Gen3 Model: Status Report From RSG

Metropolitan Washington Council of Governments Travel Forecasting Subcommittee
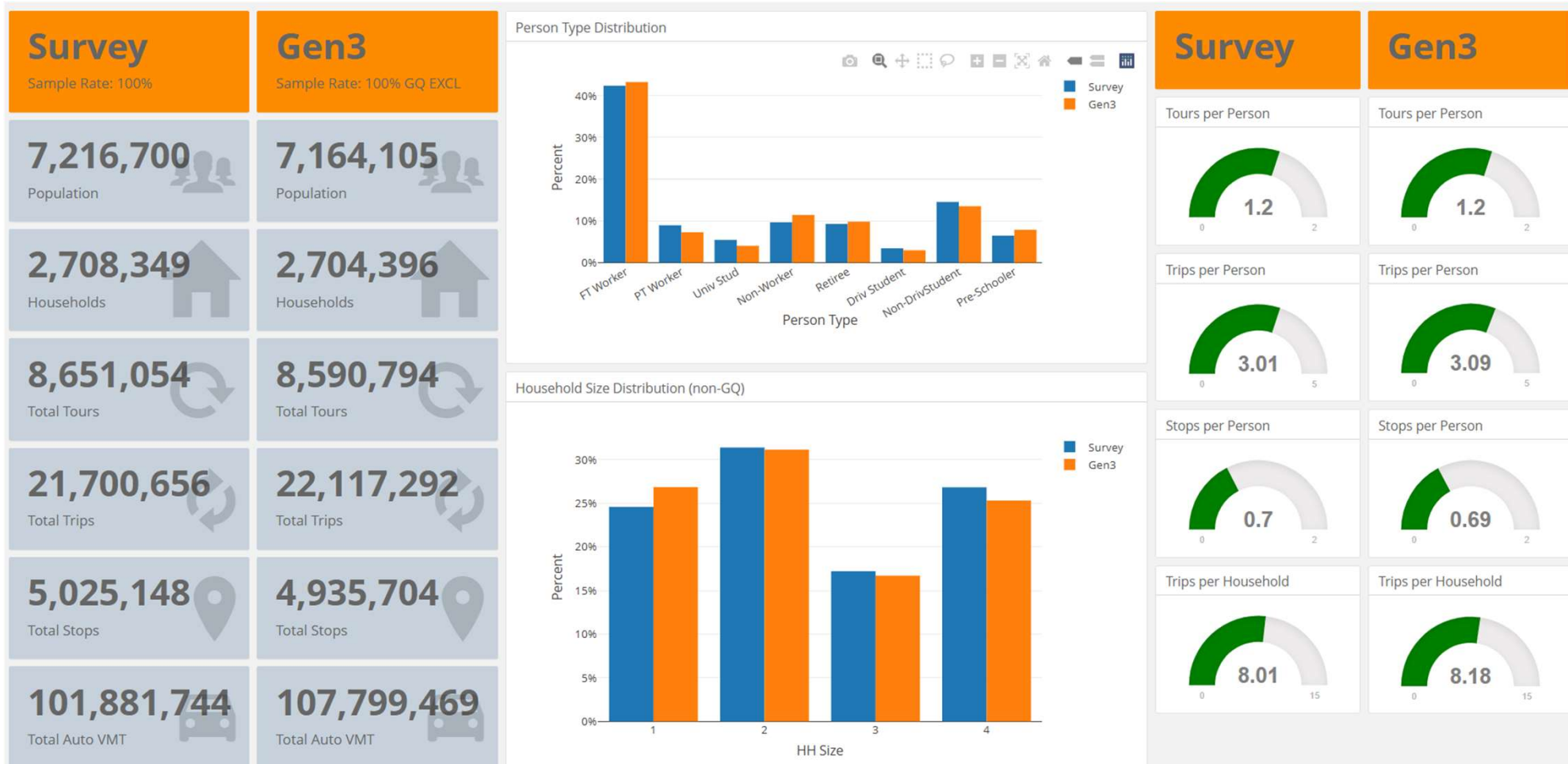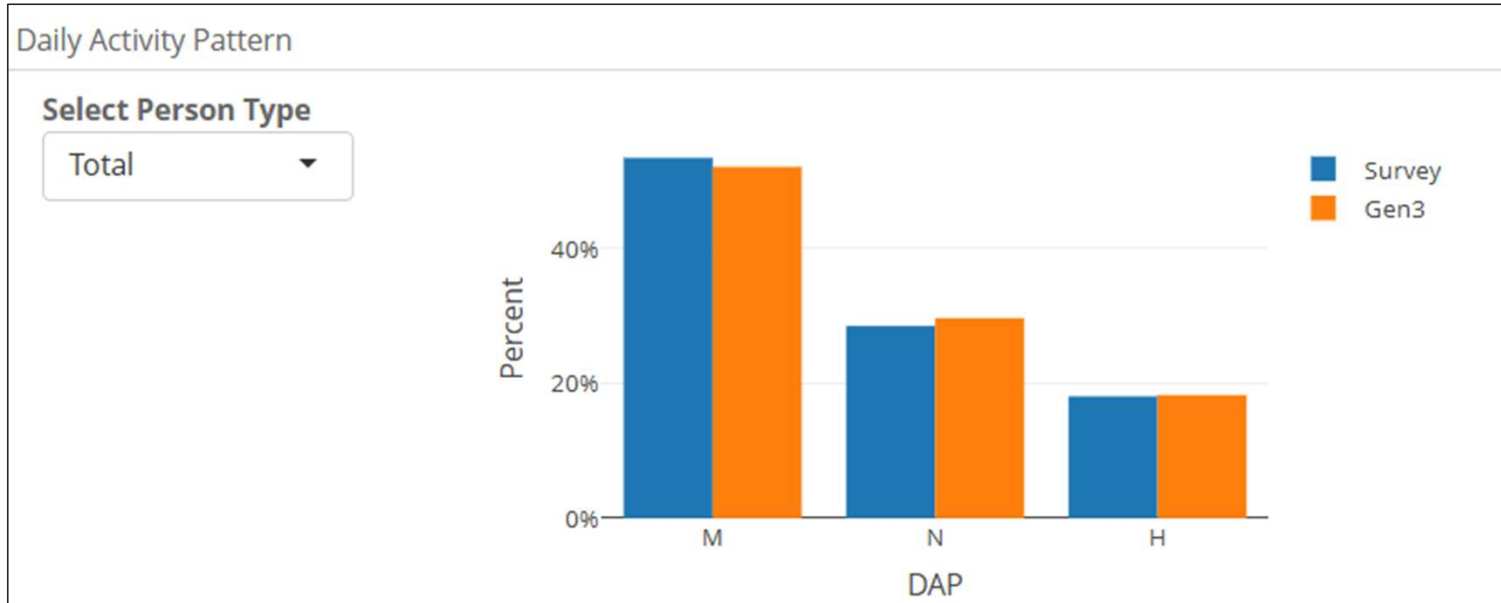
May 16, 2025

