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## **PBN SG/6 Meeting**

### **Performance-based Aerodrome Operating Minima PB-AOM**





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**Overview**

**Standards**

**Implementation**

**Examples**



# Overview



**Aerodrome Operating Minima possible**



# Overview

**Approach  
Classification**

**Aerodrome  
Infrastructure**

**Performance-based  
Aerodrome Operating  
Minima**

**Performance-based  
Navigation**

**Enhanced Visual  
Displays**

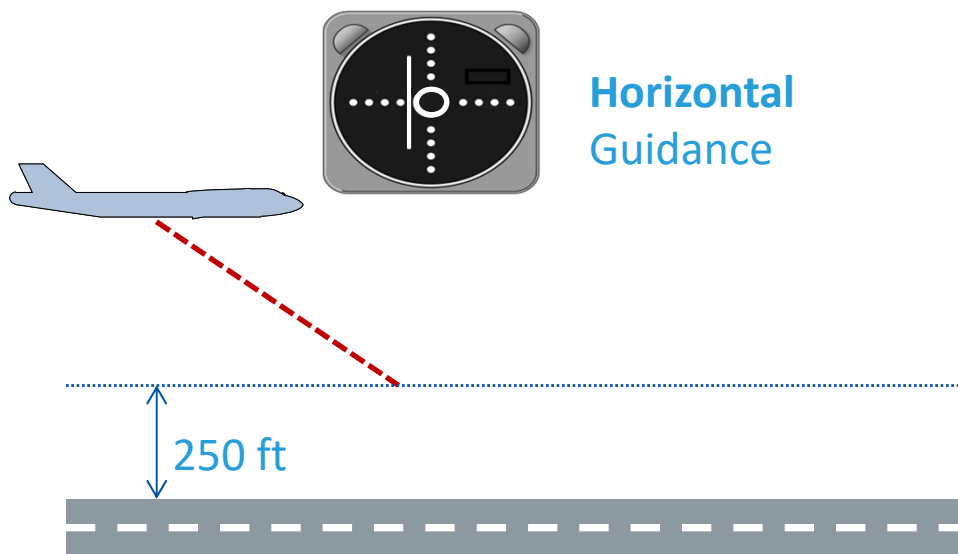


# Approach Classification

- **Defines Approach Operations**
  - Removes Operational use of
  - Precision Approach;
  - Non-Precision Approach
  - Approach with Vertical Guidance
- No reference to sensor or navigation aid
- **Performance Based**



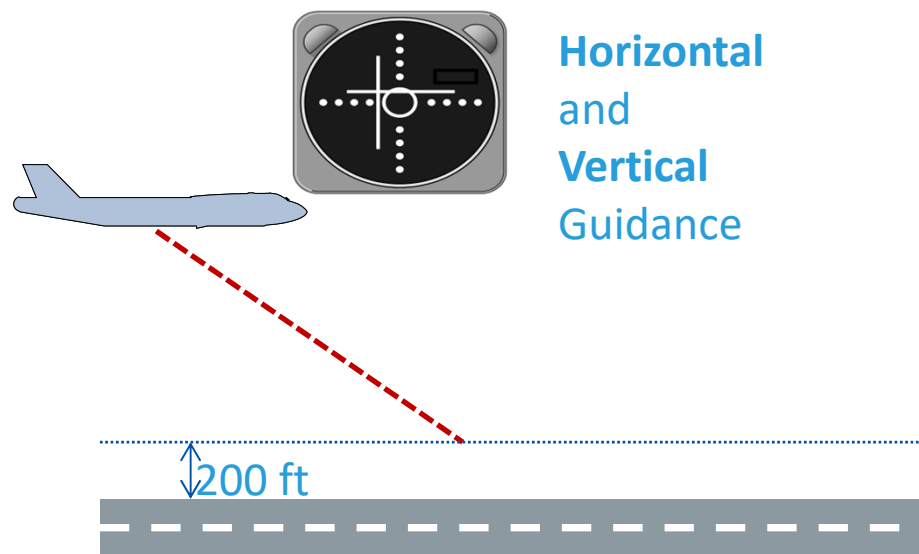
## Type A 2D



Horizontal  
Guidance

**Type A:** Instrument approach  
operation 250' or **above**

## Type B 3D



Horizontal  
and  
Vertical  
Guidance

**Type B:** Instrument approach  
operation **below** 250'



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## Aerodrome Infrastructure

- Performance-based classification allows for gradual **phased improvements**
- No large step-change in costs to gain improvement in Operating Minima



## Aerodrome Infrastructure

- Improvements can be:
  - Visual aids
  - Lighting
  - Standby systems
  - RVR measuring equipment





## Performance-based Navigation

- PBN allows vertically guided Approaches at all runways
  - APV (Approach Procedure with Vertical Guidance)
- All States ***urged*** to provide all instrument runways ends with a PBN Approach
  - *Assembly Resolution A37-11*



