

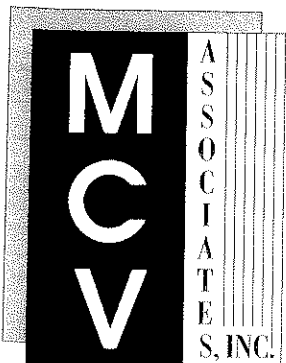
**EFFECTIVENESS OF FREE BUS FARES
ON FORECAST AIR QUALITY CODE ORANGE, RED AND PURPLE DAYS**

FINAL REPORT

Prepared For

**NORTHERN VIRGINIA TRANSPORTATION COMMISSION
Arlington, Virginia 22203**

October 24, 2007



PLANNING • ENGINEERING • INFORMATION TECHNOLOGY

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QUALITY CODE ORANGE, RED AND PURPLE DAYS**

FINAL REPORT

Prepared For

**NORTHERN VIRGINIA TRANSPORTATION COMMISSION
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October 24, 2007

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INTRODUCTION

Beginning in 1999, the Northern Virginia Transportation Commission (NVTC) has managed a program offering free bus fares on forecast Code Red air quality days. Code Red air quality days occur when pollution levels are harmful to all sensitive health groups and outdoor activity should be avoided. Nitrogen Oxides (NO_x) and volatile organic compounds (VOCs) undergo chemical reaction in high heat and strong sunlight to form ground level ozone. Metropolitan Washington Council of Governments (MWCOCG) designates the Code Orange and worse days based on its daily forecast of ozone levels and air quality. From May through September, there is an increase in the number of unhealthy ozone level days. Since automobile emissions are major contributors of air pollution, NVTC's program is designed to encourage travelers to use transit instead of their automobiles on forecast unhealthy air quality days. Between 1999 and 2006, 31 Code Red days have been forecasted by MWCOCG. In 2003, the Environmental Protection Agency (EPA) began instituting a more stringent eight-hour air quality standard and ultimately revoked the one-hour standard in 2005. Under the new standard, the Washington Metropolitan region was officially designated by the EPA as a non-attainment area. Now Code Orange Days and worse (i.e., Red and Purple) are considered by MWCOCG to be high pollution days exceeding the EPA's new health-based standards. Since the new standards were implemented, the Washington Metropolitan Region has been experiencing fewer forecast Code Red days. No forecast Code Red days occurred in 2004 and 2007 and only one day in 2005 and two days in 2006.

Bus service providers will offer free fare bus service on forecast Code Orange and worse days to promote transit use (previously it was for Code Red and worse days). The bus drivers are instructed to record the number of boarding passengers. NVTC compares the Code Orange and worse day boardings with the ridership on the same day of the week during the previous three weeks. Estimates of lost revenues are made by NVTC and then CMAQ program funding is used to reimburse the bus operating agencies.

A NVTC Code Red Day evaluation program was instituted in the summer of 2003. Code Red Days were evaluated using telephone surveys and data collected by the agencies. The lack of Code Red Days in 2003 and 2004 prevented on-board surveys to be conducted. An Interim Report was developed that evaluated the program and presented on-board survey bus samples and sampling techniques. Since then, the program has been expanded to include Code Orange days, as well. NVTC requires information on the effectiveness of the free fare Code Orange and worse days program (Is this program investment providing the returns expected in increased ridership and reductions in air pollution).

The Technical Approach and Work Plan to conducting the study consisted of the following Tasks:

Task 1: *Project Initiation/Work Scope Refinement*

Task 2: *More Detailed Review of Methodology and Data Collection Plan*

Task 3: *Data Collection*

Task 4: *Analyze Data*

Task 5: *Summary Report and Presentation*

WORK SCOPE REFINEMENT

A Project Initiation Meeting was held with the NVTC, Management Advisory Committee (MAC) on February 12, 2007. The following are members of the Advisory Committee:

Al Himes	Alexandria Transit Company	al.himes@alexandriava.gov	703-370-3274x613
Anne Janeski	Alexandria Transit Company	Anne.Janeski@alexandriava.gov	703-370-3274x614
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Joe Swartz	PRTC	jswartz@omniride.com	703-580-6112
Laurel Hammig	PRTC	lhammig@omniride.com	703-580-6148
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Kris Miller	Fairfax County	kris.miller@fairfaxcounty.gov	703-324-1123
Kala Quintana	NVTC	kala@nvtc.org	703-524-3322x104
Rick Taube	NVTC	rick@nvtc.org	703-524-3322x105
Elizabeth Rodgers	NVTC	elizabeth@nvtc.org	703-524-3322x103

The purpose of the initial meeting was to review the scope and work plan presented in the proposal and in particular the survey form developed in the previous study. Based on this meeting the survey and work plan has been revised as described below.

The final data collection survey form is presented in Exhibit 1. The survey form will provide data on increase in ridership on Code Orange Days, alternate forms of transportation, reasons for using transit, travel distance for the trip, socio-economic data about the traveler, etc. The survey will provide the data to compute emissions reductions due to transit use. This will be printed in English only. The riders will have the option of completing the survey form later and return it via postage-free mail back to NVTC. Note too that the survey form will have a unique identification number. We will use this to define the route and particular trip on which the respondent got the form.

Looking at the NVTC bus system, a sampling plan was developed to select bus trips based on factors such as, route coverage and type of service (local versus express, feeder to Metro, etc.), time of day (am peak, mid-day, pm peak), key geographic and socio-economic markets served by the various systems, and cover each of the eight bus systems (WMATA, Fairfax Connector, DASH, CUE, PRTC, Loudoun Transit, Virginia Regional Transportation Association VRTA and ART). The bus sampling plan

EXHIBIT 1. ON-BOARD SURVEY FORM

NVTC AIR QUALITY ACTION (BAD AIR) DAY SURVEY

Dear Rider:

The Northern Virginia Transportation Commission in cooperation with the transit agencies operating in Northern Virginia, is conducting this survey to learn more about your travel and how it is affected by the Air Quality Action (Bad Air) Day alerts. Please complete and return this card to the survey worker or fold and return free by mail. All responses will be kept confidential.



Thank you for your help!

AWARENESS

- 1.a. Prior to boarding the bus, were you aware that you could ride the bus free on Forecast Bad Air Days? Yes No
- b. Prior to boarding the bus, were you aware that today is a BAD AIR DAY? Yes No
- c. IF YES, how did you become aware of the BAD AIR DAY alert today? (Please check only one.)
 TV, Radio or Newspaper Employer Alert Website Other _____

REASON TO RIDE

- 2.a. What is the most important reason that you chose to ride the bus today? (Please check only one.)
 I am a regular rider I wanted to help reduce air pollution
 I am riding because of the free fare I wanted to avoid the heat
 I don't have a car available Other _____
- b. How do you typically make this same trip (when the full bus fare is charged)?
 Same Bus Drive an automobile Passenger in an automobile Walk or Bike
 Ride other transit (What route _____) Would not have made trip
 Other _____
- c. If you would have driven yourself, what type of vehicle would it be?
 Automobile "Green" Vehicle SUV or Van
 Pick-up Truck Diesel Other _____
- d. Would you have taken the bus today if the fare was not free but: (Please check all that apply)
 25 Cents Yes No
 50 Cents Yes No
 1/2 Price Yes No
- e. Do you receive Metrochek/SmartBenefits? Yes No

REACHING THE BUS

- 3.a. Where did you COME FROM before you got on THIS BUS?
 Home Work Shopping School Other _____
- b. What is the address of, or closest intersection to, the stop where you boarded the bus?
Address or Street _____ Nearest Intersection _____
- c. How did you get from 3.a. to the bus? (Please check all that apply)
 Drive a car Passenger in a car Walk or Bike
 Ride other transit (what route _____) Other _____

EXHIBIT 1 (CONTINUED). ON-BOARD SURVEY FORM

DESTINATION

4.a. What is your final destination for this one-way bus ride?

- Home
- Work
- Shopping
- School
- Other _____

b. What is the address of, or closest intersection to your final destination?

Address or Street _____ Nearest Intersection _____

FREQUENCY OF TRAVEL

5. How often do you make this trip on the BUS?

- 5 or more days a week
- 2-4 days a week
- 1 or fewer days a week
- First time
- Only on Bad Air days
- Other _____

6. How often do you make this trip by AUTOMOBILE?

- 5 or more days a week
- 2-4 days a week
- 1 or fewer days a week
- Other _____

PLEASE TELL US ABOUT YOURSELF

7.a. Are you: Male Female

b. What is your age?

- Under 18
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- 75+

c. What is your approximate household income per year?

- Under \$25,000
- \$25,000-49,999
- \$50,000- \$74,999
- \$75,000-\$99,999
- \$100,000 and above

d. Are you currently employed?

- Yes
- No

e. Education completed:

- Less than High School
- High School
- College Graduate
- Technical / Trade

f. Do you consider yourself:

- Asian
- Black or African American
- Hispanic or Latino
- White
- Other _____

Please return this card to the survey worker or fold/tape and return free by mail.

Thank you for your cooperation!



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that was developed is shown in Exhibit 2 and includes the bus routes, starting times, starting and ending locations, etc. As noted, all eight bus systems have been covered. A total of 58 bus trips were included in the sampling plan.

Due to the limited resources, it was decided to use the survey instrument on two occurrences of Code Orange days. The first survey would be implemented on the season's second Code Orange day. The second survey would be conducted towards the end of summer season in August. No additional surveys or baseline counts will be conducted.

SURVEY METHODOLOGY

The procedure for conducting the survey is summarized here.

