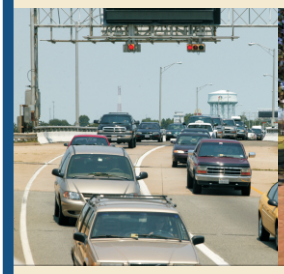
HAMPTON ROADS CMAQ/RSTP





PROJECT SELECTION PROCESS

HAMPTON ROADS TPO
TRANSPORTATION PLANNING ORGANIZATION

T10-03

MAY 2010

HAMPTON ROADS TRANSPORTATION PLANNING ORGANIZATION

VOTING MEMBERS

CHESAPEAKE
ALAN P. KRASNOFF

GLOUCESTER COUNTY
CHRISTIAN D. RILEE

HAMPTON
MOLLY J. WARD

ISLE OF WIGHT COUNTY
STAN D. CLARK

JAMES CITY COUNTY
BRUCE C. GOODSON

NEWPORT NEWS
JOE S. FRANK

NORFOLK
PAUL D. FRAIM

POQUOSON
GORDON C. HELSEL, JR

PORTSMOUTH
DOUGLAS L. SMITH

SUFFOLK
LINDA T. JOHNSON

VIRGINIA BEACH
WILLIAM D. SESSOMS, JR

WILLIAMSBURG
JEANNE ZEIDLER

YORK COUNTY
THOMAS G. SHEPPERD, JR

MEMBERS OF THE VIRGINIA SENATE
THE HONORABLE JOHN C. MILLER
THE HONORABLE YVONNE B. MILLER

MEMBERS OF THE VIRGINIA HOUSE OF DELEGATES
THE HONORABLE G. GLENN ODER
THE HONORABLE JOHN A. COSGROVE

TRANSPORTATION DISTRICT COMMISSION OF HAMPTON ROADS
PHILIP A. SHUCET, President/Chief Executive Officer

WILLIAMSBURG AREA TRANSIT AUTHORITY
MARK D. RICKARDS, Executive Director

VIRGINIA DEPARTMENT OF TRANSPORTATION
DENNIS W. HEUER, District Administrator – Hampton Roads District

VIRGINIA DEPARTMENT OF RAIL AND PUBLIC TRANSPORTATION
COREY W. HILL, Chief of Public Transportation

VIRGINIA PORT AUTHORITY
JERRY A. BRIDGES, Executive Director

HAMPTON ROADS TRANSPORTATION PLANNING ORGANIZATION

NON-VOTING MEMBERS

CHESAPEAKE
WILLIAM E. HARRELL

GLOUCESTER COUNTY
BRENDA G. GARTON

HAMPTON
MARY BUNTING

ISLE OF WIGHT COUNTY
W. DOUGLAS CASKEY

JAMES CITY COUNTY
SANFORD B. WANNER

NEWPORT NEWS
NEIL MORGAN

NORFOLK
REGINA V.K. WILLIAMS

POQUOSON
J. RANDALL WHEELER

PORTSMOUTH
KENNETH L. CHANDLER

SUFFOLK
SELENA CUFFEE-GLENN

VIRGINIA BEACH
JAMES K. SPORE

WILLIAMSBURG
JACKSON C. TUTTLE

YORK COUNTY
JAMES O. McREYNOLDS

FEDERAL HIGHWAY ADMINISTRATION
IRENE RIC0 – Division Administrator – Virginia Division

FEDERAL TRANSIT ADMINISTRATION
LETITIA A. THOMPSON – Regional Administrator, Region 3

FEDERAL AVIATION ADMINISTRATION
JEFFREY W. BREEDEN – Airport Planner, Washington Airports District Office

VIRGINIA DEPARTMENT OF AVIATION
RANDALL P. BURDETTE – Director

PENINSULA AIRPORT COMMISSION
KEN SPIRITO – Executive Director

NORFOLK AIRPORT AUTHORITY
WAYNE E. SHANK –Executive Director

CHAIR – CITIZEN TRANSPORTATION ADVISORY COMMITTEE
WILLIAM W. HARRISON, JR.

CHAIR – FREIGHT TRANSPORTATION ADVISORY COMMITTEE
WILLIAM BELL – Northrop Grumman – Private Sector Co-Chair (Non-Voting Board Member)
DOUGLAS L. SMITH – Portsmouth City Council – Public Sector Co-Chair (Voting Board Member)

MILITARY LIAISONS
KELLY JOHNSON, Captain, U.S. Navy
MARK S. OGLE, Captain, U.S. Coast Guard

PAGE INTENTIONALLY LEFT BLANK

HAMPTON ROADS
CMAQ/RSTP PROJECT SELECTION PROCESS

FY 2011- 2015

This report was included in the Unified Planning Work Program for Fiscal Year 2009-2010, which was approved by the Board of the Hampton Roads Transportation Planning Organization on June 17, 2009.

PREPARED BY:

HAMPTON ROADS TPO
TRANSPORTATION PLANNING ORGANIZATION

MAY 2010

T10-03

PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION

TITLE:
Hampton Roads
CMAQ/RSTP Project Selection Process
FY 2011 - 2015

REPORT DATE
May 2010

GRANT/SPONSORINGAGENCY
FHWA/FTA/VDOT/DRPT/LOCAL FUNDS

PROJECT MANAGER:
Michael S. Kimbrel

PROJECT STAFF:
Robert B. Case, P.E.
Samuel S. Belfield
Stephanie L. Shealey

ORGANIZATION NAME, ADDRESS AND TELEPHONE
Hampton Roads Transportation Planning Organization
723 Woodlake Drive
Chesapeake, Virginia 23320
(757) 420-8300
http://www.hrtpo.org

ABSTRACT

This report summarizes the work of selecting Congestion Mitigation and Air Quality (CMAQ) Improvement Program and Regional Surface Transportation Program (RSTP) projects during the CMAQ/RSTP Project Selection Process of 2009. Projects selected received allocations of CMAQ or RSTP funds over the fiscal years 2011 through 2015.

ACKNOWLEDGMENTS

This report was prepared by the Hampton Roads Transportation Planning Organization (HRTPO) in cooperation with the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), the Virginia Department of Transportation (VDOT), the Virginia Department of Rail and Public Transportation (DRPT), and the local jurisdictions and transit agencies within the Hampton Roads metropolitan planning area. The contents of this report reflect the views of the HRTPO. The HRTPO staff is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the FHWA, FTA, VDOT, or DRPT. This report does not constitute a standard, specification, or regulation. FHWA, FTA, VDOT, or DRPT acceptance of this report as evidence of fulfillment of the objectives of this task does not constitute endorsement/approval of the need for any recommended improvements nor does it constitute approval of their location and design or a commitment to fund any such improvements. Additional project level environmental impact assessments and/or studies of alternatives may be necessary.

REPORT PRODUCTION STAFF

Dwight L. Farmer	Executive Director/Secretary
Camelia Ravanbakht	Deputy Executive Director
Robert B. Case	Principal Transportation Engineer
Michael S. Kimbrel	Principal Transportation Engineer
Samuel S. Belfield	Senior Transportation Engineer
Stephanie L. Shealey	Transportation Engineer
Michael R. Long	Assistant General Service Manager
Christopher Vaigneur	Reprographic Coordinator

TABLE OF CONTENTS

REPORT DOCUMENTATION i

LIST OF TABLES iv

EXECUTIVE SUMMARY E-1

INTRODUCTION 1

BACKGROUND 1
ELIGIBLE RECIPIENTS 1
CMAQ/RSTP PROJECT SELECTION PROCESS 2
CMAQ/RSTP PROJECT SELECTION PROCESS (PSP)STEPS 2
SCHEDULE FOR THE FY 2011 – 2015 CMAQ/RSTP PSP 3
PUBLIC PARTICIPATION 3
REPORT ORGANIZATION 4

CMAQ PROJECT SELECTION 5

RSTP PROJECT SELECTION 11

APPENDIX A: *CMAQ Policies, Procedures, and Analysis Methodologies* 15

APPENDIX B: *CMAQ Candidate Project Application Forms* 23

APPENDIX C: *CMAQ Project Analysis Worksheets* 33

APPENDIX D: *RSTP Policies, Procedures, and Analysis Methodologies* 113

APPENDIX E: *RSTP Candidate Project Application Forms* 125

APPENDIX F: *RSTP Project Analysis Worksheets* 137

LIST OF TABLES

TABLE 1
CMAQ Project Proposals – December 2009 6-7

TABLE 2
CMAQ Project Proposals Ranked by Cost Effectiveness 8

TABLE 3
CMAQ Projects and Allocations 9

TABLE 4
RSTP Project Proposals – December 2009 12

TABLE 5
RSTP Project Proposals Ranked Within Categories 13

TABLE 6
RSTP Projects and Allocations 14

EXECUTIVE SUMMARY

As the metropolitan planning organization (MPO) for the Hampton Roads area, the Hampton Roads Transportation Planning Organization (HRTPO) is responsible for project selection and allocation of funds under two federal funding programs – the Congestion Mitigation and Air Quality (CMAQ) Improvement Program and the Regional Surface Transportation Program (RSTP). The process used by the HRTPO staff to select projects to receive funds from these two programs is referred to as the CMAQ/RSTP Project Selection Process (PSP).

A CMAQ/RSTP PSP is opened at the discretion of the Transportation Technical Advisory Committee (TTAC). Since the HRTPO allocates funds for multiple years in each application process, it is unnecessary to hold a CMAQ/RSTP PSP every year. The most recent CMAQ/RSTP PSP was conducted from July through December of 2009, with final approval by the HRTPO Board in January 2010.

This report summarizes the work of selecting CMAQ and RSTP projects during the CMAQ/RSTP Project Selection Process of 2009. Projects selected received allocations of CMAQ or RSTP funds over the fiscal years 2011 through 2015.

CMAQ ANALYSIS

The analysis of CMAQ project proposals focuses on the cost-effectiveness of each project with respect to reducing the precursors of ozone – volatile organic compounds (VOCs) and nitrogen oxides (NOx). The air quality aspect of the CMAQ analysis allows all types of CMAQ projects to be compared against one another. A total of 59 CMAQ project proposals were submitted during the 2009 PSP. Of those 59 projects proposed, 31 were ultimately selected. The selected projects and associated annual allocations are shown in **Table ES-1**. It should be noted that the four projects at the bottom of the table are previously approved projects that received allocations in fiscal years 2011 and 2012 prior to the 2009 PSP. Including those four projects, the total CMAQ allocations for fiscal years 2011 through 2015 equals $70,916,871.

RSTP ANALYSIS

The analysis of RSTP project proposals is more qualitative in nature than the CMAQ analysis. Unlike the CMAQ analysis, RSTP projects must be placed into categories and only projects within the same category can be compared against one another. Therefore, a predetermination must be made with regard to the proportions of available funds that will be allocated to the various categories of projects. A total of 29 RSTP project proposals were submitted during the 2009 PSP. Of those 29 projects proposed, 23 were ultimately selected. The selected projects and associated annual allocations are shown in **Table ES-2**. It should be noted that one project shown at the bottom of the table is a previously approved project that received a fiscal year 2011 allocation prior to the 2009 PSP. Including that project, the total RSTP allocations for fiscal years 2011 through 2015 equals $119,181,253.

PUBLIC PARTICIPATION

The general public was invited to submit project ideas for possible CMAQ or RSTP funding. A public notice soliciting CMAQ and RSTP project ideas from the public was posted on July 17, 2009. A special CMAQ/RSTP Project Idea Form was developed for use by the public and posted on the HRTPO website. The deadline for submission of project ideas from the public was July 31, 2009. Project ideas submitted by the public were to be reviewed by HRTPO staff and then forwarded to the appropriate locality or agency for consideration as a possible project proposal. Unfortunately, no input was received by the public as a result of this invitation.

In addition to the invitation for public involvement at the beginning of the process, all of the meetings associated with the CMAQ/RSTP Project Selection Process (PSP) – meetings of the CMAQ/RSTP Subcommittee, TTAC, and HRTPO Board - were public meetings that included an opportunity for public comment at the beginning of each meeting. No public comments regarding the CMAQ/RSTP PSP were received, verbally or in writing, during any of those meetings.

Finally, a public notice was posted on February 24, 2010 to solicit public comments on a proposed amendment to the FY 2009-2012 Transportation Improvement Program (TIP) to add the new CMAQ and RSTP projects and allocations that were approved by the HRTPO Board on January 20, 2010. The deadline for public comments associated with this notice was March 10, 2010. No public comments were received with regard to the proposed TIP amendment.

TABLE ES-1
CMAQ PROJECTS AND ALLOCATIONS
FY 2011 – 2015

APPROVED BY HRTPO BOARD ON JANUARY 20, 2010

				ALLOCATIONS					
#	Proposal Number	Juris/Agency	Project Name	FY-11	FY-12	FY-13	FY-14	FY-15	TOTAL
1	1	Chesapeake	HRT Bus Shelters	$150,000					$150,000
2	3	Chesapeake	Liberty St Transfer Station			$250,000			$250,000
3	8	Gloucester Co	Signal Coordination Along Route 17			$660,000	$770,000	$770,000	$2,200,000
4	12	Hampton	HRBT Diversion Signal Timings	$160,000					$160,000
5	13	Hampton	Citywide Traffic Signal System Retiming	$130,000	$262,000				$392,000
6	14	Hampton	Citywide Traffic Signal Upgrade	$225,000	$1,275,000				$1,500,000
7	15	HRT	TRAFFIX Funding	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$5,000,000
8	19	HRT	Feeder Bus Service for The Tide Light Rail	$1,200,000	$1,200,000	$1,200,000			$3,600,000
9	17	HRT	Retrofit 100 Buses w/ Diesel Particulate Filters	$500,000	$1,000,000				$1,500,000
10	18	HRT	Environmental Management System		$150,000	$150,000	$150,000	$150,000	$600,000
11	16	HRT	Purchase 38 Replacement 40' Buses			$1,686,205	$6,737,876	$6,175,919	$14,600,000
12	30	Newport News	Citywide Signal System Retiming				$250,000	$250,000	$500,000
13	29	Newport News	Jefferson Ave Corridor Improvements		$90,000				$90,000
14	27	Newport News	Citywide Wayfinding Sign Project - Phase 3	$500,000					$500,000
15	24	Newport News	Citywide Bus Shelter Program - Phases 2-4		$312,400	$320,000			$632,400
16	31	Norfolk	Citywide Traffic Signal Cabinet Upgrade	$300,000					$300,000
17	32	Norfolk	Citywide Signal System Retiming - Phase 2	$500,000					$500,000
18	33	Norfolk	Norfolk ATMS - Phase IV		$1,000,000	$1,500,000	$1,000,000	$1,000,000	$4,500,000
19	34	Portsmouth	Citywide Signal Timing - Phase 1		$120,000				$120,000
20	35	Portsmouth	Citywide Signal Timing - Phase 2			$112,000			$112,000
21	36	Portsmouth	Citywide Signal Timing - Phase 3				$120,000		$120,000
22	37	Portsmouth	Citywide Signal Timing - Phase 4					$132,000	$132,000
23	39	Portsmouth	Signal System Upgrade - Phases 2, 3, & 4	$702,599	$2,948,701	$2,948,700			$6,600,000
24	40	Regional	3 Total Stations for Regional Fatal Crash Team (State Police)	$30,000					$30,000
25	45	Suffolk	Godwin Blvd Park & Ride Lot					$400,000	$400,000
26	54	Virginia Beach	Citywide Signal Retiming - Phase 3	$676,000	$600,000				$1,276,000
27	48	Virginia Beach	Citywide Bus Shelter Program	$100,000					$100,000
28	55	VPA	Inter-Terminal Barge Service		$2,599,011	$1,863,823	$1,863,823	$1,863,823	$8,190,480
29	56	WATA	Purchase 12 Replacement Buses			$2,386,000	$2,204,000	$1,513,000	$6,103,000
30	59	WATA	Purchase 1 Replacement Trolley (Clean Diesel Medium Bus Trolley)					$315,000	$315,000
31	57	WATA	New Service - Jamestown Route	$269,080	$274,462	$279,950			$823,492
ALLOCATIONS MADE PRIOR TO THE 2009 PROJECT SELECTION PROCESS (Approved Previously by HRTPO Board)									
32		Hampton	Coliseum Central Transit Shuttle	$1,085,571					$1,085,571
33		Newport News	Jefferson Ave Sidewalk Project: Buchanan Dr to J Clyde Morris	$600,000					$600,000
34		Newport News	J Clyde Morris Corridor Bike Trail - Phase V	$600,000					$600,000
35		HRT	Norfolk Light Rail Transit Operating Assist. 2 years	$5,834,928	$1,500,000				$7,334,928
		TOTALS		$14,563,178	$14,331,574	$14,356,678	$14,095,699	$13,569,742	$70,916,871

TABLE ES-2
RSTP PROJECTS AND ALLOCATIONS
FY 2011 – 2015

APPROVED BY HRTPO BOARD ON JANUARY 20, 2010

				ALLOCATIONS					
#	Proposal Number	Juris/Agency	Project Name	FY-11	FY-12	FY-13	FY-14	FY-15	TOTAL
1	2	Chesapeake	Mount Pleasant Rd Widening	$2,500,000	$2,500,000	$2,323,000			$7,323,000
2	3	Chesapeake	Portsmouth Blvd Widening	$2,000,000	$1,586,000				$3,586,000
3	29	Gloucester Co	Business Route 17 Corridor Planning Study		$300,000				$300,000
4	4	Hampton	Wythe Creek Rd Widening	$300,000	$1,500,000	$0	$3,000,000	$0	$4,800,000
5	8	HRT	Ferry Fare Collection Equipment		$1,500,000				$1,500,000
6	5	HRT	Systemwide Bus Stop Sign Program	$591,968	$1,308,032				$1,900,000
7	6	HRT	Replacement of Southside Admin Facilities - Phase 1a	$1,800,000					$1,800,000
8	9	HRT	HRT Facility Upgrades		$116,925	$3,383,075			$3,500,000
9	7	HRT	LRT Extension to Norfolk Naval Station and Virginia Beach Oceanfront (AA/EIS/PE/FD/ROW)	$5,000,000	$5,000,000	$5,000,000	$7,000,000	$7,000,000	$29,000,000
10	12	James City Co	Route 60/143 Connector Study		$300,000				$300,000
11	10	James City Co	Longhill Rd Corridor Study		$300,000				$300,000
12	11	James City Co	Mooretown Rd Extension Study		$400,000				$400,000
13	15	Newport News	Amtrak Station Relocation Project	$1,000,000	$1,000,000				$2,000,000
14	16	Newport News	Peninsula Rapid Transit Project (AA & Other Studies) (Previous HRT Project UPC# T1821)		$500,000				$500,000
15	19	Norfolk	North Military Hwy Widening & Improvement - Lowery Rd to Northampton Blvd	$1,000,000	$2,000,000	$3,000,000	$4,282,369	$3,503,982	$13,786,351
16	20	Norfolk	North Military Hwy & Robin Hood Rd Widening & Improvement	$1,000,000	$2,000,000	$2,000,000	$2,693,440		$7,693,440
17	21	Poquoson	Wythe Creek Rd Widening	$200,000	$400,000	$1,645,850	$1,458,288	$8,295,862	$12,000,000
18	22	Portsmouth	Drainage Pond Construction near I-264 & Frederick Blvd	$500,000					$500,000
19	24	Portsmouth	Turnpike Rd Widening	$2,500,000					$2,500,000
20	30	Suffolk	Citywide Traffic Management System Plan	$400,000					$400,000
21	26	Virginia Beach	Lynnhaven Pkwy Reconstruction - Phase XI		$151,435	$2,555,519	$177,741		$2,884,695
22	25	Virginia Beach	Virginia Beach Transit Extension Study (AA/SDEIS/PE/FE)			$1,099,838	$2,541,225	$2,599,896	$6,240,959
23	28	York	Route 17 Widening	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,600,000	$13,400,000
ALLOCATIONS MADE PRIOR TO THE 2009 PROJECT SELECTION PROCESS (Approved Previously by HRTPO Board)									
24		HRT	Norfolk LRT - 8 mile/11 stations - PE Phase	$2,566,808					$2,566,808
		TOTALS		$24,058,776	$23,562,392	$23,707,282	$23,853,063	$23,999,740	$119,181,253

INTRODUCTION

BACKGROUND

The Hampton Roads Transportation Planning Organization (HRTPO) is the metropolitan planning organization (MPO) for the Hampton Roads region of Virginia. As such, it is a federally mandated transportation policy board comprised of representatives from local, state, and federal governments, transit agencies, and other stakeholders and is responsible for transportation planning and programming for the Hampton Roads metropolitan planning area (MPA). The MPA is comprised of the cities of Chesapeake, Hampton, Newport News, Norfolk Poquoson, Portsmouth, Suffolk, Virginia Beach, and Williamsburg; the counties of Isle of Wight, James City, and York; and a portion of Gloucester County. Among its functions, the HRTPO is responsible for project selection and allocation of funds under two federal programs – the Congestion Mitigation and Air Quality (CMAQ) Improvement Program and the Regional Surface Transportation Program (RSTP).

The CMAQ program provides federal funding to states and localities for transportation projects and programs that help improve air quality and reduce traffic congestion. This funding is intended for areas designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance areas with regard to the National Ambient Air Quality Standards (NAAQS). A *nonattainment area* is one that does not meet the NAAQS for one or more pollutant. A *maintenance area* is one that was originally designated a nonattainment area, but later met the NAAQS. Hampton Roads is currently a maintenance area for ozone.

The Surface Transportation Program (STP) provides federal funding that may be used by states and localities for a wide range of highway and transit projects. Regional Surface Transportation Program (RSTP) funds are STP funds that are apportioned to specific regions within a state.

This report summarizes the work of selecting CMAQ and RSTP projects during the CMAQ/RSTP Project Selection Process of 2009. Projects selected received allocations of CMAQ or RSTP funds over the fiscal years 2011 through 2015.

ELIGIBLE RECIPIENTS

Eligible recipients of CMAQ and RSTP funds in Hampton Roads include the localities within the MPA, Hampton Roads Transit (HRT), the Williamsburg Area Transit Authority (WATA), and state transportation agencies.

CMAQ/RSTP PROJECT SELECTION PROCESS

The process for obtaining CMAQ or RSTP funding for transportation projects is a competitive one. According to the CMAQ/RSTP Project Selection Process (PSP) that has been approved by the HRTPO Board, all project proposals are analyzed by HRTPO staff using a specific set of evaluation criteria. The proposed projects are then ranked based on the results of the analyses. All proposed projects must be consistent with the current Long-Range Transportation Plan (LRTP). The LRTP is a financially-constrained transportation plan for the Hampton Roads MPA. The LRTP has a planning horizon of at least 20 years.

CMAQ/RSTP PROJECT SELECTION PROCESS (PSP) STEPS

1. The HRTPO Transportation Technical Advisory Committee (TTAC) determines when a PSP should begin.
2. Informational materials on the PSP are made available to members of the TTAC and the public and a deadline for project applications is set.
3. Projects proposed by the public are reviewed by HRTPO staff and forwarded to the appropriate locality or agency for consideration.
4. Proposed projects are evaluated by HRTPO staff and ranked lists of CMAQ and RSTP projects are produced.
5. The CMAQ/RSTP Subcommittee, a subgroup of the TTAC, meets to recommend funding allocations to projects based, in part, on the ranked project lists.
6. The recommendations of the CMAQ/RSTP Subcommittee are considered during a meeting of the full TTAC. The TTAC provides its recommendations on CMAQ and RSTP projects and funding to the HRTPO Board.
7. The recommendations of the TTAC are considered during a meeting of the HRTPO Board for final approval.

SCHEDULE FOR THE FY 2011 – 2015 CMAQ/RSTP PSP

Items	Dates
Informational materials posted on HRTPO website. Public notice posted to solicit possible CMAQ and RSTP project ideas from the public.	7/17/09
Deadline for the public to submit projects to be considered for CMAQ or RSTP funding.	7/31/09
Application deadline for project proposals from localities, transit agencies, and state transportation agencies.	9/25/09
Project evaluations completed by HRTPO staff.	12/8/09
CMAQ/RSTP Subcommittee meeting to review proposed projects and recommended funding allocations.	12/11/09
TTAC Meeting – Committee considers recommendations of the CMAQ/RSTP Subcommittee and makes recommendations for consideration by the HRTPO Board.	1/6/10
HRTPO Board Meeting – Board considers recommendations of the TTAC regarding CMAQ and RSTP projects and funding allocations and gives final approval.	1/20/10
Newly approved CMAQ and RSTP projects and allocations added to the Transportation Improvement Program.	3/17/10

PUBLIC PARTICIPATION

The general public was invited to submit project ideas for possible CMAQ or RSTP funding. A public notice soliciting CMAQ and RSTP project ideas from the public was posted on July 17, 2009. A special CMAQ/RSTP Project Idea Form was developed for use by the public and posted on the HRTPO website. The deadline for submission of project ideas from the public was July 31, 2009. Project ideas submitted by the public were to be reviewed by HRTPO staff and then forwarded to the appropriate locality or agency for consideration as a possible project proposal. Unfortunately, no input was received by the public as a result of this invitation.

In addition to the invitation for public involvement at the beginning of the process, all of the meetings associated with the CMAQ/RSTP Project Selection Process (PSP) – meetings of the CMAQ/RSTP Subcommittee, TTAC, and HRTPO Board - were public meetings that included an opportunity for public comment at the beginning of each meeting. No public comments regarding the CMAQ/RSTP PSP were received, verbally or in writing, during any of those meetings.

Finally, a public notice was posted on February 24, 2010 to solicit public comments on a proposed amendment to the FY 2009-2012 Transportation Improvement Program (TIP) to add the new CMAQ and RSTP projects and allocations that were approved by the HRTPO Board on January 20, 2010. The deadline for public comments associated with this notice was March 10, 2010. No public comments were received with regard to the proposed TIP amendment.

REPORT ORGANIZATION

This report has been organized into two sections:

Section 1, CMAQ Project Selection, includes a list of all of the projects proposed for CMAQ funding, scoring and ranking of those projects, and the final selection of projects to receive funding allocations.

Section 2, RSTP Project Selection, includes a list of all of the projects proposed for RSTP funding, scoring and ranking of those projects, and the final selection of projects to receive funding allocations.

The appendices of this report include the uniform application forms used for submitting CMAQ and RSTP project proposals and the detailed worksheets used in the analysis of each project proposal.

CMAQ PROJECT SELECTION

In Hampton Roads, projects are selected for funding with Congestion Mitigation and Air Quality (CMAQ) Improvement Program funds based on the amount of air quality improvement expected per dollar spent. This is analyzed in terms of reductions in the emissions of volatile organic compounds (VOCs) and nitrogen oxides (NOx), which are precursors of ozone.

The original analysis policies and procedures were developed in December 1992 after the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA). Over the years since 1992 the policies and procedures have been reviewed and revised in 1995, 2001 and 2006. Details on the policies, procedures, and analysis methodologies used for CMAQ project selection in Hampton Roads are included in **Appendix A**.

To help insure that all of the necessary information is included with each project proposal, and to provide some uniformity to the way that project information is submitted, HRTPO staff developed application forms to be used by when submitting CMAQ project proposals. The latest version of the CMAQ Candidate Project Application form is included in **Appendix B**. An automated version of the application form is made available on the HRTPO web site.

Table 1 shows all of the new projects proposed for CMAQ funding during the project selection process of 2009. As shown in the table, 59 CMAQ project proposals, with a total cost of over $143 million, were submitted. It should be noted that the total CMAQ funding expected to be available from fiscal year 2011 through fiscal year 2015 was just over $64 million.

