COMMONWEALTH OF VIRGINIA
STATE AIR POLLUTION CONTROL BOARD

OZONE ADVANCE ACTION PLAN
HAMPTON ROADS, VIRGINIA

Appendix C: CMAQ Emission Reduction Estimates

HAMPTON ROADS TRANSPORTATION PLANNING ORGANIZATION

CMAQ/RSTP PROJECTS AND ALLOCATIONS 2011

HAMPTON ROADS TPO
TRANSPORTATION PLANNING ORGANIZATION

T12-01

JANUARY 2012

HAMPTON ROADS TRANSPORTATION PLANNING ORGANIZATION
CMAQ/RSTP PROJECTS AND ALLOCATIONS

2011

This report was included in the Unified Planning Work Program for Fiscal Year 2011-2012, which was approved by the Board of the Hampton Roads Transportation Planning Organization on June 16, 2011.

PREPARED BY:

HAMPTON ROADS TPO
TRANSPORTATION PLANNING ORGANIZATION

JANUARY 2012

T12-01

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ABSTRACT

This report summarizes the Hampton Roads Transportation Planning Organization 2011 Congestion Mitigation and Air Quality (CMAQ) Improvement Program and Regional Surface Transportation Program (RSTP) Projects and Allocations. As a result of the 2011 CMAQ/RSTP Project Selection Process, selected projects received allocations of CMAQ or RSTP funds through Fiscal Year 2018.

ACKNOWLEDGMENTS

This report was prepared by the Hampton Roads Transportation Planning Organization (HRTPO) in cooperation with the U.S. Department of Transportation (USDOT), 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.

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Section II – Background

The Background section of this report includes an introduction, a description of the CMAQ/RSTP project selection process, and public participation.

Section III – CMAQ Projects and Allocations

The CMAQ Projects and Allocations section of this report describes the process by which projects were selected to receive allocations of CMAQ funds.

Section IV – RSTP Projects and Allocations

The RSTP Projects and Allocations section of this report describes the process by which projects were selected to receive allocations of RSTP funds.

Section V – Appendices

The appendices of this report include detailed worksheets used in the analysis of each of the candidate projects submitted by member localities/agencies to receive available CMAQ or RSTP funding.

Section I
Executive Summary

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 to select projects to receive funds from these two programs is referred to as the CMAQ/RSTP Project Selection Process. Beginning this year, the project selection process will be conducted annually, normally beginning in July and running through December.

This report summarizes the work of selecting CMAQ and RSTP projects during the 2011 CMAQ/RSTP Project Selection Process. Selected projects received allocations of CMAQ or RSTP funds through Fiscal Year (FY) 2018.

CMAQ PROJECT SELECTION AND FUNDING ALLOCATIONS

During the December 15, 2011 meeting, the HRTPO Board approved the following to receive available allocations of CMAQ through FY 2018:

- Adjustments made to the allocations on 15 previously approved CMAQ projects to address changes in cost estimates and to advance funding on some of the projects to allow them to be completed sooner.
- FY 2018 allocations at the previously-agreed upon funding levels for the TRAFFIX program.
- 29 new CMAQ projects selected to receive a total of $33.8 million in allocations through FY 2018.

The HRTPO Board approved CMAQ projects and allocations are summarized below. In addition, a map showing the locations of the recommended CMAQ projects is included.

Previously Approved CMAQ Projects – Transfers and New Allocations to Cover Funding Shortfalls

1. **Bicycle-Pedestrian Improvements to Route 17 (UPC# 100626) – Gloucester County**
    - Advance and increase project CMAQ funding from FY 2015 ($42,000) and FY 2016 ($168,000) to FY 2012 ($53,258) and FY 2013 ($267,281) to address increases in the phase cost estimates and allow the project to be completed sooner.

2. **Bicycle-Pedestrian Improvements to Route 216 (UPC# 100625) – Gloucester County**
    - Allocate an additional $45,853 in FY 2017 CMAQ funds to address an increase in the construction phase cost estimate for this project.

3. **Bicycle-Pedestrian Improvements to Route 1216 (UPC# 100624) – Gloucester County**
    - Allocate an additional $46,874 in FY 2015 CMAQ funds and $445,157 in FY 2016 CMAQ funds to address increases in the phase cost estimates for this project.

4. **Big Bethel Road/Todds Lane Intersection Improvements (UPC# 83454) – Hampton**
    - Restore allocation of $650,000 in FY 2012 CMAQ funds that were approved by the HRTPO Board but later removed by VDOT Programming Division due to an outdated cost estimate for the project.

5. **Bridge Road/Bennetts Pasture Road Intersection Improvement (UPC# 100604) – Suffolk**
    - Advance project CMAQ funding from FY 2016 ($75,000) and FY 2017 ($675,000) to FY 2012 ($75,000) and FY 2013 ($675,000) to allow the project to be completed sooner.

6. **Bridge Road/Lee Farm Lane Intersection Improvement (UPC# 100605) – Suffolk**
    - Advance project CMAQ funding from FY 2016 ($75,000) and FY 2017 ($675,000) to FY 2012 ($75,000) and FY 2013 ($675,000) to allow the project to be completed sooner.

7. **Capitol Landing Bikeway (UPC# 84484) – York County**
    - Allocate an additional $92,487 in FY 2012 CMAQ funds to address an increase in the construction phase cost estimate for this project.

8. **Emergency Vehicle Preemption (UPC# 100537) – Chesapeake**
    - Advance a total of $500,000 in CMAQ funding from FY 2015 ($50,000) and FY 2016 ($450,000) to FY 2012 to allow the project to be completed sooner.

9. **Godwin Boulevard/Route 58 Park & Ride Lot (UPC# 98815) – Suffolk**
    - Advance project CMAQ funding from FY 2015 ($400,000) to FY 2012 to allow the project to be completed sooner.

10. **Mounts Bay Route – New Transit Service (UPC# T10862) – WATA**
    - Advance project CMAQ funding from FY 2016 ($350,000) and FY 2017 ($327,000) to FY 2014 ($350,000) and FY 2015 ($327,000) to allow the new transit service to begin sooner.

11. **Portsmouth Boulevard Park & Ride Lot (UPC# 100607) – Suffolk**
    - Advance project CMAQ funding from FY 2015 ($75,000) and FY 2016 ($675,000) to FY 2012 ($75,000) and FY 2013 ($675,000) to allow the project to be completed sooner.

12. **Purchase 12 Replacement Buses (UPC# T9148) – WATA**
    - Advance project CMAQ funding to allow WATA to begin purchasing the replacement buses sooner. Change allocations as follows:
        - From: FY 2013 ($2,386,000), FY 2014 ($2,204,000), FY 2015 ($1,513,000)
        - To: FY 2012 ($2,386,000), FY 2014 ($2,204,000), FY 2015 ($1,513,000)

13. **Purchase 38 Replacement 40' Buses (UPC# T9126) – HRT**
    - Advance project CMAQ funding to allow HRT to begin purchasing the replacement buses sooner. Change allocations as follows:
        - From: FY 2013 ($1,686,205), FY 2014 ($6,487,876), FY 2015 ($6,425,919)
        - To: FY 2012 ($2,689,477), FY 2013 ($3,607,260), FY 2014 ($4,951,032), FY 2015 ($3,352,231)

14. **Regional Opticom Preemption Strategic Plan & Deployment (UPC# 100606) – Regional**
    - Advance project CMAQ funding from FY 2015 ($150,000), FY 2016 ($1,000,000) and FY 2017 ($500,000) to FY 2014 ($150,000), FY 2015 ($1,000,000), and FY 2016 ($500,000) to allow the project to be completed sooner.

15. **Traffic Management Center & System Additions (UPC# 100538) – Chesapeake**
    - Advance project CMAQ funding from FY 2015 ($300,000), FY 2016 ($1,000,000) and FY 2017 ($700,000) to FY 2013 ($700,000), FY 2014 ($1,000,000), and FY 2015 ($700,000) to allow the project to be completed sooner.

16. **TRAFFIX (UPC# T1823) – HRT**
    - Allocate $1.1 million in FY 2018 CMAQ funds to continue this transportation demand management program at the previously agreed-upon level.

<u>New CMAQ Projects</u>

17. **Bridge Road Signal Coordination and ITS Network – Suffolk**
    - The project entails upgrading signal control equipment at four locations and coordinating a total of ten intersections to create a managed and coordinated traffic signal corridor along US Route 17. These improvements will result in reduced delays, which, in turn, result in reduced vehicular emissions.
    - Allocate $150,000 in FY 2017 and $1,107,000 in FY 2018 to fully fund the project.

18. **Centerville Road and News Road – James City County**
    - The project entails the following improvements to the intersection: improve visibility for left turns onto Centerville Road from News Road, add a right-turn lane on westbound News Road, add a left-turn lane on southbound Centerville Road, and add a right-turn lane on northbound Centerville Road. These improvements will reduce congestion at the intersection and, in turn, reduce vehicular emissions.
    - Allocate $70,000 in FY 2018 to fund the preliminary engineering phase of the project. The County will likely request additional funds in the future to complete the project.

19. **Citywide Pedestrian Enhancements – Newport News**
    - The project entails installing enhanced pedestrian accommodations, including pedestrian signal indicators, pushbutton actuators, and ADA-compliant sidewalk ramps. This project will involve approximately 60 intersections. In addition to improving pedestrian safety, these enhancements will allow for improved signal timing which will, in turn, reduce vehicular delay.

- Allocate $250,000 each in fiscal years 2016, 2017 and 2018. This will fund 75 percent of the total project cost and the City will likely request the balance in future years to complete the project.

20. **Citywide Signal Timing – Newport News**
    - The project entails developing and implementing new signal timing plans for strategic corridors in the City to improve traffic progression and reduce congestion.
    - Allocate $300,000 each in fiscal years 2015, 2016, and 2017 to fully fund the project.

21. **Citywide Traffic Signal Upgrade Phase 4 – Hampton**
    - The project entails upgrading the preemption system into a complete centralized unit, advanced traffic signal cabinet components, advanced video components, computerized interface units, and a TS2 traffic cabinet analyzer. These upgrades will allow for monitoring and troubleshooting signal problems remotely, reducing the use of motorized vehicles in addressing problems in the field.
    - Allocate $553,000 in FY 2015 to fully fund the project.

22. **Clifford/Bart/South Street Bike Boulevard – Portsmouth**
    - The project entails providing a designated route for bicyclists traveling between residential and commercial areas in the central portion of the City. The bike boulevard will provide nearly two miles of continuous bike paths.
    - Allocate $500,000 in FY 2018 to fully fund the project.

23. **CNG Bus Replacement – WATA**
    - The project entails purchasing 7 forty-foot CNG (Compressed Natural Gas) buses to replace similar buses that have reached the end of their useful life. The new vehicles will have improved fuel economy and performance, lower operating costs, and lower emissions than the buses they will replace.
    - Allocate 878,000 in FY 2018. This will provide for the purchase of two buses and WATA will likely request additional funds in future years to complete the project.

24. **Cunningham Drive Sidewalk Project – Hampton**
    - The project entails design and construction of sidewalks on both sides of Cunningham Drive between Mercury Boulevard and Todds Lane, providing pedestrian connectivity through the Coliseum Central section of the City, including the Peninsula Town Center.
    - Allocate $920,000 in FY 2018 to fully fund the project.

25. **First Colonial Road and Laskin Road – Virginia Beach**
    - The project entails improvement to the intersection of First Colonial Road and Laskin Road in the form of a second westbound left-turn lane. The additional turn lane will reduce the amount of green time required by the westbound approach to the intersection, thereby reducing overall delay and, in turn, reducing vehicular emissions.
    - Allocate $1 million in FY 2018 to fully fund the project.

26. **Green Operator (GO): Truck Replacement Program – Virginia Port Authority**
    - The project entails encouraging drayage truck owners to replace their pre-2004 heavy duty diesel trucks with low emission and more fuel efficient 2007 or newer models by providing a financial incentive in the form of a rebate or down payment on a GO-approved replacement vehicle. The incentive will equal 25% of the sales price of the replacement vehicle, or $20,000, whichever is less.
    - Allocate $1 million each in fiscal years 2015, 2016 and 2017 to fully fund the project.

27. **Green Operator (GO): Ocean-Going Vessel Hybridization and Fuel Switching Demo Project – Virginia Port Authority**
    - The project entails encouraging the use of alternative fuel/hybrid technology to reduce emissions from at-berth operations. VPA is prepared to execute two alternatives under this project:
        1. FlexGen, which eliminates the need for a commercial container vessel to run its auxiliary diesel engines and eliminates the need for shore-side power at the berth; and
        2. Fuel Switching, in which vessels will use ultra-low sulfur marine diesel while at berth at VPA facilities. Both alternatives will result in significant emissions reductions.
    - Allocate $500,000 in FY 2013 reserves, $500,000 in FY 2015, and $1 million each in fiscal years 2016, 2017, and 2018 to fully fund the project.

28. **Hybrid Bus Capital Replacements – WATA**
    - The project entails purchasing eight diesel-electric hybrid buses to replace eight diesel buses that have reached the end of their useful life. The new vehicles will have improved fuel economy and performance, lower operating costs, and lower emissions than the buses they will replace.
    - Allocate $3,208,000 in FY 2018. This covers WATA's full request for FY 2018 and will provide for the purchase of four buses. WATA plans to request additional funding in future years to complete the project.

29. **Lee Hall Bus Transfer Center – Newport News**
    - The project entails construction of a curbside bus transfer center with shelters, benches, and trash receptacles near the Lee Hall Shopping Center.
    - Allocate $125,000 in FY 2015 and $125,000 in FY 2016 to fully fund the project.

30. **Main Street at Route 10 Sidewalk Extension – Isle of Wight County**
    - The project entails extending the sidewalk along the north side of Main Street in Smithfield, connecting existing sidewalks in Smithfield with the Park and Ride lot at Route 10. This project will improve connectivity and safety for pedestrians from a number of multi-family residential areas through the busy intersection.
    - Allocate $165,000 in FY 2015 to fully fund the project.

31. **Purchase 29' Buses – HRT**

- The project entails purchasing 29 twenty-nine foot buses to replace similar buses that have reached the end of their useful life. The new buses will have improved fuel economy and performance, lower operating costs, and lower emissions than the buses they will replace.
- Allocate $802,166 in FY 2017 and $2 million in FY 2018. This will provide for the purchase of approximately seven buses and HRT will likely request additional funds in future years to complete this project.

32. **Purchase 40' Buses – HRT**

- The project entails purchasing 41 forty-foot buses to replace similar buses that have reached the end of their useful life. The new buses will have improved fuel economy and performance, lower operating costs, and lower emissions than the buses they will replace.
- Allocate $2 million in FY 2018. This will provide for the purchase of approximately five buses and HRT will likely request additional funds in future years to complete this project.

33. **Purchase One Replacement Ferry - HRT**

- The project entails the purchase of one passenger ferry to be used on the Elizabeth River service between Norfolk and Portsmouth. The new ferry will replace a ferry that is approaching the end of its useful life.
- Allocate $2 million in 2017 to fully fund the project.

34. **Route 199 and Brookwood Drive – James City County**

- The project entails improving the intersection by converting the right lane on northbound Brookwood Drive into a left/through lane and adding a new right-turn lane to the same approach. The improvement will address the current problem of insufficient capacity to accommodate the high number of left turns from northbound Brookwood Drive during rush hour. This will reduce delay at the intersection which will result in reduced vehicular emissions.
- Allocate $50,000 in FY 2015, $25,000 in FY 2016, $125,000 in 2017 and $75,000 in FY 2018 to fully fund the project.

35. **Route 199 West Ramp at Richmond Road – James City County**

- The project entails adding a new right-turn lane at the end of the ramp from Route 199 West onto Richmond Road and converting the existing lane into a dedicated left-turn lane. This improvement will address the current problem of the left turn queue blocking vehicles attempting to turn right onto Richmond Road. Reducing the delay will result in reduced vehicular emissions.
- Allocate $41,172 in FY 2016, $63,828 in FY 2017 and $350,000 in FY 2018. This will fund 70 percent of the total project cost and the County will likely request the balance in future years to complete the project.

36. **Shoulders Hill Road Bicycle and Pedestrian Improvements – Suffolk**
    - The project entails improvements to the intersection of Shoulders Hill Road and Bennetts Pasture Park Road to include modification of the signal and controller, pedestrian signals, signage, and pavement markings. A multiuse trail will be constructed extending approximately 1,090 feet south of the intersection along the southbound lane and approximately 250 feet south of the intersection along the northbound lane of Shoulders Hill Road.
    - Allocate $272,000 in FY 2018 to fully fund the project.

37. **Shoulders Hill Road/Nansemond Parkway/Wilroy Road Signal Coordination and ITS Network - Suffolk**
    - The project entails upgrading signal control equipment at six locations and coordinating a total of eight intersections to create a managed and coordinated north-south traffic signal corridor between northern Suffolk and the Downtown Suffolk area. These improvements will reduce delay and, in turn, reduce vehicular emissions. They will also aid in traffic management during incidents on I-664 and in evacuation management during regional emergencies.
    - Allocate $2,748,000 in FY 2018 to fully fund the project.

38. **Signal Re-timing Phase 3 – Norfolk**
    - The project entails traffic data collection, the hiring of a consultant to develop updated signal timing plans, and implementation of those plans. Improved signal timing plans reduce traffic congestion, resulting in decreased vehicle emissions.
    - Allocate $200,000 each in fiscal years 2015, 2016, and 2017 to fully fund the project.

39. **Signal System Citywide Upgrades – Portsmouth**
    - The project entails upgrading signalized intersections to bring the equipment into compliance with current design standards. The improvement will reduce delay at intersections and, in turn, reduce vehicular emissions.
    - Allocate $1.5 million each in fiscal years 2017 and 2018. This will fund half of the total project cost and the City will likely request the remainder in future years.

40. **South Lawson Park Bike Path – Poquoson**
    - The project entails the development and construction of a bike/pedestrian path for South Lawson Park that will accompany the new entrance road and surround the park.
    - Allocate $195,100 in FY 2018 to fully fund the project.

41. **Traffic Signal System Retiming – Hampton**
    - The project entails retiming 133 traffic signals with the intent of reducing travel times, delays, stops, and fuel consumption.
    - Allocate $698,000 in FY 2016 to fully fund the project.

42. **Traffic Signal Upgrade – Poquoson**
    - The project entails upgrading the traffic signal equipment at four intersections and linking the signals to Hampton's traffic signal network. This linkage will provide Hampton traffic technicians the ability to maintain Poquoson's traffic signals remotely. These improvements will result in reduced delays, which, in turn, result in reduced vehicular emissions.
    - Allocate $260,000 in FY 2017 to fully fund the project.

43. **Trolley Bus Replacements – WATA**
    - The project entails purchasing five transit trolleys to replace similar vehicles that have reached the end of their useful life. The new vehicles will have improved fuel economy and performance, lower operating costs, and lower emissions than the buses they will replace.
    - Allocate $432,000 in FY 2018. This covers WATA's full request for FY 2018 and will provide for the purchase of one replacement trolley. WATA plans to request additional funding in future years to complete the project.

44. **Roaring Springs Road Shared Roadway Bike Path and Main Street Sidewalk Gap Correction – Gloucester County**
    - The project entails improving the shoulders along Roaring Springs Road from Main Street to Beaver Dam Park to provide for a bike path and eliminating gaps in sidewalk coverage along Main Street, from where the current sidewalk ends west of Old Gloucester Way to the intersection of US Route 17. These improvements are proposed to encourage non-motorized travel in the County's historic Courthouse Village and between the Village and Beaver Dam Park.
    - Allocate $252,000 in FY 2018 to fund the preliminary engineering phase of the project. The County will likely request additional funds in the future to complete the project.

45. **Windsor North Court Street Sidewalk Extension – Isle of Wight County**
    - The project entails eliminating a gap in sidewalk coverage along North Court Street, south of Joyner Town Road. It is expected that the provision of pedestrian facilities will benefit a significant number of students that will be attending a new middle school scheduled for completion in 2012.
    - Allocate $375,000 in FY 2014 reserves.

Map 1 | Projects Selected for CMAQ Allocations

Projects Selected for CMAQ Allocations

Project Selection Status

- Previously Approved CMAQ Projects
- Recommended New CMAQ Projects

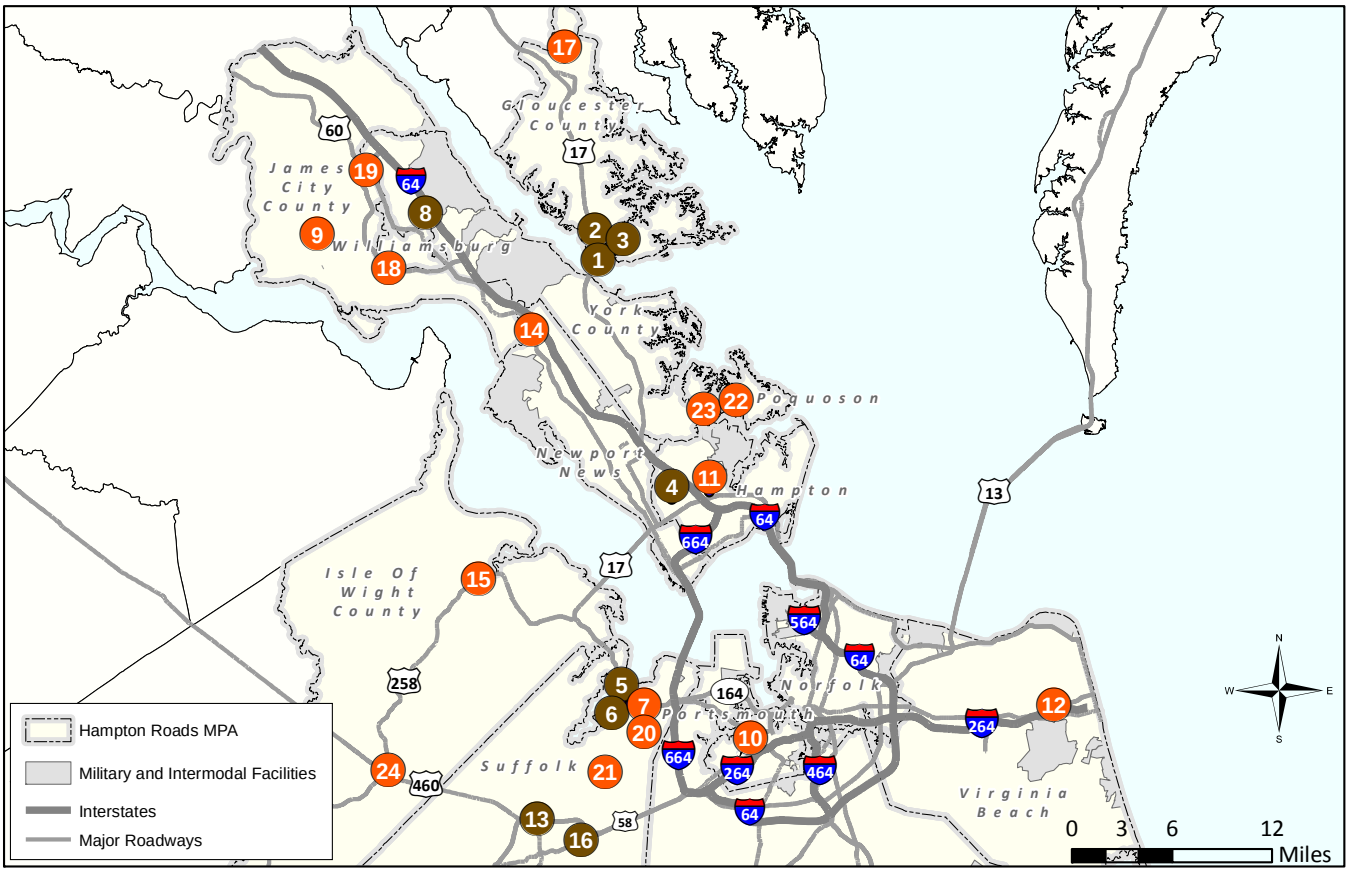
Mapped Projects

1. Bicycle & Pedestrian Improvements to Route 17
2. Bicycle & Pedestrian Improvements to Route 216
3. Bicycle & Pedestrian Improvements to Route 1216
4. Big Bethel Rd/Todds Ln Intersection Improvements
5. Bridge Rd/Bennetts Pasture Rd Intersection Improvements
6. Bridge Rd/Lee Farm Ln Intersection Improvements
7. Bridge Rd Signal Coordination & ITS Network
8. Capitol Landing Bikeway
9. Centerville Rd & News Rd
10. Clifford/Bart/South St Bike Blvd
11. Cunningham Dr Sidewalk Project
12. First Colonial Rd & Laskin Rd
13. Godwin Blvd/Route 58 Park & Ride Lot
14. Lee Hall Bus Transfer Center
15. Main Street at Route 10 Sidewalk Extension
16. Portsmouth Blvd Park & Ride Lot
17. Roaring Springs Rd Shared Roadway Bike Path & Main St Sidewalk Gap Correction
18. Route 199 & Brookwood Dr
19. Route 199 West Ramp at Richmond Rd
20. Shoulders Hill Rd Bicycle & Pedestrian Improvements
21. Shoulders Hill Rd/Nansemond Pky/Wilroy Rd Signal Coordination & ITS Network
22. South Lawson Park Bike Path
23. Traffic Signal Upgrade (PQ)
24. Windsor North Court St Sidewalk Extension

Unmapped Projects

- Citywide Pedestrian Enhancements (NN)
- Citywide Signal Timing (NN)
- Citywide Traffic Signal Upgrade Phase 4 (HA)
- CNG Bus Replacement (WATA)
- Emergency Vehicle Preemption (CH)
- Green Operator: Ocean-Going Vessel Hybridization & Fuel Switching Demo Project (VPA)
- Green Operator: Truck Replacement Program (VPA)
- Hybrid Bus Capital Replacements (WATA)
- Mounts Bay Transit Route (WATA)
- Purchase 12 Replacement Buses (WATA)
- Purchase 29' Buses (HRT)
- Purchase 38 Replacement 40' Buses (HRT)
- Purchase 40' Buses (HRT)
- Purchase One Replacement Ferry (HRT)
- Regional Opticom Preemption Strategic Plan & Deployment
- Signal Re-timing Phase 3 (NO)
- Signal System Citywide Upgrades (PO)
- Traffic Management Center & System Additions (CH)
- Traffic Signal System Retiming (HA)
- TRAFFIX
- Trolley Bus Replacements (WATA)

Hampton Roads TPO
Transportation Planning Organization



RSTP Project Selection and Funding Allocations

During the November 17, 2011 meeting, the HRTPO Board approved 4 current RSTP projects and 10 new projects to receive available allocations of RSTP through FY 2018. Current RSTP projects in need of additional funding to allow completion of a project or project were addressed first, followed by consideration of new RSTP project proposals. The HRTPO Board approved RSTP projects and allocations are summarized below. In addition, a map showing the locations of the recommended RSTP projects is included.

Previously Approved RSTP Projects with Funding Shortfalls

1. **Atkinson Boulevard Construction (UPC# 4483) – Newport News**
    - Allocate $6,000,000 in FY 2018 RSTP funds. Although the project was $10,000,000 short, City staff stated that the City will be able to provide $4,000,000 to fully fund the project through completion.

2. **I-64 Interchange Improvements at Norview Avenue (UPC# 17824) – Norfolk**
    - Allocate $556,000 from the FY 2012 RSTP Reserve to close a gap in construction funding and allow the project to be completed.

3. **Skiffes Creek Connector (UPC# 100200) – James City County**
    - Allocate $10,000,000 in FY 2018 RSTP funds. The project will still be approximately $15,000,000 short of being fully funded. The County plans to request additional funds in the future to close the funding gap.

4. **Stormwater Management Facilities at I-264/Frederick Boulevard Interchange (UPC# 97725) – Portsmouth**
    - Allocate $80,000 from FY 2012 RSTP Reserve to close a gap in construction funding and allow the project to be completed.

New RSTP Projects

5. **Administration and Operations Facility: Phase 1 – WATA**
    - The project entails constructing an administration and operations facility for the Williamsburg Area Transit Authority.
    - Allocate $3,700,000 in FY 2018 RSTP funds to fully fund Phase 1 of the project, which covers everything up to construction.

6. **Centerville Turnpike Widening, from Kempsville Road to Indian River Road – Virginia Beach**
    - The project entails widening this section of roadway from two lanes to four or six lanes.
    - Allocate $7,123,433 in FY 2018 RSTP funds to cover the Preliminary Engineering (PE) and Right of Way (RW) phases.

7. **Croaker Road Widening and Multi-Purpose Trail – James City County**
    - The project entails widening Croaker Road from two to four lanes and an adjacent multi-purpose trail from Richmond Road to the James City County Library (approximately 0.5 mile).
    - Allocate $500,000 in FY 2018 RSTP funds to cover the Construction (CN) phase.

8. **Intelligent Transportation System (ITS) Upgrades – Suffolk**
    - The project entails providing fiber optic connectivity and ITS highway management system along the Route 58 corridor from the west end of the downtown Suffolk bypass to the Chesapeake city limits. The project includes installation of traffic sensors and dynamic message sign systems, as well as interoperability with the VDOT Transportation Operations Center.
    - Allocate $135,000 in FY 2018 RSTP funds to cover the PE phase.

9. **Nansemond Parkway and Wilroy Road – Suffolk**
    - The intersection improvement project entails adding a right-turn lane on Nansemond Parkway and adding a left-turn lane on Wilroy Road.
    - Allocate $200,000 in FY 2018 RSTP funds to cover the PE phase.

10. **Purchase Forty-Foot Buses – HRT**
    - The complete project entails the purchase of 41 forty-foot transit buses to replace buses that have reached the end of their useful life.
    - Allocate $1,314,289 in FY 2018 RSTP funds to purchase approximately three buses. HRT will return to request additional funds in future years to complete this project.

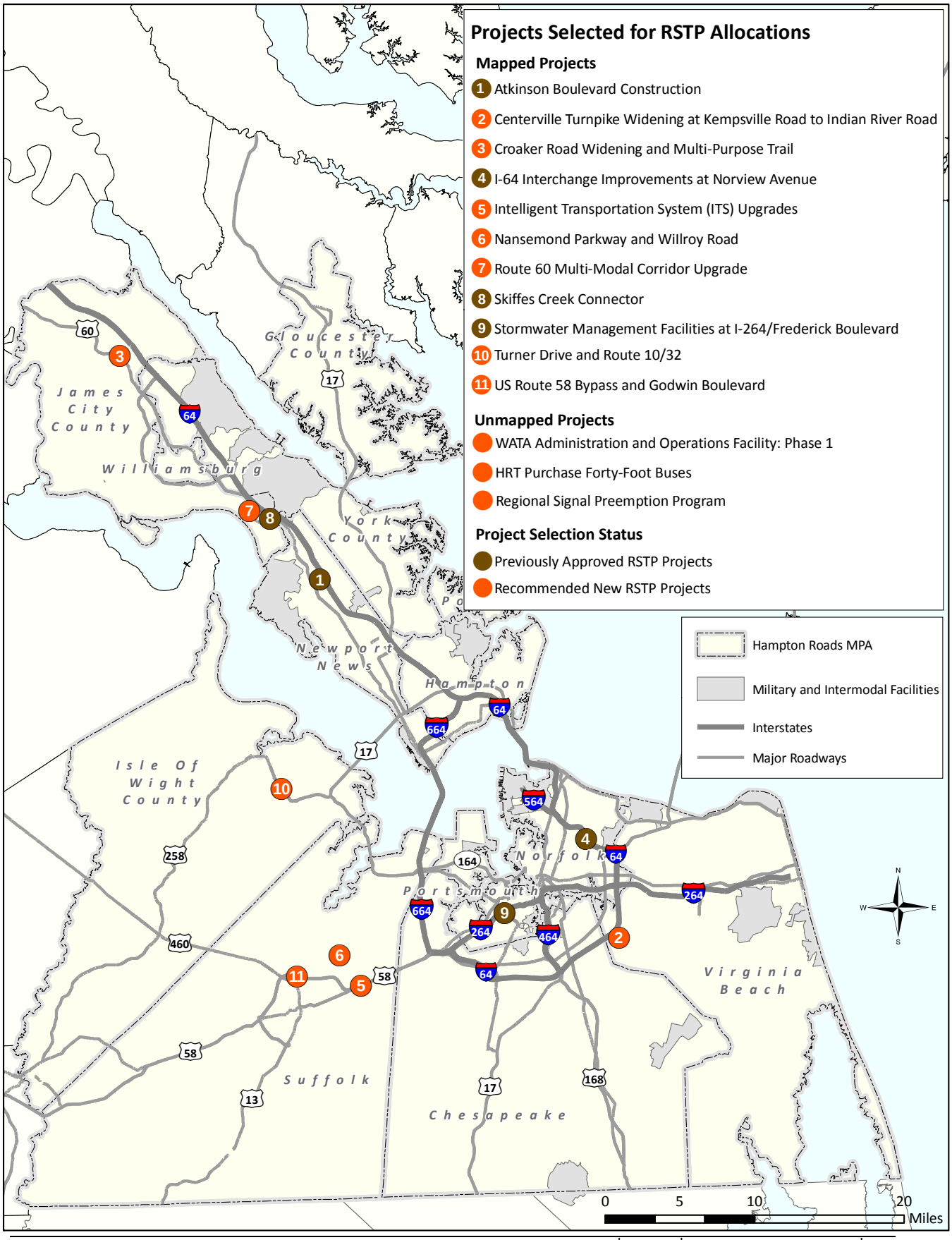
11. **Regional Signal Preemption Program**
    - The project entails developing and executing a regional traffic signal preemption coding plan. A regional treatment of these systems, through allocating transponder code ranges by locality, will allow identification of appropriate users and lock out unauthorized users.
    - Allocate $133,000 in FY 2018 RSTP funds to fully fund the project.

12. **Route 60 Multi-Modal Corridor Upgrade – James City County**
    - The project entails upgrading a 1.8 mile segment of Pocahontas Trail (Route 60) with a five-foot sidewalk and a five-foot paved shoulder and to include installation of trees, pedestrian lighting, and bus pull outs.
    - Allocate $800,000 in FY 2018 RSTP funds to cover the PE phase.

13. **Turner Drive and Route 10/32 – Isle of Wight County**
    - The interchange improvement project entails adding a right-turn lane from Turner Drive onto Benns Church Boulevard (Route 10/32).
    - Allocate $300,000 in FY 2018 RSTP funds to fully fund the project.

14. **U.S. Route 58 Bypass and Godwin Boulevard – Suffolk**
    - The interchange improvement project is focused on the westbound Route 58 Bypass off-ramp onto Godwin Boulevard and entails upgrading the interchange to a dual-right turn, single left-turn ramp along with associated traffic signal modifications.
    - Allocate $1,000,000 in FY 2018 RSTP funds to fully fund the project.

Map 2 | *Projects Selected for RSTP Allocations*



Section II
Background

INTRODUCTION

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 2011. Projects selected received allocations of CMAQ or RSTP funds over the fiscal years 2012 through 2018.

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.

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 that has been approved by the HRTPO Board, all project proposals are analyzed by the 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.

