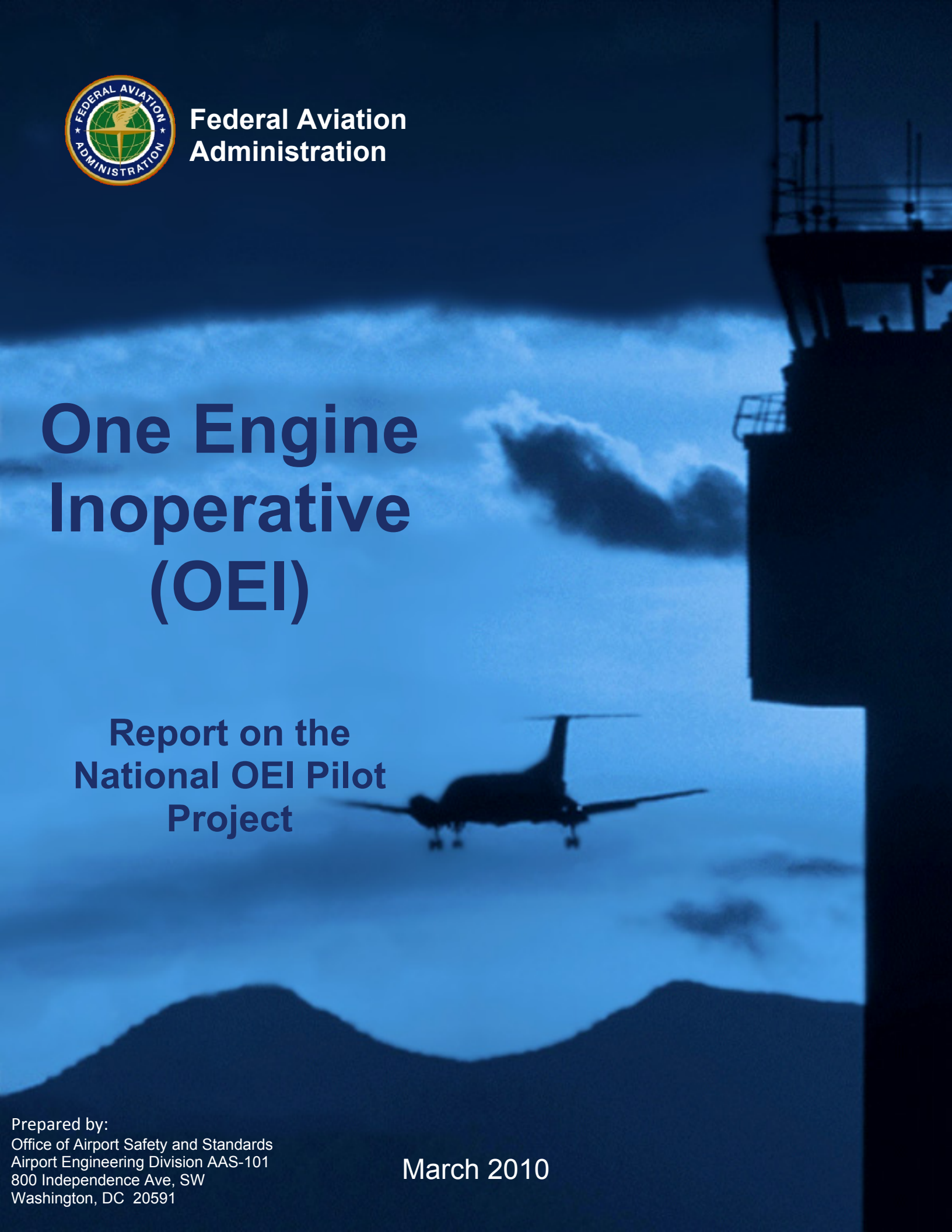

Federal Aviation Administration

One Engine Inoperative (OEI)

Report on the National OEI Pilot Project

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March 2010

U.S. Department
of Transportation
Federal Aviation Administration

Office of Airport Safety and Standards
Airport Engineering Division AAS-101

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OEI Pilot Airports **March 2010**


Boston Logan International


Las Vegas McCarran International


Miami International


Phoenix Sky Harbor International


Ronald Reagan Washington National

National OEI Project Participants:

The Airport Obstructions Standards Committee (AOSC) gratefully acknowledges the contributions of the pilot airports, airlines, aircraft manufacturers, associations, consultants, local authorizes, and community developers as well as the FAA lines of business for their participation in the National One Engine Inoperative (OEI) Project.

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Executive Summary

As of 2008, there were over 240 certificated U.S. air carriers and many foreign air carriers operating in the United States at 573 commercial service airports, many of which are surrounded by fast-growing commercial and residential developments. Although Federal Aviation Regulations (FAR) Part 77 defines a number of obstacle protection surfaces that are intended to control and regulate the growth of obstacles on and around airports, OEI is considered an emergency procedure and protection of emergency procedure airspace is not addressed in the FAR Part 77 or any other FAA obstruction evaluation directive. For years, air carriers and airports have requested the FAA to develop a consistent position on the OEI-related procedures and adequately protect the OEI surfaces.

The FAA AOSC commenced a review of OEI issues in 2003, including numerous studies on aircraft performance and the implications on takeoff and climb gradients, as well as conducting meetings with stakeholders from the FAA lines of business, airports, airlines, consultants, associations and community developers. In 2007, the AOSC initiated the National OEI Pilot Project with Ronald Reagan Washington National Airport, Virginia (DCA), Boston Logan International Airport, Massachusetts (BOS), Miami International Airport, Florida (MIA), Phoenix Sky Harbor International Airport, Arizona (PHX), and Las Vegas McCarran International Airport, Nevada (LSV), with the aim of seeking input for the development of a consolidated FAA policy and regulatory guidance relating to the OEI surfaces and procedures.

Based on the results of the AOSC research and a consensus of Pilot Airport participants, the following recommendations for a National OEI Policy are provided below:

- At each departure runway end supporting commercial operations, an OEI departure area is to be defined and agreed to by airport sponsor/owner and the FAA.
- The airport sponsor/owner will be responsible for coordination with all airport customers such as airlines, local government and property owners.
- The accepted OEI departure area and slope are to be defined and appropriately depicted on the Airport Layout Plan (ALP) at the direction of ARP.
- To harmonize with International Civil Aviation Organization (ICAO) standards, the nominal OEI Obstacle Identification Surface (OIS) to be implemented is a straight area with a slope of 62.5:1. However, the surface slopes may vary from 80:1 to 40:1 and a single turning, offset, or combination area may be implemented.
- If operationally acceptable and agreed to by the airport sponsor/owner and in coordination with the FAA, the OEI area may be narrower or wider than the nominal.
- Modify OEI-related criteria in the appropriate FAA documents such as Advisory Circular (AC) 150/5300-13, AC 150/5300-18, AC 120-91, Order 8900.1, and Order 7400.2.
- Propose future modification of FAR Part 77 to include OEI areas.
- Convene follow-up meetings with the OEI Pilot Airports, airlines and other appropriate parties for the FAA to provide feedback on OEI implementation of recommendations and refine the details of the OEI surface protection process.

Table of Contents

List of Figures

List of Tables

INTRODUCTION

Navigable airspace is being threatened all around the country with the net effect of decreasing access for aviation operations. Everything from microwave towers to office buildings and wind turbines are being built in ever increasing numbers near many airports. Even uncontrolled tree growth next to airports is an issue affecting aviation access[1]. As of 2008 there were over 240[2] certificated U.S. air carriers and many foreign air carriers operating in the U.S. at 573[3] commercial service airports[4]. Surrounding these airports are fast-growing commercial and residential developments.

Federal Aviation Regulations (FAR) Part 77 defines a number of obstacle protection surfaces that are intended to control and regulate the growth of obstacles on and around an airport. The takeoff and climb-out with One Engine Inoperative (OEI) is considered an emergency procedure and protection of emergency procedure airspace is not addressed in Part 77 or any other FAA obstruction evaluation directive.

