HAMPTON ROADS TRANSPORTATION PLANNING ORGANIZATION

CMAQ/RSTP PROJECT SELECTION PROCESS 2018

T19-04

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TRANSPORTATION PLANNING ORGANIZATION

APRIL 2019

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ABSTRACT

This report summarizes the 2018 selection process for projects to be funded under the Congestion Mitigation and Air Quality Improvement Program (CMAQ) and Regional Surface Transportation Program (RSTP). As a result of the 2018 CMAQ/RSTP Project Selection Process, selected projects received allocations of CMAQ or RSTP funds for Fiscal Year 2025.

ACKNOWLEDGMENTS

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HAMPTON ROADS TRANSPORTATION PLANNING ORGANIZATION
CMAQ/RSTP PROJECT SELECTION PROCESS

2018

This report was included in the Unified Planning Work Program for Fiscal Year 2019, which was approved by the Board of the Hampton Roads Transportation Planning Organization on May 17, 2018.

PREPARED BY:

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TRANSPORTATION PLANNING ORGANIZATION

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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 November.

This report summarizes the work of selecting CMAQ and RSTP projects during the 2018 CMAQ/RSTP Project Selection Process. Selected projects received allocations of CMAQ or RSTP funds for Fiscal Year (FY) 2025.

CMAQ Project Selection and Funding Allocations

During the November 15, 2018 meeting, the HRTPO Board approved the following actions regarding CMAQ funding for FY 2025:

- Five previously approved CMAQ projects were selected to receive a total of $7.2 million in FY 2025 allocations.
- Sixteen new CMAQ projects were selected to receive a total of $7.5 million in FY 2025 allocations.

The approved CMAQ projects are summarized individually below. Map 1 on Page 9 displays the geographic location of the FY 2025 CMAQ allocations where feasible.

Allocations to Previously Approved CMAQ Projects

1. **Chesapeake Signal System – Phase 4 – (UPC# 110801) – Chesapeake**
   - The project entails a citywide upgrade of the traffic signal system, central system operations, and local intersection capabilities to allow deployment of state of the practice functional operations.
   - Allocated $200,000 in FY 2025 CMAQ funds to fully fund the project.

2. **Citywide Signal System Progression – (UPC# 111081) – Newport News**
   - This project entails the procurement and installation of hardware and software components for the City's Centralized Signal System. These include but are not limited to items that maintain and extend the system's capabilities and create efficiency improvements for internal traffic monitoring, counting, and analytics; automated traffic responsive and adaptive implementation, as well as providing connectivity to vehicles and other road users.
   - Allocated $450,000 in FY 2025 CMAQ funds to fully fund the project.

3. **Crittenden Road/Route 17 Intersection Realignment – (UPC# 111089) – Suffolk**
    - Project will realign the existing intersection of Crittenden Road and Route 17 with Clubhouse Road and Route 17. Traffic signal, turn lanes, and stormwater management features will be included.
    - Allocated $2,038,425 in FY 2025 CMAQ funds to fully fund the project.

4. **Pocahontas Trail Multi-Modal Corridor – (UPC# 102980) – James City County**
    - The project entails upgrading a 1.8 mile segment of Pocahontas Trail (Route 60) with a five-foot sidewalk and a five-foot paved shoulder and to include installation of trees, pedestrian lighting, and bus pull outs.
    - Allocated $4,075,000 in FY 2025 CMAQ funds.
    - Total FY 2025 and future CMAQ funding request: $8,150,000.

5. **New Demonstration Route – Upper York County/New Kent County Connector – (UPC# T19494) – Williamsburg Area Transit Authority (WATA)**
    - The project provides a connection point between areas of Upper York County and New Kent County and the current service of the Williamsburg Area Transit Authority.
    - Allocated $405,578 in FY 2025 CMAQ funds to fully fund the project.

New CMAQ Projects

1. **Transportation Information and Decision Support System – (ID# NO8CM) - Norfolk**
    - The project entails identifying and implementing a combination of remote sensing utilities, field devices, and central system software enhancements, which will improve the City of Norfolk Advanced Traffic Management System (ATMS).
    - Allocated $100,000 in FY 2025 CMAQ funds.
    - Total FY 2025 and future CMAQ funding request: $800,000.

2. **Traffic Signal System Communications Upgrade – (ID# NO2CM) – Norfolk**
    - This project entails enhancing the reliability and capacity of Norfolk's Advanced Traffic Management System (ATMS) communications network as well as improving overall network management capabilities.
    - Allocated $250,000 in FY 2025 CMAQ funds.
    - Total FY 2025 and future CMAQ funding request: $1,000,000.

3. **Citywide Signal Retiming – Phase 4 – (ID# NO5CM) – Norfolk**
    - This project entails updating or creating new coordinated timing plans and other timing parameters for approximately one-fourth of signalized intersections citywide (about 80 intersections) operating as part of coordinated timing systems. Locations will be selected for improvements as part of the project based on system performance.
    - Allocated $170,000 in FY 2025 CMAQ funds.
    - Total FY 2025 and future CMAQ funding request: $340,000.

4. **Traffic Signal System Retiming – (ID#PO12CM) – Portsmouth**
    - The project entails the analysis of existing and development of new signal timings for strategic corridors in the City of Portsmouth.
    - Allocated $120,000 in FY 2025 CMAQ funds.
    - Total FY 2025 and future CMAQ funding request: $480,000.

5. **Citywide Traffic Signal System Upgrade – (ID# CH5CM) – Chesapeake**
    - This project entails additional enhancements to the citywide traffic signal system to include ongoing technology upgrades to share real time data and provide improved operational efficiencies of central system upgrades, Intelligent Transportation System (ITS) elements, and local intersections operations.
    - Allocated $175,000 in FY 2025 CMAQ funds.
    - Total FY 2025 and future CMAQ funding request: $875,000

6. **Signal Timing Improvements – (ID# NN8CM) – Newport News**
    - The project entails traffic signal retiming improvements providing enhanced efficiency and coordination with traffic signals, increased capacity within the existing network, and improved progression during peak hours.
    - Allocated $450,000 in FY 2025 CMAQ funds.
    - Total FY 2025 and future CMAQ funding request: $1,350,000.

7. **Opticom Emergency Vehicle Preemption – (ID# NN5CM) – Newport News**
    - The project entails the installation of emergency vehicle preemption hardware at signalized intersections that do not have Opticom currently to ensure a more efficient signal network.
    - Allocated $412,500 in FY 2025 CMAQ funds.
    - Total FY 2025 and future CMAQ funding request: $755,000.

8. **Five (5) Replacement Buses – (ID# WA1CM) – WATA**
    - This project entails the replacement of five (5) existing fleet buses which will have met their useful life prior to FY 2025, with replacement vehicles being more efficient and sustainable.
    - Allocated $2,925,000 in FY 2025 CMAQ funds to fully fund the project.

9. **Traffic Signal System Detection Upgrades – (ID# NO3CM) – Norfolk**
    - This project entails upgrading vehicle detection infrastructure at approximately 20 intersections to improve detection and system performance by moving from low-performing video and/or loop "stop-bar presence" detection to devices with multi-function capabilities including presence detection, advance detection and traffic monitoring.
    - Allocated $1,000,000 in FY 2025 CMAQ funds to fully fund the project.

10. **Battlefield Boulevard/Volvo Parkway Intersection Improvements – (ID# CH6CM) – Chesapeake**
    - This project entails construction of right-turn improvements to the westbound approach to create two dedicated right-turn lanes, complementing other recent City improvements that included restriping the approach to include dual left-turn lanes, a shared through left and dedicated through with a single right-turn lane. Some modifications to the northeast channelizing island to construct the proposed westbound turn lanes will be required, but the medians and signal poles along Volvo Parkway are anticipated to remain. Some minor acquisition of right-of-way will be required as well as proposed site improvements to reconfigure an existing parking lot.
    - Allocated $317,500 in FY 2025 CMAQ funds.
    - Total FY 2025 and future CMAQ funding request: $827,500.

11. **Chesapeake Signal Timing – All Phases – (ID# CH7CM) – Chesapeake**
    - The proposed project entails the analysis and development of new signal timings for strategic corridors and isolated intersections. 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.
    - Allocated $150,000 in FY 2025 CMAQ funds.
    - Total FY 2025 and future CMAQ funding request: $600,000.

12. **Canon Boulevard and Old Oyster Point Road Intersection Improvements – (ID# NN1CM) – Newport News**
    - The project entails the extension of the southbound left turn lane on Canon Boulevard, modification of existing signage, pavement markings, and signal operation to prohibit the eastbound/westbound left-turn and through movements on Old Oyster Point Road and Bayport Way, provision of pedestrian accommodations across three legs of the signalized intersection, modification of signal operation to allow the northbound left-turn lane on Canon Boulevard to operate with protected-permissive phasing, and installation of video detection capturing all approaches of the intersection.
    - Allocated $65,000 in FY 2025 CMAQ funds.
    - Total FY 2025 and future CMAQ funding request: $352, 500.

13. **Denbigh Fringe Park and Ride Improvements – (ID# VT1CM) – Virginia Department of Transportation (VDOT)**
    - This project entails repaving and restriping the existing Denbigh Fringe Park & Ride lot to provide for a total of 133 car spaces and 17 commercial truck spaces, with sufficient paving to accommodate heavier vehicles.
    - Allocated $200,365 in FY 2025 CMAQ funds to fully fund the project.

14. **Oyster Point Road and Canon Boulevard Intersection Improvements – (ID# NN6CM) – Newport News**
    - The project entails the extension of the westbound left turn lane on Oyster Point Road and provision of pedestrian accommodations across the west leg of the intersection.
    - Allocated $75,000 in FY 2025 CMAQ funds.
    - Total FY 2025 and future CMAQ funding request: $469,875.

15. **Permanent Message Boards – (ID# NN7CM) – Newport News**
    - The project entails the installation of permanent message boards in the City Center area to mitigate congestion through active route management, increasing traveler awareness, and encouraging the use of alternate routes.
    - Allocated $100,000 in FY 2025 CMAQ funds.
    - Total FY 2025 and future CMAQ funding request: $500,000.

16. **North Great Neck/London Bridge and Virginia Beach Boulevard Intersection Improvements – (ID# VB2CM) – Virginia Beach**
    - The project entails construction of a second southbound left turn lane, relocation and reconstruction of the existing median as well as utilization of the existing gore area along the median in the northbound direction, lengthening the northbound left turn lane, and removal of the existing pork-chop island located at the eastbound right turn lane as part of a safety improvement in order to improve sight lines with eastbound right turning vehicles controlled through a traffic signal rather than having a channelized free-flow movement.
    - Allocated $1,000,000 in FY 2025 CMAQ funds.
    - Total FY 2025 and future CMAQ funding request: $2,157,100

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Map 1 | *Projects Selected for CMAQ Allocations*

Projects Selected for CMAQ Allocations

Mapped Projects

1. Pocahontas Trail Multimodal Corridor - James City County
2. Crittenden Road/Route 17 Intersection Realignment - Suffolk
3. Battlefield Blvd/Volvo Parkway Intersection Improvements - Chesapeake
4. Canon Blvd/Old Oyster Point Rd Intersection Improvements - Newport News
5. Denbigh Fringe Park and Ride Improvements - VDOT
6. Oyster Point Rd/Canon Blvd Intersection Improvements - Newport News
7. Permanent Message Boards - Newport News
8. North Great Neck/London Bridge/Virginia Beach Blvd Intersection Improvements - Virginia Beach

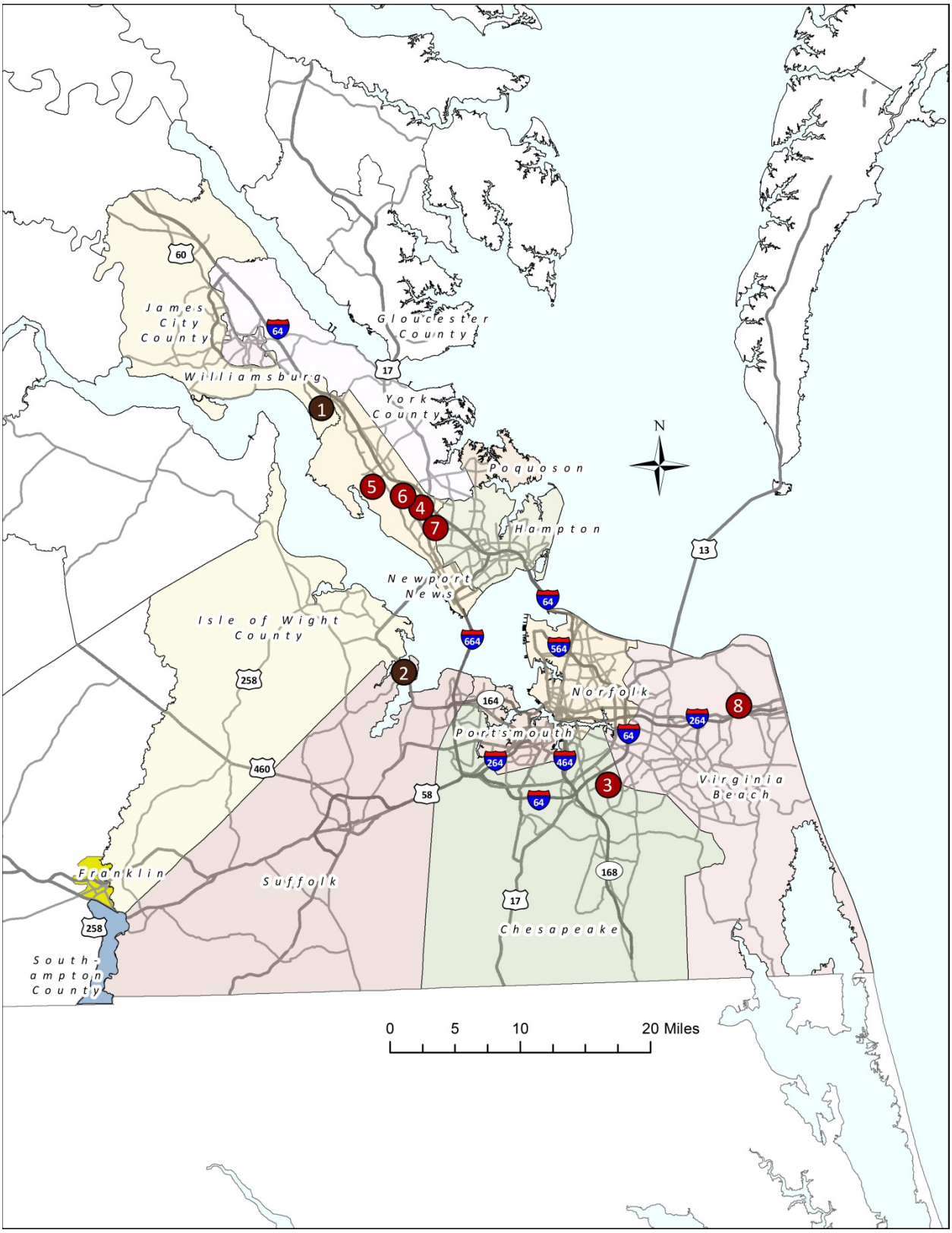
Unmapped Projects

9. Chesapeake Signal System - Phase 4 - Chesapeake
10. Citywide Signal System Progression - Newport News
11. Upper York County/New Kent County Connector - WATA
12. Transportation Information and Decision Support System - Norfolk
13. Traffic Signal System Communications Upgrade - Norfolk
14. Citywide Signal Retiming - Phase 4 - Norfolk
15. Traffic Signal System Retiming - Portsmouth
16. Citywide Traffic Signal System Upgrade - Chesapeake
17. Signal Timing Improvements - Newport News
18. Opticom Emergency Vehicle Preemption - Newport News
19. Five (5) Replacement Buses - WATA
20. Traffic Signal Detection Upgrades - Norfolk
21. Chesapeake Signal Timing - All Phases - Chesapeake

Project Selection Status

- Previously Approved CMAQ Projects
- New CMAQ Projects

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



RSTP Project Selection and Funding Allocations

During the November 15, 2018 meeting, the HRTPO Board approved the following actions regarding RSTP funding for FY 2025:

- Five previously approved RSTP projects were selected to receive a total of $24.1 million in FY 2025 allocations.
- Twelve new RSTP projects were selected to receive a total of $11.7 million in FY 2025 allocations.

The approved RSTP projects are summarized individually below. Map 2 on Page 15 displays the geographic location of the FY 2025 RSTP allocations where feasible.

Allocations to Previously Approved RSTP Projects

1. **TRAFFIX – (UPC# T14104) – Hampton Roads Transit (HRT)**
   - This project entails the continued funding of the regional Transportation Demand Management (TDM) program.
   - Allocated $1,000,000 in FY 2025 RSTP funds.
   - Total FY 2025 and future RSTP funding request: $5,000,000.

2. **Bus Vehicle Replacement (148) – (UPC# T16054) – HRT**
   - The project entails purchasing (29, 35, and 40 foot) buses to replace similar vehicles that have reached the end of their service life. The new buses will have improved fuel economy and performance, lower operating costs, and lower emissions than the buses they will replace.
   - Allocated $5,000,000 in FY 2025 RSTP funds.
   - Total FY 2025 and future RSTP funding request: $46,071,313.

3. **George Washington Memorial Highway (Route 17) Widening – Phase 1 – (UPC# 110627) – Gloucester County**
   - This project entails the continuation of the widening of George Washington Memorial Highway (US Route 17) from a 4-lane principal arterial to a 6-lane principle arterial while also providing safe passage for pedestrians. The phase will begin at the intersection of Farmwood Road, where a previous widening project ended, and continue to approximately 1,000 feet north of the intersection of Hook Road/Guinea Road. The total length of this phase is 1.4 miles of the overall larger 10.4 mile long project.
   - Allocated $9,000,000 in FY 2025 RSTP funds.
   - Total FY 2025 and future RSTP funding request: $20,970,530.

4. **Pocahontas Trail Multimodal Corridor – (UPC# 102980) – James City County**
   - The project entails upgrading a 1.8 mile segment of Pocahontas Trail (Route 60) with a five-foot sidewalk and a five-foot paved shoulder and to include installation of trees, pedestrian lighting, and bus pull outs.
   - Allocated $4,075,000 in FY 2025 RSTP funds.
   - Total FY 2025 and future RSTP funding request: $8,150,000.

5. **Elbow Road Extended – Phase 2D - (UPC# 112318) – Virginia Beach**
    - The project entails construction of two lanes of Elbow Road (westbound) from Salem Road west to the Princess Anne Athletic Complex, including improvements at the Salem Road/Dam Neck Road intersection.
    - Allocated $5,000,000 in FY 2025 RSTP funds.
    - Total FY 2025 and future RSTP funding request: $17,000,000.

New RSTP Projects

1. **Route 17/Shoulders Hill Road Intersection Improvements – (UPC# 69050) – Suffolk**
    - This project entails the full build out of Shoulders Hill Road/Route 17 intersection including added through lanes in each direction, turn lane improvements, and traffic signal improvements.
    - Allocated $4,500,000 in FY 2025 RSTP funds.
    - Total FY 2025 and future RSTP funding request: $9,000,000.

2. **George Washington Highway Widening – (ID# CH2RS) – Chesapeake**
    - The project entails the expansion of George Washington Highway from an existing three lane undivided roadway to a four lane divided roadway from Yadkin Road to Canal Drive. In addition, the project will provide improvements at three signalized intersections, construct new pedestrian facilities, and address other safety and access management issues along the corridor.
    - Allocated $1,500,000 in FY 2025 RSTP funds.
    - Total FY 2025 and future RSTP funding request: $17,200,000.

3. **Mt. Pleasant/Route 168 (Great Bridge Bypass) Interchange – (ID# CH1RS) – Chesapeake**
    - The project entails construction of a partial displaced left interchange which includes enhanced operations for vehicle movements and also provides a cross section for dedicated bike lanes.
    - Allocated $500,000 in FY 2025 RSTP funds.
    - Total FY 2025 and future RSTP funding request: $4,900,000.

4. **Nimmo Parkway Phase VIIB – (ID# VB3RS) – Virginia Beach**
    - The project entails the construction of a new two lane undivided roadway with shoulders, on road bike lanes, and a single shared use path on the north side from Albuquerque Drive to Sandbridge Road, a distance of approximately 1.7 miles. This project will include a bridge spanning Hell's Point Creek and the adjacent flood plain and wetlands area.
    - Allocated $500,000 in FY 2025 RSTP funds.
    - Total FY 2025 and future RSTP funding request: $10,000,000.

5. **Penniman Road/Government Road Intersection Realignment – (UPC# 16314) – York County**
    - The project entails realigning an existing Y-intersection into a T-intersection to improve safety and operations and also includes the addition of shoulder bike lanes on both legs.
    - Allocated $1 in FY 2025 RSTP funds to fully fund the project.

6. **Southside Bike Lane Network – (ID# NO6RS) – Norfolk**
    - The project entails development of bike lanes/facilities along multiple corridors in the Southside area of Norfolk. The locations include a bike lane/facility connection to the Berkley Bridge multi-use path at State Street to Berkley Avenue, bike lanes on Indian River Road from State Street to the Chesapeake city limit, bike lanes along Wilson Road from Indian River Road to the Chesapeake city limit, and protected bike lanes along Campostella Road from Indian River Road to the Chesapeake city limit.
    - Allocated $104,000 in FY 2025 RSTP funds.
    - Total FY 2025 and future RSTP funding request: $1,015,900.

7. **Newtown Road Corridor Study – (ID# NO5RS) – Norfolk**
    - The project advances a comprehensive analysis of options for addressing congestion issues on Newtown Road between Curlew Drive and Baker Road. The study will analyze potential capacity improvements to mainline Newtown Road, as well as at intersections along the corridor, with a focus on the major intersections of Princess Anne Road/Kempsville Road, Virginia Beach Boulevard, and Baker Road. The study will also consider the results of the I-64/I-264 Interchange Phase III study, currently in progress, as well as existing and future developments, access management, access to the HRT Tide Light Rail Newtown Road Park and Ride Lot, and possible pedestrian accommodations.
    - Allocated $250,000 in FY 2025 RSTP funds to fully fund the project.

8. **Victoria Boulevard Facility Upgrades – Phase 2 – (ID# HT4RS) – HRT**
    - The project covers the ongoing rehabilitation of HRT's Victoria Boulevard facility in Hampton which was constructed in 1989 and serves as the primary operating and maintenance location for HRT's Peninsula operations. The program supports the efficient maintenance of vehicles and expansion of bus service by providing sufficient accommodations for bus fleet maintenance and repair including bus surveillance and radio equipment, fareboxes, and other passenger amenities that support safety, comfort, and convenience.
    - Allocated $3,500,000 in FY 2025 RSTP funds.
    - Total FY 2025 and future RSTP funding request: $10,000,000.

9. **Strategic Plan and Comprehensive Operating Analysis – (ID# WT1RS) – WATA**
    - The project advances a comprehensive analysis to identify transit service needs, prioritize improvements and determine the resources required for implementing modified or new service. The Strategic Plan will analyze the entire WATA environment, which includes travel patterns, routes, destination centers, infrastructure, and funding.
    - Allocated $300,000 in FY 2025 RSTP funds to fully fund the project.

10. **Route 17B Main Street Bike and Pedestrian Improvements Study – (ID# GC1RS) – Gloucester County**
    - The project entails study of preferred alignments and costs associated with development of a bicycle and pedestrian facilities along South Main Street between Routes 14 and 3, where pedestrian improvements are planned, south to its terminus at Route 17 (George Washington Memorial Highway) and connection to the Fox Mill Centre pedestrian improvements along West Main Street (SR 1075), a total of approximately 1.3 miles.
    - Allocated $238,000 in FY 2025 RSTP funds to fully fund the project.

11. **Ware House Road Bike and Pedestrian Improvements Study – (ID# GC2RS) – Gloucester County**
    - The project entails study of the feasibility, preferred alignment, and costs associated with development of a bicycle and pedestrian facility along Ware House Road to connect historic Main Street (Gloucester Village) with the residential neighborhoods along Ware House Road as well as providing a safe alternative transportation mode to the public access to the Ware River between existing or proposed pedestrian facilities near its intersection with Route 17B (Main Street) to its terminus at the public boat landing along the Ware River (approximately 2.1 miles).
    - Allocated $268,000 in FY 2025 RSTP funds to fully fund the project.

