



### d. Transit Signal Prioritization

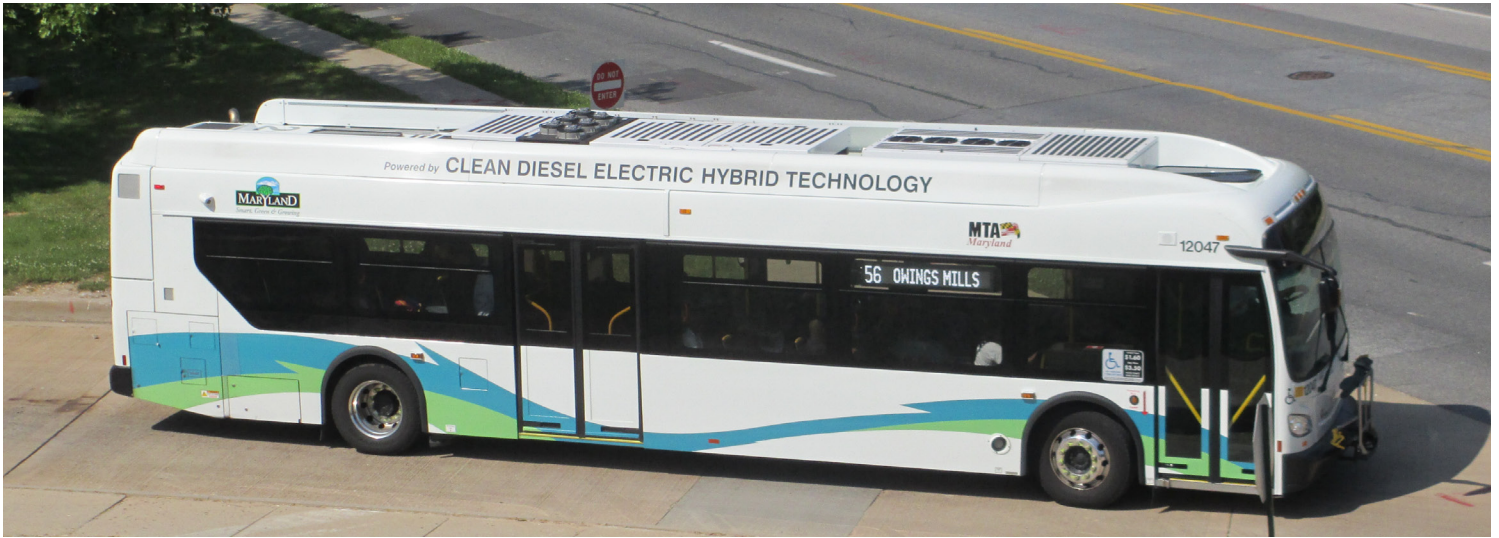
A balanced system of automobile, transit, bicycle and pedestrian usage will provide benefits to all users of the corridor. From a transit standpoint, one way to improve on-time performance is through the use of signal prioritization and queue jump/bypass lanes at signalized intersections. This approach allows buses the ability to continue to operate at a constant 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. One on-going initiative is being led by the Washington Metropolitan Transportation Authority (WMATA). WMATA is evaluating locations in the US 1 corridor for signal prioritization. Equipment testing is anticipated to take place soon. Montgomery County has completed planning efforts to implement transit signal priority capabilities along major transit corridors in the County. A joint state/county policy and criteria for location identification has been developed, and corridors have been screened to determine the most beneficial locations for potential implementation. Future deployment remains unfunded at this time.

## 2. Multi-Modal

### a. Park and Ride

The SHA and MDTA have established a park and ride lot network throughout the State of Maryland. This assists in reducing vehicle trips to an urban area. Many of the lots are served by transit which increases the number of transit trips. Even in locations where transit service is not provided, carpools result in less total vehicle trips on the network, thereby, improving overall congestion and reliability. Together SHA and MDTA operate 105 park and ride lots in 20 counties providing a total of 12,742 spaces. These range in size from less than 15 spaces to over 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). A new 202 space park and ride lot was constructed in 2013 as part of the InterCounty Connector project (MD 200) at MD 97. Due to resurfacing projects at park and ride lots, capacity changes occurred in the number of spaces at I-695 and Cromwell Bridge Road (11 additional spaces were added) and at I-195/MD 166 (43 spaces reduced) lot. In addition, 735 LED luminaries were installed to upgrade lighting at the lots.

