



MEMORANDUM

TO: TPB Aviation Technical Subcommittee
FROM: Tim Canan, Planning Data and Research Program Director
SUBJECT: CASP 34: Ground Access Forecasts and Ground Access Element Update
DATE: November 17, 2021

The Comprehensive Regional Air System Plan (RASP) Update was finalized in 2020 under the 2018 FAA Airport Improvement Program (AIP) grant (CASP 33) and included the Ground Access Element Update (GAEU). The GAEU is twofold: (1) it shares the most recent ground access forecast update (GAFU) conducted based off of the 2017 Washington-Baltimore Regional Air Passenger Survey and (2) it identifies plans, policies, and programs of critically important roadway and transit improvements that are relevant to BWI, DCA, and/or IAD Airport connectivity based on latest adopted long-range transportation plans (LRTPs).

The 2019 FAA Airport Improvement Program (AIP) grant (CASP 34) provides for the update of the Ground Access Forecasts and Ground Access Element of the RASP. Due to the timing of completing the RASP, the status of LRTP updates in both the Washington and Baltimore regions as well as availability of forecast inputs, this latest update of both the ground access forecasts and the ground access element prepared under CASP 34 are similar to those included in the latest RASP. Under CASP 34, staff comprehensively reviewed the methodology and procedures followed to prepare the forecasts as well as the status of projects contained in the LRTPs of both the Washington and Baltimore regions to confirm the status and relevancy of both the GAFU and GAEU.

This memorandum transmits the Ground Access Forecast and Ground Access Element Updates prepared under CASP 34 (Attachment 1). It also provides additional technical documentation and detailed tables prepared as part of the Ground Access Forecast Update prepared under CASP 34 (Attachment 2).

Members of the Aviation Technical Subcommittee are invited to provide comments on these products no later than December 15, 2021. Staff will then finalize these submittals based on comments received.

The CASP 36 grant awarded in 2021 calls for another update of Ground Access Forecasts and Ground Access Element. This update will reflect more recently-available inputs, including the 2019 Washington-Baltimore Regional Air Passenger Survey, as well as updated enplanement forecasts and land use forecasts prepared by the Baltimore Metropolitan Council and the Metropolitan Washington Council of Governments.

ATTACHMENTS

ATTACHMENT 1

**CASP 34 GROUND ACCESS FORECAST AND GROUND ACCESS ELEMENT
UPDATE**

CASP 34

GROUND ACCESS FORECAST AND GROUND ACCESS ELEMENT UPDATE

As part of the Air Passenger Origin/Destination and Air Passenger Ground Access Forecast Update projects, COG staff reviewed the air passenger trips input to the regional travel demand modeling process. This exercise consisted of the following major tasks: review and update FAA Terminal Area Forecast inputs, review the results of the 2017 Washington-Baltimore Regional Air Passenger Survey, and review and update the MWCOG and BMC planning areas land use forecasts included in the Round 9.1 Cooperative Forecasts. The product of these tasks is an update of base year and forecast year annual and weekday air passenger ground access trips by mode and time-of-day for the MWCOG travel demand modeling region.

The technical details of the forecasts themselves are well documented in the aforementioned ground access forecast update reports and in the table below. The intent of this section is simply to demonstrate that demand for airports will continue to grow and therefore it is necessary to plan for that growth. This growth cannot be accommodated without the projects identified in the Recommendations section in this report. Without those improvements, existing bottlenecks will worsen, continuing to negatively impact travel to the airports, and accessibility will decrease in future years. The planned regional transportation network contained in Visualize 2045 and Maximize2045 can effectively serve the needs of the region's air passengers, but only if advanced and constructed according to project schedules.

Air Passenger Ground Access Trips by Mode of Access

Air passenger trips to the airports consist of a larger mode choice set compared with what is ordinarily used in COG's standard mode choice modeling procedures. The ground access trips to the airports were summarized into four major arrival modes as follows:

Auto = Private Car, Rental Car, Transportation Network Companies (TNCs) and Taxi

Transit = Metrorail, Amtrak/MARC/VRE and Light Rail

Airport Transit = Airport Bus/Limo and Hotel/Motel Courtesy Shuttle

Other = Charter Bus, Employer Shuttle, and All Other

The auto mode of arrival was further split into two sub-categories:

Auto Driver

Auto Passenger

The split of auto ground access trips into auto driver and auto passenger trips was determined from the air passenger survey question that asked for the total number of household members, friends, or business associates that traveled with the surveyed air passenger to the airport (Question B-5). From this question the total vehicle occupancy of air passengers arriving at the airport by private or rental cars could be determined. The reciprocal of this number yields the proportion of air passengers who were likely auto drivers. The complement of this reciprocal yields the proportion of air passengers

who were likely auto passengers. Multiplying the survey record weights by these proportions produces estimates of the number of air passenger who were auto drivers and the number of air passengers who were auto passengers for these auto ground access trips. Air passengers arriving at the airport by taxi are, by definition, auto passengers.

Once the ground access mode of arrival trip data had been summarized, modal shares for Auto Driver, Auto Passenger, Transit, Airport Transit and Other arrival modes were calculated for each Airport/AAZ/trip origin type/resident status classification. Table 1 shows estimated 2017 to 2045 air passenger ground access trip totals by mode of arrival.

Table 1: Average Weekday Air Passenger Ground Access Trips 2045 Forecast (All Airports)

Arrival Mode - BWI

Forecast Year	Auto Driver	Auto Passenger	Transit	Airport Transit	Other	Total
2017	5,975	8,047	910	1,079	211	16,222
2020	6,473	8,706	1,010	1,159	229	17,577
2025	7,107	9,562	1,142	1,274	256	19,341
2030	7,809	10,500	1,271	1,398	281	21,259
2035	8,520	11,467	1,401	1,555	307	23,250
2040	9,276	12,483	1,541	1,738	340	25,378
2045	10,421	14,029	1,751	1,964	379	28,544

Arrival Mode - DCA

Forecast Year	Auto Driver	Auto Passenger	Transit	Airport Transit	Other	Total
2017	9,614	12,267	4,201	1,737	634	28,453
2020	10,189	12,987	4,385	1,819	662	30,042
2025	11,409	14,529	4,892	2,046	729	33,605
2030	11,840	15,100	5,082	2,198	759	34,979
2035	12,167	15,512	5,214	2,265	785	35,943
2040	12,468	15,872	5,325	2,341	807	36,813
2045	12,743	16,224	5,407	2,443	819	37,636

Arrival Mode - IAD

Forecast Year	Auto Driver	Auto Passenger	Transit	Airport Transit	Other	Total
2017	7,457	9,674	402	1,072	395	19,000
2020	7,790	10,118	426	1,113	404	19,851
2025	8,685	11,275	473	1,261	444	22,138
2030	9,633	12,493	531	1,409	498	24,564
2035	10,611	13,759	593	1,558	543	27,064
2040	11,656	15,086	653	1,707	589	29,691
2045	12,721	16,475	722	1,883	642	32,443

Arrival Mode - ALL

Forecast Year	Auto Driver	Auto Passenger	Transit	Airport Transit	Other	Total
2017	23,046	29,988	5,513	3,888	1,240	63,675
2020	24,452	31,811	5,821	4,091	1,295	67,470
2025	27,201	35,366	6,507	4,581	1,429	75,084
2030	29,282	38,093	6,884	5,005	1,538	80,802
2035	31,298	40,738	7,208	5,378	1,635	86,257
2040	33,400	43,441	7,519	5,786	1,736	91,882
2045	35,885	46,728	7,880	6,290	1,840	98,623

Source:- 2017 Washington-Baltimore Regional Air Passenger Survey

Note :- Totals may not add due to rounding

VISUALIZE 2045, NATIONAL CAPITAL REGION TRANSPORTATION PLANNING BOARD (TPB)

Visualize 2045 is the federally mandated, long-range transportation plan for the National Capital Region. It represents a new kind of long-range planning effort in this region. For the first time, in addition to projects that the region's transportation agencies expect to be able to afford between now and 2045, the plan includes aspirational projects, programs, and policies that go beyond financial constraints.

The following section highlights the projects, programs, and policies in Visualize 2045 that support ground access to BWI, DCA, and IAD.

Aspirational Initiatives

The express travel network would provide several benefits for airport ground access connectivity, including reducing congestion and incentivizing travelers to either carpool or travel by transit vehicle. Expanding Metrorail capacity would increase logistical ease and comfort for those traveling by Metrorail to and from airports.

Planning Factors

- Enhance travel and tourism.
- Increase accessibility and mobility of people.
- Increase accessibility and mobility of freight.

Regional Transportation Priorities Plan (RTPP) Goals

- Provide a comprehensive range of transportation options.
- Support inter-regional and international travel and commerce.

Table 2: Visualize 2045 MDOT Interstate Roadway Airport Ground Access Projects

Agency / County	Corridor Type	Improvement	Facility	From	To	Facility		Lanes		Completion Date
						Fr	To	Fr	To	
MDOT										
Interstate										
MDOT	Interstate	Construct	I 270 Interchange	at Watkins Mill Road		1	1	8	8	2020
MDOT	Interstate	Construct/Widen	I 270 Toll Lanes	I 495	I 270Y	1	1	4 + 2 HOV	4 + 2 HOV + 4 ETL	2025
MDOT	Interstate	Construct/Widen	I 270 Toll Lanes	I 270Y	I 370	1	1	10 + 2 HOV	10 + 2 HOV + 4 ETL	2025
MDOT	Interstate	Construct/Widen	I 270 Northbound Toll Lanes	I 370	Middlebrook Road	1	1	3 + 1 HOV NB	3 + 1 HOV + 2 ETL NB	2025
MDOT	Interstate	Construct/Widen	I 270 Southbound Toll Lanes	Middlebrook Road	I-370	1	1	4 SB	4 + 2 ETL SB	2025
MDOT	Interstate	Construct/Widen	I 270 Northbound Toll Lanes	Middlebrook Road	MD 121	1	1	2 + 1 HOV NB	2 + 1 HOV NB + 2 ETL	2025
MDOT	Interstate	Construct/Widen	I 270 Southbound Toll Lanes	MD 121	Middlebrook Road	1	1	3 SB	3 + 2 ETL SB	2025
MDOT	Interstate	Construct/Widen	I 270 Toll Lanes	MD 121	I 70 / US 40	1	1	4	4+4 ETL	2025
MDOT	Interstate	Construct	I270 southbound auxiliary lane	South of Shady Grove Rd local slip ramp	South of Shady Grove Rd express lanes slip	1	1			2019 2020
MDOT	Interstate	Construct	"	Md 28 on-ramp	MD 189 off-ramp	1	1			2019
MDOT	Interstate	Construct	I270 southbound (innovative congestion	MD 189 on-ramp	Montrose Road off-ramp	1	1			2019
MDOT	Interstate	Construct	"	North of Montrose Road	Democracy Boulevard	1	1			2019
MDOT	Interstate	Construct	I270 northbound (innovative congestion management)	Democracy Boulevard on-ramp	North of Montrose Road slip ramp to local lanes	1	1			2019
MDOT	Interstate	Construct	"	Shady Grove Road	I-370 off-ramp	1	1			2019

Source: Visualize 2045, National Capital Area Transportation Planning Board, 2020

Table 2 Continued

Agency / County	Corridor Type	Improvement	Facility	From	To	Facility		Lanes		Complete Date
						Fr	To	Fr	To	
MDOT										
Interstate										
MDOT	Interstate	Construct	"	MD 121	Comus Road Bridge	1	1			2019
MDOT	Interstate	Construct	I270 northbound auxiliary lane (innovative congestion management)	MD 189 on-ramp	MD 28 off-ramp	1	1			2019
MDOT	Interstate	Construct	"	South of MD 28 slip ramp to express lanes	North of MD 28 slip ramp to local lanes	1	1			2019
MDOT	Interstate	Construct	"	MD 124 on-ramp	Watkins Mill Road off-ramp	1	1			2019
MDOT	Interstate	Construct	"	Watkins Mill Road on-ramp	Middlebrook Road westbound off-ramp	1	1			2019
MDOT	Interstate	Construct/Widen	I 495 Toll Lanes	Virginia State line/Potomac River (including American Legion Bridge)	I 270Y	1	1	8/10	8/10+4 ETL	2025
MDOT	Interstate	Construct/Widen	I 495 Toll Lanes	I 270Y	MD 355	1	1	6	6+4 ETL	2025
MDOT	Interstate	Construct/Widen	I 495 Toll Lanes	MD 355	I 95	1	1	8	8+4 ETL	2025
MDOT	Interstate	Construct/Widen	I 95 / I 495 Toll Lanes	I 95	Baltimore Washington Parkway	1	1	8	8+4 ETL	2025
MDOT	Interstate	Construct/Widen	I 95 / I 495 Toll Lanes	Baltimore Washington Parkway	Glenarden Parkway	1	1	8	8+4 ETL	2025
MDOT	Interstate	Construct/Widen	I 95 / I 495 Toll Lanes	Glenarden Parkway	MD 202F	1	1	10	10+4 ETL	2025
MDOT	Interstate	Construct/Widen	I 95 / I 495 Toll Lanes	MD 202F	Potomac River (not including Wilson Bridge)	1	1	8	8+4 ETL	2025

Source: Visualize 2045, National Capital Area Transportation Planning Board, 2020

