MD 355 North of Cedar Lane

Capital Projects

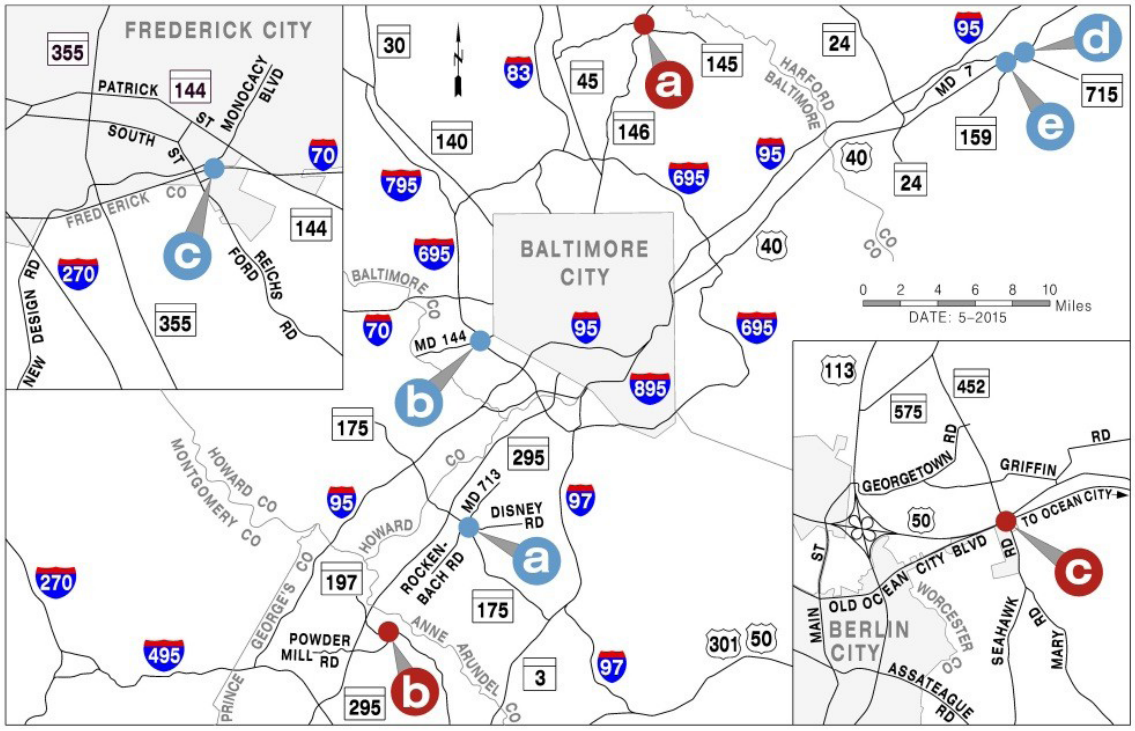
SHA employs a variety of strategies to address congestion and reliability challenges including major capital projects and programs that implement bottleneck solutions in a systematic and responsible manner. SHA implements a performance based approach to identify and plan/design/construct congestion mitigation solutions.

Major capital projects can be difficult to construct as they are limited by cost, right-of-way and environmental constraints. These projects often take years to complete to meet the Federal requirements. As a result, a major emphasis in recent years has been on system preservation. However, SHA is now in a financial position to evaluate major multi-modal capacity enhancement process. This was enhanced by the 2015 announcement that another 13 new projects will be funded to improve traffic operations. SHA continues to focus on alleviating congestion hotspots through a low cost congested intersection improvement program. Some of the most cost effective programs SHA implements to improve mobility involve signal system optimization projects and the CHART program. Signal optimization projects are low cost improvements to improve traffic flow where signal timing adjustments are made to minimize delay, reduce wasted fuel costs and maximize vehicular throughput on arterials. CHART, is Maryland's Intelligent Transportation Systems program, providing real-time information to the public and by providing quick response to reduce delay due to incidents.

