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MEMORANDUM

To: P. Agnello, BMC
From: B. Allen
Date: 11 Feb 2003
Re: Revisions to the Truck and Commercial Models

As per our contract of 2 December 2002, I have completed the work to update the Truck and Commercial trip models for the BMC regional travel model. BMC recently changed its traffic assignment procedure and its zone system. Assignment now uses equilibrium volume averaging and incorporates drive-to-transit vehicle trips. The zone system was expanded to 2973 zones to include the MWCOG zone system in the MWCOG modelled area. Because the development of the new Truck and Commercial models was related to the assignment technique and the zone system, those changes suggested that a re-examination of these models was in order. This memo documents the results of that analysis. I am also separately sending you a CD with all of the files from this update.

External Stations

The first change involves year 2000 counts at external stations. In the previous work, there turned out to be a few minor errors in those counts and a few counts that were updated too late to be included in that project. Those discrepancies have been resolved. I ensured that there was a complete correspondence between the external station volumes shown in the SP0006.DAT file and the counts posted at the external stations in the SP0020.NET network.

This change required that I update the CV/MT/HT X/X trip table. The updated version is called SP00XX.NEW, table 1 = CV = 4,250 trips, table 2 = MT = 1,833 trips, table 3 = HT = 7,749 trips.

CV Counts

Due to the changes in the external station MT/HT counts, as well as a number of other count changes, it was necessary to re-estimate the CV counts. So I re-applied the CV count model in COMMDL.JOB, with a few minor changes required by changes in some of the network fields. I also checked for CV count "outliers" – synthesized counts that seemed inconsistent or illogical; these were removed. The outlier list from the previous work was substantially revised. I examined the resulting synthesized CV counts visually in Viper and was satisfied that they were reasonable. The file on the CD, INT2\SP0020C.NET, contains these counts in the COMCNT00 field.

F Factor Bounds

TP+ uses a parameter vector called "FAIL" to specify bounds on the F factor lookup table. The FAIL(1) value is used for times of less than the minimum time in the lookup table and FAIL(2) is used for times that exceed the maximum time in the table. In reviewing the model setups you sent, I noticed that BMC staff had modified these parameters from what I had used in the original model development. This concerned me, so I ran some tests and discovered that there was only a very tiny difference in the results between your parameters and mine.

I discovered that if I divided the original HT F factors by 5000 across the board, then the answers would be consistent between your method and mine. I also verified that changing the HT F factors this way has no effect on the average trip length. The new HT F factors are shown in Table 1 and are in INT2\HTRKFF.DAT on the CD. The revised pre-adjustment average trip lengths changed a little from the original values and are shown in Table 2. Thus, your FAIL parameters are now correct.

Table 1

Revised HT F Factors

Time	F	Time	F	Time	F	Time	F
1	654	31	7.03	61	2.88	91	1.70
2	262	32	6.74	62	2.82	92	1.67
3	153	33	6.47	63	2.76	93	1.65
4	105	34	6.22	64	2.70	94	1.63
5	78	35	5.99	65	2.64	95	1.60
6	61	36	5.77	66	2.59	96	1.58
7	50	37	5.56	67	2.54	97	1.56
8	42	38	5.37	68	2.49	98	1.54
9	36	39	5.19	69	2.44	99	1.52
10	31	40	5.02	70	2.40	100	1.50
11	28	41	4.86	71	2.35	101	1.48
12	25	42	4.71	72	2.31	102	1.46
13	22	43	4.56	73	2.27	103	1.44
14	20	44	4.43	74	2.23	104	1.42
15	18	45	4.30	75	2.19	105	1.40
16	17	46	4.17	76	2.15	106	1.39
17	16	47	4.06	77	2.11	107	1.37
18	14	48	3.95	78	2.08	108	1.35
19	13	49	3.84	79	2.04	109	1.34
20	13	50	3.74	80	2.01	110	1.32
21	12	51	3.64	81	1.98	111	1.31
22	11	52	3.55	82	1.95	112	1.29
23	10.42	53	3.46	83	1.92	113	1.27
24	9.85	54	3.38	84	1.89	114	1.26
25	9.34	55	3.30	85	1.86	115	1.25
26	8.87	56	3.22	86	1.83	116	1.23
27	8.43	57	3.15	87	1.80	117	1.22
28	8.04	58	3.07	88	1.77	118	1.20
29	7.68	59	3.01	89	1.75	119	1.19
30	7.34	60	2.94	90	1.72	120	1.18