Table 3: Visualize 2045 MDOT Primary Roadway Airport Ground Access Projects

Agency / County	Corridor Type	Improvement	Facility	From	To	Facility		Lanes		Complete Date
						Fr	To	Fr	To	
MDOT										
Primary										
MDOT	Primary	Widen	MD 3 Robert Crain Highway	I595/US 50/US 301	Anne Arundel County Line	2	2	4	6	2035
Anne Arundel Co.	Primary	Widen	US 50	I-97	MD 2	1	1	6	8	2045
Anne Arundel Co.	Primary	Widen	I-295	I-195	MD 100	1	1	4	6	2030 2035
Anne Arundel Co.	Primary	Widen	MD 2	US 50	I-695			4	6	2035
Anne Arundel Co.	Primary	Widen	MD 3	MD 32	St. Stephen's Church Rd.	2	2	4	6	2025
Anne Arundel Co.	Primary	Widen	MD 100	Howard Co. Line	I-97		5/1	4	6	2035
Anne Arundel Co.	Primary	Widen	MD 175	MD 170	BW Parkway National Business Parkway		2	4	6	2025
Anne Arundel Co.	Primary	Widen	MD 198	MD 32	BW Parkway	2	2	2	4	2030
Anne Arundel Co.	Primary	Widen	MD 713	MD 175	Arundel Mills Boulevard Stoney Run Dr.		2	2	4	2040

Source: Visualize 2045, National Capital Area Transportation Planning Board, 2020

Table 4: Visualize 2045 Howard County Primary Roadway Airport Ground Access Projects

Agency / County	Corridor Type	Improvement	Facility	From	To	Facility		Lanes		Complete Date
						Fr	To	Fr	To	
Howard County										
Primary										
Howard Co.	Primary	Widen	I-70	US 29	US 40 MD 32	1	1	4	6	2025 2035
Howard Co.	Primary	Widen	I-95 Peak period shoulder use	MD 32	MD 100	1	1	4	4+1	2035
Howard Co.	Primary	Widen	US 29 NB	Middle Patuxent River	Seneca Dr.		5	4	6	2030
Howard Co.	Primary	Widen	US 29 NB	Seneca Dr.	MD 100	5	5	5	6	2017
Howard Co.	Primary	Widen	MD 32	MD 108	I-70		2	2	4	2021
Howard Co.	Primary	Widen	MD 32	I-70	Howard/ Carroll County Line River Rd			2	4	2045
Howard Co.	Primary	Widen	MD 100	I-95	AA/Howard Line	1	1	4	6	2035

Source: Visualize 2045, National Capital Area Transportation Planning Board, 2020

Table 5: Visualize 2045 VDOT Interstate Roadway Airport Ground Access Projects

Agency / County	Corridor Type	Improvement	Facility	From	To	Facility		Lanes		Complete Date
						Fr	To	Fr	To	
VDOT										
Interstate										
VDOT	Interstate	Construct	I 66 Vienna Metro Station bus ramp (duplicate project with ConID 759,	Transit Ramps- from EB & to WB	Saintsbury Dr.	1	1	0	2	2021
VDOT	Interstate	Reconstruct	I 66 WB Operational/Spot Improvements	Westmoreland Dr. / Washington Blvd Exit	Haycock Rd /Dulles Access Highway	1	1	3	4	2020
VDOT	Interstate	Reconstruct	"	Lee Highway/Spout Run On-Ramp	Glebe Road Off-Ramp	1	1	2	3	2020
VDOT	Interstate	Widen / Revise Operations	I-66	I-495	US 50	1	1	3 general purpose in each direction + 1 HOV in peak direction during peak period	3 general purpose + 1 Auxiliary + 2 HOT each direction	2021
VDOT	Interstate	Widen / Revise Operations	I-66	US 50	US 29 Centreville	1	1	4 general purpose in each direction off-peak, 3 general purpose + 1 HOV in peak direction during peak period	3 general purpose + 1 Auxiliary + 2 HOT in each direction (2 Aux per direction btwn VA 286 & VA 28 only)	2021
VDOT	Interstate	Widen / Revise Operations	I-66	US 29 Centreville	University Boulevard Ramps (new interchange for HOT only)	1	1	4 general purpose in each direction off-peak, 3 general purpose + 1 HOV in peak direction during peak period	3 general purpose + 2 HOT in each direction	2021
VDOT	Interstate	Widen / Revise Operations	I-66	VA 234 Bypass	University Blvd.	1	1	4 general purpose in each direction off-peak, 3 general purpose + 1 HOV in peak direction during peak period	3 general purpose+ 2 HOT in each direction (+1 Auxiliary each direction between US 29 and VA 234 Bypass only)	2021
VDOT	Interstate	Widen / Revise Operations	I-66	University Boulevard Ramps (new interchange for HOT only)	US 15 (1.2 miles west of)	1	1	4 general purpose in each direction off-peak, 3 general purpose + 1 HOV in peak direction during peak period	3 general purpose+ 2 HOT in each direction (+1 Auxiliary each direction between US 29 and VA 234 Bypass only)	2040
VDOT	Interstate	Revise Operations	I-66	I-495	US 29 near Rosslyn	1	1	HOT 2 in peak direction during peak period	HOT 2 in peak direction during peak period	2017
VDOT	Interstate	Revise Operations	I-66	I-495	US 29 near Rosslyn	1	1	HOT 2 in peak direction during peak period	HOT 3 in peak direction during peak period	2021

Source: Visualize 2045, National Capital Area Transportation Planning Board, 2020

Table 5 Continued

Agency / County	Corridor Type	Improvement	Facility	From	To	Facility		Lanes		Complete Date
						Fr	To	Fr	To	
VDOT										
Interstate										
VDOT	Interstate	Revise Operations	I-66	I-495	US 29 near Rosslyn	1	1	HOT 3 in peak direction during peak period	HOT 3 in both directions during peak period	2040
VDOT	Interstate	Construct/Widen	I 66 Eastbound	VA 267 DTR	Washington Blvd. Off-Ramp	1	1	3	4	2020
VDOT	Interstate	Construct/Widen	I 66 Eastbound	Washington Blvd. Off-Ramp	North Fairfax Drive	1	1	2	3	2020
VDOT	Interstate	Construct/Widen	I 66 Westbound	Sycamore Street	Washington Blvd. On-Ramp	1	1	2	3	2040
VDOT	Interstate	Construct	I-66 Express Lanes Interchange Ramps	EB Expr to SB GP; NB GP to WB Expr; SB Expr to WB Expr; EB Expr to NB GP; SB GP to WB Expr	I-495 Interchange (Capital Beltway GP and Express Lanes)	0	1	0	1	2022
VDOT	Interstate	Construct	I-66 General Purpose Lanes Interchange Ramp	NB Expr to WB GP (modification of existing loop ramp)	I-495 Interchange (Capital Beltway GP and Express Lanes)	0	1	0	1	2022
VDOT	Interstate	Relocate / Reconstruct	I-66 Interchange	Dual-lane loop ramp from NB I-495 GP to I-66 GP relocated to dual-lane flyover & existing ramp modified to NB I-495 GP to I-66 WB HOT	@ I-495	1	1	2	2	2022
VDOT	Interstate	Reconstruct	I-66 Interchange	EB GP to SB GP; WB GP to SB GP; WB GP to SB Expr; NB GP to EB GP; SB GP to WB GP	@ I-495	1	1	—	—	2022
VDOT	Interstate	Construct	I-66 flyover ramp	EB general purpose to EB express lanes	.5 mile east of VA 243	0	1	0	1	2022
VDOT	Interstate	Reconstruct	I-66 Interchange	Cloverleaf interchange converted to diverging diamond interchange	@ Nutley Street (VA 243)	1	1	—	—	2022
VDOT	Interstate	Construct	I-66 Express Lanes Interchange Ramps (duplicate project with ConID 399, above)	EB off-ramp, WB on-ramp to/from I-66 Express lanes BUS /HOV-3/HOT ONLY	@ Vaden Drive / Vienna Metro Station	1	1		Bus / HOV-3 / HOT from proposed Express Lanes	2022

Source: Visualize 2045, National Capital Area Transportation Planning Board, 2020

Table 5 Continued

Agency / County	Corridor Type	Improvement	Facility	From	To	Facility		Lanes		Complete Date
						Fr	To	Fr	To	
VDOT										
Interstate										
VDOT	Interstate	Widen	I 495 Capital Beltway NB Auxiliary Lane	North of Hemming Ave. Underpass	Braddock Road Off Ramp	1	1	4+2	5+2	2030
VDOT	Interstate	Widen	I 495 Capital Beltway SB Auxiliary Lane	Braddock Road On Ramp	North of Hemming Ave. Underpass	1	1	4+2	5+2	2030
VDOT	Interstate	Widen	I 495 Capital Beltway NB Auxiliary Lane	Braddock Road On Ramp	VA 236 Off Ramp	1	1	4+2	5+2	2030
VDOT	Interstate	Widen	I 495 Capital Beltway NB Auxiliary Lane	VA 236 On Ramp	Gallows Road Off Ramp	1	1	4+2	5+2	2030
VDOT	Interstate	Widen	I 495 Capital Beltway SB Auxiliary Lane	Gallows Road On Ramp	VA 236 Off Ramp	1	1	4+2	5+2	2030
VDOT	Interstate	Widen	I 495 Capital Beltway NB Auxiliary Lane	US 50 On Ramp	I 66 Off Ramp	1	1	5+2	6+2	2030
VDOT	Interstate	Widen	I 495 Capital Beltway SB Auxiliary Lane	VA 7 On Ramp	I 66 Off Ramp to WB	1	1	4+2	5+2	2030
VDOT	Interstate	Widen	I 495 Capital Beltway SB Auxiliary Lane	VA 123 On Ramp	VA 7 Off Ramp	1	1	5+2	6+2	2030
VDOT	Interstate	Widen	I 495 Capital Beltway NB Auxiliary Lane	VA 267 On Ramp	VA 193 Off Ramp	1	1	4+2	5+2	2030

Source: Visualize 2045, National Capital Area Transportation Planning Board, 2020

Table 6: Visualize 2045 VDOT Primary Roadway Airport Ground Access Projects

Agency / County	Corridor Type	Improvement	Facility	From	To	Facility		Lanes		Complete Date
						Fr	To	Fr	To	
VDOT										
Primary										
VDOT	Primary	Widen	VA 7 Leesburg Pike	VA 123 Chain Bridge Road	I 495 Capital Beltway	2	2	6	8	2021 2030
VDOT	Primary	Widen	VA 7 Leesburg Pike	I 495	I 66	2	2	4	6	2021 2030
VDOT	Primary	Widen	VA 7	Seven Corners	Bailey's Crossroads	2	2	4	6	2025 2030
VDOT	Primary	Widen	US 15 James Madison Highway	US 29 Lee Highway	Haymarket Drive	3	3	2	4	2040
VDOT	Primary	Widen	US 15 James Madison Highway Overpass	1200' S of RR tracks	1000' N. of RR tracks	3	3	2	4	2030
VDOT	Primary	Widen	VA 28 PPTA Phase II	I 66	Westfields Blvd	5	5	6	8+ 2 aux	2021
VDOT	Primary	Widen	VA 28 PPTA Phase II	Westfields	US 50	5	5	6	8	2025
VDOT	Primary	Widen	VA 28 PPTA Phase II	US 50	Sterling Blvd.	5	5	6	8	2016
VDOT	Primary	Widen	VA 28 PPTA Phase II	Sterling Blvd.	VA 7	5	5	6	8	2025
VDOT	Primary	Study	VA 28 Manassas Bypass /VA 411	VA 234 Sudley Road	I 66 Proposed Interchange					Not Coded
VDOT	Primary	Widen	VA 28 Centreville Road	VA 898 Old Centreville Road US 29	Prince William County Line	2	2	4	6	2025 2023
VDOT	Primary	Widen	VA 123	US 1	Annapolis Way	2	2	4	6	2025

Source: Visualize 2045, National Capital Area Transportation Planning Board, 2020

Table 6 Continued

Agency / County	Corridor Type	Improvement	Facility	From	To	Facility		Lanes		Complete Date
						Fr	To	Fr	To	
VDOT										
Primary										
VDOT	Primary	Widen	VA 123 Ox Road	Hooes Rd.	Fairfax Co. Parkway	2	2	4	6	2025 2030
VDOT	Primary	Widen	VA 123 Ox Road	Fairfax Co. Parkway	Burke Center Parkway	2	2	4	6	2025 2030
VDOT	Primary	Widen	VA 123	Burke Center Parkway	Braddock Road	2	2	4	6	2025 2030
VDOT	Primary	Widen	VA 123	VA 677 Old Courthouse Road	VA 7 Leesburg Pike			4	6	2025 2030
VDOT	Primary	Widen	VA 123 Chain Bridge Road	VA 7 Leesburg Pike	I 495 Capital Beltway	2	2	6	8	2025 2030
VDOT	Primary	Upgrade	VA 123	I-495 Capital Beltway	VA 267 Dulles Access Road	3	3	6	6	2030
VDOT	Primary	Widen	VA 123	VA 267 Dulles Access Road	VA 634 Great Falls Street	2	2	4	6	2030
VDOT	Primary	Convert	VA 286 Fairfax County Parkway HOV	VA 267 Dulles Toll Road	Sunrise Valley Drive	5	5	6	4+2	2035
VDOT	Primary	Widen/Upgrade	VA 286 Fairfax County Parkway HOV	VA 7735 Fair Lakes Parkway	I 66	2	5	6	6+2	2035
VDOT	Primary	Widen	VA 286 Fairfax County Parkway	US 29	VA 123 Ox Road Rolling Rd.	5	5	4	6	2025 2030
VDOT	Primary	Construct	VA 289 Franconia-Springfield Parkway HOV	VA 286 Fairfax County Parkway	VA 2677 Frontier Drive	5	5		2	2025

Source: Visualize 2045, National Capital Area Transportation Planning Board, 2020

