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William J. Hughes Technical Center
Aviation Research Division
Atlantic City International Airport
New Jersey 08405

Runway Incursion Mitigation Fiscal Year 2019 Annual Summary Report

January 2020

Final Report

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16. Abstract

The Federal Aviation Administration (FAA) defines a runway incursion (RI) as "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 takeoff of aircraft." These occurrences, including wrong runway landings and takeoffs, remain a top airport safety concern for the FAA. Research shows that airport geometry can contribute to runway incursions. The FAA provides airports with guidance on recommended taxiway layouts in both Advisory Circular 150/5300-13 and Engineering Brief Number 75. Airport layouts not conforming to these recommendations may lead to pilot confusion and ultimately, runway incursions. The FAA launched the Runway Incursion Mitigation (RIM) program in fiscal year (FY) 2015 in an effort to mitigate the nonstandard geometry factors present at airport locations that experienced a high number of runway incursions.

The FAA maintains a RIM program database updated on an annual basis, including only towered airports. During each annual update, all runway incursions and surface incidents (pilot deviation (PD) and vehicle/pedestrian deviation (V/PD)) from the previous calendar year (CY), including wrong surface landings and takeoffs, are georeferenced in the geographic information system database. An annual review of the layout of each airport determines if locations with previously identified nonstandard geometry characteristics have changed and/or been mitigated. New locations with nonstandard geometry characteristics are also identified. If a location has three or more runway incursions in a single CY or an average of one runway incursion per year since the program began, it is considered for inclusion in the RIM inventory.

This report captures the RIM program summary through FY19, annual updates, and current inventory. Since initiation of the RIM program in FY15, a total of 6445 runway incursions (PD and V/PD) and 239 nonstandard geometry locations were added to the database, bringing the total to 11544 runway incursions and 6275 nonstandard geometry locations. At the end of FY19, there were 134 locations in the RIM inventory at 76 airports and 44 locations mitigated since the program's inception. Airports utilized a variety of mitigation strategies to eliminate the problematic geometry characteristics or reduce their effect at these locations. Mitigation strategies include modifications to airport geometry, changes to lighting, markings, or signage, or changes to procedures or operations.

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LIST OF ACRONYMS

AC	Advisory Circular
ARP	Office of Airports
CY	Calendar year
EB	Engineering Brief
FAA	Federal Aviation Administration
FY	Fiscal year
GIS	Geographic information system
HQ	Headquarters
PD	Pilot deviation
PTG	Problematic taxiway geometry
RI	Runway incursion
RIM	Runway incursion mitigation
V/PD	Vehicle/pedestrian deviation

LIST OF FEDERAL AVIATION ADMINISTRATION LOCATION IDENTIFIER
AIRPORT CODES USED IN THIS REPORT

ABQ	Albuquerque International Sunport Airport, Albuquerque, New Mexico
ACT	Waco Regional Airport, Waco, Texas
ADS	Addison Airport, Dallas, Texas
APA	Centennial Airport, Denver, Colorado
APC	Napa County Airport, Napa, California
ASE	Aspen-Pitkin County Airport/Sardy Field, Aspen, Colorado
ATL	Hartsfield-Jackson Atlanta International Airport, Atlanta, Georgia
AZO	Kalamazoo/Battle Creek International, Kalamazoo, Michigan
BJC	Rocky Mountain Metropolitan Airport, Denver, Colorado
BOI	Boise Air Terminal/Gowen Field Airport, Boise, Idaho
BOS	General Edward Lawrence Logan International Airport, Boston, Massachusetts
BTV	Burlington International Airport, Burlington, Vermont
BUR	Bob Hope Airport, Burbank, California
CCR	Buchanan Field Airport, Concord, California
CLE	Cleveland Hopkins International Airport
CLT	Charlotte/Douglas International Airport, Charlotte, North Carolina
CMA	Camarillo Airport, Camarillo, California
CNO	Chino Airport, Chino, California
CRP	Corpus Christi International Airport, Corpus Christi, Texas
CRQ	Mc Clellan-Palomar Airport, Carlsbad, California
CXO	Conroe-North Houston Regional Airport, Houston, Texas
DAB	Daytona Beach International Airport, Daytona Beach, Florida
DAL	Dallas Love Field Airport, Dallas, Texas
DCA	Ronald Reagan Washington National Airport, Washington, DC
DEN	Denver International Airport, Denver, Colorado
DSM	Des Moines International Airport, Des Moines, Iowa
DVT	Phoenix Deer Valley Airport, Phoenix, Arizona
DWH	David Wayne Hooks Memorial Airport, Houston, Texas
FAI	Fairbanks International Airport, Fairbanks, Alaska
FAT	Fresno Yosemite International Airport, Fresno, California
FCM	Flying Cloud Airport, Minneapolis, Minnesota
FDK	Frederick Municipal Airport, Frederick, Maryland
FFZ	Falcon Field Airport, Mesa, Arizona
FTY	Fulton County Airport-Brown Field, Atlanta, Georgia
FXE	Fort Lauderdale Executive Airport, Fort Lauderdale, Florida
GLS	Scholes International Airport, Galveston, Texas
HIO	Portland-Hillsboro Airport, Portland, Oregon
HLN	Helena Regional Airport, Helena, Montana
HNL	Daniel K. Inouye International Airport, Honolulu, Hawaii
HOU	William P. Hobby Airport, Houston, Texas
HUF	Terre Haute Regional Airport, Terre Haute, Indiana
HWD	Hayward Executive Airport, Hayward, California
IDA	Idaho Falls Regional Airport, Idaho Falls, Idaho

ISM	Kissimmee Gateway Airport, Orlando, Florida
IWA	Phoenix-Mesa Gateway Airport, Phoenix, Arizona
JLN	Joplin Regional Airport, Joplin, Missouri
JNU	Juneau International Airport, Juneau, Alaska
LAF	Purdue University Airport, Lafayette, Indiana
LAS	McCarran International Airport, Las Vegas, Nevada
LAX	Los Angeles International Airport, Los Angeles, California
LFT	Lafayette Regional Airport, Lafayette, Louisiana
LGB	Long Beach Airport/Daugherty Field, Long Beach, California
LOU	Bowman Field Airport, Louisville, Kentucky
LVK	Livermore Municipal Airport, Livermore, California
MAF	Midland International Air and Space Port, Midland, Texas
MDW	Chicago Midway International Airport, Chicago, Illinois
MEM	Memphis International Airport, Memphis, Tennessee
MHT	Manchester-Boston Regional Airport, Manchester, New Hampshire
MIA	Miami International Airport, Miami, Florida
MIC	Crystal Airport, Minneapolis, Minnesota
MLI	Quad City Airport, Moline, Illinois
MLU	Monroe Regional Airport, Monroe, Louisiana
MQY	Smyrna Airport, Smyrna, Tennessee
MRI	Merrill Field, Anchorage, Alaska
MSY	Louis Armstrong New Orleans International Airport, New Orleans, Louisiana
MYF	Montgomery-Gibbs Executive Airport, San Diego, California
NEW	Lakefront Airport, New Orleans, Louisiana
OPF	Miami-Opa Locka Executive Airport, Miami, Florida
ORD	Chicago O'Hare International Airport, Chicago, Illinois
ORL	Orlando Executive Airport, Orlando, Florida
PAO	Palo Alto Airport, Palo Alto, California
PBI	Palm Beach International Airport, Palm Beach, Florida
PDK	DeKalb-Peachtree Airport, Atlanta, Georgia
PHL	Philadelphia International Airport, Philadelphia, Pennsylvania
PHX	Phoenix Sky Harbor International Airport, Phoenix, Arizona
PIE	St. Pete-Clearwater International Airport, St. Petersburg-Clearwater, Florida
PNS	Pensacola International Airport, Pensacola, Florida
POC	Brackett Field, LaVerne, California
PRC	Ernest A. Love Field Airport, Prescott, Arizona
PSP	Palm Springs International Airport, Palm Springs, California
RHV	Reid-Hillview Airport of Santa Clara County, San Jose, California
RNO	Reno/Tahoe International Airport, Reno, Nevada
SAT	San Antonio International Airport, San Antonio, Texas
SBA	Santa Barbara Municipal Airport, Santa Barbara, California
SDM	Brown Field Municipal Airport, San Diego, California
SEA	Seattle-Tacoma International Airport, Seattle, Washington
SFB	Orlando Sanford International Airport, Orlando, Florida
SFO	San Francisco International Airport, San Francisco, California
SJC	Norman Y. Mineta San Jose International Airport, San Jose, California

SLC	Salt Lake City International Airport, Salt Lake City, Utah
SMO	Santa Monica Municipal Airport, Santa Monica, California
SNA	John Wayne-Orange County Airport, Santa Ana, California
SPI	Abraham Lincoln Capital Airport, Springfield, Illinois
SRQ	Sarasota/Bradenton International Airport, Sarasota/Bradenton, Florida
STS	Charles M. Schulz-Sonoma County Airport, Santa Rosa, California
TEB	Teterboro Airport, Teterboro, New Jersey
TMB	Miami Executive Airport, Miami, Florida
TUL	Tulsa International Airport, Tulsa, Oklahoma
TUS	Tucson International Airport, Tucson, Arizona
UAO	Aurora State Airport, Aurora, Oregon
VGT	North Las Vegas Airport, Las Vegas, Nevada
VNY	Van Nuys Airport, Van Nuys, California

EXECUTIVE SUMMARY

The Federal Aviation Administration (FAA) defines a runway incursion (RI) as "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 takeoff of aircraft." These occurrences, including wrong runway landings and takeoffs, remain a top airport safety concern for the FAA. Research shows that airport geometry can contribute to runway incursions. As a result, the FAA provides airports with guidance on recommended taxiway layouts in both Advisory Circular 150/5300-13 "Airport Design" and Engineering Brief Number 75, "Incorporation of Runway Incursion Prevention into Taxiway and Apron Design." Airport layouts not conforming to these recommendations may lead to pilot confusion and ultimately, runway incursions.

In fiscal year (FY) 2012, the FAA Office of Airports initiated a research study to identify and geographically locate areas at airports with nonstandard geometry. This effort developed a geographic information system (GIS) database including a graphical interface of airport locations with nonstandard geometry, also known as problematic taxiway geometry (PTG) locations, all pilot deviation (PD) and vehicle/pedestrian deviation (V/PD) runway incursions, including wrong runway events, surface incidents, airport diagrams and information, and hot spots. The initial study and field verification process identified 140 locations with a high incidence of runway incursions using data from October 1, 2007 to September 30, 2013 after studying 5099 runway incursion reports. As a result, the FAA launched the Runway Incursion Mitigation (RIM) program in FY15 in an effort to mitigate the nonstandard geometry factors present at these locations and ultimately reduce the number of runway incursions.

Updated on an annual basis, the RIM program database only includes towered airports. During each annual update, all runway incursions and surface incidents (PD and V/PD) from the previous calendar year (CY), including wrong surface landings and takeoffs, are georeferenced in the GIS database. An annual review of the layout of each airport determines if locations with previously identified nonstandard geometry characteristics have changed and/or been mitigated. New locations with nonstandard geometry characteristics are also identified. If a location has three or more runway incursions in a single CY or an average of one runway incursion per year over the course of the program, it is considered for inclusion in the RIM inventory. The FAA staff then performs a series of validations to determine which locations ultimately go into the inventory.