Due to a lack of delineated procedures over the previous three decades between FAA lines of business, an initiative was commenced in 2003 by the FAA Airport Obstruction Standards Committee (AOSC) to develop a national OEI policy to encompass all of the stakeholders. An OEI surface was introduced in the Advisory Circular (AC) 150/5300-13[5] and AC 115/5300-18[6] but has not yet been implemented. AOSC initiated and sponsored the National OEI Pilot Project for developing FAA policy guidance relating to the OEI surface and engaged the airport owners/sponsors in facilitating the OEI surface and depicting it on the ALP.

CURRENT REQUIREMENTS AND ISSUES

The current OEI requirements and issues involve a number of interrelated areas including aircraft certification requirements, airport obstacle analysis, effect of obstacles on take-off procedures, normal versus emergency take-off procedures, and legal considerations which are explained below.

[1] National Business Aviation Association, www.nbaa.org
[2] www.faa.gov
[3] www.faa.gov
[4] TITLE 49 – TRANSPORTATION, Subtitle A, Commercial service airport - As defined by Federal law, an airport receiving scheduled passenger service
[5] AC 150/5300-13 – Airport Design
[6] AC 150/5300-18 - GENERAL GUIDANCE AND SPECIFICATIONS FOR SUBMISSION OF AERONAUTICAL SURVEYS TO NGS: FIELD DATA COLLECTION AND GEOGRAPHIC INFORMATION SYSTEM (GIS) STANDARDS

Aircraft Certification Requirements

Aircraft operated under an Air Carrier Certificate must be able to take off and clear all obstacles beyond the runway end, even if power is lost from an engine at the most critical point in the takeoff. Two-engine aircraft certificated under Part 25[7] and operated under FAR Parts 121[8] and 135[9] must be able to take off and climb at a 1.6% (62.5:1) gradient with OEI. Additionally, AC 120-91 states that obstacles shall be cleared by either 35 feet vertically or 200 feet laterally inside the airport boundary, or 300 feet laterally outside the airport boundary.

These requirements must be satisfied by aircraft operators at FAR Part 139[10] certificated airports. The operators have the responsibility to consider all obstructions beyond the runway end and make the necessary adjustments to their OEI departure procedures to ensure safe clearance. FAA Principal Operations Inspectors (POIs) oversee air carrier operations' specifications that govern compliance with these regulations. The POIs verify that obstructions affecting OEI requirements are properly considered when accepting air carrier OEI procedures as a part of the carrier's operations' specifications.

Airport Obstacle Analysis Requirements

In the early 1990s an effort was undertaken to document common OEI practices for complying with FAR Parts 121 and 135 Standards. FAA and air carrier representatives jointly developed Draft AC 120-OBS[11] and, in 2006, the FAA-implemented AC 120-91[12]. The circular describes acceptable methods and guidelines for developing takeoff and initial climb-out airport obstacle analyses and in-flight procedures to comply with the FAR Parts 121 and 135. Air carriers have typically followed AC 120-91, although they may have used other methods if those were shown to provide the necessary level of safety and were acceptable to the FAA POI. Over the years, air carrier flights experiencing an engine failure on takeoff have had a very successful record of recovery hence OEI was not considered a safety issue.

However, there is inconsistency between air carrier OEI takeoff obstacle clearance requirements and obstruction evaluations conducted by the FAA Air Traffic Organization (ATO) under FAA Order 7400.2[13]. This inconsistency results in differences between the ground track area that operators evaluate to comply with the Parts 121 and 135 obstacle clearance requirements, and the criteria that the ATO considers in determining whether proposed new structures create a hazard to air navigation. Specifically, air carriers have concerns when an ATO determination of hazard for proposed structures is not made available for their consideration.

[7] FAR Part 25 – Airworthiness standards: Transport category airplanes
[8] FAR Part 121 – Operating Requirements: Domestic, Flag, and Supplemental Operations
[9] FAR Part 135 – Commuter and On-Demand Operations
[10] FAR Part 139 – Certification and operations: Land airports serving certain air carriers
[11] AC 120-OBS – Airport Obstacle Analysis
[12] AC 120-91 – Airport Obstacle Analysis
[13] FAA Order 7400.2 – Procedures for Handling Airspace Matters

Adverse Effects of Obstacles on Take-Off Procedures

Although AC 120-91 ensures the safety of aircraft takeoff with OEI, obstacles near an airport can adversely affect the OEI takeoff procedures. When necessary to avoid such obstacles, air carriers must position the OEI emergency escape tracks at least 300 feet horizontally from the obstacles, which may be impossible if other obstacles are in the vicinity. Another way to avoid obstacles is to climb steeper than 1.6% with OEI which may force air carriers to reduce the maximum takeoff weight by limiting passengers, cargo and/or fuel; and may result in a loss of revenue, a reduction in the useable runway length, and a reduction in airport capacity and efficiency.

Figure 1 illustrates that proliferation of obstacles at many airports today could adversely affect OEI takeoff requirements, as shown with Symbols 1, 2, and 3 in Figure 1.

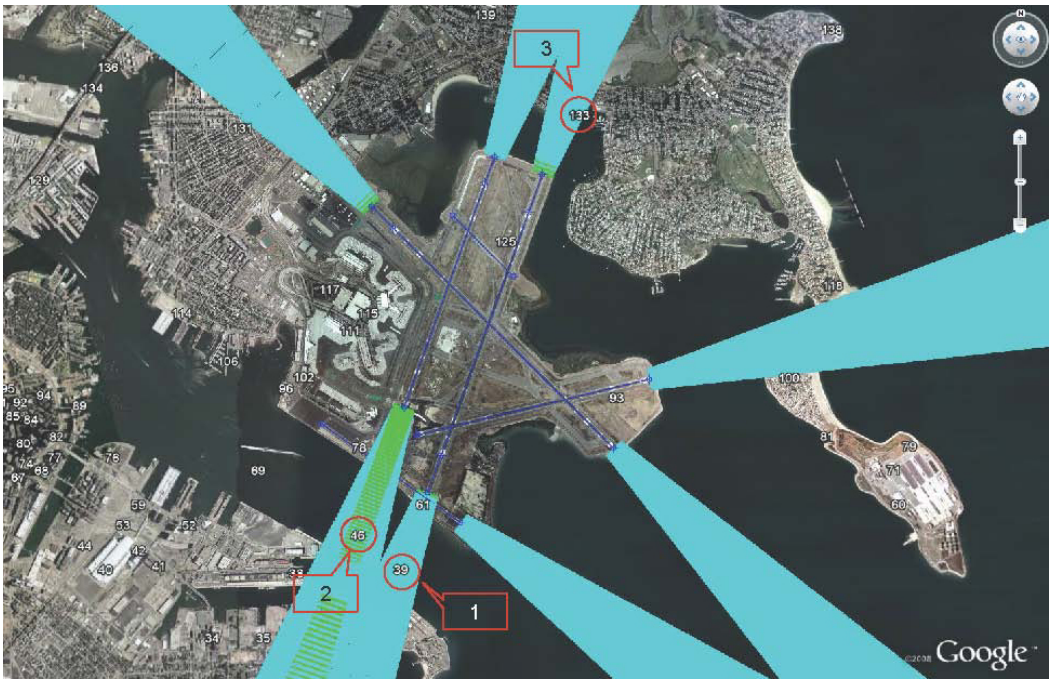

Figure 1. Obstacles that adversely affect OEI takeoff requirements at BOS

In addition to accounting for existing obstacles, the FAA and air carriers are concerned with proposed obstructions becoming hazards in navigable airspace, which includes airspace needed for safe takeoff. The navigable airspace is a limited national resource and Congress has charged the FAA to administer its efficient use and to ensure safety of aircraft. FAR Part 77 establishes standards for determining obstructions in navigable airspace. An organization that is planning to sponsor any construction or alterations that may affect navigable airspace must file a Notice of Proposed Construction or Alteration with the FAA. This filing will result in an aeronautical study and the FAA issuing a determination of hazard, no hazard, or presumed hazard. While AC 120-91 regulates aircraft flight paths to avoid existing obstacles safely, protection of OEI airspace from proposed construction is not addressed in FAR Part 77.

Normal versus Emergency Take-off Procedures

Historically, OEI are considered as emergency procedures and have been excluded from Part 77, the scope of which is to address only normal procedures. Every air carrier takeoff operation, however, must plan for an engine failure. As a result, air carriers believe that the FAR Part 77 Imaginary Surfaces should include OEI requirements to protect against the possibility of an emergency engine-out situation.