Table 7: Visualize 2045 Transit Airport Ground Access Projects

Scenario	Agency / County	Improvement	Facility	From	To	Complete Date
MDOT/MTA						
MARCFRQ	MDOT / MTA	Implement	Penn Line Service Improvements			2029
Montgomery County						
MCT7	Montgomery Co.	Construct	Olney Transit Center	Adjacent to or north of MD 108		2045
VDOT						
MWAYBRT	VDOT	Construct	Crystal City/Potomac Yard Busway (2 lane- dedicated)	Vicinity of Glebe Road Extended (City/County Line)	Pentagon City Metro Station	Complete
	VDOT	Construct	Crystal City Transitway: Northern Extension - complete dedicated lanes	Crystal City Metro Station	Army Navy Drive Transit Station (Army Navy Dr halfway between Hayes St and Joyce St)	2021 — 2022
MWAYEXT2	VDOT	Construct	Crystal City Transitway: Southern Extension - complete dedicated	South Glebe Road	Alexandria city line	2025
MWAYROW	VDOT	Construct	Crystal City/Potomac Yard Transitway- realign with dedicated	East Glebe Road	Evans Lane	2030
SILVER 2	VDOT	Construct	Dulles Corridor Metrorail	Wiehle-Reston East Station	VA-772 Ashburn Station	2020
SILVER 2	VDOT	Construct	Park-and-Ride Garage	Herndon-Monroe Station		2020
SILVER 2	VDOT	Construct	Park-and-Ride Garage	Innovation Station		2020
VANDBRT	VDOT	Construct	West End Transitway (City Funded)	Van Dorn Street Metro	Pentagon & Landmark	2024 — 2026

Source: Visualize 2045, National Capital Area Transportation Planning Board, 2020

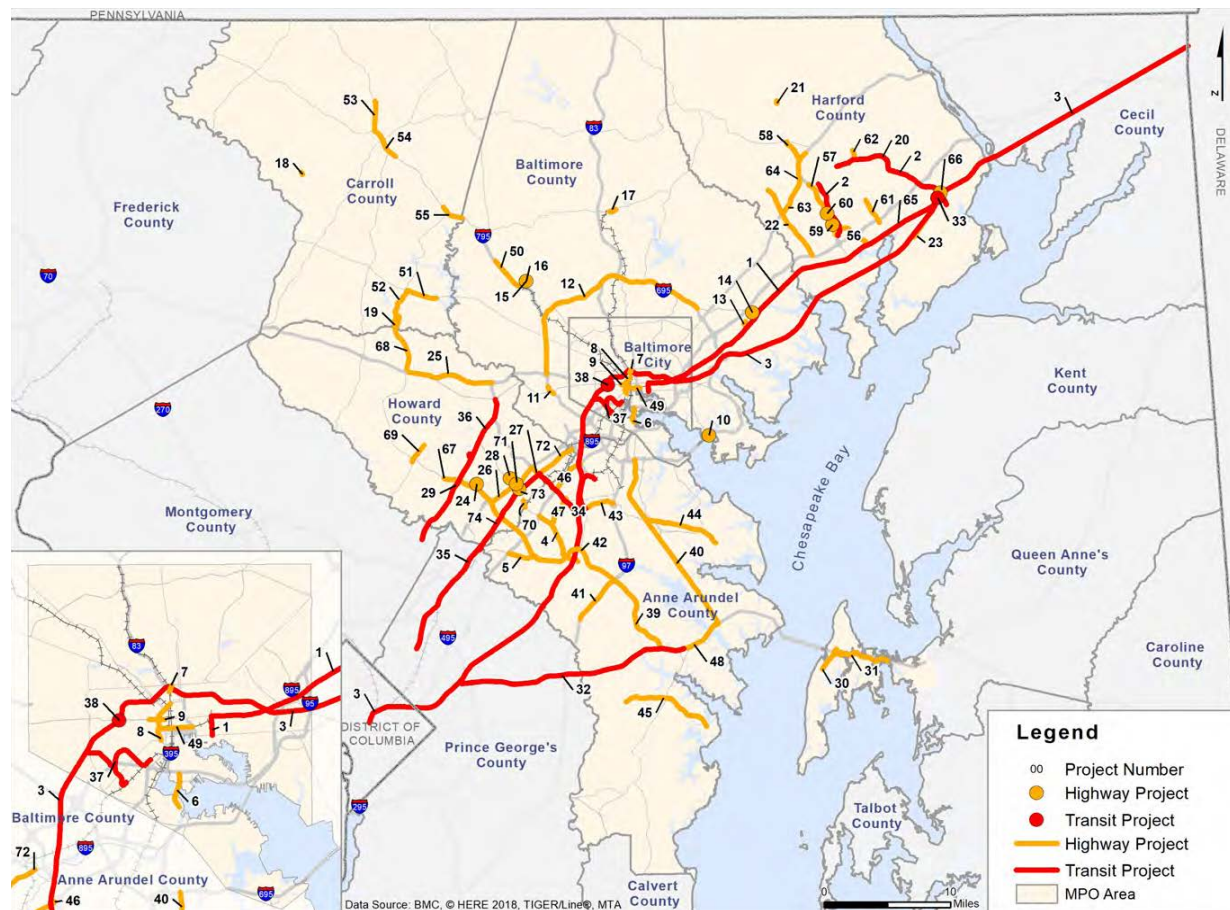
MAXIMIZE2045, BALTIMORE METROPOLITAN COUNCIL (BMC)

Maximize2045 is a regional long-range transportation plan that seeks to make the best use of—or maximize—the resources that make up and support the Baltimore region’s transportation system. Maximize2045 contains a list of major capital transportation projects totaling \$12 billion, which the region expects to implement from 2024 to 2045.

This section highlights critically important roadway and transit improvements within Maximize2045 that are relevant to BWI, DCA, and/or IAD Airport connectivity.

In addition to the airport ground access-related capital projects to be supported with federal funds which are outlined in Figure 42 and in the tables following, BWI planning staff also emphasized the importance of including the following Maryland Transportation Authority (MDTA) project: I-95: Section 200, ranging from north of MD 43 to north of MD 22 in FY 2026. This project constructs express toll lanes, including MD 152, MD 543, and MD 22 interchanges, adding capacity to a length section of I-95 from White Marsh northward for 18 miles.

Figure 1: Locations of Major Capital Projects, FY 2024-2045



Source: Maximize 2045, Baltimore Metropolitan Council

Table 8: Maximize2045 Major Capital Airport Ground Access Projects, 2024-2034

Map ID	Agency / Jurisdiction	Project Type	Project Timeframe	Project Name	Limits / Length	Description	Justification	Estimated Cost (YOE)
3	MDOT MTA; Regional	Transit	FY 2024-2034	MARC Service	Northern Virginia to Philadelphia	Fill Northeast Corridor commuter rail gap by providing commuter rail service between Perryville, MD and Newark, DE. Provide additional service to Harford County, including reverse commute, late evening service, and weekend service.	Improve service and mobility for current and future riders by addressing capacity, frequency, and reliability.	\$21,000,000
4	MDOT MTA; Anne Arundel County	Roadway	FY 2024-2034	MD 175	MD 295 to MD 170; 5.2 miles	Widen from 4 to 6 lanes; reconstruct MD 175/MD 295 interchange, improve MD 32 interchange, improve pedestrian/ bicycle facilities.	Support growth of cyber-security activities at Fort Meade by relieving congestion with added travel lanes, improving traffic operations with access controls in the form of a center median, and supporting multimodal access to major employment hub with extensive pedestrian and bicycle facilities.	\$185,000,000
6	Baltimore City	Roadway	FY 2024-2034	Hanover Street Bridge over Middle Branch	Reedbird Ave. to McComas St.; 0.5 miles	Replace existing 1916 Hanover Street Bridge over Middle Branch.	Improve access to jobs, amenities, and wider range of transportation modes: transit, bicycling, walking. Improve access to disadvantaged communities and to Port Covington development. Land use changes might bring destinations closer and increase property values. Provide operating cost and time savings to passengers, freight carriers, and shippers. Provide for smoother roadway with updated signings and markings. Improve safety: reduce fatalities, injuries, crash costs, and hazmat releases.	\$255,000,000

Source: Maximize2045, Baltimore Metropolitan Council

Table 8 Continued

Map ID	Agency / Jurisdiction	Project Type	Project Timeframe	Project Name	Limits / Length	Description	Justification	Estimated Cost (YOE)
12	MDOT SHA; Baltimore County	Roadway	FY 2024-2034	I-695	I-70 to MD 43; 18.9 miles	Create new lane of traffic along inside shoulder of inner and outer loops during peak hours. Ramp metering and reconfiguration of I-695 / I-70 interchange.	Capacity improvements will support mobility and infrastructure stability for adjacent communities and greater Baltimore region.	\$350,000,000
26	MDOT SHA; Howard County	Roadway	FY 2024-2034	I-95	MD 32 to MD 100; 6 miles	Create peak hour shoulder use.	Relieve congestion and improve freight movement by adding one outside lane in both directions during peak hours. Creating additional merge area at MD 100 and MD 32 entrance ramps will increase safety.	\$41,000,000
27	MDOT SHA; Howard County	Roadway	FY 2024-2034	MD 100	I-95 to Anne Arundel County line; 2 miles	Widen MD 100 from 4 to 6 lanes with auxiliary merge/diverge lanes.	MD 100 (east of I-95) daily, especially during peak periods, experiences congestion that negatively effects commuter, freight/commercial, and regional traffic as well as air quality and energy use. Local traffic diverts to local road network with commensurate negative effects. Widening MD 100 east of I-95 will relieve these problems and accommodate progressively increasing demand for this highway. Prior investment for initial MD 100 construction will be positively augmented by further needed.	\$36,000,000

Source: Maximize2045, Baltimore Metropolitan Council

Table 9: Maximize2045 Major Capital Airport Ground Access Projects, 2045-2045

Map ID	Agency / Jurisdiction	Project Type	Project Timeframe	Project Name	Limits / Length	Description	Justification	Estimated Cost (YOE)
33	MDOT SHA; Harford County	Transit	FY 2035-2045	Aberdeen MARC Station	U.S. 40 at MD 132 / Bel Air Rd.	Transit Oriented Development (TOD); new train station, additional parking, U.S. 40 "Green Boulevard," and Station Square Plaza - new pedestrian underpass and green, terraced plaza/amphitheater.	Improve service and mobility for current and future riders by addressing capacity, frequency, and reliability.	\$70,000,000
34	TBD Howard County	Transit	FY 2035-2045	Bus Rapid Transit to BWI Airport	Dorsey MARC Station to BWI Light Rail Station; 9.7 miles	New bus rapid transit service: Dorsey MARC station to Arundel Mills to BWI consolidated rental car facility to BWI light rail station.	Link Baltimore and Washington regions more closely together to enable greater economic, housing, educational, and cultural opportunities in each region. Address peak hour congestion. Provide an effective linkage between Camden MARC line and BWI Airport.	\$449,000,000
39	MDOT SHA; Anne Arundel County	Roadway	FY 2035-2045	I-97	MD 32 to U.S. 50/301; 6.5 miles	Add managed lanes (HOV lanes) to address capacity needs. Investigate need for additional interchange access in Crownsville.	I-97 provides a gateway to the City of Annapolis and Eastern Shore. Bottlenecks occur on roadway (not just during summer season, but year-round). Project will support U.S. 50/301 improvements (Bay Bridge).	\$391,000,000
40	MDOT SHA; Anne Arundel County	Roadway	FY 2035-2045	MD 2	U.S. 50 to I-695; 17 miles	Widen 4-lane sections to 6 lanes throughout. Roadway improvements, new premium transit service, new sidewalks, and permitting land use densities that support transit in select locations where redevelopment might occur.	Corridor serves both local traffic and long-distance commuter traffic destined for downtown Baltimore in the Annapolis, Severna Park, Pasadena, and Glen Burnie areas.	\$299,000,000
41	MDOT SHA; Anne Arundel County	Roadway	FY 2035-2045	MD 3	MD 424 to MD 32; 4 miles	Widen from 4 to 6 lanes from St. Stephen Church Road to MD 175. Upgrade roadway segments, improve bike / pedestrian facilities (especially crossings), and improve intersection operations.	Reduce congestion on MD 3, thus improving air quality and reducing greenhouse gases. Improve access to Prince George's County, Fort Meade, and BWI. Project will benefit a significant amount of truck traffic on MD 3. Also, project serves Crofton and Davidsonville areas, where there is a considerable amount of retail and residential activity, including new Waugh Chapel Village.	\$120,000,000

Source: Maximize2045, Baltimore Metropolitan Council

Table 9 Continued

Map ID	Agency / Jurisdiction	Project Type	Project Timeframe	Project Name	Limits / Length	Description	Justification	Estimated Cost (YOE)
43	MDOT SHA; Anne Arundel County	Roadway	FY 2035-2045	MD 100	Howard County line to I-97; 6.5 miles	Widen from 4 to 6 lanes. Possible inclusion of managed lanes.	1. The Yellow Line Light Rail Study utilized part of median to run the train. 2. This is a major route connecting Howard County, Anne Arundel County, Arundel Mills and the BWI Airport. 3. Connects Anne Arundel and Howard counties. 4. Connectivity to I-9	\$271,000,000
46	MDOT SHA; Anne Arundel County	Roadway	FY 2035-2045	MD 295	MD 100 TO I-195; 3.3 miles	Widen from 4 to 6 lanes. Includes a new interchange at Hanover Road and an extension of Hanover Road from the CSX railroad tracks to MD 170.	Support economic growth at BWI Airport. Relieve congestion and improve freight movement by adding one lane in both directions. Develop a key component of local network with Hanover Road interchange and extension.	\$331,000,000
47	MDOT SHA; Anne Arundel County	Roadway	FY 2035-2045	MD 713 (Ridge Rd.)	MD 175 to MD 176; 2.6 miles	Corridorwide road improvements, including reconstruction and widening, as well as intersection improvements and bike/pedestrian accommodations. Primarily widening MD 713 from 2 to 4 lanes between MD 175 and Stoney Run Drive.	Ridge Road corridor parallels the Baltimore-Washington Parkway and connects public facilities and activity centers with residential areas. Pedestrian and bicycle accommodations among residential areas and activity centers are limited and not constructed to county/state standards. County expects growth in employment and population from planned and future developments along or near MD 713 to result in increased travel demand and recurring congestion. Purpose of MD 713 planning study is to identify year 2040 deficiencies, evaluate build alternatives to address deficiencies, reduce current and forecasted congestion, reduce crash potential, and improve pedestrian and bicycle compatibility, while minimizing impacts to natural and built environment.	\$60,000,000

Source: Maximize2045, Baltimore Metropolitan Council

ATTACHMENT 2

TECHNICAL DOCUMENTATION ON THE GROUND ACCESS FORECAST UPDATE



CASP 34: GROUND ACCESS FORECAST UPDATE

TECHNICAL DOCUMENTATION ON AIR PASSENGER GROUND ACCESS TRIPS FORECAST UPDATE

Introduction

As part of the Air Passenger Origin/Destination and Air Passenger Ground Access Forecast Update projects, COG staff reviewed the air passenger trips input to the regional travel demand modeling process. This exercise consisted of the following major tasks: review and update FAA Terminal Area Forecast inputs, review the results of the 2017 Washington-Baltimore Regional Air Passenger Survey, and review and update the MWCOG and BMC planning areas land use forecasts included in the Round 9.1 Cooperative Forecasts. The product of these tasks is an update of base year and forecast year annual and weekday air passenger ground access trips by arrival mode and time-of-day for the MWCOG travel demand modeling region.