2011 CMAQ/RSTP PROJECT SELECTION PROCESS: STEPS AND SCHEDULE

Step		Schedule
1.	Solicit input from the Public on potential projects to be considered for CMAQ/RSTP funding.	6/29/11 – 7/31/11
2.	Applications for project proposals submitted by localities, transit agencies and state transportation agencies.	6/29/11 – 8/17/11
3.	Project evaluations completed by HRTPO staff.	By 9/30/11
4.	Transportation Programming Subcommittee (TPS) meeting to review proposed projects and recommend funding allocations.	10/12/11 & 11/9/11
5.	Transportation Technical Advisory Committee (TTAC) meeting to consider recommendations of the TPS and makes a recommendation for consideration by the HRTPO Board.	11/2/11 & 12/7/11
6.	HRTPO Board meeting to consider TTAC recommendations regarding CMAQ/RSTP projects and funding allocations for final approval.	11/17/11 & 12/15/11

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 June 29, 2011. A special CMAQ/RSTP Project Idea Form was provided for use by the public and posted on the HRTPO website. The deadline for submission of project ideas from the public was July 31, 2011. 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. However, 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 – meetings of the Transportation Programming Subcommittee (TPS), Transportation Technical Advisory Committee (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 project selection process were received, verbally or in writing, during any of those meetings.

Finally, public notices were posted to solicit public comments on proposed amendments to the FY 2012-2015 Transportation Improvement Program (TIP) to add or revise CMAQ and RSTP allocations that were approved by the HRTPO Board. The public review period regarding RSTP allocations ran from October 26, 2011 through November 9, 2011 and the public review period regarding CMAQ allocations ran from November 30, 2011 through December 14, 2011. No public comments were received with regard to the proposed TIP amendments.

Section III
CMAQ Projects and Allocations

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 air quality aspect of the CMAQ analysis allows all types of CMAQ projects to be compared against one another.

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. Details on the policies, procedures, and analysis methodologies used for CMAQ project selection are included in the ***Guide to the HRTPO CMAQ and RSTP Project Selection Process***, which may be accessed on the HRTPO website at www.hrtpo.org.

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, the HRTPO staff developed application forms to be used by when submitting CMAQ project proposals. The various ***CMAQ Candidate Project Application Forms*** may be accessed on the HRTPO website at www.hrtpo.org.

Prior to considering new projects to receive CMAQ allocations, the status of previously approved projects is reviewed to determine whether additional funding is required to allow for the completion of a project or project phase. The review of previously approved projects also includes determining whether those projects are progressing on schedule or whether funds should be:

1. reallocated to correspond with updated phase schedules, or
2. reallocated to other projects.

As shown in **Table 1**, during the 2011 project selection process, adjustments were made to the allocations on 15 previously approved projects to address changes in cost estimates and to advance funding on some of the projects to allow them to be completed sooner than originally scheduled.

After addressing the needs of previously approved CMAQ projects, new projects to receive CMAQ allocations were evaluated. **Table 2** shows all of the new projects proposed for CMAQ funding during the project selection process of 2011. As shown in the table, 35 candidate projects, with a total request of over $75 million, were submitted.

Table 3 shows the scoring and ranking of the 35 candidate 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 summed to produce the composite ranking. The detailed evaluation and scoring worksheets for each of the CMAQ candidate projects are included in **Appendix A.**

Table 4 shows the 29 new projects that were ultimately approved by the HRTPO Board on December 15, 2011 to receive CMAQ allocations in fiscal years 2012 through 2018. It should be noted that the total CMAQ funding expected to be available from FY 2012 through FY 2018, including the 20 percent state match, was approximately $39.3 million.

Table 1 | FY 2012-2018 Allocations to Previously Approved CMAQ Projects

Number	Applicant	Project Name	Allocations							
			FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	Total
1	Chesapeake	Emergency Vehicle Preemption	$500,000			$0	$0			$500,000
2	Chesapeake	Traffic Management Center & System Additions		$300,000	$1,000,000	$700,000	$0	$0		$2,000,000
3	Gloucester Co	Bicycle-Pedestrian Improvements to Route 17	$53,258	$267,281		$0	$0			$320,539
4	Gloucester Co	Bicycle-Pedestrian Improvements to Route 216				$260,000	$200,000	$885,853		$1,345,853
5	Hampton	Big Bethel Rd/Todds Ln Intersection Improvements	$675,000							$675,000
6	HRT	Purchase 38 Replacement 40' Buses	$2,689,477	$3,607,260	$4,951,032	$3,352,231				$14,600,000
7	HRT	TRAFFIX Funding	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,100,000	$7,100,000
8	Regional	Regional Opticom Preemption Strategic Plan & Deployment			$150,000	$1,000,000	$500,000	$0		$1,650,000
9	Suffolk	Godwin Blvd Park & Ride Lot (T9143)	$400,000							$400,000
10	Suffolk	Intersection Improvement - Bridge Rd/Bennetts Pasture Rd	$75,000	$675,000		$0	$0	$0		$750,000
11	Suffolk	Intersection Improvement - Bridge Rd/Lee Farm Ln	$75,000	$675,000			$0	$0		$750,000
12	Suffolk	Portsmouth Blvd Park & Ride Lot	$75,000	$675,000		$0	$0			$750,000
13	WATA	New Service - Mounts Bay Route			$350,000	$327,389	$0	$0		$677,389
14	WATA	Purchase 12 Replacement Buses	$2,386,000	$0	$2,204,000	$1,513,000				$6,103,000
15	York County	Capitol Landing Bikeway	$199,990	$117,654						$317,644
		Total Allocations	**$8,128,725**	**$7,317,195**	**$9,655,032**	**$8,152,620**	**$1,700,000**	**$1,885,853**	**$1,100,000**	**$37,939,425**

Note: As part of the CMAQ strategy approved by the HRTPO Board on December 15, 2011, the allocations highlighted in green-colored text indicate the adjustments made to previously approved CMAQ projects.

Table 2 | 2011 CMAQ Candidate Projects

Number	Applicant	Project Name	Total Cost	CMAQ Request
1	Gloucester Co	Shared Roadway Bike Path Along Roaring Springs Road (SR 616) and sidewalk gap correction along Main St (Bus 17)	$1,619,000	$1,619,000
2	Hampton	Citywide Traffic Signal Upgrade Phase 4	$553,000	$553,000
3	Hampton	Cunningham Drive Sidewalk Project	$920,000	$920,000
4	Hampton	Traffic Signal System Retiming	$698,000	$698,000
5	HRT	Purchase 29 Twenty-Nine-Foot Buses	$10,875,000	$10,875,000
6	HRT	Purchase 33 Paratransit Vans	$2,640,000	$2,640,000
7	HRT	Purchase 41 Forty-Foot Buses	$16,195,000	$16,195,000
8	HRT	Purchase One Replacement Ferry	$2,000,000	$2,000,000
9	Isle of Wight Co	Main St at Route 10 sidewalk extension	$1,000,000	$1,000,000
10	Isle of Wight Co	Windsor North Court St sidewalk extension	$1,000,000	$1,000,000
11	James City Co	Intersection Improvements - Centerville Rd & News Rd	$445,000	$445,000
12	James City Co	Intersection Improvements - Pocahontas Tr & Blow Flats Rd	$450,000	$450,000
13	James City Co	Intersection Improvements - Route 199 & Brookwood Dr	$275,000	$275,000
14	James City Co	Intersection Improvements - Route 199 West Ramp at Richmond Rd	$650,000	$650,000
15	Newport News	Citywide Pedestrian Enhancements	$1,000,000	$1,000,000
16	Newport News	Citywide Signal Timing	$900,000	$900,000
17	Newport News	Ft. Eustis MAX Express Bus	$150,000	$150,000
18	Newport News	Lee Hall Bus Transfer Center	$250,000	$250,000
19	Norfolk	Citywide Signal Re-timing Phase 3	$600,000	$600,000
20	Norfolk	Research Partnership with Virginia Universities	$300,000	$300,000
21	Poquoson	Poquoson Traffic Signal Upgrade	$260,000	$260,000
22	Poquoson	South Lawson Park Bike Path	$195,100	$195,100
23	Portsmouth	Clifford/Bart/South St Bike Boulevard	$500,000	$500,000
24	Portsmouth	Signal System Citywide Upgrades	$6,000,000	$6,000,000
25	Suffolk	Bridge Road Signal Coordination and ITS Network	$1,257,000	$1,257,000
26	Suffolk	Route 10 and 13 - Turnouts	$458,000	$458,000
27	Suffolk	Shoulders Hill Rd/Nansemond Pkwy/Wilroy Rd Signal Coordination and ITS Network	$2,454,000	$2,454,000
28	Suffolk	Shoulders Hill Road Bicycle and Pedestrian Improvements	$272,000	$272,000
29	Virginia Beach	Intersection Improvements - First Colonial Rd & Laskin Rd	$1,000,000	$1,000,000
30	VPA	Green Operator - Ocean-Going Vessel Hybridization & Fuel Switching Demo Project	$10,400,000	$5,000,000
31	VPA	Green Operator - Truck Replacement Program	$6,400,000	$3,000,000
32	WATA	ADA Body-n-Chassis Bus Replacements	$1,083,000	$1,083,000
33	WATA	CNG Bus Replacement	$3,073,000	$3,073,000
34	WATA	Hybrid Bus Capital Replacements	$6,480,000	$6,480,000
35	WATA	Trolley Bus Replacements	$2,018,000	$2,018,000
			Total CMAQ Requests	**$75,570,100**

Table 3 | 2011 CMAQ Candidate Projects in Ranked Order

Number	Applicant	Project Name	Cost Effectiveness		Ranking		
			Cost per Ton (VOC)	Cost per Ton (NOx)	VOC Rank	NOx Rank	Composite Score [1]
1	Norfolk	Research Partnership with Virginia Universities [2,3]	Qualitative	Qualitative	N/A	N/A	**N/A**
2	VPA	Green Operator - Truck Replacement Program	$5,356	$1,243	3	1	**4**
3	Newport News	Citywide Signal Timing	$2,213	$4,416	1	3	**4**
4	Hampton	Citywide Traffic Signal Upgrade Phase 4	$2,717	$5,421	2	4	**6**
5	VPA	Green Operator - Ocean-Going Vessel Hybridization & Fuel Switching Demo Project	$22,337	$3,606	7	2	**9**
6	Norfolk	Citywide Signal Re-timing Phase 3	$7,097	$14,160	4	5	**9**
7	Newport News	Citywide Pedestrian Enhancements	$7,197	$14,360	5	6	**11**
8	Hampton	Traffic Signal System Retiming	$7,384	$22,627	6	8	**14**
9	Newport News	Lee Hall Bus Transfer Center	$35,246	$37,204	8	10	**18**
10	HRT	Purchase One Replacement Ferry	$429,129	$16,599	15	7	**22**
11	Poquoson	Poquoson Traffic Signal Upgrade	$62,887	$125,482	9	13	**22**
12	James City Co	Intersection Improvements - Route 199 & Brookwood Dr	$92,683	$291,800	10	15	**25**
13	James City Co	Intersection Improvements - Route 199 West Ramp at Richmond Rd	$96,648	$304,284	11	16	**27**
14	Suffolk	Bridge Road Signal Coordination and ITS Network	$104,943	$321,585	12	17	**29**
15	Portsmouth	Signal System Citywide Upgrades	$230,724	$460,374	13	18	**31**
16	HRT	Purchase 29 Twenty-Nine-Foot Buses	$1,664,208	$37,393	21	11	**32**
17	HRT	Purchase 41 Forty-Foot Buses	$2,182,191	$33,583	24	9	**33**
18	Portsmouth	Clifford/Bart/South St Bike Boulevard	$851,350	$898,637	17	19	**36**
19	Suffolk	Shoulders Hill Rd/Nansemond Pkwy/Wilroy Rd Signal Coordination and ITS Network	$649,363	$1,989,895	16	22	**38**
20	Poquoson	South Lawson Park Bike Path	$1,328,788	$1,402,592	20	21	**41**
21	WATA	Trolley Bus Replacements	negative	$78,825	34	12	**46**
22	WATA	Hybrid Bus Capital Replacements	$244,890,000	$144,053	32	14	**46**
23	Hampton	Cunningham Drive Sidewalk Project	$2,128,055	$2,246,253	23	23	**46**
24	Newport News	Ft. Eustis MAX Express Bus	$374,901	negative	14	32	**46**
25	Virginia Beach	Intersection Improvements - First Colonial Rd & Laskin Rd	$1,720,624	$5,417,192	22	25	**47**
26	WATA	CNG Bus Replacement	$6,771,650	$1,053,368	28	20	**48**
27	Suffolk	Shoulders Hill Road Bicycle and Pedestrian Improvements	$2,565,054	$2,707,523	25	24	**49**
28	HRT	Purchase 33 Paratransit Vans	$857,958	no change	18	31	**49**
29	WATA	ADA Body-n-Chassis Bus Replacements	$1,209,855	no change	19	31	**50**
30	Isle of Wight Co	Main St at Route 10 sidewalk extension	$6,742,696	$7,117,203	27	26	**53**
31	James City Co	Intersection Improvements - Centerville Rd & News Rd	$2,999,543	$9,443,723	26	28	**54**
32	Gloucester Co	Shared Roadway Bike Path Along Roaring Springs Road (SR 616) and sidewalk gap correction along Main St (Bus 17)	$7,939,218	$8,380,183	29	27	**56**
33	Isle of Wight Co	Windsor North Court St sidewalk extension	$22,986,463	$24,263,193	30	29	**59**
34	Suffolk	Route 10 and 13 - Turnouts	$58,164,425	$61,881,441	31	30	**61**
35	James City Co	Intersection Improvements - Pocahontas Tr & Blow Flats Rd	no change	no change	33	31	**64**

[1] The Composite Score is computed as follows:
First, projects are evaluated for their estimated impacts on the reduction of VOCs and NOx.
Second, projects are sorted in ascending order based on the Cost/Benefit for VOC reduction and numbered sequentially. Lower numbers are better.
Third, projects are sorted in ascending order based on the Cost/Benefit for NOx reduction and numbered sequentially. Lower numbers are better.
Finally, the sequential numbers for VOC reduction and NOx reduction are added together to produce the Composite Score. Lower numbers are better.

[2] This project could not be evaluated quantitatively and, although it appears at the top of the table, it is not actually ranked.

[3] This project received funding previously, but the City later requested that all of the funds be transferred to the Norfolk LRT project.

Table 4 | FY 2012-2018 Allocations to New CMAQ Projects

Number	Applicant	Project Name	Allocations							
			FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	Total
1	VPA	Green Operator - Truck Replacement Program				$1,000,000	$1,000,000	$1,000,000		**$3,000,000**
2	Newport News	Citywide Signal Timing				$ 300,000	$ 300,000	$ 300,000		**$ 900,000**
3	Hampton	Citywide Traffic Signal Upgrade Phase 4				$ 553,000				**$ 553,000**
4	VPA	Green Operator - Ocean-Going Vessel Hybridization & Fuel Switching Demo Project		$500,000		$ 500,000	$1,000,000	$1,000,000	$1,000,000	**$4,000,000**
5	Norfolk	Citywide Signal Re-timing Phase 3				$ 200,000	$ 200,000	$ 200,000		**$ 600,000**
6	Newport News	Citywide Pedestrian Enhancements					$ 250,000	$ 250,000	$ 250,000	**$ 750,000**
7	Hampton	Traffic Signal System Retiming					$ 698,000			**$ 698,000**
8	Newport News	Lee Hall Bus Transfer Center				$ 125,000	$ 125,000			**$ 250,000**
9	HRT	Purchase One Replacement Ferry						$2,000,000		**$2,000,000**
10	Poquoson	Poquoson Traffic Signal Upgrade						$ 260,000		**$ 260,000**
11	James City Co	Intersection Improvements - Route 199 & Brookwood Dr				$ 50,000	$ 25,000	$ 125,000	$ 75,000	**$ 275,000**
12	James City Co	Intersection Improvements - Route 199 West Ramp at Richmond Rd					$ 41,172	$ 63,828	$ 350,000	**$ 455,000**
13	Suffolk	Bridge Road Signal Coordination and ITS Network						$ 150,000	$1,107,000	**$1,257,000**
14	Portsmouth	Signal System Citywide Upgrades						$1,500,000	$1,500,000	**$3,000,000**
15	HRT	Purchase 29 Twenty-Nine-Foot Buses						$ 802,166	$2,000,000	**$2,802,166**
16	HRT	Purchase 41 Forty-Foot Buses							$2,000,000	**$2,000,000**
17	Portsmouth	Clifford/Bart/South St Bike Boulevard							$ 500,000	**$ 500,000**
18	Suffolk	Shoulders Hill Rd/Nansemond Pkwy/Wilroy Rd Signal Coordination and ITS Network							$2,748,000	**$2,748,000**
19	Poquoson	South Lawson Park Bike Path							$ 195,100	**$ 195,100**
20	WATA	Trolley Bus Replacements							$ 432,000	**$ 432,000**
21	WATA	Hybrid Bus Capital Replacements							$3,208,000	**$3,208,000**
22	Hampton	Cunningham Drive Sidewalk Project							$ 920,000	**$ 920,000**
23	Virginia Beach	Intersection Improvements - First Colonial Rd & Laskin Rd							$1,000,000	**$1,000,000**
24	WATA	CNG Bus Replacement							$ 878,000	**$ 878,000**
25	Suffolk	Shoulders Hill Road Bicycle and Pedestrian Improvements							$ 272,000	**$ 272,000**
26	Isle of Wight Co	Main St at Route 10 sidewalk extension				$ 165,000				**$ 165,000**
27	James City Co	Intersection Improvements - Centerville Rd & News Rd							$ 70,000	**$ 70,000**
28	Gloucester Co	Shared Roadway Bike Path Along Roaring Springs Road (SR 616) and sidewalk gap correction along Main St (Bus 17)							$ 252,000	**$ 252,000**
29	Isle of Wight Co	Windsor North Court St sidewalk extension			$375,000					**$ 375,000**

Section IV

RSTP Projects and Allocations

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 since. Details on the policies, procedures, and analysis methodologies used for RSTP project selection are included in the ***Guide to the HRTPO CMAQ and RSTP Project Selection Process***, which may be accessed on the HRTPO website at www.hrtpo.org.

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 various ***RSTP Candidate Project Application Forms*** may be accessed on the HRTPO website at www.hrtpo.org.

Prior to considering new projects to receive RSTP allocations, the status of previously approved projects is reviewed to determine whether additional funding is required to allow for the completion of a project or project phase. The review of previously approved projects also includes determining whether those projects are progressing on schedule or whether funds should be:

1. reallocated to correspond with updated phase schedules, or
2. reallocated to other projects.

Table 5 shows adjustments were made to the allocations on four previously approved projects to help close funding gaps during the 2011 project selection process.

After addressing the needs of previously approved RSTP projects, new RSTP projects to receive available RSTP funding were considered. **Table 6** shows all of the new projects proposed for RSTP projects for RSTP funding during the project selection process in 2011. As shown in the table, 32 candidate projects, with a total request of $208 million, were submitted.

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. **Table 7** indicates the scoring and ranking of the 32 candidate projects. The detailed evaluation and scoring worksheets for each of the newly selected RSTP projects are included in **Appendix B.**

Table 8 shows 10 new projects that were ultimately approved by the HRTPO Board on November 17, 2011 to receive RSTP allocations in fiscal years 2012 through 2018 and associated annual allocations. The total RSTP funding expected to be available from FY 2012 through FY 2018, including the 20 percent state match, was approximately $41.6 million.

Table 5 | FY 2012-2018 Allocations to Previously Approved RSTP Projects

Number	Applicant	Project Name	Allocations							
			FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	Total
1	Portsmouth	Drainage Pond Construction near I-264 & Frederick Blvd	$ 80,000							$ 80,000
2	Newport News	Atkinson Blvd - Construct New Road		$ 955,876			$ 10,000,000	$ 31,205,722	$ 6,000,000	$ 48,161,598
3	Norfolk	I-64 Interchange Improvements at Norview Ave	$ 556,000							$ 556,000
4	James City Co	Skiffes Creek Connector							$ 10,000,000	$ 10,000,000
		Total Allocations	**$ 636,000**	**$ 955,876**	**$ -**	**$ -**	**$ 10,000,000**	**$ 31,205,722**	**$ 16,000,000**	**$ 58,797,598**

Note: The allocations highlighted in green-colored text indicate the adjustments made to previously approved RSTP projects.

Table 6 | 2011 RSTP Candidate Projects

Number	Applicant	Project Name	Total Cost	RSTP Request
Highway Projects				
1	Isle of Wight Co	Right turn lane at Turner Dr (Route 644) onto Route 10/32	$ 300,000	$ 300,000
2	James City Co	Croaker Rd Widening & Multi-Purpose Trail	$ 12,550,000	$ 11,000,000
3	Newport News	Atkinson Blvd - Construct New Road	$ 52,000,000	$ 10,000,000
4	Norfolk	I-264/Ballentine Blvd/Light Rail Crossing - Modified Diverging Diamond Interchange	$ 5,000,000	$ 5,000,000
5	Suffolk	Godwin Blvd Interchange Improvement	$ 1,000,000	$ 1,000,000
6	Suffolk	U.S. Route 58/Holland Rd Corridor Improvements	$ 72,500,000	$ 60,000,000
7	Suffolk	Nansmond Pkwy & Wilroy Rd Intersection Improvements	$ 1,420,000	$ 1,420,000
8	Virginia Beach	Centerville Tpke Widening - Kempsville Rd to Indian River Rd	$ 24,000,000	$ 24,000,000
9	Virginia Beach	Centerville Tpke Widening - Lynnhaven Pkwy to Kempsville Rd	$ 38,000,000	$ 38,000,000
Intermodal Projects				
10	James City Co	Route 60 Multi-Modal Corridor Upgrade	$ 6,100,000	$ 6,100,000
Transit - Passenger				
11	HRT	Evelyn Butts Transfer Station	$ 1,000,000	$ 1,000,000
12	HRT	Install 200 Bus Shelters	$ 1,600,000	$ 1,600,000
13	HRT	Military Circle Transfer Area	$ 750,000	$ 750,000
14	HRT	Oceanview Transfer Area	$ 650,000	$ 650,000
15	HRT	Pacific Ave Transfer Area Upgrades	$ 550,000	$ 550,000
16	HRT	Pleasure House Rd Transfer Area Upgrades	$ 250,000	$ 250,000
17	HRT	Rehabilitate Reon Dr Transfer Center	$ 350,000	$ 350,000
18	HRT	Town Center/Pembroke Mall Transfer Station	$ 750,000	$ 750,000
19	HRT	Victory Crossing Park & Ride Lot	$ 225,000	$ 225,000
Transit - Vehicle				
20	HRT	Purchase 29 Twenty-Nine-Foot Buses	$ 10,875,000	$ 10,875,000
21	HRT	Purchase 41 Forty-Foot Buses	$ 16,195,000	$ 16,195,000
Transit - Other				
22	HRT	Concrete Pavement Repair/Replacement	$ 600,000	$ 600,000
23	HRT	LEED Existing Building Upgrades	$ 200,000	$ 200,000
24	HRT	Renovate Parks Ave Maintenance Facility	$ 1,000,000	$ 1,000,000
25	HRT	Solar Lights Upgrade	$ 500,000	$ 500,000
26	HRT	Transfer Area Bathroom Design & Construction	$ 1,000,000	$ 1,000,000
27	WATA	Administration & Operations Facility	$ 9,000,000	$ 9,000,000
Planning Studies				
28	HRT	Completion of Before & After Study of Norfolk LRT Project	$ 800,000	$ 800,000
29	VPA	Economic Analysis of Toll Pricing in Hampton Roads (effect of toll rates on freight bus.)	$ 400,000	$ 400,000
ITS Projects				
30	Suffolk	Suffolk Bypass, ITS Upgrades	$ 1,650,000	$ 1,650,000
31	Suffolk	Suffolk Traffic Operations Center (TOC)	$ 3,000,000	$ 3,000,000
32	Virginia Beach	Regional Signal Pre-Emption Program	$ 133,000	$ 133,000
			Total RSTP Requests	**$ 208,298,000**

Table 7 | 2011 RSTP Candidate Projects in Ranked Order

Number	Applicant	Project Name	Score (Max=100)
Highway Projects			
1	Virginia Beach	Centerville Tpke Widening - Kempsville Rd to Indian River Rd	69
2	Suffolk	Godwin Blvd Interchange Improvement	69
3	Suffolk	U.S. Route 58/Holland Rd Corridor Improvements	63
4	Virginia Beach	Centerville Tpke Widening - Lynnhaven Pkwy to Kempsville Rd	54
5	Isle of Wight Co	Right turn lane at Turner Dr (Route 644) onto Route 10/32	53
6	Suffolk	Nansmond Pkwy & Wilroy Rd Intersection Improvements	50
7	Norfolk	I-264/Ballentine Blvd/Light Rail Crossing - Modified Diverging Diamond Interchange	50
8	Newport News	Atkinson Blvd - Construct New Road	50
9	James City Co	Croaker Rd Widening & Multi-Purpose Trail	48
Intermodal Projects			
10	James City Co	Route 60 Multi-Modal Corridor Upgrade	48
Transit - Passenger			
11	HRT	Install 200 Bus Shelters	50
12	HRT	Town Center/Pembroke Mall Transfer Station	30
13	HRT	Military Circle Transfer Area	28
14	HRT	Pleasure House Rd Transfer Area Upgrades	26
15	HRT	Pacific Ave Transfer Area Upgrades	26
16	HRT	Oceanview Transfer Area	25
17	HRT	Evelyn Butts Transfer Station	24
18	HRT	Rehabilitate Reon Dr Transfer Center	11
19	HRT	Victory Crossing Park & Ride Lot	4
Transit - Vehicle			
20	HRT	Purchase 41 Forty-Foot Buses	50
21	HRT	Purchase 29 Twenty-Nine-Foot Buses	50
Transit - Other			
22	WATA	Administration & Operations Facility	45
23	HRT	Solar Lights Upgrade	27.5
24	HRT	Renovate Parks Ave Maintenance Facility	17.5
25	HRT	Transfer Area Bathroom Design & Construction	17.5
26	HRT	Concrete Pavement Repair/Replacement	12.5
27	HRT	LEED Existing Building Upgrades	5
Planning Studies			
28	VPA	Economic Analysis of Toll Pricing in Hampton Roads (effect of toll rates on freight bus.)	45
29	HRT	Completion of Before & After Study of Norfolk LRT Project	42.5
ITS Projects			
30	Suffolk	Suffolk Bypass, ITS Upgrades	56.5
31	Suffolk	Suffolk Traffic Operations Center (TOC)	56.5
32	Virginia Beach	Regional Signal Pre-Emption Program	32

Table 8 | FY 2012-2018 Allocations to New RSTP Projects

Number	Applicant	Project Name	Allocations							
			FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	Total
1	Virginia Beach	Centerville Tpke Widening - Kempsville Rd to Indian River Rd							$7,123,433	**$ 7,123,433**
2	Suffolk	Godwin Blvd Interchange Improvement							$1,000,000	**$ 1,000,000**
3	Isle of Wight Co	Right turn lane at Turner Dr (Route 644) onto Route 10/32							$ 300,000	**$ 300,000**
4	Suffolk	Nansmond Pkwy & Wilroy Rd Intersection Improvements							$ 200,000	**$ 200,000**
5	James City Co	Croaker Rd Widening & Multi-Purpose Trail							$ 500,000	**$ 500,000**
6	James City Co	Route 60 Multi-Modal Corridor Upgrade							$ 800,000	**$ 800,000**
7	HRT	Purchase 41 Forty-Foot Buses							$1,314,289	**$ 1,314,289**
8	WATA	Administration & Operations Facility							$3,700,000	**$ 3,700,000**
9	Suffolk	Suffolk Bypass, ITS Upgrades							$ 135,000	**$ 135,000**
10	Virginia Beach	Regional Signal Pre-Emption Program							$ 133,000	**$ 133,000**

Section V
Appendices

APPENDIX A

CMAQ Project Evaluation Worksheets

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Gloucester County
PROJECT NAME: **Roaring Springs Rd and Main Street Bike/Ped Improvements**
Roaring Springs Rd from Route 17 to Beaverdam Park
LOCATION: Main Street from Old Gloucester Way to Route 17
DESCRIPTION: Add pedestrian/bicycle path to Roaring Springs Rd and connect gaps in sidewalk on Main Street
DATE: 8/15/2011 (on application)
PROJECT COST: $1,619,000

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% [2]
Facility Length (L): 2.40 mi. [13]

Buffer, Distance from Project	TAZ [13]	2009 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.	1427	553	1.20	664	2	4	1	1
0.25-0.50 mi.	1428	751	1.20	901	2	2	1	1
0.50-1.00 mi.	1446	297	2.40	714	2	1	1	0
				2,279	6	7	3	2

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

Existing Adult Cyclists:	6	above
New Adult Cyclists:	7	above
Total Adult Cyclists:	13	
Trips, per day per cyclist:	2	trip to destination + return trip
Total Trips per Day:	26	
vs. Trips on Sampled Bikeways:	23	above

Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	7	2	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	14	4	
Eliminated Person Trips by Auto:	14	4	above [7]
Occupancy of Eliminated Auto Trips:	1.25	1.25	[11]
Eliminated Vehicle Trips (Auto):	11	3	
Avg. Alt. Mode Trip Length, mi.:	2	1	[9]
Factor (for converting alt. mode trip lengths):	2	2	[10]
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	44	6	
		Total:	50 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	50	34	0.034	365	12
NOx	0.640	50	32	0.032	365	12

3- COST EFFECTIVENESS:

Total Cost:	$1,619,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$107,933	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$107,933	12	$8,753	907	**$7,939,218**
NOx	$107,933	12	$9,239	907	**$8,380,183**

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

[13] From application

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION: Hampton
PROJECT NAME: **Citywide Traffic Signal Upgrade, Phase IV**
LOCATION: Citywide
DESCRIPTION: Upgrade preemption system, advanced traffic signal cabinet components, advanced video components, Computerized interface units, and a TS2 traffic cabinet analyzer.
DATE: 8/10/2011 (1)
PROJECT COST: $553,000

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):		45	58	7	110
	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:		2,116	5,983	1,163	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 9,262 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	9,262	73,848	73.8	250	18,462
NOx	3.996	9,262	37,010	37.0	250	9,252

2 - COST EFFECTIVENESS

Total Cost: $553,000 (from above)
Useful Life, years: 10 (2)
Annual Cost: $55,300

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$55,300	18,462	$3.00	907	**$2,717**
NOx	$55,300	9,252	$5.98	907	**$5,421**

Notes:
(1) From application
(2) As previously assumed
(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
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Hampton
PROJECT NAME: **Cunningham Drive Sidewalk Project**
LOCATION: Cunningham Drive from Todds Lane to Mercury Boulevard
DESCRIPTION: Design and installation of a sidewalk on both sides of Cunningham Drive (partial sidewalk exists)
DATE: 8/9/2011 (on application)
PROJECT COST: $920,000

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% [2]
Facility Length (L): 1.70 mi. [13]

Buffer, Distance from Project	TAZ [13]	2009 Density (D), persons/ sq.mi.
0.00-0.25 mi.	1018	5,097
	1023	3,785
	Average:	4,441
0.50-1.00 mi.	1030	4,648
	1049	2,705
	1051	5,013
	Average:	4,122

Buffer, Distance from Project	TAZ [13]	2009 Density (D), persons/ sq.mi.
0.25-0.50 mi.	1014	2,745
	1022	4,217
	1024	5,905
	1031	3,087
	1040	549
	1041	1,233
	Average:	2,956

Buffer, Distance from Project	TAZ	2009 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 [14] Adult Cyclists [4]	Existing Adult Pedestrians [5]	New [14] Adult Pedestrians [5]
0.00-0.25 mi.	above	4,441	0.85	3,775	9	9	2	1
0.25-0.50 mi.	above	2,956	0.85	2,513	6	4	2	1
0.50-1.00 mi.	above	4,122	1.70	7,008	17	4	4	1
				13,295	32	16	8	2

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

Existing Adult Cyclists:	32	above
New Adult Cyclists:	16	above
Total Adult Cyclists:	48	
Trips, per day per cyclist:	2	trip to destination + return trip
Total Trips per Day:	95	
vs. Trips on Sampled Bikeways:	23	above

Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	16	2	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	31	4	
Eliminated Person Trips by Auto:	31	4	above [7]
Occupancy of Eliminated Auto Trips:	1.25	1.25	[11]
Eliminated Vehicle Trips (Auto):	25	3	
Avg. Alt. Mode Trip Length, mi.:	2	1	[9]
Factor (for converting alt. mode trip lengths):	2	2	[10]
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	100	6	
		Total:	106 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	106	72	0.072	365	26
NOx	0.640	106	68	0.068	365	25

3- COST EFFECTIVENESS:

Total Cost:	$920,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$61,333	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$61,333	26	$2,346	907	**$2,128,055**
NOx	$61,333	25	$2,477	907	**$2,246,253**

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

[13] From application

[14] Assumes half of new adult cyclists and pedestrians since sidewalk exists on one side currently.

CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY - CORRIDOR IMPROVEMENTS

JURISDICTION: Hampton
PROJECT NAME: **Traffic Signal System Retiming**
LOCATION: Citywide
DESCRIPTION: Retiming of arterial streets
DATE: 8/10/2011 (1)
PROJECT COST: $698,000

1 - EMISSIONS REDUCTION

Arterial Intersection(s)	Number of Intersections	AADT (1)	Peak Hour Volume (2)	Delay Savings (s/veh)(3)	Delay Savings (s / pk hr)(4)	Delay Savings (hr/day)(5)
Big Bethel Rd						
HRCP to North Park Ln	4	18,173	1,599	10.7	68,447	112
Old Big Bethel Rd to Michael Woods Dr	5	28,999	2,552	10.7	136,527	223
Saunders Rd	1	18,173	1,599	10.7	17,112	28
Semple Farm Rd	1	14,322	1,260	10.7	13,486	22
Magruder Blvd						
Butler Farm Rd	1	31,147	2,741	10.7	29,328	48
Hardy Cash Dr to HRCP	2	37,994	3,343	10.7	71,550	117
Floyd Thompson Blvd to Semple Farm Rd	2	28,605	2,517	10.7	53,869	88
Hardy Cash Dr						
Hampton Club Dr	1	15,773	1,388	10.7	14,852	24
Wythe Creek						
Semple Farm Rd to Steam Plant	3	16,688	1,469	10.7	47,140	77
Commander Shepard Blvd						
NASA to Research Dr	2	24,511	2,157	10.7	46,159	75
Armistead Ave						
Butler Farm Rd to HRCP	2	24,285	2,137	10.7	45,734	75
Marcella Rd to Tidemill Ln	2	25,877	2,277	10.7	48,732	80
Sweeney Blvd to Sacramento Dr	2	24,285	2,137	10.7	45,734	75
Pembroke Ave to Settlers Landing Rd	4	13,021	1,146	10.7	49,042	80
La Salle Ave to Convention Center Blvd	4	19,528	1,718	10.7	73,550	120
Rip Rap Rd	1	16,396	1,443	10.7	15,438	25
Coliseum Dr						
Marcella Rd to Coliseum Crossing South	3	19,759	1,739	10.7	55,815	91
Cunningham Dr to Von Schilling Dr	3	24,681	2,172	10.7	69,719	114
Hardy Cash Dr	1	14,025	1,234	10.7	13,206	22

Cunningham Dr						
Executive Dr to Hartford Rd	2	20,032	1,763	10.7	37,724	62
Mercury Blvd						
Armistead Ave to Charlton Dr	2	54,611	4,806	10.7	102,843	168
Coliseum Dr to Kilgore Ave	2	55,452	4,880	10.7	104,427	171
Riverdale Ct to Saville Row	2	45,396	3,995	10.7	85,490	140
Cunningham Dr	1	54,209	4,770	10.7	51,043	83
Langley Sq to Seldendale Dr	2	57,242	5,037	10.7	107,798	176
Pembroke Blvd to Old Buckroe Rd	3	29,743	2,617	10.7	84,018	137
Mallory St to Willard Ave	2	8,563	754	10.7	16,126	26
Aberdeen Rd to Big Bethel Rd	3	50,124	4,411	10.7	141,590	231
Newmarket Dr to Martha Lee Dr	5	45,346	3,990	10.7	213,489	349
Todds Ctr to Power Plant Wy	3	62,071	5,462	10.7	175,338	287
King Street						
Rip Rap Rd to Gilbert St	4	22,226	1,956	10.7	83,712	137
Fox Hill Rd						
Nickerson Blvd to Clemwood Pkwy	5	23,546	2,072	10.7	110,855	181
Mercury Blvd to Old Fox Hill Rd	2	26,997	2,376	10.7	50,841	83
Woodland Rd						
I-64	1	8,563	754	10.7	8,063	13
County St	1	17,869	1,572	10.7	16,825	27
Pembroke Ave	1	13,133	1,156	10.7	12,366	20
Settlers Landing Rd						
Tyler St to Hampton Harbor Ave	2	15,887	1,398	10.7	29,918	49
Eaton St to Bridge St	4	13,051	1,148	10.7	49,155	80
Kecoughtan Rd	1	14,781	1,301	10.7	13,918	23
Pembroke Ave						
King St to Back River Rd	2	9,049	796	10.7	17,041	28
La Salle Ave	1	18,168	1,599	10.7	17,107	28
Settlers Landing Rd	1	11,380	1,001	10.7	10,715	18
G St	1	10,697	941	10.7	10,072	16
Old Aberdeen Rd	1	10,697	941	10.7	10,072	16
Powhatan Pkwy						
Pembroke Pkwy to I-664 Ramp (North)	3	20,748	1,826	10.7	58,609	96
Shell Rd	1	8,290	730	10.7	7,806	13
La Salle Ave						
Michigan Dr	1	18,168	1,599	10.7	17,107	28
Settlers Landing Rd to Victoria Blvd	3	12,869	1,132	10.7	36,352	59

County St						
Libbey St to Mallory St	2	3,928	346	10.7	7,397	12
Mallory St						
Mellan St to Segar St	2	9,196	809	10.7	17,318	28
Mellen St						
Hope St	1	4,844	426	10.7	4,561	7
Victoria Blvd						
Chesterfield Rd to Powhatan Pkwy	2	5,743	505	10.7	10,815	18
Aberdeen Rd						
Briarfield Rd to Pembroke Ave	7	21,822	1,920	10.7	143,833	235
Todds Ln						
Orcutt Ave to Cunningham Dr	8	17,063	1,502	10.7	128,532	210
Power Plant Pkwy						
Pine Chapel Rd to Power Plant Wy	4	17,234	1,517	10.7	64,910	106
				Total Delay Savings		3,133 hr/day

Type	Emissions Factor, g/hr [6]	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	3,133	34,295	34.3	250	8,574
NOx	3.573	3,133	11,192	11.2	250	2,798

2 - COST EFFECTIVENESS

Total Cost:	$698,000	(from above)
Useful Life, years:	10 [3]	
Annual Cost:	$69,800	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$69,800	8,574	$8	**$7,384**
NOx	$69,800	2,798	$25	**$22,627**

[1] From application

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

[3] As previously assumed

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

[5] 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, 6/97

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

CONGESTION MITIGATION AND AIR QUALITY

TRANSIT AND FIXED GUIDEWAY PROJECTS - VEHICLE PURCHASE/REPLACEMENT

AGENCY: HRT
PROJECT NAME: **Purchase 29 - twenty-nine foot buses**
DESCRIPTION: Replacement of 29 29-foot buses
DATE: 8/8/2011 (1)
PROJECT COST: $10,875,000

Number of Vehicles Being Retired	29	vehicles(1)
Number of New Vehicles	29	vehicles(1)
Average Yearly Vehicle-Miles for Retired Vehicles	45,000	vehicle-miles(1)
Average Yearly Vehicle-Miles for New Vehicles	45,000	vehicle-miles(1)

1 - CHANGE IN VEHICLE EMISSIONS

Current Vehicles	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	0.08	0.38	45,000	29	502,409	502
NOx	3.8	17.78	45,000	29	23,203,161	23,203

New Vehicles	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	0.001	0.01	45,000	29	8,500	8
NOx	0.2	0.94	45,000	29	1,221,219	1,221

2 - EMISSIONS REDUCTION

Reduction in Emissions: VOC 493.9 kg/yr; NOx 21,982 kg/yr

3 - COST EFFECTIVENESS

Total Cost: $10,875,000 (from above)
Useful life, years: 12 (1)
Annual Cost: $906,250

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Eff., $/Ton
VOC	$906,250	493.9	$1,835	**$1,664,208**
NOx	$906,250	21,982	$41	**$37,393**

(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

CONGESTION MITIGATION AND AIR QUALITY

TRANSIT AND FIXED GUIDEWAY PROJECTS - VEHICLE PURCHASE/REPLACEMENT

AGENCY: Hampton Roads Transit
PROJECT NAME: **HRT Paratransit Replacement**
DESCRIPTION: Replacement of 33 paratransit vans
DATE: 8/8/2011 (1)
PROJECT COST: $2,640,000

Number of Vehicles Being Retired	33	vehicles(1)
Number of New Vehicles	33	vehicles(1)
Average Yearly Vehicle-Miles for Retired Vehicles	50,000	vehicle-miles(1)
Average Yearly Vehicle-Miles for New Vehicles	50,000	vehicle-miles(1)

1 - CHANGE IN VEHICLE EMISSIONS

Current Vehicles	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	0.30	1.42	50,000	33	2,335,406	2,335
NOx	2.5	11.70	50,000	33	19,300,875	19,301

New Vehicles	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	0.28	1.30	50,000	33	2,149,345	2,149
NOx	2.5	11.70	50,000	33	19,300,875	19,301

2 - EMISSIONS REDUCTION

Reduction in Emissions	VOC	186	kg/yr
	NOx	0	kg/yr

3 - COST EFFECTIVENESS

Total Cost:	$2,640,000	(from above)
Useful life, years:	15 (3)	
Annual Cost:	$176,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Eff., $/Ton
VOC	$176,000	186	$946	**$857,958**
NOx	$176,000	0	no change	**no change**

(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) As assumed previously

CONGESTION MITIGATION AND AIR QUALITY

TRANSIT AND FIXED GUIDEWAY PROJECTS - VEHICLE PURCHASE/REPLACEMENT

AGENCY: HRT
PROJECT NAME: **Purchase 41 - forty foot buses**
DESCRIPTION: Replacement of 41 40-foot buses
DATE: 8/10/2011 (1)
PROJECT COST: $16,195,000

Number of Vehicles Being Retired	41	vehicles(1)
Number of New Vehicles	41	vehicles(1)
Average Yearly Vehicle-Miles for Retired Vehicles	50,000	vehicle-miles(1)
Average Yearly Vehicle-Miles for New Vehicles	50,000	vehicle-miles(1)

1 - CHANGE IN VEHICLE EMISSIONS

Current Vehicles	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	50,000	41	649,951	650
NOx	4.0	18.72	50,000	41	38,367,800	38,368

New Vehicles	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	0.009	0.04	50,000	41	89,013	89
NOx	0.2	0.94	50,000	41	1,918,390	1,918

2 - EMISSIONS REDUCTION

Reduction in Emissions: VOC 560.9 kg/yr; NOx 36,449 kg/yr

3 - COST EFFECTIVENESS

Total Cost:	$16,195,000 (from above)
Useful life, years:	12 (1)
Annual Cost:	$1,349,583

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Eff., $/Ton
VOC	$1,349,583	560.9	$2,406	**$2,182,191**
NOx	$1,349,583	36,449	$37	**$33,583**

(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

CONGESTION MITIGATION AND AIR QUALITY

TRANSIT AND FIXED GUIDEWAY PROJECTS - VEHICLE PURCHASE/REPLACEMENT

AGENCY: Hampton Roads Transit
PROJECT NAME: **HRT Ferry Replacement**
DESCRIPTION: Replacement of a ferry on the Elizabeth River
DATE: 8/8/2011 (1)
PROJECT COST: $2,000,000

Number of Vehicles Being Retired	1	vehicles(1)
Number of New Vehicles	1	vehicles(1)
Average Hours per Day for Retired Vehicles	16	hours(1)
Average Hours per Day for New Vehicles	16	hours(1)

1- EMISSIONS RATES

Old Vehicles:

VOC	40.4	gm/hr(1)
NOx	2330	gm/hr(1)

New Vehicles:

	Emissions Rate	Fuel Density	Brake-Specific Fuel Consumption	Fuel Economy	Emissions Rate
	g/bhp-hr (1)	lb/gal (1)	lb/bhp-hr (1)	hr/gal (1)	g/hr (2)
VOC	0.032	6.99	0.36	18.1	11.4
NOx	4.5	6.99	0.36	18.1	1581.5

2 - CHANGE IN VEHICLE EMISSIONS

Current Vehicles	Emissions Rate g/hr (3)	Ferry Usage hrs/year	Number of Vehicles	Yearly Emissions g/yr	Yearly Emissions kg/yr
VOC	40.37	5,840	1	235,749	236
NOx	2330	5,840	1	13,607,200	13,607

New Vehicles	Emissions Rate g/hr (3)	Ferry Usage hrs/year	Number of Vehicles	Yearly Emissions g/yr	Yearly Emissions kg/yr
VOC	11.4	5,840	1	66,663	67
NOx	1581.5	5,840	1	9,235,887	9,236

3 - EMISSIONS REDUCTION

Reduction in Emissions	VOC	169	kg/yr
	NOx	4,371	kg/yr

4 - COST EFFECTIVENESS

Total Cost:	$2,000,000	(from above)
Useful life, years:	25 (1)	
Annual Cost:	$80,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Eff., $/Ton
VOC	$80,000	169	$473	**$429,129**
NOx	$80,000	4,371	$18	**$16,599**

(1) From application; given values for NMHC converted to VOC by factor of .484 (source: fhwa.dot.gov)

(2) Conversion from g/bhp-hr to g/hr using equation:
based off of: http://www.epa.gov/oms/models/part5/p5-awma.pdf

$$Rate\left(\frac{g}{hr}\right) = Rate\left(\frac{g}{bhp-hr}\right) * \frac{\rho\left(\frac{lb}{gal}\right)}{BSFC\left(\frac{lb}{bhp-hr}\right)} * FE\left(\frac{gal}{hr}\right)$$

(3) From above

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Isle of Wight County
PROJECT NAME: **Main Street Sidewalk Extension**
LOCATION: Main Street from Route 10 to the Park and Ride Lot
DESCRIPTION: Install sidewalks to connect the Town of Smithfield to the Park and Ride Lot
DATE: 8/16/2011 (on application)
PROJECT COST: $165,000

1- ESTIMATES OF VMT REDUCTIONS:

Facility Length (L): 0.15 mi. (2)

Demand estimation for proposed facility:

Existing Adult Cyclists:	0 (1)	
New Adult Cyclists:	0 (1)	
Number of HH within 2 mile radius:	1856 (3)	
Estimated percentage walking before	2% (2)	
Existing Adult Pedestrians, annual	37	
Existing Adult Pedestrians, daily	0	365 days/yr
Number of HH within 2 mile radius:	1856 (3)	
Estimated percentage walking after	30% (2)	
New Adult Pedestrians, annual	557	
New Adult Pedestrians, daily	2	365 days/yr

Calculating VMT reduction:

	Biking	Walking	
New Users:	0	2	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	0	4	
Eliminated Person Trips by Auto:	0	4	above (4)
Occupancy of Eliminated Auto Trips:	1.25	1.25 (8)	
Eliminated Vehicle Trips (Auto):	0	3	
Avg. Alt. Mode Trip Length, mi.:	2	1 (6)	
Factor (for converting alt. mode trip lengths):	2	2 (7)	
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	0	6	
		Total:	6 vehicle-miles

2- EMISSIONS CALCULATIONS:

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	0.676	6	4	0.004	365	1
NOx	0.640	6	4	0.004	365	1

3- COST EFFECTIVENESS:

Total Cost:	$165,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$11,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$11,000	1	$7,434	907	**$6,742,696**
NOx	$11,000	1	$7,847	907	**$7,117,203**

Notes:

[1] CMAQ application specifies that cycling is not allowed.

[2] From application.

[3] Isle of Wight assumes 1 pedestrian per household.

[4] Assuming each new alt. mode trip eliminates an auto trip

[5] Source: VDOT, Hampton Roads average for light duty vehicles and roadway functional classes, 2011, 35mph

[6] Source: 2001 NHTS Table Designer

[7] It is assumed that the eliminated auto trips will have length lower than regular auto trips (10 miles; source [6]) and higher than regular alt. mode trips (shown above).

[8] All-trip occupancy, based on occupancies assumed in CMAQ analyses of previous years: work- 1.1; non-work- 1.3

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Isle of Wight County
PROJECT NAME: **Windsor North Court Street Sidewalk Extension**
LOCATION: North Court Street from Joyner Town Rd to existing sidewalks in Windsor
DESCRIPTION: Construct sidewalk from Joyner Town Rd to the Town of Windsor
DATE: 8/16/2011 (on application)
PROJECT COST: $375,000

1- ESTIMATES OF VMT REDUCTIONS:

Facility Length (L): 0.12 mi. (2)

Demand estimation for proposed facility:

Existing Adult Cyclists:	0 (1)	
New Adult Cyclists:	0 (1)	
Number of HH within 2 mile radius:	1561 (3)	
Estimated percentage walking before	3% (2)	
Existing Adult Pedestrians, annual	47	
Existing Adult Pedestrians, daily	0	365 days/yr
Number of HH within 2 mile radius:	1561 (3)	
Estimated percentage walking after	30% (2)	
New Adult Pedestrians, annual	468	
New Adult Pedestrians, daily	1	365 days/yr

Calculating VMT reduction:

	Biking	Walking	
New Users:	0	1	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	0	2	
Eliminated Person Trips by Auto:	0	2	above (4)
Occupancy of Eliminated Auto Trips:	1.25	1.25 (8)	
Eliminated Vehicle Trips (Auto):	0	2	
Avg. Alt. Mode Trip Length, mi.:	2	1 (6)	
Factor (for converting alt. mode trip lengths):	2	2 (7)	
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	0	4	
		Total:	4 vehicle-miles

2- EMISSIONS CALCULATIONS:

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	0.676	4	3	0.003	365	1
NOx	0.640	4	3	0.003	365	1

3- COST EFFECTIVENESS:

Total Cost:	$375,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$25,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$25,000	1	$25,343	907	**$22,986,463**
NOx	$25,000	1	$26,751	907	**$24,263,193**

Notes:

[1] CMAQ application specifies that cycling is not allowed.

[2] From application.

[3] Isle of Wight assumes 1 pedestrian per household.

[4] Assuming each n 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] Source: VDOT, Hampton Roads average for light duty vehicles and roadway functional classes, 2011, 35mph

[6] Source: 2001 NHTS Table Designer

[7] It is assumed that the eliminated auto trips will have length lower than regular auto trips (10 miles; source [6]) and higher than regular alt. mode trips (shown above).

[8] All-trip occupancy, based on occupancies assumed in CMAQ analyses of previous years: work- 1.1; non-work- 1.3

CONGESTION MITIGATION AND AIR QUALITY

HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION:	James City County
PROJECT NAME:	**Intersection Improvements - Centerville Road and News Road**
LOCATION:	Centerville Rd/News Rd
DESCRIPTION:	Add right-turn lane on News Road and add a right-turn and left-turn lane on Centerville Road
DATE:	8/15/2011 (1)
PROJECT COST:	$445,000

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		20	sec/veh (1)
Intersection Delay After Project		15	sec/veh (1)
Change In Intersection Delay		5.0	sec/veh, pk hr
Total Vehicles During Peak Hour		600	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		0.8	veh hr's, pk hr
	divided by	17%	pk hr delay factor(2)
Change In Intersection Delay		4.9	hours/day

Type	Emissions Factor, g/hr (3)	Delay Change, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, weekdays/yr	Emissions Reduction, kg/yr
VOC	10.98	4.9	54	0.054	250	13.5
NOx	3.49	4.9	17	0.017	250	4.3

2 - COST EFFECTIVENESS

Total Cost:	$445,000	(from above)
Useful life, years:	10 (4)	
Annual Cost:	$44,500	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$44,500	13.5	$3,307	907	**$2,999,543**
NOx	$44,500	4.3	$10,412	907	**$9,443,723**

Notes:

(1) From application

(2) pk hr delay factor = pk hr delay / daily delay;
Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, Page 8, June 1997.

(3) Source: VDOT, Hampton Roads average for all vehicle types and principal arterials, 2011, idle speed.

(4) As previously assumed.

CONGESTION MITIGATION AND AIR QUALITY

HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: James City County
PROJECT NAME: **Intersection Improvements - Pocahontas Trail (Route 60) and Blow Flats Road (Route 1305)**
LOCATION: Pocahontas Trail/Blow Flats Road Intersection
DESCRIPTION: Realign intersection to improve tractor-trailer movements.
DATE: 8/15/2011 (1)
PROJECT COST: $450,000

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		60	sec/veh (1)
Intersection Delay After Project		60	sec/veh (1)
Change In Intersection Delay		0.0	sec/veh, pk hr
Total Vehicles During Peak Hour		950	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		0.0	veh hr's, pk hr
	divided by	17%	pk hr delay factor(2)
Change In Intersection Delay		0.0	hours/day

Type	Emissions Factor, g/hr (3)	Delay Change, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, weekdays/yr	Emissions Reduction, kg/yr
VOC	10.98	0.0	0	0.000	250	0.0
NOx	3.49	0.0	0	0.000	250	0.0

2 - COST EFFECTIVENESS

Total Cost:	$450,000	(from above)
Useful life, years:	10 (4)	
Annual Cost:	$45,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$45,000	0.0	no change	907	no change
NOx	$45,000	0.0	no change	907	no change

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

CONGESTION MITIGATION AND AIR QUALITY

HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: James City County
PROJECT NAME: **Intersection Improvements - Route 199 and Brookwood Drive**
LOCATION: Route 199/Brookwood Dr Intersection
DESCRIPTION: Convert right-turn lane from Brookwood Dr onto Route 199 East into a left/through lane and add new right-turn lane on Brookwood Dr
DATE: 8/15/2011 (1)
PROJECT COST: $275,000

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		100	sec/veh (1)
Intersection Delay After Project		50	sec/veh (1)
Change In Intersection Delay		50.0	sec/veh, pk hr
Total Vehicles During Peak Hour		1,200	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		16.7	veh hr's, pk hr
	divided by	17%	pk hr delay factor(2)
Change In Intersection Delay		98.0	hours/day

Type	Emissions Factor, g/hr (3)	Delay Change, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, weekdays/yr	Emissions Reduction, kg/yr
VOC	10.98	98.0	1,076	1.076	250	269.1
NOx	3.49	98.0	342	0.342	250	85.5

2 - COST EFFECTIVENESS

Total Cost:	$275,000	(from above)
Useful life, years:	10 (4)	
Annual Cost:	$27,500	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$27,500	269.1	$102	907	**$92,683**
NOx	$27,500	85.5	$322	907	**$291,800**

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

CONGESTION MITIGATION AND AIR QUALITY

HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION:	James City County
PROJECT NAME:	**Intersection Improvements - Route 199 West Ramp at Richmond Road (Route 60)**
LOCATION:	Route 199/Route 60 Intersection
DESCRIPTION:	Add dedicated right and left-turn lanes from Route 199 West Ramp onto Richmond Rd
DATE:	8/15/2011 (1)
PROJECT COST:	$650,000

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		180	sec/veh (1)
Intersection Delay After Project		100	sec/veh (1)
Change In Intersection Delay		80.0	sec/veh, pk hr
Total Vehicles During Peak Hour		1,700	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		37.8	veh hr's, pk hr
	divided by	17%	pk hr delay factor(2)
Change In Intersection Delay		222.2	hours/day

Type	Emissions Factor, g/hr (3)	Delay Change, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, weekdays/yr	Emissions Reduction, kg/yr
VOC	10.98	222.2	2,440	2.440	250	610.0
NOx	3.49	222.2	775	0.775	250	193.8

2 - COST EFFECTIVENESS

Total Cost:	$650,000	(from above)
Useful life, years:	10 (4)	
Annual Cost:	$65,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$65,000	610.0	$107	907	**$96,648**
NOx	$65,000	193.8	$335	907	**$304,284**

Notes:

(1) From application

(2) pk hr delay factor = pk hr delay / daily delay;
Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, Page 8, June 1997.

(3) Source: VDOT, Hampton Roads average for all vehicle types and principal arterials, 2011, idle speed.

(4) As previously assumed.

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION: Newport News
PROJECT NAME: **Citywide Pedestrian Enhancements**
LOCATION: Citywide
DESCRIPTION: Install pedestrian accomodations at signalized intersections that currently provide crosswalks only in order to remove the required pedestrian walk and clearance intervals from the signal timing plan when pedestrians are not present.
DATE: 8/17/2011 (1)
PROJECT COST: $1,000,000

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):		16	54	0	70
	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:		752	5,570	0	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 6,323 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	6,323	50,413	50.4	250	12,603
NOx	3.996	6,323	25,265	25.3	250	6,316

2 - COST EFFECTIVENESS

Total Cost: $1,000,000 (from above)
Useful Life, years: 10 (2)
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	12,603	$7.93	907	**$7,197**
NOx	$100,000	6,316	$15.83	907	**$14,360**

Notes:
(1) From application
(2) As previously assumed
(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

CITYWIDE SIGNAL SYSTEM

JURISDICTION: Newport News
PROJECT NAME: **Citywide Signal Retiming**
LOCATION: Citywide
DESCRIPTION:

Analysis of existing and development of new signal timings for strategic corridors in Newport News.

DATE: 8/17/2011 (1)
PROJECT COST: $900,000

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):		139	116	0	255
	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:		6,537	11,966	0	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 18,503 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	18,503	147,529	147.5	250	36,882
NOx	3.996	18,503	73,937	73.9	250	18,484

2 - COST EFFECTIVENESS

Total Cost: $900,000 (from above)
Useful Life, years: 10 (2)
Annual Cost: $90,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$90,000	36,882	$2.44	907	**$2,213**
NOx	$90,000	18,484	$4.87	907	**$4,416**

Notes:
(1) From application
(2) As previously assumed
(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

TRANSIT AND FIXED GUIDEWAY PROJECTS - NEW OR EXPANDED TRANSIT SERVICE

JURISDICTION: Ft. Eustis/Newport News
PROJECT NAME: **Ft. Eustis MAX Express Bus**
LOCATION: From Hampton to Ft. Eustis
DESCRIPTION: Express bus for military personnel working at Ft. Eustis
DATE: 7/27/2011 (on application)
PROJECT COST: $150,000 (1)

1 - INCREASED BUS EMISSIONS:

Route Length (one-way):	20	mi/trip (2)
Bus Trips per day (round trips):	4	round trips / day (2)
Factor:	2	trips / round trip
Bus VMT:	160	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	160	94	0.09	250	24
NOx	12.461	160	1,994	1.99	250	498

2 - REDUCED AUTO EMISSIONS:

Ridership Estimate:	100	boardings/day (2)
Vehicle Occupancy Rate:	1.15	persons/veh (4)
Reduction in Daily Vehicle Trips:	87	veh trips / day
Average Trip Length:	10	miles/trip (5)
Reduction in VMT:	870	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	870	578	0.58	250	145
NOx	0.797	870	693	0.69	250	173

3- COST EFFECTIVENESS:

Project Cost:	$150,000	above
Project life, years:	3	[2]
Annual Cost:	$50,000	

Type	Cost, $/yr (above)	Net Emissions Reduction, kg/yr	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$50,000	121	$413	907	**$374,901**
NOx	$50,000	-325	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
TRANSIT SHELTERS/FACILITIES

LOCALITY/AGCY: Newport News
PROJECT NAME: **Lee Hall Bus Transfer Center**
DESCRIPTION: Construct transfer center for the bus stop linking Williamsburg Transit and HRT
DATE: 7/27/2011 (on application)
PROJECT COST: $250,000

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

2- TRAVEL REDUCTIONS:

Increase in Ridership:	200	boardings/day [1]
Vehicle Occupancy Rate (work):	1.15	persons/veh [3]
Reduction in Daily Vehicle Trips:	174	vehicles/day
Average Trip Length:	10	miles/trip [4]
Reduction in VMT:	1,739	miles/day

3- EMISSIONS REDUCTIONS:

Type	Emissions Factor, g/mi [2]	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, days/yr	Emissions Reduction, kg/yr
VOC	0.676	1,739	1,175	1.175	365	429
NOx	0.640	1,739	1,113	1.113	365	406

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	429	$39	907	**$35,246**
NOx	$16,667	406	$41	907	**$37,204**

Notes:
[1] From Application
[2] Source: VDOT, Hampton Roads average for light-duty vehicles and all roadway functional classes, 2011, 35mph
[3] As assumed in CMAQ analyses of previous years
[4] 2001 NHTS Table Designer

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION: Norfolk
PROJECT NAME: **Citywide Signal Retiming, Phase III**
LOCATION: Citywide
DESCRIPTION: Updating/developing a plan and procedure for analyzing and prioritizing the signals within a five year period, and retime multiple corridors
DATE: 8/17/2011 (1)
PROJECT COST: $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):		16	30	0	46
	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:		752	3,095	0	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 3,847 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	3,847	30,674	30.7	250	7,668
NOx	3.996	3,847	15,373	15.4	250	3,843

2 - COST EFFECTIVENESS

Total Cost: $600,000 (from above)
Useful Life, years: 10 (2)
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	7,668	$7.82	907	**$7,097**
NOx	$60,000	3,843	$15.61	907	**$14,160**

Notes:
(1) From application
(2) As previously assumed
(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

CITYWIDE SIGNAL SYSTEM

JURISDICTION: Poquoson
PROJECT NAME: **Poquoson Traffic Signal Upgrade**
LOCATION: Wythe Creek Road Corridor
DESCRIPTION: Upgrade all traffic signals into a communications system and link with the City of Hampton's Traffic Signal Network
DATE: 8/10/2011 (1)
PROJECT COST: $260,000

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):		4	0	0	4	
	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:		188	0	0		hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 188 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	188	1,500	1.5	250	375
NOx	3.996	188	752	0.8	250	188

2 - COST EFFECTIVENESS

Total Cost: $260,000 (from above)
Useful Life, years: 10 (2)
Annual Cost: $26,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$26,000	375	$69.34	907	**$62,887**
NOx	$26,000	188	$138.35	907	**$125,482**

Notes:
(1) From application
(2) As previously assumed
(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
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Poquoson
PROJECT NAME: **South Lawson Park Bike Path**
LOCATION: South Lawson Park
DESCRIPTION: Construction of a circular bike path around South Lawson Park with connections to Poquoson Avenue
DATE: 8/9/2011 (on application)
PROJECT COST: $195,100

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% [2]
Facility Length (L): 1.00 mi. [13]

Buffer, Distance from Project	TAZ [13]	2009 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.	1230	1,422	0.50	711	2	4	1	1
0.25-0.50 mi.	1231	495	0.50	247	1	1	0	0
0.50-1.00 mi.	1232	81	1.00	81	0	0	0	0
				1,039	3	5	1	1

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

Existing Adult Cyclists: 3 above
New Adult Cyclists: 5 above
Total Adult Cyclists: 8

Trips, per day per cyclist: 2 trip to destination + return trip
Total Trips per Day: 16

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

Calculating VMT reduction:

	Biking	Walking	
New Users:	5	1	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	10	2	
Eliminated Person Trips by Auto:	10	2	above [7]
Occupancy of Eliminated Auto Trips:	1.25	1.25	[11]
Eliminated Vehicle Trips (Auto):	8	2	
Avg. Alt. Mode Trip Length, mi.:	2	1	[9]
Factor (for converting alt. mode trip lengths):	2	2	[10]
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	32	4	
Total:			36 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	36	24	0.024	365	9
NOx	0.640	36	23	0.023	365	8

3- COST EFFECTIVENESS:

Total Cost:	$195,100	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$13,007	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$13,007	9	$1,465	907	**$1,328,788**
NOx	$13,007	8	$1,546	907	**$1,402,592**

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

[13] From application

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Portsmouth
PROJECT NAME: **Clifford/Bart/South Street Bike Boulevard**
LOCATION: From Powhatan Avenue to Airline Boulevard
DESCRIPTION: Construct a bicycle route along Clifford/Bart/South Streets
DATE: 7/25/2011 (on application)
PROJECT COST: $500,000

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% [2]
Facility Length (L): 1.15 mi. [13]

Buffer, Distance from Project	TAZ [13]	2009 Density (D), persons/ sq.mi.
0.00-0.25 mi.	491	3,590
	910	2,540
	Average:	3,065
0.50-1.00 mi.	455	4,441
	456	5,305
	488	4,022
	489	1,158
	Average:	3,732

Buffer, Distance from Project	TAZ [13]	2009 Density (D), persons/ sq.mi.
0.25-0.50 mi.	490	5,031
	491	3,590
	917	5,892
	Average:	4,838

Buffer, Distance from Project	TAZ	2009 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.	above	3,065	0.58	1,762	4	8	1	2
0.25-0.50 mi.	above	4,838	0.58	2,782	7	8	2	2
0.50-1.00 mi.	above	3,732	1.15	4,291	10	4	3	1
				8,836	21	20	6	5

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

Existing Adult Cyclists:	21	above
New Adult Cyclists:	20	above
Total Adult Cyclists:	41	
Trips, per day per cyclist:	2	trip to destination + return trip
Total Trips per Day:	82	
vs. Trips on Sampled Bikeways:	23	above

Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	20	5	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	40	10	
Eliminated Person Trips by Auto:	40	10	above [7]
Occupancy of Eliminated Auto Trips:	1.25	1.25	[11]
Eliminated Vehicle Trips (Auto):	32	8	
Avg. Alt. Mode Trip Length, mi.:	2	1	[9]
Factor (for converting alt. mode trip lengths):	2	2	[10]
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	128	16	
Total:			144 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	144	97	0.097	365	36
NOx	0.640	144	92	0.092	365	34

3- COST EFFECTIVENESS:

Total Cost:	$500,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$33,333	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$33,333	36	$939	907	**$851,350**
NOx	$33,333	34	$991	907	**$898,637**

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

[13] From application

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION: Portsmouth
PROJECT NAME: **Signal System Citywide Upgrades**
LOCATION: Citywide
DESCRIPTION: Upgrade signal systems to be in compliance with MUTCD standards and maximize the functionality of the signal system.
DATE: 8/2/2011 (1)
PROJECT COST: $6,000,000

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):		12	6	0	18
	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:		564	619	0	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 1,183 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	1,183	9,435	9.4	250	2,359
NOx	3.996	1,183	4,728	4.7	250	1,182

2 - COST EFFECTIVENESS

Total Cost: $6,000,000 (from above)
Useful Life, years: 10 (2)
Annual Cost: $600,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$600,000	2,359	$254.38	907	**$230,724**
NOx	$600,000	1,182	$507.58	907	**$460,374**

Notes:
(1) From application
(2) As previously assumed
(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
HIGHWAY - CORRIDOR IMPROVEMENTS

JURISDICTION: Suffolk
PROJECT NAME: **Bridge Road Signal Coordination and ITS Network**
LOCATION: Bridge Road from College Drive to Eclipse Drive
DESCRIPTION: Upgrade signal control equipment and coordinate signals along Bridge Road
DATE: 8/15/2011 (1)
PROJECT COST: $1,257,000

1 - EMISSIONS REDUCTION

Arterial Intersection(s)	Number of Intersections	AADT (1)	Peak Hour Volume (2)	Delay Savings (s/veh)(3)	Delay Savings (s / pk hr)(4)	Delay Savings (hr/day)(5)
Bridge Rd						
College Dr to Shoulders Hill Rd	5	30,000	2,640	10.7	141,240	231
Shoulders Hill Rd to Bennetts Pasture Rd	3	24,000	2,112	10.7	67,795	111
Bennetts Pasture Rd to Eclipse Dr	2	18,000	1,584	10.7	33,898	55
				Total Delay Savings		397 hr/day

Type	Emissions Factor, g/hr (6)	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	397	4,346	4.3	250	1,086
NOx	3.573	397	1,418	1.4	250	355

2 - COST EFFECTIVENESS

Total Cost: $1,257,000 (from above)
Useful Life, years: 10 (3)
Annual Cost: $125,700

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$125,700	1,086	$116	**$104,943**
NOx	$125,700	355	$355	**$321,585**

(1) From application
(2) VDOT AADT * Regional k factor from 2009 CMP database (0.088)
(3) As previously assumed
(4) Number of Signals * Peak Hr Volume * Delay Savings
(5) 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, 6/97
(6) VDOT, Hampton Roads Average for all vehicle types, average of principal and minor arterials, 2011, idle

CONGESTION MITIGATION AND AIR QUALITY
OTHER

JURISDICTION: Suffolk
PROJECT NAME: **Route 10 and 13 - Turnouts**
LOCATION: Various locations
DESCRIPTION: Paved turnouts to allow traffic to safely pass maintenance vehicles along corridors.
DATE: 8/16/2011 (1)
PROJECT COST: $458,000

1 - EMISSIONS REDUCTION

Arterial Number of Turnouts	Number of Vehicles Delayed(1)	Avg Delay Before (s/veh)(1)	Avg Delay After (s/veh)(1)	Delay Savings (s/veh)	Delay Savings (s/day)	Delay Savings (hr/day)
Route 10 (Godwin Blvd)						
4 Turnouts (2 Northbound & 2 Southbound)	315	255	175	80	25,200	7
Route 13 (Carolina Rd/Whaleyville Blvd)						
8 Turnouts (4 Northbound & 4 Southbound)	117	204	106	98	11,466	3
				Total Delay Savings		10 hr/day

Type	Emissions Factor, g/hr (2)	Change in Veh Delay, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr (3)	Emissions Reduction, kg/yr
VOC	0.899	10	9	0.0	52	0
NOx	0.845	10	9	0.0	52	0

2 - COST EFFECTIVENESS

Total Cost: $732,800 (4)
Useful Life, years: 24 (4)
Annual Cost: $30,533

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$30,533	0	$64,128	**$58,164,425**
NOx	$30,533	0	$68,227	**$61,881,441**

(1) From application
(2) VDOT, Hampton Roads Average for all vehicle types, principal arterials, 2011, 15 mph
(3) Service occurs one day per week
(4) According to City, turnouts would need to be milled and overlaid every 6 years at 20% of initial cost

CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY - CORRIDOR IMPROVEMENTS

JURISDICTION: Suffolk
PROJECT NAME: **Shoulders Hill Rd/Nansemond Pkwy/Wilroy Rd Signal Coordination**
LOCATION: and Wilroy Rd
DESCRIPTION: Upgrade signal control equipment and coordinate signals along corridor
DATE: 8/15/2011 (1)
PROJECT COST: $2,454,000

1 - EMISSIONS REDUCTION

Arterial Intersection(s)	Number of Intersections	AADT (1)	Peak Hour Volume (2)	Delay Savings (s/veh)(3)	Delay Savings (s / pk hr)(4)	Delay Savings (hr/day)(5)
Shoulders Hill Rd						
Bridge Rd to Nansemond Pkwy	2	9,800	862	10.7	18,455	30
Nansemond Pkwy						
Shoulders Hill Rd to Wilroy Rd	3	12,000	1,056	10.7	33,898	55
Wilroy Rd						
Nansemond Pkwy to Route 58 Bypass	3	8,600	757	10.7	24,293	40
				Total Delay Savings		125 hr/day

Type	Emissions Factor, g/hr (6)	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	125	1,371	1.4	250	343
NOx	3.573	125	447	0.4	250	112

2 - COST EFFECTIVENESS

Total Cost: $2,454,000 (from above)
Useful Life, years: 10 (3)
Annual Cost: $245,400

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$245,400	343	$716	**$649,363**
NOx	$245,400	112	$2,194	**$1,989,895**

(1) From application
(2) VDOT AADT * Regional k factor from 2009 CMP database (0.088)
(3) As previously assumed
(4) Number of Signals * Peak Hr Volume * Delay Savings
(5) 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, 6/97
(6) VDOT, Hampton Roads Average for all vehicle types, average of principal and minor arterials, 2011, idle

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Suffolk
PROJECT NAME: **Shoulders Hill Road Bicycle and Pedestrian Improvements**
LOCATION: Approaches to the Shoulders Hill Rd and Bennett's Creek Park Rd Intersection
DESCRIPTION: Improve pedestrian crossings at the intersection of Shoulders Hill Rd and Bennett's Creek Park Rd and add a multi-use trail and sidewalk along Shoulders Creek Road (provides access to Creekside Elementary School)
DATE: 8/17/2011 (on application)
PROJECT COST: $272,000

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% [2]
Facility Length (L): 0.25 mi. [13]

Buffer, Distance from Project	TAZ [13]	2009 Density (D), persons/ sq.mi.
0.00-0.25 mi.	553	1,030
	554	807
	Average:	918
0.50-1.00 mi.	552	407
	553	1,030
	554	807
	555	135
	Average:	718

Buffer, Distance from Project	TAZ [13]	2009 Density (D), persons/ sq.mi.
0.25-0.50 mi.	553	1,030
	554	807
	Average:	918

Buffer, Distance from Project	TAZ	2009 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.	above	918	0.13	115	0	0	0	0
0.25-0.50 mi.	above	918	0.13	115	0	0	0	0
0.50-1.00 mi.	above	718	0.25	180	0	0	0	0
				409	0	0	0	0

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

Existing Adult Cyclists:	0	above
New Adult Cyclists:	0	above
Total Adult Cyclists:	0	
Trips, per day per cyclist:	2	trip to destination + return trip
Total Trips per Day:	0	
vs. Trips on Sampled Bikeways:	23	above

Therefore, the demand calculation results are reasonable.

