

VER 2.5 TRAVEL DEMAND MODEL DEVELOPMENT

Status Report

Ron Milone
Contractor to COG/TPB staff

TPB Travel Forecasting Subcommittee
March 15, 2019

TFS_2019-03-15_Item3A_V25_Status2.pptx



Ver 2.5 model: status overview

- Envisioned to replace the existing Ver 2.3 model
- Last status report was given last November
- The model was developed by CS during FY 2017
Model has been under evaluation ~1.5 years

- Not ready for implementation



Ver 2.5 features/refinements

1. Updated transit network/path-building software
2. A more robust non-motorized modeling capability
3. Simplified mode choice model
 - Transit choice set reduced from 11 to 3 modes
4. Highway & transit assignment enhancements
 - Highway assignment: VOT stratification
 - Transit assignment: Transit sub-mode market stratification



Goals for Ver 2.5 adoption

1. Familiarity with model & its application
2. Performance that is superior to that of Ver 2.3
3. Acceptable sensitivity test findings
A fairly rigorous validation/testing list has been prepared
4. Reasonable running time
Ideally, an “overnight” timeframe
5. Documentation
PT-based network documentation is needed
User’s guide, validation report



Model reference names

Model Reference	Description
Ver 2.3.75:	Version 2.3 travel model used for re-validation of the base year, 2014
	-Initial ("Pump-Prime") four-step iteration is removed to streamline the application process
Ver 2.5.9:	-Vehicle constants used in the Vehicle Availability sub-model were updated to match 2014 ACS data
	-Fixed bug in the highway skimming calculation (bridge penalty was not used in the impedance formulation)
	-Updated the PT transit skim process
	-Minor scripting edits made to fix minor bugs or to enhance reporting
	-Updated External Trip Distribution Process
	-Builds on Ver 2.5.9
Ver 2.5.11	- Updated external trip distribution process further refined
	-Includes correction to City of Alexandria Jurisdiction boundary definition



Performance summaries

- All summaries correspond to the year 2014
- Summaries compiled:
 - Daily regional VMT by jurisdiction
 - Daily regional VMT on facilities (where link counts exist)
 - Daily screenline crossings (where link counts exist)
 - Daily regional transit boardings



Daily VMT performance (est./obs. ratio) by jurisdiction

- VMT reflects on-network facilities
- V2.5.11 validation performance is comparable to that of V2.3

Jurisdiction	E/O Ratio		
	V2.3.75	V2.5.9	V2.5.11
District of Columbia	1.03	1.05	1.05
Montgomery County	1.09	1.03	1.03
Prince George's County	0.98	0.93	0.93
Arlington County	0.96	0.97	0.97
City of Alexandria	1.00	1.04	1.03
Fairfax County	1.00	1.03	1.01
Loudoun County	1.11	1.01	1.01
Prince William County	1.01	1.00	0.99
Frederick County	1.13	1.12	1.11
Charles County	0.92	0.92	0.92
TPB Member Area	1.03	1.01	1.00
Non-TPB Member Area	1.02	1.01	1.01
Grand Total	1.02	1.01	1.01



Daily VMT performance (est./obs. ratio) by facility type

FTYPE	E/O Ratio		
	V2.3.75	V2.5.9	V2.5.11
Freeway	1.07	1.09	1.08
Major Arterial	1.07	1.05	1.05
Minor Arterial	1.13	1.07	1.08
Collector	0.74	0.72	0.72
Expwy	0.95	0.95	0.95
Total	1.06	1.05	1.05

- E/O ratio based on 6,693 directional links with daily traffic counts
- V2.5.11 performance is comparable to that of V2.3



Daily % RMSE performance by facility type

FTYPE	Percent RMSE		
	V2.3.75	V2.5.9	V2.5.11
Freeway	22	25	23
Major Arterial	38	38	37
Minor Arterial	52	49	49
Collector	76	76	75
Expwy	34	33	34
Ramp	13	13	11
Total	43	45	43

- Historically, TPB model %RMSE performance has been about 20% for freeways and 40% for all links
- The V2.5.11 model performance is same as the existing 2.3 model



Daily vehicular screenline crossing performance (Est./Obs. ratios)

