

# TECHNICAL BACKGROUND

## Prepared for the Use of the Joint Committee Reviewing the FAA's Notice of Proposed Policy Change Related to Building Heights and One Engine Inoperative Aircraft

---

<b>Part 1. Executive Summary</b> .....	<b>2</b>
<b>Part 2. Detail – Questions and Answers</b> .....	<b>4</b>
1. How busy is Reagan National? .....	4
2. How many runways does Reagan National have? .....	5
3. What typically happens when a commercial passenger plane departs from or arrives at Reagan National Airport? .....	5
4. Where is the prohibited airspace and what are the penalties for entering it? .....	6
5. Does the FAA have height limits that apply to buildings and other structures near an airport? .....	6
6. From where is a plane's altitude and a building's height measured, sea level or ground level? .....	7
7. How does a pilot know if there is an obstruction? .....	7
8. What change is the FAA proposing — and why? .....	7
9. Have any structures in Arlington been subject to an obstruction evaluation? .....	8
10. Does the Arlington County zoning ordinance limit building heights in Arlington on sites that are within the Reagan National Airport obstruction area? .....	9
11. If the FAA expands its current obstruction guidelines to include OEI emergencies, what will happen to existing structures that are subsequently found to be a potential hazard to OEI planes? .....	9
12. Do Arlington County officials and Virginia elected representatives support the FAA's proposal to include OEI considerations when making a Determination of Hazard to Navigation? .....	10
13. What is the difference between the process the FAA is proposing and a "formal rulemaking process"? .....	10
14. What is an OEI and what causes it? .....	10
15. Are birds a potential OEI risk at Reagan National Airport? .....	11
16. Have there been bird strikes or OEI-related emergencies at Reagan National? .....	11
17. How would an OEI affect planes departing or arriving at Reagan National Airport from the north? .....	11
18. How do pilots communicate with controllers? What additional types of information do they have? .....	12
19. Do pilots have concerns about Reagan National? .....	13
20. What has the reaction from the public been to the FAA's proposal to add OEI as a consideration when assessing whether a building is a hazard to navigation? .....	13
<b>APPENDICES</b> .....	<b>14</b>

## Part 1. Executive Summary

**Issue Statement.** The FAA has proposed changing the evaluation criteria it uses to determine if a proposed structure poses a hazard to the safe navigation of aircraft. In its “rulemaking” change process, initiated to protect departure paths for aircraft suffering an engine failure, the FAA is pursuing a “fast track” process to make the change. The County and other government representatives have objected, based on economic impacts. The resolution submitted at the September 2, 2014 General Membership meeting proposes the Civic Federation support the FAA’s proposed changes and urges the County to develop an overlay ordinance governing the maximum height of buildings near the airport and under the airport’s flight paths.

**Background.** Airports in dense urban areas provide economic benefits but impose risks. Tall buildings and other structures (such as microwave towers and construction cranes) can present a hazard to navigation for planes approaching and departing Reagan National Airport. By Federal Law, the FAA is responsible for conducting an aeronautical review using the procedures and standards in Federal Law 14 CFR Part 77 to determine if a proposed structure poses a hazard to aircraft.

Commercial passenger airlines, turbo-prop regional airlines and private executive planes that use Reagan National are configured with two engines. The FAA is proposing to expand the evaluation criteria in Part 77 to ensure flight paths are available for planes that have an engine failure on takeoff or while climbing, a condition referred to as “one engine inoperative (OEI). Since flight obstacles vary from airport to airport, the FAA proposal would provide a “local rule” in each case.

Engine failures can be caused by mechanical problems in the engine itself, such as damage caused by oil leaks, fuel pump problems, or fuel contamination. Based on available Boeing documentation, we estimate that the loss of a turbine engine due to mechanical failure is a 1-in-a-million-flights event. However a turbine engine failure also can be caused external factors, such as volcanic ash, bird strikes<sup>1</sup> or weather conditions like icing or severe turbulence.

Reagan National was designed decades ago for propeller-driven planes that were smaller, lighter, and more agile than today’s jet aircraft — and had lower airspeeds at landing. By contrast, the Boeing 737-800/900 has a 117-foot wingspan, is 150 feet long, and can weigh more than 174,000 pounds when loaded with passengers, cargo, and fuel. Pilots say that flying in and out of Reagan National is challenging:

---

<sup>1</sup> It should be noted that the Roaches Run Waterfowl Sanctuary is next to the main runway at Reagan National. The airport fires an air canon to disperse birds.

- The longest runway, which begins and ends near water, is 6,800 feet. This is substantially shorter than airports originally built for jets such as the Boeing 737-800 where the requirements are for a runway with a minimum of 9,000 feet for takeoff and 6,600 feet for landing. For example, the runway length of the San Diego Airport, a similar urban airport with comparable passenger usage, is 9,401 feet. Most airline pilots would consider any runway under 8,000 feet in length to be substandard and a significant challenge to operate to/from.
- The end of the runway on a north departure points the plane at prohibited airspace on the north side of the Potomac: the National Mall and White House, which is identified as “P-56” by the FAA. Avoiding P-56 requires a sharp turn towards Virginia at slow speeds and high nose attitudes a few seconds after take-off.
- Local noise abatement procedures require planes to fly over the Potomac River, which necessitates sharp turns at low altitudes when landing and taking off. Planes often thread between the tall buildings in Rosslyn to avoid P-56.

Pilots departing Reagan National fly by instrument flight rules (IFR<sup>2</sup>) and use route charts developed by the FAA. These are published and available to local officials.

In an emergency, pilots have the authority to divert from their planned course. For example, an OEI that occurs when taking off from Reagan National Airport will require the pilot to land as soon as practicable. Pilots of northbound planes experiencing an OEI will have limited maneuvering room, and thus will turn west to make an emergency landing at Dulles International Airport.

Airlines have developed route charts that pilots should follow when one engine is inoperative (OEI). Their routes are proprietary and not disclosed—but the combination of all the OEI routes encompasses a wide area. One of the potential outcomes of the FAA's proposed local rule would be that airlines using Reagan National would work with the Metropolitan Washington Airports Authority, the FAA, Arlington officials, and other stakeholders (developers and people living/working under flight paths) to jointly plan one or more OEI routes that could be used for planning purposes.

The FAA has indicated that while it has power to compel an aeronautical review of a potential building and to determine if the building is a hazard to navigation, it does not have the power to dictate what is actually built. Those powers lie with the local authorities. The FAA states that the addition of a local rule for OEI

---

<sup>2</sup> Instrument Flight Rules (IFR) also are used when visibility is less than 3 miles.

would refine what they consider in their aeronautical review but would not expand their current authority.