This report captures the RIM program summary through FY19, annual updates, and current inventory. Since initiation of the RIM program in FY15, 6445 runway incursions (PD and V/PD) and 239 nonstandard geometry locations were added to the database, bringing the total to 11544 runway incursions and 6275 nonstandard geometry locations. At the end of FY19, there were 134 locations in the RIM inventory at 76 airports and 44 locations mitigated through the program. The number of PTG locations decreased by 62 in FY19 due to mitigation of nonstandard geometry characteristics. Airports used a variety of mitigation strategies to eliminate the problematic geometry characteristics or reduce their effect at these locations. Mitigation strategies include modifications to airport geometry; changes to lighting, markings, or signage; or changes to procedures or operations.

1. INTRODUCTION

The Federal Aviation Administration (FAA) defines a runway incursion as "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 takeoff of aircraft" (FAA, 2015). These occurrences, including wrong runway landings and takeoffs, are a top airport safety concern for the FAA. Several studies in recent years have linked confusing airport geometry with these incursions.

The FAA conducted an initial study of runway incursions from 1997 to 2003 resulting from a pilot deviation (PD) or vehicle/pedestrian deviation (V/PD). These incursions were then plotted on airport diagrams (Legarretta, 2012). Analysis of these incursions found that certain taxiway locations experienced far more runway incursions than other locations (Legarretta 2012). Through additional research, the FAA identified taxiway geometry configurations associated with a higher incidence of runway incursions (Legarretta, 2012). This led the FAA Airport Engineering Division to publish Engineering Brief (EB) 75, "Incorporation or Runway Incursion Prevention into Taxiway and Apron Design," in November 2007 (FAA, 2007). Subsequently, the FAA revised Advisory Circular (AC) 150/5300-13, "Airport Design" (FAA, 2012), in September 2012 to incorporate the airport layout recommendations from EB 75. Both documents guide airports how to design taxiways in a manner to reduce confusion and increase situational awareness. Airport layouts not conforming to these recommendations may lead to confusion and ultimately, runway incursions.

In fiscal year (FY) 2012, the FAA Office of Airports (ARP) initiated a research study to identify and geographically locate areas at airports with nonstandard geometry and a high incidence of runway incursions. This effort, detailed in the FAA report "Problematic Taxiway Geometry Study Overview" (FAA, 2018), developed a geographic information system (GIS) database including 6098 airport locations with nonstandard geometry, also known as problematic taxiway geometry (PTG) locations, all PD and V/PD deviation runway incursions, including wrong runway events, surface incidents, airport diagrams and information, and hot spots. The initial study and field validation process identified 140 locations with a high incidence of runway incursions using data from October 1, 2007 to September 30, 2013 after reviewing 5099 runway incursion reports. As a result, a 15- to 20-year improvement program, known as the Runway Incursion Mitigation (RIM) program, launched in FY15 in an effort to mitigate the nonstandard geometry factors present at these locations and ultimately reduce the number of runway incursions. The FAA maintains a RIM program website, which can be accessed at https://www.faa.gov/airports/special_programs/rim/ (FAA, 2019).

2. ANNUAL DATABASE UPDATES

The FAA maintains the RIM database including all data relevant to the program from towered airports, and provides a history of database updates. The following data are maintained for each airport: hub category, general aviation asset category, annual operations, enplanements, and Title 14 Code of Federal Regulations Part 139 status (Airport Certification, 2004), herein referred to as Part 139. The current FAA airport diagram can be displayed within the database. Additionally, hot spots and their descriptions update every 28 days, when applicable.

All runway incursions and surface incidents categorized as V/PDs or PDs by the FAA Office of Runway Safety are included for each airport in the database. This includes wrong runway landings and takeoffs. On an annual basis, the database incorporates new data. This update process typically occurs during the second quarter of the fiscal year, and involves analysis of all runway incursions from the previous calendar year (CY). Reviewing the narrative in the incursion report determines the runway incursion location. Each incursion is then georeferenced in the database.

In addition to analyzing runway incursions, an annual review of the layout of each airport to determines if locations with previously identified nonstandard geometry characteristics have changed and/or mitigated. Locations with new nonstandard geometry characteristics are identified as well. The FAA identified 19 nonstandard taxiway geometry characteristics that lead to pilot confusion. Locations having at least one of the 19 nonstandard geometry characteristics below are PTG locations (FAA, 2013):

- Y-shaped taxiways crossing a runway
- Wrong runway events
- Wide expanses of taxi pavements entering or along a runway
- Convergence of numerous taxiway types entering a runway
- High-speed exit crossing a taxiway
- Two runway thresholds in close proximity
- Short taxiways (stubs) between runways
- Direct taxiing access to runways from ramp areas
- An aligned taxiway entering runway ends
- Nonstandard markings and/or signage placement
- Greater than three-node taxiway intersection
- Taxiway connection to V-shaped runways
- Taxiway intersects runway at other than a right angle
- Short taxi distance from ramp/apron area to a runway
- High-speed exits leading directly onto another runway
- Taxiway coinciding with the intersection of two runways
- Use of a runway as a taxiway
- Unexpected holding position marking on parallel/entrance taxiway
- Miscellaneous (i.e., nonsequential taxiway designation schemes, absence of full-length parallel taxiway, taxiway intersection along the middle third of a runway, etc.)

Once all runway incursions from the previous CY are georeferenced, a review of annual and cumulative runway incursion counts for each PTG location determines which locations meet the criteria considered as a potential new RIM location. The criteria are: (1) three or more runway incursions in a single CY, or (2) an average of one or more runway incursions per year since FY08.

A further review of locations meeting at least one of these criteria determines inclusion for the field validation. The purpose of field validation, which occurs after each annual database update and typically lasts approximately two months, is to obtain feedback from FAA field personnel regarding locations considered for classification as RIM locations. Information obtained from the field, such as extenuating circumstances surrounding runway incursions (i.e., construction activity,

air shows, other special events, etc.) and whether or not mitigations are underway, is considered. ARP personnel use this information to make a final determination regarding which locations to add to the RIM inventory. After a final determination, the FAA publishes the updated RIM inventory on the FAA website (2019). Figure 1 provides a summary of the annual database update process, which typically begins in January and is completed in September.

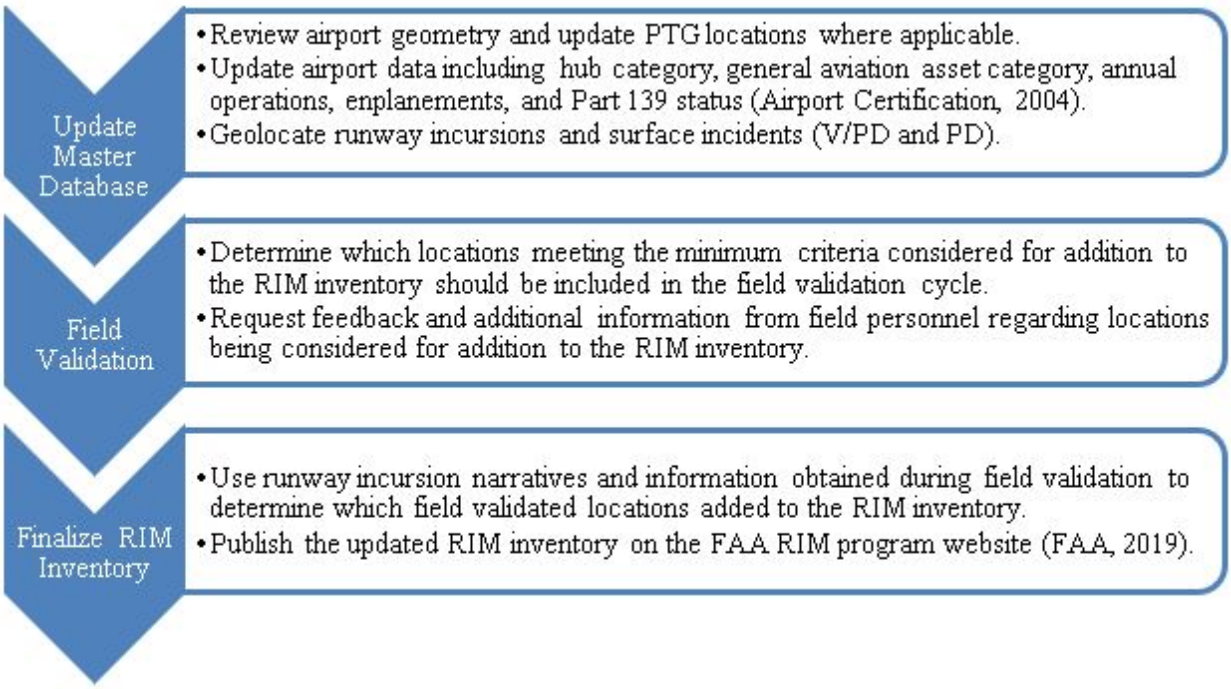

Figure 1. The RIM Database Update Process

The FAA maintains a GIS-based website, referred to as the RIM Data Management (RDM) tool (FAA, 2016) that allows field and FAA headquarters (HQ) personnel to share information related to potential or active RIM locations; monitor the progress of mitigation for RIM locations; and track the success of the overall program. Additionally, non-FAA users, such as the Airline Pilots Association, airport sponsors, and industry consultants have limited, read-only access to the tool. Runway incursion and GIS data are updated in the tool on an annual basis. FAA users may update information (mitigation progress, etc.) related to specific RIM locations at any time.

2.1 THE FY15–FY19 PROGRAM SUMMARY

The RIM database has undergone five annual updates since the initial FY12 study. These updates added a total of 6445 runway incursions (PD and V/PD) and 239 PTG locations to the database. The updates, with the exception of the FY15 update, involved the previous CY's runway incursion data. The FY15 update included CY14 runway incursions as well as incursions from October, November, and December 2013, which were not included in the original study. Five field validation cycles coincided with these annual database updates. These cycles were completed in July 2015, December 2016, July 2017, July 2018, and July 2019. These validation cycles added 75 new RIM locations. Figure 2 provides a breakdown of runway incursions added with each update, while figure 3 shows the number of PTG locations added with each update. As shown, the

number of PTG locations decreased by 62 in FY19 due to the mitigation of nonstandard geometry characteristics, either through the RIM program or through projects not related to RIM. Figure 4 shows the counts of locations that became RIM after each validation cycle. Section 2.2 provides an in-depth discussion of the most recent database update and validation cycle, which took place in 2019.

