



## Use of SMS Risk-Based Methodology to Identify and Mitigate Airfield Hazards

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## Background: Fundamental Components of Safety Management Systems

A proactive approach to safety based on risk-management methods.

Four components:

- Policy
- Promotion
- Safety Risk Management
- Safety Assurance





## Background: SMS Safety Risk Management (SRM)

### Safety Risk Management (SRM)

Analysis of suspected airfield hazards towards estimating level of risk and mitigation priorities.

Factors: Likelihood & Severity

| Severity \ Likelihood | No Safety Effect | Minor       | Major       | Hazardous   | Catastrophic |
|-----------------------|------------------|-------------|-------------|-------------|--------------|
| Frequent              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
| Probable              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
| Remote                | Low Risk         | Low Risk    | Medium Risk | High Risk   | High Risk    |
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| Extremely Improbable  | Low Risk         | Low Risk    | Low Risk    | Low Risk    | Medium Risk  |

|             |
|-------------|
| High Risk   |
| Medium Risk |
| Low Risk    |



Severity →

| Severity \ Likelihood | No Safety Effect | Minor       | Major       | Hazardous   | Catastrophic |
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Goal:

- Identify and Assess Hazards
- Determine level of risk
- Prioritize mitigation

|             |
|-------------|
| HIGH RISK   |
| MEDIUM RISK |
| LOW RISK    |

**High Risk:** Immediate Priority  
**Medium Risk:** Active Management  
**Low Risk:** Periodic review

FAA SMS Risk Assessment Matrix



## Safety Risk Assessments – Defining the Risk

### Level of Severity:

|                   |   |
|-------------------|---|
| A - No Effect:    | No Injuries or damage   |
| B - Minor:        | No injuries, minor damage to property or equipment                  |
| C - Major:        | Minor to moderate injuries, moderate to significant property damage |
| D - Hazardous:    | Few major to fatal injuries, significant property damage            |
| E - Catastrophic: | Several fatal and serious injuries, major property damage           |

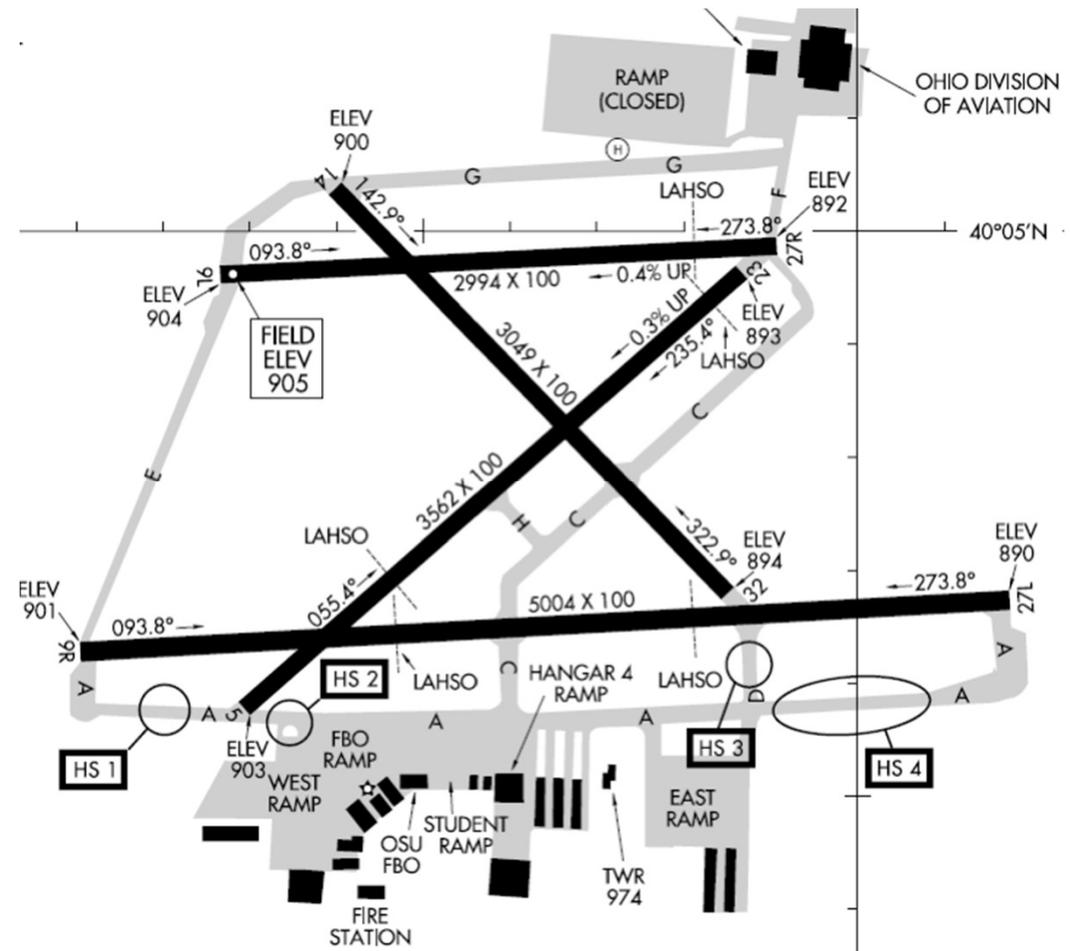
### Levels of Likelihood:

|                           |  |
|---------------------------|--|
| 1 – Extremely Improbable: | Has never occurred at the airport (but could)  |
| 2 – Extremely Remote:     | A highly irregular occurrence (perhaps once in 10 years)                                 |
| 3 – Remote:               | An irregular and unexpected occurrence<br>(perhaps 1 once per 6 months to year)          |
| 4 – Probable:             | An irregular, but not unexpected occurrence<br>(can expect to occur at least 1 per year) |
| 5 – Frequent:             | A regular occurrence (can expect to occur at least once 3-6 months)                      |



