METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS
777 North Capitol Street, N.E.
Suite 300
Washington, D.C. 20002-4239

MEMORANDUM

TO: Files

FROM: Ron Milone

DATE: April 8, 2004

SUBJECT: Transmittal of Version 2.1D (Draft #16) Model

This memorandum documents information supporting the transmittal of the TPB's Version 2.1D (Draft #16) travel forecasting model. It includes a summary of the electronic files needed to apply the model, a brief description of the technical differences of the model relative to the currently adopted Version 2.1/TP+, Release C model, and a corresponding set of model performance tables. A CD containing the electronic file accompanies this memorandum. Please note that all referenced tables and figures appear at the end of this memorandum.

Clarification

The Version 2.1D model development process remains an ongoing work in progress. The model files listed in this memorandum pertain to the most recent refinements accomplished to date. The results shown in this memorandum supersede the performance summaries presented at the March 19 Travel Forecasting Subcommittee meeting.

Technical Differences, Version 2.1D vs Version 2.1C/Release C

The following is a list of the differences between the 2.1D model and the 2.1/C model, to date.

1) The application structure of the model has been modified to include additional iterations. The V2.1C model application consists of four iterations: 1) 'pump-prime', 2) 'base', 3) 'first', and 4) 'second' iterations. The mode choice model was explicitly executed in the 'base' iteration, while a simplified mode choice process was applied in the following 'first' and 'second' iterations. The current V2.1D model application consists of the same application procedure (4 iterations), but additionally includes a re-running of the 'base', 'first' and 'second' iterations, for a total of 7 iterations. The Version 2.1D procedure therefore involves running the mode choice model 2 times instead one time as was previously done. The execution of additional iterations provides greater assurance that highway travel time inputs used in the mode choice model are in equilibrium. The nomenclature of iterations has been simplified in the Version 2.1D batch process. The iterations are now referred to as 'pump-prime' iteration, 'first' iteration, 'second' iteration, … ,'sixth' iteration.

2) The number of K-factors used in the trip distribution process has been reduced from 68 to 59. Of the remaining 59 K-factors, 13 have been reduced in magnitude and none have been increased in magnitude. The adjustment of various model parameters (described below) afforded the opportunity to revisit and reduce the use of K-factors. Table 1 provides a detailed summary of K-factor differences between models.

3) Parameters assumed in the highway traffic assignment process have been re-specified. The free-flow speed and highway capacity table look-up values used in the traffic assignment process have been adjusted (see Table 2). The refined free-flow speeds are closer to what is assumed in the TPB's mobile emissions post processor, in comparison with the V2.1C speed assumptions. Furthermore, the Volume-Delay Function (VDF) associated with freeways have also been adjusted to better reflect observed freeway performance in the Washington region. Finally the number of maximum iterations used in the equilibrium highway assignment process has been increased from 10 to 20. Recent tests have indicated that 10 iteration specification (used in the V2.1C model) is not always ample for closure of the equilibrium assignment process, particularly for peak period assignments. A maximum iteration setting of 20 has been determined to be more appropriate.

4) The V2.1D model now includes improved sensitivity to highway pricing such as tolls. The capability is based an 'equivalent minute' approach. Monetary toll values, specified at the network link level, are converted into comparable time increments, which are added to highway time and considered in pathbuilding procedures. The influence of toll coding therefore impacts trip distribution, mode choice, and traffic assignment steps. Trip distribution toll/time equivalents are specified on a *person* level basis and may vary by income level and time period. Traffic assignment toll/time equivalents are specified on *vehicle type* basis and may vary by time period and facility (TOLLGRP). Tolls are coded in the highway network using two link attributes: TOLL (monetary toll value in current year dollars) and TOLLGRP (an optional operator code ranging from 1 to 9). Three user-specified parameter files are also used, *TOLL.ESC*, *TOLL.INC*, and *TOLL.SKM*. *TOLL.ESC* contains link specific factors associated with each TOLLGRP, including toll deflation rate, per mile rates, and time period-specific factors. The *TOLL.INC* file is used to specify the time/toll equivalent rate associated with each income group. *TOLL.SKM* is used to identify vehicle-specific time/toll equivalents.

5) The highway network building process has been re-written so that a single script file (Highway_Build_Toll.S) replaces the prior Fortran/TP+ steps used in highway building in the Version 2.1C model (i.e., CLOSESTP.EXE, ATYPETP.EXE, AREALKTP.EXE, and Highway_Build.S). The network building process also includes a zonal area type override capability so that 'standard' area type codes generated as part of the network building process can be changed at the user's discretion. Area type overrides are specified with the input file named *AREAOVR.ASC*. The highway network building process also reads initial highway speed files (AMSPD.LKP, OPSPD.LKP, TAZAMSPD.LKP, and TAZOPSPD.LKP) from the \INPUTS subdirectory instead of the \SUPPORT subdirectory. This enables the option for the analyst to re-specify initial highway speeds used in the 'Pump-Prime' iteration so that they are closer to equilibrium speeds.

6) A transit pathbuilding parameter PATHSTYLE has been reset from a value of '1' to '0'. A value of '1' has been historically recommended for large networks, as it is computationally efficient but less rigorous in the path development process compared to a setting of '0'. Recent model application work has indicated that transit path consistency problems may arise with a setting of '1'.

7) The in-vehicle travel time coefficient in the HBW mode choice model has been changed from 0.03556 to 0.02128 to obtain an out-of-vehicle/in-vehicle coefficient ratio of 2.5.

8) A non-zero transit aggregate adjustment factor corresponding to HBO trips within Prince William County was determined to be inappropriate, and was removed in the Version 2.1D model.

Version 2.1D Summary Tables

Summary and model performance tables are provided in Attachment 1. Results are provided for the years 1994, 2000, and 2030. The 2030 network is based on the 2003 CLRP adopted by the TPB in December 2003. Round 6.3 Land Use Forecasts are assumed. Staff notes a marked improvement for most of the 1994 and 2000 performance summaries relative to the documented Version 2.1C results.

Version 2.1D Model Application File Listings

The files for applying the Version 2.1D (Draft #16) model are provided on CD and are listed on Attachment 2. Model application files for the years 1994, 2000, and 2030 are provided.

The files include all software, TP+ scripts, control files, and modeling inputs. The application has been developed to operate with TP+ Version 2.2 or Version 3.*x*. Please note Version 3.*x* users may need to add a file named *tppdlibx.dll* to the TP+ software subdirectory to allow the application batch files to operate properly. (This file may be obtained from the CD on the \UTILITY subdirectory). To successfully execute the model with the above data, the user must have 1) TP+ installed on the computer, and 2) ample hard disk resources are available on the computer to accommodate output files and report listings. As a general rule 2.2 GB of hard disk space per year/alternative should be available.

The principal reference documents supporting the above model release are:

- Memorandum to the file describing transit constraint procedures (See Attachment 3).
- COG/TPB Travel Forecasting Model Version 2.1, Release C User's Guide, MWCOG, 12/23/02
- COG/TPB Travel Forecasting Model Version 2.1, Release C Calibration Report, MWCOG, 12/23/02

Prospective users should familiarize themselves with specific application conventions, including a pre-defined subdirectory structure, file naming conventions, and batch file specifications. The user's guide provides information in this regard.

The transmitted files are arranged in subdirectory groups, as shown on the first table in Attachment 2. Attachment 2 also provides a listing of individual filenames by subdirectory group. The control totals of trips and VMT resulting from the model runs by year are shown on the first page of Attachment 1. Note that the table references source reports generated by the model for each specific control total.

Table 1: K-Factor Comparison

	Version 2.1/C Travel Model				Version 2.1D (Draft #16)Travel Model				Result of K-Factor Change			
	Purpose				Purpose				Purpose			
Interchange	HBW	HBS	HBO	NHB	HBW	HBS	HBO	NHB	HBW	HBS	HBO	NHB
dc cr - dc cr	2.2				2.2							
dc cr - dc ncr	2.5				2.5							
dc ncr - dc cr	3.0	1.2	2.0		3.0		1.5			**Removed**	Reduced	
dc ncr - dc ncr	2.5	1.3	1.3		2.5	1.3					**Removed**	
dc ncr - mtg		2.0				2.0						
dc ncr - ffx			0.5								**Removed**	
dc ncr - extls	0.1								**Removed**			
mtg - dc cr	2.9		2.0		2.9		2.0					
mtg - dc ncr	2.4				2.4							
mtg - mtg	2.0	2.8	2.5	2.0	2.0	2.8	2.5	1.9				Reduced
mtg - how	0.2		0.2	0.2	0.2		0.2	0.2				
mtg - aa	0.2				0.2							
pg - dc cr	1.8		2.0		1.8		2.0					
pg - dc ncr	1.8				1.8							
pg - pg	2.5	1.8	2.5	2.0	1.5	1.8	2.5	1.9	Reduced			Reduced
pg - how	0.2				0.2							
pg - aa	0.2			0.2	0.2			0.3				Reduced
pg - extls	0.2								**Removed**			
arl cr - dc cr	2.5				2.5							
arl cr - dc ncr	2.0				2.0							
arl ncr - arl ncr		2.6	1.6	2.0		2.6	1.5				Reduced	**Removed**
arl ncr - dc cr	2.5				2.5							
alx - alx		2.3	1.9	2.0		2.3	1.9	1.7				Reduced
alx - dc cr	2.8				2.5				Reduced			
how - mtg			0.5				0.5					
how - pg	2.5				2.5							
how - extls/balt	2.5				2.5							
aa - aa	0.5		2.5		0.5		2.5					
aa - pg			0.6				0.7				Reduced	
ffx - dc cr	2.8		2.0		2.5		1.9		Reduced		Reduced	
ffx - dc ncr	2.3				1.5				Reduced			
ffx - ffx	1.2	1.1	2.0	2.0		1.1	2.0	1.7	**Removed**			Reduced
ffx - arl ncr	1.3				1.3							
frd - frd		2.8	2.5	2.5		2.8	2.5					**Removed**
frd - aa	0.2				0.2							
frd - how	0.2				0.2							
chs - chs		2.5	2.5	2.5		2.5	2.5					**Removed**
chs - dc cr	2.2				2.2							
chs - pg	2.2				2.2							
car - car		0.5				0.5						

Table 2: Speed and Capacity Comparisons

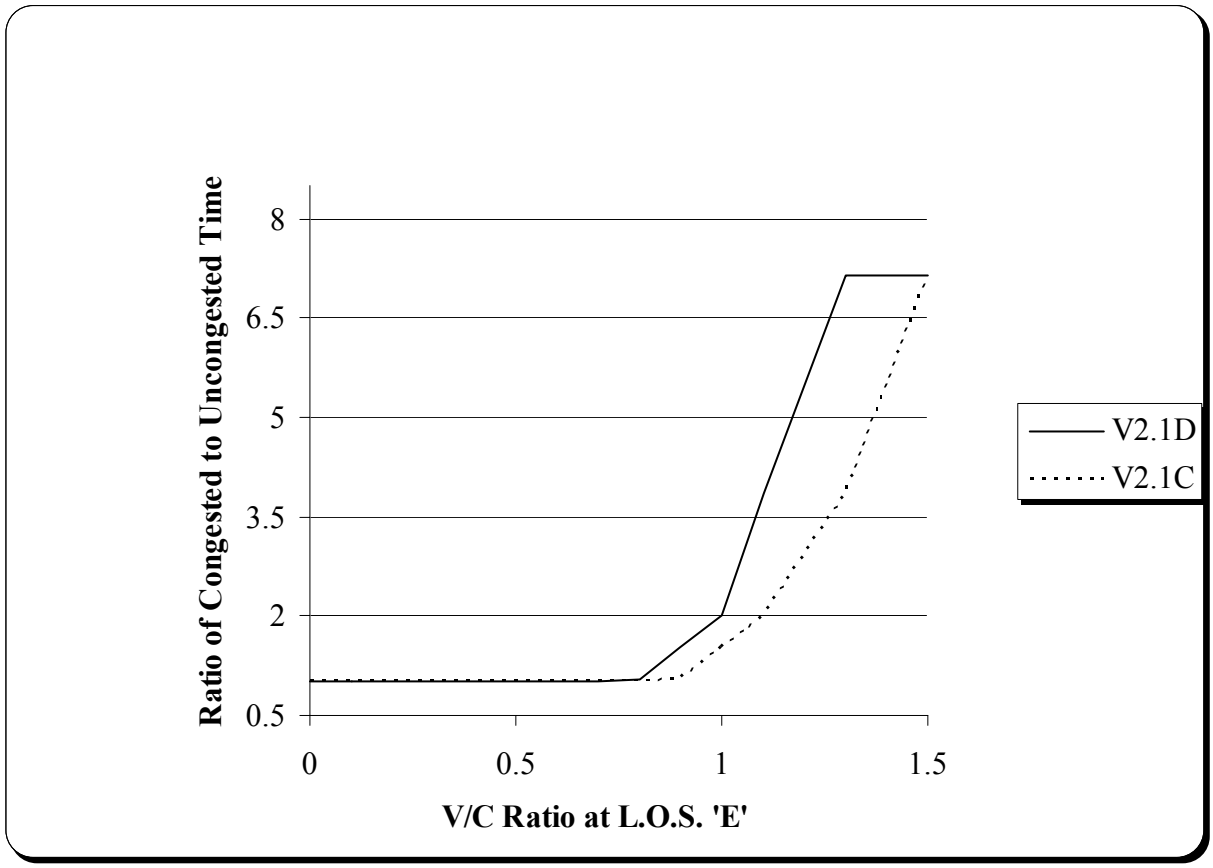
Freeflow Speed (mph)

	Version 2.1/C Travel Model						Version 2.1/D (Draft #16) Travel Model						Change (v2.1D - V2.1C)					
Area Type	Centroids (FT=0)	Freeway (FT=1)	Major Art. (FT=2)	Minor Art. (FT=3)	Collector (FT=4)	Exprway. (FT=5)	Centroids (FT=0)	Freeway (FT=1)	Major Art. (FT=2)	Minor Art. (FT=3)	Collector (FT=4)	Exprway. (FT=5)	Centroids (FT=0)	Freeway (FT=1)	Major Art. (FT=2)	Minor Art. (FT=3)	Collector (FT=4)	Exprway. (FT=5)
1	15	65	35	30	25	60	15	55	25	20	15	45	0	-10	-10	-10	-10	-15
2	15	65	40	35	35	60	15	55	25	20	15	45	0	-10	-15	-15	-20	-15
3	20	70	40	35	35	65	20	60	35	30	20	50	0	-10	-5	-5	-15	-15
4	25	70	45	40	35	65	25	60	35	30	20	50	0	-10	-10	-10	-15	-15
5	30	70	50	40	40	65	30	67	40	35	25	50	0	-3	-10	-5	-15	-15
6	30	70	50	45	40	65	30	67	45	40	30	55	0	-3	-5	-5	-10	-10
7	35	70	50	45	40	65	35	67	45	40	30	55	0	-3	-5	-5	-10	-10

LOS E Capacity (vphpl)

	Version 2.1/C Travel Model						Version 2.1/D (Draft #16) Travel Model						Change (v2.1D - V2.1C)					
Area Type	Centroids (FT=0)	Freeway (FT=1)	Major Art. (FT=2)	Minor Art. (FT=3)	Collector (FT=4)	Exprway. (FT=5)	Centroids (FT=0)	Freeway (FT=1)	Major Art. (FT=2)	Minor Art. (FT=3)	Collector (FT=4)	Exprway. (FT=5)	Centroids (FT=0)	Freeway (FT=1)	Major Art. (FT=2)	Minor Art. (FT=3)	Collector (FT=4)	Exprway. (FT=5)
1	3,150	1,500	800	400	300	900	3,150	1,500	800	500	300	900	0	0	0	100	0	0
2	3,150	1,600	900	500	400	1,000	3,150	1,600	800	600	400	1,000	0	0	-100	100	0	0
3	3,150	2,000	1,000	700	500	1,000	3,150	1,800	960	700	500	1,000	0	-200	-40	0	0	0
4	3,150	2,000	1,200	800	700	1,200	3,150	1,800	960	840	700	1,200	0	-200	-240	40	0	0
5	3,150	2,100	1,500	900	700	1,500	3,150	2,000	1,260	1,000	700	1,500	0	-100	-240	100	0	0
6	3,150	2,100	1,500	900	700	1,500	3,150	2,000	1,260	1,000	700	1,500	0	-100	-240	100	0	0
7	3,150	2,200	1,500	1,000	800	1,500	3,150	2,100	1,260	1,000	800	1,500	0	-100	-240	0	0	0

Figure 1: Comparison of Freeway Volume Delay Functions



Attachment 1
Version 2.1 D (Draft #16) Model Summary Section

1. Comparison of Reg. Demographic and Travel Trends: 1994, 2000, and 2030
2. 1994 Estimated and Observed VMT Summary by Jurisdiction
3. 1994 Estimated and Observed Daily Traffic Across Regional Screenlines
4. 1994 RMSE Summary by Facility Type and Volume Range
5. 2000 Estimated and Observed VMT by Jurisdiction
6. 2000 Estimated and Observed Screenline Volumes
7. 2000 RMSE Summary by Facility Type
8. Estimated and Observed Ring 1 Trip Summary
9. Est. and Obs. Metro Core and Beltway Cordon Trip Crossings by Time Period
10. Estimated Volumes Across Regional Screenlines: 1994, 2000, and 2030
11. Estimated VMT by Jurisdiction: 1994, 2000, and 2030
12. Average Link Speeds by Jurisdiction for the Final Iteration Assignment

Version 2.1 D (Draft #16) Model
Comparison of Regional Demographic and Travel Trends Over Time

