

GROUND ACCESS FORECAST UPDATE

Based on 2019 Air Passenger Survey

Zhuo Yang
Transportation Data Analyst

Aviation Technical Subcommittee
July 28, 2022



Purpose

- In its role as the MPO, the TPB prepares the region's Long-Range Transportation Plan (LRTP) and Transportation Improvement Program (TIP). A key step in the LRTP and TIP preparation is the development of forecasts of travel demand over the planning period
- As part of the airport system planning process, air passenger forecasts are used to develop locally originating ground access (passenger) vehicle trips to the region's three commercial airports
- These forecasts are also used as the basis for revising the Ground Access Element of the CASP Regional Airport System Plan.

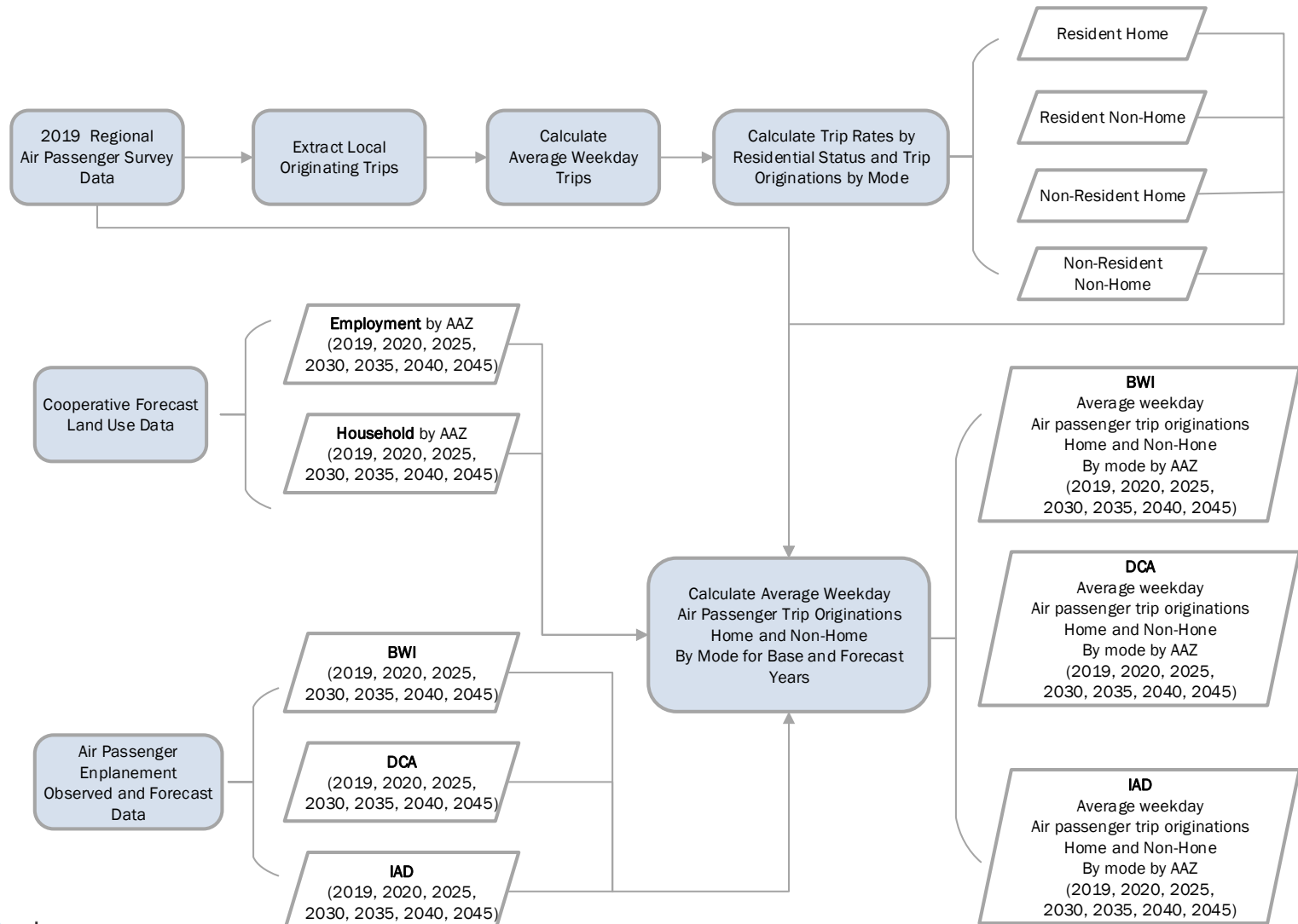


Objective

- Develop average weekday base and forecast years of local originating air passenger trips for the Washington/Baltimore Regional Air System Planning Area to the three regional commercial airports (BWI, DCA and IAD) for each Aviation Analysis Zone (AAZ)
 - By residential status (Resident and Non-Resident)
 - By trip originations (Home and Non-Home)
 - By mode (Auto Driver, Auto Passenger, Transit, Airport Transit, and Other)
 - By time period (AM-Peak, PM-Peak, Off-Peak)



Processing Flow



Enplanement Forecasts

1. Obtain enplanement forecasts from Federal Aviation Administration (FAA) for BWI, DCA and IAD for forecast years 2019 to 2045.
2. Convert FAA forecast data from the federal government's fiscal year (October to September) to calendar year (January to December).