## SMS Applied at KOSU Airport

- FAR Part 139 Reliever Airport
- ATCT operated
- ARFF Index A
- FBO
- Flight Education
- FAR Part 145 Repair Station
  
- 4 Runways
- 6 Taxiways
  
- 70,000 ops/year
- Wide fleet mix
  
- Safety Management a virtual necessity





## SMS Applied at KOSU Airport





## KOSU SMS SRM Safety Risk Analysis (SRA) process:

- SMS Safety Committee formed and met regularly to identify potential hazards on & around airfield
- Independent hazard reporting infrastructure established.
- SRA is performed for identified hazards
- Risks assessed, prioritized, and addressed





## KOSU SMS SRM Safety Risk Analysis (SRA) process: Online hazard reporting via OSU Airport SMS Website

**OSU Airport Safety Management Systems**

Home Submit Hazard Report

### Welcome!

Welcome to the OSU Airport Safety Management Systems website. From here you may learn about the Safety Management System (SMS) Implementation that has been occurring over the past year, and access various helpful resources. On this site we will post news updates about Safety Committee meetings, FAA directives, and overall airport safety information. You may also submit a [hazard report](#).

### What is a "hazard report"?

Employees, users, and organizations of the OSU Airport are encouraged to report safety hazards that may have been observed or encountered. This can be anything from confusing signage, procedures, unsafe acts witnessed, or anything safety related with regard to the ramp and airfield areas. These reports are non-punitive, and can be submitted anonymously, if desired. Participation is strictly voluntary, and highly encouraged to increase safety at OSU Airport.

### What is a Safety Management System (SMS)?

In order for the OSU Airport to provide the safest environment possible for its staff and pilots, the airport has decided to implement a Safety Management System (SMS). By definition a SMS is, "formalized approach to managing safety by developing an organization-wide safety policy, developing formal methods of identifying hazards, analyzing and mitigating risk, developing methods for ensuring continuous safety improvement, and creating organization-wide safety promotion strategies." SMS will allow the airport to strengthen its overall safety by consistently considering safety in all aspects of the airport operations. So, what does this mean to you?

There are four pillars of SMS - Safety Policy, Safety Assurance, Safety Risk Management, and Safety Promotion - that will be affecting all areas of the airport. Safety Policy is related to the fundamentals of safety management that the airport has committed to and is a coherent aspect of all procedures. The OSU airport has also formed a Safety Committee that is composed of members representing a multitude of interests and is devoted to continued improvement of policies and all other aspects of SMS. Safety Risk Management and Safety Assurance work together to proactively prevent accidents or any other mishap. Any individual at the airport can assist in Safety Risk Management by submitting a hazard report. This simple form allows the airport to collect data on the hazards. A risk assessment is then performed on the hazard and the necessary procedures are performed accordingly. In order for these risks to stay at bay, Safety Assurance consistently measures the effectiveness of the risk control and ensures the hazard has not become more of a danger. The final pillar, Safety Promotion involves all members of the airport community. Staff and all levels of management can contribute a positive attitude towards

### News

Airport Safety Committee Meeting will be held Thursday, June 16th at 9:00am in the OSU Airport Administration Building Classroom.

4/27/2011 - OSU Airport Safety Website now up and running! Check this site for news, safety announcements, and all other things pertaining to OSU Airport safety. You may also use this site to submit a hazard report, anonymously if desired.

### SMS Resources

- [NPRM](#)
- [Advisory Circular](#)
- [ACRP SMS Guidebook](#)

### OSU Airport Safety Committee

| Name                   | Department/Organization |
|------------------------|-------------------------|
| Dale Geiter            | Airfield Operations     |
| Sue Riggs              | FBO Customer Service    |
| Ashley Webb University | Flight Education        |
| Tony Barrell           | Aircraft Maintenance    |
| Dan Murphy             | FBO Line Service        |
| Mike Fetch             | ARFF                    |
| Daral Carson           | Air Traffic Control     |

### Submit Hazard Report

Home Submit Hazard Report

Date

Name (optional)

Organization (optional)

Location

Hazard Type  
 Ramp Safety  
 Wildlife  
 Aircraft Incursion  
 Vehicle/Pedestrian Incursion  
 Other

