HAMPTON ROADS TRANSPORTATION PLANNING ORGANIZATION

CMAQ/RSTP PROJECT SELECTION PROCESS 2014

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T15-02

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HAMPTON ROADS TRANSPORTATION PLANNING ORGANIZATION
CMAQ/RSTP PROJECT SELECTION PROCESS

2014

This report was included in the Unified Planning Work Program for Fiscal Year 2015, which was approved by the Board of the Hampton Roads Transportation Planning Organization on April 17, 2014.

PREPARED BY:

the heartbeat of HAMPTON ROADS TPO
TRANSPORTATION PLANNING ORGANIZATION

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ABSTRACT

This report summarizes the Hampton Roads Transportation Planning Organization 2014 Congestion Mitigation and Air Quality (CMAQ) Improvement Program and Regional Surface Transportation Program (RSTP) Projects and Allocations. As a result of the 2014 CMAQ/RSTP Project Selection Process, selected projects received allocations of CMAQ or RSTP funds for Fiscal Year 2021.

ACKNOWLEDGMENTS

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

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Section II – Background

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

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.

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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. The project selection process is conducted annually, normally beginning in July and running through December.

This report summarizes the work of selecting CMAQ and RSTP projects during the 2014 CMAQ/RSTP Project Selection Process. Selected projects received allocations of CMAQ or RSTP funds for Fiscal Year (FY) 2021.

CMAQ PROJECT SELECTION AND FUNDING ALLOCATIONS

During the November 20, 2014 meeting, the HRTPO Board approved the following actions regarding CMAQ funding for FY 2021:

- Allocations to eight previously approved CMAQ projects to fulfill the funding needs of those projects.
- Six new CMAQ projects were selected to receive a total of $2.99 million in allocations through FY 2021.

The HRTPO Board approved CMAQ projects with FY-2021 allocations are summarized below. In addition, a map showing the locations of the CMAQ projects is included.

Allocations to Previously Approved CMAQ Projects

1. **Centerville Road and News Road –(UPC# 102944) 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.
    - Allocated $120,000 in FY 2021 to complete funding on the project.

2. **Cunningham Drive Sidewalk Project –(UPC# 102866) 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.
    - Allocated $920,000 in FY 2021 to fund the project.

3. **CNG Bus Replacement –(UPC# T11779) 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.
    - Allocated $3,073,000 in FY 2021. This will provide for the purchase of seven buses and complete funding on the project.

4. **First Colonial Road and Laskin Road –(UPC# 102972) 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.
    - Allocated $1,000,000 in FY 2021 to complete funding on the project.

5. **Bus Capital Replacements –(UPC# T11780) WATA**
    - The project entails purchasing eight low sulfur diesel 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.
    - Allocated $3,271,732 in FY 2021 to complete funding on the project.

6. **Shoulders Hill Road Bicycle and Pedestrian Improvements –(UPC# 102992) Suffolk**
    - The project entails improvements to the intersection of Shoulders Hill Road and Bennetts Creek 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.
    - Allocated $272,000 in FY 2021 to complete funding on the project.

7. **Trolley Bus Replacements –(UPC# T11782) WATA**
    - The project entails purchasing five transit trolleys to replace vehicles that have reached the end of their useful life. The new vehicles would better meet the agency's long-term needs, offer standardization, offer efficiencies, reduce emissions, reduce maintenance costs, and also have a longer useful life (according to FTA's standards) for the vehicle.
    - Allocated $2,099,778 in FY 2021. This includes a transfer allocation from UPC# T11780 (Bus Capital Replacements) in the amount of $1,667,778 FY 2021 CMAQ. The transferred and new allocations complete funding on the the Trolley Replacement Project.

8. **Roaring Springs Road Shared Roadway Bike Path and Main Street Sidewalk Gap Correction –(UPC# 102919) 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.
    - Based on current VDOT estimates, the allocation of $452,000 in FY 2021 leaves an unfunded balance on the project of $1,158,705.

New CMAQ Projects

9. **Citywide Signal System Retiming –(ID# NN2CM) Newport News**
    - The project entails the retiming of approximately 169 of the 260 coordinated signals in Newport News. Traffic volumes and patterns are continually changing due to development, road construction, seasonal effects etc. This retiming program will systematically improve traffic progression and reevaluate signal phasing, lane usage, timing parameters, incident management plans and system boundaries for optimized signal operation.
    - Allocated $500,000 in FY 2021 to fully fund the project.

10. **Chesapeake Signal Timing – Phase 1 –(ID# CH1CM) Chesapeake**
    - The project entails the analysis and development of new signal timing for strategic corridors and isolated intersections in the City of Chesapeake. To obtain optimized timings, traffic data will be collected and analyzed using the latest version of Synchro software, for which improved signal timings will be developed. The Signals under this phase are referenced as Phase 1. Phase 1 includes 19 intersections within two systems along Military Highway that extend from the east at the Virginia Beach city line to the west where it meets Suffolk. This phase also includes Western Branch Boulevard, two signals along Battlefield Boulevard, and a section of George Washington Highway.
    - Allocated $150,000 in FY 2021 to fully fund Phase 1 of the project.

11. **Chesapeake Signal Timing – Phase 2 –(ID# CH2CM) Chesapeake**
    - The project entails the analysis and development of new signal timing for strategic corridors and isolated intersections in the City of Chesapeake. To obtain optimized timings, traffic data will be collected and analyzed using the latest version of Synchro software, for which improved signal timings will be developed. Signals under this phase are referenced as Phase 2. Phase 2 includes systems along Greenbrier Parkway, a major north/ south arterial within the city that serves numerous residential communities, major retail centers and provides direct access to I-64. This phase also includes Cedar Road, a major east/west connector within the City, as well as intersections along

Bainbridge Boulevard and Poindexter Road both of which provide key connections between the interstate and the local street network.

- Allocated $150,000 in FY 2021 to fully fund Phase 2 of the project.

12. **Chesapeake Signal Timing – Phase 3 –(ID# CH3CM) Chesapeake**
    - The project entails the analysis and development of new signal timing for strategic corridors and isolated intersections in the City of Chesapeake. To obtain optimized timings, traffic data will be collected and analyzed using the latest version of Synchro software, for which improved signal timings will be developed. The Signals under this phase are referenced as Phase 3. Phase 3 includes Battlefield Boulevard, a major north/ south arterial within the city that serves numerous residential communities, Chesapeake General medical complex, major retail centers and provides direct access to I-64. This phase also includes Providence Road that connects with Virginia Beach to the south and extends north through the City where it connects with Norfolk and provides access to the Campostella Bridge and Midtown Tunnel. There are also several smaller intersections along Hillcrest Parkway that provide key connections between limited access facilities and the local street network.
    - Allocated $150,000 in FY 2021 to fully fund Phase 3 of the project.

13. **Bus Vehicle Replacement – (ID# HT1CM) – HRT**
    - The project entails purchasing (29, 35, and 40 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.
    - Allocated $1,712,165 in FY 2021. This should provide for the purchase of approximately four buses and HRT will likely request additional funds in future years to complete this project.

14. **Main Street at Route 10 Sidewalk Extension - Phase 1C –(ID# IW1CM) - Isle of Wight County**
    - The project entails constructing a new sidewalk along the western side of Great Springs Road approximately 0.25 miles to connect the residential community at Quail Street into the sidewalk system on Route 258 (Main Street). The sidewalk linkage will also improve multi-modal access to the existing Park and Ride lot located on the corner of the intersection, which is also one of only 3 local HRT bus stops.
    - Allocated $325,233 in FY 2021 to fully fund Phase 1C of the project. This project is related to existing CMAQ project UPC #102915, which covers Phase 1B and has an allocation of $165,000 in FY 2017 CMAQ. Based on information received in the County's project submission, an unfunded balance of $350,000 remains on the overall project.

Map 1 | *Projects Selected for CMAQ Allocations*

Projects Selected for CMAQ Allocations

Mapped Projects

1. Centerville Road and News Road
2. Cunningham Drive Sidewalk Project
3. First Colonial Road and Laskin Road
4. Shoulders Hill Road Bicycle and Pedestrian Improvements
5. Roaring Springs Road Shared Roadway Bike Path and Main St. Sidewalk Gap Correction
6. Main Street at Route 10 Sidewalk Extension - Phase 1C

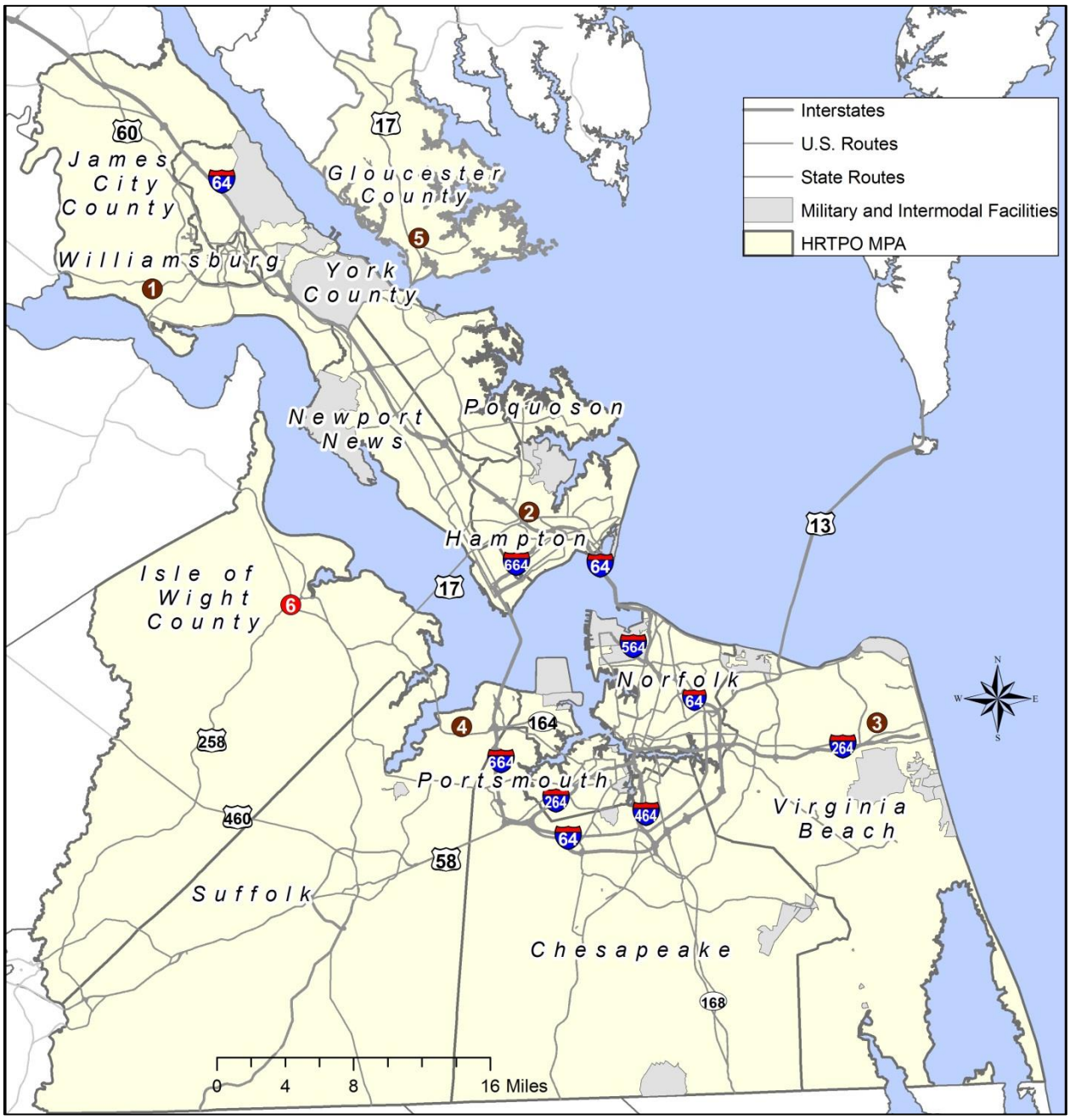
Unmapped Projects

7. CNG Bus Replacement - WATA
8. Bus Capital Replacements - WATA
9. Trolley Bus Replacements - WATA
10. Citywide Signal System Retiming - Newport News
11. Chesapeake Signal Timing - Phase 1
12. Chesapeake Signal Timing - Phase 2
13. Chesapeake Signal Timing - Phase 3
14. Bus Vehicle Replacement - HRT

Project Selection Status

- Previously Approved CMAQ Projects
- New CMAQ Projects

Map 1 **|** ***Projects Selected for RSTP Allocations***



RSTP Project Selection and Funding Allocations

During the November 20, 2014 meeting, the HRTPO Board approved the following actions regarding RSTP funding for FY 2021:

- Allocations to four previously approved RSTP projects to fulfill the funding needs of those projects.
- Five new RSTP projects were selected to receive a total of $16.3 million in allocations through FY 2021.
- FY 2021 allocations at the previously agreed upon funding levels were approved for the HRT TRAFFIX Program.

The HRTPO Board approved RSTP projects with FY 2021 allocations are summarized below. In addition, a map showing the locations of the RSTP projects is included.

Allocations to Previously Approved RSTP Projects

1. **TRAFFIX (UPC# T1823/T14104) – HRT**
   - This project entails the continued funding of this transportation demand management (TDM) program at previously agreed upon levels
   - Allocated $1,000,000 in FY 2021 RSTP funds to fully fund this project.