Recurring congestion occurs at many locations throughout the State of Maryland. In order to address this congestion, SHA continues to provide capacity and operational enhancements. These range from the reconstruction of interstate highways and interchanges to minor geometric improvements at intersections. In addition, the Maryland Transportation Authority (MDTA) recently completed major construction projects; there were upgrades to the freight network; and new pedestrian and bicycle projects. There were eight SHA roadway projects completed in 2014 (five major projects and three minor congestion relief projects); MDTA also completed two major construction projects.

The location of the major and minor projects completed in 2014 is depicted on the following map:

1. MAJOR PROJECTS



MAJOR PROJECTS	MINOR PROJECTS
a. MD 175 @ Rockenbach Rd. & Disney Rd.	a. MD 145 @ MD 146
b. I-695 @ MD 144 (Frederick Rd.)	b. MD 197 @ Powder Mill Rd./American Holly Dr.
c. I-70 @ South Street/Monocacy Blvd.	c. US 50 @ Seahawk Rd./MD 452
d. US 40 @ MD 715	
e. US 40 @ MD 7/MD 159	

These projects provide the following annual user benefits:

- **Major Projects: $12.7 Million**
- **Minor Projects: $8.3 Million**

In order to address mobility issues throughout the State, various major construction projects were opened to traffic in 2014. These projects provide for congestion relief, improve safety and enhance traffic operations. In calendar year 2014, the major emphasis of the completed projects related to improving access to the additional employment created as part of the Base Realignment and Closure Act (BRAC). In addition, a number of other projects began such as the I-695/MD 147 interchange and associated I-695 widening. Five major projects were completed in calendar year 2014 including:

MD 175 @ MD 713

Maryland 175 @ Maryland 713 (Rockenbach Road/Ridge Road) and Disney Road (Anne Arundel County)

Fort Meade was a beneficiary of the Base Realignment and Closure Act (BRAC). This legislation relocated numerous personnel to Fort Meade. The Realignment was positive for the State of Maryland and economic development. MD 175 is one of the major access points to Fort Meade interchanging with the MD 295 expressway approximately one mile to the west of MD 713. The project consisted of widening MD 175 to four lanes and providing additional turn lanes at the intersections. A bike lane is provided along MD 175.

I-695 @ MD 144

I-695 @ Maryland 144 (Frederick Road) (Baltimore County)

I-695/MD 144 is a diamond interchange located on the southwest side of the Baltimore Beltway. The bridge over I-695 was structurally deficient and needed to be reconstructed. The ramp from I-695 northbound to MD 144 was relocated and new left turn lanes were added along MD 144 in both directions. I-695 through this section is congested with over 183,000 vehicles per day using the roadway including more than 7,000 motorists in the peak hour. MD 144 carries approximately 20,000 vehicles per day.

I-70 @ South Street/Monocacy Boulevard

I-70 @ South Street/Monocacy Boulevard (Frederick County)

The widening of I-70 through Frederick has been completed in several phases. East of I-270/US 15, the last section was constructed as part of this project. The construction widened I-70 from four to six lanes from East Patrick Street to west of Maryland 355. This project remedied the lane drop situation that occurred along I-70 westbound at East Patrick Street and made for a continuous six lane freeway on I-70 from US 40 in Howard County to I-270/US 15. The interchange at South Street/Monocacy Boulevard was reconstructed. I-70 carries more than 80,000 vehicles per day through this section with peak hour volumes exceeding 3,000 vehicles per hour in the peak direction. The volume for the South Street/Monocacy Boulevard ramps ranges from less than 1,000 vehicles per day to greater than 7,000 vehicles per day.

US 40 @ MD 715

US 40 @ Maryland 715 (Harford County)

Hundreds of new jobs were brought to Aberdeen Proving Grounds (APG) in the eastern portion of Harford County by BRAC. The increase in jobs caused an increase in traffic accessing APG. One of the major ways to access The Proving Grounds is via an interchange at US 40/MD 715. Traffic volumes from US 40 eastbound to MD 715 exceeds 1,500 vehicles in the peak hour. The interchange reconstruction consisted of widening the US 40 eastbound to MD 715 southbound ramp to multiple lanes, widening the MD 715 bridge over US 40 and providing for the movement from US 40 eastbound to MD 715 northbound. MD 715 was widened from four to six lanes south of the interchange. The intersection of MD 7/ MD 715 was widened and reconstructed.

