Status report on COG/TPB's travel demand modeling improvement efforts:

Overview and status of COG/TPB staff work

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July 22, 2016

FY 2016 Task Orders

T.O. #	Name	Responsibility	Date Authorized	Budget
16.1	Attend meetings/ad-hoc requests	CS	6/23/15	$50k
16.2	Advice and Testing	CS & TPB Staff	12/28/15	$60k
16.3	Managed Lanes	CS	2/10/16	$50k
16.4	Non-Motorized Model Enhancements	CS	2/10/16	$40k
16.5	Mode Choice Model Enhancements	CS	2/10/16	$85k
	Total:			$285k

T.O. 16.2 Advice & Testing: Tasks

(TPB staff-assigned tasks in bold)

1. Version Control and Bug-Tracking Software
2. **Non-Resident Trips Update**
3. **Screenlines/Cutlines**
4. Speed/Travel Time Validation Improvement
5. **Migration of Transit Path-Building Software**
6. **Perform Transit Network Coding Enhancements**
7. **Include Transit Drive-Access Trips into Highway Assignment**
8. **Add External-to-Internal Transit Trips**
9. Revise Bus Speed Linkage to Highway Speeds
10. **Migration of Mode Choice Application Software**
11. **Walk-Access Script Enhancement**
12. Develop Parcel-Level Development Database
13. Develop Census and Household Travel Survey Database
14. Prepare Non-Motorized GIS Database

Topics of today's discussion

- TPB staff progress on non-resident travel
- CS will address progress on their assigned activities per T.O.s 16.2 -16.5

16.2 #2 Non-Resident (NR) Trip Update

- Objective: To update our existing internal (I-I) Non-Resident (NR) forecasting process

- Data source: Cellular O-D data obtained in FY 2014
  - Data allows NR travel to be distinguished

airsage
The power of where and when

Who are non-resident travelers?

- Numerous and diverse sub-markets:
  - Visitors/tourists
  - Business travelers
  - Military
  - Temporary workers
  - College students
  - External Commuters

These special markets are typically:

- "swept under the NHB rug"; or
- treated as special generators on an ad-hoc basis

Non-resident trips are problematic with regional models

- The market is small relative to resident travel
- Some of the market is seasonal in nature
- Typical NR travel can't be effectively explained by Cooperative Forecast land activity
- Collecting NR survey data is difficult/impossible
- NR travel is associated with generator locations, but it is also pervasive throughout the system

Consequences of ignoring NR travel

- Inability for the model to handle travel activity that is unique to our region: Tourism & business travelers
- Poor highway modeling performance in areas around NR generators
- Poor transit model performance for stations serving NR markets

NR Travel: What is needed?

- A technique that addresses both:
  - the “special generator” aspect of NR travel
  - the “non-special generator” aspect of NR travel
- A simple technique that is can be integrated into the regional model

Opportunity: AirSage Data

Advantages:

- Large sample size
- Large geographic trip capture
- Detects both resident and non-resident O-D movements

But…

- Mode unknown
- Weak correlation with land use at TAZ level:

  Aggregation is your friend

Overview of AirSage Trips by Purpose

Purpose	Internal 2014 AirSage Trips	Pct.
HBW	5,546,469	27.9%
HBNW	10,324,649	52.0%
NHW	1,667,905	8.4%
NHO	1,411,836	7.1%
NRES	893,883	4.5%
Total:	19,844,743	100.0%

Features of AirSage NR Trips

- About 4.5% of total cellular trips
- Exhibit a typical NHB Trip pattern:

  Zonal trip origins are equal to trip destinations
- Regional NR trip rates for modeled area:

  0.34 NR Trips/HH

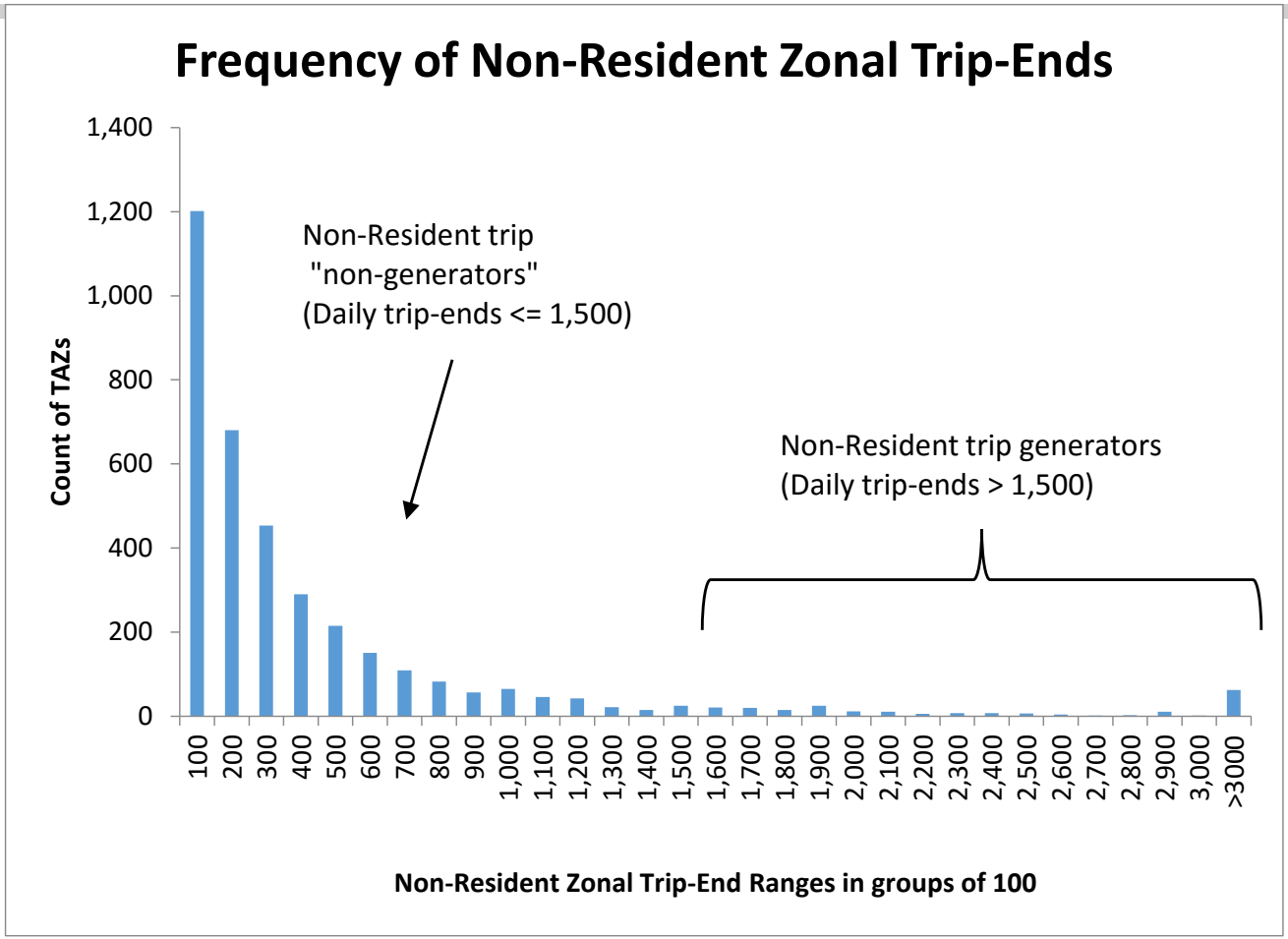
  0.22 NR Trips/Job

Note: In our analysis, airport-related records were removed from the file

Why?
Resident and Non-Resident Air passenger trips are already addressed

Total NR Trips:		893,883
Total NR Trips Excluding Airports:		806,516
Difference:		87,367