2. **Wythe Creek Rd – Widen to 5-L (Alphus to SCL) - (UPC# 13427) – Poquoson**
   - This project entails the widening of Wythe Creek Road to five lanes from Alphus Road south to the Hampton City line to address capacity and safety improvements. This is a joint project with the City of Hampton and is led by VDOT.
   - Allocated $620,000 in FY 2021 RSTP funds to complete the Poquoson portion of the widening project.

3. **Skiffes Creek Connector (UPC# 100200) – James City County**
   - This project entails construction of a connector road between Pocahontas Trail (Route 60) and Merrimac Trail (Route 143) in James City County.
   - Allocated $2,500,615 in FY 2021 RSTP funds. With this allocation the project is fully funded at the current VDOT project cost estimate of $35,000,000; however, the County is considering consolidating this project with UPC #13496, Route 60 Relocation, which could substantially increase the overall project cost. The County plans to request additional funds in the future to close the funding gap.

4. **Wythe Creek Road Widening (UPC# 97715) – Hampton**
   - This project entails the widening of Wythe Creek Road to four lanes from Commander Shepard Blvd. (Route 172) north to the Poquoson City line to address capacity and safety improvements. This is a joint project with the City of Poquoson and VDOT.
   - Allocated $6,368,934 in FY 2021 RSTP funds to close a gap in construction funding due to a change in the scope of the project (additional $16,780,000 required for revised cost estimate). The City is exploring additional funding sources to help close the $10,411,066 funding gap.

New RSTP Projects

5. **Bus Vehicle Replacement (ID# HT1RS) – HRT**
   - The project entails purchasing (29, 35, and 40 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.
   - Allocated $9,158,545 in FY 2021. This should provide for the purchase of approximately 21 buses and HRT will likely request additional funds in future years to complete this project.

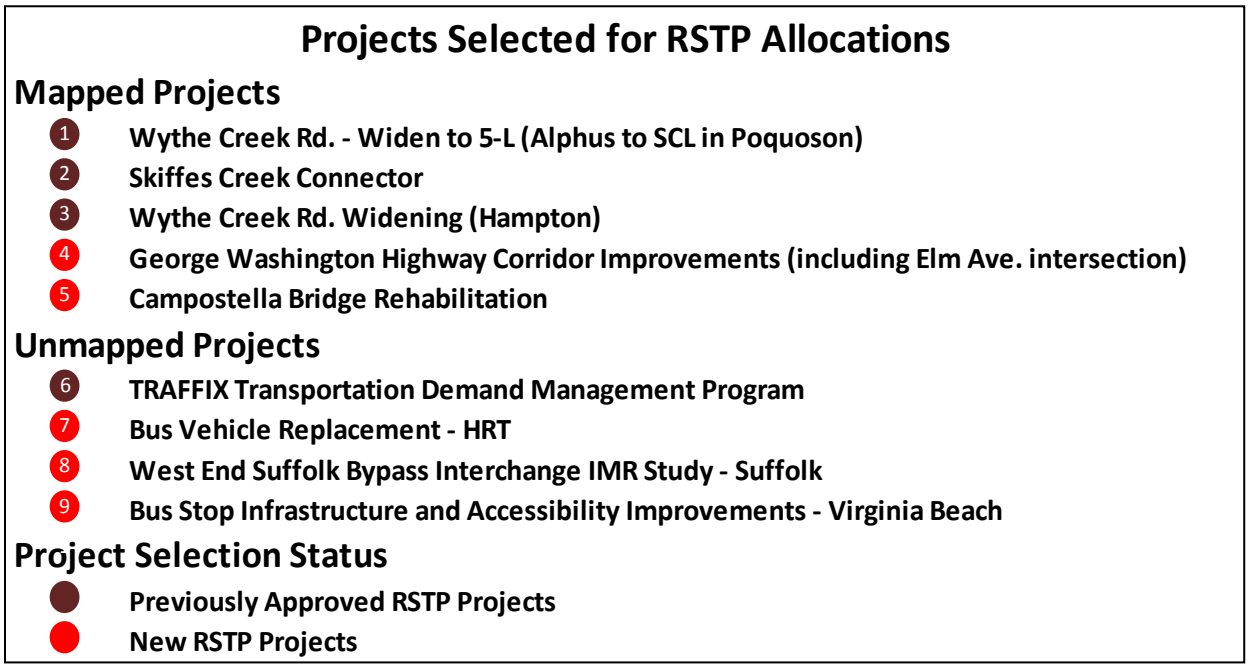
6. **West End Suffolk Bypass Interchange IMR Study (ID# SF1RS) – Suffolk**
   - The project entails providing a full Interchange Modification Report (IMR) study of the interchange at the west end of the Suffolk Bypass and Holland Road for capacity and safety improvements needed to maintain the capacity of the interchange.
   - Allocated $200,000 in FY 2021 RSTP funds to fully fund the project.

7. **Bus Stop Infrastructure and Accessibility Improvements (ID# VB1RS) - Virginia Beach**
   - The project entails improving bus stop infrastructure and accessibility for pedestrians within the City of Virginia Beach. There are a total of 21 locations where improvements are needed. The project is for improving connectivity for pedestrians using the Hampton Roads Transit system.
   - Allocated $398,969 in FY 2021 RSTP funds to fully fund the project.

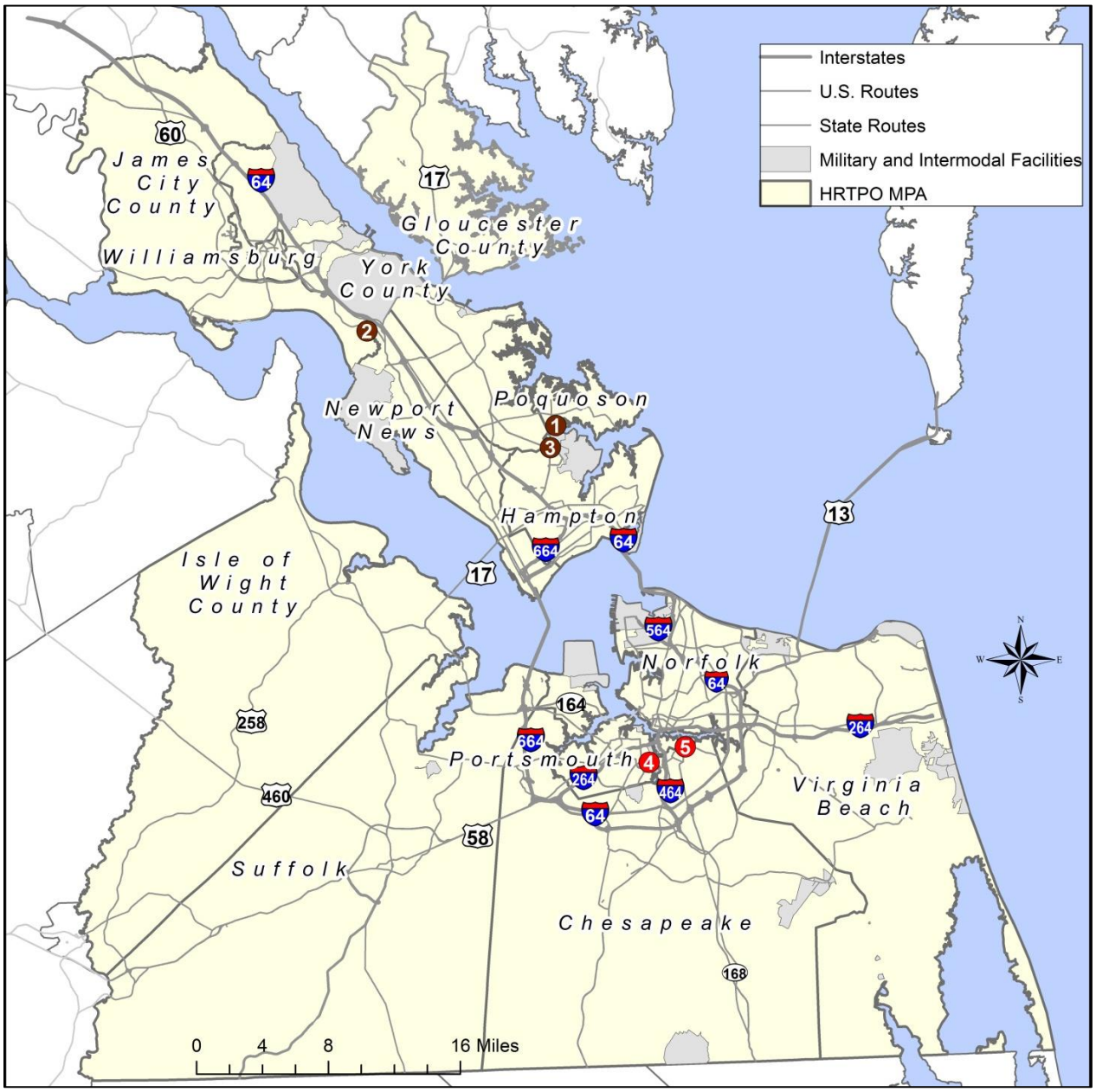
8. **George Washington Highway Corridor Improvements (including Elm Avenue intersection) – (ID#PR2RS) – Portsmouth**
   - The project consists of corridor improvements to include the necessary turn lanes at the intersection of George Washington Highway and Elm Avenue. In addition, the project will evaluate all four approaches of this critical intersection to determine the appropriate cross sections per approach to address access management issues, railroad crossing and bike/pedestrian accommodations.
   - Allocated $550,000 in FY 2021 RSTP funds to cover the PE phase. The remaining balance to complete the project is $5,400,000.

9. **Campostella Bridge Rehabilitation (ID# NF2RS) – Norfolk**
   - The proposed scope of work includes the following repairs: Reseal expansion joints and repair expansion dams; weld broken connections on lateral bracing; reset fully expanded and contracted bearings; seal cracks in footings; clean and paint bearing devices, cross frames, girders, and bracing; repair delamination and spalling in concrete beams, diaphragms, and substructure; seal cracks in top of deck, curbs, sidewalks, median, and parapets; clean and seal exposed reinforcing in bottom of deck; replace or clean and coat pile cluster wrappings; repair or replace damaged sections of railing; upgrade approach guardrail to meet VDOT standards; replace missing and decayed wales on timber fender system.
   - Allocated $6,000,000 in FY 2021 RSTP funds to fully fund the project.

Map 2 | *Projects Selected for RSTP Allocations*



Map 3 **|** ***Projects Selected for RSTP Allocations***



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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 has been designated as an attainment area for the current ozone standard and as a maintenance area for the previous standard.

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 2014. Projects selected received allocations of CMAQ or RSTP funds for FY-2021.

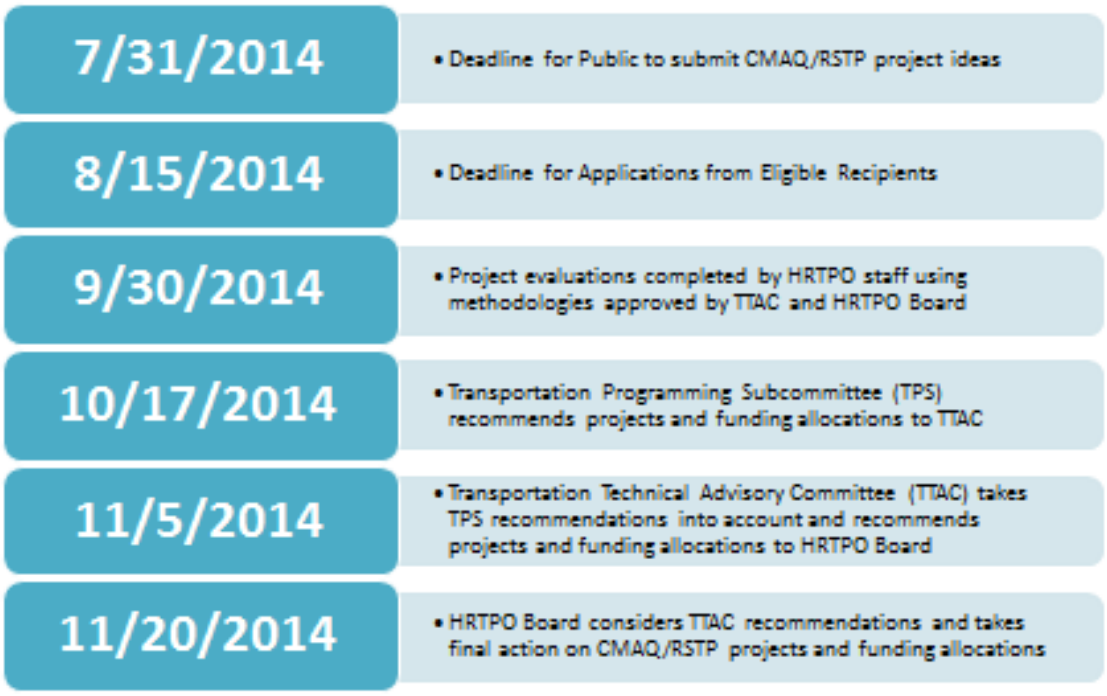
ELIGIBLE RECIPIENTS

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 HRTPO 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.

2014 CMAQ/RSTP Project Selection Process Steps and Deadlines



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 25, 2014. 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, 2014. Project ideas submitted by the public are 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 from 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, orally or in writing, during any of those meetings.

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 http://www.hrtpo.org/page/cmaq-and-rstp/.

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 when submitting CMAQ project proposals. The various ***CMAQ Candidate Project Application Forms*** may be accessed on the HRTPO website at http://www.hrtpo.org/page/cmaq-and-rstp/.