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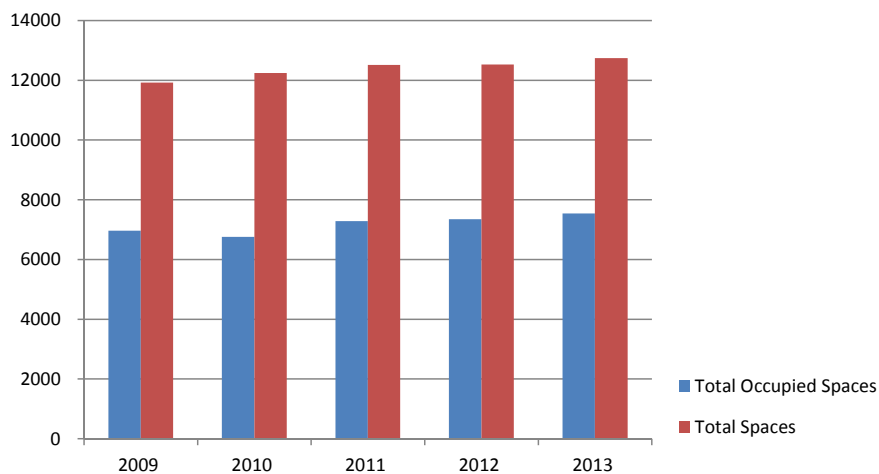


The 105 lots were surveyed during the spring and fall to determine the number of occupied spaces. Over 7,500 spaces were utilized on a given day accounting for about 60% of the total spaces. The park and ride lots which saw the largest increase in the number of motorists parking were:

- MD 665 @ Riva Road
- I-195 @ MD 166
- MD 5 @ Mattawoman - Beantown Road
- I-270 @ MD 124
- MD 210 @ MD 273

All of these lots experienced increased usage of between 20 and 60 additional spaces at these locations. It is estimated SHA and MDTA park and ride lot facilities saved motorists in Maryland over \$5.9 million for the entire year and resulted in 106 million less VMT on roadways.

**SHA/MDTA PARK AND RIDE  
LOT SPACES AND USES**



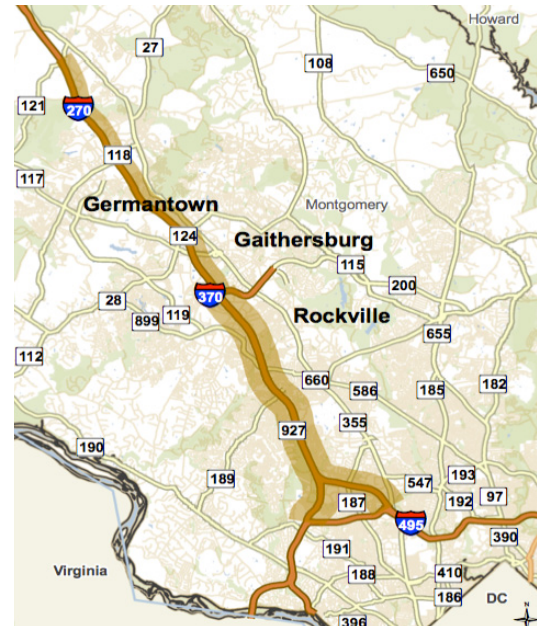




### b. HOV Lane Operation

One strategy to improve the person throughput in a corridor is through the use of high occupancy vehicle (HOV) lanes. The lanes maximize person throughput instead of vehicle throughput by offering a travel time savings for multiple occupant vehicles over single occupant vehicles. The HOV lanes restrict access to vehicles with two or more occupants. This allows HOV lanes to operate near free flow speeds while the general purpose lanes experience congestion and lower travel speeds. The locations of HOV lanes in Maryland are as follows:

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

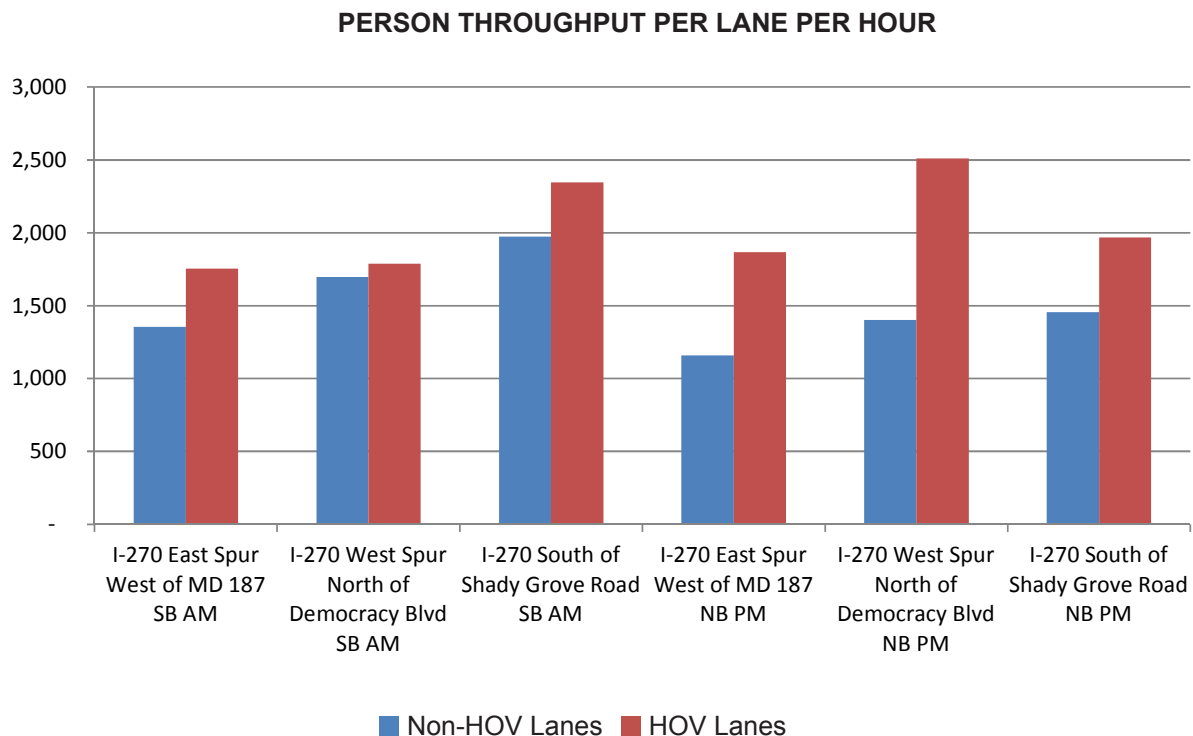


The I-270 HOV lanes operate southbound from 6:00 to 9:00 AM and northbound from 3:30 to 6:30 PM and are separated mainly by pavement markings and some barrier from the general purpose lanes. The US 50 HOV lanes operate the entire day with the separation of the HOV lanes and the general purpose lanes accomplished through pavement markings. The HOV lanes are restricted for automobiles with two plus occupants, 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 in Maryland. This provides an effective Active Travel Demand Management (ATDM) strategy.

