

Airspace, the National Airspace System, Air Traffic Control, and Influence on Noise Setting

Presented to the BWI DC Metroplex Community Roundtable

Kurt M. Hellauer, HMMH

February 20, 2018

Agenda

- Introduction / Purpose / Definition of Common Terminology
 - Regulatory Framework
 - Operational Framework
 - Navigable Airspace
 - National Airspace System
- Air Traffic Control
- Airport Capacity
- Factors Influencing Noise from Aircraft Operations
- Questions / Discussion

Introduction

Purpose:

- Acquaint Roundtable Members with Regulatory Framework within which FAA operates, serving as manager and steward of navigable airspace within the US
- Provide an overview of the operational framework within which flight operations and infrastructure investment within the National Airspace System (NAS) are managed



Navigable Airspace

- Similar to the concept of “high seas” and navigable waterways, common/public ownership (US government)
- Includes surface of airports, heliports, seaplane landing areas, etc., and extends outward and upward
 - Navigable airspace means airspace above the minimum altitudes of flight prescribed by regulations issued under 49 USC §40103 including airspace needed to ensure takeoff and landing of aircraft.
 - Embraces operations occurring from the time any person boards an aircraft with intention of flight until all persons have disembarked are occurring within the NAS (49 CFR 830).
- Stewardship and management of navigable airspace provides basis for regulation of aircraft design, airmen certification, air carriers, airport sponsors, air traffic flight rules, and provision of air navigation services
- Federal pre-emption of state/local regulation (generally) of matters involving air commerce
 - Airport operators do not control when or where aircraft fly



National Airspace System (NAS) – What is it?

- FAA Definition (from AIM/PCG)
 - The common network of:
 - US airspace
 - Air navigation facilities
 - Equipment and services
 - Airports or landing areas
 - Aeronautical charts, information, and services
 - Rules, regulations, and procedures
 - Technical information, and
 - Manpower and materiel
 - Includes system components shared jointly with military



U.S. Department
of Transportation
**Federal Aviation
Administration**

October 12, 2017

Aeronautical
Information

Manual Official Guide to
Basic Flight Information and ATC Procedures

10-12-17

Pilot/Controller Glossary

PILOT/CONTROLLER GLOSSARY

PURPOSE

a. This Glossary was compiled to promote a common understanding of the terms used in the Air Traffic Control system. It includes those terms which are intended for pilot-controller communications. Those terms most frequently used in pilot-controller communications are printed in *bold italics*. The definitions are primarily defined in an operational sense applicable to both users and operators of the National Airspace System. Use of the Glossary will preclude any misunderstandings concerning the system's design, function, and purpose.

b. Because of the international nature of flying, terms used in the Lexicon, published by the International Civil Aviation Organization (ICAO), are included when they differ from FAA definitions. These terms are followed by "[ICAO]." For the reader's convenience, there are also cross-references to related terms in other parts of the Glossary and to other documents such as the Code of Federal Regulations (CFR) and the Aeronautical Information Manual (AIM).

c. This Glossary will be revised, as necessary, to maintain a common understanding of the system.

EXPLANATION OF CHANGES

d. Terms Added:
RUNWAY CONDITION CODES (RWYCC)
RUNWAY CONDITION REPORT (RWYCR)
SPECIAL AIR TRAFFIC RULES (SATR)
SPECIAL FLIGHT RULES AREA (SFRA)
WEATHER RECONNAISSANCE AREA (WRA)

e. Terms Modified:
BRAKING ACTION (GOOD, FAIR, POOR, OR NIL)
BRAKING ACTION ADVISORIES
ENHANCED FLIGHT VISION SYSTEM (EFVS)
ESTABLISHED
PRECIPITATION RADAR WEATHER DESCRIPTIONS
RADAR IDENTIFICATION

f. Editorial format changes were made where necessary. Revision bars were not used due to the insignificant nature of the changes.

PCG-1

An electronic version of this publication is on the internet at
<http://www.faa.gov/atpubs>



National Airspace System (NAS) – Roles & Responsibilities

- Airspace Stewardship, Management, and Sovereignty: **US Government (FAA)**
- Certification of Airmen, Aircraft, Airports, Air Carriers, Air Agencies, and Promulgation of Flight Rules: **US Government (FAA); DoD (military airmen, aircraft, and airfields – but not airspace)**
- Provision of Air Traffic Control services: **US Government (FAA and DoD)**
- Communications, Navigation, and Surveillance Infrastructure: **Primarily US Government (FAA/DoD) but also State Aviation Agencies (some NAVAIDs) and airport sponsors (airfield lighting)**
- Airports and Landing Areas: **Airport Sponsor, often State or Municipal government**
 - Public Use (may be privately owned but open to public)
 - Private Use (may be publicly owned, e.g., military airfield but closed to public but normally privately owned)
- Aeronautical Information Services: **US Government and Private Sector Organizations**
 - FAA AeroNav Data and Charts, NOTAMs, Publications
 - Jeppesen Charts and Data
 - Leidos Flight Service Stations
- Flight Safety Standards and Accident Investigation: **FAA and NTSB**



Regulatory Framework

United States Code

Code of Federal Regulations

FAA Orders, Advisory Circulars, Handbooks



Title 49 – 49 US Code (USC) §40103

Sovereignty and Use of Airspace

TITLE 49—TRANSPORTATION

This title was enacted by Pub. L. 95-473, § 1, Oct. 17, 1978, 92 Stat. 1337; Pub. L. 96 Stat. 2413; Pub. L. 103-272, July 5, 1994, 108 Stat. 745

Subtitle	Sec.	TABLE SHOWING DISPOSITION TITLE 49—C
I. DEPARTMENT OF TRANSPORTATION	101	
II. OTHER GOVERNMENT AGENCIES	1101	
III. GENERAL AND INTERMODAL PROGRAMS	5101	
IV. INTERSTATE TRANSPORTATION	10101	
V. RAIL PROGRAMS	20101	
VI. MOTOR VEHICLE AND DRIVER PROGRAMS	30101	
VII. AVIATION PROGRAMS	40101	
VIII. PIPELINES	60101	
IX. [TRANSFERRED]		
X. MISCELLANEOUS	80101	

Title 49 Former Sections	
1(6) (less last sentence)	1
1(7) (1st sentence, 32 words before 8th semicolon-9th semicolon).	1
1(7) (1st sentence words before 2d semicolon, words between 5th semicolon and 21st word after 7th semicolon, 1st-18th words after 9th semicolon, 1st proviso (words before semicolon), 2d, and 3d provisos).	1
1(7) (1st sentence 1st-4th and 13th-20th words after 2d	1

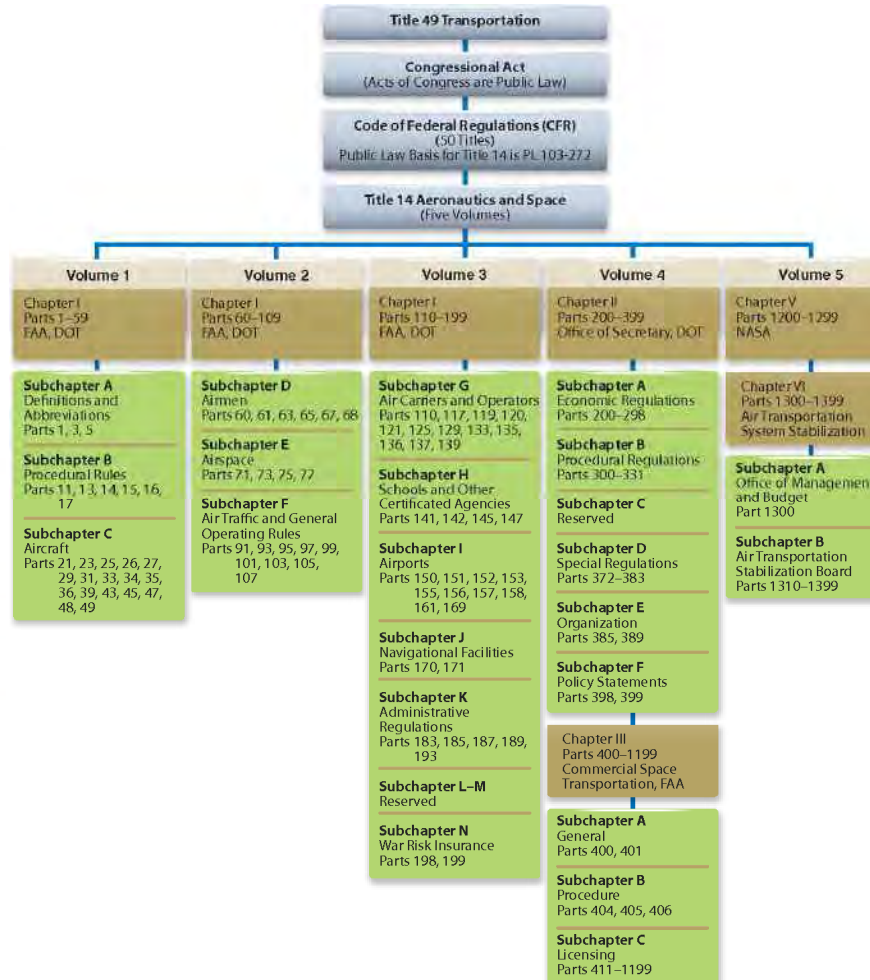
- Navigable Airspace
 - 49 USC §40103 Sovereignty and use of airspace
 - Navigable airspace means airspace above the minimum altitudes of flight prescribed by regulations issued under 49 USC §40103 including airspace needed to ensure takeoff and landing of aircraft.
 - US Government has exclusive sovereignty of airspace of the US
 - Congress delegated to FAA responsibility for *stewardship and management* of navigable airspace
 - Comprehensive regulatory scheme
 - Pre-emption of conflicting state/local regulation
 - Other USG Departments also have a role, including DoD, DHS, etc.
 - A citizen of the US has a public right of transit through navigable airspace



