

# Gen3 Model Update

November 17, 2023

Presented by: Joel Freedman



# Overview

- Model Validation Updates
- Sensitivity Test Updates
- Task Order 5 scope of work

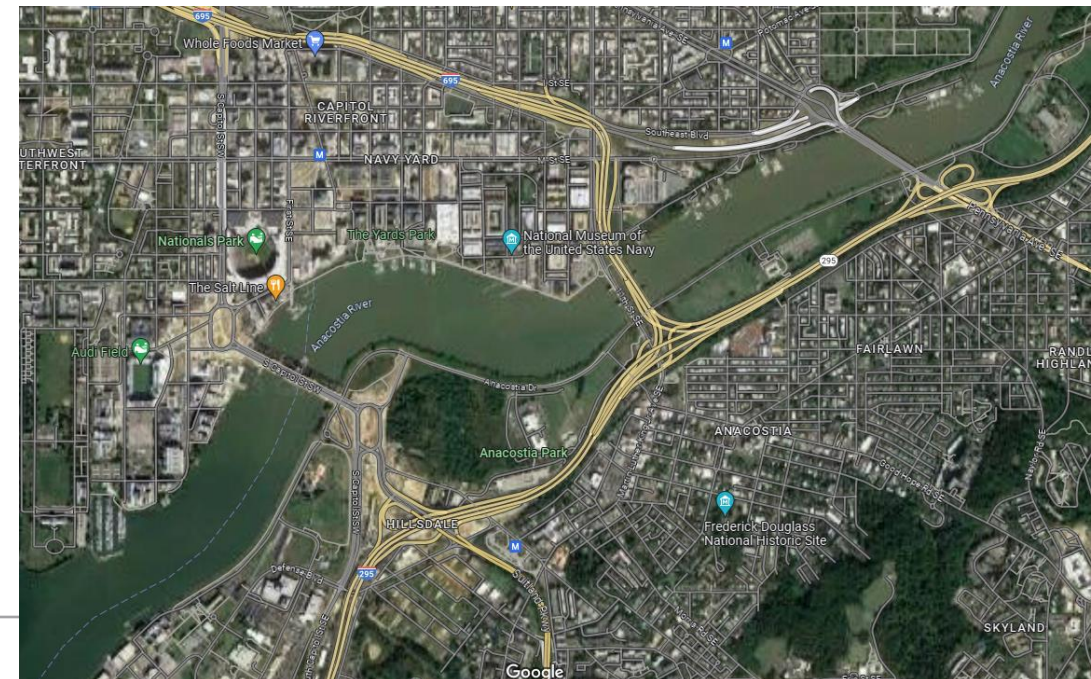
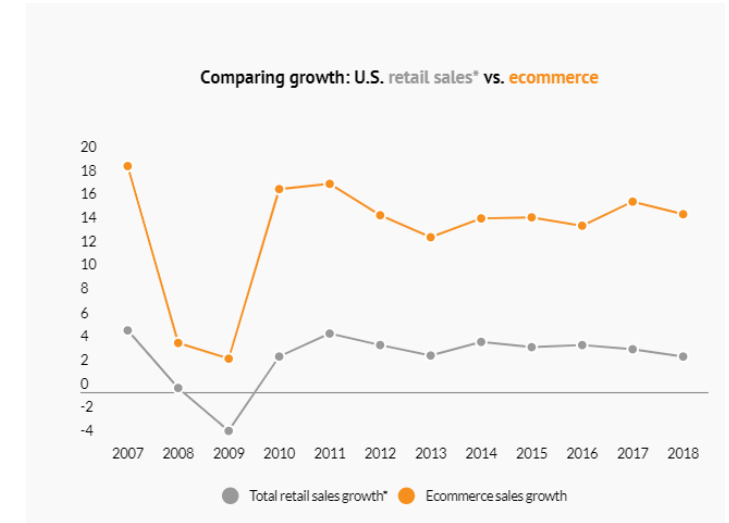




