

JUNEAU RIM PROGRAM SAFETY RISK ASSESSMENT

APRIL 11, 2017





Agenda

- ➔ Background
- ➔ Design and Geometry Deficiencies
- ➔ Potential Mitigations
- ➔ SRA, SRM, and SMS
- ➔ 5-Step Process
- ➔ Next Steps





BACKGROUND

Runway Incursion Definitions

➔ “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.”

» (ICAO Doc 4444 - PANS-ATM)





Runway Incursion Classifications

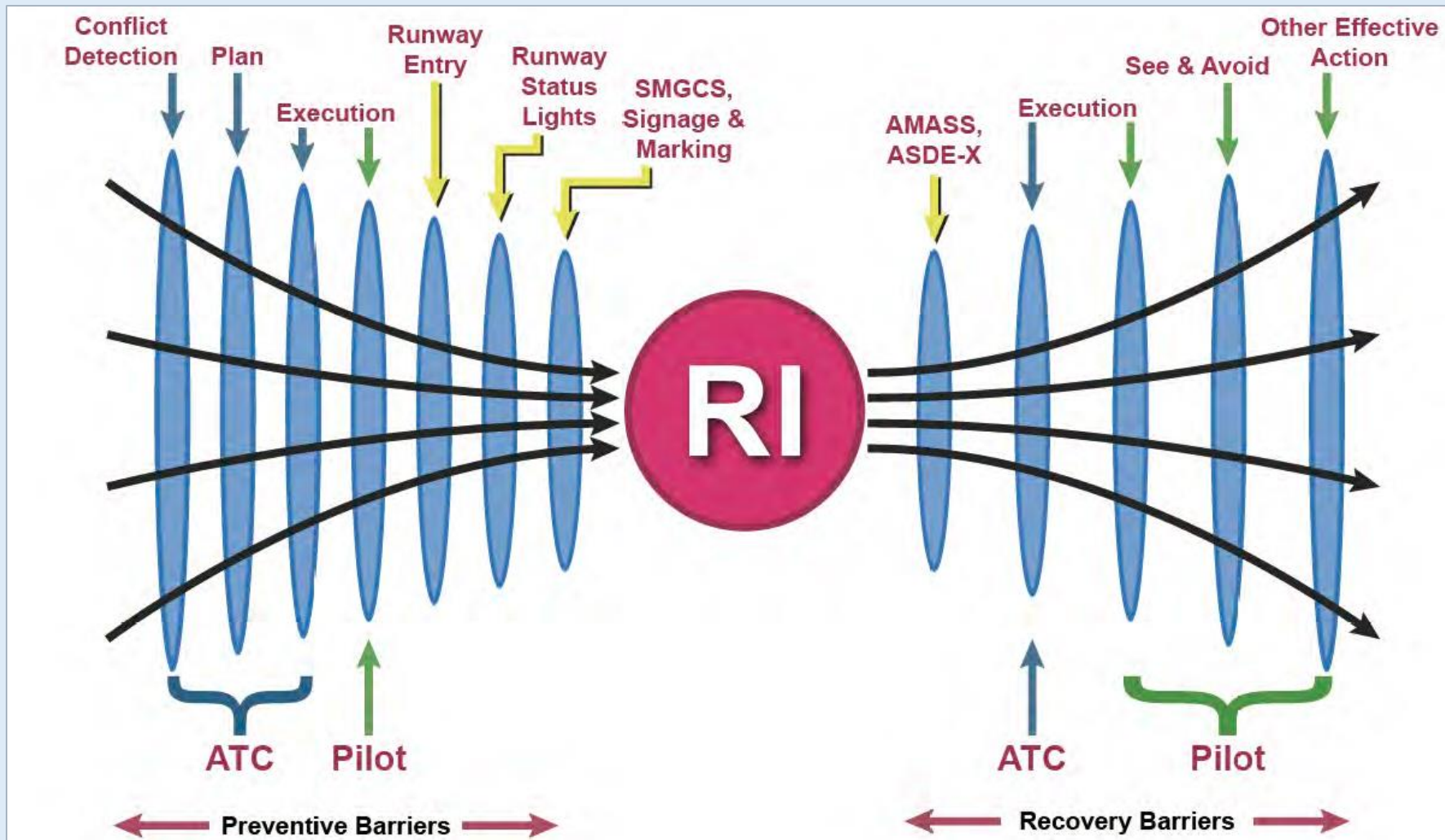
Operational Incident	a surface event attributed to ATC action or inaction.
Pilot Deviation	action of a pilot that violates any Federal Aviation Regulation
Vehicle / Pedestrian Deviation (V/PD)	any entry or movement on the movement area or safety area by a vehicle or pedestrian that has not been authorized by ATC.

Runway Incursion Categories

- ✈ A - Serious Incident – Actual Collision or Collision Narrowly Avoided
- ✈ B – Separation Decreases- Potential for Collision
- ✈ C – Ample Time and/or Distance to Avoid Collision
- ✈ D – Runway Incursion but No Immediate Safety Consequence



RIM Prevention Strategies



How SMS, SRM, and SRA work together

→ Safety Management System (SMS)

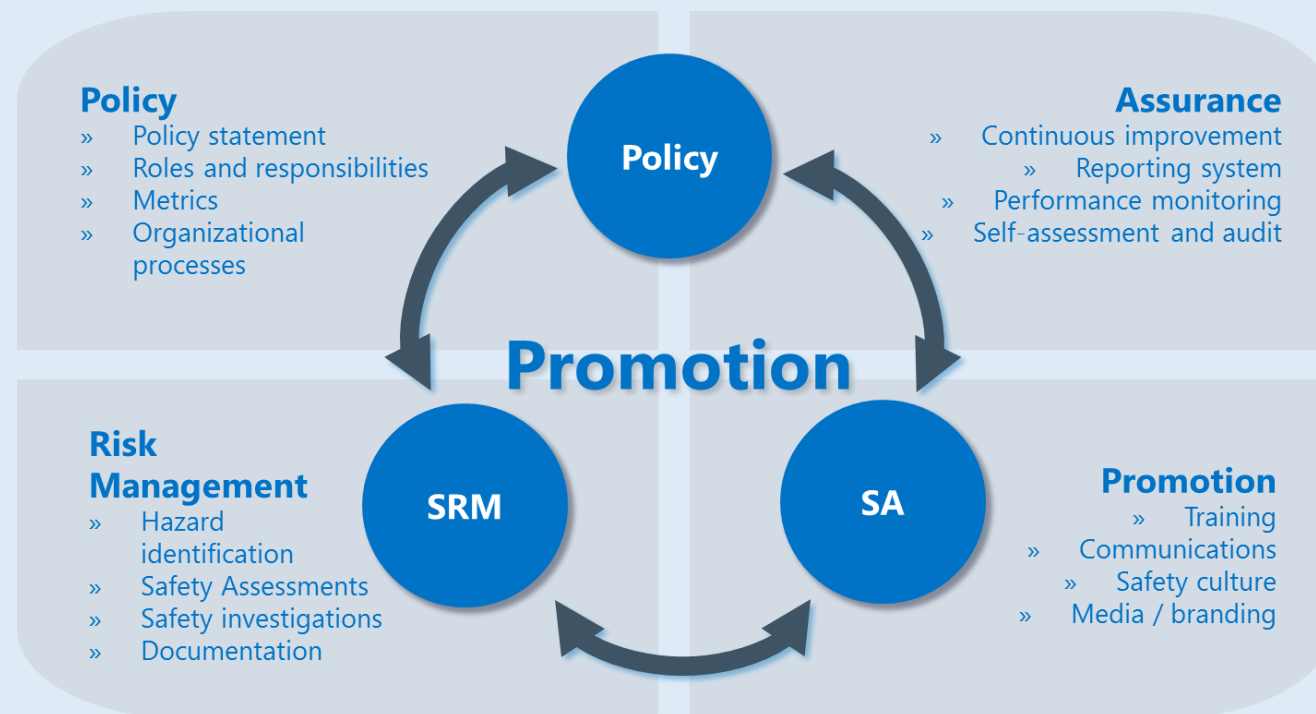
- » The overall system. The FAA is implementing SMS internally as well as requiring airports to comply

→ Safety Risk Management (SRM)

- » Identifying hazards, analyzing and assessing the risks, and mitigating them

→ Safety Risk Assessment (SRA)

- » Conducted by a group of Subject Matter Experts



5-Step Process

Describe System

Describe the most important aspects of the system; make sure to establish boundaries or limits for analysis. Identify operational, procedural, organizational, environmental, and physical factors.

Identify Hazards

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Analyze Risks

Identify a credible worst case scenario as a possible outcome of each hazard, including the potential severity and likelihood of each hazard.

Assess Risks

Assess the risk based on the Risk Matrix using the most accurate severity and likelihood definitions provided.

Mitigate Risks

Identify steps for reducing the severity or likelihood. Assign who will be responsible for implementing those steps. Describe how mitigations will be monitored and documented.



