

Exogenous travel inputs to the Version 2.3 travel model

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What is TPB staff's definition of exogenous travel?

1. Non-resident travel within the study area
 - ▣ External (I-X, X-I) auto and truck trips
 - ▣ Through (X-X) auto and truck trips
 - ▣ Non-resident visitor-tourist, taxi and school trips
2. Resident travel that is not well sampled by the Household Travel Survey (HTS)
 - ▣ Resident tourist, taxi and school trips
 - ▣ Airport auto passenger trips

Exogenous travel must be accounted for to achieve a good match between est. & obs. VMT



Formulation of exogenous travel

- Exogenous travel forecasts have improved in recent years with respect to:
 - Keeping base-year traffic counts at external stations current
 - Keeping base-year airport travel patterns current
 - Evaluating travel growth assumptions for individual markets

- Exogenous travel files are normally reviewed and updated when new land activity forecasts are released



Exogenous trip filenames

File Description	Year-Specific Filename	Generic Filename
Commercial Vehicle, Medium Truck, Heavy Truck Through trip tables (Three tables in the file)	XXCVT<year>.vtt	XXCVT.VTT
Auto through trip table (one trip table in file)	XXAUT<year>.vtt	XXAUT.VTT
External and through zonal person/vehicle trip-ends	EXT_PsAs<year>.dbf	EXT_PsAs .dbf
Visitor/tourist auto driver trips (one trip table in the file)	VISI<year>ADR_3722TAZ.VTT	VISI.ADR
Taxi auto driver trips (one trip table in the file)	TAXI<Year>ADR_3722TAZ.VTT	TAXI.ADR
School auto driver trips (one trip table in the file)	SCHL<year>ADR_3722TAZ.VTT	SCHL.ADR
Airport Passenger auto driver trips (one trip table in the file)	APX<year>ADR.VTT	AIRPAX.ADR



Modal specifications of exogenous trips in the Version 2.3 Travel Model

Trip Type	Modes Addressed	Modes Not Addressed
Through	Auto Driver, Trucks	Auto Passenger, Transit, Non-motorized
External	Auto Driver, Trucks,	Transit, Non-motorized
	Auto Passenger	
Visitor-Tourist/Taxi/School	Auto Driver	Auto Passenger, Transit, Non-motorized
Airport Passenger	Auto Driver	Auto Passenger, Transit, Non-motorized

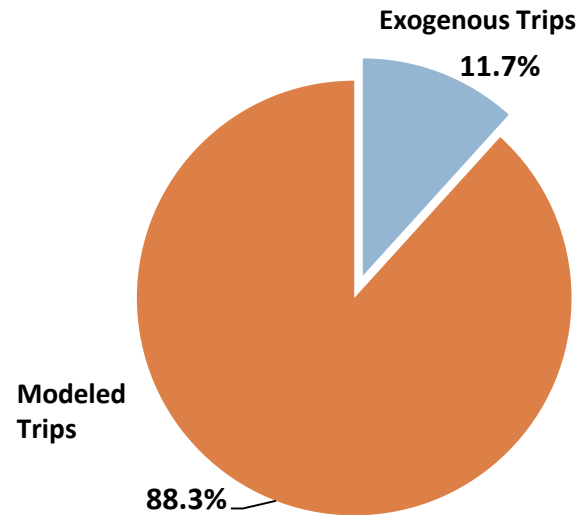


Model *still* does not explicitly account for the full universe of travel

- Example markets not explicitly addressed by the travel model:
 - ▣ Non-resident NHB auto travel
 - ▣ Auto access-to-transit trips *are* estimated but *are not* assigned to the network
 - ▣ Vehicular travel associated with military bases or other special generators
- VMT associated with these markets is relatively small and not critical for regional planning work
- Missing travel is ultimately accounted for in the modeled Non-Home-Based (NHB) purposes