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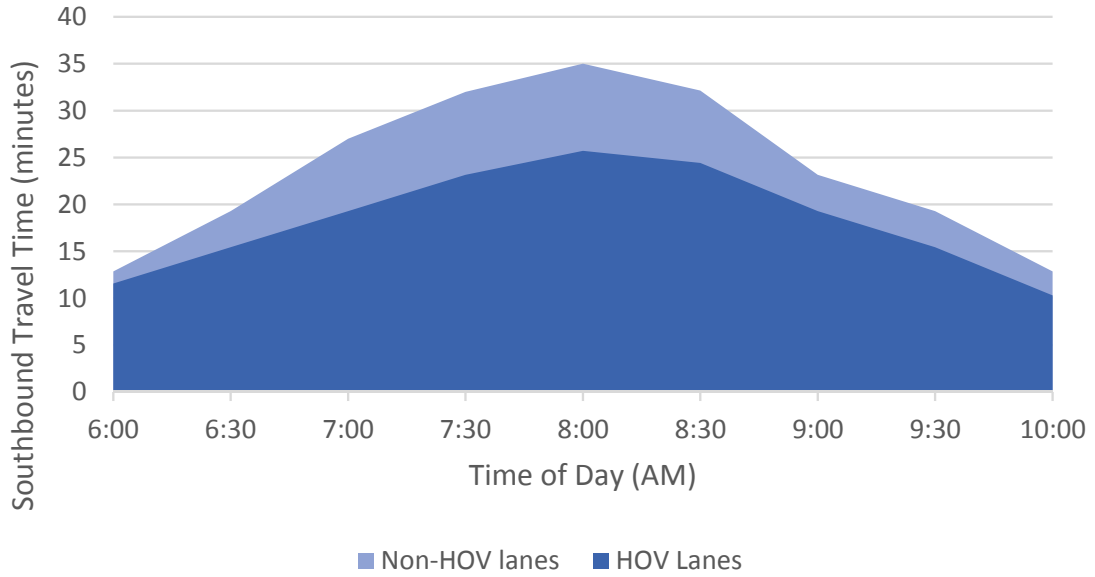
Surveys were performed along I-270 to evaluate the effectiveness of the HOV lanes. This included analyzing person throughput and travel time savings. Person throughput evaluates the total number of people moved in each lane not just vehicles. On I-270 the HOV lanes transported approximately 100 to 1,000 additional persons versus the general purpose lanes.

The HOV lane carries as much as 2,500 persons per lane per hour as shown in the following chart:

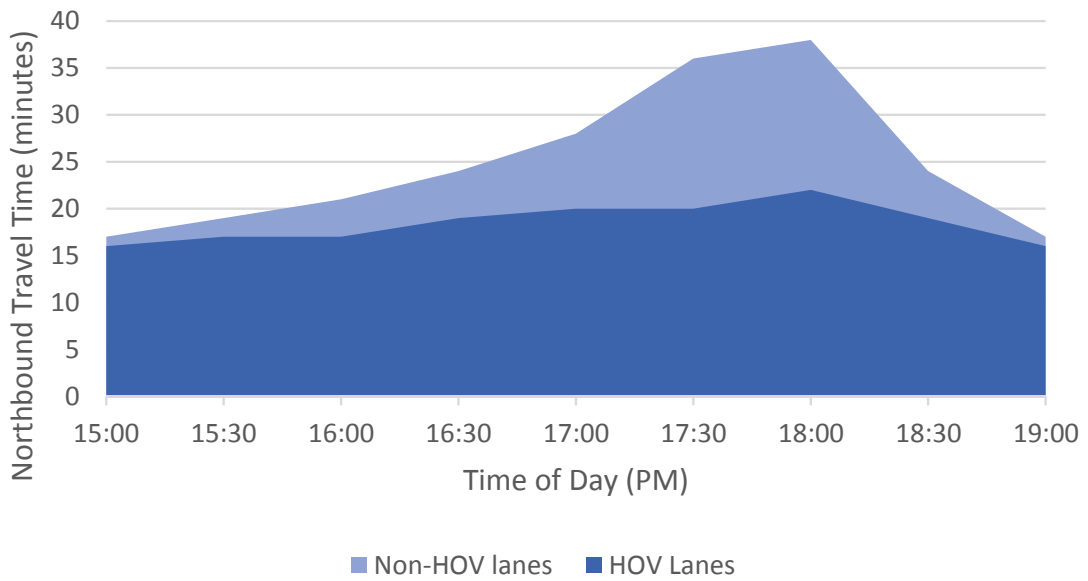


Motorists utilizing the HOV lanes experienced a significant savings in travel time. In the morning peak period, this amounted to up to 9 minutes with an average of 6 minutes. The afternoon peak period provided even greater travel time savings. This was measured to be a maximum of approximately 16 minutes with an average of 8 minutes for motorist utilizing the HOV lane versus the general purpose lanes. This resulted in a 1.2 million person-hour time savings amounting to \$4.5 million dollars. These savings were calculated using travel time data collected from permanent Bluetooth directories on I-270. The following figures show the average travel time savings on the HOV lanes during the AM and PM peak period of operation.

I-270 MORNING TRAVEL TIMES (SOUTHBOUND)



I-270 AFTERNOON TRAVEL TIMES (NORTHBOUND)





## c. Reversible Lane Operation

Maximizing the throughput of a roadway especially during the peak periods can involve many different solutions. This could include high occupancy vehicle lanes, managed lanes, truck lanes and 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 usually limited to certain hours of the day. Among the issues that reversible lane operations face are driver lack of familiarity with the operations, left turning traffic, overhead lane signals or adequate signing, the hours the reversible lanes should operate and ease of implementing the operation.

There are four locations where reversible lane operation occurs along the State roadway system including:

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

The most recognizable reversible lane operation is the US 50/US 301 Bay Bridge. The two lane eastbound span and the three lane westbound span vary through the use of overhead lane signing and modifications at the toll booth on the east side of the bridge and the tie-in on the west side of the bridge. This allows for three eastbound lanes and two westbound lanes. The changeover occurs as needed with the major times being the PM peak period and on Saturdays mornings during the summer. The US 29 and MD 97 reversible lane operations improve traffic flow from residential areas into the Downtown Silver Spring employment center and the WMATA METRO Red Line in the morning and returning northbound in the PM peak period. MD 177 is the main roadway leading to Lake Shore and Gibson Island. Traffic volumes are directional leading off the island in the morning and returning home in the evening. This three lane roadway is converted from two lanes westbound in the AM peak period to two lanes eastbound in the PM peak period through the use of overhead lane control signals.





The following are the number of motorists in the peak hour that utilize the reversible lane or lanes:

Location	Volume of Motorists Traveling in Reversible Lane(s) (Vehicles Per Hour)
US 29	1,550
US 50/301	1,400
MD 97	600
MD 177	250

The use of reversible lanes in these four areas allows for increased person throughput and reduced congestion without significant capital investment and widening the roadway.

#### d. Bicycles and Pedestrians

The SHA is committed to improving access for bicycles and pedestrians. This provides for a clean form of transportation, reduces vehicles trips on the roadway system, reduces congestion and improves mobility. This can be provided through separate projects such as adding sidewalks or bicycle compatible lanes or shoulders or combined with a Complete Street approach to design. The Complete Streets policy strives to create a transportation system that balances all users of the roadway, including pedestrians, transit, bicyclists, and motorists. This policy impacts all divisions of SHA and how projects are developed from concepts to final design.

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

## **Sidewalk Retrofit**

The goals of the sidewalk retrofit program are to improve mobility for the general population and persons with disabilities, remove barriers that impede movement of citizens 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 a local government, or due to a high rate of pedestrian crashes at a location. There were 8 miles of new sidewalk constructed and the reconstruction of 21 miles of sidewalk occurred.