Incidents at Juneau

**50 Runway Incursions between
2004 – August 2016**

— 18 related to construction activities

=

**32 Runway Incursions Left to
Analyze**

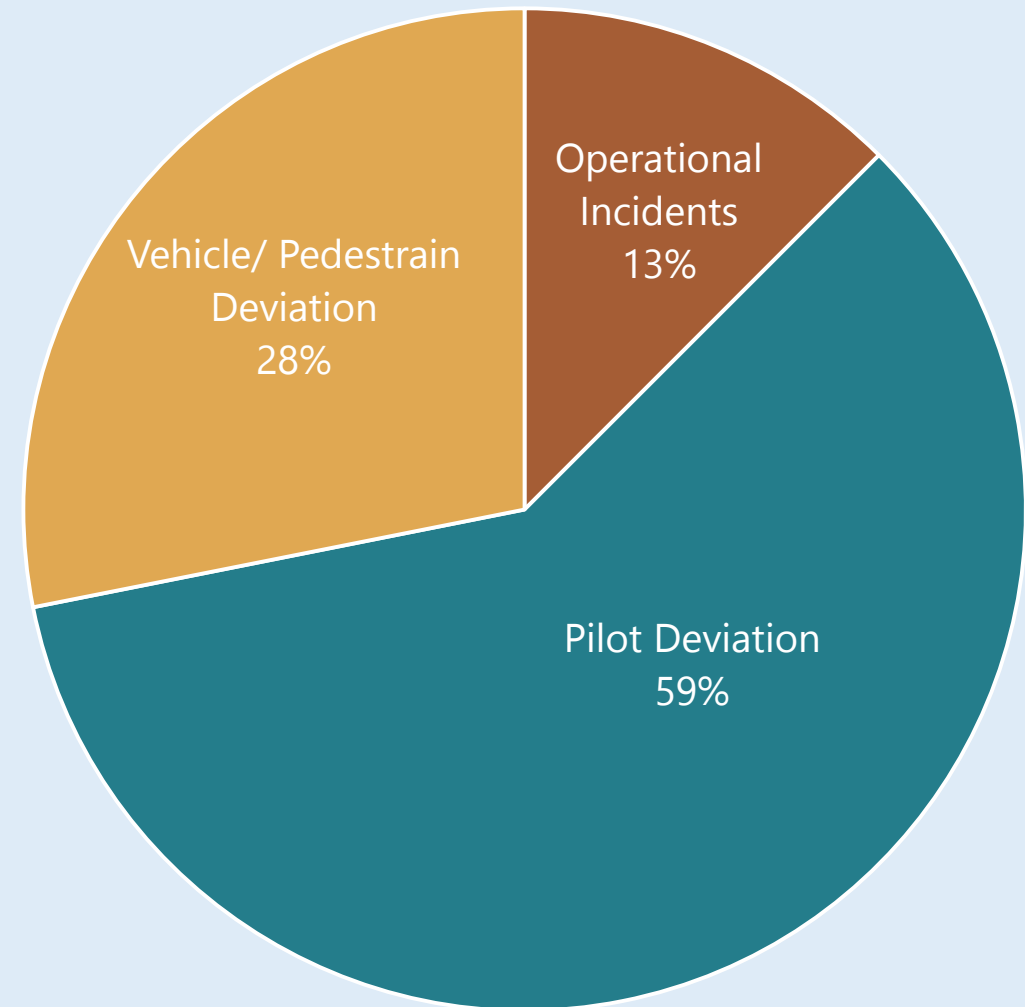
4 Operational Incident

19 Pilot Deviations

9 Vehicle/Pedestrian Deviation

Runway Incursions by Category

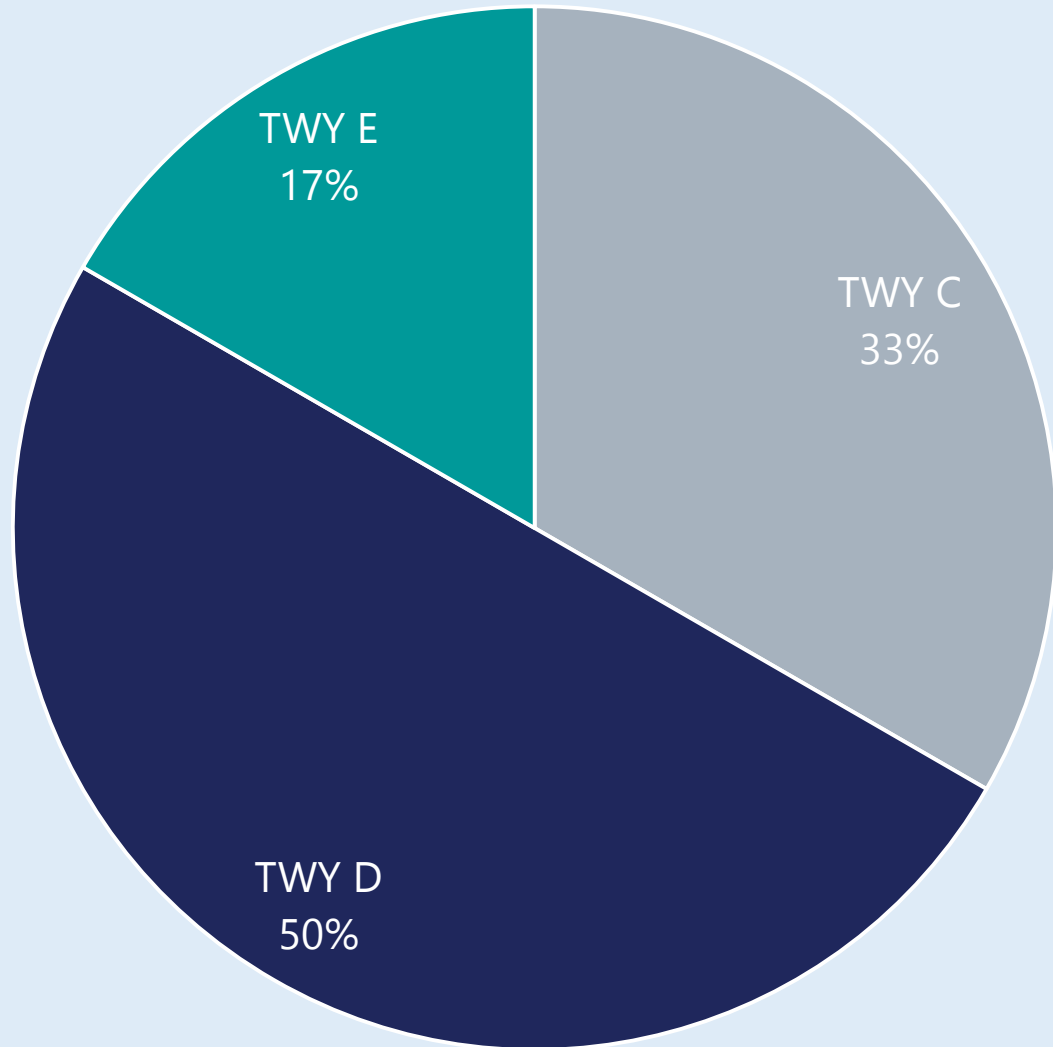
- 4 Operational Incidents
- 19 Pilot Deviations
- 9 Vehicle/ Pedestrian Deviations





