

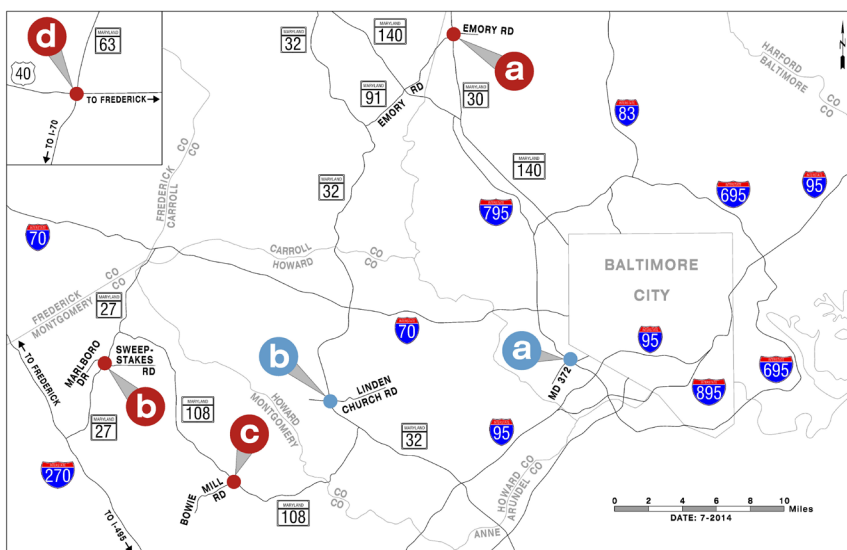
Capital Projects

In order to address congestion and reliability issues, SHA utilizes a variety of strategies. This includes capital projects and programs 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. The following describes SHA project and program efforts to address mobility issues.

As with the case of all other transportation agencies in the nation, the potential for major capacity enhancement projects in Maryland is limited due to cost, right-of-way and environmental constraints. The recent economic climate has limited the potential of implementing major mobility projects and the major emphasis in recent years has been on system preservation. However, with the passage of the Transportation Infrastructure and Investment Act of 2013, SHA is now evaluating major multi-modal capacity enhancement projects. However, these projects take years to complete design and construction. At the same time, SHA continues to focus on alleviating congestion hotspots through a low cost congested intersection improvement program. Another mobility improvement is by implementing signal system optimization projects. Signal optimization projects are one of the most cost effective methods of improving traffic flow. These studies are performed along arterials where signal timing adjustments are made to minimize delay, reduce wasted fuel costs and maximize vehicular throughput.

There are many locations throughout the State of Maryland that experience recurring congestion. This ranges from spot intersections to major sections of interstate highways. In order to address this congestion, Maryland SHA continues to provide capacity and operational enhancements through various projects. In 2013 six projects were completed, that consisted of two major projects and four minor congestion relief projects.

The location of the major and minor projects completed in 2013 is shown on the following map:



MAJOR PROJECTS

- a. I-695/Wilkins Avenue
- b. MD 32/Linden Church Road

MINOR PROJECTS

- a. MD 30/MD 91
- b. MD 27/Sweepstakes Road
Marlboro Drive
- c. MD 108/Bowie Mill Road
- d. US 40/MD 63

THESE PROJECTS PROVIDE THE FOLLOWING ANNUAL USER BENEFITS:

- Major Projects: \$3.3 Million
- Minor Projects: \$2.4 Million

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1. MAJOR PROJECTS

The Maryland Transportation Infrastructure Act of 2013 has allowed the commencement of various major construction projects throughout the State either in the design of plans or the actual construction. These projects provide for congestion relief, improve traffic operations, safety and allow for a basis for future improvements. However, major projects can take many years to complete. A number of these projects were commenced such as the I-695/Maryland 144 interchange and the I-70/South Street interchange and are under construction. Despite the previous limited funding in calendar year 2013, two projects were completed in Maryland including:



I-695 @ Maryland 372 (Wilkens Avenue) (Baltimore County)

This interchange is located on the southwest side of the Baltimore Beltway. I-695 was previously widened to four lanes and the southbound bridge reconstructed. This project involved reconstructing and widening the northbound bridge over Wilkens Avenue. The widening allowed for a painted collector distributor roadway to be created through the two ramp diverges. The basic ramp configuration for the interchange did not change. No improvements occurred along Wilkens Avenue. This project is part of the Baltimore Beltway widening.