OEI surface protection is not addressed in the FAA Obstruction Evaluation/Airport Airspace Analysis (OE/AAA) Program; thus, there is no protection from future development or modification of existing obstacles. Air carriers are not involved in the OE/AAA program and no communications between the program and air carriers currently exist.

Because OEI procedures are not covered by FAR Part 77 or addressed in the OE/AAA program, the OEI surfaces are not taken into account in off-airport obstruction evaluations. Air carriers have expressed concern that the FAA's current policies and practices do not adequately protect the OEI surface and that growing community development may result in "walls" being built around many airports.

Legal Considerations

One should realize that neither FAA nor air carriers have the legal means to prevent new development around the airport including tall structures. The federal government regulates the airspace above the ground and is not authorized to approve or deny building permits or to determine land use issues. Airport sponsors have no land use authority outside the airport boundaries. Compatible land use and obstruction zoning belong to local municipalities and surrounding communities. Collaborative efforts among members of the aviation community (including airport sponsors, air carriers, associated FAA offices, and related industry organizations) along with local authorities, developers and property owners can help to avoid obstruction degradation of operational capability and safety of the airport.

However, voluntary cooperation only goes so far and adequate FAA policy and regulatory guidance are required to regulate airspace effectively and to protect public aviation infrastructure investment by legal means. For years, air carriers have requested the FAA to consider engine out requirements in the OE/AAA studies and FAR Part 77, and to develop a consistent policy on OEI-related procedures.

AIRPORT OBSTRUCTION STANDARDS COMMITTEE (AOSC) INITIATIVE

AOSC Charter

The AOSC was established in 2003 by FAA Administrator Charter for the purpose of harmonizing FAA airport obstruction policy. The AOSC was charged with developing a transition strategy to guide the application of obstruction standards for airports and operations where standards previously were not applied consistently, or where operations were approved under older standards. The AOSC also serves as the vehicle for transforming outdated, inconsistent obstruction standards' practices to future policy that balances operational safety, effectiveness, and economic benefit.

The objective and scope of the committee is to provide a forum for the various FAA lines of business to discuss and resolve issues associated with airport obstruction standards and Terminal Instrument Procedures (TERPS) policies; and it provides a vehicle for developing resolutions and processes to facilitate the evolution of safe and efficient airport operations. A major task of the committee is to clarify the relationship between instrument flight operations' capability and the airport obstruction environment. The general goal of the committee is to develop a means to implement improvements in airport operations with an optimal balance among safety, capacity, and efficiency. The internal effort of the committee is aimed at bridging gaps between:

- Office of Airports (ARP),
- Air Traffic Organization (ATO),
- Aviation Safety Organization (AVS), and
- Flight Procedure Standards (AFS)

The AOSC clarifies, de-conflicts and develops consistent FAA interpretations of policy and practice regarding all FAA airport obstruction standards, orders, advisory circulars and rules. The AOSC Steering Group (AOSC SG) is an FAA Associate Administrator-level group providing strategic direction and functional guidance for the AOSC. It is headed by the Assistant Administrator for Regions and Center Operations.

AOSC OEI Activities

Since adding OEI to the AOSC responsibilities, continuous progress has been made as shown in Table 1.

Table 1. AOSC OEI Activities

AOSC established	COORDINATION ACROSS BUSINESS LINES TO DEVELOP A CONSISTENT POSITION (AIRPORTS, FLIGHT STANDARDS, AIR TRAFFIC AND REGIONS & CENTERS)					
2003	2004	2005	2006	2007	2008	2009
OEI issues	*Planning*	*Studies*	*Pilot Program Project*			
	Discussion of issues, scope & approach	CACC Seminar			Collection of GIS data at Pilot Program airports	
		Impact on A/C weight				
			OEI rate of occurrences			
				Pilot Program initiated BOS, DCA, MIA, LSB, PHX	First round of meetings	Second round of meetings
						Final meeting recommendations
				AC development	AC 150/5300-13 CH 12 & CH 14	AC 150/ 5300-18B
						AC 150/ 5300-17 & 150/5300-19

After initial discussions within the FAA by the AOSC, a meeting was held with industry on September 20, 2005 to discuss policies associated with obstacle evaluation and one engine out planning and performance requirements for FAR Part 121 operators. There was broad industry participation at the meeting, including 11 air carriers, four airport sponsors, Air Line Pilots Association (ALPA), and several consultants representing both airports and community developers.

After the industry meeting members of the FAA AOSC held several internal and external follow-up meetings, including one on November 3, 2005 in Seattle with Boeing and the Transport Airplane Directorate to better understand the risk associated with advanced airplane performance. On December 14, 2005, the AOSC briefed the Steering Group on the following strategies:

Short-Term Goals:

- AOSC to issue a decision document on OEI.
- OE/AAA to modify automation program to make proposed structure information (height, latitude/longitude, and description) publicly available on the website.

- ARP to establish standards and provide guidance to airport sponsors for inclusion of the approved OEI surfaces on the ALP.

- FAA to modify all applicable orders and advisory circulars in accordance with new OEI policy guidance.

Long-Term Goals:

- Develop a sound basis for determining whether modifications to current FAA policies relating to either airspace protection under FAR Part 77 or OEI planning requirements in FAR parts 25, 121, and 135 would be developed.

Dialogue among Stakeholders

To maximize involvement in implementing these short-term and long-term strategies, stakeholders representing the FAA, airports, airlines, aircraft manufacturers, associations, community developers and consultants were encouraged to participate in the AOSC OEI Project. A list of the stakeholders is provided in Appendix C and summarized below.

FAA – Office of Airport Safety and. Standards (AAS), Flight Standards Service (AFS), Region/Center Operations (ARC), Administration's Office of Airports (ARP), Air Traffic Organization (ATO), NE and SW Regions.

- Airports – BOS, BWI, DCA, LAS, LAX, MIA, PHX, SAN, SFO and SJC.

- Airlines – Alaska Air, American, Continental, Delta, Horizon, Jet Blue, Mesa, Northwest, Southwest, United and US Airways.

- Aircraft Manufacturers – Boeing.

Associations – Airport Consultants Council (ACC), Airports Council International (ACI), Air Line Pilots Association (ALPA), Air Transport Association (IATA), National Association of State Aviation Officials (NASAO), National Business Aviation Association (NBAA).

- Consultants – CGH, Fed Ex, ISI, Jacobs, MITRE, PTI and QED.

- Community developers.

AOSC OEI Process Focus

The AOSC focused on developing a process shown in Figure 2 whereby the FAA, airport sponsors, airport users and local government and property owners could agree on OEI departure areas and protect these areas from future development. The departure areas would be depicted on the ALP in a standardized format.

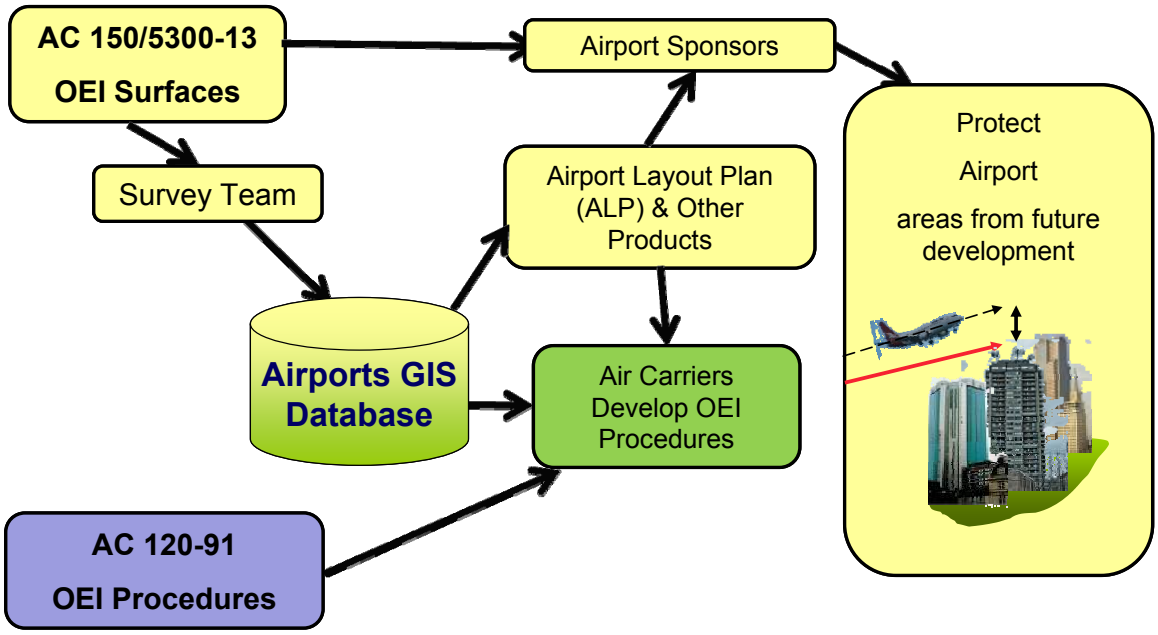

Figure 2. Process for Establishing OEI Surfaces and Procedures and Developing ALPs to Protect Airport Areas from Future Development