Objects Involved

Persons Involved

Wildlife Involved



## KOSU SMS SRM Safety Risk Analysis (SRA) process:

### Case Studies

- Airfield Incursions
- Wildlife Hazards
- Ramp Area Analysis

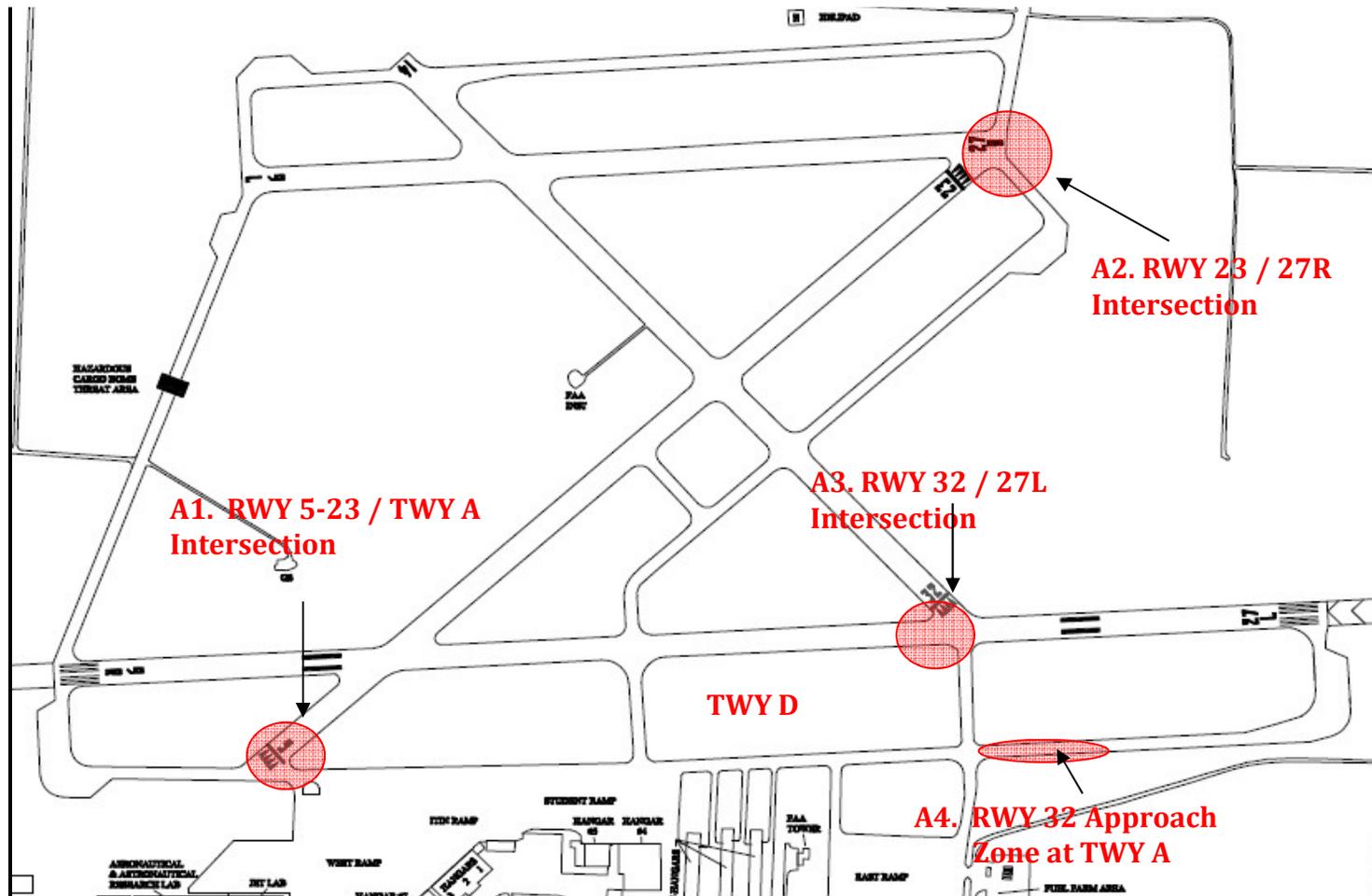


### Multi-day efforts

- Initial meetings with SMS Safety Committee
- Individual interviews with airport users
- Hazard report collection
- Internal Analysis
- Review with SMS Safety Committee

