

We are
Airports



Complex Airfield Geometry

Mitigating Runway Incursions & Excursions

Presented by:

Carlton Lambiasi, PE

April 10, 2024



FAA
Office of Airports

LIVE: White House holds press briefing

TRANSPORTATION

FAA spending millions at airports to address near collisions

BY LAUREN SFORZA - 08/23/23 11:24 AM ET

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A Delta Air Lines plane lands at Logan International Airport on Jan. 26, 2023, in Boston. (AP Photo/Michael Dwyer)

The Federal Aviation Administration (FAA) announced Wednesday that it is investing hundreds of millions of dollars to reduce near collisions at airports.

“The FAA is serious about ending runway incursions and we are putting substantial resources behind our efforts. In some cases, the best way to address safety risks is modifying or reconfiguring existing airfields — these grants directly address those situations.”



Shannetta R. Griffin
Associate Administrator
for Airports

Presentation Objectives

- Runway Incursion
 - Locating Hot Spots
 - Understand the Runway Incursion Mitigation (RIM) Program
 - Identify Complex Airfield Geometry
 - Learn Optimum Airfield Layouts
- Runway Excursion
 - Runway Safety Area
- Recognizing Airport Planning to Enhance Airfield Safety

Airport Design

FAA publishes standards and guidelines for establishing an acceptable level of safety, efficiency, and capacity when designing and implementing airport development projects at civil airports. Codified in Advisory Circular 150/5300-13.



Advisory Circular

Subject: Airport Design

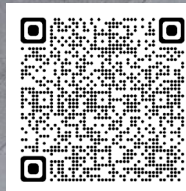
Date: 3/31/2022

AC No: 150/5300-13B

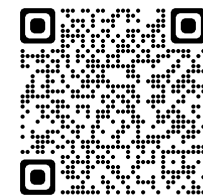
Initiated By: AAS-100

Change:

- 1 **Purpose.**
This Advisory Circular (AC) contains the Federal Aviation Administration's (FAA) standards and recommendations for airport design.
- 2 **Cancellation.**
This AC cancels AC 150/5300-13A, *Airport Design*, dated September 28, 2012.
- 3 **Applicability.**
The FAA recommends using the standards and guidelines in this AC for application at civil airports. This AC does not constitute a regulation, is not mandatory, and is not legally binding in its own right. It will not be relied upon as a separate basis by the FAA for affirmative enforcement action or other administrative penalty. Conformity with this AC is voluntary, except for the projects described in subparagraphs 3 and 4 below:
 1. Use of these standards and guidelines are practices the FAA recommends for establishing an acceptable level of safety, efficiency, and capacity when designing and implementing airport development projects at civil airports.
 2. This AC provides one, but not the only, acceptable means of meeting the requirements of 14 Code of Federal Regulations (CFR) [Part 139, Certification of Airports](#).
 3. Use of these standards is mandatory for projects funded under certain Federal grant assistance programs including, but not limited to, the Airport Improvement Program (AIP). See [Grant Assurance #34](#). Airport sponsors should familiarize themselves with the obligations and assurances that apply to each grant program from which they obtained grant funds.
 4. This AC is mandatory, as required by regulation, for projects funded by the Passenger Facility Charge (PFC) program. See [PFC Assurance #9](#).



Runway Incursion

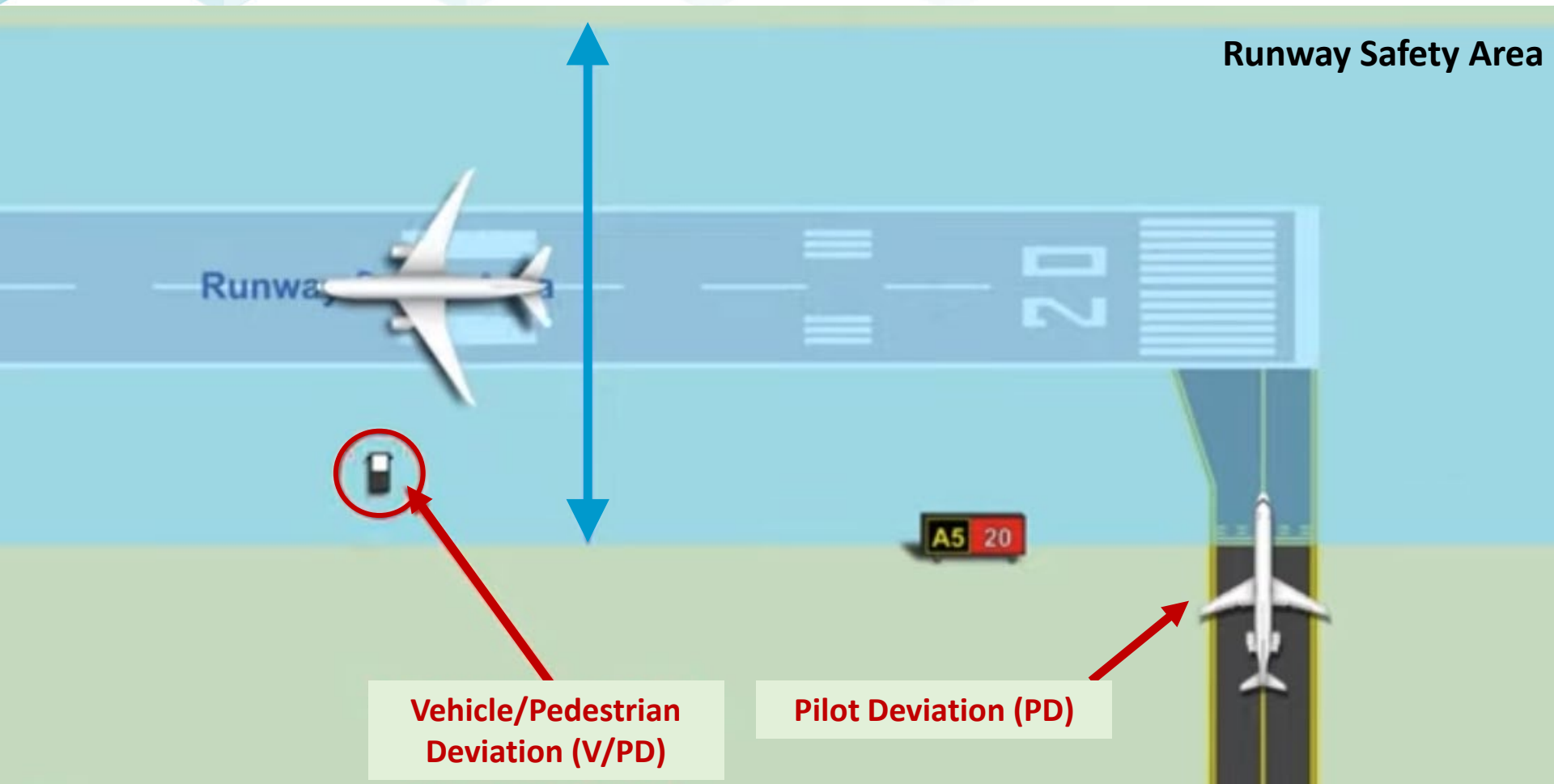


Any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft.