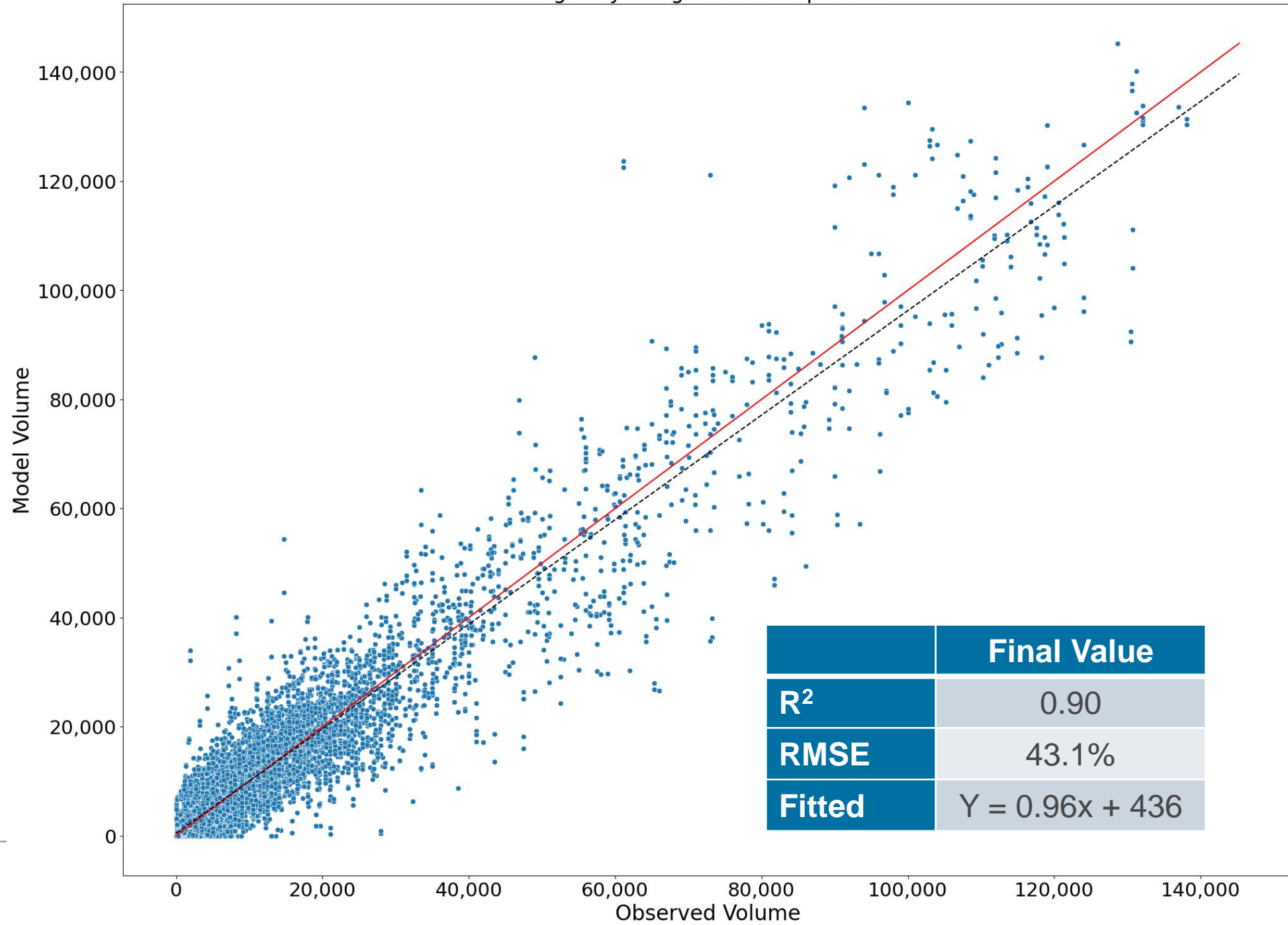
## **Final Validation Results (10/21)**

# Recent Calibration Updates

- Network Adjustments
  - 11-minute penalty on Potomac River bridges
  - 5-minute penalty on Anacostia River bridges
  - Capacity reductions on arterials crossing screenlines in DC to account for on-street parking
- ActivitySim Adjustments
  - Bugfix in some stop frequency files
- Truck model adjustments
  - Increased truck and commercial vehicles by 15% to account for increased e-commerce and freight traffic since last CV model update



# Highway Assignment Comparison



VDOT standard for R2 in large regions is 0.90



# VMT by Facility Type

<b>FTYPE</b>	<b>Gen3</b>	<b>Gen2.4 (2018)</b>	<b>Standard (Acceptable)</b>	<b>Standard (Preferable)</b>
<b>Freeway</b>	1.02	1.05	0.07	0.06
<b>Major Arterial</b>	1.07	1.07	0.15	0.10
<b>Minor Arterial</b>	1.13	1.09	0.15	0.10
<b>Collector</b>	0.80	0.74	0.25	0.20
<b>Expressway</b>	0.93	0.89	0.15	0.10
<b>Total</b>	<b>1.03</b>	<b>1.03</b>	<b>0.05</b>	<b>0.02</b>