MCV staff, augmented by temporary staff, were utilized to distribute and collect the short survey forms. It should be noted that relying only on temporary staff to be trained and ready for Code Orange days with a few hours notice would be difficult to implement. The temporary person(s) may be busy on the day of survey or may not be available for some other reason. Therefore, MCV relied on their regular staff to accomplish this task with limited support of the temporary staff. All 58 bus trips were surveyed over a two day period, due to staff limitations.

Every rider was provided with a survey card and a small pencil. If a rider refused to take the survey form or did not want to fill the form, the blank form was placed in the drop-off box. The surveyors were required to fill a short log sheet at the beginning and end of the trip, recording the bus route number, time, and survey form numbers (the first and last numbers of the survey forms distributed to the riders on this trip). The total survey forms distributed provided a count of the total bus riders on that bus route. The returns were also matched to the bus route and transit system based on the preprinted survey number. Each of the transit agency and their coordinators were informed in advance about the upcoming survey on forecasted code orange day, so that the bus drivers would be informed about the survey.

ON-BOARD SURVEY

The first on-board survey was conducted on Wednesday, June 27 and Thursday, June 28, as both these days were forecasted Code Orange Days. Most of the buses were surveyed on June 27 and a limited number of buses were surveyed on June 28. Exhibit 2 also shows the bus trips and the survey dates. A total of 1,256 survey forms were distributed on the two days. Most of the passengers completed the survey forms on-board and returned them to the surveyors. A limited number (approximately 30) of survey forms were mailed back. The total number of completed survey forms received were 750 or 60 percent of the sample. The second Code Orange Days was surveyed on Thursday, August 30, 2007. The second survey was conducted on one day only and 39 bus trips were surveyed. Exhibit 3 presents the bus trips, the bus routes, starting

EXHIBIT 2. BUSES SURVEYED ON JUNE 27-28, 2007

Date	Day	System	Bus Route No.	Start Time	End Time	Start Location	End Location	Start Form No.	Start End No.	Forms Distribute
6/27/2007	WED	WMATA	18R	6.13	6.57	COFFERWOODS	FRANCONIA	241	252	12
6/27/2007	WED	Connector	401	7.09	8.26	FRANCONIA	TYSONS	253	326	74
6/27/2007	WED	WMATA	26	8.38	9.25	TYSONS	BALLSTON	327	362	36
6/27/2007	WED	Connector	331	10.59	11.59	FRANCONIA	FRANCONIA	363	366	4
6/27/2007	WED	Connector	231	3.01	3.47	FRANCONIA	FRANCONIA	367	376	10
6/27/2007	WED	Connector	185	4.07	4.41	FRANCONIA	COFFERWOODS	377	380	4
6/27/2007	WED	ART	61	6.5	7.10	ROSSLYN	ROSSLYN	721	726	6
6/27/2007	WED	ART	82	7.39	8.05	PENTAGON CITY	PENTAGON CITY	727	734	8
6/27/2007	WED	ART	41	10.5	11.15	DINWIDDIO	COURT HOUSE M	735	752	18
6/27/2007	WED	WMATA	5A	6.3	7.15	Dulles AIRPORT	ROSSLYN	961	990	30
6/27/2007	WED	Connector	301	8.45	9.25	HUNTINGTON	FRANCONIA	991	992	2
6/27/2007	WED	Connector	171	9.25	11.00	FRANCONIA	HUNTINGTON	993	1036	44
6/27/2007	WED	Connector	151	12.11	1.29	HUNTINGTON	HUNTINGTON	1037	1049	13
6/27/2007	WED	Connector	425	3.35	4.10	WESTFALLS	WESTFALLS	1050	1061	12
6/27/2007	WED	Connector	28B	5.00	6.25	TYSON CONER	KING ST METRO	1062	1080	19
6/27/2007	WED	WMATA	15L	8.03	9.47	GMU	ROSSLYN	1200	1218	19
6/27/2007	WED	WMATA	17G	4.18	5.16	PENTAGON CITY	GMU	1219	1233	15
6/27/2007	WED	Connector	551	7.13	7.54	HERDON P&R	WESTFALL	1321	1360	40
6/27/2007	WED	WMATA	3B	8.06	9.08	WESTFALLS	ROSSLYN	1361	1405	45
6/27/2007	WED	WMATA	4A	9.31	10.15	ROSSLYN	GLEN,CARL	1406	1433	28
6/27/2007	WED	WMATA	23A	2.38	4.12	TYSON CONER	CRYSTAL CITY	1434	1472	39
6/27/2007	WED	Connector	597	4.15	5.05	CRTSTAL DR	RESTON	1473	1493	21
6/27/2007	WED	Connector	RIBS-2	5.19	5.52	RESTON EAST	RESTOWN CENT	1494	1515	22
6/27/2007	WED	Connector	924	6.18	6.37	HERDON P&R	DARNSVILLE RT7	1516	1523	8
6/27/2007	WED	LOUDOUN	71025	6.23	7.40	LOUDON	ROSSLYN	121	163	43
6/27/2007	WED	Connector	310	8.34	9.54	HUNTINGTON	HUNTINGTON	163	185	23
6/27/2007	WED	CUE	GREEN 1	6.44	7.4	VIENNA	VIENNA	1	36	36
6/27/2007	WED	CUE	GREEN2	8.17	9.15	VIENNA	VIENNA	37	68	32
6/27/2007	WED	CUE	GOLD 1	9.45	10.38	VIENNA	VIENNA	69	92	24
6/27/2007	WED	CUE	GOLD 2	10.46	11.44	VIENNA	VIENNA	93	108	16
6/27/2007	WED	DASH	AT-5	6.27	7.27	BRADOCK METRO	VANDORN METR	481	508	28
6/27/2007	WED	DASH	AT-4	8.3	9.11	KING ST/FAIRFAX	PENTGON	509	537	29

EXHIBIT 2 (CONTINUED). BUSES SURVEYED ON JUNE 27-28, 2007

Date	Day	System	Bus		Start		End Time	Start Location	End Location	Start		Forms Distribute
			Route No.	Time	Form No.	End No.						
6/27/2007	WED	DASH	AT-2	4:02	5:29	BRADOCK METRO	EISENHOWER	538	579	42		
6/27/2007	WED	PRTC	M-6	6:15	8:04	MANASSAS	PENTAGON	601	625	25		
6/27/2007	WED	WMATA	21-C	8:15	8:29	PENTAGON CITY	LANDMARK MALL	626	626	1		
6/27/2007	WED	PRTC		4:00	4:40	Westfalls metro	Manassas	627	674	48		
6/27/2007	WED	PRTC		5:44	6:10	Manassas	Oaks Wellington	654	663	10		
6/27/2007	WED	Connector	125	6:45	7:35	STRINGFELLOW	VIENNA	1081	1108	28		
6/27/2007	WED	Connector	623	7:56	8:36	VIENNA METRO	VIENNA METRO	1109	1140	32		
6/27/2007	WED	WMATA	10-B	9:20	10:20	BALLSTON METRO	S.WASHINGTON ST	1141	1166	26		
6/27/2007	WED	WMATA	10-A	10:28	11:00	S.WASHINGTON	PENTAGON	1167	1181	15		
6/27/2007	WED	WMATA	25-B	12:15	1:10	BALLSTON METRO	VANDORN	1182	1200	19		
6/27/2007	WED	WMATA	17-H	4:35	5:20	PENTAGON METRO	TWINBROOK/PICK	1921	1931	11		
6/27/2007	WED	GEORGE	26-W	4:30	4:50	Westfalls metro	westfall metro	1681	1683	3		
6/27/2007	WED	GEORGE	26-E	5:20	5:40	EASTFALLS	EASTFALLS	1687	1699	13		
6/27/2007	WED	Connector	554	5:01	5:58	Westfalls metro	westfall metro	753	769	17		
6/27/2007	WED	LOUDOUN	CP1	4:00	4:40	WESTFALLS	CASCADE	185	216	32		
6/27/2007	WED	LOUDOUN	PURPLE	5:05	5:59	HUB	HUB	216	222	7		
6/28/2007	Thurs	Connector	307	7:48	8:09	Laurel Crest	Sheffield Green	1234	1235	2		
6/28/2007	Thurs	Connector	307	8:09	8:42	Sheffield Green	Laurel Crest			0		
6/28/2007	Thurs	WMATA	18J	5:01	5:33	Rolling	PENTAGON CITY	580	582	3		
6/28/2007	Thurs	WMATA	29X	5:54	6:40	PENTAGON CITY	NVCC	801	815	15		
6/28/2007	Thurs	WMATA	8Z	7:02	7:30	Quaker Lane	PENTAGON CITY	1932	1944	13		
6/28/2007	Thurs	Connector	304	8:06	8:46	FRANCONIA	FRANCONIA	1945	1965	21		
6/28/2007	Thurs	WMATA	16A	10:05	10:59	PENTAGON CITY	Americana Dr.	1966	2020	55		
6/28/2007	Thurs	PRTC	PF-2			Dale City		664	690	27		
6/28/2007	Thurs	PRTC	R-2					697	698	2		
6/28/2007	Thurs	PRTC	R-2					700	719	20		
6/28/2007	Thurs	PRTC	R-2			Ballston	Dale City	841	845	5		
6/28/2007	Thurs	PRTC	DC-2	6:37	7:20	Chin Ctr	Potomac	846	849	4		
total routes			58							1256		