12. **Transit Operations Facility – (ID# SF4RS) – Suffolk**
    - The project entails development of a new transit operations facility where vehicles could be stored and cleaned. Facilities for dispatch training and operational support for transit operations will also be provided. A City facility would provide for enhanced security and control and would allow for some cleaning and limited non-vehicular maintenance to be performed on site. The project would enhance reliability and service standards as the fleet would be better maintained and less susceptible to threats due to vandalism.
    - Allocated $60,000 in FY 2025 RSTP funds.
    - Total FY 2025 and future RSTP funding request: $1,890,066.

Projects Selected for RSTP Allocations

Mapped Projects

1. George Washington Memorial Highway (Route 17) Widening - Phase 1 - Gloucester County
2. Pocahontas Trail Multimodal Corridor - James City County
3. Elbow Road Extended - Phase 2D - Virginia Beach
4. Route 17/Shoulders Hill Rd Intersection Improvements - Suffolk
5. George Washington Highway Widening - Chesapeake
6. Mt. Pleasant/Route 168 (Great Bridge Bypass) Interchange - Chesapeake
7. Nimmo Parkway Phase VIIB - Virginia Beach
8. Penniman Rd/Government Rd Intersection Realignment - York County
9. Southside Bike Network - Norfolk
10. Newtown Road Corridor Study - Norfolk
11. Victoria Boulevard Facility Upgrades - Phase 2 - HRT
12. Route 17B Main Street Bike and Pedestrian Improvements Study - Gloucester County
13. Ware House Road Bike and Pedestrian Improvements Study - Gloucester County
14. Transit Operations Facility - Suffolk

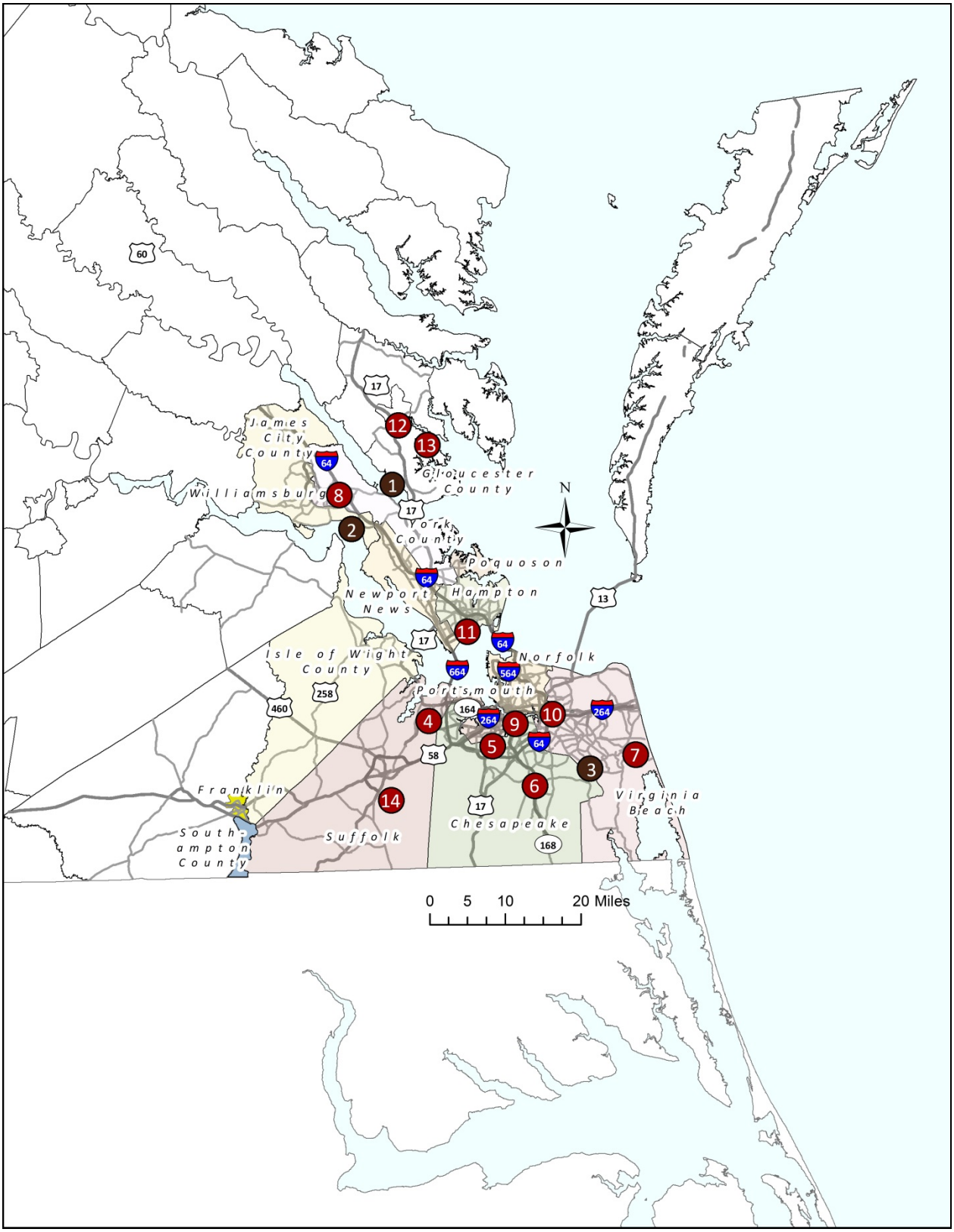
Unmapped Projects

15. TRAFFIX Transportation Demand Management Program - HRT
16. Bus Vehicle Replacement - HRT
17. Strategic Plan and Comprehensive Operating Analysis - WATA

Project Selection Status

- Previously Approved RSTP Projects
- New RSTP Projects

Map 2 | 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 the City of Franklin and Counties of Gloucester and Southampton. Among its functions, the HRTPO is responsible for project selection and allocation of funds under two federal programs – the Congestion Mitigation and Air Quality Improvement Program (CMAQ) 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. At present, Hampton Roads has been designated as an attainment area for the current 2015 ozone standard; previously, Hampton Roads was designated a nonattainment area under the 1997 ozone standard and later a maintenance area before being designated an attainment area under the 2008 ozone 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 2018. Projects selected received allocations of CMAQ or RSTP funds for FY 2025.

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), Suffolk Transit, state transportation agencies, National Park Service, and the HRTPO.

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 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 with a planning horizon of at least 20 years. The schedule used for the 2018 CMAQ/RSTP project selection process is listed below. Table 1 on the following page details the available funding, current allocations, and reserves for both the CMAQ and RSTP programs under consideration and discussion during the current project selection process.

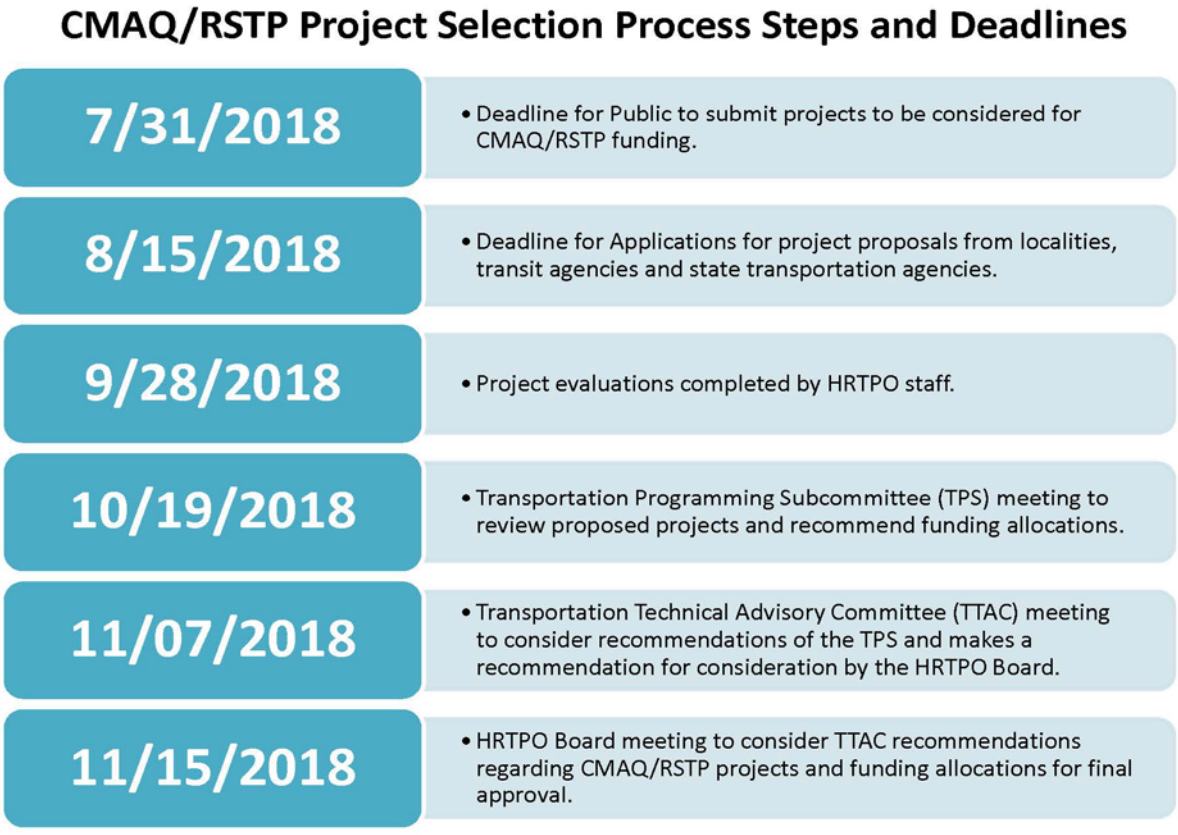

Table 1 | FY 2019-2025 CMAQ and RSTP Funding: Available Funding, Current Allocations, and Reserves

CMAQ	Previous	FY - 19	FY - 20	FY - 21	FY - 22	FY - 23	FY - 24	FY - 25
Marks	$0	$13,698,089	$13,999,683	$14,243,448	$14,243,448	$14,243,448	$15,080,199	$15,361,905
Allocations	$0	$13,698,089	$14,001,684	$14,243,448	$13,837,069	$13,661,828	$14,161,525	$14,679,368
Available	$3,000	$0	($2,001)	$0	$406,379	$581,620	$918,674	$682,537
							Total	$2,590,209

RSTP	Previous	FY - 19	FY - 20	FY - 21	FY - 22	FY - 23	FY - 24	FY - 25
Marks	$0	$34,774,658	$35,497,259	$34,383,730	$35,040,488	$35,708,410	$36,387,688	$37,078,513
Allocations	$0	$34,774,658	$34,218,596	$34,322,550	$34,978,269	$34,790,097	$35,359,271	$35,795,001
Available	$0	$0	$1,278,663	$61,180	$62,219	$918,313	$1,028,417	$1,283,512
							Total	$4,632,304

Prepared by HRTPO staff February 26, 2019

PUBLIC PARTICIPATION

The HRTPO is fully committed to involving and collaborating with Hampton Roads citizens in a public involvement process that is grounded in community partnership, mutual problem solving and understanding. In other words, a process whereby citizens feel a sense of ownership and satisfaction in knowing their voice has been legitimately heard and their thoughts, ideas, and opinions have the potential to impact future HRTPO decisions. In Hampton Roads, the cost of needed improvements to the transportation system far exceeds the funding available to address those needs and difficult decisions must be made regarding the use of scarce transportation dollars. For each project that is chosen for construction, many others will not be able to be built. The long term effect that such decisions can have on so many lives makes it critical that the public be provided with ongoing, dynamic opportunities to participate in the planning and programming processes associated with the complex system of roads, mass transit, rail, waterways, pedestrian and bicycle facilities, and related infrastructure that make up the transportation system.

The HRTPO understands "the public" to mean all of those who have the potential to affect or be affected by the Hampton Roads transportation system. From bicyclists to motorists, public transportation users to freight haulers, social to environmental activists – Hampton Roads residents have a stake in the future of our transportation system. Equally important, the HRTPO recognizes that not all communities and community members have enjoyed the same level of access or representation in transportation and other decisions made by public agencies. Therefore, as part of its public involvement strategy, the HRTPO takes special steps and measures to understand and consider the wants, needs, and aspirations of minority, low-income, and other under-served groups in Hampton Roads.

The HRTPO believes that the regional transportation planning and programming process benefits from public input. The public has valuable knowledge and insight regarding the problems and needs of our communities. The HRTPO also recognizes that it is our responsibility to provide as many opportunities as possible for the community to be informed and aware of the decisions that will affect the future of this region. As such, the public was invited and encouraged to participate in the CMAQ/RSTP Project Selection Process.

A social media campaign launched on July 10, 2018 and ran until July 30, 2018. Over 9,000 ads appeared across the Hampton Roads Region. Approximately, 5,868 people engaged the ads and visited the HRTPO CMAQ/RSTP webpage. HRTPO planning partners and stakeholders were

engaged in this outreach effort as well, and shared the public input opportunity with their respective stakeholders.

In addition to the invitation for public involvement at the beginning of the process, all 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 start of each meeting. No public comments regarding the project selection process were received, orally or in writing, during these meetings.

A public notice soliciting CMAQ and RSTP project ideas from the public was posted to the HRTPO website in July of 2018. In addition, a CMAQ/RSTP Project Idea Form was provided for use by the public with a deadline for submission of project ideas of July 31, 2018. 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. Eight project ideas were received from the public as a result of this invitation (see Appendix C).

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Section III
CMAQ Project Selection

CMAQ PROJECT SELECTION

In Hampton Roads, projects are selected for funding with CMAQ Improvement Program funds based on the amount of air quality improvement expected per dollar spent. This is analyzed in terms of a reduction in the emissions of Volatile Organic Compounds (VOCs) and Nitrogen Oxides (NOx), which are precursors of ozone depletion. 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 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 uniformity to the way that project information is submitted, the HRTPO staff developed application forms to be utilized for submission of 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.

During the 2018 Project Selection Process, 5 requests were made for additional funding for previously approved CMAQ projects. The total request for FY 2025 funding was $12.7 million.

Table 1 shows all new projects proposed for CMAQ funding during the project selection process of 2018. As shown in the table, 33 candidate projects, with a total request of over $67.6 million, were submitted. The total request for FY 2025 funding was $25.0 million.

Table 2 shows the scoring and ranking of the 33 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 3 shows the new and previously approved projects that were ultimately approved by the HRTPO Board on November 15, 2018 to receive CMAQ allocations in FY 2025. It should be noted that the total CMAQ funding expected to be available for FY 2025, including the 20 percent state match, is approximately $15.4 million.

Table 2 | 2018 CMAQ New Candidate Projects

Number	Code	Applicant	Project Name	Total Cost	Total CMAQ Request	Total FY-25 Request
1	CH7CM	Chesapeake	Chesapeake Signal Timing -- All Phases	$ 600,000	$ 600,000	$150,000
2	CH5CM	Chesapeake	Citywide Traffic Signal System Upgrade	$ 875,000	$ 875,000	$ 175,000
3	CH6CM	Chesapeake	Battlefield/Volvo Intersection	$ 827,500	$ 827,500	$ 317,500
4	IW1CM	Isle of Wight County	US 460 at Five Point Intersection Improvements	$ 2,322,328	$ 2,322,328	$ 816,841
5	IW2CM	Isle of Wight County	US 460 at US 258 Turn Lane Improvements	$ 3,460,797	$ 3,460,797	$ 968,671
6	IW3CM	Isle of Wight County	Carrollton Blvd (Route 17) Crosswalks	$ 240,653	$ 240,653	$ 30,082
7	JC1CM	James City County	Longhill Road Shared Use Path	$ 4,017,000	$ 4,017,000	$ 30,900
8	NN1CM	Newport News	Canon Blvd/Old Oyster Point Rd Intersection Improvments	$ 352,500	$ 352,500	$ 65,000
9	NN2CM	Newport News	Canon Blvd/Thimble Shoals Blvd Intersection Improvments	$ 939,875	$ 939,875	$ 78,000
10	NN3CM	Newport News	Citywide Pedestrian Signal Improvements	$ 1,000,000	$ 1,000,000	$ 250,000
11	NN4CM	Newport News	Harpersville Rd Pedestrian Enhancement Project	$ 4,857,166	$ 4,857,166	$ 140,000
12	NN5CM	Newport News	Opticom Emergency Vehicle Preemption	$ 775,000	$ 775,000	$ 412,500
13	NN6CM	Newport News	Oyster Point Rd/Canon Blvd Intersection Improvments	$ 469,875	$ 469,875	$ 75,000
14	NN7CM	Newport News	Permanent Message Boards	$ 500,000	$ 500,000	$ 100,000
15	NN8CM	Newport News	Signal Retiming Improvements	$ 1,350,000	$ 1,350,000	$ 450,000
16	NO1CM	Norfolk	Ballentine Blvd Lane Improvements	$ 832,500	$ 832,500	$ 160,000
17	NO2CM	Norfolk	Traffic Signal Communications Network Upgrades	$ 1,000,000	$ 1,000,000	$ 250,000
18	NO3CM	Norfolk	Traffic Signal Detection Upgrades	$ 1,000,000	$ 1,000,000	$ 1,000,000
19	NO4CM	Norfolk	Llewellyn Avenue and Princess Anne Road Turn Lane Improvements	$ 734,200	$ 734,200	$ 734,200
20	NO5CM	Norfolk	Citywide Signal Retiming Phase 4	$ 340,000	$ 340,000	$ 170,000
21	NO6CM	Norfolk	Southside Bike Lane Network	$ 1,015,900	$ 1,015,900	$ 1,015,900
22	NO7CM	Norfolk	Terminal Boulevard Multi-Use Path	$ 3,500,000	$ 3,500,000	$ 400,000
23	NO8CM	Norfolk	Transportation Information and Decision Support System	$ 800,000	$ 800,000	$ 100,000
24	PO10CM	Portsmouth	The "Complete" High Street	$ 10,915,000	$ 10,915,000	$ 1,428,000
25	PO11CM	Portsmouth	Portsmouth Signal Timing -- Phases 1-4	$ 480,000	$ 480,000	$ 120,000
26	SF4CM	Suffolk	Route 17/Shoulders Hill Road Intersection Improvement	$ 26,000,000	$ 9,000,000	$ 9,000,000
27	SF5CM	Suffolk	Downtown Suffolk Bike Trail Crossing	$ 800,000	$ 800,000	$ 200,000
28	SF8CM	Suffolk	Carolina Road Bike Trail	$ 1,950,000	$ 1,950,000	$ 200,000
29	SF9CM	Suffolk	Holland Road Bike Trail	$ 6,800,000	$ 6,800,000	$ 300,000
30	VB1CM	Virginia Beach	Traffic Signal System Retiming	$ 612,000	$ 612,000	$ 612,000
31	VB2CM	Virginia Beach	N Great Neck/London Bridge/VA Beach Blvd Intersection Improvements	$ 2,157,100	$ 2,157,100	$ 2,157,100
32	VT1CM	VDOT	Denbigh Fringe Park & Ride Improvements	$ 200,365	$ 200,365	$ 200,365
33	WT1CM	WATA	5 Replacement Buses	$ 2,925,000	$ 2,925,000	$ 2,925,000
TOTAL				$ 84,649,759	$ 67,649,759	$25,032,059

Table 3 | 2018 CMAQ New Candidate Projects in Ranked Order

Number	ID	Jurisdiction	Project Description	Rank	Total Cost	Total Request	FY 25 Request	Cost-Effectiveness		Score		
New Candidate Projects								VOC	Nox	VOC	Nox	Composite[1]
1	NO8CM	*Norfolk*	Transportation Information and Decision Support System	1	$800,000	$800,000	$100,000	$7,304	$7,792	1	1	2
2	NO2CM	*Norfolk*	Traffic Signal System Communications Upgrade	2	$1,000,000	$1,000,000	$250,000	$9,130	$9,740	2	2	4
3	NO5CM	*Norfolk*	Citywide Signal Retiming Phase 4	3	$340,000	$340,000	$170,000	$12,249	$13,067	3	3	6
4	PO12CM	*Portsmouth*	Traffic Signal System Retiming	4	$480,000	$480,000	$120,000	$17,108	$18,251	4	4	8
5	CH5CM	*Chesapeake*	Citywide Traffic Signal System Upgrade	5	$875,000	$875,000	$175,000	$17,393	$18,555	5	5	10
6	NN8CM	*Newport News*	Signal Timing Improvements	6	$1,350,000	$1,350,000	$450,000	$24,538	$26,177	6	6	12
7	VB1CM	*Virginia Beach*	Traffic Signal System Retiming	7	$612,000	$612,000	$612,000	$33,927	$36,192	7	7	14
8	NN5CM	*Newport News*	Opticom Emergency Vehicle Preemption	8	$775,000	$775,000	$412,500	$42,963	$45,832	8	8	16
9	WA1CM	*WATA*	Five (5) Replacement Buses	9	$2,925,000	$2,925,000	$2,925,000	$99,697	$48,373	10	9	19
10	NO3CM	*Norfolk*	Traffic Signal System Detection Upgrades	10	$1,000,000	$1,000,000	$1,000,000	$96,825	$103,291	9	10	19
11	CH6CM	*Chesapeake*	Battlefield Blvd/Volvo Parkway Intersection Improvements	11	$827,500	$827,500	$317,500	$259,096	$276,399	11	11	22
12	CH7CM	*Chesapeake*	Chesapeake Signal Timing -- All Phases	12	$600,000	$600,000	$150,000	$1,270,356	$293,159	13	12	25
13	NN1CM	*Newport News*	Canon Boulevard and Old Oyster Pt Rd Intersection Improvements	13	$352,500	$352,500	$65,000	$815,425	$869,880	12	14	26
14	VT1CM	*VDOT*	Denbigh Fringe Park and Ride Improvements	14	$200,365	$200,365	$200,365	$2,683,238	$868,488	15	13	28
15	NN6CM	*Newport News*	Oyster Point Rd and Canon Blvd Intersection Improvements	15	$469,875	$469,875	$75,000	$1,301,587	$1,391,709	14	15	29
16	NN7CM	*Newport News*	Permanent Message Boards	16	$500,000	$500,000	$100,000	$6,428,139	$1,483,417	18	16	34
17	VB2CM	*Virginia Beach*	N Great Neck/London Bridge and VA Beach Blvd Intersection Improvements	17	$2,157,100	$2,157,100	$2,157,100	$4,198,981	$4,479,392	16	18	34
18	NO6CM	*Norfolk*	Southside Bike Lane Network	18	$1,015,900	$1,015,900	$1,015,900	$10,746,680	$3,478,394	19	17	36
19	SF4CM	*Suffolk*	Route 17/Shoulders Hill Road Intersection Improvements	19	$26,000,000	$9,000,000	$9,000,000	$4,226,364	$4,508,604	17	19	36
20	IW2CM	*Isle of Wight*	US 460 at US 258 Turn Lane Improvements	20	$3,460,797	$3,460,797	$968,671	$11,062,491	$11,801,254	20	21	41
21	IW1CM	*Isle of Wight*	US 460 at Five Points Intersection Improvements	21	$2,322,328	$2,322,328	$816,841	$11,198,636	$11,946,490	21	22	43
22	NO7CM	*Norfolk*	Terminal Boulevard Multi-Use Path	22	$3,500,000	$3,500,000	$400,000	$29,758,799	$9,632,075	24	20	44
23	NN2CM	*Newport News*	Canon Blvd and Thimble Shoals Blvd Intersection Improvements	23	$939,875	$939,875	$78,000	$11,915,241	$12,710,951	22	23	45
24	NO1CM	*Norfolk*	Ballentine Boulevard Lane Improvements	24	$832,500	$832,500	$160,000	$20,808,659	$22,189,279	23	24	47
25	SF8CM	*Suffolk*	Carolina Road Bike Trail	25	$1,950,000	$1,950,000	$200,000	$104,085,024	$33,689,356	26	25	51
26	NO4CM	*Norfolk*	Llewellyn Avenue and Princess Anne Road Turn Lane Improvements	26	$734,200	$734,200	$734,200	$52,091,224	$55,569,919	25	27	52
27	NN4CM	*Newport News*	Harpersville Road Pedestrian Enhancement Project	27	$4,857,166	$4,857,166	$140,000	$107,011,924	$34,636,710	27	26	53
28	PO10CM	*Portsmouth*	The "Complete" High Street	28	$10,915,000	$10,915,000	$1,428,000	$253,871,118	$82,171,059	28	28	56
29	NN3CM	*Newport News*	Citywide Pedestrian Signal Improvements	29	$1,000,000	$1,000,000	$250,000	$292,377,099	$94,634,134	29	29	58
30	JC1CM	*James City County*	Longhill Road Shared Use Path	30	$4,017,000	$4,017,000	$30,900	$356,113,481	$115,263,784	30	30	60
31	SF9CM	*Suffolk*	Holland Road Bike Trail	31	$6,800,000	$6,800,000	$300,000	$434,527,189	$140,644,066	31	31	62
32	IW3CM	*Isle of Wight*	Carrolton Blvd (Route 17) Crosswalks	32	$240,653	$240,653	$30,082	$1,920,545,182	$621,625,735	32	32	64
33	SF5CM	*Suffolk*	Downtown Suffolk Bike Trail Crossing	33	$800,000	$800,000	$200,000	$1,943,032,227	$628,904,151	33	33	66
	Totals				$84,649,759	$67,649,759	$25,032,059					

Prepared by HRPO Staff October 15, 2018

[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.
The Cost-Effectiveness figures represent $/ton of pollutants (NOx, VOC) removed based on the annualized cost of the project.