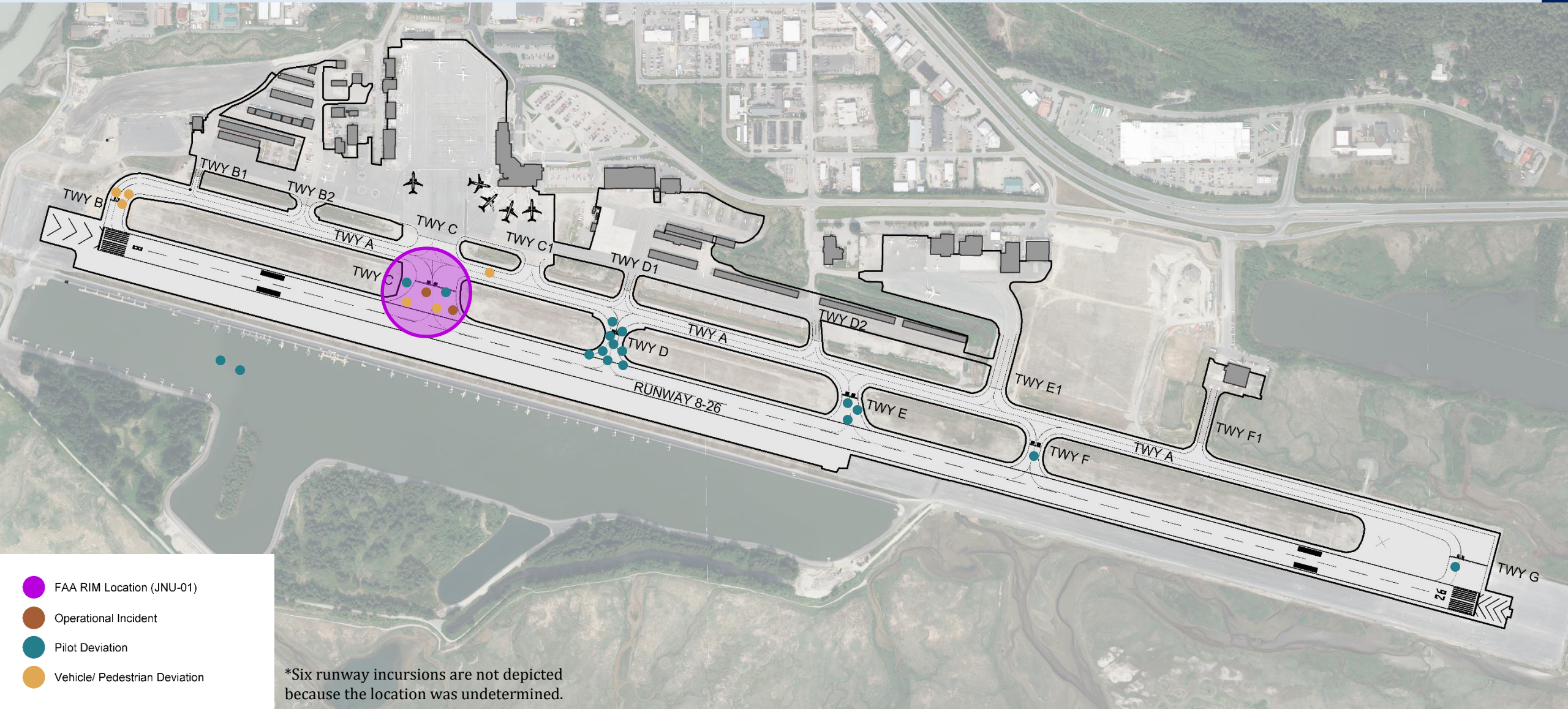
Runway Incursions by Location

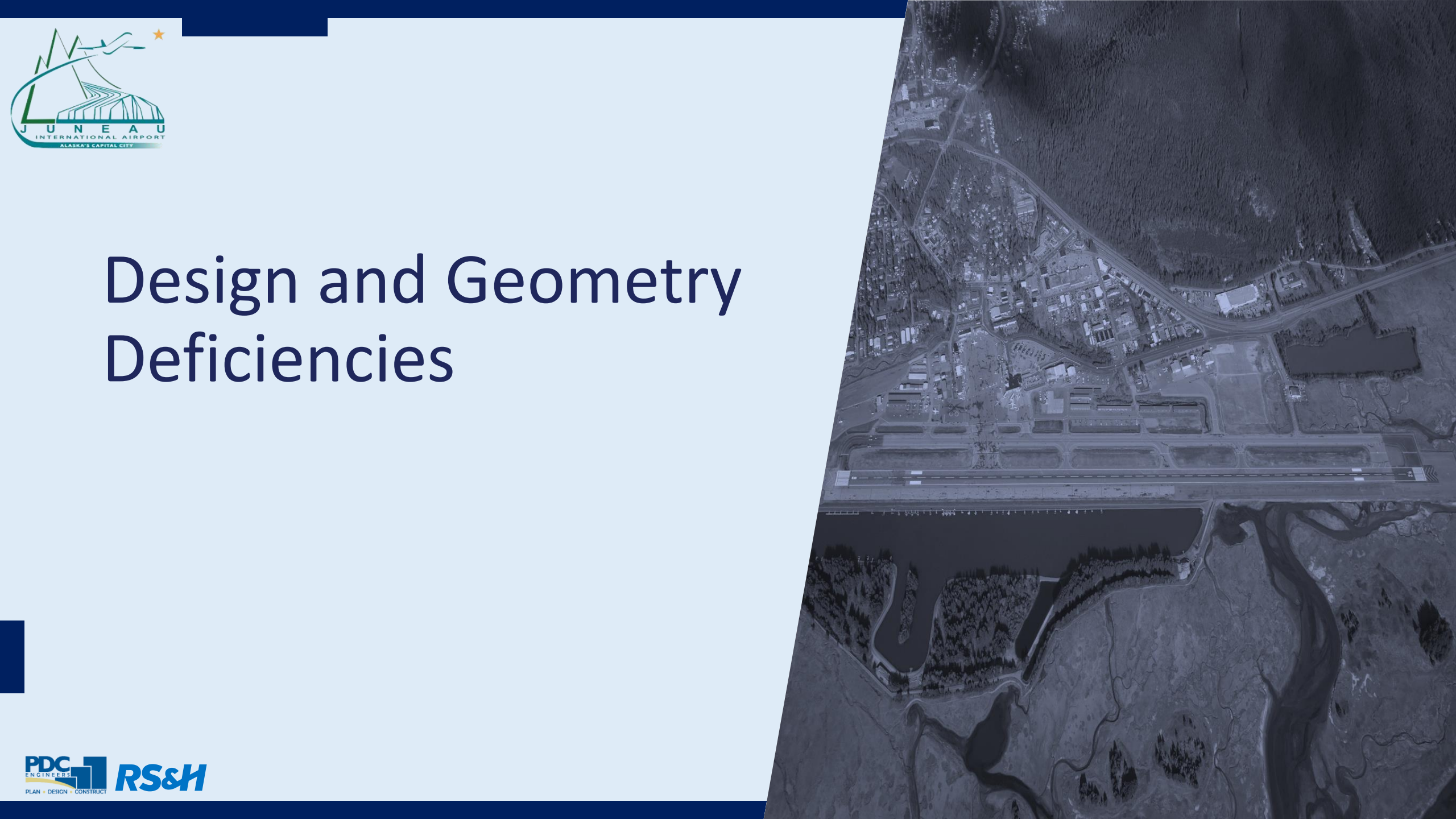
- TWY C – 6 Runway Incursions
- TWY D – 9 Runway Incursions
- TWY E – 3 Runway Incursions





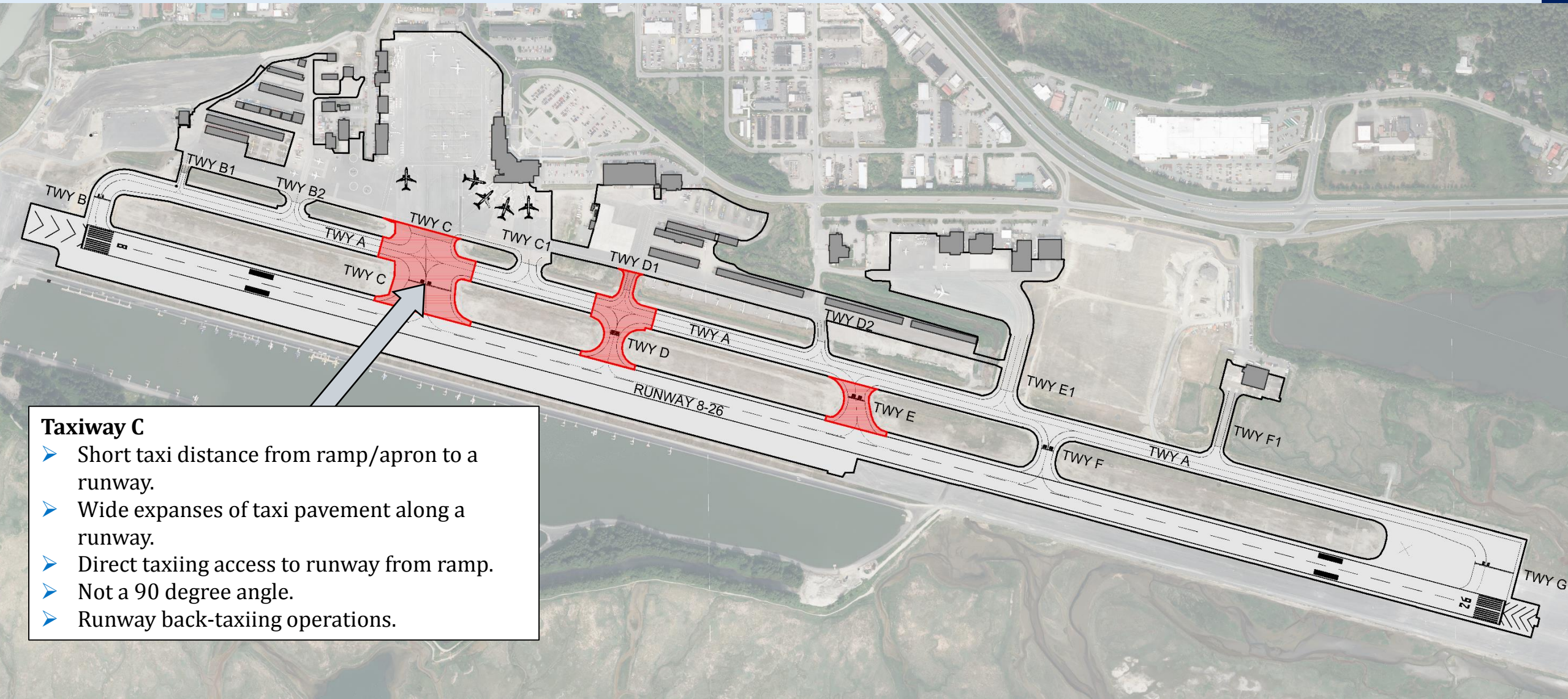
Juneau Runway Incursions





Design and Geometry Deficiencies

Taxiway Design Deficiencies

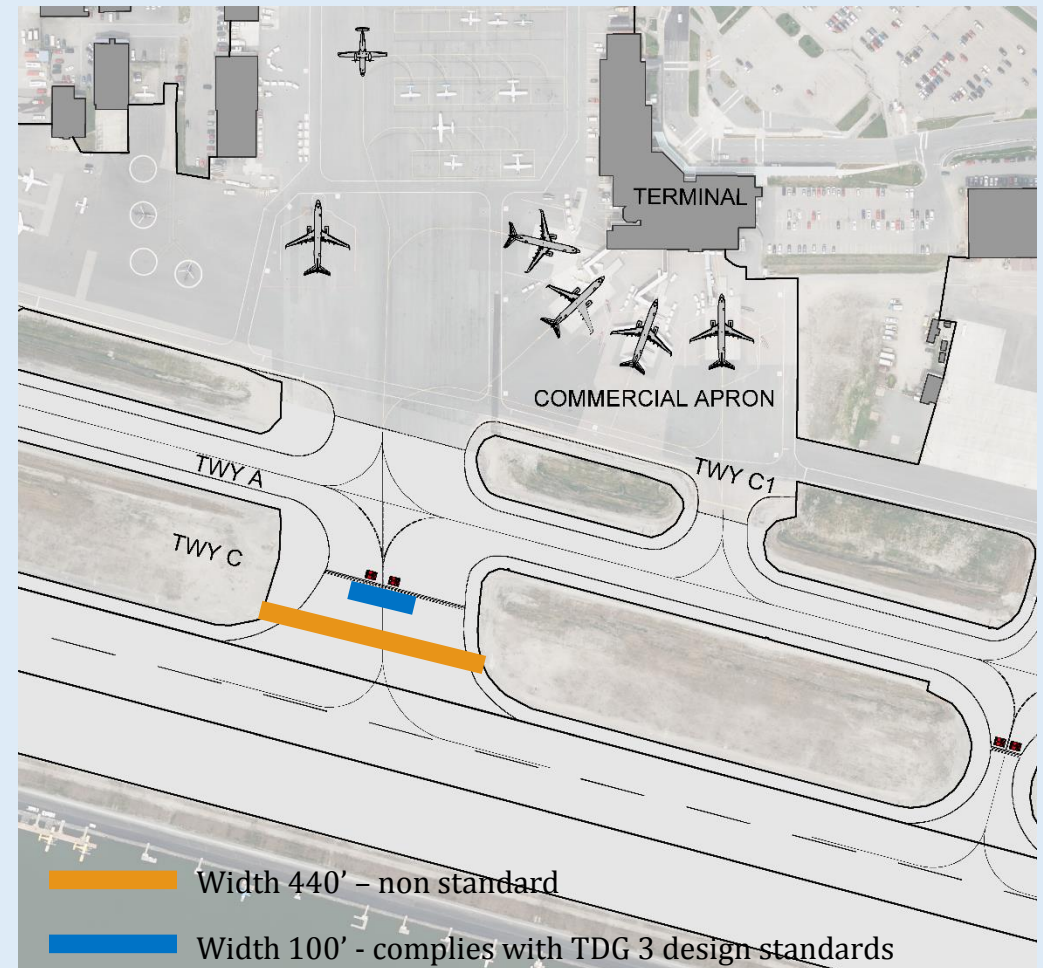


Taxiway C

- Short taxi distance from ramp/apron to a runway.
- Wide expanses of taxi pavement along a runway.
- Direct taxiing access to runway from ramp.
- Not a 90 degree angle.
- Runway back-taxiing operations.

