Item #2

Status report on the Version 2.3 Travel Model: The year-2010 validation

Presentation to the Travel Forecasting Subcommittee
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Where have we been?

- Version 2.3 model validation effort has been ongoing since the fall
  - Focus of the validation: Ver2.3.39 travel model
  - The Ver2.3.39 model was calibrated to 2007/08 HTS, on-board transit surveys and 2007 ground counts
- Validated model results were shared with the TFS in March
  - Validated model is known as: V2.3.52 model
  - 2010 demographic and traffic count data utilized
- No additional changes have been made to model since March

What has been done recently?

- Errors in observed data have been rectified
  - VMT targets for some Virginia counties were corrected
  - A few daily link traffic counts in the District were corrected
- Application of the V2.3.52 model has commenced
  - Air quality analysis of the 2013 CLRP/FY 2013-18 TIP
- Sensitivity testing of validated model was conducted
  - Analysis was done to better understand how results have changed from last year

Today's discussion:

- Ron: Validation Status
  - Review of updates reflected in the V2.3.52 model
  - Report on updated validated results
  - Overview on how model results change
- Jane: Status of the 2012 CLRP air quality analysis
  - Years/scenarios being studied
  - Upcoming schedule of events

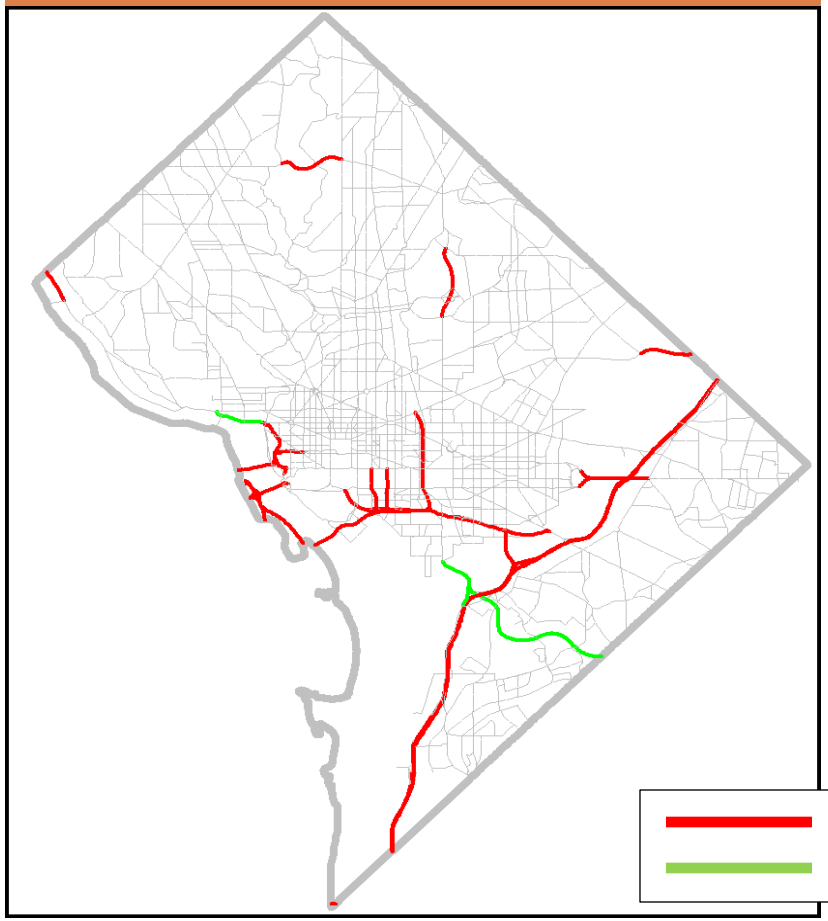
Validation-related changes to model

- Highway network refinements
  - Facility type changes
    - Many freeway links in the District of Columbia recoded as expressways to address a general over-estimation of freeway VMT in that jurisdiction
  - Lane and facility code refinements implemented throughout the modeled study area
- 11-minute time penalties used on the Potomac River bridges to address an over-estimation of traffic crossing the river
  - Pre-existing K-factors relating to river crossings have been removed
- Non-work, non-motorized trip shares in high density areas increased by 30% to improve the match between modeled shares and observed shares determined from the recent geographically focused household travel survey
- Trip generation and distribution process restructured to improve the model's calculation of internal trip productions