Enplanement Forecasts

Baltimore/Washington International Thurgood Marshall Airport (BWI)

Year	Enplanements	Change from previous year	Average Annual Compound Growth	
2019	13,541,751 ¹			
2020	5,606,801 ¹	-7,934,950	2019 - 2020	-58.60%
2025	14,366,148 ²	8,759,347	2020 - 2025	156.23%
2030	16,033,343 ²	1,667,195	2025 - 2030	11.61%
2035	17,664,050 ²	1,630,707	2030 - 2035	10.17%
2040	19,278,629 ²	1,614,579	2035 - 2040	9.14%
2045	21,002,555 ²	1,723,926	2040 - 2045	8.94%

¹ Observed

² Forecast based on FAA TAF Fiscal Year annual percent increase
Enplanements are calculated for calendar year



Enplanement Forecasts

Ronald Reagan Washington National Airport (DCA)

Year	Enplanements	Change from previous year	Average Annual Compound Growth	
2019	11,949,042 ¹			
2020	3,768,361 ¹	-8,180,681	2019 - 2020	-68.46%
2025	13,725,183 ²	9,956,822	2020 - 2025	264.22%
2030	14,799,152 ²	1,073,969	2025 - 2030	7.82%
2035	15,464,737 ²	665,585	2030 - 2035	4.50%
2040	16,128,510 ²	663,773	2035 - 2040	4.29%
2045	16,788,450 ²	659,940	2040 - 2045	4.09%

¹ Observed

² Forecast based on FAA TAF Fiscal Year annual percent increase

Enplanements are calculated for calendar year



Enplanement Forecasts

Washington Dulles International Airport (IAD)

Year	Enplanements	Change from previous year	Average Annual Compound Growth	
2019	12,328,926 ¹			
2020	4,087,368 ¹	-8,241,558	2019 - 2020	-66.85%
2025	12,990,820 ²	8,903,452	2020 - 2025	217.83%
2030	14,702,859 ²	1,712,039	2025 - 2030	13.18%
2035	16,368,635 ²	1,665,776	2030 - 2035	11.33%
2040	18,033,722 ²	1,665,087	2035 - 2040	10.17%
2045	19,759,028 ²	1,725,306	2040 - 2045	9.57%

¹ Observed

² Forecast based on FAA TAF Fiscal Year annual percent increase
Enplanements are calculated for calendar year



Land Use Forecasts

1. Obtain land use forecasts of household and employment base year 2019 and forecast years to 2045 for the Washington/Baltimore Air System Planning Region
2. Summarize Household and Employment data from 4,374 TAZs to 161 AAZs



Land Use Forecasts

Households and Employment, 2019 to 2045

Household Forecasts			
Year	Household	Growth (from previous forecast year)	Percent Growth
2019	3,317,128	-	-
2020	3,348,910	31,782	1.0%
2025	3,521,453	172,543	5.2%
2030	3,692,301	170,848	4.9%
2035	3,840,616	148,315	4.0%
2040	3,972,676	132,060	3.4%
2045	4,096,163	123,487	3.1%

Employment Forecasts			
Year	Employment	Growth (from previous forecast year)	Percent Growth
2019	5,045,500	-	-
2020	5,101,016	55,516	1.1%
2025	5,386,036	285,020	5.6%
2030	5,656,451	270,415	5.0%
2035	5,904,765	248,314	4.4%
2040	6,143,758	238,993	4.0%
2045	6,365,730	221,972	3.6%

Source: COG Cooperative Forecast Round 9.2 and BMC Round 8B Cooperative Land Use Forecast



Methodology – Step 3

2019 Regional Air Passenger Survey Data

1. Adjust survey weights to annual passenger
2. Select local originating passenger trips
3. Select trips originating within the Washington/Baltimore Regional Air System Planning Area



2019 Regional Air Passenger Survey Data

Annual Trip Origination

Annual Trip Originations by Airport (in Thousands)				
Enplanement Type	Airport			
	BWI	DCA	IAD	Total
Local origination <i>(Came by ground transportation)</i>	10,426	10,918	8,726	30,070
	77%	91%	71%	80%
Connected from another flight <i>(Local and/or International)</i>	3,116	1,031	3,603	7,750
	23%	9%	29%	20%
Total Annual Enplanements	13,542	11,949	12,329	37,820
	100%	100%	100%	100%
<i>Percent of Air System Planning Region</i>	36%	32%	33%	

