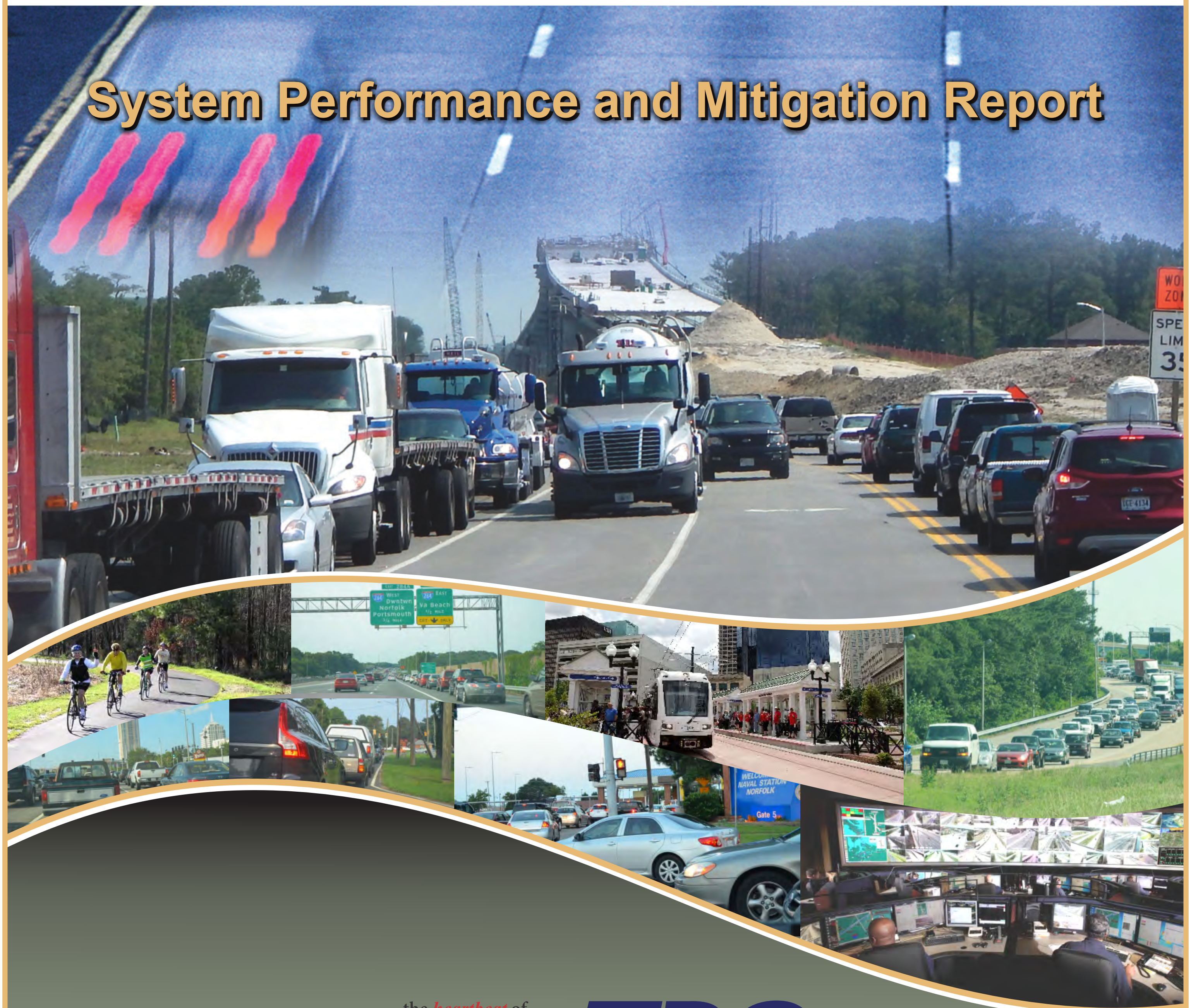
# Hampton Roads Congestion Management Process

## System Performance and Mitigation Report



the heartbeat of HAMPTON ROADS TPO
TRANSPORTATION PLANNING ORGANIZATION

T14-12

October 2014

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# *HAMPTON ROADS*
# *CONGESTION MANAGEMENT PROCESS*

## SYSTEM PERFORMANCE AND MITIGATION REPORT

**PREPARED BY:**

**OCTOBER 2014**

***T14-12***

**TITLE:**
Hampton Roads Congestion Management Process: System Performance and Mitigation Report

**REPORT DATE:**
October 2014

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**ABSTRACT**

As the federally designated Metropolitan Planning Organization (MPO) for the Hampton Roads, Virginia region, HRTPO is required by federal law to maintain a Congestion Management Process (CMP). The Hampton Roads CMP is an on-going systematic process for managing congestion that provides information and analysis on multimodal transportation system performance and on strategies to alleviate congestion and enhance the mobility of persons and goods regionwide. During this process, HRTPO works with state and local agencies to develop these strategies and mobility options. Federal regulations require that a CMP be in place in all Transportation Management Areas (TMAs), which are urban areas over 200,000 in population. The first Congestion Management System for Hampton Roads was released in 1995, and was updated in 1997, 2001, 2005, and 2010.

This report provides a thorough assessment of the roadway system in Hampton Roads, updates the regional LOS congestion analysis (using the 2013 Existing and the 2034 roadway network), ranks the most congested corridors, and provides congestion mitigation strategies and recommended improvements for the congested corridors.

**ACKNOWLEDGMENTS**

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

**NON-DISCRIMINATION**

# EXECUTIVE SUMMARY

The Hampton Roads Congestion Management Process (CMP) is an on-going systematic process for managing congestion that provides information and analysis on multimodal transportation system performance and on strategies to alleviate congestion and enhance the mobility of persons and goods regionwide. During this process, the Hampton Roads Transportation Planning Organization (HRTPO) works with state and local agencies to develop these strategies and mobility options.

Federal regulations require that a CMP be in place in all Transportation Management Areas (TMAs), which are urbanized areas over 200,000 in population. The Hampton Roads Transportation Planning Organization began developing a Congestion Management System for the region in the early 1990s, and released the region's first CMS report in 1995. Updates to the CMS were released in 1997, 2001, 2005, and 2010. The 2010 update was the first regional report to be referenced as a "Congestion Management Process." This new requirement from SAFETEA-LU legislation was intended to encourage regions to incorporate congestion management into the metropolitan planning process, rather than have it as a stand-alone program or system.

According to the Federal Highway Administration (FHWA), the CMP should assist MPOs with performing the following actions for the regional transportation system:

- Develop regional objectives for congestion management
- Define CMP network
- Develop multimodal performance measures
- Collect data/monitor system performance
- Analyze congestion problems and needs
- Identify and assess strategies
- Program and implement strategies
- Evaluate strategy effectiveness

The overall goal of the Hampton Roads CMP is to take a regional approach to identify and address congestion concerns. The CMP also develops a "toolbox" of strategies to address the most congested locations. Since the region cannot simply build itself out of congestion, all strategies must be considered, with adding capacity as the last resort. For some severely congested corridors, additional roadway capacity may be the only solution for congestion based on the roadway characteristics.

For the first time, HRTPO staff has access to historical travel time and speed data for use in the CMP. The travel time and speed data used in this study was collected by INRIX. INRIX collects travel time and speed data on a continuous basis, using millions of GPS-enabled fleet vehicles (taxis, airport shuttles, service vehicles, and long haul trucks), mobile devices that have INRIX's real-time traffic applications installed, traditional road sensors, and other sources. INRIX data allows for a number of congestion measures to be reported, as shown below:

**HRTPO INRIX MEASURES**

1) Travel Speeds/Travel Time Indices
2) Potential for Intersection Congestion Alleviation (PICA)
3) Congestion Duration
4) Total Delay
5) Travel Time Reliability

INRIX travel time and speed data is available for 1,100 centerline-miles of roadway in Hampton Roads, including nearly all freeways and most principal and minor arterials. INRIX's coverage comprises 69% of the centerline-miles and 77% of the lane-miles of the existing CMP Roadway Network.

HRTPO staff determined roadway congestion levels using INRIX travel time and speed data for roadways where it was available and by conceptual planning level analysis methods for roadways without this data. For the 31% of the CMP Roadway Network where INRIX data is not available, AM and PM Peak Period roadway congestion levels were determined using a widely accepted engineering standard from the *Highway Capacity Manual* (HCM)[1] called Level of

[1] *Highway Capacity Manual*, Transportation Research Board, 2010

Service (LOS). Level of Service is measured on a scale of "A" through "F," with LOS A representing the best operating conditions and LOS F representing the worst. Levels of Service A through C are acceptable operating conditions that equate to "Low Congestion" levels. LOS D is considered to be an acceptable operating condition with "Moderate Congestion" levels, while Levels of Service E and F are considered to be unacceptable operating conditions with "Severe Congestion".

For roadways with INRIX data, HRTPO staff used the travel time index (TTI) to determine levels of roadway congestion. The travel time index compares typical travel conditions during a particular time of day (usually the peak travel hour or period) to the travel conditions during uncongested, or free-flow, conditions. As an example, if it takes one minute to travel the length of a roadway segment during uncongested, free-flow conditions but it takes two minutes on average during congested conditions, the travel time index would be 2 minutes/1 minute = 2.0.

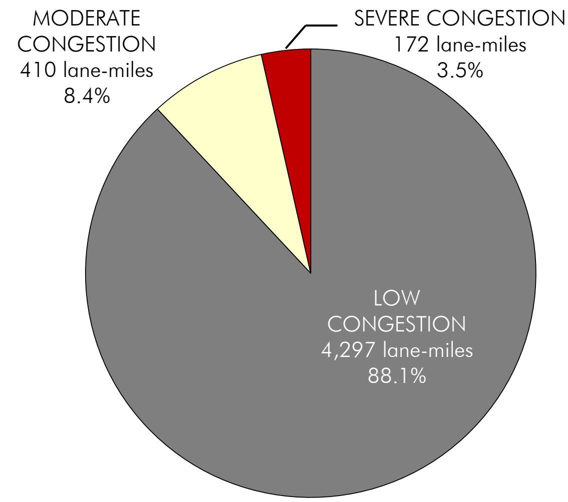
HRTPO staff calculated the travel time index for each CMP Roadway Network segment by direction for each 15-minute interval during the AM and PM Peak Periods in 2013. The highest 15-minute travel time index during the AM Peak Period (defined in this study as occurring between 5:00 am and 9:00 am) and the PM Peak Period (defined as occurring between 3:00 pm and 7:00 pm) was used to determine each roadway segment's peak period congestion level.

Each roadway segment was classified as having a "low", "moderate", or "severe" level of peak period congestion based on this highest travel time index, using the thresholds shown in **Table ES-1**. Low congestion levels are comparable to a HCM Level of Service A, B or C. Moderate congestion levels are comparable to a Level of Service D, and severe congestion levels are comparable to a Level of Service E or F.

| CONGESTION LEVEL | | FREEWAY | ARTERIAL |
|---|---|---|---|
| Low | LOW | TTI < 1.15 | TTI < 1.25 |
| Moderate | MOD | 1.15 ≤ TTI < 1.3 | 1.25 ≤ TTI < 1.4 |
| Severe | SEV | TTI ≥ 1.3 | TTI ≥ 1.4 |

**Table ES-1 – Congestion Level Thresholds**
Source: HRTPO.

**AM Peak Period**




**PM Peak Period**

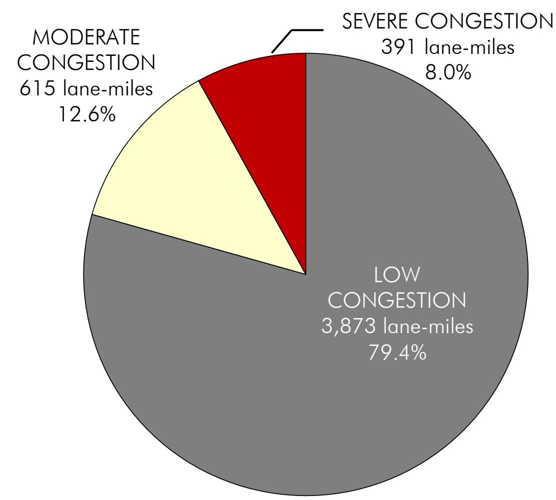


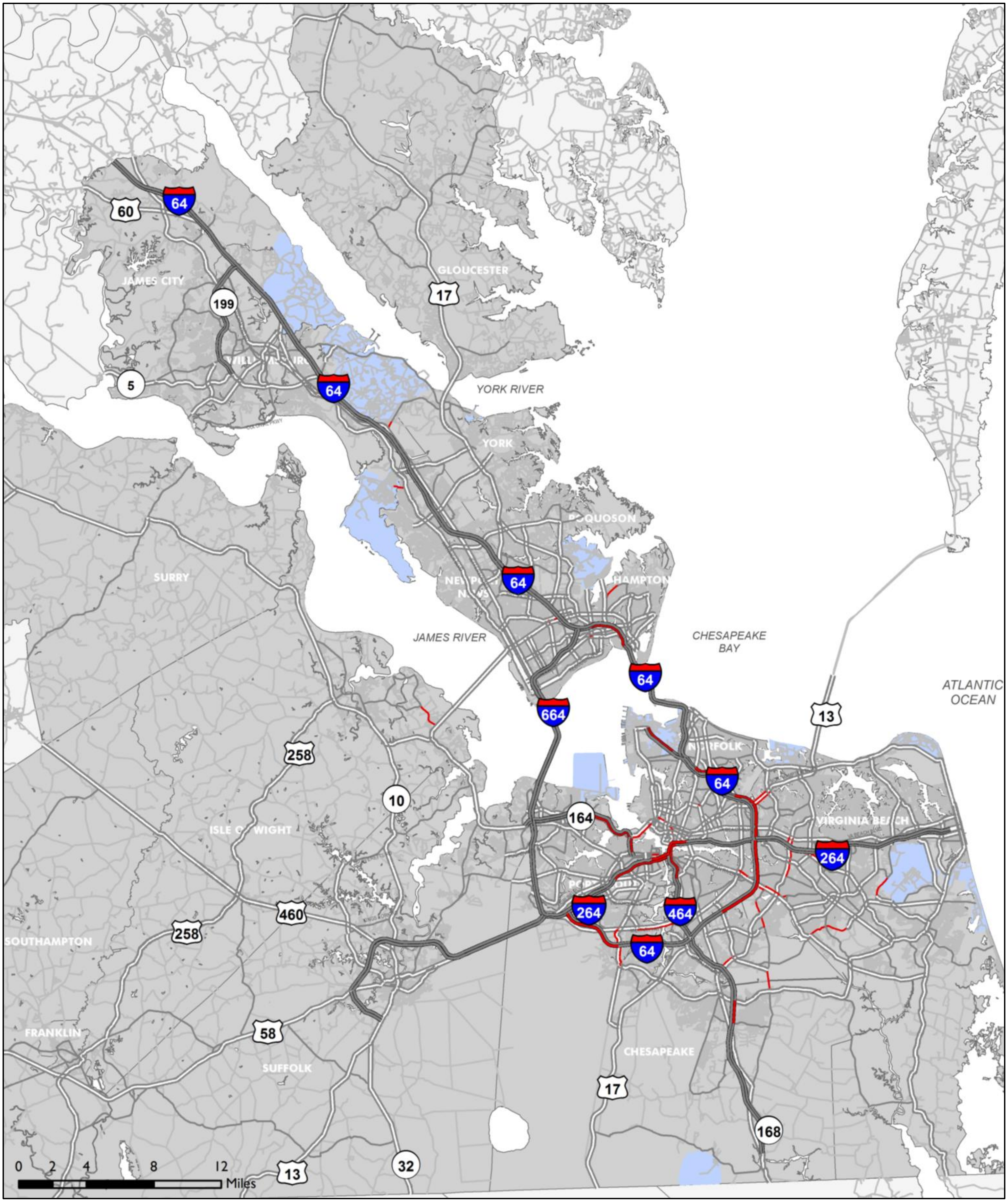

**Figure ES-1 - Existing (2013) Congestion Levels by Lane-Mile for the CMP Roadway Network**

Source: HRTPO analysis of INRIX and VDOT data.

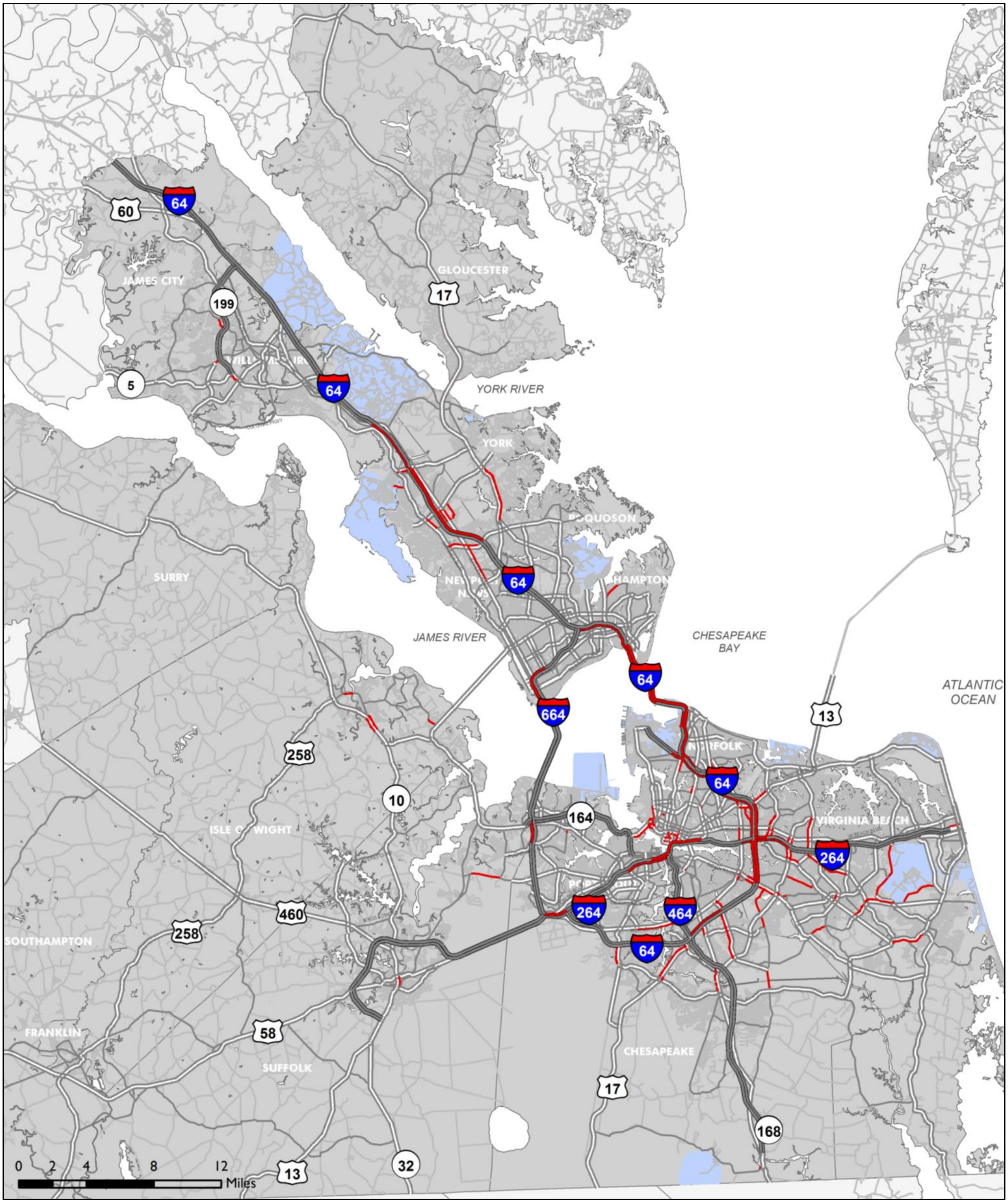
Figure only include those roadways in the CMP network within the Hampton Roads Metropolitan Planning Area (MPA).

**Map ES-1** on page v shows the existing congestion levels in Hampton Roads during the AM Peak Period, and **Map ES-2** on page vi shows the existing congestion levels during the PM Peak Period.

**Map ES-1 – Existing (2013) CMP Roadway Network Congestion Levels – AM PEAK PERIOD**



## Map ES-2 – Existing (2013) CMP Roadway Network Congestion Levels – PM PEAK PERIOD



Looking only at the roadways within the Metropolitan Planning Area (MPA)[2], the Hampton Roads region experienced severe congestion on 172 of the 4,879 lane-miles (3.5%) on the Hampton Roads CMP Roadway Network during the AM Peak Period in 2013. During the PM Peak Period, 391 lane-miles (8.0%) operated at severely congested conditions (**Figure ES-1**) in 2013.

The amount of roadway congestion is expected to grow significantly by the year 2034. Approximately one third (34%) of all CMP roadway lane-miles during the PM Peak Period are projected to operate in severely congested conditions in the year 2034 (**Figure ES-2**), based on the volumes and improvement projects contained in the 2034 Long-Range Transportation Plan. Caution should be used when making comparisons between the 2013 Existing and 2034 congestion levels, however, since different methodologies were used.

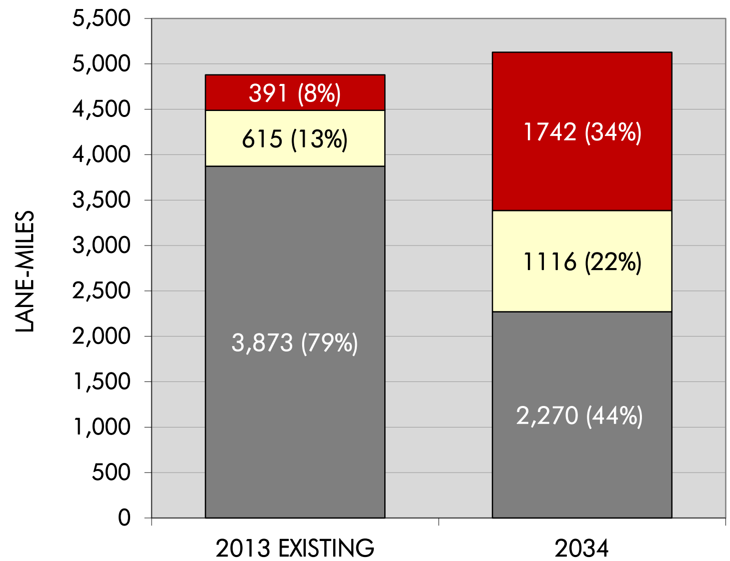



**Figure ES-2 – Existing (2013) and 2034 Congestion Levels by Lane-Mile for the CMP Roadway Network (PM Peak)**

Source: HRTPO analysis of HRTPO, INRIX, and VDOT data.

Figure only include those roadways in the CMP network within the Hampton Roads Metropolitan Planning Area (MPA).

Given funding constraints, it is imperative that planners and officials select transportation projects that will be the most beneficial to the region. Rather than ranking corridors on congestion measures alone, HRTPO staff has incorporated the results from previous HRTPO studies which address measures such as freight, the military, and safety. Based on an assessment of available data as well as discussions with other transportation professionals throughout the region, five factors were included in the CMP Segment Scoring Criteria as shown below.

**CMP SEGMENT SCORING CRITERIA**

1) Existing Congestion
2) Existing Truck Volumes
3) Future Truck Delay
4) Safety
5) National Highway System (NHS)/Military

Each CMP Roadway Network segment was scored using these criteria by direction for the AM and PM Peak Periods. A CMP Segment Score was awarded to each segment based on the highest AM or PM Peak Period point total.

After CMP Segment Scores were produced for each congested roadway segment in the region, high scoring segments were grouped into corridors for analysis purposes. Eighteen "CMP Congested Corridors" were created based on the location and proximity of each congested roadway segment. Then the CMP Congested Corridors were ranked based on the roadway segments with the highest CMP Segment Scores. These ranked CMP Congested Corridors – including the Top 6 Freeways and Top 12 Arterials – are shown in **Table ES-2** on page viii.

As congestion levels rise, it is imperative to evaluate, develop, and apply congestion mitigation strategies involving all modes of transportation to improve service levels on the regional transportation system. In order to achieve this goal, a comprehensive "toolbox" of specific congestion mitigation measures has been assembled to promote strategic solutions involving all modes of transportation, better land development, and more efficient use of the existing transportation system as required by federal CMP

[2] Although congestion levels were determined for roadways in the City of Franklin, Southampton County, Surry County, and Northern Gloucester County, these jurisdictions are excluded from these statistics since they fall outside of the MPA.

regulations. The strategies were grouped into five general categories:

### HRTPO GENERAL CONGESTION MITIGATION STRATEGIES

1) Eliminate Person Trips or Reduce VMT
2) Shift Trips from Automobile to Other Modes
3) Shift Trips from SOV to HOV
4) Improve Roadway Operations
5) Add Capacity

During the strategy evaluation process, it is important to consider using the strategies listed above in the order presented in a "top-down" approach that would examine strategies to eliminate or shift automobile trips or improve roadway operations prior to adding capacity. Given today's budgetary constraints, it is imperative to first investigate strategies that utilize the existing capacity of the transportation network. It is also important for regional decision makers, planners, engineers, and other agencies involved with transportation to communicate and coordinate their efforts on a regular basis to solve existing problems and mitigate future congestion in Hampton Roads.

**Top 6 Freeways**

| Rank | Jurisdiction | CMP Congested Corridor |
|---|---|---|
| 1 | HAM/NOR | Hampton Roads Bridge-Tunnel (I-64) from I-664 to I-564 |
| | | - 4th View St from I-64 to Ocean View Ave |
| 2 | NOR/PORT/CHES | Downtown Tunnel/Berkley Bridge (I-264/I-464)[1] |
| | | - I-264 from Portsmouth Blvd to Brambleton Ave |
| | | - I-464 from Poindexter St to I-264 |
| | | - St. Pauls Blvd from I-264 Ramp to Brambleton Ave |
| 3 | CHES | I-64/High Rise Bridge from I-264 & I-664 (Bowers Hill) to Greenbrier Pkwy |
| 4 | NN | Monitor-Merrimac Mem. Bridge-Tunnel (I-664) from Terminal Ave to Chestnut Rd |
| 5 | NOR/VB | I-64 (Norfolk/VA Beach) from I-564 to Indian River Rd |
| 6 | NOR | I-564 (Norfolk) from International Terminal Blvd to Admiral Taussig Blvd |

**Top 12 Arterials**

| Rank | Jurisdiction | CMP Congested Corridor |
|---|---|---|
| 1 | NOR/PORT | Midtown Tunnel/Western Fwy from West Norfolk Rd to Brambleton Ave[1] |
| | | - Hampton Blvd from 27th St to Brambleton Ave |
| | | - Brambleton Ave from Colley Ave to Hampton Blvd |
| 2 | VB | Indian River Rd/Ferrell Pkwy from Providence Rd to Indian Lakes Blvd |
| 3 | NOR/VB | Northampton Blvd from I-64 to Diamond Springs Rd[3] |
| 4 | NN | Fort Eustis Blvd from Warwick Blvd to I-64[2] |
| 5 | VB | London Bridge Rd/Drakesmile Rd from Dam Neck Rd to Virginia Beach Blvd |
| 6 | VB | Independence Blvd from Holland Rd to Jeanne St |
| 7 | CHES | Battlefield Blvd from Cedar Rd to I-64 |
| 8 | CHES | Military Hwy from Bainbridge Blvd to I-464[2] |
| 9 | JCC | Monticello Ave from News Rd to Route 199 |
| 10 | CHES/VB | Centerville Tnpk from Mt Pleasant Rd to Indian River Rd |
| 11 | JCC/WMB | Route 199 from John Tyler Hwy (Rte 5) to Jamestown Rd |
| 12 | CHES | George Washington Hwy from Moses Grandy Trail to I-64 |

**Table ES-2 - CMP Congested Corridors**

1 - Not included in the CMP analysis due to tolls imposed in February 2014.
2 – Not included in the CMP analysis due to bridge construction projects.
3 – Corridor impacted by construction during the CMP analysis period (2013).

As part of this CMP update, 14 CMP Congested Corridors – 5 Freeways and 9 Arterials – were analyzed in detail to determine probable causes of congestion, peak hour traffic characteristics, recent and future projects, existing and future congestion levels, possible application of CMP mitigation strategies, and candidate congestion mitigation strategies. Two of the freeway corridors (Downtown Tunnel/Berkley Bridge and Midtown Tunnel/Western Freeway) are not included in the CMP Congested Corridors analysis, because tolls at the Midtown and Downtown Tunnels have greatly reduced congestion at those facilities. HRTPO staff has been monitoring the impacts of these tolls on the regional transportation network, and will release the *Analyzing and Mitigating the Impact of Tolls at the Midtown and Downtown Tunnels* report in late 2014. Two arterial corridors (Fort Eustis Boulevard and Military Highway) are not included in the analysis because of bridge construction projects that temporarily reduced capacity on these roadways. Another roadway on the list – Northampton Boulevard – was impacted by construction during 2013 that resulted in a lane reduction in the eastbound direction.

HRTPO staff recommends the following congestion mitigation strategies for the 14 CMP Congested Corridors shown in **Tables ES-3 and ES-4** on pages ix-xi.

## Table ES-3 - CMP Congested Corridor Congestion Mitigation Strategies - Freeways

**Freeway Corridor #1 - Hampton Roads Bridge-Tunnel (I-64) from I-664 to I-564**

- Consider adding tolls ("congestion pricing") to the Hampton Roads Harbor crossings.
- Continue to promote TDM and public transit strategies in order to reduce traffic volume in this corridor. This could include increasing transit service across the Hampton Roads Harbor, such as enhancing express bus service or implementing ferry service.
- Improve ITS technologies and signage to minimize over-height vehicle turnarounds at the tunnel entrance.
- Continue to use and improve ITS/operational strategies to manage traffic at the tunnel and quickly respond to incidents. This can help reduce clearance times and reduce the number of secondary incidents.
- ODU is currently conducting a study titled "Investigation of Sources of Congestion at the HRBT" that should be completed by the end of the year. Planners and engineers should review this study in order to develop specific remedies for these sources of congestion.
- Add additional capacity across the Hampton Roads Harbor.

**Freeway Corridor #2 - Downtown Tunnel**

- This corridor was not analyzed, due to a significant reduction in congestion after tolls were implemented in Feburary 2014.

**Freeway Corridor #3 - I-64/High Rise Bridge from I-264 & I-664 (Bowers Hill) to Greenbrier Pkwy**

- Continue to promote TDM and public transit strategies in order to reduce traffic volume in this corridor.
- Maintain bridge opening restrictions during morning and afternoon peak periods.
- Improve the interchange of I-64 and I-464/Chesapeake Expressway to reduce weaving movements.
- Continue to use and improve ITS/Operational strategies to manage traffic in the corridor and quickly respond to incidents.
- Widen I-64 and the High Rise Bridge.

**Freeway Corridor #4 - Monitor-Merrimac Mem. Bridge-Tunnel (I-664) from Terminal Ave to Chestnut Rd**

- Consider adding tolls ("congestion pricing") to the Hampton Roads Harbor crossings.
- Continue to promote TDM and public transit strategies in order to reduce traffic volume in this corridor. This could include increasing transit service across the Hampton Roads Harbor, such as enhancing express bus service or implementing ferry service.
- Continue to use and improve ITS/Operational strategies to manage traffic at the tunnel and quickly respond to incidents.
- Add additional capacity across the Hampton Roads Harbor.

**Freeway Corridor #5 - I-64 from I-564 to Indian River Rd**

- Continue to promote TDM and public transit strategies in order to reduce traffic volume in this corridor.
- Encourage local military leaders to modify policies concerning work times.
- Continue to use and improve ITS/Operational strategies to manage traffic in this corridor and quickly respond to incidents.
- Consider converting High Occupancy Vehicle (HOV) lanes to High Occupancy Toll (HOT) lanes to improve the usage of the existing capacity.
- Widen I-64 EB from the end of the Northampton Boulevard on-ramp to beyond the merging area for the reversible lanes. This will allow for the Northampton Boulevard on-ramp to remain as a through lane rather than the much less used ramp coming from the HOV lanes.
- Improve the interchange of I-64 and I-264. This could include:
  - o Balancing traffic volumes by restriping I-64 EB to allow for 2 lanes exiting to I-264 and 2 through lanes continuing towards Chesapeake. This would also allow for the I-264 EB on-ramp to I-64 EB to have a dedicated lane beyond the interchange rather than the existing short acceleration lane.
  - o Widening the ramp from WB I-64 to EB I-264 to 2 lanes.
  - o Lengthening the acceleration lane from the I-264 ramp to EB I-64.
- Rebuild the EB side of the interchange of I-64 and Indian River Road to alleviate weaving/merging issues.
- Consider strategies included in Arterial #2 – Indian River Rd and Arterial #3 – Northampton Blvd.

**Freeway Corridor #6 - I-564 from International Terminal Blvd to Admiral Taussig Blvd**

- Encourage local military leaders to modify policies concerning work times and work location (by entry gate).
- Encourage local partnerships with Hampton Roads Transit (HRT) and others to increase travel options for military personnel through travel demand management strategies such as working off-peak hours, telecommuting, ridesharing (carpools/vanpools), and using public transit.
- Extend light rail passenger service to/from Naval Station Norfolk.
- Ensure coordination of the signals on Admiral Taussig Blvd.
- Improve the operations of the gates, particularly at Gates 3/3A. This could include adding additional lanes for processing through the gates and improving technologies at the gates.
- Construct the Intermodal Connector and Air Terminal Interchange projects to improve access from I-564 to Naval Station Norfolk.
- Construct the Third Crossing to improve access to Naval Station Norfolk.

## Table ES-4 - CMP Congested Corridor Congestion Mitigation Strategies - Arterials

**Arterial Corridor #1 - Midtown Tunnel**

- This corridor was not analyzed, due to a significant reduction in congestion after tolls were implemented in Feburary 2014.

**Arterial Corridor #2 - Indian River Rd/Ferrell Pkwy from Providence Rd to Indian Lakes Blvd**

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor.
- Improve the intersection of Indian River Road and Kempsville Road. Rebuilding the intersection with a non-traditional configuration is included in the SYIP/TIP (UPC #84366), with construction expected to begin in 2015.
- Ensure coordination of signals in the corridor.
- Widen Indian River Road. (This project is included in the Long-Range Transportation Plan.)
- Construct alternate routes, such as the Southeastern Parkway and Greenbelt. The extension of Lynnhaven Pkwy between Centerville Tpke and Indian River Rd (UPC #14603) is under construction and will reduce congestion at Indian River Road/Kempsville Rd when complete.

**Arterial Corridor #3 - Northampton Blvd from I-64 to Diamond Springs Rd**

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor.
- Improve the interchange of I-64 and Northampton Blvd. One possibility is to widen I-64 EB from the end of the Northampton Boulevard on-ramp to beyond the merging area for the reversible lanes. This will allow for the Northampton Boulevard on-ramp to remain as a through lane rather than the much less used ramp coming from the HOV lanes.

**Arterial Corridor #4 - Fort Eustis Blvd**

- This corridor was not analyzed, since congestion in this corridor was due to a bridge replacement project.

**Arterial Corridor #5 - London Bridge Rd/Drakesmile Rd from Dam Neck Rd to Virginia Beach Blvd**

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor.
- Consider improvements to the intersection of Virginia Beach Blvd/Great Neck Rd/London Bridge Rd to improve flow on London Bridge Rd. This could include restriping EB Virginia Beach Blvd to provide a triple left turn movement to NB Great Neck Rd and WB Virginia Beach Blvd to provide a double left turn movement to SB London Bridge Rd. The EB triple left would require restriping Great Neck Rd to the north of Virginia
- Ensure coordination between the closely spaced signals from Potters Rd to Virginia Beach Blvd.
- Widen London Bridge Rd between Drakesmile Rd and Dam Neck Rd to alleviate backups on SB Drakesmile Rd. (This project is included in the Long-Range Transportation Plan.)

**Arterial Corridor #6 - Independence Blvd from Holland Rd to Jeanne St**

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor, e.g. the current HRT Virginia Beach Transit Extension Study.
- Ensure coordination of signals in the corridor, especially between the closely spaced signals from Bonney Rd to Virginia Beach Blvd.
- Improve the interchange of I-264 and Independence Boulevard to add capacity, improve safety, and reduce weaving movements. Possible improvements would include Single Point Urban Interchange and Diverging Diamond Interchange designs.
- Improve alternate routes, such as an overpass of I-264 in the Constitution Dr/Edwin Dr corridor.

**Arterial Corridor #7 - Battlefield Blvd from Cedar Rd to I-64**

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor.
- Add an exclusive right-turn lane on the SB Battlefield Blvd approach at the Cedar Rd intersection.
- Add an additional exit lane for the Great Bridge Shopping Center at Cedar Rd/Battlefield Blvd signalized intersection and redesignate lanes to dual left-turns, one through, and one right-turn (and retime signal).
- Ensure coordination of signals in the corridor.
- Implement rush hour restrictions for Great Bridge Bridge lifts, similar to those in place on other bridges.
- Remove two-way left-turn lane and construct a raised-curb median with openings and channelized left-turn bays at strategic locations along the entire length of Battlefield Blvd south of Great Bridge Blvd/Kempsville Rd. (Note: This will likely increase congestion but also improve safety.)
- Consider redesigning the Great Bridge Blvd/Kempsville Rd and Battlefield Blvd intersection to increase capacity by adding additional left-turn and through lanes on the EB Great Bridge Blvd approach at the Battlefield Blvd intersection, and adding a 3rd through lane on NB Battlefield Blvd from south of Great Bridge Blvd/Kempsville Rd intersection to Old Oak Grove Rd/Great Bridge Bypass off-ramp.
- Consider increasing capacity of the intersection of Volvo Pkwy and Battlefield Blvd. This could include triple left-turn lanes from both approaches of Volvo Pkwy to Battlefield Blvd.
- Extend right-turn lane along NB Battlefield Blvd from Coastal Way to the right-turn lane at Wal Mart Way.
- Perform signal warrant analysis at the Albemarle Dr intersection.

**Arterial Corridor #8 - Military Hwy from Bainbridge Blvd to I-464**

- This corridor was not analyzed, since congestion in this corridor was due to a bridge replacement project.

### Table ES-4 - CMP Congested Corridor Congestion Mitigation Strategies - Arterials (continued)

| Arterial Corridor #9 - Monticello Ave from News Rd to Route 199 |
|---|
| • Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor. Active transportation strategies and safety in the corridor will be addressed in an upcoming VDOT study.<br>• Improve the movement between Monticello Ave and Ironbound Rd via News Rd by constructing new turn lanes as included in the programmed project (UPC #82961).<br>• Evaluate and consider constructing an additional exit lane for Monticello Marketplace at Monticello Ave signalized intersection and redesignate exit lanes to dual left-turns and one through/right-turn lane.<br>• Ensure coordination of signals in the corridor. This can be done through a Special Use Permit completed with the developer of the Courthouse Commons Shopping Center. This would also be assisted with the future installation of the Insync system, which VDOT anticiapates happening within the next 6 months to a year.<br>• Continue existing access management strategies in this corridor for future developments.<br>• Consider improving connections between developments so traffic does not have to use Monticello Ave. |
| **Arterial Corridor #10 - Centerville Tpke from Mt Pleasant Rd to Indian River Rd** |
| • Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor. Add HRT Bus service route along corridor if demand is warranted.<br>• Add capacity to the intersection of Centerville Tpke and Mt Pleasant Rd:<br>o Add a second NB lane along Centerville Tpke for approximately 1,800 feet to the north of Mt Pleasant Rd.<br>o Add an additional left-turn lane on the EB Mt Pleasant Rd approach at the Centerville Turnpike intersection.<br>o Add an additional through lane for the NB Centerville Turnpike approach at the Mt Pleasant Rd intersection.<br>• Add capacity to the intersection of Centerville Tpke and Elbow Rd by constructing left-turn lanes for EB and WB approaches for Elbow Rd or consider adding a roundabout.<br>• Perform a signal warrant analysis at the Butts Station Rd intersection and consider constructing a roundabout.<br>• Implement the programmed widening project (UPC #103005) from 2 to 6 lanes from Indian River Rd to Kempsville Rd and the planned widening project from 2 to 4 lanes from Kempsville Rd to the Chesapeake city line.<br>• Consider widening Centerville Tpke from 2 to 4 lanes in Chesapeake. |
| **Arterial Corridor #11 - Route 199 from John Tyler Hwy (Route 5) to Jamestown Rd** |
| • Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor.<br>• Evaluate and consider adding dual left turn lanes for the EB and WB Route 199 approaches at the Jamestown Rd intersection. This would require adding a 2nd receiving lane for SB Jamestown Rd south of the Route 199 intersection, either through new construction or changing the existing NB lane uses and restriping the pavement.<br>• Consider extending the turn bays on EB Route 199 beyond the typical peak period length of the queue.<br>• Evaluate and consider adding 2nd through lane for SB Jamestown Rd approach at the Route 199 intersection. This would also require adding a 2nd receiving lane for SB Jamestown Rd south of the Route 199 intersection. |
| **Arterial Corridor #12 - George Washington Hwy from Moses Grandy Tr to I-64** |
| • Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor. Add HRT bus service route along corridor if demand warrants.<br>• Perform a signal warrant analysis at the George Washington Hwy/Moses Grandy Tr/Hinton Ave intersection.<br>• Ensure coordination of signals in the corridor.<br>• Replace the 2-lane Deep Creek Bridge with 4-lane bridge.<br>• Reroute/realign George Washington Hwy along Sawyers Arch to Hugo A Owens Middle School entrance roadway with Moses Grandy Trail, including a new traffic signal. This project has been included in previous Long-Range Transportation Plans. |

Federal regulations require that CMPs be implemented as a continuous part of the metropolitan planning process, which also includes the Long-Range Transportation Plan (LRTP), the Transportation Improvement Program (TIP), and the Unified Planning Work Program (UPWP). The CMP is the first step in addressing regional congestion as it monitors the regional roadway network, identifies congestion, and develops strategies to address congestion. The CMP also includes a ranking of roadways based on current congestion and other performance measures to determine where future congestion relief projects are most needed. The HRTPO encourages local planners, engineers, and decision makers to strongly consider the CMP results when developing future projects for congested areas. Once projects are developed, data from the CMP will be input into the LRTP Project Prioritization Tool in order to assist in the ranking of projects. Finally, the highest priority projects are programmed via the TIP and the process begins again (**Figure ES-3**).

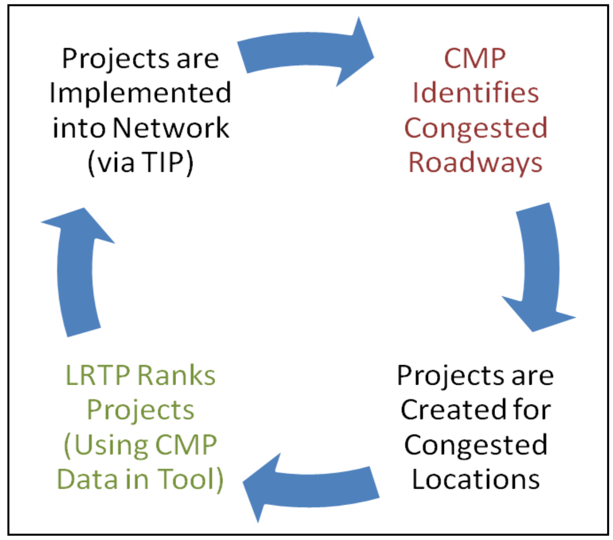



**Figure ES-3 - Steps for Integrating CMP into the Planning Process**

HRTPO staff will continue to monitor and refine the regional CMP. Roadway data, such as traffic volumes, travel times and speeds, roadway and signal characteristics, safety data, capacity changes, and other transportation improvements will be updated continuously in order to assist with future CMP report releases and other HRTPO planning efforts. Furthermore, the HRTPO will work to gain input from the general public and regional stakeholders going forward to achieve CMP goals and to enhance the overall process for Hampton Roads.

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# INTRODUCTION

As the federally designated Metropolitan Planning Organization (MPO) for the Hampton Roads region, the Hampton Roads Transportation Planning Organization (HRTPO) is required by federal law to maintain a Congestion Management Process (CMP). The Hampton Roads CMP is an on-going systematic process for managing congestion that provides information and analysis on multimodal transportation system performance and on strategies to alleviate congestion and enhance the mobility of persons and goods regionwide. During this process, HRTPO works with state and local agencies to develop these strategies and mobility options.

Federal regulations require that a CMP be in place in all Transportation Management Areas (TMAs), which are urban areas over 200,000 in population. The CMP builds upon more than two decades of experience in planning for congestion management, including the Congestion Management System (CMS), which was first introduced in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). In 2005, emphasis was placed on transportation management and operations in the reauthorization of the nation's surface transportation program – Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU). In 2012, Congress passed and President Obama signed the Moving Ahead for Progress in the 21st Century Act (MAP-21), which authorizes over $105 billion in funding for surface transportation programs for Federal Fiscal Years 2013 and 2014.

MAP-21 created a streamlined, performance-based, and multimodal program to address the many challenges facing the U.S. transportation system. It also established seven national performance goals for Federal highway programs:

1. Safety
2. Infrastructure Condition
3. **Congestion Reduction**
4. System Reliability
5. Freight Movement and Economic Vitality
6. Environmental Sustainability
7. Reduced Project Delivery Delays

**HAMPTON ROADS**
**CONGESTION MANAGEMENT PROCESS (CMP)**

The Hampton Roads CMP is an on-going systematic process for managing congestion that provides information and analysis on multimodal transportation system performance and on strategies to alleviate congestion and enhance the mobility of persons and goods regionwide.

The Hampton Roads Transportation Planning Organization began developing a Congestion Management System for the region in the early 1990s, and released the region's first CMS report in 1995. Updates to the CMS were released in 1997, 2001, 2005, and 2010. The 2010 update was the first regional report to be referenced as a "Congestion Management Process." This new requirement from SAFETEA-LU was intended to encourage regions to incorporate congestion management into the metropolitan planning process, rather than have it as a stand-alone program or system. In the past, the Hampton Roads Congestion Management System had been viewed as an on-going process rather than a stand-alone program, so this concept was not new to the region. Hampton Roads jurisdictions have always been encouraged to utilize the CMS/CMP as a tool for developing transportation projects for the Hampton Roads Long-Range Transportation Plan (LRTP).

One of the primary performance measures of the CMP has been a comprehensive regional roadway congestion analysis of the existing conditions, which identifies the most congested locations in the region. The last CMP update, released in 2010, included a level of service (LOS) congestion analysis for the 2009 roadway network. The current congestion analysis is limited to identifying congestion on roadways due to data constraints of other transportation modes and facilities. This report provides a thorough assessment of the roadway system in Hampton Roads and updates the regional LOS congestion analysis for the 2013 Existing morning and afternoon peak travel periods. In addition, this report ranks the most congested corridors based on congestion and a variety of other criteria, including freight, safety, and military or national significance. Finally, congestion mitigation strategies are identified and recommended for these locations.

## CMP ACTIONS AND GOALS

According to the Federal Highway Administration (FHWA)[3], the CMP should assist MPOs with performing the following actions for the regional transportation system:

- Develop regional objectives for congestion management
- Define CMP network
- Develop multimodal performance measures
- Collect data/monitor system performance
- Analyze congestion problems and needs
- Identify and assess strategies
- Program and implement strategies
- Evaluate strategy effectiveness

The overall goal of the Hampton Roads CMP is to take a regional approach to identify and address congestion concerns. The CMP also develops a "toolbox" of strategies to address the most congested locations. Since the region cannot simply build itself out of congestion, all strategies must be considered, with adding capacity as the last resort. For some severely congested corridors, additional roadway capacity may be the only solution for congestion based on the roadway characteristics.

## INTEGRATING CMP INTO THE PLANNING PROCESS

Federal regulations require that CMPs be implemented as a continuous part of the metropolitan planning process, which also includes the Long-Range Transportation Plan (LRTP), the Transportation Improvement Program (TIP), and the Unified Planning Work Program (UPWP). The CMP is the first step in addressing regional congestion as it monitors the regional roadway network, identifies congestion, and develops strategies to address congestion (**Figure 1**). The CMP also includes a ranking of roadways based on current congestion and other performance measures to determine where future congestion relief projects are most needed. The HRTPO encourages local planners, engineers, and decision makers to strongly consider the CMP results when developing future projects for congested areas. Once projects are developed, data from the CMP will be input into the LRTP Project Prioritization Tool (described later in this report) in order to assist in the ranking of projects. Finally, the highest priority projects are programmed via the TIP and the process begins again.

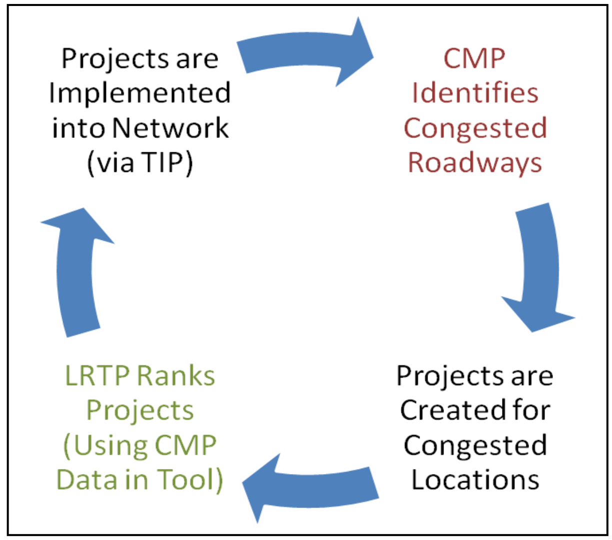


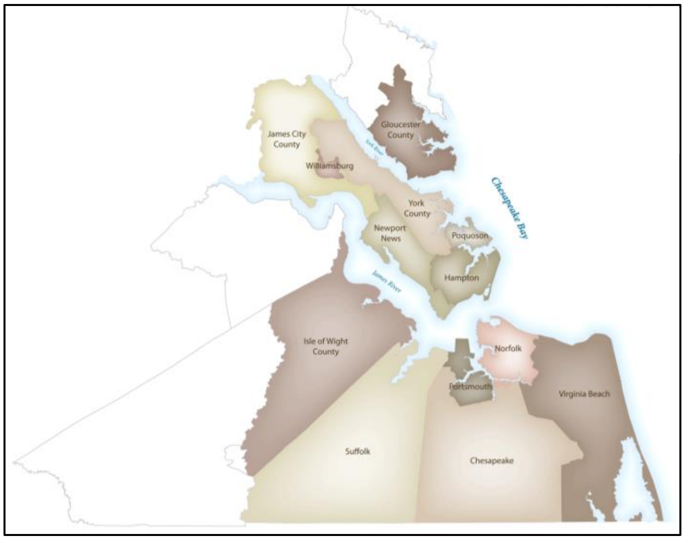

**Figure 1 – Steps for Integrating the CMP into the Metropolitan Planning Process**

## CMP STUDY AREA

The Hampton Roads Transportation Planning Organization serves as the intergovernmental transportation planning body or Metropolitan Planning Organization (MPO) for the Hampton Roads Metropolitan Planning Area (MPA). The Hampton Roads MPA, which is located in Southeastern Virginia, adjacent to the Atlantic Ocean and the Chesapeake Bay (**Map 1** on page 3), is divided by the James River and the Hampton Roads harbor into two subregions: the Peninsula and the Southside. The Peninsula is the northern subregion, comprised of the cities of Hampton, Newport News, Poquoson, and Williamsburg, and the counties of James City and York, as well as a portion of Gloucester County. The Southside includes the cities of Chesapeake, Norfolk,

[3] Congestion Management Process: A Guidebook, FHWA, U.S. Department of Transportation, April 2011, p. 8.

Portsmouth, Suffolk, and Virginia Beach, as well as Isle of Wight County and the towns of Windsor and Smithfield.




**Map 1 – Hampton Roads Metropolitan Planning Area**

HRTPO also assists with transportation planning efforts for rural areas within the Hampton Roads Planning District Commission (HRPDC) boundary, which includes the City of Franklin and Southampton and Surry Counties.

Hampton Roads is named after the body of water that splits the region, one of the world's largest natural harbors. The region also contains miles of coastal beaches and easy access to the Chesapeake Bay and other waterways, making Hampton Roads a prime East Coast tourist destination.

Furthermore, the location and physical features make it an attractive location for foreign trade and many military facilities. The region's military presence is anchored by Naval Station Norfolk, the largest in the world, which totals more than 96,000 military and civilian employees. The Hampton Roads region is comprised of four state-operated port facilities, several private port facilities, eighty-three federal facilities (including over twenty-five military facilities), two international airports, three Amtrak stations, multiple rail lines, and shipyards.

Providing links to these facilities are a system of highways, bridges and tunnels, bike and pedestrian facilities, and multiple transit modes and authorities. The same factors that provide the region with so many economic and recreational advantages also create a set of geographical challenges for creating and maintaining the transportation infrastructure. Hampton Roads' location and topography requires many bridges and tunnels, which involve higher costs for construction and maintenance. The combination of these factors creates a need for a safe, efficient, and well maintained regional transportation system.

## REPORT CONTENTS

This report is organized into nine sections as shown in the box below:

1) **INTRODUCTION**
2) **SYSTEM MONITORING** – Contains information on HRTPO's performance management efforts including the State of Transportation and regional performance measures, and also include information on regional roadway travel and trends, traffic volumes and characteristics at regional bridges and tunnels, and recently completed and planned roadway projects
3) **IDENTIFICATION OF CONGESTED LOCATIONS** – Includes a description of the CMP roadway network, data used in the study, and the congestion analysis
4) **RANKING OF CMP CONGESTED CORRIDORS** – CMP ranking criteria includes existing congestion levels and associated data, existing and future freight levels, safety, and roadways classified as part of the National Highway System or important to the military
5) **CONGESTION MITIGATION STRATEGIES** – Describes tools and methods to relieve congested areas
6) **APPLICATION OF STRATEGIES TO CMP CONGESTED CORRIDORS** – Identifies causes of congestion and recommends improvements to the highest ranked congested freeways and arterials
7) **NEXT STEPS**
8) **PUBLIC INVOLVEMENT** – Describes HRTPO's public involvement efforts for this study
9) **APPENDICES**

# SYSTEM MONITORING

As part of its "Performance Management" planning efforts, HRTPO staff monitors statistics regarding the Hampton Roads transportation network. HRTPO staff does this by collecting transportation data from a variety of sources on an ongoing basis and maintaining various databases related to all facets of the regional transportation system.

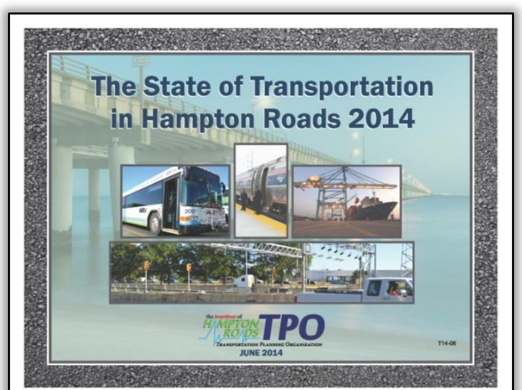
Much of the transportation data obtained by HRTPO staff is included in the CMP Database. This database serves as a "one-stop shop" for facilities included within the CMP Roadway Network (which is described further on page 24). The CMP Database includes existing and historical daily volumes, peak hour characteristics and levels of service, INRIX travel time and speed data, roadway characteristics, daily and hourly truck volumes, and crash data.

In addition, HRTPO staff also collects and monitors data related to many other transportation modes – including air, rail, and marine – on a regular basis.

More information on HRTPO's Performance Management effort is available at http://hrtpo.org/page/performance-management.

## STATE OF TRANSPORTATION

HRTPO annually produces the State of Transportation in Hampton Roads report. The State of Transportation report details the current status of all facets of the transportation system in Hampton Roads as shown in the box to the right. Historical trends and new developments are highlighted, and




### INFORMATION INCLUDED IN THE STATE OF TRANSPORTATION IN HAMPTON ROADS

**AIR TRAVEL –**

Passenger levels at regional airports

Airfares

Capacity in seat-miles

Nonstop destinations

**RAIL TRAVEL –**

The Tide light rail passenger levels

Amtrak passenger levels at stations in Norfolk, Newport News and Williamsburg

Rail safety

**PORT DATA –**

Cargo levels at the Port of Virginia

Cargo mode split

**ROADWAY TRAVEL –**

Vehicle-miles of travel

Licensed drivers/registered vehicles

Regional roadway capacity (lane-miles)

Congestion levels and costs

Travel time to work

Commuting methods

Safety

Seat belt usage

Bridges

Pavement condition

Truck volumes

Public transportation usage

Active transportation (bicycle/pedestrian)

Transportation operations

Air quality

**TRANSPORTATION FINANCING –**

Transportation revenues and allocations

Fuel prices and taxes

Roadway projects

comparisons are made between Hampton Roads and similar large metropolitan areas.

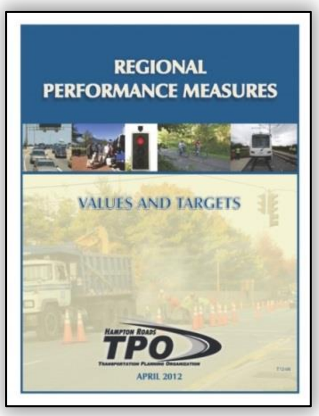
The most recent version of the State of Transportation in Hampton Roads report was released in June 2014 and is available at http://hrtpo.org/page/state-of-transportation.

## REGIONAL PERFORMANCE MEASURES

Although the HRTPO has been measuring the performance of the regional transportation system via the State of Transportation reports, the HRTPO also prepares a standard set of regional performance measures according to a process led by the state, and will prepare a set of regional performance measures and targets based on federal legislation in the future.

In 2009, the General Assembly of Virginia passed legislation codifying regional transportation performance measurement. In response to the legislation, the HRTPO staff, in cooperation with other Virginia metropolitan areas and Virginia's Office of Intermodal Planning and Investment (OIPI), developed a list of regional performance measures (RPM), as shown to the right. The list was approved by the HRPTO Board in January 2011 and the Commonwealth Transportation Board in June 2011.

In April 2012, the HRTPO Board approved a set of targets for its Regional Performance Measures. Lacking a basis for setting numerical targets, the HRTPO, with the recommendation of the Transportation Technical Advisory Committee's RPM Task Force, decided to set trend targets – increasing a particular value, decreasing a particular value, or maintaining that particular value.




The current federal surface transportation authorization program, MAP-21, also requires that states and metropolitan areas use performance measures and set targets. These measures and targets will be required in the following areas shown in the box to the bottom right of this page.

HRTPO staff annually updates these RPMs, with the most recent version being released in September 2014. More information on HRTPO's Regional Performance Measures effort is available at http://hrtpo.org/page/performance-management.

### HRTPO REGIONAL PERFORMANCE MEASURES (RPMS)

- Congestion reduction
- Safety
- Transit usage
- HOV usage
- Jobs-to-housing balance
- Access to transit
- Access to pedestrian facilities
- Air quality
- Movement of freight
- Vehicle-miles of travel (VMT)
- Maintenance
- Financial system

### MAP-21 PERFORMANCE MEASURES AREAS

- Pavement condition on the Interstate system and the remainder of the National Highway System (NHS)
- Performance of the Interstate System and the remainder of the NHS
- Bridge condition on the NHS
- Transit usage
- Fatalities and serious injuries – both number and rate per vehicle-miles of travel – on all public roads
- Traffic congestion
- On-road mobile source emissions
- Freight movement on the Interstate System

## REGIONAL ROADWAY TRAVEL AND TRENDS

There has been little change in the amount of roadway travel in Hampton Roads in recent years, a trend that is similar to the trend experienced throughout the country. This section examines these trends in regional roadway travel levels, regional roadway travel by time of day, and truck travel.

### Regional Roadway Travel

The amount of roadway travel is measured in terms of vehicle-miles of travel (VMT), which is the total number of miles every vehicle in the region travels over a period of time. VDOT annually estimates roadway travel levels based on traffic counts collected on a recurring basis.

There were 40 million vehicle-miles of travel on the typical day in Hampton Roads in 2012 according to VDOT (**Figure 2**). The amount of roadway travel in Hampton Roads has actually decreased over the last decade, with a 0.7% decline occurring between 2003 and 2012. This varies from historical trends, as prior to 2003 regional traffic volumes typically grew at about a 2% rate annually.

This leveling off in roadway travel is not unique to Hampton Roads. Since 2005, roadway travel in Hampton Roads decreased 1.5%, roadway travel throughout Virginia only increased 0.5%, and roadway travel throughout the United States decreased 1.0%.

While regional roadway travel decreased 0.7% between 2003 and 2012, the region's population increased 6.1%. This combination resulted in a significant decrease in vehicular travel per capita in Hampton Roads. The vehicular travel per capita in Hampton Roads was 23.4 vehicle-miles per person per day in 2012, down 6.3% from the peak of 25.0 daily VMT per capita in the region in 2003.

The amount of roadway travel per capita in Hampton Roads is fairly typical to similar metropolitan areas as shown in **Figure 3**. Among 36 large metropolitan areas in the United States with populations between one and three million people, Hampton Roads ranked 18th highest in terms of vehicular travel per capita in 2011 (the most recent data available).

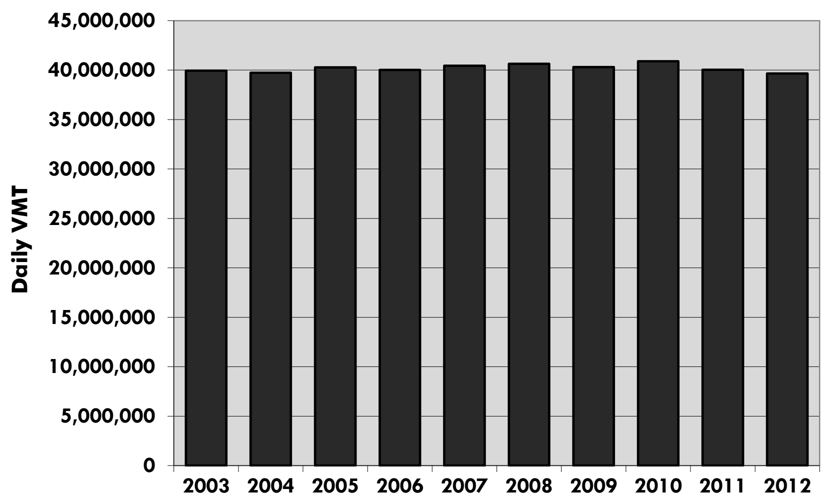



**Figure 2 – Daily Vehicle-Miles of Travel in Hampton Roads, 2003-2012**

Source: HRTPO analysis of VDOT data.

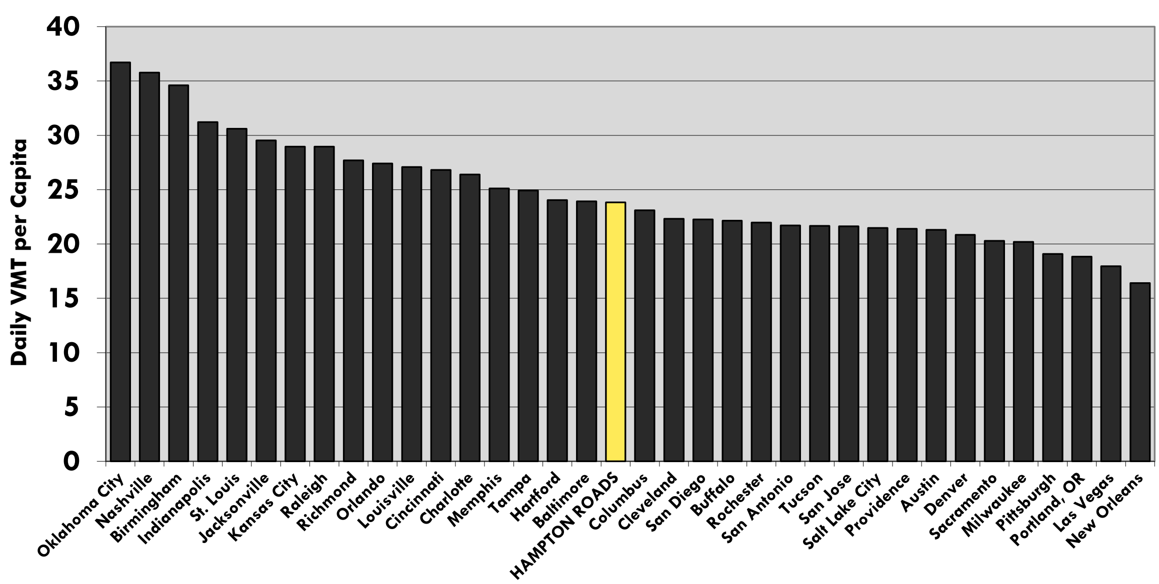



**Figure 3 – Daily Vehicle-Miles of Travel per Capita in Large Metropolitan Areas, 2011**

Source: FHWA. Includes all metropolitan areas with a population between one and three million people.

## Travel by Time of Day

The distribution of roadway travel in Hampton Roads includes pronounced peak travel periods in both the morning and afternoon (**Figure 4**). These periods largely occur between 6:30 am and 9:00 am in the morning with a peak at 7:30 am, and 3:00 pm and 6:00 pm in the afternoon with a peak at 5:15 pm.

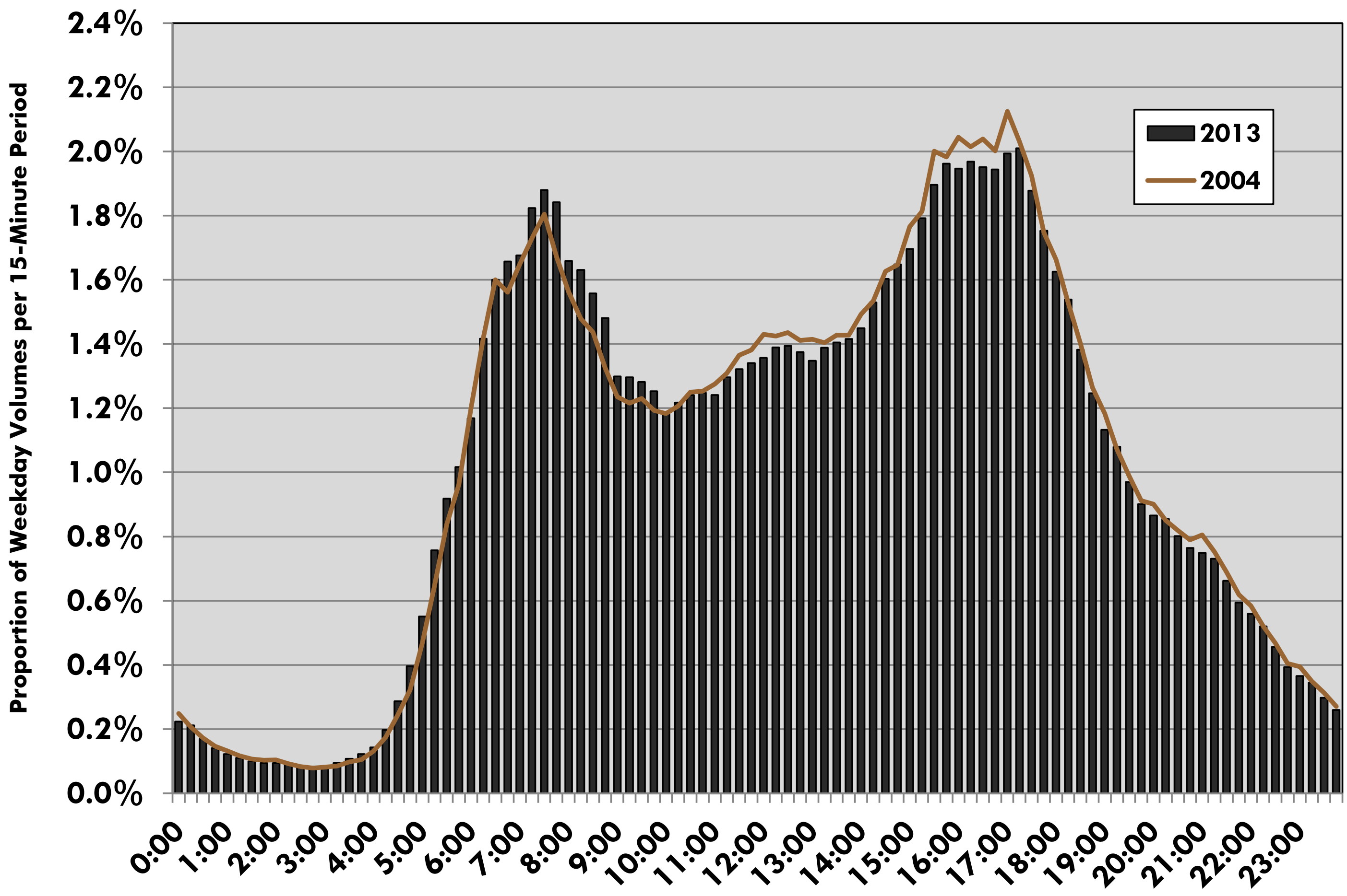
In the Identification of Congested Locations section of this report, the morning (AM) peak travel period is defined to occur between 5:00 - 9:00 am and the afternoon (PM) peak travel period is defined to occur between 3:00 - 7:00 pm. These larger time periods ensure that each individual roadway segment's peak travel times are reflected in the congestion analysis.

In 2013, the breakdown of traffic volumes in Hampton Roads by time of day is as follows:

- 22.6% during the AM Peak Period (5 - 9 am)
- 32.5% during the Midday Period (9 am - 3 pm)
- 28.6% during the PM Peak Period (3 - 7 pm)
- 16.3% during the Overnight Period (7 pm - 5 am)

By comparison, in 2004 the proportion of volumes in Hampton Roads during the AM Peak Period was lower (21.4%) and the proportion of volumes during the PM Peak Period was higher (29.4%) than in 2013.

**Figure 4 – Weekday Traffic Volumes by Time of Day, 2004 and 2013**




Source: HRTPO analysis of VDOT data. Figure only includes data collected by VDOT at continuous count stations in Hampton Roads.

## Truck Travel

Freight movement is a critical component of the Hampton Roads economy, and trucks are the primary mode for moving freight to and from the Port of Virginia. They also supply goods used by each resident and business in the region.

In 2013, 16,900 trucks entered or exited Hampton Roads through major gateways each weekday (**Figure 5**). The number of trucks passing through Hampton Roads gateways increased in 2013 for the first time since the economic downturn started, but the number of trucks is still much lower than the levels seen before the economic downturn started. About 19,100 trucks passed through major regional gateways each weekday in 2005, and this number increased to a high of over 20,000 trucks in 2007.

The primary gateway for trucks entering or exiting Hampton Roads is I-64. An average of 6,100 trucks used I-64 to enter or exit the region each weekday in 2013, which accounted for 36% of the trucks passing through the region's major gateways. This is down, however, from 6,227 trucks in 2012. The next most used gateways are Route 58 and Route 460. An average of 3,606 trucks used the Route 58 gateway each weekday in 2013, and 2,020 trucks used the Route 460 gateway, up from 3,209 and 1,927 trucks respectively in 2012. Combined, I-64, Route 58, and Route 460 accounted for 69% of all trucks passing through Hampton Roads major gateways in 2013.

