

# **APPENDIX B**

## **Current Conditions and Progress Since 2002**

## Summary of Conditions

This report provides an overview of existing bicycle and pedestrian conditions throughout the State of Maryland as of 2012. The report provides an assessment of roadway and trail systems used for bicycling and walking; sidewalks and ADA compliance; accessibility to transit; as well as a summary of how dedicated funding has been spent. The information presented is based primarily on data provided by the Maryland Department of Transportation (MDOT), Maryland State Highway Administration (SHA), and the Maryland Transit Administration (MTA). It is organized around nine topics, each addressing one aspect of bicycling and walking in Maryland. A list of the topics discussed follows:

- ◆ **Pedestrian Crashes:** presents crash data, including injuries and fatalities, from 2006 through 2011, and describes crash trends related to pedestrian travel.
- ◆ **Sidewalks and ADA Compliance:** summarizes data describing the extent of sidewalks on State roads and the SHA's progress in making existing sidewalks and intersections on State roads ADA compliant.
- ◆ **Bicycle Crashes:** describes injuries and fatalities, from 2006 through 2011, and other crash trends related to bicycle travel.
- ◆ **Bicycle Level of Comfort (BLOC):** presents updates on BLOC which is a widely-utilized and accepted method of evaluating the bicycling conditions of shared roadway environments. It was first put to use in Maryland as a result of the 2002 statewide master plan effort, and data has been updated regularly since that time.
- ◆ **Transportation Trails:** describes the extent of existing and planned transportation trails based upon the Maryland State Strategic Trail Implementation Plan; includes an assessment of missing links in the networks of shared use paths that serve utilitarian travel.
- ◆ **Land Use, Bicycling and Walking:** describes how the built environment affects the rates of people bicycling and walking throughout the State.
- ◆ **Bicycle and Pedestrian Mode Share:** presents an account of the mode share trends in bicycling and walking around the State.
- ◆ **Connections to Transit:** discusses the status of infrastructure provided to facilitate bicycle and pedestrian access to transit stations and systems, as well as a list of existing resources for documentation on this topic.
- ◆ **Funding and Spending:** provides a summary of the State's bicycle and pedestrian focused spending for recent years, both in total dollars and as a percent of MDOT's total capital expenditures.

For each topic, existing conditions are first summarized for the State as a whole. To the degree possible and depending on the structure of the various data sets, conditions are also summarized for urban and rural areas. This approach is used because bicycling and walking needs and conditions differ across these geographic contexts. For planners, practitioners and the public, expectations about the extent and manner by which, roads, trails and transit systems address bicycling and walking needs can vary greatly depending on community context.

For the purposes of this overview, the term "urban" is used to generally describe conditions within the Washington, DC and Baltimore metropolitan areas, and the cities and towns in otherwise rural counties. The term "rural" is used to generally describe areas outside the metropolitan areas and smaller cities and towns.

For conditions that are directly associated with the roadway system (ex. BLOC, crash and fatality rates) the report utilizes the SHA's Functional Roadway Classification of urban and rural roads, which is rooted in Census data, to analyze urban and rural roadway conditions.

## Pedestrian Crashes<sup>1</sup>

Pedestrian safety is a key focus area for MDOT and the SHA. The Maryland Strategic State Highway Safety Plan sets a goal of reducing the number of pedestrian crashes (from 2,469 in 2008 to fewer than 2,053 by 2015, a 16.8 percent reduction); and pedestrian fatalities (from 115 in 2008 to fewer than 92 by 2015 or a 19.8 percent reduction). The SHA's 2011 Business Plan reiterates these goals.<sup>2</sup>

In 2012, SHA began conducting pedestrian safety audits along prioritized one-mile roadway segments that had experienced at least 10 crashes over a five year period (2006-2011). Prioritization of the segments was based on the severity and number of crashes within each segment. Working with local jurisdictions and stakeholders, SHA has utilized observational and crash data to help develop recommendations to address pedestrian safety issues in each segment. Since 2012, SHA has prioritized 18 one-mile roadway segments for further study. SHA plans to continue studying corridors and coordinating the appropriate countermeasures with local governments.

Pedestrian crash data from the Maryland Automated Accident Reporting System (MAARS) was obtained for this report from the SHA. The data represents all reported crashes for the time period between 2006 and 2011 that involved a pedestrian. This data is used in a variety of ways, by police, public safety and road engineering agencies to assist in their efforts to reduce crashes, the severity of injuries and fatalities.

Because statewide data describing overall levels of pedestrian activity (i.e. pedestrian counts) are not available, crash rates per pedestrian trip cannot be calculated. As a result, it cannot be determined whether increases or decreases in crashes over time represents a change in crash rates or a change in overall activity levels.

Highlights from the pedestrian crash data include:

### **STATE**

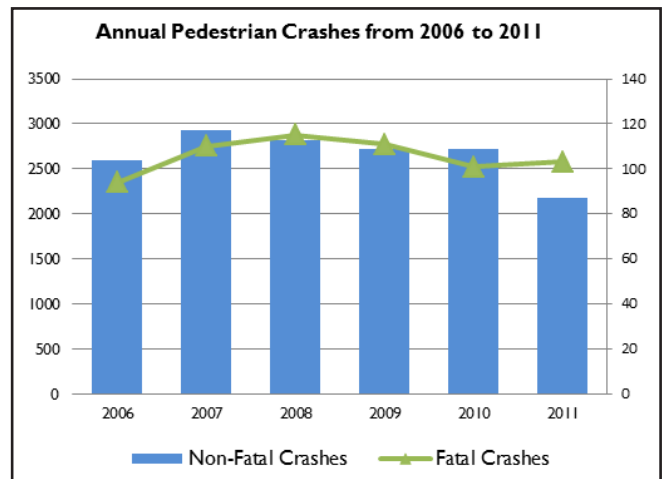
- ◆ In the five year period between 2006 and 2011, the State recorded over 18,000 pedestrian crashes.
- ◆ During that same period, the number of annual pedestrian related crashes decreased by 19 percent, but the number of pedestrian fatalities increased by 9 percent (see **Figure 1**).<sup>3</sup>
- ◆ Seventy three percent of all fatal pedestrian-involved crashes occurred at dusk, dawn or after dark. Of those, over 75 percent of the pedestrians killed were males.<sup>4</sup>
- ◆ **Figure 2** shows pedestrian crash rates per capita for each census tract in Maryland. The analysis shows that crash rates are higher in the most densely populated parts of the State, both in the metropolitan areas and smaller towns and cities across the State.

### **URBAN AREAS**

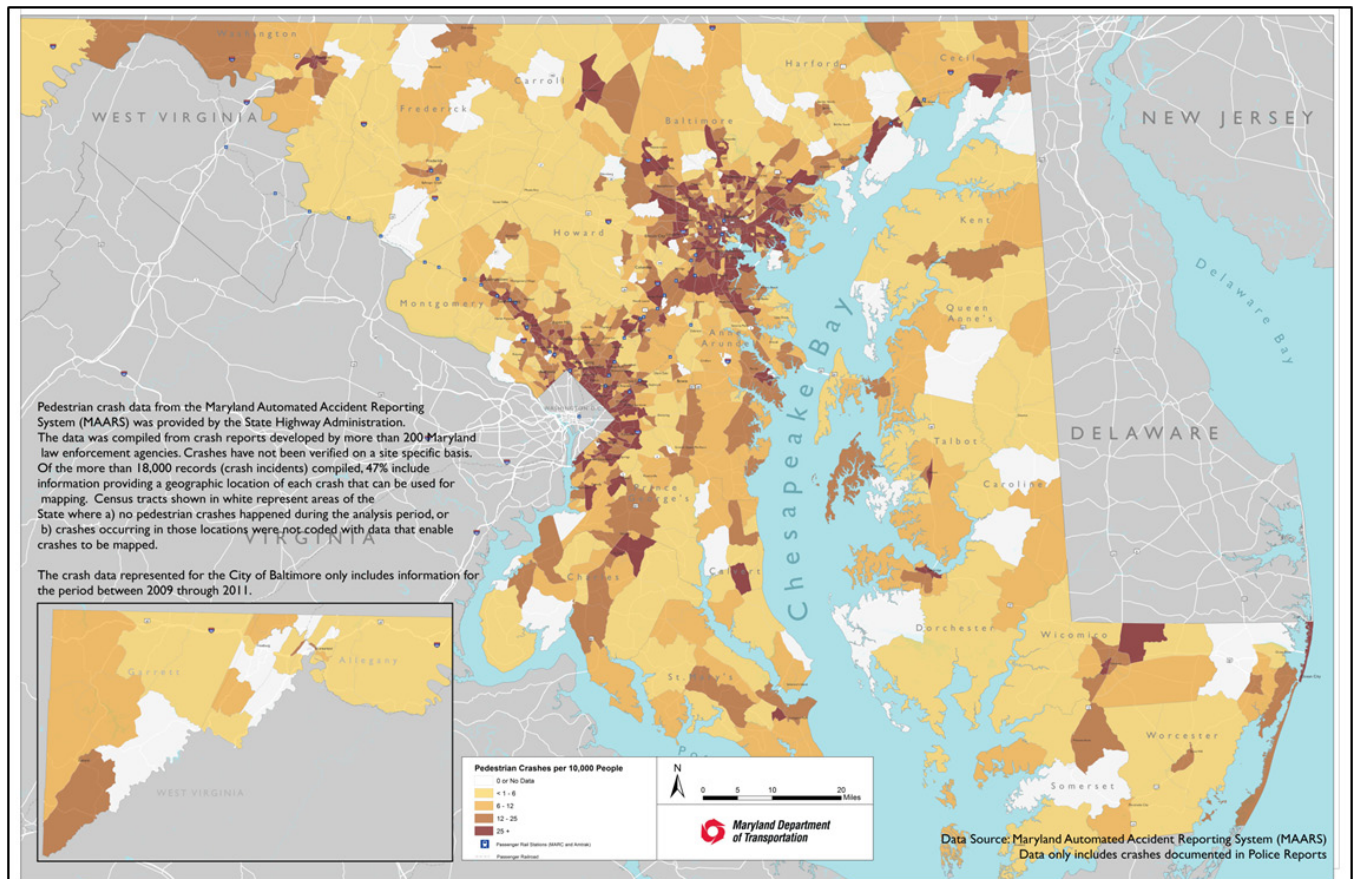
For the period between 2006 and 2011:

- ◆ More than eighty percent of all pedestrian related crashes (85.2 percent ) and 78 percent of pedestrian fatalities occurred in Baltimore City, Baltimore, Howard, Montgomery, Prince Georges and Anne Arundel counties.

**Figure 1- Statewide Annual Pedestrian Crashes**



**Figure 2 - Pedestrian Crashes per 10,000 Residents (2006-2011)**



- ◆ Baltimore City, the most densely populated urban area in the State, recorded the highest number of pedestrian related crashes (more than 4000), while Prince George’s County recorded the highest number of pedestrian fatalities (161) for the same five year period. Please note that Baltimore City crash data is included in the MAARS data set; however location information for crashes reflects only the 2009-2011 period.(see Note 1 for more details).<sup>5</sup>
- ◆ The census tracts with the highest pedestrian crash rates occur predominantly in suburban areas surrounding Washington, DC and the City of Baltimore, particularly in the counties of Anne Arundel, Baltimore and Prince George’s (see **Figure 2**).<sup>6</sup>
- ◆ The highest incidence of pedestrian crashes in rural counties occurred in and around cities on the Eastern Shore, especially, Ocean City.

