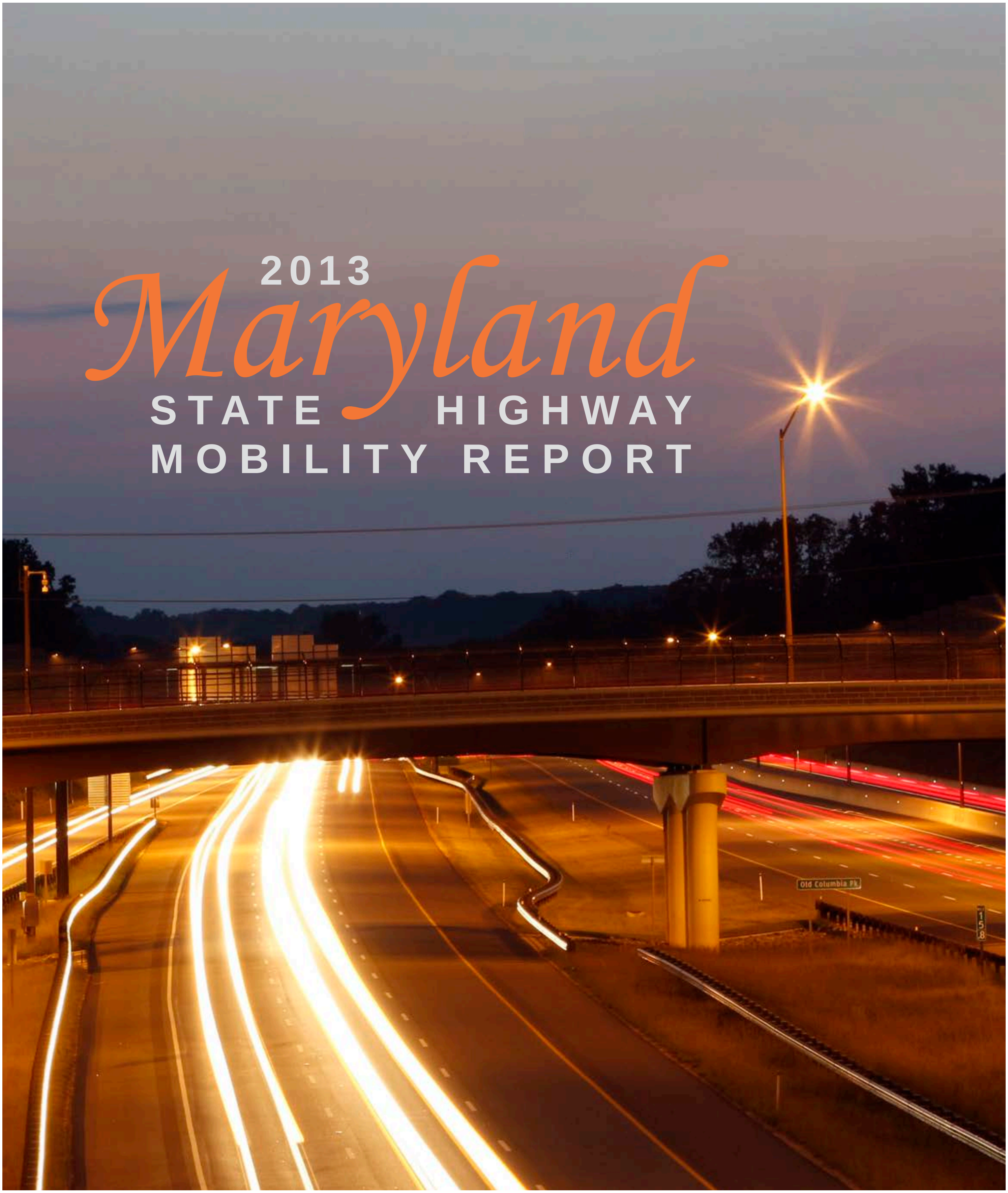
2013 Maryland State Highway Mobility Report



SEPTEMBER 2013

Martin O'Malley, Governor
Anthony G. Brown, Lt. Governor

SHA State Highway Administration
Maryland Department of Transportation

Maryland Department of Transportation

2013 Maryland STATE HIGHWAY MOBILITY REPORT - 2ND EDITION

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SEPTEMBER 2013

Foreword

Dear Readers:

The Maryland State Highway Administration (SHA) is pleased to publish the 2013 State Highway Mobility Report. Centrally located in the Mid-Atlantic region of the United States, Maryland is strategically positioned near the middle of the I-95 corridor. Among the 50 states, Maryland ranks only 42nd in geographic size but with nearly six million residents, the state ranks 19th in population and 5th in population density. Visitors to the state and nation's capital, business owners transporting long-distance freight and local goods, commuters and families all rely on Maryland's roads for safe, dependable transportation 24 hours a day, 365 days a year. Given Maryland's small geographic size, the transportation system faces significant challenges in serving the mobility needs of Washington, DC suburbs, the greater Baltimore metropolitan area, Western and Southern Maryland and the Eastern Shore.

Maryland's transportation network of more than 31,000 miles of roadway, 5,000 bridges and tunnels, 800 miles of rail lines and public transit systems serve a combined ridership of more than 400 million passengers annually. The system includes critical links including the Chesapeake Bay Bridge, the Woodrow Wilson Bridge over the Potomac River and the Fort McHenry tunnel under the Baltimore Harbor. Additionally, the state has major marine facilities at the Port of Baltimore and 18 publicly owned airports including Baltimore – Washington Thurgood Marshall International Airport.

With the approval of the Transportation Infrastructure Investment Act of 2013, Maryland has an opportunity to make needed safety and mobility improvements. This influx of new funding will allow SHA to significantly upgrade aging highways and bridges throughout the State. SHA uses a performance based approach to provide our customers with a high quality, reliable highway system. With a focus on policies, programs and projects that systematically address both recurring (every day) and non-recurring (weather, collisions, etc.) congestion, SHA continues to preserve and improve the state highway system, while supporting Maryland's economic competitiveness, environmental stewardship and quality of life.

With more than 50 percent of congestion caused by incidents, real-time information about transportation choices is a valuable and necessary commodity. In recent years, Maryland joined the 511 network for traffic information. Nationally, 511 is the telephone number designated by Congress for traveler information and Maryland also provides the same, if not more, via the website, www.MD511.org.

In addition to safety and congestion, transportation system reliability is another key factor to providing our customers with a good travel experience. As part of this report, engineers researched and investigated the underlying causes of congestion to better evaluate short and long-term strategies for improvement. Congratulations to the talented team of people who researched and wrote this report and the members of SHA's Mobility Key Performance Area council who work to improve travel in the state every day. Like the first edition in 2012, we believe that the 2013 report will provide valuable information for transportation decision-making.

Sincerely,

Melinda B. Peters

Administrator

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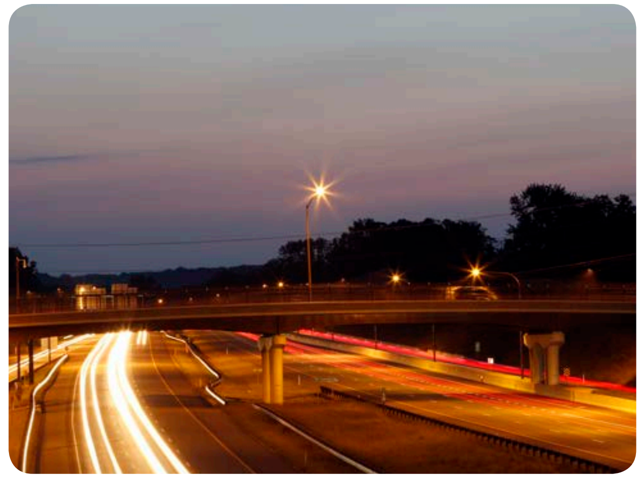
Executive Summary



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Executive Summary

The Maryland State Highway Administration's (SHA) mobility related efforts in calendar year 2012 are highlighted in the 2013 Maryland State Highway Mobility Report. Mobility is a key performance area (KPA) at SHA which aims to "Support Maryland Economy and Communities with Reliable Movement of People and Goods". This report identifies successes, challenges, and strategies being utilized to improve the transportation services SHA delivers to Marylanders and the traveling public.

The report concentrates on the following four strategic focus areas:

- Mobility & Reliability
- Incident Management & Traveler Information Systems
- Multi-Modalism & Smart Growth
- Freight

These four strategic areas are critical to provide reliable movement of people and goods throughout the State. This in turn provides the engine for growth and economic development in the state and the region.

The following is a summary of congestion and reliability performance on the States' roadway system in 2012:

- In 2012, vehicle miles travelled (VMT) in Maryland reached 56.4 billion miles. This is 0.6% increase over 2011 and less than 1% lower than the all time high of nearly 57 billion in 2007. The 2012 VMT in the Baltimore – Washington region was 47.2 billion, and the remaining 9.2 billion VMT occurred on the Eastern Shore and in Western Maryland. About 72% of the VMT occurred on state and toll maintained roadways.
- Analysis of the weekday vehicle speed data shows that 13% of the Maryland freeways/expressways system experience congested conditions in the AM peak hour. Congestion levels in the PM peak hour were worse with 20% of the freeways/expressways experiencing congested conditions. AM and PM peak hour travel conditions have slightly worsened compared to 2011 conditions.
- In 2012, on freeways/expressways, 23% of the AM peak hour VMT and 33% of the PM peak hour VMT was in congested conditions compared to 16% and 26% (AM and PM peak hour respectively) in 2011. On weekdays, approximately, 94% of the peak hour congestion occurred in the Baltimore – Washington region.

- Motorists travelling on Maryland freeways/expressways on weekdays experienced a total annual delay of 35 million hours and consumed 29 million gallons of extra fuel due to congestion. This translates into $1.27 billion dollars of annual user costs due to congestion on Maryland's freeways/expressways system alone.
- Reliability performance measures illustrate the variability in traffic congestion so that highway users can add the extra "buffer" time to their trip for reaching their destination on time. The planning time index (PTI) which is a standard indicator of highway reliability is a comparison of the worse case travel time to free flow conditions. The analysis showed 91% in the AM peak hour and 83% in the PM peak hour of the Maryland freeways and expressways have a PTI value of <1.5 which is considered acceptable for reliability.

The following roadway segments are considered the most congested for the AM and PM weekday peak hour.

2012 MOST CONGESTED FREEWAYS/EXPRESSWAY SEGMENTS

AM Peak (7-8 AM)	PM Peak (5-6 PM)
I-495 Outer Loop - I-95 to MD 97	I-495 Inner Loop - Virginia State Line to I-270
I-270 Southbound - Shady Grove Road to MD 189	I-270/I-495 Outer Loop - Democracy Boulevard to Virginia State Line
I-695 Outer Loop - US 1 to Providence Road	I-495 Inner Loop - MD 187 to MD 97
I-695 Outer Loop - MD 122 to US 40	I-695 Inner Loop - MD 139 to MD 146
I-270 Southbound - Father Harley Boulevard to MD 117	MD 295 (Baltimore – Washington Parkway) Northbound - I-95 to MD 197*

* - Maintained by National Parks Service

The following roadway segments are considered the most unreliable for the AM peak hour and PM peak hour on a weekday. Motorists traversing these segments experience the greatest travel time variation compared to free flow conditions.

2012 MOST UNRELIABLE FREEWAYS/EXPRESSWAY SEGMENTS

AM Peak (7-8 AM)	PM Peak (5-6 PM)
I-495 Outer Loop - I-95 to MD 97	I-270 Southbound/I-495 Inner Loop - Democracy Boulevard to Virginia State Line
I-695 Outer Loop - US 1 to Providence Road	I-495 Inner Loop/I-270 Southbound - MD 187 to MD 97
I-270 Southbound - Shady Grove Road to Montrose Road	I-495 Inner Loop - Clara Barton Parkway to I-270
I-695 Outer Loop - MD 140 to US 40	US 50/301 Eastbound - MD 450 to MD 70
US 50 Westbound - MD 410 to MD 201	MD 295 (Baltimore – Washington Parkway) Northbound - I-95 to MD 197*

* - Maintained by National Parks Service

2012 INRIX data was also used to identify the worst bottlenecks on Maryland freeways/expressways. The bottlenecks are based on the number of occurrences of speed reductions due to incidents etc., average length of queue and duration of incident events over the entire day. The top bottleneck locations are:

BOTTLENECKS

- MD 295 (Baltimore – Washington Parkway) Northbound @ MD 175*
- I-270 Northbound @ MD 80**
- I-270 Southbound @ I-270 Spurs
- MD 295 (Baltimore – Washington Parkway) Northbound @ MD 197*
- I-695 Inner Loop @ MD 147
- I-95 Northbound @ MD 100
- I-270 Northbound @ I-70
- I-695 Outer Loop @ Edmondson Avenue
- I-495 Inner Loop @ MD 650**
- I-95 Northbound @ MD 43***

* Maintained by the National Park Service

**Under Construction

***Under Construction and maintained by the Maryland Transportation Authority (MDTA)

Analysis of a sampling of available count data for the arterial system revealed the following:

- 8% of the multi-lane facilities accounting for 2% of the mileage operate at LOS ‘F’.
- 5% of the two lane roadways accounting for 3% of the mileage are operating at LOS ‘F’.
- Based on traffic data collected over the last three years, there are 81 LOS ‘F’ intersections and 108 LOS ‘E’ intersections in the AM and/or PM peak hours.

In order to improve mobility throughout the State, the SHA uses a combination of policies, programs and strategies to address the many needs of users of the transportation system. Programs have been established to expand pedestrian and bicycle facilities, provide ADA accommodations, increase access to transit and address freight issues. On the highway side, emphasis is placed on alleviating congestion hotspots through low cost congestion related projects. This includes using the latest advances in Intelligent Transportation Systems (ITS) technology, retiming signals to reduce delay, making more efficient use of the existing system through HOV lanes and constructing geometric improvements at critical segments or intersections. Projects are developed through a high quality data driven process in which SHA implements programs to provide improved mobility in a systemic and responsible manner.

The SHA and the Maryland Transportation Authority (MDTA) with the assistance of metropolitan planning organizations (MPOs), County and local agencies, have completed numerous projects to improve mobility within the State of Maryland. Highlights of 2012 include:

- The Intercounty Connector (ICC)/MD 200, the first all electronic toll road in Maryland, completed its first year of operation with volumes of up to 30,000 vehicles per day on certain sections. This roadway provides a vital east-west connection between the I-270 and I-95 corridors and improves access to the Baltimore – Washington Thurgood Marshall International Airport. The final phase will extend MD 200 from I-95 to US 1. MD 200 provides a travel time savings of 20 to 25 minutes for a trip from Gaithersburg to Laurel or Rockville to Beltsville. In addition, parallel corridors have seen a 5-11% decrease in peak hour travel times.
- The SHA Coordinated Highways Action Response Team (CHART), responded to and cleared more than 17,000 incidents and assisted more than 28,000 stranded motorists from Maryland roadways. This reduced delay by almost 29 million vehicle hours saving approximately $962 million in annual user costs.
- SHA partnership with State Farm® Insurance provides 24 full time and seven part time Emergency Traffic Patrols to optimize incident response along high-volume/high-incident locations in the Baltimore, Frederick and Washington metropolitan areas.
- SHA collaborated with other regional agencies to increase camera video feed interoperability, allowing for access to over 600 camera sites throughout Maryland thereby, improving traffic monitoring and emergency response.

- SHA operates the Maryland 511 traveler information service. This service, with its "Know Before You Go" theme, provides reliable travel information via the web, phone or e-mail/text alerts on state-maintained roadways. Travel time, incident or work zone lane closures, weather reports, and connections to transit, airport, and tourism information are some of the features of the 511 system. This information helps Marylanders plan their travel to major events, for long distance trips, and for daily commutes.
- Several major and minor capacity and operational improvement projects were implemented in 2012. Examples include the widening of US 113 from Goody Hill Road to Massey Branch in Worcester County and widening MD 295 from I-695 to I-195 in Anne Arundel County. The MD 295 widening improves access to BWI Thurgood Marshall International Airport. Major interchange reconstruction projects included I-695/MD 139 (Charles Street) and I-695/MD 26 (Liberty Road). A new interchange at MD 24/MD 924 and a reconstructed interchange at I-95/MD 24 was also designed and constructed by MDTA. These major and minor projects resulted in approximately $15.8 million savings in annual user costs.
- Traffic signal systems were retimed throughout the State accounting for improved operations at 279 signalized intersections including some 46 signal systems. This resulted in an annual delay reduction of 1.2 million hours equivalent to approximately $37 million dollars in annual user cost savings.
- Capacity and operational improvement projects currently under construction to improve operations include I-70 from west of MD 85 to east of MD 144 in Frederick County, I-895 to north of MD 43, the I-695/Wilkens Avenue interchange in Baltimore County, the I-695/Frederick Road interchange in Baltimore County, the I-95/Contee Road interchange in Prince George's County and the I-95 improvement project from I-895 to north of MD 43 including reconstruction of the interchanges and construction of express toll lanes in Baltimore County by MDTA.
- The SHA is coordinating with local and federal partners to provide operational improvements as part of the Base Realignment and Closure (BRAC). This includes the reconstruction of the US 40 and MD 715 interchange and four intersections near Aberdeen Proving Grounds in Harford County, performing intersection improvements along MD 175 near Ft. Meade in Anne Arundel County and providing additional capacity at intersections along MD 185, MD 355 and MD 187 in Montgomery County related to Walter Reed National Military Medical Center.
- The SHA recognizes the importance of multi-modal programs to facilitate walking and bicycling as low-cost, environmentally friendly, and healthy transportation alternatives. In 2012, more than 6 new miles of sidewalk was constructed, over 15 miles of sidewalks was reconstructed and the number of bicycle lane miles along state roadways increased by almost 10%.
- As part of the Freight Implementation Plan to enhance the safe and efficient movement of commercial vehicle freight, the expansion of truck parking at the Howard County I-95 Southbound Welcome Center project was initiated in 2012. In addition, MDOT and SHA are reviewing and updating the National Freight Network and Maryland Freight Network.

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1. Introduction

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I. Introduction

What's New
in the 2013 Mobility Report?

- Benefits of Major Construction Projects
- Benefits of Minor Congestion Relief Projects
- HOV Travel Time Benefits
- Pedestrian Performance and Bicycle Improvements
- Major Arterial Corridor Performance

Mobility is defined as the ability to move in one's environment with ease and without restriction. This involves a wide variety of areas in life including transportation. Residents and travelers through Maryland need an efficient transportation system that provides mobility and accessibility thereby, supporting economic development and smart growth. The Maryland State Highway Administration's (SHA) has identified Mobility as a key performance area (KPA) in its Business Plan. The goal of the Mobility KPA is to "Support Maryland's Economy and Communities with Reliable Movement of People and Goods". The statewide transportation needs require a balance between attaining the most efficient use of the existing system by management and operations and strategic investment to meet the future needs. With a focus on policies, programs and projects that systematically address both the recurring and non-recurring nature of congestion, SHA has adopted a performance based approach to provide it's users with a high quality reliable highway system. The Maryland State Highway Mobility Report summarizes several performance measures, which helps in identifying areas of success as well as areas that need improvement from year to year.

There are four strategic focus areas associated with transportation operations: mobility & reliability, incident management & traveler information systems, multi-modalism & smart growth and freight. Each plays a vital role in Maryland's ability to provide for the needed transportation services. The focus areas are also critical to the movement of goods and services thereby supporting the overall economy of the state and the mid-Atlantic region.

In addition to these four strategic focus areas, the 2013 Maryland State Highway Mobility Report describes the performance of freeways/expressways and selected high volume major arterials in calendar year 2012. Performance measures related to congestion, reliability and bottlenecks on the entire system and key corridors have been identified. The intent is to support performance based planning, programming and investment related decisions at the agency.

The following chapters highlight Maryland's efforts in 2012.

Mobility & Reliability

This chapter identifies measures of congestion and reliability statewide and by region including the cost to motorists. Reliability is measured on the variability of travel time or speeds on freeways/expressways and is a key indicator of the stability of the highway system with regards to non-recurring congestion. The effectiveness of SHA projects to address recurring congestion by means of major capital projects, minor congestion related projects, signal re-timings and reversible lanes is also discussed.

Incident Management & Traveler Information Systems

Non-recurring congestion is a major impediment to mobility and reliability of the transportation system. The efforts put forth by the SHA through the CHART program are highlighted in this chapter including incident detection and response along with traveler information services.

Multi-Modalism & Smart Growth

In order to improve person throughput on highways, various multi-modal strategies are employed by the SHA. This includes a substantial investment in pedestrian and bicycle facility improvements and the use of a system of transit served park and ride lots and high occupancy vehicle (HOV) lanes. Besides the transportation network, land use plays a vital role in reducing trips on the roadway system. This includes the implementation and support of transit oriented developments (TOD).

Freight

This chapter outlines the movement of goods in Maryland. A network of truck routes has been created through the Maryland Truck Route System. The Truck Route System is being highlighted through various congestion points and lack of overnight parking which impacts mobility and safety.

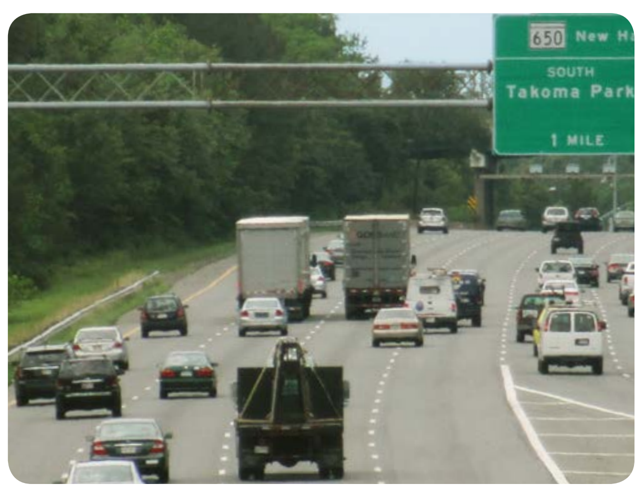
Regionally Significant Corridor Performance

Maryland's freeways/expressways and major arterials represent the locations of highest travel demand. Key indicators such as travel speeds, traffic volumes, congestion, reliability and bottlenecks are identified along these roadways.

Statewide Most Congested Locations

The top 30 congested locations, unreliable segments and bottlenecks on Maryland's freeways/expressways are identified in this chapter. This list is utilized to monitor congestion from year to year at key locations and identify potential mitigation strategies which could include geometric improvements, active traffic management and providing more efficient CHART emergency vehicle deployment.

II. Mobility & Reliability



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A. Introduction

Major population centers in the United States experience congestion on their roadway system. This is no different in Maryland where in the Baltimore – Washington region highway congestion occurs regularly. The challenge is that growth in travel demand has outpaced the growth in infrastructure capacity in the form of roads and public transportation. This is further exacerbated by non-recurring congestion due to crashes, vehicle breakdowns, special events and weather. The impacts of a congested system are detrimental in several ways, specifically, increased costs to the individual user, environmental impacts and the increased potential of collisions.

Mobility on Maryland's roadway system is reflected in the number of Vehicle Miles Traveled (VMT) and the traffic volumes along the various roadways. VMT on Maryland's roadways have steadily increased historically, as a result of population growth and economic activity in the region and have outpaced the ability to increase infrastructure capacity. Individual sections of roadways such as I-495 and I-270 serve more than 240,000 vehicles per day. Other roadways such as US 29 in Howard County have seen traffic volumes more than double over the last 30 years.

The following facts highlight the current state of congestion in Maryland:

- Maryland residents have the longest average commute to work in the nation. According to the 2010 American Community Survey, Maryland residents average commute time to work is 32 minutes, compared to the national average of 25 minutes.
- The 2011 data from the national *2012 Annual Urban Mobility Report* ranks the Washington, DC region with the fourth highest travel delay in the country amounting to approximately 1.8 billion hours of annual travel delay and 85 million gallons of wasted fuel. The average D.C. area auto commuter experienced 67 hours of annual delay which is the highest in the country.
- The Baltimore region ranks seventeenth for the highest delay in the country at approximately 70 million hours of annual delay and 33 million gallons of wasted fuel. On average, Baltimore area commuters experienced an annual delay of 41 hours.
- Compared to other regions of the nation, Maryland has seen less transportation impacts as a result of the economic downturn. This is attributed to the fact the state supports a large proportion of the federal and associated labor force. With the on-going economic recovery, Maryland's traffic volumes have remained stable and are returning to previous levels.
- Maryland's population in 2012 was slightly less than 5.9 million according to the United States Census Bureau estimates. This is a 2% increase over 2010 census data. Maryland's annual unemployment rate has ranged from 6.8% to 7.5% over that time period which is 1.3% to 2.1% below the national average.

- With the passage of the Transportation Infrastructure and Investment Act of 2013, Maryland is planning and programming various transportation projects and programs in the coming years. This should have a positive impact on mobility and reliability.

The SHA employs a multi-faceted program to invest in the transportation system. This starts with addressing any safety issues to reduce crashes on the network. System preservation including bridge and pavement reconstruction is the next major emphasis of the program. The investment to mobility upgrades to pedestrian and bicycle facilities is the next most major strategy. Finally investments to system are to address recurring congestion. This is through minor congestion relief projects or major capacity expansion projects. SHA continues to focus on alleviating congestion hotspots through a low cost congested intersection improvement program. The potential for major capacity enhancement projects in Maryland is constrained due to high cost of construction, right-of-ways and environmental constraints, but still several major projects are on-going or completed.

RELIABILITY

Research finds that roadway users have some level of acceptance of congestion; however, frustration and anxiety are compounded with the variability or unreliability of the system. A high degree of variability of travel times between two points on the system either leads to not arriving at a destination on time or being too early. Late or early arrival to a destination has a cost that varies by trip purpose and nature. For example, the penalty for not allowing enough" buffer time" for a trip to the airport or, a business meeting or, a just-in-time truck delivery has very high costs associated with it. Improving reliability of the highway system leads to less uncertainty; which in turn decreases motorist frustration, allowing trips to be better planned and meet expectations of the motorists using the system. Similarly on the transit side, it is important to provide reliable operations. For transit operations, missing schedules reduces riders confidence and could lead to decreased ridership demand. With advances in technology and data collection processes, SHA uses real time vehicle probe data from INRIX to disseminate travel time information on dynamic message signs. CHART Travel information is available for motorists from public and private sources including the 511 program. The dynamic message signs along the interstates provide traveler information about incidents and travel times to various points. In addition, drivers can access traffic conditions from SHA's website or private companies such as INRIX or Google.

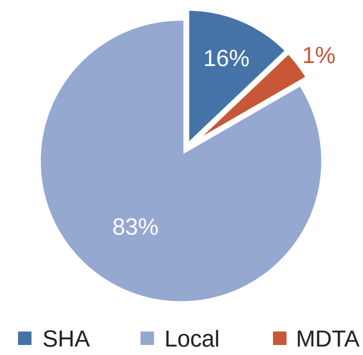
SHA continues to strive to leverage the latest advances in ITS technology to provide high quality data driven processes including programs and projects that implement bottleneck solutions in a systemic and responsible manner. SHA has been advancing the concepts of Planning For Operations and continues a performance based approach to identify and implement congestion mitigation solutions.

B. Vehicle Miles Traveled (VMT)

In Maryland, roadways are owned, operated and maintained by several entities including: SHA, MDTA, counties, cities, other local municipalities and private entities. SHA owns and maintains the numbered, non-toll routes in Maryland's 23 counties - a total of 17,000 lane-miles and 2,572 bridges that represent the backbone of Maryland's transportation system. This infrastructure that forms the majority of the National

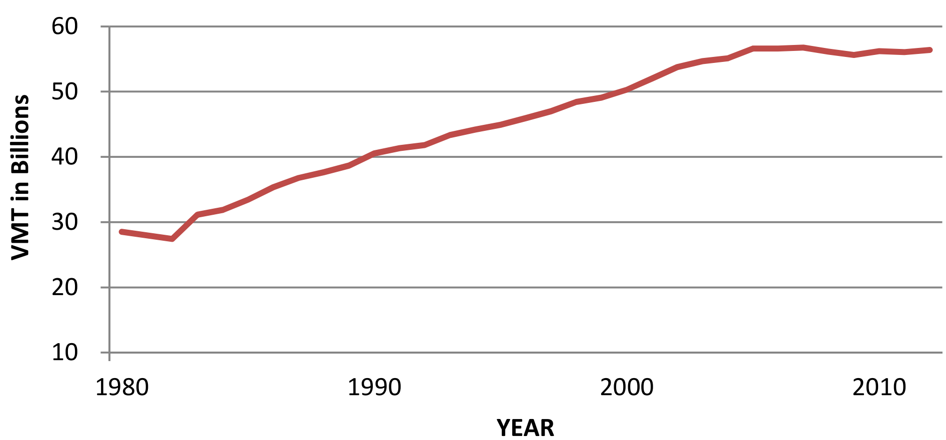
Highway System (NHS) in Maryland, connects local and county roads to major activity centers and other modes of transportation such as mass transit, the port, airports and railroads. Although SHA and MDTA roadways account for only 17% of the state's roadways they carry 72% of the state's traffic and an even greater percentage of its truck traffic. In addition to State roadways, the MDTA owns and operates toll facilities including I-95 from Baltimore City to the Delaware State Line, I-895 including spurs to I-97 and MD 2, MD 695 from east of MD 10 to MD 151, the Hatem Bridge (US 40), the Bay Bridge (US 50/301), the Nice Bridge (US 301) and MD 200 (Intercounty Connector).

MARYLAND HIGHWAY MILEAGE



A standard measure of defining roadway usage is vehicle miles traveled (VMT). This is defined as the number of vehicles times the distance that they traverse along the network. VMT in Maryland grew steadily during the state's economic and population boom starting in the 1940's. Over the last 70 years, there have been periods where the VMT growth has slowed mostly related to economic downturns or the rise in gasoline prices. In Maryland, the growth in VMT has outpaced population growth and SHA's ability to expand the roadway network resulting in an increase in congestion on the roadway network. The growth in VMT is reflected in the following graph.

Annual Vehicle Miles of Travel

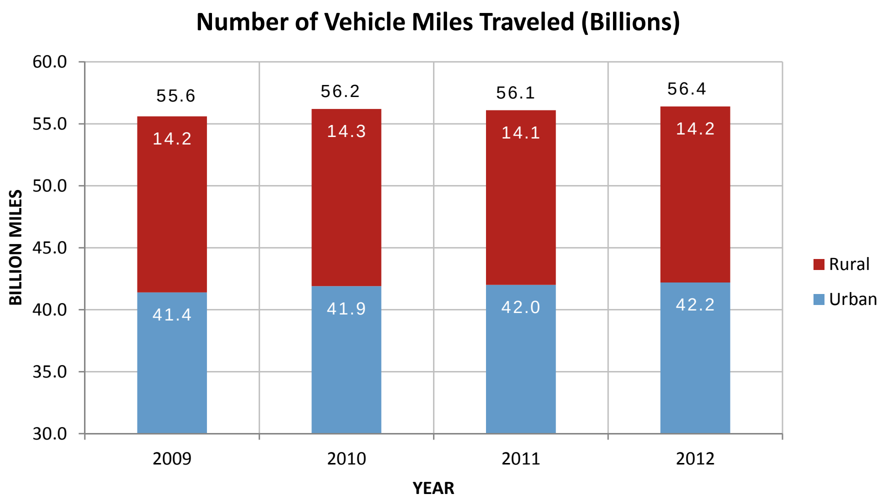


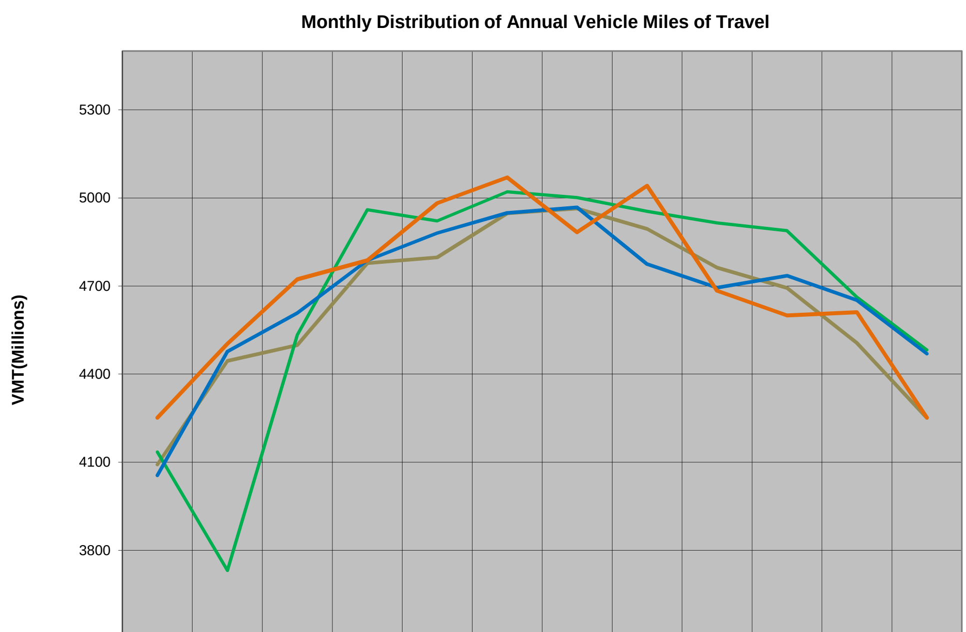
In 2012, drivers in Maryland traveled 56.4 billion vehicle miles. The highest volume roadway is I-270 which carries more than 240,000 vehicles per day. Other roadways such as the Capital Beltway and I-695 between the I-83 ramps have volumes of over 220,000 vehicles per day. The VMT in 2012 is about 0.6% greater than the previous year and has remained fairly constant over the last five years.

The 2012 VMT on the state and toll maintained roadways were 40.4 billion approximately a 100 million vehicle mile increase from 2011. Similarly, on all other roadways in Maryland, the VMT was 16 billion vehicle miles in 2012 compared to 15.8 billion vehicle miles in 2011.

The VMT for the Eastern Shore and Western Maryland was approximately 9.2 billion vehicle miles. This was approximately the same as 2011. The Baltimore Washington region saw a slight increase to 47.2 billion vehicle miles in 2012 from 46.9 billion vehicle miles from year 2011.

The following charts show the yearly trend of VMT from year 2009 thru 2012, the monthly distribution and the disaggregation of VMT by ownership and roadway type:



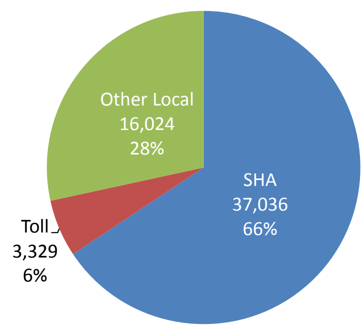


	January	February	March	April	May	June	July	August	September	October	November	December
2009 VMT (Millions)	4092	4445	4499	4777	4797	4948	4964	4895	4763	4693	4506	4251
2010 VMT (Millions)	4135	3731	4533	4960	4922	5021	5001	4954	4915	4888	4662	4483
2011 VMT (Millions)	4056	4477	4608	4788	4880	4949	4968	4775	4694	4735	4652	4469
2012 VMT (Millions)	4252	4504	4723	4787	4982	5070	4883	5042	4684	4600	4611	4252

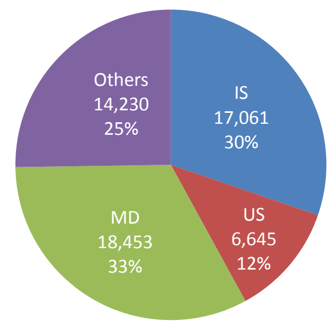
NOTE: This chart displays estimated monthly Vehicle Miles of Travel compared with the previous year based on data collected at approximately 67 continuous count stations throughout the State.

In 2012, the summer months of May through August had the highest levels of VMT. In fact, June 2012 was the highest month for VMT in the last four years. As the nation and region slowly recovers from the economic downturn, increased economic activity appear to result in a slow but steady increase in VMT over the past few years.

2012 VMT BY OWNERSHIP



2012 VMT BY ROADWAY TYPE



C. Congestion and Reliability Measures

FREEWAY/EXPRESSWAY MOBILITY AND RELIABILITY METRICS

Over the last few years the availability of traffic data has increased from both public and private sources. This data, together with analyses methodologies that have been developed and tested over time, provides a detailed "picture" of mobility for travelers using the freeway/expressway system in Maryland. The public data is developed from a statewide program that collects traffic volume data on all of its roadways in a continual cycle. The private data comes from INRIX, a company providing both real-time and historic traffic speed data collected from an estimated 100 million vehicles nationwide, including commercial vehicle fleets. The University of Maryland Center for Advanced Transportation Technology (UMD CATT) uses the INRIX speed data, together with detailed traffic volume data from the SHA Office of Planning and Preliminary Engineering to generate measures of congestion and reliability across the entire freeway system. The analysis methodology is consistent with that developed by the Texas Transportation Institute to prepare the *Annual Urban Mobility Report*. Presentation and reporting of congestion and reliability measures have also been closely coordinated with the Washington and Baltimore Metropolitan Planning Organizations (MPOs) to ensure regional consistency in definition and reporting.

1. Travel Time Index (TTI) and Planning Time Index (PTI)

There are two popular measures used to quantify congestion. These are the Travel Time Index (TTI) and the Planning Time Index (PTI). These measures are popular because they are easily computed from speed data and are relatively easy to communicate to a broad range of audiences. The TTI compares the average travel time of a trip during the peak period (when congestion is the worst) to the travel time of a trip during off peak (free-flow or uncongested) conditions. The index depicts how much longer, on average, travel times are during congestion compared to light traffic. The higher the TTI number, the worse/longer the travel times. For the purposes of the statewide and regional congestion maps presented in this report, the TTI is categorized as follows:

- Uncongested (TTI <1.15)
- Light (1.15 <TTI <1.3)
- Moderate (1.3 <TTI <2.0)
- Severe (TTI >2.0)

For example, a TTI of 1.5 indicates that a trip that takes 20 minutes in light traffic will take one and a half times longer, or 30 minutes in congested conditions.

While TTI helps measure average congestion, most travelers expect variance in travel times and plan their trips accordingly, both during the peak and off peak periods. Frustration increases considerably when travelers experience highly variable travel times. Travelers desire reliability and prefer consistent and dependable travel times for the same trip taken at the same time on a daily basis. Even if congestion occurs during this trip, if it is predictable the motorist can plan accordingly.

Trip reliability is measured using the Planning Time Index (PTI). The PTI represents the total time travelers should allow to make sure they arrive at their destination on-time while taking into account the likelihood and subsequent impacts of traffic incidents or weather. A PTI of 2.0 means the total trip time under light traffic conditions should be increased by 100% to make sure of an on-time arrival. So if a trip takes 20 minutes under uncongested traffic conditions where the PTI is 2.0 the total trip time should be increased to 40 minutes to ensure arriving on time. The lower the PTI number, the more reliable the trip while the higher the number, the less reliable (and potentially more frustrating) the trip. For the purposes of the statewide and regional reliability maps presented in this report, the PTI is categorized as follows:

- Reliable (PTI < 1.5)
- Moderately Reliable (1.5 < PTI < 2.5)
- Highly Unreliable (PTI > 2.5)

2. Geographic Regions

The detailed analysis of the congestion and reliability measures was performed to provide a comprehensive picture of the statewide Maryland freeway/expressway network. The analysis included the entire state network, plus focused on following four major geographic regions:

BALTIMORE METROPOLITAN REGION

- Anne Arundel County
- Baltimore City
- Baltimore County
- Carroll County
- Harford County
- Howard County

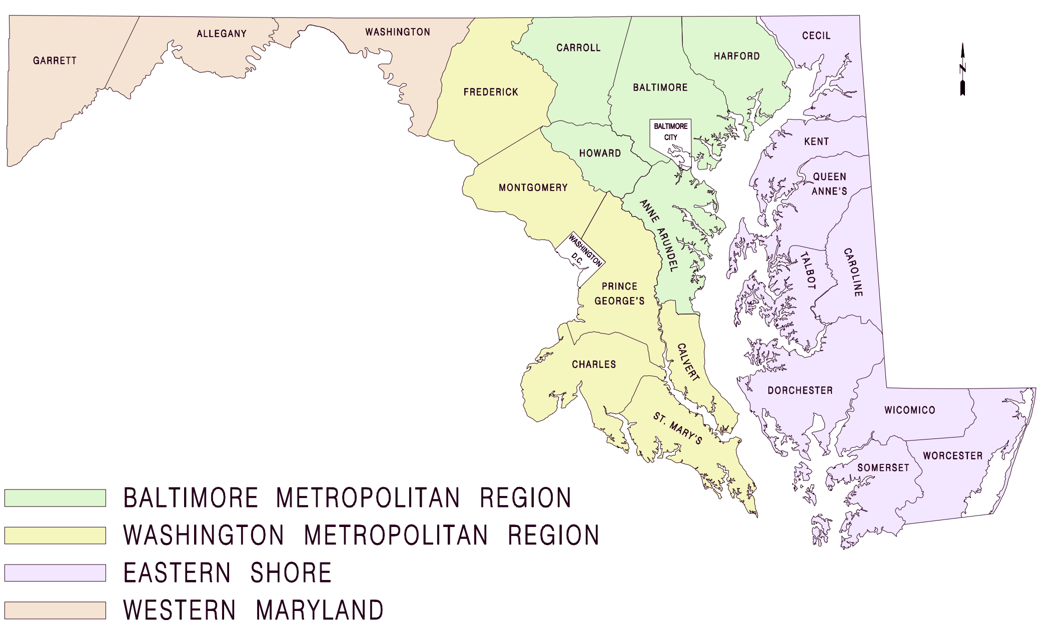
WASHINGTON METROPOLITAN REGION (MARYLAND COUNTIES)

- Calvert County
- Charles County
- Frederick County
- Montgomery County
- Prince George's County
- St. Mary's County

Congestion and reliability measures are generated for the combined Baltimore – Washington urban area.

EASTERN SHORE

- Caroline County
- Cecil County
- Dorchester County
- Kent County
- Queen Anne's County
- Somerset County
- Talbot County
- Wicomico County
- Worcester County



WESTERN MARYLAND

- Allegany County
- Garrett County
- Washington County

The Eastern Shore and Western Maryland regions were combined together for congestion and reliability measures reporting.

The 2012 INRIX data analysis involves 1,698 directional miles of freeways/expressways that account for approximately 95% of all these type roadways in Maryland. This includes 1,061 directional miles of freeways/ expressways in the combined Baltimore – Washington region with the remaining 637 directional miles on the Eastern Shore and Western Maryland.

3. Congestion and Reliability Measures on the Maryland State Freeway/Expressway Network

STATEWIDE PEAK HOUR CONGESTION
(PERCENT SYSTEM CONGESTED AND PERCENT VMT IN CONGESTED CONDITIONS)

The TTI was calculated for the freeway/expressway system in Maryland. The analysis was performed for the peak AM and PM hours with the highest levels of congestion occurring in the 8-9 AM hour in the morning peak and 5-6 PM hour in the afternoon peak. Figures 1 and 2 depict the TTI for those hours on the freeway/ expressway system.

Motorists experienced, moderate to severe congestion (TTI > 1.3) on 219 road miles (13% of the statewide network) during the morning (8-9 AM) peak hour. Twenty-three percent (23%) of the morning peak hour VMT occurs in these congested conditions.

Motorists experienced moderate to severe congestion (TTI >1.3) on 345 road miles (20% of the statewide network) during the afternoon (5-6 PM) peak hour. Thirty-three percent (33%) of the afternoon peak hour VMT occurs in these congested conditions.