		1994	2000	2030	Report Reference
Land Use			*Rnd 6.3*	*Rnd 6.3*	
	Households	1,912,782	2,144,161	2,995,759	pp_hhsizinc.rpt
	Employment	3,049,559	3,482,427	5,063,847	pp_highway_build.rpt (p.11)
	Population	5,168,380	5,746,598	7,720,512	pp_highway_build.rpt (p.11)
Motorized Trips / Trip Rates	HBW	3,692,184	4,160,420	6,033,666	i4_mc_summary.tab
Motorized Person Travel	HBS	2,767,337	3,110,511	4,373,368	i4_mc_summary.tab
(Internal & External)	HBO	8,470,509	9,491,107	13,131,727	i4_mc_summary.tab
	NHB	6,170,232	6,931,317	9,643,490	i4_mc_summary.tab
	Total Person Trips	21,100,262	23,693,355	33,182,251	
Motorized Person Trips per HH		*11.03*	*11.05*	*11.08*	
Motorized Person Trips per Capita		*4.08*	*4.12*	*4.30*	
Non-Motorized HBW Trips		160,727	183,465	275,566	pp_hbw_tg.rpt
Auto Driver Travel	HBW	2,844,894	3,238,306	4,710,929	i4_mc_summary.tab
(Internal & External)	HBS	2,189,434	2,446,572	3,431,785	i4_mc_summary.tab
	HBO	5,914,335	6,577,887	9,126,735	i4_mc_summary.tab
	NHB	4,728,182	5,290,651	7,361,375	i4_mc_summary.tab
	Total Auto Dr.	15,676,845	17,553,416	24,630,824	
Auto Passenger Travel	HBW	348,089	384,335	570,613	
(Internal & External)	HBS	543,659	626,459	885,992	
	HBO	2,413,876	2,761,189	3,796,083	
	NHB	1,285,425	1,470,626	2,061,325	
	Total Auto Pass.	4,591,049	5,242,609	7,314,013	
Auto Occupancies	*HBW*	*1.12*	*1.12*	*1.12*	
(Internal & External)	*HBS*	*1.25*	*1.26*	*1.26*	
	HBO	*1.41*	*1.42*	*1.42*	
	NHB	*1.27*	*1.28*	*1.28*	
	Total Auto Occ.	*1.29*	*1.30*	*1.30*	
Transit Travel	HBW	499,201	537,779	752,124	i4_mc_summary.tab
(Internal Only)	HBS	34,244	37,480	55,591	i4_mc_summary.tab
	HBO	142,298	152,031	208,909	i4_mc_summary.tab
	NHB	156,625	170,040	220,790	i4_mc_summary.tab
	Total Int'l Transit	832,368	897,330	1,237,414	
Transit Percentage	*HBW*	*13.52%*	*12.93%*	*12.47%*	
	HBS	*1.24%*	*1.20%*	*1.27%*	
	HBO	*1.68%*	*1.60%*	*1.59%*	
	NHB	*2.54%*	*2.45%*	*2.29%*	
	Total Transit Pct.	*3.94%*	*3.79%*	*3.73%*	
Truck Travel	Medium Wgt.	266,027	304,865	446,380	Misc_Time-of-Day.tab
	Heavy Wgt.	135,327	157,976	280,083	Misc_Time-of-Day.tab
Miscellaneous & Through	Misc. Auto Dr.	483,232	583,921	847,389	Misc_Time-of-Day.tab
	Through Auto Dr.	31,816	40,706	98,796	Misc_Time-of-Day.tab
	Through Trucks	26,190	32,752	79,469	Misc_Time-of-Day.tab
	Airport Auto Drs.	n/a	22,612	56,694	Misc_Time-of-Day.tab
TOTAL VEHICLE TRIPS		16,619,437	18,696,248	26,439,635	
Vehicle-Miles-Traveled					i6_highway_assignment.rpt
Regional VMT		126,030,981	142,167,090	205,644,933	(search for tvmt00)
VMT per Capita		*24.39*	*24.74*	*26.64*	
VMT per HH		*65.89*	*66.30*	*68.65*	

Version 2.1D (Draft #16) Model
1994 Estimated and Observed Vehicle Miles of Travel (Thousands)
by Jurisdiction

Jurisdiction	Estimated	Observed	Est/Obs Ratio
District of Columbia	8,326	7,875	1.06
Montgomery	17,746	17,129	1.04
Prince George's	19,204	20,333	0.94
Arlington	3,910	4,124	0.95
Alexandria	1,935	2,072	0.93
Fairfax	21,686	22,979	0.94
Loudoun	2,402	2,902	0.83
Prince William	5,573	6,221	0.90
Frederick	6,007	4,879	1.23
COG Member Jurisdictions Subtotal:	*86,789*	*88,514*	*0.98*
Howard	8,065	6,990	1.15
Anne Arundel	8,326	8,580	0.97
Charles	1,771	2,007	0.88
1,478 Zone Cordon Subtotal	*104,951*	*106,091*	*0.99*
Carroll	2,363	2,167	1.09
Calvert	1,173	1,280	0.92
St. Mary's	1,138	1,166	0.98
King George	622	559	1.11
Fredericksburg	487	663	0.73
Stafford	2,896	2,935	0.99
Spotsylvania	1,361	1,940	0.70
Fauquier	1,953	2,104	0.93
Clarke	576	492	1.17
Jefferson	966	601	1.61
Outer Counties Subtotal	*13,535*	*13,907*	*0.97*
Expanded Cordon Total	**118,486**	**119,998**	**0.99**

The table reflects highway links with coded ground counts.
Source: i6_highway_assignment.rpt **3/31/2004**

Version 2.1D (Draft #16) Model
1994 Estimated and Observed Screenline Volume (in Thousands)

Screenline No.	Screenline Location	Estimated Volume	Observed Volume	Est./Obs.
1	Ring 1, Virginia	736	802	0.92
2	Ring 1, DC	969	915	1.06
3	Ring 3, Virginia	910	866	1.05
4	Ring 3, DC	990	966	1.02
5	Beltway, Virginia	1111	1078	1.03
6	Beltway, Maryland	1622	1591	1.02
7	Ring 5, Virginia	1121	1154	0.97
8	Ring 5, Maryland	1449	1368	1.06
9	Ring 7, Virginia	617	598	1.03
10	Eastern Loudoun Co.	224	230	0.97
11	US 15, Loudoun / Pr. William Co.	151	156	0.97
12	Central Montgomery Co. Radial	509	472	1.08
13	Eastern Montgomery Co. Radial	370	370	1.00
14	NE. Pr.Geo. Co. Radial	292	318	0.92
15	Central Pr.George's Co. Radial	262	238	1.10
16	Southern Pr.George's Co. Radial	226	214	1.06
17	Southern Fairfax / Pr. Wm. Radial	386	390	0.99
18	Central Fairfax Co. Radial	572	544	1.05
19	VA Route 7 Radial	426	466	0.91
20	Beltway & 'Inner' Potomac River Crossings	959	892	1.08
22	Central Mtg./P.G. Radial	1352	1196	1.13
23	NE Montgomery Co. Radial	156	136	1.15
24	Montgomery / Pr.Geo. Co. border	418	444	0.94
25	Montgomery/ Frederick Co. border	85	78	1.09
26	Montgomery / Howard Co. border	337	256	1.32
27	Pr.Geo. / Anne Arundel Co. Border	275	290	0.95
28	Charles / Pr.Geo. Co. Border	111	108	1.03
	Inner Screenline Subtotal	*16,636*	*16,136*	*1.03*
31	Frederick / Carroll Co. Border	116	58	2.00
32	Western Loudoun Co. Border	94	54	1.74
33	'Outer' Southwestern Circumferential	277	226	1.23
34	'Outer' Southeastern Circumferential	91	94	0.97
35	South of Baltimore City	814	782	1.04
36	'Outer' Northwestern Radial	76	28	2.71
37	'Outer' Western Circumferential	29	24	1.21
38	'Outer' I-95 (South) Radial	118	174	0.68
	Outer Screenline Subtotal	*1,615*	*1,440*	*1.12*
	Grand Total	**18,251**	**17,576**	**1.04**

Notes:

- The estimated figures reflect highway links with coded ground counts only.
- The estimated link volumes that have been rounded to thousands as the observed volumes are coded in thousands.
- Source: i6_highway_assignment.rpt **3/31/2004**

1994 Version 2.1 D (Draft #16) Model RMSE summary by facility type and volume range

Facility Type	Volume Range	Links Count	Ave Obs Volume	Ave Est Volume	Diff. (Obs-Est)	Pct Diff.	RMSE	Pct RMSE
Freeways	1.00-9.99K	20	7.10	19.10	-12.00	-169.01	17.99	253.36
	10.00-19.99K	106	14.45	25.26	-10.81	-74.80	14.95	103.46
	20.00-29.99K	143	24.60	32.08	-7.48	-30.39	11.48	46.66
	30.00-39.99K	171	34.56	38.23	-3.67	-10.61	11.80	34.15
	40.00-49.99K	147	45.24	45.89	-0.65	-1.43	14.27	31.54
	50.00-59.99K	84	54.94	62.08	-7.14	-13.00	15.07	27.43
	60.00-69.00K	63	64.05	55.37	8.68	13.56	17.36	27.11
	70.00-79.00K	43	72.95	75.19	-2.23	-3.06	14.86	20.36
	80.00-89.99K	81	85.59	76.00	9.59	11.21	18.11	21.16
	90.00-99.99K	62	95.08	80.58	14.50	15.25	20.49	21.55
	100.00-109.99K	124	103.97	83.64	20.33	19.55	26.13	25.14
	110.00-119.99K	36	114.61	85.78	28.83	25.16	32.99	28.79
	120.00-129.99K	2	127.00	77.50	49.50	38.98	49.50	38.98
	130.00-139.99K	6	138.00	103.33	34.67	25.12	42.52	30.81
	Subtotal:	***1,088***	***55.58***	***53.54***	***2.04***	***3.66***	***17.74***	***31.93***
Maj Arterials	1.00-9.99K	1,489	6.31	9.18	-2.87	-45.53	5.83	92.52
	10.00-19.99K	2,911	14.28	15.25	-0.97	-6.76	6.16	43.12
	20.00-29.99K	1,211	24.10	20.65	3.45	14.30	7.72	32.05
	30.00-39.99K	322	33.06	22.82	10.24	30.98	12.84	38.82
	40.00-49.99K	26	43.38	35.38	8.00	18.44	13.30	30.65
	50.00-59.99K	12	55.33	37.33	18.00	32.53	18.77	33.91
	Subtotal:	***5,971***	***15.51***	***15.37***	***0.14***	***0.87***	***7.03***	***45.35***
Minor Arterials	1.00-9.99K	2,681	5.06	5.79	-0.74	-14.58	3.32	65.63
	10.00-19.99K	494	12.28	8.82	3.46	28.17	5.82	47.39
	20.00-29.99K	56	22.11	12.79	9.32	42.16	12.02	54.37
	30.00-39.99K	4	31.00	12.00	19.00	61.29	19.00	61.29
	40.00-49.99K	1	44.00	20.00	24.00	54.55	24.00	54.55
	Subtotal:	***3,236***	***6.50***	***6.39***	***0.11***	***1.68***	***4.17***	***64.23***
Collectors	1.00-9.99K	2,472	4.07	3.60	0.47	11.58	2.84	69.86
	10.00-19.99K	354	12.53	5.93	6.60	52.69	8.01	63.94
	20.00-29.99K	30	22.47	7.63	14.83	66.02	16.47	73.30
	30.00-39.99K	2	39.00	8.00	31.00	79.49	31.00	79.49
	Subtotal:	***2,858***	***5.33***	***3.93***	***1.40***	***26.30***	***4.30***	***80.54***
Expressways	1.00-9.99K	46	7.17	8.85	-1.67	-23.33	4.32	60.17
	10.00-19.99K	120	14.50	17.67	-3.17	-21.84	8.11	55.96
	20.00-29.99K	98	23.92	27.74	-3.83	-16.00	7.75	32.42
	30.00-39.99K	94	33.77	30.12	3.65	10.81	8.73	25.86
	40.00-49.99K	35	42.09	29.69	12.40	29.46	13.91	33.05
	50.00-59.99K	3	56.00	31.33	24.67	44.05	24.74	44.18
	Subtotal:	***396***	***23.31***	***23.26***	***0.05***	***0.21***	***8.77***	***37.61***
Grand Total		***13,549***	***14.65***	***14.11***	***0.55***	***3.73***	***7.57***	***51.69***

Note:

$$RMSE = \sqrt{\frac{\sum (Obs.Count - Sim.Count)^2}{n}}$$

where n= the number of observations in each facility type / volume range group

Source: rmse_vol_94.s

Version 2.1D (Draft #16) Model
2000 Estimated and Observed Vehicle Miles of Travel (Thousands)
by Jurisdiction

Jurisdiction	Estimated	Observed	Est/Obs Ratio
District of Columbia	6,569	5,854	1.12
Montgomery	15,461	14,934	1.04
Prince George's	18,808	20,009	0.94
Arlington	3,349	3,555	0.94
Alexandria	1,396	1,254	1.11
Fairfax	22,751	23,050	0.99
Loudoun	3,875	3,821	1.01
Prince William	6,385	6,317	1.01
Frederick	7,353	6,528	1.13
COG Member Jurisdictions Subtotal:	*85,947*	*85,322*	*1.01*
Howard	8,302	8,035	1.03
Anne Arundel	12,252	11,494	1.07
Charles	2,160	2,742	0.79
1,478 Zone Cordon Subtotal	*108,661*	*107,593*	*1.01*
Carroll	2,632	2,496	1.05
Calvert	1,342	1,690	0.79
St. Mary's	1,521	1,628	0.93
King George	617	567	1.09
Fredericksburg	306	534	0.57
Stafford	3,478	3,151	1.10
Spotsylvania	1,507	1,803	0.84
Fauquier	2,368	2,372	1.00
Clarke	727	579	1.26
Jefferson	957	673	1.42
Outer Counties Subtotal	*15,455*	*15,493*	*1.00*
Expanded Cordon Total	**124,116**	**123,086**	**1.01**

The table reflects highway links with coded ground counts.
Source: i6_highway_assignment.rpt **3/31/2004**

Version 2.1D (Draft #16) Model
2000 Estimated and Observed Screenline Volume (in Thousands)

Screenline No.	Screenline Location	Estimated Volume	Observed Volume	Est./Obs.
1	Ring 1, Virginia	623	686	0.91
2	Ring 1, DC	810	680	1.19
3	Ring 3, Virginia	659	648	1.02
4	Ring 3, DC	956	870	1.10
5	Beltway, Virginia	1120	910	1.23
6	Beltway, Maryland	1519	1476	1.03
7	Ring 5, Virginia	1034	1116	0.93
8	Ring 5, Maryland	1381	1268	1.09
9	Ring 7, Virginia	781	716	1.09
10	Eastern Loudoun Co.	347	302	1.15
11	US 15, Loudoun / Pr. William Co.	162	148	1.09
12	Central Montgomery Co. Radial	384	398	0.96
13	Eastern Montgomery Co. Radial	316	314	1.01
14	NE. Pr.Geo. Co. Radial	302	308	0.98
15	Central Pr.George's Co. Radial	282	294	0.96
16	Southern Pr.George's Co. Radial	228	210	1.09
17	Southern Fairfax / Pr. Wm. Radial	401	360	1.11
18	Central Fairfax Co. Radial	685	658	1.04
19	VA Route 7 Radial	491	466	1.05
20	Beltway & 'Inner' Potomac River Crossings	972	972	1.00
22	Central Mtg./P.G. Radial	1254	1158	1.08
23	NE Montgomery Co. Radial	177	144	1.23
24	Montgomery / Pr.Geo. Co. border	376	392	0.96
25	Montgomery/ Frederick Co. border	107	92	1.16
26	Montgomery / Howard Co. border	365	342	1.07
27	Pr.Geo. / Anne Arundel Co. Border	321	312	1.03
28	Charles / Pr.Geo. Co. Border	153	164	0.93
	Inner Screenline Subtotal	*16,206*	*15,404*	*1.05*
31	Frederick / Carroll Co. Border	130	82	1.59
32	Western Loudoun Co. Border	113	64	1.77
33	'Outer' Southwestern Circumferential	310	226	1.37
34	'Outer' Southeastern Circumferential	106	100	1.06
35	South of Baltimore City	898	886	1.01
36	'Outer' Northwestern Radial	92	42	2.19
37	'Outer' Western Circumferential	34	32	1.06
38	'Outer' I-95 (South) Radial	162	174	0.93
	Outer Screenline Subtotal	*1,845*	*1,606*	*1.15*
	Grand Total	**18,051**	**17,010**	**1.06**

Notes:

- The estimated figures reflect highway links with coded ground counts only.
- The estimated link volumes that have been rounded to thousands as the observed volumes are coded in thousands.
- Source: i6_highway_assignment.rpt **3/31/2004**

2000 Version 2.1 D (Draft #16) Model RMSE summary by facility type and volume range

Facility Type	Volume Range	Links Count	Ave Obs Volume	Ave Est Volume	Diff. (Obs-Est)	Pct Diff.	RMSE	Pct RMSE
Freeways	1.00-9.99K	23	8.04	18.00	-9.96	-123.78	13.16	163.65
	10.00-19.99K	144	15.72	27.63	-11.92	-75.83	15.46	98.36
	20.00-29.99K	64	25.14	38.42	-13.28	-52.83	16.37	65.11
	30.00-39.99K	200	35.17	41.46	-6.29	-17.88	12.06	34.29
	40.00-49.99K	162	43.87	50.14	-6.27	-14.28	16.50	37.61
	50.00-59.99K	119	54.21	61.00	-6.79	-12.53	13.96	25.75
	60.00-69.00K	137	64.67	64.58	0.09	0.15	14.60	22.58
	70.00-79.00K	104	73.88	72.73	1.15	1.56	16.62	22.50
	80.00-89.99K	90	84.60	78.69	5.91	6.99	16.85	19.91
	90.00-99.99K	127	95.09	84.66	10.43	10.97	19.83	20.85
	100.00-109.99K	85	104.68	96.91	7.78	7.43	17.81	17.01
	110.00-119.99K	47	115.36	104.94	10.43	9.04	22.20	19.24
	120.00-129.99K	36	125.06	99.06	26.00	20.79	32.46	25.95
	130.00-139.99K	28	137.86	95.96	41.89	30.39	44.90	32.57
	Subtotal:	***1,366***	***61.18***	***61.63***	***-0.46***	***-0.75***	***17.74***	***29.00***
Maj Arterials	1.00-9.99K	1,316	6.52	10.55	-4.03	-61.75	6.96	106.81
	10.00-19.99K	2,614	14.32	17.31	-2.99	-20.89	7.25	50.67
	20.00-29.99K	1,289	23.67	23.06	0.61	2.58	6.81	28.76
	30.00-39.99K	312	32.30	26.62	5.68	17.59	9.68	29.98
	40.00-49.99K	24	42.75	35.67	7.08	16.57	17.70	41.40
	50.00-59.99K	12	52.67	32.08	20.58	39.08	22.93	43.54
	Subtotal:	***5,567***	***15.85***	***17.67***	***-1.82***	***-11.49***	***7.39***	***46.63***
Minor Arterials	1.00-9.99K	1,740	4.91	6.00	-1.10	-22.34	3.56	72.44
	10.00-19.99K	399	12.73	10.07	2.67	20.94	5.65	44.38
	20.00-29.99K	37	22.70	13.00	9.70	42.74	12.86	56.66
	30.00-39.99K	8	35.00	21.50	13.50	38.57	17.05	48.72
	Subtotal:	***2,184***	***6.75***	***6.92***	***-0.17***	***-2.56***	***4.45***	***65.88***
Collectors	1.00-9.99K	1,574	3.78	3.76	0.02	0.52	2.67	70.57
	10.00-19.99K	200	12.34	7.40	4.93	39.97	6.79	55.02
	20.00-29.99K	32	21.69	14.25	7.44	34.29	12.03	55.46
	Subtotal:	***1,806***	***5.04***	***4.35***	***0.69***	***13.78***	***3.72***	***73.82***
Expressways	1.00-9.99K	26	6.85	10.92	-4.08	-59.55	5.26	76.76
	10.00-19.99K	90	15.44	19.03	-3.59	-23.24	7.28	47.14
	20.00-29.99K	128	24.50	29.69	-5.19	-21.17	9.43	38.50
	30.00-39.99K	86	34.37	32.98	1.40	4.06	9.38	27.28
	40.00-49.99K	44	44.77	31.32	13.45	30.05	16.17	36.11
	50.00-59.99K	28	54.29	33.71	20.57	37.89	23.42	43.15
	Subtotal:	***402***	***27.74***	***27.25***	***0.49***	***1.75***	***11.30***	***40.73***
Grand Total		***11,325***	***18.26***	***19.12***	***-0.86***	***-4.69***	***8.68***	***47.54***