## **Bicycle Retrofit**

The Bicycle Retrofit program was developed to ensure bicycling remains a viable mode of transportation. The program identifies projects along state roadways that enhance bicycle mobility and safety while minimizing the impacts to environmental features or requiring private property (right-of-way). The range of improvements could include 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. SHA spent \$1.1 million on these improvements in 2013 including:

- MD 543 from Gilmer Way to Church Creek Road
- MD 117 from Steeple Road to Little Star Drive

## **Bicycle and Pedestrian Priority Areas (BPPA)**

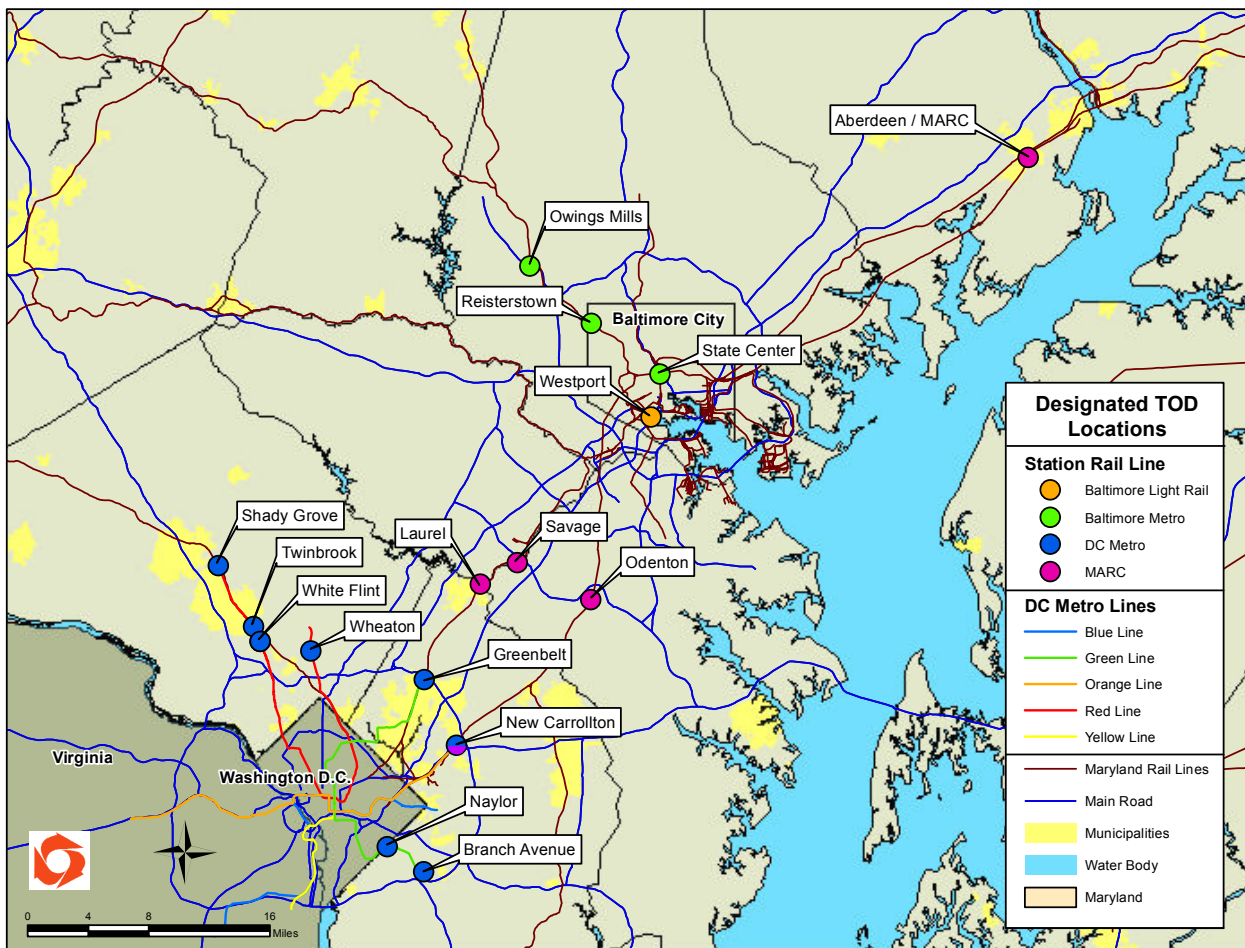
Safe and efficient bicycle and pedestrian accommodations are important to creating a transportation network that accommodates all users of the road. These facilities become increasingly important in urban areas and at transit stations where there are significant numbers of pedestrians and cyclists. SHA and MDOT completed the "Maryland Twenty Year Bicycle and Pedestrian Master Plan" in January 2014. The master plan provides for the direction for bicycle and pedestrian improvements for the State of Maryland including the Bicycle and Pedestrian Priority Areas (BPPA's). The designation allows the state and the local counties to emphasize bicycle and pedestrian improvements as priority modes and requires a plan be developed in cooperation between the counties and SHA. In 2014, SHA will begin a pilot of a traffic management plan for the White Flint area, the first designated BPPA, in Montgomery County.



