



Transportation

Background Report



Anne
Arundel
2040



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Introduction

Anne Arundel County is both defined and constrained by the network of highways, roads, trails, railroads, and transit services that move its residents and goods in, through and out of the community. A comprehensive, well-planned, and efficiently functioning transportation system is essential to the County's long-term growth and vitality.

This background report contains a summary of the County's existing transportation plans and programs, current initiatives since the adoption of the 2009 General Development Plan as well as the challenges to maintain and improve the transportation infrastructure to meet the needs of the County. Growth in the local and regional economy has resulted in additional jobs and commuter trips into Anne Arundel County each day and has led to redistributions and reassignments in travel flow, increases in travel demand, and changes in modes of travel that have influenced the mobility of the County's residents and work force and accessibility to its activity centers.

Some of Anne Arundel County's notable activity centers and facilities that impact the network include:

- **Maryland Live! Casino:** This casino and entertainment complex in Hanover, adjacent to Arundel Mills Mall, opened in June of 2012. It is currently a year-round operation open 24 hours per day and employs 3,000 people. Maryland Live! Casino includes over 4,200 slots and electronic table games, 189 live table games, and 52 poker tables.

A hotel and conference center opened in June 2018. Anne Arundel County also receives 16.5% of video lottery tax revenue from the State that is utilized for local improvements within 3 miles of the casino.

- **Fort George G. Meade:** The U.S. Army base is also home to the National Security Agency (NSA) and numerous other intelligence and information agencies. In 2009, US Cybercom was created at NSA and in May 2018 was elevated to a full and independent Unified Combatant Command. By the end of 2017 the population of Fort Meade was 54,491 including 29,702 civilians, 14,358 military and 10, 431 contractor personnel. From a personnel perspective, Fort Meade is now the second largest military base in the nation.

The East Campus Integration Program proposes to add significant facilities to the Fort Meade campus including new building infrastructure. Relocation of 7,200 offsite personnel onto the base is also planned.

- **Baltimore/Washington International Thurgood Marshall Airport (BWI):** Anne Arundel County is home to the Baltimore/Washington International Thurgood Marshall Airport (BWI), a significant economic engine for the region. BWI is located in Linthicum, approximately 10 miles south of Baltimore and 30 miles north of Washington. The airport is owned by the State and operated by the Maryland Department of Transportation Maryland Aviation Administration (MDOT MAA). The BWI Airport has continued to expand since 2009. Annual passengers have increased from 20,953,615 to 26,369,411 as of 2017. In 2013, BWI opened a new Concourse C security checkpoint, widened Concourse C, and built a new Concourse A/B-C connector with additional concessions. In 2016, the airport and the Maryland Aviation Administration finished a modernization of concourse D, a new airside connection linking concourse D and E, a new TSA Security checkpoint, and the addition of 3 international swing gates to allow additional international flights. New restaurants, shops, and a new children's play facility were also added to Concourse E.

The Federal Aviation Administration is currently in the process of designing a new air traffic control tower that will replace the current tower. A \$60.3 million expansion to Concourse E was announced in February 2017 that will include 70,000 square feet of new terminal space and six additional international gates. The airport plans to introduce new service to Asia and additional service to Europe in the near future.

In July 2018, a \$60 million expansion was also proposed for Concourse A. This expansion is needed to accommodate Southwest Airlines' growth. The plan calls for a 55,000 square foot expansion which would add five new gates, passenger waiting areas, food and retail concession spaces and restrooms. It is expected this project will be completed by July 2020.

- **Arundel Mills:** As a regional activity center, the 2.5 million square-foot mixed-use development is connected to the regional highway network with an interchange on MD 100 and MD 295. Arundel Mills has been noted as the largest outlet shopping destination in the State of Maryland. This offers a significant impact to the highway network both locally and regionally.
- **The William Preston Lane Memorial (Chesapeake Bay) Bridge:** The William Preston Lane Jr. Memorial Bridge (US 50/301) spans one of Maryland's great natural features, the Chesapeake Bay. The Bay Bridge provides a direct travel link between the metropolitan areas of Baltimore, Washington D.C., and Annapolis and Maryland's Eastern Shore communities. It is the only roadway crossing of the Chesapeake Bay in Maryland and carries approximately 24 million vehicles a year.

Since the 2009 GDP update, Anne Arundel County has experienced a boom in residential development with 17,214 new residential units permitted from 2010 through 2017. This represents 31% of the 56,057 total residential units permitted in the Baltimore Metropolitan Urban Area over the same time period. Additionally, since the Great Recession of 2009, the State of Maryland added 108,979 new housing units per the Maryland Department of Planning's 2016 Annual Building Permit Report. Anne Arundel County's 14,641 units permitted in that same time-period represent 13% of the total new units Statewide.

Based on the 2040 demographic (population and employment) forecast, growth in employment will lead to an increase in jobs per household (1.9 jobs per household). The mobility challenge of these households to jobs and the opportunities for employment will require either increases in automobile ownership per household (2.01 automobiles per household in 2017 based on the American Community Survey data) or in greatly improved transit availability both in the coverage of area and in the span of service (hours of operation).

With more than 500,000 citizens and 15,207 employers, Anne Arundel County continues to have one of the State's largest work forces. The County is experiencing a constant increase in travel demand that can lead to congestion of the highway network and even the transit network if the demand is not managed. This can be attributed not only to an estimated 139,275 County residents who commute outside of Anne Arundel County for work, but also the 100,169 in-County commuters coupled with an influx of 137,712 commuters from neighboring jurisdictions per 2015 Longitudinal Employer-Household Dynamics (LEHD) data.

Combined, these activity centers, facilities and trends exert travel demands on the existing and planned highway and transit network.

The Existing Transportation Network

Transportation options in Anne Arundel County consist of vehicle travel, bus, light rail, bicycle, foot travel, Rideshare, para-transit, vanpool, and commuter train. Most of the County has been developed in a typical auto-oriented suburban fashion since the 1940s with commercial and industrial areas separated through zoning practices, although a few communities grew up as or have been retrofitted towards pedestrian-orientation. While residents of different parts of the County have varying levels of desire for non-auto modes, the predominant mode of transportation in Anne Arundel County is the personal automobile. More than 80% of County residents commute to work alone via personal car; less than four percent use public transit. There is no evidence that at a Countywide scale, these proportions are likely to change; however, it is possible that development policies, transportation facilities and services could evolve over the next two decades to achieve a more balanced transportation network in smaller planning areas.

The responsibility for constructing and maintaining roads and bridges, developing and operating transit networks and expanding the bicycle and pedestrian network is the responsibility of more than a dozen local, State and private agencies. The travelling public makes little distinction between these agencies. What matters is that the traveler can drive, ride or walk to their destination in a manner that is safe and reliable.

The sections below outline all modes of the County's transportation networks and the roles of various agencies in planning, operating, and maintaining these systems.

Transit

Although only four percent of commuting trips occur by public transit, there are multiple elements of the public transit network in Anne Arundel County that serve specific populations, trip types and communities to a greater degree. On the MARC Penn Line, roughly 2,220 and 2,350 daily commuters to Washington, D.C., pass through the BWI Station and the Odenton Station respectively. Regional commuter buses carry approximately 3,500 people daily from Davidsonville, Severna Park and Annapolis. Services to the elderly and disabled are provided by the County and various human service providers on an "on-demand" basis. The Maryland Transit Administration (MTA) Light Rail Link connects residents in the North County to jobs and events in Baltimore, and provides access to employment at BWI Airport and the surrounding business district. Finally, an extensive shuttle bus system transports thousands of BWI travelers daily to park-and-ride lots, the Amtrak/MARC Train station and off-site rental car facility. Other trip types are not as well served by transit as it is difficult to do so in a sprawling suburban environment.

- Maryland Transit Administration (MTA)

The MTA provides five commuter bus routes in Anne Arundel County that provide service between the County and the Washington region. They are the 210, 215, 220, 230 and 260. The five routes account for almost 3,000 passenger trips per day. The State also provides service to the County with the LocalLink 69 and LocalLink 70 bus routes. These transit routes service the MD 2 corridor from the Patapsco Avenue Light Rail Station to the Anne Arundel Community College. The LocalLink 75 bus route services both the BWI Business District and the Arundel Mills Complex. Express Buslink 164 transit route services Rivera Beach to Downtown Baltimore.

- Regional Transportation Agency of Central Maryland (RTA)

Regional Transportation Agency of Central Maryland, locally referred to as the RTA, is a transit organization developed to establish a more effective and efficient public transportation system across Central Maryland. RTA partners include; Anne Arundel County, Howard County, Northern Prince George’s County and the City of Laurel. The RTA has combined the management and administrative functions of all jurisdictions to reduce operating expenses and provide a better customer service experience for riders.

The RTA operates fixed-route and demand-response services within Anne Arundel, Howard, northern Prince George’s Counties and the City of Laurel. The RTA service area spans approximately 845 square miles, and is located in the suburban counties of Baltimore and Maryland, and Washington, D.C. Transit connections are located throughout the service area to connect passengers throughout the system and to Baltimore and Washington, D.C.

Within Anne Arundel County the RTA provides transit service to Laurel, Jessup/ Maryland City, Arundel Mills, Odenton, Glen Burnie, Pioneer City and Seven Oaks.

- Annapolis Transit (AT)

Annapolis Transit (AT) services the greater Annapolis area (including Arnold and Edgewater) as well as the BWI Thurgood Marshall International Airport. The system consists of three shuttle routes and a fixed route system that is composed of eleven routes. In total, they carry over 1.3 million annual passenger trips.

Recently, the City of Annapolis was notified by the Federal Transit Administration of the loss of operating subsidy funds previously available because of its classification as a small, urbanized area as defined by census statistics and the US Department of Transportation. Annapolis Transit is funded by various Federal, State and local funding sources as well as an operating subsidy grant provided by the County funds.

- Light Rail Transit

There are seven Light Rail stations in the County. They are located at Nursery Road, North Linthicum, Linthicum, the BWI Business District, the BWI Thurgood Marshall Airport, Ferndale and Cromwell Station/ Glen Burnie. About 23,000 unlinked weekday trips are taken on the entire

Anne Arundel County is currently served by five transit operators:

- **The Maryland Transit Administration** which operates local bus service, light rail, commuter bus service, MARC Train and provides complementary paratransit services for the above;
- **Annapolis Transit** which provides local bus service generally within the borders of Maryland’s capital city;
- **The Regional Transportation Agency of Central Maryland** which serves the western communities of Anne Arundel County, much of Howard County and the City of Laurel;
- **The Anne Arundel County Office of Transportation** manages the South County Circulator (SoCo Go!) and the Arundel Mills Jobs Connector;
- **The Washington Metropolitan Area Transit Authority (WMATA)** provides express service between the Greenbelt Metrorail Station and BWI Thurgood Marshall Airport.

In addition, many private transit services operate in Anne Arundel County, including Greyhound and Megabus long-distance carriers, an extensive shuttle bus system supporting BWI Airport, as well as shuttles operated by area hotels, medical facilities and others.

system that consists of thirty-three stations and extends to Hunt Valley in Baltimore County, down from 29,000 in 2009.

- Maryland Rail Commuter System (MARC)

Anne Arundel County has four MARC Commuter Rail Stations. They are located at BWI, Odenton, Jessup and Savage. They account for a total of approximately 4,487 boardings per day with the Odenton Station accounting for over half the boardings (2,320) followed closely by BWI (1,697). The predominant travel pattern for commuters is from Anne Arundel County south to the Washington region.

The MTA provides regional connections to the study area with two commuter rail lines that link Baltimore and Washington, D.C. with stops in the study area. The Penn Line services share the electrified Northeast Corridor tracks with Amtrak, with stops in the study area at the BWI MARC/Amtrak station and Odenton, both of which have very large commuter parking lots. It provides significant capacity with 28 daily (weekday) trains scheduled each way, with a higher level of frequency in the morning headed toward Washington, D.C. and a similar higher level in the evening headed away from Washington, D.C. The Penn Line also offers weekend service.

The Camden Line also links Washington, D.C. and Baltimore, but its terminus in Baltimore is Camden Station rather than Penn Station. The MARC services also share the tracks with CSX freight services. Stations in the study area include Dorsey, Jessup, Savage and Laurel Racetrack—they are all on the Howard/Anne Arundel County line. In the portion of Prince George's County served by the RTA Camden line trains also stop at Laurel and Muirkirk stations. Compared to the Penn line, frequencies are lower, with only weekday service. In the morning, there are six southbound trains headed for Washington D.C. and four northbound, with the pattern reversed in the evening. There are no mid-day or weekend trains.

Freight and Goods Movement

With a relatively small manufacturing base, Anne Arundel County tends not to generate significant amounts of freight traffic, but the County experiences significant through movements by trucks to and from the Eastern Shore, in particular. In addition, the expanding reach of the Port of Baltimore and private sector land needs for warehousing and logistics may begin to yield additional truck traffic in the northern part of the County.

