

# Establishing a Runway Safety Culture – Preventing Runway Incursions & Excursions

Presented to: ICAO/ACI Runway Safety Team  
Tocumen, Panama

By: Guillermo Felix, Senior Civil Engineer  
and ACIS

Date: October 9, 2018



Federal Aviation  
Administration



# Four areas of Airports Division Involvement of Runway Safety

- **Airport Design: Airport Geometry (AC 150/5300-13A**
- **Runway Incursion Mitigation Plan. Existing airport geometry problems**
- **Airport Operations (Regulation Part 139):  
Driver training program**
- **Airport Safety during period of construction**

# Background - PTG History

- **What are Runway Incursions?**

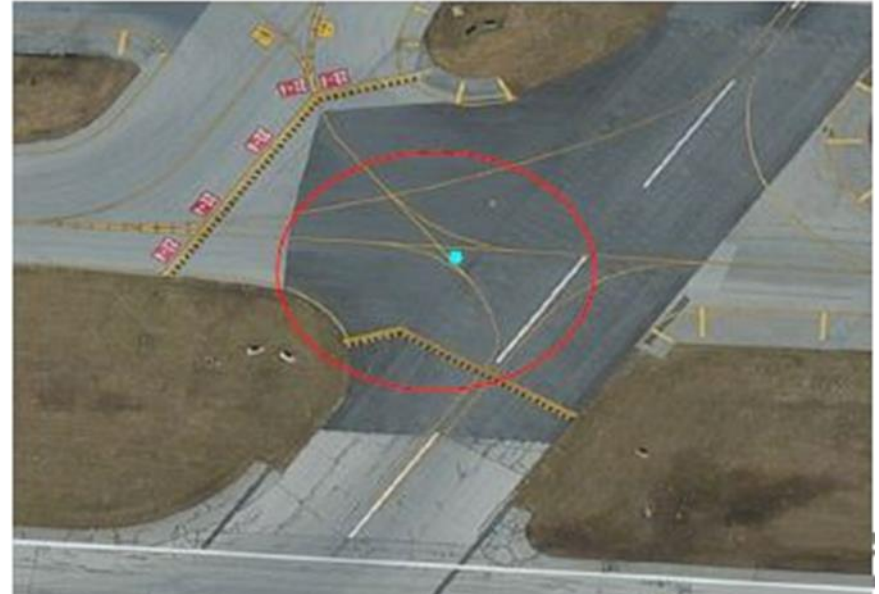
**ICAO Definition: “Any occurrence at an aerodrome involving the incorrect presence of an aircraft vehicle or person on the protected area of a surface designated for the landing and take off of aircraft”**

- **Problematic Taxiway Geometry points (PTG)**
- **AC 150/5300-13A, Chapter 4, standards for taxiway geometry**