Figure 1

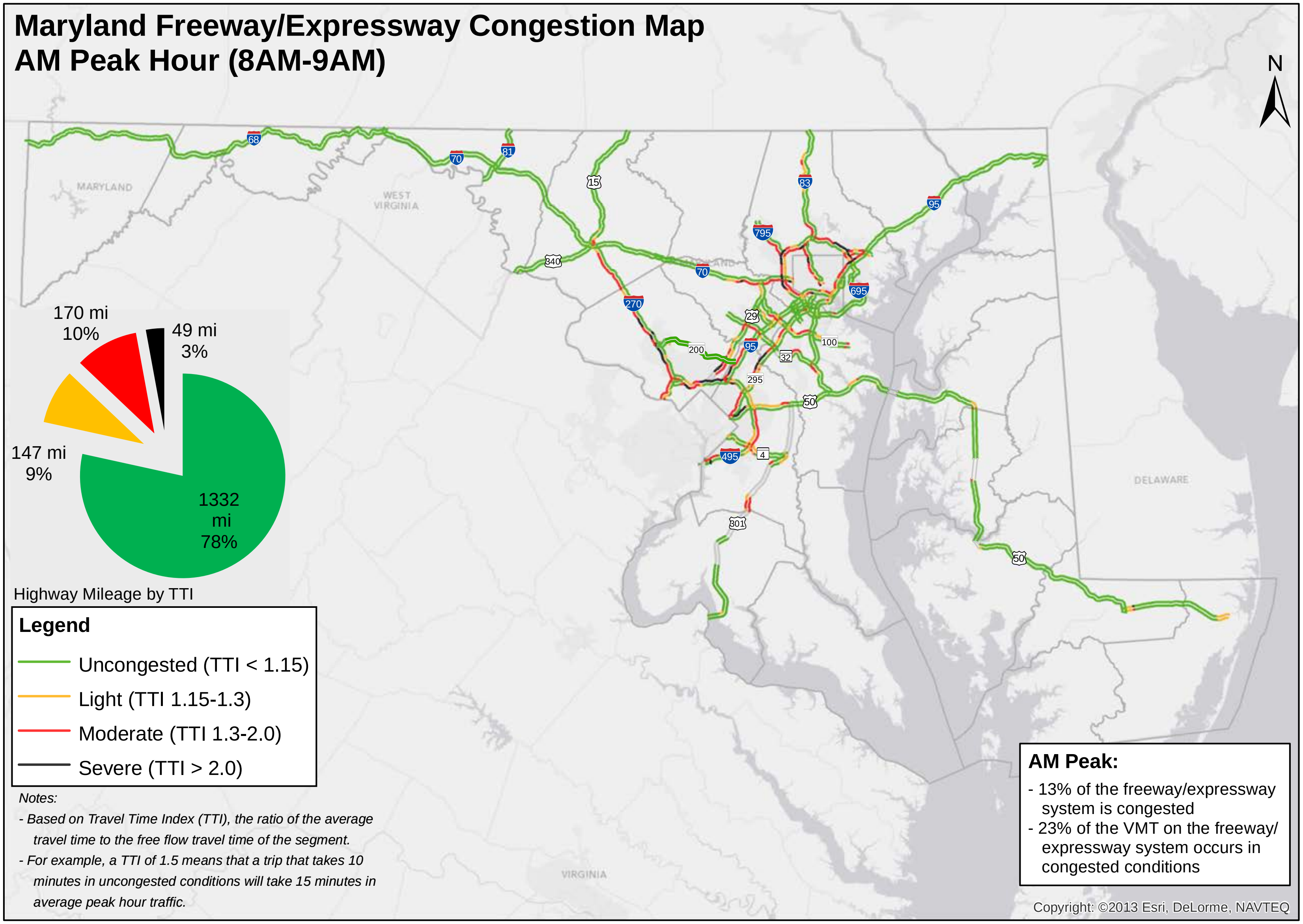

Maryland Freeway/Expressway Congestion Map
AM Peak Hour (8AM-9AM)
N
MARYLAND
WEST VIRGINIA
DELAWARE
VIRGINIA
170 mi
10%
49 mi
3%
147 mi
9%
1332
mi
78%
Highway Mileage by TTI
Legend
Uncongested (TTI < 1.15)
Light (TTI 1.15-1.3)
Moderate (TTI 1.3-2.0)
Severe (TTI > 2.0)
Notes:
- Based on Travel Time Index (TTI), the ratio of the average travel time to the free flow travel time of the segment.
- For example, a TTI of 1.5 means that a trip that takes 10 minutes in uncongested conditions will take 15 minutes in average peak hour traffic.
AM Peak:
- 13% of the freeway/expressway system is congested
- 23% of the VMT on the freeway/ expressway system occurs in congested conditions
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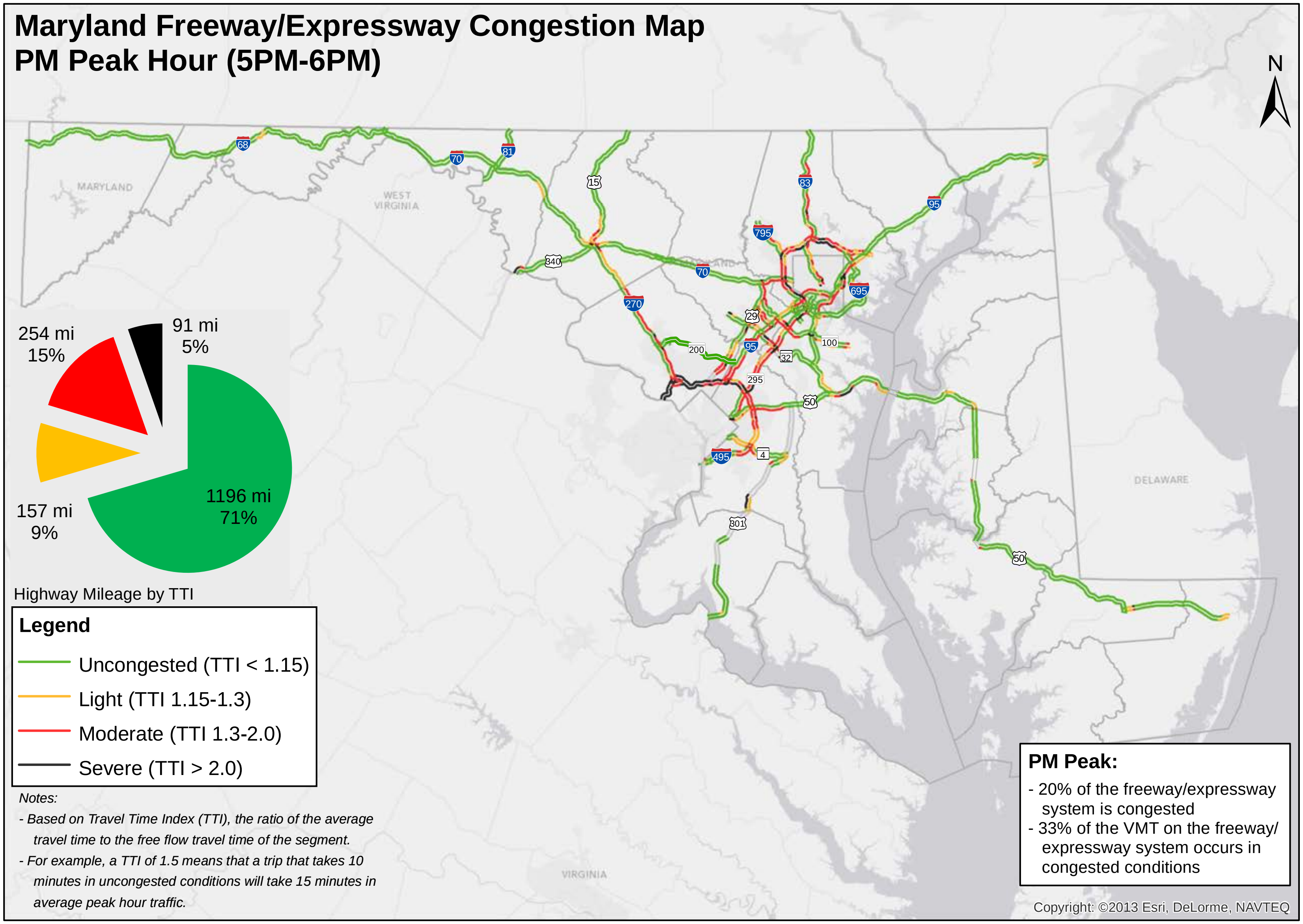
Figure 2


Maryland Freeway/Expressway Congestion Map
PM Peak Hour (5PM-6PM)
N
MARYLAND
WEST VIRGINIA
DELAWARE
VIRGINIA
68
70
81
15
83
95
795
840
70
695
270
29
95
200
100
32
295
50
495
4
301
50
254 mi
15%
91 mi
5%
157 mi
9%
1196 mi
71%
Highway Mileage by TTI
Legend
Uncongested (TTI < 1.15)
Light (TTI 1.15-1.3)
Moderate (TTI 1.3-2.0)
Severe (TTI > 2.0)
Notes:
- Based on Travel Time Index (TTI), the ratio of the average travel time to the free flow travel time of the segment.
- For example, a TTI of 1.5 means that a trip that takes 10 minutes in uncongested conditions will take 15 minutes in average peak hour traffic.
PM Peak:
- 20% of the freeway/expressway system is congested
- 33% of the VMT on the freeway/expressway system occurs in congested conditions
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STATEWIDE COST OF CONGESTION ON FREEWAYS/EXPRESSWAYS

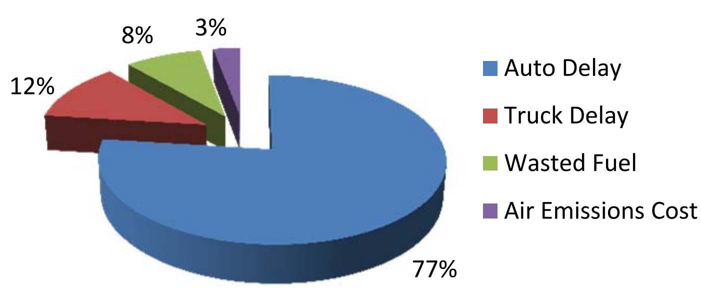
The total statewide estimated cost of congestion due to auto delay, truck delay, wasted fuel and emissions on the freeway network in 2012 is estimated to be $1.27 billion. The total costs can be broken down as follows:

- Auto delay cost: $974.8 Million
- Truck delay cost: $147.5 Million
- Wasted fuel cost: $107.0 Million (Auto $85.8 Million, Truck $21.2 Million)
- Emissions cost: $37.3 Million (Auto $33.6 Million, Truck $3.7 Million)

The percent breakdown of the congestion costs by source and by different regions is depicted in the following graphs.

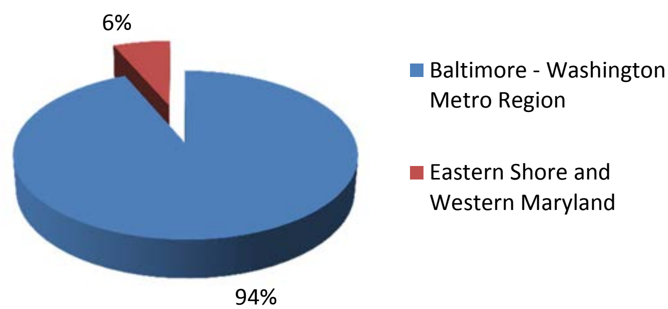
PERCENT OF STATEWIDE FREEWAYS/ EXPRESSWAYS CONGESTION COST BY SOURCE

(TOTAL CONGESTION COST = $1.27B)



PERCENT OF STATEWIDE FREEWAYS/ EXPRESSWAYS CONGESTION COST BY REGION

(TOTAL CONGESTION COST = $1.27B)



STATEWIDE FREEWAY/EXPRESSWAY PEAK HOUR RELIABILITY

The Planning Time Index was developed on a statewide basis for the peak hours (8-9 AM and 5-6 PM) of the network. The results are shown in Figures 3 and 4.

There are 151 road miles (9% of the statewide network) where motorists experienced moderately or highly unreliable conditions (PTI >1.5) in the AM peak hour. The vehicle miles traveled under these unreliable conditions is estimated to be 16% of total VMT during the morning peak hour.

In the afternoon peak hour, 295 road miles (17% of the statewide network) operate under moderately or highly unreliable conditions (PTI >1.5). The vehicle miles traveled under these unreliable conditions is estimated to be 29% of the total VMT during the afternoon peak hour.

Figure 3

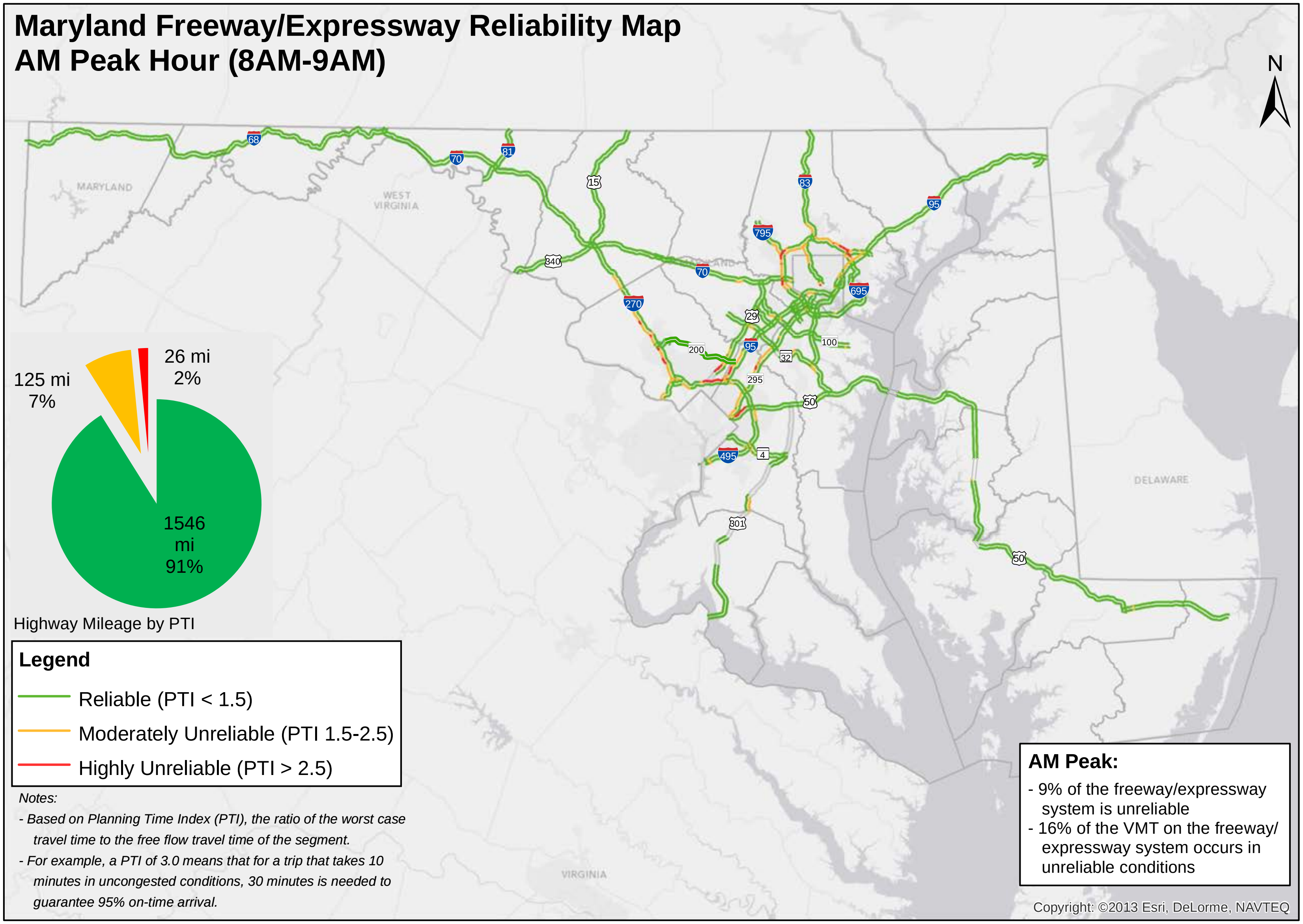

Maryland Freeway/Expressway Reliability Map
AM Peak Hour (8AM-9AM)
N
MARYLAND
WEST VIRGINIA
DELAWARE
VIRGINIA
68
70
81
15
83
95
795
840
70
695
270
29
200
95
100
32
295
50
495
4
301
50
125 mi
7%
26 mi
2%
1546
mi
91%
Highway Mileage by PTI
Legend
Reliable (PTI < 1.5)
Moderately Unreliable (PTI 1.5-2.5)
Highly Unreliable (PTI > 2.5)
Notes:
- Based on Planning Time Index (PTI), the ratio of the worst case travel time to the free flow travel time of the segment.
- For example, a PTI of 3.0 means that for a trip that takes 10 minutes in uncongested conditions, 30 minutes is needed to guarantee 95% on-time arrival.
AM Peak:
- 9% of the freeway/expressway system is unreliable
- 16% of the VMT on the freeway/ expressway system occurs in unreliable conditions
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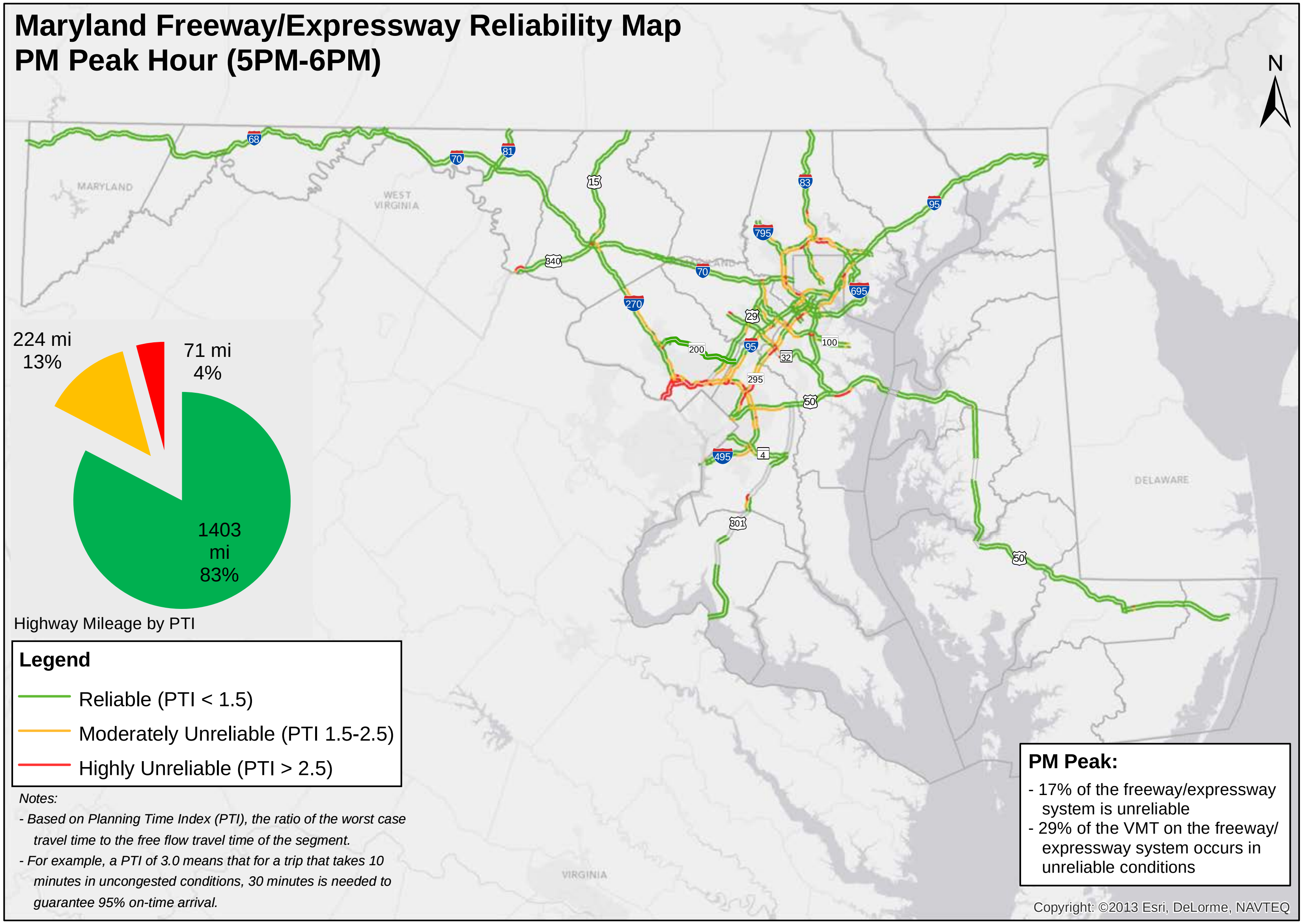
Figure 4


Maryland Freeway/Expressway Reliability Map
PM Peak Hour (5PM-6PM)
N
224 mi
13%
71 mi
4%
1403
mi
83%
Highway Mileage by PTI
Legend
Reliable (PTI < 1.5)
Moderately Unreliable (PTI 1.5-2.5)
Highly Unreliable (PTI > 2.5)
Notes:
- Based on Planning Time Index (PTI), the ratio of the worst case travel time to the free flow travel time of the segment.
- For example, a PTI of 3.0 means that for a trip that takes 10 minutes in uncongested conditions, 30 minutes is needed to guarantee 95% on-time arrival.
PM Peak:
- 17% of the freeway/expressway system is unreliable
- 29% of the VMT on the freeway/ expressway system occurs in unreliable conditions
MARYLAND
WEST VIRGINIA
DELAWARE
VIRGINIA
68
70
81
15
83
95
795
340
270
695
29
200
100
32
295
50
495
4
301
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BALTIMORE – WASHINGTON REGION PEAK HOUR CONGESTION

The Baltimore – Washington Region experiences the majority of congestion and impacts on mobility in Maryland. The Travel Time Index Maps are provided for the peak hours (8-9 AM and 5-6 PM) in Figures 5 and 6.

During the morning peak hour (8-9 AM), 20% of the Baltimore – Washington region experiences moderate to severe congestion (TTI >1.3). This accounts for a total of 214 road miles that occurs in these congested conditions. This amounts to 26% of total VMT in the morning peak hour for the region that experience congested conditions.

The Baltimore – Washington region in the afternoon peak hour, has a total of 317 road miles (30%) that motorists experience moderate to severe congestion (TTI >1.3). This amounts to 39% of the total VMT in the afternoon peak hour for the region that experiences congested conditions.

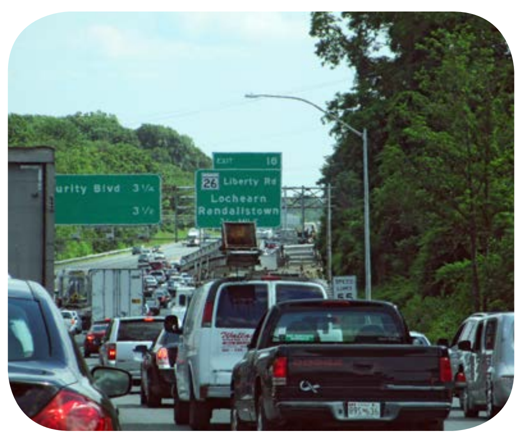

Figure 5

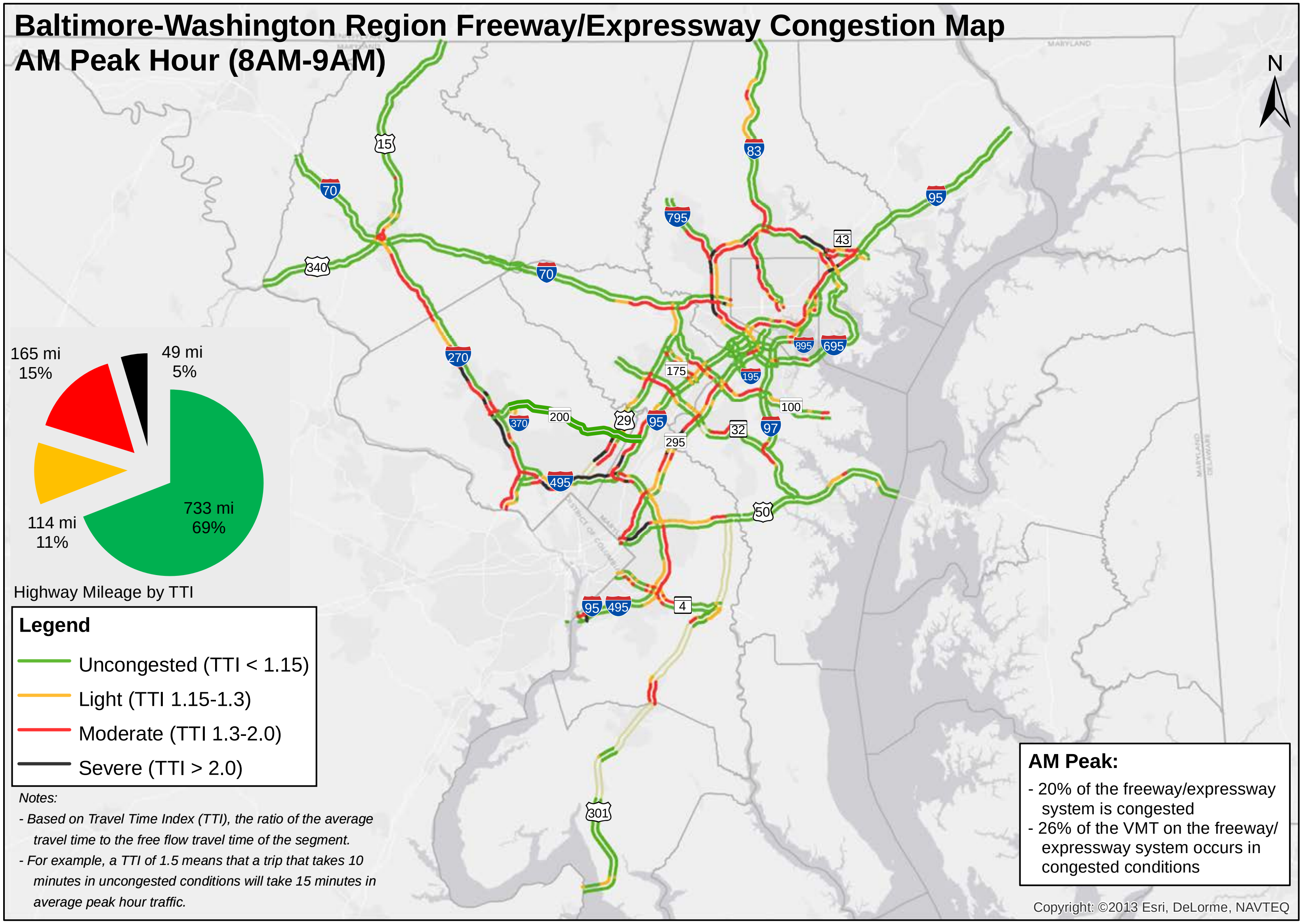
Baltimore-Washington Region Freeway/Expressway Congestion Map
AM Peak Hour (8AM-9AM)
N
15
70
340
795
83
95
43
70
270
895
695
175
195
100
370
200
29
95
295
32
97
495
50
95
495
4
301
165 mi
15%
49 mi
5%
114 mi
11%
733 mi
69%
Highway Mileage by TTI
Legend
Uncongested (TTI < 1.15)
Light (TTI 1.15-1.3)
Moderate (TTI 1.3-2.0)
Severe (TTI > 2.0)
Notes:
- Based on Travel Time Index (TTI), the ratio of the average travel time to the free flow travel time of the segment.
- For example, a TTI of 1.5 means that a trip that takes 10 minutes in uncongested conditions will take 15 minutes in average peak hour traffic.
AM Peak:
- 20% of the freeway/expressway system is congested
- 26% of the VMT on the freeway/expressway system occurs in congested conditions
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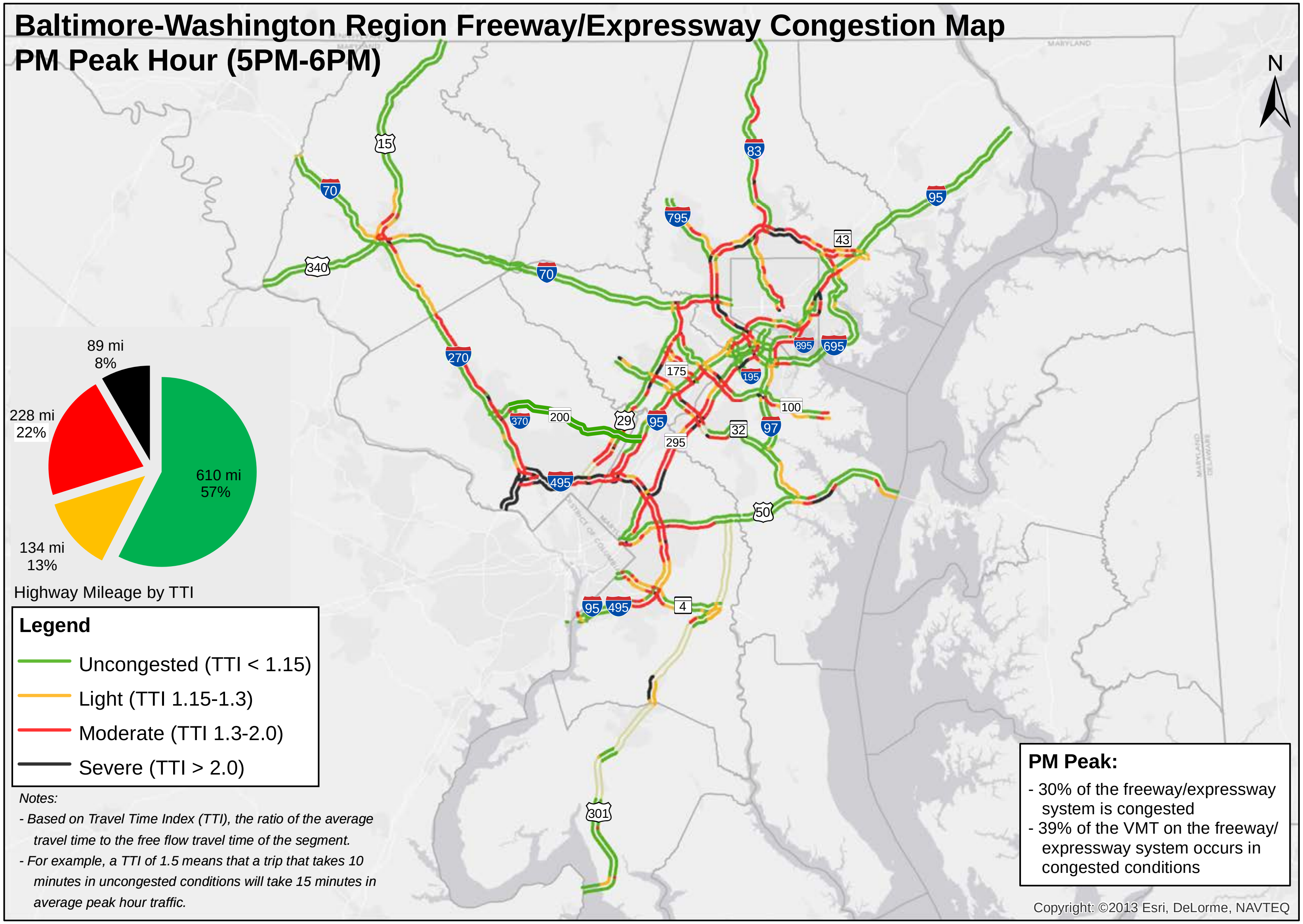
Figure 6



Baltimore-Washington Region Freeway/Expressway Congestion Map
PM Peak Hour (5PM-6PM)
N
89 mi
8%
228 mi
22%
610 mi
57%
134 mi
13%
Highway Mileage by TTI
Legend
Uncongested (TTI < 1.15)
Light (TTI 1.15-1.3)
Moderate (TTI 1.3-2.0)
Severe (TTI > 2.0)
Notes:
- Based on Travel Time Index (TTI), the ratio of the average travel time to the free flow travel time of the segment.
- For example, a TTI of 1.5 means that a trip that takes 10 minutes in uncongested conditions will take 15 minutes in average peak hour traffic.
PM Peak:
- 30% of the freeway/expressway system is congested
- 39% of the VMT on the freeway/ expressway system occurs in congested conditions
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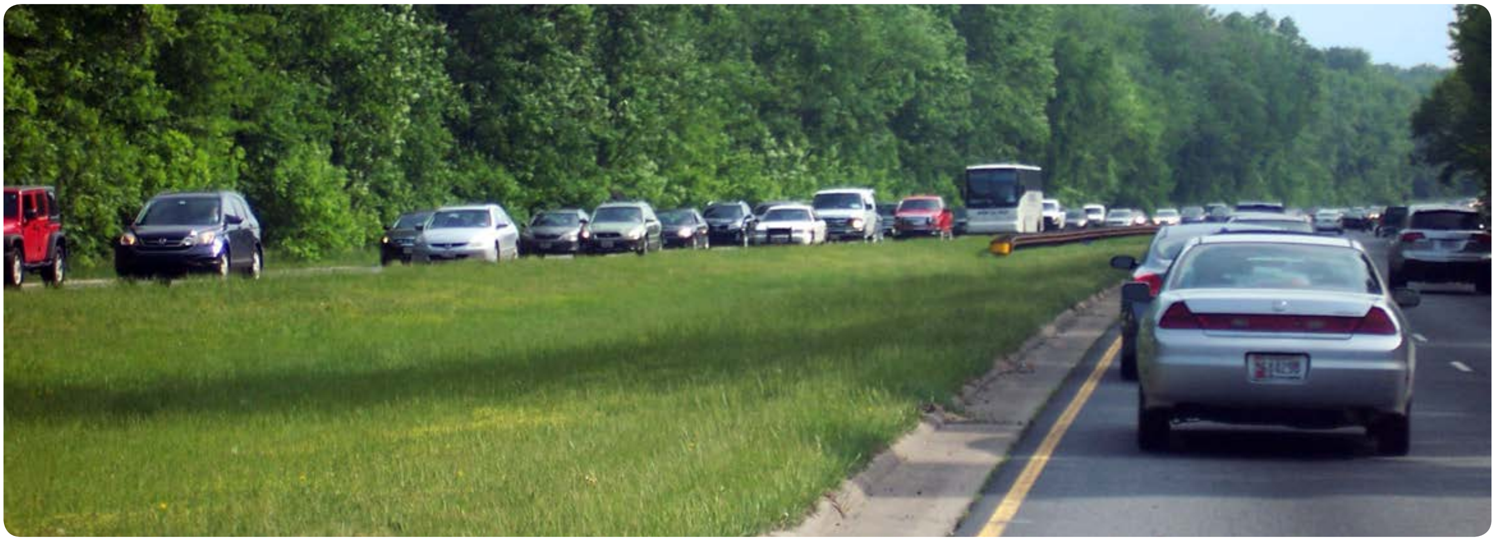
15
70
83
95
795
43
340
895
695
270
175
195
100
370
200
29
32
97
295
495
50
4
301



BALTIMORE – WASHINGTON REGION COST OF CONGESTION

The estimated congestion cost to motorists on the freeway/expressway network in the Baltimore – Washington region in 2012 is $1.185 million. The total costs are divided up as follows:

- Auto delay cost: $915.2 Million
- Truck delay cost: $134.8 Million
- Wasted fuel cost: $99.7 Million
  (Auto $80.5 Million, Truck $19.2 Million)
- Emissions cost: $34.9 Million
  (Auto $31.5 Million, Truck $3.4 Million)

BALTIMORE – WASHINGTON REGION PEAK HOUR RELIABILITY

The peak hour (8-9 AM and 5-6 PM) was utilized to determine the PTI on the freeways/expressways in the Baltimore – Washington region. The reliability maps for the region are shown in Figures 7 and 8.

In the Baltimore – Washington region, there is a total of 146 road miles (14% of the Baltimore – Washington region network) where motorists experience moderately or highly unreliable conditions (PTI >1.5) in the morning peak hour. Nineteen percent (19%) of the morning peak hour VMT in the Baltimore – Washington Region occurs in moderately or highly unreliable conditions.

During the afternoon peak hour, motorists experience moderately or highly unreliable conditions (PTI >1.5) on 275 road miles within the Baltimore – Washington region. This represents 26% of the statewide network. Thirty-four percent (34%) of the afternoon peak hour VMT in the Baltimore – Washington region occurs in moderately or highly unreliable conditions.

Figure 7

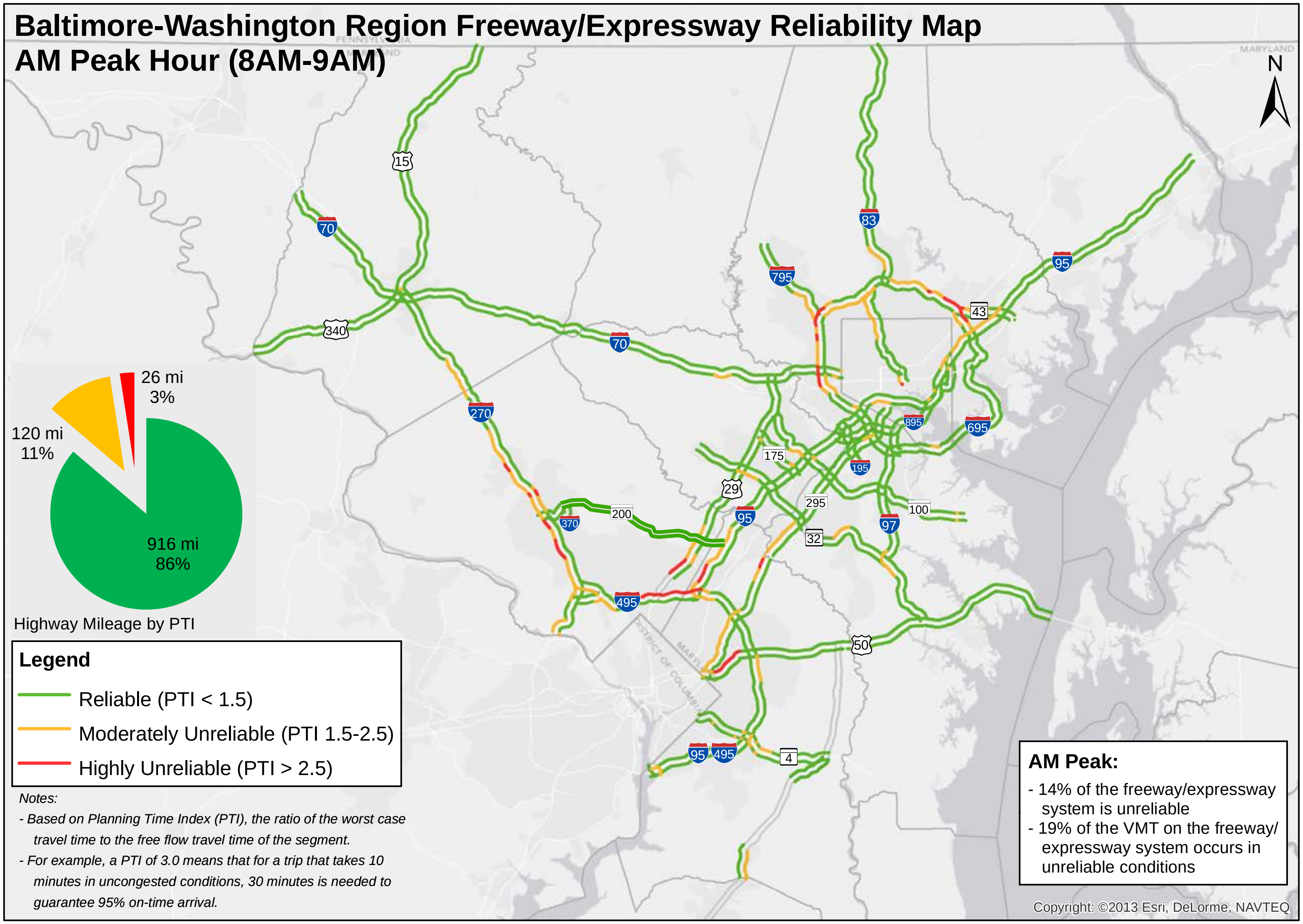
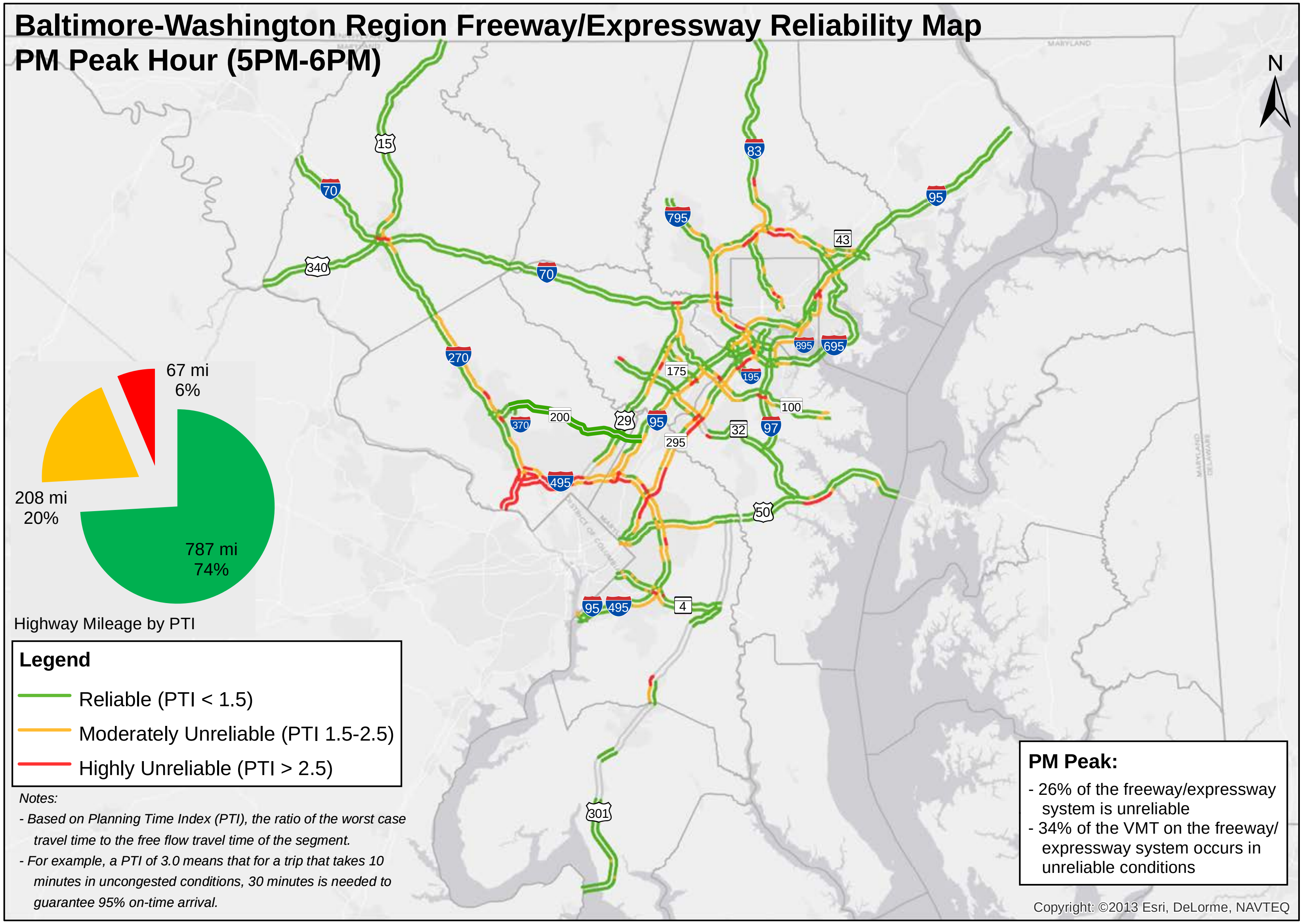
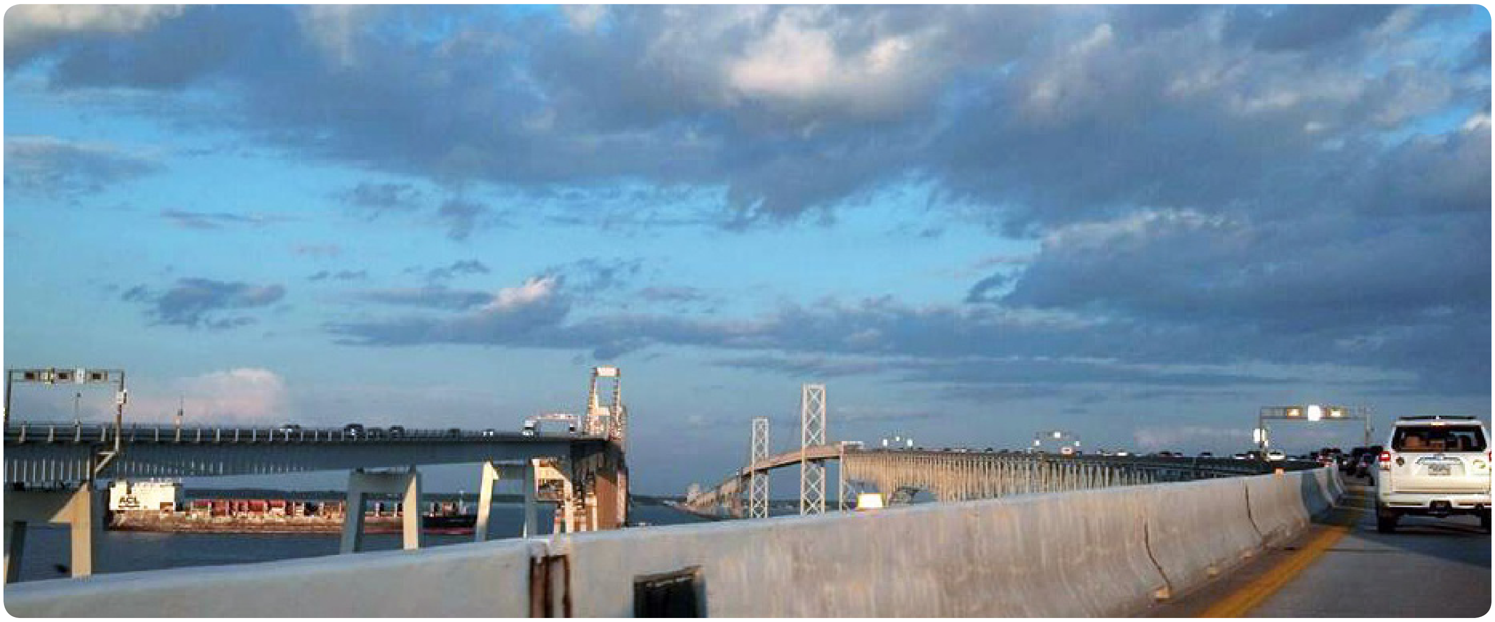

Baltimore-Washington Region Freeway/Expressway Reliability Map
AM Peak Hour (8AM-9AM)
N
26 mi
3%
120 mi
11%
916 mi
86%
Highway Mileage by PTI
Legend
Reliable (PTI < 1.5)
Moderately Unreliable (PTI 1.5-2.5)
Highly Unreliable (PTI > 2.5)
Notes:
- Based on Planning Time Index (PTI), the ratio of the worst case travel time to the free flow travel time of the segment.
- For example, a PTI of 3.0 means that for a trip that takes 10 minutes in uncongested conditions, 30 minutes is needed to guarantee 95% on-time arrival.
AM Peak:
- 14% of the freeway/expressway system is unreliable
- 19% of the VMT on the freeway/ expressway system occurs in unreliable conditions
15
70
340
270
370
200
83
795
95
43
695
895
175
195
29
295
100
97
32
495
50
4
Copyright: ©2013 Esri, DeLorme, NAVTEQ

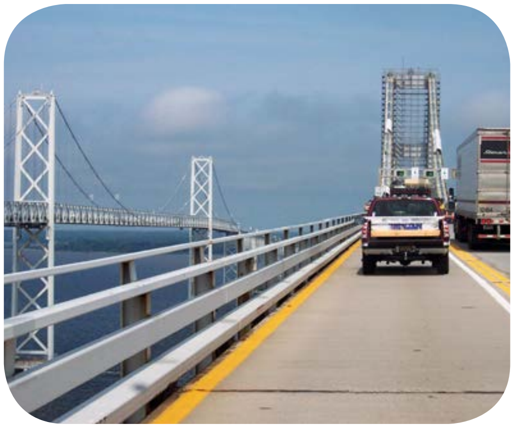
Figure 8


Baltimore-Washington Region Freeway/Expressway Reliability Map
PM Peak Hour (5PM-6PM)
N
67 mi
6%
208 mi
20%
787 mi
74%
Highway Mileage by PTI
Legend
Reliable (PTI < 1.5)
Moderately Unreliable (PTI 1.5-2.5)
Highly Unreliable (PTI > 2.5)
Notes:
- Based on Planning Time Index (PTI), the ratio of the worst case travel time to the free flow travel time of the segment.
- For example, a PTI of 3.0 means that for a trip that takes 10 minutes in uncongested conditions, 30 minutes is needed to guarantee 95% on-time arrival.
PM Peak:
- 26% of the freeway/expressway system is unreliable
- 34% of the VMT on the freeway/ expressway system occurs in unreliable conditions
15
83
70
95
795
43
340
70
270
895
695
175
195
100
370
200
29
95
32
97
295
495
50
95
495
4
301
Copyright: ©2013 Esri, DeLorme, NAVTEQ



EASTERN SHORE AND WESTERN REGION CONGESTION AND RELIABILITY

Many times during the year the Eastern Shore and Western Maryland mobility is impacted. This ranges from Thanksgiving weekend in Cecil County and Western Maryland to "Reach the Beach" during the summer where motorists along major roadways experience increased travel times and congestion on average weekdays. The Eastern Shore and Western Maryland experience pockets of congestion and reliability issues as shown in Figures 1-4 during the AM and PM peak hours. The analysis of the total cost of auto delay, truck delay, wasted fuel and emissions amounts to $81.9 million for the Eastern Shore and in Western Maryland for the weekdays.



