S A F E T Y R I S K A S S E S S M E N T R E P O R T

Date of Report: January 16, 2011

Safety Risk Assessment (SRA) Topic: Major Events in the City of South Bend IN and their impact on the South Bend Regional Airport (SBN)

Introduction

The St. Joseph County Airport Authority (SJCAA) chose for their first of three SRAs to analyze the impacts of major events in the City of South Bend IN on SBN operations. The SRA was conducted on December 16, 2010. This report and the attached documentation are intended to meet the requirements of the Safety Management System (SMS) Implementation Study (Study) for SRA reporting.

SRA Process

The process used for this SRA closely followed the SBN SMS Program Manual Safety Risk Management (SRM) process. The detailed SRM process extracted from the SMS Program Manual is included in **Appendix A** of this report. This particular topic provided some challenges. Because the SJCAA staff and the airport's tenants and airlines have been managing major events at SBN for many years; this SRA ultimately focused on existing practices and potential improvements.

In order to focus the SRA and its analysis, a decision was made early in the SRA panel discussion to concentrate on Notre Dame Football games. Initially the panel considered including presidential arrivals in the scope of the SRA; but ultimately the panel determined that activities associated with the Notre Dame Football games have a much broader impact on airport operations.

Findings

The SRA facilitation analyzed the risks as currently mitigated within the existing system. The SJCAA, tenants, and airlines have several mitigations currently in place that have been developed and improved upon over many years. The results from the SRA's hazard identification and risk analysis demonstrated the effectiveness of the existing mitigations. The hazards that were analyzed produced one hazard that was determined to result in a medium level of risk and two others resulted in a low level of risk.

Although the hazards were determined to be at acceptable levels as currently mitigated the panel identified several other possible mitigations that warranted investigation and possible implementation. See **Appendix B** for the SRA Documentation as approved and accepted by SJCAA staff following the completion of an SRA.

Summary

As background, the SJCAA staff has conducted four SRAs over the past two years. The documentation has been modified to support improved processes and better staff participation. The SRA process however has not changed much. This SRA resulted in no residual risk assessment because current mitigations developed over the last few years result in an acceptable level of risk.

One change is proposed to the SJCAA SMS Program Manual SRA process. When the SMS Program Manual was developed during the first Pilot Study, the term Safety Risk Management (SRM) was used to describe the SRA process. The documented product that would be developed was called the SRM Document (SRMD). This mirrored terms used by the FAA Air Traffic Organization (ATO). As a result of the SMS Implementation Study the term is consistently called SRA. Therefore; this change will be made to the SJCAA SMS Program Manual at the conclusion of the Study and as part of the final report.

The SJCAA will be conducting two additional SRAs as part of the Study; a similar report will be developed that will describe the SRA topic, identified hazards, and outcomes.

Please see the attached documentation for further details.

Appendix A

Detailed SRM Process from SMS Program Manual

Safety Risk Management (SRM) Assessment Process

The following process assumes the project "owner" or "proponent" has already assembled the SRM panel. The panel includes Subject Matter Experts (SME) and stakeholders in the project or system.

SRM is broken out into five (5) steps. They are:

1. Describe the System
2. Identify the Hazards
3. Analyze the Risk(s) Associated with Each Hazard
4. Assess Each Risk
5. Treat/Mitigate Each Risk, Implement, Verify, and Monitor

To conduct a successful SRM, there must be an understanding of the situation and system that is to be analyzed for hazards and risks. Each individual SRM may have different inputs and results. However, each SRM has basic fundamental parts that should be incorporated. Following is a brief outline of what each step of an SRM should include:

Step 1: Describe the System uses the 5M Model:

- Mission: What is the function of the system?
- Media/Environment where does the system reside? (airport environment most likely)
- "hu" Man/Person.
    - Operational Personnel
    - Maintenance Personnel
    - Engineering Personnel
    - Other (Airline, FAA, TSA)
- Machine: Outline mechanical and human interface points.
- Management: SOPs, checklists, rules, and regulations.
- Bounded out: Determine what is NOT included in the system for review (OSHA regulations perhaps).