# Background - PTG History



# Background - PTG History



# AC 150/5300-13A

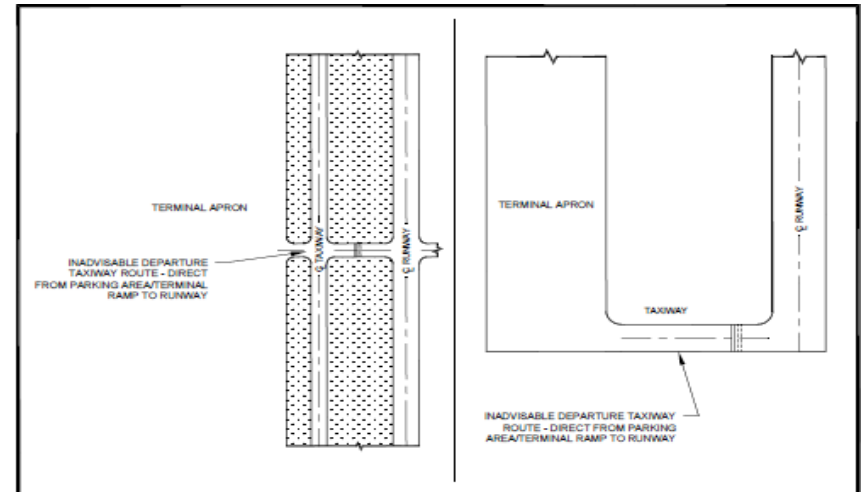
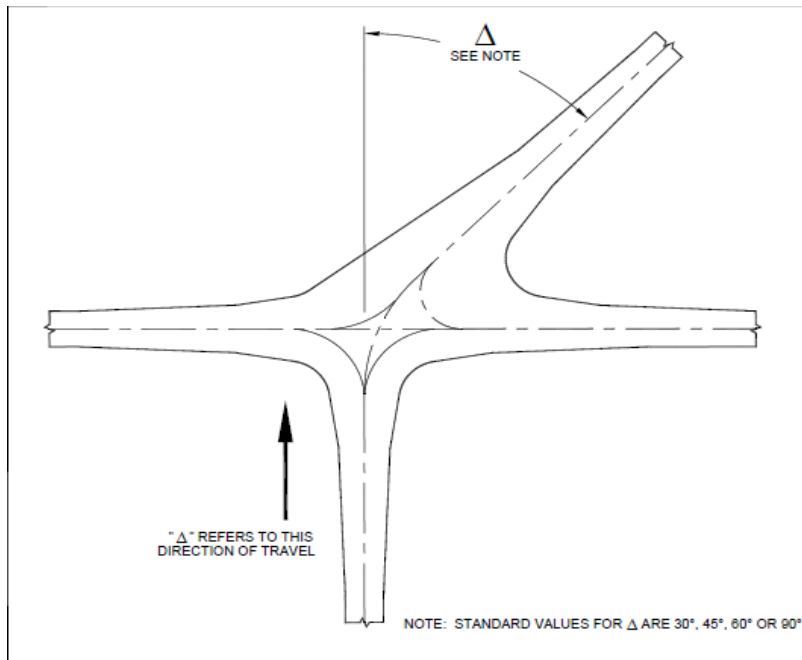
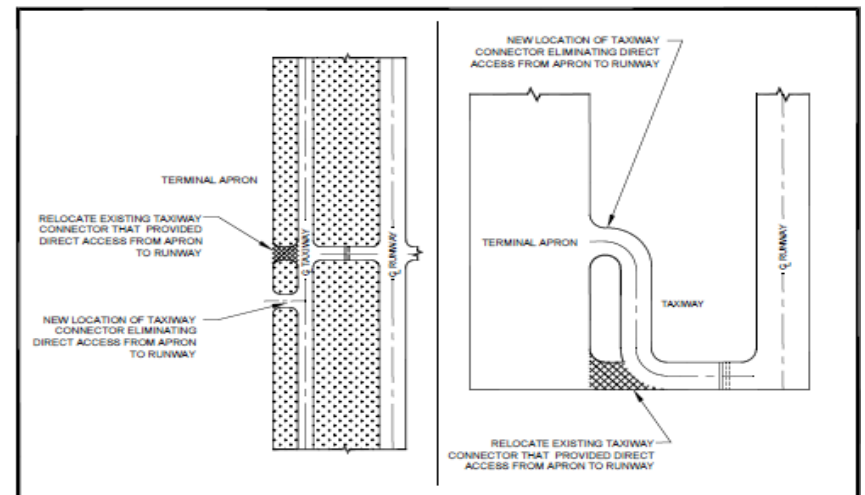
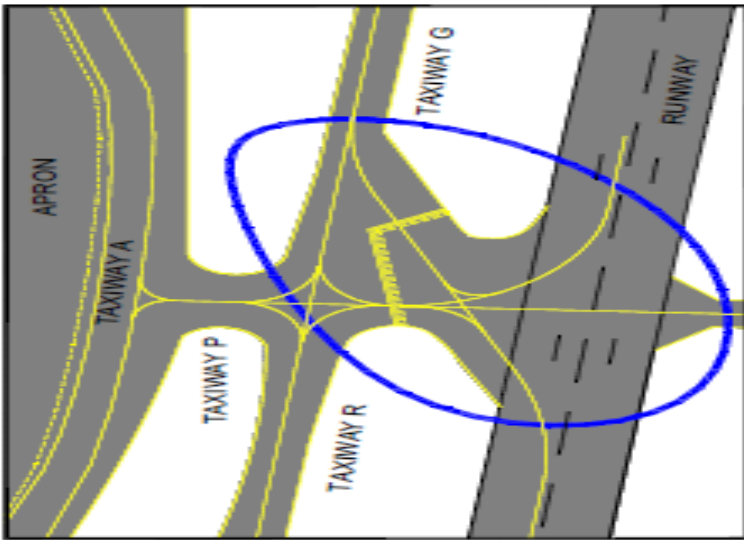
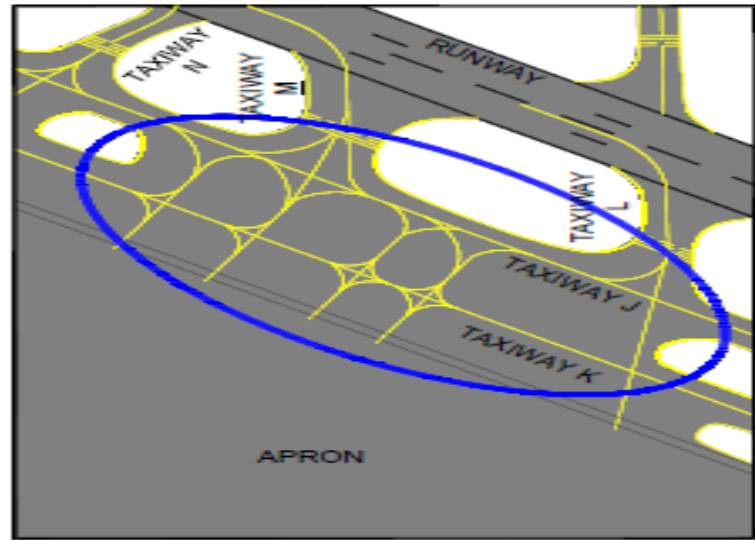