Background

- MWCOG staff have been testing and summarizing Gen3 Model results since fall 2024

- MWCOG and RSG have made minor bug fixes and updates over that time
  - Update to latest ActivitySim version
  - Code fixes
  - Network changes

- Staff asked RSG to address a few key shortcomings in the previous calibration and validation
  - Household trip rate under-estimation compared to 2017/2018 Region Travel Survey (RTS)
  - Somewhat higher SOV share and lower HOV shares compared to RTS
  - Too few trips in midday and evening periods compared to RTS
  - Truck and Commercial Vehicle VMT increase compared to Gen2.4/Ver 2.4 Model

RSG.

Calibration Overview

Survey	Gen3
Sample Rate: 100%	Sample Rate: 100% GQ EXCL
7,216,700 Population	**7,164,105** Population
2,708,349 Households	**2,704,396** Households
8,651,054 Total Tours	**8,590,794** Total Tours
21,700,656 Total Trips	**22,117,292** Total Trips
5,025,148 Total Stops	**4,935,704** Total Stops
101,881,744 Total Auto VMT	**107,799,469** Total Auto VMT

Person Type Distribution

Household Size Distribution (non-GQ)

Survey	Gen3
Tours per Person **1.2**	Tours per Person **1.2**
Trips per Person **3.01**	Trips per Person **3.09**
Stops per Person **0.7**	Stops per Person **0.69**
Trips per Household **8.01**	Trips per Household **8.18**

RSG®

3

Daily Activity Pattern Comparison

M = Mandatory (work or school),   N = Non-mandatory,   H = Home

Slight adjustments to daily activity pattern model for certain person types

RSG.