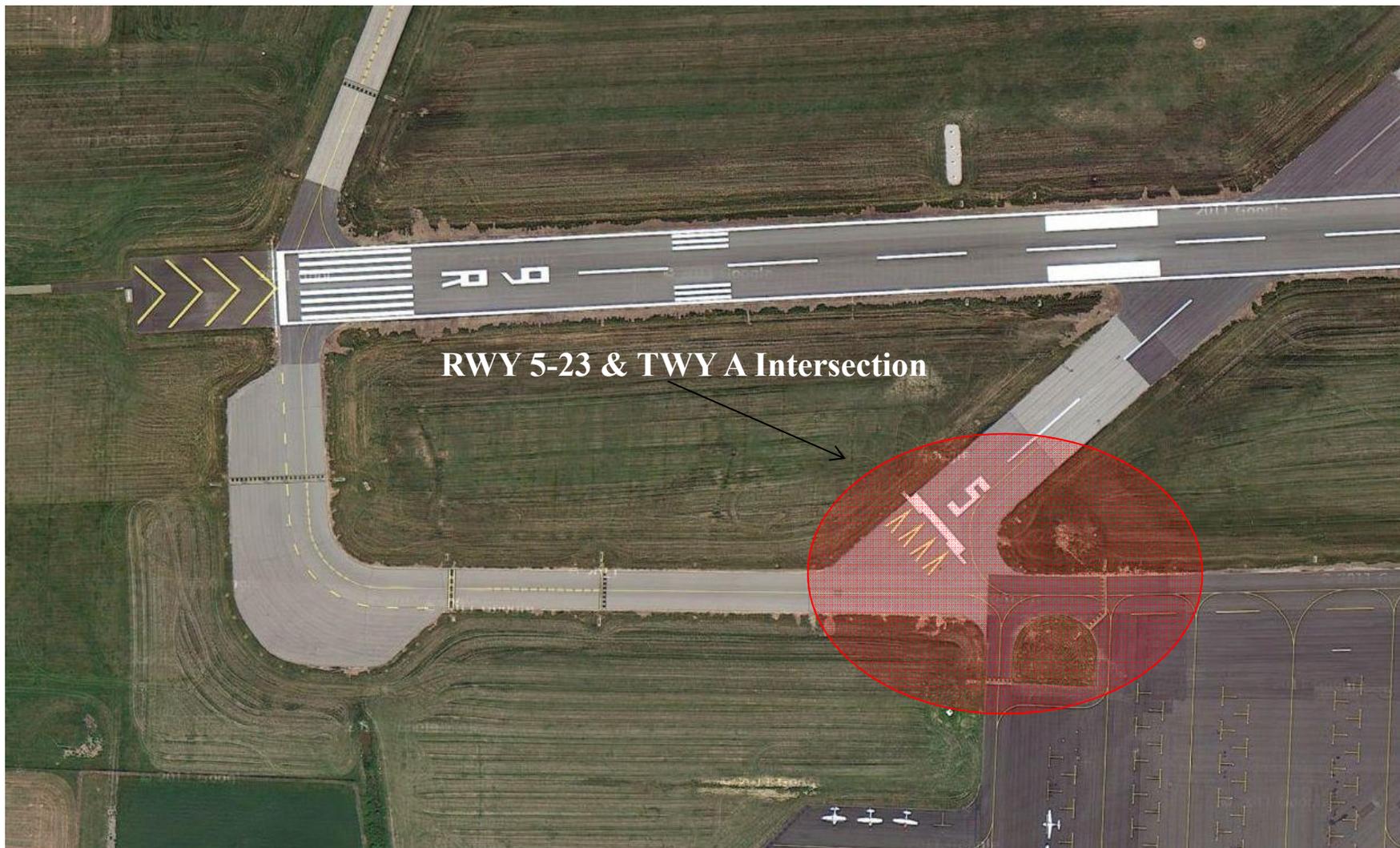


## KOSU SRA Case 1: Airfield Incursions





## KOSU SRA Case 1: Location A1





## KOSU SRA Case 1: Location A1



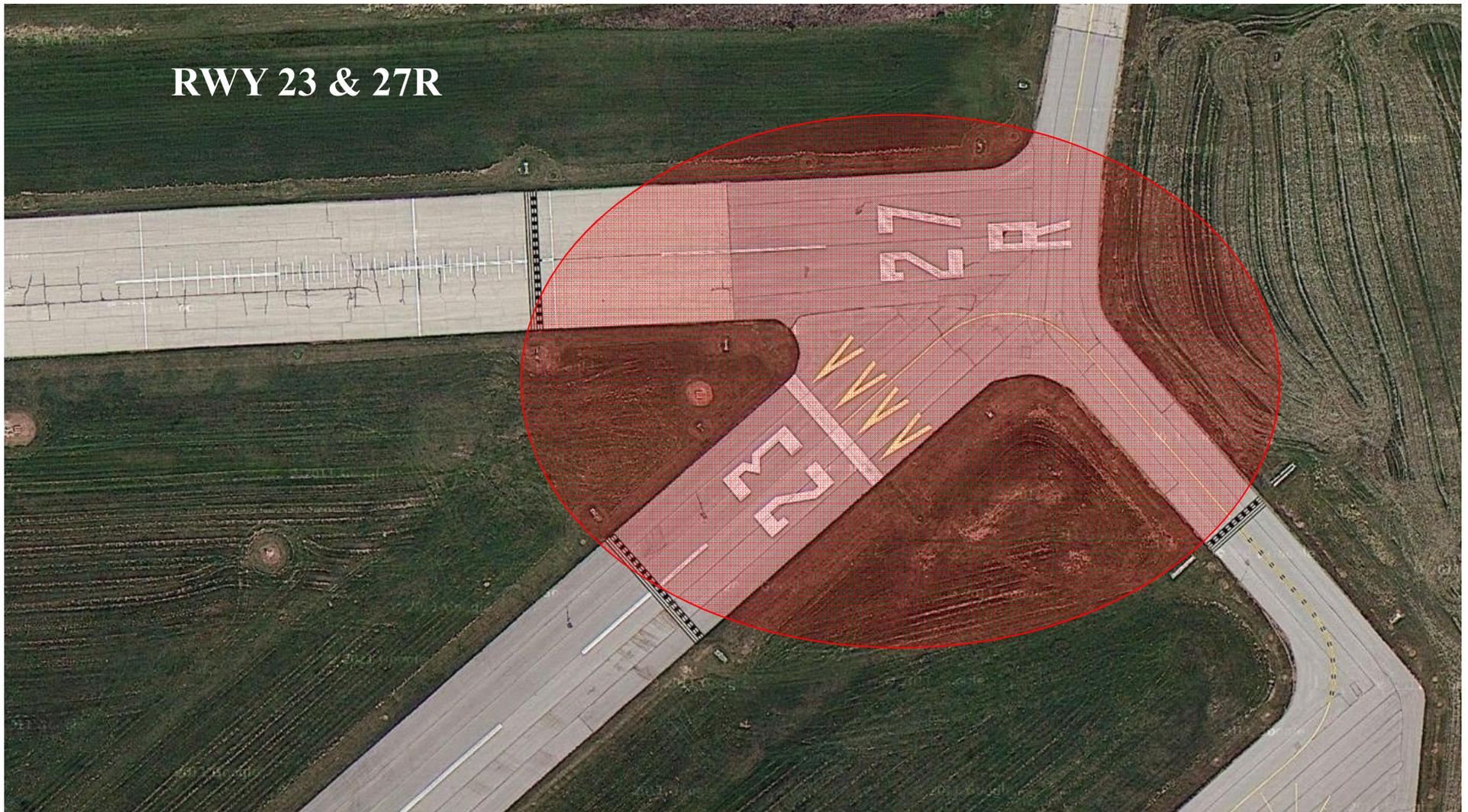
Potential for GA aircraft to perform run-ups in the vicinity of RWY 5.

| Severity \ Likelihood | No Safety Effect | Minor       | Major       | Hazardous   | Catastrophic |
|-----------------------|------------------|-------------|-------------|-------------|--------------|
| Frequent              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
| Probable              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
| Remote                | Low Risk         | Low Risk    | Medium Risk | High Risk   | High Risk    |
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## KOSU SRA Case 1: Location A2





## KOSU SRA Case 1: Location A2

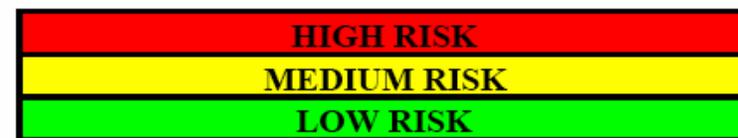


Potential for the use of incorrect runway.