Step 2: Identify the Hazards: FAA defines a hazard as: *Conditions that exist in the system that can lead to injury, illness, or death to people; damage to or loss of a system, equipment, or property; or damage to the environment.*

Hazards can originate from multiple sources. They include:

- Equipment
- Operating Environment
- Human Operator
- Human-Machine Interface
- Standard Operating Procedures (SOPs)
- External Services

Several tools may be used for Hazard identification; they include many of the business model tools used in other industries. Such as:

- Scenario Process Tool
- Logic Diagram
- Change Analysis
- Cause and Effect Tool
- Bow Tie Model

However, the process of a "what-if" brainstorming session to create a Preliminary Hazard List (PHL) and then conducting a Preliminary Hazard Analysis to focus the remainder of the process is a preferred simple and direct method of approach. This process works well with a diverse SRM Panel that can represent different points of view in the system.

Step 3: Analyze the Risk(s) Associated with Each Hazard:

- Identify the existing mitigations/controls in the system. (example: radio procedures for communication with ATC)
- Determine the severity of risk for each hazard. What can happen that is reasonably anticipated? DO NOT factor in likelihood at this point. This is the severity.
- Determine the likelihood of risk for each hazard. How often can it happen? Has it happened before (review previous incidents and accidents reports)? Use operational expertise and professional judgment if not enough information is available from previous data. Quantitative analysis is preferred over Qualitative.

Step 4: Assess Each Risk(s) Associated with Each Hazard: Using the risk matrix, rank the hazards according to their severity and likelihood.

- Hazards that are identified as a low risk do not need further mitigation or analysis.
- Hazards that are identified as a medium risk do not require further mitigation; however, if mitigations can be implemented to reduce the risk, then the SRM Panel should consider deploying the mitigation.
- Hazards that are identified as a high risk must be mitigated or avoided all together. A medium risk is the lowest level of acceptable risk.
- Determine hazards for detailed risk mitigation (based on their risk level).

Note: All high risks must be mitigated down to a medium risk or avoided altogether. All medium risks must be analyzed to determine if they can be lowered to a low level of risk. A medium level of risk is the minimal acceptable level of risk. All low levels of risk should be analyzed to determine if they can be eliminated altogether.

Step 5: Treat/Mitigate Each Risk, Implement, Verify, and Monitor: Determine what treatment/mitigation measures may be implemented to reduce the risks as described above:

a. Identify feasible mitigation options.
   - Mitigation options may include:

i. Training (example: additional radio operator training for ATCT communications).
ii. Improved equipment (example: new table saw with updated safety devices).
iii. Specific safety equipment (example: hard hats or reflective vests).
iv. Reconfigure the system to improve a hazardous situation (example: realign aircraft parking positions to increase wingtip clearance between aircraft).

b. Develop risk mitigation plans:
   - Determine what mitigation options are feasible (realistic). Review what mitigation options have been successful in the past. What new options are available now?
   - Determine if the mitigation that is put in place creates additional hazards. Example: A Passenger Boarding Bridges (PBB) used to board larger commercial aircraft eliminates the hazard of passengers walking on the aircraft ramp. However, by using a PBB you have introduced a new hazard into the system that is the act of pulling a large piece of equipment up to and coming in contact with a multimillion dollar aircraft. This new hazard and its associated risks must also be mitigated.
   - Determine the costs of mitigation. Each mitigation tool put in place has costs, in the form of time or money. Define this impact and document it. Costs should NOT be considered except when determining what mitigation options should be considered or used. It is important to know the costs so that the person accepting the risk and the mitigation has a complete picture of the impact.

c. Document what will be completed for mitigation.
d. Document what will be completed for monitoring the mitigation to ensure its effectiveness.
   - Monitoring should continue throughout the life cycle of the change.
   - Documentation of the monitoring should be reviewed periodically to ensure the mitigation is working.

Appendix B

SRA Document

Major Events in South Bend IN. Impact to Airport Operations

Safety Risk Assessment (SRA) Topic:

The purpose of the SRA was to analyze the impacts on the airport of major events held in the city of South Bend. Specifically, events identified included Notre Dame Football games and presidential arrivals. Both types of events cause major disruption to the airport and require special operations and procedural changes to accommodate the event. The impacts and current procedures were analyzed to assess whether additional mitigations could improve the overall safety of handling these events at the airport.

