

# Runway Safety Team



Federal Aviation  
Administration

## Operational Safety for Airport pavement Construction

Presented to: RST - Panama

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and this pickup.





# Presentation outline

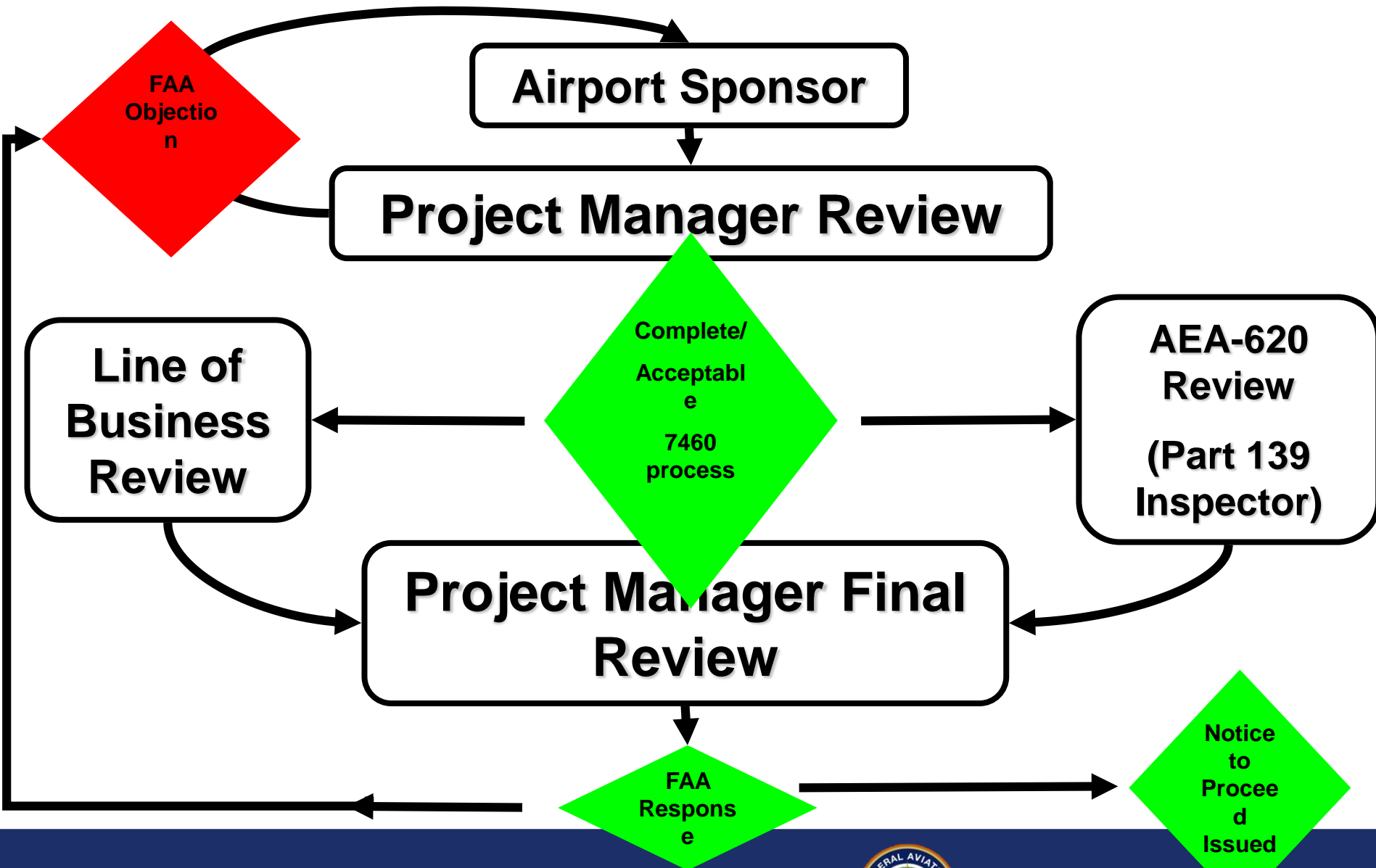
- **The FAA responsibilities: Regulations, external guidance (AC) and internal guidance (Orders)**
- **The airport operator's responsibilities**
- **The consultant's role**
- **The contractor's role**
- **Guidance for developing a construction safety and phasing plan**
- **Application in the field on FAA guidance**



# Regulation and internal guidance

- Protection of navigable airspace
- 14 CFR Part 77: regulation for **notification** to FAA proposals affecting navigable airspace
- 14 CFR Part 139: applies to certificated airport where air carrier operate
- Order 7400.2 – FAA procedure for conducting the airspace study (OE/NRA)
- AIP handbook: Requirement for ADO project managers for projects funded under AIP

# FAA Review Process



# Coordinating the study - LOBs

- **AT- Obstruction Evaluation Specialist (OES):  
Airspace – M&L**
- **AT –Office of System Support Group (OSG):  
Controllers impact (ATCT)**
- **Flight Procedures Office (FPO): IFR procedures**
- **Flight Standards (FS): Safety of people and  
property on the ground, site inspection**
- **AT- Tech-Ops: NAVAIDs, VISAIDs, Line-of Sight,  
Frequency Management**
- **Airports – AP: design standards, CSPP, Part 139**



# External guidance: Advisory Circulars

- Airport Design AC 150/5300-13
- Advisory Circular (AC) 150/5370-2E, *Operational Safety on Airports During Construction*, contains guidelines to develop and implement Construction safety and Phasing Plans
- Standards for Airport Marking AC 150/5340-1.
- Design and Installation Details for Airport Visual Aids, AC 150/5345-30 (lighting)
- Standards For Airport Sign Systems, AC 150/3540-18.

# Airport Operator's Responsibilities

- Ensure operational safety is not degraded by hazards or marginal conditions associated with construction activity on the airport.
- Provide and maintain safe clearances between construction activities and aircraft.
- Close affected area or pull back personnel and equipment for aircraft movement during construction.
- Get necessary coordination and permits with the FAA



# Airport Operator's Responsibility

- Coordinate the development and approval of construction safety (phasing) plan.
- Require contractors to adhere to safety plans.
- Coordinate construction. (contacts list)
- Notify users. (NOTAM)
- Training.
- Control vehicles.
- Comply with standards
- Inspect and resolve deficiencies found



# Airport Operator's Responsibilities at certificated airports

- **Compliance with FAR Part 139 Regulation and ACM during construction —**
  - Part 139.341, Identifying, marking, lighting and reporting construction and other unserviceable areas
  - Underground utility protection
  - Condition of movement areas and safety areas
  - Self-inspection and airport condition reporting
  - Emergency access roads

# Consultant's role

- **Develop plan for safe and efficient construction activities minimizing airport operation**
- **Preparing construction safety and phasing plan**
- **Prepare contract documents**
- **Provide technical advices to airport operators**



# Contractor's role

- **Familiarize and adhere to plan**
- **Recommend modification of plan if applicable. If changes are made to original coordinated plan with the FAA, the revision has to be coordinated as well**
- **Get all necessary training**
- **Coordinate with airport operations for movement on the airfield**
- **Work with airport operator for issuance of NOTAM**
- **Provide POC**



