TFS item #2

TPB Version 2.3 travel model on the 3,722-TAZ area system: Status report

Presented to the Travel Forecasting Subcommittee
of the TPB Technical Committee
January 21, 2011

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National Capital Region Transportation Planning Board (TPB)
Metropolitan Washington Council of Governments (COG)

Introduction

- Original plan
  - Finish developing the TPB Version 2.3 travel model on the 3,722-TAZ area system in Jan. 2011
  - Present model and documentation to the TFS on Jan. 21, 2011 (today)
- Due to delays, new schedule
  - Finish developing the model in Feb. 2011
  - Present model and documentation to the TFS in a special meeting at the end of Feb. Proposed dates:
    - Friday, Feb. 25 OR Monday, Feb. 28
- Consequently, today's presentation is a status report

Progress since November

- Further refinement of the traffic assignment process
- Calibration work on distribution and mode choice step
- Four-step model application stream established (with feedback)
  - Results and procedures under review
- Model documentation in progress
- TPB apprised of Ver. 2.3 model progress and schedule (two days ago)

Overview of this presentation

- Traffic assignment
- Trip distribution
- Mode choice
- Schedule for release and use of the Ver. 2.3 travel model

Mary Martchouk

TRAFFIC ASSIGNMENT

Traffic Assignment Parameters

- Need to decide on:
  - Volume Delay Functional (VDF) form
    - Akçelik vs. Conical
  - Use of Queuing Delay Function (QDF)
    - Only freeways
    - Only surface streets (i.e., all roads except freeways)
    - All facilities
    - None
  - Convergence criteria for the number of user equilibrium iterations
    - Relative gap, maximum number of iterations, or combination
  - Free-flow capacities and speeds

Background

- Version 2.2 travel model:
  - Uses conical volume delay function for all facilities
  - Uses queuing delay function for **only freeways and ramps**
  - Convergence criterion: 60 iterations of user equilibrium
  - UE Algorithm: Frank-Wolfe
- Consultant recommendations regarding QDF:
  - TPB is one of the few agencies that apply QDF to only freeways
  - More typical: All streets; only surface streets; not at all

Background

- Previous TFS (November 19, 2010) presentation conclusions:
  - Use conical volume delay function
  - Use queuing delay on all facilities
  - Use relative gap of 10^{-2} to produce reasonable run times
  - Use bi-conjugate Frank-Wolfe algorithm
  - Retain same free-flow capacities and speeds as Version 2.2 travel model

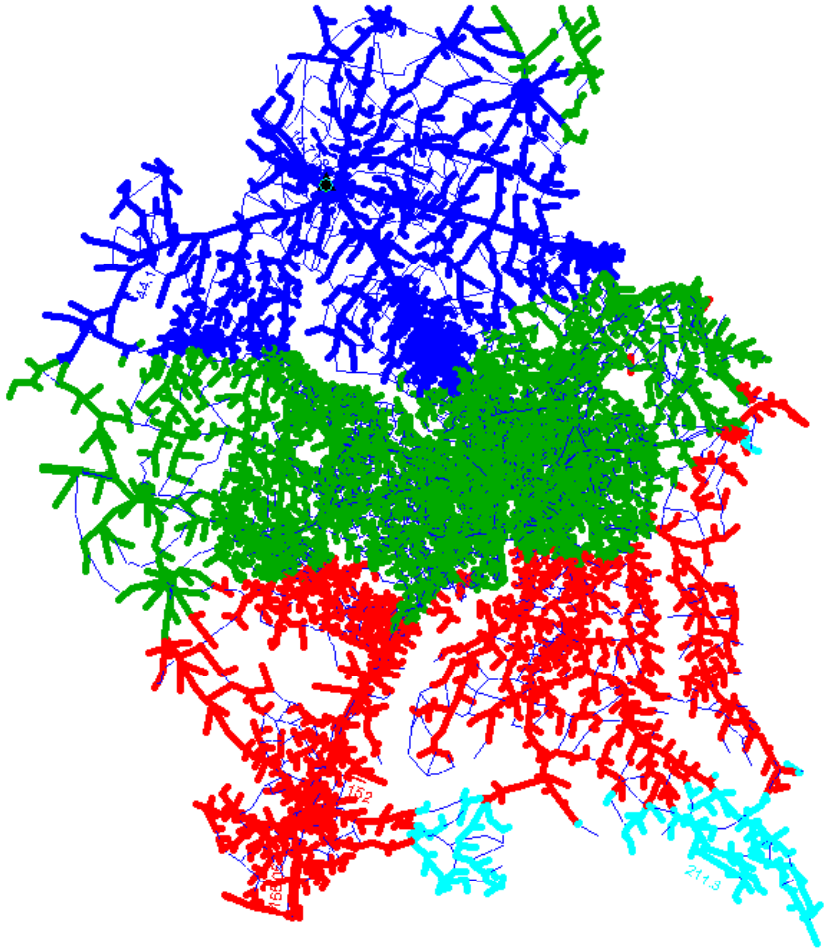
Updates: Queuing Delay Function

- Tested omitting queuing delay function from all facilities
  - Compared speeds on freeways to INRIX data
  - Compared some arterial speeds to those obtained from probe vehicle data
- Speeds match reasonably well INRIX and floating car results
- Therefore, no queuing delay function will be used in Version 2.3 travel model
  - In line with consultant recommendations: Cambridge Systematics, Inc., *Fiscal Year 2010 Task Reports*, Final Report
  - Also, QDF sometimes resulted in very slow link speeds, particularly for short links

Updates cont'd

Travel Time Contours from Frederick City

- Each color is an additional 60 minutes of travel time
- Travel times more reasonable than Version 2.2 model (e.g., 1.5 -2 hours to downtown DC)



Updates: Free-flow capacities

- Tested increasing free-flow capacities

Version 2.2

	Area type					
	1	2	3	4	5	6
Freeways	1500	1600	1800	1800	2000	2100
Major Arterials	800	800	960	960	1260	1260
Minor Arterials	500	600	700	840	1000	1000
Collectors	300	400	500	700	700	800
Expressways	900	1000	1000	1200	1500	1500

Version 2.3

	Area type					
	1	2	3	4	5	6
Freeways	2100	2100	2100	2100	2100	2200
Major Arterials	800	800	960	960	1260	1260
Minor Arterials	500	600	700	840	1000	1000
Collectors	500	500	600	700	700	800
Expressways	1100	1200	1200	1400	1600	1600

- Increased capacities yielded more reasonable speeds

Updates: Free-flow Speeds

- Tested increasing free-flow speeds

Version 2.2

	Area type					
	1	**2**	**3**	**4**	**5**	**6**
Freeways	55	55	60	60	67	67
Major Arterials	25	25	35	35	40	45
Minor Arterials	20	20	30	30	35	40
Collectors	15	15	20	20	25	30
Expressways	45	45	50	50	50	55