Runway lengths similar

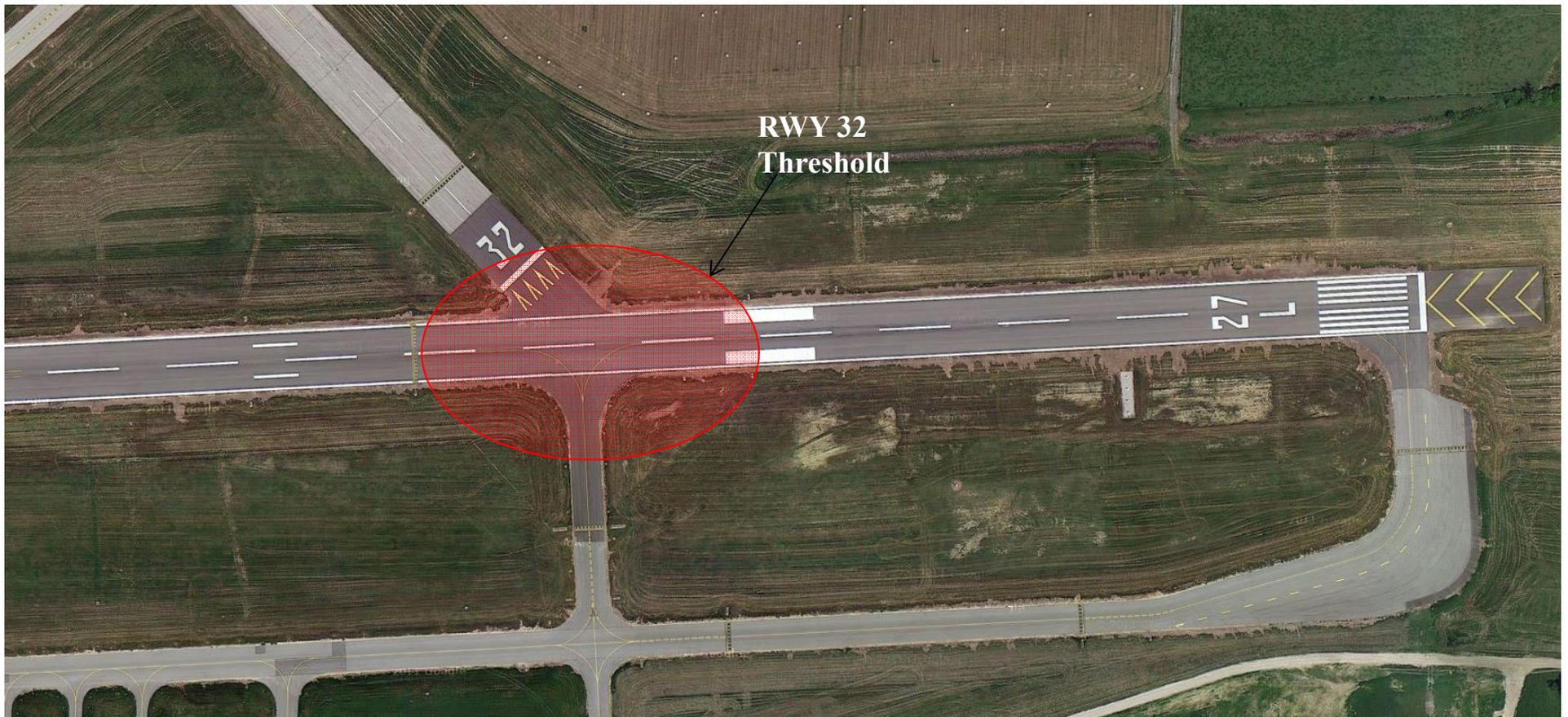
Remote chance for incursion of operations between RWY 23 and RWY 09R-27L

| Severity \ Likelihood | No Safety Effect | Minor       | Major       | Hazardous   | Catastrophic |
|-----------------------|------------------|-------------|-------------|-------------|--------------|
| Frequent              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
| Probable              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
| Remote                | Low Risk         | Low Risk    | Medium Risk | High Risk   | High Risk    |
| Extremely Remote      | Low Risk         | Low Risk    | Low Risk    | Medium Risk | High Risk    |
| Extremely Improbable  | Low Risk         | Low Risk    | Low Risk    | Low Risk    | Medium Risk  |





