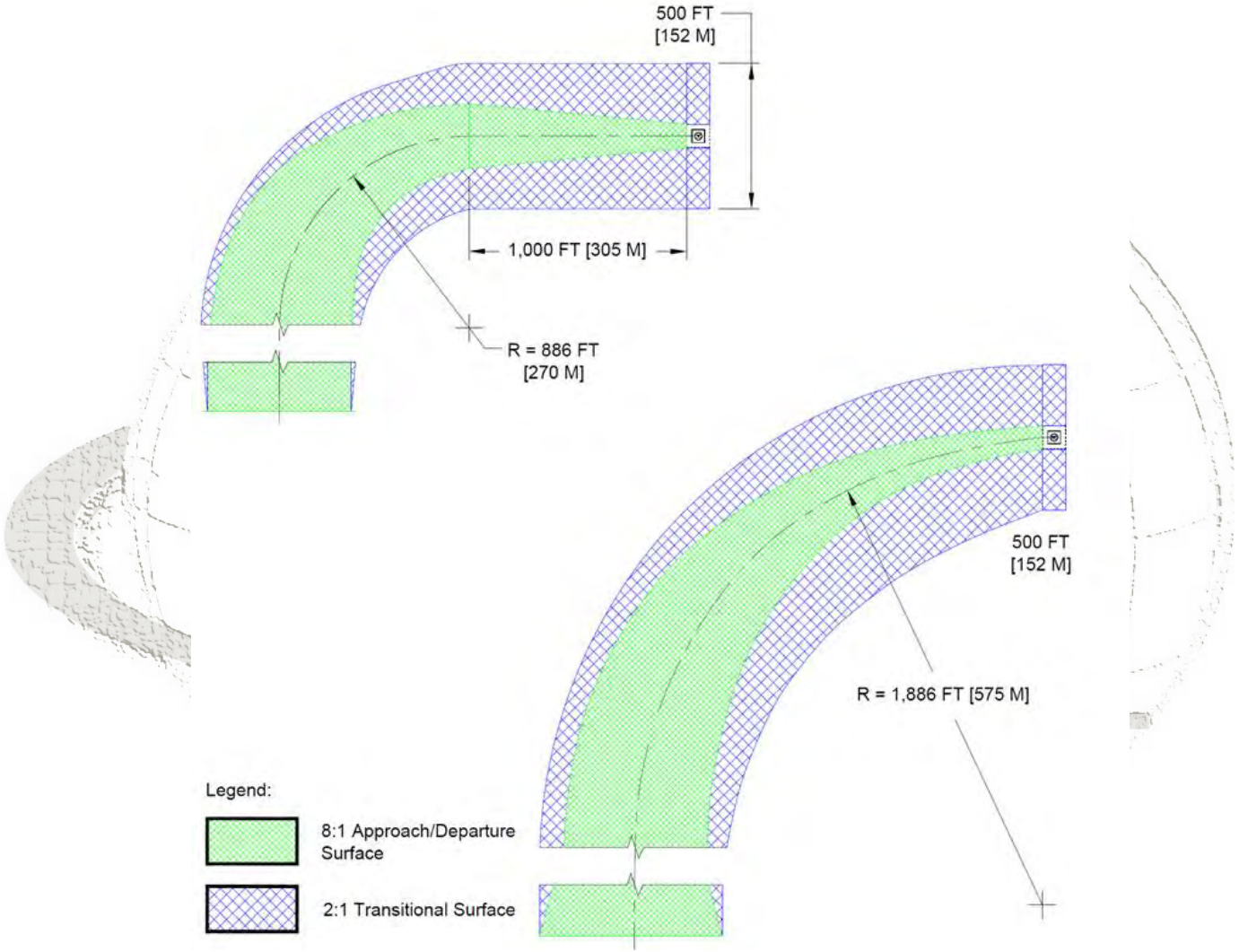
Airspace
Straight-In App/Dep Path



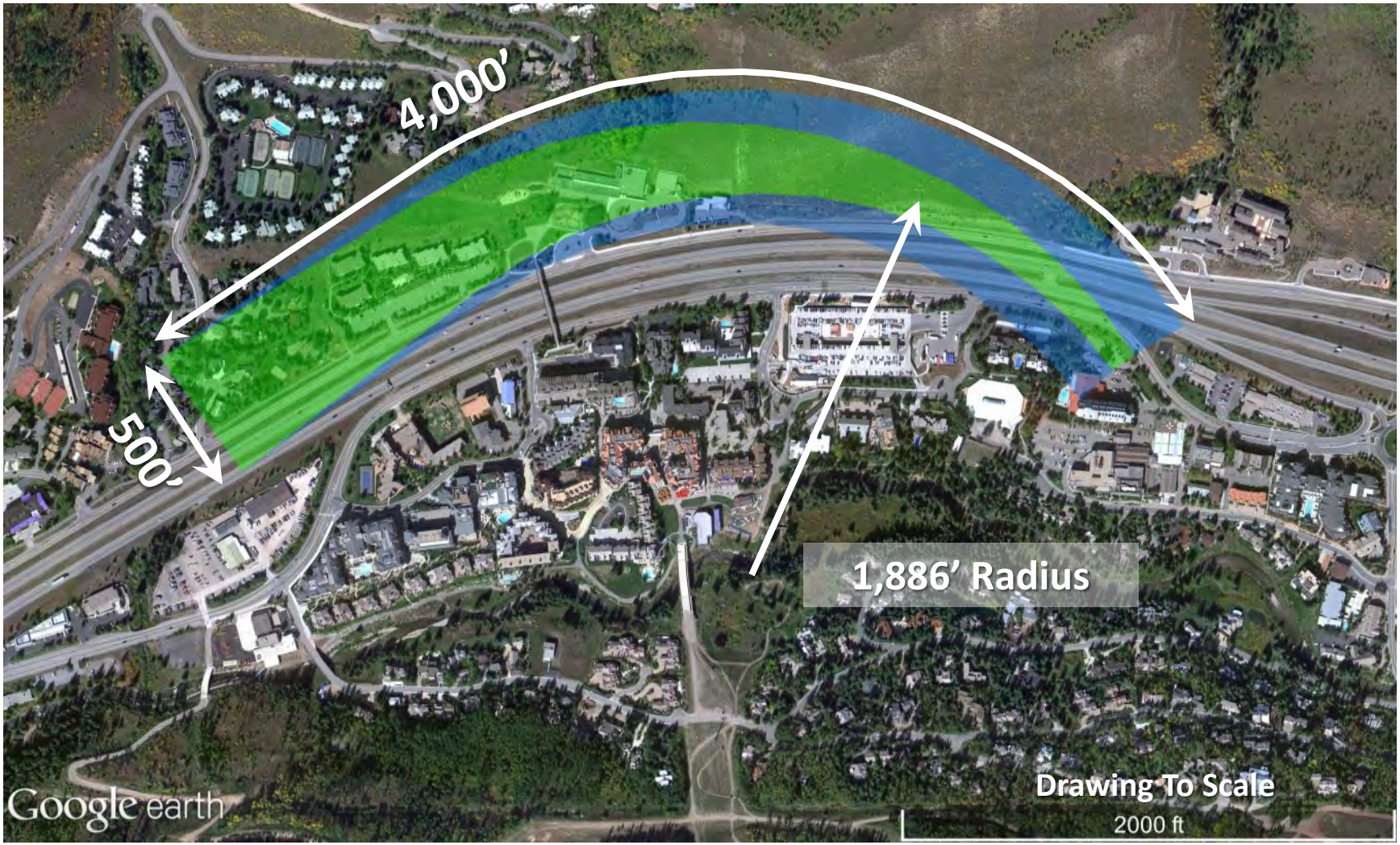
Proposed East App/Dep Path



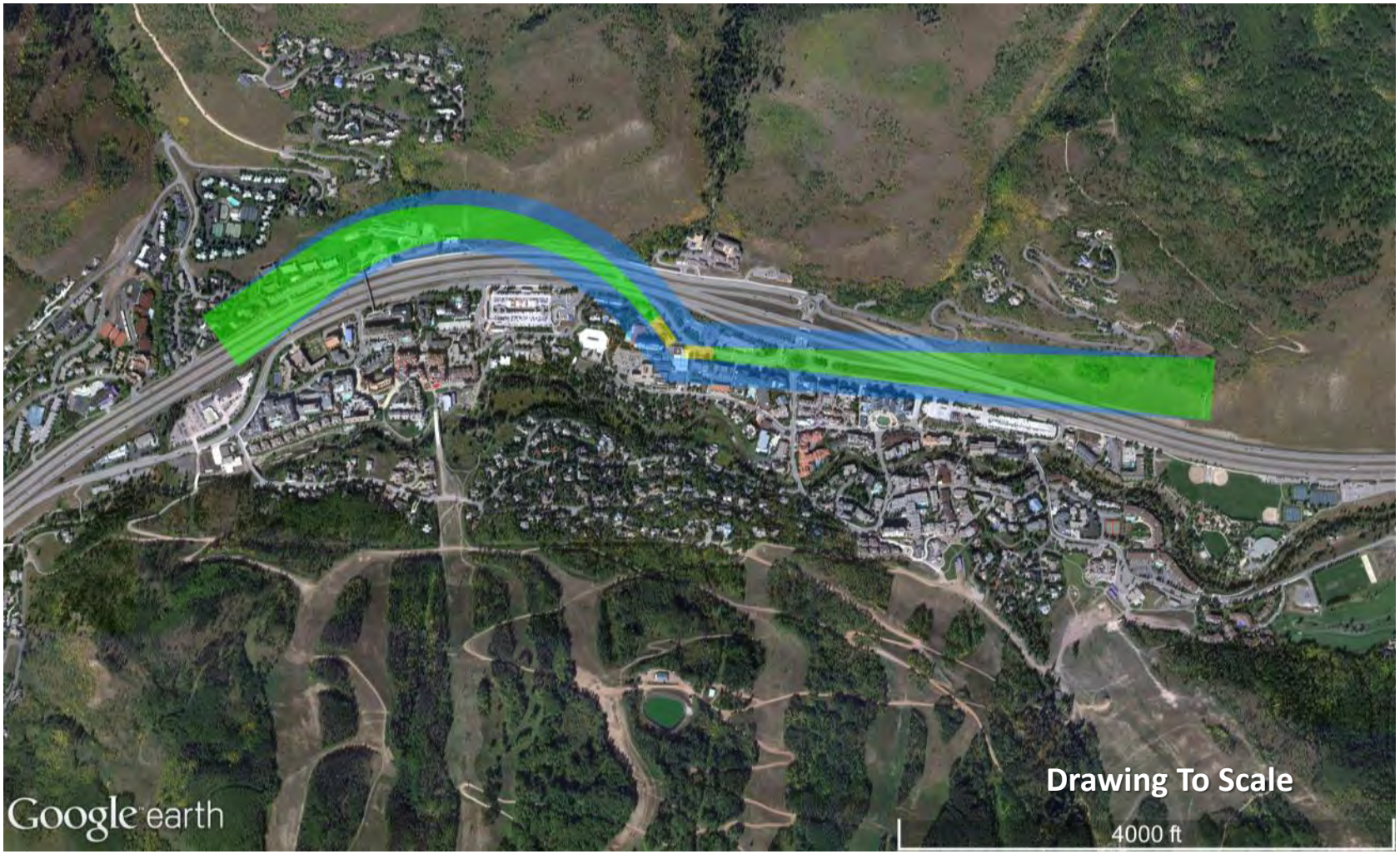
Airspace
Curved App/Dep Path



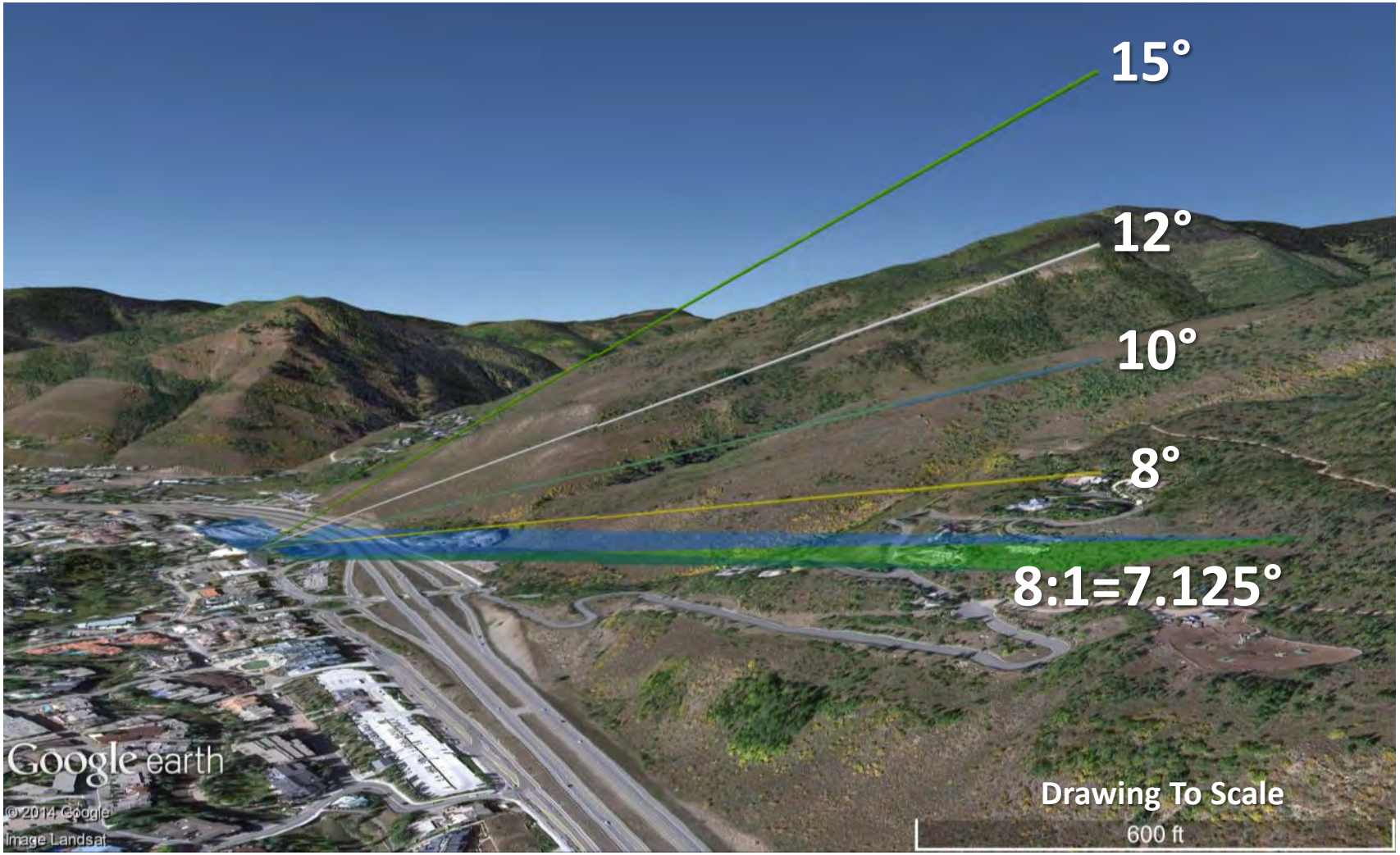
Proposed West App/Dep Path



Overall VVMC Airspace



Approach Angles vs. 8:1 Surface



Flight Simulation

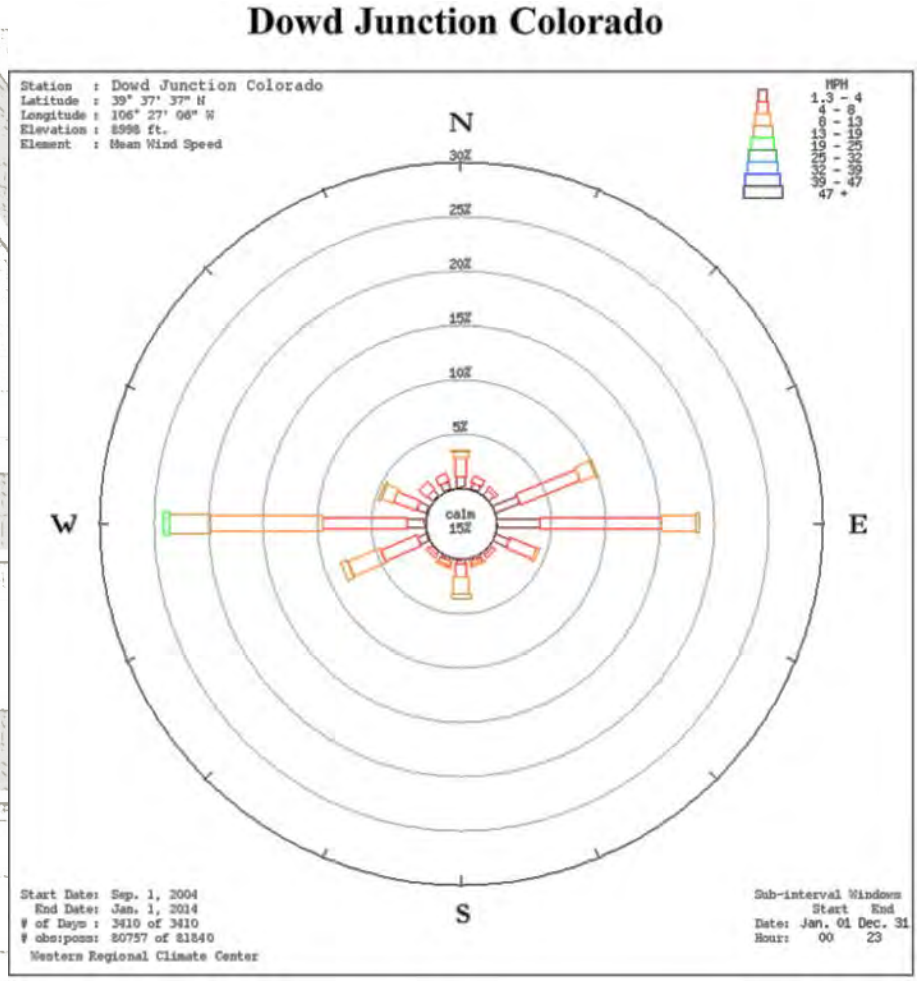
Local Wind Patterns

RAWS

REMOTE AUTOMATIC WEATHER STATION

Dowd Junction *(2004-2014)*

- **3.4 nm West of VVMC**
- **Lat: N-39° 37’ 37”**
- **Long: W-106° 27’ 06”**
- **Elevation: 8,998’**
- **NESS ID: 3241B960**