# Safety Plan Elements: AC Paragraph 2-2

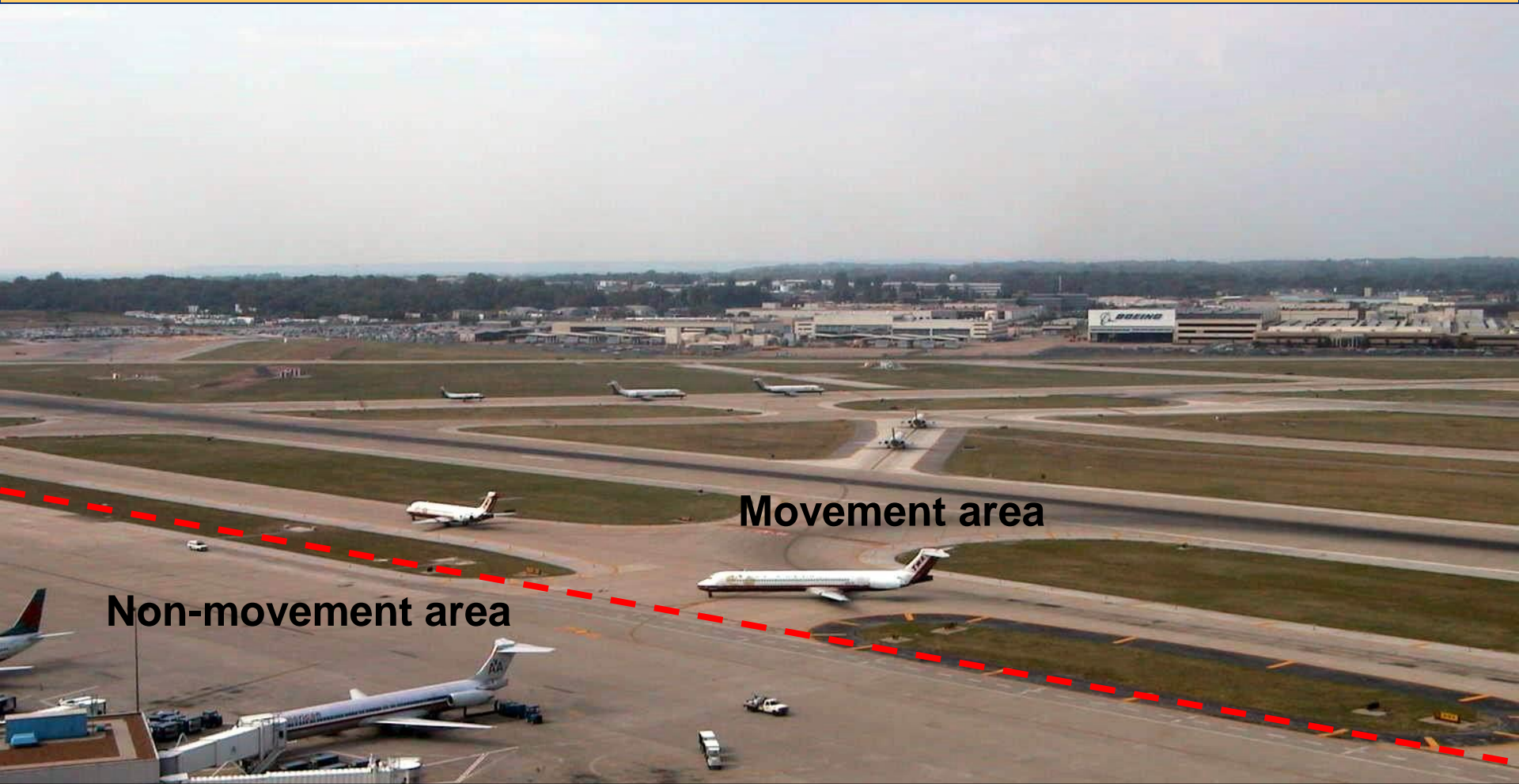
- Scope of work
- Marking and lighting
- Safety Areas, OFA, OFZ and TSC
- Affected area on the AOA
- Barricades/fencing
- Equipments to be used
- NAVAID protection
- Visual aids
- Wildlife control
- Limits
- Stock piles
- Trenches and excavation
- communication
- ARFF
- FOD
- Hazmat
- NOTAM
- Training and Inspections
- Utility locations
- Point of contacts
- Penalties

# Air Operations Area (AOA)



The **Air Operations Area** is the portion of the airfield inside the perimeter fence where airport safety and security regulations apply.

# Movement Areas – Towered Airports



Non-movement area

Movement area

The **movement area** is the portion of the airfield where aircraft operate under the control of the Air Traffic Control Tower (ATCT). The movement area includes runways and taxiways. Normally, the apron area is non-movement area, however, at some airports, a taxiway may be located adjacent to the apron area and be under the control of Air Traffic Control.

# Safety Phasing Plan

An aerial photograph of an airfield under construction. The central focus is a large, circular excavation site with multiple levels and piles of earth. Surrounding the excavation are various pieces of construction equipment, including cranes and trucks. The airfield's runways and taxiways are visible in the background, along with green grassy areas and some buildings. The overall scene depicts a complex construction project in progress.

**Coordinates of critical points of the airfield  
(batch plant, stock piles, cranes, contractor  
staging area, etc.)**

# Safety Phasing Plan

**Delineate and separate construction areas from aircraft operating areas**



# Safety Phasing Plan

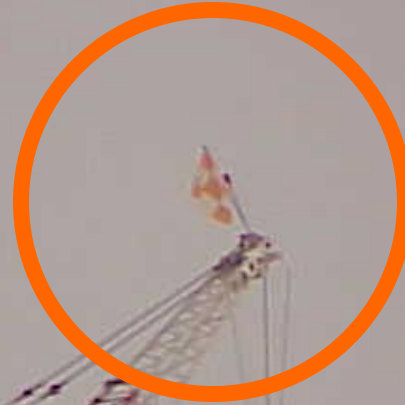
Separate construction activities from movement and safety areas