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 2014 project selection process, allocations were made to fulfill the funding needs of eight previously approved CMAQ projects.

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 2014. As shown in the table, 24 candidate projects, with a total request of over $133 million, were submitted.

Table 3 shows the scoring and ranking of the 24 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 new projects that were ultimately approved by the HRTPO Board on November 20, 2014 to receive CMAQ allocations in fiscal year 2021. It should be noted that the total CMAQ funding expected to be available for FY 2021, including the 20 percent state match, was approximately $14 million.

Table 1 | FY-2021 Allocations to Previously Approved CMAQ Projects

UPC #	Jurisdiction	Project Description	FY-20 & Prior CMAQ Allocations	Total Cost Estimate	FY-2021 Allocation
102866	Hampton	Cunningham Drive Sidewalk Project	$ -	$ 920,000	$ 920,000
102919	Gloucester Co.	Roaring Springs Bike Path & Main St Sidewalk Gap Correction	$ -	$ 1,610,705	$ 452,000
102944	James City Co.	Centerville Road & News Road	$ 934,098	$ 1,513,160	$ 120,000
102972	Virginia Beach	First Colonial Road & Laskin Road Intersection Improvements	$ -	$ 1,000,000	$ 1,000,000
102992	Suffolk	Shoulders Hill Road Bicycle & Pedestrian Improvements	$ -	$ 272,000	$ 272,000
T11779	WATA	Purchase 7 CNG Replacement Buses	$ -	$ 3,073,000	$ 3,073,000
T11780	WATA	Purchase 8 Low Sulfur Diesel Replacement Buses	$ 1,540,490	$ 6,480,000	$ 3,271,732
T11782	WATA	Purchase Five Replacement Trolleys	$ -	$ 2,018,000	$ 2,099,778
Total			$ 2,474,588	$ 16,886,865	**$ 11,208,510**

Table 2 | 2014 CMAQ Candidate Projects

Number	Code	Applicant	Project Name	Total Cost	Total CMAQ Request	Total FY-21 Request
1	CH1CM	Chesapeake	Chesapeake Signal Timing - Phase 1	$ 150,000	$ 150,000	$150,000
2	CH2CM	Chesapeake	Chesapeake Signal Timing - Phase 2	$ 150,000	$ 150,000	$ 150,000
3	CH3CM	Chesapeake	Chesapeake Signal Timing - Phase 3	$ 150,000	$ 150,000	$ 150,000
4	CH4CM	Chesapeake	Chesapeake Signal Timing - Phase 4	$ 150,000	$ 150,000	$ 150,000
5	CH5CM	Chesapeake	Citywide Traffic Signal System Upgrade	$ 7,200,000	$ 7,200,000	$ 500,000
6	CH6CM	Chesapeake	Freeman Avenue/Norfolk-Portsmouth Beltline Railroad Overpass	$ 21,007,550	$ 21,007,550	$ 5,500,000
7	GC1CM	Gloucester Co	Intersection Improvement at RTE 17B and RTE 3/14 John Clayton Memorial Highway	$ 6,500,000	$ 6,500,000	$ 250,000
8	GC2CM	Gloucester Co	Pedestrian Improvements on Rte 1208 Greate Road	$ 1,500,000	$ 1,500,000	$ 300,000
9	HT1CM	HRT	Bus Vehicle Replacement	$ 70,696,396	$ 55,553,238	$ 12,858,088
10	IW1CM	Isle of Wight Co	Main Street at Route 10 sidewalk extension (Smithfield Sidewalk)	$ 840,233	$ 325,233	$ 325,233
11	NN1CM	Newport News	Briarfield Sidewalk	$ 600,000	$ 600,000	$ 600,000
12	NN2CM	Newport News	Citywide Signal System Retiming	$ 500,000	$ 500,000	$ 500,000
13	NN3CM	Newport News	Citywide Wayfinding Phase IV	$ 500,000	$ 500,000	$ 500,000
14	NF1CM	Norfolk	Bus Shelters and Pedestrian Improvements	$ 700,000	$ 700,000	$ 330,000
15	NF2CM	Norfolk	Norfolk Systemwide Signal Controller and System Upgrade	$ 3,000,000	$ 3,000,000	$ 3,000,000
16	PR1CM	Portsmouth	Port Norfolk/Shea Terrace Bicycle Boulevard	$ 500,000	$ 500,000	$ 500,000
17	SF1CM	Suffolk	Downtown Signal System Upgrades	$ 10,000,000	$ 10,000,000	$ 500,000
18	SF2CM	Suffolk	Route 17 (Bridge Road) and Shoulders Hill Road Intersection Improvements	$ 18,000,000	$ 18,000,000	$ 3,000,000
19	SF3CM	Suffolk	Suffolk Citywide Signal Timings	$ 1,015,500	$ 1,015,500	$ 372,000
20	SF4CM	Suffolk	Suffolk TOC	$ 4,000,000	$ 4,000,000	$ 500,000
21	VB1CM	Virginia Beach	Corridor Retiming-Kempsville Road and Newtown Area	$ 521,180	$ 521,880	$ 260,950
22	VB2CM	Virginia Beach	Independence BLVD/Edwin Dr Intersection Improvements	$ 593,052	$ 593,052	$ 593,052
23	VB3CM	Virginia Beach	Rosemont Road/South Plaza Trail Intersection Improvements	$ 348,038	$ 348,038	$ 348,038
24	VB4CM	Virginia Beach	Traffic Adaptive Corridor Implementation	$ 390,000	$ 390,000	$ 390,000
Total				$ 149,011,949	$ 133,354,491	$31,727,361

Table 3 | 2014 CMAQ Candidate Projects in Ranked Order

ID	Jurisdiction	Project Description	Rank	Cost-Effectiveness		Rankings		
				VOC	NOx	VOC	NOx	Composite[1]
NN2CM	Newport News	Citywide Signal System Retiming	1	$130,743	$30,171	1	1	2
CH3CM	Chesapeake	Chesapeake Signal Timing - Phase 3	2	$133,566	$30,823	3	2	5
CH1CM	Chesapeake	Chesapeake Signal Timing - Phase 1	3	$142,915	$32,980	4	3	7
CH2CM	Chesapeake	Chesapeake Signal Timing - Phase 2	4	$143,545	$33,126	5	4	9
HT1CM	HRT	Bus Vehicle Replacement	4	$133,039	$64,571	2	7	9
CH4CM	Chesapeake	Chesapeake Signal Timing - Phase 4	6	$156,326	$36,075	6	5	11
NF2CM	Norfolk	Norfolk Systemwide Signal Controller and System Upgrade	7	$235,853	$54,428	7	6	13
VB1CM	Virginia Beach	Corridor Retiming-Kempsville Road and Newtown Area	8	$661,368	$152,623	8	8	16
SF3CM	Suffolk	Suffolk Citywide Signal Timings	9	$691,850	$159,658	9	9	18
VB4CM	Virginia Beach	Traffic Adaptive Corridor Implementation	10	$787,999	$181,846	11	10	21
NN3CM	Newport News	Citywide Wayfinding Phase IV	10	$775,844	$233,039	10	11	21
NN1CM	Newport News	Briarfield Sidewalk	12	$854,129	$256,933	12	12	24
NF1CM	Norfolk	Bus Shelters and Pedestrian Improvements	13	$1,190,551	$358,133	13	13	26
PR1CM	Portsmouth	Port Norfolk/Shea Terrace Bicycle Boulevard	14	$1,276,745	$384,062	14	14	28
CH5CM	Chesapeake	Citywide Traffic Signal System Upgrade	15	$1,825,632	$421,300	15	15	30
SF4CM	Suffolk	Suffolk TOC	16	$2,847,256	$657,082	17	16	33
IW1CM	Isle of Wight Co	Main Street at Route 10 sidewalk extension (Smithfield Sidewalk)	16	$2,238,203	$673,281	16	17	33
GC2CM	Gloucester Co	Pedestrian Improvements on Rte 1208 Greate Road	18	$6,571,988	$1,976,939	18	18	36
SF1CM	Suffolk	Downtown Signal System Upgrades	19	$10,875,341	$2,509,694	19	19	38
VB3CM	Virginia Beach	Rosemont Road/South Plaza Trail Intersection Improvements	20	$15,693,490	$3,621,575	20	20	40
VB2CM	Virginia Beach	Independence BLVD/Edwin Dr Intersection Improvements	21	$16,840,349	$3,886,234	21	21	42
CH6CM	Chesapeake	Freeman Avenue/Norfolk-Portsmouth Beltline Railroad Overpass	22	$32,938,224	$7,601,129	22	22	44
SF2CM	Suffolk	Route 17 (Bridge Road) and Shoulders Hill Road Intersection Improvements	23	$52,083,885	$12,019,358	23	23	46
GC1CM	Gloucester Co	Intersection Improvement at RTE 17B and RTE 3/14 John Clayton Memorial Highway	24	$58,757,629	$13,559,453	24	24	48

[1]The Composite Score is computed as follows:
First, projects are evaluated for their estimated impacts on the reduction of VOC's 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.

Table 4 | FY -2021 Allocations to New CMAQ Projects

ID #	Jurisdiction	Project Description	FY-2021 Allocation
NN2CM	Newport News	Citywide Signal System Retiming	$ 500,000
CH3CM	Chesapeake	Chesapeake Signal Timing -Phase 3	$ 150,000
CH1CM	Chesapeake	Chesapeake Signal Timing -Phase 1	$ 150,000
CH2CM	Chesapeake	Chesapeake Signal Timing -Phase 2	$ 150,000
HT1CM	HRT	Bus Vehicle Replacement	$ 1,712,165
IW1CM	Isle of Wight Co.	Main Street at Route 10 sidewalk extension (Smithfield sidewalk)	$ 325,233
Total			**$ 2,987,398**

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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 http://www.hrtpo.org/page/cmaq-and-rstp/.

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 http://www.hrtpo.org/page/cmaq-and-rstp/.

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 the allocations made to fulfill the funding needs of four previously approved RSTP projects.

After addressing the needs of previously approved RSTP projects, new candidate projects to receive available RSTP funding were considered. **Table 6** shows all of the new projects proposed for RSTP funding during the project selection process in 2014. As shown in the table, 36 candidate projects, with a total request of $559 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 36 candidate projects. The detailed evaluation and scoring worksheets for each of the newly selected RSTP projects are included in **Appendix B.**

Table 8 shows five new projects that were ultimately approved by the HRTPO Board on November 20, 2014 to receive RSTP funding allocations in fiscal year 2021. The total RSTP funding expected to be available for FY 2021, including the 20 percent state match, is approximately $26.8 million.

Table 5 | FY-2021 Allocations to Previously Approved RSTP Projects

UPC #	Jurisdiction	Project Description	FY-20 & Prior RSTP Allocations	Total Cost Estimate	FY-2021 Allocation
13427	Poquoson	Wythe Creek Rd - Widen to 5-L (Alphus to SCL)	$ 16,159,000	$ 19,215,146	$ 620,000
97715	Hampton	Wythe Creek Road Widening	$ 23,400,000	$ 40,180,000	$ 6,368,934
100200	James City Co.	Skiffes Creek Connector	$ 32,499,385	$ 35,000,000	$ 2,500,615
T14104	HRT	TRAFFIX Program	$ 13,801,000	$ -	$ 1,000,000
Total			$ 85,859,385	$ 94,395,146	**$ 10,489,549**