The Code of Virginia allows Arlington to implement overlay height restrictions designed to prevent flight obstructions, independent of other zoning. However Arlington has chosen not to use that option. Instead, Arlington's zoning relies on the current FAA hazard determination policy, which does not consider OEI.

Reaction to the FAA's proposal during the official comment period (which closed June 27, 2014) has been mixed:

Some business property owners and developers are concerned that the addition of OEI standards will restrict future development — or even force them to reduce existing heights. (The FAA denies that existing buildings will be affected unless there is a change made to the building.)

The Arlington County Manager and some local business groups have expressed concern that the FAA's proposed change could negatively impact Arlington's plans for economic development in Rosslyn. She and our two Virginia senators have asked for a "formal rule-making process" that could take up to four years. In the interim, more proposed tall structures could be deemed by the FAA to be "No Hazard" that with OEI criteria would otherwise be deemed "Hazard."

The Metropolitan Washington Airports Authority (which oversees operations at Reagan National and Dulles International airports) and the Metropolitan Washington Airlines Committee expressed support for the rulemaking change as proposed, as did pilots, pilot associations, airports, airport associations, and people who live near airports and flight paths.

**Conclusion.** The inherent challenges of flying into and out of Reagan National Airport and the added challenges of an emergency should dictate (1) adoption of the OEI obstruction evaluation criteria by the FAA that will reduce the risk of a major incident; (2) greater scrutiny, caution, and consideration by County officials and Arlington civic leaders of the impact on airport safety of increasing building heights in Roslyn and elsewhere in Arlington County; and development of an overlay zoning ordinance as suggested in the Virginia Code.

## **Part 2. Detail – Questions and Answers**

### **1. *How busy is Reagan National?***

In 2013, Reagan National Airport had 292,648 flights that handled 20,415,085 passengers—a new record—and 4,193,190 pounds of cargo (freight, express, and mail). Appendix 1 has data about airport traffic, destinations, and airlines.

## 2. How many runways does Reagan National have?

The FAA Airport Master Record for DCA, Reagan National has three runways

Runway Name (See Note Below)	Length [+Overrun]		Surface
	Feet	Meters	
1/19	7,169	2,094	Asphalt
4/22	4,911	1,497	Asphalt
15/33	5,204	1,586	Asphalt

Note - Runways are named with numbers between 01 and 36, which is generally the magnetic azimuth of the runway's heading in decadegrees: a runway numbered 09 points east (90°), runway 18 is south (180°), runway 27 points west (270°) and runway 36 points to the north (360° rather than 0°). When taking off from or landing on runway 09, a plane would be heading 90° (east).

A runway can normally be used in both directions, and is named for each direction separately: for example runway 1 and 19 at Reagan National. The two numbers always differ by 18 (= 180°).

Appendix 2 shows the location of the three runways at Reagan National. Each is typically used as follows:

- Runway 1/19 — commercial passenger jets
- Runway 4/22 — regional turbo propeller driven planes and private aircraft.
- Runway 15/33 — Rarely used

## 3. What typically happens when a commercial passenger plane departs from or arrives at Reagan National Airport?

The Airport Traffic Area is 3 miles and 3,000 feet around an airport. Whenever a plane is in the Airport Traffic Area, the pilot must be communicating with the tower or local FAA Approach Control.

### Departing Planes

- Prior to departure, the airport's Ground Control gives the pilot departure instructions: runway, assigned altitude, departure route, and a channel for communications in case there is a problem before the Tower gives permission to takeoff.

See Appendix 3 and 4 for examples of departure routes.

- After takeoff, as the plane approaches the edge of the Airport Traffic Area, the pilot is handed off to Departure Control, which provides specific

headings and altitudes, and a transponder code that the plane is assigned for the day.

- Along the way, the pilot is handed off to Enroute Traffic Control, and when the plane nears its destination the pilot is handed off to that airport's Approach Control.

### **Arriving Planes**

- When a plane is about 100 – 150 miles from its destination, Enroute Traffic Control will hand off the plane to the airport area's Approach Control, which provides instructions for beginning a descent for landing.
- Approach Control manages the flight until the plane reaches the Airport Traffic Area and the pilot has the airfield in sight. Then the Tower takes over.

Planes arriving and departing Reagan National have an additional consideration: Prohibited Airspace around the Mall and the White House.

### **4. Where is the prohibited airspace and what are the penalties for entering it?**

See the chart in Appendix 4. Pilots know that they can have their license suspended or subject their airline to considerable fines if they enter Prohibited Area P-56, which is 1.5 nautical miles north of the airport and covers the National Mall and the White House.

### **5. Does the FAA have height limits that apply to buildings and other structures near an airport?**

According to Federal Law 14 CFR Part 77, anyone who builds a structure over 200 feet above ground level within 3 miles of an airport — or builds a structure 500 feet above ground level anywhere in the US — must file a request for an Obstruction Evaluation before construction begins. Not filing before starting construction is subject to a civil penalty of \$1,000 per day.

Obstruction standards relevant to Reagan National are in Appendix 5. The full list of obstruction standards is at <http://www.law.cornell.edu/cfr/text/14/77.17>.

Appendix 6 shows how Part 77 Obstruction Standards are applied near the airport and Appendix 7 shows the current structures over 200 feet AGL (above ground level) near Reagan National Airport.

Keep in mind that:

- Planes land and take off gradually. The slope of their route is an important consideration when determining if heights within that sloping approach or departure path pose a hazard to navigation from proposed structures.
- Reagan National is 3.1 miles from central Rosslyn, which lies beneath the airport approach path. Buildings in Crystal City, located within one-half mile

from the runways, can also pose obstruction hazards by blocking radar and radio reception as well as presenting obstacle risks to maneuvering aircraft. Pilots need low altitude maneuvering room when the need arises to wave off a landing (called a “go-around”) due to the runway being unexpectedly fouled, or they encounter conflicts with other aircraft or their aircraft is not in a position to land safely on initial approach.

**6. From where is a plane's altitude and a building's height measured, sea level or ground level?**

While the FAA uses height criteria measured in feet above ground level (AGL), pilots normally refer to altitudes in heights above mean sea level (MSL).

**7. How does a pilot know if there is an obstruction?**

When landing, a pilot flying visual flight rules (VFR) can see obstructions. However pilots who do not routinely fly into or out of Reagan National may not be familiar with the surrounding landscape. A pilot flying instrument flight rules (IFR) due to the inability to see the ground or airport because of clouds or fog must rely on minimum descent altitudes listed on navigation charts provided by the FAA to ensure the plane remains clear of obstructions at night and during bad weather.