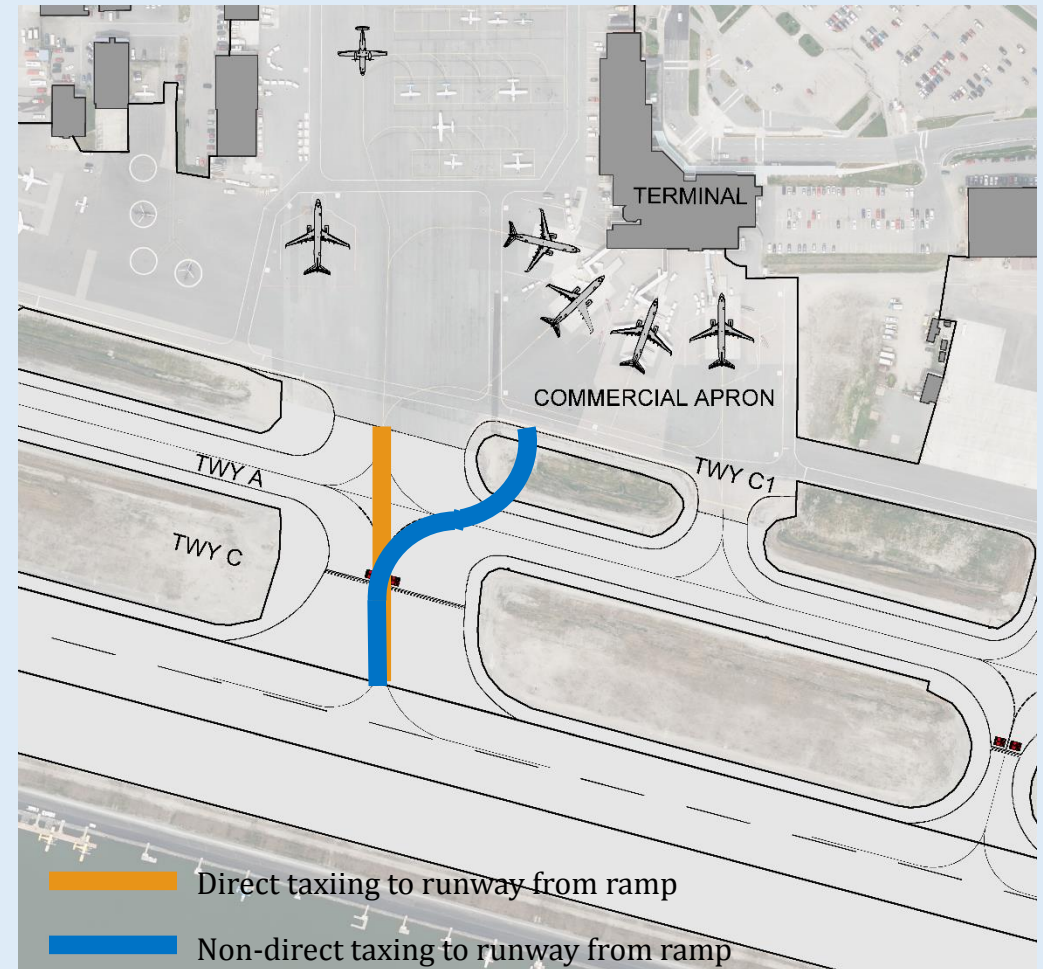
Geocode 3

➔ Wide Expanse of Pavement



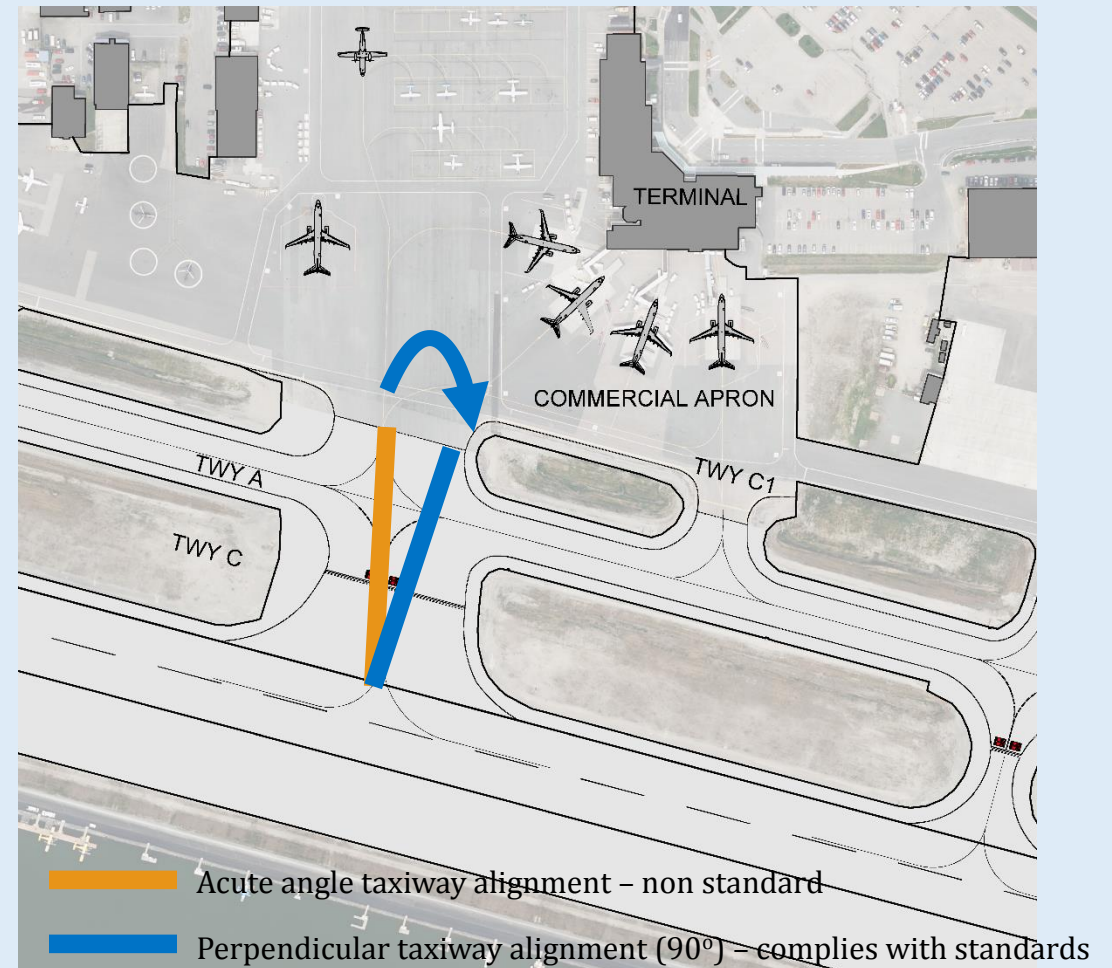
Geocode 8

➔ Direct Taxiing Access to Runway from the Ramp



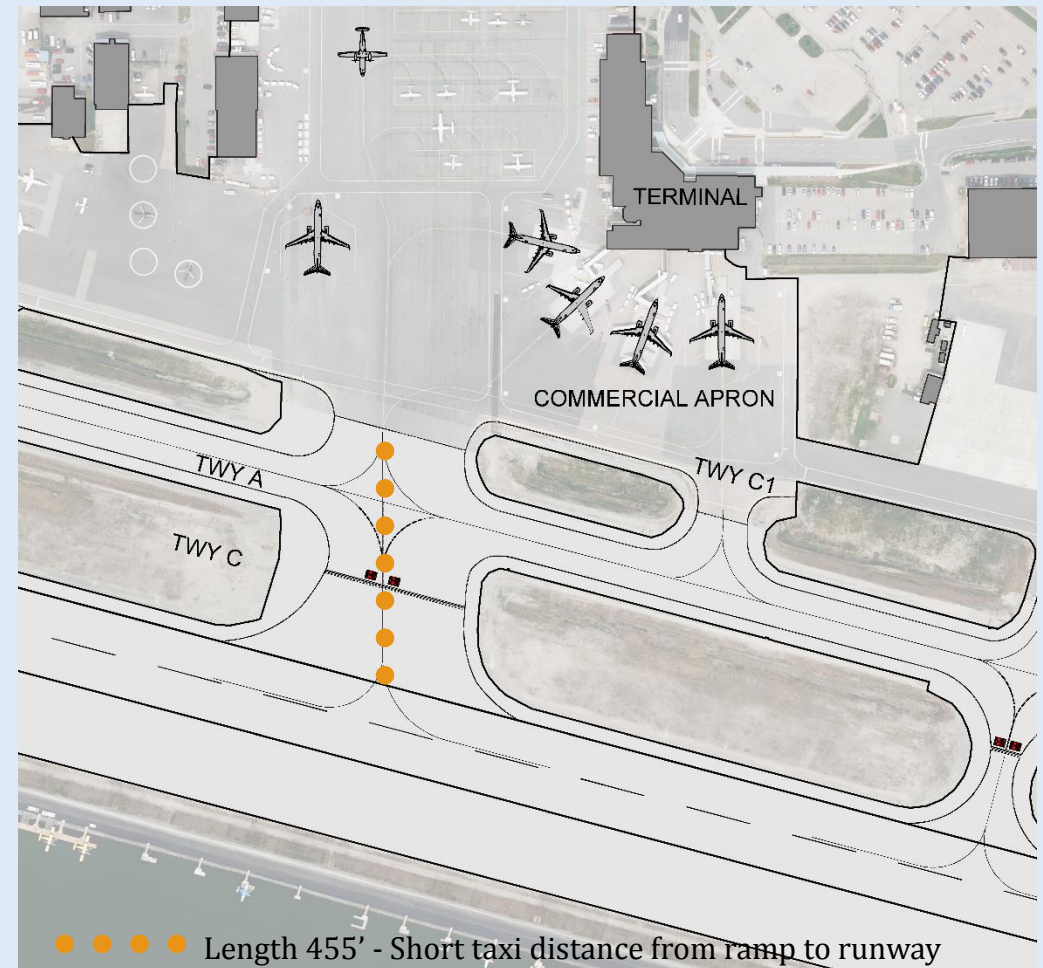
Geocode 13

➔ Taxiway Intersects Runway at Other Than Right Angle



Geocode 14

➔ Short Taxi Distance From Ramp to Runway





Taxiway C - Design Challenges

- ➔ Wide Expanse of Pavement
- ➔ Direct Taxiing Access to Runway from Ramp
- ➔ Taxiway Intersects Runway at other than Right Angle
- ➔ Short Taxi Distance from Ramp to Runway





Potential Mitigations

Taxiway C – Operational Considerations

- ➔ Apron is very congested during peak periods (queuing of departing aircraft).
- ➔ Location of facilities (helicopters, hardstand, terminal) contribute to apron congestion.
- ➔ Taxiway C is a high priority during snow events.
- ➔ 2-way traffic happens every day