TABLE 1
CMAQ PROJECT PROPOSALS

DECEMBER 2009

Number	Juris/Agency	Project Name	Total Cost
1	Chesapeake	HRT Bus Shelters	$150,000
2	Chesapeake	Emergency Vehicle Preemption	$1,000,000
3	Chesapeake	Liberty St Transfer Station	$250,000
4	Chesapeake	Traffic Management Center & System Additions	$2,000,000
5	Gloucester Co	Bicycle-Pedestrian Improvements to Route 216	$1,300,000
6	Gloucester Co	Bicycle-Pedestrian Improvements to Route 17	$300,000
7	Gloucester Co	Bicycle-Pedestrian Improvements to Route 1216	$750,000
8	Gloucester Co	Signal Coordination Along Route 17	$2,200,000
9	Gloucester Co	Planning Study of Business 17 Corridor (Turned in as CMAQ Project)	$300,000
10	Hampton	Big Bethel Rd/Todds Ln Intersection Improvements	$1,375,000
11	Hampton	Coliseum Central Transit Shuttle	$7,152,867
12	Hampton	HRBT Diversion Signal Timings	$160,000
13	Hampton	Citywide Traffic Signal System Retiming	$392,000
14	Hampton	Citywide Traffic Signal Upgrade	$1,500,000
15	HRT	TRAFFIX Funding	$5,000,000
16	HRT	Purchase 38 Replacement 40' Buses	$14,600,000
17	HRT	Retrofit 100 Buses w/ Diesel Particulate Filters	$1,500,000
18	HRT	Environmental Management System	$750,000
19	HRT	Feeder Bus Service for The Tide Light Rail	$3,600,000
20	James City Co	Longhill Rd Corridor Study	$300,000
21	James City Co	Monticello Ave Geometric Changes	$3,100,000
22	James City Co	Mooretown Rd Extension Study	$400,000
23	James City Co	Route 60/143 Connector Study	$300,000
24	Newport News	Citywide Bus Shelter Program - Phases 2-4	$900,000
25	Newport News	Hampton Roads Fast Ferry	$40,000,000
26	Newport News	Riverside Hospital Bus Transfer Center	$1,500,000
27	Newport News	Citywide Wayfinding Sign Project - Phase 3	$500,000
28	Newport News	Citywide ITS Upgrades	$300,000
29	Newport News	Jefferson Ave Corridor Improvements	$90,000
30	Newport News	Citywide Signal System Retiming	$500,000
31	Norfolk	Citywide Traffic Signal Cabinet Upgrade	$300,000
32	Norfolk	Citywide Signal System Retiming - Phase 2	$500,000
33	Norfolk	Norfolk ATMS - Phase IV	$4,500,000

Table 1 Continued on Next Page

TABLE 1 – CONTINUED
CMAQ PROJECT PROPOSALS

DECEMBER 2009

Number	Juris/Agency	Project Name	Total Cost
34	Portsmouth	Citywide Signal Timing - Phase 1	$120,000
35	Portsmouth	Citywide Signal Timing - Phase 2	$112,000
36	Portsmouth	Citywide Signal Timing - Phase 3	$120,000
37	Portsmouth	Citywide Signal Timing - Phase 4	$132,000
38	Portsmouth	Intersection Improvement - Portsmouth Blvd/Elmhurst Ln	$500,000
39	Portsmouth	Signal System Upgrade - Phases 2, 3, & 4	$6,600,000
40	Regional	Purchase 3 Total Stations for Regional Fatal Crash Team (State Police)	$30,000
41	Regional	Regional Opticom Preemption Strategic Plan & Deployment	$500,000
42	Suffolk	Intersection Improvement - Bridge Rd/Bennetts Pasture Rd	$750,000
43	Suffolk	Intersection Improvement - Bridge Rd/Lee Farm Ln	$750,000
44	Suffolk	Citywide Traffic Management System Plan	$400,000
45	Suffolk	Godwin Blvd Park & Ride Lot	$400,000
46	Suffolk	Harbour View Area Traffic Signal Coordination	$3,500,000
47	Suffolk	Portsmouth Blvd Park & Ride Lot	$750,000
48	Virginia Beach	Citywide Bus Shelter Program	$100,000
49	Virginia Beach	Intersection Improvement - General Booth Blvd/London Bridge Rd	$1,100,000
50	Virginia Beach	Intersection Improvement - S. Independence Blvd/Dahlia Dr	$1,300,000
51	Virginia Beach	Intersection Improvement - S. Independence Blvd/Lynnhaven Pkwy	$1,310,000
52	Virginia Beach	Intersection Improvement - Rosemont Rd/Lynnhaven Pkwy	$1,000,000
53	Virginia Beach	Intersection Improvement - Indian River Rd/Kempsville Rd	$4,500,000
54	Virginia Beach	Citywide Signal Retiming - Phase 3	$1,276,000
55	VPA	Inter-Terminal Barge Service	$10,970,640
56	WATA	Purchase 16 Replacement Buses (6 Clean Diesel, 6 Hybrid Diesel/Electric, 4 CNG)	$7,803,000
57	WATA	New Service - Jamestown Route	$823,492
58	WATA	New Service - Mounts Bay Route	$677,389
59	WATA	Purchase 1 Replacement Trolley (Clean Diesel Medium Bus Trolley)	$315,000
	TOTALS		$143,309,388

Table 2 shows the scoring and ranking of the submitted projects. As shown in the table, each project was scored and ranked based on its cost-effectiveness at reducing VOC and NOx emissions. The ranks for VOC and NOx reduction were added to produce the composite ranking. The detailed analysis worksheets for each proposed project are included in **Appendix C**.

TABLE 2
CMAQ PROJECT PROPOSALS RANKED BY COST EFFECTIVENESS ($/TON/YEAR)

					Emissions Reduction		Cost Effectiveness		Rank		
Number	Juris/Agency	Project Name	Project Life (Years)	Annualized Cost	VOC (kg/year)	NOx (kg/year)	VOC ($/ton/year)	NOx ($/ton/year)	VOC	NOx	Overall
30	Newport News	Citywide Signal System Retiming	10	$50,000	41,915	21,006	$1,082	$2,159	1	1	1
31	Norfolk	Citywide Traffic Signal Cabinet Upgrade	10	$30,000	9,911	4,967	$2,746	$5,478	2	2	2
32	Norfolk	Citywide Signal System Retiming - Phase 2	10	$50,000	14,982	7,508	$3,027	$6,040	4	3	3-tie
40	Regional	Purchase 3 Total Stations for Regional Fatal Crash Team (State Police)	10	$3,000	968	340	$2,811	$7,998	3	4	3-tie
12	Hampton	HRBT Diversion Signal Timings	10	$16,000	3,447	1,728	$4,210	$8,400	7	5	5
34	Portsmouth	Citywide Signal Timing - Phase 1	10	$12,000	2,737	893	$3,977	$12,186	5	8	6
13	Hampton	Citywide Traffic Signal System Retiming	10	$39,200	6,495	3,255	$5,474	$10,922	9	7	7-tie
35	Portsmouth	Citywide Signal Timing - Phase 2	10	$11,200	2,414	788	$4,209	$12,897	6	10	7-tie
14	Hampton	Citywide Traffic Signal Upgrade	10	$150,000	21,967	11,009	$6,193	$12,358	10	9	9
36	Portsmouth	Citywide Signal Timing - Phase 3	10	$12,000	2,087	681	$5,216	$15,985	8	12	10
54	Virginia Beach	Citywide Signal Retiming - Phase 3	10	$127,600	17,376	8,708	$6,660	$13,290	11	11	11
15	HRT	TRAFFIX Funding	5	$1,000,000	52,433	49,674	$17,302	$18,263	13	13	12-tie
37	Portsmouth	Citywide Signal Timing - Phase 4	10	$13,200	1,743	569	$6,869	$21,050	12	14	12-tie
19	HRT	Feeder Bus Service for The Tide Light Rail	3	$1,200,000	47,824	42,961	$22,758	$25,335	16	15	14
33	Norfolk	Norfolk ATMS - Phase IV	10	$450,000	19,818	9,932	$20,595	$41,093	15	18	15
29	Newport News	Jefferson Ave Corridor Improvements	10	$9,000	407	133	$20,033	$61,207	14	20	16
48	Virginia Beach	Citywide Bus Shelter Program	15	$6,667	150	142	$40,241	$42,476	18	19	17
17	HRT	Retrofit 100 Buses w/ Diesel Particulate Filters	15	$100,000	2,392	1,107	$37,913	$81,959	17	21	18
27	Newport News	Citywide Wayfinding Sign Project - Phase 3	10	$50,000	534	486	$84,885	$93,283	20	23	19-tie
39	Portsmouth	Signal System Upgrade - Phases 2, 3, & 4	10	$660,000	11,588	5,807	$51,660	$103,080	19	24	19-tie
1	Chesapeake	HRT Bus Shelters	15	$10,000	89	84	$101,964	$107,627	21	25	21
18	HRT	Environmental Management System	5	$150,000	416	3,537	$326,921	$38,461	30	17	22
24	Newport News	Citywide Bus Shelter Program - Phases 2-4	15	$60,000	533	505	$102,165	$107,839	22	26	23
55	VPA	Inter-Terminal Barge Service	3	$3,656,880	2,086	328,636	$1,589,948	$10,093	44	6	24
8	Gloucester Co	Signal Coordination Along Route 17	10	$220,000	1,824	594	$109,368	$336,139	23	29	25
56	WATA	Purchase 16 Replacement Buses (6 Clean Diesel, 6 Hybrid Diesel/Electric, 4 CNG)	10	$780,300	2,146	7,779	$329,803	$90,980	31	22	26
53	Virginia Beach	Intersection Improvement - Indian River Rd/Kempsville Rd	10	$450,000	3,458	1,125	$118,015	$362,718	24	30	27
3	Chesapeake	Liberty St Transfer Station	15	$16,667	53	50	$284,073	$299,851	28	28	28
16	HRT	Purchase 38 Replacement 40' Buses	15	$973,333	878	28,844	$1,005,119	$30,606	41	16	29-tie
10	Hampton	Big Bethel Rd/Todds Ln Intersection Improvements	10	$137,500	655	208	$190,423	$599,524	25	32	29-tie
51	Virginia Beach	Intersection Improvement - S. Independence Blvd/Lynnhaven Pkwy	10	$131,000	619	197	$191,849	$604,013	26	33	31
46	Suffolk	Harbour View Area Traffic Signal Coordination	10	$350,000	1,607	525	$197,507	$605,238	27	34	32
59	WATA	Purchase 1 Replacement Trolley (Clean Diesel Medium Bus Trolley)	10	$31,500	41	238	$693,211	$119,951	36	27	33-tie
45	Suffolk	Godwin Blvd Park & Ride Lot	10	$40,000	83	79	$436,180	$460,407	32	31	33-tie
52	Virginia Beach	Intersection Improvement - Rosemont Rd/Lynnhaven Pkwy	10	$100,000	290	92	$313,083	$985,706	29	36	35
47	Suffolk	Portsmouth Blvd Park & Ride Lot	10	$75,000	117	110	$583,699	$616,119	34	35	36
21	James City Co	Monticello Ave Geometric Changes	10	$310,000	489	155	$575,253	$1,811,119	33	38	37
28	Newport News	Citywide ITS Upgrades	10	$30,000	40	13	$677,771	$2,133,886	35	39	38
26	Newport News	Riverside Hospital Bus Transfer Center	15	$100,000	82	78	$1,099,554	$1,160,627	42	37	39-tie
4	Chesapeake	Traffic Management Center & System Additions	10	$200,000	220	70	$822,868	$2,590,708	39	40	39-tie
49	Virginia Beach	Intersection Improvement - General Booth Blvd/London Bridge Rd	10	$110,000	105	33	$947,170	$2,982,056	40	43	41
6	Gloucester Co	Bicycle-Pedestrian Improvements to Route 17	15	$20,000	7	7	$2,627,024	$2,772,936	48	41	42-tie
42	Suffolk	Intersection Improvement - Bridge Rd/Bennetts Pasture Rd	10	$75,000	48	15	$1,422,403	$4,478,275	43	46	42-tie
7	Gloucester Co	Bicycle-Pedestrian Improvements to Route 1216	15	$50,000	16	15	$2,786,238	$2,940,993	49	42	44
41	Regional	Regional Opticom Preemption Strategic Plan & Deployment	10	$50,000	20	10	$2,228,538	$4,446,702	47	45	45-tie
58	WATA	New Service - Mounts Bay Route	3	$225,796	256	-589	$799,466	negative	37	55	45-tie
50	Virginia Beach	Intersection Improvement - S. Independence Blvd/Dahlia Dr	10	$130,000	70	22	$1,679,302	$5,287,093	46	47	45-tie
57	WATA	New Service - Jamestown Route	3	$274,497	303	-593	$820,759	negative	38	55	45-tie
5	Gloucester Co	Bicycle-Pedestrian Improvements to Route 216	15	$86,667	21	20	$3,706,344	$3,912,205	50	44	49
2	Chesapeake	Emergency Vehicle Preemption	10	$100,000	9	4	$10,521,464	$20,993,953	52	48	50-tie
38	Portsmouth	Intersection Improvement - Portsmouth Blvd/Elmhurst Ln	10	$50,000	5	2	$8,404,671	$26,461,159	51	49	50-tie
25	Newport News	Hampton Roads Fast Ferry	4	$10,000,000	5,503	-92,708	$1,648,166	negative	45	55	50-tie
44	Suffolk	Citywide Traffic Management System Plan	n.a.	n.a.	n.a.	n.a.	n.a.;RSTP(1)	n.a.;RSTP(1)	54	50	50-tie
9	Gloucester Co	Planning Study of Business 17 Corridor (Turned in as CMAQ Project)	n.a.	n.a.	n.a.	n.a.	n.a.;RSTP(1)	n.a.;RSTP(1)	54	50	50-tie
20	James City Co	Longhill Rd Corridor Study	n.a.	n.a.	n.a.	n.a.	n.a.;RSTP(1)	n.a.;RSTP(1)	54	50	50-tie
22	James City Co	Mooretown Rd Extension Study	n.a.	n.a.	n.a.	n.a.	n.a.;RSTP(1)	n.a.;RSTP(1)	54	50	50-tie
23	James City Co	Route 60/143 Connector Study	n.a.	n.a.	n.a.	n.a.	n.a.;RSTP(1)	n.a.;RSTP(1)	54	50	50-tie
11	Hampton	Coliseum Central Transit Shuttle	3	$2,384,289	33	-2,844	$66,377,466	negative	53	55	58
43	Suffolk	Intersection Improvement - Bridge Rd/Lee Farm Ln	10	$75,000	-12	-4	negative	negative	59	55	59

(1) Cannot be evaluated quantitatively, therefore evaluate qualitatively. Also a candidate for RSTP funds.

Table 3 shows the final allocations recommended by the TTAC and approved by the HRTPO Board on January 20, 2010. Projects 32 through 35 in Table 3 received fiscal year 2011 and 2012 allocations prior to the 2009 project selection process.

TABLE 3
CMAQ PROJECTS AND ALLOCATIONS
FY 2011 – 2015

APPROVED BY HRTPO BOARD ON JANUARY 20, 2010

				ALLOCATIONS					
#	Proposal Number	Juris/Agency	Project Name	FY-11	FY-12	FY-13	FY-14	FY-15	TOTAL
1	1	Chesapeake	HRT Bus Shelters	$150,000					$150,000
2	3	Chesapeake	Liberty St Transfer Station			$250,000			$250,000
3	8	Gloucester Co	Signal Coordination Along Route 17			$660,000	$770,000	$770,000	$2,200,000
4	12	Hampton	HRBT Diversion Signal Timings	$160,000					$160,000
5	13	Hampton	Citywide Traffic Signal System Retiming	$130,000	$262,000				$392,000
6	14	Hampton	Citywide Traffic Signal Upgrade	$225,000	$1,275,000				$1,500,000
7	15	HRT	TRAFFIX Funding	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$5,000,000
8	19	HRT	Feeder Bus Service for The Tide Light Rail	$1,200,000	$1,200,000	$1,200,000			$3,600,000
9	17	HRT	Retrofit 100 Buses w/ Diesel Particulate Filters	$500,000	$1,000,000				$1,500,000
10	18	HRT	Environmental Management System		$150,000	$150,000	$150,000	$150,000	$600,000
11	16	HRT	Purchase 38 Replacement 40' Buses			$1,686,205	$6,737,876	$6,175,919	$14,600,000
12	30	Newport News	Citywide Signal System Retiming				$250,000	$250,000	$500,000
13	29	Newport News	Jefferson Ave Corridor Improvements		$90,000				$90,000
14	27	Newport News	Citywide Wayfinding Sign Project - Phase 3	$500,000					$500,000
15	24	Newport News	Citywide Bus Shelter Program - Phases 2-4		$312,400	$320,000			$632,400
16	31	Norfolk	Citywide Traffic Signal Cabinet Upgrade	$300,000					$300,000
17	32	Norfolk	Citywide Signal System Retiming - Phase 2	$500,000					$500,000
18	33	Norfolk	Norfolk ATMS - Phase IV		$1,000,000	$1,500,000	$1,000,000	$1,000,000	$4,500,000
19	34	Portsmouth	Citywide Signal Timing - Phase 1		$120,000				$120,000
20	35	Portsmouth	Citywide Signal Timing - Phase 2			$112,000			$112,000
21	36	Portsmouth	Citywide Signal Timing - Phase 3				$120,000		$120,000
22	37	Portsmouth	Citywide Signal Timing - Phase 4					$132,000	$132,000
23	39	Portsmouth	Signal System Upgrade - Phases 2, 3, & 4	$702,599	$2,948,701	$2,948,700			$6,600,000
24	40	Regional	3 Total Stations for Regional Fatal Crash Team (State Police)	$30,000					$30,000
25	45	Suffolk	Godwin Blvd Park & Ride Lot					$400,000	$400,000
26	54	Virginia Beach	Citywide Signal Retiming - Phase 3	$676,000	$600,000				$1,276,000
27	48	Virginia Beach	Citywide Bus Shelter Program	$100,000					$100,000
28	55	VPA	Inter-Terminal Barge Service		$2,599,011	$1,863,823	$1,863,823	$1,863,823	$8,190,480
29	56	WATA	Purchase 12 Replacement Buses			$2,386,000	$2,204,000	$1,513,000	$6,103,000
30	59	WATA	Purchase 1 Replacement Trolley (Clean Diesel Medium Bus Trolley)					$315,000	$315,000
31	57	WATA	New Service - Jamestown Route	$269,080	$274,462	$279,950			$823,492
ALLOCATIONS MADE PRIOR TO THE 2009 PROJECT SELECTION PROCESS (Approved Previously by HRTPO Board)									
32		Hampton	Coliseum Central Transit Shuttle	$1,085,571					$1,085,571
33		Newport News	Jefferson Ave Sidewalk Project: Buchanan Dr to J Clyde Morris	$600,000					$600,000
34		Newport News	J Clyde Morris Corridor Bike Trail - Phase V	$600,000					$600,000
35		HRT	Norfolk Light Rail Transit Operating Assist. 2 years	$5,834,928	$1,500,000				$7,334,928
		TOTALS		$14,563,178	$14,331,574	$14,356,678	$14,095,699	$13,569,742	$70,916,871

PAGE INTENTIONALLY LEFT BLANK

RSTP PROJECT SELECTION

Projects selected for funding with Regional Surface Transportation Program (RSTP) funds must meet certain criteria originally developed in 1992 and reviewed and revised in 1999, 2001, 2003, and 2006. Details on the policies, procedures, and analysis methodologies used for RSTP project selection in Hampton Roads are included in **Appendix D**.

To help insure that all of the necessary information is included with each project proposal, and to provide some uniformity to the way that project information is submitted, HRTPO staff developed application forms to be used when submitting RSTP project proposals. The latest version of the RSTP Candidate Project Application form is included in **Appendix E**. An automated version of the application form is made available on the HRTPO web site.

Table 4 shows all of the projects proposed for RSTP funding during the project selection process of 2009. As shown in the table, 29 RSTP project proposals, with a total cost of nearly $468 million, were submitted. The total RSTP funding expected to be available from fiscal year 2011 through fiscal year 2015 was just over $122 million. It should be noted that two jurisdictions, James City County and Newport News, submitted the same project – US Route 60 Relocation and Upgrading. The two projects were originally numbered 13 and 17 in the table. During the analysis phase, it was determined that the James City County proposal included the entire project, while the Newport News proposal included the portion of the project in Newport News. HRTPO staff coordinated with the two localities and it was agreed that the Newport News proposal would be dropped from the list of submitted projects. Therefore, Table 4 does not include a proposal numbered 17 and the total number of proposals evaluated was 29.

TABLE 4
RSTP PROPOSALS

DECEMBER 2009

Number	Juris/Agency	Project Name	Total Cost
1	Chesapeake	Hanbury Rd Widening	$16,000,000
2	Chesapeake	Mount Pleasant Rd Widening	$15,623,000
3	Chesapeake	Portsmouth Blvd Widening	$15,218,000
4	Hampton	Wythe Creek Rd Widening	$23,400,000
5	HRT	Systemwide Bus Stop Sign Program	$1,900,000
6	HRT	Replacement of Southside Admin Facilities - Phase 1a	$50,000,000
7	HRT	LRT Extension to Norfolk Naval Station and Virginia Beach Oceanfront (AA/EIS/PE/FD/ROW)	$29,000,000
8	HRT	Ferry Fare Collection Equipment	$1,500,000
9	HRT	HRT Facility Upgrades	$3,500,000
10	James City Co	Longhill Rd Corridor Study	$300,000
11	James City Co	Mooretown Rd Extension Study	$400,000
12	James City Co	Route 60/143 Connector Study	$300,000
13	James City Co & Newport News	Route 60 Relocation and Upgrading	$70,800,000
14	Newport News	Atkinson Blvd - Construct New Road	$52,000,000
15	Newport News	Amtrak Station Relocation Project	$20,000,000
16	Newport News	Peninsula Rapid Transit Project (AA & Other Studies) (Previous HRT Project UPC# T1821)	$1,500,000
18	Norfolk	Intersection Improvement - Princess Anne Rd/Sewells Point Rd	$844,496
19	Norfolk	North Military Hwy Widening & Improvement - Lowery Rd to Northampton Blvd	$26,367,523
20	Norfolk	North Military Hwy & Robin Hood Rd Widening & Improvement	$24,834,247
21	Poquoson	Wythe Creek Rd Widening	$16,159,000
22	Portsmouth	Drainage Pond Construction near I-264 & Frederick Blvd	$500,000
23	Portsmouth	Access Management Along US 17	$2,000,000
24	Portsmouth	Turnpike Rd Widening	$2,500,000
25	Virginia Beach	Virginia Beach Transit Extension Study (AA/SDEIS/PE/FE)	$10,000,000
26	Virginia Beach	Lynnhaven Pkwy Reconstruction - Phase XI	$16,000,000
27	Virginia Beach	Wesleyan Dr Widening	$8,100,000
28	York	Route 17 Widening	$58,509,000
29	Gloucester Co	Business Route 17 Corridor Planning Study	$300,000
30	Suffolk	Citywide Traffic Management System Plan	$400,000
	TOTALS		$467,955,266

Table 5 shows the scoring and ranking of the submitted projects. As shown in the table, the projects were placed into categories of similar projects. Each project was scored against projects within the same category. The detailed scoring worksheets for each proposed project are included in **Appendix F**.

TABLE 5
RSTP PROJECTS PROPOSALS RANKED WITHIN CATEGORIES

Number	Juris/Agency	Project Name	Total Cost	Total RSTP Request	Score (Max=100)
		HIGHWAY PROJECTS			
21	Poquoson	Wythe Creek Rd Widening	$16,159,000	$12,000,000	93
28	York	Route 17 Widening	$58,509,000	$13,400,000	91
19	Norfolk	North Military Hwy Widening & Improvement - Lowery Rd to Northampton Blvd	$26,367,523	$13,786,351	90
22	Portsmouth	Drainage Pond Construction near I-264 & Frederick Blvd	$500,000	$500,000	90
20	Norfolk	North Military Hwy & Robin Hood Rd Widening & Improvement	$24,834,247	$7,693,440	88
2	Chesapeake	Mount Pleasant Rd Widening	$15,623,000	$7,323,000	82
3	Chesapeake	Portsmouth Blvd Widening	$15,218,000	$3,586,000	82
27	Virginia Beach	Wesleyan Dr Widening	$8,100,000	$1,089,000	82
4	Hampton	Wythe Creek Rd Widening	$23,400,000	$23,400,000	80
24	Portsmouth	Turnpike Rd Widening	$2,500,000	$2,500,000	79
1	Chesapeake	Hanbury Rd Widening	$16,000,000	$16,000,000	75
13	James City Co & Newport News	Route 60 Relocation and Upgrading	$70,800,000	$38,350,000	75
14	Newport News	Atkinson Blvd - Construct New Road	$52,000,000	$39,500,000	72
26	Virginia Beach	Lynnhaven Pkwy Reconstruction - Phase XI	$16,000,000	$16,000,000	57
23	Portsmouth	Access Management Along US 17	$2,000,000	$2,000,000	43
18	Norfolk	Intersection Improvement - Princess Anne Rd/Sewells Point Rd	$844,496	$544,496	36
	SUBTOTALS		$348,855,266	$197,672,287	
		NEW TRANSIT SERVICE, EXPANSION OF EXISTING SERVICE, FACILITIES			
15	Newport News	Amtrak Station Relocation Project	$20,000,000	$20,000,000	49
	SUBTOTALS		$20,000,000	$20,000,000	
		OTHER TRANSIT PROJECTS			
8	HRT	Ferry Fare Collection Equipment	$1,500,000	$1,500,000	85
5	HRT	Systemwide Bus Stop Sign Program	$1,900,000	$1,900,000	52
6	HRT	Replacement of Southside Admin Facilities - Phase 1a	$50,000,000	$2,000,000	50
9	HRT	HRT Facility Upgrades	$3,500,000	$3,500,000	33
	SUBTOTALS		$56,900,000	$8,900,000	
		PLANNING STUDIES			
7	HRT	LRT Extension to Norfolk Naval Station and Virginia Beach Oceanfront (AA/EIS/PE/FD/ROW)	$29,000,000	$29,000,000	77
16	Newport News	Peninsula Rapid Transit Project (AA & Other Studies) (Previous HRT Project UPC# T1821)	$1,500,000	$1,500,000	77
25	Virginia Beach	Virginia Beach Transit Extension Study (AA/SDEIS/PE/FE)	$10,000,000	$10,000,000	77
30	Suffolk	Citywide Traffic Management System Plan	$400,000	$400,000	56
12	James City Co	Route 60/143 Connector Study	$300,000	$300,000	51
10	James City Co	Longhill Rd Corridor Study	$300,000	$300,000	50
29	Gloucester Co	Business Route 17 Corridor Planning Study	$300,000	$300,000	47
11	James City Co	Mooretown Rd Extension Study	$400,000	$400,000	25
	SUBTOTALS		$42,200,000	$42,200,000	
	TOTALS		$451,796,266	$256,772,287	

Table 6 shows the final allocations recommended by the TTAC and approved by the HRTPO Board on January 20, 2010. Project 24 in Table 6 received a fiscal year 2011 allocation prior to the 2009 project selection process.