Distribution of 2010 exogenous & modeled vehicle trips in the modeled study area

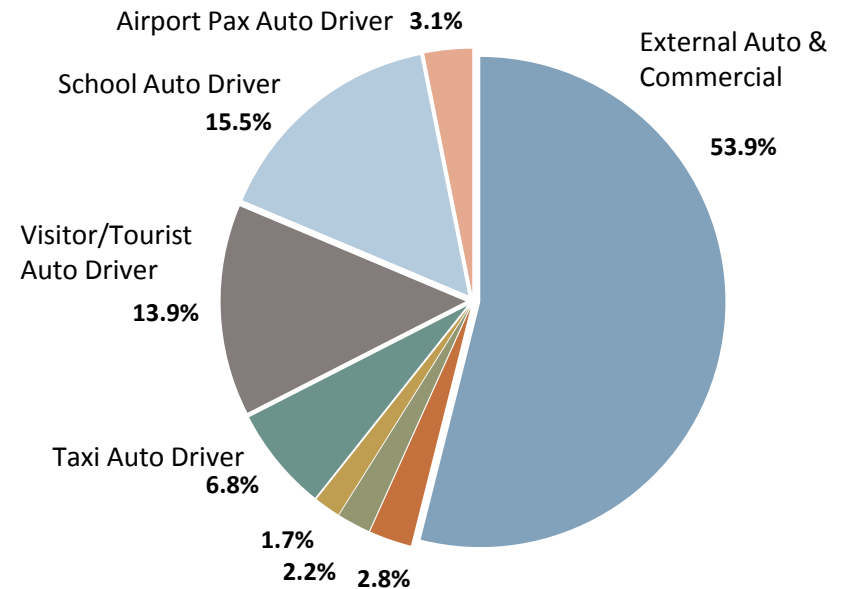


	2010	
	Vehicle Trips	Pct.
Exogenous Vehicle Trips	1,868,022	11.7%
Modeled Auto & Truck	14,066,441	88.3%
Total Vehicle Trips	15,934,463	100.0%



Distribution of 2010 exogenous vehicle trips by type

	2010	
	Vehicle Trips	Pct.
External Auto & Com.Veh.	1,007,130	53.9%
External Truck	52,493	2.8%
Through Auto & Comm. Veh.	41,142	2.2%
Through Truck	32,457	1.7%
Taxi Auto Driver	127,348	6.8%
Visitor/Tourist Auto Driver	258,928	13.9%
School Auto Driver	289,754	15.5%
Airport Passenger Auto Driver	58,770	3.1%
Total Exogenous Trips	1,868,022	100.0%

