

APPENDIX - A

TERM ANALYSIS INSTRUCTIONS

TERM EMISSIONS REDUCTION CALCULATIONS

This section of the solicitation document contains instructions for analyzing transportation emissions reduction measure (TERM) projects. Starting this fiscal year in addition to estimating the Ozone precursor (VOC and NOx) emissions reductions, we will estimate fine particulate matter (PM 2.5) emissions reduction benefits. Section I provides information to estimate VOC and NOx and Section II provides the necessary information to estimate PM 2.5.

Section I

Table 1 provides an overview of the three emissions components, namely Start-up (Cold Start), Running, and Hot Soak. The methodology that will be used to analyze TERMS for the 2006 CLRP and FY 2007 - 2012 TIP utilizes the latest travel demand results from the Version 2.1D model and emissions data from the Mobile 6.2 emissions model.

The introduction of the Mobile 6 emissions model offered the potential for a more disaggregate emissions reduction analysis of TERMS. Instead of the 8 different vehicle classes used in the Mobile 5b model, the Mobile 6 model utilizes 28 vehicle classes. Four categories of TERMS have been developed utilizing the disaggregate nature of the vehicle classes. The four categories are:

- TERMS impacting the traffic stream (all vehicle types), such as the Signal Optimization TERM, will continue to be analyzed using a regional composite vehicle emissions factor. Tables 2, 3 and 4 display emissions factors for analysis years 2010, 2020 and 2030. *(Emissions factors are under development)*
- TERMS impacting commuting vehicle trips, such as the Employer Outreach and Telework Resources Center TERM (item # 75 and # 90 on the TERM tracking sheet, page 1-2), will be analyzed using an average light duty vehicle emissions factor composed of emissions factors for several classes of light duty vehicles and for motorcycles. Tables 5, 6, and 7 display emissions factors for commuting vehicle trips for analysis years 2010, 2020 and 2030. *(2030 Emissions factors are under development)*
- TERMS impacting all types of heavy duty diesel vehicles, such as a Diesel Fuel Additive TERM, are the next category.
- TERMS impacting an individual heavy duty vehicle type of a specific weight class, are categorized as a specific vehicle type, such as school buses, transit buses, tractor trailers. Emissions rates for 2010 heavy duty diesel transit, and school buses are shown in Table 8; rates for other specific weight classes can be generated as needed. *(Emissions factors are under development)*

TERMs impacting vehicle idling such as roundabouts in place of traffic signals can be analyzed using the individual vehicle type 2005 idling emissions factors or the traffic stream 2005 idling emissions factors shown in Table 9. (*Emissions factors are under development*)

Table 2 through 7 shows Cold Start, Running, Hot Soak emissions factors for VOC and NO_x for the analysis years 2010, 2020 and 2030 to be used for analyzing “Traffic Stream” and Commute Vehicle” TERMs. Table 8 shows 2010 emissions factors for school and transit buses (heavy duty diesel vehicles). Table 9 shows the 2005 idling emissions factors for the different vehicle types. Table 10 shows the 2005 regional average speeds generated by the post-processor which is used to compute hourly speeds for emissions calculations; use specific speeds for each application, where available. Table 11 provides the Mobile 6 vehicle classifications.

The cost effectiveness calculation methodology is explained following the emissions factors tables and is a primary criteria used to select TERMs. The final section provides an example of a commuting vehicle TERM analysis using the emissions factors included in the tables.

For purpose of determining emissions reductions, the start-up, running, and hot soak portions of each trip must be considered. Table 1 shows the procedure to use in the analysis.

Table 1: Mobile Source Emissions Overview

EMISSIONS=TRAVEL X EMISSIONS RATE

Start-up=Trip Origins X Grams/Trip

Running=VMT X Grams/Mile

Hot Soak=Trip Destins X Grams/Trip

Emissions factors were obtained from the Mobile 6 model and are contained herein. NO_x emissions do not occur in the hot soak portion of the trip, therefore only VOC factors are shown for this category.

It may be noted that the running factors and cold start/hot soak factors shown in the attached tables were generated using the Mobile 6.2 emissions model with the latest VMT and vehicle registration data as input to the model. These are the factors that were used in the conformity analysis of the 2005 CLRP and FY 2006-2011 TIP. Running emissions factors for speed range 1 to 65 mph are shown in the emissions factor tables. If the actual speed for a TERM is known, use the appropriate emissions factors, otherwise use emissions factors for average travel speed.

Table 2: 2010 Running, Cold Start and Hot Soak Emissions Factors for Traffic Stream

**TERMs
(GM/MI)
(Mobile 6.2)**

(Under development)

**Table 3: 2020 Running, Cold Start and Hot Soak Emissions Factors for Traffic Stream
TERMs
(GM/MI)
(Mobile 6.2)**

(Under development)

**Table 4: 2030 Running, Cold Start and Hot Soak Emissions Factors for Traffic Stream
TERMs
(GM/MI)
(Mobile 6.2)**

(Under development)

Exhibit - 1

(Insert worksheet Exhibit -1 Traffic VOC from File: Exhibit 1-2-3-4 -Graphs RUNNALLYEARS.xls)

(Under development)

Exhibit - 2

(Insert worksheet Exhibit -2 Traffic NOx from File: Exhibit 1-2-3-4 -Graphs RUNNALLYEARS.xls)

(Under development)

Table 5: 2010 Running, Cold Start, and Hot Soak Average Emissions Factors for "Commute"
TERMS
(Mobile 6.2)

