The Forest Drive/Eastport Sector Study

May 31, 2018

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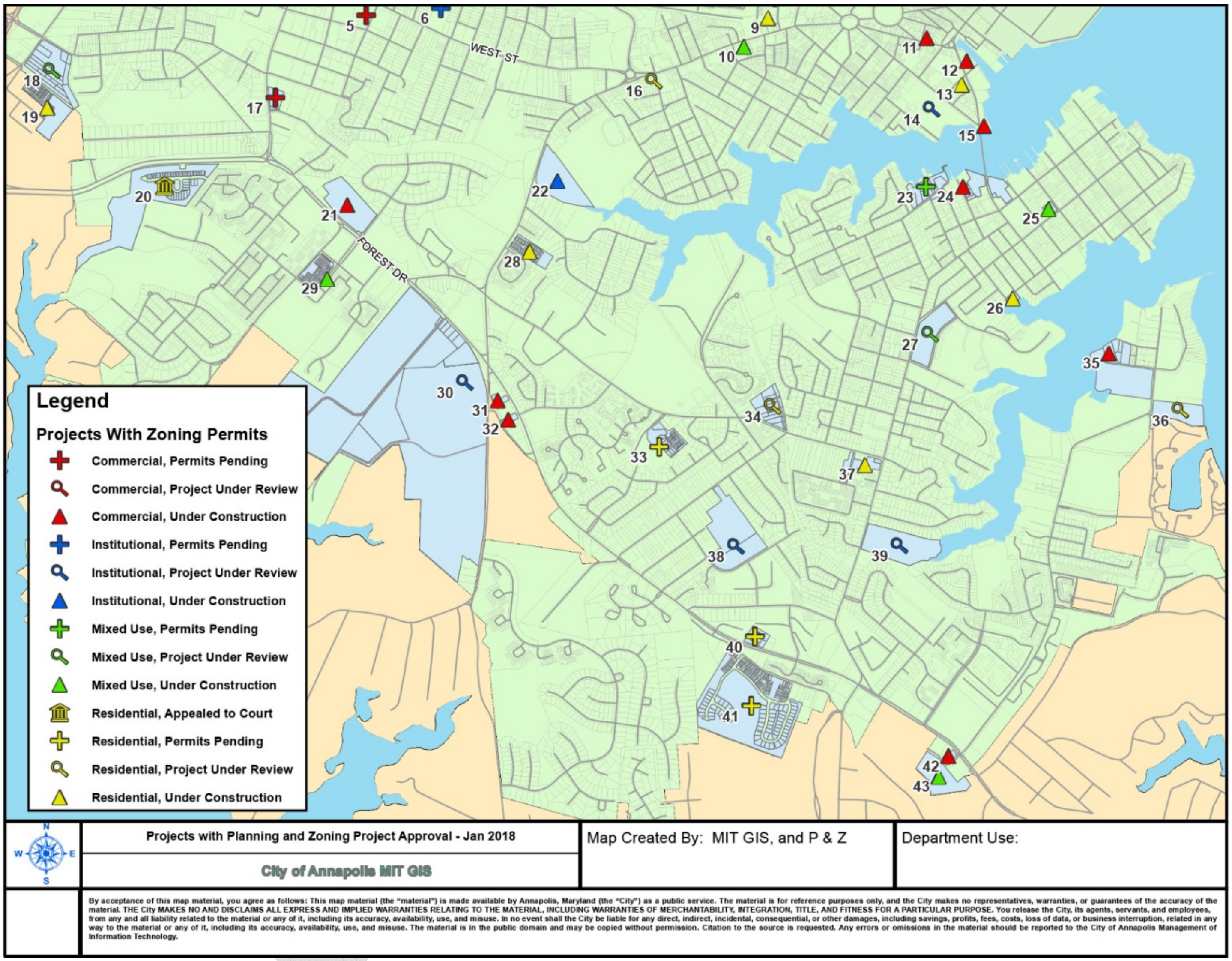
APPENDIX A: Pipeline Development

The following map identifies development proposals either “under construction,” “pending,” “under review,” or “under appeal” located within the City that are either within or close to the sector area. The date of this map is January 2018.



The following chart provides additional details to those development proposals identified in the previous map. The date of the chart is January 2018.

Number	Project Name	Status	Type	Units	Net New	Sq ft	Net Sq ft
1	Rodgers Heights	Under Construction	Residential	5	0	0	0
2	706 & 712 Giddings Ave	Under Construction	Commercial	0	0	22,086	11,374
3	39 Hudson Street	Permits Pending	Commercial	0	0	15,000	15,000
4	Towne Courts	Project Under Review	Mixed Use	42	42	2,400	2,400
5	Acura Dealership	Permits Pending	Commercial	0	0	0	0
6	Annapolis Public Library	Permits Pending	Institutional	0	0	32,500	12,653
7	Terrapin Station	Project Under Review	Residential	6	6	6	6
8	Bowman Housing for Veterans	Permits Pending	Residential	6	2	0	0
9	Timothy Gardens	Under Construction	Residential	14	0	0	0
10	141 West	Under Construction	Mixed Use	24	24	31,852	31,852
11	122 MAIN	Under Construction	Commercial	0	0	2,300	2,300
12	110 Compromise St	Under Construction	Commercial	0	0	11,378	0
13	9 ST MARYS	Under Construction	Residential	9	9	0	0
14	St Marys School	Project Under Review	Institutional	0	0	12,694	12,494
15	Annapolis Yacht Club - Downtown	Under Construction	Commercial	0	0	16,838	0
16	285 West	Project Under Review	Residential	18	18	0	0
17	Lincoln Dr	Permits Pending	Commercial	0	0	13,200	13,200
18	Parole Place	Project Under Review	Mixed Use	-	-	-	-
19	Annapolis Towns at Neal Farm	Under Construction	Residential	50	50	0	0
20	Rocky Gorge	Appealed to Court	Residential	46	46	0	0
21	Manekin	Under Construction	Commercial	0	0	107,324	0
22	Public Works Maintenance Facility	Under Construction	Institutional	0	0	21,000	0
23	South Annapolis Yacht Center	Permits Pending	Mixed Use	9	0	-	14,660
24	Annapolis Yacht Club - Eastport	Under Construction	Commercial	-	-	-	-
25	Eastport Sail Loft	Under Construction	Mixed Use	11	11	2,842	-18,945
26	Woodsback Marina	Under Construction	Residential	2	0	0	0
27	Lofts at Eastport Landing	Project Under Review	Mixed Use	127	127	11,898	0
28	Enclave on Spa	Under Construction	Residential	36	36	0	0
29	Village Greens	Under Construction	Mixed Use	89	89	1,000	1,000
30	Villages at Providence Point	Project Under Review	Institutional	383	383	0	0
31	1503 Forest	Under Construction	Commercial	0	0	22,680	22,680
32	1415 Forest Dr	Under Construction	Commercial	0	0	7,043	2,986
33	Primrose Hill	Permits Pending	Residential	26	26	0	0
34	Central Park	Project Under Review	Residential	45	35	0	0
35	Port Annapolis	Under Construction	Commercial	0	0	5,000	5,000
36	Chesapeake Grove	Project Under Review	Residential	42	42	0	0
37	Griscom Square	Under Construction	Residential	12	12	0	0
38	Tyler Heights Elementary	Project Under Review	Institutional	0	0	44,000	44,000
39	SPCA	Project Under Review	Institutional	0	0	27,415	7,155
40	Thomas Woods	Permits Pending	Residential	10	10	0	0
41	Parkside Preserve	Permits Pending	Residential	130	130	0	0
42	Starbucks	Under Construction	Commercial	0	0	1,993	1,993
43	Bay Village Assisted Living	Under Construction	Mixed Use	0	0	92,020	92,020

APPENDIX B: U.S. City Economic Trends Memo

Annapolis Economic Development and Land Use Presentation

Introduction

According to the National League of Cities, economic development is the top issue mentioned in mayoral state of the city speeches, followed closely by public safety. The biggest challenge is that economic development rules are changing more rapidly than ever before.

Economic Development

In general, economic development is about building healthy economies to ensure healthy communities. These are just a few of the ways successful economic development benefits communities:

- Increases tax base—to support, maintain, and improve local infrastructure, such as roads, parks, libraries, and emergency medical services
- Creates and retains jobs—to provide better wages, benefits, and opportunities for advancement
- Enhances quality of life—to raise the economic tide for the entire community, including the overall standard of living for residents

Overview of Land Values

A growing body of empirical evidence shows that while commercial and industrial development can indeed improve the financial well-being of a local government, residential development can strain it. The obvious conclusion is that bedroom communities are not economically sustainable at current tax rates.

National Summary of Cost of Community Services Study Results*

Land Use	Residential*	Comm./Ind.	Farm/Forest/Open Space
Minimum*	1 **versus** 2.11*	1 **versus** 1.04	1 **versus** 0.99
Median	1 **versus** 1.15	1 **versus** 0.27	1 **versus** 0.36
Maximum	1 **versus** 1.02	1 **versus** 0.05	1 **versus** 0.02

*Revenue versus Expenditures. Example, for every $1 of revenue received the expenditure for services is $2.11

These figures are for 83 COCS studies compiled by the American Farmland Trust (http://www.farmlandinfo.org/fic/tas/COCS_9-01.pdf)

Economic Development Trends Having a Big Impact on Cities

1. Placemaking

High quality of life and place are increasingly needed to attract and retain today's companies and workers. Today's workers put more emphasis on quality of life factors such as transportation options, affordability, schools, recreational opportunities, environmental quality, access to healthcare, local vitality, range of service amenities, cultural offerings, and aesthetic qualities. And, companies locate where workers want to be. Hence, today a new "economics of place" is driving economic growth and development. Cities worldwide are now encouraging "livable places" that are mixed-use, economically vibrant, convivial, walkable, bikeable, and transit-friendly.

2. The Knowledge Age

In today's Knowledge Age, wealth is based on the ownership of knowledge and the ability to use that knowledge to create or improve goods and services—*whether you are an auto mechanic or a cybersecurity analyst*. It is an economy in which the driving force is innovation and creativity so that companies can continually offer new and better value to customers and deliver it sooner. Success in this economy also partly depends upon attracting and retaining the "creative class" (aka knowledgeable, innovative and creative workers). This group of the nation's most progressive individuals in technology, knowledge, design, healthcare, law, and the arts accounts for a third of the country's workforce and about half of all wages and salaries. Such workers choose places to live, work, play and learn that place emphasis on quality of life factors.

3. Improved Connectivity

Internet-based technologies allow us to control appliances in our homes through smartphones. Cities are also becoming more connected to help them become more liveable (sensors, crowd-sourced data, etc.) Today's population wants connectivity access, on-demand services and information—and they want it all now. As Annapolis adapts to accommodate digital-native generations, the new "sharing" economy ($335 billion in global revenues expected by 2025, up from today's $15 billion) and other emerging industries—creating a culture of innovation and connectivity, high-speed internet access has become an important factor in attracting new residents and businesses.

4. Increased Diversity

Successful economic development in its simplest form is the creation of economic wealth for all citizens within the diverse layers of society so that all people potentially have access to an increased quality of life. Today, cities must serve a diverse mix of economic, demographic and multi-cultural groups, especially disadvantaged and marginalized residents and businesses, in a manner that enables all residents to contribute to the City's success and prosperity. Despite everything else Annapolis does to promote the City as a hotbed of economic opportunity—inequality and poverty and the resulting social issues could easily drive people, businesses, and economic opportunities away. Economic diversity must be fostered to reduce the City's vulnerability to industry volatility.

5. Affordable Housing

A region's affordability is a critical driver of business and workforce location decisions. A majority of all age categories worry about savings and cost of living, citing living expenses, especially affordable housing options, as important in deciding where to live. Americans are facing, especially in cities, housing scarcity that is pushing up prices and consuming their incomes. The lack of affordable and workforce housing in Annapolis creates many problems, including inhibiting the ability of employers to recruit qualified employees. To the extent an employee cannot find housing near a potential place of employment, this lack of affordable housing creates a disincentive for accepting a job offer.

6. New Mobility

Denser, less car-dependent cities are becoming the accepted wisdom across the developed world. The new vision is one of more walkable and bikeable, denser, neighborhood-based, self-sufficient communities dominated not by the car, but by the smartphone and the network. Generally, in the near future there will be less commuting, less travel and less separation of functions. Numerous trends are helping to shape this "new mobility" approach: electrification of vehicles, increased immediate access to decision-making data via connectivity, car sharing and autonomous driving. Less car-centric sprawl is moving toward more environmentally-focused, high-density developments that emphasize walkability, a wide range of transportation options, and proximity to key resources and amenities. Walkable streets encourage business activity, generate greater tax revenue per acre and offer a higher return on investment than auto-oriented streets.

7. Regional Context

The globalization of the economy and the advance of technology have made geographic boundaries less important. An increasingly mobile workforce can live almost anywhere, which intensifies the jockeying for economic activity among cities and regions throughout the world.

Annapolis not only faces new questions in defining and preserving its character globally, but also within the context of the surrounding region. In order to provide relevant economic development programs to meet today's ever-changing economy, the City must, more than ever, work collaboratively with external officials, nonprofits and larger employers.

8. Land Use and Government Trends Having a Big Impact on Cities

In the context of an ever-changing global economy, it is incumbent upon Annapolis to embrace the following trends and realign some of its current policies regarding zoning, infrastructure, parking, and other related issues in order to adapt.

a. Densification

Growing populations, rapid urbanization, and limited available land in many of the world's cities invariably means accommodating more people in what are already tight spaces. In most cases, density is the best way to accommodate economic change and population growth. Densifying cities can accommodate population growth within a contained environmental footprint where people can enjoy better connectivity, amenities, open spaces, and social interaction, and potentially become more productive and spawn innovation. Today's well-designed developments include a mixed use of land that provides people with liveable areas in which to work and enjoy a high quality of life, where amenities and reliable transport are within easy walking distance. Well managed and well serviced densification makes economic, social and environmental sense, and will provide a competitive advantage for people and firms in the future.

b. Public-Private Transactions

Public-private partnership (also known as PPPs or P3s) deals by local governments are growing in popularity. In a public-private transaction, a local government enters into an agreement with a private entity, whereby the private entity agrees to build specific public facilities, such as a parking garage or new city hall, in exchange for profitable private property rights relating to the underlying public land. Once selected, usually through a competitive bidding process, the private entity designs and builds the new facility at its expense, pursuant to a development agreement with the local government. In these cases, the developer recovers its costs and receives a return on its investment from uses, while the city receives ground rent and a percentage of revenues.

The key to a successful P3 is the ability to define concrete, measurable goals for which private enterprise can be rewarded, but without over-specification, such as dictating precisely the technologies that must be deployed or the design requirements. Such strictures can lead to higher costs and finding the best solution can be left to the better-qualified private partner once goals are set. Designed and executed well, private-sector expertise harnessed within a P3 has the potential to deliver lower-cost, higher-quality infrastructure and services, making them an essential element of smart growth.

c. Parking Requirement Reductions

The U.S. has close to a billion parking spots, roughly four times more parking spaces than vehicles. And, the average automobile spends 95% of its time sitting in place. Ultimately, parking is a self-reinforcing problem. Cities have trained people to expect that parking would be plentiful and free, which encouraged them to drive everywhere—which made them demand more parking. Today, Annapolis is on the cusp of a new era, when cities have begun dramatically reducing the amount of parking spaces they offer. This shift is being driven by both social and technological change. On the social side, people are increasingly opting to live in urban centers, where they do not need, or want to own a car. They are ride-sharing or using public transit instead. As a result, local governments are creating disincentives for persons to have cars and instead, adapt to the "New Mobility" environment.

d. Updating Zoning Code

Current zoning codes in most American cities are Traditional (or Euclidean), which encourages sprawl because it splits land up into segregated residential, commercial, and industrial zones. It is based on the notion that each space should have one, singular use and essentially makes illegal the dense, walkable mixed-use places people are flocking to in cities. In addition, setbacks, floor-to-area-ratio, density and other codes have become overly complicated, often with layers of fixes and overlays, rendering it nearly impossible to determine what actually can and cannot be built. With an outdated zoning code, the process is more difficult, costly and time consuming than it needs to be and it is holding back economic growth and increasing housing costs across America.

The solution to these issues may be the creation of a new hybrid zoning code that blends together elements from Euclidean zoning, Form-based zoning and Incentive zoning. Form-based zoning focuses on building form and scale as it relates to streetscape and adjacent uses. It encourages mixed use, while also preserving the assets and character of a community. Incentive zoning refers to municipal and county planning ordinances that encourage certain aspects such as open space or public amenities in exchange for allowances to density or other bulk regulations. A hybrid-zoning approach to development can benefit both individual landowners and the entire community.

How are healthy cities adapting to these trends?

- Establishing by-right development (streamlined approvals process for projects that comply with the zoning standards receive their approval without a discretionary review process)
- Taxing vacant land or donating it to non-profit developers
- Eliminating off-street parking requirements
- Allowing accessory dwelling units
- Enacting high-density and multifamily zoning
- Establishing density bonuses
- Incorporating inclusionary zoning
- Rezoning, changing codes, and altering utility and infrastructure provisions to accommodate growth

- Establishing development tax or value capture incentives (allowing public agencies to tax the direct beneficiaries of their investments, e.g. property tax, infrastructure impact fees, air rights, joint-venture development)
- Using property tax abatements
- Incentivizing developers to include affordable and/or workforce housing as a portion of new mixed unit projects (lowering or waiving impact fees and other costs for projects that include affordable and/or workforce housing)
- Streamlining or shortening permitting processes and timelines

APPENDIX C: MOBILITY ANALYSIS

In order to establish a clearer basis for City planning decisions, and for coordination with the County, the consultant team and City staff undertook an in depth mobility analysis. The results of these tasks are reported in this appendix.

Section 1: Refined Baltimore Metropolitan Council (BMC) Regional Model. The BMC is the Metropolitan Planning Organization for the Baltimore region. They receive federal funding and perform high-level traffic modeling and planning for all of the greater Baltimore Area, including Anne Arundel County and Annapolis. A new City traffic planning tool was developed in collaboration with the BMC that can model current and future travel demand. This is a refined, more detailed, version of the BMC's current regional model. It is referred to in the study as the "refined BMC model".

Section 2: City Demographic Database. This new database was prepared by City staff for use in the refined BMC model. It reports past, existing, and projected future land use and demographic data and reflects current policies, regulations, and pipeline development projects. This data provides the Baseline Scenario conditions for the future in this study.

Section 3: Existing Traffic Conditions Analysis. Traffic counts were performed at nineteen intersections in the study area in 2017, during typical AM and PM peak periods. Two pre-existing traffic operations analysis models, developed by the City and County using Synchro/SimTraffic software, were updated with these counts. These models were run five times each for both the AM and PM peak hours to analyze 2017 conditions along the Forest Drive corridor and within Eastport to identify traffic operations hot spots and intersections with queuing issues. Screenshots from these models, showing the areas with issues, are included.

Using the existing traffic volume data and observations of existing traffic operations, estimates for the percentage of utilized capacity along the network's road segments were quantified. "Capacity Utilization" was derived by comparing traffic volumes, for each direction within each segment, against the field-observed per-lane capacity of the corridor. The per lane capacity was obtained from field observations in which segments that are currently operating at full capacity were identified (as evidenced by constant signal cycle failures and unmet demand). The volume-to-capacity ratio (v/c) is shown as a percentage and mapped to show conditions in the typical AM and PM peak periods. Road segments that are currently operating at or near capacity have been identified.

Section 4: Future Baseline Traffic Evaluation. A Baseline Scenario trial was run on the refined BMC model using the City's demographic database projections through 2030. This trial assessed the sector's future composition, based on existing City and County policies and City zoning. The model estimates the new travel demand generated within the road network segments by analyzing demographic growth projections to estimate the change in traffic volumes and the future utilization of capacity during typical AM and PM peak periods. Road segments that are expected to operate at or near capacity were again identified. No changes to roads or current choices for modes of travel were assumed in the trial so that the impacts of current land use/demographic trends are considered in isolation.

Section 5: Possible Remedies to Existing and Future Baseline Conditions. A list of possible remedies to current hot spot and capacity issues was developed. It includes potential land use changes, mode changes, and road improvements. The possible road improvements discussed for the west end of the Forest Drive corridor were evaluated using the existing conditions Synchro/SimTraffic models, to provide a planning-level assessment of their potential to alleviate system-wide congestion. Land use scenarios were also developed to test their potential to help redistribute traffic volumes along the Forest Drive corridor and throughout Eastport during the AM and PM peak hours. Other remedies were further researched, as follows:

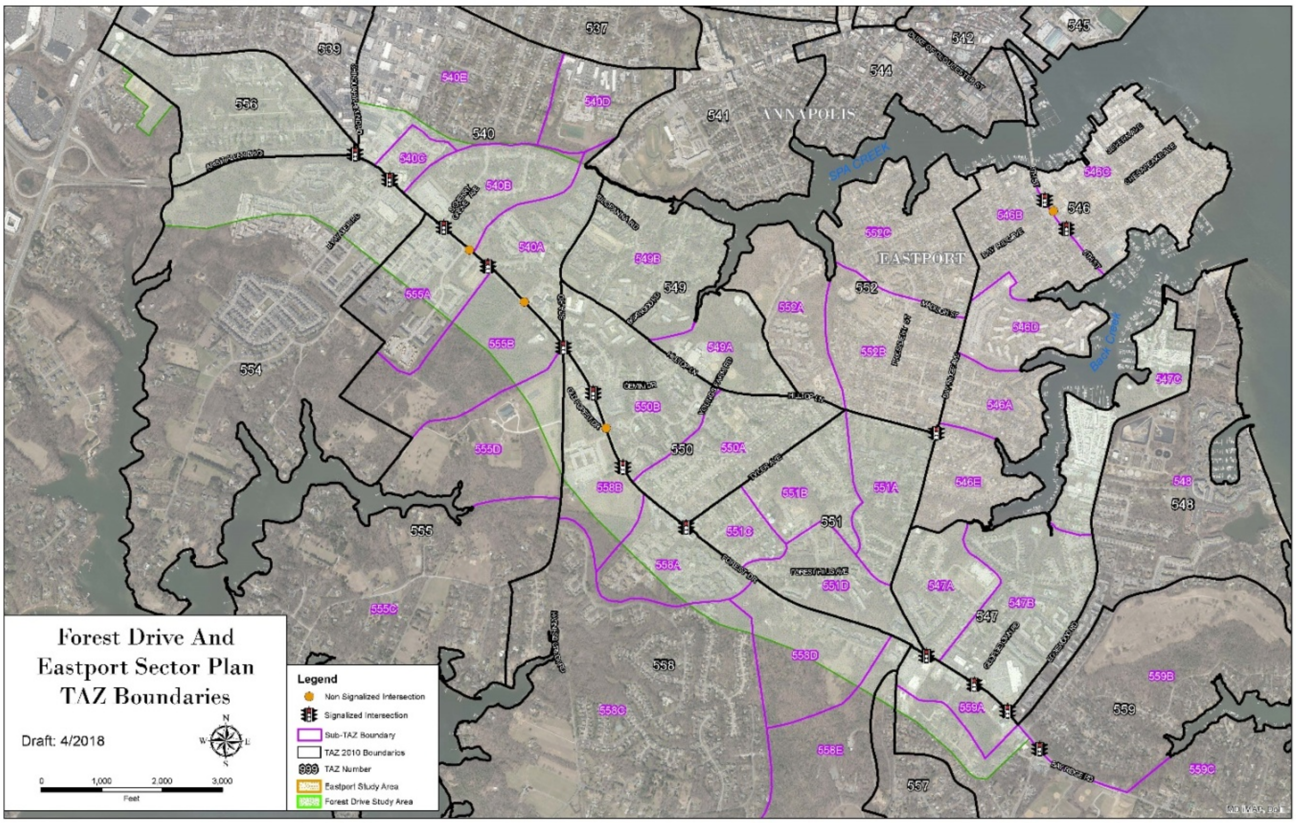
- Land use changes - Mid and High Scenarios. Two demographic scenarios were prepared to quantify the possible amounts, types, and locations of land use changes in the sector based on this study's recommendations. The Mid scenario envisions a moderate rate of change consistent with the City's recent growth rates. The High scenario tests a faster rate of change. The High Scenario also tests a comparatively larger amount of change in Eastport.
- Changes in travel modes. A review of current mode choices was performed to identify possible changes to travel mode choices that might occur in this planning timeframe and could impact vehicular travel demand.
- Changes in technology. A review of technology trends was performed to identify possible changes that might occur in this planning timeframe and could impact vehicular travel demand.
- Commuter origins and destinations. A review of available data on commuter origins and destinations was done to identify opportunities for improved local and regional transit service that could impact vehicular travel demand.
- Preliminary Ultimate Complete Street Sections. A series of preliminary Ultimate Complete Street Sections were developed, for further discussion with the County. These identify ways to increase vehicular traffic capacity as well other modes within the current rights of way (ROW). They also provide the means to reserve capacity for added ROW where needed for future road improvements in the County corridor.

Section 1: Refined BMC Regional Model

The team worked with the Baltimore Metropolitan Council (BMC) staff to develop and run a refined Greater Annapolis version of BMC's regional travel demand model. BMC's regional model includes the major roadway network within the City of Baltimore and Baltimore, Harford, Howard, and Anne Arundel Counties. Geographic regions are divided into Traffic Analysis Zones (TAZs), each of which incorporates demographic/land use information such as number and size of households or number of office or retail employees operating within its boundaries. The model is based on Census data combined with updated data provided regularly by all participating jurisdictions. The latest/current data round is Round 9.

The BMC traffic model presents a conservative view of travel demand in that it assumes drivers will make no significant changes in their travel mode choices in the future. For example, it assumes that the percentages of commuters who currently choose to work at home, or to walk, bike, or take transit to work will not increase in the future. BMC has also not yet attempted to quantify the impacts of coming technological changes on travel behavior. Potential technological changes include the introduction of compact mixed land uses and innovations such as ridesharing, self-driving vehicles, home deliveries, and others, all of which may affect the number of trips a home or workplace might be expected to generate.