- **NWS ID: 051606**
- **Agency: USFS**



FAA Airspace Determination Process

- Develop preliminary design in accordance with FAA AC 150/5390-2C
- Complete FAA Form 7480 “Notice of Landing Area Proposal”
- Submit FAA 7480 to FAA Airports District Office
- FAA airports district office checks 7480 for completeness
- Project then assigned an airspace case number
- Application distributed to the appropriate lines of business within the FAA
- Flight standards assigns a trained airspace inspector. (Commonly a helicopter pilot who is a primary operations inspector and has completed the Evaluation course at TSI in Oklahoma City)
- The inspector will go to the site and meet with the component and review all of the heliport design elements
- Upon completion of the inspection a recommendation is rendered
- A determination letter is issued
- When the heliport is constructed and the FAA may opt for an additional inspection
- FAA Form 5010 Airport Master Record then issued

Expected Utilization

- **VVMC Retrospective Study on Helicopter Transport Utilization.**
  - ***JAN 2009 to DEC 2013***
  - **Average Number of Flights per year: 73**
  - **Estimated Utilization: 1 Every 5 Days**

Operational Specific Policies

- Only VVMC approved helicopter providers will be utilized
- Strict criteria for patient transport will be utilized
- Pilots will be protected from patient information

Pilot Decision Making

- **Decision to fly or not to fly will be determined strictly on:**
  - **Weather**
  - **Performance**
  - **Crew availability**

Approved HEMS Providers

- **Helicopter EMS Provider Requirements**
  - Part 135 registered and compliant operators
  - Formalized risk management program
  - Strict adherence to published HEMS weather minimums

Pilot Training Requirements

- **Prior to conducting operations at VVMC pilots will:**
  - Perform an onsite orientation flight
  - Complete an online pilot training program
  - Become familiar with site specific pilot briefing sheet information

Pilot briefing Sheets

Harrisburg, NC			Harrisburg Hospital
FAA Identifier	(TBD)	GPS ID (local)	
Sectional	Charlotte	Heliport Use	Hospital / PPR

LOCATION		
Lat/Long	35° 17' 09.20" N	080° 39' 58.98" W
(estimated)	35° 17.153' N	080° 39.983' W
(NAD 83)	35.28589° N	080.66638° W
Address:	9592 Rocky River Road, Harrisburg, NC 28075	
Description: Hospital is located in Cabarrus County and is 0.5nm east of exit-36 of I-485. Heliport is north of the hospital 175'.		

