COMPREHENSIVE REGIONAL AIR SYSTEM PLAN – 2018
PHASE 1 DRAFT FINAL REPORT

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National Capital Region
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COMPREHENSIVE REGIONAL AIR SYSTEM PLAN, PHASE 1 REPORT – SEPTEMBER 2018
Prepared by the National Capital Region Transportation Planning Board (TPB) in cooperation with the Federal Aviation Administration (FAA). Oversight was provided by the Aviation Technical Subcommittee of the TPB Technical Committee.

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The National Capital Region Transportation Planning Board (TPB) is the federally designated metropolitan planning organization (MPO) for metropolitan Washington. It is responsible for developing and carrying out a continuing, cooperative, and comprehensive transportation planning process in the metropolitan area. Members of the TPB include representatives of the transportation agencies of the states of Maryland and Virginia and the District of Columbia, 23 local governments, the Washington Metropolitan Area Transit Authority, the Maryland and Virginia General Assemblies, and nonvoting members from the Metropolitan Washington Airports Authority and federal agencies. The TPB is staffed by the Department of Transportation Planning at the Metropolitan Washington Council of Governments (COG).

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The comprehensive Regional Air System Plan (RASP) Phase 1 Report summarizes previous and recent air systems planning efforts, resulting in a determination of the state of the practice in regional air system planning. This report will be followed by two additional phases – Phase 2 will include a regional needs assessment, while Phase 3 will provide future air system forecasts and recommendations for the system plan update. All three phases will be developed in conjunction with the National Capital Region's three commercial airports and the Federal Aviation Administration (FAA). All three phases will collectively constitute the updated RASP.

I. INTRODUCTION

In 1975, the Metropolitan Washington Council of Governments (MWCOG) began the Continuous Airport System Planning (CASP) program with the landmark study, "The Future of Washington's Airports." Since the initial 1975 study, there has not been a fully comprehensive regional air system plan (RASP) update conducted. Rather, the CASP program has provided incremental updates over multiple plan volumes, along with a series of continual, smaller, incremental updates or amendments to the RASP.

Due to resource limitations, this RASP update has been prepared in three distinct phases, which will result in a single comprehensive document at the end of the process. All three phases will collectively constitute the updated RASP. Descriptions of the three phases are provided below:

- Phase 1 of the comprehensive RASP update is a review of previous and recent planning efforts and determination of the state of the practice in regional air system planning through a national literature review.

- Phase 2 contains a review of existing conditions in the regional airport system as well as a needs assessment. The specific areas of assessment will be determined by the work performed in Phase 1. The results of Phase 2 will be documented in a report that will provide initial guidance for the discussion of forecasts and future recommendations in Phase 3.

- Phase 3 of the comprehensive RASP update builds on the review of previous planning efforts and determination of best practices in Phase 1 and the review of existing conditions and needs assessment in Phase 2 by reviewing and preparing future air system forecasts and developing recommendations for the system plan update. As with the previous two phases, the forecasts and plan recommendations will be developed in conjunction with the airports and the FAA. All three phases will be bound as a single plan update and will include a timeline for incremental updates as well as another future comprehensive update.

As depicted in Figure 1 on the following page, the Washington/Baltimore air systems planning region stretches from Harford County, Maryland, on the Susquehanna River to the north, to Spotsylvania County, Virginia, to the south, and from the Chesapeake Bay in the east to the Shenandoah Valley to the west. This air systems planning region consists of 25 jurisdictions, 161 Aviation Analysis Zones, and 4,374 Transportation Analysis Zones.

Figure 1: Washington-Baltimore Air System Planning Region

Source: Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board

II. FEDERAL AVIATION ADMINISTRATION GUIDANCE ON REGIONAL AIR SYSTEMS PLANS

According to Federal Aviation Administration (FAA) guidance on the development of regional air systems plans, the role of metropolitan and/or regional planning organizations in the airport system planning process is determined by their legislative authority and the aviation expertise they possess. Typical agencies authorized to conduct these studies are Metropolitan Planning Organizations (MPOs), Councils of Government (COGs), and Regional Planning Councils or Commissions (RPCs). [1] These agencies are made up of representatives from local government and transportation authorities.

The geographic scope of an airport system planning process can include several adjacent states in a region, one individual state, or a specific metropolitan area. In the case of the Washington-Baltimore air systems planning region, the region does span beyond the COG-TPB metropolitan planning region to also include parts of the Baltimore Metropolitan Council (BMC) planning region, given the volume of individuals traveling in and out of the Washington Metropolitan Area who utilize BWI Airport. The variation in the roles of metropolitan planning organizations in airport system planning is even more pronounced than that of state agencies. Consultations between the local FAA Airport District Office, the state aviation agency, and local airports are needed to determine what role, if any, the regional or metropolitan planning organization will have in airport system planning for its region.

Metropolitan planning should not be considered a separate effort, but rather should complement the ongoing state airport system planning process, as is the spirit of this regional air system plan (RASP). Through airport advisory committees, individual airports should also participate in the metropolitan airport system planning process. Representatives of individual airports can identify issues, constraints, and opportunities at their airports and provide updates on the status of development projects.

Where metropolitan areas span several states, as is the case in the Metropolitan Washington Region, the regional planning agency should also consider the relationships among the various state airport system plans. Multi-state metropolitan systems are not always identified in individual state airport system plans; metropolitan planning studies can exist separately and should complement each state planning document, assisting with regional priorities for the state's recommendations. Surface transportation, airport access facilities, and land use impacts are important elements to consider in the metropolitan airport planning and project development process.

The most obvious distinguishing characteristic of an airport system planning process is its geographic scope. The scope of the plan can include several adjacent states in a region, one individual state, or a specific metropolitan area.

[1] U.S. Department of Transportation, Federal Aviation Administration, 2015. Advisory Circular 150/5070-7: The Airport System Planning Process. Washington, DC. https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5070-7-change1.pdf

III. WASHINGTON-BALTIMORE REGIONAL AIR SYSTEMS PLANNING REVIEW

The TPB has conducted a Continuous Airport System Planning (CASP) program since 1975 when the first grant application was approved by the Federal Aviation Administration (FAA). The goal of the CASP program is to provide a process that supports the planning, development, and operation of airport facilities and the transportation facilities that serve the airports in a systematic framework for the Washington-Baltimore region.

The airport system planning process consists of a continuous cycle that begins with a regional air passenger survey. This survey is followed by forecasts of future air passenger travel and the ground travel of these air passengers to and from the region's three commercial airports. These forecasts in turn lead to the development of a revised ground access plan for the region.

The CASP program is developed, implemented, and monitored with the assistance of the Aviation Technical Subcommittee of the TPB's Technical Committee. The subcommittee is responsible for the coordination of airport system planning with the regional transportation planning process. The region's three major commercial airports are represented on the TPB by the Maryland Aviation Administration (MAA) and the Metropolitan Washington Airports Authority (MWAA). Although the TPB is the designated metropolitan planning organization (MPO) for the Washington metropolitan area, the air systems planning region included in its air system planning area consists of both the Washington metropolitan area as well as the Baltimore metropolitan area. As a result, TPB, through its Aviation Technical Subcommittee, coordinates its air systems planning process very closely with the Baltimore Metropolitan Council (BMC), the designated MPO for the Baltimore metropolitan area.

This section contains a review of the foundational as well as contemporary regional air systems planning-related studies conducted by COG-TPB and its regional planning partners. The summaries provided address each study's purpose, findings, and applicable recommendations.

THE FUTURE OF WASHINGTON'S AIRPORTS (1975, 1978)

In 1975 COG--TPB, in coordination with the Maryland Department of Transportation (MDOT), published The Future of Washington's Airports – A Proposed Plan for an Air Transportation System for the National Capital Region.

The purpose of the study was two-fold:

- To forecast commercial aviation activities for the Washington-Baltimore region to a horizon year of 2000 with appropriately proportional allocations of these demand forecasts to Baltimore/Washington International Airport (BWI; present-day Baltimore/Washington International Thurgood Marshall Airport), Washington Dulles International Airport (IAD), and Washington National Airport (DCA; present-day Ronald Reagan Washington National Airport).

- To consider commercial airport facility requirements on a regional scale, providing a general framework for individual airport planning.[2]

[2] "The Future of Washington's Airports." National Capital Region Transportation Planning Board, Metropolitan Washington Council of Governments, 1975, 1978.

Key recommendations addressed the following topic areas:

- Air Carrier Aviation Activity
- Recent Demographic and Economic Trends
- Air Carrier Airport Developments
- General Aviation Activity and Development
- Environmental Issues
- Continuing Air Transportation System Planning

WASHINGTON-BALTIMORE REGIONAL AIRPORT SYSTEM PLAN (1988-1997)

The first Washington-Baltimore Regional Airport System Plan (RASP) was conducted in three volumes from 1988 until 1997 by the Metropolitan Washington Council of Governments, in cooperation with the region's commercial airports and state departments of transportation.[3] The three studies, Volume I – Commercial Airports (1988), Volume II – Ground Access (1993), and Volume III – Air Cargo (1997) are synthesized in this section.

Volume I – Commercial Airports (1988)

At the time of the study's completion, air transportation in the Washington-Baltimore region had changed significantly since 1982 – most of which can be attributed to the effect of the 1978 deregulation of the U.S. airline industry. Within that brief window of time, the region's air service transitioned from one major, high-volume downtown airport (DCA) and two less-utilized suburban airports (BWI and IAD), to all three airports becoming fully used, providing high-quality air service to the major domestic markets. It was forecasted that the use of each of the three airports would continue to grow to the year 2000 and by then, both BWI and IAD would have passenger activity levels near or above those of DCA. [4]

Key Recommendations:

- **Airport Development:** Accommodate the forecasted growth with a call for the completion or update of airport master plans for BWI, DCA, and IAD.

- **Community Concerns:** Focus on Noise, Community Engagement, and Safety

- **Interaction with Other Systems:** Conduct full intermodal coordination between the airports and highway and transit access facilities; Prioritize the development of facilities which improve transit accessibility to the airports; Consider full airport economic impacts when making airport policy decisions

- **Future Regional Airport Planning:** Produce a regional general aviation plan to be updated on a minimum five-year cycle of activities; Develop a continuous regional air passenger survey; Prepare regional air passenger forecasts, comprehensive studies of airport ground access, and measure/forecast economic impacts of the region's airports on an ongoing basis

[3] "Washington-Baltimore Regional Airport System Plan." National Capital Region Transportation Planning Board, Metropolitan Washington Council of Governments, 1988, 1993, 1997.
[4] "Washington-Baltimore Regional Airport System Plan, Volume I – Commercial Airports." National Capital Region Transportation Planning Board, Metropolitan Washington Council of Governments, 1988.

Volume II – Ground Access (1993)

Volume II of the Regional Airport System Plan was developed to address ground access to three major commercial airports in the Washington metropolitan area – BWI, DCA, and IAD. This effort approached the issue from a regional perspective, examining the total transportation system in the metropolitan area, and considering all major modes of access to the airports. The publication of this volume marked the initial attempt to consider airport ground access planning in the regional transportation context. Prior to Volume II – Ground Access, most ground access planning conducted was part of an individual airport's master planning process, or as a separate planning study.[5]

The study adapted the traditional four-step transportation planning modeling process (trip generation, trip distribution, modal split, and trip assignment) to incorporate and specifically focus on airport-related travel, thus allowing the impact of airport activity on the regional transportation system to be estimated. The results of this process provided the total volume, the level of service, the number of air passenger trips, the number of airport-work trips, and the number of airport-other trips for each link in the transportation network.

Study Approach:

- **Alternative Airport Access Scenarios:** Time series examining future demand in the years 2000 and 2010 with a base year of 1987
- **Travel Time Analysis:** Travel times for each of the transportation analysis zones (TAZ) in the region to each airport
- **Alternative Transit Scenarios:** Overview of the then-most recent evaluation of transit alternatives for the Dulles Corridor.
- **Air Passenger Access Satisfaction:** User satisfaction with airport access was evaluated by comparing distance and speed data to the scale of satisfaction.

Key Recommendations:

- **Highway Improvements:** Timely construction of airport-serving facilities in the Highway Element of the Long-Range Plan; Further study to determine needed improvements in the Dulles Airport Access Highway Corridor – as well as key highway and transportation improvements
- **Transit Improvements:** Full pedestrian integration between Metrorail and the terminal improvements at DCA; Completion of the 103-mile Metrorail system; High-quality, quickly implementable transit service in the IAD Access Highway Corridor
- **Paratransit Improvements:** Full integration of existing Washington Flyer service into the region's overall transit service program; Institution of shared ride door-to-door shuttle service via Washington Flyer; Study to assess the possibility of establishing a system of remote airport terminals; Regional taxicab licensing system to be studied for implementation at DCA

[5] "Washington-Baltimore Regional Airport System Plan, Volume II – Ground Access." National Capital Region Transportation Planning Board, Metropolitan Washington Council of Governments, 1993.

- **Policy Recommendations:**
    - Preserve free-flow travel on the IAD Access Highway Corridor
    - Encourage airport employees to use high-occupancy modes of travel
    - Fully integrate the major commercial airports and all aspects of airport system planning into the regional transportation planning process
    - Fully incorporate the airport special generator modeling capability developed for the study into the regional transportation modeling process
    - Synchronize the cycles of the air passenger survey and airport ground access update with the regional Long-Range Plan
    - Receive a reliable, continuous source of funding from the Federal Aviation Administration for the Continuous Airport System Planning Program

Volume III – Air Cargo (1997)

Due to the overall growth in the amount of total air freight activity, both nationwide and within the region and the various calls for study in this area, Volume III – Air Cargo of the Washington-Baltimore Regional Airport System Plan was developed.[6] Leading up to the completion of this study, the total world-wide air cargo traffic had more than tripled between 1980 and 1995. In 1996, total U.S. air freight activity was estimated to grow from 39.2 billion pounds to 89.6 billion pounds by 2010. The intent of the study was to examine the existing and future demand for air cargo at BWI and IAD airports, and to analyze how the movement of this cargo affects the regional ground transportation network. The study examined the estimated potential demand for air cargo facilities and compared this demand with current and planned facilities to determine what air cargo facilities would be needed to meet future demand.

While the study concluded that the current level of air cargo-related vehicle traffic was insignificant compared with total airport vehicle traffic and traffic levels on major local and regional routes that thus would not have a significant impact on regional congestion or expansion requirements, it also cautioned that the projected increase in congestion on major access corridors in the metropolitan region could have a detrimental impact on the competitiveness of cargo services at both BWI and IAD due to increased access costs and diminished service levels relative to other airports.