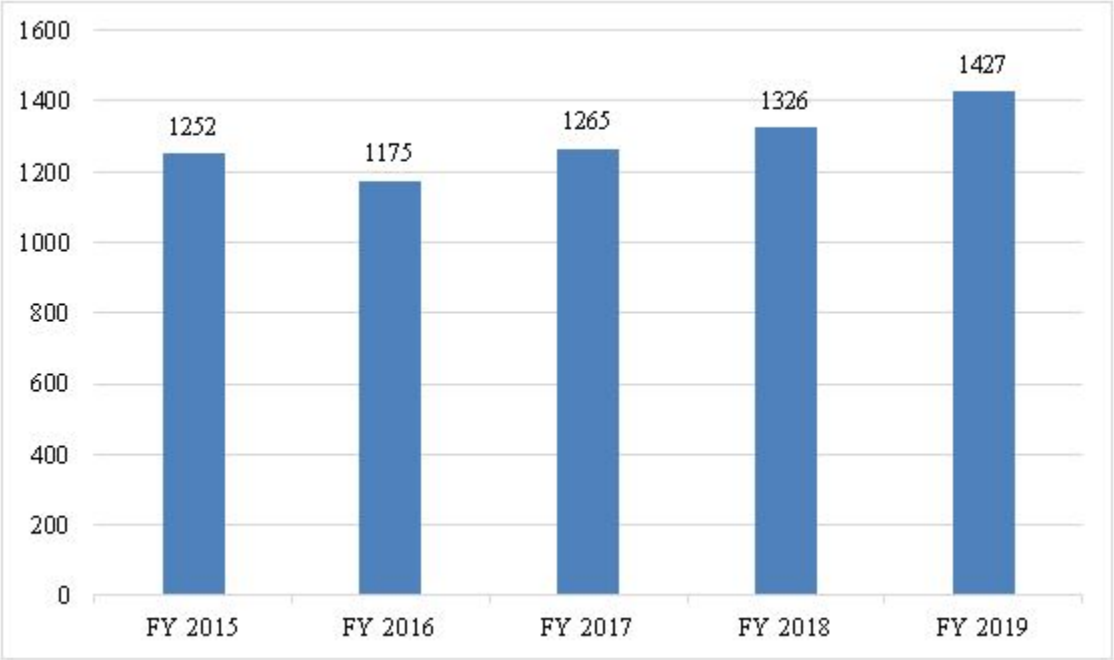

Figure 2. Runway Incursions Added to RIM Database Per FY

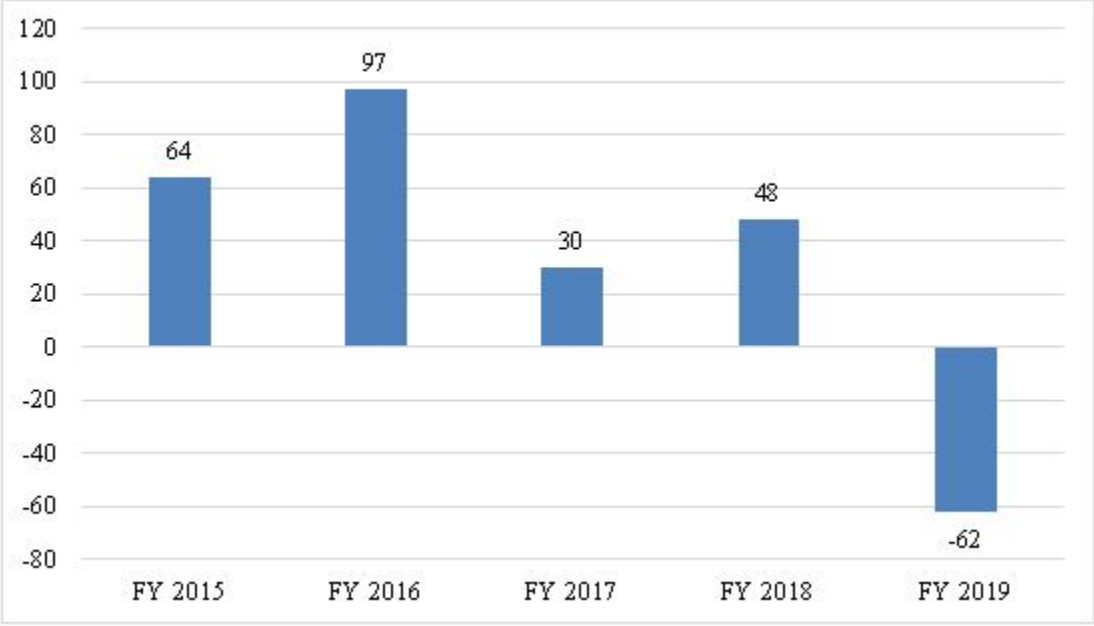

Figure 3. The PTG Locations Added to RIM Database Per FY

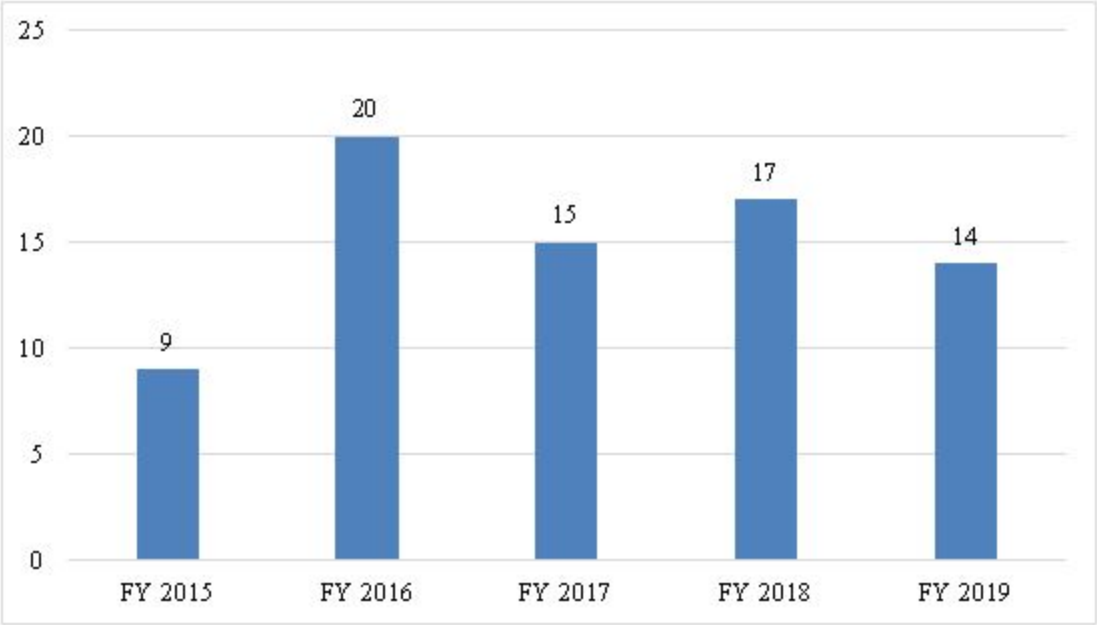

Figure 4. The RIM Locations Added Per Validation Cycle

2.2 THE FY19 PROGRAM UPDATE

The FY19 RIM database update was completed in September 2019. With this update, 1427 runway incursions (PD and V/PD) from CY18 were analyzed and georeferenced. This increased the overall number of runway incursions (PD and V/PD) in the database to 11544. These incursions occurred at 520 towered airports between FY08 and the end of CY18. Due to the mitigation of nonstandard geometry characteristics at various locations, the count of PTG locations decreased by 62 in FY19. For example, if an airport project eliminated nonstandard geometry characteristics at a PTG location, it was removed from the PTG count.

Analysis of runway incursion (PD and V/PD) counts identified 26 PTG locations that met the minimum criteria to be considered for entry into the RIM inventory. Of these locations, 21 were included in the field validation cycle. Based on information obtained during field validation, 14 PTG locations were added to the RIM inventory in FY19. Table 1 lists these 14 locations and provides relevant details such as location, peak year runway incursion counts, and cumulative runway incursion counts. Due to CY18 runway incursion counts, two locations, indicated by an asterisk in table 1, returned to the RIM inventory in FY19 for additional mitigations.

Table 1. The FY19 New RIM Locations: Summary Data

Airport Name and Identifier	Location Description	Peak Year Runway Incursion Count	Cumulative Runway Incursion Count
Centennial Airport (APA)*	Approach end of Runway 35R	4	10
Napa County Airport (APC)	Approach end of Runway 18R	4	6
Aspen-Pitkin County Airport/Sardy Field (ASE)	Hot Spot 3: Taxiway A9 at approach end of Runway 33	4	12
Boise Air Terminal/Gowen Field (BOI)	Hot Spot 1: Approach hold marking on Taxiway J/A at approach end of Runway 10L and hold short bar on Taxiway W at approach end of Runway 10L	4	12
Bob Hope Airport (BUR)	Hot Spot 1: Hold short bars for Runways 8/26 and 15/33 at northwest corner of air carrier ramp (nonmovement area)	4	7
Dallas Love Field Airport (DAL)	Hold short bar on Taxiway L for approach end of Runway 13R	7	10
Dallas Love Field Airport (DAL)*	Hot Spot 1: Hold short bar on Taxiway A at approach end of Runway 13L	12	32
Flying Cloud Airport (FCM)	Hot Spot 2: Hold position bar for Runway 10L/28R on Taxiway C (north of runway)	6	11
Falcon Field Airport (FFZ)	Hold position bar for Runway 4R/22L on Taxiway B	2	11
Daniel K. Inouye International Airport (HNL)	Hold position bar for Runway 4R/22L on Taxiway F (south of runway)	4	9
Purdue University Airport (LAF)	Hot Spot 1: Intersection of Taxiways B, B3, C and Runways 10/28 and 5/23	6	20
Long Beach Airport/Daugherty Field (LGB)	Hot Spot 1: Intersection of Taxiways B, D, K and Runways 8L/26R and 12/30	3	8
Miami-Opa Locka Executive Airport (OPF)	Hold short bar on Taxiway T8 at approach end of Runway 30	4	5
Charles M. Schulz – Sonoma County Airport (STS)	Hot Spot 4: Intersection of Runway 14/32 and 2/20	4	8

* Returned to RIM inventory in FY19 for additional mitigations

As part of the FY19 RIM update, the FAA conducted an evaluation of seven hot spot RIM locations. The locations met RIM criteria based on the occurrence of incursions within the entire limits of the hot spot polygon, but not at any single runway hold bar within the polygon. FAA HQ requested input from field personnel for more information regarding the history and unique

geometry characteristics at the locations to determine if the locations should remain in the RIM inventory. Table 2 provides a summary of the evaluated locations and the outcome of the evaluation. As shown, the evaluation resulted in the removal of two locations from the RIM inventory based on information provided by field personnel.

Table 2. Hot Spot Evaluation Summary

Airport Name and Identifier	Location	Outcome
Des Moines International Airport (DSM)	Hot Spot 2	Remained in RIM inventory
Daniel K. Inouye International Airport (HNL)	Hot Spot 4	Remained in RIM inventory
Lafayette Regional Airport/Paul Fournet Field (LFT)	Hot Spot 2	Removed from RIM inventory
Miami International Airport (MIA)	Hot Spot 4	Remained in RIM inventory
Quad City International Airport (MLI)	Hot Spot 2	Remained in RIM inventory
Louis Armstrong New Orleans International Airport (MSY)	Hot Spot 1	Removed from RIM inventory
Abraham Lincoln Capital Airport (SPI)	Hot Spot 1	Remained in RIM inventory

2.3 THE RIM INVENTORY

At the end of FY19, there were 134 active RIM locations at 76 airports in every FAA region in various stages of mitigation. Several airports have more than one active RIM location. Airports with multiple RIM locations include HNL in Honolulu, Hawaii (eight RIM locations), Chino Airport (CNO) in Chino, California (five RIM locations), and Montgomery-Gibbs Executive Airport (MYF) in San Diego, California (five RIM locations). Table 3 lists the Core 30 airports with current RIM locations in alphabetical order.

Table 3. Core 30 Airports With RIM Locations

Airport Name and Identifier	Number of RIM Locations
Chicago O'Hare International Airport (ORD)	1
Daniel K. Inouye International Airport (HNL)	8
Denver International Airport (DEN)	1
General Edward Lawrence Logan International Airport (BOS)	3
Hartsfield–Jackson Atlanta International Airport (ATL)	3
Los Angeles International Airport (LAX)	2
McCarran International Airport (LAS)	1
Memphis International Airport (MEM)	1
Miami International Airport (MIA)	2
Phoenix Sky Harbor International Airport (PHX)	1
Ronald Reagan Washington National Airport (DCA)	1

Table 3. Core 30 Airports With RIM Locations (Continued)

Airport Name and Identifier	Number of RIM Locations
Salt Lake City International Airport (SLC)	2
San Francisco International Airport (SFO)	1
Seattle–Tacoma International Airport (SEA)	1

The complete RIM inventory as of the end of FY19 is provided in appendix A and can be found at https://www.faa.gov/airports/special_programs/rim/ (FAA, 2019).