Airports

- BWI Thurgood Marshall Airport

With record passenger traffic in recent years, BWI Airport is the 22nd busiest in the United States, and the busiest in the Washington-Baltimore region. Commercial air service includes more than 330 daily nonstop departures and flights to nearly 90 domestic and international destinations. BWI is the largest airport in the State and serves the general public carrying over 25 million passengers in 2017. It has four runways, the longest being approximately 10,500 feet and has 79 based general aviation aircraft. Through the late 1980s, most access to BWI was via local roadways such as West Nursery Road, Elkridge Landing Road and MD 170. A well-planned strategy to improve roadway access over the past 40 years has constructed a road and rail network on which landside access is

largely congestion-free until on airport property itself. Today, access to BWI is primarily via I-195, I-97 and MD 170, a consolidated rental car facility, airport operated shuttle system connected to large satellite parking lots and the MDOT MTA light rail.

BWI is in a central location between Baltimore and Washington and proximity to Fort Meade and NSA have helped make it one of the biggest economic engines in Maryland, serving the Federal government, technical and hospitality industries. It generates a \$9.3 billion economic impact for the State and more than 106,000 jobs are now created and supported by the airport and visitors¹.

- Tipton Airport

Tipton Airport was transferred by the Federal Government to the Anne Arundel County Tipton Airport Authority as a result of the Base Realignment and Closure (BRAC) initiative. Tipton Airport opened as a public use, general aviation airport on November 1, 1999. Formerly part of Fort George G. Meade, the Airport is located immediately south of the Fort along Route 32. The nine members of the Anne Arundel County Tipton Airport Authority, which owns and operates the facility, are appointed by the County Executive.

The Airport has one 3,000-foot X 75-foot runway, four large aircraft hangars, 22 T-hangars which opened on January 1, 2018, and approximately 500,000 square feet of apron area. Over 130 aircraft are based at the facility. These aircraft are used for recreation and business, public safety, news, medical, flight training, and aerial tours. The State estimates that Tipton has an average of approximately 110 aircraft operations per day.

The Authority is conducting an Environmental Assessment for the extension of the runway to 4,200 feet, construction of a new parallel taxiway, and the construction of additional facilities. The extension of the runway will increase safety and improve operating efficiency for the design aircraft.

- Lee Airport

Lee Airport is a privately owned general aviation airport located on MD 2 south of Annapolis. It has a 2,500 X 48-foot runway. Nearly 100 aircraft are based at the facility that averages about 90 operations a day.

Rideshare Car and Van Pooling

The Rideshare program within Anne Arundel County has rebranded itself as the Commuter Crew over the past year. The Commuter Crew is responsible for helping citizens find, and connect with, carpools and vanpools. The Commuter Crew can also assist citizens with finding transit routes to fit their commute, and organizes Bike to Work Day. The Commuter Crew doesn't just help citizens connect with these modes of transportation; they encourage citizens to use them. In promoting these modes of mobility, Guaranteed Ride Home is a part of the Commuter Crew's program, which provides commuters with a free ride home if they are ever sick, or if they are asked to work late by a supervisor.

¹ Baltimore / Washington International Thurgood Marshall Airport: Regional Economic Impact of BWI Marshall Airport, December 2017

The Commuter Crew's goal is to reduce traffic congestion, and improve the air quality. They have access to the Commuter Connections System and checks in on the system daily to help those who registered to seek carpools and vanpools, and for Guaranteed Ride Home.

The Employer Outreach portion of the Rideshare program has been developed and is consistently implemented, and reported in quarterly reports to the State. The Commuter Crew attends promotional events to spread awareness of its resources. Lastly, large marketing campaigns have taken place to make the Commuter Crew's message known. Commercials have been aired in movie theatres, on television, and on the radio. Ads have also been placed in local newsletters, newspapers, and a magazine.

Pedestrian and Bicycle Network

Having developed in a suburban fashion over the past 80 years, Anne Arundel County as a whole lacks a robust and connected pedestrian and bicycle network. This is not universally true as communities such as Annapolis are very walkable and interior sidewalk networks within subdivisions are present; but in terms of connectivity from neighborhoods to shopping centers, schools, and other local destinations, the sidewalk network needs further development. The County does have a number of off-street, shared use paths such as the 13-mile B&A Trail extending from Glen Burnie to the Severn River in Annapolis; the BWI Trail, an 11 mile route around BWI Airport and extending to the Linthicum Light Rail Station; and, the WB&A Trail, a 9-mile paved trail from Odenton to the Patuxent River, among others.

In general, off-street trails are viewed as a recreational amenity rather than as part of the County's transportation network. The County's trails are constructed and managed by the Anne Arundel County Department of Recreation and Parks. Opportunities for additional on-road bicycling has been limited due to lack of striped lanes, funding and rights-of-way. In addition, poor terrain, topography, street and drainage infrastructure conditions, high-speed traffic flow, and scenic and historic road designations have also been limiting factors.

An annual Bike to Work Day event in Anne Arundel County attracts almost 300 people to pit stops placed throughout the jurisdiction. Bike tune-ups are usually placed at larger pit stops, and free t-shirts are given to all participants.

Vehicular Travel

The overwhelming percentage of trips made when travelling alone makes for significant congestion and less travel time reliability within Anne Arundel County. While more than 70% of commute trips are made within the County, the average resident reports a commute of approximately 30 minutes; however, some commutes are less reliable than others due to bottlenecks, frequent traffic crashes and other conditions. In 2017, MDOT SHA reported four roadway segments among the top 15 most congested freeways in the State; four arterial roadways were also among the 15 most congested arterial segments Statewide². Furthermore, Anne Arundel County ranks fifth among Maryland counties for prevalence of motor vehicle crashes and for crashes involving bicyclists or pedestrians. This equates to nearly two crashes per million vehicle miles traveled (VMT). These data begin to outline the growing challenge for vehicular mobility and the roadway capacity in the County.

2 MDOT SHA. 2017 Maryland State Highway Mobility Report. pp. 1.B.10, 1.B.12, 1.B.15, 1.B.17. <https://www.roads.maryland.gov/OPPEN/2017_Mobility_Report.pdf>

Highway Network

The transportation goal of the 2009 GDP emphasizes the need to sustain existing and future mobility, and to provide appropriate access for Anne Arundel County residents and those who work in the County. The complementary networks of roads, rail and bus transit, and facilities for pedestrians and bikers that make up the County's transportation system interact differently. The primary mode of travel used by residents and businesses in the County is the automobile (88.1% of trips in Anne Arundel County according to the 2016 ACS). Therefore, the highway network is the predominant mode of travel and will continue in that role well into the anticipated span of Plan2040. However, multimodal transportation efforts and travel demand management increase the efficiency of the highway network and their mode shares are increasing.

Anne Arundel County is a suburban jurisdiction with auto-oriented activity centers, an abundance of free and surface parking and high automobile ownership. There are more than 500,000 vehicles registered in Anne Arundel County (562,327 in FY2017) and they are driven on approximately 5,044 public lane miles of roads that are maintained by the National Park Service, the Maryland State Highway Administration (SHA), the City of Annapolis, the Maryland Transportation Authority (MDTA), and the Anne Arundel County Department of Public Works (DPW). Most of those, 3,644 miles, are maintained by the County.

Highway Network County and State Transportation Projects

Transportation projects planned, designed and constructed within the County typically are provided by land developers through a permit process, as a capital project by the DPW, or as a project by the SHA. Some of these projects propose long-range transportation improvements for existing roadways and may involve new transportation and transit routes. The DPW maintains a list of projects and their current status on their website. The SHA, the MDTA and the Maryland Transit Administration (MTA) maintain a list of major projects on the Maryland Department of Transportation (MDOT) website. The status of several projects is noted in Table 4 of this report.

Functional Classification Map

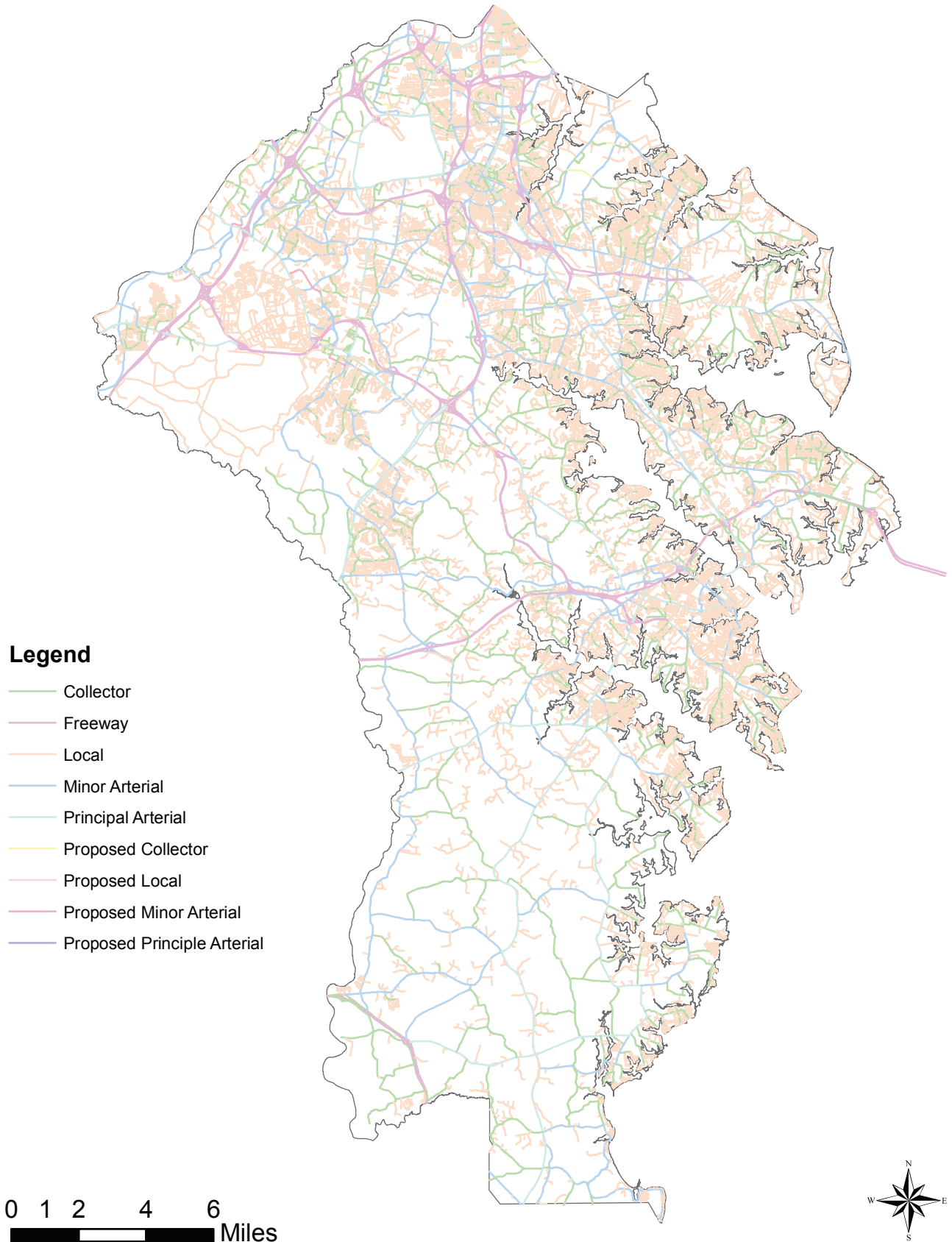
The Functional Classification Map identifies current and future highway and transit proposals throughout the County. The map also identifies roadways by their functional classification, which is the grouping of highways, roads and streets by the character of service they provide. These classifications reflect the utility of the various facilities and should determine the design of the roadway. In Anne Arundel County, roadway facilities are classified as Freeways, Principal Arterials, Minor Arterials, Collectors and Local Roadways. The Functional Classification Map is shown in Figure 1 and reflects the

The MDOT's State Highway Administration is responsible for operating, maintaining and constructing improvements to approximately 3,814 miles of roadways designated such as MD 648 or I-97. These roads tend to operate at speeds greater than 35 miles per hour.

Within Anne Arundel County, the Maryland Transportation Authority owns the Bay Bridge connecting Maryland's eastern and western shores (US 50), a small portion of the Baltimore Beltway (I-695) and the Baltimore Harbor Tunnel (I-895) which connects from south of the Baltimore harbor to the northern shore.

The Anne Arundel County Department of Public Works is responsible for approximately 1,317 miles of neighborhood streets and collector roadways that feed into the MDOT SHA network.

Figure 1: Fuctional Classification Map



assumed classification of roadway links in the major highway network and changes since the adoption of the 2016 Functional Classification Map.

All roads serve the dual functions of providing mobility and access. Mobility and access are inversely related as more mobility (measured in speed and capacity) means less access (measured in numbers of driveways and intersections over a distance). Arterials are primarily for moving vehicles from one place to another. They may still provide access to some adjacent lands, but accesses should be kept to a minimum in order to maintain a high level of service in terms of mobility. Local roads, on the other end of the scale, are primarily oriented toward providing access to adjacent land. While they do serve to provide some degree of mobility from one location to another, they are not generally designed to process the volume and speed of traffic one would expect to find on a principal arterial.