Study Approach:

- **Regional Air Cargo Demand:** Projected to grow from 4.6 billion pounds (1996) to 20.1 billion pounds (2020); Consists of air freight and air mail which originates/terminates in the market region of BWI and IAD.

- **Regional Air Cargo Facilities:** Examined current and planned facilities, as well as an estimate of the capacity of the facilities and the air mail centers at BWI and IAD.

- **Regional Air Cargo Needs:** Estimated that an additional 1.2 billion pounds of air cargo capacity would be required by 2020, with horizons for expected shortfalls at BWI in 2017 and Dulles in 2011.

[6] "Washington-Baltimore Regional Airport System Plan, Volume III – Air Cargo." National Capital Region Transportation Planning Board, Metropolitan Washington Council of Governments, 1997.

- **Regional Network Analysis:** Concentrated on examining the effect that current and future vehicle traffic and congestion would have on truck traffic to and from the air cargo facilities; Examined the year 1997 as a base case and modeled scenarios for 2010 and 2020.

Key Recommendations:

- **Air Cargo Terminal Facilities:** Project planning for implementation of those facilities required to meet the projected shortfalls at BWI and IAD be undertaken in a timely manner

- **Efficiency Measures:** Examine potential measures, such as reduction in air cargo terminal use or more efficient use of truck services to inform timing of new facility developments.

- **Internal Access:** Analyze internal access systems at BWI and IAD to ensure the ability to accommodate congestion in and around air cargo terminal areas.

- **Road Layout:** Analyze layout of roads which serve the air cargo terminals in the immediate vicinity of BWI and IAD to ensure that they can accommodate large trucks.

- **Regional Collaboration:** Work together to identify financially beneficial opportunities to the region for improving access to the commercial airports in the Washington-Baltimore Region.

WASHINGTON NATIONAL AIRPORT NOISE COMPATIBILITY STUDY (1989)

The purpose of this study was to describe the 1989 DCA Noise Compatibility Study conducted in accordance with the provisions of Federal Aviation Regulation (FAR) Part 150. The study contains material developed in consultation with airport users, local jurisdictions, and interested individuals over a period of two years.[7]

Key Recommendations:

- **Noise Abatement Program:** Includes a noise abatement strategy, methods for reducing aircraft noise at source, restrictions on night operations, and overall operation procedures.

- **Land Use Compatibility Measures:**

    - Preventive Measures: Amending comprehensive plans and zoning maps to promote compatible land uses; Airport noise overlay zoning; Amending building codes to require sound-proofing; Disclosing noise levels prior to contract for sale/lease; Establishing an airport noise information program.

    - Corrective Measures: Sound-proofing noise-sensitive public buildings; Constructing sound barriers.

[7] "Washington National Airport Noise Compatibility Study." Metropolitan Washington Airports Authority, 1989.

WASHINGTON-BALTIMORE REGIONAL AIR PASSENGER SURVEY

OVERVIEW

Simultaneous, regional surveys of air passengers at all three commercial airports (BWI, DCA, IAD) have been performed a total of 14 times to date - in 1973/74, 1981/82, 1987, 1992, 1998, 2000, 2002, 2005 and every two years since 2005. These surveys provide data which are essential for the airport system planning and master planning processes.

The Regional Air Passenger Survey is designed as an at-gate lobby interview survey. Interviewers distribute survey questionnaires to departing air passengers in the gate holding areas for pre-selected flights, and then collect the completed questionnaires as the passengers complete them or as the passengers are called to board their flight. Late arriving passengers are given a survey questionnaire with a postage paid mail-back envelope and are asked to fill in the questionnaire during their flight and return it by mail. In the 2013 survey, for the first-time, respondents also had the option of completing the survey online using a smartphone, tablet, or computer. The questionnaires ask travelers about the purpose of their air travel, how they traveled to the airport (drove, rode transit, etc.), and other information to support the airport system planning and airport ground access planning processes.

GENERAL FINDINGS REPORT (2017)

The General Findings Report of the 2017 Washington-Baltimore Regional Air Passenger Survey (APS) summarizes patterns of airport enplanement share, airport choice, airport preference, air trip purpose, ground trip origin, airport mode of access, air traveler characteristics, and at-airport use of facilities.[8] The report analyzes these data based on their geographic distribution.

Key Findings:

- **Airport Enplanement Share:** In 2017, 36.4 million passengers traveled through the Washington-Baltimore Region, an increase of seven percent from 2015 (34.1 million). Enplanement share by airport is broken down below.
    - 36 percent of passengers at BWI (up from 35 percent in 2015)
    - 33 percent of passengers at DCA (down from 34 percent in 2015)
    - 31 percent of passengers at IAD (the same as in 2015)
- **Airport Choice:** Survey respondents were asked to rank the three most important reasons (out of a list of nine) for choosing the airport they were departing from, of which closest airport and lowest airfare were the highest ranked.
- **Airport Preference:** For all air passengers (both residents and non-residents of the area), airport preference changed little between 2015 and 2017. In 2017 overall airport

[8] "Washington-Baltimore Regional Air Passenger Survey – General Findings Report, 2017." Metropolitan Washington Council of Governments, Transportation Planning Board, 2018. https://www.mwcog.org/documents/2018/06/29/washington-baltimore-regional-air-passenger-survey-airport-access/

preference was distributed as follows: BWI (28 percent), DCA (41 percent), and IAD (15 percent). Sixteen percent expressed no preference.

- **Trip Purpose**

    - Locally originating air passengers reporting that they were traveling for non-business-related reasons declined from 63 percent in 2015 to 62 percent in 2017.

    - While non-business trips such as vacation declined from 28 percent to 24 percent, business-related trips overall increased from 37 percent in 2015 to 38 percent.

- **Ground Trip Origin:** While sufficient information is not currently available, it is possible that the following trends were at least in part a result of increased usage of companies like AirBNB. Future surveys may be designed to gain further insights into this trend.

    - Between 2015 and 2017, air passengers beginning their trips from a private residence increased from 56 percent to 60 percent of total trip originations.

    - Air passengers beginning their trip to the airport from a hotel or motel saw a five percent decline between 2015 and 2017 - from 33 percent to 28 percent.

- **Mode of Access:** The region's most common mode of access to the airports continued to be the automobile (private, rental, taxicab, and transportation network companies [TNCs] such as Uber/Lyft), accounting for 84 percent of all local originations.

    - Of the 84 percent of trips accessed by automobile, taxicabs make up 11 percent (down from 15 percent in 2015) and TNCs make up 14 percent (up from 9 percent).

    - Metrorail usage by passengers traveling to DCA continues to be among the highest proportion of any airport in the country at 13 percent (up from 12 percent in 2015).

- **Air Traveler Characteristics**

    - Area residents accounted for 40 percent of the total departing air passengers. Non-residents accounted for the remaining 60 percent of departing air passengers.

    - Local originating passengers under age 25 increased from eight to nine percent. Passengers over 35 stayed decreased slightly from 73 to 72 percent.

    - Annual household incomes for passengers in the region continue to be higher than the regional median. In 2017, only 27 percent of the region's passengers had annual household incomes less than $80,000. More than half of both area residents (59 percent) and non-residents (53 percent) have an annual household income over $120,000.

- **At-Airport Use of Facilities:** Overall, 63 percent of departing passengers reported stopping for a boarding pass and/or bag check; 26 percent of whom utilized the e-ticket kiosk. When compared with 2015 findings, passengers who made a stop for a boarding pass and/or bag check increased at all three airports.

GEOGRAPHIC FINDINGS REPORT (2015)

This report summarizes findings regarding patterns of airport use, trip purpose, origin activity, mode of access, and household income; and analyzes these data based on their geographic distribution. The survey results are aggregated by Aviation Analysis Zone (AAZ), which are composed of aggregations of smaller TPB Transportation Analysis Zones (TAZs). AAZs are based on transportation geography, jurisdictional boundaries, major highways, and barriers to travel; they are relatively fixed zones, not intended to be adjusted due to demographic changes, and thus provide a consistent geographic basis to measure changes over time.[9]

Key Findings:

Airport Use

- Approximately 25.5 million air passengers originated in the Washington-Baltimore region in 2015, an increase of nine percent over the 23.4 million passenger originations in 2013.
- The total number of air passengers (including connecting passengers) increased by six percent between 2013 and 2015, from 32.3 million to 34.1 million.
- The total number of local originating passengers increased by nine percent between 2013 and 2015, primarily due to an 18 percent increase in those local originations traveling from the Virginia suburbs.

Trip Purpose and Origin

- In 2015, the percentage of locally originating passengers traveling for business increased to 36 percent, when compared with 32 percent in 2013. 27 percent of locally originating passengers indicated vacation as their trip purpose and 30 percent indicated personal or family affairs as their purpose.
- While 36 percent of air passengers originating in the Washington-Baltimore region were traveling on business, only nine percent of the total number of passengers left a place of business and traveled directly to the airport, same as in 2013.
- While over half of all air passengers left for the airport from a private residence, a significant amount (32 percent of the total) left from a hotel or motel.

Mode of Access

- For the Washington-Baltimore region overall, the most common mode of access to the airports in 2015 was a private car, accounting for 44 percent of locally originating air passengers, a slight decrease from 49 percent in 2013.

[9] "Washington-Baltimore Regional Air Passenger Survey – Geographic Findings Report, 2015." Metropolitan Washington Council of Governments, Transportation Planning Board, 2015. https://www.mwcog.org/documents/2016/11/16/washington-baltimore-regional-air-passenger-survey-geographic-findings-report-airport-access/

- Taxicabs were used by the second highest percentage (15 percent) of locally originating air passengers, followed by rental cars (14 percent).

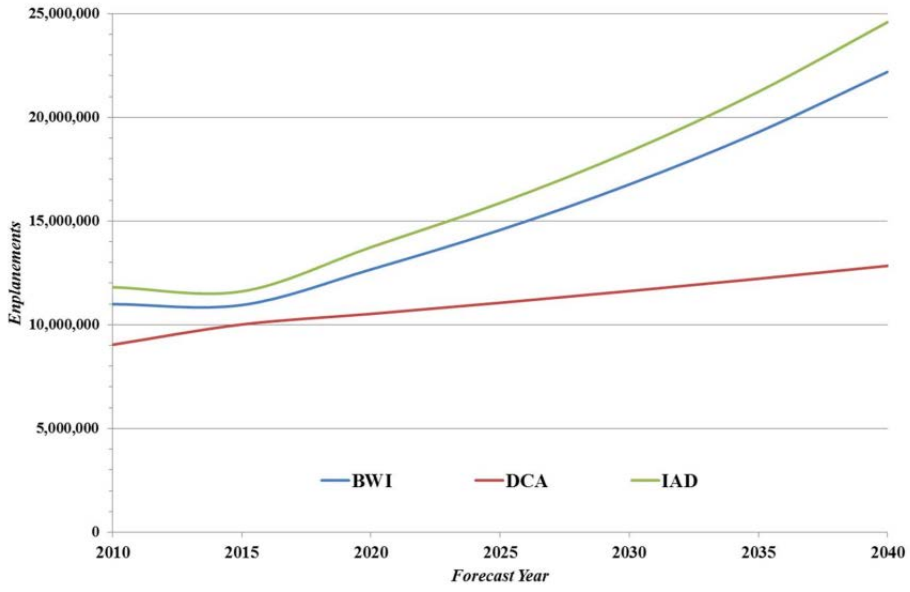
- TNCs such as Uber and Lyft, which were not an option for survey respondents in the 2013 survey, were used by nine percent of locally originating air passengers in 2015.

- Locally originating air passengers traveling to the airport by public transportation, such as Metrorail to DCA, or MTA light rail, MARC commuter rail, or Amtrak intercity rail to BWI, accounted for seven percent.

WASHINGTON-BALTIMORE REGIONAL AIR PASSENGER ORIGIN/DESTINATION FORECAST UPDATE (2013)

The Federal Aviation Administration (FAA) publishes Terminal Area Forecasts (TAF) of aviation activity for mainly FAA towered airports. While these forecasts are produced for passenger enplanements, they do not include ground access trip characteristics such origin/destination. However, origin/destination information is essential for airport-related transportation studies and for airport master plan landside facility determination. As a result, the Washington-Baltimore Regional Air Passenger Origin/Destination Forecast Update project developed an air passenger forecasting technique, based on the technique used in COG's Cooperative Forecasting program, and an airport origin/destination allocation based on a trip distribution model calibrated from the Air Passenger Survey data. This origin/destination data is then used to update airport ground access forecasts, which are then considered in the regional travel demand model.

Figure 2: Observed and Forecast Enplanements by Airport



Source: Washington-Baltimore Regional Air Forecast Update, 2013.

It should be noted that, although this report is dated 2013, it made use of the 2011 Washington-Baltimore Regional Air Passenger Survey (not the 2013 survey). This report documents the procedures used to develop forecasts of locally originating air passenger trips from each regional aviation analysis zone (AAZ, TAZs, aggregations of TAZs) to each of the three major commercial airports in the Washington-Baltimore region.[10] According to the report, the COG/TPB Models Development program identifies the

[10] "Washington-Baltimore Regional Air Passenger Origin/Destination Forecast Update, 2013." Metropolitan Washington Council of Governments, Transportation Planning Board, 2013. https://www.mwcog.org/assets/1/6/APOD_13_Final_July_2013.pdf, p. 1.

improvement of the representation of special traffic generators as an important component of the travel demand forecasting process.[11] COG/TPB has performed several special generator surveys in recent years, relating to military facilities, universities, tourist locations, and major shopping centers. The principal purpose of this forecast is to provide annual air passenger control totals to be used as an input to the regional travel forecasting process.

Key Findings:

The region's three airports are forecasted to have 59.6 million enplanements by 2040 - an increase of 87 percent from 2010. Domestic enplanements will experience a 75 percent increase between 2010 and 2040 to reach to 50 million. International destined enplanements are projected to more than double between 2010 and 2040 to 9.5 million. Figure 2 illustrates historical and forecast air passenger enplanements for the three airports in the Washington/Baltimore region.