NOTE: The panel participants agreed to focus on Notre Dame football games to narrow the discussion.

Existing System:

The South Bend Regional Airport (SBN) is owned and operated by the St. Joseph County Airport Authority (SJCAA). SBN serves the City of South Bend IN, the northern region of the State of IN, and the southwest region of the State of Michigan.

Runways:

1. Runway 9R-27L, 8,412X 150 ft. (the primary) CAT I approaches to both ends
2. Runway 9L-27R, 4,300 X 75 ft. [General Aviation Aircraft (GA) use only] no precision approaches, GPS and VOR approaches only
3. Runway 18-36, 7,100 X 150 ft. no precision approaches, GPS and VOR approaches only

Taxiways:

Parallel taxiway system exists for all three runways. Runway 9R-27L has duel parallel taxiways, one on either side of the runway.

Fixed Base Operator (FBO):

SBN has one FBO, Atlantic Aviation. The FBO is located on the north side of Runway 9R-27L. The FBO provides ground handling services and refuels the majority of GA arriving and departing into SBN for major events.

Aircraft parking ramps:

Several aircraft parking ramps are used for GA parking; including the FBO ramp, UPS cargo ramp, Executive ramp, and the "Football" ramp which is only used for major events that require overflow parking. The Football ramp is located across A Taxiway from the FBO. Use of the Football ramp sometimes requires the use and closure of Taxiways A-3 and A-4. The type of event and the wind direction (runway use) will dictate whether A-3 and or A-4 are closed. On occasion, when the numbers of aircraft require more area for parking, Runway 18-36 is closed; and aircraft are parked between the parallel runways. However, Runway 18-36 has not been closed since the football ramp was opened. The Charter ramp, located on the south side of the airport, is used for the arriving football teams' aircraft. (See attached airfield layout plan for the location of the identified ramps).

Aircraft numbers and types:

Based on SRA panel discussions, during the past three years the average number of aircraft on an event day is approximately 100. An event weekend duration is defined as noon on Friday until 1:00 PM on Sunday. The overall numbers for an event weekend are 1.5 times greater than a one-day event. Prior to the past three years, GA has numbered closer to 300 for the event weekend. Total event related GA operations may number as high as 750 for the entire weekend.

The types of GA very widely. However, GA most commonly includes small to medium size business aircraft, such as Citation Jets, Lears, and light twin engine. The arriving football teams typically use a Boeing 757.

Current procedures:

FBO: Smaller GA are parked on the FBO ramp, the Football ramp, and the Executive ramp. Medium to larger sized GA are parked on the UPS ramp. All GA are parked so they can start engines and taxi out without requiring another aircraft to move. The FBO ensures that all GA are parked to accommodate this procedure. The FBO marshals all arriving GA to parking areas and transports flight crews and passengers via shuttle buses to the FBO building for ground transportation. The FBO offers a reservation system for incoming GA. Approximately 50% of the arriving GA take advantage of this system. The reservation system allows the FBO to be prepared to accommodate the aircraft type and the number of passengers on board, as well as any special needs. The FBO uses a dispatcher working on the Unicom frequency, to take information from in-bound GA and relay that information to the marshallers and shuttle bus drivers. Information is relayed using Nextel phones. "Follow Me" carts are used to lead GA to their parking positions. Designated walking and driving routes are used and marked with cones to assist with the transportation of crews and passengers. The FBO employs additional personnel to assist from other Atlantic Aviation locations (other airports). The process is reversed for departing GA.

FAA Air Traffic Control Tower (ATC): During an event, the ATC closes A Taxiway between N Taxiway and A-2. This includes turnoffs A-3 and A-4 as previous mentioned. ATC directs landing GA to the FBO. ATC also uses a departure reservation system for the weekend events. This ensures individual GA has a specific departure time and therefore assists with dispersing and managing the volume of GA after the games. Additional staff is also deployed to provide additional oversight and staff rotations for controllers.