Maryland 32 @ Linden Church Road (Howard County)

Maryland 32 from Maryland 108 to I-70 is a very congested two lane roadway carrying approximately 25,000 vehicles per day. The roadway is intersected by several moderate volume cross streets including Linden Church Road. In order to improve traffic flow along the mainline of MD 32 and provide better access for the neighboring developments, an interchange was constructed. This diamond interchange includes a roundabout at the ramp termini for traffic to and from the north.



Major Project Benefits

These two 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 and the reduction in fuel consumption. Traffic analysis was performed for the before and after conditions. The analysis indicates that these two projects provide approximately in \$3.3 million in annual user benefits.

MAJOR CONGESTION RELIEF PROJECTS ANNUAL BENEFITS

Location	Reduction in Delay		Reduction in Fuel Consumption		Annual Cost Savings (Million \$)
	Hours (Thousands)	\$ Savings (Thousands)	Gallons (Thousands)	\$ Savings (Thousands)	
I-695 @ MD 372	5	172	7	24	0.20
MD 32 @ Linden Church Road	91	3,068	19	69	3.14
Total	96	3,240	26	93	3.34

2. MINOR CONGESTION RELIEF PROJECTS

Minor congestion relief projects are mainly small intersection improvements, which are part of the SHA Congested Intersection Program (CIP) or required from developers to mitigate their traffic impacts. The CIP addresses congestion issues at failing/near failing signalized intersections on state roadways using relatively low cost geometric or traffic control device improvements. Intersections that routinely suffer from daily recurring congestion increase overall travel times, delays and have the potential for a higher number of crashes. These intersections are often characterized by frequent signal 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 also provides safety and environmental benefits. In calendar year 2013, four CIP Projects were completed.

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MD 30 @ MD 91 (Baltimore County)

This intersection is located in northwest Baltimore County south of Hampstead, approximately one - half mile from the Carroll County Line. MD 30 is a two lane roadway that has an average daily traffic volume of approximately 19,000 vehicles per day north of MD 91. Travel along the roadway is very directional especially in the AM peak hour with over 1,100 motorists traversing southbound compared to 200 proceeding northbound. This caused long queues to form on MD 30 southbound in the AM peak period. In order to alleviate the queuing, a second through lane was constructed on MD 30 southbound and an exclusive left turn lane was provided along MD 91.



MD 27 @ Sweepstakes Road/Marlboro Drive (Montgomery County)

MD 27 is a high volume two lane roadway that carries approximately 20,000 vehicles per day. MD 27 intersects with two Montgomery County roadways, Sweepstakes Road and Marlboro Drive south of Damascus. Traffic operations at this signalized intersection is constrained especially in the PM peak period due to the high volume of MD 27 northbound through traffic. Northbound MD 27 originally had a left turn lane and a through/right turn lane. To assist in improving the congestion at this intersection, a separate northbound right turn lane was constructed. The right turn movement exceeds 150 vehicles per hour in the PM peak hour. This project assists in reducing the queues and improving overall intersection operation.



MD 108 @ Bowie Mill Road (Montgomery County)

The MD 108/Bowie Mill Road intersection is located in the Olney area of Montgomery County. Maryland 108 operates in an east-west direction with Bowie Mill Road T-ing into the intersection on the south leg. The major movements are the westbound left turn and the northbound right turn with volumes in the peak hour exceeding 400 vehicles. With approximately 30,000 vehicles a day along MD 108 this caused difficulty for motorists from Bowie Mill Rd accessing MD 108 and for the left turn from MD 108 westbound to Bowie Mill Road. In order to improve operations, a traffic signal was constructed at this intersection including a short left turn lane on Bowie Mill Road northbound. This allowed the traffic signal to operate with the MD 108 westbound left turn movement at the same time as the Bowie Mill Road northbound right turn movement. This maximizes the efficiency of the signal operation.



US 40 @ MD 63 (Washington County)

The US 40 at MD 63 intersection is located west of Hagerstown in Washington County. The intersection is signalized and operates such that MD 63 northbound and southbound movements operate in a split phase where first northbound traffic progresses then southbound traffic flows. This causes inefficient signal operations but was needed due to the northbound left turn volume being almost 200 vehicles in the peak hour this was the most efficient manner to operate the signal to reduce delays. This improvement project consisted of providing northbound and southbound left turn lanes on MD 63 and eliminating the split phasing for the operation of the traffic signal.