Note: Totals may not add up due to rounding



2019 Regional Air Passenger Survey Data

Trip Origination Within Air System Planning Region

Annual Trip Originations by Airport (in Thousands)				
Internal/External Trip Originations by Airport				
Enplanement Type	Airport			
	BWI	DCA	IAD	Total
Within Air System Planning Region - <i>Internals</i>	8,999	10,761	8,071	27,831
	86%	99%	92%	93%
Outside Air System Planning Region - <i>Externals</i>	1,427	157	656	2,239
	14%	1%	8%	7%
Total Annual Enplanements	10,426	10,918	8,726	30,070
	100%	100%	100%	100%

Internal originating trips are local originating trips within the Washington/Baltimore Air System Planning Area.

External originating trips are trips originating from PA, DE, WV, NJ or external VA and MD

Totals may not add up due to rounding



Trip Originations for Base and Forecast Years

Local and Internal Originating Trips

Local Originating Trips (in Thousands)				
Year	BWI	DCA	IAD	Total
2019	10,426	10,918	8,726	30,070
2020	4,317	3,443	2,893	10,653
2025	11,060	12,541	9,195	32,796
2030	12,344	13,522	10,407	36,273
2035	13,600	14,130	11,586	39,316
2040	14,843	14,737	12,764	42,344
2045	16,170	15,340	13,985	45,495

Internal AAZ Originating Trips (in Thousands)				
Year	BWI	DCA	IAD	Total
2019	8,999	10,761	8,071	27,831
2020	3,726	3,394	2,676	9,795
2025	9,547	12,361	8,504	30,412
2030	10,655	13,328	9,625	33,608
2035	11,739	13,928	10,715	36,382
2040	12,812	14,526	11,805	39,142
2045	13,957	15,120	12,935	42,012



2019 Regional Air Passenger Survey Data

Origination Trip Summary

- Local originating trips are departing passengers whose trips start from one of the region's three airports.
- Internal AAZ originating trips are local originating trips within the Washington/Baltimore Air System Planning Area
- Local originating trips are calculated based on the 2019 Air Passenger Survey data:
 - 77% for BWI, 91% for DCA and 71% for IAD, of total enplanements
- Internal originating trips are calculated based on the 2019 Air Passenger Survey data:
 - 86% for BWI, 99% for DCA, and 92% for IAD, of total local originating trips, that are within the 161 internal AAZs
- These data do not include external zones for PA, DE, and NJ or external VA, MD, and WV.

Methodology – Step 4

Calculate Average Weekday Air Passenger Trip Originations for Base and Forecast Years

1. Calculate average weekday enplanements by airport
2. Summarize local originating trips by Resident/Non-Resident and Home and Non-Home originations by airport
3. Calculate trip rates by airport
4. Calculate trip mode share for Home and Non-Home
5. Calculate trip time-of-day split (ongoing)



Local Trip Originations by Residency and Type

Baltimore/Washington International Thurgood Marshall Airport (BWI)

Forecast Year	Resident			Non-Resident		
	Home Based	Non-Home Based	Total	Home Based	Non-Home Based	Total
2025	11,459	1,656	13,115	4,988	6,622	11,610
2030	11,892	1,724	13,616	5,206	6,906	12,112
2035	12,245	1,798	14,043	5,385	7,174	12,559
2040	12,523	1,871	14,394	5,536	7,458	12,994
2045	12,729	1,937	14,666	5,635	7,744	13,379

Local Trip Originations by Residency and Type

Ronald Reagan Washington National Airport (DCA)

Forecast Year	Resident			Non-Resident		
	Home Based	Non-Home Based	Total	Home Based	Non-Home Based	Total
2025	9,874	1,480	11,354	4,245	15,419	19,664
2030	10,386	1,557	11,943	4,469	16,543	21,012
2035	10,831	1,627	12,458	4,658	17,623	22,281
2040	11,289	1,688	12,977	4,836	18,144	22,980
2045	11,725	1,735	13,460	5,014	18,529	23,543

Local Trip Originations by Residency and Type

Washington Dulles International Airport (IAD)

Forecast Year	Resident			Non-Resident		
	Home Based	Non-Home Based	Total	Home Based	Non-Home Based	Total
2025	11,886	1,284	13,170	4,467	8,626	13,093
2030	12,583	1,344	13,927	4,762	9,139	13,901
2035	13,160	1,405	14,565	5,031	9,648	14,679
2040	13,683	1,462	15,145	5,279	10,119	15,398
2045	14,146	1,499	15,645	5,503	10,474	15,977



Calculate trip rates by airport

1. Resident Home Based Trips

$$\frac{\text{AAZ}_x \text{ Resident Origin Home Trips (2019)}}{\text{AAZ}_x \text{ Number of Household (2019)}}$$

2. Resident Non-Home Based Trips

$$\frac{\text{AAZ}_x \text{ Resident Origin NonHome Trips (2019)}}{\text{AAZ}_x \text{ Number of Household (2019)}}$$



Calculate trip rates by airport (Cont.)