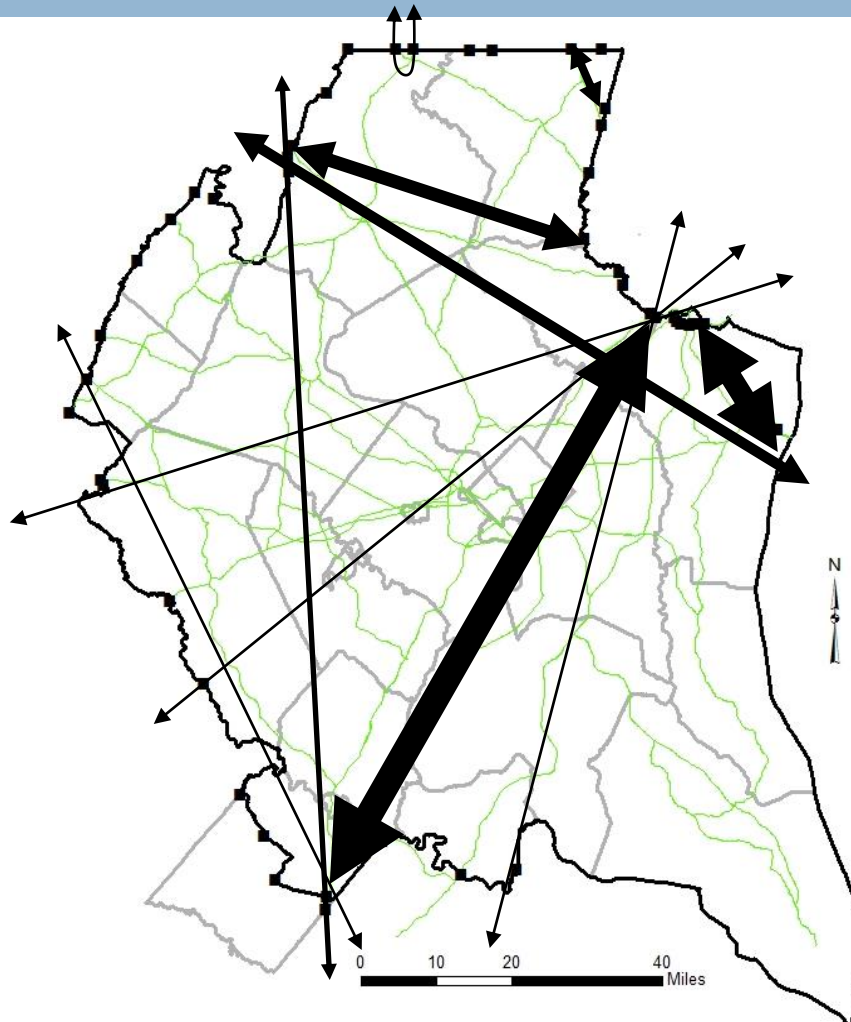


Preparing exogenous trips forecasts: External and through trips

- Procedure:
 - Base-year external station counts checked/updated
 - Counts are factored on a station group basis using reasonable growth rates
 - Counts are sequentially apportioned by:
 - vehicle type (auto, commercial vehicle, truck)
 - movement type (XX,IX,XI)
 - purpose... using static “observed” probabilities developed by station as per the 1994 External Auto Survey
 - A “Fratar” process is used to construct through (X-X) trip tables using forecasted “controls” at each station and existing “seed” trip patterns



Principal through (X-X) auto movements



Largest auto through trip flows exist on:

- I-95 North/South
- Bay Bridge to Baltimore
- I-70 West/East

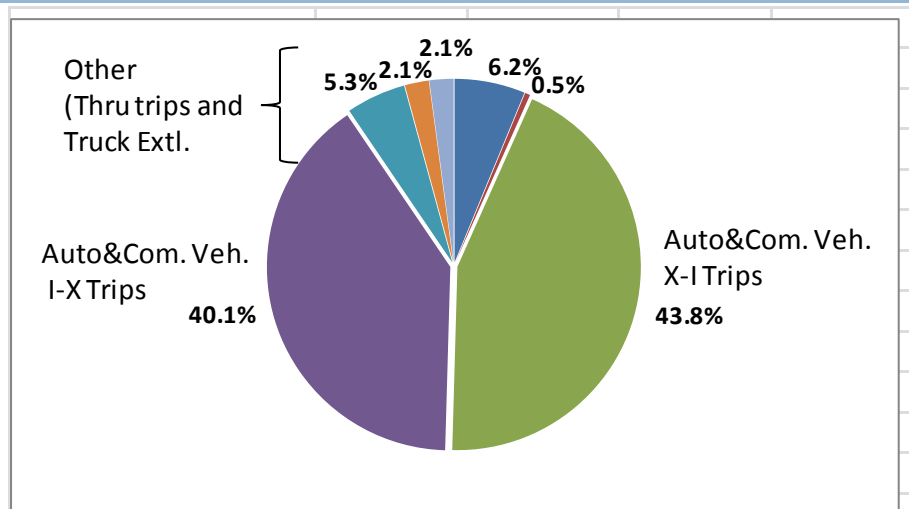
Annual traffic growth rates at external stations

External Group	Extl. Stations	Forecasting Period		
		2010 to 2020	2020 to 2030	2030 to 2040
Va/WVa	3976 to 3695	2.50%	2.50%	1.50%
MD / North	3696 to 3704	1.50%	1.50%	0.50%
MD / Baltimore	3705 to 3722	1.10%	1.00%	0.50%