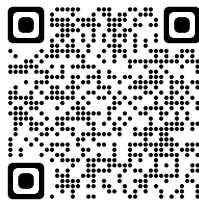
Category	Description
A	A serious incident in which a collision was narrowly avoided.
B	An incident in which separation decreases and there is a significant potential for collision, which may result in a time critical corrective/ evasive response to avoid a collision.
C	An incident characterized by ample time and/or distance to avoid a collision.
D	Incident that meets the definition of runway incursion such as incorrect presence of a single vehicle/person/aircraft on the protected area of a surface designated for the landing and take-off of aircraft but with no immediate safety consequences.



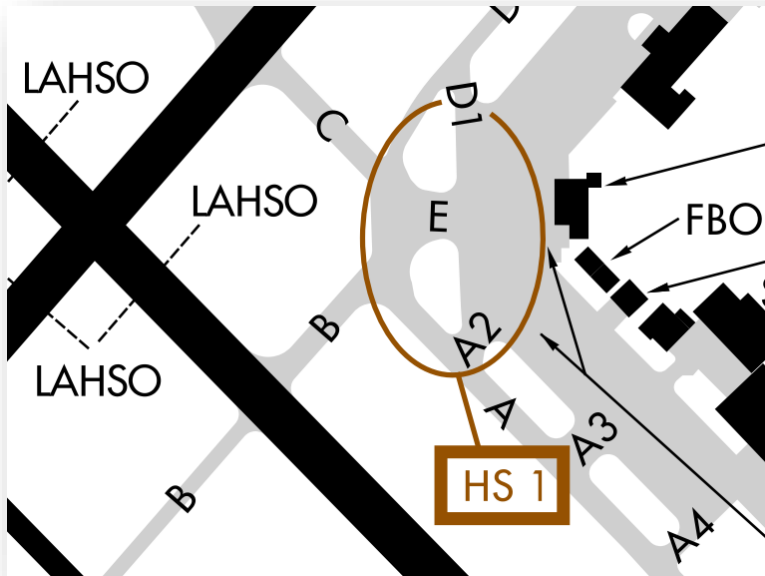
Types of Runway Incursion



Hot Spots



A location on an airport movement area with a history of potential risk of a collision or runway incursion. Heightened attention by pilots/drivers/controllers is necessary when maneuvering through a hot spot.



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Types of Hot Spots

Ground Movement

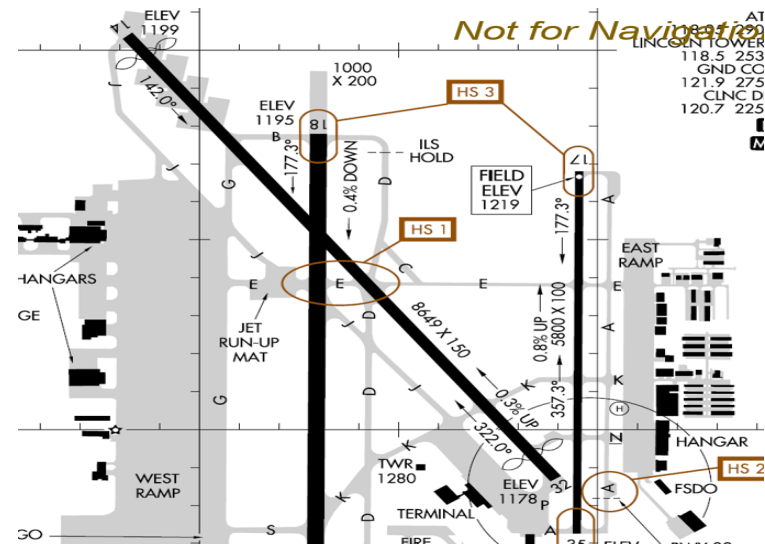


- Airport movement areas with a history or potential risk of collision or runway incursion
- Examples are:
 - hold short line infractions
 - approach hold issues
 - complex taxiway configurations
 - movement-non movement boundary area issues
 - tower line of sight problems
 - marking and signage issues