TABLE 6
RSTP PROJECTS AND ALLOCATIONS
FY 2011 – 2015

APPROVED BY HRTPO BOARD ON JANUARY 20, 2010

				ALLOCATIONS					
#	Proposal Number	Juris/Agency	Project Name	FY-11	FY-12	FY-13	FY-14	FY-15	TOTAL
1	2	Chesapeake	Mount Pleasant Rd Widening	$2,500,000	$2,500,000	$2,323,000			$7,323,000
2	3	Chesapeake	Portsmouth Blvd Widening	$2,000,000	$1,586,000				$3,586,000
3	29	Gloucester Co	Business Route 17 Corridor Planning Study		$300,000				$300,000
4	4	Hampton	Wythe Creek Rd Widening	$300,000	$1,500,000	$0	$3,000,000	$0	$4,800,000
5	8	HRT	Ferry Fare Collection Equipment		$1,500,000				$1,500,000
6	5	HRT	Systemwide Bus Stop Sign Program	$591,968	$1,308,032				$1,900,000
7	6	HRT	Replacement of Southside Admin Facilities - Phase 1a	$1,800,000					$1,800,000
8	9	HRT	HRT Facility Upgrades		$116,925	$3,383,075			$3,500,000
9	7	HRT	LRT Extension to Norfolk Naval Station and Virginia Beach Oceanfront (AA/EIS/PE/FD/ROW)	$5,000,000	$5,000,000	$5,000,000	$7,000,000	$7,000,000	$29,000,000
10	12	James City Co	Route 60/143 Connector Study		$300,000				$300,000
11	10	James City Co	Longhill Rd Corridor Study		$300,000				$300,000
12	11	James City Co	Mooretown Rd Extension Study		$400,000				$400,000
13	15	Newport News	Amtrak Station Relocation Project	$1,000,000	$1,000,000				$2,000,000
14	16	Newport News	Peninsula Rapid Transit Project (AA & Other Studies) (Previous HRT Project UPC# T1821)		$500,000				$500,000
15	19	Norfolk	North Military Hwy Widening & Improvement - Lowery Rd to Northampton Blvd	$1,000,000	$2,000,000	$3,000,000	$4,282,369	$3,503,982	$13,786,351
16	20	Norfolk	North Military Hwy & Robin Hood Rd Widening & Improvement	$1,000,000	$2,000,000	$2,000,000	$2,693,440		$7,693,440
17	21	Poquoson	Wythe Creek Rd Widening	$200,000	$400,000	$1,645,850	$1,458,288	$8,295,862	$12,000,000
18	22	Portsmouth	Drainage Pond Construction near I-264 & Frederick Blvd	$500,000					$500,000
19	24	Portsmouth	Turnpike Rd Widening	$2,500,000					$2,500,000
20	30	Suffolk	Citywide Traffic Management System Plan	$400,000					$400,000
21	26	Virginia Beach	Lynnhaven Pkwy Reconstruction - Phase XI		$151,435	$2,555,519	$177,741		$2,884,695
22	25	Virginia Beach	Virginia Beach Transit Extension Study (AA/SDEIS/PE/FE)			$1,099,838	$2,541,225	$2,599,896	$6,240,959
23	28	York	Route 17 Widening	$2,700,000	$2,700,000	$2,700,000	$2,700,000	$2,600,000	$13,400,000
ALLOCATIONS MADE PRIOR TO THE 2009 PROJECT SELECTION PROCESS (Approved Previously by HRTPO Board)									
24		HRT	Norfolk LRT - 8 mile/11 stations - PE Phase	$2,566,808					$2,566,808
		TOTALS		$24,058,776	$23,562,392	$23,707,282	$23,853,063	$23,999,740	$119,181,253

APPENDIX A

CMAQ Policies, Procedures, and Analysis Methodologies

CONGESTION MITIGATION AND AIR QUALITY IMPROVEMENT PROGRAM

Program Policies and Criteria:

- **Funding Program Criteria, 1992** - The Transportation Technical Committee (TTC) agreed to the following set of criteria for the use of CMAQ Funds:

    - Highest reduction in hydrocarbons (HC)
    - Improve air quality over the long term
    - Provide funding for mix of forward thinking and traditional projects
    - Projects should be of regional significance

- **Funding Change Policy – Adopted in June 13, 1995**

    1. Approve a CMAQ reserve account of up to 5% of the current year allocation. The Hampton Roads CMAQ allocation has averaged approximately $7 million per year during the past ten years.

    2. If the cost/annual allocation and the scope of a project change less than 10% on any one CMAQ funded project, the locality/agency should notify the TTC with a request and justification for a change in funding. The TTC must review the request and recommend use of the reserve account or, if possible, commit future year funding to preserve the project.

    3. If the cost/annual allocation and/or scope of the project change by more than 10% on any one CMAQ funded project, the locality/agency should notify the TTC and MPO with a request and justification for a change in funding and/or scope. The TTC and MPO must review the request and may recommend one or any combination of the following:

        - Scale back the project
        - Use local funds
        - Use urban funds
        - Use reserve account CMAQ funds
        - Use existing CMAQ funds from another project
        - Use future CMAQ allocations
        - Use future non-CMAQ funds
        - Drop the project

- **Funding Change Policy – Adopted in June 2001**

    - On-going projects will be funded to completion before funding is committed to a new CMAQ project.

    - To increase the reserve account from 5% of the mark to 8%**.**

- **Reserve Account Policy Change – Adopted in May 2006**

    - To allocate the full amount of FY 07-10 CMAQ Marks without allowing any amount in the reserve account.

- **Reserve Account Policy Change – Adopted in December 11, 2009**

    - To maintain a reserve account for each fiscal year, FY 11-15, initially set at 5% of the annual CMAQ Mark.

    - The purpose of the reserve account is two-fold:

        - To provide a way to handle potential reductions in the CMAQ funds for FY 11-15.
        - To provide funding for potential cost overruns on approved CMAQ projects.

Application Process and Preliminary Screening:

HRTPO staff provides standard application forms for submitting CMAQ project proposals. These forms are made available in electronic format and on the HRTPO web site. Jurisdictions and transit agencies return completed forms to HRTPO within a set time schedule. Projects are screened using the following criteria:

- Must meet all applicable SAFETEA-LU requirements
- Must be included in the current Long-Range Transportation Plan (LRTP)
- Must be well defined
- Reasonable data (including data required for the emissions analysis) and cost estimates must be provided

Emissions Analysis of Eligible Projects:

HRTPO staff performs an emissions analysis on all eligible projects. Emissions are estimated for volatile organic compounds (VOC) and nitrogen oxides (NOx). Analysis results are tabulated for the eligible projects.

Project Ranking:

Projects are ranked based on their cost-effectiveness ratios for VOC and NOx reduction. Each project is analyzed to estimate the impact of the project on VOC and NOx emissions. The cost per reduction of emissions is computed using the total cost of each project and annualizing the cost over the effective life of the project. Once all of the projects are analyzed, they are ranked on the basis of their cost effectiveness ratios. In the cost effectiveness analysis, the amount of emissions reduction per dollar spent is computed for VOC and NOx . A rank is then applied for each of these emission types, with a lower rank number indicating greater cost effectiveness. Finally, the two ranks are combined and these composite ranks are scored, again with the lower composite rank number indicating greater cost effectiveness.

Project Selection:

The CMAQ/RSTP Subcommittee of the Transportation Technical Advisory Committee (TTAC) reviews the ranked set of eligible CMAQ projects and makes recommendations to the full TTAC.

CMAQ Analysis Methodologies:

Projects proposed for CMAQ funding are analyzed for their effectiveness in reducing emissions of VOCs, also known as hydrocarbons, and NOx. The analysis methodologies for various types of CMAQ projects were originally developed in 1993. Over the years, as "new" types of projects were proposed, analysis methodologies were developed to evaluate them. The projects can be divided into three primary groups:

- Highway Projects
- Non-Highway Projects
- Other Projects including ITS

A. HIGHWAY PROJECTS

Highway Projects include improvements to traffic signal timing and intersection/interchange geometric design, upgrades to traffic signal systems, and Intelligent Transportation System (ITS) projects. Analysis methodologies vary depending on the type of project being evaluated. A brief description of the analysis methodologies used for each type of highway project is included below.

Isolated Intersection Analysis

This project type refers to improvements at individual intersections that are not part of a coordinated signal system. The projects may include improvements in the geometric design of the intersection and signal timing or improvements in timing only. The change in emissions for a project is based on the change in delay (in hours per day) at the intersection as a result of the project.

Highway Capacity Software, or similar software, is used to compute the intersection delay for the afternoon peak hour with and without the project. Then, using the total number of vehicles entering the intersection during the afternoon peak hour and the change in intersection delay resulting from the project, vehicle-hours of delay are computed for the afternoon peak hour. That value is then converted to vehicle-hours of delay per day by using a seventeen percent conversion factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, a study published by the Hampton Roads Planning District Commission (HRPDC) in June 1997. The Idle Emissions Factors are applied to the vehicle-hours of delay per day to compute the change in emissions of VOC and NO_x for the intersection in units of kilograms per day.

Coordinated Signal Systems

This type of project includes several intersections along a section of roadway for which the signal timing is coordinated to promote progression of traffic along that section. Most of the projects in this category consist of improvements to signal timing only. The change in emissions for a project is based on the change in average speed (in miles per hour) along the section of roadway as a result of the project.

The initial average speed along the section of roadway is submitted with the project proposal. In an analysis of a sample of before and after studies of coordinated signal system improvements, it was determined that an average increase of four miles-per-hour in average speed resulted from such improvements. Therefore, for the purposes of the emissions analyses, an increase of four miles-per-hour is assumed to occur as a result of the coordinated signal system projects.

The emissions factors are determined for the “before” and “after” average speeds. These factors are multiplied by the daily VMT (vehicle miles traveled) for the section of roadway to compute the daily change in emissions of VOC and NO_x for the section in units of kilograms per day.

Citywide Signal System Improvements

This type of project includes a large number of intersections within a jurisdiction. Nearly all of the intersections included in this type of project are part of a coordinated signal system. The projects in this category include improvements to signal equipment and signal timing. The change in emissions for a project is based on the change in average speed (in miles per hour) for the citywide system.

To analyze these projects, "citywide" values for average speed and VMT for principal and minor arterials are obtained from a VDOT Air Quality Conformity Analysis. Then, using the analysis discussed in the section on Coordinated Signal Systems, a four miles-per-hour increase in average speed is assumed to result from the project. If the applicant submits additional "before" and "after" data and analyses, the staff will use this data in lieu of the average value estimated for this category.

The emissions factors are determined for the "before" and "after" average speeds. These factors are multiplied by the citywide daily VMT to compute the daily change in emissions of VOC and NO_x in units of kilograms per day.

Intelligent Transportation Systems (ITS)

A wide array of projects are classified as ITS projects, including Advanced Traffic Management Systems, variable message signs, communications, incident management and other innovative applications that take advantage of new technologies to help improve traffic flow, safety, driver information and, often as a result, air quality. Analysis methodologies for ITS projects are usually project-specific and may be qualitative or quantitative depending on the type of project and the availability of input data.

B. NON-HIGHWAY PROJECTS

Transit Projects

Transit projects include park & ride lots, replacement buses, and new/expanded transit services. Emissions benefits for most transit projects are based on the predicted reduction in automobile trips and VMT resulting from the project. Projects that involve new or expanded service also take into account the increase in emissions due to the "new" transit vehicles on the road. Park and ride lot projects take into account the emissions due to the automobile trips to the lot. Emissions reductions resulting from replacement buses are due to emissions improvements in the newer bus engines and any increases in ridership due to newer vehicles.

Bikeway Projects

Air quality benefits of bikeway projects are calculated as a function of a reduction in the number of automobile trips and VMT. Specifically, emissions reductions are based on cold start and hot soak emissions produced at the beginning and end of a trip, respectively. The methodology is based on Census data for Hampton Roads, results from the regional model and a review of CMAQ studies conducted in different regions of the country. The Benefit Cost Analysis of Bicycle Facilities tool based on the Guidelines for Analysis of Investments in Bicycle Facilities (NCHRP Report #552) was used to determine the reduction of vehicle trips attributable to a given bikeway.

C. OTHER PROJECTS

The "Other" group includes projects that may not fit perfectly within the Highway or Non-Highway groups. Innovative projects in this group may include alternative fuels, truck idling controls, early engine retirement programs, and Intermodal freight projects, among others.

PAGE INTENTIONALLY LEFT BLANK

APPENDIX B

CMAQ Candidate Project Application Forms

HAMPTON ROADS CMAQ/RSTP PROJECT SELECTION PROCESS

CMAQ CANDIDATE PROJECT APPLICATION

To be considered for CMAQ funding, a proposed project must be included in the current Long-Range Transportation Plan (LRTP). Data necessary for evaluating the project must be submitted for each candidate project. Filling out the appropriate sections of this application will insure that the necessary data are submitted. One application should be filled out for each project being proposed for CMAQ funding.

Form A must be filled out for each project. At the end of Form A, you will indicate the CMAQ Project Type that best fits your proposed project. Depending upon the CMAQ Project Type selected, you will be directed to fill out one of the following forms: Form B, Form C, Form D, Form E, or Form F. If you select the "Other" category, please contact HRTPO staff for input data requirements.

CMAQ FORM-A

Locality/Agency:_____ Date:_____

Prepared By:_____ Phone:_____

E-mail:_____ Fax:_____

UPC #: _____

Project Name:_____

Project Location:

Project Description:

(Brief description of project. If applicable, include additional data or maps as attachments.)

Is this a new project?_____

Is this project included in the Long-Range Transportation Plan? _____

Estimated Start Date:_____

Estimated Completion Date:_____

CMAQ FORM-A (Continued)

Need for and Benefit to be Derived from Project: (Probable impact on air quality)

Project Cost and Funding:

Total Project Cost: $_____

Indicate Requested CMAQ Funding Per Fiscal Year Below:

Fiscal Year 1:	Year:_____	Requested CMAQ Amount: $_____
Fiscal Year 2:	Year:_____	Requested CMAQ Amount: $_____
Fiscal Year 3:	Year:_____	Requested CMAQ Amount: $_____
Fiscal Year 4:	Year:_____	Requested CMAQ Amount: $_____
Fiscal Year 5:	Year:_____	Requested CMAQ Amount: $_____

CMAQ Project Type
(Please check ONE below and then use the associated form to complete your application)

☐ Citywide Signal System	USE FORM-B, Section 1
☐ Intersection Geometric/Timing	USE FORM-B, Section 2
☐ Signal System Coordination	USE FORM-B, Section 3
☐ Park & Ride Lots	USE FORM-C
☐ Bicycle/Pedestrian	USE FORM-D
☐ Transportation Demand Management	USE FORM-E
☐ Transit Service (New or Expanded)	USE FORM-F, Section 1
☐ Transit Vehicle Replacement/Purchase	USE FORM-F, Section 2
☐ Transit Shelters/Facilities	USE FORM-F, Section 3
☐ Other	Contact HRTPO Staff for Input Data Requirements

CMAQ FORM-B

HIGHWAY PROJECTS

(Fill out only ONE section below, depending on the Project Type)

SECTION 1: Citywide Signal System

1-a. Number of intersections included in project:_____

1-b. Other data:

SECTION 2: Intersection Geometric/Timing

2-a. Attach the intersection analysis showing the total intersection delay (seconds/vehicle) and the total number of vehicles entering the intersection during the AM and PM peak hours, with and without the proposed improvements

OR

2-b. Attach a drawing of the current intersection geometry

2-c. Attach the current signal timing plan

2-d. Attach recent turning movement counts for the AM and PM peak hours

SECTION 3: Signal System Coordination

3-a. Segment length in miles:_____

3-b. Posted speed limit:_____

3-c. Current average speed during the peak hour:_____

3-d. Current Average Daily Traffic for the segment (vehicles/day):_____

CMAQ FORM-C

PARK & RIDE LOTS

1. Is this a new Park & Ride lot?_____ If "yes", what is the size of the lot?_____
2. Please provide the current mode share of trips expected to use this P&R lot:
   a. Single Occupant Vehicle: _____%
   b. Carpool/Vanpool: _____%
   c. Bike/Walk: _____%
   d. Transit: _____%
3. Number of parking spaces: Current:_____ After Project:_____
4. Is the lot currently served by transit? _____
5. Will the lot be served by transit after the project?_____
7. Estimated average distance people drive from home to lot (miles):_____
6. Services available at this P&R lot:
   a. Local Bus? ☐ Frequency: _____ Boardings: _____
   b. Express Bus? ☐ Frequency: _____ Boardings: _____
   c. HOV Express? ☐ Frequency: _____ Boardings: _____
8. Additional information on improvements:

CMAQ FORM-D

BICYCLE/PEDESTRIAN PROJECTS

1. Type of facility (shoulder lane, separated, etc.):_____
2. Length of facility (miles):
   a. Existing:_____
   b. After Project:_____
3. Expected primary use of facility (Check all that apply):
   a. Recreation: ☐
   b. Work trips: ☐
   c. Non-Work trips: ☐
4. Is this a Bikeway project?_____ (If yes, fill in a through d below)
   a. Population within 3 miles of the corridor:_____
   b. Percentage of trips that are work trips within 3 miles of the corridor:_____%
   c. Percentage of trips that are non-work trips within 3 miles of the corridor:_____%
   d. List the TAZs within 3 miles of the corridor:_____
5. Is this a pedestrian project?_____ (If yes, fill in a through d below)
   a. List the TAZs within 1 mile of the corridor:_____
   b. Population within 1 mile of the corridor:_____
   c. Percentage of trips that are work trips within 1 mile of the corridor:_____%
   d. Percentage of trips that are non-work trips within 1 mile of the corridor:_____%
6. Additional information:

CMAQ FORM-E

TDM PROGRAM

1. Type of TDM Program:_____
2. Current total number of employees at site or area:_____
3. Average one-way distance of employees' commute (miles):_____
4. Number of employees expected to participate in this program:_____
5. Number of employees currently driving to work alone:_____
6. Number of employees currently car/vanpooling:_____
7. Number of employees currently using transit:_____
8. Number of employees currently biking or walking:_____
9. Number of employees currently telecommuting:_____ Days/week:_____
10. Additional information:

CMAQ FORM-F

TRANSIT PROJECTS

(Fill out only ONE section below, depending on the Project Type)

SECTION 1: New or Expanded Transit Service (Includes tourist shuttles & special events service)

1-a. Estimated daily ridership:_____

1-b. Number of transit trips during peak hours: AM _____ PM _____

1-c. Number of transit trips per day:_____

1-d. Number of vehicles used for this service:_____

1-e. Hours of service per day:_____

1-f. Number of days per week service is available:_____

1-g. Number of days per year service is available:_____

1-h. Length of route (miles):_____

1-i. Does the project include a change in service frequency?_____

If "Yes", please specify:_____

Expected increase in daily ridership:_____

1-j. Does the project include a change in service coverage?_____

If "Yes", please specify:_____

Expected increase in daily ridership:_____

SECTION 2: Vehicle Replacement/Purchase

2-a. Type of new vehicles: _____

2-b. Number of new vehicles:_____

2-c. Emissions rates of new vehicles (specify units, i.e. grams/brake-horsepower/hour):

VOC:_____ NOx:_____

If the new vehicles are replacements for old vehicles, fill in 2-d through 2-h; otherwise, skip to 2-i.

2-d. Type of vehicles being replaced:_____

2-e. Average age of vehicles being replaced (years):_____

2-f. Average mileage of vehicles being replaced:_____

2-g. Number of vehicles being retired:_____

2-h. Emissions rates of vehicles being replaced (specify units, i.e. grams/brake-horsepower/hour):

VOC:_____ NOx:_____

2-i. Expected increase in ridership due to vehicle replacement or new/expanded service:_____

CMAQ FORM-F (Continued)

SECTION 3: Transit Shelters/Facilities

3-a. Type of improvement: (Check below)

- ☐ Shelters
- ☐ Signs
- ☐ Pull offs
- ☐ Transit center/facility

3-b. Affected area: (Check below)

- ☐ Regionwide
- ☐ Multijurisdiction – Specify: _____
- ☐ Citywide – Specify: _____
- ☐ Specific Neighborhood(s) – Specify: _____

3-c. Estimated population within ½ mile of the improvements: _____

3-d. Expected increase in ridership due to the proposed improvements: _____

Explain why ridership is expected to increase:

PAGE INTENTIONALLY LEFT BLANK

APPENDIX C

CMAQ Project Analysis Worksheets

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #1
TRANSIT SHELTERS/FACILITIES

LOCALITY/AGCY: City of Chesapeake
PROJECT NAME: **HRT Bus Shelters- Chesapeake**
DESCRIPTION: Provide 11 bus shelters at existing bus stops.
DATE: 9/10/2009 (on application)
PROJECT COST: $150,000

1- INCREASED BUS EMISSIONS: No Increase in Service or Emissions

2- TRAVEL REDUCTIONS:

Existing Monthly Ridership:

Shelter	Route	Ridership	source: HRT
1&2- Greenbrier Mall	15	100,019	June 2009
1&2- Greenbrier Mall	922	4,172	June 2009
1&2- Greenbrier Mall	967	2,940	June 2009
3- Bainbridge & Holly	58	5,649	June 2009
4&5- Battlefield Blvd	13	34,184	June 2009
6&7- Eden Way N	same route (#15) as for shelters 1&2 above		
8thru11- locations TBD (2)	6	22,729	June 2009
	6	169,693	boardings/month
	(# of routes)		
		30	days/month
	Existing Daily Ridership:	5,656	boardings/day

Assumption:
"Basic Coverage" is 5 new shelters per route, which produces 2% increase in ridership:

Basic Shelters/Route:	5.0	
Basic Increase in Ridership:	2.0%	as assumed during previous CMAQ cylces

Increase in Ridership Due to Project:

Shelters:	11	above
Routes:	6	above
Shelters/Rte:	1.8	
Resulting Increase in Ridership:	0.7%	prorating above #'s (1)
Existing Daily Ridership:	5,656	above
Increase in Ridership:	41	boardings/day
Vehicle Occupancy Rate (work):	1.15	persons/veh (5)
Reduction in Daily Vehicle Trips:	36	vehicles/day
Average Trip Length:	10	miles/trip (4)
Reduction in VMT:	361	miles/day

3- EMISSIONS REDUCTIONS:

Type	Emissions Factor, g/mi (3)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, days/yr	Emissions Reduction, kg/yr
VOC	0.676	361	244	0.244	365	89
NOx	0.640	361	231	0.231	365	84

4- COST EFFECTIVENESS:

Total Cost:	$150,000	above
Useful Life, years:	15	as assumed during previous CMAQ cycles
Annual Cost:	$10,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$10,000	89	$112	907	**$101,964**
NOx	$10,000	84	$119	907	**$107,627**

Notes:
(1) Project Increase = (Basic Increase) * (Project Shelters/Rte)/(Basic Shelters/Rte)
(2) "TBD": to be determined (therefore, a route w/ average ridership [#6] was chosen)
(3) Source: VDOT, Hampton Roads average for light-duty vehicles, all roadway classes, 2011, 35mph
(4) 2001 NHTS Table Designer
(5) As assumed in CMAQ analyses of previous years

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #2
OTHER - VEHICLE PREEMPTION

JURISDICTION:	Chesapeake
PROJECT NAME:	**Traffic Management System Emergency Vehicle Preemption**
LOCATION:	Citywide
DESCRIPTION:	Installation of Emergency Vehicle Preemption on 125 intersections
DATE:	9/10/2009 (on application)
PROJECT COST:	$1,000,000

1 - EMISSIONS REDUCTION:

Average Incident Duration	50	minutes/incident [1]
Average Travel Time to Incident	7.82	minutes/response [2]
Average Reduction in Travel Time due to Preemption	20% [3]	
Time Saved due to Preemption	1.56	minutes/incident

Delay Savings for Total Blockage Interstate Incidents:

Number of Lanes	Capacity (veh/hr) [4]	Hourly Volume (veh/hr) [5]	Delay Savings per Incident (veh-hr) [6]	Number of Incidents per year [1]	Total Delay Savings (veh-hr)
4	6,240	2,500	89	3	268
3	4,680	1,188	34	2	68
2	3,120	1,188	41	5	205

Total Delay Savings, Interstates	541	veh-hr
multiplied by:	2 [7]	
Total Delay Savings, Interstates and Arterials	1,081	veh-hr

Type	Emissions Factor, g/hr [8]	Change in Veh Delay, hr/yr (above)	Emissions Reduction, g/yr	Emissions Reduction, kg/yr
VOC	7.97	1,081	8,620	8.62
NOx	4.00	1,081	4,320	4.32

2 - COST EFFECTIVENESS

Total Cost:	$1,000,000	(from above)
Useful Life, years:	10	
Annual Cost:	$100,000	

Type	Cost, $/yr (above)	kg/yr (above)	$/kg	$/ton
VOC	$100,000	9	$11,600	**$10,521,464**
NOx	$100,000	4	$23,147	**$20,993,953**

(1) 2006 STC Incident Data, Average for Incidents on Chesapeake Interstates

(2) From application

(3) From Opticom studies

(4) 1,560 veh/hr/ln capacity for free flow speed of 60mi/hr (HCS, 23-10)

(5) From CMP

(6) Based on equation derived through traffic flow theory: $\Delta Delay = \frac{1}{2}\left(\frac{2vqnt - vqn^2}{q - v}\right)$

(v = volume, q=capacity, n= time saved due to preemption, t= average incident duration)

(7) Factor assumed to account for delay savings for incidents on arterials

(8) VDOT, Hampton Roads average for all vehicle types and roadway functional classes, 2011, idle

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #3
TRANSIT SHELTERS/FACILITIES

LOCALITY/AGCY: City of Chesapeake
PROJECT NAME: **Liberty Street Transfer Station**
DESCRIPTION: Construct transfer station with 4 shelters to replace existing station with 2 shelters.
DATE: 9/10/2009 (on application)
PROJECT COST: $250,000

1- INCREASED BUS EMISSIONS: No Increase in Service or Emissions

2- TRAVEL REDUCTIONS:

Existing Monthly Ridership:

Route	Ridership	source: HRT
6	22,729	June 2009
12	11,882	June 2009
13	34,184	June 2009
58	5,649	June 2009
4	74,444	boardings/month
(# of routes)		
	30	days/month
Existing Daily Ridership:	2,481	boardings/day

Increase in Ridership Due to Project: 1% estimate (2)
Increase in Ridership: 25 boardings/day

Vehicle Occupancy Rate (work): 1.15 persons/veh (3)
Reduction in Daily Vehicle Trips: 22 vehicles/day

Average Trip Length: 10 miles/trip (4)
Reduction in VMT: 216 miles/day

3- EMISSIONS REDUCTIONS:

Type	Emissions Factor, g/mi (1)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, days/yr	Emissions Reduction, kg/yr
VOC	0.676	216	146	0.146	365	53
NOx	0.640	216	138	0.138	365	50

4- COST EFFECTIVENESS:

Total Cost: $250,000 above
Useful Life, years: 15 as assumed in previous CMAQ analyses
Annual Cost: $16,667

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$16,667	53	$313	907	**$284,073**
NOx	$16,667	50	$331	907	**$299,851**

Notes:
(1) Source: VDOT, Hampton Roads average for light-duty vehicles and all roadway functional classes, 2011, 35mph
(2) A 2% increase was previously assumed for shelter group projects, i.e. projects adding many shelters.
For this project, which adds a few shelters and improves lighting, 1% was used.
(3) As assumed in CMAQ analyses of previous years
(4) 2001 NHTS Table Designer

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #4
OTHER - CITYWIDE ITS UPGRADES

JURISDICTION: Chesapeake
PROJECT NAME: **Traffic Management Center and System Additions**
LOCATION: Citywide
DESCRIPTION: Installation of 15 CCTV cameras, 8 VMS signs, Highway Advisory Radio systems and automated traffic count collection devices at key locations.

PROJECT COST: $2,000,000

1 - PROCEDURE: The City turned in a Measures of Effectiveness table that included fifteen intersections for CCTV cameras and 8 intersections for VMS signs. The MOE table took into account the estimated time saved per incident, number of vehicles entering the intersection per 12 hr day, number of crashes per year at the intersections, and the estimated savings in delay expected as a result of the cameras and signs.

2 - ANALYSIS:

15 CCTV Cameras, Delay Saved Annually (sec/yr)	42,219,600
8 VMS Signs, Delay Saved Annually (sec/yr)	30,058,560
Delay Saved Annually (sec/yr)	72,278,160
divided by	3,600 sec/hr
Delay Saved Annually (hrs/yr)	20,077

3 - PROJECT EFFECT ON AIR QUALITY:

Total Cost:	$2,000,000	above
Useful life, years:	10	as assumed previously
Annual Cost:	$200,000	

Type	Emissions Factor, g/hr [1]	Emissions Reduction, kg/yr [2]	Cost, $/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	10.98	220.4	$200,000	$907	907	**$822,868**
NOx	3.49	70.0	$200,000	$2,856	907	**$2,590,708**

Notes:
(1) Source: VDOT, Hampton Roads average for all vehicle types and principal arterials, 2011, idle speed.
(2) Emmissions Reduction = (Emissions Factor (g/hr) x Change in Delay (hrs/yr)) / 1,000 (g/kg)

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #5
BICYCLE/PEDESTRIAN FACILITIES

JURISDICTION: Gloucester
PROJECT NAME: **Bicycle-Pedestrian Improvement to Route 216, Guinea Rd**
LOCATION: From US 17 to Maryus Rd
DESCRIPTION: Shoulder lane - sidewalk
DATE: 9/24/2009 (on application)
PROJECT COST: $1,300,000

1- ESTIMATES OF VMT REDUCTIONS:

Ground counts for reasonableness check re: CMAQ Post Evaluation study (12):

Bikeway	Bicycle Counts			Pedestrian Counts		
Sampled Bikeway	Weekday Counts	Weekend Counts	Avg. Day Estimate (1)	Weekday Counts	Weekend Counts	Avg. Day Estimate (1)
Goodwin Neck	2	4	3	0	0	0
Warwick Blvd	13	31	18	11	10	11
Col. Pkwy Conn.	34	81	47	7	5	6
Average:	16	39	**23**	6	5	**6**

Demand estimation for proposed facility re: NCHRP Report 552:

Local Bicycle Commute Share (C): 0.3% source (2)
Facility Length (L): 3.61 mi.