Table 2

Average Trip Lengths (pre-adjustment, excluding X/X, minutes)

Type	Original	Revised	Difference
Commercial	15.23	16.30	7%
Medium Truck	17.22	18.03	5%
Heavy Truck	35.15	35.36	1%

New Adaptable Runs

I made a new set of adaptable assignment runs using the new network, counts, assignment procedures, and "base" auto trips from my application of the BMC model to 2000 conditions ("SP00" run). This included a special setup provided by BMC staff to sum daily trips and perform a daily assignment. I used the SP00196.DAT daily auto trip table, the SP00596.DAT daily drive-to-transit vehicle trip table, the SP00PEN.PEN turn penalty file, and the SP0011.DAT highway skim tables. This set of adaptable runs was revised to assign and adjust all three trip tables (CV/MT/HT) simultaneously. I made one set of adaptable runs (10 iterations for all purposes) and examined the resulting trip tables in the same fashion as in the original project. This analysis indicated that there should be some adjustments in the trip factors by jurisdiction, density code, and truck zone type. After making those adjustments, I ran another set of adaptable runs and those results were satisfactory. All runs used the multiplicative adjustment factor that BMC earlier indicated a preference for.

Table 3 presents a summary of the trip totals from the earlier work and as revised, both pre- and post-adjustment. Pre-adjustment, there were modest increases in CV and MT trips (5% and 8%), but a rather large increase (27%) in HT trips. One-quarter of the HT increase is due solely to corrections in the external station volumes. Post-adjustment, these increases were slightly lower, but the final HT trips still increased by 20% from before. This change can be ascribed partially to differences in the count data and partially to the use of 5 additional iterations of adaptable assignment this time for HT. These additional iterations increase the trip total, but produce a more accurate assignment.

Assignment Validation

Table 4 presents a summary of the change introduced by the delta adjustment and the overall assignment error, original vs. revised. As this table shows, the CV model is clearly better than before. For MT, the volume error is higher, but the relative delta adjustment is smaller. For HT, the volume error is also higher, but the RMS error and delta adjustment are smaller.

Table 5 presents the detailed assignment summary tables. These results should be considered acceptable. Table 6 shows the delta trip adjustments in district-district format.

Setup Changes

A few changes are required to the current SP00 setup run:

1. Incorporate new HT F factors, as shown in Table 1 and on the CD at INT2\HTRKFF.DAT.
2. Incorporate new delta adjustment table on the CD, ADAPT2\DELTA.FAC. These factors are now applied to the base trips without rounding.
3. Modify the lookup tables for the trip factors in the CV/MT/HT generation step. The revised factors are shown in Table 7. These changes increase CV trips in the D.C. suburbs and Carroll Co., MT trips in the D.C. suburbs and Howard Co., and HT trips in the D.C. suburbs and Howard and Harford Cos., and decrease HT trips in Baltimore City. The increase in the D.C. suburbs is probably due to the new, smaller zone sizes, converting trips from intrazonal to interzonal. The truck zone factors affect only HTs, decreasing them for truck zone types 3 and 9 and increasing them for type 7.
4. Use new CV/MT/HT X/X trips, on the CD at INT2\SP00XX.NEW (table 1 = PC [unmodified], t2 = CV, t3 = MT, c4 = HT).

I recommend that you use my new version of SP0006.DAT, on the CD in the \INT2 directory.