## e. Transit Oriented Development

Transit Oriented Development (TOD) is a mix of land-uses that is physically and functionally integrated with transit, reduces auto dependency, increases pedestrian and bicycle trips, fosters safer station areas, offers attractive public spaces, enhances public transportation ridership, and encourages revitalization and smart growth. By achieving these principles a TOD could result in reduced traffic congestion, fuel consumption, air pollution, greenhouse gas emissions, sprawl, and local infrastructure costs, while increasing the mobility of citizens by providing more convenient access to mass transit.

This state designation allows TOD projects to get prioritization for funds and resources, financing assistance, tax credits, prioritization for the location of State offices, and support from the SHA on access improvements. Since 2008, 16 sites have been designated as TOD's including the Greenbelt Metro Station in Prince George's County which was approved as a Designated TOD in 2013.



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Maryland adopted and instituted a state level TOD program that defines TOD in Transportation Article 7-101 (m): as a mix of private or public parking facilities, commercial and residential structures and uses, improvements and facilities customarily appurtenant to such facilities that (1) is part of a deliberate development plan or strategy involving: (I) property that is adjacent to the passenger boarding and alighting location of a planned or existing transit station; or (II) property, any part of which is located within one-half mile of the passenger boarding and alighting location of a planned or existing transit station and is (2) planned to maximize the use of transit, walking and bicycling by residents and employees and is designated as a TOD by the Secretary of MDOT after considering a recommendation of the Smart Growth Subcabinet established under § 9-1406 of the State Government Article and the appropriate local government or multicounty agency with land use and planning responsibility for the relevant area.

Since 2013, MDOT, State Highway Administration (SHA), Maryland Transit Administration (MTA), and Washington Metropolitan Area Transit Authority (WMATA) have been worked together to develop and refine processes and policies to support TOD development. These documents detail the State's role in promoting TOD's and provide guidance to developers, county and local jurisdictions, and citizens on the TOD process in Maryland. This is useful for both official designated sites and for TOD at non-designated transit stations.



Maryland had a number success stories related to TOD's in 2013. This included receiving Board of Public Works approval on an amendment to the Master Development Agreement and an extension of the TIF Bond ordinance by Howard County for the Annapolis Junction Town Center (Savage). This will allow the development to move forward and to break ground on a parking garage in 2014. This revised amendment also includes provisions to potentially add a pedestrian bridge from the garage to the MARC station.

Another TOD success story continues to be progress at the Owings Mills Metro Station. In March 2013, Baltimore County completed construction of a new Baltimore County Public Library and Baltimore County Community College combined facility. In addition, the developer finished the first residential building with ground floor retail. The second parking garage will begin and be completed in 2014. The rest of the development will proceed as the market dictates.

Besides TOD's, another method to reduce VMT and increase mobility is through the construction of transit projects. The Maryland Department of Transportation and its sister agencies have two major new light rail lines in design. These are the Red Line in the Baltimore region and the Purple Line in the Washington region. Once complete, these new transit lines will provide increased accessibility and mobility for tens of thousands of Maryland residents. In addition, Montgomery County has partnered with SHA and MTA on planning for three new Bus Rapid Transit lines, on Veirs Mill Road, Georgia Avenue, and the Corridor Cities Transitway (CCT). The CCT will provide a connection from the end of the Red Line at Shady Grove to Metropolitan Grove.