14 Code of Federal Regulations Aeronautics and Space

CHAPTER I—FEDERAL AVIATION ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

SUBCHAPTER A—DEFINITIONS AND GENERAL REQUIREMENTS		
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Subjects Which FAA Regulates as part of “Air Commerce”

- Airmen (14 CFR 61, 65, 67)
- Air Carriers, Commercial Operators and Air Agencies (14 CFR 119, 121, 135)
- Air Traffic (Rules of the Road) (14 CFR 91)
- Airports (14 CFR 139, 150)
- Aircraft Design (14 CFR 21, 23, 25, 36)
- Aircraft Maintenance (14 CFR 43, 145)



Air Traffic Control

Personnel

Communications, Navigation, and Surveillance Infrastructure

Aeronautical Information

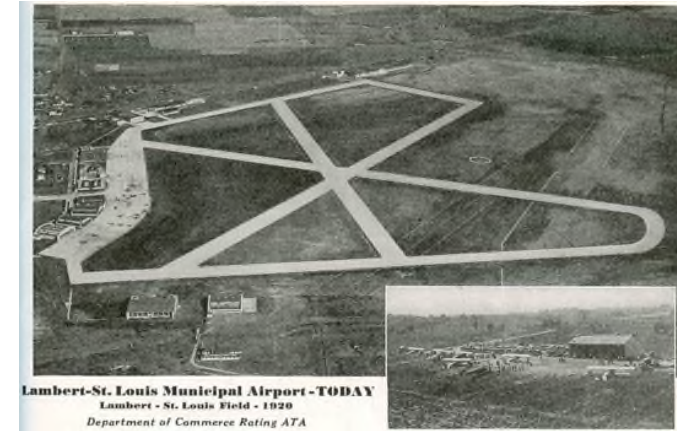
“Rules of the Road”



Air Traffic Control and the NAS

- Personnel

- Archie League
 - Regarded as “first” air traffic controller
 - Lambert Field, St. Louis
 - 1929
 - Daylight / Semaphores
- FAA employs more than 14,000 air traffic controllers
- Approximately 1,400 non-FAA employees work for contractors at Federally Contracted Towers (FCT)



Air Traffic Control and the NAS

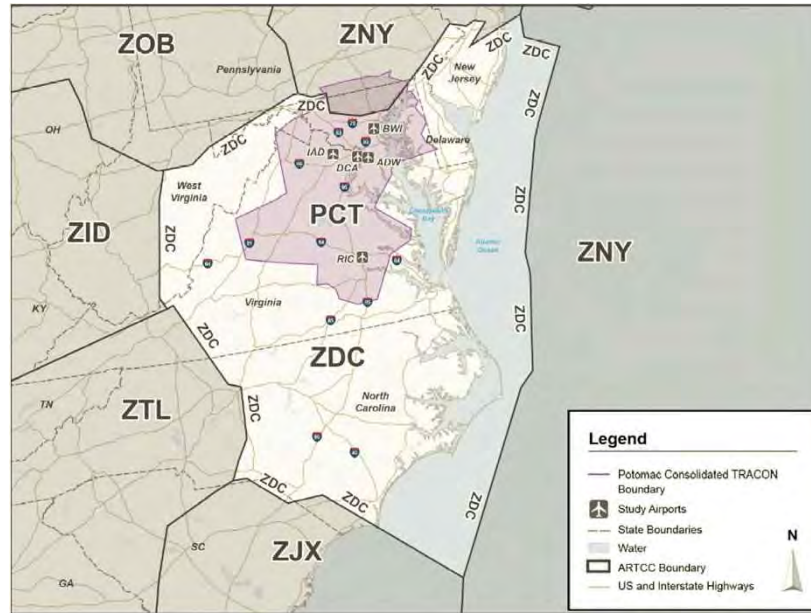
- Infrastructure / Equipment
 - Communications
 - Navigation
 - Surveillance
- NEXTGEN upgrades all 3 elements of CNS
- Facility Types
 - Communications
 - Air Traffic Control Tower (ATCT) – *Airport Surface & Immediate Environs*
 - Terminal Radar Approach Control (TRACON) – *region & low-altitude strata (~5 to 40 miles from airport, ~10,000 feet)*
 - Air Route Traffic Control Center (ARTCC) – *en route phase of flight between terminal areas (spans several states)*



Air Traffic Control and the NAS

- Infrastructure / Equipment

- Communications
- Navigation
- Surveillance



Notes:
 PCT – Potomac Consolidated TRACON
 ZID – Indianapolis ARTCC
 ZTL – Atlanta ARTCC
 ZDC – Washington ARTCC
 ZNY – New York ARTCC
 ZJX – Jacksonville ARTCC
 ZOB – Cleveland ARTCC



- BWI ATCT
- Potomac TRACON
 - A TRACON serves as interface between the high-altitude, en route environment and the airport surface
 - POTOMAC TRACON (PCT) is the consolidation of five smaller TRACONS that each individually served BWI, ADW, IAD, DCA, and RIC
 - Operations at other Primary Airports (ADW, DCA, IAD) influence arrival and departure flows at BWI
- ZDC ARTCC (Washington Center)
 - An Air Route Traffic Control Center provides separation services in the “en route” environment, away from the terminal area (TRACON) and the immediate vicinity of the airport (Air Traffic Control Tower)



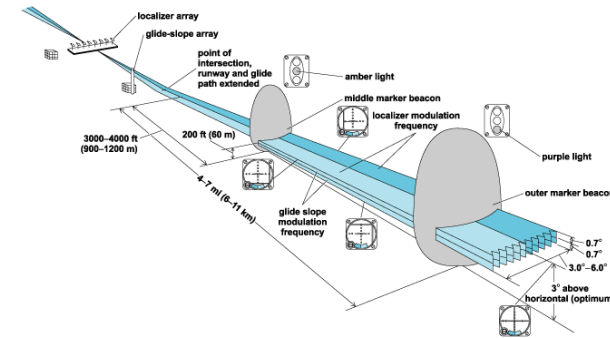
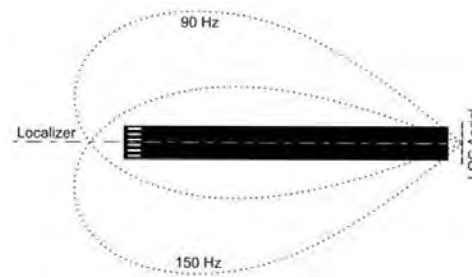
Air Traffic Control and the NAS

■ Infrastructure / Equipment

- Communications
- Navigation (1 of 4)
- Surveillance

■ Facility Types

- Navigation
 - ILS (Airport Vicinity)
 - Localizer
 - Glisdeslope
 - Range Markers
 - Approach Lighting
 - VOR/TACAN (Terminal / En route)



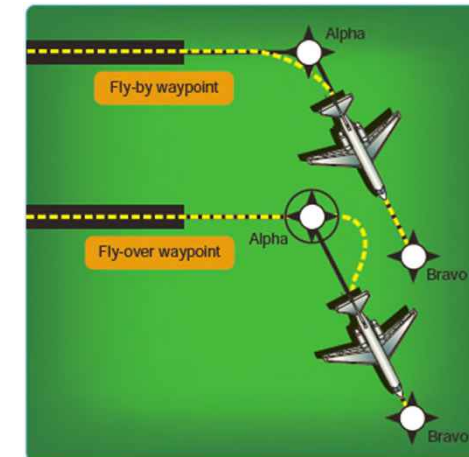
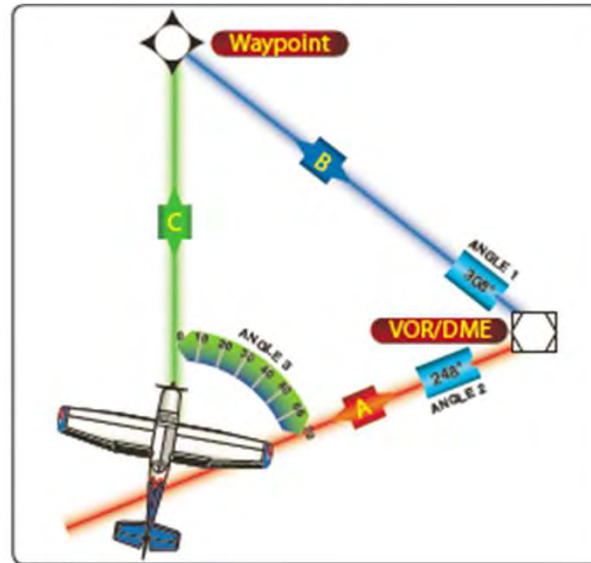
Air Traffic Control and the NAS

■ Infrastructure / Equipment

- Communications
- Navigation (2 of 4)
- Surveillance

■ Facility Types

- Navigation
 - Area Navigation (RNAV)
 - Terminal
 - Enroute
 - May be satellite (GPS), terrestrially based (DME/DME), or self-contained (inertial)