D. SHA Mobility Performance for Recurring Congestion Related Projects

Recurring congestion occurs throughout the State from spot intersection locations to long sections of interstate highways. In order to address this congestion, Maryland SHA has constructed various projects. In the past year, ten projects were completed. These ten projects consisted of five major projects and five minor congestion relief projects. The InterCounty Connector (MD 200) which opened in late 2011 was included in this year's report since the analysis was completed in 2012.

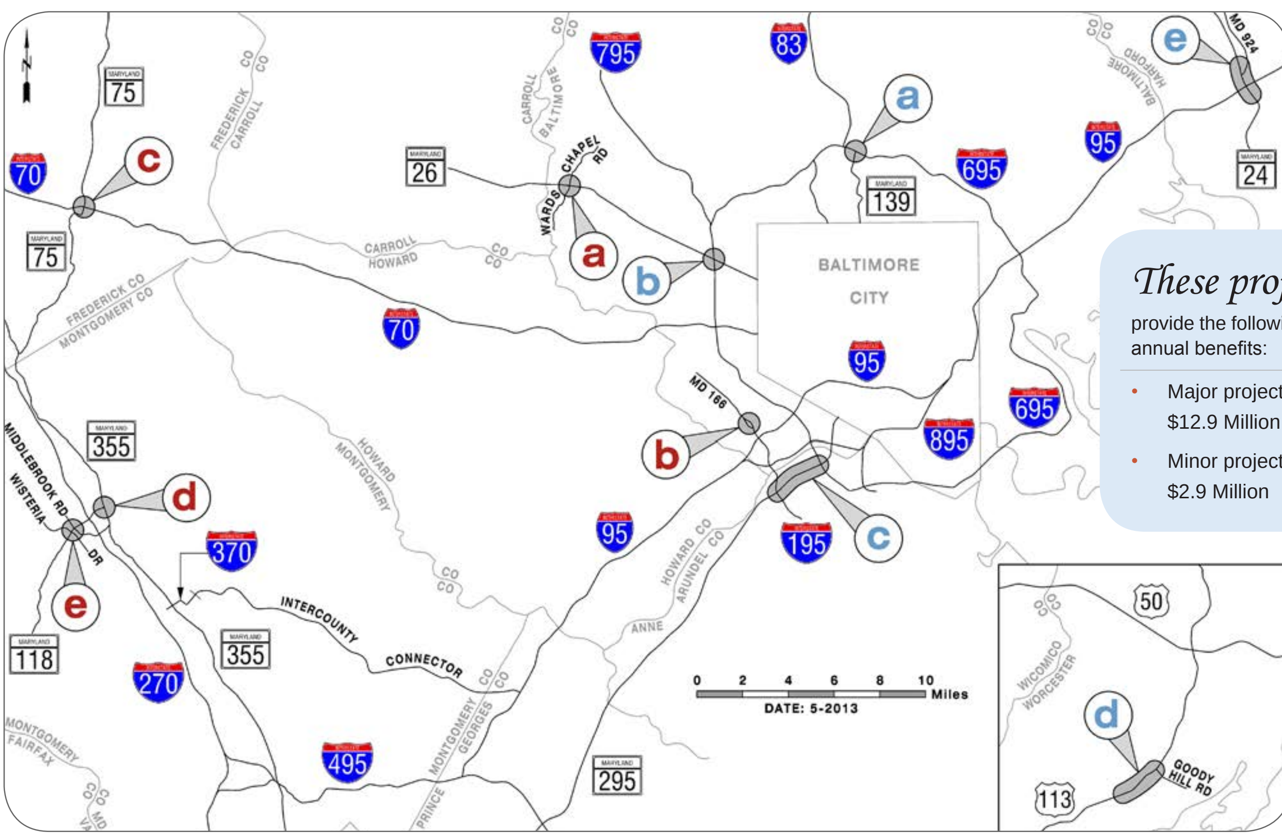
The location of the major and minor projects completed in 2012 is shown on the following map:

Major Projects

a. I-695/MD 139
b. I-695/MD 26
c. MD 295 from I-695 to I-195
d. US 113 Goody Hill Rd. to Massey Branch
e. I-95/MD 24/MD 924

Minor Congestion Relief Projects

a. MD 26 at Wards Chapel Rd.
b. MD 166 at Rolling Rd.
c. I-70 Eastbound Ramp at MD 75
d. MD 355 at MD 118
e. MD 118 at Middlebrook Rd. & Wisteria Dr.



These projects

provide the following annual benefits:

- Major projects: $12.9 Million
- Minor projects: $2.9 Million

MAJOR PROJECTS

The Maryland State Highway Administration even in difficult economic times has still made major investments in the roadway network. By their very nature, major projects result in substantial changes in mobility for the project location and the surrounding areas. Because of this, SHA conducts extensive studies, public hearings and reviews through the planning and design phases to assure the project meets current and future needs of the surrounding community and state as a whole. Because of the significant size and complexity these projects take many years to complete the planning, design, and construction to provide for congestion relief, improve traffic operations and allow for a basis for future improvements. In 2012, in Maryland five major projects were completed, including:

a. I-695 @ MD 139 (Charles Street) (Baltimore County)

This project was commenced due to the condition of the bridge which led to reconstructing the interchange to provide relief to MD 139. The I-695/MD 139 interchange is directly adjacent to the high volume I-83 North interchange. The bridge over I-695 was widened to address any future improvements on I-695.

Along MD 139, the widened bridge provided for additional lanes. The mini-roundabout at MD 139 and Bellona Avenue/Nightgale Way was eliminated and replaced with a signalized intersection.

b. I-695 @ MD 26 (Liberty Road) (Baltimore County)

This interchange, located on the west side of the Baltimore Beltway (I-695), was reconstructed due to the bridge condition. At the same time, operational improvements could be implemented to address the problem of the numerous weaving movements that occurred at this cloverleaf interchange, which caused traffic to back up onto I-695.

The I-695/MD 26 project widened the bridge over MD 26, which allowed for a paint separated collector-distributor (C-D) roadway. This improvement reduces the impact to mainline I-695 motorists and allows for the weaving movements to occur along the C-D roadway. This is expected to assist in reducing crashes by decreasing the speed differential between non-weaving motorists and weaving motorists.

c. MD 295 from I-695 to I-195 (Anne Arundel County)

The Baltimore – Washington Parkway (MD 295) widening project was originally identified in the Baltimore – Washington Thurgood Marshall International Airport Access Study to reduce congestion on the roadway network to BWI Airport. This project involved widening MD 295 from four to six lanes from I-195 to I-695. The additional lanes tie into the existing six lanes near I-695. The on ramp from I-195 westbound to MD 295 northbound became the additional northbound lane. Southbound, the median lane which originally ended just south of I-695 was extended to the diverge to I-195 eastbound on ramp. These movements are the major movements to and from the Baltimore – Washington Thurgood Marshall International Airport.

Traffic benefits from the opening of this project were seen immediately especially in the southbound direction in the AM peak period and the northbound direction in the PM peak period.

It should be noted that the MD 295/West Nursery Road interchange reconstruction started about 6 months after the opening of the MD 295 widening project which reduced one lane each direction along MD 295. This limited the benefits during the calendar year 2012.

d. US 113 North of Goody Hill Road to South of Massey Branch (Worcester County)

US 113 in Worcester County on the Eastern Shore is being dualized in sections to upgrade the roadway to a four-lane divided highway. The roadway north of Goody Hill Road has been reconstructed to a four-lane section and this project continues the widening towards the south. US 113 carries only about 9,000 vehicles per day, but does have a high percentage (13%) of medium and heavy trucks.

The benefit of this project is from a safety and capacity standpoint. The total crash rate for rural two lane highways versus rural four lane highways is approximately 33% higher for similar facilities. US 113 has experienced a fatality rate significantly higher than the statewide average for similar highways.

e. I-95/MD 24/MD 924 (Harford County)

The proximity of the MD 24/MD 924 intersection to the I-95 interchange caused queuing on to the I-95 northbound mainline during the PM peak period. Traffic would queue in the right most lane for approximately one mile creating a safety issue with stopped traffic operating next to free flowing high speed interstate traffic. The MDTA in cooperation with the SHA developed a project to alleviate the congestion along the mainline of I-95 and improve flow through the MD 24/MD 924 intersection.

This construction project involved splitting the ramp traffic for this movement into two movements with one ramp destined to MD 24 and the other ramp bound for MD 924. Adjustments were made to the mainline of MD 24 and the ramps at I-95/MD 24. A diamond interchange was constructed by MDTA at MD 24/MD 924 which alleviated a failing intersection.

f. Major Project Benefits

Traffic analysis was performed to measure the benefits of these projects. The analysis showed the five major projects provided $13 million in annual benefits. The two most beneficial projects were the widening of MD 295 and the construction of the MD 24/MD 924 interchange plus the reconstruction of the I-95/MD 24 interchange.

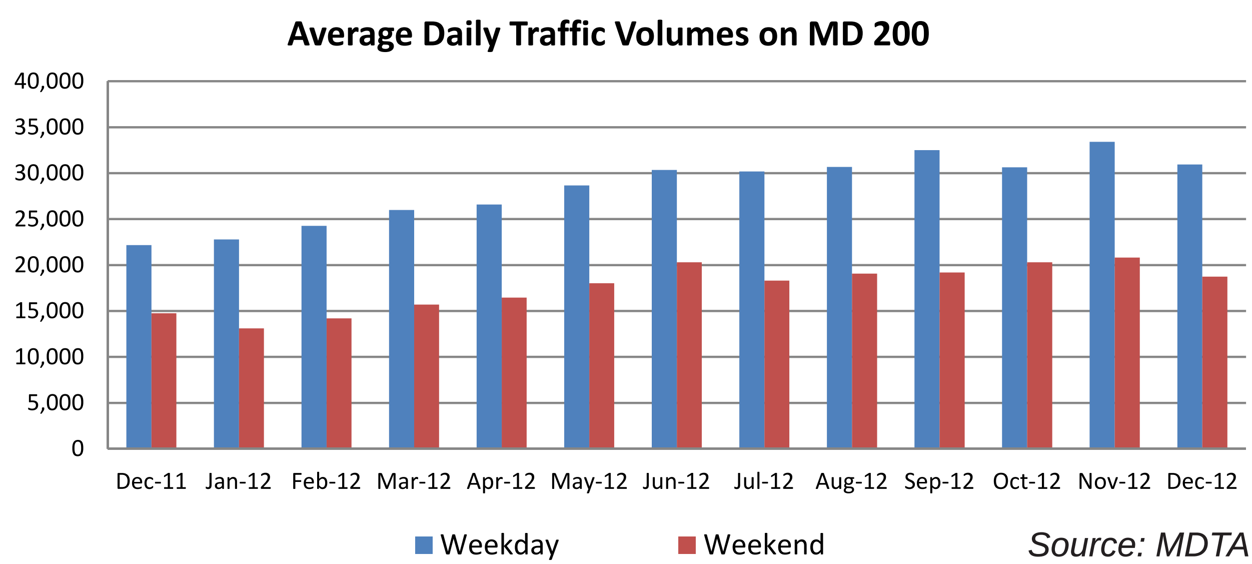
MAJOR CONGESTION RELIEF PROJECTS ANNUAL BENEFITS

Location	Annual Reduction in Delay		Annual Reduction in Fuel Consumption		Annual Cost Savings (Thousands)
	Hours (Thousands)	Savings (Thousands)	Gallons (Thousands)	Savings (Thousands)	
I-695@ MD 139	46	$1,223	13	$49	$1,272
I-695 @ MD 26	9	$263	18	$65	$328
MD 295 – I-695 to I-195	74	$2,054	14	$53	$2,107
US 113 – Goody Hill Rd. to South of Massey Branch	2	$51	-3	$-11	$40
I-95 @ MD 24/ MD 924	292	$9,040	39	$149	$9,189
TOTAL	423	$12,631	81	$305	$12,936

MD 200 (INTERCOUNTY CONNECTOR)

MD 200, otherwise known as the InterCounty Connector (ICC) was opened to traffic between I-95 and I-370 in November 2011. This joint effort between SHA and the Maryland Transportation Authority provided for a six lane 16 mile variable priced toll facility. This major project despite being completed in 2011 was not included in the 2012 analysis report to allow for travel patterns to be established.

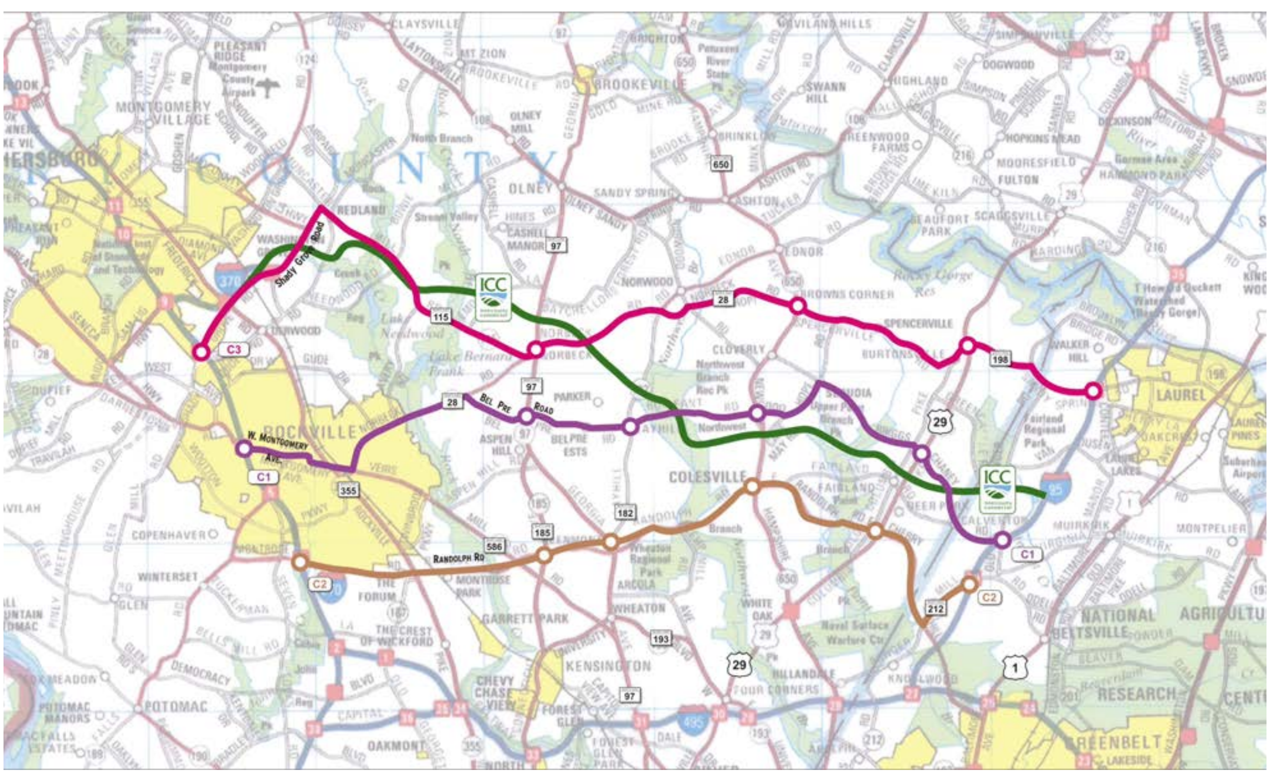
In 2012, average weekday traffic on MD 200 was 28,900 vehicles. Traffic on MD 200 continues to grow steadily at a rate of 3% per month. Between December 2011 to December 2012, average weekday traffic on MD 200 has increased by 40% from 22,200 to 30,900. Average weekend traffic has increased by 28%, from 14,800 to 18,800 vehicles.



Peak hour travel time runs performed by the SHA in the MD 200 study area show that users of MD 200 experience significant travel time savings compared to parallel routes. Motorists traveling the local routes during peak hours also are experiencing time savings due to the diversion of motorists to MD 200. This has resulted in a 5-11% percent decrease in peak hour travel times on parallel corridors. The following table shows the decrease in travel times in 2012 peak hour conditions compared to the "Before MD 200" conditions.

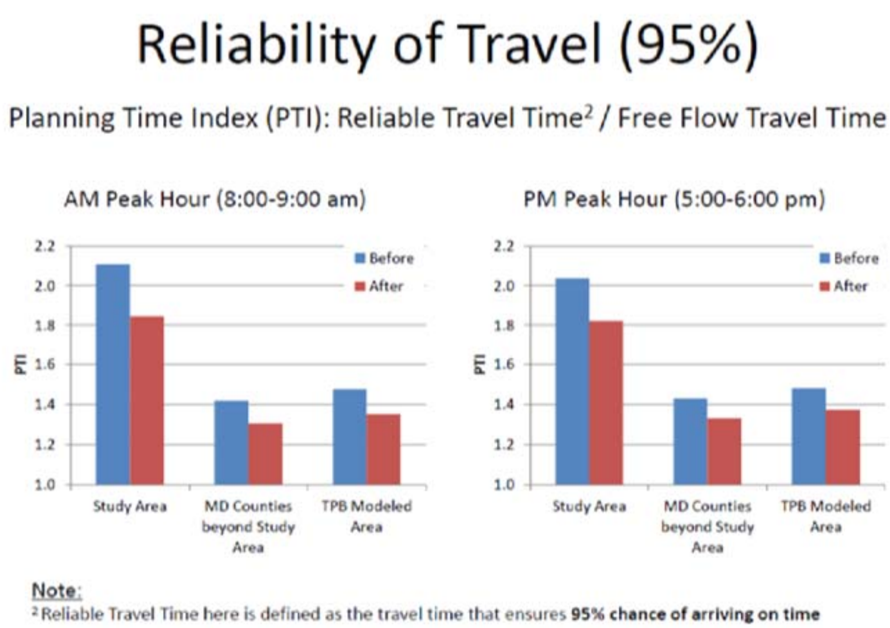
CHANGE IN TRAVEL TIME "BEFORE" AND "AFTER" MD 200

Origin-Destination Pairs	Travel Time (Minutes) Via Corridors 1-3			Travel Time Savings Via MD 200 (Min)
	Before	After	Savings	
MD 200 (I-270 to I-95)		17		N/A
Corridor 1 (S. Gaithersburg to Laurel)	45	40	5 (11%)	23 (58%)
Corridor 2 (Rockville and Calverton)	44	42	2 (5%)	25 (60%)
Corridor 3 (S. Rockville and Beltsville)	40	38	2 (5%)	21 (55%)



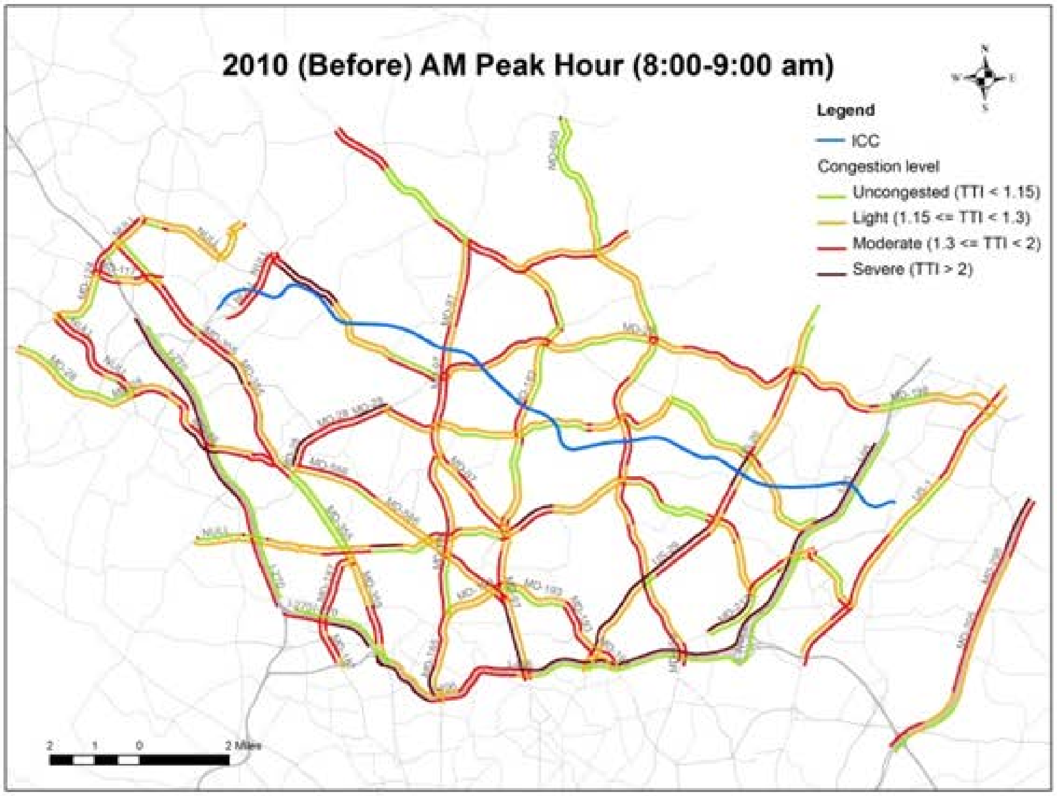
Source: SHA/MDTA/MWCOG ICC Before/After Study, 2013

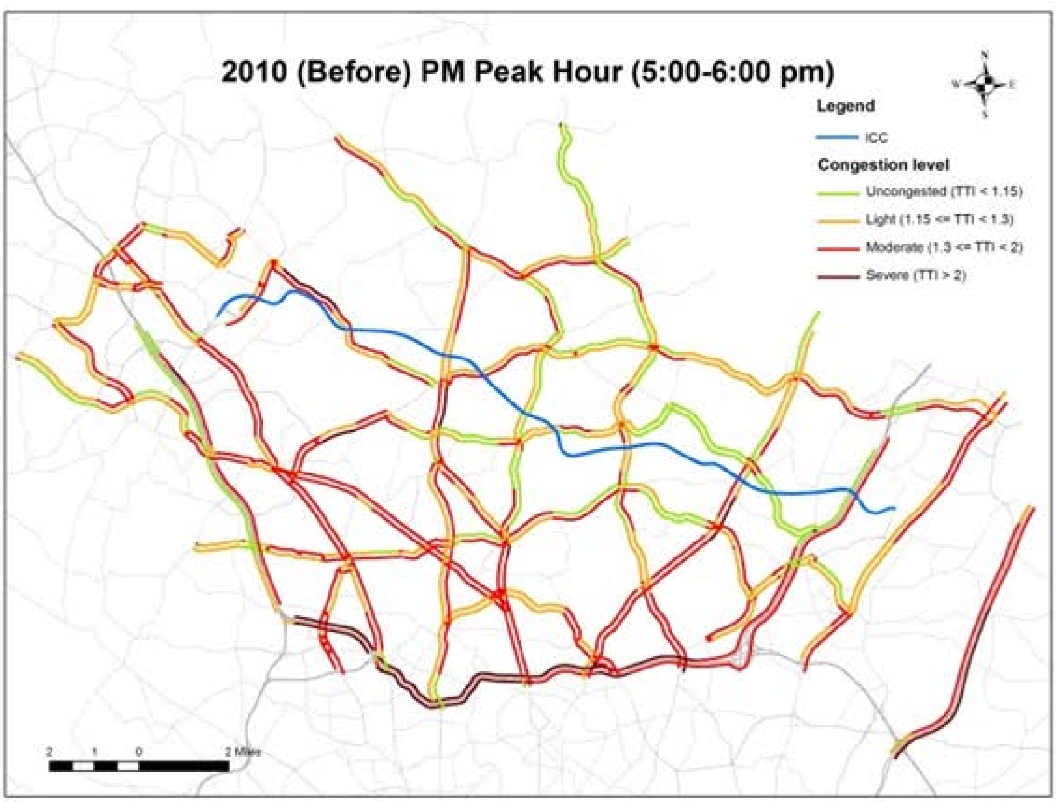
The SHA, with assistance from National Capital Region Transportation Planning Board (NCRTPB) performed a regional before/after study using INRIX vehicle speed data for years 2010 (Before) and 2012 (After). The immediate vicinity of the project recorded double-digit improvements in both congestion and travel time reliability from 2010 (before) to 2012 (after). Within the study area, the percentage of time traveling without congestion during peak morning hours increased from 24 percent before MD 200 was built to 46 percent after MD 200 was operational. The evening peak hour traffic went from 20 percent uncongested conditions before the opening of MD 200 to 42 percent after MD 200 opened. Overall, MD 200 has been a success in saving time, increasing reliability and reducing delays for motorists traveling between Montgomery and Prince George's Counties while reducing congestion and travel time along the local roadway system.

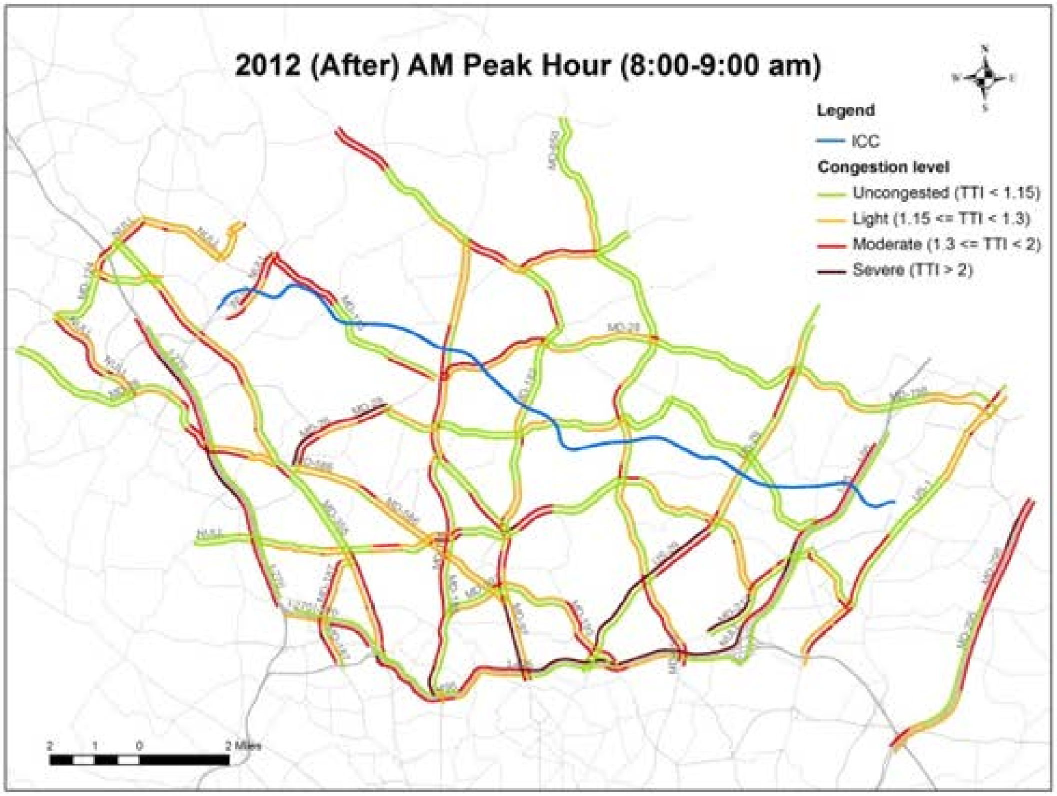


Source: ICC Before/After Study - SHA/NCRTPB Analysis

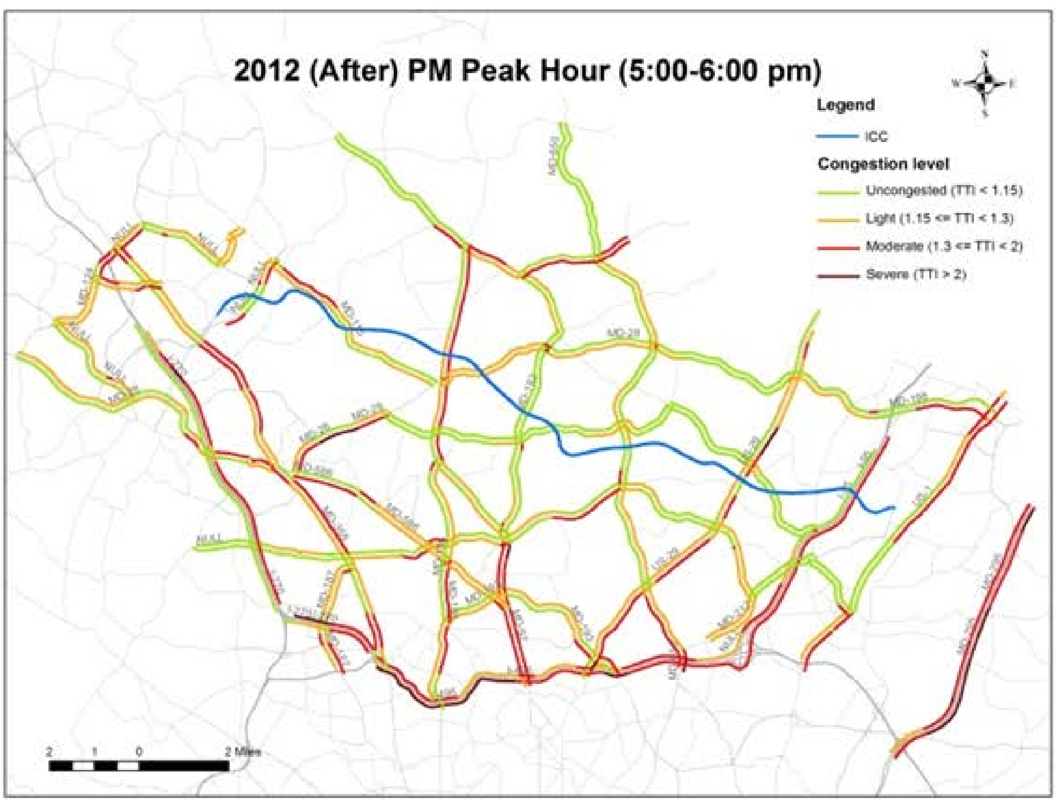
CONGESTION LEVEL COMPARISON IN THE MD 200 REGION BETWEEN 2010 (BEFORE) AND 2012 (AFTER)





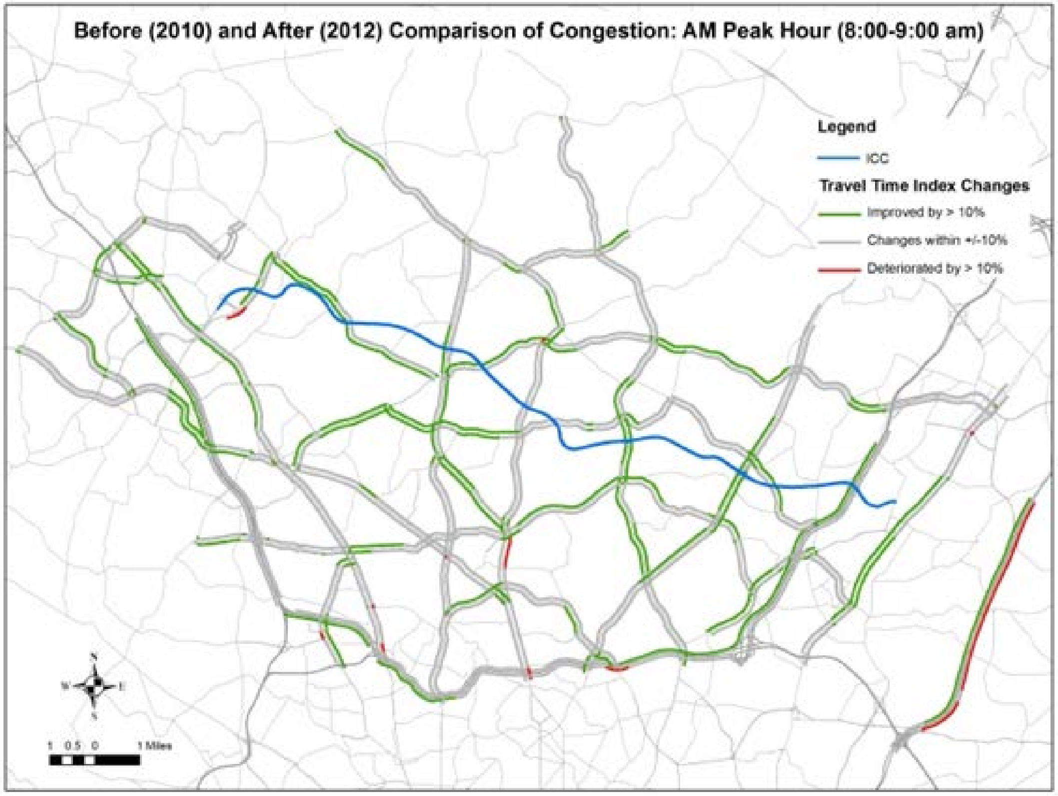


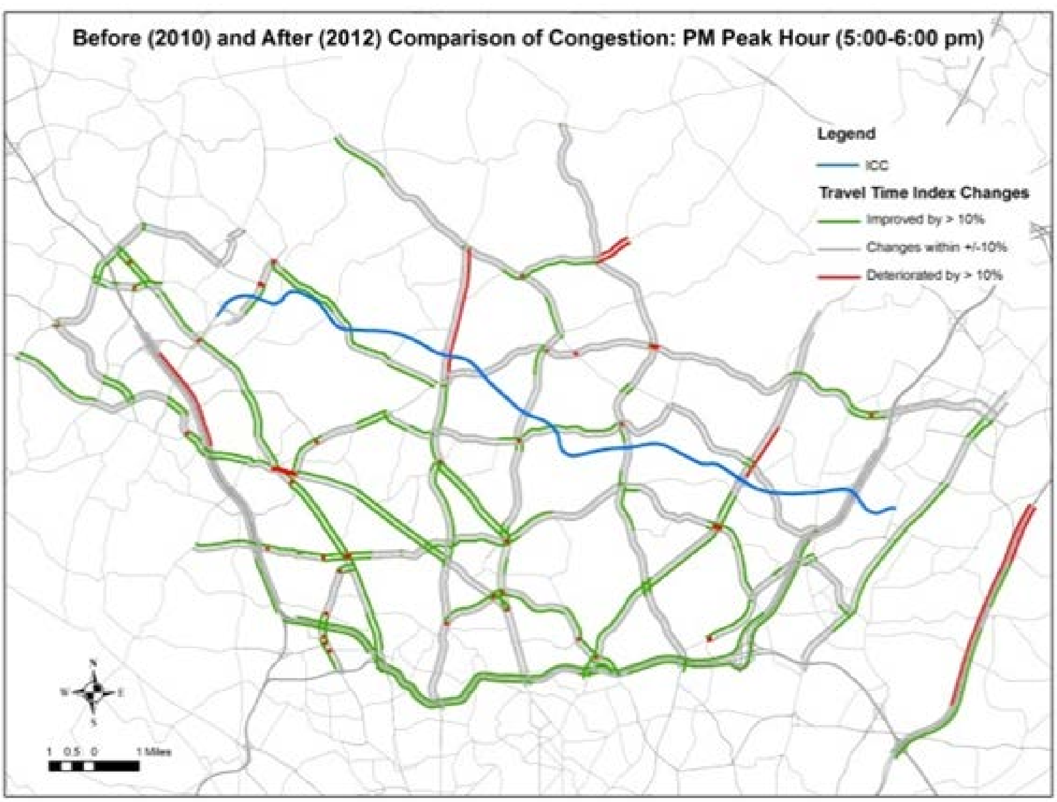
2012 (After) AM Peak Hour (8:00-9:00 am)



2012 (After) PM Peak Hour (5:00-6:00 pm)

CHANGE IN CONGESTION LEVELS IN THE MD 200 REGION BETWEEN 2010 (BEFORE) AND 2012 (AFTER)





MINOR CONGESTION RELIEF PROJECTS

In addition to major projects, several intersection improvement projects were constructed during the 2012 calendar year. These intersection improvements were either part of the SHA Congested Intersection Program or required from developers to mitigate their impact to traffic. The Congested Intersection Program addresses congestion issues at failing/near failing signalized intersections on state roadways using relatively low cost geometric improvements. The intersections typically funded for geometric improvements often experience frequent phase failures, turn bay spillovers, long queues blocking upstream intersections, and/or blocked turn bays. Turn bay extensions can assist in reducing the occurrence of spillovers and blockages, while providing additional turn lanes or through lanes can reduce queues and increase intersection throughput. Projects funded in this category have cost constraints and are typically spot intersection type improvements for existing conditions (rather than corridor-wide improvements for future demand). SHA maintains a streamlined process to develop and implement projects across the state, which along with congestion relief provide safety and environmental benefits.

a. MD 26 at Wards Chapel Road (Baltimore County)

This intersection is located in northwest Baltimore County along the Liberty Road (MD 26) corridor approximately one-half mile east of the Carroll County line. MD 26 carries approximately 19,000 vehicles per day through this section. The improvement consisted of providing a second through/right lane eastbound along MD 26. Over 1,000 eastbound motorists during the AM peak benefited from the reduced delayed at the intersection.

b. MD 166 at Rolling Road (Baltimore County)

This intersection exists just east of the terminus of I-195. It is located adjacent to the I-195 Southwest Park and Ride lot. The access point to/from the Park and Ride lot was directly adjacent to the left turn from the MD 166 to Rolling Road eastbound movement. This caused numerous conflicts between motorists turning out of both of these locations at the same time. The improvement was to reconfigure both access points on MD 166 to one location which would allow motorists to ingress the Park and Ride lot at that location. The egress from the Park and Ride lot would occur at a separate location. The intersection was signalized.

c. I-70 Eastbound Ramp at MD 75 (Frederick County)

The I-70/MD 75 interchange is located in Frederick County near New Market. The eastbound off-ramp left turn is a high volume movement with approximately 600 left turns in the peak hour in a single lane. The improvement consisted of providing a double left turn movement for this ramp to MD 75 northbound to reduce queuing along the ramp and provide for a more efficient signal operation. This project reduced delay along MD 75.

d. MD 355 at MD 118 (Montgomery County)

The MD 355/MD 118 intersection is located in northern Montgomery County. MD 118 interchanges with I-270 just to the west of this project. This improvement consisted of extending the single left turn lane on southbound MD 355 by approximately 300 feet to increase the left turn queue storage and allow motorists turning left to access the turn bay.

e. MD 118 at Middlebrook Road and MD 118 at Wisteria Drive (Montgomery County)

Both of these signalized intersections are located within 1000 feet of each other. The improvements that were constructed were similar at both locations which consisted of adding a second left turn lane in the eastbound direction. This improvement assisted in reducing the amount of green time the left turn needed and reduced the overall delay at the intersection.

f. Minor Congestion Relief Project Benefits

Analysis was performed on the improvements that were completed as part of the Congested Intersection Program to determine the benefits that these projects provided. The five Congested Intersection Program Projects completed in 2012 provided $2.9 million in benefits with the largest benefit being provided by the I-70 eastbound ramp at MD 75. The summary of delay and fuel savings is depicted in the following table:

MINOR CONGESTION RELIEF PROJECTS ANNUAL BENEFITS

Location	Annual Reduction in Delay		Annual Reduction in Fuel Consumption		Annual Cost Savings (Thousands)
	Hours (Thousands)	Savings (Thousands)	Gallons (Thousands)	Savings (Thousands)	
MD 26 @ Wards Chapel Road	16	$438	3	$9	$447
MD 166 @ Rolling Road	4	$112	2	$6	$118
I-70 Eastbound Ramp @ MD 75	59	$1,913	37	$107	$2,020
MD 355 @ MD 118	2	$42	3	$7	$49
MD 118 @ Middlebrook Rd & MD 118 @ Wisteria Drive	9	$241	9	$25	$266
TOTAL	90	$2,746	54	$154	$2,900

Developments that impact the State roadway system must include measures to mitigate for the additional traffic they generate on the network. The improvements can range from acceleration and deceleration lanes into the property to a major intersection improvement. In 2012, several different improvements were constructed through the development review process administered by the SHA Access Management Division.