MAY 3 2004

# Safety Phasing Plan



Identify all construction access & egress routes on the airfield



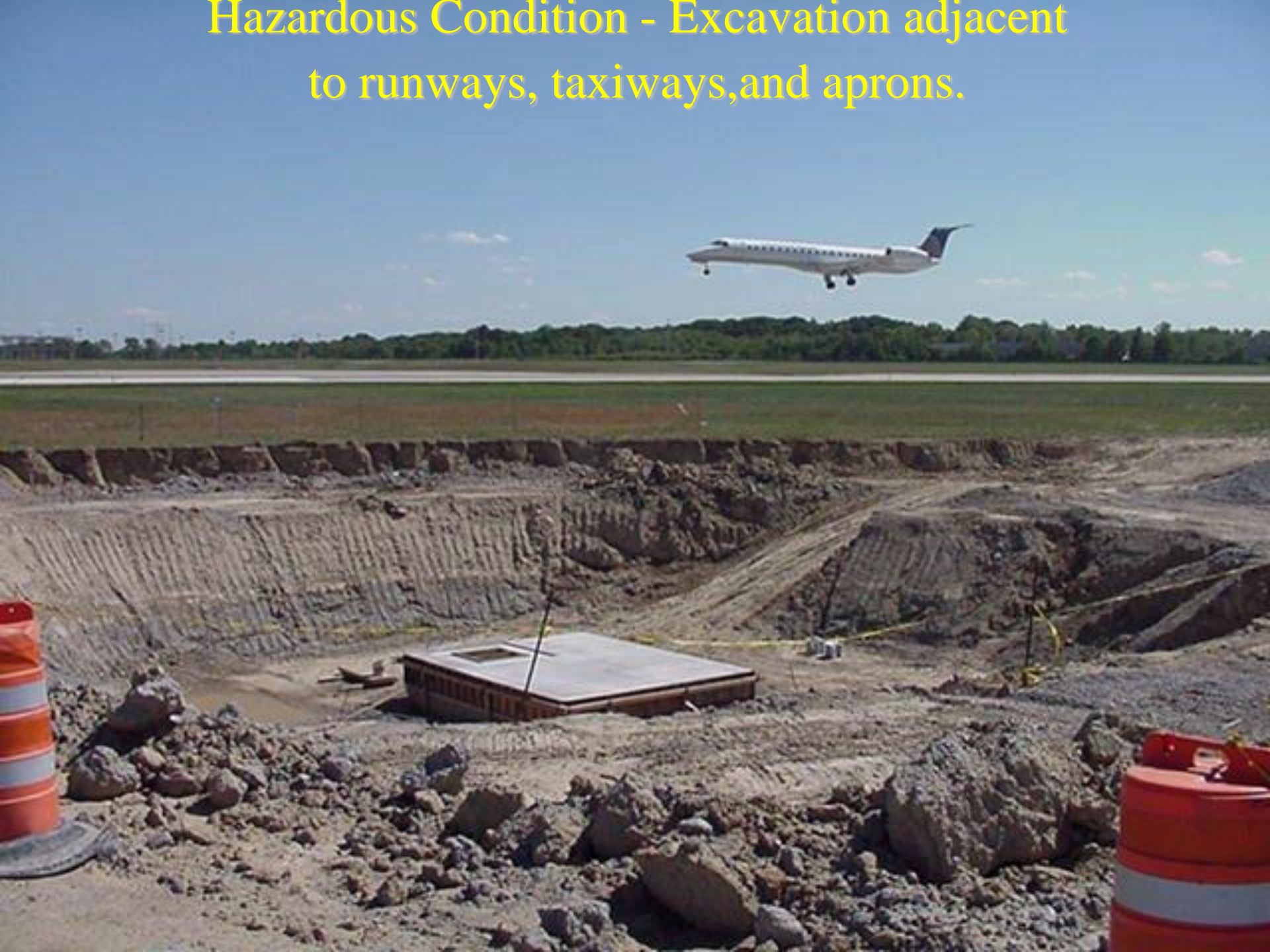
## **HAZARDOUS CONDITIONS:**

- **Tall but relatively low visibility units such as cranes or drilling equipment in safety areas or approach zones.**

A photograph of a Northwest Airlines airplane on a snowy tarmac. The airplane is white with a red tail and the word "NORTHWEST" visible on the fuselage. The ground is covered in snow, and there are some orange traffic cones in the foreground. Two orange circles are drawn around the text: one around the word "Mounds" and another around the word "structures".

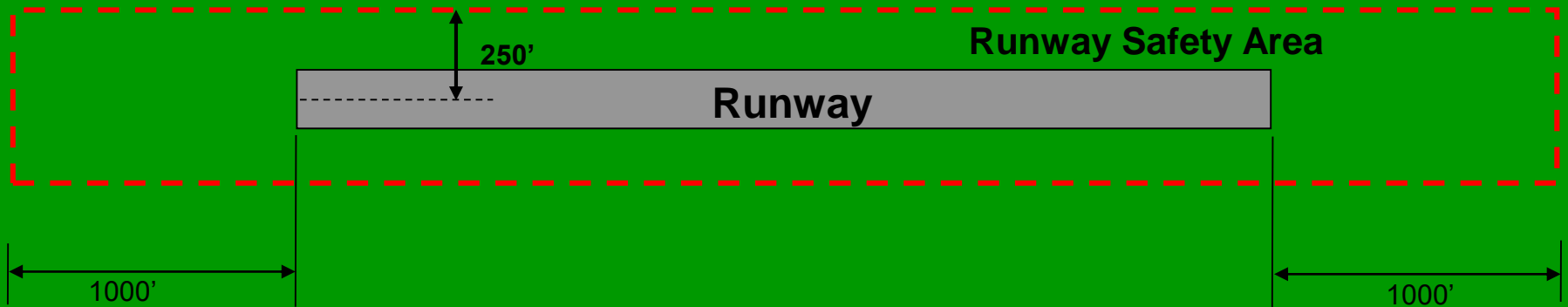
**Mounds or stockpiles of construction material, earth, temporary structures, and other materials in proximity to movement areas or approach zones.**

Hazardous Condition - Excavation adjacent to runways, taxiways, and aprons.



# Runway Safety Areas

## Typical Runway Used by Airlines



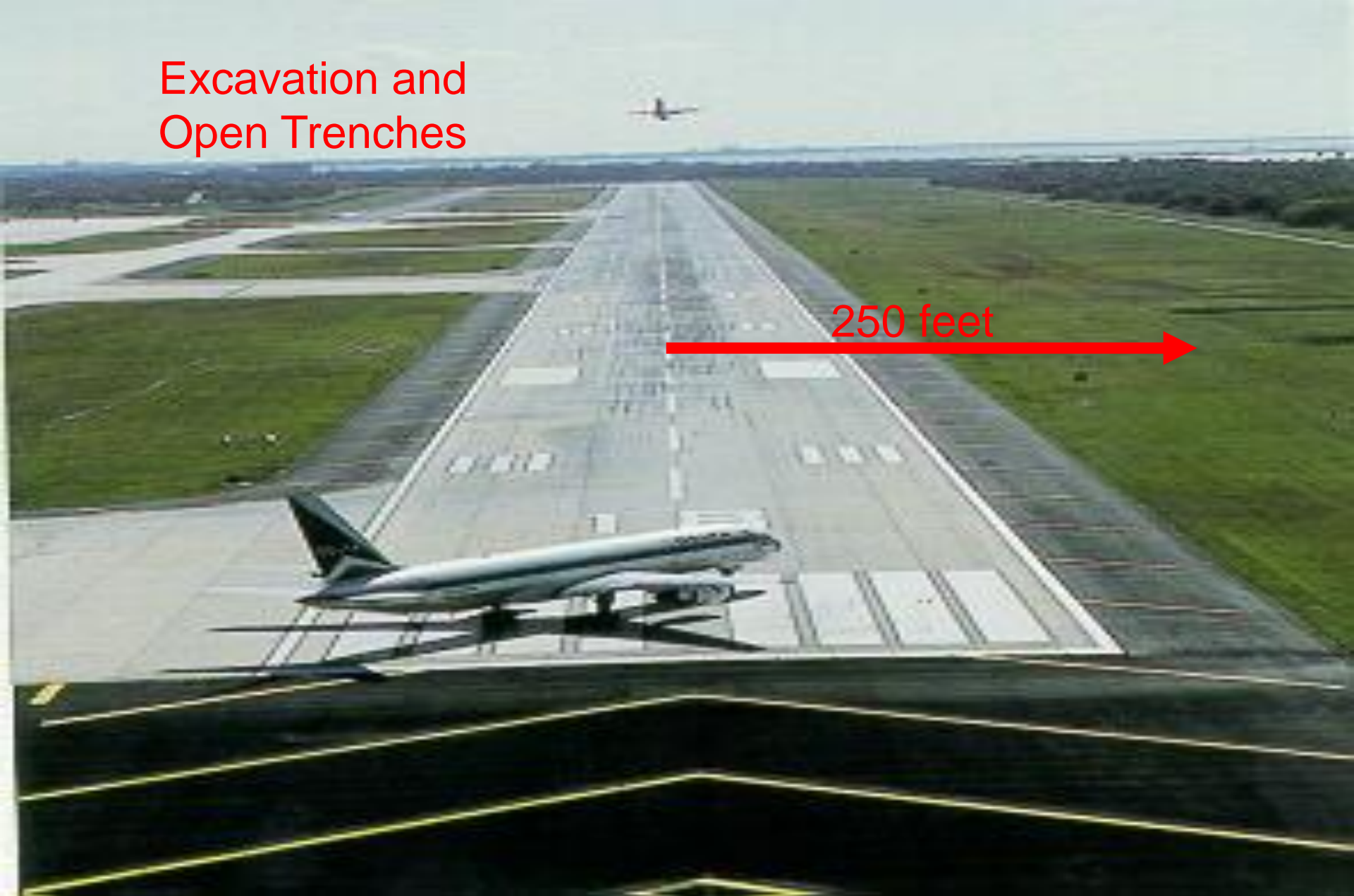
**Runway safety area** dimensions are based on the size and landing speed of the aircraft using the runway. Typically, for runways used by airlines, the runway safety area extends 250 ft from runway centerline and 1000 ft off each end.