Table 6 | 2014 RSTP New Candidate Projects

Number	Code	Applicant	Project Name	Total Cost	Total RSTP Request	Total FY-21 Request
Highway:						
Roadway Widening, New Facilities, HOV Lanes, Intersection Improvements						
1	NF3RS	Norfolk	I-64/Northhampton Interchange Ramp Modifications	$ 6,000,000	$ 6,000,000	$ 500,000
2	IW1RS	Isle of Wight Co	Route 258 NORTH Widening	$ 6,000,000	$ 6,000,000	$ 500,000
3	IW2RS	Isle of Wight Co	Route 607 (Old Mill Road) Signalization	$ 382,728	$ 257,728	$ 257,728
4	IW3RS	Isle of Wight Co	Route 258 SOUTH Widening	$ 8,000,000	$ 8,000,000	$ 500,000
5	VB2RS	Virginia Beach	Elbow Road Extended-Phase II	$ 75,588,369	$ 54,181,804	$ 52,804,770
6	JC1RS	James City Co	Route 60 Relocation & Upgrading/ Skiffes Creek Connector	$ 153,622,167	$ 101,149,944	$ 17,385,244
7	JC4RS	James City Co	Longhill Road Widening Phase III	$ 32,063,002	$ 32,063,002	$ 6,086,667
8	GC1RS	Gloucester	Intersection Improvement at RTE 17B and RTE 3/14 John Clayton Memorial Highway	$ 6,500,000	$ 6,500,000	$ 250,000
9	PO2RS	Poquoson	Laydon Way/Poquoson Avenue/Little Florida Road Intersection Realignment	$ 892,163	$ 892,163	$ 45,000
10	JC3RS	James City Co	Longhill Road Widening Phase II	$ 40,401,004	$ 40,401,004	$ 7,933,834
11	SF5RS	Suffolk	Route 17 (Bridge Road) and Shoulders HIll Road Intersection	$ 18,000,000	$ 18,000,000	$ 3,000,000
12	SF2RS	Suffolk	Godwin Blvd Interchange Upgrades	$ 10,000,000	$ 10,000,000	$ 500,000
13	JC2RS	James City Co	Longhill Road Widening Phase I	$ 21,115,000	$ 18,621,392	$ 5,593,057
14	NN1RS	Newport News	Jefferson Avenue from Green Grove Lane to Industrial Park Drive	$ 23,000,000	$ 23,000,000	$ 14,000,000
15	PO1RS	Poquoson	Victory Blvd Widening	$ 21,700,000	$ 21,700,000	$ 2,060,000
16	NN2RS	Newport News	Relocated Route 60 in Newport News	$ 18,300,000	$ 10,400,000	$ 10,400,000
17	VB3RS	Virginia Beach	Indian River Road-Phase VII	$ 89,070,517	$ 77,762,446	$ 18,599,396
18	SF3RS	Suffolk	Crittenden Road Intersection Improvement	$ 8,000,000	$ 8,000,000	$ 100,000
19	SF4RS	Suffolk	Suffolk Traffic Operations Center	$ 4,000,000	$ 4,000,000	$ 500,000
Corridor Operational Improvements						
20	NF5RS	Norfolk	Llewellyn Avenue Street Improvements	$ 2,000,000	$ 2,000,000	$ 1,600,000
21	PR2RS	Portsmouth	George Washington Highway Corridor Improvements (including Elm Avenue Intersection)	$ 5,950,000	$ 5,950,000	$ 550,000
22	PR1RS	Portsmouth	Elm Avenue Improvements between George Washington Highway and Victory Boulevard	$ 9,750,000	$ 9,750,000	$ 900,000
Bridge Replacement						
23	NF2RS	Norfolk	Campostella Bridge Rehabilitation	$ 6,000,000	$ 6,000,000	$ 6,000,000
24	NF4RS	Norfolk	Hampton Boulevard Rehabilitation	$ 5,000,000	$ 5,000,000	$ 5,000,000
25	NF1RS	Norfolk	Berkley Avenue Bridge Rehabilitation	$ 3,500,000	$ 3,500,000	$ 3,500,000
Alternatives Analysis and Feasiblilty Studies						
26	SF1RS	Suffolk	West End Suffolk Bypass Interchange IMR Study	$ 200,000	$ 200,000	$ 200,000
Intelligent Transportation Systems Projects						
27	NF6RS	Norfolk	Norfolk Systemwide Signal Controller and System Upgrade	$ 3,000,000	$ 3,000,000	$ 3,000,000
28	VB4RS	Virginia Beach	Travel Time Display on DMS	$ 197,500	$ 197,500	$ 197,500
Non-Highway:						
New or Expanded Service, Passenger Facilities, HS/intercity/& light rail, Station Development, Vehicle Upgrades etc.						
29	VB1RS	Virginia Beach	Bus Stop Infrastructure and Accessibility Improvements	$ 668,157	$ 398,969	$ 398,969
30	HT4RS	HRT	Passenger Amenity Program	$ 1,200,000	$ 1,200,000	$ 200,000
Vehicle Replacement/Purchase						
31	HT1RS	HRT	Bus Vehicle Replacement	$ 70,696,396	$ 55,553,238	$ 12,858,088
Other Transit						
32	HT6RS	HRT	Farebox Upgrades - Incorporation of Alternative Fare Media Technology	$ 2,579,500	$ 2,579,500	$ 2,462,250
33	HT5RS	HRT	Ticket Vending Machine (TVM) II Replacement	$ 819,100	$ 819,100	$ 694,100
Alternatives Analysis and Feasiblilty Studies						
34	HT3RS	HRT	Naval Station Norfolk Trasnit Extension Study FEIS/PE	$ 12,000,000	$ 12,000,000	$ 12,000,000
35	HT2RS	HRT	Study of Fixed Guideway Transit in Hampton and Newport News	$ 2,000,000	$ 2,000,000	$ 2,000,000
36	CH1RS	Chesapeake	Study of Light Rail Extension to Chesapeake	$ 2,000,000	$ 2,000,000	$ 2,000,000
		TOTALS		**$ 670,195,603**	**$ 559,077,790**	**$ 194,576,603**

Table 7 | 2014 RSTP Candidate Projects in Ranked Order

Number	Code	Applicant	Project Name	Score (Max = 100)
Highway:				
Roadway Widening, New Facilities, HOV Lanes, Intersection Improvements				
1	NF3RS	Norfolk	I-64/Northhampton Interchange Ramp Modifications	**70.0**
2	IW1RS	Isle of Wight Co	Route 258 NORTH Widening	**62.0**
3	IW2RS	Isle of Wight Co	Route 607 (Old Mill Road) Signalization	**59.0**
4	IW3RS	Isle of Wight Co	Route 258 SOUTH Widening	**56.0**
5	VB2RS	Virginia Beach	Elbow Road Extended-Phase II	**55.0**
6	JC1RS	James City Co	Route 60 Relocation & Upgrading/ Skiffes Creek Connector	**53.0**
7	JC4RS	James City Co	Longhill Road Widening Phase III	**52.0**
8	GC1RS	Gloucester	Intersection Improvement at RTE 17B and RTE 3/14 John Clayton Memorial Highway	**51.0**
9	PO2RS	Poquoson	Laydon Way/Poquoson Avenue/Little Florida Road Intersection Realignment	**50.0**
10	JC3RS	James City Co	Longhill Road Widening Phase II	**49.0**
11	SF5RS	Suffolk	Route 17 (Bridge Road) and Shoulders HIll Road Intersection	**46.0**
12	SF2RS	Suffolk	Godwin Blvd Interchange Upgrades	**46.0**
13	JC2RS	James City Co	Longhill Road Widening Phase I	**46.0**
14	NN1RS	Newport News	Jefferson Avenue from Green Grove Lane to Industrial Park Drive	**44.0**
15	PO1RS	Poquoson	Victory Blvd Widening	**41.0**
16	NN2RS	Newport News	Relocated Route 60 in Newport News	**41.0**
17	VB3RS	Virginia Beach	Indian River Road-Phase VII	**37.0**
18	SF3RS	Suffolk	Crittenden Road Intersection Improvement	**30.0**
19	SF4RS	Suffolk	Suffolk Traffic Operations Center	**10.0**
Corridor Operational Improvements				
20	NF5RS	Norfolk	Llewellyn Avenue Street Improvements	**67.5**
21	PR2RS	Portsmouth	George Washington Highway Corridor Improvements (including Elm Avenue Intersection)	**62.5**
22	PR1RS	Portsmouth	Elm Avenue Improvements between George Washington Highway and Victory Boulevard	**48.0**
Bridge Replacement				
23	NF2RS	Norfolk	Campostella Bridge Rehabilitation	**93.0**
24	NF4RS	Norfolk	Hampton Boulevard Rehabilitation	**90.0**
25	NF1RS	Norfolk	Berkley Avenue Bridge Rehabilitation	**53.0**
Alternatives Analysis and Feasiblilty Studies				
26	SF1RS	Suffolk	West End Suffolk Bypass Interchange IMR Study	**72.0**
Intelligent Transportation Systems Projects				
27	NF6RS	Norfolk	Norfolk Systemwide Signal Controller and System Upgrade	**50.5**
28	VB4RS	Virginia Beach	Travel Time Display on DMS	**37.0**
Non-Highway:				
New or Expanded Service, Passenger Facilities, HS/intercity/& light rail, Station Development, Vehicle Upgrades etc.				
29	VB1RS	Virginia Beach	Bus Stop Infrastructure and Accessibility Improvements	**53.0**
30	HT4RS	HRT	Passenger Amenity Program	**7.0**
Vehicle Replacement/Purchase				
31	HT1RS	HRT	Bus Vehicle Replacement	**90.0**
Other Transit				
32	HT6RS	HRT	Farebox Upgrades - Incorporation of Alternative Fare Media Technology	**55.0**
33	HT5RS	HRT	Ticket Vending Machine (TVM) II Replacement	**42.5**
Alternatives Analysis and Feasiblilty Studies				
34	HT3RS	HRT	Naval Station Norfolk Trasnit Extension Study FEIS/PE	**75.0**
35	HT2RS	HRT	Study of Fixed Guideway Transit in Hampton and Newport News	**70.0**
36	CH1RS	Chesapeake	Study of Light Rail Extension to Chesapeake	**70.0**

Table 8 | FY 2021 Allocations to New RSTP Projects

ID	Jurisdiction	Project Description	FY-2021 Allocation
SF1RS	Suffolk	West End Suffolk Bypass Interchange IMR Study	$ 200,000
VB1RS	Virginia Beach	Bus Stop Infrastructure and Accessibility Improvements	$ 398,969
PR2RS	Portsmouth	George Washington Highway Corridor Improvements (including Elm Avenue Intersection)	$ 550,000
NF2RS	Norfolk	Campostella Bridge Rehabilitation	$ 6,000,000
HT1RS	HRT	Bus Vehicle Replacement	$ 9,158,545
Total			**$ 16,307,514**

Section V
Appendices

APPENDIX A

CMAQ Project Evaluation Worksheets

CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY - CORRIDOR IMPROVEMENTS

JURISDICTION: Newport News
PROJECT NAME: **Citywide Signal System Retiming**
LOCATION: Citywide
DESCRIPTION: Retime approximately 169 traffic signals citywide
DATE: 8/15/2014 (1)
PROJECT COST: $500,000

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)
Jefferson Avenue						
74th Street to Groome Road	19	47,737	4,296	10.7	873,444	1,427
J. Clyde Morris Blvd to Freedom Way	13	58,795	5,292	10.7	736,055	1,203
Brick Kiln Boulevard to Buchanan Drive	10	62,343	5,611	10.7	600,363	981
Richneck Road to Fort Eustis Boulevard	8	32,272	2,904	10.7	248,623	406
Warwick Boulevard						
75th St to Center Avenue	5	32,632	2,937	10.7	157,123	257
Ridgeway Place to Harpersville Rd	5	23,798	2,142	10.7	114,587	187
Riverside Hospital to First Baptis Church ent.	16	32,419	2,918	10.7	499,512	816
Oyster Point Rd. to Old Courthouse Way	12	32,269	2,904	10.7	372,901	609
Beechmont Rd. to Lee's Mill Drive	12	31,198	2,808	10.7	360,524	589
Enterprise Dr. to Elmhurst St.	5	15,800	1,422	10.7	76,077	124
Mercury Boulevard						
Newmarket Drive to River Road	4	43,859	3,947	10.7	168,945	276
Hampton Roads Center Parkway						
Meridian Pkwy to Jefferson Avenue	4	21,024	1,892	10.7	80,984	132
J. Clyde Morris Boulevard						
Harperville Road to Louise Drive	3	42,979	3,868	10.7	124,166	203
Diligence Dr. to Jefferson Avenue	5	31,825	2,864	10.7	153,237	250
Kingstowne Rd. to Riverside Entrance	3	32,801	2,952	10.7	94,762	155
Middle Ground Boulevard						
Jefferson Ave. to Warwick Blvd	5	25,000	2,250	10.7	120,375	197
Oyster Point Road						
Canon Blvd. to Jefferson Ave.	4	44,098	3,969	10.7	169,865	278
HQ Way to Warwick Blvd	5	35,694	3,212	10.7	171,867	281

Bland Boulevard						
Jefferson Ave. to Warwick Blvd	5	27,482	2,473	10.7	132,326	216
Denbigh Boulevard						
Woodside Lane to Jefferson Ave.	6	24,919	2,243	10.7	143,982	235
Millwood Rd. to Warwick Blvd	4	25,544	2,299	10.7	98,395	161
Old Courthouse Way to Lucas Creek Road	3	20,787	1,871	10.7	60,054	98
Canon Boulevard						
Thimble Shoals Blvd. to Oyster Point Rd.	6	16,604	1,494	10.7	95,938	157
Thimble Shoals Blvd.						
J Clyde Morris Blvd. to Jefferson Ave.	7	18,133	1,632	10.7	122,235	200
				Total Delay Savings		9,438 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	0.147	9,438	1,387	1.4	250	347
NOx	0.637	9,438	6,012	6.0	250	1,503

2 - COST EFFECTIVENESS

Total Cost:	$500,000	(from above)
Useful Life, years:	10 [3]	
Annual Cost:	$50,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$50,000	347	$144	**$130,743**
NOx	$50,000	1,503	$33	**$30,171**

[1] From application
[2] VDOT AADT * Regional k factor from 2014 CMP database (0.090)
[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, Fleet Avg Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION: Chesapeake
PROJECT NAME: **Chesapeake Signal Timing - Phase 3**
LOCATION: Citywide
DESCRIPTION: Citywide signal timing to be deployed in four phases. Phase 3 includes 47 signals in 9 systems and includes 15 isolated intersections.
DATE: 8/15/2014 (1)
PROJECT COST: $150,000

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):		37	10	0	47
	multiplied by:	2,690	5,900	9,500	veh / pm pk hr (2)
	multiplied by:	10.7	10.7	10.7	sec/veh (2)
	divided by:	3,600	3,600	3,600	sec/hr
	divided by:	0.17	0.17	0.17	delay factor (3)
Change in Vehicle Delay:		1,740	1,032	0	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 2,772 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	0.147	2,772	407	0.4	250	102
NOx	0.637	2,772	1,766	1.8	250	441

2 - COST EFFECTIVENESS

Total Cost: $150,000 (from above)
Useful Life, years: 10 (2)
Annual Cost: $15,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$15,000	102	$147.26	907	**$133,566**
NOx	$15,000	441	$33.98	907	**$30,823**