Emission Type	Speed (mph)	Average 2010 Running Emission Factor (g/mi)					
		Arterial	Freeway	Weighted Factor VOC	Arterial	Freeway	Weighted Factor NOx
		VOC		Arterial - 60%, Freeway- 40%	NOx		Arterial - 60%, Freeway- 40%
Running (g/mi)	1	3.1067	3.1066	3.1067	0.9036	0.9036	0.9036
Running (g/mi)	2	3.1067	3.1066	3.1067	0.9036	0.9036	0.9036
Running (g/mi)	3	2.4163	2.4163	2.4163	0.8588	0.8588	0.8588
Running (g/mi)	4	1.5542	1.5541	1.5542	0.8023	0.8023	0.8023
Running (g/mi)	5	1.0367	1.0367	1.0367	0.7688	0.7688	0.7688
Running (g/mi)	6	0.8515	0.8420	0.8477	0.7123	0.6794	0.6991
Running (g/mi)	7	0.7196	0.7032	0.7130	0.6720	0.6157	0.6495
Running (g/mi)	8	0.6201	0.5989	0.6116	0.6417	0.5678	0.6121
Running (g/mi)	9	0.5434	0.5180	0.5332	0.6182	0.5308	0.5832
Running (g/mi)	10	0.4815	0.4533	0.4702	0.5992	0.5010	0.5599
Running (g/mi)	11	0.4427	0.4130	0.4308	0.5708	0.4665	0.5291
Running (g/mi)	12	0.4103	0.3789	0.3977	0.5471	0.4375	0.5033
Running (g/mi)	13	0.3829	0.3504	0.3699	0.5274	0.4132	0.4817
Running (g/mi)	14	0.3596	0.3260	0.3462	0.5102	0.3922	0.4630
Running (g/mi)	15	0.3391	0.3048	0.3254	0.4953	0.3741	0.4468
Running (g/mi)	16	0.3199	0.2898	0.3079	0.4821	0.3752	0.4393
Running (g/mi)	17	0.3024	0.2766	0.2921	0.4704	0.3761	0.4327
Running (g/mi)	18	0.2872	0.2646	0.2782	0.4602	0.3768	0.4268
Running (g/mi)	19	0.2736	0.2542	0.2658	0.4508	0.3777	0.4216
Running (g/mi)	20	0.2613	0.2446	0.2546	0.4422	0.3783	0.4166
Running (g/mi)	21	0.2513	0.2374	0.2457	0.4347	0.3786	0.4123
Running (g/mi)	22	0.2422	0.2307	0.2376	0.4277	0.3788	0.4081
Running (g/mi)	23	0.2344	0.2249	0.2306	0.4212	0.3793	0.4044
Running (g/mi)	24	0.2267	0.2191	0.2237	0.4153	0.3794	0.4009
Running (g/mi)	25	0.2197	0.2140	0.2174	0.4100	0.3798	0.3979
Running (g/mi)	26	0.2139	0.2091	0.2120	0.4048	0.3798	0.3948
Running (g/mi)	27	0.2084	0.2044	0.2068	0.4001	0.3798	0.3920
Running (g/mi)	28	0.2029	0.1999	0.2017	0.3957	0.3799	0.3894
Running (g/mi)	29	0.1983	0.1962	0.1975	0.3919	0.3799	0.3871
Running (g/mi)	30	0.1938	0.1925	0.1933	0.3880	0.3799	0.3848
Running (g/mi)	31	0.1893	0.1883	0.1889	0.3856	0.3793	0.3831
Running (g/mi)	32	0.1852	0.1846	0.1850	0.3833	0.3786	0.3814
Running (g/mi)	33	0.1815	0.1810	0.1813	0.3810	0.3781	0.3798
Running (g/mi)	34	0.1780	0.1776	0.1778	0.3789	0.3775	0.3783
Running (g/mi)	35	0.1745	0.1745	0.1745	0.3771	0.3771	0.3771
Running (g/mi)	36	0.1720	0.1720	0.1720	0.3783	0.3783	0.3783
Running (g/mi)	37	0.1697	0.1697	0.1697	0.3797	0.3797	0.3797
Running (g/mi)	38	0.1673	0.1673	0.1673	0.3809	0.3809	0.3809
Running (g/mi)	39	0.1652	0.1652	0.1652	0.3820	0.3820	0.3820
Running (g/mi)	40	0.1631	0.1631	0.1631	0.3833	0.3833	0.3833
Running (g/mi)	41	0.1613	0.1613	0.1613	0.3852	0.3852	0.3852
Running (g/mi)	42	0.1591	0.1591	0.1591	0.3869	0.3869	0.3869
Running (g/mi)	43	0.1573	0.1573	0.1573	0.3888	0.3888	0.3888
Running (g/mi)	44	0.1556	0.1556	0.1556	0.3904	0.3904	0.3904
Running (g/mi)	45	0.1540	0.1540	0.1540	0.3921	0.3921	0.3921
Running (g/mi)	46	0.1523	0.1523	0.1523	0.3940	0.3940	0.3940
Running (g/mi)	47	0.1504	0.1504	0.1504	0.3959	0.3959	0.3959
Running (g/mi)	48	0.1488	0.1488	0.1488	0.3980	0.3980	0.3980
Running (g/mi)	49	0.1471	0.1471	0.1471	0.3996	0.3996	0.3996
Running (g/mi)	50	0.1457	0.1457	0.1457	0.4013	0.4013	0.4013
Running (g/mi)	51	0.1442	0.1442	0.1442	0.4037	0.4037	0.4037
Running (g/mi)	52	0.1430	0.1430	0.1430	0.4058	0.4058	0.4058
Running (g/mi)	53	0.1417	0.1417	0.1417	0.4078	0.4078	0.4078
Running (g/mi)	54	0.1404	0.1404	0.1404	0.4097	0.4097	0.4097
Running (g/mi)	55	0.1390	0.1390	0.1390	0.4114	0.4114	0.4114
Running (g/mi)	56	0.1383	0.1383	0.1383	0.4138	0.4138	0.4138
Running (g/mi)	57	0.1375	0.1375	0.1375	0.4161	0.4161	0.4161
Running (g/mi)	58	0.1372	0.1372	0.1372	0.4182	0.4182	0.4182
Running (g/mi)	59	0.1363	0.1363	0.1363	0.4200	0.4200	0.4200
Running (g/mi)	60	0.1359	0.1359	0.1359	0.4220	0.4220	0.4220
Running (g/mi)	61	0.1351	0.1351	0.1351	0.4245	0.4245	0.4245
Running (g/mi)	62	0.1347	0.1347	0.1347	0.4267	0.4267	0.4267
Running (g/mi)	63	0.1343	0.1343	0.1343	0.4289	0.4289	0.4289
Running (g/mi)	64	0.1338	0.1338	0.1338	0.4313	0.4313	0.4313
Running (g/mi)	65	0.1336	0.1336	0.1336	0.4333	0.4333	0.4333

Emission Type	VOC	NOx
Cold Start (g/trip start, Total)	0.9659	0.5818
Hot Soak Loss (g/trip end)	0.5705	-
Hot Start (g/trip start, Total)	0.1649	0.1271

Table 6: 2020 Running, Cold Start, and Hot Soak Average Emissions Factors for "Commuter Vehicle"
TERMs
(Mobile 6.2)