US 40 @ MD 7/MD 159

US 40 @ Maryland 7/Maryland 159 (Harford County)

The final completed project associated with BRAC was at the intersection of US 40 and MD 7/MD 159. Motorists trying to access Aberdeen Proving Grounds exit I-95 at MD 543 and then turn left onto MD 7. They continue on MD 7 to the US 40 intersection where most motorists turn left on to US 40 to access the new US 40/ MD 715 interchange. Other motorists continue straight through on to MD 159 which ties into MD 715. Peak hour left turning volumes in the AM exceed 850 vehicles per hour. This project widened the MD 7 approach to US 40 to provide for an additional left turn lane to US 40 eastbound and a separate right turn lane to split out the through and right turn movements.

Major Project Benefits

The construction of these five projects provide benefits to the motorists that utilize these facilities. The benefits are related to the reduction in delay incurred by motorists and commercial vehicles, the reduction in fuel consumption, the safety benefit anticipated by the improvement and the benefit provided by increased reliability of the system. Traffic analysis was performed for the before and after conditions. Approximately $12.7 in annual user benefits are provided through these five projects.

Additional details about the above major projects are provided in Appendix C.

MAJOR CONGESTION RELIEF PROJECTS ANNUAL BENEFITS

Location	Reduction in Delay	Reliability Savings	Reduction in Fuel Consumption	Safety Savings	Annual Cost Savings ($ Millions)
	$ Savings (Thousands)	$ Savings (Thousands)	$ Savings (Thousands)	$ Savings (Thousands)	
MD 175 @ Rockenbach Rd. & Disney Rd.	3,976	2,982	73	281	7.3
I-695 @ MD 144	93	69	2	75	0.2
I-70 @ South Street/ Monocacy Blvd.	176	132	3	67	0.4
US 40 @ MD 715	1,595	1,196	30	27	2.8
US 40 @ MD 7/MD 159	1,092	819	19	24	2.0
Total	**6,931**	**5,199**	**127**	**474**	**12.7**

Of the $12.7 million annual benefits, $11.7 million annual benefits are experienced by automobile traffic while $1 million in benefits were realized by truck traffic.

2. MINOR CONGESTION RELIEF PROJECTS

The SHA Congested Intersection Program (CIP) is another funding source to improve mobility. The CIP addresses congestion issues at failing/near failing signalized intersections on state roadways using relatively low cost geometric improvements. These intersections are often characterized by frequent signal phase failures, turn bay spillovers, long queues blocking upstream intersections, and/or blocked or lack of left turn lanes. Intersections that routinely suffer from daily recurring congestion increase overall travel times, delays and have the potential for a higher number of crashes. The construction of left turn lanes can assist in reducing delays for queued through motorists and in reducing rear end crashes due to stopped vehicles in the through lanes. Turn bay extensions can assist in mitigating the occurrence of spillovers and blockages, while providing additional through lanes can reduce queues and increase intersection throughput. These projects not only provide congestion relief but also safety and environmental benefits and improvements to the pedestrian and bicycle facilities. The projects developed from the CIP have cost constraints and are typically limited to intersection type improvements for existing conditions (rather than corridor-wide improvements for future demand). Three CIP projects were completed in calendar year 2014 as follows:

MD 145 @ MD 146

Maryland 145 @ Maryland 146 (Baltimore County)

The intersection of MD 145 @ MD 146 is located in the Jacksonville area of Baltimore County. Both MD 145 and MD 146 are two lane roadways that are highly utilized by commuters. MD 146 provides north-south travel patterns between Towson and points in Harford County and towards the Pennsylvania State line. MD 145 is utilized by many motorists from residential areas such as in Bel Air to employment centers in Hunt Valley. There are high turning volume movements from MD 146 southbound to MD 145 westbound in the AM peak period and the reverse movement in the PM peak hour. MD 145 has a volume of more than 11,000 vehicles per day while MD 146 has an average daily traffic of approximately 17,000 vehicles per day. The high volume of traffic causes major queues both in the AM and PM peak period with the PM being the worse condition. The PM peak period congestion is especially deficient along MD 146 northbound and MD 145 eastbound. In order to alleviate that congestion a second MD 146 northbound and MD 145 eastbound through lane were constructed.

