HAMPTON ROADS TRANSPORTATION PLANNING ORGANIZATION

CMAQ/RSTP PROJECTS AND ALLOCATIONS 2011

HAMPTON ROADS TPO
TRANSPORTATION PLANNING ORGANIZATION

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HAMPTON ROADS TRANSPORTATION PLANNING ORGANIZATION
CMAQ/RSTP PROJECTS AND ALLOCATIONS

2011

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HAMPTON ROADS TPO
TRANSPORTATION PLANNING ORGANIZATION

JANUARY 2012

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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.

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REPORT ORGANIZATION

This report has been organized into five sections:

Section I – Executive Summary

The Executive Summary summarizes the CMAQ and RSPT projects selected to receive available CMAQ and RSTP funds through FY 2018.

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

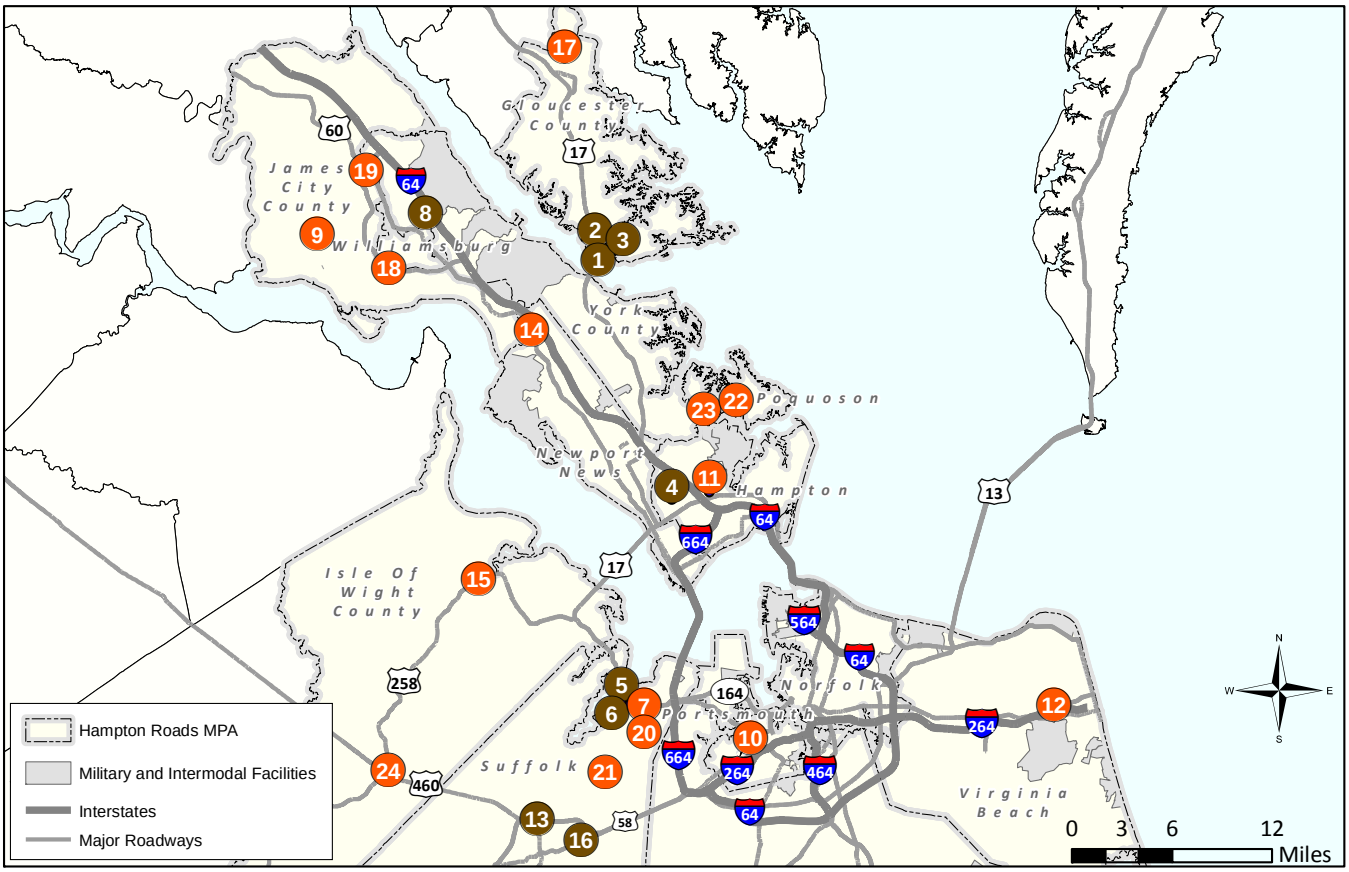
- Previously Approved CMAQ Projects
- Recommended New CMAQ Projects

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)



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.