## **RURAL AREAS**

- ◆ Rural areas throughout the State exhibited lower per capita, pedestrian crash rates and overall numbers of pedestrian crashes and fatalities. This may be explained by lower housing density and low intensity land uses, associated with lower numbers of people walking.

## **Sidewalks and ADA Compliance**

Whether or not a Maryland state highway has a sidewalk along it today is dependent on a range of factors that were operative when the roadway was initially built or most recently reconstructed. These factors include the extent of State right-

**Table 1 – Sidewalk Availability and ADA Compliance along State Roadways by County, December 2012**

	Total Sidewalk length along State roads (Mi)	ADA Compliant Sidewalk length (Mi)	Percent of Sidewalks Compliant with ADA (%)	Non-Urban Sidewalk (Mi)	Urban Sidewalk (Mi)	Percent of Urban State Road with Sidewalk (%)
<b>Allegany</b>	15.31	9.36	61.16	3.79	11.51	7.5%
<b>Anne Arundel</b>	52.68	32.81	62.29	0.00	52.69	12.9%
<b>Baltimore</b>	106.11	67.41	63.53	0.97	105.14	26.4%
<b>Calvert</b>	7.22	5.08	70.41	2.75	4.47	4.2%
<b>Caroline</b>	8.33	5.18	62.22	8.33	0.00	-
<b>Carroll</b>	18.42	7.84	42.56	2.80	15.62	8.8%
<b>Cecil</b>	19.30	10.26	53.13	7.32	11.99	10.2%
<b>Charles</b>	8.74	1.97	22.49	0.09	8.66	9.1%
<b>Dorchester</b>	9.01	6.97	77.31	4.35	4.66	18.8%
<b>Frederick</b>	38.21	25.24	66.05	10.23	27.98	16.4%
<b>Garrett</b>	3.73	2.18	58.59	3.73	0.00	0.0%
<b>Harford</b>	28.75	20.94	72.82	0.83	27.92	12.2%
<b>Howard</b>	20.84	14.00	67.20	1.01	19.83	14.2%
<b>Kent</b>	7.85	4.13	52.57	4.92	2.92	24.6%
<b>Montgomery</b>	223.09	153.16	68.65	3.54	219.55	46.4%
<b>Prince George's</b>	139.06	77.07	55.43	0.08	138.97	30.1%
<b>Queen Anne's</b>	11.21	4.66	41.57	10.50	0.71	3.3%
<b>Somerset</b>	8.00	5.10	63.75	4.87	3.13	23.8%
<b>St. Mary's</b>	20.63	17.01	82.46	3.44	17.19	27.8%
<b>Talbot</b>	5.27	2.98	56.69	3.74	1.53	5.5%
<b>Washington</b>	24.69	11.96	48.45	12.33	12.36	9.0%
<b>Wicomico</b>	17.04	13.01	76.35	4.69	12.35	11.7%
<b>Worcester</b>	28.10	21.28	75.71	7.41	20.69	29.1%
<b>Maryland</b>	821.57	519.60	63.24	101.75	719.83	21.1%

of-way available for the road, the potential for obtaining additional right-of-way if needed, the willingness of local government or adjacent property owners to agree to maintain a sidewalk if built, terrain and other potential physical impediments, the nature of adjacent development, local zoning/subdivision regulations related to provision of sidewalks, and other factors.

By Maryland State law, constructing and maintaining sidewalks along state roadways requires a partnership between the SHA and the local jurisdiction in which both generally assume some costs and responsibilities.<sup>7</sup> Counties and municipalities govern the provision and maintenance of sidewalks on State roadways through local ordinances. In some communities, local laws transfer maintenance responsibility to adjacent property owners, however this responsibility is generally held by the local jurisdiction.

Where public sidewalks exist, the Americans with Disabilities Act (ADA) requires that the sidewalks and associated infrastructure such as bus stops, crosswalks and curb ramps, be accessible to persons with disabilities. To comply with the ADA, the SHA maintains an inventory of roadway infrastructure describing the compliance status of sidewalks, curb ramps,

bus stops, driveway crossings and medians located on State administered roadways and has been working aggressively to retrofit older facilities to bring them into compliance with ADA requirements. Some of the most common issues with ADA non-compliance include the following: a lack of curb ramps, non-compliant curb ramp designs, barriers in the middle of sidewalks (e.g. utility poles), narrow sidewalks, non-compliant driveway cross-slopes, and inaccessible bus stops.

There are approximately 821 miles of sidewalks along State roadways. The majority of sidewalks on State roadways are located in urban areas and commercial areas along rural roads. When reviewing State progress toward meeting its obligations under the ADA, it is important to note that compliance is assessed only in locations where sidewalks already exist along State roadways. State roadways that do not have sidewalks are not factored into the ADA compliance calculation.

## **STATE**

- ◆ As of December 2012, SHA reported the following figures for ADA compliance:
  - 63 percent of sidewalks
  - 33.5 percent of curb ramps
  - 59.1 percent of bus stops
  - 36.8 percent of driveway crossings
  - 69.1 percent of medians
- ◆ In 2012, SHA reconstructed more than 26 miles of sidewalk along State roadways.
- ◆ In 2012, ADA compliance projects were completed on various roadways throughout eleven corridors (5 urban and 6 rural).

## **URBAN AREAS**

- ◆ Over 87 percent of sidewalks along State roadways are in urban areas.
- ◆ Sidewalks are available along 21 percent of eligible urban State roadways.
- ◆ In 2012, SHA completed 17.54 miles of sidewalk improvements along State roadways throughout five urban counties: Anne Arundel, Baltimore County, Howard, Montgomery, and Prince George’s.
- ◆ Commercial corridors and urban areas are often characterized by constrained right-of-way widths, which can limit sidewalk space.

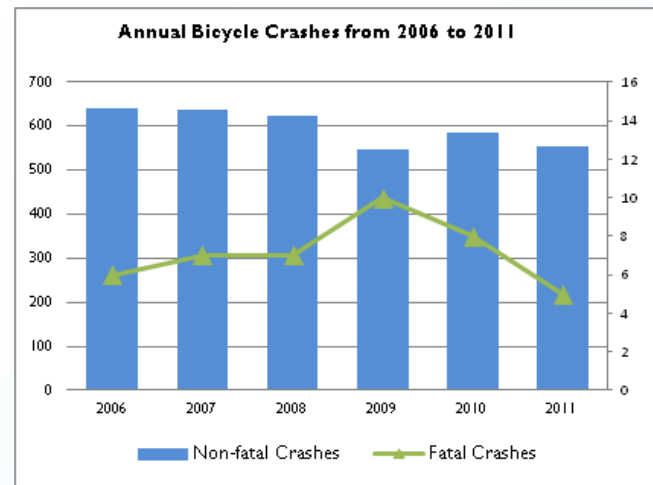
## **RURAL AREAS**

- ◆ Generally sidewalks are not provided along rural state roadways; however, over 200 miles of sidewalks exist along State roadways classified as rural.
- ◆ In 2012, SHA completed ADA-compliance improvement projects, totaling nine miles of sidewalk, on State roadways throughout six rural counties including: Calvert, Dorchester, Hartford, St. Mary’s, Somerset, and Worcester.

## **Bicycle Crashes**

Bicycle safety is a key priority for MDOT and SHA. Bicycles are considered vehicles under Maryland law, and as such, cyclists must abide by traffic laws applicable to vehicles on

*Figure 3 – Statewide Annual Bicycle Crashes and Fatalities*



the roadway. Motorists must allow cyclists the same respect and caution they would allow another automobile. There are additional bicycle safety laws governing the interaction between bicyclists and motor vehicles, such as the recently passed State law requiring drivers to leave a minimum three foot passing distance when passing a bicyclist on a roadway. In the 2012-2015 State Highway Administration Business Plan, SHA committed to annually conduct ten road safety audits with preference at high priority locations crash areas.<sup>8</sup>

Bicycle crash data from the Maryland Automated Accident Reporting System (MAARS) was obtained for this report from the SHA. The data represents all reported crashes for the time period between 2006 and 2011 that involved a bicycle. This data is used in a variety of ways, by police, public safety and road engineering agencies to assist in their efforts to reduce crashes, the severity of injuries and fatalities. When considering this summary report it is important to note that many bicycle crashes go unreported. Generally, only crashes involving a motor vehicle in which police assistance is involved are reported.<sup>9</sup>

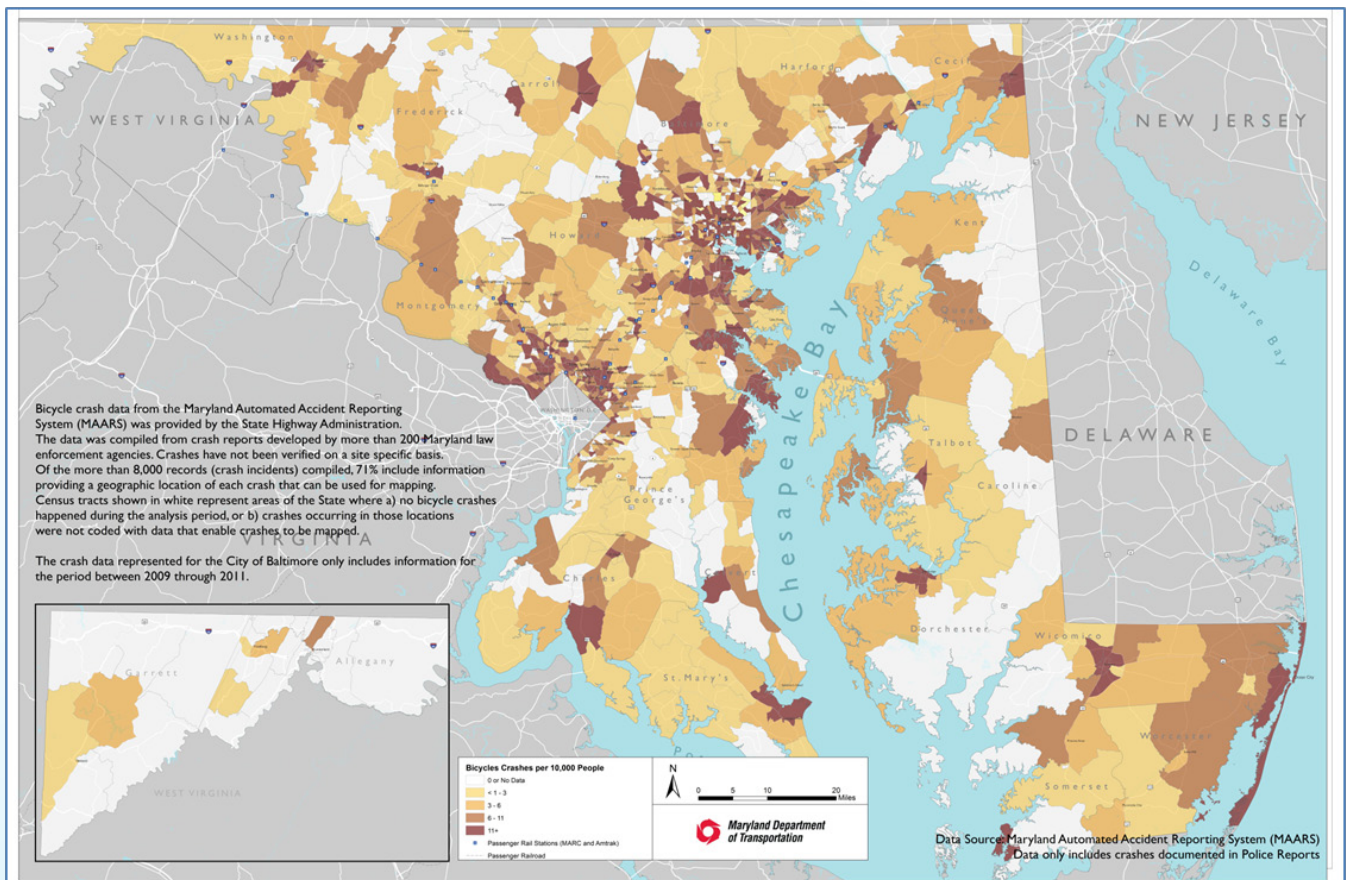
Highlights of recent State bicycle crash statistics follow:

**STATE**

For the period between 2006 and 2011-

- ◆ Over 4,000 bicycle crashes were recorded.
- ◆ From 2006 to 2011 the number of bicycle related crashes decreased by 16 percent (see **Figure 3**).