# Total Tour Rate (All Tours) By Person Type Comparison
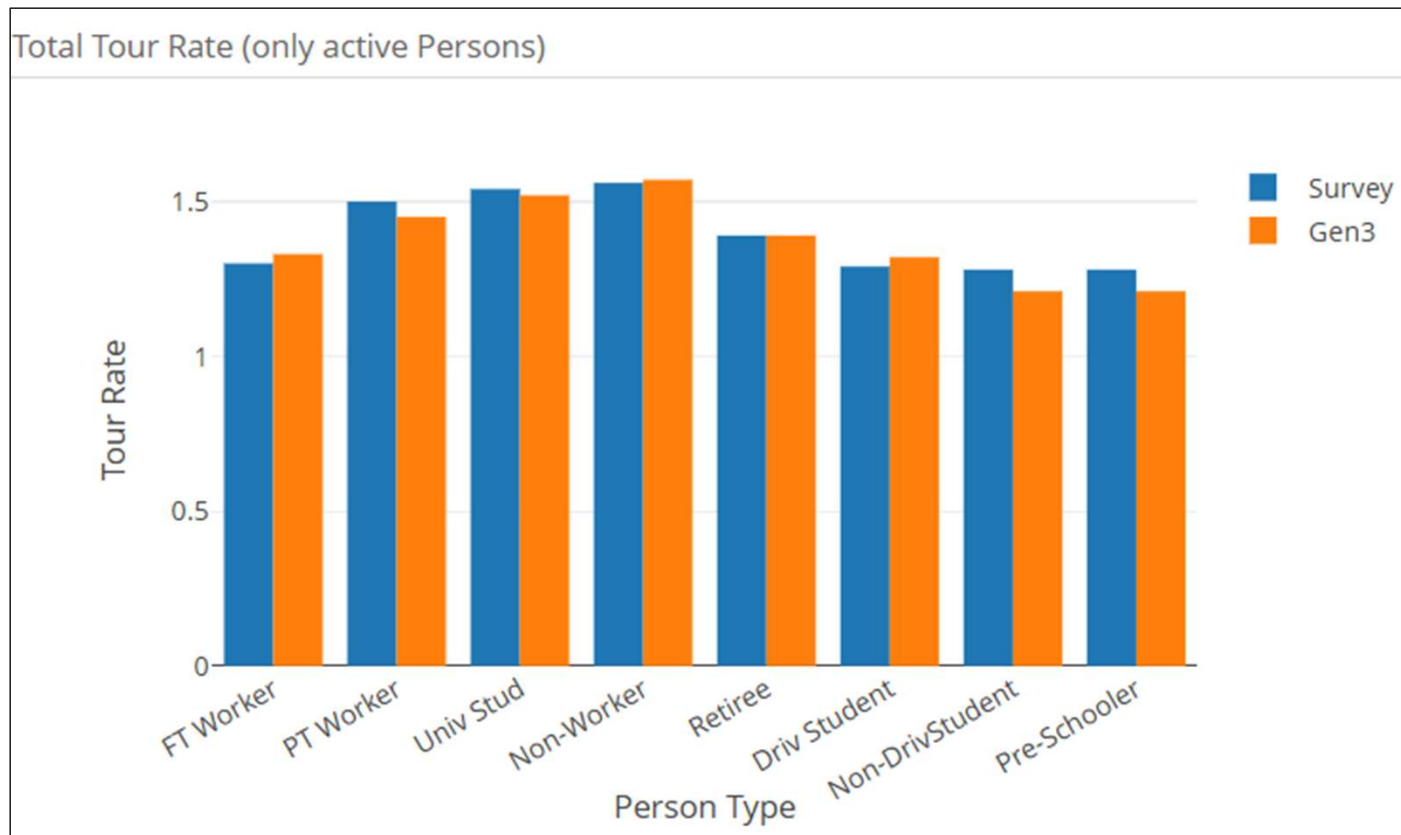
Non-mandatory tour frequency model re-calibrated to better match household survey

Total Departures and Arrivals by Aggregated Period
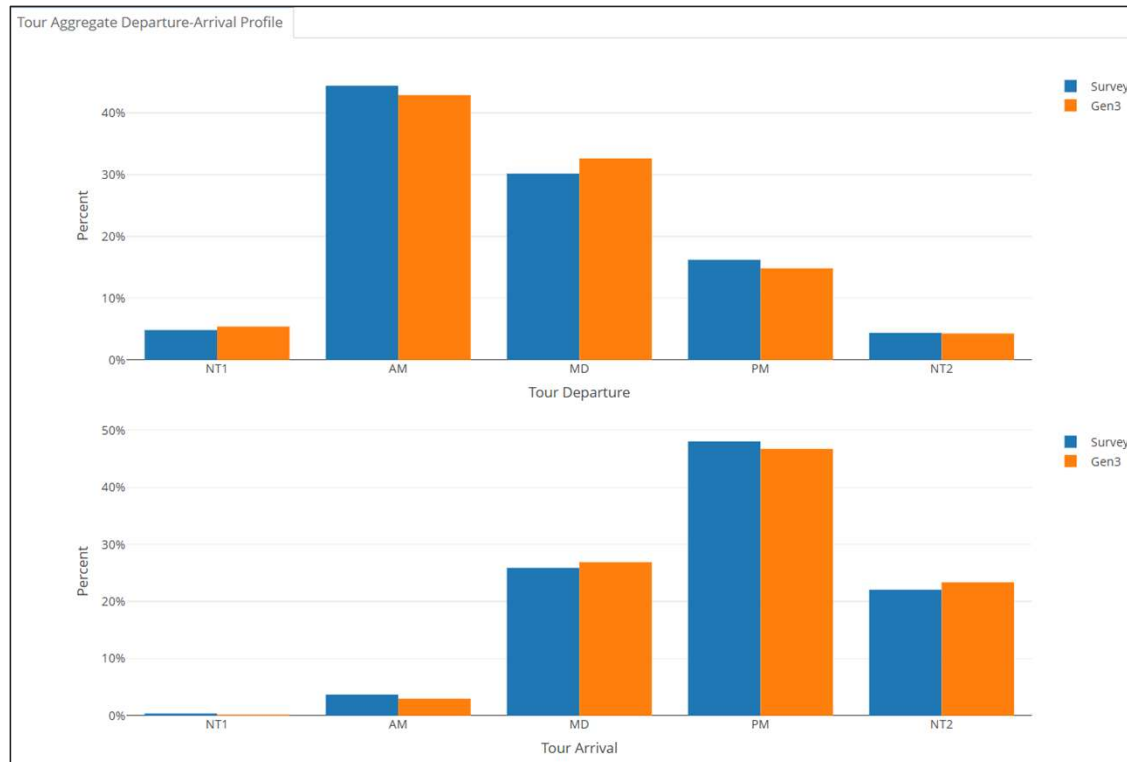
Tour time of day choice models for non-mandatory purposes calibrated to better match household survey, particularly for off-peak periods