When taking off, the plane's nose is pointed up, significantly restricting the pilot's view of what's below. At Reagan National pilots depart flying IFR and use navigation charts prepared by the FAA.

**8. What change is the FAA proposing — and why?**

The FAA has stated that:

“Navigable airspace is being encroached around the country with the net effect of decreasing access for aviation operations. Structures as diverse as microwave towers to office buildings and wind turbines are being built in ever-increasing numbers near many airports. While developers may erect these structures, the FAA must consider the impact of the structures on the safe operation of flight and their impact on the safe, efficient use and preservation of the navigable airspace and airport capacity and efficiency. Additionally, aircraft operators must plan for the potential of an engine failure (one engine inoperative, or OEI) during take-off in accordance with [Federal Law] 14 CFR parts 25, 121, and 135. An engine failure could prevent the aircraft from climbing at the normal climb rate and structures near an airport could, under such circumstances, create a safety risk. Thus, the agency interest in studying the potential impact of these structures is not limited solely to whether aircraft could avoid the proposed structures under normal circumstances. The agency should also consider the impact of OEI.

The potential impact of a structure is particularly significant at airports where existing development or other factors effectively limit operator options in an OEI situation. At these airports, increasing encroachment of the airspace may effectively reduce the amount of usable runway because of OEI procedures. ...”

Currently, Federal Law 14 CFR Part 77 SAFE, EFFICIENT USE, AND PRESERVATION OF THE NAVIGABLE AIRSPACE guides the FAA's activities related to navigable airspace. However, the FAA further says:

“The FAA is not authorized to grant or deny construction projects. Rather, Part 77 defines a number of obstruction standards that are used to identify obstacles that may have an adverse impact on the navigable airspace. Even upon the issuance of a Determination of Hazard, the developer is free to continue construction. However, zoning authorities and private insurers may be reluctant to permit construction of the structure, given the FAA's determination that it poses a hazard to navigation. Should the developer proceed with construction, the FAA, through its air traffic organization, takes action to mitigate the impact of the obstruction by altering procedures (e.g., departure routes, climb gradients) to ensure that safety is maintained. In making a hazard determination under part 77, the FAA has historically only considered aircraft operations under normal circumstances. OEI procedures have been considered emergency procedures and have not been considered by the FAA when conducting an aeronautical study under Part 77.”

Thus the FAA wants to add OEI as a consideration for determining whether a structure is a hazard to navigation.

**9. Have any structures in Arlington been subject to an obstruction evaluation?**

Yes, many, including cell towers, temporary cranes, and buildings. For example in 2006 when the FAA conducted an aeronautical study of JBG Inc.'s proposal for the Central Place buildings in Rosslyn, and the building at 1812 North Moore Street, which has the entrance to the Rosslyn Metro Station. Both initially were evaluated by the FAA and found to be hazards to navigation.

The building at 1812 North Moore Street appealed an initial FAA decision of hazard to navigation. After two stories were removed from the building plans, the FAA changed the hazard determination to no hazard because the building was revised to be no higher than the previously approved (after modifications and an appeal) Central Place building.

You can view the current and former Arlington Virginia cases at <https://oeaaa.faa.gov/oeaaa/external/searchAction.jsp>.

**10. Does the Arlington County zoning ordinance limit building heights in Arlington on sites that are within the Reagan National Airport obstruction area?**

Yes and no. The Arlington Zoning Ordinance specifically addresses building heights in §14.5. AIRCRAFT LANDING APPROACH AREA:

“No building meeting Federal Aviation Administration criteria for notice (§77.9 Construction or alteration requiring notice) shall be erected, constructed, reconstructed, structurally altered, enlarged or moved per the requirements in 14 Code of Federal Regulations, Part 77 pursuant to 49 U.S.C, Section 44718 as amended, unless the zoning administrator shall have received a letter of clearance from the Federal Aviation Agency. “

It's important to note:

- Part 77 currently does not include a consideration of OEI situations, hence the FAA's proposal for a local rule to ensure there is a safe outbound flight path for aircraft in such emergency situations.
- While the Zoning Ordinance often specifies a maximum height for a property, virtually all very tall buildings are built under the Site Plan process that, among other things, often permits a building to be higher than currently zoned height limits for the location.
- The Code of Virginia requires Arlington to regulate development to ensure the safety of the public as well as aircraft. With the Dillon Rule in mind, it authorizes the County to adopt an overlay zone that would “provide for the regulation of the height of structures and natural growth for the purpose of protecting the safety of air navigation.” However Arlington has chosen not to do that and instead has relied on the FAA's hazard evaluation process.

See Appendix 8 for the applicable wording in the Arlington County Zoning Ordinance and the Code of Virginia.

**11. If the FAA expands its current obstruction guidelines to include OEI emergencies, what will happen to existing structures that are subsequently found to be a potential hazard to OEI planes?**

The FAA has indicated that it will not require changes to any existing structures that would be deemed “hazards” using the OEI criteria, unless and until they are subsequently altered. One of the potential outcomes of the FAA's proposal is that stakeholders will work together to establish new routes safe routes that avoid the existing hazards. This will become more difficult if more buildings are constructed under the existing criteria, which assume planes are flying under normal conditions.

## **12. Do Arlington County officials and Virginia elected representatives support the FAA's proposal to include OEI considerations when making a Determination of Hazard to Navigation?**

Not that we have found.

- During the FAA's Public Comment period, the Arlington County Manager (Barbara Donnellan) wrote the FAA and expressed concern that the proposal would have a negative impact on Rosslyn's economic development plans. She asked for a formal rulemaking process. Text from her July 22, 2014 letter is in Appendix 9.
- Shortly after the comment period ended on June 27<sup>th</sup> Virginia Senators Mark Warner and Tim Kaine sent a joint letter to the FAA also indicating their concerns about the impact of the FAA's proposal on 4,000 existing buildings that might not meet the standard, and their desire for a full rulemaking process. Evidently the Senators did not know that the FAA is not going to require prior construction to be modified.

Letters received after the Public Comment period ended can still be considered reference materials by the FAA. So it's not too late for the Arlington County Civic Federation, Home Owner Associations, Civic Associations, and Individuals to send comments. But that decision making process is moving forward, therefore delaying the Civic Federation's response could make it moot.