Estimation of students (pedestrians) that can walk to school as a result of sidewalk project:

Number of buses serving new area:	1
Avg number of students per bus:	54 (14)
Estimated percentage of children that will walk:	15% (15)
New users, walking:	8

Calculating VMT reduction:

	Biking	Walking	
New Users:	0	8	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	0	16	
Eliminated Person Trips by Auto:	0	16	above (7)
Occupancy of Eliminated Auto Trips:	1.25	1.25	(11)
Eliminated Vehicle Trips (Auto):	0	13	
Avg. Alt. Mode Trip Length, mi.:	2	1	(9)
Factor (for converting alt. mode trip lengths):	2	2	(10)
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	0	26	
Total:		26	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	26	18	0.018	365	6
NOx	0.640	26	17	0.017	365	6

3- COST EFFECTIVENESS:

Total Cost:	$272,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$18,133	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$18,133	6	$2,828	907	**$2,565,054**
NOx	$18,133	6	$2,985	907	**$2,707,523**

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

[(13)] From application

[(14)] Source: http://www.schoolbusinfo.com/faq.asp

[(15)] Source: US Environmental Protection Agency. Travel and environmental implications of school siting. Washington, DC: US Environmental Protection Agency; 2003. Available at http://www.epa.gov/smartgrowth/pdf/school_travel.pdf

CONGESTION MITIGATION AND AIR QUALITY

HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION:	Virginia Beach
PROJECT NAME:	**Intersection Improvements - First Colonial Road and Laskin Road**
LOCATION:	First Colonial Rd and Laskin Rd Intersection
DESCRIPTION:	Addition of a second westbound left-turn lane
DATE:	7/29/2011 (1)
PROJECT COST:	$1,000,000

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		53.8	sec/veh (1)
Intersection Delay After Project		51.3	sec/veh (1)
Change In Intersection Delay		2.5	sec/veh, pk hr
Total Vehicles During Peak Hour		4,701	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		3.3	veh hr's, pk hr
	divided by	17%	pk hr delay factor(2)
Change In Intersection Delay		19.2	hours/day

Type	Emissions Factor, g/hr (3)	Delay Change, hr/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, weekdays/yr	Emissions Reduction, kg/yr
VOC	10.98	19.2	211	0.211	250	52.7
NOx	3.49	19.2	67	0.067	250	16.7

2 - COST EFFECTIVENESS

Total Cost:	$1,000,000	(from above)
Useful life, years:	10 (4)	
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	52.7	$1,897	907	**$1,720,624**
NOx	$100,000	16.7	$5,973	907	**$5,417,192**

Notes:

(1) From application

(2) pk hr delay factor = pk hr delay / daily delay;
Source: "Cost Benefit Model for Intersection Level of Service Improvements", HRPDC, Page 8, June 1997.

(3) Source: VDOT, Hampton Roads average for all vehicle types and principal arterials, 2011, idle speed.

(4) As previously assumed.

CONGESTION MITIGATION AND AIR QUALITY

OTHER

JURISDICTION: Virginia Port Authority

PROJECT NAME: **Green Operator, Ocean-Going Vessel Hybridization & Fuel Switching Demonstration Project**

DESCRIPTION: Expand the Green Operator Program to containsership lines servicing the Port of Virginia through the Earl Energy Flex Gen System and the Maersk Line Limited - Fuel Switching Project

DATE: 8/17/2011 (on application)

PROJECT COST: $10,400,000

1 - COST EFFECTIVENESS

Total Cost:	$10,400,000	(from above)
Useful Life, years:	4 [1]	
Annual Cost:	$2,600,000	

Type	Cost, $/yr (above)	Emissions Reduction, ton/yr[1]	Cost Effectiveness, $/ton
VOC	$2,600,000	116	**$22,337**
NOx	$2,600,000	721	**$3,606**

Notes:

[1] From application

CONGESTION MITIGATION AND AIR QUALITY

OTHER

JURISDICTION: Virginia Port Authority

PROJECT NAME: **Green Operator - Truck Replacement Program**

DESCRIPTION: Continue operator of Green Operator Program, providing incentives to replace heavy duty diesel port drayage trucks with later models meeting EPA standards.

DATE: 8/17/2011 (on application)

PROJECT COST: $9,400,000

1 - COST EFFECTIVENESS

Total Cost:	$9,400,000	(from above)
Useful Life, years:	15 [1]	
Annual Cost:	$626,667	

Type	Cost, $/yr (above)	Emissions Reduction, ton/yr[1]	Cost Effectiveness, $/ton
VOC	$626,667	117	**$5,356**
NOx	$626,667	504	**$1,243**

Notes:

[1] From application

CONGESTION MITIGATION AND AIR QUALITY

TRANSIT AND FIXED GUIDEWAY PROJECTS - VEHICLE PURCHASE/REPLACEMENT

AGENCY: WATA
PROJECT NAME: **ADA Body-n-Chassis Bus Replacements**
DESCRIPTION: Replacement of 12 paratransit vehicles
DATE: 8/10/2011 (1)
PROJECT COST: $1,083,000

Number of Vehicles Being Retired	12	vehicles(1)
Number of New Vehicles	12	vehicles(1)
Average Yearly Vehicle-Miles for Retired Vehicles	40,000	vehicle-miles(1)
Average Yearly Vehicle-Miles for New Vehicles	40,000	vehicle-miles(1)

1 - CHANGE IN VEHICLE EMISSIONS

Current Vehicles	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	0.30	1.42	40,000	12	679,391	679.4
NOx	2.5	11.70	40,000	12	5,614,800	5,615

New Vehicles	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	0.28	1.30	40,000	12	625,264	625.3
NOx	2.5	11.70	40,000	12	5,614,800	5,615

2 - EMISSIONS REDUCTION

Reduction in Emissions	VOC	54.1	kg/yr
	NOx	0	kg/yr

3 - COST EFFECTIVENESS

Total Cost:	$1,083,000	(from above)
Useful life, years:	15 (3)	
Annual Cost:	$72,200	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Eff., $/Ton
VOC	$72,200	54.1	$1,334	**$1,209,855**
NOx	$72,200	0	no change	**no change**

(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

CONGESTION MITIGATION AND AIR QUALITY

TRANSIT AND FIXED GUIDEWAY PROJECTS - VEHICLE PURCHASE/REPLACEMENT

AGENCY: WATA
PROJECT NAME: **CNG Bus Replacements**
DESCRIPTION: Replacement of 7 - 40' CNG buses
DATE: 8/10/2011 (1)
PROJECT COST: $3,073,000

Number of Vehicles Being Retired	7	vehicles(1)
Number of New Vehicles	7	vehicles(1)
Average Yearly Vehicle-Miles for Retired Vehicles	28,000	vehicle-miles(1)
Average Yearly Vehicle-Miles for New Vehicles	28,000	vehicle-miles(1)

1 - CHANGE IN VEHICLE EMISSIONS

Current Vehicles	Emissions Rate g/mi (1)	VMT mi/yr/bus	Number of Vehicles	Yearly Emissions g/yr	Yearly Emissions kg/yr
VOC	0.15	28,000	7	29,400	29
NOx	1.10	28,000	7	215,600	216

New Vehicles	Emissions Rate g/mi (1)	VMT mi/yr/bus	Number of Vehicles	Yearly Emissions g/yr	Yearly Emissions kg/yr
VOC	0.01	28,000	7	1,960	2
NOx	0.20	28,000	7	39,200	39

2 - EMISSIONS REDUCTION

Reduction in Emissions	VOC	27	kg/yr
	NOx	176	kg/yr

3 - COST EFFECTIVENESS

Total Cost:	$3,073,000	(from above)
Useful life, years:	15 (2)	
Annual Cost:	$204,867	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Eff., $/Ton
VOC	$204,867	27	$7,466	**$6,771,650**
NOx	$204,867	176	$1,161	**$1,053,368**

(1) From application

(2) As assumed previously

CONGESTION MITIGATION AND AIR QUALITY

TRANSIT AND FIXED GUIDEWAY PROJECTS - VEHICLE PURCHASE/REPLACEMENT

AGENCY: WATA
PROJECT NAME: **Hybrid Bus Capital Replacements**
DESCRIPTION: Replacement of 8 diesel transit buses with diesel-electric hybrid buses
DATE: 8/10/2011 (1)
PROJECT COST: $6,480,000

Number of Vehicles Being Retired	8	vehicles(1)
Number of New Vehicles	8	vehicles(1)
Average Yearly Vehicle-Miles for Retired Vehicles	35,000	vehicle-miles(1)
Average Yearly Vehicle-Miles for New Vehicles	40,000	vehicle-miles(1)

1 - CHANGE IN VEHICLE EMISSIONS

Current Vehicles	Emissions Rate g/mi (1)	VMT mi/yr/bus	Number of Vehicles	Yearly Emissions g/yr	Yearly Emissions kg/yr
VOC	0.04	35,000	8	11,200	11.2
NOx	10.40	35,000	8	2,912,000	2,912

New Vehicles	Emissions Rate g/mi (1)	VMT mi/yr/bus	Number of Vehicles	Yearly Emissions g/yr	Yearly Emissions kg/yr
VOC	0.03	40,000	8	9,600	9.6
NOx	0.60	40,000	8	192,000	192

2 - EMISSIONS REDUCTION

Reduction in Emissions	VOC	1.6	kg/yr
	NOx	2,720	kg/yr

3 - COST EFFECTIVENESS

Total Cost:	$6,480,000	(from above)
Useful life, years:	15 (2)	
Annual Cost:	$432,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Eff., $/Ton
VOC	$432,000	1.6	$270,000	**$244,890,000**
NOx	$432,000	2,720	$159	**$144,053**

(1) From application

(2) As assumed previously

CONGESTION MITIGATION AND AIR QUALITY

TRANSIT AND FIXED GUIDEWAY PROJECTS - VEHICLE PURCHASE/REPLACEMENT

AGENCY: WATA
PROJECT NAME: **Trolley Bus Replacements**
DESCRIPTION: Replacement of 5 Trolley Transit Buses
DATE: 8/10/2011 (1)
PROJECT COST: $2,018,000

Number of Vehicles Being Retired	5	vehicles(1)
Number of New Vehicles	5	vehicles(1)
Average Yearly Vehicle-Miles for Retired Vehicles	20,000	vehicle-miles(1)
Average Yearly Vehicle-Miles for New Vehicles	28,000	vehicle-miles(1)

1 - CHANGE IN VEHICLE EMISSIONS

Current Vehicles	Emissions Rate g/mi (1)	VMT mi/yr/bus	Number of Vehicles	Yearly Emissions g/yr	Yearly Emissions kg/yr
VOC	0.04	20,000	5	4,000	4.0
NOx	16.60	20,000	5	1,660,000	1,660

New Vehicles	Emissions Rate g/mi (1)	VMT mi/yr/bus	Number of Vehicles	Yearly Emissions g/yr	Yearly Emissions kg/yr
VOC	0.04	28,000	5	5,600	5.6
NOx	0.80	28,000	5	112,000	112

2 - EMISSIONS REDUCTION

Reduction in Emissions	VOC	-1.6	kg/yr
	NOx	1,548	kg/yr

3 - COST EFFECTIVENESS

Total Cost:	$2,018,000	(from above)
Useful life, years:	15 (2)	
Annual Cost:	$134,533	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Eff., $/Ton
VOC	$134,533	-1.6	negative	**negative**
NOx	$134,533	1,548	$87	**$78,825**

(1) From application

(2) As assumed previously

APPENDIX B

RSTP Project Evaluation Worksheets

Evaluation of RSTP Applications

Highway- New Lanes, Intersection Improvements

Applicant	Project Name	Total Cost	Congestion Level (ex., fut.- 10 pts each; severe=7, moderate=3, low=0)	(0-20)	Cost-Effectiveness (lowest $/vmt = 20; highest $/vmt = 0; straight line interp)	(0-20)	System Continuity (for missing links: total completion = 20, partial completion = 10)	(0-20)	Safety (20 pts to project with highest safety improve-ments)	(0-20)	Air Quality (reduces NOx = 5; reduces HC = 5)	(0-10)	Project Readiness (detailed design and cost estimates, ready to go: 10 pts)	(0-10)	Total (0-100)
Virginia Beach	Centerville Tpke Widening - Kempsville Rd to Indian River Rd	$ 24,000,000	Current LOS: F; Future LOS: F	14	Annual: ($24m * 5%) / (32k * 1.83mi * 338days) = $0.06/vmt	15	Yes	10	Add'l lane to avoid turning veh's; median to separate directions	10	PM: Reduces NOx (0.01 kg); reduces VOC (0.01 kg)	10	Yes (community support, detailed design and $estimate, and all approvals)	10	**69**
Suffolk	Godwin Blvd Interchange Improvement	$ 1,000,000	Current LOS: D/E; Future LOS: E/F	14	Annual: ($1m * 5%) / (48k * 0.19mi * 338days) = $0.02/vmt	18	Yes	10	Reduces queue length	10	Reduction in idling at intersection	10	Community support and approvals: Yes; detailed design and $estimate: No	7	**69**
Suffolk	U.S. Route 58/Holland Rd Corridor Improvements	$ 72,500,000	Current LOS: D; Future LOS: F	10	Annual: ($72.5m * 5%) / (68k * 3.5mi * 338days) = $0.05/vmt	16	Yes	10	Signalization, bike/ped accomodations, access management	10	Reduction in idling at congested intersections	10	Community support, detailed design and $estimate: Yes; all approvals: No	7	**63**
Virginia Beach	Centerville Tpke Widening - Lynnhaven Pkwy to Kempsville Rd	$ 38,000,000	Current LOS: F; Future LOS: F	14	Annual: ($38m * 5%) / (32k * 0.77mi * 338days) = $0.23/vmt	0	Yes	10	Add'l lane to avoid turning veh's; median to separate directions	10	PM: Reduces NOx (0.04 kg); reduces VOC (0.04 kg)	10	Yes (community support, detailed design and $estimate, and all approvals)	10	**54**
Isle of Wight Co	Right turn lane at Turner Dr (Route 644) onto Route 10/32	$ 300,000	Current LOS: A-C; Future LOS: A-C	0	Annual: ($0.3m * 5%) / (38k * 0.25mi * 338days) = $0.005/vmt	20	Yes	10	Vehicles currently use shoulder w/ obstructed view	10	Reduction in idling at intersection	10	Community support: Yes; detailed design and $estimate, all approvals: No	3	**53**
Suffolk	Nansmond Pkwy & Wilroy Rd Intersection Improvements	$ 1,420,000	Current LOS: C; Future LOS: E	7	Annual: ($1.42m * 5%) / (10k * 0.17mi * 338days) = $0.12/vmt	10	Yes	10	Reduces queue lengths, removes some blockage caused by	10	Reduction in idling at intersection	10	Community support: Yes; detailed design and $estimate, all approvals: No	3	**50**
Norfolk	I-264/Ballentine Blvd/Light Rail Crossing - Modified Diverging Diamond Interchange	$ 5,000,000	Current LOS: D; Future LOS: E	7	Annual: ($5m * 5%) / (30k * 0.20mi * 338days) = $0.12/vmt	10	Yes	10	Queue lengths shortened	10	Round-about expected to reduce idling	10	Community support: Yes; detailed design and $estimate, all approvals: No	3	**50**
Newport News	Atkinson Blvd - Construct New Road	$ 52,000,000	Relieves Denbigh Blvd- Current LOS: D; Future LOS: D	6	Annual: ($52m * 5%) / (30k * 1.19mi * 338days) = $0.22/vmt	1	Yes (missing link: no crossing between Ft Eustis Blvd and Denbigh Blvd)	20	Reduces congestion on Denbigh Blvd; fewer driveways & intersections than Denbigh Blvd	10	Reduction in idling at congested intersections on Denbigh Blvd	10	Community support: Yes; detailed design and $estimate, all approvals: No	3	**50**
James City Co	Croaker Rd Widening & Multi-Purpose Trail	$ 12,550,000	Current LOS: D; Future LOS: D	6	Annual: ($12.55m * 5%) / (28k * 0.5mi * 338days) = $0.13/vmt	9	Yes	10	4 lanes safer than 2 lanes	10	Includes multi-purpose trail	10	Community support: Yes; detailed design and $estimate, all approvals: No	3	**48**

Evaluation of RSTP Applications

Intermodal Projects

Applicant	Project Name	Total Cost	Establishes connections between modes/ corridors/ centers?	(0-40)	Improves operating system to accommodate intermodal movements?	(0-25)	Improves rail or vehicular access to freight facilities or major industries?	(0-25)	Project has detailed design and cost estimates and is ready to go?	(0-10)	Total (0-100)
James City Co	Route 60 Multi-Modal Corridor Upgrade	$ 6,100,000	Yes (connected modes: bus, ped, bike)	20	Yes (connected modes: bus, ped, bike)	12.5	Yes (improves vehicular access to Greenmount Industrial Park)	12.5	Community support: Yes; detailed design and $estimate, all approvals: No	3	**48**

Evaluation of RSTP Applications

Transit & Fixed Guideway- Passenger-related Projects

Applicant	Project Name	Total Cost	Congestion Relief (10 pts to project w highest % removed; 0 pts to lowest)	(0-10)	Facility Usage, Daily Ridership (20 pts to highest; 0 pts to lowest)	(0-20)	Cost Effective-ness-- Subsidy/ Passenger (20 pts to lowest; 0 pts to highest)	(0-20)	Air Quality (NOx reductions = 10; HC reductions = 10)	(0-20)	Coverage Area (based on population and employment)	(0-20)	Project Readiness (detailed design and cost estimates, ready to go: 10 pts)	(0-10)	Total (0-100)
HRT	Install 200 Bus Shelters	$ 1,600,000	"No"	0	Ridership of routes served ("after project"): 55,620	20	Subsidy/ passenger of routes served: $3.54	0	"No"	0	For routes served- population: 1,296k; employ-ment: 8886k	20	"Yes" to all	10	**50**
HRT	Town Center/Pembroke Mall Transfer Station	$ 750,000	"No"	0	Ridership of routes served ("after project"): 8,642	3	Subsidy/ passenger of routes served: $1.65	20	"No"	0	For routes served- population: 488k; employ-ment: 447k	2	Some (community support but no detailed design or $estimate and no approvals)	5	**30**
HRT	Military Circle Transfer Area	$ 750,000	"No"	0	Ridership of routes served ("after project"): 11,214	4	Subsidy/ passenger of routes served: $1.90	17	"No"	0	For routes served- population: 555k; employ-ment: 596k	2	Some (community support but no detailed design or $estimate and no approvals)	5	**28**
HRT	Pleasure House Rd Transfer Area Upgrades	$ 250,000	"No"	0	Ridership of routes served ("after project"): 4,131	1	Subsidy/ passenger of routes served: $1.72	19	"No"	0	For routes served- population: 376k; employ-ment: 321k	1	Some (community support but no detailed design or $estimate and no approvals)	5	**26**
HRT	Pacific Ave Transfer Area Upgrades	$ 550,000	"No"	0	Ridership of routes served ("after project"): 5,187	2	Subsidy/ passenger of routes served: $1.81	18	"No"	0	For routes served- population: 301k; employ-ment: 279k	1	Some (community support but no detailed design or $estimate and no approvals)	5	**26**
HRT	Oceanview Transfer Area	$ 650,000	"No"	0	Ridership of routes served ("after project"): 5,988	2	Subsidy/ passenger of routes served: $1.89	17	"No"	0	For routes served- population: 367k; employ-ment: 324k	1	Some (community support but no detailed design or $estimate and no approvals)	5	**25**
HRT	Evelyn Butts Transfer Station	$ 1,000,000	"No"	0	Ridership of routes served ("after project"): 9,541	3	Subsidy/ passenger of routes served: $2.24	14	"No"	0	For routes served- population: 564k; employ-ment: 546k	2	Some (community support but no detailed design or $estimate and no approvals)	5	**24**
HRT	Rehabilitate Reon Dr Transfer Center	$ 350,000	"No"	0	Ridership of routes served ("after project"): 471	0	Subsidy/ passenger of routes served: $2.98	6	"No"	0	For routes served- population: 160k; employ-ment: 65k	0	Some (community support but no detailed design or $estimate and no approvals)	5	**11**
HRT	Victory Crossing Park & Ride Lot	$ 225,000	"No"	0	Ridership of routes served ("after project"): 3,410	1	Subsidy/ passenger of routes served: $3.45	1	"No"	0	For routes served- population: 445k; employ-ment: 383k	2	"No"	0	**4**

Evaluation of RSTP Applications

Transit & Fixed Guideway- Vehicle Replacement/Purchase

Applicant	Project Name	Total Cost	Average age of vehicles (FTA standard is 12 years)	(0-35)	Number of vehicles to replace/ total fleet	(0-10)	Emissions changes of the old and new vehicles	(0-30)	Cost Effective-ness (Cost/ Ridership)	(0-10)	Average mileage of the vehicles to be replaced (FTA Standards)	(0-15)	Total (0-100)
HRT	Purchase 41 Forty-Foot Buses	$ 16,195,000	12 years	17.5	41 replace-ments out of 140 total 40' fleet (29%)	5	HC: 0.14g (old) vs. 0.02g (new); NOx: 4.0g (old) vs. 0.2g (new)	15	Ridership unknown b/c buses are used on changing routes	5	575k (vs. 500k standard)	7.5	**50**
HRT	Purchase 29 Twenty-Nine-Foot Buses	$ 10,875,000	12 years	17.5	29 replace-ments out of 51 total 29' fleet (57%)	5	HC: 0.17g (old) vs. 0.003g (new); NOx: 3.8g (old) vs. 0.2g (new)	15	Ridership unknown b/c buses are used on changing routes	5	540k (vs. 500k standard)	7.5	**50**

Evaluation of RSTP Applications

Transit & Fixed Guideway- Other Projects

Applicant	Project Name	Total Cost	Will the project increase service reliability?	(0-25)	Will the project improve passenger safety, comfort, and conven-ience?	(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)	Total (0-100)
WATA	Administration & Operations Facility	$ 9,000,000	"Yes"	12.5	"Yes"	15	"Yes"	5	"Yes"	12.5	"No"	0	**45**
HRT	Solar Lights Upgrade	$ 500,000	"Yes"	12.5	"Yes"	15	"No"	0	"No"	0	"No"	0	**27.5**
HRT	Renovate Parks Ave Maintenance Facility	$ 1,000,000	"Yes"	12.5	"No"	0	"Yes"	5	"No"	0	"No"	0	**17.5**
HRT	Transfer Area Bathroom Design & Construction	$ 1,000,000	"Yes"	12.5	"No"	0	"Yes"	5	"No"	0	"No"	0	**17.5**
HRT	Concrete Pavement Repair/Replacement	$ 600,000	"Yes"	12.5	"No"	0	"No"	0	"No"	0	"No"	0	**12.5**
HRT	LEED Existing Building Upgrades	$ 200,000	"No"	0	"No"	0	"Yes"	5	"No"	0	"No"	0	**5**

Evaluation of RSTP Applications

Planning Studies

Applicant	Project Name	Total Cost	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 encourag-ing multi-modal transport-ation?	(0-10)	4. Does the study address the mobility or access-ibility 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 develop-ment?	(0-10)	7. Do the goals and objectives demonstrate preservation or protection of the environ-ment?	(0-10)	Total (0-100)
VPA	Economic Analysis of Toll Pricing in Hampton Roads (effect of toll rates on freight bus.)	$ 400,000	"Yes"	12.5	"Yes"	7.5	"No"	0	"Yes"	10	"Yes"	5	"Yes"	5	"Yes"	5	**45**
HRT	Completion of Before & After Study of Norfolk LRT Project	$ 800,000	"Yes"	12.5	"No"	0	"Yes"	5	"Yes"	10	"Yes"	5	"Yes"	5	Yes	5	**42.5**

Evaluation of RSTP Applications

ITS Projects

Applicant	Project Name	Total Cost	1. Will project improve flow during peak periods and special events?	(0-15)	2. Will project directly reduce number or severity of roadway accidents?	(0-25)	3. Will project improve LOS, increase capacity, or contribute to incident management?	(0-20)	4. Does the study address the mobility or accessibility needs of the region?	(0-10)	5. Does project improve linkage between operating agencies to provide traffic info to motorists?	(0-20)	6. Is project part of the Regional ITS Strategic Plan?	(0-10)	Total (0-100)
Suffolk	Suffolk Bypass, ITS Upgrades	$ 1,650,000	"Yes"	10	"Yes"	12.5	"Yes"	14	"Yes"	5	"Yes"	10	"Yes"	5	**56.5**
Suffolk	Suffolk Traffic Operations Center (TOC)	$ 3,000,000	"Yes"	10	"Yes"	12.5	"Yes"	14	"Yes"	5	"Yes"	10	"Yes"	5	**56.5**
Virginia Beach	Regional Signal Pre-Emption Program	$ 133,000	Peak: "Yes"; Events: "No"	5	"No"	0	LOS: "No"; Incident Man't: "Yes"	7	"Yes"	5	"Yes"	10	"Yes"	5	**32**

Air Quality Evaluation of CMAQ Proposals -

Agency: HRT
Project Category: Transit
Fiscal Year: 2009, 2010, 2011
Project Name: Norfolk Light Rail Transit - Operating Assistance
Project Number: CMAQ 19
Project Location: Southside
Project Description: Operation assistance for new 7.4 mile light rail transit
Length (mi): 7.4 oneway
Activity Centers: Norfolk
Completion Date: 2009
Project Cost: Total Cost: $7,000,000

Assumptions:

a. Auto travel factors
Average trip length - 7 miles
Average auto speed - 35 mph
Vehicle occupancy rate - 1.15 for work trips; 1.3 for Non-Work trips

b. Transit data

Daily Ridership:	12000		
No.of Days per week:	7	Number of days per year:	365
Hours/vehicles/day:	18	No of Trips/day:	164
Seats/Vehicle	64		

LRT VMT/ı # of vehicles*length*2way

1- Increased LRT Emissions : (new service)

Trains will be electric and, therefore, will not produce emissions

2- Travel Reductions:

Daily Riders:	12000	Daily Trips:	10435
Reduced VMTs =	146,087		

			Emissions Reduction	
Type	g/mi	VMT	g/day	kg/day
HC	0.716	146,087	104,598	104.60
NOx	0.879	146,087	128,410	128.41

3- Cost Effectiveness:

This ratio is determined by dividing the total annual cost by annual emission changes.

Operating Cost:	$7,000,000	over 2 years
AnnualizedCost:	$3,500,000	

Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	**104.60**	**38,178**	**42.08**	**$83,166**
NOx	**128.41**	**46,870**	**51.67**	**$67,744**

Hampton Roads Regional STP and CMAQ Projects

FY 2007 - 2010

HAMPTON ROADS
PLANNING DISTRICT COMMISSION

July 2006

T06-06

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HAMPTON ROADS
REGIONAL STP AND CMAQ PROJECTS
FY 2007- 2010

This report was included in the Work Program for Fiscal Year 2005-2006, which was approved by the Commission and the Metropolitan Planning Organization at their meetings of March 16, 2005.

PREPARED BY:

HAMPTON ROADS
PLANNING DISTRICT COMMISSION

JULY 2006

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Regional STP and CMAQ Projects
FY 2007 - 2010

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ABSTRACT

This report summarizes the work of selecting Regional Surface Transportation Program (RSTP) and Congestion Mitigation and Air Quality (CMAQ) Improvement Program projects for FY 2007-2010. Recommended projects will be incorporated into the FY 2006-2009 Transportation Improvement Program (TIP). The report also includes a summary of the Hampton Roads Project Selection Process for RSTP and CMAQ as approved by the Metropolitan Planning Organization (MPO).

ACKNOWLEDGMENTS

This report was prepared by the Hampton Roads Planning District Commission (HRPDC) in cooperation with the Federal Highway Administration (FHWA), the Virginia Department of Transportation (VDOT), the Virginia Department of Rail and Public Transportation (VDRPT), and the local jurisdictions and transit agencies within the Hampton Roads Planning District. The contents of this report reflect the views of the staff of the Hampton Roads Area Metropolitan Planning Organization (MPO). The MPO 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, VDOT, or HRPDC. This report does not constitute a standard, specification, or regulation. FHWA or VDOT acceptance of this report as evidence of fulfillment of the objectives of this planning study 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.

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INTRODUCTION

BACKGROUND

This report summarizes the work of selecting Congestion Mitigation and Air Quality (CMAQ) Improvement Program and Regional Surface Transportation Program (RSTP) projects for FY 2007-2010 funding allocations. These projects will be included in the FY 2006-2009 Transportation Improvement Program (TIP) for Hampton Roads.

Between 1993 and 2006, the Hampton Roads region received over $240 million of RSTP and $111 million of CMAQ funding. As shown in **Figure 1**, 49 percent of the total CMAQ funds were allocated to bikeway/pedestrian, new/expanded transit service, transit shelters and vehicle replacement, Transportation Demand Management (TDM) and park-&-ride lots projects. Signal system integration, intersection geometric improvements, and ITS projects received 51 percent of the total funds. **Figure 2** shows the distribution of RSTP funds with 65 percent to highway and 35 percent to non-highway projects.

Figure 1- CMAQ Allocations by Project Type, 1993-2006

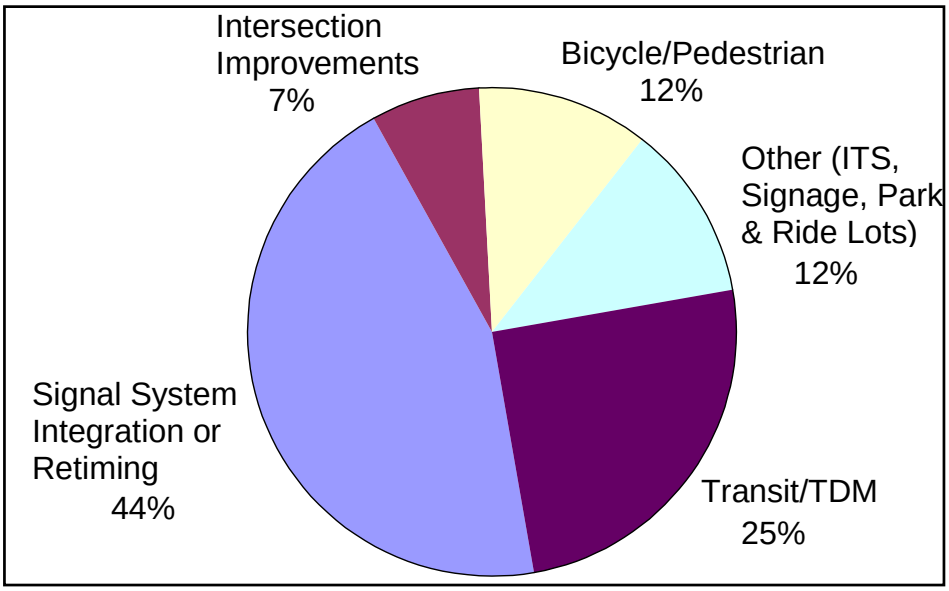
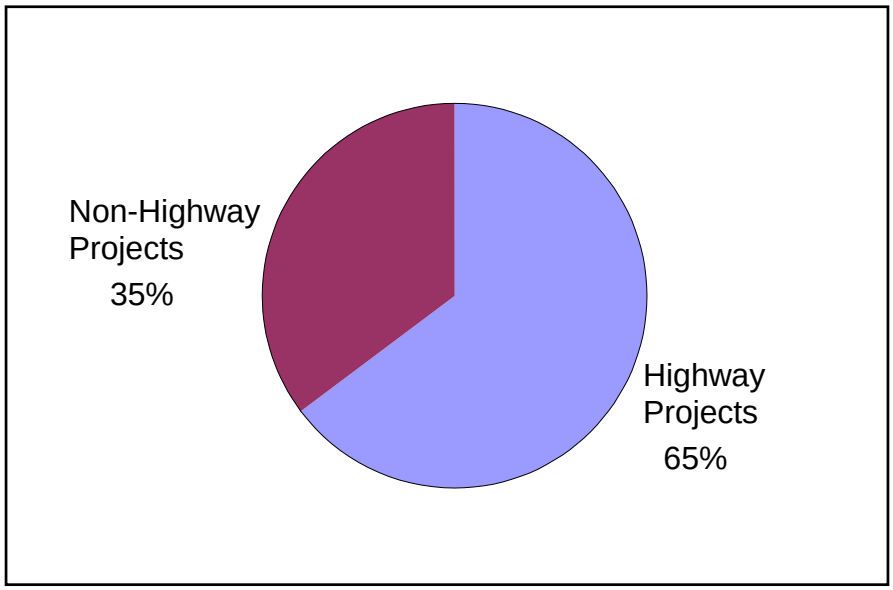


Figure 2- RSTP Allocation by Category, 1993-2006



SCHEDULE

Table 1 shows the schedule used for the 2006 session of the project selection process. The projects selected during this session received funding allocations during fiscal years 2007 – 2010.

Table 1
CMAQ and RSTP Project Selection Process Schedule for 2006

Process Elements	Completed In
Methodology & Criteria Revision	-
Project Solicitation	March 1
Project Application Submittals	March 31
Project Evaluation & Ranking – HRPDC staff	April 1- May 15
Transportation Technical Subcommittee Review	May 18
Transportation Technical Committee/MPO Action	June
Inclusion in the Revised TIP	October

STUDY ORGANIZATION

This study 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 to 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).

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, HRPDC staff developed application forms to be used by localities and transit agencies 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 in a special area of the HRPDC web site for use by locality and transit agency staffs.

Table 2 shows all of the new projects proposed for CMAQ funding during the 2006 session of the project selection process. As shown in the table, 58 new proposals and 7 funding application requests for previously approved projects were proposed with a total cost of nearly $64 million.