COMPLETED FORMS 750 PERCENT COMPLETE 60%

EXHIBIT 3. BUSES SURVEYED ON AUGUST 30, 2007

Date	Day	System	Bus Route No.	Start Time	End Time	Start Location	End Location	Start Form No.	Start End No.	Forms Distribute
8/30/2007	Thurs	ART	61	0:28	0:30	ROSSLYN	ROSSLYN	2950	2959	10
8/30/2007	Thurs	ART	82	7:39	8:05	PENTAGON CITY	PENTAGON CITY	2960	2966	7
8/30/2007	Thurs	ART	41	10:30	10:55	DINWIDDIO	COURT HOUSE M	2967	2986	20
8/30/2007	Thurs	Connector	401	7:09	8:28	FRANCONIA	TYSONS	381	480	100
8/30/2007	Thurs	Connector	551	7:13	7:54	HERNDON P&R	WEST FALLS M	816	839	24
8/30/2007	Thurs	Connector	597	4:15	5:05	CRTSTAL DR	RESTON	897	912	16
8/30/2007	Thurs	Connector	RIBS-2	4:42	5:28	RESTON EAST	RESTOWN CENT	913	917	5
8/30/2007	Thurs	Connector	924	6:18	6:37	HERDON P&R	DRANESVILLE RT7	918	923	6
8/30/2007	Thurs	Connector	125	6:20	6:48	STRINGFELLOW	VIENNA	2021	2052	32
8/30/2007	Thurs	Connector	623	6:56	7:35	VIENNA METRO	VIENNA METRO	2053	2112	60
8/30/2007	Thurs	Connector	331	10:59	11:59	FRANCONIA	FRANCONIA	2200	2204	5
8/30/2007	Thurs	Connector	231	3:01	3:49	FRANCONIA	FRANCONIA	2205	2214	10
8/30/2007	Thurs	Connector	185	4:07	4:41	FRANCONIA	COFFERWOODS	2215	2222	8
8/30/2007	Thurs	Connector	301	8:41	9:20	HUNTINGTON	FRANCONIA	2808	2809	2
8/30/2007	Thurs	Connector	171	9:25	10:55	FRANCONIA	HUNTINGTON	2810	2844	35
8/30/2007	Thurs	Connector	151	11:40	12:52	HUNTINGTON	HUNTINGTON	2845	2875	31
8/30/2007	Thurs	Connector	425	3:30	4:00	WEST FALLS M	WEST FALLS M	2876	2896	21
8/30/2007	Thurs	Connector	285	5:00	6:30	TYSONS CORNER	KING ST METRO	2897	2949	53
8/30/2007	Thurs	CUE	GREEN 1	6:40	7:45	VIENNA	VIENNA	1524	1555	32
8/30/2007	Thurs	CUE	GREEN2	8:12	9:17	VIENNA	VIENNA	1556	1560	5
8/30/2007	Thurs	CUE	GREEN2	8:12	9:17	VIENNA	VIENNA	1698	1733	36
8/30/2007	Thurs	CUE	GOLD 1	9:45	10:42	VIENNA	VIENNA	1734	1764	31
8/30/2007	Thurs	CUE	GOLD 2	10:46	11:45	VIENNA	VIENNA	1765	1791	27
8/30/2007	Thurs	DASH	AT 5	6:30	7:29	Braddock Metro	Van Dom Metro	1236	1272	37
8/30/2007	Thurs	DASH	AT 4	8:31	9:12	King St/Fairfax	Pentagon	1273	1302	30
8/30/2007	Thurs	DASH	AT 2	4:02	5:29	Braddock Metro	Van Dom Metro	1303	1320	18
8/30/2007	Thurs	DASH	AT 8	5:30	6:28	VanDorn Street	N Fairfax St.	2401	2457	57
8/30/2007	Thurs	DASH	AT 8	6:32	7:27	N Fairfax St.	Vandorn Street	2458	2482	25
8/30/2007	Thurs	GEORGE	26-W	4:30	4:55	WEST FALLS M	WEST FALLS M	2483	2519	37
8/30/2007	Thurs	GEORGE	26-E	5:20	5:40	EAST FALLS M	EAST FALLS M	1792	1795	4
8/30/2007	Thurs	PRTC	M-6	6:18	7:46	MANASSAS	PENTAGON CITY	1796	1800	5
8/30/2007	Thurs	PRTC		4:00	5:00	WEST FALLS M	MANASSAS	1801	1826	26
8/30/2007	Thurs	PRTC		5:20	6:10	MANASSAS	Oaks Wellington	1827	1844	18
8/30/2007	Thurs	WMATA	4A	9:31	10:15	ROSSLYN	GLEN CARLYN	1845	1849	5
8/30/2007	Thurs	WMATA	23A	2:38	4:12	TYSONS CORNER	CRYSTAL CITY	848	854	7
8/30/2007	Thurs	WMATA	3B	8:06	9:08	WEST FALLS M	ROSSLYN	856	896	41
8/30/2007	Thurs	WMATA	15L	6:56	8:15	GMU	ROSSLYN	949	1024	76
8/30/2007	Thurs	WMATA	21-C	8:52	9:15	PENTAGON CITY	LANDMARK MALL	1561	1593	33
8/30/2007	Thurs	WMATA	2 C	8:38	9:25	TYSONS	BALLSTON	1826	1826	1
8/30/2007	Thurs	WMATA	5A	6:30	7:10	Dulles AIRPORT	ROSSLYN	2161	2199	39
total routes			39					2761	2807	47
								2521	2524	4
										1086

FORMS COMPLETED 460

PERCENT COMPLETED 42%

times, starting and ending locations, etc. for the second survey day. A total of 1,086 survey forms were distributed on August 30, 2007. As in the earlier survey, most of the passengers completed the survey forms on-board and returned them to the surveyors. A limited number (approximately 10) of survey forms were mailed back. The total number of completed survey forms received were 460 or 42 percent of the sample. The return rate was less than the first survey because some people who completed the survey in June may not have completed the survey in August. Further, some drivers were not aware of the Code Orange Days in the early hours and some passengers refused to complete the survey.

CODING AND PROCESSING OF DATA

The survey forms were reviewed for their completeness. The survey data was coded and converted to electronic form using Microsoft Excel Spreadsheet. The data was analyzed to develop cross-tabs and summaries of responses. The survey data was analyzed to determine the total number of bus riders by system that use the transit on the Code Orange days. The number of passengers that would not have used the bus if it were not forecast Code Orange day was determined through the survey data. Other analysis was conducted to determine the trip length of the passengers who normally drive and took the bus because it was Code Orange Days. However, the information on trip origin and trip destination was generally not completely answered. Analysis was also conducted to determine the responses of persons to pay a small fare (\$ 0.25, \$0.50 or half price) instead of free.

The results are presented in the next section.

SURVEY RESULTS

The survey results for the June 27/28 survey are summarized in Exhibits 4 through 13 for each of the questions in the survey form (Loudoun summary includes the VTRA data since there were only three responses).

Among the key results:

- 72% were aware of the Ride Free program before boarding
- 46% knew that today was a Bad Air day and became aware by:
 - o TV, Radio or Newspaper = 38%
 - o Employer Alert = 3%
 - o Website = 3%
 - o Other = 10%
- The most important reason for choosing the bus:
 - o Regular Rider = 72%
 - o Help reduce air pollution = 5%
 - o Because of the free fare = 3%
 - o Avoid the heat = 2%

Exhibit 4. JUNE SURVEY RESULTS ON AWARENESS

1.a. Were you aware of the free bus ride on Forecast Bad Air Days?

Bus System	Total No.	Yes	%	No	%	no response	%	All
ART	8	6	75	1	13	1	13	8
CUE	78	44	56	30	38	4	5	78
DASH	69	50	72	16	23	3	4	69
FAIRFAX C	199	150	75	40	20	9	5	199
LOUDOUN	67	55	82	12	18	0	0	67
METRO	221	144	65	69	31	8	4	221
PRTC	108	90	83	12	11	6	6	108
TOTAL	750	539	72	180	24	31	4	750

1.b. Were you aware that today is a BAD AIR DAY prior to boarding the bus?

System	Tot No.	Yes	%	No	%	no response	%	All
ART	8	5	63	3	38	0	0	8
CUE	78	28	36	42	54	8	10	78
DASH	69	32	46	30	43	7	10	69
FAIRFAX C	199	98	49	87	44	14	7	199
LOUDOUN	67	35	52	28	42	4	6	67
METRO	221	75	34	109	49	37	17	221
PRTC	108	72	67	24	22	12	11	108
TOTAL	750	345	46	323	43	82	11	750

1.c. If YES, how did you become aware of the BAD AIR DAY alert today?

System	Tot No.	TV	%	Employer	%	Website	%	Others	%	no response	%	All
ART	8	4	50		0		0	1	13	3	38	8
CUE	78	28	36	1	1	5	6	7	9	37	47	78
DASH	69	25	36	2	3	2	3	6	9	34	49	69
FAIRFAX C	199	76	38	6	3	7	4	14	7	96	48	199
LOUDOUN	67	24	36	3	4	2	3	12	18	26	39	67
METRO	221	80	36	7	3	2	1	11	5	121	55	221
PRTC	108	46	43	4	4	5	5	25	23	28	26	108
TOTAL	750	283	38	23	3	23	3	76	10	345	46	750

Exhibit 5. JUNE SURVEY RESULTS - REASON TO RIDE

2.a. what is the most important reason that you chose to ride the bus today?

System	Tot No.	Regular	%	Reduce	%	Free fare	%	Heat	%	Car	%	Others	%	no response	%	All
ART	8	5	63	1	13		0		0	2	25		0	0	0	8
CUE	78	43	55	2	3	4	5	1	1	19	24	9	12	0	0	78
DASH	69	48	70	3	4	1	1	1	1	11	16	5	7	0	0	69
FAIRFAX C	199	150	75	16	8	5	3	4	2	21	11	11	6	2	1	209
LOUDOUN	67	54	81	2	3	2	3	1	1	5	7	4	6	0	0	68
METRO	221	160	72	7	3	4	2	8	4	31	14	11	5	0	0	221
PRTC	108	82	76	5	5	6	6	2	2	12	11	6	6	6	6	119
TOTAL	750	542	72	36	5	22	3	17	2	101	13	46	6	8	1	772

2.b. How do you typically make this same trip (when the full bus fare is charged)?