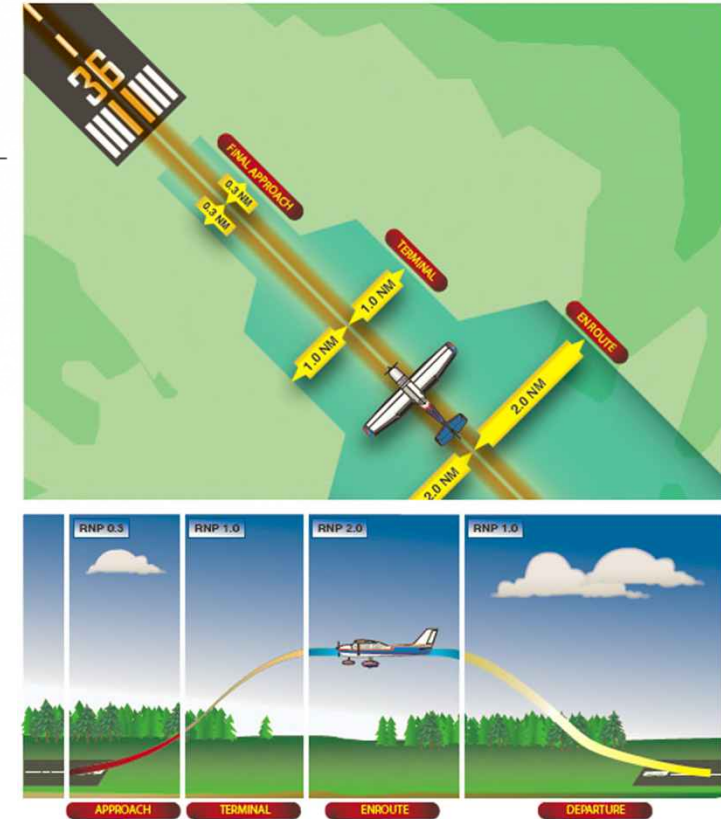
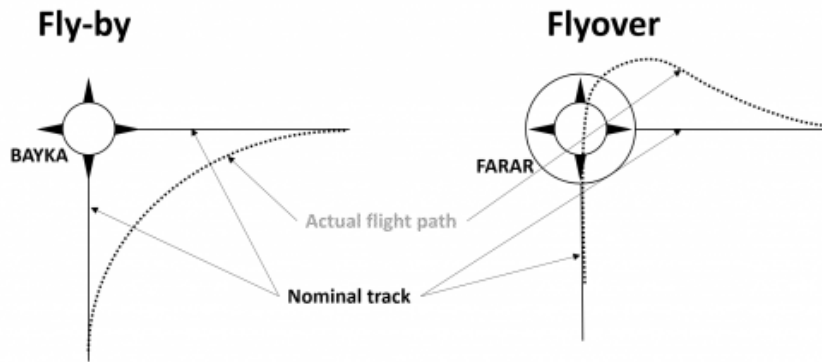
Air Traffic Control and the NAS

■ Infrastructure / Equipment

- Communications
- Navigation (3 of 4)
- Surveillance

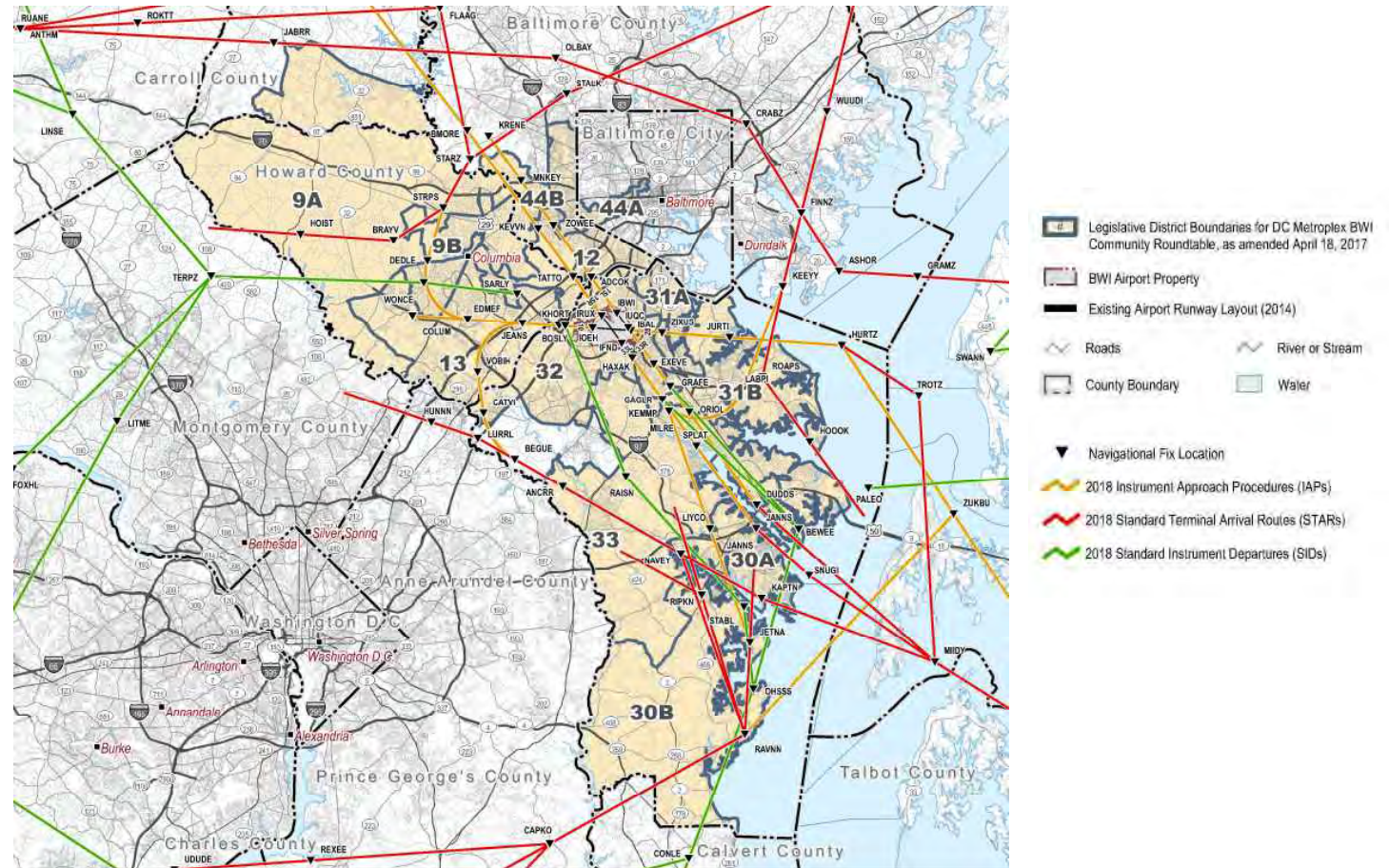
■ Facility Types

- Navigation
 - Area Navigation (RNAV)
 - *Waypoints*
 - *Fly-over*
 - *Fly-by*
 - *PBN*
 - *RNP*



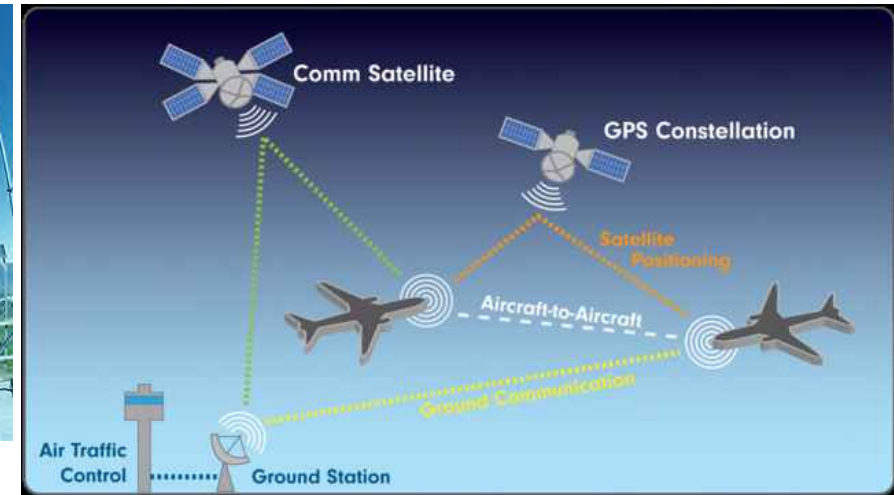
Air Traffic Control and the NAS

- Infrastructure / Equipment
 - Communications
 - Navigation (4 of 4)
 - Surveillance
- Procedures
 - Utilize various navigational facility types to construct published flight routes
 - Departure
 - Standard Instrument Departures (SIDs)
 - En-route
 - Victor Airways/T-Routes (low altitude)
 - Jet Routes/Q-Routes (high altitude)
 - Arrival
 - Standard Terminal Arrival Routes (STARs)
 - Instrument Approach Procedures (IAPs)
 - Charted Visual Flight Procedures (CVFPs)




Air Traffic Control and the NAS

- Infrastructure / Equipment
 - Communications
 - Navigation
 - Surveillance
- Facility Types
 - Surveillance
 - Position Reporting
 - Primary / Secondary Radar
 - Aircraft skin
 - Secondary Surveillance Beacon
 - ADS-B
 - GPS-derived position reporting



Air Traffic Control and the NAS

- “Rules of the Road”
 - For the aircraft operator:
 - 14 CFR Part 91
 - Operations Specifications incorporated into Air Carrier or Operating Certificate issued under 14 CFR Part 121 or 135
 - Limitations in Aircraft Flight Manuals or Handbooks issued by aircraft manufacturer
 - For the Air Traffic Controller:
 - JO 7110.65X *Air Traffic Control*

 U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Air Traffic Organization Policy

ORDER
JO 7110.65X

Effective Date:
October 12, 2017


SUBJ: Air Traffic Control

This order prescribes air traffic control procedures for air traffic control services. Controllers are responsible for their operational responsibilities in situations not covered by it.