3. Non-Resident Home Based Trips

$$\frac{\text{AAZ}_x \text{ NonResident Origin Home Trips (2019)}}{\text{AAZ}_x \text{ Number of Employment (2019)}}$$

4. Non-Resident Non-Home Based Trips

$$\frac{\text{AAZ}_x \text{ NonResident Origin NonHome Trips (2019)}}{\text{AAZ}_x \text{ Number of Employment (2019)}}$$

Airport	Resident		Non-Resident	
	Home	Non-Home	Home	Non-Home
BWI	46.55%	6.66%	20.14%	26.64%
DCA	32.19%	4.91%	13.83%	49.06%
IAD	45.85%	4.83%	17.02%	32.30%



Calculate Trip Mode Share

for Home and Non-Home Trips

Home Originations

- Auto Driver Home Origination
- Auto Passenger Home Origination
- Transit Passenger Home Origination
- Airport Transit Passenger Home Origination
- Other Mode Passenger Home Origination

Non-Home Originations

- Auto Driver Home Origination
- Auto Passenger Home Origination
- Transit Passenger Home Origination
- Airport Transit Passenger Home Origination
- Other Mode Passenger Home Origination

* Airport Transit includes Airport Bus, Van, Limo, and Hotel Courtesy Bus.



Trips by Arrival Mode

Baltimore/Washington International Thurgood Marshall Airport

Forecast Year	Auto Driver	Auto Passenger	Transit	Airport Transit	Other	Total
2025	8,048	12,941	1,117	1,790	887	24,725
2030	8,361	13,449	1,190	1,858	923	25,728
2035	8,642	13,891	1,249	1,935	947	26,602
2040	8,889	14,283	1,292	2,009	971	27,388
2045	9,082	14,613	1,325	2,077	991	28,045

Source: 2019 Washington-Baltimore Regional Air Passenger Survey

Note: Totals may not add up due to rounding

Trips by Arrival Mode

Ronald Reagan Washington National Airport (DCA)

Forecast Year	Auto Driver	Auto Passenger	Transit	Airport Transit	Other	Total
2025	9,103	14,665	4,472	1,936	874	31,018
2030	9,607	15,488	4,755	2,232	917	32,955
2035	10,048	16,217	5,021	2,523	963	34,739
2040	10,436	16,835	5,173	2,573	984	35,957
2045	10,751	17,358	5,321	2,600	1,002	37,003

Source: 2019 Washington-Baltimore Regional Air Passenger Survey

Note: Totals may not add up due to rounding



Trips by Arrival Mode

Washington Dulles International Airport (IAD)

Forecast Year	Auto Driver	Auto Passenger	Transit	Airport Transit	Other	Total
2025	8,737	13,841	839	2,041	854	26,263
2030	9,243	14,666	900	2,190	874	27,828
2035	9,704	15,406	943	2,324	903	29,244
2040	10,129	16,089	987	2,453	929	30,543
2045	10,479	16,656	1,026	2,553	952	31,622

Source: 2019 Washington-Baltimore Regional Air Passenger Survey

Note: Totals may not add up due to rounding



Calculate Trip Time-of-Day Split for Home and Non-Home Trips

One-Hour Before Flight Time

- AM trips = flight time 700 to 1000 (7:00 AM to 10:00 AM)
- PM trips = flight time 1600 to 1900 (4:00 PM to 7:00 PM)
- Off-Peak trips = flight time 600 to 700, 1000 to 1600, and 1900 to 2400 (6:00-7:00 AM, 10:00 AM-4:00 PM, and 7:00 PM-12:00 AM)

Two-Hour Before Flight Time

- AM trips = flight time 600 to 900 (6:00 AM to 9:00 AM)
- PM trips = flight time 1500 to 1800 (3:00 PM to 6:00 PM)
- Off-Peak trips = flight time 900 to 1500, and 1800 to 2400 (9:00 AM-3:00 PM, and 6:00 PM-12:00 AM)

- Results for time-of-day split are forthcoming



Next Steps

- Staff will complete preparing the Ground Access Forecast Update and distribute a memo documenting the results to the Aviation Technical Subcommittee soon
- The Subcommittee will have the opportunity to provide comments and feedback on the memo before it is finalized.



Questions/Comments?



Zhuo Yang

Transportation Data Analyst

(202) 962-3370

zyang@mwkog.org

mwkog.org/tpb

Metropolitan Washington Council of Governments

777 North Capitol Street NE, Suite 300

Washington, DC 20002



National Capital Region
Transportation Planning Board