- ➔ Small aircraft exit Runway 8/26 and conduct intersection takeoffs at Taxiway C

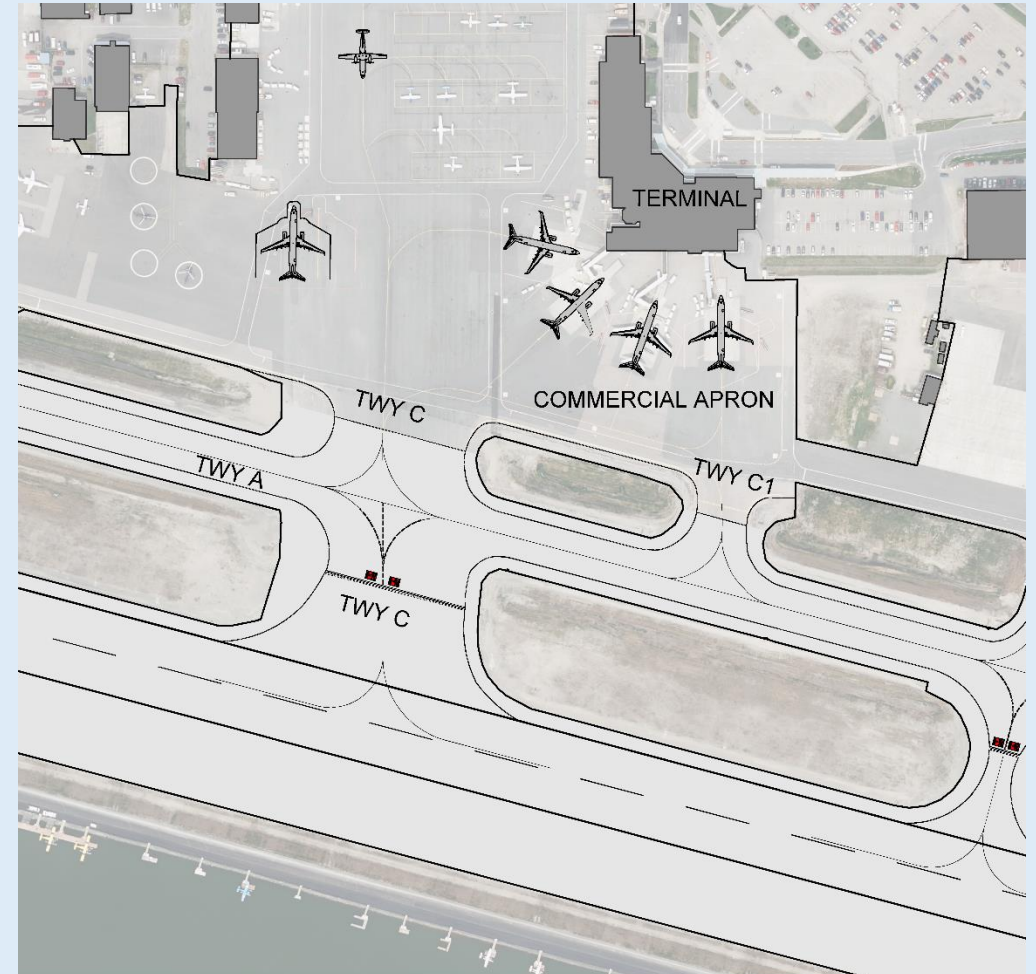


Exhibit Produced By: RS&H, 2016

Potential Mitigations

➔ Non-Construction Mitigation

- » New Training Programs
- » New Communication Protocol
- » Revised Operational Procedures

➔ Construction Mitigation

- » Signs, Lighting, Markings,
- » Taxiway Nomenclature
- » Taxiway Geometry

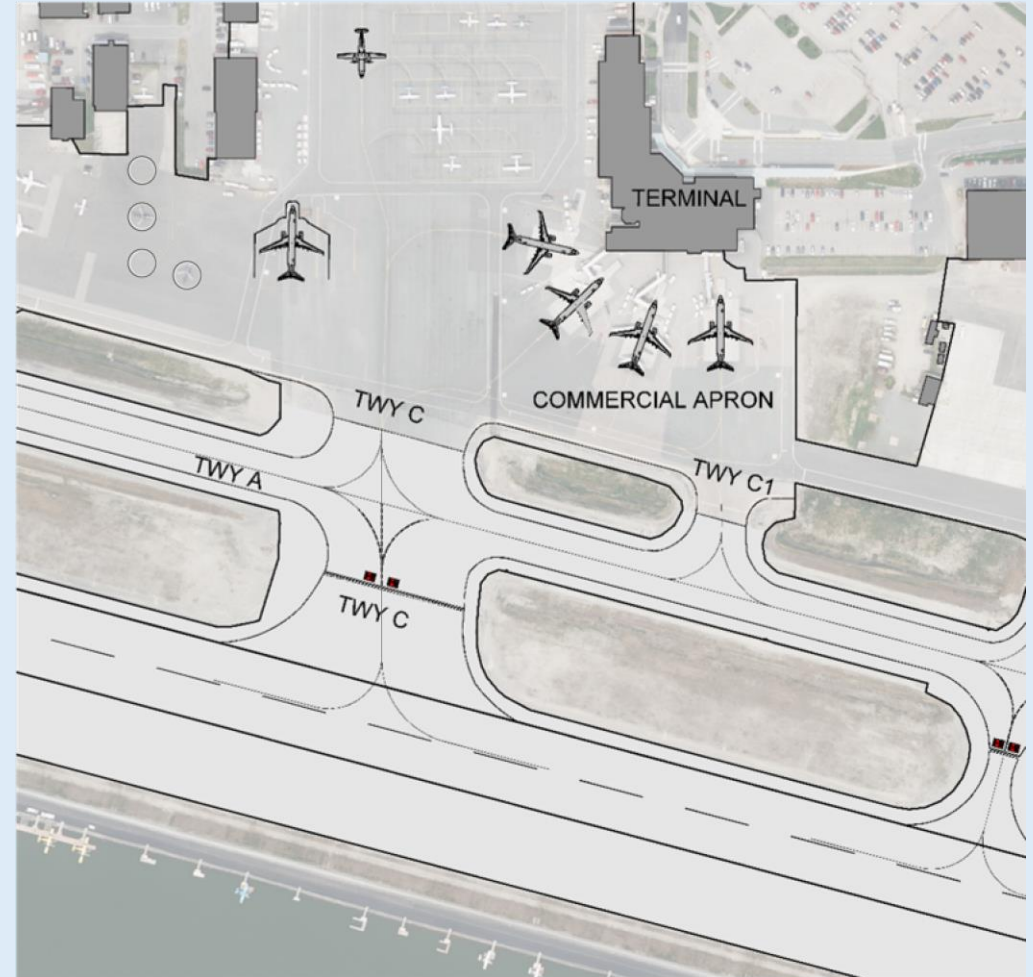


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Potential Mitigation Non-Construction

➔ Air Traffic Controllers

- » Encourage use of correct terminology and proper voice cadence.

➔ Pilots

- » Maintaining a sterile cockpit during taxiing, departing, and preparing for arrival.

➔ Airport Personnel

- » Promote the use of effective communication and encourage educational seminars for operating on an airfield.