3. MITIGATION ANALYSIS

Once a PTG location is added to the RIM inventory, relevant stakeholders (e.g., FAA personnel, local airport authority, etc.) coordinate to determine the most appropriate mitigation strategies for the location. When mitigation strategies have been selected, the project advances to the planning (and possibly environmental) and design phases. Project(s) details, such as funding sources, project timeline, and construction specifics, are determined during this time. If the mitigation is a capital improvement, the project then advances to the construction phase, during which the mitigation strategies are implemented. The 134 active RIM locations are in various stages of mitigation. Figure 5 provides a breakdown of RIM locations by mitigation milestone. As shown, 107 (80%) active RIM locations initiated mitigation activities and are in the planning, design, or construction phases. Note that of the 27 (20%) RIM locations with no project identified, 10 of these became RIM locations in the fourth quarter of FY19.

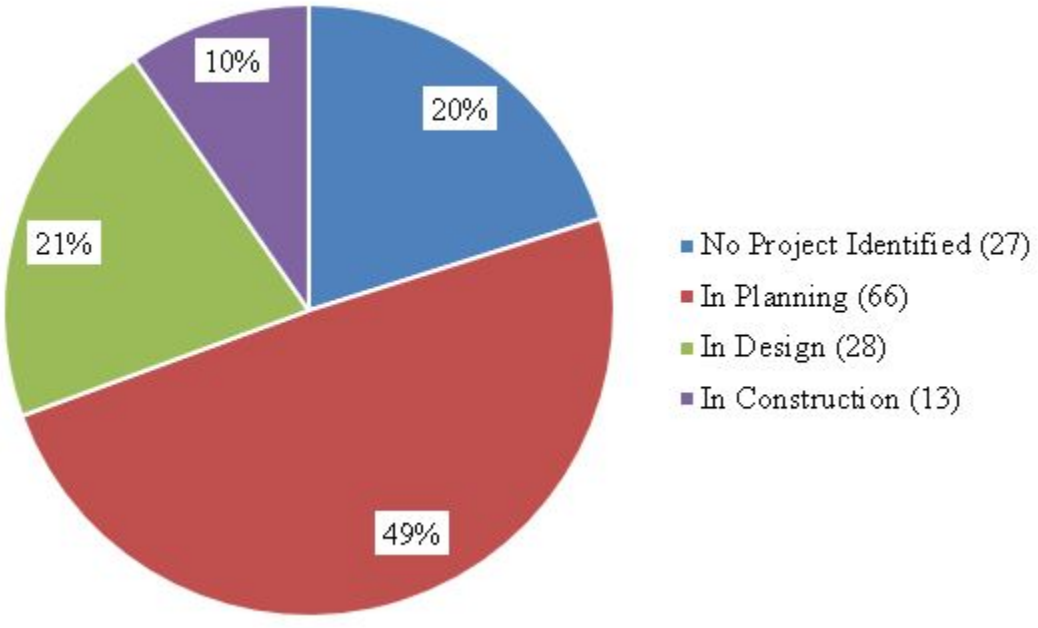

Figure 5. Status of Active RIM Locations

Airports utilize a variety of mitigation strategies to eliminate nonstandard geometry configurations and reduce the likelihood of pilot confusion and ultimately, runway incursions. AC 150/5300-13 (FAA, 2012) and EB 75 (FAA, 2007) provide airports with recommended taxiway layouts. Airports often use a combination of mitigation strategies for RIM locations. Mitigation strategies include changes to airport geometry, lights, signs, markings, and/or operational procedures. Table 4 provides some examples of mitigation strategies.

Table 4. Mitigation Strategy Examples (FAA, 2016)

Mitigation Type	Mitigation Strategy Examples
Airport Geometry Changes	• Reconfigure taxiway to intersect runway at 90-degree angle • Relocate taxiway to eliminate direct access • Narrow the taxiway pavement entrance
Lighting	• Install runway end identifier lights (REILs) • Install elevated or in-pavement runway guard lights
Signage	• Relocate signs to meet FAA standards • Install runway holding position signs at runway/runway intersections where operational use as a taxiway cannot be avoided • Adjust hold position signs to align with incoming taxiway centerline
Markings	• Relocate markings to meet FAA standards • Install enhanced centerline markings • Collocate instrument landing system (ILS) and hold position markings • Install runway holding position markings at runway/runway intersections
Procedures/Operational	• Notify pilots of problems with correct runway selection through Automated Traffic Information System (ATIS), Notice to Airman (NOTAMs), and airport diagram notations • Eliminate use of runways as taxiways

FAA HQ and regional personnel monitor the mitigation progress for each active RIM location. After implementation of construction and other nonconstruction mitigations, FAA field personnel communicate that status to FAA HQ personnel. FAA HQ personnel review mitigation details and, if necessary, visit the airport to confirm the implemented mitigations are satisfactory. If so, the location is considered mitigated and removed from the RIM inventory. Location monitoring continues each year to ensure the success of the mitigations.

At the end of FY19, the RIM program mitigated 44 locations. Airports utilized a variety of mitigation strategies to eliminate the problematic geometry characteristics or reduce their effect at these locations. Table 5 shows the breakdown of mitigated RIM locations by FY.

Table 5. Breakdown of Mitigated RIM Locations by FY

FY	Mitigated RIM Locations
2015	• Charlotte/Douglas International Airport (CLT), North Carolina: Hold short bar on Taxiway D at intersection with Runway 5/23 (south of runway) • Frederick Municipal Airport (FDK), Maryland: Intersection of Taxiway A and Runway 12/30
2016	• Centennial Airport (APA), Colorado: Taxiway A1 hold short bar at approach end of Runway 17L • Chicago Midway International Airport (MDW), Illinois: Hold short bar on Taxiways E1, E2, and E3 at approach end of Runway 31C • Corpus Christi International Airport (CRP), Texas: Hold short bars on taxiways at approach ends of Runway 31 and Runway 36 • Reno/Tahoe International Airport (RNO), Nevada: Hold short bar on Taxiway J, east of Runway 16L/34R • Santa Barbara Municipal Airport (SBA), California: Taxiway C between approach ends of Runway 15R and Runway 15L
2017	• Centennial Airport (APA), Colorado: Hold short bar on Taxiway B8 at intersection with Runway 17L/35R • Dallas Love Field Airport (DAL), Texas: Hold short bar on Taxiway C at approach end of Runway 13R • David Wayne Hooks Memorial Airport (DWH), Texas: Intersection of Taxiway D, Taxiway E, and approach end of Runway 17L • David Wayne Hooks Memorial Airport (DWH), Texas: Intersection of Runway 17R/35L and Taxiway E • Fort Lauderdale Executive Airport (FXE), Florida: Intersection of Runway 27 and Taxiway C • Fort Lauderdale Executive Airport (FXE), Florida: Taxiways E, J, L, and P at the approach end of Runway 9 • Fort Lauderdale Executive Airport (FXE), Florida: Intersection of Runway 13/31 and Taxiway A • Mc Clellan-Palomar Airport (CRQ), California: Hold short bar on Taxiway A1 at intersection with approach end of Runway 24 • Palm Beach International Airport (PBI), Florida: Intersection of Runway 10R and Taxiway S • Palm Beach International Airport (PBI), Florida: Intersection of Runway 10L and Taxiway L • Philadelphia International Airport (PHL), Pennsylvania: Hold short bar on Taxiway D (north side of runway) at intersection with Runway 9L/22R • Philadelphia International Airport (PHL), Pennsylvania: Intersection of Taxiway D and the approach end of Runway 8 • Waco Regional Airport (ACT), Texas: Approach end of Runway 32

Table 5. Breakdown of Mitigated RIM Locations by FY (Continued)

FY	Mitigated RIM Locations
2018	• Albuquerque International Sunport Airport (ABQ), New Mexico: Approach ends of Runway 8 and Runway 12 • Daytona Beach International Airport (DAB), Florida: Intersection of Runway 7L/25R and Taxiway P5 • Ernest A. Love Field Airport (PRC), Arizona: Hold short bar at intersection of Runway 3R/21L and Taxiways C2 and E • Kissimmee Gateway Airport (ISM), Florida: Intersection of Runway 15/33 and Taxiway B • Rocky Mountain Metropolitan Airport (BJC), Colorado: Approach end of Runway 30R • Santa Monica Municipal Airport (SMO), California: Taxiway B at approach end of Runway 21 • Seattle-Tacoma International Airport (SEA), Washington: Hold short bars on Taxiway F at intersection with Runway 16C/34C • Seattle-Tacoma International Airport (SEA), Washington: Hold short bar on Taxiway Q for Runway 16L/34R • Terre Haute Regional Airport (HUF), Indiana: Hold short bar for Taxiway D at approach end of Runway 14 and former Runway 18 • Teterboro Airport (TEB), New Jersey: Taxiway B between Runway 19 and Runway 24 • Tulsa International Airport (TUL), Oklahoma: Intersection of Runway 8/26 and Taxiways C, J, and K
2019	• Bowman Field Airport (LOU), Kentucky: Hold short bar on Taxiway J at the intersection with Runway 6/24 • Fulton County Airport/Brown Field (FTY), Georgia: Intersection of Runway 8/26 and Taxiway K • Long Beach Airport/Daugherty Field (LGB), California: Intersection of approach end of Runway 26L and Taxiways D and F • Manchester Airport (MHT), New Hampshire: Hold short bars on Taxiways P and U at intersection with approach end of Runway 35 • Miami Executive Airport (TMB), Florida: Hold short bar on Taxiway A at approach end of Runway 9L • Miami International Airport (MIA), Florida: Intersection of Runway 8R/26L and Taxiway M5 • Midland International Air and Space Port Airport (MAF), Texas: Hold short bar on Taxiway A at approach end of Runway 10 • Orlando Sanford International Airport (SFB), Florida: Hold short bar on Runway 18/36 south of Runway 9R • Orlando Sanford International Airport (SFB), Florida: Taxiway R under approach path for Runway 9R • Phoenix Deer Valley Airport (DVT), Arizona: Hold short bar at intersection of Taxiway A4 and approach end of Runway 7L • Sarasota/Bradenton International Airport (SRQ), Florida: Intersections of Runway 4/22, Runway 14/32, and Taxiways A, B, C, and D • Smyrna Airport (MQY), Tennessee: Convergence of Taxiways B, C, and D at the approach end of Runway 19 • Van Nuys Airport (VNY), California: Intersection of Taxiway C/B and approach end of Runway 16L (east of runway)

The 44 RIM mitigated locations experienced 491 runway incursions prior to mitigation, compared to 23 runway incursions after mitigation. Similarly, the average annual number of runway incursions at these locations decreased from 1.17 prior to mitigation to 0.47 after mitigation. Because these locations were recently mitigated between FY15 and FY19, significant post mitigation runway incursion trending data do not yet exist. These locations will be monitored over time to determine if mitigation efforts were successful and whether or not additional mitigation will be necessary. Appendix B provides summary data for all RIM mitigated locations.

4. CONCLUSION

In fiscal year (FY) 2015, the Federal Aviation Administration (FAA) launched a 15- to 20-year improvement program known as the Runway Incursion Mitigation (RIM) program. The goal of the RIM program is to identify locations at towered airports that have nonstandard geometry characteristics and a high occurrence of runway incursions, mitigate the nonstandard geometry characteristics present at these locations, and ultimately reduce the number of runway incursions at these locations.