Some of the locations where improvements took place statewide include:

- US 50 at MD 16 (Dorchester County)
- US 50 at Wal-Mart Access (Worcester County)
- MD 175 at MD 108 (Howard County)
- MD 140 at Meadow Creek Drive (Carroll County)
- MD 26 at Wormans Mill Road (Frederick County)

These projects resulted in improved operations, providing savings in user travel times and fuel costs.

SIGNAL SYSTEM OPTIMIZATION PROJECTS

One of the most cost-effective methods for improving traffic operations through a given corridor is to better synchronize signals in order that they are more responsive to traffic flows. This reduces delays to motorists and decreases automobile emissions. It provides for improved safety and increased person throughput. In studies from around the country, the benefits of signal optimization include reducing travel time from 7% to 25%, lowering delays by about 5% to 15% and number of times motorists need to stop is cut by 10% to 20%.

The SHA has 249 signal systems across the State which include 1,524 signals. The signal systems are reviewed and adjusted on a three to five year basis with an objective of reducing delay by 5% or more. The process of upgrading signal timing includes gathering new traffic volume data, performing traffic modeling, developing adjustments to the timing patterns and conducting travel time runs to evaluate the before and after results of the adjustments. In 2012, SHA continued with its program to enhance signal timing in which, 46 signal systems were reviewed, that included 279 signals. No new systems were added in 2012. The signal retiming and optimization modifications provided an estimated reduction of almost 1.2 million hours of delay for motorists. The fuel, delay and emissions savings resulted in approximately $37 million total user annual cost savings.

TRANSIT SIGNAL PRIORITIZATION PROJECTS

To encourage transit use, it is crucial that buses operate on-time. One way to improve on-time performance is through the use of signal prioritization and queue jump/bypass lanes at signalized intersections. This approach allows buses the ability to continue to operate at a consistent pace and reduces the variation in travel times for buses over the entire route. This provides for more consistent on-time performance and reduces the variation in arrival times at stops along the route. The Washington Metropolitan Transportation Authority (WMATA) is currently leading an initiative evaluating 27 locations on the US 1 and MD 193 corridors for signal prioritization. Seven additional locations are being reviewed for the potential of installing queue jump/bypasses to stopped traffic. In addition, Montgomery County and SHA are identifying priority corridors to implement signal prioritization. Corridors are being screened to determine the most beneficial locations for further study and implementation.

REVERSIBLE LANES

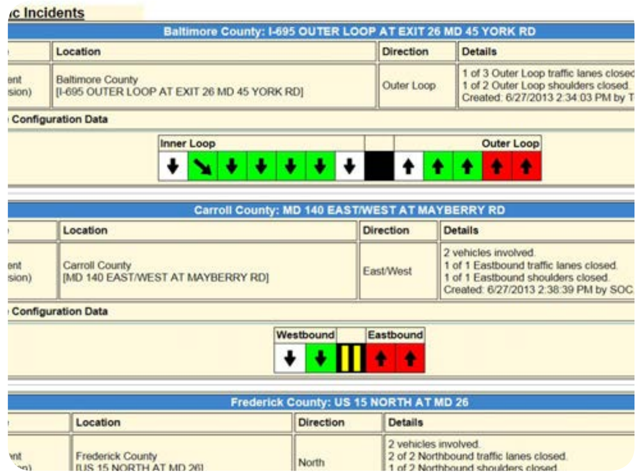
The ability to add capacity on the roadway system faces many challenges including right-of-way constraints, environmental impacts and cost. To overcome these challenges, SHA continues to consider strategies to better use existing facilities. One method of maximizing the use of existing roadway geometrics is through the use of reversible lanes. Reversible lanes are utilized where traffic volumes are very high in one direction and much lower in the other direction. The reversible lanes are limited to certain hours of the day. Among the issues that reversible lane operations face, are driver familiarity with the operations, left turning traffic, overhead lane signals or adequate signing, when the reversible lanes should operate and ease of implementing the operation.

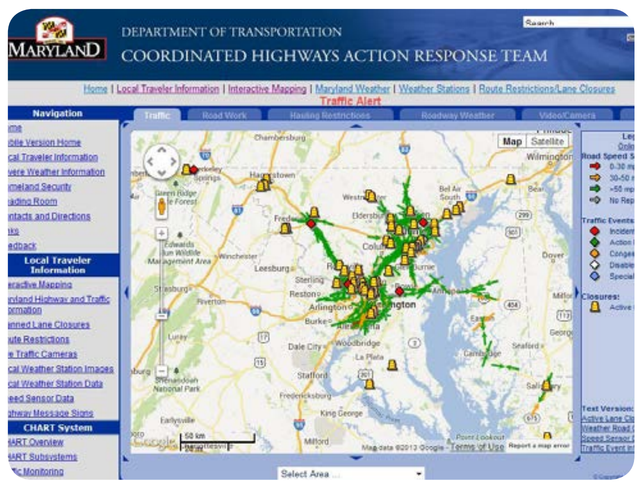
There are four locations where reversible lane operation occurs, including:

- MD 177 from MD 100 to West of South Carolina Ave (Anne Arundel County)
- MD 97 from I-495 to MD 390 (16th Street) (Montgomery County)
- US 29 from Rock Creek Parkway to MD 97 (Georgia Ave) (Montgomery County)
- US 50/301 Bay Bridge (Anne Arundel/Queen Anne’s County)

The MD 177 reversible operation is in place due to the high volume of traffic from the Riviera Beach area heading westbound in the AM peak period and returning home in the PM peak period. The MD 97 and US 29 traffic in the morning is destined southbound into the Silver Spring employment center and returning northbound in the PM peak period. The Bay Bridge is the most familiar reversible lane operation in the State. The combined five lanes between the two bridges is modified either to provide two lanes eastbound and three lanes westbound or three lanes eastbound and two lanes westbound. Originally, the reversible lane operation occurred only in the summertime when persons were trying to “Reach The Beach”. Due to increased commuter traffic, changes are made to the reversible lane operation during weekday peaks. By the reversible lane operation at the Bay Bridge, during the peak hour over 1,000 additional motorists are able to cross the bridge.

III. Incident Management & Traveler Information Systems





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III. Incident Management & Traveler Information Systems

A. Introduction

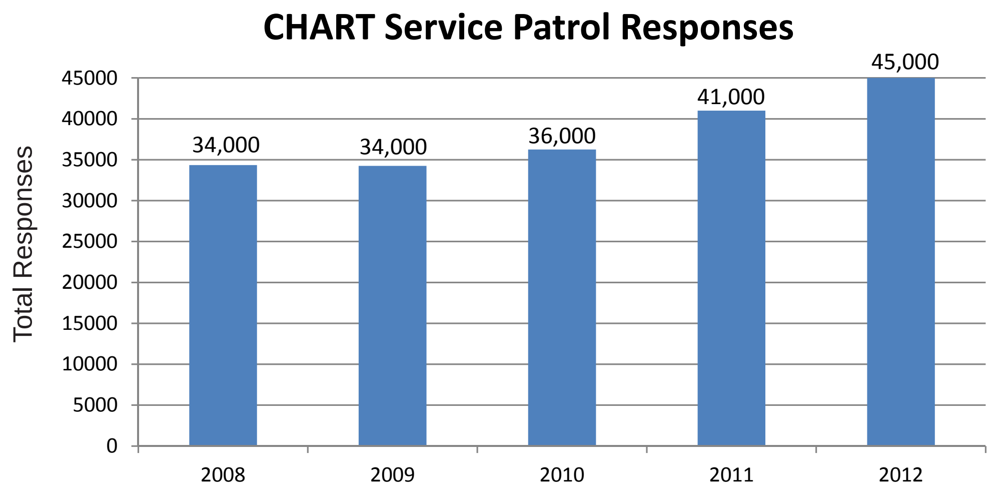
Non-recurring congestion includes crashes, vehicle breakdowns, work zones, special events, and weather events. Nonrecurring congestion is estimated to account for 50% of all delays on Maryland roadways. The importance of avoiding crashes and providing emergency response in a timely manner is critical both for safety and mobility. Any effort to minimize incident clearance time will not only contribute towards minimizing crash-related safety impacts but also significantly reduces the user and agency costs in terms of travel delay, fuel consumption, and emission reductions. The SHA Coordinated Highways Action Response Team (CHART) Program, a joint effort between the Maryland Department of Transportation (MDOT), Maryland State Police (MSP), and the Maryland Transportation Authority (MDTA), improves real-time operations for Maryland's highway system through communication, system integration, incident response and management, service patrols, and advanced traffic management systems. CHART's mission is to "Improve mobility and safety for the users of Maryland's highways through the application of ITS technology and interagency teamwork." CHART is involved in the following areas:

- Traveler Information
- Traffic and Roadway Monitoring
- Incident Management
- Emergency Preparedness
- Traffic Management
- Emergency and Weather Operations

B. Incident Management

CHART provides services for incident management. Their goal is to improve response times and clear incidents quickly as well as proactively providing service patrols along major roadways. At the Statewide Operations Center (SOC) near BWI Airport and its three regional operations centers, traffic is monitored through numerous intelligent transportation devices such as closed-circuit television (CCTV) cameras, speed sensors, and weather stations. When an incident occurs, the necessary information is relayed to emergency service personnel tasked with responding to an incident. SHA and MDTA operates emergency traffic patrols to assist drivers when their vehicles become disabled. SHA has partnered with State Farm Insurance to expand CHART's emergency traffic patrol coverage. These daily patrols supplement CHART's current coverage and optimize incident response in identified high-volume/high-incident locations. There are currently 24 full-time and seven part-time Emergency Traffic Patrols (ETP's) in the Baltimore, Frederick, Washington and Annapolis areas that offer various types of motorist assistance on the freeways. With the use of various ITS technologies, travel time information is available to motorists along the major roadways. As a result of all of these incident management and traveler information system initiatives, CHART has saved billions of dollars since its inception, for the roadway user in terms of lost time, fuel, and emissions.

One of the key elements to reducing non-recurring congestion is to provide a quick response and mitigation to any incident. A timely response and efficient management have been shown to reduce the potential of secondary incidents. In 2012, the CHART Program responded to and cleared more than 17,000 incidents and assisted more than 28,000 stranded motorists. The total number of CHART responses on a yearly basis is illustrated in the following graph.

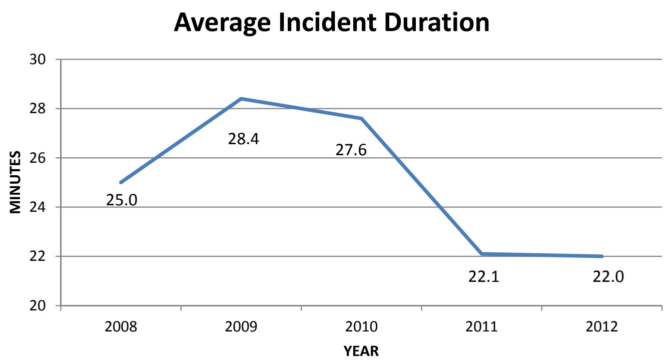


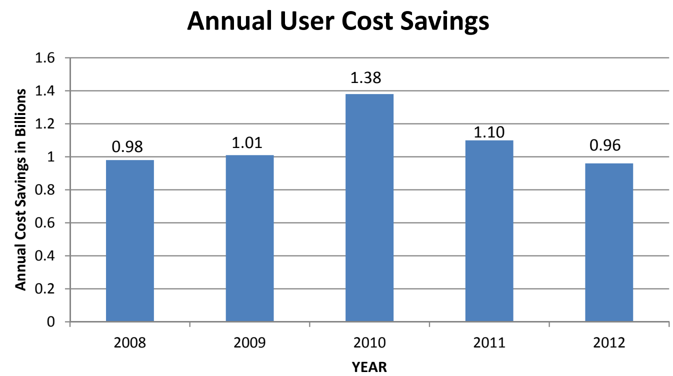
C. Incident Clearance Times

The CHART Program recognizes the importance of faster incident clearance and the associated benefits in reducing delay, improving mobility, and providing safer conditions. Once the traffic and roadway monitoring system has identified a problem, an immediate response is initiated to clear the incident and re-open lanes as quickly as possible, while protecting the safety of those involved in the incident, the emergency personnel responding, and other travelers in the vicinity. CHART operates a nationally recognized incident management program which depends heavily on the cooperation of the SHA, MSP, MDTA and numerous other agencies. The tools used for incident management include:

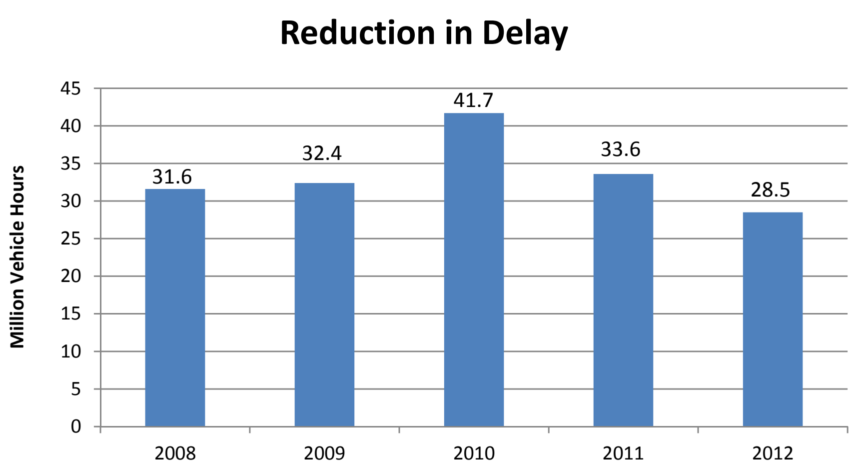
- Emergency Traffic Patrols (ETP's) are used to provide emergency motorist assistance and to clear disabled vehicles from the travel lanes.
- Emergency Response Units (ERU's) establish overall traffic control at crash locations.
- Freeway Incident Traffic Management (FITM) trailers, are pre-stocked with traffic control tools including detour signs, cones, and trailblazer signs. They are used to quickly set up pre-planned detour routes when incidents require full roadway closure.
- A "Clear the Road" policy provides direction for the rapid removal of vehicles from the travel lanes rather than waiting for a private tow service or time-consuming off-loading of disabled vehicles which are blocking traffic.
- An Information Exchange Network (IEN) Clearinghouse, provided by an I-95 Corridor Coalition workstation at the SOC, shares regional incident and traveler information to member agencies along the Corridor.

The goal is to provide quick response time to reduce the duration of incidents and, therefore, the amount of delay that motorists experience. This, in turn, provides user cost savings to the motorists. In 2012, CHART's average response time was less than 10 minutes, and the average incident took 22 minutes to clear, savings motorists using Maryland highways approximately $962 million. The following graphs show the trends of average incident duration and annual user cost savings for the last five years.





The combination of a quick response time plus reducing the average incident duration not only means a savings in annual user cost but a more important consideration, is the reduction in delay. The following graph depicts that delay is reduced by almost 29 million vehicle hours due to the CHART system.



D. Intelligent Transportation Systems

The various ITS devices deployed throughout the state constitute the backbone of the CHART system. These include:

- 80 + Dynamic Message Signs
- 35+ Traveler Advisory Radios
- 200+ Speed Detectors
- 600+ CCTV Cameras which include video feeds from other agencies
- 50+ Roadway Weather Information Systems

CHART also integrates:

- Traveler Information - CCTV Camera Video Sharing with First Responders and Internet (www.traffic.md.gov)
- Traffic and Roadway Monitoring - Cell phone #77, CCTV, and Public/Private Partnerships
- Incident Management - Emergency Traffic Patrols, CHART Operations Center, and Emergency Response Units
- Emergency Preparedness - Redundant Power and Communication, Decentralized Communications, and Department of Transportation Emergency Operations (DOTOPs)
- Traffic Management - Special Event and Work Zone Management
- Emergency Weather Operations - Automatic Vehicle Location Fleet Management System and Resource Tracking System
- Maryland 511 Traveler Information System - High-quality, Timely, and Comprehensive Travel Information to Motorists

The CHART system provides many benefits to motorists. Expanding the system will further assist travelers with providing better traffic operations statewide. In 2012, CHART deployed and integrated four new dynamic message signs into the network. Through real time analysis of INRIX traffic probe data, CHART is able to post travel time information on 47 dynamic message signs (DMS). MDTA also uses the CHART system to post travel time information on eight DMS and toll rate information on another ten DMS. The Maryland 511 Travel Information System continues to provide useful, high-quality, timely, and comprehensive travel information. In 2012, two enhancements were made to the Maryland 511 system: (1) e-mail/text alerts and (2) arterial traffic flow reports for the Eastern Shore.

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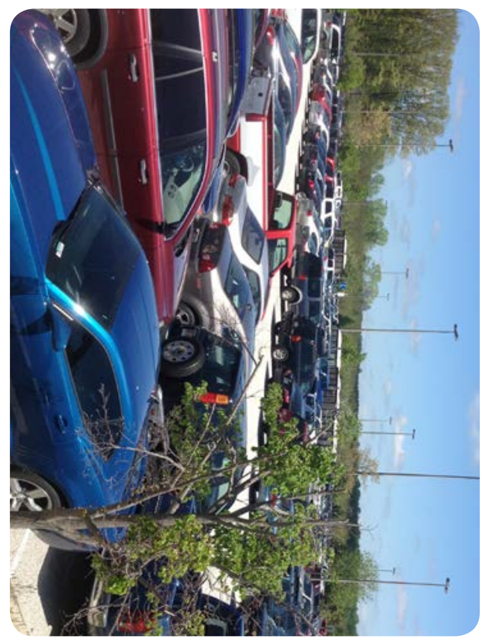
IV. Multi-Modalism & Smart Growth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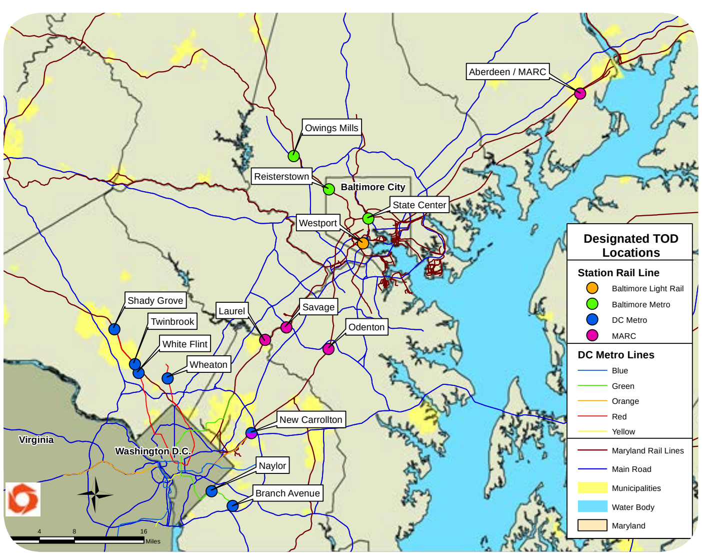
A. Introduction

The State of Maryland prides itself on providing transportation choices to reduce the number of vehicle trips on the roadway network that support smart growth in urban areas. Smart growth encourages development near transit centers through policies applied to create transit oriented developments. The reduction in vehicle trips involves providing transit service, high occupancy vehicle lanes, park and ride lots and pedestrian and bicycle accommodations. Congestion and reliability are improved by providing modal choice reducing the dependency on automobile travel. This brings about additional benefits of reducing air pollution, fuel savings and reducing delay to the other roadway users.

B. Transit Oriented Development

Transit oriented development (TOD) is a method to promote the efficient use of land and infrastructure by building communities that encourage alternative modes of transportation to homes and employment centers. TOD creates a place around transit stations where residents and employees can conveniently walk, bike, or take transit to and from their destinations. This is accomplished by having a mix of higher density residential, office, commercial, and civic land-uses in conjunction with a pedestrian friendly environment that provides walking access to a transit center.

Maryland instituted a TOD program in 2008 which allows TOD projects to get prioritization for technical assistance, prioritization for certain discretionary funding, financing tools, prioritization for the location of State offices, Sustainable Community designation benefits, and support from the SHA and the Maryland Transit Administration (MTA) on access improvements. Since 2008, 15 locations have been designated as TOD sites. The latest site receiving designation is White Flint in Montgomery County. Owings Mills Town Center also saw significant construction progress in 2012, including a new library, a branch of the community college, commercial and residential units. The library and community college branch are now open and the first commercial and residential units are anticipated to open in 2013.



C. Transit Projects

Another method to increase mobility is through the construction of transit projects. The Maryland Department of Transportation (MDOT) and MTA have two major new light rail lines in design. These are the Red Line in the Baltimore region which will extend 14.1 miles from western Baltimore County to eastern Baltimore City and the Purple Line in the Washington region which will extend 16 miles from New Carrollton to Bethesda. In the Washington Region, the Corridor Cities Transitway (CCT), a new bus-rapid transit (BRT) line is also under development. In 2012, the CCT reached an important milestone with the selection of the preferred alignment and mode. This BRT line will extend from the Shady Grove Metro Station, through the Life Sciences Area, to the Metropolitan Grove MARC station. Once complete, these new transit lines will provide increased accessibility and mobility for tens of thousands of Maryland residents. Finally, Montgomery County has partnered with SHA and MTA on planning for two additional new Bus Rapid Transit lines, on Veirs Mill Road and Georgia Avenue.

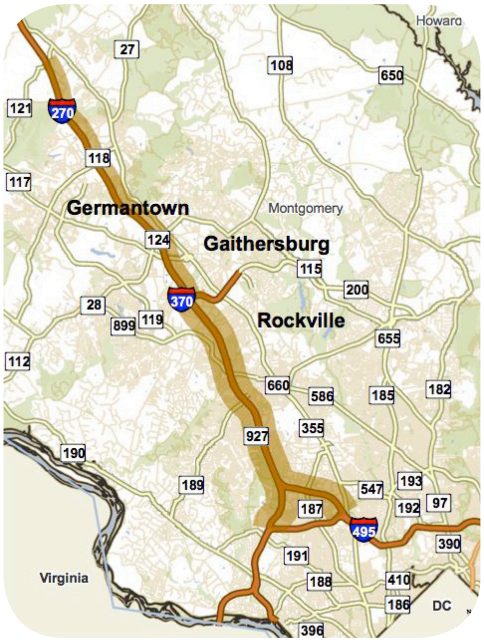
D. HOV Performance

High occupancy vehicle (HOV) lanes promote carpooling, van and bus usage. The lanes maximize person throughput instead of just vehicle throughput. HOV lanes offer a travel time savings for multiple occupant vehicles over single occupant vehicles by restricting access to vehicles that have two or more occupants. There are two roadways in Maryland where HOV lanes are in operation. They are:

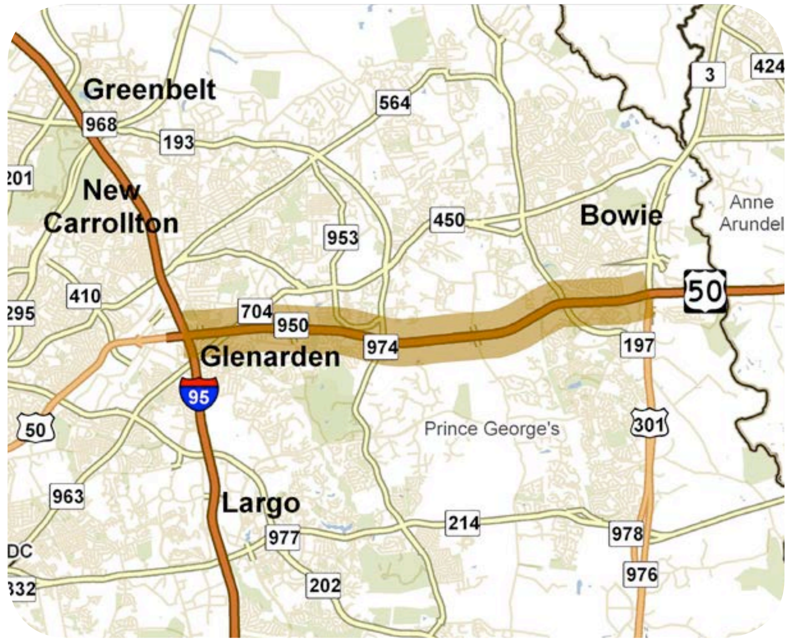
- I-270 – I-495 to MD 121 (Northbound)
- I-270 – MD 117 to I-495 (Southbound)
- US 50 – US 301 to I-95

The I-270 HOV lanes operate southbound from 6:00 to 9:00 AM and northbound from 3:30 to 6:30 PM while the US 50 HOV lanes operate 24 hours a day. The HOV lanes are restricted to two or more occupants per vehicles, transit vehicles, motorcycles, or plug-in hybrid vehicles (permit required). HOV lanes in combination with park and ride lots increase person throughput and provide a viable alternative transportation mode for commuters.

I-270

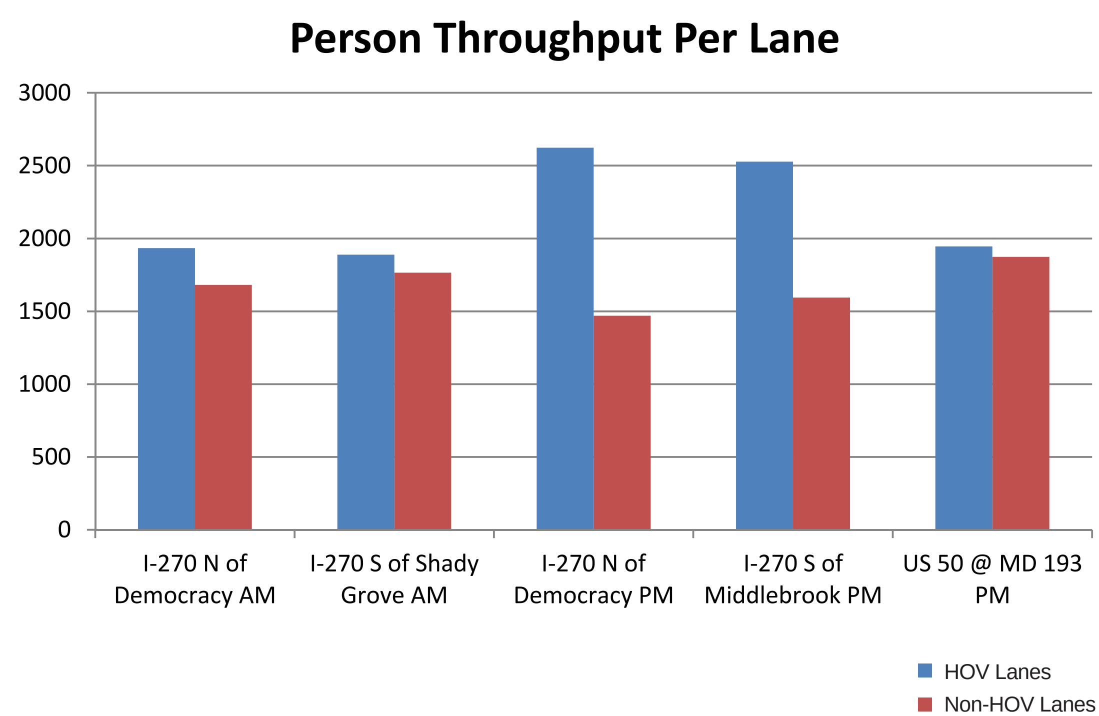


US 50



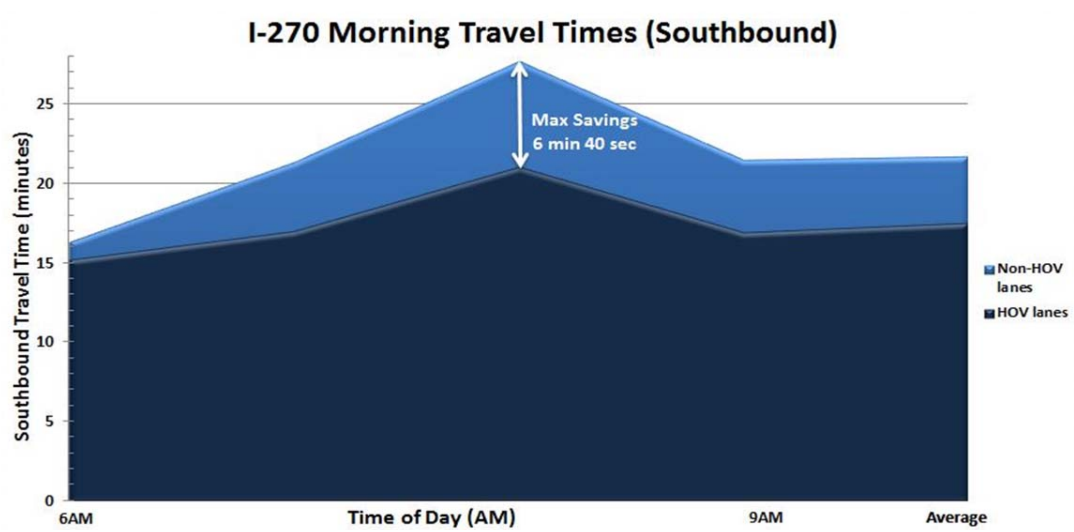
HOV Facilities Person Throughput

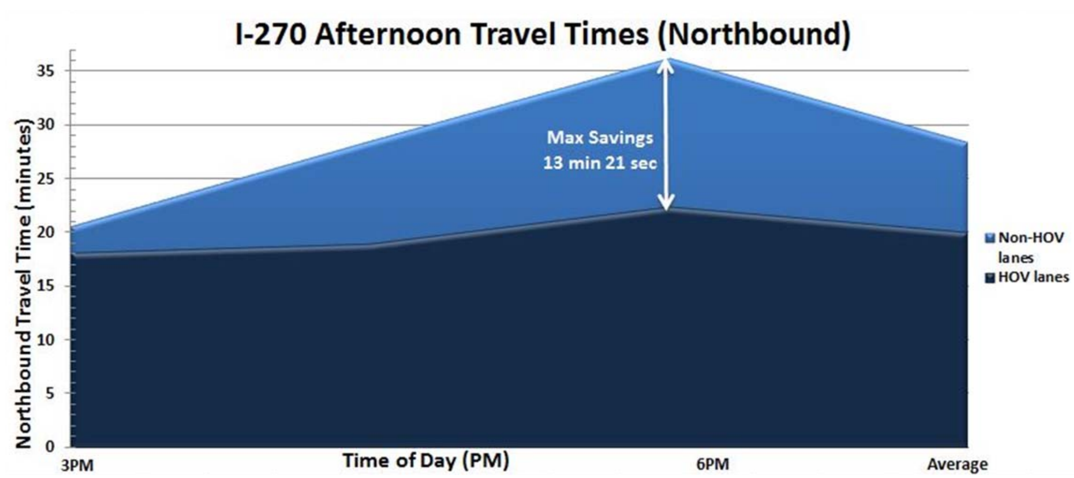
HOV Lanes Versus Non HOV Lanes



The person throughput for I-270 and US 50 is higher in the HOV lanes than the non-HOV or general purpose lanes even though the number of vehicles traversing the HOV lanes is lower.

The HOV lanes also provide for a significant time savings. In the afternoon, motorists on I-270 can save up to 14 minutes utilizing the high occupancy vehicle lanes versus the general purpose lanes for travelling the entire length of the facility. A travel time savings of up to 7 minutes occurs in the morning peak period using the I-270 HOV lanes.



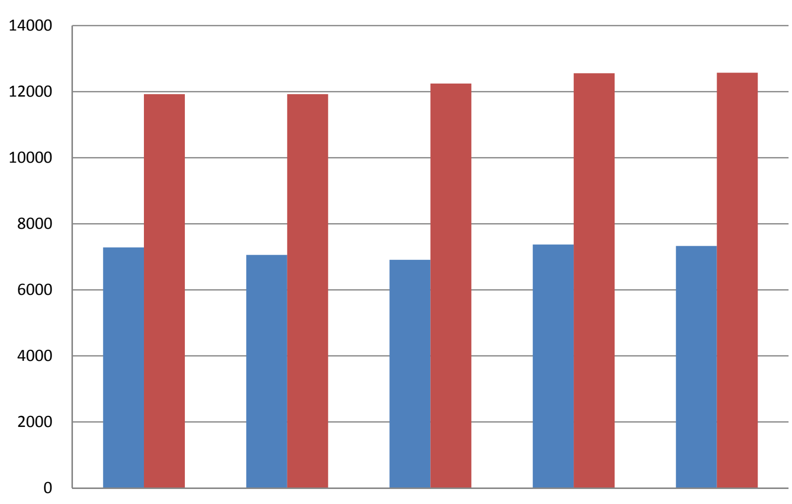


E. Park and Ride Lots

One method of reducing trips to an urban area is by providing park and ride lots. This lowers the number of single occupant vehicles and increases the number of transit trips and carpools. The SHA and the MDTA have established a network of park and ride lots throughout the State. Park and ride lots are located off each of the nine interchanges on I-95 from I-695 near White Marsh to the Delaware State Line as an example of this commitment.

There are 103 park and ride lots located in 20 counties throughout the State providing a total of 12,572 spaces. These range in size from less than 15 spaces to more than 800 spaces (MD 5 in the Waldorf area of Charles County and MD 665 at Riva Road in the Annapolis area of Anne Arundel County). In 2012, the Park and Ride lot at I-68 at Christie Road (Allegany County) was expanded by 18 spaces.

All of the lots are surveyed during the spring and fall to determine the number of occupied spaces. In 2012, approximately 7,300 spaces were utilized on a given day which accounts for about 60% usage of the total spaces. The average daily usage for park and ride lots for the last five years is depicted in the graph below. It is estimated that providing the park and ride lot facilities resulted in 108 million fewer vehicle miles of travel in 2012.



SHA/MDTA Park and Ride
Lot Spaces and Uses

F. Bicycle and Pedestrian Accommodations

BICYCLE AND PEDESTRIAN PROGRAMS

The SHA is committed to improving access for bicycles and pedestrians. This provides for a clean form of transportation, reduces vehicle trips on the roadway system, reduces congestion and improves mobility. Bicycle and pedestrian improvements are provided through separate projects such as adding sidewalks and/or bicycle lanes or combined with other improvement projects such as a road widening project. The SHA implemented a Complete Streets policy that strives to create a transportation system that balances all users of the roadway, including pedestrians, transit, bicyclists, and motorists.

There are various system preservation funds dedicated for the planning, design, and construction of bicycle and pedestrian facilities including:

Americans with Disabilities Act (ADA) Retrofit

The ADA retrofit program was developed to upgrade existing pedestrian facilities to meet ADA guidelines. These projects are prioritized at roadways within 1/2 mile radius of transit stops, public facilities, government facilities, and analyzing the number of pedestrian crashes that occurred in the area. This amounted to program expenditures of over $19.8 million dollars for engineering and construction.

Sidewalk Retrofit

The goals of the sidewalk retrofit program are to improve mobility for the general population and persons with disabilities, remove barriers that impedes movement of people and lower potential safety risks. This program advances SHA's vision of multi-modal transportation by providing pedestrian facilities and enhancing access along urban state routes in existing communities as viable and safe modes of transportation. The major emphasis of these projects is to provide new sidewalks constructed as a part of a request from the local government. Sidewalks may also be constructed due to a high rate of pedestrian crashes at a location. Local governments are required to secure any necessary right-of-way, agree to maintenance, assist with public outreach and contribute to a percentage of the construction cost.

Bicycle Retrofit

The Bicycle Retrofit program was developed to enhance bicycling as a viable mode of transportation. This program identifies projects along state roadways to improve bicycle mobility and safety. The range of improvements includes minor enhancements to safety such as signing and marking corridors for bicycle access, remarking wide curb lanes or shoulders as bike lanes, changing the typical section of the roadway to accommodate bicyclists, or creating new off-road bike trails parallel to a roadway. In 2012, the SHA, through the Bicycle Retrofit program, completed the first two counties (Caroline and Talbot) in its bicycle library. This library will assist SHA in determining where and what bicycle signs and markings should be located as system preservation projects are developed.

BICYCLE AND PEDESTRIAN IMPROVEMENTS

The SHA has invested substantially in improving access and mobility to pedestrians and bicyclists. This can be shown through a combination of projects throughout the entire State, including sidewalk improvement projects along:

- MD 150 in Essex (Baltimore County)
- MD 528 in Ocean City (Worcester County)
- MD 373 in Berlin (Worcester County)
- MD 414 in Oxon Hill (Prince's Georges County)
- MD 450 from MD 2 to MD 435 in Annapolis

For example, the MD 450 sidewalk retrofit project from MD 2 to MD 435 was a $1.8 million project focused on linking the entire corridor via new ADA-compliant sidewalks and removing obstacles. This included upgrading existing sidewalks, constructing new sidewalks, installing curb ramps, relocating utilities and constructing sidewalk "bump outs".

Other pedestrian improvements included:

- Installing Pedestrian Countdown Signals and ADA features such as pedestrian curb ramps
- Safe Routes to Schools which improved safety at more than 290 schools

2012 Bicycle improvements included the following:

- Increased the directional miles of bicycle facilities along SHA roadways by 9%
- Improved the Bicycle Level of Comfort (BLOC) from “D” to “C” on 19 miles of roadways

Performance measures for pedestrian and bicycle facilities were established to encourage more multi-modal transportation. The comparison between 2011 and 2012 for improvements in pedestrian and bicycle facilities is shown as follows:

	December 31, 2011	December 31, 2012
Percent of Sidewalks that meet ADA Compliance.	60.3	62.3
Percent of Pedestrian Signals that have accessible pedestrian signal equipment.	54	66
Directional Miles of Newly Constructed Sidewalk.	N/A	6
Directional Miles of Reconstructed Sidewalk.	N/A	15.1
Percent of eligible SHA roadways within 1 mile of a transit facility improved with Sidewalks.	40.6	41.7
Percent of state owned roadways with a BLOC grade of D or better.	79	79

BICYCLE AND PEDESTRIAN PRIORITY AREAS (BPPA)

Safe and efficient bicycle and pedestrian accommodations are important to creating a transportation network that accommodates all users of the road. These facilities become increasingly important in urban areas and at transit stations where there are significant numbers of pedestrians and cyclists. One method available to local communities to help with prioritization of pedestrian and bicycle improvements is to partner with the Maryland Department of Transportation (MDOT) and SHA on designating an area as a bicycle and pedestrian priority area (BPPA). The designation will allow the state and the local counties to jointly develop a plan for bicycle and pedestrian improvements. MDOT and SHA are presently developing a statewide pedestrian/bicycle plan and BPPA program that will further define the methodology used to designate an area and the associated benefits.

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V. Freight

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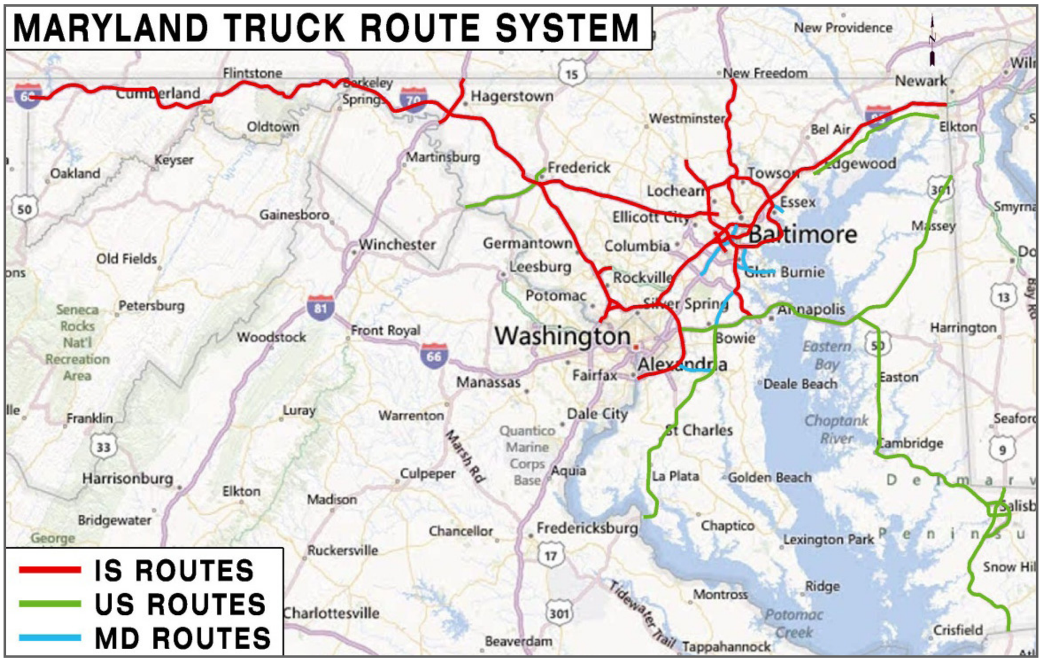
V. Freight

A. Introduction

The movement of goods is vital to the economic health of the state and the region. It is not only important on a statewide basis but Maryland also serves as a crucial location nationally to move freight. This is accomplished through a vibrant highway system, major intermodal freight connections like the Port of Baltimore, the Dundalk Marine Terminal, Seagirt Marine Terminal, BWI Thurgood Marshall Airport and other regional distribution centers. With freight activity anticipated to nearly double by 2035, Maryland is working to address future needs. This ranges from installing four supersized cranes at the Seagirt Marine Terminal to partnering with CSX's National Gateway initiative to create a double stacked railroad network.

Still, the majority of freight moved in Maryland is via truck. This means that the roadway network must be able to handle the many issues that the system faces. This ranges from the need for retailers to have "just-in-time" delivery stocking procedures to intermodal connections. Freight movement in Maryland is estimated to be valued at greater than $365 billion accounting for over 510 million tons of goods. Approximately 60% of the freight tonnage moves by highway. In addition to the movement of goods in or around Maryland, its position as a "through" state especially related to the key corridors of I-95 and I-81 will continue to require that freight congestion be minimized. For example, on sections of I-95 there are over 25,000 trucks per day utilizing the roadway. To facilitate optimal freight movement in Maryland certain federal and state highways have been designated as the Maryland Truck Route System. The Maryland Truck Route System consists of approximately 900 miles of roadways throughout the State. This includes all interstate routes (481 miles), seven segments of U.S. Routes (320 miles) including US 13, US 40, US 50, US 301, US 340, US 13 Business and US 50 Business and seven segments of Maryland state routes (99 miles). The state routes include sections of MD 3, MD 4, MD 10, MD 100, MD 201, MD 295 and MD 702. It should be noted that as a result of MAP-21 legislation, revisions may occur to the map based on changes to the Federal Freight Network.

In 2011, the SHA and MDTA initiated the development of a Freight Implementation Plan to serve as a guide for planning and project development and to provide direction for future transportation investments to enhance the safe and efficient movement of commercial vehicle freight. The first of these projects initiated in 2012 was the expansion of truck parking at the I-95 Southbound Welcome Center. In addition, MDOT and SHA are reviewing and updating the National Freight Network and the Maryland Freight Network.



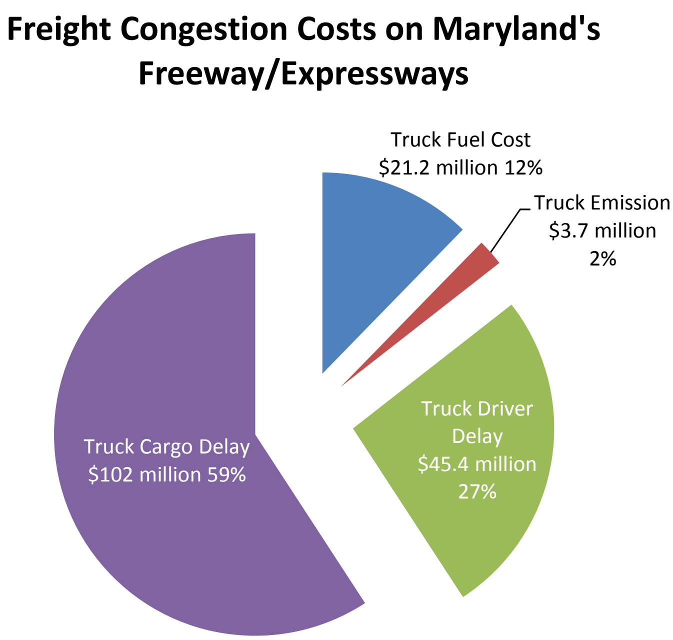
B. Freight Performance Indicators

The *2012 Annual Urban Mobility Report* identified congestion costs associated with trucking operations. The Washington DC metropolitan area ranked number eight in the nation of total annual delay for trucks which amounted to 8.6 million hours of delay. The Baltimore region experienced 5 million hours of delay which was fifteenth in the country according to the report.