- Higher growth rates assumed for external stations in developing areas
- The growth rates reflect a slowing of external traffic growth in the “out-years” (beyond 2030)
- Round 8.2 land activity (HH & job) growth between 2010 and 2040 roughly implies about a 1% average annual growth rate



Distribution of 2010 External/Through Trips by Vehicle Type and Movement Type



	2010		2040	
	Trips	Pct.	Trips	Pct.
Auto Thru Trip-Ends	77,320	6.2%	115,287	6.3%
CV Thru Trip-Ends	5,691	0.5%	8,405	0.5%
Auto XI Trips	543,999	43.8%	796,794	43.9%
Auto IX Trips	497,781	40.1%	724,769	39.9%
Truck Thru Trip Ends	65,326	5.3%	98,050	5.4%
Truck XI Trips	26,354	2.1%	36,878	2.0%
Truck IX Trips	26,354	2.1%	36,878	2.0%
Total Ext./Thru Trips	1,242,825	100.0%	1,817,061	100.0%

Source: I:\ateam\mod_inputs\externals\2013_03_29_Rnd82_3722_V2.3\ExtAutTrk_CV.txt



Preparing exogenous trips forecasts: Airport passenger auto driver trips

- Procedure:
 - Most currently available Regional Air Passenger Survey file is obtained; most recent FAA operations forecasts are obtained for each airport
 - HB and NHB air passenger auto driver trips (one-way) trip tables built by airport at the Aviation Analysis Zone (AAZ) level
 - Zonal Cooperative land activity forecasts converted to the AAZ geography
 - A “Fratar” process is used to construct forecasted trips using the survey trips tables as a seed:
 - Airport-end growth: Based on FAA operations forecasts
 - Non-AP end/HB trip growth: Based on HH growth in
 - Non-AP end/NHB trip growth: Based on job growth
 - AAZ level trip tables are “split” to TAZ level trip tables using land use proration. One-way trip tables are converted into daily trip tables