Note:

$$RMSE = \sqrt{\frac{\sum (Obs.Count - Sim.Count)^2}{n}}$$

where n= the number of observations in each facility type / volume range group

Source: rmse_vol_00.s

Estimated and Observed Ring 1 Trips Summary, Year 1994

Metro Core Cordon Location

		Est	Obs	E/O Ratio
From Metro Core to Non-Metro Core				
	Transit	9,314	10,154	0.92
	Auto Driver	11,255	13,468	0.84
	Auto Person	13,077	14,205	0.92
	Auto Occ.	1.16	1.05	1.10
	Transit Pct.	41.6%	41.7%	1.00
From Non-Metro Core to Metro Core				
	Transit	302,952	282,582	1.07
	Auto Driver	274,240	272,449	1.01
	Auto Person	349,641	352,604	0.99
	Auto Occ.	1.27	1.29	0.99
	Transit Pct.	46.4%	44.5%	1.04
Total Metro Core Cordon Crossings				
	Transit	312,266	292,736	1.07
	Auto Driver	285,495	285,917	1.00
	Auto Person	362,718	366,809	0.99
	Auto Occ.	1.27	1.28	0.99
	Transit Pct.	46.3%	44.4%	1.04

Sources: Observed Data- 1994 COG HTS/1994 Auto External Survey
Simulated Data- Version 2.1 D (Draft #16) Model / 6th Iteration HBW Trips (04/02/04)
sqzchksx.s

Comparison of Estimated and Observed 1994 HBW Trips
Crossing the
Beltway Cordon
Trips are in P/A Format

Beltway Cordon Location

		Est	Obs	E/O Ratio
From Inside Beltway to Outside				
	Transit	10,576	14,888	0.71
	Auto Driver	124,799	140,253	0.89
	Auto Person	137,564	155,160	0.89
	Auto Occ.	1.10	1.11	1.00
	Transit Pct.	7.1%	8.8%	0.82
From Outside the Beltway to Inside				
	Transit	155,481	149,749	1.04
	Auto Driver	493,170	527,478	0.93
	Auto Person	577,169	607,372	0.95
	Auto Occ.	1.17	1.15	1.02
	Transit Pct.	21.2%	19.8%	1.07
Total Beltway Cordon Crossings				
	Transit	166,057	164,637	1.01
	Auto Driver	617,969	667,731	0.93
	Auto Person	714,733	762,532	0.94
	Auto Occ.	1.16	1.14	1.01
	Transit Pct.	18.9%	17.8%	1.06

Sources: Observed Data- 1994 COG HTS/1994 Auto External Survey
Simulated Data- Version 2.1 D (Draft #16) Model / 6th Iteration HBW Trips (04/02/04)
sqzchksx.s

Estimated and Observed Metro Core and Beltway Cordon Trip Crossings by Time Period

Metro Core Cordon

	Inbound / 6:00 AM to 9:00 AM			Outbound / 4:00 PM - 7:00 PM		
	Estimated (1994)	Observed (1993)	Est/Obs Ratio	Estimated (1994)	Observed (1993)	Est/Obs Ratio
Total Vehicles	215,800	212,000	1.02	272,000	206,800	1.32
Transit Pass.	147,000	166,700	0.88	N/A	175,700	N/A

	Estimated (2000)	Observed (1999)	Est/Obs Ratio	Estimated (2000)	Observed (1999)	Est/Obs Ratio
Total Vehicles	213,600	225,800	0.95	271,600	222,300	1.22
Transit Pass.	150,400	166,000	0.91	N/A	153,900	N/A

Notes:
- Simulated figures from MWCOG Version 2.1 D (Draft #16) model (04/02/04).
- Observed figures from available MWCOG Metro Core Cordon Reports.
  The 1999 figures are currently in draft and unpublished.
- Transit trips include Metrorail, Metrobus, commuter rail, and commuter bus service
- Vehicle trips include autos, buses, trucks and motorcycles
- All figures have been rounded to the nearest hundred
- The 1999 and 2001 figures are currently in draft and unpublished.

Beltway Cordon

	Inbound / 6:00 AM to 9:00 AM			Outbound / 4:00 PM - 7:00 PM		
	Estimated (1994)	Observed (1995)	Est/Obs Ratio	Estimated (1994)	Observed (1995)	Est/Obs Ratio
Total Vehicles	322,200	374,800	0.86	434,700	399,000	1.09
Transit Pass.	57,700	63,600	0.91	N/A	61,800	N/A

	Estimated (2000)	Observed (2001)	Est/Obs Ratio	Estimated (2000)	Observed (2001)	Est/Obs Ratio
Total Vehicles	301,700	376,700	0.80	472,800	400,700	1.18
Transit Pass.	58,800	75,400	0.78	N/A	75,200	N/A

Notes:
- Simulated figures from MWCOG Version 2.1 D (Draft #16) model (04/02/04).
- Observed figures from available MWCOG Beltway Cordon Reports.
  The 2001 figures are currently in draft and unpublished.
- Transit trips include Metrorail, Metrobus, commuter rail, and commuter bus service
- Vehicle trips include autos, buses, trucks and motorcycles
- All figures have been rounded to the nearest hundred

Version 2.1D (Draft #16) Model

Estimated Volumes Across Regional Screenlines Over Time:
1994, 2000, 2030 (in thousands)

No.	Screenline Location	1994 Volume	1994 Link Count	2000 Volume	2000 Link Count	2030 Volume	2030 Link Count	% Change 94-'00	% Change 94-'30
1	Ring 1, Virginia	736	40	764	40	860	42	*3.8%*	*16.8%*
2	Ring 1, DC	973	74	982	74	1,078	74	*0.9%*	*10.8%*
3	Ring 3, Virginia	910	56	938	56	1,019	56	*3.1%*	*12.0%*
4	Ring 3, DC	990	68	1,014	68	1,108	68	*2.4%*	*11.9%*
5	Beltway, Virginia	1,121	52	1,159	54	1,323	54	*3.4%*	*18.0%*
6	Beltway, Maryland	1,635	98	1,731	100	2,065	102	*5.9%*	*26.3%*
7	Ring 5, Virginia	1,121	60	1,196	62	1,438	66	*6.7%*	*28.3%*
8	Ring 5, Maryland	1,471	94	1,629	96	2,098	102	*10.7%*	*42.6%*
9	Ring 7, Virginia	633	40	819	44	1,320	53	*29.4%*	*108.5%*
10	Eastern Loudoun Co.	224	14	348	20	719	24	*55.4%*	*221.0%*
11	US 15, Loudoun / Pr. William Co.	153	16	164	16	368	16	*7.2%*	*140.5%*
12	Central Montgomery Co. Radial	509	30	524	30	571	30	*2.9%*	*12.2%*
13	Eastern Montgomery Co. Radial	370	16	425	16	515	18	*14.9%*	*39.2%*
14	NE. Pr.Geo. Co. Radial	296	16	313	16	361	16	*5.7%*	*22.0%*
15	Central Pr.George's Co. Radial	267	10	292	12	326	12	*9.4%*	*22.1%*
16	Southern Pr.George's Co. Radial	226	16	230	16	307	16	*1.8%*	*35.8%*
17	Southern Fairfax / Pr. Wm. Radial	386	26	440	28	570	30	*14.0%*	*47.7%*
18	Central Fairfax Co. Radial	617	36	685	36	943	44	*11.0%*	*52.8%*
19	VA Route 7 Radial	429	34	508	38	718	40	*18.4%*	*67.4%*
20	Beltway & 'Inner' Potomac Riv. Crossings	959	14	972	14	1,135	18	*1.4%*	*18.4%*
22	Central Mtg./P.G. Radial	1,368	108	1,548	114	1,853	114	*13.2%*	*35.5%*
23	NE Montgomery Co. Radial	163	24	184	24	282	26	*12.9%*	*73.0%*
24	Montgomery / Pr.Geo. Co. border	418	26	464	26	552	26	*11.0%*	*32.1%*
25	Montgomery/ Frederick Co. border	100	8	107	8	269	12	*7.0%*	*169.0%*
26	Montgomery / Howard Co. border	337	20	373	20	572	22	*10.7%*	*69.7%*
27	Pr.Geo. / Anne Arundel Co. Border	275	14	328	14	445	14	*19.3%*	*61.8%*
28	Charles / Pr.Geo. Co. Border	115	10	155	10	223	10	*34.8%*	*93.9%*
	Inner Screenline Subtotal	**16,802**	***1,020***	**18,292**	***1,052***	**23,038**	***1,105***	*8.9%*	*37.1%*
31	Frederick / Carroll Co. Border	118	20	132	20	223	20	*11.9%*	*89.0%*
32	Western Loudoun Co. Border	94	8	113	8	186	8	*20.2%*	*97.9%*
33	'Outer' Southwestern Circumferential	277	14	310	14	523	16	*11.9%*	*88.8%*
34	'Outer' Southeastern Circumferential	91	12	106	12	143	12	*16.5%*	*57.1%*
35	South of Baltimore City	814	38	952	42	1,344	40	*17.0%*	*65.1%*
36	'Outer' Northwestern Radial	76	6	92	6	140	6	*21.1%*	*84.2%*
37	'Outer' Western Circumferential	33	10	34	10	77	10	*3.0%*	*133.3%*
38	'Outer' I-95 (South) Radial	118	20	174	20	279	22	*47.5%*	*136.4%*
	Outer Screenline Subtotal	1,621	128	1,913	132	2,915	134	*18.0%*	*79.8%*
	Grand Total	***18,423***	***1,148***	***20,205***	***1,184***	***25,953***	***1,239***	***9.7%***	***40.9%***

Source: scrnsum.s, scrnsum.rpt (04/02/04)

Version 2.1D (Draft #16) Model
Estimated VMT by Jurisdiction: 1994, 2000, 2030
(in thousands)

		VMT			Percent change	
	Jurisdiction	**1994**	**2000**	**2030**	**94 to 00**	**94 to 30**
0	Washington DC	8,585	8,684	9,579	1.2%	11.6%
1	Montgomery Co.	18,571	19,856	24,210	6.9%	30.4%
2	Prince George's Co.	19,959	21,107	26,726	5.8%	33.9%
3	Arlington Co.	4,068	4,184	4,602	2.9%	13.1%
4	Alexandria	2,010	2,103	2,524	4.6%	25.6%
5	Fairfax Co.	22,903	25,436	33,101	11.1%	44.5%
6	Loudoun Co.	2,763	4,341	10,232	57.1%	270.3%
7	Prince William Co.	5,861	7,011	11,959	19.6%	104.0%
9	Frederick Co.	6,418	7,772	13,240	21.1%	106.3%
10	Howard Co.	8,417	9,978	16,421	18.5%	95.1%
11	Anne Arundel Co.	10,234	13,125	19,560	28.2%	91.1%
12	Charles Co.	2,043	2,348	3,668	14.9%	79.5%
14	Carroll Co.	2,497	2,842	5,458	13.8%	118.6%
15	Calvert Co.	1,190	1,349	1,746	13.4%	46.7%
16	St Mary's Co.	1,344	1,571	2,218	16.9%	65.0%
17	King George Co.	626	622	1,299	-0.6%	107.5%
18	Fredericksburg	501	322	546	-35.7%	9.0%
19	Stafford Co.	3,007	3,563	6,159	18.5%	104.8%
20	Spotsylvania Co.	1,388	1,678	3,642	20.9%	162.4%
21	Fauquier Co.	2,053	2,378	5,108	15.8%	148.8%
22	Clarke Co.	570	735	1,559	28.9%	173.5%
23	Jefferson Co.	1024	1,159	2,088	13.2%	103.9%
	Total	126,032	142,164	205,645	12.8%	63.2%

Source: scrnsum.s, scrnsum.rpt (04/02/04)

Version 2.1D (Draft #16) Model
Average link speeds by jurisdiction
for the final (iteration #6) traffic assignment
Speeds in mph

					Change	
		1994	2000	2030	94 to 00	00 to 30
AM	DC	23	23	21	0	-2
	Mtg	30	30	26	0	-4
	Pg	34	33	26	-1	-7
	Arl	28	27	26	-1	-1
	Alx	24	23	20	-1	-3
	Ffx	30	30	27	0	-3
	Ldn	33	40	32	7	-8
	Pw	37	36	32	-1	-4
	Frd	50	47	32	-3	-15
	How	38	37	26	-1	-11
	AA	35	35	23	0	-12
	Chs	36	36	32	0	-4
	Car	36	35	29	-1	-6
	Cal	41	40	36	-1	-4
	St M	37	36	32	-1	-4
	KG	38	37	31	-1	-6
	Fbg	52	43	24	-9	-19
	Staf	51	48	29	-3	-19
	Spots	55	49	30	-6	-19
	Fau	48	48	40	0	-8
	Clk	39	38	27	-1	-11
	Jef	40	40	34	0	-6
	TOTAL	34	34	28	0	-6
PM	DC	19	19	17	0	-2
	Mtg	23	21	19	-2	-2
	Pg	27	25	20	-2	-5
	Arl	19	18	17	-1	-1
	Alx	18	16	14	-2	-2
	Ffx	23	22	20	-1	-2
	Ldn	31	36	27	5	-9
	Pw	33	31	28	-2	-3
	Frd	46	42	27	-4	-15
	How	30	30	19	0	-11
	AA	26	26	16	0	-10
	Chs	34	33	28	-1	-5
	Car	33	32	24	-1	-8
	Cal	40	38	33	-2	-5
	St M	36	33	29	-3	-4
	KG	36	35	25	-1	-10
	Fbg	50	39	21	-11	-18
	Staf	44	39	24	-5	-15
	Spots	53	47	25	-6	-22
	Fau	46	46	36	0	-10
	Clk	38	36	24	-2	-12
	Jef	38	38	30	0	-8
	TOTAL	28	27	22	-1	-5
Off-Pk	DC	28	28	25	0	-3
	Mtg	35	33	30	-2	-3
	Pg	38	38	30	0	-8
	Arl	33	31	29	-2	-2
	Alx	28	27	26	-1	-1
	Ffx	36	35	33	-1	-2
	Ldn	37	43	40	6	-3
	Pw	45	43	40	-2	-3
	Frd	54	53	42	-1	-11
	How	44	44	36	0	-8
	AA	42	44	30	2	-14
	Chs	37	37	35	0	-2
	Car	38	37	34	-1	-3
	Cal	42	42	38	0	-4
	St M	39	38	36	-1	-2
	KG	39	39	34	0	-5
	Fbg	54	45	29	-9	-16
	Staf	55	49	35	-6	-14
	Spots	56	52	36	-4	-16
	Fau	49	49	45	0	-4
	Clk	40	40	35	0	-5
	Jef	42	42	37	0	-5
	TOTAL	39	39	34	0	-5

ITERSUM.S (Iter. 6: JURIS_ITR_SUM.94, JURIS_ITR_SUM.00, and JURIS_ITR_SUM.30)

Attachment 2
Version 2.1 D (Draft #16) Model Application Files

1. Subdirectory Groups
2. Controls
3. Scripts
4. Software
5. Support
6. 1994 Inputs
7. 2000 Inputs
8. 2030 Inputs
9. 2005 Mode Choice Files
10. Utility

Subdirectories	Bytes	No. of Files	Subdirectory Description
\CGV21D_16X	37,267	39	Batch Files for model execution
\CGV21D_16X\controls	202,089	63	Control files for special programs
\CGV21D_16X\scripts	323,645	20	TP+ script files
\CGV21D_16X\software	2,575,698	19	Software executable programs
\CGV21D_16X\support	1,883,804	42	Model parameter files
\CGV21D_16X\1994_tip9499\inputs	21,609,619	52	Input files pertaining to 1994
\CGV21D_16X\2000_tip0005_rnd63\inputs	22,582,247	52	Input files pertaining to 2000
\CGV21D_16X\2030_tip0409_rnd63\inputs	24,891,890	55	Input files pertaining to 2030
\CGV21D_16X\2005base	17,073,901	4	2005 Mode Choice Files by purpose
\CGV21D_16X\utility	189,362	11	General utility programs
Total	**91,369,522**	**357**	

File List - Subdirectory: \CGV21D_16X

Seq. No.	File Name	Bytes	Date	Time
1	runall.bat	181	4/2/2004	03:46p
2	runall_00.bat	3,901	4/2/2004	12:20p
3	runall_30.bat	4,182	4/5/2004	03:02p
4	runall_94.bat	3901	4/2/2004	12:20p
5	Step00.Set_Factors.BAT	252	3/16/2004	10:22a
6	Step01.PP_Highway_Build.BAT	518	3/16/2004	10:22a
7	Step02.PP_Highway_PNR.bat	314	3/16/2004	10:22a
8	Step03.PP_Transit_Prep.bat	2241	3/16/2004	10:22a
9	Step04.PP_Transit_Skim.bat	305	3/11/2004	03:34p
10	Step05.PP_Trip_Generation.BAT	1555	3/16/2004	10:21a
11	Step06.PP_Trip_Distribution.BAT	492	4/1/2004	12:07p
12	Step07.PP_Auto_Drivers.bat	485	3/16/2004	10:21a
13	Step08.Misc_Time-of-Day.bat	485	3/16/2004	10:21a
14	Step09.PP_Time-of-Day.bat	542	3/16/2004	10:21a
15	Step10.PP_Highway_Assignment.BAT	510	3/16/2004	10:21a
16	Step11.PP_Highway_Skims.bat	313	3/16/2004	10:21a
17	Step12.Highway_PNR.bat	352	3/16/2004	10:21a
18	Step13.Transit_Skim.bat	304	3/16/2004	10:21a
19	Step14.Transit_Fare.bat	1842	3/16/2004	10:21a
20	Step15.Trip_Generation.BAT	1768	3/16/2004	10:21a
21	Step16.Trip_Distribution.BAT	583	4/1/2004	12:07p
22	Step17.Mode_Choice.bat	1,443	3/16/2004	10:20a
23	Step17.Mode_Choice_TC.bat	3,179	4/2/2004	12:25p
24	Step18.Auto_Driver.bat	525	3/16/2004	10:20a
25	Step19.Time-of-Day.bat	535	3/16/2004	10:20a
26	Step20.Highway_Assignment.BAT	498	3/16/2004	10:19a
27	Step21.Highway_Skims.bat	317	3/16/2004	10:19a
28	Step22.Trip_Distribution.BAT	580	4/1/2004	12:07p
29	Step23.Mode_Choice_Update.bat	450	3/16/2004	10:19a
30	Step24.Auto_Driver.bat	496	3/16/2004	10:19a
31	Step25.Time-of-Day.bat	515	3/16/2004	10:19a
32	Step26.Highway_Assignment.BAT	505	3/16/2004	10:19a
33	Step27.Highway_Skims.bat	316	3/16/2004	10:18a
34	Step28.Trip_Distribution.BAT	575	4/1/2004	12:07p
35	Step29.Mode_Choice_Update.bat	465	3/16/2004	10:18a
36	Step30.Auto_Driver.bat	508	3/16/2004	10:18a
37	Step31.Time-of-Day.bat	521	3/16/2004	10:18a
38	Step32.Highway_Assignment.BAT	497	3/16/2004	10:18a
39	Step33.Highway_Skims.bat	316	3/16/2004	10:22a
	Total	**37,267**		