MD 197 @ Powder Mill Rd./American Holly Dr.

Maryland 197 @ Powder Mill Road/American Holly Drive (Prince George's County)

MD 197 intersects with Powder Mill Road to the south and American Holly Drive to the north approximately 1.5 miles west of MD 295 (Baltimore / Washington Parkway). MD 197 (Laurel Bowie Road) is a two lane roadway between S. Laurel Drive (approximately one mile to the west) to Lenons Bridge Road (approximately 3.5 miles to the east). Powder Mill Road intersects with MD 295 approximately 2.5 miles to the west and continues through to the Beltsville area while American Holly Drive is a gated entrance to Patuxent Research Refuge. The intersection is signalized and no turn lanes were present which caused substantial queuing along MD 197.

This improvement project consisted of widening MD 197 to provide an eastbound right and left turn lane and a westbound left turn lane. The eastbound right turn has a daily volume of approximately 1,000 vehicles per day. The MD 197 westbound left turn carries an average daily traffic of more than 1,300 vehicles per day. This project assists in reducing queuing at the intersection. It also reduces the possibility of rear end crashes along MD 197 eastbound and westbound due to stopped vehicles in the through lane.

US 50 @ Seahawk Rd./MD 452

US 50 @ Seahawk Road/MD 452 (Worcester County)

US 50 in Maryland extends from the Washington DC line to Ocean City. It is called the "Gateway to the Atlantic Ocean". The four lane divided roadway on the Eastern Shore is mainly rural in nature except during the peak summer travel season. As it approaches Ocean City, numerous commercial properties border the roadway, increasing traffic volumes and congestion in the area. One of the signalized intersections along this section is at Seahawk Road/MD 452 (Friendship Road). Seahawk Road provides access to Stephen Decatur Middle and High School and to Assateague Island. MD 452 provides a connection to US 113. One of the major movements at the intersection is the left turn from US 50 westbound to Seahawk Road southbound. This movement experienced queuing into the through lane especially during the summer season. The volume for the movement is almost 300 vehicles in the peak hour during the week. In order to address this operational issue, a second left turn lane was constructed.

Minor Congestion Relief Project Benefits

The three projects constructed as part of the Congested Intersection Program were analyzed to determine the annual user benefits. This included the reduction in the number of hours of delay, the savings in the amount of gallons of fuel, the safety benefit and the reliability benefit provided by each project. The analysis results of the three projects is shown in the following table:

MINOR CONGESTION RELIEF PROJECTS ANNUAL BENEFITS

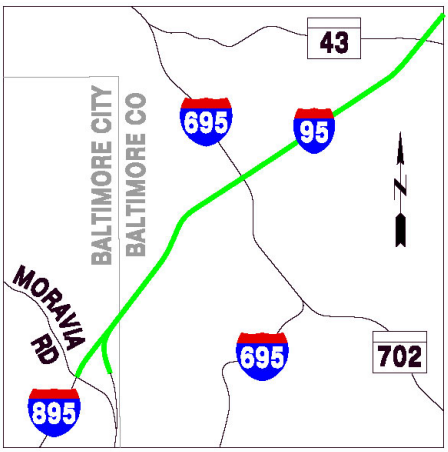
Location	Reduction in Delay	Reliability Savings	Reduction in Fuel Consumption	Safety Savings	Annual Cost Savings ($ Millions)
	$ Savings (Thousands)	$ Savings (Thousands)	$ Savings (Thousands)	$ Savings (Thousands)	
MD 145 @ MD 146	2,651	1,989	48	1	4.7
MD 197 @ Powder Mill Road/American Holly Drive	1,886	1,415	35	42	3.4
US 50 @ MD 452/ Seahawk Road	97	72	2	39	0.2
Total	**4,634**	**3,476**	**85**	**82**	**8.3**

Of the $8.3 annual benefits, $7.8 million was saved by automobile traffic while $0.5 was realized by truck traffic. Additional information about the minor projects are provided in Appendix C.