Table 4 | FY-2025 Allocations to Previously Approved and New CMAQ Projects

#	ID/UPC #	Jurisdiction	Project Description	Proposed Allocations FY - 25
Previously Approved Projects				
1	110801	*Chesapeake*	Chesapeake Signal System - Phase 4	* $200,000
2	102980	*James City County*	Pocahontas Trail Multimodal Corridor	$4,075,000
3	111081	*Newport News*	Citywide Signal System Progression	* $450,000
4	111089	*Suffolk*	Crittenden Road/Route 17 Intersection Realignment	* $2,038,425
5	T19494	*WATA*	Upper York County - New Kent County Connector	* $405,578
New CMAQ Projects with FY 2025 Allocations				
6	NO8CM	*Norfolk*	Transportation Information and Decision Support System	$100,000
7	NO2Cm	*Norfolk*	Traffic Signal System Communications Upgrade	$250,000
8	NO5CM	*Norfolk*	Citywide Signal Retiming Phase 4	$170,000
9	PO12CM	*Portsmouth*	Traffic Signal System Retiming	$120,000
10	CH5CM	*Chesapeake*	Citywide Traffic Signal System Upgrade	$175,000
11	NN8CM	*Newport News*	Signal Timing Improvements	$450,000
12	NN5CM	*Newport News*	Opticom Emergency Vehicle Preemption	$412,500
13	WA1CM	*WATA*	Five (5) Replacement Buses	* $2,925,000
14	NO3CM	*Norfolk*	Traffic Signal Detection Upgrades	* $1,000,000
15	CH6CM	*Chesapeake*	Battlefield Blvd/Volvo Parkway Intersection Improvements	$317,500
16	CH7CM	*Chesapeake*	Chesapeake Signal Timing -- All Phases	$150,000
17	NN1CM	*Newport News*	Canon Boulevard and Old Oyster Point Road Intersection Improvements	$65,000
18	VT1CM	*VDOT*	Denbigh Fringe Park and Ride Improvements	* $200,365
19	NN6CM	*Newport News*	Oyster Point Road and Canon Boulevard Intersection Improvements	$75,000
20	NN7CM	*Newport News*	Permanent Message Boards	$100,000
21	VB2CM	*Virginia Beach*	N Great Neck/London Bridge and VA Beach Boulevard Intersection Improvements	$1,000,000
			FY-25 Mark	$15,361,905
			Total FY-25 Allocations	$14,679,368
			Total Balance Left in Reserve	$682,537

*** Project is fully funded with the proposed FY 2025 allocation.**

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Section IV
RSTP Project Selection

RSTP PROJECT SELECTION

Projects selected for funding with Regional Surface Transportation Program (RSTP) funds must meet certain criteria originally developed in 1992 and subsequently reviewed and revised. 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 uniformity to the way that project information is submitted, HRTPO staff developed application forms to be utilized for submission of 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.

After addressing the needs of previously approved RSTP projects, new candidate projects to receive available RSTP funding were considered. **Table 4** shows all new projects proposed for RSTP funding during the project selection process in 2018. As shown in the table, 33 candidate projects, with a total request of $403.5 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. For this reason, a predetermination must be made with regard to the proportions of available funds that will be allocated to highway versus non-highway projects.

In an effort to continually improve the quantitative nature of the HRTPO CMAQ and RSTP Project Selection Process, the Transportation Technical Advisory Committee (TTAC) recommended during the meeting of March 2, 2016 that the HRTPO Project Prioritization Tool be used to evaluate highway-type RSTP projects and to continue to use the previous RSTP methodologies to evaluate non-highway RSTP projects since the HRTPO Prioritization Tool is not currently capable of evaluating most non-highway type projects. The HRTPO Board approved this change to the Project Selection Process on March 17, 2016. The HRTPO Project Prioritization Tool is being further enhanced to be able to evaluate nearly all RSTP project applications.

The Tool does not currently apply the Economic Vitality component for some projects types and, therefore, the scores for such projects cannot be directly compared to the scores for the other projects. **Table 5** shows the scoring and ranking of the 33 candidate projects. The detailed evaluation and scoring worksheets for each of the newly submitted RSTP projects are included in **Appendix B.**

Table 6 shows the four new projects and six previously approved projects that were ultimately approved by the HRTPO Board on November 15, 2018 to receive RSTP funding allocations in FY 2025. The total RSTP funding expected to be available for FY 2025, including the 20 percent state match, is approximately $34 million.

Table 5 | 2018 RSTP New Candidate Projects

Number	Code	Applicant	Project Name (HRTPO Prioritization Tool ID)	Total Cost	Total RSTP Request	Total FY-25 Request
Highway: Utilizing HRTPO Prioritization Tool						
Roadway Widening, New Facilities, HOV Lanes, Intersection Improvements						
1	CH1RS	Chesapeake	Mt. Pleasant/Route 168 Interchange	$ 4,900,000	$ 4,900,000	$ 4,900,000
2	CH2RS	Chesapeake	George Washington Highway Widening	$ 17,200,000	$ 17,200,000	$ 17,200,000
3	CH3RS	Chesapeake	Elbow Rd Realignment	$ 60,000,000	$ 40,000,000	$ 2,000,000
4	CH4RS	Chesapeake	Mt. Pleasant Road Widening	$ 32,895,722	$ 32,895,722	$ 32,895,722
5	CH5RS	Chesapeake	Elbow Road Widening (Butts Station to Centerville)	$ 3,000,000	$ 3,000,000	$ 3,000,000
6	CH6RS	Chesapeake	Johnston Road Widening	$ 4,542,995	$ 3,043,807	$ 3,043,807
7	IW1RS	Isle of Wight County	US 460 at Five Point Intersection Improvements	$ 2,322,328	$ 2,322,328	$ 816,841
8	IW2RS	Isle of Wight County	Broadwater (Route 620) Reconstruction with No New Capacity	$ 9,965,703	$ 9,965,703	$ 628,562
9	IW3RS	Isle of Wight County	US 460 at US 258 Turn Lane Improvements	$ 3,460,797	$ 3,460,797	$ 968,671
10	NN1RS	Newport News	I-64 Ramp C	$ 7,553,317	$ 7,553,317	$ 1,051,617
11	NN2RS	Newport News	Harpersville Rd and Saunders Rd Widening	$ 85,334,309	$ 85,334,309	$ 6,764,480
12	NO7RS	Norfolk	Ballentine Blvd lane Improvements	$ 832,500	$ 832,500	$ 160,000
13	PO1RS	Portsmouth	Elm Avenue Improvements between Navy Gates 29 and 36 (2040-126)	$ 25,450,000	$ 25,450,000	$ 25,450,000
14	SF1RS	Suffolk	North Suffolk Connector Phase I	$ 34,000,000	$ 34,000,000	$ 3,000,000
15	SF3RS	Suffolk	Route 17/Shoulders Hill Road Intersection Improvement	$ 9,000,000	$ 9,000,000	$ 9,000,000
16	VB2RS	Virginia Beach	Farrell Parkway Phase I	$ 13,200,000	$ 13,200,000	$ 13,200,000
17	VB3RS	Virginia Beach	Nimmo Parkway Phase VIIB	$ 43,505,000	$ 43,505,000	$ 43,505,000
18	YC1RS	York County	Penniman Rd/Government Rd Intersection	$ -	$ -	$ -
Corridor Operational Improvements						
19	NO6RS	Norfolk	Southside Bike Lane Network	$ 1,015,900	$ 1,015,900	$ 104,000
Bridge Rehabilitation						
20	NO8RS	Norfolk	Hampton Boulevard Bridge Rehabilitation	$ 6,000,000	$ 6,000,000	$ 6,000,000
Highway: Utilizing RSTP Scoring Process						
Alternatives Analysis and Feasiblilty Studies						
21	NO4RS	Norfolk	I-264/Military Hwy Ramp Modifications and Park and Ride Access Study	$ 400,000	$ 400,000	$ 400,000
22	NO5RS	Norfolk	Newtown Rd Corridor Study	$ 250,000	$ 250,000	$ 250,000
23	SF5RS	Suffolk	Bridge Road Corridor and IMR Study	$ 700,000	$ 700,000	$ 400,000
Intelligent Transportation Systems Projects						
24	NO1RS	Norfolk	Traffic Signal System Communications Network Upgrades	$ 1,000,000	$ 1,000,000	$ 250,000
25	NO2RS	Norfolk	Traffic Signal Detection Upgrades	$ 1,000,000	$ 1,000,000	$ 1,000,000
26	NO3RS	Norfolk	Transportation Information and Decision Support System	$ 800,000	$ 800,000	$ 100,000
Intermodal Transportation Projects						
27	SF2RS	Suffolk	Holland Road Intermodal Improvement Project	$ 24,750,000	$ 24,750,000	$ 750,000
Non-Highway:						
New or Expanded Service, Passenger Facilities, HS/intercity/& light rail, Station Development, Vehicle Upgrades etc.						
28	HT4RS	HRT	Victoria Boulevard Facility Upgrades -- Phase 2	$ 10,000,000	$ 10,000,000	$ 5,000,000
29	SF4RS	Suffolk	Transit Operations Facility	$ 1,890,066	$ 1,890,066	$ 1,890,066
Vehicle Replacement/Purchase						
30	HT3RS	HRT	High Frequency Network Vehicles -- Peninsula	$ 19,200,000	$ 19,200,000	$ 19,200,000
Other Transit						
Alternatives Analysis and Feasiblilty Studies						
31	GC1RS	Gloucester County	Route 17B Main Street Bike and Pedestrian Improvements Study	$ 238,000	$ 238,000	$ 238,000
32	GC2RS	Gloucester County	Ware House Rd Bike and Pedestrian Improvements Study	$ 268,000	$ 268,000	$ 268,000
33	WT1RS	WATA	Strategic Plan and Comprehensive Operating Analysis	$ 300,000	$ 300,000	$ 300,000
			TOTAL	**$ 424,974,637**	**$ 403,475,449**	**$ 203,734,766**

Table 6 | 2018 RSTP Candidate Projects in Ranked Order

Number	Code	Applicant	Project Name	Score
Highway: Utilizing HRTPO Prioritization Tool				Score (Max =300)
1	SF3RS	Suffolk	Route 17/Shoulders Hill Road Intersection Improvements	**169.0**
2	CH2RS	Chesapeake	George Washington Highway Widening	**156.0**
3	NN1RS	Newport News	I-64 Ramp C	**152.0**
4	VB2RS	Virginia Beach	Ferrell Parkway Phase 1	**143.0**
5	CH1RS	Chesapeake	Mt. Pleasant/Route 168 Interchange	**122.0**
6	PO1RS	Portsmouth	Elm Avenue improvements between Navy Gates 29 and 36	**112.0**
7	NO8RS	Norfolk	Hampton Boulevard Bridge Rehabilitation	**110.0**
8	VB3RS	Virginia Beach	Nimmo Parkway Phase VIIB	**107.0**
9	16314	York County	Penniman Rd/Government Rd Intersection	**102.0**
10	IW1RS	Isle of Wight	US Route 460 at Five Point Intersection Improvements	**101.0**
11	NO7RS	Norfolk	Ballentine Boulevard Lane Improvements	**98.0**
12	SF1RS	Suffolk	North Suffolk Connector	**98.0**
13	CH4RS	Chesapeake	Mt. Pleasant Road Widening	**96.0**
14	IW3RS	Isle of Wight	US Route 460 at US Route 258 Turn Lane Improvements	**93.0**
15	NN2RS	Newport News	Harpersville Road and Saunders Road Widening	**84.0**
16	CH3RS	Chesapeake	Elbow Road Realignment	**79.0**
17	CH6RS	Chesapeake	Johnstown Road Widening	**60.0**
18	IW2RS	Isle of Wight	Broadwater (Route 620) Reconstruction with No New Capacity	**40.0**
19	CH5RS	Chesapeake	Elbow Road Widening (Butts Station to Centerville) (Center Turn Lane)	**37.0**
Highway: Corridor Operational: Utilizing HRTPO Prioritization Tool				Score (Max =200)
20	NO6RS	Norfolk	Southside Bike Network	**78.0**
Highway: Utilizing RSTP Scoring Process				Score (Max =100)
21	NO5RS	Norfolk	Newtown Road Corridor Study	**70.0**
22	NO4RS	Norfolk	I-264/Military Highway Ramp Modifications and Park and Ride Access study	**68.0**
23	SF2RS	Suffolk	Holland Road Intermodal Improvement Project	**68.0**
24	NO3RS	Norfolk	Transportation Information and Decision Support System	**67.0**
25	NO2RS	Norfolk	Traffic Signal Detection Upgrades	**65.0**
26	SF5RS	Suffolk	Bridge Road Corridor and IMR Study	**62.0**
27	NO1RS	Norfolk	Traffic Signal System Communications Network Upgrades	**57.0**
Non-Highway: Utilizing RSTP Scoring Process				Score (Max =100)
28	HRT4RS	HRT	Victoria Boulevard Facility Upgrades - Phase 2	**73.0**
29	WT1RS	WATA	Strategic Plan and Comprehensive Operating Analysis	**72.0**
30	GC1RS	Gloucester	Route 17B Main Street Bike and Pedestrian Improvements	**68.0**
31	HT3RS	HRT	High Frequency Network Vehicles - Peninsula	**68.0**
32	GC2RS	Gloucester	Ware House Road Bike and Pedestrian Improvements Study	**64.0**
33	SF4RS	Suffolk	Transit Operations Facility	**27.0**

Table 7 | FY 2025 Allocations to New and Previously Approved RSTP Projects

#	ID/UPC #	Jurisdiction	Project Description	Proposed Allocations FY - 25
Previously Approved Projects				
1	T14104	*HRT*	TRAFFIX Program	$1,000,000
2	T16054	*HRT*	Bus Vehicle Replacement	$5,000,000
3	110627	*Gloucester County*	George Washington Memorial Highway (Route 17) Widening Phase 1	$9,000,000
4	102980	*James City County*	Pocahontas Trail Multimodal Corridor	$4,075,000
5	112318	*Virginia Beach*	Elbow Road Extended - Phase 2D	$5,000,000
New RSTP Projects with FY 2025 Allocations				
6	SF3RS	*Suffolk*	Route 17/ Shoulders Hill Road Intersection Improvements	$4,500,000
7	CH2RS	*Chesapeake*	George Washington Highway Widening	$1,500,000
8	CH1RS	*Chesapeake*	Mt. Pleasant/Route 168 Interchange	$500,000
9	VB2RS	*Virginia Beach*	Nimmo Parkway Phase VIIB	$500,000
10	16314	*York County*	Penniman Road/Government Road Intersection	$1
11	NO6RS	*Norfolk*	Southside Bike Network	$104,000
12	NO5RS	*Norfolk*	Newtown Road Corridor Study	* $250,000
13	HT4RS	*HRT*	Victoria Boulevard Facility Upgrades - Phase 2	$3,500,000
14	WT1RS	*WATA*	Strategic Plan and Comprehensive Operating Analysis	* $300,000
15	GC1RS	*Gloucester County*	Route 17B Main Street Bike and Pedestrian Improvements Study	* $238,000
16	GC2RS	*Gloucester County*	Ware House Road Bike and Pedestrian Improvements Study	* $268,000
17	SF4RS	*Suffolk*	Transit Operations Facility	$60,000
			FY-25 Mark	$37,078,513
			Total FY-25 Allocations	$35,795,001
			Total Balance Left in Reserve	$1,283,512

*** Project is fully funded with the proposed FY 2025 allocation.**

Section V
Appendices

APPENDIX A

CMAQ Project Evaluation Worksheets

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Isle of Wight
PROJECT NAME: **Carrollton Blvd. (Route 17) Crosswalks**
LOCATION: Route 17/Carrollton Blvd at the intersection of Route 17 and Eagle Harbor Parkway, and Smith's Neck Road (Route 669) at the intersection of Smiths Neck Road and Graystone Drive.
DESCRIPTION: One perpendicular crossing and one parallel crossing of Route 17 at the intersection of Route 17 and Eagle Harbor Parkway and secondary crosswalk location for the same neighborhood at the intersection of Smith's Neck Road (Route 669) and Graystone Drive.
DATE: 8\14\18 (on application)
PROJECT COST: $240,653

1- ESTIMATES OF VMT REDUCTIONS:

Ground counts for reasonableness check re: CMAQ Post Evaluation study [12]:

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

Demand estimation for proposed facility re: NCHRP Report 552:

Local Bicycle Commute Share (C): 0.3% [2]
Facility Length (L): 0.25 mi. [13]

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.00-0.25 mi.	742	333
	728	459
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
Average:		79
0.25-0.50 mi.	741	267
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
Average:		38

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.50-1.00 mi.	726	310
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
Average:		18

Buffer, Distance from Project	TAZ	2009 Density (D), persons/ sq.mi.	Area of Buffer (A), sq.mi. [6]	Residents in Buffer (R=D*A)	Existing Adult Cyclists (R*C*0.8) [3]	New Adult Cyclists [4]	Existing Adult Pedestrians [5]	New Adult Pedestrians [5]
0.00-0.25 mi.	above	79	0.13	10	0	0	0	0
0.25-0.50 mi.	above	38	0.13	5	0	0	0	0
0.50-1.00 mi.	above	18	0.25	5	0	0	0	0
				19	0	0	0	0

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

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

Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	0	0	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	0	0	
Eliminated Person Trips by Auto:	0	0	above [7]
Occupancy of Eliminated Auto Trips:	1.25	1.25	[11]
Eliminated Vehicle Trips (Auto):	0	0	
Avg. Alt. Mode Trip Length, mi.:	2	1	[9]
Factor (for converting alt. mode trip lengths):	2	2	[10]
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	0	0	
		Total:	0 vehicle-miles

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi [5]	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	0.067	0	0	0.000	250	0
NOx	0.207	0	0	0.000	250	0

3- COST EFFECTIVENESS:

Total Cost:	$240,653	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$16,044	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$16,044	0	$2,117,470	907	**$1,920,545,182**
NOx	$16,044	0	$685,365	907	**$621,625,735**

Notes:

[1] Average Day Estimate = [(Weekday Count * 5) + (Weekend Count * 2)] / 7

[2] "A Review of 2000 Census Commute Data for Hampton Roads", HRPDC, Nov. 2005, p. 28

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

[4] "New": i.e. as a result of proposed facility; New = Existing * B, where B varies by buffer: 0-0.25mi: 1.93; 0.25-0.50mi: 1.11; 0.50-1.00mi: 0.39, re: NCHRP Report 552, pg. 39

[5] Pedestrians = Cyclists / 4, based on ground counts at top of page

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

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

[8] Source: VDOT, Hampton Roads average for light duty vehicles and roadway functional classes, 2014, 35mph

[9] Source: 2001 NHTS Table Designer

[10] It is assumed that the eliminated auto trips will have length lower than regular auto trips (10 miles; source [9]) and higher than regular alt. mode trips (shown above).

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

[12] HRPDC, Feb. 2003, Appendix C

[13] From application

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CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: James City County
PROJECT NAME: **Longhill Road Shared Use Path**

LOCATION: Along a 0.55-mile stretch of Longhill Rd from DePue Dr at its eastern terminus, over Rt 199, to Lane Place at its western terminus.
DESCRIPTION: This project will improve connectivity in the bike and pedestrian network by closing existing and projected bike/pedestrian gaps and by improving multi-modal safety on this widely traveled road.

DATE: 8/15/2018 (on application)
PROJECT COST: $4,017,000

1- ESTIMATES OF VMT REDUCTIONS:

Ground counts for reasonableness check re: CMAQ Post Evaluation study [12]:

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

Demand estimation for proposed facility re: NCHRP Report 552:

Local Bicycle Commute Share (C): 0.3% [2]
Facility Length (L): 0.55 mi. [13]

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.00-0.25 mi.	1319	1,064
	1338	3,261
	0	
	0	
	0	
	0	
	0	
	Average:	2,163
0.25-0.50 mi.	1276	3,438
	1280	1,535
	1338	3,261
	1339	3,452
	1341	1,509
	Average:	2,639

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.50-1.00 mi.	1276	3,438
	1279	4,114
	1319	1,064
	1338	3,261
	1339	3,452
	1341	1,509
	1342	1,951
	1392	9
	0	0
	0	0
	0	0
	0	0
	0	0
	Average:	1,880

Buffer, Distance from Project	TAZ	2009 Density (D), persons/ sq.mi.	Area of Buffer (A), sq.mi. [6]	Residents in Buffer (R=D*A)	Existing Adult Cyclists (R*C*0.8) [3]	New Adult Cyclists [4]	Existing Adult Pedestrians [5]	New Adult Pedestrians [5]
0.00-0.25 mi.	above	2,163	0.28	595	1	3	0	1
0.25-0.50 mi.	above	2,639	0.28	726	2	2	0	0
0.50-1.00 mi.	above	1,880	0.55	1,034	2	1	1	0
				2,354	6	6	1	1

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

Existing Adult Cyclists:	6	above
New Adult Cyclists:	6	above
Total Adult Cyclists:	11	
Trips, per day per cyclist:	2	trip to destination + return trip
Total Trips per Day:	23	
vs. Trips on Sampled Bikeways:	23	above

Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	6	1	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	11	3	
Eliminated Person Trips by Auto:	11	3	above [7]
Occupancy of Eliminated Auto Trips:	1.25	1.25	[11]
Eliminated Vehicle Trips (Auto):	9	2	
Avg. Alt. Mode Trip Length, mi.:	2	1	[9]
Factor (for converting alt. mode trip lengths):	2	2	[10]
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	36	5	
		Total:	41 vehicle-miles

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi [5]	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	0.067	41	3	0.003	250	1
NOx	0.207	41	8	0.008	250	2

3- COST EFFECTIVENESS:

Total Cost:	$4,017,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$267,800	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$267,800	1	$392,628	907	**$356,113,481**
NOx	$267,800	2	$127,082	907	**$115,263,784**

Notes:

[1] Average Day Estimate = [(Weekday Count * 5) + (Weekend Count * 2)] / 7

[2] "A Review of 2000 Census Commute Data for Hampton Roads", HRPDC, Nov. 2005, p. 28

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

[4] "New": i.e. as a result of proposed facility; New = Existing * B, where B varies by buffer: 0-0.25mi: 1.93; 0.25-0.50mi: 1.11; 0.50-1.00mi: 0.39, re: NCHRP Report 552, pg. 39

[5] Pedestrians = Cyclists / 4, based on ground counts at top of page

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

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

[8] Source: VDOT, Hampton Roads average for light duty vehicles and roadway functional classes, 2014, 35mph

[9] Source: 2001 NHTS Table Designer

[10] It is assumed that the eliminated auto trips will have length lower than regular auto trips (10 miles; source [9]) and higher than regular alt. mode trips (shown above).

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

[12] HRPDC, Feb. 2003, Appendix C

[13] From application

Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Newport News
PROJECT NAME: **Citywide Pedestrian Signal Improvements**
20 intersections citywide

LOCATION:
DESCRIPTION: Install pedestrian accommodations including but not limited to pedestrian signals, ADA compliant handicap ramps, and crosswalks.