There was a total of 1.13 million miles of truck travel each day in Hampton Roads in 2012 according to VDOT estimates (**Figure 6**), which accounted for 2.9% of the nearly 40 million vehicle-miles of travel experienced each day throughout the region. Regional truck travel was 15% lower in 2012 than the level seen in 2005, and 21% below the high seen in 2007. This occurred in spite of the amount of freight handled by the Port of Virginia being similar in 2007 and 2012, port truck travel being a small portion of total truck travel.

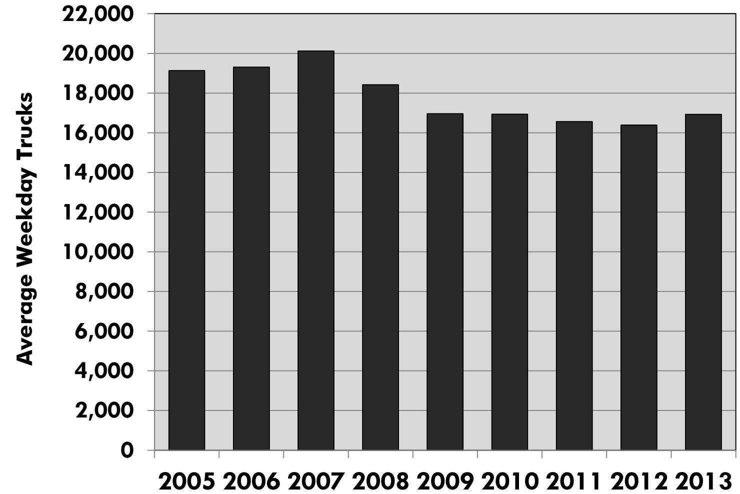



**Figure 5 – Number of Trucks Passing through Hampton Roads Gateways Each Weekday, 2005-2013**
Source: HRTPO analysis of VDOT and CBBT data.

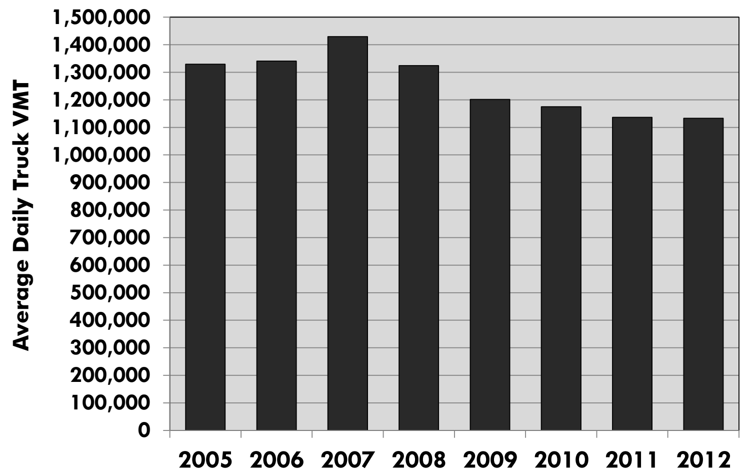



**Figure 6 – Daily Truck Travel in Hampton Roads, 2005-2012**
Source: HRTPO analysis of VDOT data.

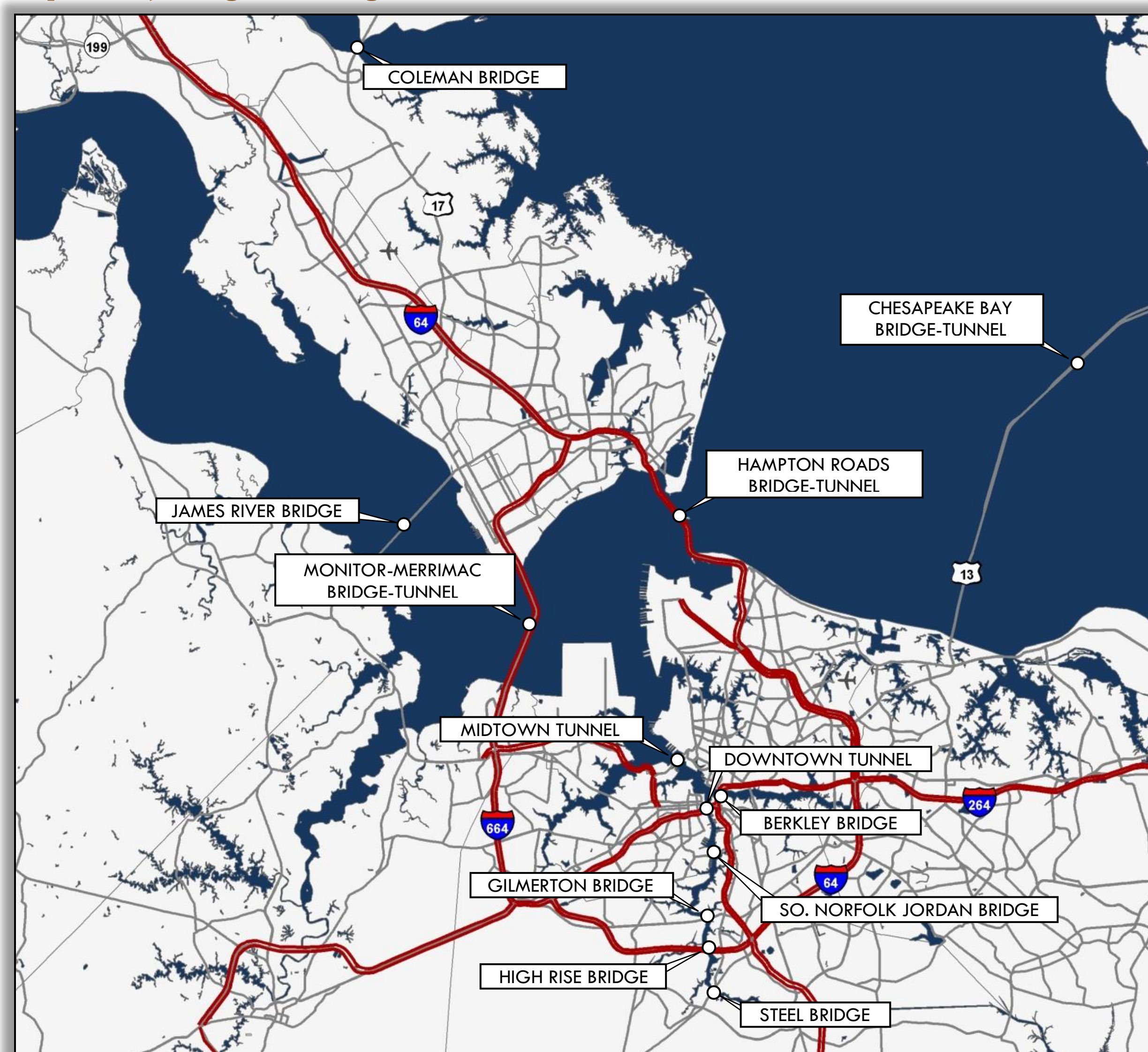
## BRIDGES AND TUNNELS

Hampton Roads unique topography makes bridges and tunnels not only a prominent part of the regional landscape but also one of the most critical parts of the Hampton Roads transportation network. In fact, Hampton Roads has more area on bridges than all other metropolitan areas in Virginia and the 8th most among 36 metropolitan areas throughout the country with populations between one and three million people.

Because of the importance of bridges and tunnels to the region's transportation system, HRTPO produced an update to the Regional Bridge Study in 2012. This study looked at various aspects of bridges in Hampton Roads, including regional summaries, bridge inspections and ratings, structurally deficient and functionally obsolete bridges, fracture and scour critical bridges, sufficiency ratings, and bridge funding. A comparison between Hampton Roads and other metropolitan areas is also included. The Hampton Roads Regional Bridge Study – 2012 Update is available at http://hrtpo.org/uploads/t12_14.pdf.

This section provides additional information on the major bridges and tunnels in Hampton Roads. It describes the bridges and tunnels that cross the Hampton Roads Harbor, the Chesapeake Bay, the Southern Branch of the Elizabeth River, and the York River. A total of twelve major regional bridges/tunnels are analyzed in this section as shown on **Map 2**.

**Map 2 – Major Regional Bridges and Tunnels**



## Hampton Roads Harbor Crossings


### Hampton Roads Bridge-Tunnel

The Hampton Roads Bridge-Tunnel (HRBT/I-64) is one of the most congested facilities in the region. Opened to traffic in 1957, the Hampton Roads Bridge-Tunnel replaced ferries that carried travelers between Norfolk and Hampton. The eastbound bridges and tunnel were added in 1976, which widened the facility from 2 to 4 lanes.


### Monitor-Merrimac Memorial Bridge-Tunnel

The Monitor-Merrimac Memorial Bridge-Tunnel (MMMBT/I-664) is the newest tunnel facility in Hampton Roads. Connecting Newport News and Suffolk, the 4-lane facility opened to traffic in 1992.


### James River Bridge

The James River Bridge (US Routes 17/258) is the westernmost Hampton Roads harbor crossing in the region, connecting Newport News with Isle of Wight County. The first James River Bridge was the original Hampton Roads harbor crossing, opening to traffic in 1928. In 1982 the aging 2-lane facility was replaced with the current 4-lane structure. Tolls were collected on the James River Bridge from its opening in 1928 until 1976.

## Chesapeake Bay Crossing


### Chesapeake Bay Bridge-Tunnel

The Chesapeake Bay Bridge-Tunnel (CBBT) connects Virginia Beach with the Eastern Shore of Virginia. The 18-mile facility was opened to traffic in 1964 and was designated as one of the Seven Engineering Wonders of the Modern World. In 1999, parallel spans were opened to traffic, widening the facility from 2 to 4 lanes outside of the two tunnels. Plans are in place to begin construction on a parallel tunnel at the Thimble Shoal Channel in 2016, with a parallel tunnel planned for the Chesapeake Channel in 2040.

## Elizabeth River Crossings

### Midtown Tunnel

The Midtown Tunnel (US Route 58) is a 2-lane facility that crosses underneath the Elizabeth River between the Cities of Norfolk and Portsmouth. Opened to traffic in 1962, the Midtown Tunnel carries more vehicles than any other two-lane facility in the state of Virginia. A parallel tube is currently being constructed to widen the facility to four lanes, and toll collection (currently $1.00 per trip during peak periods and $0.75 during off peak periods for EZ-Pass users) resumed in February 2014.

HRTPO

### Downtown Tunnel

The Downtown Tunnel (I-264) crosses underneath the Southern Branch of the Elizabeth River between the Cities of Norfolk and Portsmouth. The original facility opened to traffic in 1952 as the first tunnel facility in Hampton Roads. A second tunnel was added in 1987, which widened the facility from two to four lanes. The tunnel is currently being rehabilitated, and toll collection (currently $1.00 per trip during peak periods and $0.75 during off peak periods for EZ-Pass users) resumed in February 2014.

HRTPO

### Berkley Bridge

The Berkley Bridge (I-264) is an 8-lane drawbridge that crosses the Eastern Branch of the Elizabeth River between Downtown Norfolk and South Norfolk near the Downtown Tunnel. Opened in 1952 with the Downtown Tunnel and widened in 1991, the Berkley Bridge opens at approximately 9 am, 11 am, 1 pm, and 2:30 pm on weekdays for marine traffic and on demand outside of restricted hours.

HRTPO

### South Norfolk Jordan Bridge

The South Norfolk Jordan Bridge is a tolled 2-lane fixed crossing of the Southern Branch of the Elizabeth River between Chesapeake and Portsmouth. The privately-owned South Norfolk Jordan Bridge opened in 2012, replacing the original Jordan Bridge that was opened in 1928 and closed in 2008.

City of Chesapeake

### Gilmerton Bridge


VDOT

The Gilmerton Bridge (Military Highway/US Route 13) is a 4-lane facility that spans the Southern Branch of the Elizabeth River in the City of Chesapeake. The Gilmerton Bridge was rebuilt and opened to traffic in 2013, replacing the original drawbridge that was opened in 1938.

### High Rise Bridge


VDOT

The High Rise Bridge (I-64) is a four-lane span over the Southern Branch of the Elizabeth River in the City of Chesapeake that opened in 1972. Although the High Rise Bridge provides 65 feet of vertical clearance, the bridge can open for larger ships as necessary. It, along with the Berkley Bridge, is among only eight drawbridges on the Interstate system in the United States.

### Steel Bridge


City of Chesapeake

The Steel Bridge (Dominion Boulevard/US Route 17) is a two-lane drawbridge that spans the Southern Branch of the Elizabeth River in the City of Chesapeake. Constructed in 1962, the Steel Bridge carries the second-highest number of vehicles of any 2-lane facility in Hampton Roads. The bridge is currently being replaced by the city with a tolled four-lane fixed span that is expected to fully open to traffic in 2017.

## York River Crossing

### Coleman Bridge


HRTPO

The Coleman Bridge (Route 17) connects the Peninsula in York County with the Middle Peninsula in Gloucester County. The original 2-lane span, which was opened to traffic in 1952, was replaced with a 4-lane facility in 1996. Tolls were implemented for northbound traffic after it was widened, and are currently $2 for two-axle vehicles or $0.85 with an EZ-Pass transponder.

## Bridge/Tunnel Traffic Volumes

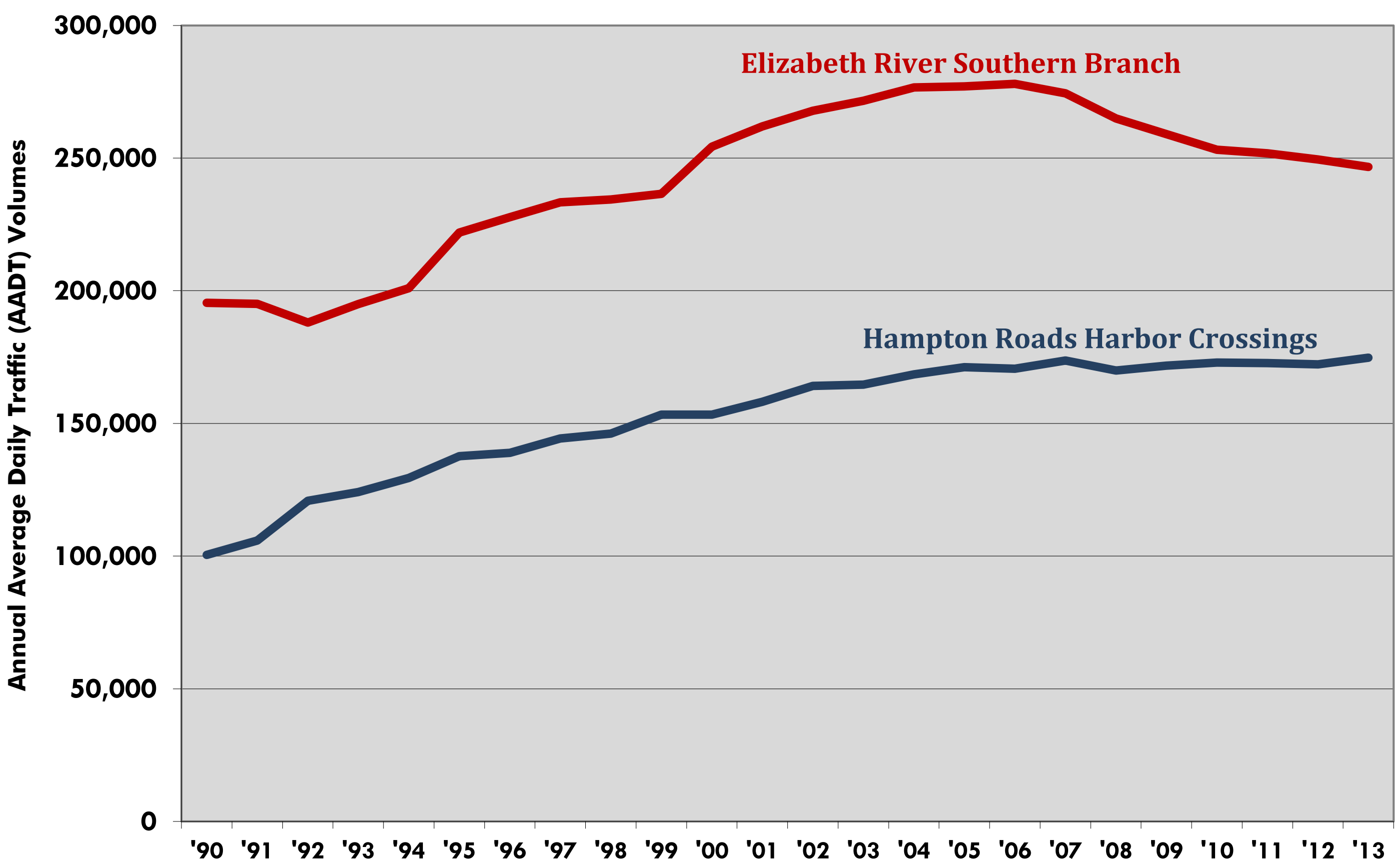
As mentioned previously in this report, growth in regional roadway travel levels has largely been flat since 2003. A similar trend has occurred at the region's major water crossings. **Figure 7** shows the Annual Average Daily Traffic (AADT) volumes at Hampton Roads Harbor and Elizabeth River Southern Branch crossings for the years 1990-2013.

Nearly 175,000 vehicles crossed the Hampton Roads Harbor each day in 2013 at one of the three crossings (the Hampton Roads Bridge-Tunnel, Monitor-Merrimac Memorial Bridge-Tunnel, and James River Bridge). The number of vehicles crossing the Hampton Roads Harbor has increased 74% since 1990, when 100,000 vehicles crossed the harbor each day. However, most of this growth occurred in the 1990s and early 2000s. Since 2005, volumes crossing the Hampton Roads Harbor have only increased 2%.

Most of the growth in Hampton Roads Harbor crossings is largely due to the Monitor-Merrimac Memorial Bridge-Tunnel, which has experienced the most growth of any of the major bridges and tunnels. Since its opening in 1992, daily traffic volumes at the Monitor-Merrimac have grown by 147%, or an average annual growth rate of 4.4%.

On the Southside of Hampton Roads, nearly 250,000 vehicles crossed the Southern Branch of the Elizabeth River each day in 2013 on one of the river crossings between the Midtown Tunnel and the Steel Bridge. The number of vehicles crossing the Southern Branch of the Elizabeth River increased 42% from 1990 to its peak in 2006. However, between 2006 and 2013 traffic volumes crossing the Southern Branch of the Elizabeth River decreased 11%.

**Figure 7 – Annual Average Daily Traffic Volumes Crossing the Hampton Roads Harbor and Elizabeth River Southern Branch, 1990 - 2013**




Data Sources: VDOT, SNJB. The Hampton Roads Harbor crossings are comprised of the Hampton Roads Bridge-Tunnel, Monitor-Merrimac Memorial Bridge-Tunnel, and the James River Bridge. The Elizabeth River Southern Branch crossings are comprised of the Midtown Tunnel, Downtown Tunnel, South Norfolk Jordan Bridge, Gilmerton Bridge, High Rise Bridge, and Steel Bridge.

Although beyond the time period of Figure 7, the number of crossings of the Elizabeth River has been impacted by the tolls that were imposed on the Midtown and Downtown Tunnels on February 1, 2014. For March through June of 2014, total volumes at the Downtown Tunnel were down 27% from the comparable 2013 volumes, and volumes at the Midtown Tunnel were down 10%. HRTPO staff has been monitoring the impacts of these tolls on the regional transportation network, and will release the *Analyzing and Mitigating the Impact of Tolls at the Midtown and Downtown Tunnels* report in late 2014. This report will examine the impacts that tolls have had on traffic volumes, speeds, congestion levels, transit ridership, and truck travel patterns.

In spite of the decrease in volumes at some of the region's water crossings, congestion and queues continue to be prevalent, particularly at the Hampton Roads Bridge-Tunnel. A wide range of information regarding the congestion at the bridges and tunnels is included in the Identification of Congested Locations section of this report.


**Toll Gantries at the Downtown Tunnel**

## ROADWAY IMPROVEMENTS

A number of important roadway projects have been completed throughout Hampton Roads in recent years, and with funding levels increasing, many projects are slated to begin construction throughout the region in the next few years. This section details those major roadway projects completed in recent years as well as projects planned and programmed in the future.

### Recently Completed Roadway Projects

A total of 24 major roadway projects were completed in Hampton Roads between the beginning of 2008 and July 2014 (**Table 1**). These projects include widening I-64 in Chesapeake, constructing a new interchange at I-264 and London Bridge Road, replacing the Gilmerton and South Norfolk Jordan Bridges, and widening many roadways including sections of Fort Eustis Boulevard, Jefferson Avenue, Lynnhaven Parkway, Princess Anne Road, Warwick Boulevard, and Witchduck Road. These 24 roadway projects added nearly 48 lane-miles[4] to the regional roadway network.

In addition to these 24 projects, many smaller projects have been completed throughout the region during this time. This includes projects such as intersection improvements (adding or extending turn bays and adding traffic signals), installing medians, improving signage, and implementing Intelligent Transportation System (ITS) technologies such as coordinating traffic signals and travel time signage.

**Table 1 – Major Roadway Projects Completed in Hampton Roads, 2008 – July 2014**

| JURIS-DICTION | FACILITY | LOCATION | IMPROVEMENT TYPE | PROJECT COMPLETION DATE |
|---|---|---|---|---|
| VB | BIRDNECK ROAD | GENERAL BOOTH BLVD TO NORFOLK AVE | WIDEN TO 4 LANES | 2010 |
| VB | BUCKNER BOULEVARD | ROSEMONT RD TO HOLLAND RD | NEW 2 LANE FACILITY | 2010 |
| HAM | COMMANDER SHEPARD BOULEVARD | BIG BETHEL RD TO NORTH CAMPUS PKWY | NEW 4 LANE FACILITY | 2014 |
| HAM | COMMANDER SHEPARD BOULEVARD | NORTH CAMPUS PKWY TO MAGRUDER BLVD | NEW 4 LANE FACILITY | 2010 |
| VB | CONSTITUTION DRIVE | BONNEY RD TO COLUMBUS ST | NEW 4 LANE FACILITY | 2010 |
| YC | FORT EUSTIS BOULEVARD | JEFFERSON AVE TO ROUTE 17 | WIDEN TO 4 LANES | 2012 |
| CHES | GEORGE WASHINGTON HIGHWAY | MILL CREEK PKWY TO WILLOWWOOD DR | WIDEN TO 4 LANES | 2012 |
| CHES | GREENBRIER PARKWAY | VOLVO PKWY TO EDEN WAY | WIDEN TO 6 LANES | 2009 |
| CHES | I-64 | GREENBRIER PKWY TO I-464 | WIDEN TO 8 LANES | 2009 |
| NOR | I-64 | NORVIEW AVE | RAMP IMPROVEMENT | 2013 |
| VB | I-264 | LONDON BRIDGE RD | NEW INTERCHANGE | 2012 |
| JCC/WMB | IRONBOUND ROAD | STRAWBERRY PLAINS RD TO DEPUE DR | WIDEN TO 4 LANES | 2013 |
| NN | JEFFERSON AVENUE | BUCHANAN DR TO GREEN GROVE LN | WIDEN TO 6 LANES | 2010 |
| VB | LYNNHAVEN PARKWAY | HOLLAND RD TO SOUTH LYNNHAVEN RD | WIDEN TO 6 LANES | 2010 |
| CHES | MILITARY HIGHWAY | GILMERTON BRIDGE | REPLACE BRIDGE | 2013 |
| VB | NIMMO PARKWAY | PRINCESS ANNE RD TO HOLLAND RD | NEW 4 LANE FACILITY | 2012 |
| VB | PRINCESS ANNE ROAD | DAM NECK RD TO NIMMO PKWY | WIDEN TO 4 LANES | 2014 |
| VB | PRINCESS ANNE ROAD | WITCHDUCK RD | INTERSECTION RELOCATION | 2012 |
| JCC | ROUTE 5 | DRESSER BRIDGE OVER CHICKAHOMINY RIVER | BRIDGE REPLACEMENT | 2009 |
| CHES/PORT | SOUTH NORFOLK JORDAN BRIDGE | BETWEEN PORTSMOUTH AND CHESAPEAKE | BRIDGE REPLACEMENT | 2012 |
| NOR | VIRGINIA BEACH BOULEVARD | JETT ST TO MILITARY HWY | WIDEN TO 6 LANES | 2010 |
| NN | WARWICK BOULEVARD | J CLYDE MORRIS BLVD TO NETTLES DR | WIDEN TO 6 LANES | 2010 |
| NOR/VB | WESLEYAN DRIVE | NORTHAMPTON BLVD TO BAKER RD | WIDEN TO 4 LANES | 2013 |
| VB | WITCHDUCK ROAD | PRINCESS ANNE RD TO I-264 | WIDEN TO 6 LANES | 2012 |

Data obtained from various sources.

[4] A lane-mile is defined as the length of a roadway segment multiplied by the number of lanes. A one-mile long, four-lane wide roadway segment would comprise four lane-miles.

## Future Roadway Projects

Planned and programmed roadway improvement projects for Hampton Roads are included in three documents: the Long-Range Transportation Plan (LRTP), the Six-Year Improvement Program (SYIP), and the Transportation Improvement Program (TIP). Each of these three documents is detailed in this section.


## Long-Range Transportation Plan

In accordance with federal regulations, the HRTPO produces a financially constrained regional Long-Range Transportation Plan (LRTP) every four years that addresses a planning horizon of 20+ years. The purpose of these plans – the current Hampton Roads LRTP[5] is for the 2034 time horizon – is to guide transportation investments to projects designed to meet the transportation goals of the HRTPO – economic vitality, safety, mobility, and environmental protection.

The HRTPO's LRTP serves as the blueprint for the region's transportation development and identifies all planned regionally significant transportation projects in the Hampton Roads metropolitan area. Federal regulations require LRTPs be fiscally constrained – meaning that all projects in the plan must have realistic assumptions about future revenues for funding and construction during the time horizon. The LRTP is a comprehensive document that covers several modes of transportation, including motorized vehicles, public transportation, bicycling, and walking.

The HRTPO Board, as the designated policy committee, has the primary responsibility for development of the Regional LRTP. Voting members of the HRTPO Board include locally elected officials, members of the Virginia Senate and House of Delegates, VDOT, transit agencies, the Virginia Department of Rail and Public Transportation, and the Virginia Port Authority. In addition, other state and federal transportation authorities are kept informed of the HRTPO's activities and are available as advisors.

Development of the plan also includes participation of the Transportation Technical Advisory Committee (TTAC) – which produces a recommended plan for the HRTPO Board's approval – and the public. TTAC members include transportation engineers and planners from each city and county, VDOT, local public transit officials, the military, the freight community, and others.

As new long-range plans are being developed, candidate long-range plan projects are submitted to the HRTPO by local jurisdictions, VDOT, and the public. HRTPO staff performs a rigorous multidisciplinary analysis for each candidate project based on the best available data and technical processes. A total of 150 candidate transportation projects were identified as needs for the 2034 plan, with estimated costs totaling over $30 billion.

Given the discrepancy between the region's transportation needs and the anticipated funding that was available (approximately $7.7 billion between 2012 and 2034), the 2034 candidate project list needed to be prioritized. The HRTPO assisted decision makers in selecting projects to be included in the LRTP by creating the Project Prioritization Tool. The Project Prioritization Tool scores candidate transportation projects by evaluating three components: Project Utility, Project Viability, and Economic Vitality. Data and inputs for the Project Prioritization Tool are collected from localities, the CMP, and other HRTPO studies and resources.

[5] *Hampton Roads 2034 Long-Range Transportation Plan*, HRTPO, January 2012.

Work is currently underway on the 2040 Hampton Roads Long-Range Transportation Plan, with an expected completion date of January 2016.

## Six-Year Improvement Program

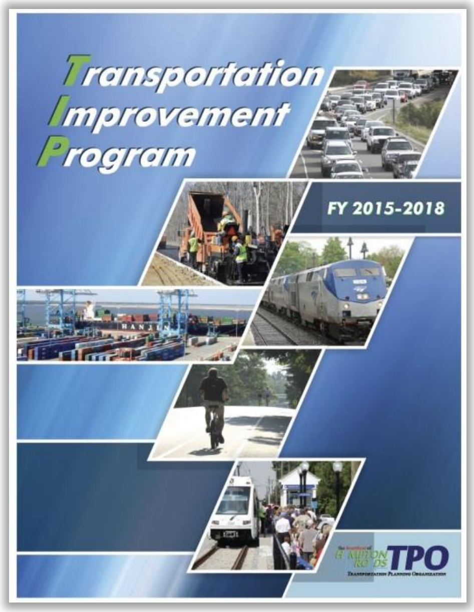
The Six-Year Improvement Program (SYIP) is a statewide document through which the Commonwealth Transportation Board (CTB) allocates funds for the construction, development or study of transportation projects. The projects included in the SYIP not only encompass major projects such as new roadway construction and widening existing facilities but also include smaller projects such as adding or extending turn bays at intersections, adding traffic signals, installing bike paths, and improving signage.

Per its name, the Six-Year Improvement Program includes information on funding for each project over the course of the upcoming six fiscal years. The SYIP also includes timelines for the expected initiation of preliminary engineering design, right-of-way acquisition, and construction phases of each project.

The SYIP is developed annually by VDOT and the CTB. The Commonwealth Transportation Board typically approves an updated SYIP each June, and the current SYIP[6] was approved by the CTB in June 2014.

## Transportation Improvement Program

The Hampton Roads Transportation Improvement Program (TIP) is a multi-year program for the implementation of surface transportation projects in Hampton Roads. The TIP is a federally-mandated document that contains all federally-funded and/or regionally significant projects that require Federal Highway Administration (FHWA) or Federal Transit Administration (FTA) approval. The TIP must be consistent with the current long-range transportation plan and identifies the near-term programming of Federal, state, and local transportation funds.




As the federally designated MPO, the HRTPO is required to coordinate the transportation planning activities for the Hampton Roads Metropolitan Planning Area. This includes the planning and programming of Federal funds through the TIP. Before any federally-funded and/or regionally significant surface transportation project can be built, it must be included in the current TIP that has been approved by the HRTPO.

The TIP is developed by the HRTPO in cooperation with the Virginia Department of Transportation (VDOT), the Virginia Department of Rail and Public Transportation (DRPT), Hampton Roads Transit (HRT), and the Williamsburg Area Transit Authority (WATA). The current TIP[7] (FY 2015-2018) was developed in adherence to all applicable Federal regulations associated with the current Moving Ahead for Progress in the 21st Century Act (MAP-21) Federal surface transportation legislation. The HRTPO-approved TIP is incorporated into the Statewide Transportation Improvement Program (STIP), which is submitted to the FHWA and FTA for approval.

The Hampton Roads TIP covers a four-year time period and is updated and amended on a recurring basis. Not only are roadway projects included in the TIP but transit, bicycle and pedestrian, and freight-

[6] *FY 2015-2020 Six-Year Improvement Program*, Commonwealth Transportation Board, June 2014.

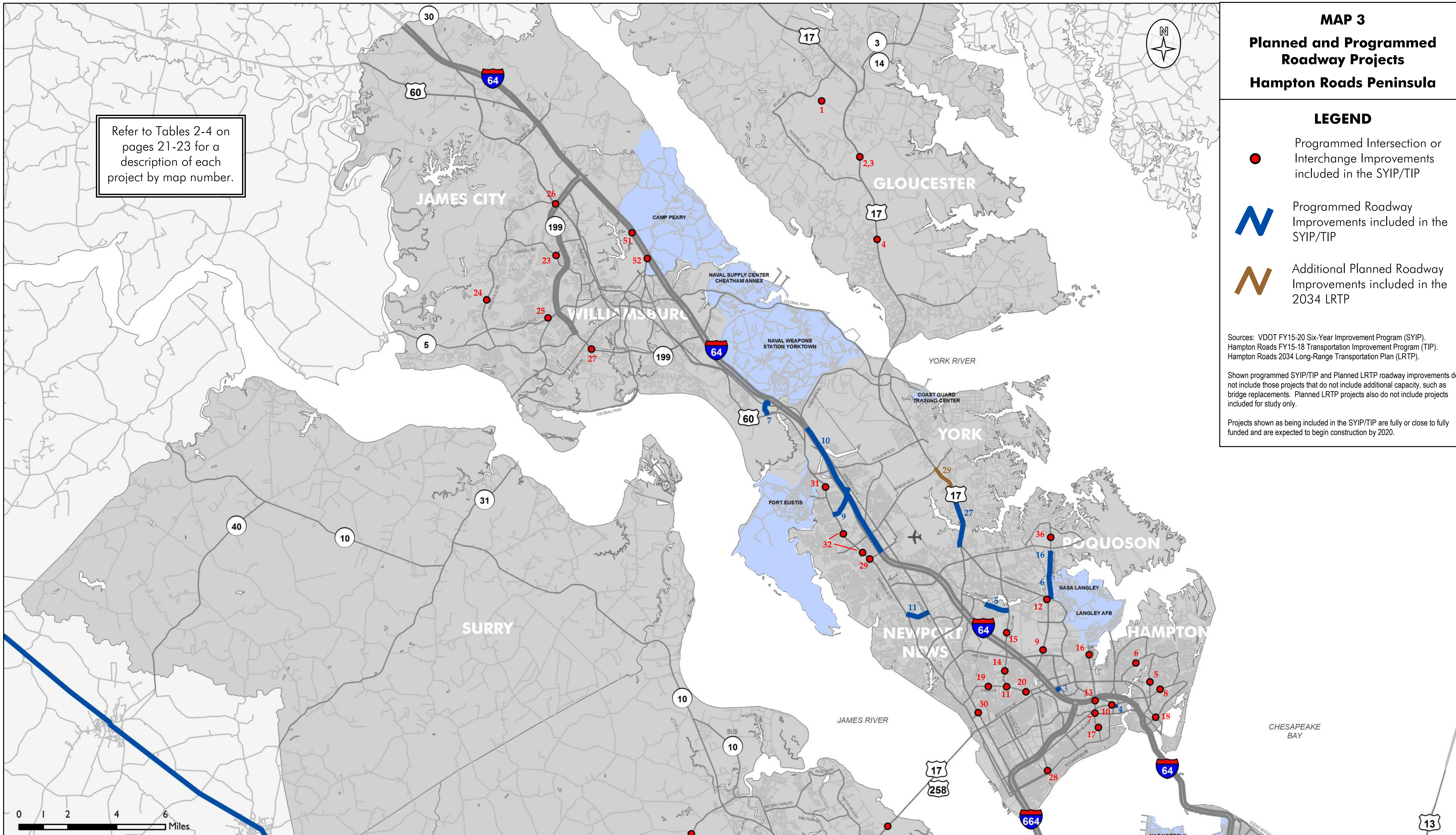
[7] *Hampton Roads Transportation Improvement Program FY 2015-2018*, HRTPO, July 2014.

related projects are included as well. Most of the projects included in the TIP are included in the SYIP and vice versa.

Like the LRTP, the TIP must be financially constrained – meaning that programmed funding levels cannot exceed the amount of funding reasonably expected to be available. Once the TIP is approved by the HRTPO Board, the approved TIP may be revised in order to add new projects, remove projects, and update information associated with projects. In order to add projects to the TIP, sufficient revenues must be available, other projects must be deferred, or new revenues must be identified. Consequently, the TIP is a list of projects with funding commitments during its timeframe.

**Middle Ground Boulevard Project**

**Maps 3 and 4** on pages 19-20 as well as **Tables 2 - 4** on pages 21-23 show the projects throughout Hampton Roads included in the FY 2015-2020 Six-Year Improvement Program, FY 2015-2018 Transportation Improvement Program, and the 2034 Hampton Roads Long-Range Transportation Plan.

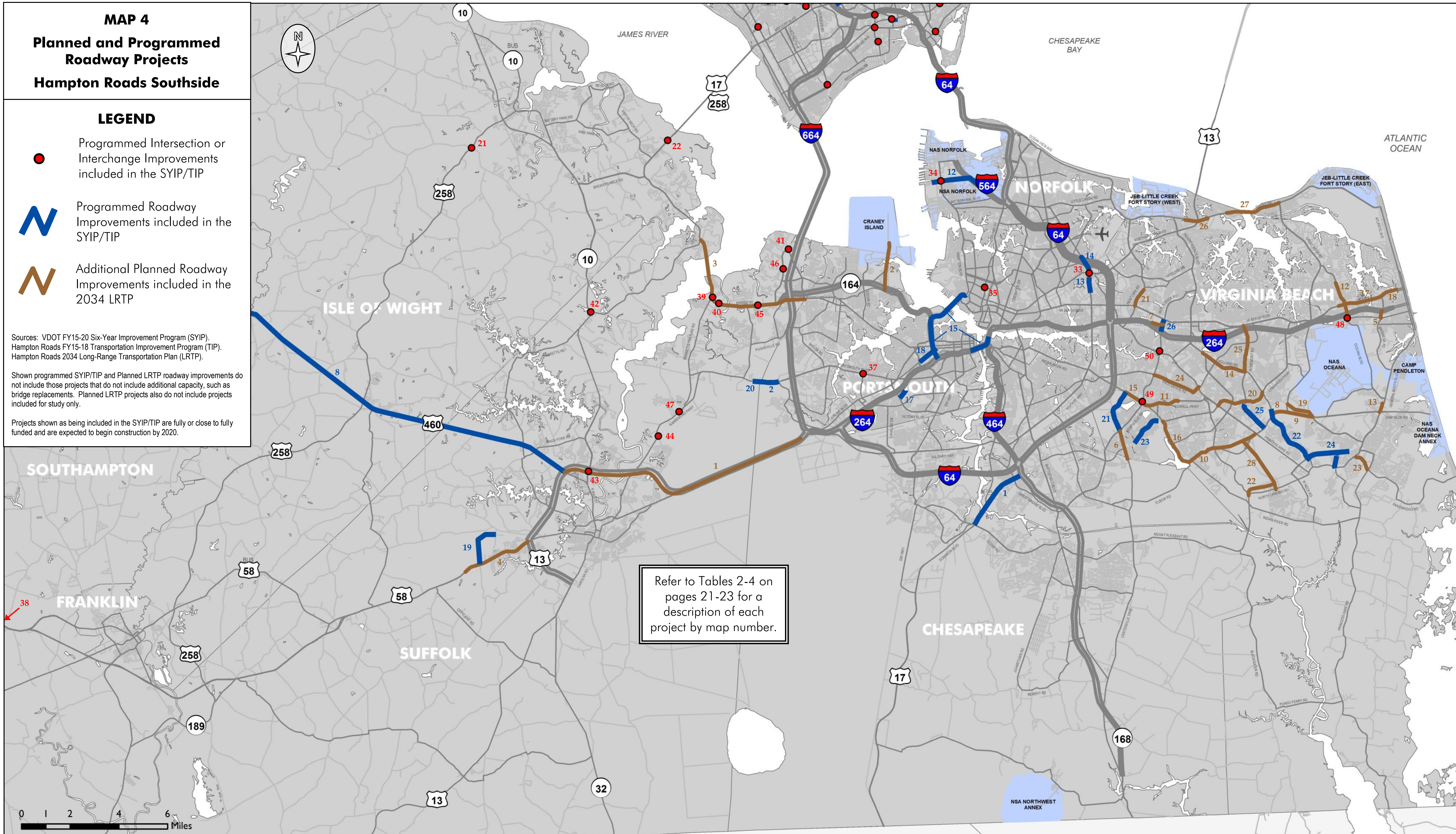

MAP 3
Planned and Programmed Roadway Projects
Hampton Roads Peninsula
LEGEND
Programmed Intersection or Interchange Improvements included in the SYIP/TIP
Programmed Roadway Improvements included in the SYIP/TIP
Additional Planned Roadway Improvements included in the 2034 LRTP
Sources: VDOT FY15-20 Six-Year Improvement Program (SYIP). Hampton Roads FY15-18 Transportation Improvement Program (TIP). Hampton Roads 2034 Long-Range Transportation Plan (LRTP).
Shown programmed SYIP/TIP and Planned LRTP roadway improvements do not include those projects that do not include additional capacity, such as bridge replacements. Planned LRTP projects also do not include projects included for study only.
Projects shown as being included in the SYIP/TIP are fully or close to fully funded and are expected to begin construction by 2020.
Refer to Tables 2-4 on pages 21-23 for a description of each project by map number.
JAMES CITY
GLOUCESTER
WILLIAMSBURG
YORK
POQUOSON
NEWPORT NEWS
HAMPTON
SURRY
CAMP PEARY
NAVAL SUPPLY CENTER CHEATHAM ANNEX
NAVAL WEAPONS STATION YORKTOWN
COAST GUARD TRAINING CENTER
FORT EUSTIS
NASA LANGLEY
LANGLEY AFB
NAS NORFOLK
YORK RIVER
JAMES RIVER
CHESAPEAKE BAY
0 1 2 4 6 Miles

v

**MAP 4**

**Planned and Programmed Roadway Projects**

**Hampton Roads Southside**



## Table 2 – Roadway Widening Projects Included in the Six-Year Improvement Program/Transportation Improvement Program

| MAP # | UPC | JURISDICTION | FACILITY | PROJECT TYPE | PROJECTED CONSTRUCTION BEGIN | PROJECTED COST ($000s) |
|---|---|---|---|---|---|---|
| 1 | 56187 | CHESAPEAKE | DOMINION BLVD - CEDAR RD TO CHESAPEAKE EXPRESSWAY | WIDEN TO 4 LANES | UNDERWAY | $411,572 |
| 2 | 18591 | CHESAPEAKE | PORTSMOUTH BLVD - SUFFOLK CL TO JOLIFF RD | WIDEN TO 4 LANES | 2016 | $21,580 |
| 3 | 105779 | HAMPTON | COMMERCE DR AND CONVENTION DR | ROADWAY EXTENSION & PED IMPROVEMENTS | 2016 | $1,200 |
| 4 | 104367 | HAMPTON | FRANKLIN ST - LINCOLN ST TO PEMBROKE AVE | NEW 2 LANE FACILITY | 2014 | $525 |
| 5 | 57047 | HAMPTON | SAUNDERS RD - NEWPORT NEWS CL TO BIG BETHEL RD | WIDEN TO 4 LANES | 2014 | $15,462 |
| 6 | 97715 | HAMPTON | WYTHE CREEK RD - COMMANDER SHEPARD BLVD TO POQUOSON CL | WIDEN TO 4 LANES | 2018 | $23,400 |
| 7 | 100200 | JAMES CITY | SKIFFES CREEK CONNECTOR - ROUTE 60 TO ROUTE 143 | NEW 4 LANE FACILITY | 2017 | $35,000 |
| 8 | 103803 | MULTIPLE | ROUTE 460 - PETERSBURG TO HAMPTON ROADS | TO BE DETERMINED | TBD | TBD |
| 9 | 4483 | NEWPORT NEWS | ATKINSON BLVD - WARWICK BLVD TO JEFFERSON AVE | NEW 4 LANE FACILITY | 2015 | $52,754 |
| 10 | 104905 | NEWPORT NEWS | I-64 - YORKTOWN RD (EXIT 247) TO JEFFERSON AVE (EXIT 255) | WIDEN TO 6 LANES | 2017 | $144,000 |
| 11 | 11816 | NEWPORT NEWS | MIDDLE GROUND BLVD - JEFFERSON AVE TO WARWICK BLVD | NEW 4 LANE FACILITY | UNDERWAY | $69,988 |
| 12 | 18968 | NORFOLK | INTERMODAL CONNECTOR | NEW 4 LANE FACILITY | 2015 | $189,138 |
| 13 | 9783 | NORFOLK | MILITARY HWY - LOWERY RD TO NORTHAMPTON BLVD | WIDEN TO 8 LANES | 2015 | $26,991 |
| 14 | 84243 | NORFOLK | MILITARY HWY - NORTHAMPTON BLVD TO ROBIN HOOD RD | WIDEN TO 6 LANES | 2015 | $21,888 |
| 15 | Multi | NORFOLK/PORT. | MIDTOWN TUNNEL/MLK EXTENSION | WIDENING AND NEW FACILITY | UNDERWAY | $2,100,000 |
| 16 | 13427 | POQUOSON | WYTHE CREEK RD - HAMPTON CL TO ALPHUS ST | WIDEN TO 4 LANES | 2018 | $19,215 |
| 17 | 104390 | PORTSMOUTH | ELLIOTT AVE - FREEDOM AVE TO MCLEAN ST | NEW 2 LANE FACILITY | 2014 | $1,500 |
| 18 | 65655 | PORTSMOUTH | TURNPIKE ROAD - FREDERICK BLVD TO CONSTITUTION AVE | WIDEN TO 4 LANES | UNDERWAY | $22,453 |
| 19 | 104359 | SUFFOLK | KENYON RD CONNECTOR - KENYON CT TO ROUTE 58 | NEW 2 LANE FACILITY | 2014 | $7,710 |
| 20 | 61407 | SUFFOLK | NANSEMOND PKWY - SHOULDERS HILL RD TO CHESAPEAKE CL | WIDEN TO 4 LANES | 2016 | $11,167 |
| 21 | 103005 | VIRGINIA BEACH | CENTERVILLE TPKE - KEMPSVILLE RD TO INDIAN RIVER RD | WIDEN TO 6 LANES | 2016 | $31,000 |
| 22 | 15827 | VIRGINIA BEACH | HOLLAND RD - DAM NECK RD TO NIMMO PKWY | WIDEN TO 4 LANES | UNDERWAY | $51,535 |
| 23 | 14603 | VIRGINIA BEACH | LYNNHAVEN PKWY - CENTERVILLE TPKE TO INDIAN RIVER RD | NEW 4 LANE FACILITY | UNDERWAY | $34,314 |
| 24 | 52058 | VIRGINIA BEACH | NIMMO PKWY - HOLLAND RD TO GENERAL BOOTH BLVD | NEW 4 LANE FACILITY | UNDERWAY | $58,474 |
| 25 | 105623 | VIRGINIA BEACH | ROSEMONT RD - DAM NECK RD TO LYNNHAVEN PKWY | WIDEN TO 4 LANES | 2017 | $7,711 |
| 26 | 55202 | VIRGINIA BEACH | WITCHDUCK RD - I-264 TO VA BEACH BLVD | WIDEN TO 6 LANES | 2015 | $55,180 |
| 27 | 60843 | YORK | ROUTE 17 - HAMPTON HWY TO WOLF TRAP RD | WIDEN TO 6 LANES | UNDERWAY | $57,674 |

Projects in this table are fully or close to fully funded and are expected to begin construction by 2020.

UPCs are unique Universal Project Codes assigned to each project by VDOT.

Sources: FY 2015-2020 Six-Year Improvement Program, FY 2015-2018 Transportation Improvement Program.

## Table 3 – Intersection/Interchange Improvements included in the Six-Year Improvement Program or the Transportation Improvement Program

| MAP # | UPC | JURISDICTION | PROJECT | PROJECTED CONSTRUCTION BEGIN | PROJECTED COST ($000s) |
|---|---|---|---|---|---|
| 1 | 7909 | GLOUCESTER | GEOMETRIC IMPROVEMENTS - BURLEIGH RD EAST OF ROUTE 616 | 2014 | $2,016 |
| 2 | 104686 | GLOUCESTER | INSTALL SIGNAL - ROUTE 17 AT TC WALKER RD | 2014 | $375 |
| 3 | 104163 | GLOUCESTER | INTERSECTION IMPROVEMENTS - ROUTE 17 AT TC WALKER RD | UNDERWAY | $2,297 |
| 4 | 98806 | GLOUCESTER | SIGNAL COORDINATION - ROUTE 17 FROM COLEMAN BRIDGE TO BUS ROUTE 17 | 2016 | $2,068 |
| 5 | 86489 | HAMPTON | ADD LEFT TURN LANE - ANDREWS BLVD AT WOODLAND RD | UNDERWAY | $884 |
| 6 | 86488 | HAMPTON | ADD LEFT TURN LANE - FOX HILL RD AT CLEMWOOD PKWY | UNDERWAY | $770 |
| 7 | 86490 | HAMPTON | ADD LEFT TURN LANE - LASALLE AVE AT QUEEN ST | 2014 | $533 |
| 8 | 86480 | HAMPTON | ADD LEFT TURN LANE - PEMBROKE AVE AT GRIMES RD | UNDERWAY | $875 |
| 9 | 86678 | HAMPTON | ADD RIGHT TURN ACCELERATION LANE - MAGRUDER BLVD AT BUTLER FARM RD | UNDERWAY | $125 |
| 10 | 81441 | HAMPTON | ADD TURN LANE - PEMBROKE AVE AT ARMISTEAD AVE | UNDERWAY | $685 |
| 11 | 83454 | HAMPTON | ADD TURN LANES - TODDS LN AT BIG BETHEL RD | 2015 | $4,963 |
| 12 | 89904 | HAMPTON | EXTEND LEFT TURN LANE - MAGRUDER BLVD AT SEMPLE FARM RD | 2014 | $165 |
| 13 | 104363 | HAMPTON | RECONSTRUCT OFF RAMP - I-64/LASALLE AVENUE | 2015 | $540 |
| 14 | 93626 | HAMPTON | SIGNAL IMPROVEMENT - BIG BETHEL RD AT BURTON ST | UNDERWAY | $286 |
| 15 | 105780 | HAMPTON | SIGNAL IMPROVEMENT - BIG BETHEL RD FROM NORTH PARK LN TO COMMANDER SHEPPARD | 2015 | $250 |
| 16 | 93614 | HAMPTON | SIGNAL IMPROVEMENT - LASALLE AVE AT TIDEMILL LANE | UNDERWAY | $244 |
| 17 | 89903 | HAMPTON | SIGNAL IMPROVEMENT - LASALLE AVE AT VICTORIA BLVD | UNDERWAY | $268 |
| 18 | 89902 | HAMPTON | SIGNAL IMPROVEMENT - MERCURY BLVD AT MALLORY ST | UNDERWAY | $225 |
| 19 | 93601 | HAMPTON | SIGNAL IMPROVEMENT - TODDS LN AT FARMINGTON BLVD/ORCUTT AVE | UNDERWAY | $278 |
| 20 | 89899 | HAMPTON | SIGNAL IMPROVEMENT - TODDS LN AT WINCHESTER DR | UNDERWAY | $208 |
| 21 | 58297 | ISLE OF WIGHT | ADD TURN LANES - ROUTE 258 AT SCOTTS FACTORY RD | 2015 | $3,346 |
| 22 | 98095 | ISLE OF WIGHT | EXTEND LEFT TURN LANE - ROUTE 17 AT KINGS COVE WAY | 2016 | $313 |
| 23 | 104360 | JAMES CITY | ACCESS MANAGEMENT IMPROVEMENTS - LONGHILL RD NEAR OLDE TOWNE RD | 2015 | $60 |
| 24 | 102944 | JAMES CITY | ADD TURN LANES - CENTERVILLE RD AT NEWS RD | 2017 | $1,514 |
| 25 | 82961 | JAMES CITY | ADD TURN LANES - NEWS RD AT MONTICELLO AVE AND IRONBOUND RD | UNDERWAY | $3,473 |
| 26 | 102947 | JAMES CITY | INTERSECTION IMPROVEMENTS - RICHMOND RD AT ROUTE 199 WEST RAMP | 2017 | $1,477 |
| 27 | 102948 | JAMES CITY | INTERSECTION IMPROVEMENTS - ROUTE 199 AT BROOKWOOD DR | 2017 | $275 |
| 28 | 103027 | NEWPORT NEWS | INTERSECTION IMPROVEMENTS - 27TH ST AT BUXTON AVE | 2014 | $936 |
| 29 | 103002 | NEWPORT NEWS | INTERSECTION IMPROVEMENTS - WARWICK BLVD AT BLAND BLVD | 2014 | $2,615 |
| 30 | 104377 | NEWPORT NEWS | SIGNAL IMPROVEMENT - JEFFERSON AVE AT CENTER AVE | 2014 | $295 |
| 31 | 105626 | NEWPORT NEWS | SIGNAL IMPROVEMENT - WARWICK BLVD AT INDUSTRIAL PARK DR | 2016 | $300 |
| 32 | 100542 | NEWPORT NEWS | SIGNAL IMPROVEMENT - WARWICK BLVD AT TABBS LANE AND BEECHMONT DR | 2015 | $1,385 |
| 33 | 1765 | NORFOLK | INTERSECTION IMPROVEMENTS - MILITARY HWY AT NORTHAMPTON BLVD | 2015 | $65,200 |
| 34 | 14672 | NORFOLK | NEW RAILROAD OVERPASS OF HAMPTON BLVD INTO NORFOLK INTERNATIONAL TERMINALS | UNDERWAY | $88,718 |
| 35 | 104379 | NORFOLK | SIGNAL IMPROVEMENT - 21ST ST AT LLEWELLYN AVE | UNDERWAY | $400 |
| 36 | 102999 | POQUOSON | SIGNAL COORDINATION - WYTHE CREEK RD CORRIDOR | 2017 | $260 |
| 37 | 100602 | PORTSMOUTH | INTERSECTION IMPROVEMENTS - PORTSMOUTH BLVD AT ELMHURST LN | 2017 | $500 |
| 38 | 17728 | SOUTHAMPTON | CONSTRUCT INTERCHANGE - ROUTE 58 AT BUS RTE 58/ROUTE 742 EAST OF COURTLAND | 2014 | $31,460 |
| 39 | 100604 | SUFFOLK | INTERSECTION IMPROVEMENTS - BRIDGE RD AT BENNETTS PASTURE RD | 2014 | $894 |
| 40 | 100605 | SUFFOLK | INTERSECTION IMPROVEMENTS - BRIDGE RD AT LEE FARM LN | 2014 | $750 |
| 41 | 104361 | SUFFOLK | INTERSECTION IMPROVEMENTS - COLLEGE DR AT HARBOUR VIEW BLVD | 2015 | $2,000 |
| 42 | 104332 | SUFFOLK | INTERSECTION IMPROVEMENTS - GODWIN BLVD AT KINGS HWY | 2015 | $1,500 |
| 43 | 102998 | SUFFOLK | INTERSECTION IMPROVEMENTS - GODWIN BLVD AT SUFFOLK BYPASS RAMP | 2018 | $1,000 |
| 44 | 102995 | SUFFOLK | INTERSECTION IMPROVEMENTS - NANSEMOND PKWY AT WILROY RD | 2019 | $1,600 |
| 45 | 102991 | SUFFOLK | SIGNAL COORDINATION - BRIDGE RD CORRIDOR | 2017 | $1,257 |
| 46 | 100603 | SUFFOLK | SIGNAL COORDINATION - HARBOUR VIEW AREA | 2014 | $3,500 |
| 47 | 102990 | SUFFOLK | SIGNAL COORDINATION - WILROY, NANSEMOND, AND SHOULDERS HILL CORRIDORS | 2018 | $2,748 |
| 48 | 105622 | VIRGINIA BEACH | INTERSECTION IMPROVEMENTS - FIRST COLONIAL RD AT VA BEACH BLVD | 2016 | $27,602 |
| 49 | 84366 | VIRGINIA BEACH | INTERSECTION IMPROVEMENTS - INDIAN RIVER RD AT KEMPSVILLE RD | 2015 | $13,781 |
| 50 | 51866 | VIRGINIA BEACH | INTERSECTION IMPROVEMENTS - PRINCESS ANNE RD AT KEMPSVILLE RD | UNDERWAY | $83,602 |
| 51 | 95423 | YORK | ADD TURN LANES - ROCHAMBEAU DR AT AIRPORT RD | 2015 | $503 |
| 52 | 104337 | YORK | INSTALL ROUNDABOUT - ROUTE 143 AT I-64 RAMP | 2016 | $2,220 |

Projects in this table are fully or close to fully funded and are expected to begin construction by 2020. UPCs are unique Universal Project Codes assigned to each project by VDOT. Sources: FY 2015-2020 Six-Year Improvement Program, FY 2015-2018 Transportation Improvement Program.

## Table 4 – Additional Roadway Widening Projects Included in the 2034 Long-Range Transportation Plan

| MAP # | UPC | JURISDICTION | FACILITY | PROJECT TYPE | PROJECTED COST ($ millions) |
|---|---|---|---|---|---|
| 1 | | CHESAPEAKE/SUFFOLK | ROUTE 58 - ROUTE 460 TO BOWERS HILL | UPGRADE TO INTERSTATE STANDARDS/ INTERCHANGE IMPROVEMENTS | $150.0 |
| 2 | | PORTSMOUTH | CRANEY ISLAND ACCESS RD | NEW 2 LANE FACILITY | $436.0 |
| 3 | | SUFFOLK | BRIDGE RD - GODWIN BRIDGE TO CHESAPEAKE CL | WIDEN TO 6 LANES | $90.0 |
| 4 | 100937 | SUFFOLK | ROUTE 58 - MANNING BRIDGE RD TO SUFFOLK BYPASS | WIDEN TO 6 LANES | $75.0 |
| 5 | | VIRGINIA BEACH | BIRDNECK RD - VIRGINIA BEACH BLVD TO I-264 | WIDEN TO 6 LANES | $21.1 |
| 6 | | VIRGINIA BEACH | CENTERVILLE TPKE - CHESAPEAKE CL TO KEMPSVILLE RD | WIDEN TO 4 LANES | $72.8 |
| 7 | | VIRGINIA BEACH | CLEVELAND ST - CLEARFIELD AVE TO WITCHDUCK RD | WIDEN TO 4 LANES | $13.6 |
| 8 | | VIRGINIA BEACH | DAM NECK RD - HOLLAND RD TO DRAKESMILE RD | WIDEN TO 6 LANES | $34.8 |
| 9 | | VIRGINIA BEACH | DAM NECK RD - DRAKESMILE RD TO LONDON BRIDGE RD | WIDEN TO 6 LANES | $49.4 |
| 10 | 15828 | VIRGINIA BEACH | DAM NECK RD/ELBOW RD - INDIAN RIVER RD TO VB AMPHITHEATER | WIDEN TO 4 LANES | $55.6 |
| 11 | | VIRGINIA BEACH | FERRELL PKWY - INDIAN RIVER RD TO PLEASANT VALLEY RD | WIDEN TO 6 LANES | $75.6 |
| 12 | | VIRGINIA BEACH | FIRST COLONIAL RD - VA BEACH BLVD TO OLD DONATION RD | WIDEN TO 6 LANES | $51.0 |
| 13 | | VIRGINIA BEACH | GENERAL BOOTH BLVD - DAM NECK RD TO OCEANA BLVD | WIDEN TO 8 LANES | $37.4 |
| 14 | | VIRGINIA BEACH | HOLLAND RD - INDEPENDENCE BLVD TO ROSEMONT RD | WIDEN TO 6 LANES | $56.5 |
| 15 | | VIRGINIA BEACH | INDIAN RIVER RD - CENTERVILLE TPKE TO FERRELL PKWY | WIDEN TO 8 LANES | $74.2 |
| 16 | 15829 | VIRGINIA BEACH | INDIAN RIVER RD - LYNNHAVEN PKWY TO ELBOW RD | WIDEN TO 4 LANES | $73.4 |
| 17 | 14601 | VIRGINIA BEACH | LASKIN RD - ORIOLE DR TO 30TH/32ND ST | WIDEN TO 6 LANES | $23.1 |
| 18 | 12546 | VIRGINIA BEACH | LASKIN RD - REPUBLIC RD TO ORIOLE DR | WIDEN TO 6 LANES | $66.5 |
| 19 | | VIRGINIA BEACH | LONDON BRIDGE RD - DAM NECK RD TO SHIPPS CORNER RD | WIDEN TO 4 LANES | $40.8 |
| 20 | | VIRGINIA BEACH | LYNNHAVEN PKWY - PRINCESS ANNE RD TO HOLLAND RD | WIDEN TO 6 LANES | $92.7 |
| 21 | | VIRGINIA BEACH | NEWTOWN RD - BAKER RD TO VIRGINIA BEACH BLVD | WIDEN TO 6 LANES | $23.5 |
| 22 | | VIRGINIA BEACH | NIMMO PKWY - NORTH LANDING RD TO WEST NECK PKWY | NEW 2 LANE FACILITY | $41.1 |
| 23 | | VIRGINIA BEACH | PRINCESS ANNE RD - GENERAL BOOTH BLVD TO UPTON DR | WIDEN TO 4 LANES | $22.9 |
| 24 | | VIRGINIA BEACH | PROVIDENCE RD - KEMPSVILLE RD TO PRINCESS ANNE RD | WIDEN TO 4 LANES | $63.8 |
| 25 | | VIRGINIA BEACH | ROSEMONT RD - HOLLAND RD TO VA BEACH BLVD | WIDEN TO 6 LANES | $86.9 |
| 26 | | VIRGINIA BEACH | SHORE DR - PLEASURE HOUSE RD TO TREASURE ISLAND DR | WIDEN TO 6 LANES | $14.8 |
| 27 | | VIRGINIA BEACH | SHORE DR - MARLIN BAY DR TO GREAT NECK RD | WIDEN TO 6 LANES | $31.3 |
| 28 | | VIRGINIA BEACH | WEST NECK PKWY - ELBOW RD TO NORTH LANDING RD | NEW 4 LANE FACILITY | $49.1 |
| 29 | | YORK | ROUTE 17 - WOLF TRAP RD TO DENBIGH BLVD | WIDEN TO 6 LANES | $8.0 |

Projects in this table are included in the Long-Range Transportation Plan and 1) not close to fully funded in the SYIP/TIP or 2) not expected to begin construction by 2020.

UPCs are unique Universal Project Codes assigned to each project by VDOT.

Sources: Hampton Roads 2034 Long-Range Transportation Plan, FY 2015-2020 Six-Year Improvement Program, FY 2015-2018 Transportation Improvement Program.

# IDENTIFICATION OF CONGESTED LOCATIONS

This section provides a thorough assessment of the operating conditions of the Hampton Roads roadway system, particularly during peak periods of travel. Congested roadway segments are identified using travel time and speed data collected by INRIX and by conceptual planning level analysis methods for roadways without this data. INRIX collects travel times and speeds on a continuous basis, which enables numerous congestion measures to be reported – i.e. actual travel speeds, congestion duration, total delay, and travel time reliability.

**Congestion Approaching the Westbound Hampton Roads Bridge-Tunnel**

The CMP congestion analysis is performed for the 2013 Existing and 2034 roadway networks which include all interstates, freeways and other expressways, principal arterials, and minor arterials as well as selected collectors throughout Hampton Roads. The congestion identification analysis is presently limited to roadways due to the data availability and reliability constraints of other transportation modes and facilities. The results of this analysis will enable the region to identify corridors that are experiencing severe congestion levels today and into the future.

## CMP ROADWAY NETWORK

The roadways included in this congestion analysis are defined as the CMP Roadway Network. The CMP Roadway Network includes both 1) major roadways within the Hampton Roads Transportation Planning Organization (HRTPO) boundary (see Map 1 on page 3), which is also referred to as the Hampton Roads Metropolitan Planning Area (MPA), and 2) major roadways in that portion of the Hampton Roads Planning District Commission (HRPDC) boundary outside of the Metropolitan Planning Area. Roadways in the City of Franklin, Southampton County, Surry County, and portions of northern Gloucester County were analyzed for this study as part of the Rural Transportation Planning Program. Although the roadways in these areas outside of the MPA were analyzed and are included in the appendices, **regional roadway and congestion statistics within this report only reflect the CMP Roadway Network within the Metropolitan Planning Area.**

The CMP Roadway Network includes all roadways in Hampton Roads classified as interstates, freeways or other expressways, principal arterials, or minor arterials. The CMP network also includes several roadways classified as collectors. These collectors were chosen for inclusion in the CMP network based on network connectivity, access to major activity centers, and input from jurisdictions.

A few changes were made to the CMP Roadway Network since the 2010 version of the CMP report. New roadways have been added to the network, and segment endpoints were adjusted.

Most of the roadways added to the CMP Roadway Network increase the network's connectivity with military installations. The impetus for these additions was the creation of a network of "Roadways Serving the Military in Hampton Roads" that was included in HRTPO's Hampton Roads Military Transportation Needs Study[8].

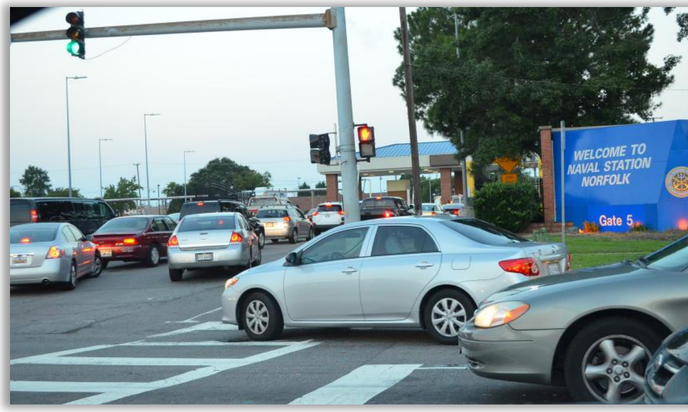
[8] *Hampton Roads Military Transportation Needs Study - Highway Network Analysis*, HRTPO, September 2011.

The existing CMP Roadway Network was also expanded due to new roadways being opened and roadway widening projects being completed since the 2010 CMP report. The existing CMP Roadway Network is comprised of 1,597 centerline-miles and 5,452 lane-miles of roadway. Excluding areas outside of the Metropolitan Planning Area, the CMP Roadway Network includes 1,382 centerline-miles and 4,879 lane-miles of roadway, up from 1,357 centerline-miles and 4,776 lane-miles of roadway in the 2010 CMP Roadway Network.

In addition to existing facilities, major roadways that are expected to be constructed in the future are also included in the CMP Roadway Network. These roadways, which are included in the 2034 Long-Range Transportation Plan, are described previously in the System Monitoring section of this report.

Roadways added to the CMP Roadway Network since the previous CMP update include:

- Ballahack Road/Old Battlefield Boulevard between George Washington Highway and Battlefield Boulevard in Chesapeake
- Cedar Lane between the Western Freeway and Craney Island Naval Supply Center in Portsmouth
- Coast Guard Boulevard between Cedar Lane and the Coast Guard Base in Portsmouth
- Cook Road between George Washington Highway and Ballard Street in York County
- Harpers Road between Dam Neck Road and Oceana Boulevard in Virginia Beach
- Lightfoot Road between Richmond Road and Mooretown Road in York County
- Mooretown Road between Route 199 and Lightfoot Road in York County
- Shellabarger Drive between Warwick Boulevard and Fort Eustis in Newport News




**Traffic Congestion at Naval Station Norfolk**

## DATA

A large amount of data including recent traffic volumes, roadway characteristic data, and future traffic volume estimates is required for the analysis that was performed for this study. This data also includes travel time and speed data for the first time as part of the CMP.

The traffic volume and roadway characteristic data used in this study was largely obtained from VDOT. VDOT collects vehicle count data for more than 100,000 roadway segments throughout the state – and over 8,000 locations in Hampton Roads – as part of its Traffic Monitoring Program. Data is collected on all roadways classified as collectors or above once every three years for a 48-hour period. Data from the years 2011-2013 was used in this study to determine the "2013 Existing" weekday volumes and characteristics.

In addition to VDOT's data, traffic volume data collected by other sources throughout the region are used in this report. The Cities of Hampton, Newport News, Suffolk, and Virginia Beach maintain traffic data collection programs. All five tunnels in the region, the South Norfolk Jordan Bridge, and the Chesapeake Expressway also collect traffic volume data as part of their daily operations.

For the limited number of roadway segments where traffic volumes were not available from any of these sources, daily volumes were estimated by HRTPO staff with assistance from the staff of those localities.

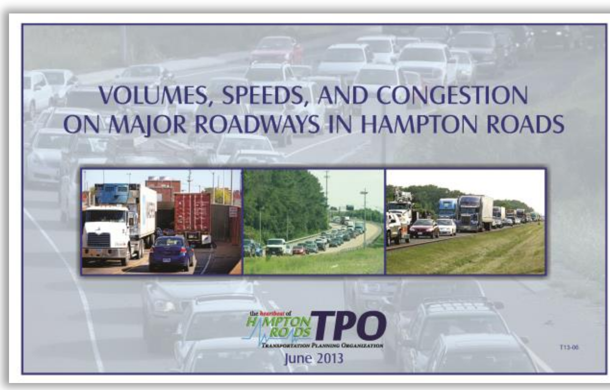
Existing and historical weekday traffic volumes for each roadway segment are included in **Appendix A**. HRTPO also documents traffic volume data in the *Volumes, Speeds, and Congestion on Major Roadways in Hampton Roads* report. This report is produced by HRTPO annually in those years when CMP reports are not published.

Future traffic volumes for the year 2034 were projected using the Hampton Roads Travel Demand Model. This model produces daily volumes based on projected socioeconomic conditions and the expected future roadway network. These model volumes were adjusted by HRTPO staff where necessary using engineering judgment. Projected traffic volumes for the year 2034 are included in **Appendix D**.

For the first time, HRTPO staff has access to historical travel time and speed data for use in the CMP. The travel time and speed data used in this study was collected by INRIX. INRIX collects travel time and speed data on a continuous basis, using millions of GPS-enabled fleet vehicles (taxis, airport shuttles, service vehicles, and long haul trucks), mobile devices that have INRIX's real-time traffic applications installed, traditional road sensors, and other sources.

VDOT has purchased real-time and archived travel time and speed data from INRIX, which HRTPO staff can access through the Regional Integrated Transportation Information System (RITIS). RITIS is maintained by the University of Maryland's Center for Advanced Transportation Technology Laboratory. INRIX data is available for 1,100 miles of roadway in Hampton Roads, including nearly all freeways and most principal and minor arterials. INRIX's coverage comprises 69% of the centerline-miles and 77% of the lane-miles of the existing CMP Roadway Network.

HRTPO staff downloaded INRIX data for the CMP Roadway Network for the entire year of 2013. Data was collected by direction for every 15-minute period on Tuesdays, Wednesdays, and Thursdays during the morning (AM) peak period (defined in this study as occurring between 5:00 am and 9:00 am) and the afternoon (PM) peak period (defined as occurring between 3:00 pm and 7:00 pm). This data was analyzed by HRTPO staff to produce yearly average and 95$^{th}$ percentile segment speeds for each 15 minute interval during the AM and PM peak periods.



## CONGESTION ANALYSIS

As stated in the previous section, INRIX data is available for 69% of the centerline-miles of the CMP Roadway Network. The methodology used to identify congested locations in this study depends on whether or not INRIX speed data is available for the roadway segment.

### Roadways without Speed Data

For the 31% of the CMP Roadway Network where INRIX data is not available, AM and PM peak hour roadway congestion levels were determined using a widely accepted engineering standard from the *Highway Capacity Manual* (HCM)[9] called Level of Service (LOS). Level of Service is measured on a scale of "A" through "F," with LOS A representing the best operating conditions and LOS F representing the worst (see **Figure 8**). Levels of Service A through C are acceptable operating conditions that equate to "Low Congestion" levels. LOS D is considered to be an acceptable operating condition with "Moderate Congestion" levels, while Levels of Service E and F are considered to be unacceptable operating conditions with "Severe Congestion".

The CMP study uses a conceptual planning level analysis for the "2013 Existing" LOS for those roadways without INRIX data. Conceptual planning includes a number of roadway factors and characteristics, such as daily volumes, number of lanes, signals per mile, median type, and peak hour traffic factors. Conceptual planning is more detailed than generalized planning, which uses generalized tables with many default values to calculate "in the ballpark" levels of service. But it is not as detailed as an operational analysis which would include factors such as intersection signal timings, turn bay lengths, and turning movement counts at intersections and commercial entrances.