Table 3

Trip Totals (000's)

	Commercial	Med. Truck	Hvy. Truck
Original Model	*Pre-Adjustment*		
I/I	1,038	249	192
External	82	35	69
X/X	4	2	7
Total	1,124	286	268
	Post-Adjustment		
Total	1,179	335	297
Revised Model	*Pre-Adjustment*		
I/I	1,090	273	247
External	84	35	86
X/X	4	2	8
Total	1,178	310	341
	Post-Adjustment		
Total	1,203	357	355

Table 4

Assignment Summary

	Commercial	Med. Truck	Hvy. Truck
Original Model			
Percent Adjustment	5%	17%	11%
% RMSE	13%	24%	33%
% Volume Error	-1.9%	-0.4%	+4.3%
Revised Model			
Percent Adjustment	2%	15%	4%
% RMSE	13%	24%	27%
% Volume Error	+0.4%	+3.3%	+5.9%

Table 5

Assignment Report

BMC Truck Model Adaptable Evaluation Results 2000, CV/TK: CV 02/07/03 19:13:42

County	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
BaltCity	244240	243903	1.00	0.15	133	86670	85490
AnnArndl	415234	409265	0.99	0.14	212	336205	333381
BaltmrCo	595159	608408	1.02	0.13	310	386524	399393
Carroll	42346	42763	1.01	0.05	80	37279	37815
Harford	131160	131064	1.00	0.08	142	157443	155074
Howard	234934	233448	0.99	0.08	111	182427	179908
Montgomery	198982	203897	1.02	0.16	57	197186	201196
PG	298849	298669	1.00	0.08	85	343692	340156
Frederick	27336	25748	0.94	0.13	22	71855	67280
External	92100	92289	1.00	0.01	84	27632	27687

Vol Class	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
<= 999	278885	288210	1.03	0.25	565	174183	175274
1000-2499	572354	584183	1.02	0.11	362	354538	358773
2500-4999	705134	705021	1.00	0.09	198	693863	696048
5000-9999	723967	712040	0.98	0.08	111	604329	597285

Area Type	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
Rural	747350	742695	0.99	0.14	586	794233	786268
Suburban	1388753	1398809	1.01	0.13	566	987046	994757
Urban	72619	76597	1.05	0.16	59	30606	31373
City Ctr	71618	71353	1.00	0.03	25	15028	14982

Roadway Type	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
Frwy 1	1093446	1090795	1.00	0.10	229	1126333	1126381
Frwy 2	409031	407390	1.00	0.10	159	320906	320398
Pr Multi	135484	136627	1.01	0.11	98	78588	78186
Pr 2lane	59784	60544	1.01	0.11	103	57283	56754
Mn 2lane	86746	88208	1.02	0.18	184	66790	67575
Pr MulDiv	132825	133678	1.01	0.07	92	40410	40529
Pr 2lnDiv	6168	6703	1.09	0.13	10	1396	1515
Mult CLTL	30780	30875	1.00	0.01	26	17546	17631
2 ln CLTL	1222	1222	1.00	0.00	2	956	957
Pr MulUnd	155378	161035	1.04	0.15	125	60034	61857
2ln Undiv	6852	7393	1.08	0.10	8	986	1143
Min Multi	27252	28774	1.06	0.37	34	5991	6584
Min 2lane	9526	9284	0.97	0.36	18	2320	2109
Collector	31438	32385	1.03	0.18	62	19004	17388
HiSpdRamp	2308	2252	0.98	0.14	2	738	686
Cent Conn	92100	92289	1.00	0.01	84	27632	27687

Table 5 (cont.)