Wrong Surface

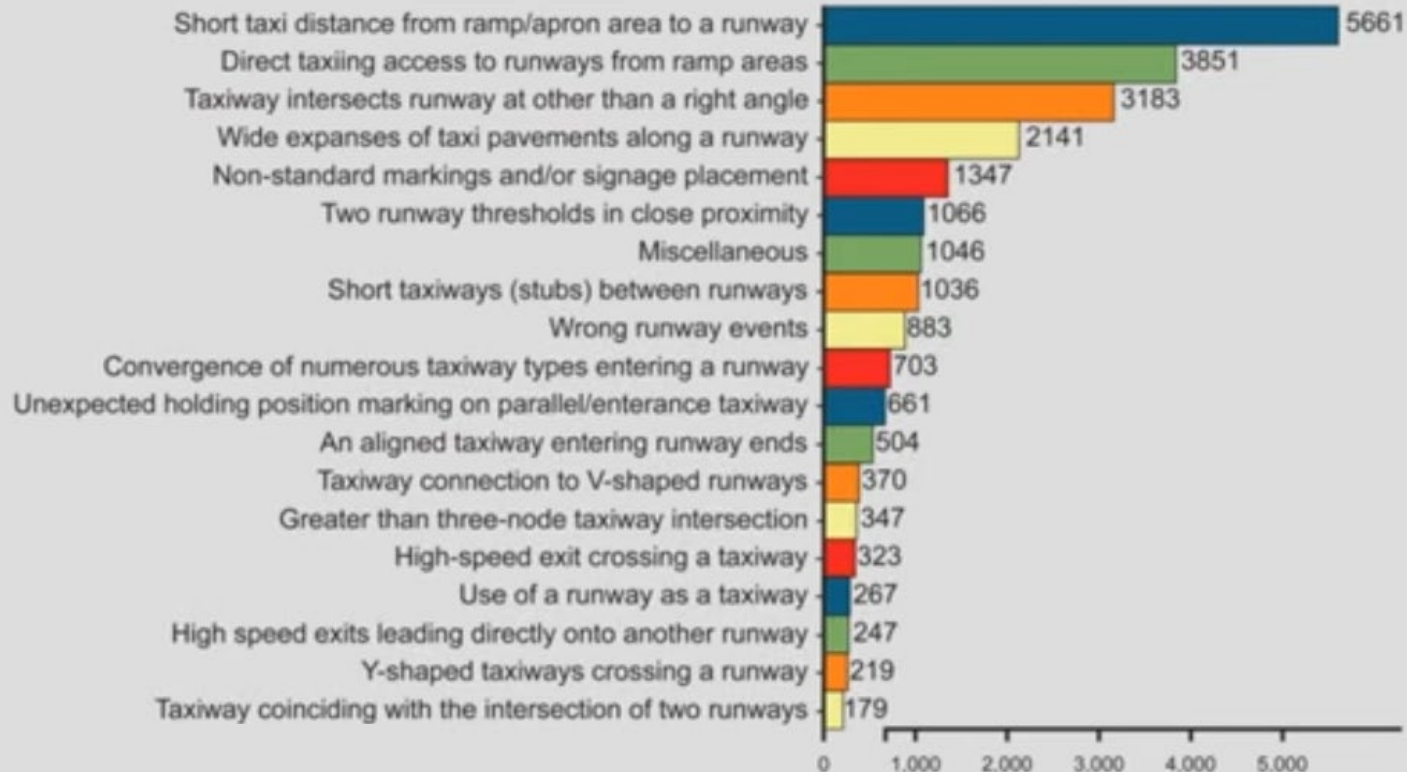


- An aircraft has attempted or, landed or departed from the wrong surface

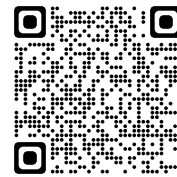


Airfield Geometry and Runway Incursions

V/VPD and PD Runway Incursions 10/1/07 - 12/31/20



Runway Incursion Mitigation (RIM) Program



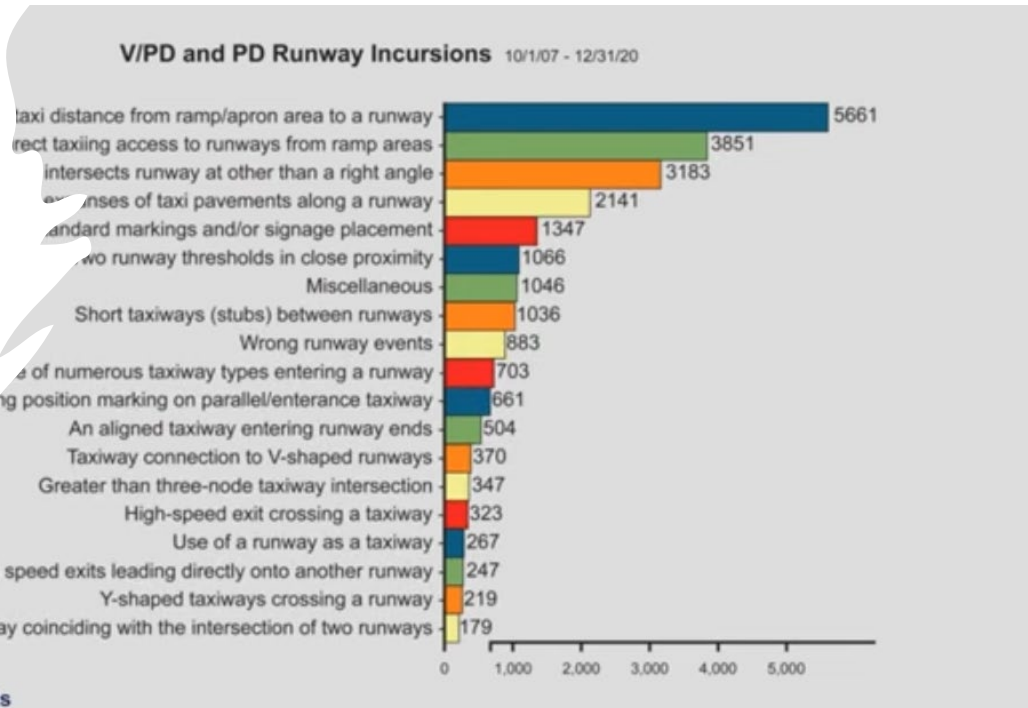
The FAA's RIM program identifies, prioritizes, and develops strategies to help airport sponsors mitigate risk at locations on the airfield where risk factors might contribute to a runway incursion.

RUNWAY INCURSION MITIGATION (RIM) PROGRAM INVENTORY OF AIRPORT LOCATIONS

The FAA developed this inventory of airport locations where runway incursions (RI) have occurred, and is now working with airports on mitigation strategies. The data collected indicates airport locations where three or more peak annual RIs occurred in a given calendar year or where cumulative incursion counts averaged one or more RIs per year of data analyzed. Cumulative RI counts reflect total RIs to date since FY 2008 for each location validated prior to 2020. For locations validated in 2020 and later, cumulative RI counts reflect total RIs beginning 10 calendar years prior to validation year. This information is subject to change as the FAA works with the airport sponsors. The FAA updates this inventory as necessary as mitigation projects proceed and additional data are collected on RIs. Runway incursion data is as of September, 2023.