Implementation of the OEI process includes the following:

- Notification of proposed construction or alterations.
- Consolidation of OEI-related policies and practices within FAA lines of business.
- Guidance for OEI OIS.
- Harmonization of OEI surfaces with ICAO.
- Avoidance of changes to current OEI tracks.
- Modification of criteria as appropriate in the following documents:
  - AC 150/5300-13 Airport Design,
  - AC 150/5300-18 General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards,
  - AC 120-91 Airport Obstacle Analysis,
  - FAA Order 8900.1 Flight Standards Information Management System (FSIMS),
  - FAA Order 7400.2 Procedures for Handling Airspace Matters,
  - FAA Order 8400.10 Air Transportation *Operations Inspector's* (POI) Handbook.

PILOT AIRPORTS

The OEI Pilot Project was undertaken to take advantage of the specific knowledge, expertise, and operational experience of airport management, local government, and airlines to develop policy guidance for OEI surfaces that would satisfy the needs of the majority of airports and air carriers.

One of the main objectives of the program is to expand the ATO effort by developing a process enabling the airport sponsor to act as the facilitator in protecting the OEI departure surface for runway ends supporting commercial service[14]. The Airports-GIS will be the enabling technology for sharing verified data between the stakeholders, rather than each using separate data sets. Through the OEI pilot project at five airports, specific guidance will be developed that can be applied to all commercial service airports in the National Airspace System (NAS).

This effort will capitalize on the work of the ATO Obstruction Evaluation Services in teaming with the airlines to collect OEI track data. This data will be used by the FAA to assess and address potential OEI issues, recommend actions, and enable early e-mail notification to air carriers of proposed obstacles within their specific OEI tracks[15].

The ATO Obstruction Evaluation Services' effort provides a near-term solution. The AOSC Pilot Project will develop the tools, guidance and standards for establishing a long-term sustainable solution to the problem. The joint ARP/ATO effort will define an OEI surface at each runway end, based on a defined and maintained airport centric data set. This data set may also be used to support local zoning initiatives, state aviation goals, and potential federal airspace rule changes.

Selection of Pilot Airports

Five Pilot Airports selected[16] for participation in the National OEI Pilot Project are listed below:

- Ronald Reagan Washington National Airport, Virginia (DCA),
- Boston Logan International Airport, Massachusetts (BOS),
- Miami International Airport, Florida (MIA),
- Phoenix Sky Harbor International Airport, Arizona (PHX),
- Las Vegas McCarran International Airport, Nevada (LSV).

[14] AOSC OEI Recommendation and SATD Next Step Briefing, Mar 08
[15] Overview OEI Project to Airport Directors, May 08
[16] Statement of Work to Contract DTFAWA04A-00019

Aside from the willingness of these airports to participate in the project, the selection was also based on the following factors[17]:

- Obstacle environment,
- Operational environment such as runway length and airport geometry etc.,
- Environmental factors including noise abatement, ambient temperature, cultural features and terrain,
- Flight characteristics such as bank angles, airspeed(s) and turn radii,
- Special Use Airspace (SUA) and Special Activity Airspace (SAA) surrounding the airport,
- Zoning difficulties with multiple zoning authorities,
- OEI routes requiring flight over residential areas,
- Complex terrain surrounding airport, and
- Complex air traffic operations.

Airlines that operate at the Pilot Airports[18] are shown in Table 2 and those that participated in the meetings are noted.

[17] OEI Project Statement of Work document, Jun 08
[18] MHinz OEI Document, Dec 08

Table 2. Airlines Operating from Pilot Airports

ABX Air	Air Azul	Air Tahoma
Air Tran Airways	Air Transport International	Alaska Airlines *
Allegiant Air *	American Airlines *	American Eagle
Amerijet	Ameritar	Arrow Cargo
Atlas Air	Belair	Cape Air
Centurion Air Cargo	Continental *	Continental Comair
Delta Airlines *	DHL Express	Express
FedEx *	Florida West	Frontier Airlines
Great Lakes	Gulfstream International	Hawaiian
IBC Airways	JetBlue *	Kalitta Air
Merlin Airways	Midwest	Mountain Air Cargo
Northwest Airlines	Polar Air Cargo	Ryan International
Shuttle America	Southern Air	Southwest Airlines *
Spirit Airlines	Sun Country	Sun Wing
Tradewinds Airlines	United Airlines *	United Express
UPS	US Airways *	US Airways Express
Virgin America	West Jet	

* Airlines attending the OEI Pilot Airport Meetings

Pilot Airport Data

Three-dimensional (3D) information about objects on and surrounding the five identified airports was collected for use in analysis and planning of OEI departures. During the data collection, the existing data for these airports was verified to ensure applicability and when required, additional data was collected[19].

When the final data is collected and verified, it will be used to assist in the development of a composite OEI surface and coordinated with the appropriate offices of FAA including AVS and ATO as well as ACI and local zoning designated representatives to ensure that requirements were addressed in the final solution. The data will also be used to provide input and supporting information for recommendations for protecting the operational environment of the airport in appropriate directives.

For each of the five Pilot Airports, the data collection effort involved the following:

- Ronald Reagan Washington National Airport, Virginia (DCA):
  - Utilizing existing airport data.
  - Integrating objects provided by the FAA.
  - Collecting and processing of aerial imagery-developed geospatial vector files of the extracted features.

[19] Statement of Work to Contract DTFAWA04A-00019

- Developing digital orthorectified photos using a digital terrain model.
- Conducting tests and providing documentation that the collected data (geospatial files and imagery) met the accuracy.

- Las Vegas McCarran International Airport, Miami International Airport, Boston Logan International Airport and Phoenix Sky Harbor International:
  - Collecting existing airport data from the FAA.
  - Providing three dimensional geospatial vector files of the planimetric and topographic features.
  - Integrating the FAA provided proposed objects.
  - Conducting test and providing documentation that the collected data (geospatial files and imagery) meet the accuracy according to guidelines.

Pilot Airport Meetings Issues

A summary of issues expressed at Pilot Airport meetings include the following items for FAA consideration and action:

- Determining specific height at which a proposed object will have an effect on air navigation.

- Providing clear definitions for “shielding” and “existing structures”.

- Implementing a program that ensures obstacle data is provided to all airport stakeholders and initiates actions to protect OEI paths.

- Ensuring the new OEI protection area and surfaces are compatible with ICAO OEI area criteria, supporting international operations at U.S. airports.

- Updating regulatory guidance:
  - Directing implementation of the new OEI protection area depicted on the ALP, and providing clear guidance ensuring its enforceability at all Part 139 runways.
  - Identifying what may be grand-fathered using existing guidance.
  - Allowing for the development of multiple surfaces (straight, turning, and combination surface).
  - Authorizing variation to OEI protection area(s) and providing a variation of limitations with a minimum and maximum widths and slopes.

- Ensuring that new OEI protection surface criteria do not undermine existing efforts supporting current OEI tracks.

- Correcting conflicting guidance between regulations, FARs and ACs.

- Ensuring that OEI protection surfaces are addressed in FAR Part 77.