To better understand local travel patterns within the sector area, the model was refined to include a more detailed street network and refined Traffic Analysis Zones (TAZs). The existing TAZ areas were divided into sub-TAZs, allowing more precise allocation of forecasted trips to the local network, and the local roadway network included in the model was refined to provide accurate connectivity to the refined TAZs. The following map shows the refined "baseline" network and TAZs, with TAZ split boundaries.



Section 2: City Demographic Database

Starting with the BMC's Round 9 demographic data and format, City staff worked with data from the U.S. Census, City development records, and other resources, to prepare a refined City database. The database shows past and current data and future growth projections. It is being maintained and updated regularly. The data reflects current growth trends, current zoning, approved development, and estimates of possible future development. It quantifies information by TAZ, such as population, average household size, median household income, workers and jobs. For the purposes of this study, 2017 data was used to establish a Baseline Scenario traffic analysis. For purposes of land use comparisons with and without this study, 2020 projections were used; current growth trends were assumed to continue unchanged through 2020.

In 2020, the database estimates that the sector will contain the following:

Population	35,167	75% of the City total
Households	14,155	74% of the City total
Resident workers	18,122	71% of the City total
Jobs	11,509	31% of the City total

The forecasted change in the sector between 2020 and 2030 is as follows:

added population	171	0.02% annual growth rate
added households	251	0.09% annual growth rate
added resident workers	64	0.02% annual growth rate
added jobs	366	0.16% annual growth rate

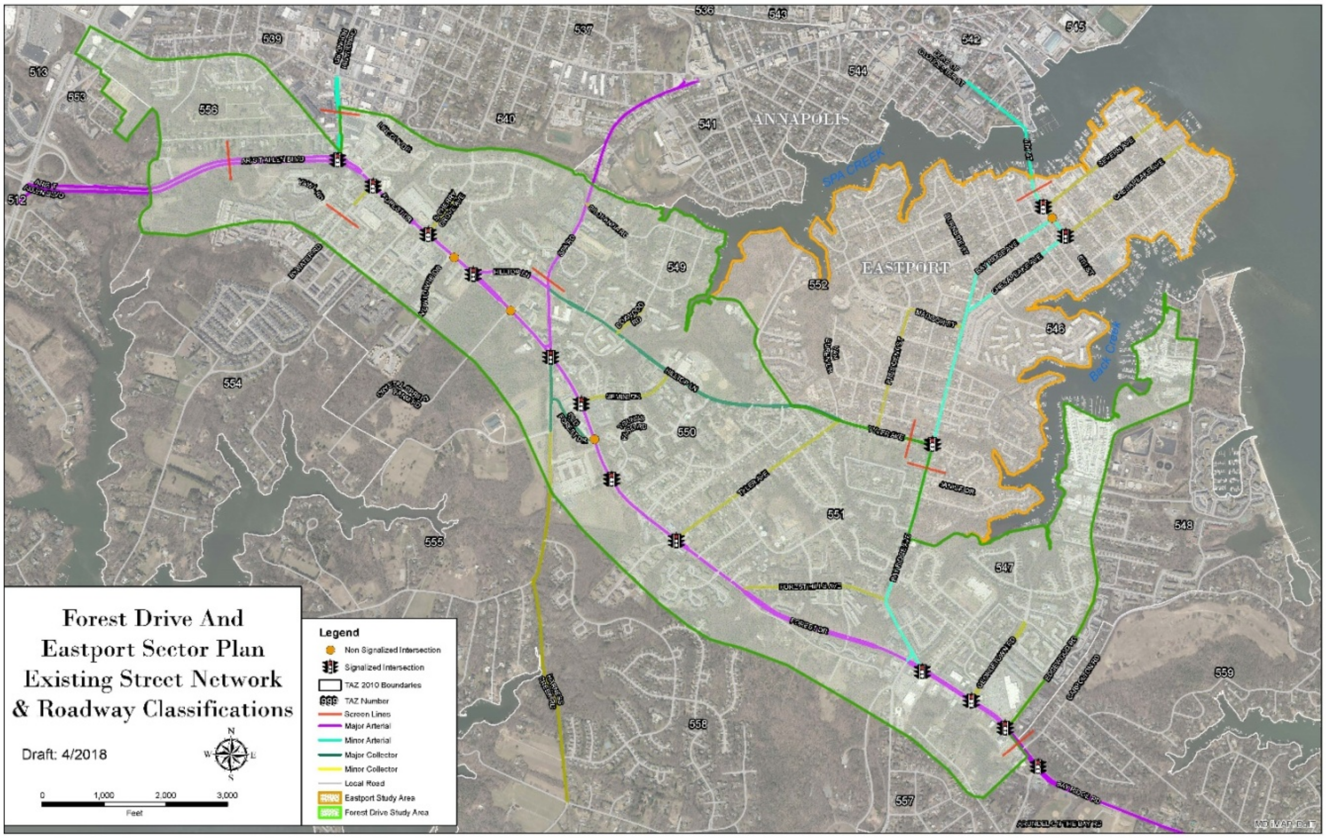
Section 3: Existing Traffic Conditions Analysis

A review of the 2017 traffic conditions in the County corridor and the City street network was done in order to identify existing delays and areas where roads may be operating near or at their capacity to handle traffic. The team reviewed several other traffic studies that have looked at various sections of the sector since the 2009 Comprehensive Plan. Comments from the County, City staff and from stakeholders helped focus these investigations. Some of the key comments follow:

- Stakeholders reported strong directional commuter flows during the AM and PM peak hours, with delays at the western end of the Forest Drive corridor as commuters leave the City in the morning and return in the evening.
- Further down the Corridor, stakeholders reported frustration with delays while making left turns from the Forest Drive corridor onto City streets, as well as making left turns from City streets onto the corridor. Queuing capacity on certain lanes on the City street approaches to corridor intersections were frequently mentioned.
- In Eastport, drivers reported difficulty in leaving their driveways and making left turns in several areas.
- County stakeholders to the east of the City expressed concerns about maintaining a free-flowing corridor through the City with no reduction in travel times.
- All stakeholders expressed concerns about their ability to leave the peninsula during events or emergencies and to navigate the street network during incidents that block portions of the network.
- The City reported that a multi-agency review of procedures has been conducted and new policies have been put in place to better manage traffic during various types of incidents and emergencies.
- The County reported recent installation of a system of 12 interconnected adaptive traffic signals with cameras. The new signals are programmed to modify signal timings during each signal cycle to respond to changes in traffic flows. They work to respond to queuing build-up on the side streets while giving preference to the mainline flow. They are also coordinated to time signal sequences along the corridor. The cameras capture trip data to help in ongoing monitoring and adjustments to signal management.
- County staff reported that this new system has made a 10 to 15% improvement in the corridor's traffic efficiency and that the system has added abilities not yet fully utilized. With these improvements, the corridor mainline moves at the posted speeds. Travel along the corridor through the City typically takes about 6 minutes in non-peak periods.

- Lastly, the County reported two upcoming improvements—one is a safety and capacity improvement for the Forest Drive/Hilltop Lane intersection and one is a developer-funded improvement required for the planned Lidl's grocery store.

The image below illustrates the sector's existing network of collector and arterial streets and the locations of existing signalized intersections in the network.



Traffic counts were collected in 2017 at nineteen intersections to identify current turning movement traffic volumes. Data collection was performed on "typical" weekdays, during a Tuesday, Wednesday, or Thursday when schools were in session. The collection dates for each of the nineteen intersections are listed below.

1. Aris T. Allen Boulevard / Forest Drive at Chinquapin Round Road * .... Wed, May 10, 2017
2. Forest Drive at Bywater Road * .... Wed, May 10, 2017
3. Forest Drive at S. Cherry Grove Avenue * .... Tue, March 21, 2017
4. Forest Drive at Newtowne Drive * .... Thurs, June 1, 2017
5. Forest Drive at Hilltop Lane *... Thurs, May 11, 2017
6. Forest Drive at Crystal Springs Farm Road .... Thurs, June 1, 2017
7. Forest Drive at Spa Road *... Thurs, May 11, 2017
8. Forest Drive at Gemini Drive *.. Tue, May 9, 2017
9. Forest Drive at Old Forest Drive.. Thurs, June 8, 2017
10. Forest Drive at Youngs Farm Road * .... Wed, May 10, 2017
11. Forest Drive at Tyler Avenue * .... Thurs, May 11, 2017
12. Forest Drive / Bay Ridge Road at Bay Ridge Avenue / Hillsmere Drive *........... Tue, May 16, 2017
13. Bay Ridge Road at Georgetown Road *... Wed, May 17, 2017
14. Bay Ridge Road at Edgewood Road * .... Thurs, May 18, 2017
15. Bay Ridge Avenue at Tyler Avenue...Tue, Nov 14, 2017
16. Bay Ridge Avenue at Madison Street ....Tue, Nov 14, 2017
17. Sixth Street at Bay Ridge Avenue ....Tue, Nov 14, 2017

**These intersections have adaptive signals*

Follow-up field visits were made to observe traffic operations and queues at these intersections during the normal weekday PM peak period.

Traffic operations analyses can be performed using multiple techniques. One method is a Critical Lane Volume (CLV) analysis, which evaluates the capacity utilization of an intersection based on the volumes for each movement and the lane configuration of each approach. Outputs of the CLV analysis are volume-to-capacity ratio (v/c) and level of service (LOS). A v/c close to zero is indicative of an intersection that has a lot of available capacity, while a v/c approaching 1.0 has a volume that is approaching the capacity of the intersection, and a v/c of greater than 1.0 indicates an intersection whose demand per hour exceeds the capacity. The assigned LOS corresponds to the calculated v/c and correlates to the control delay. LOS A, B, or C represent good operations with less control delay, while LOS D represents poor conditions, and LOS E and F representing near-failing and failing conditions respectively, with longer levels of delay. Intersections with a v/c of 1.0 or greater are at LOS F.

CLV analyses are easy to calculate and quick to perform and are therefore very useful for preliminary assessments and to help identify the types of improvements that may be recommended for an intersection that is experiencing congestion. However, CLV analyses do not take into account the effects of signal timings, queues, platooning traffic, the effects that delays at one intersection may have on another, or the potential effects of turn lanes with inadequate storage lengths.

For more detailed analysis of intersections and arterial corridors, models are developed using Synchro, which is a software application that incorporates traffic volumes and lane configurations, as does CLV analysis, but also considers the effects of signal timings. Outputs from Synchro include average delay per vehicle for each movement, each approach, or an intersection as a whole; the average delays are equated to LOS to simplify interpretation. While the Synchro analyses are more detailed than CLV analyses, they still do not take into account the effects of queues, platoons, turn lane lengths, or flow between intersections.

Full evaluation of traffic operations at an intersection or along an arterial corridor requires simulation. Models developed in Synchro may be “run” in SimTraffic, which produces a “movie” in which vehicles are introduced into a computerized roadway network and must obey lane uses, intersection controls, posted speed limits, and any other rules of the road that apply to the real world, while traveling to their destination. Modeled vehicles experience congestion along a roadway segment due to queues caused by an intersection three signals ahead, or have to bypass traffic waiting to turn, which has spilled out into the through lanes, just like real vehicles. Model environments are calibrated to approximate realistic variable travel speeds, lane changing behaviors, etc., and allow modelers to watch the roadway network operate, and test improvement scenarios, to identify the source of congestion issues and evaluate potential solutions.

Outputs from SimTraffic include average delay per vehicle by movement, by approach, or for an overall intersection, and measured queue lengths by movement or by approach.

Average delays are equated to LOS to simplify interpretation. Two pre-existing Synchro/SimTraffic models, previously prepared to look at the sector, were utilized to analyze the above list of intersections. One model was provided by Anne Arundel County and was developed for the Forest Drive Corridor; the other was developed for a previous City study of Eastport. The 2017 traffic count data from the studied intersections was used to update these models to represent the AM and PM peak hour traffic operations under "typical" conditions in 2017. The field observations, which include qualitative observations of queues and traffic flows, were used as a basis for refinements to the models, so traffic flows in the models would more closely represent field conditions. Each model was run five times to produce average outputs.

For signalized intersections from a system-wide perspective, metrics include LOS for the overall intersection and queue lengths for each movement and/or approach. Because traffic signals inherently generate delay for vehicles that approach during a red signal phase, and because vehicles along minor approaches may be delayed during a significant portion of a signal cycle, delays for individual approaches are not generally considered to be metrics upon which significant decisions will be based. From a system-wide perspective, delays along a minor approach that is guaranteed a green signal, although not ideal, are not intolerable, particularly when reducing those delays for the minor approach would result in reduced cycle time for mainline traffic, as opposed to worsened average delays for the intersection as a whole.

If it is determined that queues are disrupting traffic flow (such as turn queues that extend beyond their storage and block through lanes) or that queues extend into or beyond an adjacent intersection or major driveway resulting in gridlock or system-wide congestion, those queues should be addressed, whether they are occurring along a major or minor approach, or within a single turn lane. From a design perspective when planning intersection improvements, analysis of lane group delays can also a useful metric as a means to review overall signal timing and phasing.

For intersections along arterials roads, such as Forest Drive, a signal cycle may include as few as two or as many as six signal phases, ranging from less than 60 seconds to over 180 seconds (3 minutes). Traffic planners and engineers must prioritize distribution of that time to provide optimum service to the largest vehicle flows. Therefore, priority at a signal is typically given to the mainline, and side streets and mainline left-turns that are used by comparatively fewer vehicles are often given less "green" signal time. With this approach, the greater delay experienced getting onto and off the mainline is compensated for by reduced delays at the other intersections along the corridor.

As an example, the County signals within the Forest Drive corridor are currently programmed for a 140-second cycle. Some of the smaller volume intersection movements experience delay times within a single cycle that exceeds 80 seconds of delay, which is defined as a LOS F. Therefore, focusing on overall intersection delays and the queues along the approaches, rather than the delays for each approach, provides a clearer, more accurate representation of conditions within the network. The traffic operations analyses were performed using Synchro/SimTraffic models, which identified several corridor segments and individual legs of intersections where delays are currently experienced.

The following Levels of Service tables report the Synchro/SimTraffic model findings for current conditions at the network's major intersections. They estimate both the delay experienced within the overall intersection and the delay experienced along each approach.

Forest Drive Intersection Level of Service (SimTraffic)

Intersection / Approach	Existing Condition						Available Storage
	AM Peak Hour			PM Peak Hour			
	LOS	Delay	Queue	LOS	Delay	Queue	
Aris T. Allen Boulevard / Forest Drive at Chinquapin Round Road							
EB Aris T. Allen Boulevard	C	20.4 s/veh	280 ft	F	140.0 s/veh	2040 ft	3000 ft
WB Forest Drive	C	34.7 s/veh	720 ft	C	21.9 s/veh	505 ft	605 ft
SB Chinquapin Round Road	D	45.5 s/veh	415 ft	F	144.3 s/veh	770 ft	355 ft
Overall Intersection	C	30.7 s/veh	--	F	88.1 s/veh	--	--
Forest Drive at Bywater Road							
EB Forest Drive	B	13.3 s/veh	320 ft	E	61.5 s/veh	695 ft	570 ft
WB Forest Drive	D	38.8 s/veh	785 ft	B	18.4 s/veh	360 ft	770 ft
NB Bywater Road	D	45.0 s/veh	275 ft	D	49.5 s/veh	230 ft	260 ft
SB Bywater Road	D	39.5 s/veh	20 ft	D	47.4 s/veh	20 ft	100 ft
Overall Intersection	C	29.4 s/veh	--	D	42.0 s/veh	--	--
Forest Drive at Cherry Grove Road							
EB Forest Drive	B	16.1 s/veh	320 ft	F	100.4 s/veh	1230 ft	1100 ft
WB Forest Drive	B	18.8 s/veh	510 ft	B	16.6 s/veh	450 ft	860 ft
NB Cherry Grove Road	D	46.5 s/veh	210 ft	D	47.9 s/veh	185 ft	240 ft
SB Cherry Grove Road	D	46.0 s/veh	100 ft	D	40.0 s/veh	75 ft	300 ft
Overall Intersection	B	19.6 s/veh	--	E	59.6 s/veh	--	--
Forest Drive at Newtowne Drive*							
EB Forest Drive	A	2.7 s/veh	5 ft	B	14.6 s/veh	430 ft	440 ft
WB Forest Drive	A	3.6 s/veh	35 ft	A	2.6 s/veh	15 ft	385 ft
NB Newtowne Drive	C	19.2 s/veh	70 ft	F	800.0 s/veh	675 ft	240 ft
Forest Drive at Hilltop Lane							
EB Forest Drive	B	16.5 s/veh	330 ft	D	43.1 s/veh	590 ft	355 ft
WB Forest Drive	B	13.5 s/veh	330 ft	B	18.9 s/veh	285 ft	1640 ft
SB Hilltop Lane	F	371.6 s/veh	1150 ft	D	41.5 s/veh	400 ft	545 ft
Overall Intersection	E	74.4 s/veh	--	D	35.7 s/veh	--	--
Forest Drive at Spa Road							
EB Forest Drive	B	17.9 s/veh	180 ft	F	129.5 s/veh	1720 ft	1680 ft
WB Forest Drive	E	79.0 s/veh	840 ft	C	21.5 s/veh	335 ft	815 ft
NB Spa Road	F	204.2 s/veh	980 ft	E	64.0 s/veh	265 ft	610 ft
SB Spa Road	E	60.9 s/veh	240 ft	E	60.7 s/veh	300 ft	325 ft
Overall Intersection	E	70.9 s/veh	--	E	76.2 s/veh	--	--
Forest Drive at Gemini Drive							
EB Forest Drive	A	6.5 s/veh	140 ft	A	8.5 s/veh	165 ft	780 ft
WB Forest Drive	E	78.4 s/veh	690 ft	A	6.9 s/veh	255 ft	570 ft
NB Driveway	A	0.0 s/veh	0 ft	A	0.0 s/veh	5 ft	60 ft
SB Gemini Drive	E	58.0 s/veh	220 ft	D	37.1 s/veh	130 ft	200 ft
Overall Intersection	D	47.2 s/veh	--	A	9.2 s/veh	--	--
Forest Drive at Old Forest Drive*							
EB Forest Drive	A	1.3 s/veh	5 ft	A	1.5 s/veh	5 ft	560 ft
WB Forest Drive	F	65.7 s/veh	640 ft	A	3.2 s/veh	85 ft	615 ft
NB Old Forest Drive	F	131.6 s/veh	130 ft	C	24.8 s/veh	80 ft	270 ft

Forest Drive Intersection Level of Service (SimTraffic), cont.

Intersection / Approach	Existing Condition						Available Storage
	AM Peak Hour			PM Peak Hour			
	LOS	Delay	Queue	LOS	Delay	Queue	
Forest Drive at Youngs Farm Road / Annapolis Middle School							
EB Forest Drive	A	3.1 s/veh	90 ft	A	3.0 s/veh	130 ft	640 ft
WB Forest Drive	F	147.8 s/veh	1440 ft	A	4.6 s/veh	175 ft	750 ft
NB Driveway	D	53.6 s/veh	35 ft	D	37.8 s/veh	15 ft	200 ft
SB Youngs Farm Road	D	50.5 s/veh	65 ft	D	41.7 s/veh	25 ft	135 ft
Overall Intersection	F	84.3 s/veh	--	A	3.9 s/veh	--	--
Forest Drive at Tyler Avenue							
EB Forest Drive	A	6.8 s/veh	120 ft	A	5.7 s/veh	150 ft	540 ft
WB Forest Drive	F	173.7 s/veh	1805 ft	A	5.4 s/veh	105 ft	370 ft
NB Tyler Avenue	E	57.2 s/veh	105 ft	E	60.1 s/veh	110 ft	470 ft
SB Tyler Avenue	D	49.9 s/veh	190 ft	C	27.5 s/veh	95 ft	50 ft
Overall Intersection	F	95.0 s/veh	--	A	7.6 s/veh	--	--
Forest Drive / Bay Ridge Avenue at Hillsmere Drive							
EB Forest Drive	B	18.5 s/veh	245 ft	C	25.5 s/veh	410 ft	960 ft
WB Bay Ridge Avenue	C	23.3 s/veh	300 ft	C	23.8 s/veh	290 ft	280 ft
NB Hillsmere Drive	D	50.3 s/veh	155 ft	E	62.2 s/veh	395 ft	270 ft
SB Bay Ridge Avenue	D	51.7 s/veh	180 ft	D	51.7 s/veh	160 ft	510 ft
Overall Intersection	C	29.5 s/veh	--	D	35.2 s/veh	--	--
Bay Ridge Avenue at Georgetown Boulevard							
EB Bay Ridge Avenue	A	5.0 s/veh	135 ft	A	5.6 s/veh	215 ft	765 ft
WB Bay Ridge Avenue	A	5.5 s/veh	185 ft	A	5.1 s/veh	135 ft	650 ft
SB Georgetown Boulevard	C	28.2 s/veh	195 ft	C	20.2 s/veh	155 ft	215 ft
Overall Intersection	A	7.4 s/veh	--	A	6.7 s/veh	--	--
Bay Ridge Avenue at Edgewood Road							
EB Bay Ridge Avenue	A	8.5 s/veh	235 ft	B	11.2 s/veh	245 ft	640 ft
WB Bay Ridge Avenue	B	10.1 s/veh	250 ft	B	19.6 s/veh	270 ft	370 ft
NB Driveway	D	45.4 s/veh	35 ft	D	52.6 s/veh	70 ft	200 ft
SB Edgewood Road	C	21.4 s/veh	200 ft	C	25.4 s/veh	190 ft	190 ft
Overall Intersection	B	11.7 s/veh	--	B	16.9 s/veh	--	--

Note: The above results are based on planning-level analyses. More detailed analysis and study are required to fully evaluate the existing conditions traffic operations.

LOS:
Signalized Intersection

LOS	Delay
A	≤ 10 s/veh
B	≤ 20 s/veh
C	≤ 35 s/veh
D	≤ 55 s/veh
E	≤ 80 s/veh
F	> 80 s/veh

LOS:
Unsignalized Intersection*

LOS	Delay
A	≤ 10 s/veh
B	≤ 15 s/veh
C	≤ 25 s/veh
D	≤ 35 s/veh
E	≤ 50 s/veh
F	> 50 s/veh

Eastport Intersection Level of Service (SimTraffic)

Intersection / Approach	Existing Condition						Available Storage
	AM Peak Hour			PM Peak Hour			
	LOS	Delay	Queue	LOS	Delay	Queue	
6th Street at Severn Avenue							
EB 6th Street	B	12.6 s/veh	200 ft	B	12.7 s/veh	310 ft	445 ft
WB 6th Street	B	17.1 s/veh	215 ft	B	15.3 s/veh	190 ft	155 ft
NB Severn Avenue	C	25.5 s/veh	120 ft	C	24.8 s/veh	75 ft	365 ft
SB Severn Avenue	B	18.1 s/veh	100 ft	B	19.4 s/veh	180 ft	305 ft
Overall Intersection	B	16.3 s/veh	--	B	15.1 s/veh	--	--
6th Street at Bay Ridge Avenue*							
EB 6th Street	A	1.4 s/veh	30 ft	A	1.9 s/veh	20 ft	180 ft
WB 6th Street	A	4.2 s/veh	180 ft	A	1.6 s/veh	70 ft	300 ft
6th Street at Chesapeake Avenue							
EB 6th Street	A	7.6 s/veh	90 ft	A	5.8 s/veh	85 ft	275 ft
NB Chesapeake Avenue	A	8.3 s/veh	145 ft	A	5.4 s/veh	95 ft	340 ft
SB Chesapeake Avenue	B	15.9 s/veh	105 ft	B	13.1 s/veh	120 ft	320 ft
Overall Intersection	A	9.2 s/veh	--	A	7.0 s/veh	--	--
Bay Ridge Avenue at Madison Street							
EB Madison Street	B	16.0 s/veh	65 ft	B	18.0 s/veh	75 ft	410 ft
WB Driveway	B	14.3 s/veh	70 ft	B	17.2 s/veh	120 ft	100 ft
NB Bay Ridge Avenue	B	10.8 s/veh	235 ft	B	10.5 s/veh	230 ft	360 ft
SB Bay Ridge Avenue	A	7.5 s/veh	185 ft	B	10.2 s/veh	210 ft	360 ft
Overall Intersection	B	10.0 s/veh	--	B	11.4 s/veh	--	--
Bay Ridge Avenue at Tyler Avenue							
EB Tyler Avenue	C	26.1 s/veh	180 ft	C	31.5 s/veh	340 ft	900 ft
WB Tyler Avenue	D	45.2 s/veh	35 ft	D	47.5 s/veh	40 ft	300 ft
NB Bay Ridge Avenue	B	11.4 s/veh	210 ft	B	13.6 s/veh	200 ft	320 ft
SB Bay Ridge Avenue	B	10.8 s/veh	175 ft	B	17.8 s/veh	385 ft	360 ft
Overall Intersection	B	14.7 s/veh	--	C	20.6 s/veh	--	--

Note: The above results are based on planning-level analyses. More detailed analysis and study are required to fully evaluate the existing conditions traffic operations.