WASHINGTON-BALTIMORE REGIONAL GROUND ACCESS TRAVEL TIME STUDY (2015)

The purpose of the airport ground access travel time study is to analyze travel time and changes in peak-period delay and level of service on principal airport-serving roadways from selected activity centers to the three commercial airports as well as changes in airport accessibility due to highway and transit improvements. Ground Access Travel Time studies were conducted in 1989, 1995, 2003, and 2011.[12]

Key Findings:

- Travel times to the airports, as measured by Travel Time Index (TTI) have not changed substantially from the 2011/2012 period to 2014/2015.
- Peak TTI
    - Peak TTI was observed for travel to DCA during midweek morning peak (6 - 9 AM).
    - Peak TTI to BWI was observed during weekday afternoon peak period (3 - 7 PM).
    - Travel to IAD was also during midweek morning peak, though not as high as to DCA.
- Use of new managed lanes that have opened since 2010 and certain HOV lanes can save time for travelers using the highway network to reach the airports.
    - The highest travel time savings were observed from Fredericksburg to IAD, at 25 minutes, using the 95Express and 495Express lanes during midweek morning peak.
    - Travel from Rockville to BWI saved about 20 minutes by using MD-200 (Inter-County Connector) instead of I-270 and I-495.

[11] Cambridge Systematics, Inc., "Fiscal Year 2010 Task Reports," Final Report (Washington, D.C.: National Capital Region Transportation Planning Board, November 16, 2010), http://www.mwcog.org/transportation/activities/models/review.asp, chap. 2.

[12] "Washington-Baltimore Regional Ground Access Travel Time Study, 2017." Metropolitan Washington Council of Governments, Transportation Planning Board, 2015. https://www.mwcog.org/documents/2017/01/18/washington-baltimore-regional-airport-ground-access-travel-time-study-airport-access/

- It is possible to reach all three airports by transit. Transit travel times ranged from about 16 minutes to reach DCA from downtown Washington, D.C. via Metrorail; 30 to 50 minutes from downtown Baltimore to BWI; to between 2 hours and 20 minutes and 3 hours and 30 minutes to reach the airports by way of transit from origins in Charles and St. Mary's Counties in Southern Maryland and Hagerstown, Washington County, Maryland.

- Congested highways continue to be a problem for travel to and between the three airports.

- Some of the more congested parts of the Baltimore and Washington highway networks include the Outer Loop of the Baltimore Beltway (I-695), both loops of the Capital Beltway (I-495) in Montgomery County and Fairfax County; I-270 and I-270 Spur in Montgomery County; the Baltimore-Washington Parkway in Anne Arundel County and Prince George's County; John Hanson Highway (US 50) in Prince George's County; the general purpose lanes of I-95 in Prince William County; the general purpose lanes of I-395 in Fairfax County, City of Alexandria and Arlington County; I-66 in Fairfax and Prince William Counties, DC 295, I-695 and I-395 in the District of Columbia.

WASHINGTON-BALTIMORE REGIONAL AIRPORTS AIR PASSENGER GROUND ACCESS FORECAST UPDATE (2013)

The Washington-Baltimore Regional Airports Air Passenger Ground Access Forecast Update presents detailed average weekday local originating air passenger ground access trips from 161 local area Aviation Analysis Zones (AAZ) to each of the region's three commercial airports.[13] The forecasts are further broken out by major ground access mode for each local AAZ to airport origin-destination pairs. These ground access forecasts are used as inputs for the update of the TPB's constrained element of the Visualize 2045 long-range plan and as the basis for revising the Ground Access Element of the CASP Regional Airport System Plan.

Key Findings:

- **Baltimore-Washington International Thurgood Marshall Airport:** Domestic destined enplanements at BWI are forecast to reach 21.6 million by 2040, an average annual increase of 2.4 percent, and international destined enplanements, with an average annual increase of 3.9 percent to 600,000 by 2040.

- **Ronald Reagan Washington National Airport:** At DCA, enplanements are projected to reach 12.8 million by 2040, an increase of 42 percent over 2010. Domestic enplanements are forecast to reach 12.7 million by 2040, from 8.8 million in 2010, an increase of 43 percent. International service at DCA under the perimeter rule is limited to eastern Canada and portions of the Caribbean islands. Total international enplanements at DCA are forecasted to decline by 27 percent from 158,000 in 2010 to 115,000 in 2040.

- **Washington Dulles International Airport:** Enplanements at IAD are projected to reach more than 24 million by 2040, double the 2010 volume. Domestic enplanements are forecast to reach 15.8 million by 2040, an average annual increase of 2.5 percent, and international

[13] "Washington-Baltimore Regional Airports Air Passenger Ground Access Forecast Update, 2013." Metropolitan Washington Council of Governments, Transportation Planning Board, 2013. https://www.mwcog.org/assets/1/6/GAFU-13-_Report-final_sept_2013.pdf

destined enplanements, with an average annual increase of 3.7 percent to 8.8 million by 2040.

WASHINGTON-BALTIMORE REGIONAL AIR SYSTEM PLAN GROUND ACCESS ELEMENT UPDATE (2013)

The Ground Access Element of the Regional Airport System Plan provides an analysis of current and forecast ground access problems at BWI, DCA, and IAD airports. This plan element also integrates airport system ground access and facility planning into the overall regional transportation planning process and will include recommendations for improving ground access to the airports.[14]

Key Recommendations:

- **Maryland:** Widening sections of I-270, US 29, MD 28/MD 198, I-695, US 50, I-97, MD 5 and MD 210, as well as the construction of the I-95 Express Toll Lanes north of Baltimore are some of the highly recommended priorities for improving airport access, particularly to BWI.

- **Virginia:** Construction of the Tri-County Parkway, the widening of the Dulles Access Road and major sections of VA 28, the Loudoun County Parkway, VA 123, the Fairfax County Parkway, US 1 and the construction of High Occupancy/Toll (HOT) lanes on I-95 to connect with the 495 Express Lanes were some of the highly recommended priorities for improving airport access in the Northern Virginia portion of the region. Since the time of this study's completion, the Tri-County Parkway construction is no longer reflective of local plans, and the 95 Express Lanes have since been constructed.

WASHINGTON-BALTIMORE REGIONAL AIR CARGO STUDY (2015)

Airport cargo and handling facilities are a major element of airport system planning. This study examines existing demand and analyzes how the movement of cargo affects the regional ground transportation network. It also focuses on the goods movement portion of airport access, examines the estimated potential demand for air cargo facilities, and compares this demand with current and planned facilities to determine what air cargo facilities are needed in the region to meet future demand.[15] The work is done in coordination with the programs of the Virginia Department of Aviation (DOAV), MAA, and MWAA.

Key Recommendations:

- **Congestion Alleviation:** Consideration should be given to the need to plan internal circulation systems and parking facilities in a manner that alleviates congestion in and around cargo facilities and improves truck access to and from cargo facilities.

- **Comprehensive Planning:** Airports should continue to incorporate air cargo needs into their comprehensive planning activities.

[14] "Washington-Baltimore Regional Air System Plan Ground Access Element Update, 2013." Metropolitan Washington Council of Governments, Transportation Planning Board, 2013. https://www.mwcog.org/assets/1/6/GAEU_Phase2_Report_Final_FAA.pdf

[15] "Washington-Baltimore Regional Air Cargo Study, 2015." Metropolitan Washington Council of Governments, Transportation Planning Board, 2017. https://www.mwcog.org/documents/2017/02/15/washington-baltimore-regional-air-cargo-study-airport-access-freight/

- **Regional Transportation Planning:** Airports should continue participating in the regional transportation planning process to ensure that ground access needs are identified and analyzed and that suitable ground access systems are planned and implemented.

- **Regional Collaboration:** Area jurisdictions should continue to work together to collaboratively identify financially beneficial opportunities for improving airport ground access in the Washington-Baltimore region.

IV. AIRPORT MASTER PLANS

An airport master plan is a detailed, long-term development plan for an individual airport.[16] Airport master plans are prepared to support the modernization or expansion of airports. As demonstrated in this section's summaries of the master plans for each of the region's three major commercial airports, the airport master planning effort involves collecting data, inventorying existing facilities, forecasting demand, determining facility requirements, evaluating alternative development plans, detailing long-range development plans and financial implementation schedules for a specific airport, and preparing an Airport Layout Plan (ALP).

The approved ALP is a key deliverable of the master planning process, serving as a record of aeronautical requirements, both current and future, and as a reference for local community deliberations on land use and zoning proposals as well as budget issues. The FAA requires all federally funded airports to have an FAA-approved ALP in place, which is typically updated and submitted to the FAA for approval every five years or as needed. The ALP should reflect an accurate depiction of existing and future proposed conditions in the airside, landside, and terminal areas, as well as proposed development over the near, interim and long-term planning horizons.[17]

According to a 2016 Washingtonian article – and as further articulated in the Washington-Baltimore Regional Air Passenger Survey 2017 General Findings results below – it's a close race for passengers among the region's three airports, with all three planning major upgrades in order to attract more air passengers and improve the airport experience, from the security checkpoints to the food court.[18] Many of these changes are reflected in the airport master plan descriptions within this section.

In 2017, 36.4 million passengers traveled through the Washington-Baltimore Region, an increase of seven percent from 2015 (34.1 million).[19] This total is broken down by the percentage of passengers at each airport:

- 36 percent of passengers at BWI (up from 35 percent in 2015)
- 33 percent of passengers at DCA (down from 34 percent in 2015)
- 31 percent of passengers at IAD (the same as in 2015)

[16] "Advisory Circular: The Airport System Planning Process." U.S. Department of Transportation Federal Aviation Administration, 2015.
[17] "Recommendation to Approve an Update to the Airport Layout Plan for Ronald Reagan Washington National Airport." Metropolitan Washington Airports Authority, 2017. http://www.mwaa.com/sites/default/files/BOD/2017-01/tab_5_recommendation_to_approve_an_update_to_the_airport_layout_plan_for_ronald_reagan_washington_national_airport.pdf
[18] "Future of DC Airports – New Construction DCA BWI IAD." The Washingtonian, 2016. https://www.washingtonian.com/2016/11/21/future-of-dc-airports-new-construction-dca-bwi-iad/
[19] "Washington-Baltimore Regional Air Passenger Survey – 2017 General Findings." National Capital Region Transportation Planning Board, Metropolitan Washington Council of Governments, 2018.

BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT (BWI)

Consolidated Transportation Program (2018 – 2023, 2019–2024)

In 2017, a record 26.3 million enplaning air passengers flew through BWI – 1.4 million more than the previous year. To accommodate the airport's growth, the Maryland Aviation Administration (MAA) continues improving its facilities and passenger amenities, as outlined in the forthcoming Maryland Department of Transportation Consolidated Transportation Plan 2019 - 2024 (MDOT CTP).[20]

Following the installation of a new International Checked Baggage Inspection System in 2017, a six-gate expansion of the International Concourse will open to the public in fall 2018, enhancing Customs processing for arriving travelers. Reconstruction of 28,000 square yards of concrete apron pavement surrounding Concourse B is underway and the design of a five-gate extension to Concourse A is nearing completion. In early 2019, construction will begin on the 55,000 square foot, five-gate extension to Concourse A, which serves Southwest Airlines. This is an important first step in a multi-year upgrade to Terminal A/B, which is the center of operations for Southwest Airlines at BWI.

Over the past year, BWI air cargo activity grew by approximately 60 percent. The airport responded to this rapid growth with a fast-track construction project, expanding the Midfield Cargo Apron with three new aircraft parking positions – for a total of six – to accommodate growth by an existing carrier in time for peak 2017 holiday season demand.

At BWI, airlines need to perform periodic or incidental maintenance on their aircraft. Currently there is insufficient space at the airline gates or within the terminal and adjacent areas for airlines to perform aircraft maintenance functions. The forthcoming creation of an Aircraft Maintenance Facility will support aircraft maintenance needs.[21]

With support from the Maryland Department of the Environment (MDE), MAA procured twenty new articulated shuttle buses powered by clean natural gas (CNG) for transportation between the BWI terminal and the consolidated rental car facility. For those travelers seeking the highest level of convenience, "concierge-style" valet parking was launched in the hourly garage in early 2018.

Environmental Assessment of Airport Layout Plan Phase 1 (2016–2020)

In April of 2015 the FAA conditionally approved the Airport Layout Plan (ALP) for BWI. The 2015 ALP identified three phases of improvements at BWI, which are key to meeting FAA design standards as well as the airport's own capacity demands. Phase 1 (2016-2020) is the primary element of the ALP under consideration in the Environmental Assessment and Section 4(f) Determination recently undertaken by the Office of Environmental Services at MAA.[22] The purpose of each element of Phase 1 and its associated projects are outlined below:

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[20] "Draft Consolidated Transportation Program 2019 to 2024." Maryland Aviation Administration, Maryland Department of Transportation, Publication forthcoming: 2019.

[21] "Consolidated Transportation Program 2018 to 2023." Maryland Aviation Administration, Maryland Department of Transportation, 2018.

[22] "Proposed Improvements 2016-2020 at Baltimore/Washington International Thurgood Marshall Airport: Draft Environmental Assessment and Draft Section 4(f) Determination." Office of Environmental Services, Maryland Aviation Administration, Maryland Department of Transportation, 2018.
http://www.marylandaviation.com/_media/client/environmental/2018/Draft_EA_and_Section4(f)_Determination_Proposed_Improv_2016_2020_BWI_v2.pdf

- **Meet FAA Design Standards**
  - Improve taxiway fillets/shoulders in the International Terminal Area
  - Construct new infill pavement near Taxiways T, P and 'Future P' (Runway 4-22 has been converted to Taxiway P but was previously referred to as Future P)
  - Relocate Taxiway K and Re-establish Taxiway L
  - Relocate Taxiways R and F
  - Relocate Taxiway V
  - Expand Runway 28 Deicing Pad
  - Remove Part 77 Obstructions: for on airport property clear the primary, approach (50:1) and transition surfaces; for off-airport properties clear to the threshold siting surface (34:1)
  - Clear trees in the VORTAC critical area to a 1,200-foot radius

- **Enhance Airfield Safety and Efficiency**
  - Construct Taxiway U3
  - Relocate Taxiway H
  - Construct Isolation/ Remain Overnight (RON) Apron
  - Construct Northwest Quadrant Perimeter Road
  - Construct vehicle service roadway (VSR) connector south of the former Runway 4 end
  - Expand existing ARFF indoor parking
  - Relocate fire training facility
  - Rehabilitate/improve pavement in accordance with the latest Pavement Management Plan

- **Accommodate Existing and Anticipated Demand**
  - Expand Runway 15R Deicing Pad
  - Construct Second FBO
  - Construct new Northrop Grumman Hangar
  - Construct new airline maintenance facility
  - Increase runway deicing chemical storage and construct access road
  - Building 113 Demolition
  - Relocate and consolidate airport maintenance complex

- **Improve Customer Service**
  - Construct new Sky Bridge C
  - Widen terminal roadway
  - Widen upper level roadway at Concourse E

- **NEPA Review of Previously Acquired Property**
  - Perform NEPA review of acquired parcel located at 1143 Stoney Run Road

RONALD REAGAN WASHINGTON NATIONAL AIRPORT (DCA)

Reagan National Project Journey

The current facilities at Ronald Reagan Washington National Airport (DCA) were designed to serve 15 million enplaning passengers per year. However, 23.9 million enplaning passengers traveled through the airport in 2017, setting new records and straining the existing infrastructure. To accommodate this level of passenger traffic and provide an improved level of service, a series of projects are underway.