Pilot Airport Meeting Consensus

A Joint Pilot Airports Meeting was conducted on November 10, 2009, at the Air Traffic Association (ATA) in Washington, D.C. The group came to a consensus on the OEI area and slope that are defined as nominal, but allowing modification in the area width and slope to support surrounding terrain or existing and under-construction development at the airport. It was recommended that the FAA ensure that all rules and regulations have enforceability, no loopholes, and are written as clearly as those with no aviation background can understand. Further, the group emphasized the need for the FAA to ensure that all written policies, directives and guidance are consistent. The areas of consensus are summarized below:

- The nominal surface will have a slope of 62.5:1, but may be varied, with a minimum and maximum slope defined.
- Nominally there will be one area, but more than one area may be developed where required.
- The nominal area is straight, but may be varied to include a turning and combination of straight and turning areas, with a minimum and maximum turn defined.
- The OEI area must support ICAO requirements.
- The OEI area will be that defined in the existing AC 150/5300-13, but may be varied, with a minimum and maximum width and length defined.
- OEI Surfaces will be depicted on the ALP

In addition, the Joint Pilot Airports Meeting Group requested that follow-up meetings be convened for the FAA to provide feedback on the implementation of the group's recommendations and for the group to provide input on:

- Revising FAA technical standards and criteria,
- Collecting and sharing data,
- Collaborating between airport and airlines, and
- Depicting OEI surfaces on the ALP

RECOMMENDATIONS

1. At each departure runway end supporting FAR Part 139 operations, an OEI departure area is to be defined, agreed to by airport sponsor/owner and FAA.

2. The airport sponsor/owner will be responsible for coordination with all airport customers, i.e., airlines, land owners and local governments.

3. The accepted OEI departure area and slope are to be defined and appropriately depicted on the ALP at the direction of ARP.

4. To harmonize with ICAO standards, the nominal OEI OIS to be implemented is a straight area with a slope of 62.5:1; however:

   a. The surface slopes may vary from 80:1 to 40:1.

   b. A turning, offset or combination area may be implemented.

5. If operationally acceptable and agreed to by airport sponsor/owner and in coordination with the FAA, the OEI area may be:

   a. Narrower than the nominal but not less than that stated in AC 120-91, or

   b. Wider than the nominal with special approval by the FAA.

6. Modify OEI-related criteria in the appropriate FAA documents such as:

   a. AC 150/5300-13, Airport Design,

   b. AC 150/5300-18, General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards,

   c. AC 120-91 Airport Obstacle Analysis,

   d. Order 8900.1 Flight Standards Information Management System (FSIMS), and

   e. Order 7400.2 Procedures for Handling Airspace Matters.

7. Propose future modification of FAR Part 77 to include OEI areas.

8. Convene follow-up meetings with the OEI Pilot Airports, airlines and other appropriate parties for the FAA to provide feedback on OEI implementation of recommendations and refine the details of the OEI surface protection process.

APPENDIX A. ACRONYMS

AC .....Advisory Circular
ACI-NA .....Airports Council International - North America
AFS.....Flight Procedure Standards
AGC.....Associated General Contractors
ALP .....Airport Layout Plan
ALPA .....Air Line Pilots Association
AOSC SG .....AOSC Steering Group
AOSC.....Airport Obstruction Standards Committee
ARP .....Office of Airports
ATA .....Air Traffic Association
ATO.....Air Traffic Organization
AVS .....Aviation Safety Organization
eALP .....Electronic Airport Layout Plan
FAR .....Federal Aviation Regulations
FGDC.....Federal Geographic Data Committee
FSIMS.....Flight Standards Information Management System
GIS .....Geographic Information System
ICAO .....International Civil Aviation Organization
NAS.....National Airspace System
NGS.....National Geodetic Survey
OE/AAA .....Obstruction Evaluation/Airport Airspace Analysis
OEI .....One Engine Inoperative
OIS .....Obstacle Identification Surface
POI.....Principal Operations Inspector
SAA .....Special Activity Airspace
SUA.....Special Use Airspace
TERPS.....Terminal Instrument Procedures

APPENDIX B. Pilot Airport Meetings

A series of meetings were held throughout 2008 to determine the data availability for each airport[20]. Available data varied from computer-aided drafting documents to complete GIS. Progress toward OEI surface protection development was also discussed. Additional meetings were held throughout 2009 to collect inputs from each pilot airport on their OEI related issues and to gain a consensus on the FAA OEI surface proposal.

Washington Reagan National Airport (DCA) – June 9 and 12, 2008

The largest issue was the amount of data requiring collection to support the development of the OEI containment area, data analysis, and stakeholder consultations. Surrounding Special Use Airspace and construction activity in Rosslyn, Virginia, pose the potential to further affect airport operations and the FAA airport surveillance radar at the airport.

Figure 3. DCA, Commercial Development Affecting all Runways

[20] OEI Initial Meetings with the Airports, July 08

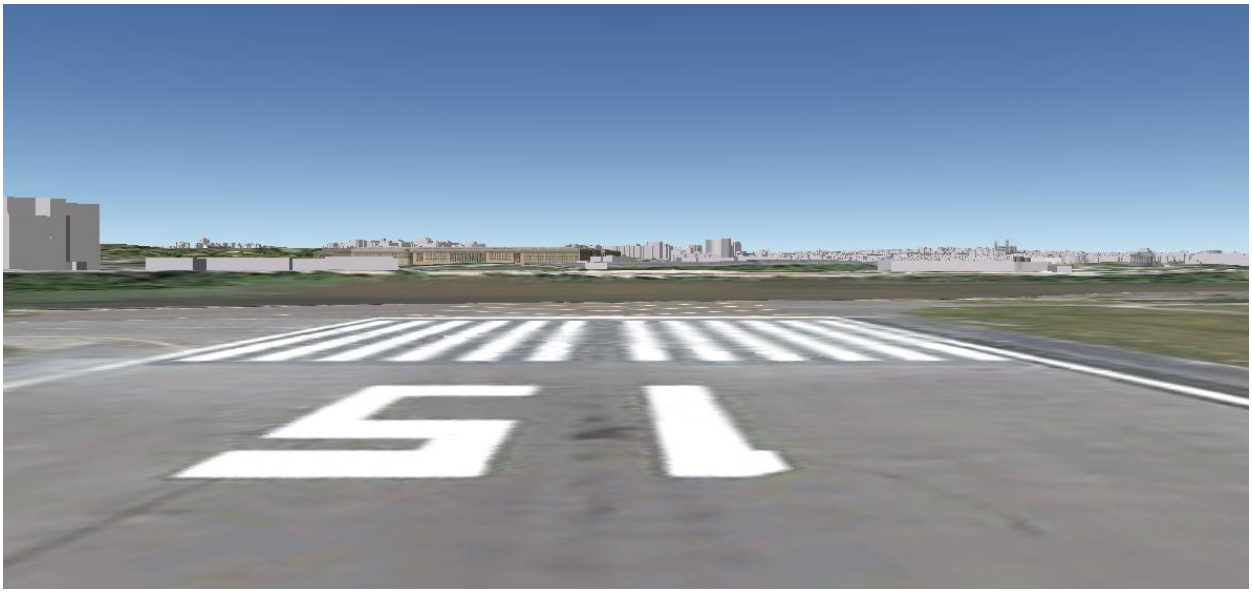

Figure 4. DCA, RWY 33 departure
Buildings encroachment is a factor for Departure
Aircraft Must Turn to Avoid the Pentagon Directly Ahead and Must Remain Clear of Restricted Airspace Around White House to right