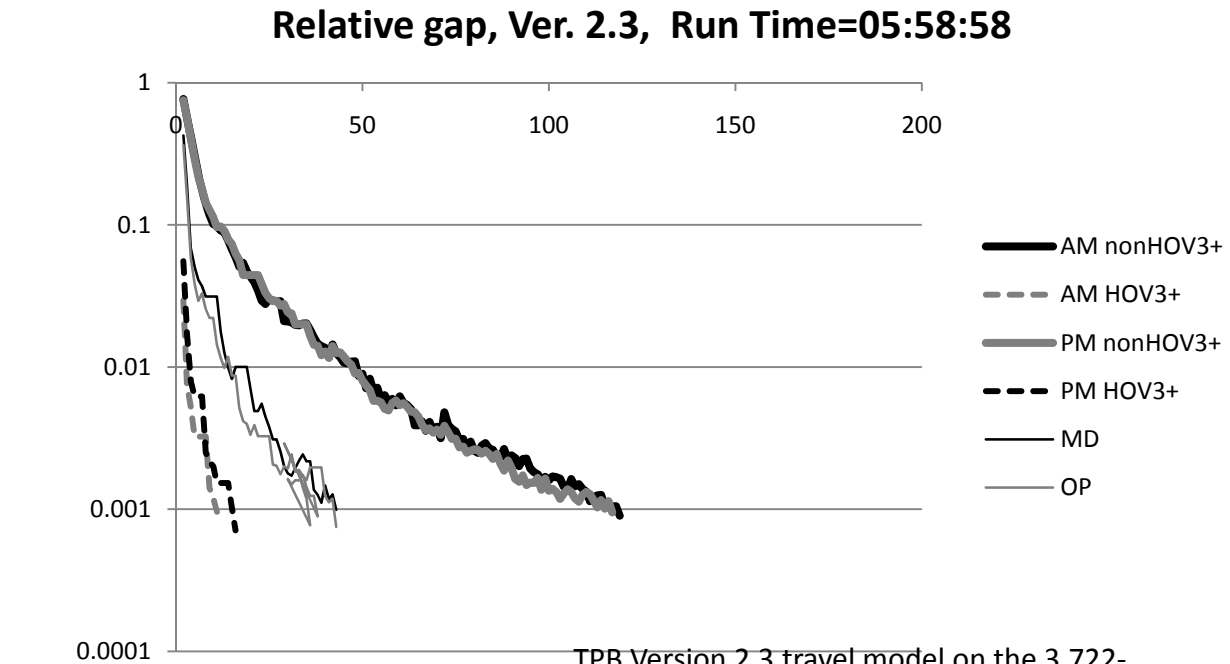
Version 2.3

	Area type					
	1	**2**	**3**	**4**	**5**	**6**
Freeways	55	55	60	60	67	67
Major Arterials	25	25	35	35	40	45
Minor Arterials	20	20	30	30	35	40
Collectors	20	20	25	25	25	30
Expressways	45	45	50	50	50	55

- Increased speeds on collectors improved travel times

Updates: Other

- Removing QDF and increasing free-flow capacities and speeds resulted in quicker convergence and faster traffic assignment run time, thus a relative gap of 10^{-3} is now a feasible option



Results

- Final traffic assignment parameters:
  - Use conical volume delay function
  - DO NOT use queuing delay function
  - Use relative gap of 10^{-3} to produce highly converged loaded networks, within a reasonable run time
  - Use bi-conjugate Frank-Wolfe algorithm
  - Increase free-flow capacities and speeds from Version 2.2 travel model

Ron Milone

TRIP DISTRIBUTION CALIBRATION

Trip Distribution Calibration Background

- Gravity model formulation selected
- 2007/08 HTS survey trip data used
- 14 Trip distribution models to be calibrated
  - HBW, HBS, HBO purposes stratified by 4 income levels
  - Non-Home-Based Work (NHW) and Non-Home-Based Other (NHO)
- Legacy non-resident distribution models will be retained
  - Truck, commercial, external models

Impedance Measure

- Composite highway and transit time
  - Harmonic mean function
- Level of service varies by purpose
  - AM peak service assumed for HBW purpose
  - Midday service levels assumed for other purposes
- "time" includes IVT as well as OVT
- Highway terminal (Off-network) time varies from 1-5 minutes based on area type
- Intrazonal time: 85% of shortest Interzonal time
- Highway time accounts for (inclusive of) tolls

Composite Impedance Measure

$$CT_i = \frac{1.0}{[\ (1.0 / (HT + TollT_i)) \ + \ (P_i / TT)\ ]}$$

Where:

CT_i	= Composite time for income level "i"
HT	= Congested highway time (min) including terminal time
$TollT_i$	= Time equivalent (min) of toll(s) associated with the minimum time path for income "i"
P_i	= Regional transit share of income "i" for the trip purpose
TT	= Metrorail–related transit time (min) including in-vehicle & out-of-vehicle components

Internal Motorized Trips and Transit Percentages by Purpose and Mode

Source: 2007/08 HTS

		Income Level				
Purpose	**Mode**	**<50k**	**50k - 100k**	**100k - 150k**	**>150k**	**Total**
HBW	Transit	84,443	181,611	199,065	106,767	571,886
	Auto Person & Transit	456,170	1,161,633	1,183,520	720,145	3,521,468
	Transit Percentage	*18.51%*	*15.63%*	*16.82%*	*14.83%*	*16.24%*
HBS	Transit	35,553	18,377	11,572	4,748	70,250
	Auto Person & Transit	441,532	999,471	984,941	456,151	2,882,095
	Transit Percentage	*8.05%*	*1.84%*	*1.17%*	*1.04%*	*2.44%*
HBO	Transit	105,308	49,816	41,030	19,324	215,478
	Auto Person & Transit	849,860	2,160,034	2,187,745	1,223,266	6,420,905
	Transit Percentage	*12.39%*	*2.31%*	*1.88%*	*1.58%*	*3.36%*
NHW	Transit	20,858	38,214	51,402	29,110	139,584
	Auto Person & Transit	183,863	549,589	557,211	320,450	1,611,113
	Transit Percentage	*11.34%*	*6.95%*	*9.22%*	*9.08%*	*8.66%*
NHO	Transit	35,845	10,999	12,305	6,216	65,365
	Auto Person & Transit	478,859	1,050,166	950,672	437,335	2,917,032
	Transit Percentage	*7.49%*	*1.05%*	*1.29%*	*1.42%*	*2.24%*
All	Transit	282,007	299,017	315,374	166,165	1,062,563
	Auto Person & Transit	2,410,284	5,920,893	5,864,089	3,157,347	17,352,613
	Transit Percentage	*11.70%*	*5.05%*	*5.38%*	*5.26%*	*6.12%*

Converting Monetary Toll Values to Minutes

Time Valuation (Minutes/2007$) by Purpose and Income Level

HH Income Quartile Range (1)	Mid-Point of HH Income Range	Hourly Rate per Worker (2)	2007 Time Valuation (Minutes per Dollar) Work Trips (75% V.O.T.)	Non-work (50% V.O.T.)
$ 0 - $ 50,000	$25,000	$9.23	**8.7**	**13.0**
$ 50,000 - $ 100,000	$75,000	$27.70	**2.9**	**4.3**
$100,000 - $150,000	$125,000	$46.17	**1.7**	**2.6**
$150,000 +	$175,000	$64.64	**1.2**	**1.9**

Notes:

(1) Income groups based on 2007 ACS-based quartiles

(2) Hourly rate based on 1,920 annual hours/worker * 1.41 workers/HH = 2,707 hrs/HH

(3) Median 2007 Annual Income for modeled area is $84,280

For example, a commuter from an income level 2 household choosing a minimum path with a $1.00 toll, the highway time in the composite impedance function would be equal to the "over-the-network" time plus 2.9 minutes

F-Factor Calibration Process

- A “trial and error” process:
  1. Run the gravity model with test – F-factors
  2. Compare resulting TLFs with observed TLFs
  3. Adjust the test factors based on ratio of Obs. and Est. TLFs, on an impedance-by-impedance basis
  4. “Smooth” the adjusted F-factor (Gamma function used for this purpose)
  5. Re-run gravity model and repeat the above steps