System	Tot No.	Bus	%	Drive	%	Auto	%	Walk/Bike	%	Ride	%	Trip	%	Other	%	no response	%	All
ART	8	7	88		0	1	13		0		0		0		0	0	0	8
CUE	78	61	78	4	5	1	1		0	3	4	2	3	3	4	4	5	78
DASH	69	57	83	3	4		0	4	6	2	3		0	2	3	1	1	69
FAIRFAX C	199	169	85	3	2	6	3	2	1	8	4	1	1	3	2	7	4	199
LOUDOUN	67	59	88	7	10	1	1		0		0		0		0	0	0	67
METRO	221	177	80	7	3	4	2	8	4	12	5	3	1	2	1	8	4	221
PRTC	108	85	79	10	9	2	2	2	2	2	2	3	3	1	1	3	3	108
TOTAL	750	615	82	34	5	15	2	16	2	27	4	9	1	11	1	23	3	750

Exhibit 6. JUNE SURVEY RESULTS - REASON TO RIDE

2.c. If you would have driven yourself, what type of vehicle would it be?

System	Tot No.	Auto	%	Vehicle	%	SUV or VAN	%	Pick-up Truck	%	Diesel	%	Other	%	no response	%	All
ART	8	5	63	1	13	1	13	0	0	0	0	0	0	1	13	8
CUE	78	45	58	5	6	6	8	3	4	2	3	6	8	11	14	78
DASH	69	37	54	2	3	12	17	1	1	0	0	7	10	10	14	69
FAIRFAX C	199	110	55	14	7	27	14	3	2	2	1	19	10	24	12	199
LOUDOUN	67	36	54	1	1	17	25	3	4	0	0	2	3	8	12	67
METRO	221	125	57	10	5	32	14	9	4	2	1	12	5	31	14	221
PRTC	108	52	48	4	4	21	19	10	9	2	2	6	6	13	12	108
TOTAL	750	410	55	37	5	116	15	29	4	8	1	52	7	98	13	750

2.d. Would you have taken the bus today if the fare was not free but:

System	Tot No.	\$ 0.25 fare				\$ 0.50 Fare				Half Fare			
		Yes	%	No	%	Yes	%	No	%	Yes	%	No	%
ART	8	4	50	1	13	5	63	1	13	6	75	1	13
CUE	78	47	60	6	8	53	68	4	5	48	62	5	6
DASH	69	53	77	4	6	48	70	4	6	45	65	7	10
FAIRFAX C	199	146	73	11	6	145	73	9	5	150	75	9	5
LOUDOUN	67	54	81	3	4	50	75	3	4	52	78	3	4
METRO	221	175	79	8	4	152	69	11	5	148	67	9	4
PRTC	108	76	70	8	7	70	65	7	6	69	64	9	8
TOTAL	750	555	74	41	5	523	70	39	5	518	69	43	6

2.e. Do you receive Metrocheck/SmartBenefits?

System	Tot No.	Yes	%	No	%	no response	%	All
ART	8	2	25	5	63	1	13	8
CUE	78	13	17	57	73	8	10	78
DASH	69	20	29	40	58	9	13	69
FAIRFAX C	199	77	39	101	51	21	11	199
LOUDOUN	67	32	48	32	48	3	4	67
METRO	221	81	37	115	52	25	11	221
PRTC	108	47	44	50	46	11	10	108
TOTAL	750	272	36	400	53	78	10	750

Exhibit 7. JUNE SURVEY RESULTS - REACHING THE BUS

3.a. Where did you COME FROM before you got on THIS BUS?

System	Tot No.	Home	%	Work	%	Shopping	%	School	%	Other	%	no response	%	All
ART	8	8	100	1	13	1	13		0		0	0	0	10
CUE	78	56	72	8	10	2	3	1	1	9	12	2	3	78
DASH	69	48	70	16	23		0	2	3	3	4	0	0	69
FAIRFAX C	199	124	62	61	31	4	2		0	34	17	7	4	230
LOUDOUN	67	40	60	22	33	1	1	2	3	1	1	1	1	67
METRO	221	132	60	59	27	4	2	3	1	32	14	12	5	242
PRTC	108	46	43	52	48		0	1	1	5	5	4	4	108
TOTAL	750	454	61	219	29	12	2	9	1	84	11	26	3	804

3.c. How did you get from 3.a. to the bus?

System	Tot No.	Car	%	Passenger	%	Walk/Bike	%	Ride	%	Other	%	no response	%	All
ART	8		0		0	4	50	4	50		0	0	0	8
CUE	78	3	4	2	3	48	62	9	12	4	5	12	15	78
DASH	69	6	9	2	3	40	58	10	14	3	4	8	12	69
FAIRFAX C	199	25	13	11	6	101	51	32	16	10	5	20	10	199
LOUDOUN	67	39	58	5	7	7	10	16	24	4	6	0	0	71
METRO	221	29	13	11	5	119	54	25	11	14	6	23	10	221
PRTC	108	27	25	4	4	40	37	21	19	10	9	9	8	111
TOTAL	750	129	17	35	5	359	48	117	16	45	6	72	10	757

Exhibit 8. JUNE SURVEY RESULTS - DESTINATION

4.a. What is the final destination for this one-way bus ride?

System	Tot No.	Home	Percent	Work	Percent	Shop	Percent	School	Percent	Other	Percent	no response	Percent	All
ART	8	1	13	7	88		0		0		0	0	0	8
CUE	78	7	9	35	45	1	1	16	21	15	19	4	5	78
DASH	69	20	29	31	45	4	6	2	3	9	13	3	4	69
FAIRFAX C	199	59	30	95	48	3	2	3	2	49	25	14	7	223
LOUDOUN	67	28	42	34	51	1	1		0	1	1	3	4	67
METRO	221	58	26	111	50	7	3	4	2	28	13	13	6	221
PRTC	108	55	51	32	30	1	1		0	11	10	9	8	108
TOTAL	750	228	30	345	46	17	2	25	3	113	15	46	6	774

Exhibit 9. JUNE SURVEY RESULTS - FREQUENCY OF TRAVEL

5. How often do you make this trip on the BUS?

System	Tot No.	(5 days)	%	(2-4 Days)	%	(1 day)	%	First	%	Bad Air	%	Other	%	no response	%	All
ART	8	6	75		0	1	13		0		0	1	13	0	0	8
CUE	78	36	46	20	26	7	9	1	1	2	3	4	5	8	10	78
DASH	69	37	54	12	17	9	13	1	1		0	2	3	8	12	69
FAIRFAX C	199	132	66	38	19	7	4	3	2	1	1	4	2	14	7	199
LOUDOUN	67	39	58	16	24	6	9	1	1	1	1	2	3	2	3	67
METRO	221	117	53	44	20	8	4	6	3	3	1	15	7	28	13	221
PRTC	108	72	67	19	18	2	2	2	2	1	1	1	1	11	10	108
TOTAL	750	439	59	149	20	40	5	14	2	8	1	29	4	71	9	750

Exhibit 10. JUNE SURVEY RESULTS - FREQUENCY OF TRAVEL

6. How often do you make this trip by AUTOMOBILE?

System	Tot No.	(5 Days)	Percent	(2-4 Days)	Percent	(1 Day)	Percent	Other	Percent	no response	Percent	All
ART	8	2	25		0	3	38	1	13	2	25	8
CUE	78	3	4	8	10	30	38	21	27	16	21	78
DASH	69	6	9	6	9	26	38	18	26	13	19	69
FAIRFAX C	199	13	7	14	7	82	41	56	28	34	17	199
LOUDOUN	67	2	3	10	15	32	48	19	28	4	6	67
METRO	221	16	7	17	8	85	38	52	24	51	23	221
PRTC	108	12	11	7	6	39	36	26	24	24	22	108
TOTAL	750	54	7	62	8	297	40	193	26	144	19	750

Exhibit 11. JUNE SURVEY RESULTS - DEMOGRAPHICS

7.a. Gender:

System	Tot No.	Male	%	Female	%	no response	%	All
ART	8	4	50	4	50	0	0	8
CUE	78	32	41	33	42	13	17	78
DASH	69	23	33	33	48	13	19	69
FAIRFAX	199	90	45	84	42	25	13	199
LOUDOUN	67	38	57	22	33	7	10	67
METRO	221	105	48	85	38	31	14	221
PRTC	108	42	39	50	46	16	15	108
TOTAL	750	334	45	311	41	105	14	750

7.b. Age Grouping:

System	Tot No.	< 18	%	18-24	%	25-34	%	35-44	%	45-54	%	55-64	%	65-74	%	75+	%	no response	%	All
ART	8		0	1	13	3	38	2	25		0	2	25		0		0	0	0	8
CUE	78	2	3	28	36	18	23	7	9	6	8	4	5	1	1	1	11	14	14	78
DASH	69	3	4	7	10	18	26	14	20	8	12	8	12	2			9	13	69	
FAIRFAX	199	6	3	24	12	49	25	25	13	37	19	29	15	7	4	1	21	11	199	
LOUDOUN	67	2	3	3	4	10	15	19	28	15	22	13	19	2	3		3	4	67	
METRO	221	4	2	22	10	39	18	38	17	45	20	38	17	5	2	2	28	13	221	
PRTC	108	2	2	6	6	20	19	21	19	29	27	18	17	1	1		11	10	108	
TOTAL	750	19	3	91	12	157	21	126	17	140	19	112	15	18	2	4	83	11	750	

Exhibit 12. DEMOGRAPHICS

Table 7c. What is your approximate household income per year? (in thousands)

System	Tot No.	<25	%	25-49	%	50-74	%	75-99	%	100+	%	no response	%	All
ART	8	4	50	2	25		0	1	13	1	13	0	0	8
CUE	78	24	31	15	19	8	10	5	6	4	5	22	28	78
DASH	69	16	23	9	13	10	14	7	10	9	13	18	26	69
FAIRFAX	199	40	20	33	17	20	10	23	12	40	20	43	22	199
LOUDOUN	67	7	10	4	6	8	12	5	7	30	45	13	19	67
METRO	221	38	17	40	18	20	9	18	8	46	21	59	27	221
PRTC	108	13	12	19	18	16	15	16	15	22	20	22	20	108
TOTAL	750	142	19	122	16	82	11	75	10	152	20	177	24	750

7.d. Are you currently employed?