SJCAA: Operations Team: files Notice to Airman (Notam(s)) to close Taxiway A as a movement area; it remains open as a non-movement area, so it is still available for aircraft movement. Physical barricades are sometimes used to help identify the transition between movement and non-movement areas. This facilitates the use of the Football ramp. Additional staff is assigned to the area to actively monitor and assist with GA parking, vehicle movements, and pedestrians. SJCAA operations team assists with the relocation of UPS aircraft from their cargo ramp to accommodate GA parking. SJCAA operations team gathers information from Atlantic Aviation concerning rental car reservations as well as other sources to facilitate discussion between the FBO, ATC, and SJCAA regarding numbers of anticipated aircraft. SJCAA also holds an annual meeting to discuss changes and/or logistics associated with the upcoming football season.

Exhibits:

1. Airport Layout drawing
2. Ramp designations
3. SJCAA Risk Matrix and definitions

Date: December 16, 2010	Facilitator: Dave Fleet (SMS Consultant) SRA Sponsor: Bruce MacLachlan, Manager for Operations and Maintenance SJCAA.

Panel Participants

Note: Sign in sheet is attached.

Hazard and Risk Assessment:

The panel identified the following list of potential hazards:

1. Pedestrians on the airfield
2. Jetblast
3. Conflicting traffic on A taxiway (aircraft and vehicles)
4. Inexperienced pilots
5. Unfamiliar employees
6. Weather
7. Darkness
8. Disgruntled and inebriated fans
9. Noise
10. Additional Foreign Object Debris (FOD)
11. Human factors
12. Fire/emergency response

Table 1 identifies the potential hazards and the associated risk assessment. Note: the panel determined that after considering all the existing mitigations, not all hazards merited a full assessment of residual risk. Some hazards were combined to facilitate a concise risk assessment.

Table 1 - Hazard and Risk Identification

Hazard	Risk	Risk Assessment	Mitigation	Residual Risk
1. Pedestrians on the airfield	Impact to pedestrians	Severity – Minor personal injury Likelihood – Probable Medium Risk	1. The FBO provides designated walking paths. 2. The FBO escorts all pedestrians to and from GA. 3. The FBO and the SJCAA maintain visual contact with all pedestrians while they are on the airfield. 4. The FBO trains all staff from other airports. 5. The FBO maintains a list of between 5 and 10 employees from other airports. Only those employees are allowed to work on major event days.	MEDIUM
2. Aircraft and vehicles using A Taxiway simultaneously	Incident or accident between aircraft and or equipment	Severity – Major Likelihood – Extremely Remote Low Risk	1. All aircraft are marshaled to parking positions 2. Wingtip clearances are maintained between aircraft to ensure adequate vehicle and aircraft movement around the aircraft 3. Radio communications are established among the FBO, ATC, Pilots, and SJCAA 4. Low speeds are maintained for both aircraft and vehicles	LOW
3. Aircraft and vehicles using A Taxiway	Incursion of an adjacent movement area, especially Runway 9R-27L	Severity – Minor Likelihood – Extremely Remote Low Risk	1. Physical barricades are in place 2. Aircraft are parked to restrict exit from non-movement areas 3. FBO staff are trained in ramp area and airfield operations 4. ATC maintains radio communication with SJCAA and the FBO 5. SJCAA actively monitors the ramp areas	LOW

Synopsis of Risk Assessment:

Hazard 1. The panel referred to limited records and their Subject Matter Experts (SMEs) to determine when the last time a pedestrian was injured on the airfield. There were no records of such an incident and the SME could not recall anyone becoming injured on the airfield. However, because the jetblast and propwash were so prevalent, the panel believed that potential damage or irritation to eyes warranted a minor injury determination for Severity and a probable determination for Likelihood. The panel also noted that due to the low speed of vehicles and aircraft on the ramp area, this increased separation and therefore improved the margin of safety.

Hazard 2. The panel referred to limited records and their SME to determine when the last time an aircraft or vehicle was damaged on the airfield. The only record noted was an accident that occurred approximately seven years ago when a limo driver left the proximity of his escort and backed into an aircraft causing minor damage to the aircraft. However, this incident was unrelated to a major event. The panel also agreed that the low speeds of aircraft and vehicles increased separation and therefore improved the margin of safety.