Source: wiki.media.org, 2016

Potential Mitigation Construction

➔ Airfield Design Standards

- » Surface Painted Signs
- » Lighting Enhancements
- » Taxiway Nomenclature
- » Taxiway Geometry

➔ Master Plan Solutions

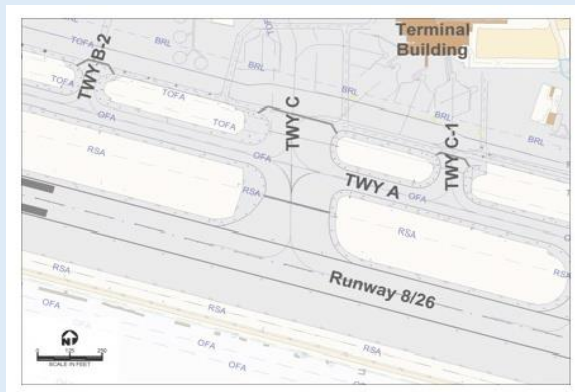
- » Taxiway E, D, and C



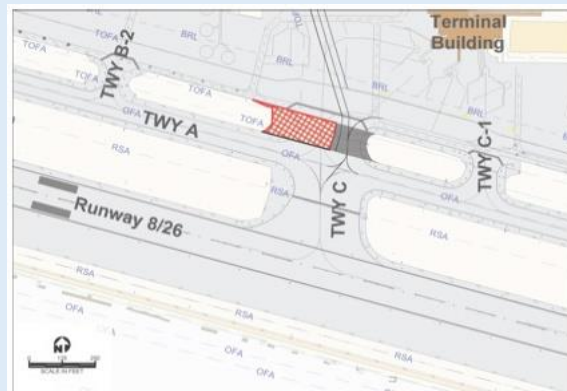
Source: 20/20 HeinSite, 2016

Master Plan Solutions for Taxiway C

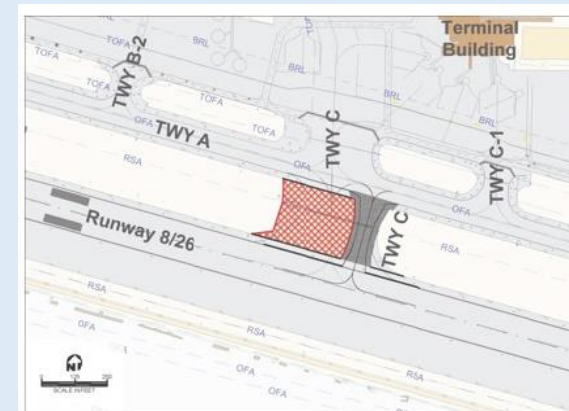
Exhibits prepared by URS Corporation.



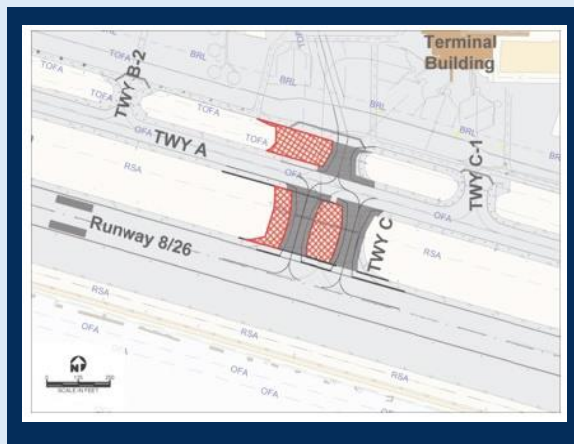
Alternative 1 – Do-Nothing



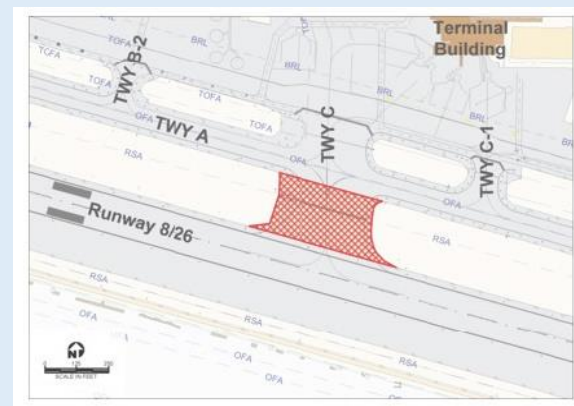
Alternative 2 – Realign Ramp Connection



Alternative 3 – Realign Runway Connection



Alternative 4 – Mark as Dual Taxiway



Alternative 5 – Close Taxiway

Taxiway C – Operational Considerations

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- ➔ Location of facilities (helicopters, hardstand, terminal) contribute to apron congestion.
- ➔ Taxiway C is a high priority during snow events.
- ➔ 2-way traffic happens everyday
- ➔ Small aircraft exit Runway 8/26 and conduct intersection takeoffs at Taxiway C

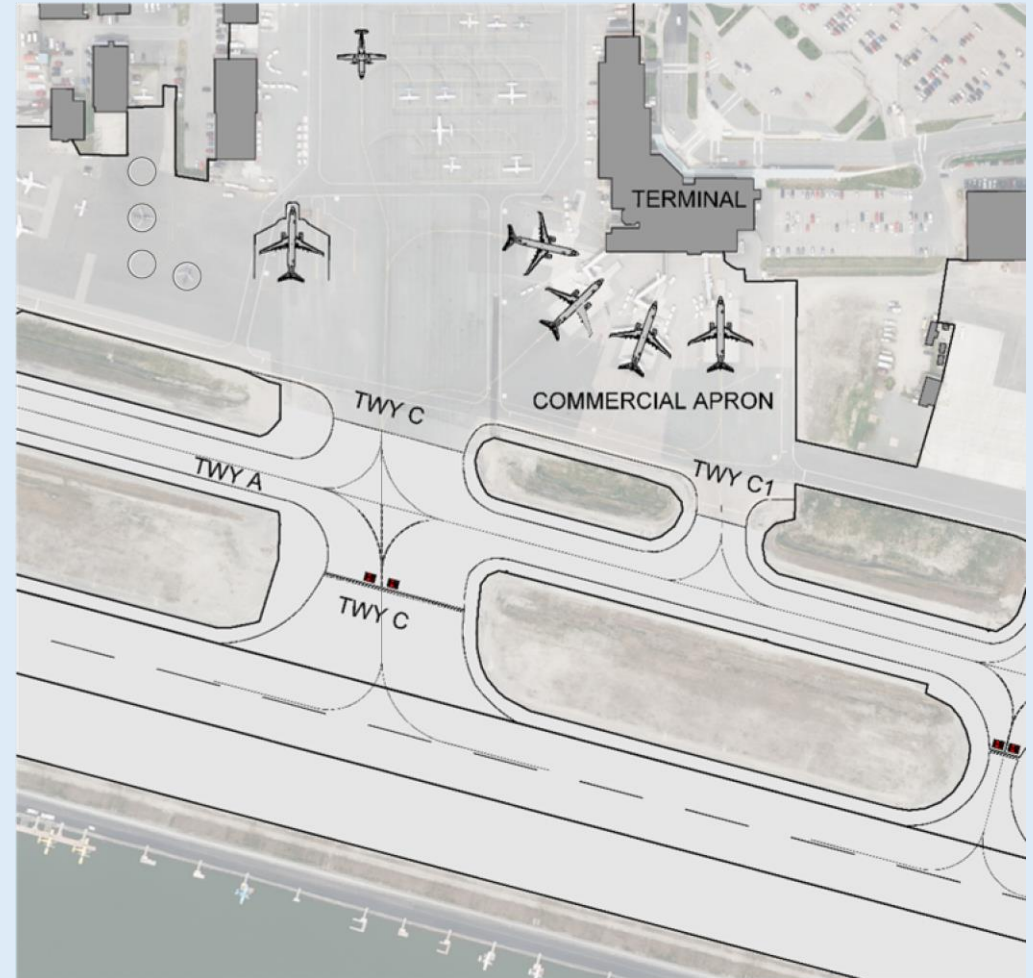


Exhibit Produced By: RS&H, 2016

Considerations for Taxiway C

- ➔ Current geometry established though decades of airfield enhancements
- ➔ No such thing as perfectly safe
- ➔ Balancing safety, operational efficiency and capacity is essential
- ➔ Safety Risk Assessment is a key tool in striking that balance
- ➔ More than just the RIs, geometry and dimensional standards are vital to this solution
- ➔ Three options were developed as a potential solution for Taxiway C