Cong Spd Range	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
15	956	1115	1.17	0.17	1	60	70
20	1742	1897	1.09	0.16	3	118	128
25	59360	60970	1.03	0.12	59	12452	13024
30	224672	230970	1.03	0.16	223	88582	91347
35	42229	44965	1.06	0.18	17	34083	35295
40	430868	437320	1.01	0.11	441	270515	272258
45	228446	228534	1.00	0.11	135	142848	141893
50	147873	153006	1.03	0.10	39	142851	148426
55	200943	200978	1.00	0.07	40	180528	179749
60	719971	710144	0.99	0.11	208	600252	594799
65	145450	144135	0.99	0.15	41	185355	186041
70	77830	75420	0.97	0.06	29	169269	164350

Cap/Lane Range	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
750	4516	4443	0.98	0.02	2	1436	1413
1000	36448	37226	1.02	0.26	78	19888	18084
1250	107379	110538	1.03	0.21	130	30207	31344
1500	299475	307344	1.03	0.15	384	191571	193576
1750	100153	100550	1.00	0.07	70	29614	29625
2000	254281	255683	1.01	0.12	142	195421	195736
2250	1129493	1127740	1.00	0.10	271	897743	901117
2500	256495	253641	0.99	0.12	75	433401	428798
3000	92100	92289	1.00	0.01	84	27632	27687

Totals:

Count	2280340.000
Assigned Vol	2289454.000
Est/Obs Vol	1.004
RMS Error	73771670.000
Avg RMS Error	244.307
% RMS Error	0.132420
Links	1236.000
Obs. VMT	1826913.000
Est. VMT	1827380.000
Est/Obs VMT	1.000
Corr Coef R	0.996
Coef Var Rsq	0.991277

Table 5 (cont.)

BMC Truck Model Adaptable Evaluation Results 2000, CV/TK: MT 02/07/03 19:14:31

County	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
BaltCity	63557	63610	1.00	0.24	133	23094	22850
AnnArndl	151706	157960	1.04	0.26	214	122694	125503
BaltmrCo	247465	260134	1.05	0.25	314	172827	177825
Carroll	21486	21868	1.02	0.12	80	20628	20821
Harford	49196	50153	1.02	0.11	142	65950	66466
Howard	86044	89985	1.05	0.20	111	76416	78168
Montgomery	67119	69307	1.03	0.25	57	67866	69278
PG	126719	128644	1.02	0.15	85	139622	142568
Frederick	11900	11690	0.98	0.20	22	31806	30638
External	38852	38858	1.00	0.05	84	11652	11660

Vol Class	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
<= 999	328157	363538	1.11	0.36	994	210182	226696
1000-2499	282913	286465	1.01	0.18	171	286515	292009
2500-4999	252974	242206	0.96	0.08	77	235858	227072

Area Type	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
Rural	305331	308090	1.01	0.22	590	336290	335894
Suburban	528336	551929	1.04	0.23	568	386969	400181
Urban	18425	19726	1.07	0.23	59	7072	7329
City Ctr	11952	12464	1.04	0.13	25	2224	2373

Roadway Type	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
Frwy 1	469052	472601	1.01	0.16	231	496130	500132
Frwy 2	129507	135880	1.05	0.22	161	97295	100202
Pr Multi	47578	50560	1.06	0.26	100	27505	28479
Pr 2lane	25812	26386	1.02	0.15	103	26415	26111
Mn 2lane	28326	31573	1.11	0.36	184	24617	26461
Pr MulDiv	41973	43683	1.04	0.14	92	12860	13414
Pr 2lnDiv	2260	2656	1.18	0.30	10	512	602
Mult CLTL	11284	11442	1.01	0.05	26	6562	6662
2 ln CLTL	384	375	0.98	0.03	2	300	293
Pr MulUnd	43002	48575	1.13	0.30	125	18287	20363
2ln Undiv	2186	2538	1.16	0.38	8	376	408
Min Multi	10392	11424	1.10	0.41	34	2257	2556
Min 2lane	2962	2817	0.95	0.58	18	730	618
Collector	10102	11882	1.18	0.60	62	6938	7517
HiSpdRamp	372	959	2.58	1.59	2	119	299
Cent Conn	38852	38858	1.00	0.05	84	11652	11660

Table 5 (cont.)