Figure 4-2. Not recommended taxiway design

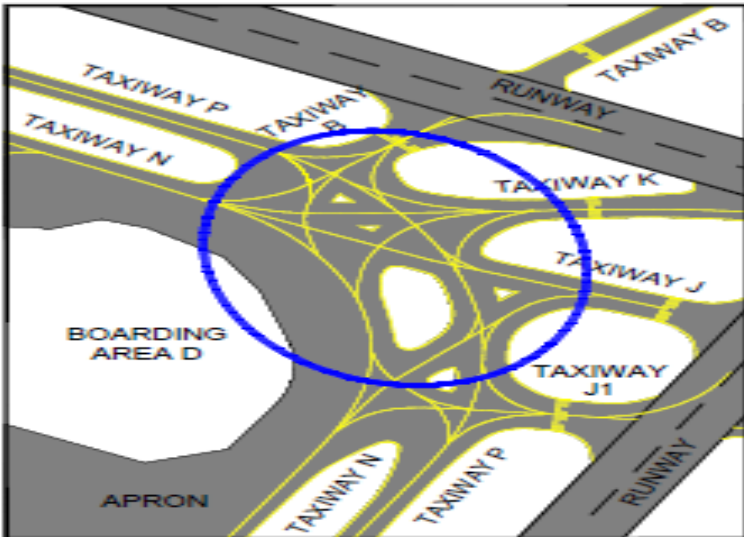




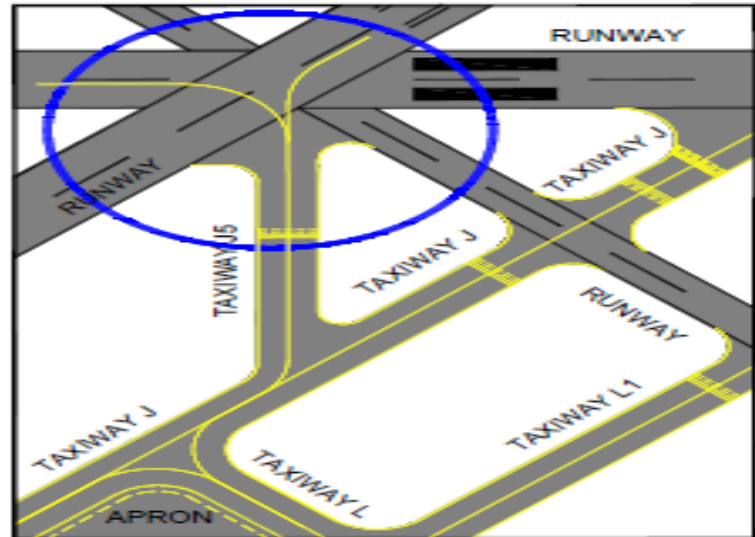
(a) Taxiway crossing high-speed exit and Wide throated runway entrance



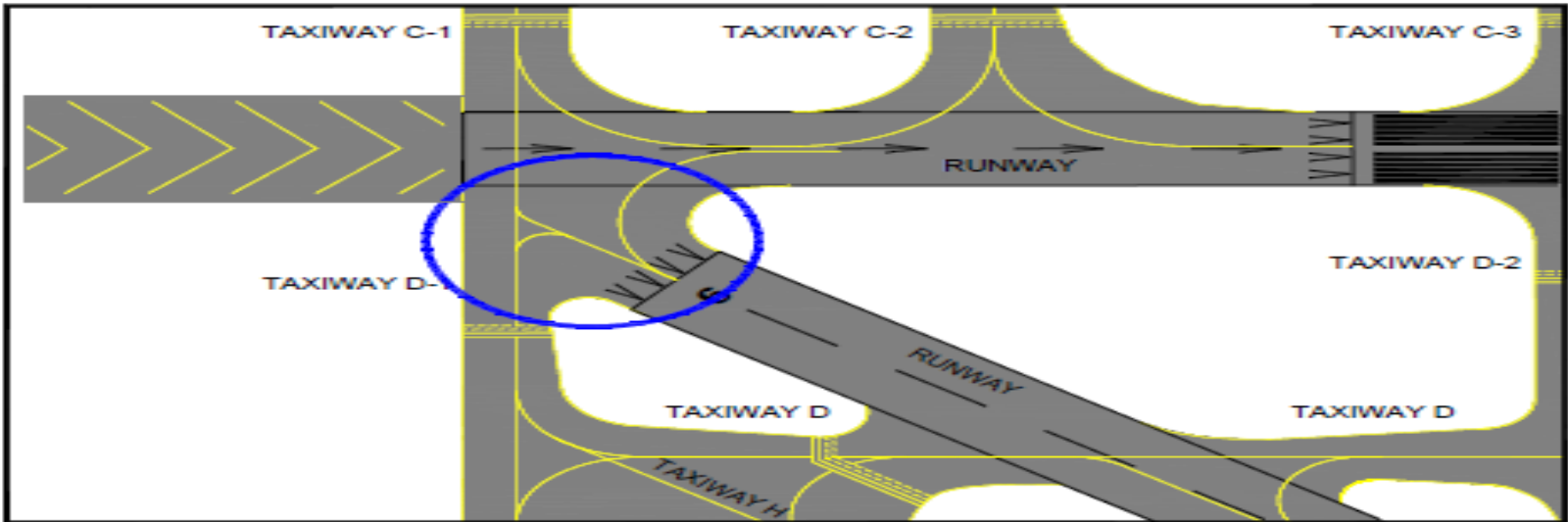
(b) Extra-wide throated taxiway leading from the apron directly to parallel taxiways and runways



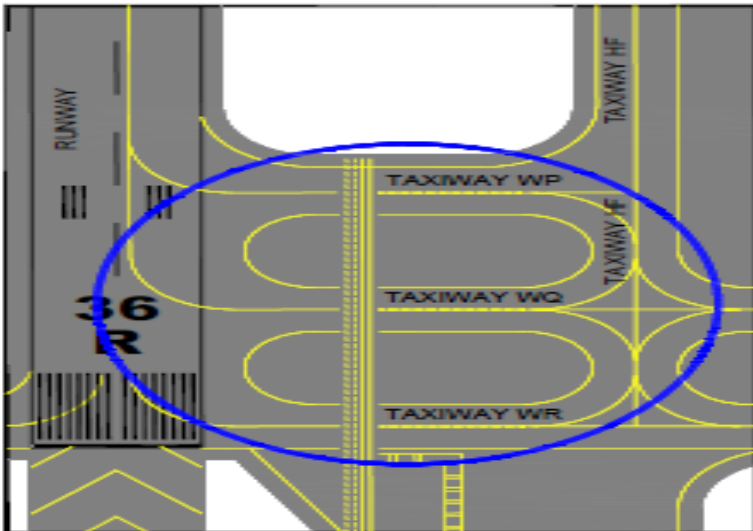
(c) Taxiway intersection exceeds "3-node" concept