LOS: Signalized Intersection		LOS: Unsignalized Intersection*	
LOS	Delay	LOS	Delay
A	≤ 10 s/veh	A	≤ 10 s/veh
B	≤ 20 s/veh	B	≤ 15 s/veh
C	≤ 35 s/veh	C	≤ 25 s/veh
D	≤ 55 s/veh	D	≤ 35 s/veh
E	≤ 80 s/veh	E	≤ 50 s/veh
F	> 80 s/veh	F	> 50 s/veh

Based on these tables, the list below highlights the most congested corridor segments and intersection approaches during each peak period:

- AM Peak Hour:
    - Southbound (SB) Hilltop Lane approaching Forest Drive

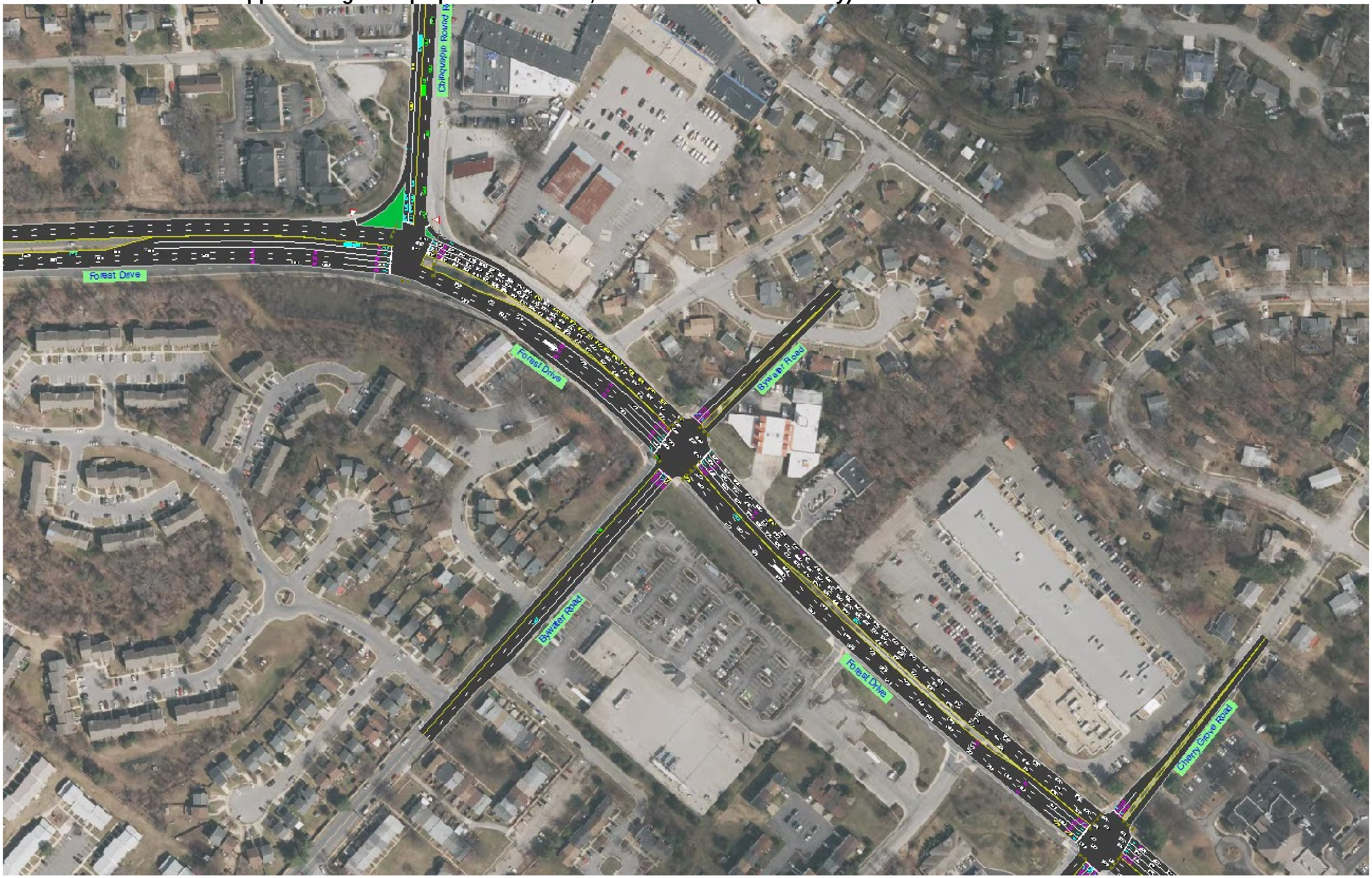
- Westbound (WB) Forest Drive approaching Spa Road—this congestion along Forest Drive results in operational issues at several additional locations, as follows:
  - SB Gemini Drive approaching Forest Drive
  - Northbound (NB) Old Forest Drive approaching Forest Drive
  - NB Tyler Avenue approaching Forest Drive

- PM Peak Hour:
  - Eastbound (EB) Aris T. Allen Boulevard approaching Chinquapin Round Road
  - SB Chinquapin Round Road approaching Forest Drive
  - EB Forest Drive approaching Bywater Road, S. Cherry Grove Road, Hilltop Lane, and Spa Road—this congestion along Forest Drive results in operational issues at multiple additional locations, as follows:
    - NB Newtowne Drive approaching Forest Drive
    - NB and SB Spa Road approaching Forest Drive
  - NB Tyler Avenue approaching Forest Drive
  - NB Hillsmere Drive approaching Forest Drive

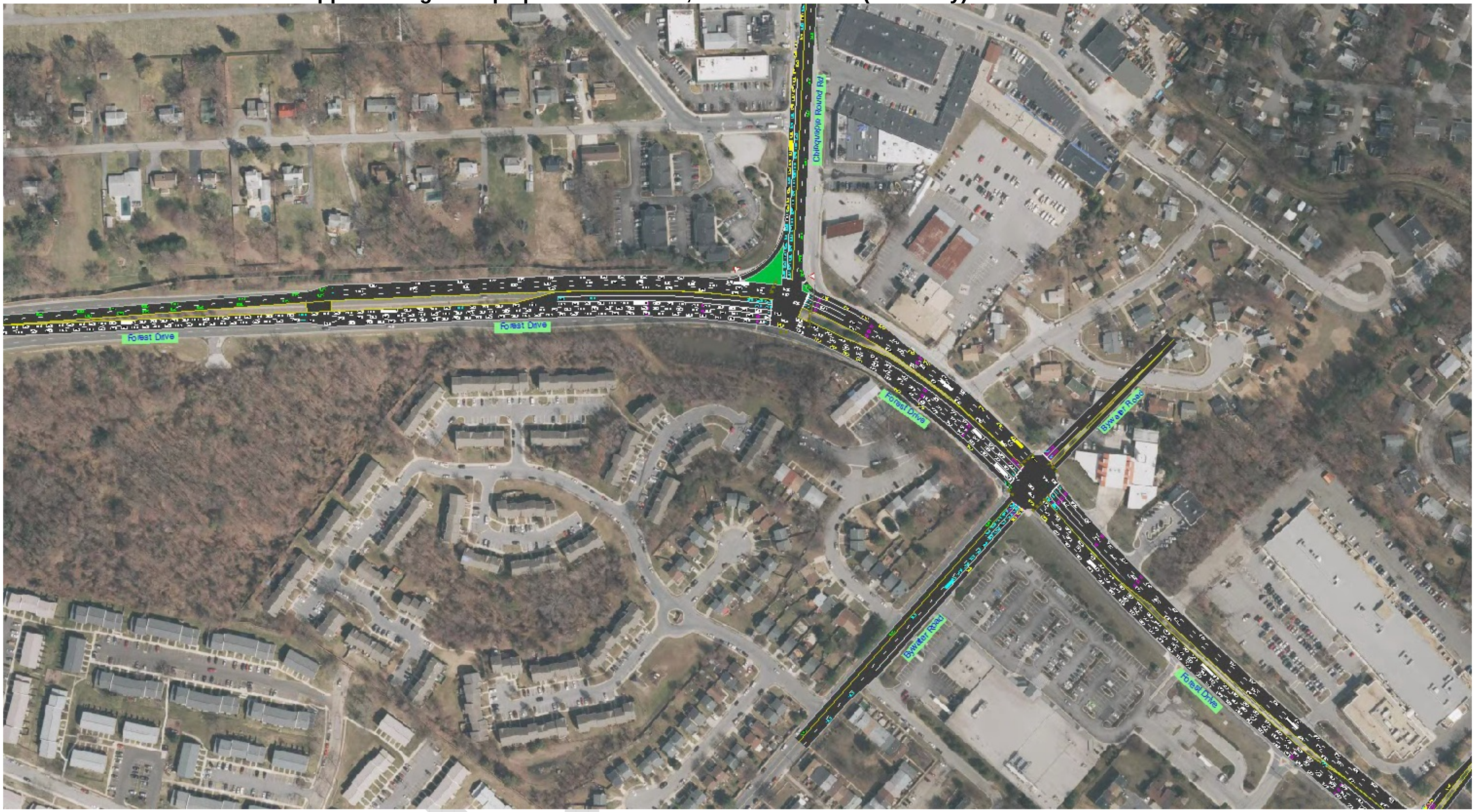
The tables also provide an assessment of current queuing conditions. Queues are identified as a potential issue when their length approaches or extends beyond an adjacent intersection or major driveway, where the presence of the queue may disrupt traffic operations resulting in conflicts and/or gridlock. Extensive queues along Forest Drive demonstrate the level of congestion through multiple roadway segments; along WB Forest Drive, from east of Tyler Avenue to Spa Road, during the AM peak hour, and along EB Forest Drive, from west of Chinquapin Round Road to Spa Road, during the PM peak hour. Excessive queues along the approaches to Forest Drive are a byproduct of congestion along Forest Drive, and in some cases a result of adjacent intersections or driveways being located too close to Forest Drive along the approach.

The following SimTraffic screenshot images show the areas in the corridor currently experiencing delays and vehicular queuing during peak commuter periods. The vehicles are color-coded to represent intended movements through the intersection or modeled network: white = through; yellow = right-turn; teal = left-turn, and green = leaving network.

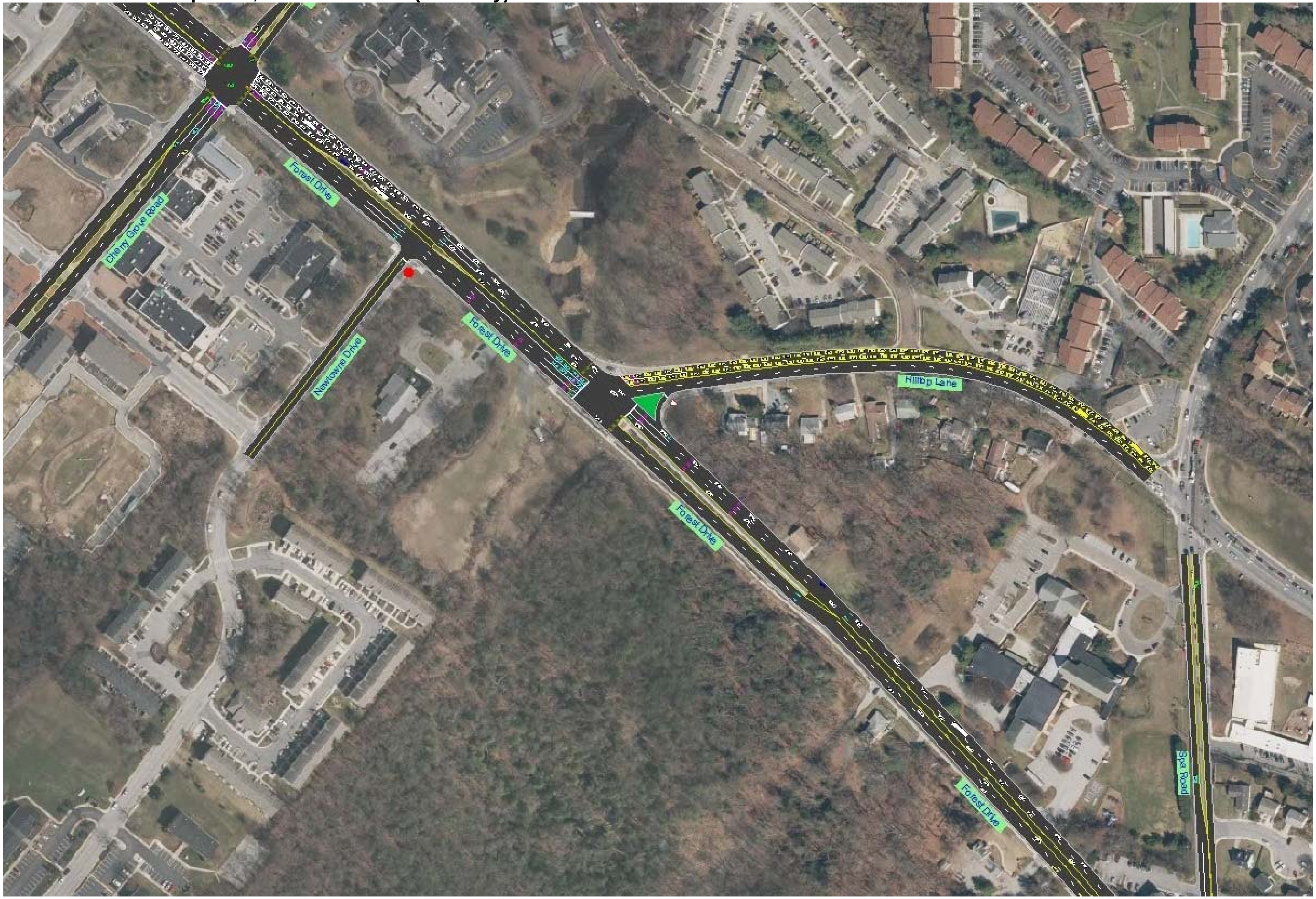
Westbound Forest Drive approaching Chinquapin Round Road, AM Peak Period (Weekday)



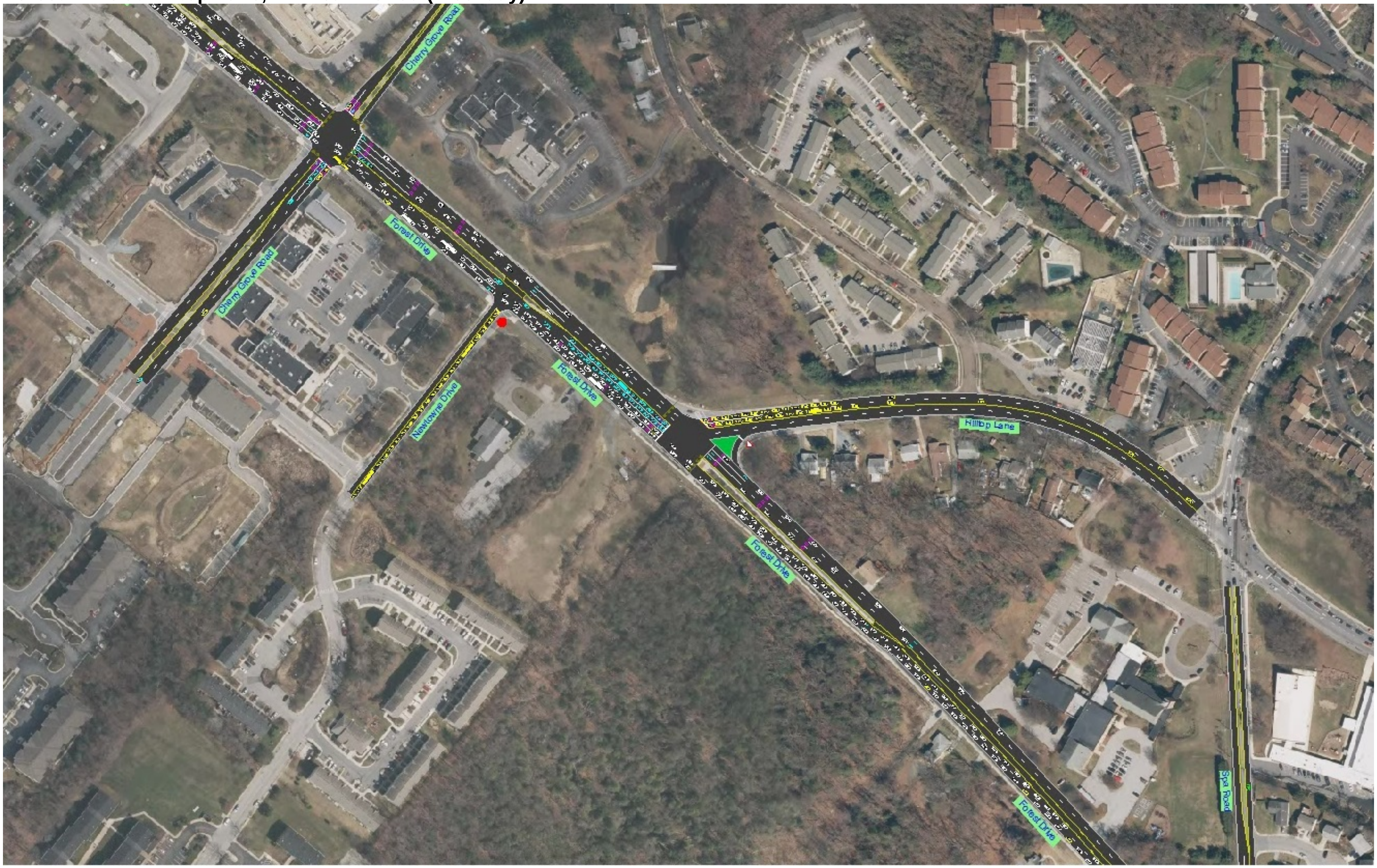
Eastbound Aris T. Allen Blvd. approaching Chinquapin Round Road, PM Peak Period (Weekday)



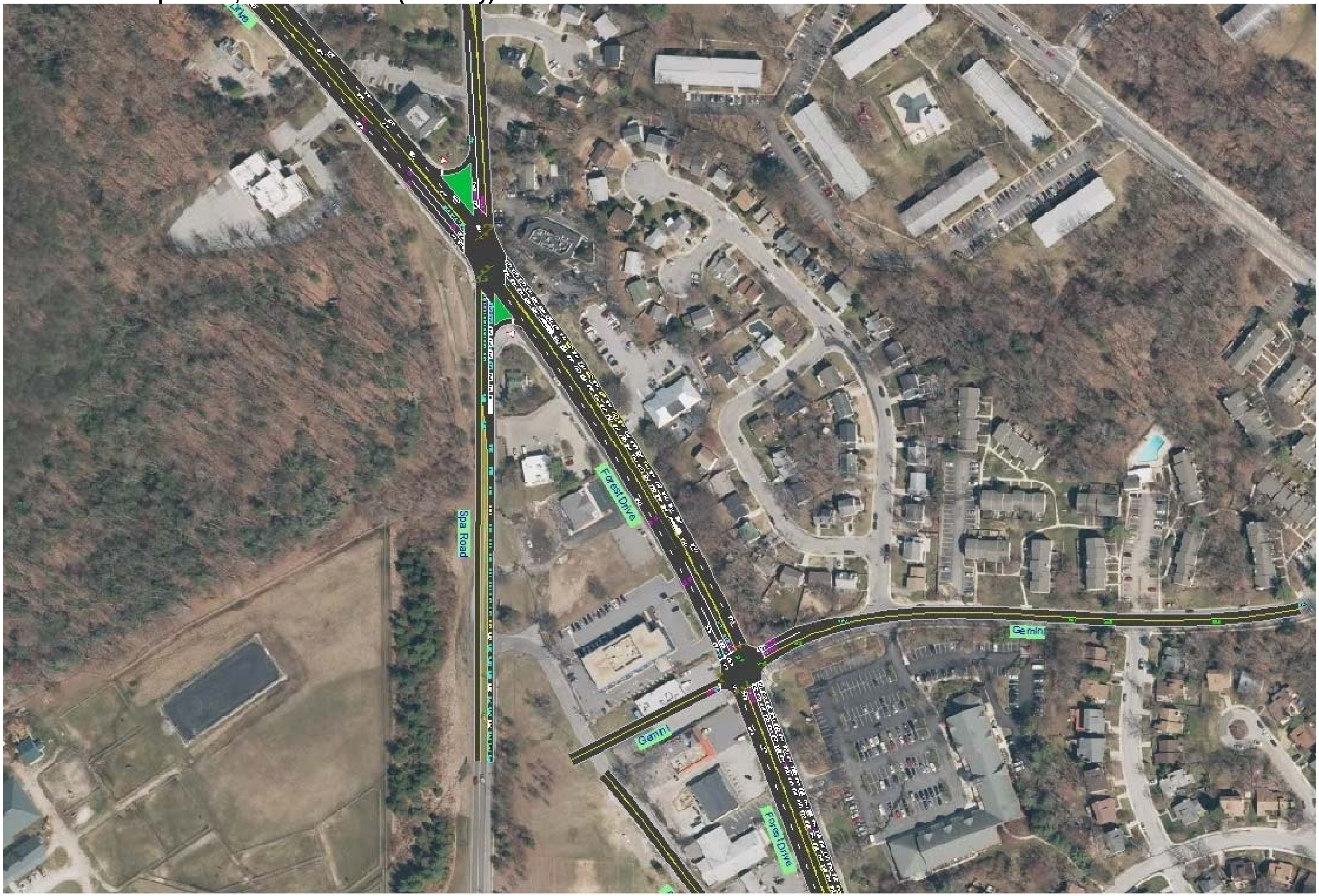
Forest Drive at Hilltop Lane, AM Peak Period (Weekday)



Forest Drive at Hilltop Lane, PM Peak Period (Weekday)



Forest Drive at Spa Road, AM Peak Period (Weekday)



Under existing conditions, network traffic volumes are greatest in the west end of the corridor as large numbers of commuters depart the peninsula to go to work in the AM peak and then return in the PM peak. The directional distribution is approximately 38% EB and 62% WB during the AM peak period, and approximately 57% EB and 43% WB during the PM peak period, indicating a notable directional imbalance during the AM and PM peak periods. A similar trend occurs along Bay Ridge Avenue, with traffic flowing NB in the AM peak period and SB in the PM peak period. The smaller difference in the directional split during the PM peak period is due to significant numbers of non-commuter trips, presumably for shopping and entertainment that are also leaving the peninsula, and the City, during the evening peak hour. The through traffic flows in the west end PM period also includes many local trips to the shopping areas on the south side of the corridor between Bywater Road and S. Cherry Grove Road that add delays at mid-block turns along this primary arterial.

Traffic volumes are generally least along the eastern half of the Forest Drive corridor. In the AM peak, traffic volumes increase along the primary City collector routes as they approach Forest Drive and along Forest Drive as the corridor approaches Chinquapin Round Road. In the PM peak, as commuters are returning home, the reverse occurs; traffic volumes are highest along Forest Drive at Chinquapin Round Road then gradually filter out through the peninsula’s roadway network.

Traffic volumes through Eastport are oriented more towards travel across the Sixth Street Bridge into downtown Annapolis, with AM experiencing slightly more traffic NB into the downtown area and PM travel experiencing slightly more traffic SB into Eastport (46/54 in the AM, and 52/48 in the PM).

<u>Current Road Capacity Analysis</u>

The method used to qualitatively evaluate utilized road capacity along Forest Drive, Bay Ridge Road, Bay Ridge Avenue, and Sixth Street was performed using 2017 traffic count data, BMC model results for 2017, and a series of field visits performed on typical weekdays to observe utilization of available capacity at the signalized intersections in the study area. Utilization of available capacity is defined by the amount of “downtime” experienced during each signal cycle (time during which no vehicles are proceeding through the intersection along the highest volume approach during each signal phase), and the presence of unmet demand along each approach (waiting vehicles that are unable to enter the intersection during a green signal phase for that movement).

<u>Findings</u>

This evaluation found that portions of Forest Drive, at the west end of the corridor, are currently operating at or near capacity, primarily between Chinquapin Round Road and Bywater Road. No roadway segments in Eastport were determined to be operating at or near capacity. The capacity issues identified at the west end appear to dictate the overall capacity of the Forest Drive corridor during peak periods. This is explained further in the following paragraphs.

Traffic entering and exiting the peninsula along Forest Drive does so via Chinquapin Round Road and Aris T. Allen Boulevard. As a result, the section of Forest Drive between Chinquapin Round Road and Bywater Road has become the bottleneck that regulates traffic flow both into and out of the peninsula. Eastbound, in the PM peak period, high volumes of traffic queue along both SB Chinquapin Round Road and EB Aris T. Allen Boulevard, with the majority of this traffic destined for EB Forest Drive. The inflow from these two approaches is metered, or restricted, by the traffic signal at Bywater Road; while the traffic signal for EB Forest Drive is green at Bywater Road, SB Chinquapin Round Road and EB Aris T. Allen Boulevard provide a constant flow of traffic into the peninsula.