Minor Congestion Relief Project Benefits

Analysis was performed on the four projects associated with the Congested Intersection Program to determine the benefits these projects provided. This included the annual reduction in the number of hours of delay, the savings in the amount of gallons of gasoline and the overall benefit provided by the project. The summation of the four projects is depicted in the following table:

MINOR CONGESTION RELIEF PROJECTS ANNUAL BENEFITS

Location	Reduction in Delay		Reduction in Fuel Consumption		Annual Cost Savings (Millions \$)
	Hours (Thousands)	\$ Savings (Thousands)	Gallons (Thousands)	\$ Savings (Thousands)	
MD 30 @ MD 91	25	878	5	19	0.90
MD 27 @ Sweepstakes Road/ Marlboro Drive	2	68	1	4	0.07
MD 108 @ Bowie Mill Road	14	479	2	6	0.48
US 40 @ MD 63	28	967	6	20	0.99
Total	69	2,392	15	49	2.44

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Intersection improvements to the State Highway System is supplemented by the need for developers to mitigate their traffic impacts. The Access Management Division is responsible for determining the mitigation measures required by developers to offset the additional traffic these developments will generate. The improvements can range from acceleration and deceleration lanes into their property to a major intersection enhancement. In 2013, several different improvements were constructed through the developer review process administered by the Access Management Division. Some of the locations include:

- US 50 at MD 16 (Dorchester County)
- I-95 at MD 222 (Cecil County)
- MD 118 at MD 355 (Montgomery County)
- MD 7 at Ashford Drive (Harford County)
- MD 713 at Bass Pro Drive (Anne Arundel County)
- US 11 at Glenside Avenue (Washington County)
- MD 30 at Brodbeck Road (Carroll County)

These projects benefit the traffic generated from these developments as well as motorists that utilize these roadways as everyday commuters and residents. These projects provided improvements in traffic operations thereby providing savings in user travel times and fuel costs.



3. Freight Projects

There are various areas of concern related to the movement of goods along the Maryland Highway system. Safety is one of those areas. This includes truck drivers being too tired and not having sufficient places to rest at their appropriate break times. MDOT and SHA have initiated a program to monitor overnight truck parking especially when it occurs along highways and not at appropriate rest areas. Trucks often park along the shoulders of the Maryland Truck Route system, increasing the potential for crashes between parked trucks and moving vehicles. A survey of the major routes in the Maryland Truck Route system where truck parking has been previously identified was performed. Peak overnight truck parking identified more than 600 trucks parked on the mainline and ramps either directly on or near these roadways. I-95 and I-70 were the leading routes for truck parking with on average over 145 trucks parked on a given night. The I-95/I-495 truck weigh station and the I-95 northbound Welcome Center in Howard County had over 60 trucks parked overnight, which were the highest recorded locations.

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. Truck parking is both a safety and infrastructure preservation issue, similar to the issue of overweight trucks, which can cause increased risk and damage on the system. The SHA Motor Carrier Division's Virtual Weigh Station program uses technology to protect the reliability of the pavement and keep trucks moving smoothly.



4. Pedestrians and Bicyclists

SHA has invested substantially in improving access and mobility to pedestrians and bicyclists through a series of projects. This includes sidewalk improvement projects along:

- MD 320 - Potomac Avenue to Sligo Creek Parkway (Montgomery County)
- MD 374 - Ann Drive to MD 818 (Worcester County)

In addition, accessible pedestrian signals have been provided at 60% of the intersections in Maryland, an increase of 4% of the total signals statewide.

One of the major emphasis of SHA is to improve pedestrian safety. One of the elements of this program is conducting pedestrian road safety audits. These audits identify safety issues pedestrians may confront and address those concerns. Among the locations where audits were completed in 2013 include Ocean City, Langley Park, Wheaton and MD 140 in Baltimore County.

The ability to provide facilities for bicyclists are another important part of the Complete Streets philosophy of SHA. This involves providing on-street bike lanes or off street facilities to encourage bicycle use and for safety.

The following bicycle improvements and procedures were implemented:

- Development of the Bicycle Policy and Design Guidelines
- Increased the directional miles of bicycle facilities along SHA roadways by 119 in the fiscal year