At the end of FY19, there were 134 active RIM locations at 76 airports. Of these locations, 107 initiated mitigation activities and were in the planning, design, or construction phases. The RIM program mitigated 44 locations since its inception. Mitigations eliminated hot spots from the airport diagrams at 12 of these locations. The FAA continues to monitor these locations to ensure the mitigations successfully reduce the number of runway incursions.

FAA headquarters (HQ) personnel continue to monitor the progress of the program by visiting as many airports with RIM locations as feasible. Personnel from FAA HQ, the regions, and the Airports District Offices are available to assist with mitigation strategies, as the ultimate goal is to reduce runway incursions as much as possible.

5. REFERENCES

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APPENDIX A—RUNWAY INCURSION MITIGATION INVENTORY

The Federal Aviation Administration (FAA) Runway Incursion Mitigation (RIM) program personnel developed this preliminary inventory of airport locations where runway incursions (RIs) have occurred and are now working with airports on mitigation strategies. The pilot deviation (PD) and vehicle/pedestrian deviation (V/PD) data collected from fiscal year (FY) 2008–calendar year (CY) 2018 indicate airport locations where 3 or more peak annual RIs have occurred in a given CY or more than 11 RIs have cumulatively occurred during this period. Table A-1 shows this information, which is subject to change as the FAA works with the airport sponsors. The RIM program inventory will be updated as projects proceed and additional RI data are collected.

Table A-1. The RIM Program Inventory of Airport Locations as of October 2019

Airport Name and Identifier	Location	Location Identifier	Region	NPIAS Hub Classification	Asset Category	Part 139*	Cumulative RI (PD and V/PD)	Peak CY Annual RI (PD and V/PD)
Addison (ADS)	Taxiway A entrance to approach end of Runway 15	ADS-HS1	ASW	Reliever	National	N	29	5
Addison (ADS)	Runway 15-33/Taxiway G intersection	ADS-HS4	ASW	Reliever	National	N	11	9
Addison (ADS)	Runway 15-33/Taxiway C intersection	ADS-HS8	ASW	Reliever	National	N	7	2
Centennial (APA)	Approach end of Runway 35R	APA-07	ANM	Reliever	National	N	10	4
Centennial (APA)	Taxiway C1 at approach end of Runway 10	APA-HS3	ANM	Reliever	National	N	23	4
Napa County (APC)	Approach end of Runway 18R	APC-09	AWP	Reliever	Regional	N	6	4
Aspen-Pitkin County/Sardy Field (ASE)	Taxiway A9 at approach end of Runway 33	ASE-HS3	ANM	Non-Hub Primary	NA	Y	12	4
Hartsfield-Jackson Atlanta International (ATL)	Runway 9L-27R/Taxiway D intersection, south side	ATL-18	ASO	Large	NA	Y	7	3
Hartsfield-Jackson Atlanta International (ATL)	Runway 8L - 26R/Taxiway C, D Intersections	ATL-HS1	ASO	Large	NA	Y	14	4
Hartsfield-Jackson Atlanta International (ATL)	Runway 8R - 26L/Taxiway C, D Intersections	ATL-HS2	ASO	Large	NA	Y	35	5

* Airport Certification, 14 C. F. R. § 139 (2004).

NPAIS–National Plan of Integrated Airport Systems

Airport Name and Identifier	Location	Location Identifier	Region	NPIAS Hub Classification	Asset Category	Part 139*	Cumulative RI (PD and V/PD)	Peak CY Annual RI (PD and V/PD)
Kalamazoo/Battle Creek International (AZO)	Runway 17/Taxiway C Intersection	AZO-02	AGL	Non-Hub Primary	NA	Y	5	3
Boise Air Terminal/Gowen Field (BOI)	Hold short bar on Taxiway J, north of Runway 10R approach end	BOI-01	ANM	Small	NA	Y	10	3
Boise Air Terminal/Gowen Field (BOI)	Approach hold marking on Taxiway J/A at approach end of Runway 10L and hold short bar on Taxiway W at approach end of Runway 10L	BOI-HS1	ANM	Small	NA	Y	12	4
General Edward Lawrence Logan International (BOS)	Runway 15L/Runway 22R intersection	BOS-HS1	ANE	Large	NA	Y	13	3
General Edward Lawrence Logan International (BOS)	Runway 4L approach end/Taxiway E, K Intersections	BOS-HS3	ANE	Large	NA	Y	25	5
General Edward Lawrence Logan International (BOS)	Runway 4R/Runway 14-32 intersection	BOS-47	ANE	Large	NA	Y	9	3
Burlington International (BTV)	Intersection of Taxiway C and Runway 1-19	BTV-HS2	ANE	Small	NA	Y	9	3
Bob Hope (BUR)	Hold short bars for Runways 8-26 and 15-33 at northwest corner of air carrier ramp (nonmovement area)	BUR-HS1	AWP	Medium	NA	Y	7	4
Buchanan Field (CCR)	Runway 32R/Taxiway B intersection	CCR-03	AWP	Reliever	National	Y	12	4
Cleveland-Hopkins International (CLE)	Five-point intersection of Taxiways J, L, S, and Runway 6R-24L	CLE-HS1	AGL	Medium	NA	Y	5	4

Airport Name and Identifier	Location	Location Identifier	Region	NPIAS Hub Classification	Asset Category	Part 139*	Cumulative RI (PD and V/PD)	Peak CY Annual RI (PD and V/PD)
Cleveland-Hopkins International (CLE)	Five-point intersection of Taxiways R, L, A, and Runway 6R-24L	CLE-HS2	AGL	Medium	NA	Y	5	5
Camarillo (CMA)	Taxiway A at Runway 26 approach end	CMA-01	AWP	Reliever	National	N	15	5
Chino (CNO)	Taxiway P between Runway 26R approach end and 26L	CNO-05	AWP	Reliever	National	N	6	3
Chino (CNO)	Hold short bar on Taxiway P north of Runway 26R	CNO-10	AWP	Reliever	National	N	25	8
Chino (CNO)	Runway 26L approach end	CNO-19	AWP	Reliever	National	N	15	6
Chino (CNO)	Taxiway L between Runways 3-21 and 8R-26L	CNO-HS2	AWP	Reliever	National	N	7	5
Chino (CNO)	Intersections of Taxiways D, K, and L and Runways 8L-26R and 3-21	CNO-HS4	AWP	Reliever	National	N	18	5
Conroe-North Houston Regional (CXO)	Intersection of Runway 14-32 and Taxiway J	CXO-02	ASW	Reliever	National	N	5	4
Dallas Love Field (DAL)	Hold short bar on Taxiway L for approach end of Runway 13R	DAL-15	ASW	Medium	NA	Y	10	7
Dallas Love Field (DAL)	Runway 13L-31R/Taxiway B5 intersection	DAL-33	ASW	Medium	NA	Y	10	3
Dallas Love Field (DAL)	Hold short bar on Taxiway A at approach end of Runway 13L	DAL-HS1	ASW	Medium	NA	Y	32	12
Ronald Reagan Washington National (DCA)	Taxiway J at Runway 19 approach end	DCA-04	AEA	Large	NA	Y	20	4
Denver International (DEN)	Runway 17R approach area on Taxiway ED	DEN-HS1	ANM	Large	NA	Y	17	4
Des Moines International (DSM)	Intersection of Runway 13-31 and Taxiway P	DSM-HS2	ACE	Small	NA	Y	9	3
Phoenix Deer Valley (DVT)	Approach end of Runway 7R	DVT-07	AWP	Reliever	National	N	9	3

Airport Name and Identifier	Location	Location Identifier	Region	NPIAS Hub Classification	Asset Category	Part 139*	Cumulative RI (PD and V/PD)	Peak CY Annual RI (PD and V/PD)
Phoenix Deer Valley (DVT)	Taxiway B5 between Taxiway B and Runway 7R-25L	DVT-HS1	AWP	Reliever	National	N	11	3
Phoenix Deer Valley (DVT)	Runway 7R-25L/Taxiway B9 intersection	DVT-HS2	AWP	Reliever	National	N	36	5
David Wayne Hooks Memorial (DWH)	Runway 17R approach end	DWH-HS1	ASW	Reliever	Regional	N	21	5
David Wayne Hooks Memorial (DWH)	Intersection of Taxiway G and Runway 17L-35R	DWH-HS4	ASW	Reliever	Regional	N	8	5
Fairbanks International (FAI)	Runway 20L approach end/Runway 2 ski strip	FAI-11	AAL	Small	NA	Y	8	3
Fairbanks International (FAI)	Approach end of ski strip 20	FAI-25	AAL	Small	NA	Y	3	3
Fairbanks International (FAI)	Closely located Taxiways (B, T, U) and Runways (approach ends of 20L and 2)	FAI-HS1	AAL	Small	NA	Y	23	6
Fresno Yosemite International (FAT)	Runway 29R approach end	FAT-21	AWP	Small	NA	Y	10	3
Flying Cloud (FCM)	Hold short bar for Runway 10L-28R on Taxiway C (north of runway)	FCM-HS2	AGL	Reliever	National	N	11	6
Flying Cloud (FCM)	Runway 28L approach end	FCM-HS10	AGL	Reliever	National	N	16	4
Falcon Field (FFZ)	Hold short bar for Runway 4R/22L on Taxiway B	FFZ-01	AWP	Reliever	Regional	N	11	2
Falcon Field (FFZ)	Approach end of Runway 22L	FFZ-13	AWP	Reliever	Regional	N	16	3
Scholes International Airport at Galveston (GLS)	Runway 18/Taxiway E intersection	GLS-04	ASW	Reliever	Regional	N	10	4
Portland-Hillsboro (HIO)	Hold short bar on Taxiway A9 at the approach end of Runway 31L	HIO-05	ANM	Reliever	National	N	10	3

Airport Name and Identifier	Location	Location Identifier	Region	NPIAS Hub Classification	Asset Category	Part 139*	Cumulative RI (PD and V/PD)	Peak CY Annual RI (PD and V/PD)
Portland-Hillsboro (HIO)	Intersection of Taxiways A, A6, and Runway 13R-31L	HIO-HS1	ANM	Reliever	National	N	5	3
Portland-Hillsboro (HIO)	Taxiway A8 between Taxiway A and Runway 13R-31L	HIO-HS2	ANM	Reliever	National	N	13	4
Helena Regional (HLN)	Intersection of Taxiway C and approach end of Runway 35	HLN-01	ANM	Non-Hub Primary	NA	Y	11	3
Daniel K. Inouye International (HNL)	Taxiway E between Runways 4L-22R and 4R-22L	HNL-01	AWP	Large	NA	Y	11	3
Daniel K. Inouye International (HNL)	Taxiway D between Runways 4L-22R and 4R-22L	HNL-02	AWP	Large	NA	Y	19	4
Daniel K. Inouye International (HNL)	Approach end of Runway 4R	HNL-27	AWP	Large	NA	Y	15	3
Daniel K. Inouye International (HNL)	Hold short bar for Runway 4R-22L on Taxiway F (south of runway)	HNL-36	AWP	Large	NA	Y	9	4
Daniel K. Inouye International (HNL)	Runways 4L and 4R approach ends	HNL-HS1	AWP	Large	NA	Y	9	3
Daniel K. Inouye International (HNL)	Runway 8L-26R/Taxiway E/Taxiway B	HNL-HS3	AWP	Large	NA	Y	10	3
Daniel K. Inouye International (HNL)	Runway 8L approach/Taxiways A, V, T, RB and M intersection	HNL-HS4	AWP	Large	NA	Y	15	4
Daniel K. Inouye International (HNL)	Taxiways E, D, and F between Runways 4L-22R and 4R-22L	HNL-HS6	AWP	Large	NA	Y	11	3
William P. Hobby (HOU)	Runway 17 Taxiway E entrance	HOU-01	ASW	Medium	NA	Y	10	3
William P. Hobby (HOU)	Hold short bar on Taxiway G at approach end of Runway 4	HOU-15	ASW	Medium	NA	Y	8	3
William P. Hobby (HOU)	Runway 13R/Taxiway G entrance	HOU-HS2	ASW	Medium	NA	Y	15	4

