Item #10

Status of Upgrades to the TPB Travel Demand Model and Emissions Post-Processor to Address Six Topics Identified in TRB Modeling Review

Transportation Planning Board

October 20, 2004

Model release dates

Model version	Release date
Version 2.1 C*	December 2002
Version 2.1 D, Draft #16	March 2004
Version 2.1 D, Draft #18	May 2004
Version 2.1 D, Draft #28	July 2004
Version 2.1 D, Draft #50	September 2004

*Reviewed by TRB Committee

TRB review: Modeling topics

1. Improving model validation
2. Light duty commercial vehicles
3. Bus network characterization
4. Use of adjustment factors
5. Speed feedback and mode choice
6. Hourly traffic volumes, speeds, and emissions estimation.

TOPIC 1: IMPROVING MODEL VALIDATION

TRB comment: Base year modeled link volumes do not match observed traffic counts and transit ridership as closely as committee members would expect.

TPB staff response:

(1) Short-term: Improvements achieved through refined volume/delay functions, zonal area types, and network coding.

(2) Longer-term: Continued refinement of network representation, use of the FTA Summit model to compare transit alternatives

Progression of model performance

	Ver 2.1C	Ver 2.1D Draft 16	Ver 2.1D Draft 18	Ver 2.1D Draft 28	Ver 2.1D Draft 50
Release date	12/23/02	03/19/04	05/21/04	07/23/04	09/17/04
VMT, Est/Obs, 2000, Modeled area	1.08	1.01	1.02	1.02	1.03
VMT, Est/Obs, 2000, MSA	1.09	1.00	1.01	1.01	1.02
Transit, Est/Obs, 2000, Modeled area	0.92	0.94	0.95	0.96	0.96
Link volume Pct RMSE, 2000, Modeled area	51.91	47.54	48.23	47.44	47.21

TOPIC 2: LIGHT DUTY COMMERCIAL VEHICLES

(Package delivery, postal, courier, service technicians using light duty vehicles)

TRB Comment: Combining business and commercial trips in the non-home-based trip category is not advisable.

TPB Staff Response:

(1) Short-term: Consultant engaged to develop additional light duty commercial vehicle classification counts to adjust base year vehicle trip tables.

(2) Long-term: Monitor ongoing research activities on accounting for light duty commercial vehicles.

TOPIC 3: BUS NETWORK CHARACTERIZATION

TRB Comment: The use of fixed bus speeds in TPB networks may misstate the influence of transit in estimates of future trip distribution and mode choice.

TPB Staff Response:

(1) Short-term: Bus speeds adjusted for congestion delays in the out-years.

(2) Longer-term: More comprehensive analysis and coding of future bus services and priority treatments.

TOPIC 4: USE OF ADJUSTMENT FACTORS

TRB Comment: TPB makes extensive use of adjustment factors to enhance the match between simulated and observed base-year data.

TPB Staff Response:

(1) Short-term: All adjustment factors reviewed, and some removed or dampened as employment and other data inputs are refined.

(2) Longer term: Continuing review, refinement, and documentation of adjustment factors.

Summary of changes to K factors

	Travel Model				
	2.1C	**2.1D #16**	**2.1D #18**	**2.1D #28**	**2.1D #50**
Number of K factors	68	59	55	52	52
Number of K factors **removed**	--	9	13	17	17
Of the remaining K factors, the number **reduced in magnitude**	--	13	32	31	32
Number of K factors **added**	--	0	0	1*	1*

* K factor added: Prince William Co. to DC core (value 2.8)

TOPIC 5: SPEED FEEDBACK AND MODE CHOICE

TRB Comment: TPB's feedback of highway and transit times to trip distribution "bypasses mode choice."

TPB Staff Response:

(1) Short-term: To reflect peak-spreading, freeway volume-delay functions refined to raise "floor" on speeds under congested conditions; speed feedback now includes mode choice in each iteration

(2) Longer-term: Review weighting of highway and transit times in impedance function for trip distribution; assess alternative functional forms for impedance functions; monitor ongoing research and development activities on "speed feedback"

TOPIC 6: HOURLY TRAFFIC VOLUMES, SPEEDS, AND EMISSIONS ESTIMATION

TRB Comment: TPB's estimates of hourly traffic volumes, speeds, and emissions are not strictly based upon assigned peak and off-peak link volumes and speeds produced by the travel models

TPB Staff Response:

(1) Short-term:

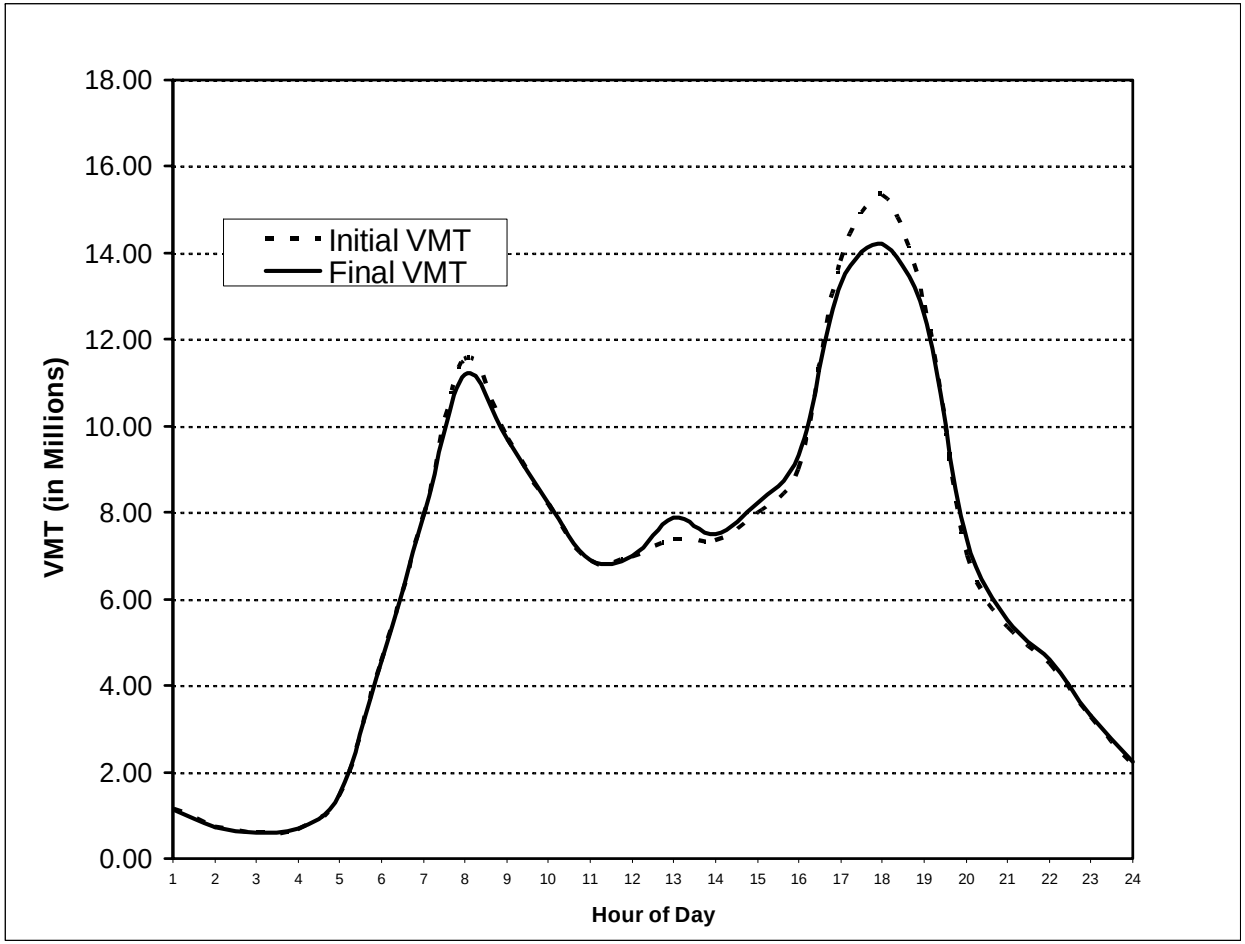
(a) Peak and off-peak link volumes from the travel models are conserved in the development of 'initial' hourly volumes for emissions estimation

(b) Relationship of speed and volume refined in peak-spreading of initial hourly volumes to better reflect operating conditions observed in TPB travel monitoring studies

(c) Post processor being integrated into the travel model so the effects of peak-spreading are reflected in peak and off-peak volumes and speeds

(2) Longer-term: Monitor ongoing research and development activities on time-of-day modeling and peak-spreading

2005 Regional VMT by Hour Before and After Volume Spreading



2005 Mobile Emissions Summary for the MSA (FY 2004-2009 TIP and FY 2005-2010 TIP)

		FY 2004-2009 TIP (1)	FY 2005-2010 TIP (2)	Difference (2) - (1)
Travel Model		Version 2.1C	Version 2.1D #50	
Land Use		Round 6.3	Round 6.4A	
Mobile Emiss. Post-Processor		March 2003	October 2004	
Mobile Model		M 6.0	M 6.2 final	
VMT		126,453,600	117,389,600	-9,064,000
Ave. Highway Speed (mph)		39.3	40.9	1.6
Avg Running Rates (gm/mi)	HC	0.336	0.316	-0.020
	Nx	1.450	1.438	-0.012
Running Emissions (tons)	HC	46.813	40.854	-5.959
	Nx	202.118	186.108	-16.010

ONGOING ASSISTANCE FOR ENHANCING TPB TRAVEL MODELS

1) Comprehensive external review can be conducted only infrequently

2) Federal Travel Model Improvement Program (TMIP) can provide ongoing assistance

- Cooperatively funded and supported by FHWA, FTA, DOT/OST, and EPA
- Managing ongoing applied research
- Funding TRB Synthesis project
- Familiar with travel demanding forecasting and air quality analysis needs and practices nationwide
- Can quickly identify sources of specialized knowledge and expertise