Emission Type	Speed (mph)	Average 2020 Running Emission Factor (g/mi)					
		Arterial	Freeway	Weighted Factor VOC	Arterial	Freeway	Weighted Factor NOx
		VOC		Arterial - 60%, Freeway- 40%	NOx		Arterial - 60%, Freeway- 40%
Running (g/mi)	1	1.6246	1.6246	1.6246	0.3849	0.3849	0.3849
Running (g/mi)	2	1.6246	1.6246	1.6246	0.3849	0.3849	0.3849
Running (g/mi)	3	1.2752	1.2752	1.2752	0.3654	0.3653	0.3654
Running (g/mi)	4	0.8390	0.8390	0.8390	0.3413	0.3413	0.3413
Running (g/mi)	5	0.5769	0.5769	0.5769	0.3270	0.3270	0.3270
Running (g/mi)	6	0.4783	0.4725	0.4760	0.3024	0.2878	0.2966
Running (g/mi)	7	0.4079	0.3979	0.4039	0.2847	0.2599	0.2748
Running (g/mi)	8	0.3552	0.3420	0.3499	0.2716	0.2392	0.2586
Running (g/mi)	9	0.3142	0.2986	0.3080	0.2614	0.2227	0.2459
Running (g/mi)	10	0.2814	0.2637	0.2743	0.2532	0.2097	0.2358
Running (g/mi)	11	0.2590	0.2406	0.2516	0.2407	0.1946	0.2223
Running (g/mi)	12	0.2406	0.2212	0.2328	0.2305	0.1821	0.2111
Running (g/mi)	13	0.2249	0.2046	0.2168	0.2219	0.1715	0.2017
Running (g/mi)	14	0.2116	0.1905	0.2032	0.2145	0.1624	0.1937
Running (g/mi)	15	0.2000	0.1785	0.1914	0.2078	0.1544	0.1864
Running (g/mi)	16	0.1882	0.1693	0.1806	0.2021	0.1550	0.1833
Running (g/mi)	17	0.1777	0.1613	0.1711	0.1971	0.1555	0.1805
Running (g/mi)	18	0.1685	0.1541	0.1627	0.1928	0.1559	0.1780
Running (g/mi)	19	0.1602	0.1478	0.1552	0.1886	0.1564	0.1757
Running (g/mi)	20	0.1528	0.1421	0.1485	0.1849	0.1568	0.1737
Running (g/mi)	21	0.1474	0.1380	0.1436	0.1817	0.1570	0.1718
Running (g/mi)	22	0.1424	0.1346	0.1393	0.1787	0.1573	0.1701
Running (g/mi)	23	0.1375	0.1312	0.1350	0.1760	0.1574	0.1686
Running (g/mi)	24	0.1335	0.1281	0.1313	0.1735	0.1574	0.1671
Running (g/mi)	25	0.1296	0.1254	0.1279	0.1711	0.1578	0.1658
Running (g/mi)	26	0.1261	0.1224	0.1246	0.1688	0.1578	0.1644
Running (g/mi)	27	0.1227	0.1200	0.1216	0.1669	0.1578	0.1633
Running (g/mi)	28	0.1194	0.1172	0.1185	0.1651	0.1579	0.1622
Running (g/mi)	29	0.1166	0.1151	0.1160	0.1633	0.1580	0.1612
Running (g/mi)	30	0.1139	0.1127	0.1134	0.1618	0.1580	0.1603
Running (g/mi)	31	0.1116	0.1107	0.1112	0.1606	0.1578	0.1595
Running (g/mi)	32	0.1091	0.1084	0.1088	0.1595	0.1575	0.1587
Running (g/mi)	33	0.1070	0.1066	0.1068	0.1587	0.1573	0.1581
Running (g/mi)	34	0.1048	0.1048	0.1048	0.1577	0.1570	0.1574
Running (g/mi)	35	0.1030	0.1030	0.1030	0.1568	0.1568	0.1568
Running (g/mi)	36	0.1017	0.1017	0.1017	0.1575	0.1575	0.1575
Running (g/mi)	37	0.1004	0.1004	0.1004	0.1582	0.1582	0.1582
Running (g/mi)	38	0.0990	0.0990	0.0990	0.1587	0.1587	0.1587
Running (g/mi)	39	0.0978	0.0978	0.0978	0.1593	0.1593	0.1593
Running (g/mi)	40	0.0968	0.0968	0.0968	0.1598	0.1598	0.1598
Running (g/mi)	41	0.0957	0.0957	0.0957	0.1608	0.1608	0.1608
Running (g/mi)	42	0.0948	0.0948	0.0948	0.1615	0.1615	0.1615
Running (g/mi)	43	0.0935	0.0935	0.0935	0.1623	0.1623	0.1623
Running (g/mi)	44	0.0926	0.0926	0.0926	0.1632	0.1632	0.1632
Running (g/mi)	45	0.0916	0.0916	0.0916	0.1640	0.1640	0.1640
Running (g/mi)	46	0.0908	0.0908	0.0908	0.1650	0.1650	0.1650
Running (g/mi)	47	0.0899	0.0899	0.0899	0.1659	0.1659	0.1659
Running (g/mi)	48	0.0890	0.0890	0.0890	0.1666	0.1666	0.1666
Running (g/mi)	49	0.0883	0.0883	0.0883	0.1674	0.1674	0.1674
Running (g/mi)	50	0.0876	0.0876	0.0876	0.1683	0.1683	0.1683
Running (g/mi)	51	0.0871	0.0871	0.0871	0.1693	0.1693	0.1693
Running (g/mi)	52	0.0866	0.0866	0.0866	0.1704	0.1704	0.1704
Running (g/mi)	53	0.0860	0.0860	0.0860	0.1714	0.1714	0.1714
Running (g/mi)	54	0.0856	0.0856	0.0856	0.1723	0.1723	0.1723
Running (g/mi)	55	0.0851	0.0851	0.0851	0.1731	0.1731	0.1731
Running (g/mi)	56	0.0850	0.0850	0.0850	0.1742	0.1742	0.1742
Running (g/mi)	57	0.0852	0.0852	0.0852	0.1752	0.1752	0.1752
Running (g/mi)	58	0.0851	0.0851	0.0851	0.1762	0.1762	0.1762
Running (g/mi)	59	0.0852	0.0852	0.0852	0.1771	0.1771	0.1771
Running (g/mi)	60	0.0851	0.0851	0.0851	0.1781	0.1781	0.1781
Running (g/mi)	61	0.0852	0.0852	0.0852	0.1791	0.1791	0.1791
Running (g/mi)	62	0.0853	0.0853	0.0853	0.1802	0.1802	0.1802
Running (g/mi)	63	0.0855	0.0855	0.0855	0.1812	0.1812	0.1812
Running (g/mi)	64	0.0855	0.0855	0.0855	0.1822	0.1822	0.1822
Running (g/mi)	65	0.0857	0.0857	0.0857	0.1833	0.1833	0.1833

Emission Type	VOC	NOx
Cold Start (g/trip start, Total)	0.5387	0.2398
Hot Soak Loss (g/trip end)	0.2584	-
Hot Start (g/trip start, Total)	0.0959	0.0552

**Table 7: 2030 Running, Cold Start and Hot Soak Emissions Factors for Commute
Vehicle TERMS
(GM/MI)
(Mobile 6)
(Under development)**

Exhibit - 3

(Insert worksheet Exhibit -3 Commute VOC from File: Exhibit 1-2-3-4 -Graphs RUNNALLYEARS.xls)

(Under development)

Exhibit - 4

(Insert worksheet Exhibit -4 Commute NOx from File: Exhibit 1-2-3-4 -Graphs RUNNALLYEARS.xls)

(Under development)

**Table 8: 2010 REGIONAL DIESEL BUS EMISSION FACTORS
(GM/MI)
(Mobile 6.2)
(Under development)**

Table 9:
Table 9 - Idling Emission Factors
(Mobile 6.2)
(Under development)

Also for use in the emissions reduction calculations are average weighted speed by time period for 2005, shown in Table 10 below. The 24 hour average weighted speed for 2005 is 41 miles per hour and would be used for TERMS affecting the entire traffic stream, where site-specific speed data are not available. For commute vehicle TERMS, 40 mph peak period average speed will be used. Please express reductions of VOC and NOX for all years in both kilograms per day and tons per day using a conversion factor of .0011 (# of kg reduced X .0011 = # of tons reduced).

Table 10 : 2005 Average Weighted Speed by Time Period

Time	2005
12-1	48
1-2	49
2-3	49
3-4	49
4-5	48
5-6	45
6-7	41
7-8	38
8-9	39
9-10	41
10-11	43
11-12	42
12-1 PM	40
1-2 PM	42
2-3 PM	42
3-4 PM	41
4-5 PM	40
5-6 PM	39
6-7 PM	40
7-8 PM	42
8-9 PM	43
9-10 PM	44
10-11 PM	45
11-12 MID	45
24 Hour Avg	41