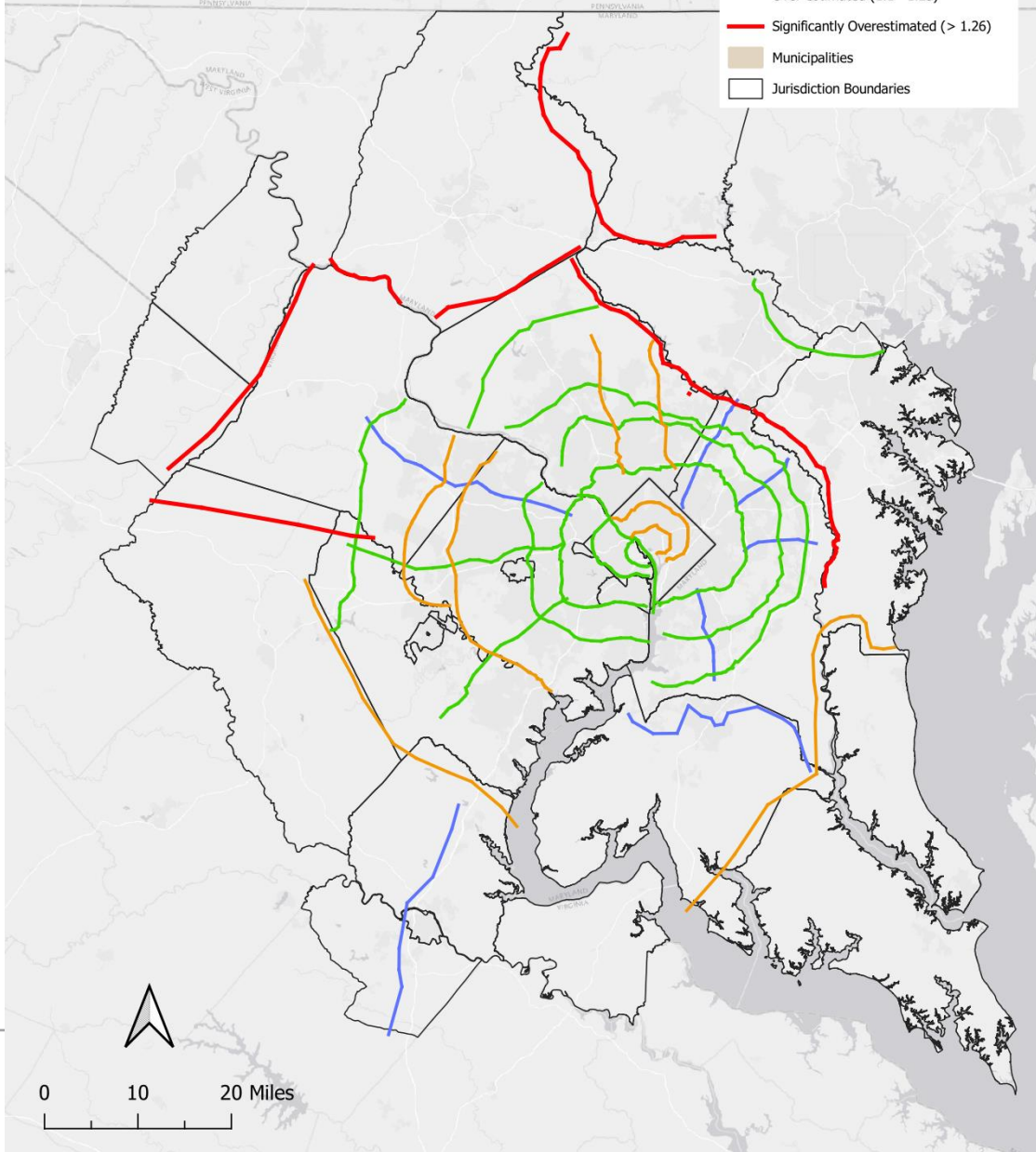
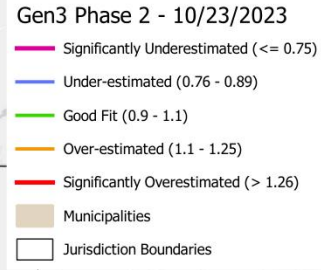