System	Tot No.	Yes	%	No	%	no response	%	All
ART	8	6	75	1	13	1	13	8
CUE	78	43	55	24	31	11	14	78
DASH	69	53	77	8	12	8	12	69
FAIRFAX	199	156	78	17	9	26	13	199
LOUDOUN	67	59	88	5	7	3	4	67
METRO	221	171	77	17	8	33	15	221
PRTC	108	93	86	3	3	12	11	108
TOTAL	750	581	77	75	10	94	13	750

Exhibit 13. DEMOGRAPHICS

7.e. Education completed:

System	Tot No.	< HighSch	%	HighSchool	%	College	%	Technical	%	no response	%	All
ART	8		0	4	50	4	50		0	0	0	8
CUE	78	4	5	19	24	39	50	3	4	13	17	78
DASH	69	3	4	16	23	38	55	3	4	9	13	69
FAIRFAX C	199	11	6	40	20	116	58	14	7	18	9	199
LOUDOUN	67	1	1	9	13	49	73	3	4	5	7	67
METRO	221	5	2	47	21	127	57	8	4	34	15	221
PRTC	108	2	2	26	24	61	56	8	7	11	10	108
TOTAL	750	26	3	161	21	434	58	39	5	90	12	750

7.f. Do you consider yourself:

System	Tot No.	Asian	%	Black	%	Hisp/Latin	%	White	%	Other	%	no response	%	All
ART	8		0	1	13	3	38	4	50		0	0	0	8
CUE	78	22	28	12	15	8	10	19	24	6	8	11	14	78
DASH	69	1	1	19	28	8	12	31	45	3	4	7	10	69
FAIRFAX C	199	32	16	35	18	22	11	78	39	9	5	23	12	199
LOUDOUN	67	11	16	9	13	6	9	36	54	1	1	4	6	67
METRO	221	28	13	38	17	17	8	96	43	9	4	33	15	221
PRTC	108	5	5	31	29	22	20	31	29	6	6	13	12	108
TOTAL	750	99	13	145	19	86	11	295	39	34	5	91	12	750

- o Do not have a car = 13%
 - o Other = 6%
- How passengers would have typically made the same trip if full bus fare was charged:
 - o Same bus = 82%
 - o Driven an automobile = 5%
 - o Passenger in an automobile = 2%
 - o Walk or Bike = 2%
 - o Ride other Transit = 4%
 - o Would not have made trip = 1%
 - o Other = 1%
 - o No response = 3%
- If a small fare was charged would the passengers still ride:
 - o 25 cents = 74% YES
 - o 50 cents = 70% YES
 - o ½ price = 69% YES
- The household income varied from less than \$ 25,000 (19 percent) to greater than \$100,000 (20 percent)
- 77 percent of the respondents were currently employed
- 58 percent of the respondents were college graduates
- the age grouping were predominantly from 18 to 64 years

With reference to the above key results, the August survey showed the following significant differences (it should be noted that the Loudoun County Transit and VRTA were not surveyed):

- 31 percent were aware that today was a bad air day versus 46 percent in the June survey and 25 percent became aware through TV, radio or newspaper.
- How passengers would have typically made the same trip if full bus fare was charged:
 - o Same bus = 80%
 - o Driven an automobile = 3%
 - o Passenger in an automobile = 0%
 - o Walk or Bike = 4%
 - o Ride other Transit = 4%
 - o Would not have made trip = 2%
 - o Other = 4%
 - o No response = 3%

Thirty-six respondents indicated that they typically made the trip on code orange day by driving an automobile. Since this is the market segment that results in emissions reductions on code orange days, details on their characteristics are presented in Exhibit 14.

COST-EFFECTIVENESS ANALYSIS

NVTC provided the reported ridership by bus operators for each of the forecast Code Orange Days for the year 2007. The average ridership for the three previous weeks for the same day was also provided. This data is summarized in Exhibit 15. This data shows that for the year 2007 the reported ridership was 1,927,615 passengers, whereas, the average ridership was 2,086,707 passengers. This shows that on a systemwide basis, there were fewer passengers riding on Code Orange Days than on the previous days. This is true for the two survey time periods also. This may be due to incomplete ridership counts by some transit operators on Code Orange Days that results in the reported ridership on forecast bad air days being lower than the ridership that actually occurred on these days. In order to check and verify if there is a systematic bias in counting bus passengers on Code Orange Days, passenger counts on specific bus trips were obtained from WMATA. This data was compared with the survey passenger counts. The comparison showed that for the twelve bus trips, WMATA bus drivers recorded 170 passengers, whereas, the survey showed 285 passengers. This small sample showed that the WMATA bus drivers were under reporting passenger counts on Code Orange Days by approximately 67 percent.

The cost for each of the Code Orange Days for each bus operator was also provided by NVTC. This data is summarized in Exhibit 16. The cost for a weekday forecast Code Orange Days varies from \$ 108,000 to \$ 135,000 or an average of \$ 120,000. The total cost for the year 2007 was approximately \$ 1.7 million.

The primary reason for conducting the forecast Code Orange Day free fare program is to reduce emissions on extreme pollution days when the one-hour NAAQS standard for ozone is likely to be exceeded. While offering free bus fares has the ancillary benefits of attracting new riders to transit and reducing vehicle travel and traffic congestion on these days, the ultimate goal for which the program is funded is to reduce emissions on these days. Hence, the major purpose of this surveys was to collect data to determine the effectiveness of the fare free program in reducing emissions. Assumptions were made for translating the reported bus ridership changes into vehicle trip and vehicle miles of travel (VMT) reductions and emissions reductions.

The assumptions are as follows (these are consistent with the Effectiveness of Free Bus fares on Forecast Air Quality Code Red Days, prepared for NVTC, dated December 31, 2003):

- Prior Mode and Vehicle Trips reduced: The new bus rider on a free fare day would

EXHIBIT 14. JUNE SURVEY RESULTS - DETAILS OF DIVERTED TRIPS FROM AUTOMOBILES

- Only 58% were aware of the Ride Free program before boarding
- 44% knew that today was a Bad Air day and 31% became aware by TV, Radio or Newspaper
- The most important reason for choosing the bus:
 - o Help reduce air pollution = 22%
 - o Because of the free fare = 19%
 - o Avoid the heat = 11%
- 61% would have driven in an automobile and 19% in a SUV or Van if the passengers drove
- 61% came from home and 28% came from work before boarding the bus
- 42% walked to the bus stop and 28% drove to the bus stop
- 50% were going to work and 33% were going home
- If a small fare was charged would the passengers still ride:
 - o 25 cents = 72% YES
 - o 50 cents = 64% YES
 - o ½ price = 42% YES
- 19 % of the respondents received Mterochek/SmartBenefits
- Frequency of making this trip by bus:
 - o 5 or more days = 22%
 - o 2-4 days = 28%
 - o 1 day = 17%
 - o Only on Bad Air day = 8%
- Frequency of making this trip by Automobile:
 - o 5 or more days = 22%
 - o 2-4 days = 22%
 - o 1 day = 31%
- 56 % of the respondents were male and 33% were female
- The household income varied from less than \$ 25,000 (14 percent), \$25,000 to \$ 49,000 (19%), \$ 50,000 to \$ 74,000 (17%) and greater than \$100,000 (28 percent)
- 81 % of the respondents were currently employed
- 78 % of the respondents were college graduates
- the age grouping was predominantly from 25 to 34 years (33%)
- The respondents noted the following:
 - o Asian = 19%
 - o Black = 14%
 - o Hispanic/Latino = 17%
 - o White = 31%