TABLE 2
CMAQ PROJECT PROPOSALS

JUNE 2006

Project No	Jurisdiction	Project Name	TOTAL COST	TOTAL CMAQ REQUEST
PREVIOUSLY APPROVED PROJECTS				
A1	Chesapeake	Citywide Fiber optic Communications Ring, Phase III		*
A2	Newport News	Signal System Retiming -Phases VI-XI		*
A3	Virginia Beach	Citywide ITS project, Phase I26		$3,000,000
A4	Chesapeake	Greenbrier Pkwy NBLTL EXT at Woodlake Drive		$45,000
A5	Hampton	Citywide CCTV Camera Installations		$50,000
A6	Newport News	JCMorris BLVD- Phase IV (Canon Blvd & Oyster Point Rd)		$1,250,000
A7	Newport News	Rivermont Bike Trail		$440,000
A8	Newport News	Signal System Upgrade 255 intersections		$3,000,000
A9	Norfolk	Norview Ave/Azalea Garden Rd-Add EB & NB L.T. Lanes		$200,000
A10	Virginia Beach	Rosemont & VA Beach Blvd Intersection Imprts.		$436,000
A11	Virginia Beach	General Booth Blvd/Dam Neck Rd Intersection Improvements		$43,000
NEW PROPOSED PROJECTS				
1	Chesapeake	Signal System Retiming (Battlefield Blvd, Portsmouth Blvd, Taylor Rd)	$200,000	$200,000
2	Chesapeake	Volvo Pkwy & Executive Blvd Intersection Improvements	$300,000	$300,000
3	Chesapeake	Volvo Pkwy & Progressive Drive Intersection Improvements	$320,000	$320,000
4	Chesapeake	Pughsville Road and Taylor Road Intersection Improvements	$95,000	$95,000
5	Gloucester Co	Rte 17 Coord Timing & Sig Sys Upgrades - Courthouse Area (Rte 615 to Walter Reed Hos)	$55,000	$55,000
6	Gloucester Co	Rte 17 Coord Timing & Sig Sys Upgrades - Gloucester Pt Area (Rte 1206 to Rte 636 N)	$60,000	$60,000
7	Hampton	Hampton Roads Center Parkway & Big Bethel Road Intersection Improvement	$125,000	$125,000
8	Hampton	Big Bethel Road / Radford Drive New Traffic Signal Installation	$160,000	$160,000
9	Hampton	Big Bethel Road / Todds Lane Intersection Improvements	$700,000	$700,000
10	Hampton	Coliseum Central Transit Shelters	$300,000	$300,000
11	Hampton	Citywide AVL For Emergency Services Vehicles	$270,000	$270,000
12	Hampton	Citywide CCTV Camera Locations Phase II (10 Locations)	$500,000	$500,000
13	Hampton	Citywide Traffic Signal System Retiming (6 Corridors)	$150,000	$150,000
14	Hampton	Citywide Traffic Sig System Upgrade Phase II (Install fiber to close communication gaps)	$1,000,000	$1,000,000
15	Hampton	Coliseum Drive & Cunningham Drive Intersection Improvements	$785,000	$785,000
16	Hampton	Mercury Blvd and Fox Hill Rd Intersection Improvements	$350,000	$350,000
17	Hampton	Wayfinder Signs	$350,000	$350,000
18	Hampton	Coliseum Central Transit Shuttle	$5,324,480	$5,324,470
19	HRT	Commuter Route 62	$3,161,170	$3,161,170
20	HRT	New Buses	$4,590,000	$4,590,000
21	HRT	Norfolk Light Rail Transit - Operating Assistance	$7,000,000	$7,000,000
22	HRT	Route 60 Rapid Express	$2,178,034	$2,178,034
23	HRT	Vans for TRAFFIX Vanpool Program	$600,000	$600,000
24	James City Co	Airport Road Bikeway	$29,900	$29,900
25	James City Co	Croaker Road Bikeway	$1,130,000	$1,130,000
26	James City Co	John Tyler Hwy & Ironbound Rd (Five Forks) Intersection Improvements	$300,000	$300,000
27	James City Co	Monticello Avenue Geometric Changes	$860,000	$860,000
28	James City Co	Mooretown Road Bikeway	$512,000	$512,000
29	Newport News	Citywide Bus Shelter Program	$110,000	$110,000
30	Newport News	Jefferson Avenue Sidewalk Project from Buchanan Dr. to J. Clyde Morris Blvd.	$1,000,000	$1,000,000
31	Newport News	Mariner's Museum Multi-Purpose Trail	$1,000,000	$1,000,000
32	Newport News	J. Clyde Morris Blvd. Corridor Bike Trail: Phase V	$1,000,000	$1,000,000

* Projects have prior allocations for FY 07 - FY 10

TABLE 2 – CONTINUED

Project No	Jurisdiction	Project Name	TOTAL COST	TOTAL CMAQ REQUEST
33	Newport News	Newport News Shuttle, Phase 2	$1,500,000	$1,500,000
34	Newport News	Citywide Signal System Retiming Phase IX, X (14 Systems, 169 Intersections)	$450,000	$450,000
35	Newport News	Warwick Boulevard Wide Sidewalk between Menchville Rd. and Lucas Creek Rd.	$1,300,000	$1,300,000
36	Newport News	Newport News Cultural and Business District Wayfinding Sign Project, Phase 2	$500,000	$500,000
37	Norfolk	Citywide Signal Retiming (City of Norfolk)	$300,000	$300,000
38	Norfolk	Develop and Deploy Incident Management Diversion System	$500,000	$500,000
39	Norfolk	Research Partnership with Virginia Universities (Regional ITS Data)	$300,000	$300,000
40	Portsmouth	Equipment Support for Shuttle Bus Service	$900,000	$900,000
41	Portsmouth	Airline Blvd. Coordinated Signal Upgrade from Alexander corner to WCLL	$1,500,000	$1,500,000
42	Portsmouth	Resignalization of Alexander's Corner	$900,000	$900,000
43	Portsmouth	Downtown Shuttle Bus Service	$465,000	$465,000
44	Ports/Ches/VPA	Relocation of Commonwealth Rail to the Centerlines of VA Rte. 164 and I-664	$60,000,000	$4,800,000
45	Regionwide	Regional Concept of Transportation Operations (RCTO)	$650,000	$650,000
46	Virginia Beach	General Booth Boulevard/London Bridge Road Left Turn Lane	$900,000	$900,000
47	Virginia Beach	City of Virginia Beach Citywide Retiming Project	$1,200,300	$1,200,300
48	Virginia Beach	Indian River Road/Kempsville Road Intersection Improvements	$1,500,000	$1,500,000
49	Virginia Beach	Rosemont Road/Lynnhaven Parkway Left Turn Lane	$700,000	$700,000
50	Virginia Beach	S. Independence Boulevard/Dahlia Drive Intersection Improvements	$1,000,000	$1,000,000
51	Virginia Beach	S. Independence Boulevard/Lynnhaven Parkway Intersection Improvements	$900,000	$900,000
52	Virginia Beach	Salem Road/Princess Anne Road Intersection Improvements	$900,000	$900,000
53	WAT	Newport News/James City County Employee Connection	$282,000	$282,000
54	WAT	Service Frequency and Sunday Service	$4,370,000	$4,370,000
55	WAT	Mooretown Road Corridor	$315,000	$315,000
56	York County	Route 17/Route 620 Intersection Improvements	$800,000	$800,000
57	York County	Lightfoot Road bikeway	$184,000	$184,000
58	York County	Route 143 Bikeway	$173,000	$173,000
		TOTALS >>	**$117,004,884**	**$70,268,874**

Table 3 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 3
CMAQ PROJECT PROPOSALS RANKED BY COST EFFECTIVENESS ($/TON/YEAR)

JUNE 2006

						Emissions Reductions		Annualized Cost/Emissions Reduction					
								VOC		NOx			
Project Number	Jurisdiction	Project Name	TOTAL COST	PROJECT LIFE (Years)	ANNUALIZED COST	VOC (Kg/Year)	NOx (Kg/Year)	$/Ton/Year	Ranking (1)	$/Ton/Year	Ranking (2)	Total (1 + 2)	**Composite Ranking**
PREVIOUSLY APPROVED PROJECTS													
A1	Chesapeake	Citywide Fiber optic Communications Ring, Phase III											
A2	Newport News	Signal System Retiming -Phases VI-XI											
A3	Virginia Beach	Citywide ITS project, Phase I26											
A4	Chesapeake	Greenbrier Pkwy NBLTL EXT at Woodlake Drive											
A5	Hampton	Citywide CCTV Camera Installations											
A6	Newport News	JCMorris BLVD- Phase IV (Canon Blvd & Oyster Point Rd)											
A7	Newport News	Rivermont Bike Trail											
A8	Newport News	Signal System Upgrade 255 intersections											
A9	Norfolk	Norview Ave/Azalea Garden Rd-Add EB & NB L.T. Lanes											
A10	Virginia Beach	Rosemont & VA Beach Blvd Intersection Imprts.											
A11	Virginia Beach	General Booth Blvd/Dam Neck Rd Intersection Improvements											
NEW PROPOSED PROJECTS													
34	Norfolk	Citywide Signal Retiming (City of Norfolk)	$300,000	2	$150,000	86,701	28,891	$1,570	1	$4,710	1	2	**1**
12	Hampton	Citywide Traffic Sig System Upgrade Phase II (Install fiber to close communication gaps)	$1,000,000	10	$100,000	41,311	13,766	$2,196	2	$6,590	2	4	**2**
43	Virginia Beach	City of Virginia Beach Citywide Retiming Project	$1,200,300	2	$600,150	119,380	39,781	$4,561	3	$13,686	3	6	**3**
5	Hampton	Hampton Roads Center Parkway & Big Bethel Road Intersection Improvement	$125,000	10	$12,500	2,199	733	$5,156	4	$15,474	4	8	**4**
44	Virginia Beach	Indian River Road/Kempsville Road Intersection Improvements	$1,500,000	10	$150,000	10,979	5,611	$12,395	6	$24,250	6	12	**5**
26	Newport News	Citywide Bus Shelter Program	$110,000	15	$7,333	331	415	$20,108	8	$16,028	5	13	**6**
14	Hampton	Mercury Blvd and Fox Hill Rd Intersection Improvements	$350,000	10	$35,000	3,798	1,266	$8,360	5	$25,088	8	13	**7**
41	Regionwide	Regional Concept of Transportation Operations (RCTO)	$650,000	2	$325,000	22,347	7,447	$13,193	7	$39,592	10	17	**8**
54	York County	Route 143 Bikeway	$173,000	15	$11,533	351	431	$29,828	11	$24,297	7	18	**9**
31	Newport News	Citywide Signal System Retiming Phase IX, X (14 Systems, 169 Intersections)	$450,000	2	$225,000	9,726	5,047	$20,987	9	$40,441	11	20	**10**
11	Hampton	Citywide Traffic Signal System Retiming (6 Corridors)	$150,000	2	$75,000	2,696	1,235	$25,234	10	$55,107	12	22	**11**
21	James City Co	Airport Road Bikeway	$29,900	15	$1,993	43	53	$42,285	14	$34,444	9	23	**12**
56	Gloucester Co	Rte 17 Coord Timing & Sig Sys Upgrades - Courthouse Area (Rte 615 to Walter Reed Hos)	$55,000	2	$27,500	703	402	$35,480	12	$62,089	16	28	**13**
33	Newport News	Newport News Cultural and Business District Wayfinding Sign Project, Phase 2	$500,000	10	$50,000	606	761	$74,802	20	$59,623	13	33	**14**
18	HRT	New Buses	$4,590,000	15	$306,000	3,817	4,506	$72,719	19	$61,601	15	34	**15**
53	York County	Lightfoot Road bikeway	$184,000	15	$12,267	148	182	$75,243	21	$61,290	14	35	**17**
35	Norfolk	Develop and Deploy Incident Management Diversion System	$500,000	5	$100,000	2,433	811	$37,290	13	$111,906	22	35	**16**
4	Chesapeake	Pughsville Road and Taylor Road Intersection Improvements	$95,000	10	$9,500	175	58	$49,174	15	$147,572	24	39	**18**
19	HRT	Norfolk Light Rail Transit - Operating Assistance	$7,000,000	2	$3,500,000	38,178	46,870	$83,166	23	$67,744	17	40	**19**
48	Virginia Beach	Salem Road/Princess Anne Road Intersection Improvements	$900,000	10	$90,000	1,562	520	$52,279	17	$156,885	25	42	**20**
1	Chesapeake	Signal System Retiming (Battlefield Blvd, Portsmouth Blvd, Taylor Rd)	$200,000	2	$100,000	1,754	474	$51,711	16	$191,328	27	43	**21**
27	Newport News	Jefferson Avenue Sidewalk Project from Buchanan Dr. to J. Clyde Morris Blvd.	$1,000,000	15	$66,667	664	815	$91,065	26	$74,178	18	44	**22**
20	HRT	Route 60 Rapid Express	$2,178,034	3	$726,011	6,154	7,671	$107,018	27	$85,861	19	46	**23**
7	Hampton	Big Bethel Road / Todds Lane Intersection Improvements	$700,000	10	$70,000	941	313	$67,511	18	$202,592	29	47	**24**
55	HRT	Vans for TRAFFIX Vanpool Program	$600,000	6	$100,000	668	1,050	$135,868	31	$86,363	20	51	**25**
29	Newport News	J. Clyde Morris Blvd. Corridor Bike Trail: Phase V	$1,000,000	15	$66,667	474	582	$127,530	30	$103,881	21	51	**26**
6	Hampton	Big Bethel Road / Radford Drive New Traffic Signal Installation	$160,000	10	$16,000	190	63	$76,527	22	$229,666	31	53	**27**
32	Newport News	Warwick Boulevard Wide Sidewalk between Menchville Rd. and Lucas Creek Rd.	$1,300,000	15	$86,667	455	558	$172,937	33	$140,868	23	56	**28**
47	Virginia Beach	S. Independence Boulevard/Lynnhaven Parkway Intersection Improvements	$900,000	10	$90,000	906	302	$90,130	25	$270,477	34	59	**29**
28	Newport News	Mariner's Museum Multi-Purpose Trail	$1,000,000	15	$66,667	282	354	$214,570	35	$171,031	26	61	**30**
9	Hampton	Citywide AVL For Emergency Services Vehicles	$270,000	6	$45,000	373	124	$109,331	28	$328,107	36	64	**31**
8	Hampton	Coliseum Central Transit Shelters	$300,000	15	$20,000	71	90	$254,458	36	$201,143	28	64	**32**
24	James City Co	Monticello Avenue Geometric Changes	$860,000	10	$86,000	702	234	$111,136	29	$333,508	38	67	**33**
17	HRT	Commuter Route 62	$3,161,170	3	$1,053,723	3,737	4,577	$255,780	37	$208,839	30	67	**34**
49	WAT	Newport News/James City County Employee Connection	$282,000	3	$94,000	277	346	$307,642	38	$246,648	32	70	**35**
25	James City Co	Mooretown Road Bikeway	$512,000	15	$34,133	94	116	$328,771	40	$267,805	33	73	**36**
45	Virginia Beach	Rosemont Road/Lynnhaven Parkway Left Turn Lane	$700,000	10	$70,000	416	139	$152,621	32	$458,006	41	73	**37**
30	Newport News	Newport News Shuttle, Phase 2	$1,500,000	15	$100,000	254	292	$357,088	41	$310,680	35	76	**38**
13	Hampton	Coliseum Drive & Cunningham Drive Intersection Improvements	$785,000	10	$78,500	360	120	$197,838	34	$593,694	43	77	**39**
15	Hampton	Wayfinder Signs	$350,000	10	$35,000	77	97	$414,267	42	$328,175	37	79	**40**
57	Gloucester Co	Rte 17 Coord Timing & Sig Sys Upgrades - Gloucester Pt Area (Rte 1206 to Rte 636 N)	$60,000	2	$30,000	326	-235	$83,608	24	-$115,766	57	81	**41**
37	Portsmouth	Equipment Support for Shuttle Bus Service	$900,000	15	$60,000	115	140	$471,501	44	$389,818	39	83	**42**
51	WAT	Mooretown Road Corridor	$315,000	2	$157,500	305	359	$468,939	43	$397,899	40	83	**43**

TABLE 3 – CONTINUED

Project Number	Jurisdiction	Project Name	TOTAL COST	PROJECT LIFE (Years)	ANNUALIZED COST	Emissions Reductions VOC (Kg/Year)	Emissions Reductions NOx (Kg/Year)	Annualized Cost/Emissions Reduction VOC $/Ton/Year	VOC Ranking (1)	Annualized Cost/Emissions Reduction NOx $/Ton/Year	NOx Ranking (2)	Total (1 + 2)	**Composite Ranking**
NEW PROPOSED PROJECTS													
10	Hampton	Citywide CCTV Camera Locations Phase II (10 Locations)	$500,000	10	$50,000	139	46	$325,668	39	$977,354	45	84	**44**
22	James City Co	Croaker Road Bikeway	$1,130,000	15	$75,333	117	143	$584,913	48	$476,448	42	90	**45**
23	James City Co	John Tyler Hwy & Ironbound Rd (Five Forks) Intersection Improvements	$300,000	10	$30,000	53	18	$516,814	45	$1,550,735	47	92	**46**
40	Portsmouth	Downtown Shuttle Bus Service	$465,000	3	$155,000	128	157	$1,102,017	50	$898,293	44	94	**47**
42	Virginia Beach	General Booth Boulevard/London Bridge Road Left Turn Lane	$900,000	10	$90,000	151	50	$539,667	46	$1,619,643	48	94	**48**
52	York County	Route 17/Route 620 Intersection Improvements	$800,000	10	$80,000	129	43	$563,772	47	$1,691,711	49	96	**49**
50	WAT	Service Frequency and Sunday Service	$4,370,000	3	$1,456,667	989	1,044	$1,336,424	51	$1,265,692	46	97	**50**
2	Chesapeake	Volvo Pkwy & Executive Blvd Intersection Improvements	$300,000	10	$30,000	45	15	$599,194	49	$1,797,583	50	99	**51**
46	Virginia Beach	S. Independence Boulevard/Dahlia Drive Intersection Improvements	$1,000,000	10	$100,000	53	18	$1,709,081	53	$5,128,208	51	104	**52**
3	Chesapeake	Volvo Pkwy & Progressive Drive Intersection Improvements	$320,000	10	$32,000	16	5	$1,784,251	54	$5,356,044	52	106	**53**
38	Portsmouth	Airline Blvd. Coordinated Signal Upgrade from Alexander corner to WCLL	$1,500,000	10	$150,000	101	4	$1,350,640	52	$35,162,016	55	107	**54**
39	Portsmouth	Resignalization of Alexander's Corner	$900,000	10	$90,000	40	13	$2,062,294	55	$6,190,008	53	108	**55**
16	Hampton	Coliseum Central Transit Shuttle	$5,324,480	3	$1,774,827	186	216	$8,643,218	56	$7,468,769	54	110	**56**
58	Portmouth/Ches/ VPA	Relocation of Commonwealth Rail to the Centerlines of VA Rte. 164 and I-664	$60,000,000	20	$3,000,000	55	18	$49,509,301	57	$148,575,009	56	113	**57**
36	Norfolk	Research Partnership with Virginia Universities (Regional ITS Data)	$300,000	3	$100,000			Qualitative		Qualitative			

Table 4 shows the final allocations recommended by the Transportation Technical Committee (TTC) and approved by the Metropolitan Planning Organization on June 21, 2006. The Transportation Technical Subcommittee (TTS) excluded projects 56, 57, and 58 because the applications were submitted after the deadline.

TABLE 4
HAMPTON ROADS CMAQ AND RSTP PROJECT SELECTION PROCESS

FY 2007 – 2010 CMAQ ALLOCATIONS

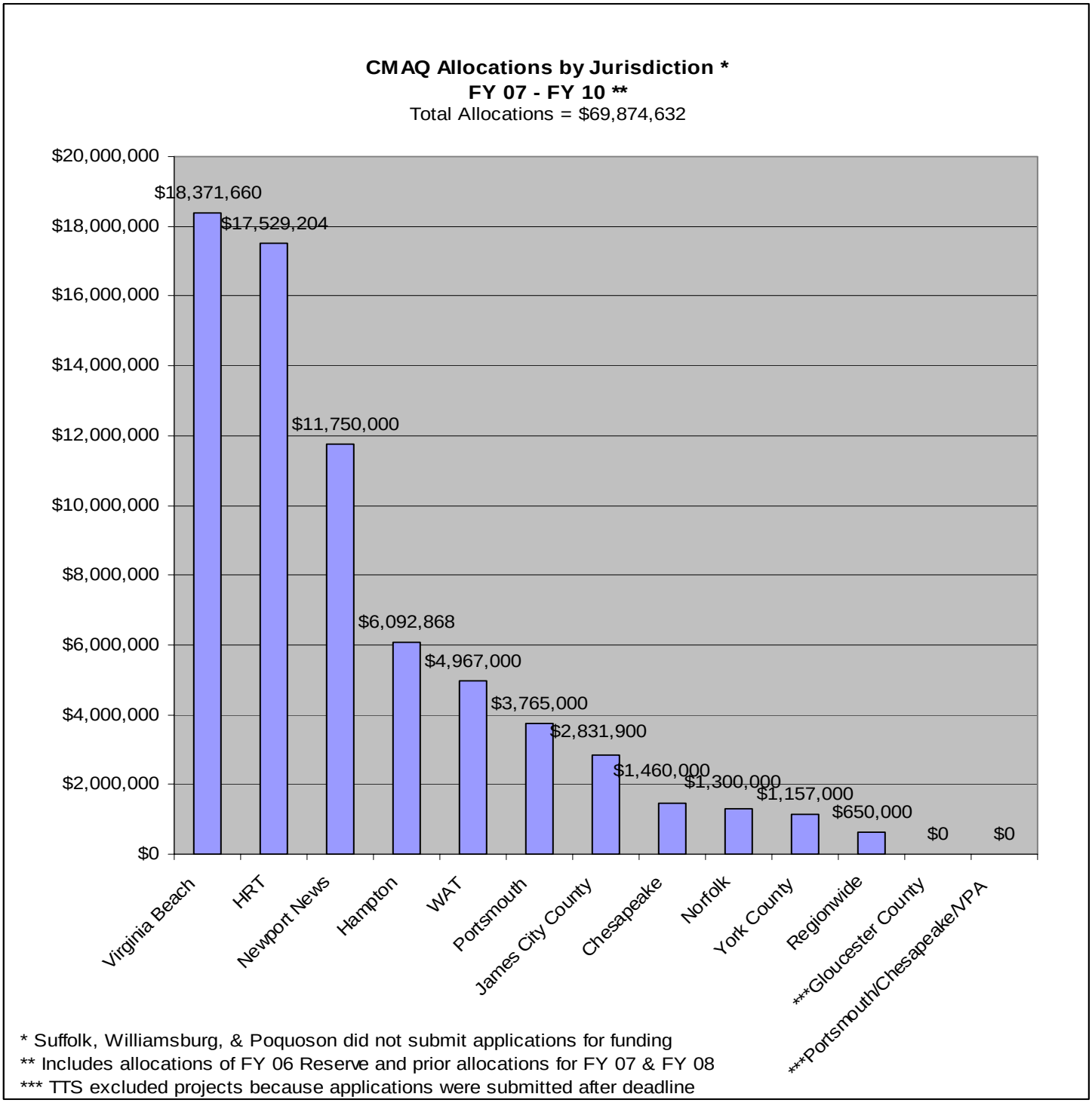
Project Number	Jurisdiction	Project Name	UPC #	TOTAL CMAQ REQUEST	TOTAL ALLOCATION	FY-06 Allocated	FY-07 Allocated	FY-08 Allocated	FY-09 Allocated	FY-10 Allocated
PREVIOUSLY APPROVED PROJECTS										
A1	Chesapeake	Citywide Fiber optic Communications Ring, Phase III			$500,000		**$500,000**			
A2	Newport News	Signal System Retiming -Phases VI-XI			$200,000		**$200,000**			
A3	Virginia Beach	Citywide ITS project, Phase I26	52355	$3,000,000	$10,792,360		**$5,500,000**	**$4,026,972**	**$1,265,388**	
A4	Chesapeake	Greenbrier Pkwy NBLTL EXT at Woodlake Drive	72797	$45,000	$45,000	**$45,000**				
A5	Hampton	Citywide CCTV Camera Installations	73234	$50,000	$50,000	**$50,000**				
A6	Newport News	JCMorris BLVD- Phase IV (Canon Blvd & Oyster Point Rd)	16103	$1,250,000	$1,250,000		**$1,250,000**			
A7	Newport News	Rivermont Bike Trail	52343	$440,000	$440,000			**$440,000**		
A8	Newport News	Signal System Upgrade 255 intersections	52350	$3,000,000	$3,000,000				**$2,000,000**	**$1,000,000**
A9	Norfolk	Norview Ave/Azalea Garden Rd-Add EB & NB L.T. Lanes	52365	$200,000	$200,000	**$200,000**				
A10	Virginia Beach	Rosemont & VA Beach Blvd Intersection Imprts.	19013	$436,000	$436,000		**$436,000**			
A11	Virginia Beach	General Booth Blvd/Dam Neck Rd Intersection Improvements	19012	$43,000	$43,000			**$43,000**		
NEW PROPOSED PROJECTS										
1	Chesapeake	Signal System Retiming (Battlefield Blvd, Portsmouth Blvd, Taylor Rd)	T4164	$200,000	$200,000		**$100,000**	**$100,000**		
2	Chesapeake	Volvo Pkwy & Executive Blvd Intersection Improvements	T4165	$300,000	$300,000					**$300,000**
3	Chesapeake	Volvo Pkwy & Progressive Drive Intersection Improvements	T4166	$320,000	$320,000					**$320,000**
4	Chesapeake	Pughsville Road and Taylor Road Intersection Improvements	T4167	$95,000	$95,000			**$25,000**	**$70,000**	
5	Hampton	Hampton Roads Center Parkway & Big Bethel Road Intersection Improvement	T4168	$125,000	$125,000		**$25,000**	**$100,000**		
6	Hampton	Big Bethel Road / Radford Drive New Traffic Signal Installation	T4169	$160,000	$160,000		**$160,000**			
7	Hampton	Big Bethel Road / Todds Lane Intersection Improvements	T4170	$700,000	$700,000			**$195,000**	**$505,000**	
8	Hampton	Coliseum Central Transit Shelters	T4171	$300,000	$300,000			**$300,000**		
9	Hampton	Citywide AVL For Emergency Services Vehicles	T4172	$270,000	$270,000		**$270,000**			
10	Hampton	Citywide CCTV Camera Locations Phase II (10 Locations)	T4173	$500,000	$500,000				**$500,000**	
11	Hampton	Citywide Traffic Signal System Retiming (6 Corridors)	T4174	$150,000	$150,000		**$57,697**	**$92,303**		
12	Hampton	Citywide Traffic Sig System Upgrade Phase II (Install fiber to close communication gaps)	T4175	$1,000,000	$1,000,000		**$470,000**	**$530,000**		

TABLE 4 - CONTINUED

Project Number	Jurisdiction	Project Name	UPC #	TOTAL CMAQ REQUEST	TOTAL ALLOCATION	FY-06 Allocated	FY-07 Allocated	FY-08 Allocated	FY-09 Allocated	FY-10 Allocated
NEW PROPOSED PROJECTS										
13	Hampton	Coliseum Drive & Cunningham Drive Intersection Improvements	T4176	$785,000	$785,000		**$180,000**	**$605,000**		
14	Hampton	Mercury Blvd and Fox Hill Rd Intersection Improvements	T4177	$350,000	$350,000		**$50,000**	**$300,000**		
15	Hampton	Wayfinder Signs	T4178	$350,000	$350,000		**$50,000**	**$300,000**		
16	Hampton	Coliseum Central Transit Shuttle	T4241	$5,324,470	$1,352,868					**$1,352,868**
17	HRT	Commuter Route 62		$3,161,170						
A	HRT	Commuter Route 62, **Phase 1**	T4179		$2,177,346			**$1,123,758**	**$1,053,588**	
B	HRT	Commuter Route 62, **Phase 2**	T4182		$983,824					**$983,824**
18	HRT	New Buses	T4183	$4,590,000	$4,590,000		**$4,590,000**			
19	HRT	Norfolk Light Rail Transit - Operating Assistance	T4184	$7,000,000	$7,000,000				**$3,500,000**	**$3,500,000**
20	HRT	Route 60 Rapid Express		$2,178,034						
A	HRT	Route 60 Rapid Express, **Phase 1**	T4186		$1,606,927		**$855,445**	**$751,482**		
B	HRT	Route 60 Rapid Express, **Phase 2**	T4188		$571,107				**$571,107**	
55	HRT	Vans for TRAFFIX Vanpool Program	T4189	$600,000	$600,000	**$600,000**				
21	James City Co	Airport Road Bikeway	T4191	$29,900	$29,900				**$29,900**	
22	James City Co	Croaker Road Bikeway	T4192	$1,130,000	$1,130,000				**$200,000**	**$930,000**
23	James City Co	John Tyler Hwy & Ironbound Rd (Five Forks) Intersection Improvements	T4193	$300,000	$300,000					**$300,000**
24	James City Co	Monticello Avenue Geometric Changes	T4194	$860,000	$860,000				**$200,000**	**$660,000**
25	James City Co	Mooretown Road Bikeway	T4195	$512,000	$512,000					**$512,000**
26	Newport News	Citywide Bus Shelter Program	T4196	$110,000	$110,000			**$110,000**		
27	Newport News	Jefferson Avenue Sidewalk Project from Buchanan Dr. to J. Clyde Morris Blvd.	T4197	$1,000,000	$1,000,000				**$400,000**	**$600,000**
28	Newport News	Mariner's Museum Multi-Purpose Trail	T4198	$1,000,000	$1,000,000		**$1,000,000**			
29	Newport News	J. Clyde Morris Blvd. Corridor Bike Trail: Phase V	T4199	$1,000,000	$1,000,000				**$400,000**	**$600,000**
30	Newport News	Newport News Shuttle, Phase 2	T4200	$1,500,000	$1,500,000			**$700,000**	**$800,000**	
31	Newport News	Citywide Signal System Retiming Phase IX, X (14 Systems, 169 Intersections)	T4201	$450,000	$450,000				**$225,000**	**$225,000**
32	Newport News	Warwick Boulevard Wide Sidewalk between Menchville Rd. and Lucas Creek Rd.	T4202	$1,300,000	$1,300,000				**$350,000**	**$950,000**
33	Newport News	Newport News Cultural and Business District Wayfinding Sign Project, Phase 2	T4203	$500,000	$500,000			**$500,000**		
34	Norfolk	Citywide Signal Retiming (City of Norfolk)	T4204	$300,000	$300,000		**$300,000**			
35	Norfolk	Develop and Deploy Incident Management Diversion System	T4205	$500,000	$500,000		**$275,000**	**$225,000**		
36	Norfolk	Research Partnership with Virginia Universities (Regional ITS Data)	T4206	$300,000	$300,000				**$100,000**	**$200,000**
37	Portsmouth	Equipment Support for Shuttle Bus Service	T4207	$900,000	$900,000		**$900,000**			
38	Portsmouth	Airline Blvd. Coordinated Signal Upgrade from Alexander corner to WCLL	T4208	$1,500,000	$1,500,000			**$1,500,000**		
39	Portsmouth	Resignalization of Alexander's Corner	T4209	$900,000	$900,000		**$900,000**			
40	Portsmouth	Downtown Shuttle Bus Service		$465,000						
A	Portsmouth	Downtown Shuttle Bus Service, **Phase 1**	T4210		$310,000		**$155,000**	**$155,000**		
B	Portsmouth	Downtown Shuttle Bus Service, **Phase 2**	T4211		$155,000				**$155,000**	
41	Regionwide	Regional Concept of Transportation Operations (RCTO)	T4212	$650,000	$650,000		**$450,000**	**$200,000**		
42	Virginia Beach	General Booth Boulevard/London Bridge Road Left Turn Lane	T4220	$900,000	$900,000			**$300,000**	**$600,000**	
43	Virginia Beach	City of Virginia Beach Citywide Retiming Project		$1,200,300						
A	Virginia Beach	City of Virginia Beach Citywide Retiming Project, **Phase 1**	T4213		$317,457	**$317,457**				
B	Virginia Beach	City of Virginia Beach Citywide Retiming Project, **Phase 2**	T4214		$283,043			**$283,043**		
C	Virginia Beach	City of Virginia Beach Citywide Retiming Project, **Phase 3**	T4215		$599,800					**$599,800**
44	Virginia Beach	Indian River Road/Kempsville Road Intersection Improvements	T4216	$1,500,000	$1,500,000				**$750,000**	**$750,000**
45	Virginia Beach	Rosemont Road/Lynnhaven Parkway Left Turn Lane	T4217	$700,000	$700,000			**$292,200**	**$407,800**	
46	Virginia Beach	S. Independence Boulevard/Dahlia Drive Intersection Improvements	T4218	$1,000,000	$1,000,000				**$400,000**	**$600,000**
47	Virginia Beach	S. Independence Boulevard/Lynnhaven Parkway Intersection Improvements	T4219	$900,000	$900,000				**$200,000**	**$700,000**
48	Virginia Beach	Salem Road/Princess Anne Road Intersection Improvements	T4221	$900,000	$900,000		**$300,000**	**$600,000**		
49	WAT	Newport News/James City County Employee Connection		$282,000						
A	WAT	Newport News/James City County Employee Connection, **Phase 1**	T4222		$184,000		**$92,200**	**$91,800**		
B	WAT	Newport News/James City County Employee Connection, **Phase 2**	T4223		$98,000				**$98,000**	
50	WAT	Service Frequency and Sunday Service		$4,370,000						
A	WAT	Service Frequency and Sunday Service, **Phase 1**	T4224		$2,835,500			**$1,362,200**	**$1,473,300**	
B	WAT	Service Frequency and Sunday Service, **Phase 2**	T4225		$1,534,500					**$1,534,500**
51	WAT	Mooretown Road Corridor	T4226	$315,000	$315,000		**$150,000**	**$165,000**		
52	York County	Route 17/Route 620 Intersection Improvements	T4227	$800,000	$800,000		**$500,000**	**$300,000**		
53	York County	Lightfoot Road bikeway	T4228	$184,000	$184,000			**$184,000**		
54	York County	Route 143 Bikeway	T4229	$173,000	$173,000			**$173,000**		
~~56~~	~~Gloucester Co~~	~~Rte 17 Coord Timing & Sig Sys Upgrades - Courthouse Area (Rte 615 to Walter Reed Hos)~~		~~$55,000~~	~~$0~~					
~~57~~	~~Gloucester Co~~	~~Rte 17 Coord Timing & Sig Sys Upgrades - Gloucester Pt Area (Rte 1206 to Rte 636 N)~~		~~$60,000~~	~~$0~~					
~~58~~	~~Ports/Ches/VPA~~	~~Relocation of Commonwealth Rail to the Centerlines of VA Rte. 164 and I-664~~		~~$4,800,000~~	~~$0~~					
				$70,268,874	**$69,874,632**	**$1,212,457**	**$19,716,342**	**$16,073,758**	**$16,254,083**	**$16,617,992**

MARK	**$1,212,457**	**$19,716,342**	**$16,073,758**	**$16,254,083**	**$16,617,992**
ALLOCATED	**$1,212,457**	**$19,716,342**	**$16,073,758**	**$16,254,083**	**$16,617,992**
8% RESERVE	**$0**	**$0**	**$0**	**$0**	**$0**
UNALLOCATED	**$0**	**$0**	**$0**	**$0**	**$0**

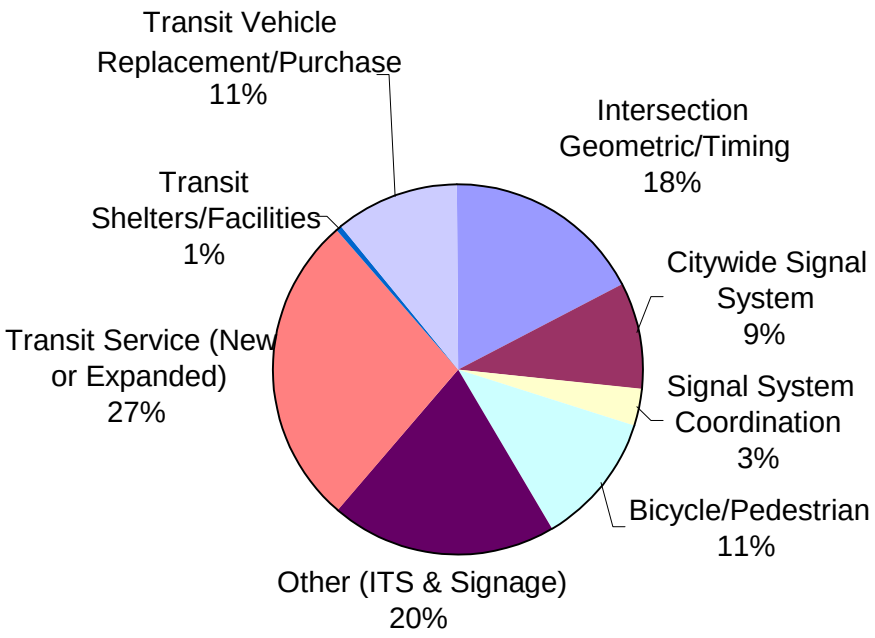
Figure 3



* Suffolk, Williamsburg, & Poquoson did not submit applications for funding
** Includes allocations of FY 06 Reserve and prior allocations for FY 07 & FY 08
*** TTS excluded projects because applications were submitted after deadline

Figure 4

CMAQ Allocations by Project Type
FY 07 - FY 10 *



* Includes allocations of FY 06 Reserve and prior allocations for FY 07 & FY 08

RSTP PROJECT SELECTION

Projects selected for funding with Regional Surface Transportation Program (RSTP) funds must meet certain criteria originally developed by the TTC 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, HRPDC staff developed application forms to be used by localities and transit agencies 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 in a special area of the HRPDC web site for use by locality and transit agency staffs.