Project Journey is a $1 billion major development program that includes two key projects: new security checkpoints and a new concourse. The program is estimated to be completed in 2021.[23]

New Concourse

The new concourse will replace the 14 hardstand gates currently accessed via bus from Gate 35X. Contact gates with enclosed access to planes via jet bridges, spacious hold rooms, new concessions and an American Airlines Admirals Club lounge will be provided. The facility will increase safety and security, as well as enhance passenger convenience. It will end the need for travelers to ride buses from the terminal to board regional jets parked outside. The concourse design includes architectural features consistent with Terminal B/C's exposed metal beams, glass walls and domed ceilings while maximizing open, navigable gate areas and panoramic views of downtown Washington, D.C.

New Security Checkpoints

The new security checkpoints will be conveniently located between National Hall and walkways from the Metrorail station and parking garages. Upon activation, the new 50,000 square foot checkpoints will expand screening capacity from 20 to 28 security lanes and create a seamless, free-flowing environment between Terminal B/C (Gates 10-45).

By relocating the existing security checkpoints, passengers will be able to move freely between gate areas and enjoy all the amenities the airport offers without having to be re-screened. The resulting terminal reconfiguration will provide passengers an improved post-security experience — alleviating gate area congestion while expanding access to a variety of shopping, dining and seating options. The two new security checkpoints will be built above the existing arrivals roadway.

Airport Capital Improvement Plan, Ronald Reagan Washington National Airport, 2019 – 2023

In addition to Project Journey, various airfield improvements are underway or planned. A pavement rehabilitation project for various taxiways and Runway 4/22 is nearing completion. Expansion of Hold Bay 04 including deicing collection and storage facilities is scheduled to begin in October 2018.

Planned airfield improvements in the Airport Capital Improvement Plan (ACIP) for Reagan National Airport include taxiway geometry projects to meet FAA standards and reduce the likelihood of runway incursion, hold bay reconfiguration, and pavement rehabilitation projects. Detailed projects by year are provided below.

[23] "Reagan National Project Journey." Ronald Reagan Washington National Airport, 2018. **http://flyreagan.com/dca/project-journey**

Air Capital Improvement Plan Projects Listed by Year:

2019

- **Construct Taxiway, J, A, C, E** (South Airfield Geometry Improvements TV-900 Electric Vault Relocation – Phase I): The relocation of the TV-900 electrical Vault is an enabling project to allow for the reconfiguration of Hold Bay 01. The project will also increase the resiliency of the vault at the south end of the Airport.

2020

These pavement rehabilitation projects are part of the ongoing pavement management program:

- **Rehabilitate Taxiways J, M, N, and N1**
- **Rehabilitate Taxiway and Apron – South GA Apron & Taxiway Papa West**

2021

- **Construction Taxiway J, A, C, E** (South Airfield Geometry Improvements Taxiway and RWY 01 Hold Apron – Phase 2): Includes the reconfiguration of the Runway 01 hold bay to meet FAA standards. In addition, the project includes deicing collection and storage facilities.

- **Expand Runway 15 Hold Bay and Rehabilitate Runways 15 and 22 Hold Bays:** Will reconfigure the Runway 15 hold bay to increase efficiency at the north end of the airport. It is also part of the ongoing pavement management program.

2022

- **Construct Taxiway J, K, N** (RIM and Hot Spot 2 Taxiway Geometry Improvements Taxiway and Hold Apron and Relocate N Phase 1): Will address the non-standard taxiway geometry associated with the FAA identified Runway Incursion Mitigation (RIM) location (Runway 19 hold bay) and Hot Spot 2. The project will meet taxiway design standards and help to decrease the likelihood of runway incursions. Runway guard lights will also be installed at Hot Spot 2 to increase pilot situational awareness.

2023

- **Relocated Taxiway N Phase II:** This project is to comply with the runway to taxiway separation distance between Taxiway N and Runway 15/33.

- **Rehabilitate Apron – Terminal B/C Ramps:** Part of ongoing pavement management program

- **Rehabilitate Apron – Terminal A Apron:** Part of ongoing pavement management program

Airport Layout Plan

The Airport Layout Plan (ALP) for Reagan National was approved by the MWAA board in January 2017 and was approved by the FAA in 2018. The update incorporates all Runway Safety Area work that was completed in previous years and all pen and ink change approvals since the last update (2012), including the Project Journey new concourse and checkpoints. New development items include the revision of planned roadway improvements, associated enabling projects (new Engineering and Maintenance Shops Building and temporary parking structure) and airfield improvements to address the Runway Incursion Mitigation (RIM)/ Hot Spot nonstandard taxiway geometry, Runway 04 Hold Bay expansion and Runway 01 Hold Bay improvements.

WASHINGTON DULLES INTERNATIONAL AIRPORT (IAD)

Airport Capital Improvement Plan, Washington Dulles International Airport, 2019 – 2023

Washington Dulles International Airport served over 22.7 million enplaning passengers in 2017, a 4.1 percent increase over the previous year. The increase was largely due to the addition of new International Airlines and destinations. This trend is anticipated to fuel continued growth in 2018. Many of the current projects at Dulles are for maintenance and/or enhancement of existing facilities. Near-term capital improvements consist of upgrades to existing concourses that will extend their useful life. Projects range from new roofing to electrical, plumbing, and new finishes. Other improvements consist of aircraft fueling system upgrades, pavement rehabilitation for aircraft parking aprons, taxiways, taxi lanes and runways, and baggage system upgrades to provide additional capacity. A small number of additional narrow body aircraft gates are envisioned that will enable existing gates to be converted to accommodate widebody aircraft.

In addition, MWAA continues to rehabilitate the pavement at the airport as part of the ongoing pavement management program and bring the airfield up to Aircraft Design Group (ADG) VI and Taxiway Design Group (TDG) 7 standards. Rehabilitation of a portion of Taxiway J and Taxilane B west section rehabilitation and widening are anticipated to be completed this fall. Additional airfield pavement rehabilitation projects planned are listed below.

Air Capital Improvement Plan Projects Listed by Year:

2019

- **Reconstruct & Wide Taxilane B, Middle, Section 2:** Will widen Taxi Lane B to 84 feet to meet TDG-7 standards; will be the final phase of the Taxi Lane B rehabilitation and widening.

2020

- **Reconstruct North Runway 1C-19C & High-Speed Taxiways:** Will rehabilitate original pavement on the northern portion of the Runway 1C/19C. Note the southern portion of the runway was rehabilitated several years ago.

2021

- **Reconstruct Runway 1R-19L (Phase 1 Design):** This project is for the design of a complete rehabilitation and widening of the Runway 1R/19L. The original pavement panels will be replaced, and the runway widened to 200 feet to accommodate Design Group VI aircraft.

- **Reconstruct Apron B Gates, SE End, Sections 3 & 4:** This project is part of the ongoing pavement management program.

2022

These projects are part of the ongoing pavement management program:

- **Reconstruct Apron B Gates, SW End, Sections 1 & 2**
- **Reconstruct Taxiway Y Section 5**

2023

- **Reconstruct Taxi Lane A:** Part of the ongoing pavement management program.

Dulles Corridor Metrorail Project: Section 106 Activities Annual Report

In 2017, the Metropolitan Washington Airports Authority (MWAA), and a number of local stakeholders - including the Virginia Department of Transportation (VDOT), the Washington Metropolitan Area Transit Authority (WMATA), Fairfax County, Loudoun County, and the Virginia Department of Rail and Public Transportation (DRPT) – continued planning, development, design and construction activities for the Project, a 23.1-mile extension of the regional Metrorail system along the rapidly growing Dulles Corridor in Fairfax and Loudoun Counties.[24] The Project extends the 106-mile Metrorail system existing in 2007 from the Metrorail Orange Line in Fairfax County through Tysons Corner to the Washington Dulles International Airport (Dulles Airport) and beyond to Route 772 in eastern Loudoun County. Most of the extension is being constructed in the median of the Dulles Connector Road, the Dulles International Airport Access Highway (DIAAH), and the Dulles Greenway toll road, but the alignment also diverts off median to directly serve Tysons Corner and Dulles Airport. The entire extension, once completed, will include 11 new Metrorail stations, a maintenance and storage yard on Dulles Airport property, and an expansion of the existing service facilities at the West Falls Church Station. Four of the new stations are located within Tysons Corner because it offers the significant ridership potential with the least impact on residential areas.

The Project's first phase, known as the Extension to Wiehle Avenue, completed the initial 11.7 miles of the planned extension from the current Metrorail Orange Line to Wiehle Avenue in Reston. The alignment follows the Dulles Connector Road, Route 123 and Route 7 in Tysons Corner, and the DIAAH. The Extension to Wiehle Avenue includes five new stations (McLean, Tysons Corner, Greensboro, Spring Hill, and Wiehle-Reston East), additional commuter parking, improvements to the existing Metrorail Service and Inspection Yard at West Falls Church, and an interim terminus at Wiehle Avenue. Construction was substantially completed in spring 2014 and revenue operations of the Extension to Wiehle Avenue commenced on July 26, 2014.

The Project's second phase, known as the Extension to Dulles Airport/Route 772, will complete the Project from the Phase 1 terminus at Wiehle Avenue to Route 772 in Loudoun County. From Wiehle Avenue, the alignment will continue along the DIAAH, cross Dulles Airport property, and then follow the Dulles Greenway to the terminus at Route 772. The Extension to Dulles Airport/Route 772 will include six additional stations (Reston Town Center, Herndon, Innovation Center, Dulles Airport, Loudoun Gateway, and Ashburn), additional commuter parking, and a new Service and Inspection Yard on Dulles Airport property. Revenue operations of the Extension to Dulles Airport/Route 772 is tentatively scheduled for some time in 2020.

Airport Layout Plan

The Airport Layout Plan for Dulles was last updated in July 2016. It included property boundary changes and various projects that were recently completed or planned.

[24] "Dulles Corridor Metrorail Project: Section 106 Activities Annual Report." Metropolitan Washington Airports Authority, 2018. http://www.dullesmetro.com/silverline/assets/File/project_docs/2017%20Section%20106%20Activities%20Annual%20Report%20-%20FINAL.pdf

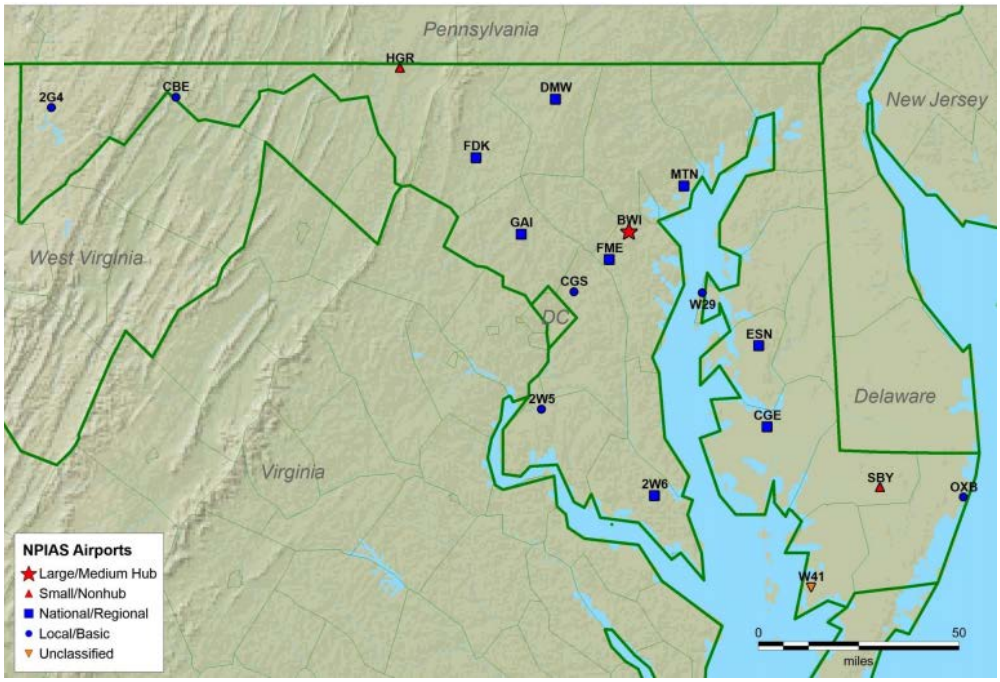
V. NPIAS AIRPORT INVENTORY

On a national scale, the National Plan of Integrated Airport Systems (NPIAS) identifies nearly 3,400 existing and proposed airports that are significant to national air transportation and thus eligible to receive Federal grants under the Airport Improvement Program (AIP). It also includes estimates of the amount of AIP money needed to fund infrastructure development projects that will bring these airports up to current design standards and add capacity to congested airports. The NPIAS contains all commercial service airports, all reliever airports, and general aviation airports. This section contains inventories for the NPIAS airports in the states of Maryland and Virginia. The District of Columbia does not contain any NPIAS airports.

MARYLAND

The map in Figure 3 depicts the 18 NPIAS airports in the state of Maryland, nine of which are found in the Washington-Baltimore Air Systems Region. The airports found in the Washington-Baltimore Air Systems Region are sorted by status (commercial service, reliever, general aviation). The city that each airport serves is also indicated.

Figure 3: Maryland NPIAS Airports



Source: Federal Aviation Administration, 2016.