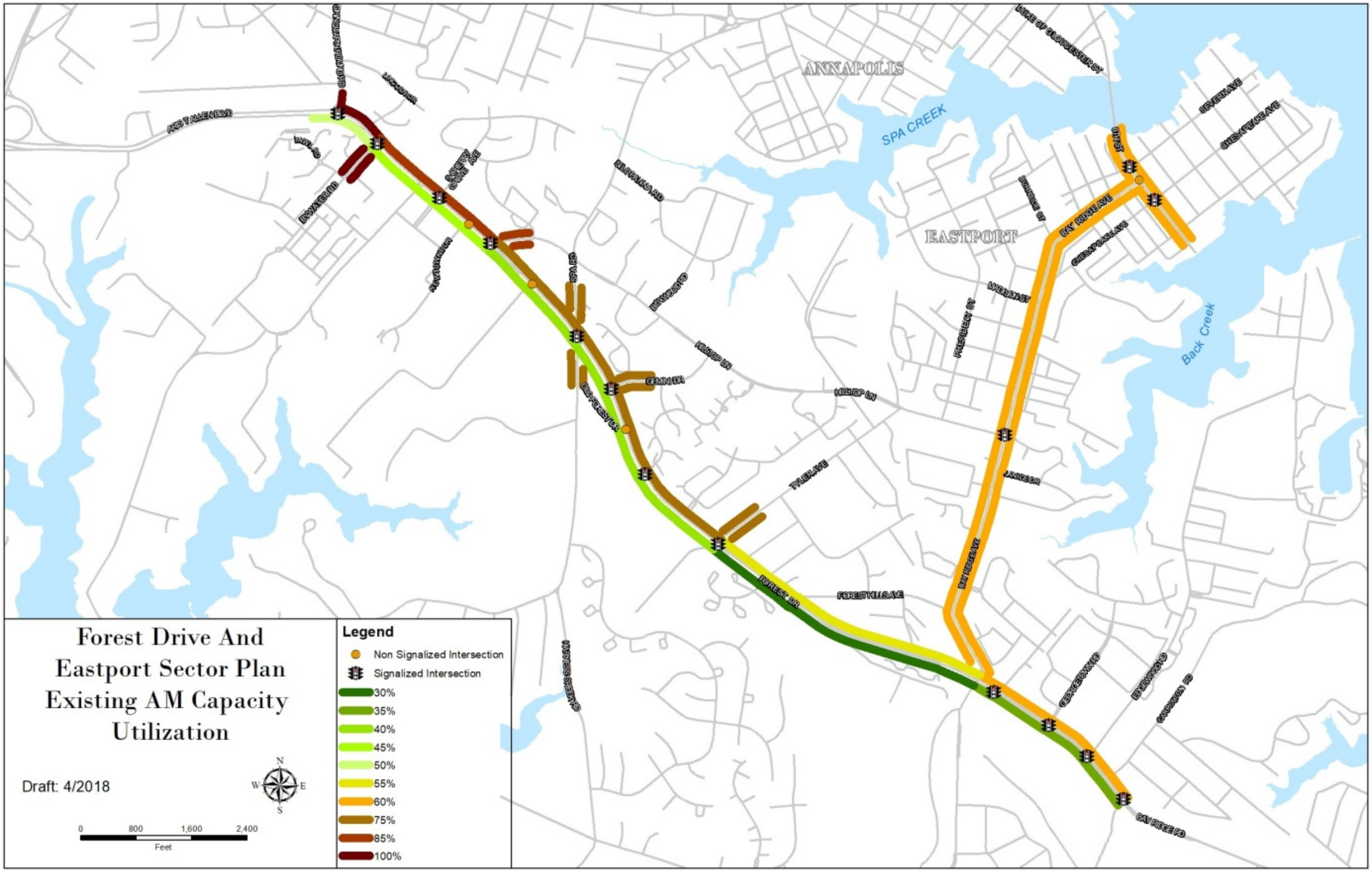
However, every time the signal for EB Forest Drive turns red to allow traffic to depart Bywater Road, traffic flow along SB Chinquapin Round Road and EB Aris T. Allen Boulevard stops. The constant demand/flow of traffic onto EB Forest Drive, east of Chinquapin Round Road, shows that this section of the network, in the peak direction during the PM peak period, is operating at 100% capacity, meaning that there is significant unmet demand along EB Forest Drive between these two intersections, and no time in which vehicles along either SB Chinquapin Round Road or EB Aris T. Allen Boulevard are not waiting to enter this segment.

During the AM peak period, a similar condition can be observed along WB Forest Drive, as traffic flows from NB Bywater Road compete with traffic flows along WB Forest Drive to access NB Chinquapin Round Road and WB Aris T. Allen Boulevard. Again, this constant demand/flow of traffic onto WB Forest Drive shows that WB Forest Drive, between Bywater Road and Chinquapin Round Road, in the peak direction during the AM peak period, is operating at 100% capacity.

The maximum available capacity for each roadway segment in the Forest Drive corridor is therefore defined by the AM and PM peak period volumes along Forest Drive between Chinquapin Round Road and Bywater Road, with adjustments made for the number of lanes along other segments of the corridor.

Similar capacity estimates were developed for the roadway network in Eastport. Observations of utilization by the peak directions of traffic at the signalized intersections were used to determine the ultimate capacity of these roadways.

An evaluation of utilized capacity along Forest Drive, Bay Ridge Road, Bay Ridge Avenue, and Sixth Street was performed based upon these observations. The maps on the following pages show the existing AM and PM Peak hour link capacity utilization of the road network, during a typical weekday in 2017, based on the traffic counts and model results.


Forest Drive And
Eastport Sector Plan
Existing AM Capacity
Utilization
Draft: 4/2018
Legend
Non Signalized Intersection
Signalized Intersection
30%
35%
40%
45%
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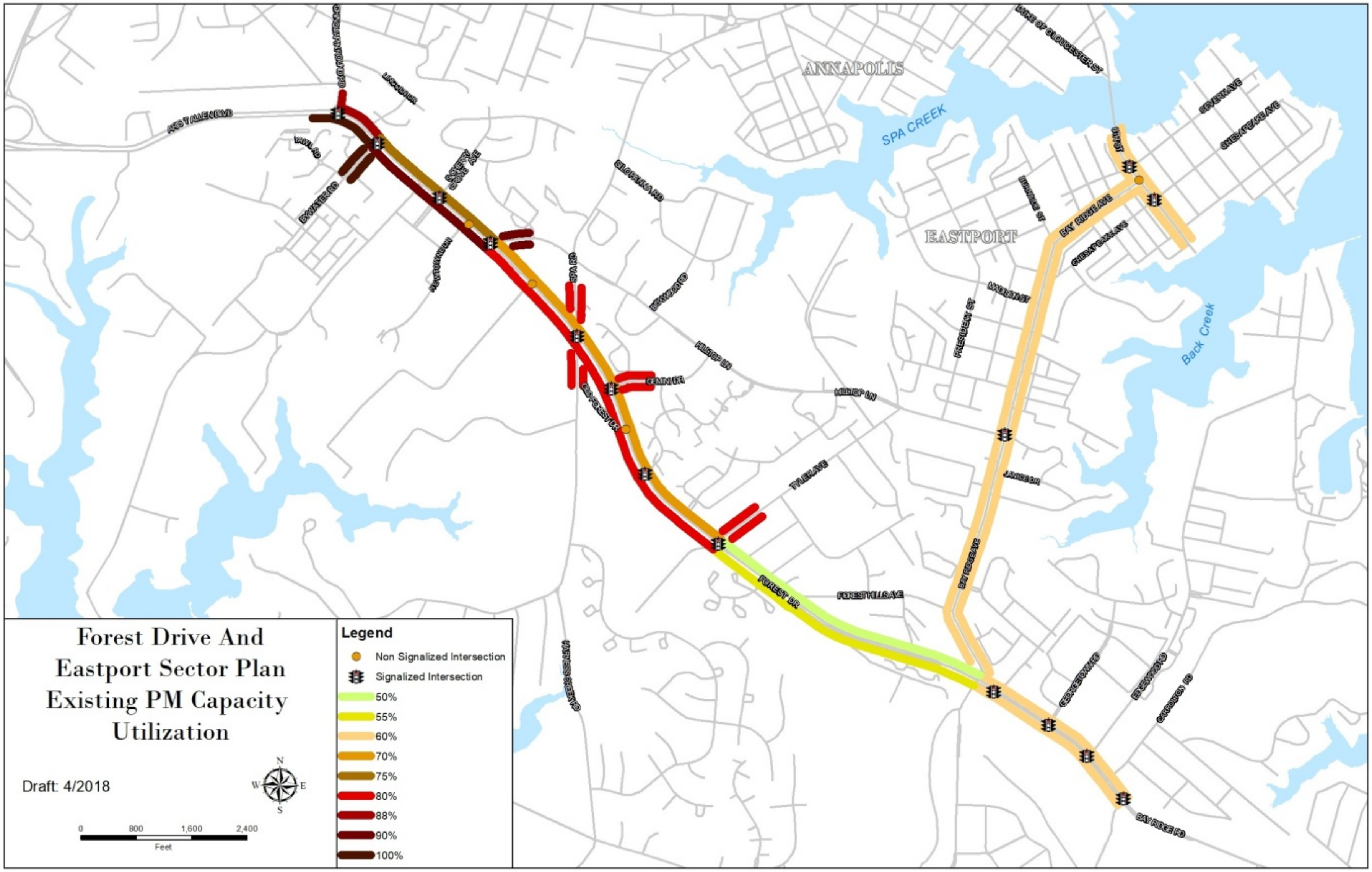
ANNAPOLIS
SPA CREEK
EASTPORT
Back Creek
FOREST DR
FOREST HILLS AVE
HILLTOP LN
BAY RIDGE AVE
BAY RIDGE RD
SEVERN AVE
CHESAPEAKE AVE


Forest Drive And
Eastport Sector Plan
Existing PM Capacity
Utilization
Draft: 4/2018
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Non Signalized Intersection
Signalized Intersection
50%
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70%
75%
80%
88%
90%
100%
ANNAPOLIS
SPA CREEK
EASTPORT
Back Creek
FOREST DR
BAY RIDGE RD

As discussed previously, the data and analyses show that existing 2017 traffic volumes along Forest Drive are typically much higher along the west end of the corridor and are relatively minor along the east end of the corridor, with several significant decision points, such as Hilltop Lane, Spa Road, Tyler Avenue, and Bay Ridge Avenue, carrying traffic to and from other areas within the peninsula.

The most significant queues and delays are experienced at critical points along WB Forest Drive during the AM peak hour, primarily approaching Spa Road, and along the SB Hilltop Lane and NB Spa Road approaches to Forest Drive. The model shows that under both existing and future conditions, right turns onto Chinquapin Round Road account for over a quarter of the movements along the WB Forest Drive approach during both the AM and PM peak hours.

During the PM peak hour, LOS E and F conditions are primarily experienced along EB Forest Drive, at Chinquapin Round Road, Bywater Road, and S. Cherry Grove Avenue, as traffic first enters the peninsula. Queues and delays are also experienced along SB Chinquapin Round Road during the PM peak hour.

Capacity is available throughout the corridor in the non-peak direction during each peak period, and along both directions of travel toward the east end of the peninsula. Additionally, east of Bywater Road, the signalized intersections within the system are typically operating well within available capacity during the AM and PM peak periods of a typical weekday, with queues along the minor approaches able to clear during each signal cycle. Queues and delays along more significant approach roads, such as Hilltop Lane, and Spa Road, may require one or two cycles for vehicles to clear, particularly during the AM peak period. The upgraded traffic signal system along the Forest Drive corridor is currently working to improve traffic flow along the corridor.

Section 4: Future Baseline Traffic Evaluation

To understand the likely future traffic conditions under current roadway and land use conditions, a “Future Baseline” analysis was conducted.

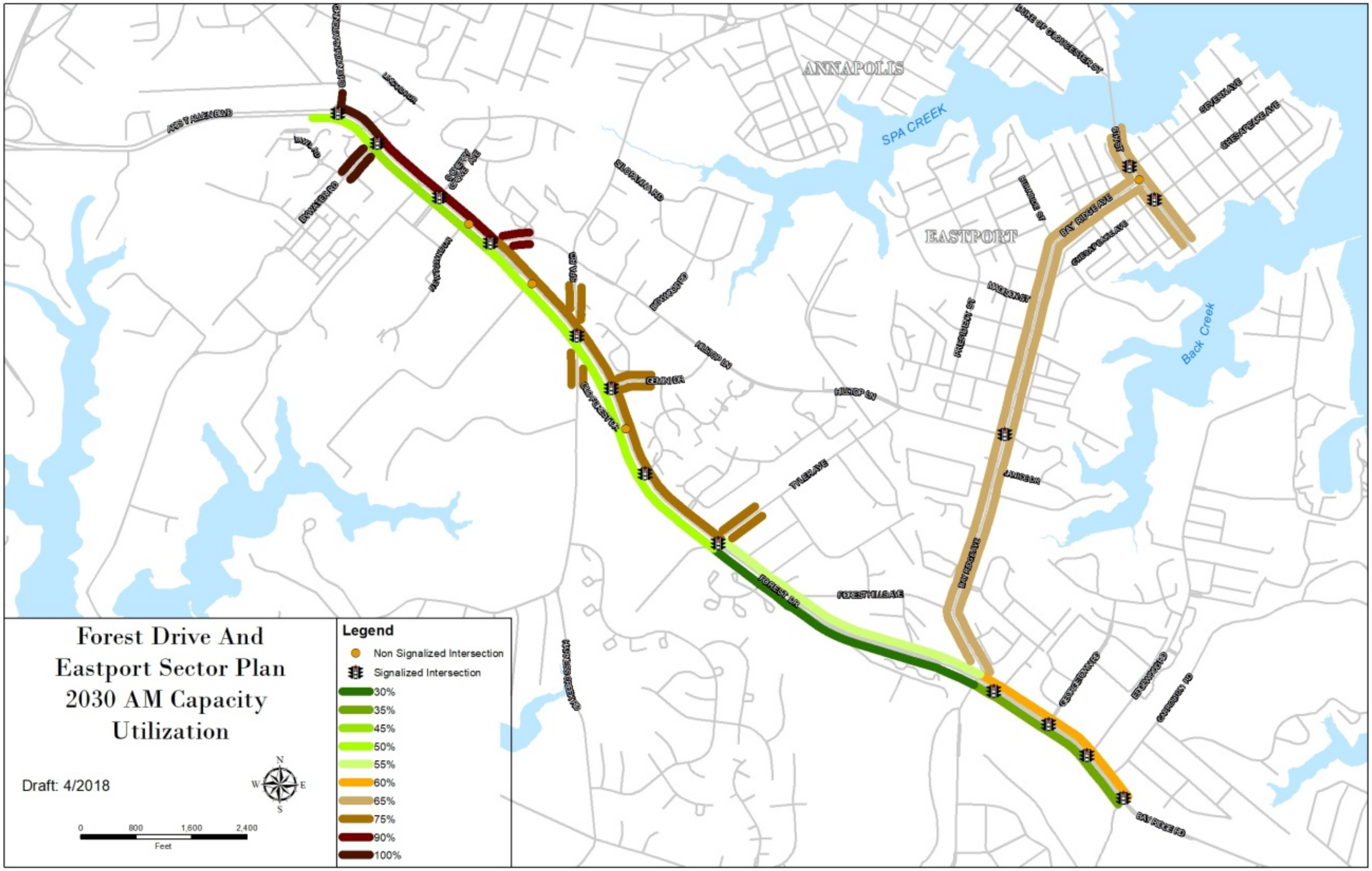
Using the refined BMC model and the Baseline Scenario City demographic data, future condition traffic volumes in the sector were assessed for the years 2025 and 2030 to create a baseline view of traffic demand growth projected to occur without any changes resulting from this Sector Study. The refined model was calibrated against the existing traffic data, and run, by BMC, to produce AM and PM peak period traffic volumes, by roadway segment for the 2017, 2025, and 2030 conditions.

Model Findings

The resulting analyses show that in 2030, the current areas with road capacity issues are still an issue. However, no additional road link sections have worsened to the point of reaching 100% capacity. The data also shows that the annual rate of traffic growth between 2017 and 2030 varies widely within the various segments and traffic direction along the network, averaging less than 0.5% growth-per-year, with a high segment of 1%. These growth rates are lower than had been assumed in earlier studies, which had anticipated a 1% annual increase in traffic over the network as a whole. This demonstrates that improvements to current problems will accommodate this growth.

These results show that the Baseline Scenario traffic growth expected within the peninsula with the anticipated land use changes, new development, and redevelopment occurring is expected to be relatively low. Improvements recommended to address the current problems will largely accommodate this growth. While localized effects of development may be felt at individual intersections, the effects to the network are expected to be minor.

The following maps show the projected sector network road link capacity during the AM and PM peak period in the year 2030.


Forest Drive And
Eastport Sector Plan
2030 AM Capacity
Utilization
Draft: 4/2018
Legend
Non Signalized Intersection
Signalized Intersection
30%
35%
45%
50%
55%
60%
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75%
90%
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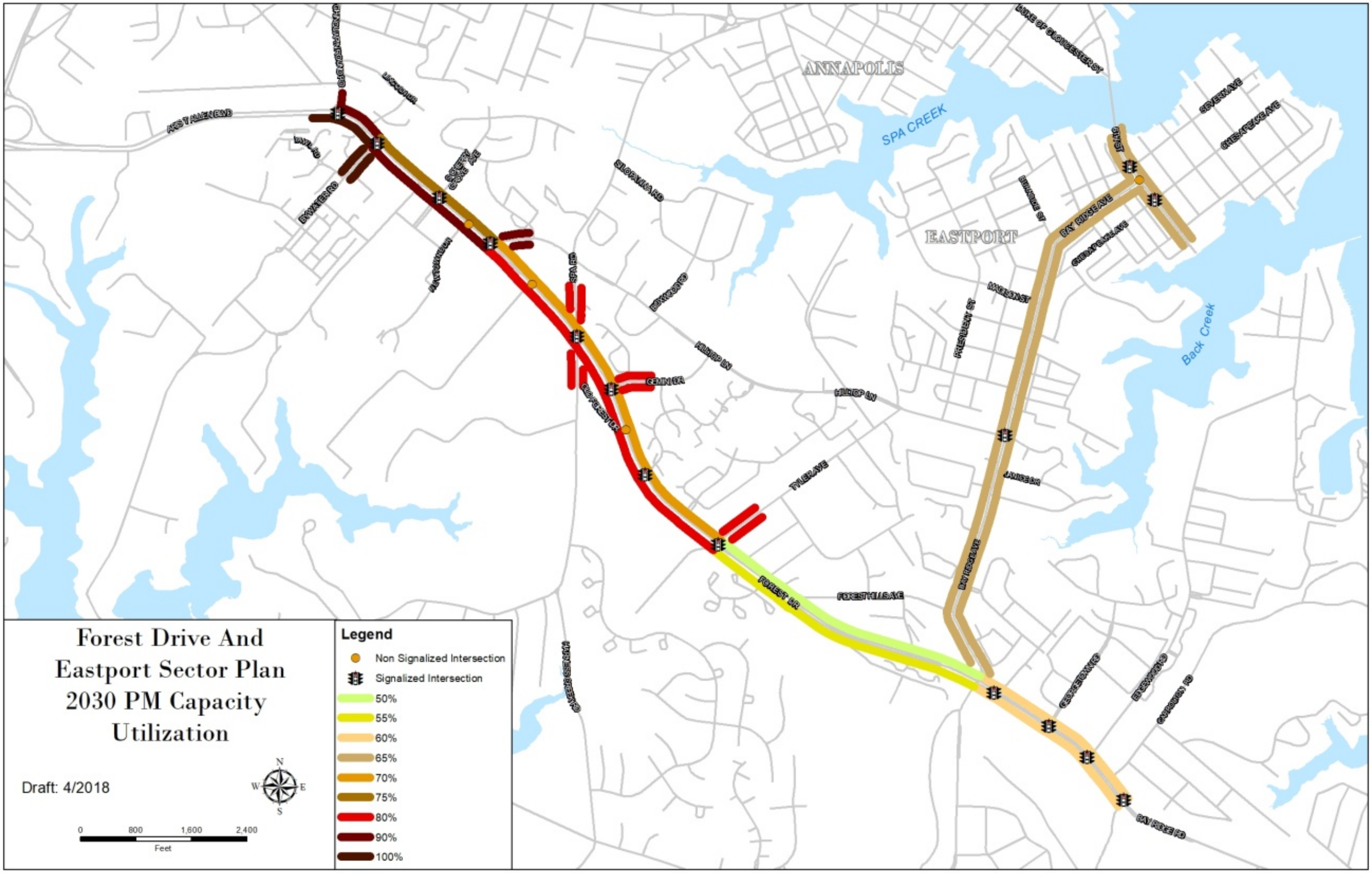
2,400
Feet
ANNAPOLIS
SPA CREEK
EASTPORT
Back Creek
FOREST DR
SPA RD
BAY RIDGE AVE
BAY RIDGE RD


Forest Drive And
Eastport Sector Plan
2030 PM Capacity
Utilization
Draft: 4/2018
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Non Signalized Intersection
Signalized Intersection
50%
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60%
65%
70%
75%
80%
90%
100%
ANNAPOLIS
SPA CREEK
EASTPORT
Back Creek
FOREST DR
PRESIDENT ST
BAY RIDGE AVE
BAY RIDGE RD

A summary of the analysis results of specific locations within the sector shows:

- Traffic entering and exiting the Forest Drive corridor on the west end will continue to experience delays;
- Peak hourly traffic volumes at the west end of the corridor will not worsen, because this portion of the corridor, which is the limiting portion of the corridor, is already operating at capacity;
- Traffic flow throughout the rest of the corridor is expected to continue to flow relatively smoothly because of the constrained conditions at the west end of the corridor;
- Individual segments along the corridor, particularly east of Hilltop Lane, can accommodate additional traffic while still operating under capacity; and
- Capacity utilization along most sections of Forest Drive, Bay Ridge Avenue and Sixth Street is not expected to experience much change.

A review of the network segments within the sector shows the following growth and capacity utilization by 2030:

- Forest Drive, between Chinquapin Round Road and Gemini Drive, is expected to experience relatively low average annual travel demand growth rates, ranging from 0.2 to 0.7% per year between 2017 and 2030 with similar growth rates in both the peak and non-peak directions of travel.
- Between Gemini Drive and Bay Ridge Avenue/Hillsmere Drive, Forest Drive is expected to experience moderate growth, ranging in the peak direction of travel between 0.4 and 0.6%, and ranging in the off-peak direction of travel between 0.2 and 1.0% per year.
- East of Bay Ridge Avenue/Hillsmere Drive, Bay Ridge Road is expected to experience minimal growth, no more than 0.3% between 2017 and 2030. This section of the corridor is therefore expected to keep operating well within the roadway capacity for the foreseeable future, with the current land use assumptions in place.

A review of the City street approaches to Forest Drive shows the following potential changes in volumes by 2030 (increased peak volumes over 1% per year):

- NB Chinquapin Round Road from Forest Drive (1.1% in the AM)
- SB Gemini Drive approaching Forest Drive (2.5% in the AM; 1.0% in the PM)
- NB Gemini Drive from Forest Drive (2.1% in the PM)
- NB Tyler Avenue from Forest Drive (4.5% in the AM; 2.6% in the PM)
- SB Tyler Avenue approaching Forest Drive (1.7% in the AM; 1.2% in the PM)

Analyses for Eastport show that the average annual growth rates are expected to range between 0 and 0.7% between 2017 and 2030.

SECTION 5: Possible Remedies to Existing and Future Baseline Conditions
Possible strategic responses and remedies to current and future baseline travel demands and traffic conditions include (but are not limited to) physical road improvements. A combination of other measures may be the most cost-effective solution to reduce the need for further road widening. Other measures can reduce or redirect peak hour travel demand, reduce the number of private vehicle trips, and increase the functional capacity of the existing pavement. Many of these measures can be undertaken by the City and its stakeholders. Others will take more time to be implemented and will need to be explored further as pilot projects coordinated with the County. The array of potential measures includes the following:

- Add local employment in the sector and compact mixed-use land-use infill to create complete neighborhoods
- Conversion of City and County streets to Complete Street designs with a connected network of pedestrian and bike facilities
- Increased City street connections combined with traffic calming on local streets.
- Improved City and County signal coordination and improved City signal operations to improve detection, timing and City network coordination. Access management along the Forest Drive corridor to consolidate driveways and connect frontage sites to side streets
- Enhanced carpooling with new technologies and on-demand services and major employer coordination
- Enhanced local transit service
- New regional transit service
- Intelligent Transportation Systems and real-time traveler information online, in the field, and in the vehicle

Possible road improvements are listed in Sub-Section A, with an evaluation of the possible impacts. Land use scenarios are described in Sub-Section B, also with an evaluation of the possible impacts. Sub-Section C addresses the possible impacts of mode shift changes, while Sub-Section D considers the impacts of coming technology changes. Transit opportunities based on sector commuter destinations are addressed in Sub-Section E. Sub-Section F provides possible corridor street sections.

Sub-Section A: Road Improvements
Based on a review of the existing conditions traffic volumes and the anticipated future traffic flows generated by the Baseline Future Land Use Analysis reviewed in Section 4, 2030 travel demands are expected to be accommodated by the same improvements that are anticipated to address existing condition issues identified in Section 3. Improvements to the network should be planned over the next eighteen years to improve the ability for traffic to leave the peninsula during AM peak periods and incidents, to mitigate the current AM traffic metering or bottleneck effect in the corridor, and to increase the network's overall capacity to adequately accommodate existing and projected flows.

To maximize efficiency of the arterial intersections, traffic flows along the mainline must be given preference. Improvements to the capacity of City streets that intersect with the Corridor must be considered carefully. Modifications to the current Adequate Public Facilities Ordinance (APFO) mitigation options would allow the City more flexibility in making these decisions in coordination with the County. Changes could allow required mitigation efforts to address a multi-modal/Complete Street approach to adequacy and design. Such a change, for example, would allow improvements to be done elsewhere in the network and to include bike and pedestrian improvements that change local travel behavior.

Several possible road and signal improvements have been identified for further discussion. The improvements suggested for the west end of the corridor (Chinquapin Round Road to Spa Road) have been tested using the Synchro/SimTraffic model to analyze their effectiveness at a planning level. Final selection and planning of specific road improvement projects that best address the issues at the least cost will require further investigation and coordination between the jurisdictions responsible for that section of roadway. All improvements should utilize Complete Street sections to minimize pavement and ROW acquisition and widening.

These improvements are referenced as "possible" because they may, in the end, not be desirable. The City and County will not always be able to build themselves more capacity. Indeed, each new road project has many drawbacks, such as cost and environmental impact, especially in terms of increased impervious surface and a decrease in land that can be used for stormwater management. The other travel demand management strategies that are identified earlier in this section as well as strategies identified in the main body of this plan (such as increasing density and modal shifts) represent a paradigm shift in how jurisdictions can manage capacity and congestion. In many ways, these new strategies are more ideal for managing a resource that is not infinite—roadway capacity.