1. *Freeway* - Freeways are high speed, multi-lane facilities with a high degree of access control. These facilities provide for efficient and uninterrupted travel over long distances serving interstate and commuter needs. They should provide a high level of traffic service for travelers making longer distance trips at high speeds. Freeways provide no direct access to abutting properties.
2. *Principal Arterial* - Principal Arterials serve the needs of through traffic for moderately long trips. They serve the major activity centers in the County and major portions of the trips entering or leaving urban areas. Principal Arterials are the primary travel route for commercial, commuter and recreational travel in rural areas. They also provide secondary linkages between large urban centers and suburban population/employment centers. Access may be controlled through medians or by the limitation of curb cuts through the orientation of access for new developments. Typically, they intersect minor arterials, collector or major activity locations.
3. *Minor Arterial* - Minor Arterials connect higher functional class facilities, activity centers, regions of the area, and major County roads. Traffic is composed predominantly of trips across and within regions of the city. They provide service to traffic at a somewhat lower level of travel mobility than principal arterials with minimal control of access to abutting commercial, industrial and residential properties. Direct access to individual properties and neighborhoods is discouraged.
4. *Collectors* - Collectors provide traffic circulation within neighborhoods, commercial and industrial areas. These roads collect traffic from local streets in neighborhoods and channel it into the arterial system. Connections between arterials should be indirect or should not be allowed in order to discourage use by traffic from outside the neighborhood.
5. *Local Roads* - Local roads are designed specifically to have high accessibility to abutting land and access to the higher classification facilities. They offer the lowest level of mobility and service to through traffic usually is deliberately discouraged.

Level of Service

Roadway networks are sometimes evaluated by comparing the traffic volumes along each facility to the facility's capacity. Roadway capacity is defined as the ability to accommodate traffic. Service flow volume is the level of traffic flow (vehicles per day) that can be accommodated at various levels of service. On roads other than freeways, Levels of Service (LOS) are determined by measuring or calculating the average delay time for vehicles traveling along a roadway or through intersections. Delay can be caused by a variety of conditions, such as traffic control devices (stop signs and traffic signals), yielding to opposing through traffic, parking maneuvers adjacent to travel lanes and, at times, high volumes of

traffic. Short delays are indicative of very good travel conditions, while very long delays generally reflect conditions considered to be unacceptable to most drivers. In the peak demand times, traditionally more delay occurs. As the daily service volume increases the duration of the peak demand period also increases.

LOS is used to identify a planning level of service along the roadway network in Anne Arundel County as a qualitative, but general, description of roadway operations ranging from LOS A (free flow conditions) to LOS F (completely jammed conditions). Roads with Levels of Service A, B, C and D are generally representative of delay times acceptable to most drivers under typical travel conditions. Levels of Service E and F reflect the higher delay time ranges and can be regarded as approximations of the limits of acceptable delay, especially if found to occur over long periods of time. Once capacity is reached along a roadway or at an intersection and travel demand continues to increase the duration of the congestion (length of time when the intersection or location operates at an unacceptable level of service) lengthens. This occurrence is typical in more urbanized areas and less tolerable in suburbanized areas. The existing 2017 and projected 2040 AM and PM peak LOS for the County's road network are shown in Figures 2, 3, 4 and 5.

Traffic Operations

Traffic signal operations are generally performed by the MDOT State Highway Administration; however, Anne Arundel County does own and operate approximately 100 signals on local roads. Adaptive traffic control, which involves traffic signal timing changes based on real-time traffic conditions, exists on several Anne Arundel County community cores, such as Riva Road, Jennifer Road, and Forest Drive in Annapolis. MDOT SHA deployed its Smart Signals adaptive signal control program along MD 2 in Brooklyn Park and near Annapolis Town Center and along MD 3 in Crofton.

Transportation Planning and Policy

Transportation Planning

In 2017, County Executive Steve Schuh established the Office of Transportation (OOT) to provide guidance on behalf of Anne Arundel County in planning and engineering studies conducted by the State Highway Administration for improvement or new construction of the State-maintained roadway network. In a similar fashion, it provides planning assistance to Anne Arundel County's Department of Public Works for roadway, bicycle and pedestrian facilities that are owned and maintained by the County. OOT coordinates with the Office of Planning and Zoning Development Division regarding road right-of-way, transit accessibility design, pedestrian and bicycle facilities and recommendations involving highway modifications resulting from the transportation adequate public facilities requirements. The OOT is advised by a 13-member Transportation Commission comprised of County residents and agency representatives.

Travel Forecast 2040

Analyses of travel demand model output which contained quantitative data and statistical measures were conducted to provide an understanding of how much traffic will utilize the roadways in Anne Arundel County for the year 2040 based on the County's goals and policies. In order to show the increase in travel demand, the model has been run for 2012 (a calibration year) and for the future year 2040.