Estimated Gamma Coefficient Values by Purpose and Income Strata

Purpose	Strata	Beta	Gamma
HBW	Income 1	-0.95818	-0.04622
	Income 2	-1.41425	-0.02571
	Income 3	-1.49461	-0.01920
	Income 4	-1.88024	-0.00835
HBS	Income 1	-2.46334	-0.07853
	Income 2	-1.33371	-0.12170
	Income 3	-1.99113	-0.09033
	Income 4	-2.91461	-0.06704
HBO	Income 1	-1.83692	-0.09635
	Income 2	-1.92946	-0.07128
	Income 3	-1.72297	-0.08637
	Income 4	-2.44221	-0.05837
NHW		-2.34915	-0.01478
NHO		-1.77486	-0.07430

Regional Estimated and Observed Trip lengths and Intra-zonal Percentages

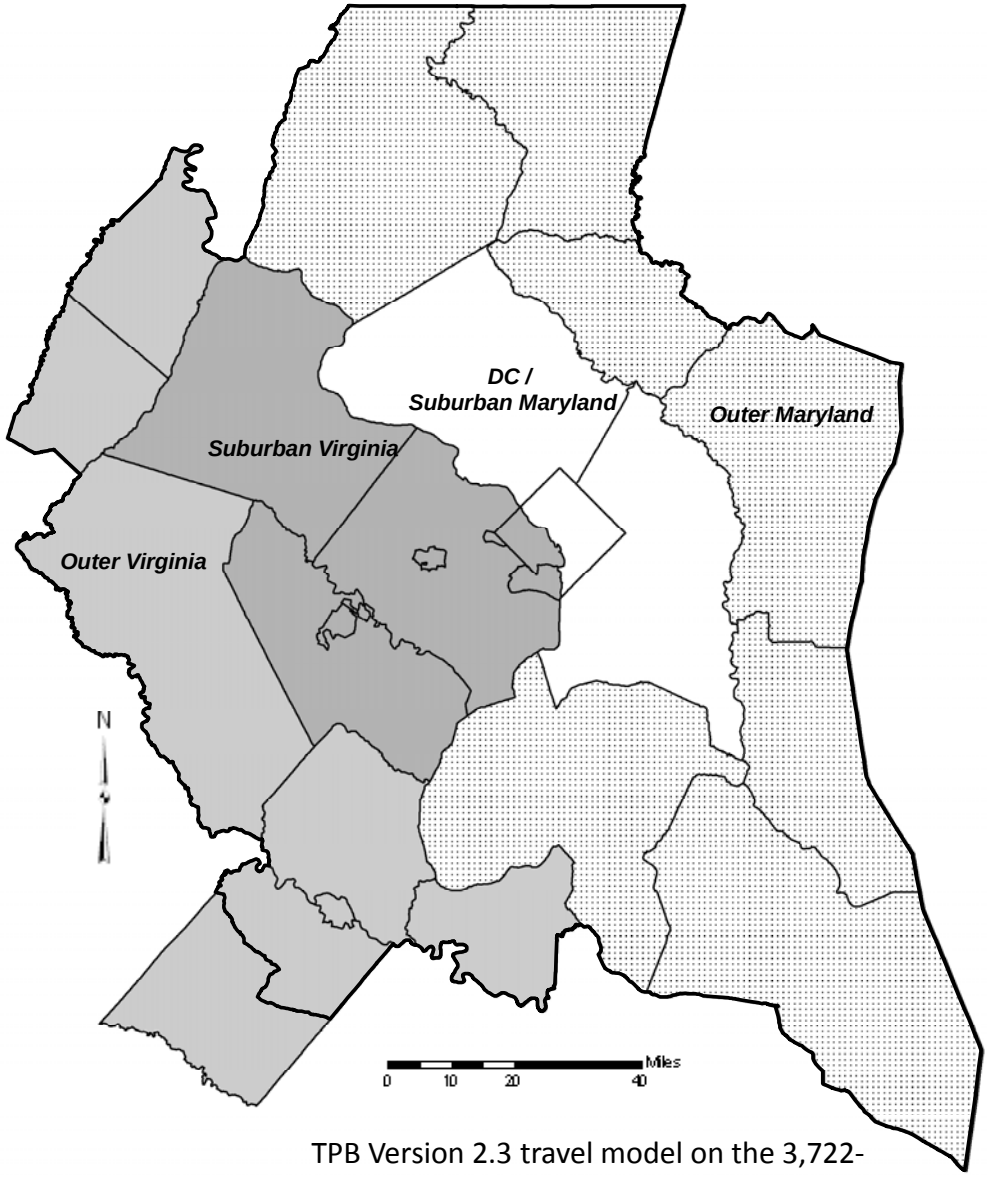
	Income	HTS	Trip Length in Composite mins.			Intrazonal Percentage		
Purpose	Level	Trips	Est.	Obs.	Est.-Obs.	Est.	Obs.	Est.-Obs.
HBW	1	456,200	33.69	35.58	-1.89	3.12	3.22	-0.10
	2	1,161,600	46.54	47.21	-0.67	3.00	2.92	0.08
	3	1,183,500	52.47	51.33	1.14	2.02	1.97	0.05
	4	720,100	53.57	52.21	1.36	1.41	1.62	-0.21
HBS	1	441,500	16.56	16.81	-0.25	9.13	9.33	-0.20
	2	999,500	16.82	17.17	-0.35	8.98	9.84	-0.86
	3	984,900	17.30	17.70	-0.40	7.88	7.68	0.20
	4	456,200	16.83	17.13	-0.30	6.37	5.19	1.18
HBO	1	849,900	16.73	18.31	-1.58	9.36	7.90	1.46
	2	2,160,000	17.61	17.86	-0.25	11.60	11.06	0.54
	3	2,187,700	17.15	17.77	-0.62	9.92	12.15	-2.23
	4	1,223,300	17.00	17.92	-0.92	9.56	9.12	0.44
NHW	(n/a)	1,611,100	24.63	23.58	1.05	10.63	7.44	3.19
NHO	(n/a)	2,917,000	17.13	17.50	-0.37	17.33	14.61	2.72

Potomac River Crossings

- Trip distribution models typically take into account major physical barriers such as rivers to account for behavioral impacts:

  "people don't like crossing rivers"
- After the F-factor calibration, a jurisdiction – based summary indicated that Potomac River crossings were over-estimated by 70%
- K-factoring was used to address the over-estimations. Time penalties could have been considered (and still can be)