Table 5 shows all of the projects proposed for RSTP funding during the 2006 session of the project selection process. As shown in the table, 17 new projects and 13 funding request applications for previously approved projects were proposed, with a total funding requests of over $265 million.

TABLE 5
HAMPTON ROADS CMAQ AND RSTP PROJECT SELECTION PROCESS
RSTP PROPOSALS

JUNE 2006

Project Number	Jurisdiction	Project Name	TOTAL COST	TOTAL REQUEST
PREVIOUSLY APPROVED PROJECTS				
A1	Chesapeake	Portsmouth Blvd widening to 4 lanes fr. WCL to Joliff Rd.		$2,000,000
A2	Hampton	Saunders Road- Widening (2 to 4LD) fr. Big Bethel to WCL 29		$0
A3	James City Co.	Route 60 Relocation & Upgrade		$38,753,000
A4	Newport News	Oyster Point Subarea CCTV & Static Signs		$0
A5	Norfolk	Wesleyan Drive- Widen to 4 Lanes, Northampton Blvd to ECL		$0
A6	HRT	Peninsula Rapid Transit Project		$5,000,000
A7	HRT	Regional TDM Program: TRAFFIX		$4,650,000
A8	HRT	Replacement of HRT Southside Bus Facility		$16,000,000
A9	Chesapeake	Mt Pleasant Rd/Fentress Airfield Rd: Add LTL		$1,202,000
A10	Chesapeake	Greenbrier Pkwy: Construct 3rd NB Lane from Volvo Pkwy to Eden Way		$59,000
A11	Gloucester Co.	Route 17 Widening and Install Raised Median		$1,748,000
A12	James City Co.	Rt 615 Ironbound Rd: 4 Lane from Rt 747 to 0.26 Mi E Rt 616		$2,600,000
A13	Newport News	Route 60 Relocated/Upgrade		$25,000,000
A14	Norfolk	Princess Anne Rd/Kilmer Ln: Add EB and WB LTLs		$3,100,000
A15	Poquoson	Wythe Creek Rd: Widen to 5-L from Alphus St to SCL		$2,000,000
A16	Virginia Beach	Wesleyan Drive- Widen to 4 Lanes, WCL to Baker Rd.		$4,950,000
A17	HRT	Norfolk LRT: 8 mile/11 stations		$25,000,000
NEW HIGHWAY PROJECTS				
1	Chesapeake	U.S. Route 17/Dominion Boulevard	$9,000,000	$9,000,000
2	Chesapeake	Hanbury Road	$11,100,000	$11,100,000
3	Chesapeake	U.S. Route 17 Business Long Bridge Replacement	$3,450,000	$3,450,000
4	Chesapeake	Mt. Pleasant Road	$8,300,000	$8,300,000
5	Gloucester County	Rte. 17 Access Management - Crossover Improvements	$6,000,000	$1,000,000
6	Hampton	Commander Shepard Blvd. Phase 2	$18,000,000	$18,000,000
7	Hampton	Wythe Creek Rd Widening	$25,000,000	$12,000,000
8	HRT	Purchase of Replacement Buses	$20,000,000	$20,000,000
9	HRT	Paratransit Replacement Vehicles	$2,000,000	$2,000,000
10	HRT	New Ferry Vessels	$4,000,000	$4,000,000
11	Newport News	Middle Ground Blvd from Warwick Blvd (Rte 60) to Jefferson Ave (Rte 143)	$40,000,000	$40,000,000
12	Norfolk	Princess Anne Road & Sewell's Point Road	$300,000	$300,000
13	WAT	Vehicle Purchase (Service Expansion/Sunday Service)	$4,200,000	$4,200,000
14	WAT	Three Body-on-Chassis Vehicles	$180,000	$180,000
15	WAT	Bus Replacement (Public Transit - Colonial Williamsburg)	$300,000	$300,000
		TOTALS >>	**$151,830,000**	**$265,892,000**

Table 6 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 6
HAMPTON ROADS CMAQ AND RSTP PROJECT SELECTION PROCESS
RSTP PROJECTS PROPOSALS RANKED WITHIN CATEGORIES

JUNE 2006

Project Number	Jurisdiction	Project Name	TOTAL COST	TOTAL REQUEST	Total Score (Max = 100)
HIGHWAY PROJECTS					
1	Chesapeake	U.S. Route 17/Dominion Boulevard	$9,000,000	$9,000,000	84
6	Hampton	Wythe Creek Rd Widening	$25,000,000	$12,000,000	79
4	Chesapeake	Mt. Pleasant Road	$8,300,000	$8,300,000	78
2	Chesapeake	Hanbury Road	$11,100,000	$11,100,000	67
3	Chesapeake	U.S. Route 17 Business Long Bridge Replacement	$3,450,000	$3,450,000	57
5	Hampton	Commander Shepard Blvd. Phase 2	$18,000,000	$18,000,000	57
7	Newport News	Middle Ground Blvd from Warwick Blvd (Rte 60) to Jefferson Ave (Rte 143)	$40,000,000	$38,000,000	56
15	Gloucester County	Rte. 17 Access Management - Crossover Improvements	$6,000,000	$1,000,000	47
8	Norfolk	Princess Anne Road & Sewell's Point Road	$300,000	$300,000	43
TRANSIT - NEW OR REPLACEMENT VEHICLES					
9	HRT	Purchase of Replacement Buses	$20,000,000	$20,000,000	70
14	WAT	Bus Replacement (Public Transit - Colonial Williamsburg)	$300,000	$300,000	65
10	HRT	Paratransit Replacement Vehicles	$2,000,000	$2,000,000	57
13	WAT	Three Body-on-Chassis Vehicles	$180,000	$180,000	52
11	HRT	New Ferry Vessels	$4,000,000	$4,000,000	12
12	WAT	Vehicle Purchase (Service Expansion/Sunday Service)	$4,200,000	$4,200,000	12
				$131,830,000	

Table 7 shows the final allocations recommended by the Transportation Technical Committee (TTC) and approved by the Metropolitan Planning Organization on June 21, 2006.

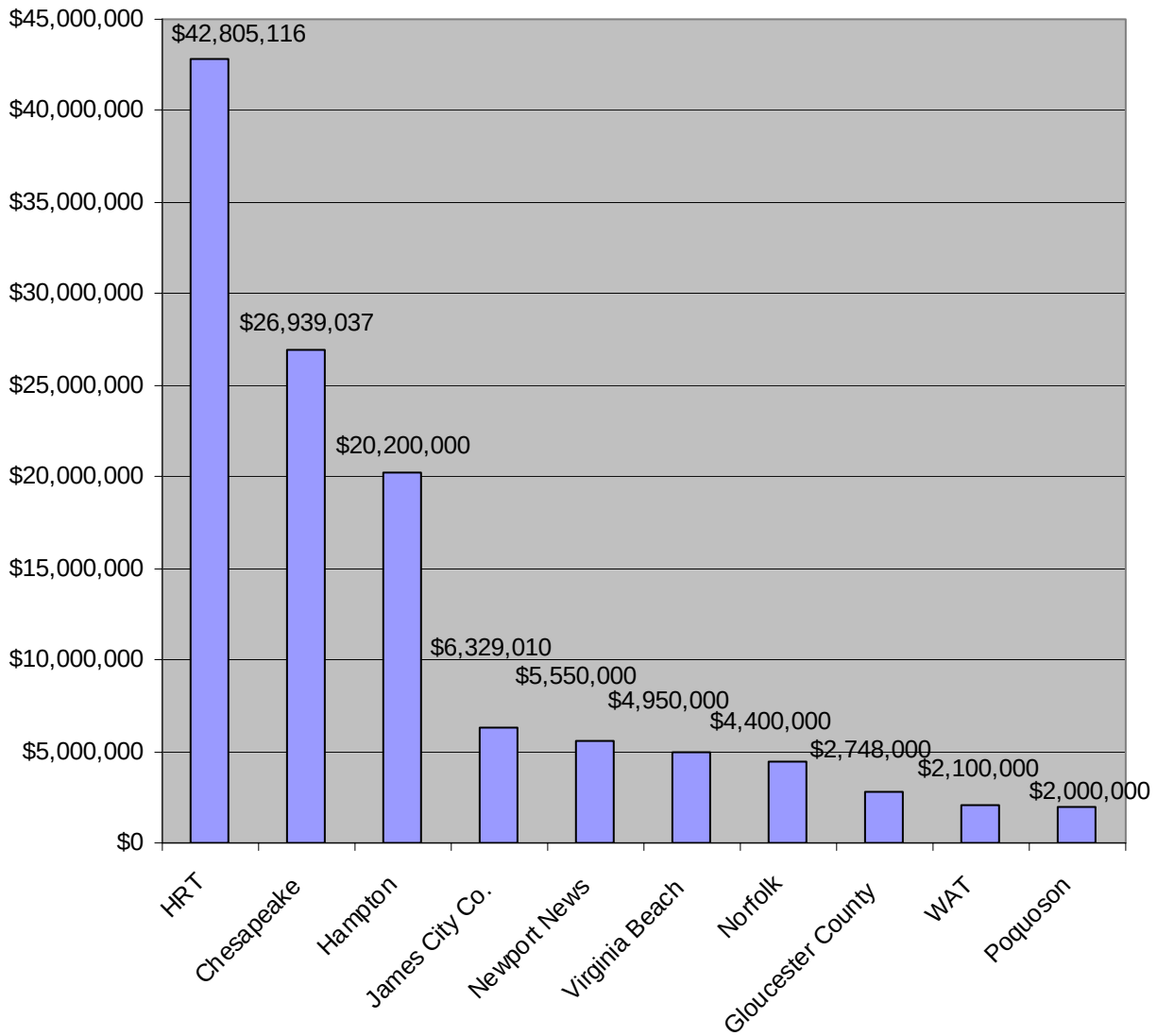
TABLE 7
FY 2007 – 2010 RSTP ALLOCATIONS

Project Number	Jurisdiction	Project Name	UPC #	TOTAL REQUEST	TOTAL ALLOCATION	FY-06 Allocated	FY-07 Allocated	FY-08 Allocated	FY-09 Allocated
PREVIOUSLY APPROVED PROJECTS									
A1	Chesapeake	Portsmouth Blvd widening to 4 lanes fr. WCL to Joliff Rd.	18591	$2,000,000	$5,000,000	**$2,000,000**	**$3,000,000**		
A9	Chesapeake	Mt Pleasant Rd/Fentress Airfield Rd: Add LTL	52151	$1,202,000	$1,202,000	**$1,202,000**			
A10	Chesapeake	Greenbrier Pkwy: Construct 3rd NB Lane from Volvo Pkwy to Eden Way	72796	$59,000	$59,000	**$59,000**			
A11	Gloucester Co.	Route 17 Widening and Install Raised Median	56934	$1,748,000	$1,748,000		**$1,748,000**		
A2	Hampton	Saunders Road- Widening (2 to 4LD) fr. Big Bethel to WCL 29	57047	$0	$8,200,000		**$6,200,000**	**$1,682,613**	**$317,387**
A6	HRT	Peninsula Rapid Transit Project	NA	$5,000,000	$4,900,000		**$3,400,000**		
A7	HRT	Regional TDM Program: TRAFFIX	NA	$3,550,000	$2,450,000	**$250,000**	**$1,100,000**	**$1,100,000**	
A8	HRT	Replacement of HRT Southside Bus Facility	T1824	$16,000,000	$10,455,116		**$1,980,425**		**$6,122,112**
A17	HRT	Norfolk LRT: 8 mile/11 stations	T1822	$25,000,000	$25,000,000	**$2,990,669**		**$6,000,000**	**$3,509,331**
A3	James City Co.	Route 60 Relocation & Upgrade	13496	$38,753,000	$3,729,010		**$1,729,010**	**$1,000,000**	
A12	James City Co.	Rt 615 Ironbound Rd: 4 Lane from Rt 747 to 0.26 Mi E Rt 616	50057	$2,600,000	$2,600,000		**$686,232**	**$1,913,768**	
A4	Newport News	Oyster Point Subarea CCTV & Static Signs	73002	$0	$550,000		**$550,000**		
A13	Newport News	Route 60 Relocated/Upgrade	14598	$25,000,000	$3,000,000			**$1,000,000**	**$1,000,000**
A5	Norfolk	Wesleyan Drive- Widen to 4 Lanes, Northampton Blvd to ECL	52147	$0	$1,000,000		**$1,000,000**		
A14	Norfolk	Princess Anne Rd/Kilmer Ln: Add EB and WB LTLs	52150	$3,100,000	$3,100,000	**$3,100,000**			
A15	Poquoson	Wythe Creek Rd: Widen to 5-L from Alphus St to SCL	13427	$2,000,000	$2,000,000		**$1,000,000**	**$1,000,000**	
A16	Virginia Beach	Wesleyan Drive- Widen to 4 Lanes, WCL to Baker Rd.	52148	$4,950,000	$4,950,000			**$4,950,000**	
NEW HIGHWAY PROJECTS									
1	Chesapeake	U.S. Route 17/Dominion Boulevard		$9,000,000	$9,000,000				**$5,000,000**
2	Chesapeake	Hanbury Road		$11,100,000	$0				
3	Chesapeake	U.S. Route 17 Business Long Bridge Replacement		$3,450,000	$3,378,037		**$850,000**	**$2,528,037**	
4	Chesapeake	Mt. Pleasant Road		$8,300,000	$8,300,000			**$700,000**	**$3,600,000**
5	Hampton	Commander Shepard Blvd. Phase 2	60970	$18,000,000	$12,000,000		**$1,500,000**	**$3,750,000**	**$6,750,000**
6	Hampton	Wythe Creek Rd Widening		$12,000,000	$0				
7	Newport News	Middle Ground Blvd from Warwick Blvd (Rte 60) to Jefferson Ave (Rte 143)	11816	$40,000,000	$2,000,000			**$500,000**	**$500,000**
8	Norfolk	Princess Anne Road & Sewell's Point Road		$300,000	$300,000			**$300,000**	
15	Gloucester County	Rte. 17 Access Management - Crossover Improvements		$1,000,000	$1,000,000		**$150,000**	**$350,000**	**$250,000**
TRANSIT - NEW OR REPLACEMENT VEHICLES									
9	HRT	Purchase of Replacement Buses		$20,000,000	$0				
10	HRT	Paratransit Replacement Vehicles		$2,000,000	$0				
11	HRT	New Ferry Vessels		$4,000,000	$0				
12	WAT	Vehicle Purchase (Service Expansion/Sunday Service)		$4,200,000	$2,100,000		**$2,100,000**		
13	WAT	Three Body-on-Chassis Vehicles		$180,000	$0				
14	WAT	Bus Replacement (Public Transit - Colonial Williamsburg)		$300,000	$0				
				$264,792,000	**$118,021,163**	**$9,601,669**	**$26,993,667**	**$26,774,418**	**$27,048,830**

MARK	**$9,601,669**	**$26,993,667**	**$26,774,418**	**$27,048,830**
ALLOCATED	**$9,601,669**	**$26,993,667**	**$26,774,418**	**$27,048,830**
5% RESERVE	**$0**	**$0**	**$0**	**$0**
UNALLOCATED	**$0**	**$0**	**$0**	**$0**

Note: Mark shown for FY 06 consists of the remaining reserve for FY 06.

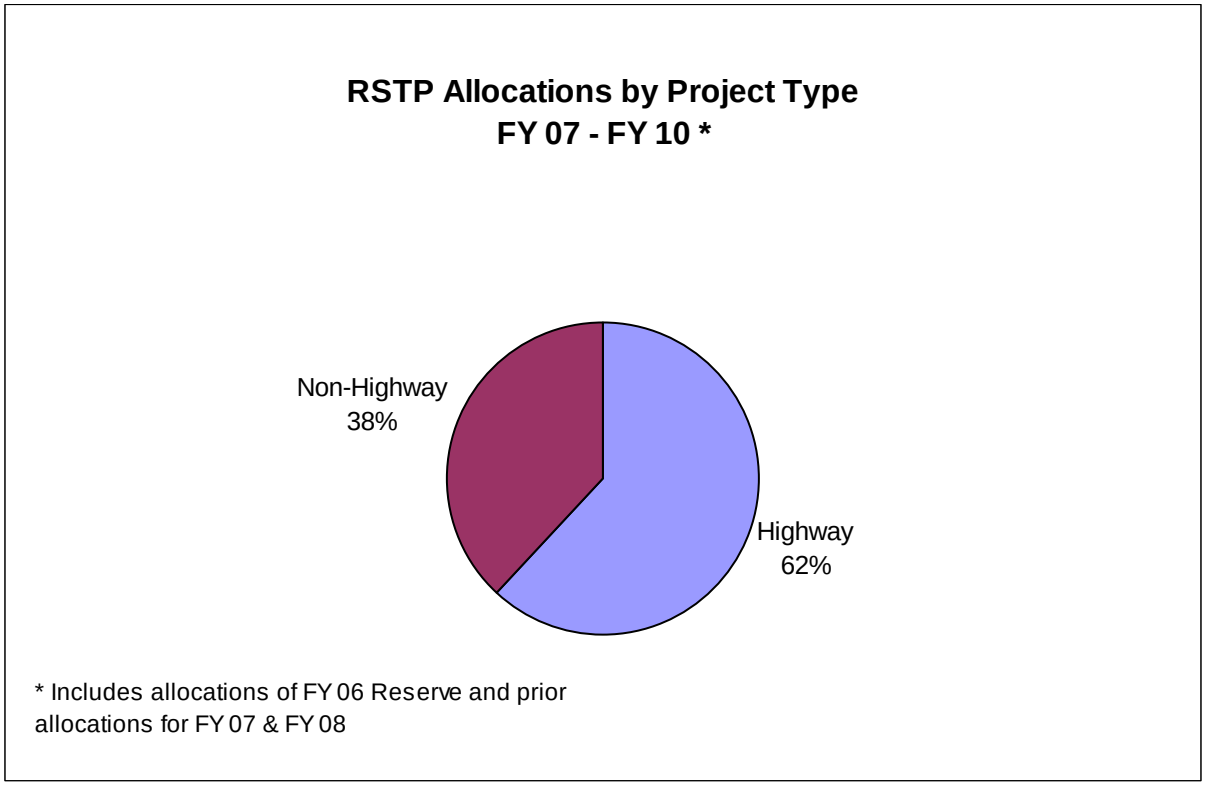
Figure 5



* Suffolk, Portsmouth, Williamsburg, & York County did not submit applications for funding

** Includes allocations of FY 06 Reserve and prior allocations for FY 07 & FY 08

Figure 6


RSTP Allocations by Project Type
FY 07 - FY 10 *
Non-Highway
38%
Highway
62%
* Includes allocations of FY 06 Reserve and prior allocations for FY 07 & FY 08

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.

Application Process and Preliminary Screening:

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

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

Emissions Analysis of Eligible Projects:

HRPDC 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 Transportation Technical Subcommittee (TTS) reviews the ranked set of eligible CMAQ projects and makes recommendations to the TTC.

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 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 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 either submitted with the project proposal or taken from one of the HRPDC **Regional Travel Time** studies. 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 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.

APPENDIX B

CMAQ Candidate Project Application Forms

HAMPTON ROADS TRANSPORTATION IMPROVEMENT PROGRAM
PROJECT SELECTION PROCESS

CMAQ CANDIDATE PROJECT APPLICATION

To be considered for CMAQ funding, a proposed project must be included in the current Regional Transportation Plan. 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 HRPDC staff for input data requirements.

CMAQ FORM-A

Locality/Agency:_____ Date:_____

Prepared By:_____ Phone:_____

E-mail:_____ Fax:_____

PPMS#:_____

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:_____

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: $_____

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 PDC 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?_____
6. Services available at this P&R lot:
   a. Local Bus? ☐ Frequency: _____ Boardings: _____
   b. Express Bus? ☐ Frequency: _____ Boardings: _____
   c. HOV Express? ☐ Frequency: _____ Boardings: _____
7. Estimated average distance people drive from home to lot (miles):_____
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. Population within 1 mile of the corridor:_____
   b. Percentage of trips that are work trips within 1 mile of the corridor:_____%
   c. Percentage of trips that are non-work trips within 1 mile of the corridor:_____%
   d. List the TAZs 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. Number of employees expected to participate in this program:_____
4. Number of employees currently driving to work alone:_____
5. Number of employees currently car/vanpooling:_____
6. Number of employees currently using transit:_____
7. Number of employees currently biking or walking:_____
8. Number of employees currently telecommuting:_____ Days/week:_____
9. Average one-way distance of employees' commute (miles):_____

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:

APPENDIX C

CMAQ Project Analysis Worksheets

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
COORDINATED SIGNAL SYSTEMS

JURISDICTION: Chesapeake
PROJECT: Signal Retiming (Battlefield Blvd, Portsmouth Blvd, and Taylor Rd Corridors)
PPMS #:
PROJECT COST: $200,000

		BEFORE PROJECT				**AFTER PROJECT**				**CHANGE**		
ARTERIAL	CURRENT VMT	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	EMISSIONS (kilograms/day) HC	CO	NOx
Battlefield Blvd Great Bridge Blvd Walmart Way	170,400	36	140.41	3,174.21	176.02	40	137.17	3,243.56	177.73	-3.24	69.35	1.70
Portsmouth Blvd Peek Trail Dock Landing Rd	37,700	26	34.31	705.78	40.83	30	32.84	696.55	39.25	-1.47	-9.24	-1.58
Taylor Rd Portsmouth Blvd Taylorwood Blvd	32,400	25	29.87	608.96	35.45	29	28.51	600.40	34.25	-1.36	-8.55	-1.20
Battlefield Blvd Cedar Rd Johnstown Rd	18,600	23	17.67	353.96	20.79	27	16.72	346.95	19.98	-0.95	-7.01	-0.82
									Reduction in Emissions (kilograms/day):	7.02	-44.55	1.90
									Reduction in Emissions (kilograms/year):	1,754.33	-11,137.62	474.15

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: Chesapeake PPMS NO.:
PROJECT NAME: Volvo Pkwy & Executive Blvd Intersection Improvements
LOCATION: Volvo Pkwy & Executive Blvd Intersection
DESCRIPTION: Install an Eastbound Right Turn Lane on Volvo Pkwy
PROJECT COST: $300,000
CMAQ REQUEST: $300,000

TURNING MOVEMENT COUNTS: 3/2006

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour. Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 2,712

INTERSECTION DELAY BEFORE PROJECT (sec/veh):	34.5
INTERSECTION DELAY AFTER PROJECT (sec/veh):	31.9
CHANGE IN INTERSECTION DELAY (sec/veh):	2.6
CHANGE IN VEHICLE DELAY (hours/day):	11.52

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	0.18	1.39	0.06
Reduction in Emissions (kilograms/year):	45.42	348.28	15.14

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: Chesapeake PPMS NO.:
PROJECT NAME: Volvo Pkwy & Progressive Dr Intersection Improvements
LOCATION: Volvo Pkwy & Progressive Dr Intersection
DESCRIPTION: Install an Eastbound Right Turn Lane and Extend Eastbound Left Turn Lane on Volvo Pkwy
PROJECT COST: $320,000
CMAQ REQUEST: $320,000

TURNING MOVEMENT COUNTS: 3/2006

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour. Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 2,526

INTERSECTION DELAY BEFORE PROJECT (sec/veh):	15.5
INTERSECTION DELAY AFTER PROJECT (sec/veh):	14.5
CHANGE IN INTERSECTION DELAY (sec/veh):	1
CHANGE IN VEHICLE DELAY (hours/day):	4.127

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	0.07	0.50	0.02
Reduction in Emissions (kilograms/year):	16.27	124.77	5.42

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: Chesapeake PPMS NO.:
PROJECT NAME: Pughsville Rd & Taylor Rd Intersection Improvements
LOCATION: Pughsville Rd & Taylor Rd Intersection
DESCRIPTION: Install an Eastbound Right Turn Lane on Pughville Rd
PROJECT COST: $95,000
CMAQ REQUEST: $95,000

TURNING MOVEMENT COUNTS: 1/2006

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour. Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 2,834

INTERSECTION DELAY BEFORE PROJECT (sec/veh):	39.2
INTERSECTION DELAY AFTER PROJECT (sec/veh):	29.6
CHANGE IN INTERSECTION DELAY (sec/veh):	9.6
CHANGE IN VEHICLE DELAY (hours/day):	44.45

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	0.70	5.38	0.23
Reduction in Emissions (kilograms/year):	175.26	1,343.79	58.40

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
COORDINATED SIGNAL SYSTEMS

JURISDICTION: Gloucester Co
PROJECT: Route 17 Coordination & Signal System Upgrades - Courthouse Area
DESCRIPTION: From Route 615 to Walter Reed Hospital
PPMS #:
PROJECT COST: $55,000

		BEFORE PROJECT				**AFTER PROJECT**				**CHANGE**		
ARTERIAL	CURRENT VMT	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	EMISSIONS (kilograms/day) HC	CO	NOx
Route 17 Route 615 Walter Reed Hosp	80,360	29	70.72	1,489.15	84.94	33	67.90	1,486.58	83.33	-2.81	-2.57	-1.61
							Reduction in Emissions (kilograms/day):			2.81	2.57	1.61
							Reduction in Emissions (kilograms/year):			703.15	642.88	401.80

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
COORDINATED SIGNAL SYSTEMS

JURISDICTION: Gloucester Co
PROJECT: Route 17 Coordination & Signal System Upgrades - Gloucester Point Area
DESCRIPTION: From Route 1206 to Route 636 North
PPMS #:
PROJECT COST: $60,000

		BEFORE PROJECT				AFTER PROJECT				CHANGE		
ARTERIAL	CURRENT VMT	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	EMISSIONS (kilograms/day) HC	CO	NOx
Route 17 Route 1206 Route 636 N	72,336	37	59.24	1,355.43	74.94	41	57.94	1,385.38	75.88	-1.30	29.95	0.94
							Reduction in Emissions (kilograms/day):			1.30	-29.95	-0.94
							Reduction in Emissions (kilograms/year):			325.51	-7,486.78	-235.09

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: Hampton PPMS NO.:
PROJECT NAME: Hampton Roads Center Pkwy & Big Bethel Rd Intersection Improvements
LOCATION: Hampton Roads Center Pkwy & Big Bethel Rd Intersection
DESCRIPTION: Add a Free-Flow Acceleration Lane from NB Big Bethel to EB HRCP towards the I-64 Interchange
PROJECT COST: $125,000
CMAQ REQUEST: $125,000

TURNING MOVEMENT COUNTS: 2006

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour.
Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 5,212

INTERSECTION DELAY BEFORE PROJECT (sec/veh):	96.3
INTERSECTION DELAY AFTER PROJECT (sec/veh):	30.8
CHANGE IN INTERSECTION DELAY (sec/veh):	65.5
CHANGE IN VEHICLE DELAY (hours/day):	557.8

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	8.80	67.45	2.93
Reduction in Emissions (kilograms/year):	2,199.21	16,861.93	732.84

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: Hampton PPMS NO.:
PROJECT NAME: Big Bethel Rd & Radford Dr New Traffic Signal Installation
LOCATION: Big Bethel Rd & Radford Dr Intersection
DESCRIPTION: Install a Fully-Actuated Traffic Signal
PROJECT COST: $160,000
CMAQ REQUEST: $160,000

TURNING MOVEMENT COUNTS: 2006

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour.
Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 3,067

INTERSECTION DELAY BEFORE PROJECT (sec/veh):	12.7
INTERSECTION DELAY AFTER PROJECT (sec/veh):	3.1
CHANGE IN INTERSECTION DELAY (sec/veh):	9.6
CHANGE IN VEHICLE DELAY (hours/day):	48.11

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	0.76	5.82	0.25
Reduction in Emissions (kilograms/year):	189.67	1,454.28	63.20

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: Hampton PPMS NO.:
PROJECT NAME: Big Bethel Rd & Todds Ln Intersection Improvements
LOCATION: Big Bethel Rd & Todds Ln Intersection
DESCRIPTION: Install an additional WB Right Turn Lane and an additional EB Left Turn Lane on Todds Lane
PROJECT COST: $700,000
CMAQ REQUEST: $700,000

TURNING MOVEMENT COUNTS: 2006

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour.
Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 4,320

INTERSECTION DELAY BEFORE PROJECT (sec/veh): 78.5
INTERSECTION DELAY AFTER PROJECT (sec/veh): 44.7
CHANGE IN INTERSECTION DELAY (sec/veh): 33.8

CHANGE IN VEHICLE DELAY (hours/day): 238.6

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	3.76	28.85	1.25
Reduction in Emissions (kilograms/year):	940.63	7,212.10	313.45

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
TRANSIT SHELTERS/FACILITIES

JURISDICTION:	Hampton
PROJECT NAME:	Coliseum Central Transit Shelters
LOCATION:	Hampton
DESCRIPTION:	Installation of new, enhanced transit shelters at high priority Coliseum Central Business District; stops along HRT routes 115 and 118
FISCAL YEAR:	2007
NO. OF SHELTERS:	9 Total (Cunningham-1; Coliseum-3; Saville-2; Pwr Plant-3)
ACTIVITY CENTERS:	Coliseum Central Business District
COMPLETION DATE:	2007
PROJECT COST:	$300,000

ASSUMPTIONS:

a. Auto travel factors
Average trip length - 7 miles
Average auto speed - 35 mph
Vehicle occupancy rate - 1.15 for work trips; 1.3 for Non-Work trips

b. Transit data
Existing Daily Ridership: 967
Increase in Ridership Due to Shelters: 2%

1- INCREASED BUS EMISSIONS:

No Increase in Service or Emissions

2- TRAVEL REDUCTIONS:

Daily Riders: 19 Daily Trips: 17
Reduced VMTs: 235

Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.83	235	195	0.20
NOx	1.05	235	247	0.25

3- COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Total Cost: $300,000
Useful life, years : 15
Annualized Cost: $20,000

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	0.20	71	0.08	$254,458
NOx	0.25	90	0.10	$201,143

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
CITYWIDE AUTOMATIC VEHICLE LOCATION
FOR EMERGENCY SERVICES VEHICLES

JURISDICTION: Hampton PPMS NO.:
PROJECT NAME: Citywide AVL for Emergency Services Vehicles
LOCATION: Citywide
DESCRIPTION: Install Automatic Vehicle Location systems in the City's Emergency Services Vehicles to Improve Response Times To Incidents
PROJECT COST: $270,000
CMAQ REQUEST: $270,000

TURNING MOVEMENT COUNTS: 2006

PROCEDURE: The City turned in a Measures of Effectiveness table that included twenty roadway segments along five arterials. The MOE table took into account the estimated time saved per incident, number of vehicles on each road segment per day, number of crashes per year on the included road segments, and the estimated savings in delay expected as a result of the AVL systems.

ANALYSIS: DELAY SAVED ANNUALLY (Hours/Year) 23677

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/year):	373.39	2862.90	124.42

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
CITYWIDE CCTV CAMERAS

JURISDICTION: Hampton PPMS NO.:
PROJECT NAME: Citywide CCTV Camera (10) Locations Phase II
LOCATION: Citywide
DESCRIPTION: Install CCTV cameras with feed to City Traffic Control Center and Emergency 911 Center. Ten locations as follows: Coliseum/ Cunningham, Executive/Cunningham, Armistead/Rip Rap, Armistead/Todds, Big Bethel/Burton, Pembroke/Armistead, Todds/Orcutt, Power Plant/Queen, Power Plant/Pine Chapel, Mercury/Andrews.
PROJECT COST: $500,000
CMAQ REQUEST: $500,000

TURNING MOVEMENT COUNTS: 2004-2005

PROCEDURE: The City turned in a Measures of Effectiveness table that included twenty roadway segments along five arterials. The MOE table took into account the estimated time saved per incident, number of vehicles on each road segment per day, number of crashes per year on the included road segments, and the estimated savings in delay expected as a result of the CCTV cameras.

ANALYSIS: DELAY SAVED ANNUALLY (Hours/Year) 8832

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/year):	139.28	1067.90	46.41

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
COORDINATED SIGNAL SYSTEMS

JURISDICTION: Hampton
PROJECT: Citywide Traffic Signal System Retiming (6 Arterials)
PPMS #:
PROJECT COST: $150,000

		BEFORE PROJECT				**AFTER PROJECT**				**CHANGE**		
ARTERIAL	CURRENT VMT	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	EMISSIONS (kilograms/day) HC	CO	NOx
Armistead Ave Warehouse Rd Marcella Rd	63,832	25	58.85	1,199.72	69.83	29	56.17	1,182.87	67.47	-2.68	-16.85	-2.36
Mercury Blvd Seldendale Dr Langley Square	20,399	37	16.71	382.24	21.13	41	16.34	390.69	21.40	-0.37	8.45	0.27
Big Bethel Rd Saunders Rd Semple Farm Rd	2,495	26	2.27	46.71	2.70	30	2.17	46.09	2.62	-0.10	-0.61	-0.08
Magruder Blvd Butler Farm Rd Hardy Cash Dr	18,264	25	16.84	343.26	19.98	29	16.07	338.44	19.30	-0.77	-4.82	-0.68
Mercury Blvd Newmarket Dr Power Plant Way	126,349	37	103.48	2,367.52	130.90	41	101.21	2,419.83	132.54	-2.27	52.31	1.64
Mercury Blvd Coliseum Dr Charlton Dr	44,173	26	40.20	826.95	47.84	30	38.47	816.13	46.34	-1.72	-10.82	-1.50
Coliseum Dr/ Von Schilling Dr Cunningham Dr/ Hartford Rd	26,143	16	29.10	533.35	32.63	20	26.22	509.01	30.40	-2.88	-24.34	-2.22
Reduction in Emissions (kilograms/day):										10.79	-3.31	4.94
Reduction in Emissions (kilograms/year):										2,696.31	-826.95	1,234.66

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
CITYWIDE SIGNAL SYSTEMS

JURISDICTION: Hampton
LOCATION: Citywide
PROJECT: Install additional fiber to close communications gaps
PPMS # :
PROJECT COST: $1,000,000

ANALYSIS NOTES:

Overall average reduction in intersection delay resulting from retiming = 10.7 seconds/vehicle for the PM peak hour.