## **13. What is the difference between the process the FAA is proposing and a "formal rulemaking process"?**

The FAA's rulemaking process is described at [http://www.ecfr.gov/cgi-bin/text-idx?SID=c290a09c98d2b3c163f8fe5ec9cfbb3d&node=sp14.1.11.a&rgn=div6#se14.1.11\\_138](http://www.ecfr.gov/cgi-bin/text-idx?SID=c290a09c98d2b3c163f8fe5ec9cfbb3d&node=sp14.1.11.a&rgn=div6#se14.1.11_138). We have been told that this process could take years to complete.

## **14. What is an OEI and what causes it?**

A one engine inoperative (OEI) occurs when a turbine engine in an aircraft stops producing thrust due to a malfunction other than fuel exhaustion. According to Wikipedia:

"Engine failures can be caused by mechanical problems in the engine itself, such as damage to portions of the turbine or oil leaks, as well as damage outside the engine such as fuel pump problems or fuel contamination. A turbine engine failure can also be caused by entirely external factors, such as volcanic ash, bird strikes or weather conditions like precipitation, icing or severe turbulence."

Many people are familiar with Chesley Burnett "Sully" Sullenberger, who successfully landed US Airways Flight 1549 in the Hudson River after his plane was disabled by striking a flock of Canada geese during its initial climb out of LaGuardia Airport on January 15, 2009. That all of the 155 passengers and crew aboard the aircraft survived was hailed as a miracle.

### **15. Are birds a potential OEI risk at Reagan National Airport?**

It would seem so. In 2007, there were more than 7,600 bird and wildlife strikes on civil aviation aircraft — and 219 people killed in worldwide aviation accidents because of bird strikes since 1988. According to an NBC report, the geese population is surging and the birds cannot hear the quieter-engine jets. See a video at <http://www.today.com/video/today/28689463#28689463>.

In addition, there is a large population of Canada Geese at the Roaches Run Waterfowl Refuge next to the Reagan National airport. See the refuge map at: <http://www.dgif.virginia.gov/vbwt/site.asp?trail=1&loop=CGF&site=CGF03>. To disperse the birds—temporarily at best—the airport fires a compressed air canon every 90 seconds to 3 minutes.

According to a September 2014 story from arlnow.com, the Department of Interior “is in the middle of a process of environmental and access enhancements to the sanctuary and ... will plant “native wetland species,” remove invasive plants and clean up trash from the sanctuary's shoreline.” (It's unclear from the reports whether the effort will attract more birds.)

### **16. Have there been bird strikes or OEI-related emergencies at Reagan National?**

According to a 2012 Washington Post article, between 2000 and 2012, aircraft operating to/from National Airport suffered 550 bird strikes, with 42 resulting in notable damage.

Of note there have been two major accidents at what was then called Washington National Airport: One in 1949 and one in 1982.

- In 1949, a DC-4 airline approaching National was struck by a twin engine aircraft that was circling back to land due to engine problems. The largest part of the fuselage impacted approximately where the Edwards Cinema in Potomac Yards now stands. 54 passengers and crew were killed.
- In a snowstorm in 1982, an Air Florida Boeing 737, which was not properly deiced before takeoff, hit 14<sup>th</sup> Street Bridge and fell into the Potomac. Five occupants of the downed plane survived. The dead included 74 people on the plane and four occupants of vehicles on the bridge.

### **17. How would an OEI affect planes departing or arriving at Regan National Airport from the north?**

Commercial passenger planes at Reagan National have two engines. If one is lost on take-off, the pilot will try to land as soon as practicable and will need maneuvering room, which may be constrained by tall structures.

- Pilots cannot turn an OEI plane sharply without causing it to decelerate dangerously or climb even more slowly. At OEI climb out speeds at around

200 knots, it takes about a two mile diameter to turn the emergency aircraft completely around.

- According to available Boeing 737 flight manuals, the rated climb angle for a Boeing 737-800 is calculated to be a 2.4 percent slope. For such an aircraft that had suffered an OEI immediately upon takeoff on a warm summer day with a full load of fuel, passengers and cargo, it's altitude when passing Rosslyn would be about 420 feet above sea level (plus or minus 50 feet, depending on local temperature and current winds).
- Pilots have the authority to adjust their routes in order to save the aircraft and its crew. Given the maneuvering challenges of large aircraft, the prohibited area 1.5 miles from the north end of the runway, and an increasingly higher skyline in Rosslyn, a northbound airline pilot with an OEI will most likely opt to go west and make an emergency landing at Dulles airport — flying across central Arlington.
- Pilots may not be able to see obstructions — especially if there are clouds or other weather conditions that limit visibility.
- Buildings can interfere with a pilot's radio communications with air traffic control or what can be seen on the plane's radar display.

### ***18. How do pilots communicate with controllers? What additional types of information do they have?***

#### **Voice Communications**

Pilots use voice communications over the VHS civil frequencies (just above our radio channels 108-137 MHz) to communicate with controllers. The Tower will indicate a specific radio frequency, which will be changed after takeoff. Departure and Approach Control will also direct the pilot which frequency to use. Enroute Control also gives the pilot new frequencies, which change each time the pilot is handed off to a new sector.

#### **Navigation Aids**

Navigation aids provide location information that pilots use to fly from point to point that use preplanned routes called "airways." However, controllers often modify assigned altitudes and routes.

#### **GPS**

In recent years, Reagan National has installed a GPS augmentation system that provides highly precise route and altitude information to the pilot to permit landings in very unfavorable weather and visibility conditions.

#### **Radar**

While the FAA Enroute, Departure and Approach controllers still have radar to observe aircraft with, these days, the system primarily uses aircraft transponder sets (called IFF) which, when interrogated by the FAA system will provide location, identification, and altitude data digitally for display.

## **19. Do pilots have concerns about Reagan National?**

### **The IFAPA**

The International Federation of Airline Pilot Associations (IFAPA) says that some airports have significant burdens for pilots: short runways, a forbidding surrounding terrain, and difficult approach and takeoff routes. In 1982, the IFAPA publicly identified airports around the world that they classified as orange, red, or black star airports, with black being the worst. They no longer make their lists public.

Appendix 10 summarizes one pilot's description of the challenges of flying today's large aircraft into and out of Reagan National.

### **The ALPA**

The Air Line Pilots Association, International (ALPA) supports the FAA's proposal, stating that:

“The proposal provides a balanced approach that benefits the community by having a publically available, documented OEI flight path corridor that allows developers and local zoning commissions to facilitate growth without a reduction in flight safety. This proposal provides transparency to the process and the final solution.”

## **20. What has the reaction from the public been to the FAA's proposal to add OEI as a consideration when assessing whether a building is a hazard to navigation.**

The FAA site link provides access to 189 comments from individuals, developers, airports, communities (such as Arlington and Alexandria), and pilot associations at this link: <http://www.regulations.gov/#!docketBrowser;rpp=25;po=0;D=FAA-2014-0134>.