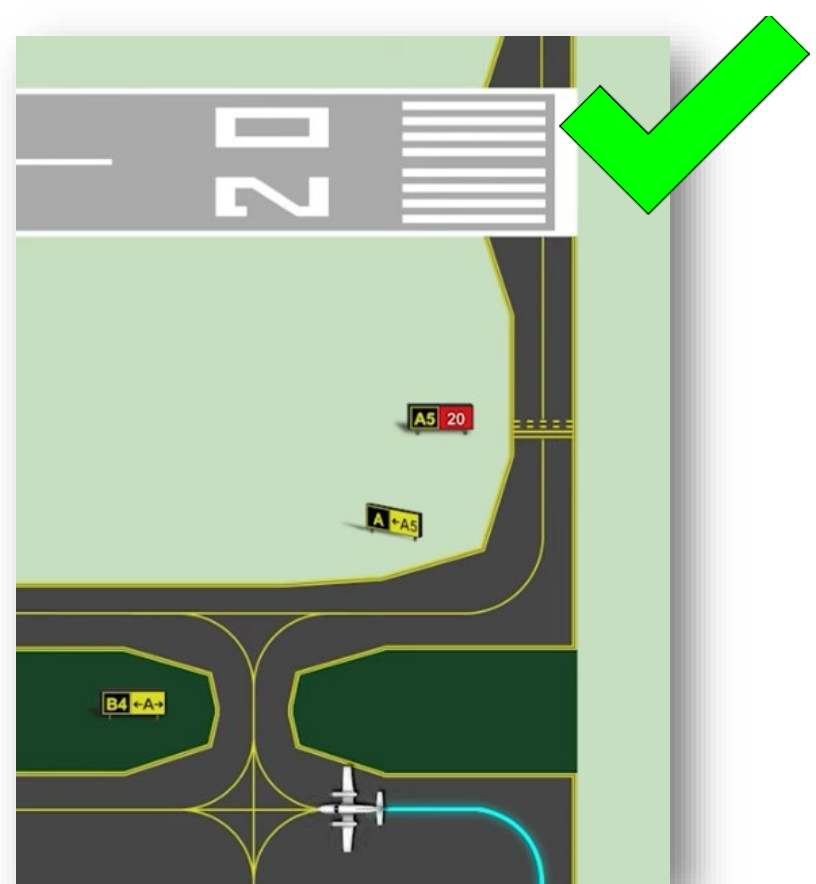
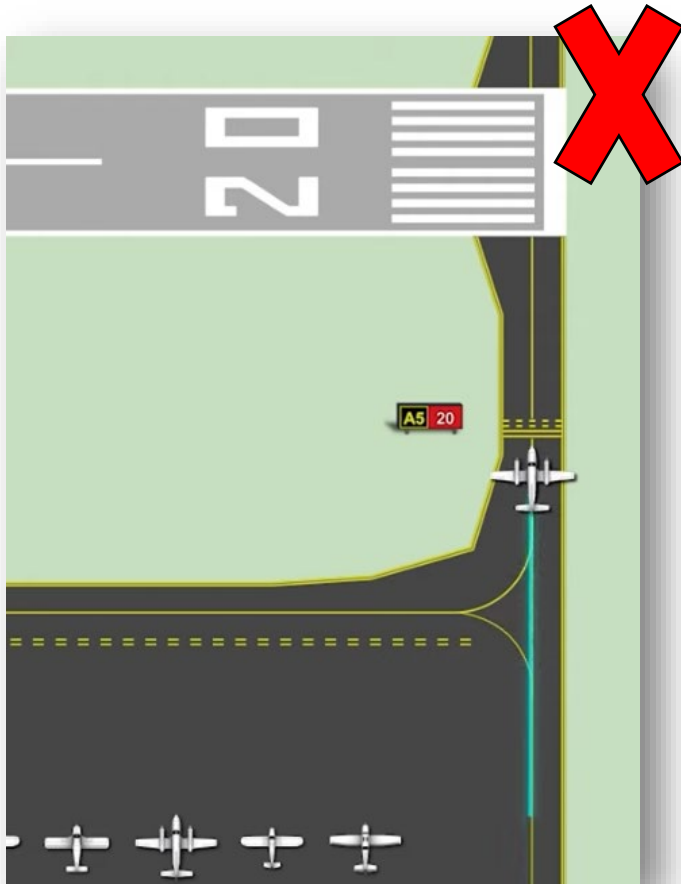
Airport Name	Location	Location Identifier	Year Added to RIM (Validation Year)	Region	NPIAS Hub Classification	Asset Cat	Part 139	Cumulative RI (Pilot & Vehicle/Pedestrian Deviations)	Peak CY Annual RI (Pilot & Vehicle/Pedestrian Deviations)
Albuquerque International Sunport, NM	Taxiway E at intersection with Runway 3/21	ABQ-H53	2022	ASW	Medium	NA	Y	14	4
Centennial Airport, CO	Approach end of Runway 35R	APA-07	2019	ANM	Reliever	National	N	14	4
Aurora Municipal Airport, IL	Holding position on Taxiway A3 at intersection with Runway 9/27	ARR-03	2020	AGL	Reliever	National	N	7	3
Aurora Municipal Airport, IL	Intersection of Runway 15/33 and Runway 9/27	ARR-15	2023	AGL	Reliever	National	N	7	3
Aurora Municipal Airport, IL	Taxiway A at intersection with Runway 15/33 (east of runway)	ARR-17	2023	AGL	Reliever	National	N	7	4
Aspen-Pitkin County/Sardy Field Airport, CO	Taxiway A9 at approach end of Runway 33	ASE-H53	2019	ANM	Non Hub Primary	NA	Y	20	4
Hartsfield-Jackson Atlanta International Airport, GA	Runway 8L/26R and Taxiway C, D intersections	ATL-H51	2015	ASO	Large	NA	Y	17	4
Kalamazoo/Battle Creek International Airport, MI	Taxiway C at intersection with Runway 17/35 (west of runway)	AZO-02	2015	AGL	Non Hub Primary	NA	Y	6	3
Boeing Field/King County International Airport, WA	Holding position on Taxiway Z parallel to approach end of Runway 14R	BFI-H51	2020	ANM	Non Hub Primary	NA	Y	8	3
Rocky Mountain Metropolitan Airport, CO	Approach end of Runway 30R	BJC-02	2021	ANM	Reliever	National	Y	17	4
Rocky Mountain Metropolitan Airport, CO	Runway 3 at intersection with Runway 12R/30L (south of runway)	BJC-H53	2020	ANM	Reliever	National	Y	14	5
Boise Air Terminal/Gowen Field, ID	Taxiway J between of Runway 10R approach end and 10L approach hold	BOI-01	2018	ANM	Small	NA	Y	28	9
Boise Air Terminal/Gowen Field, ID	Approach hold on Taxiway J/A at approach end of Runway 10L and Taxiway W at approach end of Runway 10L	BOI-H51	2019	ANM	Small	NA	Y	18	3
General Edward Lawrence Logan International Airport, MA	Intersection of Runways 4R/22L and 14/32	BOS-47	2015	ANE	Large	NA	Y	9	3
General Edward Lawrence Logan International Airport, MA	Intersection of Runways 15L/33R and 4L/22R	BOS-H51	2015	ANE	Large	NA	Y	17	3
General Edward Lawrence Logan International Airport, MA	Intersection of Runway 4L approach end and Taxiway E and K	BOS-H53	2015	ANE	Large	NA	Y	34	5
General Edward Lawrence Logan International Airport, MA	Intersections of Taxiways C and 15R/33L and 9/27	BOS-H54	2022	ANE	Large	NA	Y	10	4