EXHIBIT 15. RIDE FREE RIDERSHIP DATA

RIDE FREE DAY	METRO			ART			DASH			LCT		
	Reported Ridership	Average Ridership	% Change	Reported Ridership	Average Ridership	% Change	Reported Ridership	Average Ridership	% Change	Reported Ridership	Average Ridership	% Change
5/31/2007	50,207	79,252	-58%	3,763	3,847	-2%	14,538	13,391	8%	3,079	2,844	8%
6/1/2007	53,690	74,068	-38%	3,982	3,957	1%	15,343	13,093	15%	2,754	2,366	14%
6/18/2007	58,875	81,183	-38%	3,417	3,918	-15%	14,799	13,841	6%	3,075	2,942	4%
6/19/2007	60,797	82,168	-35%	3,545	3,986	-12%	15,603	13,823	11%	3,137	3,087	2%
6/27/2007	47,967	81,820	-71%	3,474	4,077	-17%	15,255	13,878	9%	3,048	3,011	1%
6/28/2007	63,821	81,629	-28%	3,636	4,237	-17%	15,274	13,881	9%	3,028	2,934	3%
7/8/2007	18,970	21,063	-11%	924	896	3%	4,847	4,744	2%	-	-	-
7/9/2007	78,894	80,872	-3%	3,508	3,550	-1%	15,184	13,942	8%	3,178	2,937	8%
7/10/2007	81,839	74,569	9%	3,339	3,706	-11%	14,662	13,928	5%	3,298	2,895	12%
8/2/2007	65,280	75,470	-16%	6,018	4,314	28%	15,642	13,999	11%	3,147	2,970	6%
8/3/2007	63,164	70,989	-12%	3,607	3,924	-9%	15,305	13,796	10%	2,659	2,490	6%
8/4/2007	36,060	37,571	-4%	1,424	1,668	-17%	8,612	7,393	14%	-	-	-
8/7/2007	68,751	71,585	-4%	4,295	4,120	4%	15,295	14,181	7%	3,249	3,149	3%
8/8/2007	69,682	71,321	-2%	3,467	3,753	-8%	15,682	14,296	9%	3,179	3,021	5%
8/25/2007	36,338	38,112	-5%	1,256	1,218	3%	6,752	7,095	-5%	-	-	-
8/30/2007	84,934	78,535	8%	3,265	3,136	4%	14,727	13,422	9%	2,750	2,952	-7%
	58,704	68,763		52,920	54,307							

RIDE FREE DAY	Fairfax Connector			CUE			PRTC			VRT		
	Reported Ridership	Average Ridership	% Change	Reported Ridership	Average Ridership	% Change	Reported Ridership	Average Ridership	% Change	Reported Ridership	Average Ridership	% Change
5/31/2007	26,190	31,935	-22%	3,248	3,438	-6%	12,125	11,159	8%	1,265	1,118	12%
6/1/2007	31,689	32,668	-3%	3,002	3,370	-12%	11,938	11,159	7%	1,280	1,057	17%
6/18/2007	33,627	33,489	0%	2,768	3,446	-24%	10,722	11,294	-5%	1,363	1,166	14%
6/19/2007	35,185	34,372	2%	3,431	3,377	2%	11,832	11,660	1%	1,302	1,154	11%
6/27/2007	34,398	34,891	-1%	2,436	3,523	-45%	10,504	11,530	-10%	1,390	1,110	20%
6/28/2007	35,709	35,579	0%	2,460	3,311	-35%	10,265	11,072	-8%	1,239	1,223	1%
7/8/2007	11,106	10,539	5%	473	623	-32%	-	-	-	-	-	-
7/9/2007	32,722	34,460	-5%	3,211	3,412	-6%	10,032	10,825	-8%	1,336	1,300	3%
7/10/2007	32,722	34,397	-5%	3,490	3,377	3%	10,992	11,445	-4%	1,431	1,278	11%
8/2/2007	31,890	33,497	-5%	3,397	3,578	-5%	10,720	10,687	0%	1,257	1,324	-5%
8/3/2007	30,917	31,618	-2%	3,276	3,056	7%	10,736	9,717	9%	1,430	1,333	7%
8/4/2007	13,508	16,344	-21%	1,156	1,288	-11%	1,450	1,275	12%	84	146	-74%
8/7/2007	34,250	33,851	1%	3,562	3,521	1%	12,324	10,782	13%	1,345	1,308	3%
8/8/2007	34,358	36,088	-5%	3,728	3,458	7%	11,740	10,839	8%	1,371	1,282	7%
8/25/2007	12,812	16,197	-26%	1,101	1,241	-13%	1605	1322	18%	297	325	-9%
8/30/2007	35,268	36,079	-2%	4,326	3,574	17%	10239	10744	-5%	1,890	1,661	12%

EXHIBIT 16. COST FOR CODE ORANGE DAYS

Bus System	31-May-07	1-Jun-07	18-Jun-07	19-Jun-07	27-Jun-07	28-Jun-07	8-Jul-07	9-Jul-07
METRO	\$ 34,116.00	\$ 34,930.00	\$ 37,068.29	\$ 40,162.91	\$ 38,246.00	\$ 37,707.00	\$ 8,691.44	\$ 41,449.51
ART	\$ 4,809.17	\$ 4,946.67	\$ 4,897.50	\$ 4,982.08	\$ 5,347.08	\$ 5,296.67	\$ 1,120.00	\$ 4,437.50
DASH	\$ 6,484.75	\$ 6,388.92	\$ 6,809.30	\$ 6,880.70	\$ 6,854.98	\$ 6,900.12	\$ 1,800.85	\$ 706.48
LCT	\$ 14,090.00	\$ 11,617.00	\$ 14,670.00	\$ 15,351.00	\$ 15,002.00	\$ 14,609.00	N/A	\$ 14,585.00
Fairfax Connector	\$ 19,910.00	\$ 18,966.00	\$ 19,117.00	\$ 19,428.00	\$ 22,722.22	\$ 22,756.88	\$ 6,275.97	\$ 22,302.63
CUE	\$ 1,182.00	\$ 1,093.00	\$ 996.50	\$ 1,235.00	\$ 877.00	\$ 886.00	\$ 170.00	\$ 1,156.00
PRTC	\$ 29,217.00	\$ 29,217.00	\$ 29,761.00	\$ 30,912.00	\$ 30,808.00	\$ 29,693.00	n/a	\$ 28,832.00
VRT	\$ 327.24	\$ 351.53	\$ 331.07	\$ 406.12	\$ 293.04	\$ 290.29	N/A	\$ 347.74
Total	\$ 110,136.16	\$ 107,510.12	\$ 113,650.66	\$ 119,357.81	\$ 120,150.32	\$ 118,138.96	\$ 18,058.26	\$ 113,816.86

Bus System	10-Jul-07	2-Aug-07	3-Aug-07	4-Aug-07	7-Aug-07	8-Aug-07	25-Aug-07	30-Aug-07
METRO	\$ 34,998.06	\$ 57,613.77	\$ 52,799.40	\$ 26,173.32	\$ 54,134.90	\$ 53,900.12	\$ 26,062.22	\$ 55,116.58
ART	\$ 4,632.00	\$ 5,392.00	\$ 4,905.00	\$ 2,085.00	\$ 5,150.00	\$ 4,691.25	\$ 1,522.92	\$ 3,920.00
DASH	\$ 6,979.40	\$ 6,981.83	\$ 6,782.65	\$ 2,750.80	\$ 7,102.23	\$ 7,220.90	\$ 2,698.53	\$ 6,742.37
LCT	\$ 14,337.00	\$ 14,610.00	\$ 12,082.00	-	\$ 15,529.00	\$ 14,882.00	-	\$ 14,526.00
Fairfax Connector	\$ 22,296.27	\$ 14,780.41	\$ 14,332.32	\$ 9,244.35	\$ 21,648.23	\$ 23,090.53	\$ 9,266.55	\$ 23,252.87
CUE	\$ 1,256.00	\$ 1,487.72	\$ 1,330.08	\$ 563.60	\$ 1,449.68	\$ 1,435.10	\$ 533.75	\$ 1,417.60
PRTC	\$ 30,820.00	\$ 28,829.00	\$ 24,915.00	\$ 1,275.00	\$ 29,296.00	\$ 28,985.00	\$ 1,322.00	\$ 28,727
VRT	\$ 306.49	\$ 385.04	\$ 331.33	\$ 333.99	\$ 389.92	\$ 330.64	\$ 200.00	\$ 392.00
Total	\$ 115,625.22	\$ 130,079.77	\$ 117,477.78	\$ 42,426.06	\$ 134,699.96	\$ 134,535.54	\$ 41,605.97	\$ 134,094.42

generally be expected to mirror the mode choice patterns among the traveling public at large. The 2000 Census journey-to-work data reports commuter mode shares for each of the area jurisdictions. As the various operators serve fairly specific jurisdictions, it is possible to estimate vehicle trip diversion rates for each jurisdiction and operator. The NVTC study provides the methodology for estimating vehicle trips per diverted bus rider and is as follows:

Arlington	0.830
Alexandria	0.868
Fairfax Co.	0.904
Falls Church	0.873
Fairfax City	0.889
Loudoun	0.926
Prince William	0.875
Manassas	0.879
NOVA region	0.891

- VMT Reductions: As noted before, the survey respondents did not provide specific data to estimate the average trip length based on trip origin and trip destination. The NVTC study was utilized to estimate the average trip length from the 2000 Census journey to work data. The average for the entire Northern Virginia region, which is used for Metrobus, is the weighted sum across all the jurisdictions. It should be noted that MWCOC assumes an average trip length of 15.5 miles for all regional commute trips. The average one-way commute trip length for each jurisdiction is as follows:

Arlington	6.53 miles
Alexandria	7.27 miles
Prince William	14.91 miles
Loudoun County	15.57 miles
Fairfax County	14.44 miles
Fairfax City	7.74 miles
NOVA/Metrobus	12.95 miles

VOCs and NOx are the two primary vehicle-related pollutants that are the precursors to ozone and smog. The estimated vehicle trip and VMT reductions are translated into equivalent emissions reductions for VOCs and NOx, respectively, using the 2007 emissions rates provided by MWCOC for cold starts (grams per trip) and running emissions (grams per mile). The emissions reductions are computed separately for VMT reductions and vehicle trip reductions (VTR), to account for the vehicle “cold starts”, when excess emissions occur each time a vehicle is used, independent of the trip length. Exhibit 17 presents the computations and results for the June 27/28 survey days. Included in Exhibit 17 is the percent reduction of trips due to diversion from auto to bus, vehicle trip reductions, VMT reductions, NOX and VOC reductions (in tons per day) for cold start and running emissions and the average cost for the two survey days. As noted before, since there is a difference between average ridership and reported