SIZE & WEIGHT LIMITS					
TLOF	60' x 60'	FATO	105' x 105'	MGW	35,000 lbs.

SITE INFORMATION							
Ground	X	Elevated		Surface Type	Concrete		
Elev.	723 ft. est.	Variation	7.7W	Nrst Wx / JQF	133.675		
Preferred App/Dep Paths	167° / 347°		310° / 130°				
Windsock	Yes	Fenced Site	No	Security	Yes		
Fire Suppression	Yes	(type)	Handheld Extinguisher				

LIGHTING							
Windsock	X	Perimeter	X	Lead-in	X	Flood	X
Beacon		Glide Slope		PCL		(freq)	

COMMUNICATIONS									
VHF	X	UHF		Simplex	X	Duplex		800Mhz	X-viper
Transmit	155.340					Receive	155.340		
PL	146.2	DPL				PL	146.2	DPL	

HAZARDS	
1. Magnetic interference on pad	2. Power lines on hospital perimeter
3. Hospital 175' south	4.
5.	6.

ADMINISTRATIVE			
Site Manager	Karen Corker	Office Phone	(704) 403-4840
ED Phone	(704) 403-9400	Security Phone	(704) 403-9499

NOTES:. Unmarked and unlighted power lines under the 167 °/ 347° app/dep path. All Non Carolina HealthCare helicopters coordinate with MedCenter Air Dispatch at (704) 512-7941 and radio freq. 155.325/PL-91.5.

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Safety Review Program

- **Review**
  - Every flight
  - Every turn down
  - Every question
  - Every issue
- **Involving**
  - Transport Teams
  - Pilots
  - Doctors
  - Administration

Heliport Protection Zone

- **FAA Heliport Design Advisory Circular 2012 Chapter 4 Hospital Heliports, Section 402 Applicability.**

"The standards in this chapter apply to projects funded under the Airport Improvement Program (AIP) or Passenger Facility Charge (PFC) program. For other projects/heliports, these standards are the FAA's recommendations for designing all hospital heliports.

Heliport Protection Zone

- **The FAA Heliport Design Advisory Circular states the following in Section 101:**

"When it is not feasible to meet all the standards and recommendations in this AC, consult with the appropriate offices of the Federal Aviation Administration (FAA) Office of Airports and Flight Standards Service to identify any adjustments to operational procedures necessary to accommodate operations to the maximum extent."

Heliport Protection Zone

- **The FAA heliport design advisory circular states the following in Section 106:**

"Heliport sites may be adjacent to a river or a lake, a railroad, a freeway, or a highway, all of which offer the potential for multi-functional land usage. These locations also have the advantage of relatively unobstructed airspace, which can be further protected from unwanted encroachment by properly enacted zoning."

Heliport Protection Zone

- **FAA 8900.1 (Guide used by FAA inspectors) Volume 8 General Technical functions, Chapter 3 Miscellaneous Technical Functions, Section 8-213 Heliports, B) Definitions and Elements of a Heliport, 5) Protection Zone, the guidance given is:**

  “For PPR (Prior Permission Required) heliports, a protection zone is optional”.

Heliport Protection Zone

- **FAA 8900.1 (FAA Inspectors Guidance) goes on to say the following:**

"In many situations, portions of the approach/takeoff paths can use the airspace existing above public lands and waters, freeways, streets, parks, rivers, and lakes."

Heliport Protection Zone

- **The Heliport Protection Zone was not developed due to any accidents which have occurred in the helicopter industry.**

THANK YOU

HELIEXPERTS INTERNATIONAL LLC.
Formerly Raymond A. Syms & Associates

Veteran Owned and Operated