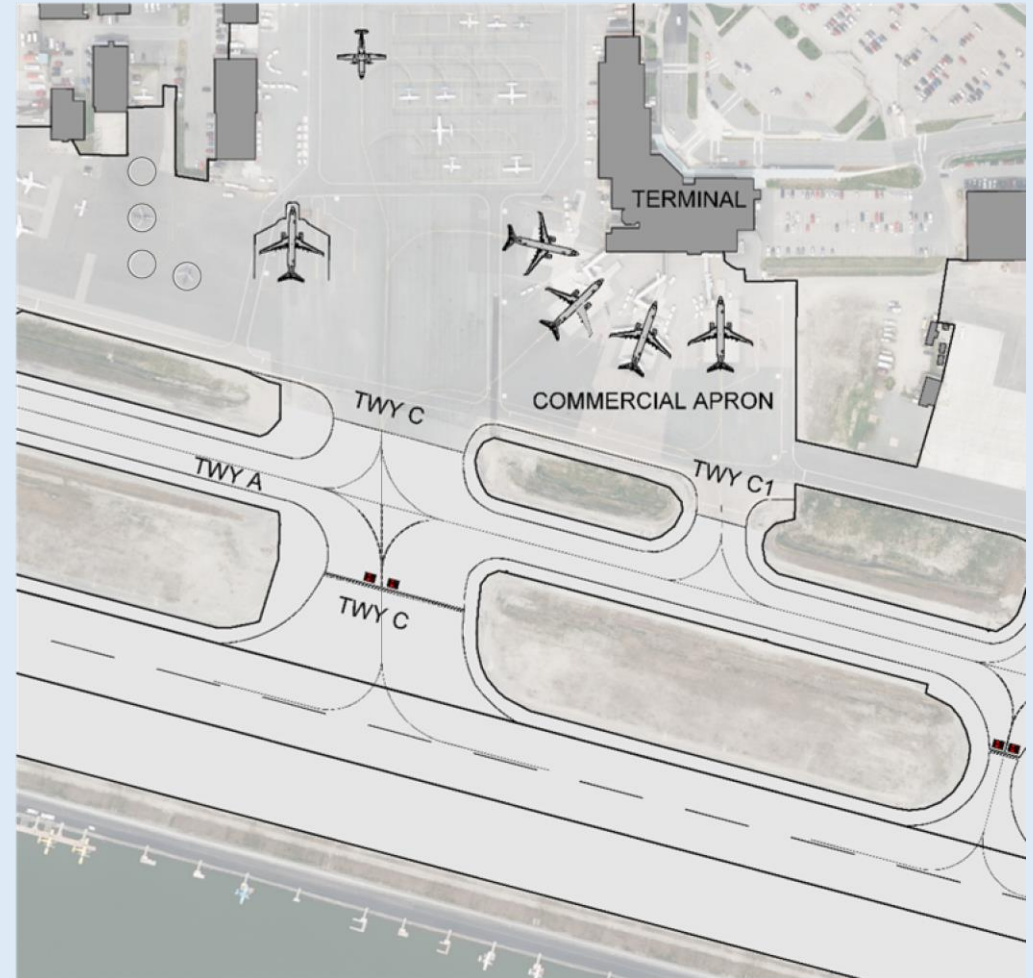
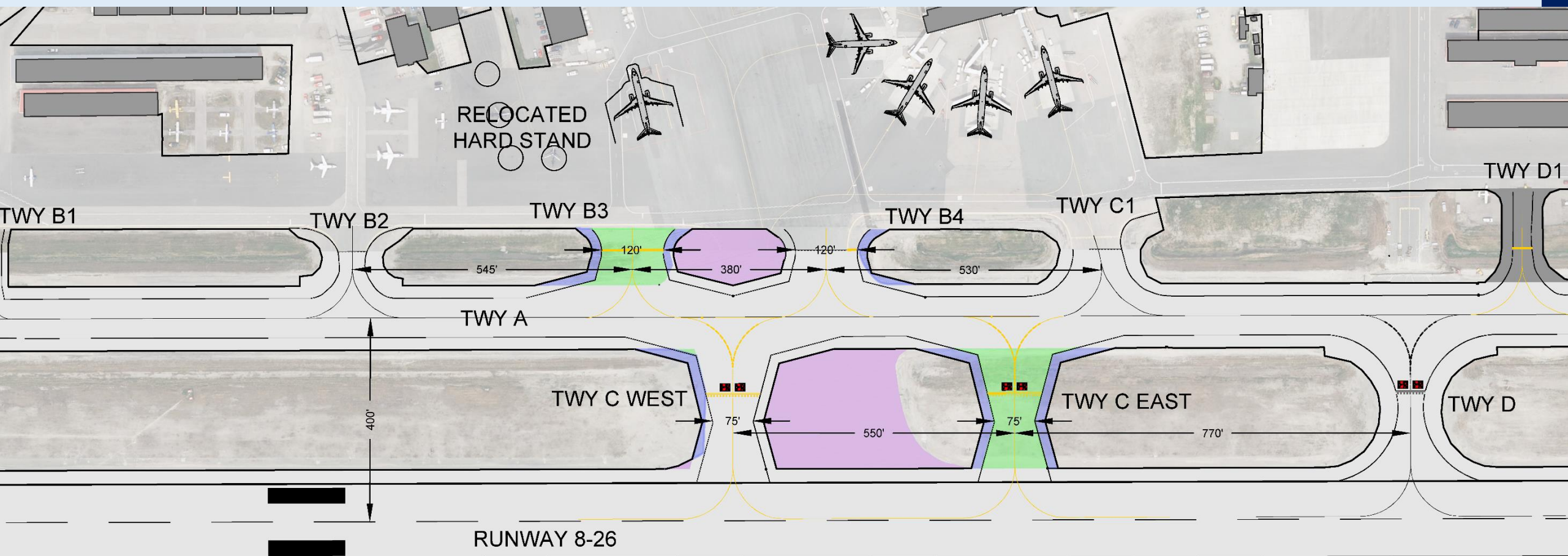


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Option 3 – Preferred Solution



Removed Pavement

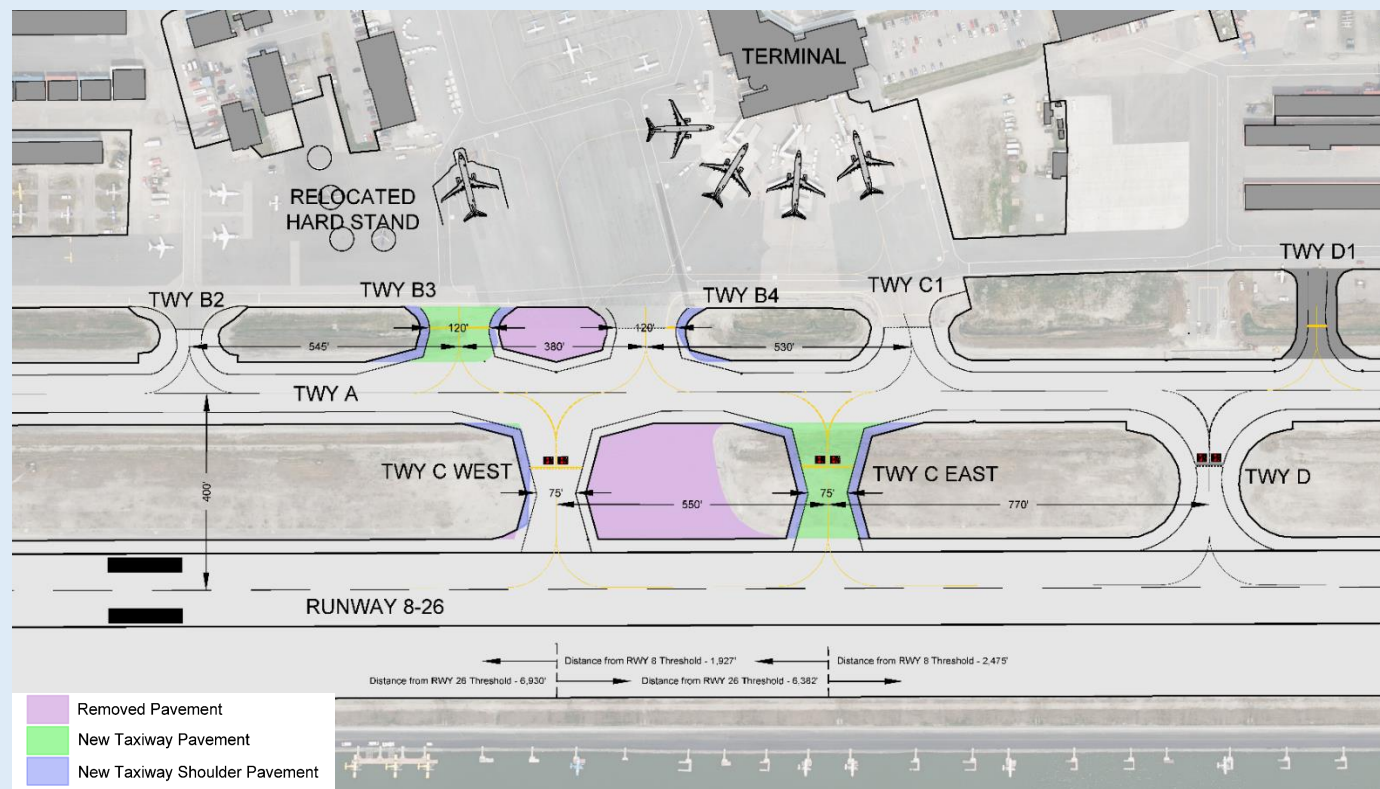
New Taxiway Pavement

New Taxiway Shoulder Pavement

Distance from RWY 8 Threshold - 1,927'
Distance from RWY 26 Threshold - 6,930'
Distance from RWY 8 Threshold - 2,475'
Distance from RWY 26 Threshold - 6,382'