DATE: 7/27/2018 (on application)
PROJECT COST: $1,000,000

1- ESTIMATES OF VMT REDUCTIONS:

Ground counts for reasonableness check re: CMAQ Post Evaluation study [12]:

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

Demand estimation for proposed facility re: NCHRP Report 552:

Local Bicycle Commute Share (C): 0.3% [2]
Facility Length (L): 0.20 mi. [13]

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.00-0.25 mi.	1118	2,574
	1119	6,847
	1128	9,078
	1130	5,412
	1131	6,776
	1147	263
	1151	1,761
	1140	0
	1141	1,114
	1101	45
	1153	3,876
	1154	3,121
	1163	6,365
	1116	4,011
	1193	6,960
	1194	2,225
	1191	2,682
	1115	4,289
	1114	7,347
	1205	0
	1184	630
	1185	3,784
	1187	5,990
	0	0
	Average:	3,702
0.25-0.50 mi.	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	Average:	0

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.50-1.00 mi.	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	Average:	0

Buffer, Distance from Project	TAZ	2009 Density (D), persons/ sq.mi.	Area of Buffer (A), sq.mi. [6]	Residents in Buffer (R=D*A)	Existing Adult Cyclists (R*C*0.8) [3]	New Adult Cyclists [4]	Existing Adult Pedestrians [5]	New Adult Pedestrians [5]
0.00-0.25 mi.	above	3,702	0.10	370	1	2	0	0
0.25-0.50 mi.	above	0	0.10	0	0	0	0	0
0.50-1.00 mi.	above	0	0.20	0	0	0	0	0
				370	1	2	0	0

Hampton Roads TPO

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

Existing Adult Cyclists:	1	above
New Adult Cyclists:	2	above
Total Adult Cyclists:	3	
Trips, per day per cyclist:	2	trip to destination + return trip
Total Trips per Day:	5	
vs. Trips on Sampled Bikeways:	23	above

Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	2	0	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	3	1	
Eliminated Person Trips by Auto:	3	1	above [7]
Occupancy of Eliminated Auto Trips:	1.25	1.25	[11]
Eliminated Vehicle Trips (Auto):	3	1	
Avg. Alt. Mode Trip Length, mi.:	2	1	[9]
Factor (for converting alt. mode trip lengths):	2	2	[10]
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	11	1	
		Total:	12 vehicle-miles

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi [5]	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	0.067	12	1	0.001	250	0
NOx	0.207	12	3	0.003	250	1

3- COST EFFECTIVENESS:

Total Cost:	$1,000,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$66,667	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$66,667	0	$322,356	907	**$292,377,099**
NOx	$66,667	1	$104,338	907	**$94,634,134**

Notes:

[1] Average Day Estimate = [(Weekday Count * 5) + (Weekend Count * 2)] / 7

[2] "A Review of 2000 Census Commute Data for Hampton Roads", HRPDC, Nov. 2005, p. 28

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

[4] "New": i.e. as a result of proposed facility; New = Existing * B, where B varies by buffer: 0-0.25mi: 1.93; 0.25-0.50mi: 1.11; 0.50-1.00mi: 0.39, re: NCHRP Report 552, pg. 39

[5] Pedestrians = Cyclists / 4, based on ground counts at top of page

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

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

[8] Source: VDOT, Hampton Roads average for light duty vehicles and roadway functional classes, 2014, 35mph

[9] Source: 2001 NHTS Table Designer

[10] It is assumed that the eliminated auto trips will have length lower than regular auto trips (10 miles; source [9]) and higher than regular alt. mode trips (shown above).

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

[12] HRPDC, Feb. 2003, Appendix C

[13] From application

Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Newport News
PROJECT NAME: **Harpersville Pedestrian Enhancement Project**
LOCATION: Harpersville Road from Hampton Roads Center Parkway to Saunders Road
DESCRIPTION: This project will construct a minimum 5 foot wide sidewalk along the north side of Harpersville Road. ADA compliant handicap ramps will be installed as part of this project as well as pedestrian signal accommodations at the intersection of Harpersville Road and Peninsula Catholic High School.

DATE: 7/23/2018 (on application)
PROJECT COST: $4,857,166

1- ESTIMATES OF VMT REDUCTIONS:

Ground counts for reasonableness check re: CMAQ Post Evaluation study [12]:

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

Demand estimation for proposed facility re: NCHRP Report 552:

Local Bicycle Commute Share (C): 0.3% [2]
Facility Length (L): 1.15 mi. [13]

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.00-0.25 mi.	1163	6,365
	1164	2,722
	1166	2,968
	Average:	6,365
0.25-0.50 mi.	1167	3,359
	1402	991
	0	
	0	
	0	
	0	
	Average:	2,175

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.50-1.00 mi.	1020	1,980
	1021	3,464
	1095	0
	1101	45
	1154	3,121
	1168	5,175
	0	
	0	
	0	
	Average:	2,298

Buffer, Distance from Project	TAZ	2009 Density (D), persons/ sq.mi.	Area of Buffer (A), sq.mi. [6]	Residents in Buffer (R=D*A)	Existing Adult Cyclists (R*C*0.8) [3]	New Adult Cyclists [4]	Existing Adult Pedestrians [5]	New Adult Pedestrians [5]
0.00-0.25 mi.	above	6,365	0.58	3,660	9	17	2	4
0.25-0.50 mi.	above	2,175	0.58	1,251	3	3	1	1
0.50-1.00 mi.	above	2,298	1.15	2,642	6	2	2	1
				7,553	18	23	5	6

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

Existing Adult Cyclists:	18	above
New Adult Cyclists:	23	above
Total Adult Cyclists:	41	
Trips, per day per cyclist:	2	trip to destination + return trip
Total Trips per Day:	82	
vs. Trips on Sampled Bikeways:	23	above

Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	23	6	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	46	11	
Eliminated Person Trips by Auto:	46	11	above [7]
Occupancy of Eliminated Auto Trips:	1.25	1.25	[11]
Eliminated Vehicle Trips (Auto):	36	9	
Avg. Alt. Mode Trip Length, mi.:	2	1	[9]
Factor (for converting alt. mode trip lengths):	2	2	[10]
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	146	18	
		Total:	164 vehicle-miles

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi [5]	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	0.067	164	11	0.011	250	3
NOx	0.207	164	34	0.034	250	8

3- COST EFFECTIVENESS:

Total Cost:	$4,857,166	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$323,811	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$323,811	3	$117,984	907	**$107,011,924**
NOx	$323,811	8	$38,188	907	**$34,636,710**

Notes:

[1] Average Day Estimate = [(Weekday Count * 5) + (Weekend Count * 2)] / 7

[2] "A Review of 2000 Census Commute Data for Hampton Roads", HRPDC, Nov. 2005, p. 28

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

[4] "New": i.e. as a result of proposed facility; New = Existing * B, where B varies by buffer: 0-0.25mi: 1.93; 0.25-0.50mi: 1.11; 0.50-1.00mi: 0.39, re: NCHRP Report 552, pg. 39

[5] Pedestrians = Cyclists / 4, based on ground counts at top of page

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

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

[8] Source: VDOT, Hampton Roads average for light duty vehicles and roadway functional classes, 2014, 35mph

[9] Source: 2001 NHTS Table Designer

[10] It is assumed that the eliminated auto trips will have length lower than regular auto trips (10 miles; source [9]) and higher than regular alt. mode trips (shown above).

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

[12] HRPDC, Feb. 2003, Appendix C

[13] From application

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Norfolk
PROJECT NAME: **Southside Bike Lane Network**
LOCATION: The project is in multiple locations along the southside of the City in the Berkley and Campostella areas.
DESCRIPTION: The Southside Bike Lane Network includes bike facility corridors outlined in the City of Norfolk Bicycle and Pedestrian Strategic Plan, adopted in 2014. The project provides a connection to the Berkley Bridge multi-use path from downtown Norfolk to the southside/Berkley communities.

DATE: 8/15/2016 (on application)
PROJECT COST: $1,015,900

1- ESTIMATES OF VMT REDUCTIONS:

Ground counts for reasonableness check re: CMAQ Post Evaluation study [12]:

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

Demand estimation for proposed facility re: NCHRP Report 552:

Local Bicycle Commute Share (C): 0.3% [2]
Facility Length (L): 3.60 mi. [13]

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.00-0.25 mi.	204	128
	205	6
	206	201
	207	4,045
	208	3,890
	198	4,277
	199	822
	200	7,048
	194	0
	197	1,281
	201	885
	202	8,154
	Average:	2,561
0.25-0.50 mi.	195	129
	196	10,732
	0	0
	0	0
	0	0
	Average:	5,431
0.50-1.00 mi.	0	0
	0	
	0	
	0	
	0	
	0	
	0	
	0	
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	Average:	0

Buffer, Distance from Project	TAZ	2009 Density (D), persons/ sq.mi.	Area of Buffer (A), sq.mi. [6]	Residents in Buffer (R=D*A)	Existing Adult Cyclists (R*C*0.8) [3]	New Adult Cyclists [4]	Existing Adult Pedestrians [5]	New Adult Pedestrians [5]
0.00-0.25 mi.	above	2,561	1.80	4,611	11	21	3	5
0.25-0.50 mi.	above	5,431	1.80	9,775	23	26	6	7
0.50-1.00 mi.	above	0	3.60	0	0	0	0	0
				14,385	35	47	9	12

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

Existing Adult Cyclists:	35	above
New Adult Cyclists:	47	above
Total Adult Cyclists:	82	
Trips, per day per cyclist:	2	trip to destination + return trip
Total Trips per Day:	164	
vs. Trips on Sampled Bikeways:	23	above

Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	47	12	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	95	24	
Eliminated Person Trips by Auto:	95	24	above [7]
Occupancy of Eliminated Auto Trips:	1.25	1.25	[11]
Eliminated Vehicle Trips (Auto):	76	19	
Avg. Alt. Mode Trip Length, mi.:	2	1	[9]
Factor (for converting alt. mode trip lengths):	2	2	[10]
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	303	38	
Total:			341 vehicle-miles

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi [5]	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	0.067	341	23	0.023	250	6
NOx	0.207	341	71	0.071	250	18

3- COST EFFECTIVENESS:

Total Cost:	$1,015,900	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$67,727	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$67,727	6	$11,849	907	**$10,746,680**
NOx	$67,727	18	$3,835	907	**$3,478,394**

Notes:

[1] Average Day Estimate = [(Weekday Count * 5) + (Weekend Count * 2)] / 7

[2] "A Review of 2000 Census Commute Data for Hampton Roads", HRPDC, Nov. 2005, p. 28

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

[4] "New": i.e. as a result of proposed facility; New = Existing * B, where B varies by buffer: 0-0.25mi: 1.93; 0.25-0.50mi: 1.11; 0.50-1.00mi: 0.39, re: NCHRP Report 552, pg. 39

[5] Pedestrians = Cyclists / 4, based on ground counts at top of page

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

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

[8] Source: VDOT, Hampton Roads average for light duty vehicles and roadway functional classes, 2014, 35mph

[9] Source: 2001 NHTS Table Designer

[10] It is assumed that the eliminated auto trips will have length lower than regular auto trips (10 miles; source [9]) and higher than regular alt. mode trips (shown above).

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

[12] HRPDC, Feb. 2003, Appendix C

[13] From application

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Norfolk
PROJECT NAME: **Terminal Blvd. Multi-Use Path**
LOCATION: Trail parallel to Terminal Boulevard, on the southside of the railroad tracks, from Hampton Boulevard to Restmere , transitioning to sharrows in the Wards Corner neighborhood
DESCRIPTION: The proposed project is for a 12-foot wide, 1.6-mile long asphalt multi-use trail south of Terminal Boulevard, adjacent to the rail line, starting at Hampton Boulevard and extending to Restmere Road.

DATE: 8/15/2018 (on application)
PROJECT COST: $3,500,000

1- ESTIMATES OF VMT REDUCTIONS:

Ground counts for reasonableness check re: CMAQ Post Evaluation study [12]:

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

Demand estimation for proposed facility re: NCHRP Report 552:

Local Bicycle Commute Share (C): 0.3% [2]
Facility Length (L): 2.40 mi. [13]

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.00-0.25 mi.	88	8,564
	89	5,607
	90	10,215
	91	4,814
	82	9,489
	902	5,031
	77	12
	78	2,733
	79	2,802
	0	0
	Average:	5,474
0.25-0.50 mi.	80	1,922
	96	3,318
	97	6,874
	0	0
	0	0
	Average:	4,038

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.50-1.00 mi.	98	9,456
	85	4,462
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	Average:	6,959

Buffer, Distance from Project	TAZ	2009 Density (D), persons/ sq.mi.	Area of Buffer (A), sq.mi. [6]	Residents in Buffer (R=D*A)	Existing Adult Cyclists (R*C*0.8) [3]	New Adult Cyclists [4]	Existing Adult Pedestrians [5]	New Adult Pedestrians [5]
0.00-0.25 mi.	above	5,474	1.20	6,569	16	30	4	8
0.25-0.50 mi.	above	4,038	1.20	4,846	12	13	3	3
0.50-1.00 mi.	above	6,959	2.40	16,702	40	16	10	4
				28,116	67	59	17	15

Hampton Roads TPO

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

Existing Adult Cyclists:	67	above
New Adult Cyclists:	59	above
Total Adult Cyclists:	126	
Trips, per day per cyclist:	2	trip to destination + return trip
Total Trips per Day:	253	
vs. Trips on Sampled Bikeways:	23	above

Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	59	15	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	118	29	
Eliminated Person Trips by Auto:	118	29	above [7]
Occupancy of Eliminated Auto Trips:	1.25	1.25	[11]
Eliminated Vehicle Trips (Auto):	94	24	
Avg. Alt. Mode Trip Length, mi.:	2	1	[9]
Factor (for converting alt. mode trip lengths):	2	2	[10]
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	377	47	
		Total:	425 vehicle-miles

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi [5]	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	0.067	425	28	0.028	250	7
NOx	0.207	425	88	0.088	250	22

3- COST EFFECTIVENESS:

Total Cost:	$3,500,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$233,333	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$233,333	7	$32,810	907	**$29,758,799**
NOx	$233,333	22	$10,620	907	**$9,632,075**

Notes:

[1] Average Day Estimate = [(Weekday Count * 5) + (Weekend Count * 2)] / 7

[2] "A Review of 2000 Census Commute Data for Hampton Roads", HRPDC, Nov. 2005, p. 28

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

[4] "New": i.e. as a result of proposed facility; New = Existing * B, where B varies by buffer: 0-0.25mi: 1.93; 0.25-0.50mi: 1.11; 0.50-1.00mi: 0.39, re: NCHRP Report 552, pg. 39

[5] Pedestrians = Cyclists / 4, based on ground counts at top of page

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

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

[8] Source: VDOT, Hampton Roads average for light duty vehicles and roadway functional classes, 2014, 35mph

[9] Source: 2001 NHTS Table Designer

[10] It is assumed that the eliminated auto trips will have length lower than regular auto trips (10 miles; source [9]) and higher than regular alt. mode trips (shown above).

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

[12] HRPDC, Feb. 2003, Appendix C

[13] From application

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Portsmouth
PROJECT NAME: **The "Complete" High Street**

LOCATION: The project extends approximately 1 mile between downtown Portsmouth and the MLK Freeway.
DESCRIPTION: The "Complete" High Street project will transform the Uptown portion of High Street between downtown Portsmouth and the MLK Freeway into a bicycle and pedestrian friendly Complete Street with wide sidewalks, on-street parking, bus pull-offs, and shared travel lanes that are convertible to bike lanes.

DATE: 8/15/2018 (on application)
PROJECT COST: $10,915,000

1- ESTIMATES OF VMT REDUCTIONS:

Ground counts for reasonableness check re: CMAQ Post Evaluation study [12]:

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

Demand estimation for proposed facility re: NCHRP Report 552:

Local Bicycle Commute Share (C): 0.3% [2]
Facility Length (L): 1.00 mi. [13]

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.00-0.25 mi.	452	3,723
	453	10,175
	471	0
	Average:	4,633
0.25-0.50 mi.	451	3,563
	452	3,723
	453	10,175
	466	8,644
	470	95
	471	0
	0	0
	Average:	4,367

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.50-1.00 mi.	449	6,721
	451	3,563
	452	3,723
	453	10,175
	466	8,644
	467	6,868
	469	7,486
	479	3240
	471	0
	507	5789
	508	2,679
	Average:	5,353

Buffer, Distance from Project	TAZ	2009 Density (D), persons/ sq.mi.	Area of Buffer (A), sq.mi. [6]	Residents in Buffer (R=D*A)	Existing Adult Cyclists (R*C*0.8) [3]	New Adult Cyclists [4]	Existing Adult Pedestrians [5]	New Adult Pedestrians [5]
0.00-0.25 mi.	above	4,633	0.50	2,316	6	11	1	3
0.25-0.50 mi.	above	4,367	0.50	2,183	5	6	1	1
0.50-1.00 mi.	above	5,353	1.00	5,353	13	5	3	1
				9,853	24	22	6	5

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

Existing Adult Cyclists:	24	above
New Adult Cyclists:	22	above
Total Adult Cyclists:	45	
Trips, per day per cyclist:	2	trip to destination + return trip
Total Trips per Day:	90	
vs. Trips on Sampled Bikeways:	23	above

Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	22	5	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	43	11	
Eliminated Person Trips by Auto:	43	11	above [7]
Occupancy of Eliminated Auto Trips:	1.25	1.25	[11]
Eliminated Vehicle Trips (Auto):	34	9	
Avg. Alt. Mode Trip Length, mi.:	2	1	[9]
Factor (for converting alt. mode trip lengths):	2	2	[10]
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	138	17	
		Total:	155 vehicle-miles

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi [5]	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	0.067	155	10	0.010	250	3
NOx	0.207	155	32	0.032	250	8

3- COST EFFECTIVENESS:

Total Cost:	$10,915,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$727,667	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$727,667	3	$279,903	907	**$253,871,778**
NOx	$727,667	8	$90,597	907	**$82,171,059**

Notes:

[1] Average Day Estimate = [(Weekday Count * 5) + (Weekend Count * 2)] / 7

[2] "A Review of 2000 Census Commute Data for Hampton Roads", HRPDC, Nov. 2005, p. 28

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

[4] "New": i.e. as a result of proposed facility; New = Existing * B, where B varies by buffer: 0-0.25mi: 1.93; 0.25-0.50mi: 1.11; 0.50-1.00mi: 0.39, re: NCHRP Report 552, pg. 39

[5] Pedestrians = Cyclists / 4, based on ground counts at top of page

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

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

[8] Source: VDOT, Hampton Roads average for light duty vehicles and roadway functional classes, 2014, 35mph

[9] Source: 2001 NHTS Table Designer

[10] It is assumed that the eliminated auto trips will have length lower than regular auto trips (10 miles; source [9]) and higher than regular alt. mode trips (shown above).

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

[12] HRPDC, Feb. 2003, Appendix C

[13] From application

Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Suffolk
PROJECT NAME: **Downtown Suffolk Bike Trail Crossing**
LOCATION: Constance Road near the Suffolk Riverfront Park
DESCRIPTION: To design and construct a signalized crossing of Constance Road for Bicycle and Pedestrians to connect the Prentis Street Bike Trail (Part of the BOA Regional Trail) to the Main Street Bike and Pedestrian Facilities

DATE: 8/23/2018 (on application)
PROJECT COST: $800,000

1- ESTIMATES OF VMT REDUCTIONS:

Ground counts for reasonableness check re: CMAQ Post Evaluation study [12]:

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

Demand estimation for proposed facility re: NCHRP Report 552:

Local Bicycle Commute Share (C): 0.3% [2]
Facility Length (L): 0.05 mi. [13]

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.00-0.25 mi.	570	124
	567	2,803
	569	2,421
	Average:	1,783
0.25-0.50 mi.	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	Average:	0

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.50-1.00 mi.	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	Average:	0

Buffer, Distance from Project	TAZ	2009 Density (D), persons/ sq.mi.	Area of Buffer (A), sq.mi. [6]	Residents in Buffer (R=D*A)	Existing Adult Cyclists (R*C*0.8) [3]	New Adult Cyclists [4]	Existing Adult Pedestrians [5]	New Adult Pedestrians [5]
0.00-0.25 mi.	above	1,783	0.03	45	0	0	0	0
0.25-0.50 mi.	above	0	0.03	0	0	0	0	0
0.50-1.00 mi.	above	0	0.05	0	0	0	0	0
				45	0	0	0	0

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

Existing Adult Cyclists:	0	above
New Adult Cyclists:	0	above
Total Adult Cyclists:	0	
Trips, per day per cyclist:	2	trip to destination + return trip
Total Trips per Day:	1	
vs. Trips on Sampled Bikeways:	23	above

Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	0	0	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	0	0	
Eliminated Person Trips by Auto:	0	0	above [7]
Occupancy of Eliminated Auto Trips:	1.25	1.25	[11]
Eliminated Vehicle Trips (Auto):	0	0	
Avg. Alt. Mode Trip Length, mi.:	2	1	[9]
Factor (for converting alt. mode trip lengths):	2	2	[10]
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	1	0	
Total:			1 vehicle-miles

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi [5]	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	0.067	1	0	0.000	250	0
NOx	0.207	1	0	0.000	250	0

3- COST EFFECTIVENESS:

Total Cost:	$800,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$53,333	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$53,333	0	$2,142,263	907	**$1,943,032,227**
NOx	$53,333	0	$693,389	907	**$628,904,151**

Notes:

[1] Average Day Estimate = [(Weekday Count * 5) + (Weekend Count * 2)] / 7

[2] "A Review of 2000 Census Commute Data for Hampton Roads", HRPDC, Nov. 2005, p. 28

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

[4] "New": i.e. as a result of proposed facility; New = Existing * B, where B varies by buffer: 0-0.25mi: 1.93; 0.25-0.50mi: 1.11; 0.50-1.00mi: 0.39, re: NCHRP Report 552, pg. 39

[5] Pedestrians = Cyclists / 4, based on ground counts at top of page

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

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

[8] Source: VDOT, Hampton Roads average for light duty vehicles and roadway functional classes, 2014, 35mph

[9] Source: 2001 NHTS Table Designer

[10] It is assumed that the eliminated auto trips will have length lower than regular auto trips (10 miles; source [9]) and higher than regular alt. mode trips (shown above).

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

[12] HRPDC, Feb. 2003, Appendix C

[13] From application

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CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Suffolk
PROJECT NAME: **Carolina Road Bike Trail**

LOCATION: Carolina Road (Rt.. 13) from Obici Industrial Boulevard to Rt. 13 Bypass
DESCRIPTION: To design and construct a Multiuse Bike and Pedestrian Trail that will connect the Obici Industrial Park (Downtown Suffolk) to the Rte. 13 Bypass including the Public Works Ops Center and Parks and Recreation Operations Facility.

DATE: 8/23/2018 (on application)
PROJECT COST: $1,950,000

1- ESTIMATES OF VMT REDUCTIONS:

Ground counts for reasonableness check re: CMAQ Post Evaluation study [12]:

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

Demand estimation for proposed facility re: NCHRP Report 552:

Local Bicycle Commute Share (C): 0.3% [2]
Facility Length (L): 1.40 mi. [13]

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.00-0.25 mi.	513	2,976
	520	5,119
	525	22
	528	369
	535	724
	558	6,289
	559	5,547
	561	2,822
	833	2,205
	Average:	2,897
0.25-0.50 mi.	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	Average:	0

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.50-1.00 mi.	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	Average:	0

Buffer, Distance from Project	TAZ	2009 Density (D), persons/ sq.mi.	Area of Buffer (A), sq.mi. [6]	Residents in Buffer (R=D*A)	Existing Adult Cyclists (R*C*0.8) [3]	New Adult Cyclists [4]	Existing Adult Pedestrians [5]	New Adult Pedestrians [5]
0.00-0.25 mi.	above	2,897	0.70	2,028	5	9	1	2
0.25-0.50 mi.	above	0	0.70	0	0	0	0	0
0.50-1.00 mi.	above	0	1.40	0	0	0	0	0
				2,028	5	9	1	2

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

Existing Adult Cyclists:	5	above
New Adult Cyclists:	9	above
Total Adult Cyclists:	14	
Trips, per day per cyclist:	2	trip to destination + return trip
Total Trips per Day:	29	
vs. Trips on Sampled Bikeways:	23	above

Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	9	2	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	19	5	
Eliminated Person Trips by Auto:	19	5	above [7]
Occupancy of Eliminated Auto Trips:	1.25	1.25	[11]
Eliminated Vehicle Trips (Auto):	15	4	
Avg. Alt. Mode Trip Length, mi.:	2	1	[9]
Factor (for converting alt. mode trip lengths):	2	2	[10]
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	60	8	
Total:			68 vehicle-miles

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi [5]	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	0.067	68	5	0.005	250	1
NOx	0.207	68	14	0.014	250	3

3- COST EFFECTIVENESS:

Total Cost:	$1,950,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$130,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$130,000	1	$114,757	907	**$104,085,024**
NOx	$130,000	3	$37,144	907	**$33,689,356**

Notes:

[1] Average Day Estimate = [(Weekday Count * 5) + (Weekend Count * 2)] / 7

[2] "A Review of 2000 Census Commute Data for Hampton Roads", HRPDC, Nov. 2005, p. 28

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

[4] "New": i.e. as a result of proposed facility; New = Existing * B, where B varies by buffer: 0-0.25mi: 1.93; 0.25-0.50mi: 1.11; 0.50-1.00mi: 0.39, re: NCHRP Report 552, pg. 39

[5] Pedestrians = Cyclists / 4, based on ground counts at top of page

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

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

[8] Source: VDOT, Hampton Roads average for light duty vehicles and roadway functional classes, 2014, 35mph

[9] Source: 2001 NHTS Table Designer

[10] It is assumed that the eliminated auto trips will have length lower than regular auto trips (10 miles; source [9]) and higher than regular alt. mode trips (shown above).