File List - Subdirectory: \CGV21D_16X\CONTROLS

Seq. No.	File Name	Bytes	Date	Time
1	COGMCA1.CTL	902	5/24/2002	01:14a
2	ct2_am.ctl	639	5/20/2002	07:13p
3	ct2_op.ctl	641	5/20/2002	07:14p
4	gis.ctl	921	12/6/2002	09:42a
5	hbo_tg.ctl	3852	3/30/2004	10:23a
6	hbs_tg.ctl	3886	3/30/2004	10:23a
7	hbw_tg.ctl	3,862	9/24/2002	02:15p
8	htk_tg.ctl	3,836	8/27/2002	05:28p
9	mc_hbo.ctl	7,183	3/8/2004	05:27p
10	MC_hbo00.ctl	7,182	3/8/2004	05:26p
11	MC_hbo25.ctl	7,182	3/8/2004	05:27p
12	mc_hbo30.ctl	7,183	3/8/2004	05:27p
13	MC_hbo94.ctl	6,728	3/8/2004	05:28p
14	mc_hbs.ctl	7,188	3/8/2004	05:29p
15	MC_hbs00.ctl	7,188	3/8/2004	05:28p
16	MC_hbs25.ctl	7,188	3/8/2004	05:29p
17	mc_hbs30.ctl	7,188	3/8/2004	05:29p
18	MC_hbs94.ctl	6,734	3/8/2004	05:29p
19	mc_hbw.ctl	7,459	3/17/2004	04:22p
20	MC_hbw00.ctl	7,459	3/17/2004	04:22p
21	MC_hbw25.ctl	7,459	3/17/2004	04:22p
22	mc_hbw30.ctl	7,459	3/17/2004	04:22p
23	MC_hbw94.ctl	7,005	3/17/2004	04:22p
24	mc_nhb.ctl	7,150	3/8/2004	05:32p
25	MC_nhb00.ctl	7,148	3/8/2004	05:31p
26	MC_nhb25.ctl	7,150	3/8/2004	05:31p
27	mc_nhb30.ctl	7,150	3/8/2004	05:32p
28	MC_nhb94.ctl	6,694	3/8/2004	05:32p
29	mf_am_dr.ctl	940	3/8/2004	05:34p
30	mf_am_wk.ctl	936	3/8/2004	05:35p
31	mf_op_dr.ctl	1046	3/8/2004	05:36p
32	mf_op_wk.ctl	1011	3/8/2004	05:36p
33	mf1_am.ctl	844	8/4/2003	01:45p
34	mf1_op.ctl	1,438	8/4/2003	02:00p
35	mf1am00.ctl	901	2/22/2002	11:05p
36	MF1AM05.CTL	844	8/4/2003	01:45p
37	mf1am94.ctl	873	2/22/2002	11:01p
38	mf1op00.ctl	1446	2/22/2002	11:11p
39	MF1OP05.CTL	1438	8/4/2003	02:00p

File List - Subdirectory: \CGV21D_16X\CONTROLS- Continued

Seq. No.	File Name	Bytes	Date	Time
40	mf1OP94.ctl	1,444	2/22/2002	11:11p
41	mfamdr00.ctl	1,049	3/8/2004	05:34p
42	MFAMDR05.CTL	940	3/8/2004	05:34p
43	mfamdr94.ctl	982	3/8/2004	05:35p
44	mfamwk00.ctl	903	3/8/2004	05:35p
45	MFAMWK05.CTL	936	3/8/2004	05:35p
46	mfamwk94.ctl	977	3/8/2004	05:35p
47	mfopdr00.ctl	1076	3/8/2004	05:35p
48	MFOPDR05.CTL	1046	3/8/2004	05:36p
49	mfopdr94.ctl	971	3/8/2004	05:36p
50	mfopwk00.ctl	1,102	3/8/2004	05:36p
51	MFOPWK05.CTL	1011	3/8/2004	05:36p
52	mfopwk94.ctl	1,032	3/8/2004	05:36p
53	mtk_tg.ctl	3,840	8/27/2002	05:27p
54	NETSWAM.CTL	220	12/22/2001	09:39a
55	NETSWOP.CTL	220	12/22/2001	09:41a
56	nhb_tg.ctl	3892	3/30/2004	10:24a
57	NT_AM.CTL	568	12/22/2001	09:55a
58	NT_OP.CTL	564	12/22/2001	09:55a
59	PREFARTP.CTL	565	12/17/2002	04:45p
60	staprotp.ctl	1721	12/26/2001	12:25p
61	vehavtp.ctl	1975	8/8/2002	06:41p
62	walk_am.ctl	861	5/23/2002	03:46p
63	walk_op.ctl	861	5/23/2002	03:47p
	Total	**202,089**		

File List - Subdirectory: \CGV21D_16X\SCRIPTS

Seq. No.	File Name	Bytes	Date	Time
1	ADr_Update.s	6,568	1/11/2002	05:19p
2	Auto_Access.s	5,252	3/9/2004	01:16p
3	Export_Fares.s	2,644	3/9/2004	02:38p
4	Highway_Assignment.S	35,795	3/16/2004	04:16p
5	highway_build_toll.s	26,605	3/28/2004	05:45p
6	Highway_Skims.s	6,516	3/9/2004	04:40p
7	MC_Auto_Drivers.s	6,525	3/9/2004	04:06p
8	MC_Constraint.s	28,398	3/25/2004	09:41a
9	MC_ConSummary.s	12,416	3/9/2004	03:55p
10	MC_Summary.s	14,046	3/9/2004	03:31p
11	MC_Update.s	17,932	3/9/2004	05:43p
12	Metrorail_skims.s	2,532	12/26/2001	11:25a
13	Misc_Time-of-Day.s	9,892	1/3/2002	04:32p
14	PP_Auto_Drivers.s	11,807	11/10/2003	12:33p
15	PUMP_PRIME_SKIMS.S	10,194	3/10/2004	06:33p
16	Set_Factors.s	18,806	4/2/2004	12:17p
17	Time-of-Day.s	15,195	3/9/2004	04:11p
18	Transit_Skims.s	12,438	3/9/2004	02:47p
19	Trip_Distribution.s	77,866	3/10/2004	02:41p
20	Update_WkLinks.s	2,218	6/6/2002	05:39p
	Total	**323,645**		

File List - Subdirectory: \CGV21D_16X\SOFTWARE

Seq. No.	File Name	Bytes	Date	Time
1	CGTGV2TP.EXE	397,968	12/3/2002	06:47p
2	CNTCONN2.EXE	129,024	9/27/2002	12:27p
3	COGMC.EXE	561,486	4/6/2001	02:17p
4	COGMCA1.EXE	232,468	12/4/2002	02:42p
5	EXTRTAB.EXE	24,663	7/26/2001	12:38p
6	GIS_PROC.EXE	48,258	12/6/2002	09:22a
7	HHSIZINC.EXE	54,894	6/19/2000	05:45p
8	MFARE1.EXE	59,748	6/28/1992	04:45p
9	MFARE1OP.EXE	55,176	1/22/1999	01:06p
10	MFARE2TP.EXE	355,882	4/6/2001	01:49p
11	MTXIJTP.EXE	74,561	12/4/2002	12:50p
12	NETSW2.EXE	109,568	4/16/2001	10:15a
13	NODESTB.EXE	105,472	4/9/2001	11:27a
14	PREFARTP.EXE	40,704	11/26/2002	01:43p
15	SORTLINE.EXE	45,056	11/9/2001	05:37p
16	STAPROTP.EXE	64,652	12/4/2002	04:26p
17	TGCHK.EXE	27,012	4/12/2001	05:19p
18	VEHAVTP.EXE	66,402	12/4/2002	12:33p
19	WLKLNKTP.EXE	122,704	11/26/2002	12:45p
	Total	**2,575,698**		

File List - Subdirectory: \CGV21D_16X\SUPPORT

Seq. No.	File Name	Bytes	Date	Time
1	adjznpaf.htk	103,069	1/27/2000	01:04p
2	adjznpaf.mtk	103,069	1/27/2000	01:02p
3	adjzpaf7.upn	109,550	9/18/2002	03:52p
4	adjzpaf7.upo	109,550	9/18/2002	03:52p
5	adjzpaf7.ups	109,550	9/18/2002	03:52p
6	adjzpaf7.upw	109,550	9/18/2002	03:52p
7	ATYPV2.CSV	119	8/11/1994	04:34p
8	copy_ffs.cmd	212	3/30/2004	06:05p
9	HBOK.DAT	57,881	4/5/2004	09:41a
10	hbopen.03	4,922	5/9/2003	10:10a
11	HBOPEN.DAT	206,120	4/5/2004	09:41a
12	HBOV2.FFS	12,400	8/27/2002	04:49p
13	HBSK.DAT	49,895	4/5/2004	09:41a
14	hbspen.03	4,802	5/9/2003	10:11a
15	HBSPEN.DAT	146,384	4/5/2004	09:41a
16	HBSV2.FFS	12,400	8/27/2002	04:39p
17	HBWK.DAT	74,993	4/5/2004	09:41a
18	hbwpen.03	4,811	8/30/2002	05:32p
19	HBWPEN.DAT	182,168	4/5/2004	09:41a
20	HBWV2.ffs	12,400	8/27/2002	04:41p
21	HTKK.DAT	94,555	4/5/2004	09:41a
22	JURISV21.EQV	40,736	5/29/2001	03:23p
23	mc_fac.asc	6,161	10/21/1991	09:39a
24	mccf_hbo.asc	2,940	12/17/2002	11:46a
25	mccf_hbs.asc	2,940	12/16/2002	07:55p
26	mccf_hbw.asc	2,940	12/16/2002	06:57p
27	mccf_nhb.asc	2,940	12/17/2002	12:13p
28	mctf_hbo.asc	2,940	3/9/2004	05:45p
29	mctf_hbs.asc	2,940	12/16/2002	07:33p
30	mctf_hbw.asc	2,940	12/16/2002	06:28p
31	mctf_nhb.asc	2,940	12/16/2002	09:46p
32	MTKK.DAT	100,603	4/5/2004	09:41a
33	N_TV2.ffs	13,200	3/30/2004	06:02p
34	NHBK.DAT	52,313	4/5/2004	09:41a
35	nhbpen.03	2,703	5/9/2003	10:12a
36	NHBPEN.DAT	76,397	4/5/2004	09:41a
37	PENALTY.TEM	2,401	4/5/2004	09:41a
38	set_factors.rpt	24,726	4/5/2004	09:41a
39	TPPL.PRJ	320	4/5/2004	09:41a
40	tppl.VAR	160	4/5/2004	09:41a
41	tppl0001.PRN	24,725	4/5/2004	09:41a
42	V2TODTPP.PAR	7,439	11/10/2003	02:20p
	Total	**1,883,804**		

File List - Subdirectory: \CGV21D_16X\1994_TIP9499\INPUTS

Seq. No.	File Name	Bytes	Date	Time
1	aext.asc	2,538	12/2/1999	10:42a
2	AIRPAX.adr	17,645	1/7/2002	06:15p
3	AMSPD.LKP	330	3/7/2004	11:06p
4	AREAOVER.ASC	306	3/7/2004	10:02p
5	busfaram.asc	2,646	12/8/1997	05:35p
6	busfarop.asc	2,646	1/22/1999	02:05p
7	FARE.EQV	3,637	9/25/1997	11:57a
8	gisWKAAM.asc	358,904	6/2/2002	10:39a
9	gisWKAOP.asc	358,904	6/3/2002	08:35p
10	gisWKLAM.asc	560,269	6/4/2002	02:31p
11	gisWKLOP.asc	520,625	6/4/2002	02:31p
12	HBOMC.OLD	4,140,860	8/24/2001	04:08p
13	HBSMC.OLD	1,721,500	8/24/2001	04:08p
14	HBWMC.OLD	4,669,852	8/24/2001	04:07p
15	link.asc	2,691,832	3/26/2004	05:32p
16	MFARE1.A1A	7,705	12/26/2001	12:35p
17	mode1am.tp	181,447	3/9/2004	10:09a
18	mode1op.tp	188,977	3/9/2004	10:10a
19	mode2am.tp	20,058	3/9/2004	10:10a
20	mode2op.tp	21,664	3/9/2004	10:10a
21	mode3am.tp	2,799	3/8/2004	03:28p
22	mode3op.tp	3,038	3/8/2004	03:27p
23	mode4am.tp	2,926	3/8/2004	03:25p
24	mode4op.tp	3,334	3/8/2004	03:25p
25	mode6am.tp	35,136	3/9/2004	10:10a
26	mode6op.tp	37,390	3/9/2004	10:09a
27	mode7am.tp	9,397	3/9/2004	10:09a
28	mode7op.tp	8,119	3/9/2004	10:09a
29	mode8am.tp	20,469	3/9/2004	10:09a
30	mode8op.tp	21,184	3/9/2004	10:09a
31	mode9am.tp	38,925	3/9/2004	10:09a
32	mode9op.tp	3,817	3/9/2004	10:10a
33	NHBMC.OLD	4,661,328	8/24/2001	04:09p
34	NODE.ASC	247,488	10/5/2001	05:47p
35	OPSPD.LKP	354	3/7/2004	11:05p
36	pext.asc	2,538	12/2/1999	10:42a
37	Rail_lnk.bse	12,262	6/13/2002	03:26p
38	RIVERSTP.BNA	506	6/6/2002	03:39p
39	schl.adr	48,331	2/18/2000	01:08p
40	sta_tpp.bse	32,193	6/26/2002	12:16p
41	taxi.adr	78,738	2/18/2000	01:04p
42	TAZAMSPD.LKP	199,501	3/7/2004	09:44p
43	tazfrzn.asc	104,988	12/16/2002	03:58p
44	TAZOPSPD.LKP	199,504	3/7/2004	09:45p
45	TOLL.ESC	3,114	2/23/2004	02:38p
46	TOLL.INC	992	12/17/2003	06:25p
47	TOLL.SKM	4,984	12/17/2003	06:25p
48	trnpen.dat	1,157	5/15/2001	06:42p
49	visi.adr	84,871	2/18/2000	01:06p
50	xxaut.vtt	32,184	3/13/1997	09:06p
51	xxtrk.vtt	16,607	3/4/1999	04:04p
52	zone.asc	219,100	4/6/1999	05:45p
	Total	**21,609,619**		

File List - Subdirectory: \CGV21D_16X\2000_TIP0005_rnd63\INPUTS

Seq. No.	File Name	Bytes	Date	Time
1	aext.asc	2,538	1/22/2002	03:24p
2	airpax.adr	55,525	12/13/2001	02:16p
3	AMSPD.LKP	330	3/7/2004	11:06p
4	AREAOVER.ASC	306	3/7/2004	10:02p
5	BUSFARAM.ASC	2,646	12/16/2002	05:20p
6	busfarop.asc	2,646	12/16/2002	05:20p
7	FARE.EQV	3,637	9/25/1997	10:57a
8	GISWKAAM.ASC	358,904	6/4/2002	04:51a
9	GISWKAOP.ASC	358,904	6/4/2002	06:01a
10	GISWKLAM.ASC	562,071	6/4/2002	02:30p
11	GISWKLOP.ASC	530,315	6/4/2002	02:30p
12	hbomc.old	4,387,575	1/22/2002	01:06p
13	hbsmc.old	1,872,112	1/22/2002	01:05p
14	hbwmc.old	4,755,756	1/22/2002	01:04p
15	LINK.ASC	2,829,736	3/26/2004	05:33p
16	MFARE1.A1A	7,705	12/26/2001	12:35p
17	mode1am.tp	166,232	5/30/2002	05:27p
18	mode1op.tp	143,102	6/13/2002	03:48p
19	mode2am.tp	21,369	3/28/2001	01:31p
20	mode2op.tp	4,616	1/21/2002	02:00p
21	mode3am.tp	2,177	3/23/2004	04:29p
22	mode3op.tp	2,161	6/12/2002	01:33p
23	mode4am.tp	4,662	5/28/2002	10:59a
24	mode4op.tp	4,875	5/28/2002	11:00a
25	mode6am.tp	69,880	5/30/2002	05:55p
26	mode6op.tp	43,537	5/30/2002	05:40p
27	mode7am.tp	12,238	1/22/2002	11:06a
28	mode7op.tp	5,651	8/9/2001	01:30p
29	mode8am.tp	48,308	6/11/2002	01:14p
30	mode8op.tp	25,052	5/30/2002	05:41p
31	mode9am.tp	53,919	1/22/2002	11:09a
32	mode9op.tp	12,330	1/22/2002	11:46a
33	nhbmc.old	4,944,032	1/22/2002	01:07p
34	NODE.ASC	247,488	10/5/2001	05:47p
35	OPSPD.LKP	354	3/7/2004	11:05p
36	pext.asc	2,538	1/22/2002	03:24p
37	RAIL_LNK.BSE	13,335	6/13/2002	03:29p
38	RIVERSTP.BNA	506	6/6/2002	03:39p
39	schl.adr	48,458	2/18/2000	01:08p
40	STA_TPP.BSE	40,866	6/26/2002	12:17p
41	taxi.adr	83171	2/18/2000	01:04p
42	TAZAMSPD.LKP	199501	3/7/2004	09:44p
43	TAZFRZN.ASC	102,544	5/16/2000	04:57p
44	TAZOPSPD.LKP	199,504	3/7/2004	09:45p
45	TOLL.ESC	3,114	3/15/2004	05:21p
46	TOLL.INC	992	3/7/2004	09:44p
47	TOLL.SKM	4,984	5/16/2000	04:57p
48	TRNPEN.DAT	1,098	3/7/2004	09:45p
49	visi.adr	86,622	3/15/2004	05:21p
50	xxaut.vtt	16316	12/17/2003	06:25p
51	xxtrk.vtt	16,909	12/17/2003	06:25p
52	ZONE.ASC	219,100	3/1/2002	01:45p
	Total	**22,582,247**		