In addition to the letter from Arlington County Manager Barbara Donnellan, there are many comments worth reading, such as:

- Airports Council International – North America (ACI-NA)  
<http://www.regulations.gov/#!documentDetail;D=FAA-2014-0134-0179>
- Douglas Taylor  
<http://www.regulations.gov/#!documentDetail;D=FAA-2014-0134-0002>
- Stuart Stein (a Civic Federation Delegate)  
<http://www.regulations.gov/#!documentDetail;D=FAA-2014-0134-0182>

# APPENDICES

Appendix 1. Reagan National Airport Usage.....	15
Appendix 2. Airport Diagram.....	17
Appendix 3. Sample Departure Route .....	18
Appendix 4. Prohibited Area (P-56) .....	19
Appendix 5. §77.17 Obstruction Standards .....	20
Appendix 6. Part 77 Evaluation Criteria Example .....	21
Appendix 7. Structures over 200 Feet AGI.....	22
Appendix 8. Airport Safety Zoning .....	23
Appendix 9. Letter to the FAA from Arlington County .....	24
Appendix 10. One Pilot's Perspective .....	25

## Appendix 1. Reagan National Airport Usage

Traffic by calendar year (Source: traffic statistics from MWAAs)

	Passengers	Change from previous year	Aircraft operations	Cargo (pounds)
2002	12,881,601	▼ 2.89%	215,691	12,925,992
2003	14,223,123	▲ 10.41%	250,802	12,732,373
2004	15,944,542	▲ 12.10%	268,576	11,182,022
2005	17,847,884	▲ 11.94%	276,056	8,751,702
2006	18,550,785	▲ 3.94%	276,419	7,963,107
2007	18,679,343	▲ 0.69%	275,433	5,544,936
2008	18,028,287	▼ 3.49%	277,298	7,321,546
2009	17,577,359	▼ 2.50%	272,146	12,811,229
2010	18,118,713	▲ 3.08%	271,097	14,506,056
2011	18,823,094	▲ 3.89%	281,770	13,802,787
2012	19,655,440	▲ 4.42%	288,176	13,138,554
2013	20,415,085	3.90%	292,648	4,193,190

### Busiest Domestic Routes from DCA (June 2013 – May 2014)

Rank	Airport	Passengers	Carriers
1	Atlanta, Georgia	802,000	AirTran, Delta
2	Chicago (O'Hare), Illinois	696,000	American, United
3	Boston, Massachusetts	689,000	JetBlue, US Airways
4	New York (LaGuardia), New York	421,000	Delta, US Airways
5	Miami, Florida	405,000	American
6	Orlando, Florida	403,000	AirTran, JetBlue, US Airways
7	Dallas/Fort Worth, Texas	394,000	American
8	Charlotte, North Carolina	296,000	US Airways
9	Minneapolis/St. Paul, Minnesota	290,000	Delta, Sun Country, US Airways
10	Detroit, Michigan	276,000	Delta, US Airways

### Largest Airlines at DCA (April 2014)

Rank	Airline	Passengers
1	American Airlines	1,066,989
2	Delta Air Lines	287,271
3	United Airlines	168,963
4	Southwest Airlines <sup>2</sup>	107,284
5	JetBlue	103,189
6	Alaska Airlines	35,339
7	Frontier Airlines	25,620
8	Air Canada	19,734
9	Sun Country Airlines	10,233
10	Virgin America	7,555



## Appendix 3. Sample Departure Route

(NATNL3.NATNL) 12264

RONALD REAGAN WASHINGTON NATIONAL (DCA)

NATIONAL THREE DEPARTURE

SL-443 (FAA)

WASHINGTON, DC



### DEPARTURE ROUTE DESCRIPTION

TAKEOFF RWY 1: Climbing left turn as soon as practical to intercept DCA VOR/DME R-328 to 5000 or as assigned, thence . . . .

TAKEOFF RWY 4: Climbing right turn as soon as practical to intercept DCA VOR/DME R-070 to 2000 or as assigned, thence . . . .

TAKEOFF RWY 15: Climbing right turn as soon as practical to intercept DCA VOR/DME R-185 to 5000 or as assigned, thence . . . .

TAKEOFF RWY 19: Climb on DCA VOR/DME R-185 to 5000 or as assigned, thence . . . .

TAKEOFF RWY 22: Climbing left turn as soon as practical to intercept DCA VOR/DME R-185 to 5000 or as assigned, thence . . . .

TAKEOFF RWY 33: Climb on DCA VOR/DME R-328 to 5000 or as assigned, thence . . . .

. . . . expect radar vectors to filed/assigned fix. Expect clearance to filed altitude ten (10) minutes after departure.