Original Signed By: Elizabeth L. Ray

Elizabeth L. Ray
Vice President, Mission Support Services
Air Traffic Organization

Date: August 17, 2017

 U.S. Department of Transportation
Federal Aviation Administration

Air Carrier Certificate

This certifies that

International Jet Aviation Services, Inc.
8511 Aviator Lane
Centennial, CO 80112

has met the requirements of the Federal Aviation Act of 1958, as amended, and the rules, regulations, and standards prescribed thereunder for the issuance of this certificate and is hereby authorized to operate as an air carrier in accordance with said Act and the rules, regulations, and standards, and the terms, conditions, and limitations contained herein.

This certificate is not transferable and, unless so stated, shall continue in effect indefinitely.

Distribution: ZAT-710, ZAT-464

Certificate number: CJFA152C

Effective Date: April 8, 2008
(Reissued May 20, 2008)

Issued at: Denver FSDO


FAA Form 8430-18 (6-87)

AFS Electronic Form



MODEL 525
525-0685 AND -0800 AND ON

SUPPLEMENT 1
CITATION PERFORMANCE CALCULATOR (CPCalc)

APPROVED BY: 
John Buena, Lead ODA Administrator
Citation Aircraft Company
Organization Designation Authorization ODA-100125-CE
FAA Approved Under 14 CFR Part 135 Subpart D

DATE OF APPROVAL: 06 DEC 2013

6 DECEMBER 2013
8 MARCH 2014



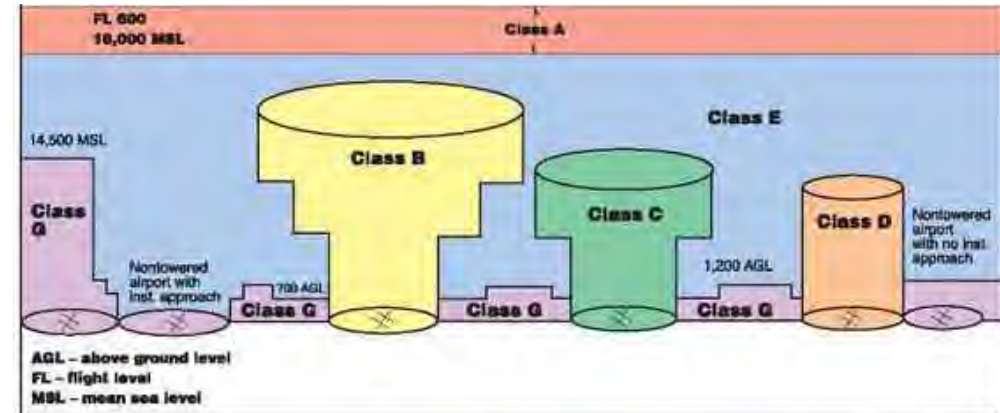
Air Traffic Control and the NAS

- 14 CFR 91 General Operating & Flight Rules
 - Places responsibility and final authority as to operation of flight on Pilot in Command and provides authority to deviate from any regulation to extent required for emergency (§91.3)
 - Otherwise, compliance with ATC Clearances and Instructions is required (§91.123)
 - Defines specific airspace classifications within which aircraft may operate in terms of:
 - weather conditions,
 - pilot qualifications,
 - equipment, and communications requirements



Air Traffic Control and the NAS

- 14 CFR 91 *General Operating & Flight Rules*
 - Defines Instrument/Visual Meteorological Conditions (IMC/VMC) in terms of cloud ceiling and flight visibility
 - Aircraft operate under either Instrument Flight Rules (IFR) or Visual Flight Rules (VFR)
 - Aircraft operating under IFR often experience VMC
 - Operations specifications issued to air carriers under 14 CFR Part 121 rarely authorize operations under VFR and all flight above 18,000' occur under IFR by regulation
 - Airspace Classes
 - Class A (Positive Control Airspace)
 - Class B (Terminal Control Area)
 - Class E (Controlled Airspace)
 - Class G (Uncontrolled Airspace)



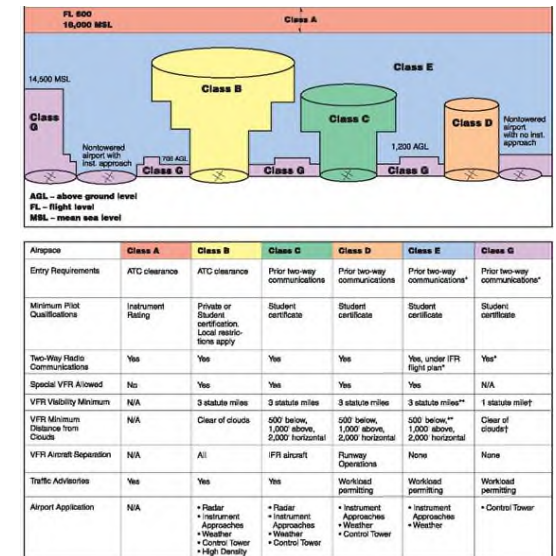
Airspace	Class A	Class B	Class C	Class D	Class E	Class G
Entry Requirements	ATC clearance	ATC clearance	Prior two-way communications	Prior two-way communications	Prior two-way communications*	Prior two-way communications*
Minimum Pilot Qualifications	Instrument Rating	Private or Student certification. Local restrictions apply	Student certificate	Student certificate	Student certificate	Student certificate
Two-Way Radio Communications	Yes	Yes	Yes	Yes	Yes, under IFR flight plan*	Yes*
Special VFR Allowed	No	Yes	Yes	Yes	Yes	N/A
VFR Visibility Minimum	N/A	3 statute miles	3 statute miles	3 statute miles	3 statute miles**	1 statute mile†
VFR Minimum Distance from Clouds	N/A	Clear of clouds	500 below, 1,000' above, 2,000' horizontal	500 below, 1,000' above, 2,000' horizontal	500 below,** 1,000' above, 2,000' horizontal	Clear of clouds†
VFR Aircraft Separation	N/A	All	IFR aircraft†	Runway Operations	None	None
Traffic Advisories	Yes	Yes	Yes	Workload permitting	Workload permitting	Workload permitting
Airport Application	N/A	• Radar • Instrument Approaches • Weather • Control Tower • High Density	• Radar • Instrument Approaches • Weather • Control Tower	• Instrument Approaches • Weather • Control Tower	• Instrument Approaches • Weather	• Control Tower



Air Traffic Control and the NAS

Airspace Classifications

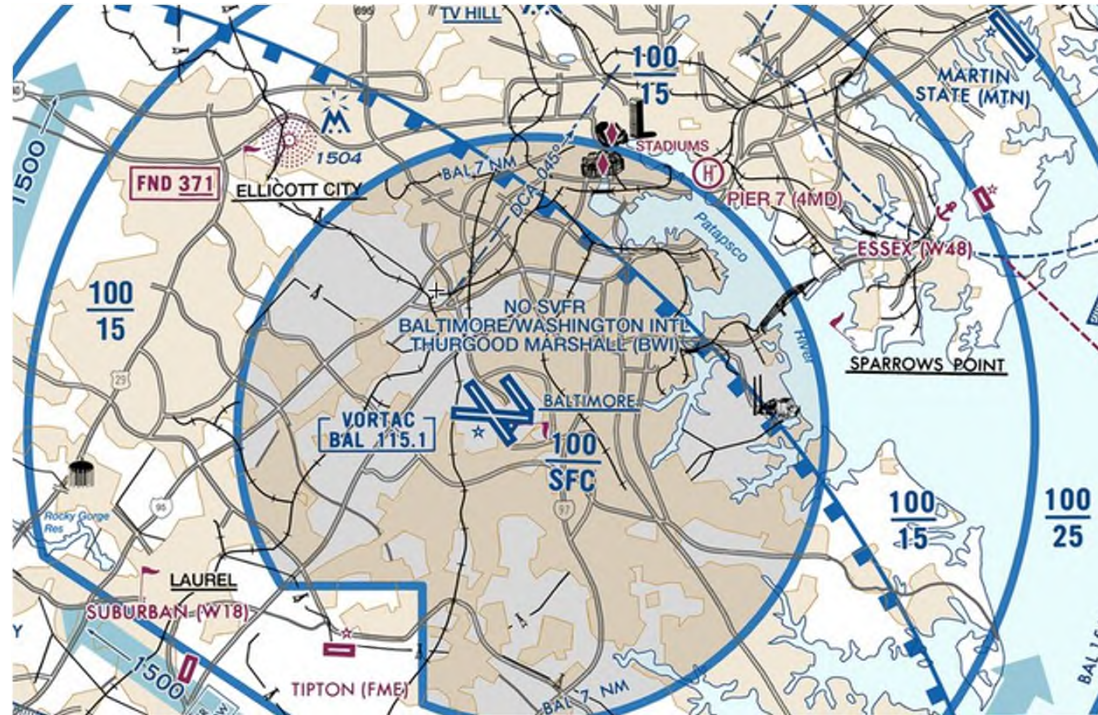
- Provision of ATC Separation Services Requires Means of Requiring Participation by Aircraft
- Controlled v. Uncontrolled
 - Controlled airspace merely means that a volume of airspace has been defined by metes-and-bounds, published at 14 CFR Part 97, and is charted for the purpose of providing air traffic control separation services (by means of an ATC clearance) from an air navigation service provider (FAA in the US)
 - Differences Among Controlled Airspace Designations Revolve around:
 - Entry Requirements: whether a prior clearance (Class A, B) or prior two-way communications (Class C, D, E – IFR ops only) is required
 - Minimum Airmen Certification and Rating Level (e.g., Private Pilot, IFR Rating)
 - Aircraft Equipage (Two-way radio communications, Surveillance Equipment)
 - Weather (minimum allowable cloud clearance, ceilings, in-flight visibility for operations under VFR)
 - Uncontrolled airspace (Class G)
 - No air traffic control separation services are provided and there is no clearance/communication requirement