The purpose of the runway safety area is to minimize the damage to an aircraft that inadvertently leaves the runway. For this reason, it must remain “sterile” during aircraft operations.



However, during some construction projects, it is necessary for work to be conducted in a portion of the runway safety area. In these situations, construction work may be conducted no closer than 200 feet from the runway centerline. If these conditions cannot be met, the runway must be closed to air carriers.

# Excavation and Open Trenches



# Runway approach areas

- Existing Construction equipment should normally not penetrate a 20:1 approach surface for visual runways, or 34:1 approach surface for ILS runways. Recommend 34:1 approach surface for all carrier operations
- Existing Runway Safety Areas should be provided during construction by temporarily relocating the runway threshold
- Displacing landing threshold and use of declare distances is a tool that can be used
- FAA must approved less than existing RSA



# HAZARDOUS CONDITIONS

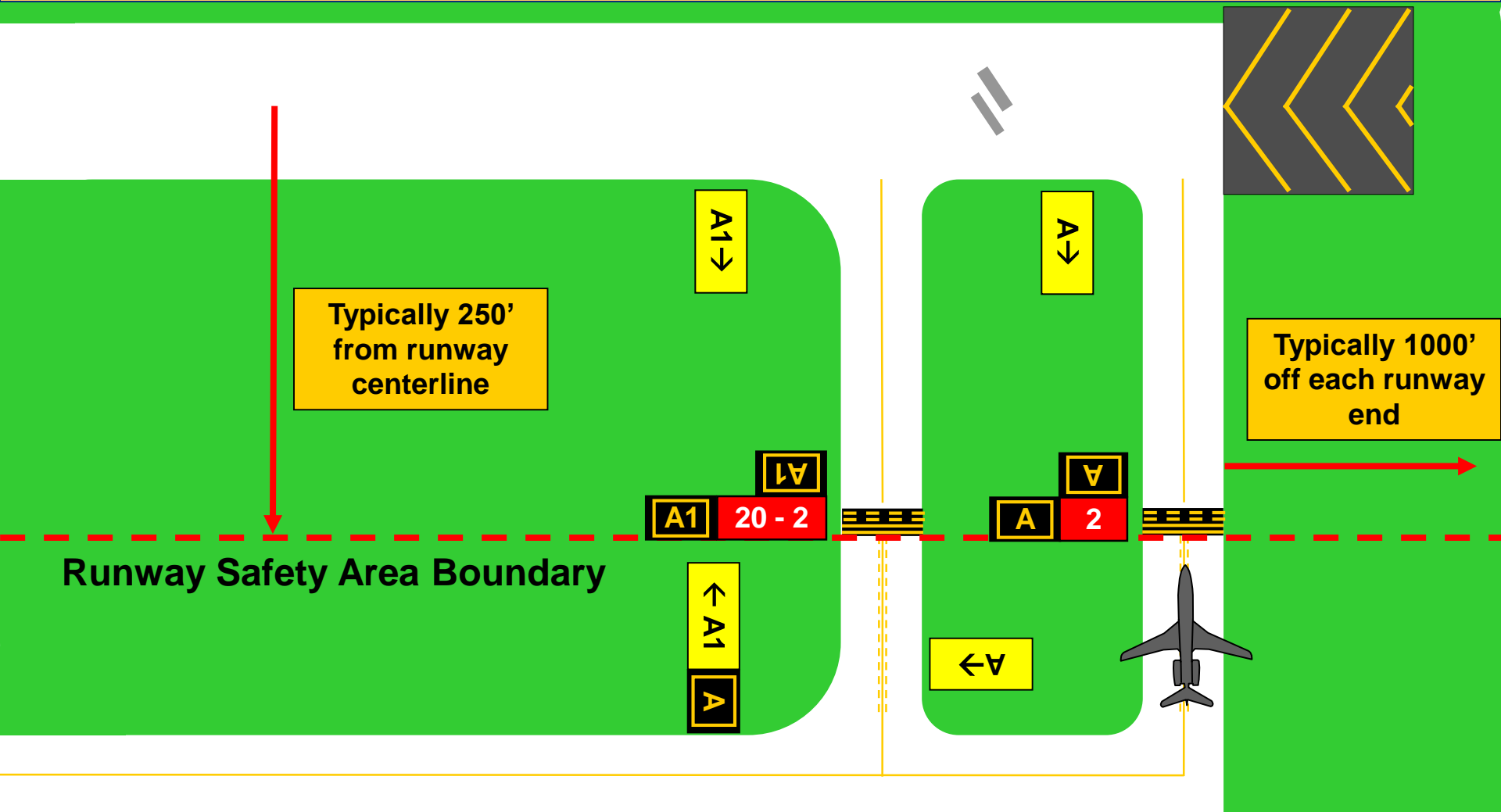


Attractions for birds such as trash, grass seeding, or ponding water on or near airport movement areas.