File List - Subdirectory: \CGV21D_16X\2030_TIP0409_rnd63\INPUTS

Seq. No.	File Name	Bytes	Date	Time
1	AEXT.ASC	2,538	9/23/2003	04:26p
2	AIRPAX.ADR	66,908	9/26/2003	02:40p
3	AMSPD.LKP	455	3/15/2004	05:21p
4	AREAOVER.ASC	306	3/7/2004	10:02p
5	BUSFARAM.ASC	2,646	8/4/2003	12:47p
6	BUSFAROP.ASC	2646	8/4/2003	12:47p
7	GISWKAAM.ASC	358,904	8/7/2003	03:10p
8	GISWKAOP.ASC	358,904	8/7/2003	03:11p
9	GISWKLAM.ASC	584,018	8/7/2003	04:23p
10	GISWKLOP.ASC	544,323	8/7/2003	04:23p
11	HBOMC.OLD	4,456,468	9/15/2003	01:12p
12	HBSMC.OLD	2,173,595	9/15/2003	01:10p
13	HBWMC.OLD	4,766,771	9/15/2003	01:07p
14	link.asc	2,925,685	3/26/2004	05:44p
15	MFARE1.A1A	7,705	12/26/2001	12:35p
16	mode1am.tp	187,143	9/4/2003	02:24p
17	mode1op.tp	140,466	9/4/2003	02:42p
18	mode2am.tp	25,290	9/4/2003	02:43p
19	mode2op.tp	7,730	9/4/2003	02:44p
20	MODE3AM.TP	3,022	3/26/2004	05:45p
21	MODE3OP.TP	2,620	9/4/2003	02:46p
22	MODE4AM.TP	6,603	9/4/2003	02:47p
23	MODE4OP.TP	4,905	9/4/2003	02:49p
24	MODE5AM.TP	0	4/9/2003	11:27a
25	MODE5OP.TP	0	4/9/2003	11:27a
26	mode6am.tp	88,890	9/4/2003	02:48p
27	mode6op.tp	59,814	9/4/2003	02:50p
28	mode7am.tp	26,097	9/4/2003	02:51p
29	MODE7OP.TP	12297	9/4/2003	02:52p
30	mode8am.tp	24967	9/4/2003	02:52p
31	mode8op.tp	22,375	9/4/2003	02:53p
32	mode9am.tp	70,916	9/4/2003	02:53p
33	mode9op.tp	19,761	9/4/2003	02:53p
34	NHBMC.OLD	4,738,279	9/15/2003	01:15p
35	node.asc	252,840	8/4/2003	02:48p
36	OPSPD.LKP	448	3/15/2004	05:24p
37	PEXT.ASC	2,538	9/23/2003	04:26p
38	RAIL_LNK.BSE	14,207	8/7/2003	11:42a
39	RIVERSTP.BNA	506	6/6/2002	03:39p
40	SCHL.ADR	59,574	9/23/2003	04:40p
41	STA_TPP.BSE	45,276	9/3/2003	04:19p
42	TAXI.ADR	100,427	9/23/2003	04:40p
43	TAZAMSPD.LKP	199381	3/15/2004	05:30p
44	TAZFRZN.ASC	102,543	8/5/2003	10:18a
45	TAZOPSPD.LKP	210,336	3/15/2004	05:34p
46	TOLL.ESC	3,214	11/17/2003	11:18a
47	TOLL.INC	992	12/17/2003	06:25p
48	TOLL.SKM	4,984	12/17/2003	06:25p
49	trnpen.dat	864	3/1/2002	01:46p
50	VISI.ADR	104,717	9/23/2003	04:40p
51	WALK_AM.OLD	927,382	9/15/2003	10:53a
52	WALK_OP.OLD	916,246	9/15/2003	10:53a
53	XXAUT.VTT	16,329	9/23/2003	03:40p
54	XXTRK.VTT	16,939	9/23/2003	03:44p
55	ZONE.ASC	219,100	9/15/2003	09:53a
	Total	**24,891,890**		

File List - Subdirectory: \CGV21D_16X\2005Base

Seq. No.	File Name	Bytes	Date	Time
1	MC_HBO.FIN	4,632,530	3/4/2003	04:48p
2	MC_HBS.FIN	2,178,056	3/4/2003	04:47p
3	MC_HBW.FIN	5,109,325	3/4/2003	04:47p
4	MC_NHB.FIN	5,153,990	3/4/2003	04:48p
	Total	**17,073,901**		

File List - Subdirectory: \CGV21D_16X\UTILITY

Seq. No.	File Name	Bytes	Date	Time
1	aon.s	3,100	1/7/2003	10:43a
2	CHECK_AC.S	6,728	1/3/2003	05:54p
3	chkfare.s	4,353	1/7/2003	10:43a
4	Highway_Access.s	7,814	10/29/2002	11:43a
5	hwyampm_access.s	10,334	10/29/2002	11:44a
6	hwychk.s	1,372	1/7/2003	10:44a
7	plot.s	1,422	1/7/2003	11:39a
8	scrnsum.s	2,612	12/23/2002	12:52p
9	tppdlibx.dll	131,072	11/10/2003	11:54a
10	transit_access.s	11,267	9/27/2002	07:19p
11	Wtransit_access.s	9,288	9/27/2002	07:21p
	Total	**189,362**		

Attachment 3
Transit Constraint Documentation

METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS
777 North Capitol Street, N.E.
Suite 300
Washington, D.C. 20002-4239

MEMORANDUM

TO: Files

FROM: Ron Milone

DATE: February 24, 2003

SUBJECT: Transit Constraint Process per the Version 2.1/TP+ Model

Version 1 travel modeling included added processing steps, generally referred to as the "transit constraint". The constraint was implemented to reflect the assumption that the core capacity of the transit system will not support expected passenger demand *beyond* projected 2005 levels. The transit constraint was therefore applied to impose a transit trip maximum on forecasted transit trips, as established by 2005 transit trip flows, for those trips destined *to or through* the regional core. The resulting *displaced* transit trips resulting from the constraining process were subsequently allocated among automobile modes. The methodology of the transit constraint as per the Version 1 model was originally suggested by Jim Hogan[1], and implemented using a combination of off-line MINUTP programs and manual steps. This memorandum describes an implementation of the transit constraint procedure for the Version 2.1/TP+, Release C. The Version 2.1 transit constraint approach is somewhat more involved than the MINUTP-based approach but it is also more automated and has been developed as an integral module in the application job stream.

There are three files that must be added to the standard set of supporting files used to execute the Version 2.1/TP+ transit constraint process:

1) MC_Constraint.S	(TP+ script file residing in the ..\SCRIPTS subdirectory)
2) MC_ConSummary.S	(TP+ script file residing in the ..\SCRIPTS subdirectory)
3) STEP18TC.Mode_Choice.bat	(application batch file residing in the 'route' subdirectory)

Detailed information on each file is provided below.

MC_Constraint.S

The MC_Constraint.S script is used to work through the necessary matrix manipulations for applying Version 2.1/TP+ transit constraint process, specifically:

[1] Memorandum to R. Kirby from J. Hogan, Subject: Methodology to address constraints in Metrorail capacity in estimating transit ridership for TIP Conformity analysis, 6/7/00.

1) The program reads the constrained (2005) and forecasted/unconstrained zone level transit trips resulting from the mode choice model and calculates peak transit trips for both years;

2) Both sets of zone level transit trips are compressed to determine the aggregate trip flows *to and through* the regional core, and aggregate factors are computed for constraining the forecasted transit trips;

3) The aggregate transit constraint factors are applied to the zone level forecasted transit trips and automobile trips are adjusted to incorporate the displaced transit trips.

The above constraint process varies slightly from the Version 1 approach in that it includes a step to extract peak period trips from daily trips. Since Version 1 model produced HBW transit trips only, the transit constraint approach included the simplifying assumption that *all* such trips occur during the peak period. Therefore, the forecasted *daily* transit trips moving to or through the regional core were adjusted to match the constraining 2005 *daily* totals. Given that the Version 2.1/TP+ model now produces *both* work and non-work transit trips, a more detailed method to extract peak period transit trips from the daily travel was deemed necessary. Unlike work trips, the majority of non-work transit trips occur outside of the peak period and is therefore irrelevant to system capacity issues. Table 1 specifies temporal transit trip distributions (percentages) summarized on the basis of purpose and orientation. The distributions were developed previously from the COG/TPB 1994 Household Travel Survey and deemed reasonable for developing peak transit travel estimates more precisely. It is currently assumed that the temporal distributions will remain *constant* through time, as there is currently no observed basis for determining how hourly travel distributions will change.

Table 1
Temporal Distribution (%) for Transit Trips by Orientation, Time Period, and Purpose
Source: 1994 COG HTS

Trip Orientation	Time Period	Purpose			
		HBW	***HBS***	***HBO***	***NHB***
Home to Work	*AM (6:00-9:00 AM)*	70	24	38	14
	PM (4:00-7:00 PM)	5	15	13	31
	Off-Peak Hours	25	61	49	55
	Subtotal	100	100	100	100
Work to Home	*AM (6:00-9:00 AM)*	1	2	2	14
	PM (4:00-7:00 PM)	72	35	35	31
	Off-Peak Hours	27	63	63	55
	Subtotal	100	100	100	100

Equation (1) shows the general form by which the temporal factors are applied to the 2005 and forecasted daily zonal transit trips to arrive at trip estimates for a specific time period (in step1).

(1) $PrdTrips_{ij} = [HWF * DayTrips_{ij} / 2.0] + [WHF * DayTrips_{ji} / 2.0]$

Where:

$PrdTrips_{ij}$ = estimated trips in a specific time period between zones i & j
HWF = Home-to-Work factor for period
WHF = Work-to-Home factor for period
$DayTrips_{ij}$ = Daily transit trips (P/A format) between zones i & j
$DayTrips_{ji}$ = Daily transit trips (P/A format) between zones j & i

Four files are written corresponding to each modeled purpose. Each file contains three zonal trip tables: 1) total peak period transit trips (*both* AM & PM, 2) off-peak transit trips, and 3) daily transit trips. A concise summary of the transit trip totals by time period is provided on an ASCII file named MC_Constraint.tab (see example listing in Attachment 1).

2005 and unconstrained peak period transit trips are each compressed from zone level to '3 by 3' superdistrict trip tables, by purpose, to allow for a computation of adjustment factors that will subsequently be applied to the unconstrained zonal transit trips (step 2). The 3 superdistricts are defined as: 1) Virgina, Non-Regional Core (including W. Virginia), 2) Virgina & DC Regional Core, and 3) Maryland & DC Non-Regional Core[2]. Adjustment factors representing the ratio of constrained to unconstrained transit trips are computed for interchanges representing trips to or through the regional core (1/2, 1/3, 3/1, and 3/2). Factors associated with all other interchanges are initialized to a value of 1.00. Daily constrained forecasted transit trips are computed by purpose and are defined as shown in equation (2):

(2) $DConFTrn_{ij} = DUncFTrn_{ij} - PUncFTrn_{ij} + P05Trn_{ij}$

Where:

$DConFTrn_{ij}$ = Daily Constrained Forecasted transit trips from superdistrict i to j
$DUncFTrn_{ij}$ = Daily Unconstrained Forecasted transit trips from superdistrict i to j
$PUncFTrn_{ij}$ = Peak period Unconstrained Forecasted transit trips from superdistrict i to j
$P05Trn_{ij}$ = Peak period 2005 transit trips from superdistrict i to j

The equation simply indicates that the resulting constrained forecasted transit trips are comprised of unconstrained off-peak trips plus 2005 peak period transit trips. Four small (9-record) ASCII files are written out for each purpose. The files are named TCONFTR.HBW, TCONFTR.HBS, TCONFTR.HBO, and TCONFTR.NHB. Each file contains interchange level totals at the 3 by 3 interchange level, for the interchanges of interest.

- interchange as a two-digit number, eg '11' refers to origin 1, destination 1, etc.
- constrained (2005) peak transit trips
- constrained (2005) daily transit trips
- unconstrained (forecasted) peak transit trips
- unconstrained (forecasted) daily transit trips
- final/constrained forecasted daily transit trips
- Adjustment factor (constrained / unconstrained forecasted daily transit trips)

[2] External stations intentionally not considered in the matrix compression.

The ASCII files containing the transit adjustment factors are read into the third and final step of the script (as lookup tables). Logically, the resulting adjustment factors *should* always be greater than zero and less than 1.00. The final (constrained) regional transit totals computed at the 3 by 3 level are also carried forward (via the TP+ LOG command) so that they can be checked against the zone level transit totals computed at the third step. During step 3, the unconstrained zone-level trip file resulting from the mode choice model is modified on an *interchange* basis to reflect the transit constraint. The standard set of tables on the file are shown below:

1) LOV Auto Drivers (including HOVs on general use facilities)
2) LOV Auto Persons (including HOV persons on general use facilities)
3) Walk Access Transit
4) Drive Access Transit
5) HOV 2-Occ Auto Drivers (on Priority Facilities/HBW only)
6) HOV Auto Person (on Priority Facilities/HBW only)
7) HOV3+-Occ. Auto Drivers (on Priority Facilities/HBW only)

The constraint factors are first applied uniformly to both walk-access and drive-access transit trips. Next, the transit residual is computed as the difference between unconstrained and constrained transit trips. If HOV persons (t6) exist, the transit residual is apportioned and added to the existing LOV and HOV persons based upon the existing proportion, otherwise the transit residual is added to the LOV persons (t2). Finally, the residual LOV/HOV auto drivers are computed and added to the existing auto driver tables (t1,t7) from the associated residual auto persons based on the existing auto driver percentage in the cell. For cases where displaced transit trips exist but no auto persons exist, a default auto driver percentage is used. The default percentages are based on the 1994 HTS and are shown below:

Default Auto Driver Percentages

Purpose	Default Value	Implied Car Occupancy
HBW	90.09%	1.11
HBS	81.30%	1.23
HBO	68.97%	1.45
NHB	80.00%	1.25

A concise summary of the constrained and unconstrained transit trip totals by mode is provided on an ASCII file named MC_Constraint.tab (see example listing in Attachment 1). This file should be reviewed for reasonability. Note that regional input and output person trip totals will not match perfectly because the TP+ 'bucket-rounding' function is invoked after the calculations are made for all interchanges.

MC_ConSummary.S

This script is used to generate jurisdictional trip summaries of the modified mode choice output file. An ASCII listing file named MC_ConSummary.tab is ultimately generated. This file may be compared to MC_Summary.tab which contains a jurisdictional summary of the unconstrained trips which is normally generated after the mode choice model is executed.

STEP18TC.Mode_Choice.bat

The STEP18TC.Mode_Choice.bat file *replaces* the standard batch file used to execute the mode choice model (STEP18.Mode_Choice.bat). The file resides in the top-level subdirectory along with the pre-existing application batch files. Prior to running batch file, 2005 transit trip tables *must* exist on the machine of execution. The user also *must* specify the path of the pre-existing 2005 transit trip tables produced by the mode choice model. The path is defined in the batch file as an environment variable near the top of the batch file, as shown on the example line below:

```
set _path05_=\cgv2tp\cg2005\
```

A section of the batch file checks that the 'standard' mode choice output files do in fact exist in the user-specified path. If the files are not detected the batch operation will exit to a 'pause' statement, thus halting the process execution. Beyond defining the _path05_ variable, the user will normally apply the batch file as is.

Irrespective of whether the constrained batch file (STEP18TC.Mode_Choice.bat) or the unconstrained batch file (STEP18.Mode_Choice.bat) is used, the resultant mode choice output files produced will be named, MC_HBW.FIN, MC_HBS.FIN, MC_HBO.FIN, and MC_NHB.FIN.

Attachments:
Attachment 1: Example Listing of MC_Constraint.tab
Attachment 2: Step18TC.Mode_Choice.bat (Batch for Applying Transit Constraint)
Attachment 3: MC_Constraint.S (TP+ Script)
Attachment 4: MC_ConSummary.s (TP+ Script)

Attachment 1: Example Listing of MC_Constraint.tab

2005 Constrained Transit Summary by Time Period

TIME PERIOD	HBW	HBS	HBO	NHB	Sum
AM	204475	5113	36944	21521	268053
PM	221776	9886	44317	47720	323699
OP	149800	24652	103456	84776	362684
Total	576051	39651	184717	154017	954436
I/P Totls	576009	39761	184801	154093	954664
Diff.	42	-110	-84	-76	-228

Future Year (Post 2005) UnConstrained Transit Summary by Time Period

TIME PERIOD	HBW	HBS	HBO	NHB	Sum
AM	290526	6623	46871	26196	370216
PM	315092	12734	56264	58082	442172
OP	212821	31678	131243	103158	478900
Total	818439	51035	234378	187436	1291288
I/P Totls	818453	51089	234425	187489	1291456
Diff.	-14	-54	-47	-53	-168

Attachment 1: Example Listing of MC_Constraint.tab

HBW TRANSIT CONSTRAINT RESULTS- Zonal Totals by Mode
Initial and Final Totals by Mode

MODE	INITIAL	UPDATED	DIFFERENCE	
SOV_AD:	4392123	4424589	32466	
SOV_AP:	4848571	4888975	40404	
TRN_WK:	493851	467817	-26034	
TRN_DR:	324602	307522	-17080	
HV2_AD:	0	0	0	
HOV_AP:	132398	135038	2640	
HV3_AD:	38094	38778	684	
TOTAL PERSON:	5799422	5799352	-70	
TRANSIT:	818453	775339	-43114	
TRANSIT Control Total		775274		<-- Based on Squeezed 3x3 Trips
AUTO PSN:	4980969	5024013	43044	
Transit %:	14.113	13.369	-0.743	
AUTO OCCUP.:	1.124	1.126	0.001	

HBS TRANSIT CONSTRAINT RESULTS- Zonal Totals by Mode
Initial and Final Totals by Mode

MODE	INITIAL	UPDATED	DIFFERENCE	
SOV_AD:	3246732	3246811	79	
SOV_AP:	4105375	4105481	106	
TRN_WK:	39465	39378	-87	
TRN_DR:	11624	11609	-15	
HV2_AD:	0	0	0	
HOV_AP:	0	0	0	
HV3_AD:	0	0	0	
TOTAL PERSON:	4156464	4156468	4	
TRANSIT:	51089	50987	-102	
TRANSIT Control Total		50969		<-- Based on Squeezed 3x3 Trips
AUTO PSN:	4105375	4105481	106	
Transit %:	1.229	1.227	-0.002	
AUTO OCCUP.:	1.264	1.264	0.000	

Attachment 1: Example Listing of MC_Constraint.tab

```
 HBO TRANSIT CONSTRAINT RESULTS- Zonal Totals by Mode
       Initial and Final Totals by Mode


MODE           INITIAL   UPDATED DIFFERENCE
------------   -------   -------  --------

SOV_AD:         8552887   8556415      3528
SOV_AP:        12278986  12283475      4489
TRN_WK:          183996    180347     -3649
TRN_DR:           50429     49649      -780
HV2_AD:               0         0         0
HOV_AP:               0         0         0
HV3_AD:               0         0         0

TOTAL PERSON:  12513411  12513471        60

TRANSIT:         234425    229996     -4429
TRANSIT Control Total      229866            <-- Based on Squeezed 3x3 Trips

AUTO PSN:      12278986  12283475      4489

Transit %:        1.873     1.838    -0.035
AUTO OCCUP.:      1.436     1.436    -0.000


 NHB TRANSIT CONSTRAINT RESULTS- Zonal Totals by Mode
       Initial and Final Totals by Mode


MODE           INITIAL   UPDATED DIFFERENCE
------------   -------   -------  --------

SOV_AD:         7226101   7227597      1496
SOV_AP:         9012963   9014726      1763
TRN_WK:          171554    169897     -1657
Metropolitan Washington Council of Governments
-----------------------------------------------
TRN_DR:           15935     15862       -73
HV2_AD:               0         0         0
HOV_AP:               0         0         0
HV3_AD:               0         0         0

TOTAL PERSON:   9200452   9200485        33

TRANSIT:         187489    185759     -1730
TRANSIT Control Total      185636            <-- Based on Squeezed 3x3 Trips

AUTO PSN:       9012963   9014726      1763

Transit %:        2.038     2.019    -0.019
AUTO OCCUP.:      1.247     1.247    -0.000
```