Figure 2: Existing Peak - AM Level of Service, 2017

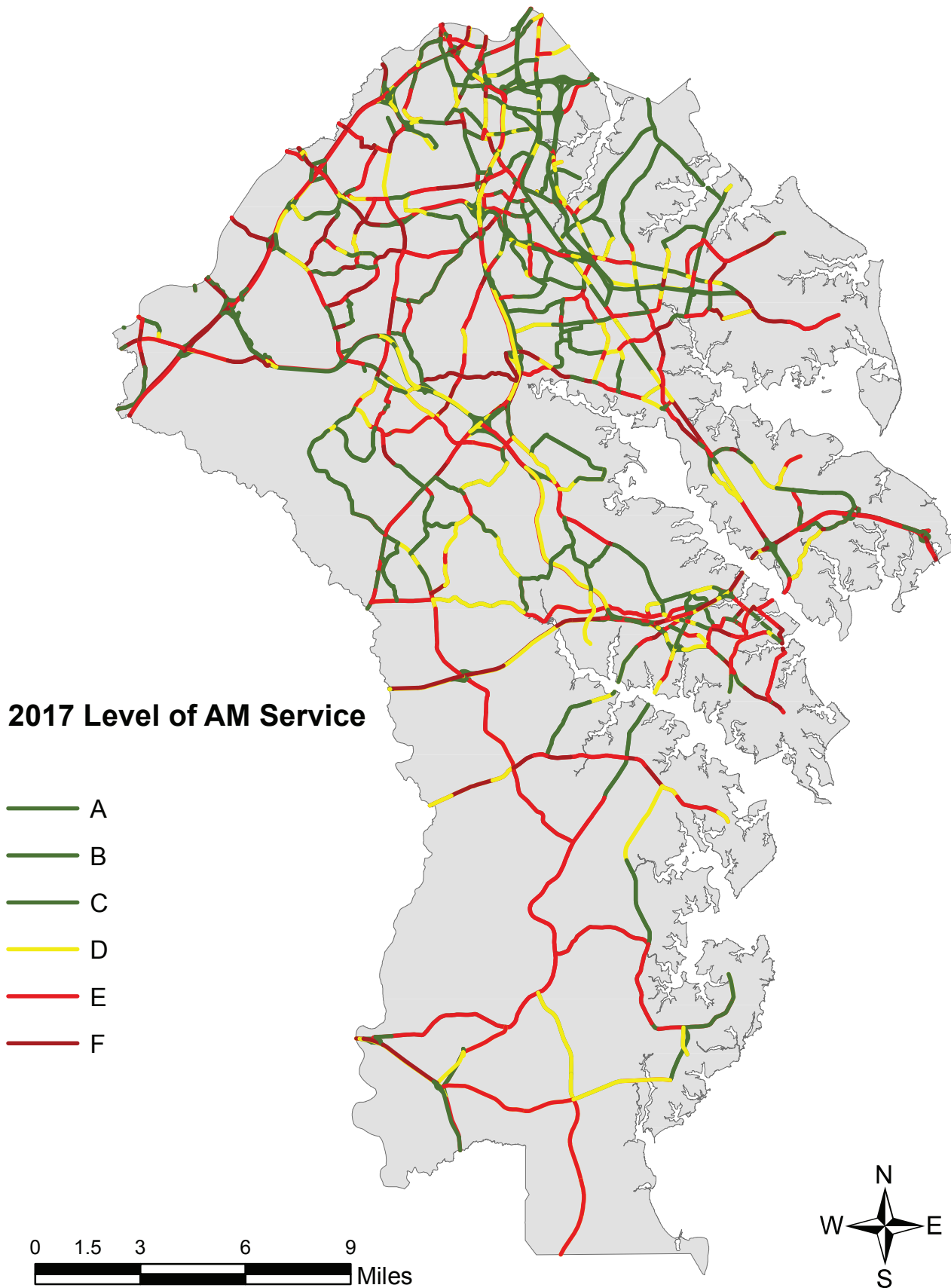


Figure 3: Existing Peak - PM Level of Service, 2017

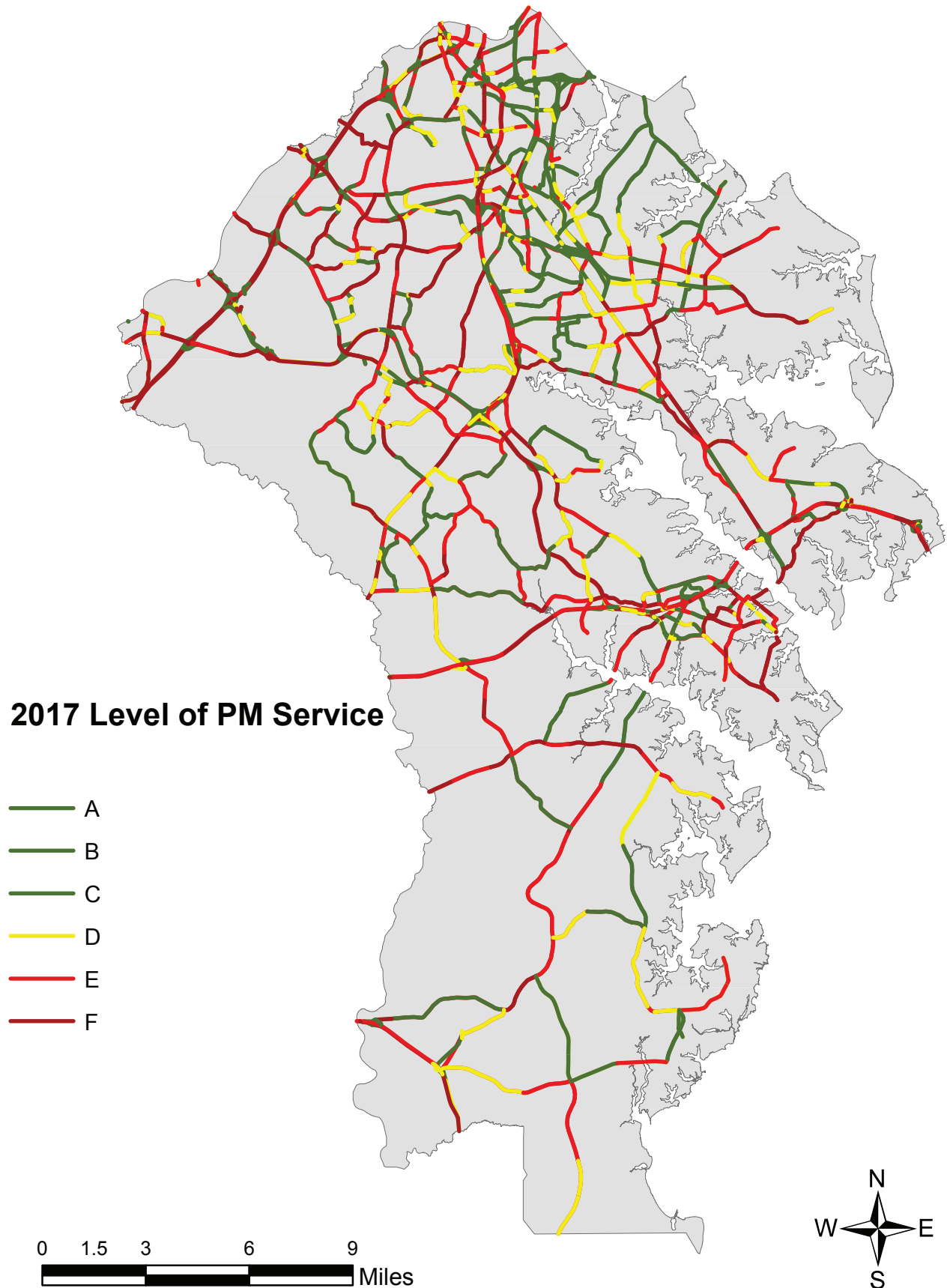


Figure 4: Projected Peak - AM Level of Service, 2040

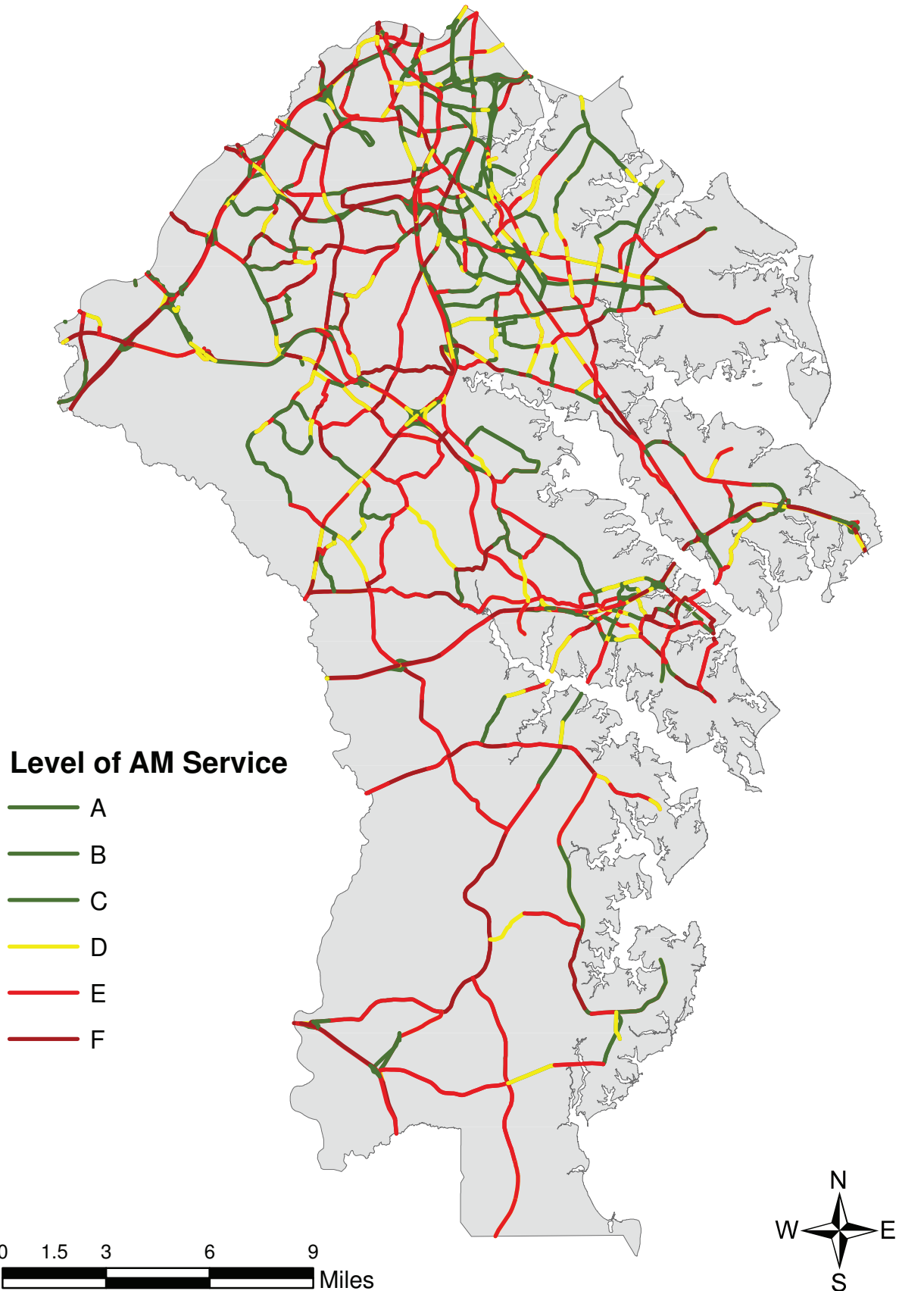
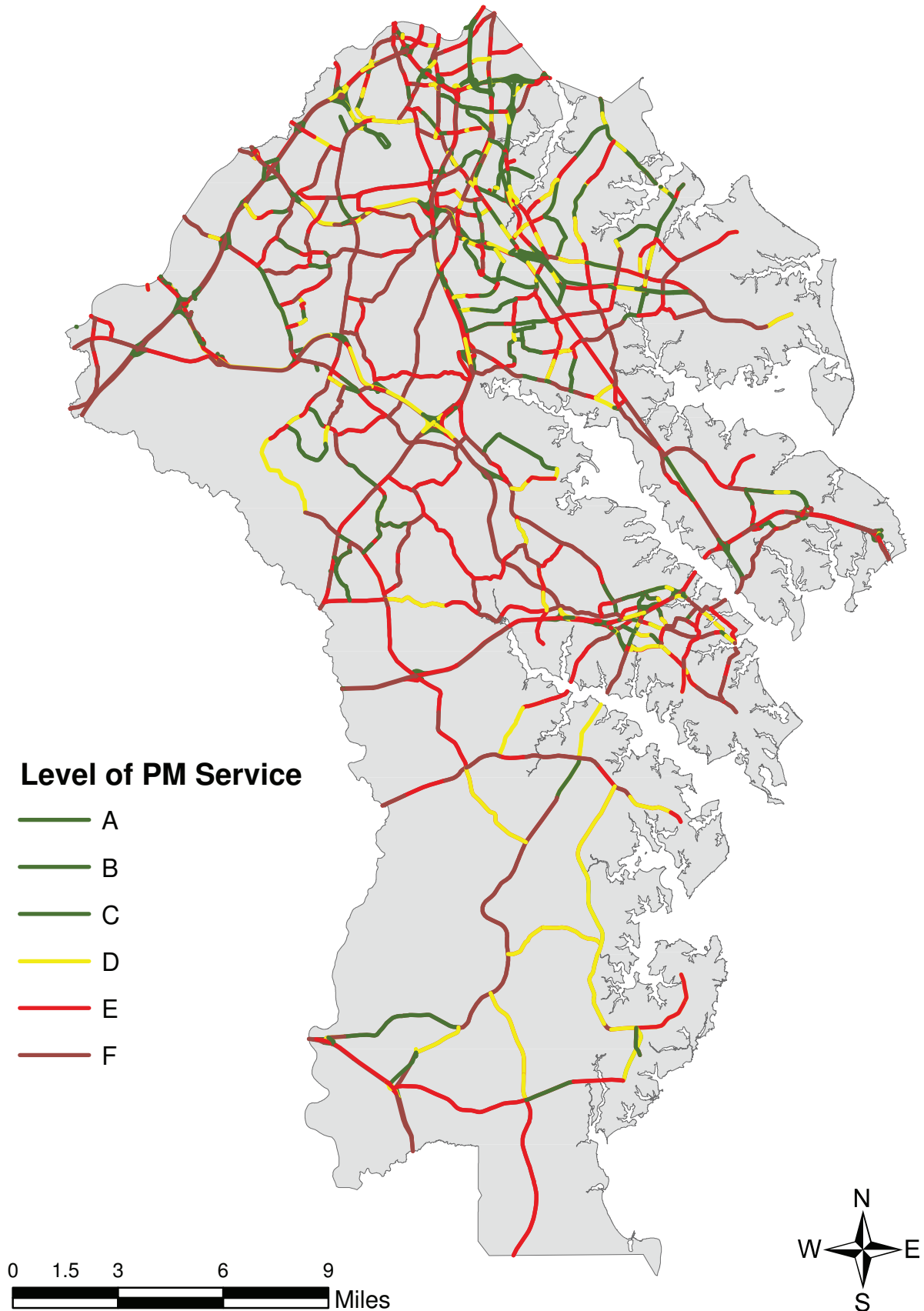


Figure 5: Projected Peak - PM Level of Service, 2040



Numerical data collected to quantify traffic in Anne Arundel County for the year 2040 came from the Baltimore Region Travel Demand Model. The travel demand model utilized data from 2012 and was validated against present day conditions. Data from the Round 9.0 cooperative socio-economic forecasts were used to generate the trips in the model and are distributed throughout the region and then assigned to roadway segments. There are more than 19,000 one-way links or roadway segments in the model. Performance measures have been developed to analyze simulation characteristics to show travel demand results.

The travel model consists of over 1,500 transportation analysis zones (TAZ) that contain land use and demographic data (employment, household size, population, income by household, automobile ownership, etc.). The universe of this model extends from the Susquehanna River in the north to the Potomac River in the south, from the William Preston Lane Chesapeake Bay Bridge to the east to Carroll County to the west. The implication of substantial increases in employment over the 30-year horizon coupled with a more modest increase in population and households implies that there will be far more jobs than households, leading to either greater amounts of automobile ownership per household or greater dependence upon transit to provide the connection between the home and the job.

There are limitations in this type of general analysis. These analyses do not identify other issues with existing roadways such as safety, multi-modal compatibility, infrastructure condition, or certain types of operational concerns. Even in terms of congestion and capacity, the LOS analysis can have limitations. In urbanized areas such as northern and eastern portions of the County, signal density (number of signals per center line mile of highway) and other factors dictate travel flow and delay. Typically, signal density of less than one per two-mile segment frames the amount of delay that is not identified in a planning level of service review. In less urban areas, the roadways are controlled by devices (typically STOP and YIELD signs) on the minor street approach. These and the geometry of the roadway (lane width, available shoulder width, terrain and typography) are the features which can impact the capacity of the road.

There have been citizen concerns about the existing roadway infrastructure not meeting current standards in many communities as many roadways do not have sufficient width, shoulders or bicycle and pedestrian infrastructure unrelated to congestion and delay.

Travel Demand

Based on current projections, there will be an increase of more than 86,950 daily trips taken within, to and from Anne Arundel County by 2040 – more than 80% of which will be by personal automobile. When considering commuting trips only, more than 90% of all trips are taken alone. The 554,600 daily trips projected for 2040 is 15% higher than was projected just five years ago.

As the number of trips increases, commuting patterns are changing as well. While travel to and from Baltimore County once was dominant, travel to Howard, Montgomery, Prince George's counties and the District of Columbia has overtaken trips to and from the north. As a result, congestion will significantly worsen on MD 3 through Crofton and Bowie, on US 50 between I-97 and I-495, and on the MARC Train stations at Odenton and BWI. This gradual shift in commuting patterns also is producing a rapidly increasing number of trips to and from Howard County which has implications for east-west travel in the mid-County along MD 100, MD 175, and MD 32.

Still, of all trips taken within the day nearly 75% are within Anne Arundel County. This includes not only commuting trips, but travel to the grocery store, doctor's office, and other day-to-day activities. This is significant because as trips on the primary State roadways become longer and less reliable, drivers will seek alternative routes using local roads not designed to handle significantly increased volume. Trips within community cores will become more difficult and less safe. As such, additional travel capacity will be needed on local roadways that run parallel to major roads owned by MDOT SHA. This capacity can be created by:

1. Deploying advanced traffic management and operations strategies such as adaptive traffic signal systems that respond to real-time traffic conditions; allow peak-hour use of hardened roadway shoulders; and, clear roadway incidents more quickly among others.
2. Encouraging trips that are less than ¼ mile to be made on foot or bicycle by providing safe and well-connected pedestrian and bicycle routes.
3. Increasing transit service in certain corridors and making transit more responsive to daily demands.

Past and current transportation planning efforts will provide the framework for meeting the County's coming mobility challenges.

Planning Framework

Anne Arundel County

- **The 2009 General Development Plan**

The 2009 General Development Plan (GDP) identified a key transportation objective to “create a safe and well-managed transportation network that provides greater choice for the traveler and limits or even reduces congestion on the road system.” The Office of Transportation has been working to achieve this goal through “preparing and adopting a Transportation Functional Master Plan (TFMP) that addresses roadway, bicycle, pedestrian and public transportation modes, and that includes a financial plan to implement proposed improvements over the next 10 years.” This is a direct action item from the 2009 GDP. In addition, since the adoption of this plan, 287 roadway improvement projects have been completed which works towards creating a safe and well managed transportation network. Further detail regarding the status of action items and recommendations can be found in the 2009 GDP Implementation Report located at www.aacounty.org/Plan2040.

Additionally, the Office of Planning and Zoning is preparing a status report on the 16 Small Area Plans adopted between 2000 and 2004 that will also inform Plan2040. Further detail regarding the status of transportation recommendations from the 16 Small Area Plans can be found in the Small Area Plan Implementation Report located at www.aacounty.org/Plan2040.

- **Transportation Functional Master Plan**

The Anne Arundel County Office of Transportation (OOT) is responsible for coordinating the County's short- and long-term transportation policy and planning activities, including development of the 2009 GDP recommended Transportation Functional Master Plan (TFMP). The 2018 TFMP will integrate five component studies and recommend improvements to the County's transportation network to enhance mobility and accessibility within local and State fiscal constraints. The goal of the TFMP is to comprehensively identify, analyze and understand the relationship between

land use patterns and the mobility and accessibility constraints and opportunities within the County. The TFMP will yield a long-range transportation plan that is fiscally constrained, as well as provide funding and policy options to ensure that the County has adequate resources for plan implementation. Finally, the TFMP will inform Plan2040.

The five component studies integrated into the TFMP include the Corridor Growth Management Plan, the Bicycle and Pedestrian Master Plan, the Transit Development Plan, the Major Intersections and Important Facilities Plan and the Complete Streets Policy. In addition to the TFMP and its components, a number of additional transportation plans, policies and projects identified by local, State and Federal agencies guide transportation planning and implementation in Anne Arundel County. These studies, plans, policies and projects are summarized below.

- **Anne Arundel County Corridor Growth Management Plan, 2012**

The Corridor Growth Management Plan (CGMP) recognizes that while travel demand in Anne Arundel County continues to grow, the ability to add road capacity is limited. The study analyzed current and projected growth patterns in the County in relation to travel demand and mobility, and focused on balancing the need for added roadway capacity with right-of-way and environmental constraints, and the need to provide for additional travel mode choices. The CGMP developed concept-level transportation alternatives, impacts and costs for nine regional and four connector corridors identified in the County (Table 1). Ultimately, the transportation improvements aim to decrease congestion, enhance travel choices, and improve safety for all modes. The CGMP is a stand-alone report that is intended as a base for future project planning and preliminary engineering, by securing funding commitments with appropriate State, Federal and private sector partners.