I-95 South of MD 43

3. MARYLAND TRANSPORTATION AUTHORITY PROJECTS

The Maryland Transportation Authority (MDTA) completed two major construction projects in 2014; the I-95 express toll lane project and the final section of the InterCounty Connector between I-95 and US 1.



I-95 Express Toll Lanes (Baltimore City and County)

The MDTA developed a Master Plan for I-95 from south of I-895 to the Delaware State Line. As part of the Master Plan, the roadway was split into four sections. The first area or Section 100 is located from just south of I-895 to north of MD 43, a distance of approximately eight miles. This is the most congested section for AM/PM peak hour traffic with the AM volume southbound and the PM volume northbound exceeding 7,000 vehicles per hour. PM peak hour volumes northbound on a Friday evening can approach 8,000 vehicles per hour.

MDTA recognized that adding general purpose lanes would solve the existing congestion but the same congestion issues could reappear in future years. In order to address future travel demands, the first express toll lane project in Maryland was constructed. The construction consisted of providing two additional barrier separated lanes on northbound and southbound I-95 for the express toll lanes. The interchanges of I-95 with I-895, I-695 and MD 43 and the I-895 interchange with Moravia Road were reconstructed. With the completion of the express toll lanes motorists have the option of utilizing the four free general purpose lanes or paying a fee via EZ-Pass to utilize the free flow express toll lanes. The express toll lanes are free for transit vehicles and improves their on-time performance.

The express toll lanes opened in December 2014. Initial volumes on the express toll lanes and travel times in the corridor show the project has been a success with more than 20,000 vehicles using the express toll lanes a day. A full analysis of the project will be included in the 2016 Mobility Report once travel patterns have been firmly established.

ICC West of US 1

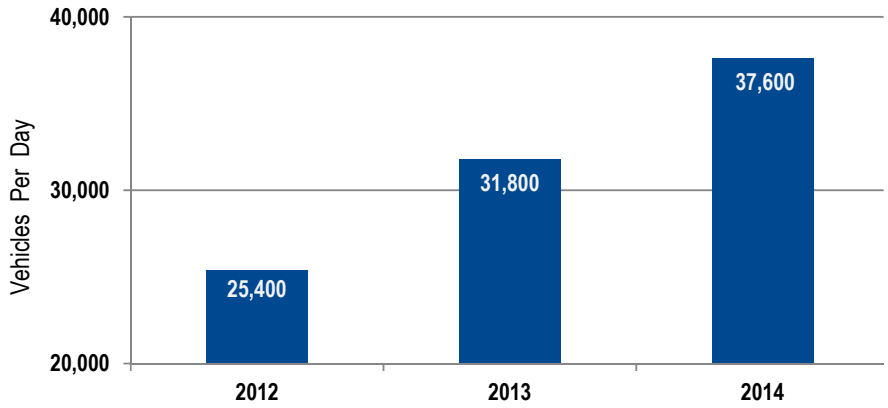
InterCounty Connector (Prince George's County)

The final section of the InterCounty Connector (ICC) was completed in 2014. The last section is a four lane facility located in Prince George's County just south of the City of Laurel. The final section extends approximately 1.5 miles from I-95 to US 1. The construction consisted of completing the remaining movement at the I-95 interchange, a new interchange at Virginia Manor Road, an at-grade intersection at US 1 plus construction of the mainline of the ICC. The ICC/US 1 intersection is unique since it is only the second displaced left turn intersection in the State of Maryland. Collector-distributor roads were created along I-95 for the ICC, Contee Road and Maryland 198 interchanges. The construction of this final section brings the total length of this toll facility to about 19 miles.