Congestion not only effects automobile traffic but has a major impact to trucking operations. Cost ranging from delays of freight arriving on time to additional fuel costs are more significant to truckers than to motorists. Based on the analysis of bottleneck locations the following sections represent the most congested area for freight traffic:

- I-270 Northbound @ MD 80
- I-270 Southbound @ I-270 Spurs
- I-695 Inner Loop @ MD 147
- I-95 Northbound @ MD 100
- I-270 Northbound @ I-70
- I-695 Outer Loop @ Edmondson Avenue
- I-495 Inner Loop @ MD 650
- I-95 Northbound @ MD 43
- I-270 Northbound @ Middlebrook Road

These bottlenecks result in driver delay costs, cargo delay costs, diesel cost and increased emissions. It is estimated this amounted to $172.4 million on the study network. The following graph illustrates these costs.

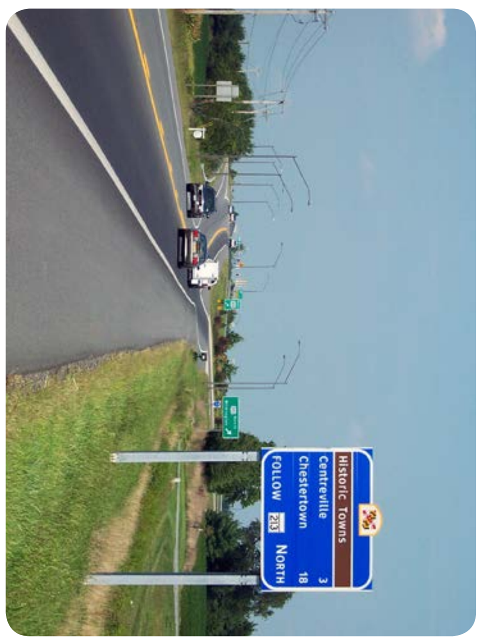


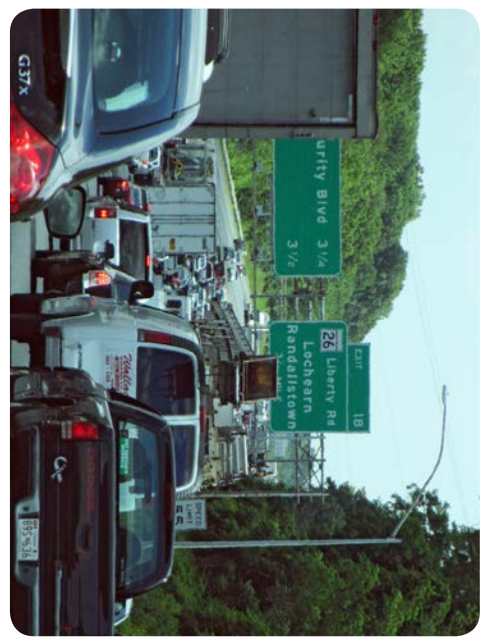
The majority of these costs are incurred on the Maryland Truck Route System. It is estimated that $161.2 million of the $172.4 million in delay, fuel and emissions costs occurs on routes that are part of the system. The American Transportation Research Institute (ATRI) and the Federal Highway Administration (FHWA) Office of Freight Management and Operations monitor freight significant highways as part of the Freight Performance Measure (FPM) initiative. A major monitoring area is the identification of bottlenecks on the nations interstate system. The *2013 Freight Performance Measures Analysis of Freight Significant Highway Locations* report identifies a congestion index based on the peak and off peak speeds below the free-flow speed over 24 hour periods and the freight demand at the junction of two interstate roadways nationwide. Four of the top 100 locations were in Maryland including in order:

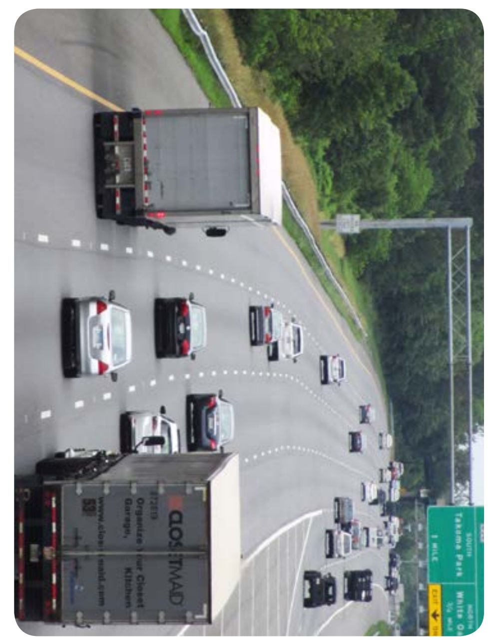
- I-95 @ I-495
- I-495 @ I-270
- I-95 @ I-395
- I-95 @ I-695 (South)

In addition, another measure of freight performance is the ability to provide truck drivers and the general motoring public with safe places for trucks to park overnight. Trucks often park along the mainline of the Maryland Truck Route system which increases the potential for crashes between parked trucks and moving vehicles. In 2012, a survey of the Maryland Truck Route system identified over 600 trucks were parking on the roadways and ramps either directly on or near these roadways. This includes the Maryland Welcome Center (I-95) and the southbound ramps in Howard County where approximately 50 trucks were parked during the overnight survey.

VI. Regionally Significant Corridor Performance







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VI. Regionally Significant Corridor Performance

CONTROLLED ACCESS FACILITIES

In addition to statewide and regional congestion and reliability reporting, summary reports on these measures are provided for both freeway and several key controlled access facility corridors. The corridors include:

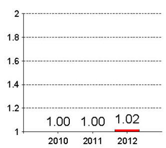
- I-70
- I-81
- I-83
- I-95 (Capital Beltway to I-695 North)
- I-95 (I-695 North to Delaware State Line)
- I-97
- I-270
- I-495 Capital Beltway
- I-695 Baltimore Beltway
- I-795
- I-895
- US 50 (D.C Line to William Preston Lane Bridge (Bay Bridge)
- MD 32
- MD 100
- MD 295/Baltimore – Washington Parkway

I-70 (Part 1)

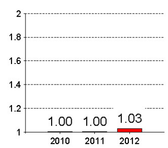
Trends[a]

Travel Time Index[b]
measure of average delay

AM Peak

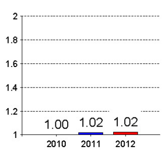


PM Peak

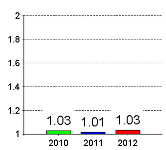


Planning Time Index[c]
measure of worst-case delay

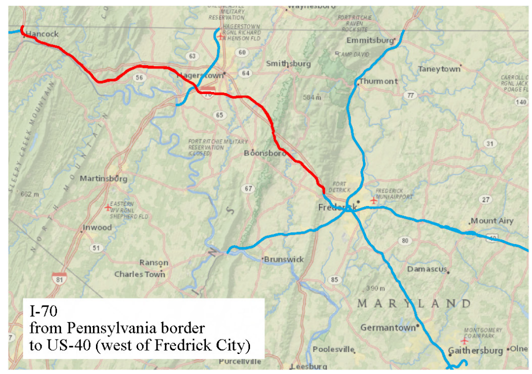
AM Peak



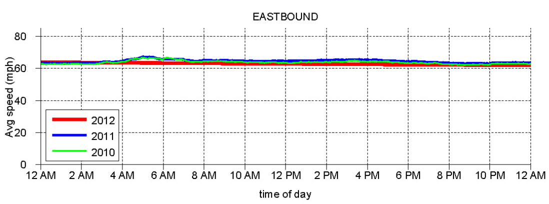
PM Peak

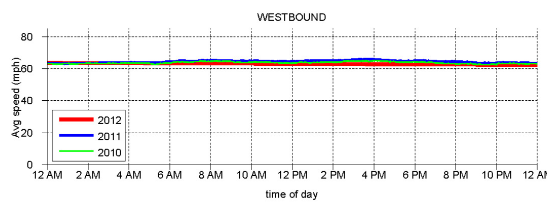


49 center miles carrying 4,000 vehicles every day

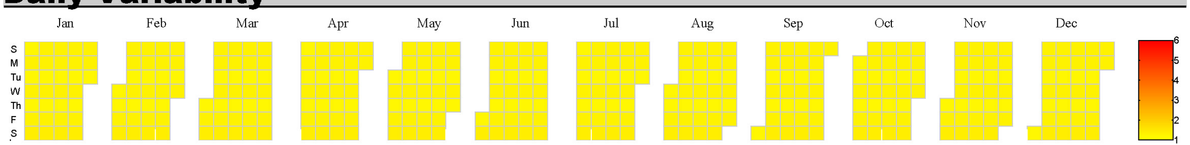


Speed Profiles[d]





Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration (minute)	Average Length (mile)	Impact Factor	2011 Rank	Change
87	I-70 W @ MD-632/Downsville Pike/Exit 28	Westbound	20	28	31	18	85	7.0	0.5	116	-29
127	I-70 W @ MD-17/Exit 42	Westbound	8	14	7	13	66	13.3	0.3	208	-81
149	I-70 W @ I-81/Exit 26	Westbound	6	6	13	28	38	11.7	0.2	324	-175
154	I-70 E @ US-40/Exit 32	Eastbound	11	16	13	15	59	10.3	0.2	229	-75
160	I-70 E @ MD-17/Exit 42	Eastbound	26	22	34	30	54	3.7	0.2	127	33
161	I-70 W @ MD-66/Exit 35	Westbound	10	17	19	16	64	7.0	0.2	128	33
200	I-70 E @ MD-63/Exit 24	Eastbound	7	15	23	39	34	5.1	0.1	269	-69
228	I-70 E @ MD-65/Exit 29	Eastbound	8	16	9	12	56	6.3	0.1	375	-147
254	I-70 W @ Frederick/Washington Co Line	Westbound	41	54	45	34	17	3.4	0.1	178	76
256	I-70 W @ US-40/Exit 32	Westbound	10	13	8	10	43	8.2	0.1	391	-135

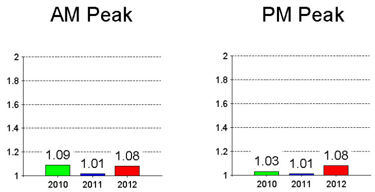
Notes

a - **Peak Hours** are considered as 8-9am and 5-6pm..
b - **Travel Time Index** (TTI) is the ratio of the *average* travel time during the peak hour to the time required under free flow.
c - **Planning Time Index** (PTI) is the ratio of the *worst-case* travel time (95th percentile) during peak hour to the free-flow time.
d - Typical work day speeds, calulcuated as the average speed of all weekdays for the entire year and shows it as varies by time-of-day.
e- Variability of worst-case travel experience along facility for each day of year, shown as plot of PTI by day of week and month, showing seasonal and weekly trends.
f - Top 10 bottlenecks on the facility, ranked by impact factor.
Impact factor is multiplication of total annual number of bottleneck occurences by their average duration and by their average length.
Bottlenecks are said to occur when speeds drop below 60% of free-flow speed for a period longer than 5 minutes.
Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

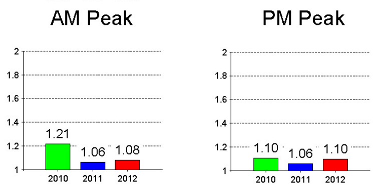
I-70 (Part 2)

Trends[a]

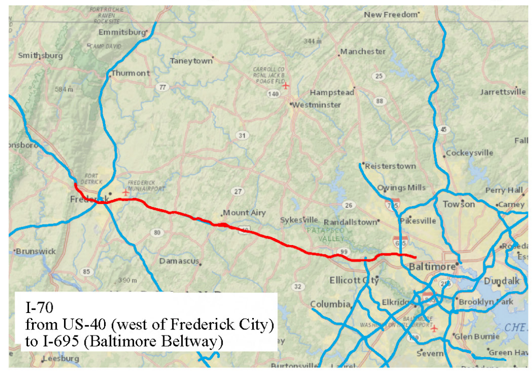
Travel Time Index[b]
measure of average delay



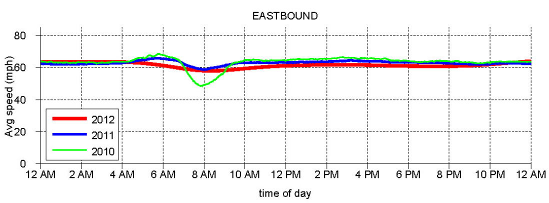
Planning Time Index[c]
measure of worst-case delay

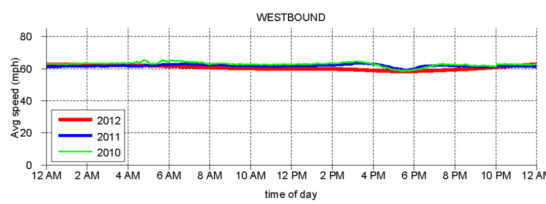


43 center miles carrying 62,000 vehicles every day

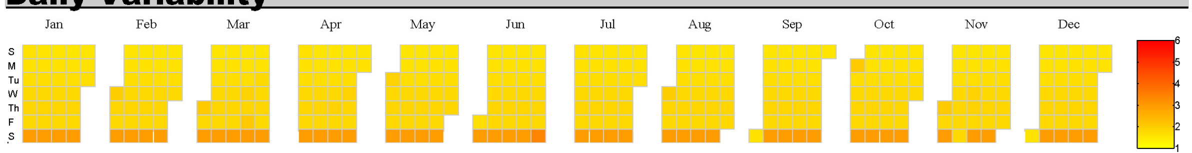


Speed Profiles[d]





Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration	Average Length	Impact Factor	2011 Rank	Change
48	I-70 E @ US-29/Exit 87	Eastbound	64	40	54	30	98	5.8	**0.9**	50	-2
83	I-70 E @ I-695/Exit 91	Eastbound	74	92	79	95	46	4.1	**0.5**	70	13
115	I-70 W @ US-29/Exit 87	Westbound	80	70	88	69	80	1.8	**0.4**	96	19
144	I-70 W @ US-15/US-340/Exit 52	Westbound	25	46	50	49	85	1.9	**0.3**	168	-24
222	I-70 E @ Marriottsville Rd/Exit 83	Eastbound	47	40	26	37	55	1.8	**0.1**	185	37
224	I-70 W @ Marriottsville Rd/Exit 83	Westbound	5	7	8	6	91	5.7	**0.1**	205	19
242	I-70 E @ US-15/US-340/Exit 52	Eastbound	13	18	28	18	43	4.5	**0.1**	187	55
255	I-70 E @ MD-32/Exit 80	Eastbound	12	4	1	4	34	25.8	**0.1**	330	-75
278	I-70 E @ MD-97/Exit 76	Eastbound	3	6	3	6	45	13.1	**0.1**	387	-109
286	I-70 E @ MD-355/Exit 54	Eastbound	7	16	1	8	48	9.2	**0.1**	381	-95

Notes

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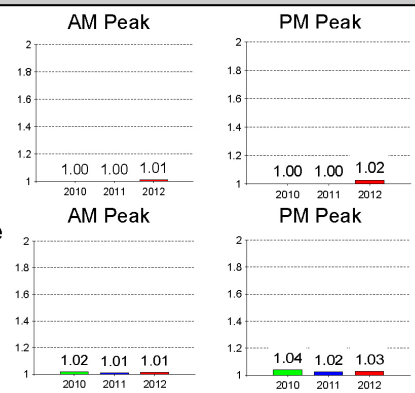
c - **Planning Time Index** (PTI) is the ratio of the *worst-case* travel time (95th percentile) during peak hour to the free-flow time.
d - Typical work day speeds, calulcuated as the average speed of all weekdays for the entire year and shows it as varies by time-of-day.
e- Variability of worst-case travel experience along facility for each day of year, shown as plot of PTI by day of week and month, showing seasonal and weekly trends.
f - Top 10 bottlenecks on the facility, ranked by impact factor.
Impact factor is multiplication of total annual number of bottleneck occurences by their average duration and by their average length.
Bottlenecks are said to occur when speeds drop below 60% of free-flow speed for a period longer than 5 minutes.
Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

I-81

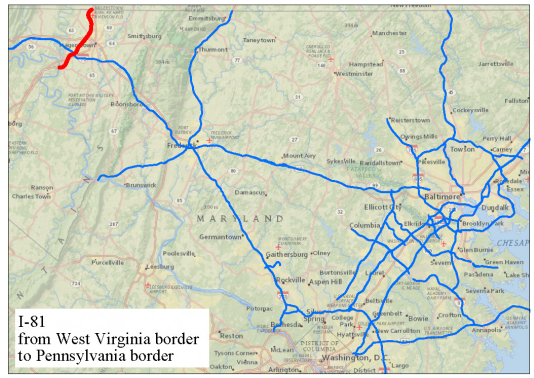
Trends[a]

Travel Time Index[b]
measure of average delay

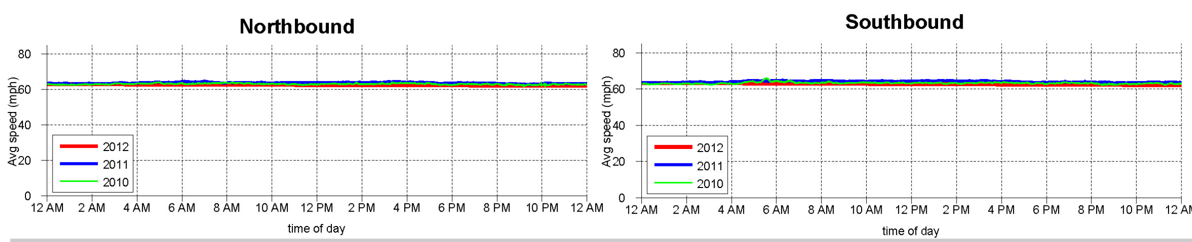
Planning Time Index[c]
measure of worst-case delay



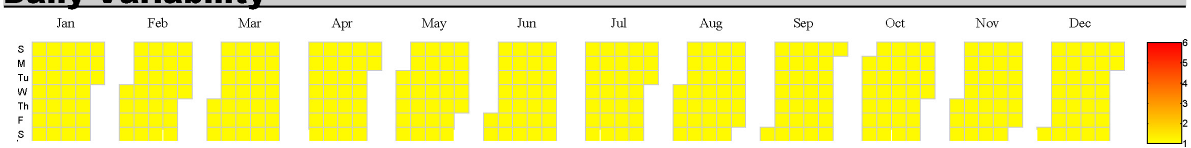
12 miles carrying 59,000 vehicles every day



Speed Profiles[d]



Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration (minute)	Average Length (mile)	Impact Factor	2011 Rank	Change
198	I-81 S @ Maryland/West Virginia St Line	Southbound	10	14	11	36	65	3.8	0.2	243	-45
307	I-81 S @ Halfway Blvd/Exit 5	Southbound	5	7	10	29	40	3.1	0.1	502	-195
362	I-81 N @ Maugans Ave/Exit 9	Northbound	9	3	7	4	57	3.2	0.0	586	-224
367	I-81 N @ US-40/Exit 6	Northbound	8	10	12	12	39	3.0	0.0	424	-57
381	I-81 N @ Maryland/Pennsylvania State Ln	Northbound	13	10	14	12	45	2.4	0.0	267	114
424	I-81 N @ Halfway Blvd/Exit 5	Northbound	9	5	8	18	35	1.8	0.0	544	-120
480	I-81 N @ Maugansville Rd/Exit 8	Northbound	11	20	3	12	28	1.7	0.0	637	-157
521	I-81 S @ MD-58/Exit 7	Southbound	5	1	4	3	33	2.7	0.0	620	-99
549	I-81 S @ US-40/Exit 6	Southbound	11	6	5	12	22	1.6	0.0	645	-96
568	I-81 S @ MD-63/MD-68/Exit 1	Southbound	2			3	36	4.0	0.0	601	-33

Notes

a - **Peak Hours** are considered as 8-9am and 5-6pm..
b - **Travel Time Index** (TTI) is the ratio of the *average* travel time during the peak hour to the time required under free flow.
c - **Planning Time Index** (PTI) is the ratio of the *worst-case* travel time (95th percentile) during peak hour to the free-flow time.
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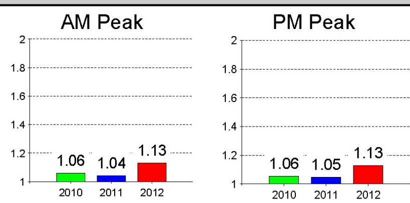
Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

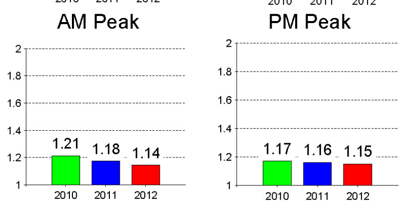
I-83

Trends[a]

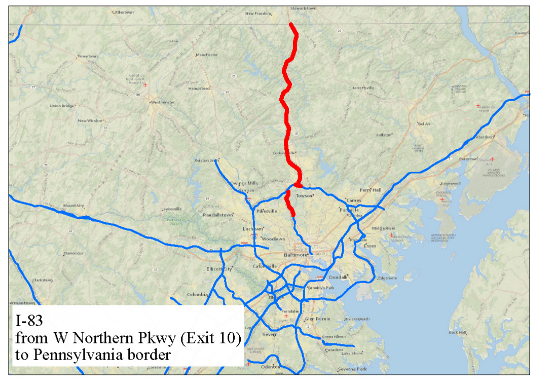
Travel Time Index[b]
measure of average delay



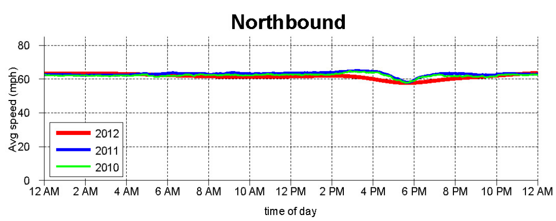
Planning Time Index[c]
measure of worst-case delay

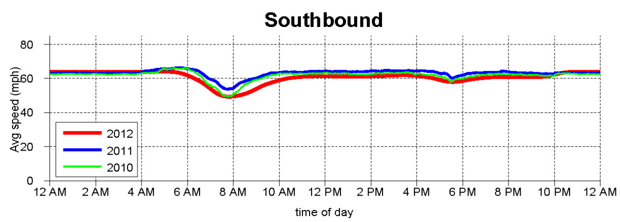


27 miles carrying 84,000 vehicles every day

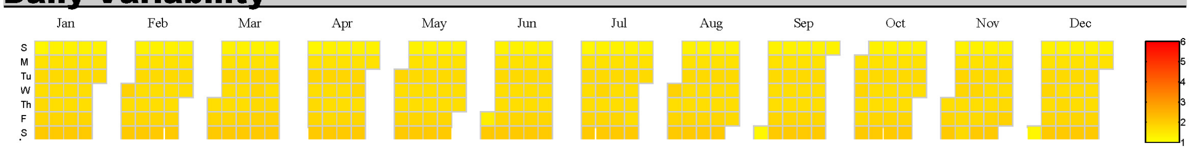


Speed Profiles[d]





Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration (minute)	Average Length (mile)	Impact Factor	2011 Rank	Change
49	I-83 S @ I-695	Southbound	95	85	132	147	67	3.1	**0.9**	65	-16
86	I-83 S @ US-1/North Ave/Exit 6	Southbound	80	60	24	53	65	4.1	**0.5**	211	-125
93	I-83 N @ Belfast Rd/Exit 24	Northbound	48	42	37	37	64	4.6	**0.4**	90	3
99	I-83 S @ Fayette St/Exit 1	Southbound	1009	1145	1250	1073	57	0.2	**0.4**	182	-83
112	I-83 S @ Belfast Rd/Exit 24	Southbound	49	37	22	43	52	5.3	**0.4**	68	44
119	I-83 N @ I-695/Jones Falls Expy/Exit 23	Northbound	33	41	43	68	50	4.4	**0.3**	126	-7
128	I-83 N @ MD-25/Falls Rd/Exit 8	Northbound	75	83	28	54	63	2.1	**0.3**	245	-117
136	I-83 S @ MD-137/Mount Carmel Rd/Exit 27	Southbound	45	20	22	40	50	4.6	**0.3**	232	-96
153	I-83 N @ Middletown Rd/Exit 31	Northbound	34	33	33	36	46	4.1	**0.2**	140	13
163	I-83 S @ MD-25/Falls Rd/Exit 8	Southbound	69	41	29	60	40	3.3	**0.2**	233	-70

Notes

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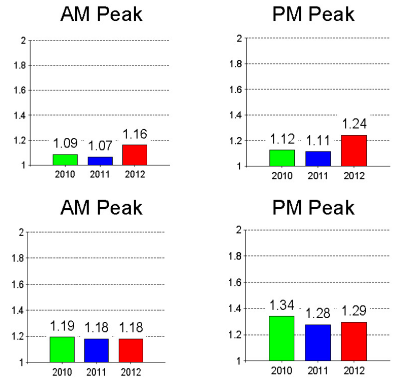
c - **Planning Time Index** (PTI) is the ratio of the *worst-case* travel time (95th percentile) during peak hour to the free-flow time.
d - Typical work day speeds, calulcuated as the average speed of all weekdays for the entire year and shows it as varies by time-of-day.
e- Variability of worst-case travel experience along facility for each day of year, shown as plot of PTI by day of week and month, showing seasonal and weekly trends.
f - Top 10 bottlenecks on the facility, ranked by impact factor.
Impact factor is multiplication of total annual number of bottleneck occurences by their average duration and by their average length.
Bottlenecks are said to occur when speeds drop below 60% of free-flow speed for a period longer than 5 minutes.
Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

I-95 (Part 1)

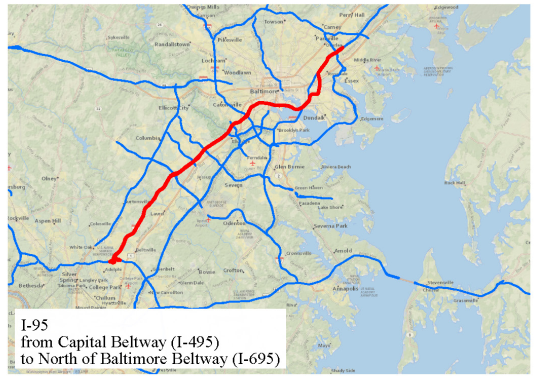
Trends[a]

Travel Time Index[b]
measure of average delay

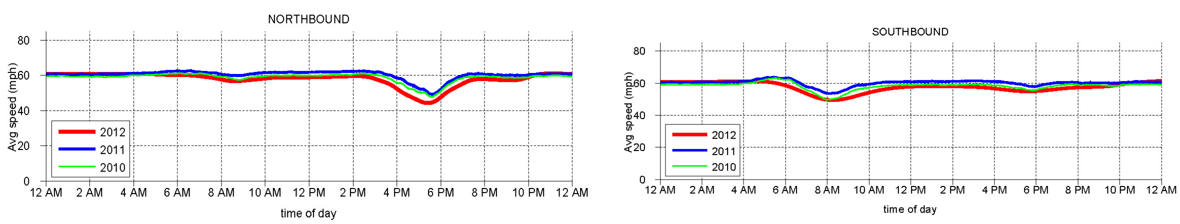
Planning Time Index[c]
measure of worst-case delay



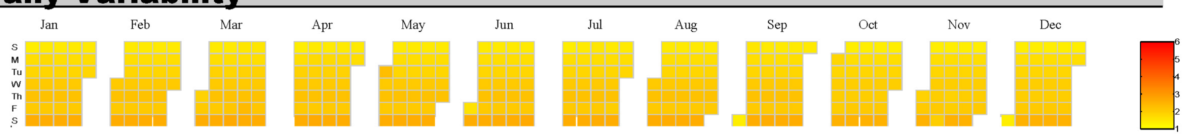
41 miles carrying 157,000 vehicles every day



Speed Profiles[d]



Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration (minute)	Average Length (mile)	Impact Factor	2011 Rank	Change
6	I-95 N @ MD-100/Exit 43	Northbound	105	170	151	120	112	8.7	5.1	8	-2
25	I-95 S @ I-495/Exit 27-25	Southbound	132	176	184	155	82	3.2	1.5	9	16
43	I-95 N @ Keith Ave/Exit 56	Northbound	636	846	906	762	29	1.3	1.0	99	-56
45	I-95 E @ I-95 (Baltimore) (East)	Eastbound	500	560	603	229	30	1.7	1.0	67	-22
64	I-95 S @ I-695/Exit 64	Southbound	45	55	346	63	62	4.3	0.7	100	-36
72	I-95 S @ Fort McHenry Tunnel	Southbound	109	107	141	57	42	4.4	0.6	61	11
76	I-95 S @ I-895/62nd St/Exit 62	Southbound	36	33	0	24	93	8.4	0.6	51	25
80	I-95 N @ I-695/Exit 49	Northbound	33	50	32	65	61	6.1	0.6	100	-20
90	I-95 N @ Fort McHenry Tunnel	Northbound	0	472	506	190	23	1.8	0.5	102	-12
105	I-95 N @ I-895/Exit 46	Northbound	8	21	19	17	72	9.9	0.4	123	-18

Notes

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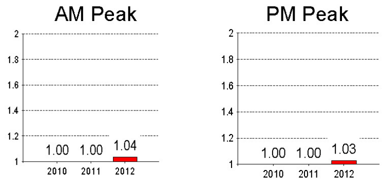
Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

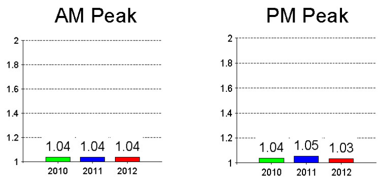
I-95 (Part 2)

Trends[a]

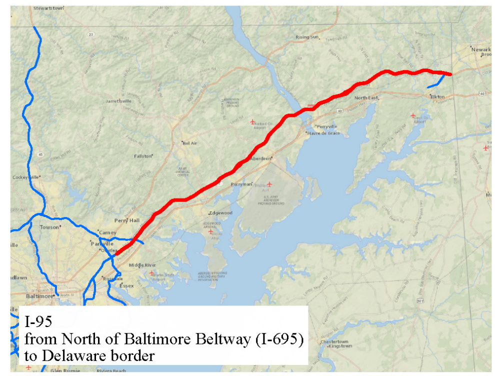
Travel Time Index[b]
measure of average delay



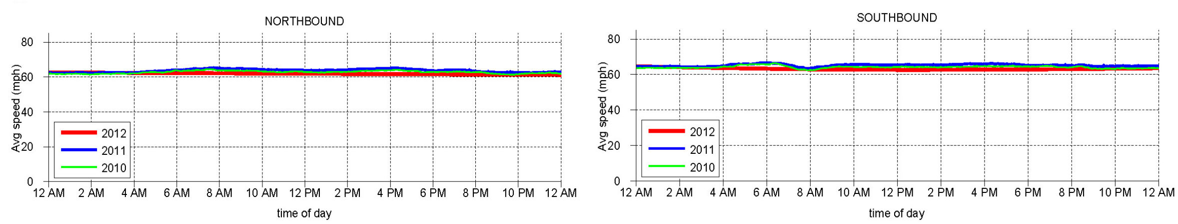
Planning Time Index[c]
measure of worst-case delay



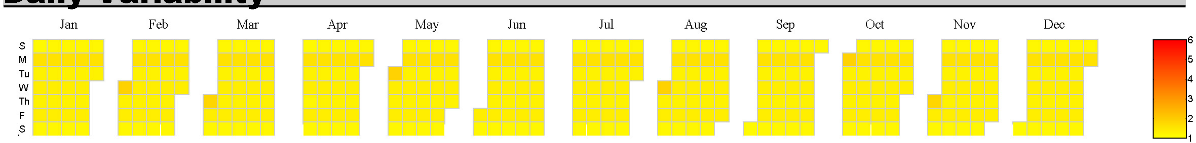
45 miles carrying 73,000 vehicles every day



Speed Profiles[d]



Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration (minute)	Average Length (mile)	Impact Factor	2011 Rank	Change
10	I-95 N @ MD-43/Whitemarsh Blvd/Exit 67	Northbound	39	91	97	62	131	9.3	3.2	11	-1
20	I-95 S @ MD-24/Exit 77	Southbound	5	24	43	37	117	14.8	1.7	14	6
51	I-95 N @ MD-152/Exit 74	Northbound	11	7	35	15	105	13.8	0.9	98	-47
54	I-95 S @ MD-155/Exit 89	Southbound	156	140	75	92	41	4.2	0.8	121	-67
70	I-95 N @ I-695/Exit 64	Northbound	47	58	34	47	81	8.0	0.7	83	-13
98	I-95 N @ Tydings Memorial Brg Toll Plaza	Northbound	70	119	108	85	28	4.2	0.4	103	-5
108	I-95 S @ Maryland House	Southbound	9	20	38	14	61	7.9	0.4	167	-59
134	I-95 N @ MD-24/Exit 77	Northbound	9	33	35	25	73	5.1	0.3	205	-71
181	I-95 N @ MD-279/Exit 109	Northbound	5	13	10	12	42	11.9	0.2	183	-2
182	I-95 N @ MD-222/Exit 93	Northbound	270	308	249	241	19	1.1	0.2	193	-11

Notes

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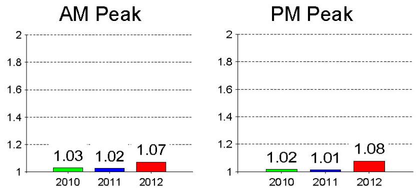
d - Typical work day speeds, calulucated as the average speed of all weekdays for the entire year and shows it as varies by time-of-day.
e- Variability of worst-case travel experience along facility for each day of year, shown as plot of PTI by day of week and month, showing seasonal and weekly trends.
f - Top 10 bottlenecks on the facility, ranked by impact factor.
Impact factor is multiplication of total annual number of bottleneck occurences by their average duration and by their average length.
Bottlenecks are said to occur when speeds drop below 60% of free-flow speed for a period longer than 5 minutes.
Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

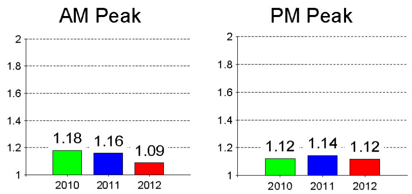
I-97

Trends[a]

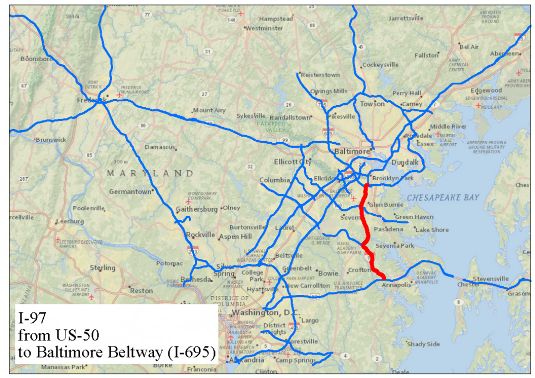
Travel Time Index[b]
measure of average delay



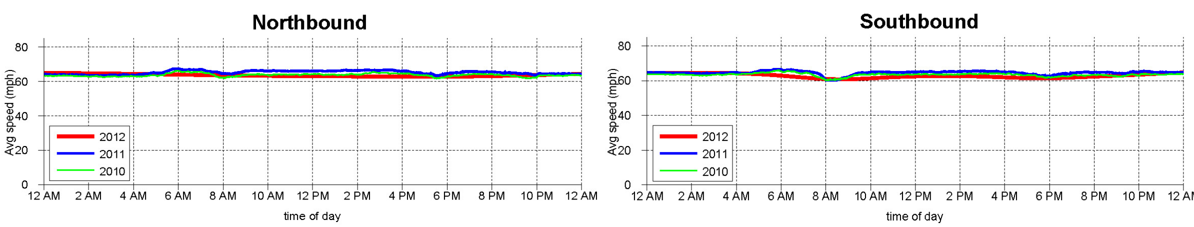
Planning Time Index[c]
measure of worst-case delay



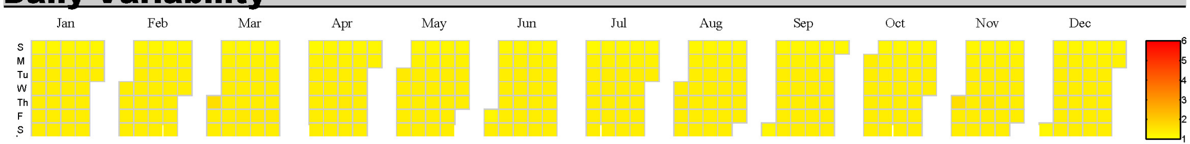
18 miles carrying 114,000 vehicles every day



Speed Profiles[d]



Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration (minute)	Average Length (mile)	Impact Factor	2011 Rank	Change
69	I-97 S @ US-301/US-50	Southbound	20	30	32	15	90	8.2	0.7	78	-9
146	I-97 S @ MD-178/Exit 5	Southbound	58	76	115	83	43	2.1	0.3	151	-5
195	I-97 S @ MD-3 Bus/New Cut Rd/Exit 12	Southbound	3	3	15	13	113	3.1	0.2	428	-233
216	I-97 N @ MD-178/Exit 5	Northbound	17	25	40	16	30	4.8	0.1	236	-20
217	I-97 S @ Benfield Blvd/Exit 10	Southbound	5	2	9	4	114	3.9	0.1	446	-229
331	I-97 N @ Benfield Blvd/Exit 10	Northbound	4		7	15	44	4.2	0.1	373	-42
337	I-97 N @ I-695/Exit 17	Northbound	69	18	28	28	31	1.5	0.1	162	175
386	I-97 N @ MD-3 Bus/New Cut Rd/Exit 12	Northbound	6	8	13	8	37	3.6	0.0	437	-51
390	I-97 S @ MD-3/Exit 7	Southbound	5	7	16	19	39	2.4	0.0	295	95
410	I-97 N @ MD-3/Exit 7	Northbound	5	6	12	6	40	3.1	0.0	406	4

Notes

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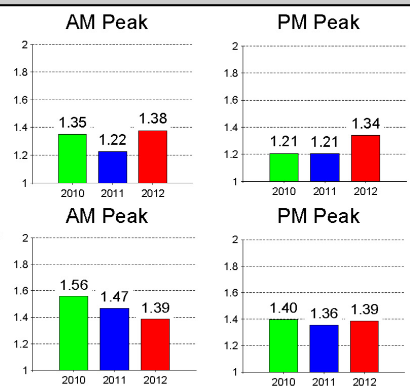
Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

I-270

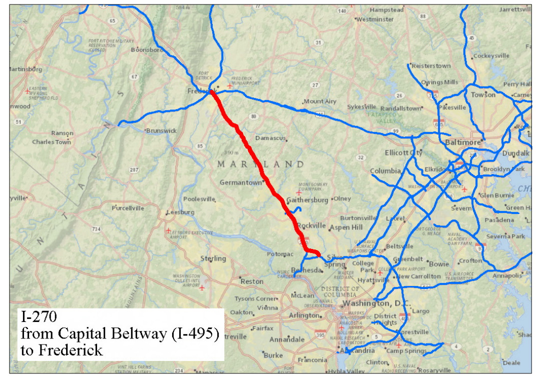
Trends[a]

Travel Time Index[b]
measure of average delay

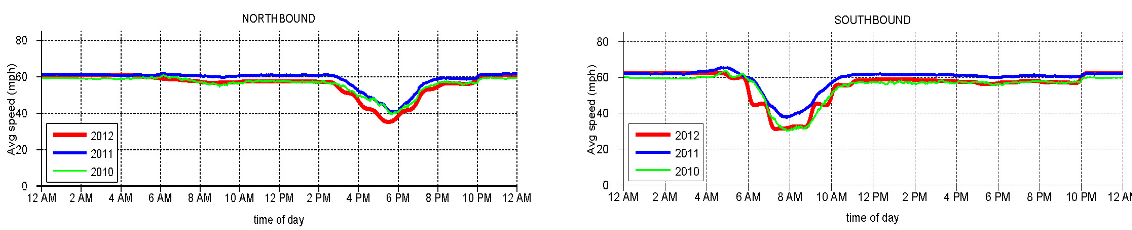
Planning Time Index[c]
measure of worst-case delay



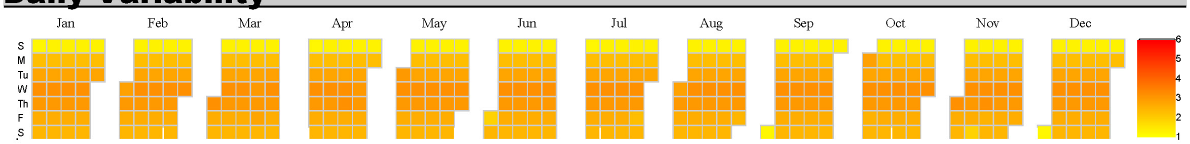
41 miles carrying 162,000 vehicles every day



Speed Profiles[d]



Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration	Average Length	Impact Factor	2011 Rank	Change
2	I-270 N @ MD-80/Exit 26	Northbound	167	221	175	113	105	11.0	**7.3**	5	-3
3	I-270 Spur S @ I-270	Southbound	139	171	177	170	79	13.0	**5.6**	7	-4
7	I-270 N @ I-70/US-40	Northbound	94	100	132	139	92	10.7	**4.1**	13	-6
11	I-270 N @ Middlebrook Rd/Exit 13	Northbound	125	66	90	128	102	8.4	**2.9**	44	-33
15	I-270 S @ MD-109/Exit 22	Southbound	145	153	128	120	84	4.8	**2.0**	16	-1
17	I-270 S @ Montrose Rd/Exit 4	Southbound	73	101	91	99	47	12.0	**1.9**	31	-14
32	I-270 N @ MD-85/Exit 31	Northbound	27	37	41	35	92	11.4	**1.3**	26	6
46	I-270 N @ MD-117/W Diamond Ave	Northbound	523	758	674	911	30	6.9	**1.0**	81	-35
52	I-270 N @ MD-187/Old Georgetown Rd/Exit 1	Northbound	146	203	181	137	65	1.5	**0.9**	49	3
55	I-270 S @ I-495/MD-355	Southbound	110	145	113	64	60	4.1	**0.8**	12	43

Notes

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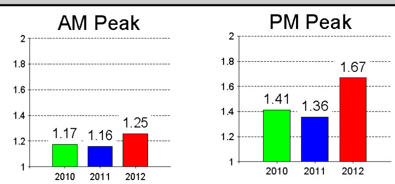
Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

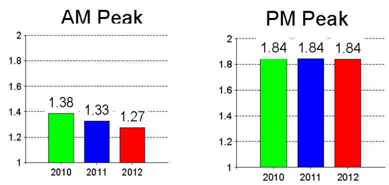
INTERSTATE 495 Capital Beltway

Trends[a]

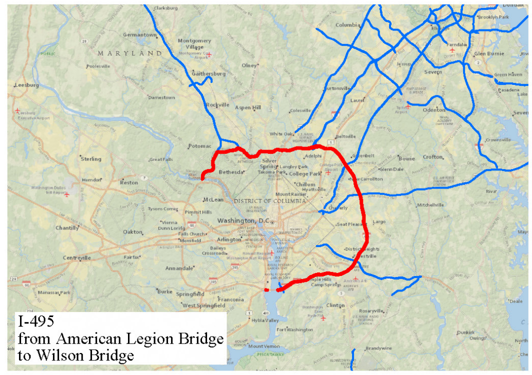
Travel Time Index[b]
measure of average delay



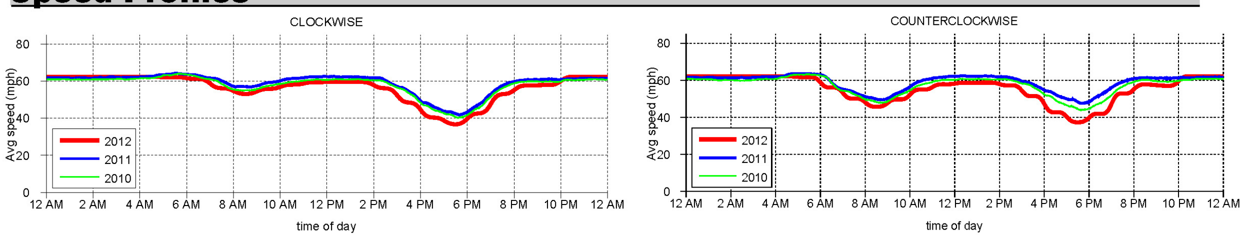
Planning Time Index[c]
measure of worst-case delay