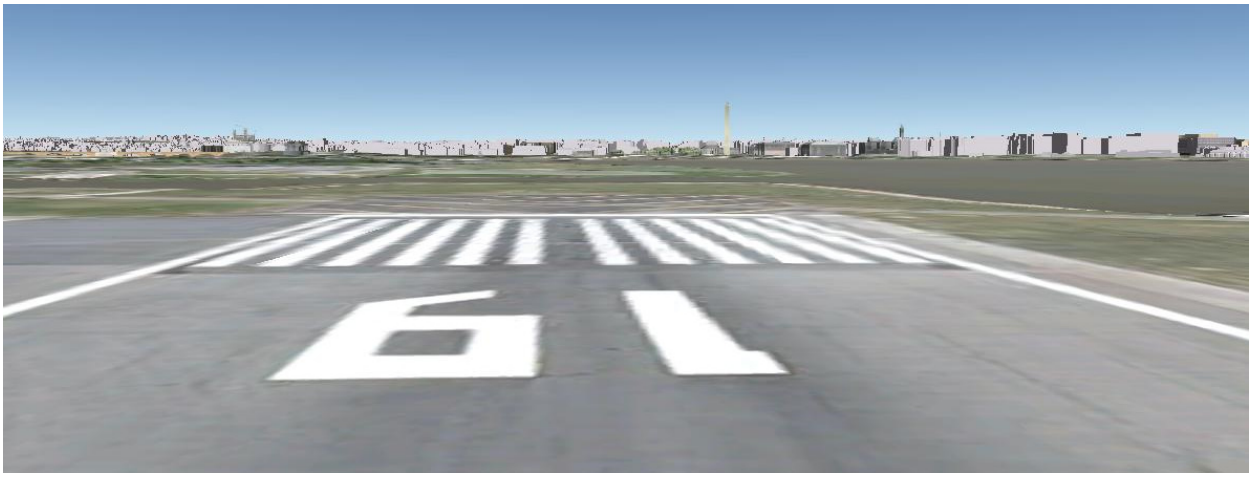

Figure 5. DCA, RWY 01 departure, plan view
Buildings encroachment is a factor for Departure
Aircraft Must Turn to Avoid the Mall and
Must Remain west of Restricted Airspace Around White House

Boston Logan International Airport (BOS) - June 10, 2008 and August 6, 2009.

Logan's airspace has been degraded over the years by development immediately adjacent and around the airport. The city of Boston and the multiple zoning authorities require extensive coordination to implement zoning changes.

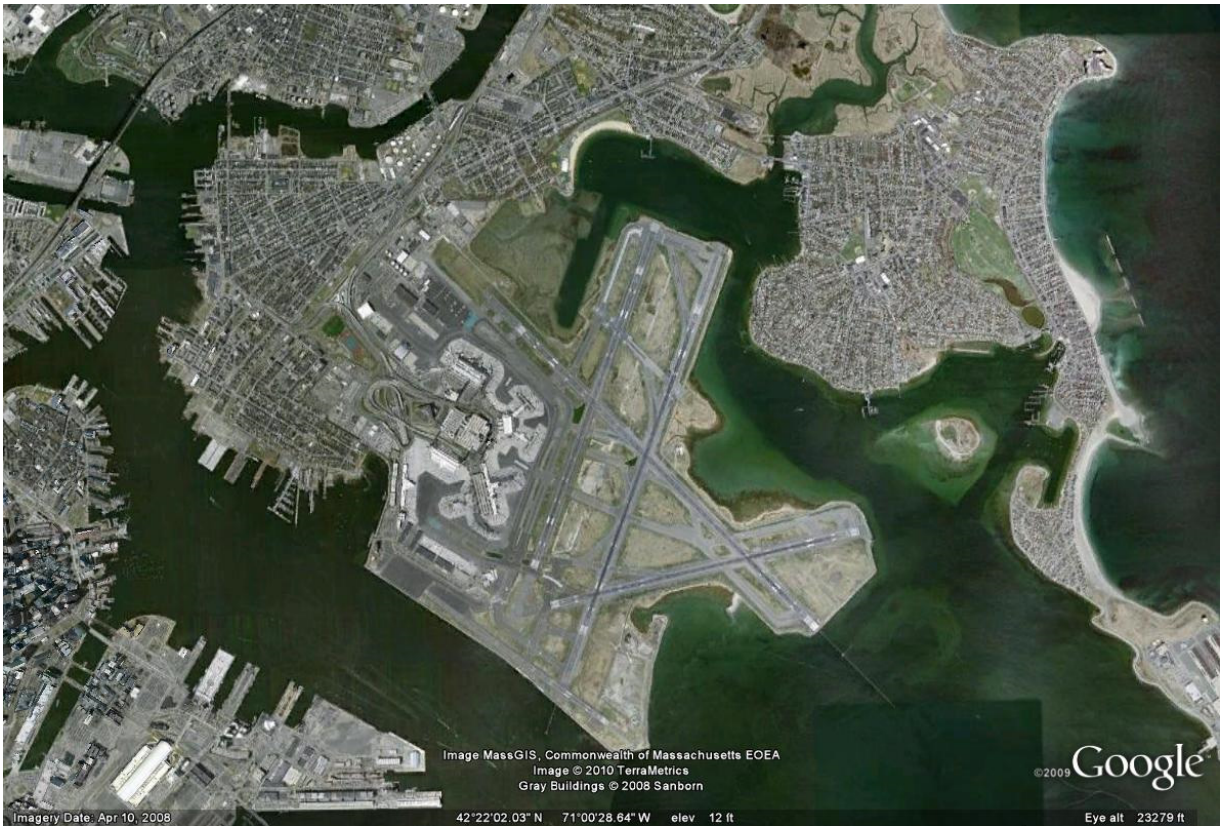

Figure 6. Boston Logan, plan view
Buildings encroachment is a factor for Departure

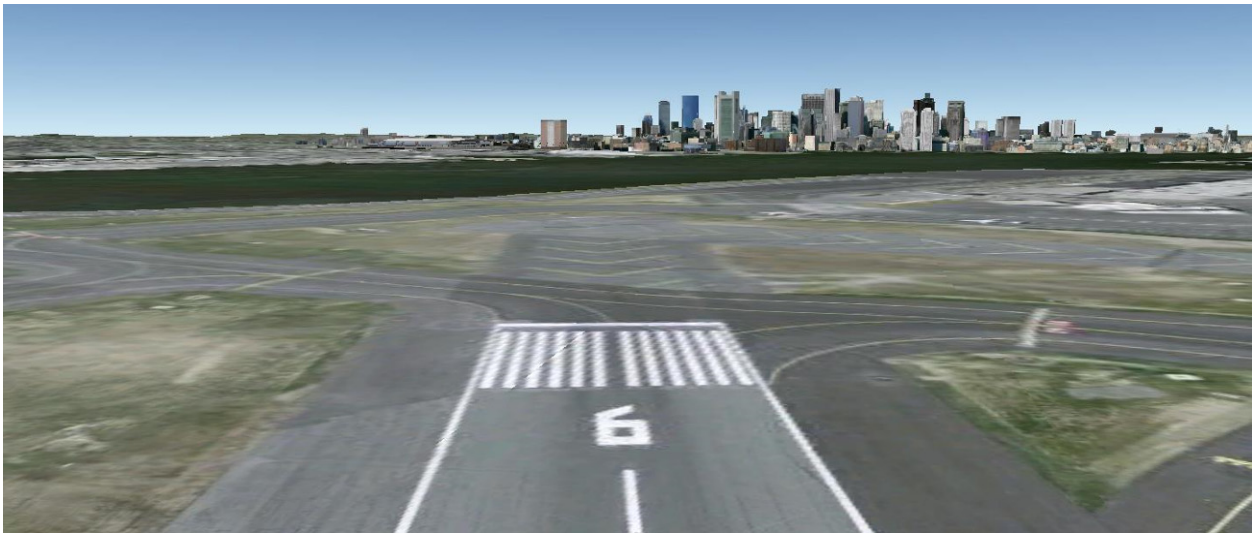

Figure 7. Boston Logan, Rwy 27L Departure
Building encroachment is a factor for Departure

Figure 8. Boston Logan, Rwy 15R Departure
Building encroachment is a possible factor for Departure

Miami International Airport (MIA) – June 30, 2008 and August 3, 2009.

The airport and the county have gone to great length to contain procedures and implement the appropriate zoning to protect the airport by height limitations. The airport historically has been more restrictive than the federal requirements.

The airport officials recommended their program to be used as a "best practice" for other airports and for the FAA to garner from their experience. Airport officials emphasized that FAA should provide airports with the tools for explaining the issues to laypersons. The airport and Dade County have already implemented and are protecting this airport through zoning. However, they realize their uniqueness in that the County owns the airport. The ownership makes the zoning problem much easier than it is for other airports that face associated jurisdictional issues.

Figure 9. MIA Commercial and Residential Development Affecting all Runways

McCarran International Airport (LAS) – July 9, 2008 and August 13, 2009.

The airport is situated close to the Las Vegas strip with many casinos encroaching on the runway. Terrain is also a factor and a problem in all directions. It was expressed that it was important for Associated General Contractors (AGC) to be at the forefront of issues once a path is recommended from the pilot program.