Overall average intersection volume
Low = 2,690 vehicles/PM peak hour
Medium = 2,690 vehicles/PM peak hour to 5,900 vehicles/PM peak hour
High = Over 5,900 vehicles/PM peak hour

Using the values listed above and the number of intersections included in the analysis, compute the vehicle-hours of delay for the PM peak hour. Convert that value to hours of delay per day using a factor of 17% as derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS:		Total	Low	Meduim	High	
	Number of Intersections: (Provided by City staff)	170	128	40	2	
	Change in Delay per Intersection:		-10.7	-10.7	-10.7	(sec/veh)
	Total Change in Delay:		-1369.6	-428	-21.4	(sec/veh)
	Change in Vehicle Delay (hours/day):		-6019.97	-4126.14	-332.19	
	Total Change in Vehicle Delay (hours/day):		-10,478.31			

PROJECT EFFECT ON AIR QUALITY: 2007 Emission Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	165.24	1266.96	55.06
Reduction in Emissions (kilograms/year):	41,310.73	316,740.89	13,765.88

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: Hampton PPMS NO.:
PROJECT NAME: Coliseum Dr & Cunningham Dr Intersection Improvements
LOCATION: Coliseum Dr & Cunningham Dr Intersection
DESCRIPTION: Widen Coliseum Dr to allow for dual NB & SB Left Turn Lanes and
Widen Cunningham Dr to allow for an Exclusive EB Right Turn Lane
PROJECT COST: $785,000
CMAQ REQUEST: $785,000

TURNING MOVEMENT COUNTS: 2006

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour.
Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 3,605

INTERSECTION DELAY BEFORE PROJECT (sec/veh): 58.6
INTERSECTION DELAY AFTER PROJECT (sec/veh): 43.1
CHANGE IN INTERSECTION DELAY (sec/veh): 15.5

CHANGE IN VEHICLE DELAY (hours/day): 91.3

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	1.44	11.04	0.48
Reduction in Emissions (kilograms/year):	359.96	2,759.93	119.95

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: Hampton PPMS NO.:
PROJECT NAME: Mercury Blvd & Fox Hill Rd Intersection Improvements
LOCATION: Mercury Blvd & Fox Hill Rd Intersection
DESCRIPTION: Add Dual EB Left Turn Lanes on Mercury Blvd
PROJECT COST: $350,000
CMAQ REQUEST: $350,000

TURNING MOVEMENT COUNTS: 2006

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour.
Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 4,624

INTERSECTION DELAY BEFORE PROJECT (sec/veh):	148.3
INTERSECTION DELAY AFTER PROJECT (sec/veh):	20.8
CHANGE IN INTERSECTION DELAY (sec/veh):	127.5
CHANGE IN VEHICLE DELAY (hours/day):	963.3

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	15.19	116.48	5.06
Reduction in Emissions (kilograms/year):	3,797.94	29,119.88	1,265.58

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
OTHER (WAYFINDING SIGNS)

JURISDICTION:	Hampton
PROJECT NAME:	Wayfinder Signs
LOCATION:	Hampton
DESCRIPTION:	Design, fabrication & installation of signing that will direct tourists, visitors, and citizens to major activity centers.
FISCAL YEAR:	2007, 2008
LENGTH (MI):	citywide
ACTIVITY CENTERS:	Community facilities, transportation facilities, and tourist attractions.
COMPLETION DATE:	2008
PROJECT COST:	$350,000

ASSUMPTIONS:

Total annual Visitors: 576,448 Source: Hampton Convention and Visitors Bureau
City estimates that up to 20% of these visitors get lost and travel an average of 2 extra miles while lost.

Total number of people:	115,290	(20% of total visitors)
Vehicle Occupancy Counts:	2.5	
Total Number of Vehicles Impacted:	46,116	
Average Trip length (mi):	2	
Total VMTs:	92,232	
Average Travel Speed:	35 MPH	

1- REDUCED EMISSIONS:

Emissions Reductions				
Type	Factors, g/mi	Annual VMTs	kg/yr	ton/yr
HC	0.831	92,232	76.64	0.08
NOx	1.049	92,232	96.75	0.11

2-COST EFFECTIVENESS:

Total Cost:	$350,000
Useful life,years :	10
Annual Cost:	$35,000

Cost Effectiveness			
Type	Kg/yr	Tons/yr	$/Ton
HC	77	0.08	$414,267
NOx	97	0.11	$328,175

Prepared By: Hampton Roads Planning District Commission, May 2006.

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

JURISDICTION: Hampton
PROJECT NAME: Coliseum Central Transit Shuttle
LOCATION: Hampton
DESCRIPTION: New full-time shuttle service connecting key nodes within Coliseum Central Business District
FISCAL YEAR: 2007, 2008, 2009
LENGTH (MI): 4.8 oneway
ACTIVITY CENTERS: Coliseum Central Business District
COMPLETION DATE: 2009
PROJECT COST: $5,324,480

ASSUMPTIONS: a. Auto travel factors
Average trip length - 7 miles
Average auto speed - 35 mph
Vehicle occupancy rate - 1.15 for work trips; 1.3 for Non-Work trips

b. Transit data
Daily Ridership: 84
No.of Days per week: 7 Number of days per year: 365
Hours/bus/day: 14 No of Trips/day: 75
Bus VMT/day= # of trips*length*2way

1- INCREASED BUS EMISSIONS : (NEW SERVICE)

Increased Emissions				
Type	g/mi	Bus VMT	g/day	kg/day
HC	0.470	720	338.4	0.34
NOx	0.671	720	483.12	0.48

2- TRAVEL REDUCTIONS:

Daily Riders: 84 Daily Trips: 73
Reduced VMTs: 1,023

Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.830	1,023	849	0.85
NOx	1.050	1,023	1,074	1.07

3-COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.
Operating Cost: $5,324,480 over 3 years
AnnualizedCost: $1,774,827

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	0.51	186	0.21	$8,643,218
NOx	0.59	216	0.24	$7,468,769

Prepared By: Hampton Roads Planning District Commission, May 2006.

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

JURISDICTION: HRT
PROJECT NAME: Commuter Route 62
LOCATION: Southside
DESCRIPTION: New commuter service from downtown Suffolk via Portsmouth to downtown Norfolk
FISCAL YEAR: 2008, 2009, 2010
LENGTH (MI): 25 oneway
ACTIVITY CENTERS: Suffolk, Portsmouth, Norfolk
COMPLETION DATE: 2010
PROJECT COST: $3,161,170

ASSUMPTIONS: a. Auto travel factors
Average trip length - 7 miles
Average auto speed - 35 mph
Vehicle occupancy rate - 1.15 for work trips; 1.3 for Non-Work trips

b. Transit data
Daily Ridership: 1287
No.of Days per week: 7 Number of days per year: 365
Hours/bus/day: 12 No of Trips/day: 75
Bus VMT/day= # of trips*length*2way

1- INCREASED BUS EMISSIONS : (NEW SERVICE)

Increased Emissions				
Type	g/mi	Bus VMT	g/day	kg/day
HC	0.470	3750	1762.5	1.76
NOx	0.671	3750	2516.25	2.52

2- TRAVEL REDUCTIONS:

Daily Riders: 1287 Daily Trips: 1119
Reduced VMTs: 15,668

Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.766	15,668	12,002	12.00
NOx	0.961	15,668	15,057	15.06

3-COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.
Operating Cost: $3,161,170 over 3 years
AnnualizedCost: $1,053,723

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	10.24	3,737	4.12	$255,780
NOx	12.54	4,577	5.05	$208,839

Prepared By: Hampton Roads Planning District Commission, May 2006.

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

JURISDICTION:	HRT
PROJECT NAME:	New Buses
LOCATION:	Region wide
DESCRIPTION:	Purchase thirteen (13) 40' coach style passenger buses
FISCAL YEAR:	2008
LENGTH (MI):	Throughout the region
ACTIVITY CENTERS:	2007
COMPLETION DATE:	$4,590,000
PROJECT COST:	

ASSUMPTIONS:

a. Auto travel factors
Average trip length - 7 miles
Average auto speed - 35 mph
Vehicle occupancy rate - 1.3 ; work trips=1.15

b. Transit data

Daily Ridership:	3147	Route length (mi):	67.3
No.of Days per week:	7	Number of days per year:	365
Hours/bus/day:	12	No of Trips/day:	172

Bus VMT/day= # of trips*length*2way
Emission factor changes * Bus VMT *# of new buses

1- INCREASED BUS EMISSIONS:

Increased Emissions				
Type	g/mi	Bus VMT	g/day	kg/day
HC	0.470	11,576	5,440.53	5.44
NOx	0.671	11,576	7,767.23	7.77

2- TRAVEL REDUCTIONS:

New daily Riders:	3,147
Reduced Vehicle Trips:	2,737
Reduced VMTs:	19,156

Emissions Reduction			
Type	g/mi	VMT	kg/day
HC	0.83	19,156	15.9
NOx	1.05	19,156	20.1

3-COST EFFECTIVENESS:

Number of new buses:	30
Useful life of a bus:	15
Total Program Cost:	$4,590,000
Annualized Total Cost:	$306,000

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	10.459	3,817	4.21	$72,719
NOx	12.346	4,506	4.97	$61,601

Prepared By: Hampton Roads Planning District Commission, May 2006.

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

JURISDICTION:	HRT
PROJECT NAME:	Norfolk Light Rail Transit - Operating Assistance
LOCATION:	Southside
DESCRIPTION:	Operation assistance for new 7.4 mile light rail transit
FISCAL YEAR:	2009, 2010, 2011
LENGTH (MI):	7.4 oneway
ACTIVITY CENTERS:	Norfolk
COMPLETION DATE:	2009
PROJECT COST:	$7,000,000

ASSUMPTIONS: a. Auto travel factors
Average trip length - 7 miles
Average auto speed - 35 mph
Vehicle occupancy rate - 1.15 for work trips; 1.3 for Non-Work trips

b. Transit data

Daily Ridership:	12000		
No.of Days per week:	7	Number of days per year:	365
Hours/vehicles/day:	18	No of Trips/day:	164
Seats/Vehicle	64		

LRT VMT/day= # of vehicles*length*2way

1- INCREASED LRT EMISSIONS : (NEW SERVICE)

Trains will be electric and, therefore, will not produce emissions

2- TRAVEL REDUCTIONS:

Daily Riders:	12000	Daily Trips:	10435
Reduced VMTs:	146,087		

Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.716	146,087	104,598	104.60
NOx	0.879	146,087	128,410	128.41

3-COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Operating Cost:	$7,000,000	over 2 years
AnnualizedCost:	$3,500,000	

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	104.60	38,178	42.08	$83,166
NOx	128.41	46,870	51.67	$67,744

Prepared By: Hampton Roads Planning District Commission, May 2006.

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

JURISDICTION:	HRT
PROJECT NAME:	Route 60 Rapid Express
LOCATION:	Southside
DESCRIPTION:	New commuter service from Virginia Beach to downtown Norfolk
FISCAL YEAR:	2007, 2008, 2009
LENGTH (MI):	21.2 oneway
ACTIVITY CENTERS:	Virginia Beach, Norfolk
COMPLETION DATE:	2007
PROJECT COST:	$2,278,035

ASSUMPTIONS:

a. Auto travel factors
Average trip length - 7 miles
Average auto speed - 35 mph
Vehicle occupancy rate - 1.15 for work trips; 1.3 for Non-Work trips

b. Transit data

Daily Ridership:	1860		
No.of Days per week:	7	Number of days per year:	365
Hours/bus/day:	12	No trips/day:	97

Bus VMT/day= # of buses*length*2way

1- INCREASED BUS EMISSIONS : (NEW SERVICE)

Increased Emissions				
Type	g/mi	Bus VMT	g/day	kg/day
HC	0.470	4112.8	1933.016	1.93
NOx	0.671	4112.8	2759.6888	2.76

2- TRAVEL REDUCTIONS:

Daily Riders:	1860	Daily Trips:	1617
Reduced VMTs:	22,643		

Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.83	22,643	18,794	18.79
NOx	1.05	22,643	23,776	23.78

3-COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Operating Cost:	$2,278,035	over 3 years
AnnualizedCost:	$759,345	

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	16.86	6,154	6.78	$111,932
NOx	21.02	7,671	8.46	$89,803

Prepared By: Hampton Roads Planning District Commission, May 2006.

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

JURISDICTION: HRT
PROJECT NAME: Vans for TRAFFIX Vanpool Program
LOCATION: Hampton Roads
DESCRIPTION: Replace fifteen vans and expand van fleet by five
FISCAL YEAR: 2007
COMPLETION DATE: 2007
PROJECT COST: $600,000

ASSUMPTIONS: a. Auto travel factors
Average trip length - 7 miles
Average auto speed - 35 mph
Vehicle occupancy rate - 1.15 for work trips; 1.3 for Non-Work trips

b. Transit data

Number of New Vans:	20	Number of Vans being Replac	15
Daily Ridership:	300	Number of days per year:	252
No.of Days per week:	5	No trips/day:	2
Average miles travelled:	37	(roundtrip)	
Van VMT/day:	# of vans*length*#trips		

1- INCREASED VAN EMISSIONS: (NEW SERVICE)

Increased Emissions				
Type	g/mi	Van VMT	g/day	kg/day
HC	3.400	1480	5032	5.03
NOx	0.080	1480	118.4	0.12

2- TRAVEL REDUCTIONS:

Daily Riders:	300	Daily Trips:	261
Reduced VMTs:	3,652		

Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.766	3,652	2,798	2.80
NOx	0.961	3,652	3,510	3.51

3 - CURRENT VAN EMISSIONS:

Current Emissions				
Type	g/mi	Van VMT	g/day	kg/day
HC	4.400	1110	4884	4.88
NOx	0.700	1110	777	0.78

4-COST EFFECTIVENESS:

Number of new vans:	20
Useful life of a bus:	6
Total Program Cost:	$600,000
Annualized Total Cost:	$100,000

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	2.65	668	0.74	$135,868
NOx	4.17	1,050	1.16	$86,363

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
BICYCLE/PEDESTRIAN FACILITIES

JURISDICTION:	JCC
PROJECT NAME:	Airport Road Bikeway
LOCATION:	Airport Road: from Richmond Road to Mooretown Road
DESCRIPTION:	Shoulder paving and widening
FISCAL YEAR:	2009
LENGTH (MI):	0.13
ACTIVITY CENTERS:	Multijurisdictional connectivity
COMPLETION DATE:	2009
PROJECT COST:	$29,900

ASSUMPTIONS:

- Bikeway trips are estimated from the guidelines in NCHRP Report 552: Guidelines for Analysis of Investments in Bicycle Facilities and demand model from www.bicyclinginfo.org/bikecost (Mid Estimate used for calculations).
- 0.31% assumed potential % of work trips removed with bike facility.
- 1.0% assumed potential % of non-work trips removed with bike facility (estimate).
- Used results of the 2002 CMAQ Post Evalaution study
- Each new cyclist will make two trips per day
- Average trip length distance for Work/Non-Work Trips = 9 miles and 7.5 miles
- Average number of persons per vehicle for Work Trips and Non-Work trips=1.1 and 1.4
- Work trips have been reduced to 5/7ths to account for 7 day week.

2002 CMAQ Post Evaluation Study		
Sampled Bikeway	Wkday Counts	Wkend Counts
YC Bikeway,1	2	4
NN Bikeway,1	13	31
JCC Bikeways,2	34	81
Average:	16	39

1- ESTIMATES OF VMT REDUCTIONS:

Demand Estimates			
	Work	Non-Work	Total
New Cyclists	2	12	14
New Person Trips by Bike	4	24	28
Converted to Reduction in Veh Trips	4	17	21
Converted to VMT Reduction	35	129	164

2- EMISSIONS CALCULATIONS:

VMT Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.716	164	117.16	0.12
NOx	0.879	164	143.84	0.14

3- COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Useful life of a Bikeway:	15	Total Cost:	$29,900
Days of Use:	365	Total Annual Cost:	$1,993

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	0.12	43	0.05	$42,285
NOx	0.14	53	0.06	$34,444

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
BICYCLE/PEDESTRIAN FACILITIES

JURISDICTION:	JCC
PROJECT NAME:	Croaker Road Bikeway
LOCATION:	Croaker Road: from Norge Public Library to Richmond Road Richmond Road: from Croaker Road to Old Church Road
DESCRIPTION:	Off road, multi-use path
FISCAL YEAR:	2008, 2009
LENGTH (MI):	1.5
ACTIVITY CENTERS:	Shopping, library, schools, residential
COMPLETION DATE:	2009
PROJECT COST:	$1,130,000

ASSUMPTIONS:
- Bikeway trips are estimated from the guidelines in NCHRP Report 552: Guidelines for Analysis of Investments in Bicycle Facilities and demand model from www.bicyclinginfo.org/bikecost (Mid Estimate used for calculations).
- 0.31% assumed potential % of work trips removed with bike facility.
- 1.0% assumed potential % of non-work trips removed with bike facility (estimate).
- Used results of the 2002 CMAQ Post Evalaution study
- Each new cyclist will make two trips per day
- Average trip length distance for Work/Non-Work Trips = 9 miles and 7.5 miles
- Average number of persons per vehicle for Work Trips and Non-Work trips=1.1 and 1.4
- Work trips have been reduced to 5/7ths to account for 7 day week.

2002 CMAQ Post Evaluation Study		
Sampled Bikeway	Wkday Counts	Wkend Counts
YC Bikeway,1	2	4
NN Bikeway,1	13	31
JCC Bikeways,2	34	81
Average:	16	39

1- ESTIMATES OF VMT REDUCTIONS:

Demand Estimates			
	Work	Non-Work	Total
New Cyclists	6	33	39
New Person Trips by Bike	11	66	77
Converted to Reduction in Veh Trips	10	47	58
Converted to VMT Reduction	94	354	447

2- EMISSIONS CALCULATIONS:

VMT Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.716	447	320.11	0.32
NOx	0.879	447	392.98	0.39

3- COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Useful life of a Bikeway:	15	Total Cost:	$1,130,000
Days of Use:	365	Total Annual Cost:	$75,333

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	0.32	117	0.13	$584,913
NOx	0.39	143	0.16	$476,448

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: James City Co PPMS NO.:
PROJECT NAME: John Tyler Hwy & Ironbound Rd Intersection Improvements
LOCATION: John Tyler Hwy & Ironbound Rd Intersection (Five Forks)
DESCRIPTION: Install NB and SB Right Turn Lanes on Ironbound Rd
PROJECT COST: $300,000
CMAQ REQUEST: $300,000

TURNING MOVEMENT COUNTS: 2003

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour.
Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 1,858

INTERSECTION DELAY BEFORE PROJECT (sec/veh):	35.1
INTERSECTION DELAY AFTER PROJECT (sec/veh):	30.7
CHANGE IN INTERSECTION DELAY (sec/veh):	4.4
CHANGE IN VEHICLE DELAY (hours/day):	13.36

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	0.21	1.62	0.07
Reduction in Emissions (kilograms/year):	52.66	403.79	17.55

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: James City Co PPMS NO.:
PROJECT NAME: Monticello Avenue Geometric Changes (3 Intersections) (#1)
LOCATION: Monticello Ave & News Rd/Ironbound Connector Intersection
DESCRIPTION: Add WB LTL on Monticello Ave for Dual Left Turns;
Add Thru Lane on NB Ironbound Connector;
Add SB LTL on News Rd for Dual Left Turns
PROJECT COST: $860,000 (All three intersections)
CMAQ REQUEST: $860,000

TURNING MOVEMENT COUNTS: 2015 Forecast

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour.
Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 3,951

INTERSECTION DELAY BEFORE PROJECT (sec/veh):	36.1
INTERSECTION DELAY AFTER PROJECT (sec/veh):	20.8
CHANGE IN INTERSECTION DELAY (sec/veh):	15.3
CHANGE IN VEHICLE DELAY (hours/day):	98.78

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	1.56	11.94	0.52
Reduction in Emissions (kilograms/year):	389.42	2,985.80	129.77

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
BICYCLE/PEDESTRIAN FACILITIES

JURISDICTION:	JCC
PROJECT NAME:	Mooretown Road Bikeway
LOCATION:	Mooretown Road: from Airport Road to Rain Tree Road
DESCRIPTION:	Const of bikeway by shoulder wedging, widening, and paving, striping and signs.
FISCAL YEAR:	2009
LENGTH (MI):	1.3
ACTIVITY CENTERS:	Retail, residential, employment, recreation, multijurisdictional connectivity
COMPLETION DATE:	2009
PROJECT COST:	$512,000

ASSUMPTIONS:
- Bikeway trips are estimated from the guidelines in NCHRP Report 552: Guidelines for Analysis of Investments in Bicycle Facilities and demand model from www.bicyclinginfo.org/bikecost (Mid Estimate used for calculations).
- 0.31% assumed potential % of work trips removed with bike facility.
- 1.0% assumed potential % of non-work trips removed with bike facility (estimate).
- Used results of the 2002 CMAQ Post Evalaution study
- Each new cyclist will make two trips per day
- Average trip length distance for Work/Non-Work Trips = 9 miles and 7.5 miles
- Average number of persons per vehicle for Work Trips and Non-Work trips=1.1 and 1.4
- Work trips have been reduced to 5/7ths to account for 7 day week.

2002 CMAQ Post Evaluation Study		
Sampled Bikeway	Wkday Counts	Wkend Counts
YC Bikeway,1	2	4
NN Bikeway,1	13	31
JCC Bikeways,2	34	81
Average:	16	39

1- ESTIMATES OF VMT REDUCTIONS:

Demand Estimates			
	Work	Non-Work	Total
New Cyclists	5	26	31
New Person Trips by Bike	10	52	62
Converted to reduction in Veh Trips	9	37	46
Converted to VMT Reduction	82	279	360

2- EMISSIONS CALCULATIONS:

VMT Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.716	360	258.04	0.26
NOx	0.879	360	316.78	0.32

3- COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Useful life of a Bikeway:	15	Total Cost:	$512,000
Days of Use:	365	Total Annual Cost:	$34,133

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	0.26	94	0.10	$328,771
NOx	0.32	116	0.13	$267,805

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
TRANSIT SHELTERS/FACILITIES

JURISDICTION:	Newport News
PROJECT NAME:	Citywide Bus Shelter Program
LOCATION:	Newport News
DESCRIPTION:	Provide bus shelters at key bus stops throughout the City.
FISCAL YEAR:	2008
NUMBER OF SHELTERS:	12 Total
ACTIVITY CENTERS:	Activity centers citywide
COMPLETION DATE:	2007
PROJECT COST:	$110,000

ASSUMPTIONS:

a. Auto travel factors
Average trip length - 7 miles
Average auto speed - 35 mph
Vehicle occupancy rate - 1.15 for work trips; 1.3 for Non-Work trips

b. Transit data
Existing Daily Ridership: 4,860
Increase in Ridership Due to Shelters: 2%

1- INCREASED BUS EMISSIONS:

No Increase in Service or Emissions

2- TRAVEL REDUCTIONS:

Daily Riders:	97	Daily Trips:	85
Reduced VMTs:	1,183		

Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.766	1,183	906	0.91
NOx	0.961	1,183	1,137	1.14

3-COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Total Cost:	$110,000
Useful life,years :	15
Annual Cost:	$7,333

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	0.91	331	0.36	$20,108
NOx	1.14	415	0.46	$16,028

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
BICYCLE/PEDESTRIAN FACILITIES

JURISDICTION:	Newport News
PROJECT NAME:	Jefferson Avenue Sidewalk Project from Buchanan Dr. to J Clyde Morris Blvd.
LOCATION:	Jefferson Avenue from Buchanan Drive to J Clyde Morris Boulevard
DESCRIPTION:	Widen ex sidewalk on both sides of Jefferson Ave to 8' for use by adult cyclists
FISCAL YEAR:	2008, 2010
LENGTH (MI):	4.75 (total 9.5 mi)
ACTIVITY CENTERS:	Shopping, residential, bicycle network connections
COMPLETION DATE:	2011
PROJECT COST:	$1,000,000

ASSUMPTIONS:
- Bikeway trips are estimated from the guidelines in NCHRP Report 552: Guidelines for Analysis of Investments in Bicycle Facilities and demand model from www.bicyclinginfo.org/bikecost (Mid Estimate used for calculations).
- 0.31% assumed potential % of work trips removed with bike facility.
- 1.0% assumed potential % of non-work trips removed with bike facility (estimate).
- Used results of the 2002 CMAQ Post Evaluation study
- Each new cyclist will make two trips per day
- Average trip length distance for Work/Non-Work Trips = 9 miles and 7.5 miles
- Average number of persons per vehicle for Work Trips and Non-Work trips=1.1 and 1.4
- Work trips have been reduced to 5/7ths to account for 7 day week.

2002 CMAQ Post Evaluation Study		
Sampled Bikeway	Wkday Counts	Wkend Counts
YC Bikeway,1	2	4
NN Bikeway,1	13	31
JCC Bikeways,2	34	81
Average:	16	39

1- ESTIMATES OF VMT REDUCTIONS:

Demand Estimates			
	Work	Non-Work	Total
New Cyclists	80	115	195
New Person Trips by Bike	160	230	390
Converted to reduction in Veh Trips	145	164	310
Converted to VMT Reduction	1,309	1,232	2,541

2- EMISSIONS CALCULATIONS:

VMT Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.716	2541	1819.52	1.82
NOx	0.879	2541	2233.74	2.23

3- COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Useful life of a Bikeway:	15	Total Cost:	$1,000,000
Days of Use:	365	Total Annual Cost:	$66,667

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	1.82	664	0.73	$91,065
NOx	2.23	815	0.90	$74,178

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
BICYCLE/PEDESTRIAN FACILITIES

JURISDICTION:	Newport News
PROJECT NAME:	Mariner's Museum Multi-Purpose Trail
LOCATION:	From the intersection of Warwick Blvd (Rte 60) and the Avenue for the Arts parallel to Warwick Blvd to just short of the Harpersville Road intersection.
DESCRIPTION:	Separate multi-use trail meandering thru woods & fields & crossing Lake Maury
FISCAL YEAR:	2007, 2008
LENGTH (MI):	1.0
ACTIVITY CENTERS:	University, bicycle and pedestrian network connections
COMPLETION DATE:	2008
PROJECT COST:	$1,000,000

ASSUMPTIONS:
- Bikeway trips are estimated from the guidelines in NCHRP Report 552: Guidelines for Analysis of Investments in Bicycle Facilities and demand model from www.bicyclinginfo.org/bikecost (Mid Estimate used for calculations).
- 0.31% assumed potential % of work trips removed with bike facility.
- 1.0% assumed potential % of non-work trips removed with bike facility (estimate).
- Used results of the 2002 CMAQ Post Evaluation study
- Each new cyclist will make two trips per day
- Average trip length distance for Work/Non-Work Trips = 9 miles and 7.5 miles
- Average number of persons per vehicle for Work Trips and Non-Work trips=1.1 and 1.4
- Work trips have been reduced to 5/7ths to account for 7 day week.

2002 CMAQ Post Evaluation Study		
Sampled Bikeway	Wkday Counts	Wkend Counts
YC Bikeway,1	2	4
NN Bikeway,1	13	31
JCC Bikeways,2	34	81
Average:	16	39

1- ESTIMATES OF VMT REDUCTIONS:

Demand Estimates			
	Work	Non-Work	Total
New Cyclists	32	45	77
New Person Trips by Bike	64	90	154
Converted to Reduction in Veh Trips	58	64	123
Converted to VMT Reduction	526	482	1,008

2- EMISSIONS CALCULATIONS:

VMT Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.766	1008	772.22	0.77
NOx	0.961	1008	968.80	0.97

3- COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Useful life of a Bikeway:	15	Total Cost:	$1,000,000
Days of Use:	365	Total Annual Cost:	$66,667

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	0.77	282	0.31	$214,570
NOx	0.97	354	0.39	$171,031

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
BICYCLE/PEDESTRIAN FACILITIES

JURISDICTION:	Newport News
PROJECT NAME:	J Clyde Morris Boulevard Corridor Bike Trail: Phase V
LOCATION:	Fr Ph3 at Canon Blvd & Middle Ground Blvd west on Middle Ground to Jefferson Ave, south on Fishing Point Dr to Thimble Shoals Blvd to City Center.
DESCRIPTION:	10-foot wide bike trail (concrete sidewalk) for 5,400 feet.
FISCAL YEAR:	2008, 2010
LENGTH (MI):	1.02
ACTIVITY CENTERS:	City Center, transit transfer site, bicycle network connections
COMPLETION DATE:	2010
PROJECT COST:	$1,000,000

ASSUMPTIONS:
- Bikeway trips are estimated from the guidelines in NCHRP Report 552: Guidelines for Analysis of Investments in Bicycle Facilities and demand model from www.bicyclinginfo.org/bikecost (Mid Estimate used for calculations).
- 0.31% assumed potential % of work trips removed with bike facility.
- 1.0% assumed potential % of non-work trips removed with bike facility (estimate).
- Used results of the 2002 CMAQ Post Evaluation study
- Each new cyclist will make two trips per day
- Average trip length distance for Work/Non-Work Trips = 9 miles and 7.5 miles
- Average number of persons per vehicle for Work Trips and Non-Work trips=1.1 and 1.4
- Work trips have been reduced to 5/7ths to account for 7 day week.

2002 CMAQ Post Evaluation Study		
Sampled Bikeway	Wkday Counts	Wkend Counts
YC Bikeway,1	2	4
NN Bikeway,1	13	31
JCC Bikeways,2	34	81
Average:	16	39

1- ESTIMATES OF VMT REDUCTIONS:

Demand Estimates			
	Work	Non-Work	Total
New Cyclists	58	81	139
New Person Trips by Bike	116	162	278
Converted to Reduction in Veh Trips	105	116	221
Converted to VMT Reduction	947	868	1,815

2- EMISSIONS CALCULATIONS:

VMT Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.716	1815	1299.26	1.30
NOx	0.879	1815	1595.04	1.60

3- COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Useful life of a Bikeway:	15	Total Cost:	$1,000,000
Days of Use:	365	Total Annual Cost:	$66,667

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	1.30	474	0.52	$127,530
NOx	1.60	582	0.64	$103,881

Prepared By: Hampton Roads Planning District Commission, May 2006.

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

JURISDICTION: Newport News
PROJECT NAME: Newport News Shuttle, Phase 2
LOCATION: Newport News
DESCRIPTION: Purchase 2 29-ft buses to expand shuttle service
FISCAL YEAR: 2008
LENGTH (MI): 10 oneway
ACTIVITY CENTERS: Newport News
COMPLETION DATE: 2008
PROJECT COST: $1,500,000

ASSUMPTIONS: a. Auto travel factors
Average trip length - 7 miles
Average auto speed - 35 mph
Vehicle occupancy rate - 1.15 for work trips; 1.3 for Non-Work trips

b. Transit data

Daily Ridership:	120		
No.of Days per week:	7	Number of days per year:	365
Hours/bus/day:	12	No trips/day:	45

Bus VMT/day= # of buses*length*2way

1- INCREASED BUS EMISSIONS : (NEW SERVICE)

Increased Emissions				
Type	g/mi	Bus VMT	g/day	kg/day
HC	0.470	900	423	0.42
NOx	0.671	900	603.9	0.60

2- TRAVEL REDUCTIONS:

Daily Riders:	120	Daily Trips:	104
Reduced VMTs:	1,461		

Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.766	1,461	1,119	1.12
NOx	0.961	1,461	1,404	1.40

3-COST EFFECTIVENESS:

Number of new buses:	2		
Useful life of a bus:	15	Years of Operation:	2
Total Bus Costs:	$600,000	Total Operation Costs:	$900,000
Annualized Bus Cost:	$40,000	Annualized Operation Costs:	$450,000

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	0.70	254	0.28	$874,865
NOx	0.80	292	0.32	$761,165

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
COORDINATED SIGNAL SYSTEMS

JURISDICTION: Newport News
PROJECT: Citywide Signal System Retiming Phases IX, X
DESCRIPTION: Phases IX and X include 14 Signal Systems comprised of 169 Intersections
PPMS #:
PROJECT COST: $450,000

		BEFORE PROJECT				**AFTER PROJECT**				**CHANGE**		
SYSTEM	CURRENT VMT	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	EMISSIONS (kilograms/day) HC	CO	NOx
Jefferson & Operations	92,732	27	83.37	1,729.72	99.59	31	79.93	1,714.05	96.90	-3.43	-15.67	-2.69
Jefferson & Hogan	161,096	25	148.53	3,027.80	176.24	29	141.76	2,985.27	170.28	-6.77	-42.53	-5.96
Jefferson & Center	239,228	32	204.06	4,423.56	249.04	36	197.12	4,456.34	247.12	-6.94	32.77	-1.91
Jefferson & 25th	8,561	30	7.46	158.18	8.98	34	7.17	158.43	8.85	-0.29	0.25	-0.13
39th & Marshall	8,363	32	7.13	154.64	8.71	36	6.89	155.78	8.64	-0.24	1.15	-0.07
26th & Marshall	7,075	25	6.52	132.97	7.74	29	6.23	131.10	7.48	-0.30	-1.87	-0.26
27th & Wickham	7,131	25	6.57	134.03	7.80	29	6.28	132.15	7.54	-0.30	-1.88	-0.26
Jefferson & Turnberry	184,896	34	154.76	3,421.50	191.18	38	150.51	3,483.81	192.11	-4.25	62.31	0.92
Warwick & Logan	30,821	31	26.57	569.69	32.21	35	25.58	570.55	31.75	-0.99	0.86	-0.46
Warwick & Merry Oaks	100,113	31	86.30	1,850.49	104.62	35	83.09	1,853.30	103.12	-3.20	2.80	-1.50
Denbigh & Old Lucas Creek	93,656	22	90.47	1,794.73	106.02	26	85.23	1,753.33	101.43	-5.24	-41.40	-4.59
Warwick & Colony	94,547	34	79.14	1,749.60	97.76	38	76.96	1,781.46	98.23	-2.17	31.86	0.47

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JURISDICTION: Newport News
PROJECT: Citywide Signal System Retiming Phases IX, X
DESCRIPTION: Phases IX and X include 14 Signal Systems comprised of 169 Intersections
PPMS #:
PROJECT COST: $450,000

		BEFORE PROJECT				**AFTER PROJECT**				**CHANGE**		
ARTERIAL	CURRENT VMT	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	EMISSIONS (kilograms/day) HC	CO	NOx
Warwick & Maxwell	97,730	26	88.93	1,829.60	105.84	30	85.12	1,805.66	102.52	-3.81	-23.94	-3.32
Warwick & 75th	28,394	30	24.73	524.61	29.79	34	23.77	525.43	29.36	-0.97	0.82	-0.43

Reduction in Emissions (kilograms/day):	38.90	-5.54	20.19
Reduction in Emissions (kilograms/year):	9,725.91	-1,384.79	5,047.30

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
BICYCLE/PEDESTRIAN FACILITIES

JURISDICTION:	Newport News
PROJECT NAME:	Warwick Blvd Wide Sidewalk between Menchville Rd. and Lucas Creek Rd.
LOCATION:	Warwick Blvd from Menchville Road to just north of Lucas Creek Road
DESCRIPTION:	Widen existing sidewalk to 8' to allow for use by adult cyclists
FISCAL YEAR:	2008, 2010
LENGTH (MI):	2.7
ACTIVITY CENTERS:	Recreation center, park, bicycle network connections
COMPLETION DATE:	2010
PROJECT COST:	$1,300,000

ASSUMPTIONS:
- Bikeway trips are estimated from the guidelines in NCHRP Report 552: Guidelines for Analysis of Investments in Bicycle Facilities and demand model from www.bicyclinginfo.org/bikecost (Mid Estimate used for calculations).
- 0.31% assumed potential % of work trips removed with bike facility.
- 1.0% assumed potential % of non-work trips removed with bike facility (estimate).
- Used results of the 2002 CMAQ Post Evaluation study
- Each new cyclist will make two trips per day
- Average trip length distance for Work/Non-Work Trips = 9 miles and 7.5 miles
- Average number of persons per vehicle for Work Trips and Non-Work trips=1.1 and 1.4
- Work trips have been reduced to 5/7ths to account for 7 day week.