Table 1: Corridor Growth Management Plan, Regional and Secondary Connector Corridors

Regional Corridors			
Project	From	To	Length (miles)
US Route 50	Prince George’s County Line	Chesapeake Bay Bridge	19
MD 2 (Governor Ritchie Highway)	US Route 50	I-695	17
MD 2 (Solomons Island Road)	MD 450 (West Street)	MD 214 (Central Avenue)	4
I-97	US Route 50	I-695	17
MD 32 (Patuxent Freeway)	I-97	Howard County Line	11
MD 100 (Paul T. Pitcher Memorial Highway)	MD 648 (Baltimore Annapolis Boulevard)	Howard County Line	5
MD 295 (Baltimore-Washington Parkway)	Prince George’s County Line	I-695	14

MD 3 (Crain Highway)	Prince George's County Line	MD 32	7
MD 173 (Fort Smallwood Road), MD 607 (Hog Neck Road) and Magothy Bridge Road	Baltimore City Line	MD 173 end	14

Secondary Corridors			
Project	From	To	Length (miles)
Benfield Blvd	I-97	MD 2 (Ritchie Highway)	5
MD 176 (Dorsey Road)	MD 170 (Telegraph Rd)	MD 2 (Ritchie Highway)	6
MD 170 (Telegraph Road)	MD 2 (Governor Ritchie Highway)	MD 175 (Annapolis Road)	13
MD 713 (Rockenbach Rd/Ridge Rd)	MD 176 (Dorsey Rd)	MD 175 (Annapolis Road)	3

- **Anne Arundel County Pedestrian and Bicycle Master Plan**

In June 2013, the County's Office of Planning and Zoning Transportation Division completed the Anne Arundel County Pedestrian and Bicycle Master Plan: 2013 Plan Update (2013 PBMP). The 2013 PBMP update was developed to identify improvement opportunities that increased the potential for safe trip-making by walking and bicycling while diminishing the need for single occupant vehicle (SOV) trips. While the 2003 Pedestrian and Bicycle Master Plan (2003 PBMP) focused upon pedestrian and bicycle improvements in targeted geographic improvement areas (Figure 6), the 2013 PBMP update emphasized pedestrian and bicycle infrastructure and non-infrastructure improvements that created transportation alternatives for Anne Arundel County residents within urbanized areas. The study area for the 2013 PBMP update excluded areas of the County located outside the Planned Water and/or Sewer Service Areas (non-urbanized). Due to this scope of work, the 2013 PBMP update resulted in no targeted projects recommendations in areas such as South County and Crownsville. However, the adopted 2003 PBMP accounts for and contains project recommendations Countywide, and these recommendations remain in effect.

A key element of the 2013 Pedestrian and Bicycle Master Plan (PBMP) update was the identification of specific pedestrian and bicycle related infrastructure projects deemed "credible of consideration for construction." The overriding intent was to identify projects for advancement to construction whenever an opportunity arises, be it through Federal/State funding, County Capital Project funding, or as a condition of development approval, and to group them into three Tiers (Figures 7, 8 and 9). Projects were prioritized based on their location within bicycle- and pedestrian-generator and attractor areas.

In addition to specific project recommendations, the 2013 PBMP proposed legislative changes to County regulations and the Department of Public Works (DPW) Design Manual to include

Figure 6: PBMP 2003 - Pedestrian Improvement Zone and Prioritized Bicycle Route Network