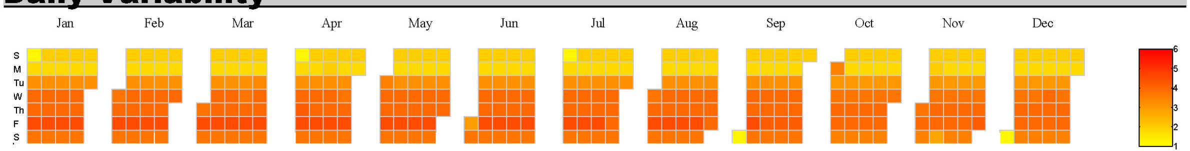
42 center miles carrying 181,000 vehicles every day



Speed Profiles[d]



Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration (minute)	Average Length (mile)	Impact Factor	2011 Rank	Change
9	I-495 CW @ MD-650/New Hampshire Ave/Exit28	Innerloop	68	133	154	61	123	6.9	3.4	36	-27
13	I-495 CW @ MD-450/Annapolis Rd/Exit 20	Innerloop	83	122	114	64	89	8.7	2.5	18	-5
18	I-495 CW @ I-270 Spur	Innerloop	149	140	47	54	107	5.6	1.8	3	15
21	I-495 CW @ MD-295/MD-193/Exit 22	Innerloop	67	120	120	62	91	5.5	1.7	71	-50
23	I-495 CCW @ MD-185/Connecticut Ave/Exit 33	Outerloop	60	42	72	55	120	6.2	1.6	21	2
26	I-495 CCW @ MD-97/Georgia Ave/Exit 31	Outerloop	81	129	88	85	104	4.6	1.5	25	1
28	I-495 CCW @ Greenbelt Metro Dr/Exit 24	Outerloop	56	94	72	64	88	6.3	1.4	37	-9
29	I-495 CW @ MD-4/Pennsylvania Ave/Exit 11	Innerloop	59	48	50	53	87	8.6	1.4	20	9
31	I-495 CCW @ US-50/Exit 19	Outerloop	77	94	106	105	81	4.9	1.3	65	-34
42	I-495 CW @ MD-202/Landover Rd/Exit 17	Innerloop	53	37	46	58	86	7.8	1.1	30	12

Notes

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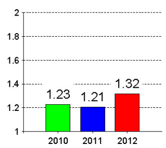
Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

695 Baltimore Beltway

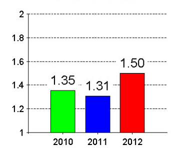
Trends[a]

Travel Time Index[b]
measure of average delay

AM Peak

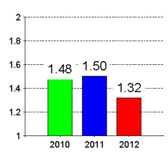


PM Peak

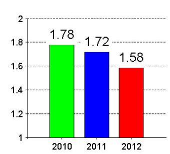


Planning Time Index[c]
measure of worst-case delay

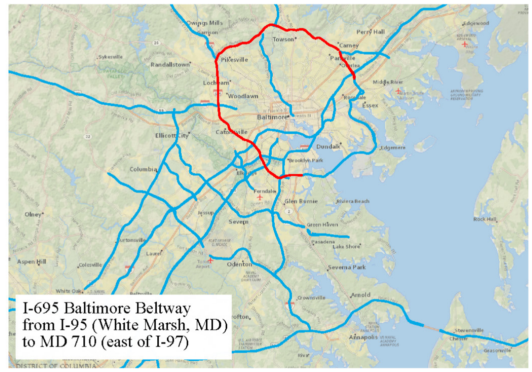
AM Peak



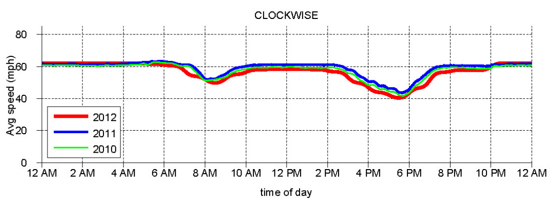
PM Peak

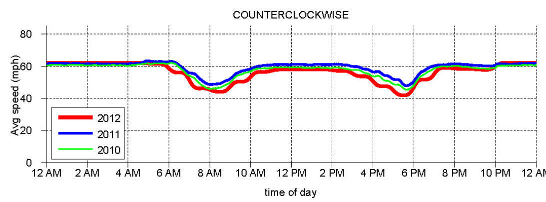


35 center miles carrying 157,000 vehicles every day

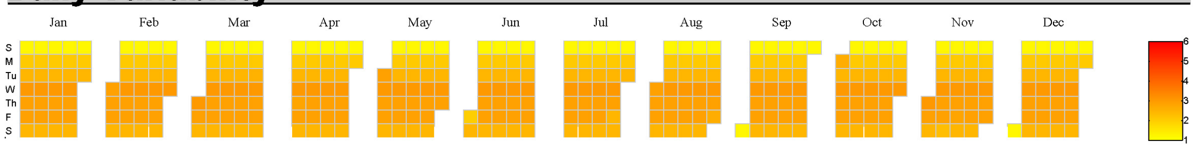


Speed Profiles[d]





Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration (minute)	Average Length (mile)	Impact Factor	2011 Rank	Change
5	I-695 CW @ MD-147/Harford Rd/Exit 31	Innerloop	91	92	100	93	141	10.5	5.1	6	-1
8	I-695 CCW @ Edmondson Ave/Exit 14	Outerloop	185	209	178	180	88	8.8	3.6	10	-2
14	I-695 CCW @ MD-144/Frederick Rd/Exit 13	Outerloop	95	46	126	56	111	11.1	2.4	15	-1
16	I-695 CW @ Stevenson Rd/Exit 21	Innerloop	5	9	167	168	57	5.6	2.0	453	-437
19	I-695 CW @ MD-41/Perring Pkwy/Exit 30	Innerloop	73	89	74	79	91	7.1	1.8	27	-8
22	I-695 CW @ MD-26/Exit 18	Innerloop	104	120	101	33	89	5.8	1.6	2	20
24	I-695 CW @ MD-129/Park Heights Ave/Exit 21	Innerloop	9	145	7	12	56	8.4	1.6	366	-342
27	I-695 CW @ I-83/MD-25/Exit 23	Innerloop	97	117	93	95	76	6.4	1.5	45	-18
30	I-695 CW @ I-795/Exit 19	Innerloop	105	29	28	25	57	8.0	1.3	133	-103
38	I-695 CCW @ MD-372/Wilkens Ave/Exit 12	Outerloop	5	79	9	11	107	11.8	1.1	184	-146

Notes

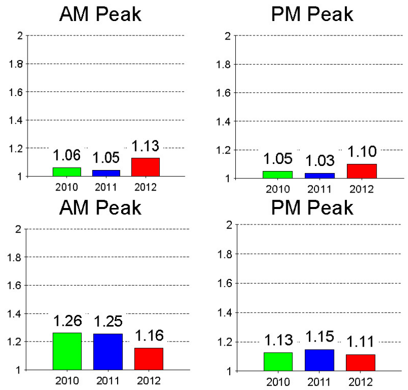
a - **Peak Hours** are considered as 8-9am and 5-6pm..
b - **Travel Time Index** (TTI) is the ratio of the *average* travel time during the peak hour to the time required under free flow.
c - **Planning Time Index** (PTI) is the ratio of the *worst-case* travel time (95th percentile) during peak hour to the free-flow time.
d - Typical work day speeds, calulucated as the average speed of all weekdays for the entire year and shows it as varies by time-of-day.
e- Variability of worst-case travel experience along facility for each day of year, shown as plot of PTI by day of week and month, showing seasonal and weekly trends.
f - Top 10 bottlenecks on the facility, ranked by impact factor.
Impact factor is multiplication of total annual number of bottleneck occurences by their average duration and by their average length.
Bottlenecks are said to occur when speeds drop below 60% of free-flow speed for a period longer than 5 minutes.
Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

I-795

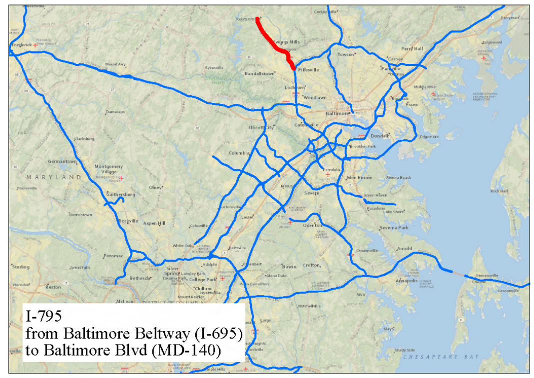
Trends[a]

Travel Time Index[b]
measure of average delay

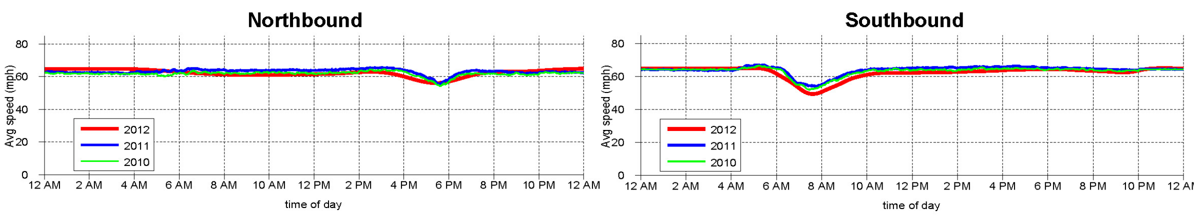
Planning Time Index[c]
measure of worst-case delay



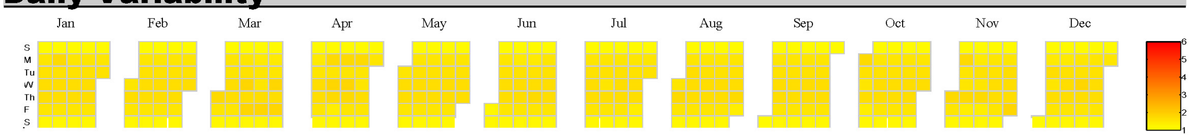
9 miles carrying 77,000 vehicles every day



Speed Profiles[d]



Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration (minute)	Average Length (mile)	Impact Factor	2011 Rank	Change
152	I-795 N @ Owings Mills Blvd/Exit 4	Northbound	56	79	67	77	39	2.2	0.2	217	-65
183	I-795 N @ Franklin Blvd/Exit 7	Northbound	21	13	18	11	79	3.8	0.2	327	-144
261	I-795 S @ Owings Mills Blvd/Exit 4	Southbound	19	8	29	8	61	2.7	0.1	112	149
355	I-795 N @ MD-128/MD-140/MD-30/Exit 9	Northbound	5	6	7	15	36	4.4	0.0	339	16
397	I-795 S @ Franklin Blvd/Exit 7	Southbound	33	21	30	19	29	1.3	0.0	383	14

Notes

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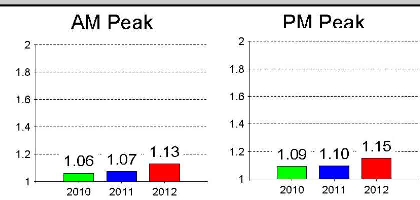
Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

I-895

Trends[a]

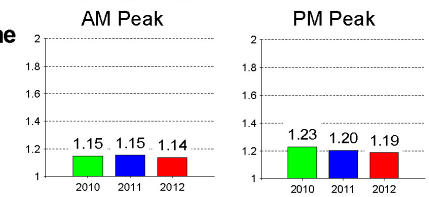
Travel Time Index[b]

measure of average delay

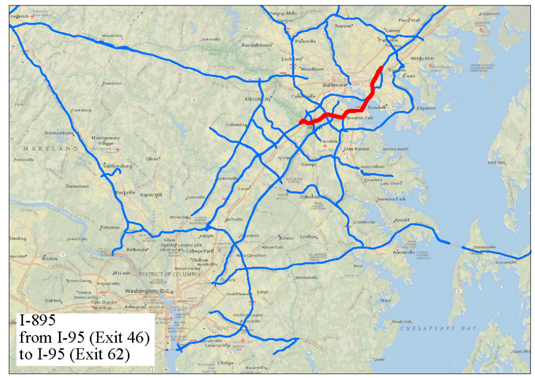


Planning Time Index[c]

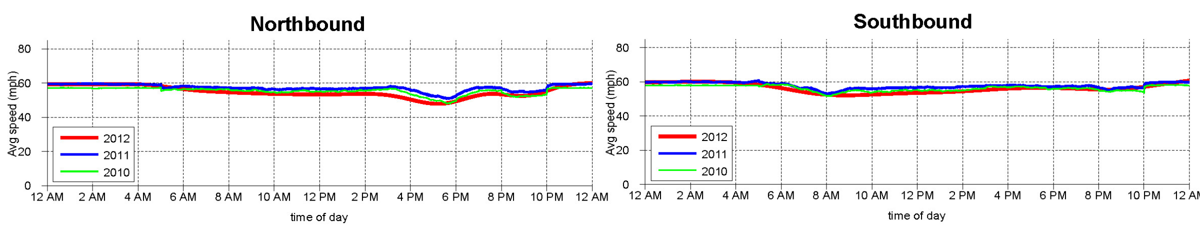
measure of worst-case delay



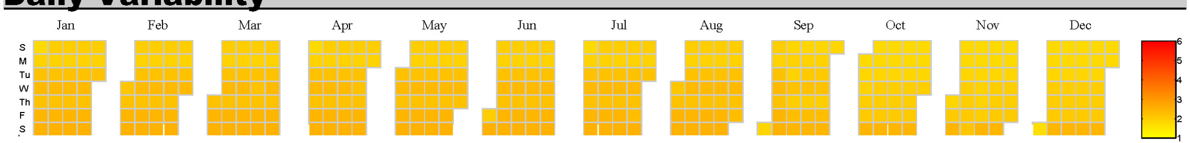
16 miles carrying 51,000 vehicles every day



Speed Profiles[d]



Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration (minute)	Average Length (mile)	Impact Factor	2011 Rank	Change
39	I-895 N @ Holabird Ave/Exit 10	Northbound	84	114	916	57	61	3.5	1.1	106	-67
65	I-895 N @ I-95/62nd St/Exit62	Northbound	98	122	100	103	89	2.0	0.7	59	6
84	I-895 S @ Frankfurst Ave/Shell Rd/Exit 8	Southbound	950	1183	1324	1155	32	0.5	0.5	363	-279
106	I-895 N @ Harbor Tunnel Toll Plaza	Northbound	1420	1328	1257	1391	33	0.3	0.4	114	-8
130	I-895 S @ MD-2/Potee St/Exit 7	Southbound	6	39	71	33	74	2.2	0.3	292	-162
164	I-895 S @ Childs St/Exit 9	Southbound	10	921	590	34	37	3.5	0.2	388	-224
184	I-895 S @ Holabird Ave/Exit 10	Southbound	156	90	56	80	38	1.2	0.2	191	-7
235	I-895 N @ Frankfurst Ave/Shell Rd/Exit 8	Northbound	22	57	145	43	33	1.1	0.1	334	-99
260	I-895 Spur N @ I-895	Northbound	31	91	52	33	34	1.4	0.1	338	-78
296	I-895 S @ I-95/Exit 46	Southbound	100	101	74	102	28	0.7	0.1	312	-16

Notes

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c - **Planning Time Index** (PTI) is the ratio of the *worst-case* travel time (95th percentile) during peak hour to the free-flow time.
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f - Top 10 bottlenecks on the facility, ranked by impact factor.
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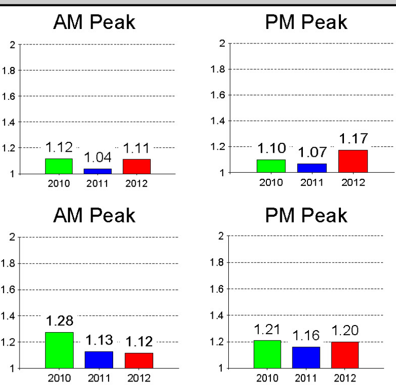
Bottlenecks are said to occur when speeds drop below 60% of free-flow speed for a period longer than 5 minutes.
Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

50 US-50

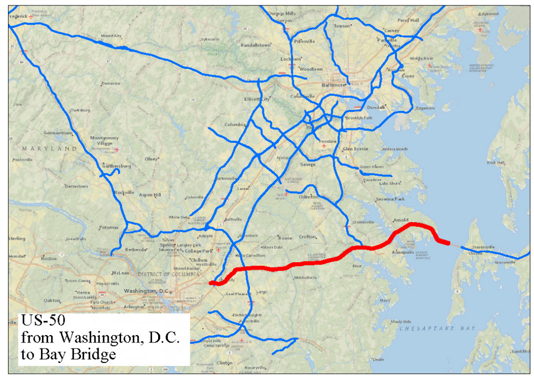
Trends[a]

Travel Time Index[b]
measure of average delay

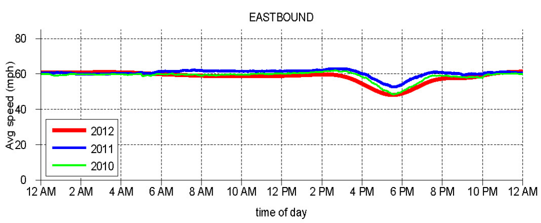
Planning Time Index[c]
measure of worst-case delay

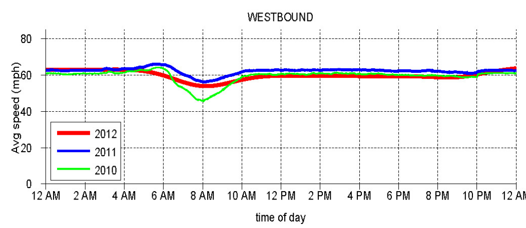


38 miles carrying 99,000 vehicles every day

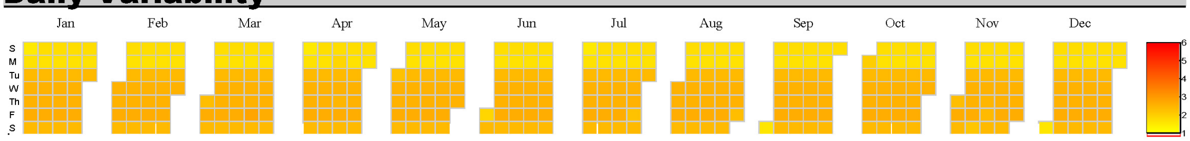


Speed Profiles[d]





Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration	Average Length	Impact Factor	2011 Rank	Change
33	US-50 W @ MD-295/Baltimore Washington Pkwy	Westbound	106	122	95	74	97	3.5	1.3	19	14
35	US-50 W @ William Preston Lane Brg	Westbound	23	130	212	48	55	5.8	1.2	53	-18
50	US-50 E @ Severn River Bridge	Eastbound	66	91	85	57	104	3.4	0.9	62	-12
75	US-50 E @ MD-202/Landover Rd	Eastbound	71	111	88	69	123	11.8	0.6	109	-34
110	US-50 E @ Columbia Park Rd	Eastbound	65	71	50	88	78	6.1	0.4	178	-68

Notes

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Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

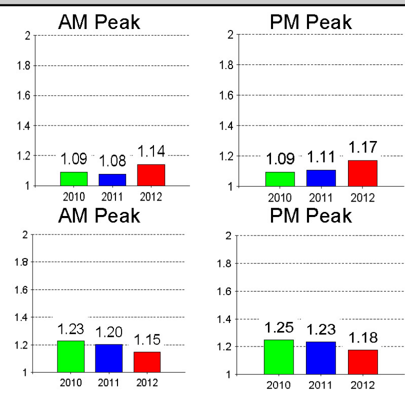
MARYLAND
32

MD-32

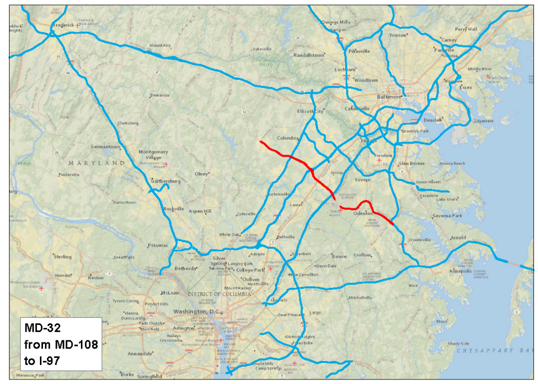
Trends[a]

Travel Time Index[b]
measure of average delay

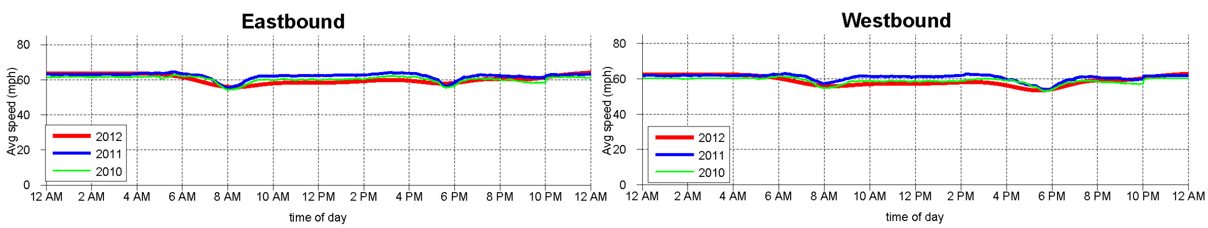
Planning Time Index[c]
measure of worst-case delay



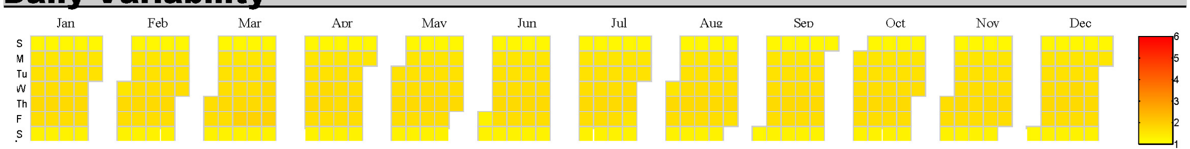
22 center miles carrying 66,000 vehicles every day



Speed Profiles[d]



Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration (minute)	Average Length (mile)	Impact Factor	2011 Rank	Change
108	MD-32 W @ MD-198/Fort Meade Rd	Westbound	35	75	38	28	87	4.9	**0.6**	133	-25
125	MD-32 E @ MD-198/Fort Meade Rd	Eastbound	45	67	48	61	68	4.0	**0.5**	174	-49
127	MD-32 E @ MD-175/Annapolis Rd	Eastbound	29	49	33	15	81	6.7	**0.5**	123	4
136	MD-32 W @ Ten Oaks Rd	Westbound			11	55	115	5.7	**0.4**		
168	MD-32 E @ MD-108	Eastbound	1		31	64	56	5.0	**0.4**	1064	-896
199	MD-32 E @ MD-26/Liberty Rd	Eastbound				173	270	0.6	**0.3**		
231	MD-32 W @ MD-108	Westbound	135	119	118	58	76	1.0	**0.3**	255	-24
307	MD-32 E @ US-1	Eastbound	25	25	19	11	77	3.9	**0.2**	181	126
388	MD-32 E @ I-70/US-40	Eastbound			175	763	42	3.5	**0.1**		
413	MD-32 W @ I-70/US-40	Westbound				457	46	0.7	**0.1**		

Notes

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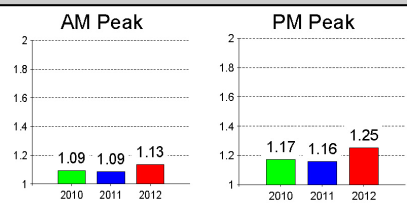
Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

Blank columns or rows may represent unavailable data.

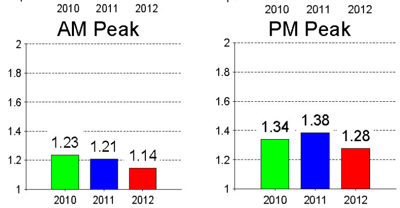
MARYLAND 100 MD-100

Trends[a]

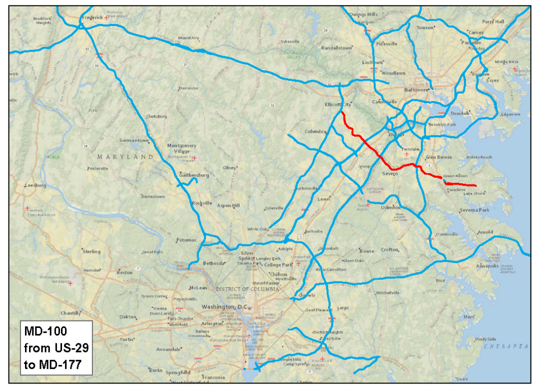
Travel Time Index[b]
measure of average delay



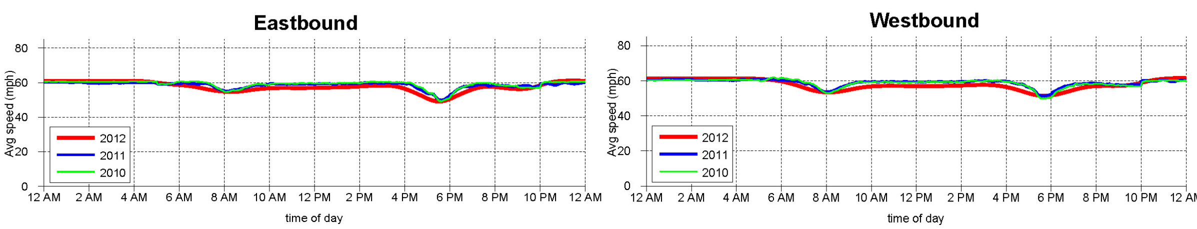
Planning Time Index[c]
measure of worst-case delay



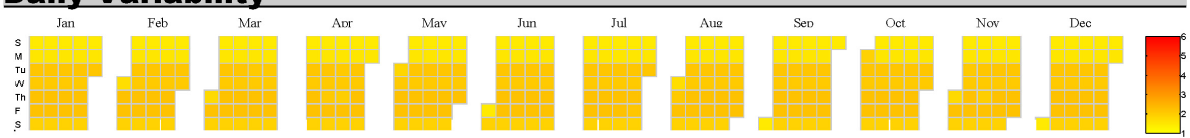
22 center miles carrying 69,000 vehicles every day



Speed Profiles[d]



Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration (minute)	Average Length (mile)	Impact Factor	2011 Rank	Change
74	MD-100 E @ MD-170/Telegraph Rd/Exit 11	Eastbound	53	85	88	82	65	4.3	0.8	107	-33
86	MD-100 E @ MD-295/Baltimore Washington Pkwy	Eastbound	1585		2248		26	0.7	0.7	115	-29
200	MD-100 W @ Marc Dorsey Station Access Rd/Exit 7	Westbound	73	72	80	79	58	1.8	0.3	212	-12
215	MD-100 W @ MD-607/Magothy Bridge Rd	Westbound	548	568	610	416	49	0.3	0.3	173	42
229	MD-100 E @ Marc Dorsey Station Access Rd/Exit 7	Eastbound	86	61	53	71	53	2.1	0.3	228	1
308	MD-100 W @ MD-174/Quarterfield Rd	Westbound	24	45	23	28	63	3.0	0.2	252	56
334	MD-100 W @ US-29	Westbound	57	125		56	53	1.6	0.2	177	157
372	MD-100 E @ MD-607/Magothy Bridge Rd	Eastbound	571	587	580	387	37	0.2	0.2	323	49
427	MD-100 E @ Oakwood Rd	Eastbound	35	40	20		69	2.2	0.1	247	180
462	MD-100 W @ I-95/Exit 5	Westbound	99	148	123	116	33	1.0	0.1	391	71

Notes

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Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

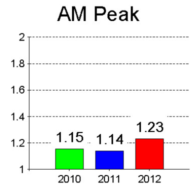
Blank columns or rows may represent unavailable data.

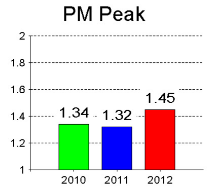
MARYLAND 295

MD-295

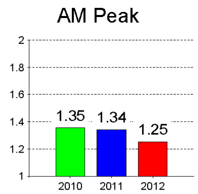
Trends[a]

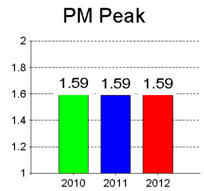
Travel Time Index[b]
measure of average delay





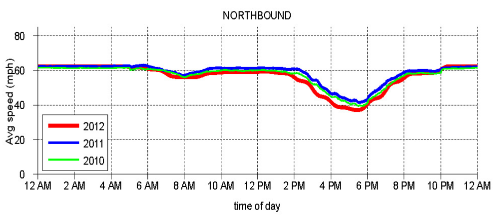
Planning Time Index[c]
measure of worst-case delay

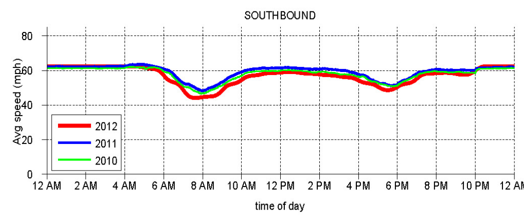




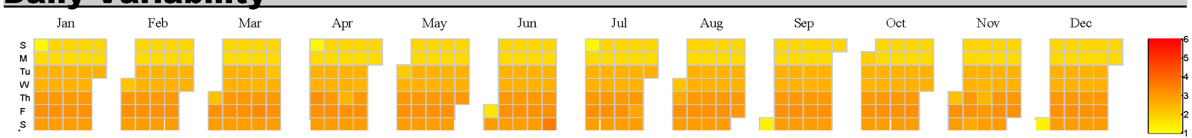
30 miles carrying 95,000 vehicles every day

Speed Profiles[d]





Daily Variability[e]



Top Bottlenecks[f]

2012 Rank	LOCATION	Direction	Number of Occurences Q1	Q2	Q3	Q4	Average Duration	Average Length	Impact Factor	2011 Rank	Change
1	MD-295 N @ MD-175	Northbound	86	143	134	116	172	11.9	**8.3**	1	0
4	MD-295 N @ MD-197/Exit 11	Northbound	105	122	118	90	177	7.5	**5.2**	4	0
12	MD-295 S @ MD-193	Southbound	109	112	108	112	98	7.0	**2.8**	17	-5
34	MD-295 S @ Eastern Ave	Southbound	84	80	85	159	74	5.1	**1.2**	42	-8
36	MD-295 N @ I-195	Northbound	35	49	96		103	8.5	**1.2**	115	-79
37	MD-295 S @ MD-198	Southbound	77	103	129	106	91	3.1	**1.2**	60	-23
40	MD-295 N @ Canine Rd	Northbound	44	70	62	48	78	8.0	**1.1**	38	2
66	MD-295 S @ Powder Mill Rd	Southbound	120	127			76	3.7	**0.7**	24	42
74	MD-295 N @ MD-198	Northbound	35	42	55	35	71	5.5	**0.6**	46	28
79	MD-295 S @ MD-450	Southbound	36	91	67	32	53	4.8	**0.6**	102	-23

Notes

a - **Peak Hours** are considered as 8-9am and 5-6pm..
b - **Travel Time Index** (TTI) is the ratio of the *average* travel time during the peak hour to the time required under free flow.
c - **Planning Time Index** (PTI) is the ratio of the *worst-case* travel time (95th percentile) during peak hour to the free-flow time.
d - Typical work day speeds, calulcuated as the average speed of all weekdays for the entire year and shows it as varies by time-of-day.
e- Variability of worst-case travel experience along facility for each day of year, shown as plot of PTI by day of week and month, showing seasonal and weekly trends.
f - Top 10 bottlenecks on the facility, ranked by impact factor.
Impact factor is multiplication of total annual number of bottleneck occurences by their average duration and by their average length.
Bottlenecks are said to occur when speeds drop below 60% of free-flow speed for a period longer than 5 minutes.
Q1: Jan-Mar Q2: Apr-Jun Q3: Jul-Sep Q4: Oct-Dec

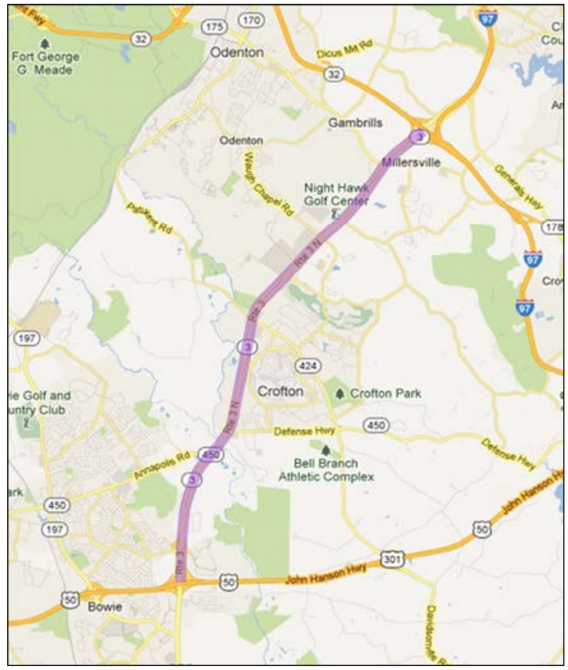
ARTERIALS

Several arterial corridors were identified based on highest volumes of traffic and regional significance to determine operational characteristics of these facilities. This included condition data such as the number of lanes, interchanges and signalized intersections and traffic data. Traffic operations by congested intersections and roadway segments were analyzed for the following corridors:

- Maryland 3 - I-97 to US 50/301
- Maryland 4 - Washington DC Line to Anne Arundel County Line
- Maryland 2/4 - Prince Frederick
- Maryland 5 - Washington DC Line to I-95
- Maryland 5 - I-95 to US 301
- Maryland 24 - US 40 to US 1
- Maryland 26 - Baltimore City Line to MD 32
- Maryland 28 - MD 124 to MD 97
- Maryland 43 - I-695 to US 40
- Maryland 45 - Baltimore City Line to Shawan Road
- Maryland 97 - Washington DC Line to MD 108
- Maryland 124 - MD 28 to MD 108
- Maryland 140 - Baltimore City Line to MD 97
- Maryland 175 - MD 32 to US 29
- Maryland 185 - Washington DC Line to MD 97
- Maryland 210 - MD 228 to I-95
- Maryland 228 - MD 210 to MD 5
- Maryland 235 - Airport Rd to MD 246
- Maryland 355 - Washington DC Line to MD 27

MD 3

Limits:	US 50/301 to I-97
Study Area Length:	9.6 miles
Functional Class:	Urban Other Principal Arterial
Speed Limit	45 MPH - 50 MPH
Number of Travel Lanes:	(2 - 4) NB (2 - 4) SB
Total Number of Signal Controlled Intersections:	12
Total Number of Grade Separated Interchanges:	3
Major Cross Streets:	I-97, MD 175, MD 424, Waugh Chapel Rd Defense Hwy, MD 450, Belair Rd, US 50



2012 ADT
65,000 - 75,000

% Trucks
5 - 10

DHV
7.5% - 8%

	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	7	4
Number of Signalized Intersections with LOS E	2	4
Number of Signalized Intersections with LOS F	1	2
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	8.83	6.69
LOS E	0.76	2.2
LOS F	0	0.7
Southbound		
LOS D or Better	8.89	9.59
LOS E	0	0
LOS F	0.7	0
Intersection data available at 10 of 12 signalized intersections.		

LOS 'E' Intersections

MD 3 at Johns Hopkins Rd (AM)
MD 3 at MD 450 East (AM,PM)
MD 3 at MD 450 West (PM)
MD 3 at Riedel Rd/Waugh Chapel Rd (PM)
MD 3 at MD 175/Millersville Rd (PM)

LOS 'F' Intersections

MD 3 at MD 175/Millersville Rd (AM)
MD 3 at MD 424/Conway Rd (PM)
MD 3 at Crawford Blvd/Cronson Blvd (PM)

LOS 'E' Roadway Segments

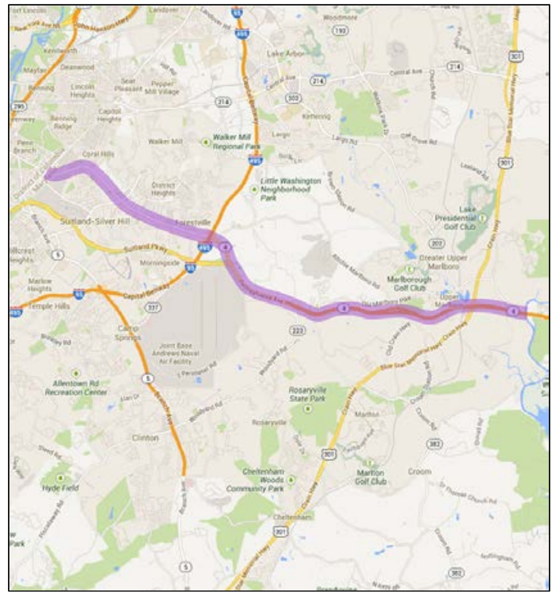
MD 175 to MD 32 - AM (NB)
US 50/301 to MD 450 - AM (NB)

LOS 'F' Roadway Segments

MD 32 to IS 97 - AM (SB)
IS 97 to MD 32 - PM (NB)

MD 4

Limits:	DC Line to Anne Arundel County Line
Study Area Length:	14.3 miles
Functional Class:	Urban Freeway Expressway - Rural Other Principal Arterial
Speed Limit	35 - 55 MPH
Number of Travel Lanes:	(2 - 3) NB (2 - 3) SB
Total Number of Signal Controlled Intersections:	12
Total Number of Grade Separated Interchanges:	7
Major Cross Streets:	MD 458, Forestville Rd, I-95, MD 337, MD 337, MD 223, US 301 MD 725, Westphalia Rd



2012 ADT
45,000 -74,000

% Trucks
7 - 11

DHV
7% - 9%

	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	6	6
Number of Signalized Intersections with LOS E	2	2
Number of Signalized Intersections with LOS F	2	2
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	5.56	14.29
LOS E	4.44	0
LOS F	4.29	0
Southbound		
LOS D or Better	14.29	5.86
LOS E	0	6.26
LOS F	0	2.17
Intersection data available at 10 of 12 signalized intersections.		

LOS 'E' Intersections

MD 4 at Forestville Rd (AM,PM)
MD 4 at Chaneyville Rd (AM,PM)

LOS 'F' Intersections

MD 4 at MD 337/Presidential Pkwy (AM,PM)
MD 4 at Dower House Rd (AM,PM)

LOS 'E' Roadway Segments

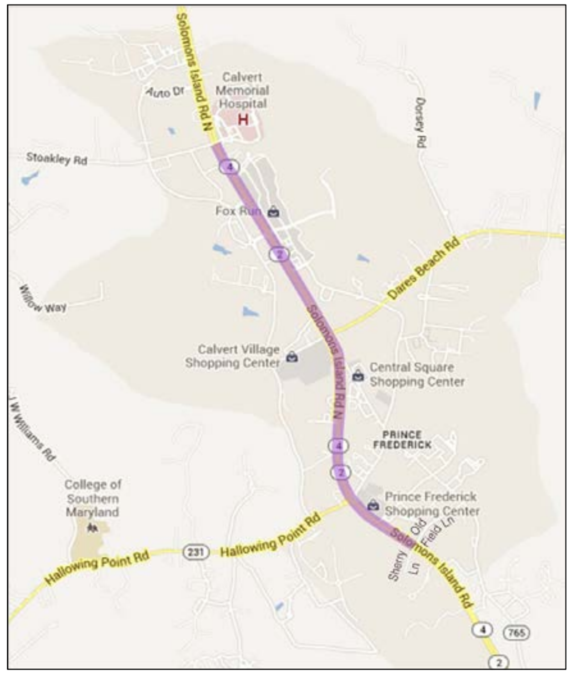
Anne Arundel Co/L to Marlboro Pike - AM (NB)
Marlboro Pike to US 301 - AM (NB)
Ritchie Marlboro Rd to MD 223 - AM (NB)
Old Marlboro Pike/Westphalia Rd to IS 95 - AM (NB)
Marlboro Pike to Anne Arundel Co/L - PM (SB)
US 301 to Marlboro Pike - PM (SB)
MD 223 to Ritchie Marlboro Rd - PM (SB)
Dower House Rd to MD 223 - PM (SB)
MD 337 to Dower House Rd - PM (SB)

LOS 'F' Roadway Segments

US 301 to Ritchie Marlboro Rd - AM (NB)
MD 223 to Dower House Rd - AM (NB)
Dower House Rd to MD 337 - AM (NB)
Ritchie Marlboro Rd to US 301 - PM (SB)

MD 2-4

Limits:	**Prince Frederick from MD 231 to Stoakley Rd**
Study Area Length:	2 miles
Functional Class:	Rural Other Principal Arterial
Speed Limit	45 MPH
Number of Travel Lanes:	(2 - 3) NB (2 - 3) SB
Total Number of Signal Controlled Intersections:	7
Total Number of Grade Separated Interchanges:	0
Major Cross Streets:	Stoakley Rd, MD 402, MD 231



2012 ADT
31,000 - 38,000

% Trucks
6.5

DHV
8%

	AM Peak Hour	**PM Peak Hour**
Number of Signalized Intersections with LOS D or Better	5	3
Number of Signalized Intersections with LOS E	0	2
Number of Signalized Intersections with LOS F	0	0
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	2	2
LOS E	0	0
LOS F	0	0
Southbound		
LOS D or Better	2	2
LOS E	0	0
LOS F	0	0
Intersection data available at 5 of 7 signalized intersections.		

LOS 'E' Intersections
MD 2 at Old Field Ln/ Sherry Ln (PM)
MD 2 at MD 402/West Dares Beach Rd (PM)

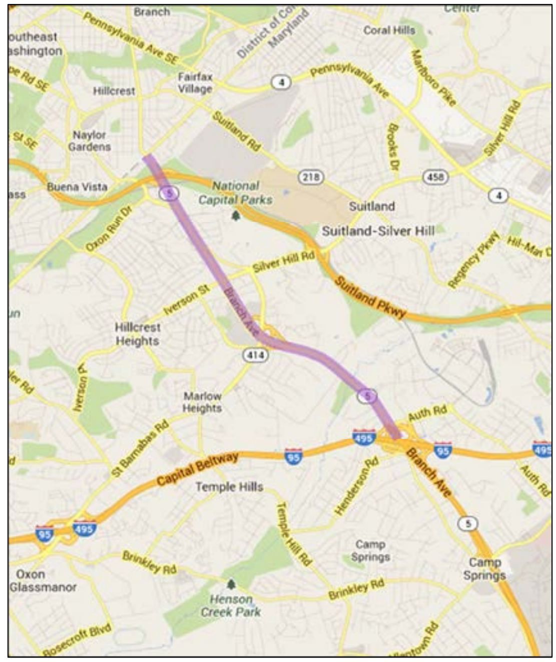
LOS 'E' Roadway Segments

LOS 'F' Intersections

LOS 'F' Roadway Segments

MD 5

Limits:	Washington DC Line to I-95
Study Area Length:	3.3 miles
Functional Class:	Urban Freeway Expressway
Speed Limit	30 MPH - 35 MPH
Number of Travel Lanes:	(1 - 4) NB (1 - 4) SB
Total Number of Signal Controlled Intersections:	10
Total Number of Grade Separated Interchanges:	3
Major Cross Streets:	Suitland Pkwy, MD 458 MD 414, I-95



2012 ADT
28,000 - 69,000

% Trucks
3

DHV
7.50%

	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	6	6
Number of Signalized Intersections with LOS E	1	1
Number of Signalized Intersections with LOS F	0	0
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	0	3.12
LOS E	3.32	0.2
LOS F	0	0
Southbound		
LOS D or Better	3.32	1.52
LOS E	0	1.8
LOS F	0	0
Intersection data available at 7 of 10 signalized intersections.		