Air Passenger Enplanement Forecasts

FAA's enplanement forecasts were obtained for forecast years 2017 through 2045. Tables 1, 2, and 3 presents observed and forecast air passenger enplanements for the three airports in the Washington/Baltimore region, respectively: Baltimore/Washington International Thurgood Marshall Airport (BWI), Ronald Reagan Washington National Airport (DCA), and Washington Dulles International Airport (IAD). Air passenger enplanements for BWI are presented in Table 1. Enplanements at BWI are forecast to reach 21.6 million by 2045, an increase of 64 percent. At DCA (shown in Table 2), enplanements are projected to reach 15.8 million, an increase of 32 percent from 2017. Enplanements at IAD (shown in Table 3) are projected to reach more than 19 million by 2045, an increase of 71 percent from 2017.

Table 1
Annual Air Passenger Enplanement Forecasts
Baltimore/Washington International Thurgood Marshall Airport

Year	Enplanements	Change	Average Annual Compound Growth	
2017	13,214,636 ¹			
2020	14,206,605 ²	991,969	2017 - 2020	1.50%
2025	15,533,893 ²	1,327,288	2020 - 2025	1.87%
2030	16,947,302 ²	1,413,409	2025 - 2030	1.82%
2035	18,426,041 ²	1,478,739	2030 - 2035	1.75%
2040	19,995,765 ²	1,569,724	2035 - 2040	1.70%
2045	21,650,495 ²	1,654,730	2040 - 2045	1.66%

¹ MAA Observed

² Forecast based on FAA TAF Fiscal Year annual percent increase

Table 2
Annual Air Passenger Enplanement Forecasts
Ronald Reagan Washington National Airport

Year	Enplanements	Change	Average Annual Compound Growth	
2017	11,956,974 ¹			
2020	12,631,321 ²	674,347	2017 - 2020	1.13%
2025	14,117,035 ²	1,485,714	2020 - 2025	2.35%
2030	14,695,369 ²	578,334	2025 - 2030	0.82%
2035	15,099,624 ²	404,255	2030 - 2035	0.55%
2040	15,462,749 ²	363,125	2035 - 2040	0.48%
2045	15,810,480 ²	347,731	2040 - 2045	0.45%

¹ MWAA Observed

² Forecast based on FAA TAF Fiscal Year annual percent increase

Table 3
Annual Air Passenger Enplanement Forecasts
Washington Dulles International Airport

Year	Enplanements	Change	Average Annual Compound Growth	
2017	11,307,077 ¹			
2020	11,809,563 ²	502,486	2017 - 2020	0.89%
2025	13,167,927 ²	1,358,364	2020 - 2025	2.30%
2030	14,606,113 ²	1,438,186	2025 - 2030	2.18%
2035	16,096,973 ²	1,490,860	2030 - 2035	2.04%
2040	17,649,702 ²	1,552,729	2035 - 2040	1.93%
2045	19,256,398 ²	1,606,696	2040 - 2045	1.82%

¹ MWAA Observed

² Forecast based on FAA TAF Fiscal Year annual percent increase

Market Segmentation

Based on the 2017 Washington-Baltimore Regional Air Passenger Survey data, enplanements were further grouped into local originations, internal originations (within the Washington-Baltimore Air System Planning Region) and the MWCOG model region (within the 132 AAZs in the MWCOG model area). Table 4 shows the breakdown of these three types of originations by airport for base year 2017 and forecast years through 2045.

A locally originating air passenger is defined as an air traveler beginning his or her air travel on a flight departing from one of the region's three airports. This definition excludes air travelers who are connecting to another flight at one of the region's airports, but it includes air travelers who are not residents of the Washington/Baltimore region who are making a return air trip home from a business or vacation trip to the Washington/Baltimore region. Thus, local originating air passengers can be either residents or non-residents of the Washington/Baltimore region. In fact, the results of the 2017 Washington/Baltimore Regional Air Passenger Survey showed that approximately 60 percent of all locally originating air passengers were non-residents who began their ground access trip to the airport from a hotel/motel, place of business, a private residence, or other location in the Air System Planning Region.

Air Passenger Ground Access Trip Forecasting Methodology

The Air Passenger Ground Access Trips Forecast Update was accomplished in a series of steps, illustrated in Figure 1 and below:

- Convert base year 2017 annual air passenger trips from Regional Air Passenger Survey to average weekday air passenger ground access trips.
- Summarize base year 2017 average weekday air passenger ground access trips by residential (home-based) / non-residential (non-home based) trip origin type and area resident/non-resident status for each AAZ.¹
- Summarize household and employment land activity data by AAZ for base year 2017 and all forecast years (2020, 2025, 2030, 2035, 2040 and 2045).
- Calculate base year 2017 air passenger ground access trip generation factors by home/non-home trip origin type and area resident/non-resident status for each airport AAZ pair.
- Calculate average weekday air passenger ground access trips to each airport for 2017 base year and all forecast years.
- Summarize base year 2017 weekday ground access trips by mode of arrival for each airport, by geographic trip origination (AAZ) and resident status.
- Calculate average weekday airport ground access trips by mode of arrival for 2017 base year and all forecast years.
- Calculate time-of-day split.

¹ In the context of air passenger ground access trips, a home-based trip refers to any airport ground access trip that begins at a private residence. For example, an airport ground access trip by a non-resident that begins at the home of a friend or family member who lives in this region is considered a home-based trip, even though this starting location is not technically the "home" of the non-resident air passenger.



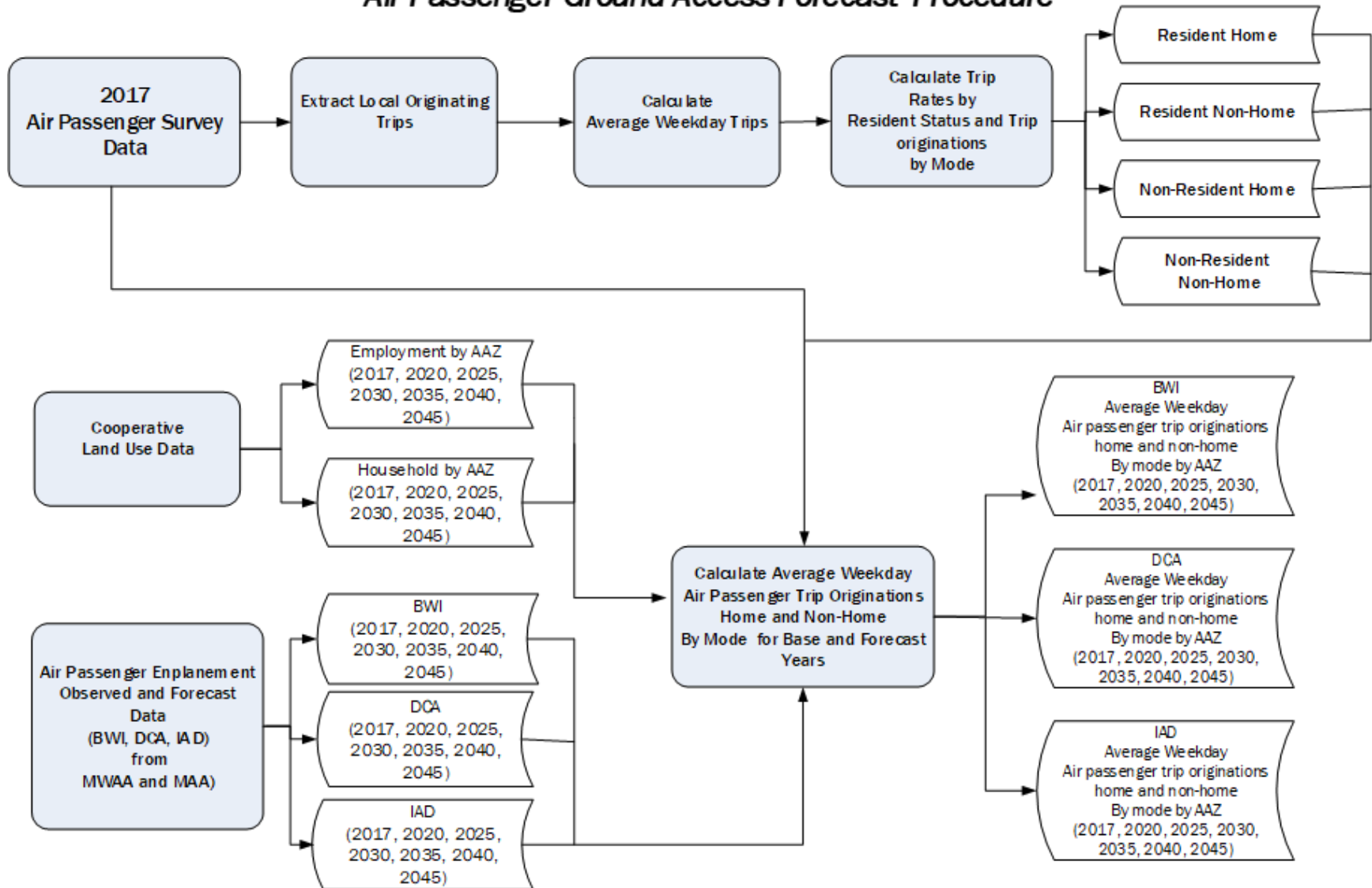
Table 4
Washington / Baltimore Regional Airports
Annual Local and Internal AAZ Originating Trips
(in thousands)

Year	Local Originating Trips				Internal AAZ Originating Trips				MWCOG AAZ Originating Trips			
	BWI	DCA	IAD	Total	BWI	DCA	IAD	Total	BWI	DCA	IAD	Total
2017	8,910	10,499	7,245	26,654	7,721	10,281	6,730	24,732	5,625	10,243	6,658	22,526
2020	9,579	11,091	7,567	28,237	8,300	10,860	7,030	26,190	6,047	10,820	6,954	23,822
2025	10,474	12,395	8,437	31,306	9,076	12,138	7,838	29,051	6,612	12,093	7,754	26,459
2030	11,427	12,903	9,359	33,689	9,901	12,635	8,694	31,231	7,214	12,588	8,601	28,403
2035	12,424	13,258	10,314	35,996	10,765	12,983	9,582	33,329	7,843	12,935	9,479	30,257
2040	13,482	13,577	11,309	38,368	11,682	13,295	10,506	35,483	8,511	13,246	10,393	32,150
2045	14,598	13,882	12,338	40,818	12,649	13,594	11,462	37,705	9,216	13,544	11,339	34,099

Note:

- Local originating trips are departing passengers whose trip starts 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 2017 Air Passenger Survey data to be 67% for BWI, 88% for DCA and 64% for IAD, of the total enplanements, shown on Tables 1, 2 and 3, respectively.
- Internal originating trips are calculated based on the 2017 Air Passenger Survey data to be 87% for BWI, 98% for DCA, and 93% for IAD, of the total local originating trips, that are within the 161 internal AAZ's.
- MWCOG AAZ originating trips are calculated based on the 2017 Air Passenger Survey data to be 73% for BWI, 99% for DCA and 99% IAD, of the total Internal AAZ originating trips, that are within the 132 AAZ's.
- Internal AAZs include 161 AAZs within the Washington-Baltimore Air System Planning Region
- MWCOG AAZs include 132 AAZs within the MWCOG Model Region
- Internal and MWCOG originations does not include external zones for PA, DE, WV, NJ or external VA and MD

Figure 1
Air Passenger Ground Access Forecast Procedure





Review of 2017 Washington-Baltimore Regional Air Passenger Survey

The 2017 Washington-Baltimore Regional Air Passenger Survey was conducted over a two-week period in the fall of 2017. The survey includes departing passengers from the three major commercial airports in the region: Baltimore/Washington International Thurgood Marshall (BWI), Ronald Reagan Washington National (DCA), and Washington Dulles International (IAD). Table 5 shows local originating and connecting annual enplanements at the three regional airports, and Table 6 shows enplanement originations within the Washington-Baltimore Air System Planning Region and originations external to the Air Systems Planning region by airport. Table 7 shows the same information as Table 6, except that originations are classified based on whether they began inside the COG/TPB planning region.