Stop Frequency Calibration Comparison
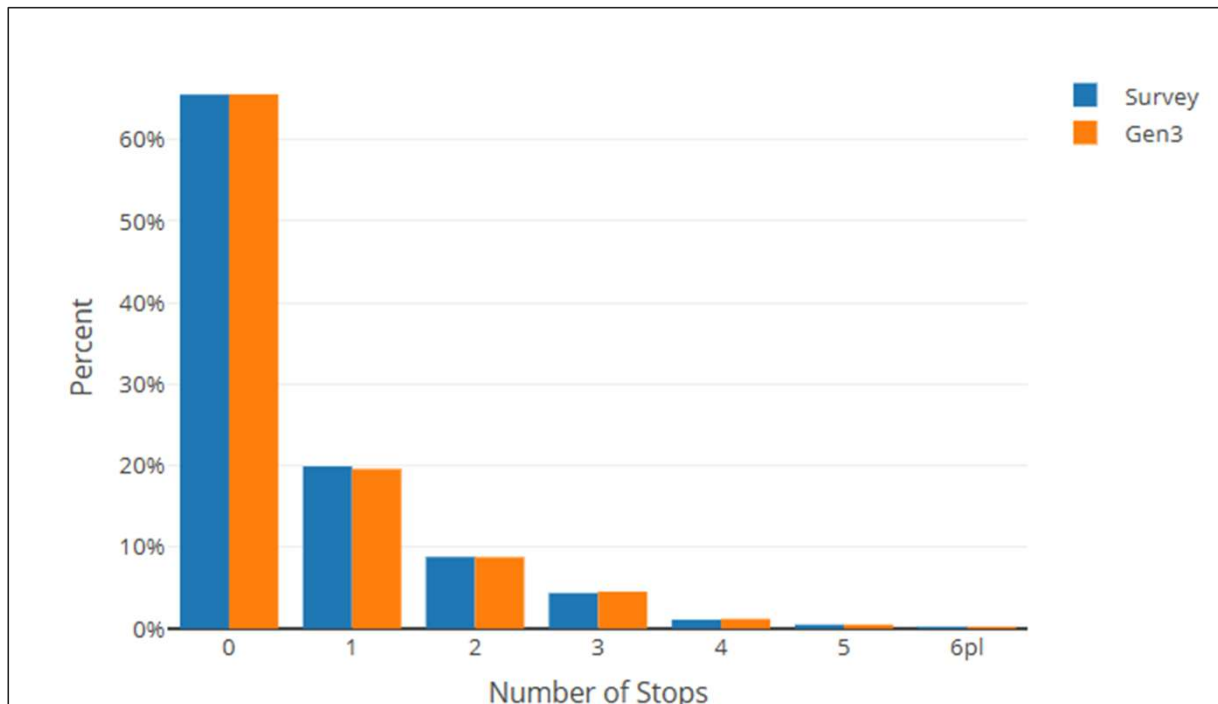
Number of intermediate stops (activities other than the primary activity on the tour) calibrated to better match total stops, in order to improve trip rate.

Also, the timing of stops adjusted by introducing new time period variables in the stop generation model, to improve trips by time of day.