Hazard 3. The last incursion at SBN occurred in 2007. Again, the incursion did not occur during a major event. The incursion occurred when an escorted vehicle took a turn too wide and incurred on A Taxiway. The last incursion that resulted in death and or catastrophic damage to an aircraft or vehicle was believed to have occurred in 1994. Therefore, the panel agreed that although the incursion occurred during a major event day, the existing mitigations result in Minor and Extremely Remote.

Note: most incursions at SBN have been associated with snow removal operations. Snow Removal might be a topic for a future SRA.

Potential Additional Mitigations:

The panel discussed how to improve the current operations and procedures to increase safety and reduce the identified hazards and associated risks. A list of potential mitigations and actions items were developed.

1. Hold separate coordination meetings specifically to address a potential scenario when the airport cannot accommodate additional aircraft.
    a. ACTION: The SJCAA will facilitate these meetings prior to 2011 football season.
2. Commission a study of the ramps and runways used to park aircraft to determine the maximum number of aircraft that can be parked in each area. The study should include the types of aircraft, the clearances between aircraft, and clearances for vehicle movement such as emergency response.
    a. ACTION: The SJCAA will assess the ability to commission this study with the goal of completing the study prior to the 2011 football season.
3. Develop a contingency plan for each aircraft parking area that will include findings from both Actions 1 and 2. The contingency plan is proposed to include an overall communication plan for internal and external communications within the airport community.
    a. ACTION: The SJCAA will coordinate this meeting and document the plan.
4. Use barricades and or cones to mark pathways to the executive ramp and to demark routes to and from aircraft parking ramps and the FBO.
    a. ACTION: The SJCAA will coordinate this effort with the FBO and incorporate it in the 2011 plan.
5. Use light stands to assist with nighttime operations.
    a. ACTION: The SJCAA will determine placement for lighting devices that will not interfere with pilot vision.

The panel discussed that substantial progress had been made within the last few years regarding major events. Most of the mitigations listed above have been deployed within the past five years and each year improvements are made. The panel believes that these additional mitigations will provide a consistent approach year to year and will prepare the airport community for future events when 300 aircraft may be the average for Notre Dame Football games.

Responsible Person Accepting Residual Risk	SRA Document Preparer
Signature:	**Signature:**
Title: Bruce MacLachlan, Manager of Operations and Maintenance	**Title: Dave Fleet, Principal, Dave Fleet Consulting LLC**
Date:	**Date: January 16, 2010**