Airport Name and Identifier	Location	Location Identifier	Region	NPIAS Hub Classification	Asset Category	Part 139*	Cumulative RI (PD and V/PD)	Peak CY Annual RI (PD and V/PD)
Hayward Executive (HWD)	Runway 28L/Taxiway A1 intersection	HWD-HS5	AWP	Reliever	National	N	37	13
Idaho Falls Regional (IDA)	Runways 20 and 17 approach ends	IDA-HS4	ANM	Non-Hub Primary	NA	Y	13	5
Phoenix-Mesa Gateway (IWA)	Approach end of Runway 12C	IWA-04	AWP	Small	NA	Y	11	3
Phoenix-Mesa Gateway (IWA)	Taxiway V/Taxiway B/Taxiway K/Runway 12R intersection	IWA-HS1	AWP	Small	NA	Y	13	3
Joplin Regional (JLN)	Instrument landing system hold line and hold short bar on Taxiway E at approach end of Runway 13	JLN-HS1	ACE	Non-Hub Primary	NA	Y	10	3
Juneau International (JNU)	Runway 8-26/Taxiway D intersection	JNU-01	AAL	Non-Hub Primary	NA	Y	10	3
Purdue University (LAF)	Intersection of Taxiways B, B3, C and Runways 10-28 and 5-23	LAF-HS1	AGL	General Aviation	Regional	Y	20	6
McCarran International (LAS)	Runway 8L-1L intersection	LAS-HS3	AWP	Large	NA	Y	24	4
Los Angeles International (LAX)	Runway 6R-24L/Taxiway AA intersection	LAX-HS1	AWP	Large	NA	Y	23	5
Los Angeles International (LAX)	Runway 7L-25R/7R-25L/Taxiway F intersection	LAX-HS3	AWP	Large	NA	Y	27	5
Long Beach (LGB)	Intersection of Taxiways B, D, K and Runways 8L-26R and 12-30	LGB-HS1	AWP	Small	NA	Y	8	3
Long Beach (LGB)	Taxiway J-D/Runway 8R-26L/Runway 12-30 intersection	LGB-HS3	AWP	Small	NA	Y	12	3
Livermore Municipal (LVK)	Runway 25R/Taxiway B intersection	LVK-HS1	AWP	Reliever	Regional	N	32	6
Livermore Municipal (LVK)	Runway 25L/Taxiway C intersection	LVK-HS2	AWP	Reliever	Regional	N	18	5

Airport Name and Identifier	Location	Location Identifier	Region	NPIAS Hub Classification	Asset Category	Part 139*	Cumulative RI (PD and V/PD)	Peak CY Annual RI (PD and V/PD)
Memphis International (MEM)	Runway 27/Taxiway V2 intersection	MEM-01	ASO	Small	NA	Y	3	3
Manchester (MHT)	Runway 17/Taxiway H intersection	MHT-HS1	ANE	Small	NA	Y	15	10
Miami International (MIA)	Runway 9-27/Runway T8 intersection	MIA-HS3	ASO	Large	NA	Y	10	4
Miami International (MIA)	Runways 8R-26L and 12-30/Taxiway N/M/M1/Q1/Q/P intersection	MIA-HS4	ASO	Large	NA	Y	13	3
Crystal (MIC)	Taxiway E4 between Runway 14R and 14L	MIC-HS6	AGL	Reliever	Regional	N	17	4
Quad City International (MLI)	Runways 13-31/9-27/5-23 intersection	MLI-HS2	AGL	Non-Hub Primary	NA	Y	12	8
Monroe Regional (MLU)	Taxiway A between Runways 14 and 18	MLU-HS1	ASW	Non-Hub Primary	NA	Y	6	4
Merrill Field (MRI)	Runway 7-25/Taxiway C intersection	MRI-13	AAL	Non-Hub Primary	NA	N	14	4
Merrill Field (MRI)	Runway 25/Taxiway K intersection	MRI-25	AAL	Non-Hub Primary	NA	N	13	3
Merrill Field (MRI)	Runway 5-23/Taxiway G intersection	MRI-26	AAL	Non-Hub Primary	NA	N	13	5
Montgomery-Gibbs Executive (MYF)	Taxiway A at approach end of Runway 28R	MYF-01	AWP	Reliever	Regional	N	12	3
Montgomery-Gibbs Executive (MYF)	Taxiway H hold short bar between approach ends of Runway 5 and Runway 10R	MYF-13	AWP	Reliever	Regional	N	6	4
Montgomery-Gibbs Executive (MYF)	Approach end of Runway 28R	MYF-15	AWP	Reliever	Regional	N	10	6
Montgomery-Gibbs Executive (MYF)	Taxiway F between Runways 10L-28R and 10R-28L	MYF-HS2	AWP	Reliever	Regional	N	11	9

Airport Name and Identifier	Location	Location Identifier	Region	NPIAS Hub Classification	Asset Category	Part 139*	Cumulative RI (PD and V/PD)	Peak CY Annual RI (PD and V/PD)
Montgomery-Gibbs Executive (MYF)	Runway 28L/Taxiway B intersection	MYF-HS3	AWP	Reliever	Regional	N	17	5
Lakefront (NEW)	Hold short bar on Taxiway F at approach end of Runway 36L	NEW-HS3	ASW	Reliever	National	N	22	11
Miami-Opa Locka Executive (OPF)	Hold short bar on Taxiway T8 at approach end of Runway 30	OPF-03	ASO	Reliever	National		5	4
Chicago O'Hare International (ORD)	Taxiway T/Taxiway SS/approach path Runway 9R	ORD-HS2	AGL	Large	NA	Y	9	6
Executive (ORL)	Runway 7/Taxiway E4 intersection	ORL-01	ASO	Reliever	National	N	13	3
Palo Alto (PAO)	Runway 31/Taxiway A intersection	PAO-01	AWP	Reliever	Regional	N	38	7
DeKalb-Peachtree (PDK)	Runways 16-34/3L-21R/3R-21L/Taxiway C/B intersection	PDK-11	ASO	Reliever	National	N	12	4
DeKalb-Peachtree (PDK)	Runway 21R/Taxiway G intersection	PDK-HS1	ASO	Reliever	National	N	15	4
DeKalb-Peachtree (PDK)	Runway 3L/Taxiway A intersection	PDK-HS3	ASO	Reliever	National	N	9	4
Phoenix Sky Harbor International (PHX)	Approach end of Runway 25R	PHX-02	AWP	Large	NA	Y	6	2
St. Pete-Clearwater International (PIE)	Hold short bar on Taxiway A, north of approach end of Runway 4	PIE-05	ASO	Small	NA	Y	6	3
Pensacola International (PNS)	Intersections of Runway 8-26, 17-35 and Taxiways A, B, and D	PNS-HS1	ASO	Small	NA	Y	16	5
Brackett Field (POC)	Runway 8L-26R / Taxiway E intersection (north of runway)	POC-02	AWP	Reliever	Regional	N	10	2
Ernest A. Love Field (PRC)	Runway 3L approach end	PRC-HS3	AWP	Non-Primary Commercial	Regional	Y	18	4
Ernest A. Love Field (PRC)	Runway 3R-21L/Taxiway C4-D4 intersection	PRC-HS4	AWP	Non-Primary Commercial	Regional	Y	12	4

Airport Name and Identifier	Location	Location Identifier	Region	NPIAS Hub Classification	Asset Category	Part 139*	Cumulative RI (PD and V/PD)	Peak CY Annual RI (PD and V/PD)
Palm Springs International (PSP)	Runway 31R/Taxiway B intersection	PSP-HS3	AWP	Small	NA	Y	9	3
Reid-Hillview (RHV)	Taxiway E between Runway 13L and 13R	RHV-01	AWP	Reliever	Regional	N	14	4
Reid-Hillview (RHV)	Runway 31R approach/Taxiway A intersection	RHV-HS2	AWP	Reliever	Regional	N	13	3
Reno/Tahoe International (RNO)	Runway 34L Approach End	RNO-18	AWP	Small	NA	Y	11	5
Reno/Tahoe International (RNO)	Intersection of Taxiway L and Runway 16L-34R and Taxiway C and Runway 7-25	RNO-HS2	AWP	Small	NA	Y	15	5
San Antonio International (SAT)	Runway 4-22/Runway13R-31L intersection	SAT-HS1	ASW	Medium	NA	Y	35	10
San Antonio International (SAT)	Runway 13R/Taxiway K intersection	SAT-05	ASW	Medium	NA	Y	11	6
Brown Field Municipal (SDM)	Taxiway B between Runways 8L-26R and 8R-26L	SDM-04	AWP	Reliever	National	N	4	4
Seattle-Tacoma International (SEA)	Runway 16L/Taxiway C intersection	SEA-02	ANM	Large	NA	Y	5	3
San Francisco International (SFO)	Taxiway T between Runway 10L-28R/Runway 10R-28L	SFO-HS3	AWP	Large	NA	Y	16	4
Norman Y. Mineta San Jose International (SJC)	Approach end of Runway 30R	SJC-28	AWP	Medium	NA	Y	5	2
Norman Y. Mineta San Jose International (SJC)	Approach end of Runway 30L	SJC-29	AWP	Medium	NA	Y	6	3

Airport Name and Identifier	Location	Location Identifier	Region	NPIAS Hub Classification	Asset Category	Part 139*	Cumulative RI (PD and V/PD)	Peak CY Annual RI (PD and V/PD)
Salt Lake City International (SLC)	Runway 35/Runway 32/Taxiway K1/Taxiway M intersection	SLC-HS1	ANM	Large	NA	Y	30	11
Salt Lake City International (SLC)	Runway 34R-16L/Runway 14-32/Taxiway Q intersection	SLC-HS2	ANM	Large	NA	Y	13	3
John Wayne-Orange County (SNA)	Taxiway L between Runways 20L and 20R approach ends	SNA-03	AWP	Medium	NA	Y	7	3
John Wayne-Orange County (SNA)	Taxiway L entrance to Runway 20L	SNA-HS1	AWP	Medium	NA	Y	12	3
John Wayne-Orange County (SNA)	Taxiway H between Runway 2L-20R and Runway 2R approach	SNA-HS2	AWP	Medium	NA	Y	13	6
Abraham Lincoln Capital (SPI)	Runway 13-31/Runway 18-36/Runway 4-22 intersections	SPI-HS1	AGL	Non-Hub Primary	NA	Y	7	3
Charles M. Schulz-Sonoma County (STS)	Taxiway A/approach path of Runway 20	STS-08	AWP	Non-Hub Primary	NA	Y	12	5
Charles M. Schulz-Sonoma County (STS)	Run-up area east of Taxiway A, Taxiway H at approach end of Runway 20, Taxiway A3 at Runway 14-32	STS-HS3	AWP	Non-Hub Primary	NA	Y	18	8
Charles M. Schulz-Sonoma County (STS)	Intersection of Runway 14-32 and Runway 2-20	STS-HS4	AWP	Non-Hub Primary	NA	Y	8	4
Teterboro (TEB)	Intersection of Taxiway L and Runway 6-24	TEB-HS1	AEA	Reliever	National	Y	7	3
Miami Executive (TMB)	Runway 31/Taxiway E, H intersection	TMB-HS1	ASO	Reliever	National	N	12	3
Tucson International (TUS)	Runway 29R approach end	TUS-03	AWP	Small	NA	Y	15	4

Airport Name and Identifier	Location	Location Identifier	Region	NPIAS Hub Classification	Asset Category	Part 139*	Cumulative RI (PD and V/PD)	Peak CY Annual RI (PD and V/PD)
Tucson International (TUS)	Taxiway D between Runway 11L and 11R	TUS-HS2	AWP	Small	NA	Y	44	10
Aurora State (UAO)	Taxiway A1 at Runway 17 approach end	UAO-HS1	ANM	General Aviation	National	N	7	5
North Las Vegas (VGT)	Taxiway F/G at Runway 7 approach end	VGT-HS1	AWP	Non-Hub Primary	NA	Y	51	12
North Las Vegas (VGT)	Runway 12R/Taxiway G	VGT-HS2	AWP	Non-Hub Primary	NA	Y	26	7

For reference purposes, table A-2 provides the FAA Airport Code Identifiers for the airports covered in the appendix. Table A-3 shows the FAA Regional abbreviations and the U.S. territories covered in each region.