Table 5
2017 Washington / Baltimore Regional Air Passenger Survey
Annual Trip Originations by Airport (in Thousands)

Enplanement Type		Airport			
		BWI	DCA	IAD	Total
Local origination	Number	8,911	10,499	7,245	26,655
- (Came by ground transportation)	Percent	67%	88%	64%	73%
Connected from another Flight	Number	4,305	1,458	4,062	9,826
- (Local and/or International)	Percent	33%	12%	36%	27%
Total Annual Enplanements	Number	13,216	11,957	11,307	36,480
	Percent	100%	100%	100%	100%
Percent of Air System Planning Region		36%	33%	31%	

Source:- 2017 Washington-Baltimore Regional Air Passenger Survey

Note :- Totals may not add due to rounding

Table 6
2017 Washington / Baltimore Regional Air Passenger Survey
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	Number	7,723	10,281	6,730	24,734
- (Internals)	Percent	87%	98%	93%	93%
Outside Air System Planning Region	Number	1,190	218	514	1,922
- (Externals)	Percent	13%	2%	7%	7%
Total Annual Enplanements	Number	8,913	10,499	7,245	26,657
	Percent	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

Source:- 2017 Washington-Baltimore Regional Air Passenger Survey

Note :- Totals may not add due to rounding

Table 7
2017 Washington / Baltimore Regional Air Passenger Survey
Annual Trip Originations by Airport (in Thousands)
MWCOG Region and External Trip Originations by Airport

Enplanement Type		Airport			
		BWI	DCA	IAD	Total
Within MWCOG Model Region	<i>Number</i>	5,627	10,243	6,658	22,528
- (<i>Internals</i>)	<i>Percent</i>	73%	100%	99%	91%
Outside MWCOG Model Region	<i>Number</i>	2,096	38	72	2,206
- (<i>Externals</i>)	<i>Percent</i>	27%	0%	1%	9%
Total Annual Enplanements	<i>Number</i>	7,723	10,281	6,730	24,734
	<i>Percent</i>	100%	100%	100%	100%

- **Internal** originating trips are local originating trips within the MWCOG Planning Area.

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

Source:- 2017 Washington-Baltimore Regional Air Passenger Survey

Note :- Totals may not add due to rounding

Since the survey was conducted over a two-week period, the survey responses were expanded to represent observed annual passenger enplanements for the survey year 2017. The MWCOG regional travel demand model simulates average weekday travel, therefore, only weekday trips (Monday – Friday) were considered.

Annual weekday total enplanements for the region’s three major airports are shown in Table 8. Approximately 19 million passengers flew out of the region’s three major airports during the weekdays of 2017. Of these, 93 percent were air passengers originating within the MWCOG model region, while seven percent were external originations.

Table 8
2017 Washington / Baltimore Regional Air Passenger Survey
Annual Weekday Trip Originations by Airport (in Thousands)
MWCOG Region and External Trip Originations by Airport

Enplanement Type		Airport			
		BWI	DCA	IAD	Total
Within MWCOG Model Region - (Internals)	Number	5,821	7,346	4,861	18,028
	Percent	87%	98%	93%	93%
Outside MWCOG Model Region - (Externals)	Number	850	149	344	1,343
	Percent	13%	2%	7%	7%
Total Annual Enplanements	Number	6,671	7,495	5,205	19,371
	Percent	100%	100%	100%	100%

- **Internal** originating trips are local originating trips within the MWCOG Planning Area.

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

Source:- 2017 Washington-Baltimore Regional Air Passenger Survey

Note :- Totals may not add due to rounding

The first step in the update of airport ground access trips was converting annual air passenger trips from the 2017 Washington/Baltimore Regional Air Passenger Survey to average weekday figures for base year 2017. This was accomplished by (1) slightly adjusting the annual air passenger survey weights to exactly match the year 2017 observed enplanements at the three commercial airports; (2) selecting only the survey records for local originating air passengers making airport ground access trips on a weekday; and (3) dividing the adjusted annual survey weights for each air passenger trip record using the following formula.

$$\text{Average Weekday Air Passenger} = \frac{\text{Annual Weekday Ground Access Trips}}{260}$$

The resulting data are shown in Table 9.

Table 9
2017 Washington / Baltimore Regional Air Passenger Survey
Average Weekday Trip Originations by Airport
MWCOG Model Region and External Trip Originations by Airport

Enplanement Type		Airport			
		BWI	DCA	IAD	Total
Within MWCOG Model Region - (Internals)	Number	16,278	28,144	18,483	62,905
	Percent	73%	100%	99%	91%
Outside MWCOG Model Region - (Externals)	Number	6,112	110	212	6,434
	Percent	27%	0%	1%	9%
Total Annual Enplanements	Number	22,390	28,254	18,695	69,338
	Percent	100%	100%	100%	100%

- **Internal** originating trips are local originating trips within the MWCOG Planning Area.

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

Source:- 2017 Washington-Baltimore Regional Air Passenger Survey

Note :- Totals may not add due to rounding

The next step in the process was to summarize the average weekday ground access trip data for each airport (BWI, DCA, and IAD) by trip origin type and resident status for each AAZ for the MWCOG modeled area within the Washington-Baltimore Regional Air System Planning Region. The weekday ground access data were summarized into two trip origin types (home-based, non-home based) and two resident status types (resident, non-resident). Thus, this processing summarized the ground access trip data into four categories for each Airport-AAZ pair. These categories were:

- (1) Resident Status=**Resident**, Origin Type=**Home-based**
- (2) Resident Status=**Resident**, Origin Type=**Non-home based**
- (3) Resident Status=**Non-Resident**, Origin Type=**Home-based**
- (4) Resident Status=**Non-Resident**, Origin Type=**Non-home based**

Summarize Land Activity Data for 2017 Base Year and Forecast Years

Household and employment land activity data for 2017 and forecasts through 2045 by small area TAZs were the latest small-area forecasts available from the MWCOG Round 9 Cooperative Forecasts. These TAZ-level data were aggregated to the internal AAZs shown in Figure 1 of the appendix following this memorandum. Table 10 shows the cooperative forecasts for the Air System Planning region.

Table 10				
Washington-Baltimore Air System Planning Region				
Household Forecast				
Year	Household	Change	Range	Percent Growth
2017	3,233,842	-		
2020	3,378,582	144,740	2010 - 2015	4.5%
2025	3,558,288	179,706	2015 - 2020	5.3%
2030	3,726,321	168,033	2020 - 2025	4.7%
2035	3,868,989	142,668	2025 - 2030	3.8%
2040	3,993,753	124,764	2030 - 2035	3.2%
2045	4,019,030	25,277	2035 - 2040	0.6%
<i>Source:- MWCOG Round 9.1 and BMC Round 8B Cooperative Land Use Forecast</i>				
Employment Forecast				
Year	Employment	Change	Range	Percent Growth
2017	4,959,560	-		
2020	5,197,073	237,513	2010 - 2015	4.8%
2025	5,491,831	294,758	2015 - 2020	5.7%
2030	5,767,066	275,235	2020 - 2025	5.0%
2035	6,007,295	240,229	2025 - 2030	4.2%
2040	6,251,041	243,746	2030 - 2035	4.1%
2045	6,169,622	-81,419	2035 - 2040	-1.3%
<i>Source:- MWCOG Round 9.1 and BMC Round 8B Cooperative Land Use Forecast</i>				
<i>Note: For regional transportation planning purposes, CTPP-based adjustments were applied to employment forecasts in selected non-MWCOG jurisdictions to account for definitional differences in employment.</i>				



Calculate Air Passenger Ground Access Trip Generation Factors

Once the air passenger ground access trip and land activity data were summarized, trip generation factors were calculated for each Airport/AAZ/trip origin type/resident-status classification using the following formulae:

A. Resident Home-based Trip Origin factor for Airport_(A) AAZ_(X) =

$$\text{Resident Home-based Trip Origin Factor} = \frac{\text{Total Resident Home-based Trip Origin Trips (AAZ}_X\text{) (Year 2017)}}{\text{Total Households (AAZ}_X\text{) (Year 2017)}}$$

B. Resident Non-home-based Trip Origin factor for Airport_(A) AAZ_(X) =

$$\text{Resident Non-home-based Trip Origin Factor} = \frac{\text{Total Resident Non-home-based Trip Origin Trips (AAZ}_X\text{) (Year 2017)}}{\text{Total Employment (AAZ}_X\text{) (Year 2017)}}$$

C. Non-Resident Home-based Trip Origin factor for Airport_(A) AAZ_(X) =

$$\text{Non-Resident Home-based Trip Origin Factor} = \frac{\text{Total Non-Resident Home-based Trip Origin Trips (AAZ}_X\text{) (Year 2017)}}{\text{Total Households (AAZ}_X\text{) (Year 2017)}}$$

D. Non-Resident Non-Home-based Trip Origin factor for Airport_(A) AAZ_(X) =

$$\text{Non-Resident Non-Home-based Trip Origin Factor} = \frac{\text{Total Non-Resident Non-home-based Trip Origin Trips (AAZ}_X\text{) (Year 2017)}}{\text{Total Employment (AAZ}_X\text{) (Year 2017)}}$$

Calculate Air Passenger Ground Access Trips for 2017 and Forecast Years

Ground access trips for 2017, 2020, 2025, 2030, 2035, 2040 and 2045 were calculated by multiplying base year and forecast year household and employment data by the appropriate trip generation factors and adjusting the resultant product to be consistent with local air passenger originations estimated from approved MWA and MAA control totals for each airport. For each airport-AAZ combination, (1) air passenger ground access trips by residents with home-based trip origin types were calculated by multiplying AAZ households by the resident home-based trip origin trip generation factor; (2) air passenger ground access trips by residents with non-home-based trip origin types were calculated by multiplying AAZ employment by the resident non-home-based trip origin trip generation factor; (3) air passenger ground access trips by non-residents with home-based trip origin types were calculated by multiplying AAZ households by the non-resident home-based trip origin trip generation factor; and (4) air passenger ground access trips by non-residents with

non-home-based origin types were calculated by multiplying AAZ employment by the non-resident non-home-based trip origin trip generation factor.

The resultant products for each AAZ-origin type-resident-status classification were then summed by airport-AAZ pair and totaled for each airport. This total was then divided by a previously determined FAA control total for local passenger originations at that airport to obtain a MWA and MA adjustment factor. This adjustment factor was then applied to all airport-AAZ pairs to ensure that the sum of the calculated ground access trips by AAZ for that airport would match the approved MWA and MA forecasts.

As shown in Table 11, average weekday resident and non-resident trips were categorized into Home-Based (HB) and Non-Home-Based (NHB) trips depending on the air passengers' trip origination, i.e., the starting point of the passenger's ground trip to the airport.

Table 11
Average Weekday Air Passenger Ground Access Trips
by Resident Status and Trip Origin
(MWCOC Model Region Only)

Forecast Year	BWI					
	Resident			Non-Resident		
	Home Based	Non-Home Based	Total	Home Based	Non-Home Based	Total
2017	7,188	910	8,098	3,971	4,108	8,079
2020	7,767	999	8,766	4,312	4,449	8,761
2025	8,525	1,120	9,645	4,751	4,899	9,650
2030	9,364	1,246	10,610	5,207	5,395	10,602
2035	10,182	1,379	11,561	5,668	5,970	11,638
2040	11,015	1,527	12,542	6,139	6,640	12,779
2045	12,360	1,733	14,093	6,902	7,504	14,406

Forecast Year	DCA					
	Resident			Non-Resident		
	Home Based	Non-Home Based	Total	Home Based	Non-Home Based	Total
2017	9,283	1,553	10,836	4,388	13,166	17,554
2020	9,801	1,613	11,414	4,641	13,972	18,613
2025	10,905	1,768	12,673	5,180	15,719	20,899
2030	11,356	1,826	13,182	5,390	16,378	21,768
2035	11,697	1,872	13,569	5,543	16,794	22,337
2040	11,984	1,909	13,893	5,669	17,214	22,883
2045	12,310	1,938	14,248	5,808	17,555	23,363

Source: - 2017 Washington-Baltimore Regional Air Passenger Survey

Note :- Totals may not add due to rounding

Table 11
Average Weekday Air Passenger Ground Access Trips
by Resident Status and Trip Origin
(MWCOC Model Region Only) - Continued

Forecast Year	IAD					
	Resident			Non-Resident		
	Home Based	Non-Home Based	Total	Home Based	Non-Home Based	Total
2017	8,644	1,357	10,001	3,644	5,327	8,971
2020	9,020	1,432	10,452	3,773	5,589	9,362
2025	10,054	1,596	11,650	4,167	6,288	10,455
2030	11,129	1,785	12,914	4,601	7,016	11,617
2035	12,267	1,973	14,240	5,051	7,744	12,795
2040	13,396	2,181	15,577	5,530	8,519	14,049
2045	14,600	2,397	16,997	6,027	9,369	15,396
Forecast Year	ALL					
	Resident			Non-Resident		
	Home Based	Non-Home Based	Total	Home Based	Non-Home Based	Total
2017	25,115	3,820	28,935	12,003	22,601	34,604
2020	26,588	4,044	30,632	12,726	24,010	36,736
2025	29,484	4,484	33,968	14,098	26,906	41,004
2030	31,849	4,857	36,706	15,198	28,789	43,987
2035	34,146	5,224	39,370	16,262	30,508	46,770
2040	36,395	5,617	42,012	17,338	32,373	49,711
2045	39,270	6,068	45,338	18,737	34,428	53,165

Source:- 2017 Washington-Baltimore Regional Air Passenger Survey

Note :- Totals may not add due to rounding

Air Passenger Ground Access Trips by Mode of Arrival

Air passenger trips to the airports consist of a larger mode choice set compared with what is ordinarily used in MWCOC's standard mode choice modeling procedures. The ground access trips to the airports were summarized into four major arrival modes as follows:

- Auto = Private Car, Rental Car, Transportation Network Companies (TNCs) and Taxi
- Transit = Metrorail, Amtrak/MARC/VRE and Light Rail
- Airport Transit = Airport Bus/Limo and Hotel/Motel Courtesy Shuttle
- Other = Charter Bus, Employer Shuttle, and All Other

The auto mode of arrival was further split into two sub-categories:

- Auto Driver
- Auto Passenger

The split of auto ground access trips into auto driver and auto passenger trips was determined from the air passenger survey question that asked for the total number of household members, friends, or business associates that traveled with the surveyed air passenger to the airport (Question B-5). From this question the total vehicle occupancy of air passengers arriving at the airport by private or rental cars could be determined. The reciprocal of this number yields the proportion of air passengers who were likely auto drivers. The complement of this reciprocal yields the proportion of air passengers who were likely auto passengers. Multiplying the survey record weights by these proportions produces estimates of the number of air passenger who were auto drivers and the number of air passengers who were auto passengers for these auto ground access trips. Air passengers arriving at the airport by taxi are, by definition, auto passengers.