For the 2013 Existing congestion analysis, LOS software[10] based on the HCM was utilized to compute congestion levels with these conceptual planning factors for each roadway segment, including the most recent traffic counts that were available (usually from 2011 – 2013). Separate roadway segment analyses were done for the AM Peak Hour (which is defined as the highest volume of weekday traffic in four consecutive 15-minute periods from 5 to 9 am) and the PM Peak Hour (from 3 to 7 pm).

The conceptual planning level analysis was also used to project future (2034) travel conditions for all CMP roadways. Future congestion levels were determined using the volumes and improvement projects contained in the 2034 Long-Range Transportation Plan, as described previously in this report.

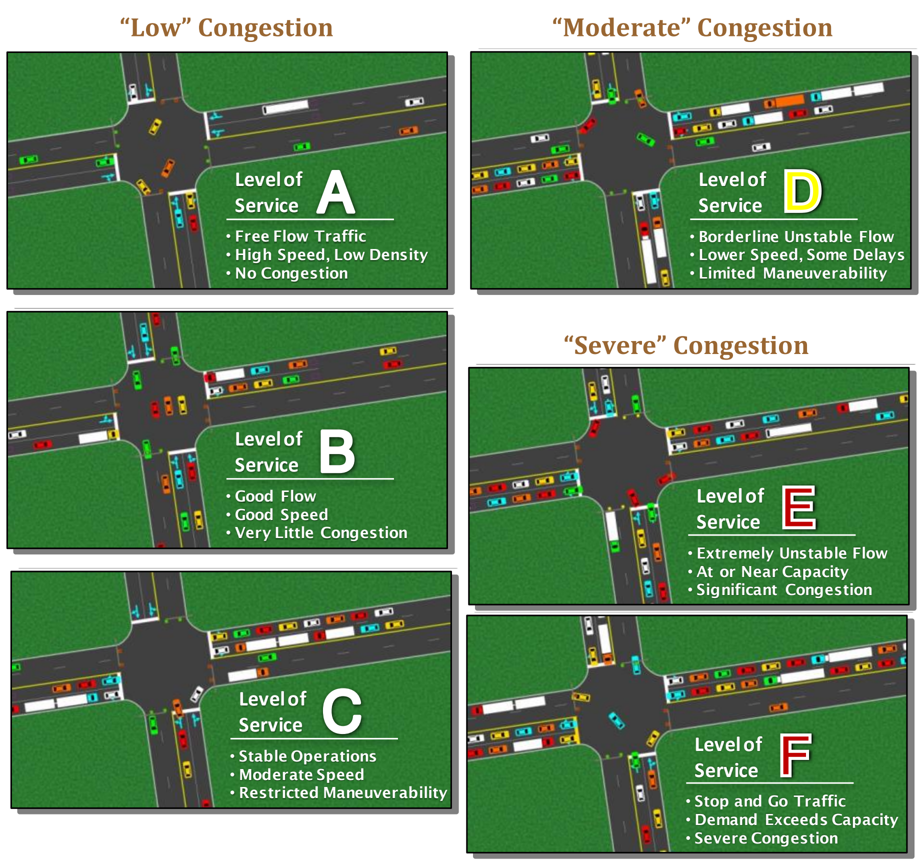



**Figure 8 – Level of Service Definitions**
Simulation Source: Synchro/SimTraffic 7

[9] *Highway Capacity Manual*, Transportation Research Board, 2010

[10] LOSPLAN Software, Florida Department of Transportation, 2010

## Roadways with Speed Data

A number of congestion-related measures can be calculated using INRIX travel time and speed data that could only be estimated in the past. These measures include:

- Congestion levels based on actual travel speeds rather than HCM estimation methods
- Potential for Intersection Congestion Alleviation (PICA), which compares actual travel speeds with projected travel speeds.
- Duration of congestion
- Total delay
- Travel time reliability

This section deals with measuring congestion levels using INRIX speed data. Information regarding PICA, congestion duration, total delay, and travel time reliability methodologies is included later in this report.

HRTPO staff used the travel time index (TTI) to determine the level of congestion on CMP Roadway Network segments with INRIX data. The travel time index is a measure used to describe levels of roadway congestion that reflect how travelers perceive the travel time of the roadway. The TTI compares typical travel conditions during a particular time of day (usually the peak travel hour or period) to the travel conditions during uncongested, or free-flow, conditions.

The travel time index is calculated using the following equation:

$$\text{Travel Time Index (TTI)} = \frac{\text{Average Travel Time}}{\text{Free-flow Travel Time}}$$

As an example, if it takes one minute to travel the length of a roadway segment during uncongested, free-flow conditions but it takes two minutes on average during congested conditions, the travel time index would be 2 minutes/1 minute = 2.0.

HRTPO staff calculated the travel time index for each CMP Roadway Network segment by direction for each 15-minute interval during the AM and PM Peak Periods in 2013. The highest 15-minute travel time index during the AM Peak Period (defined in this study as occurring between 5:00 am and 9:00 am) and the PM Peak Period (defined as occurring between 3:00 pm and 7:00 pm) was used to determine each roadway segment's peak period congestion level.

| CONGESTION LEVEL | | FREEWAY | ARTERIAL |
|---|---|---|---|
| Low | LOW | TTI < 1.15 | TTI < 1.25 |
| Moderate | MOD | 1.15 ≤ TTI < 1.3 | 1.25 ≤ TTI < 1.4 |
| Severe | SEV | TTI ≥ 1.3 | TTI ≥ 1.4 |

**Table 5 – Congestion Level Thresholds**
Source: HRTPO.

Each roadway segment was classified as having a "low", "moderate", or "severe" level of peak period congestion based on this highest travel time index, using the thresholds shown in **Table 5**. Low congestion levels are comparable to a HCM Level of Service A, B or C, as described on the previous page. Moderate congestion levels are comparable to a Level of Service D, and severe congestion levels are comparable to a Level of Service E or F.

Congestion levels for the year 2034 were calculated using the HCM procedure described on the previous page.

## Roadway Congestion Levels

As described in the previous sections, HRTPO staff determined the 2013 Existing congestion levels for regional roadways with INRIX data based on the Travel Time Index, and based on Highway Capacity Manual methodology for roadways without INRIX data.

**Maps 5-6** on pages 34-35 show the existing congestion levels during the AM Peak Period for the Peninsula and the Southside subregions of Hampton Roads, and **Maps 7-8** on pages 36-37 show the existing congestion levels during the PM Peak Period. Existing AM and PM Peak Period congestion levels for each roadway segment are also included in **Appendix D**.

Unlike Levels-of-Service, which peak at LOS F, INRIX data allows for the calculation of congestion level via the travel time index regardless of how severe the congestion is. Those roadway segments with the highest travel time indices are those that are the most congested.

**Table 6** on page 30 shows the top 20 freeway segments and top 20 arterial segments with INRIX data in terms of highest travel time indices during the AM Peak Period. Seventeen of the top 20 most congested freeway segments are at or on approaches to the Downtown Tunnel, Hampton Roads Bridge-Tunnel, Midtown Tunnel, or High Rise Bridge. In terms of arterials, the segments with the highest travel time indices during the AM Peak Period include the Midtown Tunnel and sections of Indian River Road, Northampton Boulevard, Independence Boulevard, and Pembroke Avenue.

**Table 7** on page 31 shows the top 20 freeway segments and top 20 arterial segments in terms of highest travel time indices during the PM Peak Period. Similar to the AM Peak Period, most of the top 20 freeway segments with the highest travel time indices during the PM Peak Period are at high profile locations including the Downtown Tunnel, Hampton Roads Bridge-Tunnel, High Rise Bridge, and Monitor-Merrimac Memorial Bridge Tunnel.

**Traffic Congestion along Eastbound Indian River Road during the PM Peak Period**

The most congested arterial segments during the PM Peak Period include the Brambleton Avenue and Hampton Boulevard approaches to the Midtown Tunnel, Fourth View Street approaching I-64 Westbound and the Hampton Roads Bridge-Tunnel, and sections of Indian River Road. Each of these segments have travel time indices greater than 2.0, meaning average travel times are at least twice as long during congested conditions than during uncongested, free-flow conditions.

It should be noted that the INRIX data analyzed for this study was collected throughout 2013, i.e. before tolls were implemented at the Midtown and Downtown Tunnels. With the implementation of tolling in February 2014, traffic volumes and peak period congestion levels have decreased at these two facilities, as mentioned in the Bridges and Tunnels section of this study. The 2014 travel time indices will be significantly lower at these two facilities, with higher indices likely on alternate routes such as the I-64 High Rise Bridge.

**Appendix F-5 to F-8** contains maps showing the highest travel time indices during the AM and PM Peak Periods for those roadways with INRIX data. **Appendix B** includes the highest travel time indices during the AM Peak Period and **Appendix C** includes the same for the PM Peak Period for each roadway segment with INRIX data.

## Table 6 – Roadway Segments with the Highest Travel Time Indices – 2013 AM PEAK PERIOD

### Freeways

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | HIGHEST TRAVEL TIME INDEX | HIGHEST TRAVEL TIME INDEX TIME OF DAY |
|---|---|---|---|---|---|---|---|
| PORT | I-264 | DES MOINES AVE | EFFINGHAM ST | EB | DT | 5.73 | 7:45 |
| PORT | I-264 | FREDERICK BLVD | DES MOINES AVE | EB | DT | 4.59 | 7:45 |
| HAM | I-64 | RIP RAP RD | SETTLERS LANDING RD | EB | HRBT | 3.96 | 7:45 |
| CHES | I-64 | MILITARY HWY | GEORGE WASHINGTON HWY | WB | HIGH RISE | 3.38 | 7:45 |
| HAM | I-64 | SETTLERS LANDING RD | MALLORY ST | EB | HRBT | 3.29 | 7:30 |
| NOR/PORT | I-264/DOWNTOWN TUNNEL | EFFINGHAM ST | I-464 | EB | DT | 2.65 | 8:00 |
| NOR | I-464 | SOUTH MAIN ST | I-264 | NB | DT | 2.57 | 8:00 |
| NOR | I-264/BERKLEY BRIDGE | WATERSIDE/CITY HALL/TIDEWATER | I-464 | WB | DT | 2.47 | 7:00 |
| CHES | I-64 | I-264&664 | MILITARY HWY | WB | HIGH RISE | 2.23 | 7:45 |
| CHES/NOR | I-464 | POINDEXTER ST | SOUTH MAIN ST | NB | DT | 2.11 | 8:00 |
| NOR | I-564 | ADMIRAL TAUSSIG BLVD | INTERNATIONAL TERMINAL BLVD | NB | - | 1.92 | 6:15 |
| PORT | WESTERN FWY | WEST NORFOLK RD | MLK FREEWAY/MIDTOWN TUNNEL | EB | MT | 1.87 | 7:15 |
| PORT | I-264 | PORTSMOUTH BLVD | FREDERICK BLVD | EB | DT | 1.86 | 7:45 |
| HAM | I-64 | ARMISTEAD AVE | RIP RAP RD | EB | HRBT | 1.69 | 8:00 |
| NOR/PORT | I-264/DOWNTOWN TUNNEL | I-464 | EFFINGHAM ST | WB | DT | 1.68 | 7:00 |
| NOR/VB | I-64 | INDIAN RIVER RD | I-264 | WB | I-64/I-264 | 1.62 | 7:45 |
| PORT | WESTERN FWY | CEDAR LN | WEST NORFOLK RD | EB | MT | 1.52 | 7:30 |
| NOR | I-264 | BRAMBLETON AVE | WATERSIDE/CITY HALL/TIDEWATER | WB | DT | 1.51 | 7:00 |
| NOR | I-264/BERKLEY BRIDGE | I-464 | WATERSIDE/CITY HALL/TIDEWATER | EB | DT | 1.41 | 7:45 |
| NOR | I-64 | I-264 | NORTHAMPTON BLVD | WB | - | 1.41 | 7:30 |

### Arterials

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | HIGHEST TRAVEL TIME INDEX | HIGHEST TRAVEL TIME INDEX TIME OF DAY |
|---|---|---|---|---|---|---|---|
| NOR/PORT | MIDTOWN TUNNEL | MLK FWY/WESTERN FREEWAY | BRAMBLETON AVE | NB | MT | 2.39 | 8:00 |
| VB | INDIAN RIVER RD | FERRELL PKWY | KEMPSVILLE RD | WB | - | 1.89 | 7:30 |
| NOR/VB | NORTHAMPTON BLVD | DIAMOND SPRINGS RD | I-64 | WB | - | 1.77 | 8:00 |
| VB | INDEPENDENCE BLVD | I-264 | BAXTER RD | SB | - | 1.72 | 8:15 |
| HAM | PEMBROKE AVE | SETTLERS LANDING RD | LA SALLE AVE | EB | - | 1.71 | 8:30 |
| NOR/VB | NORTHAMPTON BLVD | I-64 | DIAMOND SPRINGS RD | EB | - | 1.65 | 8:15 |
| VB | INDEPENDENCE BLVD | HOLLAND RD | BAXTER RD | NB | - | 1.65 | 8:15 |
| SH | ROUTE 35 | ROUTE 671 | GRAYS SHOP RD (RTE 673) | NB | - | 1.59 | 6:45 |
| VB | WITCHDUCK RD | I-264 | VA BEACH BLVD | NB | - | 1.55 | 8:30 |
| HAM | ABERDEEN RD | MERCURY BLVD | TODDS LA | NB | - | 1.55 | 7:00 |
| VB | KEMPSVILLE RD | PROVIDENCE RD | PRINCESS ANNE RD | EB | - | 1.53 | 8:00 |
| HAM | MERCURY BLVD | I-64 | POWER PLANT PKWY | WB | - | 1.48 | 8:15 |
| VB | WITCHDUCK RD | VA BEACH BLVD | I-264 | SB | - | 1.46 | 7:45 |
| VB | WITCHDUCK RD | PRINCESS ANNE RD | I-264 | NB | - | 1.45 | 8:15 |
| VB | INDIAN RIVER RD | KEMPSVILLE RD | CENTERVILLE TNPK | WB | - | 1.45 | 7:45 |
| CHES | GEORGE WASHINGTON HWY | MOSES GRANDY TR @ HINTON AVE | I-64 | NB | - | 1.44 | 8:00 |
| CHES | KEMPSVILLE RD | GREENBRIER PKWY | BATTLEFIELD BLVD | WB | - | 1.44 | 8:00 |
| NOR | MONTICELLO AVE/ST PAULS BLVD | BRAMBLETON AVE | PRINCESS ANNE RD | NB | - | 1.44 | 8:15 |
| NOR | CHESAPEAKE BLVD | CROMWELL DR | LAFAYETTE BLVD | SB | - | 1.43 | 7:00 |
| NOR | PRINCESS ANNE RD | LLEWELLYN AVE | COLLEY AVE | WB | - | 1.43 | 8:00 |

Source: HRTPO analysis of INRIX data.

The travel time index compares typical travel conditions during a particular time of day to the travel conditions during uncongested, or free-flow, conditions.
Travel Time Index = Average Travel Time/Free-flow Travel Time

The following abbreviations are used for high profile locations:
DT = Downtown Tunnel    GILM = Gilmerton Bridge    HIGH RISE = I-64 corridor in Chesapeake    HRBT = Hampton Roads Bridge-Tunnel
I-64/I-264 = I-64/I-264 interchange area in Norfolk    MMMBT = Monitor-Merrimac Mem. Bridge-Tunnel    MT = Midtown Tunnel

## Table 7 – Roadway Segments with the Highest Travel Time Indices – 2013 PM PEAK PERIOD

### Freeways

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | HIGHEST TRAVEL TIME INDEX | HIGHEST TRAVEL TIME INDEX TIME OF DAY |
|---|---|---|---|---|---|---|---|
| NN | I-664 | 23RD ST | TERMINAL AVE | SB | MMMBT | 4.76 | 16:15 |
| NOR | I-264/BERKLEY BRIDGE | WATERSIDE/CITY HALL/TIDEWATER | I-464 | WB | DT | 4.38 | 17:30 |
| NOR | I-264 | BRAMBLETON AVE | WATERSIDE/CITY HALL/TIDEWATER | WB | DT | 3.87 | 16:30 |
| NOR | I-64 | BAY AVE | 4TH VIEW AVE | WB | HRBT | 3.67 | 16:45 |
| HAM | I-64 | RIP RAP RD | SETTLERS LANDING RD | EB | HRBT | 3.66 | 16:45 |
| NN | I-664 | CHESTNUT AVE | 23RD ST | SB | MMMBT | 3.63 | 16:30 |
| HAM | I-64 | SETTLERS LANDING RD | MALLORY ST | EB | HRBT | 3.38 | 16:30 |
| NOR | I-64 | GRANBY ST | BAY AVE | WB | HRBT | 3.12 | 16:30 |
| CHES | I-64 | BATTLEFIELD BLVD | I-464 | EB | HIGH RISE | 2.65 | 17:30 |
| NOR | I-64 | I-564/LITTLE CREEK RD | GRANBY ST | WB | HRBT | 2.40 | 16:30 |
| NOR | I-64 | I-564/LITTLE CREEK RD | TIDEWATER DR | EB | - | 2.38 | 16:45 |
| PORT | I-264 | DES MOINES AVE | EFFINGHAM ST | EB | DT | 2.27 | 16:30 |
| NOR/PORT | I-264/DOWNTOWN TUNNEL | EFFINGHAM ST | I-464 | EB | DT | 2.20 | 16:30 |
| NOR | I-64 | TIDEWATER DR | CHESAPEAKE BLVD | EB | - | 2.18 | 16:45 |
| NOR | I-64 | 4TH VIEW AVE | OCEAN VIEW AVE | WB | HRBT | 2.17 | 16:00 |
| HAM | I-64 | ARMISTEAD AVE | RIP RAP RD | EB | HRBT | 2.09 | 17:45 |
| NOR | I-64 | CHESAPEAKE BLVD | NORVIEW AVE | EB | - | 2.06 | 16:45 |
| NOR/PORT | I-264/DOWNTOWN TUNNEL | I-464 | EFFINGHAM ST | WB | DT | 1.90 | 17:15 |
| NOR | I-64 | MILITARY HWY | NORTHAMPTON BLVD | EB | - | 1.86 | 17:30 |
| NOR | I-64 | GRANBY ST | I-564/LITTLE CREEK RD | EB | - | 1.85 | 16:45 |

### Arterials

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | HIGHEST TRAVEL TIME INDEX | HIGHEST TRAVEL TIME INDEX TIME OF DAY |
|---|---|---|---|---|---|---|---|
| VB | INDIAN RIVER RD | I-64 | CENTERVILLE TNPK | EB | - | 2.46 | 17:30 |
| NOR | HAMPTON BLVD | 21ST ST | BRAMBLETON AVE | SB | MT | 2.43 | 16:00 |
| NOR | 4TH VIEW ST | OCEAN VIEW AVE | I-64 | WB | HRBT | 2.40 | 17:00 |
| VB | INDIAN RIVER RD | CENTERVILLE TNPK | KEMPSVILLE RD | EB | - | 2.29 | 17:30 |
| NOR | BRAMBLETON AVE | COLLEY AVE | HAMPTON BLVD | WB | MT | 2.01 | 16:30 |
| VB | WITCHDUCK RD | I-264 | PRINCESS ANNE RD | SB | - | 1.83 | 17:15 |
| CHES | MILITARY HWY | I-464 | BAINBRIDGE BLVD | WB | GILM | 1.81 | 16:00 |
| NOR | NEWTOWN RD | I-264 | VA BEACH BLVD | NB | - | 1.78 | 17:30 |
| VB | INDEPENDENCE BLVD | I-264 | BAXTER RD | SB | - | 1.75 | 17:00 |
| CHES | BATTLEFIELD BLVD | GREAT BRIDGE BLVD/KEMPSVILLE RD | CEDAR RD | SB | - | 1.74 | 17:30 |
| VB | INDIAN RIVER RD | I-64 | PROVIDENCE RD | WB | - | 1.73 | 17:30 |
| VB | WITCHDUCK RD | I-264 | VA BEACH BLVD | NB | - | 1.73 | 17:15 |
| NOR | ST PAULS BLVD | BRAMBLETON AVE | I-264 RAMP/MACARTHUR MALL | SB | - | 1.72 | 17:15 |
| JCC | ROUTE 199 | JOHN TYLER HWY (RTE 5) | JAMESTOWN RD | EB | - | 1.69 | 17:15 |
| NN | FORT EUSTIS BLVD | WARWICK BLVD | I-64 | EB | - | 1.69 | 17:15 |
| CHES | GEORGE WASHINGTON HWY | I-64 | MOSES GRANDY TR @ HINTON AVE | SB | - | 1.66 | 17:00 |
| VB | INDIAN RIVER RD | FERRELL PKWY | KEMPSVILLE RD | WB | - | 1.65 | 16:00 |
| CHES | GREENBRIER PKWY | EDEN WAY | VOLVO PKWY | SB | - | 1.64 | 17:45 |
| NOR | CHESAPEAKE BLVD | I-64 | LITTLE CREEK RD | NB | - | 1.63 | 17:30 |
| NOR | NEWTOWN RD | I-264 | KEMPSVILLE RD | SB | - | 1.63 | 17:00 |

Source: HRTPO analysis of INRIX data.

The travel time index compares typical travel conditions during a particular time of day to the travel conditions during uncongested, or free-flow, conditions.
Travel Time Index = Average Travel Time/Free-flow Travel Time

The following abbreviations are used for high profile locations:
DT = Downtown Tunnel GILM = Gilmerton Bridge HIGH RISE = I-64 corridor in Chesapeake HRBT = Hampton Roads Bridge-Tunnel
I-64/I-264 = I-64/I-264 interchange area in Norfolk MMMBT = Monitor-Merrimac Mem. Bridge-Tunnel MT = Midtown Tunnel

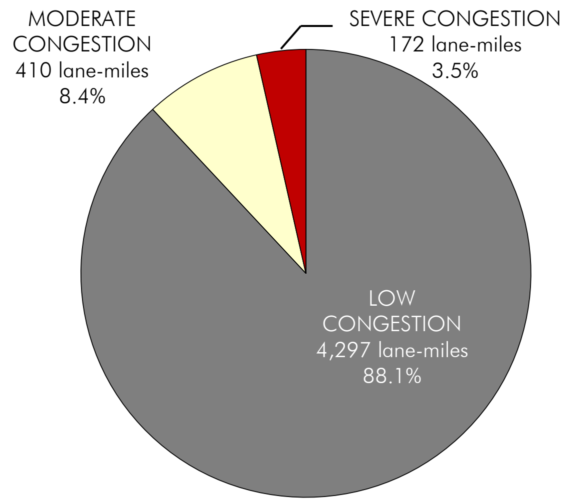
HRTPO staff used the roadway segment congestion analysis to calculate existing congestion levels on a regional basis[11]. As shown in **Figure 9**, 172 of the 4,879 lane-miles (3.5%) in the Hampton Roads CMP Roadway Network currently operate under severely congested conditions during the AM Peak Period. Another 410 lane-miles (8.4%) operate under acceptable but moderately congested conditions, while the remaining 4,297 lane-miles (88.1%) have low levels of congestion.

A much higher percentage of the CMP Roadway Network is congested during the PM Peak Period than during the AM Peak Period. A total of 391 of the 4,879 lane-miles (8.0%) currently operate under severely congested conditions during the PM Peak Period. Another 615 lane-miles (12.6%) operate under moderately congested conditions, and the remaining 3,873 lane-miles (79.4%) are roadways that operate with low levels of congestion.

**Figure 10** on page 33 displays this roadway congestion data by jurisdiction. During the AM Peak Period, the jurisdictions with the highest percentage of lane-miles operating in severely congested conditions are Portsmouth (8.7%, primarily due to backups on approaches to the Midtown and Downtown Tunnels), Norfolk (7.4%), Virginia Beach (5.4%), and Chesapeake (4.3%). During the PM Peak Period, the jurisdictions with the highest percentage of lane-miles operating in severely congested conditions are Norfolk (18.6%), Newport News (13.3%), Virginia Beach (10.6%), and Chesapeake (7.4%).

As part of the 2034 Hampton Roads Long-Range Transportation Plan, HRTPO staff projected the PM Peak Period congestion levels on the CMP Roadway Network based on predicted traffic volumes and projects that are expected to be completed by the horizon year. The 2034 PM Peak Period roadway congestion levels are shown in **Map 9** on page 38.

**AM Peak Period**




**PM Peak Period**

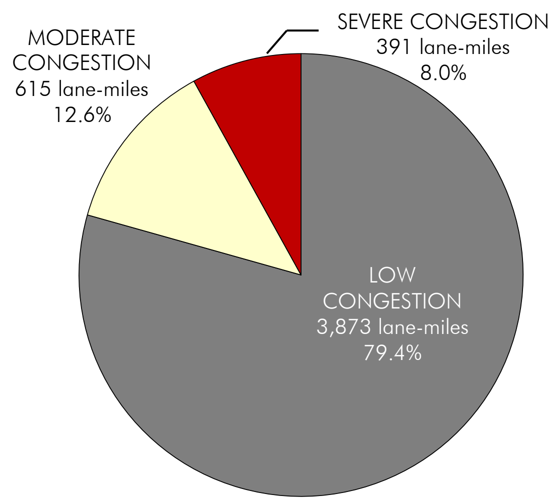



**Figure 9 – Existing (2013) Congestion Levels by Lane-Mile for the CMP Roadway Network**

Source: HRTPO analysis of INRIX and VDOT data.

Figure only include those roadways in the CMP network within the Hampton Roads Metropolitan Planning Area (MPA).

[11] These regional congestion figures only include those roadways in the CMP network within the Hampton Roads Metropolitan Planning Area (MPA) as defined on page 2. Although congestion levels were determined for roadways in the City of Franklin, Southampton County, Surry County, and Northern Gloucester County, these jurisdictions are excluded from these statistics since they fall outside of the MPA.

The number of severely congested lane-miles in Hampton Roads is projected to grow significantly between 2013 and 2034 (**Figure 11**). In 2034, one third (34%) of the Hampton Roads CMP Roadway Network is expected to operate at severely congested levels during the PM Peak Period, up from 8% in the 2013 Existing conditions. Only 44% of the CMP Roadway Network is projected to operate at low levels of congestion in the PM Peak Period in 2034.

It needs to be noted that caution should be used when making comparisons between this report's 2013 Existing congestion levels and other congestion levels (i.e. 2034 congestion levels in this report and "Existing" congestion levels in previous CMP reports). Most of the 2013 Existing congestion analysis is based on a source of data (INRIX) that is different from the other congestion analyses. Roadways with INRIX data are also analyzed by direction whereas both the 2034 and the congestion analyses in previous CMP reports were not analyzed by direction. The directional INRIX analysis used for 2013 Existing conditions will inherently produce lower congestion levels than the non-directional analyses.

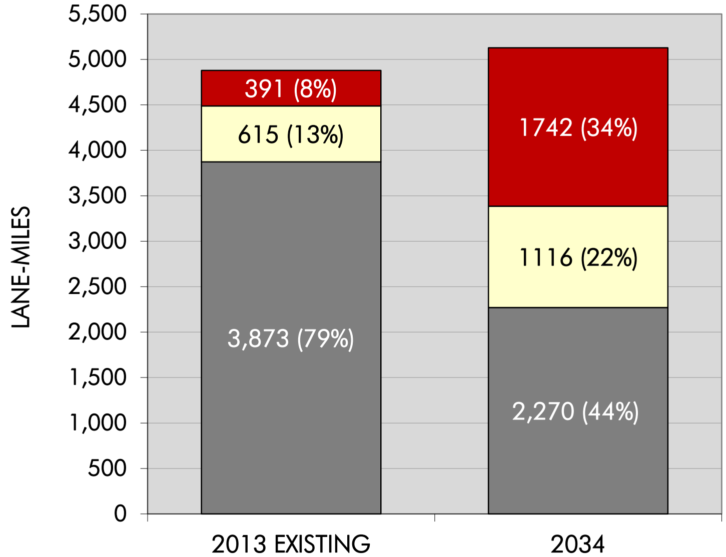
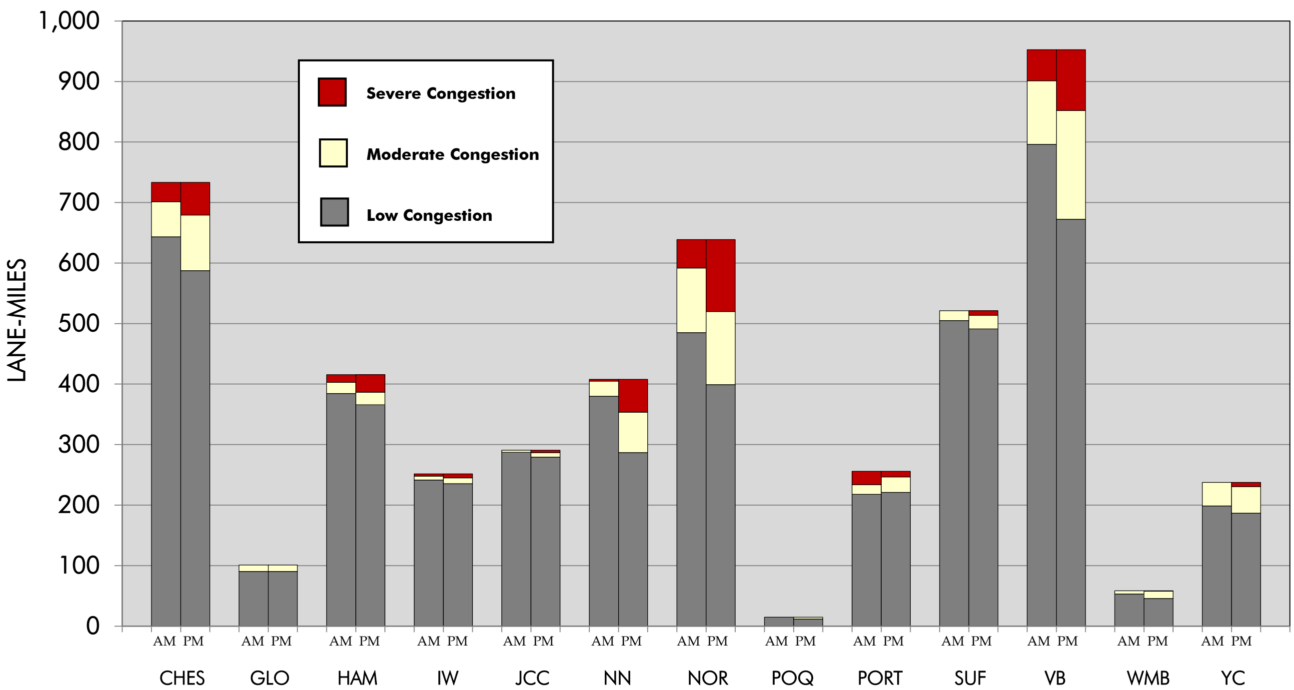



**Figure 11 – Existing (2013) and 2034 Congestion Levels by Lane-Mile for the CMP Roadway Network (PM Peak)**

Source: HRTPO analysis of HRTPO, INRIX, and VDOT data.

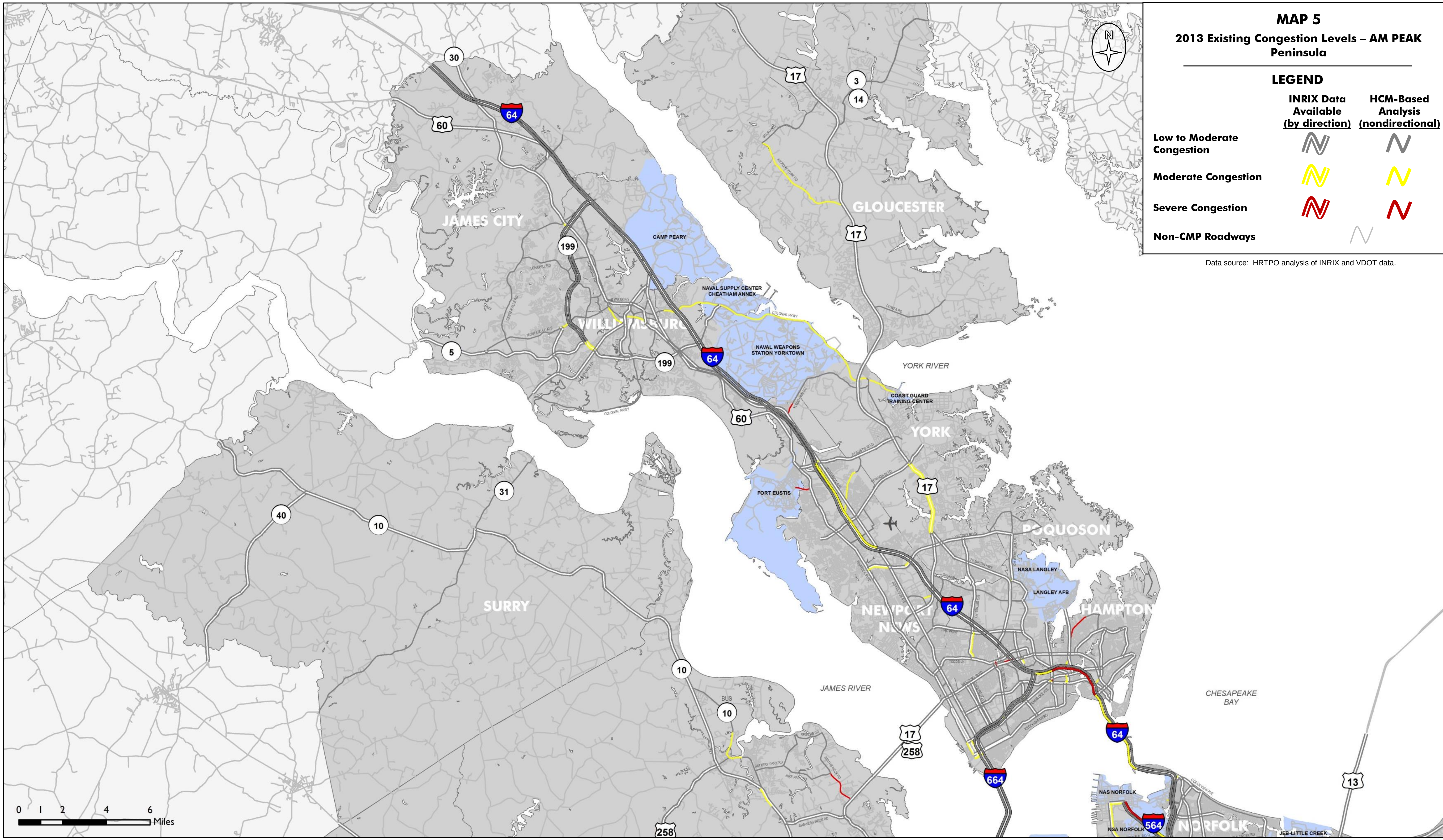
Figure only include those roadways in the CMP network within the Hampton Roads Metropolitan Planning Area (MPA).

**Figure 10 – Existing (2013) Congestion Levels by Lane-Mile for Each Jurisdiction – AM and PM Peak Periods**

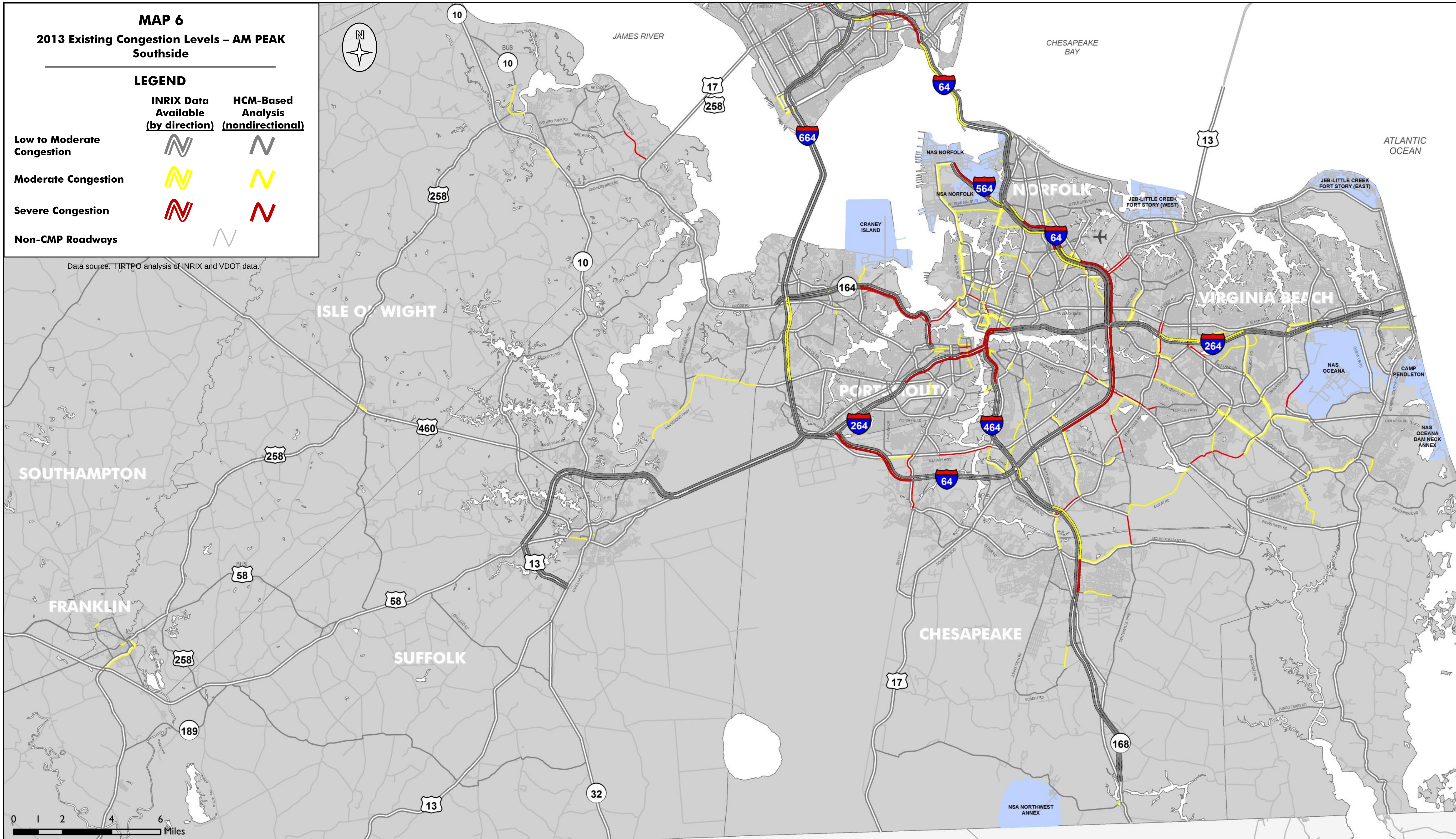


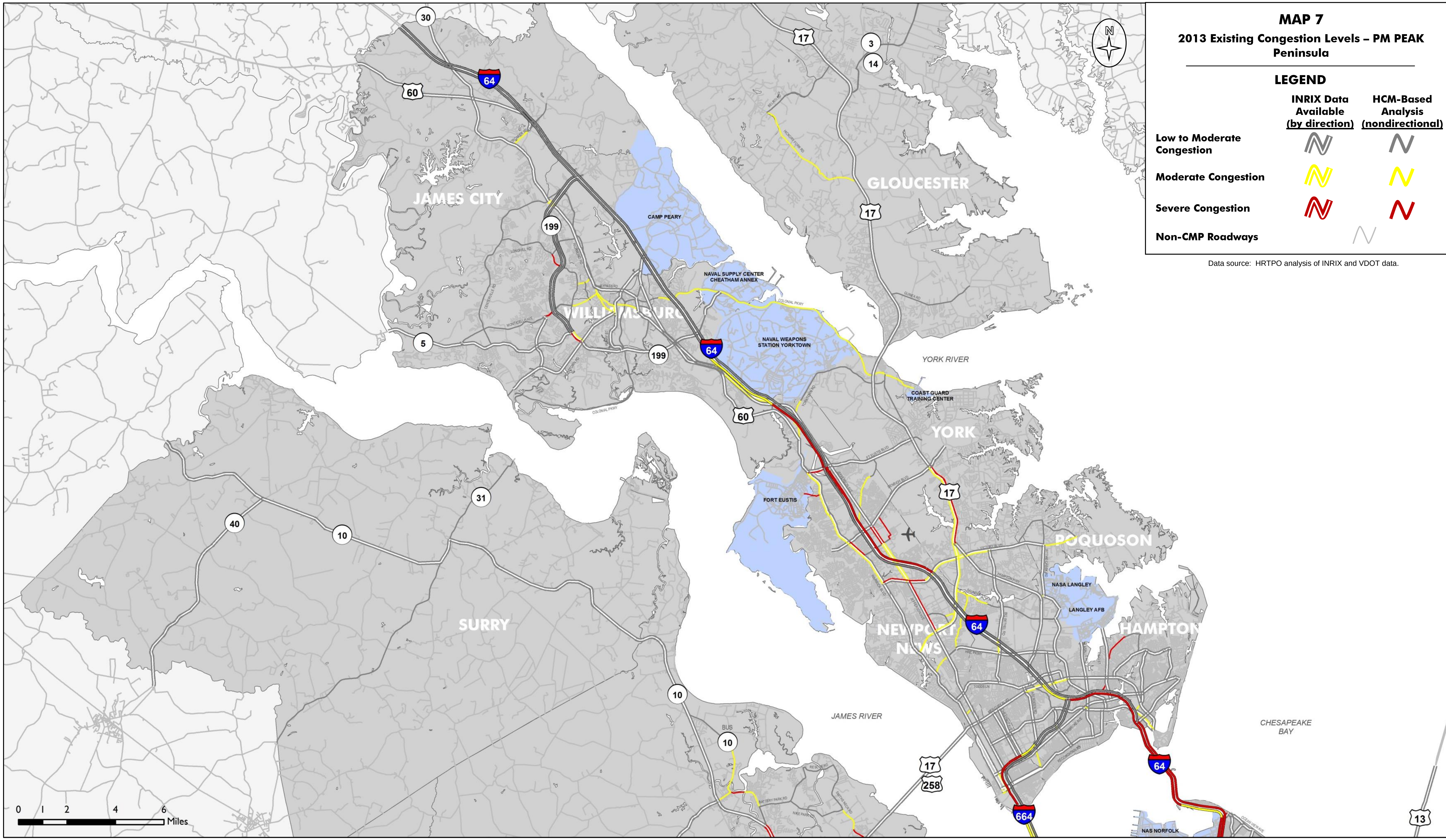

Source: HRTPO analysis of INRIX and VDOT data.

Figure only include those roadways in the CMP Roadway Network within the Hampton Roads Metropolitan Planning Area (MPA).

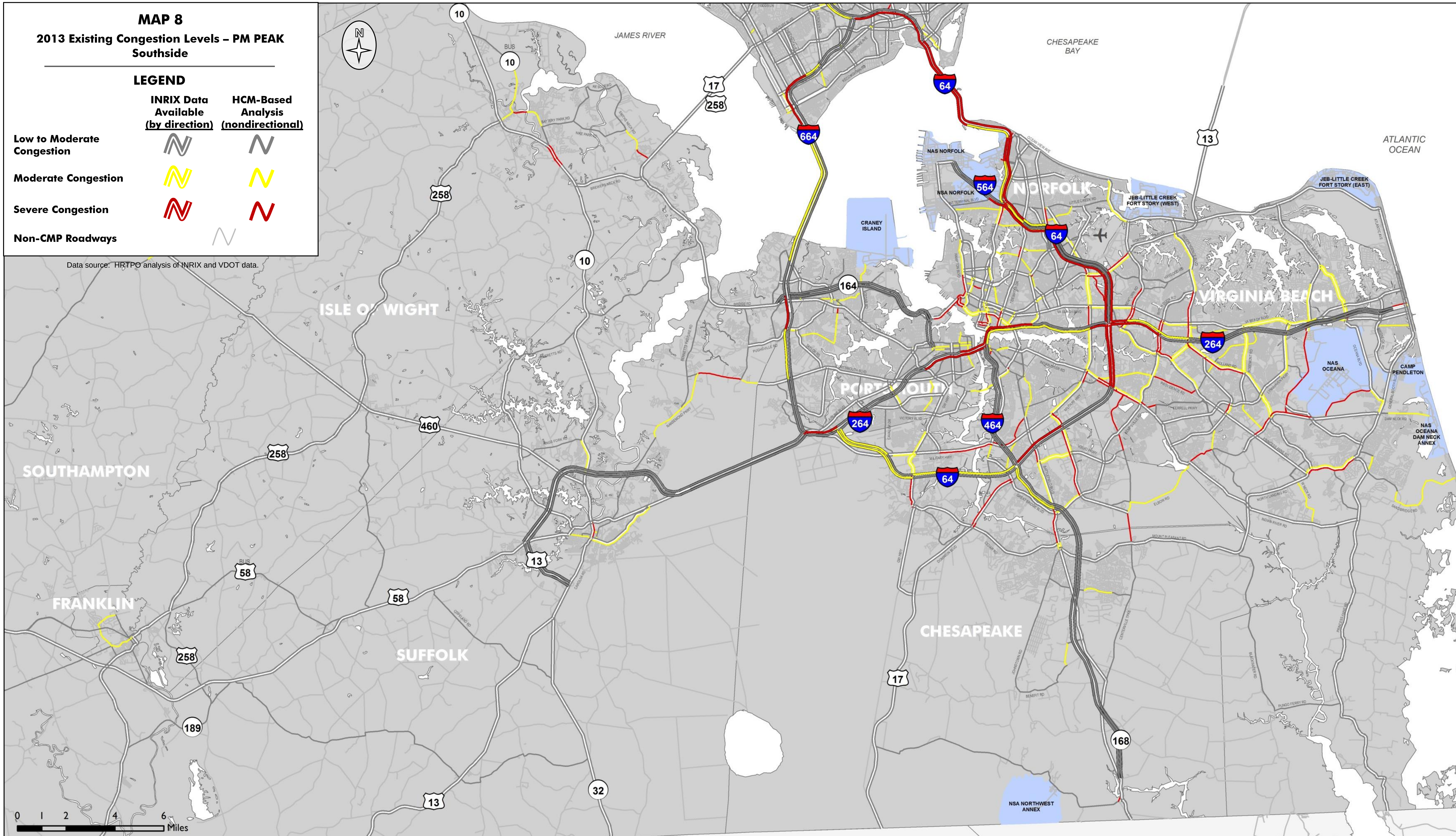



Data source: HRTPO analysis of INRIX and VDOT data.


MAP 6
2013 Existing Congestion Levels – AM PEAK
Southside
LEGEND
INRIX Data Available (by direction)
HCM-Based Analysis (nondirectional)
Low to Moderate Congestion
Moderate Congestion
Severe Congestion
Non-CMP Roadways
Data source: HRTPO analysis of INRIX and VDOT data.
JAMES RIVER
CHESAPEAKE BAY
ATLANTIC OCEAN
ISLE OF WIGHT
SOUTHAMPTON
FRANKLIN
SUFFOLK
PORTSMOUTH
NORFOLK
VIRGINIA BEACH
CHESAPEAKE
NAS NORFOLK
NSA NORFOLK
CRANEY ISLAND
JEB-LITTLE CREEK FORT STORY (WEST)
JEB-LITTLE CREEK FORT STORY (EAST)
NAS OCEANA
CAMP PENDLETON
NAS OCEANA DAM NECK ANNEX
NSA NORTHWEST ANNEX
0 1 2 4 6 Miles

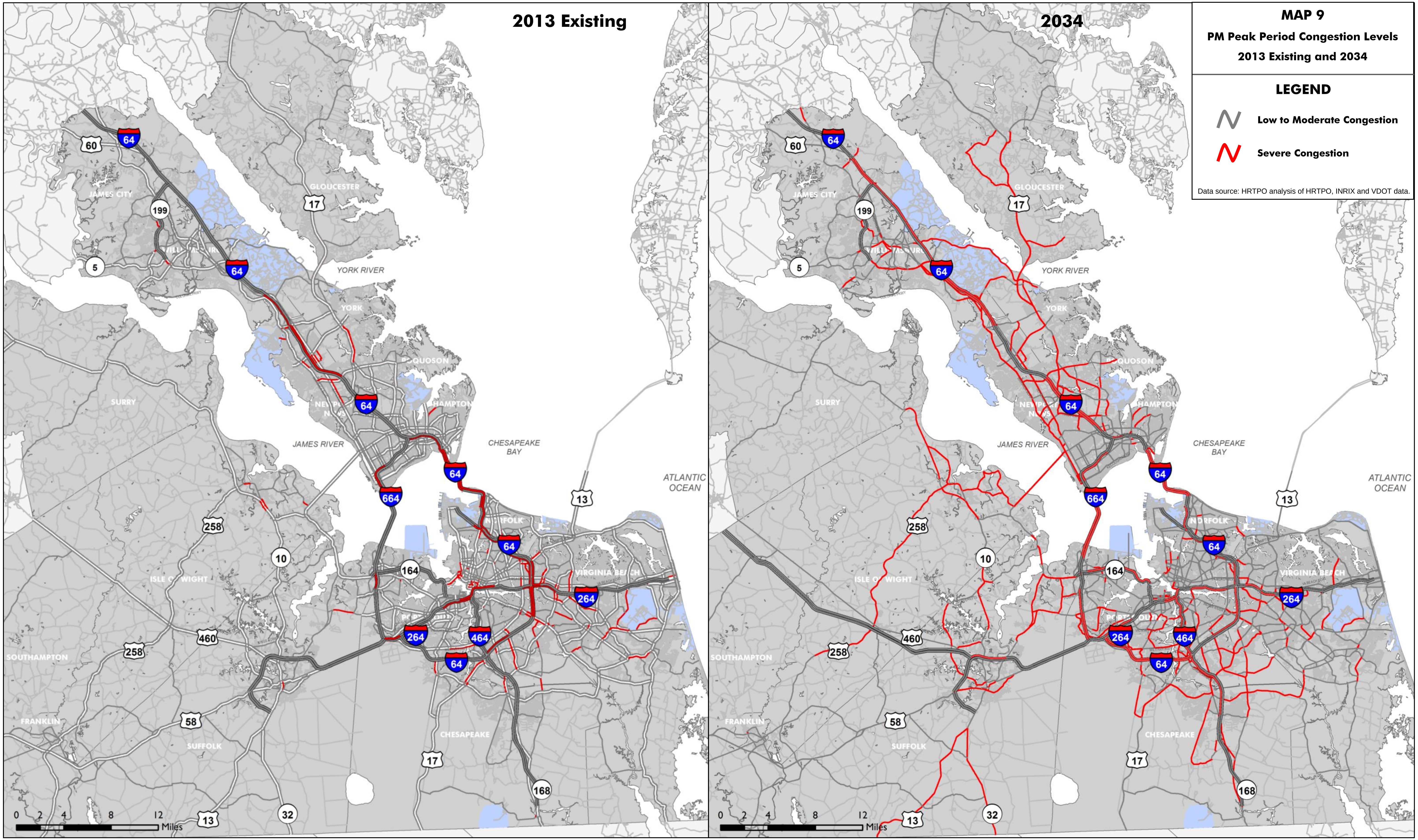



Data source: HRTPO analysis of INRIX and VDOT data.




**MAP 8**
**2013 Existing Congestion Levels – PM PEAK**
**Southside**

Data source: HRTPO analysis of INRIX and VDOT data.


2013 Existing
2034
MAP 9
PM Peak Period Congestion Levels
2013 Existing and 2034
LEGEND
Low to Moderate Congestion
Severe Congestion
Data source: HRTPO analysis of HRTPO, INRIX and VDOT data.
YORK RIVER
JAMES RIVER
CHESAPEAKE BAY
ATLANTIC OCEAN
GLOUCESTER
JAMES CITY
YORK
POQUOSON
SURRY
ISLE OF WIGHT
SOUTHAMPTON
FRANKLIN
SUFFOLK
CHESAPEAKE
VIRGINIA BEACH
0 2 4 8 12 Miles

## Potential for Intersection Congestion Alleviation (PICA)

The recently released AASHTO Highway Safety Manual (HSM) introduced a new method to analyze roadway safety. Historically, roadway safety was analyzed based on the number or rate of crashes, but the HSM recommends identifying locations with the greatest difference between the *observed* number of crashes and the *predicted* number of crashes at a similar facility, i.e. the "Potential for Safety Improvement".

This study introduces a similar measure for identifying possible arterial locations where low-cost changes can improve congestion. This measure is based on the difference between the *observed* peak period travel time index and the *predicted* peak period travel time index. HRTPO staff calls this difference the "Potential for Intersection Congestion Alleviation" (PICA), since much of this difference on the arterial network can be attributed to intersection operations (such as lack of turn lanes, poor signal timing, etc.).

PICA is calculated using the following equation:

PICA = Highest Peak Period TTI – Predicted Peak Period TTI at a similar facility

The predicted travel time index was calculated by HRTPO staff for each arterial roadway segment where INRIX travel time index data was available. The base equation for producing the predicted travel time index in this study is:

$$\text{Predicted TTI} = a * e^{[b \times \text{15-minute volume per lane}]}$$

The two coefficients in the above equation (a and b) vary based on the roadway's class and peak period (AM and PM). Each roadway in the CMP Roadway Network was assigned a class number of 1 through 4 based on roadway design, location, speeds, and access. Roadway class 1 represents rural, high speed locations and roadway class 4 represents roadways in dense, low speed urban locations.

HRTPO staff produced the predicted TTI coefficients (a and b) using exponential regression in Microsoft Excel by comparing historical INRIX travel time index values for each 15-minute interval (for both the AM and PM Peak Periods) with the volume per lane during the same 15-minute time interval. The following coefficients were determined for each roadway class and peak period:

| ROADWAY CLASS | AM PEAK PERIOD | | PM PEAK PERIOD | |
|---|---|---|---|---|
| | a | b | a | b |
| 1 | 1.0186 | 0.0006 | 1.0371 | 0.0005 |
| 2 | 1.0472 | 0.0005 | 1.0626 | 0.0006 |
| 3 | 1.0652 | 0.0004 | 1.0676 | 0.0008 |
| 4 | 1.0530 | 0.0002 | 1.1253 | 0.00006 |

**Table 8 – PICA Equation Coefficients**
Source: HRTPO.

**Table 9** on page 40 shows the top 20 arterial segments in terms of PICA values during the AM Peak Period. Segments with the highest PICA include the Midtown Tunnel and sections of Independence Boulevard, Indian River Road, and Northampton Boulevard.

**Table 10** on page 40 shows the top 20 arterial segments for PICA during the PM Peak Period. The top segments include Fourth View Street approaching the westbound Hampton Roads Bridge-Tunnel, Hampton Boulevard and Brambleton Avenue approaching the Midtown Tunnel, and eastbound Indian River Road. In fact, most of these top segments are approaches to tunnels or adjacent to interstate facilities.

Many locations with high PICA values are well known bottlenecks such as Indian River Road, while other locations may have high PICA values due to intersection problems. Examples include Pembroke Avenue and Aberdeen Road during the AM Peak Period and Chesapeake Boulevard during both peaks.

Although segment PICA values are part of the CMP analysis of corridors in the following sections, the high segment PICA values possibly caused by intersection problems are not addressed individually in this report. Therefore, it may be valuable for VDOT and localities to consider intersection improvements (such as turn lanes and signal retiming) at these locations.

**Appendix F-9 to F-12** contains maps showing the PICA for each arterial roadway segment during the AM and PM Peak Periods.

### Table 9 – Roadway Segments with the Highest Potential for Intersection Congestion Alleviation (PICA) Values – 2013 AM PEAK PERIOD

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGHEST PICA |
|---|---|---|---|---|---|
| NOR/PORT | MIDTOWN TUNNEL ● | MLK FWY/WESTERN FREEWAY | BRAMBLETON AVE | NB | 1.11 |
| VB | INDIAN RIVER RD | FERRELL PKWY | KEMPSVILLE RD | WB | 0.70 |
| HAM | PEMBROKE AVE | SETTLERS LANDING RD | LA SALLE AVE | EB | 0.64 |
| VB | NORTHAMPTON BLVD ● | DIAMOND SPRINGS RD | WESLEYAN DR/NORFOLK CL | WB | 0.64 |
| NOR | NORTHAMPTON BLVD ● | WESLEYAN DR/VA BEACH CL | I-64 | WB | 0.61 |
| VB | INDEPENDENCE BLVD | I-264 | BAXTER RD | SB | 0.58 |
| SH | ROUTE 35 | ROUTE 671 | GRAYS SHOP RD (RTE 673) | NB | 0.57 |
| VB | NORTHAMPTON BLVD | WESLEYAN DR/NORFOLK CL | DIAMOND SPRINGS RD | EB | 0.54 |
| VB | INDEPENDENCE BLVD | HOLLAND RD | BAXTER RD | NB | 0.53 |
| NOR | NORTHAMPTON BLVD | I-64 | WESLEYAN DR/VA BEACH CL | EB | 0.52 |
| HAM | ABERDEEN RD | MERCURY BLVD | TODDS LA | NB | 0.50 |
| VB | WITCHDUCK RD | I-264 | VA BEACH BLVD | NB | 0.43 |
| VB | KEMPSVILLE RD | PROVIDENCE RD | PRINCESS ANNE RD | EB | 0.38 |
| HAM | MERCURY BLVD | I-64 | POWER PLANT PKWY | WB | 0.38 |
| CHES | KEMPSVILLE RD | GREENBRIER PKWY | CHESAPEAKE EXPRESSWAY | WB | 0.36 |
| NOR | ST PAULS BLVD ● | BRAMBLETON AVE | MONTICELLO AVE | NB | 0.36 |
| NOR | CHESAPEAKE BLVD | CROMWELL DR | LAFAYETTE BLVD | SB | 0.35 |
| CHES | MILITARY HWY/GILMERTON BRIDGE | CANAL DR | BAINBRIDGE BLVD | EB | 0.34 |
| NOR | PRINCESS ANNE RD | LLEWELLYN AVE | COLLEY AVE | WB | 0.34 |
| CHES | GEORGE WASHINGTON HWY | MILL CREEK PKWY | I-64 | NB | 0.34 |

Source: HRTPO analysis of INRIX and VDOT data. The Potential for Intersection Congestion Alleviation (PICA) is defined as Highest Peak Period Travel Time Index – Predicted Peak Period Travel Time Index at a similar facility. ● indicates a roadway with a high PICA that is caused by nearby bottlenecks such as tunnel approaches.

### Table 10 – Roadway Segments with the Highest Potential for Intersection Congestion Alleviation (PICA) Values – 2013 PM PEAK PERIOD

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGHEST PICA |
|---|---|---|---|---|---|
| NOR | 4TH VIEW ST ● | OCEAN VIEW AVE | I-64 | WB | 1.30 |
| NOR | HAMPTON BLVD ● | BRAMBLETON AVE | 21ST ST | SB | 1.24 |
| VB | INDIAN RIVER RD | I-64 | CENTERVILLE TNPK | EB | 1.23 |
| VB | INDIAN RIVER RD | CENTERVILLE TNPK | KEMPSVILLE RD | EB | 1.05 |
| NOR | BRAMBLETON AVE ● | COLLEY AVE | HAMPTON BLVD | WB | 0.87 |
| CHES | MILITARY HWY ● | I-464 | BAINBRIDGE BLVD | WB | 0.69 |
| VB | WITCHDUCK RD | I-264 | PRINCESS ANNE RD | SB | 0.68 |
| NOR | NEWTOWN RD | I-264 | VA BEACH BLVD | NB | 0.61 |
| VB | INDIAN RIVER RD | I-64 | PROVIDENCE RD | WB | 0.60 |
| VB | INDEPENDENCE BLVD | I-264 | BAXTER RD | SB | 0.57 |
| JCC/WMB | ROUTE 199 | JOHN TYLER HWY (RTE 5) | JAMESTOWN RD | EB | 0.55 |
| NOR | ST PAULS BLVD ● | BRAMBLETON AVE | I-264 RAMP/MACARTHUR MALL | SB | 0.53 |
| CHES | GEORGE WASHINGTON HWY ● | I-64 | MILL CREEK PKWY | SB | 0.53 |
| CHES | BATTLEFIELD BLVD | GREAT BRIDGE BLVD/KEMPSVILLE RD | CEDAR RD | SB | 0.51 |
| CHES | GREENBRIER PKWY | EDEN WAY | VOLVO PKWY | SB | 0.50 |
| VB | WITCHDUCK RD | I-264 | VA BEACH BLVD | NB | 0.50 |
| NOR | CHESAPEAKE BLVD | I-64 | LITTLE CREEK RD | NB | 0.49 |
| VB | INDIAN RIVER RD | FERRELL PKWY | KEMPSVILLE RD | WB | 0.47 |
| VB | INDIAN RIVER RD | I-64 | PROVIDENCE RD | EB | 0.46 |
| NOR | NEWTOWN RD | I-264 | KEMPSVILLE RD | SB | 0.45 |

Source: HRTPO analysis of INRIX and VDOT data. The Potential for Intersection Congestion Alleviation (PICA) is defined as Highest Peak Period Travel Time Index – Predicted Peak Period Travel Time Index at a similar facility. ● indicates a roadway with a high PICA that is caused by nearby bottlenecks such as tunnel approaches.

## Congestion Duration

Historically, HRTPO staff estimated roadway congestion levels for the Congestion Management Process using traffic volumes and roadway characteristics. The amount of time that each roadway was congested, however, could not be easily determined. Both the level and the duration of congestion can now be measured by using the INRIX speed data.

HRTPO staff determined the duration of congestion during each peak period for each roadway segment with INRIX data by direction. Congestion levels were determined for each of the 15-minute intervals during the AM Peak Period (5:00 am to 9:00 am) and the PM Peak Period (3:00 pm to 7:00 pm) using the severe congestion thresholds of a travel time index greater than or equal to 1.30 for freeways and 1.40 for arterials (as shown in Table 5 on page 28). Each roadway segment may be congested for up to 16 15-minute intervals during each peak period.

**Table 11** shows the ten freeway and five arterial segments that are severely congested for at least two hours (or 8 15-minute intervals) during the AM Peak Period. Seven of the ten freeway segments in this list are either at or on approaches to the Downtown Tunnel and Hampton Roads Bridge-Tunnel.

**Table 12** on page 42 shows those 23 freeway and 29 arterial segments throughout the region that are congested for at least two hours during the PM Peak Period. Similar to the AM Peak Period, the top ten freeway segments with the longest congestion duration during the PM Peak Period are at the Downtown Tunnel and Hampton Roads Bridge-Tunnel. A number of arterials are congested for all four hours during the PM Peak Period, including 4th View Street and Hampton Boulevard approaching the tunnels and sections of Independence Boulevard, Indian River Road, and Newtown Road.

**Appendix F-13 to F-16** contains maps showing the congestion duration for each roadway segment during the AM and PM Peak Periods.

### Table 11 – Roadway Segments that are Severely Congested for at Least Two Hours – 2013 AM PEAK PERIOD

**Freeways**

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | # OF SEVERELY CONGESTED 15-MINUTE INTERVALS |
|---|---|---|---|---|---|---|
| PORT | I-264 | DES MOINES AVE | EFFINGHAM ST | EB | DT | 10 |
| NOR | I-264/BERKLEY BRIDGE | WATERSIDE/CITY HALL/TIDEWATER | I-464 | WB | DT | 10 |
| NOR/PORT | I-264/DOWNTOWN TUNNEL | EFFINGHAM ST | I-464 | EB | DT | 10 |
| HAM | I-64 | RIP RAP RD | SETTLERS LANDING RD | EB | HRBT | 10 |
| HAM | I-64 | SETTLERS LANDING RD | MALLORY ST | EB | HRBT | 10 |
| PORT | I-264 | FREDERICK BLVD | DES MOINES AVE | EB | DT | 9 |
| NOR/PORT | I-264/DOWNTOWN TUNNEL | I-464 | EFFINGHAM ST | WB | DT | 9 |
| PORT | WESTERN FWY | WEST NORFOLK RD | MLK FREEWAY/MIDTOWN TUNNEL | EB | MT | 9 |
| NOR | I-564 | INTERNATIONAL TERMINAL BLVD | ADMIRAL TAUSSIG BLVD | NB | - | 8 |
| CHES | I-64 | MILITARY HWY | GEORGE WASHINGTON HWY | WB | HIGH RISE | 8 |

**Arterials**

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | # OF SEVERELY CONGESTED 15-MINUTE INTERVALS |
|---|---|---|---|---|---|---|
| VB | INDEPENDENCE BLVD | I-264 | BAXTER RD | SB | - | 16 |
| VB | INDIAN RIVER RD | FERRELL PKWY | KEMPSVILLE RD | WB | - | 10 |
| NOR | MIDTOWN TUNNEL | MLK FWY/WESTERN FREEWAY | BRAMBLETON AVE | NB | MT | 10 |
| HAM | ABERDEEN RD | MERCURY BLVD | TODDS LA | NB | - | 8 |
| HAM | PEMBROKE AVE | SETTLERS LANDING RD | LA SALLE AVE | EB | - | 8 |

Source: HRTPO analysis of INRIX data. # of severely congested 15-minute intervals represents the total number of intervals during the peak period where the travel time index exceeds the threshold for severe congestion. Each peak period includes a total of 16 15-minute intervals.

In the following tables, the following abbreviations are used for high profile locations:
DT = Downtown Tunnel GILM = Gilmerton Bridge HIGH RISE = I-64 corridor in Chesapeake HRBT = Hampton Roads Bridge-Tunnel
I-64/I-264 = I-64/I-264 interchange areain Norfolk MMMBT = Monitor-Merrimac Mem. Bridge-Tunnel MT = Midtown Tunnel

## Table 12 – Roadway Segments that are Severely Congested for at Least Two Hours – 2013 PM PEAK PERIOD

### Freeways

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | # OF SEVERELY CONGESTED 15-MINUTE INTERVALS |
|---|---|---|---|---|---|---|
| NOR | I-264 | BRAMBLETON AVE | WATERSIDE/CITY HALL/TIDEWATER | WB | DT | 16 |
| NOR | I-264/BERKLEY BRIDGE | WATERSIDE/CITY HALL/TIDEWATER | I-464 | WB | DT | 16 |
| NOR/PORT | I-264/DOWNTOWN TUNNEL | I-464 | EFFINGHAM ST | WB | DT | 16 |
| HAM | I-64 | SETTLERS LANDING RD | MALLORY ST | EB | HRBT | 16 |
| NOR | I-64 | 4TH VIEW AVE | OCEAN VIEW AVE | WB | HRBT | 16 |
| NOR | I-64 | BAY AVE | 4TH VIEW AVE | WB | HRBT | 16 |
| HAM | I-64 | RIP RAP RD | SETTLERS LANDING RD | EB | HRBT | 15 |
| NOR | I-64 | GRANBY ST | BAY AVE | WB | HRBT | 15 |
| PORT | I-264/DOWNTOWN TUNNEL | EFFINGHAM ST | I-464 | EB | DT | 13 |
| NOR | I-64 | I-564/LITTLE CREEK RD | GRANBY ST | WB | HRBT | 13 |
| CHES | I-64 | BATTLEFIELD BLVD | I-464 | EB | HIGH RISE | 12 |
| HAM/NOR | I-64/HRBT | OCEAN VIEW AVE | MALLORY ST | WB | HRBT | 12 |
| NN | I-664 | 23RD ST | TERMINAL AVE | SB | MMMBT | 12 |
| HAM | I-64 | ARMISTEAD AVE | RIP RAP RD | EB | HRBT | 11 |
| NN | I-664 | CHESTNUT AVE | 23RD ST | SB | MMMBT | 11 |
| PORT | I-264 | DES MOINES AVE | EFFINGHAM ST | EB | DT | 9 |
| VB | I-264 | NEWTOWN RD/ECL NORFOLK | WITCHDUCK RD | EB | I-64/I-264 | 8 |
| HAM | I-64 | I-664 | ARMISTEAD AVE | EB | HRBT | 8 |
| CHES | I-64 | GREENBRIER PKWY | BATTLEFIELD BLVD | EB | HIGH RISE | 8 |
| NOR | I-64 | TIDEWATER DR | CHESAPEAKE BLVD | EB | - | 8 |
| NOR | I-64 | CHESAPEAKE BLVD | NORVIEW AVE | EB | - | 8 |
| NOR | I-64 | MILITARY HWY | NORTHAMPTON BLVD | EB | - | 8 |
| NOR | I-64 | NORTHAMPTON BLVD | I-264 | EB | - | 8 |

### Arterials

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | # OF SEVERELY CONGESTED 15-MINUTE INTERVALS |
|---|---|---|---|---|---|---|
| NOR | 4TH VIEW ST | OCEAN VIEW AVE | I-64 | WB | HRBT | 16 |
| NOR | HAMPTON BLVD | 21ST ST | BRAMBLETON AVE | SB | MT | 16 |
| VB | INDEPENDENCE BLVD | I-264 | BAXTER RD | SB | - | 16 |
| VB | INDIAN RIVER RD | I-64 | CENTERVILLE TNPK | EB | - | 16 |
| VB | INDIAN RIVER RD | FERRELL PKWY | KEMPSVILLE RD | WB | - | 16 |
| NOR | NEWTOWN RD | I-264 | VA BEACH BLVD | NB | - | 16 |
| VB | INDIAN RIVER RD | CENTERVILLE TNPK | KEMPSVILLE RD | EB | - | 15 |
| VB | INDIAN RIVER RD | I-64 | PROVIDENCE RD | WB | - | 15 |
| VB | WITCHDUCK RD | I-264 | VA BEACH BLVD | NB | - | 13 |
| CHES | GEORGE WASHINGTON HWY | I-64 | MOSES GRANDY TR @ HINTON AVE | SB | - | 12 |
| VB | LONDON BRIDGE RD | VA BEACH BLVD | POTTERS RD | SB | - | 12 |
| CHES | MILITARY HWY | I-464 | BAINBRIDGE BLVD | WB | GILM | 12 |
| NOR | NEWTOWN RD | I-264 | KEMPSVILLE RD | SB | - | 12 |
| JCC/WMB | ROUTE 199 | JOHN TYLER HWY (RTE 5) | JAMESTOWN RD | EB | - | 12 |
| VB | WITCHDUCK RD | I-264 | PRINCESS ANNE RD | SB | - | 12 |
| NOR | CHESAPEAKE BLVD | I-64 | LITTLE CREEK RD | NB | - | 11 |
| NN | FORT EUSTIS BLVD | WARWICK BLVD | I-64 | EB | - | 11 |
| CHES | GREENBRIER PKWY | I-64 | VOLVO PKWY | SB | - | 10 |
| CHES | BATTLEFIELD BLVD | GREAT BRIDGE BLVD/KEMPSVILLE RD | CEDAR RD | SB | - | 9 |
| NOR | BRAMBLETON AVE | COLLEY AVE | HAMPTON BLVD | WB | MT | 9 |
| NOR | NORTHAMPTON BLVD | DIAMOND SPRINGS RD | I-64 | WB | - | 9 |
| NOR | ST PAULS BLVD | BRAMBLETON AVE | I-264 RAMP/MACARTHUR MALL | SB | - | 9 |
| VB | 22ND ST | ATLANTIC AVE | PARKS AVE | WB | - | 8 |
| CHES | BATTLEFIELD BLVD | I-64 | VOLVO PKWY | SB | - | 8 |
| NOR | BRAMBLETON AVE | HAMPTON BLVD | COLLEY AVE | EB | - | 8 |
| NOR | CITY HALL AVE | ST PAULS BLVD | BOUSH ST | WB | - | 8 |
| CHES | DOMINION BLVD | GREAT BRIDGE BLVD | CEDAR RD | SB | - | 8 |
| NN | JEFFERSON AVE | DENBIGH BLVD | BLAND BLVD | NB | - | 8 |
| NOR | NEWTOWN RD | VA BEACH BLVD | I-264 | SB | - | 8 |

Source: HRTPO analysis of INRIX data. # of severely congested 15-minute intervals represents the total number of intervals during the peak period where the travel time index exceeds the threshold for severe congestion. Each peak period includes a total of 16 15-minute intervals.