2002 CMAQ Post Evaluation Study		
Sampled Bikeway	Wkday Counts	Wkend Counts
YC Bikeway,1	2	4
NN Bikeway,1	13	31
JCC Bikeways,2	34	81
Average:	16	39

1- ESTIMATES OF VMT REDUCTIONS:

Demand Estimates			
	Work	Non-Work	Total
New Cyclists	58	74	132
New Person Trips by Bike	116	148	264
Converted to Reduction in Veh Trips	105	106	211
Converted to VMT Reduction	947	793	1,740

2- EMISSIONS CALCULATIONS:

VMT Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.716	1740	1245.56	1.25
NOx	0.879	1740	1529.12	1.53

3- COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Useful life of a Bikeway:	15	Total Cost:	$1,300,000
Days of Use:	365	Total Annual Cost:	$86,667

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	1.25	455	0.50	$172,937
NOx	1.53	558	0.62	$140,868

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
OTHER (WAYFINDING 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.
FISCAL YEAR:	2008
LENGTH (MI):	citywide
ACTIVITY CENTERS:	Community facilities, transportation facilities, and tourist attractions.
COMPLETION DATE:	2008
PROJECT COST:	$500,000

ASSUMPTIONS:
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	
Total Number of Vehicles Impacted:	395,816	
Average Trip length (mi):	2	
Total VMTs:	791,633	
Average Travel Speed:	35 MPH	

1- REDUCED EMISSIONS:

Emissions Reductions				
Type	Factors, g/mi	Annual VMTs	kg/yr	ton/yr
HC	0.766	791,633	606.39	0.67
NOx	0.961	791,633	760.76	0.84

2-COST EFFECTIVENESS:

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

Cost Effectiveness			
Type	Kg/yr	Tons/yr	$/Ton
HC	606	0.67	$74,802
NOx	761	0.84	$59,623

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
CITYWIDE SIGNAL SYSTEMS

JURISDICTION: Norfolk
LOCATION: Citywide
PROJECT: Citywide Signal Retiming
PPMS # :
PROJECT COST: $300,000

ANALYSIS NOTES:

Overall average reduction in intersection delay resulting from retiming = 10.7 seconds/vehicle for the PM peak hour.

Overall average intersection volume
Low = 2,690 vehicles/PM peak hour
Medium = 2,690 vehicles/PM peak hour to 5,900 vehicles/PM peak hour
High = Over 5,900 vehicles/PM peak hour

Using the values listed above and the number of intersections included in the analysis, compute the vehicle-hours of delay for the PM peak hour. Convert that value to hours of delay per day using a factor of 17% as derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

		Total	Low	Meduim	High	
ANALYSIS:	Number of Intersections: (Provided by City staff)	284	138	139	7	
	Change in Delay per Intersection:		-10.7	-10.7	-10.7	(sec/veh)
	Total Change in Delay:		-1476.6	-1487.3	-74.9	(sec/veh)
	Change in Vehicle Delay (hours/day):		-6490.28	-14338.35	-1162.66	
	Total Change in Vehicle Delay (hours/day):		-21,991.30			

PROJECT EFFECT ON AIR QUALITY: 2007 Emission Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	346.80	2659.03	115.56
Reduction in Emissions (kilograms/year):	86,700.69	664,758.44	28,891.07

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
OTHER

JURISDICTION: Norfolk
PROJECT NAME: Develop and Deploy Incident Management Diversion System
LOCATION: Norfolk
DESCRIPTION: Identify 2 to 5 primary diversion corridors for an Incident Management Diversion Signage System to provide wayfinding for motorists during freeway incidents.
FISCAL YEAR: 2007, 2008, 2009
ACTIVITY CENTERS: I-64, I-264
COMPLETION DATE: 2009
PROJECT COST: $500,000

ASSUMPTIONS:

Idle Emissions: Mobile6.2 provides emissions for 2.5 mph as equivalent to idle
2.5 mph emissions, in g/mi, multiplied by 2.5 mph to get g/hr

HC	15.770 g/hr
NOx	5.255 g/hr

Emissions will be reduced by reducing time vehicles idle while waiting for incidents to clear.

1- DECREASED PASSENGER VEHICLE EMISSIONS:

See attached worksheet to see calculations of delay.
Delay: 154,265 hrs/year

Emissions Reduction			
Type	g/hr	g/year	kg/year
HC	15.770	2,432,761	2432.76
NOx	5.255	810,663	810.66

2- COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.
Total Cost: $500,000
Useful life,years : 5
Annual Cost: $100,000

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	n/a	2,433	2.68	$37,290
NOx	n/a	811	0.89	$111,906

Prepared By: Hampton Roads Planning District Commission, May 2006.

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

JURISDICTION:	Portsmouth
PROJECT NAME:	Equipment Support for Shuttle Bus Service
LOCATION:	Portsmouth
DESCRIPTION:	Purchase two diesel/electric hybrid shuttle buses
FISCAL YEAR:	2007
LENGTH (MI):	3.2 oneway
ACTIVITY CENTERS:	Downtown Portsmouth, Naval Hospital
COMPLETION DATE:	2009
PROJECT COST:	$900,000

ASSUMPTIONS: a. Auto travel factors
Average trip length - 7 miles
Average auto speed - 35 mph
Vehicle occupancy rate - 1.15 for work trips; 1.3 for Non-Work trips

b. Transit data

Daily Ridership:	50		
No.of Days per week:	6	Number of days per year:	312
Hours/bus/day:	4	No trips/day:	32

Bus VMT/day= # of buses*length*2way

1- INCREASED BUS EMISSIONS : (NEW SERVICE)

Increased Emissions				
Type	g/mi	Bus VMT	g/day	kg/day
HC	0.470	204.8	96.256	0.10
NOx	0.671	204.8	137.4208	0.14

2- TRAVEL REDUCTIONS:

Daily Riders:	50	Daily Trips:	43
Reduced VMTs:	609		

Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.766	609	466	0.47
NOx	0.961	609	585	0.58

3-COST EFFECTIVENESS:

Number of new buses:	2
Useful life of a bus:	15
Total Program Cost:	$900,000
Annualized Total Cost:	$60,000

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	0.37	115	0.13	$471,501
NOx	0.45	140	0.15	$389,818

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
COORDINATED SIGNAL SYSTEMS

JURISDICTION: Portsmouth
PROJECT: Airline Blvd: From Victory Blvd to Greenwood Dr
PPMS #:
DESCRIPTION: Replace all equipment at five intersections with mast arm poles, video detection, LED signal heads, radio interconnect, battery backup, and fully actuated controllers.
PROJECT COST: $1,500,000

		BEFORE PROJECT				**AFTER PROJECT**				**CHANGE**		
ARTERIAL	CURRENT VMT	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	EMISSIONS (kilograms/day) HC	CO	NOx
Airline Blvd Victory Blvd Greenwood Dr	15,500	33	13.10	286.73	16.07	37	12.69	290.44	16.06	-0.40	3.70	-0.02
Reduction in Emissions (kilograms/day):										0.40	-3.70	0.02
Reduction in Emissions (kilograms/year):										100.75	-926.12	3.87

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: Portsmouth PPMS NO.:
PROJECT NAME: Portsmouth Blvd & Airline Blvd Intersection Improvements
LOCATION: Intersect. of Portsmouth Blvd, Airline Blvd, & McLean St (Alexander's Corner)
DESCRIPTION: Upgrade intersection with new controller, LED signal heads, video detection, new monopole structure.
PROJECT COST: $900,000
CMAQ REQUEST: $900,000

TURNING MOVEMENT COUNTS: 2006

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour.
Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 3,615

INTERSECTION DELAY BEFORE PROJECT (sec/veh):	52.6
INTERSECTION DELAY AFTER PROJECT (sec/veh):	50.9
CHANGE IN INTERSECTION DELAY (sec/veh):	1.7
CHANGE IN VEHICLE DELAY (hours/day):	10.04

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	0.16	1.21	0.05
Reduction in Emissions (kilograms/year):	39.59	303.54	13.19

Prepared By: Hampton Roads Planning District Commission, May 2006.

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

JURISDICTION: Portsmouth
PROJECT NAME: Downtown Shuttle Bus
LOCATION: Portsmouth
DESCRIPTION: Provide shuttle bus service along core streets and to the Naval Hospital
FISCAL YEAR: 2007, 2008, 2009
LENGTH (MI): 3.2 oneway
ACTIVITY CENTERS: Downtown Portsmouth, Naval Hospital
COMPLETION DATE: 2009
PROJECT COST: $465,000

ASSUMPTIONS: a. Auto travel factors
Average trip length - 7 miles
Average auto speed - 35 mph
Vehicle occupancy rate - 1.15 for work trips; 1.3 for Non-Work trips

b. Transit data
Daily Ridership: 50
No.of Days per week: 6 Number of days per year: 312
Hours/bus/day: 4 No trips/day: 32
Bus VMT/day= # of buses*length*2way

1- INCREASED BUS EMISSIONS : (NEW SERVICE)

Increased Emissions				
Type	g/mi	Bus VMT	g/day	kg/day
HC	0.470	204.8	96.256	0.10
NOx	0.671	204.8	137.4208	0.14

2- TRAVEL REDUCTIONS:

Daily Riders: 50 Daily Trips: 43
Reduced VMTs: 609

Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.83	609	505	0.51
NOx	1.05	609	639	0.64

3-COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.
Operating Cost: $465,000 over 3 years
AnnualizedCost: $155,000

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	0.41	128	0.14	$1,102,017
NOx	0.50	157	0.17	$898,293

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
OTHER (FREIGHT)

JURISDICTION:	Portsmouth, Chesapeake, VPA
PROJECT NAME:	Relocation of Commonwealth Rail to the Centerline of VA Rte. 164 and I-664
LOCATION:	Portsmouth & Chesapeake
DESCRIPTION:	Relocate the Commonwealth Rail from residential areas to the centerlines of Rte. 164 and I-664 and eliminate at-grade crossings.
FISCAL YEAR:	2007
ACTIVITY CENTERS:	Maersk Terminal
COMPLETION DATE:	2009
PROJECT COST:	$60,000,000

ASSUMPTIONS:

Idle Emissions: Mobile6.2 provides emissions for 2.5 mph as equivalent to idle
2.5 mph emissions, in g/mi, multiplied by 2.5 mph to get g/hr

HC	15.770 g/hr
NOx	5.255 g/hr

Project will have no effect on rail emissions, but will reduce passenger vehicle emissions by grade-separating sixteen (16) roadway crossings.

1- DECREASED PASSENGER VEHICLE EMISSIONS:

Total vehicle delay/day = 573 min
9.55 hr

Emissions Reduction			
Type	g/hr	g/day	kg/day
HC	15.770	151	0.15
NOx	5.255	50	0.05

2- COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Total Cost:	$60,000,000
Useful life,years :	20
Annual Cost:	$3,000,000

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	0.15	55	0.06	$49,509,301
NOx	0.05	18	0.02	$148,575,009

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
OTHER

JURISDICTION: VDOT/Regionwide
PROJECT NAME: Regional Concept of Transportation Operations (RCTO)
LOCATION: Hampton Roads
DESCRIPTION: Development of a document to detail RCTO and a pilot program to implement CAD
FISCAL YEAR: 2007, 2008
ACTIVITY CENTERS: Interstates within Hampton Roads
COMPLETION DATE: 2008
PROJECT COST: $650,000

ASSUMPTIONS:

Idle Emissions: Mobile6.2 provides emissions for 2.5 mph as equivalent to idle
2.5 mph emissions, in g/mi, multiplied by 2.5 mph to get g/hr

HC	15.770 g/hr
NOx	5.255 g/hr

Emissions will be reduced by reducing time vehicles idle while waiting for incidents to clear.

1- DECREASED PASSENGER VEHICLE EMISSIONS:

See attached worksheet to see calculations of delay.
Delay: 1,417,076 hrs/year

Emissions Reduction			
Type	g/hr	g/year	kg/year
HC	15.770	22,347,281	22347.28
NOx	5.255	7,446,732	7446.73

2- COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.
Total Cost: $650,000
Useful life,years : 2
Annual Cost: $325,000

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	n/a	22,347	24.63	$13,193
NOx	n/a	7,447	8.21	$39,592

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: Virginia Beach PPMS NO.:
PROJECT NAME: General Booth Blvd & London Bridge Rd Intersection Improvements
LOCATION: General Booth Blvd & London Bridge Rd Intersection
DESCRIPTION: Install an NB Left Turn Lane on General Booth Blvd to Provide Dual Left Turns
PROJECT COST: $900,000
CMAQ REQUEST: $900,000

TURNING MOVEMENT COUNTS: 2006

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour.
Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 3,613

INTERSECTION DELAY BEFORE PROJECT (sec/veh):	36.2
INTERSECTION DELAY AFTER PROJECT (sec/veh):	29.7
CHANGE IN INTERSECTION DELAY (sec/veh):	6.5
CHANGE IN VEHICLE DELAY (hours/day):	38.37

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	0.61	4.64	0.20
Reduction in Emissions (kilograms/year):	151.29	1,159.96	50.41

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
CITYWIDE SIGNAL SYSTEMS

JURISDICTION: Virginia Beach
LOCATION: Citywide
PROJECT: Citywide Signal Retiming
PPMS # :
PROJECT COST: $1,200,300

ANALYSIS NOTES:

Overall average reduction in intersection delay resulting from retiming = 10.7 seconds/vehicle for the PM peak hour.

Overall average intersection volume
Low = 2,690 vehicles/PM peak hour
Medium = 2,690 vehicles/PM peak hour to 5,900 vehicles/PM peak hour
High = Over 5,900 vehicles/PM peak hour

Using the values listed above and the number of intersections included in the analysis, compute the vehicle-hours of delay for the PM peak hour. Convert that value to hours of delay per day using a factor of 17% as derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

		Total	Low	Meduim	High	
ANALYSIS:	Number of Intersections: (Provided by City staff)	277	38	178	61	
	Change in Delay per Intersection:		-10.7	-10.7	-10.7	(sec/veh)
	Total Change in Delay:		-406.6	-1904.6	-652.7	(sec/veh)
	Change in Vehicle Delay (hours/day):		-1787.18	-18361.34	-10131.78	
	Total Change in Vehicle Delay (hours/day):		-30,280.30			

PROJECT EFFECT ON AIR QUALITY: 2007 Emission Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	477.52	3661.28	159.12
Reduction in Emissions (kilograms/year):	119,380.09	915,320.50	39,780.74

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
COORDINATED SIGNAL SYSTEMS

JURISDICTION: Virginia Beach
PROJECT: Indian River Rd & Kempsville Rd Intersection Improvements
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.
PPMS #:
PROJECT COST: $1,500,000

		BEFORE PROJECT				**AFTER PROJECT**				**CHANGE**		
ARTERIAL	CURRENT VMT	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	AVG SPEED (mph)	EMISSIONS (kilograms/day) HC	CO	NOx	EMISSIONS (kilograms/day) HC	CO	NOx
Indian River Rd I-64 Kempsville Rd	97,590	8	164.24	2,457.40	153.31	13	120.33	2,094.66	130.87	-43.92	-362.74	-22.45
Reduction in Emissions (kilograms/day):										43.92	362.74	22.45
Reduction in Emissions (kilograms/year):										10,978.82	90,685.06	5,611.40

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: Virginia Beach PPMS NO.:
PROJECT NAME: Rosemont Rd & Lynnhaven Pkwy Intersection Improvements
LOCATION: Rosemont Rd & Lynnhaven Pkwy Intersection
DESCRIPTION: Add a NB left turn lane on Rosemont Rd to accommodate dual left turns.
PROJECT COST: $700,000
CMAQ REQUEST: $700,000

TURNING MOVEMENT COUNTS: 2006

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour.
Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 5,046

INTERSECTION DELAY BEFORE PROJECT (sec/veh):	67.8
INTERSECTION DELAY AFTER PROJECT (sec/veh):	55
CHANGE IN INTERSECTION DELAY (sec/veh):	12.8
CHANGE IN VEHICLE DELAY (hours/day):	105.5

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	1.66	12.76	0.55
Reduction in Emissions (kilograms/year):	416.08	3,190.21	138.65

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: Virginia Beach PPMS NO.:
PROJECT NAME: S Independence Blvd & Dahlia Dr Intersection Improvements
LOCATION: S Independence Blvd & Dahlia Dr Intersection
DESCRIPTION: Add a WB Left Turn Lane and an EB Right Turn Lane on Dahlia Dr
PROJECT COST: $1,000,000
CMAQ REQUEST: $1,000,000

TURNING MOVEMENT COUNTS: 2006

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour.
Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 2,943

INTERSECTION DELAY BEFORE PROJECT (sec/veh):	36.3
INTERSECTION DELAY AFTER PROJECT (sec/veh):	33.5
CHANGE IN INTERSECTION DELAY (sec/veh):	2.8
CHANGE IN VEHICLE DELAY (hours/day):	13.46

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	0.21	1.63	0.07
Reduction in Emissions (kilograms/year):	53.08	407.01	17.69

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: Virginia Beach PPMS NO.:
PROJECT NAME: S Independence Blvd & Lynnhaven Pkwy Intersection Improvements
LOCATION: S Independence Blvd & Lynnhaven Pkwy Intersection
DESCRIPTION: Install Dual Left Turn Lanes on the NB and SB approaches of S Independence Blvd
PROJECT COST: $900,000
CMAQ REQUEST: $900,000

TURNING MOVEMENT COUNTS: 2006

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour.
Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 6,421

INTERSECTION DELAY BEFORE PROJECT (sec/veh): 140.5
INTERSECTION DELAY AFTER PROJECT (sec/veh): 118.6
CHANGE IN INTERSECTION DELAY (sec/veh): 21.9

CHANGE IN VEHICLE DELAY (hours/day): 229.8

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	3.62	27.78	1.21
Reduction in Emissions (kilograms/year):	905.87	6,945.58	301.86

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: Virginia Beach PPMS NO.:
PROJECT NAME: Salem Rd & Princess Anne Rd Intersection Improvements
LOCATION: Salem Rd & Princess Anne Rd Intersection
DESCRIPTION: Add a lane on the EB Windsor Oaks Blvd approach and the WB Salem Rd approach. Reconfigure EB approach for dual LTL, one thru lane, one RTL. Reconfigure WB approach for one LTL, two thru lanes, and one RTL.
PROJECT COST: $900,000
CMAQ REQUEST: $900,000

TURNING MOVEMENT COUNTS: 2006

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour. Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 6,122

INTERSECTION DELAY BEFORE PROJECT (sec/veh):	109.4
INTERSECTION DELAY AFTER PROJECT (sec/veh):	69.8
CHANGE IN INTERSECTION DELAY (sec/veh):	39.6
CHANGE IN VEHICLE DELAY (hours/day):	396.1

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	6.25	47.90	2.08
Reduction in Emissions (kilograms/year):	1,561.74	11,974.30	520.42

Prepared By: Hampton Roads Planning District Commission, May 2006.

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

JURISDICTION: WAT
PROJECT NAME: Newport News/James City County Employee Connection
LOCATION: Peninsula
DESCRIPTION: Demonstration service between Newport News and James City County
FISCAL YEAR: 2007, 2008, 2009
LENGTH (MI): 6 oneway
ACTIVITY CENTERS: Newport News, James City County, Williamsburg
COMPLETION DATE: 2007
PROJECT COST: $282,000

ASSUMPTIONS: a. Auto travel factors
Average trip length - 7 miles
Average auto speed - 35 mph
Vehicle occupancy rate - 1.15 for work trips; 1.3 for Non-Work trips

b. Transit data
Daily Ridership: 85
No.of Days per week: 7 Number of days per year: 358
Hours/bus/day: 5 Trips/day: 15
Bus VMT/day= # of trips*length*2way

1- INCREASED BUS EMISSIONS : (NEW SERVICE)

Increased Emissions				
Type	g/mi	Bus VMT	g/day	kg/day
HC	0.470	180	84.6	0.08
NOx	0.671	180	120.78	0.12

2- TRAVEL REDUCTIONS:

Daily Riders: 85 Daily Trips: 74
Reduced VMTs: 1,035

Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.830	1,035	859	0.86
NOx	1.050	1,035	1,087	1.09

3-COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.
Operating Cost: $282,000 over 3 years
AnnualizedCost: $94,000

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	0.77	277	0.31	$307,642
NOx	0.97	346	0.38	$246,648

Prepared By: Hampton Roads Planning District Commission, May 2006.

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

JURISDICTION:	WAT
PROJECT NAME:	Service Frequency and Sunday Service
LOCATION:	Peninsula
DESCRIPTION:	Increasing service from hourly to half-hourly frequency and adding service for Sunday, consistent with long range plans.
FISCAL YEAR:	2007, 2008, 2009
LENGTH (MI):	135
ACTIVITY CENTERS:	James City County, York County, & Williamsburg
COMPLETION DATE:	2007
PROJECT COST:	$4,370,000

ASSUMPTIONS:

a. Auto travel factors
Average trip length - 7 miles
Average auto speed - 35 mph
Vehicle occupancy rate - 1.15 for work trips; 1.3 for Non-Work trips

b. Transit data

Daily Ridership:	625			
No.of Days per week:	7	Number of days per year:	358	
Hours/bus/day:	14	Trips/day:	28	

Bus VMT/day= # of trips*length*2way

1- INCREASED BUS EMISSIONS : (NEW SERVICE)

Increased Emissions				
Type	g/mi	Bus VMT	g/day	kg/day
HC	0.470	7560	3553.2	3.55
NOx	0.671	7560	5072.76	5.07

2- TRAVEL REDUCTIONS:

Daily Riders:	625	Daily Trips:	543
Reduced VMTs:	7,609		

Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.83	7,609	6,315	6.32
NOx	1.05	7,609	7,989	7.99

3-COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Operating Cost:	$4,370,000	over 3 years
AnnualizedCost:	$1,456,667	

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	2.76	989	1.09	$1,336,424
NOx	2.92	1,044	1.15	$1,265,692

Prepared By: Hampton Roads Planning District Commission, May 2006.

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

JURISDICTION:	WAT
PROJECT NAME:	Mooretown Road Corridor
LOCATION:	York County, Williamsburg, James City County
DESCRIPTION:	Continuation of demonstration service between York County, Williamsburg, and James City County.
FISCAL YEAR:	2007, 2008
LENGTH (MI):	20
ACTIVITY CENTERS:	Mooretown Road Corridor in York County and Williamsburg Transportation Center
COMPLETION DATE:	2007
PROJECT COST:	$315,000

ASSUMPTIONS:

a. Auto travel factors
Average trip length - 7 miles
Average auto speed - 35 mph
Vehicle occupancy rate - 1.15 for work trips; 1.3 for Non-Work trips

b. Transit data

Daily Ridership:	150		
No.of Days per week:	6	Number of days per year:	308
Hours/bus/day:	14	Trips/day:	28

Bus VMT/day= # of trips*length*2way

1- INCREASED BUS EMISSIONS : (NEW SERVICE)

Increased Emissions				
Type	g/mi	Bus VMT	g/day	kg/day
HC	0.470	1120	526.4	0.53
NOx	0.671	1120	751.52	0.75

2- TRAVEL REDUCTIONS:

Daily Riders:	150	Daily Trips:	130
Reduced VMTs:	1,826		

Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.830	1,826	1,516	1.52
NOx	1.050	1,826	1,917	1.92

3-COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Operating Cost:	$315,000	over 2 years
AnnualizedCost:	$157,500	

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	0.99	305	0.34	$468,939
NOx	1.17	359	0.40	$397,899

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
GEOMETRIC IMPROVEMENTS AND SIGNAL RETIMING

JURISDICTION: York Co PPMS NO.:
PROJECT NAME: Route 17 & Route 620 Intersection Improvements
LOCATION: George Washington Memorial Hwy & Oriana Rd/Lakeside Dr Intersection
DESCRIPTION: Install an NB Left Turn Lane on Route 17, install an EB Left Turn Lane on Oriana Rd. Add a lane on Lakeside Dr to provide WB dual LTL, one thru lane, and exclusive RTL.
PROJECT COST: $800,000
CMAQ REQUEST: $800,000

TURNING MOVEMENT COUNTS: 2005

ANALYSIS PERIOD: PM Peak Hour

PROCEDURE: Using the total number of vehicles entering the intersection during the PM peak hour and the change in intersection delay resulting from the project, compute the vehicle-hours of delay for the PM peak hour.
Convert that value to hours of delay per day using the 17% K(d) factor derived in the **Cost Benefit Model for Intersection Level of Service Improvements**, HRPDC, June 1997.

ANALYSIS: TOTAL VEHICLES DURING PM PEAK HOUR: 4,758

INTERSECTION DELAY BEFORE PROJECT (sec/veh):	30.3
INTERSECTION DELAY AFTER PROJECT (sec/veh):	26.1
CHANGE IN INTERSECTION DELAY (sec/veh):	4.2
CHANGE IN VEHICLE DELAY (hours/day):	32.65

PROJECT EFFECT ON AIR QUALITY: 2007 Emissions Factors

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

	HC	CO	NOx
Reduction in Emissions (kilograms/day):	0.51	3.95	0.17
Reduction in Emissions (kilograms/year):	128.73	987.04	42.90

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
BICYCLE/PEDESTRIAN FACILITIES

JURISDICTION:	York County
PROJECT NAME:	Lightfoot Road Bikeway
LOCATION:	Lightfoot Rd (Rte 646) between Mooretown Rd (Rte 603) & Richmond Rd (Rte 60)
DESCRIPTION:	Four-foot (4') shoulder bike lanes on both sides
FISCAL YEAR:	2008
LENGTH (MI):	0.63
ACTIVITY CENTERS:	Employment, retail, regional connection
COMPLETION DATE:	2008
PROJECT COST:	$184,000

ASSUMPTIONS:
- Bikeway trips are estimated from the guidelines in NCHRP Report 552: Guidelines for Analysis of Investments in Bicycle Facilities and demand model from www.bicyclinginfo.org/bikecost (Mid Estimate used for calculations).
- 0.31% assumed potential % of work trips removed with bike facility.
- 1.0% assumed potential % of non-work trips removed with bike facility (estimate).
- Used results of the 2002 CMAQ Post Evalaution study
- Each new cyclist will make two trips per day
- Average trip length distance for Work/Non-Work Trips = 9 miles and 7.5 miles
- Average number of persons per vehicle for Work Trips and Non-Work trips=1.1 and 1.4
- Work trips have been reduced to 5/7ths to account for 7 day week.

2002 CMAQ Post Evaluation Study		
Sampled Bikeway	Wkday Counts	Wkend Counts
YC Bikeway,1	2	4
NN Bikeway,1	13	31
JCC Bikeways,2	34	81
Average:	16	39

1- ESTIMATES OF VMT REDUCTIONS:

Demand Estimates			
	Work	Non-Work	Total
New Cyclists	6	43	49
New Person Trips by Bike	13	86	99
Converted to Reduction in Veh Trips	12	61	73
Converted to VMT Reduction	105	461	566

2- EMISSIONS CALCULATIONS:

VMT Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.716	566	405.19	0.41
NOx	0.879	566	497.43	0.50

3- COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Useful life of a Bikeway:	15	Total Cost:	$184,000
Days of Use:	365	Total Annual Cost:	$12,267

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	0.41	148	0.16	$75,243
NOx	0.50	182	0.20	$61,290

Prepared By: Hampton Roads Planning District Commission, May 2006.

CONGESTION MITIGATION AND AIR QUALITY
PROJECT EVALUATION
BICYCLE/PEDESTRIAN FACILITIES

JURISDICTION:	York County
PROJECT NAME:	Route 143 Bikeway
LOCATION:	Capitol Landing Rd (Rte 143) between East Rochambeau Dr (Rte F-137) and the Queens Creek Bridge/Williamsburg city line.
DESCRIPTION:	Four-foot (4') shoulder bike lanes on both sides
FISCAL YEAR:	2008
LENGTH (MI):	0.6
ACTIVITY CENTERS:	Park, athletic facilities, school, regional connection
COMPLETION DATE:	2008
PROJECT COST:	$173,000

ASSUMPTIONS:
- Bikeway trips are estimated from the guidelines in NCHRP Report 552: Guidelines for Analysis of Investments in Bicycle Facilities and demand model from www.bicyclinginfo.org/bikecost (Mid Estimate used for calculations).
- 0.31% assumed potential % of work trips removed with bike facility
- 1.0% assumed potential % of non-work trips removed with bike facility (estimate).
- Used results of the 2002 CMAQ Post Evaluation study
- Each new cyclist will make two trips per day
- Average trip length distance for Work/Non-Work Trips = 9 miles and 7.5 miles
- Average number of persons per vehicle for Work Trips and Non-Work trips=1.1 and 1.4
- Work trips have been reduced to 5/7ths to account for 7 day week.

2002 CMAQ Post Evaluation Study		
Sampled Bikeway	Wkday Counts	Wkend Counts
YC Bikeway,1	2	4
NN Bikeway,1	13	31
JCC Bikeways,2	34	81
Average:	16	39

1- ESTIMATES OF VMT REDUCTIONS:

Demand Estimates			
	Work	Non-Work	Total
New Cyclists	18	98	116
New Person Trips by Bike	36	196	232
Converted to Reduction in Veh Trips	32	140	172
Converted to VMT Reduction	292	1,050	1,342

2- EMISSIONS CALCULATIONS:

VMT Emissions Reduction				
Type	g/mi	VMT	g/day	kg/day
HC	0.716	1342	961.02	0.96
NOx	0.879	1342	1179.80	1.18

3- COST EFFECTIVENESS:

This ratio is determined by dividing the total annual cost by annual emission changes.

Useful life of a Bikeway:	15	Total Cost:	$173,000
Days of Use:	365	Total Annual Cost:	$11,533

Cost Effectiveness				
Type	kg/day	Kg/yr	Tons/yr	$/Ton
HC	0.96	351	0.39	$29,828
NOx	1.18	431	0.47	$24,297

Prepared By: Hampton Roads Planning District Commission, May 2006.

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.

Application Process and Preliminary Screening:

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

- Must meet all applicable SAFETY-LU requirements
- Must be included in the current Regional Transportation Plan
- Must be well defined
- Reasonable data and cost estimates must be provided
- Must meet all requirements developed and approved by the Transportation Technical Subcommittee

Project Evaluation and Methods:

Projects are placed into 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

HRPDC staff evaluates all projects according to the criteria developed by the TTS. 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 TTS for review.

Project Selection:

The TTS reviews, discusses and revises candidate projects as appropriate, and makes recommendations to the TTC. 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	See Table 10

Project Category	Evaluation Method
- HOV lane express bus service - Park-&-ride lots	
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

APPENDIX E

RSTP Candidate Project Application Forms

HAMPTON ROADS TRANSPORTATION IMPROVEMENT PROGRAM
PROJECT SELECTION PROCESS

RSTP CANDIDATE PROJECT APPLICATION

To be considered for RSTP funding, a proposed project must be included in the current Regional Transportation Plan. 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 HRPDC staff for input data requirements.

RSTP FORM-A

Locality/Agency:_____ Date:_____

Prepared By:_____ Phone:_____

E-mail:_____ Fax:_____

PPMS#:_____

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: $ _____

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 PDC 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:

APPENDIX F

RSTP Project Analysis Worksheets

REGIONAL SURFACE TRANSPORTATION PROGRAM
PROPOSED HIGHWAY PROJECTS

ROADWAY WIDENING, NEW FACILITY, HOV LANES, INTERCHANGE/INTERSECTION IMPROVEMENTS

						Congestion Level (0-20 Points)		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)
1	Chesapeake	Route 17: Widen to 4 lanes from Cedar Rd southward to current 4 lane section	$9,000,000	20	$450,000	7	10	20	15	20	10	2	84
6	Hampton (Must be added to 2026 LRP if approved)	Wythe Creek Rd: Widen to 4 lanes with bike lanes and sidewalks from Commander Shepard Blvd to Poquoson CL	$25,000,000	20	$1,250,000	7	8	12	20	20	10	2	79
4	Chesapeake	Mount Pleasant Rd: Widen to 4 lanes from Chesapeake Expwy to Ethridge Rd	$8,300,000	20	$415,000	7	10	19	10	20	10	2	78
2	Chesapeake	Hanbury Rd: Widen to 4 lanes from Battlefield Blvd to Johnstown Rd	$11,100,000	20	$555,000	7	10	18	10	10	10	2	67
3	Chesapeake	Route 17: Replace the bridge over Deep Creek (Long Bridge) with a 4 lane span with sidewalks on both sides	$3,450,000	20	$172,500	10	10	0	20	5	4	8	57
5	Hampton	Commander Shepard Blvd Phase 2: Construct new 4 LD road from Big Bethel Rd/Saunders Rd to Middle Rd (UPC 60970)	$18,000,000	20	$900,000	0	0	16	20	5	6	10	57
7	Newport News	Middle Ground Blvd: Construct new 4LD road from Warwick Blvd/Maxwell Ln to Jefferson Ave/Middle Ground Blvd (UPC 11816)	$40,000,000	20	$2,000,000	0	3	16	20	5	10	2	56
19	Gloucester Co	Route 17 Access Management - Crossover Improvements from Gloucester Point to Gloucester Courthouse	$6,000,000	20	$300,000	3	7	20	0	5	10	2	47
9	Norfolk	Princess Anne Rd & Sewells Point Rd Intersection Improvements	$300,000	20	$15,000	0	3	18	5	5	10	2	43

Prepared By: Hampton Roads Planning District Commission, May 2006.

Proposed RSTP Projects
Fiscal Years 2007-2010
Transit: Vehicle Replacement/Purchase

					Evaluation Criteria					
					Average Age of Vehicles (0-35 points)	Number of Vehicles to replace/Total Fleet (0-10 points)	Emission Changes (0-30 points)	Cost effectiveness (0-10 points)	Average Mileage of Vehicles to Replace (0-15 points)	
Item #	Jurisdiction	Project Name	Project Description	Total Project Cost						Total Score Max=100
13	HRT	Purchase of Replacement Buses	60 buses	$20,000,000	35	5	20	10	0	70
14	HRT	Paratransit Replacement Vehicles	40 vehicles	$2,000,000	20	7	15	0	15	57
15	HRT	New Ferry Vessels	2 ferries	$4,000,000	0	2	0	10	0	12
16	WAT	Vehicle Purchase (Service Expansion/Sunday Service)	8 buses	$4,200,000	0	2	5	5	0	12
17	WAT	Three (3) Body-on-Chassis Vehicles	3 vehicles	$180,000	15	10	15	2	10	52
18	WAT	Purchase of Replacement Buses (Colonial Williamsburg)	3 vehicles	$300,000	35	5	15	10	0	65

Prepared By: Hampton Roads Planning District Commission, May 2006.