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

[12] HRPDC, Feb. 2003, Appendix C

[13] From application

CONGESTION MITIGATION AND AIR QUALITY
BICYCLE AND PEDESTRIAN PROJECTS

JURISDICTION: Suffolk
PROJECT NAME: **Holland Road Bike Trail**
Holland Road from RTE 58 Bypass to Washington Street to Constance Road to the Prentis Street
LOCATION: Multiuse Trail
DESCRIPTION: To design and construct a Multiuse Bike Trail that will connect the Rte. 58 Multiuse trail to the Prentis Street trail which is a part of the BOA Regional trail.

DATE: 8/23/2018 (on application)
PROJECT COST: $6,800,000

1- ESTIMATES OF VMT REDUCTIONS:

Ground counts for reasonableness check re: CMAQ Post Evaluation study [12]:

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

Demand estimation for proposed facility re: NCHRP Report 552:

Local Bicycle Commute Share (C): 0.3% [2]
Facility Length (L): 2.14 mi. [13]

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.00-0.25 mi.	515	1,646
	533	148
	535	724
	562	4,507
	565	3,585
	566	2,232
	839	744
	840	1,547
	855	503
	856	195
	0	0
	Average:	1,583
0.25-0.50 mi.	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	Average:	0

Buffer, Distance from Project	TAZ [13]	2015 Density (D), persons/ sq.mi.
0.50-1.00 mi.	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	0	0
	Average:	0

Buffer, Distance from Project	TAZ	2009 Density (D), persons/ sq.mi.	Area of Buffer (A), sq.mi. [6]	Residents in Buffer (R=D*A)	Existing Adult Cyclists (R*C*0.8) [3]	New Adult Cyclists [4]	Existing Adult Pedestrians [5]	New Adult Pedestrians [5]
0.00-0.25 mi.	above	1,583	1.07	1,694	4	8	1	2
0.25-0.50 mi.	above	0	1.07	0	0	0	0	0
0.50-1.00 mi.	above	0	2.14	0	0	0	0	0
				1,694	4	8	1	2

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

Existing Adult Cyclists:	4	above
New Adult Cyclists:	8	above
Total Adult Cyclists:	12	
Trips, per day per cyclist:	2	trip to destination + return trip
Total Trips per Day:	24	
vs. Trips on Sampled Bikeways:	23	above

Therefore, the demand calculation results are reasonable.

Calculating VMT reduction:

	Biking	Walking	
New Users:	8	2	above
Trips, per day per user:	2	2	trip to destination + return trip
New Person Trips on Facility:	16	4	
Eliminated Person Trips by Auto:	16	4	above [7]
Occupancy of Eliminated Auto Trips:	1.25	1.25	[11]
Eliminated Vehicle Trips (Auto):	13	3	
Avg. Alt. Mode Trip Length, mi.:	2	1	[9]
Factor (for converting alt. mode trip lengths):	2	2	[10]
Avg. Eliminated Auto Trip Length, veh-mi.:	4	2	
VMT Reduction, mi:	50	6	
Total:			56 vehicle-miles

2- EMISSIONS CALCULATIONS:

Type	Emissions Factor, g/mi [5]	VMT Reduction, mi/day (above)	Emissions Reduction, g/day	Emissions Reduction, kg/day	Conversion Factor, wkdays/yr	Emissions Reduction, kg/yr
VOC	0.067	56	4	0.004	250	1
NOx	0.207	56	12	0.012	250	3

3- COST EFFECTIVENESS:

Total Cost:	$6,800,000	above
Useful life, years:	15	as assumed in CMAQ analyses of previous years
Annual Cost:	$453,333	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Con-version Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$453,333	1	$479,082	907	**$434,527,189**
NOx	$453,333	3	$155,065	907	**$140,644,066**

Notes:

[1] Average Day Estimate = [(Weekday Count * 5) + (Weekend Count * 2)] / 7

[2] "A Review of 2000 Census Commute Data for Hampton Roads", HRPDC, Nov. 2005, p. 28

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

[4] "New": i.e. as a result of proposed facility; New = Existing * B, where B varies by buffer: 0-0.25mi: 1.93; 0.25-0.50mi: 1.11; 0.50-1.00mi: 0.39, re: NCHRP Report 552, pg. 39

[5] Pedestrians = Cyclists / 4, based on ground counts at top of page

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

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

[8] Source: VDOT, Hampton Roads average for light duty vehicles and roadway functional classes, 2014, 35mph

[9] Source: 2001 NHTS Table Designer

[10] It is assumed that the eliminated auto trips will have length lower than regular auto trips (10 miles; source [9]) and higher than regular alt. mode trips (shown above).

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

[12] HRPDC, Feb. 2003, Appendix C

[13] From application

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CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY - CORRIDOR IMPROVEMENTS

JURISDICTION: Chesapeake
PROJECT NAME: **Chesapeake Signal Timing - All Phases**
LOCATION: Citywide
DESCRIPTION: Signal retiming
DATE: 7/31/2018 (1)
PROJECT COST: $600,000

1 - EMISSIONS REDUCTION

Arterial Intersection(s)	Number of Intersections	AADT (1)	Peak Hour Volume (2)	Delay Savings	Delay Savings (s / pk hr)(4)	Delay Savings
SEE APPLICATION FOR LOCATIONS						
	14	36,000	3,240	10.7	485,352	793
	5	35,000	3,150	10.7	168,525	275
	16	29,000	2,610	10.7	446,832	730
	14	22,000	1,980	10.7	296,604	485
	8	21,000	1,890	10.7	161,784	264
	5	24,000	2,160	10.7	115,560	189
	11	12,000	1,080	10.7	127,116	208
	12	30,000	2,700	10.7	346,680	566
	17	75,000	6,750	10.7	1,227,825	2,006
	13	11,000	990	10.7	137,709	225
	5	8,600	774	10.7	41,409	68
	2	6,000	540	10.7	11,556	19

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	4	3,500	315	10.7	13,482	22
	3	7,000	630	10.7	20,223	33
	9	10,000	900	10.7	86,670	142
	3	16,000	1,440	10.7	46,224	76
	1	31,000	2,790	10.7	29,853	49
	2	5,000	450	10.7	9,630	16
	9	12,000	1,080	10.7	104,004	170
	5	21,000	1,890	10.7	101,115	165
	1	38,000	3,420	10.7	36,594	60
	2	25,000	2,250	10.7	48,150	79
	1	19,000	1,710	10.7	18,297	30
	1	22,000	1,980	10.7	21,186	35
	3	13,000	1,170	10.7	37,557	61
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
					Total Delay Savings	5,828 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	5,828	857	0.9	250	214
NOx	0.637	5,828	3,713	3.7	250	928

2 - COST EFFECTIVENESS

Total Cost:	$600,000	(from above)
Useful Life, years:	2 [3]	
Annual Cost:	$300,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness,
VOC	$300,000	214	$1,401	**$1,270,356**
NOx	$300,000	928	$323	**$293,159**

[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

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CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY - CORRIDOR IMPROVEMENTS

JURISDICTION: Newport News
PROJECT NAME: **Permanent Message Boards**
LOCATION: City Center at Oyster Point
DESCRIPTION: Install permanent message boards to mitigate congestion through active route management
DATE: 7/25/2018 (1)
PROJECT COST: $500,000

1 - EMISSIONS REDUCTION

Arterial Intersection(s)	Number of Intersections	AADT (1)	Peak Hour Volume (2)	Delay Savings	Delay Savings (s / pk hr)(4)	Delay Savings
Jefferson Avenue						
	8	50,000	4,500	10.7	385,200	629
J Clyde Morris Boulevard						
	4	35,000	3,150	10.7	134,820	220
Oyster Point Rd						
	2	35,000	3,150	10.7	67,410	110
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0

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Isolated Intersections						
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
			0	10.7	0	0
				Total Delay Savings		960 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	960	141	0.1	250	35
NOx	0.637	960	611	0.6	250	153

2 - COST EFFECTIVENESS

Total Cost:	$500,000	(from above)
Useful Life, years:	2 [3]	
Annual Cost:	$250,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Effectiveness,
VOC	$250,000	35	$7,087	**$6,428,139**
NOx	$250,000	153	$1,636	**$1,483,417**

[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

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CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: Chesapeake
PROJECT NAME: **Battlefield Blvd/Volvo Parkway Intersection Improvements**
LOCATION: Intersection of Battlefielf Blvd and Volvo Parkway

DESCRIPTION: This project includes right-turn improvements to the westbound approach to construct two dedicated right-turn lanes. This will also require some modifications to the northeast channelizing island to construct the proposed westbound turn lanes. The proposed medians and signal poles along Volvo Parkway are anticipated to remain. This phase will require right-of-way from the SunTrust Bank as well as proposed site improvements to reconfigure the existing parking lot.

DATE: 8/15/2018 (1)
PROJECT COST: $827,500

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		204.9	sec/veh (1)
Intersection Delay After Project		132.4	sec/veh (1)
Change In Intersection Delay		72.5	sec/veh, pk hr
Total Vehicles During Peak Hour		7,850	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		158.1	veh hr's, pk hr
	divided by	17%	pk hr delay factor (2)
Change In Intersection Delay		929.9	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	1.246	929.9	1,159	1.159	250	289.7
NOx	1.168	929.9	1,086	1.086	250	271.5

2 - COST EFFECTIVENESS

Total Cost:	$827,500	(from above)
Useful life, years:	10	(4)
Annual Cost:	$82,750	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$82,750	289.7	$286	907	**$259,096**
NOx	$82,750	271.5	$305	907	**$276,399**

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 MOVES2014a), 2023, idle.
(4) As previously assumed.
Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: Isle of Wight County
PROJECT NAME: **US 460 at Five Points Intersection Improvements**
LOCATION: The intersection of U.S. Route 460 with Court Street, Bank Street, and Church Street in Windsor, VA

DESCRIPTION: The proposed project involves removing one (1) of the six (6) approaches at the intersection of U.S. Route 460 with Court Street, Bank Street, and Church Street to allow more efficient and safe function of the signalized intersection.

DATE: 8/15/2018 (1)
PROJECT COST: $2,322,328

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		58.6	sec/veh (1)
Intersection Delay After Project		35.3	sec/veh (1)
Change In Intersection Delay		23.3	sec/veh, pk hr
Total Vehicles During Peak Hour		1,586	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		10.3	veh hr's, pk hr
	divided by	17%	pk hr delay factor (2)
Change In Intersection Delay		60.4	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	1.246	60.4	75	0.075	250	18.8
NOx	1.168	60.4	71	0.071	250	17.6

2 - COST EFFECTIVENESS

Total Cost:	$2,322,328	(from above)
Useful life, years:	10 (4)	
Annual Cost:	$232,233	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$232,233	18.8	$12,347	907	**$11,198,636**
NOx	$232,233	17.6	$13,171	907	**$11,946,490**

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 MOVES2014a), 2023, idle.
(4) As previously assumed.
Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: Isle of Wight County
PROJECT NAME: **US 460 at US 258 Turn Lane Improvements**
LOCATION: The intersection of US Route 460 (Windsor Blvd) and US Route 258 (Prince Blvd) in Windsor, VA

DESCRIPTION: The proposed project involves widening the east side of U.S. Route 258 at the U.S. Route 460 intersection to accommodate turn lanes and pedestrian facilities. Left turn lanes will be added in both directions (i.e., northbound and southbound U.S. Route 258)

DATE: 8/14/2018 (1)
PROJECT COST: $3,460,797

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		155.6	sec/veh (1)
Intersection Delay After Project		118.9	sec/veh (1)
Change In Intersection Delay		36.7	sec/veh, pk hr
Total Vehicles During Peak Hour		1,519	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		15.5	veh hr's, pk hr
	divided by	17%	pk hr delay factor (2)
Change In Intersection Delay		91.1	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	1.246	91.1	113	0.113	250	28.4
NOx	1.168	91.1	106	0.106	250	26.6

2 - COST EFFECTIVENESS

Total Cost:	$3,460,797	(from above)
Useful life, years:	10 (4)	
Annual Cost:	$346,080	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$346,080	28.4	$12,197	907	**$11,062,491**
NOx	$346,080	26.6	$13,011	907	**$11,801,254**

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 MOVES2014a), 2023, idle.
(4) As previously assumed.
Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: Newport News
PROJECT NAME: **Canon Boulevard and Old Oyster Point Road Intersection Improvements**
LOCATION: Canon Boulevard and Old Oyster Point Road Intersection

DESCRIPTION: This project will extend the southbound left turn lane to 300 feet of storage on Canon Boulevard; modify existing signage, pavement markings, and signal operation to prohibit the eastbound/westbound left-turn and through movements on Old Oyster Point Road and Bayport Way; provide pedestrian accommodation across three legs of the signalized intersection; modify signal operation to allow the northbound left-turn lane on Canon Boulevard to operate with protected-permissive phasing; and install video detection that will capture all approaches of the intersection.

DATE: 8/2/2018 (1)
PROJECT COST: $352,500

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		37	sec/veh (1)
Intersection Delay After Project		13.6	sec/veh (1)
Change In Intersection Delay		23.4	sec/veh, pk hr
Total Vehicles During Peak Hour		3,292	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		21.4	veh hr's, pk hr
	divided by	17%	pk hr delay factor (2)
Change In Intersection Delay		125.9	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	1.246	125.9	157	0.157	250	39.2
NOx	1.168	125.9	147	0.147	250	36.8

2 - COST EFFECTIVENESS

Total Cost:	$352,500	(from above)
Useful life, years:	10 (4)	
Annual Cost:	$35,250	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$35,250	39.2	$899	907	**$815,425**
NOx	$35,250	36.8	$959	907	**$869,880**

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 MOVES2014a), 2023, idle.
(4) As previously assumed.
Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: Newport News
PROJECT NAME: **Canon Boulevard and Thimble Shoals Boulevard Intersection Improvements**
LOCATION: Canon Boulevard and Thimble Shoals Boulevard Intersection

DESCRIPTION: This project will install a southbound right-turn lane with 300' of storage on Canon Boulevard, optimize signal timings, install a westbound right-turn lane with 200' of storage on Thimble Shoals Boulevard, and provide pedestrian accommodations across two legs of the signalized intersection.

DATE: 8/2/2018 (1)
PROJECT COST: $939,875

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		20.1	sec/veh (1)
Intersection Delay After Project		14.4	sec/veh (1)
Change In Intersection Delay		5.7	sec/veh, pk hr
Total Vehicles During Peak Hour		2,466	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		3.9	veh hr's, pk hr
	divided by	17%	pk hr delay factor (2)
Change In Intersection Delay		23.0	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	1.246	23.0	29	0.029	250	7.2
NOx	1.168	23.0	27	0.027	250	6.7

2 - COST EFFECTIVENESS

Total Cost:	$939,875	(from above)
Useful life, years:	10 (4)	
Annual Cost:	$93,988	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$93,988	7.2	$13,137	907	**$11,915,241**
NOx	$93,988	6.7	$14,014	907	**$12,710,951**

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 MOVES2014a), 2023, idle.
(4) As previously assumed.
Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: Newport News
PROJECT NAME: **Oyster Point Road and Canon Boulevard Intersection Improvements**
LOCATION: Oyster Point Road and Canon Boulevard Intersection

DESCRIPTION: This project will extend the westbound left turn lane to 500 feet of storage on Oyster Point Road and provide pedestrian accommodations across the west leg of the intersection.

DATE: 8/2/2018 (1)
PROJECT COST: $469,875

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		40.1	sec/veh (1)
Intersection Delay After Project		28.6	sec/veh (1)
Change In Intersection Delay		11.5	sec/veh, pk hr
Total Vehicles During Peak Hour		5,581	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		17.8	veh hr's, pk hr
	divided by	17%	pk hr delay factor (2)
Change In Intersection Delay		104.9	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	1.246	104.9	131	0.131	250	32.7
NOx	1.168	104.9	122	0.122	250	30.6

2 - COST EFFECTIVENESS

Total Cost:	$469,875	(from above)
Useful life, years:	10 (4)	
Annual Cost:	$46,988	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$46,988	32.7	$1,438	907	**$1,304,587**
NOx	$46,988	30.6	$1,534	907	**$1,391,709**

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 MOVES2014a), 2023, idle.
(4) As previously assumed.
Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: Norfolk
PROJECT NAME: **Ballentine Blvd Lane Improvements**
LOCATION: Intersection of Ballentine Boulevard and the on-ramp for I-264 West and off-ramp for I-264 East

DESCRIPTION: The intersection of Ballentine Boulevard and I-264 westbound on and off ramps is a complex tight-diamond interchange operation compounded by an additional signalized intersection on the south and the TIDE light rail crossing on the north. To alleviate congestion and provide more capacity, this project will modify the existing median and extend the length of the southbound left turn lane.

DATE: 8/15/2018 (1)
PROJECT COST: $832,500

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		29.4	sec/veh (1)
Intersection Delay After Project		24.2	sec/veh (1)
Change In Intersection Delay		5.2	sec/veh, pk hr
Total Vehicles During Peak Hour		1,371	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		2.0	veh hr's, pk hr
	divided by	17%	pk hr delay factor (2)
Change In Intersection Delay		11.6	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	1.246	11.6	15	0.015	250	3.6
NOx	1.168	11.6	14	0.014	250	3.4

2 - COST EFFECTIVENESS

Total Cost:	$832,500	(from above)
Useful life, years:	10	(4)
Annual Cost:	$83,250	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$83,250	3.6	$22,942	907	**$20,808,659**
NOx	$83,250	3.4	$24,474	907	**$22,198,279**

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 MOVES2014a), 2023, idle.
(4) As previously assumed.
Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: Norfolk
PROJECT NAME: **Llewellyn Avenue and Princess Anne Road Turn Lane Improvements**
LOCATION: Intersection of Llewellyn Avenue and Princess Anne Road

DESCRIPTION: This project will increase the turn lane lengths and improve the offset of the left turn lanes on Llewellyn Avenue.

DATE: 8/15/2018 (1)
PROJECT COST: $734,200

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		37.4	sec/veh (1)
Intersection Delay After Project		36	sec/veh (1)
Change In Intersection Delay		1.4	sec/veh, pk hr
Total Vehicles During Peak Hour		1,794	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		0.7	veh hr's, pk hr
	divided by	17%	pk hr delay factor (2)
Change In Intersection Delay		4.1	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	1.246	4.1	5	0.005	250	1.3
NOx	1.168	4.1	5	0.005	250	1.2

2 - COST EFFECTIVENESS

Total Cost:	$734,200	(from above)
Useful life, years:	10	(4)
Annual Cost:	$73,420	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$73,420	1.3	$57,432	907	**$52,091,224**
NOx	$73,420	1.2	$61,268	907	**$55,569,919**

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 MOVES2014a), 2023, idle.
(4) As previously assumed.
Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: Suffolk
PROJECT NAME: **Route 17/Shoulders Hill Road Intersection Improvements**
LOCATION: Intersection improvements at Route 17 (Bridge Road) and Shoulders Hill Road

DESCRIPTION: Intersection improvements to provide for triple left turn off of Rt 17 onto Shoulders Hill Road, additional north and south bound through lanes on Rt 17 and free flow right turn lane from Shoulders HIll onto Route 17. Project will also provide for pedestrian improvements as well as stormwater improvements and new signalization.

DATE: 8/15/2018 (1)
PROJECT COST: $9,000,000

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		114.5	sec/veh (1)
Intersection Delay After Project		36	sec/veh (1)
Change In Intersection Delay		78.5	sec/veh, pk hr
Total Vehicles During Peak Hour		4,834	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		105.4	veh hr's, pk hr
	divided by	17%	pk hr delay factor(2)
Change In Intersection Delay		620.0	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	1.246	620.0	773	0.773	250	193.1
NOx	1.168	620.0	724	0.724	250	181.1

2 - COST EFFECTIVENESS

Total Cost:	$9,000,000	(from above)
Useful life, years:	10 (4)	
Annual Cost:	$900,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$900,000	193.1	$4,660	907	**$4,226,364**
NOx	$900,000	181.1	$4,971	907	**$4,508,604**

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 MOVES2014a), 2023, idle.
(4) As previously assumed.
Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY
HIGHWAY PROJECTS - INTERSECTION GEOMETRY

JURISDICTION: Virginia Beach
PROJECT NAME: **N. Great Neck/ London Bridge and Virginia Beach Boulevard Intersection Improvements**
LOCATION: Intersection of Virginia Beach Boulevard (US Route 58) and North Great Neck Road/London Bridge Road

DESCRIPTION: This project proposes a second southbound left turn lane along N Great Neck Road onto eastbound Virginia Beach Boulevard. Included in this improvement would be lengthening the existing southbound left turn lane. Also included in this project is lengthening the storage of the northbound left turn lane along London Bridge Road onto westbound Virginia Beach Boulevard.

DATE: 8/15/2018 (1)
PROJECT COST: $2,157,100

1 - REDUCED AUTO EMISSIONS

Weekday PM Peak Hour

Intersection Delay Before Project		104.5	sec/veh (1)
Intersection Delay After Project		90.8	sec/veh (1)
Change In Intersection Delay		13.7	sec/veh, pk hr
Total Vehicles During Peak Hour		6,682	veh/hr (1)
	divided by	3,600	sec/hr
Change In Intersection Delay		25.4	veh hr's, pk hr
	divided by	17%	pk hr delay factor (2)
Change In Intersection Delay		149.6	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	1.246	149.6	186	0.186	250	46.6
NOx	1.168	149.6	175	0.175	250	43.7

2 - COST EFFECTIVENESS

Total Cost:	$2,157,100	(from above)
Useful life, years:	10 (4)	
Annual Cost:	$215,710	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effective-ness, $/kg	Conversion Factor, kg/ton	Cost Effective-ness, $/ton
VOC	$215,710	46.6	$4,630	907	**$4,198,981**
NOx	$215,710	43.7	$4,939	907	**$4,479,392**

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 MOVES2014a), 2023, idle.
(4) As previously assumed.
Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION:	Chesapeake
PROJECT NAME:	Citywide Traffic Signal System Upgrade
LOCATION:	Citywide
DESCRIPTION:	System Upgrade covering 174 Intersections
DATE:	8/15/2018 [1]
PROJECT COST:	$875,000

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]:		79	77	18	174	[A]
	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:		3,715	7,943	2,990	hrs/day	

Total Change in Vehicle Delay (sum of 3 col's above): 14,648 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	1.246	14,648	18,251	18.3	250	4,563
NOx	1.168	14,648	17,109	17.1	250	4,277

2 - COST EFFECTIVENESS

Total Cost:	$875,000	(from above)
Useful Life, years:	10 [2]	
Annual Cost:	$87,500	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$87,500	4,563	$19.18	907	**$17,393**
NOx	$87,500	4,277	$20.46	907	**$18,555**

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 MOVES2014a), 2023, idle.

[5] Emission Factor * Change in Vehicle Delay

Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION:	Newport News
PROJECT NAME:	Opticom Emergency Vehicle Preemption
LOCATION:	Citywide
DESCRIPTION:	Installation of Emergency Vehicle Hardward at Intersections
DATE:	8/2/2018 [1]
PROJECT COST:	$775,000

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]:		8	36	7	51	[A]
	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:		376	3,714	1,163		hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 5,252 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	1.246	5,252	6,545	6.5	250	1,636
NOx	1.168	5,252	6,135	6.1	250	1,534

2 - COST EFFECTIVENESS

Total Cost:	$775,000	(from above)
Useful Life, years:	10 [2]	
Annual Cost:	$77,500	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$77,500	1,636	$47.37	907	**$42,963**
NOx	$77,500	1,534	$50.53	907	**$45,832**

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 MOVES2014a), 2023, idle.