Table 11: Mobile 6 Vehicle Classifications

<i>Number</i>	<i>Abbreviation</i>	<i>Description</i>
1	LDGV	Light-Duty Gasoline Vehicles (Passenger Cars)
2	LDGT1	Light-Duty Gasoline Trucks 1 (0-6,000 lbs. GVWR, 0-3,750 lbs. LVW)
3	LDGT2	Light-Duty Gasoline Trucks 2 (0-6,000 lbs. GVWR, 3,751-5,750 lbs. LVW)
4	LDGT3	Light-Duty Gasoline Trucks 3 (6,001-8,500 lbs. GVWR, 0-5,750 lbs. ALVW)
5	LDGT4	Light-Duty Gasoline Trucks 4 (6,001-8,500 lbs. GVWR, 5,751 lbs. and greater ALVW)
6	HdGV2b	Class 2b Heavy-Duty Gasoline Vehicles (8,501-10,000 lbs. GVWR)
7	HdGV3	Class 3 Heavy-Duty Gasoline Vehicles (10,001-14,000 lbs. GVWR)
8	HdGV4	Class 4 Heavy-Duty Gasoline Vehicles (14,001-16,000 lbs. GVWR)
9	HdGV5	Class 5 Heavy-Duty Gasoline Vehicles (16,001-19,500 lbs. GVWR)
10	HdGV6	Class 6 Heavy-Duty Gasoline Vehicles (19,501-26,000 lbs. GVWR)
11	HdGV7	Class 7 Heavy-Duty Gasoline Vehicles (26,001-33,000 lbs. GVWR)
12	HdGV8a	Class 8a Heavy-Duty Gasoline Vehicles (33,001-60,000 lbs. GVWR)
13	HdGV8b	Class 8b Heavy-Duty Gasoline Vehicles (>60,000 lbs. GVWR)
14	LDDV	Light-Duty Diesel Vehicles (Passenger Cars)
15	LDDT12	Light-Duty Diesel Trucks 1 and 2 (0-6,000 lbs. GVWR)
16	HDDV2b	Class 2b Heavy-Duty Diesel Vehicles (8,501-10,000 lbs. GVWR)
17	HDDV3	Class 3 Heavy-Duty Diesel Vehicles (10,001-14,000 lbs. GVWR)
18	HDDV4	Class 4 Heavy-Duty Diesel Vehicles (14,001-16,000 lbs. GVWR)
19	HDDV5	Class 5 Heavy-Duty Diesel Vehicles (16,001-19,500 lbs. GVWR)
20	HDDV6	Class 6 Heavy-Duty Diesel Vehicles (19,501-26,000 lbs. GVWR)
21	HDDV7	Class 7 Heavy-Duty Diesel Vehicles (26,001-33,000 lbs. GVWR)
22	HDDV8a	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs. GVWR)
23	HDDV8b	Class 8b Heavy-Duty Diesel Vehicles (>60,000 lbs. GVWR)
24	MC	Motorcycles (Gasoline)
25	HDGB	Gasoline Buses (School, Transit and Urban)
26	HDDBT	Diesel Transit and Urban Buses
27	HDDBS	Diesel School Buses
28	LDDT34	Light-Duty Diesel Trucks 3 and 4 (6,001-8,500 lbs. GVWR)

COST EFFECTIVENESS ESTIMATION PROCEDURES

Consistency between programming agencies in assumptions and methodology for effectiveness estimations is critical for meaningful comparison of different projects around the region. Therefore, please use the following guidelines when calculating the cost effectiveness of your TERM projects. When determining the cost effectiveness, capital costs, operating costs, and revenues should be considered. Projects should be expressed in dollars per ton of reduction for both VOC and NOX. Please use the following series of formulas to compute cost effectiveness:

$$\text{A. Total Project Cost} = \text{Capital Costs} + \text{Operating Costs} - (\text{Revenues} + \text{Resale Value}) \text{ (if relevant/significant)}$$

$$\text{B. Cost Per Day} = \frac{\text{Total Project Cost}}{\text{Benefit Days Per Year} \times \text{Lifespan}}$$

$$\text{C. Cost Per Ton} = \text{Cost Per Day} / \text{Tons VOC or NOX Reduced Per Day}$$

Where:

Benefit Days Per Year = 250 for projects mostly related to work travel (i.e., commuter lots, ridesharing)

365 for projects relating to all travel (e.g. roadway signal systems)

Lifespan¹ = 30 years for park and ride lot (construction)
100years for park and ride lot land (right-of-way)
20 years for roadways
30 years for bridges
12 years for roadway signal systems
20 years for rail signalization
35 years for structures (i.e., garages)
12 years for buses
35 years for railcars
30 years for locomotives
10 years for sidewalks

¹ These lifespan values were provided by various transit and highway agencies and consultants. If lifespan values necessary for the cost/benefit calculation of any TERM projects are not provided, please contact Daivamani Sivasailam at (202) 962-3226.

EXAMPLE OF A COMMUTING VEHICLE TRIP TERM ANALYSIS

Construction of 1300 additional Parking Spaces at a Metro Station

(example of “Commuting Vehicle Trips” TERM analysis)

Description: 1,300 parking spaces will be constructed at Grosvenor Metro station. The garages at Metrorail stations are currently experiencing full utilization of all existing parking capacity on a daily basis.

Analysis Tool: Sketch Planning

Assumptions:

- Montgomery County will build 1,300 additional parking spaces at Grosvenor Metro station to increase capacity at the station. Funding is estimated at \$2.117 million dollars.
- New trips generated due to additional parking spaces will be 2/3 of new spaces.
- Average one-way trip length reduced will be 15.5 miles.
- No cold start benefit, as autos will drive to station.
- NOx & VOC estimation using Mobile 6 Emissions factors.

Summary Impacts for 4 Parking Garages at Metrorail Stations (2010):

Daily VT Reduction:	-	VT
Daily VMT Reduction:	26,846	VMT
Daily NOx Reductions:	0.0207	tons/day
Daily VOC Reductions:	0.0080	tons/day

Emission Impacts for (2010):

1,300 additional spaces

Trip length: 15.5 mile x 2 = 31 mi round trip

2/3 new trips = 866 trips

866 x 31 miles = 26,846 VMT

Daily NOx & VOC emission reductions (2010):

Cold Start	0	x	$\frac{0.5818 \text{ grs}}{1 \text{ mi}}$	x	$\frac{1 \text{ ton}}{907,185 \text{ grs}}$	=	0.00000 tons
Running	26,846	x	$\frac{0.3833 \text{ grs}}{1 \text{ mi}}$	x	$\frac{1 \text{ ton}}{907,185 \text{ grs}}$	=	0.0113 tons

			1 mi		907,185		0.0113 tons
					Total		
VOC							
Cold Start + Hot Soak	0	x	$\frac{1.536 \text{ grs}}{1 \text{ mi}}$	x	$\frac{1 \text{ ton}}{907,185 \text{ grs}}$	=	0.00000 tons
Running	26,846	x	$\frac{0.1631 \text{ grs}}{1 \text{ mi}}$	x	$\frac{1 \text{ ton}}{907,185 \text{ grs}}$	=	0.0048 tons
					Total		0.0048 tons

Garage cost \$2.177 million

Life span: 30 years

Cost Effectiveness (2010):

$$\text{NOx} = \frac{\$2.177 \text{ million}}{250 \text{ days} \times 30 \text{ yr} \times 0.0113 \text{ t/d}} = \$25,700/\text{ton}$$

$$\text{VOC} = \frac{\$2.177 \text{ million}}{250 \text{ days} \times 30 \text{ yr} \times 0.005 \text{ t/d}} = \$60,500/\text{ton}$$

Section II

The current EPA guidance on fine particulate matter (PM 2.5) emissions require the region to estimate direct PM 2.5 emissions and NOx precursor emissions. In addition the emissions are estimated on an annual basis and not daily as in the case of Ozone precursors. Direct PM emissions is constant for all speeds and is shown in grams/mile. Direct PM 2.5 has no start up, soak or other evaporative emissions associated with them. However, NOx precursor for PM 2.5 is similar to NOx precursor for Ozone and has start up emissions in addition to running emissions.

The recommended methodology to estimate annual emissions off line is to develop an average rate based on the four seasonal emission rates (Winter, Spring, Summer, and Fall) and using the average rate and annual VMT estimate the annual emissions. Direct PM and NOx precursor emissions rates for the analysis years 2010, 2020, and 2030 are shown in tables. (Under development).

A sample analysis to estimate total PM for the Parking Garage TERM is shown below.