- No expensive ground based infrastructure





## Enhanced Visual Displays

- Potential for further benefits
- Performance **enhancements** lead to **lower** minima
  - Basic principle of a performance-based system
- Can be used in all situations



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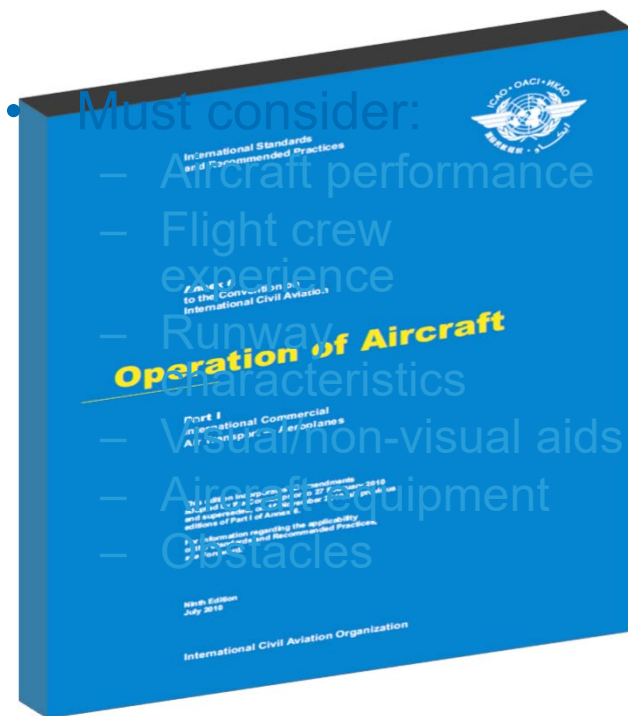
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# Standards

- Aerodrome Operating Minima
  - Paragraph 4.2.8 outlines Operators requirement to establish



## Standards

- Paragraph 4.2.8.1.1 outlines operational credits for use of
  - HUD, EVS, SVS, CVS
- Credits include:
  - Minima below aerodrome operating minima
  - Reduced infrastructure requirements
  - Reduced visibility requirement