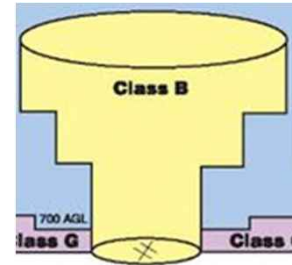
Air Traffic Control and the NAS

■ Airspace Classifications

- BWI lies within Class B airspace
 - Class B Airspace – associated with busiest airports (scheduled air carrier) in the nation
 - Part of the a broader, regional airspace setting (Potomac TRACON)
 - IFR and VFR operations permitted
 - No student pilots
 - Specific clearance required prior to entry (airborne) or movement on the surface
 - Two way radio, appropriate navigation aids, and surveillance equipment are required aircraft equipage



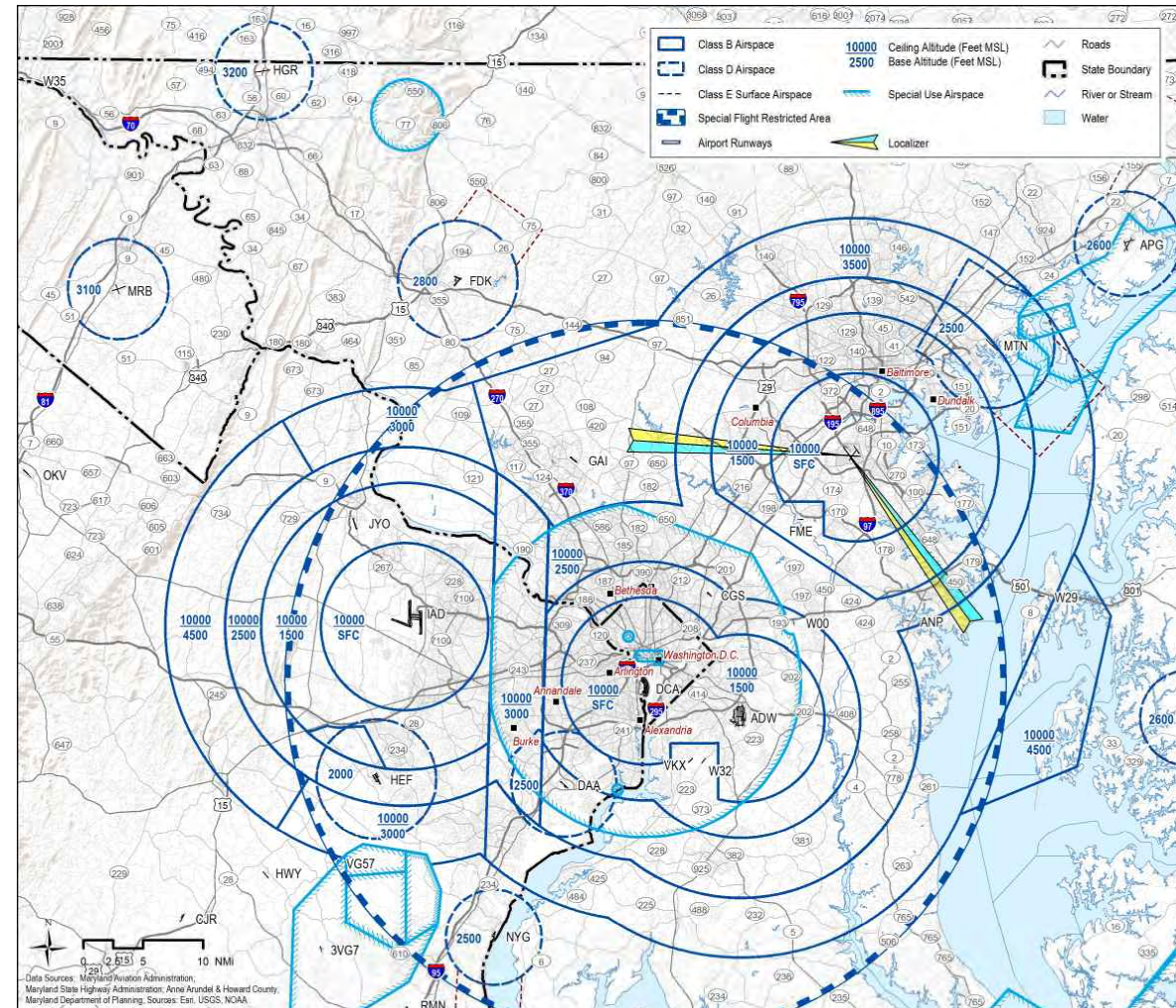
BWI Class B Airspace (7-NM radius, Surface to 10,000 Feet above Mean Sea Level)



Air Traffic Control and the NAS

■ Airspace Classifications

- BWI lies within Class B airspace
 - Part of larger Potomac Consolidated TRACON airspace serving 4 primary (IAD/DCA/ADW/BWI) and numerous satellite airports
 - Departure/Arrival flows at IAD and ADW influence flows at BWI
 - Other influences on air routes include:
 - Significant volumes of Special Use Airspace in region
 - Terrain (mountains to west, Chesapeake Bay to east)



Air Traffic Control and the NAS

- ATC Service
 - Mission and Purpose
 - **Primary:** Prevent collisions involving aircraft operating in the NAS (*separation service*)
 - **Secondary:** Provide safe, orderly, and expeditious flow of air traffic
 - ATC Responsible for Separating Aircraft
 - From other aircraft (including aircraft wake)
 - Runway separation standards
 - Airborne separation standards
 - From terrain
 - From adverse/hazardous weather
 - When meteorological conditions permit, pilots share responsibility
 - Fundamental Tools in ATC Toolbox
 - Controlled Airspace
 - Cannot exercise ATC outside of it
 - Varying degrees of control exercised
 - ATC Clearance



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Air Traffic Organization Policy

ORDER
JO 7110.65X

Effective Date:
October 12, 2017

SUBJ: Air Traffic Control

This order prescribes air traffic control procedures and phraseology for use by personnel providing air traffic control services. Controllers are required to be familiar with the provisions of this order that pertain to their operational responsibilities and to exercise their best judgment if they encounter situations not covered by it.

Original Signed By: Elizabeth L. Ray

Elizabeth L. Ray
Vice President, Mission Support Services
Air Traffic Organization

Date: August 17, 2017

Distribution: ZAT-710, ZAT-464

Initiated By: AJV-0
Vice President, System Operations Services



Air Traffic Control and the NAS

- ATC System Relies Upon Common Set of:
 - Flight Rules (Visual v. Instrument)
 - Under VFR, pilot is responsible for aircraft separation
 - VFR operation is somewhat random (although normally predictable)
 - Under IFR and within Controlled Airspace, the Air Navigation Service Provider (FAA) is responsible for separating aircraft
 - Principal Reasons for IFR are to enable all-weather operations and, at higher altitudes / faster aircraft speeds, assure “positive control” of all operations
 - Positive control means movement only occurs after receipt of prior clearance, along a predicted/specified route (airway), vector, altitude, speed, and time
 - Pilot is always responsible to “see and avoid” other aircraft if weather conditions permit, even under IFR



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Air Traffic Control and the NAS

- ATC System Relies Upon Common Set of:
 - Minimum Separation Standards for IFR Aircraft in Flight and on the Surface
 - Facilities
 - Communications Infrastructure
 - Navigation Aids and Lighting Infrastructure
 - Surveillance Infrastructure
 - Minimum Training and Certification Standards for Airmen and Controllers
 - Defined Airspace Within which ATC Separation Services Are Provided



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Air Traffic Control and the NAS

- ATC Separation Techniques and Standards
 - Aircraft operating under IFR (from other IFR Aircraft)
 - Procedural / Non-Radar (miles or time in trail based on position reporting)
 - Radar (3 or 5 miles / 1000 feet) depending upon type and distance from surveillance radar equipment transmitter
 - Visual approach under IFR – separation responsibility from terrain/aircraft transfers from ATC to pilot
 - VFR Aircraft
 - No VFR at high altitudes (above 18,000)
 - Generally, see-and-avoid (except in Class B)
 - Class B Airspace = positive control
 - All aircraft require clearance prior to entry (similar to IFR)
 - VFR/IFR separation = 1.5 miles/500'



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Air Traffic Organization Policy

ORDER
JO 7110.65X

Effective Date:
October 12, 2017

SUBJ: Air Traffic Control

This order prescribes air traffic control procedures and phraseology for use by personnel providing air traffic control services. Controllers are required to be familiar with the provisions of this order that pertain to their operational responsibilities and to exercise their best judgment if they encounter situations not covered by it.

Original Signed By: Elizabeth L. Ray

Elizabeth L. Ray
Vice President, Mission Support Services
Air Traffic Organization

Date: August 17, 2017

Distribution: ZAT-710, ZAT-464

Initiated By: AJV-0
Vice President, System Operations Services



NAS Factors That Influence Noise

NAS Factors That Influence Noise Exposure

- Air Carriers and Other Operators (14 CFR Parts 91, 119, 121, and 135)
 - Activity Levels
 - Passenger Enplanements
 - Operations Activity Levels (daily/annual)
 - Fleet Mix
- Regional Airspace Setting (14 CFRs 71, 73, 77, 97, and FAAO 8360.3B (TERPS))
- Air Traffic Control (FAAO 7110.65X) and Associated Facilities / Airways / Procedures
- Aircraft Design and Certification (14 CFR Parts 21, 25, and 36)
- Airport Design, Throughput, and Certification
 - Safety (14 CFR Part 139)
 - Design Aircraft for which Airport is Designed (AC 150-5300)
 - Runway Geometry / Airfield Layout / Effect on Throughput
 - Runway Selection / Use
 - Aircraft Limitations
 - Wind
 - Operations at other airports

Questions?