Cong Spd Range	Count	Vol Est/Obs	%RMSE	Links	Obs VMT	Est VMT
15	300	420 1.40	0.40	1	19	26
20	708	821 1.16	0.28	3	49	56
25	15480	15487 1.00	0.10	59	3387	3427
30	81638	85024 1.04	0.21	223	33593	34214
35	14250	16658 1.17	0.23	17	13413	14968
40	138167	152584 1.10	0.39	443	91094	97881
45	90803	92224 1.02	0.16	135	60150	60690
50	51763	55810 1.08	0.17	39	55149	57004
55	72787	71581 0.98	0.16	40	65526	63279
60	291620	294331 1.01	0.20	210	241743	244250
65	68139	69404 1.02	0.15	43	85731	88230
70	38389	37865 0.99	0.08	29	82701	81752

Cap/Lane Range	Count	Vol Est/Obs	%RMSE	Links	Obs VMT	Est VMT
750	788	770 0.98	0.03	2	250	245
1000	12276	13929 1.13	0.63	78	7418	7890
1250	30807	34075 1.11	0.36	130	9030	10032
1500	100507	108728 1.08	0.26	384	72726	75905
1750	34305	35849 1.05	0.14	70	10430	10933
2000	75336	78435 1.04	0.26	144	51845	52028
2250	451041	463115 1.03	0.18	273	368210	377018
2500	120132	118450 0.99	0.14	77	200994	200066
3000	38852	38858 1.00	0.05	84	11652	11660

Totals:

Count	864044.000
Assigned Vol	892209.000
Est/Obs Vol	1.033
RMS Error	34083647.000
Avg RMS Error	165.658
% RMS Error	0.238121
Links	1242.000
Obs. VMT	732555.000
Est. VMT	745777.000
Est/Obs VMT	1.018
Corr Coef R	0.989
Coef Var Rsq	0.977255

Table 5 (cont.)

BMC Truck Model Adaptable Evaluation Results 2000, CV/TK: HT 02/07/03 19:14:52

County	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
BaltCity	128877	137296	1.07	0.40	133	43830	48526
AnnArndl	269270	284048	1.05	0.25	214	214941	220259
BaltmrCo	516479	549546	1.06	0.28	314	423590	436542
Carroll	29540	34708	1.17	0.43	80	29004	33597
Harford	109870	116577	1.06	0.21	142	218376	224723
Howard	188768	200208	1.06	0.23	111	181608	185981
Montgomery	102129	105267	1.03	0.24	57	107821	109870
PG	251729	272212	1.08	0.23	85	333070	343725
Frederick	29624	28897	0.98	0.19	22	82506	77100
External	101028	100960	1.00	0.01	84	30310	30289

Vol Class	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
<= 999	310315	413835	1.33	0.80	871	180032	240242
1000-2499	226628	246585	1.09	0.36	145	145252	154541
2500-4999	511765	503300	0.98	0.12	136	530011	519850
5000-9999	573758	565304	0.99	0.09	80	704446	696788
10K-19999	104848	100695	0.96	0.06	10	105315	99191

Area Type	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
Rural	646776	674898	1.04	0.24	590	818627	834041
Suburban	1032262	1096680	1.06	0.26	568	832586	858727
Urban	32049	37435	1.17	0.46	59	11090	13782
City Ctr	16227	20706	1.28	0.70	25	2753	4062

Roadway Type	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
Frwy 1	1071388	1087578	1.02	0.14	231	1303002	1293608
Frwy 2	210103	250340	1.19	0.41	161	157764	186095
Pr Multi	73618	79604	1.08	0.35	100	40754	42836
Pr 2lane	27352	34466	1.26	0.61	103	28890	34483
Mn 2lane	42770	50973	1.19	0.49	184	31116	39529
Pr MulDiv	70691	77938	1.10	0.24	92	22467	24625
Pr 2lnDiv	3300	4148	1.26	0.38	10	798	981
Mult CLTL	12584	14964	1.19	0.34	26	6910	8532
2 ln CLTL	396	383	0.97	0.03	2	310	301
Pr MulUnd	62740	77246	1.23	0.63	125	22663	29004
2ln Undiv	5266	4284	0.81	0.52	8	852	770
Min Multi	22652	20613	0.91	0.53	34	6141	5607
Min 2lane	5028	4892	0.97	0.42	18	1170	1089
Collector	18206	20308	1.12	0.31	62	11848	12526
HiSpdRamp	192	1022	5.32	4.35	2	61	337
Cent Conn	101028	100960	1.00	0.01	84	30310	30289

Table 5 (cont.)