## Total Delay

Although the travel time index describes the level of congestion that each roadway user experiences, it does not measure the total congestion of the roadway segment. Total delay, however, takes into account both the congestion level and the volume of users (vehicles) that each roadway carries.

HRTPO staff calculated the total amount of delay that occurs on each roadway segment by direction during each peak period. This required combining the average and free flow travel speeds based on the INRIX data with the traffic volume data collected by VDOT, the localities, etc.

Total delay per mile was calculated by direction per 15-minute interval for each roadway segment where INRIX data was available. The equation used to calculate total delay is as follows:

$$\text{Total Delay} = (\text{Average Travel Time} - \text{Free flow Travel Time}) \times \text{Volume}$$

These 15-minute delay values were then summed to produce a total delay value for both the entire AM Peak Period and PM Peak Period. Because roadway segments vary in length, this total delay was then divided by the total length of the segment to produce a total delay per mile value for each peak period.

**Table 13** on page 44 shows the top 20 freeway segments and top 20 arterial segments in terms of highest total delay per mile during the AM Peak Period. Freeway segments with the highest delay per mile include approaches to the Downtown Tunnel, Hampton Roads Bridge-Tunnel, and High Rise Bridge. Top arterial segments include the Midtown Tunnel and sections of Independence Boulevard, Indian River Road, and Northampton Boulevard.

**Table 14** on page 45 shows the top 20 freeway segments and top 20 arterial segments in terms of highest total delay per mile during the PM Peak Period. Nine of the ten freeway segments with the highest delay per mile during the PM Peak Period are approaches to the Downtown Tunnel and Hampton Roads Bridge-Tunnel. In terms of arterials, three of the top five segments with the highest delay per mile are sections of Indian River Road in Virginia Beach.

**Northampton Boulevard at I-64**

**Appendix F-17 to F-20** contains maps showing total delay per mile for each roadway segment during the AM and PM Peak Periods.

## Table 13 – Roadway Segments with the Highest Total Delay per Mile – 2013 AM PEAK PERIOD

### Freeways

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | TOTAL HOURS OF DELAY PER MILE - AM PEAK PERIOD |
|---|---|---|---|---|---|---|
| PORT | I-264 | DES MOINES AVE | EFFINGHAM ST | EB | DT | 388.2 |
| PORT | I-264 | FREDERICK BLVD | DES MOINES AVE | EB | DT | 229.9 |
| NOR/PORT | I-264/DOWNTOWN TUNNEL | EFFINGHAM ST | I-464 | EB | DT | 208.7 |
| HAM | I-64 | SETTLERS LANDING RD | MALLORY ST | EB | HRBT | 194.5 |
| HAM | I-64 | RIP RAP RD | SETTLERS LANDING RD | EB | HRBT | 186.4 |
| NOR | I-264/BERKLEY BRIDGE | WATERSIDE/CITY HALL/TIDEWATER | I-464 | WB | DT | 160.2 |
| CHES | I-64 | MILITARY HWY | GEORGE WASHINGTON HWY | WB | HIGH RISE | 125.8 |
| NOR | I-564 | ADMIRAL TAUSSIG BLVD | INTERNATIONAL TERMINAL BLVD | NB | - | 89.6 |
| NOR/PORT | I-264/DOWNTOWN TUNNEL | I-464 | EFFINGHAM ST | WB | DT | 85.8 |
| NOR/VB | I-64 | INDIAN RIVER RD | I-264 | WB | I-64/I-264 | 77.6 |
| NOR | I-464 | SOUTH MAIN ST | I-264 | NB | DT | 72.3 |
| PORT | WESTERN FWY | WEST NORFOLK RD | MLK FREEWAY/MIDTOWN TUNNEL | EB | MT | 63.1 |
| NOR | I-264/BERKLEY BRIDGE | I-464 | WATERSIDE/CITY HALL/TIDEWATER | EB | DT | 54.0 |
| NOR | I-64 | I-264 | NORTHAMPTON BLVD | WB | - | 53.6 |
| HAM | I-64 | ARMISTEAD AVE | RIP RAP RD | EB | HRBT | 49.5 |
| NOR | I-64 | CHESAPEAKE BLVD | TIDEWATER DR | WB | - | 48.0 |
| NOR | I-64 | NORTHAMPTON BLVD | MILITARY HWY | WB | - | 45.3 |
| CHES/NOR | I-464 | POINDEXTER ST | SOUTH MAIN ST | NB | DT | 45.1 |
| CHES | I-64 | I-264&664 | MILITARY HWY | WB | HIGH RISE | 44.9 |
| NOR | I-64 | NORVIEW AVE | CHESAPEAKE BLVD | WB | - | 43.6 |

### Arterials

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | TOTAL HOURS OF DELAY PER MILE - AM PEAK PERIOD |
|---|---|---|---|---|---|---|
| VB | INDEPENDENCE BLVD | I-264 | BAXTER RD | SB | - | 143.4 |
| VB | INDIAN RIVER RD | FERRELL PKWY | KEMPSVILLE RD | WB | - | 139.8 |
| NOR/PORT | MIDTOWN TUNNEL | MLK FWY/WESTERN FREEWAY | BRAMBLETON AVE | NB | MT | 95.5 |
| NOR | NORTHAMPTON BLVD | WESLEYAN DR/VA BEACH CL | I-64 | WB | - | 94.6 |
| NOR | NORTHAMPTON BLVD | I-64 | WESLEYAN DR/VA BEACH CL | EB | - | 93.7 |
| VB | NORTHAMPTON BLVD | WESLEYAN DR/NORFOLK CL | DIAMOND SPRINGS RD | EB | - | 77.3 |
| VB | NORTHAMPTON BLVD | DIAMOND SPRINGS RD | WESLEYAN DR/NORFOLK CL | WB | - | 72.6 |
| VB | INDIAN RIVER RD | I-64 | CENTERVILLE TNPK | EB | - | 72.4 |
| VB | INDEPENDENCE BLVD | HOLLAND RD | BAXTER RD | NB | - | 53.6 |
| VB | INDIAN RIVER RD | KEMPSVILLE RD | CENTERVILLE TNPK | WB | - | 52.3 |
| NOR | HAMPTON BLVD | INTERNATIONAL TERMINAL BLVD | ADM TAUSSIG BLVD | NB | - | 38.1 |
| HAM | MERCURY BLVD | I-64 | POWER PLANT PKWY | WB | - | 36.8 |
| NOR | BRAMBLETON AVE | I-264 | PARK AVE | WB | - | 35.5 |
| NOR | ADMIRAL TAUSSIG BLVD | I-564 | HAMPTON BLVD | WB | - | 35.5 |
| NOR | ST PAULS BLVD | I-264 RAMP/MACARTHUR MALL | BRAMBLETON AVE | NB | - | 33.8 |
| NOR | BRAMBLETON AVE | BOUSH ST | ST PAULS BLVD | EB | - | 32.9 |
| CHES | GREENBRIER PKWY | I-64 | WOODLAKE DR | NB | - | 31.6 |
| CHES | BATTLEFIELD BLVD | I-64 | VOLVO PKWY | SB | - | 31.6 |
| VB | PRINCESS ANNE RD | INDEPENDENCE BLVD | DAM NECK RD | EB | - | 31.5 |
| VB | ROSEMONT RD | I-264 | VA BEACH BLVD | NB | - | 31.2 |

Source: HRTPO analysis of INRIX data. Total hours of delay per mile includes the sum of the delay that each vehicle experiences during the peak period divided by the total length of the segment.

In the following tables, the following abbreviations are used for high profile locations:
DT = Downtown Tunnel GILM = Gilmerton Bridge HIGH RISE = I-64 corridor in Chesapeake HRBT = Hampton Roads Bridge-Tunnel
I-64/I-264 = I-64/I-264 interchange area in Norfolk MMMBT = Monitor-Merrimac Mem. Bridge-Tunnel MT = Midtown Tunnel

## Table 14 – Roadway Segments with the Highest Total Delay per Mile – 2013 PM PEAK PERIOD

### Freeways

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | TOTAL HOURS OF DELAY PER MILE - PM PEAK PERIOD |
|---|---|---|---|---|---|---|
| NOR | I-264/BERKLEY BRIDGE | WATERSIDE/CITY HALL/TIDEWATER | I-464 | WB | DT | 1100.4 |
| NOR | I-264 | BRAMBLETON AVE | WATERSIDE/CITY HALL/TIDEWATER | WB | DT | 278.2 |
| CHES | I-64 | BATTLEFIELD BLVD | I-464 | EB | HIGH RISE | 273.9 |
| NOR | I-64 | BAY AVE | 4TH VIEW AVE | WB | HRBT | 257.7 |
| HAM | I-64 | SETTLERS LANDING RD | MALLORY ST | EB | HRBT | 214.0 |
| HAM | I-64 | RIP RAP RD | SETTLERS LANDING RD | EB | HRBT | 209.1 |
| NOR | I-64 | GRANBY ST | BAY AVE | WB | HRBT | 201.3 |
| NOR/PORT | I-264/DOWNTOWN TUNNEL | I-464 | EFFINGHAM ST | WB | DT | 199.9 |
| NOR | I-64 | 4TH VIEW AVE | OCEAN VIEW AVE | WB | HRBT | 170.4 |
| NOR/PORT | I-264/DOWNTOWN TUNNEL | EFFINGHAM ST | I-464 | EB | DT | 155.6 |
| NN | I-664 | CHESTNUT AVE | 23RD ST | SB | MMMBT | 148.4 |
| NOR | I-64 | CHESAPEAKE BLVD | NORVIEW AVE | EB | - | 143.9 |
| NOR | I-264 | I-64 | NEWTOWN RD/WCL VA. BEACH | EB | I-64/I-264 | 141.1 |
| NN | I-664 | 23RD ST | TERMINAL AVE | SB | MMMBT | 140.0 |
| VB | I-264 | NEWTOWN RD/ECL NORFOLK | WITCHDUCK RD | EB | I-64/I-264 | 137.9 |
| NOR | I-64 | I-564/LITTLE CREEK RD | TIDEWATER DR | EB | - | 130.1 |
| NOR | I-64 | TIDEWATER DR | CHESAPEAKE BLVD | EB | - | 125.2 |
| NOR | I-64 | I-564/LITTLE CREEK RD | GRANBY ST | WB | HRBT | 116.7 |
| NOR | I-64 | MILITARY HWY | NORTHAMPTON BLVD | EB | - | 111.6 |
| NOR | I-64 | NORVIEW AVE | MILITARY HWY | EB | - | 102.5 |

### Arterials

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | TOTAL HOURS OF DELAY PER MILE - PM PEAK PERIOD |
|---|---|---|---|---|---|---|
| VB | INDIAN RIVER RD | I-64 | CENTERVILLE TNPK | EB | - | 227.3 |
| VB | INDIAN RIVER RD | CENTERVILLE TNPK | KEMPSVILLE RD | EB | - | 225.7 |
| VB | INDEPENDENCE BLVD | I-264 | BAXTER RD | SB | - | 145.8 |
| NOR | HAMPTON BLVD | 21ST ST | BRAMBLETON AVE | SB | MT | 144.6 |
| VB | INDIAN RIVER RD | FERRELL PKWY | KEMPSVILLE RD | WB | - | 141.6 |
| CHES | GREENBRIER PKWY | I-64 | EDEN WAY | SB | - | 139.0 |
| VB | INDEPENDENCE BLVD | HOLLAND RD | BAXTER RD | NB | - | 121.8 |
| CHES | GREENBRIER PKWY | I-64 | WOODLAKE DR | NB | - | 109.4 |
| NOR | ST PAULS BLVD | BRAMBLETON AVE | I-264 RAMP/MACARTHUR MALL | SB | - | 106.2 |
| NOR | NORTHAMPTON BLVD | WESLEYAN DR/VA BEACH CL | I-64 | WB | - | 104.9 |
| CHES | BATTLEFIELD BLVD | I-64 | VOLVO PKWY | SB | - | 103.1 |
| VB | INDEPENDENCE BLVD | VA BEACH BLVD | I-264 | SB | - | 95.6 |
| CHES | GREENBRIER PKWY | EDEN WAY | I-64 | NB | - | 95.5 |
| NN | JEFFERSON AVE | DENBIGH BLVD | BLAND BLVD | NB | - | 92.7 |
| VB | INDEPENDENCE BLVD | BAXTER RD | I-264 | NB | - | 89.7 |
| VB | NORTHAMPTON BLVD | DIAMOND SPRINGS RD | WESLEYAN DR/NORFOLK CL | WB | | 88.9 |
| NN | JEFFERSON AVE | I-64 | BLAND BLVD | SB | - | 88.0 |
| CHES | BATTLEFIELD BLVD | GREAT BRIDGE BLVD/KEMPSVILLE RD | CEDAR RD | SB | - | 87.9 |
| VB | WITCHDUCK RD | I-264 | VA BEACH BLVD | NB | - | 85.7 |
| NOR | NEWTOWN RD | I-264 | VA BEACH BLVD | NB | - | 83.8 |

Source: HRTPO analysis of INRIX data. Total hours of delay per mile includes the sum of the delay that each vehicle experiences during the peak period divided by the total length of the segment.

In the following tables, the following abbreviations are used for high profile locations:
DT = Downtown Tunnel GILM = Gilmerton Bridge HIGH RISE = I-64 corridor in Chesapeake HRBT = Hampton Roads Bridge-Tunnel
I-64/I-264 = I-64/I-264 interchange area in Norfolk MMMBT = Monitor-Merrimac Mem. Bridge-Tunnel MT = Midtown Tunnel

## Travel Time Reliability

Roadway congestion is prevalent throughout Hampton Roads, but congestion levels are not the same each day. Daily congestion levels can vary greatly from average congestion levels due to a variety of factors including crashes, bad weather, special events, or roadway maintenance (**Figure 12**).

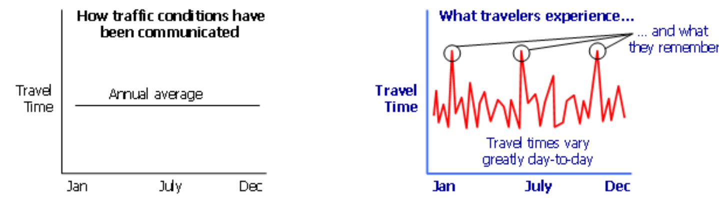



**Figure 12 – Average versus Daily Travel Times**
Source: FHWA.

Travel time "reliability" is defined as how steady travel times are over the course of time, as measured generally from day to day. The reliability of travel times is very important for many roadway users, such as those that must arrive on time to work or an appointment, catch a flight at the airport, or pick up children from day care. Since the consistency and dependability of travel times is important for so many roadway users, analyzing not only average congestion levels but also the travel time reliability of the regional roadway network is important.

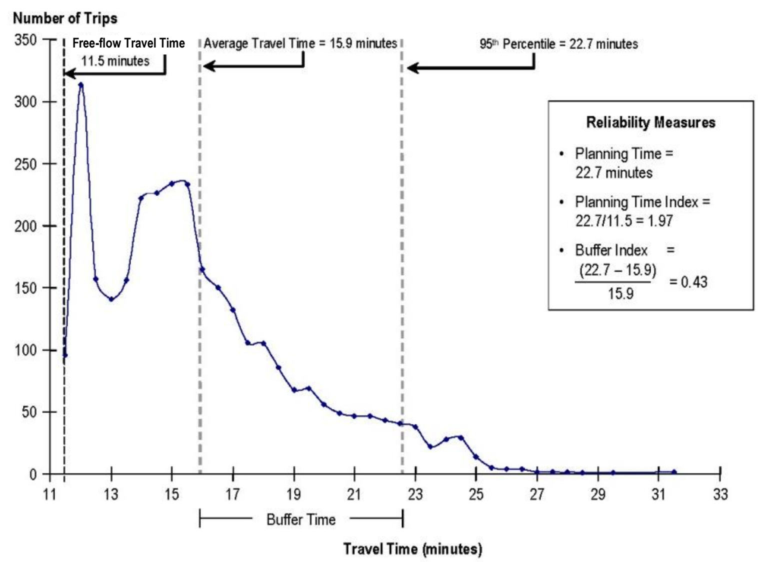



**Figure 13 – Relationship between Various Delay and Reliability Measures**
Source: FHWA.

Two measures are commonly used to describe the travel time reliability of the roadway network – the "buffer index" and the "planning time index". Both of these measures are described below and shown in **Figure 13**.

The buffer index uses the buffer time to measure travel time reliability compared to typical conditions. The buffer time is the extra time that travelers must add to their average travel time when planning trips to ensure that they will arrive on-time 95 percent of the time. The buffer index has a minimum value of zero and increases as the roadway network becomes less reliable.

The buffer index is calculated as:

$$\text{Buffer Index} = \frac{95^{th}\text{ percentile Travel Time} - \text{Average Travel Time}}{\text{Average Travel Time}}$$

The planning time index measures reliability by comparing travel times during some of the most congested conditions with travel times in free-flow, uncongested conditions. The planning time index is generally greater than or equal to one and increases as the roadway network becomes more congested and less reliable.

The planning time index is calculated as:

$$\text{Planning Time Index} = \frac{95^{th}\text{ percentile Travel Time}}{\text{Free-flow Travel Time}}$$

Both the buffer and planning time indices were calculated in 15-minute intervals during both peak periods using the INRIX data for Tuesdays through Thursdays in 2013. HRTPO staff determined the highest buffer and planning time indices during both the AM and PM Peak Periods, and these indices are included in **Appendices B and C**. Because many agencies report the planning time index for their reliability analyses – including FHWA (through the quarterly Urban Congestion Reports), Washington

DOT in their Gray Book, and the Texas Transportation Institute – the planning time index is the reliability measure that is primarily highlighted in this report.

**Table 15** on page 48 shows the top 20 freeway segments and top 20 arterial segments in terms of highest planning time indices during the AM Peak Period. Most of the freeway segments with the highest planning time indices were approaches to the Downtown Tunnel, Hampton Roads Bridge-Tunnel, High Rise Bridge, and Midtown Tunnel. With a planning time index of 9.18, travel on I-264 Eastbound between Frederick Boulevard and Des Moines Avenue took more than nine times longer during the most congested periods than it did in uncongested, free-flow conditions.

The arterial segment with the highest planning time index (3.44) during the AM Peak Period was the northbound Midtown Tunnel. Other arterial segments with high planning time indices include sections of Northampton Boulevard, Indian River Road, Independence Boulevard, and Military Highway.

**Table 16** on page 49 shows the top 20 freeway segments and top 20 arterial segments in terms of highest planning time indices during the PM Peak Period. The freeway segments with the highest planning time indices during the PM Peak Period were approaches to the Hampton Roads Bridge-Tunnel, Monitor-Merrimac Memorial Bridge Tunnel, Downtown Tunnel, and High Rise Bridge.

In terms of arterials, those with the highest planning time indices during the PM Peak Period include the Brambleton Avenue and Hampton Boulevard approaches to the Midtown Tunnel, Fourth View Street approaching I-64 westbound and the Hampton Roads Bridge-Tunnel, and sections of Indian River Road and Military Highway approaching the Gilmerton Bridge.

**Appendix F-21 to F-24** contains maps showing the highest planning time index for each roadway segment during the AM and PM Peak Periods.

**I-64 Approaching the High Rise Bridge Near I-464**

## Table 15 – Roadway Segments with the Highest Planning Time Index – 2013 AM PEAK PERIOD

### Freeways

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | HIGHEST PLANNING TIME INDEX |
|---|---|---|---|---|---|---|
| PORT | I-264 | FREDERICK BLVD | DES MOINES AVE | EB | DT | 9.18 |
| PORT | I-264 | DES MOINES AVE | EFFINGHAM ST | EB | DT | 8.64 |
| HAM | I-64 | RIP RAP RD | SETTLERS LANDING RD | EB | HRBT | 8.31 |
| HAM | I-64 | ARMISTEAD AVE | RIP RAP RD | EB | HRBT | 6.16 |
| CHES | I-64 | MILITARY HWY | GEORGE WASHINGTON HWY | WB | HIGH RISE | 5.86 |
| CHES | I-64 | I-264 & 664 | MILITARY HWY | WB | HIGH RISE | 5.33 |
| HAM | I-64 | SETTLERS LANDING RD | MALLORY ST | EB | HRBT | 4.64 |
| NOR | I-264/BERKLEY BRIDGE | WATERSIDE/CITY HALL/TIDEWATER | I-464 | WB | DT | 4.19 |
| PORT | I-264 | PORTSMOUTH BLVD | FREDERICK BLVD | EB | DT | 4.13 |
| PORT | WESTERN FWY | WEST NORFOLK RD | MLK FREEWAY/MIDTOWN TUNNEL | EB | MT | 3.96 |
| NOR | I-464 | SOUTH MAIN ST | I-264 | NB | DT | 3.92 |
| PORT | WESTERN FWY | CEDAR LN | WEST NORFOLK RD | EB | MT | 3.87 |
| NOR | I-64 | CHESAPEAKE BLVD | TIDEWATER DR | WB | - | 3.86 |
| CHES/NOR | I-464 | POINDEXTER ST | SOUTH MAIN ST | NB | DT | 3.79 |
| NOR/PORT | I-264/DOWNTOWN TUNNEL | EFFINGHAM ST | I-464 | EB | DT | 3.78 |
| NOR | I-64 | NORVIEW AVE | CHESAPEAKE BLVD | WB | - | 3.27 |
| NOR | I-564 | ADMIRAL TAUSSIG BLVD | INTERNATIONAL TERMINAL BLVD | NB | - | 3.22 |
| VB | I-64 | GREENBRIER PKWY | INDIAN RIVER RD | WB | - | 3.13 |
| NOR/VB | I-64 | INDIAN RIVER RD | I-264 | WB | I-64/I-264 | 2.96 |
| NOR | I-264 | BRAMBLETON AVE | WATERSIDE/CITY HALL/TIDEWATER | WB | DT | 2.82 |

### Arterials

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | HIGHEST PLANNING TIME INDEX |
|---|---|---|---|---|---|---|
| NOR/PORT | MIDTOWN TUNNEL | MLK FWY/WESTERN FREEWAY | BRAMBLETON AVE | NB | MT | 3.44 |
| NOR/VB | NORTHAMPTON BLVD | DIAMOND SPRINGS RD | I-64 | WB | - | 3.14 |
| VB | INDIAN RIVER RD | FERRELL PKWY | KEMPSVILLE RD | WB | - | 3.02 |
| VB | INDEPENDENCE BLVD | HOLLAND RD | BAXTER RD | NB | - | 2.90 |
| VB | INDIAN RIVER RD | KEMPSVILLE RD | CENTERVILLE TNPK | WB | - | 2.53 |
| CHES | MILITARY HWY/GILMERTON BRIDGE | CANAL DR | BAINBRIDGE BLVD | EB | GILM | 2.37 |
| VB | INDIAN RIVER RD | PROVIDENCE RD | MILITARY HWY | WB | - | 2.37 |
| NOR/VB | NORTHAMPTON BLVD | I-64 | DIAMOND SPRINGS RD | EB | - | 2.36 |
| VB | WITCHDUCK RD | PRINCESS ANNE RD | I-264 | NB | - | 2.28 |
| CHES | BATTLEFIELD BLVD | CEDAR RD | GREAT BRIDGE BLVD/KEMPSVILLE RD | NB | - | 2.23 |
| HAM | MERCURY BLVD | I-64 | POWER PLANT PKWY | WB | - | 2.21 |
| VB | INDEPENDENCE BLVD | I-264 | BAXTER RD | SB | - | 2.20 |
| NOR | BRAMBLETON AVE | BOUSH ST | COLLEY AVE | WB | - | 2.12 |
| VB | WITCHDUCK RD | I-264 | VA BEACH BLVD | NB | - | 2.10 |
| VB | KEMPSVILLE RD | PROVIDENCE RD | PRINCESS ANNE RD | EB | - | 2.09 |
| VB | MILITARY HWY | PROVIDENCE RD | INDIAN RIVER RD | NB | - | 2.02 |
| VB | WITCHDUCK RD | VA BEACH BLVD | I-264 | SB | - | 2.01 |
| HAM | PEMBROKE AVE | SETTLERS LANDING RD | LA SALLE AVE | EB | - | 2.01 |
| VB | INDIAN RIVER RD | I-64 | CENTERVILLE TNPK | EB | - | 2.00 |
| NOR | ST PAULS BLVD | BRAMBLETON AVE | I-264 RAMP/MACARTHUR MALL | SB | - | 1.97 |

Source: HRTPO analysis of INRIX data.

The planning time index measures reliability by comparing travel times during some of the most congested conditions with travel times in free-flow, uncongested conditions. Planning Time Index = 95th percentile Travel Time/Free-flow Travel Time

In the following tables, the following abbreviations are used for high profile locations:
DT = Downtown Tunnel GILM = Gilmerton Bridge HIGH RISE = I-64 corridor in Chesapeake HRBT = Hampton Roads Bridge-Tunnel
I-64/I-264 = I-64/I-264 interchange area in Norfolk MMMBT = Monitor-Merrimac Mem. Bridge-Tunnel MT = Midtown Tunnel

## Table 16 – Roadway Segments with the Highest Planning Time Index – 2013 PM PEAK PERIOD

### Freeways

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | HIGHEST PLANNING TIME INDEX |
|---|---|---|---|---|---|---|
| HAM | I-64 | RIP RAP RD | SETTLERS LANDING RD | EB | HRBT | 10.00 |
| NN | I-664 | CHESTNUT AVE | 23RD ST | SB | MMMBT | 9.28 |
| NOR | I-64 | I-564/LITTLE CREEK RD | GRANBY ST | WB | HRBT | 8.47 |
| HAM | I-64 | ARMISTEAD AVE | RIP RAP RD | EB | HRBT | 8.35 |
| NOR | I-264 | BRAMBLETON AVE | WATERSIDE/CITY HALL/TIDEWATER | WB | DT | 7.95 |
| HAM | I-64 | I-664 | ARMISTEAD AVE | EB | HRBT | 7.66 |
| NN | I-664 | 23RD ST | TERMINAL AVE | SB | MMMBT | 7.56 |
| NOR | I-64 | GRANBY ST | BAY AVE | WB | HRBT | 6.83 |
| NOR | I-264/BERKLEY BRIDGE | WATERSIDE/CITY HALL/TIDEWATER | I-464 | WB | DT | 6.68 |
| HAM | I-64 | SETTLERS LANDING RD | MALLORY ST | EB | HRBT | 6.11 |
| CHES | I-64 | BATTLEFIELD BLVD | I-464 | EB | HIGH RISE | 6.06 |
| NOR | I-64 | BAY AVE | 4TH VIEW AVE | WB | HRBT | 5.85 |
| CHES | I-64 | GREENBRIER PKWY | BATTLEFIELD BLVD | EB | HIGH RISE | 5.28 |
| PORT | I-264 | DES MOINES AVE | EFFINGHAM ST | EB | DT | 4.91 |
| NOR | I-64 | I-564/LITTLE CREEK RD | TIDEWATER DR | EB | - | 4.52 |
| NOR | I-64 | GRANBY ST | I-564/LITTLE CREEK RD | EB | - | 4.34 |
| NOR/VB | I-64 | INDIAN RIVER RD | I-264 | WB | I-64/I-264 | 3.85 |
| NOR | I-64 | TIDEWATER DR | I-564/LITTLE CREEK RD | WB | HRBT | 3.77 |
| NOR | I-64 | TIDEWATER DR | CHESAPEAKE BLVD | EB | - | 3.76 |
| NOR | I-64 | CHESAPEAKE BLVD | NORVIEW AVE | EB | - | 3.70 |

### Arterials

| JURIS-DICTION | FACILITY NAME | SEGMENT FROM | SEGMENT TO | DIR | HIGH PROFILE LOCATION | HIGHEST PLANNING TIME INDEX |
|---|---|---|---|---|---|---|
| NOR | BRAMBLETON AVE | COLLEY AVE | HAMPTON BLVD | WB | MT | 3.72 |
| VB | INDIAN RIVER RD | I-64 | CENTERVILLE TNPK | EB | - | 3.65 |
| CHES | MILITARY HWY | I-464 | BAINBRIDGE BLVD | WB | GILM | 3.56 |
| NOR | 4TH VIEW ST | OCEAN VIEW AVE | I-64 | WB | HRBT | 3.42 |
| NOR | HAMPTON BLVD | 21ST ST | BRAMBLETON AVE | SB | MT | 3.37 |
| NN | FORT EUSTIS BLVD | WARWICK BLVD | I-64 | EB | - | 3.30 |
| VB | INDIAN RIVER RD | CENTERVILLE TNPK | KEMPSVILLE RD | EB | - | 3.04 |
| JCC/WMB | ROUTE 199 | JOHN TYLER HWY (RTE 5) | JAMESTOWN RD | EB | - | 2.75 |
| CHES | BATTLEFIELD BLVD | GREAT BRIDGE BLVD/KEMPSVILLE RD | CEDAR RD | SB | - | 2.73 |
| NOR | HAMPTON BLVD | 27TH ST | 21ST ST | SB | MT | 2.72 |
| NOR | NEWTOWN RD | I-264 | VA BEACH BLVD | NB | - | 2.68 |
| NOR/VB | NORTHAMPTON BLVD | DIAMOND SPRINGS RD | I-64 | WB | - | 2.65 |
| VB | INDIAN RIVER RD | PROVIDENCE RD | I-64 | EB | - | 2.49 |
| VB | WITCHDUCK RD | I-264 | PRINCESS ANNE RD | SB | - | 2.43 |
| CHES | GEORGE WASHINGTON HWY | I-64 | MOSES GRANDY TR @ HINTON AVE | SB | - | 2.41 |
| VB | INDIAN RIVER RD | FERRELL PKWY | KEMPSVILLE RD | WB | - | 2.36 |
| NOR | ST PAULS BLVD | BRAMBLETON AVE | I-264 RAMP/MACARTHUR MALL | SB | - | 2.36 |
| VB | WITCHDUCK RD | I-264 | VA BEACH BLVD | NB | - | 2.32 |
| NN | OYSTER POINT RD | CANON BLVD | JEFFERSON AVE | WB | - | 2.29 |
| CHES | BATTLEFIELD BLVD | I-64 | VOLVO PKWY | SB | - | 2.24 |

Source: HRTPO analysis of INRIX data.

The planning time index measures reliability by comparing travel times during some of the most congested conditions with travel times in free-flow, uncongested conditions. Planning Time Index = 95th percentile Travel Time/Free-flow Travel Time

In the following tables, the following abbreviations are used for high profile locations:
DT = Downtown Tunnel GILM = Gilmerton Bridge HIGH RISE = I-64 corridor in Chesapeake HRBT = Hampton Roads Bridge-Tunnel
I-64/I-264 = I-64/I-264 interchange area in Norfolk MMMBT = Monitor-Merrimac Mem. Bridge-Tunnel MT = Midtown Tunnel

# RANKING OF CMP CONGESTED CORRIDORS

Given funding constraints, it is imperative that planners and officials select transportation projects that will be the most beneficial to the region. Therefore, HRTPO staff ranked CMP Congested Corridors accounting not only for the congestion measures shown previously in this report but also for several issues important to the HRTPO Board as reflected in the LRTP Project Prioritization Tool. These issues include freight movement, the military, and safety.

This section details the methodology used to determine which congested corridors throughout Hampton Roads would be analyzed in this CMP report.

## CMP SEGMENT SCORING CRITERIA

A variety of factors were considered for comparing congested locations. Based on an assessment of available data as well as discussions with other transportation professionals throughout the region, five factors were included in the "CMP Segment Scoring Criteria" as shown below.

**CMP SEGMENT SCORING CRITERIA**

1) Existing Congestion
2) Existing Truck Volumes
3) Future Truck Delay
4) Safety
5) National Highway System (NHS)/Military

Once these five criteria were selected, weights were applied to each criterion to produce scores for each congested roadway segment.

CMP roadway segments without INRIX speed data must have an Existing Level of Service (LOS) of E or F to be scored, while segments with INRIX speed data must have a travel time index (TTI) > 1.3 for freeways or TTI > 1.4 for arterials to be scored.


**I-64 Westbound Approaching the High Rise Bridge**

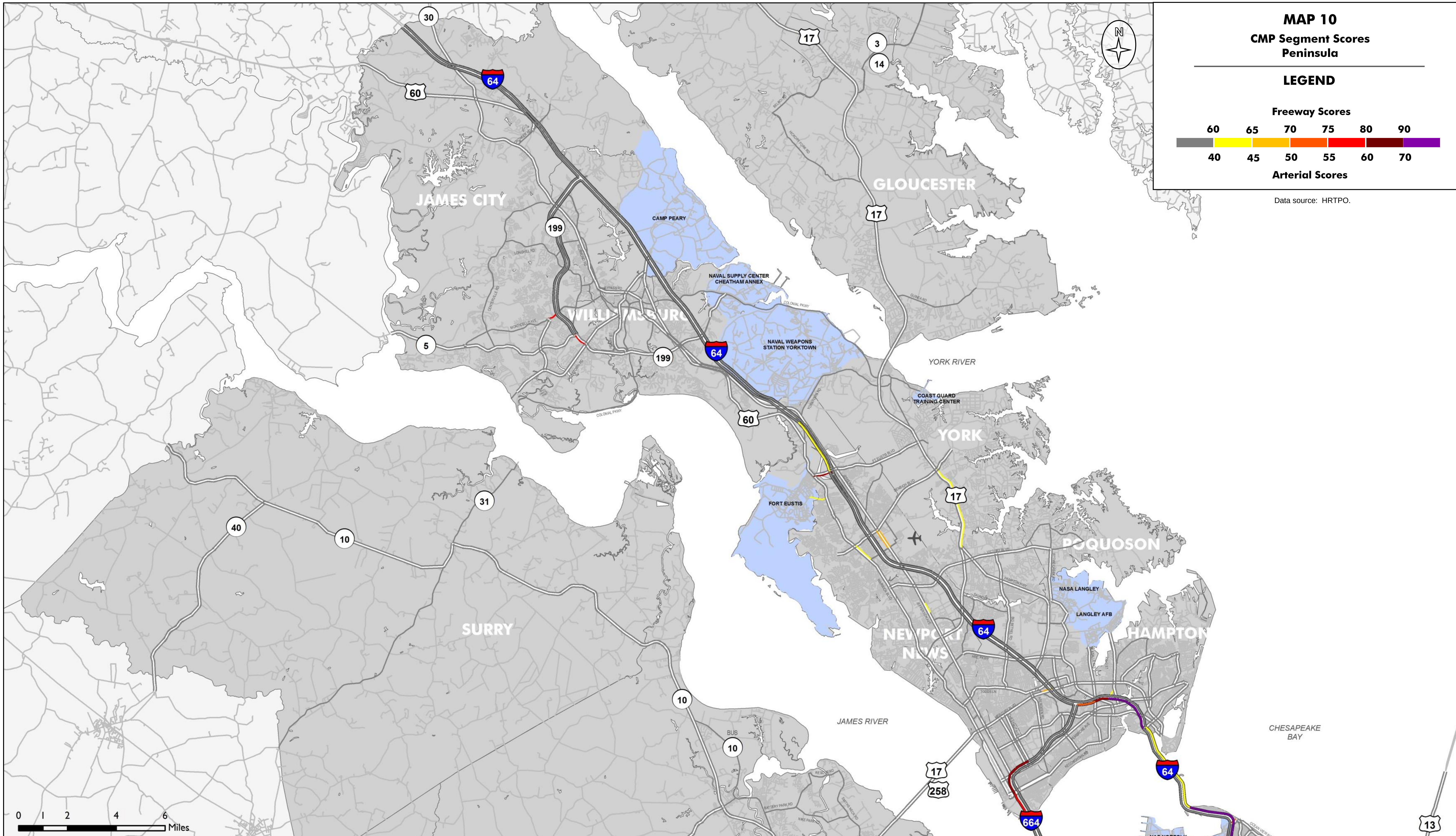
Each congested CMP Roadway Network segment was scored by direction for both the morning and afternoon peak periods, with a maximum score of 100 points available for each segment in each peak period. The highest of the AM Peak Period and PM Peak Period point totals was used as the CMP Segment Score.

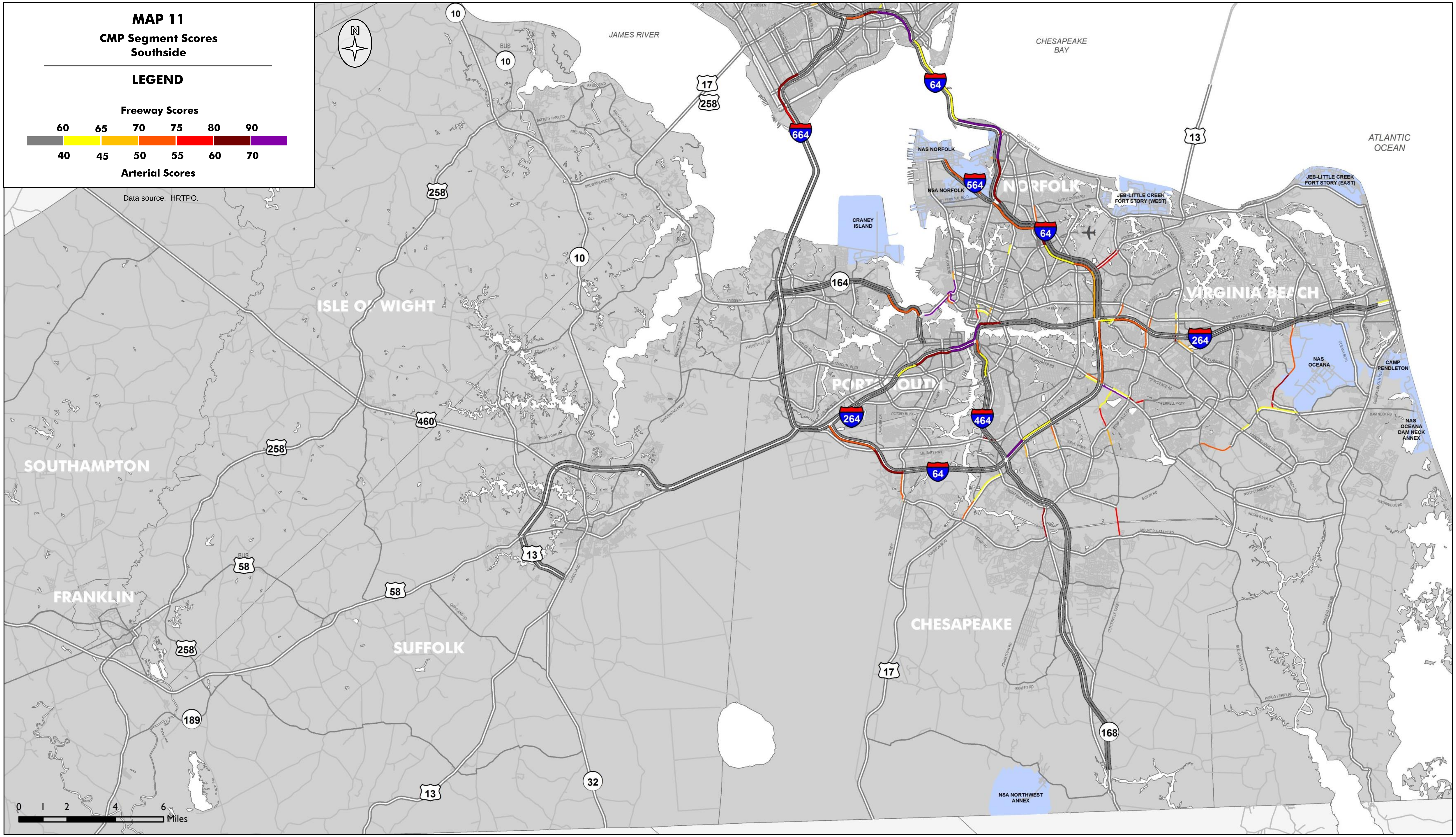
**Table 17** on page 51 shows the weights that were assigned to each of these five criteria. The CMP Segment Scores for each roadway segment were mapped to show the locations with the highest scores in Hampton Roads (**Maps 10 and 11** on pages 52-53). These roadway segments with the highest scores are the locations that are recommended to receive the highest priority for congestion mitigation. CMP Segment Scores for each roadway segment by direction are included in **Appendices E**.

## Table 17 – CMP Segment Scoring Criteria

| CMP PERFORMANCE MEASURES | | With INRIX Speed Data | | | | Without INRIX Speed Data | | |
|---|---|---|---|---|---|---|---|---|
| | | FREEWAYS | | ARTERIALS | | ARTERIALS | | |
| | | VALUE | SCORE | VALUE | SCORE | VALUE | SCORE | |
| Existing Congestion[1] | Levels of Congestion[2] | Travel Time Index (TTI) | | Travel Time Index (TTI) | | Hourly Peak Volume Per Lane | | |
| (64 points max.) | | ≤ 1.15 | 0 | ≤ 1.2 | 0 | | LOS E | LOS F |
| | | 1.15 - 1.3 | 0 | 1.2 - 1.4 | 0 | < 400 | 2 | 4 |
| | | 1.3 - 1.5 | 10 | 1.4 - 1.6 | 6 | 400 - 600 | 4 | 8 |
| | | 1.5 - 1.65 | 16 | 1.6 - 1.8 | 9 | 600 - 800 | 6 | 12 |
| | | 1.65 - 1.8 | 22 | 1.8 - 2 | 12 | 800 - 1000 | 8 | 16 |
| | | > 1.8 | 28 | > 2 | 16 | 1000 - 1200 | 10 | 20 |
| | | | | | | > 1200 | 12 | 24 |
| | | | | Potential for Intersection Congestion Alleviation (PICA) | | HCM-Based Direction Hourly Volume/Capacity | | |
| | | | | ≤ 0.1 | 0 | < 1 | 2 | |
| | | | | 0.1 - 0.2 | 2 | 1 - 1.1 | 8 | |
| | | | | 0.2 - 0.3 | 4 | 1.1 - 1.2 | 10 | |
| | | | | 0.3 - 0.4 | 6 | 1.2 - 1.3 | 12 | |
| | | | | 0.4 - 0.5 | 9 | 1.3 - 1.4 | 14 | |
| | | | | > 0.5 | 12 | > 1.4 | 16 | |
| | Vehicle Delay | Vehicle Delay (Hrs/Mi) | | Vehicle Delay (Hrs/Mi) | | Hourly Peak Direction Volume | | |
| | | < 20 | 0 | < 10 | 0 | | LOS E | LOS F |
| | | 20 - 40 | 2 | 10 - 20 | 2 | < 800 | 2 | 4 |
| | | 40 - 60 | 4 | 20 - 30 | 4 | 800 - 1200 | 4 | 8 |
| | | 60 - 80 | 6 | 30 - 40 | 6 | 1200 - 1600 | 6 | 12 |
| | | 80 - 100 | 8 | 40 - 50 | 8 | 1600 - 2000 | 8 | 16 |
| | | 100 - 200 | 10 | 50 - 100 | 10 | 2000 - 2400 | 10 | 20 |
| | | > 200 | 12 | > 100 | 12 | > 2400 | 12 | 24 |
| | Congestion Duration | # Severely Congested 15-Min Intervals | | # Severely Congested 15-Min Intervals | | | | |
| | | 0 | 0 | 0 | 0 | | | |
| | | 1 - 4 | 3 | 1 - 4 | 3 | | | |
| | | 5 - 8 | 6 | 5 - 8 | 6 | | | |
| | | 9 - 12 | 9 | 9 - 12 | 9 | | | |
| | | > 13 | 12 | > 13 | 12 | | | |
| | Travel Time Reliability | Planning Time Index (PTI) | | Planning Time Index (PTI) | | | | |
| | | ≤ 1.5 | 0 | ≤ 1.5 | 0 | | | |
| | | 1.5 - 2 | 2 | 1.5 - 2 | 2 | | | |
| | | 2 - 2.5 | 4 | 2 - 2.5 | 4 | | | |
| | | 2.5 - 3 | 6 | 2.5 - 3 | 6 | | | |
| | | 3 - 3.5 | 8 | 3 - 3.5 | 8 | | | |
| | | 3.5 - 4 | 10 | 3.5 - 4 | 10 | | | |
| | | > 4 | 12 | > 4 | 12 | | | |
| Existing Truck Volume[3] | | Daily # of Trucks | | Daily # of Trucks | | Daily # of Trucks | | |
| (6 points max.) | | ≤ 1000 | 0 | ≤ 500 | 0 | ≤ 500 | 0 | |
| | | 1000 - 1500 | 2 | 500 - 1000 | 2 | 500 - 1000 | 2 | |
| | | 1500 - 2000 | 4 | 1000 - 1500 | 4 | 1000 - 1500 | 4 | |
| | | > 2000 | 6 | > 1500 | 6 | > 1500 | 6 | |
| Future Truck Volume[4] | | 20-Year Forecast Truck Delay (Hrs/Mi) | | 20-Year Forecast Truck Delay (Hrs/Mi) | | 20-Year Forecast Truck Delay (Hrs/Mi) | | |
| (6 points max.) | | < 10 | 0 | < 5 | 0 | < 5 | 0 | |
| | | 10 - 20 | 2 | 5 - 10 | 2 | 5 - 10 | 2 | |
| | | 20 - 30 | 4 | 10 - 15 | 4 | 10 - 15 | 4 | |
| | | > 30 | 6 | > 15 | 6 | > 15 | 6 | |
| Safety[5] | | Potential for Safety Improvement (PSI) | | Potential for Safety Improvement (PSI) | | Potential for Safety Improvement (PSI) | | |
| (12 points max.) | | ≤ 0 | 0 | ≤ 0 | 0 | ≤ 0 | 0 | |
| | | 0 - 2 | 2 | 0 - 2 | 2 | 0 - 2 | 2 | |
| | | 2 - 4 | 4 | 2 - 4 | 4 | 2 - 4 | 4 | |
| | | 4 - 6 | 6 | 4 - 6 | 6 | 4 - 6 | 6 | |
| | | 6 - 8 | 8 | 6 - 8 | 8 | 6 - 8 | 8 | |
| | | 8 - 10 | 10 | 8 - 10 | 10 | 8 - 10 | 10 | |
| | | > 10 | 12 | > 10 | 12 | > 10 | 12 | |
| NHS/Military[6] | | None | 0 | None | 0 | None | 0 | |
| (12 points max.) | | NHS/Roadways Serving the Military | 8 | NHS/Roadways Serving the Military | 8 | NHS/Roadways Serving the Military | 8 | |
| | | STRAHNET | 12 | STRAHNET | 12 | STRAHNET | 12 | |

1 – Roadway segments were scored using the highest peak hour (AM or PM) for all of congestion performance measures.
2 – Roadway segments without INRIX speed data must have an Existing LOS of E or F to be scored. Segments with INRIX speed data must have a TTI > 1.3 for freeways or a TTI > 1.4 for arterials to be scored.
3 – Based on VDOT vehicle classification data. For those locations where truck data is not collect by VDOT, VDOT estimates were used.
4 – Results were used from HRTPO's Existing and Future Truck Delay in Hampton Roads (Sept 2013) & Positioning Hampton Roads for Freight Infrastructure Funding: MAP-21 and Beyond (Mar 2014) studies.
5 – For freeways, the segment's Potential for Safety Improvement (PSI) was used. For arterials, the maximum intersection PSI for the segment's end points was used.
6 – Methodology and scoring developed within HRTPO's Hampton Roads Military Transportation Needs Study: Highway Network Analysis (Sept 2011).


MAP 10
CMP Segment Scores
Peninsula
LEGEND
Freeway Scores
60 65 70 75 80 90
40 45 50 55 60 70
Arterial Scores
Data source: HRTPO.
JAMES CITY
WILLIAMSBURG
GLOUCESTER
YORK
POQUOSON
HAMPTON
NEWPORT NEWS
SURRY
CAMP PEARY
NAVAL SUPPLY CENTER CHEATHAM ANNEX
NAVAL WEAPONS STATION YORKTOWN
COAST GUARD TRAINING CENTER
FORT EUSTIS
NASA LANGLEY
LANGLEY AFB
NAS NORFOLK
YORK RIVER
JAMES RIVER
CHESAPEAKE BAY
0 1 2 4 6 Miles


MAP 11
CMP Segment Scores
Southside
LEGEND
Freeway Scores
60 65 70 75 80 90
40 45 50 55 60 70
Arterial Scores
Data source: HRTPO.
JAMES RIVER
CHESAPEAKE BAY
ATLANTIC OCEAN
NAS NORFOLK
CRANEY ISLAND
NORFOLK
JEB-LITTLE CREEK FORT STORY (WEST)
JEB-LITTLE CREEK FORT STORY (EAST)
VIRGINIA BEACH
NAS OCEANA
CAMP PENDLETON
NAS OCEANA DAM NECK ANNEX
ISLE OF WIGHT
PORTSMOUTH
SOUTHAMPTON
FRANKLIN
SUFFOLK
CHESAPEAKE
NSA NORTHWEST ANNEX
0 1 2 4 6 Miles

After CMP Segment Scores were produced for each congested roadway segment in the region, high scoring segments were grouped into corridors for analysis purposes. Eighteen "CMP Congested Corridors" were created based on the location and proximity of each congested roadway segment. Then the CMP Congested Corridors were ranked based on the roadway segments with the highest CMP Segment Scores. These ranked CMP Congested Corridors – including the Top 6 Freeways and Top 12 Arterials – are shown in **Table 18** and **Map 12** on page 55.

Fourteen of the eighteen CMP Congested Corridors are examined in detail in the Application of Strategies to CMP Congested Corridors section, which begins on page 80. One of the freeway corridors (Downtown Tunnel/Berkley Bridge) and three of the arterial corridors (Midtown Tunnel/Western Freeway, Fort Eustis Boulevard, and Military Highway) are not included in the detailed CMP Congested Corridor analysis. Tolls at the Midtown and Downtown Tunnels have greatly reduced congestion at those facilities, and HRTPO staff will be analyzing these corridors in detail as part of the *Analyzing and Mitigating the Impact of Tolls at the Midtown and Downtown Tunnels* study later in 2014. Fort Eustis Boulevard and Military Highway had high scores because of bridge construction projects that temporarily reduced capacity on these roadways. Another roadway on the list – Northampton Boulevard – was impacted by construction during 2013 that resulted in a lane reduction in the eastbound direction. Those congested roadways that did not make the CMP Congested Corridors list should be considered for further study, including future CMP report updates.

**Freeways**

| Rank | Jurisdiction | CMP Congested Corridor |
|---|---|---|
| 1 | HAM/NOR | Hampton Roads Bridge-Tunnel (I-64) from I-664 to I-564 |
| | | - 4th View St from I-64 to Ocean View Ave |
| 2 | NOR/PORT/ CHES | Downtown Tunnel/Berkley Bridge (I-264/I-464)[1] |
| | | - I-264 from Portsmouth Blvd to Brambleton Ave |
| | | - I-464 from Poindexter St to I-264 |
| | | - St. Pauls Blvd from I-264 Ramp to Brambleton Ave |
| 3 | CHES | I-64/High Rise Bridge from I-264 & I-664 (Bowers Hill) to Greenbrier Pkwy |
| 4 | NN | Monitor-Merrimac Mem. Bridge-Tunnel (I-664) from Terminal Ave to Chestnut Rd |
| 5 | NOR/VB | I-64 (Norfolk/VA Beach) from I-564 to Indian River Rd |
| 6 | NOR | I-564 (Norfolk) from International Terminal Blvd to Admiral Taussig Blvd |

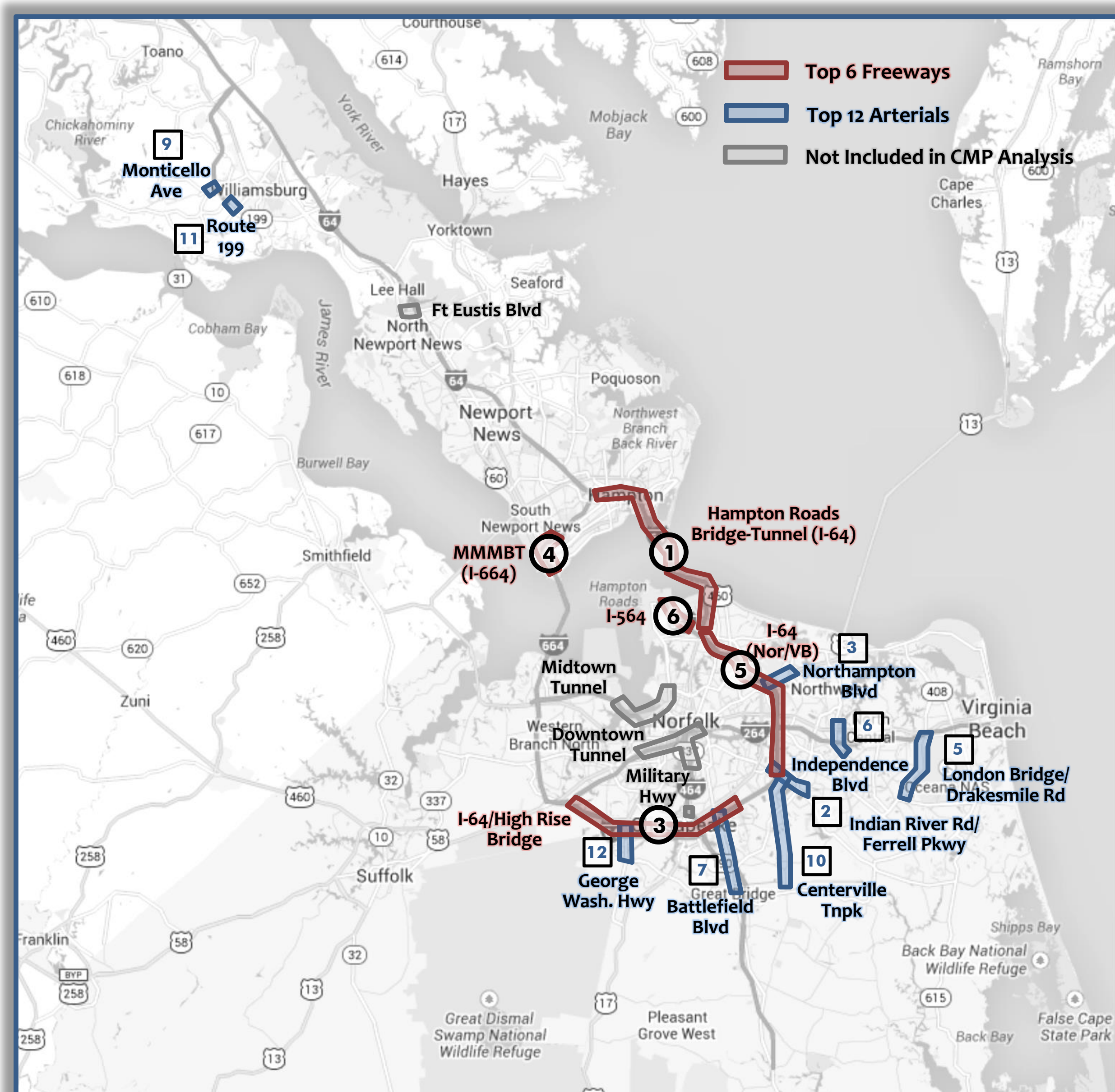
**Arterials**

| Rank | Jurisdiction | CMP Congested Corridor |
|---|---|---|
| 1 | NOR/PORT | Midtown Tunnel/Western Fwy from West Norfolk Rd to Brambleton Ave[1] |
| | | - Hampton Blvd from 27th St to Brambleton Ave |
| | | - Brambleton Ave from Colley Ave to Hampton Blvd |
| 2 | VB | Indian River Rd/Ferrell Pkwy from Providence Rd to Indian Lakes Blvd |
| 3 | NOR/VB | Northampton Blvd from I-64 to Diamond Springs Rd[3] |
| 4 | NN | Fort Eustis Blvd from Warwick Blvd to I-64[2] |
| 5 | VB | London Bridge Rd/Drakesmile Rd from Dam Neck Rd to Virginia Beach Blvd |
| 6 | VB | Independence Blvd from Holland Rd to Jeanne St |
| 7 | CHES | Battlefield Blvd from Cedar Rd to I-64 |
| 8 | CHES | Military Hwy from Bainbridge Blvd to I-464[2] |
| 9 | JCC | Monticello Ave from News Rd to Route 199 |
| 10 | CHES/VB | Centerville Tnpk from Mt Pleasant Rd to Indian River Rd |
| 11 | JCC/WMB | Route 199 from John Tyler Hwy (Rte 5) to Jamestown Rd |
| 12 | CHES | George Washington Hwy from Moses Grandy Trail to I-64 |

**Table 18 – CMP Congested Corridors**

1 - Not included in the CMP analysis due to tolls imposed in February 2014.
2 - Not included in the CMP analysis due to bridge construction projects.
3 - Corridor impacted by construction during the CMP analysis period (2013).

## Map 12 – CMP Congested Corridors




Background Map Source: Google.

# CONGESTION MITIGATION STRATEGIES

The previous section ranked congested segments in the Hampton Roads CMP Roadway Network in order to determine the list of CMP Congested Corridors that would be further analyzed in this report. This section provides a generalized Congestion Mitigation Strategy "Toolbox" and highlights various strategies that are currently used in Hampton Roads. These strategies will be applied to the CMP Congested Corridors in the next section.

## CONGESTION MITIGATION STRATEGY "TOOLBOX"

As a part of the CMP, a "toolbox" of specific congestion mitigation measures has been assembled to promote strategic solutions involving all modes of transportation, better land development, and more efficient use of the existing transportation system as required by federal CMP regulations.

**HRTPO GENERAL CONGESTION MITIGATION STRATEGIES**

1) Eliminate Person Trips or Reduce VMT
2) Shift Trips from Automobile to Other Modes
3) Shift Trips from SOV to HOV
4) Improve Roadway Operations
5) Add Capacity

During the strategy evaluation process, it is important to consider using the strategies listed above in the order presented in a "top-down" approach that would examine strategies to eliminate or shift automobile trips or improve roadway operations prior to adding capacity. Given today's budgetary constraints, it is imperative to first investigate strategies that utilize the existing capacity of the transportation network. It is also important for regional decision makers, planners, engineers, and other agencies involved with transportation to communicate and coordinate their efforts on a regular basis to solve existing problems and mitigate future congestion in Hampton Roads.

**Table 19** below provides a detailed description of all five strategies contained in the Congestion Mitigation

**Table 19 – Congestion Mitigation Strategy "Toolbox"**

| Strategy | Description |
|---|---|
| Strategy #1 Eliminate Person Trips or Reduce VMT | **Growth Management/Activity Centers** |
| | **1-1 Land Use Policies/Regulations**<br>Encourage more efficient patterns of commercial or residential development in defined areas. Specific land use policies and/or regulations that could significantly decrease both the total number of trips and overall trip lengths, as well as making transit use, bicycling and walking more viable include, but are not limited to the following:<br>· Encouraging development in existing centers and/or communities (i.e. infill development)<br>· Discouraging development outside of designated growth areas<br>· Promoting higher density and mixed uses in proximity to existing or planned transit service<br>· Establishing a policy for new and existing subdivisions to include sidewalks, bike paths, and transit facilities where appropriate |
| | **Congestion/Value Pricing** |
| | **1-2 Road User Fees/HOT Lanes**<br>Includes area-wide pricing fees, time-of-day/congestion pricing and tolls. Most appropriately applied to freeways and expressways. Requires infrastructure to collect user fees. High Occupancy Toll (HOT) lanes – combines HOV and pricing strategies by allowing single occupancy vehicles to gain access to HOV lanes by paying a toll. |
| | **1-3 Parking Fees**<br>Market-based strategy designed to modify mode choice by imposing higher costs for parking private automobiles. Most appropriately applied to parking facilities in urban environments. |
| | **Transportation Demand Management** |
| | **1-4 Telecommuting**<br>Encouraging employers to consider telecommuting options full- or part-time to reduce travel demand. |
| | **1-5 Employee Flextime Benefits/Compressed Work Week**<br>Encouraging employers to consider allowing employees to maintain a flexible schedule - thus allowing the employee the option to commute during non-peak hours. |

### Table 19 – Congestion Mitigation Strategy "Toolbox" (continued)

| Strategy | Category | Improvement |
|---|---|---|
| Strategy #2 Shift Trips from Auto to Other Modes | **Public Transit Capital Improvements** | |
| | | **2-1 Exclusive Right-of-Way - New Rail Service**<br>Includes heavy rail, commuter rail, and light rail services. Most appropriately applied in a dense context serving a major employment center. |
| | | **2-2 Exclusive Right-of-Way - New Bus Facilities**<br>Includes Busway, Bus Only Lanes, Bus Pull-Out Bays, and Bus Bypass Ramps. Most appropriately applied to freeways and expressways with high existing transit ridership rates. |
| | | **2-3 Ferry Services**<br>Implement ferry services and supporting facilities. |
| | | **2-4 Fleet Expansion**<br>Expansion of existing rail, bus, and/or ferry capacity to provide increased service. |
| | | **2-5 Improved Intermodal Connections**<br>Improve the efficiency and functionality of intermodal connectors (i.e. expanded parking/improved access to stations) where several modes of transportation are physically and operationally integrated. |
| | | **2-6 Improved/Increased Park & Ride Facilites & Capital Improvements**<br>Improve existing facilities and identify new locations. |
| | **Public Transit Operational Improvements** | |
| | | **2-7 Service Expansion**<br>Includes increased service frequency/area, special events, and accomodations for persons with disabilities. |
| | | **2-8 Traffic Signal Preemption**<br>Improve traffic flow for transit vehicles traveling through signalized intersections. |
| | | **2-9 Improved Transit Performance**<br>Includes electronic fare payment, ticket vending machines, eliminating/consolidating stops, express transit routes, and improved transfers. |
| | | **2-10 Transit Fare Reductions Plan/Reduced Rate of Fare**<br>Includes system-wide reducitons, off-peak discounts and deep discount programs. |
| | | **2-11 Transit Information Systems**<br>Improved in-vehicle and station information systems to improve the dissemination of transit-related information to the user. |
| | **Bicycle and Pedestrian Modes** | |
| | | **2-12 Improved/Expanded Bicycle Network**<br>Includes on-road facilities, pathways, and greenways. |
| | | **2-13 Bicycle Storage Systems**<br>Providing safe and secure places for bicyclists to store their bicycles. |
| | | **2-14 Improved/Expanded Pedestrian Network**<br>Includes sidewalks, pedestrian signals and signs, crosswalks, overpasses/tunnels, pedestrian only zones, countdown signals, street lighting, greenways, and walkways. |
| Strategy #3 Shift Trips from SOV to HOV | **High Occupancy Vehicles (HOV)** | |
| | | **3-1 Add HOV Lanes**<br>Most appropriate for freeways and expressways. |
| | | **3-2 HOV Toll Savings**<br>Preferential pricing to multi-occupant vehicles. Requires infrastructure to administer toll collection. |
| | **Transportation Demand Management** | |
| | | **3-3 Rideshare Matching Services**<br>Providing carpool/vanpool matching, ridesharing information resources and services, car sharing, and guaranteed ride programs. |
| | | **3-4 Vanpool/Employer Shuttle Program**<br>Organizing groups of commuters to travel together in a passenger van or employer-provided shuttle on a regular basis. |
| | | **3-5 Trip Reduction Program**<br>Organizing groups (i.e. employers) that offer tax incentives, commuter rewards, or transit subsidies on a regular basis. |
| | | **3-6 Parking Management**<br>Preferential parking is a low-cost incentive that can be used to encourage the utilization of alternative commute modes, such as carpooling and vanpooling. |

## Table 19 – Congestion Mitigation Strategy "Toolbox" (continued)

| | |
|---|---|
| **Strategy #4 Improve Roadway Operations** | **Traffic Operational Improvements** |
| | **4-1 Geometric Improvements**<br>Improvements to roadway and intersection geometrics to improve overall efficiency and operation. |
| | **4-2 Intersection Turn Restrictions**<br>Providing intersections turn restrictions to reduce conficts and increase overall intersection performance. |
| | **4-3 Intersection Signalization Improvements**<br>Improving signal operations through re-timing signal phases, adding signal actuation, event/holiday timing plans, emergency vehicle preemption etc. |
| | **4-4 Coordinated Intersections Signals**<br>Improving traffic signal progression along identified corridors. |
| | **4-5 Roadway Environment**<br>Includes improvements in pavement markings, pavement condition, pavement reflectors, signage, rumble strips, guardrails, line-of-sight clearances, roadway lighting, etc. that improve roadway operations and congestion. |
| | **4-6 Intelligent Transportation Systems/Smart Traffic Centers (ITS)**<br>Utilizing the latest technology to assist in congestion mitigation, information dissemination, and traffic planning efforts. Examples include road sensors, video detection, changeable message signs, SMART Tag (electronic toll), red light enforcement equipment, truck height/weight enforcement technologies, fiber optic network, ITS data archives, 511 Traveler service, and Smart Travel Laboratories. |
| | **4-7 Reversible Lanes**<br>Reversible Lane Systems enable the maximum use of roadways with heavy directional distribution of traffic by changing the direction of the individual travel lanes. Lane control signs, displayed well in advance of a merge, are often used to close lanes with lower traffic volume and open additional lanes for higher volume. |
| | **4-8 Freight Policies and Improvements**<br>Includes delivery hour restrictions, truck lane restrictions, truck route signage and enforcement, truck route diversion, truck only lanes, bridge lift restrictions, rail improvements, intermodal yards, reducing truck delay, system-wide freight planning etc. |
| | **4-9 Incident Management, Detection, Response & Clearance**<br>Utilize traveler radio, travel alert notification (via e-mail, fax, etc.), and general public outreach to enhance incident-related information dissemination. |
| | **4-10 Construction Management**<br>Minimizing congestion caused by roadway maintenance and construction, and alert travelers to construction activities. |
| | **4-11 Elimination of Bottlenecks**<br>Eliminating high-traffic areas where one or more travel lane(s) is dropped. |
| | **4-12 Ramp Metering**<br>Metering vehicular access to a freeway during peak periods to optimize the operational capacity of the freeway. |
| | **4-13 Access Control and Connectivity**<br>Reduction or elimination of "side friction", especially from driveways via traffic engineering, regulatory techniques, and purchase of property rights. Also includes connections between properties, developments, and roadways. |
| | **4-14 Median Control**<br>Addition of medians with turn bays via traffic engineering and regulatory techniques. |
| **Strategy #5 Add Capacity** | **Addition of General Purpose Lanes** |
| | **5-1 Freeway Lanes**<br>Increasing the capacity of congested freeways through additional travel lanes. |
| | **5-2 Arterial lanes**<br>Increasing the capacity of congested arterials through additional travel lanes. |
| | **5-3 Interchanges**<br>Improving Interchange design to allow smoother traffic flow to/from arterials. |
| | **5-4 Improve Alternate Routes**<br>Constructing new roadways or increasing the capacity of other roadways that will decrease demand on congested existing facilities. |

Strategy "Toolbox"[1]. It also provides examples and ways to apply these strategies to reduce overall congestion. Most of the congestion mitigation strategies are intended to be applied to individual corridors; however, there are several strategies that may be applied to the entire region.

The Hampton Roads region is already implementing many of these congestion mitigation strategies through state, regional, and local initiatives. The following section describes these strategies and their local application.

## LAND USE AND ACTIVITY CENTERS

**(Included in Strategy #1)**

One strategy to mitigate congestion is to plan for and manage urban land use and growth patterns. Encouraging more efficient commercial and residential growth patterns can reduce both the number of trips as well as overall trip lengths. Since land use decisions are generally made at the local level, jurisdictions within Hampton Roads are encouraged to keep growth management strategies in mind. Land development strategies oftentimes incorporate public transit, bicycling, and walking, which help areas manage transportation demand and meet air quality conformity standards. Some examples of land use strategies include transit-oriented development, densification and infill strategies, and encouragement of mixed-use development.

Recently, several jurisdictions in Hampton Roads have planned and constructed high density mixed-use activity centers offering an assortment of modern offices, shops, entertainment, restaurants, apartments and condos in a single area. These developments offer residents a vibrant, livable community in which they can live, work, and play. Activity centers that are currently open and/or under development include: The Town Center of Virginia Beach, City Center at Oyster Point (Newport News), Port Warwick (Newport News), Downtown Norfolk/Ghent (Norfolk), Downtown Portsmouth (Portsmouth), Coliseum Central/Peninsula Town Center (Hampton), Portsmouth City Center, Harbour View Station Town Center and Marketplace (Suffolk), Towne Place at Greenbrier (Chesapeake), and New Town (Williamsburg). Currently, many of these activity centers are destination points for residents living in the immediate area and those traveling by automobile. Some locations, such as the Town Center of Virginia Beach and City Center at Oyster Point, already have plans to incorporate future transit lines such as light rail. Making connections between these locations and other high-density locations (i.e. downtown Norfolk and Virginia Beach Oceanfront) throughout the region via public transportation may reduce the number and length of overall auto trips in Hampton Roads.

## PUBLIC TRANSPORTATION

**(Included in Strategy #2)**

Public transportation is an integral component of addressing congestion in both the near-term and long-term. Transit services offer a means of transportation for lower income populations as well as a cost-effective alternative to single occupant vehicles that can reduce the overall number of vehicles on the transportation network. Public transit capital improvements along a fixed route or guideway can lead to transit-oriented land development/redevelopment, which can in turn boost ridership and overall success of the program. Transit vehicles, particularly buses that share local roadways, are vulnerable to congestion, limiting transit's ability to maintain and attract new riders. For this reason, it is important to make roadway improvements and accommodations for transit routes. Over the long term, public transit can be a sustainable congestion mitigation strategy, shortening trip lengths from origins to destinations and moving more residents using fewer vehicles. The *Hampton Roads Regional Transit Vision Plan*[2] has recently been developed and can be used as a planning tool for mitigating regional congestion through transit improvements.

[1] Primary Source: Wilmington Area Planning Council (WILMAPCO), 2012 Congestion Management System.

[2] Hampton Roads Regional Transit Vision Plan, Virginia Department of Rail and Public Transportation, Hampton Roads Transit, Williamsburg Area Transit Authority, Final Report, February 2011.

## Williamsburg Area Transport

Williamsburg Area Transport (WAT) provides public transportation services in James City County, the City of Williamsburg, and northern York County. WAT's primary objective is to "ensure that services meet the social and business needs of the community by providing a seamless coordinated regional transit system serving residents, visitors, and students through fixed routes and transportation service for the disabled." WAT currently operates nine bus routes and one trolley route seven days a week. **Map 13** shows the existing WAT transit routes. Visit [www.gowata.org](http://www.gowata.org) for more information.


Map 13 – Williamsburg Area Transport (WAT) Routes

## Virginia Regional Transit (Suffolk)

In January 2012, Virginia Regional Transit began providing public transportation service in the city of Suffolk. The system – which currently includes 6 routes and operates 12 hours a day, 5 days a week – is provided by Virginia Regional Transit through a contract with the city.