EXHIBIT 17. COMPUTATIONS OF TRIP, VMT AND EMISSIONS REDUCTIONS

BASED ON AVERAGE DAILY RIDERSHIP JUNE 27-28

Bus System	Percent Reduction	AVERAGE		AVERAGE		VEH TRIP	VMT	NOX		VOC		NOX+VOC	
		DAILY RIDERSHIP	TRIP RED	TRIP LGTH	VEH TRIP FACTOR			Cold Start	Running	Cold Start	Running	TOTAL	TOTAL
ART	0%	4157	0	6.53	0.83	0	0	0	0	0	0	0	0
CUE	5%	3417	175	7.74	0.889	156	1206	0.00133	0.001446	0.000334	0.000657	0.002236	\$882
DASH	4%	13880	603	7.27	0.868	524	3808	0.000446	0.004567	0.001124	0.002144	0.007157	\$6,878
FAIRFAX CONNEX	2%	35235	531	14.44	0.904	480	6934	0.000409	0.008316	0.00103	0.001857	0.011612	\$22,740
LOUDOUN	8%	2973	232	15.57	0.926	215	3349	0.000183	0.004016	0.000461	0.000897	0.005558	\$14,806
METRO	3%	81724	2589	12.95	0.891	2306	29868	0.001963	0.035821	0.004947	0.008	0.012948	\$37,977
PRTC	9%	11300	1046	14.91	0.875	916	13650	0.000779	0.016371	0.001964	0.003656	0.02277	\$30,251
VRT	10%	1315	132	5.00	0.926	122	609	0.000104	0.00073	0.000261	0.000424	0.001258	\$292
TOTAL	4%	154001	5308			4719	59423	0.004015	0.071267	0.010122	0.015917	0.026039	\$119,145

BASED ON REPORTED DAILY RIDERSHIP

Bus System	Percent Reduction	REPORTED		AVERAGE		VEH TRIP	VMT	VOC		NOX		NOX+VOC	
		DAILY RIDERSHIP	TRIP RED	TRIP LGTH	VEH TRIP FACTOR			Cold Start	Running	Cold Start	Running	TOTAL	TOTAL
ART	0%	3555	0	6.53	0.83	0	0	0	0	0	0	0	\$5,322
CUE	5%	2448	126	7.74	0.889	112	864	0.000239	0.000231	9.5E-05	0.001036	0.001131	\$882
DASH	4%	15265	664	7.27	0.868	576	4188	0.001236	0.001122	0.00049	0.005023	0.005513	\$6,878
FAIRFAX CONNEX	2%	35054	528	14.44	0.904	478	6898	0.001025	0.001848	0.000407	0.008273	0.00868	\$22,740
LOUDOUN	8%	3038	237	15.57	0.926	220	3422	0.000471	0.000917	0.000187	0.004104	0.004291	\$14,806
METRO	3%	55894	1770	12.95	0.891	1577	20428	0.003384	0.005472	0.000856	0.001342	0.025842	\$37,977
PRTC	9%	10385	962	14.91	0.875	841	12545	0.001805	0.00336	0.000716	0.015045	0.020926	\$30,251
VRT	10%	1315	132	5.00	0.926	122	609	0.000261	0.000163	0.000104	0.00073	0.000834	\$292
TOTAL	4%	126954	4419			3926	48954	0.008421	0.013113	0.003341	0.058711	0.062052	\$119,145

ridership, the reductions have been computed using each of the two variables. The trip reductions, VMT reductions and emission reductions were computed for the August 30, 2007 survey also.

The cost-effectiveness of the free fare program was evaluated using several effectiveness measures. The cost per ton of NOX or VOC reductions were estimated as well as the cost per ton of NOX plus VOC reductions. These were estimated for average ridership and reported ridership for the June and August survey days. The results are presented in Exhibit 18. The cost per ton of NOX plus VOC reductions varied from \$ 813,583 for the reported ridership in August to a high of \$ 1,425,421 for reported ridership for the June survey.

The NVTC study noted that another way of assessing the reasonableness or relative attractiveness of the forecast Code Red or Orange Day free bus fare program is to compare its performance with national experience. For this, the CMAQ program evaluation performed by the Transportation Research Board (TRB) for Congress in 2002 offers a good sampling of measures used around the country over the past 10 years¹. However, to compare the Code Orange program with the TRB studies, it is first necessary to “weight” the emission reductions in the manner that the TRB committee elected to do for the purpose of magnifying the importance of NOx reductions over VOCs. Because NOx reductions have been historically more difficult to come by in air quality management efforts, they have generally been regarded at a premium when comparing strategies, particularly since some strategies have a comparative advantage in reducing NOx over VOCs. To reflect this, the TRB committee, comprised of State, MPO and academic/research air quality specialists from around the country, agreed to weight NOx emissions at 4 times the value of VOCs. To be able to compare the Code Orange program with these national studies, Exhibit 18 also includes the cost per ton of emissions reductions using a 4 to 1 weighting ratio for NOX to VOC. Using the weighting ratio, the cost-effectiveness is almost 30 percent of the cost per ton without the weighting. The cost-effectiveness is reduced to \$ 250,818 per ton for the August survey. This can be compared with the TRB study (See Exhibit 19) which showed that the cost per ton ranged from a low of \$ 800 for pricing measures to a high of \$ 8.227 million for Telework.

The NVTC forecast Code Red Day free bus fare program study stated that the attractiveness of the program would depend upon (1) how dire the need is for emissions reductions at any given time given conformity or ozone exceedance considerations, and (2) what other strategies are available for use and their comparative cost. MWCOG staff have stated that when emissions strategies such as the forecast Code Orange Day free fare program are considered for adoption, more criteria are applied to that determination than just cost per ton. Political acceptability, type of pollutant, ease of administration,

¹ The Congestion Mitigation and Air Quality Program: Assessing 10 Years of Experience. Special report Number 264, Transportation Research Board, Washington 2002

EXHIBIT 18. COST-EFFECTIVENESS ANALYSIS

AUGUST 30, 2007 SURVEY

Bus System	JUNE 27-28, 2007 SURVEY				AUGUST 30, 2007 SURVEY				
	AVERAGE RIDERSHIP	COST PER TON - NOX	COST PER TON - VOC	COST PER TON NOX+VOC	COST	NOX REDUCTIONS	VOC REDUCTIONS	COST PER TON - NOX	COST PER TON NOX+VOC
ART	4157	N/A	N/A	N/A	\$3,920	0	0	N/A	0
CUE	3417	\$558,397	\$1,341,430	\$394,273	\$1,418	0.00034	0.00014	\$4,226,701	\$2,984,390
DASH	13880	\$1,371,957	\$3,208,255	\$961,001	\$6,742	0.00074	0.00032	\$9,070,996	\$6,353,869
FAIRFAX CONNECTOR	35235	\$2,606,381	\$7,875,506	\$1,958,290	\$23,253	0.03865	0.01279	\$601,668	\$452,060
LOUDOUN	2973	\$3,525,750	\$10,899,474	\$2,664,002	\$0	0.00000	0.00000	\$0	\$0
METRO	81724	\$1,005,107	\$2,933,032	\$748,580	\$55,117	0.04844	0.01660	\$1,137,912	\$847,490
PRTC	11300	\$1,763,876	\$5,382,429	\$1,328,510	\$28,727	0.01904	0.00624	\$1,508,885	\$1,136,457
VRT	1315	\$349,794	\$687,415	\$231,827	\$0	0.00000	0.00000	\$0	\$0
TOTAL	154001	\$1,582,628	\$4,575,628	\$1,175,904	\$119,176	0.10720	0.03609	\$1,111,708	\$831,735

AUGUST 30, 2007 SURVEY

Bus System	JUNE 27-28, 2007 SURVEY				AUGUST 30, 2007 SURVEY				
	AVERAGE RIDERSHIP	COST PER TON - NOX	COST PER TON - VOC	COST PER TON NOX+VOC	COST	NOX REDUCTIONS	VOC REDUCTIONS	COST PER TON - NOX	COST PER TON NOX+VOC
ART	3555	N/A	N/A	N/A	\$3,920	0.00000	0.00000	N/A	\$0
CUE	2448	\$779,429	\$1,872,413	\$550,339	\$1,418	0.00041	0.00017	\$3,491,963	\$2,465,605
DASH	15265	\$1,247,479	\$2,917,169	\$873,809	\$6,742	0.00082	0.00035	\$8,267,190	\$5,790,836
FAIRFAX CONNECTOR	35054	\$2,619,839	\$7,916,171	\$1,968,401	\$23,253	0.03778	0.01250	\$615,504	\$462,455
LOUDOUN	3038	\$3,450,314	\$10,666,272	\$2,607,003	\$0	0.00000	0.00000	\$0	\$0
METRO	55894	\$1,469,591	\$4,288,459	\$1,094,517	\$55,117	0.05238	0.01795	\$1,052,181	\$783,639
PRTC	10385	\$1,919,287	\$5,856,663	\$1,445,562	\$28,727	0.01814	0.00595	\$1,583,305	\$1,192,508
VRT	1315	\$349,794	\$687,415	\$231,827	\$0	0.00000	0.00000	\$0	\$0
TOTAL	126954	\$1,920,090	\$5,532,874	\$1,425,421	\$119,145	0.10953	0.03692	\$1,087,811	\$813,583

EXHIBIT 19. RANGE OF COST-EFFECTIVENESS OF CMAQ-FUNDED EMISSIONS REDUCTION STRATEGIES (NOX:VOC WEIGHTING OF 4:1)