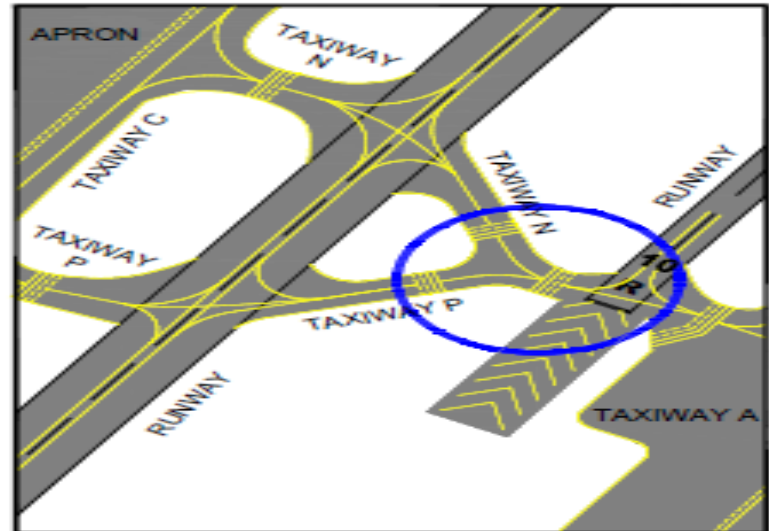
(d) Taxiway intersecting multiple runways



(e) Aligned taxiway between two closely spaced runway ends



(f) Two or more taxiway entrances lacking "No Taxi" islands



(g) "Y" Shaped taxiway crossing a runway

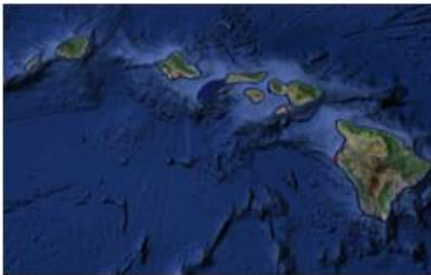


# Runway Incursion Mitigation Program

## RIM

### Background - PTG History

- **8,817 Runway Incursions Events** Geo-referenced
  - Data mining effort collected 9+ years (2007-2016) of RI data from towered airports.
  - V/PGs and PGs



# RIM

Locations Determined by:

- 3 or more RI in a CY
- Average 1 or more RI per year over study period
- Field validation of locations, RIs, and geometry



# RIM

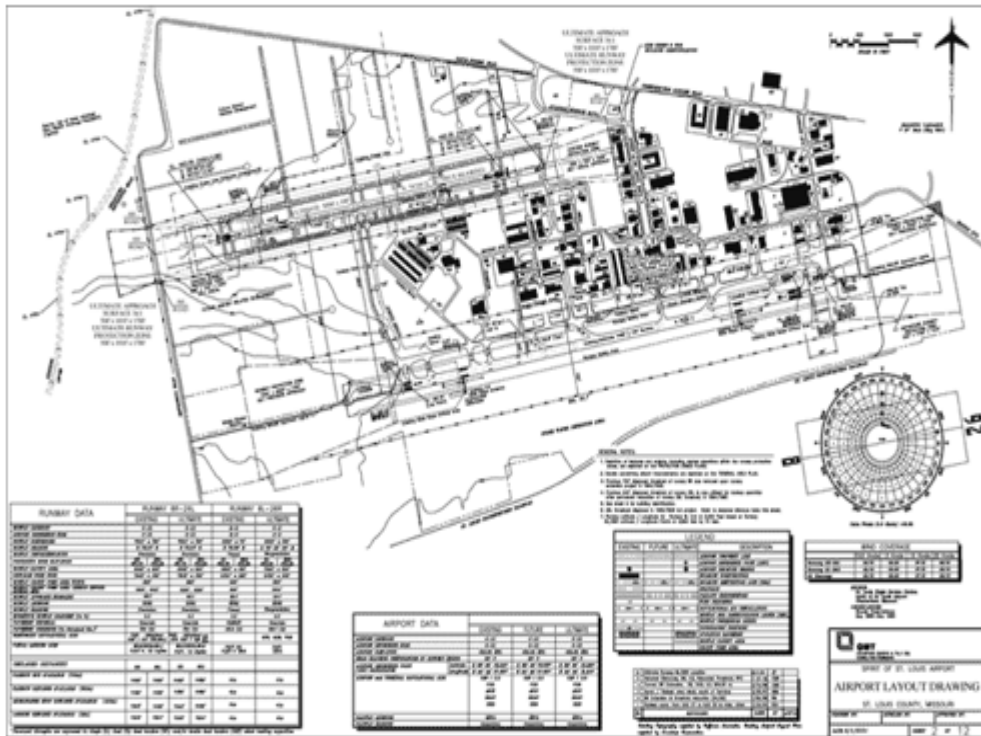
## Hot Spots vs. RIM locations

- Hot Spots
  - RSATs
  - Runway Safety Office
- RIM locations
  - RI data
  - Field validation



# Airport Sponsor Roles/Responsibilities

- Grant Assurances
- Mitigation Development
  - Coordinate with local stakeholders
  - Engage FAA LOB as necessary
- Mitigation Strategies
  - Capital Improvements
  - Non-Capital Improvements
  - Operational
  - Education
  - Other, technology
- ALP updates, etc.



# Airport Geometry

(h) Hot Spots. Redesign of hot spots identified in the FAA Airport Diagrams that may increase the risk of runway incursions is a priority when the associated runway or taxiway is subject to reconstruction or rehabilitation. Other non-standard taxiway design elements should be corrected as soon as practicable.

(6) Coordination. An efficient taxiway system can only be designed with knowledge of operational requirements. Coordination with the airport's Airport Traffic Control Tower (ATCT) personnel is essential, especially at busier airports with parallel runways and multiple aprons, and where departure queues are common and inbound and outbound traffic could conflict.