## Hampton Roads Transit

Hampton Roads Transit (HRT) is the largest public transportation agency for the Hampton Roads region, serving a population of more than 1.3 million in the cities of Chesapeake, Hampton, Norfolk, Newport News, Portsmouth, and Virginia Beach. HRT's mission is to serve the community through high quality, safe, efficient and sustainable regional transportation services.

HRT currently offers the following transit services:

- Fixed Regular Bus Routes in Hampton Roads – 35 (Southside) and 21 (Peninsula)
- Peninsula Commuter Service – Express bus service to major employers (7 Routes)
- MAX (Metro Area Express) – Express Bus Service (7 Routes with faster speeds and limited stops)
- VB Wave Shuttle System – Serving Virginia Beach resort area (3 Seasonal Routes)
- Paratransit/Handi-Ride – Service available for persons with disabilities
- Elizabeth River Ferry – Serving Downtown Norfolk and Olde Towne Portsmouth
- TRAFFIX – Providing transportation alternatives
- Google Trip Planner

**Maps 14** and **15** on pages 62-63 show the HRT system for the Hampton Roads Peninsula and Southside. Visit [www.gohrt.com](http://www.gohrt.com) for more information on HRT services.

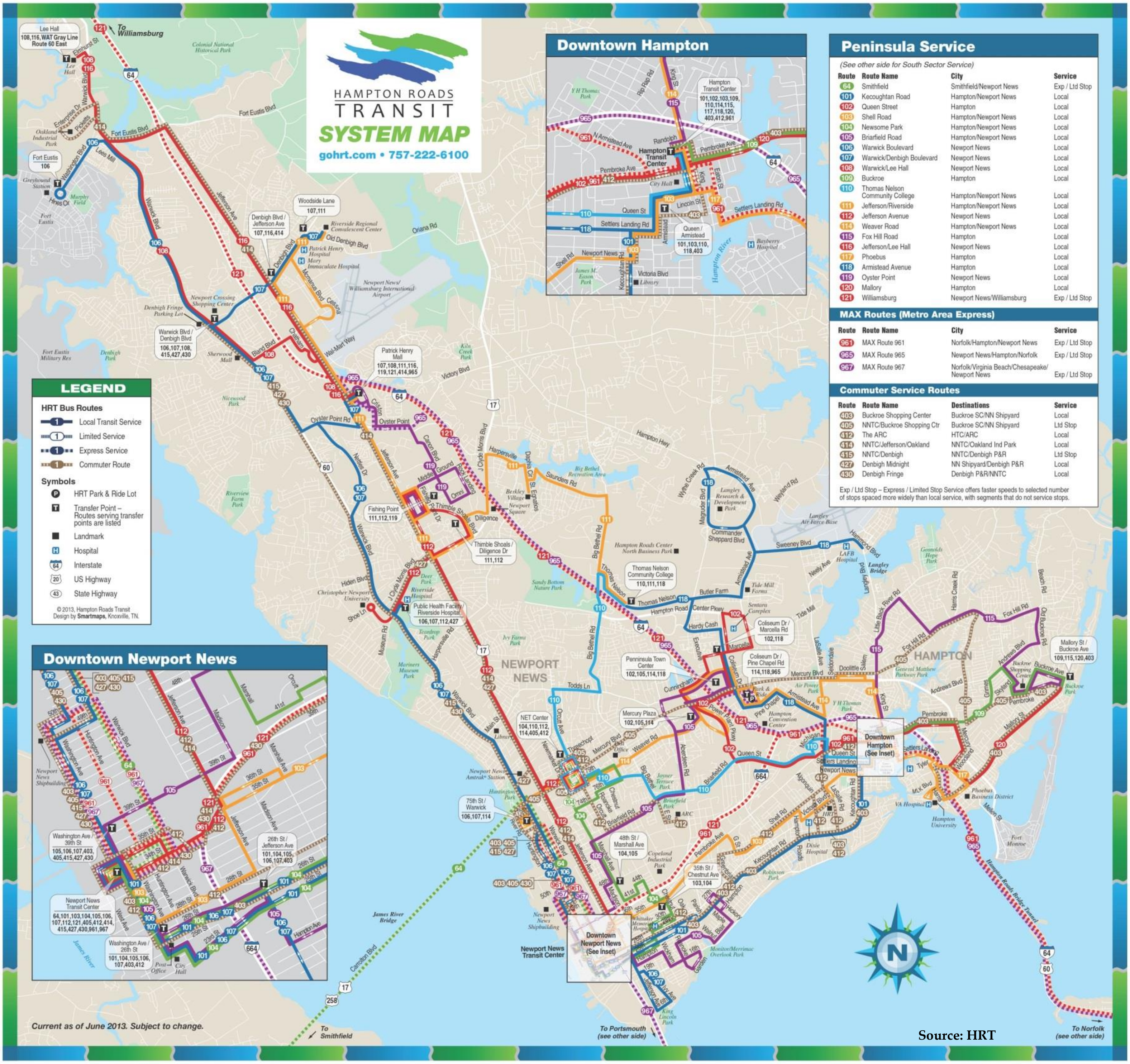
### The Tide

"The Tide" light rail system in Norfolk, Virginia began operating on August 19, 2011. It currently extends 7.4 miles from the Eastern Virginia Medical Center through downtown Norfolk, and continues along the former Norfolk Southern right-of-way adjacent to I-264 to Newtown Road. The Tide is served by eleven stations and four park and ride lots. It also provides access to major destination areas such as Norfolk State University, Tidewater Community College (Norfolk Campus), Harbor Park, City Hall, MacArthur Center, and the Sentara Norfolk General Hospital. **Map 16** on page 64 shows the Tide route and stations.

Tide trains generally run every 15 minutes – 10 minutes during peak periods and every 30 minutes during early weekend mornings and late evenings. Service is provided from 6 am through 10 pm Monday-Thursday, 6 am through midnight Friday-Saturday, 7 am through 9 pm on Sundays, and 9 am through 9 pm on holidays.

Tickets can be purchased to ride the Tide at ticket vending machines, at select retail outlets, and online. One-way Tide tickets can only be purchased from ticket vending machines, and they expire 90 minutes from the time of purchase.

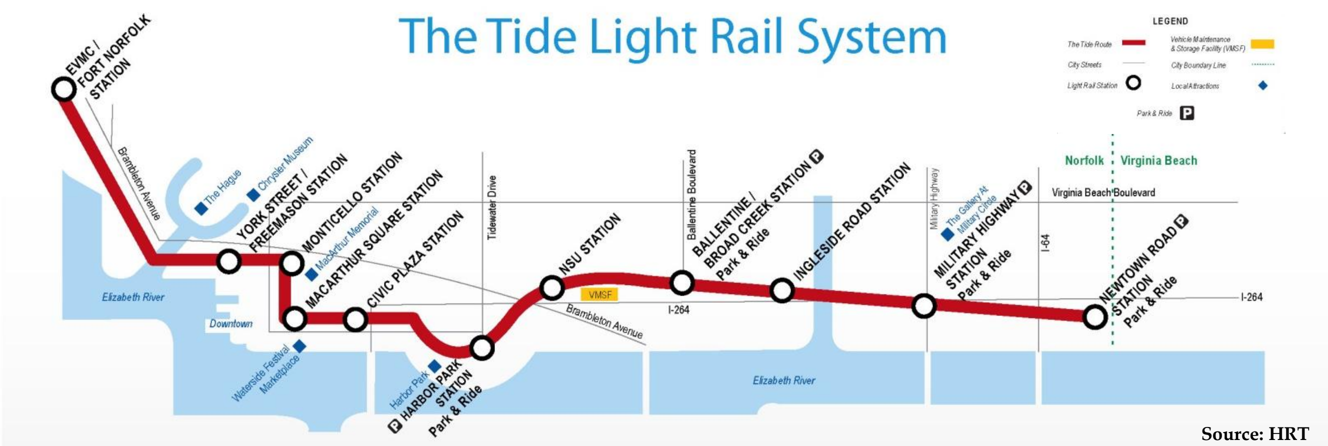
The Tide



Source: HRT

**Map 14 – Hampton Roads Transit (HRT) System Map - Peninsula**


Map 15 – Hampton Roads Transit (HRT) System Map - Southside




**Map 16 – The Tide Light Rail System (Norfolk) Map**

## HRT Transit Extension Studies

HRT is currently conducting two transit extension studies – the Naval Station Norfolk Transit Extension Study and the Virginia Beach Transit Extension study.

HRT and the City of Norfolk are in the early phases of the corridor planning process for a possible transit extension from The Tide to Naval Station Norfolk. The work will define and analyze potential routes and transit modes. **Figure 14** shows possible alignment concepts that have been developed for this extension.

On November 6, 2012, Virginia Beach voters approved a non-binding referendum in support of expanding light rail to Virginia Beach by a 62% majority. Based on this approval, HRT is conducting the Virginia Beach Transit Extension Study to examine the best transit options for the former Norfolk Southern railroad right of way in Virginia Beach. The right of way runs from the end of the Tide at Newtown Road along the I-264 corridor to Birdneck Road. The study includes options for extending transit services east of Birdneck Road to 19th Street at the Oceanfront and for service to the Laskin Road corridor.

More information on the Naval Station Norfolk Transit Extension Study is available at http://www.gohrt.com/nsntes, and the Virginia Beach Transit Extension Study at http://www.gohrt.com/about/development/vbtes.

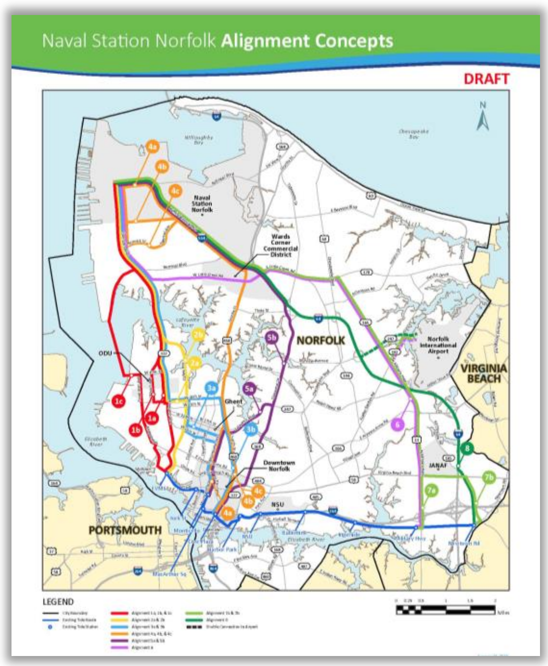




**Figure 14 – Naval Station Norfolk and Virginia Beach Transit Extension Alignment Concepts**

Source: HRT

## Hampton Roads Transit Vision Plan

The HRTPO, HRT, WAT, and the Virginia Department of Rail and Public Transportation (DRPT) assisted in the creation of the Hampton Roads Regional Transit Vision Plan, which was released in February 2011.

The Transit Vision Plan provides detailed recommendations on regional transit improvements for Hampton Roads over short term (by 2025), long term (by 2035), and extended term (beyond 2035) time horizons (**Figure 15**), allowing the region to progressively advance transit enhancements. The document provides guidance to HRTPO for the development of its Long-Range Transportation Plan. It is also being incorporated into Statewide Transit Plans and the State Surface Transportation Plan.

More information on the Hampton Roads Regional Transit Vision Plan is available at http://www.drpt.virginia.gov/activities/hrrtvp.aspx.

## Richmond/Hampton Roads Passenger Rail Project

The Virginia Department of Rail and Public Transportation and HRTPO are investigating improved passenger rail service between Hampton Roads and Richmond, ultimately connecting to the Southeast, Northeast and Mid-Atlantic regions as an extension of the Southeast High Speed Rail Corridor (SEHSR).

DRPT examined potential routes and possible environmental impacts for more frequent conventional service and higher speed rail service in a Tier I Environmental Impact Statement (EIS). The Draft EIS was released for public review and comment in December 2009. In January 2010, public hearings were held to gain feedback on the alternatives under evaluation.

The project focused on five alternatives: 1) No Action, 2) Status Quo, 3) Build 1, 4) Build 2a, and 5) Build 2b.

The Build Alternative 1 serves both the Peninsula and the Southside, with three daily round trips on the Peninsula and six daily round trips on the Southside. The Peninsula service would remain the same as in the No-Action Alternative, with three 79 mph maximum speed daily round trips between Newport News and Richmond Main Street Station. The Southside service would include six daily round trips operating at speeds of 90 mph or 110 mph between Downtown Norfolk, Chesapeake (Bowers Hill Station), Petersburg and Richmond Main Street Station. **Map 17** on page 66 shows the preliminary rail alignment alternatives between Richmond and Hampton Roads.

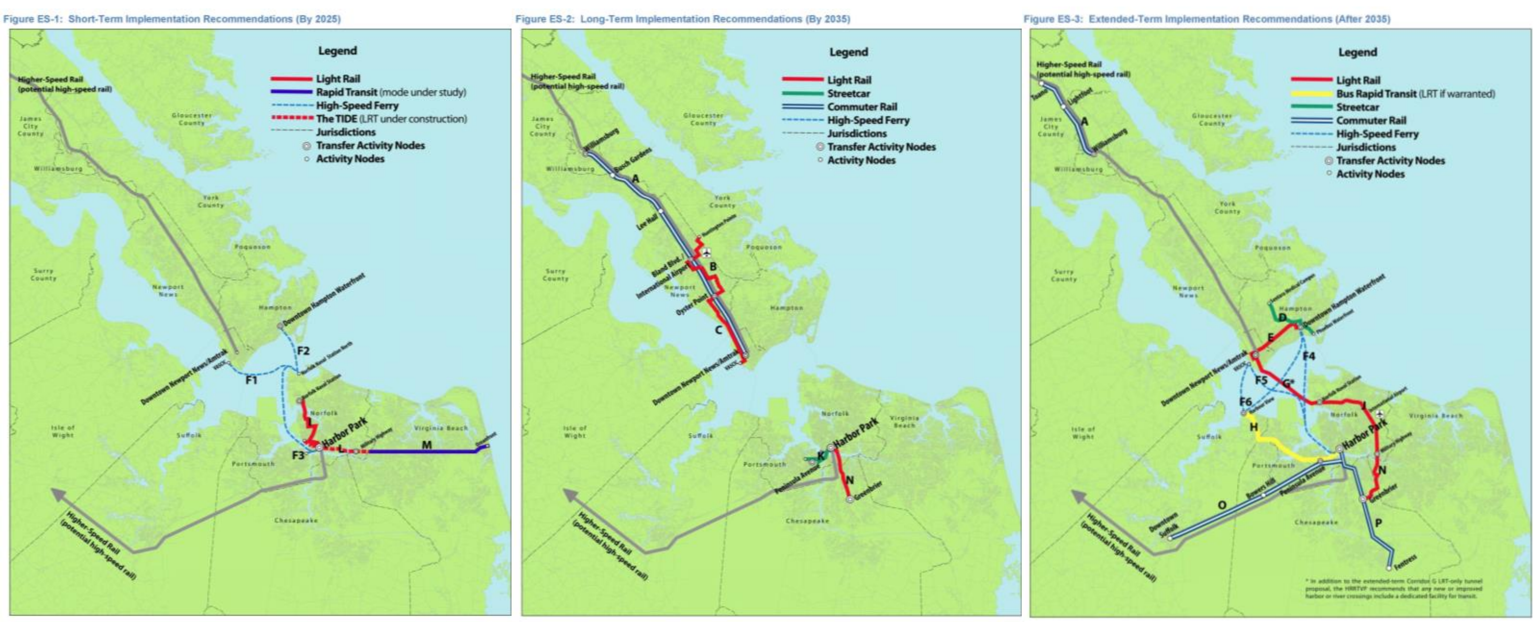



**Figure 15 – Hampton Roads Regional Transit Vision Plan Recommendations**
Source: DRPT

In February 2012, the Commonwealth Transportation Board (CTB) endorsed Build Alternative 1 (Higher-speed Southside/Conventional speed Peninsula) at maximum authorized speeds of up to 90 mph as the preferred alternative for enhanced passenger rail service between Richmond and Hampton Roads. DRPT completed the Tier I Final Environmental Impact Statement (FEIS) document in August 2012, which was subsequently approved by the Federal Railroad Administration (FRA). Once the Record of Decision (ROD) is complete, more detailed Tier II studies will determine exact designs and impacts.


Map 17 – Preliminary Rail Alignment Alternatives Map

The Richmond to Hampton Roads Passenger Rail Project is one component of the overall vision for the Southeast High Speed Rail Corridor. This corridor is shown in **Map 18**.

For more information on the Richmond/Hampton Roads Passenger Rail Project, visit http://www.rich2hrrail.info. For more information on the Southeast High Speed Rail Corridor project, visit: http://www.sehsr.org.


Map 18 – Southeast High Speed Rail Corridor Map
Source: DRPT

During a special meeting held on October 30, 2009, the HRTPO Board approved a resolution to support regional High-Speed and Intercity Passenger Rail – specifically supporting the designation of a high-speed rail corridor along the Norfolk Southern/Route 460 rail corridors and, in conjunction with the high-speed rail corridor, the endorsement of the enhancement of the intercity passenger rail service along the CSX/I-64 rail corridor. Furthermore, the resolution identified the need to procure consultant services to advise the HRTPO in positioning Hampton Roads to be more competitive regarding high-speed and intercity passenger rail and associated funding, and to develop a regional high-speed and intercity passenger rail campaign and vision plan component for the HRTPO 2034 Long-Range Transportation Plan.

Per the October 30, 2009 HRTPO resolution, the High-Speed and Intercity Passenger Rail Steering Committee was created. HRTPO, in coordination with DRPT and VDOT, also secured TEMS Incorporated - a consultant specializing in passenger rail planning - to evaluate the potential passenger rail service alternatives. TEMS worked closely throughout the course of the study with the HRTPO, DRPT staff, and the Steering Committee to assess the potential of higher and high speed rail as determined by the HRTPO Board resolution. This resulted in the creation of the Hampton Roads Passenger Rail Vision Plan.

More information on regional passenger rail initiatives, including the Hampton Roads Passenger Rail Vision Plan, is available at http://hrtpo.org/page/high-speed-passenger-rail.

## TRANSPORTATION DEMAND MANAGEMENT

**(Included in Strategies #1 and #3)**

Transportation Demand Management (TDM) programs are designed to reduce traffic congestion through a variety of mobility options, such as ridesharing, transit usage, telecommuting, and spreading out peak period traffic. TDM strategies focus on alternatives to driving alone by encouraging the use of alternate modes or programs.

In Hampton Roads, TRAFFIX is a cooperative public service, established in 1995, that implements TDM strategies by offering information and services on transportation alternatives to area commuters. TRAFFIX promotes and implements a wide variety of programs and incentives, including carpooling and commuter matching, guaranteed ride programs, NuRide rewards, the GoPass365 program, transportation incentive program, park and ride, park and sail, vanpooling and van leasing, and teleworking. TRAFFIX works with area employers, including the military, to educate, develop, and implement transportation alternative programs for their employees.

TRAFFIX staff are employees of Hampton Roads Transit (HRT); however, funding is provided through the Hampton Roads Transportation Planning Organization (HRTPO). The HRTPO has authorized annual funding for TRAFFIX through Congestion Mitigation and Air Quality (CMAQ) and/or Regional Surface Transportation Program (RSTP) funding since Fiscal Year (FY) 1995. The TRAFFIX Oversight Subcommittee (TOS), made up of transportation professionals from the cities and counties in the Metropolitan Planning Area (MPA), the Virginia Department of Transportation (VDOT), Federal Highway Administration (FHWA), U.S. Navy and the Virginia Department of Rail and Public Transportation (DRPT), meets three times per year to review the progress and status of TRAFFIX. The TOS reports to the Transportation Technical Advisory Committee (TTAC), which in turn reports to the HRTPO board.

**TRAFFIX Vanpools**
Image Source: TRAFFIX

TRAFFIX administers many programs internally and also advertises TDM programs administered by outside organizations. The Commuter Computer, Vanpool Program, Guaranteed Ride Program, and park & ride lots are operated by TRAFFIX, while NuRide Rewards and Telework!VA are programs of other agencies which TRAFFIX promotes for Hampton Roads.

TRAFFIX, in coordination with the Hampton Roads jurisdictions, Hampton Roads Transit, VDOT, military, and HRTPO, has been promoting various TDM programs to major employers and associations throughout the region. Some of the local TRAFFIX partners include:

- ABC Health Care
- Advance Technology
- Amerigroup
- Bryant & Stratton College
- Canon ITS Chesapeake
- Centura College – Chesapeake Campus
- Centura College – Norfolk Campus
- Christopher Newport University
- City of Hampton
- City of Newport News TV Channel
- City of Virginia Beach
- City of Williamsburg
- CMA CGM America, LLC
- Colonial Williamsburg Founders/Merchants Square
- Retail/Restaurant Association
- Courtyard Marriott
- Cox Communications
- E&E Enterprises; Eastern Virginia Medical School
- ECPI Virginia Beach
- Everest Institute

- Everest College – Chesapeake
- Ferguson Enterprises
- Fort Eustis
- Goodwill Industries
- Hampton Department of Social Services
- Hampton University
- KRA
- Kaplan College
- LHA &LHD Amphibious Group
- Pembroke Mall
- Newport News Shipbuilding
- Norfolk Chamber of Commerce
- Naval Medical Center Portsmouth
- Naval Station Norfolk
- Norfolk Naval Shipyard in Portsmouth
- Norfolk State University
- Norfolk Southern
- Old Dominion University
- Portfolio Recovery
- QVC
- Sentara College
- Sentara Leigh
- Sentara Norfolk
- Strayer College
- The College of William and Mary
- Thomas Nelson Community College
- Tidewater Community College Norfolk
- Tidewater Community College Virginia Beach
- Tidewater Tech – Norfolk
- USS Enterprise
- USS Abraham Lincoln
- USS Jason Dunham
- Virginia Beach Hotel/Motel Assoc.
- Virginia Department of Transportation (VDOT)
- Williamsburg Sentara Medical Center

The CMP strategies implemented by TRAFFIX are detailed and evaluated in **Table 20**, using ratings compiled from the Victoria Transport Policy Institute TDM Encyclopedia. While all of the strategies reduce congestion and assist the transportation disadvantaged, some strategies vary in their effect on other outcomes, such as promoting efficient land use.

| CMP Strategy | Reduces Congestion | Road & Parking Savings | Consumer Savings | Transportation Choices | Road Safety | Environmental Protection | Efficient Land Use | Community Livability | Applicability to all commuters | Benefits transportation disadvantaged | Improves basic mobility | TRAFFIX Program |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1-4 Telecommuting** | 3 | 2 | 2 | 3 | 1 | 1 | -2 | 2 | -1 | 3 | 3 | Telework Program (www.teleworkva.org)<br>Employer Outreach Program |
| **1-5 Employee Flextime Benefits** | 3 | 1 | 1 | 3 | 0 | 0 | 0 | 1 | -1 | 3 | 3 | Employer Outreach Program |
| **1-5 Compressed Work Week** | 3 | 2 | 2 | 3 | 1 | 1 | -1 | 1 | -1 | 3 | 3 | Employer Outreach Program |
| **3-3 Rideshare Matching Services** | 3 | 3 | 3 | 3 | 2 | 2 | -1 | 2 | 3 | 3 | 2 | Commuter Computer,<br>Guaranteed Ride Program,<br>Regional Rideshare Program,<br>Carpool and Vanpool Program<br>Employer Outreach Program |
| **3-4 Vanpool/Employer Shuttle Program** | 3 | 3 | 3 | 3 | 2 | 2 | -1 | 2 | 3 | 3 | 2 | Vanpool Leases,<br>Employer Outreach Program |
| **3-5 Trip Reduction Program** | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 1 | NuRide Program,<br>Transportation Incentives Program,<br>Partnership with FarmFresh,<br>Employer Outreach Program |
| **3-6 Parking Management** | 3 | 3 | 0 | 0 | 3 | 3 | 3 | 3 | 2 | 2 | 0 | Employer Outreach Program |

Ratings Compiled from the Victoria Transport Policy Institute TDM Encyclopedia (www.vtpi.org/tdm)

**Table 20 – TRAFFIX Programs by CMP Strategy**

Note: Ratings from 3 (very beneficial) to –3 (very harmful). A 0 indicates no impact or mixed impacts.

TRAFFIX also works with HRT, VDOT, and the Hampton Roads jurisdictions to provide Park & Ride lots (**Table 21**). These facilities provide ridesharers with free, all-day parking and are convenient for express buses, carpools, and vanpools.

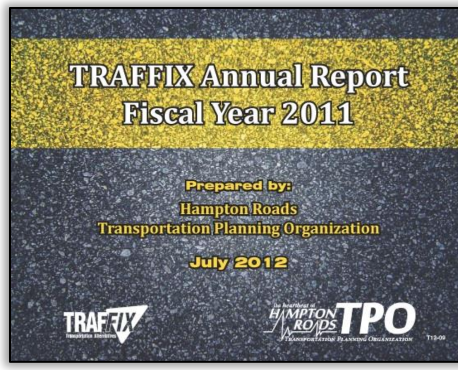
For more information on TRAFFIX services, visit: www.gohrt.com/services/traffix.

| |
|---|
| **Cheaspeake** |
| Greenbrier Mall, #261 (1401 Greenbrier Pkwy) |
| **Gloucester County** |
| Guinea Road, #267 (Route 216-Guinea Rd & York Crossing Dr) |
| Abingdon Rescue Squad, #268 (Rte 1217-Hayes Rd & Rte 1232-Bray Rd) |
| Rappahannock Community College, #269 (Rte 33-Tidewater Trl & US 17-General Puller Hwy) |
| **Hampton** |
| Hampton Transportation Center (2 West Pembroke Avenue) |
| **Isle of Wight County/Smithfield** |
| Smithfield Commuter Parking Lot, #184 (US 258-W Main St & Route 10) |
| Bartlett, #191 (Rte 669-Smith's Neck Road & US 17) |
| **James City County** |
| Croaker Rd, #192 (Rte 30-Rochambeau Blvd & Rte 607-Croaker Rd) |
| Jamestown Center, #233 (Rte 359-Green Springs Rd & Rte 31) |
| **Newport News** |
| Denbigh Fringe Parking, #181 (Rte 60 & Old Courthouse Road) |
| Lee Hall Commuter Parking Lot, #182 (Rte 238-Yorktown Rd & Rte 143-Jefferson Ave) |
| **Norfolk** |
| Harbor Park Light Rail Station |
| Ballentine/Broad Creek Light Rail Station |
| Military Highway Light Rail Station |
| Newtown Road Light Rail Station |
| EVMC/Ft. Norfolk Light Rail Station |
| **Portsmouth** |
| Park & Sail Commuter Parking Lot, #183 (Court St & Crawford St Connector) |
| **Suffolk** |
| Route 58/460 Bypass, #185 (Burnetts Way & Rte 10) |
| Magnolia Commuter Parking Lot, #187 (Rte 337 & US 13) |
| **Virginia Beach** |
| Silverleaf Station,#72 (4300 Commuter Dr) |
| Indian River Road, #189 (Reon Dr & Indian River Rd) |
| **York County** |
| Lightfoot, #260 (East Rochambeau Dr & Rte 786-Oaktree Rd) |

**Table 21 – Hampton Roads Park & Ride Lots**

Source: VDOT & HRT

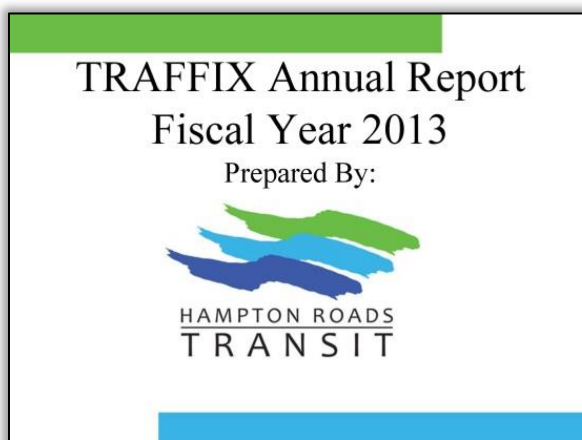
## TRAFFIX Annual Report




In July 2012, the HRTPO board approved the first TRAFFIX Annual Report that represented data from Fiscal Year (FY) 2011. This report was prepared by HRTPO staff to document existing performance data for TRAFFIX programs and to serve as a template for future reports. This report defined and tabulated a comprehensive set of performance measures for TRAFFIX, covering the actions of TRAFFIX, the outcomes of the TRAFFIX programs, and the annual TRAFFIX budget.

This report is now prepared annually by TRAFFIX/Hampton Roads Transit in coordination with the TRAFFIX Oversight Subcommittee (TOS), the Transportation Technical Advisory Committee (TTAC), and the HRTPO. In March 2014, TRAFFIX staff completed the third TRAFFIX Annual Report (FY 2013), which contained a baseline of performance data from FY 2007 through FY 2013.

To obtain a copy of the most recent TRAFFIX Annual Report, visit: http://www.hrtpo.org/page/transportation-demand-management.



## ACTIVE TRANSPORTATION

**(Included in Strategy #2)**

Active transportation planning, which aims to improve the user safety and mobility of all types of non-motorized transportation options, has expanded both in Hampton Roads and across the country. The term active transportation refers to transportation such as walking or using a bicycle, tricycle, wheelchair, scooter, skates, skateboard, push scooter, or similar devices. Bicycle lanes, multi-use paths, sidewalks, crosswalks, and trails are all non-motorized transportation facilities designed to improve the mobility and safety of active transportation users. The various types of non-motorized facilities used in Hampton Roads are shown in **Figure 16**.

Making investments in non-motorized modes of transportation, such as biking and walking, can increase safety and mobility in a cost-efficient manner. Active transportation facilities provide a zero-emission alternative to motorized modes and can mitigate congestion in localized areas of the region. These facilities must be coordinated with local land use plans and policies and integrated with other modes, such as transit, to be effective.

In Hampton Roads, VDOT and many jurisdictions require developers to incorporate facilities for non-motorized transportation into new developments. In some cases, this has resulted in gaps in the network of sidewalks and bikeways. Many local jurisdictions within Hampton Roads are working toward providing the necessary connections to improve the overall network.

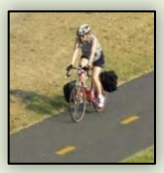
There are currently thousands of miles of sidewalks and over 450 miles of bicycle and trail facilities in Hampton Roads (see **Map 19** on page 71). These non-motorized facilities vary greatly in type and length, from secluded paths in city and state parks to dedicated lanes along major thoroughfares to facilities at the Virginia Beach Oceanfront.

### NON-MOTORIZED FACILITIES IN HAMPTON ROADS

There are various types of non-motorized facilities in place in Hampton Roads. Examples of these non-motorized facilities include:

**Bike Lanes**
A portion of the roadway is designated by signs and pavement markings for the preferential or exclusive use of bicycles.

**Shared Use Paths**
A facility physically separated from motorized vehicular traffic intended for the use of bicycles, pedestrians, and other active transportation users.



**Paved Shoulders**
A paved portion of a roadway to the right of the edge stripe on which bicyclists may ride. These areas are not to be marked as bike lanes.

**Wide Outside Lanes**
An outside travel lane with a width of at least 14 feet.

**Signed Shared Roadway**
A roadway designated by bike route signs that serve to provide continuity to other bicycle facilities.


**Grade Separated Crossing**
Facilities that are designed to continue non-motorized facilities through high volume roadways, railroads, or natural barriers.

**Sidewalks**
Non-motorized facilities between the curb line and adjacent property line that are designed primarily for foot traffic and users with smaller wheeled devices.

**Trails**
Pedestrian routes developed primarily for outdoor recreational purposes.

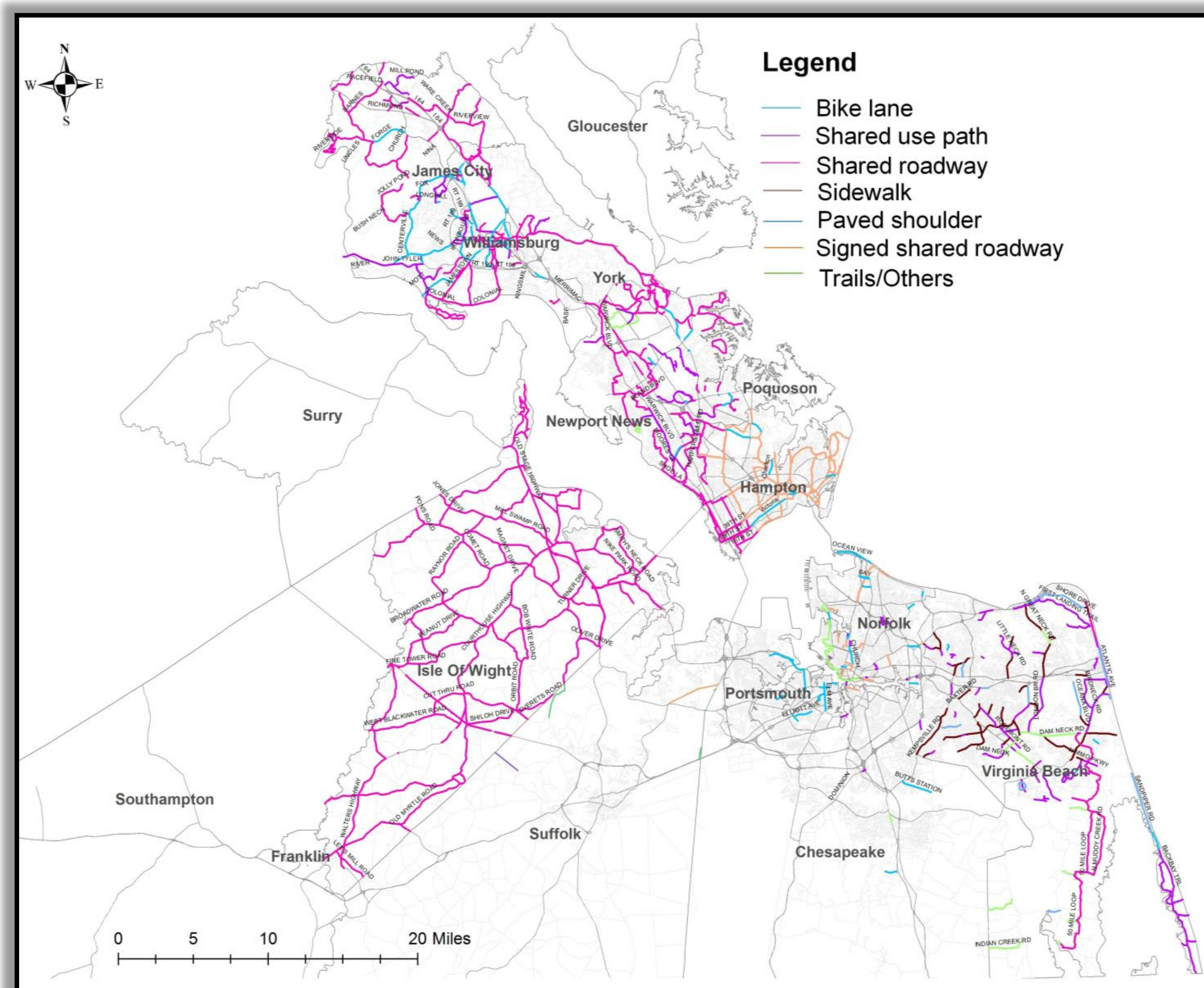
**Figure 16 – Non-Motorized Facilities in Hampton Roads**

In recent years, several major non-motorized facilities have been added in Hampton Roads. Examples include the conversion of the old section of Route 17 in Chesapeake into the Great Dismal Swamp Trail, the addition of bike lanes along a hazardous section of Shore Drive in Virginia Beach, and the construction of portions of the Virginia Capital Trail which, upon completion, will connect Williamsburg and Downtown Richmond with a 54-mile facility.

While nearly all jurisdictions in Hampton Roads incorporate a multimodal transportation vision in their projects and planning efforts, certain localities are adopting policies known as Complete Streets. Complete Streets policies ensure that corridors are planned, designed, and maintained to enable safe usage for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities. Complete Streets also increase connectivity between neighborhoods and streets and encourage the use of alternative forms of transportation.

In Hampton Roads, some localities have already incorporated Complete Streets into their comprehensive plans (or bicycle and pedestrian master plans) and others have identified it as a goal. Examples include:

- **James City County** has provided for the design of Complete Streets in their 2009 Comprehensive Plan.




**Map 19 – DRAFT Hampton Roads Regional Active Transportation Facilities Map – Existing**
Prepared by HRTPO in July 2014 (DRAFT Version 1.0)

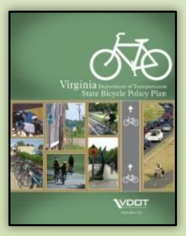
- **Norfolk** supports the development of Complete Streets as a part of their 2013 General Plan.
- **Portsmouth** recommends Complete Streets design standards in their 2010 Master Transportation Plan.
- **Virginia Beach** recommends Complete Streets strategies as a part of their 2009 Comprehensive Plan and also adopted Complete Streets goals as a part of their 2011 Bikeways and Trails Plan.

HRTPO is heavily involved in Regional Active Transportation Planning. This includes evaluating active transportation projects as part of the 2040 Long-Range Transportation Plan, developing a regional active transportation facilities map, and ultimately developing a regional active transportation plan.

## RECENT DEVELOPMENTS IN ACTIVE TRANSPORTATION

**Virginia Capital Trail** – Construction continues on the Virginia Capital Trail, which when complete will connect Williamsburg with Downtown Richmond. The Hampton Roads portion of the trail is complete, and construction of remaining sections of the trail is expected to be complete in 2015.

**South Hampton Roads Trail** – Planning continues on the South Hampton Roads Trail, a 41-mile shared-use path that would connect Suffolk, Chesapeake, Portsmouth, Norfolk, and Virginia Beach. Construction has begun on a 3.3-mile portion of this trail known as the Seaboard Coastline Trail in Suffolk.




**Local and State Active Transportation Planning** – A number of state and local planning efforts have recently been completed, including the VDOT State Bicycle Policy Plan, the Regional Bicycle Facilities Plan and Bikeway Map in the Historic Triangle Area, and the Virginia Beach Bikeways and Trails Plan.

**Regional Active Transportation Planning** – As part of the HRTPO prioritization process, the 2040 Long-Range Transportation Plan will be evaluating active transportation projects for the first time. Staff has received over 40 bicycle/pedestrian candidate project suggestions from around the region. These projects will be evaluated using the HRTPO Project Prioritization Tool, which includes several criteria such as connectivity, safety and viability among others.

Building on the 2012 Regional Active Transportation Scan, HRTPO staff is developing a regional active transportation map. This map will be the basis for identifying gaps in the system and also determining the latent demand for walking and biking. These efforts and others will ultimately become a part of developing a regional active transportation plan.

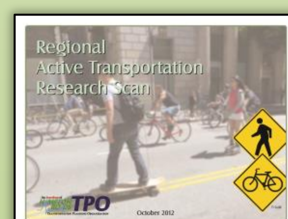



**Figure 17 – Recent Developments in Active Transportation**

## HRTPO BOARD ADVISORY COMMITTEES

**(Included in All Strategies)**

Members of the Hampton Roads Transportation Planning Organization (HRTPO) Board's advisory committees and subcommittees work collaboratively to address transportation issues and implement congestion mitigation strategies. Below is a description of each committee and their roles and responsibilities:

The **Transportation Technical Advisory Committee (TTAC)** acts as an advisory body to the HRTPO for transportation issues that are technical in nature. It is staffed by transportation professionals from member localities, the Federal Highway Administration (FHWA), Virginia Department of Transportation (VDOT), Hampton Roads Transit (HRT), Williamsburg Area Transit Authority (WATA), Virginia Department of Rail and Public Transportation (DRPT), Virginia Port Authority (VPA), Federal Transit Administration (FTA), Virginia Department of Aviation, and the U.S. Navy. The TTAC interacts with HRTPO staff on technical matters related to regional transportation planning and programming. Through this work, the TTAC develops recommendations on projects and programs for HRTPO Board consideration.

The **Transportation Advisory Committee (TAC)** acts as a standing advisory committee of the HRTPO Board, comprised mainly of city managers from the member jurisdictions. The TAC meets as circumstances require to act upon matters referred to it by the HRTPO Board.

The **Citizen Transportation Advisory Committee (CTAC)** serves as an advisory committee to the HRTPO Board and provides public input to the HRTPO Board on transportation issues. Members of the CTAC are selected from the public by the HRTPO board, and include citizens from all jurisdictions. The CTAC chairman attends HRTPO Board meetings as a non-voting member.

The **Legislative Ad-Hoc Committee** serves as an advisory committee to the HRTPO Board and provides input as circumstances require on transportation legislative issues. Committee members are from several member localities and the Virginia General Assembly.

The **Freight Transportation Advisory Committee (FTAC)** advises the HRTPO Board on regional freight-related transportation issues. The FTAC is mainly composed of members from the shipping, trucking, and warehousing industries. The mission of FTAC includes advocating on behalf of the movement of freight in the region. The FTAC chairman attends HRTPO Board meetings as a non-voting member.

The **Passenger Rail Task Force** conducts meetings as necessary to approve rail consultant progress and other work related to passenger rail initiatives for Hampton Roads. This committee is comprised of member localities, Amtrak, CSX Transportation, HRT, Norfolk Southern Corporation, Virginia DRPT, and WATA.

The **Hampton Roads Transportation Operations (HRTO) Subcommittee**, which is described in more detail later in this section, advises TTAC on regional transportation operational issues. The **TRAFFIX Oversight Subcommittee (TOS)**, which was discussed in the Transportation Demand Management section of this report, reviews the progress of TRAFFIX and reports to TTAC regularly. Regional transportation committees such as the **Hampton Roads Regional Concept of Transportation Operations – Traffic Incident Management working group (RCTO-TIM)** are led by other organizations and are discussed in more detail in the ITS & Operations section.

More information on these HRTPO Board advisory committees is available at http://hrtpo.org/page/board-advisory-committees.

## HAMPTON ROADS TRANSPORTATION ACCOUNTABILITY COMMISSION

**(Included in All Strategies)**

In April 2014, Virginia Governor Terry McAuliffe signed into law the establishment of the **Hampton Roads Transportation Accountability Commission (HRTAC)**. This new commission is comprised of 23 members – 14 chief elected officers from local governments, 2 Virginia Senators, 3 Virginia Delegates, and 4 non-voting members (the Commissioner of Highways, Director of Rail and Public Transportation, Executive Director of the Virginia Port Authority, and a member of the Commonwealth Transportation Board).

HRTAC serves as a political subdivision of the Commonwealth of Virginia to procure, finance, build, and operate high priority transportation projects in Hampton Roads using Hampton Roads Transportation Fund (HRTF) revenues from House Bill 2313 approved by the 2013 General Assembly. HRTF projects, which were identified by the HRTPO Board in October 2013, are the Third Crossing, I-64 Southside (which includes the High-Rise Bridge replacement), Route 13/58/460 Connector, I-64/I-264 Interchange, and I-64 on the Peninsula.

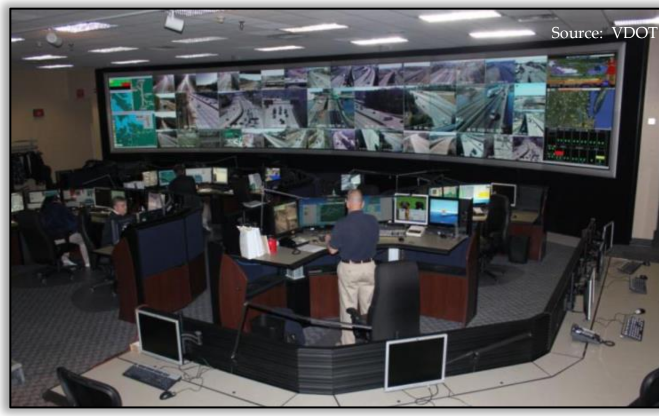
More information on HRTAC is available at http://www.hrtpo.org/page/hrtac.

## TRANSPORTATION OPERATIONS & ITS

**(Included in Strategy #4)**

Including Intelligent Transportation Systems (ITS) technologies and transportation operations – cost-effective methods of maximizing the capacity of the existing roadway network – have become more attractive as roadway projects have become more costly and more difficult to construct. The purpose of transportation operations is to maximize the safety, security, and mobility of roadway users by actively managing the regional transportation system. This is done through both trained and coordinated manpower and technological improvements. Examples include incident management, signal coordination and optimization, automated toll collection, and providing traveler information via multiple forms of media such as highway advisory radio and 511 Virginia. Examples of ITS technologies used in Hampton Roads are shown in **Figure 18** on page 75.

Regional system operations in Hampton Roads are led by the VDOT Hampton Roads Transportation Operations Center (HRTOC). The HRTOC consists of two groups – Maintenance and Operations – and seven departments: 1) Inventory Management, 2) Fleet Asset, 3) Information Technology, 4) Field and Systems Maintenance, 5) Control Room, 6) Safety Service Patrol (SSP), and 7) Bridge/Tunnel Operations. The HRTOC maintains ITS infrastructure on the interstate system, monitors traffic conditions throughout the region, responds to crashes and other incidents with the SSP, and distributes traveler information via changeable message signs, highway advisory radio, and the 511 Virginia phone and internet services.




**Hampton Roads Transportation Operations Center**

In May 2013, VDOT awarded a six-year contract to Serco to operate, integrate, and innovate VDOT's five transportation operation centers including the HRTOC. As part of the contract, Serco manages regional Safety Service Patrols, develops and implements a statewide advanced traffic management system, installs and maintains ITS equipment, manages HOV and reversible lanes, develops a new software platform that is flexible for future enhancements, and improves the interoperability of each center. The transition of operations at the HRTOC to Serco occurred on November 13, 2013.

The HRTOC serves as the backbone for transportation operations in the region. The HRTOC:

- Currently covers 140 miles, which is nearly the entire regional Interstate system and selected arterial roadways.
- Operates 282 closed-circuit cameras, 202 dynamic message signs, 6 highway advisory radio transmitters, 5 reversible roadway gate entrances, and hundreds of vehicle detection devices, all linked by 552 miles of fiber optic cable.
- Responded to 55,903 incidents and drove 3.1 million miles in 2013 via the Safety Service Patrol.
- Responded to incidents in an average of just under 7 minutes in 2013, and cleared incidents in just over 24 minutes.

Many Hampton Roads cities also maintain their own transportation operations centers (or traffic management centers). These centers manage and operate local traffic signal systems, changeable message signs, and CCTV cameras. In some cases, these centers are connected with the Hampton Roads Transportation Operations Center, allowing for data and video sharing and instant communication.

## ITS TECHNOLOGIES USED IN HAMPTON ROADS

Hampton Roads has been a national leader in the use of Intelligent Transportation Systems (ITS). Nearly every mile of Interstate in the region is instrumented with ITS technologies, and various cities throughout the region maintain ITS infrastructure as well. The following are examples of ITS technologies in use throughout Hampton Roads:

**Transportation Operations Centers**
Centers that incorporate various ITS technologies to assist staff with traffic monitoring, incident response, and information dissemination.

**Vehicle Detection Devices**
Records traffic volumes and speeds. Also notifies transportation operations center staff of congestion and incidents.

**Reversible Roadway Gates**
Allows traffic on limited access roadways to be reversed based on commuting patterns, maximizing the use of the existing roadway.

**Emergency Vehicle Signal Preemption**
Changes the traffic signal when emergency vehicles approach, improving the safety and response time of emergency vehicles.

**Advanced Signal Systems**
Improves the coordination and timing of traffic signals in a corridor or throughout an entire city, reducing the number of stops and delays.

**CCTV Cameras**
Provides roadway images to transportation operations centers and the public.

**Electronic Toll Collection**
Allows travelers to pass quickly through special lanes, avoiding backups and delays due to paying tolls.

**511 Virginia**
Provides up-to-date traveler information via telephone, the internet, and other methods.

**Transit Automatic Vehicle Location (AVL)**
Provides the location of transit vehicles, aiding on-time performance.


**Changeable Message Signs**
Provides up-to-date information to the traveling public.

**Highway Advisory Radio**
Provides up-to-date traveler information through radio broadcasts on 1680 AM.


**Figure 18 – ITS Technologies used in Hampton Roads**

Another service VDOT furnishes to improve roadway mobility is 511 Virginia. Launched in 2005, 511 Virginia provides traveler information via mobile or landline phones, email, text message, smartphone application, and http://511virginia.org. The 511 Virginia service allows users to receive real-time traffic and roadway condition information for specific locations both in Hampton Roads and throughout the state.

More information on recent regional developments in transportation operations is shown below in **Figure 19**, and information on regional ITS and transportation operations and available at http://hrtpo.org/page/operations-and-its.

## RECENT DEVELOPMENTS IN TRANSPORTATION OPERATIONS

**Travel Time Information –** In May 2012, VDOT began displaying travel times on six informational signs that notify motorists of the quickest route to the Virginia Beach Oceanfront or the North Carolina Outer Banks. VDOT expanded this effort in 2014 by displaying travel times on six dynamic message signs, with additional signs planned for the near future.


**511 Virginia App –** VDOT introduced the 511 Virginia smartphone application in May 2012. The app, which works on Android and iPhone platforms, is designed to provide the same real time traffic information on mobile devices that is provided on the website. Real-time traffic camera images are also provided on the app.

**VDOT TOC Contract –** In May 2013, VDOT awarded a six-year contract to Serco to operate, integrate, and innovate VDOT's five transportation operation centers. As part of the contract, Serco manages regional Safety Service Patrols, develops and implements a statewide advanced traffic management system, installs and maintains ITS equipment, manages HOV and reversible lanes, develops a new software platform that is flexible for future enhancements, and improves the interoperability of each center.

**Regional Operations Plan –** The HRTPO Board recently allocated funds to produce an update to the region's Operations Strategic Plan, which provides the vision and framework for a multi-jurisdictional transportation system unified by ITS and operations technologies and strategies. The updated regional Operations Strategic Plan will be completed in 2015.


**Figure 19 – Recent Developments in Transportation Operations**

## Hampton Roads Transportation Operations (HRTO) Subcommittee

The Hampton Roads Transportation Operations Subcommittee (HRTO) is comprised of regional transportation professionals from Hampton Roads jurisdictions, Virginia Department of Transportation (VDOT), local transit agencies, and other invited participants, such as local police and fire/EMS personnel. The group serves as an advisory subcommittee to the Transportation Technical Advisory Committee (TTAC), meeting bi-monthly to discuss methods that can be utilized to improve transportation operations in the region.

Recent actions by the HRTO subcommittee include creating regional standards for ITS technologies, improving communications and data sharing between cities and VDOT, obtaining CMAQ funding for additional equipment that enables Virginia State Police and other transportation officials to clear fatal crashes faster, and sharing accomplishments and lessons learned from individual city Transportation Operations Centers. HRTO also leads the development of the regional Operations Plan and helps VDOT maintain the regional ITS architecture.

More information on the HRTO subcommittee is available at http://hrtpo.org/page/hampton-roads-transportation-operations-subcommittee-(hrto).

## Hampton Roads Regional Concept of Transportation Operations – Traffic Incident Management Working Group (RCTO-TIM)

In Hampton Roads, the Regional Concept of Transportation Operations – Traffic Incident Management (RCTO-TIM) working group meets on a regular basis to develop and implement strategies to improve emergency response to roadway incidents in the region. The RCTO-TIM working group, which is led by VDOT, is comprised of various representatives from the Virginia State Police (VSP), local police, fire and rescue agencies, local traffic engineering and planning departments, HRTPO, as well as other operating and first responding agencies.

The goal of the Hampton Roads RCTO-TIM is to reduce the number of injuries incurred by responders while decreasing the clearance times associated with these incidents. The RCTO-TIM seeks to improve collaboration among the region's planners, operators, and responders to enhance various aspects of highway incident management.

The Hampton Roads RCTO-TIM has established six primary objectives:

- **Objective 1** - Increase responder safety by eliminating struck-By incidents and fatalities
- **Objective 2** - Decrease incident clearance time
- **Objective 3** - Decrease secondary incident occurrences
- **Objective 4** - Improve inter-Agency communication during incidents
- **Objective 5** - Identify existing regional incident management resources and establish plan for inter-Agency utilization and acquisition
- **Objective 6** - Establish a regional incident management proactive and post-Incident review consortium

One of the major accomplishments of the Hampton Roads RCTO-TIM has been regular post-incident reviews to determine where improvements can be made. One improvement is the adoption of a lane numbering identification system (lanes are numbered L1 and up starting from the interior to the shoulder) used by dispatchers and first responders to quickly locate incidents on freeways.

More information on the Regional Concept of Transportation Operations – Traffic Incident Management (RCTO-TIM) working group is available at http://www.hrtpo.org/page/traffic-incident-management.

## MILITARY TRANSPORTATION NEEDS

**(Included in All Strategies)**

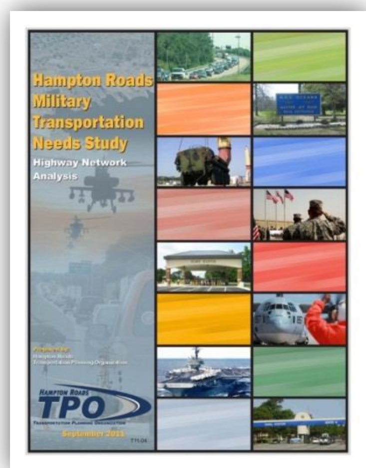
Hampton Roads is home to many U.S. military and supporting sites that are important to the defense of our nation. The military population – including active duty, reserve, retirees and family members – totals approximately 300,000 or almost 20% of the area's total population. As a result of the area's large military presence, much of the local economy is driven by the U.S. Department of Defense (DoD). Defense readiness and efficient military operations require a transportation network that moves cargo and personnel as quickly and safely as possible.

HRTPO's planning and analysis of military transportation needs is a new component of the regional CMP. Its purpose is to determine military transportation needs and to provide an efficient and safe transportation network for the military in Hampton Roads.

Since the last CMP update, the HRTPO completed the Hampton Roads Military Transportation Needs Study:

### Phase I: Highway Network Analysis

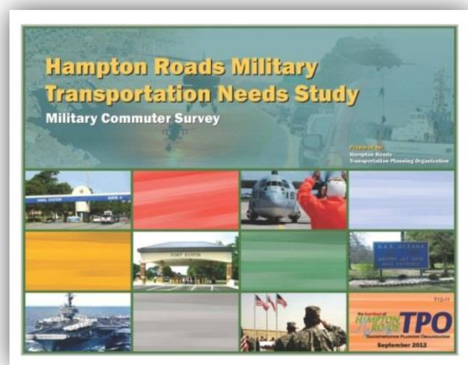
Phase I of the Hampton Roads Military Transportation Needs Study was completed and approved by the HRTPO Board in September 2011. In this phase, HRTPO staff worked with various stakeholders – local military representatives, state and federal agencies, port officials and local jurisdictions – to determine transportation concerns and needs of the local military. HRTPO staff identified a roadway network that includes both the Strategic Highway Network (STRAHNET) and additional roadways that serve the military sites and intermodal facilities not included in the STRAHNET. STRAHNET (developed by the U.S. Department of Defense) serves as the minimum national defense public highway network needed to support a defense emergency and are used for day-to-day military cargo movement. Staff analyzed this "Roadways Serving the Military" network to determine deficient locations, such as congested segments, deficient bridges, and inadequate geometrics. The study made numerous recommendations to address existing deficiencies and to accommodate future military travel needs, including revisions to current STRAHNET designations, increasing vertical clearance of tunnels, expanding the width of highway lanes to accommodate military vehicles, rehabilitating or replacing structurally deficient bridges, extending light rail transit to Naval Station Norfolk, and high-speed passenger rail service to Washington, D.C.




### Phase II: Military Commuter Survey

HRTPO staff continued this study with the creation of the first region-wide Military Commuter Survey, which was conducted from November 8, 2011 to February 24, 2012. Via the survey, the HRTPO collected information about the commuting experience of military personnel (active-duty, civilians, contractors, reservists and others) travelling to/from the region's military bases, receiving a total of 10,994 survey responses. The survey was developed by HRTPO staff in concert with the commands of the region's military installations and various other transportation stakeholders. The purpose of the survey was to determine the transportation challenges facing local military personnel during their daily commutes in Hampton Roads.

The survey was implemented using Google documents and hosted on the HRTPO website. Even though survey responses were sought from all military commuters in the region, military commuters were specifically targeted who travel to/from 29 of the 38 military and supporting sites identified in Phase I of the study. These 29 military sites are the primary locations for military-related employment. The remaining 9 locations are supporting sites, such as port terminals and airports, which move military personnel and goods in the event of a national or local emergency. One benefit of hosting the survey on the HRTPO website was that thousands of military personnel who reside within Hampton Roads were introduced to the HRTPO, some learning about its metropolitan planning process and activities for the first time.

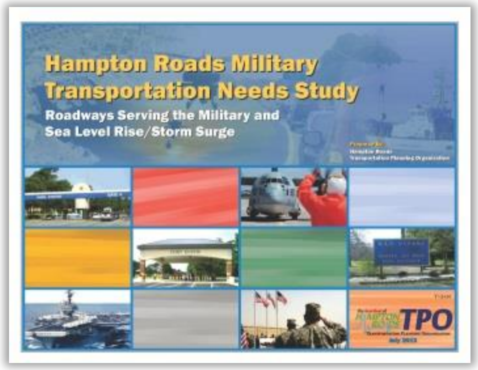



Respondents were asked to identify items such as length of morning and afternoon commutes, mode of transportation, transportation problems, and any locations of recurring trouble along their commute. The top reported transportation problems by military commuters were traffic congestion (79%), traffic backups at military gates (67%), and poor roadway maintenance (42%). At the end of the survey, respondents were asked to submit any suggestions they had regarding transportation in the region. Not only was excellent feedback provided, but many expressed thanks for having the opportunity to communicate their transportation challenges.

## Phase III: Roadways Serving the Military and Sea Level Rise/Storm Surge

The Hampton Roads region contains one of the largest natural harbors in the world, making the region an attractive location for military facilities. This coastal location also makes many of these military facilities susceptible to projected relative sea level rise and storm surge, impacting overall defense readiness. In response to these concerns, HRTPO staff completed the third phase of the Hampton Roads Military Transportation Needs Study – Roadways Serving the Military and Sea Level Rise/Storm Surge in July 2013.

The threat of relative sea level rise and storm surge has been recognized along the southeast coast for many years, particularly for low-lying communities such as Hampton Roads, Virginia. National, state, regional, and local organizations are addressing this pressing issue by raising awareness and developing potential solutions.




Phase III of the study builds on previous studies and related work to estimate the relative sea level rise and potential storm surge threats to the "Roadways Serving the Military" network established in Phase I of the Hampton Roads Military Transportation Needs Study. This third phase of the study continues the work in Phase I by determining flooding-based deficient locations along the roadway network. It expands upon the work and methodologies developed by the Hampton Roads Planning District Commission (HRPDC) and the Virginia Institute of Marine Science (VIMS) by identifying military roadway segments vulnerable to submergence. Additionally, submergence of other local roadways that provide access to and from the "Roadways Serving the Military" which may be vulnerable to flooding have been identified.

More information on the Hampton Roads Military Transportation Needs Study is available at **http://hrtpo.org/page/military-transportation-needs**.

# APPLICATION OF STRATEGIES TO CMP CONGESTED CORRIDORS

This section provides an analysis of applying the congestion mitigation strategies mentioned in the previous section to CMP Congested Corridors in Hampton Roads. The CMP Congested Corridors were selected based on the CMP Ranking Criteria and methodology shown in the Ranking of CMP Congested Corridors section of this report (page 50). The 18 CMP Congested Corridors that resulted from this methodology are shown again in **Table 22 and Map 20** on page 81.

Fourteen of the eighteen CMP Congested Corridors are analyzed within this section. Two of the corridors (Downtown Tunnel/Berkley Bridge and Midtown Tunnel/Western Freeway) are not included in the CMP Congested Corridors analysis because tolls at the Midtown and Downtown Tunnels have greatly reduced congestion at those facilities. Two other corridors (Fort Eustis Boulevard and Military Highway) are not included in the analysis because of bridge construction projects that temporarily reduced capacity on these roadways. Another roadway on the list – Northampton Boulevard – was impacted by construction during 2013 that resulted in a lane reduction in the eastbound direction.

**Freeways**

| Rank | Jurisdiction | CMP Congested Corridor |
|---|---|---|
| 1 | HAM/NOR | Hampton Roads Bridge-Tunnel (I-64) from I-664 to I-564 |
| | | - 4th View St from I-64 to Ocean View Ave |
| 2 | NOR/PORT/ CHES | Downtown Tunnel/Berkley Bridge (I-264/I-464)[1] |
| | | - I-264 from Portsmouth Blvd to Brambleton Ave |
| | | - I-464 from Poindexter St to I-264 |
| | | - St. Pauls Blvd from I-264 Ramp to Brambleton Ave |
| 3 | CHES | I-64/High Rise Bridge from I-264 & I-664 (Bowers Hill) to Greenbrier Pkwy |
| 4 | NN | Monitor-Merrimac Mem. Bridge-Tunnel (I-664) from Terminal Ave to Chestnut Rd |
| 5 | NOR/VB | I-64 (Norfolk/VA Beach) from I-564 to Indian River Rd |
| 6 | NOR | I-564 (Norfolk) from International Terminal Blvd to Admiral Taussig Blvd |

**Arterials**

| Rank | Jurisdiction | CMP Congested Corridor |
|---|---|---|
| 1 | NOR/PORT | Midtown Tunnel/Western Fwy from West Norfolk Rd to Brambleton Ave[1] |
| | | - Hampton Blvd from 27th St to Brambleton Ave |
| | | - Brambleton Ave from Colley Ave to Hampton Blvd |
| 2 | VB | Indian River Rd/Ferrell Pkwy from Providence Rd to Indian Lakes Blvd |
| 3 | NOR/VB | Northampton Blvd from I-64 to Diamond Springs Rd[3] |
| 4 | NN | Fort Eustis Blvd from Warwick Blvd to I-64[2] |
| 5 | VB | London Bridge Rd/Drakesmile Rd from Dam Neck Rd to Virginia Beach Blvd |
| 6 | VB | Independence Blvd from Holland Rd to Jeanne St |
| 7 | CHES | Battlefield Blvd from Cedar Rd to I-64 |
| 8 | CHES | Military Hwy from Bainbridge Blvd to I-464[2] |
| 9 | JCC | Monticello Ave from News Rd to Route 199 |
| 10 | CHES/VB | Centerville Tnpk from Mt Pleasant Rd to Indian River Rd |
| 11 | JCC/WMB | Route 199 from John Tyler Hwy (Rte 5) to Jamestown Rd |
| 12 | CHES | George Washington Hwy from Moses Grandy Trail to I-64 |

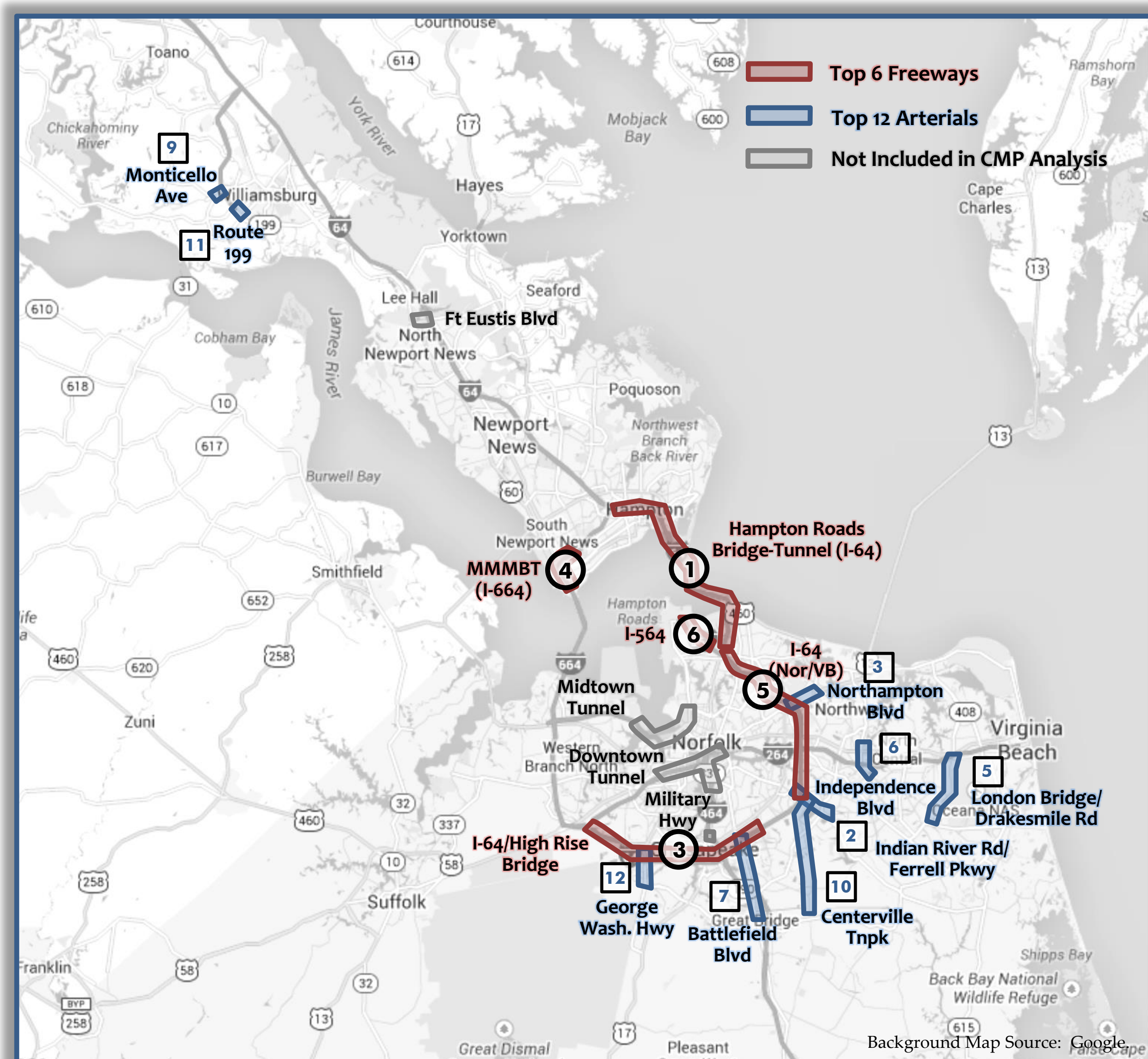
**Table 22 – CMP Congested Corridors**

1 - Not included in the CMP analysis due to tolls imposed in February 2014.
2 - Not included in the CMP analysis due to bridge construction projects.
3 - Corridor impacted by construction during the CMP analysis period (2013).

Each CMP Congested Corridor includes two pages summarizing the issues within the corridor and some remedies that could help alleviate congestion (see pages 82-109). The first page for each corridor includes:

- **Location Map** – Layout of the corridor and weekday traffic volumes, number of lanes, truck volumes, and traffic signal locations.
- **Corridor Summary** – Corridor length, speed limits, roadway functional class, transit service availability, and the CMP Segment Score for the corridor.
- **Recent Projects** – Description of any projects that were recently completed within or parallel to the corridor or are currently under construction.
- **Future Projects** – Description of any projects planned or programmed for the corridor, including current timelines. Projects must be included in the Six-Year Improvement Program/Transportation Improvement Program or the Long-Range Transportation Plan to be shown in this area.
- **Corridor and Congestion Characteristics Table** – Roadway segment lengths, congestion

**Map 20 – CMP Congested Corridors**



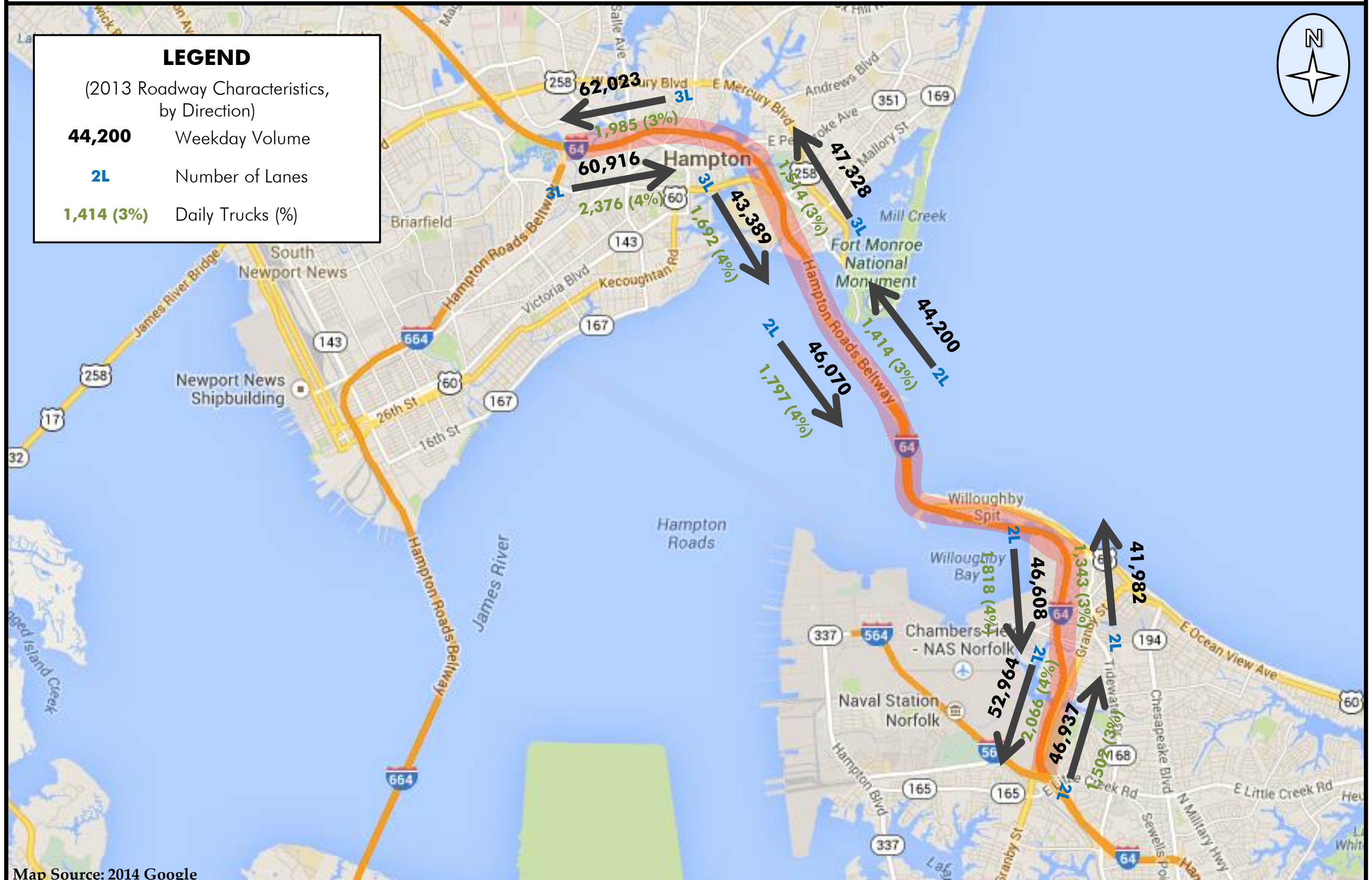

measures by direction for the AM and PM Peak Periods (including slowest speed, highest travel time index, highest Potential for Intersection Congestion Alleviation for arterials, highest planning time index, number of congested 15-minute intervals, total delay, and congestion level), 2013 and 2034 number of lanes, 2034 projected traffic volumes, 20-year projected truck delay, and 2034 PM Peak congestion levels.