# VMT by Area Type

ATYPE	Gen3	Gen2.4 (2014)	Standard (Acceptable)	Standard (Preferable)
AT 1 (CBD)	0.97	1.03	0.25	0.15
AT 2	0.92	0.95	0.25	0.15
AT 3	0.95	0.96	0.25	0.15
AT 4	0.99	1.02	0.25	0.15
AT 5	1.04	1.11	0.25	0.15
AT 6 (Exurban)	1.22	1.22	0.25	0.15
<b>Total</b>	<b>1.03</b>	<b>1.06</b>	<b>0.25</b>	<b>0.15</b>



# Screenlines



Screenline	Gen3	Gen2.4	FDOT Standard
1	0.98	1.04	+/- 10%
2	1.18	1.21	+/- 10%
3	0.98	1.06	+/- 10%
4	1.17	1.32	+/- 10%
5	0.99	1.05	+/- 10%
6	0.93	0.97	+/- 10%
7	0.93	0.99	+/- 10%
8	1.04	1	+/- 10%
9	1.14	1.1	+/- 10%
10	1.12	1.03	+/- 10%
11	0.96	0.9	+/- 10%
12	1.1	1.06	+/- 10%
13	1.11	1.09	+/- 10%
14	0.85	0.88	+/- 10%
15	0.84	0.81	+/- 10%
16	0.8	0.76	+/- 10%
17	0.96	1.09	+/- 10%
18	0.91	1	+/- 10%
19	0.86	0.86	+/- 10%
20	1.06	1	+/- 10%
22	0.96	0.88	+/- 10%
23	1.05	0.93	+/- 10%
24	0.87	0.87	+/- 10%
25	1.43	1.33	+/- 10%
26	1.39	0.91	+/- 10%
27	1.28	1.06	+/- 10%
28	0.89	0.85	+/- 10%
31	2.38	2.18	+/- 10%
32	1.77	1.75	+/- 10%
33	1.21	1.3	+/- 10%
34	1.2	1.22	+/- 10%
35	0.92	0.95	+/- 10%
36	1.91	1.77	+/- 10%
37	1.94	1.8	+/- 20%
38	0.76	0.75	+/- 10%

- Gen3: 14 meet FDOT standard
- Gen2.4 18 meet FDOT standard



# HPMS VMT by Jurisdiction (TPB Planning Area)

	Model	Observed	Est / Obs	Gen2.4 (2018)	Standard
District of Columbia	7,910,970	8,410,547	0.94	0.97	+/- 0.03
Montgomery County	21,262,946	20,844,658	1.02	1.00	
Prince George's County	23,804,090	25,320,822	0.94	0.89	
Arlington County	3,954,138	4,115,600	0.96	1.00	
City of Alexandria	2,313,215	1,851,663	1.25	1.16	
Fairfax County	27,625,667	28,284,350	0.98	0.99	
Loudoun County	8,242,056	7,342,782	1.12	1.01	
Prince William County	10,334,469	10,300,396	1.00	0.99	
Frederick County	9,187,713	8,391,370	1.09	1.08	
Charles County	3,344,053	3,426,164	0.98	0.94	
<b>TPB Planning Area Total</b>	<b>117,979,318</b>	<b>118,288,351</b>	<b>1.00</b>	<b>0.98</b>	<b>+/- 0.02</b>

VMT source: 2018 Highway Performance Monitoring System (HPMS)



# VMT by Jurisdiction (Non-TPB Member Area)

	Model	HPMS_VMT	Est / Obs	Gen2.4 (2018)
Howard County	12,039,208	11,526,986	1.04	0.99
Anne Arundel County	16,091,749	16,518,082	0.97	0.97
Carrol County	4,557,115	3,408,904	1.34	1.29
Calvert County	1,537,028	2,019,452	0.76	0.82
St. Mary's County	1,960,673	2,367,534	0.83	0.90
King George County	839,996	932,207	0.90	0.90
City of Fredericksburg	888,728	990,749	0.90	0.90
Stafford County	4,301,302	4,358,421	0.99	1.08
Spotsylvania County (1)	2,402,300	3,774,287	0.64	0.63
Fauquier County (2)	3,659,825	3,686,566	0.99	1.03
Clarke County	1,125,154	827,733	1.36	1.31
Jefferson County	1,517,889	1,069,310	1.42	1.41
<b>Non-TPB Member Area</b>	<b>50,920,968</b>	<b>51,480,231</b>	<b>0.99</b>	<b>0.98</b>

VMT source: 2018 Highway Performance Monitoring System (HPMS)

(1): Observed VMT includes entire county, estimated VMT is only the northern portion

(2): Fauquier County urbanized area is part of TPB planning area, but remaining county is not, HPMS VMT is only available for the entire county.