Buffer, Distance from Project	TAZ	2000 Density (D), persons/ sq.mi.	Area of Buffer (A), sq.mi. (6)	Residents in Buffer (R=D*A)	Existing Adult Cyclists (R*C*0.8) (3)	New Adult Cyclists (4)	Existing Adult Pedestrians (5)	New Adult Pedestrians (5)
0.00-0.25 mi.	1436	716	1.81	1,293	3	6	1	2
0.25-0.50 mi.	1438	201	1.81	363	1	1	0	0
0.50-1.00 mi.	1435	1,343	3.61	4,847	12	5	3	1
				6,502	16	12	4	3

Checking reasonableness of bicycle demand estimation via comparison to ground counts:

Existing Adult Cyclists: 16 above
New Adult Cyclists: 12 above
Total Adult Cyclists: 28

Trips, per day per cyclist: 2 trip to destination + return trip
Total Trips per Day: 56

vs. Trips on Sampled Bikeways: 23 above
Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	12	3	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	24	6	
Eliminated Person Trips by Auto:	24	6	above (7)
Occupancy of Eliminated Auto Trips:	1.25	1.25	source (11)
Eliminated Vehicle Trips (Auto):	19	5	
Avg. Alt. Mode Trip Length, mi.:	2	1	source (9)
Factor (for converting alt. mode trip lengths):	2	2	source (10)
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	76	10	
		Total:	86 vehicle-miles

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi (8)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, days/yr	Emissions Reduction, kg/yr
VOC	0.676	86	58	0.058	365	21
NOx	0.640	86	55	0.055	365	20

3- COST EFFECTIVENESS:

Total Cost:	$1,300,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$86,667	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$86,667	21	$4,086	907	**$3,706,344**
NOx	$86,667	20	$4,313	907	**$3,912,205**

Notes:
(1) Average Day Estimate = [(Weekday Count * 5) + (Weekend Count * 2)] / 7
(2) "A Review of 2000 Census Commute Data for Hampton Roads", HRPDC, Nov. 2005, p. 28
(3) "Low" estimate, re: NCHRP Report 552, pg. 38
(4) "New": i.e. as a result of proposed facility; New = Existing * B, where B varies by buffer: 0-0.25mi: 1.93; 0.25-0.50mi: 1.11; 0.50-1.00mi: 0.39, re: NCHRP Report 552, pg. 39
(5) Pedestrians = Cyclists / 4, based on ground counts at top of page
(6) Only areas lateral to facility are included in buffers; semi-circular areas at ends of facility are not included in buffers
(7) Assuming each new alt. mode trip eliminates an auto trip
(8) Source: VDOT, Hampton Roads average for light duty vehicles and roadway functional classes, 2011, 35mph
(9) Source: 2001 NHTS Table Designer
(10) It is assumed that the eliminated auto trips will have length lower than regular auto trips (10 miles; source (9)) and higher than regular alt. mode trips (shown above).
(11) All-trip occupancy, based on occupancies assumed in CMAQ analyses of previous years: work- 1.1; non-work- 1.3
(12) HRPDC, Feb. 2003, Appendix C

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #6
BICYCLE/PEDESTRIAN FACILITIES

JURISDICTION: Gloucester
PROJECT NAME: **Bicycle-Pedestrian Improvement to Route 17- GW Memorial Hwy**
LOCATION: From Coleman Bridge to Farmwood Rd
DESCRIPTION: Sidewalk
DATE: 9/24/2009 (on application)
PROJECT COST: $300,000

1- ESTIMATES OF VMT REDUCTIONS:

Ground counts for reasonableness check re: CMAQ Post Evaluation study (12):

Bikeway	Bicycle Counts			Pedestrian Counts		
Sampled Bikeway	Weekday Counts	Weekend Counts	Avg. Day Estimate (1)	Weekday Counts	Weekend Counts	Avg. Day Estimate (1)
Goodwin Neck	2	4	3	0	0	0
Warwick Blvd	13	31	18	11	10	11
Col. Pkwy Conn.	34	81	47	7	5	6
Average:	16	39	**23**	6	5	**6**

Demand estimation for proposed facility re: NCHRP Report 552:

Local Bicycle Commute Share (C): 0.3% source (2)
Facility Length (L): 0.664 mi.

Buffer, Distance from Project	TAZ	2000 Density (D), persons/ sq.mi.	Area of Buffer (A), sq.mi. (6)	Residents in Buffer (R=D*A)	Existing Adult Cyclists (R*C*0.8) (3)	New Adult Cyclists (4)	Existing Adult Pedestrians (5)	New Adult Pedestrians (5)
0.00-0.25 mi.	1435	1,343	0.33	446	1	2	0	1
0.25-0.50 mi.	1434	1,600	0.33	531	1	1	0	0
0.50-1.00 mi.	1434	1,600	0.66	1,062	3	1	1	0
				2,039	5	4	1	1

Checking reasonableness of bicycle demand estimation via comparison to ground counts:

Existing Adult Cyclists: 5 above
New Adult Cyclists: 4 above
Total Adult Cyclists: 9

Trips, per day per cyclist: 2 trip to destination + return trip
Total Trips per Day: 18

vs. Trips on Sampled Bikeways: 23 above
Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	4	1	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	8	2	
Eliminated Person Trips by Auto:	8	2	above (7)
Occupancy of Eliminated Auto Trips:	1.25	1.25	source (11)
Eliminated Vehicle Trips (Auto):	6	2	
Avg. Alt. Mode Trip Length, mi.:	2	1	source (9)
Factor (for converting alt. mode trip lengths):	2	2	source (10)
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	24	4	
		Total:	28 vehicle-miles

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi (8)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, days/yr	Emissions Reduction, kg/yr
VOC	0.676	28	19	0.019	365	7
NOx	0.640	28	18	0.018	365	7

3- COST EFFECTIVENESS:

Total Cost:	$300,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$20,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$20,000	7	$2,896	907	**$2,627,024**
NOx	$20,000	7	$3,057	907	**$2,772,936**

Notes:
(1) Average Day Estimate = [(Weekday Count * 5) + (Weekend Count * 2)] / 7
(2) "A Review of 2000 Census Commute Data for Hampton Roads", HRPDC, Nov. 2005, p. 28
(3) "Low" estimate, re: NCHRP Report 552, pg. 38
(4) "New": i.e. as a result of proposed facility; New = Existing * B, where B varies by buffer: 0-0.25mi: 1.93; 0.25-0.50mi: 1.11; 0.50-1.00mi: 0.39, re: NCHRP Report 552, pg. 39
(5) Pedestrians = Cyclists / 4, based on ground counts at top of page
(6) Only areas lateral to facility are included in buffers; semi-circular areas at ends of facility are not included in buffers
(7) Assuming each new alt. mode trip eliminates an auto trip
(8) Source: VDOT, Hampton Roads average for light duty vehicles and roadway functional classes, 2011, 35mph
(9) Source: 2001 NHTS Table Designer
(10) It is assumed that the eliminated auto trips will have length lower than regular auto trips (10 miles; source (9)) and higher than regular alt. mode trips (shown above).
(11) All-trip occupancy, based on occupancies assumed in CMAQ analyses of previous years: work- 1.1; non-work- 1.3
(12) HRPDC, Feb. 2003, Appendix C

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #7
BICYCLE/PEDESTRIAN FACILITIES

JURISDICTION: Gloucester
PROJECT NAME: **Bicycle-Pedestrian Improvement to Route 1216- Hayes Road**
LOCATION: Entire length of Hayes Road
DESCRIPTION: Shoulder lane - sidewalk
DATE: 9/24/2009 (on application)
PROJECT COST: $750,000

1- ESTIMATES OF VMT REDUCTIONS:

Ground counts for reasonableness check re: CMAQ Post Evaluation study (12):

Bikeway	Bicycle Counts			Pedestrian Counts		
Sampled Bikeway	Weekday Counts	Weekend Counts	Avg. Day Estimate (1)	Weekday Counts	Weekend Counts	Avg. Day Estimate (1)
Goodwin Neck	2	4	3	0	0	0
Warwick Blvd	13	31	18	11	10	11
Col. Pkwy Conn.	34	81	47	7	5	6
Average:	16	39	**23**	6	5	**6**

Demand estimation for proposed facility re: NCHRP Report 552:

Local Bicycle Commute Share (C): 0.3% source (2)
Facility Length (L): 1.78 mi.

Buffer, Distance from Project	TAZ	2000 Density (D), persons/ sq.mi.	Area of Buffer (A), sq.mi. (6)	Residents in Buffer (R=D*A)	Existing Adult Cyclists (R*C*0.8) (3)	New Adult Cyclists (4)	Existing Adult Pedestrians (5)	New Adult Pedestrians (5)
0.00-0.25 mi.	1434	1,600	0.89	1,424	3	6	1	2
0.25-0.50 mi.	1435	1,343	0.89	1,195	3	3	1	1
0.50-1.00 mi.	1440	28	1.78	49	0	0	0	0
				2,668	6	9	2	3

Checking reasonableness of bicycle demand estimation via comparison to ground counts:

Existing Adult Cyclists: 6 above
New Adult Cyclists: 9 above
Total Adult Cyclists: 15

Trips, per day per cyclist: 2 trip to destination + return trip
Total Trips per Day: 30

vs. Trips on Sampled Bikeways: 23 above
Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	9	3	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	18	6	
Eliminated Person Trips by Auto:	18	6	above (7)
Occupancy of Eliminated Auto Trips:	1.25	1.25	source (11)
Eliminated Vehicle Trips (Auto):	14	5	
Avg. Alt. Mode Trip Length, mi.:	2	1	source (9)
Factor (for converting alt. mode trip lengths):	2	2	source (10)
Avg. Eliminated Auto Trip Length, mi.:	4	2	
VMT Reduction, veh-mi:	56	10	
		Total:	66 vehicle-miles

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi (8)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, days/yr	Emissions Reduction, kg/yr
VOC	0.676	66	45	0.045	365	16
NOx	0.640	66	42	0.042	365	15

3- COST EFFECTIVENESS:

Total Cost:	$750,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$50,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$50,000	16	$3,072	907	**$2,786,238**
NOx	$50,000	15	$3,243	907	**$2,940,993**

Notes:
(1) Average Day Estimate = [(Weekday Count * 5) + (Weekend Count * 2)] / 7
(2) "A Review of 2000 Census Commute Data for Hampton Roads", HRPDC, Nov. 2005, p. 28
(3) "Low" estimate, re: NCHRP Report 552, pg. 38
(4) "New": i.e. as a result of proposed facility; New = Existing * B, where B varies by buffer: 0-0.25mi: 1.93; 0.25-0.50mi: 1.11; 0.50-1.00mi: 0.39, re: NCHRP Report 552, pg. 39
(5) Pedestrians = Cyclists / 4, based on ground counts at top of page
(6) Only areas lateral to facility are included in buffers; semi-circular areas at ends of facility are not included in buffers
(7) Assuming each new alt. mode trip eliminates an auto trip
(8) Source: VDOT, Hampton Roads average for light duty vehicles and roadway functional classes, 2011, 35mph
(9) Source: 2001 NHTS Table Designer
(10) It is assumed that the eliminated auto trips will have length lower than regular auto trips (10 miles; source (9)) and higher than regular alt. mode trips (shown above).
(11) All-trip occupancy, based on occupancies assumed in CMAQ analyses of previous years: work- 1.1; non-work- 1.3
(12) HRPDC, Feb. 2003, Appendix C

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #8
CORRIDOR SIGNALS PROJECT

JURISDICTION: Gloucester County/VDOT Fredericksburg District
PROJECT NAME: **Signalization coordination along Route 17**
LOCATION: Route 17
DESCRIPTION: Analyze the signals along Route 17
DATE: 9/24/2009 (on application)
PROJECT COST: $2,200,000

1 - EMISSIONS REDUCTION

Arterial - from - to	Number of Signals [1]	AADT [2]	Peak Hour Volume [3]	Delay Savings (s/veh)[4]	Delay Savings (s / pk hr)[5]	Delay Savings (hr/day)[6]
Route 17 Coleman Bridge Gloucester Courthouse	12	36,000	3,168	10.7	406,771	665

Type	Emissions Factor, g/hr [7]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	10.980	665	7,298	7.3	250	1,824
NOx	3.573	665	2,374	2.4	250	594

2 - COST EFFECTIVENESS

Total Cost:	$2,200,000	(from above)
Useful Life, years:	10	as assumed previously
Annual Cost:	$220,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$220,000	1,824	$121	**$109,368**
NOx	$220,000	594	$371	**$336,139**

[1] As counted from Aerial Photographs
[2] From application
[3] VDOT AADT * Regional k factor from 2009 CMP database (0.088)
[4] As previously assumed
[5] Number of Signals * Peak Hr Volume * Delay Savings
[6] Delay Savings / Delay Represented by Peak Hour (.17) / 3600 s/hr
Peak Hour Delay Factor Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.
[7] VDOT, Hampton Roads Average for all vehicle types on principal arterials, 2011, idle

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #10
IMPROVEMENT TO SINGLE INTERSECTION (GEOMETRIC OR SIGNAL WORK)

JURISDICTION:	Hampton
UPC NO.:	n.a.
PROJECT NAME:	**Big Bethel Rd/Todds Ln Intersection Improvements**
LOCATION:	see above
DESCRIPTION:	Widen Todds Ln to provide an additional WB RT lane and an additional EB LT lane to allow dual EB left turns onto NB Big Bethel Rd (request to provide additional funds of $675,000 to complete a previous CMAQ project for $700,000)
DATE:	(on application)
PROJECT COST:	$1,375,000

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		78.5	sec/veh
Intersection Delay After Project		44.7	sec/veh
Change In Intersection Delay		33.8	sec/veh, pk hr
Total Vehicles During Peak Hour		4,320	veh/hr
	divided by	3,600	sec/hr
Change In Intersection Delay		40.6	veh hr's, pk hr
	divided by	17%	pk hr delay factor(1)
Change In Intersection Delay		238.6	hours/day

Type	Emissions Factor, g/hr (2)	Delay Change, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, weekdays/yr	Emissions Reduction, kg/yr
VOC	10.98	238.6	2,620	2.620	250	654.9
NOx	3.49	238.6	832	0.832	250	208.0

2 - COST EFFECTIVENESS

Total Cost:	$1,375,000	above
Useful life, years:	10	as assumed previously
Annual Cost:	$137,500	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$137,500	654.9	$210	907	**$190,423**
NOx	$137,500	208.0	$661	907	**$599,524**

Notes:
(1) pk hr delay factor = pk hr delay / daily delay;
source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, Page 8, June 1997.
(2) Source: VDOT, Hampton Roads average for all vehicle types and principal arterials, 2011, idle speed.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #11
TRANSIT SERVICE (NEW OR EXPANDED)

JURISDICTION: Hampton
UPC NO.: T4241
PROJECT NAME: **Coliseum Central Transit Shuttle**
LOCATION: Coliseum Central Business District, City of Hampton
DESCRIPTION: Transit shuttle to connect key nodes in Coliseum Central Business District
DATE: 8/5/2009 (on application)
PROJECT COST: $7,152,867 (1)

1 - INCREASED BUS EMISSIONS:

Route Length (one-way):	4.8	mi/trip (2)
Bus Trips per day (round trips):	70	round trips / day (2)
Factor:	2	trips / round trip
Bus VMT:	672	mi/day

Type	Emissions Factor, g/mi (3)	Bus VMT, mi/day (above)	Emissions Increase, g/day	Emissions Increase, kg/day	Conversion Factor, days/yr	Emissions Increase, kg/yr
VOC	0.590	672	396	0.40	365	145
NOx	12.461	672	8,374	8.37	365	3,056

2 - REDUCED AUTO EMISSIONS:

Ridership Estimate:	84	boardings/day (2)
Vehicle Occupancy Rate:	1.15	persons/veh (4)
Reduction in Daily Vehicle Trips:	73	veh trips / day
Average Trip Length:	10	miles/trip (5)
Reduction in VMT:	730	miles/day

Type	Emissions Factor, g/mi (6)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, days/yr	Emissions Reduction, kg/yr
VOC	0.665	730	486	0.49	365	177
NOx	0.797	730	582	0.58	365	212

3- COST EFFECTIVENESS:

Project Cost:	$7,152,867	above
Project life, years:	3	(2)
Annual Cost:	$2,384,289	

Type	Cost, $/yr (above)	Net Emissions Reduction, kg/yr	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$2,384,289	33	$73,184	907	**$66,377,466**
NOx	$2,384,289	-2,844	negative	907	**negative**

(1) VDOT SYIP

(2) From application

(3) VDOT, Hampton Roads average for Diesel Transit & Urban Buses on minor arterials, 2011, 35mph

(4) 1.15 for work trips, 1.30 for non-work trips, as previously assumed

(5) Average trip length for personal vehicle trips, 2001 NHTS

(6) VDOT, Hampton Roads average for all vehicle types on minor arterials, 2011, 35mph

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #12
CITYWIDE SIGNAL SYSTEM

JURISDICTION: Hampton
PROJECT NAME: **Citywide Traffic Signal System HRBT Diversion Signal Timings**
LOCATION: Citywide
DESCRIPTION: Create traffic signal timings for HRBT Diversion
DATE: 8/5/2009 (on application)
PROJECT COST: $160,000

1 - EMISSIONS REDUCTION		Low Volume Intersections	Medium Volume Intersections	High Volume Intersections	Total Intersections
	veh / pm pk hr:	Less than 2,690	2,690 to 5,900	More than 5,900	
Number of Intersections [1]:		28	4	0	32
	multiplied by:	2,690	5,900	9,500	veh / pm pk hr [2]
	multiplied by:	10.7	10.7	10.7	sec/veh [2]
	divided by:	3,600	3,600	3,600	sec/hr
	divided by:	0.17	0.17	0.17	delay factor [3]
Change in Vehicle Delay:		1,317	413	0	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 1,729 hrs/day

Type	Emissions Factor, g/hr [4]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day [5]	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	7.973	1,729	13,790	13.8	250	3,447
NOx	3.996	1,729	6,911	6.9	250	1,728

2 - COST EFFECTIVENESS

Total Cost: $160,000 above
Useful Life, years: 10 as assumed previously
Annual Cost: $16,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$16,000	3,447	$4.64	907	**$4,210**
NOx	$16,000	1,728	$9.26	907	**$8,400**

Notes:
[1] From application
[2] As assumed in previous CMAQ analyses
[3] Portion of daily delay represented by peak hour
Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.
[4] VDOT, Hampton Roads Average for all vehicle types and roadway functional classes, 2011, idle
[5] Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #13
CITYWIDE SIGNAL SYSTEM

JURISDICTION: Hampton
PROJECT NAME: **Citywide Traffic Signal System Retiming**
LOCATION: Citywide
DESCRIPTION: Optimize signal timings for 10 arterials
DATE: 8/5/2009 (on application)
PROJECT COST: $392,000

1 - EMISSIONS REDUCTION		Low Volume Intersections	Medium Volume Intersections	High Volume Intersections	Total Intersections
	veh / pm pk hr:	Less than 2,690	2,690 to 5,900	More than 5,900	
Number of Intersections [1]:		32	17	0	49
	multiplied by:	2,690	5,900	9,500	veh / pm pk hr [2]
	multiplied by:	10.7	10.7	10.7	sec/veh [2]
	divided by:	3,600	3,600	3,600	sec/hr
	divided by:	0.17	0.17	0.17	delay factor [3]
Change in Vehicle Delay:		1,505	1,754	0	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 3,259 hrs/day

Type	Emissions Factor, g/hr [4]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day [5]	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	7.973	3,259	25,982	26.0	250	6,495
NOx	3.996	3,259	13,021	13.0	250	3,255

2 - COST EFFECTIVENESS

Total Cost: $392,000 above
Useful Life, years: 10 as assumed previously
Annual Cost: $39,200

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$39,200	6,495	$6.04	907	**$5,474**
NOx	$39,200	3,255	$12.04	907	**$10,922**

Notes:
[1] From application, analyzed as a system instead of corridor due to signals included not located on main corridor
[2] As assumed in previous CMAQ analyses
[3] Portion of daily delay represented by peak hour
Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.
[4] VDOT, Hampton Roads Average for all vehicle types and roadway functional classes, 2011, idle
[5] Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #14
CITYWIDE SIGNAL SYSTEM

JURISDICTION: Hampton
PROJECT NAME: **Citywide Traffic Signal Upgrade**
LOCATION: Citywide
DESCRIPTION: Citywide Upgrade of Traffic Signal System
DATE: 8/5/2009 (on application)
PROJECT COST: $1,500,000

1 - EMISSIONS REDUCTION

		Low Volume Intersections	Medium Volume Intersections	High Volume Intersections	Total Intersections
	veh / pm pk hr:	Less than 2,690	2,690 to 5,900	More than 5,900	
Number of Intersections [1]:		136	40	3	179
	multiplied by:	2,690	5,900	9,500	veh / pm pk hr [2]
	multiplied by:	10.7	10.7	10.7	sec/veh [2]
	divided by:	3,600	3,600	3,600	sec/hr
	divided by:	0.17	0.17	0.17	delay factor [3]
Change in Vehicle Delay:		6,396	4,126	498	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 11,021 hrs/day

Type	Emissions Factor, g/hr [4]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day [5]	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	7.973	11,021	87,870	87.9	250	21,967
NOx	3.996	11,021	44,037	44.0	250	11,009

2 - COST EFFECTIVENESS

Total Cost: $1,500,000 above
Useful Life, years: 10 as assumed previously
Annual Cost: $150,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$150,000	21,967	$6.83	907	**$6,193**
NOx	$150,000	11,009	$13.62	907	**$12,358**

Notes:
[1] From application
[2] As assumed in previous CMAQ analyses
[3] Portion of daily delay represented by peak hour
Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.
[4] VDOT, Hampton Roads Average for all vehicle types and roadway functional classes, 2011, idle
[5] Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #15
OTHER - TRAFFIX (TDM)

AGENCY: Hampton Roads Transit
PROJECT NAME: **Tranportation Demand Management - TRAFFIX - Hampton Roads**
LOCATION: Hampton Roads
DESCRIPTION: This program is designed to provide drivers of single occupancy vehicles other options for getting to and from work. The intent is to facilitate van and car pools, telework, increase ridership on the area's buses, increase ridership on the Metro Area Express and eventually Light Rail.
PROJECT COST: $5,000,000

1 - PROCEDURE: TRAFFIX submitted current and future (over the next 5 years) estimates for employees in the region directly influenced by the TRAFFIX program for car/van pool, transit, bike/walk, and telecommuting.

2 - REDUCED AUTO EMISSIONS:

Service	Employees Influenced by TRAFFIX per day (1)	Vehicle Occupancy Rate, persons/veh (2)	Reduction in Daily Vehicle Trips (3)	Work Days per Year (4)	Average Roundtrip Length (Mi) (5)	Reduction in Annual VMTs
Car/Van Pool	15,262	3.11	10,355	240	25.0	62,128,550
Transit	2,614	1.15	2,273	240	25.0	13,638,261
Bike/Walk	1,646	1.15	1,431	240	2.5	858,783
Telecommuting	375	1.15	326	120	25.0	978,261
					TOTAL	77,603,854

Emissions Reductions				
Type	Factors, g/mi (6)	Annual VMTs (above)	kg/yr	tons/yr
VOC	0.676	77,603,854	52,433	57.80
NOx	0.640	77,603,854	49,674	54.76

3 - COST EFFECTIVENESS:

Total Cost:	$5,000,000
Project life, years :	5
Annual Cost:	$1,000,000

Cost Effectiveness			
Type	Cost, $/yr (above)	tons/yr (above)	$/ton
VOC	$1,000,000	57.80	**$17,302**
NOx	$1,000,000	54.76	**$18,263**

Notes:
(1) Five year average (FY2010-FY2014) of employees influenced by TRAFFIX to use the various TDM services
(2) As previously assumed (1.15 for work trips; 1.30 for non-work trips), Car/Van Pool rate from TRAFFIX
(3) Car/Van Pool Reduction in Daily Veh Trips = Employees - (Employees/Veh Occupancy Rate)
Transit, Bike/Walk, Telecommuting Reduction in Daily Veh Trips = (Employees/Veh Occupancy Rate)
(4) Telecommuting occurs 2-3 days per week
(5) Estimates provided by TRAFFIX
(6) VDOT, Hampton Roads average for light duty vehicles on all roadway functional classes, 2011, 35mph

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #16
TRANSIT VEHICLE REPLACEMENT/PURCHASE

AGENCY:	Hampton Roads Transit
PROJECT NAME:	**Purchase of Replacement Buses**
DESCRIPTION:	Replace 36 Buses
DATE:	9/25/2009 (on application)
PROJECT COST:	$14,600,000

Average Mileage of Vehicles Being Replaced	610,000	miles (1)
Average Age of Vehicles Being Replaced	14.5	years (1)
Average Miles per Year per Bus	42,069	miles/year per bus

1 - CHANGE IN BUS EMISSIONS

Current Buses	Emissions Rate g / bhp-hr (1)	Emissions Rate g/mi (2)	VMT mi/yr/bus	Number of Vehicles	Yearly Emissions g/yr	Yearly Emissions kg/yr
VOC	0.07	0.32	42,069	38	506,841	507
NOx	4.0	18.72	42,069	38	29,919,785	29,920

New Buses	Emissions Rate g / bhp-hr (1)	Emissions Rate g/mi (2)	VMT mi/yr/bus	Number of Vehicles	Yearly Emissions g/yr	Yearly Emissions kg/yr
VOC	0.01	0.05	42,069	38	72,406	72
NOx	0.2	0.94	42,069	38	1,495,989	1,496

Reduction in Emissions	VOC	434	kg/yr
	NOx	28,424	kg/yr

2 - TRAVEL REDUCTIONS:

Existing Monthly Ridership:		1,459,827	(3)
	divided by:	30	days/mo
	divided by:	268	buses (4)
Existing Daily Ridership:		182	persons/day/bus
Increase in Ridership Due to Project:		3%	(5)
	multiplied by:	38	buses
Daily Riders:		207	persons/day
Vehicle Occupancy Rate:		1.15	persons/veh (6)
Reduction in Daily Vehicle Trips:		180	vehicles/day
Average Trip Length:		10	miles/trip (7)
Reduction in VMT:		1,800	miles/day

		VOC	NOx	
Emissions Rate		0.676	0.640	g/mile [8]
	Emissions Rate	1,216	1,152	g/day
	multiplied by:	365	365	days/year
	divided by:	1,000	1000	g/kg
	Reduction in Vehicle Emissions	444	421	kg/yr

3 - EMISSIONS REDUCTION

	VOC	NOx	
Reduction in Bus Emissions (from above)	434	28,424	kg/yr
Reduction in Vehicle Emissions (from above)	444	421	kg/yr
Reduction in Emissions	878	28,844	kg/yr

4 - COST EFFECTIVENESS

Total Cost:	$14,600,000	above
Useful life, years:	15 [9]	
Annual Cost:	$973,333	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Eff., $/Ton
VOC	$973,333	878	$1,108	**$1,005,119**
NOx	$973,333	28,844	$34	**$30,606**

[1] From application; given values for NMHC converted to VOC by factor of .484 (source: fhwa.dot.gov)
[2] Applying a conversion factor of 4.679 bhp-hr / mi, EPA data for Mobile6
[3] Total ridership, July 2009, gohrt.com
[4] Total number of buses
[5] From application
[6] 1.15 for work trips, 1.30 for non-work trips, as previously assumed
[7] Average trip length for personal vehicle trips, 2001 NHTS
[8] VDOT, Hampton Roads average for light duty vehicles and all roadway functional classes, 2011, 35 mph
[9] As assumed previously