The second page for each corridor includes:

- **Congestion Mitigation Strategy Toolbox** – Shows all of the congestion mitigation strategies described in the previous section and whether each of these strategies are currently in use within the corridor, and if not, whether the particular strategy could be applied to and benefit the corridor.
- **Observations & Probable Causes of Congestion** – Lists observations and possible causes based on available data, discussions with officials from the localities, and field observations.
- **Potential Congestion Mitigation Strategies** – Provides potential improvements based on data analysis, site observations, input from localities, and applicable CMP strategies.

# CMP CONGESTED CORRIDOR - FREEWAY #1

## Hampton Roads Bridge-Tunnel (I-64) Between I-664 and I-564
## Cities of Norfolk and Hampton




### CORRIDOR SUMMARY

| | |
|---|---|
| **Corridor Length** | 11.95 Miles |
| **Speed Limit** | 55 mph |
| **Roadway Class** | Interstate |
| **Transit Service** | HRT MAX Bus Routes 961 & 963 |
| **Highest CMP Segment Score** | 98 – Eastbound from Settlers Landing Rd to Mallory St during PM Peak |

### RECENT PROJECTS

- None

### FUTURE PROJECTS

2034 LRTP Projects

- Third Crossing. This was added to the 2034 LRTP in September 2014 as a Hampton Roads Transportation Fund (HRTF) project.

| | | | | Eastbound (2013) | | | | | | | | | | | | | | Westbound (2013) | | | | | | | | | | | | | | Both Directions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | SLOWEST SPEED (mph) | | HIGHEST TRAVEL TIME INDEX | | HIGHEST PLANNING TIME INDEX | | # CONG 15-MIN INTERVAL | | TOTAL DELAY (Hrs/Mi) | | CONG LEVEL | | SLOWEST SPEED (mph) | | HIGHEST TRAVEL TIME INDEX | | HIGHEST PLANNING TIME INDEX | | # CONG 15-MIN INTERVAL | | TOTAL DELAY (Hrs/Mi) | | CONG LEVEL | | # LANES | | 2034 PROJ VOL | 20-YR PROJ TRUCK DELAY (Hrs/Mi) | 2034 PM CONG LEVEL |
| FACILITY NAME | SEGMENT FROM | SEGMENT TO | Length (Mi) | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | 2013 | 2034 | | | |
| I-64 | I-664 | ARMISTEAD AVE | 0.88 | 52 | 36 | 1.19 | 1.75 | 1.59 | 7.66 | 0 | 8 | 15 | 84 | MOD | SEV | 63 | 61 | 1.02 | 1.04 | 1.06 | 1.07 | 0 | 0 | 1 | 5 | LOW | LOW | 6 | 6 | 143,000 | 10.6 | MOD |
| I-64 | ARMISTEAD AVE | RIP RAP RD | 0.46 | 37 | 30 | 1.69 | 2.09 | 6.16 | 8.35 | 6 | 11 | 50 | 97 | SEV | SEV | 62 | 63 | 1.02 | 1.01 | 1.07 | 1.06 | 0 | 0 | 1 | 1 | LOW | LOW | 6 | 6 | 117,000 | 16.9 | LOW |
| I-64 | RIP RAP RD | SETTLERS LANDING RD | 1.55 | 15 | 17 | 3.96 | 3.66 | 8.31 | 10.00 | 10 | 15 | 186 | 209 | SEV | SEV | 61 | 62 | 1.03 | 1.02 | 1.05 | 1.07 | 0 | 0 | 2 | 2 | LOW | LOW | 6 | 6 | 124,000 | 13.6 | MOD |
| I-64 | SETTLERS LANDING RD | MALLORY ST | 0.54 | 18 | 17 | 3.29 | 3.38 | 4.64 | 6.11 | 10 | 16 | 195 | 214 | SEV | SEV | 58 | 60 | 1.08 | 1.04 | 1.07 | 1.09 | 0 | 0 | 4 | 2 | LOW | LOW | 6 | 6 | 115,000 | 52.1 | LOW |
| I-64/HRBT | MALLORY ST | NORFOLK CL | 3.69 | 45 | 42 | 1.29 | 1.38 | 1.54 | 1.95 | 0 | 7 | 31 | 56 | MOD | SEV | 54 | 40 | 1.09 | 1.47 | 1.36 | 2.09 | 0 | 12 | 7 | 75 | LOW | SEV | 4 | 4 | 110,000 | 86.6 | SEV |
| I-64/HRBT | HAMPTON CL | OCEAN VIEW AVE | 0.19 | 45 | 42 | 1.29 | 1.38 | 1.54 | 1.95 | 0 | 7 | 31 | 56 | MOD | SEV | 54 | 40 | 1.09 | 1.47 | 1.36 | 2.09 | 0 | 12 | 7 | 75 | LOW | SEV | 4 | 4 | 110,000 | 86.6 | SEV |
| I-64 | OCEAN VIEW AVE | 4TH VIEW AVE | 1.82 | 59 | 52 | 1.04 | 1.19 | 1.10 | 1.80 | 0 | 0 | 4 | 12 | LOW | MOD | 54 | 28 | 1.13 | 2.17 | 1.91 | 3.34 | 0 | 16 | 8 | 170 | LOW | SEV | 4 | 4 | 110,000 | 44.2 | SEV |
| I-64 | 4TH VIEW AVE | BAY AVE | 1.01 | 61 | 38 | 1.02 | 1.65 | 1.06 | 3.28 | 0 | 3 | 1 | 29 | LOW | SEV | 57 | 17 | 1.10 | 3.67 | 1.34 | 5.85 | 0 | 16 | 5 | 258 | LOW | SEV | 4 | 4 | 90,000 | 17.0 | MOD |
| I-64 | BAY AVE | GRANBY ST | 1.6 | 60 | 50 | 1.03 | 1.25 | 1.08 | 1.77 | 0 | 0 | 3 | 24 | LOW | MOD | 60 | 20 | 1.04 | 3.12 | 1.12 | 6.83 | 0 | 15 | 4 | 201 | LOW | SEV | 4 | 4 | 99,000 | 28.4 | SEV |
| I-64 | GRANBY ST | I-564/LITTLE CREEK RD | 0.21 | 58 | 34 | 1.08 | 1.85 | 1.08 | 4.34 | 0 | 6 | 3 | 57 | LOW | SEV | 60 | 26 | 1.04 | 2.40 | 1.12 | 8.47 | 0 | 13 | 5 | 117 | LOW | SEV | 4 | 4 | 96,000 | 5.6 | SEV |

| Strategy | Congestion Management Strategies | Applicable Strategy? |
|---|---|---|
| Strategy #1 Eliminate Person Trips or Reduce VMT | **Growth Management/Activity Centers** | |
| | 1-1 Land Use Policies/Regulations | IN USE |
| | **Congestion/Value Pricing** | |
| | 1-2 Road User Fees/High Occupancy Toll (HOT) Lanes | YES |
| | 1-3 Parking Fees | - |
| | **Transportation Demand Management (TDM)** | |
| | 1-4 Telecommuting | IN USE |
| | 1-5 Employee Flextime Benefits/Compressed Work Week | IN USE |
| Strategy #2 Shift Trips from Auto to Other Modes | **Public Transit Capital Improvements** | |
| | 2-1 Exclusive Right-of-Way - New Rail Service | YES |
| | 2-2 Exclusive Right-of-Way - New Bus Facilities | YES |
| | 2-3 Ferry Services | YES |
| | 2-4 Fleet Expansion | YES |
| | 2-5 Improved Intermodal Connections | - |
| | 2-6 Improved/Increased Park & Ride Facilities & Capital Improvements | YES |
| | **Public Transit Operational Improvements** | |
| | 2-7 Service Expansion | YES |
| | 2-8 Traffic Signal Preemption | - |
| | 2-9 Improved Transit Performance | YES |
| | 2-10 Transit Fare Reductions Plan/Reduced Rate of Fare | YES |
| | 2-11 Transit Information Systems | YES |
| | **Bicycle and Pedestrian Modes** | |
| | 2-12 Improved/Expanded Bicycle Network | - |
| | 2-13 Bicycle Storage Systems | - |
| | 2-14 Improved/Expanded Pedestrian Network | - |
| Strategy #3 Shift Trips from SOV to HOV | **High Occupancy Vehicles (HOV)** | |
| | 3-1 Add HOV Lanes | YES |
| | 3-2 HOV Toll Savings | YES |
| | **Transportation Demand Management (TDM)** | |
| | 3-3 Rideshare Matching Services | IN USE |
| | 3-4 Vanpool/Employer Shuttle Program | IN USE |
| | 3-5 Trip Reduction Program | IN USE |
| | 3-6 Parking Management | IN USE |
| Strategy #4 Improve Roadway Operations | **Traffic Operational Improvements** | |
| | 4-1 Geometric Improvements | YES |
| | 4-2 Intersection Turn Restrictions | - |
| | 4-3 Intersection Signalization Improvements | - |
| | 4-4 Coordinated Intersections Signals | - |
| | 4-5 Roadway Environment | YES |
| | 4-6 Intelligent Transportation Systems/Smart Traffic Centers (ITS) | IN USE |
| | 4-7 Reversible Lanes | - |
| | 4-8 Freight Policies and Improvements | IN USE |
| | 4-9 Incident Management, Detection, Response & Clearance | IN USE |
| | 4-10 Construction Management | IN USE |
| | 4-11 Elimination of Bottlenecks | YES |
| | 4-12 Ramp Metering | YES |
| | 4-13 Access Control and Connectivity | - |
| | 4-14 Median Control | - |
| Strategy #5 Add Capacity | **Addition of General Purpose Lanes** | |
| | 5-1 Freeway Lanes | YES |
| | 5-2 Arterial lanes | - |
| | 5-3 Interchanges | YES |
| | 5-4 Improve Alternate Routes | YES |

## CMP CONGESTED CORRIDOR - FREEWAY #1
### Hampton Roads Bridge Tunnel (I-64)
Between I-664 and I-564

### OBSERVATIONS & POSSIBLE CAUSES OF CONGESTION

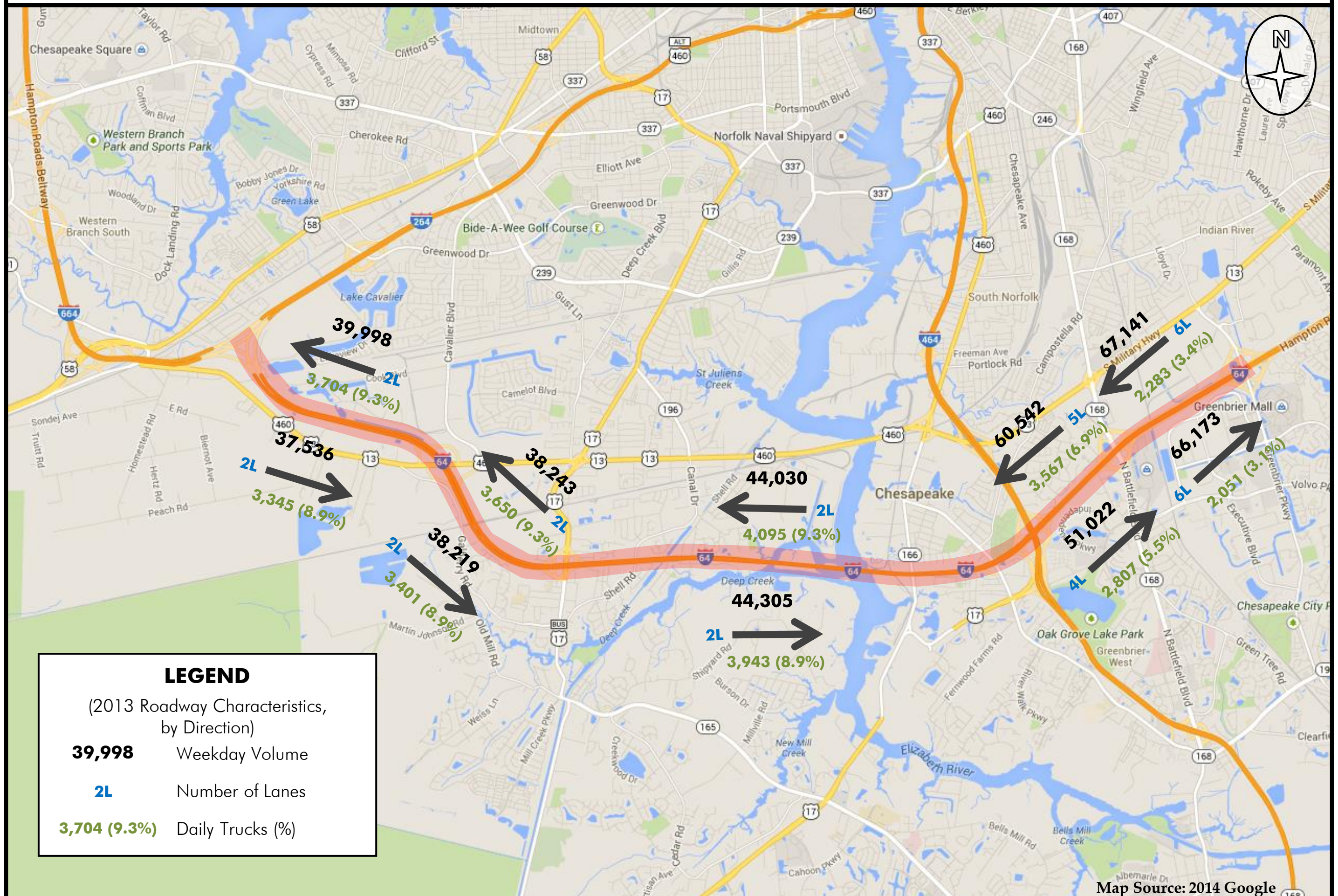
- There is a capacity deficiency at the tunnel. This is due to having only 2 lanes in each direction and also caused by tunnel-related physical and human factors. Whereas a typical freeway can carry up to 2,100 - 2,200 vehicles per hour per lane, the Hampton Roads Bridge-Tunnel only carries a maximum of approximately 1,600 vehicles per hour per lane based on these factors.
- There are a high number of congested 15-minute intervals during the AM peak (10) from Rip Rap Rd to Mallory St. Queues regularly develop back to Armistead Ave.
- There are a high number of congested 15-minute intervals during the PM peak (16) eastbound from Settlers Landing Rd to Mallory St. Queues regularly develop back to I-664.
- There are a high number of congested 15-minute intervals during the PM peak (16) westbound from Bay Ave to Ocean View Ave. Queues regularly develop back to I-564.
- Backups are also prevalent during weekday non-peak hours and on weekends, particularly during the summer.
- Curves at the entrance to both the EB and WB tunnels cause many drivers to slow down entering the tunnel.
- Overheight vehicles are an issue, particularly in the WB direction. A total of 596 vehicles were turned around at the South Island entrance to the tunnel in 2013, which greatly disrupts traffic flow in both directions. This compares to the worst year of 2005, when 1,024 vehicles were turned around at the South Island entrance to the tunnel.

### POTENTIAL CONGESTION MITIGATION STRATEGIES

- Consider adding tolls ("congestion pricing") to the Hampton Roads Harbor crossings.
- Continue to promote TDM and public transit strategies in order to reduce traffic volume in this corridor. This could include increasing transit service across the Hampton Roads Harbor, such as enhancing express bus service or implementing ferry service.
- Improve ITS technologies and signage to minimize over-height vehicle turnarounds at the tunnel entrance.
- Continue to use and improve ITS/operational strategies to manage traffic at the tunnel and quickly respond to incidents. This can help reduce clearance times and reduce the number of secondary incidents.
- ODU is currently conducting a study titled "Investigation of Sources of Congestion at the HRBT" that should be completed by the end of the year. Planners and engineers should review this study in order to develop specific remedies for these sources of congestion.
- Add additional capacity across the Hampton Roads Harbor.

# CMP CONGESTED CORRIDOR - FREEWAY #3

## I-64/High Rise Bridge Between I-264 & I-664 (Bowers Hill) and Greenbrier Pkwy City of Chesapeake





### CORRIDOR SUMMARY

| | |
|---|---|
| **Corridor Length** | 10.72 Miles |
| **Speed Limit** | 60 mph |
| **Roadway Class** | Interstate |
| **Transit Service** | HRT MAX Bus Routes 967 |
| **Highest CMP Segment Score** | 91 – Eastbound from Battlefield Blvd to I-464 during PM Peak |

### RECENT PROJECTS

- Widening and ramp improvements on I-64 between Greenbrier Pkwy and I-464 (Completed in 2009).

### FUTURE PROJECTS

2034 LRTP Projects

- I-64 Southside Widening (including the High Rise Bridge). This was added to the 2034 LRTP in September 2014 as a Hampton Roads Transportation Fund (HRTF) project.

| | | | | Eastbound (2013) | | | | | | | | | | | | | | Westbound (2013) | | | | | | | | | | | | | | Both Directions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length | SLOWEST SPEED (mph) | | HIGHEST TRAVEL TIME INDEX | | HIGHEST PLANNING TIME INDEX | | # CONG 15-MIN INTERVAL | | TOTAL DELAY (Hrs/Mi) | | CONG LEVEL | | SLOWEST SPEED (mph) | | HIGHEST TRAVEL TIME INDEX | | HIGHEST PLANNING TIME INDEX | | # CONG 15-MIN INTERVAL | | TOTAL DELAY (Hrs/Mi) | | CONG LEVEL | | # LANES | | 2034 PROJ | 20-YR PROJ TRUCK DELAY | 2034 PM CONG |
| FACILITY NAME | SEGMENT FROM | SEGMENT TO | (Mi) | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | 2013 | 2034 | VOL | (Hrs/Mi) | LEVEL |
| I-64 | GREENBRIER PKWY | BATTLEFIELD BLVD | 1.42 | 59 | 38 | 1.05 | 1.61 | 1.04 | 5.28 | 0 | 8 | 1 | 73 | LOW | SEV | 59 | 63 | 1.05 | 0.99 | 1.33 | 1.04 | 0 | 0 | 2 | 0 | LOW | LOW | 12 | 12 | 167,000 | 4.2 | LOW |
| I-64 | BATTLEFIELD BLVD | I-464 | 1.08 | 56 | 23 | 1.08 | 2.65 | 1.06 | 6.06 | 0 | 12 | 5 | 274 | LOW | SEV | 62 | 62 | 1.00 | 0.99 | 1.03 | 1.05 | 0 | 0 | 0 | 0 | LOW | LOW | 9 | 9 | 163,000 | 8.5 | MOD |
| I-64 | I-464 | GEORGE WASHINGTON HWY | 4.38 | 59 | 48 | 1.04 | 1.27 | 1.06 | 1.92 | 0 | 0 | 2 | 41 | LOW | MOD | 55 | 57 | 1.10 | 1.07 | 1.31 | 1.36 | 0 | 0 | 10 | 5 | LOW | LOW | 4 | 4 | 124,000 | 128.7 | SEV |
| I-64 | GEORGE WASHINGTON HWY | MILITARY HWY | 1.53 | 61 | 57 | 1.02 | 1.08 | 1.06 | 1.57 | 0 | 0 | 0 | 8 | LOW | LOW | 18 | 47 | 3.38 | 1.29 | 5.86 | 2.57 | 8 | 0 | 126 | 27 | SEV | MOD | 4 | 4 | 100,000 | 64.8 | SEV |
| I-64 | MILITARY HWY | I-264&664 | 2.31 | 60 | 52 | 1.02 | 1.17 | 1.03 | 2.09 | 0 | 0 | 1 | 12 | LOW | MOD | 27 | 50 | 2.23 | 1.22 | 5.33 | 2.50 | 5 | 0 | 45 | 18 | SEV | MOD | 4 | 4 | 95,000 | 19.5 | SEV |

| Strategy | | Congestion Management Strategies | Applicable Strategy? |
|---|---|---|---|
| Strategy #1 | Eliminate Person Trips or Reduce VMT | **Growth Management/Activity Centers** | |
| | | 1-1 Land Use Policies/Regulations | IN USE |
| | | **Congestion/Value Pricing** | |
| | | 1-2 Road User Fees/High Occupancy Toll (HOT) Lanes | YES |
| | | 1-3 Parking Fees | - |
| | | **Transportation Demand Management (TDM)** | |
| | | 1-4 Telecommuting | IN USE |
| | | 1-5 Employee Flextime Benefits/Compressed Work Week | IN USE |
| Strategy #2 | Shift Trips from Auto to Other Modes | **Public Transit Capital Improvements** | |
| | | 2-1 Exclusive Right-of-Way - New Rail Service | - |
| | | 2-2 Exclusive Right-of-Way - New Bus Facilities | YES |
| | | 2-3 Ferry Services | - |
| | | 2-4 Fleet Expansion | YES |
| | | 2-5 Improved Intermodal Connections | - |
| | | 2-6 Improved/Increased Park & Ride Facilities & Capital Improvements | YES |
| | | **Public Transit Operational Improvements** | |
| | | 2-7 Service Expansion | YES |
| | | 2-8 Traffic Signal Preemption | - |
| | | 2-9 Improved Transit Performance | YES |
| | | 2-10 Transit Fare Reductions Plan/Reduced Rate of Fare | YES |
| | | 2-11 Transit Information Systems | YES |
| | | **Bicycle and Pedestrian Modes** | |
| | | 2-12 Improved/Expanded Bicycle Network | - |
| | | 2-13 Bicycle Storage Systems | - |
| | | 2-14 Improved/Expanded Pedestrian Network | - |
| Strategy #3 | Shift Trips from SOV to HOV | **High Occupancy Vehicles (HOV)** | |
| | | 3-1 Add HOV Lanes | YES |
| | | 3-2 HOV Toll Savings | YES |
| | | **Transportation Demand Management (TDM)** | |
| | | 3-3 Rideshare Matching Services | IN USE |
| | | 3-4 Vanpool/Employer Shuttle Program | IN USE |
| | | 3-5 Trip Reduction Program | IN USE |
| | | 3-6 Parking Management | IN USE |
| Strategy #4 | Improve Roadway Operations | **Traffic Operational Improvements** | |
| | | 4-1 Geometric Improvements | YES |
| | | 4-2 Intersection Turn Restrictions | - |
| | | 4-3 Intersection Signalization Improvements | - |
| | | 4-4 Coordinated Intersections Signals | - |
| | | 4-5 Roadway Environment | YES |
| | | 4-6 Intelligent Transportation Systems/Smart Traffic Centers (ITS) | IN USE |
| | | 4-7 Reversible Lanes | - |
| | | 4-8 Freight Policies and Improvements | IN USE |
| | | 4-9 Incident Management, Detection, Response & Clearance | IN USE |
| | | 4-10 Construction Management | IN USE |
| | | 4-11 Elimination of Bottlenecks | - |
| | | 4-12 Ramp Metering | YES |
| | | 4-13 Access Control and Connectivity | - |
| | | 4-14 Median Control | - |
| Strategy #5 | Add Capacity | **Addition of General Purpose Lanes** | |
| | | 5-1 Freeway Lanes | YES |
| | | 5-2 Arterial lanes | - |
| | | 5-3 Interchanges | YES |
| | | 5-4 Improve Alternate Routes | YES |

## CMP CONGESTED CORRIDOR - FREEWAY #3

### I-64/High Rise Bridge

Between I-264 & I-664 (Bowers Hill) and Greenbrier Pkwy

### OBSERVATIONS & POSSIBLE CAUSES OF CONGESTION

- There is a capacity deficiency between I-264/I-664 and I-464. This is due to having only 2 lanes in each direction and also caused by capacity constraints of the High Rise Bridge. Between I-264/I-664 and I-464, AM Peak Hour volumes are as high as 4,070 vehicles in the WB direction (towards Virginia Beach) and PM Peak Hour volumes are as high as 3,870 in the EB direction (towards Suffolk).
- Backups occur during the AM Peak Period at the merge of George Washington Highway ramps and I-64 WB (towards Virginia Beach). Backups regularly occur on I-64 WB from George Washington Highway back to the I-264/I-664 interchange.
- Backups regularly occur on I-64 EB (towards Suffolk) during the PM Peak Period from the High Rise Bridge back to Greenbrier Pkwy. The segment from Battlefield Blvd to I-464 is congested for 12 15-minute intervals during the PM Period.
- Weaving is an issue on I-64 EB (towards Suffolk) at the I-464/Chesapeake Expressway interchange. Weaving/merging is also an issue at the I-264/I-664 Interchange in Bowers Hill.
- High truck volumes (9.3% of all daily traffic).
- Sun glare is an issue at times in the corridor.
- Long term nightly closures of the Gilmerton Bridge have led traffic to divert to the High Rise Bridge.
- Openings of the High Rise Bridge are restricted from 6:00 am - 9:00 am and from 3:00 pm – 6:00 pm.
- Volumes (and presumably backups) increased once tolls were implemented at the Midtown and Downtown Tunnels in February 2014.

### POTENTIAL CONGESTION MITIGATION STRATEGIES

- Continue to promote TDM and public transit strategies in order to reduce traffic volume in this corridor.
- Maintain bridge opening restrictions during morning and afternoon peak periods.
- Improve the interchange of I-64 and I-464/Chesapeake Expressway to reduce weaving movements.
- Continue to use and improve ITS/Operational strategies to manage traffic in the corridor and quickly respond to incidents.
- Widen I-64 and the High Rise Bridge.

# CMP CONGESTED CORRIDOR - FREEWAY #4

## Monitor-Merrimac Mem. Bridge Tunnel (I-664) Between Terminal Ave and Chestnut Rd
## City of Newport News


### CORRIDOR SUMMARY

| | |
|---|---|
| **Corridor Length** | 2.61 Miles |
| **Speed Limit** | 60 mph |
| **Roadway Class** | Interstate |
| **Transit Service** | HRT Bus Routes 121 and MAX 961 |
| **Highest CMP Segment Score** | 85 – Southbound from Chestnut Ave to 23rd St during PM Peak |

### RECENT PROJECTS

- None

### FUTURE PROJECTS

- None

| FACILITY NAME | SEGMENT FROM | SEGMENT TO | Length (Mi) | Southbound (2013) SLOWEST SPEED (mph) AM | Southbound (2013) SLOWEST SPEED (mph) PM | Southbound (2013) HIGHEST TRAVEL TIME INDEX AM | Southbound (2013) HIGHEST TRAVEL TIME INDEX PM | Southbound (2013) HIGHEST PLANNING TIME INDEX AM | Southbound (2013) HIGHEST PLANNING TIME INDEX PM | Southbound (2013) # CONG 15-MIN INTERVAL AM | Southbound (2013) # CONG 15-MIN INTERVAL PM | Southbound (2013) TOTAL DELAY (Hrs/Mi) AM | Southbound (2013) TOTAL DELAY (Hrs/Mi) PM | Southbound (2013) CONG LEVEL AM | Southbound (2013) CONG LEVEL PM | Northbound (2013) SLOWEST SPEED (mph) AM | Northbound (2013) SLOWEST SPEED (mph) PM | Northbound (2013) HIGHEST TRAVEL TIME INDEX AM | Northbound (2013) HIGHEST TRAVEL TIME INDEX PM | Northbound (2013) HIGHEST PLANNING TIME INDEX AM | Northbound (2013) HIGHEST PLANNING TIME INDEX PM | Northbound (2013) # CONG 15-MIN INTERVAL AM | Northbound (2013) # CONG 15-MIN INTERVAL PM | Northbound (2013) TOTAL DELAY (Hrs/Mi) AM | Northbound (2013) TOTAL DELAY (Hrs/Mi) PM | Northbound (2013) CONG LEVEL AM | Northbound (2013) CONG LEVEL PM | Both Directions # LANES 2013 | Both Directions # LANES 2034 | Both Directions 2034 PROJ VOL | Both Directions 20-YR PROJ TRUCK DELAY (Hrs/Mi) | Both Directions 2034 PM CONG LEVEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I-664 | TERMINAL AVE | 23RD ST | 0.92 | 54 | 12 | 1.08 | 4.76 | 1.25 | 7.56 | 0 | 12 | 3 | 140 | LOW | SEV | 62 | 62 | 1.00 | 1.00 | 1.04 | 1.06 | 0 | 0 | 0 | 0 | LOW | LOW | 6 | 6 | 94,000 | 9.3 | LOW |
| I-664 | 23RD ST | CHESTNUT AVE | 1.69 | 59 | 17 | 1.04 | 3.63 | 1.06 | 9.28 | 0 | 11 | 1 | 148 | LOW | SEV | 61 | 60 | 1.02 | 1.03 | 1.07 | 1.06 | 0 | 0 | 0 | 1 | LOW | LOW | 6 | 6 | 97,000 | 6.1 | LOW |

| Strategy | | Congestion Management Strategies | Applicable Strategy? |
|---|---|---|---|
| Strategy #1 | Eliminate Person Trips or Reduce VMT | **Growth Management/Activity Centers** | |
| | | 1-1 Land Use Policies/Regulations | IN USE |
| | | **Congestion/Value Pricing** | |
| | | 1-2 Road User Fees/High Occupancy Toll (HOT) Lanes | YES |
| | | 1-3 Parking Fees | - |
| | | **Transportation Demand Management (TDM)** | |
| | | 1-4 Telecommuting | IN USE |
| | | 1-5 Employee Flextime Benefits/Compressed Work Week | IN USE |
| Strategy #2 | Shift Trips from Auto to Other Modes | **Public Transit Capital Improvements** | |
| | | 2-1 Exclusive Right-of-Way - New Rail Service | YES |
| | | 2-2 Exclusive Right-of-Way - New Bus Facilities | YES |
| | | 2-3 Ferry Services | YES |
| | | 2-4 Fleet Expansion | YES |
| | | 2-5 Improved Intermodal Connections | - |
| | | 2-6 Improved/Increased Park & Ride Facilities & Capital Improvements | YES |
| | | **Public Transit Operational Improvements** | |
| | | 2-7 Service Expansion | YES |
| | | 2-8 Traffic Signal Preemption | - |
| | | 2-9 Improved Transit Performance | YES |
| | | 2-10 Transit Fare Reductions Plan/Reduced Rate of Fare | YES |
| | | 2-11 Transit Information Systems | YES |
| | | **Bicycle and Pedestrian Modes** | |
| | | 2-12 Improved/Expanded Bicycle Network | - |
| | | 2-13 Bicycle Storage Systems | - |
| | | 2-14 Improved/Expanded Pedestrian Network | - |
| Strategy #3 | Shift Trips from SOV to HOV | **High Occupancy Vehicles (HOV)** | |
| | | 3-1 Add HOV Lanes | YES |
| | | 3-2 HOV Toll Savings | YES |
| | | **Transportation Demand Management (TDM)** | |
| | | 3-3 Rideshare Matching Services | IN USE |
| | | 3-4 Vanpool/Employer Shuttle Program | IN USE |
| | | 3-5 Trip Reduction Program | IN USE |
| | | 3-6 Parking Management | IN USE |
| Strategy #4 | Improve Roadway Operations | **Traffic Operational Improvements** | |
| | | 4-1 Geometric Improvements | YES |
| | | 4-2 Intersection Turn Restrictions | - |
| | | 4-3 Intersection Signalization Improvements | - |
| | | 4-4 Coordinated Intersections Signals | - |
| | | 4-5 Roadway Environment | YES |
| | | 4-6 Intelligent Transportation Systems/Smart Traffic Centers (ITS) | IN USE |
| | | 4-7 Reversible Lanes | - |
| | | 4-8 Freight Policies and Improvements | IN USE |
| | | 4-9 Incident Management, Detection, Response & Clearance | IN USE |
| | | 4-10 Construction Management | IN USE |
| | | 4-11 Elimination of Bottlenecks | - |
| | | 4-12 Ramp Metering | YES |
| | | 4-13 Access Control and Connectivity | - |
| | | 4-14 Median Control | - |
| Strategy #5 | Add Capacity | **Addition of General Purpose Lanes** | |
| | | 5-1 Freeway Lanes | YES |
| | | 5-2 Arterial lanes | - |
| | | 5-3 Interchanges | YES |
| | | 5-4 Improve Alternate Routes | YES |

## CMP CONGESTED CORRIDOR - FREEWAY #4
### Monitor-Merrimac Mem. Bridge Tunnel (I-664)
Between Terminal Ave and Chestnut Rd

### OBSERVATIONS & POSSIBLE CAUSES OF CONGESTION

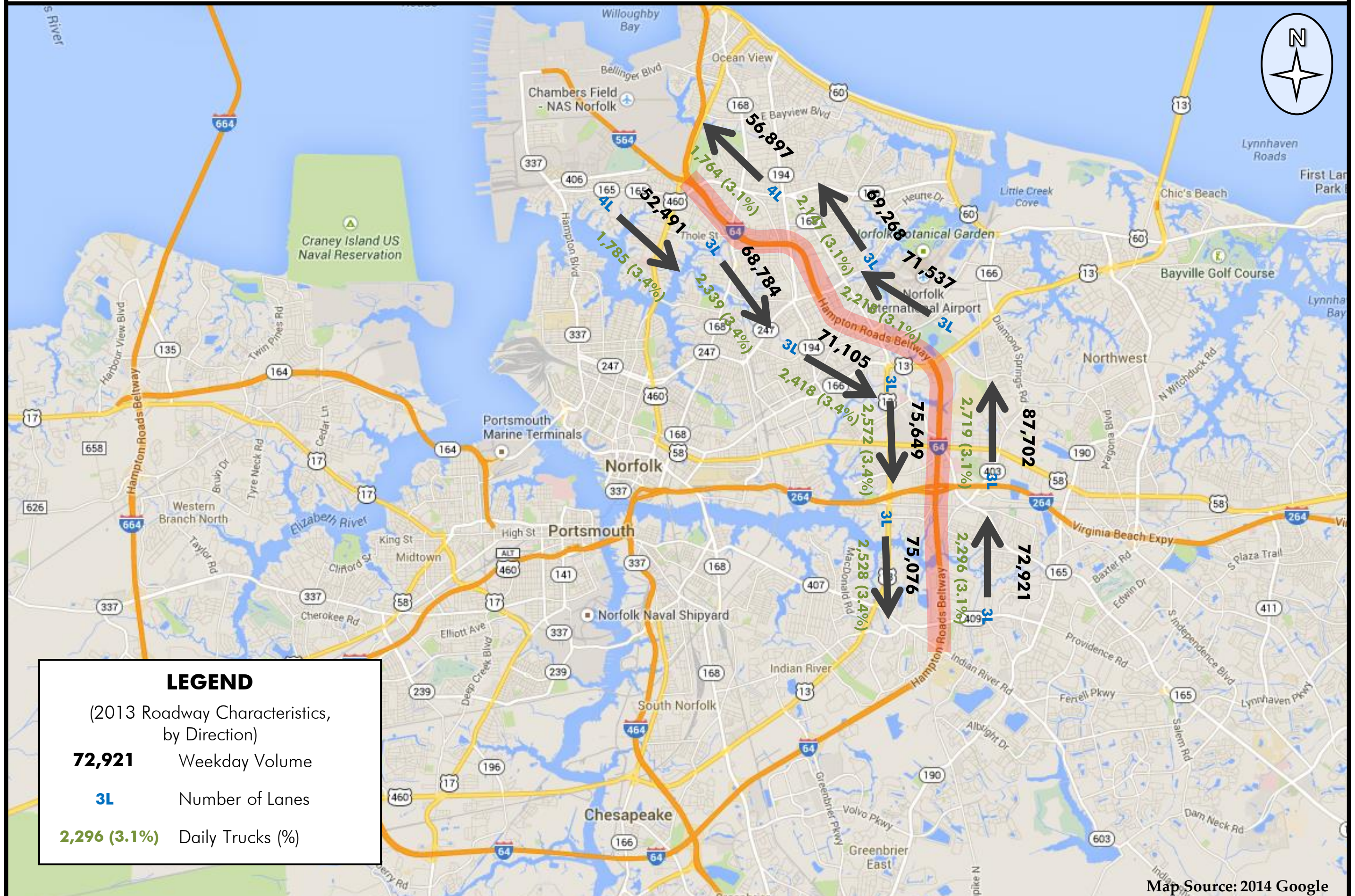
- There is a capacity deficiency at the tunnel. This is due to having only 2 lanes in each direction and also caused by tunnel-related physical and human factors. Whereas a typical freeway can carry up to 2,100 - 2,200 vehicles per hour per lane, the Monitor-Merrimac Memorial Bridge-Tunnel only carries a maximum of approximately 1,750 vehicles per hour per lane.
- Traffic backups in the SB direction extend from Terminal Ave/MMMBT entrance back to Chestnut Rd on a regular basis during the PM Peak Period. The segment from 23rd St to Terminal Ave is congested for 12 15-minute intervals during the PM Peak Period.
- High truck volumes in both directions (6.5%-6.6%).

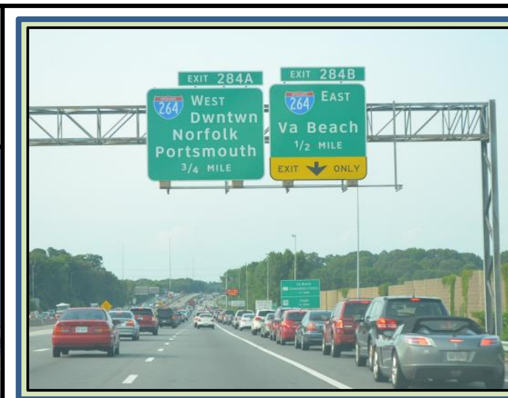
### POTENTIAL CONGESTION MITIGATION STRATEGIES

- Consider adding tolls (“congestion pricing”) to the Hampton Roads Harbor crossings.
- Continue to promote TDM and public transit strategies in order to reduce traffic volume in this corridor. This could include increasing transit service across the Hampton Roads Harbor, such as enhancing express bus service or implementing ferry service.
- Continue to use and improve ITS/Operational strategies to manage traffic at the tunnel and quickly respond to incidents. This can help reduce clearance times and reduce the number of secondary incidents.
- Add additional capacity across the Hampton Roads Harbor.

# CMP CONGESTED CORRIDOR - FREEWAY #5

## I-64 Between I-564 and Indian River Rd
## Cities of Norfolk and Virginia Beach




### CORRIDOR SUMMARY

**Corridor Length** 10.09 Miles

**Speed Limit** 55 mph

**Roadway Class** Interstate

**Transit Service** HRT MAX Bus Routes 918/919 & 922

**Highest CMP Segment Score** 80 – Eastbound from Chesapeake Blvd to Norview Ave during PM Peak

### RECENT PROJECTS

- Ramp improvements on I-64 EB at Norview Avenue (Completed in 2013).

### FUTURE PROJECTS

2034 LRTP Projects

- I-64/I-264 Interchange. This was added to the 2034 LRTP in September 2014 as a Hampton Roads Transportation Fund (HRTF) project.

| | | | | Eastbound (2013) | | | | | | | | | | | | Westbound (2013) | | | | | | | | | | | | Both Directions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | SLOWEST SPEED (mph) | | HIGHEST TRAVEL TIME INDEX | | HIGHEST PLANNING TIME INDEX | | # CONG 15-MIN INTERVAL | | TOTAL DELAY (Hrs/Mi) | | CONG LEVEL | | SLOWEST SPEED (mph) | | HIGHEST TRAVEL TIME INDEX | | HIGHEST PLANNING TIME INDEX | | # CONG 15-MIN INTERVAL | | TOTAL DELAY (Hrs/Mi) | | CONG LEVEL | | # LANES | | 2034 PROJ VOL | 20-YR PROJ TRUCK DELAY (Hrs/Mi) | 2034 PM CONG LEVEL |
| FACILITY NAME | SEGMENT FROM | SEGMENT TO | Length (Mi) | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | 2013 | 2034 | | | |
| I-64 | I-564/LITTLE CREEK RD | TIDEWATER DR | 1.17 | 57 | 26 | 1.11 | 2.38 | 1.22 | 4.52 | 0 | 7 | 5 | 130 | LOW | SEV | 54 | 44 | 1.16 | 1.44 | 1.90 | 3.77 | 0 | 6 | 25 | 40 | MOD | SEV | 8 | 8 | 150,000 | 4.1 | LOW |
| I-64 | TIDEWATER DR | CHESAPEAKE BLVD | 1.04 | 51 | 28 | 1.21 | 2.18 | 2.28 | 3.76 | 0 | 8 | 16 | 125 | MOD | SEV | 45 | 54 | 1.39 | 1.16 | 3.86 | 1.13 | 3 | 0 | 48 | 19 | SEV | MOD | 6 | 6 | 154,000 | 8.4 | SEV |
| I-64 | CHESAPEAKE BLVD | NORVIEW AVE | 0.97 | 48 | 31 | 1.30 | 2.06 | 2.64 | 3.70 | 1 | 8 | 31 | 144 | SEV | SEV | 47 | 55 | 1.34 | 1.13 | 3.27 | 1.10 | 2 | 0 | 44 | 13 | SEV | LOW | 6 | 6 | 160,000 | 10.6 | SEV |
| I-64 | NORVIEW AVE | MILITARY HWY | 1.22 | 54 | 38 | 1.16 | 1.64 | 1.61 | 3.11 | 0 | 7 | 17 | 102 | MOD | SEV | 50 | 57 | 1.24 | 1.09 | 2.76 | 1.15 | 0 | 0 | 34 | 9 | MOD | LOW | 6 | 6 | 175,000 | 19.6 | SEV |
| I-64 | MILITARY HWY | NORTHAMPTON BLVD | 1.07 | 57 | 33 | 1.09 | 1.86 | 1.34 | 3.58 | 0 | 8 | 8 | 112 | LOW | SEV | 45 | 55 | 1.37 | 1.11 | 2.59 | 1.19 | 2 | 0 | 45 | 20 | SEV | LOW | 6 | 6 | 165,000 | 9.7 | MOD |
| I-64 | NORTHAMPTON BLVD | I-264 | 2.12 | 52 | 38 | 1.13 | 1.56 | 1.50 | 2.53 | 0 | 8 | 12 | 95 | LOW | SEV | 44 | 47 | 1.41 | 1.32 | 2.79 | 2.41 | 3 | 1 | 54 | 45 | SEV | SEV | 7 | 7 | 185,000 | 7.9 | SEV |
| I-64 | I-264 | VA BEACH CL | 0.93 | 59 | 41 | 1.04 | 1.50 | 1.05 | 2.40 | 0 | 4 | 3 | 80 | LOW | SEV | 37 | 36 | 1.62 | 1.65 | 2.96 | 3.85 | 5 | 3 | 78 | 46 | SEV | SEV | 6 | 6 | 160,000 | 14.3 | SEV |
| I-64 | NORFOLK CL | INDIAN RIVER RD | 1.57 | 59 | 41 | 1.04 | 1.50 | 1.05 | 2.40 | 0 | 4 | 3 | 80 | LOW | SEV | 37 | 36 | 1.62 | 1.65 | 2.96 | 3.85 | 5 | 3 | 78 | 46 | SEV | SEV | 8 | 8 | 160,000 | 14.1 | SEV |

| | Congestion Management Strategies | Applicable Strategy? |
|---|---|---|
| Strategy #1 Eliminate Person Trips or Reduce VMT | **Growth Management/Activity Centers** | |
| | 1-1 Land Use Policies/Regulations | IN USE |
| | **Congestion/Value Pricing** | |
| | 1-2 Road User Fees/High Occupancy Toll (HOT) Lanes | YES |
| | 1-3 Parking Fees | - |
| | **Transportation Demand Management (TDM)** | |
| | 1-4 Telecommuting | IN USE |
| | 1-5 Employee Flextime Benefits/Compressed Work Week | IN USE |
| Strategy #2 Shift Trips from Auto to Other Modes | **Public Transit Capital Improvements** | |
| | 2-1 Exclusive Right-of-Way - New Rail Service | YES |
| | 2-2 Exclusive Right-of-Way - New Bus Facilities | YES |
| | 2-3 Ferry Services | - |
| | 2-4 Fleet Expansion | YES |
| | 2-5 Improved Intermodal Connections | - |
| | 2-6 Improved/Increased Park & Ride Facilities & Capital Improvements | YES |
| | **Public Transit Operational Improvements** | |
| | 2-7 Service Expansion | YES |
| | 2-8 Traffic Signal Preemption | - |
| | 2-9 Improved Transit Performance | YES |
| | 2-10 Transit Fare Reductions Plan/Reduced Rate of Fare | YES |
| | 2-11 Transit Information Systems | YES |
| | **Bicycle and Pedestrian Modes** | |
| | 2-12 Improved/Expanded Bicycle Network | - |
| | 2-13 Bicycle Storage Systems | - |
| | 2-14 Improved/Expanded Pedestrian Network | - |
| Strategy #3 Shift Trips from SOV to HOV | **High Occupancy Vehicles (HOV)** | |
| | 3-1 Add HOV Lanes | IN USE |
| | 3-2 HOV Toll Savings | YES |
| | **Transportation Demand Management (TDM)** | |
| | 3-3 Rideshare Matching Services | IN USE |
| | 3-4 Vanpool/Employer Shuttle Program | IN USE |
| | 3-5 Trip Reduction Program | IN USE |
| | 3-6 Parking Management | IN USE |
| Strategy #4 Improve Roadway Operations | **Traffic Operational Improvements** | |
| | 4-1 Geometric Improvements | YES |
| | 4-2 Intersection Turn Restrictions | - |
| | 4-3 Intersection Signalization Improvements | - |
| | 4-4 Coordinated Intersections Signals | - |
| | 4-5 Roadway Environment | YES |
| | 4-6 Intelligent Transportation Systems/Smart Traffic Centers (ITS) | IN USE |
| | 4-7 Reversible Lanes | IN USE |
| | 4-8 Freight Policies and Improvements | YES |
| | 4-9 Incident Management, Detection, Response & Clearance | IN USE |
| | 4-10 Construction Management | IN USE |
| | 4-11 Elimination of Bottlenecks | YES |
| | 4-12 Ramp Metering | YES |
| | 4-13 Access Control and Connectivity | - |
| | 4-14 Median Control | - |
| Strategy #5 Add Capacity | **Addition of General Purpose Lanes** | |
| | 5-1 Freeway Lanes | YES |
| | 5-2 Arterial lanes | - |
| | 5-3 Interchanges | YES |
| | 5-4 Improve Alternate Routes | YES |

## CMP CONGESTED CORRIDOR - FREEWAY #5

### I-64 (Norfolk/Virginia Beach)

Between I-564 and Indian River Rd

### OBSERVATIONS & POSSIBLE CAUSES OF CONGESTION

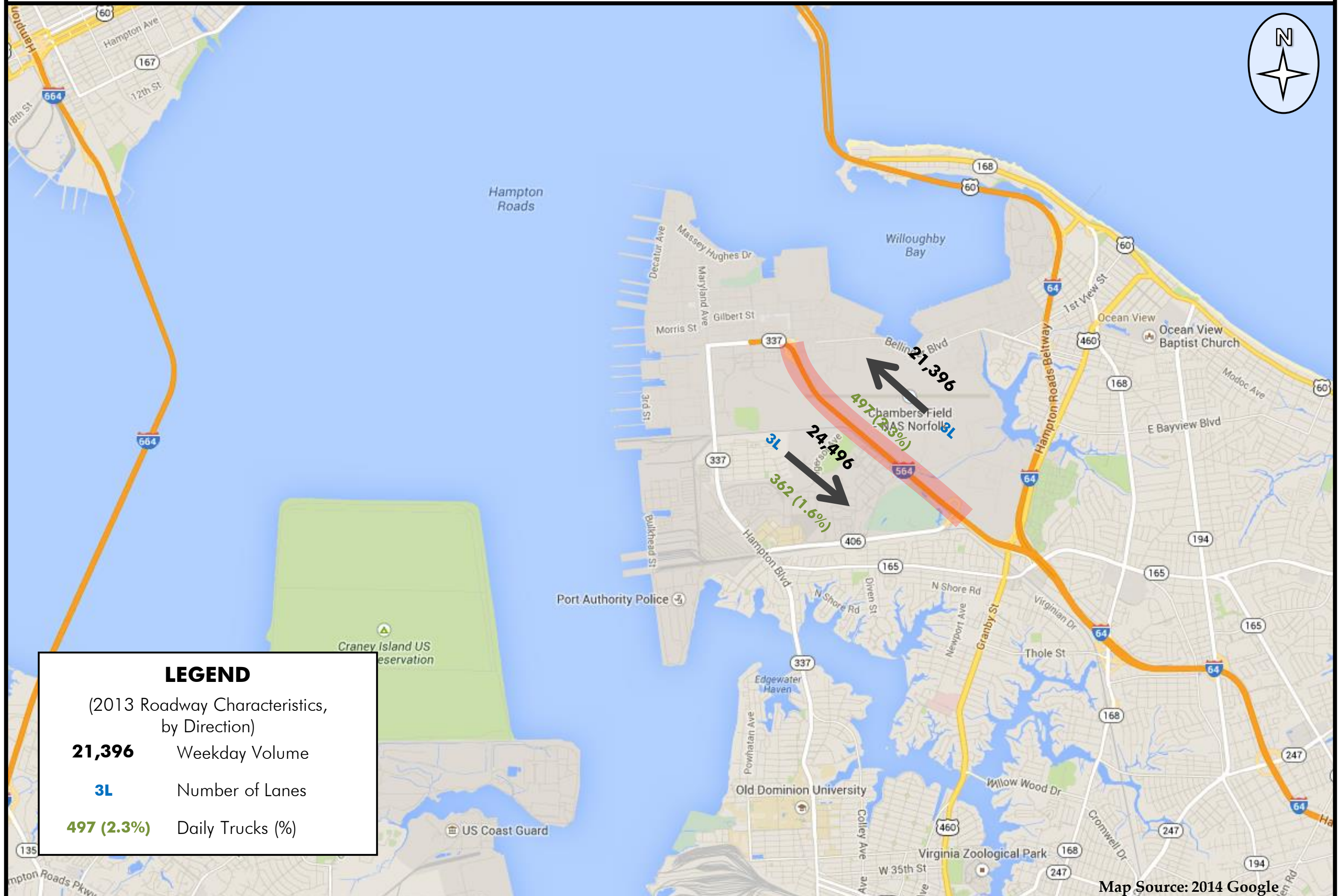
- Traffic queues on I-64 WB on a regular basis during the AM Peak Period from Indian River Rd through the I-264 interchange to Military Highway, and from Norview Ave to Tidewater Dr.
- Traffic queues on I-64 EB on a regular basis throughout the entire corridor during the PM Peak Period, and from Indian River Rd through the I-264 interchange to Northampton Blvd in the WB direction. Most of the I-64 EB segments are congested for 8 15-minute intervals during the PM Peak Period.
- Ramps from I-264 back up onto I-64 regularly beyond the Virginia Beach Boulevard overpass during the PM Peak Period and the Twin Bridges during both peak periods.
- Merging vehicles are an issue at the I-64/I-264 Interchange, particularly at the I-264 WB on-ramp to I-64 EB.
- Backups occur at the merging area of the Northampton Boulevard on-ramp to I-64 EB.
- The reversible HOV lanes are underutilized in the corridor when HOV restrictions are in effect given the capacity of 2,200 vphpl. In 2013, the HOV lanes only carried approximately 400 vehicles per hour per lane in the AM and 500 vehicles per hour per lane in the PM during the restrictions.
- Traffic volumes are heavy in the corridor, particularly during the PM Peak Hour. (For example, 7,300 vehicles use I-64 EB from I-264 to Indian River Rd and 6,500 vehicles use I-64 WB from I-264 to Northampton Blvd during the PM Peak Hour).

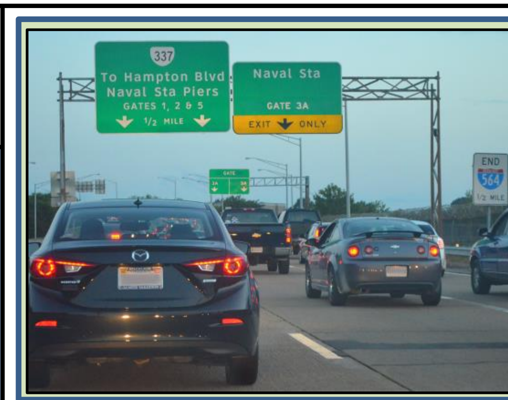
### POTENTIAL CONGESTION MITIGATION STRATEGIES

- Continue to promote TDM and public transit strategies in order to reduce traffic volume in this corridor.
- Encourage local military leaders to modify policies concerning work times.
- Continue to use and improve ITS/Operational strategies to manage traffic in this corridor and quickly respond to incidents. This can help reduce clearance times and reduce the number of secondary incidents.
- Consider converting High Occupancy Vehicle (HOV) lanes to High Occupancy Toll (HOT) lanes to improve the usage of the existing roadway capacity.
- Widen I-64 EB from the end of the Northampton Boulevard on-ramp to beyond the merging area for the reversible lanes. This will allow for the Northampton Boulevard on-ramp to remain as a through lane rather than the much less used ramp coming from the HOV lanes.
- Improve the interchange of I-64 and I-264. This could include:
    - Balancing traffic volumes by restriping I-64 EB to allow for 2 lanes exiting to I-264 and 2 through lanes continuing towards Chesapeake. This would also allow for the I-264 on-ramp to I-64 EB to have a dedicated lane beyond the interchange rather than the existing short acceleration lane.
    - Widening the ramp from WB I-64 to EB I-264 to 2 lanes.
    - Lengthening the acceleration lane from the I-264 ramp to EB I-64.
- Rebuild the EB side of the interchange of I-64 and Indian River Road to alleviate weaving/merging issues.
- Consider strategies included in Arterial #2 – Indian River Rd and Arterial #3 – Northampton Blvd.

# CMP CONGESTED CORRIDOR - FREEWAY #6

## I-564 Between International Terminal Blvd and Admiral Taussig Blvd
## City of Norfolk




### CORRIDOR SUMMARY

| | |
|---|---|
| **Corridor Length** | 1.87 Miles |
| **Speed Limit** | 55 mph |
| **Roadway Class** | Interstate |
| **Transit Service** | HRT Bus Route 3 and MAX 919 & 922 |
| **Highest CMP Segment Score** | 74 – Westbound from International Terminal Blvd to Admiral Taussig Blvd during AM Peak |

### RECENT PROJECTS

- None

### FUTURE PROJECTS

FY 2015 SYIP/TIP Projects

- Intermodal Connector between I-564 and Second St in Norfolk International Terminals and Naval Station Norfolk (UPC #18968 – Construction expected to begin in 2015).

2034 LRTP Projects

- Air Terminal Interchange on I-564 at Naval Station Norfolk (PE only)

| | | | | Northbound (2013) | | | | | | | | | | | | | | Southbound (2013) | | | | | | | | | | | | | | Both Directions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length (Mi) | SLOWEST SPEED (mph) | | HIGHEST TRAVEL TIME INDEX | | HIGHEST PLANNING TIME INDEX | | # CONG 15-MIN INTERVAL | | TOTAL DELAY (Hrs/Mi) | | CONG LEVEL | | SLOWEST SPEED (mph) | | HIGHEST TRAVEL TIME INDEX | | HIGHEST PLANNING TIME INDEX | | # CONG 15-MIN INTERVAL | | TOTAL DELAY (Hrs/Mi) | | CONG LEVEL | | # LANES | | 2034 PROJ VOL | 20-YR PROJ TRUCK DELAY (Hrs/Mi) | 2034 PM CONG LEVEL |
| FACILITY NAME | SEGMENT FROM | SEGMENT TO | | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | 2013 | 2034 | | | |
| I-564 | ADMIRAL TAUSSIG BLVD | FUTURE INTERMODAL CONNECTOR | 0.5 | 27 | 51 | 1.92 | 1.03 | 3.22 | 1.06 | 8 | 0 | 90 | 0 | SEV | LOW | 48 | 49 | 1.04 | 1.01 | 1.16 | 1.28 | 0 | 0 | 0 | 0 | LOW | LOW | 4 | 4 | 33,000 | 0.1 | LOW |
| I-564 | FUTURE INTERMODAL CONNECTOR | INTERNATIONAL TERMINAL BLVD | 1.37 | 27 | 51 | 1.92 | 1.03 | 3.22 | 1.06 | 8 | 0 | 90 | 0 | SEV | LOW | 48 | 49 | 1.04 | 1.01 | 1.16 | 1.28 | 0 | 0 | 0 | 0 | LOW | LOW | 6 | 6 | 50,000 | 0.5 | LOW |

| Strategy | Congestion Management Strategies | Applicable Strategy? |
|---|---|---|
| Strategy #1 Eliminate Person Trips or Reduce VMT | **Growth Management/Activity Centers** | |
| | 1-1 Land Use Policies/Regulations | IN USE |
| | **Congestion/Value Pricing** | |
| | 1-2 Road User Fees/High Occupancy Toll (HOT) Lanes | YES |
| | 1-3 Parking Fees | - |
| | **Transportation Demand Management (TDM)** | |
| | 1-4 Telecommuting | IN USE |
| | 1-5 Employee Flextime Benefits/Compressed Work Week | IN USE |
| Strategy #2 Shift Trips from Auto to Other Modes | **Public Transit Capital Improvements** | |
| | 2-1 Exclusive Right-of-Way - New Rail Service | YES |
| | 2-2 Exclusive Right-of-Way - New Bus Facilities | YES |
| | 2-3 Ferry Services | YES |
| | 2-4 Fleet Expansion | YES |
| | 2-5 Improved Intermodal Connections | - |
| | 2-6 Improved/Increased Park & Ride Facilities & Capital Improvements | YES |
| | **Public Transit Operational Improvements** | |
| | 2-7 Service Expansion | YES |
| | 2-8 Traffic Signal Preemption | - |
| | 2-9 Improved Transit Performance | YES |
| | 2-10 Transit Fare Reductions Plan/Reduced Rate of Fare | YES |
| | 2-11 Transit Information Systems | YES |
| | **Bicycle and Pedestrian Modes** | |
| | 2-12 Improved/Expanded Bicycle Network | - |
| | 2-13 Bicycle Storage Systems | - |
| | 2-14 Improved/Expanded Pedestrian Network | - |
| Strategy #3 Shift Trips from SOV to HOV | **High Occupancy Vehicles (HOV)** | |
| | 3-1 Add HOV Lanes | YES |
| | 3-2 HOV Toll Savings | YES |
| | **Transportation Demand Management (TDM)** | |
| | 3-3 Rideshare Matching Services | IN USE |
| | 3-4 Vanpool/Employer Shuttle Program | IN USE |
| | 3-5 Trip Reduction Program | IN USE |
| | 3-6 Parking Management | IN USE |
| Strategy #4 Improve Roadway Operations | **Traffic Operational Improvements** | |
| | 4-1 Geometric Improvements | YES |
| | 4-2 Intersection Turn Restrictions | - |
| | 4-3 Intersection Signalization Improvements | - |
| | 4-4 Coordinated Intersections Signals | YES |
| | 4-5 Roadway Environment | YES |
| | 4-6 Intelligent Transportation Systems/Smart Traffic Centers (ITS) | IN USE |
| | 4-7 Reversible Lanes | YES |
| | 4-8 Freight Policies and Improvements | IN USE |
| | 4-9 Incident Management, Detection, Response & Clearance | IN USE |
| | 4-10 Construction Management | IN USE |
| | 4-11 Elimination of Bottlenecks | YES |
| | 4-12 Ramp Metering | YES |
| | 4-13 Access Control and Connectivity | - |
| | 4-14 Median Control | - |
| Strategy #5 Add Capacity | **Addition of General Purpose Lanes** | |
| | 5-1 Freeway Lanes | YES |
| | 5-2 Arterial lanes | - |
| | 5-3 Interchanges | YES |
| | 5-4 Improve Alternate Routes | YES |

## CMP CONGESTED CORRIDOR - FREEWAY #6

### I-564 (Norfolk)

Between International Terminal Blvd and Admiral Taussig Blvd

#### OBSERVATIONS & POSSIBLE CAUSES OF CONGESTION

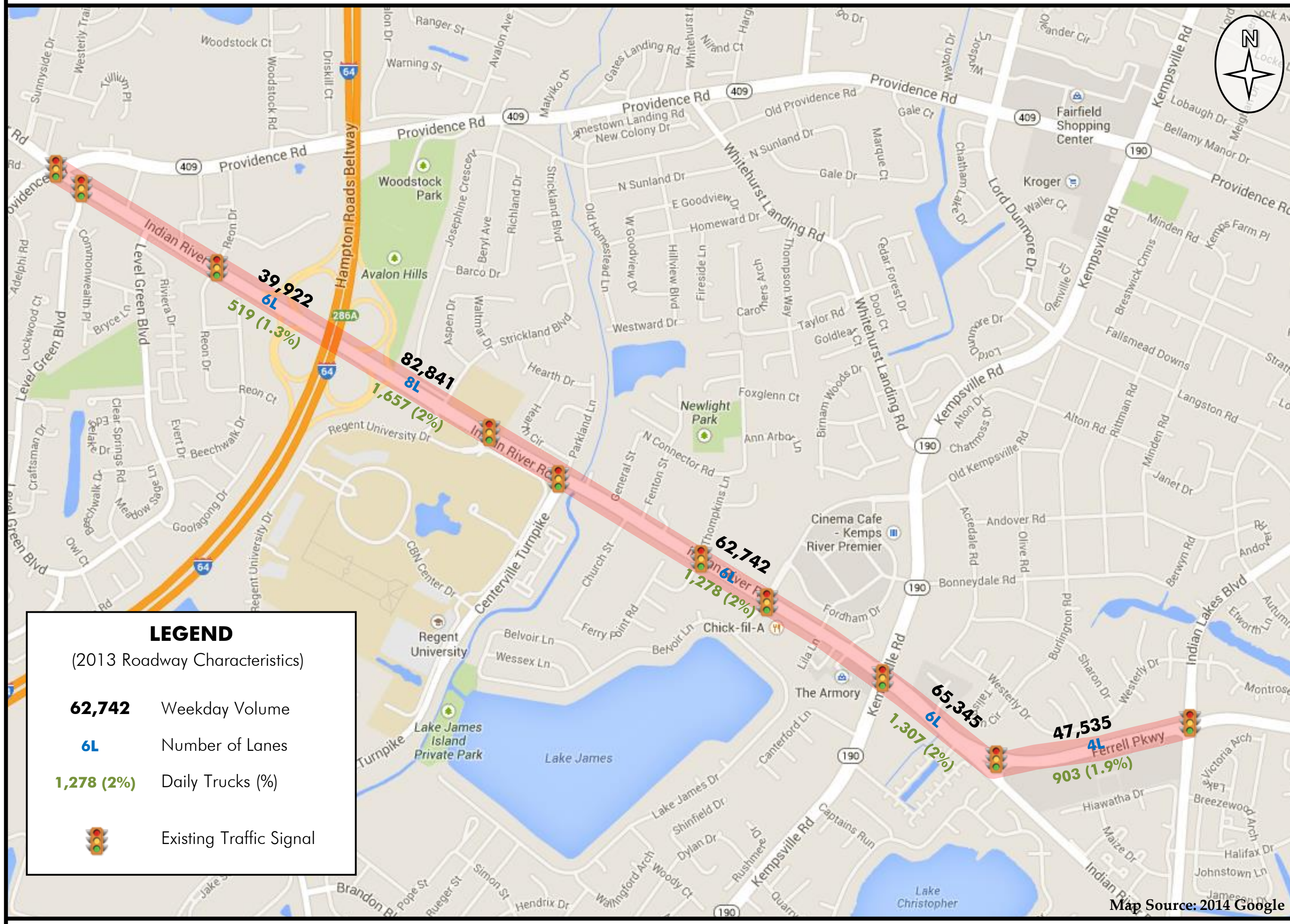
- There is congestion at Naval Station Norfolk (Gates 3/3A, 4, 5, and 22) and Naval Support Activity Hampton Roads (Gate 5) during the AM Peak Period.
- Traffic queues on I-564 NB from the Navy gate entrances in the early AM Peak Period. These queues regularly extend (on I-564 NB) from Admiral Taussig Blvd back to International Terminal Blvd.
- I-564 NB between International Terminal Blvd and Admiral Taussig Blvd is congested for 8 15-minute intervals during the AM Peak Period.
- Traffic control devices (including "railroad" gates on NB Hampton Blvd) are used to notify travelers from I-564 to access Gates 1 and 2 during the AM Peak Period.
- There is a high directional distribution of traffic volumes on I-564 during the AM Peak Period (86% NB, 14% SB) and the PM Peak Period (87% SB, 13% NB). This translates to 3,448 vehicles traveling NB during the AM Peak Hour and 4,151 vehicles traveling SB during the PM Peak Hour.

#### POTENTIAL CONGESTION MITIGATION STRATEGIES

- Encourage local military leaders to modify policies concerning work times and work location (by entry gate).
- Encourage local partnerships with Hampton Roads Transit (HRT) and others to increase travel options for military personnel through travel demand management strategies such as working off-peak hours, telecommuting, ridesharing (carpools/vanpools), and using public transit.
- Extend light rail passenger service to/from Naval Station Norfolk.
- Ensure coordination of the signals on Admiral Taussig Blvd.
- Improve the operations of the gates, particularly at Gates 3/3A. This could include adding additional lanes for processing through the gates and improving technologies at the gates.
- Construct the Intermodal Connector and Air Terminal Interchange projects to improve access from I-564 to Naval Station Norfolk.
- Construct the Third Crossing to improve access to Naval Station Norfolk.