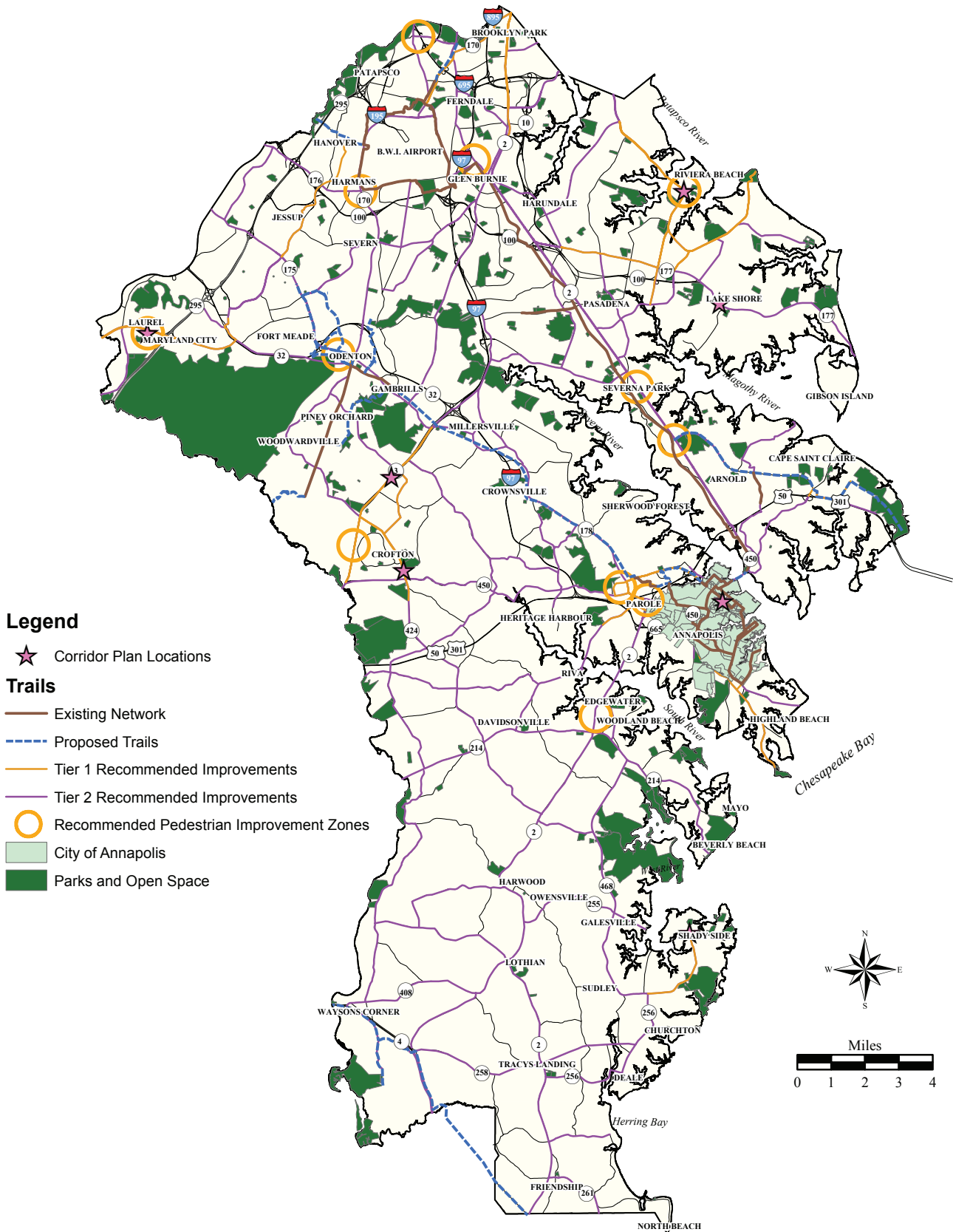


Figure 7: PBMP 2013 - Bicycle/Pedestrian Project Tier I

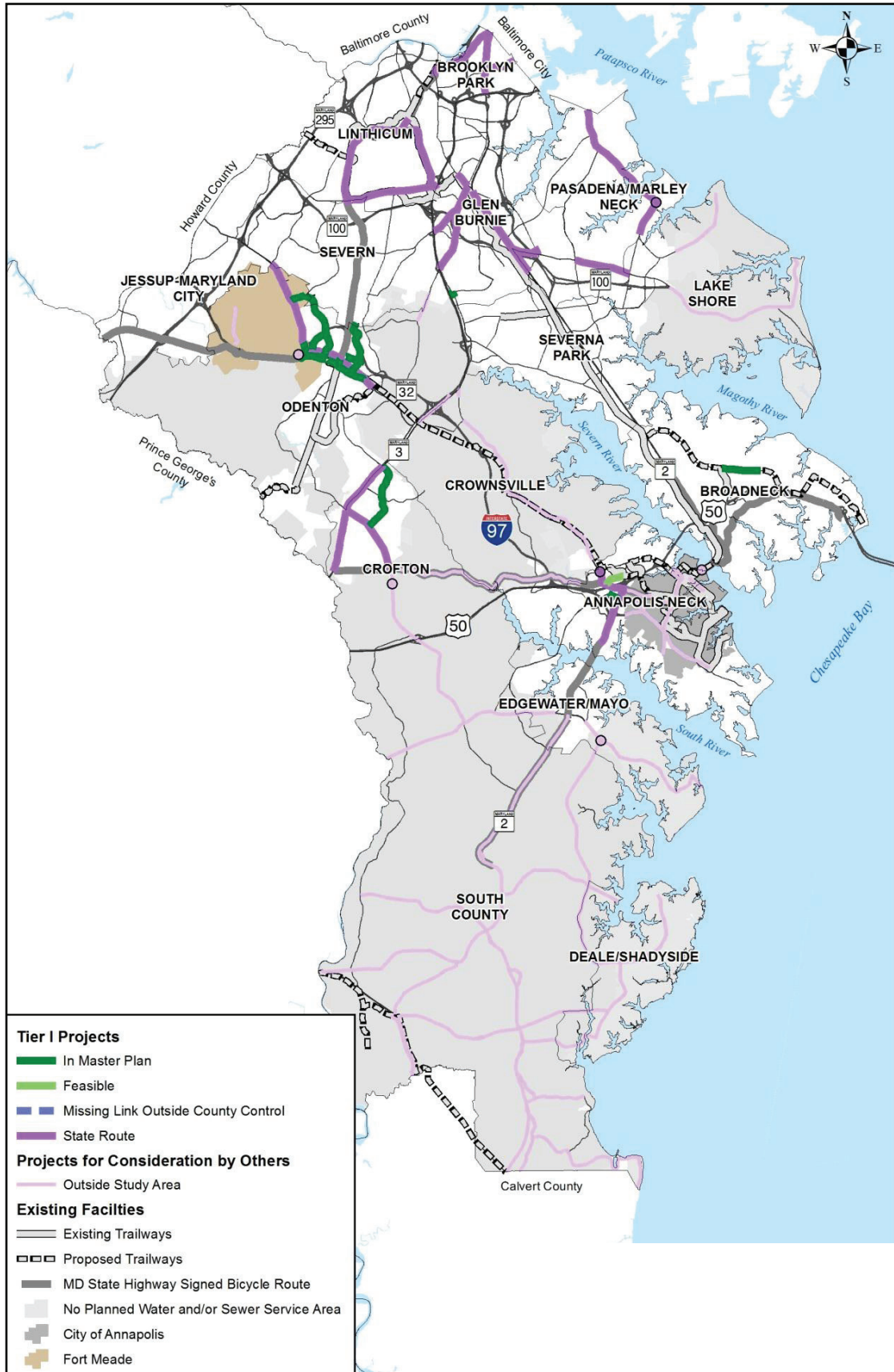


Figure 8: PBMP 2013 - Bicycle/Pedestrian Project Tier II

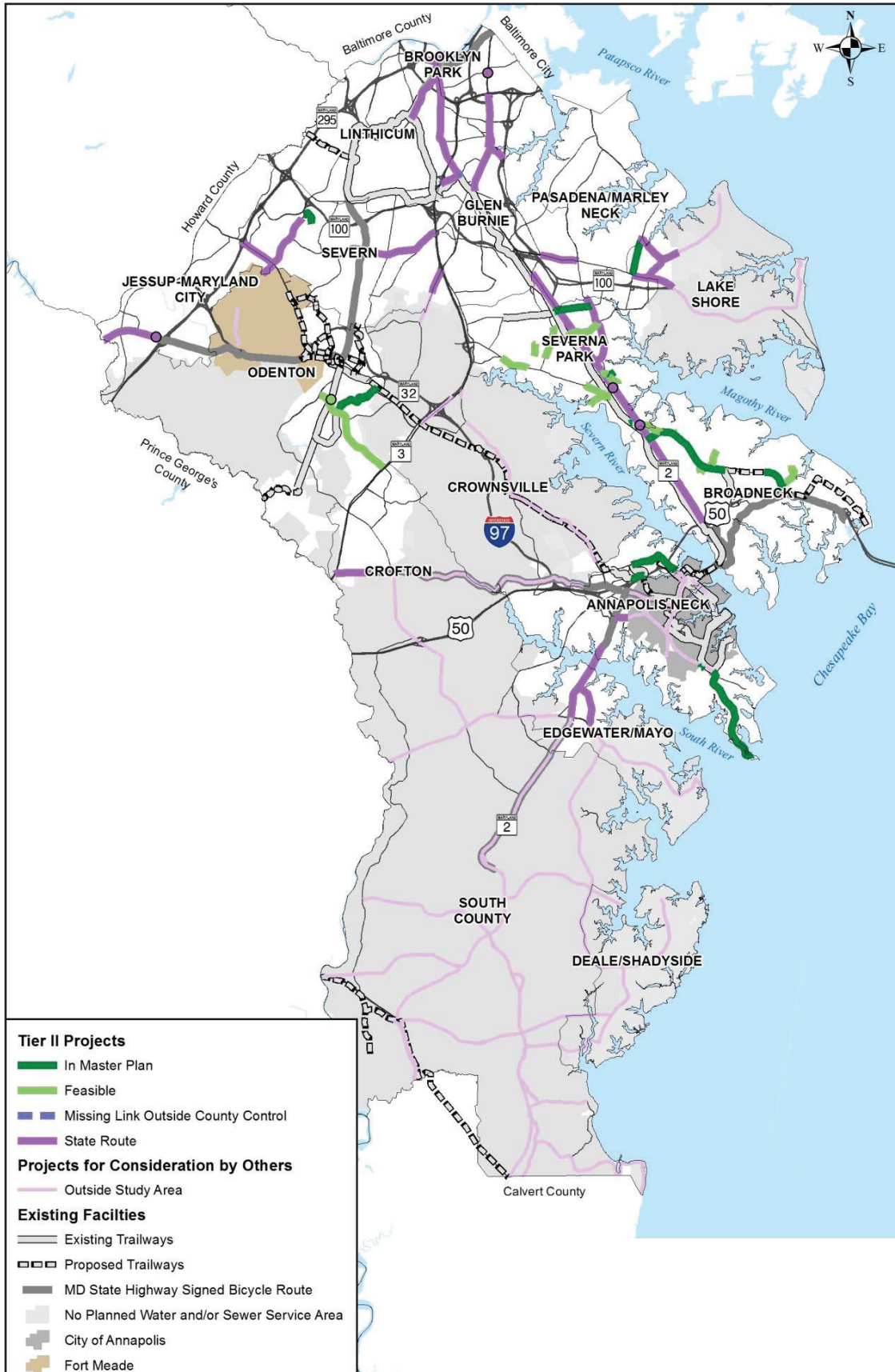
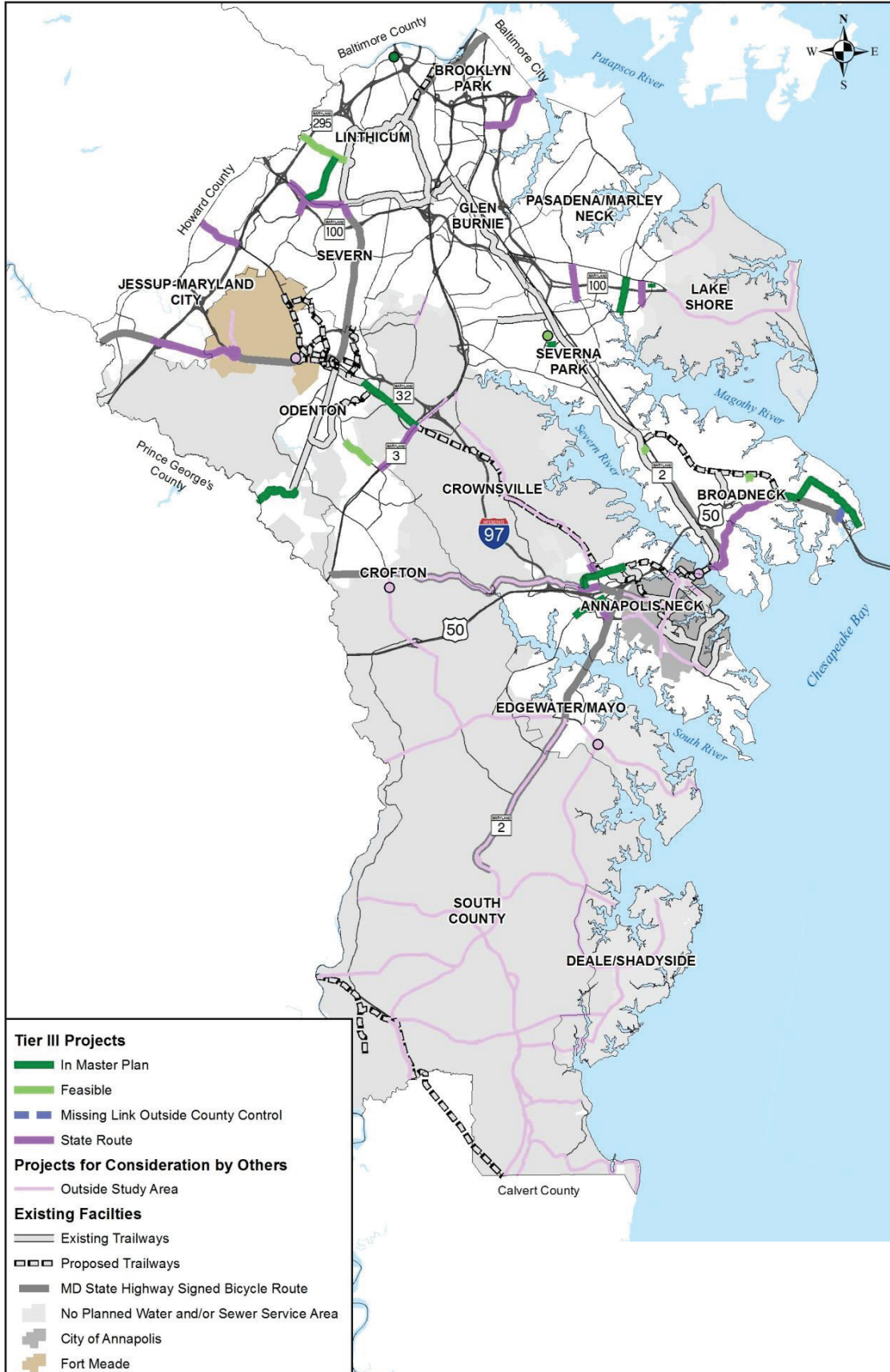


Figure 9: PBMP 2013 - Bicycle/Pedestrian Projects – Tier III



Complete Streets policies and practices for infrastructure projects. In addition, the 2013 PBMP promoted an increase in pedestrian and bicycle infrastructure. Resolution 6-14, adopted by County Council in February, 2014, established a Complete Streets Working Group to develop a Complete Streets Policy. Subsequently, the County Council adopted a Complete Streets Resolution (No. 45-14) which recognized the completion of an Anne Arundel County Complete Streets Policy (the Policy). The Policy states that it shall be the policy of the County to ensure that all County agencies responsible for transportation systems achieve and sustain safe accommodation for pedestrians, bicyclists, motorists, emergency vehicles, transit service, and freight movement. The Policy puts forth a series of guiding principles related to three major categories including Program Administration, Regulations, and Design.

In 2015, Anne Arundel County Executive Steve Schuh signed an executive order launching the Anne Arundel County Bicycle Advisory Commission (AACBAC). The AACBAC advises the County Executive, the County Council, and County Departments on bicycle related policy and budgetary issues and the implementation of the Pedestrian/Bicycle Master Plan. The 2013 PBMP update also recommended the creation of a Pedestrian/Bicycle Coordinator staff position and the development of educational and safety programs. The position was filled in July 2017 and resides within the newly created Office of Transportation.

In 2016 and 2017, Anne Arundel County contributed to the Baltimore Metropolitan Council's Bicycle Map project. The project, which collected data from the region, was intended to be a planning tool to provide data on existing, planned, and programmed bicycle facilities. In addition, the State Highway Administration performed a similar task with the creation of the Bicycle Spine network for the entire State. The Office of Transportation works with both of these agencies to update these tools regularly.

Current pedestrian conditions continue to reflect inconsistent treatment of facility needs across the County. The County's Plan2040 listening sessions and other opportunities for input from pedestrians have indicated that there are gaps in pedestrian links between neighborhoods and other activity centers; sidewalks, street furniture/landscaping and other pedestrian infrastructure along public roads; crosswalks, signs, and pedestrian signals at intersections. The Board of Education Transportation Division, embarked on a Geographic Information Systems (GIS) sidewalk inventory project in 2017 to capture all sidewalks in the County. When completed, it will assist in identifying gaps where handicap accessibility is compromised and subsequently make recommendations to the Capital Improvement Program.

Current bicycling conditions reflect approximately 35 miles of existing multi-use trails including Baltimore and Annapolis Trail, BWI Trail Park, WB&A Trail, South Shore Trail, Broadneck Trail, Poplar Trail, and Annapolis Colonial Maritime Trail, with an additional approximately 20 miles planned. Major improvements include the completion of 1.15 miles of the Broadneck Trail, 1.8 miles of the South Shore Trail, 1.71 miles of the WB&A Trail, and the design for the WB&A bridge over the Patuxent River, which will link the Prince Georges portion of the WB&A Trail to Anne Arundel County.

In response to the Complete Streets guiding principles, the Office of Transportation convened a stakeholder group in 2017, consisting of County Staff, members of the Maryland Building Industry

Association (MBIA), industry representatives, and local advocacy group members to promulgate regulatory changes to the development regulations in an effort to bolster the requirements pertaining to bicycle and pedestrian infrastructure. In addition, in that same year, DPW formed a workgroup to update the Design Manual to work in conjunction with regulatory changes to incorporate complete streets into the design of roadways.

- **Central Maryland Transit Development Plan (Anne Arundel County Element), 2017**

The Transit Development Plan (TDP) developed by the Regional Transportation Agency (RTA) serves as a guide for implementing service and organizational improvements for transit services in the Central Maryland Region, including potential service expansion, during the next five years. The TDP addresses the area's transit goals and objectives, status of transit services, and steps for implemented the State objectives. According to the TDP, some of the challenges faced by the RTA include a fixed route system with an unreliable fleet, circuitous routes, infrequent service, and high costs. The TDP aims to target these issues by expanding routes, reducing travel times, creating more direct routes, introducing new vehicles, assessing key origins and destinations, and creating more frequent service times.

- **Major Intersections and Important Facilities Study, 2016**

The Major Intersections and Important Facilities (MIIF) Study focused on seven highway corridors in the peninsula areas of the County that serve as the primary route into these areas. Due to existing traffic volumes and limited access alternatives, there is a need for improvements in mobility in these areas. The study analyzed level-of-service and forecasted travel demand in each corridor study area, and recommended feasible roadway, transit, bicycle, and pedestrian improvements as well as other strategies such as access management and operational improvements. The facilities included in the study are listed in Table 2.

Table 2: Identified Major Intersections and Important Facilities, 2016

Corridor	From	To	Length (miles)
College Parkway	MD 2 (Governor Ritchie Highway)	MD 179 (St. Margaret's Road)	4.8
Forest Drive	Chinquapin Round Road	Bay Ridge Avenue	2.3
MD 177 (Mountain Road)	MD 2 (Governor Ritchie Highway)	Lake Shore Drive	7.8
MD 214 (Central Avenue)	MD 424 (Davidsonville Road)	Shoreham Beach Road	7.5
MD 256 (Deale Road) and MD 468 (Shady Side Road)	MD 2 (Solomons Island Road)	Snug Harbor Road	8.1
MD 665 (Aris T. Allen Boulevard)	US 50	Chinquapin Round Road	2.7

- **The Complete Streets Policy, 2014**

The County Council adopted a County-wide Complete Streets Policy in 2014, aiming to expand upon the traditional road building process to include pedestrian, bicycle, rail and transit accommodations as core elements of roadway retrofits and improvements that best complement the needs of the communities they serve. The Policy ensures that alterations to transportation systems are implemented in a way that provides all users regardless of age or ability with a comprehensive and connective multi-modal network. Guiding principles of the policy fall under the categories of Program Administration, Regulations, and Design and include the following:

1. Evaluate resurfacing and reconstruction projects as well as access permit requests to public right-of-way for Complete Streets inclusion.
2. Approach every transportation improvement and project phase as an opportunity to create safer, more accommodating, and more accessible streets for all users.
3. Maintain skill and knowledge levels consistent with the State of the practice with the recommended practices of the American Association of State Highway and Transportation Officials (AASHTO), the National Association of City Transportation Officials (NACTO), and the Manual of Uniform Traffic Control Devices (MUTCD).
4. Report the success of implementation of the Complete Streets Policy, and its Guiding Principles, through measurable goals including, but not limited to, crash reduction, level of service and comfort, transit ridership, and changes in mode share.
5. Accommodate forecasted travel demand and improvements through periodic updates of the County Design Standards.
6. Adhere to design standards, Federal requirements, and construction specifications, using the best and latest standards available.

The Complete Streets Policy document is being used to update the County's Design Manual for road design and construction to incorporate Complete Streets elements.

- **Anne Arundel County Project Planning Studies**

The Anne Arundel County Department of Public Works is currently managing project planning studies for the areas listed in Table 3. The scope of these studies is generally related to minor capacity improvements, safety improvements and establishing facilities for bicycles and pedestrians.