Table A-2. The FAA Airport Identifier Codes

FAA Identifier Code	Airport Name and Location
ADS	Addison Airport, Dallas, Texas
APA	Centennial Airport, Denver, Colorado
APC	Napa County Airport, Napa, California
ASE	Aspen-Pitkin County Airport/Sardy Field, Aspen, Colorado
ATL	Hartsfield-Jackson Atlanta International Airport, Atlanta, Georgia
AZO	Kalamazoo/Battle Creek International Airport, Kalamazoo, Michigan
BOI	Boise Air Terminal/Gowen Field, Boise, ID
BOS	General Edward Lawrence Logan International Airport, Boston, Massachusetts
BTV	Burlington International Airport, Burlington, Vermont
BUR	Bob Hope Airport, Burbank, California
CCR	Buchanan Field Airport, Concord, California
CLE	Cleveland-Hopkins International Airport, Cleveland, Ohio
CMA	Camarillo Airport, Camarillo, California
CNO	Chino Airport, Chino, California
CXO	Conroe-North Houston Regional Airport, Houston, Texas
DAL	Dallas Love Field Airport, Dallas, Texas
DCA	Ronald Reagan Washington National Airport, Washington, DC
DEN	Denver International Airport, Denver, Colorado
DSM	Des Moines International Airport, Des Moines, Iowa
DVT	Phoenix Deer Valley Airport, Phoenix, Arizona
DWH	David Wayne Hooks Memorial Airport, Houston, Texas
FAI	Fairbanks International Airport, Fairbanks, Alaska
FAT	Fresno Yosemite International Airport, Fresno, California
FCM	Flying Cloud Airport, Minneapolis, Minnesota
FFZ	Falcon Field Airport, Mesa, Arizona
FTY	Fulton County Airport-Brown Field, Atlanta, Georgia
GLS	Scholes International Airport at Galveston, Galveston, Texas
HIO	Portland-Hillsboro Airport, Portland, Oregon
HLN	Helena Regional Airport, Helena, Montana
HNL	Daniel K. Inouye International Airport, Honolulu, Hawaii
HOU	William P. Hobby Airport, Houston, Texas
HWD	Hayward Executive Airport, Hayward, California
IDA	Idaho Falls Regional Airport, Idaho Falls, Idaho
IWA	Phoenix-Mesa Gateway Airport, Phoenix, Arizona
JLN	Joplin Regional Airport, Joplin, Missouri
JNU	Juneau International Airport, Juneau, Alaska

Table A-2. The FAA Airport Identifier Codes (Continued)

FAA Identifier Code	Airport Name and Location
LAF	Purdue University Airport, Lafayette, Indiana
LAS	McCarran International Airport, Las Vegas, Nevada
LAX	Los Angeles International Airport, Los Angeles, California
LGB	Long Beach Airport/Daugherty Field, Long Beach, California
LVK	Livermore Municipal Airport, Livermore, California
MEM	Memphis International Airport, Memphis, Tennessee
MHT	Manchester Airport, Manchester, New Hampshire
MIA	Miami International Airport, Miami, Florida
MIC	Crystal Airport, Minneapolis, Minnesota
MLI	Quad City International Airport, Moline, Illinois
MLU	Monroe Regional Airport, Monroe, Louisiana
MRI	Merrill Field Airport, Anchorage, Alaska
MYF	Montgomery-Gibbs Executive Airport, San Diego, California
NEW	Lakefront Airport, New Orleans, Louisiana
OPF	Miami-Opa Locka Executive Airport, Miami, Florida
ORD	Chicago O'Hare International Airport, Chicago, Illinois
ORL	Executive Airport, Orlando, Florida
PAO	Palo Alto Airport, Palo Alto, California
PDK	DeKalb-Peachtree Airport, Atlanta, Georgia
PHX	Phoenix Sky Harbor International Airport, Phoenix, Arizona
PIE	Saint Pete-Clearwater International Airport, Saint Petersburg-Clearwater, Florida
PNS	Pensacola International Airport, Pensacola, Florida
POC	Brackett Field Airport, La Verne, California
PRC	Ernest A. Love Field Airport, Prescott, Arizona
PSP	Palm Springs International Airport, Palm Springs, California
RHV	Reid-Hillview Airport of Santa Clara County, San Jose, California
RNO	Reno/Tahoe International Airport, Reno, Nevada
SAT	San Antonio International Airport, San Antonio, Texas
SDM	Brown Field Municipal Airport, San Diego, California
SEA	Seattle-Tacoma International Airport, Seattle, Washington
SFO	San Francisco International Airport, San Francisco, California
SJC	Norman Y. Mineta San Jose International Airport, San Jose, California
SLC	Salt Lake City International Airport, Salt Lake City, Utah
SNA	John Wayne-Orange County Airport, Santa Ana, California
SPI	Abraham Lincoln Capital Airport, Springfield, Illinois
STS	Charles M. Schulz – Sonoma County Airport, Santa Rosa, California
TEB	Teterboro Airport, Teterboro, New Jersey
TMB	Miami Executive Airport, Miami, Florida
TUS	Tucson International Airport, Tucson, Arizona
UAO	Aurora State Airport, Aurora, Oregon
VGT	North Las Vegas Airport, Las Vegas, Nevada

Table A-3. The FAA Region Codes and the U.S. Territories Covered Within Each Region

FAA Regional Code	Region Name and U.S. Territories Covered
AAL	Alaskan (Alaska)
ACE	Central (Iowa, Kansas, Missouri, and Nebraska)
AEA	Eastern (DC, Delaware, Maryland, New Jersey, New York, Pennsylvania, Virginia, and West Virginia)
AGL	Great Lakes (Illinois, Indiana, Michigan, Minnesota, North Dakota, Ohio, South Dakota, and Wisconsin)
ANE	New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont)
ANM	Northwest Mountain (Colorado, Idaho, Montana, Oregon, Utah, Washington, and Wyoming)
ASO	Southern (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, Puerto Rico, South Carolina, Tennessee, and U.S. Virgin Islands)
ASW	Southwest (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas)
AWP	Western-Pacific (Arizona, California, Hawaii, Nevada, Guam, American Samoa, and Marshall Islands)

APPENDIX B—RUNWAY INCURSION MITIGATION LOCATIONS REMOVED FROM INVENTORY

Table B-1 shows the summary of runway incursion mitigation (RIM) mitigated locations, runway incursion (RI) pilot deviation (PD) and vehicle/pedestrian deviation (V/PD) totals for years 2007 to 2017, RI totals before and after mitigation, and average RIs per year before and after mitigation. Locations mitigated in fiscal year 2019 are highlighted in the Date Complete column. In the RI (PD & V/PD) Totals Per Year column, red represents years with no mitigation in place, yellow represents year of mitigation, and green represents years after mitigation in place.

Table B-1. The RIM Mitigated Locations Summary

RIM-Mitigated Locations					RI (PD & V/PD) Totals Per Year												RI (PD & V/PD) Totals		Average RIs (PD & V/PD) Per Year	
																	Mitigation			
Region	Airport Name	Identifier	Mitigation Type	Date Complete	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Before	After	Before	After
AEA	Frederick Municipal Airport	FDK-HS3	Signage, Marking, and/or Lighting	07/10/2015	0	0	0	0	0	0	0	1	4	0	0	0	5	0	0.65	0.00
AEA	Philadelphia International Airport	PHL-01	Signage, Marking, and/or Lighting; Operational/ Procedural	07/27/2017	0	0	2	0	2	1	1	0	0	0	1	0	6	1	0.61	0.71
AEA	Philadelphia International Airport	PHL-HS1	Signage, Marking, and/or Lighting	08/24/2017	1	2	1	1	0	1	0	0	0	1	0	0	7	0	0.71	0.00
AEA	Teterboro Airport	TEB-HS1	Taxiway/Runway Geometry Reconfiguration	07/02/2018	0	0	0	0	1	3	1	1	0	0	1	1	7	1	0.65	N/A
AGL	Terre Haute Regional Airport	HUF-HS1	Taxiway/Runway Geometry Reconfiguration	12/10/2017	0	0	0	0	0	0	2	0	1	8	0	0	11	0	1.08	0.00
AGL	Chicago Midway International Airport	MDW-03	Signage, Marking, and/or Lighting	05/09/2016	0	0	1	0	0	3	0	1	0	0	0	0	5	0	0.58	0.00
ANE	Manchester Airport	MHT-HS2	Taxiway/Runway Geometry Reconfiguration	09/24/2019[1]	2	1	1	0	1	1	0	0	0	0	0	0	6	N/A	0.53	N/A

[1] Mitigation of highlighted locations occurred in 2019. Post-mitigation runway incursion data are not yet available.

Table B-1. The RIM Mitigated Locations Summary (Continued)

RIM-Mitigated Locations					RI (PD & V/PD) Totals Per Year												RI (PD & V/PD) Totals		Average RIs (PD & V/PD) Per Year	
																	Mitigation			
Region	Airport Name	Identifier	Mitigation Type	Date Complete	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Before	After	Before	After
ANM	Centennial Airport	APA-19	Signage, Marking, and/or Lighting	08/31/2017	0	0	0	1	2	0	0	2	4	8	2	2	19	2	1.92	1.50
ANM	Centennial Airport	APA-HS1	Taxiway/Runway Geometry Reconfiguration; Other	03/09/2016	0	3	2	2	3	1	2	1	4	0	1	1	18	2	2.14	0.71
ANM	Rocky Mountain Metropolitan Airport	BJC-02	Operational/ Procedural	5/23/2018	0	0	0	1	2	1	2	0	1	0	0	2	8	1	0.75	N/A
ANM	Seattle-Tacoma International Airport	SEA-26	Operational/ Procedural	8/10/2018	0	1	0	1	0	0	0	4	0	0	0	0	6	0	0.55	N/A
ANM	Seattle-Tacoma International Airport	SEA-HS1	Signage, Marking, and/or Lighting	04/29/2018	0	1	2	2	0	1	1	1	0	0	0	1	8	1	0.76	N/A
ASO	Charlotte/ Douglas International Airport	CLT-06	Operational/ Procedural	06/18/2015	0	0	0	0	4	0	1	0	0	0	0	0	5	0	0.65	0.00
ASO	Daytona Beach International Airport	DAB-02	Taxiway/Runway Geometry Reconfiguration	08/04/2018	0	0	1	0	1	0	3	1	0	0	0	0	6	0	0.55	N/A
ASO	Fulton County Airport/Brown Field	FTY-04	Taxiway/Runway Geometry Reconfiguration	09/01/2019	0	0	0	4	0	0	0	0	0	0	0	0	4	N/A	0.36	N/A