Cong Spd Range	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
15	1365	1433	1.05	0.05	1	86	90
20	1777	1850	1.04	0.08	3	116	121
25	24369	24780	1.02	0.19	59	4839	5170
30	181263	184014	1.02	0.26	223	72433	72706
35	35080	37523	1.07	0.39	17	27038	28432
40	206181	238863	1.16	0.46	443	127570	148674
45	143958	165675	1.15	0.34	135	93375	107063
50	112182	116173	1.04	0.15	39	127481	127148
55	145934	151778	1.04	0.17	40	140705	139999
60	578494	608338	1.05	0.23	210	541757	552259
65	173261	178634	1.03	0.10	43	247549	253234
70	123450	120658	0.98	0.10	29	282107	275716

Cap/Lane Range	Count	Vol	Est/Obs	%RMSE	Links	Obs VMT	Est VMT
750	516	502	0.97	0.04	2	164	160
1000	22718	24698	1.09	0.34	78	12854	13455
1250	61336	60443	0.99	0.45	130	19149	19422
1500	130812	161985	1.24	0.63	384	83215	104593
1750	55603	62587	1.13	0.26	70	17783	19817
2000	105538	127792	1.21	0.60	144	70083	84692
2250	924281	968679	1.05	0.19	273	817019	833995
2500	325482	322073	0.99	0.11	77	614479	604189
3000	101028	100960	1.00	0.01	84	30310	30289

Totals:

Count	1727314.000
Assigned Vol	1829719.000
Est/Obs Vol	1.059
RMS Error	180348908.000
Avg RMS Error	381.062
% RMS Error	0.273997
Links	1242.000
Obs. VMT	1665056.000
Est. VMT	1710612.000
Est/Obs VMT	1.027
Corr Coef R	0.989
Coef Var Rsq	0.977314

Table 6

Delta Trip Tables

Date: 2/ 7/2003
Time: 3:55

Baltimore Metropolitan Council Travel Model
2000 Daily Trip Calibration Adjustment Table
Commercial Vehicles

Destination District

		1	2	3	4	5	6	7	8	Total
O	1 BaltCity	12461	-4556	216	-429	-907	-2269	-3901	-461	154
r	2 AnnArndl	-4086	14007	-1059	-225	-285	-1364	-4326	136	2798
i	3 BaltmrCo	-934	-200	5943	-1166	-491	-643	-2582	-98	-171
g	4 Carroll	-366	-212	-1176	3080	-37	-288	-315	338	1024
i	5 Harford	-994	-266	-625	-85	5761	-78	-410	542	3845
n	6 Howard	-2323	-1147	-698	-269	-107	10225	-1780	-126	3775
	7 DC Area	-3726	-3850	-2695	-184	-471	-1818	23598	461	11315
D	8 External	-449	219	-75	480	524	-131	481	-1032	17
	Total	-417	-169	3987	10765					22757
		3995	1202	3634	-240					

Table 6 (cont.)