**Figure 4 - Bicycle Crashes per 10,000 Residents (2006-2011)**



- ◆ The number of fatalities rose by 40 percent from 2006 through 2009 however, they declined between 2009 and 2011.
- ◆ Forty percent of the crashes and 57 percent of the fatalities occurred between the hours of 4 pm and 8 pm.<sup>10</sup>
- ◆ Seventy-seven percent of all bicycle crashes and 71 percent of fatalities occurred in daylight.<sup>11</sup>

## **URBAN AREAS**

- ◆ As shown in **Figure 4**, bicycle crash rates are generally highest in urban areas; although there are some rural census tracts where high crash rates were also reported. This is most likely due to larger numbers of bicycle trips being undertaken, though bicycle count data is not available to verify this.
- ◆ Sixty-eight percent of all reported bicycle crashes statewide for the period between 2006 and 2011 occurred in Baltimore City, Baltimore, Howard, Anne Arundel, Montgomery and Prince George's counties.
- ◆ Twenty two percent of all crashes statewide in 2011 occurred in Baltimore City.<sup>12</sup>
- ◆ The highest concentration of crashes occurred in suburban areas surrounding the metropolitan cores of Washington, DC and the City of Baltimore, particularly in the counties of Anne Arundel, Baltimore and Prince George's.<sup>13</sup> Ocean City also experienced significant number of crashes during the reporting period.

## **RURAL AREAS**

- ◆ Some rural census tracts had relatively high rates of bicycle crashes, such as Lexington Park in St. Mary's County and La Plata in Charles County. This could be an anomaly due to the relatively small data set or could reflect higher rates of cycling in these areas.
- ◆ The lower crash numbers in the rural counties in Western Maryland, reflect both the lower incidence of bicycle crashes, as well as the lack of geo-located data for records in these communities (also depicted in **Figure 4**).
- ◆ While crash rates are higher in urban areas, from 2006-2011, almost 60 percent of bicyclist fatalities occurred in rural counties.

## **Bicycle Level of Comfort (BLOC)**

Bicycle compatibility along State roadways is measured using BLOC. BLOC is a nationally accepted and widely utilized method of evaluating the bicycling conditions on roadways. It uses measurable geometric and traffic factors to assign a letter grade (A through F) describing the comfort a typical bicyclist would experience while riding on a roadway segment. Grades are based on a composite evaluation that includes each of the following roadway characteristics: outside travel lane width, shoulder or bike lane width, speed limit, traffic volume, truck volume, pavement condition and presence of on-street parking. The relative weight given to each of these factors was determined through a study that tabulated the response to a variety of roadway environments, of adult bicyclists representing a variety of experience levels. BLOC does not account for off-road or separated bicycle facilities such as side paths and cycle tracks.

The SHA is currently evaluating BLOC and other facility assessment tools to determine the most appropriate and useful tools for monitoring facility conditions statewide and reporting this information to the public, and evaluating proposed facility improvements on a project. The map on the following page (**Figure 5**) and accompanying table (**Table 2**) illustrates the weighted average BLOC grade for each county.<sup>14</sup> **Table 2** also indicates the BLOC grade distribution for each State road within each county.

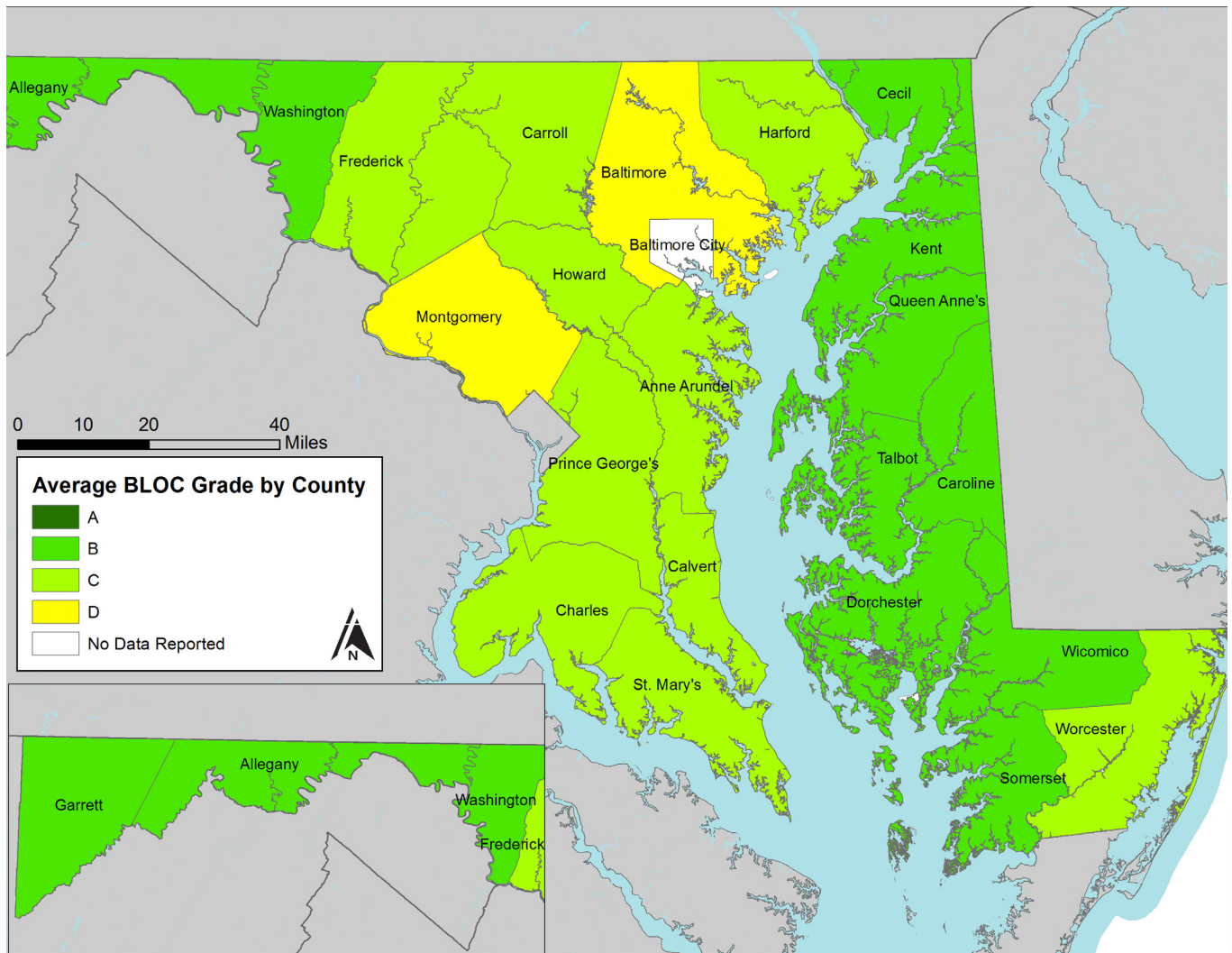
Following, are additional trends:

## **STATE**

- ◆ The 2002 Bicycle and Pedestrian Master Plan set a goal for the State to achieve a level of D or better for at least 80 percent relevant State roadways. As of 2011, 79 percent of the roadways had reached this threshold.<sup>15</sup>



Figure 5 - 2011 Bicycle Level of Comfort by County



- ◆ BLOC grades are not available for county or municipally controlled roads, and current BLOC grades are not available for any roadways within the City of Baltimore.

### URBAN AREAS

- ◆ Almost 30 percent of roadways classified as urban received grade E or F (535 out of 1,807 urban roadway miles).<sup>16</sup>
- ◆ The most difficult conditions (E-F) occur predominantly on roadways in the most densely populated urban and suburban settings. Poor scores usually result from high volumes of traffic, constrained roadway widths and higher roadway speeds.
- ◆ Along roadways with challenging conditions, bicyclists are often observed riding on sidewalks, which can create conflicts with pedestrians.
- ◆ In some urban areas, local jurisdictions are working to build networks of side paths for bicycle and pedestrian use along challenging roadways. However, BLOC scores do not account for side path availability.

**Table 2 - BLOC Level by County**

	Average BLOC	Bicycle Level of Comfort					
		A	B	C	D	E	F
<b>Allegany</b>	B	48.5%	10.7%	18.3%	16.2%	5.6%	0.8%
<b>Anne Arundel</b>	C	32.7%	9.5%	15.5%	19.1%	17.1%	6.2%
<b>Baltimore</b>	D	20.3%	3.9%	9.0%	21.7%	29.4%	15.7%
<b>Calvert</b>	C	30.7%	11.8%	11.0%	27.0%	10.9%	8.6%
<b>Caroline</b>	B	60.8%	14.9%	14.6%	6.3%	1.6%	1.8%
<b>Carroll</b>	C	30.2%	12.4%	15.8%	20.6%	16.4%	4.6%
<b>Cecil</b>	B-	46.0%	9.8%	14.0%	20.9%	6.2%	3.1%
<b>Charles</b>	C	36.9%	14.8%	10.0%	26.1%	8.6%	3.7%
<b>Dorchester</b>	B	39.5%	24.2%	22.3%	6.7%	3.8%	3.5%
<b>Frederick</b>	C	24.0%	8.1%	17.1%	27.0%	19.7%	4.2%
<b>Garrett</b>	B	48.4%	25.6%	15.2%	8.0%	1.5%	1.3%
<b>Harford</b>	C	30.4%	9.4%	11.6%	22.8%	18.6%	7.2%
<b>Howard</b>	C-	28.9%	3.6%	9.0%	25.2%	22.4%	10.9%
<b>Kent</b>	B	50.2%	23.6%	16.2%	7.8%	2.1%	0.2%
<b>Montgomery</b>	D	10.6%	1.9%	10.1%	18.7%	38.7%	20.0%
<b>Prince George's</b>	C	32.9%	3.8%	6.3%	18.2%	29.6%	9.1%
<b>Queen Anne's</b>	B	44.4%	23.6%	19.0%	6.6%	4.3%	2.0%
<b>St. Mary's</b>	C+	38.0%	12.4%	14.0%	25.1%	5.9%	4.5%
<b>Somerset</b>	B-	28.1%	36.3%	18.7%	9.9%	2.9%	4.2%
<b>Talbot</b>	B-	32.7%	23.6%	19.5%	18.1%	1.8%	4.2%
<b>Washington</b>	B-	42.9%	17.6%	12.3%	13.0%	10.9%	3.3%
<b>Wicomico</b>	B-	38.5%	19.6%	11.1%	20.9%	6.9%	3.0%
<b>Worcester</b>	C+	39.2%	15.8%	17.1%	11.9%	10.5%	5.5%
<b>State Total</b>	C	34.6%	12.9%	13.7%	18.0%	14.5%	6.3%