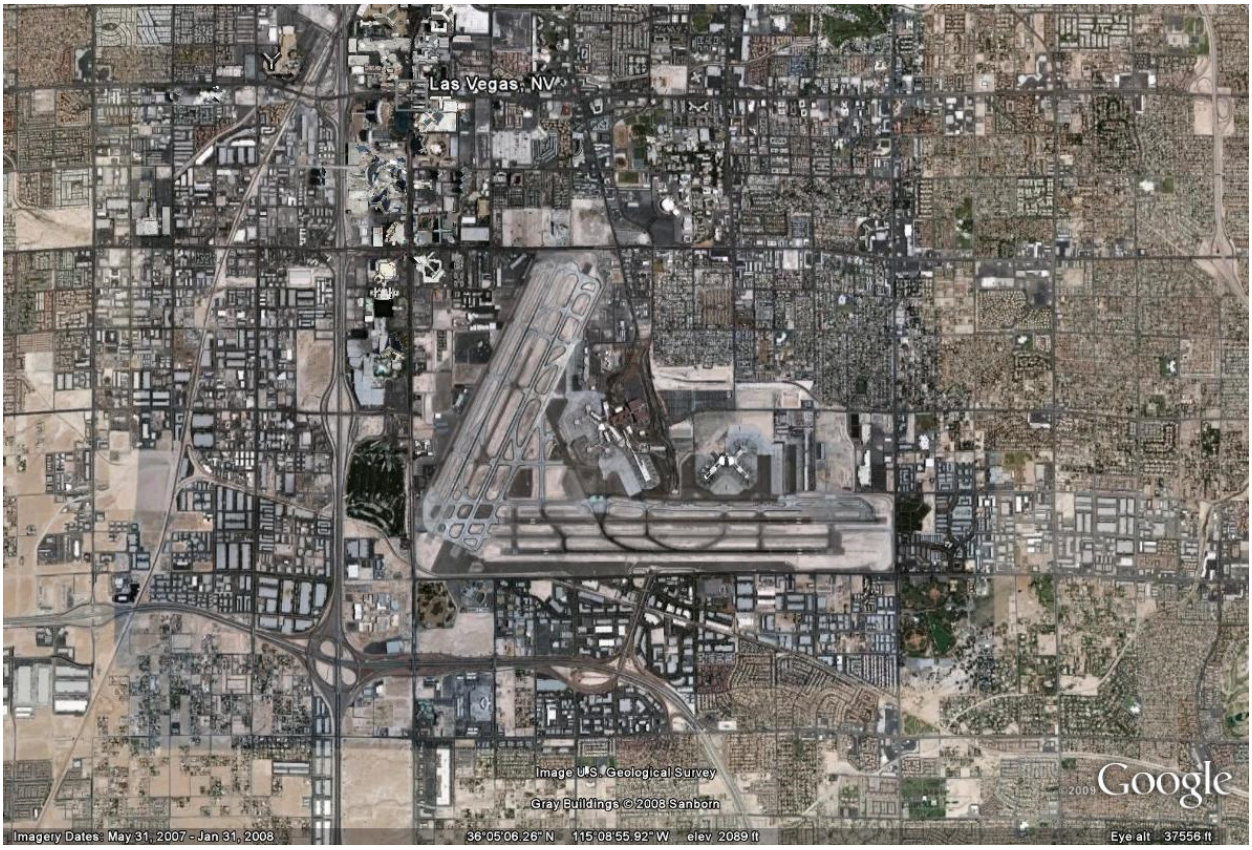

Figure 10. LAS, Plan View
Building and Terrain are Factors for Departures

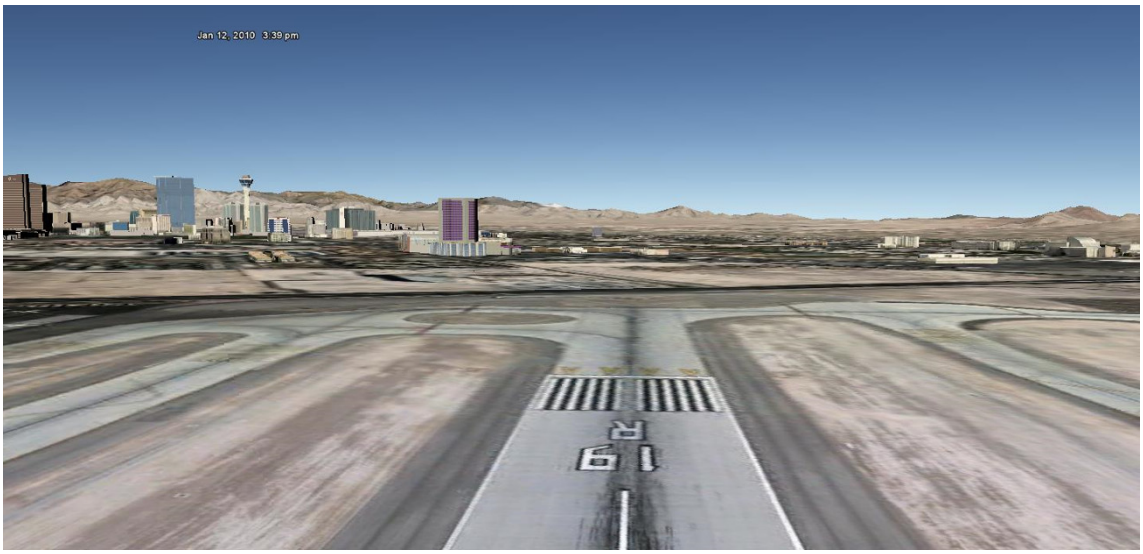

Figure 11. LAS, Rwy 1L Departure
Building and Terrain are Factors for Departures

Figure 12. LAS Runway 19R Departure
Departure Involves High Terrain Within 2 Miles of the Runway

Phoenix Sky Harbor International Airport (PHX) - July 8, 2008 and July 29, 2009.

This airport is hampered in the efforts to protect its surroundings. The biggest issue affecting the airport is the multi-jurisdictional zoning. It was also discussed at the meetings that the pilot airports could assist in working or mentoring their peers in the future. Airports Council International - North America (ACI-NA) will lead further discussion with the airport officials to determine an appropriate path for this portion of the program.

Figure 13. PHX Plan View
Terrain and City Buildings are the Factors for Departures

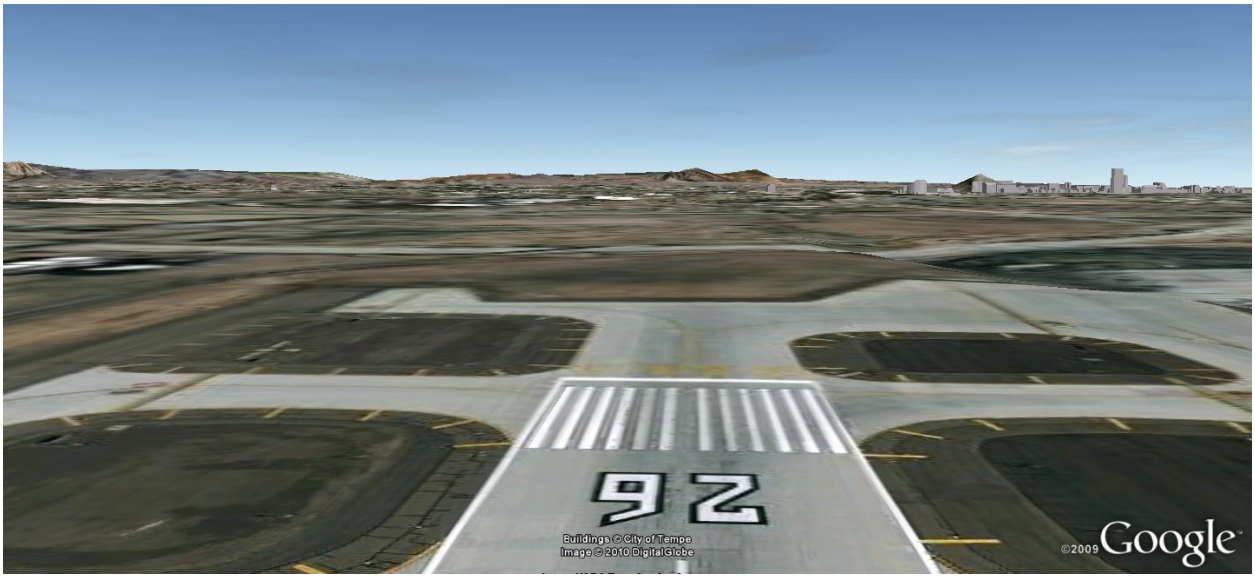

Figure 14. PHX Runway 8 Departure.
Terrain and City Buildings are the Factors for Departures