Attachment 2 Step18TC.Mode_Choice.bat (Batch for applying transit constraint process)

```
set _iter_=pp
set _path05_=c:\CGV2_1C\CG05SIP\
CD %1

REM  Step 18TC: Mode Choice Model Application w/ Transit Constraint
REM  This Batch file REPLACES Step18.Mode_Choice.bat if the transit
REM  constraint process is utilized

REM  Check that the 2005 mode ch. model output files are correctly spec'd
if not exist %_path05_%mc_hbw.fin goto error
if not exist %_path05_%mc_hbs.fin goto error
if not exist %_path05_%mc_hbo.fin goto error
if not exist %_path05_%mc_nhb.fin goto error

REM Run Mode Choice Model to get unconstrained transit trips
del mc_hbw.*
..\software\COGMC  ..\controls\mc_hbw.ctl
if errorlevel 1 goto error

del mc_hbs.*
..\software\COGMC  ..\controls\mc_hbs.ctl
if errorlevel 1 goto error

del mc_hbo.*
..\software\COGMC  ..\controls\mc_hbo.ctl
if errorlevel 1 goto error

del mc_nhb.*
..\software\COGMC ..\controls\mc_nhb.ctl
if errorlevel 1 goto error

del tppl*.prn
del mc_summary.rpt
start /w TPPLUS.EXE  ..\scripts\mc_summary.s /start -Ptppl -S..\%1
if errorlevel 1 goto error
copy tppl*.prn      mc_summary.rpt
copy tppl*.prn      temp.rpt
..\software\extrtab temp.rpt
copy extrtab.out    mc_summary.tab
del  extrtab.out
del  temp.rpt

REM End of Mode Choice Model
REM Execute Transit Constraint process
del tppl*.prn
del mc_constraint.rpt
start /w TPPLUS.EXE  ..\scripts\mc_constraint.s /start -Ptppl -S..\%1
if errorlevel 1 goto error
copy tppl*.prn      mc_constraint.rpt
copy tppl*.prn      temp.rpt
..\software\extrtab temp.rpt
copy extrtab.out    mc_constraint.tab
del  extrtab.out
del  temp.rpt

REM Delete unconstrained Mode Choice Output files
REM & replace with constrained versions, and summarize

del  mc_hbw.fin
del  mc_hbs.fin
del  mc_hbo.fin
del  mc_nhb.fin
copy mc_hbw.con  mc_hbw.fin
copy mc_hbs.con  mc_hbs.fin
copy mc_hbo.con  mc_hbo.fin
copy mc_nhb.con  mc_nhb.fin

REM Execute Summary of Constrained Transit Trips
del tppl*.prn
del mc_consummary.rpt
```

Attachment 2 Step18TC.Mode_Choice.bat (Batch for applying transit constraint process)

```
start /w TPPLUS.EXE  ..\scripts\mc_consummary.s /start -Ptppl -S..\%1
if errorlevel 1 goto error
copy tppl*.prn      mc_consummary.rpt
copy tppl*.prn      temp.rpt
..\software\extrtab temp.rpt
copy extrtab.out    mc_consummary.tab
del  extrtab.out
del  temp.rpt
goto end
error
REM  Processing Error or Misspecified 2005 transit file path....
PAUSE
:end
```