Since the opening did not occur until late 2014, only limited data is available. The analysis of the changes will be completed in the 2016 Mobility Report when additional data is available.

The first section of the ICC continues to serve as a vital east-west connection between I-270 and I-95. Traffic volumes have steadily increased over the three years the roadway has been in operations. Volumes in 2014 approach 40,000 vehicles per day on most sections. The growth in traffic volumes on the ICC is illustrated in the following chart.

ICC AVERAGE DAILY TRAFFIC VOLUMES BETWEEN I-95 AND I-370



I-95 SB Welcome Center

4. DEVELOPER PROJECTS

Economic developments generate higher traffic volumes that can cause operational issues such as failing intersections or traffic from turn lanes queuing into through lanes. In order to mitigate these additional traffic volumes, SHA works with developers to determine the improvements required to offset the additional traffic the development will generate. The improvements can range from acceleration and deceleration lanes, to a new traffic signal, to a major intersection enhancement. SHA works with the developer on the improvements to be implemented. Some of the locations where improvements were completed in 2014 include:

- US 301 @ Mitchellville Road (Prince George's County)
- US 40 over Cranberry Run (Harford County)
- MD 32 @ Raincliffe Road/Sandusky Road (Carroll County)
- MD 32 Westbound @ Cedar Lane (Howard County)

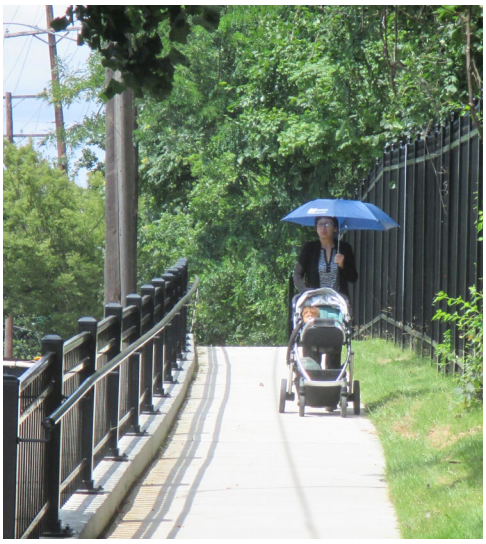
Traffic generated from these developments is mitigated by these improvements, funded by the development. These projects provide improvements in traffic operations thereby providing savings in user travel times and fuel costs.

5. FREIGHT PROJECTS

An increase in the number of trucks along the Maryland roadway system means the economy is expanding and more goods and services are being produced in the area and moved throughout the region. This increase in freight movement does bring safety issues including drowsy truck drivers and insufficient places to rest.

Truck parking is both a safety and infrastructure preservation issue, similar to the issue of overweight trucks, which can cause increased risk and damage to the system. In order to address truck parking, a project was developed to expand the truck parking capacity at the I-95 southbound Welcome Center in Laurel. This approximately doubled the number of spaces at this location to 61.

Another safety issue is at-grade railroad crossings. There are 633 public at-grade rail crossing and 22 pedestrians crossings in Maryland. Improvements include new flashing light signals, additional signal heads and improved crossing surfaces, both on State roads and County roads. In calendar year 2014 approximately 10 crossings were modified including along MD 550, Lander Road, Old Mill Bottom Road, Canal Road, South Division Street and Stone Chapel Road.