Suggested Capacity Improvements:
<u>AM improvements:</u>

- Make westbound capacity improvements to sections of State, County, and City road segments in the west end to better accommodate projected peak period flows off the peninsula. Possible elements might include:
  1. Providing an additional through lane along WB Forest Drive between Hilltop Lane and Chinquapin Round Road. This lane will drop as a dedicated free right-turn lane onto NB Chinquapin Round Road (it should have its own receiving lane, which can drop in the vicinity of Fairfax Drive).
  2. Completing the second through lane along NB Chinquapin Round Road from Forest Drive to MD 450 (the section between Fairfax Road and Virginia Street has only one through lane)
  3. Providing a third right-turn lane along SB Hilltop Lane.
- Reconfiguring the NB and SB Spa Road approaches to Forest Drive, as follows:
  1. Providing two dedicated left-turn lanes and one combined through/right-turn lane along both approaches.
  2. Consider eliminating the split-phased signal operation for NB/SB Spa Road.
  3. Providing a second approach lane along SB Spa Road and extending currently planned second turn lane along NB Spa Road if needed.
  4. Re-opening the Louis Drive and Lincoln Street link as part of land use changes in the area.

PM improvements

- Reduce the queuing and signal time for SB Chinquapin Round Road by:
  1. Extending the existing short dedicated right-turn lane along SB Chinquapin Round Road approaching Aris T. Allen Boulevard at least as far north as Fairfax Street/Forest Drive North.
  2. Providing a continuous second through lane along SB Chinquapin Round Road from MD 450 to Aris T. Allen Boulevard (this connects several existing sections)
- Reduce queues and delays along EB Forest Drive, at the west end of the corridor, as follows:
  1. Retaining the existing bottleneck by electing not to make improvements that move queues further down the corridor, or Improve PM flows, by providing an additional through lane along EB Forest Drive, beginning along Aris T. Allen Boulevard, and dropping as a second left-turn lane at Hilltop Lane.
  2. Providing a dedicated right-turn lane along EB Forest Drive onto SB Spa Road (100 to 150 feet in length)
  3. Reducing the PM peak hour green time for NB Bywater Road travelers and encourage re-routing to other corridor access points to the east via Belle Dr.. Extending Skipper Lane to Bywater to help redirect Bywater trips.
  4. Extending Skipper Lane to Spa Road to reduce the volume of local shopping trips and left-turn movements occurring on the Corridor during the PM peak period.
- Add or extend center left-turn center lanes on the corridor per the proposed Ultimate Complete Street sections provided.
- Improve City street approaches to the Corridor in response to individual movement delays: extend both Skipper Lane and Gemini Drive to Spa Road to provide added route options for this single exit sub-peninsula traffic shed.

With the suggested capacity and signal improvements in place, the Synchro/SimTraffic model reveals the following potential levels of service, based on intersection delay and queue length.

Forest Drive Intersection Levels of Service (Improved Condition)

Intersection / Approach	Improved Condition						Available Storage
	AM Peak Hour			PM Peak Hour			
	LOS	Delay	Queue	LOS	Delay	Queue	
Aris T. Allen Boulevard / Forest Drive at Chinquapin Round Road							
EB Aris T. Allen Boulevard	B	16.1 s/veh	270 ft	C	28.3 s/veh	710 ft	3000 ft
WB Forest Drive	C	26.8 s/veh	610 ft	C	23.9 s/veh	455 ft	605 ft
SB Chinquapin Round Road	D	42.2 s/veh	280 ft	F	102.6 s/veh	905 ft	355 ft
Overall Intersection	C	24.8 s/veh	--	D	39.2 s/veh	--	--
Forest Drive at Bywater Road							
EB Forest Drive	B	10.9 s/veh	225 ft	E	56.1 s/veh	765 ft	570 ft
WB Forest Drive	B	13.1 s/veh	180 ft	B	12.7 s/veh	200 ft	770 ft
NB Bywater Road	D	43.4 s/veh	280 ft	D	49.6 s/veh	235 ft	260 ft
SB Bywater Road	D	41.3 s/veh	20 ft	D	46.1 s/veh	20 ft	100 ft
Overall Intersection	B	15.0 s/veh	--	D	38.7 s/veh	--	--
Forest Drive at Cherry Grove Road							
EB Forest Drive	B	11.3 s/veh	205 ft	F	103.1 s/veh	1325 ft	1100 ft
WB Forest Drive	B	10.2 s/veh	290 ft	B	14.8 s/veh	280 ft	860 ft
NB Cherry Grove Road	D	46.5 s/veh	220 ft	D	45.3 s/veh	195 ft	240 ft
SB Cherry Grove Road	C	27.8 s/veh	75 ft	E	60.0 s/veh	80 ft	300 ft
Overall Intersection	B	12.6 s/veh	--	E	64.0 s/veh	--	--
Forest Drive at Newtowne Drive*							
EB Forest Drive	A	2.1 s/veh	45 ft	A	9.2 s/veh	410 ft	440 ft
WB Forest Drive	A	2.6 s/veh	60 ft	A	2.5 s/veh	25 ft	385 ft
NB Newtowne Drive	B	14.6 s/veh	65 ft	F	50.9 s/veh	130 ft	240 ft
Forest Drive at Hilltop Lane							
EB Forest Drive	B	10.4 s/veh	310 ft	B	10.8 s/veh	415 ft	355 ft
WB Forest Drive	B	17.1 s/veh	390 ft	B	11.5 s/veh	235 ft	1640 ft
SB Hilltop Lane	D	49.3 s/veh	330 ft	D	37.1 s/veh	285 ft	545 ft
Overall Intersection	B	19.8 s/veh	--	B	15.3 s/veh	--	--
Forest Drive at Spa Road							
EB Forest Drive	C	22.8 s/veh	385 ft	B	10.1 s/veh	200 ft	1680 ft
WB Forest Drive	D	41.7 s/veh	865 ft	B	12.3 s/veh	215 ft	815 ft
NB Spa Road	F	118.0 s/veh	470 ft	F	102.9 s/veh	220 ft	610 ft
SB Spa Road	F	151.0 s/veh	245 ft	F	203.5 s/veh	703 ft	325 ft
Overall Intersection	D	50.7 s/veh	--	C	34.2 s/veh	--	--
Forest Drive at Gemini Drive							
EB Forest Drive	B	10.1 s/veh	225 ft	A	8.0 s/veh	180 ft	780 ft
WB Forest Drive	B	14.5 s/veh	450 ft	A	7.1 s/veh	245 ft	570 ft
NB Driveway	A	0.0 s/veh	0 ft	D	38.6 s/veh	10 ft	60 ft
SB Gemini Drive	D	53.8 s/veh	180 ft	D	36.6 s/veh	125 ft	200 ft
Overall Intersection	B	14.7 s/veh	--	A	8.8 s/veh	--	--
Forest Drive at Old Forest Drive*							
EB Forest Drive	A	2.2 s/veh	10 ft	A	2.0 s/veh	15 ft	560 ft
WB Forest Drive	A	3.8 s/veh	100 ft	A	3.9 s/veh	95 ft	615 ft
NB Old Forest Drive	B	13.8 s/veh	75 ft	E	40.9 s/veh	90 ft	270 ft

Forest Drive Intersection Levels of Service (Improved Condition), cont.

Intersection / Approach	Improved Condition						Available Storage
	AM Peak Hour			PM Peak Hour			
	LOS	Delay	Queue	LOS	Delay	Queue	
Forest Drive at Youngs Farm Road / Annapolis Middle School							
EB Forest Drive	A	2.0 s/veh	45 ft	A	4.7 s/veh	245 ft	640 ft
WB Forest Drive	A	5.9 s/veh	90 ft	A	3.7 s/veh	80 ft	750 ft
NB Driveway	D	52.1 s/veh	35 ft	D	50.9 s/veh	20 ft	200 ft
SB Youngs Farm Road	D	46.0 s/veh	65 ft	D	40.0 s/veh	30 ft	135 ft
Overall Intersection	A	4.9 s/veh	--	A	4.5 s/veh	--	--
Forest Drive at Tyler Avenue							
EB Forest Drive	B	10.2 s/veh	240 ft	A	8.2 s/veh	235 ft	540 ft
WB Forest Drive	B	10.6 s/veh	250 ft	A	5.3 s/veh	95 ft	370 ft
NB Tyler Avenue	D	54.3 s/veh	110 ft	E	56.6 s/veh	130 ft	470 ft
SB Tyler Avenue	D	36.2 s/veh	150 ft	C	28.4 s/veh	95 ft	50 ft
Overall Intersection	B	12.6 s/veh	--	A	8.7 s/veh	--	--
Forest Drive / Bay Ridge Avenue at Hillsmere Drive							
EB Forest Drive	B	13.8 s/veh	255 ft	C	29.1 s/veh	500 ft	960 ft
WB Bay Ridge Avenue	B	14.4 s/veh	290 ft	C	21.4 s/veh	300 ft	280 ft
NB Hillsmere Drive	D	51.8 s/veh	295 ft	E	66.5 s/veh	420 ft	270 ft
SB Bay Ridge Avenue	E	55.8 s/veh	180 ft	E	57.2 s/veh	165 ft	510 ft
Overall Intersection	C	25.2 s/veh	--	D	36.8 s/veh	--	--
Bay Ridge Avenue at Georgetown Boulevard							
EB Bay Ridge Avenue	A	4.8 s/veh	155 ft	A	5.7 s/veh	210 ft	765 ft
WB Bay Ridge Avenue	A	5.8 s/veh	185 ft	A	6.2 s/veh	160 ft	650 ft
SB Georgetown Boulevard	C	30.9 s/veh	200 ft	B	18.4 s/veh	155 ft	215 ft
Overall Intersection	A	7.6 s/veh	--	A	7.0 s/veh	--	--
Bay Ridge Avenue at Edgewood Road							
EB Bay Ridge Avenue	A	7.7 s/veh	180 ft	A	9.3 s/veh	260 ft	640 ft
WB Bay Ridge Avenue	B	12.8 s/veh	280 ft	C	22.1 s/veh	295 ft	370 ft
NB Driveway	D	52.1 s/veh	40 ft	D	51.5 s/veh	70 ft	200 ft
SB Edgewood Road	C	24.4 s/veh	235 ft	C	23.8 s/veh	190 ft	190 ft
Overall Intersection	B	13.3 s/veh	--	B	16.3 s/veh	--	--

Note: The above results are based on planning-level analyses. More detailed analysis and study are required to fully evaluate the potential improvement concepts.

LOS:
Signalized Intersection

LOS	Delay
A	≤ 10 s/veh
B	≤ 20 s/veh
C	≤ 35 s/veh
D	≤ 55 s/veh
E	≤ 80 s/veh
F	> 80 s/veh

LOS:
Unsignalized Intersection*

LOS	Delay
A	≤ 10 s/veh
B	≤ 15 s/veh
C	≤ 25 s/veh
D	≤ 35 s/veh
E	≤ 50 s/veh
F	> 50 s/veh

Recommendations to reduce the peak-hour AM and PM traffic volumes include:

- Attract enough new employment opportunities to the City and in the eastern half of the Corridor that the number of commuters leaving the corridor is reduced and the current strong directional peak hour flow of the corridor is rebalanced.
- Improve regional and local transit services and carpool/ride sharing services to key commuter destinations to enable commuters to use other commuting modes. Consider a route to Washington, D.C. and enhanced local service to the Chinquapin Round Road area.

Responses to existing issues and reported stakeholder concerns in Eastport might include:

- Adjust the cycle times at the existing traffic signal at Bay Ridge Road and Tyler Avenue to maximize through travel signal time and significantly reduce the green cycle for the WB Tyler Avenue approach leg of the intersection. This will improve overall intersection service;
- Upgrade the three existing traffic signals in Eastport to fixtures that provide detection so that travel signal times can be maximized. This can improve the existing queuing issues at the Sixth Street and Severn Avenue signal;
- Add a stop sign if warranted at the intersection of Bay Ridge Avenue with Monroe Street to introduce platooning and wider gaps within the traffic flows along Bay Ridge Avenue so that vehicles can more quickly and safely make left-turns in and out of the intersecting streets or access points. This would help improve the queuing issues at this location;
- Add a series of mini-roundabouts at local intersections along Bay Ridge Avenue and throughout Eastport to facilitate access from minor approaches and to provide u-turn opportunities for vehicles that are unable to turn left from their stop-controlled approaches;
- When possible, further upgrade signals to create an Adaptive Control Signal (ACS) network capable of adapting to event and incident traffic.

Sub-Section B: Land Use Changes—Mid and High Sector Growth Scenarios

Two future sector growth scenarios were developed to assess the possible changes in future travel demand and behavior that might exist in 2030 as a result of implementing the sector study's land use recommendations. Both scenarios incorporate current approved pipeline development and estimate the amount of new changes that might occur in those sector areas identified as susceptible to change in this timeframe.

One scenario (Mid) assumes a moderate rate of change between 2020 and 2030 while the other (High) assumes a higher rate of change. The High Scenario also assumes a larger change in Eastport Sub-TAZ #546-D.

The year 2020 was selected as the baseline year, as current growth trends were assumed to continue unchanged until then. The 2020 Sector Baseline conditions and additions between 2020 and 2030 are as follows:

	Existing in 2020	Base line	Mid Scenario	High Scenario
Sector Households	14,155	+251	+1036	+1526
Jobs	11,509	+366	+1524	+1959
Population	35,167	+171	+2535	+4002
Resident workers	18,122	+ 64	+1354	+2078
In Eastport Sub-TAZ #546-D:				
Households	284	+0	+145	+424
Jobs	370	+10	+10	+74

The comparative rates of growth represented by the three scenarios are as follows:

	2020 Sector Conditions	**Baseline Scenario 2030**			**Mid Scenario 2030**			**High Scenario 2030**		
		Added	% Total Growth	% Annual Growth	Added	% Total Growth	% Annual Growth	Added	% Total Growth	% Annual Growth
Households (HH)	14,155	251	1.8%	0.09%	1036	7.3%	0.37%	1526	10.8%	0.54%
Jobs	11,509	366	3.2%	0.16%	1524	13.2%	0.66%	1959	17.0%	0.85%
Population	35,167	171	0.5%	0.02%	2535	7.2%	0.36%	4002	11.4%	0.57%
Resident workers	18,122	64	0.4%	0.02%	1354	7.5%	0.37%	2078	11.5%	0.57%
Added HH per yr		13			52			76		

The Mid and High scenarios were analyzed using trial runs of the refined BMC model. These trials projected new travel demands generated in the road network segments, identified potential changes in traffic volumes throughout the study area, and estimated and mapped the future utilization of capacity during typical AM and PM peak periods. Road segments at or near capacity were again identified. No roadway or current travel mode choice changes were assumed so that the positive and/or negative effects of the proposed changes to land use/demographic could be considered conservatively and in isolation. Should other improvements and remedies be made in the future, the identified scenario impacts would be mitigated to achieve a better outcome.

A comparison of the future travel patterns modeled for the Baseline, Mid and High land use scenarios shows that in all three scenarios the current areas of congestion existing in 2017 continue to be the areas of issue in 2030. In all three scenarios the model findings show that the network's other road segments accommodate the added volumes projected.

The differences in traffic impacts between the three scenarios are modest. The higher amounts of land use changes envisioned under the Mid and High Scenarios result in modest redistributions of trips within the network main lines. The High scenario causes greater increases in traffic volumes in Eastport more than the other two scenarios, The greater number of sector jobs added in both the Mid and High Scenarios appear to help mitigate the growth of commuter trips exiting the peninsula in the future thus accommodating enhanced local economic activity with comparatively modest amounts of added traffic at the west end. A comparison of the increases in AM peak period volumes passing through Chinquapin Round Rd. along with the job increases assumed are as follows:

- Baseline Scenario—3.4% increase in traffic with a 0.9% increase in jobs
- Mid Scenario—5.4% increase in traffic with a 13.2% increase in jobs
- High Scenario—7.8% increase in traffic with a 17.0% increase in jobs

The chart on the following page compares of the traffic volume changes projected throughout the network for all three scenarios based on current modes of travel.

The chart below compares of the traffic volume changes projected throughout the network for all three scenarios.

Modeled Growth Rates

Segment / Direction / Peak	Modeled Baseline Conditions				2030 Mid Scenario		2030 High Scenario	
	Existing (2017) Volumes	Future (2030) Volumes	Total Growth	Annual Growth	Volumes	Change from 2030 Baseline	Volumes	Change from 2030 Baseline
Forest Drive (Chinquapin Round Road to Hilltop Lane)								
Westbound (AM Peak Hour)	8222	8501	3.4%	0.3%	8960	5.4%	9164	7.8%
Eastbound (PM Peak Hour)	9687	10314	6.5%	0.5%	10438	1.2%	10469	1.5%
Forest Drive (Hilltop Lane to Hillsmere Drive/Bay Ridge Ave)								
Eastbound (AM Peak Hour)	2890	3262	12.9%	1.0%	2805	-14%	2942	-10%
Westbound (PM Peak Hour)	4590	4803	4.6%	0.4%	4577	-4.7%	4765	-0.8%
Forest Drive/Bay Ridge Road (Hillsmere Drive/Bay Ridge Ave to Carrollton Road)								
Eestbound (AM Peak Hour)	2558	2556	0.0%	0.0%	2657	4.0%	2738	7.1%
Westbound (PM Peak Hour)	3763	3770	0.2%	0.0%	3892	3.2%	4000	6.1%
Eastbound (PM Peak Hour)	4568	4682	2.5%	0.2%	4754	1.5%	4837	3.3%
Bay Ridge Avenue (Tyler Avenue to Forest Drive)								
Southbound (AM Peak Hour)	984	940	-4.5%	-0.3%	1019	8.4%	1058	12.6%
Northbound (AM Peak Hour)	1828	1917	4.9%	0.4%	1992	3.9%	2022	5.5%
Southbound (PM Peak Hour)	1603	1710	6.7%	0.5%	1883	10.1%	1910	11.7%
Northbound (PM Peak Hour)	1612	1570	-2.6%	-0.2%	1705	8.6%	1768	12.6%
Bay Ridge Avenue (Chesapeake Avenue to Tyler Avenue)								
Southbound (PM Peak Hour)	1849	2067	11.8%	0.9%	1970	-4.7%	2058	-0.5%
Northbound (PM Peak Hour)	2474	2555	3.3%	0.3%	2473	-3.2%	2545	-0.4%
Approach Streets - AM Peak Hour								
S. Cherry Grove Rd. (NB, from Forest Dr.)	124	119	-4.0%	-0.5%	258	117%	272	129%
Crystal Spring Farm Rd. (NB, approaching Forest	37	36	-2.7%	-0.2%	523	1353%	706	1861%
Crystal Spring Farm Rd. (SB, from Forest Dr.)	21	21	0.0%	0.0%	228	986%	320	1424%
Annapolis Neck Road (NB, approaching Forest	112	113	-0.8%	-0.1%	229	103%	229	103%
Approach Streets - PM Peak Hour								
Crystal Spring Farm Rd. (NB, approaching Forest	31	31	0.0%	0.0%	362	1067%	502	1519%
Crystal Spring Farm Rd. (SB, from Forest Dr.)	42	41	-2.4%	-0.2%	574	1300%	777	1795%

Note: The above results are based on planning-level analyses. More detailed analysis and study are required to fully evaluate the future conditions of detailed traffic operations.

Mid Scenario 2030:
Land use changes under the Mid Scenario are expected to result in some redistribution of trips within the peninsula. The number of sector jobs added does not appear to be enough to reduce the number of commuter trips leaving the peninsula by 2030. However, the scenario's elevated growth is accommodated without significantly increasing the number of peak hour trips into or out of the peninsula (at the west end of the corridor) when compared to 2030 baseline conditions. The analyzed land use changes under the Mid Scenario result in some redistribution of trips within the peninsula but not as much as occurs in the High Scenario. The anticipated increases do not outpace the current capacity of the road network assuming that the recommended operational enhancements proposed to address current issues have been implemented.

Changes along the Corridor
Under the Mid Scenario, the 2030 volumes along Forest Drive are expected to remain similar to the volumes shown in the Baseline Scenario 2030 conditions, assuming the suggested capacity improvements described in Sub-Section A are not in place. Key growth segments within the peak periods are as follows:

AM peak period:

- Up to a 5.4% increase in trips along WB Forest Drive between Hilltop Lane and Chinquapin Round Road is anticipated, which may slightly degrade operations along this section. This would result in this segment staying at 100% of current capacity for a longer period of time if no capacity improvements have been made or other measures taken to reduce the percentage of commuters driving alone.
- Up to a 4.0% increase in trips is anticipated along EB Bay Ridge Road east of the Hillsmere Drive/Bay Ridge Avenue intersection, which may slightly degrade operations along this section.
- Reductions in the off-peak direction of travel (eastbound) in the middle segment of Forest Drive are anticipated, which will not have a significant effect on traffic operations. The SimTraffic model shows up to a 14% reduction in traffic volumes along EB Forest Drive between Spa Road and Tyler Avenue.

PM peak period:

- Up to a 1.2% increase in trips along EB Forest Drive between Chinquapin Round Road and S. Cherry Grove Road, and up to a 1.5% increase in trips east of the Bay Ridge Avenue/Hillsmere Drive intersection.
- Up to a 3.2% increase in trips along WB Forest Drive between Edgewood Road and Bay Ridge Avenue/Hillsmere Drive is anticipated which may slightly degrade operations along this section.
- Reductions in the off-peak direction of travel (WB) in the middle segment of Forest Drive is anticipated, which will not have a significant effect on traffic operations. The SimTraffic model shows up to a 4.7% reduction in traffic volumes between Spa Road and Tyler Avenue.

Changes to City Street approaches to the Corridor

Notable volume increases (more than double the 2030 Baseline volumes):

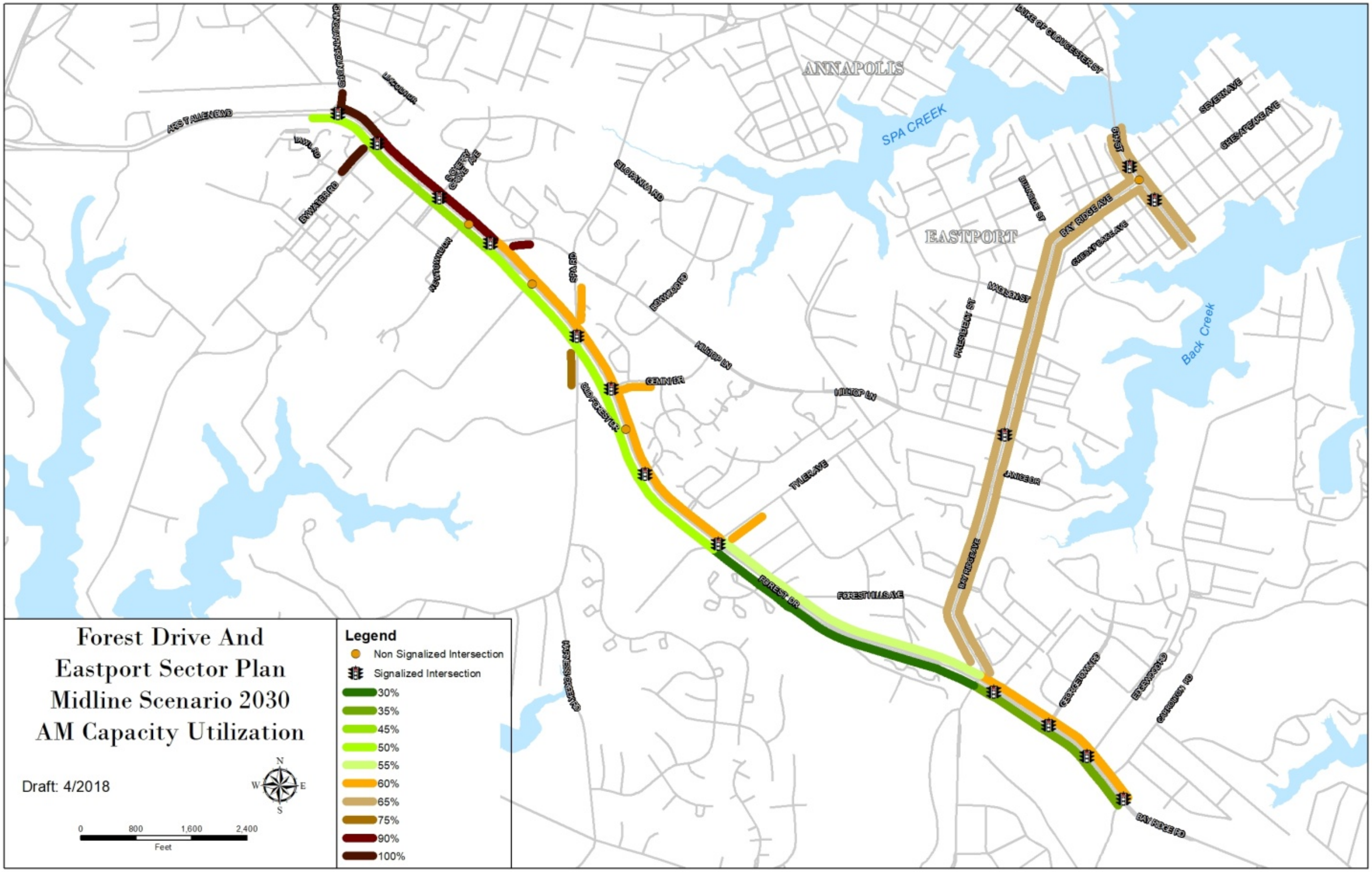
- S. Cherry Grove Road, north of Forest Drive, as the current building under renovation becomes occupied;
- Crystal Spring Farm Road approaching Forest Drive, as development is expected to occur on the opportunity site;
- Old Annapolis Neck Road, to the south of Forest Drive, as approved development is constructed.

Notable volume reductions are anticipated to occur on Tyler Avenue, north of Forest Drive; and along Old Forest Drive, south of Forest Drive.

Changes in the Eastport Area

- SB Bay Ridge Avenue: Up to an 8.5% increase in volumes in the AM peak period, and up to a one percent increase near Tyler Avenue in the PM peak period, which will slightly degrade operations.
- NB Bay Ridge Avenue: Up to a 4% increase in volumes approaching Sixth Street in the AM peak period, and up to an 8.6% increase approaching Sixth Street in the PM peak period, which will slightly degrade operations.