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) Source: VDOT, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle.
(5) Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION: Chesapeake
PROJECT NAME: **Chesapeake Signal Timing - Phase 1**
LOCATION: Citywide
DESCRIPTION: Citywide signal timing to be deployed in four phases. Phase 1 includes 43 intersections in 5 systems with 12 isolated intersections.
DATE: 8/15/2014 (1)
PROJECT COST: $150,000

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):		34	8	1	43
	multiplied by:	2,690	5,900	9,500	veh / pm pk hr (2)
	multiplied by:	10.7	10.7	10.7	sec/veh (2)
	divided by:	3,600	3,600	3,600	sec/hr
	divided by:	0.17	0.17	0.17	delay factor (3)
Change in Vehicle Delay:		1,599	825	166	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 2,590 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	0.147	2,590	381	0.4	250	95
NOx	0.637	2,590	1,650	1.7	250	413

2 - COST EFFECTIVENESS

Total Cost: $150,000 (from above)
Useful Life, years: 10 (2)
Annual Cost: $15,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$15,000	95	$157.57	907	**$142,915**
NOx	$15,000	413	$36.36	907	**$32,980**

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) Source: VDOT, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle.
(5) Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION: Chesapeake
PROJECT NAME: **Chesapeake Signal Timing - Phase 2**
LOCATION: Citywide
DESCRIPTION: Citywide signal timing to be deployed in four phases. Phase 2 includes 45 intersections located in 5 systems and 12 isolated intersections.
DATE: 8/15/2014 (1)
PROJECT COST: $150,000

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):		39	4	2	45
	multiplied by:	2,690	5,900	9,500	veh / pm pk hr (2)
	multiplied by:	10.7	10.7	10.7	sec/veh (2)
	divided by:	3,600	3,600	3,600	sec/hr
	divided by:	0.17	0.17	0.17	delay factor (3)
Change in Vehicle Delay:		1,834	413	332	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 2,579 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	0.147	2,579	379	0.4	250	95
NOx	0.637	2,579	1,643	1.6	250	411

2 - COST EFFECTIVENESS

Total Cost: $150,000 (from above)
Useful Life, years: 10 (2)
Annual Cost: $15,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$15,000	95	$158.26	907	**$143,545**
NOx	$15,000	411	$36.52	907	**$33,126**

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) Source: VDOT, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle.
(5) Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY

TRANSIT AND FIXED GUIDEWAY PROJECTS - VEHICLE PURCHASE/REPLACEMENT

AGENCY: Hampton Roads Transit
PROJECT NAME: **Bus Vehicle Replacement**
DESCRIPTION: Purchase 148 New Replacement Vehicles (29, 35, and 40 foot buses)
DATE: 8/15/2014 (1)
PROJECT COST: $70,696,396

Number of Vehicles Being Retired	148	vehicles(1)
Number of New Vehicles	148	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	1.30	6.08	40,000	148	36,009,584	36,010
NOx	2.6	12.12	40,000	148	71,742,171	71,742

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	0.14	0.66	40,000	148	3,877,955	3,878
NOx	0.2	0.94	40,000	148	5,539,936	5,540

2 - EMISSIONS REDUCTION

Reduction in Emissions: VOC 32,132 kg/yr; NOx 66,202 kg/yr

3 - COST EFFECTIVENESS

Total Cost: $70,696,396 (from above)
Useful life, years: 15 (3)
Annual Cost: $4,713,093

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Eff., $/Ton
VOC	$4,713,093	32,132	$146.68	**$133,039**
NOx	$4,713,093	66,202	$71.19	**$64,571**

(1) From application; given values for HC as proxy value for VOC

(2) Applying a conversion factor of 4.679 bhp-hr / mi, EPA data for Mobile6 (no conversion factor yet available for MOVES2010B model)

(3) As assumed previously

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION: Chesapeake
PROJECT NAME: **Chesapeake Signal Timing - Phase 4**
LOCATION: Citywide
DESCRIPTION: Citywide signal timing to be deployed in four phases. Phase 4 includes 42 intersections located in 8 systems and includes 10 isolated intersections.
DATE: 8/15/2014 (1)
PROJECT COST: $150,000

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):		35	7	0	42
	multiplied by:	2,690	5,900	9,500	veh / pm pk hr (2)
	multiplied by:	10.7	10.7	10.7	sec/veh (2)
	divided by:	3,600	3,600	3,600	sec/hr
	divided by:	0.17	0.17	0.17	delay factor (3)
Change in Vehicle Delay:		1,646	722	0	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 2,368 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	0.147	2,368	348	0.3	250	87
NOx	0.637	2,368	1,509	1.5	250	377

2 - COST EFFECTIVENESS

Total Cost:	$150,000	(from above)
Useful Life, years:	10 (2)	
Annual Cost:	$15,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$15,000	87	$172.35	907	**$156,326**
NOx	$15,000	377	$39.77	907	**$36,075**

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) Source: VDOT, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle.
(5) Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION: Norfolk
PROJECT NAME: **Norfolk Systemwide Signal Controller and System Upgrade**
LOCATION: Citywide
DESCRIPTION: Replace all traffic signal controllers at signalized intersections with "modern" controller equipment and software. Replace central signal system software.
DATE: 8/15/2014 (1)
PROJECT COST: $3,000,000

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):		25	272	13	310
	multiplied by:	2,690	5,900	9,500	veh / pm pk hr (2)
	multiplied by:	10.7	10.7	10.7	sec/veh (2)
	divided by:	3,600	3,600	3,600	sec/hr
	divided by:	0.17	0.17	0.17	delay factor (3)
Change in Vehicle Delay:		1,176	28,058	2,159	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 31,393 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	0.147	31,393	4,615	4.6	250	1,154
NOx	0.637	31,393	19,997	20.0	250	4,999

2 - COST EFFECTIVENESS

Total Cost: $3,000,000 (from above)
Useful Life, years: 10 (2)
Annual Cost: $300,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$300,000	1,154	$260.04	907	**$235,853**
NOx	$300,000	4,999	$60.01	907	**$54,428**

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) Source: VDOT, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle.
(5) Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY - CORRIDOR IMPROVEMENTS

JURISDICTION: Virginia Beach
PROJECT NAME: **Corridor Retiming - Kempsville Road and Newtown Area**
LOCATION: Kempsville Road and Newtown area
DESCRIPTION: Improve corridor signal timing along Witchduck, Kempsville and Newtown Roads
DATE: 8/15/2014 (1)
PROJECT COST: $521,180

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)
Kempsville Road						
Glen View Dr. to Princess Anne Rd.	13	28,370	2,553	10.7	355,164	580
Centerville Turnpike						
Lynnhaven Pkwy to Kempsville Rd.	3	13,562	1,221	10.7	39,181	64
Providence Rd.						
Avalon Ave. to Kempsville Rd.	9	21,194	1,907	10.7	183,688	300
Wesleyn Dr.						
Baker Rd. to Aragona Blvd.	6	18,225	1,640	10.7	105,304	172
Witchduck Rd.						
Cleveland St. to Virginia Beach Blvd	2	46,785	4,211	10.7	90,108	147
Virginia Beach Blvd to Jerico Rd.	3	16,915	1,522	10.7	48,867	80
Virginia Beach Blvd.						
Newtown Rd. to Dorset Ave.	5	34,729	3,126	10.7	167,220	273
Cleveland St.						
Witchduck Rd. to Euclid St	2	7,519	677	10.7	14,482	24
Baker Rd.						
Wesleyn Dr. to Newton Rd.	3	13,159	1,184	10.7	38,016	62
Newtown Rd.						
Virginia Beach Blvd. to Diamond Springs Rd.	3	41,115	3,700	10.7	118,781	194
Diamond Springs Rd. to Aragona Blvd.	4	7,648	688	10.7	29,460	48
				Total Delay Savings		1,945 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	0.147	1,945	286	0.3	250	71
NOx	0.637	1,945	1,239	1.2	250	310

2 - COST EFFECTIVENESS

Total Cost:	$521,180	(from above)
Useful Life, years:	10 [3]	
Annual Cost:	$52,118	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$52,118	71	$729	**$661,368**
NOx	$52,118	310	$168	**$152,623**

[1] From application

[2] VDOT AADT * Regional k factor from 2014 CMP database (0.090)

[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, Fleet Avg Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle

CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY - CORRIDOR IMPROVEMENTS

JURISDICTION: Suffolk
PROJECT NAME: **Suffolk Citywide Signal Timings**
LOCATION: Citywide
DESCRIPTION: Retime approximately 100 traffic signals citywide
DATE: 8/15/2014 (1)
PROJECT COST: $1,015,500

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 Road						
Bennetts Pasture to Harbour View Blvd. &	8	59,000	5,310	10.7	454,536	743
Harbour View Blvd.						
Bridge Rd. to Towne Point Rd.	6	18,000	1,620	10.7	104,004	170
Holland Road						
Manning Bridge Rd. to RTE 58 Bypass	5	88,000	7,920	10.7	423,720	692
Portsmouth Blvd.						
Pinner St. to E Washington St.	4	36,000	3,240	10.7	138,672	227
Pruden Blvd.						
Lake Prince Dr. to RTE 58 EB Off-ramp	5	38,000	3,420	10.7	182,970	299
N Main St.						
Pruden Blvd. to Suffolk Plaza Park Lot	5	25,000	2,250	10.7	120,375	197
Godwin Blvd.						
Kings Fork Rd Rte 58 Bypass	8	20,000	1,800	10.7	154,080	252
College Drive						
Lake View Pkway to Towne Point Rd.	3	18,000	1,620	10.7	52,002	85
Town Point Rd.						
Hunters Ct. to Respass Beach Rd	3	28,300	2,547	10.7	81,759	134
W Washington St.						
Lipton Tea Factory to N Main St.	6	16,900	1,521	10.7	97,648	160
N Main St.						
W Washington St. to Prentis St.	6	19,000	1,710	10.7	109,782	179
Market St.						
N Main St. to Saratoga St	2	4,000	360	10.7	7,704	13

Finney Ave.						
N Main St. to Moore Ave	3	6,800	612	10.7	19,645	32
College Drive						
Magnolia Dr. to Bridge Rd.	4	33,000	2,970	10.7	127,116	208
Carolina Rd.						
Fayette St. to Dill Rd.	3	11,000	990	10.7	31,779	52
E Washington St/White Marsh Rd.						
Pinner St. to Fire Station 3	5	14,300	1,287	10.7	68,855	113
W Constance Rd						
N Main St. to Prentis St./Pitchkittle Rd.	5	8,800	792	10.7	42,372	69

Total Delay Savings 3,623 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	0.147	3,623	533	0.5	250	133
NOx	0.637	3,623	2,308	2.3	250	577

2 - COST EFFECTIVENESS

Total Cost:	$1,015,500	(from above)
Useful Life, years:	10 [3]	
Annual Cost:	$101,550	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$101,550	133	$763	**$691,850**
NOx	$101,550	577	$176	**$159,658**

[1] From application

[2] VDOT AADT * Regional k factor from 2014 CMP database (0.090)

[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, Fleet Avg Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle

CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY - CORRIDOR IMPROVEMENTS

JURISDICTION: Virginia Beach
PROJECT NAME: **Traffic Adaptive Corridor Implementation**
LOCATION: Indian River Road from Military Highway to Indian Lakes Blvd in Kempsville area.
DESCRIPTION: Upgrading existing traffic signal system to an adaptive traffic signal system to measure traffic conditions in real time and constantly adjust signal timing based on real-time data
DATE: 8/15/2014 (1)
PROJECT COST: $390,000

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)
Indian River Road						
Military Highway to Indian Lakes Drive	14	55,448	4,990	10.7	747,550	1,221
				Total Delay Savings		1,221 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	0.147	1,221	180	0.2	250	45
NOx	0.637	1,221	778	0.8	250	195

2 - COST EFFECTIVENESS

Total Cost: $390,000 (from above)
Useful Life, years: 10 (3)
Annual Cost: $39,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$39,000	45	$869	**$787,999**
NOx	$39,000	195	$200	**$181,846**

(1) From application
(2) VDOT AADT * Regional k factor from 2014 CMP database (0.090)
(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, Fleet Avg Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle

CONGESTION MITIGATION AND AIR QUALITY

OTHER - Wayfinding Signs

JURISDICTION: Newport News

PROJECT NAME: **Citywide Wayfinding Phase IV**

DESCRIPTION: Installing signs to area attractions in an effort to increase efficiency of movement for drivers unfamiliar with the City.