# CMP CONGESTED CORRIDOR - ARTERIAL #2

## Indian River Rd/Ferrell Pkwy Between Providence Rd and Indian Lakes Blvd
## City of Virginia Beach




Map Source: 2014 Google

### CORRIDOR SUMMARY

| | |
|---|---|
| **Corridor Length** | 2.64 Miles |
| **Speed Limit** | 45 mph |
| **Roadway Class** | Principal/Minor Arterial |
| **Transit Service** | HRT Bus Route 12 |
| **Highest CMP Segment Score** | 76 – Eastbound from I-64 to Centerville Tpke during PM Peak |

### RECENT PROJECTS

- None

### FUTURE PROJECTS

FY 2015 SYIP/TIP Intersection Improvements

- Indian River Road at Kempsville Road (UPC #84366 - Construction expected to begin in 2015)

2034 LRTP Projects

- Indian River Road between Centerville Turnpike and Ferrell Parkway (Widen to 8 lanes)
- Ferrell Parkway between Indian River Road and Pleasant Valley Road (Widen to 6 lanes)

| FACILITY NAME | SEGMENT FROM | SEGMENT TO | Length (Mi) | Eastbound (2013) | | | | | | | | | | | | | | Westbound (2013) | | | | | | | | | | | | | | Both Directions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | SLOWEST SPEED (mph) | | HIGHEST TRAVEL TIME INDEX | | HIGHEST PICA | | HIGHEST PLANNING TIME INDEX | | # CONG 15-MIN INTRVLS | | TOTAL DELAY (Hrs/Mi) | | CONG LEVEL | | SLOWEST SPEED (mph) | | HIGHEST TRAVEL TIME INDEX | | HIGHEST PICA | | HIGHEST PLANNING TIME INDEX | | # CONG 15-MIN INTRVLS | | TOTAL DELAY (Hrs/Mi) | | CONG LEVEL | | # LANES | | 2034 PROJ VOL | 20-YR PROJ TRUCK DELAY (Hrs/Mi) | 2034 PM CONG LEVEL |
| | | | | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | 2013 | 2034 | | | |
| INDIAN RIVER RD | PROVIDENCE RD | I-64 | 0.66 | 36 | 25 | 1.13 | 1.62 | 0.04 | 0.46 | 1.33 | 2.49 | 0 | 5 | 7 | 47 | LOW | SEV | 29 | 21 | 1.27 | 1.73 | 0.15 | 0.60 | 1.72 | 2.09 | 0 | 15 | 16 | 82 | MOD | SEV | 6 | 6 | 48,000 | 2.0 | MOD |
| INDIAN RIVER RD | I-64 | CENTERVILLE TNPK | 0.57 | 29 | 17 | 1.42 | 2.46 | 0.26 | 1.23 | 2.00 | 3.65 | 1 | 16 | 72 | 227 | SEV | SEV | 35 | 34 | 1.24 | 1.28 | 0.11 | 0.07 | 1.74 | 1.57 | 0 | 0 | 19 | 63 | LOW | MOD | 8 | 8 | 110,000 | 63.8 | SEV |
| INDIAN RIVER RD | CENTERVILLE TNPK | KEMPSVILLE RD | 0.72 | 30 | 17 | 1.25 | 2.29 | 0.13 | 1.05 | 1.61 | 3.04 | 0 | 15 | 21 | 226 | MOD | SEV | 27 | 30 | 1.45 | 1.30 | 0.28 | 0.11 | 2.53 | 1.57 | 1 | 0 | 52 | 44 | SEV | MOD | 6 | 8 | 82,000 | 13.8 | SEV |
| INDIAN RIVER RD | KEMPSVILLE RD | FERRELL PKWY | 0.24 | 38 | 39 | 1.10 | 1.09 | -0.04 | -0.15 | 1.29 | 1.24 | 0 | 0 | 9 | 21 | LOW | LOW | 19 | 21 | 1.89 | 1.65 | 0.70 | 0.47 | 3.02 | 2.36 | 10 | 16 | 140 | 142 | SEV | SEV | 6 | 8 | 76,000 | 33.5 | MOD |
| FERRELL PKWY | INDIAN RIVER RD | INDIAN LAKES BLVD | 0.45 | - | - | - | - | - | - | - | - | - | - | - | - | SEV | SEV | - | - | - | - | - | - | - | - | - | - | - | - | SEV | SEV | 4 | 6 | 58,000 | 9.9 | LOW |

| Strategy | Congestion Management Strategies | Applicable Strategy? |
|---|---|---|
| Strategy #1 Eliminate Person Trips or Reduce VMT | **Growth Management/Activity Centers** | |
| | 1-1 Land Use Policies/Regulations | IN USE |
| | **Congestion/Value Pricing** | |
| | 1-2 Road User Fees/High Occupancy Toll (HOT) Lanes | - |
| | 1-3 Parking Fees | - |
| | **Transportation Demand Management (TDM)** | |
| | 1-4 Telecommuting | IN USE |
| | 1-5 Employee Flextime Benefits/Compressed Work Week | IN USE |
| Strategy #2 Shift Trips from Auto to Other Modes | **Public Transit Capital Improvements** | |
| | 2-1 Exclusive Right-of-Way - New Rail Service | - |
| | 2-2 Exclusive Right-of-Way - New Bus Facilities | - |
| | 2-3 Ferry Services | - |
| | 2-4 Fleet Expansion | YES |
| | 2-5 Improved Intermodal Connections | - |
| | 2-6 Improved/Increased Park & Ride Facilities & Capital Improvements | YES |
| | **Public Transit Operational Improvements** | |
| | 2-7 Service Expansion | YES |
| | 2-8 Traffic Signal Preemption | YES |
| | 2-9 Improved Transit Performance | YES |
| | 2-10 Transit Fare Reductions Plan/Reduced Rate of Fare | YES |
| | 2-11 Transit Information Systems | YES |
| | **Bicycle and Pedestrian Modes** | |
| | 2-12 Improved/Expanded Bicycle Network | YES |
| | 2-13 Bicycle Storage Systems | YES |
| | 2-14 Improved/Expanded Pedestrian Network | YES |
| Strategy #3 Shift Trips from SOV to HOV | **High Occupancy Vehicle (HOV)** | |
| | 3-1 Add HOV Lanes | - |
| | 3-2 HOV Toll Savings | - |
| | **Transportation Demand Management (TDM)** | |
| | 3-3 Rideshare Matching Services | IN USE |
| | 3-4 Vanpool/Employer Shuttle Program | IN USE |
| | 3-5 Trip Reduction Program | IN USE |
| | 3-6 Parking Management | IN USE |
| Strategy #4 Improve Roadway Operations | **Traffic Operational Improvements** | |
| | 4-1 Geometric Improvements | YES |
| | 4-2 Intersection Turn Restrictions | YES |
| | 4-3 Intersection Signalization Improvements | YES |
| | 4-4 Coordinated Intersections Signals | YES |
| | 4-5 Roadway Environment | YES |
| | 4-6 Intelligent Transportation Systems/Smart Traffic Centers (ITS) | IN USE |
| | 4-7 Reversible Lanes | YES |
| | 4-8 Freight Policies and Improvements | - |
| | 4-9 Incident Management, Detection, Response & Clearance | YES |
| | 4-10 Construction Management | YES |
| | 4-11 Elimination of Bottlenecks | YES |
| | 4-12 Ramp Metering | - |
| | 4-13 Access Control and Connectivity | YES |
| | 4-14 Median Control | IN USE |
| Strategy #5 Add Capacity | **Addition of General Purpose Lanes** | |
| | 5-1 Freeway Lanes | - |
| | 5-2 Arterial lanes | YES |
| | 5-3 Interchanges | YES |
| | 5-4 Improve Alternate Routes | YES |

## CMP CONGESTED CORRIDOR - ARTERIAL #2
### Indian River Road / Ferrell Parkway
Between Providence Rd and Indian Lakes Blvd

### OBSERVATIONS & POSSIBLE CAUSES OF CONGESTION

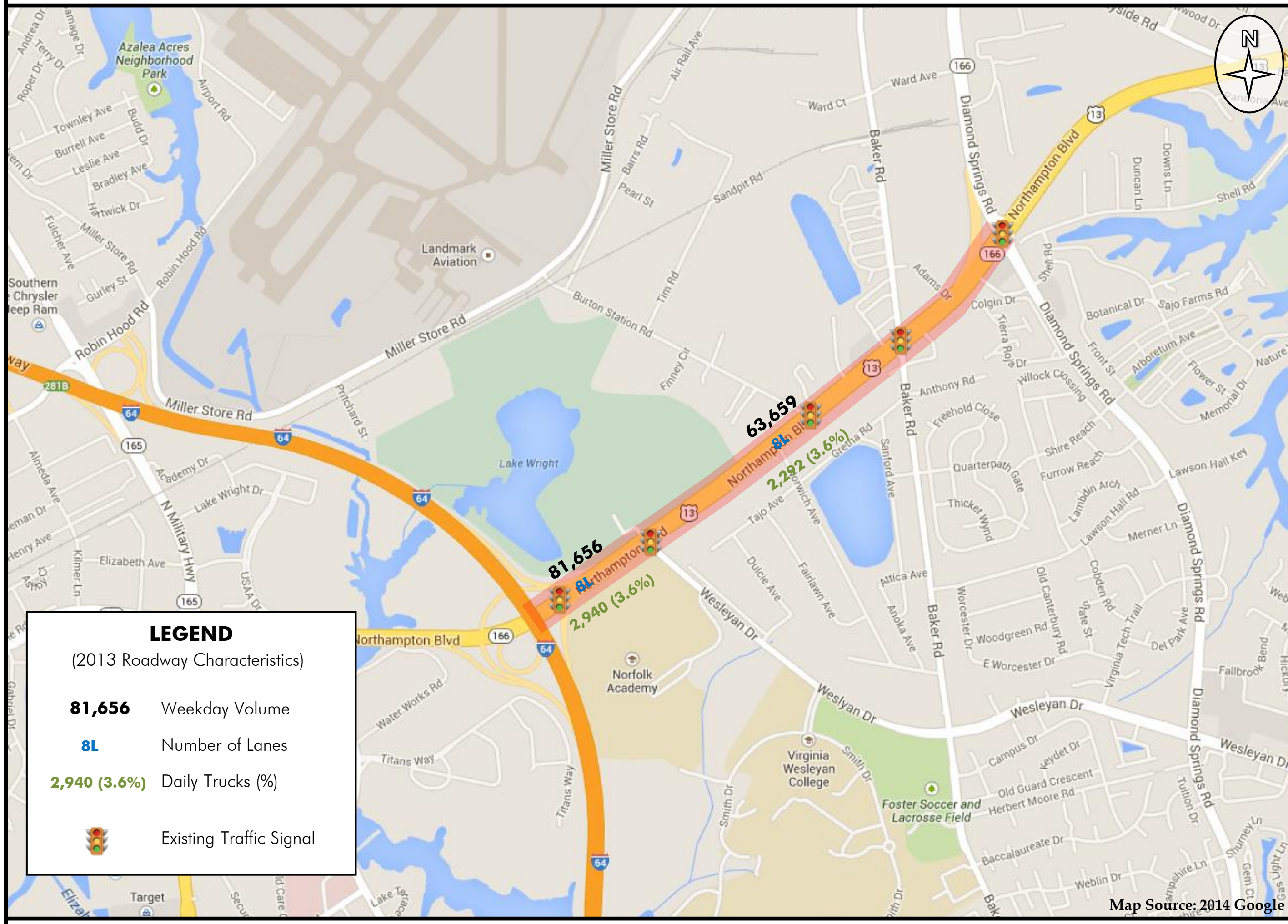
- The queue for the EB Indian River Road approach to Kempsville Road spills back over 1.5 miles onto I-64 during the PM peak period.
- The ramp from WB Indian River Rd to WB I-64 is congested during both the AM and PM peak periods.
- Heavy EB PM peak hour volume (3,622 vehicles from I-64 to Centerville Tpke).
- Heavy WB AM peak hour volume (2,838 vehicles from Ferrell Pkwy to Kempsville Rd).
- High directional distribution of traffic on Indian River Road during PM peak (58% EB).
- Heavy traffic on all approaches of the Kempsville Rd intersection during the PM peak period.
- WB Indian River Rd dual left-turn lanes at Kempsville Rd intersection back up into through lanes during the PM peak.
- At the same intersection, NB Kempsville Rd through lanes back up blocking vehicles from entering the left-turn lanes during the AM peak.
- Weaving is an issue on EB Indian River Rd between traffic coming from the WB I-64 off-ramp and drivers attempting to turn right into Regent University or onto Centerville Tpke.

### POTENTIAL CONGESTION MITIGATION STRATEGIES

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor.
- Improve the intersection of Indian River Road and Kempsville Road. Rebuilding the intersection with a non-traditional configuration is included in the SYIP/TIP (UPC #84366), with construction expected to begin in 2015.
- Ensure coordination of signals in the corridor.
- Widen Indian River Road. (This project is included in the Long-Range Transportation Plan.)
- Construct alternate routes, such as the Southeastern Parkway and Greenbelt. The extension of Lynnhaven Pkwy between Centerville Tpke and Indian River Rd (UPC #14603) is under construction and will reduce congestion at Indian River Road/Kempsville Rd when complete.

# CMP CONGESTED CORRIDOR - ARTERIAL #3

## Northampton Blvd Between I-64 and Diamond Springs Rd
## Cities of Norfolk and Virginia Beach




### CORRIDOR SUMMARY

| | |
|---|---|
| **Corridor Length** | 1.32 Miles |
| **Speed Limit** | 45 mph |
| **Roadway Class** | Principal Arterial |
| **Transit Service** | HRT Bus Route 27 |
| **Highest CMP Segment Score** | 69 – Westbound from Wesleyan Dr to I-64 during AM Peak |

### RECENT PROJECTS

- Realignment of the Wesleyan Drive/Northampton Boulevard intersection 95 feet to the northeast as part of the Wesleyan Drive widening project (completed in 2013). A third left turn lane and a through only lane were also added on Wesleyan Drive at the intersection.

### FUTURE PROJECTS

- None

| FACILITY NAME | SEGMENT FROM | SEGMENT TO | Length (Mi) | Eastbound (2013) SLOWEST SPEED (mph) | | HIGHEST TRAVEL TIME INDEX | | HIGHEST PICA | | HIGHEST PLANNING TIME INDEX | | # CONG 15-MIN INTRVLS | | TOTAL DELAY (Hrs/Mi) | | CONG LEVEL | | Westbound (2013) SLOWEST SPEED (mph) | | HIGHEST TRAVEL TIME INDEX | | HIGHEST PICA | | HIGHEST PLANNING TIME INDEX | | # CONG 15-MIN INTRVLS | | TOTAL DELAY (Hrs/Mi) | | CONG LEVEL | | Both Directions # LANES | | 2034 PROJ VOL | 20-YR PROJ TRUCK DELAY (Hrs/Mi) | 2034 PM CONG LEVEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | 2013 | 2034 | | | |
| NORTHAMPTON BLVD | I-64 | WESLEYAN DR/VA BEACH CL | 0.34 | 24 | 30 | 1.65 | 1.29 | 0.52 | 0.14 | 2.36 | 1.69 | 7 | 0 | 94 | 75 | SEV | MOD | 21 | 24 | 1.77 | 1.58 | 0.61 | 0.44 | 3.14 | 2.65 | 6 | 9 | 95 | 105 | SEV | SEV | 8 | 8 | 105,000 | 20.2 | SEV |
| NORTHAMPTON BLVD | WESLEYAN DR/NORFOLK CL | DIAMOND SPRINGS RD | 0.98 | 24 | 30 | 1.65 | 1.29 | 0.54 | 0.13 | 2.36 | 1.69 | 7 | 0 | 77 | 55 | SEV | MOD | 21 | 24 | 1.77 | 1.58 | 0.64 | 0.41 | 3.14 | 2.65 | 6 | 9 | 73 | 89 | SEV | SEV | 8 | 8 | 71,000 | 3.5 | LOW |

| Strategy | | Congestion Management Strategies | Applicable Strategy? |
|---|---|---|---|
| Strategy #1 | Eliminate Person Trips or Reduce VMT | **Growth Management/Activity Centers** | |
| | | 1-1 Land Use Policies/Regulations | IN USE |
| | | **Congestion/Value Pricing** | |
| | | 1-2 Road User Fees/High Occupancy Toll (HOT) Lanes | - |
| | | 1-3 Parking Fees | - |
| | | **Transportation Demand Management (TDM)** | |
| | | 1-4 Telecommuting | IN USE |
| | | 1-5 Employee Flextime Benefits/Compressed Work Week | IN USE |
| Strategy #2 | Shift Trips from Auto to Other Modes | **Public Transit Capital Improvements** | |
| | | 2-1 Exclusive Right-of-Way - New Rail Service | - |
| | | 2-2 Exclusive Right-of-Way - New Bus Facilities | - |
| | | 2-3 Ferry Services | - |
| | | 2-4 Fleet Expansion | YES |
| | | 2-5 Improved Intermodal Connections | - |
| | | 2-6 Improved/Increased Park & Ride Facilities & Capital Improvements | YES |
| | | **Public Transit Operational Improvements** | |
| | | 2-7 Service Expansion | YES |
| | | 2-8 Traffic Signal Preemption | YES |
| | | 2-9 Improved Transit Performance | YES |
| | | 2-10 Transit Fare Reductions Plan/Reduced Rate of Fare | YES |
| | | 2-11 Transit Information Systems | YES |
| | | **Bicycle and Pedestrian Modes** | |
| | | 2-12 Improved/Expanded Bicycle Network | YES |
| | | 2-13 Bicycle Storage Systems | YES |
| | | 2-14 Improved/Expanded Pedestrian Network | YES |
| Strategy #3 | Shift Trips from SOV to HOV | **High Occupancy Vehicle (HOV)** | |
| | | 3-1 Add HOV Lanes | - |
| | | 3-2 HOV Toll Savings | - |
| | | **Transportation Demand Management (TDM)** | |
| | | 3-3 Rideshare Matching Services | IN USE |
| | | 3-4 Vanpool/Employer Shuttle Program | IN USE |
| | | 3-5 Trip Reduction Program | IN USE |
| | | 3-6 Parking Management | IN USE |
| Strategy #4 | Improve Roadway Operations | **Traffic Operational Improvements** | |
| | | 4-1 Geometric Improvements | YES |
| | | 4-2 Intersection Turn Restrictions | YES |
| | | 4-3 Intersection Signalization Improvements | YES |
| | | 4-4 Coordinated Intersections Signals | YES |
| | | 4-5 Roadway Environment | YES |
| | | 4-6 Intelligent Transportation Systems/Smart Traffic Centers (ITS) | IN USE |
| | | 4-7 Reversible Lanes | YES |
| | | 4-8 Freight Policies and Improvements | - |
| | | 4-9 Incident Management, Detection, Response & Clearance | YES |
| | | 4-10 Construction Management | YES |
| | | 4-11 Elimination of Bottlenecks | YES |
| | | 4-12 Ramp Metering | - |
| | | 4-13 Access Control and Connectivity | YES |
| | | 4-14 Median Control | IN USE |
| Strategy #5 | Add Capacity | **Addition of General Purpose Lanes** | |
| | | 5-1 Freeway Lanes | - |
| | | 5-2 Arterial lanes | YES |
| | | 5-3 Interchanges | YES |
| | | 5-4 Improve Alternate Routes | YES |

# CMP CONGESTED CORRIDOR - ARTERIAL #3

## Northampton Blvd

Between I-64 and Diamond Springs Rd

### OBSERVATIONS & POSSIBLE CAUSES OF CONGESTION

- Traffic regularly backs up from I-64 back onto the ramps and onto WB Northampton Boulevard beyond the Wesleyan Dr intersection during the PM peak period.
- The Wesleyan Dr/Northampton Blvd intersection was under construction (End 2012 – End 2013) during the 2013 CMP analysis year. EB Northampton Blvd was reduced by one lane and the signal was run under fixed time operation during construction.
- Heavy WB traffic volumes during the AM peak hour (3,531 vehicles) and the PM peak hour (3,387 vehicles) along Northampton Blvd between Wesleyan Drive and I-64.
- Heavy traffic volumes on the on-ramp from Northampton Blvd to I-64, particularly during the PM peak hour (1,301 vehicles).
- There is a short weaving/merging distance between vehicles coming from the I-64 WB off-ramp to EB Northampton Blvd and EB Northampton Blvd vehicles turning right onto Wesleyan Dr.[1]
- There is a short weaving/merging distance for vehicles coming from the I-64 WB off-ramp to EB Northampton Blvd to turn left into the Lake Wright area.[1]
- There is a short weaving/merging distance for left turning vehicles from NB Wesleyan Dr to WB Northampton Blvd before the I-64 on-ramps. Four signs are in place on NB Wesleyan Dr to direct users to the correct lanes.
- The signal at the intersection of the WB I-64 off ramp and Northampton Blvd is operated to provide additional time for the heavy traffic levels traveling from the WB I-64 off ramp to EB Northampton Blvd. According to Norfolk staff, this has helped reduce the length of backups on the ramp.

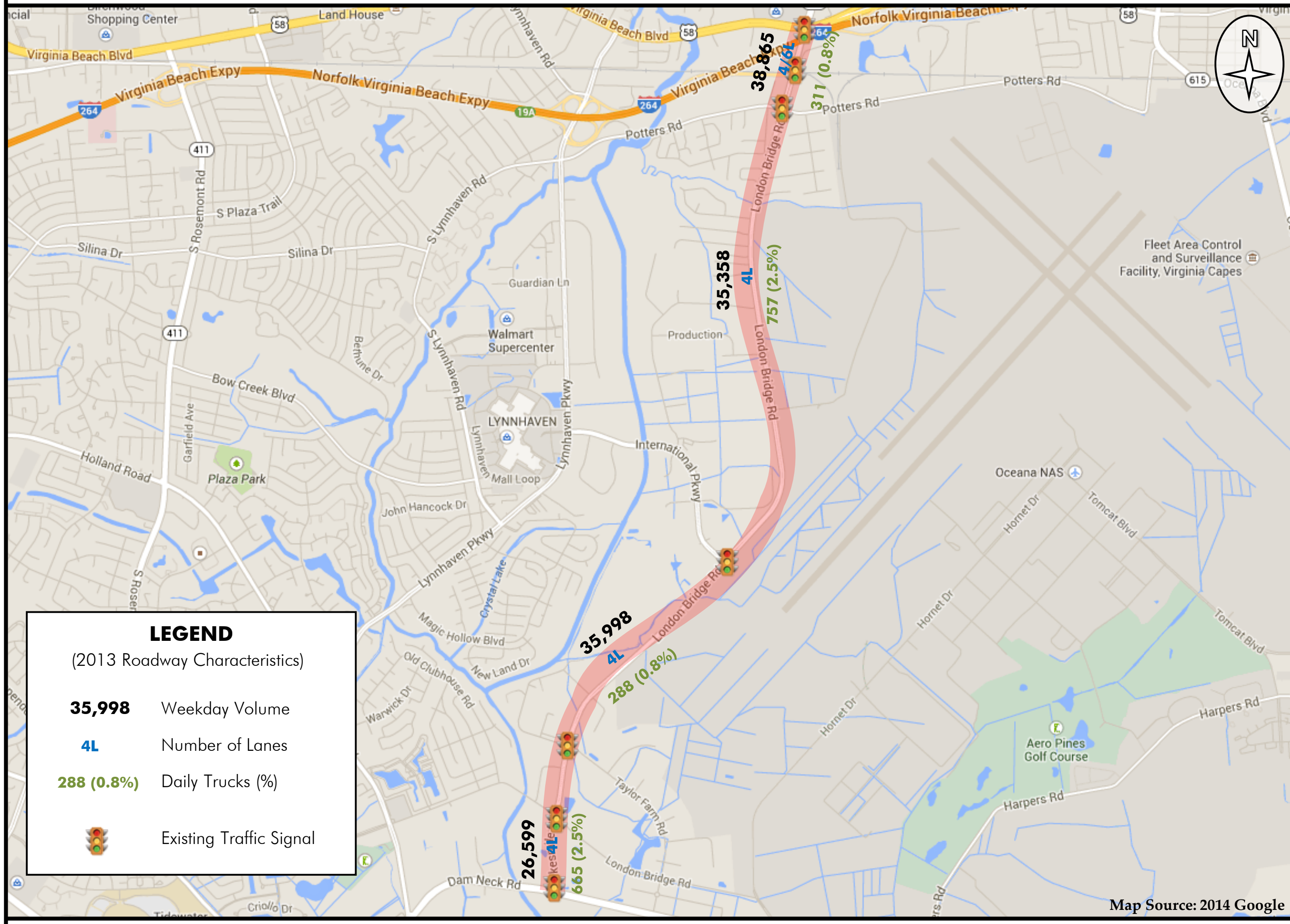
### POTENTIAL CONGESTION MITIGATION STRATEGIES

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor.
- Improve the interchange of I-64 and Northampton Blvd. One possibility is to widen I-64 EB from the end of the Northampton Boulevard on-ramp to beyond the merging area for the reversible lanes. This will allow for the Northampton Boulevard on-ramp to remain as a through lane rather than the much less used ramp coming from the HOV lanes.

[1] In 2014, EB congestion issues have been resolved due to the Wesleyan Dr intersection project and operational improvements.

# CMP CONGESTED CORRIDOR - ARTERIAL #5

## London Bridge Rd/Drakesmile Rd Between Dam Neck Rd and Virginia Beach Blvd
## City of Virginia Beach




### CORRIDOR SUMMARY

| | |
|---|---|
| **Corridor Length** | 4.03 Miles |
| **Speed Limit** | 35-55 mph |
| **Roadway Class** | Minor Arterial |
| **Transit Service** | HRT Bus Route 26 (partial) |
| **Highest CMP Segment Score** | 64 – PM Peak (Between Shipps Corner Rd and International Pkwy) |

### RECENT PROJECTS

- New partial interchange at I-264 and London Bridge Road (completed in 2012)

### FUTURE PROJECTS

2034 LRTP Projects

- London Bridge Road between Dam Neck Road and Drakesmile Road (Widen to 4 lanes)
  - This will likely alleviate traffic congestion on Drakesmile Road.

| FACILITY NAME | SEGMENT FROM | SEGMENT TO | Length (Mi) | Northbound (2013) SLOWEST SPEED (mph) AM | PM | HIGHEST TRAVEL TIME INDEX AM | PM | HIGHEST PICA AM | PM | HIGHEST PLANNING TIME INDEX AM | PM | # CONG 15-MIN INTRVLS AM | PM | TOTAL DELAY (Hrs/Mi) AM | PM | CONG LEVEL AM | PM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRAKESMILE RD | DAM NECK RD | SHIPPS CORNER RD | 0.25 | - | - | - | - | - | - | - | - | - | - | - | - | LOW | SEV |
| LONDON BRIDGE RD | SHIPPS CORNER RD | INTERNATIONAL PKWY | 1.34 | - | - | - | - | - | - | - | - | - | - | - | - | SEV | SEV |
| LONDON BRIDGE RD | INTERNATIONAL PKWY | POTTERS RD | 2.08 | - | - | - | - | - | - | - | - | - | - | - | - | LOW | SEV |
| LONDON BRIDGE RD | POTTERS RD | I-264 RAMP | 0.15 | 29 | 29 | 1.38 | 1.37 | 0.25 | 0.18 | 1.87 | 2.02 | 0 | 0 | 24 | 39 | MOD | MOD |
| LONDON BRIDGE RD | I-264 RAMP | VA BEACH BLVD | 0.21 | 29 | 29 | 1.38 | 1.37 | 0.28 | 0.19 | 1.87 | 2.02 | 0 | 0 | 24 | 40 | MOD | MOD |

| FACILITY NAME | SEGMENT FROM | SEGMENT TO | Southbound (2013) SLOWEST SPEED (mph) AM | PM | HIGHEST TRAVEL TIME INDEX AM | PM | HIGHEST PICA AM | PM | HIGHEST PLANNING TIME INDEX AM | PM | # CONG 15-MIN INTRVLS AM | PM | TOTAL DELAY (Hrs/Mi) AM | PM | CONG LEVEL AM | PM | Both Directions # LANES 2013 | # LANES 2034 | 2034 PROJ VOL | 20-YR PROJ TRUCK DELAY (Hrs/Mi) | 2034 PM CONG LEVEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRAKESMILE RD | DAM NECK RD | SHIPPS CORNER RD | - | - | - | - | - | - | - | - | - | - | - | - | LOW | SEV | 4 | 4 | 29,000 | 0.6 | SEV |
| LONDON BRIDGE RD | SHIPPS CORNER RD | INTERNATIONAL PKWY | - | - | - | - | - | - | - | - | - | - | - | - | SEV | SEV | 4 | 4 | 42,000 | 1.4 | SEV |
| LONDON BRIDGE RD | INTERNATIONAL PKWY | POTTERS RD | - | - | - | - | - | - | - | - | - | - | - | - | LOW | SEV | 4 | 4 | 33,000 | 4.9 | LOW |
| LONDON BRIDGE RD | POTTERS RD | I-264 RAMP | 31 | 26 | 1.32 | 1.59 | 0.23 | 0.41 | 1.75 | 1.99 | 0 | 12 | 16 | 57 | MOD | SEV | 6 | 6 | 40,000 | 4.0 | MOD |
| LONDON BRIDGE RD | I-264 RAMP | VA BEACH BLVD | 31 | 26 | 1.32 | 1.59 | 0.22 | 0.38 | 1.75 | 1.99 | 0 | 12 | 21 | 67 | MOD | SEV | 6 | 6 | 52,000 | 0.2 | SEV |

| Strategy | Congestion Management Strategies | Applicable Strategy? |
|---|---|---|
| Strategy #1 Eliminate Person Trips or Reduce VMT | **Growth Management/Activity Centers** | |
| | 1-1 Land Use Policies/Regulations | IN USE |
| | **Congestion/Value Pricing** | |
| | 1-2 Road User Fees/High Occupancy Toll (HOT) Lanes | - |
| | 1-3 Parking Fees | - |
| | **Transportation Demand Management (TDM)** | |
| | 1-4 Telecommuting | IN USE |
| | 1-5 Employee Flextime Benefits/Compressed Work Week | IN USE |
| Strategy #2 Shift Trips from Auto to Other Modes | **Public Transit Capital Improvements** | |
| | 2-1 Exclusive Right-of-Way - New Rail Service | - |
| | 2-2 Exclusive Right-of-Way - New Bus Facilities | - |
| | 2-3 Ferry Services | - |
| | 2-4 Fleet Expansion | YES |
| | 2-5 Improved Intermodal Connections | - |
| | 2-6 Improved/Increased Park & Ride Facilities & Capital Improvements | YES |
| | **Public Transit Operational Improvements** | |
| | 2-7 Service Expansion | YES |
| | 2-8 Traffic Signal Preemption | YES |
| | 2-9 Improved Transit Performance | YES |
| | 2-10 Transit Fare Reductions Plan/Reduced Rate of Fare | YES |
| | 2-11 Transit Information Systems | YES |
| | **Bicycle and Pedestrian Modes** | |
| | 2-12 Improved/Expanded Bicycle Network | IN USE |
| | 2-13 Bicycle Storage Systems | YES |
| | 2-14 Improved/Expanded Pedestrian Network | YES |
| Strategy #3 Shift Trips from SOV to HOV | **High Occupancy Vehicle (HOV)** | |
| | 3-1 Add HOV Lanes | - |
| | 3-2 HOV Toll Savings | - |
| | **Transportation Demand Management (TDM)** | |
| | 3-3 Rideshare Matching Services | IN USE |
| | 3-4 Vanpool/Employer Shuttle Program | IN USE |
| | 3-5 Trip Reduction Program | IN USE |
| | 3-6 Parking Management | IN USE |
| Strategy #4 Improve Roadway Operations | **Traffic Operational Improvements** | |
| | 4-1 Geometric Improvements | YES |
| | 4-2 Intersection Turn Restrictions | YES |
| | 4-3 Intersection Signalization Improvements | YES |
| | 4-4 Coordinated Intersections Signals | YES |
| | 4-5 Roadway Environment | YES |
| | 4-6 Intelligent Transportation Systems/Smart Traffic Centers (ITS) | IN USE |
| | 4-7 Reversible Lanes | YES |
| | 4-8 Freight Policies and Improvements | - |
| | 4-9 Incident Management, Detection, Response & Clearance | YES |
| | 4-10 Construction Management | YES |
| | 4-11 Elimination of Bottlenecks | - |
| | 4-12 Ramp Metering | - |
| | 4-13 Access Control and Connectivity | YES |
| | 4-14 Median Control | IN USE |
| Strategy #5 Add Capacity | **Addition of General Purpose Lanes** | |
| | 5-1 Freeway Lanes | - |
| | 5-2 Arterial lanes | YES |
| | 5-3 Interchanges | YES |
| | 5-4 Improve Alternate Routes | YES |

## CMP CONGESTED CORRIDOR - ARTERIAL #5
### London Bridge Rd/Drakesmile Rd
Between Dam Neck Rd and Virginia Beach Blvd

### OBSERVATIONS & POSSIBLE CAUSES OF CONGESTION

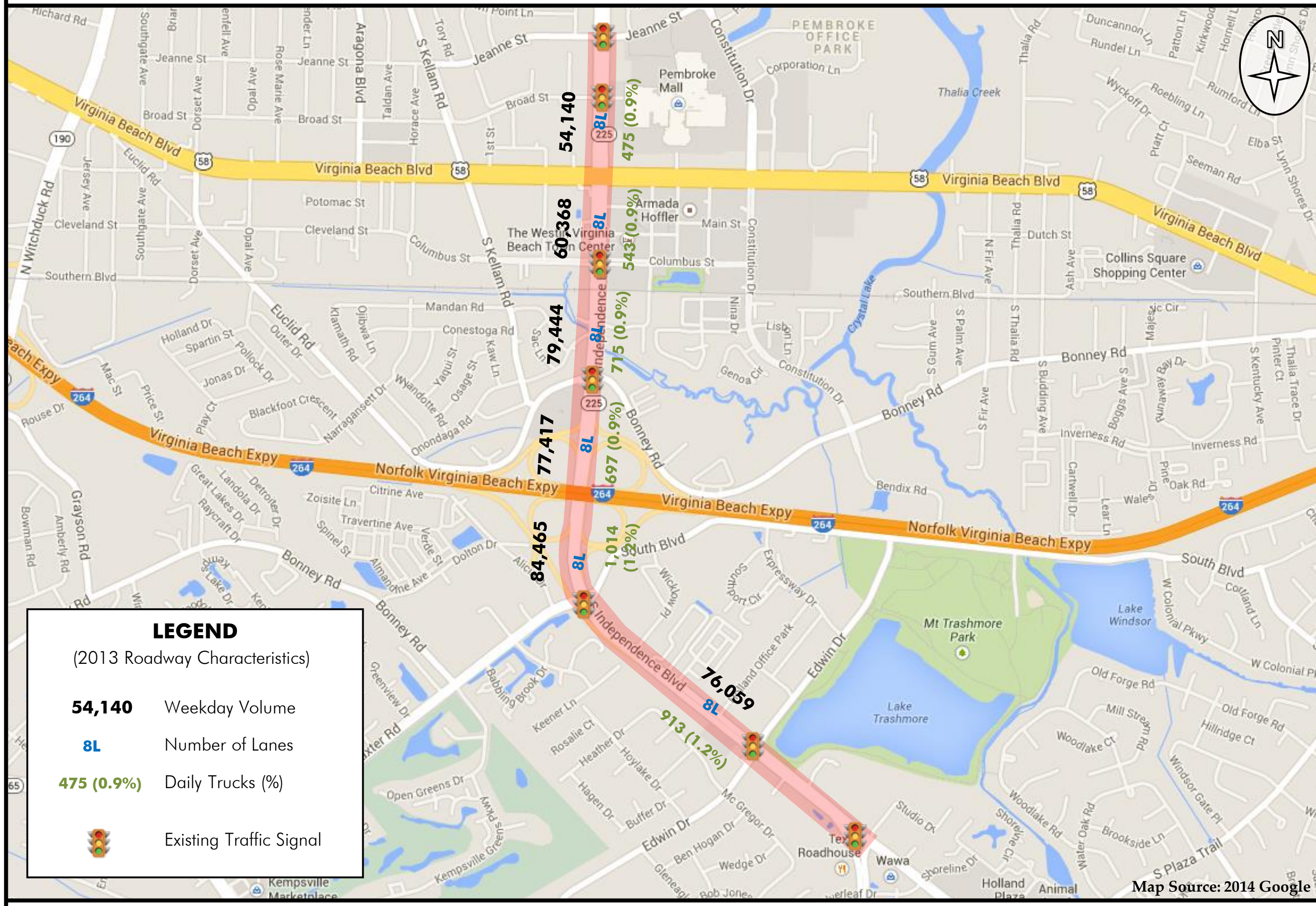
- High directional distribution of traffic along most of London Bridge Rd (56-63% NB in the AM peak and 56-70% SB in the PM peak). Between the I-264 ramp and Virginia Beach Blvd during the PM peak, directional distribution is 65% in the NB direction.
- Traffic queues in NB direction extending all the way from the Virginia Beach Blvd intersection back to Potters Rd during the PM peak. Traffic turning left from the I-264 off-ramp to NB London Bridge Rd occasionally blocks the intersection because of this, impeding SB traffic.
- Traffic queues on all approaches at the Virginia Beach Blvd/Great Neck Rd/London Bridge Rd intersection during the PM peak period.
- Traffic queues on I-264 EB off-ramp to London Bridge Rd during the PM peak. Vehicles back up to the main lanes of I-264 EB.
- Traffic queues on SB London Bridge Rd at Shipps Corner Rd and SB London Bridge Rd at Dam Neck Rd during the PM peak.
- Signals are closely spaced between Potters Rd and Virginia Beach Blvd.
- I-264 overpass limits the ability to expand London Bridge Rd between Virginia Beach Blvd and Potters Rd.

### POTENTIAL CONGESTION MITIGATION STRATEGIES

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor.
- Consider improvements to the intersection of Virginia Beach Blvd/Great Neck Rd/London Bridge Rd to improve flow on London Bridge Rd. This could include restriping EB Virginia Beach Blvd to provide a triple left turn movement to NB Great Neck Rd and WB Virginia Beach Blvd to provide a double left turn movement to SB London Bridge Rd. The EB triple left would require restriping Great Neck Rd to the north of Virginia Beach Blvd.
- Ensure coordination between the closely spaced signals from Potters Rd to Virginia Beach Blvd.
- Widen London Bridge Rd between Drakesmile Rd and Dam Neck Rd to alleviate backups on SB Drakesmile Rd. (This project is included in the Long-Range Transportation Plan.)

# CMP CONGESTED CORRIDOR - ARTERIAL #6

## Independence Blvd Between Holland Rd and Jeanne St
## City of Virginia Beach




### CORRIDOR SUMMARY

| | |
|---|---|
| **Corridor Length** | 1.98 Miles |
| **Speed Limit** | 45 mph |
| **Roadway Class** | Principal/Minor Arterial |
| **Transit Service** | HRT Bus Routes 1 & 36<br>MAX 918/919 & 960 |
| **Highest CMP Segment Score** | 63 – Southbound from I-264 to Baxter Rd during the AM and PM Peak |

### RECENT PROJECTS

- New section of Constitution Drive from Bonney Rd to Columbus St (completed in 2010)

### FUTURE PROJECTS

- None

| FACILITY NAME | SEGMENT FROM | SEGMENT TO | Length (Mi) | Northbound (2013) SLOWEST SPEED (mph) AM | PM | HIGHEST TRAVEL TIME INDEX AM | PM | HIGHEST PICA AM | PM | HIGHEST PLANNING TIME INDEX AM | PM | # CONG 15-MIN INTRVLS AM | PM | TOTAL DELAY (Hrs/Mi) AM | PM | CONG LEVEL AM | PM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INDEPENDENCE BLVD | HOLLAND RD | BAXTER RD | 0.80 | 24 | 29 | 1.65 | 1.38 | 0.53 | 0.13 | 2.90 | 1.76 | 6 | 0 | 54 | 122 | SEV | MOD |
| INDEPENDENCE BLVD | BAXTER RD | I-264 | 0.23 | 33 | 32 | 1.27 | 1.30 | 0.15 | 0.08 | 1.79 | 1.61 | 0 | 0 | 19 | 90 | MOD | MOD |
| INDEPENDENCE BLVD | I-264 | BONNEY RD | 0.24 | 27 | 25 | 1.21 | 1.30 | 0.07 | 0.08 | 1.65 | 1.63 | 0 | 0 | 26 | 74 | LOW | MOD |
| INDEPENDENCE BLVD | BONNEY RD | COLUMBUS ST | 0.25 | 27 | 25 | 1.21 | 1.30 | 0.07 | 0.08 | 1.65 | 1.63 | 0 | 0 | 26 | 74 | LOW | MOD |
| INDEPENDENCE BLVD | COLUMBUS ST | VA BEACH BLVD | 0.18 | 27 | 25 | 1.21 | 1.30 | 0.07 | 0.08 | 1.65 | 1.63 | 0 | 0 | 26 | 74 | LOW | MOD |
| INDEPENDENCE BLVD | VA BEACH BLVD | JEANNE ST | 0.28 | 39 | 38 | 1.10 | 1.14 | 0.00 | -0.01 | 1.26 | 1.33 | 0 | 0 | 7 | 22 | LOW | LOW |

| FACILITY NAME | SEGMENT FROM | SEGMENT TO | Southbound (2013) SLOWEST SPEED (mph) AM | PM | HIGHEST TRAVEL TIME INDEX AM | PM | HIGHEST PICA AM | PM | HIGHEST PLANNING TIME INDEX AM | PM | # CONG 15-MIN INTRVLS AM | PM | TOTAL DELAY (Hrs/Mi) AM | PM | CONG LEVEL AM | PM | Both Directions # LANES 2013 | 2034 | 2034 PROJ VOL | 20-YR PROJ TRUCK DELAY (Hrs/Mi) | 2034 PM CONG LEVEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INDEPENDENCE BLVD | HOLLAND RD | BAXTER RD | 38 | 28 | 1.16 | 1.59 | 0.02 | 0.42 | 1.39 | 2.04 | 0 | 6 | 18 | 74 | LOW | SEV | 8 | 8 | 80,000 | 5.9 | SEV |
| INDEPENDENCE BLVD | BAXTER RD | I-264 | 26 | 26 | 1.72 | 1.75 | 0.58 | 0.57 | 2.20 | 2.20 | 16 | 16 | 143 | 146 | SEV | SEV | 8 | 8 | 89,000 | 27.5 | SEV |
| INDEPENDENCE BLVD | I-264 | BONNEY RD | 33 | 27 | 1.23 | 1.52 | 0.11 | 0.24 | 1.47 | 2.13 | 0 | 3 | 15 | 96 | LOW | SEV | 8 | 8 | 87,000 | 18.2 | SEV |
| INDEPENDENCE BLVD | BONNEY RD | COLUMBUS ST | 33 | 27 | 1.23 | 1.52 | 0.11 | 0.24 | 1.47 | 2.13 | 0 | 3 | 15 | 96 | LOW | SEV | 8 | 8 | 87,000 | 12.1 | SEV |
| INDEPENDENCE BLVD | COLUMBUS ST | VA BEACH BLVD | 33 | 27 | 1.23 | 1.52 | 0.11 | 0.24 | 1.47 | 2.13 | 0 | 3 | 15 | 96 | LOW | SEV | 8 | 8 | 68,000 | 2.8 | MOD |
| INDEPENDENCE BLVD | VA BEACH BLVD | JEANNE ST | 36 | 27 | 1.13 | 1.49 | 0.02 | 0.34 | 1.28 | 2.21 | 0 | 3 | 10 | 63 | LOW | SEV | 8 | 8 | 62,000 | 13.5 | LOW |

| | Congestion Management Strategies | Applicable Strategy? |
|---|---|---|
| Strategy #1 Eliminate Person Trips or Reduce VMT | **Growth Management/Activity Centers** | |
| | 1-1 Land Use Policies/Regulations | IN USE |
| | **Congestion/Value Pricing** | |
| | 1-2 Road User Fees/High Occupancy Toll (HOT) Lanes | - |
| | 1-3 Parking Fees | YES |
| | **Transportation Demand Management (TDM)** | |
| | 1-4 Telecommuting | IN USE |
| | 1-5 Employee Flextime Benefits/Compressed Work Week | IN USE |
| Strategy #2 Shift Trips from Auto to Other Modes | **Public Transit Capital Improvements** | |
| | 2-1 Exclusive Right-of-Way - New Rail Service | YES |
| | 2-2 Exclusive Right-of-Way - New Bus Facilities | YES |
| | 2-3 Ferry Services | - |
| | 2-4 Fleet Expansion | YES |
| | 2-5 Improved Intermodal Connections | YES |
| | 2-6 Improved/Increased Park & Ride Facilities & Capital Improvements | YES |
| | **Public Transit Operational Improvements** | |
| | 2-7 Service Expansion | YES |
| | 2-8 Traffic Signal Preemption | YES |
| | 2-9 Improved Transit Performance | YES |
| | 2-10 Transit Fare Reductions Plan/Reduced Rate of Fare | YES |
| | 2-11 Transit Information Systems | YES |
| | **Bicycle and Pedestrian Modes** | |
| | 2-12 Improved/Expanded Bicycle Network | YES |
| | 2-13 Bicycle Storage Systems | YES |
| | 2-14 Improved/Expanded Pedestrian Network | YES |
| Strategy #3 Shift Trips from SOV to HOV | **High Occupancy Vehicles (HOV)** | |
| | 3-1 Add HOV Lanes | - |
| | 3-2 HOV Toll Savings | - |
| | **Transportation Demand Management (TDM)** | |
| | 3-3 Rideshare Matching Services | IN USE |
| | 3-4 Vanpool/Employer Shuttle Program | IN USE |
| | 3-5 Trip Reduction Program | IN USE |
| | 3-6 Parking Management | IN USE |
| Strategy #4 Improve Roadway Operations | **Traffic Operational Improvements** | |
| | 4-1 Geometric Improvements | YES |
| | 4-2 Intersection Turn Restrictions | IN USE |
| | 4-3 Intersection Signalization Improvements | YES |
| | 4-4 Coordinated Intersections Signals | IN USE |
| | 4-5 Roadway Environment | YES |
| | 4-6 Intelligent Transportation Systems/Smart Traffic Centers (ITS) | IN USE |
| | 4-7 Reversible Lanes | - |
| | 4-8 Freight Policies and Improvements | - |
| | 4-9 Incident Management, Detection, Response & Clearance | YES |
| | 4-10 Construction Management | IN USE |
| | 4-11 Elimination of Bottlenecks | YES |
| | 4-12 Ramp Metering | - |
| | 4-13 Access Control and Connectivity | YES |
| | 4-14 Median Control | IN USE |
| Strategy #5 Add Capacity | **Addition of General Purpose Lanes** | |
| | 5-1 Freeway Lanes | - |
| | 5-2 Arterial lanes | YES |
| | 5-3 Interchanges | YES |
| | 5-4 Improve Alternate Routes | YES |

## CMP CONGESTED CORRIDOR - ARTERIAL #6
### Independence Blvd
Between Holland Rd and Jeanne St

### OBSERVATIONS & POSSIBLE CAUSES OF CONGESTION

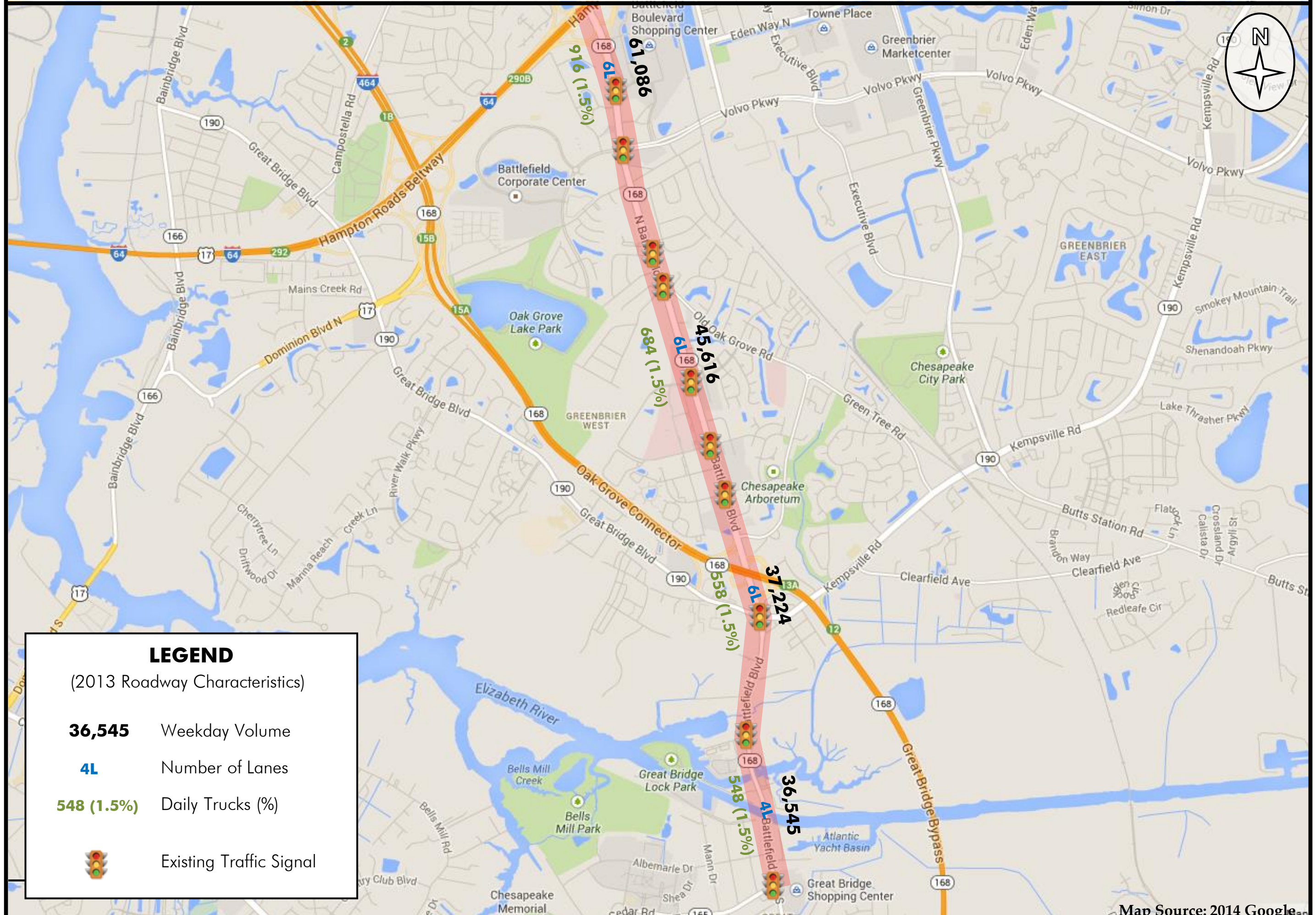
- The I-264/Independence Blvd interchange configuration is inadequate for existing traffic conditions. Issues include a short weaving area on NB Independence Blvd between I-264 and Bonney Road and a short merging area on SB Independence Blvd at the I-264 WB off-ramp.
- Traffic backs up on NB Independence Boulevard from Bonney Road back onto the I-264 ramps during the PM Peak Period. Traffic also backs up on the I-264 EB ramp to SB Independence Blvd.
- Traffic volumes are heavy in this corridor during the PM Peak Hour (3,709-4,196 vehicles in peak the direction on Independence Boulevard)
- The Virginia Beach Blvd, Columbus St, Bonney Rd, and Baxter Rd intersections are congested during the PM Peak Period.
- Traffic is congested on NB Independence Blvd from Holland Rd to Bonney Rd during the AM Peak Period.
- High directional distribution of traffic between I-264 and Holland Rd during AM peak (61% NB) and PM peak (62% SB).
- Signals are closely spaced between Bonney Rd and Virginia Beach Blvd.

### POTENTIAL CONGESTION MITIGATION STRATEGIES

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor, e.g. the current HRT Virginia Beach Transit Extension Study.
- Ensure coordination of signals in the corridor, especially between the closely spaced signals from Bonney Rd to Virginia Beach Blvd.
- Improve the interchange of I-264 and Independence Boulevard to add capacity, improve safety, and reduce weaving movements. Possible improvements would include Single Point Urban Interchange and Diverging Diamond Interchange designs.
- Improve alternate routes, such as an overpass of I-264 in the Constitution Dr/Edwin Dr corridor.

# CMP CONGESTED CORRIDOR - ARTERIAL #7

## Battlefield Blvd Between Cedar Rd and I-64
## City of Chesapeake




### CORRIDOR SUMMARY

| | |
|---|---|
| **Corridor Length** | 4.01 Miles |
| **Speed Limit** | 35-45 mph |
| **Roadway Class** | Principal/Minor Arterial |
| **Transit Service** | HRT Bus Route 14 |
| **Highest CMP Segment Score** | 62 – Southbound from Great Bridge Blvd/ Kempsville Rd to Cedar Rd during the PM Peak |

### RECENT PROJECTS

- Intersection/signal improvements at Battlefield Blvd/Volvo Pkwy (completed in 2013)
- Changeable message signs were installed on Battlefield Blvd, Great Bridge Blvd, and Kempsville Rd to alert motorists to Great Bridge Bridge openings

### FUTURE PROJECTS

- None

| FACILITY NAME | SEGMENT FROM | SEGMENT TO | Length (Mi) | Northbound (2013) SLOWEST SPEED (mph) AM | PM | HIGHEST TRAVEL TIME INDEX AM | PM | HIGHEST PICA AM | PM | HIGHEST PLANNING TIME INDEX AM | PM | # CONG 15-MIN INTRVLS AM | PM | TOTAL DELAY (Hrs/Mi) AM | PM | CONG LEVEL AM | PM | Southbound (2013) SLOWEST SPEED (mph) AM | PM | HIGHEST TRAVEL TIME INDEX AM | PM | HIGHEST PICA AM | PM | HIGHEST PLANNING TIME INDEX AM | PM | # CONG 15-MIN INTRVLS AM | PM | TOTAL DELAY (Hrs/Mi) AM | PM | CONG LEVEL AM | PM | Both Directions # LANES 2013 | 2034 | 2034 PROJ VOL | 20-YR PROJ TRUCK DELAY (Hrs/Mi) | 2034 PM CONG LEVEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BATTLEFIELD BLVD | CEDAR RD | GREAT BRIDGE BLVD/KEMPSVILLE RD | 1.20 | 27 | 32 | 1.38 | 1.19 | 0.25 | 0.03 | 2.23 | 1.45 | 0 | 0 | 18 | 16 | MOD | LOW | 31 | 21 | 1.18 | 1.74 | 0.06 | 0.51 | 1.38 | 2.73 | 0 | 9 | 7 | 88 | LOW | SEV | 4 | 4 | 62,000 | 13.2 | SEV |
| BATTLEFIELD BLVD | GREAT BRIDGE BLVD/KEMPSVILLE RD | GREAT BRIDGE BYPASS | 0.19 | 35 | 36 | 1.11 | 1.08 | 0.00 | -0.06 | 1.35 | 1.26 | 0 | 0 | 10 | 10 | LOW | LOW | 31 | 28 | 1.29 | 1.41 | 0.22 | 0.26 | 1.82 | 1.87 | 0 | 1 | 7 | 41 | MOD | SEV | 6 | 6 | 65,000 | 3.8 | SEV |
| BATTLEFIELD BLVD | GREAT BRIDGE BYPASS | VOLVO PKWY | 1.97 | 35 | 34 | 1.09 | 1.15 | -0.02 | 0.02 | 1.32 | 1.36 | 0 | 0 | 4 | 13 | LOW | LOW | 38 | 31 | 1.09 | 1.33 | -0.01 | 0.14 | 1.25 | 2.06 | 0 | 0 | 4 | 43 | LOW | MOD | 6 | 6 | 71,000 | 1.5 | SEV |
| BATTLEFIELD BLVD | VOLVO PKWY | I-64 | 0.65 | 33 | 35 | 1.23 | 1.14 | 0.09 | -0.03 | 1.52 | 1.37 | 0 | 0 | 18 | 23 | LOW | LOW | 27 | 23 | 1.25 | 1.48 | 0.09 | 0.28 | 1.74 | 2.24 | 0 | 8 | 32 | 103 | MOD | SEV | 6 | 6 | 75,000 | 8.9 | SEV |

| Strategy | | Congestion Management Strategies | Applicable Strategy? |
|---|---|---|---|
| Strategy #1 | Eliminate Person Trips or Reduce VMT | **Growth Management/Activity Centers** | |
| | | 1-1 Land Use Policies/Regulations | IN USE |
| | | **Congestion/Value Pricing** | |
| | | 1-2 Road User Fees/High Occupancy Toll (HOT) Lanes | - |
| | | 1-3 Parking Fees | - |
| | | **Transportation Demand Management (TDM)** | |
| | | 1-4 Telecommuting | IN USE |
| | | 1-5 Employee Flextime Benefits/Compressed Work Week | IN USE |
| Strategy #2 | Shift Trips from Auto to Other Modes | **Public Transit Capital Improvements** | |
| | | 2-1 Exclusive Right-of-Way - New Rail Service | - |
| | | 2-2 Exclusive Right-of-Way - New Bus Facilities | - |
| | | 2-3 Ferry Services | - |
| | | 2-4 Fleet Expansion | YES |
| | | 2-5 Improved Intermodal Connections | - |
| | | 2-6 Improved/Increased Park & Ride Facilities & Capital Improvements | YES |
| | | **Public Transit Operational Improvements** | |
| | | 2-7 Service Expansion | YES |
| | | 2-8 Traffic Signal Preemption | YES |
| | | 2-9 Improved Transit Performance | YES |
| | | 2-10 Transit Fare Reductions Plan/Reduced Rate of Fare | YES |
| | | 2-11 Transit Information Systems | YES |
| | | **Bicycle and Pedestrian Modes** | |
| | | 2-12 Improved/Expanded Bicycle Network | YES |
| | | 2-13 Bicycle Storage Systems | YES |
| | | 2-14 Improved/Expanded Pedestrian Network | YES |
| Strategy #3 | Shift Trips from SOV to HOV | **High Occupancy Vehicles (HOV)** | |
| | | 3-1 Add HOV Lanes | - |
| | | 3-2 HOV Toll Savings | - |
| | | **Transportation Demand Management (TDM)** | |
| | | 3-3 Rideshare Matching Services | IN USE |
| | | 3-4 Vanpool/Employer Shuttle Program | IN USE |
| | | 3-5 Trip Reduction Program | IN USE |
| | | 3-6 Parking Management | IN USE |
| Strategy #4 | Improve Roadway Operations | **Traffic Operational Improvements** | |
| | | 4-1 Geometric Improvements | YES |
| | | 4-2 Intersection Turn Restrictions | YES |
| | | 4-3 Intersection Signalization Improvements | YES |
| | | 4-4 Coordinated Intersections Signals | YES |
| | | 4-5 Roadway Environment | YES |
| | | 4-6 Intelligent Transportation Systems/Smart Traffic Centers (ITS) | IN USE |
| | | 4-7 Reversible Lanes | - |
| | | 4-8 Freight Policies and Improvements | - |
| | | 4-9 Incident Management, Detection, Response & Clearance | YES |
| | | 4-10 Construction Management | IN USE |
| | | 4-11 Elimination of Bottlenecks | YES |
| | | 4-12 Ramp Metering | - |
| | | 4-13 Access Control and Connectivity | YES |
| | | 4-14 Median Control | PARTIAL |
| Strategy #5 | Add Capacity | **Addition of General Purpose Lanes** | |
| | | 5-1 Freeway Lanes | - |
| | | 5-2 Arterial lanes | YES |
| | | 5-3 Interchanges | YES |
| | | 5-4 Improve Alternate Routes | YES |

## CMP CONGESTED CORRIDOR - ARTERIAL #7

**Battlefield Blvd**

Between Cedar Rd and I-64

### OBSERVATIONS & POSSIBLE CAUSES OF CONGESTION

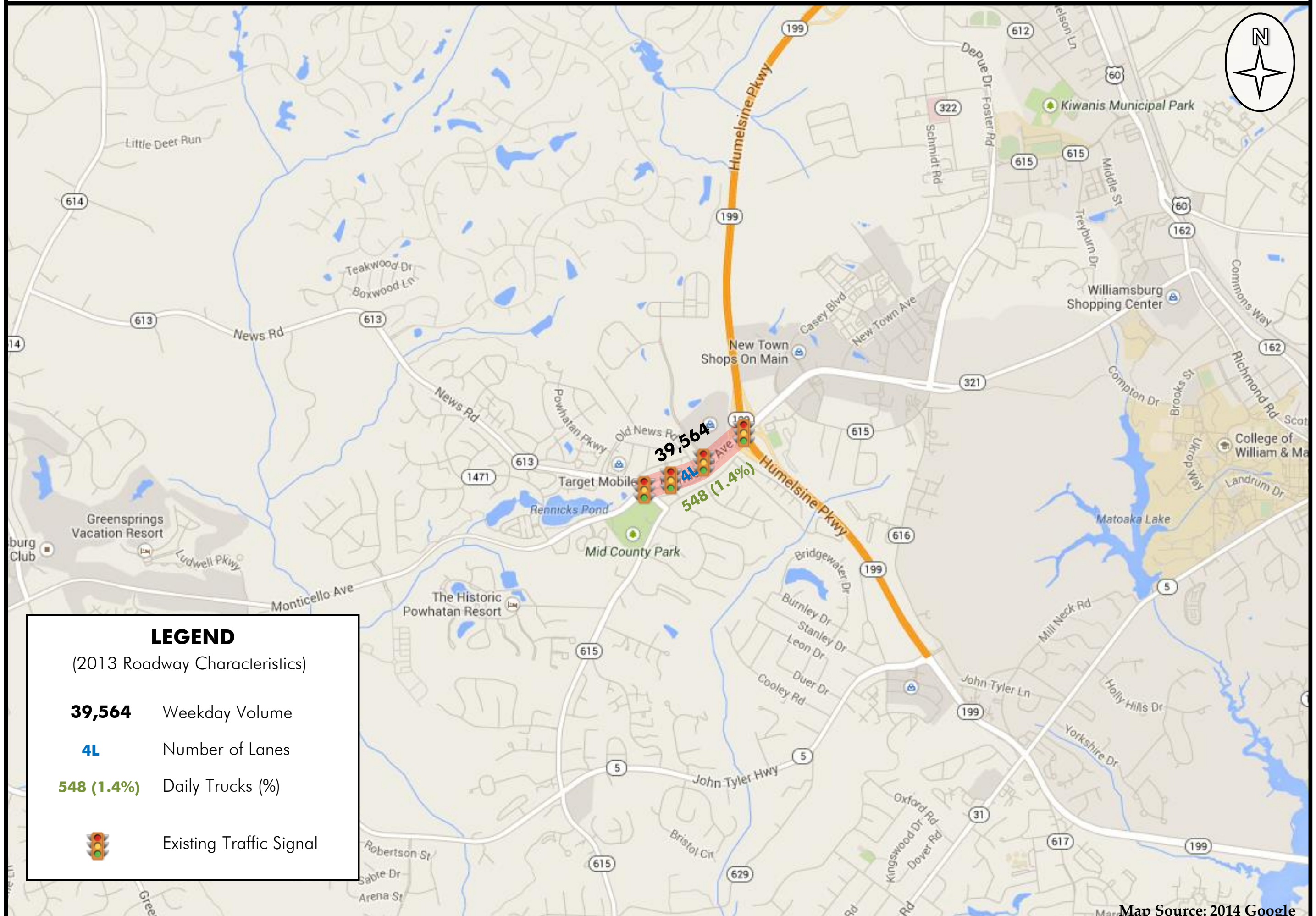
- Heavy SB traffic during PM peak (I-64 to Volvo Pkwy, Knell's Ridge Blvd to Great Bridge Bypass, Kempsville Rd to Cedar Rd), particularly when the High Rise Bridge is congested.
- High directional distribution of volumes between Volvo Pkwy and Cedar Rd during the AM peak (61-76% NB) and the PM peak (61-66% SB).
- Heavy traffic at Volvo Pkwy, Great Bridge Rd/Kempsville Rd, and Cedar Rd intersections.
- Long traffic queues along NB Battlefield Blvd at Kempsville Rd during the PM Peak Period.
- Long traffic queues along SB Battlefield Blvd at Wal-Mart Way and at Cedar Rd (particularly in the through/right-turn lane) during the PM Peak Period. There is no dedicated SB right turn lane from Battlefield Blvd to Cedar Rd.
- EB vehicles on Albemarle Dr are restricted to right-turn only at Battlefield Blvd. Many vehicles turn right into the two-way left-turn lane and then make unsafe U-turns near Causeway Dr toward NB Battlefield Blvd.
- Left-turns are difficult during congested periods for WB Causeway Dr and nearby businesses.
- Existing two-way left-turn lane in Great Bridge encourages random access and potentially unsafe turn movements/conflict points during congested periods.
- Inadequate storage capacity for SB Battlefield Blvd left-turns at Oak Grove Rd during PM peak.
- Cedar Rd/Great Bridge Shopping Center approaches operate as split phase for the existing signal.
- Traffic is impacted by openings of the Great Bridge Bridge, which opens on the hour from 6:00 am – 7:00 pm and on demand at all other times.

### POTENTIAL CONGESTION MITIGATION STRATEGIES

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor.
- Add an exclusive right-turn lane on the SB Battlefield Blvd approach at the Cedar Rd intersection.
- Add an additional exit lane for the Great Bridge Shopping Center at Cedar Rd/Battlefield Blvd signalized intersection and redesignate lanes to dual left-turns, one through, and one right-turn (and retime signal).
- Ensure coordination of signals in the corridor.
- Implement rush hour restrictions for Great Bridge Bridge lifts, similar to those in place on other bridges.
- Remove two-way left-turn lane and construct a raised-curb median with openings and channelized left-turn bays at strategic locations along the entire length of Battlefield Blvd south of Great Bridge Blvd/Kempsville Rd. (Note: This will likely increase congestion but also improve safety.)
- Consider redesigning the Great Bridge Blvd/Kempsville Rd and Battlefield Blvd intersection to increase capacity by adding additional left-turn and through lanes on the EB Great Bridge Blvd approach at the Battlefield Blvd intersection, and adding a 3rd through lane on NB Battlefield Blvd from south of Great Bridge Blvd/Kempsville Rd intersection to Old Oak Grove Rd/Great Bridge Bypass off-ramp.
- Consider increasing capacity of the intersection of Volvo Pkwy and Battlefield Blvd. This could include triple left-turn lanes from both approaches of Volvo Pkwy to Battlefield Blvd.
- Extend right-turn lane along NB Battlefield Blvd from Coastal Way to the right-turn lane at Wal Mart Way.
- Perform signal warrant analysis at the Albemarle Dr intersection.

# CMP CONGESTED CORRIDOR - ARTERIAL #9

## Monticello Ave Between News Rd and Route 199
## James City County




### CORRIDOR SUMMARY

| | |
|---|---|
| **Corridor Length** | 0.57 Miles |
| **Speed Limit** | 45 mph |
| **Roadway Class** | Minor Arterial |
| **Transit Service** | WAT Red Line – South Williamsburg |
| **Highest CMP Segment Score** | 58 – PM Peak (Between News Rd and Route 199) |

### RECENT PROJECTS

- None

### FUTURE PROJECTS

FY 2015 SYIP/TIP Intersection Improvements

- Additional turn lanes and pedestrian improvements at the intersections of Monticello Ave/Old News Rd, Monticello Ave/News Rd, and News Rd/Ironbound Rd (UPC #82961 - Construction expected to begin in 2014)

| FACILITY NAME | SEGMENT FROM | SEGMENT TO | Length (Mi) | Eastbound (2013) SLOWEST SPEED (mph) AM | PM | HIGHEST TRAVEL TIME INDEX AM | PM | HIGHEST PICA AM | PM | HIGHEST PLANNING TIME INDEX AM | PM | # CONG 15-MIN INTRVLS AM | PM | TOTAL DELAY (Hrs/Mi) AM | PM | CONG LEVEL AM | PM | Westbound (2013) SLOWEST SPEED (mph) AM | PM | HIGHEST TRAVEL TIME INDEX AM | PM | HIGHEST PICA AM | PM | HIGHEST PLANNING TIME INDEX AM | PM | # CONG 15-MIN INTRVLS AM | PM | TOTAL DELAY (Hrs/Mi) AM | PM | CONG LEVEL AM | PM | Both Directions # LANES 2013 | 2034 | 2034 PROJ VOL | 20-YR PROJ TRUCK DELAY (Hrs/Mi) | 2034 PM CONG LEVEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTICELLO AVE | NEWS RD | ROUTE 199 | 0.57 | - | - | - | - | - | - | - | - | - | - | - | - | MOD | SEV | - | - | - | - | - | - | - | - | - | - | - | - | MOD | SEV | 4 | 4 | 45,000 | 13.4 | SEV |

| | Congestion Management Strategies | Applicable Strategy? |
|---|---|---|
| Strategy #1 Eliminate Person Trips or Reduce VMT | **Growth Management/Activity Centers** | |
| | 1-1 Land Use Policies/Regulations | IN USE |
| | **Congestion/Value Pricing** | |
| | 1-2 Road User Fees/High Occupancy Toll (HOT) Lanes | - |
| | 1-3 Parking Fees | - |
| | **Transportation Demand Management (TDM)** | |
| | 1-4 Telecommuting | IN USE |
| | 1-5 Employee Flextime Benefits/Compressed Work Week | IN USE |
| Strategy #2 Shift Trips from Auto to Other Modes | **Public Transit Capital Improvements** | |
| | 2-1 Exclusive Right-of-Way - New Rail Service | - |
| | 2-2 Exclusive Right-of-Way - New Bus Facilities | - |
| | 2-3 Ferry Services | - |
| | 2-4 Fleet Expansion | YES |
| | 2-5 Improved Intermodal Connections | - |
| | 2-6 Improved/Increased Park & Ride Facilities & Capital Improvements | YES |
| | **Public Transit Operational Improvements** | |
| | 2-7 Service Expansion | YES |
| | 2-8 Traffic Signal Preemption | YES |
| | 2-9 Improved Transit Performance | YES |
| | 2-10 Transit Fare Reductions Plan/Reduced Rate of Fare | YES |
| | 2-11 Transit Information Systems | YES |
| | **Bicycle and Pedestrian Modes** | |
| | 2-12 Improved/Expanded Bicycle Network | IN USE |
| | 2-13 Bicycle Storage Systems | YES |
| | 2-14 Improved/Expanded Pedestrian Network | YES |
| Strategy #3 Shift Trips from SOV to HOV | **High Occupancy Vehicle (HOV)** | |
| | 3-1 Add HOV Lanes | - |
| | 3-2 HOV Toll Savings | - |
| | **Transportation Demand Management (TDM)** | |
| | 3-3 Rideshare Matching Services | IN USE |
| | 3-4 Vanpool/Employer Shuttle Program | IN USE |
| | 3-5 Trip Reduction Program | IN USE |
| | 3-6 Parking Management | IN USE |
| Strategy #4 Improve Roadway Operations | **Traffic Operational Improvements** | |
| | 4-1 Geometric Improvements | YES |
| | 4-2 Intersection Turn Restrictions | IN USE |
| | 4-3 Intersection Signalization Improvements | YES |
| | 4-4 Coordinated Intersections Signals | YES |
| | 4-5 Roadway Environment | YES |
| | 4-6 Intelligent Transportation Systems/Smart Traffic Centers (ITS) | IN USE |
| | 4-7 Reversible Lanes | YES |
| | 4-8 Freight Policies and Improvements | - |
| | 4-9 Incident Management, Detection, Response & Clearance | YES |
| | 4-10 Construction Management | YES |
| | 4-11 Elimination of Bottlenecks | - |
| | 4-12 Ramp Metering | - |
| | 4-13 Access Control and Connectivity | IN USE |
| | 4-14 Median Control | IN USE |
| Strategy #5 Add Capacity | **Addition of General Purpose Lanes** | |
| | 5-1 Freeway Lanes | - |
| | 5-2 Arterial lanes | YES |
| | 5-3 Interchanges | - |
| | 5-4 Improve Alternate Routes | YES |

# CMP CONGESTED CORRIDOR - ARTERIAL #9

## Monticello Ave

Between News Rd and Route 199

### OBSERVATIONS & POSSIBLE CAUSES OF CONGESTION

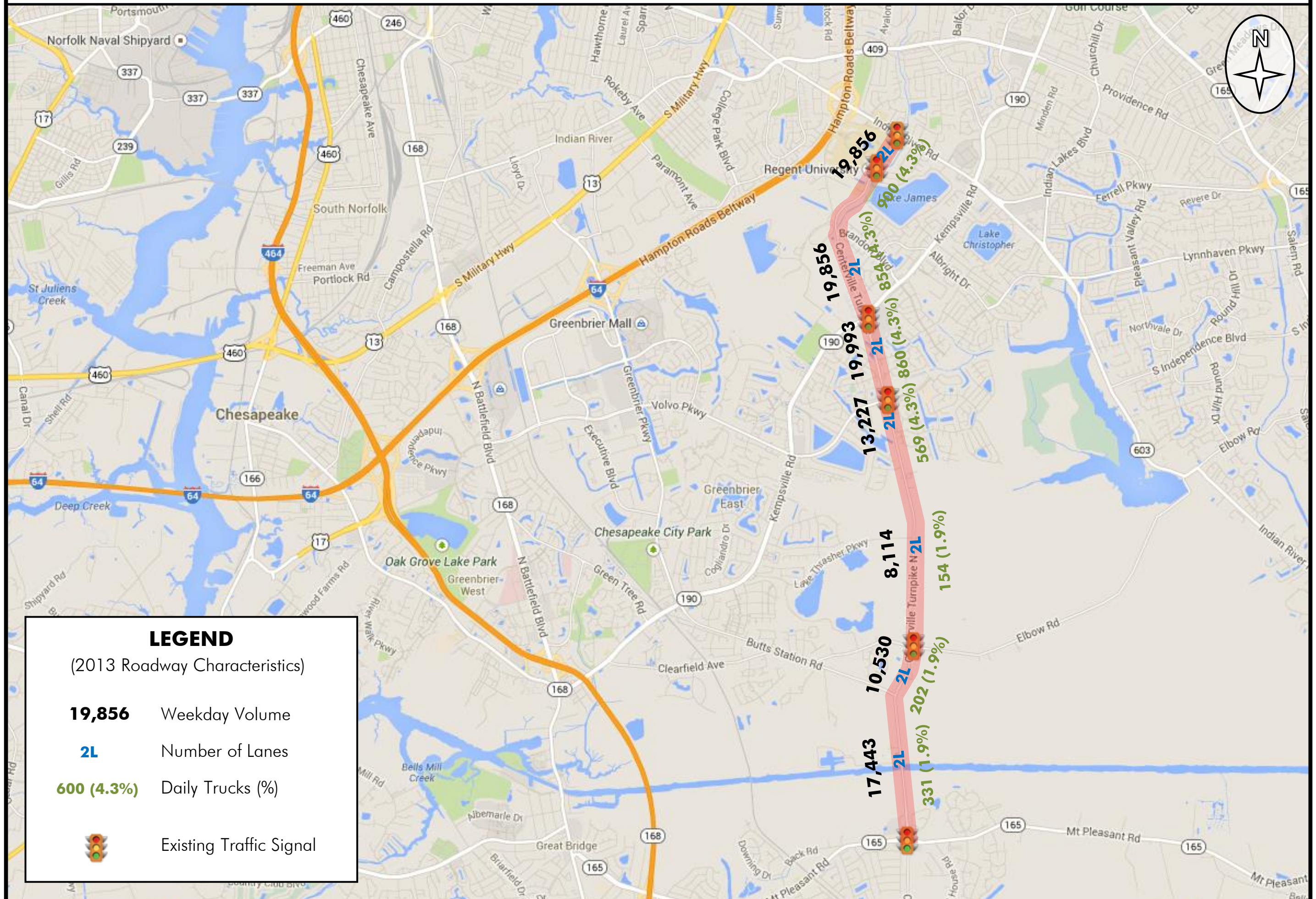
- Heavy commercial development along, and to the east of, the corridor.
- High directional distribution of traffic on Monticello Ave between News Rd and Route 199 during the AM Peak Hour (65% EB) and the PM Peak Hour (59% WB).
- Heavy PM Peak Hour volume in WB direction from Route 199 to News Rd (2,035 vehicles).
- Heavy traffic at the Monticello Ave/News Rd and Monticello Ave/Monticello Marketplace intersections during the PM Peak Period.
- Left-turning vehicles from WB Monticello Ave to SB News Rd back up beyond the turn bay into the through lanes back to the Monticello Marketplace entrance.
- Signals are closely spaced between News Rd and Windsormeade Way.
- Weaving is an issue on WB Monticello Ave between Route 199 and Windsormeade Way.
- No U-turns are allowed along Monticello Ave west of News Rd.
- There are no crosswalks or pedestrian pushbuttons at the intersection of Monticello Ave and News Rd, in spite of sidewalks in the area and the Mid County Park on the southwest corner.