(Under development)

APPENDIX - B

**TERM REPORTING
INSTRUCTIONS**

TERM REPORTING

Federal regulations require the timely implementation of TERMS (CMAQ funded, non-CMAQ funded and NOx mitigation measures). If the implementation of programmed TERMS falls behind schedule, the regulations state "that all State and local agencies with influence over approvals of funding for TERMS [should give] maximum priority to approval or funding of TERMS over other projects within their control". To address these requirements, please provide a brief statement describing the status of each TERM programmed in previous TIPs. This applies to those projects not yet fully implemented and reported as such in the TERM tracking sheet developed as part of the CLRP and TIP. Include any changes in the scheduling or implementation of these TERMS. Your submissions will be used to update the "TERM Tracking Sheet" for analysis years 2010, 2020 and 2030. For information purposes, last year's "TERM Tracking Sheet" is attached.

TERM TRACKING SHEET - CURRENT MEASURES
IMPLEMENTATAION: YEAR 2000 AND LATER
Credits are taken in Air Quality Conformity Analysis FY 2005-2010

* Project Category: TR - Traffic Stream, C - Commute, H - Heavy Duty Vehicles (Engine Technology), SP- Specific Vehicle Type, TCM - Transportation Control Measures

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					FULL	SCALED-BACK	UNDER-WAY	REM			2010		2020		2030		
											VOC	NOX	VOC	NOX	VOC	NOX	
9	X	1994-99	MDOT	Park & Ride Lot - MD 210/ MD 373	X				2000	2003	0.0006	0.0014	0.0004	0.0006	0.0004	0.0006	C
19	X	1994-99	PRTC	VRE Woodbridge Parking Expansion (add 500 spaces)	X					2002-2003	n/a	n/a	n/a	n/a	n/a	n/a	-
20	X	1994-99	ALEX	King St. Metrorail access improvements				X		2002, '04, '05	0.0011	0.0014	0.0007	0.0006	0.0008	0.0009	C
38	X	1995-00	MDOT	Signal Systems - MD 85 Executive Way to MD 355	X				1996	Pre 2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	TR
39	X	1995-00	MDOT	Signal Systems - MD 355 ,I-70 ramps to Grove Rd.	X				1996	n/a	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	TR
44	X	1995-00	MDOT	Signal Systems - MD 410, 62nd Ave. to Riverdale Rd.	X				1996	2002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	TR
48	X	1995-00	MDOT	MARC Replacement Coaches	X				1999	2004	0.0006	0.0014	0.0004	0.0006	0.0012	0.0018	C (TCM)
49	X	1995-00	MDOT	MARC Expansion Coaches	X				1999	2004	0.0052	0.0133	0.0033	0.0055	0.0054	0.0145	C (TCM)
51	X	1995-00	VDOT	Alexandria Telecommuting Pilot Program	X					2000 & 2001	0.0000	0.0000					C
52	X	1995-00	VDOT	Fairfax County Bus Shelter (Fairfax Co. TDM program)				X	2000	2001	0.0000	0.0000					C
54	X	1995-00	VDOT	City of Fairfax Bus Shelters				X	1999	2004	0.0000	0.0005	0.0000	0.0002	0.0000	0.0000	C (TCM)
56	X	1995-00	VDOT	Cherry Hill VRE Access				X		2007	0.0040	0.0114	0.0026	0.0047	0.0023	0.0047	C (TCM)
58	X	1995-00	WMATA	Bus Replacement (172 buses)	X				1998	1998	0.0690	0.2520					SP (TCM)
59	X	1995-00	MCG	Shady Grove West Park and Ride				X	2010		0.0000	0.0000	0.0000	0.0000	0.0000	0.0030	C
60	X	1995-00	MCG	White Oak Park and Ride				X	2010		0.0000	0.0000	0.0000	0.0000	0.0000	0.0059	C
61	X	1995-00	MCG	Bicycle Facilities				X	FY99		0.0017	0.0009	0.0011	0.0004	0.0012	0.0006	C
62	X	1995-00	MCG	Pedestrian Facilities to Metrorail				X			0.0029	0.0038	0.0018	0.0016	0.0015	0.0021	C
63	X	1995-00	MDOT	MARC Replacement Coaches	X				1999	2004	0.0023	0.0057	0.0015	0.0024	0.0031	0.0059	C
64	X	1995-00	MDOT	MARC Expansion Coaches	X				1999	2004	0.0183	0.0493	0.0118	0.0205	0.0283	0.0482	C (TCM)
66	X	1995-00	VDOT	Commuter Lots - District Wide				X	varies	1995, 2000	0.0063	0.0156	0.0040	0.0065	0.0062	0.0157	C
67	X	1995-00	VDOT	I-66 and Stringfellow Rd. Park and Ride	X				2000	2000 end	0.0057	0.0095	0.0037	0.0039	0.0039	0.0059	C
68	X	1995-00	VDOT	Lake Ridge Park and Ride (now called Tacketts Mill lot)	X					1999/2000	0.0000	0.0047	0.0000	0.0020	0.0000	0.0030	C
69	X	1995-00	VDOT	Bicycle Trails and Facilities				X	varies	varies	0.0011	0.0081	0.0007	0.0034	0.0074	0.0053	C
70	X	1995-00	VDOT	Improved Accesses to Metrorail Stations				X	varies	2000-2010	0.0003	0.0005	0.0002	0.0002	0.0004	0.0006	C
71	X	1995-00	VDOT	I-66 HOV access at Monument Dr.	X					1997	0.0057	0.0095	0.0037	0.0039	0.0004	0.0059	C
72	X	1995-00	DC	Bicycle Facilities				X			0.0137	0.0095	0.0088	0.0039	0.0093	0.0065	C
73	X	1995-00	REGION	COG Regional Ridesharing Support	X					on-going	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	C