#### TAKEOFF OBSTACLE NOTES:

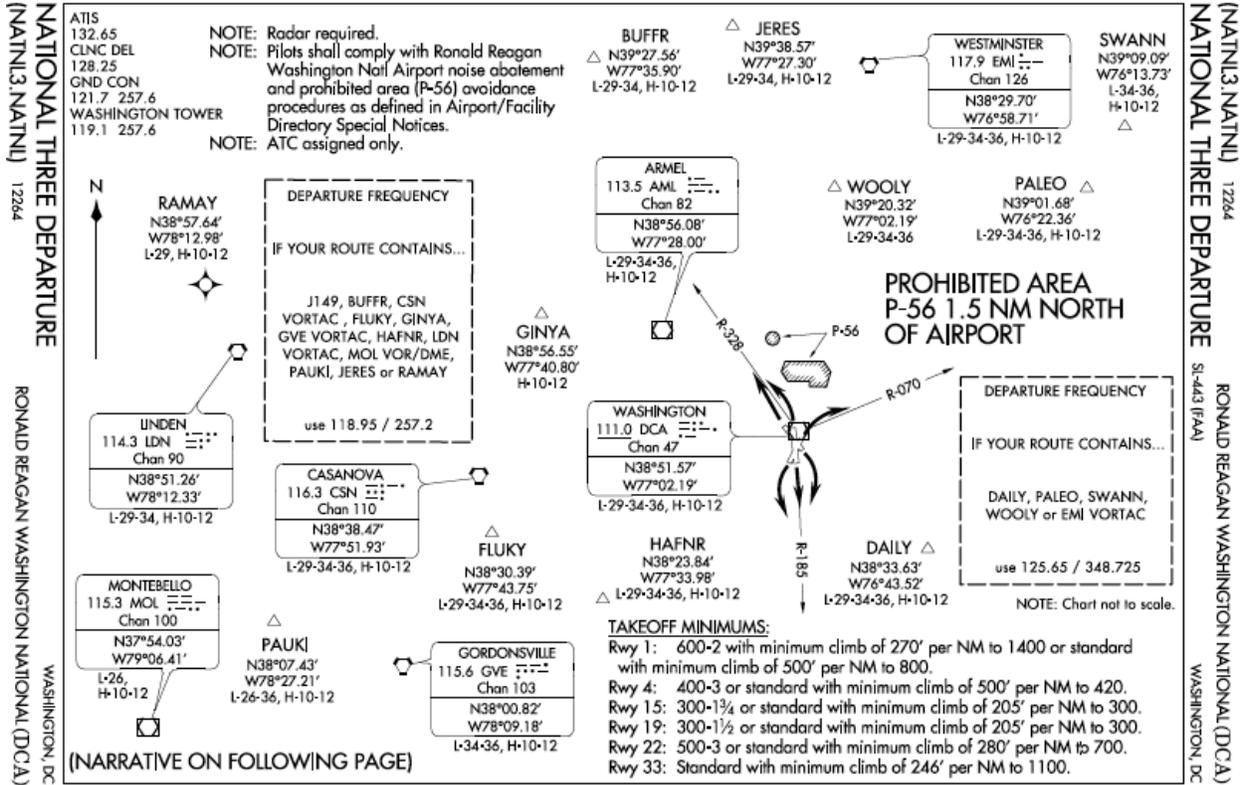
- Rwy 1: Building 119' from DER, 330' right of centerline, 16' AGL/23' MSL. Fence and trees beginning 261' from DER, 211' left of centerline, up to 62' AGL/72' MSL. Trees beginning 1365' from DER, 331' right of centerline, 47' AGL/51' MSL. Monument 1.7 NM from DER, 1784' left of centerline, 556' AGL/596' MSL.
- Rwy 4: Monument 2.4 NM from DER, 656' right of centerline, 307' AGL/377' MSL.
- Rwy 15: Tree 1.4 NM from DER, 1290' left of centerline, 74' AGL/223' MSL.
- Rwy 22: Poles beginning 500' from DER, on centerline, up to 11' AGL/28' MSL. Trees beginning 1024' from DER, 557' right of centerline, up to 78' AGL/90' MSL. Transmission pole 4732' from DER, 888' right of centerline, 100' AGL/149' MSL. Building 4903' from DER, 651' right of centerline, 97' AGL/144' MSL. Tower 1.3 NM from DER, 1421' left of centerline, 170' AGL/223' MSL. Crane 1.7 NM from DER, 1912' right of centerline, 240' AGL/276' MSL. Building 1.9 NM from DER, 2566' right of centerline, 200' AGL/370' MSL.
- Rwy 33: Trees beginning 140' from DER, left and right of centerline, up to 70' AGL/80' MSL. Blast fence beginning 174' from DER, left and right of centerline, up to 9' AGL/24' MSL. Poles beginning 1221' from DER, left and right of centerline, up to 73' AGL/106' MSL. Buildings beginning 1557' from DER, 623' left of centerline, up to 102' AGL/142' MSL. Elevator 1829' from DER, 345' right of centerline, 71' AGL/88' MSL. Flagpole 1.7 NM from DER, 2118' left of centerline, 108' AGL/308' MSL.

NE-3, 21 AUG 2014 to 18 SEP 2014

NE-3, 21 AUG 2014 to 18 SEP 2014

# Appendix 4. Prohibited Area (P-56)

NE-3 21 AUG 2014 to 18 SEP 2014



(NARRATIVE ON FOLLOWING PAGE)

NE-3, 21 AUG 2014 to 18 SEP 2014

## **Appendix 5. §77.17 Obstruction Standards**

---

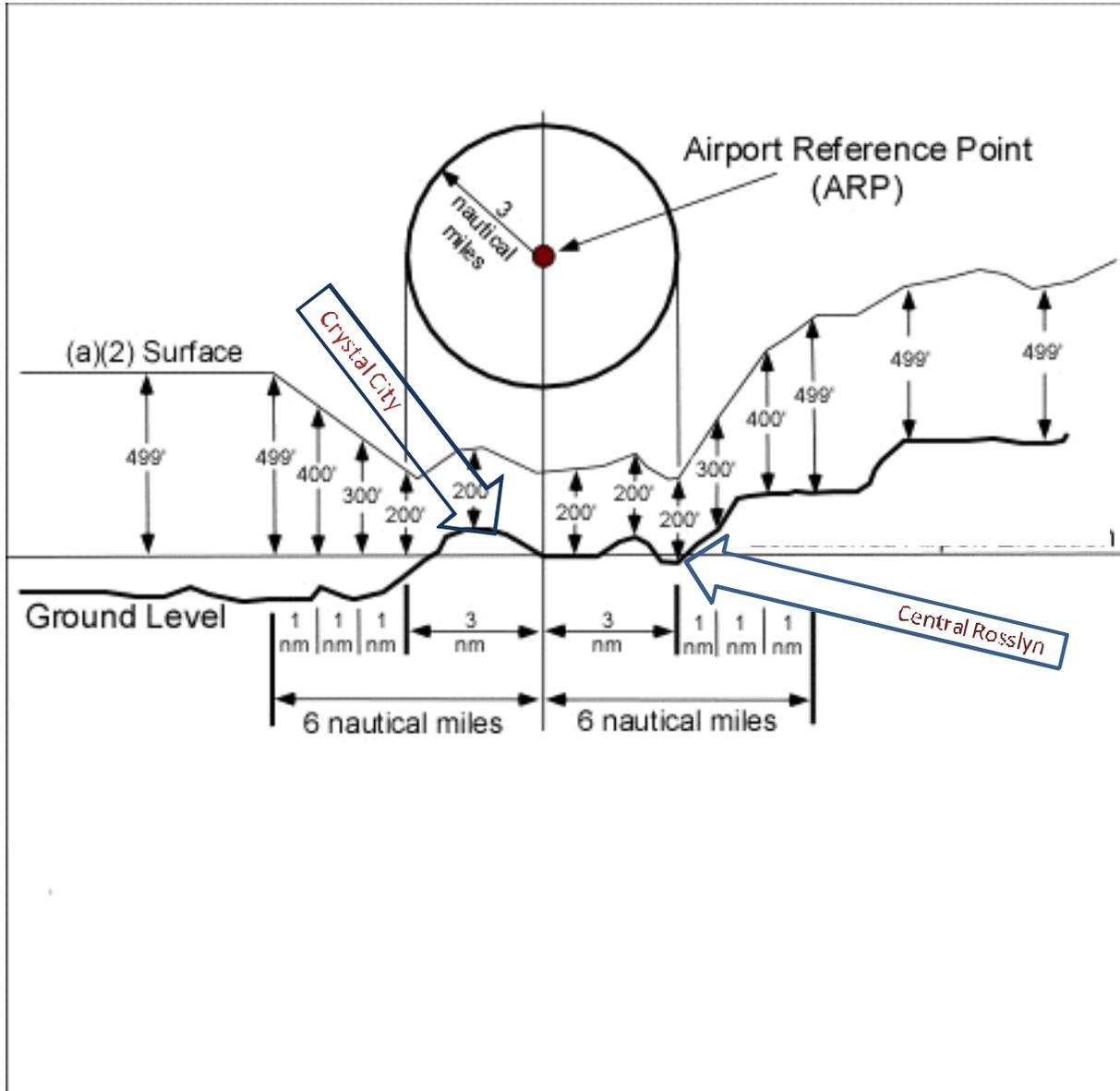
Below is the portion of §77.17 Obstruction Standards that is relevant for Reagan National Airport.