	Number of Cases	Cost per Ton Range		Median	FY92-98 CMAQ Obligations
		Low	High		
Traffic Flow Improvements					34.9%
Signalization	5	\$6,000	\$128,000	\$20,100	9.3%
Freeway/Incident Management	4	\$2,300	\$543,900	\$102,400	7.5%
HOV Facilities	2	\$15,700	\$336,800	\$176,200	5.2%
Intersections, Traveler Info, Other	0	<u>NA</u>	<u>NA</u>	<u>NA</u>	12.9%
Group Average		\$6,418	\$317,200	\$99,567	
Ridesharing					4.0%
Regional Rideshare	5	\$1,200	\$1,600	\$7,400	2.4%
Vanpool Programs	6	\$5,200	\$89,000	\$10,500	2.4%
Park & Ride Lots	4	<u>\$8,600</u>	<u>\$70,700</u>	<u>\$43,000</u>	1.6%
Group Average		\$4,773	\$54,987	\$20,300	
Travel Demand Management					3.0%
Misc. TDM	9	\$2,300	\$33,200	\$12,500	2.2%
Employer Trip Reduction	7	<u>\$5,799</u>	<u>\$175,500</u>	<u>\$22,700</u>	0.8%
Group Average		\$3,831	\$95,456	\$17,600	
Telework					0.0%
All	10	\$13,300	\$8,227,000	\$251,800	
Bike/Pedestrian					3.3%
All	14	\$4,200	\$344,700	\$84,100	3.3%
Transit Improvements					42.2%
Shuttles, Feeder, Paratransit	15	\$12,300	\$1,974,000	\$87,500	7.4%
New Capital Systems/Vehicles	6	\$8,500	\$470,800	\$66,400	10.4%
Conventional Service Upgrades	10	\$3,800	\$99,800	\$22,100	7.4%
Park & Ride Lots	1	<u>\$52,000</u>	<u>\$52,000</u>	<u>\$52,000</u>	1.3%
Group Average		\$10,172	\$1,046,400	\$57,000	
Other					6.8%
Conventional Fuel Vehicles	6	\$400	\$39,900	\$15,000	12.4%
Alternative Fuel Buses	11	\$6,700	\$568,700	\$126,400	3.3%
Alternative Fuel Vehicles	2	\$4,000	\$31,600	\$17,800	0.8%
Inspection & Maintenance	5	<u>\$4,426</u>	<u>\$5,800</u>	<u>\$1,900</u>	2.9%
Group Average		\$4,426	\$274,471	\$40,275	
Pricing Measures					0.0%
Modal Subsidies & Vouchers	14	\$800	\$471,000	\$46,600	
Charges and Fees	6	<u>\$800</u>	<u>\$49,400</u>	<u>\$10,300</u>	
Group Average		\$800	\$344,520	\$28,450	

Source: Transportation Research Board Special Report 264. *The Congestion Mitigation and Air Quality Improvement Program: Assessing 10 Years of Experience*. Table 4-2. (2002).

and scale of reduction are all used in gauging an effective strategy. Also important is the fact that the forecast Code Orange Day free fare program is strategic as an “episodic” control measure, i.e., it is brought into play on days when ozone exceedances are anticipated, and when additional efforts are necessary to try to avert an exceedance of the 1-hour standard. The most direct comparison of the forecast Code Orange Day free fare program with other current regional efforts would be MWCOG’s Transportation Emissions Reductions Measures (TERMS) Under Consideration for Conformity of the 2006 CLRP and FY 2007-2012 TIP, Year 2010 Emissions Estimate (dated September 20, 2006). The data from this study was used to develop cost-effectiveness measures similar to the ones developed for the Code Orange Days study, as shown in Exhibit 20. The cost-effectiveness of potential TERMS varies from a low of \$ 250 (for the Bose Automobile anti-air pollutant and energy conservation system) using the weighting ratio to a high of \$ 890,000 for 6 kiosks in Maryland. Four of the potential TERMS are less cost-effective than the Code Orange Days fare free program.

CONCLUSIONS

The on-board surveys show that approximately 4.4 percent and 3.2 percent of the bus riders on Code Orange Days in June and August, respectively, were automobile drivers on non Code Orange Days. This translates to approximately 4,000 to 4,700 vehicle trip reductions and approximately 49,000 to 59,000 VMT reduction, based on the June survey. The August survey showed a higher reductions of approximately 6,200 to 6,400 vehicle trip reductions and approximately 85,000 to 87,000 VMT reduction. The August survey shows a significantly higher trip reductions in the Fairfax Connector bus system. Fairfax Connector bus system has a longer average trip length than DASH or CUE and results in higher VMT reductions. Consequently, the cost-effectiveness of the August survey is approximately 57 to 70 percent better than the June survey.

The cost-effectiveness of the Code Orange Days using the NOX to VOC weighting of 4 to 1 results in a cost-effectiveness that lies within the potential TERMS being considered by MWCOG for Conformity of CLRP and TIP. Further, the Code Orange Days cost-effectiveness is also within the range of emission reduction strategies considered in the TRB CMAQ funded program.

EXHIBIT 20. COST-EFFECTIVENESS OF POTENTIAL TERMS

Potential Terms	Cost	NOX (2010)		VOC(2010)		COST EFFECTIVENESS		Cost Per ton	
		TONS/DAY	TONS/DAY	TONS/DAY	TONS/DAY	NOX(\$/T)	VOC(\$/T)	NOX+VOC	4NOX+VOC
M-160 bose automobile anti-air pollutant and energy conservation syst	\$610	0.61				1,000		\$1,000	\$250
M-162 early engine retirement(pre-88)	\$1,980	0.9				2,200		\$2,200	\$550
M-159 w15-590-diesel fueladditive	\$359	0.133				2,700		\$2,700	\$675
M-163 truck idling(truck stops and auxiliary power unit)	\$1,840	0.4				4,600		\$4,600	\$1,150
M-07A Voluntary Employer parking cash-out subsidy	\$641	0.1192	0.0741			5,379	8,655	\$3,317	\$1,164
M-103a 150 taxicab replacement program -conventional vehicle	\$2,328	0.175	1.136			13,300	20,450	\$1,775	\$1,268
M-161 diesel emulsion fuel additive(non -road or highway)	\$216	0.018				12,000		\$12,000	\$3,000
M-103 150 taxicab replacement Program-cng(expanded)	\$2,903	0.203	0.1307			14,300	22,210	\$8,699	\$3,079
M-110 10 transit stores in maryland	\$495	0.0286	0.0151			17,320	32,850	\$11,335	\$3,825
M-148 wmata bus information displays with maps (2000 cases)	\$400	0.0158	0.0098			25,348	40,785	\$15,644	\$5,486
M-24 Speed limit adherence(accelerated)	\$24,401	0.9167				26,618		\$26,618	\$6,655
M-123 employer outreach for public sector employers	\$3,267	0.0781	0.0485			41,827	67,301	\$25,803	\$9,052
M-142 G 100 new diesel buses in place of old diesel buses	\$6,826	0.1696	0.0556			40,250	122,900	\$30,313	\$9,300
M-143 real time bus schedule information	\$487	0.0088	0.0055			55,371	89,093	\$34,074	\$11,972
M-142 F 100 hybrid buses in place of old diesel buses	\$11,219	0.2095	0.0576			53,550	194,730	\$42,002	\$12,526
M-142e 100 CNG buses in place of old diesel buses	\$13,353	0.172	0.0326			77,631	410,051	\$65,262	\$18,530
M-146 purchase 185 w/mata buses(ridership growth)	\$14,634	0.135	0.0839			108,400	174,400	\$66,852	\$23,456
M-132 vanpool incentive program(expanded M-77b)	\$7,370	0.0478	0.0228			154,175	323,230	\$104,385	\$34,437
M-164 international green diesel retrofit	\$19,740	0.14				141,000		\$141,000	\$35,250
M-134 implementNeighborhood circulator buses(10)	\$4,509	0.0215	0.0133			209,733	337,465	\$129,576	\$45,410
M-155 expand carsharing program	\$568	0.0021	0.0013			270,433	435,134	\$167,032	\$58,547
M-47c employer outreach for private sector employers(expanded)	\$3,414	0.0095	0.0059			359,330	578,172	\$221,665	\$77,759
M-150 enhanced computer services-(HOV facilities)	\$8,525	0.0217	0.0092			392,867	925,922	\$275,897	\$88,804
M-93 improve Pedestrian facilities Near rail stations	\$5,673	0.0102	0.0063			556,154	894,866	\$343,804	\$120,441
M-133 metrorail feeder bus service	\$1,338	0.0025	0.0011			535,107	1,261,158	\$371,602	\$120,520
M-151 enhanced computer services-US1 (reserve commute)	\$8,067	0.0137	0.0085			588,810	947,409	\$363,365	\$127,436
M-135 construction of 1000 parking spaces at metrorail station	\$5,339	0.0087	0.0037			613,732	1,445,350	\$430,602	\$138,687
M-152 enhanced computer services-(rail relief)	\$25,768	0.0307	0.013			839,359	1,978,230	\$589,664	\$189,752
M-165 bike stations at rail station	\$724	0.0008	0.0005			905,260	1,456,714	\$557,083	\$195,732
M-144 parking impact fees	\$1,584,959	0.8714	0.5415			1,818,865	2,926,599	\$1,121,777	\$393,573
M-158 free bus services off peak(10:00am to 2:00 pm mid day and we	\$69,850	0.0306	0.019			2,282,683	3,672,893	\$1,408,268	\$493,989
M-156 free bus -to-rail/rail-to-bus transfer(similar to NYC pricing struct	\$118,081	0.0365	0.0227			3,235,093	5,205,344	\$1,994,610	\$699,946
M-113 6 kiosks in maryland	\$445	0.0001	0.0001			4,448,676	8,224,907	\$2,224,338	\$889,735
M-111 replace traffic signals with lesser controls									