Supplemental Information

Overview of Federal Aviation Regulations

(1 OF 2)

Domain	Instrument / Evidence of Compliance	Cross-Reference
Airmen (Parts 61, 65, 67, 68)	Airmen Certificate: (Pilot, Instructor, Dispatcher, Mechanic, Air Traffic Tower Operator) Medical Certificate	See Parts 91, 121 and 135 for minimum crew certification/experience requirements to conduct certain operations (e.g., scheduled air carrier, on-demand air taxi, not-for-hire, etc.)
Air Carriers & Commercial Operators (Parts 119, 121, 135, 137)	Air Carrier Certificate: (large airline) Operating Certificate & Operations Specifications: (on-demand, air taxi, commuter) Letter of Authorization: (air tour)	Numerous linkages to other domains (e.g., requirement that Air Carriers use Part 139 certificated airports, employ Part 61 ATP/Commercial Pilots, operate aircraft certificated under Part 21/23/25, operate under IFR, etc.)

Overview of Federal Aviation Regulations

(2 OF 2)

Domain	Instrument / Evidence of Compliance	Cross-Reference
Aircraft Design (Parts 21, 23, 25, 36) Aircraft Maintenance (Part 43) Air Agency: Repair Station (Part 145)	Type Certificate: (Aircraft Model Design [to manufacturer]) Supplemental Type Certificate: (Aftermarket) Airworthiness Certificate: (Each Individual Aircraft)	Airworthiness = an aircraft manufactured in accordance with type certificate, maintained and inspected per Part 43, and substantially in same condition (pre-flight walkaround)
Airports (Parts 139, 150, 161)	Airport Operating Certificate Noise Exposure Map / Noise Control Plan	Part 139 establishes minimum standards for Aircraft Rescue and Firefighting (ARFF), obstructions, wildlife management.
Airspace (Parts 71, 73, 77)	Aeronautical Information and Databases Aeronautical Charts & Publications	Part 71 defines metes-and-bounds for ATC airspace, etc. Part 73 defines metes-and-bounds for Special Use Airspace



Airport Capacity

Definition

Factors Influencing Capacity

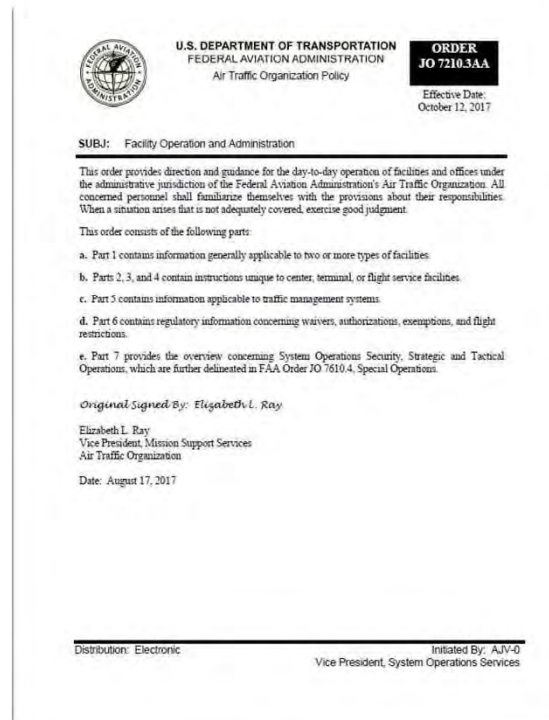
BWI Capacity Analysis

Airport Capacity

■ Airport Arrival Rate

- Dynamic parameter specifying number of arrival aircraft that an airport, in conjunction with terminal airspace, can accept under specific conditions throughout any consecutive sixty(60) minute period.

FAA Order 7210.3AA Facility Operation & Administration (2017)



10/12/17

JO 7210.3AA

Section 7. Airport Arrival Rate (AAR)

10-7-1. PURPOSE

To establish standards for determining the airport arrival rate (AAR).

10-7-2. POLICY

Airport runways are assets of the National Airspace System (NAS). System-wide standards for AARs enable the Air Traffic Organization (ATO) to manage these assets in the most efficient manner.

10-7-3. DEFINITIONS

a. AAR: A dynamic parameter specifying the number of arrival aircraft that an airport, in conjunction with terminal airspace, can accept under specific conditions throughout any consecutive sixty (60) minute period.

b. Airport Primary Runway Configuration: An airport runway configuration which handles three (3) percent or more of the annual operations.

10-7-4. RESPONSIBILITIES

a. System Operations Services is responsible for the development, establishment, and implementation of AARs at select airports in the NAS.

b. The Deputy Director of System Operations (DDSO) in collaboration with Terminal Facility Managers must:

1. Identify the airport primary runway configurations for airport(s) identified by System Operations Services.

2. Establish optimal AARs for airport(s) using the method detailed in para 10-7-5, Calculating AARs.

3. Review and validate the airport primary runway configurations and associated AARs in February of each year, or at more frequent intervals if required.

NOTE-
In the event consensus cannot be reached between facilities, the DDSO will make the final determination.

c. DDSO: must ensure that the data is entered in the National Traffic Management Log (NTML) under the runway template.

d. Consistent with para 10-1-6, Selecting Active Runways, Terminal Facility Managers must ensure efficiency at airport(s) within their jurisdiction consistent with the goals outlined in the Administrator's Flight Plan.

10-7-5. CALCULATING AARs

a. Calculate optimal AAR values for each airport runway configuration for the following weather conditions:

1. Visual Meteorological Conditions (VMC)- Weather allows vectoring for a visual approach.

2. Marginal VMC- Weather does not allow vectoring for a visual approach, but visual separation on final is possible.

3. Instrument Meteorological Conditions (IMC)- Visual approaches and visual separation on final are not possible.

4. Low IMC- Weather dictates Category II or III operations, or 2.5 miles-in-trail (MIT) on final is not available.

b. Calculate the maximum runway arrival capacity for each runway using the following methodology:

1. Determine the average ground speed crossing the runway threshold and the spacing interval required between successive arrivals.

2. Divide the ground speed by the spacing interval or use TBL 10-7-1, Maximum Runway Capacity, to determine the maximum runway arrival capacity.

FORMULA:
Ground Speed in knots at threshold / Spacing Interval at runway threshold in miles

NOTE-
When the maximum runway arrival capacity is a fraction, round down to the next whole number.

EXAMPLE-
1. $130 / 3.25 = 40$ Runway capacity = 40
2. $125 / 3.0 = 41.66$ Runway capacity = 41

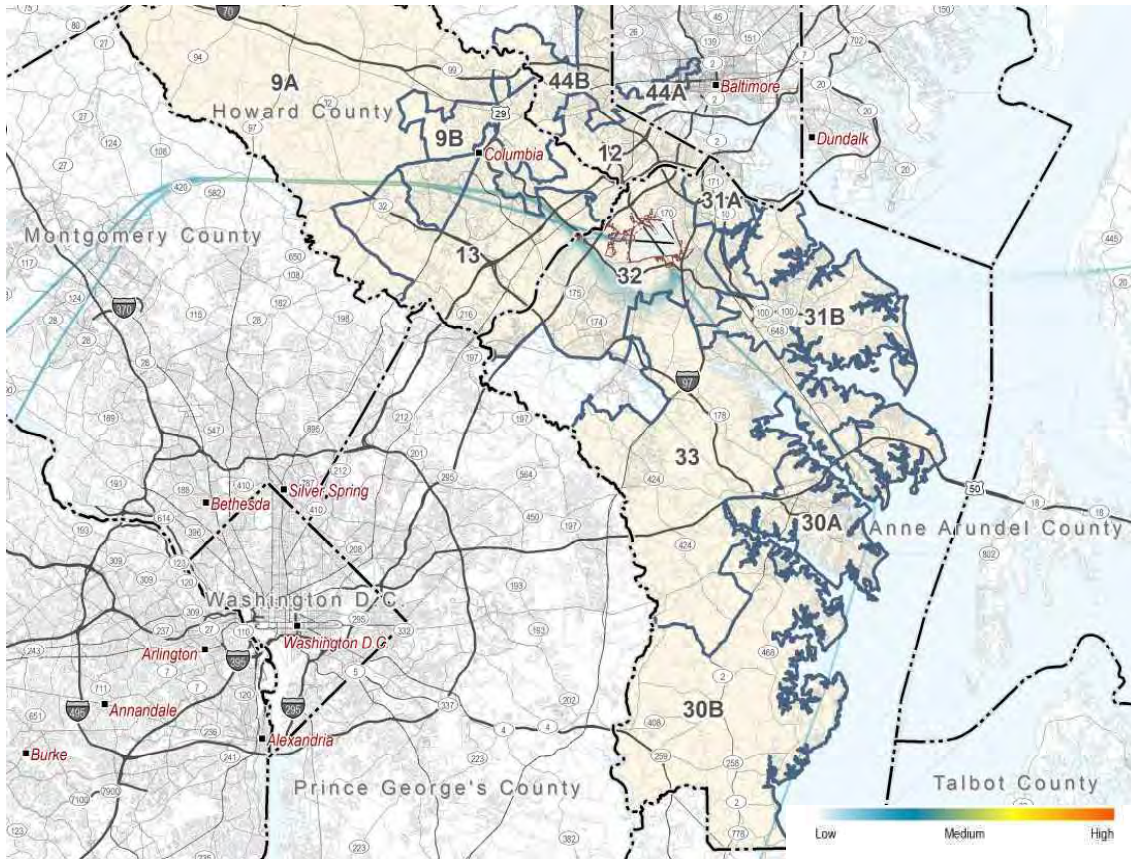
Airport Arrival Rate (AAR)