Commercial Service Airports

- BWI – Baltimore/Washington International Thurgood Marshall Airport: Baltimore/Glen Burnie

Reliever Airports
* indicates airports which are access restricted (ie: military airfields)

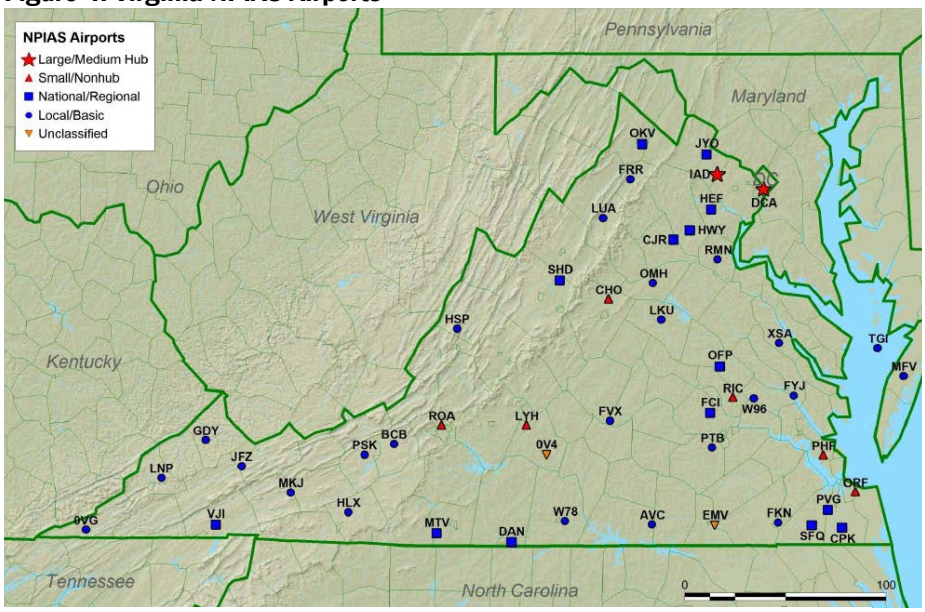
- 2W5 – Maryland Airport: Indian Head*
- DMW – Carroll County Regional Airport: Westminster
- FDK – Frederick Municipal Airport: Frederick
- FME – Tipton Airport: Odenton / Fort Meade*
- GAI – Montgomery County Airpark: Gaithersburg
- MTN – Martin State Airport: Baltimore / Middle River

General Aviation Airports

- 2W6 – St. Mary's County Regional Airport: Leonardtown
- CGS – College Park Airport: College Park

VIRGINIA

Figure 4: Virginia NPIAS Airports



Source: Federal Aviation Administration, 2016.

Over 95 percent of Virginians currently enjoy easy access to one of the Commonwealth's airports.[25] According to the 2016 update of the Virginia Air Transportation System Plan (VATSP), the only means to substantially increase the level of accessibility would be to introduce new airports into the system. Four new general aviation airports are recommended in the VATSP to serve the areas of Lexington-Rockbridge County, Franklin County-Rocky Mount, the Northern Neck, and West Richmond.[26] The map in Figure 4 showcases the 48 NPIAS airports currently located in the Commonwealth of Virginia, six of which are found in the Washington-Baltimore Air Systems Region. They are listed below the map, sorted by status (commercial service, reliever, and national general). There are no general aviation NPIAS airports in the Washington-Baltimore Air Systems Region.

[25] Depending on the performance measure that was being analyzed, accessibility was defined as being either 30- or 45-minute drive times for Virginians to public-use airports.

[26] Virginia Air Transportation System Update 2016. Virginia Department of Aviation, 2016. http://www.doav.virginia.gov/VATSP_update_2016.htm

Commercial Service Airports

- DCA – Ronald Reagan Washington National Airport: District of Columbia / Arlington County
- IAD – Washington Dulles International Airport: District of Columbia / Dulles / Chantilly

Reliever Airports

- HWY – Warrenton-Fauquier Airport: Warrenton
- JYO – Leesburg Executive Airport: Leesburg
- RMN – Stafford Regional Airport: Stafford

National General Airport

- HEF – Manassas Regional Airport: District of Columbia / Manassas

WASHINGTON, DC

The District of Columbia does not have any NPIAS airports.

VI. STATE AVIATION SYSTEM PLANS – WASHINGTON-BALTIMORE REGION

According to the Federal Aviation Administration (FAA), an aviation agency is typically authorized by state law to engage in airport system planning. It is normally under the state's aviation organization located within the Department of Transportation, an aeronautics commission, or another state planning agency. A planning agency means any agency designated by the FAA Administrator that is authorized by the laws of the state or states, or political subdivisions concerned, to engage in area wide planning for the areas in which FAA grant assistance is to be used.[27]

The state aviation agency's role in airport planning, development, and regulation often determines the scope of its system planning process. Depending on the involvement of the state agency, the airport system plan might include elements that:

- Inform the state budgetary process with assessments of resource requirements, including timing and priorities
- Provide the state with information to facilitate elected officials in making aviation planning and development decisions consistent with state goals and objectives, and with an airport's current Airport Layout Plan (ALP)
- Provide individual airport sponsors with policy, technical direction, and American Society of Testing and Materials (ASTM) standards for master planning, along with budgetary guidelines
- Provide policy guidance and act as a management and coordination resource for metropolitan and multi-state planning efforts
- Assist in coordination with other state, regional, and local planning organizations having aviation-related interests
- Provide the FAA with recommendations and supporting justification for inclusion of airports and projects in the NPIAS
- Contain special studies that provide the aviation community and the public with information on pertinent airport-related issues
- Support a continuing airport planning process, ensuring that aviation issues are continually and effectively evaluated.

[27] U.S. Department of Transportation, Federal Aviation Administration, 2015. Advisory Circular 150/5070-7: The Airport System Planning Process. Washington, DC. https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5070-7-change1.pdf

MARYLAND

Maryland Aviation System Plan (2008)

The 2008 Maryland Aviation System Plan (MASP) provides an analysis of each public use airport and an overview of Maryland's overall air transportation needs for the next 20 years. The MASP is a planning document designed to help the MAA determine the type, extent, location, timing and cost of airport development needed in Maryland to preserve and expand a safe and efficient system of airports.[28]

Nearly 95 percent of the state's population is within 60 minutes of an air carrier airport and nearly 98 percent of the population is within 30 minutes of a system airport. Even with the State's diverse geography, more than 90 percent of the State's land area is within a 30-minute drive of a system airport. Maryland's system of 35 airports is anticipated to see an increase of more than 1,000 based aircraft and 500,000 general aviation operations by 2026. Commercial operations are anticipated to grow by more than 50 percent over the planning period.

While the current system of airports was found to be well developed with outstanding infrastructure and services overall, there were areas of facility-based improvement identified. Each of the three air carrier airports met 100 percent of their system facility recommendations – which excludes the numerous local projects identified for these vital airports. Reliever airports currently meet 73 percent of their facility recommendations, while general airports meet 75 percent of their objectives, and local airports also meet 75 percent of their local objectives.

Total estimated costs for all recommended system projects amount to more than $167 million. The split of overall development between the short, mid- and long-term periods is 27 percent, 41 percent, and 32 percent, respectively, as outlined in the figure below. Note: The State funds the commercial airports through a variety of mechanisms not including in the table below, including FAA programs and airline investment, etc.

Figure 5: Recommended Projects: Costs and Phasing Summary

Airport Category	Short Term (1-5 years)	Medium Term (6-10 years)	Long Term (11-20 years)
Commercial Airports	$ 0	$ 0	$ 0
Reliever Airports	31,354,000	39,491,000	1,250,000
General Airports	11,091,000	25,950,000	53,004,000
Local Airports	3,082,000	2,545,000	0
GRAND TOTAL	**$ 45,527,000**	**$ 67,986,000**	**$ 54,254,000**

Source: Wilbur Smith Associates – via the Maryland Aviation System Plan, 2008.

While the airports vary in size, each provides service to a specific market area and plays a role in meeting Maryland's diverse air transportation and economic needs. An important element of the study was to identify the role for system airports and recommend the type of facilities and services that should be in place at each. In addition to the system airports, there are more than 100 privately-owned airports in Maryland that are restricted from public use.

[28] Maryland Aviation System Plan - 2008. Maryland Aviation Administration, 2008. http://www.marylandregionalaviation.aero/_media/clients/pdf/publications/Maryland_System_Plan.pdf

Maryland Economic Impact of Airports

The Maryland Aviation Administration conducted a study to estimate the economic impacts of the Maryland airport system. The study analyzed BWI and Martin State (MTN) airports as well as the entire statewide aviation system, which consists of 35 public use airports (including one heliport and one sea plane base), three of which are commercial service airports (BWI, Hagerstown, and Salisbury); the other 32 airports are general aviation facilities. The purpose of the study is to quantify the economic impacts generated by passenger and air cargo activity at BWI and to quantify the economic impacts generated by the general aviation and scheduled commercial service airports.[29]

The impacts are quantified in terms of: jobs, employee earnings, business revenue, state and local taxes, and federal airport-specific taxes. In 2014, it is estimated that aviation activity in the State of Maryland created approximately:

- 107,105 direct, induced, and indirect jobs
- $4.3 billion of personal wages and salaries
- $7.8 billion of business revenue
- $0.6 billion of state and local taxes
- $1.8 billion of local purchases for supplies and services

The impacts are estimated for passenger and air cargo activity for calendar year 2014. In addition to the baseline impacts, an economic impact model has been developed for BWI as well as for the state's 35 general aviation/scheduled commercial service airports, which can be used to estimate the impacts associated with capital construction and expansion projects.

Activity at BWI created the majority of the state's passenger and air cargo-based economic impacts. In calendar year 2014, 22.3 million passengers used BWI, and 231.9 million pounds of air cargo moved via the Airport. This activity resulted in approximately:

- 23,419 direct, induced and indirect jobs were generated for residents of the Baltimore area.
- $1.6 billion of direct, indirect and induced personal income and consumption expenditures were generated in the Baltimore area due to the airport activity in 2014.
- $3.2 billion of business sales were generated by airport activity.
- The Federal Government received $260 million in airport-specific taxes from activity at BWI.
- State and local governments received $165.3 million in tax revenues from airport activity.

The model can be used for future annual updates of the impacts as well as to test the sensitivity of impacts to changes in:

- Passenger levels
- Domestic versus international passengers
- Passenger trip purpose
- Peak hour flight levels and mix of aircraft
- Labor productivity and work rules
- Freight level
- General aviation operations

[29] Maryland Economic Impact of Airports – 2015. Maryland Aviation Administration, 2015. http://www.marylandregionalaviation.aero/_media/clients/publications/2015/Maryland%20Statewide%20Economic%20Impact%20Report%20-%20July%202015%20Final.pdf

VIRGINIA

Virginia Air Transportation Systems Plan Updated (2016)

According to the 2016 Virginia Air Transportation System Plan Update (VATSP), over 95 percent of Virginians currently enjoy access to one of the Commonwealth's airports, and almost 210 million passengers will be added to the system over the next 25 years. The rate of growth for commercial service operations in Virginia, excluding DCA and IAD, is expected to continue to outpace the national average. To accommodate this growth, the VATSP blends the maintenance of existing airports with the strategic development and enhancement of the facilities at current airports, along with the development of new system airports.[30]

In total, the VATSP Update shows that between now and the end of the planning period, more than four billion dollars will need to be invested in Virginia's airport system to improve existing airports and to build new airports. The VATSP recommendations include projects programmed in specific years that cannot be funded when needed because of the funding gap. Meeting these unfunded system needs will require collaboration between federal, state and local leadership.

The recommended plan is based on the sensitivity analysis which considered a number of "what if" scenarios that could be encountered as they relate to optimizing system performance, as well as a Facility, Service, and Equipment (FS&E) analysis, cost scenarios, and alternative analyses. The FS&E Objectives established for each airport in the Virginia state system provide a range of directives - such as runway lengths and hangar needs. The VATSP identifies airport improvements needs to meet each FS&E objective, which will then be incorporated into each airport's development plan.

Within the VATSP analysis, the current system's performance is evaluated relative to the following performance measures, which indicate the percentage of the state has accessibility to each measure, via Virginia airports.

Accessibility to:

- Any Airport: 94.7%
- Commercial Service Airport: 77.3%
- 5,500-foot Runway: 73.7%
- Precision Approach: 87.2%
- Weather Reporting 92.6%
- Business Class Airports: 73.7%

An alternatives analysis gave financially unconstrained consideration to if and how current system performance could be optimized, exploring changes and improvements for the system, including:

- Extending runways at select airports
- Adding additional new general aviation airports to the system
- Improving all airports to meet their FS&E Objectives

[30] Virginia Air Transportation System Update 2016. Virginia Department of Aviation, 2016. http://www.doav.virginia.gov/VATSP_update_2016.htm

Figure 6: Recommended Virginia Air Transportation System

Source: Virginia Air Transportation System Plan Update (2016). Virginia Department of Aviation, 2016.

The Commonwealth of Virginia is currently host to a robust system of 66 public-use airports, comprised of: commercial service (9), commercial service reliever (8), reliever general aviation – regional (19), general aviation region and community (16), and general aviation – community local service (14). As indicated by the white dashed circles above, four new general aviation airports are recommended in the VATSP to serve the areas of Lexington-Rockbridge County, Franklin County-Rocky Mount, the Northern Neck, and West Richmond.

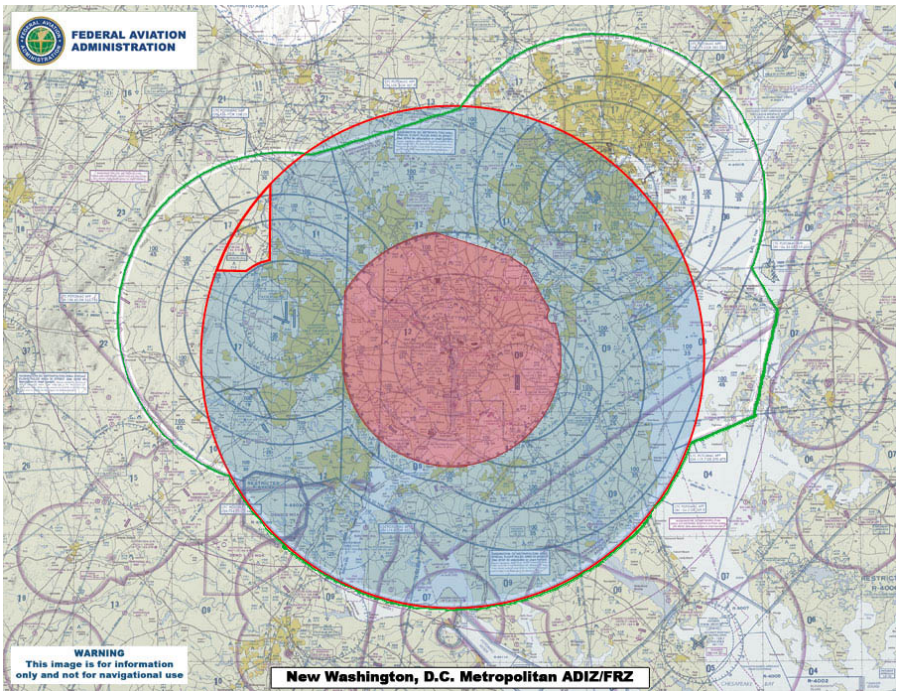
WASHINGTON, DC

Washington, DC Metropolitan Area Special Flight Rules Area

The District of Columbia does not have an airport system plan because it does not have any airports within its boundaries. Since every state is allocated Airport Improvement Plan (AIP) funds from the FAA, it is DC's AIP apportionment that funds the COG-TPB CASP Program. While DC has neither airports nor a system plan, it is significantly impacted by the plans and activities of Maryland and Virginia as well as the RASP and is most significantly impacted by the restrictions of the Air Defense Identification Zone (ADIZ) outlined below.