Once the ground access mode of arrival trip data had been summarized, modal shares for Auto Driver, Auto Passenger, Transit, Airport Transit and Other arrival modes were calculated for each Airport/AAZ/trip origin type/resident status classification. Table 12 shows estimated 2017 to 2045 air passenger ground access trip totals by mode of arrival and Table 13 shows Home and Non-Home originations by mode for the MWCOG model area by airport.

Table 12
Average Weekday Air Passenger Ground Access Trips
(MWCOG Model Region Only)

Arrival Mode - BWI

Forecast Year	Auto Driver	Auto Passenger	Transit	Airport Transit	Other	Total
2017	5,975	8,047	910	1,079	211	16,222
2020	6,473	8,706	1,010	1,159	229	17,577
2025	7,107	9,562	1,142	1,274	256	19,341
2030	7,809	10,500	1,271	1,398	281	21,259
2035	8,520	11,467	1,401	1,555	307	23,250
2040	9,276	12,483	1,541	1,738	340	25,378
2045	10,421	14,029	1,751	1,964	379	28,544

Arrival Mode - DCA

Forecast Year	Auto Driver	Auto Passenger	Transit	Airport Transit	Other	Total
2017	9,614	12,267	4,201	1,737	634	28,453
2020	10,189	12,987	4,385	1,819	662	30,042
2025	11,409	14,529	4,892	2,046	729	33,605
2030	11,840	15,100	5,082	2,198	759	34,979
2035	12,167	15,512	5,214	2,265	785	35,943
2040	12,468	15,872	5,325	2,341	807	36,813
2045	12,743	16,224	5,407	2,443	819	37,636

Source:- 2017 Washington-Baltimore Regional Air Passenger Survey

Note :- Totals may not add due to rounding

Table 12
Average Weekday Air Passenger Ground Access Trips
(MWCOC Model Region Only) - Continued

cont...

Arrival Mode - IAD

Forecast Year	Auto Driver	Auto Passenger	Transit	Airport Transit	Other	Total
2017	7,457	9,674	402	1,072	395	19,000
2020	7,790	10,118	426	1,113	404	19,851
2025	8,685	11,275	473	1,261	444	22,138
2030	9,633	12,493	531	1,409	498	24,564
2035	10,611	13,759	593	1,558	543	27,064
2040	11,656	15,086	653	1,707	589	29,691
2045	12,721	16,475	722	1,883	642	32,443

Arrival Mode - ALL

Forecast Year	Auto Driver	Auto Passenger	Transit	Airport Transit	Other	Total
2017	23,046	29,988	5,513	3,888	1,240	63,675
2020	24,452	31,811	5,821	4,091	1,295	67,470
2025	27,201	35,366	6,507	4,581	1,429	75,084
2030	29,282	38,093	6,884	5,005	1,538	80,802
2035	31,298	40,738	7,208	5,378	1,635	86,257
2040	33,400	43,441	7,519	5,786	1,736	91,882
2045	35,885	46,728	7,880	6,290	1,840	98,623

Source:- 2017 Washington-Baltimore Regional Air Passenger Survey

Note :- Totals may not add due to rounding

Table 13
Average Weekday One-Way Air Passenger Ground Access Trips
by Mode and Trip Originations

Arrival Mode	Trip Origin	Forecast Year							
		2017	2020	2025	2030	2035	2040	2045	
Auto Persons Trips	BWI	HB	5,977	6,466	7,098	7,773	8,454	9,150	10,263
		NHB	2,070	2,240	2,464	2,727	3,013	3,333	3,766
		Total	8,047	8,706	9,562	10,500	11,467	12,483	14,029
	DCA	HB	6,432	6,787	7,563	7,877	8,117	8,307	8,529
		NHB	5,835	6,200	6,966	7,223	7,395	7,565	7,695
		Total	12,267	12,987	14,529	15,100	15,512	15,872	16,224
	IAD	HB	6,665	6,946	7,715	8,532	9,382	10,259	11,174
		NHB	3,009	3,172	3,560	3,961	4,377	4,827	5,301
		Total	9,674	10,118	11,275	12,493	13,759	15,086	16,475
Auto Driver Trips	BWI	HB	4,445	4,808	5,267	5,772	6,276	6,791	7,620
		NHB	1,530	1,665	1,840	2,037	2,244	2,485	2,801
		Total	5,975	6,473	7,107	7,809	8,520	9,276	10,421
	DCA	HB	5,107	5,395	6,012	6,245	6,441	6,610	6,780
		NHB	4,507	4,794	5,397	5,595	5,726	5,858	5,963
		Total	9,614	10,189	11,409	11,840	12,167	12,468	12,743
	IAD	HB	5,131	5,340	5,941	6,569	7,233	7,912	8,618
		NHB	2,326	2,450	2,744	3,064	3,378	3,744	4,103
		Total	7,457	7,790	8,685	9,633	10,611	11,656	12,721
Transit Trips	BWI	HB	495	551	620	699	766	834	934
		NHB	415	459	522	572	635	707	817
		Total	910	1,010	1,142	1,271	1,401	1,541	1,751
	DCA	HB	1,736	1,829	2,050	2,137	2,192	2,230	2,279
		NHB	2,465	2,556	2,842	2,945	3,022	3,095	3,128
		Total	4,201	4,385	4,892	5,082	5,214	5,325	5,407
	IAD	HB	171	186	205	237	265	295	333
		NHB	231	240	268	294	328	358	389
		Total	402	426	473	531	593	653	722

Table 13
Average Weekday One-Way Air Passenger Ground Access Trips
by Mode and Trip Originations - Continued

Arrival Mode	Trip Origin	Forecast Year							
		2017	2020	2025	2030	2035	2040	2045	
Airport Transit Trips	BWI	HB	193	211	239	260	284	305	347
		NHB	886	948	1,035	1,138	1,271	1,433	1,617
		Total	1,079	1,159	1,274	1,398	1,555	1,738	1,964
	DCA	HB	157	168	188	199	203	212	219
		NHB	1,580	1,651	1,858	1,999	2,062	2,129	2,224
		Total	1,737	1,819	2,046	2,198	2,265	2,341	2,443
	IAD	HB	205	211	229	249	272	295	320
		NHB	867	902	1,032	1,160	1,286	1,412	1,563
		Total	1,072	1,113	1,261	1,409	1,558	1,707	1,883
Other Mode Trips	BWI	HB	68	74	79	87	94	103	112
		NHB	143	155	177	194	213	237	267
		Total	211	229	256	281	307	340	379
	DCA	HB	265	271	292	303	311	317	320
		NHB	369	391	437	456	474	490	499
		Total	634	662	729	759	785	807	819
	IAD	HB	131	134	147	164	178	194	208
		NHB	264	270	297	334	365	395	434
		Total	395	404	444	498	543	589	642
Total Trips	BWI	HB	11,178	12,110	13,303	14,591	15,874	17,183	19,276
		NHB	5,044	5,467	6,038	6,668	7,376	8,195	9,268
		Total	16,222	17,577	19,341	21,259	23,250	25,378	28,544
	DCA	HB	13,697	14,450	16,105	16,761	17,264	17,676	18,127
		NHB	14,756	15,592	17,500	18,218	18,679	19,137	19,509
		Total	28,453	30,042	33,605	34,979	35,943	36,813	37,636
	IAD	HB	12,303	12,817	14,237	15,751	17,330	18,955	20,653
		NHB	6,697	7,034	7,901	8,813	9,734	10,736	11,790
		Total	19,000	19,851	22,138	24,564	27,064	29,691	32,443

Source:- 2017 Washington-Baltimore Regional Air Passenger Survey

Note :- Totals may not add due to rounding

Time-Of-Day Split

The 2017 air passenger survey data has scheduled flight times for the survey records. Two separate time-of-day split factors were developed using the survey data. Time-of-day is calculated as a percent of total trips departing one hour and two hours before the scheduled flight departure time and shown in Table 14.

One hour before flight time:

1. AM trips = flight time 0700 to 1000 (7:00 AM to 10:00 AM).
2. PM trips = flight time 1600 to 1900 (4:00 PM to 7:00 PM).
3. 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 hours before flight time:

1. AM trips = flight time 0800 to 1100 (8:00 AM to 11:00 AM).
2. PM trips = flight time 1700 to 2000 (5:00 PM to 8:00 PM).
3. Off-Peak trips = flight time 1100 to 1700, and 2000 to 2400.
(11:00 AM-5:00 PM, and 8:00 PM - 12:00 AM).

Note that there are no regularly scheduled departures at any of the three regional airports between 0000 and 0600 (12:00 midnight and 6:00 AM).

Time Period	One-Hour Before Flight Departure				Two-Hour Before Flight Departure			
	BWI	DCA	IAD	Total	BWI	DCA	IAD	Total
AM-Peak	3,700 23%	5,669 20%	2,866 16%	12,235 19%	3,841 24%	4,742 4057%	3,327 18%	11,910 19%
PM-Peak	3,027 19%	4,956 18%	6,285 34%	14,268 23%	3,432 21%	4,199 15%	5,971 32%	13,602 22%
Off-Peak	9,550 59%	17,519 62%	9,332 50%	36,401 58%	9,005 55%	19,203 68%	9,185 50%	37,392 59%
Total	16,278 100%	28,144 100%	18,483 100%	62,904 100%	16,278 100%	28,144 4140%	18,483 100%	62,905 100%

Source: 2017 Washington-Baltimore Regional Air Passenger Survey
Note :- Totals may not add due to rounding

APPENDIX



Table A-1
Washington / Baltimore Air System Planning Region
Aviation Analysis Zone System

No.	Jurisdiction	No. of AAZs	AAZs Range	No. of TAZs
1	District of Columbia	20	1 - 20	393
2	Arlington County	9	21 - 29	141
3	City of Alexandria	4	30 - 33	65
4	Fairfax County	15	34 - 47	549
5	Montgomery County	20	48 - 68	375
6	Prince George's County	14	69 - 82	636
7	Prince William County	6	83 - 88	378
8	Loudoun County	6	89 -94	282
9	Frederick County	3	95 - 97	130
10	Carroll County	1	98	58
11	Howard County	9	99 - 107	68
12	Anne Arundel County	14	108 - 121	99
13	Calvert County	1	122	47
14	St. Mary's County	1	123	75
15	Charles County	2	124 - 125	113
16	King George County	1	126	25
17	Spotsylvania County	1	127	62
18	City of Fredericksburg	1	128	14
19	Stafford County	1	129	93
20	Fauquier County	1	130	50
21	Clarke County	1	131	9
22	Jefferson County	1	132	13
23	Baltimore City	13	133 - 145	217
24	Baltimore County	13	146 - 158	342
25	Harford County	3	159 - 161	140
Total Washington/Baltimore Air System Planning Area		161		4,374
26	External Maryland	1	162	NA
27	External Virginia	1	163	NA
28	External West Virginia	1	164	NA
29	Pennsylvania	1	165	NA
30	Delaware	1	166	NA
31	New Jersey	1	167	NA
32	Other	1	999	NA
Total Externals		7		
Grand Total		168		