TERM TRACKING SHEET - CURRENT MEASURES
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					FULL	SCALED-BACK	UNDER-WAY	REM			2010		2020		2030		
											VOC	NOX	VOC	NOX	VOC	NOX	
74	X	1995-00	REGION	M-47 Integrated Ridesharing	X					on-going	0.0264	0.0493	0.0165	0.0206	0.0139	0.0172	C
75	X	1995-00	REGION	M-92 Telecommuting Support	X					on-going	0.2069	0.3951	0.1763	0.2256	0.1889	0.2374	C
77		1996-01	VDOT	Duke Street Pedestrian Bridge				2005	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-
79	X	1996-01	VDOT	Fairfax County Bus Shelters (30 shelters with project #85)				X	1999	Summer 2001	0.0011	0.0014	0.0007	0.0006	0.0008	0.0009	C
81	X	1996-01	VDOT	Arlington County Metrocheck Program	X				1997	1997 Onwards	0.0011	0.0014	0.0007	0.0006	0.0004	0.0009	C
82	X	1996-01	VDOT	Old Dominion Drive Bike Trail				X	2000	2004	0.0006	0.0005	0.0004	0.0002	0.0004	0.0003	C
83	X	1996-01	WMATA	Bus Replacement (see line 58, above)	X					1998	Credit taken in line 58, above						SP
85	X	1996-01	VDOT	Fairfax County Bus Shelters (30 shelters with project #79)				X	1999	2001	0.0006	0.0005	0.0004	0.0002	0.0004	0.0009	C
90	X	1996-01	REGION	M-47c Employer Outreach / Guaranteed Ride Home	X					on-going	0.3460	0.5748	0.2209	0.2395	0.1777	0.1989	C
91	X	1996-01	REGION	M-70a Bicycle Parking				X	1999		0.0040	0.0033	0.0026	0.0014	0.0039	0.0030	C
92	X			M-92 Telecommuting Support ¹	Combined with item #75												C
95	X	1997-02	MCG	Germantown Transit Center				X	2004		0.0029	0.0090	0.0018	0.0038	0.0019	0.0053	C (TCM)
102	X	1997-02	PG	Prince George's County Bus Replacement	X				1998	1998	0.0030	0.0090					SP (TCM)
106	X	1997-02	VDOT	PRTC Employer Commuting Outreach Program	X					1977 on-going	0.0011	0.0002	0.0007	0.0001	0.0008	0.0000	C
107	X	1997-02	VDOT	PRTC Multimodal Strategic Marketing Implementation Plan	X					1977 on-going	0.0000	0.0002	0.0000	0.0001	0.0000	0.0003	C
108	X	1997-02	MDOT	M-103 Taxicab Replacement in Maryland ²		X			1999	On-going	0.0797	0.2675	0.1340	0.1827	0.3120	0.4810	SP
109	X	1997-02	REGION	M-70b Employer Outreach for Bicycles	X				1998	on going	0.0007	0.0007	0.0005	0.0003	0.0003	0.0002	C
110		1997-02	VDOT	M-77b Vanpool Incentive Programs in Virginia				X	1999	delayed	n/a	n/a	n/a	n/a	n/a	n/a	C
111	X	1998-03	WMATA	Bus Replacement (108 buses)	X				1999	1999	0.0450	0.1617					SP
112	X	1998-03	MCG	Montgomery County Bus Replacement	X						0.0080	0.0270					SP
113	X	1998-03	PG	Prince George's County Bus Replacement	X				1998	1998	0.0010	0.0020					SP
114	X	1998-03	FDC	Frederick County Bus Replacement	X						0.0010	0.0000					SP
117	X	1998-03	VDOT	Arlington County Four Mile Run Bike Trail				X	1999	delayed	0.0006	0.0005	0.0004	0.0002	0.0004	0.0003	C
118	X	1998-03	VDOT	Northern Virginia Turn Bays	X				2000	1998	0.0006	0.0008	0.0004	0.0003	0.0008	0.0003	TR
119	X	1998-03	VDOT	Fairfax City Bus Replacement				X	2001	2003	n/a	n/a					SP
121	X	1998-03	WMATA	WMATA Bus Replacement (252 buses)	X				2001	2001	0.1060	0.3860					SP
122	X	97 & 98 TIP	REGION	M-101a Mass Marketing Campagin (Consumer)				X		Underway	0.1479	0.2237	0.0952	0.0973	0.0752	0.0807	C
123	X	1999-04	MDOT	Various Park and Ride Lots(I-270/MD124, 450 & I-170/MD-75, 54 spaces)	X				2001/1999	2001	0.0046	0.0171	0.0029	0.0071	0.0039	0.0136	C

TERM TRACKING SHEET - CURRENT MEASURES
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					FULL	SCALED-BACK	UNDER-WAY	REM			2010		2020		2030		
											VOC	NOX	VOC	NOX	VOC	NOX	
124	X	1999-04	MDOT	Signal Systems (197/MD-198, MD-382 TO US-301,US301)	X				2000	2002	0.0070	-0.0017	0.0047	-0.0008	0.0079	-0.0014	TR
125	X	1999-04	VDOT	Transit Center at 7 Corners	X				2002		0.0006	0.0009	0.0004	0.0004	0.0004	0.0006	C
126	X	1999-04	VDOT	Falls Church Clean Diesel Bus Service	X				2000	2003	0.0040	0.0050					SP
127	X	1999-04	VDOT	VA 234 Bike Trail			X		2001	2007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	C
128	X	1999-04	VDOT	PRTC Ridesharing	X				on-going	2000 ongoing	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	C
130	X	1996-01	VDOT	M-14: I-66 Feeder Bus Fare Buy Down	X					1998 onward	0.0143	0.0261	0.0092	0.0109	0.0081	0.0124	C
131	X	2000-05	MDOT	Various park and Ride Lots	x				2002	2003	0.0040	0.0154	0.0025	0.0064	0.0038	0.0119	C
132	X	2000-05	MDOT	Signal Systems	X				Varies	on-going	0.0017	0.0000	0.1244	0.0000	0.0007	0.0000	TR
133	X	2000-05	VDOT	450 Spaces at Gambrill/Hoos Rds. Park and Ride			X		2002	2004	0.0040	0.0085	0.0026	0.0036	0.0021	0.0041	C
134	X	2000-05	VDOT	300 Spaces at Backlick Rd			X		2003	2006	0.0029	0.0062	0.0018	0.0026	0.0015	0.0030	C
135	X	2000-05	VDOT	Accotink-Gateway Connector Trail			X		2002	2005	0.0040	0.0047	0.0026	0.0020	0.0018	0.0020	C
136	X	2000-05	VDOT	Columbia Pike Trail			X		2000	2001, 2005	0.0034	0.0038	0.0022	0.0016	0.0014	0.0015	C
137	X	2000-05	VDOT	Lee Highway trail			X		2000	2005	0.0017	0.0019	0.0011	0.0008	0.0006	0.0008	C
138	X	2000-05	VDOT	Arlington Bus Shelter Improvements			X		2005	2005	0.0006	0.0005	0.0004	0.0002	0.0002	0.0002	C
139	X	2000-05	VDOT	Pentagon Metrostation Improvements	X					2003	0.0046	0.0081	0.0029	0.0034	0.0022	0.0033	C
140	X	2000-05	MDOT	East/West Intersection Improvements			X		2005	2005	0.0235	0.0119	0.0151	0.0049	0.0859	0.0337	C
141	X	2001-06	Feds	Federal Transit/Ridesharing subsidy	X				on-going		0.0584	0.0905	0.0375	0.0377	0.0286	0.0313	C
142	X	2002-07	WMATA	100 CNG buses	X				2002		0.0000	0.1358					SP (TCM)
143	X	2002-07	WMATA	ULSD with CRT filters			X		on-going		0.2100	0.0000	0.4300	0.0000	0.4300	0.0000	H (TCM)
144	X	2003-08	DC	Replace 23 12 Taxicabs with CNG cabs			X		2005	2006	0.0089	0.0157					H
145	X	2003-08	DC	D.C.Incident Response & TrafficManagement System	X				2005	2004	0.0161	0.0414	0.0108	0.0206	0.0100	0.0168	TR
146	X	2003-08	DC	Bicycle Lane in D. C. (35 Mile)			X		2005	2006	0.0095	0.0085	0.0061	0.0035	0.0046	0.0029	C (TCM)
147	X	2003-08	DC	Bicycle Racks in D. C. (500)	X				2005	2004	0.0013	0.0009	0.0008	0.0004	0.0006	0.0003	C (TCM)
148	X	2003-08	DC	External Bicycle Racks on WMATA Buses in D. C. (600)	X				2005	2003	0.0020	0.0031	0.0013	0.0013	0.0010	0.0011	C (TCM)
149		2003-08	DC	CNG Rental Cars (18)				X	2005	Removed	0.0000	0.0002					SP
150	X	2003-08	DC	Sidewalks in D.C. (\$ 5 million)	X				2005	2004	0.0358	0.0555	0.0230	0.0231	0.0182	0.0192	C
151	X	2003-08	DC	CNG Refuse Haulers (2)	X				2005	2004	0.0001	0.0020					H (TCM)
152	X	2003-08	DC	Circulator /Feeder Bus Routes	X				2005	2003	0.0131	0.0200	0.0084	0.0083	0.0066	0.0069	C