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #17
TRANSIT VEHICLE REPLACEMENT/PURCHASE

AGENCY: Hampton Roads Transit
PROJECT NAME: **Retrofit buses with diesel particulate filters (DPF)**
DESCRIPTION: Retrofit 100 transit buses
DATE: 9/25/2009 (on application)
PROJECT COST: $1,500,000

Average Mileage of Vehicles Being Replaced	410,000	miles [(1)]
Average Age of Vehicles Being Replaced	9.86	years [(1)]
Average Miles per Year per Bus	41,582	miles/year per bus

1 - CHANGE IN BUS EMISSIONS

Current Buses	Emissions Rate g / bhp-hr [(1)]	Emissions Rate g/mi [(2)]	VMT mi/yr/bus	Number of Vehicles	Yearly Emissions g/ yr	Yearly Emissions kg/yr
VOC	0.0678	0.32	41,582	100	1,318,358	1,318
NOx	2.5	11.70	41,582	100	48,640,720	48,641

Retrofitted Buses	Emissions Rate g / bhp-hr [(1)]	Emissions Rate g/mi [(2)]	VMT mi/yr/bus	Number of Vehicles	Yearly Emissions g/ yr	Yearly Emissions kg/yr
VOC	0.0048	0.02	41,582	100	94,168	94
NOx	2.5	11.70	41,582	100	48,640,720	48,641

Reduction in Emissions	VOC	1,224	kg/yr
	NOx	0	kg/yr

2 - TRAVEL REDUCTIONS:

Existing Monthly Ridership:		1,459,827	[(3)]
	divided by:	30	days/mo
	divided by:	268	buses [(4)]
Existing Daily Ridership:		182	persons/day/bus
Increase in Ridership Due to Project:		3%	[(5)]
	multiplied by:	100	buses
Daily Riders:		545	persons/day
Vehicle Occupancy Rate:		1.15	persons/veh [(6)]
Reduction in Daily Vehicle Trips:		474	vehicles/day
Average Trip Length:		10	miles/trip [(7)]
Reduction in VMT:		4,737	miles/day

	VOC	NOx	
Emissions Rate	0.676	0.640	g/mile [8]
Emissions Rate	3,200	3,032	g/day
multiplied by:	365	365	days/year
divided by:	1,000	1000	g/kg
Reduction in Vehicle Emissions	1,168	1,107	kg/yr

3 - EMISSIONS REDUCTION

	VOC	NOx	
Reduction in Bus Emissions (from above)	1,224	0	kg/yr
Reduction in Vehicle Emissions (from above)	1,168	1,107	kg/yr
Reduction in Emissions	2,392	1,107	kg/yr

4- COST EFFECTIVENESS:

Total Cost:	$1,500,000	above
Useful life, years:	15 [9]	
Annual Cost:	$100,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Eff., $/Ton
VOC	$100,000	2,392	$42	**$37,913**
NOx	$100,000	1,107	$90	**$81,959**

[1] From application; given values for NMHC converted to VOC by factor of .484 (source: fhwa.dot.gov)
[2] Applying a conversion factor of 4.679 bhp-hr / mi, EPA data for Mobile6
[3] Total ridership, July 2009, gohrt.com
[4] Total number of buses
[5] From application
[6] 1.15 for work trips, 1.30 for non-work trips, as previously assumed
[7] Average trip length for personal vehicle trips, 2001 NHTS
[8] VDOT, Hampton Roads average for light duty vehicles and all roadway functional classes, 2011, 35 mph
[9] As assumed previously

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #18
OTHER - ENVIRONMENTAL MANAGEMENT SYSTEM

AGENCY: Hampton Roads Transit
PROJECT NAME: **Environmental Management System**
DESCRIPTION: Policies to improve efficiency of vehicles
DATE: 9/25/2009 (on application)
PROJECT COST: $750,000

1- CHANGE IN BUS EMISSIONS

Before EMS	Emissions Rate [1]	Emissions Rate [2]	VMT [3]	Number of	Yearly Emissions	Yearly Emissions
	g / bhp-hr	g/mi	mi/yr/bus	Vehicles	g/yr	kg/yr
VOC	0.14	0.66	42,000	100	2,774,372	2,774
NOx	1.20	5.61	42,000	100	23,582,160	23,582

After EMS	Emissions Rate [4]	Emissions Rate [2]	VMT [3]	Number of	Yearly Emissions	Yearly Emissions
	g / bhp-hr	g/mi	mi/yr/bus	Vehicles	g/yr	kg/yr
VOC	0.12	0.56	42,000	100	2,358,216	2,358
NOx	1.02	4.77	42,000	100	20,044,836	20,045

Reduction in Emissions VOC 416 kg/yr
NOx 3,537 kg/yr

2- COST EFFECTIVENESS:

Total Cost: $750,000 above
Useful life, years: 5 [4]
Annual Cost: $150,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Cost Eff., $/Ton
VOC	$150,000	416	$360	**$326,921**
NOx	$150,000	3,537	$42	**$38,461**

[1] "After EMS" Emissions Rate divided by .85 (15% reduction from Before to After, from agency)
[2] Applying a conversion factor of 4.679 bhp-hr / mi, EPA data for Mobile6
[3] From agency (on CMAQ Application for New Vehicles)
[4] From agency

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #19
TRANSIT SERVICE (NEW OR EXPANDED)

AGENCY:	Hampton Roads Transit (HRT)
PROJECT NAME:	**Feeder Bus Service for The Tide Light Rail**
LOCATION:	Length of the Tide rail line
DESCRIPTION:	Integrate the existing bus service into the Light Rail network
DATE:	9/21/2009 (on application)
PROJECT COST:	$3,600,000

1- INCREASED BUS EMISSIONS:

Additional Annual Mileage due to Feeder Buses:		1,221,438	mi/year (1)
	divided by:	365	days/year
Average Bus VMT		3,346	mi/day

Type	Emissions Factor, g/mi (2)	Bus VMT, mi/day (above)	Emissions Increase, g/day	Emissions Increase, kg/day	Conversion Factor, days/yr	Emissions Increase, kg/yr
VOC	0.590	3,346	1,974	1.97	365	721
NOx	12.461	3,346	41,700	41.70	365	15,220

2- REDUCED AUTO EMISSIONS:

Ridership Estimate:		23,000	boardings/day (1)
Vehicle Occupancy Rate:		1.15	persons/veh (3)
Reduction in Daily Vehicle Trips:		20,000	veh trips / day
Average Trip Length:		10	miles/trip (4)
Reduction in VMT:		200,000	miles/day

Type	Emissions Factor, g/mi (5)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, days/yr	Emissions Reduction, kg/yr
VOC	0.665	200,000	133,000	133.00	365	48,545
NOx	0.797	200,000	159,400	159.40	365	58,181

3- COST EFFECTIVENESS:

Project Cost:	$3,600,000	above
Project life, years:	3	(1)
Annual Cost:	$1,200,000	

Type	Cost, $/yr (above)	Net Emissions Reduction, kg/yr (auto - bus, above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$1,200,000	47,824	$25	907	**$22,758**
NOx	$1,200,000	42,961	$28	907	**$25,335**

(1) From application

(2) VDOT, Hampton Roads average for Diesel Transit & Urban Buses on minor arterials, 2011, 35mph

(3) 1.15 for work trips, 1.30 for non-work trips, as previously assumed

(4) Average trip length for personal vehicle trips, 2001 NHTS

(5) VDOT, Hampton Roads average for all vehicle types on minor arterials, 2011, 35mph

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #21
IMPROVEMENT TO SINGLE INTERSECTION (GEOMETRIC OR SIGNAL WORK)

JURISDICTION:	James City County
UPC NO.:	n.a.
PROJECT NAME:	**Monticello Ave Geometric Changes (westbound from Rt 199 to News Rd)**
LOCATION:	see above
DESCRIPTION:	Geometric lane changes and turning improvements.
DATE:	(on application)
PROJECT COST:	$3,100,000

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

A. News Rd & Monticello Ave

Intersection Delay Before Project		36.1	sec/veh
Intersection Delay After Project		20.8	sec/veh
Change In Intersection Delay		15.3	sec/veh, pk hr
Total Vehicles During Peak Hour		3,951	veh/hr
	divided by	3,600	sec/hr
Change In Intersection Delay		16.8	veh hr's, pk hr
	divided by	17%	pk hr delay factor[(1)]
Change In Intersection Delay		98.8	hours/day

B. Monticello Mktpl & Monticello Ave

Intersection Delay Before Project		24.8	sec/veh
Intersection Delay After Project		17.6	sec/veh
Change In Intersection Delay		7.2	sec/veh, pk hr
Total Vehicles During Peak Hour		4,408	veh/hr
	divided by	3,600	sec/hr
Change In Intersection Delay		8.8	veh hr's, pk hr
	divided by	17%	pk hr delay factor[(1)]
Change In Intersection Delay		51.9	hours/day

C. WindsorMeade Wy & Monticello Ave

Intersection Delay Before Project		11	sec/veh
Intersection Delay After Project		8.1	sec/veh
Change In Intersection Delay		2.9	sec/veh, pk hr
Total Vehicles During Peak Hour		5,788	veh/hr
	divided by	3,600	sec/hr
Change In Intersection Delay		4.7	veh hr's, pk hr
	divided by	17%	pk hr delay factor[(1)]
Change In Intersection Delay		27.4	hours/day

Type	Emissions Factor, g/hr [(2)]	Delay Change, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, weekdays/yr	Emissions Reduction, kg/yr
VOC	10.98	178.1	1,955	1.955	250	488.8
NOx	3.49	178.1	621	0.621	250	155.2

2 - COST EFFECTIVENESS

Total Cost:	$3,100,000	above
Useful life, years:	10	as assumed previously
Annual Cost:	$310,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$310,000	488.8	$634	907	**$575,253**
NOx	$310,000	155.2	$1,997	907	**$1,811,119**

Notes:
(1) pk hr delay factor = pk hr delay / daily delay;
source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, Page 8, June 1997.
(2) Source: VDOT, Hampton Roads average for all vehicle types and principal arterials, 2011, idle speed.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #24
TRANSIT SHELTERS/FACILITIES

LOCALITY/AGCY: City of Newport News
PROJECT NAME: **Newport News Citywide Bus Shelter Program (Phases 2-4)**
DESCRIPTION: Provide 100 bus shelters at bus stops, with Advanced Notification System at some.
DATE: 9/3/2009 (on application)
PROJECT COST: $900,000

1- INCREASED BUS EMISSIONS: No Increase in Service or Emissions

2- TRAVEL REDUCTIONS:

Existing Monthly Ridership: (asssume all Newport News routes affected)

Route	Ridership	source: HRT
64	1,617	June 2009
101	27,630	June 2009
103	28,473	June 2009
104	25,288	June 2009
106	36,989	June 2009
107	29,539	June 2009
112	48,869	June 2009
113	1,377	June 2009
116	21,825	June 2009
119	2,150	June 2009
121	1,147	June 2009
961	14,340	June 2009
967	2,940	June 2009
13	242,184	boardings/month
(# of routes)		
	30	days/month
Existing Daily Ridership:	8,073	boardings/day

Assumption:
"Basic Coverage" is 5 new shelters per route, which produces 2% increase in ridership:

Basic Shelters/Route:	5.0	
Basic Increase in Ridership:	2.0%	as assumed during previous CMAQ cylces

Increase in Ridership Due to Project:

Shelters:	100	above
Routes:	13	above
Shelters/Rte:	7.7	
Resulting Increase in Ridership:	3.1%	prorating above #'s (2)
Existing Daily Ridership:	8,073	above
Increase in Ridership:	248	boardings/day
Vehicle Occupancy Rate (work):	1.15	persons/veh (3)
Reduction in Daily Vehicle Trips:	216	vehicles/day
Average Trip Length:	10	miles/trip (4)
Reduction in VMT:	2,160	miles/day

3- EMISSIONS REDUCTIONS:

Type	Emissions Factor, g/mi (1)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, days/yr	Emissions Reduction, kg/yr
VOC	0.676	2,160	1,459	1.459	365	533
NOx	0.640	2,160	1,383	1.383	365	505

4- COST EFFECTIVENESS:

Total Cost:	$900,000	above
Useful Life, years:	15	as assumed in previous CMAQ analyses
Annual Cost:	$60,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$60,000	533	$113	907	**$102,165**
NOx	$60,000	505	$119	907	**$107,839**

Notes:
(1) Source: VDOT, Hampton Roads average for light-duty vehicles and all roadway functional classes, 2011, 35mph
(2) Project Increase = (Basic Increase) * (Project Shelters/Rte)/(Basic Shelters/Rte)
(3) As assumed in CMAQ analyses of previous years
(4) 2001 NHTS Table Designer

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #25
OTHER - FAST FERRY SERVICE

JURISDICTION: City of Newport News
PROJECT NAME: **Hampton Roads Fast Ferry**
LOCATION: Newport News Victory Landing Park to Norfolk Naval Base and Waterside
DESCRIPTION: Fast Ferry across Hampton Roads Harbor
DATE: 9/3/2009 (on application)
PROJECT COST: $40,000,000

1- FERRY EMISSIONS:

Type	Emissions, tons/year (1)	Conversion Factor, kg/ton	Emissions, kg/year
VOC	3.6	907	3,265
NOx	113.8	907	103,217

2- REDUCED AUTO EMISSIONS:

Ridership Estimate:	2,700	boardings/day
Vehicle Occupancy Rate (as previously assumed):	1.15	persons/veh
(1.15 for work trips; 1.30 for non-work trips)		
Reduction in Daily Vehicle Trips:	2,348	veh trips / day
Average Trip Length (2):	18	miles/trip
Reduction in VMT:	42,261	miles/day

Type	Emissions Factor, g/mi (3)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conver-sion Factor, days/yr (4)	Emissions Reduction, kg/yr
VOC	0.665	42,261	28,103	28.10	312	8,768
NOx	0.797	42,261	33,682	33.68	312	10,509

3- NET REDUCTION IN EMISSIONS

Type	Ferry Emissions, kg/yr (above)	Reduced Auto Emissions, kg/yr (above)	Net Emissions Reduction (Increase), kg/yr	Conversion Factor, kg/ton	Net Emissions Reduction (Increase), ton/yr
VOC	3,265	8,768	5,503	907	6.1
NOx	103,217	10,509	-92,708	907	-102.2

4- COST EFFECTIVENESS:

Project Cost:	$40,000,000	above
Project life, years:	4	
Annual Cost:	$10,000,000	

Type	Cost, $/yr (above)	Net Emissions Reduction, ton/yr (above)	Cost Effective-ness, $/ton
VOC	$10,000,000	6.1	**$1,648,166**
NOx	$10,000,000	-102.2	**negative**

(1) From EPA Diesel Emissions Quantifier

(2) Average difference in trip length: Average of trip distances between peninsula & Norfolk NAS/Waterside minus distance between peninsula and Victory Landing Park

(3) VDOT, Hampton Roads average for all vehicle types and roadway funcational classes, 2011, 35mph

(4) From application

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #26
TRANSIT SHELTERS/FACILITIES

LOCALITY/AGCY: City of Newport News
PROJECT NAME: **Riverside Hospital Bus Transfer Center**
DESCRIPTION: Construct bus transfer center with four bus pull-outs and improved shelters
DATE: 9/3/2009 (on application)
PROJECT COST: $1,500,000

1- INCREASED BUS EMISSIONS: No Increase in Service or Emissions

2- TRAVEL REDUCTIONS:

	Route	Ridership	
Existing Monthly Ridership:	106	36,989	source: HRT June 2009
	107	29,539	June 2009
	112	48,869	June 2009
	3 (# of routes)	115,397	boardings/month
		30	days/month
Existing Daily Ridership:		3,847	boardings/day
Increase in Ridership due to Transfer Center:		1%	estimate (2)
Increase in Ridership:		38	boardings/day
Vehicle Occupancy Rate (work):		1.15	persons/veh (3)
Reduction in Daily Vehicle Trips:		33	vehicles/day
Average Trip Length:		10	miles/trip (4)
Reduction in VMT:		334	miles/day

3- EMISSIONS REDUCTIONS:

Type	Emissions Factor, g/mi (1)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, days/yr	Emissions Reduction, kg/yr
VOC	0.676	334	226	0.226	365	82
NOx	0.640	334	214	0.214	365	78

4- COST EFFECTIVENESS:

Total Cost: $1,500,000 above
Useful Life, years: 15 as assumed in previous CMAQ analyses
Annual Cost: $100,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$100,000	82	$1,212	907	**$1,099,554**
NOx	$100,000	78	$1,280	907	**$1,160,627**

Notes:
(1) Source: VDOT, Hampton Roads average for light-duty vehicles and all roadway functional classes, 2011, 35mph
(2) A 2% increase was previously assumed for shelter group projects, i.e. projects adding many shelters.
Therefore, for this project, which adds only a few shelters, 1% was used.
(3) As assumed in CMAQ analyses of previous years
(4) 2001 NHTS Table Designer

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #27
OTHER - WAYFINDER SIGNS

JURISDICTION:	Newport News
PROJECT NAME:	**Wayfinder Sign Project**
LOCATION:	Newport News
DESCRIPTION:	Design, fabrication & installation of signing that will direct tourists, visitors, and citizens to major activity centers.
LENGTH (MI):	citywide
ACTIVITY CENTERS:	Community facilities, transportation facilities, and tourist attractions.
PROJECT COST:	$500,000

1 - REDUCED EMISSIONS:

Total annual Visitors: 9,895,411 Source: Newport News Department of Planning
City estimates that up to 10% of these visitors get lost and travel an average of 2 extra miles while lost.

Total number of people:	989,541	(10% of total visitors)
Vehicle Occupancy Counts:	2.5	as assumed previously
Total Number of Vehicles Impacted:	395,816	
Average Trip length (mi):	2	
Total VMTs:	791,633	

Average Travel Speed: 35 MPH

Emissions Reductions				
Type	Factors, g/mi (1)	Annual VMTs (above)	kg/yr	ton/yr
VOC	0.675	791,633	534.36	0.59
NOx	0.614	791,633	486.25	0.54

2 - COST EFFECTIVENESS:

Total Cost:	$500,000
Useful life, years :	10
Annual Cost:	$50,000

Cost Effectiveness			
Type	Cost, $/yr (above)	tons/yr (above)	$/ton
VOC	$50,000	0.59	**$84,885**
NOx	$50,000	0.54	**$93,283**

Notes:
(1) Source: VDOT, Hampton Roads average for light duty vehicle types and minor arterials, 2011, 35 mph.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #28
OTHER - CITYWIDE ITS UPGRADES

JURISDICTION: Newport News
PROJECT NAME: **Citywide CCTV Camera (12) Locations and ITS upgrades**
LOCATION: Citywide
DESCRIPTION: Install 12 CCTV cameras and height/flood detection (select locations) with feed to City Traffic Operations Center and Emergency Communication Center.
PROJECT COST: $300,000

1 - PROCEDURE: The City turned in a Measures of Effectiveness table that included twelve intersections/camera locations. The MOE table took into account the estimated time saved per incident, number of vehicles entering intersection per 12 hr day, number of crashes per year at the intersections, and the estimated savings in delay expected as a result of the CCTV cameras.

2 - ANALYSIS:

12 CCTV Cameras, Delay Saved Annually (Sec/Yr)	13,162,720	
divided by	3,600	sec/hr
Delay Saved Annually (Hrs/Yr)	3,656	

3 - PROJECT EFFECT ON AIR QUALITY:

Total Cost:	$300,000	above
Useful life, years:	10	as assumed previously
Annual Cost:	$30,000	

Type	Emissions Factor, g/hr [1]	Emissions Reduction, kg/yr [2]	Cost, $/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	10.98	40.1	$30,000	$747	907	**$677,771**
NOx	3.49	12.8	$30,000	$2,353	907	**$2,133,886**

Notes:
(1) Source: VDOT, Hampton Roads average for all vehicle types and principal arterials, 2011, idle speed.
(2) Emmissions Reduction = (Emissions Factor (g/hr) x Change in Delay (hrs/yr)) / 1,000 (g/kg)

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #29
CORRIDOR SIGNALS PROJECT

JURISDICTION: City of Newport News
PROJECT NAME: **Lower Jefferson Avenue Corridor Improvements**
LOCATION: Jefferson Avenue
DESCRIPTION: Install Video Detection and Pedestrian Signal Improvements
DATE: 9/25/2009 (on application)
PROJECT COST: $90,000

1 - EMISSIONS REDUCTION

Arterial - from - to	Number of Signals [1]	AADT [2]	Peak Hour Volume [3]	Delay Savings (s/veh)[4]	Delay Savings (s / pk hr)[5]	Delay Savings (hr/day)[6]
Jefferson Ave 25th Street 36th Street	6	16,176	1,423	10.7	91,388	149

Type	Emissions Factor, g/hr [7]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	10.915	149	1,630	1.6	250	407
NOx	3.573	149	533	0.5	250	133

2 - COST EFFECTIVENESS

Total Cost:	$90,000	(from above)
Useful Life, years:	10	as assumed previously
Annual Cost:	$9,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$9,000	407	$22	**$20,033**
NOx	$9,000	133	$67	**$61,207**

[1] As counted from Aerial Photographs
[2] From application
[3] VDOT AADT * Regional k factor from 2009 CMP database (0.088)
[4] As previously assumed
[5] Number of Signals * Peak Hr Volume * Delay Savings
[6] Delay Savings / Delay Represented by Peak Hour (.17) / 3600 s/hr
Peak Hour Delay Factor Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.
[7] VDOT, Hampton Roads Average for all vehicle types on minor arterials, 2011, idle

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #30
CITYWIDE SIGNAL SYSTEM

JURISDICTION: Newport News
PROJECT NAME: **Citywide Signal System Retiming**
LOCATION: Citywide
DESCRIPTION: Retime traffic signals citywide
DATE: 9/25/2009 (on application)
PROJECT COST: $500,000

1 - EMISSIONS REDUCTION

		Low Volume Intersections	Medium Volume Intersections	High Volume Intersections	Total Intersections
	veh / pm pk hr:	Less than 2,690	2,690 to 5,900	More than 5,900	
Number of Intersections [1]:		119	119	19	257
	multiplied by:	2,690	5,900	9,500	veh / pm pk hr [2]
	multiplied by:	10.7	10.7	10.7	sec/veh [2]
	divided by:	3,600	3,600	3,600	sec/hr
	divided by:	0.17	0.17	0.17	delay factor [3]
Change in Vehicle Delay:		5,597	12,275	3,156	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 21,028 hrs/day

Type	Emissions Factor, g/hr [4]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day [5]	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	7.973	21,028	167,659	167.7	250	41,915
NOx	3.996	21,028	84,025	84.0	250	21,006

2 - COST EFFECTIVENESS

Total Cost: $500,000 above
Useful Life, years: 10 as assumed previously
Annual Cost: $50,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$50,000	41,915	$1.19	907	**$1,082**
NOx	$50,000	21,006	$2.38	907	**$2,159**

Notes:
[1] From application
[2] As assumed in previous CMAQ analyses
[3] Portion of daily delay represented by peak hour
Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.
[4] VDOT, Hampton Roads Average for all vehicle types and roadway functional classes, 2011, idle
[5] Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #31
CITYWIDE SIGNAL SYSTEM

JURISDICTION: Norfolk
PROJECT NAME: **Citywide Traffic Signal Cabinet Upgrade**
LOCATION: Citywide
DESCRIPTION: Upgrade NEMA cabinets to 'Type 170' 332 or 336 cabinets
DATE: 9/25/2009 (on application)
PROJECT COST: $300,000

1 - EMISSIONS REDUCTION

		Low Volume Intersections	Medium Volume Intersections	High Volume Intersections	Total Intersections
	veh / pm pk hr:	Less than 2,690	2,690 to 5,900	More than 5,900	
Number of Intersections [1]:		32	32	1	65
	multiplied by:	2,690	5,900	9,500	veh / pm pk hr [2]
	multiplied by:	10.7	10.7	10.7	sec/veh [2]
	divided by:	3,600	3,600	3,600	sec/hr
	divided by:	0.17	0.17	0.17	delay factor [3]
Change in Vehicle Delay:		1,505	3,301	166	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 4,972 hrs/day

Type	Emissions Factor, g/hr [4]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day [5]	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	7.973	4,972	39,643	39.6	250	9,911
NOx	3.996	4,972	19,868	19.9	250	4,967

2 - COST EFFECTIVENESS

Total Cost: $300,000 above
Useful Life, years: 10 as assumed previously
Annual Cost: $30,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$30,000	9,911	$3.03	907	**$2,746**
NOx	$30,000	4,967	$6.04	907	**$5,478**

Notes:
[1] From application
[2] As assumed in previous CMAQ analyses
[3] Portion of daily delay represented by peak hour
Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.
[4] VDOT, Hampton Roads Average for all vehicle types and roadway functional classes, 2011, idle
[5] Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #32
CITYWIDE SIGNAL SYSTEM

JURISDICTION: Norfolk
PROJECT NAME: **Citywide Signal Retiming (City of Norfolk) Phase II**
LOCATION: Citywide
DESCRIPTION: Data collection to complete traffic signal retiming plan
DATE: 8/5/2009 (on application)
PROJECT COST: $500,000

1 - EMISSIONS REDUCTION

		Low Volume Intersections	Medium Volume Intersections	High Volume Intersections	Total Intersections
	veh / pm pk hr:	Less than 2,690	2,690 to 5,900	More than 5,900	
Number of Intersections [1]:		51	48	1	100
	multiplied by:	2,690	5,900	9,500	veh / pm pk hr [2]
	multiplied by:	10.7	10.7	10.7	sec/veh [2]
	divided by:	3,600	3,600	3,600	sec/hr
	divided by:	0.17	0.17	0.17	delay factor [3]
Change in Vehicle Delay:		2,399	4,951	166	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 7,516 hrs/day

Type	Emissions Factor, g/hr [4]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day [5]	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	7.973	7,516	59,927	59.9	250	14,982
NOx	3.996	7,516	30,033	30.0	250	7,508

2 - COST EFFECTIVENESS

Total Cost:	$500,000	above
Useful Life, years:	10	as assumed previously
Annual Cost:	$50,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$50,000	14,982	$3.34	907	**$3,027**
NOx	$50,000	7,508	$6.66	907	**$6,040**

Notes:
[1] From application
[2] As assumed in previous CMAQ analyses
[3] Portion of daily delay represented by peak hour
Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.
[4] VDOT, Hampton Roads Average for all vehicle types and roadway functional classes, 2011, idle
[5] Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #33
CITYWIDE SIGNAL SYSTEM

JURISDICTION: Norfolk
PROJECT NAME: **City of Norfolk ATMS Phase IV**
LOCATION: Citywide
DESCRIPTION: Continue deployment, upgrade, and expansion of ATMS
DATE: 9/25/2009 (on application)
PROJECT COST: $4,500,000

1 - EMISSIONS REDUCTION

		Low Volume Intersections	Medium Volume Intersections	High Volume Intersections	Total Intersections
	veh / pm pk hr:	Less than 2,690	2,690 to 5,900	More than 5,900	
Number of Intersections [1]:		53	69	2	124
	multiplied by:	2,690	5,900	9,500	veh / pm pk hr [2]
	multiplied by:	10.7	10.7	10.7	sec/veh [2]
	divided by:	3,600	3,600	3,600	sec/hr
	divided by:	0.17	0.17	0.17	delay factor [3]
Change in Vehicle Delay:		2,493	7,118	332	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 9,942 hrs/day

Type	Emissions Factor, g/hr [4]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day [5]	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	7.973	9,942	79,273	79.3	250	19,818
NOx	3.996	9,942	39,729	39.7	250	9,932

2 - COST EFFECTIVENESS

Total Cost:	$4,500,000	above
Useful Life, years:	10	as assumed previously
Annual Cost:	$450,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$450,000	19,818	$22.71	907	**$20,595**
NOx	$450,000	9,932	$45.31	907	**$41,093**

Notes:
[1] From application
[2] As assumed in previous CMAQ analyses
[3] Portion of daily delay represented by peak hour
Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.
[4] VDOT, Hampton Roads Average for all vehicle types and roadway functional classes, 2011, idle
[5] Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #34
CORRIDOR SIGNALS PROJECT

JURISDICTION: Portsmouth
PROJECT NAME: **Portsmouth Citywide Signal Timing - Phase 1**
LOCATION: Various Corridors (See Below)
DESCRIPTION: Analysis of existing and development of new signal timings for strategic corridors
DATE: 9/25/2009 (on application)
PROJECT COST: $120,000

1 - EMISSIONS REDUCTION

Arterial - from - to	Number of Signals [1]	AADT [2]	Peak Hour Volume [3]	Delay Savings (s/veh)[4]	Delay Savings (s / pk hr)[5]	Delay Savings (hr/day)[6]
Airline Blvd Winchester St. Frederick Blvd	4	16,000	1,408	10.7	60,262	98
Cedar Lane Rivershore Rd Rte 164	2	11,000	968	10.7	20,715	34
Cedar Lane Rte 164 W Norfolk Rd	2	19,000	1,672	10.7	35,781	58
Frederick Blvd Turnpike Rd Airline Blvd	3	25,000	2,200	10.7	70,620	115
GW Hwy Portsmouth Blvd Elm Ave	3	19,000	1,672	10.7	53,671	88
GW Hwy Elm Ave Frederick Blvd	2	22,000	1,936	10.7	41,430	68
GW Hwy Frederick Blvd Greenwood Dr	2	27,000	2,376	10.7	50,846	83
GW Hwy Greenwood Dr Afton Pkwy	1	25,000	2,200	10.7	23,540	38
GW Hwy Afton Pkwy Victory Blvd	1	22,000	1,936	10.7	20,715	34
High St Frederick Blvd Airline Blvd	2	18,000	1,584	10.7	33,898	55
High St Airline Blvd Mt. Vernon Hwy	1	14,000	1,232	10.7	13,182	22
London Blvd High St MLK Hwy	3	21,000	1,848	10.7	59,321	97
Towne Point Rd Gateway Dr. Rte 164	3	28,000	2,464	10.7	79,094	129
Towne Point Rd Rte 164 Dunkirk St	2	26,000	2,288	10.7	48,963	80

Total Delay Savings 1,000 hr/day

Type	Emissions Factor, g/hr [7]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	10.948	1,000	10,948	10.9	250	2,737
NOx	3.573	1,000	3,573	3.6	250	893

2 - COST EFFECTIVENESS

Total Cost:	$120,000	(from above)
Useful Life, years:	10	as assumed previously
Annual Cost:	$12,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$12,000	2,737	$4	**$3,977**
NOx	$12,000	893	$13	**$12,186**

[1] As counted from Aerial Photographs

[2] From application

[3] VDOT AADT * Regional k factor from 2009 CMP database (0.088)

[4] As previously assumed

[5] Number of Signals * Peak Hr Volume * Delay Savings

[6] Delay Savings / Delay Represented by Peak Hour (.17) / 3600 s/hr
Peak Hour Delay Factor Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.