Figure 1
Washington - Baltimore
Air System Planning Region

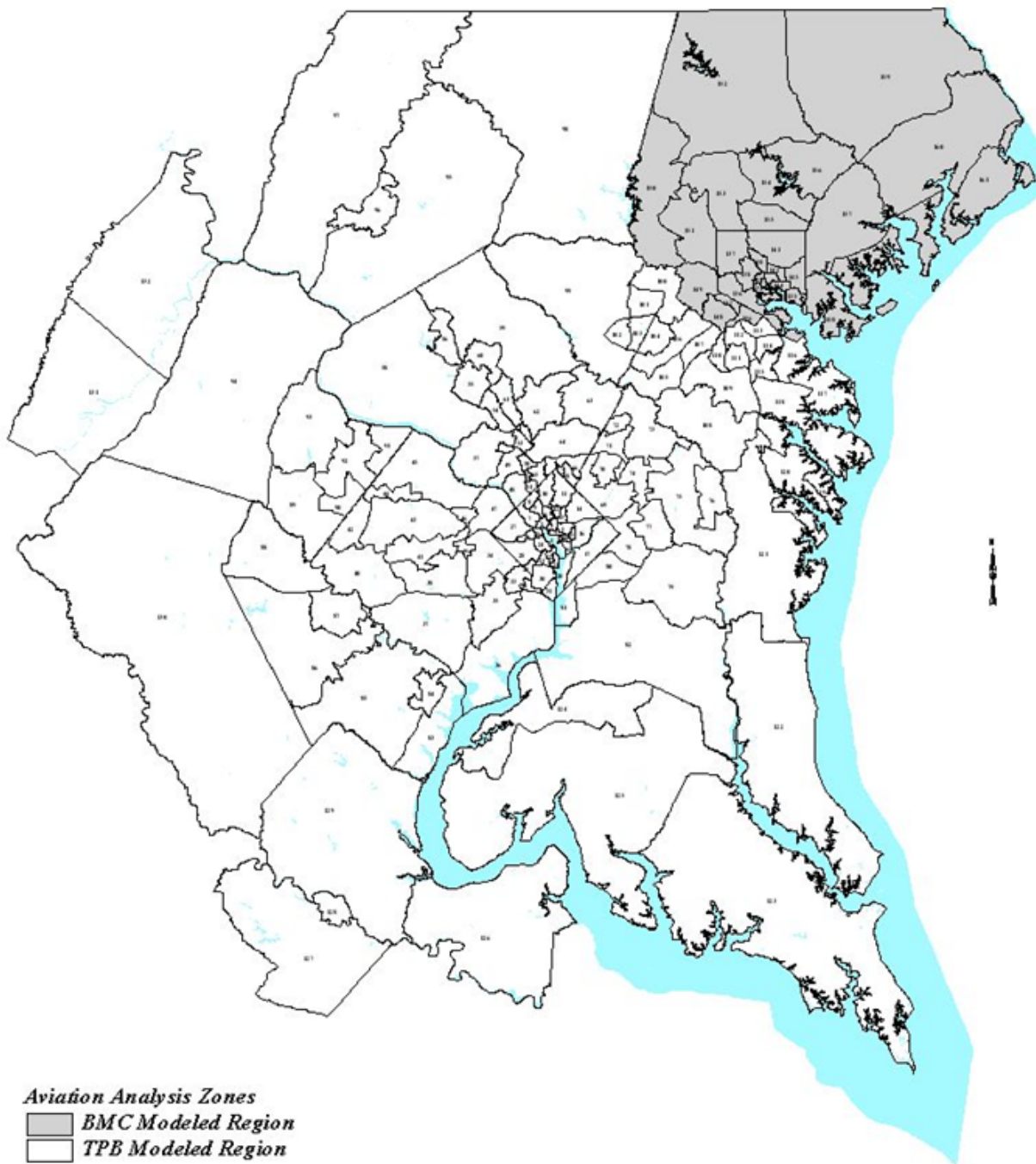




Table A-2
Washington / Baltimore Air System Planning Region
Household by Jurisdiction

Jurisdiction	Households						
	2017	2020	2025	2030	2035	2040	2045
District of Columbia	301,552	319,290	341,019	362,524	380,594	396,233	411,872
Montgomery County	378,101	391,159	405,654	422,320	438,123	450,916	461,916
Prince George's County	323,767	334,268	343,865	355,494	363,283	370,023	376,787
Arlington County	105,421	112,046	117,866	123,857	129,768	135,599	141,843
City of Alexandria	72,087	75,665	80,779	84,118	87,848	92,898	107,082
Fairfax County	420,759	430,344	454,799	482,927	507,647	529,819	549,768
Loudoun County	124,458	137,880	150,085	157,982	163,851	166,952	168,671
Prince William County	163,469	173,125	187,128	197,449	205,984	212,999	218,599
Frederick County	91,373	99,010	107,934	115,066	121,133	126,539	131,167
Howard County	113,955	122,781	131,398	136,343	138,960	139,697	140,434
Anne Arundel County	207,858	213,504	220,565	227,626	234,647	241,542	245,924
Charles County	54,976	60,302	65,529	72,911	78,606	83,426	92,163
Carroll County	62,619	64,226	65,980	67,600	69,162	70,668	72,174
Calvert County	32,298	33,903	35,703	36,946	37,556	37,650	37,912
St. Mary's County	40,930	43,621	47,217	51,768	54,912	57,956	61,060
King George County	9,266	10,495	12,015	13,955	14,258	14,561	14,867
City of Fredericksburg	9,304	9,398	9,506	11,255	11,771	12,287	12,805
Stafford County	48,947	59,453	72,548	76,208	86,384	96,560	106,723
Spotsylvania County	36,205	41,431	47,940	56,169	58,240	60,311	62,383
Fauquier County	24,981	26,444	28,270	30,096	31,922	33,748	35,574
Clarke County	5,640	5,714	5,939	6,166	6,336	6,507	6,680
Jefferson County	21,986	23,459	25,139	26,726	28,298	29,742	31,188
Baltimore City	180,051	181,546	183,222	184,636	185,770	186,117	155,267
Baltimore County	289,400	293,949	300,142	306,024	311,626	316,696	260,186
Harford County	114,439	115,569	118,046	120,155	122,310	124,307	115,985
Total	3,233,842	3,378,582	3,558,288	3,726,321	3,868,989	3,993,753	4,019,030

Source: MWCOG Round 9 Cooperative Forecast and BMC 8A Land Use Data

**Table A-3
Washington / Baltimore Air System Planning Region
Employment by Jurisdiction**

Jurisdiction	Employment						
	2017	2020	2025	2030	2035	2040	2045
District of Columbia	807,858	846,280	895,120	937,854	978,223	1,011,806	1,045,390
Montgomery County	524,813	543,467	572,497	604,516	627,351	653,865	678,753
Prince George's County	340,662	349,048	366,326	375,746	385,542	393,335	402,145
Arlington County	211,109	216,874	223,539	238,379	248,902	260,975	269,064
City of Alexandria	107,009	110,119	121,772	127,266	135,254	142,735	155,095
Fairfax County	699,006	738,884	784,676	827,977	861,586	899,356	931,892
Loudoun County	172,749	195,198	219,395	243,375	262,221	277,790	291,165
Prince William County	178,020	196,408	217,578	237,589	257,083	276,260	293,261
Frederick County	112,923	117,300	123,176	128,627	135,345	141,075	145,526
Howard County	199,383	211,390	226,386	241,386	251,718	260,318	268,918
Anne Arundel County	345,953	361,705	376,074	391,311	404,982	424,052	433,083
Charles County	46,682	46,988	49,227	52,196	55,378	58,762	61,505
Carroll County	73,679	76,113	78,419	80,887	82,991	85,348	87,705
Calvert County	34,564	36,800	39,500	40,900	41,900	43,100	44,300
St. Mary's County	66,876	70,400	74,300	76,500	79,100	81,800	84,500
King George County	18,117	19,371	20,917	22,506	24,092	25,678	27,270
City of Fredericksburg	36,389	39,585	43,590	47,314	50,868	54,425	57,981
Stafford County	53,832	58,506	64,337	70,768	77,573	84,366	91,156
Spotsylvania County	46,046	48,811	52,229	55,768	62,029	68,269	74,534
Fauquier County	24,555	25,799	27,358	28,917	30,476	32,035	33,593
Clarke County	4,233	4,317	4,684	5,051	5,450	5,850	6,250
Jefferson County	17,532	18,675	19,989	21,212	22,434	23,555	24,676
Baltimore City	235,468	240,802	247,202	253,219	258,741	263,659	263,304
Baltimore County	474,864	492,134	500,552	510,842	517,413	528,151	287,602
Harford County	127,238	132,099	142,988	146,960	150,643	154,476	110,954
Total	4,959,560	5,197,073	5,491,831	5,767,066	6,007,295	6,251,041	6,169,622

Source: MWCOG Round 9 Cooperative Forecast and BMC 8A Land Use Data



**Table A-4
Washington / Baltimore Air System Planning Region
Average Weekday Trips 2017 - 2045 - BWI Airport**

Average Weekday Trips								Average Weekday Trips							
AAZ	2017	2020	2025	2030	2035	2040	2045	AAZ	2017	2020	2025	2030	2035	2040	2045
1	14	15	16	16	18	18	20	42	5	6	7	8	9	10	11
2	36	37	40	43	45	48	53	43	30	30	32	34	37	39	44
3	257	280	324	364	392	424	477	44	20	22	25	31	35	41	49
4	137	144	154	165	175	187	207	45	18	17	18	19	20	22	24
5	25	27	29	31	34	37	43	46	37	42	47	57	67	80	94
6	25	25	27	28	30	32	35	47	0	0	0	0	0	0	0
7	10	10	10	11	12	12	13	48	21	21	23	24	27	28	32
8	35	38	43	47	50	54	59	49	24	25	27	29	31	33	36
9	16	16	17	19	20	22	26	50	62	65	72	79	84	91	100
10	71	77	80	84	89	95	105	51	8	9	9	11	11	12	13
11	112	117	127	138	154	165	186	52	66	78	92	99	103	113	124
12	37	40	43	45	49	53	59	53	42	45	54	65	70	78	87
13	122	136	156	172	186	201	226	54	192	208	226	248	278	310	358
14	78	84	96	111	128	143	166	55	220	239	263	287	321	362	413
15	48	52	59	73	86	92	102	56	68	76	80	101	111	119	136
16	226	278	336	388	422	459	519	57	112	117	124	131	141	149	164
17	51	61	68	77	89	100	115	58	308	321	346	372	406	430	472
18	37	39	43	46	51	56	63	59	146	155	163	175	189	202	231
19	11	14	16	20	25	31	38	60	57	59	62	66	71	75	82
20	12	12	12	14	15	16	17	61	118	131	147	169	180	196	228
21	0	0	0	0	0	0	0	62	141	147	154	164	177	188	207
22	45	49	58	68	78	87	104	63	102	106	111	118	129	136	149
23	7	7	7	8	8	9	10	64	384	407	434	478	546	609	690
24	13	14	14	15	18	26	30	65	35	37	43	46	49	54	60
25	14	17	20	22	23	27	31	66	137	143	154	166	177	190	211
26	0	0	0	0	0	0	0	67	144	161	184	201	225	248	275
27	62	65	70	78	82	87	97	68	24	25	27	28	31	32	36
28	172	190	205	223	254	287	334	69	133	138	148	160	171	183	202
29	9	10	10	12	12	12	14	70	108	116	129	146	157	169	190
30	39	41	47	54	60	67	80	71	54	55	59	62	65	69	75
31	29	32	37	41	44	47	54	72	17	20	26	49	62	72	86
32	14	17	18	19	22	27	29	73	358	371	392	417	439	464	512
33	76	80	86	95	104	116	157	74	162	170	183	196	213	227	252
34	143	152	164	180	197	215	243	75	247	255	272	291	306	323	354
35	118	124	135	146	160	173	194	76	150	166	181	192	206	220	242
36	33	35	40	47	52	58	66	77	52	58	64	69	74	81	92
37	19	20	21	22	23	25	27	78	47	50	53	57	61	65	73
38	45	49	52	54	58	61	67	79	62	66	74	84	94	103	120
39	5	6	7	7	8	9	10	80	26	28	31	33	34	38	43
40	112	117	126	136	146	158	176	81	31	44	52	57	62	66	74
41	46	49	52	57	61	66	72	82	54	59	64	68	73	79	87



**Table A-4
Washington / Baltimore Air System Planning Region
Average Weekday Trips 2017 - 2045 - BWI Airport**

Average Weekday Trips							
AAZ	2017	2020	2025	2030	2035	2040	2045
83	35	38	44	48	52	58	65
84	19	21	24	27	31	34	37
85	28	32	34	37	39	41	46
86	42	49	58	69	78	88	101
87	28	30	34	37	40	44	49
88	9	10	11	13	14	15	17
89	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0
91	12	13	13	13	15	15	17
92	21	25	30	36	42	48	57
93	34	38	42	48	52	56	62
94	14	16	18	20	22	25	28
95	207	234	267	308	349	390	445
96	176	197	229	257	282	311	360
97	293	312	350	381	415	449	498
98	808	860	927	1,000	1,076	1,158	1,294
99	187	211	235	255	272	291	323
100	280	305	334	369	388	409	447
101	83	93	101	108	115	120	131
102	33	35	37	39	41	44	48
103	196	225	268	302	340	373	425
104	312	326	348	369	390	412	450
105	215	242	279	324	356	378	419
106	282	302	332	353	373	393	430
107	395	490	607	681	759	842	968
108	447	482	532	584	640	704	784
109	486	540	600	664	734	827	922
110	209	247	297	341	391	427	481
111	52	58	65	71	78	87	98
112	1,503	1,593	1,710	1,872	2,099	2,408	2,704
113	90	95	102	111	119	126	142
114	59	64	69	76	84	89	99
115	194	204	217	231	248	264	294
116	48	56	65	76	87	100	111
117	621	651	695	742	793	847	942
118	217	230	250	271	294	318	354
119	640	666	700	746	793	838	929
120	378	396	423	455	487	522	583
121	175	185	201	217	234	253	280
122	234	256	283	308	330	347	385
123	181	200	224	253	280	308	353

Average Weekday Trips							
AAZ	2017	2020	2025	2030	2035	2040	2045
124	257	287	326	376	421	468	564
125	135	158	183	219	253	288	347
126	0	0	0	0	0	0	0
127	0	0	0	0	0	0	0
128	23	27	30	34	39	44	52
129	15	17	20	24	27	32	38
130	101	112	125	140	156	174	201
131	0	0	0	0	0	0	0
132	32	35	39	44	49	54	63
Sub-Total Interna	16,177	17,527	19,295	21,212	23,199	25,321	28,499
External Trips	9,481	10,049	10,858	11,684	12,568	13,493	13,527
Total Trips	25,658	27,576	30,153	32,896	35,767	38,814	42,026

Note:- Numbers may not add to total due to rounding

- **Internal** originating trips are local originating trips within the MWCOG Planning Area.
- **External** originating trips are trips originating from PA, DE, WV, NJ or external VA and MD