MD 355

To improve mobility for truckers SHAs' Motor Carrier Division has instituted a Virtual Weigh Station (VWS) program. This program uses technology to protect the reliability of the pavement and keep trucks moving smoothly. Maryland's VWS promotes the goals of safety, freight mobility and infrastructure preservation through an automated system of sensors and cameras that record activity of Commercial Motor Vehicles (CMV) traveling at high speeds. The VWS can record the speed, height and weight of a commercial vehicle without requiring the vehicle to stop, which reduces delay time for compliant vehicles. Overweight vehicles which damage roads and bridges can be identified for possible enforcement action or educational contact. Likewise, CMV exceeding the speed limit or height restrictions may lead to similar intervention. Each VWS also classifies vehicles and provides a traffic count; but unlike the older system of Automated Traffic Recorders (ATR), the VWS provide an image as well. The analytics feature of the VWS application allows better targeting of enforcement activities with real-time reports identifying traffic volumes, speeds, class and weight related trends. Currently, there are seven active VWS sites across the state. Thirteen more sites are anticipated to be constructed over the next four years. Ten of these sites will monitor Maryland Transportation Authority's bridges and tunnels. The goal is to establish a "blanket" across the state to electronically check a majority of CMV's, intercept the ones that are unsafe or overweight, and allow the legal ones to continue without delay.

6. PEDESTRIAN AND BICYCLE PROJECTS

Pedestrian and bicycle improvements are implemented through various funding mechanisms. As of September 2014, more than $48 million dollars is allocated to upgrade facilities.

Sidewalk improvements may involve the building of new sidewalks or the rehabilitation of existing sidewalks. Across the State, 11.4 miles of new sidewalk were installed in calendar year 2014, including:

- MD 17 - Eagle Bay Drive to Cedar Street (Frederick County)
- MD 355 - Grafton Street to MD 191 (Montgomery County)
- US 40 Alt. - Willow Circle to Kenley Ave (Washington County)

In addition, other upgrades include installing accessible pedestrian signals and constructing ADA compliant ramps. Accessible pedestrian signals are now provided at 66% of the intersections in Maryland, an annual increase of 6% of the total signals statewide. The number of sidewalks that are ADA compliant statewide is nearly 66%.

Bicycle facilities are incorporated into all SHA projects. Providing these facilities are an important part of the Complete Streets philosophy, which involves providing on-street bike lanes or off street facilities to encourage safe bicycle use. In 2014, 12.6 miles of marked bicycle facilities were constructed including:

- MD 222 - Cedar Corner Road to I-95 (Cecil County)
- MD 193 - 63rd Avenue to Lake Forest Drive (Prince George's County)
- MD 212 - Old Gunpowder Road to North of Ammendale Road (Prince George's County)

7. PAST PROJECT BENEFITS

Various projects have been completed along Maryland's freeway/expressway system to rehabilitate existing bridge structures (I-695 at MD 372), provide mobility relief or a combination. Projects such as I-695 at MD 26 was completed but another project (I-695 at Milford Mill Road) is presently on-going which impacts traffic operations in the area. Two projects were constructed that provided benefits to mobility were:

- MD 295 widening from I-195 to I-695
- I-695 westbound from MD 139 to I-83

The Travel Time Index (TTI) data was reviewed for 2011 and 2014. The year 2011 represented the oldest year that INRIX data was analyzed for travel time index. These projects were both under construction at that point. A comparison was made between the peak direction TTI for 2011 and 2014 data which shows the following:

LOCATION	2011 TTI	2014 TTI	2011 RANK	2014 RANK	CHANGE
MD 295 AM SB I-695 to W Nursery Rd	1.43	1.03	136	490	+354
MD 295 AM SB I-695 @ W Nursery Rd	1.06	1.01	519	646	+127
MD 295 PM NB I-195 to W Nursery Rd	1.86	1.02	92	681	+589
MD 295 PM NB W Nursery Rd to I-695	2.23	1.03	41	626	+585
MD 295 PM NB W @ I-695	1.37	1.07	308	536	+228
I-695 AM WB MD 45 to MD 139	1.24	1.13	209	267	+58
I-695 AM WB MD 139 to I-83	1.16	1.08	275	365	+90

The MD 295 widening significantly reducing travel time by as much as 53% during the PM peak hour. All travel times in the peak hour are approximately the same as in the off peak with TTI values of just over 1.0. The I-695 at MD 139 (Charles St.) improvements provided moderate benefit to motorists in the morning commute period with the modification to the ramp movement to I-83 by approximately 8%.