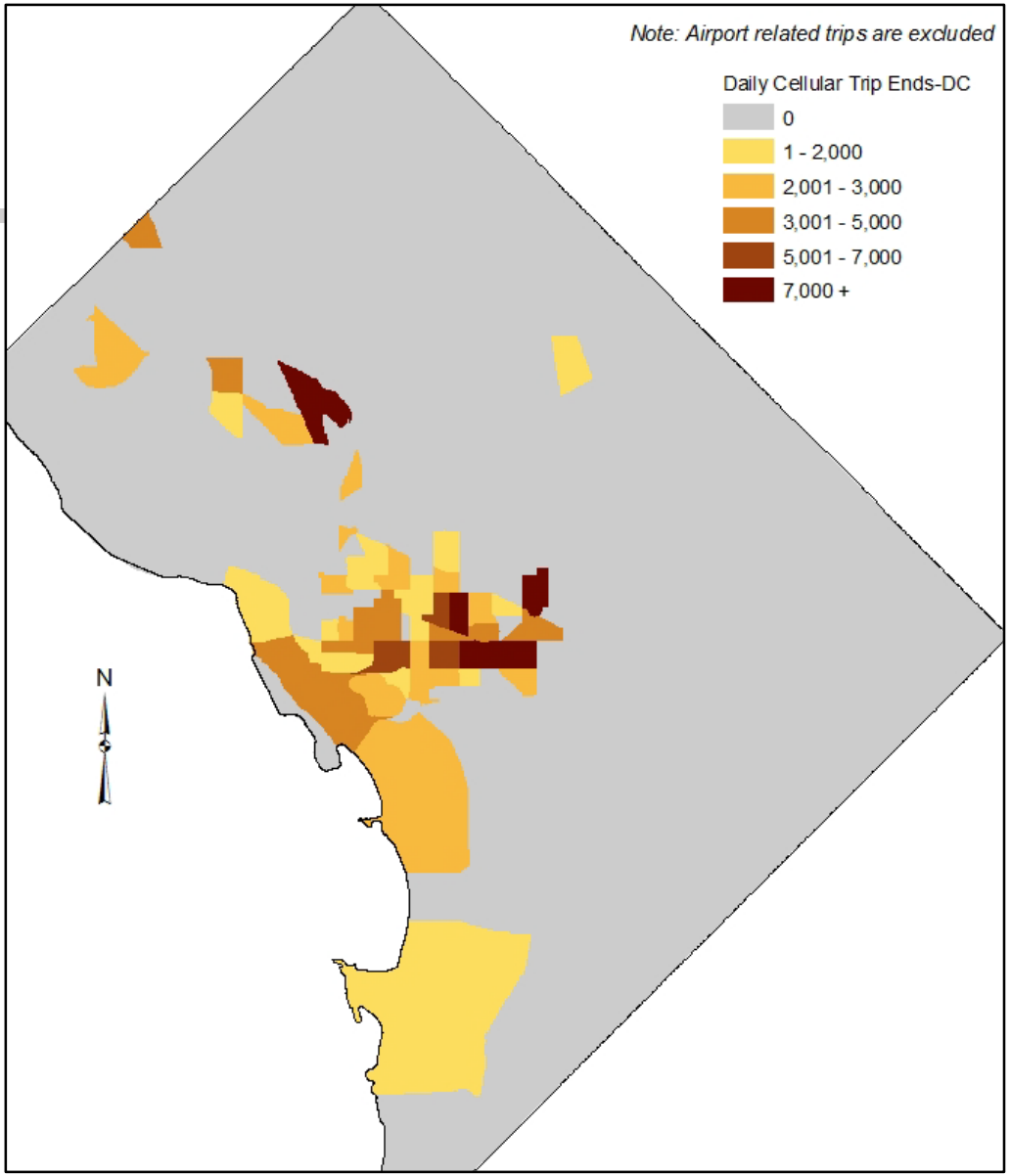
We have chosen a threshold of 1,500 trip-ends as distinguishing a TAZ as being a **NR generator** (>1,500) or a **NR non-generator** (<= 1,500).