Date: 2/ 7/2003
Time: 3:55

Baltimore Metropolitan Council Travel Model
2000 Daily Trip Calibration Adjustment Table
Medium Trucks

Destination District

		1	2	3	4	5	6	7	8	Total
O	1 BaltCity	1652	-551	-256	-45	-86	-371	-467	-130	-254
r	2 AnnArndl	-744	6474	948	-29	-16	-937	-1174	321	4843
i	3 BaltmrCo	-442	1207	6605	-192	454	64	-275	-10	7411
g	4 Carroll	-46	-15	-260	2011	-1	80	-38	56	1787
i	5 Harford	-77	-7	376	-4	3592	-5	-18	108	3965
n	6 Howard	-380	-927	-55	93	-7	6126	-487	-66	4297
	7 DC Area	-413	-1204	-313	-59	-19	-553	26731	-64	24106
D	8 External	-120	300	72	161	15	-52	-14	-366	-4
	Total	-570	5277	7117	1936	3932	4352	24258	-151	46151

Table 6 (cont.)

Date: 2/ 7/2003
Time: 3:55

Baltimore Metropolitan Council Travel Model
2000 Daily Trip Calibration Adjustment Table
Heavy Trucks

		Destination District								
		1	2	3	4	5	6	7	8	Total
Origin	1 BaltCity	8663	-2318	1745	-593	-1056	-2281	-4889	-2593	-3322
	2 AnnArndl	-2682	8666	-609	-268	-695	-1168	-2475	-114	655
	3 BaltmrCo	991	254	8706	-877	-890	-1297	-4286	-812	1789
	4 Carroll	-543	-166	-918	2435	-202	-248	-557	281	82
	5 Harford	-1318	-650	-940	-231	5879	-360	-1277	1179	2282
	6 Howard	-2059	-890	-1306	-252	-419	7410	-2740	-911	-1167
	7 DC Area	-4767	-2476	-4358	-540	-1328	-2571	24106	5125	13191
	8 External	-2786	115	-690	531	959	-860	4957	-2452	-226
	Total	-4501	2535	1630	205	2248	-1375	12839	-297	13284

Table 6 (cont.)

Date: 2/ 7/2003
Time: 3:55

Baltimore Metropolitan Council Travel Model
2000 Daily Revised/Original Trip Ratio
Commercial Vehicles

		Destination District								
		1	2	3	4	5	6	7	8	Total
O	1 BaltCity	1.13	.55	1.01	.65	.59	.47	.34	.57	1.00
r	2 AnnArndl	.59	1.16	.85	.68	.68	.82	.70	1.08	1.02
i	3 BaltmrCo	.97	.96	1.05	.62	.91	.87	.57	.97	1.00
g	4 Carroll	.63	.71	.62	1.12	.71	.71	.86	1.45	1.03
i	5 Harford	.53	.67	.88	.71	1.11	.75	.64	1.26	1.06
n	6 Howard	.45	.85	.87	.75	.72	1.31	.79	.74	1.06
	7 DC Area	.35	.74	.53	.93	.59	.80	1.05	1.01	1.02
D	8 External	.56	1.11	.95	1.58	1.20	.73	1.01	.75	1.00
	Total	1.00	1.03	1.00	1.04	1.06	1.06	1.02	1.00	1.02

Table 6 (cont.)

Date: 2/ 7/2003
Time: 3:55

Baltimore Metropolitan Council Travel Model
2000 Daily Revised/Original Trip Ratio
Medium Trucks

		Destination District								
		1	2	3	4	5	6	7	8	Total
O	1 BaltCity	1.09	.79	.96	.85	.81	.69	.65	.73	.99
r	2 AnnArndl	.75	1.28	1.38	.89	.99	.58	.69	1.25	1.13
i	3 BaltmrCo	.92	1.55	1.17	.79	1.30	1.00	.82	1.04	1.13
g	4 Carroll	.75	1.03	.75	1.23	.81	1.14	.92	1.14	1.14
i	5 Harford	.78	.96	1.25	.83	1.27	.85	.93	1.08	1.23
n	6 Howard	.66	.62	.97	1.26	.95	1.54	.82	.79	1.21
	7 DC Area	.66	.69	.80	.96	.89	.81	1.29	.99	1.21
D	8 External	.72	1.27	1.06	1.28	1.01	.84	1.00	.79	1.00
	Total	.98	1.15	1.13	1.16	1.23	1.21	.99	1.21	1.15

Table 6 (cont.)