## KOSU SRA Case 1: Location A3





## KOSU SRA Case 1: Location A3



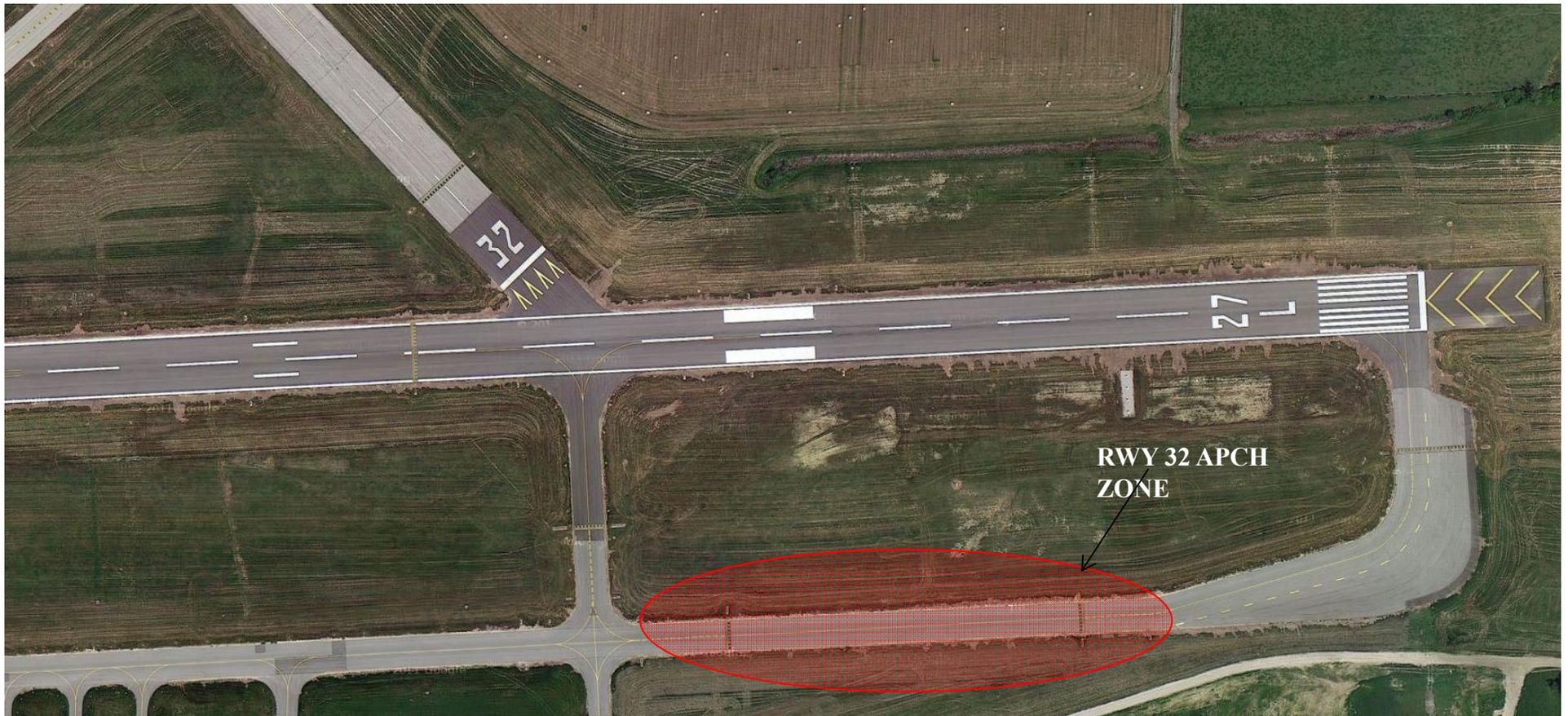
Potential confusion regarding access to RWY 32 from taxiway D, including the crossing of RWY 09R-27L.

| Severity \ Likelihood | No Safety Effect | Minor       | Major     | Hazardous   | Catastrophic |
|-----------------------|------------------|-------------|-----------|-------------|--------------|
| Frequent              | Low Risk         | Medium Risk | High Risk | High Risk   | High Risk    |
| Probable              | Low Risk         | Medium Risk | High Risk | High Risk   | High Risk    |
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## KOSU SRA Case 1: Location A4





## KOSU SRA Case 1: Location A4



Multiple hold lines bordering  
RWY 32 approach zone.

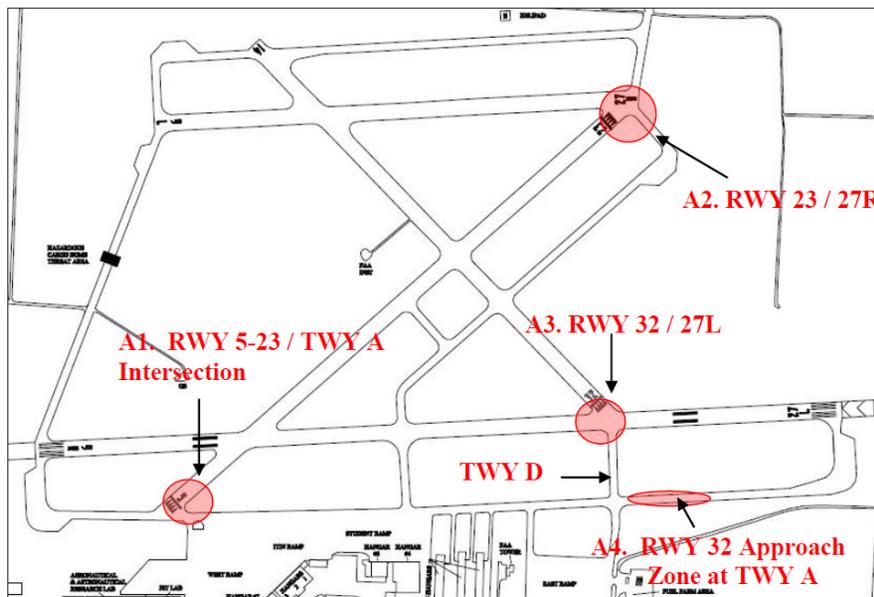
| Severity \ Likelihood | No Safety Effect | Minor       | Major     | Hazardous   | Catastrophic |
|-----------------------|------------------|-------------|-----------|-------------|--------------|
| Frequent              | Low Risk         | Medium Risk | High Risk | High Risk   | High Risk    |
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# KOSU SRA Case 1: Airfield Incursions