LOS 'E' Intersections

MD 5 at MD 458/Iverson St (AM,PM)

LOS 'F' Intersections

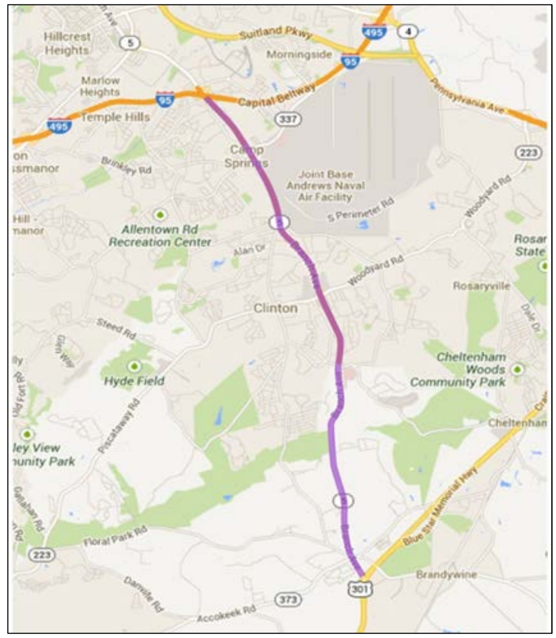
LOS 'E' Roadway Segments

IS 95 to MD 414 - AM (NB)
MD 414 to MD 458 - AM (NB)
MD 458 to Suitland Pkwy - AM (NB)
Suitland Pkwy to Washington DC/L - AM (NB)
Suitland Pkwy to Washington DC/L - PM (NB)
Washington DC/L to Suitland Pkwy- PM (SB)
Suitland Pkwy to MD 458 - PM (SB)
MD 458 to MD 414 - PM (SB)

LOS 'F' Roadway Segments

MD 5

Limits:	I-95 to US 301
Study Area Length:	9.4 miles
Functional Class:	Urban Freeway Expressway - Rural Other Principal Arterial
Speed Limit	50- 55 MPH
Number of Travel Lanes:	(2 - 3) NB (2 - 3) SB
Total Number of Signal Controlled Intersections:	3
Total Number of Grade Separated Interchanges:	8
Major Cross Streets:	I-95, MD 337, MD 223 MD 381 / MD 373, US 301



2012 ADT
59,000 - 77,000

% Trucks
5

DHV
8%

	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	0	3
Number of Signalized Intersections with LOS E	0	0
Number of Signalized Intersections with LOS F	3	0
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	3.08	9.4
LOS E	1.17	0
LOS F	5.15	0
Southbound		
LOS D or Better	9.4	1.81
LOS E	0	7.59
LOS F	0	0
Intersection data available at 3 of 3 signalized intersections.		

LOS 'E' Intersections

LOS 'E' Roadway Segments

MD 223 to Coventry Way - AM (NB)
Surratts Rd to MD 373 - PM (SB)
Coventry Way to MD 223 - PM (SB)
MD 337 to Coventry Way - PM (SB)
IS 95 to MD 337 - PM (SB)

LOS 'F' Intersections

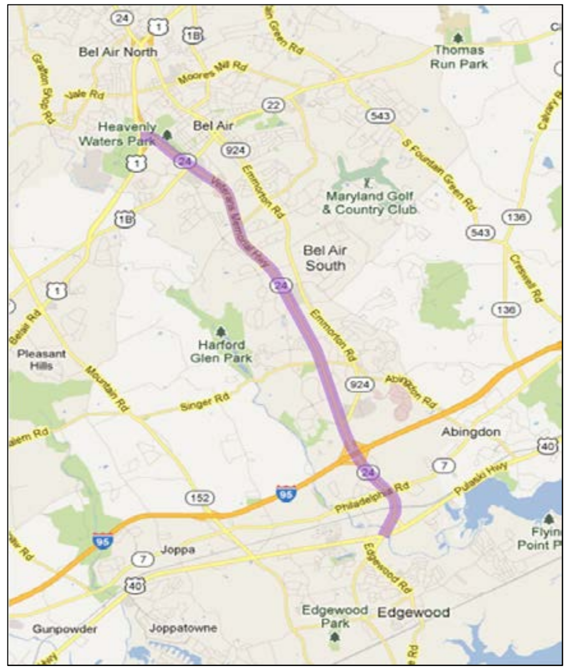
MD 5 at Brandywine Rd (AM)
MD 5 at MD 373 (AM)
MD 5 at Surratts Rd (AM)

LOS 'F' Roadway Segments

MD 373 to Surratts Rd - AM (NB)
Coventry Way to MD 337 - AM (NB)

MD 24

Limits:	US 40 (Pulaski Highway) to US 1 (Bel Air Bypass)
Study Area Length:	9.5 miles
Functional Class:	Urban Freeway Expressway – Urban Other Principal Arterial
Speed Limit	40 MPH – 55 MPH
Number of Travel Lanes:	(2 – 3) NB (2 – 3) SB
Total Number of Signal Controlled Intersections:	15
Total Number of Grade Separated Interchanges:	3
Major Cross Streets:	US 40, I-95, MD 7, MD 924 US 1 BU, US 1



2012 ADT
21,000 - 73,000

% Trucks
5 - 7

DHV
7.5% - 8.5%

	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	10	5
Number of Signalized Intersections with LOS E	0	2
Number of Signalized Intersections with LOS F	0	3
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	10.01	7.75
LOS E	0	1.7
LOS F	0	0.57
Southbound		
LOS D or Better	9.45	10
LOS E	0	0
LOS F	0.57	0
Intersection data available at 10 of 15 signalized intersections.		

LOS 'E' Intersections

MD 24 at Wheel Rd (PM)
US 1 at MD 24 (PM)

LOS 'E' Roadway Segments

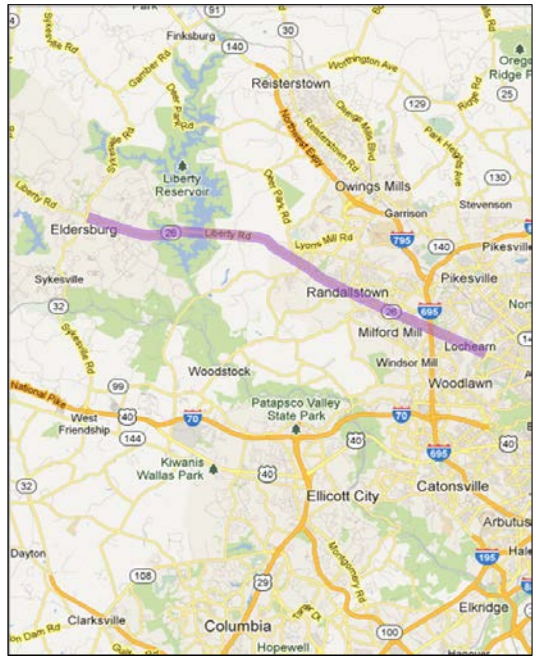
Trimble Rd to MD 755 - PM (NB)

LOS 'F' Intersections

MD 24 at Ramps 4,5&9 to and from I-95 NB (PM)
MD 24 at Singer Rd (PM)
MD 24 at W. Ring Factory Rd (PM)

LOS 'F' Roadway Segments

MD 26



Limits:	MD 32 (Sykesville Road) to Baltimore City Line
Study Area Length:	14 miles
Functional Class:	Rural Minor Arterial - Urban Other Principal Arterial
Speed Limit	35 MPH - 50 MPH
Number of Travel Lanes:	(1 - 2) EB (1 - 3) WB
Total Number of Signal Controlled Intersections:	27
Total Number of Grade Separated Interchanges:	1
Major Cross Streets:	I-695, Rolling Rd, Old Court Rd, MD 32

2012 ADT
10,000 - 48,000

% Trucks
6 - 8

DHV
7% - 9%

	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	13	14
Number of Signalized Intersections with LOS E	0	0
Number of Signalized Intersections with LOS F	1	0
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	7.9	13.44
LOS E	6.16	0.62
LOS F	0	0
Southbound		
LOS D or Better	11.56	8.08
LOS E	1.88	3.17
LOS F	0.62	2.81
Intersection data available at 14 of 27 signalized intersections.		

LOS 'E' Intersections

LOS 'E' Roadway Segments

Ridge Rd to Baltimore Co/L -AM (EB)
Carroll Co/L to Lyons Mill Rd - AM (EB)
IS 695 to Essex Rd - AM (EB)
Patterson Ave to Balto City Line - AM (EB)
Milford Mill Rd to Rolling Rd - AM (WB)
IS 695 to Milford Mill Rd - AM (WB)
Balto City Line to Patterson Ave - AM (WB)
IS 695 to Essex Rd - PM (EB)
McDonogh Rd to Deer Park Rd - PM (WB)
Rolling Rd to Old Court Rd - PM (WB)
Milford Mill Rd to Rolling Rd - PM (WB)

LOS 'F' Intersections

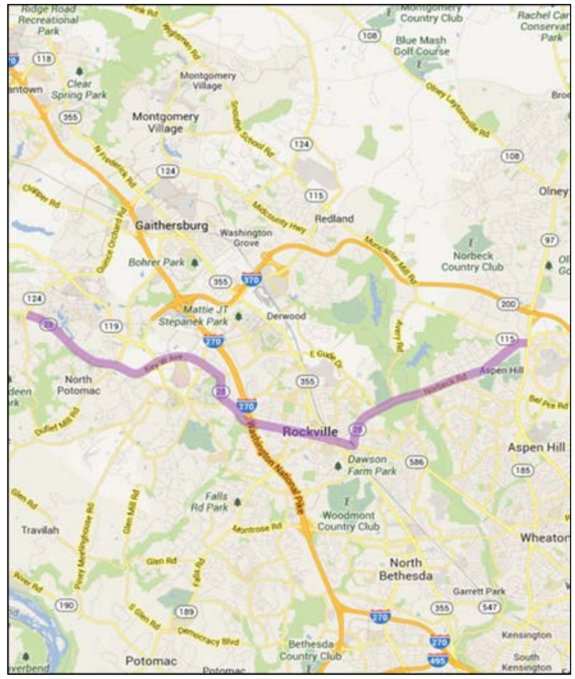
MD 26 at Lord Baltimore Dr/Ramp 5 from I-695 SB (AM)

LOS 'F' Roadway Segments

Essex Rd to IS 695 - AM (WB)
IS 695 to Milford Mill Rd - PM (WB)
Essex Rd to IS 695 - PM (WB)
Patterson Ave to Essex Rd - PM (WB)
Balto City Line to Patterson Ave - PM (WB)

MD 28

Limits:	MD 124 to MD 97
Study Area Length:	11.6 miles
Functional Class:	Urban Other Principal Arterial
Speed Limit	40 MPH - 50 MPH
Number of Travel Lanes:	(1 - 3) NB (1 - 3) SB
Total Number of Signal Controlled Intersections:	30
Total Number of Grade Separated Interchanges:	1
Major Cross Streets:	MD 124, MD 119, Shady Grove Dr, Gude Dr, I-270, MD 189, MD 355, MD 115, MD 97



2012 ADT
10,000 - 48,000

% Trucks
6 - 8

DHV
8%

	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	15	17
Number of Signalized Intersections with LOS E	1	2
Number of Signalized Intersections with LOS F	3	0
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	10.04	6.82
LOS E	1.57	4.79
LOS F	0	0
Southbound		
LOS D or Better	6.82	10.04
LOS E	0	0
LOS F	4.79	1.57
Intersection data available at 19 of 30 signalized intersections.		

LOS 'E' Intersections
MD 28 at Muddy Branch Rd (AM)
MD 28 at Baltimore Rd (PM)
MD 28 at MD 586/MD 911 (PM)

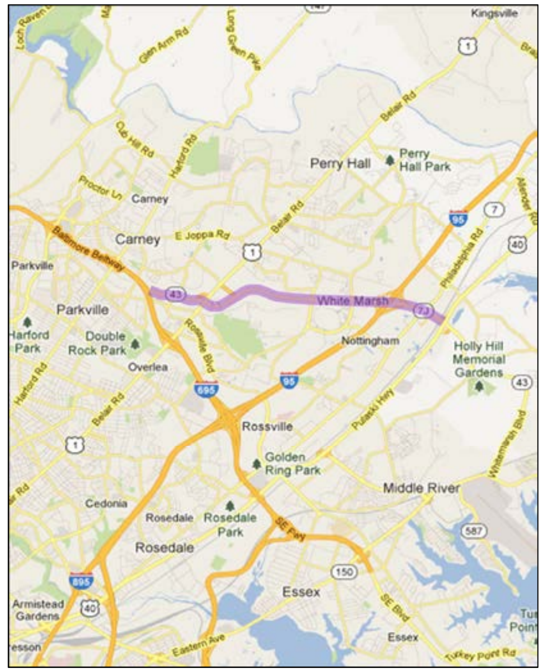
LOS 'F' Intersections
MD 28 at Bauer Dr (AM)
MD 28 at MD 586/MD 911 (AM)
MD 28 at MD 97 (AM)

LOS 'E' Roadway Segments
IS 270 to MD 355 - AM (NB)
MD 355 to IS 270 - PM (NB)
MD 97 to E. Gude Dr - PM (NB)

LOS 'F' Roadway Segments
IS 270 to MD 355 - AM (SB)
E. Gude Dr to MD 97 - AM (SB)
MD 355 to IS 270 - PM (SB)

MD 43

Limits:	I-695 to US 40
Study Area Length:	5.2 miles
Functional Class:	Urban Freeway Expressway
Speed Limit	45 MPH - 50 MPH
Number of Travel Lanes:	2 EB 2 WB
Total Number of Signal Controlled Intersections:	6
Total Number of Grade Separated Interchanges:	4
Major Cross Streets:	I-695, US 1, Perry Hall Blvd, Honeygo Blvd, I-95, US 40



2012 ADT
32,000 - 58,000

% Trucks
1 - 5

DHV
7.5% - 9%

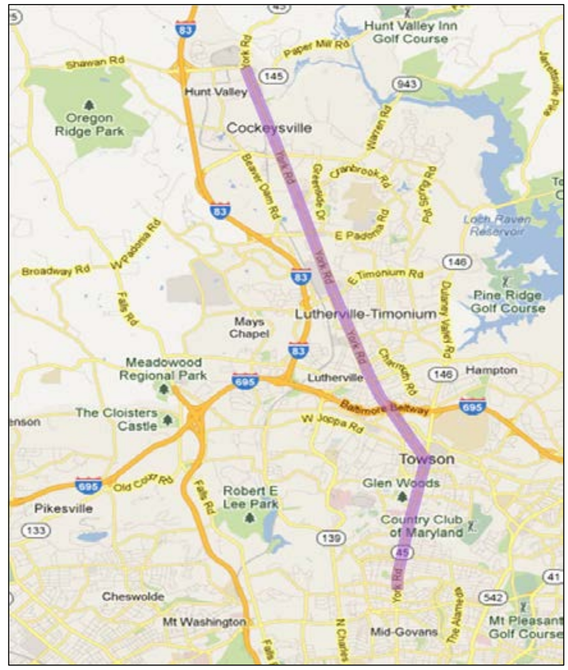
	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	1	1
Number of Signalized Intersections with LOS E	1	0
Number of Signalized Intersections with LOS F	0	1
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	5.15	5.15
LOS E	0	0
LOS F	0	0
Southbound		
LOS D or Better	4.51	3.93
LOS E	0	1.22
LOS F	0.64	0
Intersection data available at 2 of 6 signalized intersections.		

LOS 'E' Intersections	LOS 'F' Intersections
MD 43 at Honeygo Blvd (AM)	MD 43 at Honeygo Blvd (PM)

LOS 'E' Roadway Segments	LOS 'F' Roadway Segments
Walther Blvd to IS 695 - PM (WB)	IS 695 to Walther Blvd - AM (EB)
IS 95 to Honeygo Blvd - PM (WB)	

MD 45

Limits:	Baltimore City Line to Shawan Road
Study Area Length:	9.2 miles
Functional Class:	Urban Other Principal Arterial - Urban Minor Arterial
Speed Limit	35 MPH – 40 MPH
Number of Travel Lanes:	(1 – 2) NB (1 – 2) SB
Total Number of Signal Controlled Intersections:	31
Total Number of Grade Separated Interchanges:	1
Major Cross Streets:	Stevenson Ln, Towsontown Blvd, Joppa Rd, Fairmount Ave, I-695, MD 131, Timonium Rd, Padonia Rd, Warren Rd, Shawan Rd



2012 ADT
21,000 - 55,000

% Trucks
2 - 5

DHV
7.5% - 8.5%

	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	10	9
Number of Signalized Intersections with LOS E	0	1
Number of Signalized Intersections with LOS F	0	0
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	8.9	8.9
LOS E	0.31	0.31
LOS F	0	0
Southbound		
LOS D or Better	6.93	3.78
LOS E	1.12	1.66
LOS F	1.16	3.77
Intersection data available at 10 of 31 signalized intersections.		

LOS 'E' Intersections

MD 45 at Fairmount Ave (PM)

LOS 'E' Roadway Segments

Fairmount Ave to IS 695 - AM (NB)
Burke Ave to Stevenson Ln - AM (SB)
IS 695 to Fairmount Ave - AM (SB)
Fairmount Ave to IS 695 - PM (NB)
Burke Ave to Stevenson Ln - PM (SB)
IS 695 to Fairmount Ave - PM (SB)
MD 131 to IS 695 - PM (SB)

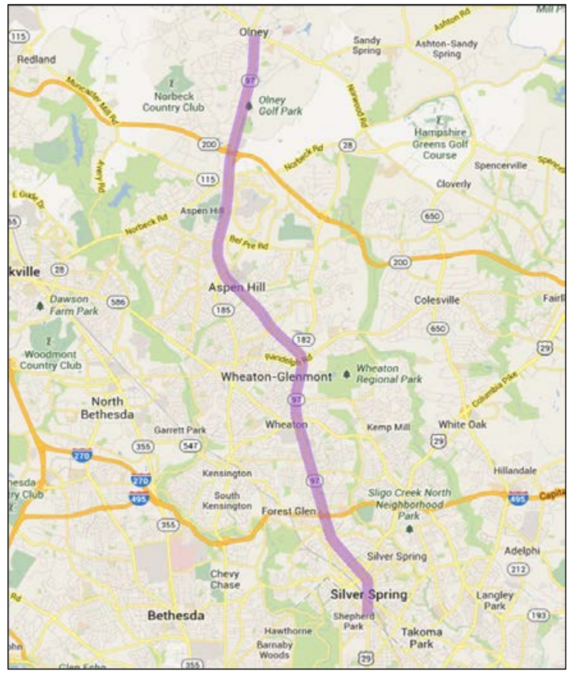
LOS 'F' Intersections

LOS 'F' Roadway Segments

Fairmount Ave to Burke Ave - AM (SB)
Fairmount Ave to Burke Ave - PM (SB)
Timonium Rd to MD 131 - PM (SB)
Padonia Rd to Timonium Rd - PM (SB)

MD 97

Limits:	**Washington DC Line to MD 108**
Study Area Length:	11.9 miles
Functional Class:	Urban Other Principal Arterial
Speed Limit	30 MPH - 45 MPH
Number of Travel Lanes:	(3 - 4) NB (3 - 4) SB
Total Number of Signal Controlled Intersections:	48
Total Number of Grade Separated Interchanges:	1
Major Cross Streets:	US 29, I-495, MD 586, Randolph Rd, MD 193, MD 182, MD 28, MD 200, MD 108



2012 ADT
34,000 - 64,000

% Trucks
4 - 6

DHV
6.5% - 8%

	AM Peak Hour	**PM Peak Hour**
Number of Signalized Intersections with LOS D or Better	25	29
Number of Signalized Intersections with LOS E	6	4
Number of Signalized Intersections with LOS F	5	3
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	11.89	10.07
LOS E	0	1.82
LOS F	0	0
Southbound		
LOS D or Better	10.68	11.89
LOS E	1.21	0
LOS F	0	0
Intersection data available at 36 of 48 signalized intersections.		

LOS 'E' Intersections

MD 97 at Emory Ln (AM)
MD 97 at Bel Pre Rd (AM)
MD 97 at Randolph Rd (AM)
MD 97 at Ramp 3 from I-495 (AM)
MD 97 at MD 192/Forest Glen Rd (AM,PM)
MD 97 at MD 586 (AM,PM)
MD 97 at Arcola Ave (PM)
MD 97 at Dennis Ave (PM)

LOS 'F' Intersections

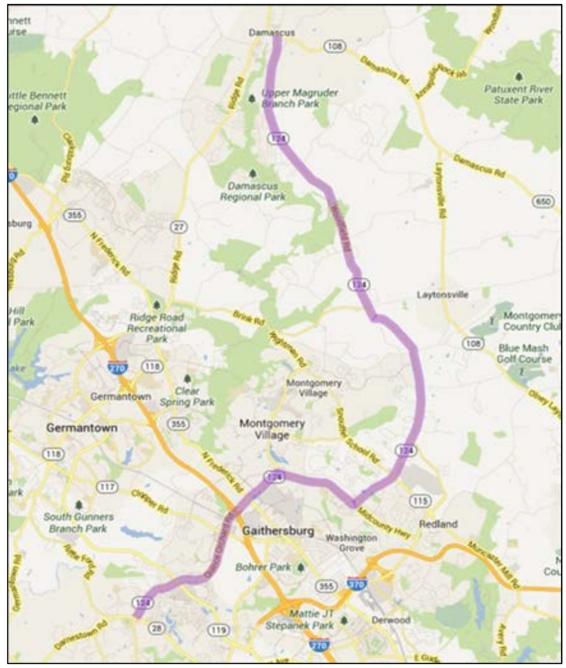
MD 28 at MD 97 (AM)
MD 97 at Old Baltimore Rd (AM)
MD 97 at Plyers Mill Rd (AM)
MD 97 at Seminary Rd/Columbia Blvd (AM,PM)
MD 97 at Seminary Pl (AM,PM)
MD 97 at MD 390 (PM)

LOS 'E' Roadway Segments

MD 192 to IS 495 - AM (SB)
Plyers Mill Rd to MD 192 - AM (SB)
MD 192 to Plyers Mill Rd - PM (NB)
Arcola Ave to Randolph Rd - PM (NB)

MD 124

Limits:	MD 28 to MD 108
Study Area Length:	17 miles
Functional Class:	Urban Other Principal Arterial - Urban Minor Arterial
Speed Limit	30 MPH - 50 MPH
Number of Travel Lanes:	(1 - 4) NB (1 - 4) SB
Total Number of Signal Controlled Intersections:	31
Total Number of Grade Separated Interchanges:	1
Major Cross Streets:	MD 28, MD 119, MD 117, I-270, MD 335, MD 115, MD 108



2012 ADT
11,000 - 76,000

% Trucks
4 - 7

DHV
8% - 11%

	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	14	13
Number of Signalized Intersections with LOS E	2	3
Number of Signalized Intersections with LOS F	0	0
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	17.03	12.71
LOS E	0	4.32
LOS F	0	0
Southbound		
LOS D or Better	8.79	15.91
LOS E	8.24	1.12
LOS F	0	0
Intersection data available at 16 of 31 signalized intersections.		

LOS 'E' Intersections

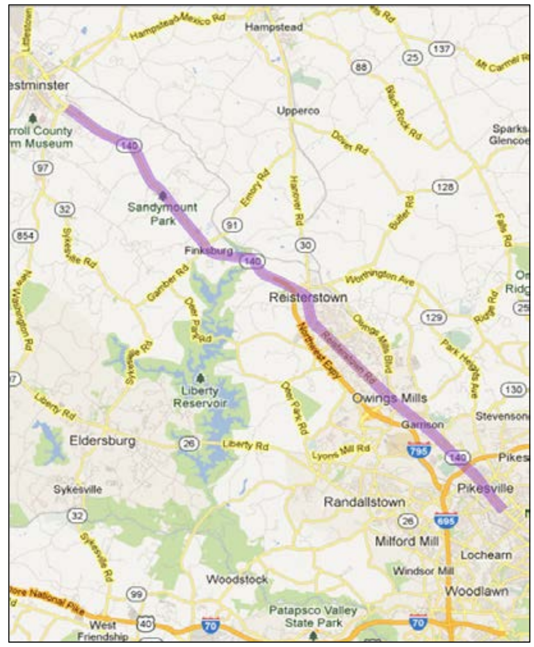
MD 119 at MD 124 (AM,PM)
MD 355 at MD 124 (AM,PM)
MD 124 at Christopher Ave/Lost Knife Rd (PM)

LOS 'E' Roadway Segments

MD 355 to IS 270 (NB) Ramps 2&4 - AM (SB)
MD 115 to Midcounty Hwy - AM (SB)
Brink Rd to Fieldcrest Rd - AM (SB)
Welsh Rd to Brink Rd - AM (SB)
Hawkins Creamery Rd to Welsh Rd - AM (SB)
IS 270 (NB) Ramps 2&4 to MD 355 - PM (NB)
Brink Rd to Welsh Rd - PM (NB)
MD 355 to IS 270 (NB) Ramps 2&4 - PM (SB)
MD 115 to Midcounty Hwy - PM (SB)

MD 140

Limits:	Baltimore City Line to MD 97
Study Area Length:	20.5 miles
Functional Class:	Rural Other Principal Arterial - Urban Other Principal Arterial
Speed Limit	30 MPH - 55 MPH
Number of Travel Lanes:	(1 - 3) NB (1 - 2) SB
Total Number of Signal Controlled Intersections:	51
Total Number of Grade Separated Interchanges:	3
Major Cross Streets:	Old Court Rd, I-695, MD 130, Painters Mill Rd, MD 940, MD 30, I-795, MD 91, MD 97



2012 ADT
19,000 - 53,000

% Trucks
3 - 9

DHV
7% - 8%

	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	20	18
Number of Signalized Intersections with LOS E	0	1
Number of Signalized Intersections with LOS F	0	1
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	16.28	12.06
LOS E	2.97	6.44
LOS F	1.22	1.97
Southbound		
LOS D or Better	10.59	11.33
LOS E	3.30	5.54
LOS F	6.58	3.60
Intersection data available at 16 of 51 signalized intersections.		

LOS 'E' Intersections

MD 140 at Painters Mill Rd (PM)

LOS 'F' Intersections

MD 140 at Ramps 1&7 of MD 940 Owings Mills Blvd (PM)

LOS 'E' Roadway Segments

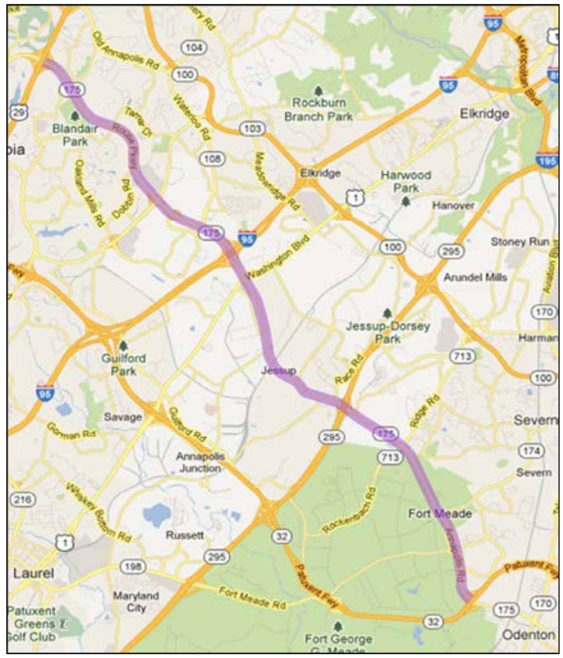
Naylors Ln to IS 695 - AM (NB)
Franklin Blvd to Ramp 1 FR IS 795 NB - AM (NB)
Painters Mill Rd to MD 130 - AM (SB)
Gores Mill Rd to Ramp 1 FR IS 795 NB - AM (SB)
Old Westminster Pike to Baltimore Co/L - AM (SB)
MD 91 to Old Westminster Pike - AM (SB)
Balto City Line to Old Court Rd - PM (NB)
Old Court Rd to Naylors Ln - PM (NB)
Naylors Ln to IS 695 - PM (NB)
McDonogh Rd to MD 130 - PM (NB)
Owings Mills Blvd Ramps to Franklin Blvd - PM (NB)
Gores Mill Rd to Carroll Co/L - PM (NB)
Naylors Ln to Old Court Rd - PM (SB)
Franklin Blvd to Owings Mills Blvd Ramps - PM (SB)
Ramp 1 FR IS 795 NB to Franklin Blvd - PM (SB)

LOS 'F' Roadway Segments

IS 695 to McDonogh Rd - AM (NB)
Old Court Rd to Balto City Line - AM (SB)
Naylors Ln to Old Court Rd - AM (SB)
IS 695 to Naylors Ln - AM (SB)
McDonogh Rd to IS 695 - AM (SB)
MD 130 to McDonogh Rd - AM (SB)
Franklin Blvd to Owings Mills Blvd Ramps - AM (SB)
IS 695 to McDonogh Rd - PM (NB)
Ramp 1 FR IS 795 NB to Gores Mill Rd - PM (NB)
Old Court Rd to Balto City Line - PM (SB)
IS 695 to Naylors Ln - PM (SB)
McDonogh Rd to IS 695 - PM (SB)
MD 130 to McDonogh Rd - PM (SB)

MD 175

Limits:	**MD 32 (Patuxent Freeway) to US 29 (Columbia Pike)**
Study Area Length:	13.3 miles
Functional Class:	Urban Freeway Expressway - Urban Minor Arterial
Speed Limit	35 MPH - 50 MPH
Number of Travel Lanes:	(1 - 3) NB (1 - 4) SB
Total Number of Signal Controlled Intersections:	19
Total Number of Grade Separated Interchanges:	5
Major Cross Streets:	MD 32, MD 174, MD 713, MD 295, US 1, I-95, Snowden River Pkwy, US 29



2012 ADT
17,000 - 69,000

% Trucks
3 - 11

DHV
7.5% - 9%

	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	9	6
Number of Signalized Intersections with LOS E	1	2
Number of Signalized Intersections with LOS F	0	2
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	11.67	11.57
LOS E	1.65	1.75
LOS F	0	0
Southbound		
LOS D or Better	13.32	10.96
LOS E	0	1.65
LOS F	0	0.71
Intersection data available at 10 of 19 signalized intersections.		

LOS 'E' Intersections

MD 175 at MD 713/Rockenbach Rd (AM)
MD 175 at Brock Bridge Rd (PM)
MD 175 at Llewellyn Ave/Blue Water Blvd (PM)

LOS 'E' Roadway Segments

MD 295 to Howard Co/L - AM (NB)
Anne Arundel Co/L to Dorsey Run Rd - AM (NB)
Dorsey Run Rd to US 1 - PM (NB)
US 1 to IS 95 - PM (NB)
Howard Co/L to MD 295 - PM (SB)
Dorsey Run Rd to Anne Arundel Co/L - PM (SB)

LOS 'F' Intersections

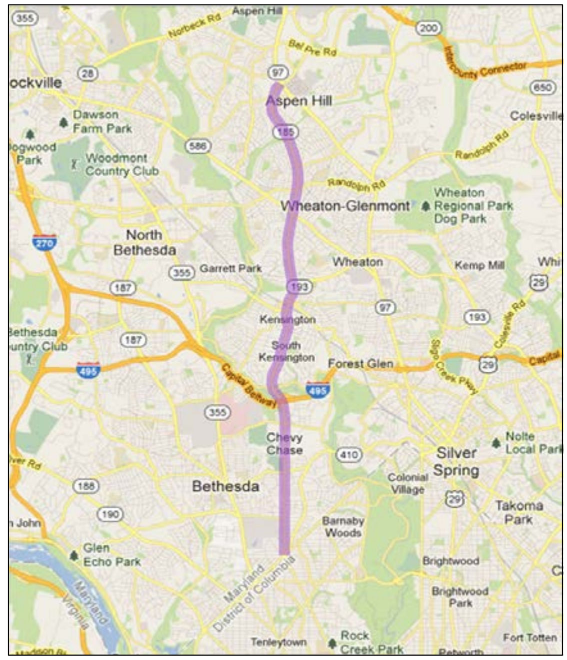
MD 175 at MD 713/Rockenbach Rd (PM)
MD 175 at Tamar Dr (PM)

LOS 'F' Roadway Segments

MD 108 to IS 95 - PM (SB)

MD 185

Limits:	Washington DC Line to MD 97
Study Area Length:	8.3 miles
Functional Class:	Urban Other Principal Arterial
Speed Limit	30 MPH - 45 MPH
Number of Travel Lanes:	(1 - 3) NB (3 - 4) SB
Total Number of Signal Controlled Intersections:	26
Total Number of Grade Separated Interchanges:	1
Major Cross Streets:	MD 410, I-495, MD 547, MD 193, MD 586, Randolph Rd, MD 97



2012 ADT
34,000 - 67,000

% Trucks
4 - 6

DHV
7.5% - 8.5%

	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	8	9
Number of Signalized Intersections with LOS E	5	3
Number of Signalized Intersections with LOS F	2	3
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	8.3	6.14
LOS E	0	0.14
LOS F	0	2.02
Southbound		
LOS D or Better	7.52	7.52
LOS E	0	0.78
LOS F	0.78	0
Intersection data available at 15 of 26 signalized intersections.		

LOS 'E' Intersections

MD 185 at Beach Dr (AM)
MD 185 at MD 191/Bradley Ln (AM)
MD 185 at Manor Rd (AM,PM)
MD 185 at MD 586 (AM,PM)
MD 185 at Randolph Rd (AM,PM)

LOS 'F' Intersections

MD 185 at Jones Bridge Rd/Kensington Pkwy (AM)
MD 185 at MD 410 (AM,PM)
MD 185 at MD 191/Bradley Ln (PM)
MD 185 at MD 192 (PM)

LOS 'E' Roadway Segments

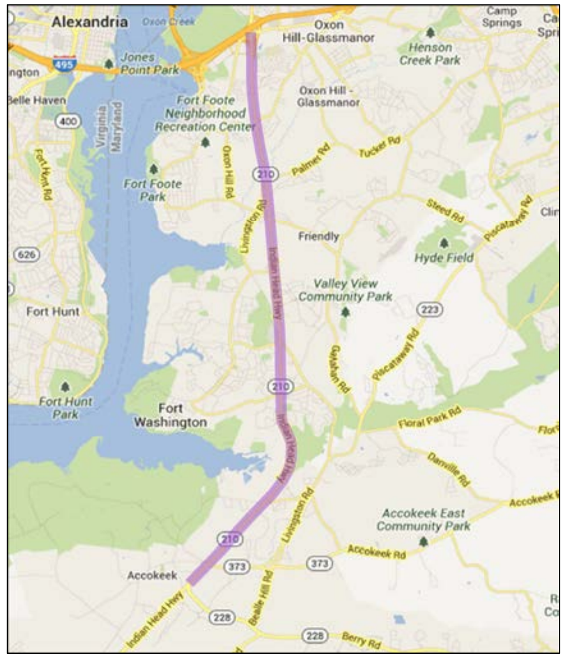
MD 192 to MD 193 - PM (NB)
MD 410 to MD 191 - PM (SB)

LOS 'F' Roadway Segments

MD 410 to MD 191 - AM (SB)
MD 191 to MD 410 - PM (NB)
MD 410 to IS 495 - PM (NB)

MD 210

Limits:	MD 228 to I-95
Study Area Length:	10.2 miles
Functional Class:	Urban Freeway Expressway - Urban Minor Arterial
Speed Limit	40 MPH - 45 MPH
Number of Travel Lanes:	2 - 3 NB 2 - 4 SB
Total Number of Signal Controlled Intersections:	10
Total Number of Grade Separated Interchanges:	1
Major Cross Streets:	I-95, Livingston Rd MD 373, MD 228



2012 ADT
47,000 - 71,000

% Trucks
4 - 7

DHV
7% - 8.5%

	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	2	4
Number of Signalized Intersections with LOS E	3	2
Number of Signalized Intersections with LOS F	3	2
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	10.2	10.2
LOS E	0	0
LOS F	0	0
Southbound		
LOS D or Better	10.2	10.2
LOS E	0	0
LOS F	0	0
Intersection data available at 8 of 10 signalized intersections.		

LOS 'E' Intersections
MD 210 at Fort Washington Rd (AM)
MD 210 at Swan Creek Rd/Livingston Rd (AM)
MD 210 at Old Fort Rd (South) (AM,PM)
MD 210 at Wilson Bridge Dr (PM)

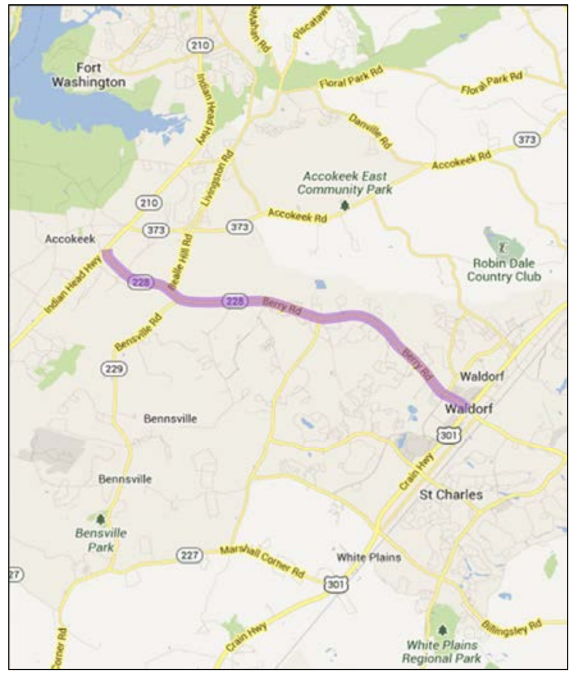
LOS 'F' Intersections
MD 210 at Farmington Rd (AM)
MD 210 at Wilson Bridge Dr (AM)
MD 210 at Livingston Rd/Kerby Hill Rd (AM,PM)
MD 210 at Fort Washington Rd (PM)

LOS 'E' Roadway Segments

LOS 'F' Roadway Segments

MD 228

Limits:	MD 210 to MD 5
Study Area Length:	6.9 miles
Functional Class:	Urban Other Principal Arterial
Speed Limit	35 MPH - 50 MPH
Number of Travel Lanes:	2 - 3 EB 2 WB
Total Number of Signal Controlled Intersections:	11
Total Number of Grade Separated Interchanges:	0
Major Cross Streets:	MD 210, MD 229 US 301, MD 5



2012 ADT
38,000 - 40,000

% Trucks
4 - 5

DHV
8%

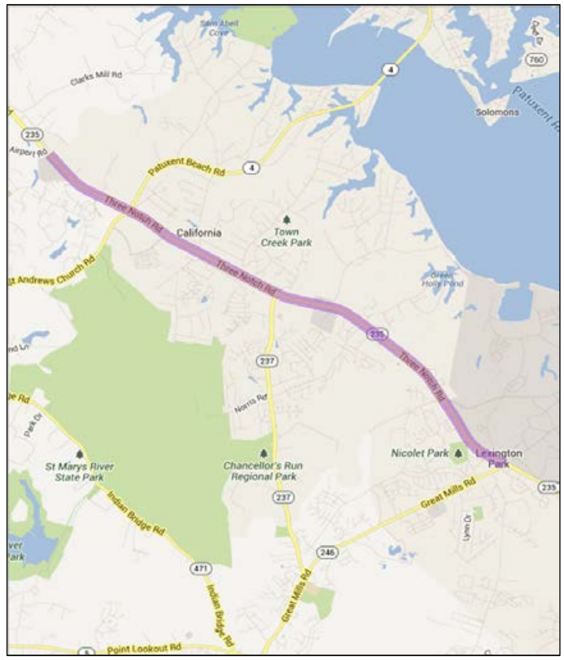
	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	3	2
Number of Signalized Intersections with LOS E	0	0
Number of Signalized Intersections with LOS F	1	2
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	6.88	6.88
LOS E	0	0
LOS F	0	0
Southbound		
LOS D or Better	6.88	6.88
LOS E	0	0
LOS F	0	0
Intersection data available at 4 of 11 signalized intersections.		

LOS 'E' Intersections	LOS 'F' Intersections
US 301 at MD 5BU/MD 228 (PM)	MD 228 at MD 229 (AM,PM)
	MD 228 at Bealle Hill Rd (PM)

LOS 'E' Roadway Segments	LOS 'F' Roadway Segments

MD 235

Limits:	Airport Rd to MD 246
Study Area Length:	4.7 miles
Functional Class:	Urban Other Principal Arterial
Speed Limit	35 MPH - 55 MPH
Number of Travel Lanes:	3 NB 3 SB
Total Number of Signal Controlled Intersections:	16
Total Number of Grade Separated Interchanges:	0
Major Cross Streets:	MD 4, MD 237 Pegg Rd, MD 246



2012 ADT
32,000 - 60,000

% Trucks
3

DHV
8.50%

	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	4	3
Number of Signalized Intersections with LOS E	4	4
Number of Signalized Intersections with LOS F	2	3
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	4.67	2.98
LOS E	0	1.69
LOS F	0	0
Southbound		
LOS D or Better	4.67	4.67
LOS E	0	0
LOS F	0	0
Intersection data available at 10 of 16 signalized intersections.		

LOS 'E' Intersections

MD 235 at First Colony Blvd (AM)
MD 235 at Shady Mile Dr/Old Rolling Rd (AM)
MD 235 at Exploration Park Dr/Ent to VEDA Corporation (AM,PM)
MD 235 at Pegg Rd/Ent to Naval Base (AM,PM)
MD 235 at MacArthur Blvd/Millstone Landing Rd (PM)
MD 4 at MD 235 (PM)

LOS 'E' Roadway Segments

MD 237 to MD 4 - PM (NB)

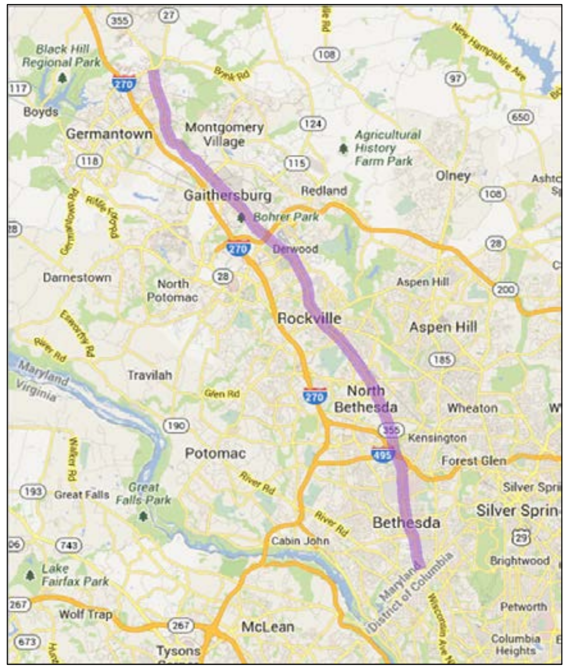
LOS 'F' Intersections

MD 235 at MD 237/Maple Rd (AM,PM)
MD 235 at Town Creek Dr/Taylor Ln (AM,PM)
MD 235 at Shady Mile Dr/Old Rolling Rd (PM)

LOS 'F' Roadway Segments

MD 355

Limits:	Washington DC Line to MD 27
Study Area Length:	19.7 miles
Functional Class:	Urban Other Principal Arterial
Speed Limit	25 MPH - 45 MPH
Number of Travel Lanes:	2 - 4 NB 2 - 4 SB
Total Number of Signal Controlled Intersections:	80
Total Number of Grade Separated Interchanges:	3
Major Cross Streets:	MD 191, MD 410, MD 547, MD 187, Montrose Pkwy, MD 28, Shady Grove Rd, I-370, MD 117, MD 124, Middlebrook Rd, MD 118, MD 27



2012 ADT
33,000 - 64,000

% Trucks
2 - 6

DHV
7.5% - 9%

	AM Peak Hour	PM Peak Hour
Number of Signalized Intersections with LOS D or Better	26	25
Number of Signalized Intersections with LOS E	4	4
Number of Signalized Intersections with LOS F	4	5
Miles of Roadway	**AM Peak Hour**	**PM Peak Hour**
Northbound		
LOS D or Better	19.14	15.59
LOS E	0.56	4.11
LOS F	0	0
Southbound		
LOS D or Better	13.4	19.14
LOS E	5.45	0.56
LOS F	0.85	0
Intersection data available at 34 of 80 signalized intersections.		