[5] Emission Factor * Change in Vehicle Delay

Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION:	Newport News
PROJECT NAME:	Signal Timing Improvements
LOCATION:	Citywide
DESCRIPTION:	System Upgrade covering 265 Intersections
DATE:	8/2/2018 [1]
PROJECT COST:	$1,350,000

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]:		205	57	3	265	[A]
	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:		9,641	5,880	498	hrs/day	

Total Change in Vehicle Delay (sum of 3 col's above): 16,019 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	1.246	16,019	19,960	20.0	250	4,990
NOx	1.168	16,019	18,711	18.7	250	4,678

2 - COST EFFECTIVENESS

Total Cost:	$1,350,000	(from above)
Useful Life, years:	10 [2]	
Annual Cost:	$135,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$135,000	4,990	$27.05	907	**$24,538**
NOx	$135,000	4,678	$28.86	907	**$26,177**

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 MOVES2014a), 2023, idle.

[5] Emission Factor * Change in Vehicle Delay

Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION:	Norfolk
PROJECT NAME:	Traffic Signal System Communications Network Upgrades
LOCATION:	Citywide
DESCRIPTION:	Enhanced Traffic Signal System Network
DATE:	8/15/2018 [1]
PROJECT COST:	$1,000,000

1 - EMISSIONS REDUCTION

		Low Volume Intersections	Medium Volume Intersections	High Volume Intersections	Total Intersections	
	veh / pm pk hr:	Less than 2,690	2,690 to 5,900	More than 5,900		
Number of Intersections [1]:		25	272	16	313	[A]
	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	2,658	hrs/day	

Total Change in Vehicle Delay (sum of 3 col's above): 31,891 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	1.246	31,891	39,736	39.7	250	9,934
NOx	1.168	31,891	37,249	37.2	250	9,312

2 - COST EFFECTIVENESS

Total Cost:	$1,000,000	(from above)
Useful Life, years:	10 [2]	
Annual Cost:	$100,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$100,000	9,934	$10.07	907	**$9,130**
NOx	$100,000	9,312	$10.74	907	**$9,740**

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 MOVES2014a), 2023, idle.

[5] Emission Factor * Change in Vehicle Delay

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION:	Norfolk
PROJECT NAME:	Traffic Signal Dection Upgrades
LOCATION:	Citywide
DESCRIPTION:	Vehicle Detection Upgrades and Improvements at 20 Intersections
DATE:	8/15/2018 [1]
PROJECT COST:	$1,000,000

1 - EMISSIONS REDUCTION

		Low Volume Intersections	Medium Volume Intersections	High Volume Intersections	Total Intersections	
	veh / pm pk hr:	Less than 2,690	2,690 to 5,900	More than 5,900		
Number of Intersections [1]:		0	5	15	20	[A]
	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	516	2,491	hrs/day	

Total Change in Vehicle Delay (sum of 3 col's above): 3,007 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	1.246	3,007	3,747	3.7	250	937
NOx	1.168	3,007	3,512	3.5	250	878

2 - COST EFFECTIVENESS

Total Cost:	$1,000,000	(from above)
Useful Life, years:	10 [2]	
Annual Cost:	$100,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$100,000	937	$106.75	907	**$96,825**
NOx	$100,000	878	$113.88	907	**$103,291**

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 MOVES2014a), 2023, idle.

[5] Emission Factor * Change in Vehicle Delay

Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION:	Norfolk
PROJECT NAME:	Citywide Signal Retiming Phase 4
LOCATION:	Citywide
DESCRIPTION:	Signal timing on 80 intersections.
DATE:	8/15/2018 [1]
PROJECT COST:	$340,000

1 - EMISSIONS REDUCTION

		Low Volume Intersections	Medium Volume Intersections	High Volume Intersections	Total Intersections	
	veh / pm pk hr:	Less than 2,690	2,690 to 5,900	More than 5,900		
Number of Intersections [1]:		12	60	8	80	[A]
	multiplied by:	2,690	5,900	9,500		veh / pm pk hr [2]
	multiplied by:	10.7	10.7	10.7		sec/veh [2]
	divided by:	3,600	3,600	3,600		sec/hr
	divided by:	0.17	0.17	0.17		delay factor [3]
Change in Vehicle Delay:		564	6,189	1,329		hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 8,082 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	1.246	8,082	10,071	10.1	250	2,518
NOx	1.168	8,082	9,440	9.4	250	2,360

2 - COST EFFECTIVENESS

Total Cost:	$340,000	(from above)
Useful Life, years:	10 [2]	
Annual Cost:	$34,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$34,000	2,518	$13.50	907	**$12,249**
NOx	$34,000	2,360	$14.41	907	**$13,067**

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 MOVES2014a), 2023, idle.

[5] Emission Factor * Change in Vehicle Delay

Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION:	Norfolk
PROJECT NAME:	Transportation Information and Decision-Support System
LOCATION:	Citywide
DESCRIPTION:	Enhanced Ability to Adjust Operations in Response to Non-Recurring Congestion
DATE:	8/15/2018 [1]
PROJECT COST:	$800,000

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	16	313	[A]
	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	2,658	hrs/day	

Total Change in Vehicle Delay (sum of 3 col's above): 31,891 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	1.246	31,891	39,736	39.7	250	9,934
NOx	1.168	31,891	37,249	37.2	250	9,312

2 - COST EFFECTIVENESS

Total Cost:	$800,000	(from above)
Useful Life, years:	10 [2]	
Annual Cost:	$80,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$80,000	9,934	$8.05	907	**$7,304**
NOx	$80,000	9,312	$8.59	907	**$7,792**

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 MOVES2014a), 2023, idle.

[5] Emission Factor * Change in Vehicle Delay

Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION:	Portsmouth
PROJECT NAME:	Traffic Signal System Retiming
LOCATION:	Citywide
DESCRIPTION:	Signal timing on 120 intersections.
DATE:	8/15/2018 [1]
PROJECT COST:	$480,000

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]:		75	45		120 [A]	
	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:		3,527	4,642	0		hrs/day
Total Change in Vehicle Delay (sum of 3 col's above):				8,169		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	1.246	8,169	10,179	10.2	250	2,545
NOx	1.168	8,169	9,542	9.5	250	2,385

2 - COST EFFECTIVENESS

Total Cost:	$480,000	(from above)
Useful Life, years:	10 [2]	
Annual Cost:	$48,000	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$48,000	2,545	$18.86	907	**$17,108**
NOx	$48,000	2,385	$20.12	907	**$18,251**

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 MOVES2014a), 2023, idle.

[5] Emission Factor * Change in Vehicle Delay

Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY

CITYWIDE SIGNAL SYSTEM

JURISDICTION:	Virginia Beach
PROJECT NAME:	Traffic Signal System Retiming
LOCATION:	Citywide
DESCRIPTION:	Signal timing on 51 intersections.
DATE:	8/15/2018 [1]
PROJECT COST:	$612,000

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]:		8	36	7	51	[A]
	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:		376	3,714	1,163		hrs/day

Total Change in Vehicle Delay (sum of 3 col's above): 5,252 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	1.246	5,252	6,545	6.5	250	1,636
NOx	1.168	5,252	6,135	6.1	250	1,534

2 - COST EFFECTIVENESS

Total Cost:	$612,000	(from above)
Useful Life, years:	10 [2]	
Annual Cost:	$61,200	

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$61,200	1,636	$37.41	907	**$33,927**
NOx	$61,200	1,534	$39.90	907	**$36,192**

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 MOVES2014a), 2023, idle.

[5] Emission Factor * Change in Vehicle Delay

Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY
TRANSIT SHELTERS/FACILITIES

LOCALITY/AGCY: Virginia Department of Transportation
PROJECT NAME: **Denbigh Fringe Park and Ride Improvements**

DESCRIPTION: Repaving and restriping existing Park and Ride lot
DATE: 8/15/2018 (on application)
PROJECT COST: $200,365

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

2- TRAVEL REDUCTIONS:

Increase in Ridership: 31 boardings/day [1]

Vehicle Occupancy Rate (work): 1.15 persons/veh [3]
Reduction in Daily Vehicle Trips: 27 vehicles/day

Average Trip Length: 10 miles/trip [4]
Reduction in VMT: 270 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	0.067	270	18	0.018	250	5
NOx	0.207	270	56	0.056	250	14

4- COST EFFECTIVENESS:

Total Cost: $200,365 above
Useful Life, years: 15 as assumed in previous CMAQ analyses
Annual Cost: $13,358

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Conversion Factor, kg/ton	Cost Effectiveness, $/ton
VOC	$13,358	5	$2,958	907	**$2,683,238**
NOx	$13,358	14	$958	907	**$868,488**

Notes:
[1] From Applicant
[2] Source: VDOT, Fleet Avg. Emission Factors for Hampton Roads (Based on US EPA Model MOVES2014a), 2014, 35mph
[3] As assumed in CMAQ analyses of previous years
[4] 2001 NHTS Table Designer

Hampton Roads TPO

CONGESTION MITIGATION AND AIR QUALITY

TRANSIT AND FIXED GUIDEWAY PROJECTS - VEHICLE PURCHASE/REPLACEMENT

AGENCY:	Williamsburg Area Transit Authority
PROJECT NAME:	**Five (5) Bus Purchase Replacement**
DESCRIPTION:	Replacement of 5 buses with more sustainable and efficient equipment
DATE:	8/14/2018 [1]
PROJECT COST:	$2,925,000

Number of Vehicles Being Retired	5	vehicles[1]
Number of New Vehicles	5	vehicles[1]
Average Yearly Vehicle-Miles for Retired Vehicles	65,438	vehicle-miles[1]
Average Yearly Vehicle-Miles for New Vehicles	66,000	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	65,438	5	1,990,199	1,990
NOx	2.6	12.12	65,438	5	3,965,088	3,965

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	66,000	5	216,170	216
NOx	0.2	0.94	66,000	5	308,814	309

2 - EMISSIONS REDUCTION

Reduction in Emissions	VOC	1,774	kg/yr
	NOx	3,656	kg/yr

3 - COST EFFECTIVENESS

Total Cost:	$2,925,000 (from above)
Useful life, years:	15 [3]
Annual Cost:	$195,000

Type	Cost, $/yr (above)	Emissions Reduction, kg/yr (above)	Cost Effectiveness, $/kg	Cost Eff., $/Ton
VOC	$195,000	1,774	$109.92	**$99,697**
NOx	$195,000	3,656	$53.33	**$48,373**

[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

Hampton Roads TPO

APPENDIX B

RSTP Project Evaluation Worksheets

Evaluation of RSTP Applications (Utilizing HRTPO Prioritization Tool)

Applicant	Project Name (code)	Total Cost	2040 LRTP Code	Project Utility (0-100)	Project Vitality (0-100)	Project Viability (0-100)	Total (0-300)
Chesapeake	Mt. Pleasant/Great Bridge Bypass (CH1RS)	$29,500,000	2040-33	63	54	5	122
Gloucester Cty.	George Washington Memorial Highway (Route 17) Widening Phase 1 (GL1RS)	$43,900,000	2040-40	72	63	5	140
Suffolk	Crittenden Road/Route 17 Intersection Realignment (SF6RS)	$ 5,000,000	2040-RSTP1	39	25	25	89
Virginia Beach	Indian River Road - Phase VII-B (VB1RS)	$12,660,000	2040-169	36	20	51	107
Virginia Beach	Laskin Road Phase 1 (VB2RS)	$82,062,000	2040-171	41	32	56	129

Evaluation of 2018 RSTP Intermodal Applications

Applicant	Project Name (code)	Total Cost	Establishes connections between modes/ corridors/ centers?	(0-40)	Improves operating system to accommodate intermodal movements?	(0-25)	Improves rail or vehicular access to freight facilities or major industries?	(0-25)	Project Readiness (detailed design and cost estimates, ready to go)	(0-10)	Total (0-100)
Suffolk	Holland Road Intermodal Improvement Project (SF2RS)	$24,750,000	Yes	30	Yes	18	Yes	20	Design: No; Cost Estimate: Yes; Permits/Ready to Go: No	4	68

Evaluation of 2018 RSTP Applications

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 = 10 pts and employment =10 pts to the highest)	(0-20)	Project Readiness (detailed design and cost estimates, ready to go: 10 pts)	(0-10)	Total (0-100)
Suffolk	Transit Operations Facility (SF4R)	$2,050,560	N/A	0	N/A	0	N/A	0	N/A	0	Pop = 432,242 Employment = 148,153	20	Community support: Yes detailed design and $ est: No, and all approvals: Yes	7	**27**

Evaluation of 2018 RSTP Applications

Transit & Fixed Guideway- Vehicle Replacement/Purchase

Applicant	Project Name (code)	Total Cost	Average age of vehicles (FTA standard is 12 years - Bus & 4 years-Vans)	(0-30)	Percent of vehicles in fleet over (12-Bus: 4-Van) years old fleet	(0-20)	Emissions changes of the old and new vehicles	(0-20)	Average daily ridership / new vehicle anticipated & or purchased	(0-15)	Average mileage of the vehicles in Fleet (FTA Standards = 500,000 -Bus and 100,000-Van)	(0-15)	Total (0-100)
HRT	High Frequesncy Network Vehicles - Peninsula (HT3RS)	$19,200,000	9.3	20	26%	6	.34 g/bhp-hr	20	429 average daily ridership/new vehicles 26.8	15	403,269	7	**68**

Evaluation of 2018 RSTP Applications

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	Victoria Boulevard Facility Upgrades = Phase 2 (HT4RS)	$10,000,000	Yes	20	Yes	25	Yes	8	Yes	25	Yes	8	**86**

Evaluation of 2018 RSTP Applications

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)
Norfolk	I-264/Military Hwy Ramp Modifications and Park and Ride Access Study (NO4RS)	$400,000	Yes	15	Yes	10	Yes	8	Yes	15	Yes	10	Yes	5	Yes	5	**68**
Norfolk	Newtown Road Corridor Study (NO5RS)	$250,000	Yes	15	Yes	15	Yes	8	Yes	15	Yes	5	Yes	7	Yes	5	**70**
Suffolk	Bridge Road Corridor and IMR Study (SF5RS)	$700,000	Yes	12	Yes	8	Yes	7	Yes	20	Yes	5	Yes	5	Yes	5	**62**
Gloucester	Route 17B Main Street Bike and Pedestrian Improvements (GC1RS)	$238,000	Yes	10	Yes	15	Yes	8	Yes	10	Yes	10	Yes	10	Yes	5	**68**
Gloucester County	Ware House Road Bike and Pedestrian Improvements Study (GC2RS)	$286,000	Yes	10	Yes	15	Yes	7	Yes	7	Yes	10	Yes	10	Yes	5	**64**
WATA	Strategic Plan and Comprehensive Operating Analysis (WT1RS) Has applied for RSTP in the past	$300,000	Yes	20	Yes	5	Yes	10	Yes	15	Yes	10	Yes	5	Yes	7	**72**

Evaluation of 2018 RSTP Applications

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. Is this project consistent with the HRTPO Long-Range Transportation Plan?	(0-10)	Total (0-100)
Norfolk	Traffic Signal System Communications Network Upgrades (NO1RS)	$1,000,000	Yes	10	No	0	Improve LOS-Yes; increase Capacity-No; Contribute to incident mgmt-Yes	15	Yes	7	Yes	15	Yes	10	**57**
Norfolk	Traffic Signal Detection Upgrades (NO2RS)	$1,000,000	Yes	13	Yes	17	Improve LOS-Yes; increase Capacity-Yes; Contribute to incident mgmt-Yes	18	Yes	7	No	0	Yes	10	**65**
Norfolk	Transportation Information and Decision Support System (NO3RS)	$800,000	Yes	10	Yes	10	Improve LOS-Yes; increase Capacity-No; Contribute to incident mgmt-Yes	15	Yes	7	Yes	15	Yes	10	**67**

APPENDIX C

Public Project Ideas

CMAQ/RSTP
HRTPO PROJECT SELECTION PROCESS

CANDIDATE PROJECT IDEA FORM

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Senior Transportation Planner
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723 Woodlake Drive
Chesapeake, VA 23320

All project ideas submitted by the public will be acknowledged and forwarded to the appropriate locality, transit agency or state agency. The project ideas will be considered by those entities for possible submission as projects proposed for CMAQ or RSTP funding.

The deadline for submitting your project ideas is July 31, 2018.

CMAQ/RSTP Project Idea Form

Your Name: Christian Strange **Date:** July 27, 2018

E-Mail: xtianstrange@gmail.com **Phone:** 757-933-1223

Project Name: 64/264 Signage Improvement

Project Location (include city or county in which the project is located, street name, end points):
I-64 in Norfolk between Northampton Blvd and I-264

Project Description (include type of project; if CMAQ project, how will it improve air quality?):
This project will improve air quality by reducing the amount of stalled/stopped traffic on I-64 East between Northampton Blvd and I-264. The plan involves adding signage to help direct traffic and poles to isolate lanes. Traveling east-bound on I-64 at the approach to Northampton Blvd there will be signs indicating that traffic in the far right lane is for Norfolk, the second from the right lane is for Virginia Beach, and the left lane is for points farther. Moving forward to where the Northampton Blvd on-ramp merges with I-64 signs will repeat that the far right lane is for Norfolk, the next lane is for Virginia Beach, and there will be an additional sign indicating there are now two lanes, the far left and next to far left, for Chesapeake and points beyond. Just past the Virginia Beach Blvd overpass there will be signs indicating in the far right lane an arrow directing traffic over one lane to the right for Norfolk which will be in the far right lane, directing traffic from the second lane over to the right for Virginia Beach, and the remaining three lanes will be kept for Chesapeake and points beyond. Just after these signs poles are added to isolate the I-264 off-ramp

lanes to Virginia Beach and Norfolk so that no traffic can merge in from the remaining lanes.

Adding these directional signs will help drivers understand how they should be merging from I-64 to I-264 in a way that will reduce congestion, accidents, and traffic stops. Today, much of the traffic intending to merge onto I-264, especially for Virginia Beach, takes the far right lane as far back as the Northampton Blvd on-ramp merge. This causes backups and accidents. By keeping those cars out of the far right lane traffic from Northampton Blvd can merge safely onto I-64 with interchange traffic waiting to move over until after vehicles from that on-ramp are safely onto I-64. Beyond the on-ramp, signs will help keep Virginia Beach traffic in the second-from-the-right lane as it safely flows past the Virginia Beach Blvd overpass until those cars can move over one lane, which would have little to no traffic at this point, and the onto the I-264 interchange. All the while, Norfolk bound traffic would have already moved over to the right lane in preparation to merge onto I-264W which already has a dedicated right lane off-ramp at the interchange. The addition of poles to isolate the off-ramp lanes will, again, reduce backups and accidents because today vehicles will attempt to avoid the interchange traffic backup by waiting to jump over into the off-ramp until the last minute. There are currently double painted lines on the roadway to separate the off-ramp however fines for illegally crossing the lines are not enforced. Another consequence to this is that vehicles attempting to avoid the backup who realize there is additional backup further along the route often stop in the second-to-the-right lane causing more accidents and backups. The addition of directional signage and isolation of the lanes would encourage those drivers to either take the appropriate lane or continue past the interchange off-ramp to the next exit at Newtown Road.

Additional Information (If applicable, include additional data or maps as attachments.):

CMAQ/RSTP
HRTPO Project Selection Process

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CMAQ/RSTP Project Idea Form

Your Name: Ronald D Berkebile **Date:** 7-12-18

E-Mail: ronberkebile@cox.com **Phone:** 757-739-2886

Project Name: Skyway People Mover

Project Location (include city or county in which the project is located, street name, end points):
Virginia Beach Resort Area

Project Description (include type of project; if CMAQ project, how will it improve air quality?):
The Hampton Roads area thrives on tourism and residential mobility. In Virginia Beach, during the tourism season, the Atlantic Avenue corridor is highly congested. Many tourists want to view venues in the area before visiting. I recommend a Skyway People Mover in the area. It can be solar powered and supplemented with electric power. The emulate Busch Gardens' sky ride and take workers, residents, and tourists to popular destinations. During the winter months, the cars can be equipped with seat heaters and the ability to enclose the gondolas. The Virginia Beach circuitous route could go from the proposed oceanfront pier to the proposed surf park to the convention center to the proposed sports center to fishing boats at Rudee Inlet to the Virginia Aquarium and adventure Park to Ocean Breeze water park and Motor World to the KOA campground and back to Red Wing Golf Course to the disability enabling Grommet Island oceanfront park and ending back at the pier. Throughout the journey, riders would be exposed to watersheds, beaches, and Atlantic avenue activities.

Norfolk could do the same. Starting at Town Point Park's ferris wheel and the World Trade Center, the people mover could go to the USS Wisconsin and Nauticus, to the Chrysler Museum, Sentara and Children's Hospital of the King's Daughters, the Harrison Opera House, Mermaid Winery, the zoo, and return with stops at the Scope and Chrysler Hall, the MacArthur Memorial and mall, Norfolk History Museum, Harbor Park and back to the ferris wheel. Throughout the journey, riders would see watersheds, historic churches, and other points of interest.

Portsmouth could offer a church tour.

In all routes, not only would tourists be offered sites, but business people could access adjacent businesses, use other public transportation means, or employ ride sharing. Ideally, the stopping points would offer parking lots or facilities.

Additional Information (If applicable, include additional data or maps as attachments.):

CMAQ/RSTP
HRTPO PROJECT SELECTION PROCESS

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CMAQ/RSTP Project Idea Form

Your Name: Beth Klapper **Date:** _____

E-Mail: Busytoes@hotmail.com **Phone:** _____

Project Name: Strawberry Plains/Rt 199 Intersection Improvements

Project Location (include city or county in which the project is located, street name, end points):
Williamsburg and James City County

Project Description (include type of project; if CMAQ project, how will it improve air quality?):
Add dedicated right turn lanes from Strawberry Plains to the Rt 199 connector. Will reduce lengthy queue am & pm peak hours – traffic proceeding straight to John Tyler Lane must yield to traffic exiting Rt. 199. Traffic often backs up ¼ mile or more.

Additional Information (If applicable, include additional data or maps as attachments.):
See map


STRAWBERRY PLAINS
RT 199

CMAQ/RSTP
HRTPO Project Selection Process

Candidate Project Idea Form

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The deadline for submitting your project ideas is July 31, 2018.

CMAQ/RSTP Project Idea Form

Your Name: Andrew B. Scott, P.E. **Date:** 7-12-2018

E-Mail: Andrew.b.scott@icloud.com **Phone:** 757-681-4580

Project Name: Electric Vehicle Charging

Project Location (include city or county in which the project is located, street name, end points):
State or Locality Owned Property, or donated Private Property

Project Description (include type of project; if CMAQ project, how will it improve air quality?):
Provide electric vehicle charging stations to promote the use of electric vehicles. Air quality will be improved by enabling growth in the use of electric vehicles which will reduce the burning of fossil fuels and the pollutants created thereby.

Additional Information (If applicable, include additional data or maps as attachments.):

CMAQ/RSTP
HRTPO Project Selection Process

Candidate Project Idea Form

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The deadline for submitting your project ideas is July 31, 2018.