# Signage & markings

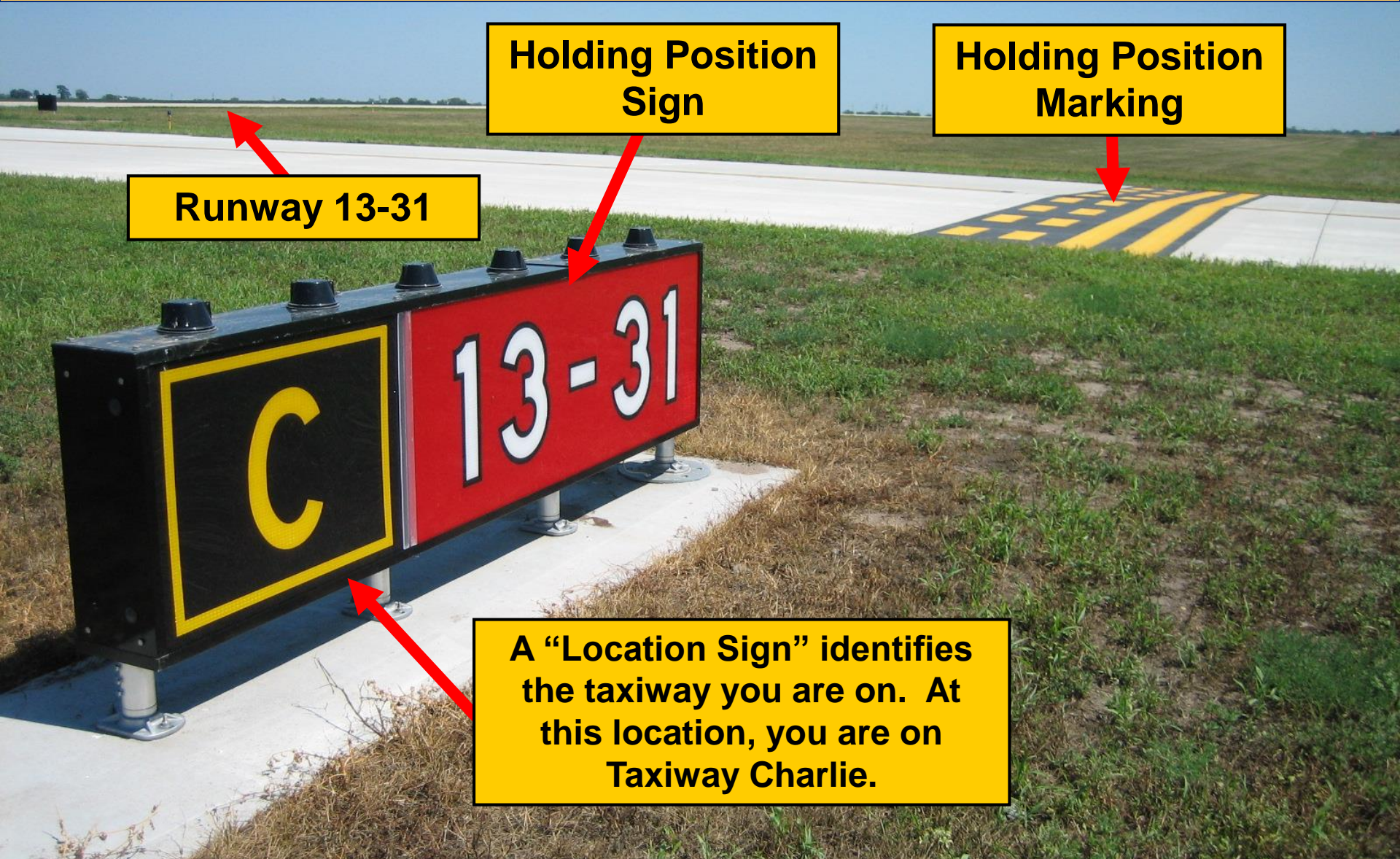


# Runway Safety Areas



To protect the runway and runway safety area, holding positions are installed at the boundary of the runway safety area on all taxiways that enter runways.

# Runway Holding Positions



Holding Position Sign

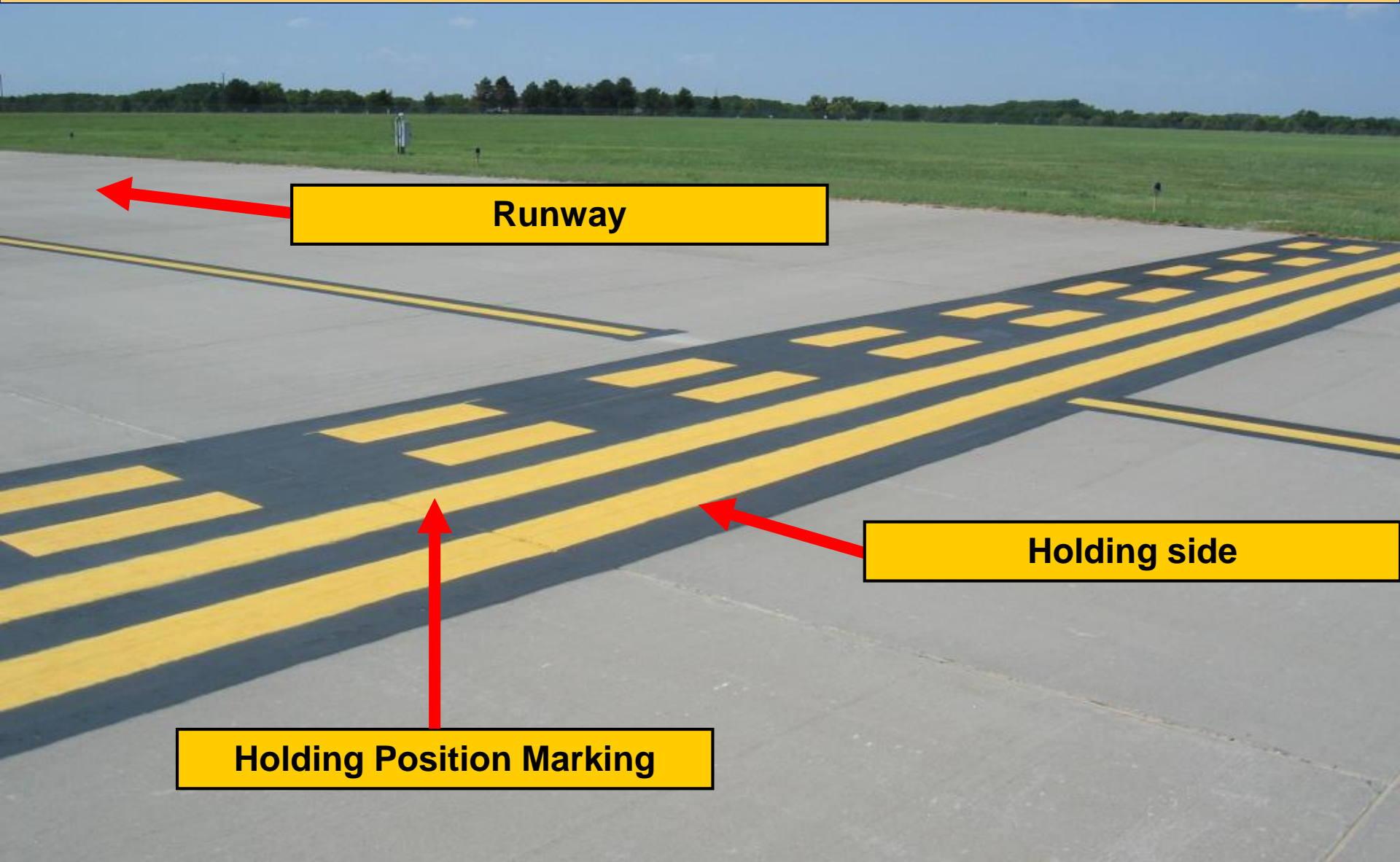
Holding Position Marking

Runway 13-31

A "Location Sign" identifies the taxiway you are on. At this location, you are on Taxiway Charlie.

Runway holding positions on taxiways have both a holding position sign and holding position marking.

# Runway Holding Positions



Runway

Holding side

Holding Position Marking

Runway holding position markings consist of two solid lines and two dashed lines. The solid lines are the holding side of the marking.

# Airport Construction Barricades



**Construction personnel have become confused and exited construction areas in the wrong direction, resulting in a surface incident or runway incursion.**

# Barricades/Red Lights



**Barricades used to mark construction areas or closed pavement must be as low as possible to the ground; low mass; easily collapsible upon contact with an aircraft or any of its components; and weighted or sturdily attached to the surface to prevent displacement from prop wash, jet blast, wing vortex, or other surface wind currents. (AC 150/5370-2E, Par 3-9 b)**  
**This particular barricade is designed to be filled with water.**

# Barricades/Red Lights



**Red lights for marking construction areas are required because of a problem with pilots confusing flashing yellow construction lights with in-pavement Runway Guard Lights.**

# Barricades/Red Lights



**This photo shows an example of a flashing red light that is visible 360 degrees. These type of red lights are recommended in situations where they need to be visible from all directions.**

# Barricades/Red Lights



**Another way to improve the 360 degree visibility of the flat light fixtures is to rotate one of the lights 90 degrees as shown in this photo.**

# Barricades/Red Lights



Highway type barricades may be too high for use adjacent to movement areas.