Complex Airfield Geometry & Runway Incursions



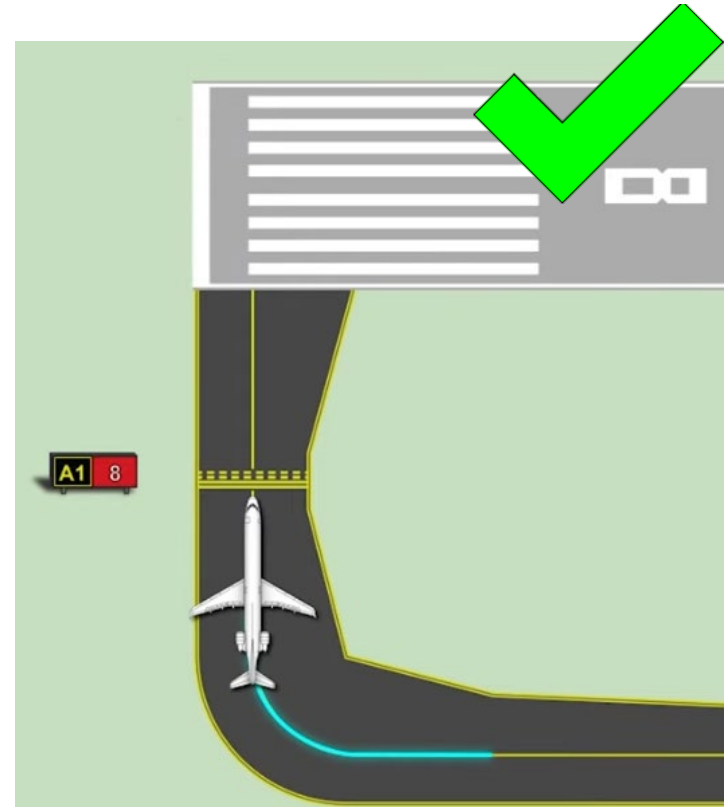
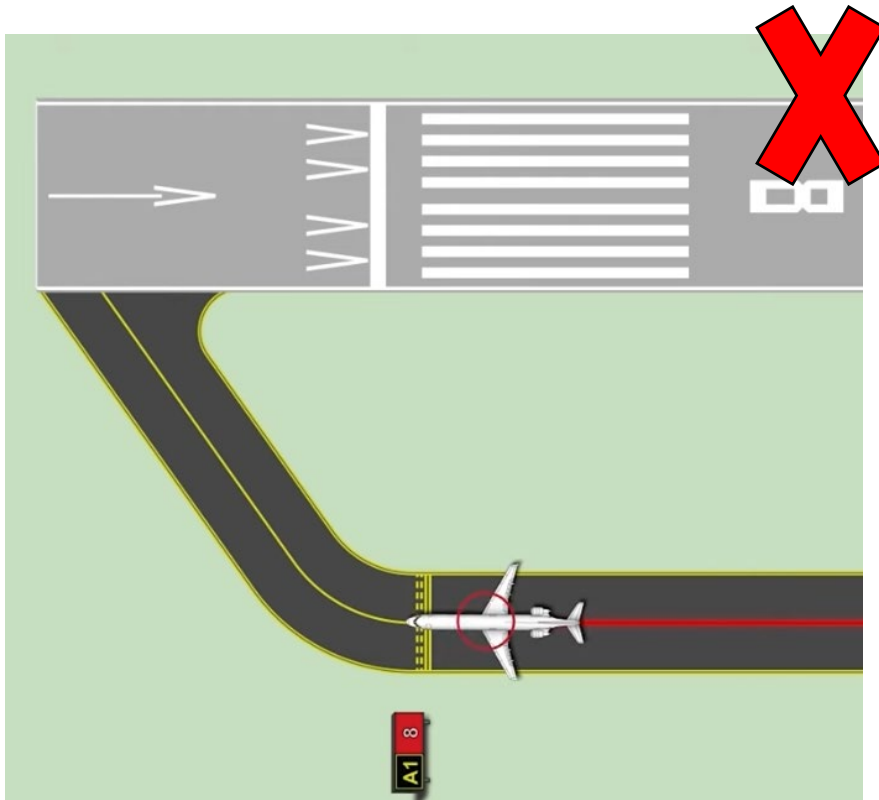
DIRECT ACCESS TO RUNWAYS FROM RAMP AREAS

When exiting a ramp area, hold lines may approach quickly. Pilots may not observe them and cause a runway incursion.



MANDATORY HOLD SHORT LINES IN UNEXPECTED PLACES

Hold short lines may be significantly further away from the actual runway entrance than expected when operating on parallel or adjacent taxiways. These hold short lines protect various imaginary safety surfaces.



WIDE EXPANSES OF TAXIWAY PAVEMENT ENTERING OR ALONG A RUNWAY

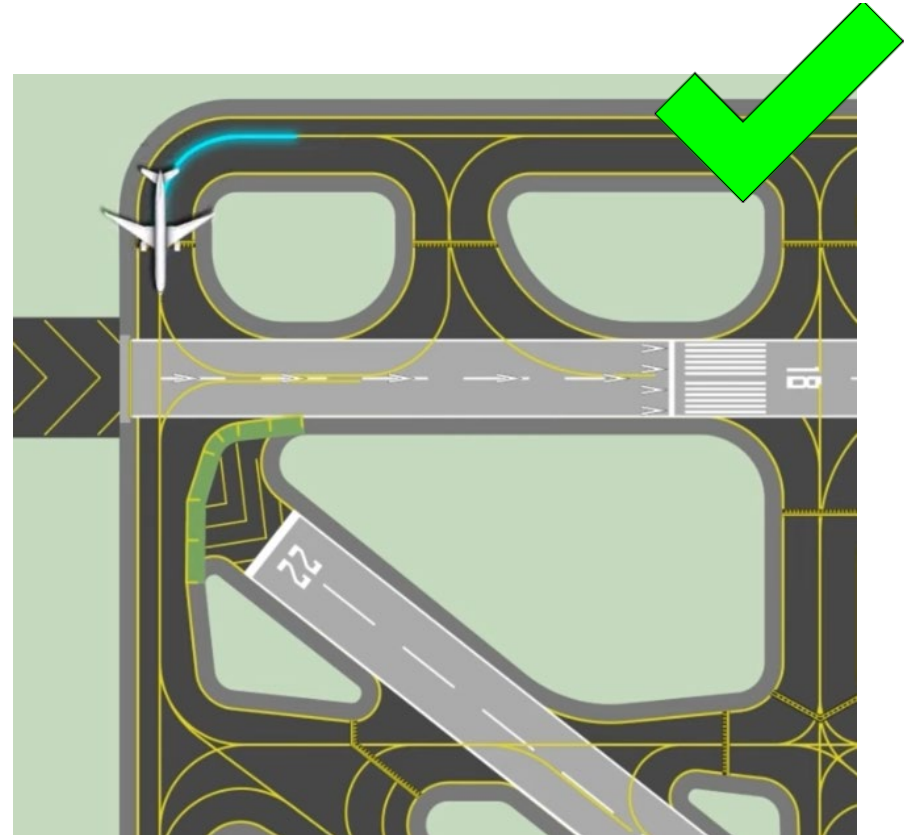
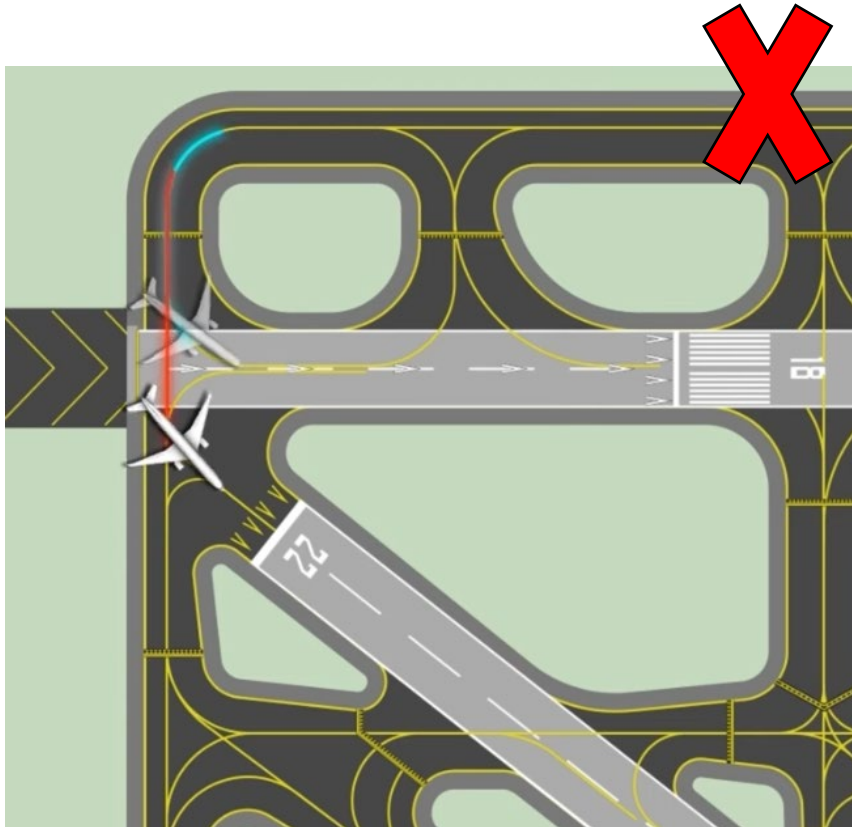
Wide expanses of taxiway pavement entering or along a runway, may cause the loss of situational awareness for pilots and drivers, where correct visual perception is key to ensuring they know where they are and where the runway is.