SBN Safety Risk Assessment Panel

Special Events

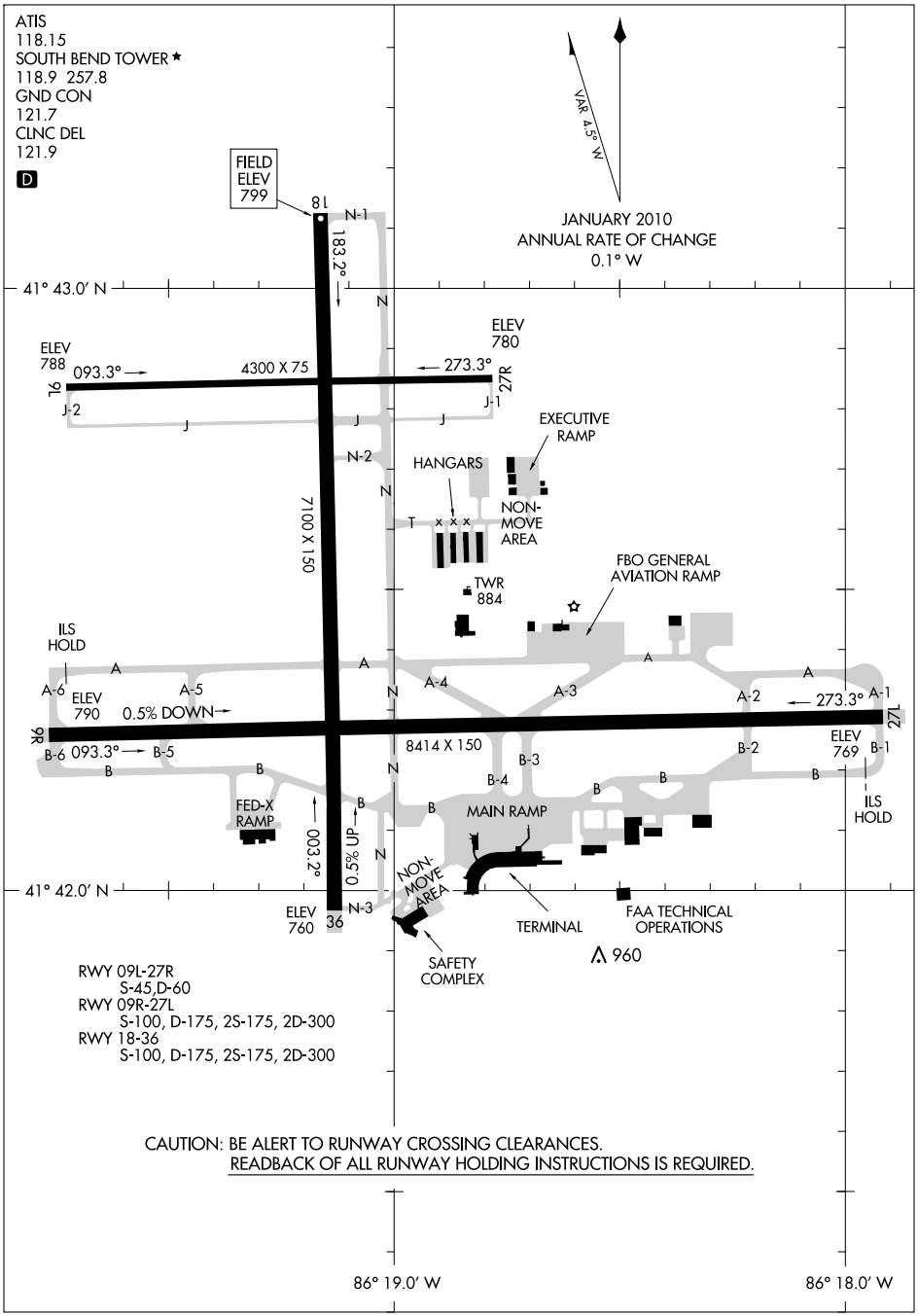
16 Decmber 2010

Name:	Employer:	Phone #:	e-mail:
Bruce MacLachlan	SJCAA	574/282-4590 ext 240	brucem@sbnair.com
DAVE FLEET	DFC	317-490-0050	DFLEET@DAVEFLEETCONSULTING.COM
Joanne Landry	Landry Cons.	206 714-7663	joanne@landryconsultants.com
DAN PAWELSKI	FAA	574 251-2601	daniel.m.pawelski@FAA.GOV
Josh Chapo	SJCAA	574-485-8041	jchapo@sbnair.com
JAY WARDLAW	ATLANTIC	574.233.8285	JAY.WARDLAW@ATLANTICAVIATION.COM
Kris Mayle	"	"	Kristie.Mayle@AtlanticAviation.com
MICHAEL GULIAS	SJCAA	" 233-2185	mikeg@sbnair.com
MIKE ORNAT	AIRPORT SAFETY	574-282-4593 x100	mornat@sbnair.com
JOHN SCHALLIOL	SJCAA	233-2185x224	johns@sbnair.com

AIRPORT DIAGRAM

AL-399 (FAA)