TERM TRACKING SHEET - CURRENT MEASURES
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					FULL	SCALED-BACK	UNDER-WAY	REM			2010		2020		2030		
											VOC	NOX	VOC	NOX	VOC	NOX	
153	X	2003-08	MDOT	Commuter Tax Credit			X		2005	n/a	0.0782	0.1223	0.0502	0.0509	0.0398	0.0422	C
155		2003-08	MDOT	Employer Vanpool Program (WWB)				X	2005	Removed	0.0018	0.0041					C
156	X	2003-08	MDOT	Green Line Link			X		2005	n/a	0.0026	0.0047	0.0016	0.0019	0.0013	0.0016	C
157	X	2003-08	MDOT	Park & Ride Lots - Southern Maryland			X		2005	2003/2005	0.0050	0.0109	0.0032	0.0045	0.0026	0.0038	C
158	X	2003-08	MDOT	Prince George's County- Bus Exp			X		2005	n/a	0.0359	0.0657	0.0230	0.0273	0.0186	0.0228	C
159	X	2003-08	MDOT	MTA - Bus Service Expansion			X		2005	n/a	0.0081	0.0157	0.0052	0.0065	0.0042	0.0054	C
160	X	2003-08	MDOT	Ride- On - Super Discount			X		2005	n/a	0.0009	0.0014	0.0006	0.0006	0.0005	0.0005	C
161	X	2003-08	Regional	Regional Traveler Information Systems			X		2005		0.1012	0.5401	0.0682	0.2686	0.0686	0.2195	TR
162	X	2003-08	MDOT	Universal Transportation Access (MD + WMATA)			X		2005	n/a	0.0161	0.0249	0.0103	0.0104	0.0082	0.0086	C
163	X	2003-08	MCG	Construction of 1300 additional Parking Spaces at Grosvenor Metro Garage	X				2004		0.0046	0.0104	0.0029	0.0044	0.0025	0.0036	C (TCM)
164	X	2003-08	MCG	Bethesda Shuttle Bus Services	X				2004		0.0031	0.0048	0.0020	0.0020	0.0016	0.0016	C
165	X	2003-08	MCG	External Bicycle Racks on Ride-On Buses in Montgomery County	X				2004		0.0006	0.0010	0.0004	0.0004	0.0003	0.0003	C
166	X	2003-08	MCG	New CNG Powered Light Duty Vehicle fleet in the County	X				2004		0.0000	0.0001					SP
167	X	2003-08	MCG	Free Bus Service on Selected Routes on I-270	X				2004		0.0011	0.0017	0.0007	0.0007	0.0005	0.0006	C
168	X	2003-08	MCG	Annual Sidewalk Program	X				2004		0.0171	0.0264	0.0110	0.0110	0.0087	0.0091	C
169	X	2003-08	MDOT	Bethesda Breeze/International Express Metrobus			X		2005	n/a	0.0037	0.0053	0.0024	0.0022	0.0019	0.0018	C
170	X	2003-08	MDOT	Bethesda-8, Silver Spring Downtown Dasher and Prince Georges Co. Shuttles at 3 PNR lot			X		2005	n/a	0.0088	0.0104	0.0057	0.0043	0.0043	0.0036	C
171		2003-08	MDOT	Proposed Transportation Management District in Montgomery County (Rockville and Gaithersburg)				X	2005	Removed	0.0057	0.0078	0.0037	0.0033	0.0029	0.0027	C
172	X	2003-08	MDOT	Sidewalks (Bikes/Pedestrian) at / near Rail Stations	X				2005	2002	0.0093	0.0147	0.0060	0.0061	0.0047	0.0051	C
173	X	2003-08	MDOT	Neighborhood Sidewalks Improvements (Bike/Pedestrian)	X				2005	2004	0.0032	0.0017	0.0021	0.0007	0.0015	0.0005	C
174	X	2003-08	MDOT	Neighborhood Conservation Program - Neighborhood Sidewalks Improvements (Bikes/Pedestrian)		X			2005	n/a	0.0028	0.0014	0.0018	0.0006	0.0013	0.0005	C
175	X	2003-08	MDOT	Maryland bus Transit Service Expansion	X				2005	2004	0.0141	0.0323	0.0091	0.0134	0.0076	0.0112	C
176	X	2003-08	VDOT	Universal Transportation Access Program			X		2005	2005	0.0012	0.0019	0.0008	0.0008	0.0006	0.0006	C
177	X	2003-08	VDOT	Interactive Rideshare & Kiosk Initiative			X		2005		0.0004	0.0007	0.0002	0.0003	0.0002	0.0002	C
178	X	2003-08	VDOT	Mobile Commuter Stores			X		2005		0.0021	0.0039	0.0014	0.0016	0.0011	0.0014	C
179	X	2003-08	VDOT	Telework Incentive Program (Telework VA) ¹	X				2005	2001	0.0007	0.0012	0.0005	0.0005	0.0004	0.0004	C
180	X	2003-08	VDOT	Commuter Choice			X		2005		0.0010	0.0014	0.0006	0.0006	0.0005	0.0005	C
181	X	2003-08	VDOT	Employer Shuttle Services			X		2005		0.0114	0.0186	0.0073	0.0069	0.0057	0.0057	C

TERM TRACKING SHEET - CURRENT MEASURES
IMPLEMENTATION: YEAR 2000 AND LATER
Credits are taken in Air Quality Conformity Analysis FY 2005-2010

* Project Category: TR - Traffic Stream, C - Commute, H - Heavy Duty Vehicles (Engine Technology), SP- Specific Vehicle Type, TCM - Transportation Control Measures