K-Factor Analysis Areas



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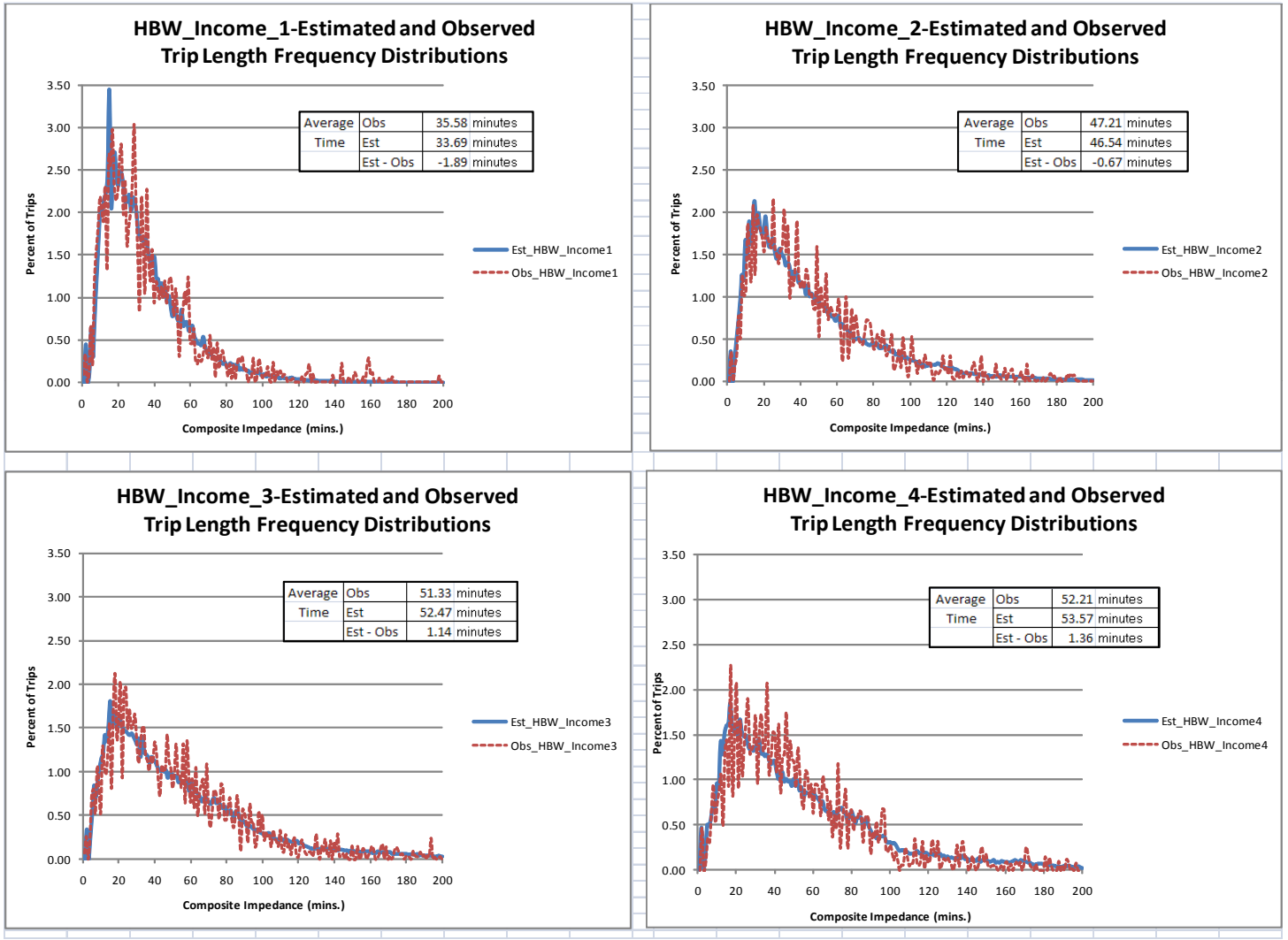
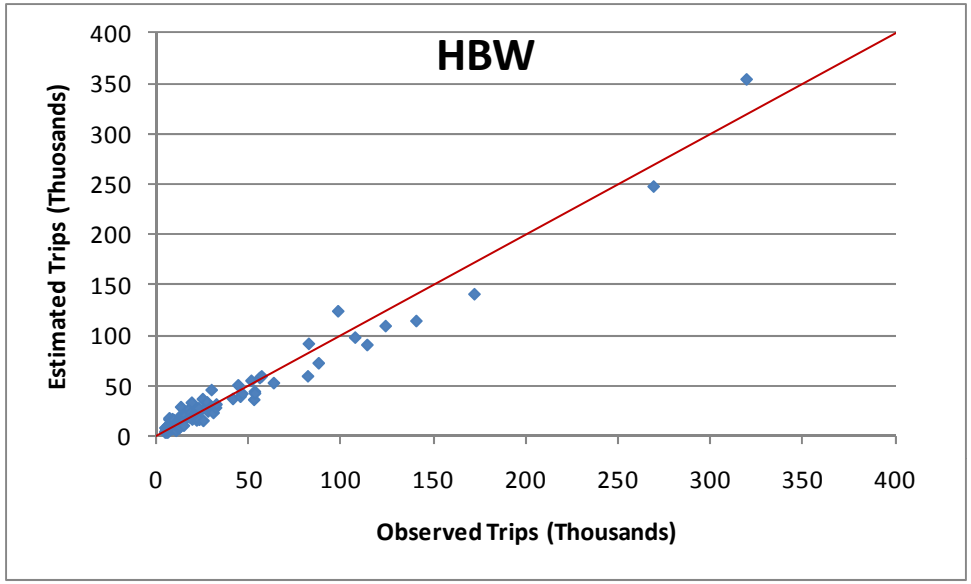
K-Factors used to calibrate Potomac River trip crossings

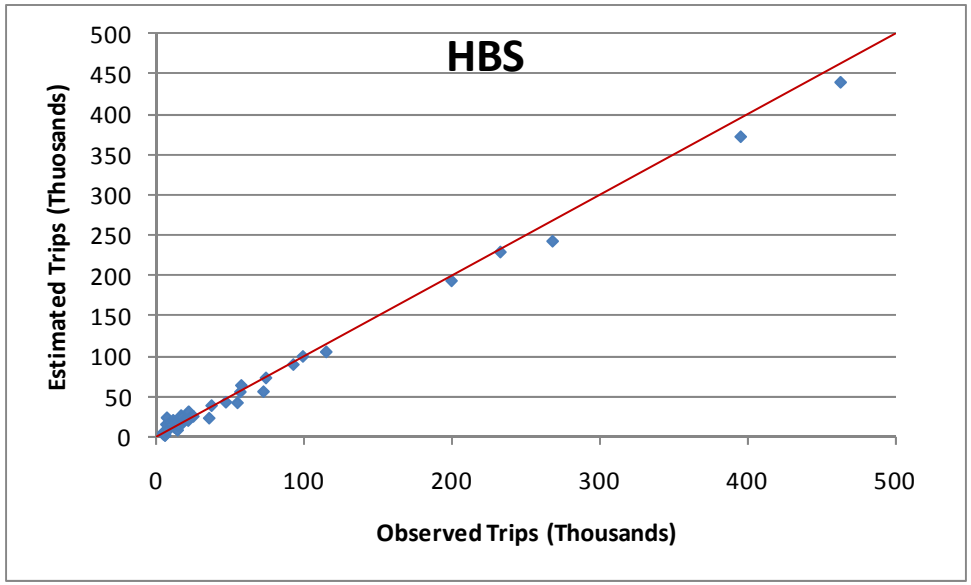
Purpose		DC/SubMD	SubVA	OuterMD	OuterVA
HBW	DC/SubMD		0.8		
	SubVA	0.9		0.5	
	OuterMD		0.7		0.5
	OuterVA	0.7		0.3	
HBS	DC/SubMD		0.25		
	SubVA	0.25		0.5	
HBO	DC/SubMD		0.3		
	SubVA	0.7		0.3	
NHW	DC/SubMD		0.6		
	SubVA	0.6		0.5	
NHO	DC/SubMD		0.3		
	SubVA	0.3		0.5	
	OuterMD		0.4		0.5