DATE: 8/1/2014 (on application)

PROJECT COST: $500,000

1 - Reduced Emissions

Total annual visitors: 9,895,411 Source: Newport News Department of Planning (2009 data)

*City estimates that up to 10% of these visitors get lost and travel an average of 2 extra miles while lost

Total number of people:	989,541	(10% of total visitors)
Vehicle occupancy counts:	2.5	
Total # of vehicles impacted:	395,816	
Average trip length (mi):	2	
Total VMTs:	791,633	
Average travel speed:	35 MPH	

Emissions Reductions				
Type	Factors, g/mi [1]	Annual VMTs (above)	kg/yr	ton/year
VOC	0.074	791,633	58.58	0.06
Nox	0.246	791,633	194.82	0.21

2 - COST EFFECTIVENESS

Total Cost:	$500,000	(from above)
Useful Life, years:	10 [2]	
Annual Cost:	$50,000	

Type	Cost, $/yr (above)	Emissions Reduction, ton/yr(above)	Cost Effectiveness, $/ton
VOC	$50,000	0.06	**$775,844**
NOx	$50,000	0.21	**$233,039**

Notes:

[1] Source: VDOT, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, 35 mph

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Newport News
PROJECT NAME: **Briarfield Sidewalk**
LOCATION: Briarfield Road from Marshall Avenue to Chestnut Avenue
DESCRIPTION: Install 5' sidewalk along southside of Briarfield Rd. including ADA compliant landing for existing bus stops
DATE: 7/15/2014 (on application)
PROJECT COST: $600,000

1- ESTIMATES OF VMT REDUCTIONS:

Facility Length (L): 0.51 mi. (2)

Demand estimation for proposed facility:

Pedestrians Only (1)

Number of HH within 1-mile radius:	8,985 (3)
Avg. HH size of driving age adults:	2.13 (4)
Driving age adults within 1-mile radius:	19,138
Trips, per day per driving age adult:	4
Trips per day:	76,552
Estimated % walking mode share existing:	0.5% (2)
Existing Adult Pedestrian trips, daily	383
Driving age adults within 1-mile radius:	19,138 (above)
Trips, per day per driving age adult:	4
Trips per day:	76,552
Estimated % walking mode share after:	3.5% (2)
Expected Adult Pedestrian trips, daily	2,679

Calculating VMT reduction:

Additional walking trips per day:	2,296 (7)
Eliminated vehicle trip rate:	50% (8)
Vehicle trips eliminated per day:	1,148
Avg. Eliminated Auto Trip Length, veh-mi.:	2 (9)
VMT reduction, vehicle mi:	2,296

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi (6)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	0.074	2,296	170	0.170	250	42
NOx	0.246	2,296	565	0.565	250	141

3- COST EFFECTIVENESS:

Total Cost:	$600,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$40,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$40,000	42	$942	907	**$854,129**
NOx	$40,000	141	$283	907	**$256,933**

Notes:

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

[(2)] From application.

[(3)] HRTPO 2009 TAZ data, 1-mile buffer of proposed facility

[(4)] VB-NO-NN, VA-NC MSA Persons per Driving Age per Household, HRPDC analysis of 2008-2012 ACS 5-yr estimates

[(6)] Source: VDOT, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, 35mph

[(7)] (Expected Adult Pedestrian Trips, Daily - Existing Adult Pedestrian Trips, Daily)

[(8)] Assuming that only 50% of each new alt. mode trip eliminates an auto trip

[(9)] 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 (2 mile for bicycles, 1 mile for pedestrians Source: 2001 NHTS Table Designer).

CONGESTION MITIGATION AND AIR QUALITY

TRANSIT SHELTERS/FACILITIES

LOCALITY/AGCY: Norfolk
PROJECT NAME: **Bus Shelters and Pedestrian Improvements**
DESCRIPTION: Construct 72 new bus shelters to replace damaged or old bus shelters that are beyond useful life.
DATE: 8/15/2014 (on application)
PROJECT COST: $700,000

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

2- TRAVEL REDUCTIONS:

Increase in Ridership:	221	boardings/day [1]
Vehicle Occupancy Rate (work):	1.15	persons/veh [3]
Reduction in Daily Vehicle Trips:	192	vehicles/day
Average Trip Length:	10	miles/trip [4]
Reduction in VMT:	1,922	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, wkdays/yr	Emissions Reduction, kg/yr
VOC	0.074	1,922	142	0.142	250	36
NOx	0.246	1,922	473	0.473	250	118

4- COST EFFECTIVENESS:

Total Cost:	$700,000	above
Useful Life, years:	15	as assumed in previous CMAQ analyses
Annual Cost:	$46,667	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$46,667	36	$1,313	907	**$1,190,551**
NOx	$46,667	118	$395	907	**$358,133**

Notes:

[1] From Applicant

[2] Source: VDOT, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2011, 35mph

[3] As assumed in CMAQ analyses of previous years

[4] 2001 NHTS Table Designer

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Portsmouth
PROJECT NAME: **Port Norfolk/Shea Terrace Bicycle Boulevard**
LOCATION: Mt. Vernon Ave - Detroit St. to London Blvd. - Peninsula Ave.
DESCRIPTION: Construct a 1.83 mile bicycle boulevard to tie into existing bike lanes in the north central portion of the city.
DATE: 8/14/2014 (on application)
PROJECT COST: $500,000

1- ESTIMATES OF VMT REDUCTION:

Demand estimation for proposed facility re: NCHRP Report 552:

Local Bicycle Commute Share (C): 0.4% (1)
Facility Length (L): 3.70 mi. (10)

Buffer, Distance from Project	TAZ (11)	2009 Density (D), persons/ sq.mi.
0.00-0.25 mi.	450	1,269
	455	4,441
	457	2,792
	460	4,391
	461	6,588
	462	0
	464	4,245
	507	7,274
	Average:	3,875
0.25-0.50 mi.	449	2,861
	456	5,305
	459	3,780
	467	9,636
	Average:	5,396
0.50-1.00 mi.	471	32
	476	3,859
	488	4,022
	499	210
	917	5,892
	Average:	2,803

Buffer, Distance from Project	TAZ	2009 Density (D), persons/ sq.mi.	Area of Buffer (A), sq.mi. (5)	Residents in Buffer (R=D*A)	Existing Adult Cyclists (R*C*0.8) (2)	Additional Adult Cyclists (3)	Existing Adult Pedestrians (4)	Additional Adult Pedestrians (4)
0.00-0.25 mi.	above	3,875	1.85	7,169	24	46	6	12
0.25-0.50 mi.	above	5,396	1.85	9,982	34	38	9	10
0.50-1.00 mi.	above	2,803	3.70	10,371	35	14	9	4
				27,522	93	98	24	26

Calculating VMT reduction:

	Biking	Walking	
Additional Users:	98	26	above
Trips, per day per user:	4	4	
Additional Person Trips on Facility:	392	104	
Estimated vehicle trip rate:	50%	50% [6]	
Vehicle trips eliminated per day:	196	52	
Avg. Alt. Mode Trip Length, mi.:	2	1 [8]	
Factor (for converting alt. mode trip lengths):	3	2 [9]	
Avg. Eliminated Auto Trip Length, veh-mi.:	6	2	
VMT Reduction, mi:	1,176	104	
		Total:	1,280 vehicle-miles

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi [7]	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	0.074	1280	95	0.095	250	24
NOx	0.246	1280	315	0.315	250	79

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	24	$1,408	907	**$1,276,745**
NOx	$33,333	79	$423	907	**$384,062**

Notes:

[1] 2008-2012 American Community Survey, 5-Year Estimates, Commuting (Journey to Work), VB-NO-NN, VA-NC MSA

[2] "Low" estimate, re: NCHRP Report 552, pg. 38

[3] "Additional": i.e. as a result of proposed facility; Additional = 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

[4] Pedestrians = Cyclists / 4, based on ground counts from HRPDC CMAQ Post Evaluation Study, Feb 2003 Appendix C

[5] Only areas lateral to facility are included in buffers; semi-circular areas at ends of facility are not included in buffers

[6] Assuming that only 50% of each new alt. mode trip eliminates an auto trip

[7] Source: VDOT, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, 35mph

[8] Source: 2001 NHTS Table Designer

[9] 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).

[10] From application

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION: Chesapeake
PROJECT NAME: **Citywide Traffic Signal System Upgrade**
LOCATION: Citywide
DESCRIPTION:

Citywide upgrade of traffic signal system in the City of Chesapeake to include feasibility study in the first year and subsequent central system upgrades, ITS elements, and local intersection upgrades.

DATE: 8/15/2014 (1)
PROJECT COST: $7,200,000

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):		138	25	4	167
	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:		6,490	2,579	664	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 9,734 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	0.147	9,734	1,431	1.4	250	358
NOx	0.637	9,734	6,200	6.2	250	1,550

2 - COST EFFECTIVENESS

Total Cost: $7,200,000 (from above)
Useful Life, years: 10 (2)
Annual Cost: $720,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$720,000	358	$2,012.82	907	**$1,825,632**
NOx	$720,000	1,550	$464.50	907	**$421,300**

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) Source: VDOT, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle.
(5) Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY
OTHER - TRAFFIC OPERATIONS CENTER

JURISDICTION: Suffolk
PROJECT NAME: **Suffolk Traffic Operations Center**
LOCATION: Citywide
DESCRIPTION: TOC providing fiber optic connectivity and ITS highway management systems along corridors throughout the city to manage traffic signals, incidents and special events.
DATE: 8/15/2014 (1)
PROJECT COST: $4,000,000

1 - EMISSIONS REDUCTION FOR AFFECTED INTERSECTIONS

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 Road						
Bennetts Pasture to Harbour View Blvd. &	7	59,000	5,310	10.7	397,719	650
Harbour View Blvd.						
Bridge Rd. to Towne Point Rd.	5	18,000	1,620	10.7	86,670	142
Holland Road						
Manning Bridge Rd. to RTE 58 Bypass	5	88,000	7,920	10.7	423,720	692
Portsmouth Blvd.						
Pinner St. to E Washington St.	4	36,000	3,240	10.7	138,672	227
Pruden Blvd.						
Lake Prince Dr. to RTE 58 EB Off-ramp	5	38,000	3,420	10.7	182,970	299
N Main St.						
Pruden Blvd. to Suffolk Plaza Park Lot	5	25,000	2,250	10.7	120,375	197
Godwin Blvd.						
Kings Fork Rd Rte 58 Bypass	8	20,000	1,800	10.7	154,080	252
College Drive						
Lake View Pkway to Towne Point Rd.	3	18,000	1,620	10.7	52,002	85
Town Point Rd.						
Hunters Ct. to Respass Beach Rd	2	28,300	2,547	10.7	54,506	89
W Washington St.						
Lipton Tea Factory to N Main St.	5	16,900	1,521	10.7	81,374	133
N Main St./ Market St.						
W Washington St. to Prentis St.	7	23,000	2,070	10.7	155,043	253

Finney Ave.						
N Main St. to Moore Ave	2	6,800	612	10.7	13,097	21
College Drive						
Magnolia Dr. to Bridge Rd.	4	33,000	2,970	10.7	127,116	208
Carolina Rd.						
Fayette St. to Dill Rd.	3	11,000	990	10.7	31,779	52
E Washington St/White Marsh Rd.						
Pinner St. to Fire Station 3	5	14,300	1,287	10.7	68,855	113
W Constance Rd						
N Main St. to Prentis St./Pitchkittle Rd.	4	8,800	792	10.7	33,898	55
				Total Delay Savings		3,467 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	0.147	3,467	510	0.5	250	127
NOx	0.637	3,467	2,209	2.2	250	552

2 - COST EFFECTIVENESS

Total Cost:	$4,000,000	(from above)
Useful Life, years:	10 [3]	
Annual Cost:	$400,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$400,000	127	$3,139	**$2,847,356**
NOx	$400,000	552	$724	**$657,082**

[1] From application

[2] VDOT AADT * Regional k factor from 2014 CMP database (0.090)

[3] As assumed for corridor improvement projects

[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, Fleet Avg Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Isle of Wight County
PROJECT NAME: **Main Street at Route 10 Sidewalk Extension (Smithfield Sidewalk)**
LOCATION: Main Street at Route 10 to Westside Elementary
DESCRIPTION: Install sidewalks to connect the Town of Smithfield to Westside Elementary
DATE: 8/12/2014 (on application)
PROJECT COST: $840,233

1- ESTIMATES OF VMT REDUCTIONS:

Facility Length (L): 0.75 mi. (2)

Demand estimation for proposed facility:

Pedestrians Only (1)

Number of HH within 1-mile radius:	4,798 (3)	
Avg. HH size of driving age adults:	2.13 (4)	
Driving age adults within 1-mile radius:	10,220	
Trips, per day per driving age adult:	4	
Trips per day:	40,879	
Estimated % walking mode share existing:	0.5% (9)	
Existing Adult Pedestrian trips, daily	204	
Driving age adults within 1-mile radius:	10,220	(above)
Trips, per day per driving age adult:	4	
Trips per day:	40,879	
Estimated % walking mode share after:	3.5% (9)	
Expected Adult Pedestrian trips, daily	1,431	

Calculating VMT reduction:

Additional walking trips per day:	1,227 (6)
Eliminated vehicle trip rate:	50% (7)
Vehicle trips eliminated per day:	614
Avg. Eliminated Auto Trip Length, veh-mi.:	2 (8)
VMT reduction, vehicle mi:	1,227

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi (5)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	0.074	1,227	91	0.091	250	23
NOx	0.246	1,227	302	0.302	250	75

3- COST EFFECTIVENESS:

Total Cost:	$840,233	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$56,016	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$56,016	23	$2,468	907	**$2,238,203**
NOx	$56,016	75	$742	907	**$673,281**

Notes:

(1) CMAQ application specifies that cycling is not allowed.

(2) From application.

(3) HRTPO 2009 TAZ data, 1-mile buffer of proposed facility

(4) VB-NO-NN, VA-NC MSA Persons per Driving Age per Household, HRPDC analysis of 2008-2012 ACS 5-yr estimates

(5) Source: VDOT, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, 35mph

(6) (Expected Adult Pedestrian Trips, Daily - Existing Adult Pedestrian Trips, Daily)

(7) Assuming that only 50% of each new alt. mode trip eliminates an auto trip

(8) 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 (2 mile for bicycles, 1 mile for pedestrians Source: 2001 NHTS Table Designer).