**Barricades are used to keep aircraft out of closed areas and to keep construction vehicles out of active movement areas. They look the same in both situations. Vehicle operators need to pay close attention when driving through or around barricades to make sure you are not entering an active movement area.**

# Barricades/Red Lights



**The use of concrete jersey barricades in the movement areas (adjacent to taxiways) is not acceptable. (AC 150/5370-2E, Par 3-9 b)**

# Special Safety Requirements

- Temporary Runway Thresholds
  - Lighting should be installed outboard of the runway surface, and could include threshold lights, runway end identifier lights (REILs), and other markings.
  - The extent of required lighting is directly related to construction duration and the level of aircraft activity.

# Marking Temporary Runway Thresholds



**Here is a temporary relocated threshold marking using white plastic material. However, white sandbags should have been used. The yellow and orange sandbags in this situation could be distracting to pilots.**

# Marking Closed Runways

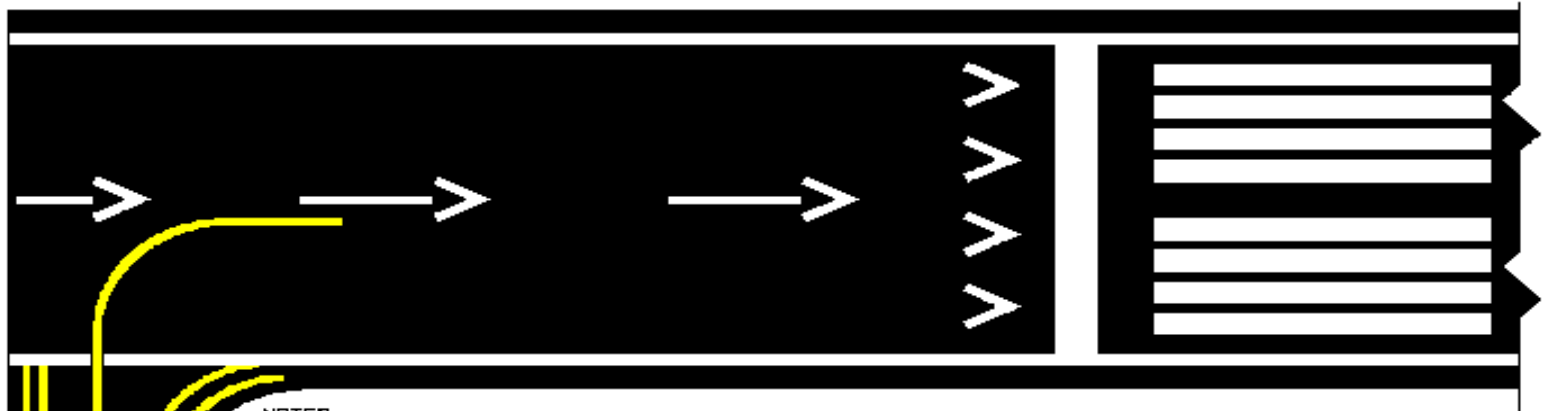


**Yellow X's at each runway end are used to mark temporarily closed runways. If sand bags are used to weight down the yellow X, they should also be yellow.**



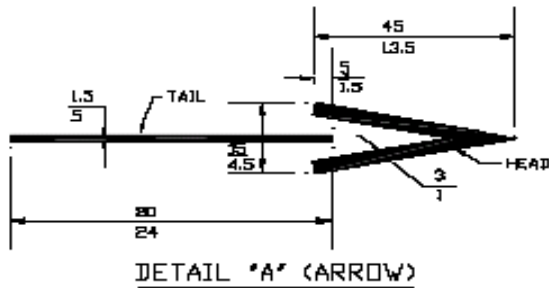
# Preferred visual aid to depict a temporary runway closure





**NOTES**

1. RUNWAY SIDE STRIPES, WHEN USED ON THE RUNWAY, EXTEND INTO THE DISPLACED AREA
2. RUNWAY MARKINGS (EXCEPT HOLDING POSITION MARKINGS), INCLUDING THOSE IN THE DISPLACED THRESHOLD AREA, ARE WHITE.
3. DIMENSIONS EXPRESSED AS  $\frac{\text{FEET}}{\text{METERS}}$  e.g.,  $\frac{10}{3}$

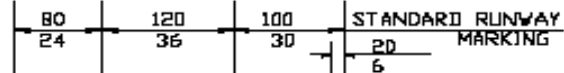


RUNWAY SIDE STRIPES (WHITE)

TAXIWAY CENTERLINE MARKINGS (YELLOW)

TAXIWAY EDGE STRIPES (YELLOW)

SEE FIGURE 11, DETAIL 'A'