HBW : Estimated and Observed TLFs by Income Group

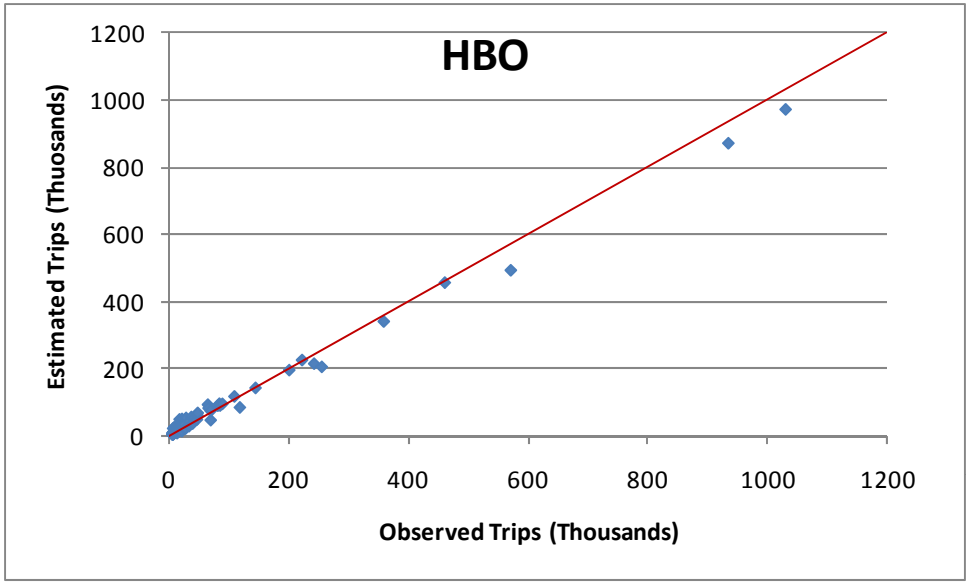


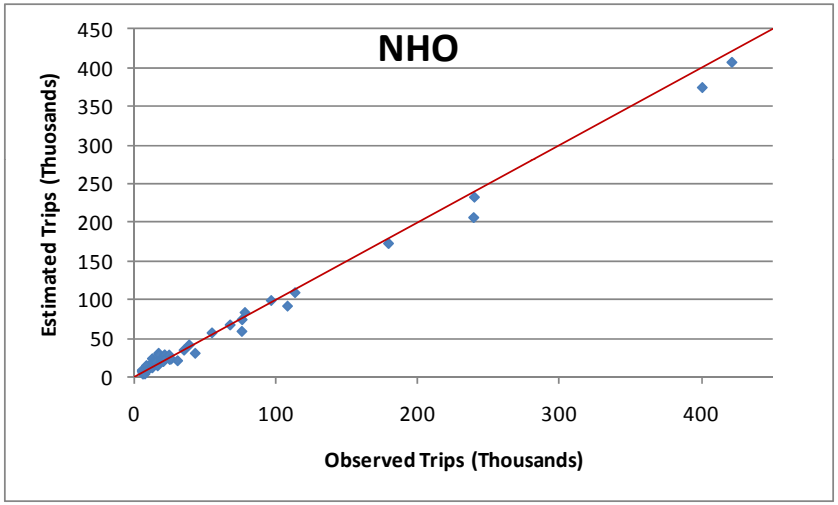
Jurisdictional Trip Flows by Purpose: Estimated vs. Observed Trips

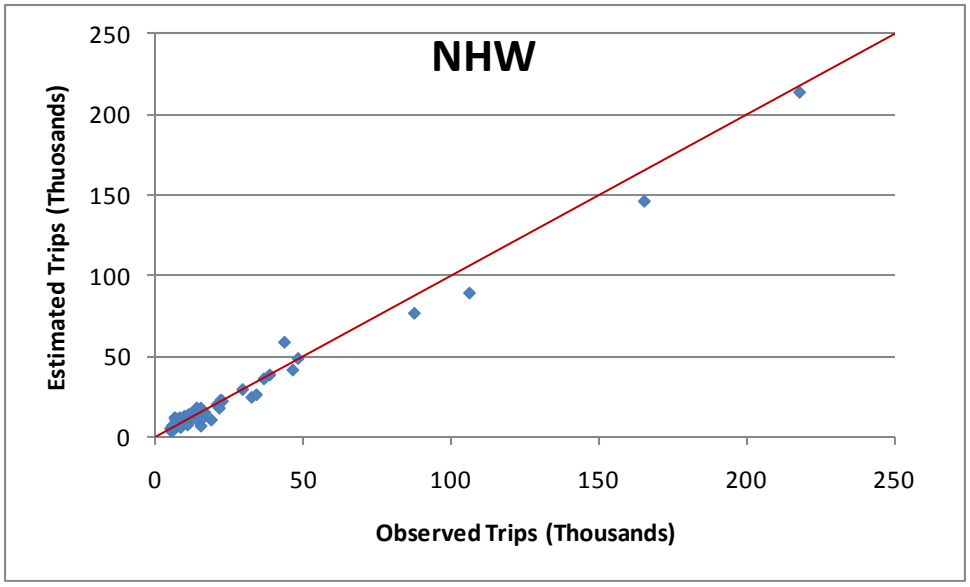




Jurisdictional Trip Flows by Purpose: Estimated vs. Observed Trips







Summary and conclusions

- Ver. 2.3 trip distribution calibration results reasonable, but under evaluation at the county-to-county level
- TPB's current number of GM iterations (7) will increased substantially increased in application
- Calibrated model is being tested in application

Mark Moran

MODE CHOICE CALIBRATION, USING AN OBSERVED TRIP TABLE

Overview

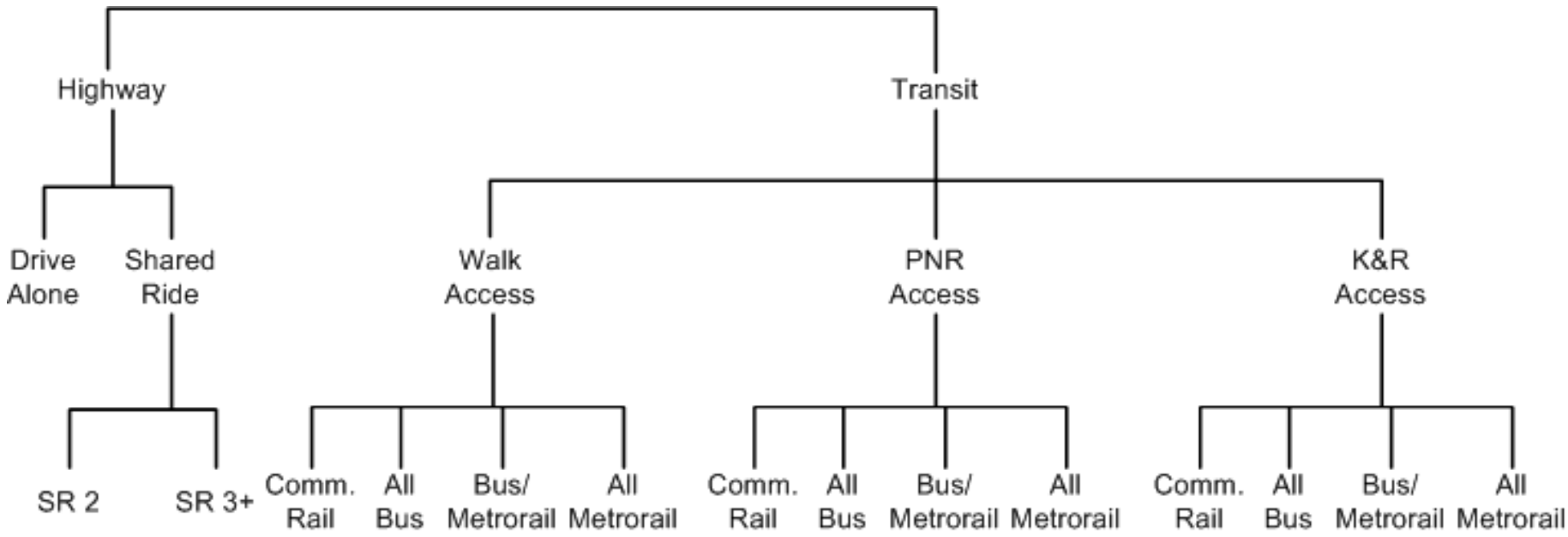
- Mode choice model will be calibrated twice
  - Observed trip table: 2007/2008 COG/TPB Household Travel Survey (weighted)
  - Simulated trip table
- Today's presentation: Calibration to an observed trip table
- Nested-logit mode choice (NLMC) model is applied
  - with AEMS Fortran program
  - within the speed feedback loop
- Automated calibration routine: CALIBMS

Overview

- NLMC model in TPB's Version 2.3 travel model can be thought of as consisting of four parts
  1. A set of available modes/choices (15) and a nesting structure;
  2. Rules for market segmentation (e.g., 4 HH income levels & 20 geographic areas)
  3. A set of utility equations, which include time/cost coefficients and also income constants;
  4. A set of **nesting *coefficients*** (a.k.a. logsum parameters or Φ) and **nesting *constants*** (NC).