(7) Operational Requirement. Changes in taxiway geometry in response to Air Traffic operational needs must be analyzed for possible effects on runway incursions. Coordinate with the Safety Risk Management (SRM) team when analyzing proposed taxiway geometry. See Order 5200.11 for projects within the movement area.

# Airport Operation Regulation Part 139 – Certificated Airport



# ICAO - Definition of a Runway Incursion

**Doc 9870, 1.1 - “Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or persons on the protected area of a surface designated for the landing and take-off of aircraft.”**



# Definition of a Vehicle/Pedestrian Deviation (V/PD)

- **Vehicle/Pedestrian Deviation (V/PD) - *Any entry or movement on the movement area by a vehicle (including aircraft operated by non-pilots) or pedestrian that has not been authorized by air traffic control.***



# Airport Operator Actions to Reduce the Potential for Pedestrian and Ground Vehicle Deviations



- **Limit the number of airport tenant personnel authorized to operate a vehicle on the movement area and safety areas to only those that have a definite need.**
- **Personnel who do not regularly drive on the movement area are not going to be as proficient as regular drivers and are more likely to commit a V/PD.**

# Airport Operator Actions to Reduce the Potential for Pedestrian and Ground Vehicle Deviations

**Airline/FBO Personnel on Remote Deicing Pads**

**Snow Removal By Contractors or Other City Department Personnel**



**Personnel who only operate on the movement area during seasonal times of the year, should receive recurrent training just prior to that seasonal period. Special procedures for seasonal operations, such as mowing, snow removal and aircraft deicing, should also be reviewed just prior to those operations.**

# Part 139.329 Pedestrian and Ground Vehicle Operations Requirements

- Comprehensive pedestrian/ground vehicle training program
- Train all personnel who access the movement area and safety area
- Recurrent training every 12 months
- Keep records for 24 months
- Limit access to movement areas and safety areas
- Consequences of noncompliance

**DOC 9870, 4.6.5 – A Formal drivers training and assessment programme should be introduced in accordance with the driver training guidelines contained in Appendix D or , where already in place, these guidelines should be reviewed.**

# Airport Operator Actions to Reduce the Potential for Pedestrian & Ground Vehicle Deviations



- **Airport Operators should require vehicle operators to use existing service roads rather than crossing a runway.**
- **Perimeter service roads should be high on improvement project lists.**

# Airport Operator Actions to Reduce the Potential for Pedestrian and Ground Vehicle Deviations



**Service roads that enter runways should have signs installed at the boundary of the runway safety area to help prevent inadvertent entry on an active runway.**

# Airport Operator Actions to Reduce the Potential for Pedestrian and Ground Vehicle Deviations



# Airport Operator Actions to Reduce the Potential for Pedestrian and Ground Vehicle Deviations



# Requirements under 139.335

- **Prevent inadvertent entry by pedestrian/vehicles in Movement Areas and Safety Areas.**
- **Reasonable protection of pedestrian and vehicles from aircraft blast**
- **Fencing required by applicable TSA regulation. This fence will satisfy “139.335(a)(1)”**



# Vehicle Operator Actions to Reduce the Potential for Pedestrian and Ground Vehicle Deviations



**Use headsets while operating loud equipment so as to better hear ATC communications.**

# Vehicle Operator Actions to Reduce the Potential for Pedestrian and Ground Vehicle Deviations

- Airport maintenance and operations vehicles should have an outside speaker for times when personnel are outside the vehicle.



# Vehicle Operator Actions to Reduce the Potential for Pedestrian and Ground Vehicle Deviations



# Vehicle/Pedestrian Deviations (V/PD)



- A vehicle or pedestrian crossing holding position marking or entering a runway, without ATCT authorization, is a runway incursion.

# Holding Position Signs and Markings



Holding position sign  
on Taxiway B1



Holding position sign  
on a runway



ILS/POFZ holding position sign



Runway approach surface holding  
position sign

Holding position signs identify the boundary of Runway Safety Areas (RSA), Obstacle Free Zones (OFZ), runway approaches, Precision Obstacle Free Zones (POFZ) and Instrument Landing System (ILS) critical areas. These signs are red with white legend and are considered critical for safety.

# Runway Incursion Severity Categories

- Runway incursions are classified with respect to the severity.
- ICAO 9870 Table 6-1.

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

# What happens when a V/PD occurs

1. **FAA Completes Form 8020-24, *Preliminary V/PD Deviation Report*.**
2. **FAA Airport Certification Safety Inspector issues a Letter of Investigation (LOI) to the airport operator.**
3. **The airport operator investigates the incident, initiates corrective actions as appropriate, and responds to the FAA.**
4. **FAA investigates the incident, reviews the airport's ground vehicle program and incident report on the V/PD and past incidents within the last few years.**
5. **The FAA determines appropriate action to take against airport certificate holder. Issues a closeout letter, Warning Letter, Compliance Letter, or initiates civil penalty enforcement action.**

# Latest Enhancements

## FAA's Call to Action at Part 139 Airports

- **Taxiway Centerline Enhanced Markings & Surface Painted Signs installed by December 31, 2010**
- **Require annual recurrent driver training for non-airport employees with movement area driving privileges**



# Vehicle Operator Actions to Reduce the Potential for Pedestrian and Ground Vehicle Deviations

Start looking for holding position marking when you see the enhanced taxiway centerline marking.