Not to scale

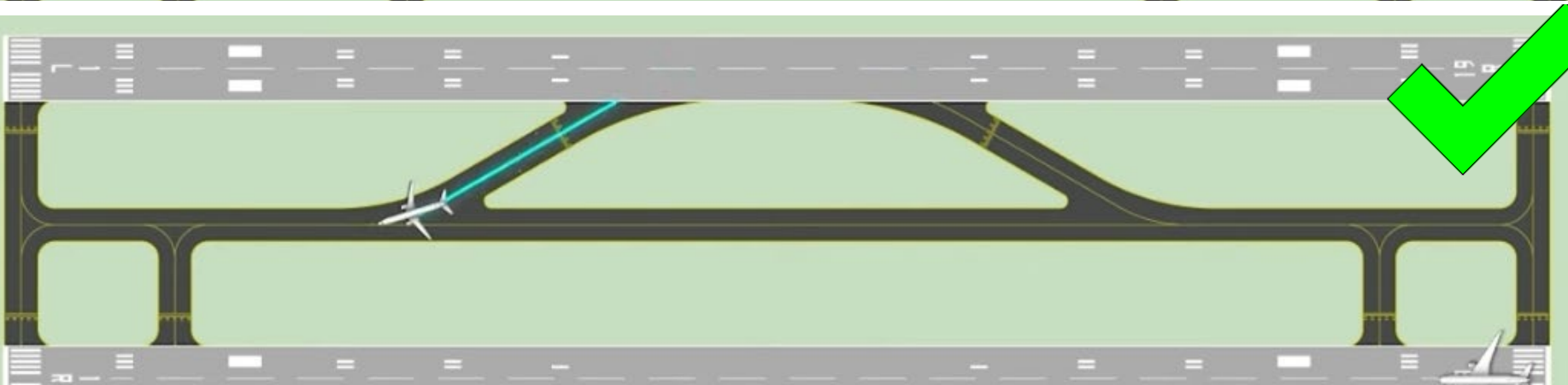
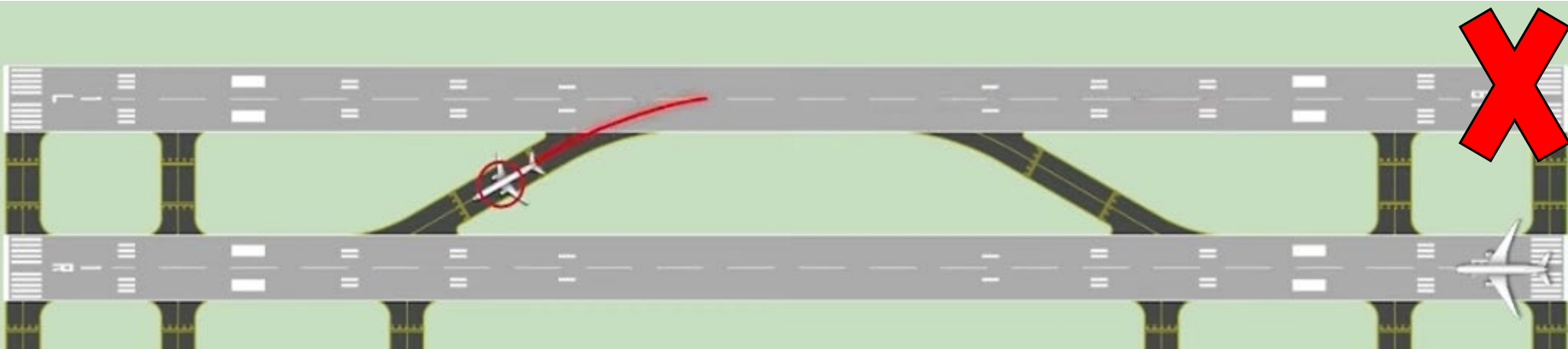
RUNWAY THRESHOLDS IN CLOSE PROXIMITY

When runway thresholds are in close proximity, or a connecting taxiway coincides with the intersection of two runways, pilots must be cautious and ensure that they depart the correct runway. Always confirm that your heading matches the runway on which you have been cleared to takeoff, BEFORE applying take-off power.



SHORT DISTANCE BETWEEN PARALLEL RUNWAYS OR HIGH-SPEED EXIT LEADING DIRECTLY INTO A RUNWAY

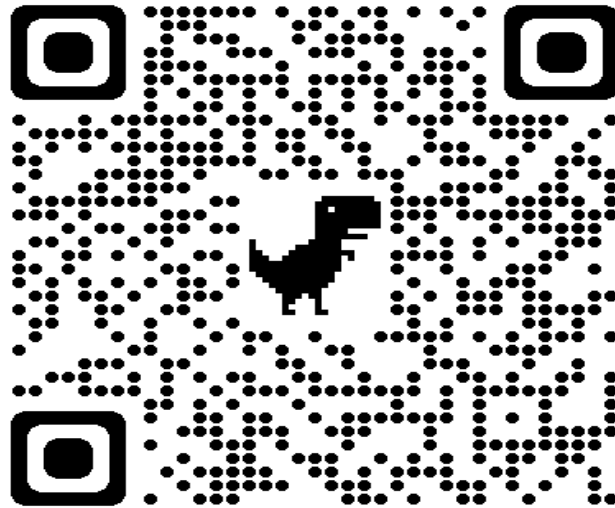
A short taxiway distance between runways reduces the area where aircraft may safely hold short between runways. When exiting a parallel runway, the hold short markings for the other runway may be encountered much sooner than expected, leading the pilot to unintentionally cross the hold lines or enter the runway.