SOUTH BEND RGNL (SBN)
SOUTH BEND, INDIANA



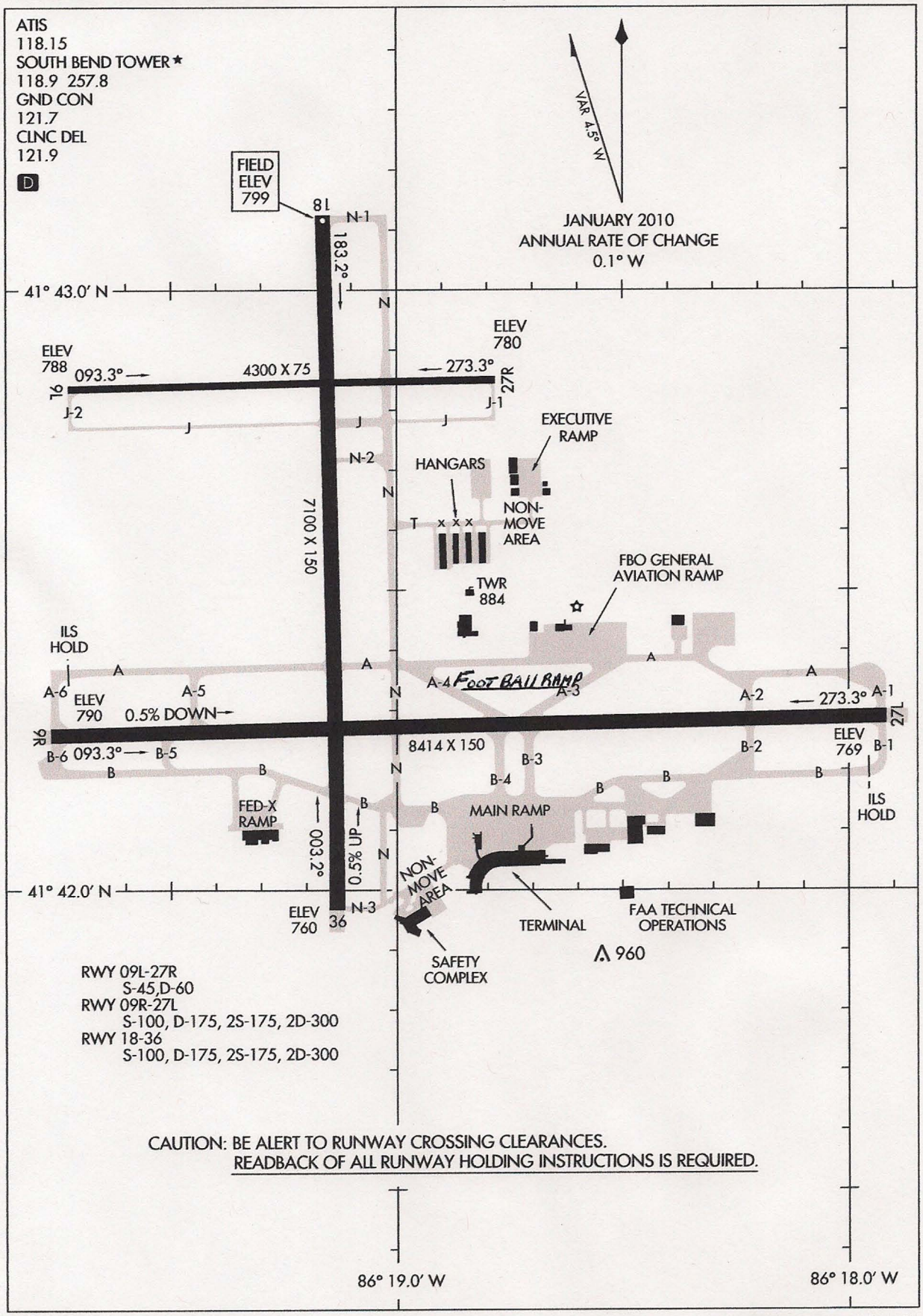
EC-2, 16 DEC 2010 to 13 JAN 2011

EC-2, 16 DEC 2010 to 13 JAN 2011

AIRPORT DIAGRAM

AL-399 (FAA)

SOUTH BEND RGNL (SBN)
SOUTH BEND, INDIANA



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EC-2, 16 DEC 2010 to 13 JAN 2011

AIRPORT DIAGRAM
10210
SOUTH BEND, INDIANA
SOUTH BEND RGNL (SBN)

SJCAA SMS Risk Matrix

Likelihood:	
Frequently	*Occurs once every* week
Probable	*Occurs once every* month
Remote	*Occurs once every* 5 years
Extremely Remote	*Occurs once every* 10 years
Extremely Improbable	*Occurs once every* 20 years
Severity:	
Catastrophic	Loss of aircraft, life and/or damage in excess of $1,000,000
Hazardous	Severe injury or damage in excess of $100,000 and/or disruption of critical services (NAVAIDS, etc.)
Major	Significant (but repairable) damage to an aircraft, equipment or facility and/or minor injury
Minor	Minor damage to equipment or facilities
No Safety Effect	No injury, equipment or facility damage is possible