7

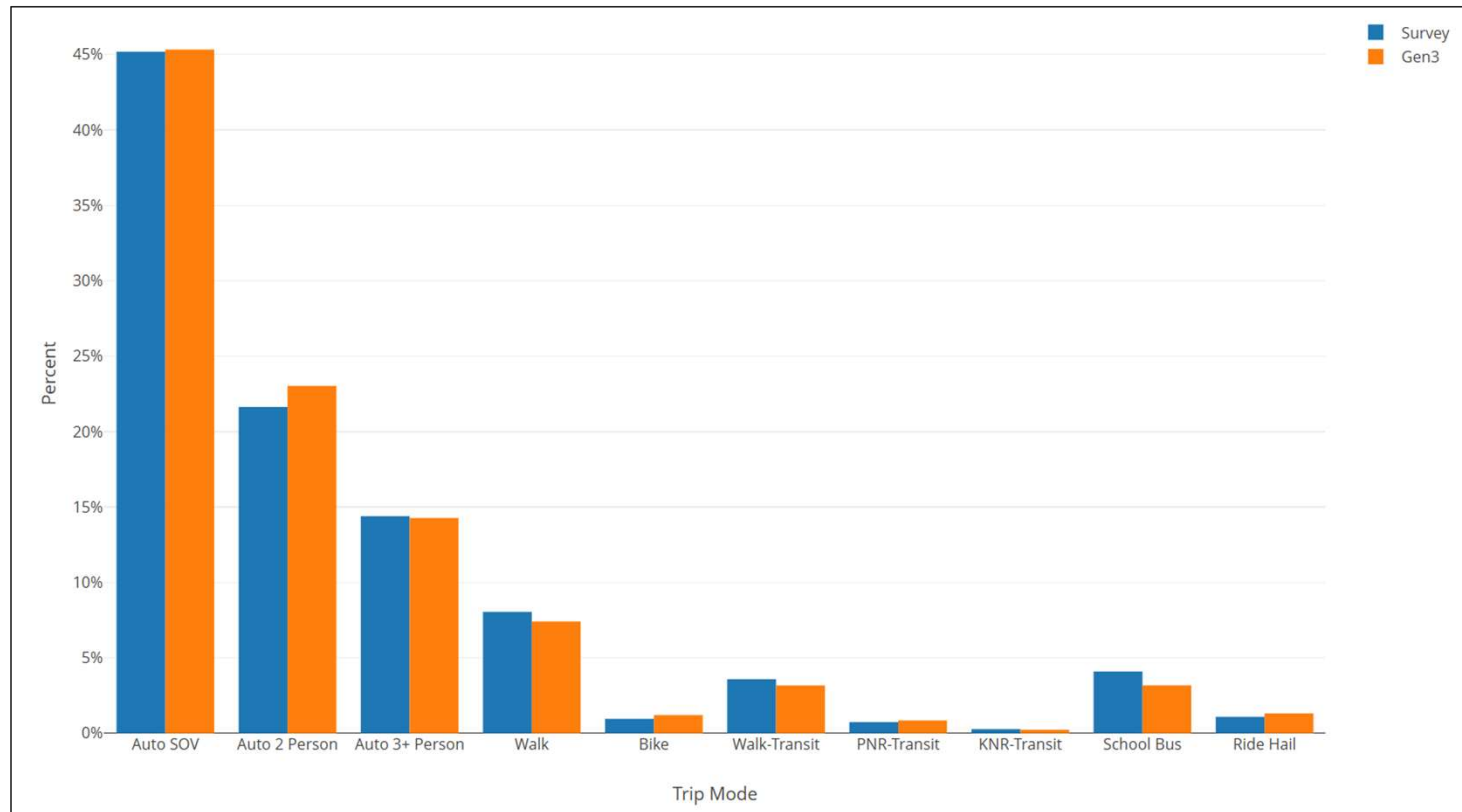# Stops and Trips By Departure Period Comparison
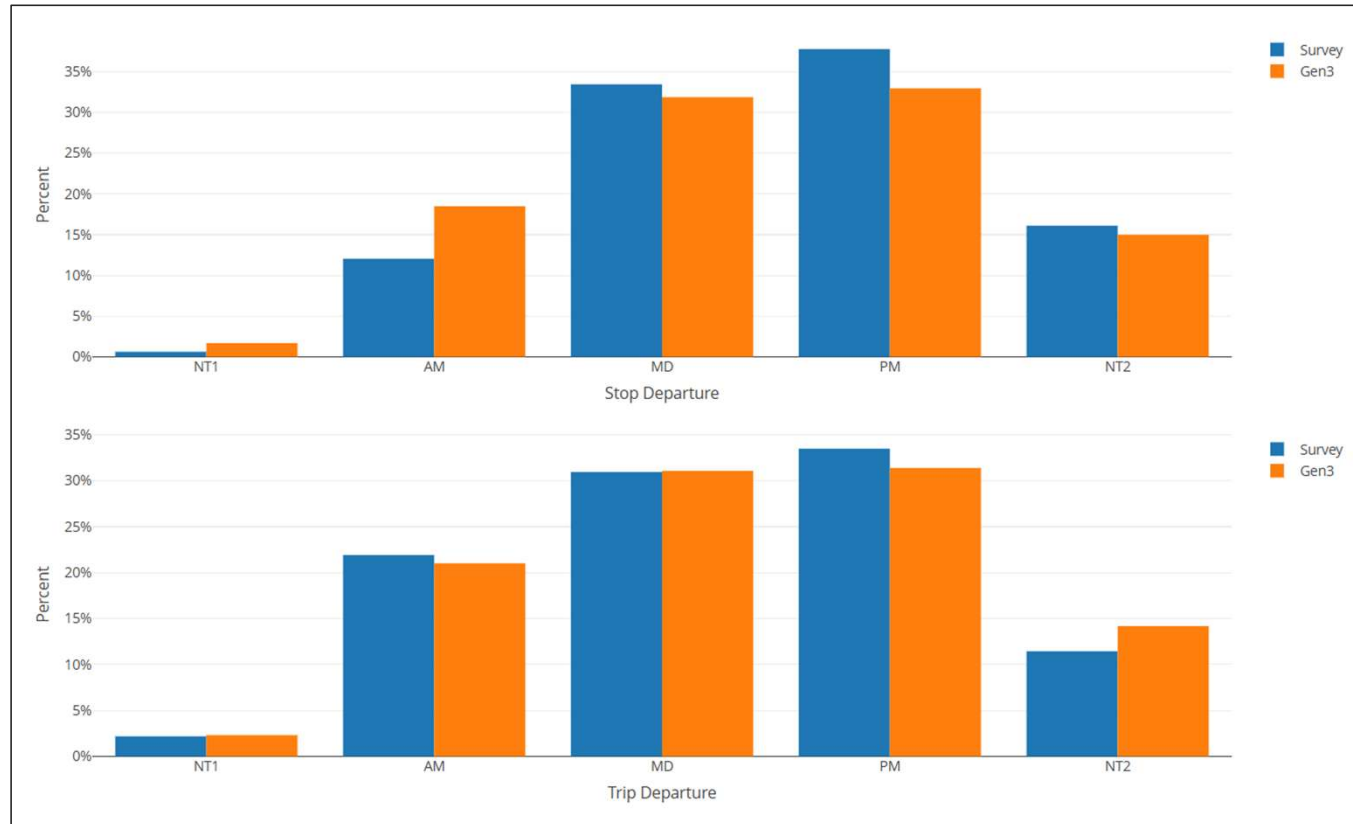
Tour Mode Choice Calibration Comparison