Complex Airfield Geometry Videos

Airfield geometry challenges are inherent in airport design. While nonstandard geometries are being corrected throughout the NAS, this video series is intended to bring pilot awareness to the types of challenges they will see and ways to avoid these challenges. <https://www.faa.gov/complexgeometry>

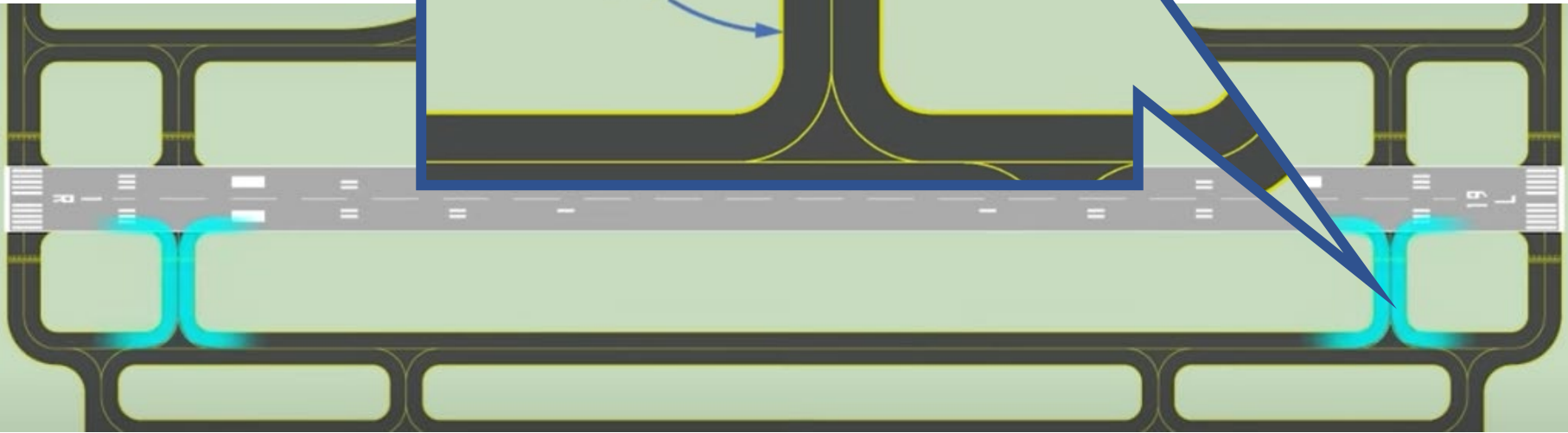
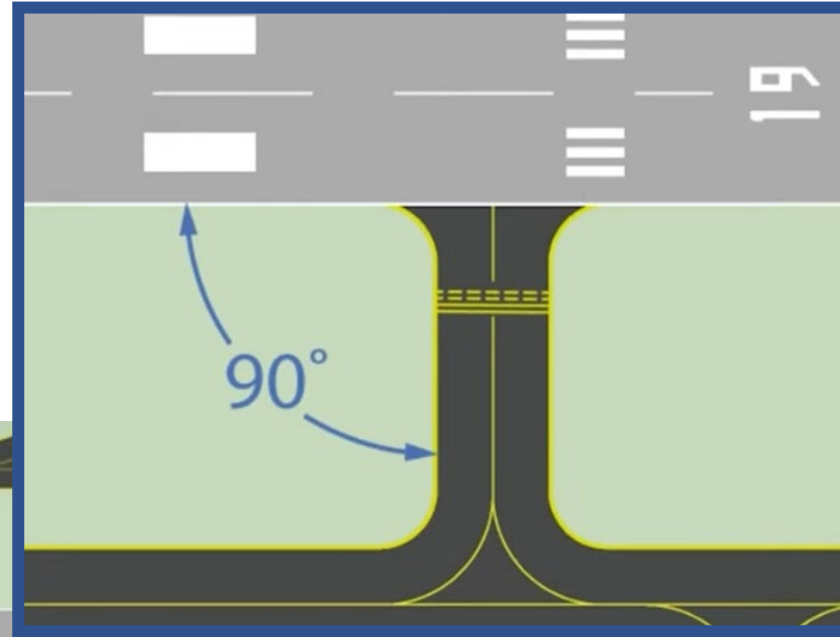
This series of seven short videos on Complex Airfield Geometry is part of the From the Flight Deck video series. You can also learn more about From the Flight Deck, check out a map of all current and forthcoming airport video locations, or watch From the Flight Deck videos on other general aviation safety challenges pilots may encounter.