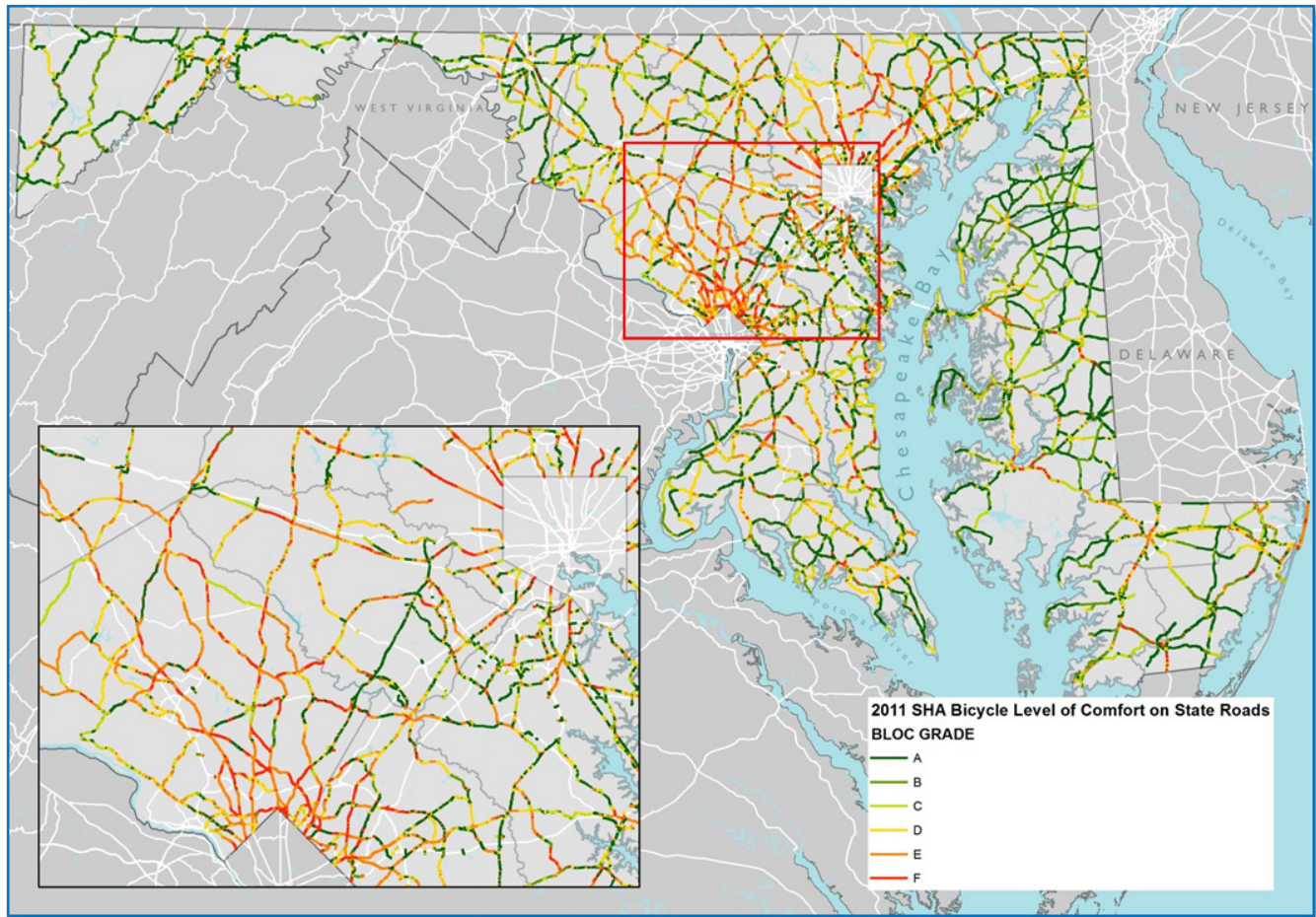
**RURAL AREAS**

- ♦ The overall BLOC score for roadways classified as rural is considerably better than urban roads - 1,678 of 3,366 (approximately 50 percent) of rural roadway miles scored B or higher.<sup>17</sup>
- ♦ Select State roadways within rural areas (Routes 40, 50, 68) have low BLOC scores. These roadways tend to exhibit characteristics similar to urban roadways due to their proximity and connectivity to activity centers, high usage levels by both local and through traffic, higher speeds and higher volumes of truck traffic

**Transportation Trails**

In 2009, MDOT led a comprehensive interagency planning effort to develop a long-term strategic plan to guide the implementation of an integrated transportation trail network throughout the State. The Maryland Trails Strategic Implementation Plan focused on expanding multimodal transportation options, supporting economic development goals; providing access to a healthy, sustainable lifestyle; and enabling Marylanders to connect to the natural environment.

Figure 6 - 2011 Bicycle Level of Comfort on Maryland Roadways

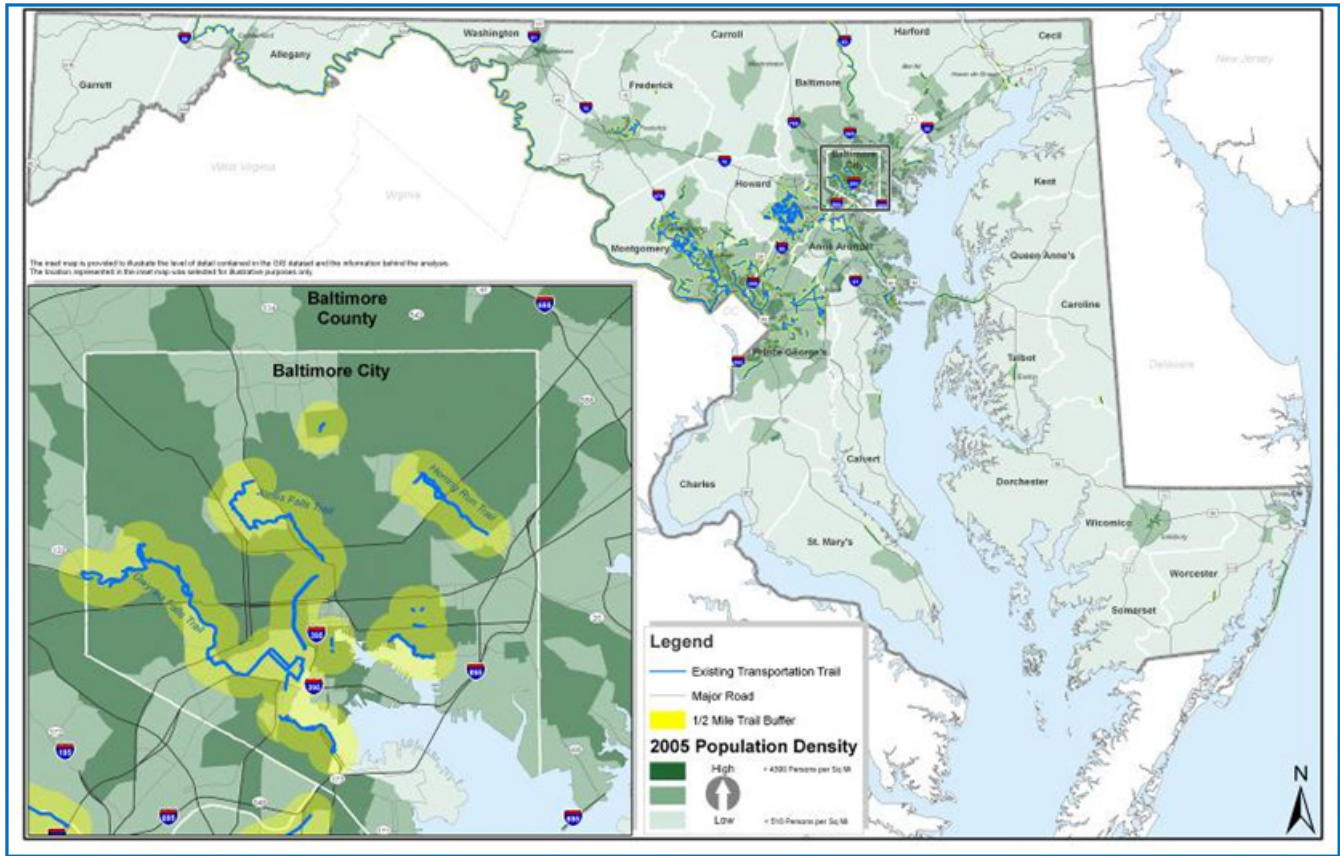


A continuous network of bicycling facilities has the potential to generate additional economic, social, and personal benefits and contribute to enhanced community identity. Additionally, bicycle tourism throughout rural parts of the State may lead to significant economic development through these communities. For example, a 2008 study measuring the impact of the Great Allegheny Passage on local economies estimated that on average one-quarter (25.5 percent) of the revenue businesses received in 2007, was attributed to the existence of the area's biking/hiking trail.<sup>18</sup> Furthermore, a recent report measuring the economic impact of recreational cyclists spending, noted that there were \$364.8 million in direct and indirect expenditures throughout the State of Iowa.<sup>19</sup> These findings underscore the importance of continued focus on economic development.

To distinguish transportation trails from hiking trails and other purely recreational trails, the Plan defines them as having the following characteristics:

- ◆ Paths that by virtue of their connectivity, length, and/or location in a community, can be used for transportation and/or long distance recreational travel.
- ◆ Paths that are shared use, i.e. permit bicyclists, pedestrians and/or other non-motorized uses.
- ◆ Paths designed for shared use, i.e. surfaced with asphalt, concrete or crushed stone.
- ◆ Paths located adjacent to (but not on) a roadway and designated for both bicycle and pedestrian use.

**Figure 7 - Population's Proximity to Existing Trails in Maryland**



The Plan notes that trail connectivity is especially important in determining the transportation value of a trail, including its connections to the street network and its proximity to every day destinations.

**STATE**

As of 2010 the status of trails, throughout the State is:<sup>20</sup>

- ◆ Approximately 780 miles of existing transportation trail.
- ◆ Approximately 480 miles of planned and proposed trail.
- ◆ Approximately 1,447 miles of potential trails and uninvestigated corridors of need.
- ◆ 23 percent of Maryland residents lived within 0.5 miles of a Transportation Trail (see **Figure 7**).

**URBAN AREAS**

- ◆ Approximately 515 miles (66 percent) are located within urbanized and suburban areas.
- ◆ Most of the trails are concentrated in the following urban jurisdictions including Baltimore City, Anne Arundel, Baltimore, Howard, Montgomery, and Prince George’s counties.

**RURAL AREAS**

- ◆ There are approximately 170 miles (34 percent) of transportation trails in rural areas.<sup>21</sup> Most of these trails are concentrated in Washington and Allegany counties.

- ◆ Allegany County has 8.5 percent of the total State trail network within its boundaries.