LOS 'E' Intersections
MD 355 at Edmonston Dr/W. Edmonston Dr (AM)
MD 355 at Foreman Blvd (AM)
MD 355 at Tuckerman Ln (North Intersection) (AM)
MD 355 at Gude Dr (AM,PM)
MD 355 at MD 124 (AM,PM)
MD 355 at Grosvenor Ln (PM)
MD 355 at MD 191 (PM)

LOS 'F' Intersections
MD 355 at Grosvenor Ln (AM)
MD 355 at Cedar Ln (AM,PM)
MD 355 at MD 911/Wootton Pkwy (AM,PM)
MD 355 at Shady Grove Rd (AM,PM)
MD 355 at Rollins Ave/Twinbrook Pkwy (PM)
MD 355 at Tuckerman Ln (North Intersection) (PM)

LOS 'E' Roadway Segments
MD 191 to MD 410 - AM (NB)
Alta Vista Rd to Cedar Ln - AM (SB)
IS 495 to Alta Vista Rd - AM (SB)
E. Gude Dr to MD 28 - AM (SB)
MD 124 to Shady Grove Rd - AM (SB)
MD 191 to MD 410 - PM (NB)
Cedar Ln to Alta Vista Rd - PM (NB)
Alta Vista Rd to IS 495 - PM (NB)

LOS 'E' Roadway Segments Cont.
Shady Grove Rd to MD 124 - PM (NB)
MD 410 to MD 191 - PM (SB)

LOS 'F' Roadway Segments
Jones Bridge Rd to MD 410 - PM (SB)

INTERSECTIONS

Traffic data has been collected at numerous intersections throughout the state in the past three years. The following intersections have been defined to operate at the worse conditions or level of service 'F' based on the counted locations:

ANNE ARUNDEL

- MD 2 @ Tarragon Lane
- MD 3 @ Crawford Boulevard
- MD 3 @ MD 424
- MD 3 @ MD 175
- MD 175 @ MD 713

BALTIMORE

- US 1 @ Rossville Boulevard
- MD 26 @ I-695 Ramps
- MD 43 @ Honeygo Boulevard
- MD 140 @ MD 940

CALVERT

- MD 2 @ MD 4
- MD 2 @ MD 524

CHARLES

- MD 5 @ Billingsley Road
- MD 228 @ MD 229

FREDERICK

- US 15 @ W. 7th Street

HARFORD

- MD 24 @ Singer Road
- MD 24 @ W. Ring Factory Road
- MD 24 @ I-95 Ramps

HOWARD

- US 1 @ Guilford Road
- US 40 @ Rogers Avenue
- MD 175 @ Tamar Drive

MONTGOMERY

- MD 28 @ MD 97
- MD 28 @ MD 586
- MD 28 @ MD 115
- US 29 @ Dale Drive
- US 29 @ Southwood Drive
- US 29 @ Tech Road
- MD 97 @ Old Baltimore Road
- MD 97 @ Seminary Road
- MD 97 @ Plyers Mill Road
- MD 97 @ Seminary Place
- MD 97 @ MD 390
- MD 108 @ Muncaster Road
- MD 117 @ Waring Station Road
- MD 119 @ Lakelands Drive
- MD 119 @ Muddy Branch Road
- MD 185 @ MD 410
- MD 185 @ Jones Bridge Road
- MD 185 @ MD 191
- MD 185 @ MD 192
- MD 187 @ Tuckerman Lane
- MD 190 @ Greenway Drive
- MD 355 @ Shady Grove Road
- MD 355 @ Twinbrook Parkway
- MD 355 @ Grosvenor Lane
- MD 355 @ Cedar Lane
- MD 355 @ MD 911

- MD 355 @ Tuckerman Lane
- MD 547 @ Summit Avenue
- MD 586 @ Randolph Road
- MD 650 @ Adelphi Road
- MD 650 @ Randolph Road

PRINCE GEORGE'S

- US 1 @ Cherry Hill Road
- US 1 @ Edgewood Road/I-95 Ramp
- US 1 @ MD 410
- MD 4 @ Dower House Road
- MD 4 @ MD 337
- MD 5 @ MD 373
- MD 5 @ Surratts Road
- MD 5 @ Brandywine Road
- MD 193 @ MD 202
- MD 197 @ MD 198
- MD 197 @ Powder Mill Road
- MD 202 @ Brightseat Road
- MD 210 @ Farmington Road
- MD 210 @ Livingston Road/Kerby Hill Road
- MD 210 @ Fort Washington Road
- MD 210 @ Wilson Bridge Drive
- MD 214 @ I-95 SB Ramps
- MD 228 @ Bealle Hill Road
- MD 228 @ MD 229
- US 301 @ MD 197
- US 301 @ Clymer Drive
- MD 410 @ MD 212
- MD 410 @ MD 450
- MD 414 @ I-95 Ramps
- MD 458 @ Swann Road
- MD 637 @ Suitland Parkway

SAINT MARY'S

- MD 235 @ MD 237
- MD 235 @ Town Creek Drive
- MD 235 @ Shady Mile Drive

WORCESTER

- US 50 @ MD 528

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VII. Statewide Most Congested Locations

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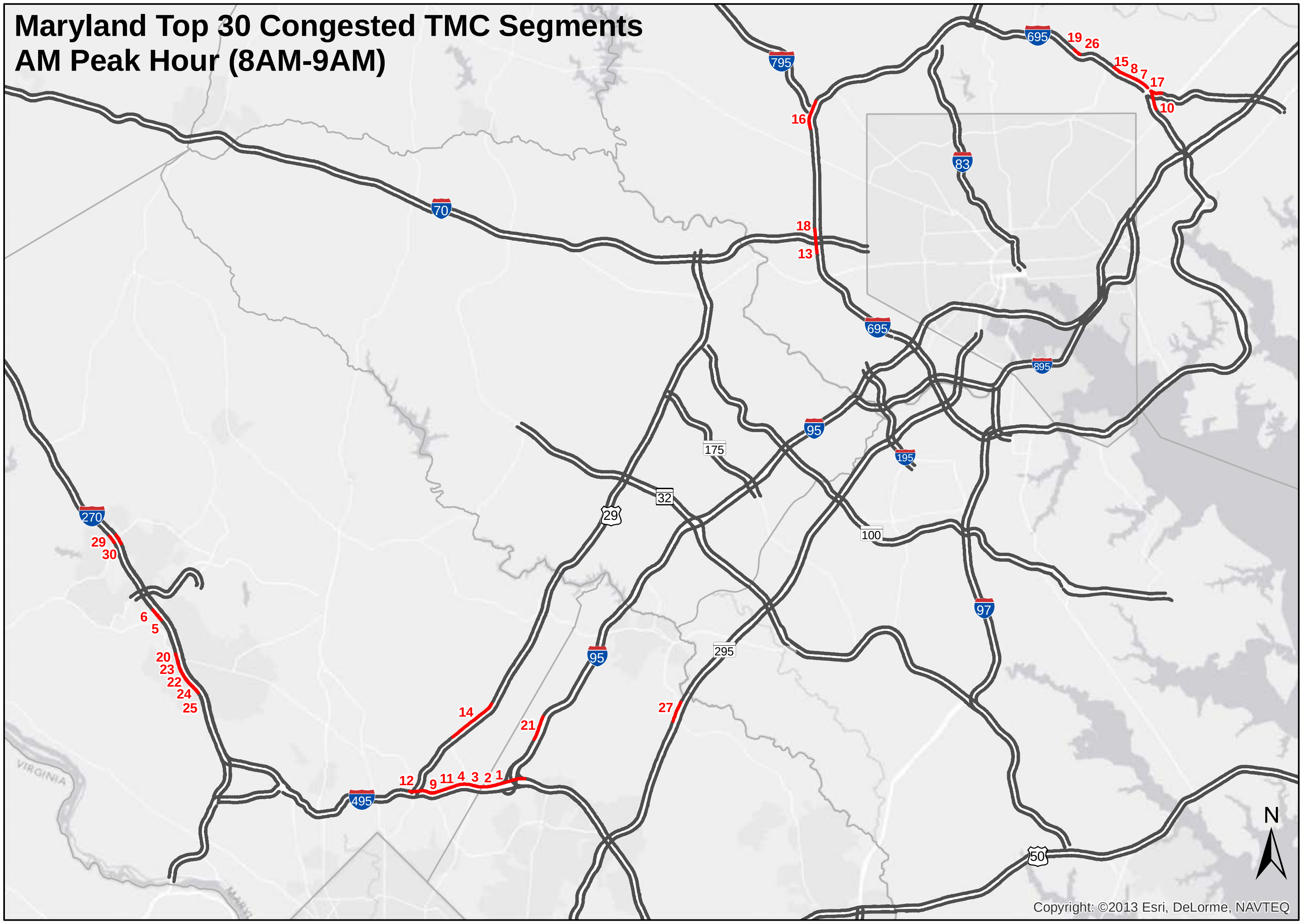
A. Top 30 Congested Segments

The Travel Time Index (TTI) reflects a comparison between the average travel time during the peak hour versus the travel time during free flow conditions. The higher the TTI, the longer a trip will be during the peak hour. The locations are broken down by INRIX in such a manner that multiple segments exist between each interchange. The following tables reflect the AM peak hour and PM peak hour top 30 congested locations.

TOP 30 CONGESTED SEGMENTS AM PEAK 2012

2012 Rank	Road	Location	Direction	2012 TTI	2011 Rank	Rank Change
1	I-495	I-95 to Montgomery CO/L	Outer Loop	6.10	7	-6
2	I-495	Prince Georges CO/L to MD 650	Outer Loop	5.81	2	0
3	I-495	@ MD 650**	Outer Loop	5.62	1	+2
4	I-495	MD 650 to MD 193**	Outer Loop	5.11	3	+1
5	I-270	Shady Grove Rd to MD 28 CD Lanes	Southbound	4.82	8	-3
6	I-270	Shady Grove Rd to MD 28	Southbound	4.82	9	-3
7	I-695	MD 43 to MD 147	Outer Loop	4.77	23	-16
8	I-695	MD 147 to MD 41	Outer Loop	4.77	10	-2
9	I-495	US 29 to MD 97	Outer Loop	3.69	5	+4
10	I-695	US 1 to MD 43	Outer Loop	3.67	52	-42
11	I-495	@ MD 193	Outer Loop	3.66	4	+7
12	I-495	MD 193 to US 29	Outer Loop	3.46	6	+6
13	I-695	I-70 to US 40	Outer Loop	3.25	12	+1
14	US 29	Randolph Rd to Stewart Ln	Southbound	3.19	15	-1
15	I-695	@ MD 41	Outer Loop	3.11	25	-10
16	I-695	I-795 to MD 26	Outer Loop	3.10	36	-20
17	MD 43	Walther Blvd to I-695	Westbound	3.05	26	-9
18	I-695	MD 122 to I-70	Outer Loop	3.05	38	-20
19	I-695	@ Providence Rd	Outer Loop	3.05	21	-2
20	I-270	@ MD 28	Southbound	3.03	16	+4
21	I-95	MD 212 to I-95 / 495	Southbound	3.00	46	-25
22	I-270	@ MD 189	Southbound	2.95	11	+11
23	I-270	MD 28 to MD 189	Southbound	2.95	13	+10
24	I-270	Montrose Rd to MD 189 CD Lanes	Southbound	2.90	18	+6
25	I-270	Montrose Rd to MD 189	Southbound	2.90	19	+6
26	I-695	MD 542 to Providence Rd	Outer Loop	2.86	28	-2
27	MD 295	MD 198 to Prince Georges CO/L*	Southbound	2.86	22	+5
28	US 50	MD 410 to MD 202	Westbound	2.82	27	+1
29	I-270	Middlebrook Rd to MD 124	Southbound	2.78	63	-34
30	I-270	MD 124 to MD 117	Southbound	2.74	62	-32

*Maintained by the National Parks Service
**Under Construction


Maryland Top 30 Congested TMC Segments
AM Peak Hour (8AM-9AM)
N
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2012

TOP 30 CONGESTED SEGMENTS PM PEAK 2012

2012 Rank	Road	Location	Direction	2012 TTI	2011 Rank	Rank Change
1	I-495	MD 190 to I-270Y	Inner Loop	5.93	2	-1
2	MD 32	Great Star Dr to MD 108	Westbound	5.64	3	-1
3	I-270 West Spur	@ I-495	Southbound	5.56	69	-66
4	I-495	MD 187 to MD 355	Inner Loop	5.34	38	-34
5	I-270 West Spur	Democracy Blvd to I-495	Southbound	5.33	112	-107
6	I-495	MD 355 to MD 185	Inner Loop	5.27	13	-7
7	I-495	@ Clara Barton Pkwy	Inner Loop	5.25	4	+3
8	I-495	Clara Barton Pkwy to MD 190	Inner Loop	5.08	1	+7
9	I-495	I-270Y to MD 355 East	Inner Loop	4.47	10	-1
10	I-495	I-270Y to MD 190	Outer Loop	4.33	70	-60
11	I-695	@ MD 45	Inner Loop	4.19	7	+4
12	I-495	@ I-270Y (West)	Inner Loop	4.11	5	+7
13	I-270	MD 124 to Middlebrook Rd	Northbound	3.96	23	-10
14	I-495	MD 355 West to I-270Y	Inner Loop	3.96	138	-124
15	MD 295	@ MD 193*	Northbound	3.86	37	-22
16	US 50 / 301	@ MD 70	Eastbound	3.84	39	-23
17	MD 295	Powder Mill Rd to MD 197*	Northbound	3.84	6	+11
18	I-495	MD 190 to Virginia State Line	Outer Loop	3.78	43	-25
19	I-495	Virginia State Line to Clara Barton Pkwy	Inner Loop	3.72	12	+7
20	I-495	@ MD 185	Inner Loop	3.70	19	+1
21	US 50 / 301	MD 2 to MD 70	Eastbound	3.63	85	-64
22	I-495	@ I-270Y (West)	Outer Loop	3.62	90	-68
23	MD 295	@ Powder Mill Rd*	Northbound	3.56	11	+12
24	MD 295	MD 193 to Powder Mill Rd*	Northbound	3.49	26	-2
25	I-495	@ MD 190	Outer Loop	3.48	68	-43
26	I-495	MD 185 to MD 97	Inner Loop	3.46	21	+5
27	I-695	MD 45 to MD 146	Inner Loop	3.45	8	+19
28	I-495	@ MD 190	Inner Loop	3.39	15	+13
29	I-695	MD 139 to MD 45	Inner Loop	3.35	25	+4
30	I-495	US 1 to Greenbelt Metro	Inner Loop	3.33	101	-71

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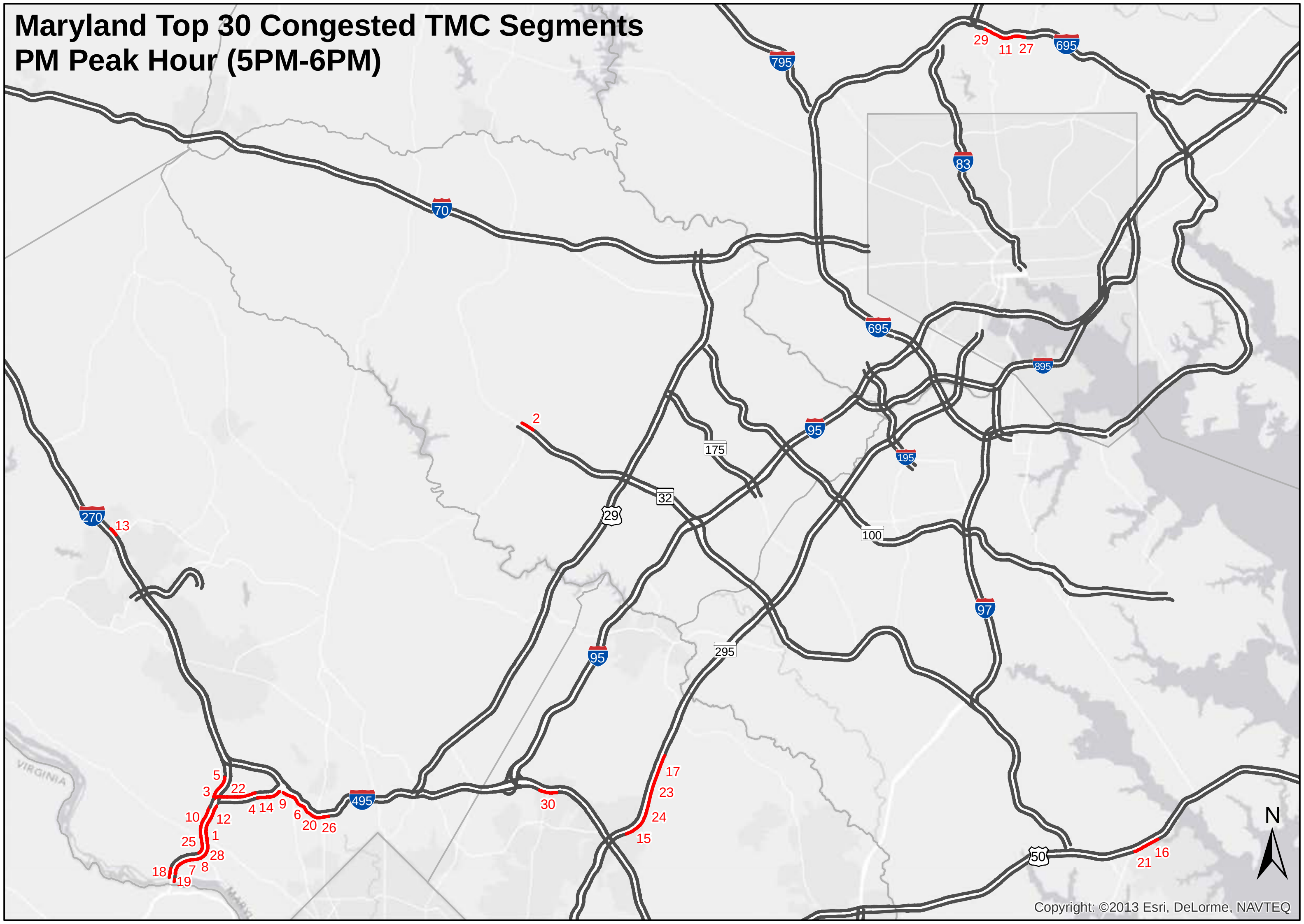
Maryland Top 30 Congested TMC Segments
PM Peak Hour (5PM-6PM)
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695
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95
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29
100
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95
295
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50
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2012

B. Top 30 Unreliable Segments

The Planning Time Index (PTI) is a measure of the variability in travel time a motorist should plan for taking into account potential impacts due to such elements as weather. The PTI was calculated for the AM peak hour (7-8 AM) and the PM peak hour (5-6 PM) for expressways/freeways based on INRIX data limits which define multiple sections between interchanges. The top 30 most unreliable roadway segments for the AM and PM peak hour are listed in the following tables.

TOP 30 UNRELIABLE SEGMENTS AM PEAK 2012

2012 Rank	Road	Location	Direction	2012 PTI	2011 Rank	Rank Change
1	I-495	I-95 to Montgomery CO/L	Outer Loop	6.30	1	0
2	I-495	@ MD 650**	Outer Loop	6.00	4	-2
3	I-495	Prince Georges CO/L to MD 650	Outer Loop	6.00	2	+1
4	I-495	MD 650 to MD 193**	Outer Loop	5.25	9	-5
5	I-695	MD 147 to MD 41	Outer Loop	5.17	8	-3
6	I-695	MD 43 to MD 147	Outer Loop	5.17	6	0
7	I-270	Shady Grove Rd to MD 28	Southbound	5.09	13	-6
8	I-270	Shady Grove Rd to MD 28 CD Lanes	Southbound	5.09	14	-6
9	I-695	I-70 to US 40	Outer Loop	4.00	12	-3
10	I-695	US 1 to MD 43	Outer Loop	4.00	7	+3
11	I-495	@ MD 193	Outer Loop	3.81	15	-4
12	I-495	US 29 to MD 97	Outer Loop	3.76	27	-15
13	US 29	Randolph Rd to Stewart Ln	Southbound	3.71	17	-4
14	I-695	I-795 to MD 26	Outer Loop	3.65	5	+9
15	I-495	MD 193 to US 29	Outer Loop	3.53	28	-13
16	I-95	MD 212 to I-495	Southbound	3.42	23	-7
17	I-695	MD 122 to I-70	Outer Loop	3.32	26	-9
18	I-695	@ Providence Rd	Outer Loop	3.20	79	-61
19	MD 43	Walther Blvd to I-695	Westbound	3.17	55	-36
20	I-695	@ MD 41	Outer Loop	3.11	44	-24
21	I-270	MD 28 to MD 189	Southbound	3.05	29	-8
22	I-270	@ MD 189	Southbound	3.05	36	-14
23	I-270	MD 189 to Montrose Rd	Southbound	3.05	34	-11
24	I-270	MD 189 to Montrose Rd CD Lanes	Southbound	3.05	35	-11
25	I-695	MD 542 to Providence Rd	Outer Loop	3.00	94	-69
26	MD 295	MD 198 to Prince Georges CO/L*	Southbound	3.00	49	-23
27	I-270	@ MD 28	Southbound	3.00	11	+16
28	I-270	MD 124 to MD 117	Southbound	2.91	41	-13
29	I-270	Middlebrook Rd to MD 124	Southbound	2.91	39	-10
30	US 50	MD 410 to MD 202	Westbound	2.90	24	+6

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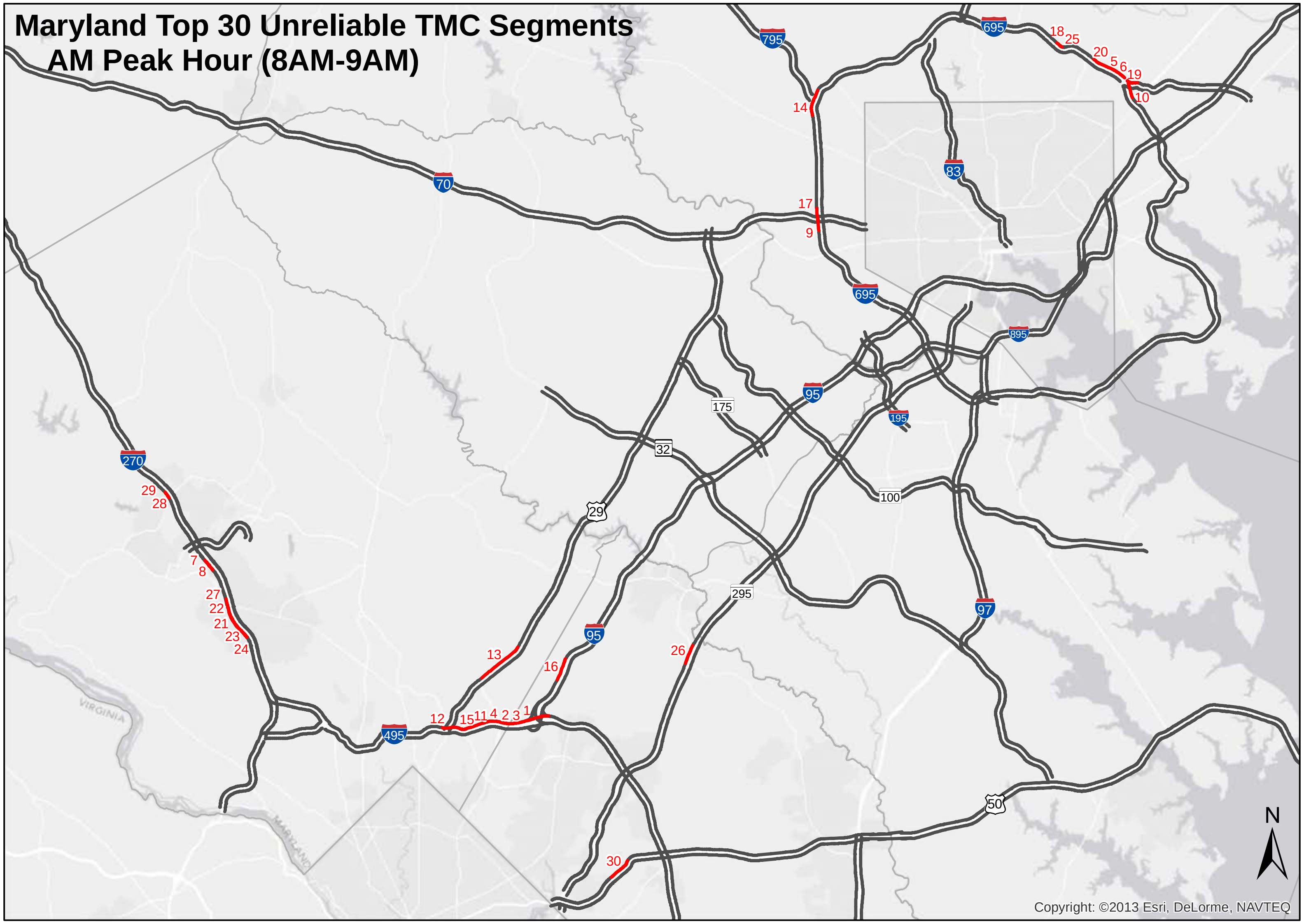
**Under Construction


Maryland Top 30 Unreliable TMC Segments
AM Peak Hour (8AM-9AM)
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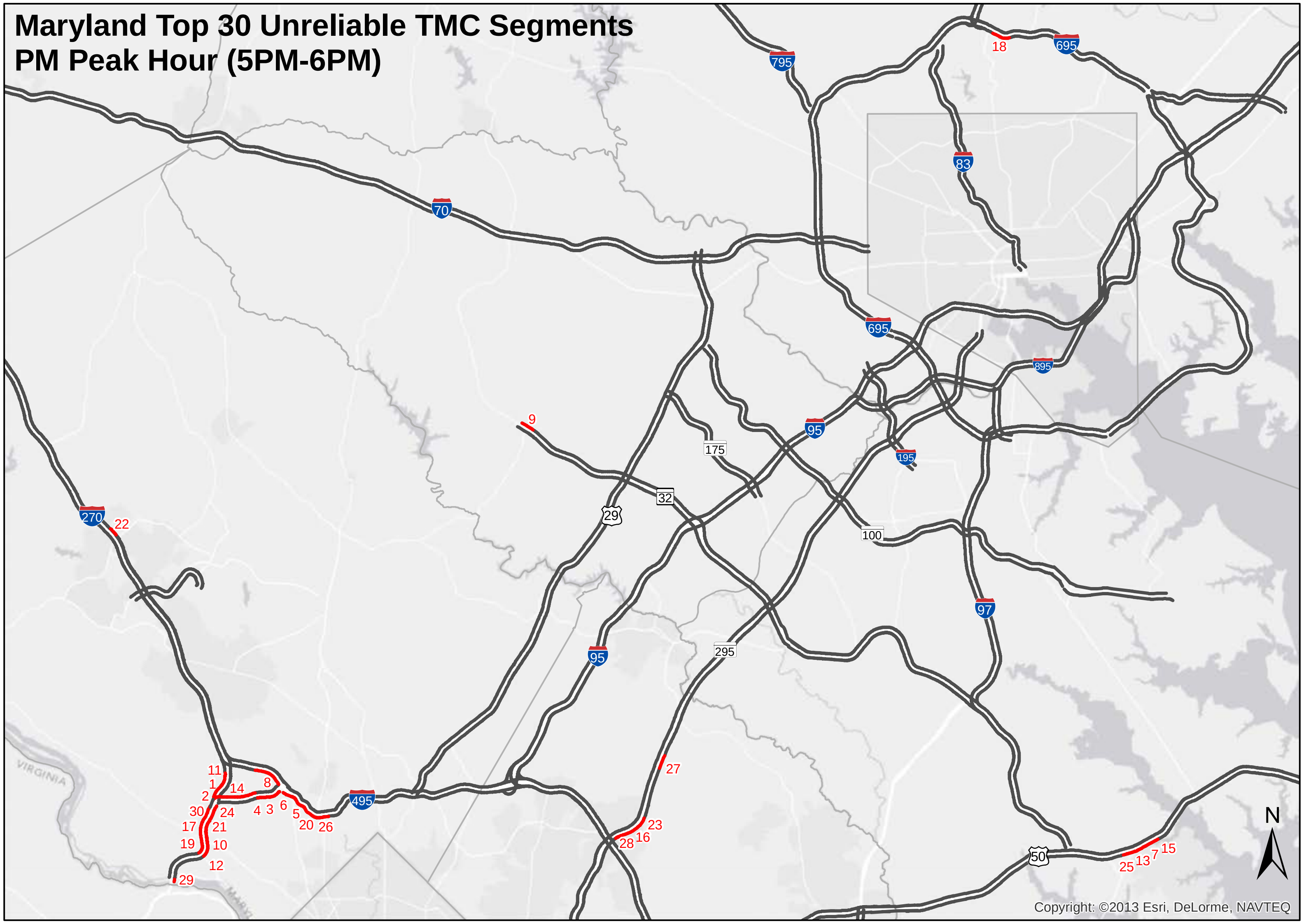
2012

TOP 30 UNRELIABLE SEGMENTS PM PEAK 2012

2012 Rank	Road	Location	Direction	2012 PTI	2011 Rank	Rank Change
1	I-270 West Spur	@ Democracy Blvd	Southbound	10.67	1	0
2	I-270 West Spur	@ I-495	Southbound	9.00	3	-1
3	I-495	MD 187 to MD 355	Inner Loop	8.14	4	-1
4	I-495	@ MD 187	Inner Loop	7.75	2	+2
5	I-495	MD 355 to MD 185	Inner Loop	7.25	5	0
6	I-495	I-270Y to MD 355 East	Inner Loop	6.44	55	-49
7	US 50 / 301	MD 2 to MD 70	Eastbound	6.40	10	-3
8	I-270 East Spur	MD 187 to I-495	Southbound	5.73	6	+2
9	MD 32	Great Star Dr to MD 108	Westbound	5.64	84	-75
10	I-495	@ MD 190	Inner Loop	5.25	14	-4
11	I-270 West Spur	I-270 to Democracy Blvd	Southbound	5.17	13	-2
12	I-495	Clara Barton Pkwy to MD 190	Inner Loop	5.08	11	+1
13	US 50 / 301	MD 450 to MD 2	Eastbound	5.00	15	-2
14	I-495	@ I-270Y (West)	Outer Loop	4.92	12	+2
15	US 50 / 301	@ MD 70	Eastbound	4.92	16	-1
16	MD 295	I-495 to MD 193*	Northbound	4.85	61	-45
17	I-495	MD 190 to Cabin John Pkwy	Outer Loop	4.64	23	-6
18	I-695	MD 139 to MD 45	Inner Loop	4.62	9	+9
19	I-495	@ Clara Barton Pkwy	Outer Loop	4.50	19	0
20	I-495	@ MD 185	Inner Loop	4.46	31	-11
21	I-495	MD 190 to I-270Y (West)	Inner Loop	4.44	21	0
22	I-270	MD 124 to Middlebrook Rd	Northbound	4.43	78	-56
23	MD 295	@ MD 193*	Northbound	4.20	67	-44
24	I-495	@ I-270Y (East)	Inner Loop	4.20	34	-10
25	US 50 / 301	@ MD 450	Eastbound	4.06	26	-1
26	I-495	MD 185 to MD 97	Inner Loop	4.00	35	-9
27	MD 295	Powder Mill Rd to MD 197*	Northbound	4.00	62	-35
28	MD 295	@ I-495*	Northbound	4.00	71	-43
29	I-495	Virginia State Line to Clara Barton Pkwy	Inner Loop	3.88	39	-10
30	I-495	I-270Y to MD 190	Outer Loop	3.87	33	-3

*Maintained by the National Parks Service


Maryland Top 30 Unreliable TMC Segments
PM Peak Hour (5PM-6PM)
VIRGINIA
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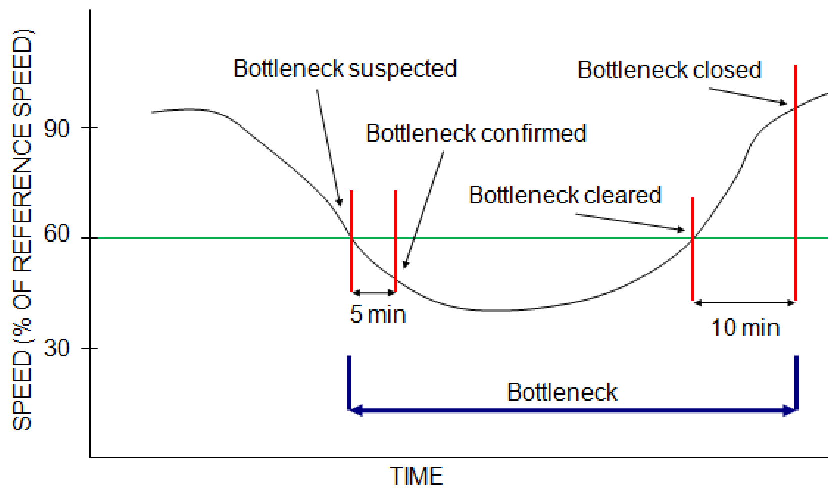
2012

C. Top 30 Bottleneck Locations

The top 30 bottleneck locations were identified for Maryland in 2012. The ranking is based on speed observations that are used to calculate their occurrence. The ranking of the segments is performed by comparing the duration, intensity and frequency with which the bottlenecks occur during an entire average weekday.

A bottleneck, as defined by the Vehicle Probe Project (VPP) Suite, occurs when, "the speeds observed for a roadway segment drop below 60% of the free flow speed for a period greater than 5 minutes. Adjacent roadway segments meeting this condition are joined together to form a bottleneck queue. The duration of the bottleneck is calculated till the time speeds are greater than 60% for more than 10 minutes." This definition uses minute-to-minute speeds available across the state highway system to determine congestion patterns. This is graphically shown below:



The analysis is based on INRIX probe data for interstates and major roadways within Maryland available through the Vehicle Probe Project. The ranking is based on impact factors (computed as a number of times a bottleneck occurs on a particular segment, times its duration and the average queue length).

2012 Rank	Location	Road	Direction	Q1	Q2	Q3	Q4	Average Duration	Average Max Length	Impact Factor	2011 Rank	Rank Change
1	MD-295 N @ MD-175[1]	MD-295	Northbound	86	143	134	116	171.8	11.9	**832877**	1	0
2	I-270 N @ MD-80/Exit 26**	I-270	Northbound	167	221	175	113	104.8	11.0	**733743**	5	-3
3	I-270 Spur S @ I-270	I-270	Southbound	139	171	177	170	78.8	13.0	**562181**	7	-4
4	MD-295 N @ MD-197/Exit 11[1]	MD-295	Northbound	105	122	118	90	177.3	7.5	**518825**	4	0
5	I-695 CW @ MD-147/Harford Rd/Exit 31	I-695	Inner Loop	91	92	100	93	141.3	10.5	**509210**	6	-1
6	I-95 N @ MD-100/Exit 43	I-95	Northbound	105	170	151	120	112.3	8.7	**507689**	8	-2
7	I-270 N @ I-70/US-40	I-270	Northbound	94	100	132	139	91.8	10.7	**408085**	13	-6
8	I-695 CCW @ Edmondson Ave/Exit 14**	I-695	Outer Loop	185	209	178	180	87.6	8.8	**356535**	10	-2
9	I-495 CW @ MD-650/New Hampshire Ave/Exit28**	I-495	Inner Loop	68	133	154	61	122.5	6.9	**341956**	34	-25
10	I-95 N @ MD-43/Whitemarsh Blvd/Exit 67[2]**	I-95	Northbound	39	91	97	62	131.0	9.3	**316255**	11	-1
11	I-270 N @ Middlebrook Rd/Exit 13	I-270	Northbound	125	66	90	128	102.3	8.4	**291097**	40	-29
12	MD-295 S @ MD-193[1]	MD-295	Southbound	109	112	108	112	97.8	7.0	**280236**	17	-5
13	I-495 CW @ MD-450/Annapolis Rd/Exit 20	I-495	Inner Loop	83	122	114	64	89.3	8.7	**247065**	18	-5
14	I-695 CCW @ MD-144/Frederick Rd/Exit 13**	I-695	Outer Loop	95	46	126	56	111.3	11.1	**235126**	15	-1
15	I-270 S @ MD-109/Exit 22	I-270	Southbound	145	153	128	120	84.3	4.8	**203400**	16	-1
16	I-695 CW @ Stevenson Rd/Exit 21*	I-695	Inner Loop	5	9	167	168	57.0	5.6	**199560**	453	-437
17	I-270 S @ Montrose Rd/Exit 4	I-270	Southbound	73	101	91	99	47.1	12.0	**185816**	52	-35
18	I-495 CW @ I-270 Spur	I-495	Inner Loop	149	140	47	54	106.5	5.6	**184690**	3	+15
19	I-695 CW @ MD-41/Perring Pkwy/Exit 30	I-695	Inner Loop	73	89	74	79	90.5	7.1	**176086**	27	-8
20	I-95 S @ MD-24/Exit 77[2]	I-95	Southbound	5	24	43	37	117.3	14.8	**167295**	14	+6
21	I-495 CW @ MD-295/MD-193/Exit 22	I-495	Inner Loop	67	120	120	62	90.8	5.5	**166041**	71	-50
22	I-695 CW @ MD-26/Exit 18	I-695	Inner Loop	104	120	101	33	89.0	5.8	**159730**	2	+20
23	I-495 CCW @ MD-185/Connecticut Ave/Exit 33	I-495	Outer Loop	60	42	72	55	120.3	6.2	**157385**	21	+2
24	I-695 CW @ MD-129/Park Heights Ave/Exit 21*	I-695	Inner Loop	9	145	7	12	55.6	8.4	**155203**	366	-342
25	I-95 S @ I-495/Exit 27-25	I-95	Southbound	132	176	184	155	81.8	3.2	**152603**	9	+16
26	I-495 CCW @ MD-97/Georgia Ave/Exit 31	I-495	Outer Loop	81	129	88	85	103.8	4.6	**152004**	25	+1
27	I-695 CW @ I-83/MD-25/Exit 23	I-695	Inner Loop	97	117	93	95	75.5	6.4	**145016**	41	-14
28	I-495 CCW @ Greenbelt Metro Dr/Exit 24	I-495	Outer Loop	56	94	72	64	88.0	6.3	**139505**	35	-7
29	I-495 CW @ MD-4/Pennsylvania Ave/Exit 11*	I-495	Inner Loop	59	48	50	53	87.3	8.6	**138172**	20	+9
30	I-695 CW @ I-795/Exit 19	I-695	Inner Loop	105	29	28	25	57.2	8.0	**131939**	133	-103

CW - Clockwise CCW - Counterclockwise

Q1: Jan-Mar Q2: Apr-June Q3: July-Sept Q4: Oct-Dec

Occurrences: # of times speed dropped below 60% of the free flow speeds

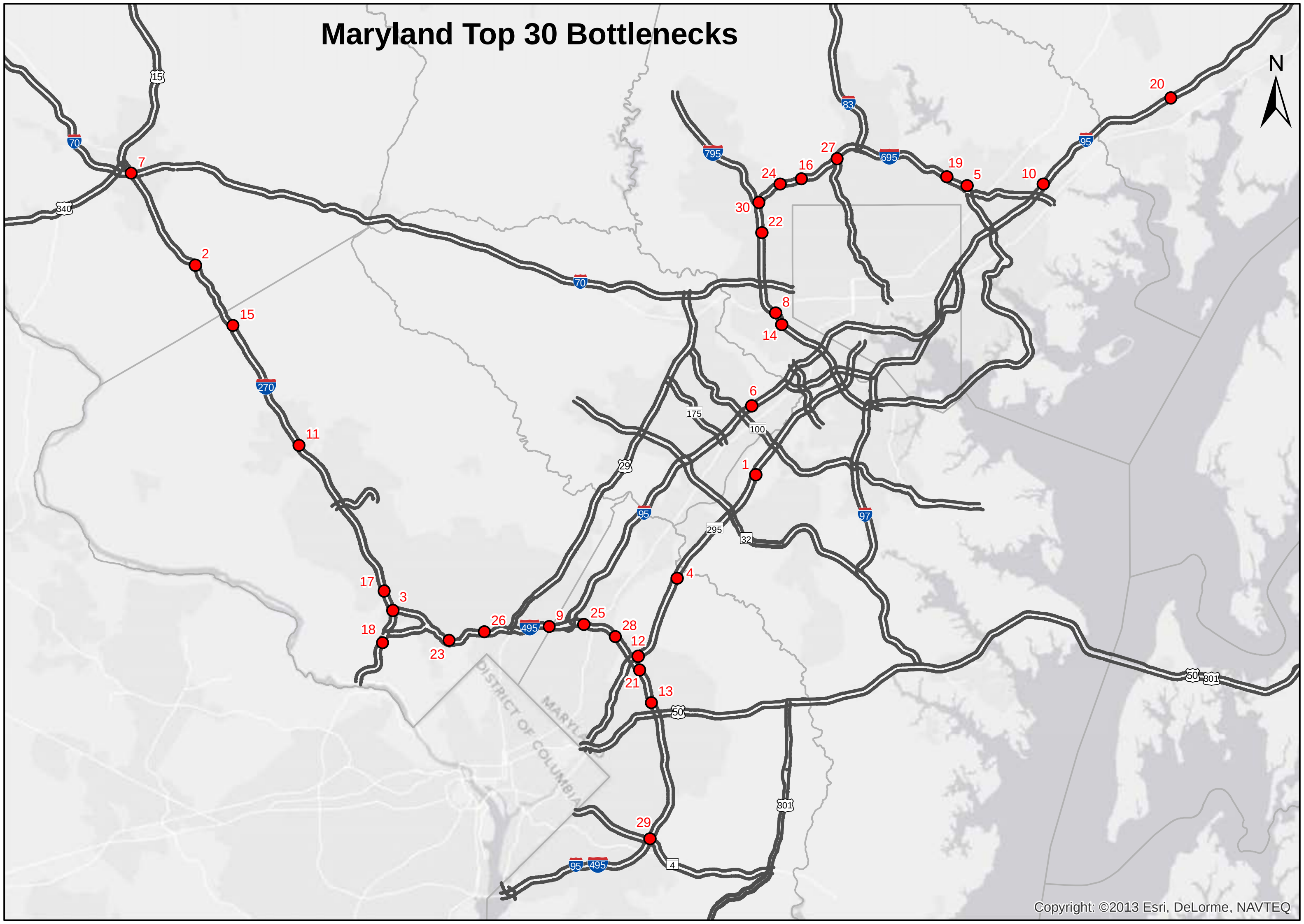
Impact factor = Sum of Occurrence per quarter x Avg. Duration per Quarter x Queue Length per Quarter

1: Owned by National Park Service

2: Owned and Operated by Maryland Transportation Authority

*Under Review

**Under Construction


Maryland Top 30 Bottlenecks
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DISTRICT OF COLUMBIA
MARYLAND
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2012

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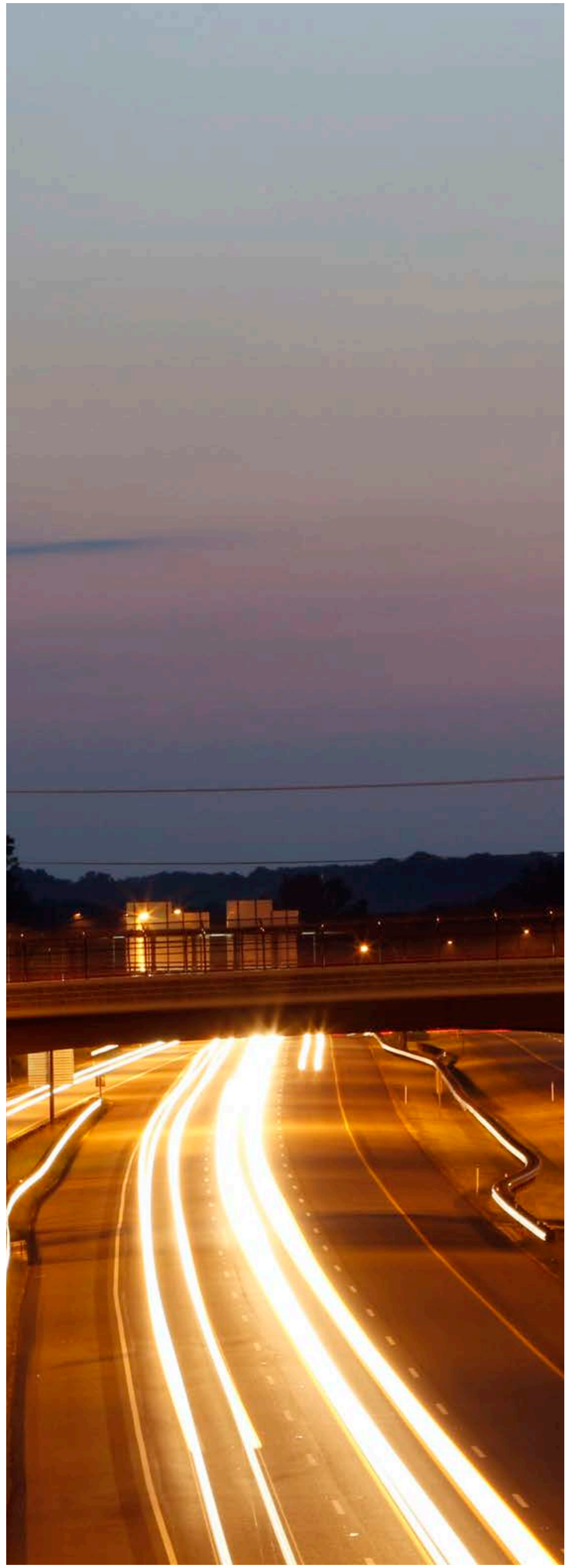

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