(9) No data provided, assumed same mode share rate as comparable sidewalk project application from City of Newport News

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Gloucester County
PROJECT NAME: **Pedestrian Improvements on RTE 1208 Greate Road**
LOCATION: RTE 1208 Greate Road from Route 17 to Greate West/Greate Rd. Intersection
DESCRIPTION: Pedestrian Improvements on RTE 1208 Greate Road and adjacent side roads
DATE: 8/12/2014 (on application)
PROJECT COST: $1,500,000

1- ESTIMATES OF VMT REDUCTIONS:

Facility Length (L): 0.63 mi. (2)

Demand estimation for proposed facility:

Pedestrians Only (1)

Number of HH within 1-mile radius:	2,917 (3)	
Avg. HH size of driving age adults:	2.13 (4)	
Driving age adults within 1-mile radius:	6,213	
Trips, per day per driving age adult:	4	
Trips per day:	24,853	
Estimated % walking mode share existing:	0.5% (9)	
Existing Adult Pedestrian trips, daily	124	
Driving age adults within 1-mile radius:	6,213	(above)
Trips, per day per driving age adult:	4	
Trips per day:	24,853	
Estimated % walking mode share after:	3.5% (9)	
Expected Adult Pedestrian trips, daily	870	

Calculating VMT reduction:

Additional walking trips per day:	746 (6)
Eliminated vehicle trip rate:	50% (7)
Vehicle trips eliminated per day:	373
Avg. Eliminated Auto Trip Length, veh-mi.:	2 (8)
VMT reduction, vehicle mi:	746

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi (5)	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	0.074	746	55	0.055	250	14
NOx	0.246	746	184	0.184	250	46

3- COST EFFECTIVENESS:

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

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$100,000	14	$7,246	907	**$6,571,988**
NOx	$100,000	46	$2,180	907	**$1,976,939**

Notes:

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

[2] From application.

[3] HRTPO 2009 TAZ data, 1-mile buffer of proposed facility

[4] VB-NO-NN, VA-NC MSA Persons per Driving Age per Household, HRPDC analysis of 2008-2012 ACS 5-yr estimates

[5] Source: VDOT, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, 35mph

[6] (Expected Adult Pedestrian Trips, Daily - Existing Adult Pedestrian Trips, Daily)

[7] Assuming that only 50% of each new alt. mode trip eliminates an auto trip

[8] 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 (2 mile for bicycles, 1 mile for pedestrians Source: 2001 NHTS Table Designer).

[9] Data provided by applicant did not yield mode share, assumed same mode share rate as comparable sidewalk project application from City of Newport News

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION: Suffolk
PROJECT NAME: **Downtown Signal System Upgrades**
LOCATION: Downtown Suffolk
DESCRIPTION: Upgrade traffic signal system in downtown Suffolk to ATC standard controllers and fiber optic based communications network.
DATE: 8/15/2014 (1)
PROJECT COST: $10,000,000

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):		0	22	0	22
	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:		0	2,269	0	hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 2,269 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	0.147	2,269	334	0.3	250	83
NOx	0.637	2,269	1,446	1.4	250	361

2 - COST EFFECTIVENESS

Total Cost: $10,000,000 (from above)
Useful Life, years: 10 (2)
Annual Cost: $1,000,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$1,000,000	83	$11,990.45	907	**$10,875,341**
NOx	$1,000,000	361	$2,767.03	907	**$2,509,694**

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) Source: VDOT, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle.
(5) Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY

HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: Virginia Beach
PROJECT NAME: **Rosemount Road/South Plaza Trail Intersection Improvements**
LOCATION: Intersection of Rosemount Road and South Plaza Trail
DESCRIPTION: Add an eastbound right turn lane on South Plaza Trail at intersection of Rosemount Road.

DATE: 8/15/2014 (1)
PROJECT COST: $348,038

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		57.9	sec/veh (1)
Intersection Delay After Project		48.7	sec/veh (1)
Change In Intersection Delay		9.2	sec/veh, pk hr
Total Vehicles During Peak Hour		3,641	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		9.3	veh hr's, pk hr
	divided by	17%	pk hr delay factor(2)
Change In Intersection Delay		54.7	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	0.147	54.7	8	0.008	250	2.0
NOx	0.637	54.7	35	0.035	250	8.7

2 - COST EFFECTIVENESS

Total Cost:	$348,038	(from above)
Useful life, years:	10 (4)	
Annual Cost:	$34,804	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$34,804	2.0	$17,303	907	**$15,693,490**
NOx	$34,804	8.7	$3,993	907	**$3,621,575**

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, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle.
(4) As previously assumed.

CONGESTION MITIGATION AND AIR QUALITY

HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: Virginia Beach
PROJECT NAME: **Independence Blvd/Edwin Dr Intersection Improvements**
LOCATION: Intersection of Independence Blvd. and Edwin Drive
DESCRIPTION: Improve westbound Edwin Drive from a single left turn lane to a dual left turn lane and extending the right turn storage length all within existing right-of-way.
DATE: 8/15/2014 (1)
PROJECT COST: $593,052

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		42.7	sec/veh (1)
Intersection Delay After Project		35	sec/veh (1)
Change In Intersection Delay		7.7	sec/veh, pk hr
Total Vehicles During Peak Hour		6,908	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		14.8	veh hr's, pk hr
	divided by	17%	pk hr delay factor(2)
Change In Intersection Delay		86.9	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	0.147	86.9	13	0.013	250	3.2
NOx	0.637	86.9	55	0.055	250	13.8

2 - COST EFFECTIVENESS

Total Cost:	$593,052	(from above)
Useful life, years:	10 (4)	
Annual Cost:	$59,305	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$59,305	3.2	$18,567	907	**$16,840,349**
NOx	$59,305	13.8	$4,285	907	**$3,886,234**

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, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle.
(4) As previously assumed.

CONGESTION MITIGATION AND AIR QUALITY

OTHER

JURISDICTION:	Chesapeake
PROJECT NAME:	**Freeman Avenue/ Norfolk-Portsmouth Beltline Railroad Overpass**
LOCATION:	At-grade railroad crossing on Freeman Ave at Norfolk-Portsmouth Beltline (NPBL)
DESCRIPTION:	Remove existing at-grade crossing and replace with an overpass bridge
DATE:	8/15/2014 [1]
PROJECT COST:	$21,007,550

1 - EMISSIONS REDUCTION

Vehicle Volume (ADT)	5,000	/1440	3.47	vehicles per minute
Train Crossings per day	20		69.44	vehicles delayed per train [3]
Average Obstruction per train (min)	20		10	average vehicle delay (mins) [6]

Arterial	Number of Vehicles Delayed [4]	Avg Delay Before (s/veh)	Avg Delay After (s/veh)	Delay Savings (s/veh)	Delay Savings (s/day)	Delay Savings (hr/day)
Freeman Avenue						
Freeman Avenue at Norfolk-Portsmouth Beltline Railroad Crossing	1389	600	0	600	833,333	231
				Total Delay Savings		231 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	0.147	231	34	0.0	250	9
NOx	0.637	231	147	0.1	250	37

2 - COST EFFECTIVENESS

Total Cost:	$21,007,550
Useful Life, years:	68 [5]
Annual Cost:	$308,935

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness, $/ton
VOC	$308,935	9	$36,316	**$32,938,224**
NOx	$308,935	37	$8,381	**$7,601,129**

[1] From application

[2] Source: VDOT, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle.

[3] Average Obstruction per train (minutes) * Vehicles per minute

[4] Vehicles delayed per train * number of train crossings per day

[5] Avg. life of bridges at time of replacement,Regional Bridge Study pg. 55, HRTPO, November 2012

[6] Avg. of 20 minute maximum delay and 0 minute minimum delay; (AVG 20,0)

CONGESTION MITIGATION AND AIR QUALITY

HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: Suffolk

PROJECT NAME: **Route 17 (Bridge Road) and Shoulders Hill Road Intersection Improvements**

LOCATION: Intersection of Bridge Rd. and Shoulders Hill Rd.

DESCRIPTION: Provide dedicated right and left turn lanes on both Shoulders Hill Road and Bridge Road. Scope will include a traffic analysis, design, right of way acquisition and construction.

DATE: 8/11/2014 (1)

PROJECT COST: $18,000,000

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		109	sec/veh (1)
Intersection Delay After Project		19	sec/veh (1)
Change In Intersection Delay		90.0	sec/veh, pk hr
Total Vehicles During Peak Hour		5,800	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		145.0	veh hr's, pk hr
	divided by	17%	pk hr delay factor(2)
Change In Intersection Delay		852.9	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	0.147	852.9	125	0.125	250	31.3
NOx	0.637	852.9	543	0.543	250	135.8

2 - COST EFFECTIVENESS

Total Cost:	$18,000,000	(from above)
Useful life, years:	10 (4)	
Annual Cost:	$1,800,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$1,800,000	31.3	$57,424	907	**$52,083,885**
NOx	$1,800,000	135.8	$13,252	907	**$12,019,358**

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, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle.

(4) As previously assumed.

CONGESTION MITIGATION AND AIR QUALITY

HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: Gloucester
PROJECT NAME: **Intersection Improvement at RTE 17B and RTE 3/14 John Clayton Memorial Highway**
LOCATION: .25 M North of RTE 17 B Main Street and 3/14 John Clayton Mem. Hwy Intersection to .25 M South
DESCRIPTION: Intersection Improvement at RTE 17B and RTE 3/14 John Clayton Memorial Highway
DATE: 7/14/2014 (1)
PROJECT COST: $6,500,000

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		66	sec/veh (1)
Intersection Delay After Project		12.1	sec/veh (1)
Change In Intersection Delay		53.9	sec/veh, pk hr
Total Vehicles During Peak Hour		3,100	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		46.4	veh hr's, pk hr
	divided by	17%	pk hr delay factor(2)
Change In Intersection Delay		273.0	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	0.147	273.0	40	0.040	250	10.0
NOx	0.637	273.0	174	0.174	250	43.5

2 - COST EFFECTIVENESS

Total Cost:	$6,500,000	(from above)
Useful life, years:	10 (4)	
Annual Cost:	$650,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$650,000	10.0	$64,782	907	**$58,757,629**
NOx	$650,000	43.5	$14,950	907	**$13,559,453**

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, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2010b), 2021, idle.
(4) As previously assumed.

APPENDIX B

RSTP Project Evaluation Worksheets

Table 2: Highway- Roadway Widening, New Facility, HOV Lanes, Intersection Improvements

Applicant	Project Name (code)	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)
Gloucester	Intersection Improvement at RTE 17B and RTE 3/14 John Clayton Memorial Highway **GC1RS**	$ 6,500,000	Current LOS: D-E Future LOS: E-F	10	Annual: ($6.5m*5%) /(34k*0.5mi*338 days) = $0.057/vmt	16	Yes	5	Ped. Safety,geometric, capacity improvements, reduce RE crashes	10	Reduction of emissions from improved operations	10	Community support: Yes detailed design and $ est., and all approvals: No	3	**51**
Isle of Wight Co	Route 258 NORTH Widening **IW1RS**	$ 6,000,000	Current LOS: D-E Future LOS: E-F	15	Annual: ($6.0m*5%) /(5.7k*1.8mi *338 days) = $0.087/vmt	12	Yes	5	Bike/ped accom. >storage & stacking capacity, access & evacuation mgmt.	20	Decreased idling and emissions at intersections	10	Community support: Yes detailed design and $ est., and all approvals: No	3	**62**
Isle of Wight Co	Route 607 (Old Mill Road) Signalization **IW2RS**	$ 382,728	Currrent LOS: C Future LOS: F	10	Annual: ($.382m*5%) /(9.82k*0.25mi *338 days) = $0.023/vmt	19	No	0	Reduced speeds along corridor, Increased opportunity for left turning freight traffic	20	Decreased idling and emissions at intersections	10	Community support: Yes detailed design and $ est: Yes, and all approvals: No	7	**59**
Isle of Wight Co	Route 258 SOUTH Widening **IW3RS**	$ 8,000,000	Current LOS: C-D Future LOS: E-F	10	Annual: ($8.0m*5%) /(5.7k*2.6mi *338 days) = $0.08/vmt	13	Yes	5	Bike/ped accom. >storage & stacking capacity, access & evacuation mgmt.	18	Decreased idling and emissions at the intersection	10	Community support: Yes detailed design and $ est: Yes, and all approvals: No	7	**56**
James City Co	Route 60 Relocation & Upgrading/ Skiffes Creek Connector **JC1RS**	$ 153,622,167	Current LOS: A-C Future LOS: F	10	Annual: ($153.62m*5%) /(11.5k*2.57mi *338 days) = $0.779/vmt	0	Yes	15	Industrial traffic redirected, improved access for local traffic & bike/ped	18	Decreased idling and emissions at intersections	10	Community support: Yes detailed design and $ est: Yes, and all approvals: No	7	**53**
James City Co	Longhill Road Widening Phase I **JC2RS**	$ 21,115,000	Current LOS: (EB) C-D Current LOS: (WB) C-F Future LOS: (EB) D-F Future LOS: (WB) C-F **No-Build Scenario**	13	Annual: ($21.115m*5%) /(8.7k*0.64mi *338 days) = $0.56/vmt	3	Yes	10	Bike/ped accom., additional lane decrease lane space competition	10	Includes active transport facilities, decreased idling and emissions at intersections	10	Community support: Yes detailed design and $ est: Yes, and all approvals: No	7	**46**
James City Co	Longhill Road Widening Phase II **JC3RS**	$ 40,401,004	Current LOS: (EB) C-D Current LOS: (WB) C-F Future LOS: (EB) D-F Future LOS: (WB) C-F **No-Build Scenario**	11	Annual: ($40.401m*5%) /(31.25k*1.23mi *338 days) = $0.155/vmt	8	Yes	10	Bike/ped accom., additional lane decrease lane space competition	10	Includes active transport facilities, decreased idling and emissions at intersections	10	Community support: Yes detailed design and $ est: Yes, and all approvals: No	7	**49**