Option 3 – Preferred Solution

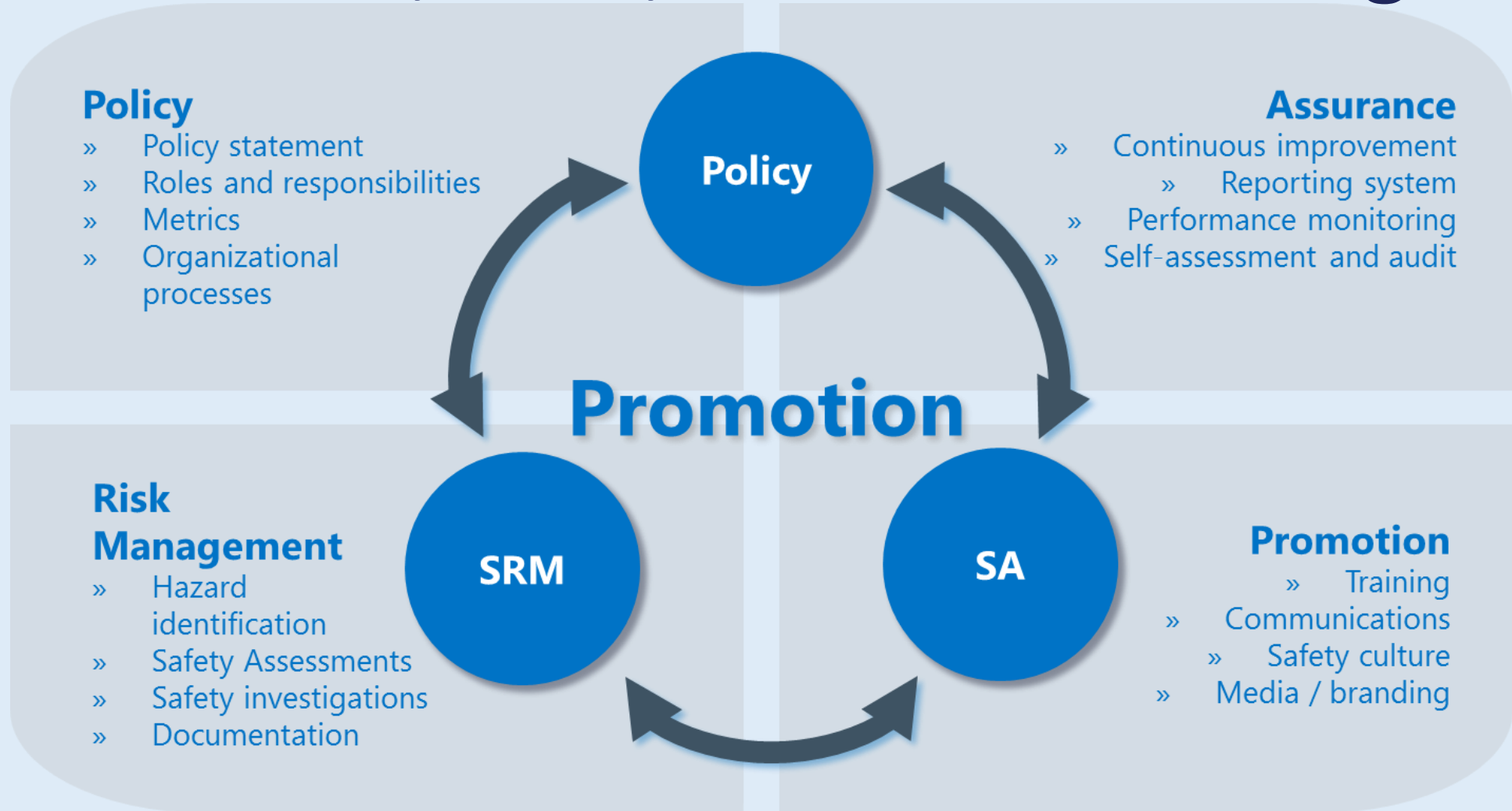
- ➔ Meets current airfield design standards.
- ➔ Optimizes the configuration based on the aircraft fleet.
- ➔ Improved ATCT flexibility and airfield efficiency.
- ➔ Increase situational awareness and aircraft performance



SRA, SRM, and SMS



How SMS, SRM, and SRA work together



5-Step Process

Describe System

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Analyze Risks

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Assess Risks

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Mitigate Risks

Identify steps for reducing the severity or likelihood. Assign who will be responsible for implementing those steps. Describe how mitigations will be monitored and documented.

Hazard Assessment Worksheet

(1) Hazard ID	(2) Hazard Description	(3) Cause(s)	(4) System State	(5) Existing Controls	(6) Justification / Supporting Data
XYZ-1	Condition, real or potential; can cause injury, illness, etc. Prerequisite for an accident or incident	Events that result in a hazard or failure.	Conditions, characterized by quantities or qualities, in which a system can exist; worst credible	Mitigations that exist to prevent or reduce hazard occurrence or mitigate its effect	Explanation and additional detailing of Existing Controls

Hazard Assessment Worksheet

(7) Effects	(8) Severity	(9) Severity Rationale	(10) Likelihood	(11) Likelihood Rationale	(12) Initial Risk	(13) Mitigations	(14) Mitigation Responsibility	(15) Predicted Residual Risk
Potential outcome or harm of the hazard if it occurs in the defined system state	Resultant matrix determination	Particular effect of the identified hazard producing the worst credible outcome (likelihood is not considered)	Resultant matrix determination	Expression of how often a particular effect is expected to occur given existing controls and requirements (severity must be considered first)	Risk matrix ranking based on severity and likelihood of a hazard when it is first identified and assessed	Stated mitigation for this hazard	Who has the responsibility to implement the mitigation	Risk status predicted to occur when recommended controls or requirements are verified



Step 1 – Describe the System

Describe System

Describe the most important aspects of the system; make sure to establish boundaries or limits for analysis. Identify operational, procedural, organizational, environmental, and physical factors.

Identify Hazards

Analyze Risks

Assess Risks

Mitigate Risks

Step 2 – Identify Hazards

Describe System



Identify Hazards



Analyze Risks



Assess Risks

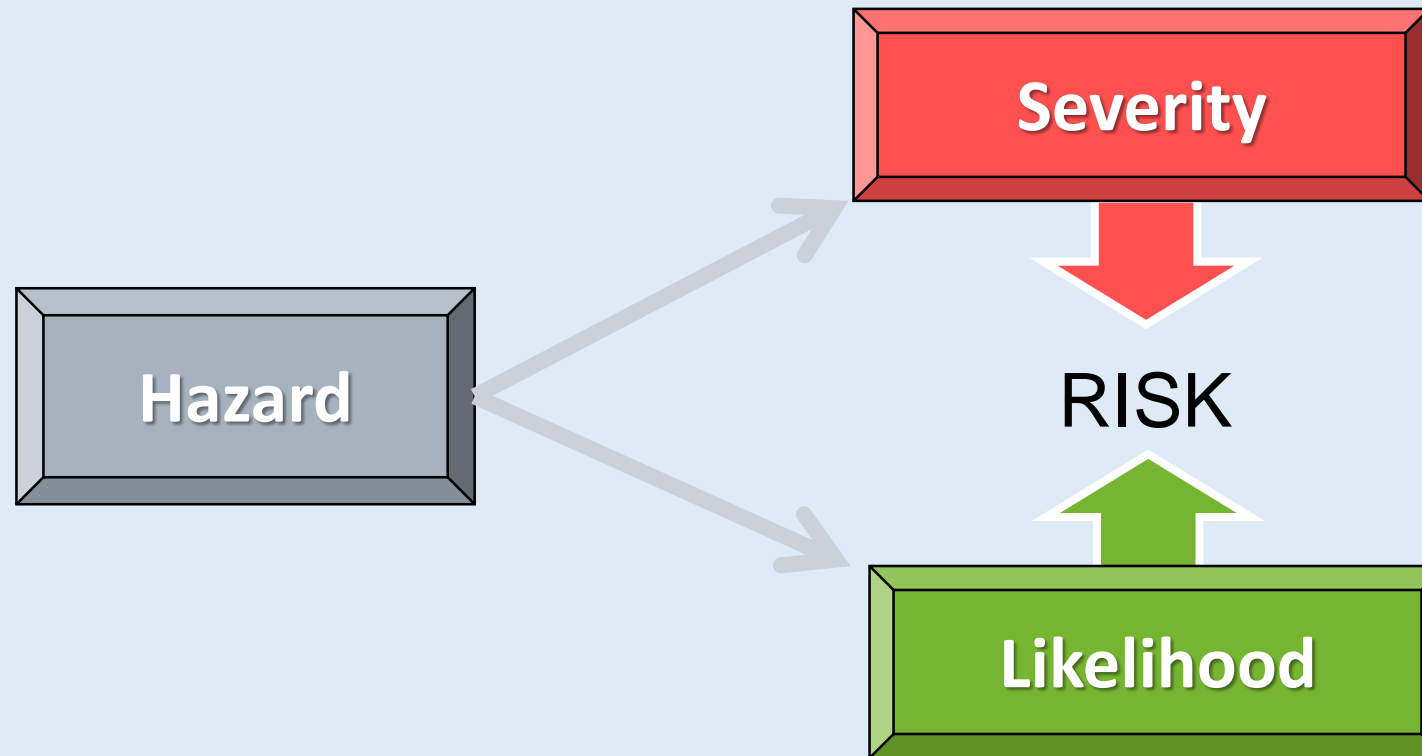


Mitigate Risks

Identify the inherent conditions associated with the defined system that have the potential to cause harm.

Step 3 – Analyze Risks

Risk: Composite of predicted severity and likelihood of outcome.



Severity and Likelihood Definitions

Table C-1: Severity Definitions*

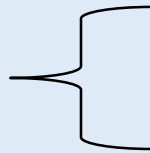
Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1
Negligible safety effect	<ul style="list-style-type: none"> Physical discomfort to persons Slight damage to aircraft/vehicle 	<ul style="list-style-type: none"> Physical distress or injuries to persons Substantial damage to aircraft/vehicle 	Multiple serious injuries; fatal injury to a relatively small number of persons (one or two); or a hull loss without fatalities	Multiple fatalities (or fatality to all on board) usually with the loss of aircraft/vehicle

* Excludes vehicles, crew, and participants of commercial space flight.

Table C-2: Likelihood Definitions

Frequent A	Expected to occur routinely
Probable B	Expected to occur often
Remote C	Expected to occur infrequently
Extremely Remote D	Expected to occur rarely
Extremely Improbable E	So unlikely that it is not expected to occur, but it is not impossible

Step 4 – Assess Risks



Assess the risk based on the Risk Matrix using the most accurate severity and likelihood definitions provided.

Risk Matrix

Severity \ Likelihood	Minimal 5 Negligible safety effect	Minor 4 - Physical discomfort to persons - Slight damage to aircraft / vehicle	Major 3 - Physical distress or injuries to persons - Substantial damage to aircraft / vehicle	Hazardous 2 Multiple serious injuries; fatal injury to a relatively small number of persons (one or two); or a hull loss without fatalities	Catastrophic 1 Multiple fatalities (or fatality to all on board) usually with the loss of aircraft / vehicle
Frequent A Expected to occur routinely					
Probable B Expected to occur often					
Remote C Expected to occur infrequently					
Extremely Remote D Expected to occur rarely					
Extremely Improbable E So unlikely that it is not expected to occur, but it is not impossible					*

* Unacceptable with Single Point and / or Common Cause Failures

Step 5 – Mitigate the Risks

Describe System



Identify Hazards



Analyze Risks



Assess Risks



Mitigate Risks

Identify steps for reducing the severity or likelihood. Assign who will be responsible for implementing those steps. Describe how mitigations will be monitored and documented.