Table 3: Current Project Planning Studies, Anne Arundel County

Corridor	Project Description	Project Status
Andover Road from West Nursery Road to Camp Meade Road (MD 170)	The scope of this project is for a planning-level study only with concept-level plans. If advanced, the project would upgrade the conditions along Andover Road from West Nursery Road to MD 170 to improve travel conditions for motorists, pedestrians, bicyclists, and transit service. The study also includes West Nursery Road south of Andover Road and Elkridge Landing Road from West Nursery Road to Terminal Road. The proposed design includes various methods for speed mitigation and sight distance improvements. Upgraded facilities for non-motorized users are recommended at various points along the corridor.	Planning study underway
Jumpers Hole Road from Benfield Road to Kinder Road	This project entails the development of a planning study that will focus on Jumpers Hole Road between Benfield Road and Kinder Road. This segment of the road network has experienced an increase in traffic volumes and serves as access to a local school and park. The potential issues that have developed include, but are not limited to, sight distance, speed, and a lack of pedestrian and bicycle facilities.	Planning study nearing completion
Jumpers Hole Road from Ritchie Highway (MD 2) to Mountain Road (MD 177)	The scope of this project is for a planning-level study only with concept-level plans. The proposed design includes upgrades through the residential portion of the roadway, including with curb and gutter where appropriate and feasible. Upgraded bicycle facilities are recommended in the form of on-road bicycle lanes and/or off-road shared-use paths. Additional pedestrian facilities are proposed, including new sidewalks and designated crossings.	Planning study nearing completion
South Shore Trail Phase 2	Phase 2 of the South Shore Trail will use the abandoned WB & A Railroad from MD 175 and Sappington Station Road to Bonheur Avenue.	Design Development
Ridge Road from Hanover Road (MD 176) Corporate Center Drive	The purpose of the Ridge Road transportation facility planning study is to identify future year 2040 deficiencies, evaluate build alternatives to address deficiencies, improve travel in the corridor by reducing current and forecasted congestion, reduce crash potential, improve pedestrian and bicycle compatibility, while minimizing impacts to the natural and built environment.	Planning study complete

Corridor	Project Description	Project Status
Odenton Grid Streets	This project is to design, acquire rights-of-way, and construct roadways, pedestrian and bicycle facilities, and streetscape improvements to grid streets within the Odenton Town Center area (Hale Street, Nevada Avenue, Duckens Street, Dare Street). A change order has been requested to include Baldwin Road. (Berger Street to Duckens Street) and Duckens Street (Nevada Avenue to Baldwin Road) as well as scenarios if Nevada Avenue were to be closed between MD 175 and Hale Street for the park concept.	Design is underway for this project.
Waugh Chapel Road	The Waugh Chapel Road Transportation Facility Planning study was initiated to identify gaps in the sidewalk and bicycle facilities that connect Waugh Chapel Shopping Center to the existing and planned neighborhoods to the west. The limits of the Waugh Chapel Road study corridor are from Maytime Drive to New Market Lane. The goal is a multimodal, context-sensitive approach to identify and recommend improvements to the existing corridor that strike a balance between future vehicular traffic volumes and pedestrian/bicyclists and to enhance safety and connectivity for all modes of transportation.	Planning study is underway
Edwin Raynor Boulevard.	This Project will improve operating conditions for motorists, pedestrians, and bicyclists on Edwin Raynor Boulevard by providing extra capacity, a new traffic signal at Deering Road, widened shoulders for bicyclists, and sidewalks from Deering Road to Countryside Drive. Congestion and safety concerns at MD 177 and the commercial entrances just north of MD 177 are included.	Planning study is underway.
MD 214 Corridor Planning Study	This Project is a concept-level planning study to accommodate future traffic demand by focusing on intersection improvements, bicycle and pedestrian improvements, etc. from MD 468 (Muddy Creek Road) to its eastern terminus, immediately east of Oakford Avenue,	Planning study is underway.
Solley Road	This study is to identify potential near-term and long term safety, capacity and operational improvements that will enhance automobile, bicycle and pedestrian travel in the 3.9 mile corridor between MD 177 (Mountain Road) and MD 173 (Fort Smallwood Road)	Planning study completed in 2017.
BWI-Arundel Mills Trail	The BWI Trails Schematic Plan is to develop a safe and convenient route that will connect the existing BWI Trail, the Arundel Mills shopping and entertainment complex and the surrounding communities and office/retail/light industrial land uses in the area.	Planning study nearing completion

State of Maryland

The Maryland Department of Transportation (MDOT) is responsible for the State's transportation facilities. MDOT is comprised of several sub-agencies including the Maryland Aviation Administration (MDOT MAA), the State Highway Administration (MDOT SHA) and the Maryland Transit Administration (MDOT MTA). In addition, the MDOT includes the Maryland Transportation Authority (MDTA).

MDOT develops a 20-year transportation plan for the State every five years known as the Maryland Transportation Plan (MTP) to identify the State's most critical transportation needs and provides a framework for addressing the State's transportation goals, objectives and strategies. A draft of the 2040 Maryland Transportation Plan is currently being developed. For more information, go to http://www.mdot.maryland.gov/newMDOT/Planning/Maryland_Transportation_Plan/Index.html. The MTP guides the development of the Consolidated Transportation Program (CTP) which identifies specific aviation, road, bridge, transit, port and bikeway projects to be funded over the six-year capital program.

The MDOT also prepares a Strategic Goods Movement Plan which examines existing conditions and long-range projections for the logistics chains of Maryland's industries, as well as the infrastructure required to support their efficient multimodal transportation throughout the region. The Plan evaluates current conditions for major roadways, rail, air and waterway freight movements and recommends policies and strategies for MDOT and freight stakeholders to adopt over the next five years. Recommendations include strategies for improving quality of service, system preservation, environmental stewardship, community vitality, safety and security, and economic prosperity. The Strategic Goods Movement Plan does not specify recommendations for infrastructure improvements but does support MDOT sub-agency plans for highway, port and rail recommendations. To access the 2017 Strategic Goods Movement Plan, go to <http://www.mdot.maryland.gov/newMDOT/Freight/index.html>.

Other State Transportation Plans, Studies and Inventories

- **BWI Thurgood Marshall Airport Master Plan**

The Maryland Aviation Administration (MDOT MAA) 2011 Baltimore-Washington International (BWI) Thurgood Marshall Airport Master Plan assessed long-range needs, identified the status of facilities and services, projected future facility requirements, identified airfield terminal and landside development alternatives, and developed implementation plans. The MDOT MAA is currently updating its 20-year master plan. As of the writing of this background report, the document is not publicly available.

- **Highway Needs Inventory (HNI)**

The MDOT State Highway Administration's (MDOT SHA) 2017 Highway Needs Inventory (HNI) identifies highway improvements that will benefit both the existing and projected population and economic activity in the State of Maryland. The HNI is based on a technical evaluation of highway conditions, and it is expected that more precise cost estimates and planning studies would need to be determined before ultimate implementation. The projects identified aim to address safety and structural problems that would warrant major construction or reconstruction, but the inclusion of a project in the document does not imply definitive implementation. The

HNI serves as a technical reference and reflection of the key planning documents developed by the MDOT SHA and serves as the basis for setting priorities for major capital improvement projects within the MDOT CTP. For more information, see <https://www.roads.maryland.gov/Index.aspx?PageId=509>.

- **MARC Growth and Investment Plan: Update 2013 – 2050**

The MARC Growth and Investment Plan (MGIP) prepared by the Maryland Transit Administration, is a guiding document for MTA's improvements that foster a State of Good Repair and establishes bold, new objectives for MARC service on the Penn, Camden and Brunswick lines. The document presents a program that ties together future ridership increases, rolling stock investments, and facility and parking expansions to meet increasing demand and enhance the customer experience. While only a handful of projects in the MGIP are physically located within the County, the nearly \$2 billion in systemic improvements included in the Plan greatly affect MARC's ability to serve residents of Anne Arundel County. See <https://mta.maryland.gov/marc-growth-and-investment-plan> for more information regarding the MGIP.

- **Maryland Transportation Authority (MDTA) Project Planning Studies**

The Maryland Transportation Authority (MDTA) oversees all toll roads within the State of Maryland such as I-95 and MD 200 (Intercounty Connector). In Anne Arundel County, the main MDTA facility is U.S. Route 50 at the Chesapeake Bay Bridge and the William Preston Lane, Jr. Memorial Bridge connecting the Western and Eastern Shores of Maryland. These crossings are the only land connection over the Chesapeake Bay between the Susquehanna River to the north and the Chesapeake Bay Bridge and Tunnel to the south in Virginia. The MDTA Project Planning Studies includes all planning for existing and future roadways managed by the MDTA. Within Anne Arundel County, the MDTA Project Planning Studies include:

1. The Baltimore Harbor Traffic Management Study, completed in 2009, analyzed existing conditions on three Baltimore Harbor crossing facilities and evaluated improvements to better distribute the traffic across them during the peak and off-peak times on the weekdays and weekends along the following roadway limits. The results of the evaluation did not provide clear evidence that the improvements studied would better distribute traffic, however short-term, long-term and toll-related improvements were recommended. For more information regarding these recommendations, see http://mdta.maryland.gov/Capital_Projects/ProjectStudies/BaltimoreHarborTrafficManagementStudies.html
2. William Preston Lane Jr. Memorial Bay Bridge Life Cycle Cost Analysis Report, 2015 - The Maryland Transportation Authority (MDTA) completed the William Preston Lane Jr. Memorial (Bay) Bridge Life Cycle Cost Analysis Study (Bay Bridge LCCA) to evaluate the traffic operations and structural condition of the Bay Bridge, and to understand the costs and time frame associated with implementing future Bay Bridge improvements. The report also evaluated the complementary improvements that would be needed if and when a new structure(s) were built including mainline US 50/301 improvements. The report concluded that the existing Bay Bridge structures are currently in satisfactory condition. The structural analysis shows that with programmed and anticipated rehabilitation and maintenance, the existing structures can be maintained in fair or better condition through 2065. The traffic analysis

shows that without additional capacity by 2040, there will be significant daily eastbound and westbound congestion during the summer months and during the non-summer months, there would be eastbound congestion Friday evenings and Saturday afternoons. As a result of this report, a Chesapeake Bay Crossing Study (described below) is currently underway to identify an alternative to accommodate future traffic demand.

3. Chesapeake Bay Crossing Study, 2016 – 2020 - This four-year study aims to identify a preferred corridor alternative for addressing congestion at the Chesapeake Bay Bridge. The study area spans the entire length of the Chesapeake Bay in Maryland. This is a Tier I National Environmental Policy Act (NEPA) study to establish the purpose and needs, identify the corridor for a new crossing, determine environmental feasibility, gauge public input and evaluate financial feasibility for a new Bay crossing. To see the latest information regarding the schedule and public involvement opportunities, see <http://www.baycrossingstudy.com/>.
- **MDOT SHA Planning Studies and Design Projects**

The current MDOT SHA planning studies and design development for major projects in Anne Arundel County are identified in Table 4.

Table 4: Current SHA Planning Studies and Design Development Projects

Corridor	Project Description	Project Status
MD 198 (MD 295 to MD 32)	The purpose of the project is to improve existing capacity, traffic operations, as well as vehicular and pedestrian safety along MD 198, while supporting existing and planned development in the area. Bicycle and pedestrian access will be provided where appropriate. (BRAC Related)	Planning completed. Project on hold until additional funding is available for design and construction.
MD 175 from National Business Parkway to McCarron Court	Widen from two lanes to six lanes and reconfigure ramps at MD 295 interchange to create signalized left turns at MD 175.	Final design is underway. Utility relocation to begin in Fall 2018 and road construction in 2019.
MD 175 (Mapes Road to MD 32)	Convert existing four lane roadway to six lane highway, including sidewalk and shared use path.	Conceptual storm water management plans have been submitted for approval. Roadway plans are 30 percent complete. Future phases of this project are currently unfunded.

Other Plans, Programs and Studies

- **Baltimore Regional Long Range Transportation Plan – Maximize 2040, 2017**

Maximize 2040 is the long-range transportation plan prepared by the Baltimore Regional Transportation Board (BRTB) for the Baltimore region, which encompasses Anne Arundel, Baltimore, Carroll, Harford, and Howard counties, Baltimore City and the City of Annapolis.

Maximize 2040 was developed in accordance “Moving Ahead for Progress in the 21st Century” (MAP-21) requirements for the authorization and funding of Federal surface transportation programs, and it adopted nine regional transportation goals that are targeted by the recommended projects and programs. Maximize 2040 includes sections with explanations of these goals, a revenue forecast, future needs and conditions, project evaluation criteria, a congestion management process, and a public involvement process. Seven Anne Arundel County capacity expansion projects are included in the plan. As of the writing of this memorandum, the document is not publicly available. When the plan is available, this technical memorandum will be updated as appropriate.

- **Regional Transportation Improvement Program, 2016**

The Baltimore Region Transportation Improvement Program (TIP) developed by the BRTB is a four-year, fiscally constrained, and prioritized set of transportation projects from the Regional Long Range Transportation Plan. The TIP includes all forms of surface transportation improvements including but not limited to system preservation, management and operations, emission reduction projects, safety, roadway capacity expansion, transit vehicle purchases, bicycle and pedestrian projects and more. The TIP is published annually, generally following adoption.

- **Patapsco Regional Greenway Concept Plan and Implementation Matrix, 2017**

The Patapsco Regional Greenway (PRG) Concept Plan and Implementation Matrix developed by the Baltimore Metropolitan Council identifies and prioritizes a shared-use path system along the Patapsco Valley between Sykesville and the Inner Harbor of Baltimore. This 58-mile system uses existing trails, roads and utility corridors to connect neighborhoods and destinations in Baltimore City and Baltimore, Anne Arundel, Howard and Carroll counties. A completed greenway system will improve opportunities for transportation, recreation and economic development for communities along the route. Within Anne Arundel County, two greenway alignments are proposed. The first follows the County’s Bicycle and Pedestrian Plan recommendation of a proposed Baltimore Washington International (BWI) Trail and Baltimore and Annapolis (B&A) Connector Trail from the Patapsco River at MD 648 to Maple Road. The second greenway segment proposes a new trail parallel to Stony Run from the Patapsco River at I-195 to the BWI Trail following Ridge Road and Corporate Center Drive.