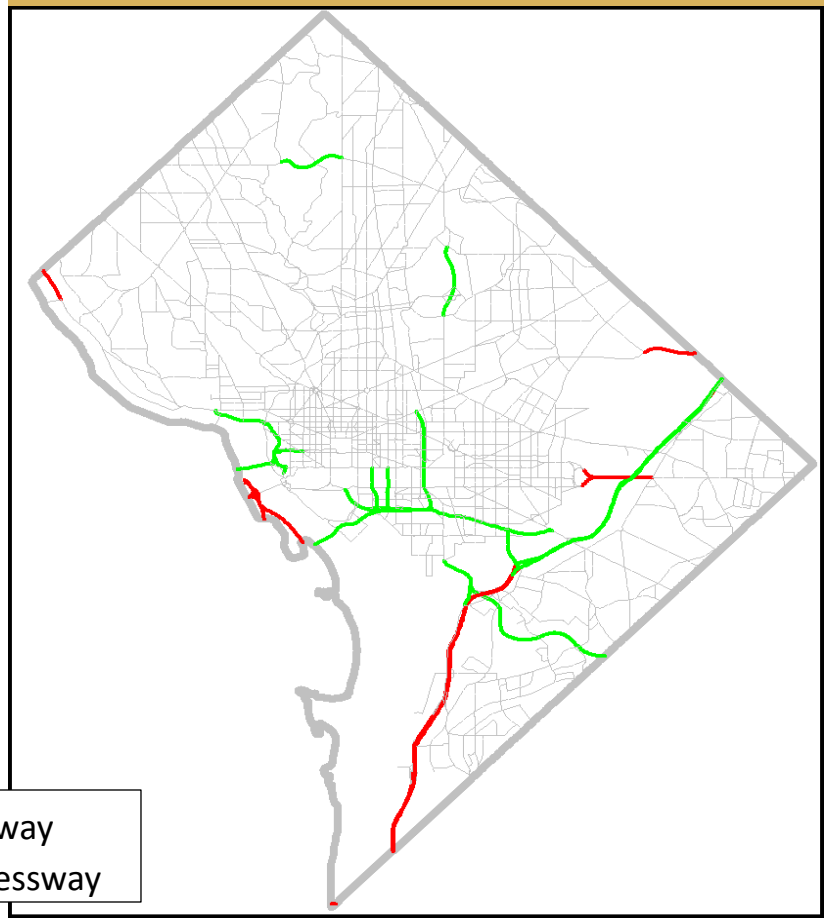
Facility code updates in the District of Columbia

most freeway links recoded as expressways

Existing Network Coding



Updated (Ver2.3.52) Network Coding



Trip generation/distribution updates

- Background:
  - Trip generation process calculates internal trip-ends (Ps, As) by purpose
  - External Ps, As are developed "outside" of the model based on traffic counts

- Implication: external (I-X) portion of Ps must be removed from the total computed Ps to avoid double-counting
  - Existing process estimates I-X Ps based on a sub-model:

    I-X% = f (distance to nearest ext. station)

- Issue: The modeled I-X trips computed by the sub-model may not agree with the I-X trips developed exogenously, based on traffic counts

Overview of the existing and updated trip generation /distribution procedure

Existing V2.3.39 Model

Model Step	Procedure
Generation	-Total Ps are computed
	-External (I-X) trip-ends are estimated & removed from total Ps
	-Total As are computed
	-Internal As are balanced to Ps
	-External trip-ends combined with internal trip-ends
Distribution	-Internal, external trip-ends distributed

Updated V2.3.52 Model

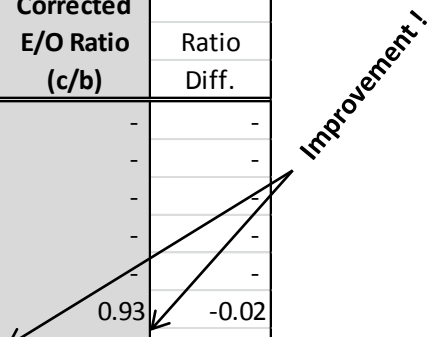
Model Step	Procedure
Generation	-Total Ps are computed
	-Total As are computed
Distribution	-External trip-ends are distributed
(Added step)	-External trip-ends summarized
	-External (I-X) trip-ends removed from total Ps
	-Internal As are balanced to Ps
Distribution	-Internal trip-ends are distributed
(Added step)	-Internal trips are combined with external trips (from above)

Updated procedure ensures improved consistency between the development of internal productions and external counts; running time implications are minimal

2010 Daily E/O VMT by Jurisdiction

(using the **corrected** VMT data in Virginia)