[7] VDOT, Hampton Roads Average for all vehicle types, average of principal and minor arterials, 2011, idle

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #35
CORRIDOR SIGNALS PROJECT

JURISDICTION: Portsmouth
PROJECT NAME: **Portsmouth Citywide Signal Timing - Phase 2**
LOCATION: Various Corridors (See Below)
DESCRIPTION: Analysis of existing and development of new signal timings for strategic corridors
DATE: 9/25/2009 (on application)
PROJECT COST: $112,000

1 - EMISSIONS REDUCTION

Arterial - from - to	Number of Signals [1]	AADT [2]	Peak Hour Volume [3]	Delay Savings (s/veh)[4]	Delay Savings (s / pk hr)[5]	Delay Savings (hr/day)[6]
Airline Blvd Greenwood Rd/ Hodges Ferry Rd Elmhurst Ln	2	16,000	1,408	10.7	30,131	49
Airline Blvd Elmhurst Ln Victory Blvd	3	12,000	1,056	10.7	33,898	55
Airline Blvd Victory Blvd Portsmouth Blvd	1	14,000	1,232	10.7	13,182	22
Airline Blvd Portsmouth Blvd Kings Hwy	1	16,000	1,408	10.7	15,066	25
Airline Blvd Kings Hwy Turnpike Rd	1	14,000	1,232	10.7	13,182	22
Greenwood Dr Airline Blvd Rotunda Rd	3	18,000	1,584	10.7	50,846	83
Greenwood Dr Rotunda Rd Victory Blvd	2	9,600	845	10.7	18,079	30
Portsmouth Blvd Hodges Ferry Rd/ Bob White St Elmhurst Ln	3	27,000	2,376	10.7	76,270	125
Portsmouth Blvd Elmhurst Ln Victory Blvd	4	24,000	2,112	10.7	90,394	148
Portsmouth Blvd Victory Blvd Airline Blvd	1	18,000	1,584	10.7	16,949	28

Victory Blvd Airline Blvd Cavalier Blvd	4	25,000	2,200	10.7	94,160	154
Victory Blvd Cavalier Blvd Greenwood Dr	2	21,000	1,848	10.7	39,547	65
Victory Blvd Greenwood Dr Deep Creek Blvd	2	16,000	1,408	10.7	30,131	49
Victory Blvd Deep Creek Blvd GW Hwy	1	19,000	1,672	10.7	17,890	29

Total Delay Savings 882 hr/day

Type	Emissions Factor, g/hr [7]	Veh Delay, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	10.948	882	9,655	9.7	250	2,414
NOx	3.573	882	3,151	3.2	250	788

2 - COST EFFECTIVENESS

Total Cost:	$112,000	(from above)
Useful Life, years:	10	as assumed previously
Annual Cost:	$11,200	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$11,200	2,414	$5	**$4,209**
NOx	$11,200	788	$14	**$12,897**

[1] As counted from Aerial Photographs

[2] From application

[3] VDOT AADT * Regional k factor from 2009 CMP database (0.088)

[4] As previously assumed

[5] Number of Signals * Peak Hr Volume * Delay Savings

[6] Delay Savings / Delay Represented by Peak Hour (.17) / 3600 s/hr

Peak Hour Delay Factor Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.

[7] VDOT, Hampton Roads Average for all vehicle types, average of principal and minor arterials, 2011, idle

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #36
CORRIDOR SIGNALS PROJECT

JURISDICTION: Portsmouth
PROJECT NAME: **Portsmouth Citywide Signal Timing - Phase 3**
LOCATION: Various Corridors (See Below)
DESCRIPTION: Analysis of existing and development of new signal timings for strategic corridors
DATE: 9/25/2009 (on application)
PROJECT COST: $120,000

1 - EMISSIONS REDUCTION

Arterial - from - to	Number of Signals [1]	AADT [2]	Peak Hour Volume [3]	Delay Savings (s/veh)[4]	Delay Savings (s / pk hr)[5]	Delay Savings (hr/day)[6]
Churchland Blvd Academy Ave High St	3	16,000	1,408	10.7	45,197	74
Deep Creek Blvd Frederick Blvd Portsmouth Blvd	2	10,000	880	10.7	18,832	31
Deep Creek Blvd Portsmouth Blvd Greenwood Dr	2	9,400	827	10.7	17,702	29
Frederick Blvd I-264 Deep Creek Blvd	2	21,000	1,848	10.7	39,547	65
Frederick Blvd Deep Creek Blvd Portsmouth Blvd	1	15,000	1,320	10.7	14,124	23
High St Academy Ave Tyre Neck Rd	2	21,000	1,848	10.7	39,547	65
High St Tyre Neck Rd Churchland Blvd/ Stamford St	1	18,000	1,584	10.7	16,949	28
High St Churchland Blvd/ Stamford St Cedar Ln/ Sterling Point Dr	2	23,000	2,024	10.7	43,314	71
High St Cedar Ln/ Sterling Point Dr Shirley Rd	2	28,000	2,464	10.7	52,730	86
High St Grayson St Rodman Ave	4	28,000	2,464	10.7	105,459	172
London Blvd Constitution Ave Peninsula Ave	2	12,159	1,070	10.7	22,898	37

Portsmouth Blvd Rodman Ave Deep Creek Blvd	2	12,000	1,056	10.7	22,598	37
Portsmouth Blvd Deep Creek Blvd Frederick Blvd	1	7,400	651	10.7	6,968	11
Turnpike Rd/ Constitution Dr Phillips Ave High St	2	9,500	836	10.7	17,890	29
Turnpike Rd/ Constitution Dr High St London Blvd	1	3,000	264	10.7	2,825	5

Total Delay Savings 762 hr/day

Type	Emissions Factor, g/hr [7]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	10.948	762	8,346	8.3	250	2,087
NOx	3.573	762	2,724	2.7	250	681

2 - COST EFFECTIVENESS

Total Cost:	$120,000	(from above)
Useful Life, years:	10	as assumed previously
Annual Cost:	$12,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$12,000	2,087	$6	**$5,216**
NOx	$12,000	681	$18	**$15,985**

[1] As counted from Aerial Photographs

[2] From application

[3] VDOT AADT * Regional k factor from 2009 CMP database (0.088)

[4] As previously assumed

[5] Number of Signals * Peak Hr Volume * Delay Savings

[6] Delay Savings / Delay Represented by Peak Hour (.17) / 3600 s/hr

Peak Hour Delay Factor Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.

[7] VDOT, Hampton Roads Average for all vehicle types, average of principal and minor arterials, 2011, idle

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #37
CORRIDOR SIGNALS PROJECT

JURISDICTION: Portsmouth
PROJECT NAME: **Portsmouth Citywide Signal Timing - Phase 4**
LOCATION: Various Corridors (See Below)
DESCRIPTION: Analysis of existing and development of new signal timings for strategic corridors
DATE: 9/25/2009 (on application)
PROJECT COST: $132,000

1 - EMISSIONS REDUCTION

Arterial - from - to	Number of Signals [1]	AADT [2]	Peak Hour Volume [3]	Delay Savings (s/veh)[4]	Delay Savings (s / pk hr)[5]	Delay Savings (hr/day)[6]
Cleveland St Lee Ave Rte. 58	2	5,400	475	10.7	10,169	17
County St Godwin St Elm Ave	2	4,600	405	10.7	8,663	14
County St Elm Ave Effingham St	1	4,100	361	10.7	3,861	6
County St Effingham St Court St	1	3,500	308	10.7	3,296	5
County St Court St Bart St	1	3,000	264	10.7	2,825	5
Effingham St London Blvd High St	2	26,000	2,288	10.7	48,963	80
Effingham St High St County St	1	30,000	2,640	10.7	28,248	46
Effingham St County St Bart St	2	38,000	3,344	10.7	71,562	117
Elm Ave London Blvd High St	2	7,000	616	10.7	13,182	22
Elm Ave High St County St	1	10,000	880	10.7	9,416	15
Elm Ave County St South St	1	11,000	968	10.7	10,358	17
Elm Ave South St Duke St	1	10,000	880	10.7	9,416	15
Elm Ave Duke St Portsmouth Blvd	2	8,700	766	10.7	16,384	27

High St Godwin St Elm Ave	2	17,000	1,496	10.7	32,014	52
High St Elm Ave Effingham St	1	11,000	968	10.7	10,358	17
High St Effingham St Crawford St	2	7,100	625	10.7	13,371	22
Lincoln St Elm Ave Port Centre Pkwy	3	2,900	255	10.7	8,192	13
London Blvd Elm Ave Effingham St	2	25,000	2,200	10.7	47,080	77
London Blvd Effingham St Crawford St	3	15,000	1,320	10.7	42,372	69

Total Delay Savings 637 hr/day

Type	Emissions Factor, g/hr [7]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	10.948	637	6,971	7.0	250	1,743
NOx	3.573	637	2,275	2.3	250	569

2 - COST EFFECTIVENESS

Total Cost:	$132,000	(from above)
Useful Life, years:	10	as assumed previously
Annual Cost:	$13,200	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$13,200	1,743	$8	**$6,869**
NOx	$13,200	569	$23	**$21,050**

[1] As counted from Aerial Photographs

[2] From application

[3] VDOT AADT * Regional k factor from 2009 CMP database (0.088)

[4] As previously assumed

[5] Number of Signals * Peak Hr Volume * Delay Savings

[6] Delay Savings / Delay Represented by Peak Hour (.17) / 3600 s/hr

Peak Hour Delay Factor Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.

[7] VDOT, Hampton Roads Average for all vehicle types, average of principal and minor arterials, 2011, idle

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #38
IMPROVEMENT TO SINGLE INTERSECTION (GEOMETRIC OR SIGNAL WORK)

JURISDICTION:	Portsmouth
UPC NO.:	n.a.
PROJECT NAME:	**Intersection Geometric - Portsmouth Blvd (Rte 337) & Elmhurst Ln**
LOCATION:	see above
DESCRIPTION:	This project provides for widening the SB approach to the intersection to provide an additional 100' of storage for left turning vehicles on Elmhurst Ln. The signal will also be converted to a mast arm installation.
DATE:	(on application)
PROJECT COST:	$500,000

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		27.6	sec/veh
Intersection Delay After Project		27.1	sec/veh
Change In Intersection Delay		0.5	sec/veh, pk hr
Total Vehicles During Peak Hour		2,406	veh/hr
	divided by	3,600	sec/hr
Change In Intersection Delay		0.3	veh hr's, pk hr
	divided by	17%	pk hr delay factor(1)
Change In Intersection Delay		2.0	hours/day

Type	Emissions Factor, g/hr (2)	Delay Change, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, weekdays/yr	Emissions Reduction, kg/yr
VOC	10.98	2.0	22	0.022	250	5.4
NOx	3.49	2.0	7	0.007	250	1.7

2 - COST EFFECTIVENESS

Total Cost:	$500,000	above
Useful life, years:	10	as assumed previously
Annual Cost:	$50,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$50,000	5.4	$9,266	907	**$8,404,671**
NOx	$50,000	1.7	$29,174	907	**$26,461,159**

Notes:
(1) pk hr delay factor = pk hr delay / daily delay;
source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, Page 8, June 1997.
(2) Source: VDOT, Hampton Roads average for all vehicle types and principal arterials, 2011, idle speed.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #39
CITYWIDE SIGNAL SYSTEM

JURISDICTION: Portsmouth
PROJECT NAME: **City of Portsmouth Signal System Upgrade - Phases 2, 3 and 4**
LOCATION: Citywide
DESCRIPTION: Upgrade to provide centralized management and operation of traffic signals
DATE: 9/25/2009 (on application)
PROJECT COST: $6,600,000

1 - EMISSIONS REDUCTION

		Low Volume Intersections	Medium Volume Intersections	High Volume Intersections	Total Intersections
	veh / pm pk hr:	Less than 2,690	2,690 to 5,900	More than 5,900	
Number of Intersections [(1)]:		60	29	0	89
	multiplied by:	2,690	5,900	9,500	veh / pm pk hr [(2)]
	multiplied by:	10.7	10.7	10.7	sec/veh [(2)]
	divided by:	3,600	3,600	3,600	sec/hr
	divided by:	0.17	0.17	0.17	delay factor [(3)]
Change in Vehicle Delay:		2,822	2,991	0	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 5,813 hrs/day

Type	Emissions Factor, g/hr [(4)]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day [(5)]	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	7.973	5,813	46,351	46.4	250	11,588
NOx	3.996	5,813	23,229	23.2	250	5,807

2 - COST EFFECTIVENESS

Total Cost:	$6,600,000	above
Useful Life, years:	10	as assumed previously
Annual Cost:	$660,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$660,000	11,588	$56.96	907	**$51,660**
NOx	$660,000	5,807	$113.65	907	**$103,080**

Notes:
[(1)] From application
[(2)] As assumed in previous CMAQ analyses
[(3)] Portion of daily delay represented by peak hour
Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.
[(4)] VDOT, Hampton Roads Average for all vehicle types and roadway functional classes, 2011, idle
[(5)] Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #40
OTHER - TOTAL STATIONS FOR VSP

JURISDICTION: Virginia State Police
PROJECT NAME: **Hampton Roads Regional Fatal Crash Team Total Stations**
LOCATION: Regionwide
DESCRIPTION: Purchase 3 total stations for Va State Police (bringing regional total to 4). This equipment is required at the scene of serious crashes including fatalities and will allow incidents to be clear more quickly.
PROJECT COST: $30,000

1 - PROCEDURE: A CMAQ Measures of Effectiveness table for the total station equipment was submitted. The MOE table took into account the estimated time saved per incident, number of vehicles entering the interstate segment per day, average number of crashes per year requiring total station, and the estimated savings in delay expected as a result of the additional total stations.

2 - ANALYSIS:

Road Class Location	Time Saved per incident (s) [2]	Veh on Segment per day (one direction) [3]	Veh entering Segment per hour [4]	Avg Fatal Crashes per year [5]	Delay Saved per Crash (s) [6]	Delay Saved Annually (s) [7]	Delay Saved Annually (hrs)
Interstate	3600	47,000	1,958	22	7,050,000	155,100,000	43,083
Freeway	3600	19,000	792	8	2,850,000	22,800,000	6,333
Principle Arterial	3600	14,000	583	34	2,100,000	71,400,000	19,833
Minor Arterial	3600	8,000	333	50	1,200,000	60,000,000	16,667
Collector	3600	3,000	125	17	450,000	7,650,000	2,125
Local	3600	1,000	42	10	150,000	1,500,000	417

Notes:
(1) Delay is the only MOE tabulated. It is assumed that speeds experience breakdown conditions during crashes and normal flows after incident is removed.
(2) Value of 60 minutes per incident derived from VSP Estimates
(3) Averages using most recent counts from HRTPO Congestion Management Process Database, Nov 2009
(4) Average hourly volume: daily volume divided by 24
(5) Estimated no. of incidents requiring total station (2007 VDOT Statewide Crash Database)
(6) Average hourly volume X 3600 seconds
(7) Delay saved per crash X crashes per year

3 - PROJECT EFFECT ON AIR QUALITY:

EQUATION: Emission (grams/hour) x Change in Delay (hours/year)

Road Class Location	Type	Delay Saved Annually, hrs (above)	Emissions Factor, g/hr [8]	Emissions Reduction, kg/yr
Interstate	VOC	43,083	10.93	471
	NOx	43,083	3.99	172
Freeway	VOC	6,333	10.90	69
	NOx	6,333	4.09	26
Principle Arterial	VOC	19,833	10.98	218
	NOx	19,833	3.49	69
Minor Arterial	VOC	16,667	10.92	182
	NOx	16,667	3.66	61
Collector	VOC	2,125	10.94	23
	NOx	2,125	3.58	8
Local	VOC	417	12.10	5
	NOx	417	11.46	5

TOTAL Emissions Reduction (kg/yr)

VOC	968
NOx	340

4 - COST EFFECTIVENESS:

Total Cost:	$30,000	above
Useful life, years:	10	
Annual Cost:	$3,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$3,000	968	$3	907	**$2,811**
NOx	$3,000	340	$9	907	**$7,998**

Notes:

(8) Source: VDOT, Hampton Roads average for all vehicle types by individual roadway functional class, 2011, idle speed.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #41
OTHER - VEHICLE PREEMPTION

COMMITTEE:	Hampton Roads Traffic Operations Committee
PROJECT NAME:	**Hampton Roads Regional Opticom Preemption Strategic Plan and Deployment**
LOCATION:	Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, Suffolk, Virginia Beach
DESCRIPTION:	Development and Implementation of a Preemption Strategic Plan
DATE:	9/14/2009 (on application)
PROJECT COST:	$500,000

1 - EMISSIONS REDUCTION:

Average Incident Duration	57	minutes/incident [1]
Average Travel Time to Incident	7.82	minutes/response [2]
Average Reduction in Travel Time due to Preemption	20%	[3]
Time Saved due to Preemption	1.56	minutes/incident

Delay Savings on Total Blockage Interstate Incidents (based on full preemption system):

Number of Lanes	Capacity (veh/hr) [4]	Hourly Volume (veh/hr) [5]	Delay Savings per Incident (veh-hr) [6]	Number of Incidents per year [1]	Total Delay Savings (veh-hr)
4	6,240	2,900	132	13	1,720
3	4,680	1,650	62	23	1,432
2	3,120	1,200	48	41	1,953

Total Delay Savings with Full Preemption Coverage, Interstates	5,105	veh-hr
multiplied by:	2	[7]
Total Delay Savings, Interstates and Arterials	10,209	veh-hr
Percentage of Coverage Project Provides	25%	[8]
Delay Savings of Project	2,552	veh-hr

Type	Emissions Factor, g/hr [8]	Delay Savings, hr/yr (above)	Emissions Reduction, g/yr	Emissions Reduction, kg/yr
VOC	7.97	2,552	20,350	20
NOx	4.00	2,552	10,199	10

2 - COST EFFECTIVENESS

Total Cost:	$500,000	(from above)
Useful Life, years:	10	
Annual Cost:	$50,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$50,000	20	$2,457	**$2,228,538**
NOx	$50,000	10	$4,903	**$4,446,702**

(1) 2006 STC Incident Data, Average for Incidents on all Hampton Roads Interstates

(2) From Chesapeake Preemption Application

(3) From Opticom studies

(4) 1,560 veh/hr/ln capacity for free flow speed of 60mi/hr (HCS, 23-10)

(5) From CMP

(6) Based on equation derived through traffic flow theory: $\Delta Delay = \frac{1}{2}\left(\frac{2vqnt - vqn^2}{q - v}\right)$

(v = volume, q=capacity, n= time saved due to preemption, t= average incident duration)

(7) Factor assumed to account for delay savings for incidents on arterials

(8) Percentage estimated on project covering the highest priority intersections

(9) VDOT, Hampton Roads average for all vehicle types and roadway functional classes, 2011, idle

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #42
IMPROVEMENT TO SINGLE INTERSECTION (GEOMETRIC OR SIGNAL WORK)

JURISDICTION:	Suffolk
UPC NO.:	n.a.
PROJECT NAME:	**Intersection Improvements - Bridge Rd & Bennetts Pasture Rd**
LOCATION:	see above
DESCRIPTION:	Add LT lane on EB Bennetts Pasture Rd w/ 200' storage. Redesignate existing lane on EB Bennetts Pasture Rd as a Thru/RT lane.
DATE:	(on application)
PROJECT COST:	$750,000

1 - REDUCED AUTO EMISSIONS

Weekday AM Peak Hour

Intersection Delay Before Project		13.6	sec/veh
Intersection Delay After Project		8.0	sec/veh
Change In Intersection Delay		5.6	sec/veh, pk hr
Total Vehicles During Peak Hour		1,904	veh/hr
	divided by	3,600	sec/hr
Change In Intersection Delay		3.0	veh hr's, pk hr
	divided by	17%	pk hr delay factor(1)
Change In Intersection Delay		17.4	hours/day

Type	Emissions Factor, g/hr (2)	Delay Change, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, weekdays/yr	Emissions Reduction, kg/yr
VOC	10.98	17.4	191	0.191	250	47.8
NOx	3.49	17.4	61	0.061	250	15.2

2 - COST EFFECTIVENESS

Total Cost:	$750,000	above
Useful life, years:	10	as assumed previously
Annual Cost:	$75,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$75,000	47.8	$1,568	907	**$1,422,403**
NOx	$75,000	15.2	$4,937	907	**$4,478,275**

Notes:
(1) pk hr delay factor = pk hr delay / daily delay;
source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, Page 8, June 1997.
(2) Source: VDOT, Hampton Roads average for all vehicle types and principal arterials, 2011, idle speed.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #43

IMPROVEMENT TO SINGLE INTERSECTION (GEOMETRIC OR SIGNAL WORK)

JURISDICTION: Suffolk
UPC NO.: n.a.
PROJECT NAME: **Intersection Improvements - Bridge Rd & Lee Farm Ln**
LOCATION: see above
DESCRIPTION: Add RT lane on NB Lee Farm Ln with 200' storage. Modify traffic signal to include overlap phase for RT movement. Add 2nd LT lane on WB Bridge Rd and extend both LT lanes to 250' (Modify LT to protected movement). Extend RT lane on EB Bridge Rd from 20' to 200' of storage.
DATE: (on application)
PROJECT COST: $750,000

1 - REDUCED AUTO EMISSIONS

Weekday AM Peak Hour

Intersection Delay Before Project		6.1	sec/veh
Intersection Delay After Project		7.5	sec/veh
Change In Intersection Delay		-1.4	sec/veh, pk hr
Total Vehicles During Peak Hour		1,904	veh/hr
	divided by	3,600	sec/hr
Change In Intersection Delay		-0.7	veh hr's, pk hr
	divided by	17%	pk hr delay factor[1]
Change In Intersection Delay		-4.4	hours/day

Type	Emissions Factor, g/hr [2]	Delay Change, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, weekdays/yr	Emissions Reduction, kg/yr
VOC	10.98	-4.4	-48	-0.048	250	-12.0
NOx	3.49	-4.4	-15	-0.015	250	-3.8

2 - COST EFFECTIVENESS

Total Cost:	$750,000	above
Useful life, years:	10	as assumed previously
Annual Cost:	$75,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$75,000	-12.0	negative	907	**negative**
NOx	$75,000	-3.8	negative	907	**negative**

Notes:
(1) pk hr delay factor = pk hr delay / daily delay;
source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, Page 8, June 1997.
(2) Source: VDOT, Hampton Roads average for all vehicle types and principal arterials, 2011, idle speed.

*These intersection improvements were recommended as a part of the Bridge Road Corridor Study for increased traffic conditions by 2018. This CMAQ analysis evaluates improvements to existing intersection deficiencies.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #45
PARK & RIDE LOTS

JURISDICTION: Suffolk
PROJECT NAME: **Godwin Boulevard Park & Ride Lot Upgrades**
LOCATION: Portsmouth Boulevard at Nansemond Parkway
DESCRIPTION: Project to provide an upgrade of the existing gravel parking lot to a modern Park & Ride Lot with paved parking, drainage, lighting and landscaping and paved access to the lot off of the public street. It also increases the parking capacity from 25 to 40 spaces.

PROJECT COST: $400,000

1 - REDUCED AUTO EMISSIONS:

Parking spaces (after project):	40
Parking spaces (current):	25
Additional Capacity/Users	15

	Additional Commuters using Park & Ride Lot (above)	Vehicle Occupancy Rate, persons/veh (1)	Reduction in Daily Vehicle Trips (2)	Work Days per Year	Average Roundtrip Length (Mi) (3)	Reduction in Annual VMTs
P&R Lot	15	1.15	13	240	39.3	123,130

Emissions Reductions				
Type	Factors, g/mi (4)	Annual VMTs (above)	kg/yr	tons/yr
VOC	0.676	123,130	83	0.09
NOx	0.640	123,130	79	0.09

2 - COST EFFECTIVENESS:

Total Cost:	$400,000
Project life, years :	10
Annual Cost:	$40,000

Cost Effectiveness			
Type	Cost, $/yr (above)	tons/yr (above)	$/ton
VOC	$40,000	0.09	**$436,180**
NOx	$40,000	0.09	**$460,407**

Notes:
(1) As previously assumed (1.15 for work trips; 1.30 for non-work trips)
(2) Reduction in Daily Veh Trips = Commuters/Veh Occupancy Rate
(3) City of Suffolk stated that most users travel from P&R Lot to/from Smithfield Foods and Norfolk/NN Shipyards
(4) VDOT, Hampton Roads average for light duty vehicles on all roadway functional classes, 2011, 35mph

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #46
CORRIDOR SIGNALS PROJECT

JURISDICTION: City of Suffolk
PROJECT NAME: **Harbour View Area Traffic Signal Coordination**
LOCATION: Harbour View Boulevard, College Drive, Townpoint Road, and Bridge Road
DESCRIPTION: Provide a comprehensive coordinated traffic signal system
DATE: 9/15/2009 (on application)
PROJECT COST: $3,500,000

1 - EMISSIONS REDUCTION

Arterial - from - to	Number of Signals [1]	AADT [2]	Peak Hour Volume [3]	Delay Savings (s/veh)[4]	Delay Savings (s / pk hr)[5]	Delay Savings (hr/day)[6]
Bridge Rd Harbour View Blvd Walden Rd	5	36,000	3,168	10.7	169,488	277
College Dr Harbour View Blvd Bridge Rd	7	18,700	1,646	10.7	123,255	201
Harbour View Blvd College Dr Bridge Rd	3	14,800	1,302	10.7	41,807	68
Townpoint Rd Harbour View Blvd College Dr	3	8,800	774	10.7	24,858	41
				Total Delay Savings		587 hr/day

Type	Emissions Factor, g/hr [7]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	10.948	587	6,429	6.4	250	1,607
NOx	3.573	587	2,098	2.1	250	525

2 - COST EFFECTIVENESS

Total Cost:	$3,500,000	(from above)
Useful Life, years:	10	as assumed previously
Annual Cost:	$350,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$350,000	1,607	$218	**$197,507**
NOx	$350,000	525	$667	**$605,238**

[1] As counted from Aerial Photographs
[2] From application
[3] VDOT AADT * Regional k factor from 2009 CMP database (0.088)
[4] As previously assumed
[5] Number of Signals * Peak Hr Volume * Delay Savings
[6] Delay Savings / Delay Represented by Peak Hour (.17) / 3600 s/hr
Peak Hour Delay Factor Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.
[7] VDOT, Hampton Roads Average for all vehicle types, average of principal and minor arterials, 2011, idle

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #47
PARK & RIDE LOTS

JURISDICTION: Suffolk
PROJECT NAME: **Portsmouth Boulevard Park & Ride Lot Upgrades**
LOCATION: Portsmouth Boulevard at Nansemond Parkway
DESCRIPTION: Project to provide an upgrade of the existing gravel parking lot to a modern Park & Ride Lot with paved parking, drainage, lighting and landscaping and paved access to the lot off of the public street. It also increases the parking capacity from 30 to 50 spaces.