Attachment 3 MC_Constraint.S (TP+ Script)

```
;/////////////////////////////////////////////////////////////////
; ================================================================
; Transit Constraint Process -Applied to modeled mode choice output
;         file for forecast years beyond the year 2005.
;         The process constrains Peak Period Transit trips heading
;         TO or THROUGH the regional core to be constrained to
;         2005 levels and adjusts auto person/driver trips accordingly.
;
; The process consists of 3 Steps:
; Step 1. 2005 & future year peak/off-peak transit trips are calculated
;         for each purpose using 1994 HTS time period factors.
;         (2 Loops for constr./unconstr. mode choice output files)
;
; Step 2. 2005 & Future year peak & total transit trips are squeezed to
;          a 3x3 (core/va/dc,md).  Factors for scaling unconstrained
;          transit trips to constrained transit trips are computed, on
;          an i/j basis.  A 'lookup' of constraint factors is produced.
;
; Step 3.  Future year constrained zonal trips are computed by applying
;          the constraint factors to the zonal trip tables.
;          constrained transit trips are produced (i.e., residual auto
;          persons are generated. and LOV,HOV auto person/driver trips
;          are computed using existing distributions on a cell by cell
;          basis.
;         (4 Loops for each Purpose)
;
;-------------------------------------------------------------------------
; Step 1.
;         2005 & future year peak/off-peak transit trips are calculated
;         for each purpose using 1994 HTS time period factors.
;-------------------------------------------------------------------------
LOOP Time  = 1, 2            ; Time '1' = 2005/ Time '2' = Future year

 IF (Time = 1)
  PATHSPEC = '%_PATH05_%'    ; path specification of 2005 transit trips
  YR       = 'con'           ; constraint indicator    (for file naming)
  title    = ' 2005 Constrained Transit Summary by Time Period '

 ELSE
  PATHSPEC = '           '   ; forecast year should be in current subdir
  YR       = 'ucn'           ; unconstrained indicator (for file naming)
  title    = ' Future Year (Post 2005) UnConstrained Transit Summary by Time Period '

 ENDIF
;
;  Factors for distributing Daily Transit Trips
;  (HBW,HBS,HBO,NHB) Among 3 Time Periods:
;
;              -  AM peak  (6:00 - 9:00 AM)
;              -  PM peak  (4:00 - 7:00 PM)
;              -  Off-peak (All Other hrs )
;
; ================================================================
;
;  Transit Time-of-Day Factors (Pcts) Follow:
;
;                      Period       Purpose   Mode        Direction
;                     --------      -------   ----        ---------
; Start of HBW
AMWTRHNP = '70.00'    ; AM  Pk Prd    HBW     Transit  H -> NH
PMWTRHNP = ' 5.00'    ; PM  Pk Prd    HBW     Transit  H -> NH
OPWTRHNP = '25.00'    ; NON Pk Prd    HBW     Transit  H -> NH

AMWTRNHP = ' 1.00'    ; AM  Pk Prd    HBW     Transit  NH -> H
PMWTRNHP = '72.00'    ; PM  Pk Prd    HBW     Transit  NH -> H
OPWTRNHP = '27.00'    ; NON Pk Prd    HBW     Transit  NH -> H
;
; End of HBW
;
; Start of HBS
AMSTRHNP = '24.00'    ; AM  Pk Prd    HBS     Transit  H -> NH
PMSTRHNP = '15.00'    ; PM  Pk Prd    HBS     Transit  H -> NH
OPSTRHNP = '61.00'    ; NON Pk Prd    HBS     Transit  H -> NH

AMSTRNHP = ' 2.00'    ; AM  Pk Prd    HBS     Transit  NH -> H
PMSTRNHP = '35.00'    ; PM  Pk Prd    HBS     Transit  NH -> H
OPSTRNHP = '63.00'    ; NON Pk Prd    HBS     Transit  NH -> H
;
; End of HBS
;
; Start of HBO
AMOTRHNP = '38.00'    ; AM  Pk Prd    HBO     Transit  H -> NH
PMOTRHNP = '13.00'    ; PM  Pk Prd    HBO     Transit  H -> NH
OPOTRHNP = '49.00'    ; NON Pk Prd    HBO     Transit  H -> NH

AMOTRNHP = ' 2.00'    ; AM  Pk Prd    HBO     Transit  NH -> H
PMOTRNHP = '35.00'    ; PM  Pk Prd    HBO     Transit  NH -> H
OPOTRNHP = '63.00'    ; NON Pk Prd    HBO     Transit  NH -> H
;
; End of HBO
;
; Start of NHB
AMNTRHNP = '14.00'    ; AM  Pk Prd    NHB     Transit  H -> NH
PMNTRHNP = '31.00'    ; PM  Pk Prd    NHB     Transit  H -> NH
```

```
OPNTRHNP = '55.00'    ; NON Pk Prd    NHB     Transit  H -> NH

AMNTRNHP = '14.00'    ; AM  Pk Prd    NHB     Transit  NH -> H
PMNTRNHP = '31.00'    ; PM  Pk Prd    NHB     Transit  NH -> H
OPNTRNHP = '55.00'    ; NON Pk Prd    NHB     Transit  NH -> H
;
; End of NHB

;/////////////////////////////////////////////////////////////////
;
; Begin Step 1 TP+ WORK
;
;\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\

RUN PGM=MATRIX
; Read input Mode Choice Model Output (Transit in tabs 3,4)
    MATI[1]=@PATHSPEC@MC_HBW.FIN ; HBW Wk,Dr Access Trn Trips (T3-4)
    MATI[2]=@PATHSPEC@MC_HBS.FIN ; HBS Wk,Dr Access Trn Trips (T3-4)
    MATI[3]=@PATHSPEC@MC_HBO.FIN ; HBO Wk,Dr Access Trn Trips (T3-4)
    MATI[4]=@PATHSPEC@MC_NHB.FIN ; NHB Wk,Dr Access Trn Trips (T3-4)

;  Specify output Pk, Offpk transit Total Transit trips (t1-3) by purpose
;                Peak trips consist of AM & PM Trips
   MATO[1] = TRNWPKOP.@yr@, MO=51,41,1 ;HBW Pk,Off-Pk,total Transit Trips
   MATO[2] = TRNSPKOP.@yr@, MO=52,42,2 ;HBS Pk,Off-Pk,total Transit Trips
   MATO[3] = TRNOPKOP.@yr@, MO=53,43,3 ;HBO Pk,Off-Pk,total Transit Trips
   MATO[4] = TRNNPKOP.@yr@, MO=54,44,4 ;NHB Pk,Off-Pk,total Transit Trips

;
; Put HBW  Total (Walk, Drive Access) Transit Trips in MW  1
; Put HBS  Total (Walk, Drive Access) Transit Trips in MW  2
; Put HBO  Total (Walk, Drive Access) Transit Trips in MW  3
; Put NHB  Total (Walk, Drive Access) Transit Trips in MW  4

;  These are in P/A format and represent the Home-to-NonHome direction

      MW[01]  = MI.1.3 + MI.1.4   ; Work  transit P/A fmt
      MW[02]  = MI.2.3 + MI.2.4   ; Shop  transit P/A fmt
      MW[03]  = MI.3.3 + MI.3.4   ; Othr  transit P/A fmt
      MW[04]  = MI.4.3 + MI.4.4   ; NHB   transit P/A fmt

; Put Transpose of the above
; HBW, HBS, HBO, and NHB trip tables in Work Mats 5 -8
; The transpose represents the NonHome-to-Home direction

     MW[11]=MI.1.3.T, MW[12]=MI.1.4.T   ; Work wk,dr transit A/P fmt
     MW[13]=MI.2.3.T, MW[14]=MI.2.4.T   ; Shop wk,dr transit A/P fmt
     MW[15]=MI.3.3.T, MW[16]=MI.3.4.T   ; Othr wk,dr transit A/P fmt
     MW[17]=MI.4.3.T, MW[18]=MI.4.4.T   ; NHB  wk,dr transit A/P fmt

     MW[05]=MW[11] + MW[12]             ; Work total transit A/P fmt
     MW[06]=MW[13] + MW[14]             ; Shop total transit A/P fmt
     MW[07]=MW[15] + MW[16]             ; Othe total transit A/P fmt
     MW[08]=MW[17] + MW[18]             ; NonH total transit A/P fmt
; Now we're ready to apply apply TOD factors
;
;
 JLOOP

;\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
;///////////////// AM Trip Calculations          ////////////////////
;\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\

; AM Peak Period Transit Trips (MWs 21-24)
;    HBW Transit Trips:
MW[21]=(( MW[1]*(@AMWTRHNP@/100.0))+(MW[05]*(@AMWTRNHP@/100.0)))/2.0;
;    HBS Transit Trips:
MW[22]=(( MW[2]*(@AMSTRHNP@/100.0))+(MW[06]*(@AMSTRNHP@/100.0)))/2.0;
;    HBO Transit Trips:
MW[23]=(( MW[3]*(@AMOTRHNP@/100.0))+(MW[07]*(@AMOTRNHP@/100.0)))/2.0;
;    NHB Transit Trips:
MW[24]=(( MW[4]*(@AMNTRHNP@/100.0))+(MW[08]*(@AMNTRNHP@/100.0)))/2.0;
;

;\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
;///////////////// PM Trip Calculations          ////////////////////
;\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\

; PM Peak Period Transit Trips (MWs 31-34)
;    HBW Transit Trips:
MW[31]=(( MW[1]*(@PMWTRHNP@/100.0))+(MW[05]*(@PMWTRNHP@/100.0)))/2.0;
;    HBS Transit Trips:
MW[32]=(( MW[2]*(@PMSTRHNP@/100.0))+(MW[06]*(@PMSTRNHP@/100.0)))/2.0;
;    HBO Transit Trips:
MW[33]=(( MW[3]*(@PMOTRHNP@/100.0))+(MW[07]*(@PMOTRNHP@/100.0)))/2.0;
;    NHB Transit Trips:
MW[34]=(( MW[4]*(@PMNTRHNP@/100.0))+(MW[08]*(@PMNTRNHP@/100.0)))/2.0;
;
;

;\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
;///////////////// Off-Pk Trip Calculations      ////////////////////
;\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\

; Off-Peak Period Transit Trips (MWs 41-44)
```

```
;    HBW Transit Trips:
MW[41]=(( MW[1]*(@OPWTRHNP@/100.0))+(MW[05]*(@OPWTRNHP@/100.0)))/2.0;
;    HBS Transit Trips:
MW[42]=(( MW[2]*(@OPSTRHNP@/100.0))+(MW[06]*(@OPSTRNHP@/100.0)))/2.0;
;    HBO Transit Trips:
MW[43]=(( MW[3]*(@OPOTRHNP@/100.0))+(MW[07]*(@OPOTRNHP@/100.0)))/2.0;
;    NHB Transit Trips:
MW[44]=(( MW[4]*(@OPNTRHNP@/100.0))+(MW[08]*(@OPNTRNHP@/100.0)))/2.0;
;
;
ENDJLOOP

;  bucket round

   DUMMY = ROWFIX(21) ; FINAL AM hbw  transit Trips
   DUMMY = ROWFIX(22) ; FINAL AM hbs  transit Trips
   DUMMY = ROWFIX(23) ; FINAL AM hbo  transit Trips
   DUMMY = ROWFIX(24) ; FINAL AM nhb  transit Trips

   DUMMY = ROWFIX(31) ; FINAL PM hbw  transit Trips
   DUMMY = ROWFIX(32) ; FINAL PM hbs  transit Trips
   DUMMY = ROWFIX(33) ; FINAL PM hbo  transit Trips
   DUMMY = ROWFIX(34) ; FINAL PM nhb  transit Trips

   DUMMY = ROWFIX(41) ; FINAL OP hbw  transit Trips
   DUMMY = ROWFIX(42) ; FINAL OP hbs  transit Trips
   DUMMY = ROWFIX(43) ; FINAL OP hbo  transit Trips
   DUMMY = ROWFIX(44) ; FINAL OP nhb  transit Trips

;-------------------------------------------------------------------------
; Summarize Output / Allocated Transit Trips by purpose for checking;
; Total HBW:
 MW[101] = MW[21] + MW[31] + MW[41]
; Total HBS:
 MW[102] = MW[22] + MW[32] + MW[42]
; Total HBO:
 MW[103] = MW[23] + MW[33] + MW[43]
; Total NHB:
 MW[104] = MW[24] + MW[34] + MW[44]
;
;-------------------------------------------------------------------------
; Summarize by purpose & Pk time periods(AM+PM) - put in MWs 51-54

; HBW PK(AM&PM):
 MW[51]= MW[21]+MW[31] ; Peak (AM+PM) HBW Transit Trips
 MW[52]= MW[22]+MW[32] ; Peak (AM+PM) HBS Transit Trips
 MW[53]= MW[23]+MW[33] ; Peak (AM+PM) HBO Transit Trips
 MW[54]= MW[24]+MW[34] ; Peak (AM+PM) NHB Transit Trips

;
;
; Now get regional totals to summarize neatly
Jloop
; accumulate trips by period(a,p,o), purpose(w,s,o,n)
; e.g. 'aw' refers to period 'a',  and purp 'w'


aw=aw+mw[21] as=as+mw[22] ao=ao+mw[23] an=an+mw[24]
pw=pw+mw[31] ps=ps+mw[32] po=po+mw[33] pn=pn+mw[34]
ow=ow+mw[41] os=os+mw[42] oo=oo+mw[43] on=on+mw[44]



; accumulate total output trips by time period
 oam =oam     + MW[21] + MW[22] + MW[23] + MW[24]

 opm =opm     + MW[31] + MW[32] + MW[33] + MW[34]

 oop =oop     + MW[41] + MW[42] + MW[43] + MW[44]

; accumulate total input trips by purpose, total
 ihbw=ihbw + MW[1]                    ; Total Input HBW Transit Trips
 ihbs=ihbs + MW[2]                    ; Total Input HBS Transit Trips
 ihbo=ihbo + MW[3]                    ; Total Input HBO Transit Trips
 inhb=inhb + MW[4]                    ; Total Input NHB Transit Trips
 itot=itot + MW[1]+MW[2]+MW[3]+MW[4]  ; Total Input     Transit Trips


; accumulate total output trips by purpose, total
 ohbw=ohbw + MW[101]
 ohbs=ohbs + MW[102]
 ohbo=ohbo + MW[103]
 onhb=onhb + MW[104]
 otot=otot + MW[101] + MW[102] + MW[103] + MW[104]

endjloop

; now write out the totals neatly:
if (i=zones)
; get differences by purpose (output - Input)
dfhbw = ohbw - ihbw;
dfhbs = ohbs - ihbs;
dfhbo = ohbo - ihbo;
dfnhb = onhb - inhb;
dftot = otot - itot;
```

```
LIST = '/bt     '
LIST = '@title@','\n'
LIST = '     '
list = 'TIME PERIOD  HBW     HBS     HBO     NHB     Sum '
list = '-----------  ---     ---     ---     ---     --- '
list = 'AM       ',aw(8.0),  as(8.0),  ao(8.0),  an(8.0),  oam(8.0)
list = 'PM       ',pw(8.0),  ps(8.0),  po(8.0),  pn(8.0),  opm(8.0)
list = 'OP       ',ow(8.0),  os(8.0),  oo(8.0),  on(8.0),  oop(8.0)
list = '  '
list = 'Total    ',ohbw(8.0),ohbs(8.0),ohbo(8.0),onhb(8.0),otot(8.0)
list = '  '
list = '  '
list = 'I/P Totls',ihbw(8.0),ihbs(8.0),ihbo(8.0),inhb(8.0),itot(8.0)
list = '  '
list = 'Diff.    ',dfhbw(8.0),dfhbs(8.0),dfhbo(8.0),dfnhb(8.0),dftot(8.0)

list = '/et       '
endif

;
;-------------------------------------------------------------
;---  END of TRANSIT Time-of-Day Process             ----------
;---                                                 ----------
;-------------------------------------------------------------
ENDRUN
ENDLOOP ; End  of time-of -day loop

;/////////////////////////////////////////////////////////////////
;
;   Step 2
;         2005 & Future year peak & total transit trips are squeezed to
;          a 3x3 (core/va/dc,md).  Factors for scaling unconstrained
;          transit trips to constrained transit trips are computed, on
;          an i/j basis FOR ijS TO AND THROUGH the regional core.
;
;\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
; create zone, state equiv table (Note: Internal TAZs ONLY)
COPY FILE = three.eqv
; Beginning of 3x3 Equivalency Table
D 1=1239-2144       ;  VA    - Non-Regional Core
D 2=1-88,1230-1238  ;  DC&VA -     Regional Core
D 3=89-1229         ;  DC&MD - Non-Regional Core
;       End of 3x3 Equivalency Table
ENDCOPY

RUN PGM=MATRIX
; Read input Files

 ; Input Year 2005 / Constraining Transit Trips:
  MATI[01] = TRNWPKOP.con             ; HBW Pk,OffPk, Total Transit
  MATI[02] = TRNSPKOP.con             ; HBS Pk,OffPk, Total Transit
  MATI[03] = TRNOPKOP.con             ; HBO Pk,OffPk, Total Transit
  MATI[04] = TRNNPKOP.con             ; NHB Pk,OffPk, Total Transit

 ; Input Forecast Year /Unconstrained Transit Trips:
  MATI[05] = TRNWPKOP.ucn             ; HBW Pk,OffPk, Total Transit
  MATI[06] = TRNSPKOP.ucn             ; HBS Pk,OffPk, Total Transit
  MATI[07] = TRNOPKOP.ucn             ; HBO Pk,OffPk, Total Transit
  MATI[08] = TRNNPKOP.ucn             ; NHB Pk,OffPk, Total Transit

 ; Output 3x3 tables
   FILEO MATO[1] = tempsqz.dat, MO=1-8,11-18
         ;  sequence of squeezed (3x3) output trip tables
         ;  1- 4 ->> 2005     Peak  HBW,HBS,HBO,NHB Transit trips
         ;  5- 8 ->> 2005     Daily HBW,HBS,HBO,NHB Transit trips
         ; 11-14 ->> Forecast Peak  HBW,HBS,HBO,NHB Transit trips
         ; 15-18 ->> Forecast Daily HBW,HBS,HBO,NHB Transit trips


  ; Read in Constraining Transit Trips for each purpose (mw 1-8)
  MW[1] = MI.1.1       MW[5]=MI.1.3  ; HBW Pk,Total Trn Trips (MW1,5)
  MW[2] = MI.2.1       MW[6]=MI.2.3  ; HBS Pk,Total Trn Trips (MW2,6)
  MW[3] = MI.3.1       MW[7]=MI.3.3  ; HBO Pk,Total Trn Trips (MW3,7)
  MW[4] = MI.4.1       MW[8]=MI.4.3  ; NHB Pk,Total Trn Trips (MW4,8)

  ; Read in Forecasted Transit Trips for each purpose  (mw 11-18)
  MW[11] = MI.5.1      MW[15]=MI.5.3  ; HBW Pk,Total Trn Trips (MW11,15)
  MW[12] = MI.6.1      MW[16]=MI.6.3  ; HBS Pk,Total Trn Trips (MW12,16)
  MW[13] = MI.7.1      MW[17]=MI.7.3  ; HBO Pk,Total Trn Trips (MW13,17)
  MW[14] = MI.8.1      MW[18]=MI.8.3  ; NHB Pk,Total Trn Trips (MW14,18)

 RENUMBER FILE=three.eqv, MISSINGZI=M, MISSINGZO=W
ENDRUN

RUN PGM=MATRIX
; Read input Squeezed
ZONES=3
    MATI[1] = tempsqz.dat
  ; Read in Constraining Transit Trips for each purpose (mw 1-8)
  MW[1] = MI.1.1       MW[5]=MI.1.5  ; HBW Pk,Total Trn Trips (MW1,5)
  MW[2] = MI.1.2       MW[6]=MI.1.6  ; HBS Pk,Total Trn Trips (MW2,6)
  MW[3] = MI.1.3       MW[7]=MI.1.7  ; HBO Pk,Total Trn Trips (MW3,7)
  MW[4] = MI.1.4       MW[8]=MI.1.8  ; NHB Pk,Total Trn Trips (MW4,8)
```

```
  ; Read in Forecasted Transit Trips for each purpose  (mw 11-18)
  MW[11] = MI.1.9      MW[15]=MI.1.13 ; HBW Pk,Total Trn Trips (MW11,15)
  MW[12] = MI.1.10     MW[16]=MI.1.14 ; HBS Pk,Total Trn Trips (MW12,16)
  MW[13] = MI.1.11     MW[17]=MI.1.15 ; HBO Pk,Total Trn Trips (MW13,17)
  MW[14] = MI.1.12     MW[18]=MI.1.16 ; NHB Pk,Total Trn Trips (MW14,18)

;      Now calculate constrained factors on an ij basis
 JLOOP              ; Initialize transit constraint factors
    WConFtr = 1.000  ; HBW ftr
    SConFtr = 1.000  ; HBS Ftr
    OConFtr = 1.000  ; HBO Ftr
    NConFtr = 1.000  ; NHB Ftr
     IF ((I = 1 && J = 2) || ; IF from VA nonCore   to Regional Core
         (I = 1 && J = 3) || ; or from VA nonCore   to DC/MD Non Reg Core
         (I = 3 && J = 1) || ; or from MD/DCnonCore to VA    Non Reg Core
         (I = 3 && J = 2))   ; or from MD/DCnonCore to Regional Core
         ; THEN calculate peak constraint factor, by purpose
         ; Constrained Transit trips =
         ; UnCon. Daily trips - UnCon. Pk Trips + Constrained Pk Trips
          MW[21] = (MW[15]-MW[11])+MW[1] ; Constrained HBW Daily Trn Trips
          MW[22] = (MW[16]-MW[12])+MW[2] ; Constrained HBS Daily Trn Trips
          MW[23] = (MW[17]-MW[13])+MW[3] ; Constrained HBO Daily Trn Trips
          MW[24] = (MW[18]-MW[14])+MW[4] ; Constrained NHB Daily Trn Trips

           IF (MW[15]=0)
               WConFtr = 0   ;
             ELSE
               WConFtr = MW[21] / MW[15]  ;
           ENDIF

           IF (MW[16]=0)
               SConFtr = 0   ;
             ELSE
               SConFtr = MW[22] / MW[16]  ;
           ENDIF

           IF (MW[17]=0)
               OConFtr = 0   ;
             ELSE
               OConFtr = MW[23] / MW[17]  ;
           ENDIF

           IF (MW[18]=0)
               NConFtr = 0   ;
             ELSE
               NConFtr = MW[24] / MW[18]  ;
           ENDIF
                    ; Accumulate Final Costrained Transit
         HBW_FCT  = HBW_FCT + ((MW[15]-MW[11])+MW[1]) ; Constrained HBW Daily Trn Trips
        HBS_FCT  = HBS_FCT + ((MW[16]-MW[12])+MW[2]) ; Constrained HBS Daily Trn Trips
        HBO_FCT  = HBO_FCT + ((MW[17]-MW[13])+MW[3]) ; Constrained HBO Daily Trn Trips
        NHB_FCT  = NHB_FCT + ((MW[18]-MW[14])+MW[4]) ; Constrained NHB Daily Trn Trips

     ELSE

          HBW_FCT  = HBW_FCT + MW[15] ;                 Constrained HBW Daily Trn Trips
        HBS_FCT  = HBS_FCT + MW[16] ;                 Constrained HBS Daily Trn Trips
        HBO_FCT  = HBO_FCT + MW[17] ;                 Constrained HBO Daily Trn Trips
        NHB_FCT  = NHB_FCT + MW[18] ;                 Constrained NHB Daily Trn Trips

     ENDIF



     IJ = I*10+j         ; create two digit no where 1st digit=i,2nd=j

; print ij, const pk&total,unconstr pk/total, final total trn trips,ftr
;  --one file for each purpose

  Print LIST = ij(4),MW[1](8),MW[5](8),MW[11](8),MW[15](8),MW[21](8),
               WConFtr(6.3),File=tconftr.HBW
  Print LIST = ij(4),MW[2](8),MW[6](8),MW[12](8),MW[16](8),MW[22](8),
               SConFtr(6.3),File=tconftr.HBS
  Print LIST = ij(4),MW[3](8),MW[7](8),MW[13](8),MW[17](8),MW[23](8),
               OConFtr(6.3),File=tconftr.HBO
  Print LIST = ij(4),MW[4](8),MW[8](8),MW[14](8),MW[18](8),MW[24](8),
               NConFtr(6.3),File=tconftr.NHB
 ENDJLOOP


IF (I=ZONES)
  Print LIST = ' Control Total HBW Constrained Transit Trips: ',HBW_FCT(10)
  Print LIST = ' Control Total HBS Constrained Transit Trips: ',HBS_FCT(10)
  Print LIST = ' Control Total HBO Constrained Transit Trips: ',HBO_FCT(10)
  Print LIST = ' Control Total NHB Constrained Transit Trips: ',NHB_FCT(10)
endif
; Now, Let's carry the control totals with us so we can compare with the
; zonal totals, top be computed in the next step
LOG PREFIX = MATRIX, VAR = HBW_FCT, HBS_FCT, HBO_FCT, NHB_FCT
;
;
ENDRUN

;/////////////////////////////////////////////////////////////////
;
```

```
; Begin Step 3
;          future year constrained trips are computed by applying
;          the constraint factors to the zonal trip tables.
;          constrained transit trips are produced (i.e., residual auto
;          persons are generated. and LOV,HOV auto person/driver trips
;          are computed using existing distributions on a cell by cell
;          basis.
;
;\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
LOOP TIME = 1,4    ; Loop through for each purpose
   IF     (TIME=1)
      PRP     = 'HBW'                                ; Purpose code
      INTAB   = 'FILLMW MW[1]=MI.1.1,2,3,4,5,6,7' ; Input table spec
      DADRPCT = '0.9009'                            ; LOV Default Adr %
      HADRPCT = '0.2857'                            ; HOV Default Adr %
      Control = MATRIX.HBW_FCT    ; Transit Control Total
   ELSEIF (TIME=2)
      PRP   = 'HBS'                                 ; Purpose Code
      INTAB = 'FILLMW MW[1]=MI.1.1,2,3,4'         ; Input table spec
      DADRPCT = '0.8130'                            ; Default Adr %
      HADRPCT = '0.2857'                            ; HOV Default Adr %
      Control = MATRIX.HBS_FCT     ; Transit Control Total
   ELSEIF (TIME=3)
      PRP   = 'HBO'      ; Purpose code
      INTAB = 'FILLMW MW[1]=MI.1.1,2,3,4'   ; Input table spec
      DADRPCT = '0.6897'                            ; Default Adr %
      HADRPCT = '0.2857'                            ; HOV Default Adr %
      Control = MATRIX.HBO_FCT     ; Transit Control Total
   ELSEIF (TIME=4)
      PRP   = 'NHB'      ; Purpose code
      INTAB = 'FILLMW MW[1]=MI.1.1,2,3,4'   ; Input table spec
      DADRPCT = '0.8000'                            ; Default Adr %
      HADRPCT = '0.2857'                            ; HOV Default Adr %
      Control = MATRIX.NHB_FCT     ; Transit Control Total
   ENDIF

RUN PGM=MATRIX
ZONES = 2191
; DEFINE INPUT/OUTPUT  FILES HERE:
  MATI[1] = MC_@prp@.FIN                        ; UNCONST. MODE CH TRIPS
  MATO[1] = MC_@prp@.CON,MO=17,15,10,11,5,14,18  ; CONSTR.  MODE CH TRIPS
  MW[5]  = 0             ; initialize HOV tabs (5-7) to 0
  MW[6]  = 0             ; they exist for HBW purpose but do not exist
  MW[7]  = 0             ; for non-work purposes
  @INTAB@                ; Read in 'Final' Mode Choice Model tables
   ;  Trip tables read in are:
   ; 1/SOVadr, 2/SOVapn, 3/WlkTrn, 4/DrvTrn, 5/Hv2adr, 6/Hvapn, 7/Hv3adr

  LOOKUP NAME=TCONFTR,
  LOOKUP[1]=1,RESULT=7,INTERPOLATE=N,LIST=T,FAIL=0,0,0,FILE=TCONFTR.@prp@

  IF (I = 1239-2144)      MW[30] =  11, INCLUDE=1239-2144
  IF (I = 1239-2144)      MW[30] =  12, INCLUDE=1-88,1230-1238
  IF (I = 1239-2144)      MW[30] =  13, INCLUDE=89-1229

  IF (I = 1-88,1230-1238) MW[30] =  21, INCLUDE=1239-2144
  IF (I = 1-88,1230-1238) MW[30] =  22, INCLUDE=1-88,1230-1238
  IF (I = 1-88,1230-1238) MW[30] =  23, INCLUDE=89-1229

  IF (I = 89-1229)        MW[30] =  31, INCLUDE=1239-2144
  IF (I = 89-1229)        MW[30] =  32, INCLUDE=1-88,1230-1238
  IF (I = 89-1229)        MW[30] =  33, INCLUDE=89-1229
;
; Now Factor transit tables
;
 JLOOP
    MW[8] = MW[3] + MW[4]                  ; Initial/Unconstr. Total Trn
    MW[9] = MW[2] + MW[3] + MW[4] + MW[6]  ; Initial Total Person

    MW[10] = MW[3] * tconftr(1,MW[30])    ; Constrained Walk  transit
    MW[11] = MW[4] * tconftr(1,MW[30])    ; Constrained Drive transit
    MW[12] = MW[10] + MW[11]              ; Constrained Total transit

    MW[13] = MW[8] - MW[12]               ; Transit 'Residual'
      IF (MW[13] < 0)                     ; - Make sure the residual is
          MW[13] = 0                      ;   NOT negative
      ENDIF                               ;

  IF (MW[6]= 0)
    MW[14] = MW[6]
   ELSE
    MW[14] = MW[6] + (MW[13] * (MW[6]/(MW[2]+MW[6]))) ; Updated HOV Psn
  ENDIF

  MW[15] = MW[9] - (MW[14] + MW[12])                ; Updated LOV Psn
                                                    ; Updated LOV Adr:
 IF (MW[2] = 0 && MW[6] =0)
    MW[17] = MW[1]+(@DADRPCT@ * MW[13])
   ELSEIF (MW[2] > 0)
    MW[17] = MW[1]+((MW[1]/MW[2]) * (MW[13]-(MW[13]*(MW[6]/(MW[2]+MW[6])))))
   ELSE
    MW[17] = MW[1]+ (@DADRPCT@ * (MW[13]-(MW[13]*(MW[6]/(MW[2]+MW[6])))))
 ENDIF

 IF (MW[14] = 0)
```

```
   MW[18] = MW[7]
  ELSE
   MW[18] = MW[7]+((@HADRPCT@) * (MW[13]*(MW[6]/(MW[2]+MW[6]))))
 ENDIF
ENDJLOOP
;

;Bucket Round

DUMMY=ROWFIX(17)
DUMMY=ROWFIX(15)
DUMMY=ROWFIX(10)
DUMMY=ROWFIX(11)
DUMMY=ROWFIX(05)
DUMMY=ROWFIX(14)
DUMMY=ROWFIX(18)
;
;
;
;
JLOOP
;
; Now Accumulate Initial and Updated Totals /RATES Here:       ; OLD|NEW
;                                                              ; -------
 INISOVAD = INISOVAD + MW[01]    UPDSOVAD = UPDSOVAD + MW[17]  ; SOV ADRs
 INISOVAP = INISOVAP + MW[02]    UPDSOVAP = UPDSOVAP + MW[15]  ; SOV APns
 INITRNWK = INITRNWK + MW[03]    UPDTRNWK = UPDTRNWK + MW[10]  ; Trn Wk
 INITRNDR = INITRNDR + MW[04]    UPDTRNDR = UPDTRNDR + MW[11]  ; Trn Dr
 INIHV2AD = INIHV2AD + MW[05]    UPDHV2AD = UPDHV2AD + MW[05]  ; HV2 Adrs
 INIHOVAP = INIHOVAP + MW[06]    UPDHOVAP = UPDHOVAP + MW[14]  ; HOV APns
 INIHV3AD = INIHV3AD + MW[07]    UPDHV3AD = UPDHV3AD + MW[18]  ; HV3 Adrs

 INI_PSN  = INI_PSN  + MW[02] + MW[03] + MW[04] + MW[06]       ; OLD Psns
 UPD_PSN  = UPD_PSN  + MW[15] + MW[10] + MW[11] + MW[14]       ; NEW Psns

 INI_TRN  = INI_TRN  + MW[03] + MW[04]                         ; OLD TRN
 UPD_TRN  = UPD_TRN  + MW[10] + MW[11]                         ; NEW TRN

 INI_APN  = INI_APN  + MW[02] + MW[06]                         ; OLD APSN
 UPD_APN  = UPD_APN  + MW[15] + MW[14]                         ; NEW APSN

 INI_ADR  = INI_ADR  + MW[01] + MW[05] + MW[07]                ; OLD APSN
 UPD_ADR  = UPD_ADR  + MW[17] + MW[05] + MW[18]                ; NEW APSN


ENDJLOOP


; If at end,  Get Global Mode differences and regional rates

if (i=zones)

; get differences by purpose (output - Input)

 DIFSOVAD =    UPDSOVAD - INISOVAD
 DIFSOVAP =    UPDSOVAP - INISOVAP
 DIFTRNWK =    UPDTRNWK - INITRNWK
 DIFTRNDR =    UPDTRNDR - INITRNDR
 DIFHV2AD =    UPDHV2AD - INIHV2AD
 DIFHOVAP =    UPDHOVAP - INIHOVAP
 DIFHV3AD =    UPDHV3AD - INIHV3AD
 DIF_PSN  =    UPD_PSN  - INI_PSN
 DIF_TRN  =    UPD_TRN  - INI_TRN
 DIF_APN  =    UPD_APN  - INI_APN

; Calculate final car occupancy and transit percentage

IF (INI_ADR = 0)
  INI_OCC  =   0                                              ; OLD OCC
 ELSE
  INI_OCC  = INI_APN/INI_ADR                                  ; OLD OCC
ENDIF

IF (UPD_ADR = 0)
  UPD_OCC   = 0                                               ; NEW OCC
 ELSE
  UPD_OCC  = UPD_APN/UPD_ADR                                  ; NEW OCC
ENDIF

IF (INI_PSN = 0)
 INI_TPCT   = 0                                               ; OLD %TRN
  ELSE
 INI_TPCT = INI_TRN/INI_PSN * 100.00                          ; OLD %TRN
ENDIF

IF (UPD_PSN = 0)
 UPD_TPCT   = 0                                               ; NEW %tRN
  ELSE
 UPD_TPCT = UPD_TRN/UPD_PSN * 100.00                          ; NEW %tRN
ENDIF

 DIF_OCC  =    UPD_OCC  - INI_OCC
 DIF_TPCT =    UPD_TPCT - INI_TPCT
```

```
 CONTOTAL  = @control@ ; control total from previous step
LIST = '/bt     '
LIST = ' @prp@ TRANSIT CONSTRAINT RESULTS- Zonal Totals by Mode'
LIST = '       Initial and Final Totals by Mode','\n'
LIST = '    '
list = 'MODE         ','  INITIAL ','  UPDATED ','DIFFERENCE'
list = '------------ ','  ------- ','  ------- ',' -------- '
LIST='  '
LIST = 'SOV_AD:      ',   INISOVAD(10),   UPDSOVAD(10),  DIFSOVAD(10)
LIST = 'SOV_AP:      ',   INISOVAP(10),   UPDSOVAP(10),  DIFSOVAP(10)
LIST = 'TRN_WK:      ',   INITRNWK(10),   UPDTRNWK(10),  DIFTRNWK(10)
LIST = 'TRN_DR:      ',   INITRNDR(10),   UPDTRNDR(10),  DIFTRNDR(10)
LIST = 'HV2_AD:      ',   INIHV2AD(10),   UPDHV2AD(10),  DIFHV2AD(10)
LIST = 'HOV_AP:      ',   INIHOVAP(10),   UPDHOVAP(10),  DIFHOVAP(10)
LIST = 'HV3_AD:      ',   INIHV3AD(10),   UPDHV3AD(10),  DIFHV3AD(10)
LIST='  '
LIST = 'TOTAL PERSON:',    INI_PSN(10),    UPD_PSN(10),  DIF_PSN(10)
LIST='  '
LIST = 'TRANSIT:     ',    INI_TRN(10),    UPD_TRN(10),  DIF_TRN(10)
LIST = 'TRANSIT Control Total  ', CONTOTAL(10),'            <-- Based on Squeezed 3x3 Trips'
LIST='  '
LIST = 'AUTO PSN:    ',    INI_APN(10),    UPD_APN(10),  DIF_APN(10)
LIST='  '
LIST = 'Transit %:   ',    INI_TPCT(10.3), UPD_TPCT(10.3), DIF_TPCT(10.3)
LIST = 'AUTO OCCUP.: ',    INI_OCC(10.3),  UPD_OCC(10.3),  DIF_OCC(10.3)
list = '/et       '
endif

ENDRUN
ENDLOOP
```