In 2003 an ADIZ was established, and in 2008 was made permanent, to restrict air traffic near DC.[31] An ADIZ is airspace over land or water in which the identification, location, and control of civil aircraft is performed in the interest of national security. The ADIZ – now more commonly known by its components, the DC Flight Restricted Zone (FRZ) and DC Special Flight Rules Area (SFRA) – was created by the FAA in response to demands by a working group that became formalized as the National Capital Region Coordination Center. The ADIZ covers a 30-nautical-mile radius circle centered on DCA, with a small cutout for Leesburg Executive Airport.

Figure 7: Washington Air Defense Identification Zone



Source: U.S. Federal Aviation Administration, 2007.
Note: red line = 2008, green line = 2003

The ADIZ contains an even more sensitive zone within it, the Flight Restricted Zone (FRZ), which extends approximately 15 nautical miles around DCA. Air travel within the FRZ is limited to governmental flights, as well as limited set of waivered and scheduled commercial flights. Three general aviation airports are located within the FRZ: College Park Airport (CGS), Washington Executive/Hyde Field (W32) and Potomac Airport (VKX).[32]

31 Chung, Charles K. (2005). "FAA Proposes Making D.C. ADIZ Permanent" (Regulatory Review). Rotor. p. 22.
32 "ALC-55: Washington DC Special Flight Rules Area (SFRA) – Online Course." FAASafety.gov. 2011-11-29. Retrieved 2018-09-10.

VII. ADJACENT STATE AVIATION SYSTEM PLANS

While Delaware and Pennsylvania are not technically part of the Washington-Baltimore Air Systems Region, and only one county – Jefferson County – in West Virginia is, the aviation system plans are outlined below given their geographic proximity to the Washington-Baltimore Air Systems Region.

DELAWARE

Delaware Aviation System Plan Update

The 2013 Delaware Aviation System Plan Update (Phases I and II) takes a fresh look at the classifications of Delaware's airports and heliports and provides guidelines for their orderly development. The study serves as a forum for public input to the state aviation policy decision process. Review and comment from the Aviation Advisory Committee, combined with the input from State and local agencies as well as the public are important factors in deciding the course of aviation priorities and issues. The Delaware Aviation System Plan generated valuable management information tools, general aviation airport security plans, and legislative recommendations.[33]

Four Work Elements:

- Issues, Goals, and Objectives
- Analysis of Existing System
- Forecast of Aviation Demand
- Demand/Capacity & Aviation System Needs

Key Questions:

- How has the most recent recession impacted aviation in Delaware?
- Can the long-term system be sustained with fewer FAA dollars?
- What are the implications of full (unrestricted) joint use at Dover Air Force Base?
- What are the implications of scheduled airline passenger service in central Delaware?
- Is civilian air cargo service possible in Delaware?
- What impact would the implementation of green technology have on system airports?
- What aviation subsystems require State regulation, guidance, policy input, or financing?
- What are the financial implications of the recommended plan?
- How is the recommended plan implemented?

Key issues that could change the aviation system in Delaware include the possible unrestricted joint use of Dover AFB, the development of a civilian air cargo hub at the Civil Air Terminal at Dover AFB, the loss of one or more private airports, and the removal of Summit Airport from the FAA funding program. Allegiant Airlines has selected Salisbury, Maryland to initiate service to the Orlando, Florida area, but Dover remains another possible outlet for Allegiant service. While it is not explicitly called out in the system plan, it is worth noting that there are currently efforts to establish commercial service at New Castle County Airport (ILG), which has implications for BWI's catchment area.

[33] "Delaware Aviation System Plan Update – 2013." Delaware Department of Transportation, 2013. https://www.deldot.gov/Programs/aviation_svcs/pdfs/sys_plan/DASPU_Phase_2_Report.pdf

PENNSYLVANIA

Statewide Airport System Plan

The 2007 Pennsylvania State Airport System Plan (SASP) Update addressed the following:[34]

Updated Classification Criteria and Reclassified Airports

The 2007 SASP Update defined airport classifications based solely on the objective facility amenities and services for each airport type. All "advanced" and several "intermediate" airports were reviewed and reclassified as "commercial service," "advanced," and "intermediate."

State of the System

SASP airports' adherence to the performance criteria for the "commercial service," "advanced," and "intermediate" classifications were reviewed, comparing the performance criteria data contained in the 1999 and 2005 SASP airport inventory tables. Most of Pennsylvania's airports meet the key performance criteria for runways and taxiways.

Pennsylvania's NPIAS Airports

The FAA entry requirements for NPIAS airports were studied as were the 64 AIP eligible NPIAS airports in Pennsylvania. Eight case-study airports were examined, and recommendations made regarding their NPIAS status. This process was documented for future use by PennDOT. A GIS map was developed to illustrate the coverage of NPIAS airports throughout the state, based on 30-minute drive times.

Project Benefits and System Contribution Analysis

In order to analyze and prioritize projects, a process was developed to determine which projects provide the greatest benefit to the system based on the operational contribution to the system and on project cost. The process calculates the operational contribution to the system from runway, taxiway, and apron projects. The process assigns a higher weight to projects at busier airports and identifies the level of sponsor and project readiness.

Definition of an Ideal Four-Year Funding Level

A tool was developed to estimate ideal or realistic funding levels tied to typical project implementation timelines and statewide funding demand for any four-year period. This tool provides an estimate of ideal funding levels that are supportable and realistic.

Market Areas of CASP Airports

It is worth noting that for large swaths of South Central Pennsylvania, BWI or IAD are much closer and/or offer more service than Pittsburgh (PIT), Harrisburg (MDT), and Philadelphia (PHL). Consideration of the market areas of the CASP airports will be elaborated on in subsequent phases of the RASP.

[34] "Statewide Airport System Plan – 2007." Pennsylvania Department of Transportation, 2007. https://www.penndot.gov/Doing-Business/Aviation/Planning%20and%20Zoning/Pages/2007-Statewide-Airport-System-Plan.aspx

WEST VIRGINIA

West Virginia Multimodal Statewide Transportation Plan

This 2010 study examines the 34 airports in West Virginia that are open for public use, whether they are owned by public or private entities. There are many privately owned airports in the state that are not open to public and not included in this analysis.[35]

West Virginia is rich in history and natural beauty. The state offers a wide range of tourist and outdoor recreational opportunities, such as hunting, fishing, caving, rock climbing, whitewater rafting, and hiking. The strong tourism and recreation market along with its universities and businesses support commercial passenger and general aviation activity at the state's airports. Currently, the Aeronautics Commission of WVDOT oversees 34 public use airports. While these existing airports serve the current aviation demand generated in the state, this section of the report documents existing conditions and identifies the potential needs for these airports over the next 25 years.

The total projected cost for runway, taxiway, and weather equipment for West Virginia's airports over the next 10 years is summarized in the table below. No additional projects have been identified beyond 2018 as part of this study.

Figure 8: Total Projected Airport Cost

Type of Project	State	Total
Runway Rehabilitation	$240,132	$9,605,263
Runway Extensions	$234,974	$9,398,947
Taxiway Improvements	$291,961	$11,678,421
ASOS	$5,000	$200,000
Total	$772,066	$30,882,632

Source: West Virginia Multimodal Statewide Transportation Plan, 2010.

As the state transforms from a coal mining economy into a tourism, service, aerospace industry, and technology-based economy, access to aviation facilities and services is one important factor that will help foster this growth. The recommended needs that satisfy future aviation demand are essential to support the growing needs of the aviation industry in the state. The closures of two airports, Roy Airfield and Welch Municipal Airports may have a local effect on general aviation access. However, the recent expansion of Boggs Airfield in Spencer is expected to improve the aviation access in that area of the state. The state's support of aviation and the economic benefits generated from these facilities will have positive impacts for the community many times greater than the state will expend.

Market Areas of CASP Airports

It is worth noting that for large swaths of West Virginia, IAD is much closer and/or offers more service than Yeager (CRW) or PIT. Consideration of the market areas of the CASP airports will be elaborated on in subsequent phases of the RASP. The recent improvements to Appalachian Development Highway System Corridor H (US 48) has improved IAD's market standing in the Potomac Highlands. Improving Corridor H in Virginia is low priority but also benefits IAD access.

35 "West Virginia Multimodal Statewide Transportation Plan - 2010." West Virginia Department of Transportation, 2010. http://transportation.wv.gov/highways/programplanning/planning/statewide/Documents/West_Virginia_Long_Range_Multi-modal_Transportation_Plan.pdf

VIII. ACRP REPORTS ON THE STATE OF PRACTICE

The need for the Airport Cooperative Research Program (ACRP) was identified in *TRB Special Report 272: Airport Research Needs: Cooperative Solutions* in 2003, based on a study sponsored by the Federal Aviation Administration (FAA). The ACRP carries out applied research on problems that are shared by airport operating agencies that are not being adequately addressed by existing federal research programs. The ACRP is modeled after the successful National Cooperative Highway Research Program and Transit Cooperative Research Program. The ACRP undertakes research and other technical activities in a variety of airport subject areas, including design, construction, maintenance, operations, safety, security, policy, planning, human resources, and administration. Furthermore, the ACRP provides a forum where airport operators can cooperatively address common operational problems.

A careful review of existing ACRP reports was conducted to best gauge the state of the practice in regional air system planning. The following ACRP reports primarily concern ground access to airports, which is the focus of this regional air systems plan.

AIRPORT SYSTEM PLANNING PRACTICES (2009)

TRB's Airport Cooperative Research Program (ACRP) Synthesis 14: Airport System Planning Practices explores the extent to which state aviation agencies and regional planning organizations are involved in airport system planning. The report also examines the type of studies these organizations perform and how successful their efforts have been in meeting the planning process objectives.[36]

The focus of this synthesis is on how airport system plans are now being conducted and used. The synthesis collected information on each of the following:

- General background information including the plan's funding source, number of airports analyzed, and ownership of system airports
- Interface of the planning effort with the National Plan of Integrated Airport Systems (NPIAS)
- Coordination and other outreach efforts that characterize the planning process
- Various elements or special studies included in the planning effort
- Ways that plans are being used and implemented.

All 50 state aviation directors, as well as the directors from Guam and Puerto Rico, were surveyed to collect information on their current airport system planning practices. This report also presents several case studies that focus on multi-state and metropolitan or regional aviation system plans. This synthesis reports on current airport system planning practices based on survey results, case studies, and a literature review.

AIRPORT CURBSIDE AND TERMINAL AREA ROADWAY OPERATIONS (2010)

TRB's Airport Cooperative Research Program (ACRP) Report 40: Airport Curbside and Terminal Area Roadway Operations includes guidance on a cohesive approach to analyzing traffic operations on

[36] National Academies of Sciences, Engineering, and Medicine. 2009. *Airport System Planning Practices*. Washington, DC: The National Academies Press. https://doi.org/10.17226/23041.

airport curbside and terminal area roadways. The report examines operational performance measures for airport curbside and terminal area roadway operations and reviews methods of estimating those performance measures. The report includes a quick analysis tool for curbside operations and low-speed roadway weaving area, highlights techniques for estimating traffic volumes, and presents common ways of addressing operational problems.[37]

DEVELOPING AN AIRPORT PERFORMANCE-MEASUREMENT SYSTEM (2010)

TRB's Airport Cooperative Research Program (ACRP) Report 19: Developing an Airport Performance-Measurement System provides guidance on developing and implementing an effective performance-measurement system for airports.[38]

HANDBOOK TO ASSESS THE IMPACTS OF CONSTRAINED PARKING AT AIRPORTS (2010)

TRB's Airport Cooperative Research Program (ACRP) Report 34: Handbook to Assess the Impacts of Constrained Parking at Airports explores different types of parking constraints that airports experience and highlights tools to assess the impacts of the constraints and strategies to deal with them.[39]

EXPLORING AIRPORT EMPLOYEE COMMUTE AND PARKING STRATEGIES (2012)

TRB's Airport Cooperative Research Program (ACRP) Synthesis 36: Exploring Airport Employee Commute and Parking Strategies analyzes what is known about airport employee commute patterns and commute modes. The report addresses alternatives to the drive alone commute for airport employees, the effectiveness and challenges of airport employee commute options programs, and commute options programs offered by non-airport employers that might be applicable to the airport environment.[40]

COMMERCIAL GROUND TRANSPORTATION AT AIRPORTS: BEST PRACTICES (2015)

TRB's Airport Cooperative Research Program (ACRP) Report 146: Commercial Ground Transportation at Airports: Best Practices covers best management practices to ensure the provision of safe, comfortable, easy-to-use, and efficient commercial ground transportation service. Commercial ground transportation services include taxicabs, limousines, shared-ride services, transportation network companies, courtesy vehicles, buses, and vans. The guidebook reviews the ground transportation industry, potential solutions to challenges airport operators frequently face, how to select a solution, and how to implement the selected best practice.[41]

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[37] National Academies of Sciences, Engineering, and Medicine. 2010. Airport Curbside and Terminal Area Roadway Operations. Washington, DC: The National Academies Press. https://doi.org/10.17226/14451.
[38] National Academies of Sciences, Engineering, and Medicine. 2010. Developing an Airport Performance-Measurement System. Washington, DC: The National Academies Press. https://doi.org/10.17226/14428.
[39] National Academies of Sciences, Engineering, and Medicine. 2010. Handbook to Assess the Impacts of Constrained Parking at Airports. Washington, DC: The National Academies Press. https://doi.org/10.17226/14435.
[40] National Academies of Sciences, Engineering, and Medicine. 2012. Exploring Airport Employee Commute and Parking Strategies. Washington, DC: The National Academies Press. https://doi.org/10.17226/22724.
[41] National Academies of Sciences, Engineering, and Medicine. 2015. Commercial Ground Transportation at Airports: Best Practices. Washington, DC: The National Academies Press. https://doi.org/10.17226/21905.