Applicant	Project Name (code)	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)
James City Co	Longhill Road Widening Phase III **JC4RS**	$ 32,063,002	Current LOS: (EB) C-D Current LOS: (WB) C-F Future LOS: (EB) D-F Future LOS: (WB) C-F **No-Build Scenario**	12	Annual: ($32.063m*5%) /(37.5k*1.16mi *338 days) = $0.11/vmt	10	Yes	10	Bike/ped accom., additional lane decrease lane space competition	10	Includes active transport facilities, decreased idling and emissions at intersections	10	Community support: Yes detailed design and $ est: Yes, and all approvals: No	7	**52**
Newport News	Jefferson Avenue from Green Grove Lane to Industrial Park Drive **NN1RS**	$ 23,000,000	Current LOS: N/A Future LOS: A-C	0	Annual: ($23m*5%) /(29.4k*0.75mi *338 days) = $0.15/vmt	9	Yes	10	Add'l lane to avoid turning veh., median to separate directions	15	Reduction in congestion along corridor, increased speeds	10	Community support: Yes detailed design and $ est., and all approvals: No	3	**44**
Newport News	Relocated Route 60 in Newport News **NN2RS**	$ 18,300,000	Current LOS: N/A Future LOS: N/A	0	Annual: ($18.3m*5%) /(27.25k*1.4mi *338 days) = $0.71/vmt	1	Yes	15	Bike/ped accom., median to separate directions, streetlights added	15	Reduction in congestion along current corridor, and increased speeds due to increased capacity w/ new corridor	10	Community support: Yes detailed design and $ est., and all approvals: No	3	**41**
Norfolk	I-64/Northhampton Interchange Ramp Modifications **NF3RS**	$ 6,000,000	Current LOS: E Future LOS: F	17	Annual: ($6m*5%) /(81k*0.34mi *338 days) = $0.032/vmt	18	Yes	5	Eliminate dangerous queuing onto I-64 and weaving on Northhampton Bl.	20	Reduction in emissions due to decrease in bottlenecks	10	Community support: Yes detailed design and $ est., and all approvals: No	3	**70**
Poquoson	Victory Blvd Widening **PO1RS**	$ 21,700,000	Current LOS: N/A Future LOS: N/A	0	Annual: ($21.7m*5%) /(13.3k*0.79mi *338 days) = $0.31/vmt	6	Yes	10	Median to separate directions, improved evacuation mgmt., reduce congestion	15	Reduction in congestion along corridor, increased speeds	10	Community support: Yes detailed design and $ est., and all approvals: No	3	**41**
Poquoson	Laydon Way/Poquoson Avenue/Little Florida Road Intersection Realignment **PO2RS**	$ 892,163	Current LOS: N/A Future LOS: N/A	0	Annual: ($.89m*5%) /(11k*0.79mi *338 days) = $0.015/vmt	20	Yes	5	Pedestrian accom., eliminate ROW intersection for a round about	15	Decreased idling and emissions at intersections	10	Community support: Yes detailed design and $ est: Yes, and all approvals: No	7	**50**
Suffolk	Godwin Blvd Interchange Upgrades **SF2RS**	$ 10,000,000	Current LOS: D Future LOS: E	10	Annual: ($21.7m*5%) /(13.3k*0.79mi *338 days) = $0.31/vmt	6	No	5	Reduce spillover to main line traffic	15	Reduction in emissions due to decrease in main line spillover	10	Community support: Yes detailed design and $ est: No, and all approvals: Yes	7	**46**
Suffolk	Crittenden Road Intersection Improvement **SF3RS**	$ 8,000,000	Current LOS: C Future LOS: C	0	Annual: ($8m*5%) /(19.6k*0.2mi *338 days) = $0.32/vmt	5	Yes	5	eliminate uneven intersection and vehicles bottoming out	10	Decreased idling and emissions at the intersection	10	Community support: Yes detailed design and $ est: No, and all approvals: Yes	7	**30**

Applicant	Project Name (code)	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)
Suffolk	Suffolk Traffic Operations Center **SF4RS**	$ 4,000,000	Current LOS: N/A Future LOS: N/A	0	N/A	0	Yes	0	Improve traffic incident management, dynamic message devices	10	No explanation	0	Community support: Yes detailed design and $ est: No, and all approvals: Yes	7	**10**
Suffolk	Route 17 (Bridge Road) and Shoulders HIll Road Intersection **SF5RS**	$ 18,000,000	Current LOS: C Future LOS: F	10	Annual: ($18m*5%) /(34.2k*0.5mi *338 days) = $0.16/vmt	7	Yes	5	Dedicated turn lane increases capacity & reduces queuing, improved shoulders, improved access mgmt.	10	Decreased idling and emissions at the intersection	10	Community support: Yes detailed design and $ est., and all approvals: No	3	**42**
Virginia Beach	Elbow Road Extended-Phase II **VB2RS**	$ 75,588,369	Current LOS: F Future LOS: F	20	Annual: ($75.588m*5%) /(11.5k*3.0mi *338 days) = $0.32/vmt	5	Yes	10	Wider roadway to reduce runoff crashes, geometric improvements	10	Reduction in congestion along corridor, increased speeds	10	Community support: Yes detailed design and $ est: Yes, and all approvals: No	7	**55**
Virginia Beach	Indian River Road-Phase VII **VB3RS**	$ 89,070,517	Current LOS: C Future LOS: D	3	Annual: ($89.070m*5%) /(12.5k*2.2mi *338 days) = $0.48/vmt	4	Yes	10	Wider roadway to reduce runoff crashes, median to separate directions	10	Reduction in congestion along corridor, increased speeds	10	Community support: Yes detailed design and $ est: Yes, and all approvals: No	7	**37**

Table 3: Highway- Corridor Operational Improvements

Applicant	Project Name (code)	Total Cost	Arterial LOS (Rel. Scale- max pts to worst LOS, 0 to arterial w/ LOS C or better	(0-25)	ADT of Roadway (Existing & future ADT = 10 pts ea. -Rel. Scale - max pts to highest ADT/Lane)	(0-20)	Cost-Effectiveness (lowest $/vmt = 20; highest $/vmt = 0; straight line interp)	(0-25)	Existing Accidents (Rel Scale-max pts to project w/ highest accident rate or frequency	(0-20)	Project Readiness (detailed design and cost estimates, ready to go: 10 pts)	(0-10)	Total (0-100)
Norfolk	Llewellyn Avenue Street Improvements **NF5RS**	$ 2,000,000	Current LOS: D Future LOS: E	12.5	Current ADT: 12,688 VPD (2009) Future ADT: 13,000 VPD (2030)	15	Annual: ($2.0m*5%) /(12.7k *.38mi *338 days) = $0.06/vmt	20	20	13	Community support: Yes detailed design and $ est: Yes, and all approvals: No	7	**67.5**
Portsmouth	Elm Avenue Improvements between George Washington Highway and Victory Boulevard **PR1RS**	$ 9,750,000	Current LOS: A-C Future LOS: F	25	Current ADT: 7,500 VPD (2013) Future ADT: 12,000 VPD (2034)	10	Annual: ($9.75m*5%) /(7.5k*0.7mi *338 days) = $0.275/vmt	0	15	10	Community support: Yes detailed design and $ est., and all approvals: No	3	**48**
Portsmouth	George Washington Highway Corridor Improvements (including Elm Avenue Intersection) **PR2RS**	$ 5,950,000	Current LOS: A-C Future LOS: E	12.5	Current ADT: 22,000 VPD (2013) Future ADT: 23,000 VPD (2034)	20	Annual: ($5.95m*5%) /(22k*1.8mi *338 days) = $0.10/vmt	10	31	20	Community support: N/A detailed design and $ est., and all approvals: No	0	**62.5**

Table 4: Highway-Bridge Rehabilitation

Applicant	Project Name (code)	Total Cost	Bridge Condition (Rel Scale-max pts to bridge w/ the worst condition)	(0-60)	ADT of Bridge (Rel Scale-max points to bridge w/ highest ADT)	(0-30)	Project Readiness (detailed design and cost estimates, ready to go: 10 pts)	(0-10)	Total (0-100)
Norfolk	Berkley Avenue Bridge Rehabilitation **NF1RS**	$ 3,500,000	Sufficiency Rating = 79.6 (80.6*)	40	Current ADT: 12,000 VPD (2012) Future ADT: 13,000 VPD (2030)	10	Community support: Yes detailed design and $ est., and all approvals: No	3	**53**
Norfolk	Campostella Bridge Rehabilitation **NF2RS**	$ 6,000,000	Sufficiency Rating= 66.0 (67.0*)	60	Current ADT: 35,000 VPD (2012) Future ADT: 46,000 VPD (2030)	30	Community support: Yes detailed design and $ est., and all approvals: No	3	**93**
Norfolk	Hampton Boulevard Rehabilitation **NF4RS**	$ 5,000,000	Sufficiency Rating SB = 69.9 (70.2*), FO/NB = 63.1	59	Current ADT: 34,000 VPD (2012) Future ADT: 41,000 VPD (2030)	28	Community support: Yes detailed design and $ est., and all approvals: No	3	**90**

*From HRTPO Statewide Bridge Data (August 2014)

Table 6: Transit & Fixed Guideway-New or expanded service, passenger facilities, HS/intercity/and light rail, station Dev., vehicle upgrades, etc.

Applicant	Project Name (code)	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 employ-ment)	(0-20)	Project Readiness (detailed design and cost estimates, ready to go: 10 pts)	(0-10)	Total (0-100)
HRT	Passenger Amenity Program **HT4RS**	$1,200,000	No Relief	0	N/A	0	N/A	0	None	0	N/A	0	Community support: Yes detailed design and $ est: Yes, and all approvals: No	7	**7**
Virginia Beach	Bus Stop Infrastructure and Accessibility Improvements VB1RS	$668,157	No Relief	0	26-78 persons/day & 5% incr. /stop after project	20	N/A	0	Better connectivity encourages increased transit usage and less emissions	10	Pop: 442,707 Empl: 418,800 = Pop./Emp. Factor of 1.06	20	Community support: Yes detailed design and $ est: No, and all approvals: No	3	53

Table 7: Transit & Fixed Guideway- Vehicle Replacement/Purchase

Applicant	Project Name (code)	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	Bus Vehicle Replacement **HT1RS**	$70,696,396	15 years	35	148	10	Nox New = .20 g/bhp-hr Nox Old + 1.18-4.0 g/bhp-hr change = -.98-3.8 g/bhp-	30	Ridership unknown b/c buses are used on changing routes	0	600k(vs. 500k standard)	15	**90**

Table 8: Other Transit, Other Fixed Guideway and Transit ITS Projects

Applicant	Project Name (code)	Total Cost	Will the project increase service reliability?	(0-25)	Will the project improve passenger safety, comfort, and convenience?	(0-30)	Does the project improve efficiency of the transit system?	(0-10)	Does the project improve the revenue collection?	(0-25)	Does the project improve transit data collection system?	(0-10)	Total (0-100)
HRT	Ticket Vending Machine (TVM) II Replacement **HT5RS**	$819,100	N/A	0	Yes: (convenience)	10	Yes	10	Yes	12.5	Yes	10	**42.5**
HRT	Farebox Upgrades - Incorporation of Alternative Fare Media Technology **HT6RS**	$2,579,500	Yes: (upgraded components allow for faster boarding	12.5	Yes: (convenience)	10	Yes	10	Yes	12.5	Yes	10	**55**

Table 9: Alternatives Analysis and Feasibility Studies

Applicant	Project Name (code)	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 protec-tion of the environ-ment?	(0-10)	Total (0-100)
Chesapeake	Study of Light Rail Extension to Chesapeake **CH1RS**	$2,000,000	Yes	25	Yes	0	Yes	10	Yes	20	Yes	3	Yes	7	Yes	5	**70**
HRT	Study of Fixed Guideway Transit in Hampton and Newport News **HT2RS**	$2,000,000	Yes	25	Yes	0	Yes	10	Yes	20	Yes	3	Yes	7	Yes	5	**70**
HRT	Naval Station Norfolk Transit Extension Study FEIS/PE **HT3RS**	$12,000,000	Yes	25	Yes	0	Yes	10	Yes	20	Yes	8	Yes	7	Yes	5	**75**
Suffolk	West End Suffolk Bypass Interchange IMR Study **SF1RS**	$200,000	Yes	25	Yes	10	Yes	0	Yes	20	Yes	5	Yes	7	Yes	5	**72**

Table 11: Intelligent Transportation Systems Projects

Applicant	Project Name (code)	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 project 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.Has project been endorsed by the HRTO Subcommittee?	(0-10)	Total (0-100)
Norfolk	Norfolk Systemwide Signal Controller and System Upgrade **NF6RS**	$3,000,000	Yes	15	Yes	12.5	Improve LOS-No; Inc. Cap.-Yes: Incident Mgmt.-Yes	13	Yes	10	No	0	No	0	**50.5**
Virginia Beach	Travel Time Display on DMS **VB4RS**	$197,500	Yes	15	No	0	Improve LOS-No; Inc. Cap.-No: Incident Mgmt.-Yes	7	No	0	Yes	15	No	0	**37**