# Vehicle Operator Actions to Reduce the Potential for Pedestrian and Ground Vehicle Deviations

## Surface Painted Signs



# Getting the Word Out

- **Problem areas (Hot Spots) on your airport what are you doing to inform vehicle operators and pilots?**
- **Robust training program with vigilant monitoring.**

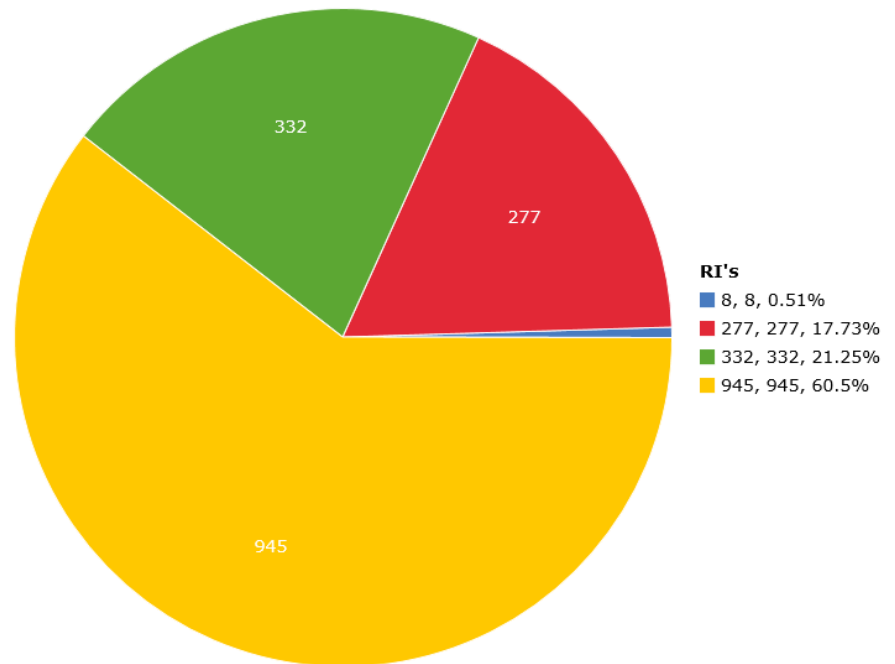
# Benefits of reporting...

- **We can't fix problems that we don't identify.**
- **Some Runway Safety Action Items have a higher priority for funding.**
- **It's simply part of being a professional.**



# FY 2016 RI Breakdown by Type

- Pilot Deviations (945)
- Operational Incidents (332)
- Vehicle/Pedestrian Deviations (277)
- Other – (8)
- Total (1,562)



# Reducing the Potential for Ground Vehicle and Pedestrian Deviations



# Security Fencing, Gates Closed, Limit personnel, Escorts



- Installation of security fencing and insuring gates remain closed.
- Airport Operators should **limit the number of airport tenant** personnel authorized to operate a vehicle on the movement area to **only those that have a definite need**.
- Tenant personnel who may have a need to occasionally drive on the movement area would be better off being escorted by an authorized vehicle operator.

# Review Vehicle Access Procedures



**Airport Operators should review procedures for access onto the AOA by City emergency vehicles, especially during airport emergencies.**



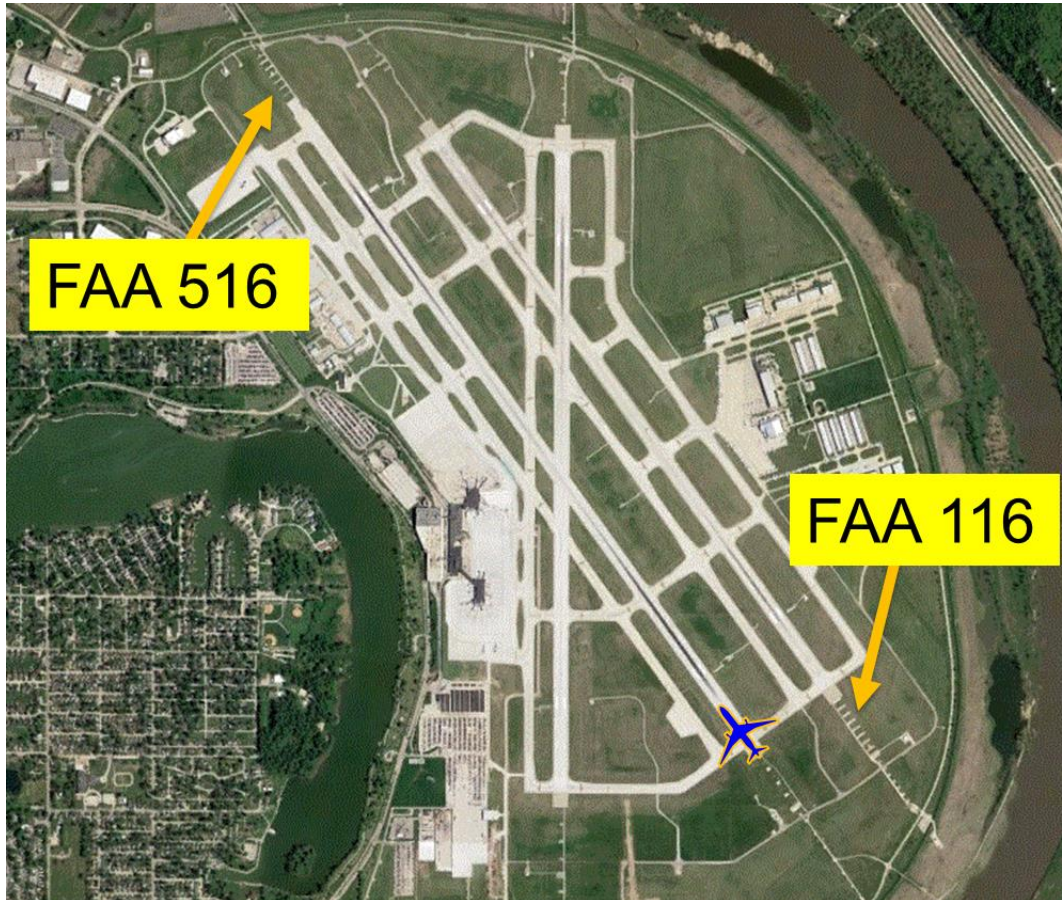
# Get Clearance; Question; Ask for Repeat