| Identified Hazards in Airfield Incursions Risk Assessment |                                     |
|---|-------------------------------------|
| Hazard  | Location                            |
| A1. Absence of marked run-up area for RWY 5               | Taxiway "A"                         |
| A2. Multiple runway thresholds at one taxiway             | Taxiway "C" and RWY 27R/RWY 23      |
| A3. RWY 32 threshold proximity to RWY 27L                 | Int. of TWY "D", RWY 27L and RWY 32 |
| A4. RWY 32 approach zone on TWY "A"                       | TWY "A" east of TWY "D"             |



| Severity \ Likelihood | No Safety Effect | Minor        | Major  | Hazardous | Catastrophic |
|-----------------------|------------------|--------------|--------|-----------|--------------|
| Frequent              | Green            | Yellow       | Red    | Red       | Red          |
| Probable              | Green            | Yellow (1,2) | Red    | Red       | Red          |
| Remote                | Green            | Yellow (3,4) | Yellow | Red       | Red          |
| Extremely Remote      | Green            | Green        | Green  | Yellow    | Red          |
| Extremely Improbable  | Green            | Green        | Green  | Green     | Yellow/Red   |

|             |
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## KOSU SRA Case 2: Wildlife Hazards



- Historical FAA Strike Data and Recent Strike Data
- Worked with on-site USDA professional



## KOSU SRA Case 2: Area 1: AOA Grass areas



Nesting / resting starlings in tall grass south of RWY 09R-27L produces risk of bird strikes (many of which go unreported).

| Severity \ Likelihood | No Safety Effect | Minor       | Major       | Hazardous   | Catastrophic |
|-----------------------|------------------|-------------|-------------|-------------|--------------|
| Frequent              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
| Probable              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
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## KOSU SRA Case 2: Area 2: Vulture Attractants



| Severity \ Likelihood | No Safety Effect | Minor       | Major       | Hazardous   | Catastrophic |
|-----------------------|------------------|-------------|-------------|-------------|--------------|
| Frequent              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
| Probable              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
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## KOSU SRA Case 2: Area 3: Ornamental Trees near AOA



Resting location for smaller birds  
(robins, cardinals, etc.)

| Severity \ Likelihood | No Safety Effect | Minor       | Major       | Hazardous   | Catastrophic |
|-----------------------|------------------|-------------|-------------|-------------|--------------|
| Frequent              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
| Probable              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
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| Extremely Improbable  | Low Risk         | Low Risk    | Low Risk    | Low Risk    | Medium Risk  |

|             |
|-------------|
| High Risk   |
| Medium Risk |
| Low Risk    |



## KOSU SRA Case 3: Ramp Area Operations

Investigating the safety of aircraft, ground vehicle, and pedestrian movements on active general aviation ramp area and fixed base operation under a variety of conditions.





## KOSU SRA Case 3: Case 1: Untrained Ramp Area Drivers



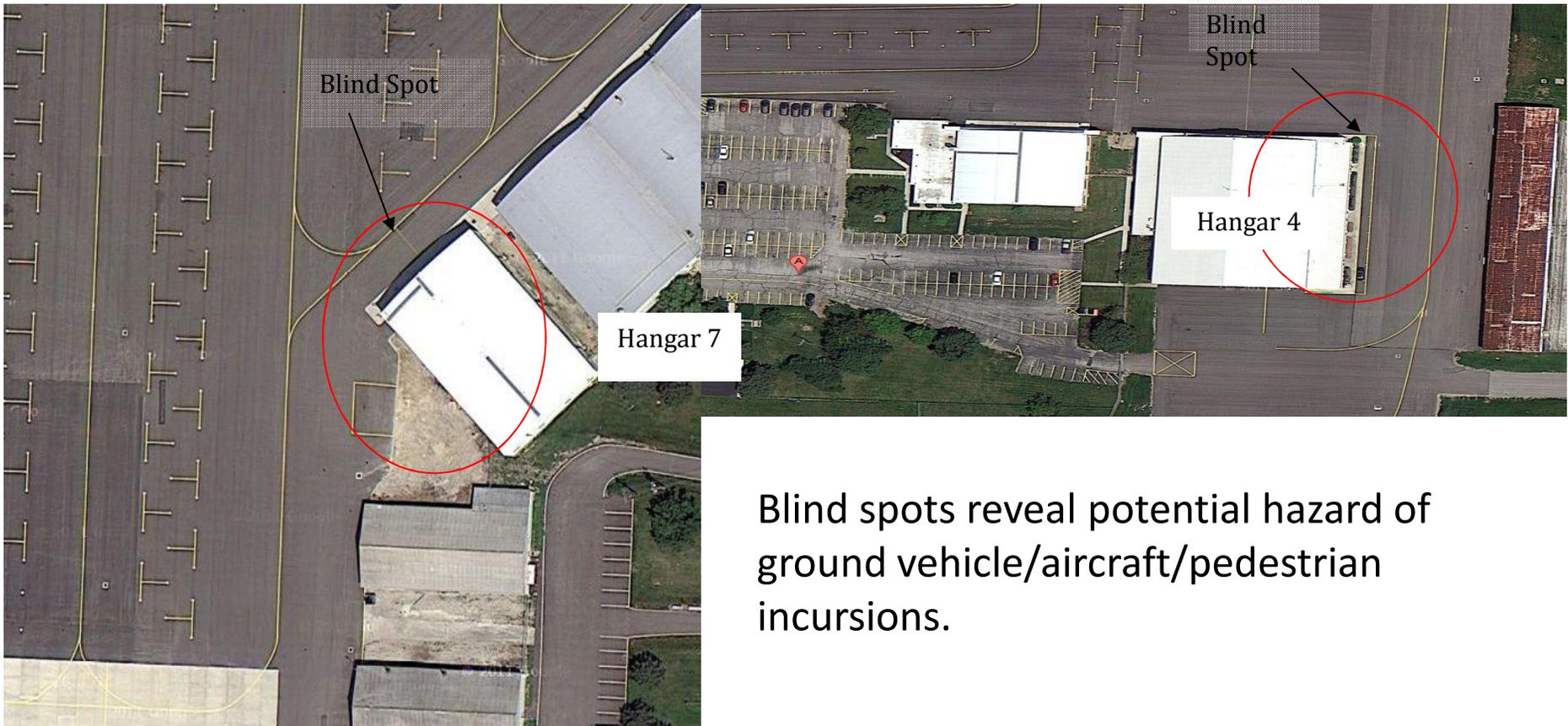
Majority of drivers are transient visitors accessing rental vehicles on ramp area.