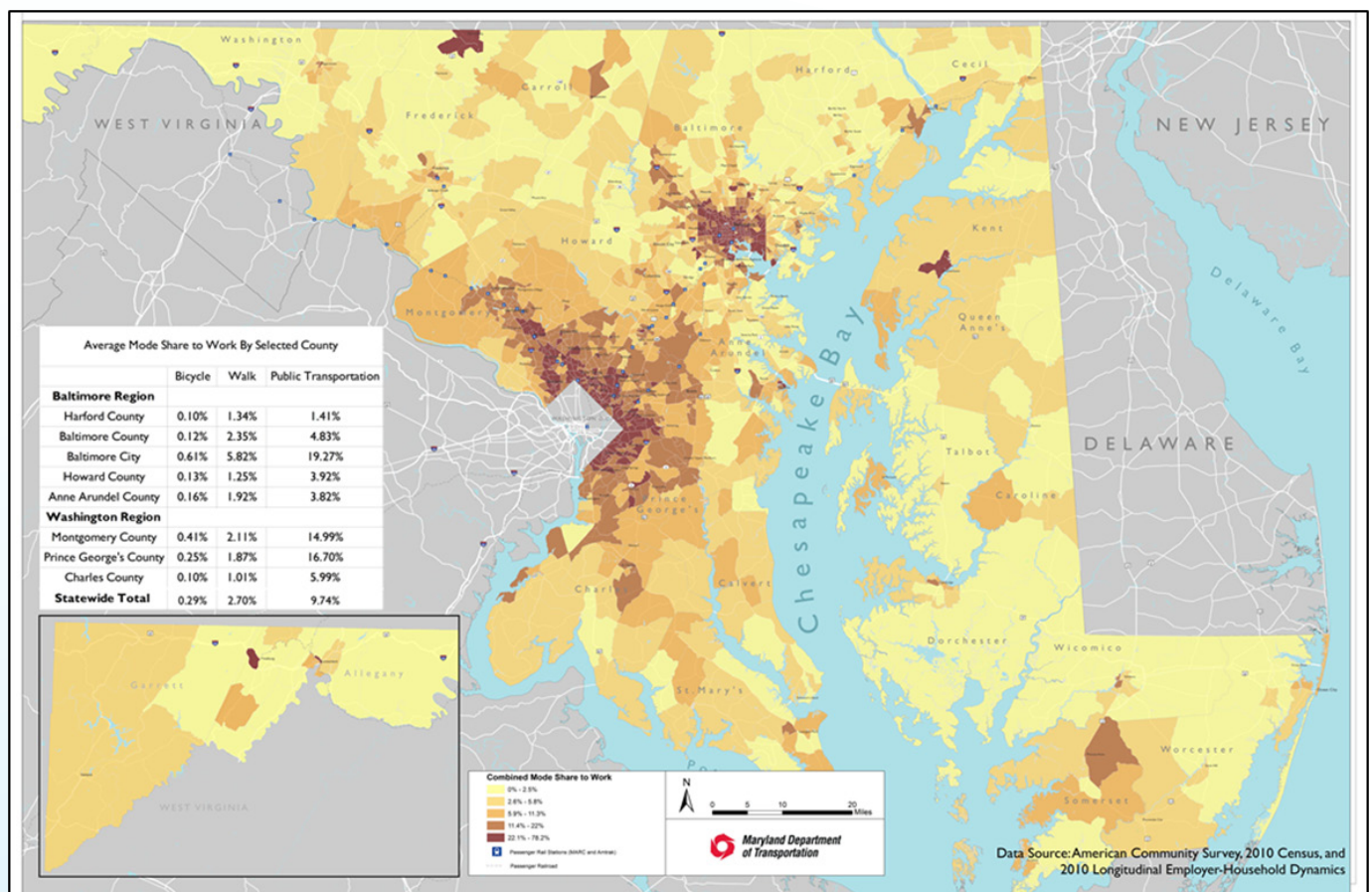
## Mode Share

An estimated 2.43 percent of work related trips throughout Maryland were made on foot in 2012, according to the US Census American Community Survey. By this measure, Maryland ranks 29 out of 50 States according to the 2012 Benchmarking Report by the Alliance of Bicycling and Walking.<sup>22</sup> Furthermore, an estimated 0.28 percent of work trips are made by bicycle; placing Maryland 37th out of all states for bicycle commuting. These modal shares have stayed relatively stable over the past decade.

The only statewide data source describing the transportation usage levels of the bicycling and walking modes is the *Journey to Work* data collected by the US Census. Because this data examines only trips to work, it is not known how many non-motorized trips may be taken for other purposes, such as shopping, running errands, visiting friends, etc. These types of trips tend to be shorter, so the bicycle and pedestrian modes may be used more often for non-work related travel; how much more is not known.

This report combines transit mode share data with bicycle and pedestrian data to further explain bicycling and walking trends. The data from the US Census (the Journey to Work) only reflects the primary mode of transportation to work (i.e. personal automobile, transit, bicycle, walk, etc.). It is reasonable to assume that most transit trips include at least one walk or bicycle access trip that is not identified in the data.

**Figure 8 - Bicycle, Pedestrian and Transit Mode Share to Work**



## STATE

- ♦ *Walking*: From 2000 to 2012, the share of people walking to work decreased from 2.59 to 2.43 percent; however, the total number of people walking to work increased by about 2,000. In 2010, 49 percent of these walkers were women; 51 percent men.<sup>23</sup>
- ♦ *Bicycling*: From 2000 to 2010 bicycle mode share nearly doubled from 0.19 percent to 0.36 percent. In 2010, 80 percent of these cyclists were men; 20 percent women.<sup>24</sup>
- ♦ *Transit Access*: From 2000 to 2010 public transit use for work trips rose from 7.2 percent to 9.2 percent.<sup>25</sup> Though it is not reported, nearly all transit trips involve walking or biking at, at least one end of the transit trip to reach the final destination.

## URBAN AND RURAL AREAS

- ♦ **Figure 8** shows that most walking and bicycling occurs in geographic locations with varied land uses and a concentration of activities. Additionally, increased transit availability and connectivity to transportation trails support multimodal travel in these areas. The highest volumes of pedestrian and bicycle trips (darker brown) are concentrated throughout the City of Baltimore and the suburban counties of Anne Arundel, Baltimore, Howard, Montgomery and Prince George's.
- ♦ Additionally, bicycle and pedestrian mode share around colleges and universities tend to be high. This may be caused by the lower rates of automobile ownership and consequentially the reliance by students on biking and walking as their main forms of transportation.

## Land Use and Transportation

More compact land use tends to increase opportunities for pedestrian and bicycle travel by shortening the distances between destinations and activities, and increasing connectivity between them. The State of Maryland's smart growth policies support efforts to increase the number of people walking, cycling and taking public transit, and reduce the use of single occupancy automobiles, especially for short trips. Studies have shown that residents of more walkable communities typically walk 2-4 times more and drive 5-15 percent less than in more automobile-dependent areas.<sup>26</sup> In general, higher density and activity areas tend to have a higher potential for multimodal travel, including walking and biking.

Utilizing geographic data reflecting the population density and key travel generating land uses, including schools, transit centers, shopping and recreation, a Latent Demand Index was developed. This index measures the combined density of key trip generators and attractors at the census tract level to generate an estimate of the relative walk and bike friendliness of existing land uses across the State.

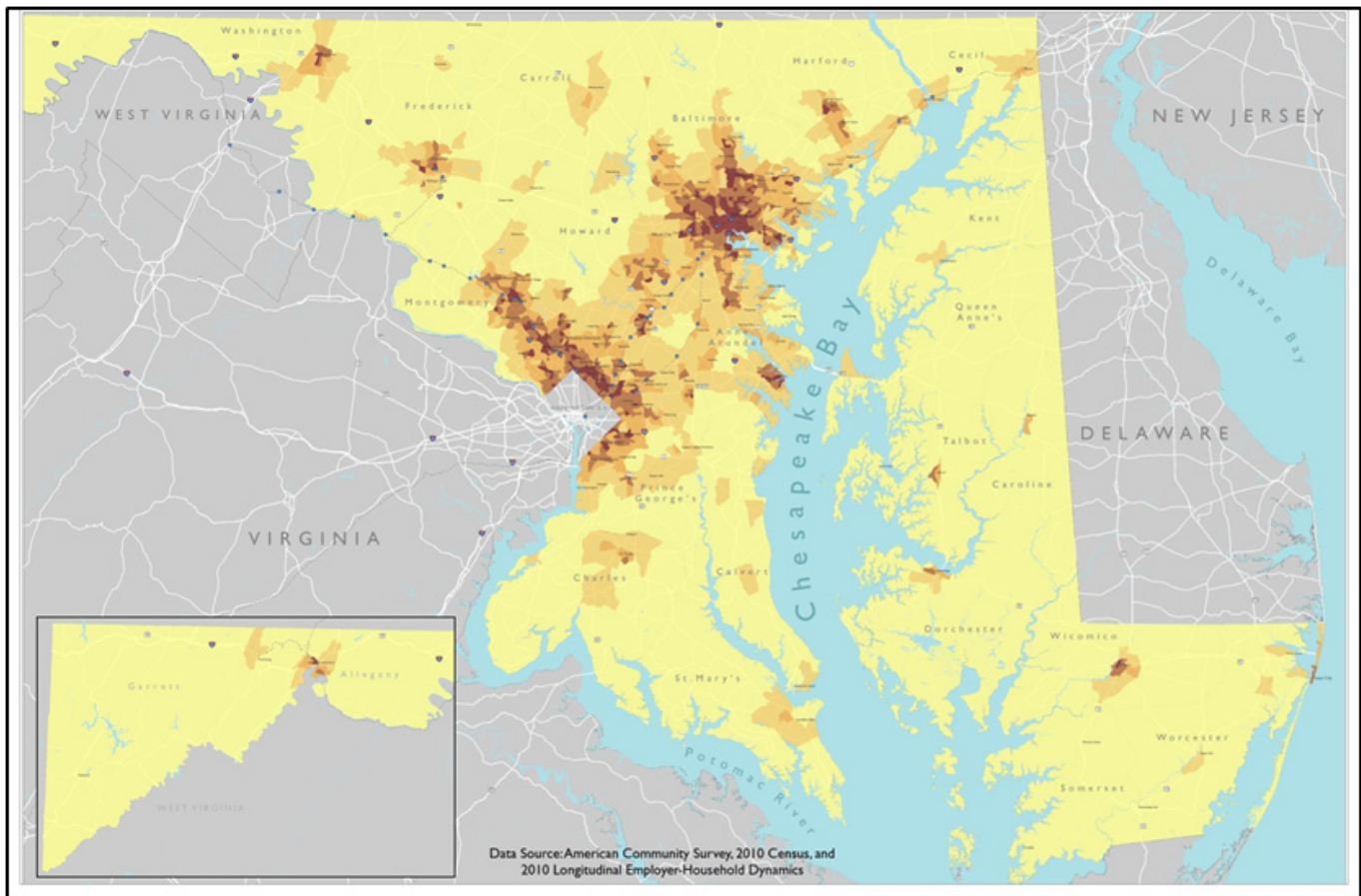
A comparison of **Figure 8** to **Figure 9** supports the concept that development of compact mixed-use communities are associated with higher rates of bicycling, walking and transit use. The areas in **Figure 9** with the highest projected bicycle, pedestrian and transit use are generally the same as those in **Figure 8** that maps these actual trip types.

## Bicycle and Pedestrian Access to Transit

There are many factors that play into an evaluation of conditions affecting bicycle and pedestrian access to transit, such as residential and employment density around transit stations and stops; frequency of transit service; the presence of sidewalks, crosswalks, signals and bus shelters; availability of bike racks on buses; availability of bike parking at rail stations, bicycling conditions on roads serving transit stations; trail connections, etc.