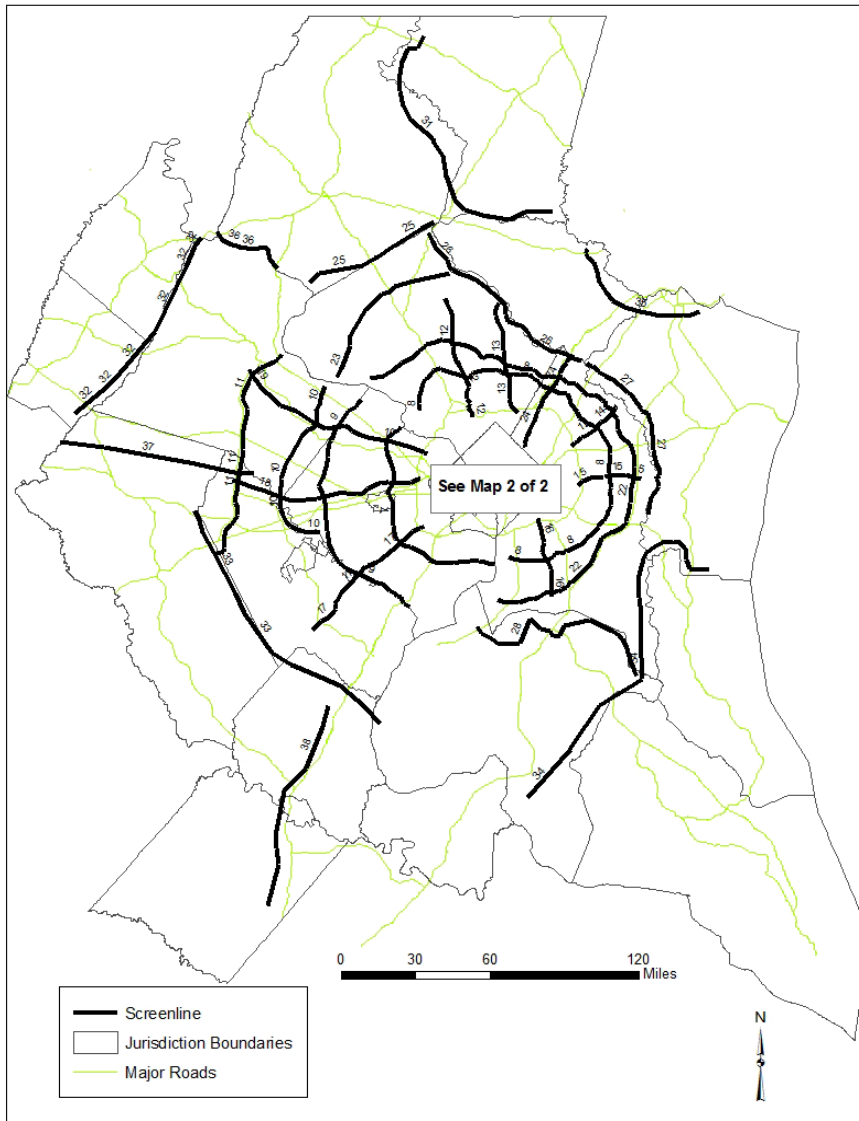
Ver 2.5.11 model results are comparable to Ver 2.3 model

The Ver 2.5 model appears to understate Potomac River screenline #20 crossings by 13% vs. 7% for Ver 2.3

Screenline	E/O Ratio			Screenline	E/O Ratio		
	V2.3.75	V2.5.9	V2.5.11		V2.3.75	V2.5.9	V2.5.11
1	0.74	0.74	0.74	20	0.93	0.89	0.87
2	1.26	1.25	1.25	22	1.05	1.01	1.01
3	0.89	0.87	0.87	23	1.60	1.24	1.24
4	1.22	1.23	1.23	24	0.90	0.89	0.89
5	0.84	0.89	0.88	25	1.32	1.28	1.27
6	1.03	1.04	1.04	26	2.10	1.64	1.66
7	0.97	0.96	0.95	27	1.49	1.29	1.31
8	1.10	1.06	1.06	28	0.75	0.77	0.77
9	0.77	0.85	0.84	31	2.21	2.00	2.03
10	0.95	0.98	0.98	32	1.76	2.15	2.05
12	1.00	0.99	0.98	33	1.11	1.00	0.98
13	1.21	1.21	1.21	34	1.17	1.12	1.13
14	1.06	1.07	1.08	35	0.93	1.03	1.03
15	0.90	0.83	0.84	36	2.11	1.41	1.43
16	0.94	0.83	0.81	37	2.00	1.82	1.82
17	0.91	0.88	0.88	38	0.70	0.72	0.73
18	0.88	0.75	0.91				
19	0.80	0.70	0.80				
				Total	1.01	0.99	1.00



Screenline Reference Maps



Transit ridership performance (est./obs. boardings) by sub-mode

Transit Mode	Observed	Est.	Est.	Est.	E/O Ratio		
		V2.3.75	V2.5.9	V2.5.11	V2.3.75	V2.5.9	V2.5.11
Metrorail	737,679	746,541	761,077	761,256	1.01	1.03	1.03
MARC	36,051	28,200	11,389	11,475	0.78	0.32	0.32
VRE	18,166	4,075	6,492	6,372	0.22	0.36	0.35
Bus	648,083	715,273	434,327	435,006	1.10	0.67	0.67
Total	1,439,979	1,494,089	1,213,285	1,214,110	1.04	0.84	0.84

- Ver 2.5 transit boardings are lower than observed figures
- This is under investigation



Conclusion

- Ver 2.5 model development has been slow
- Progress has been made
- Staff will carry on with validation testing plans
- Theoretical refinements have appeal
- Status report planned for May



Ron Milone

Contractor to COG/TPB staff

(202) 962-3283

rmilone@mwcog.org

mwcog.org/TPB

Metropolitan Washington Council of Governments

777 North Capitol Street NE, Suite 300

Washington, DC 20002