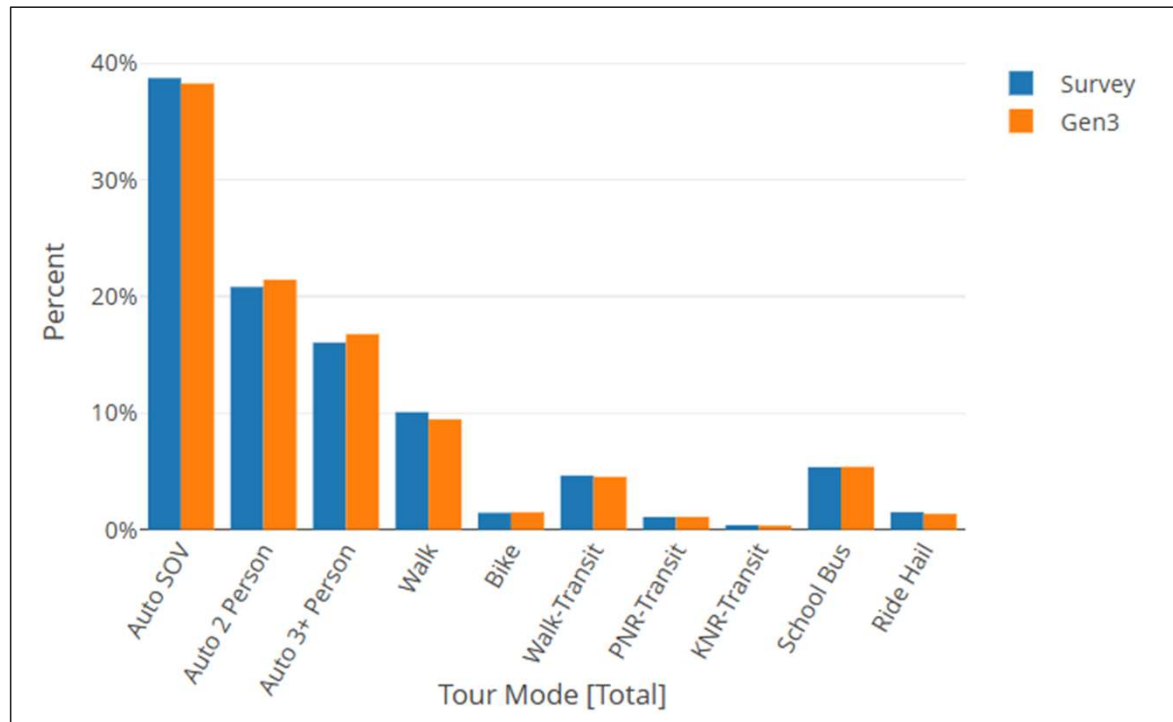
Tour and trip mode choice models calibrated to match transit targets by mode (bus, Metrorail, commuter rail) and to improve SOV versus HOV tours.