The following diagrams show the anticipated traffic capacity utilization (AM and PM peak period) on today's existing network based on the Mid level scenario in the year 2030.


Forest Drive And
Eastport Sector Plan
Midline Scenario 2030
AM Capacity Utilization
Draft: 4/2018
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Non Signalized Intersection
Signalized Intersection
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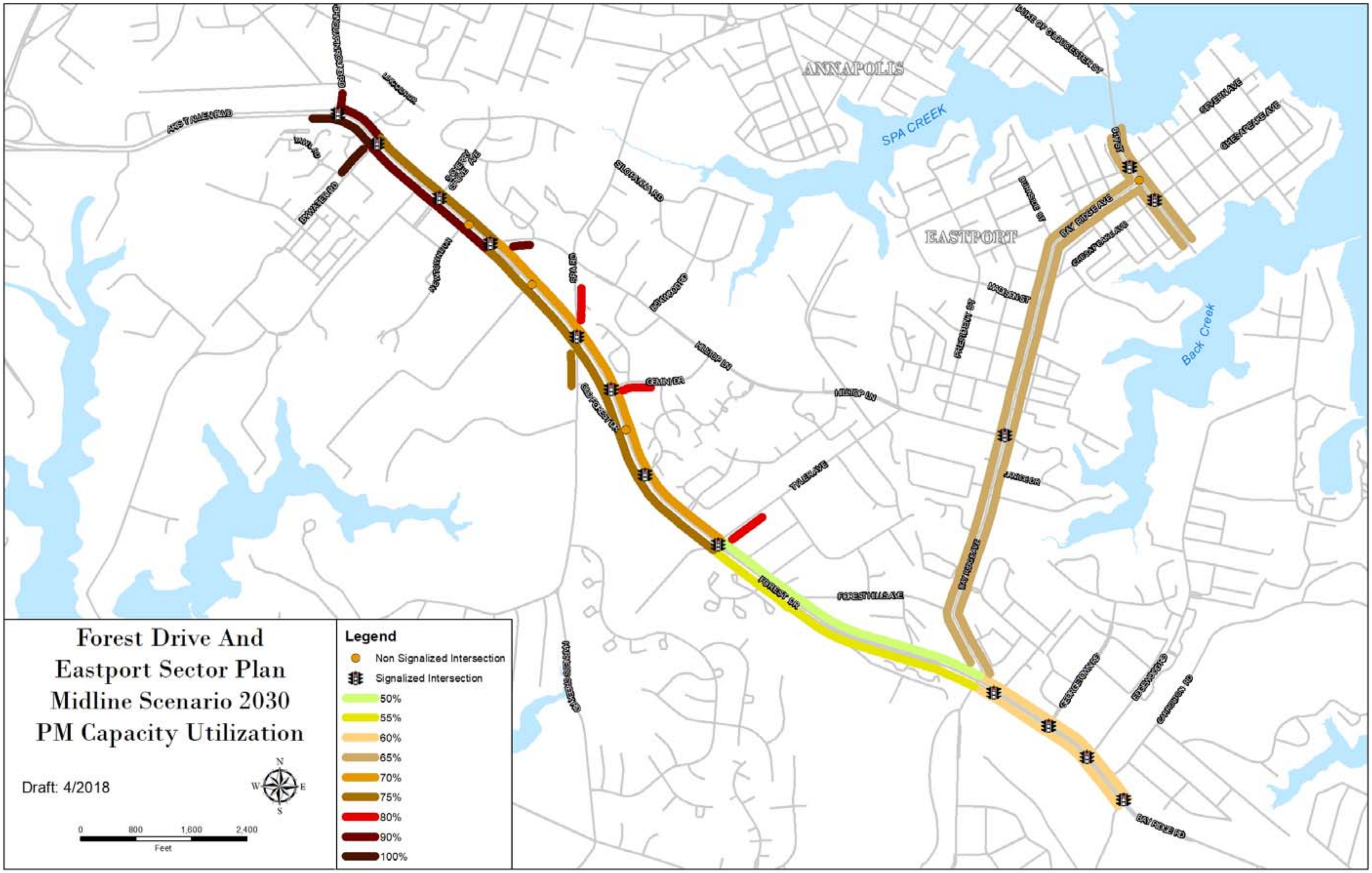
Forest Drive And
Eastport Sector Plan
Midline Scenario 2030
PM Capacity Utilization
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Non Signalized Intersection
Signalized Intersection
50%
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75%
80%
90%
100%
ANNAPOLIS
EASTPORT
SPA CREEK
Back Creek
FOREST DR
HILLTOP LN
FORESTVILLE AVE
BAY RIDGE AVE
BAY RIDGE RD
PRESIDENT ST

High Scenario 2030:
Land use changes under the High Scenario are also expected to result in greater redistribution of trips within the peninsula as compared to the Baseline and Mid scenarios. More rebalancing of the current strong directional flows during commuting hours occurs. Increases are seen in the traffic flows in the off-peak direction of travel along some segments of Forest Drive. The 2030 High Scenario is not expected to significantly affect the number of trips in or out of the peninsula (at the west end of the corridor) during the peak periods as compared to Baseline conditions in 2030. With this scenario, the greatest change in travel demand occurs in Eastport.

The anticipated increases in Eastport will not exceed the current capacity of the road network assuming that the recommended operational enhancements proposed to address current issues have been implemented. Without implementation of remedies, left turns from stop-controlled minor approaches to the mainline routes in Eastport may become more difficult. This change in Eastport is the primary difference between the High scenario and the Mid Scenario. The High Scenario tests the possible travel demand impacts of a larger number of new residences and jobs there.

<u>Changes along the Corridor</u>
AM Peak Period:

- Up to a 7.8% increase in trips along WB Forest Drive between Hilltop Lane and Chinquapin Round Road is anticipated, which may slightly degrade operations along this section. This would result in this segment staying at 100% of current capacity for a longer period of time if no capacity improvements have been made or other measures taken to reduce the percentage of commuters driving alone.
- Up to a 7% increase in trips is anticipated along EB Forest Drive east of the Bay Ridge Avenue/Hillsmere Drive intersection, which may slightly degrade operations along this section.
- Reductions in the off-peak direction of travel (EB) in the middle segment of Forest Drive is anticipated, which will not have a significant effect on traffic operations. The SimTraffic model shows up to a 10% reduction in traffic volumes along EB Forest Drive between Spa Road and Tyler Avenue.

PM Peak Period:

- Up to a 1.5% increase in trips along EB Forest Drive between Chinquapin Round Road and S. Cherry Grove Road, and up to a 3.3% increase east of the Bay Ridge Avenue/Hillsmere Drive intersection.
- Up to a 6.1% increase in trips is anticipated along WB Forest Drive between Edgewood Road and the Bay Ridge Avenue / Hillsmere Drive, which may slightly degrade operations along this section.

<u>Changes on City Approaches to the Corridor:</u>
The anticipated changes are very similar to the Mid Scenario. Notable volume increases (more than double the 2030 Baseline volumes):

- S. Cherry Grove Road, north of Forest Drive, as the current building under renovation becomes occupied;
- Crystal Spring Farm Road approaching Forest Drive, as development is expected to occur on the opportunity site;

- Annapolis Neck Road, to the south of Forest Drive, as approved development is constructed.

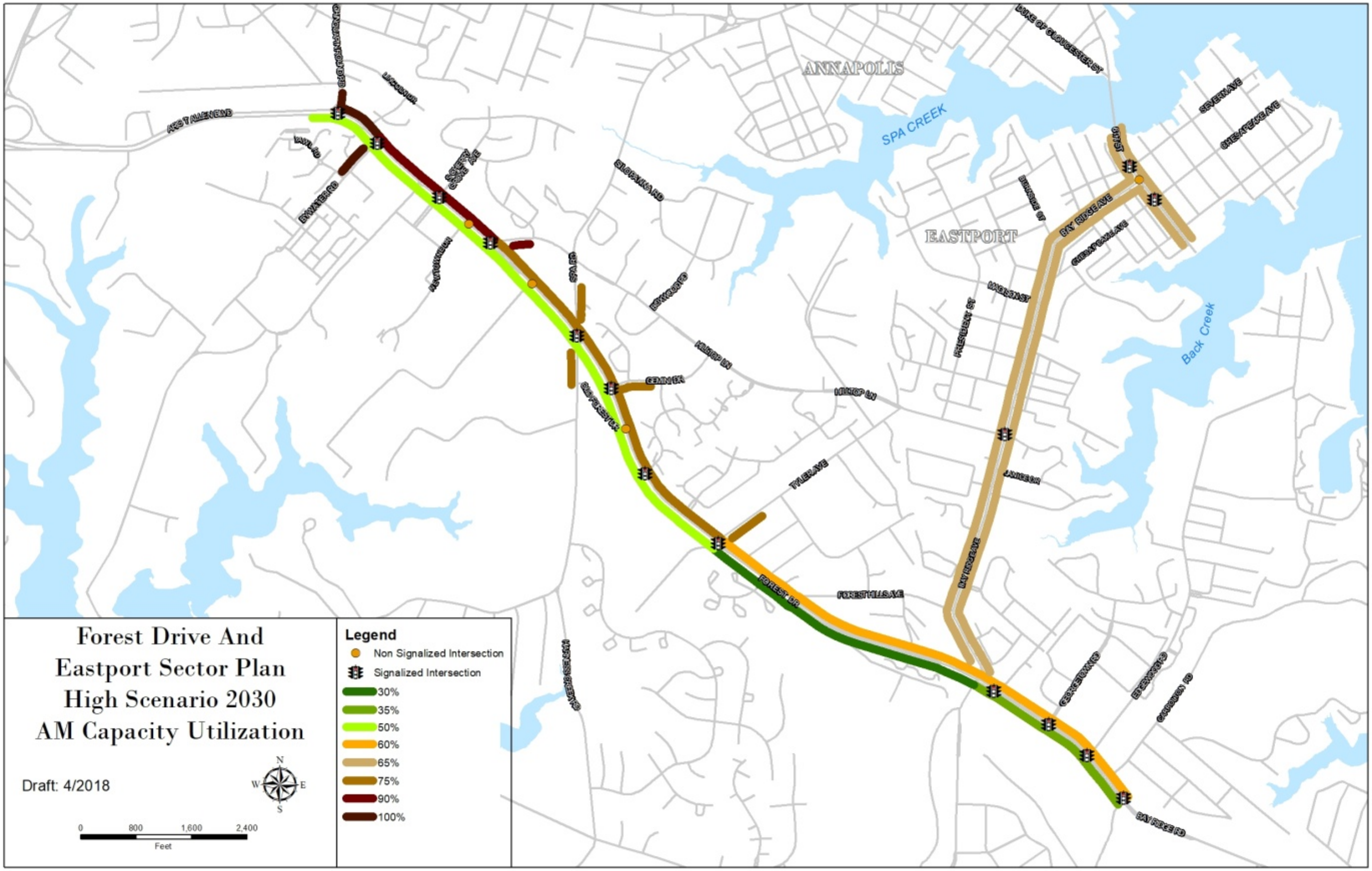
Notable volume reductions are anticipated to occur on Old Forest Drive, south of Forest Drive.

Changes in Eastport

- SB Bay Ridge Avenue: Up to a 13% increase in volumes in both the AM and PM peak periods;
- NB Bay Ridge Avenue: Up to an 8% increase in volumes in the AM peak period and up to a 13% increase in the PM peak period.
- Sixth Street will experience up to a 6% increase in volumes in both the AM and PM peak periods.

Based on both the land use and traffic analysis conducted, the land use changes envisioned by the High Scenario best achieve goals of the 2009 Comprehensive Plan and the requests of the sector stakeholders. The analysis indicates that the added traffic generated as a result of this scenario can be accommodated assuming implementation of appropriate remedies occur, as needed, to address current issues and development impacts. The scenario anticipates residential growth rates consistent with recent City trends while increasing the amount of non-residential development in the sector to provide the desired new businesses, jobs and enhanced tax base.

The diagrams on the next pages show the anticipated traffic capacity utilization (AM and PM) on today's existing network based on the High Scenario in the year 2030.


Forest Drive And
Eastport Sector Plan
High Scenario 2030
AM Capacity Utilization
Draft: 4/2018
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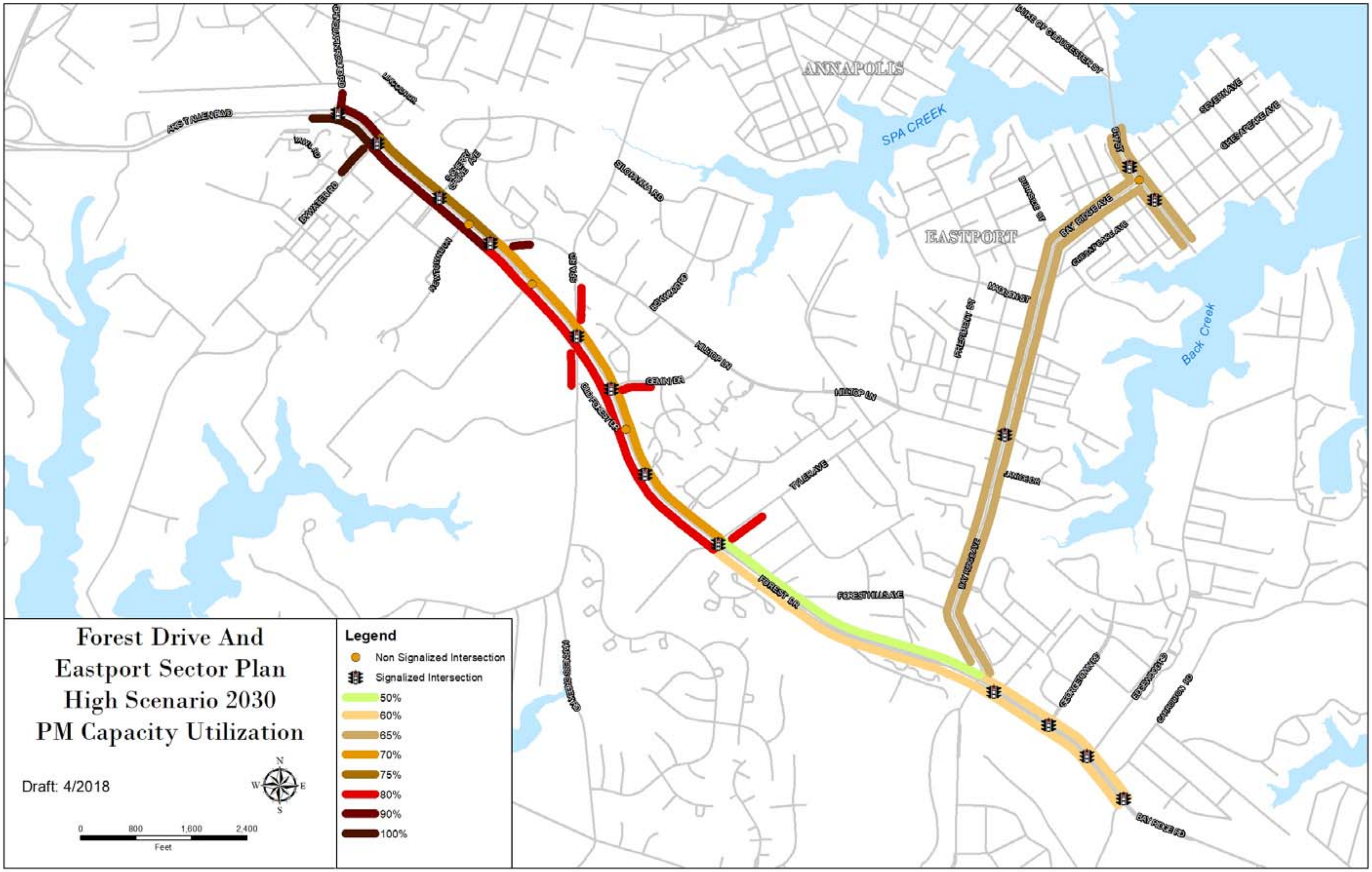
90%
100%
ANNAPOLIS
SPA CREEK
EASTPORT
Back Creek
FOREST DR
FOREST HILLS AVE
HILLTOP LN
BAY RIDGE AVE
BAY RIDGE RD
TYLER AVE
GEMINI DR
PRESIDENT ST
CHESAPEAKE AVE
SEVERN AVE


Forest Drive And
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ANNAPOLIS
SPA CREEK
EASTPORT
Back Creek
FOREST DR
BAY RIDGE AVE
BAY RIDGE RD
HILLTOP LN
FORESTVILLE AVE
PRESIDENT ST

A summary comparison of the capacity utilizations shown on the diagrams for all three land use scenarios is as follows:

CAPACITY UTILIZATION ANALYSIS	**Existing 2017 Condtions**				**2030 Conditions**											
Key Network Road Segments					**Baseline Scenario**				**Mid Scenario**				**High Scenario**			
	AM		**PM**		AM		PM		AM		PM		AM		PM	
CORRIDOR SEGMENTS	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
Chinquapin Round Rd to Bywater Rd.	55%	100%	100%	88%	50%	100%	90%	90%	55%	100%	**100%**	90%	50%	100%	90%	100%
Bywater Rd to Hill Top Lane	50%	85%	90%	75%	55%	90%	75%	75%	50%	90%	90%	75%	50%	90%	75%	90%
Hill Top to Tyler Ave.	45%	75%	80%	70%	50%	75%	70%	70%	55%	60%	75%	70%	50%	75%	70%	80%
Tyler Ave to Bay Ridge/Hillsmere Dr	30%	55%	55%	50%	30%	55%	50%	55%	30%	50%	55%	50%	30%	60%	50%	60%
Bay Ridge Rd./Hillsmere Dr. to Arundle -on-the Bay Rd.	35%	60%	60%	60%	45%	60%	60%	60%	35%	60%	60%	60%	35%	60%	60%	60%
EASTPORT SEGMENTS																
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
Bay Ridge Ave.	60%	60%	60%	60%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	75%	75%
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
Sixth Street	60%	60%	60%	60%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	75%	75%
CITY APPROACHES TO CORRIDOR																
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
Chinquapin Round Rd																
North of Forest		100%		88%				90%		100%		90%		100%		90%
Bywater Rd																
South of Forest			100%				100%		100%		100%			100%		
Hilltop Lane																
North of Forest		85%		90%				90%	90%		90%			90%		90%
Spa Rd																
South of Forest		75%	80%				80%		70%		75%		75%		80%	
North of Forest	75%			80%				80%		60%	80%			75%		80%
Gemini Dr																
North of Forest		75%		80%						60%	80%			75%		80%
Tyler Ave																
North of Forest		75%					80%			60%	80%			75%		80%

Note: The above results are based on planning-level analyses. More detailed analysis and study are required to fully evaluate the future conditions of detailed traffic operations.

Sub Section C: Travel Mode Choices

A comparison of data from the years 2000 and 2015 regarding the modes of transportation used by City workers commuting to work is provided below. It shows that between 2000 and 2015 there have been declines in walking, carpooling and transit use and increases in driving alone, biking to work and working from home.

Looking forward a review of possible future shifts in mode choices was prepared based on national trends, City goals, and both Plan and Sector Study recommended actions. The chart below provides a scenario for a reduction in the percent of commuters driving alone based on increased use of ridesharing, regional and local transit, biking and walking as well as continued increases in working from home.

MODE OF COMMUTING BY CITY WORKERS	**2000**		**2015****		**2030**	**% of Change**
Workers 16 years and over	19,174	%	20,408	%		
Car, truck, or van -- drove alone (personal vehicle)	13,200	68.8%	14,773	72%	**52%**	-20%
Car, truck, or van -- carpooled	2,202	11.5%	1,782	9%	**10%**	1%
Worked at home	812	4.2%	1,211	6%	**9%**	3%
Public Transit - local & regional, (excluding taxi)*	1388	7.2%	1,274	6%	**7%**	1%
Walked	1318	6.9%	755	4%	**9%**	5%
Ride sharing /hailing services					**6%**	6%
Other modes: bike, taxi*, boat, motor bike	254	1.3%	613	3%	**7%**	4%

** the 2000 data included taxi service*

** 2015 ACS data

Stakeholder responses to survey questions indicate a desire for change. For example, Survey #2 asks, “What options would allow you to reduce your travel time and your need to drive in the study area?”

1	Local market/small grocery store located nearby	19.4%
2	Commuter bus line on Forest Drive to other parts of the region	14.6%
3	More healthy food options/fast casual restaurants	14.1%
4	Better retail options available	12.2%
5	Better options/programs for telecommuting	8.2%
6	More community services nearby	7.7%
7	Flexible operating hours of businesses in the area	7.4%
8	Spaces for living and working	6.4%
9	Incentives/programs for starting a business	5.0%
10	Satellite offices for regional establishments	4.2%
11	Training for the types of careers nearby	0.8%

Sub Section D: Technology Trends Review

A review of the rapidly changing projections offered by vehicle manufacturers, traffic futurists, and various policy makers was performed to assess the possible impacts of these changes. The review suggests a scenario of change that has already begun and extends over the next twenty-five years as more people will have increased access to mobility than ever before. There may be more vehicles on roadways but the roads will become significantly safer, delays during peak hour and incident congestion will be reduced and more people will travel by other means than alone in a vehicle. As of the writing of this document, no guidance is available from the State of Maryland, Anne Arundel County or the City of Annapolis. A possible timeline of changes for consideration is as follows:

- Ongoing mode shift to ride hailing/ride sharing services is happening now. It will add more trips on the road, not less, as more people become more mobile without a car or driver's license. Ride hailing will serve as a transit substitute for wealthier residents, younger commuters, and the elderly.
    - This change will decrease the need for parking in close proximity to jobs, retail, and high demand destinations in Annapolis.
    - In larger US cities, off-duty cars are reported to be circulating and adding to congestion.
- Increased use of home delivery services with online purchasing is starting now and is not yet reducing traffic volumes or trips generated by households; this may help congestion by shifting trips out of the peak-congestion periods.
- Increased prevalence of driver assisted, semi-autonomous and connected vehicles is starting now and will improve rapidly. This will not necessarily reduce traffic volumes but will reduce congestion during incidents and peak hours. It will reduce traffic accidents and will direct more cars into the city grid. Due to greater comfort it may promote more long-distance commuting.
- Carpooling (currently on the increase again) will continue to grow with new technological support for more responsive services, therefore reducing the average number of vehicles owned by households.
- Use of local public transit by transit dependent groups may continue to go down if the service does not adapt. Advancing technologies will be able to assist in altering this outcome.
- Regional transit services will need to become more responsive to the needs of commuter groups. Again, advancing technologies will be able to assist in altering this outcome.
- Fully autonomous (driverless) vehicles might be permitted on certain highways within 10 years. Vans, buses, trucks and cars will all be using this option.
- Fully autonomous (driverless) vehicles might be permitted on streets within 20 years.
- Autonomous/driverless vehicles might become the dominant vehicle type in 30 years and the use of unassisted vehicles will be restricted.
- Alternative fuel vehicles will gradually become the dominate form and air pollution from vehicles will go down significantly.

Current research also advises that, to reduce the future travel demand, cities must make land use and community design changes in order to:

- Locate suitable jobs in closer proximity to workers
- Foster more dense/compact development patterns that can minimize vehicle miles traveled through walkable and bike-friendly neighborhoods,
- Promote greater full- and part-time work from home options.
- Continue to invest in mass transit,
- Facilitate shared rides in shared vehicles through pricing or incentives and employer promotion

Sub-Section E: Commuter Destination Review

A review of current work destinations for the workers living in the sector area was performed to identify those destinations with trip volumes that may be large enough to support added local transit or regional transit services and/or enhanced carpool services.

The sector's work destinations were found to differ for those of the City as a whole. Based on the 2015 American Community Survey Data that was used in the refined BMC model, over 87% of the sector's commuting trips are destined to four areas:

- 38% Anne Arundel County (outside of the City)
- 23% City of Annapolis
- 14% Washington, D.C. of which the largest group, 7%, goes to NE D.C.
- 13% Prince George's County.

Only 3% of the trips are destined for Baltimore County and Baltimore City, another 3% commute to Howard County. For the commuter trips with a destination located on the Annapolis Neck peninsula, the results are as follows:

- 36% have destinations in the Upper West Street/West Annapolis cluster
- 36% have destinations in the Downtown Annapolis cluster
- 6% have destinations in the Eastport cluster
- 10% have destinations in the Outer Neck Cluster(to the east)
- 12% have destinations in the Forest Drive Sector (excluding Eastport and Parole)

This data reveals some interesting trip results:

- A significant amount of the trips (72%) that begin in the Forest Drive Sector and remain on the Annapolis Neck end in the northern two clusters: Upper West Street/West Annapolis and Downtown Annapolis. The Rowe Blvd/West Annapolis area (TAZ #536) and the Downtown Annapolis/State Buildings (TAZ #542) generate the most trips at 22% and 13% respectively.
- Only 6% of the trips end in the Eastport cluster (TAZ #546A, 545B, 546C, 546D, and 546E), and most of those trips (4%) are generated by the eastern end of Eastport (TAZ #546C).
- 10% of the trips are destined for the Outer Neck Cluster (TAZ #548, #555C, #557, #558C, #558D, #558E, #559B, & #559C)

Further analysis of the trip destination data shows the following:

- Only 28% of the commuter trips originating in the Forest Drive Sector stay within the Annapolis Neck area.
- Less than 5% of the commuter trips in the Forest Drive Sector end in the sector.