- **Washington Area Constrained Long-Range Transportation Plan, 2016**

The National Capital Region Transportation Planning Board’s Constrained Long-Range Transportation Plan (CLRP, see <http://www1.mwcog.org/clrp>) shows how the Washington, D.C. region plans to invest in its transportation system over the next 20 to 30 years. The CLRP highlights major highway projects, strategies for system maintenance, expanded transit capacity, targeted congestion relief, development of activity centers, and environmental protection. Any project that might affect future air quality by adding or removing highway or transit capacity is considered to be “regionally significant” and must be included in the plan, in addition to any project that will require Federal funding or Federal approval during the timespan that the CLRP covers. The following projects are included in the CLRP for Prince George’s County and directly connect to Anne Arundel County roadways and rail service:

1. MD 3 (Robert Crain Highway) - widen to 6 lanes, 2030

2. MD 450 (Annapolis Rd) - widen to 4 lanes, 2020
 3. MARC - Increase trip capacity and frequency along all commuter rail lines, 2029
- **Fort George G. Meade Strategic Action Plan: 2012 – 2017**

The Strategic Action Plan of 2012 is the U. S. Army’s guiding document for all facility improvements related to the social and physical infrastructure necessary to support the needs of more than 56,000 active forces, dependents, civilians, reservists and retirees at Fort George G. Meade in western Anne Arundel County. While transportation improvements included in the Plan are typically “inside the fence,” their implementation relates directly to County and State-owned transportation facilities outside the fence.

Implementation

Every year, each of Maryland’s 24 local governments provides a Priority Letter to the MDOT listing the jurisdiction’s priorities and recommendations for implementation. Anne Arundel County’s 2018 Priority Letter identifies the top five (5) projects as well as an attached list of additional projects the County would like MDOT to include in the FY2019 CTP, which schedules improvements on State-managed properties. This year’s top priorities include the following:

- a planning study for the Route 3 (Robert Crain Highway) corridor between MD 424 and MD 32,
- capacity improvements on Route 2 North of US 50,
- improvements in Crownsville for I-97,
- corridor improvements along MD 177 (Mountain Road) from Catherine Avenue to Edwin Raynor Boulevard, and
- corridor improvements on MD 214 through the Mayo Peninsula.

The County priority letter also included numerous other roadway, transit, noise wall and bicycle and pedestrian improvements along eligible State roads as well as off-road trails for transportation.

The County Capital Budget and Program provides a comprehensive summary of the current financial standing for the County and anticipated costs for the next five years. The document includes overviews of the anticipated fiscal year debt, use of bonds and “pay as you go” funds, grants and aid, impact fees, and projected spending in different project categories. The Capital Budget also provides comparisons between the Planning Advisory Board spending recommendations and the County Executive spending recommendations. For the transportation system, the Capital Budget includes all manner of investments from system preservation to safety improvements and capacity expansion on County-owned roadways and bridges.

In October of 2018, the Anne Arundel County Council passed the Multi-Modal Transportation Bill (Bill 78-18), which requires all modes of transportation, including biking, walking, transit and motorized vehicles, be considered when residential and commercial developments are planned and approved. Previously, assessment of development impacts typically focused only on the motorized traffic network.

Conclusion and Future Needs

Anticipated growth in households, population and employment will continue to lead to greater travel demand within the County. The County's 2009 General Development Plan is a starting point for analyzing potential vision statements, goals, objectives and performance measures of a comprehensive, multimodal long-range transportation plan for Anne Arundel County. The 2009 GDP was based on four broad planning themes for the County: balancing growth and sustainability, community preservation and enhancement, environmental stewardship, and quality public services. The elements of the County's transportation planning approach flows from the GDP themes:

1. Maintenance of the existing transportation facilities inventory to protect public investment in facilities and to support redevelopment and revitalization of the County's neighborhoods and commercial areas;
2. Expansion of the transportation facilities inventory to meet the increasing travel demand;
3. Emphasis on improving safety for motorists, pedestrians, and bicyclists;
4. Provision of alternative means of mobility through increased transit service;
5. Implementation of travel demand management strategies;
6. Inclusion of emergency management principles in transportation plans; and
7. Expansion of dedicated pedestrian and bicycle facilities to segregate automobiles from bicycles and pedestrians.

The County's stated transportation objective is to create a safe and well-managed transportation network that provides greater choice for the traveler and limits or even reduces congestion on the road system. Various roadway improvements, improved regional and local transit, expanded bicycle and pedestrian networks, and improved connections between the different modes will help to lessen reliance on the single-occupancy vehicle and reduce vehicle emissions. It is important to note that many of these activities are only partially controlled or accountable to County development regulations. Because of this, outside (State and/or Federal) funding participation will be necessary to reduce the impact of this impending growth.

The 2018 TFMP will integrate the five component studies discussed under the Planning Framework section of this report and recommend improvements to the County's transportation network to enhance mobility and accessibility within local and State fiscal constraints. Figures 10, 11 and 12 show the draft 2018 TFMP recommended projects incorporated from the five component studies.

The County's land use and economic development staff and the Office of Transportation should monitor freight-generating land use development and any associated transportation needs. Similarly, while BWI Thurgood Marshall Airport is not a significant hub for goods movement, any significant expansion in this market may require further transportation analysis.

While no improvements are recommended for landside access to BWI over the next decade, the County and MDOT SHA should continue to monitor roadway congestion at the airport. If BWI's growth trajectory continues as it has since the mid-1990s, transportation systems management and improved regional transit access should be explored.

Lastly, the Concurrency Management element of Plan2040 should include an assessment of the infrastructure condition of existing roadways (including road widths, sidewalks, etc.) to provide a true picture of the infrastructure needs of the County on public roadways and what improvements may be necessary outside of a specific congestion related concern.

Figure 10: Potential Roadway Projects in the Draft 2018 TFMP

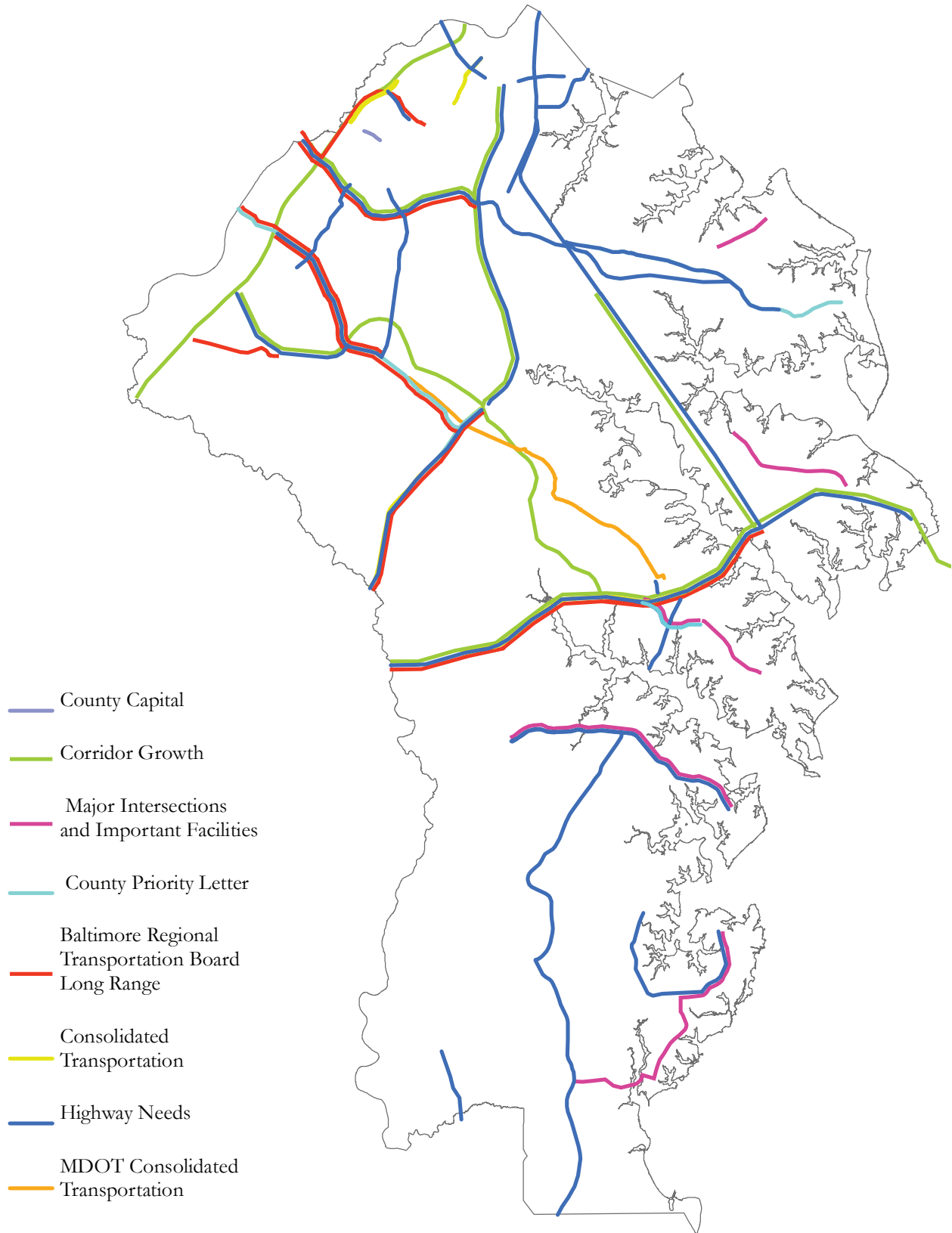


Figure 11: Potential Transit Projects in the Draft 2018 TFMP

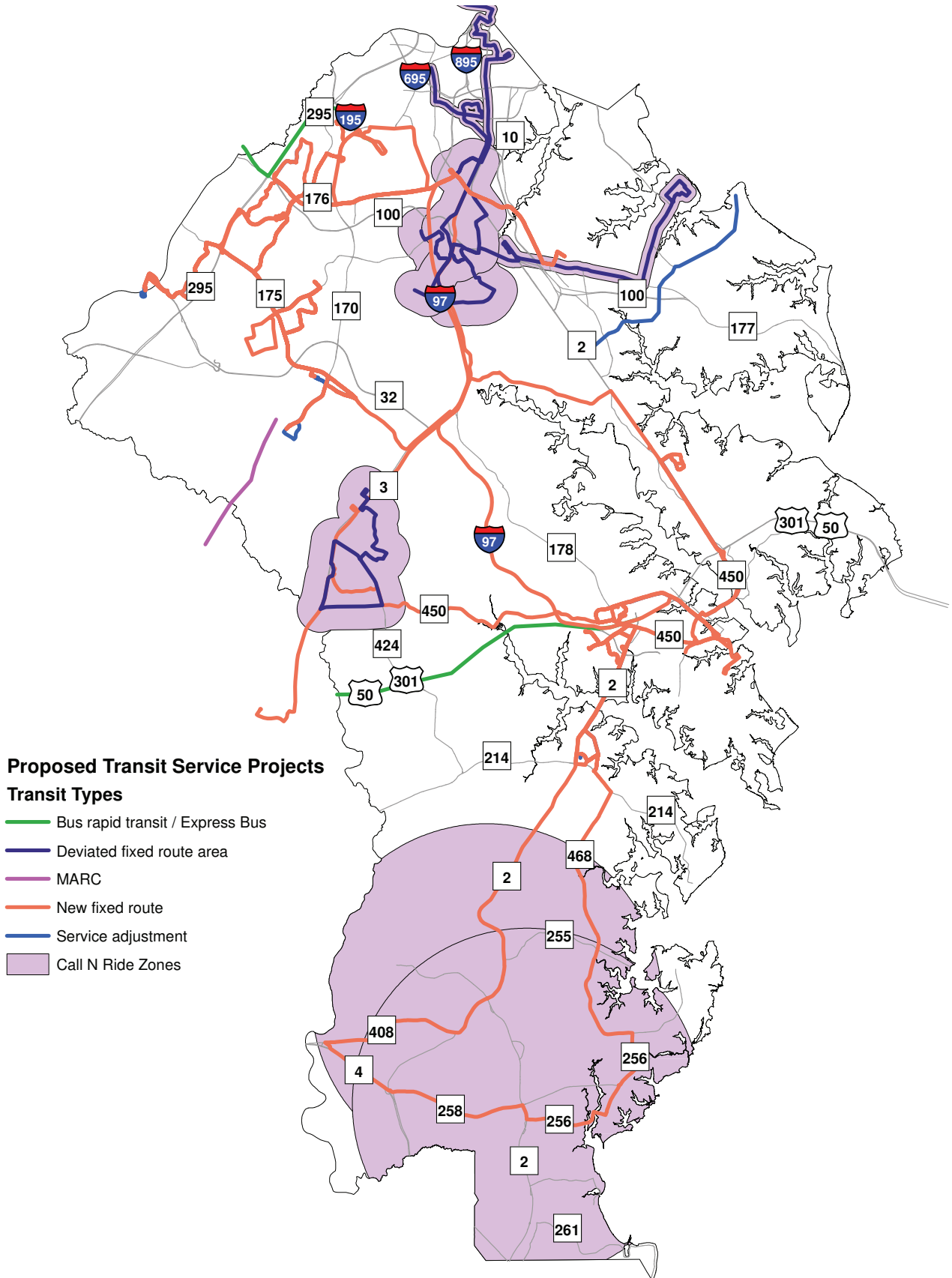


Figure 12: Potential Bicycle/Pedestrian Improvements in the Draft 2018 TFMP