It is important to note that the various transit and transportation agencies throughout the State collect and organize their own data, making it challenging to aggregate and compare on a statewide basis. This section provides a description of three of the most important data sources describing factors related to bicycle and pedestrian access conditions, and

Figure 9 - Latent Demand Index for Bicycle, Pedestrian and Transit Trips



provides select highlights in the areas of bicycle parking at transit centers.

In Maryland, rail transit services are provided by a number of agencies and variety of service types:

- ◆ Metrorail--Washington Metropolitan Area Transit Authority (WMATA)
- ◆ Baltimore Metro—MTA
- ◆ Baltimore Light Rail—MTA
- ◆ Commuter Rail (MARC)—MTA
- ◆ Intercity Rail Passenger Service--AMTRAK

The areas served by these systems are concentrated in the Baltimore-Washington, I-95 and I-270 corridors. Primarily, they serve the central cities and suburbs of Baltimore and Washington, where employment and activity centers are most dense.

Bus services are more extensive, as every county provides a level of transit service although service coverage and frequency vary. In the Baltimore and Washington, DC metropolitan areas the vehicle fleets of all major bus transit services are now fully equipped to carry up to 2 bicycles per bus on front mounted racks. The extent to which rural and small city transit systems are so equipped is not known.

Periodically, studies have been performed at state, regional or local levels to assess conditions for bicycle and pedestrian access to public transit. The most recent studies include the following: the Baltimore Metropolitan Council (BMC) Access to Rail Stations Report<sup>27</sup>, the WMATA 2012-2017 Pedestrian and Bicycle Program Station Needs Summary<sup>28</sup>, and the Maryland Transit Authority Parking Facilities Manual.

- ◆ The BMC summary documented conditions and factors affecting bicycle and pedestrian conditions in and around transit stations (MTA, MARC, Light Rail). Information contained in this report included land use types around stations, existing parking, crash data around stations, ridership statistics, residents within a 3 mile radius, existing bicycling facilities, existing pedestrian facilities, as well as connectivity to and from stations. The analysis serves as a resource to understanding existing conditions for bicyclists and pedestrians near rail stations. Additionally the maps and database provided through the report help the BMC, local jurisdiction staff and transit planners better understand and plan for potential improvements.
- ◆ The WMATA 2012-2017 Pedestrian and Bicycle Program Station Needs Summary documented bicycle and pedestrian infrastructure and provided a needs inventory (i.e. bicycle parking, connecting pathways and sidewalk improvements, curb ramps, curb extensions, crosswalks, way-finding) for each of WMATA's metro stations. The document served as the foundation of the pedestrian and bicycle element of WMATA's Capital Improvement Program (CIP) and can be used to inform the budgeting processes, guide discussions on station accessibility studies, help prioritize projects, and be a one-stop resource to find eligible pedestrian and bicycle improvement projects.
- ◆ The 2010 MTA Parking Facilities manual presented information on all parking facilities serving the MTA Commuter Bus routes, MARC lines, as well as the Baltimore Metro and Light Rail administered by the MTA. The manual serves as a quick reference tool for planners and officials to understand existing conditions in and around MTA commuter parking facilities. It contains information regarding station characteristics (e.g., number of parking spaces, number of accessible spaces, bicycle racks, bicycle lockers, pedestrian accessibility, lighting, shelter information.) as well as characteristics of the population around each transit facility.

The following table summarizes the data obtained from the aforementioned studies on bicycle parking at rail stations and Park & Ride lots.

**Table 3 - Prevalence of Bike Parking at Maryland Transit Centers**

	Total	With Bike Parking		No Bike Parking	% Bike Parking
		Racks	Lockers		
<b>Light Rail Stations</b>	31	11	4	16	52%
<b>MARC Stations</b>	40	24	15	12	30%
<b>Metro Subway Stations</b>	14	7	7	7	50%
<b>Park &amp; Ride Lots</b>	45	13	0	32	71%



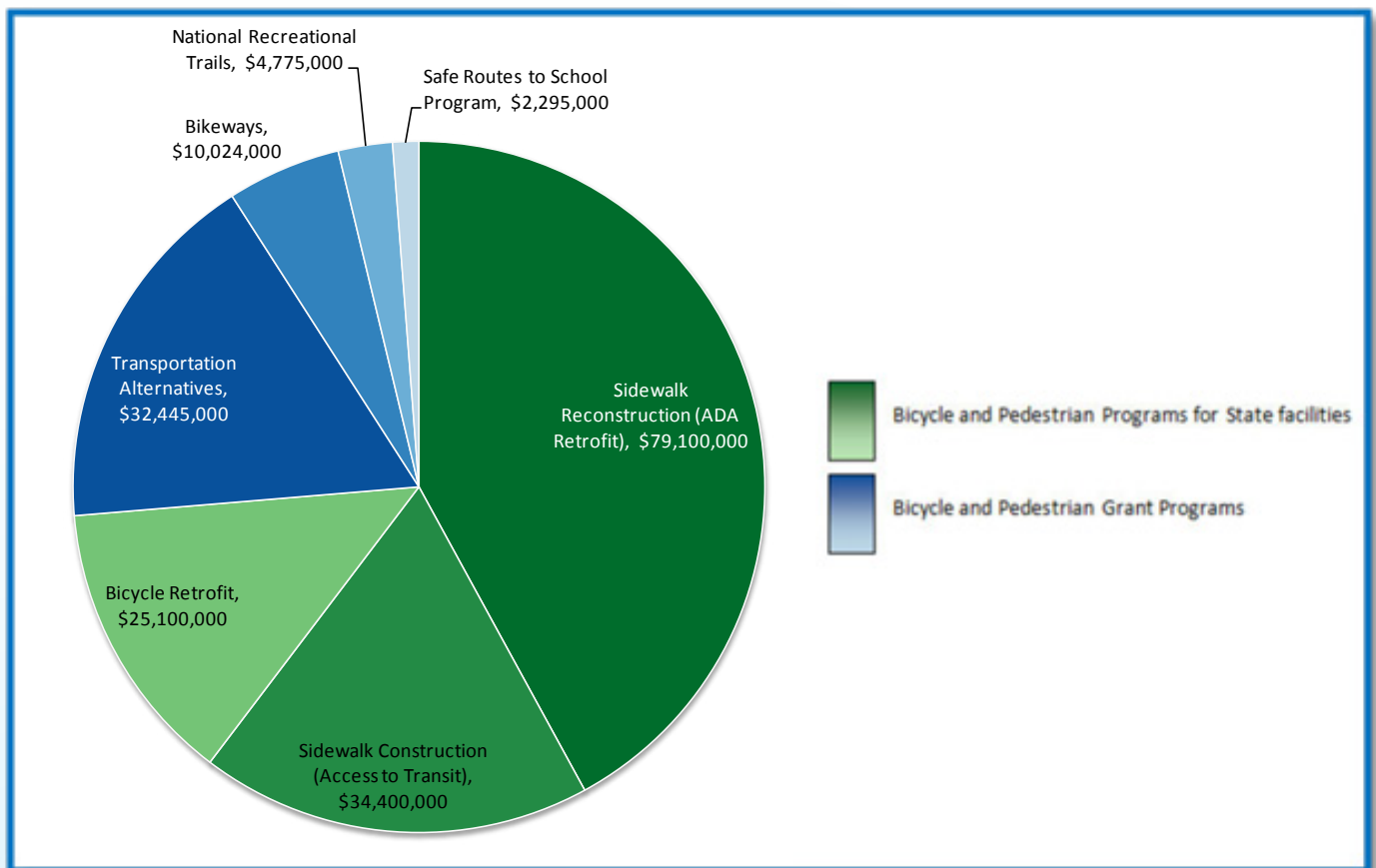
# Bicycle and Pedestrian Spending

## Bicycle and Pedestrian Funding Programs

MDOT supports bicycle and pedestrian improvements through a variety of funding programs, each designed to address particular needs and priorities. The 2014-2019 Consolidated Transportation Program budgeted nearly \$210 million for bicycle and pedestrian related projects over the 6-year period. As shown in **Figure 10**, the sidewalk reconstruction program which supports reconstruction of sidewalks, curbs and other roadway elements to bring them into compliance with the Americans with Disabilities Act (ADA) is the largest program. Transportation Alternatives (formerly Transportation Enhancements) is another large funding program that provides federal grant money to support bicycle and pedestrian projects, including trails.

Safe Routes to School (SRTS), a federally-funded transportation program administered SHA, has provided funding for encouragement, enforcement, education, evaluation activities, as well as engineering improvements to make it easier for children to walk and bike to school. Since 2007, Maryland has awarded \$12,166,830 to SRTS activities, programs and infrastructure improvements. The SRTS program was combined under the Transportation Alternatives Program by the 2012 Federal Transportation authorization bill Moving Ahead for Progress in the 21st Century (MAP-21). As part of Governor O'Malley's Cycle Maryland initiative, over \$12 million in additional funds were dedicated to the Maryland Bikeways and Bikeshare Programs in 2011.

**Figure 10 - MDOT Bicycle and Pedestrian Program Funding Levels (2014-2019)**



## Bicycle and Pedestrian Expenditures

In the past decade (2002-2012), MDOT spent more than \$283 million on bicycle and pedestrian projects. The proportion of bicycle and pedestrian related expenditures from the total highway expenditures increased from two percent to four percent over this period.<sup>29</sup>

Bicycle and pedestrian improvements were also constructed as components of larger roadway projects (e.g. bike lanes or crosswalks in conjunction with road reconstruction); however, these expenditures often are not itemized and therefore are not captured within the expenditures presented above. Additionally, bicycle and pedestrian improvements made through resurfacing projects are not included in **Figures 10** and **11**. Much of the specific bicycle and pedestrian infrastructure and program funding has been allocated through the Recreational Trails, Transportation Enhancements, and Safe Routes to Schools programs.