(a) An existing object, including a mobile object, is, and a future object would be an obstruction to air navigation if it is of greater height than any of the following heights or surfaces:

- (1) A height of 499 feet AGL [At Ground Level] at the site of the object.
- (2) A height that is 200 feet AGL, or above the established airport elevation, whichever is higher, within 3 nautical miles of the established reference point of an airport, excluding heliports, with its longest runway more than 3,200 feet in actual length, and that height increases in the proportion of 100 feet for each additional nautical mile from the airport up to a maximum of 499 feet.
- (3) A height within a terminal obstacle clearance area, including an initial approach segment, a departure area, and a circling approach area, which would result in the vertical distance between any point on the object and an established minimum instrument flight altitude within that area or segment to be less than the required obstacle clearance.
- (4) A height within an en route obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the minimum obstacle clearance altitude.
- (5) The surface of a takeoff and landing area of an airport or any imaginary surface established under §77.19, 77.21, or 77.23. However, no part of the takeoff or landing area itself will be considered an obstruction.

## Appendix 6. Part 77 Evaluation Criteria Example

The diagram below is one of several used by the FAA to determine if a proposed structure will be evaluated as a hazard/no hazard to navigation. To illustrate application, the locations of Crystal City and Central Rosslyn are added for the case where Reagan National Airport is at the center (ARP)



# Appendix 7. Structures over 200 Feet AGI

WASHINGTON, DC

AL-443 (FAA)

14149

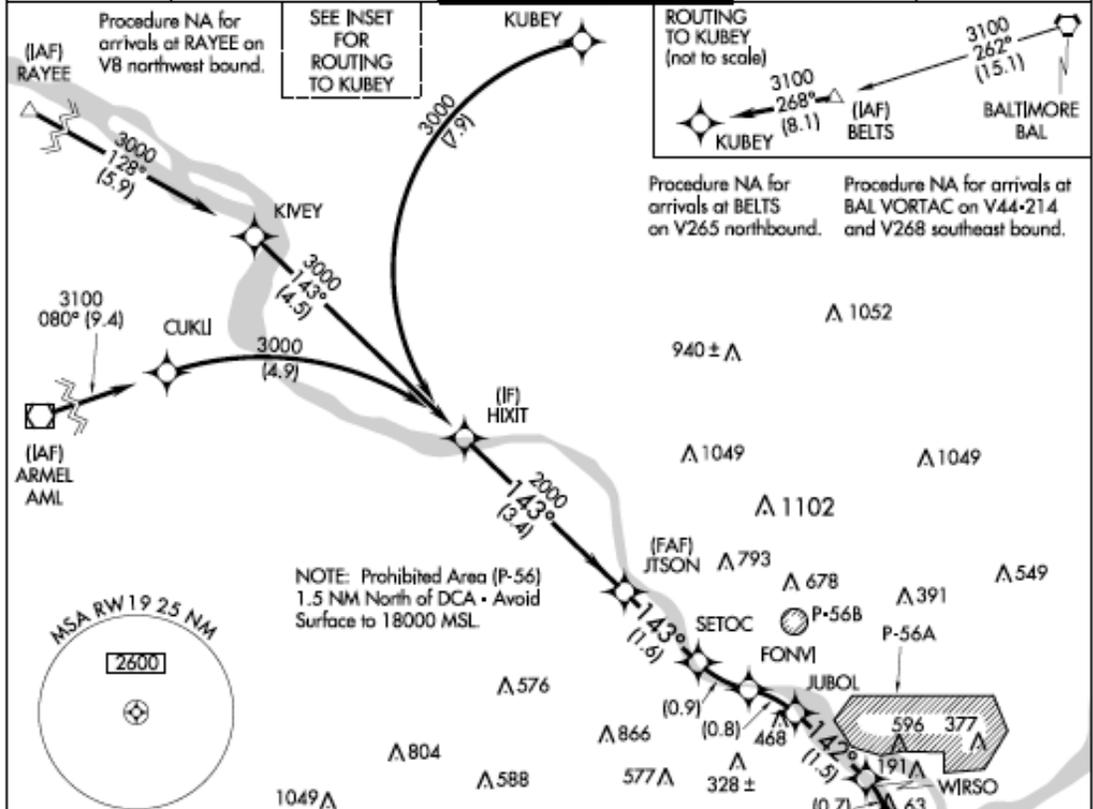
APP CRS	Rwy Idg	<b>6869</b>
<b>184°</b>	TDZE	<b>13</b>
	Apt Elev	<b>15</b>

## RNAV (RNP) RWY 19 RONALD REAGAN WASHINGTON NATIONAL (DCA)

For uncompensated Baro-VNAV systems, procedure NA below -10°C (14°F) or above 54°C (130°F). Inop table does not apply. RF and GPS required. When VGSI Inop, procedure NA.

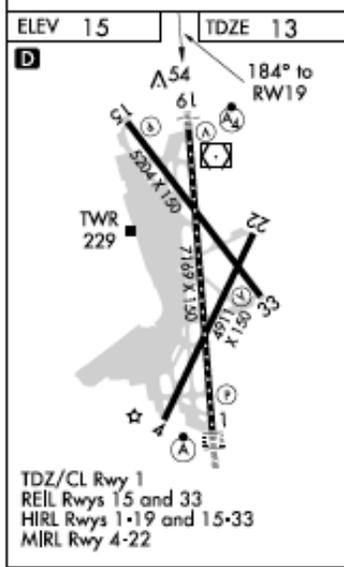
**MALSF**  
MISSED APPROACH: Climb on the final approach track to RW19 then direct BADDN to 1600 and hold.