# VMT by Jurisdiction Summary

	Model	Observed	Est / Obs	Gen2.4 (2018)	Standard
TPB Planning Area Total	117,979,318	118,288,351	1.00	0.98	
Non-TPB Member Area	50,920,968	51,480,231	0.99	0.98	
<b>Total</b>	<b>168,900,286</b>	<b>169,768,582</b>	<b>0.99</b>	<b>0.98</b>	<b>+/- 0.02</b>



# Transit Validation Summary

	Model	Observed	Est / Obs	Gen2.4 2014 E/O	Standard
<b>Metrorail</b>	653,644	641,227	1.02	1.01	+/- 0.05
<b>Commuter Rail</b>	54,014	56,580	0.95	0.60	+/- 0.05
<b>All Bus</b>	592,719	575,642	1.03	1.10	+/- 0.05
<b>Metrobus Total</b>	363,780	360,000	1.01		
<b>Other Bus in WMATA Area</b>	162,414	141,390	1.15		
<b>Other Bus not in WMATA Area</b>	66,525	74,252	0.90		
<b>Total Transit</b>	<b>1,300,377</b>	<b>1,273,449</b>	<b>1.02</b>	<b>1.04</b>	

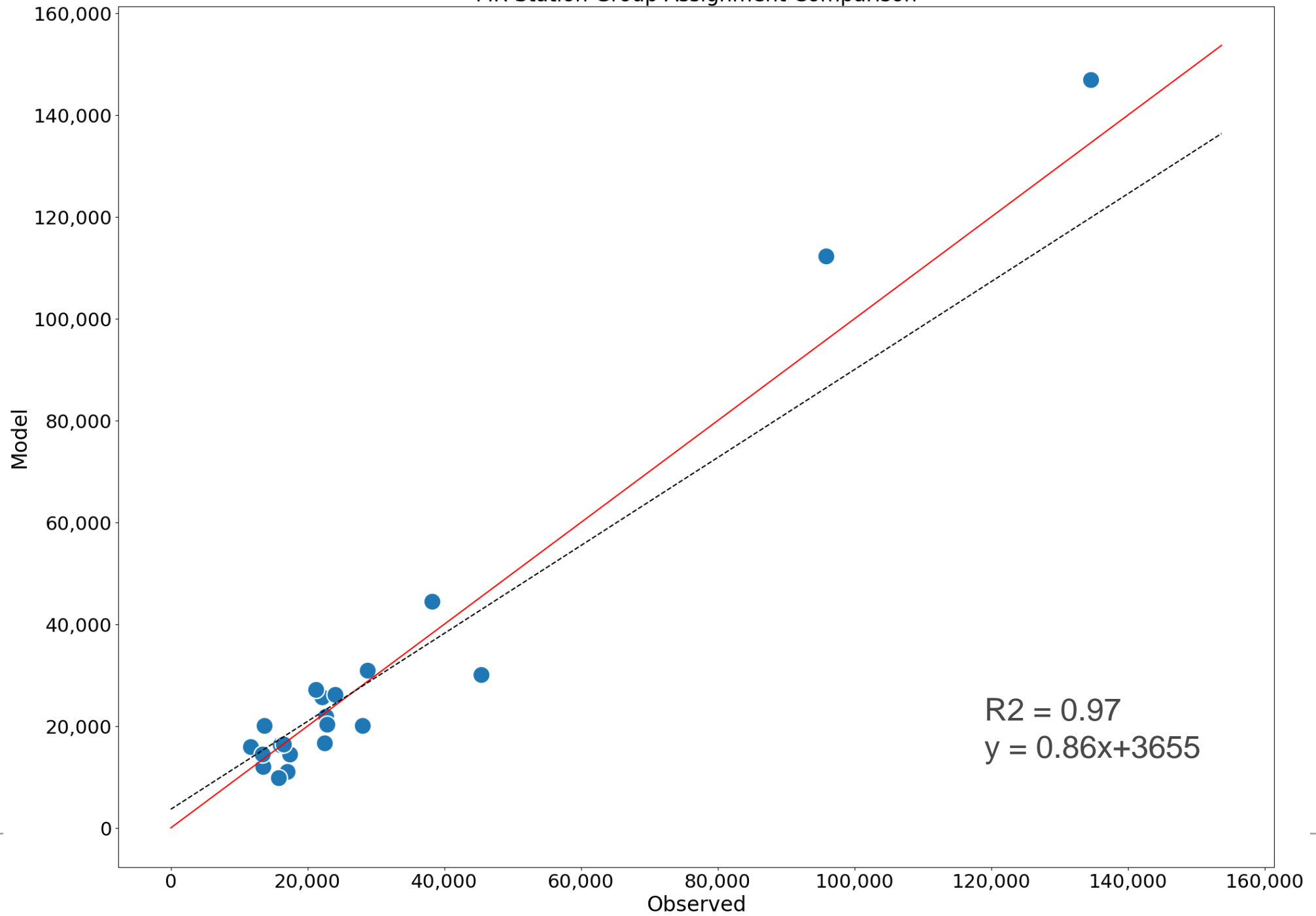


# Transit Transfers

	Model Boards/Trips	Survey Boards/Trips	Source
<b>AB</b>	1.36	1.30	Metrobus survey
<b>MR</b>	1.00	1.00	Inferred rate since boards = trips
<b>BM</b>	2.09	2.14	Metrorail survey
<b>CR</b>	1.43	1.42	Average of MARC and VRE



MR Station Group Assignment Comparison



# Final model documentation

- Model User Guide
  - Submitted and reviewed by COG staff. Finalizing now.
- Sensitivity Testing Report
  - Submitted and under review by COG staff.
- Model Calibration & Validation Report
  - Being finalized by RSG for submittal to COG



# CALIBRATION AND VALIDATION REPORT

November 13, 2023



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With Baseline Mobility Group



# CONTENTS

<b>1.0 INTRODUCTION</b> .....	<b>1</b>
<b>2.0 MODEL CALIBRATION ADJUSTMENTS AND VALIDATION</b> .....	<b>2</b>
2.1 SCHOOL LOCATION MODEL .....	4
2.2 WORK FROM HOME MODEL .....	5
2.3 WORKPLACE LOCATION MODEL .....	7
2.4 AUTO OWNERSHIP .....	9
2.5 TELECOMMUTE FREQUENCY .....	10
2.6 COORDINATED DAILY ACTIVITY PATTERN .....	11
2.7 MANDATORY TOUR FREQUENCY .....	16