NOs	CREDIT TAKEN	TIP CREDITED	AGENCY	PROJECT	IMPLEMENTATION STATUS				ORIGINAL COMPLETION DATE	ACTUAL COMPLETION DATE	TONS/DAY REDUCTION CREDITED						Project Category *
					FULL	SCALED-BACK	UNDER-WAY	REM			2010		2020		2030		
											VOC	NOX	VOC	NOX	VOC	NOX	
184	X	2003-08	VDOT	Van Start / Van Save			X		2005	till 2006	0.0014	0.0026					C
185	X	2003-08	VDOT	Metro Shuttle Bus			X		2005	1999-2005	0.0012	0.0026	0.0008	0.0011	0.0006	0.0009	C
187	X	2003-08	VDOT	VRE Mid-Day Train Service	X				2005	2002	0.0016	0.0029	0.0010	0.0012	0.0008	0.0010	C
190	X	2003-08	VDOT	Employer Vanpool Program (Bridge deck)			X		2005	2004 - 2008	0.0009	0.0019					C
191	X	2003-08	VDOT	Town of Leesburg P&R Lot			X		2005	2004	0.0019	0.0039	0.0012	0.0016	0.0010	0.0014	C
192	X	2003-08	VDOT	District-wide P&R Lots	X		X		2005	2001-2005	0.0113	0.0224	0.0072	0.0093	0.0059	0.0078	C
193	X	2003-08	VDOT	Additional Parking at 4 Metro stations			X		2005	2001, 2005	0.0145	0.0333	0.0093	0.0139	0.0078	0.0116	C
196	X	2003-08	WMATA	64 CNG Buses (Purchased in 2001)	X				2005	2004	0.0021	0.0870					SP (TCM)
197	X	2003-08	WMATA	250 CNG Buses (175 buses by Dec. 2004; 75 buses by mid 2006)			X		2005	2004-2006	0.0083	0.3400					SP
198	X	2003-08	WMATA	60 Engine Replacement (MY 1992 & 1993 MY buses)	X				2004	2004	0.0138	0.0755					SP
199	X	2003-08	WMATA	Car Sharing Program	X				2005	2004	0.0008	0.0018	0.0005	0.0008	0.0004	0.0006	C
200	X	2003-08	WMATA	Bikes Racks on WMATA Buses in VA (372 Bike Racks)	X				2005	2004	0.0012	0.0019	0.0008	0.0008	0.0006	0.0007	C (TCM)
202		2003-08	MDOT	Fleet Replacement (state auto fleet, gas to hybrid, 250 vehicles)				X	2005	Removed	0.0055	0.0133	0.0022	0.0031			SP
203	X	2003-08	MDOT	Replace 55 Montgomery County 10 yr. old buses w/ new CNG buses			X		2005	n/a	0.0000	0.2861	0.0000	0.0657			SP
204		2003-08	MDOT	Neighborhood Bus Shuttle (5 circulator routes)				X	2005	Removed	0.0075	0.0122	0.0048	0.0051	0.0038	0.0042	C
205	X	2003-08	MDOT	New Surface Parking at Transit Centers (500 spaces)			X		2005	n/a	0.0026	0.0060	0.0017	0.0025	0.0014	0.0021	C
206		2003-08	MDOT	Additional Bike Lockers at Metro-Stations				X	2005	Removed	0.0132	0.0209	0.0085	0.0087	0.0067	0.0072	C
207	X	2003-08	MDOT	Bike Facilities at PnR Lots or other similar location			X		2005	n/a	0.0093	0.0166	0.0060	0.0069	0.0048	0.0057	C
208		2003-08	MDOT	CNG Fueling Stations				X	2005	Removed	0.1270	0.1170					SP
209		2003-08	MDOT	Gas cap replacements (ROP Credit)				X	2005	Removed	N/A	N/A	N/A	N/A	N/A	N/A	SP
210		2003-08	MDOT	Gas can turnover (ROP Credit)				X	2005	Removed	N/A	N/A	N/A	N/A	N/A	N/A	SP
211	X	2003-08	MDOT	External Bicycle Racks on WMATA Buses (486 MD buses)	X				2005	2002	0.0014	0.0022	0.0009	0.0009	0.0007	0.0008	C (TCM)
212	X	2003-08	MDOT	Bike \ Pedestrian Trail - Anacostia River Walk			X		2005	n/a	0.0006	0.0005	0.0004	0.0002	0.0003	0.0002	C
213		2003-08	MDOT	Transit Prioritization - Queue Jumps				X	2005	Removed	0.0031	0.0037	0.0020	0.0016	0.0015	0.0013	C
214	X	2003-08	MDOT	Commuter Choice Benefit/Tax Credit - Marketing Expansion			X		2005	n/a	0.0546	0.0859	0.0351	0.0358	0.0278	0.0297	C
215	X	2003-08	MDOT	Improvements to Pedestrian Access in TOD areas (4 locations)			X		2005	n/a	0.0060	0.0087	0.0038	0.0036	0.0030	0.0030	C
216	X	2003-08	MDOT	Telecommuting Expansion ¹	X				2005	n/a	0.0645	0.1208	0.0414	0.0503	0.0336	0.0419	C
217		2003-08	MDOT	Replace older Diesel Engine in Public Sector vehicles				X	2005	Removed	0.0237	0.1300					H
218	X	2003-08	VDOT	MV-92 Telecommuting Program - Expanded ¹	X				2005	2003	0.0689	0.1291	0.0442	0.0537	0.0359	0.0447	C
219	X	2003-08	VDOT	MV-123 Employer Outreach for Public Sector Employees ²	X				2005	2003	0.0153	0.0237	0.0098	0.0099	0.0078	0.0082	C
220	X	2003-08	REGION	Signal System Optimization			X		2005	2005	0.4272	0.1510	0.2879	0.0751	0.2896	0.0613	TR
Available Emissions Credits											2.467	5.072	1.826	1.436	1.689	1.319	

TRANSPORTATION EMISSION REDUCTION MEASURES (CLRP Projects Only)

Credited in Air Quality Conformity Analyses (calendar years 1993-2004)
(TRACKING SHEET)

Project Category: TR - Traffic Stream, C - Commute, H - Engine Technology (Heavy Dudy Vehicles), SP- Specific Vehicle Type

NOs	CREDIT TAKEN	TIP CREDITED	AGENCY	PROJECT	IMPLEMENTATION STATUS				PROJECTED COMPLETION DATE	ACTUAL COMPLETION DATE	TONS/DAY REDUCTION CREDITED						Project Category
					FULL	SCALED-BACK	UNDER-WAY	REM			2010		2020		2030		
											VOC	NOx	VOC	NOx	VOC	NOx	
221	X	1995-00 TIP	REGION	M-24 Speed Limit Adherence					2010		-0.0146	0.5364	-0.0042	0.2365	0.0010	0.0739	TR
222		1996-01 TIP	MGC	Rock Spring Park Pedestrian Amenities				X			0.0010	0.0040	0.0000	0.0000	0.0000	0.0000	-
223	X	1996-01 TIP	MGC	Olney Transit Center Park and Ride					2015		0.0020	0.0080	0.0009	0.0030	0.0003	0.0007	C
224	X	1996-01 TIP	MGC	Damascus Park and Ride						2003	0.0010	0.0040	0.0004	0.0015	0.0001	0.0003	C
225	X	1996-01 TIP	DC	M-103 Taxicab Replacement (DC)					2015		0.0000	0.0000	0.1745	0.3000	0.3490	0.6000	H
226	X	STADIUM ANALYSIS		M-103 Taxicab Replacement (MD)		X			2008		0.0000	0.0000	0.1560	0.2400	0.1560	0.2400	H
227	X	1997-02 TIP	MDOT	Shady Grove West Transit Center Park and Ride							0.0000	0.0100	0.0000	0.0038	0.0000	0.0009	C
228	X	1997-02 TIP	MGC	Olney Transit Center Park and Ride							0.0000	0.0000	0.0004	0.0012	0.0003	0.0007	C
229	X	1997-02 TIP	MGC	White Oak Park and Ride							0.0000	0.0200	0.0000	0.0076	0.0000	0.0017	C
230	X	1997-02 TIP	MGC	Damascus Park and Ride						2003	0.0000	0.0000	0.0002	0.0005	0.0001	0.0003	C
231	X	1997-02 TIP	MGC	Four Corners Transit Center					2015		0.0000	0.0010	0.0000	0.0004	0.0000	0.0001	C
232		1997-02 TIP	MGC	Burtonsville Transit Center				X			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-
233	X	1997-02 TIP	MGC	Silver Spring Transit Access							0.0000	0.0010	0.0000	0.0003	0.0000	0.0002	C
234	X	1997-02 TIP	MGC	Shady Grove Parking Construction						2003	0.0050	0.0190	0.0021	0.0072	0.0007	0.0017	C

PLAN TOTAL	-0.0066	0.5994	0.1743	0.5621	0.3516	0.6804
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GRAND TOTAL (Current Measures + CLRP plan)	2.460	5.671	2.000	1.998	2.041	1.999
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DEFINITIONS:

CREDIT TAKEN (X means emissions reduction credits taken):

TIP - Emissions credits are taken for projects being implemented, according to the progress reporting schedules provided by the implementing agencies (contained in Appendix J of Conformity Document). No credit has been taken for projects in which only some components of the measure have been implemented.

CLRP - Credit is taken for each of these elements of the CLRP according to the schedule provided by the implementing agency.

IMPLEMENTATION STATUS:

FULL = project is completed as planned at the time of analysis.

SCALED BACK = project is completed, but at a different level than assumed at the time of analysis (i.e., purchased 50 buses instead of 100)

UNDERWAY = project is not complete, but is close enough that credit may be taken (i.e., under construction, NOT just out for bid)

REMOVED = project no longer expected to be implemented or constructed

COMPLETION DATE:

PROJECTED = project completion date originally expected (i.e., at time of emissions analysis)

ACTUAL = actual year project was open for use, or expected to be open for use if under construction

REMOVED

projects Emissions credits are not counted in total available emissions credits

1 Line items 218, 216, 179, 92 are all credited as part of M-92 Regional Telecommute Support TERM, line item # 75

2 Line item 108 & 219 credits are taken only for year 2010