ATIS	POTOMAC APP CON	<b>WASHINGTON TOWER</b>	GND CON	CLNC DEL
<b>132,65</b>	<b>124,7 338,2</b>	<b>119,1 257,6</b>	<b>121,7 257,6</b>	<b>128,25</b>



NE-3, 21 AUG 2014 to 18 SEP 2014

NE-3, 21 AUG 2014 to 18 SEP 2014



HIXIT	JTSON	SETOC	FONVI	JUBOL	WIRSO	FIROP	RW19
3000	2000	1500	1214	955	480	253	62
GP 3.00° TCH 50							
3.4 NM		1.6 NM	0.9 NM	0.8 NM	1.3 NM	0.7	0.6 NM
CATEGORY	A	B	C	D			
RNP 0.11 DA	491-1½		478 (500-1½)				
RNP 0.30 DA	550-1¾		549 (600-1¾)				

**AUTHORIZATION REQUIRED**

WASHINGTON, DC  
Amdt 1A 29MAY14

RONALD REAGAN WASHINGTON NATIONAL (DCA)  
38°51'N-77°02'W  
**RNAV (RNP) RWY 19**

## **Appendix 8. Airport Safety Zoning**

---

### **Code of Virginia**

§ 15.2-2294. Airport safety zoning.

Every locality in whose jurisdiction a licensed airport or United States government or military air facility is located or (ii) over whose jurisdiction the approach slopes and other safety zones of a licensed airport, including United States government or military air facility extend shall, by ordinance, provide for the regulation of the height of structures and natural growth for the purpose of protecting the safety of air navigation and the public investment in air navigation facilities. The ordinance may be adopted regardless of whether the local governing body has adopted a zoning ordinance applicable to other land uses in the locality. The ordinance may be designed and adopted by the locality as an overlay zone superimposed on any preexisting base zone.

The provisions of the airport safety zoning ordinance shall be in compliance with the rules of the Virginia Aviation Board.

### **Arlington County Zoning Ordinance With Regard To Hazards To Air Navigation:**

§ 14.5. AIRCRAFT LANDING APPROACH AREA

No building meeting Federal Aviation Administration criteria for notice (§77.9 Construction or alteration requiring notice) shall be erected, constructed, reconstructed, structurally altered, enlarged or moved per the requirements in 14 Code of Federal Regulations, part 77 pursuant to 49 U.S.C, Section 44718 as amended, unless the zoning administrator shall have received a letter of clearance from the Federal Aviation Agency.

## **Appendix 9. Letter to the FAA from Arlington County**

---

*Submitted on July 22<sup>nd</sup>, 2014 as the County's position regarding the FAA's proposed rulemaking change to evaluation criteria for obstruction hazards*

Dear Administrator Huerta:

As Ronald Reagan Washington National Airport (DCA) is within our boundary, Arlington County is closely following the proposed policy change cited in Docket No. FAA 2014-0134 to consider one engine inoperative (OEI) procedures in standard CFR part 77 reviews.

We share the FAA's interest in ensuring that air navigation in and around airports is safe, with appropriate plans and procedures in place to account for emergency situations. We also support the long-term economic sustainability of DCA, and recognize the mutual benefits of a healthy local economy and smooth airport operations.

At the same time, Arlington is committed to our long-established smart growth and transit-oriented development policies, which includes creating mixed-use high-density neighborhoods around investments in transit. Our planning is regularly referenced as a national model for economic and environmental sustainability. Just this month Arlington was heralded in a national magazine as "The Suburb of the Future" for creating a place where less than half of residents drive to work, and where seven percent of the land generates fifty percent of the real estate tax revenue.

Over many years Arlington has worked hard to balance the land use planning that produced such outcomes with airport operations at DCA. As a result, we have a significant stake in how our land use plans may be affected by the proposed policy change.

Specifically, the land use plan for central Rosslyn anticipates the addition of 4.5 million square feet of office use and more than 1,000 new housing units over the next 25 years. With more than 9 million square feet of office space, 6,000 residential units and 2,100 hotel rooms already in place, Rosslyn's importance to economic development and sustainability is well-established. Yet its future depends on realizing the development plans, as a means to be economically competitive and overcome the 4,000 jobs lost in Rosslyn due to federal Base Realignment and Closure (BRAC).

Therefore we share the view of other potentially-affected communities that the impacts be thoroughly evaluated through the formal rulemaking process before any change is made. If a change is enacted, we expect to be a full partner with the airport, FAA and other stakeholders in determining how the change would take effect. We have a productive history of working with the airport and the FAA and look forward to continuing this relationship in the future.

Sincerely,

Barbara M. Donnellan  
County Manager

## **Appendix 10. One Pilot's Perspective**

---

Reagan National Airport was built in the early days of commercial aviation when aircraft were propeller-driven and agile due to their slow air speed and lighter weight. Today's heavier swept wing jets need lots of room in the air and on the ground to operate safely.

### **Approach Challenges**

Last second, close-in maneuvering is standard at Washington Reagan and extraordinary low-altitude maneuvering is required:

- The approach course is 145 degrees and the runway heading is 194, so there's an almost 50 degree heading change on final approach that occurs at 424 feet above the ground.
- The wingspan of the 737-800 is over 130 feet long, and the jet is normally sinking at a rate of 700 feet per minute on short final. That means thirty degrees of bank at 400 feet with seconds to touchdown, with each wingtip dipping up to 50 feet in a turn less than 200 feet above the ground.
- The length of the longest runway [1/19] is 6,800 feet and often on final approach, the tower will ask you to sidestep to the 5,200-foot runway [15/33] instead. So before you start the approach, you should determine and memorize your gross weight and stopping distance corrected for wind. In most cases, you'll find that the total is within a couple hundred feet of the shorter runway's length. Then figure in the winds and the runway condition.
- You may need to make hairpin S-shaped turns because more spacing is needed to allow planes to take-off (called "sequencing.")

### **Northbound Departure Issues**

The runway at DCA is aimed at the national mall, which is strictly prohibited airspace that starts 1.5 miles from the end of the runway. Serious maneuvering is required in a 160,000-pound jet crossing the departure end at nearly 200 mph. We're usually configured at a high degree of flaps (5-15 versus the normal leading edge slats only setting of "1"1) so you're climbing steeply. To prevent violating the prohibited airspace, you must maintain the minimum maneuvering speed which means the nose is pitched abnormally high; then you must use maximum bank angle to turn left 45 degrees at only 400 feet above the ground.

---

\*\*\*