- **Be 100% sure that the ATCT clearance onto the runway was for you.**
- **Question any clearance that does not appear to be correct.**
- **If you did not clearly hear the ATC instruction, request the controller to repeat the instruction.**

# Expectation Bias & Call Signs

- Communications Breakdown



# Focus on Airfield Drivers

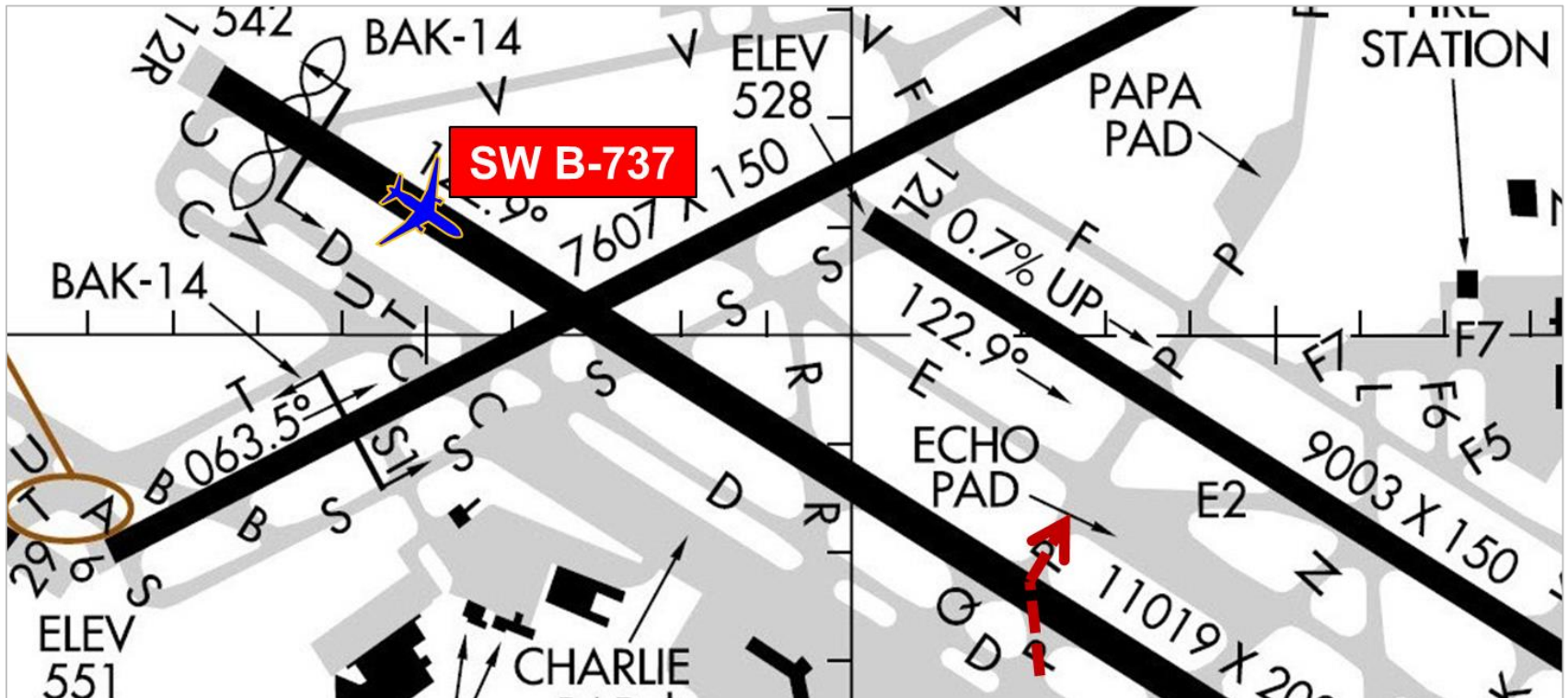
## Lessons Learned

- **Good Communication/Coordination of field activities with ATC BEFORE they are on the movement area.**
- **Controller knowledge of Maintenance Needs**
- **Common naming convention for entry points**
- **Avoid Similar call signs**
- **Follow up with lessons learned.**