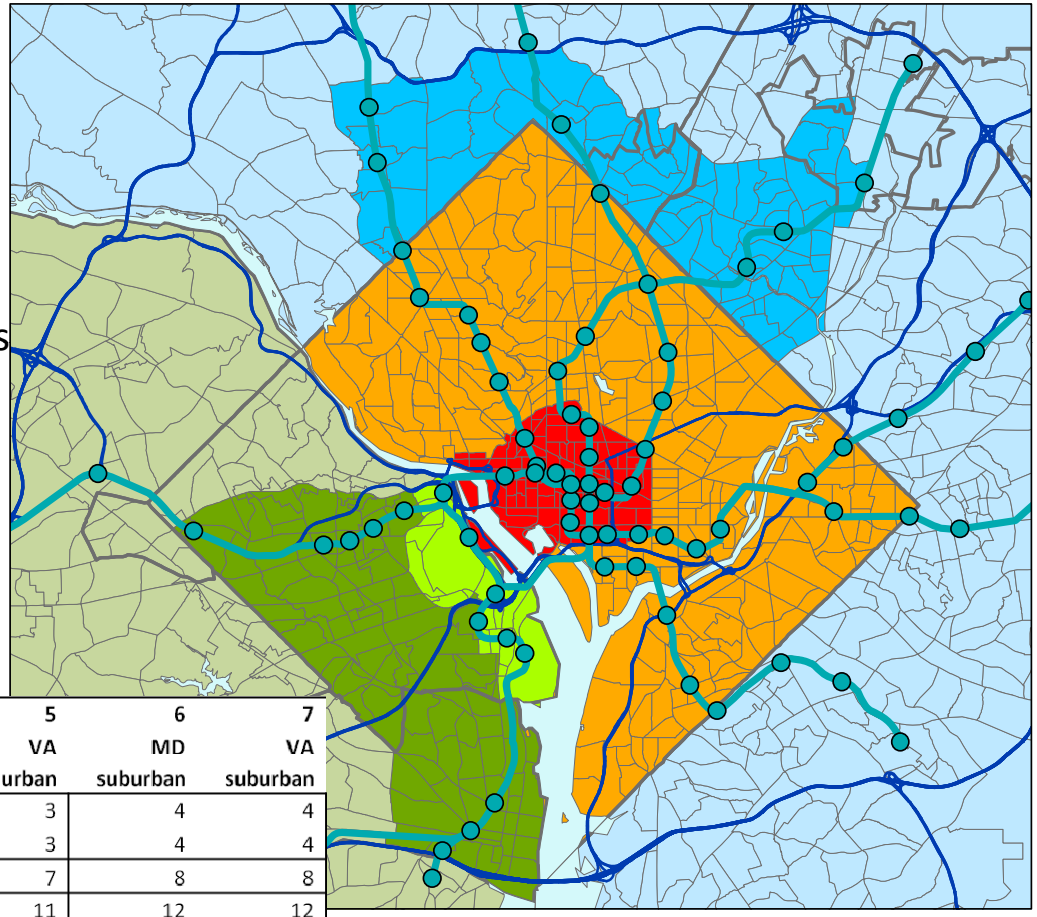
NLMC model description, 1

- Choices and nesting structure



NLMC model description, 2

- Rules for market segmentation
  - Household income levels (1, 2, 3, 4)
  - Seven superdistricts => 20 geographic market segments



		1 DC core	2 VA core	3 DC urban	4 MD urban	5 VA urban	6 MD suburban	7 VA suburban
1	DC core	1	2	3	3	3	4	4
3	DC urban	1	2	3	3	3	4	4
4	MD urban	5	6	7	7	7	8	8
2	VA core	9	10	11	11	11	12	12
5	VA urban	9	10	11	11	11	12	12
6	MD suburban	13	14	15	15	15	16	16
7	VA suburban	17	18	19	19	19	20	20

NLMC model description, 3

- A set of utility equations:
  - Time/cost coefficients

		Trip Purpose (5)				
Variable		**HBW**	**HBS**	**HBO**	**NHBW**	**NHBO**
In-vehicle time	ivt	-0.02128	-0.02168	-0.02322	-0.02860	-0.02860
Auto access time	aat	-0.03192	-0.03252	-0.03483	-0.04290	-0.04290
Walk access time	ovtwa	-0.04256	-0.04336	-0.04644	-0.05720	-0.05720
Other out-of-vehicle time*	ovtot	-0.05320	-0.05420	-0.05805	-0.07150	-0.07150
Cost - Income group 1	costinc1	-0.00185	-0.00202	-0.00202	-0.00994	-0.00994
Cost - Income group 2	costinc2	-0.00093	-0.00101	-0.00101	-0.00994	-0.00994
Cost - Income group 3	costinc3	-0.00062	-0.00067	-0.00067	-0.00994	-0.00994
Cost - Income group 4	costinc4	-0.00046	-0.00051	-0.00051	-0.00994	-0.00994
* Includes boarding penalty						

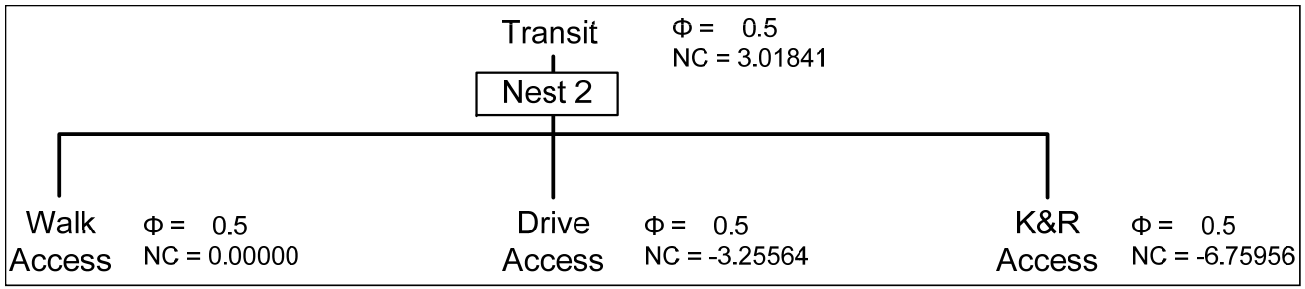
  - Income constants

	Income stratification		
Mode	**Low**	**Middle**	**High**
All auto modes	0.0	0.0	0.0
Walk to commuter rail	2.0	0.0	-2.0
Walk to all bus	2.0	0.0	-2.0
Walk to bus/Metrorail	2.0	0.0	-2.0
Walk to all Metrorail	2.0	0.0	-2.0
PNR and KNR to transit	0.0	0.0	0.0