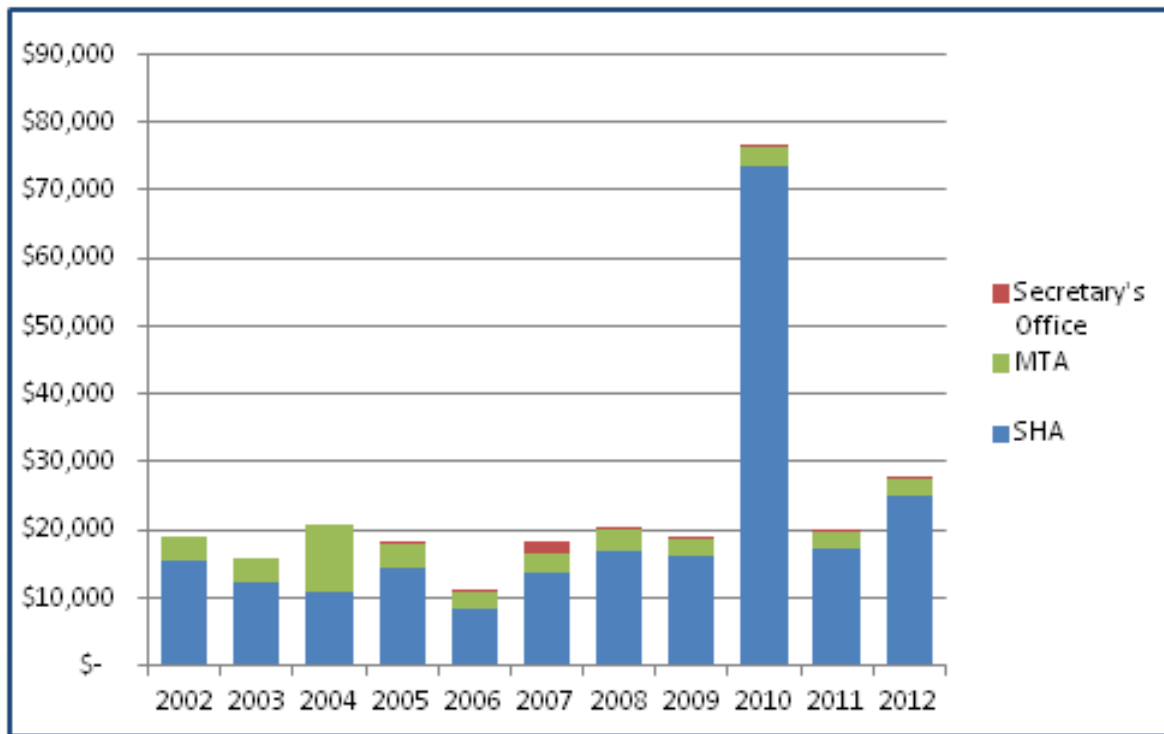
The majority (83 percent) of State expenditures related to bicycle and pedestrian improvements were administered by the SHA. In comparison, the MTA recorded 16 percent of the total spent, while the MDOT Office of the Secretary expenditures made up 1 percent of all of MDOT's bicycle and pedestrian related expenditures. Fifty six percent or \$65.4 million of the SHA funding dedicated for bicycle and pedestrian improvements was spent on retrofitting and ADA compliance projects. It is important to note that SHA expenditures spiked in 2010 due to the completion of the Woodrow Wilson Bridge connecting Prince George's County in Maryland and the City of Alexandria and Fairfax County in Virginia.

Expenditures from the MDOT Office of the Secretary primarily supported trail projects. They accounted for \$2.6 million of the total bicycle and pedestrian related expenditures for the period between 2002 and 2012. Projects supported included construction of the BWI MARC Pedestrian Bridge; the Allegheny Highlands Trail; Pathways to School programs; Ridgley Trail; and a demonstration bicycle route project in Baltimore; among others.

## MAP-21 Federal Requirements

The two year Federal surface transportation legislation, Moving Ahead for Progress in the 21st Century (MAP-21), enacted in July 2012, reorganized the framework and methods for distributing Federal funding. MAP-21 consolidated three long-standing programs and funding: Recreational Trails, Transportation Enhancements (TE), and Safe Routes to School (SRTS). MDOT is adapting to the new federal requirements and implications for organizational structure, funding, implementation, and documentation of pedestrian and bicycle projects in Maryland.

Figure 11 - MDOT Bicycle and Pedestrian Program Expenditures (\$100,000)



## Summary of Progress Since 2002

As a first step in the planning process to update the 20-Year Bicycle and Pedestrian Access Master Plan, a high-level review of the 66 action items in the 2002 plan was conducted. The status review was not exhaustive, but it did provide insight and a starting point for discussions about actions and issues that had been satisfactorily addressed, those that remained priorities, and those that may no longer be relevant.

The matrix below lists the 66 original action items which are organized around the five major goals/themes of the plan. The 2002 projected completion date is provided along with the 2006 progress status and the 2013 progress status. For the 2013 evaluation six measurement categories were used:

- ◆ Not Started
- ◆ Early Progress
- ◆ Underway
- ◆ Substantial Progress
- ◆ Completed (or ongoing)
- ◆ No Longer in Progress (actions that were discontinued for a variety of reasons) It should be noted that some of these action items have proved to not be needed or the need has been addressed in another way.

Action No.	Action Item	Completion Date Projected in 2002	2006 Status	2013 Status
<b>Facility Integration and Expansion</b>				
1a1	Continue current programs, such as Bike Retrofit, Smart Growth Transit Program, Sidewalk Retrofit, etc. to construct bicycle and pedestrian facilities and work to obtain additional funding, as needed.	Ongoing	Substantial Progress	Ongoing
1a2	Incorporate a bicycle/pedestrian/ADA assessment (including field visits) into scoping and engineering activities for all (new/rehab.) roadway and bridge projects.	2008	Complete	Complete
1a3	Incorporate BLOC measures into the scope and design of all roadway and bridge projects with the goal of achieving desired standards for bicyclists at the most reasonable cost.	2008	Complete	Complete
1a4	Implement the Bicycle and Pedestrian Accommodations Checklist developed by SHA staff for internal review of roadway development projects with regard to improving bicycling and walking conditions.	2008	Complete	Complete
1a5	Consider state-of-practice approaches for all roadway and bridge projects, including national standards such as AASHTO and ADAAG (with the exception of interstates and freeways).	2008	Substantial Progress	Substantial Progress
1a6	Continue to assess internal SHA documents and update with appropriate bicycle and pedestrian design standards and guidelines.	Ongoing	Substantial Progress	Substantial Progress
1a7	Increase public awareness of available services.	2008	Early Progress	Substantial Progress

Action No.	Action Item	Completion Date Projected in 2002	2006 Status	2013 Status
<b>Facility Integration and Expansion</b>				
1a1	Continue current programs, such as Bike Retrofit, Smart Growth Transit Program, Sidewalk Retrofit, etc. to construct bicycle and pedestrian facilities and work to obtain additional funding, as needed.	Ongoing	Substantial Progress	Ongoing
1a2	Incorporate a bicycle/pedestrian/ADA assessment (including field visits) into scoping and engineering activities for all (new/rehab.) roadway and bridge projects.	2008	Complete	Complete
1a3	Incorporate BLOC measures into the scope and design of all roadway and bridge projects with the goal of achieving desired standards for bicyclists at the most reasonable cost.	2008	Complete	Complete
1a4	Implement the Bicycle and Pedestrian Accommodations Checklist developed by SHA staff for internal review of roadway development projects with regard to improving bicycling and walking conditions.	2008	Complete	Complete
1a5	Consider state-of-practice approaches for all roadway and bridge projects, including national standards such as AASHTO and ADAAG (with the exception of interstates and freeways).	2008	Substantial Progress	Substantial Progress
1a6	Continue to assess internal SHA documents and update with appropriate bicycle and pedestrian design standards and guidelines.	Ongoing	Substantial Progress	Substantial Progress
1a7	Increase public awareness of available services.	2008	Early Progress	Substantial Progress
1a8	Develop a best practice document for Maryland bicycle and pedestrian facilities using AASHTO and other national standards to address integrate factors such as traffic calming, spot hazards and safe crossings.	2008	Underway	Underway
1b1	In coordination with the Department of Natural Resources (DNR), continue to update and implement plans for multi-use trails in the State.	2008	Underway	Substantial Progress
1b2	Work with trail operators to develop uniform practices for trail user counting procedures and utilize trail counts to track trail use.	2008	Not Started	Early Progress
1b3	Working together, MDOT and local jurisdictions will examine corridors to identify high-quality commuter routes that provide direct links to major employment/activity centers.	2008	Not Started	Early Progress
1b4	Provide support for designation, development, funding, management, and mapping of multi-use trails and greenways that serve both transportation and recreation needs.	2008	Underway	Substantial Progress
1b5	Evaluate and address trail/roadway intersection and grade separation needs from the proposed Statewide multi-use trail plans.	2008	Early Progress	Early Progress
1c1	Evaluate transit stations in terms of existing and potential demand for bike/pedestrian access as well as reasonable improvements to accommodate this demand.	2008	Complete	Substantial Progress

Action No.	Action Item	Completion Date Projected in 2002	2006 Status	2013 Status
1c2	Continue providing funding for capital improvement projects that improve bicycle and pedestrian access to transit stations and bicycle and pedestrian accommodations at the stations.	Ongoing	Not Started	Early Progress
1c3	Increase the number of bicycle parking racks and lockers located at rail transit stations.	2008	Early Progress	Early Progress
1c4	Continue to increase the number of transit buses that are equipped to transport bicycles.	Ongoing	Early Progress	Substantial Progress
1c5	Continue to plan for implementing MARC Bike-on-Rail services on rail cars, as appropriate.	2008	Early Progress	Early Progress
1c6	Evaluate the potential for locating Bike Stations at major rail transit centers.	2023	Not Started	Early Progress
1c7	Continue to examine and provide access and safety improvements to existing and planned new bus stops.	Ongoing	Underway	Underway
<b>Facility Preservation and Maintenance</b>				
2a1	"Planning: Update the sidewalk and bicycle facility inventory over a three-year cycle."	2023	Ongoing	Ongoing
2a2	Continue to ensure that sidewalk, intersection and transit facilities comply with ADA.	Ongoing	Complete	Ongoing
2a3	"Maintenance: (Local agencies provide most maintenance of bicycle and pedestrian facilities. These actions will be completed in coordination with local agencies.) Include an element in existing highway spot maintenance response program (brochure, web page, etc.) to address the safety of bicycle and pedestrian facilities and networks. "	2008	Not Started	Underway
2a4	Evaluate maintenance routines completed by the State and at the local levels to determine if practices need to be changed to better address the needs of bicyclists and pedestrians.	2008	Not Started	Early Progress
<b>Safety</b>				
3a1	In coordination with the Maryland Department of Education and local schools, promote pedestrian and bicycle safety, knowledge and skills into the Health Education Learner Outcomes and Performance Indicators for grades K - 12.	2008	Not Started	Early Progress
3a2	In coordination with the Maryland Bicycle and Pedestrian Advisory Committee, Maryland Department of Education and local schools, assess the potential of a Safe Routes to School program.	2008	Substantial Progress	Substantial Progress
3a3	Include MDOT materials related to bicycling and walking in brochures provided with vehicle registration renewals.	2008	Not Started	Substantial Progress

Action No.	Action Item	Completion Date Projected in 2002	2006 Status	2013 Status
3a4	Study the possibility for inclusion of additional bicycle and pedestrian related questions on the Motor Vehicle Administration driver's license exam.	2008	Early Progress	Complete
3a5	Display and distribute bicycle and pedestrian safety information at all Motor Vehicle Administration locations.	2008	Early Progress	Early Progress
3a6	Work with the appropriate State and local agencies to obtain bicycle and pedestrian crash location data for use in developing targeted, local education and enforcement programs.	2008	Ongoing	Ongoing
3a7	In coordination with local and State law enforcement agencies, analyze and document the effectiveness of all traffic enforcement activities and programs.	2023	Not Started	Early Progress
3a8	In partnership with other State agencies, continue to provide support to local governments for education and enforcement campaigns and programs.	2008	Complete	Ongoing
3a9	Encourage the Maryland General Assembly to review the enforcement of existing traffic law violation penalties to determine the sufficiency of their deterrent and punishment value.	2008	Underway	Substantial Progress
3a10	In partnership with local communities and other appropriate agencies, use crash location data and public surveys to identify high crash locations to target engineering, enforcement and education actions.	2008	Complete	Ongoing
3a11	Encourage local communities to maintain and step-up visible pedestrian, bicycle and traffic enforcement and education efforts.	2008	Complete	Ongoing
3a12	Encourage appropriate local and State agencies to provide pedestrian and bicycle safety education materials in Spanish or other languages used by local residents.	2008	Complete	Ongoing
3a13	Encourage the Department of Education and local schools to integrate pedestrian and bicycle safety into English as second language classes.	2008	Not Started	Not Started
3a14	In partnership with local communities, provide dual-language signs on pedestrian activated signals in neighborhoods with high levels of non-English speaking populations.	2008	Not Started	Early Progress
<b>Education and Encouragement</b>				
4a1	Continue to enhance bicycle/pedestrian information on the MDOT website.	2008	Early Progress	Substantial Progress
4a2	Work with State agencies and employers to support and participate in national, State and local programs and events that promote increased participation in bicycling and walking.	2008	Underway	Underway