2.8 JOINT TOUR FREQUENCY .....	19
2.9 JOINT TOUR COMPOSITION .....	21
2.10 JOINT TOUR PARTICIPATION .....	22
2.11 JOINT TOUR DESTINATION .....	24
2.12 NON-MANDATORY TOUR DESTINATION .....	25
2.13 TOUR MODE CHOICE .....	27
WORK TOURS .....	30
UNIVERSITY AND SCHOOL TOURS .....	32
NON-MANDATORY TOURS .....	35
2.14 AT-WORK SUBTOUR FREQUENCY .....	42
2.15 AT-WORK SUBTOUR DESTINATION .....	43
2.16 AT-WORK SUBTOUR MODE CHOICE .....	44
2.17 STOP FREQUENCY .....	48
2.18 TRIP MODE CHOICE .....	57







## **Sensitivity Test Updates**

# The Sensitivity Tests

- Auto Operating Cost Increase
- Increased Telecommuting to DC
- Arlington Memorial Bridge Closure to Vehicular Traffic
- Double Frequency of High-Capacity Transit
- Autonomous Vehicle Test

# Autonomous vehicle sensitivity test

- Problem discovered in model setup: AV choice not enforced in vehicle type model
- Problem has been fixed and COG staff in process of re-running alternative
- Expect more significant changes due to fix (next TFS meeting)





## **Task Order 5 Scope of Work**

# Task Order 5 Scope

- Complete calibration and validation (documenting now)
- On-Call Assistance
  - RSG to provide on-call assistance to COG as they deploy model and compare results to Gen 2.4 model.
  - Will start early 2024
- Sharrow Implementation
  - RSG is implementing “Sharrow” in the Gen 3 model
  - Sharrow is an ActivitySim extension that compiles pandas expressions to native Python code for faster runtimes using Numba
  - Certain models see significant runtime reductions and memory usage improvements. Other models see less improvement.
  - Does not like String comparisons. Currently going through code to replace with numeric comparisons.
  - Started work several weeks ago. Hoping to complete by end of calendar year.





**Questions\Discussion???**



## Contacts

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