Attachment 4: MC_ConSummary.S (TP+ Script)

```
; ---------------------------------------------------------------
; MC_ConSummary.s - Juris. Summary of constrained transit trips
;               by Purpose and Mode
;
;
; Now summarize total purpose trip tables, by mode
; ---------------------------------------------------------------

RUN PGM=MATRIX
  ZONES=2191
  MATI[1]= MC_HBW.FIN
  MATI[2]= MC_HBS.FIN
  MATI[3]= MC_HBO.FIN
  MATI[4]= MC_NHB.FIN
  FILLMW MW[01]=MI.1.1,2,3,4,5,6,7
  FILLMW MW[11]=MI.2.1,2,3,4,5,6,7
  FILLMW MW[21]=MI.3.1,2,3,4,5,6,7
  FILLMW MW[31]=MI.4.1,2,3,4,5,6,7

  MW[51] = MW[01] + MW[11] + MW[21] + MW[31]  ; Total LOV Auto Drv
  MW[52] = MW[02] + MW[12] + MW[22] + MW[32]  ; Total LOV Auto Psn
  MW[53] = MW[03] + MW[13] + MW[23] + MW[33]  ; Total Walk  Acc Transit
  MW[54] = MW[04] + MW[14] + MW[24] + MW[34]  ; Total Drive Acc Transit
  MW[55] = MW[05] + MW[15] + MW[25] + MW[35]  ; Total HOV-2occ Auto Drv
  MW[56] = MW[06] + MW[16] + MW[26] + MW[36]  ; Total HOV(2/3+) Auto Psn
  MW[57] = MW[07] + MW[17] + MW[27] + MW[37]  ; Total HOV-3+occ Auto Drv

 MATO[1] = MC_ALL.FIN, MO=51-57  ; Total Purpose Mode Choice Trips
ENDRUN


;---------------------------------------------------------------
; Summarize the Mode Choice Model Output to Juris. Level
;---------------------------------------------------------------
DESCRIPT='Simulation - Year: %_year_% Alt: %_alt_% *** With Transit Constraint ***'
LOOP PURP=1,5  ; Outer Loop for Each Purpose (HBW,HBS,HBO,NHB,Total)
IF (PURP=1)
    MCOUTTAB='mc_HBW.FIN'
    PURPOSE ='HBW '
ELSEIF (PURP=2)
    MCOUTTAB='mc_HBS.FIN'
    PURPOSE ='HBS'
ELSEIF (PURP=3)
    MCOUTTAB='mc_HBO.FIN'
    PURPOSE ='HBO'
ELSEIF (PURP=4)
    MCOUTTAB='mc_NHB.FIN'
    PURPOSE ='NHB'
ELSEIF (PURP=5)
    MCOUTTAB='mc_ALL.FIN'
    PURPOSE ='ALL'
ENDIF

;
COPY FILE=DJ.EQV
;   -- Start of Jurisiction-to-TAZ equivalency --
D 1=1-88                        ; DC cr
D 2=89-319                      ; DC ncr
D 3=320-639                     ; MTG MD
D 4=640-1029                    ; PG  MD
D 5=1230-1238                   ; ARL core
D 6=1239-1329                   ; ARLcnore
D 7=1330-1399                   ; ALX VA
D 8=1400-1779                   ; FFX VA
D 9=1780-1919                   ; LDN VA
D 10=1920-2069                  ; PW  VA
D 11=1030-1059                  ; FRD MD
D 12=1060-1079                  ; CAR MD
D 13=1080-1109                  ; HOW MD
D 14=1110-1149                  ; AAR MD
D 15=1150-1169                  ; CAL
D 16=1170-1199                  ; STM
D 17=1200-1229                  ; CHS MD
D 18=2115-2129                  ; FAU VA
D 19=2080-2099                  ; STA VA
D 20=2130-2134,2135-2144        ; CLK/JEF
D 21=2100-2104,2105-2114        ; FBG/SPTS
D 22=2070-2079                  ; KGEOVA
D 23=2145-2191                  ; EXTRNLS
;   -- end of Jurisiction-to-TAZ equivalency --
ENDCOPY

RUN PGM=MATRIX
  ZONES=2191
  MATI[1]= @MCOUTTAB@
  MW[1]=MI.1.1                      ;  SOV ADR
  MW[2]=MI.1.2                      ;  SOV APSN
  MW[3]=MI.1.3+MI.1.4               ;  Transit
```

```
  MW[4]=MI.1.6                        ;  HOV APSN
  MW[5]=MI.1.5+MI.1.7                 ;  HOV ADR
  MW[6]=MI.1.1+MI.1.5+MI.1.7          ;  Auto Driver
  MW[7]=MI.1.2+MI.1.6                 ;  Auto Psn
  MW[8]=MI.1.2+MI.1.3+MI.1.4+MI.1.6   ;  Person
  MW[10]=0                            ;  dummy/placemarker table
  FILEO MATO[1]  = TEMP.sad MO=1,10
        MATO[2]  = TEMP.sap MO=2,10
        MATO[3]  = TEMP.trn MO=3,10
        MATO[4]  = TEMP.hap MO=4,10
        MATO[5]  = TEMP.had MO=5,10
        MATO[6]  = TEMP.adr MO=6,10
        MATO[7]  = TEMP.apn MO=7,10
        MATO[8]  = TEMP.psn MO=8,10
        MATO[9]  = TEMP.trp MO=3,8
        MATO[10] = TEMP.occ MO=7,6

  ; renumber OUT.MAT according to DJ.EQV
  RENUMBER FILE=DJ.EQV, MISSINGZI=M, MISSINGZO=W
ENDRUN

;
LOOP INDEX2=1,10  ; Inner Loop for Each Summary Type:
;               1/LOV Adrs,2/LOV APpsns,3/Transit,4/HOV Psns,5/HOV Adrs
;               6/Adrs    ,7/Apsns     ,8/Persons,9/Pct Trn ,10/Auto Occ
;
IF (INDEX2=1)               ; Parameters for each table:
  SQFNAME='temp.sad'        ; Token name of squeezed modal trip table(s)
  MODE ='LOV Auto Driver'   ; Token mode label od trip table
  DCML=0                    ; decimal specification
  TABTYPE=1                 ; table type(1/2)-involves 1 or 2 trip tables
  SCALE=1                   ; scale factor to be applied (if desired)
  OPER='+'                  ; operation(if tabtype=2) Tab1(?)Tab2=Result
ELSEIF (INDEX2=2)
  SQFNAME='temp.sap'        ;
  MODE ='LOV Auto Person'
  DCML=0
  TABTYPE=1
  SCALE=1                   ;
  OPER='+'                  ;
ELSEIF (INDEX2=3)
  SQFNAME='temp.trn'        ;
  MODE ='Transit   '
  DCML=0
  TABTYPE=1
  SCALE=1                   ;
  OPER='+'                  ;
ELSEIF (INDEX2=4)
  SQFNAME='temp.hap'        ;
  MODE ='HOV Auto Person'
  DCML=0
  TABTYPE=1
  SCALE=1                   ;
  OPER='+'                  ;
ELSEIF (INDEX2=5)
  SQFNAME='temp.had'        ;
  MODE ='HOV AUTO Driver'
  DCML=0
  TABTYPE=1
  SCALE=1                   ;
  OPER='+'                  ;
ELSEIF (INDEX2=6)
  SQFNAME='temp.adr'        ;
  MODE ='Auto Driver'
  DCML=0
  TABTYPE=1
  SCALE=1                   ;
  OPER='+'                  ;
ELSEIF (INDEX2=7)
  SQFNAME='temp.apn'        ;
  MODE ='Auto Person  '
  DCML=0
  TABTYPE=1
  SCALE=1                   ;
  OPER='+'                  ;
ELSEIF (INDEX2=8)
  SQFNAME='temp.psn'        ;
  MODE ='Total Motorized Person'
  DCML=0
  TABTYPE=1
  SCALE=1                   ;
  OPER='+'                  ;
ELSEIF (INDEX2=9)
  SQFNAME='temp.trp'        ;
  MODE ='Transit Percentage'
  DCML=1
  TABTYPE=2
  SCALE=100                 ;
```

```
  OPER='/'
ELSEIF (INDEX2=10)
  SQFNAME='temp.occ'        ;
  MODE ='Avg. Auto Occupancy '
  DCML=2
  TABTYPE=2
  SCALE=1                   ;
  OPER='/'
ENDIF
;
RUN PGM=MATRIX
  ZONES=23
  FILEI MATI=@SQFNAME@
  ARRAY CSUM=23,CSUM1=23,CSUM2=23
; ---------------------------------------------------------------
; --  Table Cell Value decalaration or computation (in MW[1])
; ---------------------------------------------------------------

  FILLMW MW[1]=MI.1.1,2     ;    read input tables in MW 2,3

 IF (@TABTYPE@ = 2)
  FILLMW MW[2]=MI.1.1,2     ;    read input tables in MW 2,3
 ENDIF

  IF (@TABTYPE@=2)                                ; Cell Value
     JLOOP                                        ; computed for
      IF (MW[3][J]>0) MW[1]=MW[2]*@SCALE@@OPER@MW[3]; special summaries-
     ENDJLOOP                                     ; calculation in MW[1]
  ENDIF

; ---------------------------------------------------------
; ---- ROW Marginal declaration or computation --------
; ---------------------------------------------------------
  RSUM   =     ROWSUM(1)            ; 'normal' table- row summary value

  IF (@TABTYPE@=2)
        RSUM = @SCALE@*ROWSUM(2)@OPER@ROWSUM(3)  ; non-'normal' table
  ENDIF                                  ; compute the row marginal(%)

; ---------------------------------------------------------
; ---- COLUMN/Total Marginal Accumulation            ----
; ---- The computation (if necessary) is done below  ----
; ---------------------------------------------------------

  JLOOP                            ; COL/Total Accumulation
    CSUM[J] = CSUM[J] +  MW[1][J]  ; for 'normal' table
    TOTAL   = TOTAL   +  MW[1]     ;
  ENDJLOOP

IF (@TABTYPE@=2)
  JLOOP                              ; COL/Total Accumulation
    CSUM1[J] = CSUM1[J] +  MW[2][J]  ; for non-'normal' Table
    TOTAL1   = TOTAL1   +  MW[2]     ;
    CSUM2[J] = CSUM2[J] +  MW[3][J]  ;
    TOTAL2   = TOTAL2   +  MW[3]     ;
  ENDJLOOP
ENDIF

  IF (I==1)      ; print header

  PRINT LIST='/bt   ','@DESCRIPT@'
  PRINT LIST='      ','Purpose: ','@PURPOSE@','   MODE: ','@MODE@'
  PRINT LIST='      '

   PRINT LIST='           DESTINATION'
   PRINT LIST=' ORIGIN |',
              '      1','      2','      3','      4',
              '      5','      6','      7','      8','      9',
              '     10','     11','     12','     13','     14',
              '     15','     16','     17','     18','     19',
              '     20','     21','     22','     23',' |  TOTAL'


   PRINT LIST='==============',
              '=========================================',
              '=========================================',
              '=========================================',
              '=========================================='


  ENDIF

  IF (I=1)
   CURDIST=STR(I,2,1)+' DC CR'+ '|' ; Make row header
  ELSEIF (I=2)
   CURDIST=STR(I,2,1)+' DC NC'+ '|' ; Make row header
  ELSEIF (I=3)
```

```
   CURDIST=STR(I,2,1)+' MTG  '+ '|' ; Make row header
  ELSEIF (I=4)
   CURDIST=STR(I,2,1)+' PG   '+ '|' ; Make row header
  ELSEIF (I=5)
   CURDIST=STR(I,2,1)+' ARLCR'+ '|' ; Make row header
  ELSEIF (I=6)
   CURDIST=STR(I,2,1)+' ARNCR'+ '|' ; Make row header
  ELSEIF (I=7)
   CURDIST=STR(I,2,1)+' ALX  '+ '|'; Make row header
  ELSEIF (I=8)
   CURDIST=STR(I,2,1)+' FFX  '+ '|' ; Make row header
  ELSEIF (I=9)
   CURDIST=STR(I,2,1)+' LDN  '+ '|' ; Make row header
  ELSEIF (I=10)
   CURDIST=STR(I,2,1)+' PW   '+ '|' ; Make row header
  ELSEIF (I=11)
   CURDIST=STR(I,2,1)+' FRD  '+ '|' ; Make row header
  ELSEIF (I=12)
   CURDIST=STR(I,2,1)+' CAR  '+ '|' ; Make row header
  ELSEIF (I=13)
   CURDIST=STR(I,2,1)+' HOW  '+ '|' ; Make row header
  ELSEIF (I=14)
   CURDIST=STR(I,2,1)+' AAR  '+ '|' ; Make row header
  ELSEIF (I=15)
   CURDIST=STR(I,2,1)+' CAL  '+ '|' ; Make row header
  ELSEIF (I=16)
   CURDIST=STR(I,2,1)+' STM  '+ '|' ; Make row header
  ELSEIF (I=17)
   CURDIST=STR(I,2,1)+' CHS  '+ '|' ; Make row header
  ELSEIF (I=18)
   CURDIST=STR(I,2,1)+' FAU  '+ '|' ; Make row header
  ELSEIF (I=19)
   CURDIST=STR(I,2,1)+' STA  '+ '|' ; Make row header
  ELSEIF (I=20)
   CURDIST=STR(I,2,1)+' CL/JF'+ '|' ; Make row header
  ELSEIF (I=21)
   CURDIST=STR(I,2,1)+' SP/FB'+ '|' ; Make row header
  ELSEIF (I=22)
   CURDIST=STR(I,2,1)+' KGEO '+ '|' ; Make row header
  ELSEIF (I=23)
   CURDIST=STR(I,2,1)+' EXTL '+ '|' ; Make row header
  ELSE   (I=24)
   CURDIST=STR(I,2,1)+' TOTAL'+ '|' ; Make row header
  ENDIF

  PRINT FORM=7.@DCML@ LIST=CURDIST, MW[1][1],MW[1][2],MW[1][3],MW[1][4],MW[1][5],
                   MW[1][6],MW[1][7],MW[1][8],MW[1][9],MW[1][10],
                   MW[1][11],MW[1][12],MW[1][13],MW[1][14],MW[1][15],
                   MW[1][16],MW[1][17],MW[1][18],MW[1][19],MW[1][20],
                   MW[1][21],MW[1][22],MW[1][23],' |',RSUM

  IF (I==ZONES)
; Now at the end of Processed zone matrix
;  Do final Column/Grand Total Computations
     IF (@TABTYPE@=2)
       LOOP IDX = 1,ZONES
            IF (CSUM2[IDX] = 0)
                 CSUM[IDX] = 0
            ELSE
                 CSUM[IDX] = @SCALE@* CSUM1[IDX] @OPER@ CSUM2[IDX]
            ENDIF
       ENDLOOP
     ENDIF
     IF (@TABTYPE@=2 )
            IF (TOTAL2 = 0)
                TOTAL  = 0
            ELSE
                TOTAL  = @SCALE@ *TOTAL1 @OPER@ TOTAL2
            ENDIF
     ENDIF

;  End of final Column/Grand Total Computations

    PRINT LIST='==============',
               '=========================================',
               '=========================================',
               '=========================================',
               '======================================='



     PRINT FORM=8.@DCML@,
     LIST=' TOTAL ',' ',CSUM[1],'      ' ,CSUM[3],
     '      ',CSUM[5],'      ',CSUM[7],'      ',CSUM[9],
     '      ',CSUM[11],'      ',CSUM[13],'      ',CSUM[15],
     '      ',CSUM[17],'      ',CSUM[19],'      ',CSUM[21],
     '      ',CSUM[23],' |'
     PRINT FORM=8.@DCML@,
```

```
    LIST='/et            ',CSUM[2],
    '      ' ,CSUM[4],'      ',CSUM[6],'      ',CSUM[8],
    '      ',CSUM[10],'      ',CSUM[12],'      ',CSUM[14],
    '      ',CSUM[16],'      ',CSUM[18],'      ',CSUM[20],
    '      ',CSUM[22],'       ',TOTAL(9.@DCML@)


 ENDIF
ENDRUN

ENDLOOP ; End 'Inner' Loop
ENDLOOP ; End 'Outer' Loop
```