**Table A-5
Washington / Baltimore Air System Planning Region
Average Weekday Trips 2017 - 2045 - DCA Airport**

Average Weekday Trips								Average Weekday Trips							
AAZ	2017	2020	2025	2030	2035	2040	2045	AAZ	2017	2020	2025	2030	2035	2040	2045
1	24	26	28	28	28	28	28	42	13	15	16	16	16	17	17
2	476	481	507	503	500	497	492	43	276	279	295	296	296	295	295
3	2,806	2,960	3,409	3,551	3,601	3,647	3,684	44	181	190	223	251	274	294	317
4	2402	2448	2629	2637	2632	2623	2608	45	147	149	158	158	157	157	155
5	348	353	378	385	395	407	415	46	242	260	296	335	375	420	441
6	697	711	748	745	741	737	732	47	0	0	0	0	0	0	0
7	100	101	105	104	103	102	101	48	94	96	101	102	105	104	104
8	107	109	122	127	127	128	128	49	94	95	103	103	104	103	102
9	156	156	174	180	183	190	194	50	108	109	125	131	129	128	127
10	204	211	221	220	217	218	214	51	75	77	81	87	87	85	84
11	289	296	320	329	342	346	350	52	274	295	356	351	348	344	337
12	343	349	374	379	382	386	390	53	183	189	224	250	256	258	264
13	293	313	351	366	371	377	382	54	154	163	180	185	196	205	212
14	348	370	431	476	519	549	576	55	305	316	345	354	373	406	417
15	237	243	270	291	306	306	305	56	16	17	18	21	21	21	21
16	1032	1213	1466	1597	1658	1709	1755	57	162	164	175	181	181	179	177
17	85	88	98	102	108	113	117	58	129	129	139	141	145	144	141
18	490	510	577	592	605	617	628	59	74	75	80	80	82	82	83
19	295	369	436	501	575	654	730	60	43	43	46	46	45	45	44
20	38	38	41	41	42	42	40	61	177	189	209	222	222	225	238
21	0	0	0	0	0	0	0	62	72	72	76	75	76	76	75
22	1612	1649	1874	2118	2217	2313	2469	63	27	27	29	29	29	29	29
23	299	301	317	314	316	312	320	64	290	300	323	334	359	374	380
24	505	508	533	561	589	614	620	65	59	61	71	71	71	73	72
25	463	526	598	636	645	661	699	66	282	284	304	308	310	311	310
26	398	414	453	465	471	481	483	67	158	172	198	206	214	220	221
27	414	427	453	471	469	469	468	68	102	103	109	108	109	110	109
28	659	703	756	777	833	877	914	69	201	203	217	220	220	219	217
29	231	235	254	254	251	248	245	70	323	335	377	394	401	409	413
30	497	520	646	686	724	767	807	71	19	20	21	21	20	20	20
31	798	833	962	985	1,015	1,015	1,043	72	4	5	7	13	15	16	16
32	193	217	231	241	255	284	285	73	44	44	47	47	47	48	46
33	506	520	561	568	587	614	749	74	28	29	33	33	33	32	32
34	711	737	800	826	848	863	876	75	48	48	50	50	50	49	48
35	673	700	780	820	834	842	852	76	177	191	208	208	209	208	205
36	497	508	576	629	660	694	701	77	47	51	56	58	60	60	61
37	418	423	450	450	448	444	440	78	62	65	90	90	91	91	91
38	316	325	345	344	342	340	336	79	110	112	128	135	145	151	159
39	30	32	35	37	38	39	41	80	290	296	316	326	330	338	352
40	34	34	37	37	38	38	38	81	648	976	1207	1208	1222	1237	1240
41	368	380	420	432	441	446	450	82	219	236	259	262	262	266	265



**Table A-5
Washington / Baltimore Air System Planning Region
Average Weekday Trips 2017 - 2045 - DCA Airport**

AAZ	Average Weekday Trips						
	2017	2020	2025	2030	2035	2040	2045
83	69	74	84	88	90	93	94
84	162	174	198	203	213	222	227
85	153	163	179	181	181	181	179
86	45	48	58	63	66	68	70
87	88	91	102	105	107	110	112
88	35	36	43	46	46	48	48
89	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0
91	16	16	17	17	17	17	16
92	35	40	49	57	63	66	68
93	57	61	67	68	69	69	67
94	0	0	0	0	0	0	0
95	27	30	35	38	40	42	43
96	25	27	31	33	33	35	36
97	33	35	41	41	42	43	43
98	24	25	28	28	28	28	28
99	18	20	22	23	23	23	23
100	0	0	0	0	0	0	0
101	0	0	0	0	0	0	0
102	0	0	0	0	0	0	0
103	7	8	9	10	10	10	10
104	86	87	93	93	93	91	90
105	97	107	123	132	136	135	133
106	13	14	15	15	15	15	14
107	0	0	0	0	0	0	0
108	0	0	0	0	0	0	0
109	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0
111	0	0	0	0	0	0	0
112	10	10	11	11	12	13	13
113	0	0	0	0	0	0	0
114	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0
116	0	0	0	0	0	0	0
117	0	0	0	0	0	0	0
118	0	0	0	0	0	0	0
119	23	23	24	25	25	25	24
120	21	22	23	23	24	24	24
121	29	29	32	32	34	34	34
122	65	69	78	80	80	80	80
123	145	153	171	176	181	185	189

AAZ	Average Weekday Trips						
	2017	2020	2025	2030	2035	2040	2045
124	182	195	221	239	252	263	263
125	73	83	96	108	118	125	136
126	3	4	5	5	5	5	5
127	31	35	43	50	51	53	53
128	59	59	64	74	76	79	81
129	340	397	490	518	572	626	675
130	50	53	60	63	65	68	71
131	0	0	0	0	0	0	0
132	0	0	0	0	0	0	0
Sub-Total Internal	28,390	30,027	33,572	34,950	35,906	36,776	37,611
External Trips	438	427	464	481	489	505	508
Total Trips	28,828	30,454	34,036	35,431	36,405	37,281	38,119

Note:- Numbers may not add to total due to rounding

- **Internal** originating trips are local originating trips within the MWCOG Planning Area.

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



**Table A-6
Washington / Baltimore Air System Planning Region
Average Weekday Trips 2017 - 2045 - IAD Airport**

Average Weekday Trips								Average Weekday Trips							
AAZ	2017	2020	2025	2030	2035	2040	2045	AAZ	2017	2020	2025	2030	2035	2040	2045
1	18	19	20	21	22	23	24	42	484	554	607	646	697	748	822
2	92	92	96	102	107	113	120	43	1247	1247	1310	1393	1488	1582	1686
3	1,012	1,056	1,209	1,336	1,444	1,560	1,683	44	1,462	1,509	1,751	2,054	2,353	2,650	3,031
4	524	530	563	600	638	680	724	45	570	572	607	642	681	724	769
5	106	106	113	122	132	145	158	46	702	761	968	1,195	1,449	1,738	1,982
6	123	125	131	138	147	156	166	47	0	0	0	0	0	0	0
7	18	18	19	20	21	23	24	48	74	74	77	83	91	97	102
8	81	82	88	97	103	110	117	49	148	149	160	171	183	193	203
9	33	34	37	40	44	49	53	50	277	278	297	319	343	377	399
10	69	70	74	78	82	87	92	51	22	22	23	25	27	28	30
11	46	46	50	54	60	65	70	52	58	63	75	78	83	88	94
12	61	61	65	70	76	81	88	53	135	140	163	195	213	231	251
13	74	79	90	99	106	116	124	54	180	190	214	240	271	303	334
14	54	57	66	76	87	97	109	55	141	145	158	172	193	222	244
15	48	49	55	68	79	84	91	56	16	16	17	23	25	27	31
16	156	183	220	254	279	303	331	57	257	260	271	286	309	325	343
17	36	36	40	45	50	56	62	58	222	223	238	257	279	295	311
18	158	165	191	207	226	245	268	59	73	73	76	82	88	94	104
19	58	71	84	103	125	152	181	60	24	24	25	27	29	30	32
20	8	8	9	10	11	11	12	61	210	217	236	258	273	295	334
21	4	4	4	4	4	5	5	62	130	129	135	143	154	164	174
22	159	163	186	222	249	278	316	63	31	31	32	34	37	39	41
23	36	36	37	39	42	45	48	64	186	193	210	231	264	294	318
24	53	52	54	60	65	69	97	65	22	23	26	27	29	33	34
25	123	140	155	174	187	211	228	66	120	119	128	137	146	157	167
26	181	186	201	217	236	258	278	67	98	107	123	135	149	164	176
27	405	412	434	480	508	542	577	68	24	24	26	27	29	31	33
28	417	438	470	512	566	656	731	69	44	43	46	50	54	58	60
29	172	171	184	195	205	217	229	70	119	122	136	152	164	176	190
30	459	477	555	624	699	777	884	71	18	17	18	18	20	21	22
31	68	74	88	96	105	113	129	72	0	0	0	0	0	0	0
32	7	7	8	9	10	11	12	73	45	45	47	50	53	56	59
33	157	161	172	183	202	225	293	74	61	61	66	70	75	81	86
34	266	271	290	318	348	380	412	75	45	45	47	51	53	55	59
35	239	246	271	300	326	351	380	76	159	170	183	193	209	221	232
36	224	223	252	295	330	368	398	77	32	34	37	40	43	46	50
37	71	71	76	80	85	90	95	78	0	0	0	0	0	0	0
38	536	541	570	602	639	677	716	79	15	15	17	20	23	25	29
39	104	111	120	132	146	159	174	80	8	8	9	10	10	11	12
40	345	345	368	396	425	458	492	81	123	159	189	202	219	235	252
41	457	465	511	556	603	650	700	82	41	42	45	49	51	55	58



**Table A-6
Washington / Baltimore Air System Planning Region
Average Weekday Trips 2017 - 2045 - IAD Airport**

AAZ	Average Weekday Trips						
	2017	2020	2025	2030	2035	2040	2045
83	81	85	95	103	116	127	137
84	37	39	45	50	56	62	68
85	140	148	160	172	183	194	206
86	298	323	389	450	507	565	622
87	174	178	197	218	238	258	279
88	127	132	156	177	192	208	223
89	224	293	357	387	413	437	461
90	22	22	25	29	33	36	38
91	222	222	233	246	259	273	287
92	580	659	799	977	1,144	1,290	1,425
93	662	699	775	840	907	969	1,030
94	327	349	396	441	487	533	583
95	60	63	72	83	95	104	115
96	133	144	169	190	208	231	259
97	68	72	81	87	95	102	109
98	29	30	32	34	36	41	43
99	10	11	12	13	14	15	16
100	34	36	40	43	45	48	50
101	11	12	13	14	15	16	16
102	0	0	0	0	0	0	0
103	25	27	32	36	41	44	48
104	106	106	114	120	127	134	140
105	15	17	19	21	23	24	26
106	0	0	0	0	0	0	0
107	14	18	21	24	27	28	30
108	11	11	12	14	15	16	17
109	7	8	8	9	10	11	11
110	0	0	0	0	0	0	0
111	0	0	0	0	0	0	0
112	0	0	0	0	0	0	0
113	0	0	0	0	0	0	0
114	0	0	0	0	0	0	0
115	16	16	17	18	20	21	22
116	0	0	0	0	0	0	0
117	0	0	0	0	0	0	0
118	11	11	12	13	14	15	16
119	25	25	26	27	30	31	34
120	25	26	27	29	31	33	36
121	7	7	7	8	9	9	10
122	22	24	26	29	30	32	34
123	35	37	41	47	52	57	62
124	16	17	19	22	25	28	32
125	22	24	28	33	38	44	51
126	0	0	0	0	0	0	0
127	42	47	58	70	77	84	91
128	30	30	32	39	43	48	52
129	139	166	210	233	277	325	376
130	153	161	180	201	224	248	275
131	57	57	62	67	73	79	85
132	74	79	89	98	110	121	133
Sub-Total Internal	18,972	19,814	22,105	24,531	27,035	29,626	32,393
External Trips	1,046	1,093	1,207	1,327	1,463	1,620	1,698
Total Trips	20,018	20,907	23,312	25,858	28,498	31,246	34,091

Note:- Numbers may not add to total due to rounding
- **Internal** originating trips are local originating trips within the MWCOG Planning Area.
- **External** originating trips are trips originating from PA, DE, WV, NJ or external VA and MD





**2017 Washington - Baltimore Regional Air Passenger Survey
 Average Weekday Observed 2017 Trips**

File - I:\GAFU_19\ATeam\ATeam_trips17_GAFU19.dat

Columns		Total		
		MWCOG AAZ: 1- 132	BMC AAZ: 133 - 161	Total AAZ: 1- 161
001 - 003	Airport			
005 - 007	AAZ			
010 - 015	Resident HB Trips	25,126	3,229	28,355
018 - 023	Resident Non-HB Trips	3,823	295	4,118
026 - 031	Non-Resident HB Trips	12,006	1,162	13,168
034 - 039	Non-Resident Non-HB Trips	22,615	1,692	24,307
	Total	63,570	6,378	69,948
042 - 047	Total HB Trips	37,132	4,391	41,523
050 - 055	Total Non-HB Trips	26,438	1,987	28,425
	Total	63,570	6,378	69,948
058 - 063	Auto Driver HB Trips	14,683	1,778	16,461
066 - 071	Auto Passenger HB Trips	19,074	2,416	21,490
074 - 079	Transit HB Trips	2,402	112	2,514
082 - 087	Airport Transit HB Trips	555	68	623
090 - 095	Other HB Trips	464	25	489
098 - 103	Auto Driver Non-HB Trips	8,363	744	9,107
106 - 111	Auto Passenger Non-HB Trips	10,914	977	11,891
114 - 119	Transit Non-HB Trips	3,111	71	3,182
122 - 127	Airport Transit Non-HB Trips	3,333	131	3,464
130 - 135	Other Non-HB Trips	776	74	850
	Total	63,675	6,396	70,071

Source:- 2017 Washington-Baltimore Regional Air Passenger Survey

Note :- Totals may not add due to rounding