Jurisdiction	Original Observed VMT (a)	Corrected Observed VMT (b)	Observed Difference (b) - (a)	Estimated Ver2.3.52 (c)	Original E/O Ratio (c/a)	Corrected E/O Ratio (c/b)	Ratio Diff.
District of Columbia	8,218,979	8,218,979	-	8,057,876	0.98	-	-
Montgomery Co., Md.	19,693,973	19,693,973	-	20,822,943	1.06	-	-
Prince George's Co., Md.	23,123,014	23,123,014	-	22,685,984	0.98	-	-
Arlington Co., Va.	4,256,249	4,256,249	-	3,876,314	0.91	-	-
City of Alexandria, Va.	2,122,476	2,122,476	-	2,414,208	1.14	-	-
Fairfax Co.. Va.	26,736,352	27,221,807	485,455	25,418,571	0.95	0.93	-0.02
Loudoun Co., Va.	5,412,448	6,212,516	800,068	6,906,894	1.28	1.11	-0.16
Prince William Co., Va.	8,416,630	8,573,525	156,895	8,876,845	1.05	1.04	-0.02
Frederick Co., Md.	7,738,356	7,738,356	-	8,460,471	1.09	-	-
Howard Co., Md.	10,491,370	10,491,370	-	10,575,990	1.01	-	-
Anne Arundel Co., Md.	14,984,795	14,984,795	-	14,742,784	0.98	-	-
Charles Co., Md.	3,253,562	3,253,562	-	3,101,335	0.95	-	-
Carroll Co., Md.	3,354,247	3,354,247	-	3,999,660	1.19	-	-
Calvert Co., Md	2,036,712	2,036,712	-	1,848,978	0.91	-	-
St. Mary's Co., Md.	2,192,055	2,192,055	-	2,050,833	0.94	-	-
King George Co., Va.	819,433	819,433	-	753,741	0.92	-	-
City of Fredericksburg, Va.	919,376	919,376	-	822,610	0.89	-	-
Stafford Co., Va.	3,920,132	3,920,132	-	4,141,312	1.06	-	-
Spotsylvania Co., Va.	3,303,754	3,303,754	-	2,212,010	0.67	-	-
Fauquier Co., Va.	3,133,312	3,331,811	198,499	3,187,848	1.02	0.96	-0.06
Clarke Co., Va.	727,408	757,688	30,280	926,425	1.27	1.22	-0.05
Jefferson Co., WVa.	1,094,762	1,094,762	-	1,213,570	1.11	-	-
Total	155,949,393	157,620,591	1,671,198	157,097,202	1.01	1.00	-0.01



How do V2.3.52 results compare with V2.3.39 model results?

The “52” model yields decreased motorized trips & VMT when holding land use and network inputs constant

Observation	Explanation
Non-motorized trips increase by 13%	Non-work, non-motorized trip shares increased in densely developed areas, to improve matches with recently collected geo-focused HH Survey data
Internal motorized person trips decrease by 3%	Non-motorized trip shares increased (see above) and the improved treatment of external trip productions causes a reduction in motorized trips
VMT decreases by 2%	
Transit trips decrease by 5%	
Transit share decreases by 2%	

Note: Observations are for the year 2010

Validation: conclusions & next steps

- The V2.3.52 is now being used in application by TPB staff and results are under evaluation
  - Inputs: 2013 CLRP and Round 8.2 land activity

- One notable benefit of the "52" model is reduced computation time
  - The running time of the "52" model is ~2/3 that of the "39" model due to increased core utilization in the traffic assignment process

- Documentation planned:
  - Validation report (July)
  - Model "transmittal package" (September)
  - User's Guide (September)
  - Network Report (September)

2013 CLRP & FY 2013-18 TIP analysis years / alternatives

YEAR	ALTERNATIVE	REQUIREMENT
2015		2008 Ozone Standard Attainment Year
2017		$PM_{2.5}$ Maintenance Plan SIP* Budget Year
2020		Transit Constraint Year
2025	No Dulles Access Project	$PM_{2.5}$ Maintenance Plan SIP* Budget Year
2025	VDOT Alternative A	$PM_{2.5}$ Maintenance Plan SIP* Budget Year
2025	VDOT Alternative B	$PM_{2.5}$ Maintenance Plan SIP* Budget Year
2025	VDOT Alternative C	$PM_{2.5}$ Maintenance Plan SIP* Budget Year
2030	No Dulles Access Project	No Greater Than 10 Years Between Analysis Years
2030	VDOT Alternative A	No Greater Than 10 Years Between Analysis Years
2030	VDOT Alternative B	No Greater Than 10 Years Between Analysis Years
2030	VDOT Alternative C	No Greater Than 10 Years Between Analysis Years
2040	No Dulles Access Project	Out Year of Plan
2040	VDOT Alternative A	Out Year of Plan
2040	VDOT Alternative B	Out Year of Plan
2040	VDOT Alternative C	Out Year of Plan

*** These analysis years will be needed once the PM 2.5 Maintenance SIP has been approved by EPA. This SIP has not yet been submitted for approval.**

2013 CLRP & FY 2013-18 TIP schedule

Date	Event
June 13, 2013	Draft CLRP/TIP and Conformity Assessment released for public comment at the Citizens Advisory Committee (CAC) meeting
June 19, 2013	TPB briefed on the Draft CLRP/TIP and Conformity Assessment
July 13, 2013	Public comment period ends
July 17, 2013	TPB reviews public comments and responses to comments, and is presented the draft CLRP/TIP and Conformity Assessment for adoption