INNOVATIVE REVENUE STRATEGIES – AN AIRPORT GUIDE (2015)

TRB's Airport Cooperative Research Program (ACRP) Report 121: Innovative Revenue Strategies – An Airport Guide describes a broad range of tools and techniques to improve airport revenue streams, recover costs, and achieve operational efficiencies. The report identifies customer needs; airport-provided services and shared services, facilities, and equipment; revenue participation in real estate and natural resource development; value capture and other financing opportunities; and improvements to existing airport businesses.[42]

ESTIMATING TRUCK TRIP GENERATION FOR AIRPORT CARGO ACTIVITY (2017)

TRB's Airport Cooperative Research Program (ACRP) Synthesis 80: Estimating Truck Trip Generation for Airport Air Cargo Activity compiles existing information about air cargo truck trip generation studies. The existing literature and research regarding air cargo facility-related truck trip generation rates is limited in its scope and detail. In addition, the complexity of the modern air cargo industry makes it difficult to obtain the data necessary to develop truck trip generation rates. Access to such information could conceivably help a community plan and invest appropriately by accounting for air cargo's impacts. Similarly, air cargo operators and airport officials could employ such data to help ensure cargo facility truck access and egress remains reliable and safe.[43]

TRANSPORTATION NETWORK COMPANIES: CHALLENGES AND OPPORTUNITIES FOR AIRPORT OPERATORS (2017)

TRB's Airport Cooperative Research Program (ACRP) Synthesis 84: Transportation Network Companies: Challenges and Opportunities for Airport Operators compiles experiences and effective practices by airports in facilitating customer access to Transportation Network Companies (TNCs) like Uber and Lyft. This synthesis also summarizes the amount of revenue airports receive from TNCs and how TNCs are affecting airport operations and other businesses.[44]

[42] National Academies of Sciences, Engineering, and Medicine. 2015. Innovative Revenue Strategies – An Airport Guide. Washington, DC: The National Academies Press. https://doi.org/10.17226/22132.
[43] National Academies of Sciences, Engineering, and Medicine. 2017. Estimating Truck Trip Generation for Airport Air Cargo Activity. Washington, DC: The National Academies Press. https://doi.org/10.17226/24848.
[44] National Academies of Sciences, Engineering, and Medicine. 2017. Transportation Network Companies: Challenges and Opportunities for Airport Operators. Washington, DC: The National Academies Press. https://doi.org/10.17226/24867.

IX. NATIONAL CASE STUDIES

In the summer of 2018, interviews were conducted with five metropolitan planning organizations (MPOs) that, like COG-TPB, are host to sizeable air systems planning programs – and one not-for-profit regional planning organization, the Regional Plan Association. Case studies of their most recent regional air systems planning efforts are included in this section.

The entities featured in this section are:

- Delaware Valley Regional Planning Commission (DVRPC)
- Houston-Galveston Area Council (HGAC)
- Metropolitan Transportation Commission (MTC)
- North Central Texas Council of Governments (NCTCOG)
- Regional Plan Association (RPA)
- Southern California Association of Governments (SCAG)

DELAWARE VALLEY REGIONAL PLANNING COMMISSION (DVRPC)

2040 Regional Airport System Plan (2014)

The purpose of this report is to provide an update to the 2035 Regional Airport System Plan (RASP) on base data (such as based aircraft and traffic counts), population, employment, operational and capacity forecasts, and recommendations to 2040. In addition, the report will provide an overview and analysis of the issues and trends impacting regional airport system development. Based on that analysis, the report makes detailed airport system development and investment recommendations to guide aviation in the region for the foreseeable future.[45]

Objectives:

Expand commercial air service capacity within the region.

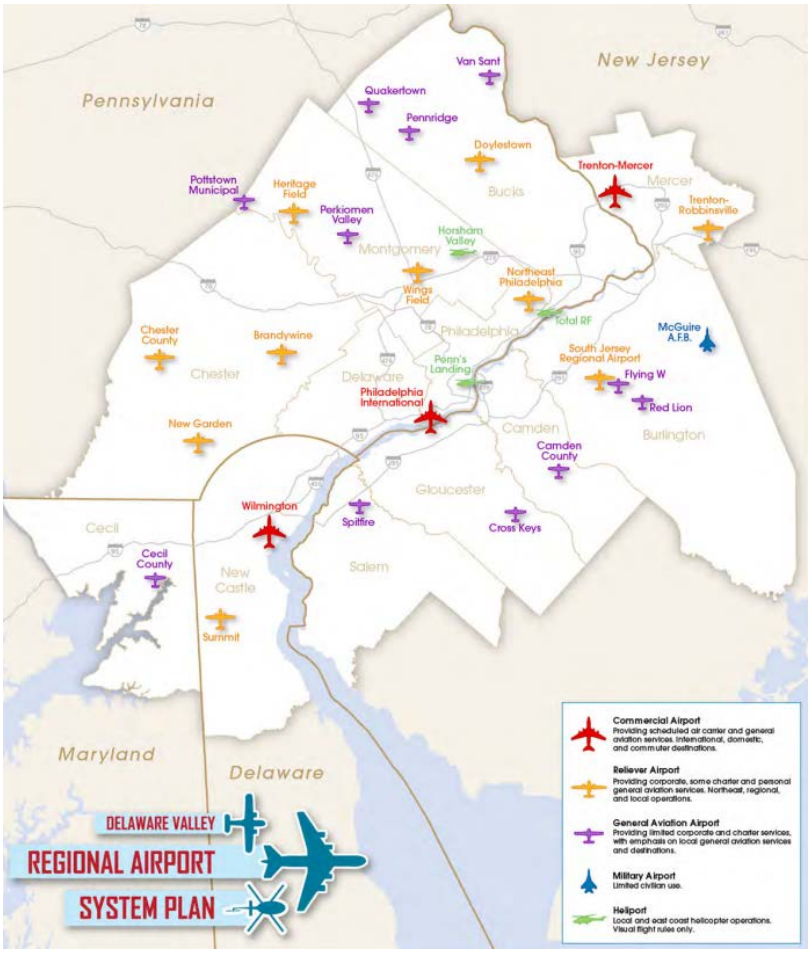
Preserve the existing public-use GA airport system.

Sustain and improve infrastructure to attract more users.

Improve community outreach to inform the public of the importance of airports to the local and regional economy.

Improve efforts to attract students to careers in aviation fields.

Figure 9: Regional Airport System Map - DVRPC



Source: Delaware Valley Regional Planning Commission, 2014

[45] "2040 Regional Airport System Plan." Delaware Valley Regional Planning Commission, 2014. https://www.dvrpc.org/reports/13064.pdf

HOUSTON-GALVESTON AREA COUNCIL (H-GAC)

Gateways to Our Communities: 2040 Regional Aviation System Plan (2011)

The Regional Aviation System Plan (RASP) is the framework for airport development in the 13-county Houston-Galveston region. The plan examines the region's airports, evaluates how well they are performing today, and determines what improvements are needed in the future. The RASP seeks to ensure that the region's airports are preserved, that they have the facilities and capacity to operate safely and efficiently, and that they provide maximum economic benefits to their local communities and the region.[46]

Objectives:

Inventory facilities and condition of regionally significant airports.

Consult with leaders of communities in which airports are located.

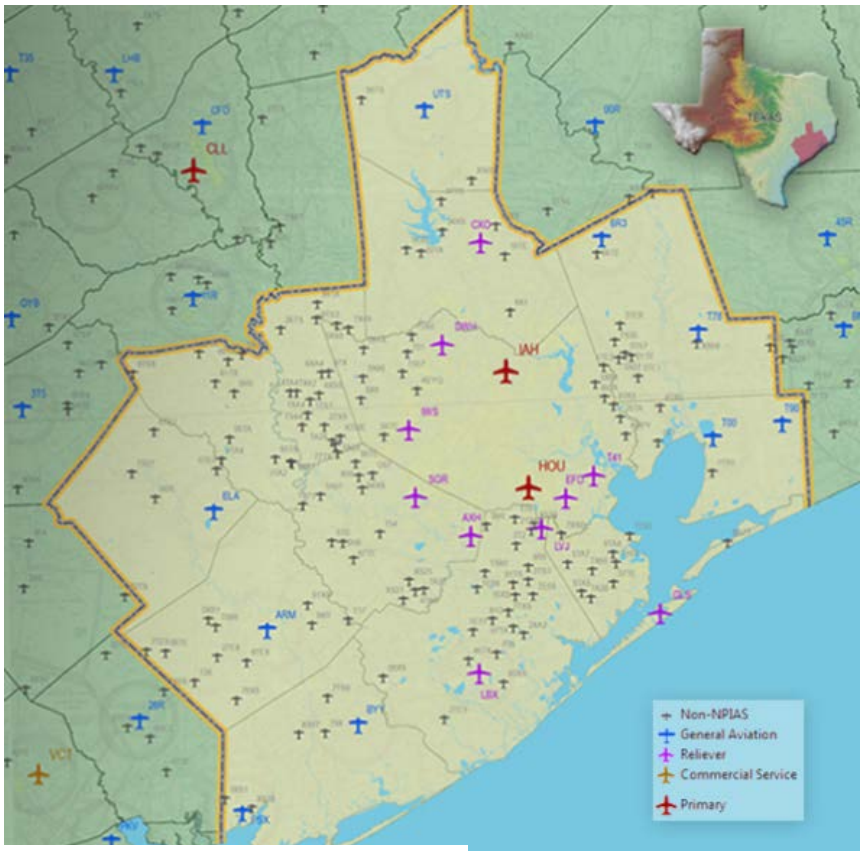
Identify major issues affecting regional aviation.

Develop goals to guide selection of improvement measures and priorities.

Forecast future aviation demand; assess capacity of each airport for aviation activity to 2030.

Explore scenarios of unexpected events that could impact the system.

Figure 10: Airports in the H-GAC Region



Source: Houston-Galveston Area Council, 2011.

Develop plan that establishes airport roles and improves user safety, efficiency, convenience.

Develop list of projects that result in the optimal plan.

Set priorities for projects to form a logical sequence of plan development.

Provide recommendations for updates to the Texas Airport System Plan (TASP) and NPIAS

[46] "Gateways to Our Communities: 2040 Regional Aviation System Plan." Houston-Galveston Area Council, 2011. http://www.h-gac.com/taq/aviation/documents/RASP%20executive%20summary.pdf

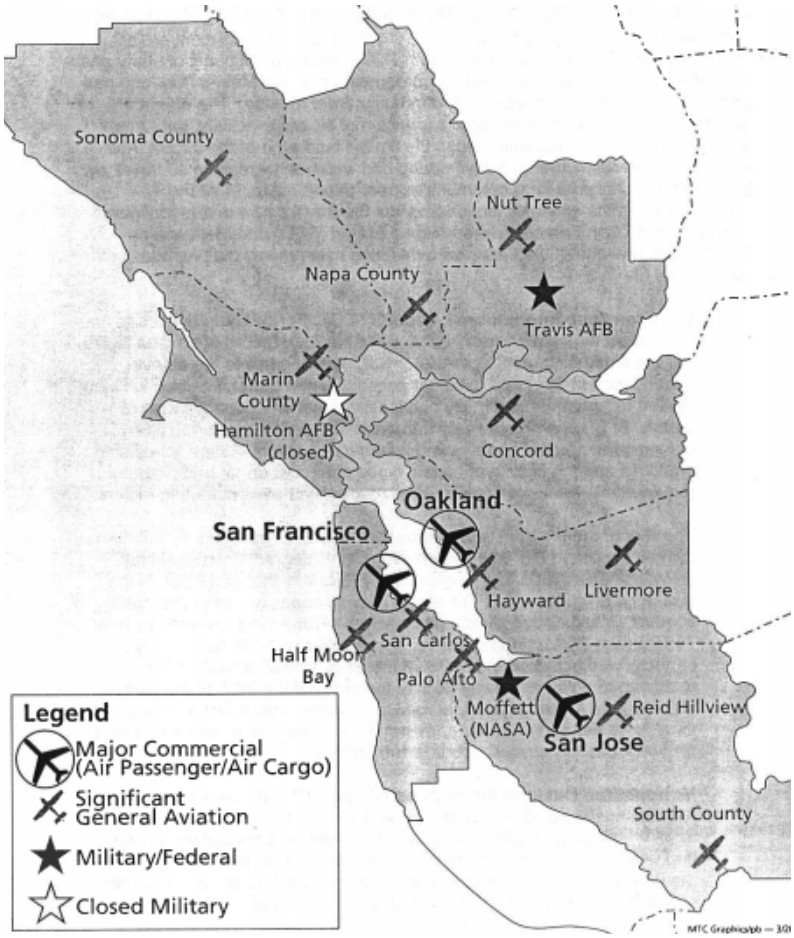
METROPOLITAN TRANSPORTATION COMMISSION (MTC)

Regional Airport System Plan (2000)

The 1999 update of the 1994 RASP was intended to explore a range of solutions to address the increasing air traffic demands being placed on the runways at the major commercial airports and on the airspace around these airports. The decreasing reliability of airline service was also an issue, due to the significant delays experienced at San Francisco International Airport during poor weather. Additionally, San Francisco Airport had initiated its own comprehensive study of runway reconfiguration options, which needed to be considered in a larger regional planning context.[47]

While earlier regional airport planning exercises determined that the region's aviation system capacity would eventually reach its limits, these plans did not provide any detailed analysis of the options for addressing this condition.

Figure 11: Bay Area Airports



Source: Regional Airport Planning Committee, 2000.

The Regional Airport Planning Committee (RAPC) identified three primary issues to focus on:

- The need for additional airport system capacity, now, in 10 years, and in 20 years
- Regional airport system alternatives to provide this capacity
- Significant environmental effects (airport noise, air quality, Bay fill, wetlands/habitats, etc.)