NR Generator TAZs represent 6% of all internal TAZs but 40% of NR Trips

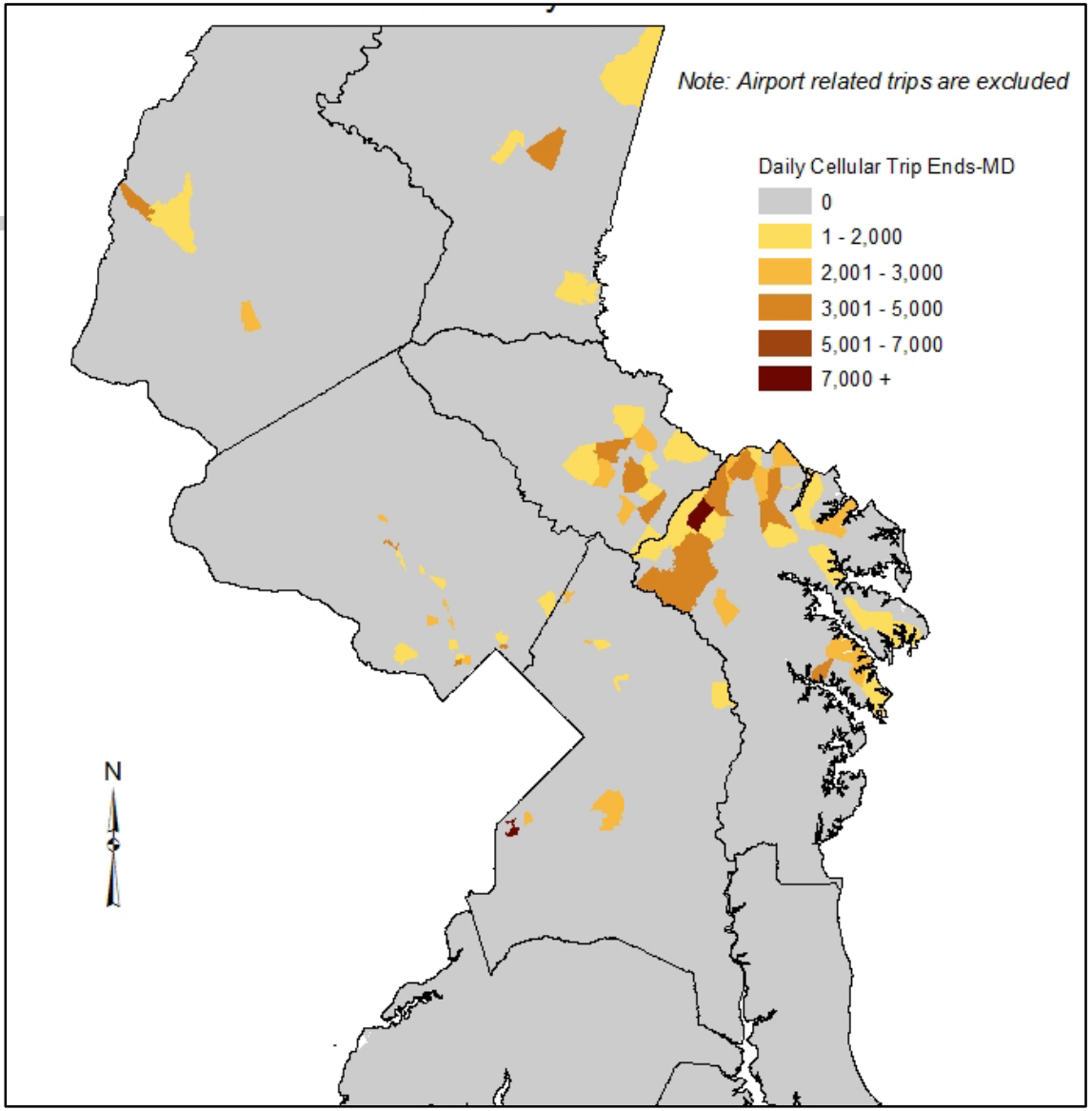
	Trip-Ends	T-E Pct.	# of TAZs	Pct. Of TAZs
Non-Res. Non-Generators	970,301	60%	3,456	94.0%
Non-Res. Generators	642,731	40%	219	6.0%
Total Non-Residents	1,613,032	100%	3,675	100.0%

Major generators of non-resident travel in the District of Columbia



Includes:
-National Mall
-National Zoo
-Federal Center area
-Gallery Place area
-Union Station