# Minimum Effort

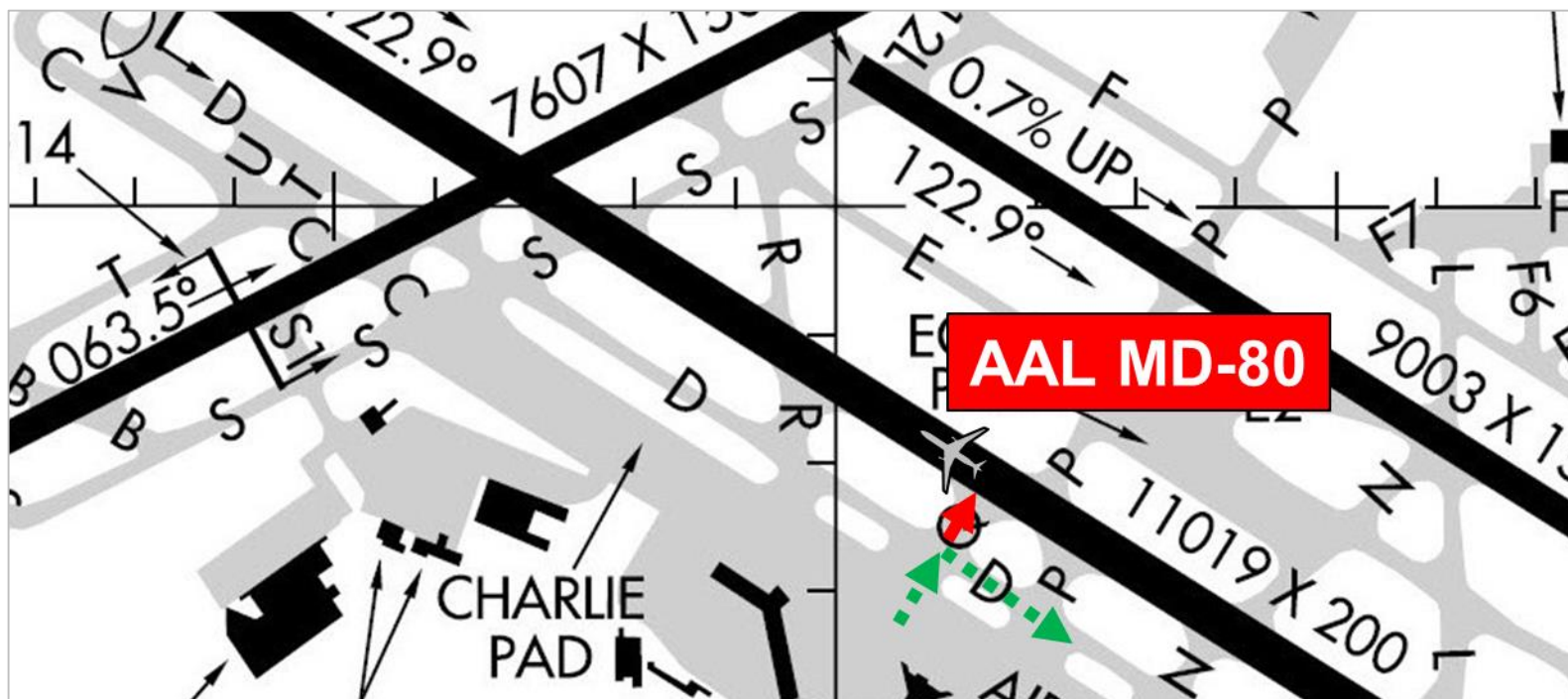
- **Contact GC when entering movement area**
- **Declare intentions and receive clearance**
- **Contact GC when completed or moving to a new zone**
- **Call clear once outside of the movement area**
- **Always have a clearance any time you cross or operate in the RSA**
- **Monitor LC if working on or along the Runway in the RSA even if runway is closed**

# Cat C V/PD Runway Incursion, May 31, 2013 - ARFF



ARFF Truck 42 requested to cross from Terminal Apron to North Fire House. ATC instructed Truck 42 to hold short of 12R on Twy Papa and Truck 42 repeated the hold short instruction. Truck 42 crossed 12R without ATC clearance while Southwest B-737 was landing 12R. The driver was distracted while training a new firefighter and missed seeing the hold position.

## Cat C V/PD Runway Incursion, June 30, 2013 - ARFF



ARFF Truck 42 plus ARFF Truck 44 on Apron at Quebec, requested to cross the airfield to North Fire House. ATC instructed Truck 42 to turn right on Delta and hold short 30L at November. Truck 42 turned right on Delta and Truck 44 crossed the 30L hold position without ATC clearance while AAL MD-80 was rolling out on 30L. T44 driver thought he heard a clearance to cross 30L.

# Cat C V/PD Runway Incursion, 5/8/14 – ARFF



- ARFF Truck 52 plus one, was instructed to hold short of Runway 12R on Runway 24. GC observed the ARFF vehicles approaching the hold short line and asked Truck 52 to verify hold short 12R. Truck 52 replied crossing 12R. ATC immediately instructed Truck 52 to stop hold short 12R. Truck 52 stopped between the hold line and runway edge. A Trans States E-145 was sent around inside of ½ mile final.

# Avoid High Energy areas

- **Focus crossings at runway ends when possible and avoid the first 2/3rds of the runway.**



# Use Service Roads



## Best Practice:

- **Maximum** and **mandatory** use of service roads to remain clear of runways and taxiways even if means your route is longer

# Airfield Construction Impacts



The X does **not** imply you are on Runway 10!

# Participate in Local RSATs

- **RSATs meet annually to discuss surface movement issues and concerns at all FAA and federal contract-towered airports**
- **RSATs have resulted in the identification and mitigation of safety issues at all FAA and federal contract-towered airports**



# Local RSAT Meetings

- **The primary role of the Runway Safety Team is not to inspect or regulate the airport, pilots or controllers.**
- **The purpose of the Runway Safety Team is to work with the local airport community to ensure that we are doing everything possible to improve and enhance Runway Safety to prevent Runway Incursions and Excursions**

# LRSAT: What can you do

- Encourage Active Participation by Vehicle Drivers
- Come Prepared and Ask Questions
- Review LOAs, Incidents, Hot Spots and Mitigations
- Review and Update LOAs & **Airport Data**

# Monitor Tower Frequency when Working in the RSA



# Precursors – “The Red Flags” - 1

## VPD INCURSIONS:

- Mid-field Crossings
- Open Access to Airfield
- Airport Construction
- Emergency Operations
- Similar Call Signs
- Poor Radios/Coverage
- Missing or Improper NOTAMs



# Precursors – “The Red Flags” - 2

## VPD Incursions:

- **Airport with Parallel Runways**
- **Complacency**
- **Not Monitoring Tower Freq.**
- **Snow Removal**
- **Closed Runway Operations**
- **#1 Red Flag - Lack of Attention**





# Airport Safety During Period of Construction

## In another presentation



# Questions?