A more detailed breakout of these findings are shown in the charts and diagrams that follow:

49,848	Total Trips Originating in the Sector Area Traffic Shed	
13,876	**28%**	**Local Destinations (City)**
35,971	**72%**	**Other Destinations**
1,128	2.26%	City of Baltimore
16,217	32.53%	Anne Arundel County
652	1.31%	Baltimore County
236	0.47%	Carroll County
26	0.05%	Harford County
1,597	3.20%	Howard County
7,110	14.26%	Washington, D.C.
2,180	4.37%	Montgomery County
6,322	12.68%	Prince George's County
500	1.00%	Frederick County
2	0.00%	Kent Island

	Washington, D.C. Breakdown	
1,474	3%	NW
3,438	7%	NE
83	0%	SW
2,115	4%	SE

Source: BMC regional model Compiled from 2015 American Communities Survey Data

A comparison of this data with older corridor commuter destinations reported in the 2009 Comprehensive Plan Appendix shows that significant changes have occurred in commuter destinations. The Appendix reported that in the year 2000, 37% to 45% of the workers who are residents of the City (in various parts of the Sector) worked in the City. About 24% of the Outer Neck workers did as well.

A comparison of the City-wide commuter destinations in the year 2000 versus 2015 shows significant changes in commuter destinations. Overall, there has been a 26.6% decline in the percentage of workers who are residents of the City and who work in the City. As of 2015, almost 80% commuted elsewhere. Many are driving further away as the array of destinations listed below illustrates.

2000 CITY COMMUTER TRIP DESTINATIONS		2015 CITY COMMUTER TRIP DESTINATIONS		CHANGE
46.8%	**Local Destinations**	20.2%	**Local Destinations (in the City)**	-26.6%
53%	**Other Destinations**	**79.8%**	**Other Destinations**	26.6%
3.6%	City of Baltimore	4.5%	City of Baltimore	0.9%
22.7%	Anne Arundel County	28.9%	Anne Arundel County	6.2%
3.6%	Baltimore County	3.6%	Baltimore County	0.0%
0.0%	Carroll County	0.0%	Carroll County	0.0%
0.0%	Harford County	0.0%	Harford County	0.0%
1.8%	Howard County	3.3%	Howard County	1.5%
5.5%	Washington, D.C.	6.5%	Washington, D.C.	1.0%
0.0%	Montgomery County	3.3%	Montgomery County	3.3%
5.2%	Prince George's County	2.3%	Prince George's County	-2.9%
0.0%	Frederick County	0.3%	Frederick County	0.3%
0.0%	Kent Island	0.3%	Kent Island	0.3%
		1.0%	Virginia (Alexandria and Arlington)	1.0%
		0.4%	Charles County (Waldorf)	0.4%
		0.3%	Talbot County	0.3%
5.6%	All Other Destinations	25.1%	All Other Destinations	19.5%

Destinations within the County have also changed as the following charts illustrate:

	Anne Arundel County Breakdown in 2000
13.5%	Parole and Broadneck
7.0%	Glen Burnie /E of I-97
2.2%	West AA Co./south of US 50

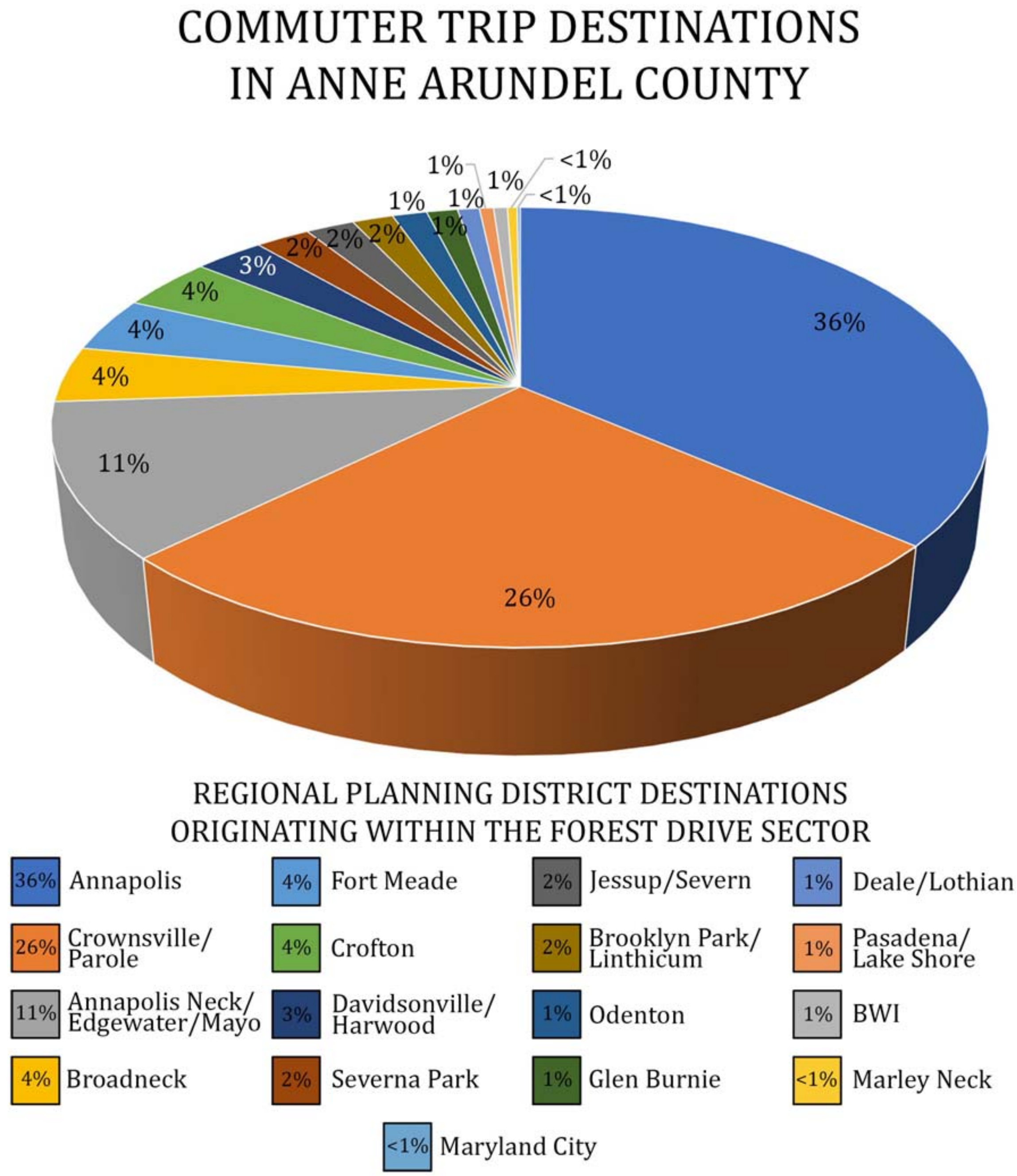
Source: 2009 Comprehensive Plan Appendix

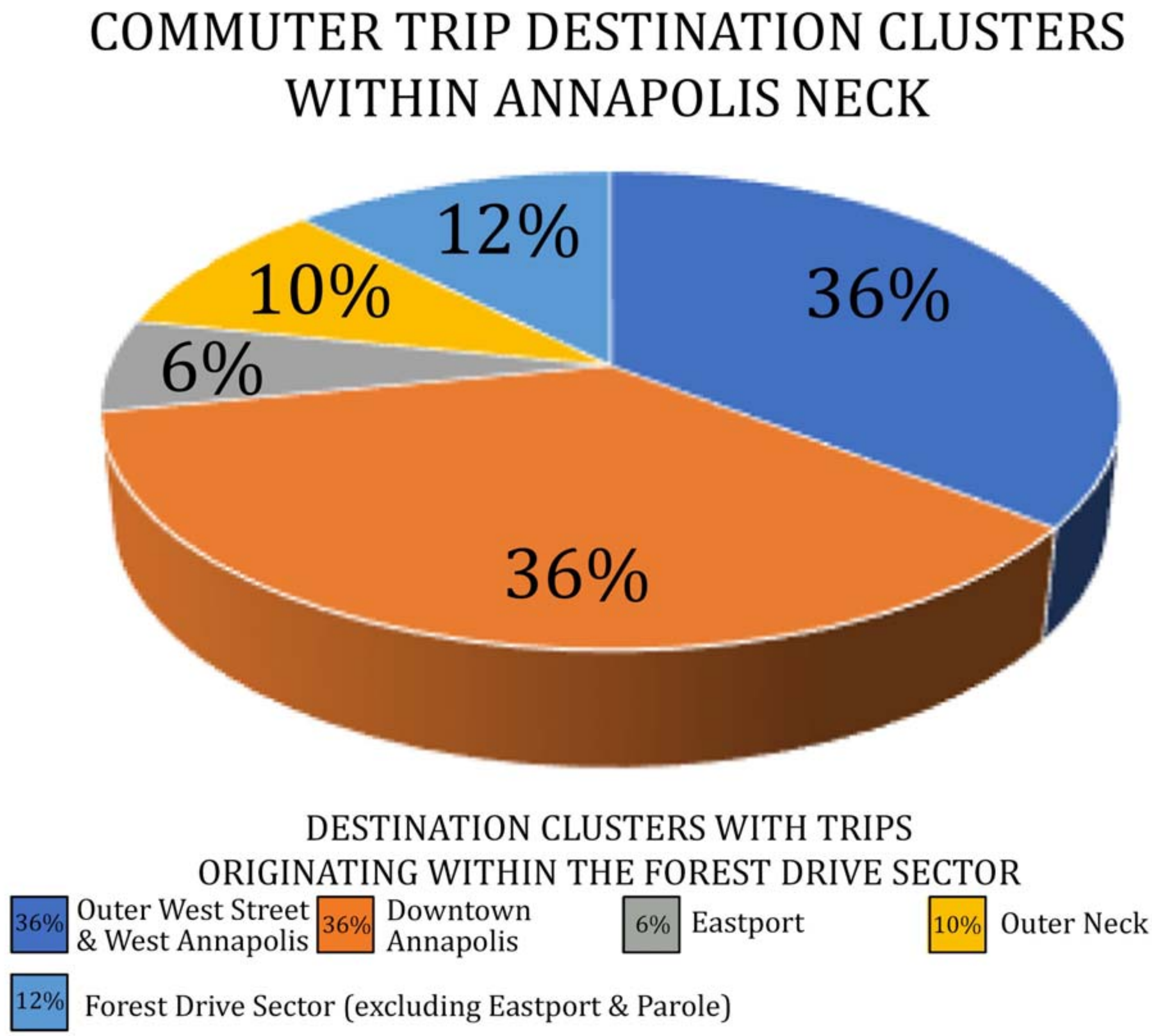
Compiled from 2000 US census

	Anne Arundel County Breakdown in 2015
14.4%	Parole/ Crownsville
1.6%	Arnold/Broadneck
2.1%	Glen Burnie
2.0%	Severna Park
1.3%	Annapolis Neck
1.0%	Edgewater
0.7%	Naval Academy
5.8%	Other County destinations

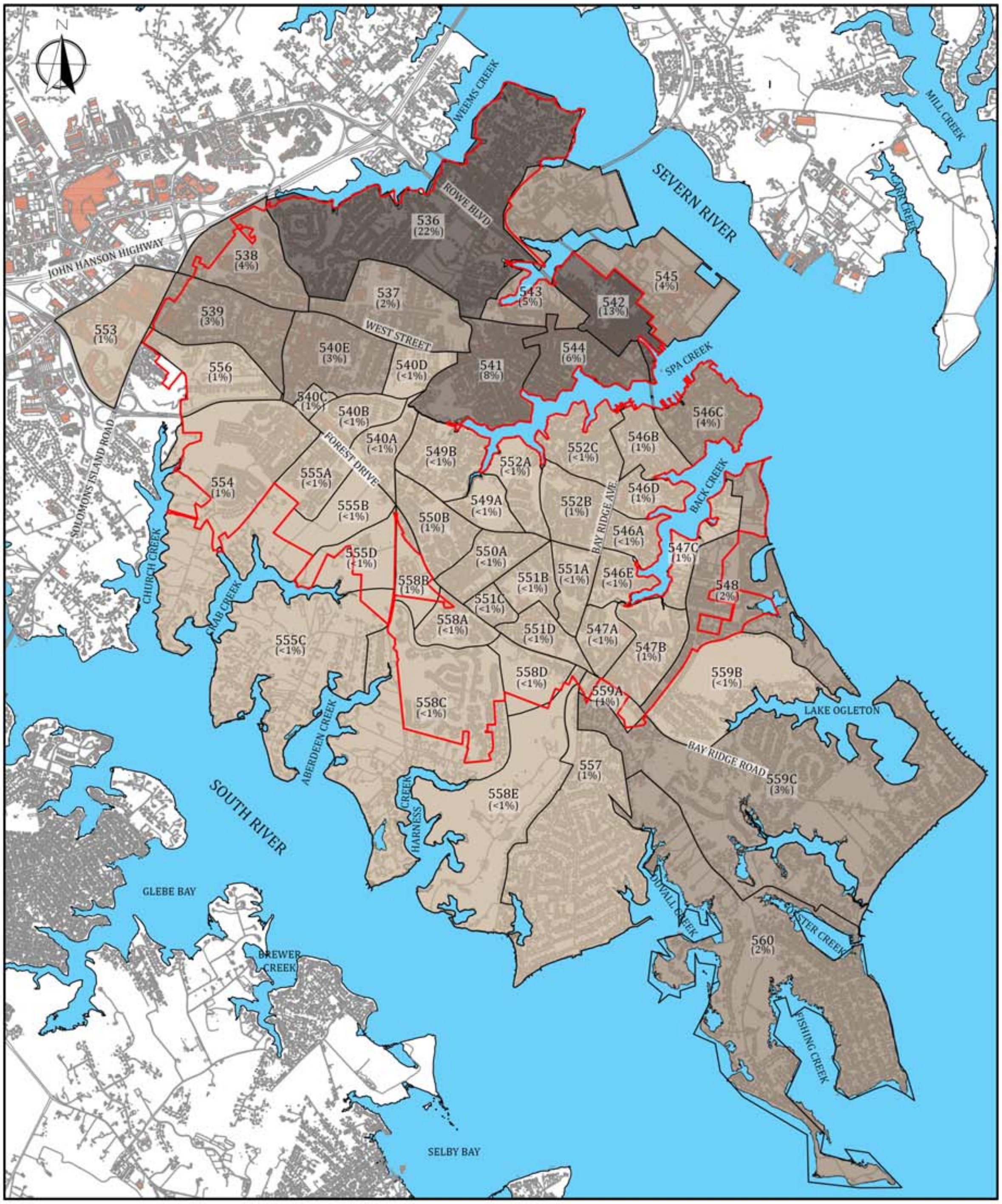
Compiled from 2015 American Community Survey Data

Existing destinations within the City and the sector TAZ areas are shown below:





The map on the following page indentifies the commuter trip destinations by TAZ to illustrate areas where local jobs generate the most trips from the sector.



ANNAPOLIS NECK - TRIP GENERATION

VERY HEAVY GENERATOR - >10% of trip generated (1123+ trips)

HEAVY GENERATOR - 6-10% of trips generated (562-1122 trips)

MODERATE GENERATOR - 2-5% of trips generated (113-561 trips)

LIGHT GENERATOR - 0-1% of trips generated (0-112 trips)

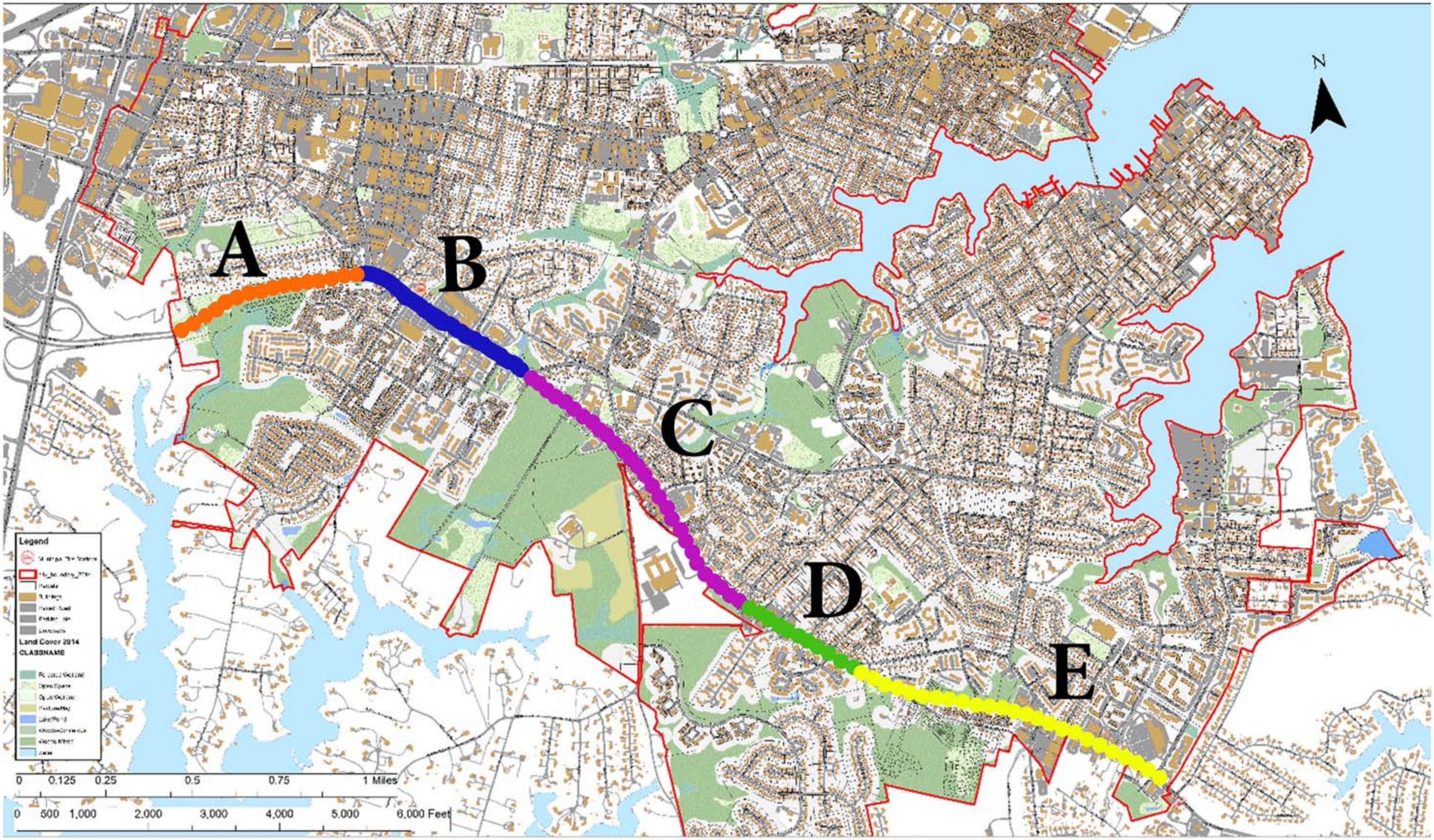
Sub-Section F: Preliminary Ultimate Complete Street Section Concepts for Discussion

The purpose of the following cross-sections is to describe the existing conditions of Forest Drive. These cross-sections also offer modifications to address specific issues related to the implementation of Complete Streets. Right of Way widths vary with the space available.

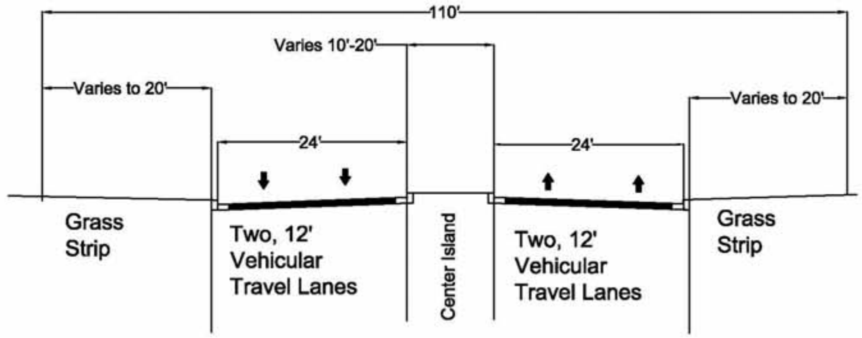
Modifications include:

- Reduction of travel lane widths from twelve feet to eleven feet.
- Reduction of turning lane widths from eleven to ten feet.
- Continuing the pedestrian / bicycle path established by the County at the west end of the corridor. Introducing an eight foot pedestrian/bicycle path separated from vehicular travel lanes within the county and state ROW, where space permits.
- Establishing a ten foot landscape easement that abuts the county ROW. This landscape easement is intended to provide additional space necessary for quality planting and pedestrian amenities. This easement may include the eight foot pedestrian/bicycle path where ROW is insufficient to accommodate needed lane improvements. This easement may include decorative lighting or banners. Where the landscape easement is imposed on private property the development rights are transferred to the remainder of the property. This easement should allow the inclusion of stormwater bioretention treatments that benefit either the ROW or the adjoining property. Plantings in this easement should count towards satisfying code landscape or forest conservation requirements and tree canopy requirements of the City.
- Continuing the consistent use of center islands to separate travel lanes and provide pedestrian refuge at busy intersections. The application of a raised island is not recommended where single family residential or small business driveways currently exist. Where pedestrian crosswalks exist or are being proposed the center island should have a minimum width of four feet and at that location the overall width of a turning lane and island combined should be a minimum of fifteen feet.

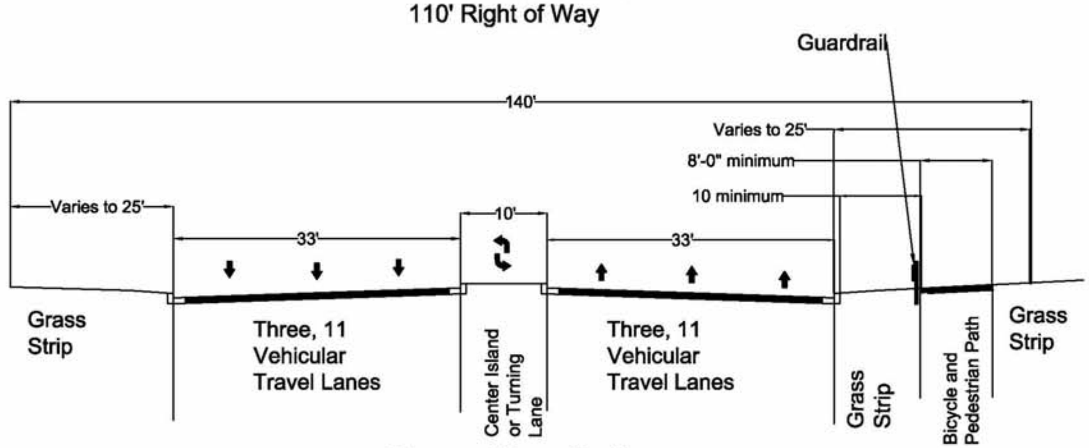
Map of Ultimate Complete Street Sections



Identity							Curb to Curb						Back of Curb to Right of Way						Beyond Right of Way		
Symbol	Street	Segment	Classification	Character	Status	Right of Way	Travel Lanes			Median			Bicycle Facilities	Sidewalks		Bustops	Lighting	Banners	Set backs	Max. Height	Landscape Easement
							# of Lanes	Width	Left Turn	Width	Trees	Shrubs	Bike Lane	Pavement type	Width	10 on Forest					
A	ARIS T. ALLEN	Md 2 / Chinnquapin	Principal Arterial	Freeway / Auto Oriented	Not in Study Area	110'	4	12	Yes - limited	10' - 20'	No	Yes	No	none	0	No	Highway Interchange	No	No	N/A	No
A	ARIS T. ALLEN	Md 2 / Chinnquapin	Principal Arterial	Boulevard / Auto Oriented, Bicycle / Pedestrian Friendly	Not in Study Area	140'	6	11	Yes - limited	10' - 20'	No	Yes	No	Concrete / Asphalt	4' - 8'	No	L.E.D. with Cutoff Sheilds	No	N/A	N/A	10' Both Sides
B	FOREST Drive	Chinnquapin / Hilltop	Principal Arterial	Suburban Medium Density / Auto Oriented	Existing	110'	6	12	Yes 11'	6' to 16'	No	Yes	No	Concrete / Asphalt	3' - 8'	Yes	Decorative at Safeway	No	20'	By Zoning District	No
B	FOREST Drive	Chinnquapin / Hilltop	Principal Arterial	Suburban Medium Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	120'	7; 8	11	Yes 10'	6'	Small	Yes	No	Concrete / Asphalt	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	20'	65' to 4 Stories	10' Both Sides
C	FOREST Drive	Hilltop / Rosecrest Dr.	Minor Arterial	Suburban Low Density / Auto Oriented	Existing	90'	5; 4	12	Yes 11'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	Corbra at Intersections	No	By Zoning District	By Zoning District	No
C	FOREST Drive	Hilltop / Rosecrest Dr.	Minor Arterial	Suburban Low Density / Auto Oriented / Pedestrian Friendly	Proposed	80'	5; 4	11	Yes 10'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	Build to Landscape Easement	65' to 4 Stories	10' Both Sides
D	FOREST Drive	Rosecrest Dr. / Forest Hills Ave	Minor Arterial	Suburban Low Density / Auto Oriented	Existing	80'	4	12	Yes 11'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	Corbra at Intersections	No	By Zoning District	By Zoning District	No
D	FOREST Drive	Rosecrest Dr. / Forest Hills Ave	Minor Arterial	Suburban Low Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	80'	4	11	Yes 10'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	Build to Landscape Easement	65' to 4 Stories	10' Both Sides
E	FOREST Drive	Forest Hills Ave /	Minor Arterial	Suburban Low Density / Auto Oriented	Existing	80'	4	12	Yes 11'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	Corbra at Intersections	No	By Zoning District	By Zoning District	No
E	FOREST Drive	Forest Hills Ave / Edgewood	Minor Arterial	Suburban Low Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	80'	4	11	Yes 10'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	Build to Landscape Easement	65' to 4 Stories	10' Both Sides