Low = income quartile 1
Middle = income quartile 2,3
High = income quartile 4

NLMC model description, 4

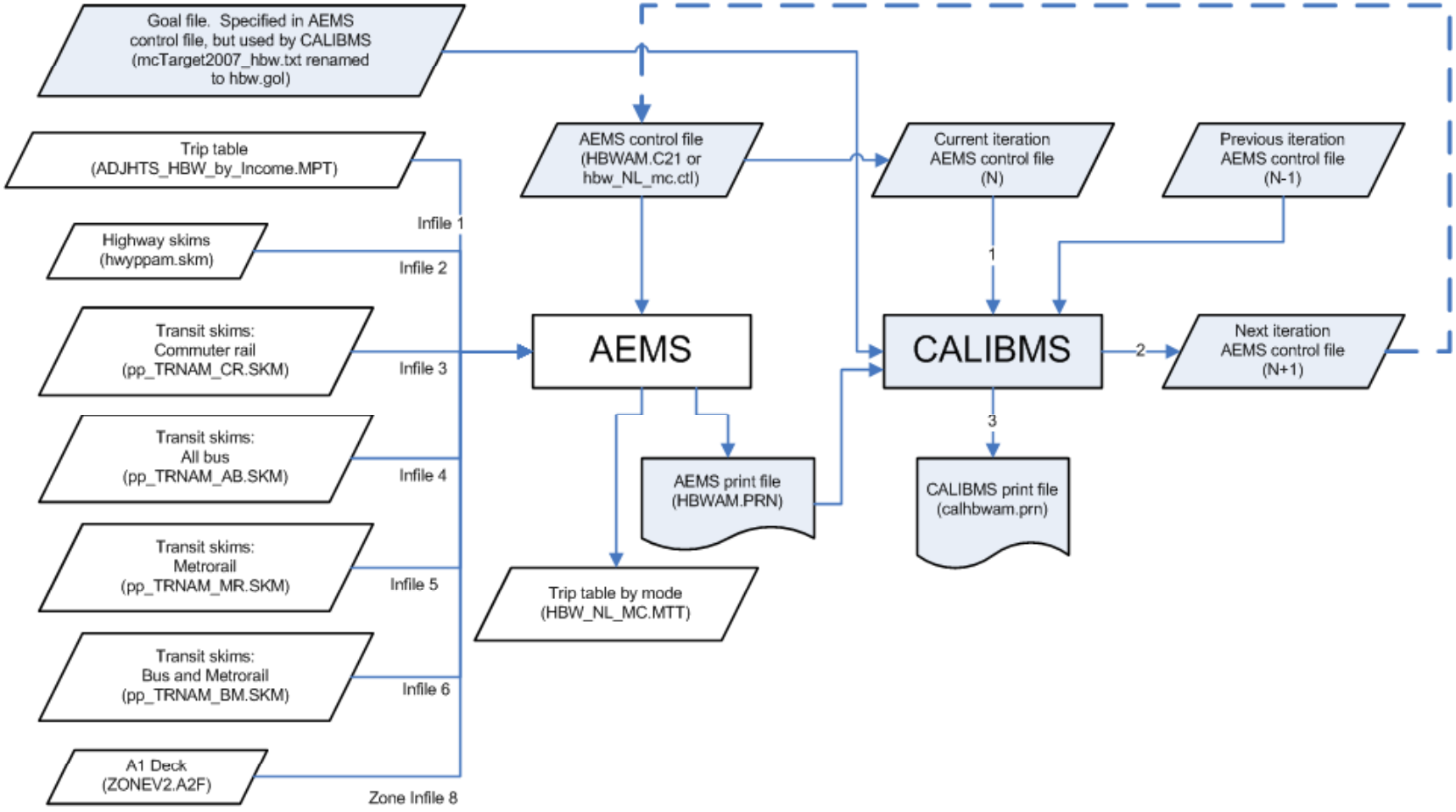
- Nesting coefficients, Φ
  - A function of the underlying correlation between the unobserved components for pairs of alternatives in a nest
  - They characterize the degree of substitutability between alternatives
  - Set by professional judgment
- Nesting constants, NC (from CALIBMS)
  - Nesting constants serve the role of the "alternative-specific constants" in a classic logit mode choice model
  - They account for effects of variables not explicitly coded in the model, such as the comfort and convenience of travel modes



Calibration process

- Automated using CALIBMS
  - Assume all parameters are fixed, except for nesting constants
  - Determine the value of the nesting constants that will allow the model to best replicate a series of calibration targets (observed trips by travel mode and geographic market segment)
  - Review calculated nesting constants; possible manual adjustment/override of calculated values

Calibration process: Schematic



Calibration targets

- Transit person trips
  - 2008 Metrorail Survey
  - 2008 Regional Bus Survey (supplemented by the Fairfax Connector Bus Survey)
  - 2007-2008 On-Board Survey of Maryland Transit Administration (MTA) Riders (i.e., MARC riders)
  - 2005 Virginia Railway Express (VRE) Passenger Survey

	HBW (Peak)	HBS (Midday)	HBO (Midday)	NHBW (Midday)	NHBO (Midday)	TOTAL
WK-CR	1,851	21	210	0	400	2,483
PNR-CR	16,645	0	259	0	208	17,112
KNR-CR	1,473	0	197	0	217	1,887
ALL CR	19,970	21	666	0	825	21,482
WK-BUS	171,836	18,432	87,043	23,685	16,226	317,222
PNR-BUS	15,966	81	3,029	354	1,522	20,953
KNR-BUS	4,554	199	2,004	1,425	880	9,063
ALL BUS	192,356	18,712	92,077	25,465	18,628	347,238
WK-BUS/MR	132,144	2,486	23,694	12,417	3,960	174,701
PNR-BUS/MR	27,525	112	2,700	1,482	560	32,379
KNR-BUS/MR	9,248	136	1,731	1,211	1,003	13,329
ALL BUS/MR	168,916	2,733	28,125	15,110	5,524	220,408
WK-MR	194,164	4,854	46,905	56,578	16,428	318,928
PNR-MR	137,984	469	15,658	7,270	1,562	162,943
KNR-MR	42,791	145	4,437	4,378	1,832	53,582
ALL MR	374,939	5,468	66,999	68,226	19,822	535,454
GRAND TOTAL	**756,181**	**26,934**	**187,867**	**108,801**	**44,798**	**1,124,582**

- Auto person trips
  - loading the weighted 2007 HTS on a year-2007 highway network

	HBW (Peak)	HBS (Midday)	HBO (Midday)	NHBW (Midday)	NHBO (Midday)	TOTAL
DRIVE ALONE	2,630,375	2,282,295	3,731,467	2,074,295	2,140,994	12,859,426
SR2	303,275	1,621,887	4,105,606	483,476	1,723,387	8,237,631
SR3+	17,355	1,021,132	3,084,632	16,007	1,154,492	5,293,618
TOTAL AUTO	**2,951,005**	**4,925,314**	**10,921,705**	**2,573,778**	**5,018,873**	**26,390,675**