# Standards

- The provisions already exist, they can be used right now



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**Overview**

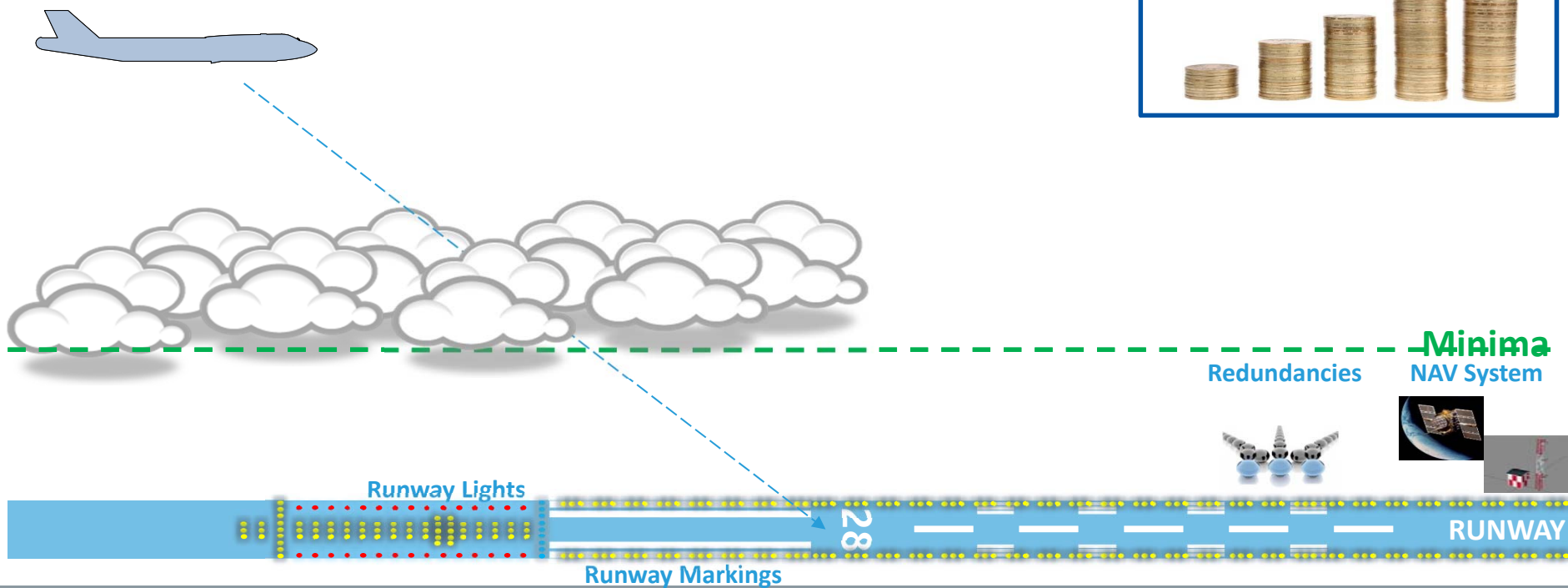
**Standards**

**Implementation**

**Examples**



### Traditional Requirements



### INVESTMENT



Minima  
NAV System

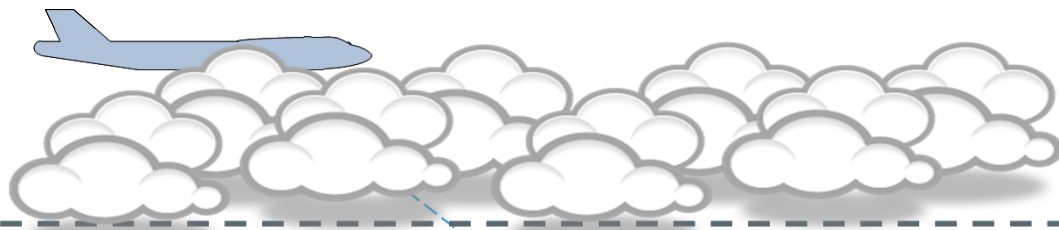
Redundancies





# Performance-based Requirements

## INVESTMENT



Minima

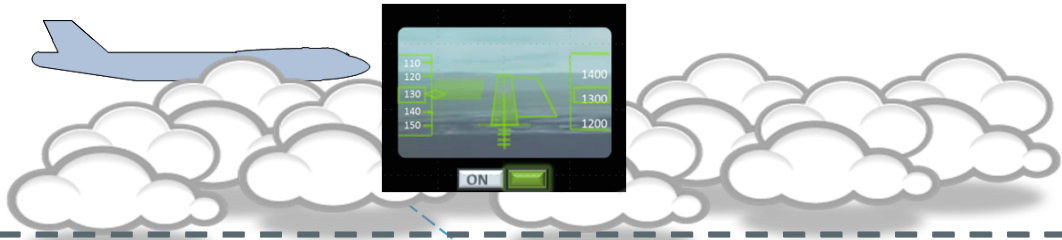
Minima

Redundancies NAV System





Alternative path



Basic Minima

Advanced aircraft benefit

Advanced

NAV System



Runway Markings



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**Overview**

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# Franklin County (KFSO)



Non-precision runway

HIGHGATE, VERMONT Al-6141 (FAA) 14345

WAAS CH 48900	APP CRS W01A	Rwy Idg TDZE 3000 228	Appt Elev 228
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**RNAV (GPS) RWY 1**  
FRANKLIN COUNTY STATE (F'SO)

Circling to Rwy 19 NA at night. Baro-VNAV NA when using Flattsburgh altimeter setting. For uncompensated Baro-VNAV systems, LNAV/VNAV NA below -1.5°C (5°F) or above 5.4°C (130°F).  
 When VGS (map, Straight-in/Circling Rwy 1 procedure NA at night.  
 DME/DME RNP-0.3 NA. Visibility reduction by helicopters NA.  
 When local altimeter setting not received, use Flattsburgh altimeter setting and increase all DA 55 feet and all MDA 60 feet; increase LNAV/VNAV all Cals and LNAV and Circling Cat B visibilities 1/2 mile.

MISSED APPROACH: Climb to 1100 then climbing left turn to 3000 direct JUTEK and hold.

AWOS-3 119,025	BURKINGTON APP CON (EAST) 121.1 (WEST) 360.8	GCO 121.725	UNICOM 122.8 (CTAF) 0
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	5.7 NM	
CATEGORY	A	B
LPV DA	512-1	284 (300-1)
LNAV/VNAV DA	1024-2½	796 (800-2½)
LNAV MDA	920-1	692 (700-1)
CIRCLING	920-1	692 (700-1)

ELEV 228 TDZE 228

FRANKLIN COUNTY STATE (F'SO)  
RNAV (GPS) RWY 1

NE-1, 15 SEP 2016 to 13 OCT 2016

NE-1, 16 SEP 2016 to 13 OCT 2016



# Operational credit - example







## Operational credit – States regulations

- UAE CAR OPS 1 1.785 AND Appendix 1 to CAR-OPS HUD, VS or Equivalent Head Up Display (HUD), Vision System (VS) or Equivalent.
- QCAR Air Operations Annex IV: Part-CAT : CAT.OP.MPA.110 Aerodrome operating minima
- Oman CAR-OPS 1.430 Aerodrome Operating Minima – General
- GACAR PART 91 – GENERAL OPERATING AND FLIGHT RULES 91.403 LVO: Use of Enhanced Vision Systems or Head-Up Display.
- Bahrain ANTR OPS 1.785 Head Up Display (HUD) or Equivalent Displays and Appendix 1
- Jordan JCAR-OPS.1 OPS 1.430 Aerodrome operating minima – General
- Egypt Part 91 General operating and flight rules 91.146 Aerodrome operating minima



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# Questions?