EXISTING Cross Section
110' Right of Way

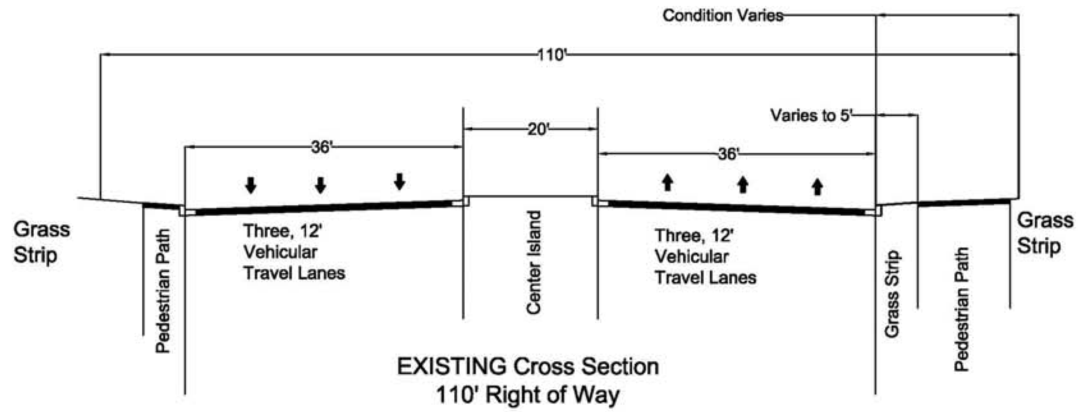


Proposed Cross Section
140' Right of Way

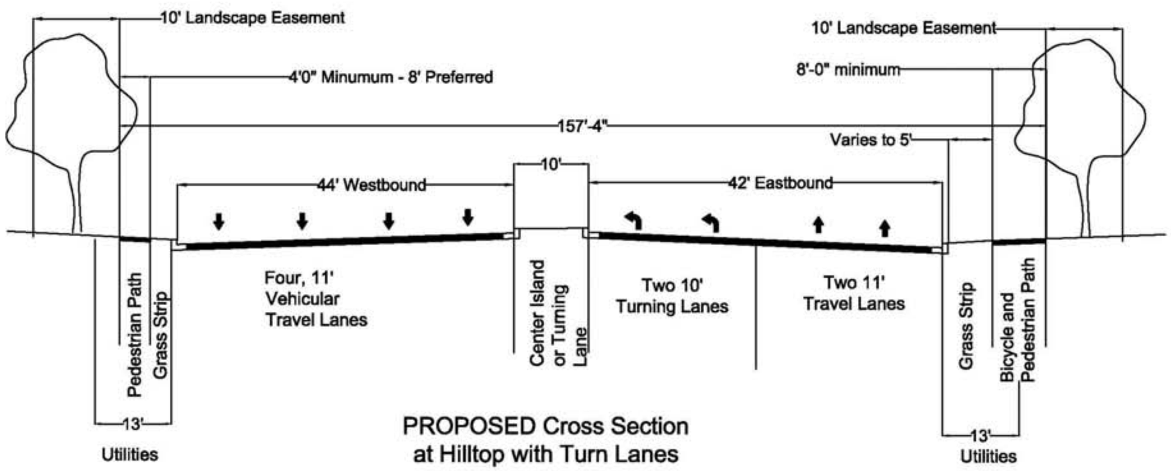
Conceptual Forest Drive Street Section A
Westbound

A

Identity						Right of Way	Curb to Curb						Back of Curb to Right of Way							Beyond Right of Way		
Symbol	Street	Segment	Classification	Character	Status		Travel Lanes			Median			Bicycle Facilities	Sidewalks		Bustops	Lighting	Banners	Set backs	Max. Height	Landscape Easement
							# of Lanes	Width	Left Turn	Width	Trees	Shrubs	Bike Lane	Pavement type	Width	10 on Forest					
A	ARIS T. ALLEN	Md 2 / Chinnquapin	Principal Arterial	Freeway / Auto Oriented	Not in Study Area	110'	4	12	Yes - limited	10' - 20'	No	Yes	No	none	0	No	Highway Interchange	No	No	N/A	No
A	ARIS T. ALLEN	Md 2 / Chinnquapin	Principal Arterial	Boulevard / Auto Oriented, Bicycle / Pedestrian Friendly	Not in Study Area	140'	6	11	Yes - limited	10' - 20'	No	Yes	No	Concrete / Asphalt	4' - 8'	No	L.E.D. with Cutoff Sheilds	No	N/A	N/A	10' Both Sides
B	FOREST Drive	Chinnquapin / Hilltop	Principal Arterial	Suburban Medium Density / Auto Oriented	Existing	110'	6	12	Yes 11'	6' to 16'	No	Yes	No	Concrete / Asphalt	3' - 8'	Yes	Decorative at Safeway	No	20'	By Zoning District	No
B	FOREST Drive	Chinnquapin / Hilltop	Principal Arterial	Suburban Medium Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	120'	7; 8	11	Yes 10'	6'	Small	Yes	No	Concrete / Asphalt	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	20'	65' to 4 Stories	10' Both Sides
C	FOREST Drive	Hilltop / Rosecrest Dr.	Minor Arterial	Suburban Low Density / Auto Oriented	Existing	90'	5; 4	12	Yes 11'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	Corbra at Intersections	No	By Zoning District	By Zoning District	No
C	FOREST Drive	Hilltop / Rosecrest Dr.	Minor Arterial	Suburban Low Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	80'	5; 4	11	Yes 10'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	Build to Landscape Easement	65' to 4 Stories	10' Both Sides
D	FOREST Drive	Rosecrest Dr. / Forest Hills Ave	Minor Arterial	Suburban Low Density / Auto Oriented	Existing	80'	4	12	Yes 11'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	Corbra at Intersections	No	By Zoning District	By Zoning District	No
D	FOREST Drive	Rosecrest Dr. / Forest Hills Ave	Minor Arterial	Suburban Low Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	80'	4	11	Yes 10'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	Build to Landscape Easement	65' to 4 Stories	10' Both Sides
E	FOREST Drive	Forest Hills Ave /	Minor Arterial	Suburban Low Density / Auto Oriented	Existing	80'	4	12	Yes 11'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	Corbra at Intersections	No	By Zoning District	By Zoning District	No
E	FOREST Drive	Forest Hills Ave / Edgewood	Minor Arterial	Suburban Low Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	80'	4	11	Yes 10'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	Build to Landscape Easement	65' to 4 Stories	10' Both Sides



EXISTING Cross Section
110' Right of Way

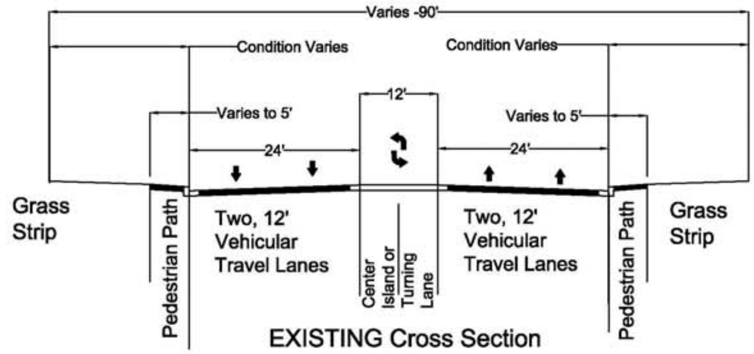


PROPOSED Cross Section
at Hilltop with Turn Lanes
121' Right of Way

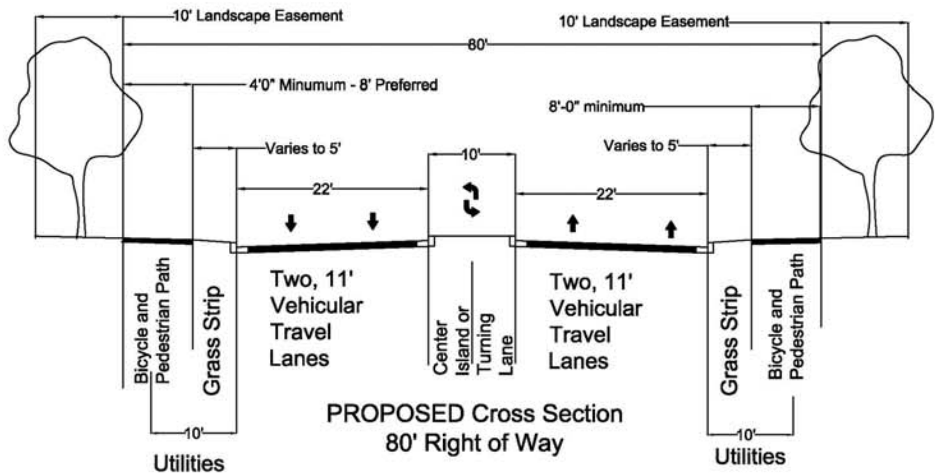
Conceptual Forest Drive Street Section B
Eastbound

B

Identity						Right of Way	Curb to Curb						Back of Curb to Right of Way						Beyond Right of Way		
Symbol	Street	Segment	Classification	Character	Status		Travel Lanes			Median			Bicycle Facilities	Sidewalks		Bustops	Lighting	Banners	Set backs	Max. Height	Landscape Easement
							# of Lanes	Width	Left Turn	Width	Trees	Shrubs	Bike Lane	Pavement type	Width	10 on Forest					
A	ARIS T. ALLEN	Md 2 / Chinnquapin	Principal Arterial	Freeway / Auto Oriented	Not in Study Area	110'	4	12	Yes - limited	10' - 20'	No	Yes	No	none	0	No	Highway Interchange	No	No	N/A	No
A	ARIS T. ALLEN	Md 2 / Chinnquapin	Principal Arterial	Boulevard / Auto Oriented, Bicycle / Pedestrian Friendly	Not in Study Area	140'	6	11	Yes - limited	10' - 20'	No	Yes	No	Concrete / Asphalt	4' - 8'	No	L.E.D. with Cutoff Sheilds	No	N/A	N/A	10' Both Sides
B	FOREST Drive	Chinnquapin / Hilltop	Principal Arterial	Suburban Medium Density / Auto Oriented	Existing	110'	6	12	Yes 11'	6' to 16'	No	Yes	No	Concrete / Asphalt	3' - 8'	Yes	Decorative at Safeway	No	20'	By Zoning District	No
B	FOREST Drive	Chinnquapin / Hilltop	Principal Arterial	Suburban Medium Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	120'	7; 8	11	Yes 10'	6'	Small	Yes	No	Concrete / Asphalt	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	20'	65' to 4 Stories	10' Both Sides
C	FOREST Drive	Hilltop / Rosecrest Dr.	Minor Arterial	Suburban Low Density / Auto Oriented	Existing	90'	5; 4	12	Yes 11'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	Corbra at Intersections	No	By Zoning District	By Zoning District	No
C	FOREST Drive	Hilltop / Rosecrest Dr.	Minor Arterial	Suburban Low Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	80'	5; 4	11	Yes 10'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	Build to Landscape Easement	65' to 4 Stories	10' Both Sides
D	FOREST Drive	Rosecrest Dr. / Forest Hills Ave	Minor Arterial	Suburban Low Density / Auto Oriented	Existing	80'	4	12	Yes 11'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	Corbra at Intersections	No	By Zoning District	By Zoning District	No
D	FOREST Drive	Rosecrest Dr. / Forest Hills Ave	Minor Arterial	Suburban Low Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	80'	4	11	Yes 10'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	Build to Landscape Easement	65' to 4 Stories	10' Both Sides
E	FOREST Drive	Forest Hills Ave /	Minor Arterial	Suburban Low Density / Auto Oriented	Existing	80'	4	12	Yes 11'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	Corbra at Intersections	No	By Zoning District	By Zoning District	No
E	FOREST Drive	Forest Hills Ave / Edgewood	Minor Arterial	Suburban Low Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	80'	4	11	Yes 10'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	Build to Landscape Easement	65' to 4 Stories	10' Both Sides



EXISTING Cross Section
90' Right of Way



PROPOSED Cross Section
80' Right of Way

Conceptual Forest Drive Street Section C
Eastbound

C

Identity						Right of Way	Curb to Curb						Back of Curb to Right of Way						Beyond Right of Way		
Symbol	Street	Segment	Classification	Character	Status		Travel Lanes			Median			Bicycle Facilities	Sidewalks		Bustops	Lighting	Banners	Set backs	Max. Height	Landscape Easement
							# of Lanes	Width	Left Turn	Width	Trees	Shrubs	Bike Lane	Pavement type	Width	10 on Forest					
A	ARIS T. ALLEN	Md 2 / Chinnquapin	Principal Arterial	Freeway / Auto Oriented	Not in Study Area	110'	4	12	Yes - limited	10' - 20'	No	Yes	No	none	0	No	Highway Interchange	No	No	N/A	No
A	ARIS T. ALLEN	Md 2 / Chinnquapin	Principal Arterial	Boulevard / Auto Oriented, Bicycle / Pedestrian Friendly	Not in Study Area	140'	6	11	Yes - limited	10' - 20'	No	Yes	No	Concrete / Asphalt	4' - 8'	No	L.E.D. with Cutoff Sheilds	No	N/A	N/A	10' Both Sides
B	FOREST Drive	Chinnquapin / Hilltop	Principal Arterial	Suburban Medium Density / Auto Oriented	Existing	110'	6	12	Yes 11'	6' to 16'	No	Yes	No	Concrete / Asphalt	3' - 8'	Yes	Decorative at Safeway	No	20'	By Zoning District	No
B	FOREST Drive	Chinnquapin / Hilltop	Principal Arterial	Suburban Medium Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	120'	7; 8	11	Yes 10'	6'	Small	Yes	No	Concrete / Asphalt	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	20'	65' to 4 Stories	10' Both Sides
C	FOREST Drive	Hilltop / Rosecrest Dr.	Minor Arterial	Suburban Low Density / Auto Oriented	Existing	90'	5; 4	12	Yes 11'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	Corbra at Intersections	No	By Zoning District	By Zoning District	No
C	FOREST Drive	Hilltop / Rosecrest Dr.	Minor Arterial	Suburban Low Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	80'	5; 4	11	Yes 10'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	Build to Landscape Easement	65' to 4 Stories	10' Both Sides
D	FOREST Drive	Rosecrest Dr. / Forest Hills Ave	Minor Arterial	Suburban Low Density / Auto Oriented	Existing	80'	4	12	Yes 11'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	Corbra at Intersections	No	By Zoning District	By Zoning District	No
D	FOREST Drive	Rosecrest Dr. / Forest Hills Ave	Minor Arterial	Suburban Low Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	80'	4	11	Yes 10'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	Build to Landscape Easement	65' to 4 Stories	10' Both Sides
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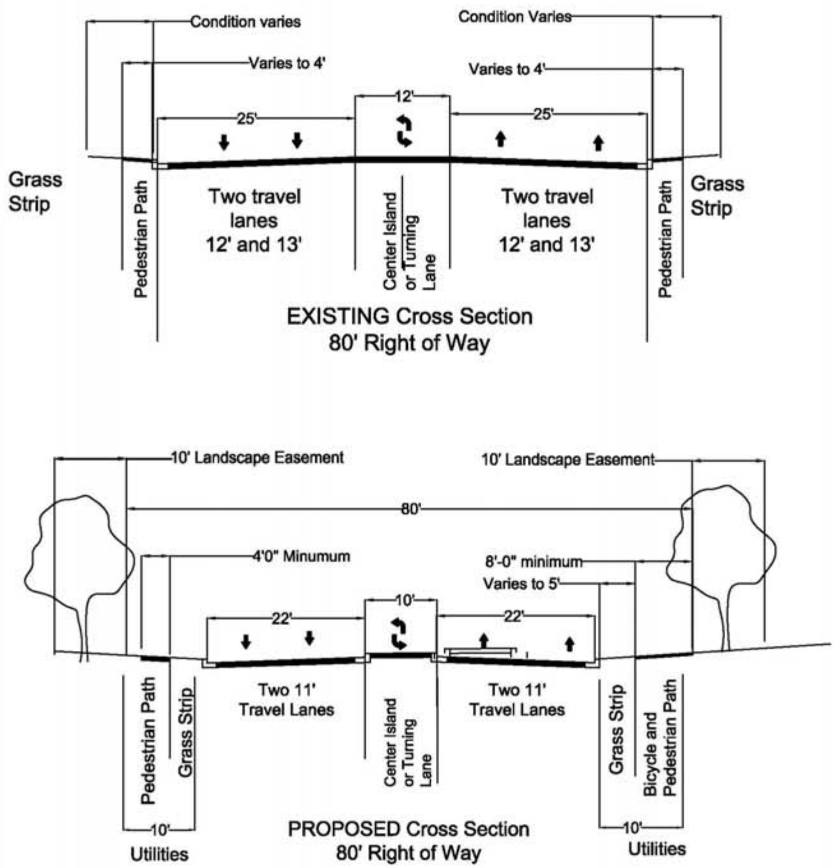

Conceptual Forest Drive Street Section D
Eastbound

D

Identity						Right of Way	Curb to Curb						Back of Curb to Right of Way						Beyond Right of Way		
Symbol	Street	Segment	Classification	Character	Status		Travel Lanes			Median			Bicycle Facilities	Sidewalks		Bustops	Lighting	Banners	Set backs	Max. Height	Landscape Easement
							# of Lanes	Width	Left Turn	Width	Trees	Shrubs	Bike Lane	Pavement type	Width	10 on Forest					
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C	FOREST Drive	Hilltop / Rosecrest Dr.	Minor Arterial	Suburban Low Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	80'	5; 4	11	Yes 10'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	Build to Landscape Easement	65' to 4 Stories	10' Both Sides
D	FOREST Drive	Rosecrest Dr. / Forest Hills Ave	Minor Arterial	Suburban Low Density / Auto Oriented	Existing	80'	4	12	Yes 11'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	Corbra at Intersections	No	By Zoning District	By Zoning District	No
D	FOREST Drive	Rosecrest Dr. / Forest Hills Ave	Minor Arterial	Suburban Low Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	80'	4	11	Yes 10'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	Build to Landscape Easement	65' to 4 Stories	10' Both Sides
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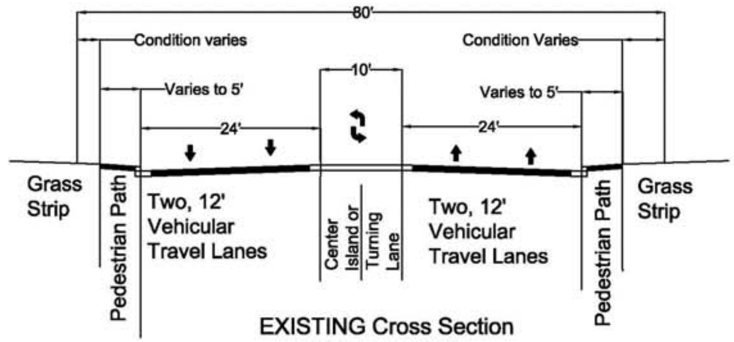
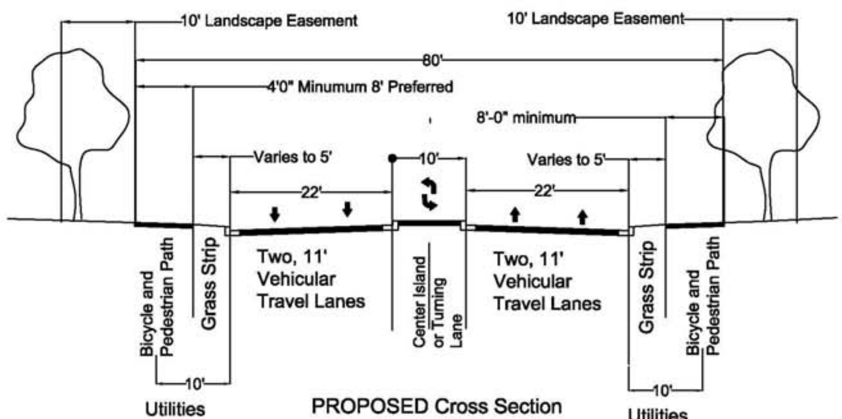
E	FOREST Drive	Forest Hills Ave / Edgewood	Minor Arterial	Suburban Low Density / Auto Oriented, Bicycle / Pedestrian Friendly	Proposed	80'	4	11	Yes 10'	0' to 12'	Small	Yes	No	Concrete	4' - 8'	Yes	L.E.D. with Cutoff Sheilds	Yes	Build to Landscape Easement	65' to 4 Stories	10' Both Sides



EXISTING Cross Section
80' Right of Way



PROPOSED Cross Section
80' Right of Way

Conceptual Forest Drive Street Section E
Eastbound

E

APPENDIX D
Possible Modifications to Traffic Adequate Public Facility Ordinance and Traffic Impact Analysis Guidelines

Several changes to the current traffic adequate public facility ordinance and traffic impact study guidelines have been proposed since the 2009 Comprehensive Plan. The following reiterates some of these changes, and adds new options available to the City.

The traffic impact study guidelines for a potential development project should be modified so that:

- The proposal analyzes the total impact/benefit to the City. Consider an evaluation approach based on a grading system that scores the total effort offered by the applicant to mitigate the effects of the proposed development and acknowledge the benefits.
- A mitigation option list is provided. This list would identify projects that are a priority to the affected community. This could serve as a substitute mitigation proposal. However it does not affect the basic requirements of site development mandated by code such as stormwater or tree canopy requirements.
- Mitigation options are categorized into major themes, i.e. transportation, economic development or environment.
- City priorities to be implemented over time are identified
- Alternative improvements that are within the category for mitigation can be provided. (Example: If an initial traffic study reveals congestion near the proposed project is a high priority but the solutions available for improvement will not significantly alter the congestion, the applicant may offer other measures such as improvements to Transit or Pedestrian/Bike facilities). The applicant should be required to meet a “reasonable standard for improvement” within each major category.
- The applicant is allowed to make a payment (fee in lieu) to an escrow account that can be applied to a mitigation option as identified by staff. Place a time limit on the escrow account to have money used by a certain date or it gets refunded

Another method to modify the APFO and guidelines is to continue with the current approaches but with smaller revisions that would produce results that are much more realistic/practical for the real world in a multimodal city and consistent with the goals of the 2009 Comprehensive Plan. These changes should be consistent with the Complete Streets approach and ensure that future development projects are evaluated against their contribution to the City’s transportation performance broadly defined to include safety, transit ridership and cost effectiveness, heavy truck congestion, automobile congestion, bicycle and pedestrian circulation, as well as the existing nature and purpose of the surrounding road network. Changes might include the following:

- Require development applications to provide traffic impact studies to address adequacy of transit, biking and walking as well as vehicular traffic. Require a multimodal LOS analysis of intersections at staff discretion. Require that a context map be provided that locates the existing street connectivity, transit services, bike and pedestrian routes and major destinations within the vicinity of the development site and identifies relevant gaps and obstructions. The vicinity should include at a minimum a one-mile radius.
- Require that site vehicular trip generation estimates reflect a Complete Streets mode emphasis as well as a proposed site mode split data. Permit trip generation estimates

to quantify estimated pass-by travel changes such as trip capture and commuter trip reversals.

- Require that the traffic impact studies use simulation analyses for all locations; either SimTraffic or Vissim software should be used. Simulation models should be built to scale using ortho-rectified aerial images available from MDSHA, and use current signal timings provided by the City, County, and/or State. Require that the simulation models be calibrated to reflect existing queues along approaches to the intersections.
- Retain the existing requirement that overall intersection LOS/delay metrics shall be used to determine vehicular adequacy at signalized intersections.
- Add a requirement that at the discretion of staff, vehicular adequacy determinations shall also consider operations along individual approaches as follows:
    - Require a review of queuing capacity. Measurements shall be taken along each approach to identify the "critical length," which means the point at which the queue would intersect a vital conflict point in the network. These vital conflict points should be defined by the City during the scoping meeting, and may include adjacent signalized or un-signalized intersections, ramp junctions, or driveways where extension of the queue to this point would be expected to have a significantly adverse effect on traffic flow through the system. Any queues extending beyond this point, either under existing or proposed conditions, will require mitigation. Retain the existing requirement that mitigation needs to be sought for any signalized intersection (overall intersection), and additionally, when feasible and depending on the volume at the intersection, for the individual approach to an un-signalized intersection and/or ramp junction, that is proposed to operate at LOS E or F as a result of the addition of the development's trips. This means that any overall signalized intersection, or approach to an un-signalized intersection or ramp junction, currently operating at LOS D or better that is going to drop to LOS E or F shall to be mitigated back to LOS D (when possible), and will not be permitted to experience any degradation in average delay.
- Provide that what measure gets selected for mitigation, how, when or "if" it gets implemented, is at the discretion of the City or the agency that manages the facility. The City may require alternate mitigation in cases in which the only effective improvement to an identified inadequacy is one that is considered by the City to be not viable due to unacceptable anticipated impacts. Those impacts include stormwater runoff, damage to environmental features, etc.
- Expand the list of acceptable mitigation options that may be required or considered by staff and the Planning Commission to include an option to substitute improvements to existing and proposed transit stops, bike and pedestrian routes, and crossings for vehicular circulation improvements.
- An option to allow the applicant to make a payment (fee in lieu) to an escrow account that can be applied to a mitigation option as identified by staff. Place a time limit on the escrow account to have money used by a certain date or it gets refunded
- An option to provide access management improvements—such as closure of access points that are determined to be too close to other intersections.
- An option to shift improvements to alternate routes, to encourage shifting travel patterns to route with available capacity.
- Commitments by an employer to help reduce peak hour commuter trips through telecommuting, flexible work hours, and compressed work schedules etc.

- Add a provision that exceptions to Complete Street design standards conformance may be granted by staff and the Planning Commission based on mobility/traffic analysis that demonstrates that one on more modes should not be planned for in that location for reasons of safety. (Example: existing curb to curb street width is insufficient to allow for a bike lane.)
- Consider supplementing the current letter grade terminology used to “grade” user satisfaction and define LOS with the following industry standard terms:
    - Free flow – A
    - Reasonably free flow – B
    - Stable flow – C
    - Approaching unstable flow – D
    - Unstable flow operating at capacity - E
    - Forced or breakdown flow with more demand than capacity - F