10-7-1

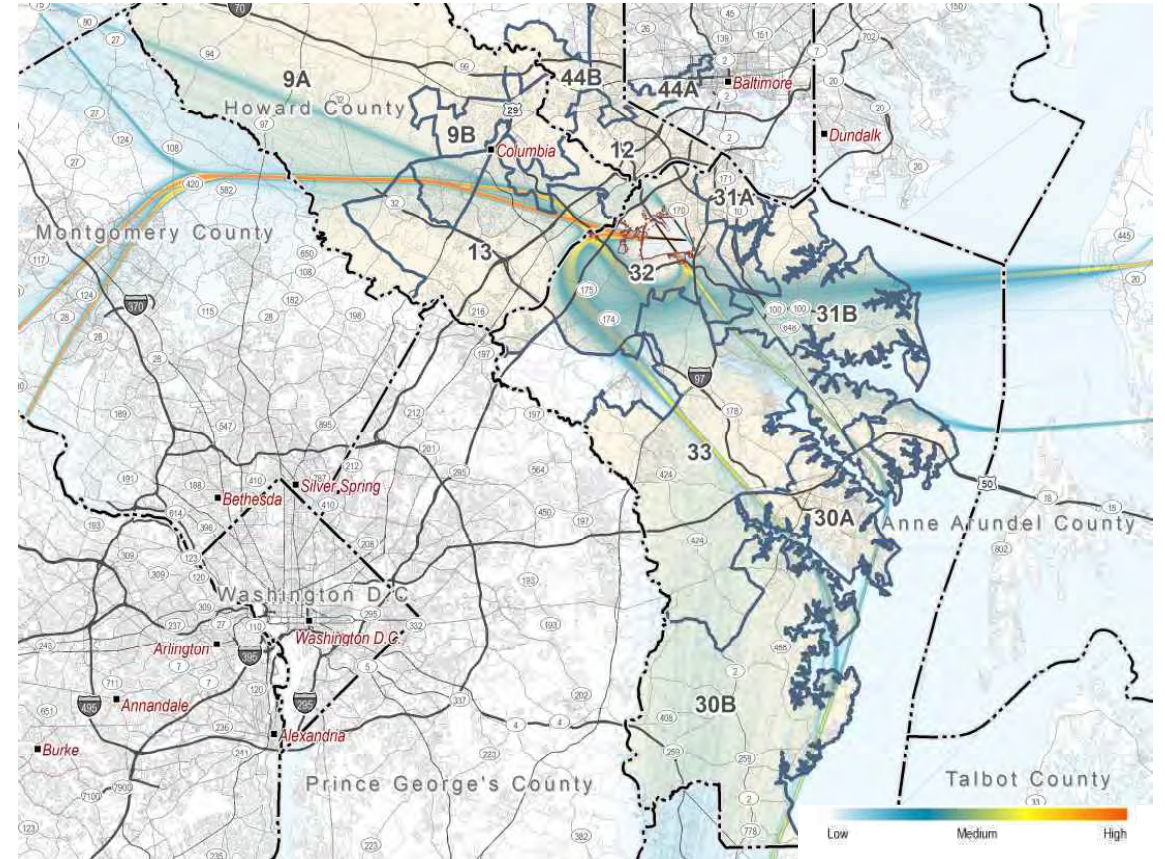


Air Traffic Control and the NAS

BWI Marshall Jet Departures under Instrument Meteorological Conditions (IMC)
February 2, 2017 – April 26, 2017/2,017 Flight Tracks

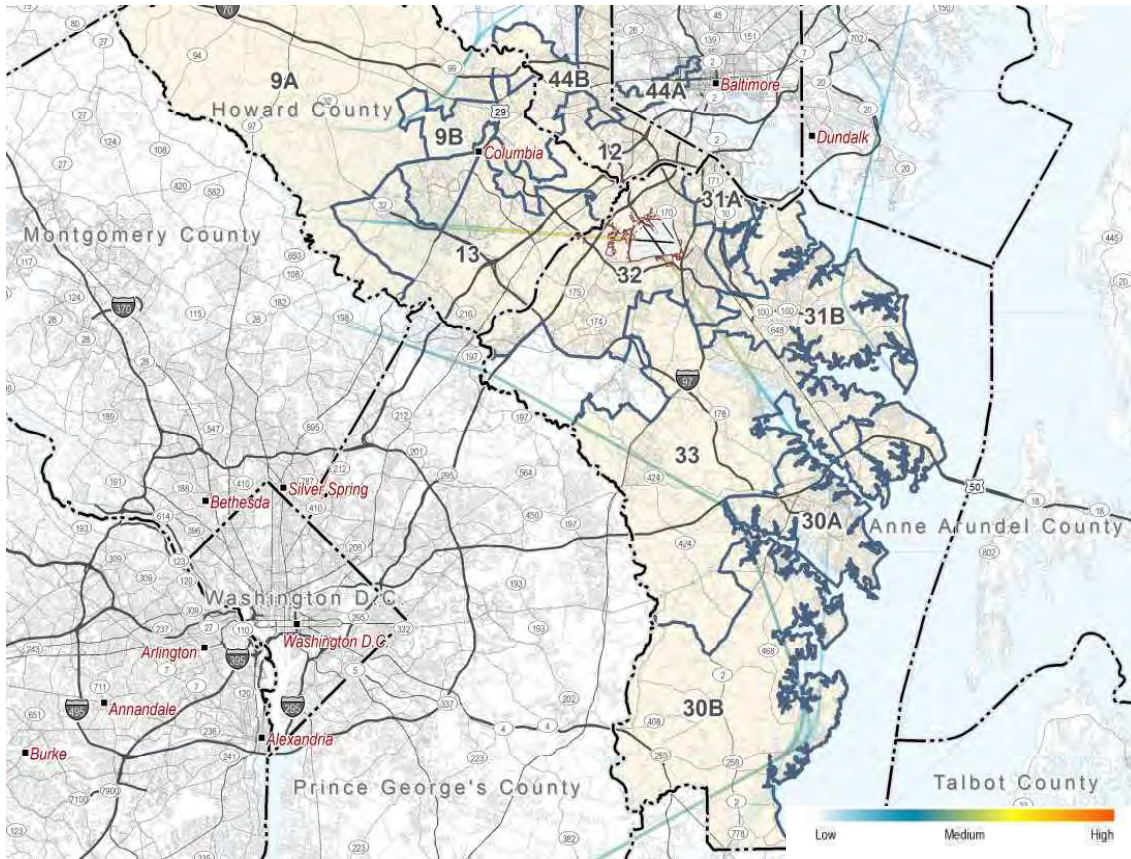


BWI Marshall Jet Departures under Visual Meteorological Conditions (VMC)
February 2, 2017 – April 26, 2017/23,957 Flight Tracks

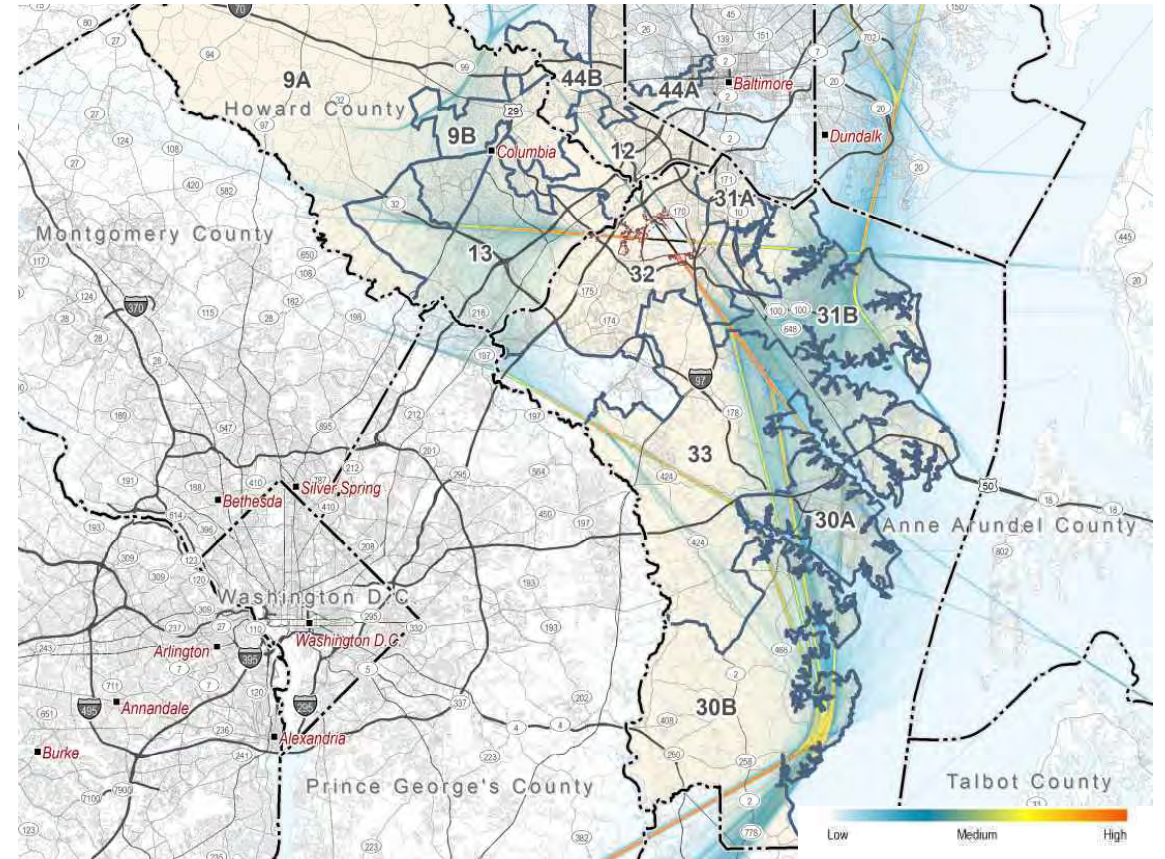


Air Traffic Control and the NAS

BWI Marshall Jet Arrivals Vectored for Instrument Approaches
February 2, 2017 – April 26, 2017/2,625 Flight Tracks