| Severity \ Likelihood | No Safety Effect | Minor       | Major       | Hazardous   | Catastrophic |
|-----------------------|------------------|-------------|-------------|-------------|--------------|
| Frequent              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
| Probable              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
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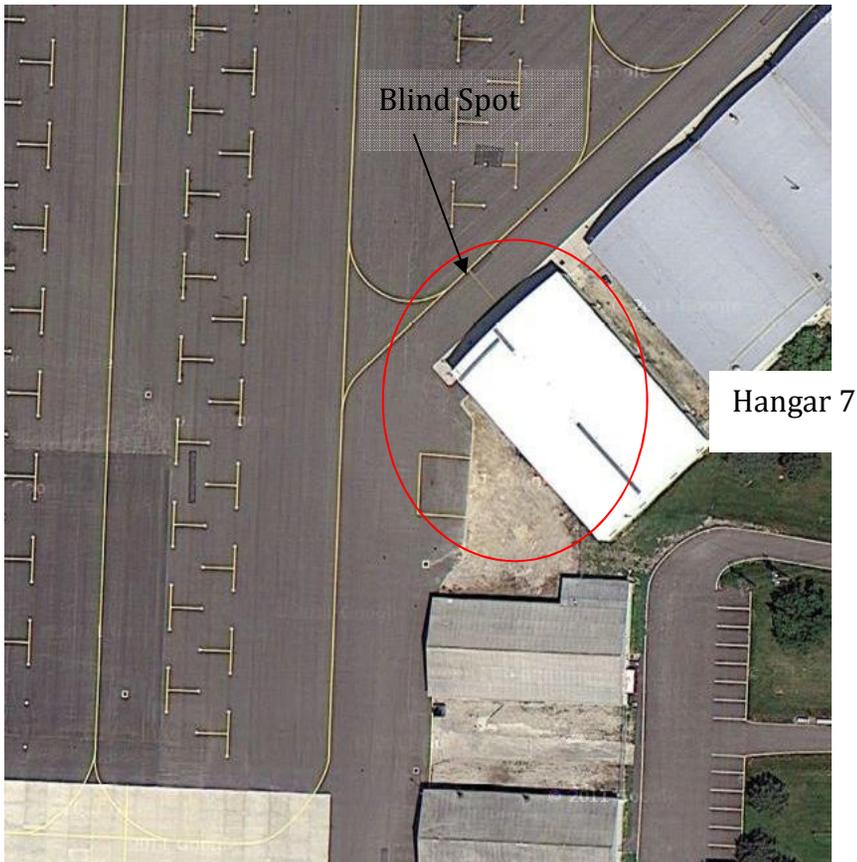


## KOSU SRA Case 3: Case 2: Ramp Area Blind Spots

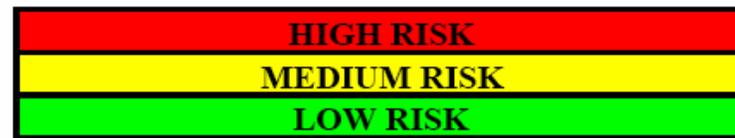




## KOSU SRA Case 3: Case 2: Ramp Area Blind Spots



| Severity \ Likelihood | No Safety Effect | Minor       | Major       | Hazardous   | Catastrophic |
|-----------------------|------------------|-------------|-------------|-------------|--------------|
| Frequent              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
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## KOSU SRA Case 3: Case 3: FBO Access from Ramp



Mix of pedestrians, ground vehicles, and aircraft create potential hazards.



## KOSU SRA Case 3: Case 3: FBO Access from Ramp



Need for increased movement guidance (striping, aircraft wing cones, etc.).

| Severity \ Likelihood | No Safety Effect | Minor       | Major       | Hazardous   | Catastrophic |
|-----------------------|------------------|-------------|-------------|-------------|--------------|
| Frequent              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
| Probable              | Low Risk         | Medium Risk | High Risk   | High Risk   | High Risk    |
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## Summary and Conclusions

- Implementation of SMS technology and policies have provided great insight into prioritizing safety-related issues at KOSU.
- Areas of safety concern were different than originally hypothesized.
- Focusing on proactively preventing accidents rather than reacting to accidents.



## Next Steps

- Implementing resolutions to medium risk areas
- Completion of program audit
- Acceptance and promotion of safety culture
- Increase participation in hazard reporting process
- Further formalization of the SMS process
- Will need to hire a dedicated SMS manager eventually



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