Trip Mode Choice Calibration Comparison

Highway Validation – Volume Count by Area Type and Facility Type

Gen2/Ver. 2.4 Model

Estimate/Observed Ratio

Area Type	Freeway	Major Arterial	Minor Arterial	Collector	Expressway	Ramp	TOTAL
			Facility Type				
1	0.95	1.12	1.01	0.95	0.97	-	1.04
2	1.01	1.01	0.97	0.84	0.88	-	0.98
3	1.02	0.97	0.92	0.70	0.86	-	0.96
4	1.09	1.10	0.97	0.80	0.99	-	1.03
5	1.04	1.12	1.03	0.78	1.02	0.97	1.04
6	1.22	1.21	1.36	0.86	0.96	-	1.23
TOTAL	1.04	1.06	1.02	0.80	0.92	0.97	1.02

Gen3/Ver. 1.0.4 Model

Estimate/Observed Ratio

Area Type	Freeway	Major Arterial	Minor Arterial	Collector	Expressway	Ramp	TOTAL
			Facility Type				
1	0.82	1.13	1.00	1.05	0.84	-	1.01
2	0.93	0.99	0.96	0.83	0.77	-	0.95
3	0.97	0.98	0.93	0.76	0.90	-	0.95
4	1.05	1.08	0.94	0.82	0.88	-	1.00
5	1.01	1.13	1.04	0.84	1.13	0.76	1.05
6	1.19	1.17	1.48	0.95	1.01	-	1.25
TOTAL	0.99	1.05	1.03	0.85	0.91	0.76	1.00

Highway Validation – VMT by Area Type and Facility Type

Gen2/Ver. 2.4 Model

Area Type	Facility Type						TOTAL
	Freeway	Major Arterial	Minor Arterial	Collector	Expressway	Ramp	
1	0.99	1.03	0.90	0.91	0.97	-	0.98
2	0.98	0.96	0.95	0.73	0.79	-	0.95
3	1.03	0.94	0.91	0.69	0.81	-	0.96
4	1.08	1.02	0.92	0.75	0.97	-	1.01
5	1.02	1.13	1.05	0.72	1.00	0.97	1.03
6	1.16	1.24	1.35	0.78	0.90	-	1.20
TOTAL	1.05	1.07	1.09	0.74	0.89	0.97	1.03

Gen3/Ver. 1.0.4 Model

Area Type	Facility Type						TOTAL
	Freeway	Major Arterial	Minor Arterial	Collector	Expressway	Ramp	
1	0.84	1.06	0.88	1.02	0.82	-	0.92
2	0.92	0.94	0.94	0.74	0.68	-	0.91
3	0.98	0.96	0.92	0.75	0.89	-	0.95
4	1.04	1.01	0.91	0.78	0.90	-	0.98
5	1.01	1.13	1.08	0.79	1.11	0.76	1.04
6	1.12	1.18	1.46	0.87	0.99	-	1.21
TOTAL	1.01	1.06	1.12	0.80	0.91	0.76	1.02