PROJECT COST: $750,000

1 - REDUCED AUTO EMISSIONS:

Parking spaces (after project):	50
Parking spaces (current):	30
Additional Capacity/Users	20

	Additional Commuters using Park & Ride Lot (above)	Vehicle Occupancy Rate, persons/veh (1)	Reduction in Daily Vehicle Trips (2)	Work Days per Year	Average Roundtrip Length (Mi) (3)	Reduction in Annual VMTs
P&R Lot	20	1.15	17	240	41.3	172,522

Emissions Reductions				
Type	Factors, g/mi (4)	Annual VMTs (above)	kg/yr	tons/yr
VOC	0.676	172,522	117	0.13
NOx	0.640	172,522	110	0.12

2 - COST EFFECTIVENESS:

Total Cost:	$750,000
Project life, years :	10
Annual Cost:	$75,000

Cost Effectiveness			
Type	Cost, $/yr (above)	tons/yr (above)	$/ton
VOC	$75,000	0.13	**$583,699**
NOx	$75,000	0.12	**$616,119**

Notes:
(1) As previously assumed (1.15 for work trips; 1.30 for non-work trips)
(2) Reduction in Daily Veh Trips = Commuters/Veh Occupancy Rate
(3) City of Suffolk stated that most users travel from P&R Lot to/from Smithfield Foods and Norfolk/NN Shipyards
(4) VDOT, Hampton Roads average for light duty vehicles on all roadway functional classes, 2011, 35mph

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #48
TRANSIT SHELTERS/FACILITIES

LOCALITY/AGCY: City of Virginia Beach
PROJECT NAME: **Virginia Beach Bus Shelter Program**
DESCRIPTION: Provide 15 bus shelters at bus stops.
DATE: 9/21/2009 (on application)
PROJECT COST: $100,000

1- INCREASED BUS EMISSIONS: No Increase in Service or Emissions

2- TRAVEL REDUCTIONS:

	Route	Ridership	
Existing Monthly Ridership:			source: HRT
	12	11,882	June 2009
	20	111,238	June 2009
	27	6,900	June 2009
	36	10,119	June 2009
	4	140,139	boardings/month
	(# of routes)		
		30	days/month
	Existing Daily Ridership:	4,671	boardings/day

Assumption:
"Basic Coverage" is 5 new shelters per route, which produces 2% increase in ridership:

Basic Shelters/Route:	5.0	
Basic Increase in Ridership:	2.0%	as assumed during previous CMAQ cylces

Increase in Ridership Due to Project:

Shelters:	15	above
Routes:	4	above
Shelters/Rte:	3.8	
Resulting Increase in Ridership:	1.5%	prorating above #'s (2)
Existing Daily Ridership:	4,671	above
Increase in Ridership:	70	boardings/day
Vehicle Occupancy Rate (work):	1.15	persons/veh (3)
Reduction in Daily Vehicle Trips:	61	vehicles/day
Average Trip Length:	10	miles/trip (4)
Reduction in VMT:	609	miles/day

3- EMISSIONS REDUCTIONS:

Type	Emissions Factor, g/mi (1)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, days/yr	Emissions Reduction, kg/yr
VOC	0.676	609	412	0.412	365	150
NOx	0.640	609	390	0.390	365	142

4- COST EFFECTIVENESS:

Total Cost:	$100,000	above
Useful Life, years:	15	as assumed in previous CMAQ analyses
Annual Cost:	$6,667	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$6,667	150	$44	907	**$40,241**
NOx	$6,667	142	$47	907	**$42,476**

Notes:
(1) Source: VDOT, Hampton Roads average for light-duty vehicles and all roadway functional classes, 2011, 35mph
(2) Project Increase = (Basic Increase) * (Project Shelters/Rte)/(Basic Shelters/Rte)
(3) As assumed in CMAQ analyses of previous years
(4) 2001 NHTS Table Designer

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #49

IMPROVEMENT TO SINGLE INTERSECTION (GEOMETRIC OR SIGNAL WORK)

JURISDICTION:	Virginia Beach
UPC NO.:	n.a.
PROJECT NAME:	**General Booth Blvd/London Bridge Rd Left Turn Lane**
LOCATION:	see above
DESCRIPTION:	This project provides for the design and construction of an additional NB LT lane on General Booth Blvd to accommodate left turns in the NB direction along with improvements to the receiving lanes on the western approach of London Bridge Rd.
DATE:	(on application)
PROJECT COST:	$1,100,000

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		36.2	sec/veh
Intersection Delay After Project		29.7	sec/veh
Change In Intersection Delay		6.5	sec/veh, pk hr
Total Vehicles During Peak Hour		3,613	veh/hr
	divided by	3,600	sec/hr
Change In Intersection Delay		6.5	veh hr's, pk hr
	divided by	17%	pk hr delay factor(1)
Change In Intersection Delay		38.4	hours/day

Type	Emissions Factor, g/hr (2)	Delay Change, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, weekdays/yr	Emissions Reduction, kg/yr
VOC	10.98	38.4	421	0.421	250	105.3
NOx	3.49	38.4	134	0.134	250	33.5

2 - COST EFFECTIVENESS

Total Cost:	$1,100,000	above
Useful life, years:	10	as assumed previously
Annual Cost:	$110,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$110,000	105.3	$1,044	907	**$947,170**
NOx	$110,000	33.5	$3,288	907	**$2,982,056**

Notes:
(1) pk hr delay factor = pk hr delay / daily delay;
source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, Page 8, June 1997.
(2) Source: VDOT, Hampton Roads average for all vehicle types and principal arterials, 2011, idle speed.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #50

IMPROVEMENT TO SINGLE INTERSECTION (GEOMETRIC OR SIGNAL WORK)

JURISDICTION:	Virginia Beach
UPC NO.:	n.a.
PROJECT NAME:	**S. Independence Blvd/Dahlia Dr Intersection Improvements**
LOCATION:	see above
DESCRIPTION:	This project provides for the design and construction of a westbound left turn lane on Dahlia Dr and an eastbound right turn lane on Dahlia Dr.
DATE:	(on application)
PROJECT COST:	$1,300,000

1 - REDUCED AUTO EMISSIONS

Weekday AM Peak Hour

Intersection Delay Before Project		23.2	sec/veh
Intersection Delay After Project		17.4	sec/veh
Change In Intersection Delay		5.8	sec/veh, pk hr
Total Vehicles During Peak Hour		2,699	veh/hr
	divided by	3,600	sec/hr
Change In Intersection Delay		4.3	veh hr's, pk hr
	divided by	17%	pk hr delay factor(1)
Change In Intersection Delay		25.6	hours/day

Type	Emissions Factor, g/hr (2)	Delay Change, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, weekdays/yr	Emissions Reduction, kg/yr
VOC	10.98	25.6	281	0.281	250	70.2
NOx	3.49	25.6	89	0.089	250	22.3

2 - COST EFFECTIVENESS

Total Cost:	$1,300,000	above
Useful life, years:	10	as assumed previously
Annual Cost:	$130,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$130,000	70.2	$1,851	907	**$1,679,302**
NOx	$130,000	22.3	$5,829	907	**$5,287,093**

Notes:
(1) pk hr delay factor = pk hr delay / daily delay;
source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, Page 8, June 1997.
(2) Source: VDOT, Hampton Roads average for all vehicle types and principal arterials, 2011, idle speed.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #51
IMPROVEMENT TO SINGLE INTERSECTION (GEOMETRIC OR SIGNAL WORK)

JURISDICTION: Virginia Beach
UPC NO.: n.a.
PROJECT NAME: **S. Independence Blvd/Lynnhaven Pkwy Intersection Improvements**
LOCATION: see above
DESCRIPTION: This project provides for the design and construction of dual LT lanes on the NB & SB approaches of S. Independence Blvd along with improvements to the receiving lanes on the eastern and western approaches of Lynnhaven Pkwy.
DATE: (on application)
PROJECT COST: $1,310,000

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		140.5	sec/veh
Intersection Delay After Project		118.6	sec/veh
Change In Intersection Delay		21.9	sec/veh, pk hr
Total Vehicles During Peak Hour		6,305	veh/hr
	divided by	3,600	sec/hr
Change In Intersection Delay		38.4	veh hr's, pk hr
	divided by	17%	pk hr delay factor(1)
Change In Intersection Delay		225.6	hours/day

Type	Emissions Factor, g/hr (2)	Delay Change, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, weekdays/yr	Emissions Reduction, kg/yr
VOC	10.98	225.6	2,477	2.477	250	619.3
NOx	3.49	225.6	787	0.787	250	196.7

2 - COST EFFECTIVENESS

Total Cost:	$1,310,000	above
Useful life, years:	10	as assumed previously
Annual Cost:	$131,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$131,000	619.3	$212	907	**$191,849**
NOx	$131,000	196.7	$666	907	**$604,013**

Notes:
(1) pk hr delay factor = pk hr delay / daily delay;
source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, Page 8, June 1997.
(2) Source: VDOT, Hampton Roads average for all vehicle types and principal arterials, 2011, idle speed.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #52
IMPROVEMENT TO SINGLE INTERSECTION (GEOMETRIC OR SIGNAL WORK)

JURISDICTION:	Virginia Beach
UPC NO.:	n.a.
PROJECT NAME:	**Rosemont Rd/Lynnhaven Pkwy Left Turn Lane**
LOCATION:	see above
DESCRIPTION:	This project provides for the design and construction of an additional LT lane on Rosemont Rd to accommodate dual LT lanes in the NB direction along with improvements to the receiving lanes on the western approach of Lynnhaven Pkwy.
DATE:	(on application)
PROJECT COST:	$1,000,000

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		67.8	sec/veh
Intersection Delay After Project		55.0	sec/veh
Change In Intersection Delay		12.8	sec/veh, pk hr
Total Vehicles During Peak Hour		5,046	veh/hr
	divided by	3,600	sec/hr
Change In Intersection Delay		17.9	veh hr's, pk hr
	divided by	17%	pk hr delay factor(1)
Change In Intersection Delay		105.5	hours/day

Type	Emissions Factor, g/hr (2)	Delay Change, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, weekdays/yr	Emissions Reduction, kg/yr
VOC	10.98	105.5	1,159	1.159	250	289.7
NOx	3.49	105.5	368	0.368	250	92.0

2 - COST EFFECTIVENESS

Total Cost:	$1,000,000	above
Useful life, years:	10	as assumed previously
Annual Cost:	$100,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$100,000	289.7	$345	907	**$313,083**
NOx	$100,000	92.0	$1,087	907	**$985,706**

Notes:
(1) pk hr delay factor = pk hr delay / daily delay;
source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, Page 8, June 1997.
(2) Source: VDOT, Hampton Roads average for all vehicle types and principal arterials, 2011, idle speed.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #53
CORRIDOR SIGNALS PROJECT

JURISDICTION: Virginia Beach
PROJECT NAME: **Indian River Rd & Kempsville Rd Intersection Improvements**
LOCATION: Intersection of Indian River Road and Kempsville Road
DESCRIPTION: This project will remove the left turn movements from Indian River Rd at the intersection with Kempsville Rd by providing indirect turns north and south of the intersection. This is expected to result in a reduction in the congestion along the Indian River Rd corridor from I-64 through Kempsville Rd.
DATE: 9/21/2009 (on application)
PROJECT COST: $4,500,000 (1)

1 - EMISSIONS REDUCTIONS

EXISTING DELAY:

Segment	Cross Street	Signal Delay (s/veh) (1)	PM Pk hr Volume (veh / pm pk hr) (1)	Delay (s / pm pk hr)	Directional Subtotal (s / pm pk hr)
EB Indian River	Regent Univ.	77.5	4073	315,658	1,747,432
	Centerville Tnpk	195.0	4116	802,620	
	Thompkins Lane	10.4	2857	29,713	
	Lake James	124.1	2879	357,284	
	Kempsville	88.8	2727	242,158	
WB Indian River	Kempsville	31.0	2139	66,309	170,522
	Kempsriver	28.4	1810	51,404	
	Thompkins Lane	6.7	1708	11,444	
	Parkland Lane	19.8	1828	36,194	
	Founders Inn	2.6	1989	5,171	
NB Kempsville	Indian River	66.2	1359	89,966	89,966
SB Kempsville	Indian River	92.7	1195	110,777	110,777
		Total Existing Delay			2,118,697 s / pm pk hr

DELAY AFTER PROJECT:

Segment	Cross Street	Signal Delay (s/veh) (1)	PM Pk hr Volume (veh / pm pk hr) (1)	Delay (s / pm pk hr)	Directional Subtotal (s / pm pk hr)
EB Indian River	Regent Univ.	77.5	4073	315,658	951,992
	Centerville Tnpk	95.8	4116	394,313	
	Thompkins Lane	3.1	2857	8,857	
	Lake James	3.5	2879	10,077	
	WB Crossover	68.1	2727	185,709	
	Kempsville	11.4	3195	36,423	
	EB Crossover	0.3	3189	957	
WB Indian River	EB Crossover	30.6	2278	69,707	182,567
	Kempsville	7.6	2302	17,495	
	WB Crossover	0.1	2139	214	
	Kempsriver	11.3	1810	20,453	
	Thompkins Lane	22.0	1708	37,576	
	Parkland Lane	12.8	1828	23,398	
	Founders Inn	6.9	1989	13,724	
SB Kempsriver	Indian River	109.6	677	74,199	74,199
NB Kempsville	Indian River	51.1	1359	69,445	69,445
SB Kempsville	Indian River	58.1	1195	69,430	69,430
		Total Delay after Project			1,347,633 s / pm pk hr

Reduction in Delay, Peak Hour 771,064 s / pm pk hr

divided by: 3,600 s/hr
divided by: 0.17 (2)

Reduction in Delay, All Day 1,260 hr/day

Type	Emissions Factor, g/hr [3]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	10.980	1,260	13,834	13.8	250	3,458
NOx	3.573	1,260	4,501	4.5	250	1,125

2 - COST EFFECTIVENESS

Total Cost:	$4,500,000	(from above)
Useful Life, years:	10	as assumed previously
Annual Cost:	$450,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$450,000	3,458	$130	**$118,015**
NOx	$450,000	1,125	$400	**$362,718**

[1] From application

[2] Portion of daily delay represented by peak hour
Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.

[3] VDOT, Hampton Roads Average for all vehicle types on principal arterials, 2011, idle

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #54
CITYWIDE SIGNAL SYSTEM

JURISDICTION: Virginia Beach
PROJECT NAME: **Citywide Retiming Project - Phase 3**
LOCATION: Citywide
DESCRIPTION: Retiming corridors, create diversion routes, create traffic responsive corridors
DATE: 9/22/2009 (on application)
PROJECT COST: $1,276,000

1 - EMISSIONS REDUCTION

		Low Volume Intersections	Medium Volume Intersections	High Volume Intersections	Total Intersections
	veh / pm pk hr:	Less than 2,690	2,690 to 5,900	More than 5,900	
Number of Intersections [1]:		30	66	3	99
	multiplied by:	2,690	5,900	9,500	veh / pm pk hr [2]
	multiplied by:	10.7	10.7	10.7	sec/veh [2]
	divided by:	3,600	3,600	3,600	sec/hr
	divided by:	0.17	0.17	0.17	delay factor [3]
Change in Vehicle Delay:		1,411	6,808	498	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 8,717 hrs/day

Type	Emissions Factor, g/hr [4]	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day [5]	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	7.973	8,717	69,505	69.5	250	17,376
NOx	3.996	8,717	34,834	34.8	250	8,708

2 - COST EFFECTIVENESS

Total Cost:	$1,276,000	above
Useful Life, years:	10	as assumed previously
Annual Cost:	$127,600	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$127,600	17,376	$7.34	907	**$6,660**
NOx	$127,600	8,708	$14.65	907	**$13,290**

Notes:
[1] From application
[2] As assumed in previous CMAQ analyses
[3] Portion of daily delay represented by peak hour
Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, June 1997.
[4] VDOT, Hampton Roads Average for all vehicle types and roadway functional classes, 2011, idle
[5] Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #55
OTHER - BARGE SERVICE

AGENCY: Virginia Port Authority
PROJECT NAME: **Inter-Terminal Barge Service**
LOCATION: Norfolk Harbor
DESCRIPTION: Container barge between Norfolk International Terminal and Portsmouth Marine Terminal
DATE: 9/25/2009 (on application)
PROJECT COST: $10,970,640 (1)

Project Cost $10,970,640 (above)
Expected Life-span of Project 3 Years (1)
Annual Cost $3,656,880

Type	3-yr Emissions Reduction, tons (1)	Emissions Reduction, tons/yr	Conversion Factor, kg/ton	Emissions Reduction, kg/yr	Cost per year (above)	Cost Effectiveness, $/ton
VOC	6.9	2.3	907	2,086	$3,656,880	**$1,589,948**
NOx	1087	362	907	328,636	$3,656,880	**$10,093**

(1) From application

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #56
TRANSIT VEHICLE REPLACEMENT/PURCHASE

AGENCY: Williamsburg Area Transit Authority
PROJECT NAME: **Bus Replacement**
DESCRIPTION: Replacement of 16 buses that meet FTA vehicle life standards
DATE: 9/18/2009 (on application)
PROJECT COST: $7,803,000

1 - CHANGE IN BUS EMISSIONS

Current Buses		Emissions Rate g / bhp-hr [1]	Emissions Rate g/mi [2]	VMT mi/yr/bus [1]	Number of Vehicles	Yearly Emissions g/ yr	Yearly Emissions kg/yr
30' Diesel	VOC	0.01	0.05	43,866	8	16,420	16
	NOx	2.5	11.70			4,104,980	4,105
35' Diesel	VOC	0.01	0.05	39,063	4	7,311	7
	NOx	2.5	11.70			1,827,758	1,828
40' CNG	VOC	0.15	0.70	19,447	4	54,596	55
	NOx	1.1	5.15			400,367	400
						VOC Subtotal	78 kg/yr
						NOx Subtotal	6,333 kg/yr

New Buses		Emissions Rate g / bhp-hr [1]	Emissions Rate g/mi [2]	VMT mi/yr/bus [1]	Number of Vehicles	Yearly Emissions g/ yr	Yearly Emissions kg/yr
35' Diesel	VOC	0.01	0.05	43,866	6	12,315	12
	NOx	0.2	0.94			246,299	246
35' Diesel Hybrid	VOC	0.01	0.05	39,063	6	10,967	11
	NOx	0.2	0.94			219,331	219
40' CNG	VOC	0.01	0.05	19,447	4	3,640	4
	NOx	0.2	0.94			72,794	73
						VOC Subtotal	27 kg/yr
						NOx Subtotal	538 kg/yr

Reduction in Emissions	VOC	51 kg/yr
	NOx	5,795 kg/yr

2 - TRAVEL REDUCTIONS:

Average Yearly VMT Reduction: 3,100,000 miles/year [1]

		VOC	NOx	
Emissions Rate		0.676	0.640	g/mile [3]
Emissions Rate		2,094,517	1,984,304	g/year
	divided by:	1,000	1000	g/kg
Reduction in Vehicle Emissions		2,095	1,984	kg/yr

3 - EMISSIONS REDUCTION

	VOC	NOx	
Reduction in Bus Emissions (from above)	51	5,795	kg/yr
Reduction in Vehicle Emissions (from above)	2,095	1,984	kg/yr
Total Reduction in Emissions	2,146	7,779	kg/yr

4 - COST EFFECTIVENESS:

Total Cost:	$7,803,000	above
Useful life, years:	10 [1]	
Annual Cost:	$780,300	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Cost Eff., $/Ton
VOC	$780,300	2,146	$364	**$329,803**
NOx	$780,300	7,779	$100	**$90,980**

[1] From application

[2] Applying a conversion factor of 4.679 bhp-hr / mi, EPA data for Mobile6

[3] VDOT, Hampton Roads average for light duty vehicles and all roadway functional classes, 2011, 35 mph

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #57
TRANSIT SERVICE (NEW OR EXPANDED)

AGENCY: Williamsburg Area Transit Authority
PROJECT NAME: **Jamestown Route**
LOCATION: James City County, connecting to Williamsburg, York County, and Newport News
DESCRIPTION: Provide transit service to the Jamestown Area
DATE: 9/18/2009 (on application)
PROJECT COST: $823,492

1- INCREASED BUS EMISSIONS:

Route Length:	18.75	mi/trip (1)
Bus Trips per day (round trips):	14	round trips / day (1)
Bus VMT:	263	mi/day

Type	Emissions Factor, g/mi (2)	Bus VMT, mi/day (above)	Emissions Increase, g/day	Emissions Increase, kg/day	Conversion Factor, days/yr (1)	Emissions Increase, kg/yr
VOC	0.590	263	155	0.15	310	48
NOx	12.461	263	3,271	3.27	310	1,014

2- REDUCED AUTO EMISSIONS:

Ridership Estimate:	196	boardings/day (1)
Vehicle Occupancy Rate:	1.15	persons/veh (3)
Reduction in Daily Vehicle Trips:	170	veh trips / day
Average Trip Length:	10	miles/trip (4)
Reduction in VMT:	1,704	miles/day

Type	Emissions Factor, g/mi (5)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, days/yr	Emissions Reduction, kg/yr
VOC	0.665	1,704	1,133	1.13	310	351
NOx	0.797	1,704	1,358	1.36	310	421

3- COST EFFECTIVENESS:

Project Cost:	$823,492	above
Project life, years:	3	(1)
Annual Cost:	$274,497	

Type	Cost, $/yr (above)	Net Emissions Reduction, kg/yr (auto - bus, above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$274,497	303	$905	907	**$820,759**
NOx	$274,497	-593	negative	907	**negative**

(1) From application

(2) VDOT, Hampton Roads average for Diesel Transit & Urban Buses on minor arterials, 2011, 35mph

(3) 1.15 for work trips, 1.30 for non-work trips, as previously assumed

(4) Average trip length for personal vehicle trips, 2001 NHTS

(5) VDOT, Hampton Roads average for all vehicle types on minor arterials, 2011, 35mph

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #58
TRANSIT SERVICE (NEW OR EXPANDED)

AGENCY: Williamsburg Area Transit Authority
PROJECT NAME: **Mounts Bay Route**
LOCATION: James City County and York County, with connections to Williamsburg and Newport News
DESCRIPTION: Provide transit service to Mounts Bay Governmental Complex
DATE: 9/18/2009 (on application)
PROJECT COST: $677,389

1- INCREASED BUS EMISSIONS:

Route Length:	21.36	mi/trip (1)
Bus Trips per day (round trips):	14	round trips / day (1)
Bus VMT:	299	mi/day

Type	Emissions Factor, g/mi (2)	Bus VMT, mi/day (above)	Emissions Increase, g/day	Emissions Increase, kg/day	Conversion Factor, days/yr (1)	Emissions Increase, kg/yr
VOC	0.590	299	176	0.18	255	45
NOx	12.461	299	3,726	3.73	255	950

2- REDUCED AUTO EMISSIONS:

Ridership Estimate:	168	boardings/day (1)
Vehicle Occupancy Rate:	1.15	persons/veh (3)
Reduction in Daily Vehicle Trips:	146	veh trips / day
Average Trip Length:	10	miles/trip (4)
Reduction in VMT:	1,461	miles/day

Type	Emissions Factor, g/mi (5)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, days/yr	Emissions Reduction, kg/yr
VOC	0.665	1,461	971	0.97	310	301
NOx	0.797	1,461	1,164	1.16	310	361

3- COST EFFECTIVENESS:

Project Cost:	$677,389	above
Project life, years:	3	(1)
Annual Cost:	$225,796	

Type	Cost, $/yr (above)	Net Emissions Reduction, kg/yr (auto - bus, above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/Ton
VOC	$225,796	256	$881	907	**$799,466**
NOx	$225,796	-589	negative	907	**negative**

(1) From application

(2) VDOT, Hampton Roads average for Diesel Transit & Urban Buses on minor arterials, 2011, 35mph

(3) 1.15 for work trips, 1.30 for non-work trips, as previously assumed

(4) Average trip length for personal vehicle trips, 2001 NHTS

(5) VDOT, Hampton Roads average for all vehicle types on minor arterials, 2011, 35mph

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION #59
TRANSIT VEHICLE REPLACEMENT/PURCHASE

JURISDICTION: Williamsburg Area Transit Authority
PROJECT NAME: **Trolley Replacement**
DESCRIPTION: Replace Diesel Bus Trolley
DATE: 9/18/2009
PROJECT COST: $315,000

Average Mileage of Vehicles Being Replaced	112,000	miles [(1)]
Average Age of Vehicles Being Replaced	10	years [(1)]
Average Miles per Year per Bus	11,200	miles/year per bus

1 - CHANGE IN BUS EMISSIONS

Current Bus-Trolley	Emissions Rate g / bhp-hr [(1)]	Emissions Rate g/mi [(2)]	VMT mi/yr/bus	Number of Vehicles	Yearly Emissions g/yr	Yearly Emissions kg/yr
VOC	0.01	0.05	11,200	1	524	1
NOx	4.0	18.72	11,200	1	209,619	210

New Bus-Trolley	Emissions Rate g / bhp-hr [(1)]	Emissions Rate g/mi [(2)]	VMT mi/yr/bus	Number of Vehicles	Yearly Emissions g/yr	Yearly Emissions kg/yr
VOC	0.01	0.05	11,200	1	524	1
NOx	0.2	0.94	11,200	1	10,481	10

Reduction in Emissions	VOC	0	kg/yr
	NOx	199	kg/yr

2- TRAVEL REDUCTIONS:

Average Yearly VMT Reduction: 61,000 miles/year [(1)]

	VOC	NOx	
Emissions Rate	0.676	0.640	g/mile [(3)]
Emissions Rate	41,215	39,046	g/year
divided by:	1,000	1000	g/kg
Reduction in Vehicle Emissions	41	39	kg/yr

3 - EMISSIONS REDUCTION

	VOC	NOx	
Reduction in Bus Emissions (from above)	0	199	kg/yr
Reduction in Vehicle Emissions (from above)	41	39	kg/yr
Reduction in Emissions	41	238	kg/yr

4 - COST EFFECTIVENESS:

Total Cost:	$315,000	above
Useful life, years:	10 [1]	
Annual Cost:	$31,500	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Eff., $/Ton
VOC	$31,500	41	$764	**$693,211**
NOx	$31,500	238	$132	**$119,951**

[1] From application

[2] Applying a conversion factor of 4.679 bhp-hr / mi, EPA data for Mobile6

[3] VDOT, Hampton Roads average for light duty vehicles and all roadway functional classes, 2011, 35 mph

PAGE INTENTIONALLY LEFT BLANK

APPENDIX D

RSTP Policies, Procedures, and Analysis Methodologies

REGIONAL SURFACE TRANSPORTATION PROGRAM (RSTP)

Program Policies and Criteria:

- **Funding Program Criteria, 1992** – The Transportation Technical Committee (TTC) agreed to the following set of criteria for the use of RSTP Funds:

  - RSTP funds should play a significant role in the region's transportation system generally affecting two or more localities
  - The region could use RSTP funds to implement a regional project, which would have a low probability of funding under the current allocation program
  - RSTP funds will not be used for interstate improvements
  - RSTP funds should be used for projects that are unfundable by a locality or present funding sources
  - In many cases, full funding could not be achieved, however, multiple years of supplemental funding will enable the region to fund these projects at a significant level

- **RSTP Policy for 2020 LRP** - Adopted by the MPO on December 15, 1999. The MPO action endorsed the following regarding the use of RSTP funds during the next 20 years:

  - To supplement, as necessary, the funding of the Regional Priority Setting projects
  - To cover cost overruns of regionally significant projects
  - To finance ITS improvements
  - To finance new regionally significant projects when substantive progress can be made as a result of RSTP funding

- **RSTP Reserve Account Policy – Adopted in June 2001**

  - To set aside **5%** of the mark in the reserve account as a contingency measure.