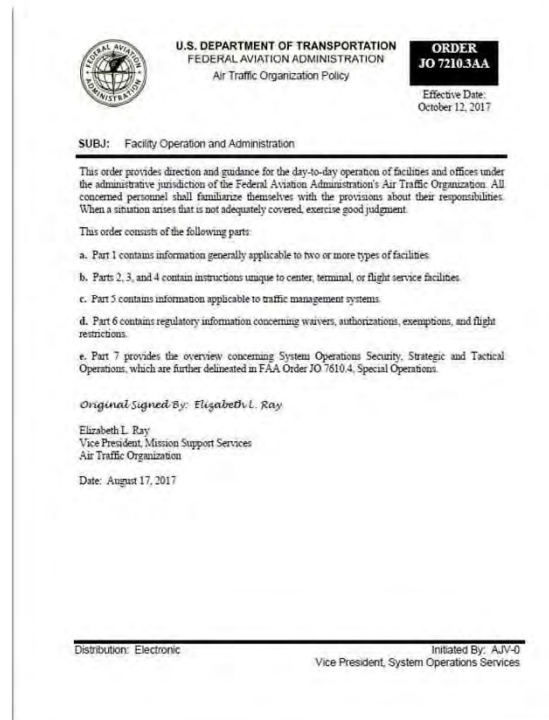
BWI Marshall Jet Arrivals Vectored for Visual Approaches
February 2, 2017 – April 26, 2017/23,233 Flight Tracks



Airport Capacity

- Factors Influencing AAR
 - Runway Geometry
 - Intersecting v. Parallel Runways
 - High-speed taxiways
 - Meteorological Conditions
 - Aircraft type / fleet mix

FAA Order 7210.3AA *Facility Operation & Administration (2017)*



10/12/17

JO 7210.3AA

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Airport Arrival Rate (AAR)

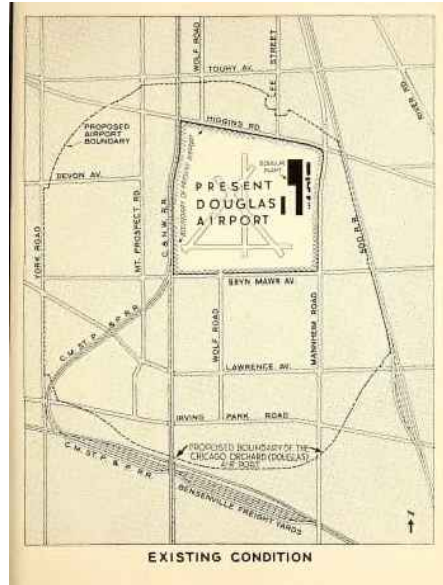
10-7-1



Airport Capacity

■ Runway Geometry

- Intersecting v. Parallel Runways
- High-speed taxiways
- Airports reflect evolution of aircraft fleet mix
 - Jet aircraft less sensitive to wind compared to propeller aircraft
 - Crosswind velocity component became a smaller percentage of total (forward) velocity
 - Reduced need for crosswind runways led to development of parallels to increase throughput
- Runway geometry in turn influences flight tracks in the immediate airport environs



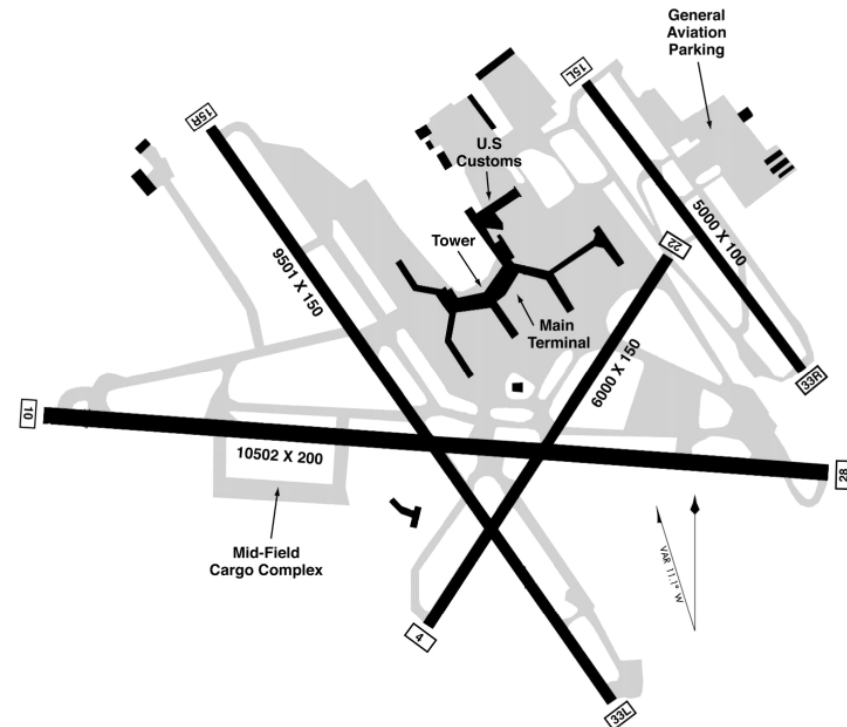
Airport Capacity

■ FAA Airfield Capacity Analysis

- 2014 (prior to closure of Runway 4/22)
- Intersecting Air Carrier Runways
- Visual Conditions predominate
 - 85% cloud ceilings and visibility greater than 2,500' and 5 miles
 - 7% marginal VFR
 - 8% IFR (below 1000' ceiling and/or 3 miles visibility)

BWI

BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL



Airport capacity profile estimates were created using a standard set of performance characteristics and do not take into account non-runway constraints, unless otherwise noted. The capacity estimates developed for this report are not intended to replace the results of any detailed analysis that would precede an environmental, investment, or policy decision.

The list of Future Improvements and their expected effects on capacity does not imply FAA commitment to, or approval of, any item on the list.



Airport Capacity



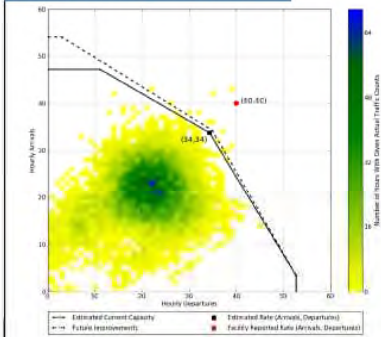
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FAA Airfield Capacity Analysis

VISUAL BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL

BWI Scenario	Arrival Runways	Departure Runways	Procedures	Hourly Rate	
				ATC Facility Reported	Model-Estimated
CURRENT OPERATIONS	33L, 33R	28, 33R	Visual Approaches, Visual Separation	80	68
FUTURE IMPROVEMENTS Improved Runway Delivery Accuracy	33L, 33R	28, 33R		N/A	69

VISUAL WEATHER CONDITIONS

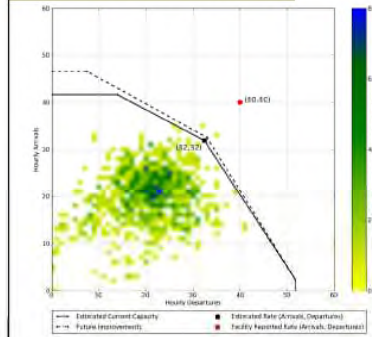


- The capacity rate range in Visual conditions is currently 68-80 operations per hour.
- BWI has two primary directional traffic flows. The airport operates in variations of this configuration approximately 66% of the time in Visual weather conditions (totaling 56% annually).
- Operations on Runway 33R are typically limited to small propeller and general aviation aircraft due to length and noise restrictions.

MARGINAL BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL

BWI Scenario	Arrival Runways	Departure Runways	Procedures	Hourly Rate	
				ATC Facility Reported	Model-Estimated
CURRENT OPERATIONS	10, 15L	15L, 15R	Dependent Instrument Approaches, Radar Separation	64	62
FUTURE IMPROVEMENTS Improved Runway Delivery Accuracy	10, 15L	15L, 15R		N/A	64

MARGINAL WEATHER CONDITIONS

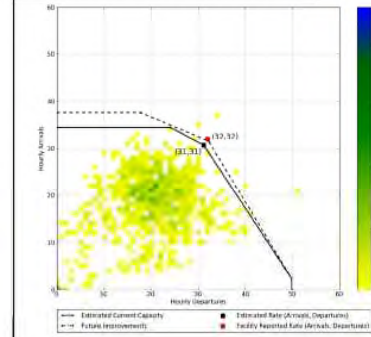


- The capacity currently 64-80 operations per hour.
- BWI has two primary directional traffic flows. The airport operates in variations of this configuration approximately 64% of the time in Marginal weather conditions (totaling 5% annually).
- Operations on Runway 15L are typically limited to small propeller and general aviation aircraft due to length and noise restrictions.

INSTRUMENT BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL

BWI Scenario	Arrival Runways	Departure Runways	Procedures	Hourly Rate	
				ATC Facility Reported	Model-Estimated
CURRENT OPERATIONS	10, 15L	15L, 15R	Dependent Instrument Approaches, Radar Separation	64	62
FUTURE IMPROVEMENTS Improved Runway Delivery Accuracy	10, 15L	15L, 15R		N/A	64

INSTRUMENT WEATHER CONDITIONS



- The capacity rate range in Instrument conditions is currently 62-64 operations per hour.
- BWI has two primary directional traffic flows. The airport operates in variations of this configuration approximately 64% of the time in Instrument weather conditions (totaling 5% annually).
- Operations on Runway 15L are typically limited to small propeller and general aviation aircraft due to length and noise restrictions.