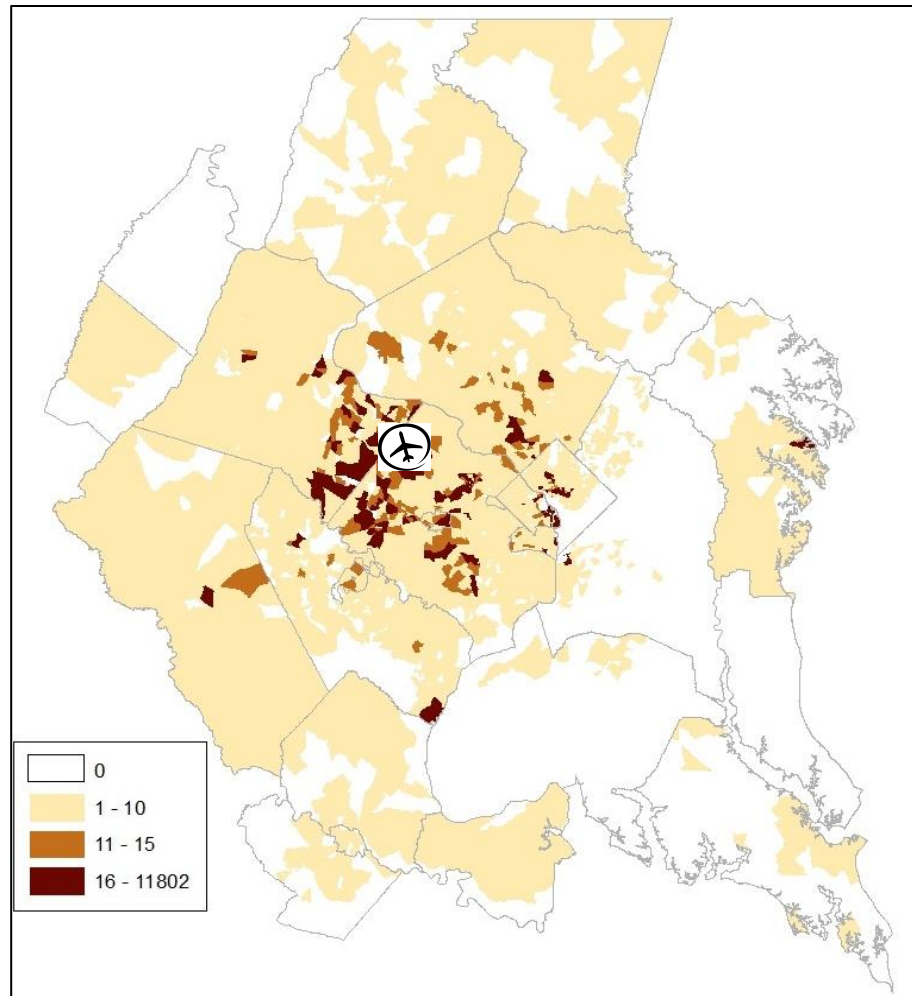


Base-year and future-year airport passenger auto driver trips

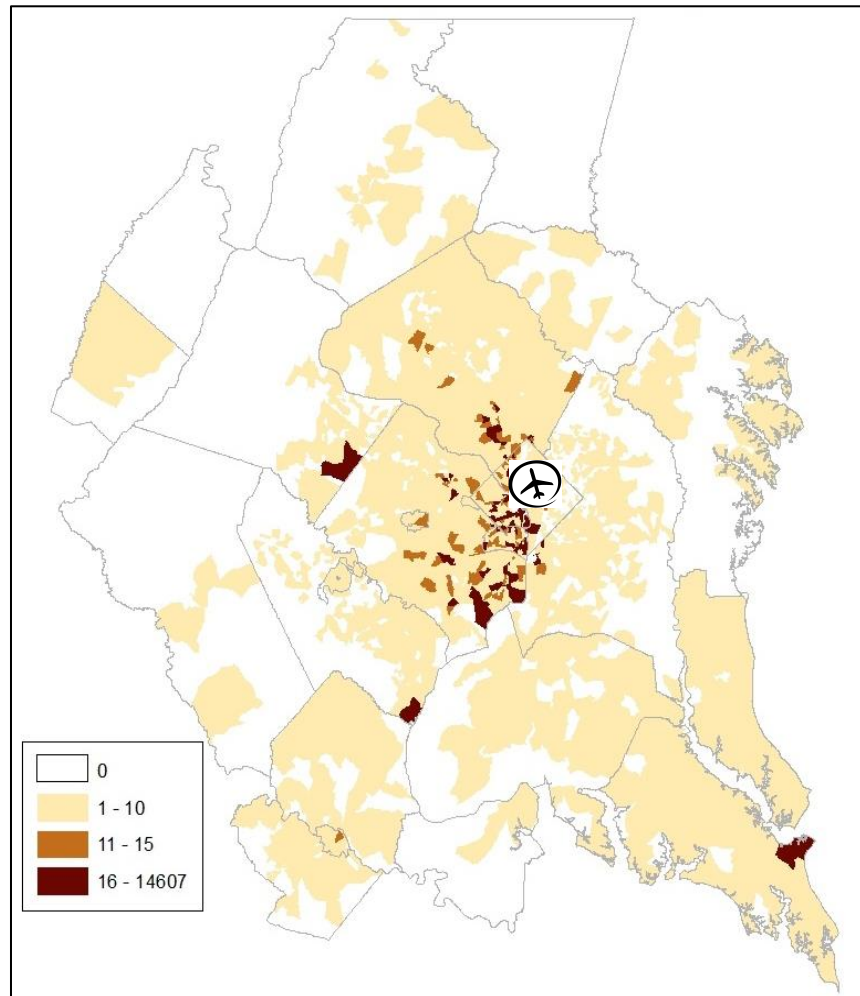
Airport / Year	2009	2040	ratio (2040/2009)
National	25,647	37,474	1.46
Dulles	23,278	49,791	2.14
BWI	18,428	39,092	2.12
TOTAL	67,305	126,273	1.88