- **RSTP Reserve Account Policy Addendum – March 2003**

  At its meeting on February 20, 2003, the Transportation Technical Subcommittee (TTS) recommended that a policy similar to the one in place for CMAQ funded projects be put in place for cost overruns of RSTP funded projects. The addendum to the RTSP reserve account policy is therefore as follows:

  1. If the cost/annual allocation and the scope of a project change less than 10% on any one RSTP funded project, the locality/agency should notify the TTC

with a request and justification for a change in funding. The TTC must review the request and recommend use of the reserve account or if possible commit future year funding to preserve the project.

2. If the cost/annual allocation and/or scope of the project change by more than 10% on any one RSTP funded project, the locality/agency should notify the TTC and MPO with a request and justification for a change in funding and/or scope. The TTC and MPO must review the request and may recommend one or any combination of the following:

   - Scale back the project
   - Use local funds
   - Use urban funds
   - Use reserve account RSTP funds
   - Use existing RSTP funds from another project
   - Use future RSTP allocations
   - Use future non-RSTP funds
   - Drop the project

- **RSTP Reserve Account Policy Change – Adopted in May 2006**

  - To allocate the full amount of FY 07-10 RSTP Marks without allowing any amount in the annual reserve account.

- **Reserve Account Policy Change – Adopted in December 11, 2009**

  - To maintain a reserve account for each fiscal year, FY 11-15, initially set at 5% of the annual RSTP Mark.

  - The purpose of the reserve account is two-fold:

    - To provide a way to handle potential reductions in the RSTP funds for FY 11-15.
    - To provide funding for potential cost overruns on approved RSTP projects.

Application Process and Preliminary Screening:

HRTPO staff provides standard application forms for submitting RSTP project proposals. These forms are made available in electronic format and on the HRTPO web site. Jurisdictions and transit agencies return completed forms to HRTPO within a set time schedule. Projects are screened using the following criteria:

- Must meet all applicable SAFETEA-LU requirements
- Must be included in the current Long-Range Transportation Plan (LRTP)
- Must be well defined
- Reasonable data and cost estimates must be provided
- Must meet all requirements developed and approved by the Transportation Technical Advisory Committee and the HRTPO Board

Project Evaluation and Methods:

Projects are placed in up to six categories and then scored. Projects within each category are then compared to one another. The six categories are:

1. Highway Capacity, Accessibility and Operational Improvements, including:
    - Roadway Widening
    - New Facilities
    - HOV Lanes
    - New Interchange
    - Intersection/Interchange Improvements
    - Corridor Operational Improvements
    - Bridge Rehabilitation

2. Intermodal Transportation Projects, including:
    - Passenger facilities
    - Freight facilities

3. Transit Projects, including:
    - New Service
    - Expansion of Existing Service
    - Bus Shelters/Facilities
    - Vehicle Replacement/Purchase
    - Fixed Guideway
    - Other Transit and ITS Projects

4. Planning Studies, including:
    - Alternatives Analysis
    - Other Planning Studies

5. Transportation Demand Management Projects, including:
    - Regional Rideshare
    - Marketing and Outreach Program
    - HOV Express Bus Service
    - Park-and-Ride Lots

6. Intelligent Transportation Systems

HRTPO staff evaluates all projects according to the criteria developed by the CMAQ/RSTP Subcommittee and approved by the TTAC and the HRTPO Board. The staff prepares a list of candidate projects that have been scored and ranked by category. Projects with insufficient data or late submittals are dropped from the process. The list of projects is then submitted to the CMAQ/RSTP Subcommittee for review.

Project Selection:

The CMAQ/RSTP Subcommittee of the Transportation Technical Advisory Committee (TTAC) reviews, discusses and revises candidate projects as appropriate, and makes recommendations to the TTAC. Projects are selected based upon:

- Project Score/Ranking
- Funding Availability
- Other Criteria (prior commitment, federal mandates, etc.)

Project Prioritization:

Selected projects are assigned to fiscal years based on priority and on project readiness.

RSTP PROJECT EVALUATION METHOD BY PROJECT CATEGORY

Project Category	Evaluation Method
Highway Capacity, Accessibility & Operational Improvements - Roadway widening, new facilities, HOV lanes, new interchanges, Intersection improvements - Corridor operational improvements - Bridge rehabilitation	 See Table 2 See Table 3 See Table 4
Intermodal Transportation Projects - Intermodal facilities	See Table 5
Transit - New service, Expansion of Service, Shelters & Facilities (Bus, fixed-guideway, HOV express) - Vehicle replacement/purchase - Other transit & ITS projects	 See Table 6 See Table 7 See Table 8
Planning Studies - Alternatives Analysis - Feasibility Studies	See Table 9
Transportation Demand Management - Regional rideshare - Marketing & outreach - HOV lane express bus service - Park-&-ride lots	See Table 10
Intelligent Transportation Systems	See Table 11

HIGHWAY CAPACITY, ACCESSIBILITY AND OPERATIONAL IMPROVEMENTS

Table 2
Roadway Widening, New Facility, HOV Lanes, Intersection Improvements

Evaluation Criteria	Points	Scoring Instructions
Congestion Level	0-20	Existing and future conditions (10 points each): severe=7, moderate=3, low=0
Cost-Effectiveness	0-20	Lowest cost/vmt = 20 Highest cost/vmt = 0 Straight line interpolation between
System Continuity	0-20	Completion of a missing link in the transportation system Total completion = 20 Partial completion = 10
Safety	0-20	20 points to the project with highest safety improvements
Air Quality	0-10	Reduces NOx =5 points Reduces HC=5 points
Project Readiness	0-10	Projects with detailed design and cost estimates that are ready to go will receive 10 points

Table 3
Corridor Operational Improvements

Evaluation Criteria	Points	Scoring Instructions
Arterial LOS based on Average Travel Speed	0-25	Relative Scale- maximum points to arterial with lowest average speed (worst LOS), 0 to arterial with LOS C or better
ADT of Roadway	0-20	Existing and future ADT (10 points each). Relative scale - maximum points to highest corridor ADT/Lane
Cost-Effectiveness	0-35	Relative Scale- maximum points to the project with lowest cost/vmt
Existing Accident Experience	0-20	Relative Scale- maximum points to the project With highest accident rate or frequency
Project Readiness	0-10	Projects with detailed design and cost estimates that are ready to go will receive 10 points

HIGHWAY CAPACITY, ACCESSIBILITY AND OPERATIONAL IMPROVEMENTS

Table 4
Bridge Rehabilitation

Evaluation Criteria	Points	Scoring Instructions
Bridge Condition per VDOT Sufficiency Index	0-60	Relative Scale- maximum points to the bridge with worst condition
ADT of Bridge	0-30	Relative Scale- maximum points to the bridge with highest ADT
Project Readiness	0-10	Projects with detailed design and cost estimates that are ready to go will receive 10 points

INTERMODAL TRANSPORTATION PROJECTS

Table 5
Intermodal Facilities

Evaluation Consideration	Points
Will the project establish opportunities for linkages or connections between transportation modes or existing corridors or centers?	Up to 40 points
Will the project improve the operating system to better accommodate intermodal movements?	Up to 25 points
Will the project improve rail or vehicular access to freight distribution facilities, ports, or major industrial clients?	Up to 25 points
Project Readiness Projects with detailed design and cost estimates that are ready to go will receive 10 points	Up to 10 points

TRANSIT

Table 6
New Service, Expansion of Existing Service, Facilities, etc.

Evaluation Criteria	Points	Scoring Instructions
Congestion relief	0-10	Impacts of new/expanded service on area highways- 10 points to the project with the highest % of trips removed from highways; 0 points to the project with no impact on adjacent highway.
Facility Usage- Daily Ridership	0-20	Relative Scale Highest ridership=20 points Lowest ridership=0 points
Cost Effectiveness - Subsidy/ passenger (or use other FTA formula depending on the project)	0-20	Relative scale Lowest subsidy/passenger=20 Highest subsidy/passenger=0
Air Quality	0-20	NOX reductions=10 HC reductions=10
Coverage Area	0-20	Relative scale - Population and Employment data.
Project Readiness	0-10	Projects with detailed design and cost estimates that are ready to go will receive 10 points

Table 7
Vehicle Replacement/Purchase

Evaluation Criteria	Points	Scoring Instructions
Average age of the vehicles	35	FTA standard=12 years
Number of vehicles to replace/total fleet	10	
Emissions changes of the old and new vehicles	30	
Cost Effectiveness	10	Cost/Ridership
Average mileage of the vehicles to be replaced	15	FTA Standards

TRANSIT

Table 8
Other Transit and ITS Projects

Evaluation Consideration	Points
Will the project increase service reliability of the transit system?	0-25
Will the project improve passenger safety, comfort and convenience?	0-30
Does the project improve efficiency of the transit system?	0-10
Does the project improve the revenue collection?	0-25
Does the project improve transit data collection system?	0-10

PLANNING STUDIES

Table 9
Alternatives Analysis & Feasibility Studies

Evaluation Consideration	Points	Yes or No
1) Is the study necessary to address a major issue or to revise the Plan?	0-25	
2) Is the study necessary to address a safety issue?	0-15	
3) Is the study concerned with encouraging multimodal transportation?	0-10	
4) Does the study address the mobility or accessibility needs of the region?	0-20	
5) Is the study well defined in terms of purpose, design concept and scope?	0-10	
6) Do the goals and objectives of the study show support for economic development?	0-10	
7) Do the goals and objectives demonstrate preservation or protection of the environment?	0-10	

TRANSPORTATION DEMAND MANAGEMENT

Table 10

Regional Rideshare, Marketing & Outreach, HOV Lane Express Bus Service, Park-and Ride Lots, Telecommuting, etc. The TDM Committee developed the following criteria. Measures will be evaluated against the base year's figures (TDM Manager will provide appropriate data for base and target years).

Measures of Success	Base Year	Target Year
Number of employers offering some TDM programs		
% of employees ridesharing (car, van, bus)		
% of employees walking or biking		
Number of contacts made		
Parking Management (availability, price, zoning requirements)		
Mixed use land use (trip reduction)		
HOV usage/ Vehicle occupancy rates		
Other measures		

INTELLIGENT TRANSPORTATION SYSTEMS

Table 11

ITS Projects

Evaluation Consideration	Points
Will the project improve traffic flow during peak congestion periods and special events?	0-15
Will the project directly reduce the number or severity of accidents, which occur on roadways?	0-25
Will the project improve level of service, increase service capacity, or contribute to incident management?	0-20
Does the project address the mobility or accessibility needs of the region?	0-10
Does the project improve the linkage and communications among various operating agencies to provide better and accurate traffic information to the motorists?	0-20
Is the project part of the Regional ITS Strategic Plan?	0-10

PAGE INTENTIONALLY LEFT BLANK

APPENDIX E

RSTP Candidate Project Application Forms

HAMPTON ROADS CMAQ/RSTP PROJECT SELECTION PROCESS

RSTP CANDIDATE PROJECT APPLICATION

To be considered for RSTP funding, a proposed project must be included in the current Long-Range Transportation Plan (LRTP). Data necessary for evaluating the project must be submitted for each candidate project. Filling out the appropriate sections of this application will insure that the necessary data are submitted. One application should be filled out for each project being proposed for RSTP funding.

Form A must be filled out for each project. At the end of Form A, you will indicate the RSTP Project Type that best fits your proposed project. Depending upon the RSTP Project Type selected, you will be directed to fill out one of the following forms: Form B, Form C, Form D, Form E, Form F, or Form G. If you select the "Other" category, please contact HRTPO staff for input data requirements.

RSTP FORM-A

Locality/Agency:_____ Date:_____

Prepared By:_____ Phone:_____

E-mail:_____ Fax:_____

UPC #: _____

Project Name:_____

Project Location:

Project Description:

(Brief description of project. If applicable, include additional data or maps as attachments.)

Is this a new project? _____

Is this project included in the Regional Transportation Plan? _____

Estimated Start Date: _____

Estimated Completion Date: _____

RSTP FORM-A (Continued)

Need for and Benefit to be Derived from Project: (Probable impact on air quality)

Project Cost and Funding:

Total Project Cost: $ _____

Indicate Requested RSTP Funding Per Fiscal Year Below:

Fiscal Year 1:	Year:_____	Requested RSTP Amount: $ _____
Fiscal Year 2:	Year:_____	Requested RSTP Amount: $ _____
Fiscal Year 3:	Year:_____	Requested RSTP Amount: $ _____
Fiscal Year 4:	Year:_____	Requested RSTP Amount: $ _____
Fiscal Year 5:	Year:_____	Requested RSTP Amount: $ _____
Fiscal Year 6:	Year:_____	Requested RSTP Amount: $ _____

RSTP Project Type
(Please check ONE below and then use the associated form to complete your application)

☐	Highway Project	USE FORM-B
☐	Intermodal Transportation Project	USE FORM-C
☐	Transit Service (New, Expanded, Facilities)	USE FORM-D, Section 1
☐	Transit Vehicle Replacement/Purchase	USE FORM-D, Section 2
☐	Transit ITS	USE FORM-D, Section 3
☐	Planning Study	USE FORM-E
☐	Transportation Demand Management	USE FORM-F
☐	Intelligent Transportation System	USE FORM-G
☐	Other	Contact HRTPO Staff for Input Data Requirements

RSTP FORM-B
HIGHWAY PROJECTS

1. Traffic Count Data:

   "Current" ADT (vpd): _____ "Current" Year: _____

   "Current Peak Hour Traffic (vph): _____ "Current" LOS: _____

   Forecasted ADT (vpd): _____ Forecast Year: _____

   Forecasted Peak Hour Traffic (vph): _____ Forecasted LOS: _____

2. Length of Project Section (miles): _____

3. Functional Classification of Project Section: _____

4. Peak Hour Average Speed in Project Section:

   AM Peak (mph):_____ PM Peak (mph): _____

5. Total accidents in project section over the last three years: _____

6. Will this project improve safety? _____

   If "yes," explain: _____

7. Will this project improve system continuity? _____

   If "yes," explain: _____

8. Will this project help improve air quality? _____

   If "yes," explain (quantify the impacts on VOC and NOx): _____

9. Project Readiness:

   Do you have a detailed design and cost estimates? _____

   Is there community support for the project? _____

10. Sponsor Readiness:

    Do you have all necessary local, state, and federal permits and approvals? _____

11. Is this a Bridge Rehabilitation/Replacement project? _____

    If "yes", what is the Bridge Condition per the VDOT Sufficiency Index? _____

RSTP FORM-C

INTERMODAL TRANSPORTATION PROJECT

1. Will the project establish opportunities for linkages or connections between transportation modes, existing corridors, or centers? _____

   If "yes," explain:

2. Will the project improve intermodal movements? _____

   If "yes," explain:

3. Will the project improve rail access to freight distribution facilities, ports, or major clients? _____

   If "yes," explain:

4. Will the project improve vehicular access to freight distribution facilities, ports, or major clients? _____

   If "yes," explain:

5. Project Readiness:

   Do you have a detailed design and cost estimates? _____

   Is there community support for the project? _____

6. Sponsor Readiness:

   Do you have all necessary local, state, and federal permits and approvals? _____

RSTP FORM-D

TRANSIT PROJECT

(Fill out only ONE section below, depending on the Project Type)

SECTION 1: New Service, Expanded Service, Shelters & Facilities

1-a. Daily ridership:

Current:_____

Expected after project:_____

1-b. Subsidy per Passenger:

Existing:_____

After Project:_____

1-c. Service Coverage Area of Project:

Population:_____

Employment:_____

1-d. Will this project help improve air quality? _____

If "yes," explain (quantify impacts on VOC and NOx):

1-e. Will this project provide congestion relief? _____

If "yes":

Expected reduction in daily VMT: _____

Expected reduction in daily Vehicle Trips: _____

1-f. Project Readiness:

Do you have a detailed design and cost estimates? _____

Is there community support for the project? _____

1-g. Sponsor Readiness:

Do you have all necessary local, state, and federal permits and approvals? _____

1-h. Additional information:

RSTP FORM-D (Continued)

TRANSIT PROJECT

SECTION 2: Vehicle Replacement/Purchase

2-a. Number of vehicles to be purchased: _____

Average daily revenue miles (DRM) per new vehicle: _____

Average operational days per year per new vehicle: _____

2-b. Number of old vehicles being retired: _____

Average DRM per vehicle being retired: _____

Average operational days per year per vehicle being retired: _____

Average age of vehicles being retired: _____

Average mileage of vehicles being retired: _____

2-c. Type of vehicles to be purchased: _____

2-d. Emissions Factors for new vehicles: (specify units, i.e. grams/brake-horsepower/hour):

New vehicles:

VOC:_____ NOx:_____

Vehicles being replaced:

VOC:_____ NOx:_____

RSTP FORM-D (Continued)

TRANSIT PROJECT

SECTION 3: Transit ITS Projects

3-a. Will this project improve the reliability and ridership of the transit system?_____

Explain how:

3-b. Will this project improve passenger safety, comfort, and convenience? _____

If "yes," explain:

3-c. Will the project improve the efficiency of the transit system? _____

If "yes," explain:

3-d. Will the project improve revenue collection? _____

If "yes," explain:

3-e. Will the project improve transit data collection? _____

If "yes," explain:

3-f. Estimated total passenger miles traveled (PMT) resulting from this project:_____

3-g. Is this project part of the Regional ITS Strategic Plan?_____

If "yes," explain:

RSTP FORM-E

PLANNING STUDY

1. Is the study necessary to address a major issue or to revise the Regional Transportation Plan? _____
2. Is the study necessary to address a safety issue? _____
3. Is the study concerned with encouraging multimodal transportation? _____
4. Will the study address the mobility or accessibility needs of the region? _____
5. Is the study well defined in terms of purpose, design concept, and scope? _____
6. Do the goals and objectives of the study show support for economic development? _____
7. Do the goals and objectives of the study demonstrate preservation or protection of the environment?_____
8. Please describe the purpose, scope, and/or any detail related to the proposed study:

RSTP FORM-F

TRANSPORTATION DEMAND MANAGEMENT PROGRAM

1. Number of employers offering some type of TDM program: _____
2. Percent of employees that rideshare (car, van, bus): _____%
3. Percent of employees walking or biking: _____%
4. Number of contacts made:_____
5. Parking management (availability, price, zoning requirements):

6. Mixed use land use (trip reduction):

7. HOV Usage: _____
8. Number of employers participating in Telecommuting: _____
9. Additional information:

RSTP FORM-G

INTELLIGENT TRANSPORTATION SYSTEM

1. Will the project improve traffic flow during peak congestion periods? _____
2. Will the project improve traffic flow during special events? _____
3. Will the project directly reduce the number of accidents that occur on roadways? _____
4. Will the project directly reduce the severity of accidents that occur on roadways? _____
5. Will the project improve level of service? _____

   If "yes", explain below and quantify in terms of VMT/Lane-Mile:

6. Will the project increase capacity? _____
7. Total VMT served by this project: _____
8. Will the project contribute to incident management? _____
9. Does the project address the mobility needs of the region? _____
10. Does the project address the accessibility needs of the region? _____
11. Does the project improve the linkage and communications among various operating agencies to provide better and more accurate traffic information to motorists? _____
12. Is the project part of the Regional ITS Strategic Plan? _____
13. Please provide additional information to help evaluate this project:

PAGE INTENTIONALLY LEFT BLANK

APPENDIX F

RSTP Project Analysis Worksheets

RSTP Project Analysis
Proposed Highway Projects

Roadway Widening, New Facility, HOV Lanes, Interchange/Intersection Improvements

						Congestion Level (0-20 Points)		Annualized Cost/Annual VMT	Cost Effectiveness (0-20 Points)	System Continuity (0-20 Points)	Safety (0-20 Points)	Air Quality (0-10 Points)	Project Readiness (0-10 Points)	
Project Number	Jurisdiction	Project Name	Total Cost	Project Life (Years)	Annualized Cost	Existing (0-10 Points)	Future (0-10 Points)							Total Score (Max = 100)
21	Poquoson	Wythe Creek Rd: Widen to 4 lanes with center turn lane from Alphus St to Hampton CL	$16,159,000	20	$807,950	10	10	$0.220	18	20	15	10	10	93
28	York Co	Rt 17 (George Washington Memorial Hwy): Widen to 6 lanes from York Crossing Rd to Ella Taylor Rd	$58,509,000	20	$2,925,450	10	10	$0.545	14	20	20	10	7	91
22	Portsmouth	Stormwater management facilities near I-264/Frederick Blvd	$500,000	20	$25,000	10	10	$0.182	20	10	20	10	10	90
19	Norfolk	North Military Hwy: Widen to 8 lanes from Lowery Rd to 0.2 mi south of Northampton Blvd	$26,367,523	20	$1,318,376	10	10	$0.341	15	18	20	10	7	90
20	Norfolk	North Military Hwy & Robin Hood Rd: Widen Military Hwy to 6 lanes from 0.289 mi north of Northampton Blvd to 0.230 mi north of I-64; Widen Robin Hood Rd to 4 lanes from North Military Hwy to Almeda Ave	$24,834,247	20	$1,241,712	10	10	$0.352	15	18	18	10	7	88
3	Chesapeake	Portsmouth Blvd: Widen to 4 lanes from Suffolk CL to Jolliff Rd	$15,218,000	20	$760,900	6	10	$0.154	20	20	12	10	4	82
2	Chesapeake	Mount Pleasant Rd: Widen to 4 lanes from Chesapeake Expwy to Ethridge Rd	$15,623,000	20	$781,150	8	10	$0.265	17	15	18	10	4	82
27	Virginia Beach	Wesleyan Dr: Widen to 4 lanes from Norfok CL to Baker Rd	$8,100,000	20	$405,000	10	10	$0.353	15	20	10	10	7	82
4	Hampton	Wythe Creek Rd: Widen to 4 lanes with bike lanes & sidewalks from Commander Shepard Blvd to Poquoson CL	$23,400,000	20	$1,170,000	8	10	$0.454	15	20	15	10	2	80
24	Portsmouth	Turnpike Rd: Widen to 4 lanes from Frederick Blvd to Constitution Ave	$2,500,000	20	$125,000	6	8	$0.347	15	20	12	8	10	79
13	James City Co & Newport News	Rt 60 Relocation & Upgrading: Complete PE, acquire ROW, & construct new 4-lane facility from Blow Flats Rd/Pocahontas Trl in JCC to Fort Eustis	$70,800,000	20	$3,540,000	3	10	$0.281	17	20	10	8	7	75
1	Chesapeake	Hanbury Rd: Widen to 4 lanes from Battlefield Blvd to Johnstown Rd	$16,000,000	20	$800,000	8	10	$0.828	10	20	15	10	2	75
14	Newport News	Atkinson Blvd: New 4-lane facility between Warwick Blvd & Jefferson Ave approx. halfway between Denbigh Blvd & Fort Eustis Blvd with pedestrian & bicycle facilities	$52,000,000	20	$2,600,000	6	6	$0.289	17	20	10	6	7	72
26	Virginia Beach	Lynnhaven Pkwy Phase XI: Reconstruct to 4 lanes with bikeway from Indian River Rd to Centerville Tnpk	$16,000,000	20	$800,000	3	3	$48.485	0	20	15	6	10	57
23	Portsmouth	Rt 17 Access Management: Along George Washington Hwy from Chesapeake CL to Victory Blvd	$2,000,000	20	$100,000	8	8	$2.963	5	10	2	8	2	43
18	Norfolk	Princess Anne Rd & Sewells Point Rd Intersection Improvements	$844,496	20	$42,225	2	3	$1.535	5	10	5	4	7	36

Prepared By: Hampton Roads Transportation Planning Organization, December 2009.

RSTP Project Analysis
Proposed Transit Projects

New Service, Expansion of Existing Service, Facilities

Project Number	Jurisdiction	Project Name	Total Cost	Will Project Reduce Congestion on Area Highways? (0-10 Points)	Facility Ridership - Daily Ridership (0-20 Points)	Cost Effectiveness - Subsidy/Passenger (0-10 Points)	Air Quality (0-20 Points)	Coverage Area (Based on Population & Employment Data) (0-20 Points)	Project Readiness (Detailed Design & Cost Estimates?) (0-10 Points)	Total Score (Max = 100)
15	Newport News	Amtrak Station Relocation Project	$20,000,000	4	10	7	12	10	6	49

Prepared By: Hampton Roads Transportation Planning Organization, December 2009.

RSTP Project Analysis
Proposed Transit Projects

Other Transit Projects

Project Number	Jurisdiction	Project Name	Total Cost	Will Project Increase Service Reliability and Ridership of Transit System? (0-25 Points)	Will Project Improve Passenger Safety, Comfort, and Convenience? (0-30 Points)	Does Project Improve Efficiency of Transit System? (0-10 Points)	Does Project Improve Revenue Collection? (0-25 Points)	Does Project Improve Transit Data Collection System? (0-10 Points)	Total Score (Max = 100)
8	HRT	Ferry Fare Collection Equipment	$1,500,000	20	25	10	20	10	85
5	HRT	Systemwide Bus Stop Sign Program (3,400 Bus Stops)	$1,900,000	25	20	7	0	0	52
6	HRT	Replacement of Southside Administrative Facilities, Phase 1a	$2,000,000	10	10	10	10	10	50
9	HRT	Facilities Upgrades - Hampton Headquarters and Related Facilities	$3,500,000	10	10	8	0	5	33

Prepared By: Hampton Roads Transportation Planning Organization, December 2009.

RSTP Project Analysis
Proposed Planning Studies

Planning Studies

Project Number	Jurisdiction	Project Name	Total Cost	Study Needed to Address Major Issue or Revise LRTP? (0-25 Points)	Study Needed to Address a Safety Issue? (0-15 Points)	Study Concerned with Encouraging Multimodal Transportation? (0-10 Points)	Does the Study Address Mobility or Accessibility Needs of the Region? (0-20 Points)	Well Defined - Purpose, Design Concept, Scope (0-10 Points)	Support for Economic Development (0-10 Points)	Goals Demonstrate Preservation or Protection of Environment (0-10 Points)	Total Score (Max = 100)
7	HRT	Virginia Beach/Naval Station Norfolk LRT Extension Study AA/EIS/PE/FD/ROW	$29,000,000	25	5	10	15	8	7	7	77
16	Newport News	Peninsula Rapid Transit Project (AA & Other Studies) (Previous HRT Project UPC# T1821)	$1,500,000	25	5	10	15	8	7	7	77
25	Virginia Beach	Virginia Beach Transit Extension Study AA/SDEIS/PE/FE	$10,000,000	25	5	10	15	8	7	7	77
30	Suffolk	Citywide Traffic Management System Plan	$400,000	20	5	5	10	8	4	4	56
12	James City Co	Route 60/143 Connector Study	$300,000	25	0	0	10	5	7	4	51
10	James City Co	Longhill Road Corridor Study	$300,000	20	5	5	10	6	0	4	50
29	Gloucester Co	Business Route 17 Corridor Planning Study	$300,000	20	5	3	6	5	4	4	47
11	James City Co	Mooretown Road Extension Study	$400,000	0	5	3	0	6	7	4	25

Prepared By: Hampton Roads Transportation Planning Organization, December 2009.