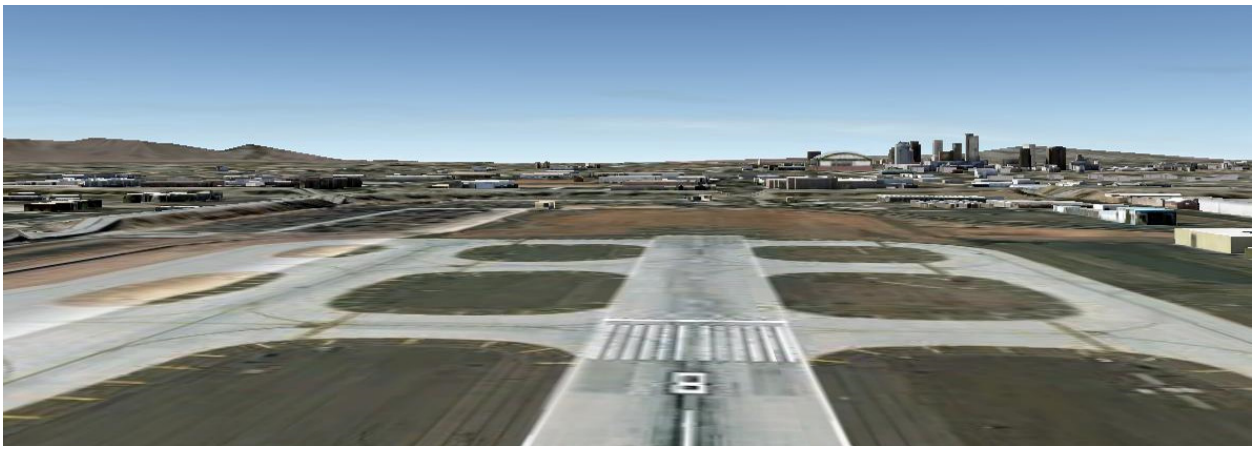

Figure 15. PHX Runway 26 Departure.
Terrain and city Buildings are the Factors for Departures

APPENDIX C. List of Participants

(Work in progress to verify and expand list)

Last Name	First Name	Organization
Agarwal	Ravin	Continental
Aggin	Ken	American Airlines
Agoral	Raveen	Continental Airlines
Aldinger	Craig	American Airlines
Allen	Carl	Alaska Air
Anderson	Shawn	BWI
Andres	Chris	Phoenix Sky Harbor
Banks	Mel	FAA ARC Regions & Centers
Bellis	Scotty	American Airlines
Bergean	Mimi	Aviation Planning
Bergner	John	San Francisco International Airport
Blackwell	Brent	American Airlines
Blake	David	Continental Airlines Flight Ops Engineering
Boll	Richard	NBAA
Boltinghouse	Bennett	Southwest Airlines, Flight Ops Engineering
Bonanni	Bob	FAA
Broderick	Tony	
Byham	Mike	US Airways
Cabalbag	Ruben	AWP-LAX-ADO
Carwell	Matthew L.	ASA
Chapman	Brian	United Airlines, Performance Engineering
Comstock	Kevin	ALPA
Cope	Derek	Alaska Airlines, Flight Ops Engineering
Coradello	Vincent	Deputy Director of Aviation Operations, MassPort
Cornell	Tom	Unknown
Corrie	Steve	ALPA
Craven	Ronny	Division Director, Airside Operations
Cross	David	NASAO
Crum	Ellen	FAA
Doyle	Ben	Aviation Management
Ferrara	Anelli	Aviation Planning
Fetty	Wayne	FAA Support Contractor
Fix	Walt	Phoenix Mesa Gateway
Foose	Scott	RAA
Friesenhahn	Chuck	FAA
Gaines	Jesse	FAA
Galyen	Mark	US Airways
Gonsalves	Bernard	IATA

Last Name	First Name	Organization
Grubbs	Steve	Phoenix Operations
Haggerty	Kevin	FAA ATO System Operations
Hall	Charles	Las Vegas, Clark County Department of Aviation
Harman	Sunil	Division Director, Miami International Airport, Land Use & Grant
Harrison	Mike	Aviation Management
Hewitt	Jay	Horizon Air
Hill	Christopher	Delta Airlines
Hines	Mike	Metropolitan Washington Airports Authority
Hochstetler	Paula	ACC
Holtorf	Gerald	FAA
Horvath	LJ	US Airways, Operations Engineering
Horvital	Joe	San Jose Planning
Huang	Schubert	Continental Airlines
Hunnicutt	E.C.	FAA Airports Engineering Division
Johnson	Coby	FAA Flight Standards
Johnson	Todd	Innovative Solutions International Inc., Contractor supporting FAA
Koch	Jerrod	Alaska Airlines
Kranzfelder	Russell	United Airlines
Lee	Bob	Boston Logan
Leech	Frank	Southwest Airlines
Leo	Flavio	Logan International Airport
Leverenz	Ruth	FAA
Loeffler	Fred	ACC
Loghides	Mike	Las Vegas McCarran Arpt.
Lombard	Kolie	FAA AFS-400
Lotterer	David	RAA
Lynch	Bob	MassPort Airport Operations
Marchi	Dick	ACI
Marinelli	Rick	FAA
Marquis	Dick	Las Vegas meeting
Marsden	Heath	Jacobs
Maxwell	Roy	Delta Airlines, Performance Engineering
McCluskey	Matt	FAA
McGraw	Paul	ATA
McGraw	John	FAA
McInnis	Tracey	FAA Airports Division, NE Region
Mitchell	Scott	FAA contractor, in support of ARP-101
Morris	Owen	Continental Airlines
Morris	Jane	Phoenix Sky Harbor
Morse	Glenn	Continental
Mosser	Dave	San Jose
Murphy	Jim	Miami Airfield Operations

Last Name	First Name	Organization
Nakagawa	Diane	Phoenix
Nichols	TJ	FAA
Nicosia-Rusin	Ralph	FAA New England Region Airports Division
Nordstrom	Craig	Airports Counsel International, North America
O'Donnell	Michael	FAA
Ogrodzinski	Henry M.	NASAO
O'Harra	Michael	FAA
Ori	Bob	Planning Technology (PTI)
Oswald	Chris	Airports Council International
Owen	Glynn	CGH Technologies, Contractor supporting FAA OES
Palen	Meredith L.	ASA
Panteli	Jorge	MassPort
Payne	Randy	Phoenix
Perry	Dave	FAA AAS-100, Airport Engineering
Peter	Lorelei	FAA
Peters	Hank	San Diego Airport
Phillips	Carlos	Delta Airlines, Performance Engineering
Praskovsky, Dr.	Alex	FAA contractor, in support of ARP-101
Price	Ronald F.	QED
Ramos	Oso	Aviation Planning
Ramos	Jose A.	MIA / Dade Aviation Dep't
Randall	Tom	Delta
Reilly	Brendan	FAA, Boston Tower
Rivas	Pedro	ALPA
Rodriguez	Juan	Aviation Planning
Ryan	Mike	US Airways
Scarborough	Ken	Planning Tech (PTI), consultant to FAA
Schmidt	Ed	US Airways
Schul	Chris	Northwest
Setchel	Tyler	AAAE
Sgroi	Bob	FAA Staff, Logan Tower
Snusselwhite	Roy	Miami Tower
Sullivan	George	PHX
Thurber	Byron	Jacobs Consultancy
Warren	Eric	Fed Ex
Washington	Terry	FAA Southern Region, Regional Planner
Wiecek	Kevin	Southwest Airlines
Wormaster	Gene	US Airways
Yinling	Bill	Jet Blue Airlines
Zee	Raymond	FAA Airports
Zoeller	Tom	AAAE

Federal Aviation Administration