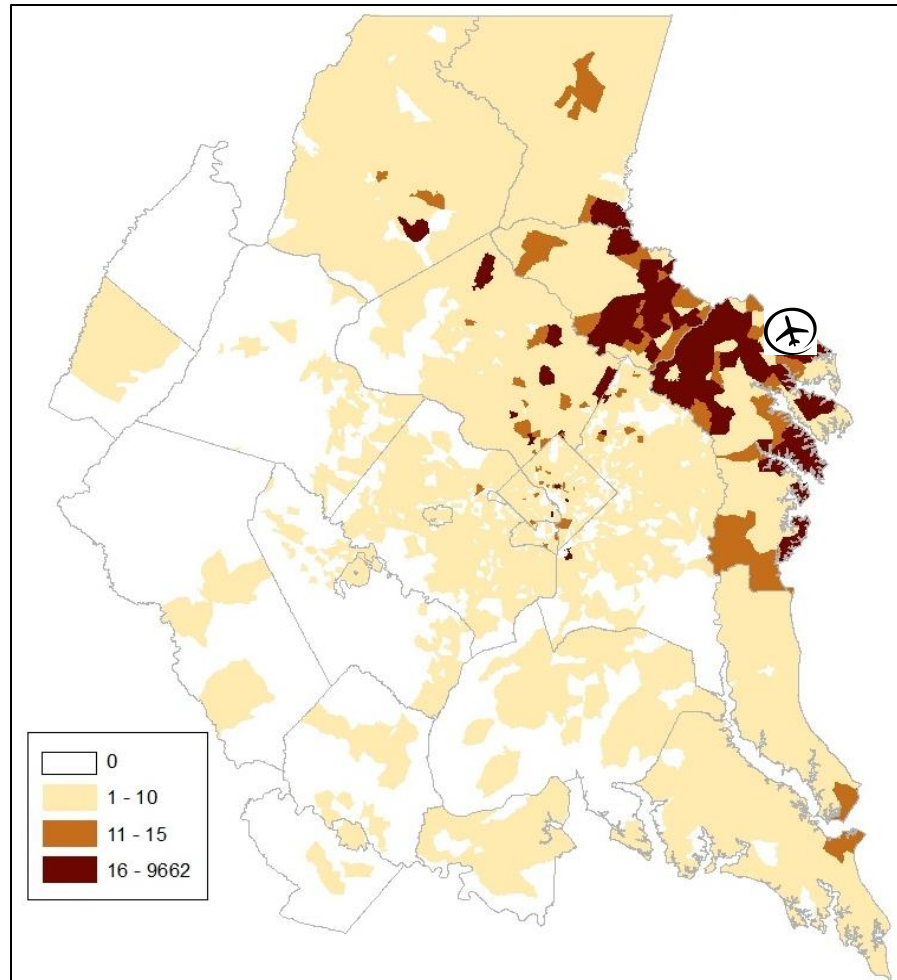
2015 auto driver trip origins to Dulles Airport



2015 auto driver trip origins to Reagan National Airport



2015 auto driver trip origins to BWI Airport



Preparing exogenous trips forecasts: Visitor-Tourist/Taxi/School

- Procedure:
 - Existing “observed” survey patterns (trip tables) obtained
 - Existing trip tables are globally factored through time
 - Global growth in taxi and visitor-tourist trips directly related to global job growth in the Coop. Forecasts
 - Global growth in school trips directly related to global HH growth in the Coop. Forecasts

- The existing survey patterns are dated and need to be updated



Conclusions

- TPB staff acknowledges that exogenous travel is a significant input to the travel model
- TPB staff is about to revisit these inputs with the anticipated release of the Round 8.3 Coop. Forecasts
- We recognize a need to improve how exogenous trips are currently addressed, through:
 - Emerging data opportunities
 - Enhanced forecasting methods for exogenous markets
- Resources dedicated to improving exogenous travel forecasts must be weighed against other competing model improvement needs