Highway Validation – Estimated vs. Observed by Screenline

Screenline Results - Gen2 Model V2.4
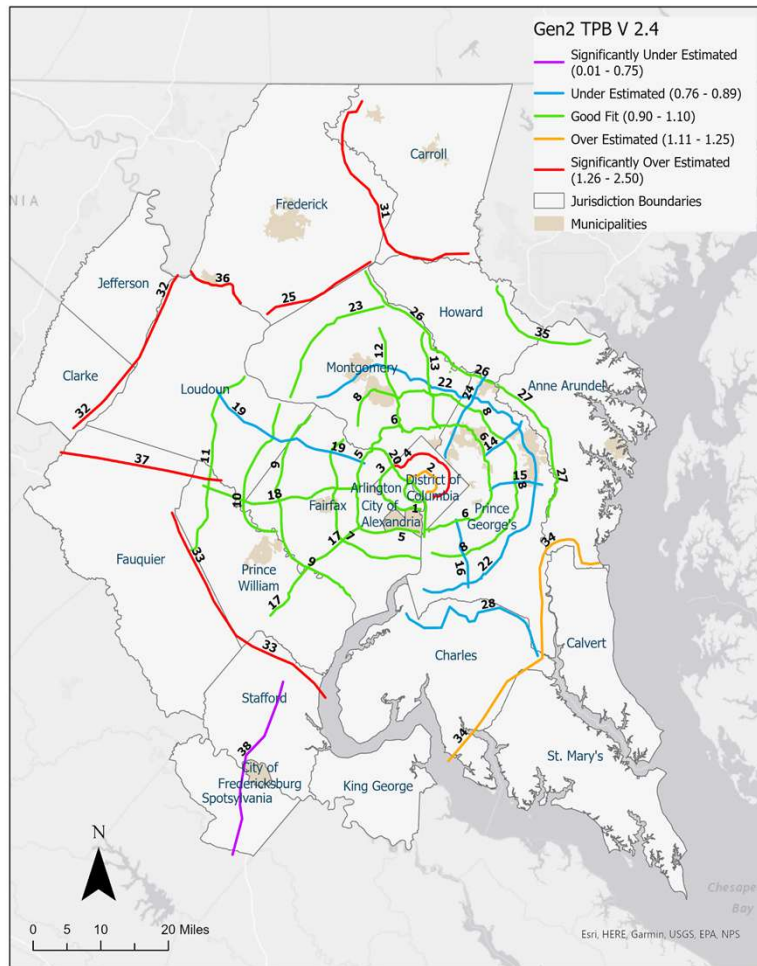
Screenline Results – Gen3/Ver. 1.0.4 Model
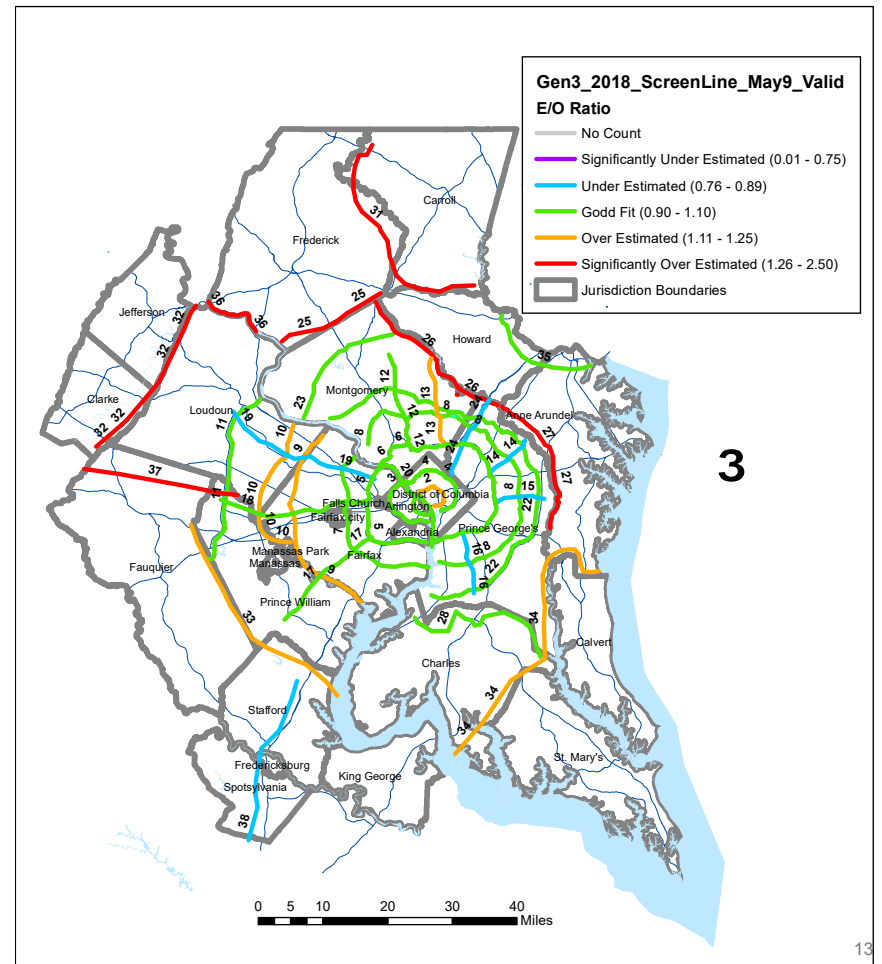
Transit Validation

Mode Name	Observed Boardings	Gen3 Estimated Boardings	Gen3 Ratio (obs/est)	Gen2 v2.4 Ratio (obs/est)
Metrorail*	641,227	624,717	0.97	1.01
Commuter Rail	56,580	55,776	0.99	0.76
Bus (All)	575,642	608,083	1.06	1.09
Total	1,273,449	1,288,577	1.01	0.99
Metrobus	360,000	336,969	0.94	
Other bus in WMATA area	141,390	173,702	1.23	
Other bus outside WMATA area	74,252	97,413	1.31	

* Does not include station-station transfers

Conclusions

- Household trip rates now match survey data well

- Mode shares more closely match household travel survey and on-board surveys.

- Distribution of trips by time of day more closely matches household travel survey.

- Transit validation improved compared to Gen2/v2.4 model.

- Truck and commercial vehicle trip rates consistent with Gen2/v2.4 model.

- Gen3 calibration and validation documentation will be updated to reflect these calibration results.

RSG.

Thank you

Joel Freedman
PRINCIPAL

Joel.freedman@rsginc.com
+1 503 539 8226