Date: 2/ 7/2003
Time: 3:55

Baltimore Metropolitan Council Travel Model
2000 Daily Revised/Original Trip Ratio
Heavy Trucks

		Destination District								
		1	2	3	4	5	6	7	8	Total
O	1 BaltCity	1.55	.51	1.16	.47	.52	.27	.32	.49	.93
r	2 AnnArndl	.43	2.20	.85	.61	.37	.57	.66	.98	1.02
i	3 BaltmrCo	1.09	1.05	1.46	.43	.76	.60	.45	.88	1.03
g	4 Carroll	.46	.71	.44	2.93	.30	.55	.68	1.18	1.01
i	5 Harford	.43	.41	.74	.35	2.19	.42	.45	1.33	1.12
n	6 Howard	.34	.67	.62	.54	.40	2.59	.51	.62	.95
	7 DC Area	.32	.67	.44	.70	.42	.55	1.51	1.26	1.13
D	8 External	.45	1.03	.90	1.38	1.27	.64	1.25	.68	1.00
	Total	.91	1.08	1.03	1.04	1.12	.94	1.13	.99	1.04

Table 7

Revised Trip Generation Adjustment Factors

```
; Truck Zone Factor Lookup Table
lookup name=tznfac,
       lookup[1]=1, result=2,      ;CV
       lookup[2]=1, result=3,      ;MT
       lookup[3]=1, result=4,      ;HT
       list=y,
;                CV   MT   HT
        r=' 1  1.2  1.3  1.1',     ;Bus Dist,    Large
          ' 2  1.0  1.0  1.9',     ;Whse/Mfgr,   Lg
          ' 3  1.0  1.0  3.8',     ;Inter/Trans, Lg
          ' 4  1.0  1.0  1.0',     ;Airport,     Lg
          ' 5  1.0  1.0  2.7',     ;Inst/Othr,   Lg
          ' 6  3.0  1.3  2.0',     ;Exp/Pkg,     Lg
          ' 7  1.0  1.2  1.3',     ;Bus Dist,    Small
          ' 8  1.0  1.0  1.8',     ;Whse/Mfgr,   Sm
          ' 9  1.0  1.0  3.0',     ;Inter/Trans, Sm
          '10  1.0  1.0  1.0',     ;(N/A)
          '11  1.0  1.0  1.4',     ;Inst/Othr,   Sm
          '12  2.5  1.0  1.6'      ;Exp/Pkg,     Sm

; Density Code adjustment table
lookup name=dcfac,
       lookup[1]=1, result=2,      ;CV
       lookup[2]=1, result=3,      ;MT
       lookup[3]=1, result=4,      ;HT
       list=y,
;                CV   MT   HT
        r=' 1  0.8  1.4  0.8',     ;Rural
          ' 2  1.0  0.9  0.9',     ;Suburban
          ' 3  1.5  0.8  1.0',     ;Urban
          ' 4  0.7  0.8  0.5'      ;City Center

; Jurisdictional Factor Lookup Table
lookup name=jurfac,
       lookup[1]=1, result=2,          ;CV
       lookup[2]=1, result=3,          ;MT
       lookup[3]=1, result=4,          ;HT
       list=y,
;                CV   MT   HT
        r=' 1  1.0  1.1  1.2',     ;Balt City
          ' 2  1.5  1.2  1.2',     ;Anne Arundel
          ' 3  1.2  1.3  1.2',     ;Balt Co
          ' 4  1.8  1.3  1.1',     ;Carroll
          ' 5  2.1  1.5  1.7',     ;Harford
          ' 6  1.2  1.2  1.2',     ;Howard
          ' 7  0.5  0.7  0.4',     ;DC
          ' 8  0.8  1.0  0.7',     ;Montgomery
          ' 9  1.3  1.2  1.0',     ;PG
          '10  0.6  0.6  0.6'      ;Frederick
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