To address these central issues, the RAPC update process provided the following:

- A review of aviation forecasts and update for 2010 and 2020
- A review of the airport system's capacity for major runway alternatives and a sensitivity analysis addressing changes in capacity/delay due to different supply/demand assumptions
- A review of basic environmental impact data on the regional runway
- Alternatives

[47] "Regional Airport System Plan – Update 2000." Regional Airport Planning Committee, 2000. http://bayplanningcoalition.org/downloads/library/Regional_Airport_System_Plan_Update_2000.pdf

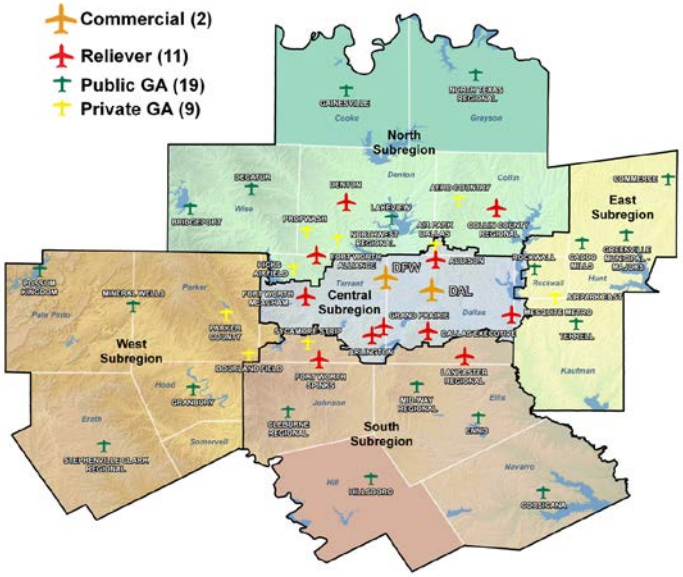
NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS (NCTCOG)

General Aviation and Heliport System Plan (2012)

The North Central Texas General Aviation and Heliport System Plan (System Plan) provides guidance and recommendations for the successful future of General Aviation (GA) and Vertical Flight through 2035. The System Plan details the recommended initiatives, by subregion, to ensure adequate and strategic regional aviation capacity to meet future demand requirements.[48]

The System Plan encompasses 19 counties and 35 GA airports. In addition, five commercial airports serve the region. At the time of this study, more than 140 heliports were registered. The region is divided into five subregions, as indicated in the system map below, each with its own needs and unique characteristics.

Figure 12: NCTCOG Airport System Recommended Plan



Source: North Central Texas Council of Governments, 2012.

Forecasting, using a combination of market share and single variable regression analyses, was applied to the following:

- Airside Development Planning
- Landside Development Planning
- Financial Side Planning
- Community Side Planning

NCTCOG offers a pamphlet for use as a tool by local governments, airports, and community organizations to assist in publicizing the roles of airports, how encroachment has detrimentally affected them in the past, and how compatible land-use practices can preserve them for the future.[49]

A new two-part metric was designed to help airport sponsors compare the facility's Airport Community Value (ACV) to other community assets, as well as its importance to the regional and State aviation systems. The ACV metric is subjected to six Value Modifying Factors (VMF), which are:

- Regional Airport Resource
- Airport Protection
- Location/Access
- Business Use Index
- Expandability
- Community Commitment

[48] "North Central Texas General Aviation and Heliport System Plan." North Central Texas Council of Governments, 2012. www.nctaviationplan.com

[49] "A Guide for the Public – Preserving General Aviation Airports in North Texas." North Central Texas Council of Governments, 2012. www.nctcog.org/aviation/outreach

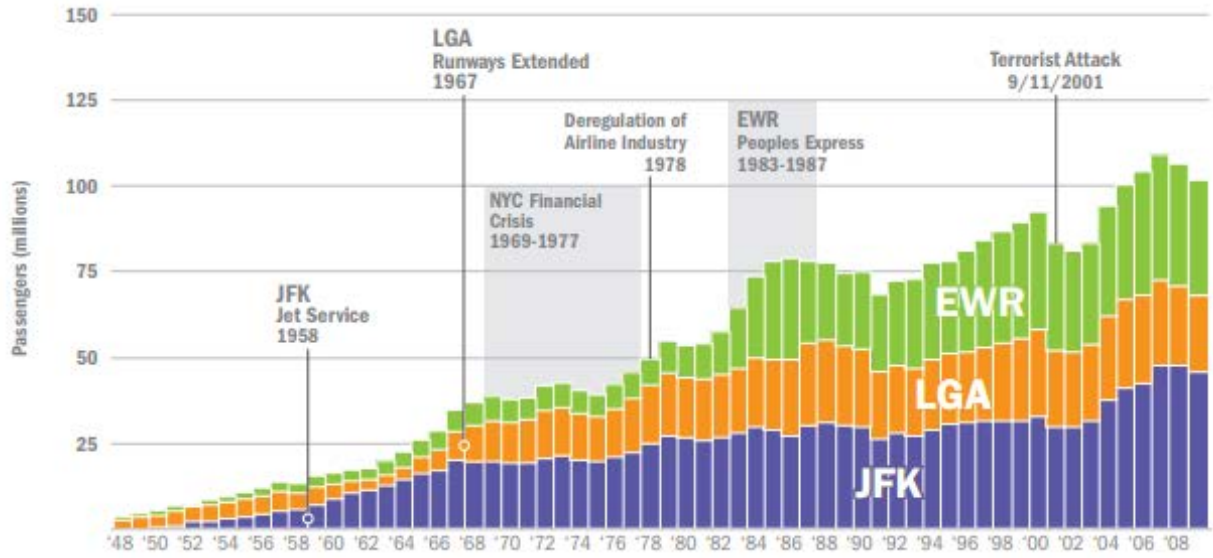
REGIONAL PLAN ASSOCIATION (RPA)

Upgrading to World Class: The Future of the New York Region's Airports (2011)

In Upgrading to World Class: The Future of the New York Region's Airports, the Regional Plan Association (RPA), with support from the Port Authority of New York & New Jersey (PANYNJ), identifies projects and evaluates options that will be required to meet future demand at PANYNJ's three major airports – John F. Kennedy International, Newark Liberty International, and LaGuardia airports.[50]

The study was conducted out of necessity: in 2009 it was estimated that the airports generated 415,000 jobs and $49 billion in economic activity for the region – and that if existing aviation facilities were not expanded or new facilities not built, an estimated 22 million air travelers would not be served by the regional air system by 2030, delays and congestion would worsen, and 125,000 jobs would not be created.

Figure 13: Air Travel Demand at New York Airports: 1948 - 2009



RPA examined sixed categories of potential investments and demand management:

- Implement NextGen I and II
- Encourage the use of outlying airports
- Improve intercity rail service
- Build a new airport
- Manage demand to reduce peak flights
- Expand runway capacity

Source: North Central Texas Council of Governments, 2012.

[50] "Upgrading to World Class: The Future of the New York Region's Airports." Regional Plan Association, 2011. http://library.rpa.org/pdf/RPA-Upgrading-to-World-Class.pdf

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS (SCAG)

Regional Transportation Plan 2012-2035: Aviation and Airport Ground Access Appendix

This report was prepared for the 2012 Regional Transportation Plan for Southern California. The report reviews the ground access system serving the region's commercial airports and identifies roadway and public transportation projects to improve airport ground access in the region.[51]

Figure 14: Commercial and Commuter Airports

Source: Southern California Association of Governments, 2012.

The SCAG Aviation Technical Advisory Committee (ATAC) participated in a series of round table discussions over a six-month period to identify regional aviation policy issues that merited further evaluation for inclusion in the 2012 Regional Transportation Plan (RTP).

The recommended regional aviation policies and action steps included:

- Regional Aviation Demand, Airport Infrastructure and Airport Ground Access
- Airport Economics, Finance and Funding
- Airport Land Use Compatibility and Environmental Impacts
- Airspace Planning and New Technologies.

The SCAG Aviation Technical Advisory Committee (ATAC) approved three alternative 2035 regional air passenger demand forecast scenarios for commercial airports, to be considered for potential inclusion in SCAG's 2012–2035 Regional Transportation Plan (RTP). These include baseline/medium growth, low growth, and high growth scenarios.

This report also discusses the characteristics of high occupancy public transportation services that have the potential for attracting air passengers, thereby shifting some away from preferred lower-occupancy modes.

[51] "Regional Transportation Plan 2012-2035: Aviation and Airport Ground Access Appendix." Southern California Association of Governments, 2012.

X. CONCLUSION

The comprehensive Regional Air System Plan (RASP) Phase 1 Report concludes with a synthesis of the state of the practice in regional air systems planning most applicable to the forthcoming Phase 2 and Phase 3 elements of the RASP. Phase 2 of the RASP will review existing conditions in the regional airport system and conduct a needs assessment. The specific areas of assessment in Phase 2 are outlined below, as informed by the work performed in Phase 1. The results of Phase 2 will be documented in a report that will also provide initial guidance for the discussion of forecasts and future recommendations in Phase 3 of the comprehensive RASP update. All three phases will collectively constitute the updated RASP and will include a timeline for incremental updates as well as another future comprehensive update.

Airport Master Plans

Baltimore/Washington International Thurgood Marshall Airport (BWI)

- Concourse A five-gate extension (2019)
- Development of aircraft maintenance facility (forthcoming)
- Introduction of new airlines and service to new air passenger and cargo markets (ongoing)

Ronald Reagan Washington National Airport (DCA)

- Existing Gate 35X renovation into a 14-gate concourse (in progress)
- Construction of new security checkpoint outside of each Metro entrance (2020)
- Significant taxiway relocation, rehabilitation, and construction (2019 – 2023)

Washington Dulles International Airport (IAD)

- Sale of 424-acre Western Lands (2018)
- Noise Contour Map Study (in progress – 2019 completion)
- Completion of the Dulles Corridor Metrorail Project (in progress – 2020 completion)

NPIAS Airports

- Following the Phase 1 NPIAS Airports Inventory, in Phase 2, staff representatives from BWI, DCA, and IAD will indicate which forthcoming airport developments and upgrades will have the most significant implications for the Washington-Baltimore Air Systems Region.

State Aviation System Plans – Washington-Baltimore Region

Maryland

- The 2008 Maryland Aviation System Plan (MASP) anticipates that by 2026, the aviation system will experience an increase of 1,000 based aircraft and 500,000 general aviation operations, as well as 50 percent growth in commercial operations

- The Maryland Aviation Administration conducted a study to estimate the economic impacts of the Maryland aviation system generated by air passenger and air cargo activity

Virginia

- The 2016 Virginia Air Transportation System Plan (VATSP) anticipates that by 2040, almost 210 million air passengers will be added to the aviation system

- Over four billion dollars will need to be invested in Virginia's aviation system by the end of the planning period; the VATSP recommendations include projects programmed in specific years that cannot be funded when needed due to the current funding gap

Adjacent State Aviation System Plans

Delaware

- The 2013 Delaware Aviation System Plan (DASP) poses some key questions that are worth lending consideration to in the Washington-Baltimore Air Systems Planning Region:
    - How has the most recent recession impacted aviation in the region?
    - What impact would the implementation of green technology have on system airports?
    - How would the loss or gain of one or more private airports impact the region?

Pennsylvania

- The 2007 Statewide Airport System Plan (SASP) develops a process to determine which projects provide the greatest benefit to the system based on the operational contribution to the system and on project cost. The process calculates each project's operational contribution to the system and assigned higher weight to projects at busier airports

- A tool was developed to estimate ideal or realistic funding levels tied to typical project implementation timelines and statewide funding demand for any four-year period; this tool provides an estimate of ideal funding levels that are supportable and realistic

West Virginia

- The 2010 West Virginia Multimodal Statewide Transportation emphasizes the economic benefits of the state's aviation system – and in particular – that as the state transforms from a coal mining economy into a tourism, service, aerospace industry, and technology-based economy, access to aviation facilities and services will be key to fostering economic growth

ACRP Reports on the State of Practice

Airport System Planning Practices (2009)

- Highlights various elements or special studies that could be included in the planning effort
- Includes ways that plans are being used and implemented

Airport Curbside and Terminal Area Roadway Operations (2010)

- Includes a quick analysis tool for curbside operations and low-speed roadway weaving area
- Highlights techniques for estimating traffic volumes

Developing an Airport Performance-Measurement System (2010)

- Provides guidance on developing and implementing performance-measurement systems

Handbook to Assess the Impacts of Constrained Parking at Airports (2010)

- Explores different types of parking constraints that airports experience and highlights tools to assess the impacts of the constraints and strategies to deal with them

Exploring Airport Employee Commute and Parking Strategies (2012)

- Addresses alternatives to the drive alone commute for airport employees, the effectiveness and challenges of airport employee commute options programs, and commute options programs offered by non-airport employers with potential airport environment applicability

Commercial Ground Transportation at Airports: Best Practices (2015)

- Shares potential solutions to ground transportation-based challenges airport operators frequently face, how to select a solution, and how to implement the selected best practice

Innovative Revenue Strategies – An Airport Guide (2015)

- Identifies: Customer needs - airport-provided services and shared services, facilities, and equipment; Revenue participation in real estate and natural resource development; Value capture and other financing opportunities; Improvements to existing airport businesses

Estimating Truck Trip Generation for Airport Cargo Activity (2017)

- Assists communities in planning and investing appropriately by accounting for air cargo's impacts; Helps ensure cargo facility truck access and egress remains reliable and safe

Transportation Network Companies: Challenges and Opportunities for Airport Operators (2017)

- Compiles experiences and effective practices by airports in facilitating customer access to Transportation Network Companies (TNCs) like Uber and Lyft

- Summarizes the amount of revenue airports receive from TNCs and how TNCs are affecting airport operations and other businesses

National Case Studies

DVRPC

- Preserves the existing public-use General Aviation airport system
- Expands community outreach to inform the public of the economic impact of airports
- Improves efforts to attract students to careers in aviation fields

H-GAC

- Explores scenarios of unexpected events that could impact the regional aviation system
- Develops "optimal plan" to improve user safety, efficiency, and convenience

MTC

- Identifies current airport system capacity needs, as well as on 10 and 20-year forecasts
- Addresses significant environmental effects of airport expansion and air service delivery, such as airport noise, air quality, Bay fill, wetlands/habitats, etc.

NCTCOG

- Offers pamphlet for publicizing the roles of airports and compatible land use practices
- Introduces a metric for comparing the facility's Airport Community Value to other assets

RPA

- Examines six categories of potential investments and demand management

SCAG

- Recommends regional aviation policies and action steps concerning emerging technologies
- Develops three scenarios for the regional air passenger demand forecast: baseline/medium growth, low growth, and high growth
- Identifies the characteristics of high occupancy public transportation services with the potential to attract air passengers away from lower-occupancy modes