Table B-1. The RIM Mitigated Locations Summary (Continued)

RIM-Mitigated Locations					RI (PD & V/PD) Totals Per Year												RI (PD & V/PD) Totals		Average RIs (PD & V/PD) Per Year	
																	Mitigation			
Region	Airport Name	Identifier	Mitigation Type	Date Complete	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Before	After	Before	After
ASO	Fort Lauderdale Executive Airport	FXE-08	Signage, Markings, and/or Lighting	02/16/2017	0	1	0	3	0	0	0	0	0	0	0	0	4	0	0.42	0.00
ASO	Fort Lauderdale Executive Airport	FXE-HS1	Signage, Markings, and/or Lighting	02/16/2017	0	2	1	1	0	3	3	3	4	0	0	0	17	0	1.81	0.00
ASO	Fort Lauderdale Executive Airport	FXE-HS3	Signage, Markings, and/or Lighting	02/16/2017	0	0	1	0	3	0	5	1	1	2	0	0	13	0	1.38	0.00
ASO	Kissimmee Gateway Airport	ISM-02	Signage, Markings, and/or Lighting	07/31/2018	0	0	0	0	0	3	0	0	0	0	0	0	3	0	0.28	N/A
ASO	Bowman Field Airport	LOU-01	Signage, Markings, and/or Lighting	05/01/2019	0	0	1	0	3	1	0	0	0	0	0	0	5	N/A	0.44	N/A
ASO	Miami International Airport	MIA-HS1	Taxiway/Runway Geometry Reconfiguration, Signage, Marking, and/or Lighting	11/16/2018	0	3	0	0	1	0	0	1	0	0	0	0	5	0	0.45	N/A
ASO	Smyrna Airport	MQY-HS3	Signage, Marking, and/or Lighting	05/29/2019	0	0	0	0	1	4	2	0	1	0	3	8	19	N/A	1.69	N/A
ASO	Palm Beach International Airport	PBI-02	Taxiway/Runway Geometry Reconfiguration, Signage, Markings, and/or Lighting	09/01/2017	0	0	3	0	0	0	0	0	0	0	0	0	3	0	0.30	0.00

Table B-1. The RIM Mitigated Locations Summary (Continued)

RIM-Mitigated Locations					RI (PD & V/PD) Totals Per Year												RI (PD & V/PD) Totals		Average RIs (PD & V/PD) Per Year	
																	Mitigation			
Region	Airport Name	Identifier	Mitigation Type	Date Complete	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Before	After	Before	After
ASO	Palm Beach International Airport	PBI-HS1	Signage, Markings, and/or Lighting	02/03/2017	1	1	1	0	0	2	5	0	0	0	1	0	10	1	1.07	0.52
ASO	Orlando Sanford International Airport	SFB-05	Taxiway/Runway Geometry Reconfiguration	10/15/2018	0	0	1	0	1	2	2	0	1	0	1	0	8	0	0.72	N/A
ASO	Orlando Sanford International Airport	SFB-HS2	Taxiway/Runway Geometry Reconfiguration	10/15/2018	0	3	1	0	1	3	0	2	5	2	0	0	17	0	1.53	N/A
ASO	Sarasota/ Bradenton International Airport	SRQ-HS1	Taxiway/Runway Geometric Reconfiguration, Signage, Marking, and/or Lighting Change(s), Technological Enhancements	08/08/2019	0	0	0	1	2	5	7	2	2	7	5	3	34	N/A	3.02	N/A
ASO	Miami Executive Airport	TMB-04	Taxiway/Runway Geometry Reconfiguration; Signage, Marking, and/or Lighting Change(s)	03/29/2019	0	0	0	1	0	3	2	2	4	3	2	4	21	N/A	1.87	N/A
ASW	Albuquerque International Sunport Airport	ABQ-HS1	Taxiway/Runway Geometry Reconfiguration	05/11/2018	0	1	0	2	1	2	2	2	1	0	0	2	12	1	1.13	N/A
ASW	Waco Regional Airport	ACT-04	Taxiway/Runway Geometry	10/10/2016	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0.11	0.00

Table B-1. The RIM Mitigated Locations Summary (Continued)

RIM-Mitigated Locations					RI (PD & V/PD) Totals Per Year												RI (PD & V/PD) Totals		Average RIs (PD & V/PD) Per Year	
																	Mitigation			
Region	Airport Name	Identifier	Mitigation Type	Date Complete	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Before	After	Before	After
			Reconfiguration; Operational/ Procedural																	
ASW	Corpus Christi International Airport	CRP-HS1	Taxiway/Runway Geometry Reconfiguration	05/26/2016	0	1	6	2	2	2	1	1	0	0	0	0	15	0	1.73	0.00
ASW	Dallas Love Field Airport	DAL-14	Signage, Marking, and/or Lighting	11/01/2016	0	1	6	3	1	0	3	5	3	5	3	0	27	3	2.97	1.38
ASW	David Wayne Hooks Memorial Airport	DWH-HS2	Signage, Markings, and/or Lighting; Operational/ Procedural; Taxiway/Runway Geometry Reconfiguration	12/31/2016	1	0	1	1	1	1	7	5	14	9	1	0	40	1	4.32	0.50
ASW	David Wayne Hooks Memorial Airport	DWH-HS3	Signage, Markings, and/or Lighting	12/31/2016	0	1	0	2	0	1	0	3	7	0	2	3	14	5	1.51	2.50
ASW	Midland International Air and Space Port Airport	MAF-HS2	Taxiway/Runway Geometry Reconfiguration	01/01/2019	0	1	0	0	6	1	1	0	1	2	1	0	13	N/A	1.16	N/A
ASW	Tulsa International Airport	TUL-HS1	Taxiway/Runway Geometry Reconfiguration	08/01/2018	0	0	0	0	0	0	3	0	0	0	0	0	3	0	0.28	N/A
AWP	Mc Clellan-Palomar Airport	CRQ-03	Signage, Marking, and/or Lighting	03/31/2017	0	1	1	2	0	1	2	0	2	5	1	1	14	2	1.47	1.14

Table B-1. The RIM Mitigated Locations Summary (Continued)

RIM-Mitigated Locations					RI (PD & V/PD) Totals Per Year												RI (PD & V/PD) Totals		Average RIs (PD & V/PD) Per Year	
																	Mitigation			
Region	Airport Name	Identifier	Mitigation Type	Date Complete	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Before	After	Before	After
AWP	Phoenix Deer Valley Airport	DVT-12	Taxiway/Runway Geometry Reconfiguration	05/07/2019	0	0	0	1	2	3	0	1	1	3	0	1	12	N/A	1.07	N/A
AWP	Long Beach Airport/ Daugherty Field	LGB-35	Taxiway/Runway Geometry Reconfiguration	10/11/2018	0	0	1	1	0	1	2	0	0	0	1	0	6	0	0.55	N/A
AWP	Ernest A. Love Field Airport	PRC-HS2	Taxiway/Runway Geometry Reconfiguration	08/31/2018	0	0	2	0	0	3	2	1	2	1	0	1	12	0	1.10	N/A
AWP	Reno/Tahoe International Airport	RNO-11	Taxiway/Runway Geometry Reconfiguration, Signage, Markings, and/or Lighting	05/31/2016	0	0	0	0	0	0	0	0	5	0	0	0	5	0	0.58	0.00
AWP	Santa Barbara Municipal Airport	SBA-17	Signage, Marking, and/or Lighting	05/18/2016	0	3	1	2	1	1	0	0	0	0	0	1	8	1	0.92	0.39
AWP	Santa Monica Municipal Airport	SMO-02	Taxiway/Runway Geometry Reconfiguration	12/22/2017	0	0	0	0	0	3	3	5	3	5	1	1	20	1	1.95	1.00
AWP	Van Nuys Airport	VNY-02	Signage, Marking, and/or Lighting	03/31/2019	0	1	0	0	0	1	2	3	0	0	2	0	9	N/A	0.80	N/A
Totals																	491	23	1.17	0.47

For reference purposes, table B-2 provides the Federal Aviation Administration (FAA) Airport Code Identifiers for the airports covered in this appendix. Table B-3 shows the FAA regional abbreviations and the U.S. territories covered in each region.

Table B-2. The FAA Airport Identifier Codes

FAA Identifier Code	Airport Name and Location
ABQ	Albuquerque International Sunport Airport, Albuquerque, New Mexico
ACT	Waco Regional Airport, Waco, Texas
APA	Addison Airport, Dallas, Texas
BJC	Rocky Mountain Metropolitan Airport, Denver, Colorado
CLT	Charlotte/Douglas International Airport, Charlotte, North Carolina
CRP	Corpus Christi International Airport, Corpus Christi, Texas
CRQ	Mc Clellan-Palomar Airport, Carlsbad, California
DAB	Daytona Beach International Airport, Daytona Beach, Florida
DAL	Dallas Love Field, Dallas, Texas
DVT	Phoenix Deer Valley Airport, Phoenix, Arizona
DWH	David Wayne Hooks Memorial Airport, Houston, Texas
FDK	Frederick Municipal Airport, Frederick, Maryland
FXE	Fort Lauderdale Executive Airport, Fort Lauderdale, Florida
HUF	Terre Haute Regional Airport, Terre Haute, Indiana
ISM	Kissimmee Gateway Airport, Orlando, Florida
LOU	Bowman Field Airport, Louisville, Kentucky
MAF	Midland International Air and Space Port, Midland, Texas
MDW	Chicago Midway International Airport, Chicago, Illinois
MHT	Manchester-Boston Regional Airport, Manchester, New Hampshire
MIA	Miami International Airport, Miami, Florida
MQY	Smyrna Airport, Smyrna, Tennessee
PBI	Palm Beach International Airport, Palm Beach, Florida
PHL	Philadelphia International Airport, Philadelphia, Pennsylvania
PRC	Ernest A. Love Field Airport, Prescott, Arizona
RNO	Reno/Tahoe International Airport, Reno, Nevada
SBA	Santa Barbara Municipal Airport, Santa Barbara, California
SEA	Seattle-Tacoma International Airport, Seattle, Washington
SFB	Orlando Sanford International Airport, Orlando, Florida
SMO	Santa Monica Municipal Airport, Santa Monica, California
SRQ	Sarasota/Bradenton International Airport, Sarasota/Bradenton, Florida

Table B-2. The FAA Airport Identifier Codes (Continued)

FAA Identifier Code	Airport Name and Location
TEB	Teterboro Airport, Teterboro, New Jersey
TMB	Miami Executive Airport, Miami, Florida
TUL	Tulsa International Airport, Tulsa, Oklahoma
VNY	Van Nuys Airport, Van Nuys, California

Table B-3. The FAA Region Codes and the U.S. Territories Covered Within Each Region

FAA Regional Code	Region Name and U.S. Territories Covered
AAL	Alaskan (Alaska)
ACE	Central (Iowa, Kansas, Missouri, and Nebraska)
AEA	Eastern (DC, Delaware, Maryland, New Jersey, New York, Pennsylvania, Virginia, and West Virginia)
AGL	Great Lakes (Illinois, Indiana, Michigan, Minnesota, North Dakota, Ohio, South Dakota, and Wisconsin)
ANE	New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont)
ANM	Northwest Mountain (Colorado, Idaho, Montana, Oregon, Utah, Washington, and Wyoming)
ASO	Southern (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, Puerto Rico, South Carolina, Tennessee, and U.S. Virgin Islands)
ASW	Southwest (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas)
AWP	Western-Pacific (Arizona, California, Hawaii, Nevada, Guam, American Samoa, and Marshall Islands)