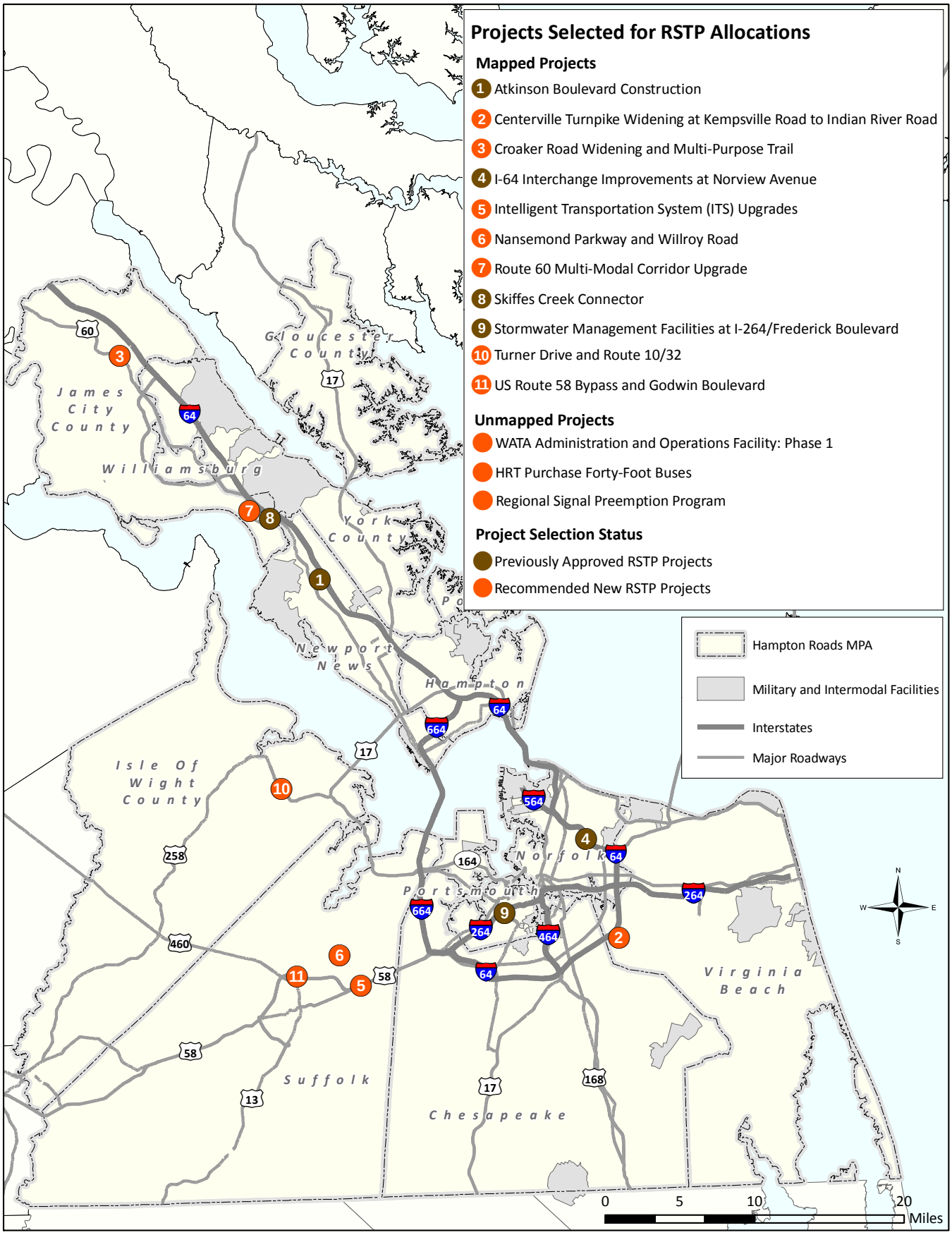
11. **Regional Signal Preemption Program**
    - The project entails developing and executing a regional traffic signal preemption coding plan. A regional treatment of these systems, through allocating transponder code ranges by locality, will allow identification of appropriate users and lock out unauthorized 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	Ferry Usage	Number of Vehicles	Yearly Emissions	Yearly Emissions
	g/hr (3)	hrs/year		g/yr	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	Ferry Usage	Number of Vehicles	Yearly Emissions	Yearly Emissions
	g/hr (3)	hrs/year		g/yr	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 containership 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 accomodation s, 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**