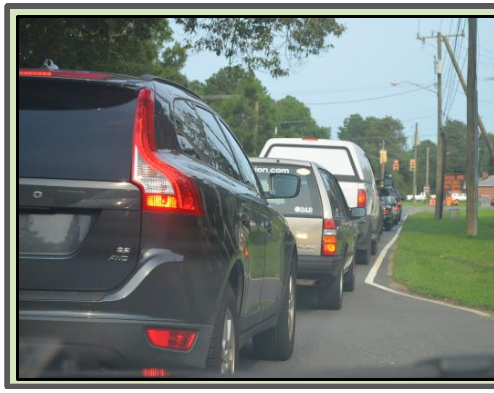
### POTENTIAL CONGESTION MITIGATION STRATEGIES

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor. Active transportation strategies and safety in the corridor will be addressed in an upcoming VDOT study.
- Improve the movement between Monticello Ave and Ironbound Rd via News Rd by constructing new turn lanes as included in the programmed project (UPC #82961).
- Evaluate and consider constructing an additional exit lane for Monticello Marketplace at Monticello Ave signalized intersection and redesignate exit lanes to dual left-turns and one through/right-turn lane.
- Ensure coordination of signals in the corridor. This can be done through a Special Use Permit completed with the developer of the Courthouse Commons Shopping Center. This would also be assisted with the future installation of the Insync system, which VDOT anticiapates happening within the next 6 months to a year.
- Continue existing access management strategies in this corridor for future developments.
- Consider improving connections between developments so traffic does not have to use Monticello Ave.

# CMP CONGESTED CORRIDOR - ARTERIAL #10

## Centerville Turnpike Between Mount Pleasant Rd and Indian River Rd
## Cities of Chesapeake and Virginia Beach



### CORRIDOR SUMMARY

| | |
|---|---|
| **Corridor Length** | 6.08 Miles |
| **Speed Limit** | 40-45 mph |
| **Roadway Class** | Minor Arterial |
| **Transit Service** | None |
| **Highest CMP Segment Score** | 58 – PM Peak (Between Jake Sears Rd and Kempsville Rd) |

### RECENT PROJECTS

- None

### FUTURE PROJECTS

FY 2015 SYIP/TIP Projects

- Widen Centerville Turnpike to 6 lanes between Kempsville Road and Indian River Road (UPC #103005 – Construction expected to begin in 2016)

2034 LRTP Projects

- Centerville Turnpike between Chesapeake CL and Kempsville Road (widen to 4 lanes)

| | | | | Northbound (2013) | | | | | | | | | | | | | | Southbound (2013) | | | | | | | | | | | | | | Both Directions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | SLOWEST SPEED (mph) | | HIGHEST TRAVEL TIME INDEX | | HIGHEST PICA | | HIGHEST PLANNING TIME INDEX | | # CONG 15-MIN INTRVLS | | TOTAL DELAY (Hrs/Mi) | | CONG LEVEL | | SLOWEST SPEED (mph) | | HIGHEST TRAVEL TIME INDEX | | HIGHEST PICA | | HIGHEST PLANNING TIME INDEX | | # CONG 15-MIN INTRVLS | | TOTAL DELAY (Hrs/Mi) | | CONG LEVEL | | # LANES | | 2034 PROJ VOL | 20-YR PROJ TRUCK DELAY (Hrs/Mi) | 2034 PM CONG LEVEL |
| FACILITY NAME | SEGMENT FROM | SEGMENT TO | Length (Mi) | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | 2013 | 2034 | | | |
| CENTERVILLE TNPK | MT PLEASANT RD | BUTTS STATION RD | 1.27 | - | - | - | - | - | - | - | - | - | - | - | - | SEV | SEV | - | - | - | - | - | - | - | - | - | - | - | - | SEV | SEV | 2 | 2 | 21,000 | 6.9 | SEV |
| CENTERVILLE TNPK | BUTTS STATION RD | ELBOW RD | 0.45 | - | - | - | - | - | - | - | - | - | - | - | - | MOD | MOD | - | - | - | - | - | - | - | - | - | - | - | - | MOD | MOD | 2 | 2 | 13,000 | 3.5 | SEV |
| CENTERVILLE TNPK | ELBOW RD | VA BEACH CL | 1.40 | - | - | - | - | - | - | - | - | - | - | - | - | LOW | LOW | - | - | - | - | - | - | - | - | - | - | - | - | LOW | LOW | 2 | 2 | 23,000 | 2.0 | SEV |
| CENTERVILLE TNPK | CHESAPEAKE CL | LYNNHAVEN PKWY | 0.38 | - | - | - | - | - | - | - | - | - | - | - | - | LOW | LOW | - | - | - | - | - | - | - | - | - | - | - | - | LOW | LOW | 2 | 4 | 23,000 | 2.7 | LOW |
| CENTERVILLE TNPK | LYNNHAVEN PKWY | KEMPSVILLE RD | 0.75 | - | - | - | - | - | - | - | - | - | - | - | - | SEV | SEV | - | - | - | - | - | - | - | - | - | - | - | - | SEV | SEV | 2 | 4 | 23,000 | 2.5 | LOW |
| CENTERVILLE TNPK | KEMPSVILLE RD | JAKE SEARS RD | 0.88 | - | - | - | - | - | - | - | - | - | - | - | - | SEV | SEV | - | - | - | - | - | - | - | - | - | - | - | - | SEV | SEV | 2 | 6 | 42,000 | 0.6 | SEV |
| CENTERVILLE TNPK | JAKE SEARS RD | INDIAN RIVER RD | 0.95 | - | - | - | - | - | - | - | - | - | - | - | - | MOD | SEV | - | - | - | - | - | - | - | - | - | - | - | - | MOD | SEV | 2 | 6 | 44,000 | 4.7 | MOD |

| | Congestion Management Strategies | Applicable Strategy? |
|---|---|---|
| Strategy #1 Eliminate Person Trips or Reduce VMT | **Growth Management/Activity Centers** | |
| | 1-1 Land Use Policies/Regulations | IN USE |
| | **Congestion/Value Pricing** | |
| | 1-2 Road User Fees/High Occupancy Toll (HOT) Lanes | - |
| | 1-3 Parking Fees | - |
| | **Transportation Demand Management (TDM)** | |
| | 1-4 Telecommuting | IN USE |
| | 1-5 Employee Flextime Benefits/Compressed Work Week | IN USE |
| Strategy #2 Shift Trips from Auto to Other Modes | **Public Transit Capital Improvements** | |
| | 2-1 Exclusive Right-of-Way - New Rail Service | - |
| | 2-2 Exclusive Right-of-Way - New Bus Facilities | - |
| | 2-3 Ferry Services | - |
| | 2-4 Fleet Expansion | YES |
| | 2-5 Improved Intermodal Connections | - |
| | 2-6 Improved/Increased Park & Ride Facilities & Capital Improvements | YES |
| | **Public Transit Operational Improvements** | |
| | 2-7 Service Expansion | YES |
| | 2-8 Traffic Signal Preemption | YES |
| | 2-9 Improved Transit Performance | YES |
| | 2-10 Transit Fare Reductions Plan/Reduced Rate of Fare | YES |
| | 2-11 Transit Information Systems | YES |
| | **Bicycle and Pedestrian Modes** | |
| | 2-12 Improved/Expanded Bicycle Network | YES |
| | 2-13 Bicycle Storage Systems | YES |
| | 2-14 Improved/Expanded Pedestrian Network | YES |
| Strategy #3 Shift Trips from SOV to HOV | **High Occupancy Vehicles (HOV)** | |
| | 3-1 Add HOV Lanes | - |
| | 3-2 HOV Toll Savings | - |
| | **Transportation Demand Management (TDM)** | |
| | 3-3 Rideshare Matching Services | IN USE |
| | 3-4 Vanpool/Employer Shuttle Program | IN USE |
| | 3-5 Trip Reduction Program | IN USE |
| | 3-6 Parking Management | IN USE |
| Strategy #4 Improve Roadway Operations | **Traffic Operational Improvements** | |
| | 4-1 Geometric Improvements | YES |
| | 4-2 Intersection Turn Restrictions | YES |
| | 4-3 Intersection Signalization Improvements | YES |
| | 4-4 Coordinated Intersections Signals | YES |
| | 4-5 Roadway Environment | YES |
| | 4-6 Intelligent Transportation Systems/Smart Traffic Centers (ITS) | IN USE |
| | 4-7 Reversible Lanes | - |
| | 4-8 Freight Policies and Improvements | - |
| | 4-9 Incident Management, Detection, Response & Clearance | YES |
| | 4-10 Construction Management | IN USE |
| | 4-11 Elimination of Bottlenecks | - |
| | 4-12 Ramp Metering | - |
| | 4-13 Access Control and Connectivity | YES |
| | 4-14 Median Control | YES |
| Strategy #5 Add Capacity | **Addition of General Purpose Lanes** | |
| | 5-1 Freeway Lanes | - |
| | 5-2 Arterial lanes | YES |
| | 5-3 Interchanges | - |
| | 5-4 Improve Alternate Routes | YES |

## CMP CONGESTED CORRIDOR - ARTERIAL #10

### Centerville Turnpike

Between Mount Pleasant Rd and Indian River Rd

### OBSERVATIONS & POSSIBLE CAUSES OF CONGESTION

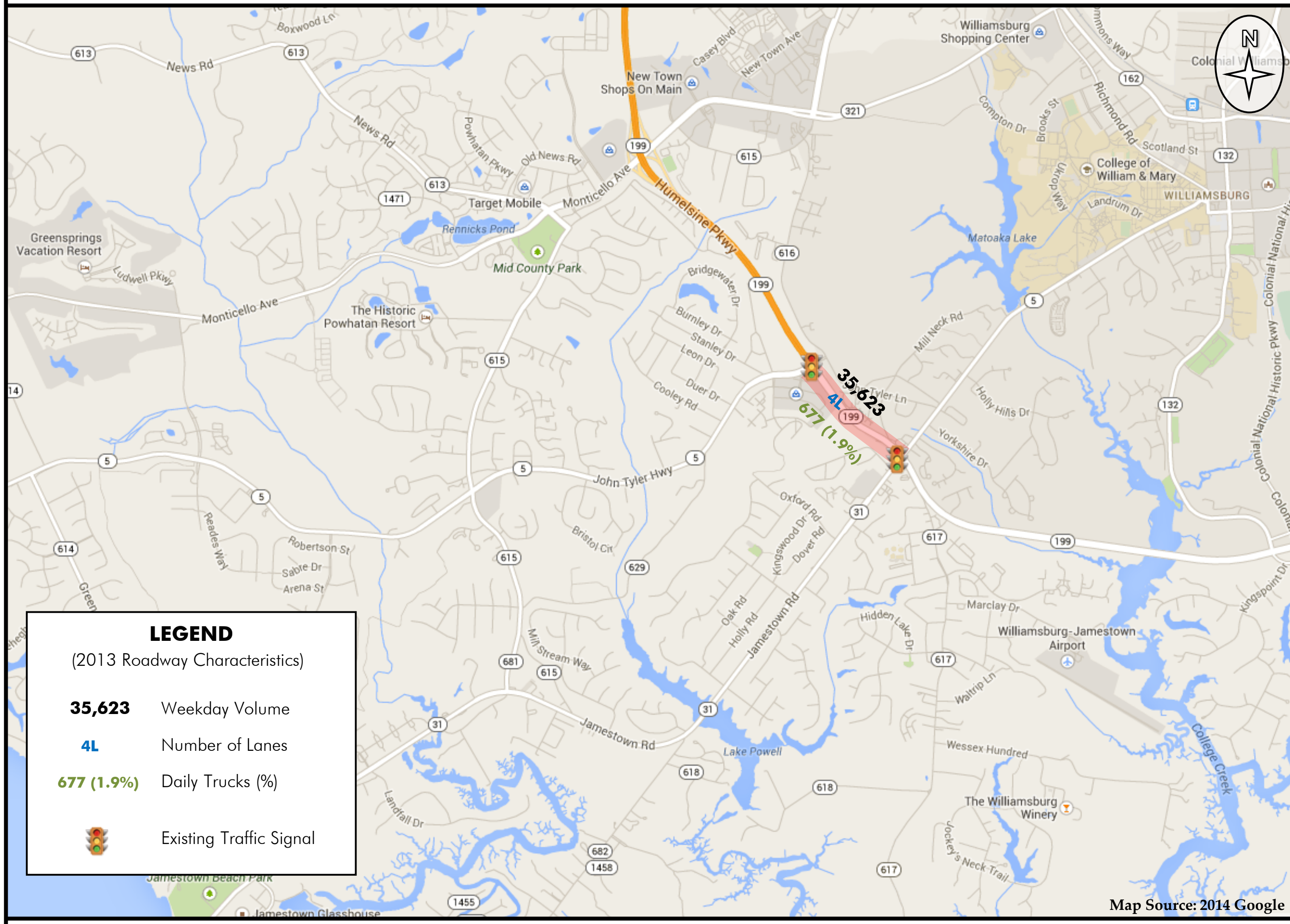
- Centerville Tpke is only 2 lanes wide, which greatly reduces the capacity of the corridor.
- Traffic is impacted by openings of the Centerville Turnpike Bridge. Bridge openings are restricted from 6:30 am – 8:30 am and 4:00 pm – 6:00 pm. The bridge opens to marine traffic on the hour and half hour from 8:30 am – 4:00 pm and on demand at all other times.
- Heavy truck volumes in Virginia Beach (4.3%).
- There are heavy traffic volumes at signalized intersections (Mount Pleasant Rd, Elbow Rd, Kempsville Rd, and Indian River Rd) during AM and PM Peak Periods.
- Long traffic queues for NB approach of Centerville Tpke at Mt Pleasant Rd during the AM Peak Period.
- There are backups on WB Elbow Rd at Centerville Tpke during the AM Peak Period.
- There are backups on EB Butts Station Rd at the Centerville Tpke intersection during the PM Peak Period.
- There are no turn lanes for EB and WB Elbow Rd at the Centerville Turnpike intersection.
- Right-turning vehicles along SB Centerville Tpke at the Kempsville Rd intersection back up into the through lanes during the PM Peak Period.

### POTENTIAL CONGESTION MITIGATION STRATEGIES

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor. Add HRT Bus service route along corridor if demand is warranted.
- Add capacity to the intersection of Centerville Tpke and Mt Pleasant Rd:
  - Add a second NB lane along Centerville Tpke for approximately 1,800 feet to the north of Mt Pleasant Rd.
  - Add an additional left-turn lane on the EB Mt Pleasant Rd approach at the Centerville Turnpike intersection.
  - Add an additional through lane for the NB Centerville Turnpike approach at the Mt Pleasant Rd intersection.
- Add capacity to the intersection of Centerville Tpke and Elbow Rd by constructing left-turn lanes for EB and WB approaches for Elbow Rd or consider adding a roundabout.
- Perform a signal warrant analysis at the Butts Station Rd intersection and consider constructing a roundabout.
- Implement the programmed widening project (UPC #103005) from 2 to 6 lanes from Indian River Rd to Kempsville Rd and the planned widening project from 2 to 4 lanes from Kempsville Rd to the Chesapeake city line.
- Consider widening Centerville Tpke from 2 to 4 lanes in Chesapeake.

# CMP CONGESTED CORRIDOR - ARTERIAL #11

## Route 199 Between John Tyler Hwy (Route 5) and Jamestown Rd
## James City County and City of Williamsburg




### CORRIDOR SUMMARY

| | |
|---|---|
| **Corridor Length** | 0.47 Miles |
| **Speed Limit** | 45 mph |
| **Roadway Class** | Principal Arterial |
| **Transit Service** | WAT Red Line – South Williamsburg |
| **Highest CMP Segment Score** | 56 – Southeastbound from John Tyler Hwy to Jamestown Rd during the PM Peak |

### RECENT PROJECTS

- Upgraded signal and installed second left-turn lane on Westbound Route 199 at John Tyler Highway (completed in 2013)

### FUTURE PROJECTS

- None

| FACILITY NAME | SEGMENT FROM | SEGMENT TO | Length (Mi) | Eastbound (2013) SLOWEST SPEED (mph) AM | PM | HIGHEST TRAVEL TIME INDEX AM | PM | HIGHEST PICA AM | PM | HIGHEST PLANNING TIME INDEX AM | PM | # CONG 15-MIN INTRVLS AM | PM | TOTAL DELAY (Hrs/Mi) AM | PM | CONG LEVEL AM | PM | Westbound (2013) SLOWEST SPEED (mph) AM | PM | HIGHEST TRAVEL TIME INDEX AM | PM | HIGHEST PICA AM | PM | HIGHEST PLANNING TIME INDEX AM | PM | # CONG 15-MIN INTRVLS AM | PM | TOTAL DELAY (Hrs/Mi) AM | PM | CONG LEVEL AM | PM | Both Directions # LANES 2013 | 2034 | 2034 PROJ VOL | 20-YR PROJ TRUCK DELAY (Hrs/Mi) | 2034 PM CONG LEVEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROUTE 199 | JOHN TYLER HWY (RTE 5) | WILLIAMSBURG CL | 0.23 | 34 | 27 | 1.32 | 1.69 | 0.18 | 0.55 | 1.66 | 2.75 | 0 | 12 | 15 | 58 | MOD | SEV | 33 | 32 | 1.32 | 1.37 | 0.20 | 0.24 | 1.73 | 1.58 | 0 | 0 | 15 | 39 | MOD | MOD | 4 | 4 | 49,000 | 0.8 | SEV |
| ROUTE 199 | JAMES CITY CL (WEST) | JAMESTOWN RD | 0.24 | 34 | 27 | 1.32 | 1.69 | 0.18 | 0.55 | 1.66 | 2.75 | 0 | 12 | 15 | 58 | MOD | SEV | 33 | 32 | 1.32 | 1.37 | 0.20 | 0.24 | 1.73 | 1.58 | 0 | 0 | 15 | 39 | MOD | MOD | 4 | 4 | 49,000 | 0.8 | SEV |

| | Congestion Management Strategies | Applicable Strategy? |
|---|---|---|
| Strategy #1 Eliminate Person Trips or Reduce VMT | **Growth Management/Activity Centers** | |
| | 1-1 Land Use Policies/Regulations | IN USE |
| | **Congestion/Value Pricing** | |
| | 1-2 Road User Fees/High Occupancy Toll (HOT) Lanes | - |
| | 1-3 Parking Fees | - |
| | **Transportation Demand Management (TDM)** | |
| | 1-4 Telecommuting | IN USE |
| | 1-5 Employee Flextime Benefits/Compressed Work Week | IN USE |
| Strategy #2 Shift Trips from Auto to Other Modes | **Public Transit Capital Improvements** | |
| | 2-1 Exclusive Right-of-Way - New Rail Service | - |
| | 2-2 Exclusive Right-of-Way - New Bus Facilities | - |
| | 2-3 Ferry Services | - |
| | 2-4 Fleet Expansion | YES |
| | 2-5 Improved Intermodal Connections | - |
| | 2-6 Improved/Increased Park & Ride Facilities & Capital Improvements | YES |
| | **Public Transit Operational Improvements** | |
| | 2-7 Service Expansion | YES |
| | 2-8 Traffic Signal Preemption | YES |
| | 2-9 Improved Transit Performance | YES |
| | 2-10 Transit Fare Reductions Plan/Reduced Rate of Fare | YES |
| | 2-11 Transit Information Systems | YES |
| | **Bicycle and Pedestrian Modes** | |
| | 2-12 Improved/Expanded Bicycle Network | YES |
| | 2-13 Bicycle Storage Systems | YES |
| | 2-14 Improved/Expanded Pedestrian Network | YES |
| Strategy #3 Shift Trips from SOV to HOV | **High Occupancy Vehicle (HOV)** | |
| | 3-1 Add HOV Lanes | - |
| | 3-2 HOV Toll Savings | - |
| | **Transportation Demand Management (TDM)** | |
| | 3-3 Rideshare Matching Services | IN USE |
| | 3-4 Vanpool/Employer Shuttle Program | IN USE |
| | 3-5 Trip Reduction Program | IN USE |
| | 3-6 Parking Management | IN USE |
| Strategy #4 Improve Roadway Operations | **Traffic Operational Improvements** | |
| | 4-1 Geometric Improvements | YES |
| | 4-2 Intersection Turn Restrictions | YES |
| | 4-3 Intersection Signalization Improvements | YES |
| | 4-4 Coordinated Intersections Signals | YES |
| | 4-5 Roadway Environment | YES |
| | 4-6 Intelligent Transportation Systems/Smart Traffic Centers (ITS) | IN USE |
| | 4-7 Reversible Lanes | - |
| | 4-8 Freight Policies and Improvements | - |
| | 4-9 Incident Management, Detection, Response & Clearance | YES |
| | 4-10 Construction Management | YES |
| | 4-11 Elimination of Bottlenecks | YES |
| | 4-12 Ramp Metering | - |
| | 4-13 Access Control and Connectivity | IN USE |
| | 4-14 Median Control | IN USE |
| Strategy #5 Add Capacity | **Addition of General Purpose Lanes** | |
| | 5-1 Freeway Lanes | - |
| | 5-2 Arterial lanes | YES |
| | 5-3 Interchanges | - |
| | 5-4 Improve Alternate Routes | YES |

# CMP CONGESTED CORRIDOR - ARTERIAL #11

## Route 199

Between John Tyler Hwy (Route 5) and Jamestown Rd

### OBSERVATIONS & POSSIBLE CAUSES OF CONGESTION

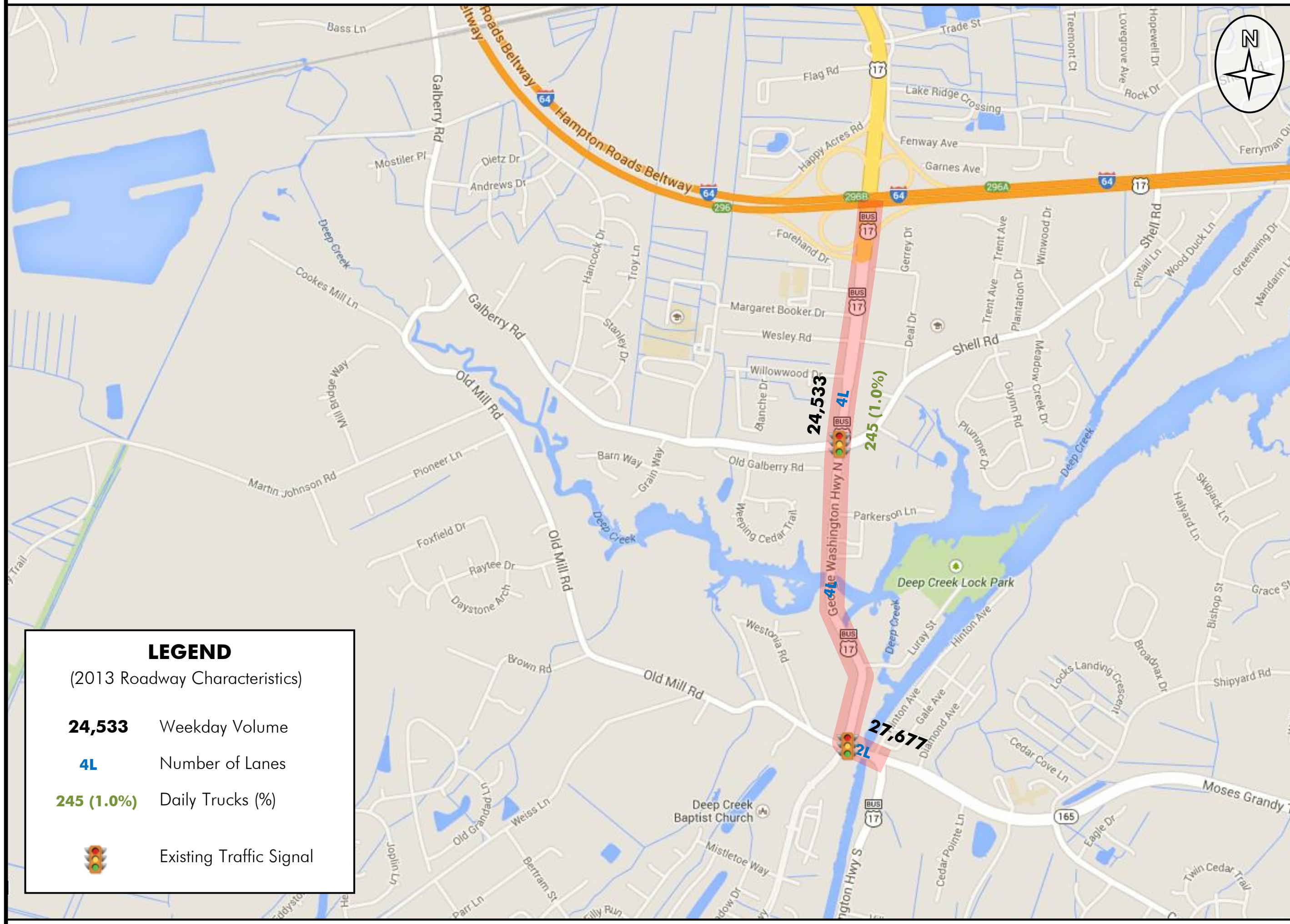
- Heavy PM Peak Hour volume (1,804 vehicles in EB peak direction from John Tyler Hwy to Jamestown Rd).
- Heavy traffic congestion at the Jamestown Rd intersection during the PM Peak Period.
  - o High number of through vehicles for EB Route 199 approach at Jamestown Rd. This traffic often backs up beyond the turn bays.
  - o High number of vehicles turning left from WB Route 199 to SB Jamestown Rd. Left-turn demand is higher than the allocated green time.
  - o Heavy through volumes for the SB Jamestown Rd approach at Route 199. There is only one receiving lane for SB Jamestown Rd south of the Route 199 intersection.
- This corridor was retimed and put into time based coordination approximately 1 year ago. It was previously running in a free mode of timing which helped cause extensive backups on Route 199 at Jamestown Rd.

### POTENTIAL CONGESTION MITIGATION STRATEGIES

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor.
- Evaluate and consider adding dual left turn lanes for the EB and WB Route 199 approaches at the Jamestown Rd intersection. This would require adding a 2nd receiving lane for SB Jamestown Rd south of the Route 199 intersection, either through new construction or changing the existing NB lane uses and restriping the pavement.
- Consider extending the turn bays on EB Route 199 beyond the typical peak period length of the queue.
- Evaluate and consider adding 2nd through lane for SB Jamestown Rd approach at the Route 199 intersection. This would also require adding a 2nd receiving lane for SB Jamestown Rd south of the Route 199 intersection.

# CMP CONGESTED CORRIDOR - ARTERIAL #12

## George Washington Hwy Between Moses Grandy Trail and I-64
## City of Chesapeake




### CORRIDOR SUMMARY

| | |
|---|---|
| **Corridor Length** | 1.28 Miles |
| **Speed Limit** | 35 mph |
| **Roadway Class** | Principal Arterial |
| **Transit Service** | None |
| **Highest CMP Segment Score** | 54 – Southbound from I-64 to Mill Creek Pkwy during the PM Peak |

### RECENT PROJECTS

- Widened George Washington Hwy to 4 lanes between Mill Creek Pkwy and Willowwood Dr (completed in 2012)
- Intersection improvements at George Washington Hwy and Mill Creek Pkwy/Old Mill Rd. Improvements include a SB right turn lane, an additional SB thru lane, an EB right turn lane, and a channelized WB free-flow right turn lane. (completed in 2012)
- Signal upgrades at Shell Rd/Galberry Rd. (completed in 2012)

### FUTURE PROJECTS

- None

| | | | | Northbound (2013) | | | | | | | | | | | | | | Southbound (2013) | | | | | | | | | | | | | | Both Directions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FACILITY NAME | SEGMENT FROM | SEGMENT TO | Length (Mi) | SLOWEST SPEED (mph) AM | SLOWEST SPEED (mph) PM | HIGHEST TRAVEL TIME INDEX AM | HIGHEST TRAVEL TIME INDEX PM | HIGHEST PICA AM | HIGHEST PICA PM | HIGHEST PLANNING TIME INDEX AM | HIGHEST PLANNING TIME INDEX PM | # CONG 15-MIN INTRVLS AM | # CONG 15-MIN INTRVLS PM | TOTAL DELAY (Hrs/Mi) AM | TOTAL DELAY (Hrs/Mi) PM | CONG LEVEL AM | CONG LEVEL PM | SLOWEST SPEED (mph) AM | SLOWEST SPEED (mph) PM | HIGHEST TRAVEL TIME INDEX AM | HIGHEST TRAVEL TIME INDEX PM | HIGHEST PICA AM | HIGHEST PICA PM | HIGHEST PLANNING TIME INDEX AM | HIGHEST PLANNING TIME INDEX PM | # CONG 15-MIN INTRVLS AM | # CONG 15-MIN INTRVLS PM | TOTAL DELAY (Hrs/Mi) AM | TOTAL DELAY (Hrs/Mi) PM | CONG LEVEL AM | CONG LEVEL PM | # LANES 2013 | # LANES 2034 | 2034 PROJ VOL | 20-YR PROJ TRUCK DELAY (Hrs/Mi) | 2034 PM CONG LEVEL |
| GW HWY (DEEP CREEK BRIDGE) | MOSES GRANDY TR @ HINTON AVE | MILL CREEK PKWY | 0.10 | 25 | 32 | 1.44 | 1.13 | 0.27 | -0.07 | 1.96 | 1.26 | 2 | 0 | 23 | 9 | SEV | LOW | 27 | 19 | 1.17 | 1.66 | 0.04 | 0.45 | 1.36 | 2.41 | 0 | 12 | 6 | 53 | LOW | SEV | 2 | 2 | 52,000 | 0.0 | SEV |
| GEORGE WASHINGTON HWY | MILL CREEK PKWY | WILLOWOOD DR | 0.8 | 25 | 32 | 1.44 | 1.13 | 0.34 | 0.00 | 1.96 | 1.26 | 2 | 0 | 23 | 9 | SEV | LOW | 27 | 19 | 1.17 | 1.66 | 0.08 | 0.53 | 1.36 | 2.41 | 0 | 12 | 6 | 53 | LOW | SEV | 4 | 2 | 46,000 | 0.0 | SEV |
| GEORGE WASHINGTON HWY | WILLOWOOD DR | I-64 | 0.38 | 25 | 32 | 1.44 | 1.13 | 0.34 | 0.00 | 1.96 | 1.26 | 2 | 0 | 23 | 9 | SEV | LOW | 27 | 19 | 1.17 | 1.66 | 0.08 | 0.53 | 1.36 | 2.41 | 0 | 12 | 6 | 53 | LOW | SEV | 4 | 4 | 46,000 | 0.0 | MOD |

| | Congestion Management Strategies | Applicable Strategy? |
|---|---|---|
| Strategy #1 Eliminate Person Trips or Reduce VMT | **Growth Management/Activity Centers** | |
| | 1-1 Land Use Policies/Regulations | IN USE |
| | **Congestion/Value Pricing** | |
| | 1-2 Road User Fees/High Occupancy Toll (HOT) Lanes | - |
| | 1-3 Parking Fees | - |
| | **Transportation Demand Management (TDM)** | |
| | 1-4 Telecommuting | IN USE |
| | 1-5 Employee Flextime Benefits/Compressed Work Week | IN USE |
| Strategy #2 Shift Trips from Auto to Other Modes | **Public Transit Capital Improvements** | |
| | 2-1 Exclusive Right-of-Way - New Rail Service | - |
| | 2-2 Exclusive Right-of-Way - New Bus Facilities | - |
| | 2-3 Ferry Services | - |
| | 2-4 Fleet Expansion | YES |
| | 2-5 Improved Intermodal Connections | - |
| | 2-6 Improved/Increased Park & Ride Facilities & Capital Improvements | YES |
| | **Public Transit Operational Improvements** | |
| | 2-7 Service Expansion | YES |
| | 2-8 Traffic Signal Preemption | YES |
| | 2-9 Improved Transit Performance | YES |
| | 2-10 Transit Fare Reductions Plan/Reduced Rate of Fare | YES |
| | 2-11 Transit Information Systems | YES |
| | **Bicycle and Pedestrian Modes** | |
| | 2-12 Improved/Expanded Bicycle Network | YES |
| | 2-13 Bicycle Storage Systems | YES |
| | 2-14 Improved/Expanded Pedestrian Network | YES |
| Strategy #3 Shift Trips from SOV to HOV | **High Occupancy Vehicles (HOV)** | |
| | 3-1 Add HOV Lanes | - |
| | 3-2 HOV Toll Savings | - |
| | **Transportation Demand Management (TDM)** | |
| | 3-3 Rideshare Matching Services | IN USE |
| | 3-4 Vanpool/Employer Shuttle Program | IN USE |
| | 3-5 Trip Reduction Program | IN USE |
| | 3-6 Parking Management | IN USE |
| Strategy #4 Improve Roadway Operations | **Traffic Operational Improvements** | |
| | 4-1 Geometric Improvements | YES |
| | 4-2 Intersection Turn Restrictions | YES |
| | 4-3 Intersection Signalization Improvements | YES |
| | 4-4 Coordinated Intersections Signals | YES |
| | 4-5 Roadway Environment | YES |
| | 4-6 Intelligent Transportation Systems/Smart Traffic Centers (ITS) | IN USE |
| | 4-7 Reversible Lanes | - |
| | 4-8 Freight Policies and Improvements | - |
| | 4-9 Incident Management, Detection, Response & Clearance | YES |
| | 4-10 Construction Management | IN USE |
| | 4-11 Elimination of Bottlenecks | YES |
| | 4-12 Ramp Metering | - |
| | 4-13 Access Control and Connectivity | YES |
| | 4-14 Median Control | PARTIAL |
| Strategy #5 Add Capacity | **Addition of General Purpose Lanes** | |
| | 5-1 Freeway Lanes | - |
| | 5-2 Arterial lanes | YES |
| | 5-3 Interchanges | YES |
| | 5-4 Improve Alternate Routes | YES |

# CMP CONGESTED CORRIDOR - ARTERIAL #12

## George Washington Hwy

Between Moses Grandy Trail and I-64

### OBSERVATIONS & POSSIBLE CAUSES OF CONGESTION

- Traffic movement is greatly restricted by the 2 lane Deep Creek Bridge. The bridge is within 200 feet of the Old Mill Rd/Mill Creek Pkwy signalized intersection and 150 feet of the Moses Grandy Trail/Hinton Ave unsignalized intersection. The drawbridge opens to marine traffic at 8:30 am, 11:00 am, 1:30 pm, and 3:30 pm.
- Heavy traffic and long queues on approaches to the bridge, including:
  - NB George Washington Hwy at Hinton Ave/Moses Grandy Trail intersection during the AM Peak Period.
  - WB Moses Grandy Trail at the Old Mill Rd/Mill Creek Pkwy intersection extending past Cedar Rd during the AM Peak Period.
  - SB George Washington Hwy approaching the Old Mill Rd/Mill Creek Pkwy intersection during the PM Peak Period.
  - EB Old Mill Rd approaching the George Washington Hwy/Mill Creek Pkwy intersection during the PM Peak Period.
- There are queues on NB George Washington Hwy approaching the I-64 on-ramp towards Virginia Beach during the AM Peak Period.

### POTENTIAL CONGESTION MITIGATION STRATEGIES

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor. Add HRT bus service route along corridor if demand warrants.
- Perform a signal warrant analysis at the George Washington Hwy/Moses Grandy Tr/Hinton Ave intersection.
- Ensure coordination of signals in the corridor.
- Replace the 2-lane Deep Creek Bridge with 4-lane bridge.
- Reroute/realign George Washington Hwy along Sawyers Arch to Hugo A Owens Middle School entrance roadway with Moses Grandy Trail, including a new traffic signal. This project has been included in previous Long-Range Transportation Plans.

# CONCLUSIONS AND NEXT STEPS

The Congestion Management Process (CMP) for Hampton Roads is an on-going systematic process for managing congestion that provides information and analysis on multimodal transportation system performance and on strategies to alleviate congestion and enhance the mobility of persons and goods regionwide. Currently, the Hampton Roads region is experiencing severe congestion on 3.5% of all CMP Roadway Network lane-miles during the morning peak period and on 8.0% during the afternoon peak period (**Figure 20**). Severe congestion levels are expected to more than quadruple to approximately one third (34%) of all CMP roadway lane-miles during the afternoon peak hour by the year 2034. Despite this increase, however, caution should be used when making comparisons between the 2013 Existing and 2034 congestion levels since different methodologies were used (as described on page 33).

In order to rank and differentiate congested corridors in the region, this CMP incorporates both congestion measures and performance measures from previous HRTPO studies such as freight, military, and safety. Each CMP Roadway Network segment was scored by direction for the AM and PM Peak Periods based on five criteria – existing congestion, existing freight, future freight delay, safety, and National Highway System/Military importance. A CMP Segment Score was awarded to each segment based on the highest AM or PM Peak Period point total.

Although CMP Segment Scores were produced for each congested roadway segment in the region, these segments were grouped into corridors for analysis purposes. CMP Congested Corridors were created based on the location and proximity of each of the congested roadway segments and were ranked based on corridors with the roadway segments with the highest CMP Segment Scores.

As congestion levels rise, it is imperative to evaluate, develop, and apply congestion mitigation strategies involving all modes of transportation to improve service levels on the regional transportation system. In order to achieve this goal, a comprehensive "toolbox" of CMP mitigation strategies has been provided in prior sections of this report. The strategies were grouped into five major categories:

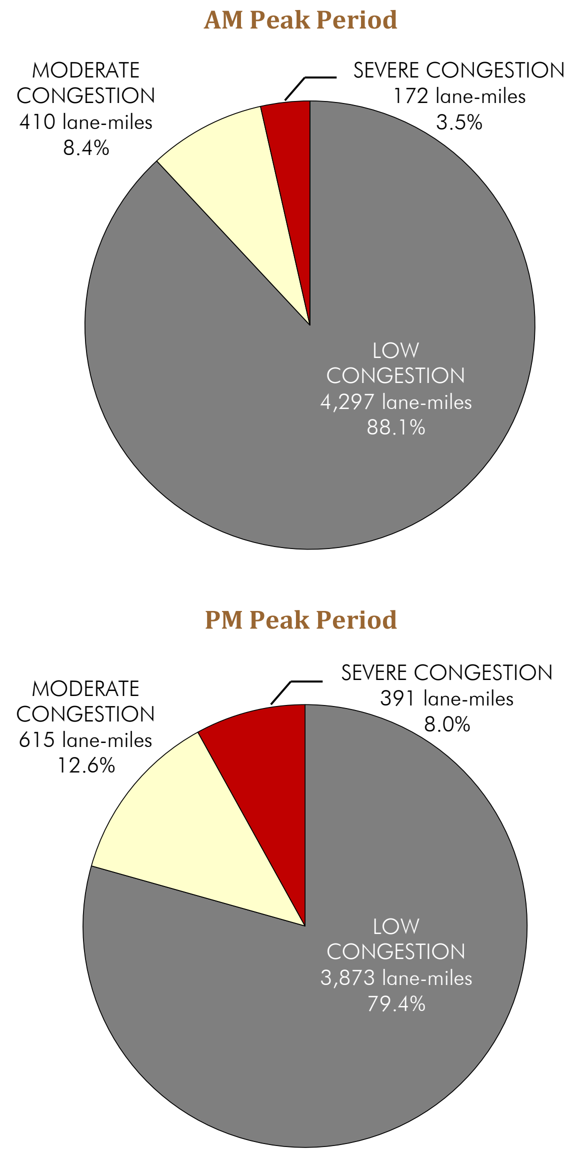



**Figure 20 – Existing (2013) Congestion Levels by Lane-Mile for the CMP Roadway Network**

Source: HRTPO analysis of INRIX and VDOT data.

Figure only include those roadways in the CMP network within the Hampton Roads Metropolitan Planning Area (MPA).

### HRTPO GENERAL CONGESTION MITIGATION STRATEGIES

1) Eliminate Person Trips or Reduce VMT
2) Shift Trips from Automobile to Other Modes
3) Shift Trips from SOV to HOV
4) Improve Roadway Operations
5) Add Capacity

As part of this CMP update, 14 CMP Congested Corridors – 5 Freeways and 9 Arterials – were analyzed in detail to determine probable causes of congestion, peak hour traffic characteristics, recent and future projects, congestion levels, possible application of CMP mitigation strategies, and candidate congestion mitigation strategies.

HRTPO staff recommends the following congestion mitigation strategies for the 14 CMP Congested Corridors as shown in **Table 23** on page 112 and **Table 24** on page 113.

Although other congested CMP roadways are not analyzed in this report, congestion remains a problem within these corridors and they should be considered in any future studies regarding congested locations throughout Hampton Roads. The jurisdictions in which these congested corridors are located are encouraged to perform detailed corridor studies to determine alternative strategies and recommendations to address congestion.

Federal regulations require that the Congestion Management Process be implemented as a continuous part of the metropolitan planning process, which also includes the Long-Range Transportation Plan (LRTP), the Transportation Improvement Program (TIP), and the Unified Planning Work Program (UPWP). The CMP is the first step in addressing regional congestion as it monitors the regional roadway network, identifies congestion, and develops strategies to address congestion.

Given the recent development of the LRTP Project Prioritization Tool and the establishment of the Hampton Roads Transportation Accountability Commission (HRTAC), it is more important than ever that the most beneficial transportation projects be selected for construction. HRTPO staff encourages local planners, engineers, and decision makers to strongly consider the CMP results when developing project proposals for the most congested areas. Once these proposed projects are developed, data from the CMP will be input into the LRTP Project Prioritization Tool in order to assist in the ranking of projects. Finally, the highest priority

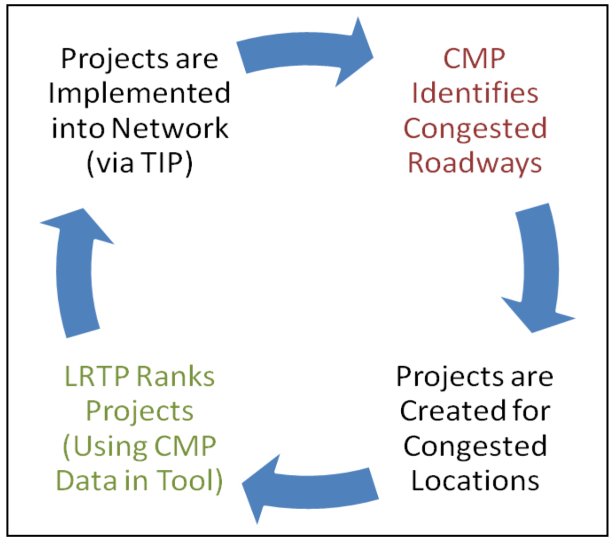



**Figure 21 - Steps for Integrating the CMP into the Metropolitan Planning Process**

projects should be implemented into the network via the TIP and the process can begin again.

The HRTPO staff will continue to monitor and refine the regional CMP. Roadway data, such as traffic volumes, peak hour factors, roadway and signal characteristics, safety data, capacity changes, and other transportation improvements will be updated continuously in order to assist with future CMP report releases and other HRTPO planning efforts. Furthermore, the HRTPO will work to gain input from the general public and regional stakeholders going forward to achieve CMP goals and to enhance the overall process for Hampton Roads.

## Table 23 – CMP Congested Corridor Congestion Mitigation Strategies - Freeways

**Freeway Corridor #1 - Hampton Roads Bridge-Tunnel (I-64) from I-664 to I-564**

- Consider adding tolls ("congestion pricing") to the Hampton Roads Harbor crossings.
- Continue to promote TDM and public transit strategies in order to reduce traffic volume in this corridor. This could include increasing transit service across the Hampton Roads Harbor, such as enhancing express bus service or implementing ferry service.
- Improve ITS technologies and signage to minimize over-height vehicle turnarounds at the tunnel entrance.
- Continue to use and improve ITS/operational strategies to manage traffic at the tunnel and quickly respond to incidents. This can help reduce clearance times and reduce the number of secondary incidents.
- ODU is currently conducting a study titled "Investigation of Sources of Congestion at the HRBT" that should be completed by the end of the year. Planners and engineers should review this study in order to develop specific remedies for these sources of congestion.
- Add additional capacity across the Hampton Roads Harbor.

**Freeway Corridor #2 - Downtown Tunnel**

- This corridor was not analyzed, due to a significant reduction in congestion after tolls were implemented in Feburary 2014.

**Freeway Corridor #3 - I-64/High Rise Bridge from I-264 & I-664 (Bowers Hill) to Greenbrier Pkwy**

- Continue to promote TDM and public transit strategies in order to reduce traffic volume in this corridor.
- Maintain bridge opening restrictions during morning and afternoon peak periods.
- Improve the interchange of I-64 and I-464/Chesapeake Expressway to reduce weaving movements.
- Continue to use and improve ITS/Operational strategies to manage traffic in the corridor and quickly respond to incidents.
- Widen I-64 and the High Rise Bridge.

**Freeway Corridor #4 - Monitor-Merrimac Mem. Bridge-Tunnel (I-664) from Terminal Ave to Chestnut Rd**

- Consider adding tolls ("congestion pricing") to the Hampton Roads Harbor crossings.
- Continue to promote TDM and public transit strategies in order to reduce traffic volume in this corridor. This could include increasing transit service across the Hampton Roads Harbor, such as enhancing express bus service or implementing ferry service.
- Continue to use and improve ITS/Operational strategies to manage traffic at the tunnel and quickly respond to incidents.
- Add additional capacity across the Hampton Roads Harbor.

**Freeway Corridor #5 - I-64 from I-564 to Indian River Rd**

- Continue to promote TDM and public transit strategies in order to reduce traffic volume in this corridor.
- Encourage local military leaders to modify policies concerning work times.
- Continue to use and improve ITS/Operational strategies to manage traffic in this corridor and quickly respond to incidents.
- Consider converting High Occupancy Vehicle (HOV) lanes to High Occupancy Toll (HOT) lanes to improve the usage of the existing capacity.
- Widen I-64 EB from the end of the Northampton Boulevard on-ramp to beyond the merging area for the reversible lanes. This will allow for the Northampton Boulevard on-ramp to remain as a through lane rather than the much less used ramp coming from the HOV lanes.
- Improve the interchange of I-64 and I-264. This could include:
  - Balancing traffic volumes by restriping I-64 EB to allow for 2 lanes exiting to I-264 and 2 through lanes continuing towards Chesapeake. This would also allow for the I-264 EB on-ramp to I-64 EB to have a dedicated lane beyond the interchange rather than the existing short acceleration lane.
  - Widening the ramp from WB I-64 to EB I-264 to 2 lanes.
  - Lengthening the acceleration lane from the I-264 ramp to EB I-64.
- Rebuild the EB side of the interchange of I-64 and Indian River Road to alleviate weaving/merging issues.
- Consider strategies included in Arterial #2 – Indian River Rd and Arterial #3 – Northampton Blvd.

**Freeway Corridor #6 - I-564 from International Terminal Blvd to Admiral Taussig Blvd**

- Encourage local military leaders to modify policies concerning work times and work location (by entry gate).
- Encourage local partnerships with Hampton Roads Transit (HRT) and others to increase travel options for military personnel through travel demand management strategies such as working off-peak hours, telecommuting, ridesharing (carpools/vanpools), and using public transit.
- Extend light rail passenger service to/from Naval Station Norfolk.
- Ensure coordination of the signals on Admiral Taussig Blvd.
- Improve the operations of the gates, particularly at Gates 3/3A. This could include adding additional lanes for processing through the gates and improving technologies at the gates.
- Construct the Intermodal Connector and Air Terminal Interchange projects to improve access from I-564 to Naval Station Norfolk.
- Construct the Third Crossing to improve access to Naval Station Norfolk.

## Table 24 – CMP Congested Corridor Congestion Mitigation Strategies – Arterials

**Arterial Corridor #1 - Midtown Tunnel**

- This corridor was not analyzed, due to a significant reduction in congestion after tolls were implemented in Feburary 2014.

**Arterial Corridor #2 - Indian River Rd/Ferrell Pkwy from Providence Rd to Indian Lakes Blvd**

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor.
- Improve the intersection of Indian River Road and Kempsville Road. Rebuilding the intersection with a non-traditional configuration is included in the SYIP/TIP (UPC #84366), with construction expected to begin in 2015.
- Ensure coordination of signals in the corridor.
- Widen Indian River Road. (This project is included in the Long-Range Transportation Plan.)
- Construct alternate routes, such as the Southeastern Parkway and Greenbelt. The extension of Lynnhaven Pkwy between Centerville Tpke and Indian River Rd (UPC #14603) is under construction and will reduce congestion at Indian River Road/Kempsville Rd when complete.

**Arterial Corridor #3 - Northampton Blvd from I-64 to Diamond Springs Rd**

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor.
- Improve the interchange of I-64 and Northampton Blvd. One possibility is to widen I-64 EB from the end of the Northampton Boulevard on-ramp to beyond the merging area for the reversible lanes. This will allow for the Northampton Boulevard on-ramp to remain as a through lane rather than the much less used ramp coming from the HOV lanes.

**Arterial Corridor #4 - Fort Eustis Blvd**

- This corridor was not analyzed, since congestion in this corridor was due to a bridge replacement project.

**Arterial Corridor #5 - London Bridge Rd/Drakesmile Rd from Dam Neck Rd to Virginia Beach Blvd**

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor.
- Consider improvements to the intersection of Virginia Beach Blvd/Great Neck Rd/London Bridge Rd to improve flow on London Bridge Rd. This could include restriping EB Virginia Beach Blvd to provide a triple left turn movement to NB Great Neck Rd and WB Virginia Beach Blvd to provide a double left turn movement to SB London Bridge Rd. The EB triple left would require restriping Great Neck Rd to the north of Virginia
- Ensure coordination between the closely spaced signals from Potters Rd to Virginia Beach Blvd.
- Widen London Bridge Rd between Drakesmile Rd and Dam Neck Rd to alleviate backups on SB Drakesmile Rd. (This project is included in the Long-Range Transportation Plan.)

**Arterial Corridor #6 - Independence Blvd from Holland Rd to Jeanne St**

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor, e.g. the current HRT Virginia Beach Transit Extension Study.
- Ensure coordination of signals in the corridor, especially between the closely spaced signals from Bonney Rd to Virginia Beach Blvd.
- Improve the interchange of I-264 and Independence Boulevard to add capacity, improve safety, and reduce weaving movements. Possible improvements would include Single Point Urban Interchange and Diverging Diamond Interchange designs.
- Improve alternate routes, such as an overpass of I-264 in the Constitution Dr/Edwin Dr corridor.

**Arterial Corridor #7 - Battlefield Blvd from Cedar Rd to I-64**

- Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor.
- Add an exclusive right-turn lane on the SB Battlefield Blvd approach at the Cedar Rd intersection.
- Add an additional exit lane for the Great Bridge Shopping Center at Cedar Rd/Battlefield Blvd signalized intersection and redesignate lanes to dual left-turns, one through, and one right-turn (and retime signal).
- Ensure coordination of signals in the corridor.
- Implement rush hour restrictions for Great Bridge Bridge lifts, similar to those in place on other bridges.
- Remove two-way left-turn lane and construct a raised-curb median with openings and channelized left-turn bays at strategic locations along the entire length of Battlefield Blvd south of Great Bridge Blvd/Kempsville Rd. (Note: This will likely increase congestion but also improve safety.)
- Consider redesigning the Great Bridge Blvd/Kempsville Rd and Battlefield Blvd intersection to increase capacity by adding additional left-turn and through lanes on the EB Great Bridge Blvd approach at the Battlefield Blvd intersection, and adding a 3rd through lane on NB Battlefield Blvd from south of Great Bridge Blvd/Kempsville Rd intersection to Old Oak Grove Rd/Great Bridge Bypass off-ramp.
- Consider increasing capacity of the intersection of Volvo Pkwy and Battlefield Blvd. This could include triple left-turn lanes from both approaches of Volvo Pkwy to Battlefield Blvd.
- Extend right-turn lane along NB Battlefield Blvd from Coastal Way to the right-turn lane at Wal Mart Way.
- Perform signal warrant analysis at the Albemarle Dr intersection.

**Arterial Corridor #8 - Military Hwy from Bainbridge Blvd to I-464**

- This corridor was not analyzed, since congestion in this corridor was due to a bridge replacement project.

### Table 24 – CMP Congested Corridor Congestion Mitigation Strategies – Arterials (continued)

| Arterial Corridor #9 - Monticello Ave from News Rd to Route 199 |
|---|
| • Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor. Active transportation strategies and safety in the corridor will be addressed in an upcoming VDOT study.<br>• Improve the movement between Monticello Ave and Ironbound Rd via News Rd by constructing new turn lanes as included in the programmed project (UPC #82961).<br>• Evaluate and consider constructing an additional exit lane for Monticello Marketplace at Monticello Ave signalized intersection and redesignate exit lanes to dual left-turns and one through/right-turn lane.<br>• Ensure coordination of signals in the corridor. This can be done through a Special Use Permit completed with the developer of the Courthouse Commons Shopping Center. This would also be assisted with the future installation of the Insync system, which VDOT anticiapates happening within the next 6 months to a year.<br>• Continue existing access management strategies in this corridor for future developments.<br>• Consider improving connections between developments so traffic does not have to use Monticello Ave. |
| **Arterial Corridor #10 - Centerville Tpke from Mt Pleasant Rd to Indian River Rd** |
| • Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor. Add HRT Bus service route along corridor if demand is warranted.<br>• Add capacity to the intersection of Centerville Tpke and Mt Pleasant Rd:<br>o Add a second NB lane along Centerville Tpke for approximately 1,800 feet to the north of Mt Pleasant Rd.<br>o Add an additional left-turn lane on the EB Mt Pleasant Rd approach at the Centerville Turnpike intersection.<br>o Add an additional through lane for the NB Centerville Turnpike approach at the Mt Pleasant Rd intersection.<br>• Add capacity to the intersection of Centerville Tpke and Elbow Rd by constructing left-turn lanes for EB and WB approaches for Elbow Rd or consider adding a roundabout.<br>• Perform a signal warrant analysis at the Butts Station Rd intersection and consider constructing a roundabout.<br>• Implement the programmed widening project (UPC #103005) from 2 to 6 lanes from Indian River Rd to Kempsville Rd and the planned widening project from 2 to 4 lanes from Kempsville Rd to the Chesapeake city line.<br>• Consider widening Centerville Tpke from 2 to 4 lanes in Chesapeake. |
| **Arterial Corridor #11 - Route 199 from John Tyler Hwy (Route 5) to Jamestown Rd** |
| • Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor.<br>• Evaluate and consider adding dual left turn lanes for the EB and WB Route 199 approaches at the Jamestown Rd intersection. This would require adding a 2nd receiving lane for SB Jamestown Rd south of the Route 199 intersection, either through new construction or changing the existing NB lane uses and restriping the pavement.<br>• Consider extending the turn bays on EB Route 199 beyond the typical peak period length of the queue.<br>• Evaluate and consider adding 2nd through lane for SB Jamestown Rd approach at the Route 199 intersection. This would also require adding a 2nd receiving lane for SB Jamestown Rd south of the Route 199 intersection. |
| **Arterial Corridor #12 - George Washington Hwy from Moses Grandy Tr to I-64** |
| • Continue to promote TDM, public transit, and active transportation strategies in order to reduce traffic volume in this corridor. Add HRT bus service route along corridor if demand warrants.<br>• Perform a signal warrant analysis at the George Washington Hwy/Moses Grandy Tr/Hinton Ave intersection.<br>• Ensure coordination of signals in the corridor.<br>• Replace the 2-lane Deep Creek Bridge with 4-lane bridge.<br>• Reroute/realign George Washington Hwy along Sawyers Arch to Hugo A Owens Middle School entrance roadway with Moses Grandy Trail, including a new traffic signal. This project has been included in previous Long-Range Transportation Plans. |

# PUBLIC INVOLVEMENT

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. This principle lies at the core of all recent HRTPO public involvement activities.

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 bikers to environmental activists, the majority of Hampton Roads citizens have a stake in the future of our transportation system.

Equally important, the HRTPO recognizes that not all communities and its 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 underserved groups in Hampton Roads. Understanding how important public involvement is, the HRTPO takes every available step to engage the public in conversations promoting mutual understanding and problem solving. It is a process defined by two-way communication and interaction. We want to help create an efficient, equitable Hampton Roads transportation system together and are committed to gaining public input and feedback.


As such, fewer things impact the quality of life of those who call Hampton Roads home than traffic congestion. Time spent in traffic means more money spent on fuel, higher emissions, and less time with family and friends. Early on, however, the HRTPO recognized that while facts and figures offer a dynamic picture of current traffic conditions, the experience and stories of those who travel in and around Hampton Roads on a daily basis in truly invaluable. In consideration of this fact, the HRTPO set out to engage regional stakeholders and community members.

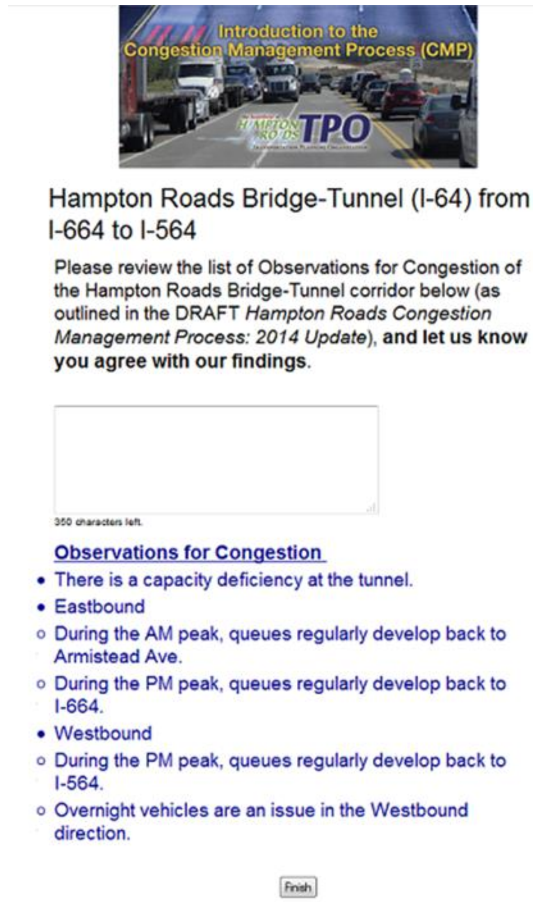
**The opportunity to comment on the draft study was available from September 2, 2014 to September 19, 2014.** Submitted comments and HRTPO staff responses are included in **Appendix G**. In addition to a multi-lingual public notice (see below)**,** inviting public comment on the Draft CMP on the HRTPO website (http://hrtpo.org/page/public-comment-opportunities/), specific efforts were taken to maximize involvement among a wide variety of diverse stakeholders and communities.

## Corridor Surveys

In an effort to gain the public 's input on the observations made for contributing causes of congestion along the Hampton Roads Region's 14 CMP congested corridors, the HRTPO staff devised a 14-part survey.


The public was able to view all corridors and select the corridor(s) they were most familiar with and weigh in on HRTPO findings.

Within two hours of the survey's launch, over 300 members had already weighed in on observations of the causes of congestion in the 14 corridors. When the survey ended on September 19, 2014, 1156 responses had been received, with 936 individuals offering comments. While 34.1% of survey responders simply agreed with the survey findings, 65.9% shared other observations of causes of congestion not indicated by HRTPO staff findings. Many of those comments were used to enhance the mitigation strategies outlined on page 24 of this report. Survey comments were also shared with the HRTPO's planning partners, including the military, HRT, Hampton Roads localities, VDOT and the Port of Virginia. For a full detail of survey comments see **Appendix H**.



## HRTPO News

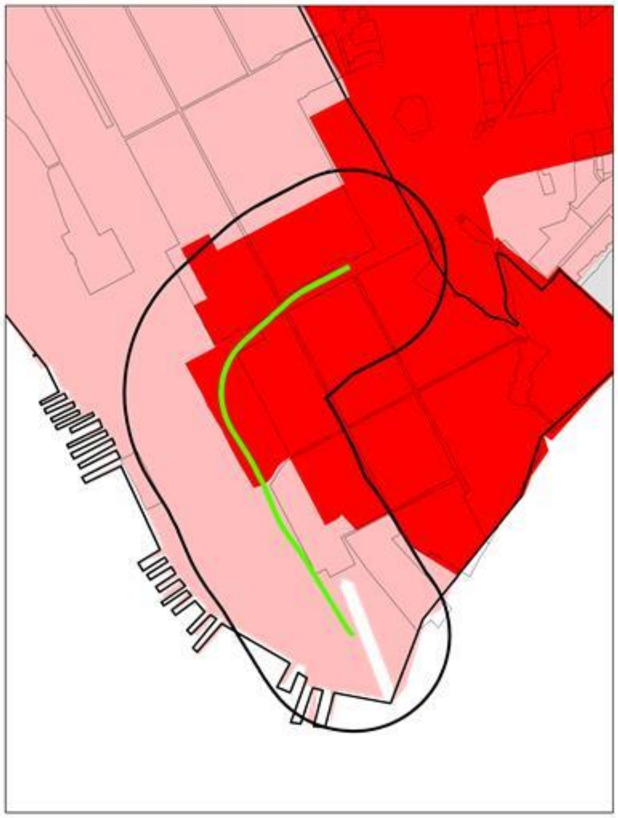
An invitation to review the Draft CMP and complete one or more of the corridor surveys was sent out to the HRTPO's list of more than 3,000 contacts via Constant Contact on September 4, 2014. Nearly 800 contacts opened the email, with a click-through rate of 29%, beating the industry average of 12.7%. Notification of the CMP was also sent by the HRTPO's sister agency, the Hampton Roads Planning District Commission (HRPDC), to its 4,500 followers via Constant Contact.

## Community Contacts

The HRTPO also conducted personal outreach to a number of communities in Hampton Roads. Specifically, using geospatial analysis (i.e. ArcGIS), neighborhoods and subdivisions within a ½ mile of each corridor were identified. Because the HRTPO is committed to understanding and considering the wants, needs, and aspirations of minority, low-income, and other underserved groups in Hampton Roads, demographic information was then overlaid and used to identify those neighborhoods that may adversely affected by transportation and regional planning decisions (see map on page 118). Special care was taken to reach notify these areas of the opportunity to participate.

Specifically, an invitation to offer feedback via the corridor surveys was sent to the following community contacts:

- Ocean View Civic League
- Suburban Acres Civic League
- Wards Corner Civic League
- Northside Civic League
- Cottage Road Park Civic League
- East Hampton Neighborhood Association
- Johnathan's Landing
- Pasture Point Neighborhood Association
- Bowers Hill Civic League
- Camelot Civic League
- Crestwood Civic League
- Shore Drive Coalition
- Drive Safe Hampton Roads
- Virginia Beach Council of Civic Organizations
- Norfolk Federation of Civic Leagues
- Alexandria VB Civic League
- Dominion Lakes Homeowner's Association
- Eva Gardens Civic League
- Fernwood Farms Civic League
- Wickford Civic League
- Carolanne Farms Civic League
- Homestead Civic League
- Level Green Civic League
- Glenrock Civic League
- Hollywood Homes/Maple Hall Civic League
- Meadowbrook Woods Civic League
- Norview Civic League
- Wards Corner Now
- Indian Lakes Association
- Lake Christopher Homes Association
- Lake James Homes Association
- Lake End Homeowner's Association
- New Light Civic League
- Diamond Lake Estates Civic League
- Lawson Forest Civic League
- Point O'Woods Civic League
- Aragona Village Civic League
- Kempsville Lakes Community Association
- Larkspur Civic League
- Pembroke Manor Civic League
- Oak Brooke Civic League
- Stillwater Farms Civic League
- Charlestown Civic League
- Charlestown Lakes South Civic League
- Carriage Homes at Williamsburg Commons Management
- Mill Creek Elmwood Landing Civic League
- Chesapeake Climate Action Network
- Hampton Talks



"Example CMP Corridor overlaid with neighborhoods and demographic information"

## News Media

Over the course of the public comment period (September 2, 2014 – September 19, 2014) several local media outlets covered the CMP and associated corridor surveys, including the Virginian Pilot, Daily Press, and WVEC. This coverage included an on-air demonstration of the CMP surveys by WVEC (http://www.hrtpo.org/news/article/september/10/2014/hrtpo%27s-cmp-survey-gains-local-recognition/). As a result of this and other coverage, hundreds were guided to the HRTPO's website to offer feedback.

Road survey seeks insight on region's bottlenecks | HamptonRoads.com | PilotOnline.com

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**Road survey seeks insight on region's bottlenecks**

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Traffic is at a virtual standstill at the 1100 block of London Blvd. near downtown Portsmouth as rerouted traffic from the closed eastbound section of the Downtown Tunnel makes its way to the clogged and overwhelmed Midtown Tunnel on Saturday afternoon, July 26, 2014. (Martin Smith-Rodden | The Virginian-Pilot)

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TRAFFIC CAMERAS
Live views of highways, tunnels and bridges around Hampton Roads

By Dave Forster
The Virginian-Pilot
© September 6, 2014

If there's one thing people like more than complaining about traffic, it's complaining about the cause of traffic.

It's drivers going too fast. It's drivers going too slow. The road was designed poorly or the stoplights are timed terribly.

For motorists, the insight is gained over weeks, months and - shudder the thought - years of slogging to and from work through the same traffic backups.

Regional transportation planners are tapping that vast and painfully earned expertise in a new survey that asks the public for thoughts on Hampton Roads' worst bottlenecks, their causes and possible solutions.

The open-ended questionnaire went live Thursday and quickly struck a reservoir of frustration. More than 500 responses were logged in the survey's first 24 hours.

People are given 350 characters of space to comment on any of 14 troubled corridors. The survey links to a document in which transportation engineers detailed what they think is causing the problem at each location. Respondents are asked if they agree with the findings.

The Hampton Roads Transportation Planning Organization, which is conducting the survey, released a batch of the responses on Friday.

"Terrible road design combined with insufficient capacity," wrote one person about a stretch of Independence Boulevard in Virginia Beach.

Another complained of lights that change too fast in the area of Indian River Road and Ferrell Parkway.



http://hamptonroads.com/2014/09/road-survey-seeks-insight-regions-bottlenecks[9/8/2014 7:56:05 AM]


WVEC-TV & WVEC.com shared a link.
6 hours ago

Planners want to know: What traffic headaches are you experiencing? A link to the survey is in the story. Where do you run into the worst traffic?

**Survey asks drivers' opinions on traffic congestion in Hampton Roads**
www.wvec.com
Let planners know what you think is causing problems by taking the Hampton Roads' Congestion Management Process survey.

Like · Comment · Share | 20 Shares

Christy McKinnon Bashaw, Denise Moses, Barbara Durkee and 24 others like this. | Top Comments

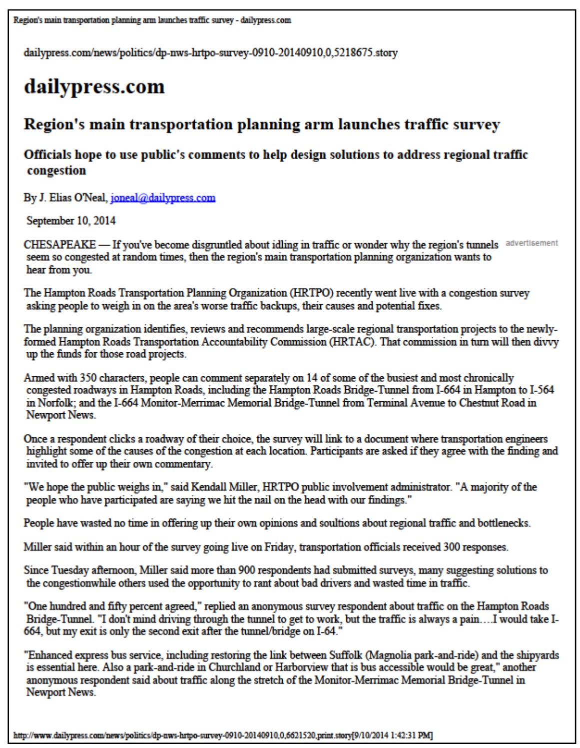
Write a comment...

Ashley Stowers HRBT, hands down, is the worst.
Like · Reply · 13 · 6 hours ago

3 Replies · about an hour ago

Brian Kelley HA! This entire area is a traffic headache!
Like · Reply · 12 · 6 hours ago

View more comments | 2 of 68



Region's main transportation planning arm launches traffic survey - dailypress.com

dailypress.com/news/politics/dp-nws-hrtpo-survey-0910-20140910,0,5218675.story

**dailypress.com**

**Region's main transportation planning arm launches traffic survey**

**Officials hope to use public's comments to help design solutions to address regional traffic congestion**

By J. Elias O'Neal, joneal@dailypress.com

September 10, 2014

CHESAPEAKE — If you've become disgruntled about idling in traffic or wonder why the region's tunnels seem so congested at random times, then the region's main transportation planning organization wants to hear from you.



The Hampton Roads Transportation Planning Organization (HRTPO) recently went live with a congestion survey asking people to weigh in on the area's worse traffic backups, their causes and potential fixes.

The planning organization identifies, reviews and recommends large-scale regional transportation projects to the newly-formed Hampton Roads Transportation Accountability Commission (HRTAC). That commission in turn will then divvy up the funds for those road projects.

Armed with 350 characters, people can comment separately on 14 of some of the busiest and most chronically congested roadways in Hampton Roads, including the Hampton Roads Bridge-Tunnel from I-664 in Hampton to I-564 in Norfolk; and the I-664 Monitor-Merrimac Memorial Bridge-Tunnel from Terminal Avenue to Chestnut Road in Newport News.

Once a respondent clicks a roadway of their choice, the survey will link to a document where transportation engineers highlight some of the causes of the congestion at each location. Participants are asked if they agree with the finding and invited to offer up their own commentary.

"We hope the public weighs in," said Kendall Miller, HRTPO public involvement administrator. "A majority of the people who have participated are saying we hit the nail on the head with our findings."

People have wasted no time in offering up their own opinions and soultions about regional traffic and bottlenecks.

Miller said within an hour of the survey going live on Friday, transportation officials received 300 responses.

Since Tuesday afternoon, Miller said more than 900 respondents had submitted surveys, many suggesting solutions to the congestionwhile others used the opportunity to rant about bad drivers and wasted time in traffic.

"One hundred and fifty percent agreed," replied an anonymous survey respondent about traffic on the Hampton Roads Bridge-Tunnel. "I don't mind driving through the tunnel to get to work, but the traffic is always a pain….I would take I-664, but my exit is only the second exit after the tunnel/bridge on I-64."

"Enhanced express bus service, including restoring the link between Suffolk (Magnolia park-and-ride) and the shipyards is essential here. Also a park-and-ride in Churchland or Harborview that is bus accessible would be great," another anonymous respondent said about traffic along the stretch of the Monitor-Merrimac Memorial Bridge-Tunnel in Newport News.

http://www.dailypress.com/news/politics/dp-nws-hrtpo-survey-0910-20140910,0,6621520,print.story[9/10/2014 1:42:31 PM]

## Social Media

Notification was sent to those who stay connected with the HRTPO via its social media platforms. Specifically, the HRTPO used Twitter and Facebook as a means of conveying an invitation to review and comment on the Draft CMP. Social media allows the HRTPO to better connect with the diverse individuals that make up Hampton Roads.





## Member Localities Assistance

The HRTPO also received help from its member localities, including James City County, Chesapeake, Portsmouth and Hampton, in spreading the word about the CMP and corridor surveys. Several tools were used to invite residents to participate, including social media, newsletters, and showcasing the CMP on their homepage. Like local media coverage, assistance from member localities in inviting residents to participate resulted in a marked increase in the number and diversity of responses.