NLMC model description

- Nesting constants (output from CALIBMS), e.g., HBW

HBW - Top level equivalents of nest constants

		1	2	3	4	5	6	7	8	9	10	11	12
		DC CORE / URBAN-DC CORE	DC CORE / URBAN-VA CORE	DC CORE / URBAN-URBAN	DC CORE / URBAN-OTHER	MD URBAN-DC CORE	MD URBAN-VA CORE	MD URBAN-URBAN	MD URBAN-OTHER	VA CORE / URBAN-DC CORE	VA CORE / URBAN-VA CORE	VA CORE / URBAN-URBAN	VA CORE / URBAN-OTHER
1	LOV	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	HOV2	-1.2362	-1.1969	-1.1672	-1.1998	-1.2302	-1.2900	-1.1675	-1.1600	-1.2587	-1.1915	-1.1828	-1.1932
3	HOV3+	-2.0295	-1.9661	-1.9285	-1.9794	-2.0199	-2.1019	-1.9295	-1.9177	-2.1777	-2.0589	-2.0006	-1.9938
4	WLK CR	1.2083	2.1148	1.1810	3.5553	2.1014	3.2352	0.0378	1.7964	-0.1529	0.7022	1.1234	-0.3151
5	WLK BUS	1.0212	0.9616	0.9328	0.2718	0.1979	-1.7536	-0.3408	-0.6161	-0.3203	0.4944	-0.3445	-1.1590
6	WLK BU/MR	1.9191	2.0796	1.8326	0.0112	1.2630	1.1049	0.1729	-0.6871	0.6798	-0.1301	0.0268	-1.0700
7	WLK METRO	1.1879	2.2380	1.1031	3.1606	2.8685	4.7929	0.6123	1.8658	2.4727	1.0444	2.6743	2.6189
8	PNR CR	0.2268	0.7895	-0.4964	0.4457	-0.9255	-0.8275	-2.7202	-2.6965	-0.8295	-2.0333	-1.5138	-3.3031
9	KNR CR	-0.8351	-0.6928	-1.4113	-0.0289	-1.6291	-1.6716	-4.3421	-3.4326	-1.8739	-2.9843	-2.4803	-2.9249
10	PNR BUS	-0.0419	0.7895	-1.1735	-1.0702	-0.9642	-0.8275	-2.7721	-2.0272	-0.4520	-1.6012	-1.6002	-1.6315
11	KNR BUS	-1.1145	-0.6928	-1.2846	-0.5768	-0.8929	-1.6716	-2.1674	-1.8961	-1.8739	-2.9843	-2.4803	-1.6012
12	PNR BU/MR	0.7442	0.6559	-1.4183	-1.1695	-0.1438	-0.8275	-2.2576	-3.0799	-0.5034	-2.0333	-1.5673	-3.3031
13	KNR BU/MR	0.0491	-0.6928	-0.5653	-1.8178	-0.6042	-1.6716	-1.9410	-3.1117	-0.3538	-2.9843	-2.6778	-3.6005
14	PNR METRO	0.2468	1.5198	-0.2722	0.6678	-0.6362	-0.9815	-2.3236	-2.1534	-1.0020	-1.6262	-1.4881	-1.5838
15	KNR METRO	-2.1355	-1.1929	-1.5957	-0.3054	-1.5850	-1.5815	-2.7593	-3.3553	-1.9456	-2.8855	-2.4285	-2.6257

13	14	15	16	17	18	19	20
MD OTHER-DC CORE	MD OTHER-VA CORE	MD OTHER-URBAN	MD OTHER-OTHER	VA OTHER-DC CORE	VA OTHER-VA CORE	VA OTHER-URBAN	VA OTHER-OTHER
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
-1.3209	-1.2851	-1.2335	-1.1679	-1.7765	-1.6623	-1.5257	-1.2117
-2.1542	-2.1049	-2.0250	-1.9331	-3.7215	-3.7848	-3.5939	-2.4092
-0.2547	0.4225	-1.0197	-1.7377	-1.4712	-1.2404	-1.7323	-3.2293
0.1728	0.1154	-0.4453	-0.4369	-0.6751	-0.3652	-0.7668	-1.3488
0.2738	-0.5131	-0.6040	-0.9181	-0.1762	-0.4802	-0.7153	-1.8771
1.8616	0.6113	1.5124	0.1998	1.5397	0.6003	0.8149	-0.0444
-0.7863	-2.5219	-1.9944	-2.9733	-2.9784	-2.2104	-2.0416	-4.9553
-2.3631	-4.4459	-3.2714	-3.7724	-4.2278	-3.6856	-3.3912	-6.0359
-2.9290	-0.6746	-1.4698	-2.2328	-2.2059	-1.6453	-2.1507	-6.0737
-3.6836	-1.5783	-2.1849	-2.6083	-3.3122	-2.9882	-3.1989	-4.2392
0.1839	-0.7672	-1.3895	-2.9302	0.1496	-1.6164	-1.8234	-4.9050
-1.1346	-1.7597	-2.1983	-3.0639	-1.6862	-2.7941	-2.8691	-4.3660
-0.7017	-0.1704	-1.5852	-2.5759	-1.6087	-2.0965	-2.1711	-3.2048
-1.2917	-0.9415	-1.7111	-2.1868	-1.8060	-1.8762	-1.9133	-1.8399

Modeled results: Regional level

	Mode	HBW		HBS		HBO		NHW		NHO		ALL	
		Target	Model	Target	Model	Target	Model	Target	Model	Target	Model	Target	Model
All 20 Segments	DR ALONE	2,630,375	2,639,778	2,282,295	2,278,671	3,731,467	3,730,732	2,074,295	2,073,797	2,140,994	2,139,731	12,859,426	12,862,709
	SR2	303,275	304,362	1,621,887	1,619,314	4,105,606	4,104,805	483,476	483,378	1,723,387	1,722,374	8,237,631	8,234,234
	SR3+	17,355	17,421	1,021,132	1,019,512	3,084,632	3,084,024	16,007	16,004	1,154,492	1,153,836	5,293,618	5,290,797
	WK-CR	1,851	1,808	21	21	210	253	0	966	400	287	2,483	3,335
	WK-BUS	171,836	172,135	18,432	18,089	87,043	81,213	23,685	22,314	16,226	15,288	317,222	309,040
	WK-BU/MR	132,144	132,070	2,486	2,872	23,694	23,223	12,417	11,760	3,960	3,946	174,701	173,872
	WK-MR	194,164	181,192	4,854	4,702	46,905	46,342	56,578	55,329	16,428	16,255	318,928	303,820
	PNR-CR	16,645	16,972	0	5	259	1,087	0	110	208	181	17,112	18,355
	KNR-CR	1,473	1,517	0	16	197	402	0	948	217	1,191	1,887	4,074
	PNR-BUS	15,966	16,310	81	4,551	3,029	4,529	354	1,041	1,522	1,812	20,953	28,242
	KNR-BUS	4,554	4,701	199	1,154	2,004	4,731	1,425	1,482	880	1,068	9,063	13,136
	PNR-BU/MR	27,525	27,411	112	628	2,700	3,363	1,482	1,821	560	514	32,379	33,738
	KNR-BU/MR	9,248	9,336	136	204	1,731	2,330	1,211	1,164	1,003	2,056	13,329	15,090
	PNR-MR	137,984	138,741	469	550	15,658	15,647	7,270	7,107	1,562	1,809	162,943	163,853
	KNR-MR	42,791	43,078	145	474	4,437	4,441	4,378	4,350	1,832	1,970	53,582	54,313
	Total Person	3,707,186	3,706,832	4,952,248	4,950,763	11,109,572	11,107,122	2,682,579	2,681,573	5,063,671	5,062,317	27,515,257	27,508,607
	Total Transit	756,181	745,271	26,934	33,266	187,867	187,561	108,801	108,393	44,798	46,375	1,124,582	1,120,866
	Transit Pct	20.4%	20.1%	0.5%	0.7%	1.7%	1.7%	4.1%	4.0%	0.9%	0.9%	4.1%	4.1%

These results reflect the calibration of the mode choice model to an observed trip table (2007/2008 HTS). These results will be superseded when the mode choice model is calibrated to a simulated trip table.

Next steps

- Calibration of NLMC model to a simulated trip table
- Further checking of transit networks
- Testing of transit assignment
  - After release of travel model in February

Ron Milone

SCHEDULE FOR RELEASE AND USE OF VERSION 2.3 TRAVEL MODEL

Upcoming dates for the Version 2.3 model on 3,722-TAZ area system

- February 2011
  - Release of draft Version 2.3 model to TFS, along with documentation
  - Release of AQC draft scope of work to TPB Technical Committee, which identifies the selection of travel model
- March to October 2011
  - Testing of new travel model on AQC networks
  - Refinement to travel model, based on tests
- October 2011
  - Draft model results to Tech. Comm.
- November 2011
  - TPB approval of AQC determination
  - Ver. 2.3 travel model becomes **adopted model**