SEE DETAIL 'A' FOR ARROW DIMENSIONS

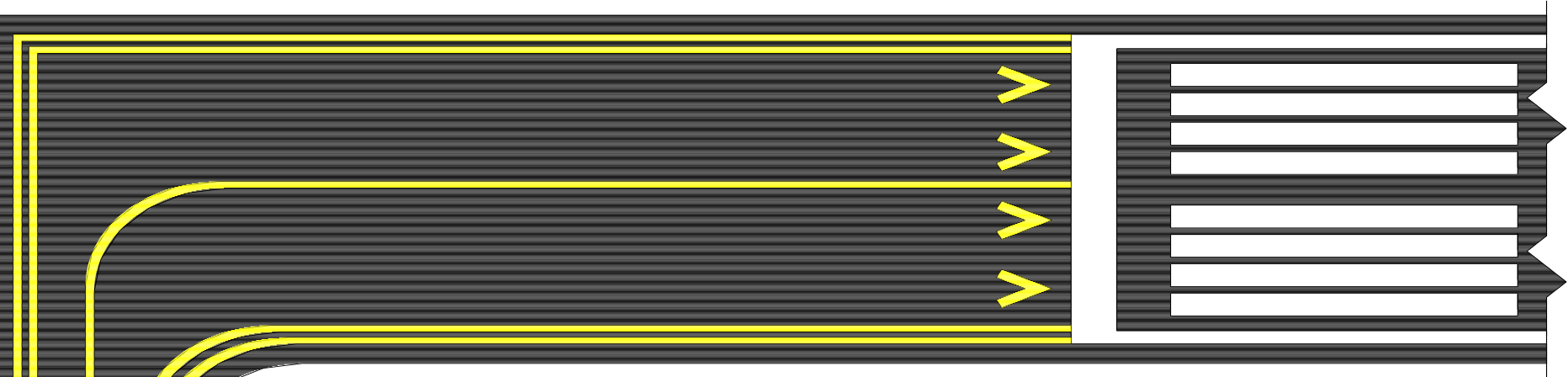
RUNWAY THRESHOLD IS AT OUTBOARD EDGE OF THRESHOLD BAR

SEE DETAIL 'A' AND TABLE BELOW \* = RUNWAY WIDTH

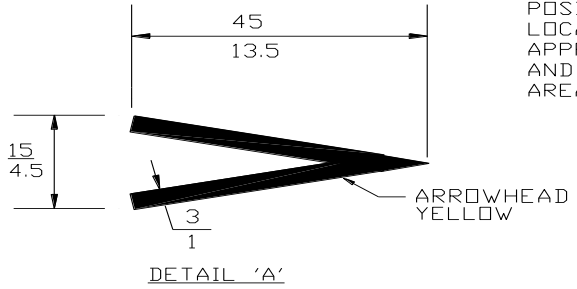
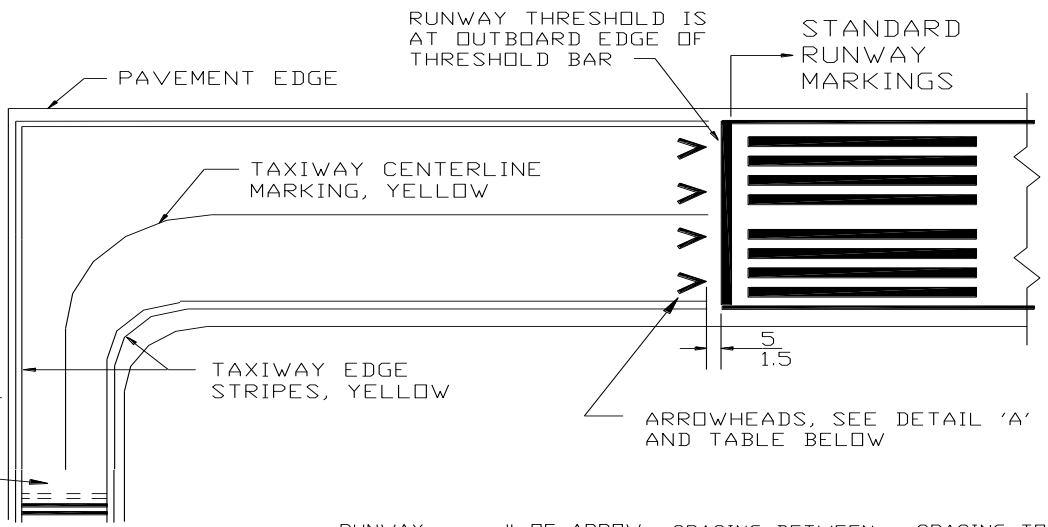
THRESHOLD BAR (WHITE)

RUNWAY WIDTH	# OF ARROW HEADS	SPACING BETWEEN ARROW HEADS	SPACING TO RUNWAY EDGE
≥ 100' (30 m)	4	w/4	w/8
< 100' (30 m)	3	w/3	w/6
< 60' (30 m)	2	w/2	w/4

NOTE: \*W\* IS THE RUNWAY WIDTH



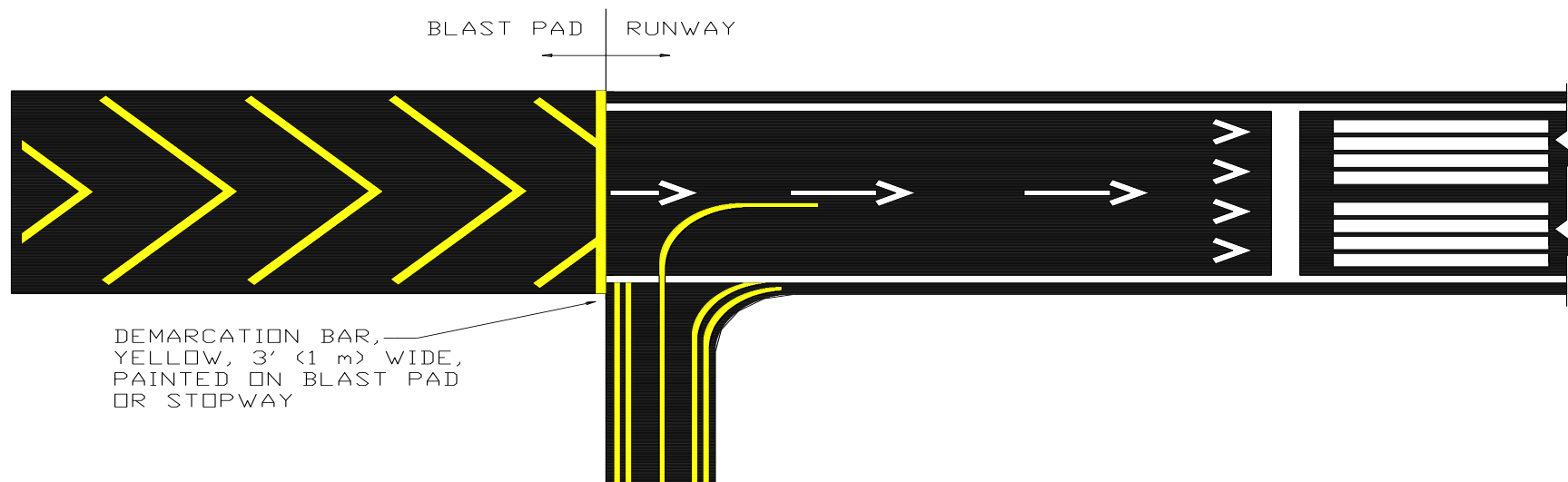
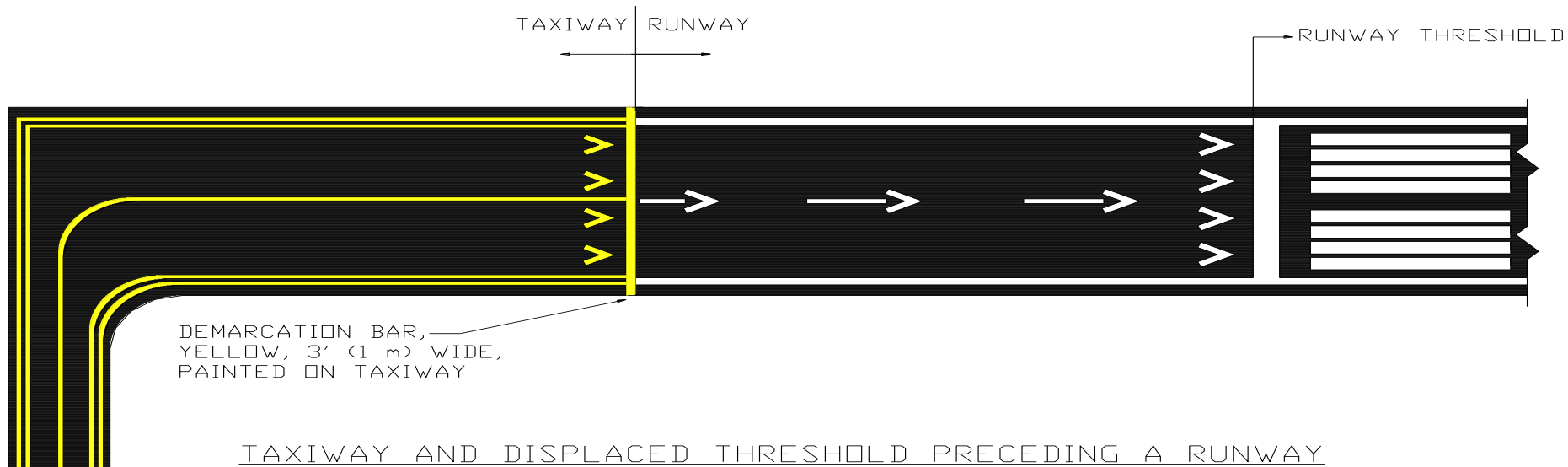
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NOTE: 'W' IS THE RUNWAY WIDTH





# SPECIAL SAFETY REQUIREMENTS

- Temporarily closed runway/taxiway
  - Disconnect all lighting circuits.
  - Obliterate threshold, designation, and touchdown zone markings.
  - Place a temporary cross at each runway end, covering the numbers.
  - Place a cross at entrances to each closed taxiway.
  - Usually have NAVAIDs removed from service.