Action No.	Action Item	Completion Date Projected in 2002	2006 Status	2013 Status
4a3	Step-up overall marketing activities designed to promote increased use of bicycle and pedestrian modes as a means to access rail and bus transit services.	2008	Early Progress	Early Progress
4a4	Working together with local agencies, MDOT and DNR will create a one-stop shopping outlet on the MDOT and DNR websites for trail maps and other similar information.	2008	Early Progress	Substantial Progress
4a5	In partnership with the Department of Business and Economic Development, initiate a special marketing program for BWI Airport as the preeminent gateway for foreign and national tourists seeking a biking or hiking-based travel experience in Maryland.	2008	Early Progress	Early Progress
4a6	Reach out to new markets by developing bicycle and pedestrian travel promotion strategies with new partners, such as the Maryland Department of Health and Mental Hygiene (MDHMH).	2008	Substantial Progress	Substantial Progress
4a7	Explore expansion of the Commuter Choice Maryland program to encourage employers to establish bicycling and walking commute incentive programs for employees.	2008	Not Started	Not Started
4b1	Continue to include bicycle facilities, pedestrian improvements, ADA accessibility improvements as part of the Comprehensive Transportation Plan (CTP).	Ongoing	Substantial Progress	Substantial Progress
4b2	Publish and distribute (or create on the MDOT website) a brief compilation and reference guide to State and federal laws and policies related to bicycling and walking.	2008	Substantial Progress	Complete
4b3	Publish new statewide bicycle map which designates bicycle routes and trails.	2008	Substantial Progress	Complete
4c1	Continue to provide bicycle and pedestrian transportation training for MDOT engineers and planners which incorporate ADA, AASHTO, and other federal design guidelines, in the training curriculum.	Ongoing	Underway	Underway
4c2	Expand internal communication strategies which include consideration of the access needs of persons with disabilities, pedestrians, and bicyclists when planning, designing and implementing transportation facilities.	Ongoing	Underway	Substantial Progress
4d1	Select demonstration corridors to provide innovative examples of pedestrian and bicycle facilities.	2008	Underway	Underway
4d2	In partnership with the Maryland Transportation Technology Transfer Center (MTTTC), establish a pedestrian and bicycle transportation seminar series for college students and professionals at MDOT and other professionals working in the field of bicycling, walking and traffic safety.	2023	Complete	No Longer in Progress



Action No.	Action Item	Completion Date Projected in 2002	2006 Status	2013 Status
4d3	In partnership with one or more universities, establish a Statewide institute for bicycle and pedestrian research and technology transfer program to conduct policy research and identify cutting-edge bicycle and pedestrian technology and treatments and procedures that can be evaluated, tested and applied in Maryland.	2023	Early Progress	Early Progress
4d4	Establish a component of the Smart Growth Leadership Training Course that focuses on pedestrian and bicycle transportation project and policy issues.	2008	Not Started	No Longer in Progress
<b>Smart Growth</b>				
5a1	Conduct a transportation survey to establish baseline use volume data for bicycling and walking.	2008	Early Progress	Underway
5a2	Assess the relationship between proximity to pedestrian and bicycle facilities and the amount of exercise undertaken by Maryland residents and their fitness levels.	2008	Substantial Progress	Complete
5b1	Explore implementation of a Bicycle and Pedestrian Partnership Program as a framework for MDOT/County & Municipality partnerships focusing on development of effective bicycle and pedestrian facility networks and support for programs that create results at the local level.	2008	Early Progress	Early Progress
5c1	Continue assessment of progress in implementing this plan on a regular schedule to coincide with the updating of the Maryland Transportation Plan (MTP), including integrating goals and performance measures from this Plan into the Annual Attainment Report.	Ongoing	Substantial Progress	Ongoing
5c2	When developing strategic or business plans, include bicycle and pedestrian related goals and objectives.	2008	Complete	Complete
5c3	Encourage the Department of General Services to adopt a policy of providing secure bicycle parking facilities and related amenities such as showers, clothing lockers and changing rooms in all State government buildings.	2008	Not Started	Early Progress
5c4	Encourage counties and municipalities to adopt policies, procedures, and guidelines describing how local roadway projects can be designed to safely accommodate non-motorized modes of travel and how all local planning and land use regulation can address bicycling and walking needs.	2008	Complete	Complete
5c5	Initiate a study of State and local laws, policies and practices that affect sidewalk maintenance and construction.	2008	Not Started	Complete
5c6	Encourage all counties to identify bicycle and pedestrian projects in their priority project designations.	2008	Not Started	Early Progress

## Endnotes

- 1 Pedestrian crash data from the Maryland Automated Accident Reporting System (MAARS) was provided by the State Highway Administration. The data was compiled from crash reports developed by more than 200 Maryland law enforcement agencies. Crashes have not been verified on a site specific basis. Of the more than 18,000 records (crash incidents) compiled, 47% include information providing a geographic location of each crash that can be used for mapping. On Figure 2, census tracts shown in white represent areas of the State where a) no pedestrian crashes happened during the analysis period, or b) crashes occurring in those locations were not coded with data that enable crashes to be mapped.  
  
The crash data represented for the City of Baltimore only includes information for the period between 2009 through 2011.
- 2 FY 2012-2015 SHA Business Plan. Performance Excellence Division, Administrator's Office, SHA, Adopted in 2011.
- 3 Maryland Automated Accident Reporting System. Pedestrian Crash Data 2006-2011.
- 4 Maryland Motor Vehicle Administration. Highway Safety Program - Pedestrian Safety. From website [http://mhso.mva.maryland.gov/SafetyPrograms/program\\_pedestrian\\_safety.htm](http://mhso.mva.maryland.gov/SafetyPrograms/program_pedestrian_safety.htm), May 18, 2013.
- 5 Geographic (mapped) crash data obtained from the City of Baltimore is for the period from 2009-2011.
- 6 Maryland Automated Accident Reporting System. Pedestrian Crash Data 2006-2011.
- 7 Article 8-629 and 8-630 of the Maryland SHA Bicycle and Pedestrian Design Guidelines sets forth the requirements for the building and maintenance of sidewalks in local jurisdictions. This article enables SHA to require developers to construct sidewalks in local jurisdictions (where needed) and for the local jurisdiction to maintain and repair them.
- 8 FY 2012-2015 SHA Business Plan. Performance Excellence Division, Administrator's Office, SHA, Adopted in 2011.
- 9 Bicycle crash data from the Maryland Automated Accident Reporting System (MAARS) was provided by the State Highway Administration. The data was compiled from crash reports developed by more than 200 Maryland law enforcement agencies. Crashes have not been verified on a site specific basis. Of the more than 8,000 records (crash incidents) compiled, 71% include information providing a geographic location of each crash that can be used for mapping. On Figure 4, census tracts shown in white represent areas of the State where a) no bicycle crashes happened during the analysis period, or b) crashes occurring in those locations were not coded with data that enable crashes to be mapped.  
  
[The crash data represented for the City of Baltimore only includes information for the period between 2009 through 2011.
- 10 Maryland Motor Vehicle Administration. Highway Safety Program – Bicycle Safety. Accessed from [http://mhso.mva.maryland.gov/SafetyPrograms/program\\_bicycle\\_safety.htm](http://mhso.mva.maryland.gov/SafetyPrograms/program_bicycle_safety.htm) on May 18, 2013.
- 11 Maryland Motor Vehicle Administration. Highway Safety Program – Bicycle Safety. Accessed from [http://mhso.mva.maryland.gov/SafetyPrograms/program\\_bicycle\\_safety.htm](http://mhso.mva.maryland.gov/SafetyPrograms/program_bicycle_safety.htm) on May 18, 2013.
- 12 While included in the MAARS data set, the State of Maryland does not manage Baltimore City crash data. Figure 4 features data obtained from Baltimore City by for the period between 2009 and 2011.
- 13 Maryland Automated Accident Reporting System. Bicycle Crash data 2006-2011.
- 14 The weighted average BLOC grade for a county was developed by multiplying the percentage of state roadways in each BLOC grade category by the midpoint of the BLOC grade (i.e. "BLOC A" = 1, "BLOC B" = 2, "BLOC C" = 3 and so on). The product of each of multiplication was then summed to develop a composite numerical BLOC grade for each county. This was then converted to a letter grade for mapping and inclusion in Table 2.15 State Highway Administration Line BLOC MD 2010.

- 15 SHA is currently reviewing BLOC data and methodology to verify BLOC scores.
- 16 State Highway Administration Line BLOC MD 2010.
- 17 State Highway Administration Line BLOC MD 2010.
- 18 Great Allegheny Passage. Trail Town Economic Impact Study. Accessed from [http://www.atatrail.org/docs/GAP\\_Economic\\_Impact\\_Study\\_Phase1.pdf](http://www.atatrail.org/docs/GAP_Economic_Impact_Study_Phase1.pdf) on May 13, 2013.
- 19 Economic and Health Benefits of Bicycling in Iowa. Iowa Bicycle Coalition. Accessed from <http://iowabicyclecoalition.org/wp-content/uploads/2012/04/2012-Economic-Impact-Study.pdf> on May 10, 2013.
- 20 Maryland Trails Strategic Implementation Plan. State of the Trails Addendum [http://www.mdot.maryland.gov/Office\\_of\\_Planning\\_and\\_Capital\\_Programming/Trails/Documents/pdfs/TSIP\\_State\\_of\\_Trails.pdf](http://www.mdot.maryland.gov/Office_of_Planning_and_Capital_Programming/Trails/Documents/pdfs/TSIP_State_of_Trails.pdf).
- 21 Maryland Department of Transportation. Shared use paths GIS data.
- 22 2012 Benchmarking Report. Alliance of Bicycling and Walking. Page 30. Accessed from [http://www.peoplepoweredmovement.org/site/index.php/site/memberservices/2012\\_benchmarking\\_report/](http://www.peoplepoweredmovement.org/site/index.php/site/memberservices/2012_benchmarking_report/) on May 5, 2013.
- 23 American Community Survey, Journey to work 3-year estimate. 2012. Census Transportation Planning Package, Journey to work, 2000.
- 24 Ibid.
- 25 American Community Survey, Journey to work 3-year estimate. 2012. Census Transportation Planning Package, Journey to work, 2000.
- 26 Litman, Todd. Land Use Impacts on Transport - How Land Use Factors Affect Travel Behavior. Victoria Transportation Policy Institute. July 2012.
- 27 Access to Rail Stations in the Baltimore Region. Baltimore Metropolitan Council Accessed from <http://www.baltometro.org/transportation/pedestrian-and-bicycle-access-to-rail-stations> on April 18, 2013.
- 28 Pedestrian and Bicycle Element of the 2012-2017 Capital Improvement Program. Washington Metropolitan Area Transit Authority. Office of Long Range Planning <http://planitmetro.com/wp-content/uploads/2011/12/Metro-Pedestrian-and-Bicycle-Element-of-CIP-1.1-MB.pdf>.
- 29 Highway Expenditures by Fund, 2002-2012, Maryland Department of Transportation.