FAA
Office of Airports

Optimum Airfield Layout

90° Taxiways

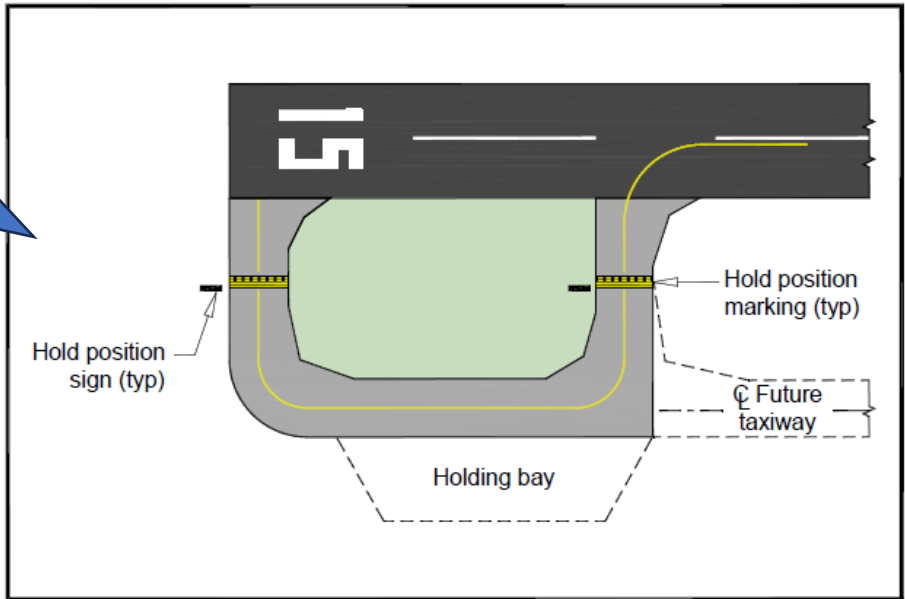


Optimum Airfield Layout

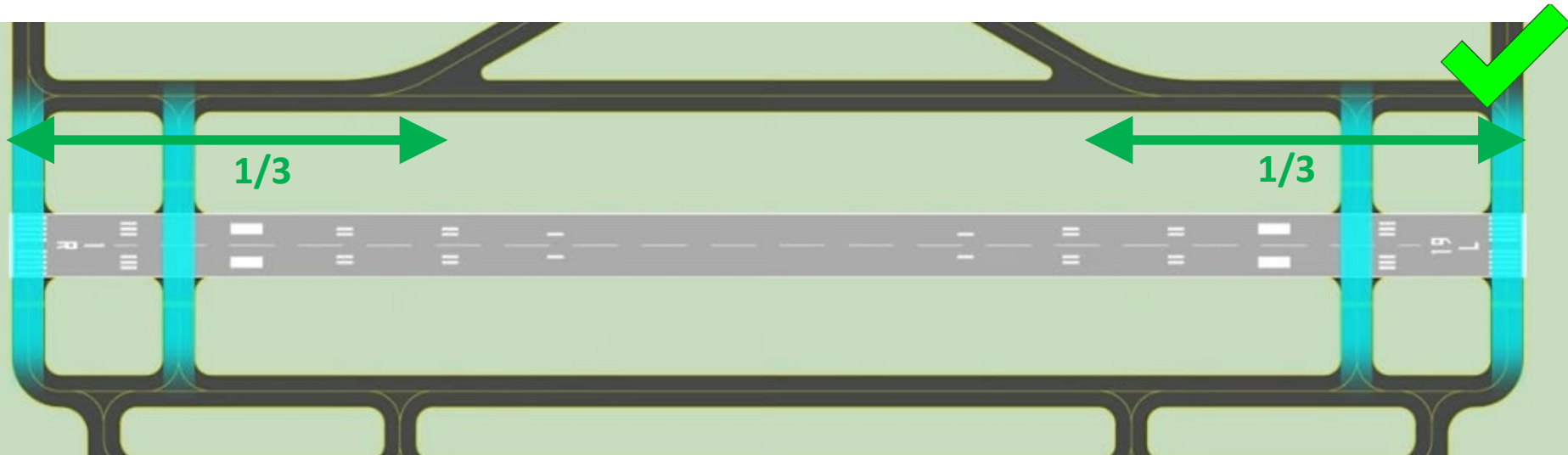
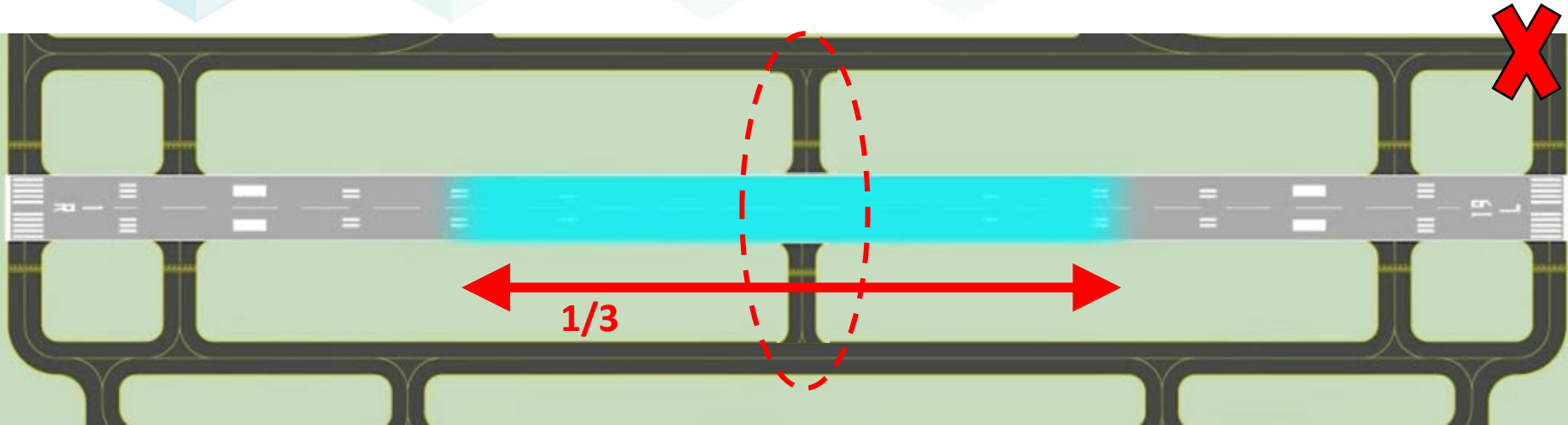
Parallel Taxiway



Taxiway Turnaround



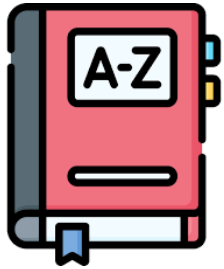
Optimum Airfield Layout Crossing at the Outer Third



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Runway Excursion



Runway Excursion is a veer off or overrun of an aircraft from the runway surface. Runway excursions also include aircraft that undershoot (land short of) the runway surface or land adjacent to the runway surface.



Runway Safety Area (RSA)



The RSA enhances the safety of aircraft that undershoot, overrun, or veer off the runway, and provides greater accessibility for ARFF equipment during such incidents.



RSA Determination

FAA reviews RSA data along with supporting documentation and makes one of the following determinations:

- The existing RSA meets the current standards contained in AC 150/5300-13.
- The existing RSA does not meet standards, but it is practicable to improve the RSA so that it will meet current standards.
- The existing RSA can be improved to enhance safety, but the RSA will still not meet current standards.
- The existing RSA does not meet current standards, and it is not practicable to improve the RSA.





Airport Data & Information Portal (ADIP)

RSA determinations and inventories of objects located within RSAs reside in the FAA's ADIP.

Object Identification			Object Location				Object Status					Show Deleted			
No	Type	Name	RWY End	End Dist	L/R	Dist	Fixed By Function	Can be Relocated	Frangible	Frangible to 3"	As Practic-able	High Mass	Owner	Note	Connecting Object
1	VNAVAID	PAPI-28	20L	-482	R	64	✓		✓	✓			FAA		
2	VNAVAID	PAPI-28	20L	-514	R	69	✓		✓	✓			FAA		1
3	VNAVAID	PAPI-28	20L	-540	R	72	✓		✓	✓			FAA		2
4	VNAVAID	PAPI-28	20L	-569	R	78	✓		✓	✓			FAA		3
5	VNAVAID	PAPI-28	20L	-600	R	78							FAA		4

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Airport Planning to Enhance Airfield Safety

- Evaluate existing airfield and design utilizing the standards, recommended practices, and design considerations contained in AC 150/5300-13.
- Develop a plan (e.g., Master Plan, ALP) to meet the standard when it becomes practical to make such improvements.
- Reconfigure existing infrastructures, including those not designated as hot spots, when the associated pavement is subject to reconstruction

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