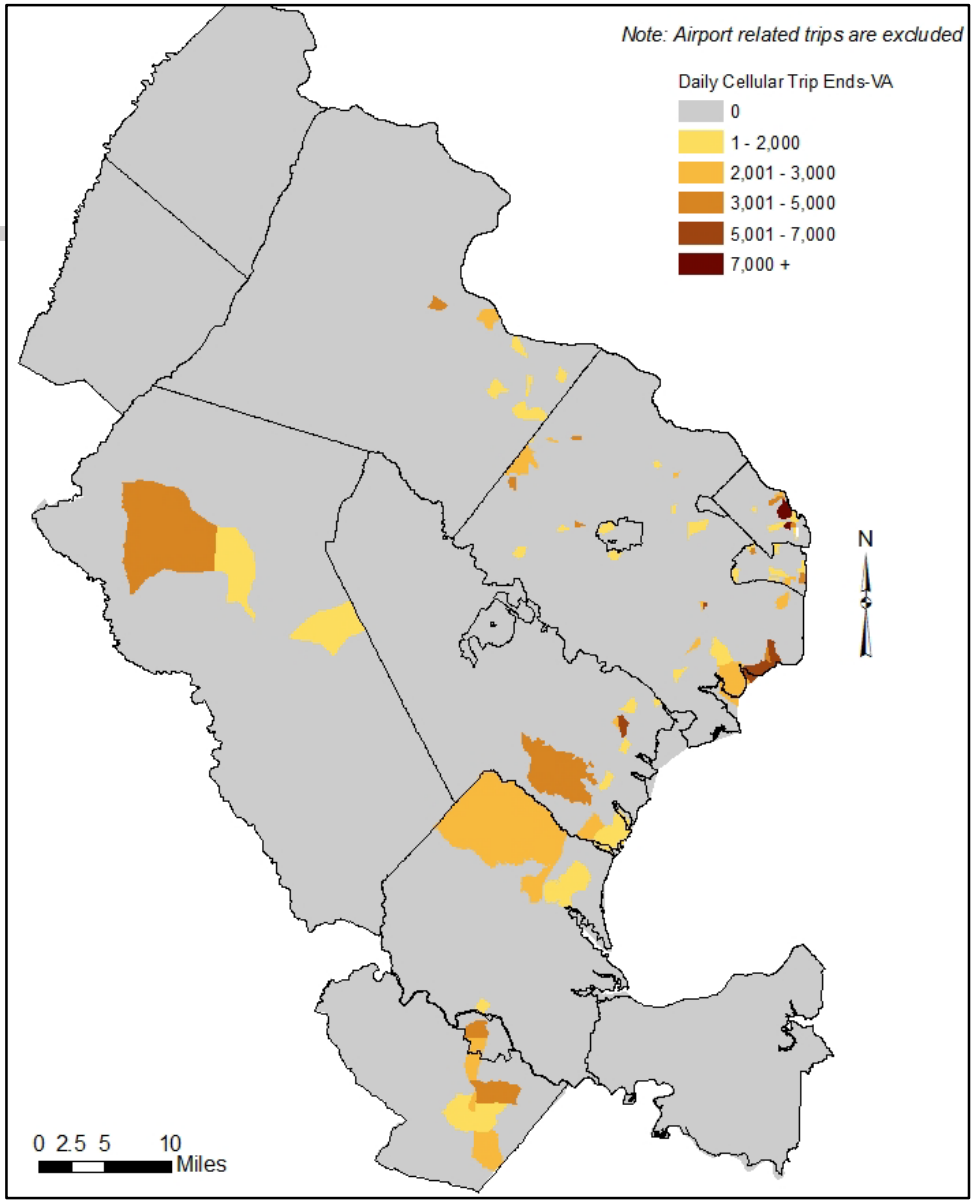
Major generators of non-resident travel in Maryland



Includes:
-National Harbor area
-Maryland Live Casino
-Hotels nearby BWI Airport

Major generators of non-resident travel in Virginia

Includes:
- Crystal City Hotels
- Arlington Cemetery
- Ft. Myer
- Potomac Mills Shopping Center
- Mt. Vernon



NR Generator TAZs by Activity Type

Location Descriptions	Trip-Ends	Pct.	No. of TAZs	Pct.
Tourist/Recreation Areas	205,610	32.0%	61	27.9%
Government/Business Locations	171,429	26.7%	66	30.1%
Military installations	74,279	11.6%	24	11.0%
University	60,052	9.3%	21	9.6%
Hotel Areas	51,366	8.0%	15	6.8%
Malls/Shopping	41,810	6.5%	14	6.4%
Hospitals	23,170	3.6%	11	5.0%
Other	15,016	2.3%	7	3.2%
Total	642,731	100.0%	219	100.0%

NR forecasting approach:

Three basic steps:

1. Estimate non-generator NR zonal trip table to establish a “Base” O-D trip table pattern
2. Adjust Base O-D trip table to reflect NR special generator zones
3. “Split” resulting trips among modes at TAZ level using “freeze-dried” NHO percentages from the travel model

NR Approach- More Detailed

1. Develop NR **non-generator** trip ends at the **district level** of analysis
   Non-Generator NR Trip-Ends = (0.25*HH) + (0.29*Retail_Emp) + (0.03*Non-Retail_Emp)
2. Develop estimated **non-generator** NR trip table at the **district level** of analysis
   Use AirSage Total NR trips as "seed" matrix
3. Split **district level non-generator** NR trips from Step 2. to **zone level** trip table
   Use land activity proration
4. Estimate **generator** NR trips at the **zone level** based on regional activity
   e.g., NR trips to the mall are = 0.3 trip-ends per thousand HHs in the region
5. Develop **total** NR trip table by adjusting **non-generator** trips to reflect **generators**
   Adjust trip-ends of non-gen. NR trips to reflect estimated generator trips
6. Apply **freeze-dried NHO percentages** from the travel model on an i/j basis to allocate **total** NR trips to NR trips **by mode**

Concluding Comments

- Work is continuing
- Work will be combined with other related activities
  - Update of External travel
  - Development of external transit trips
- Improving our treatment of non-resident travel will not affect regional performance, but will serve to improve performance in particular sub-areas of the region