# Foreign Object Debris (FOD)

- Significant potential for FOD.
- Monitor haul routes and crossing points.
- **Sweepers.**
- **Ops/maintenance inspections.**
- **Eliminate FOD that attracts wildlife**



Sweepers only work if they are used.

# FOD





- **Proximity to Navigation Aids**

- Construction activity in the vicinity of navigational aids requires special consideration, particularly stockpiles of materials and movement or parking of equipment that may interfere with electronic emissions and transmissions
- The effect of the activity will be evaluated by the FAA through the airspace review process. Recommend coordinating with local AF for input prior to submission of S/P.

# Coordination with ARFF



**Identify Alternative ARFF  
Provisions/Routes**

# Construction Impact on ARFF

- Develop notification procedures.
- Include in safety meetings.
- Ensure response.
- Ensure access roads remain available.
- Consider mutual aid.



# SAFETY PHASING PLAN SUBMITTALS TO THE FAA

Airport **Ground Vehicle** Operations

## Identify Vehicle Operator & Driver Training Programs

GROUND VEHICLE -- AIRFIELD VISUAL AID SAFETY PLACARD				
ATCT LIGHT GUN SIGNALS		AIRPORT SIGN SYSTEMS		AIRPORT MARKINGS
<b>COLOR AND TYPE OF SIGNAL</b>	<b>VEHICLE, EQUIPMENT &amp; PERSONNEL MOVEMENT</b>	<b>TAXIWAY LOCATION:</b> Identifies twy on which vehicle/aircraft is located	<b>B 4-22</b> TWY/RWY HOLD POSITION: Hold short of runway on taxiway	<b>HOLDING POSITION:</b> Hold short of intersecting rwy
STEADY GREEN	CLEARED TO CROSS. PROCEED OR GO	<b>22</b> <b>RUNWAY LOCATION:</b> Identifies rwy on which vehicle/aircraft is located	<b>26-8</b> <b>RWY/RWY HOLD POSITION:</b> Hold short of intersecting runway	<b>ILS CRITICAL AREA:</b> Hold short during IMC conditions
FLASHING GREEN	NOT APPLICABLE TO GROUND VEHICLES	<b>RSA/OFZ BOUNDARY:</b> Exit boundary of rwy protected areas	<b>8-APCH</b> <b>RWY APCH HOLD POSITION:</b> Hold short for acct on approach	<b>TAXIWAY/TAXIWAY HOLDING POSITION:</b> Hold short of intersecting taxiway
STEADY RED	STOP	<b>ILS CRITICAL AREA BOUNDARY:</b> Exit boundary of ILS critical area	<b>ILS</b> <b>ILS CRITICAL AREA HOLD POSITION:</b> Hold short of ILS apch critical area	<b>MOVEMENT AREA BOUNDARY:</b> Defines boundary of movement area and non-movement area
FLASHING RED	CLEAR THE TAXIWAY/RUNWAY	<b>TWY DIRECTION:</b> Defines direction & designation of intersecting taxiway(s)	<b>NO ENTRY:</b> Identifies paved areas where aircraft entry is prohibited	<b>TAXIWAY EDGE:</b> Defines edge of usable full strength taxiway pavement. Adjoining pavement NOT usable
FLASHING WHITE	RETURN TO STARTING POINT ON AIRPORT	<b>DIRECTION SIGN ARRAY:</b> Identifies location in conjunction with multiple intersecting taxiways	<b>22↑</b> <b>OUTBOUND DESTINATION:</b> Defines directions to take-off runways	<b>DASHED TAXIWAY EDGE:</b> Defines edge of taxiway where adjoining pavement or apron IS available for taxi
ALTERNATE RED/GREEN	EXERCISE EXTREME CAUTION	<b>RUNWAY EXIT:</b> Defines direction & designation of exit twy from rwy	<b>MIL</b> <b>INBOUND DESTINATION:</b> Defines directions for arriving aircraft	<b>1-19</b> <b>SURFACE PAINTED HOLDING POSITION:</b> Hold short of intersecting runway on twy
<b>TOWER FREQ:</b>	<b>GROUND FREQ:</b>	<b>4</b> <b>RUNWAY DISTANCE REMAINING:</b> Identifies runway length remaining	<b>TAXIWAY ENDING MARKER:</b> Indicates twy does not continue	<b>AB</b> <b>SURFACE PAINTED TAXIWAY LOCATION:</b> Identifies twy on which vehicle/aircraft is located

**HELP PREVENT RUNWAY INCURSIONS -- "READ BACK" YOUR AIR TRAFFIC INSTRUCTIONS!**

References: Aeronautical Information Manual (AIM), AC 90-87B, AC 150/5340-1H, and AC 150/5340-18C. (Graphics not to scale)

FAA Form 5280-7GV (2-2006) FAA Great Lakes Region, Airport Certification Staff, 2009

An **FAA** Guide

Construction Safety and Phasing Plan  
March 2, 2011



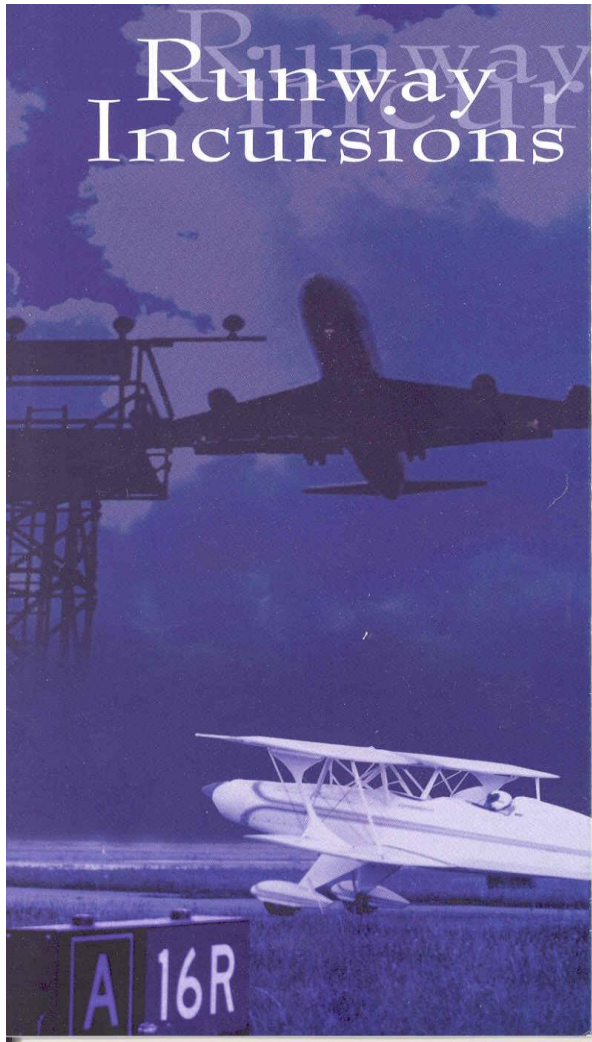
Federal Aviation  
Administration



**If you are authorized to drive on the movement area, always look carefully before crossing a runway, even when cleared by ATC. Controllers, pilots and vehicle drivers can make a mistake.**

# SAFETY PHASING PLAN SUBMITTALS

## TO THE FAA



**Airfield construction training programs should incorporate runway incursion prevention.**

# Two new requirement

- **Safety management System: safety Risk Assessment.** It is part of the Airports Division approval process for the CSPP. It does not necessarily requires a panel.
- **The Safety Plan Compliance Document (SPCD) details how the contractor will comply with the CSPP.**



# Any Questions?



# Thank You!