CMAQ/RSTP Project Idea Form

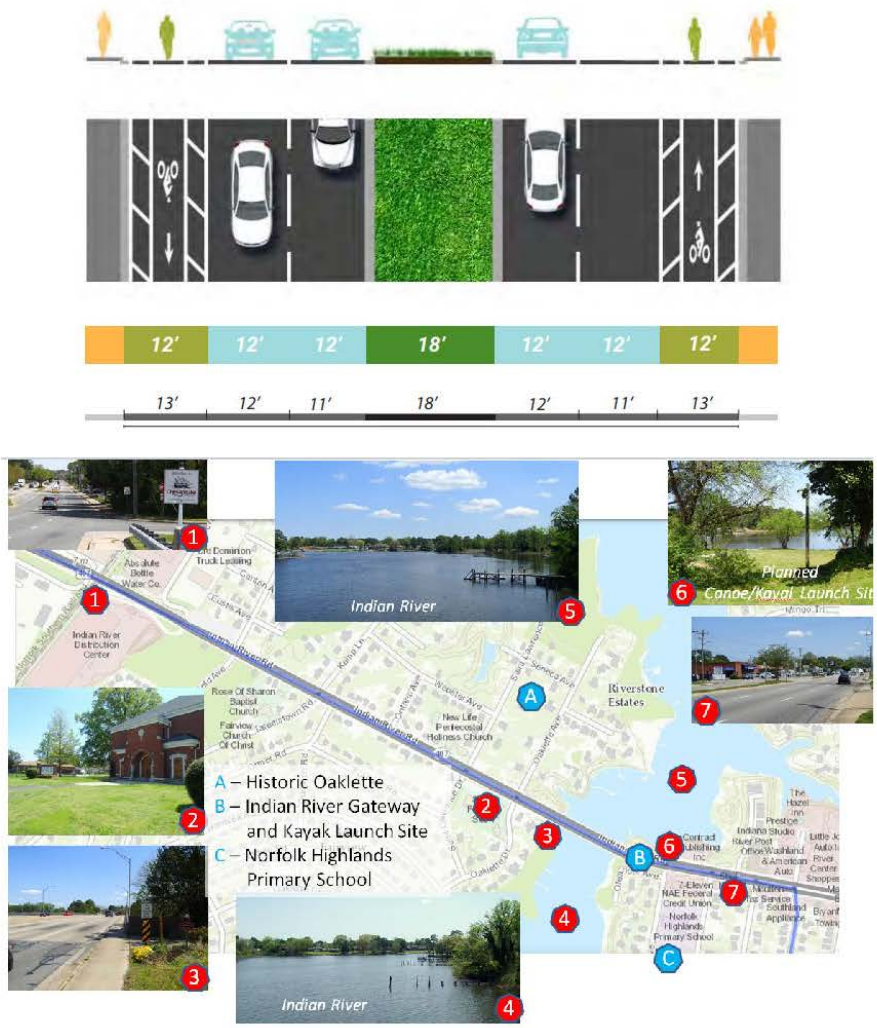
Your Name: Rogard Ross **Date:** 7/17/2018

E-Mail: rogard@yahoo.com **Phone:** 757-420-0743

Project Name: Indian River Road Bicycle Lanes/Road Diet

Project Location (include city or county in which the project is located, street name, end points):
Chesapeake, Indian River Road from Norfolk city line to Hazel Avenue

Project Description (include type of project; if CMAQ project, how will it improve air quality?):
Implement a roadway diet along 1 mile of Indian River Road to establish bicycle lanes along Indian River Road. Bicycle lanes will enable residents to make local trips in the area safely, thus reducing the number of car trips and improving air quality. "Downtown" Indian River is located at the east end of this route and includes the local post office, a primary school and playground, a planned canoe/kayak launch site, and numerous retail businesses, restaurants, and other eateries. Today you can observe a small but regular stream of bicycle traffic along this route, much of it by local residents go to and from work and shopping. Many of these bikers ride on the uneven sidewalk because they are uncomfortable riding on the roadway. Bicycle lanes will increase safety and utilization of this route. Project would be low cost, primarily entailing striping and signage at a cost estimated at $8,000 to $16,000 for one mile, increasing up to $30,000 if adding delineator posts or bumps,



Indian River Road was expanded to a 6 lane roadway in the 1970's to support the old Ford Plant. The Ford Plant closed in 2007 and the roadway is now over designed for the current level of traffic. The Norfolk Strategic Bike Plan measured an AADT of 16,000 to 19,000 trips for the six lane roadway; the recent HRPTO Road Diet study put the target for consideration at 15,000 for a four lane roadway to be reduced to 2 lanes. Indian River Road runs through the residential Oaklette neighborhood and homes are as close as 18' to 24' from the travel lanes. The over design of the roadway also results in speeding and at least one fatal pedestrian accident in the past two years. A roadway diet and speed reduction will also make this road safer and quieter for residents of the Oaklette neighborhood.

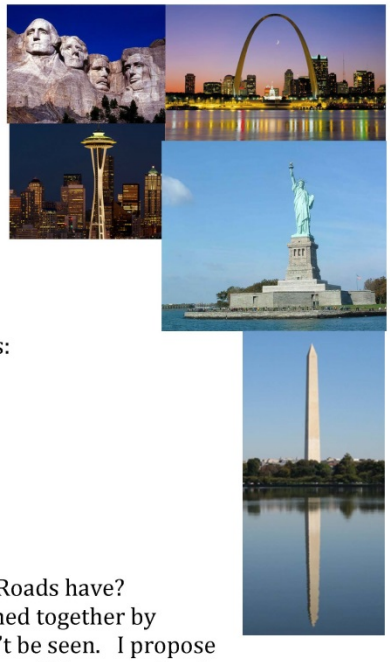
The Chesapeake Comprehensive plan identifies Indian River Road as a future bicycle facility and supports use of alternative modes of transportation such as biking to improve air quality. The recent Candidate Segments for Road Diets in Hampton Roads study by the HRTPO, while it did not

consider 6 lane roadways, depicts a significant concentration of persons who use bikes as their mode to work in the neighborhoods adjacent to Indian River Road (draft study, pg 49, Sparrow Rd). The Norfolk Strategic Bike and Pedestrian Plan calls for bicycle lanes to be implemented on Indian River Road in Norfolk. Once established in Norfolk and Chesapeake, this would give a safe route from the Indian River area to the shipyards in Berkley and to downtown Norfolk, approximately a 20 minute bicycle ride. The route is also identified a bicycle route in the Elizabeth River Eastern Branch Restoration Plan and would connect to an additional an bike route through Norfolk Highlands to Providence Road and Indian River Park.

Additional Information (If applicable, include additional data or maps as attachments.):
Candidate Segments for Road Diets in Hampton Roads
https://www.hrtpo.org/uploads/docs/road%20diets-%20study%20%28inclg%20spreadsheet%29-%20reduced%20size.pdf
Norfolk Strategic Bicycle and Pedestrian Plan - https://www.norfolk.gov/BikePlan
Eastern Branch Environmental Restoration Strategy -
https://www.elizabethriver.org/sites/default/files/eastern-branch-environmental-restoration-strategy_0.pdf
Eastern Branch Trail Concept -
https://drive.google.com/file/d/0B1C5n48ReRbkTDhnYk9mOXFoMjQ/view
Bike Lane Costs https://peopleforbikes.org/blog/protected-bike-lanes-do-not-cost-1-million-per-mile/

Proposal for a Statue of Hampton Roads

Proposal: Hampton Roads Art Project Known As The "Statue of Hampton Roads"



Many major cities / states have landmarks that they are known for. For example:

- St Louis - the Gateway Arch
- Seattle - the Space Needle
- South Dakota - Mount Rushmore
- Washington DC - the Washington Monument
- New York - the Statue of Liberty
- Hollywood - the HOLLYWOOD sign
- San Francisco – Golden Gate Bridge
- Others?

Even foreign cities also have their iconic symbols and statues:

- Egypt - Pyramids
- Easter Island – Moai
- India – Buddha statue; Taj Mahal
- Paris – Eiffel Tower
- Australia – Sydney Opera House
- Etc., etc., etc.

What is symbolic for Hampton Roads? What does Hampton Roads have? Nothing that stands out above anything else. Many cities joined together by water and tunnels! Tunnels are not iconic, as they really can't be seen. I propose the Cities of Hampton Roads band together and create a Statue of Hampton Roads, one that represents the "Seven Cities" (and really all of the more than 18 cities that make up "Hampton Roads").

What Should Be Built? There are many options to consider, a few are listed below.

1. The first idea is to have a statue that recognizes the military in the region. Possibly a military person holding a child as a "Welcome Home" for all troops returning from overseas, similar to the Soviet statue shown here:
2. A statue containing symbols from each military branch in the region. For example, an aircraft carrier, a tank, a jet fighter, submarine, and so on.

waddell.steve@gmail.com

3. A more modern design structure could be built that would represent the region. Something totally different that becomes recognizable for the region, similar to the Gateway Arch in St Louis. A foreign example comes from the city of Hangzhou in China. The city sculpture is called Tidewater, and it stands 28 meters high, and is made of stainless steel and metal coated. Qiantang River tide is described as a marvelous spectacle in Hangzhou. The tide shape shows the soul of tide, that's the city sculpture's spirit. The idea of the designer is showing the grand vigor of Hangzhou entering into the Qiantang generation by higher and higher tide, and showing the people in Xiasha district lead the Chinese economy.

4. The area is steeped in 400 years of American history, and hundreds of historical sites and attractions in the area draw visitors from around the world each year. Captain John Smith? Christopher Columbus? A combination of old and new? The structure could be designed to reflect different aspects this.

Whatever is selected, it should be *moving, memorable, and inspirational.*

How should this be decided? Primary options that come to mind include:

1. Commission a well-known artist to develop several proposals for consideration. While there is a fee associated with this, depending upon the artist selected, this process alone will generate publicity for the region.

2. Initiate a public contest, one that could be done online, and have online voting to determine the finalists.

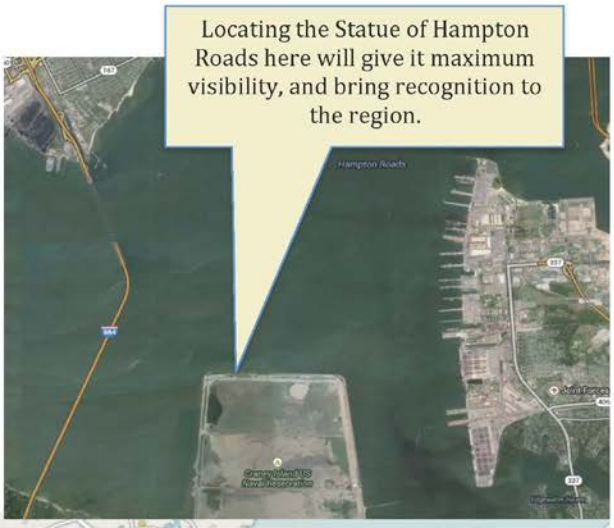
3. Have the region's Fortune 500 companies that are headquartered here in Hampton Roads sponsor the design – Amerigroup, Dollar Tree, Huntington Ingalls Industries / Newport News Shipbuilding, Norfolk Southern, and Smithfield Foods.

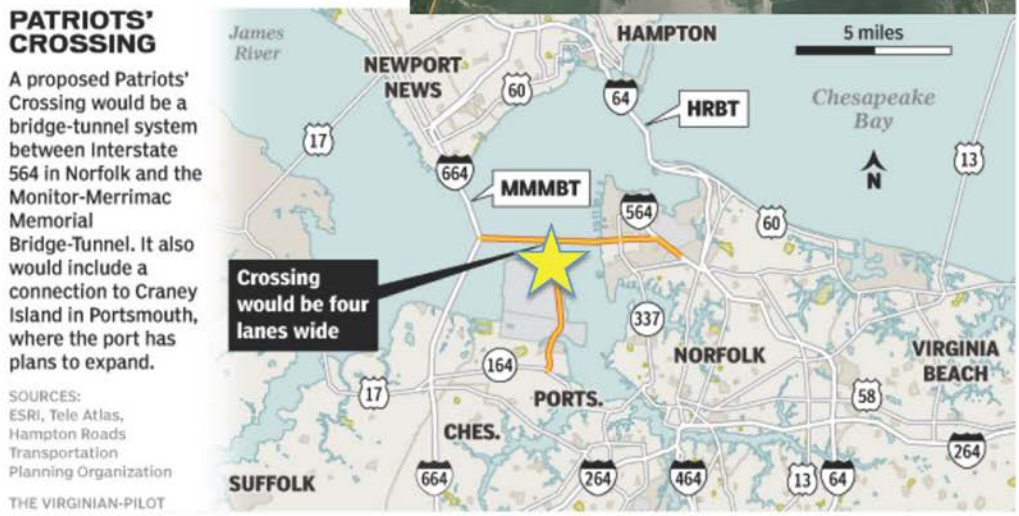
Where to locate it: While there are many different options for location, the most obvious one would be on an expansion of the island of the Hampton Roads Bridge Tunnel. This location has many benefits:

waddell.steve@gmail.com

1. HRBT is in the heart of Hampton Roads! The combination of the words "Hampton Roads" was recorded as the channel linking the James, Elizabeth, and Nansemond rivers with the Chesapeake Bay in an act of the Virginia General Assembly in 1755.
2. The HRBT is the most travelled of all bridges/tunnels in the region; according to VDOT, almost 3 million vehicles use it each month.
3. Returning Navy ships, cruise ships traveling to Half Moon Cay in Norfolk, any ship traveling up the James River, etc. all pass by this area.
4. Visible to air traffic traveling into Norfolk Airport, as well as Newport-News Williamsburg International airport.

BEST – Patriots' Crossing: the BEST location for consideration would be the middle ground at the bifurcation of the James, Nansemond, and Elizabeth Rivers since it is these waters that join us together as a region. If planned and constructed on Craney Island with the proposed 3rd crossing, costs could be reduced as Elizabeth River Crossings (ERC) could incorporate this into their construction efforts, and it would help to better position them in a positive light. It would also be adding a "Patriot" to Patriot's Crossing!





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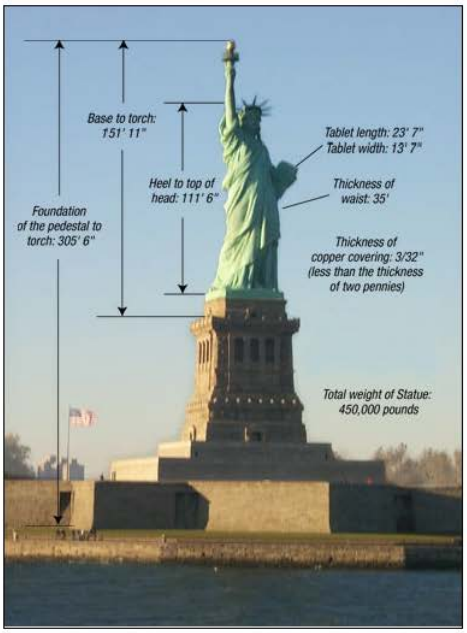
How to Integrate the Cities of Hampton Roads: One way would be for the base of the statue could be made up of each city's representative icon – Norfolk's Mermaid, Chesapeake's Egret, Suffolk's Peanut, Smithfield's Pig, and so on. Other ideas could come from a public competition.

What About the Seven Cities Concept? That too could be integrated into the design of the statute, either in the base itself, or in the statue above it.

When to start: There are proposals currently on the table for expanding the HRBT, as well as implementing a 3rd crossing at the Monitor-Merrimack by Elizabeth River Crossings. Including this proposal as part of either of these plan makes the timing perfect!

How to pay for it:

1. Federal Funding (particularly if using a Military related statue)
2. Foreign Government donations as a way to recognize the support they have received from the US and US Military
3. Donations (Corporate and private. A plaque could be added naming the sponsors to encourage sponsorship, with varying prominence and levels.)
4. State Funding
5. Hampton Roads tax (e.g. ½%)
6. City Funding
7. Include as part of new HRBT tunnel expansion project, cover with toll fees
8. Sell custom pavers (people can buy them for $150 and include their name, etc., as was done for AT&T stadium in Texas)
9. Any combination of the above



At the end of the day, it would become an attraction itself and become a revenue generator in many ways – e.g. – tours, sales of replicas, and more. Each city in Hampton Roads would have replicas for sale at every corner store! And online sales could be made nationally and internationally.

Who would build it?

Any shipyard could, but ERC should probably build it as part of the 3rd crossing effort.

waddell.steve@gmail.com

Dimensions – How Big Should It Be?

Follow a proven approach! Make the Hampton Roads solution similar to the dimensions of the Statue of Liberty.

Submitted by: Steve Waddell, MBA, PMP

Email: waddell.steve@gmail.com

(C): 757-358-7475

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The deadline for submitting your project ideas is July 31, 2018.

CMAQ/RSTP Project Idea Form

Your Name: Mack T. Nolen **Date:** July 26, 2018

E-Mail: mtnjr@yahoo.com **Phone:** 832-334-8123

Project Name: I-64E and I-464S/US-17S Exit 291B interchange change

Project Location (include city or county in which the project is located, street name, end points):
Beginning at I-64E/Battlefield on ramp and continuing to interchange of I-64E and I-464S/US-17S at exit 291B.

Project Description (include type of project; if CMAQ project, how will it improve air quality?):
RSTP project. This project would change the exit lane configuration for the 291B exit off of I-64 Eastbound on to I-464S/US-17S by elevating it (or some similar change) to eliminate the current stoppages that take place at this interchange.

Additional Information (If applicable, include additional data or maps as attachments.):
The problem:
Currently, the interchange at I-64E and I-464S/US-17S (see figure 1) is consistently the worst interchange for traffic delays, slowing, and accidents. This is evident in the HRTPO Annual Roadway Performance Report for 2017 (see figure 2), where the stretch of roadway leading up to this interchange, between Battlefield Blvd and I-464, is shown to have the worst travel time index (TTI - a measure of roadway congestion) for that part of Hampton Roads with the exception of a

portion of the George Washington Hwy. In the 2018 HRTPO Annual Performance Report, that TTI jumps to 3.17, topping anything else nearby.

It is worth noting here as well that in the 2018 HRTPO Annual Performance Report, there is a list of roadways with highest TTIs on the last page. Of the top PM period roadways with the highest TTI, this I-64 from Battlefield to I-464 roadway is listed as #10 on this list, but it has one of the highest traffic volumes on the list (which is not shown), meaning that it impacts a larger number of than many other roadways on that list.

Further, this section of roadway is listed in HRTPO's Hampton Roads Congestion Management Process: System Performance And Mitigation Report (https://www.hrtpo.org/uploads/docs/CMP%20Report%20Appendices%20Updated%20Final%20Version.pdf) as having one of the highest segment scores for the region, which indicates poor performance in moving traffic quickly during peak travel periods.

Not only is the road very slow during the PM peak period and consistently one of the first to begin backing up with congestion, but it also suffers from the highest accident rate in the area as well. Even a cursory glance at Figure 3, a screen shot of the heat map display taken from VDOT's TREDS (Traffic Records Electronic Data System) database, one can see that the instance of accidents in the vicinity of this interchange is higher. Drilling down further, figure 4, which shows pins or markers for each accident, illustrates just where these accidents take place. Comparing other sections of highway nearby (circled in green) to the area just in front of the 291A and 291B off ramps (circled in red), it becomes apparent where the accidents cluster. Looking at the inset in figure 4, we see further the dense clusters of markers (circled in red) immediately preceding the off ramps. While this is presumably the case at most interchanges, the acute nature of the problem here is evident. All of this to simply say that this proposal is not just a person complaining that their commute is too long (everyone thinks their commute is too long). There is objective data to indicate that this particular interchange is worse than others on a similar highway with similar traffic.

The reason:
The reason this interchange is so problematic is that there is a tight convergence between the traffic merging on to I-64E from Battlefield Blvd N on ramp and the two streams of traffic on I-64E that are trying to exit on to exits 291A and 291B.
It is exceedingly difficult for drivers getting on I-64 from Battlefield N to get over into I-64 travel lanes before they are forced to exit on to I-464, causing them to drive dangerously close to other drivers and take risks. Additionally, due to the volume of cars using 291B and the difficulty of merging into this stream, cars begin to line up in the lane for exit 291B (see figure 5). Traffic merging on to I-64 from Battlefield Blvd is faced with this bumper-to-bumper block of cars that won't easily allow merging, forcing them to drive quickly and dart into small openings, causing accidents. While the whole situation feels too complicated to explain or even show in picture form, I would simply encourage anyone who is curious to drive this way one weekday afternoon between 4:30 and about 6:00.

It appears to me at least, that the root cause of this all is the throughput of the 291B exit ramp on to I-464/US-17. The volume of traffic trying to move through that exit backs up on the ramp and begins a cascade of problems into an interchange that does not function well with such a backup. The cumulative effect of high volume and an interchange that forces unsafe driver behavior is a virtual gauntlet that motorists must navigate, creating more opportunities for accidents.

Proposed solution:
I'll first say here that I'm not a traffic engineer, so this is my best attempt at describing a solution. Second, this solution described here is really a rehash of the project description itself. In short, I

recommend that HRTPO/VDOT (1) spread out the on and off ramps (labeled 1-4 on figure 6) to avoid conflicting traffic patterns and (2) increase the throughput capacity of the 291B exit ramp. I recommend something similar to the crossover style ramp that separates traffic from Battlefield S on to I-64 W from the traffic that is exiting from I-64 W to Greenbrier Rd S (see figure 7), thus eliminating the conflicting traffic patterns.

Why act now?

I think there are a few reasons to act on this as soon as possible. First, as stated above, the traffic at this interchange is objectively worse than just about anywhere else in Chesapeake. It causes more accidents, which costs people money and wastes city resources.

Second, it will only get worse from here. Chesapeake/HRTPO/VDOT have already taken steps to make US-17S the Dominion Blvd Transportation Corridor, meaning that it will get more use over the next few decades. Additionally, as the neighborhoods and businesses of SW Chesapeake grow, like at Summer Park, Grassfield, Brabble Shores, Ryan Homes off Millville, and the Walmart Supercenter and all the businesses clustered around it, that exit will get busier and busier. As has always been the case, lots of people live in Chesapeake, but commute to Norfolk or Virginia Beach, meaning they will be using that exit.

Third, VDOT and the FHWA are building a new highway, called I-87, that will connect US-17S to Raleigh, NC (See figure 8, highlighted in green). Once that is complete, everyone from places north of there (see figure 8, red shaded area) who are travelling to Raleigh or other parts of NC will use that highway.

In short, this interchange is the key connection between I-64, a busy and important highway, and US-17/I-87, which will become a busy and important highway. A single lane, 360 degree loop exit just won't cut it and this weak link will only get worse.

Figures

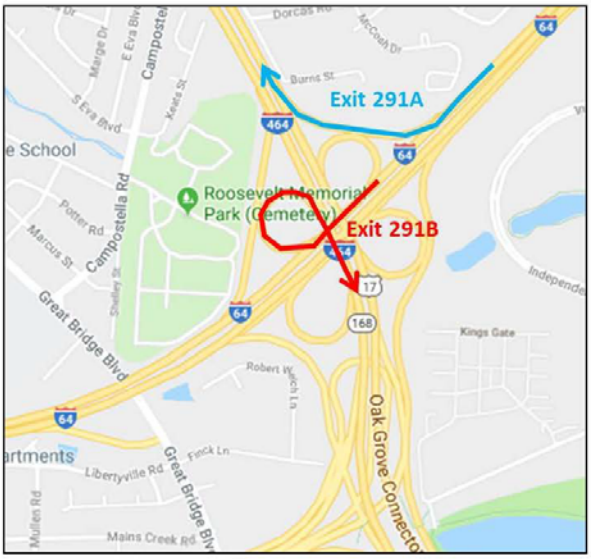


Figure 1 - I-64E and I-464/US-17 Interchange

FACILITY NAME	SEGMENT FROM	SEGMENT TO	AM PEAK PERIOD				PM PEAK PERIOD					
			TRAVEL TIME INDEX		CONGESTION LEVEL		SPEED (mph)		TRAVEL TIME INDEX		CONGESTION LEVEL	
			NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB
I-64	VA BEACH CL	GREENBRIER PKWY	0.99	-	LOW	-	54	-	1.13	-	LOW	-
			-	1.51	-	SEV	-	54	-	1.11	-	LOW
I-64	GREENBRIER PKWY	BATTLEFIELD BLVD	1.23	-	MOD	-	24	-	2.58	-	SEV	-
			-	1.05	-	LOW	-	58	-	1.06	-	LOW
I-64	BATTLEFIELD BLVD	I-464	1.43	-	SEV	-	20	-	2.95	-	SEV	-
			-	0.97	-	LOW	-	62	-	0.99	-	LOW
I-64	I-464	GEORGE WASHINGTON HWY	1.23	-	MOD	-	41	-	1.47	-	SEV	-
			-	1.17	-	MOD	-	49	-	1.22	-	MOD
I-64	GEORGE WASHINGTON HWY	MILITARY HWY	1.11	-	LOW	-	46	-	1.32	-	SEV	-
			-	3.49	-	SEV	-	29	-	2.09	-	SEV

Figure 2 - HRTPO Annual Roadway Performance Report – 2017 Edition, page 15
https://www.hrtpo.org/uploads/docs/Roadway%20Performance%20Measures%202017%20-%20FINAL.pdf

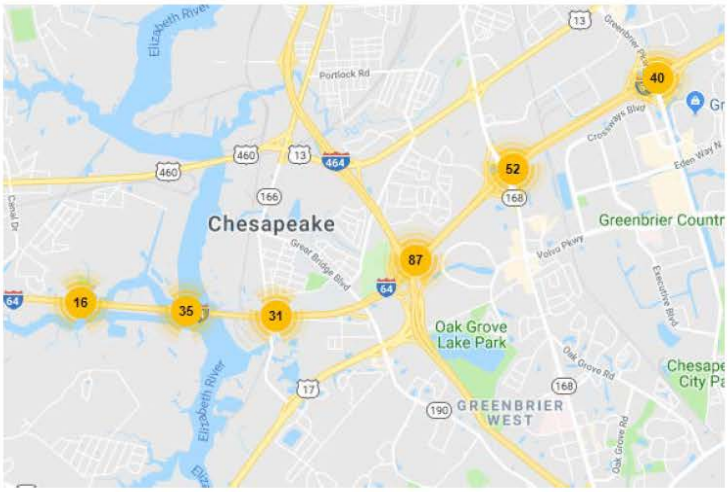


Figure 3 - Screen shot. Heat map of accidents on I-64 and I-64 ramps in 2017 from
https://www.treds.virginia.gov/Mapping/Map/CrashesByJurisdiction

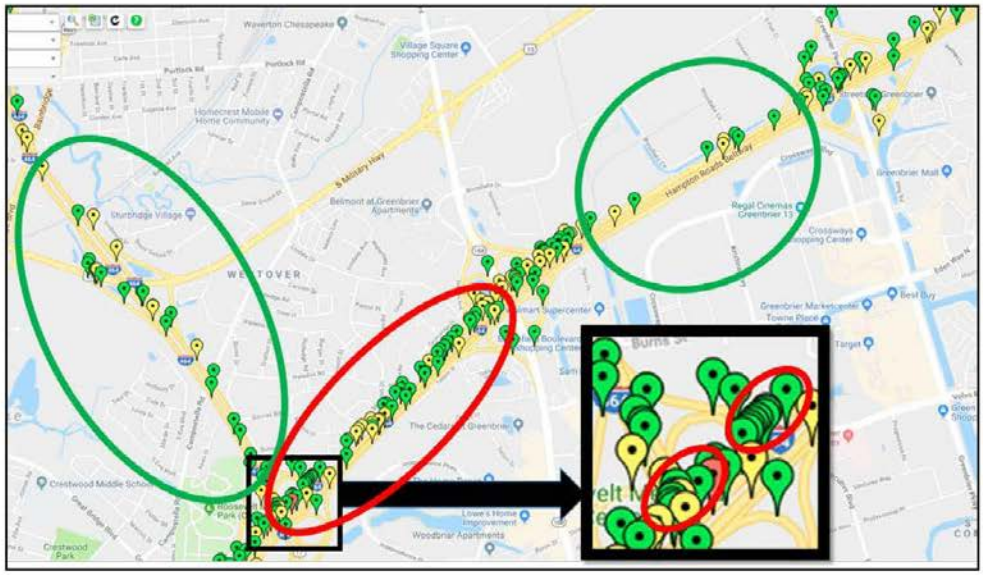


Figure 4 - Screen shot. Markers showing accidents on I-64 and I-64 ramps in 2017 from https://www.treds.virginia.gov/Mapping/Map/CrashesByJurisdiction

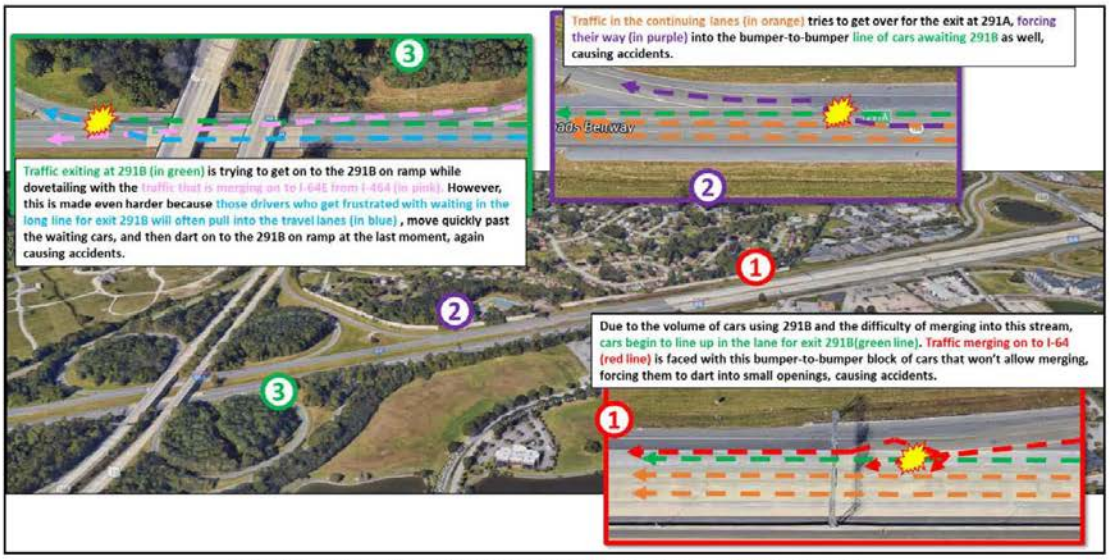


Figure 5 - Explanation of I-64E and I-464S/US-17S interchange problems

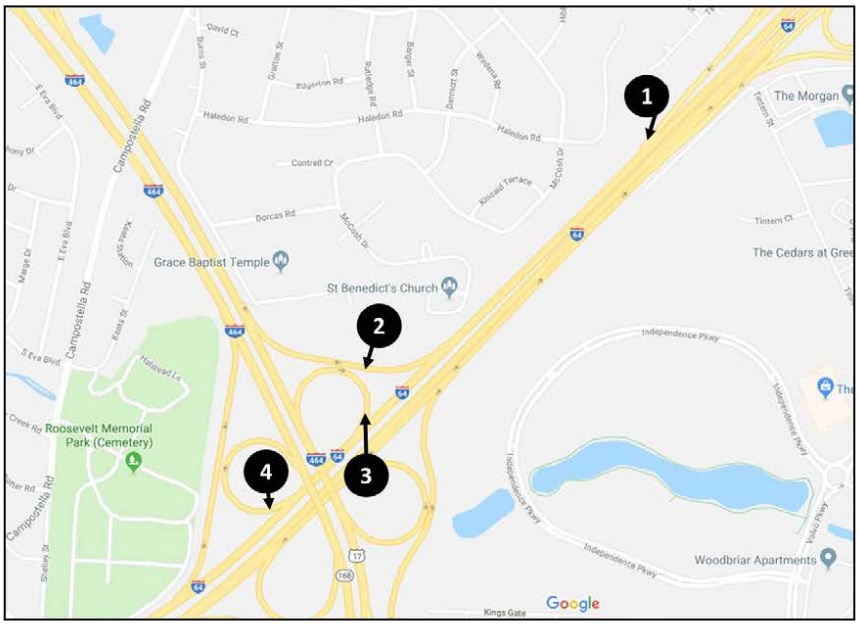


Figure 6 - I-64/464 interchange

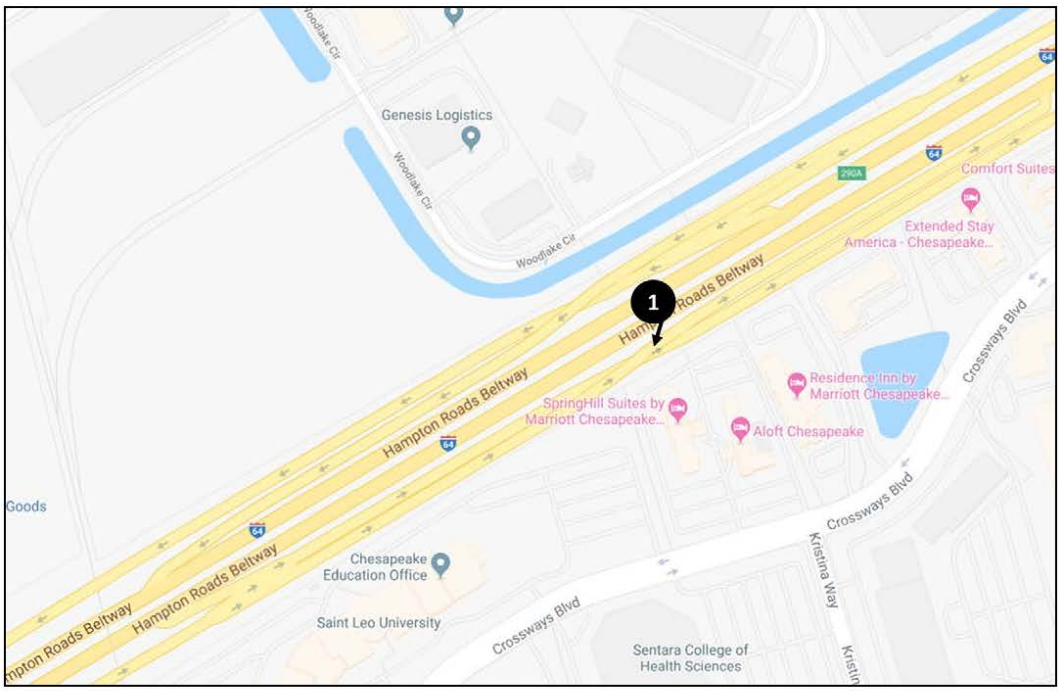


Figure 7 - Battlefield Blvd on ramp and I-64W

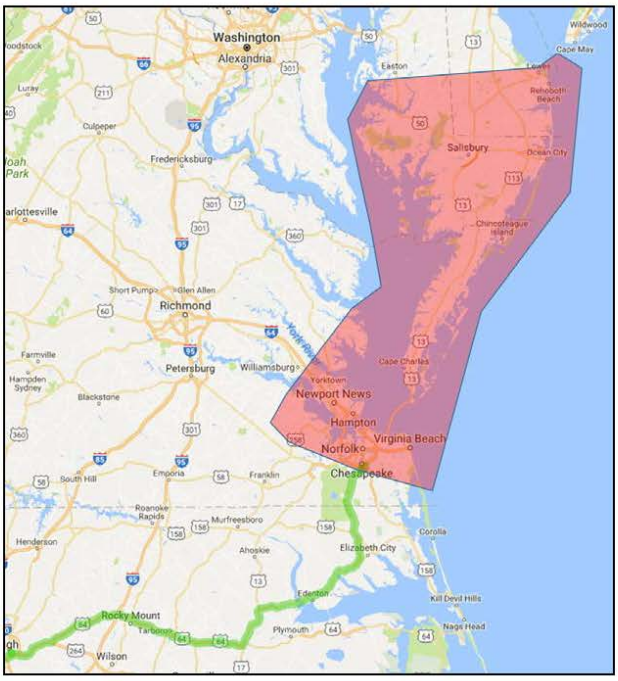


Figure 8 - I-87 proposed route (in green) and traffic watershed (in red)

CMAQ/RSTP
HRTPO Project Selection Process

Candidate Project Idea Form

To be considered for Congestion Mitigation and Air Quality (CMAQ) or Regional Surface Transportation Program (RSTP) funding, a proposed project must be included in the current HRTPO Long-Range Transportation Plan (LRTP). Please fill out one form for each project idea you are submitting. When you have completed the form, save it with a file name that includes your last name and a project name (example: Jones-Main St Bikeway.doc). Send an email message, with your project idea form(s) attached, to John Mihaly, Senior Transportation Planner, at jmihaly@hrtpo.org. As an alternative, you may send your project idea form(s) to:

John Mihaly
Senior Transportation Planner
Hampton Roads Transportation Planning Organization
723 Woodlake Drive
Chesapeake, VA 23320

All project ideas submitted by the public will be acknowledged and forwarded to the appropriate locality, transit agency or state agency. The project ideas will be considered by those entities for possible submission as projects proposed for CMAQ or RSTP funding.

The deadline for submitting your project ideas is July 31, 2018.

CMAQ/RSTP Project Idea Form

Your Name: Mack Nolen **Date:** July 27, 2018

E-Mail: mtnjr@yahoo.com **Phone:** 832-334-8123

Project Name: Millville Rd and Moses Grandy Trail Sidewalk/Multi-use Path Addition

Project Location (include city or county in which the project is located, street name, end points):
Chesapeake, VA. Deep Creek area.

Project Description (include type of project; if CMAQ project, how will it improve air quality?):
CMAQ. Install a sidewalk or separate bike path on Millville Rd from the intersection at Shipyard Rd southwest approx. 1.8 mi to the intersection at Cedar Rd, from there south along Cedar Rd approx. 0.2 miles to link into the existing sidewalk at Lynnfield Rd, and from the intersection of Millville Rd and Moses Grandy Trail eastward approx. 0.7mi along Moses Grandy Trail to link into the existing sidewalk at the intersection of Sebreill Way and Moses Grandy Trail. This project would improve air quality by making these critical roadways safe for bike use, cutting down on automobile traffic on them.

Additional Information (If applicable, include additional data or maps as attachments.):
My understanding from reviewing the Master Transportation Plan and Trails Plan is that there is no plan to install a sidewalk along the roadways described above. While I understand that in general there are tremendous difficulties in adding sidewalks after the fact along roadways,

particularly where homes line that roadway, due to issues with cost, drainage, ROW, etc, but I think this stretch of road warrants consideration for the addition of a sidewalk, even if only on one side.

Millville Rd Section

Millville Rd serves half a dozen or more neighborhoods that have or will have a total of almost 600 homes when construction is complete (by my estimates based on publicly available data). These include Summer Park (~430 homes), Summerwood at Grassfield (~60 homes), Brabble Shores subdivision on Shipyard Rd (~40 homes), The Towns at Bryan's Cove (~40 homes), Windrose Farms, Mill Creek Harbor, Kinston Waters, plus existing homes all around that area that aren't in a subdivision. Most of these homes have or will soon have elementary, middle, or high school children living in them and these kids frequently ride their bikes on the road as there is no sidewalk there. The road is narrow in most places with a ditch on both sides. In short, it is unsafe. It is also unsafe for joggers, walkers, and adult bicyclists too.

Currently, children and adults on bikes, skateboards, skates and walking/running put themselves in harm's way by traveling on Millville through dangerous traffic to get to Deep Creek Park, the Dismal Swamp Trail system, the Veteran's bridge, or their friend's homes on the other side of Moses Grandy Trail. There is a plan for a tremendous network of trails and sidewalks to be put in, but the people of this area (area in red on figure 1) are cut off from it if they don't want to put themselves in harm's way.

Additionally, drivers often go much faster on Millville than on any of the neighborhood roads that feed it. It is also the feeder road for many of those neighborhoods, so delivery trucks, construction vehicles, and other large traffic also fills this road.

Moses Grandy Trail Section

For the Moses Grandy Trail section of the proposal, the justification for adding a sidewalk there is much the same as above. Currently the Chesapeake 2050 Trails Plan appears to show that the stretch of Moses Grandy Trail between Sebriel Way and Millville Rd (see figure 2) has a Class II path, which is defined in the Chesapeake 2035 Comprehensive Plan (see figure 3) as "on-street bicycle lanes ... defined by a painted stripe." However, if that painted stripe is simply the stripe that indicates the edge of the roadway and the start of the shoulder, then I would say that is insufficient and really can't be counted as a "Roadway Bike Lane." Looking at figure 4, which is a Google Street View of that stretch of road, it is apparent that this is little more than a 2-4ft shoulder that slopes into the grass. I would challenge any parent who says that they are comfortable having their child ride their bike on this road. I am an experienced rider and I would be nervous on that bare strip of road.

Further, while that road has a speed limit of 45 miles per hour (see figure 5), people regularly travel much faster than this on the road, probably closer to 55 mph, making it even less hospitable for pedestrians, joggers, and bikers.

In short, this is a small section of road that needs a sidewalk for a significant and growing population of residents, and while this addition of a sidewalk/multi-use path will cause a relatively minor disruption to drainage and adjacent properties, it would have a high payoff in terms of the number of people who could clearly benefit from this addition, not to mention a potential decrease in traffic and an increase in general quality of life.

Figures

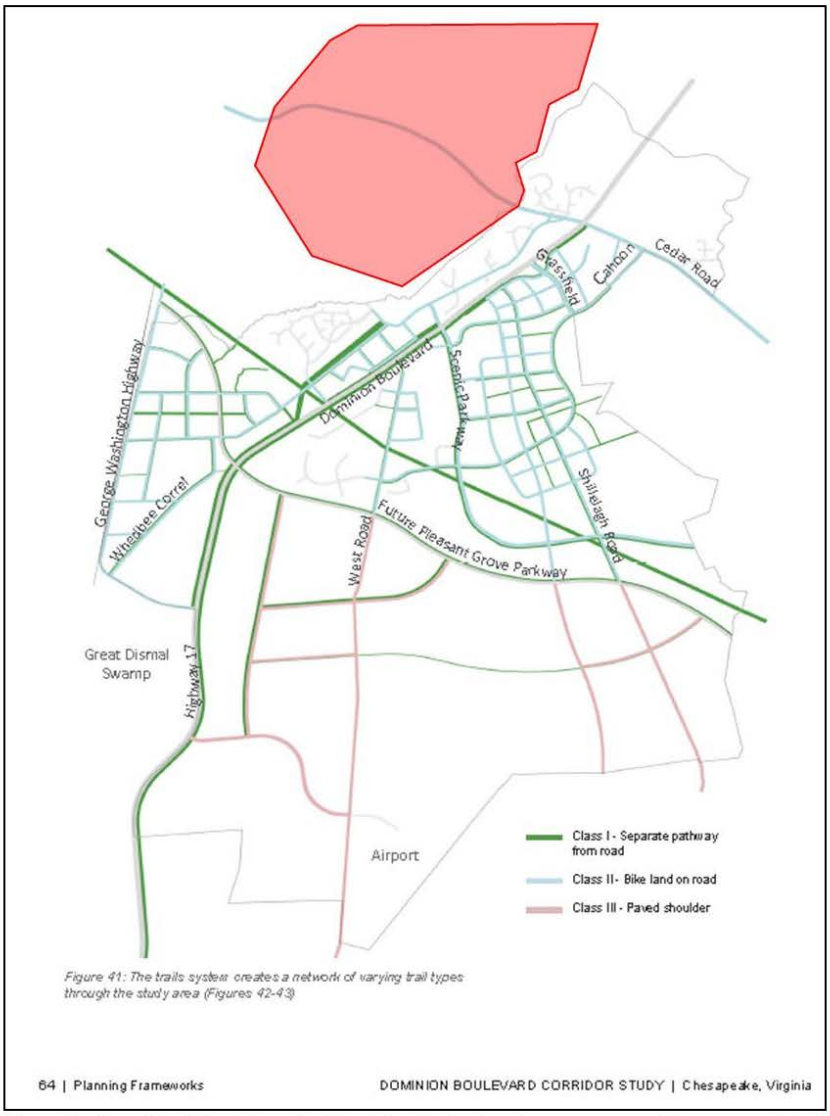


Figure 1 - Page 64 of Dominion Blvd Corridor Study showing areas served by proposed trails and sidewalks

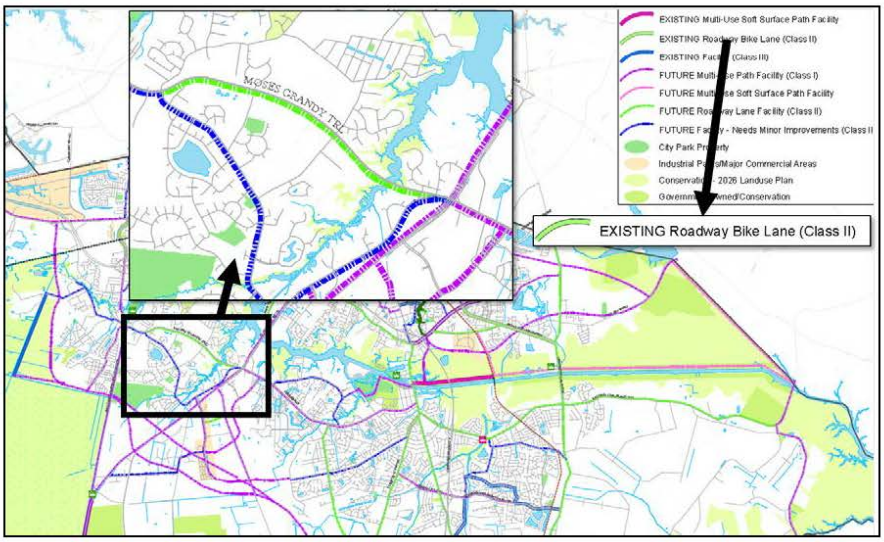
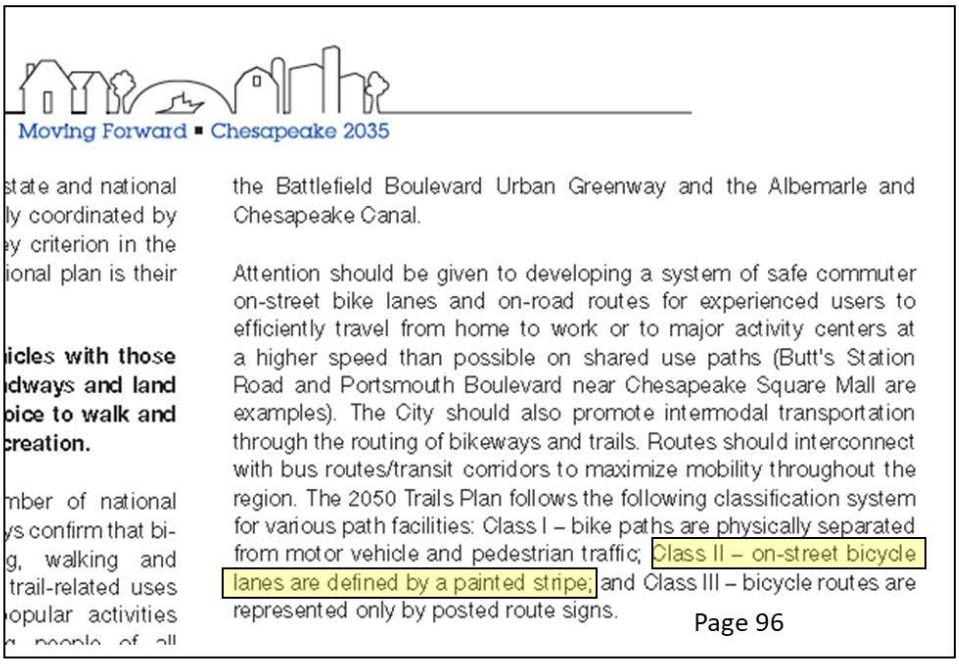


Figure 2 - Screenshot of Chesapeake 2050 Trails Plan



Moving Forward ▪ Chesapeake 2035

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the Battlefield Boulevard Urban Greenway and the Albemarle and Chesapeake Canal.

Attention should be given to developing a system of safe commuter on-street bike lanes and on-road routes for experienced users to efficiently travel from home to work or to major activity centers at a higher speed than possible on shared use paths (Butt's Station Road and Portsmouth Boulevard near Chesapeake Square Mall are examples). The City should also promote intermodal transportation through the routing of bikeways and trails. Routes should interconnect with bus routes/transit corridors to maximize mobility throughout the region. The 2050 Trails Plan follows the following classification system for various path facilities: Class I – bike paths are physically separated from motor vehicle and pedestrian traffic; Class II – on-street bicycle lanes are defined by a painted stripe; and Class III – bicycle routes are represented only by posted route signs.

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Figure 3 - Screenshot of Chesapeake 2035 Comprehensive Plan

Figure 4 - Google Street View of Moses Grandy Trail

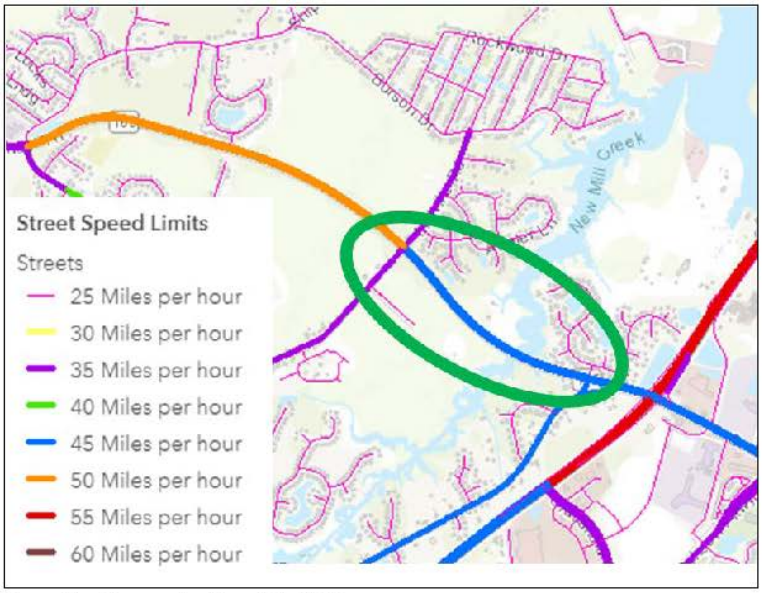

Figure 5 - Chesapeake Speed Limit Map
(https://www.arcgis.com/home/webmap/viewer.html?webmap=e8a59ca40f1345c89962044b870e87a1)