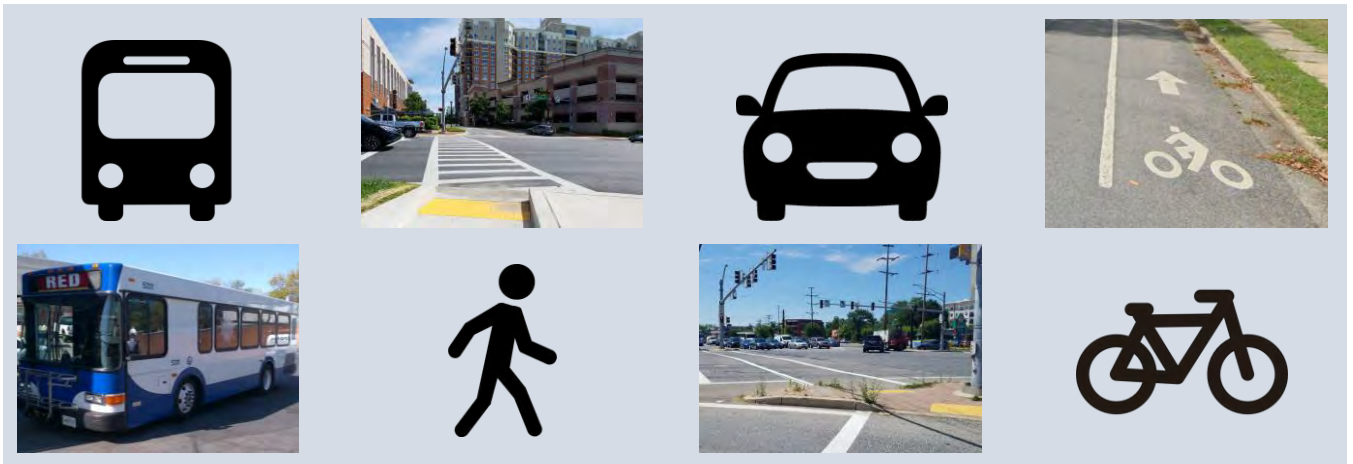


Parole Mobility Study for the Parole Town Center Master Plan

Final Report | February 2021



Prepared For



Prepared By



Parole Mobility Study for the Parole Town Center Master Plan

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Parole Mobility Study for the Parole Town Center Master Plan

I. INTRODUCTION

A. Purpose and Need

The purpose of the Parole Mobility Study is to identify necessary short-term and long-term improvements to meet the Parole Town Center's future land use, urban design and multi-modal mobility needs and provide a connected transportation network supporting all users of the right-of-way including motorists, pedestrians, and bicyclists.

The Parole Urban Design Concept Plan (PUDCP) is the master plan that guides land use and development and sets general standards for the quality of design within the County-designated Parole Growth Management Area (PGMA). The current PUDCP was adopted in 1994. This study will focus on updating the transportation elements of the PUDCP and will help address the growth in traffic demand in the Parole Town Center by identifying recommendations to reduce congestion and increase multimodal transportation options. Anne Arundel County has committed to undertake several other studies that may have an impact on the PGMA and Parole Master Plan's recommendations. The studies include a County-wide Land Use Market Analysis and a Multimodal Center Feasibility Study in Anne Arundel County, with locations in Parole being considered. This mobility study will support the update of the current PUDCP through the following efforts:

- a) Collection and evaluation of data that accurately characterizes existing traffic demand;
- b) Assessment of the connectivity and performance of walking, biking and transit networks within the PGMA;
- c) Simulation and capacity analysis of roadway networks to:
 - a. Identify underperforming roadway segments and intersections
 - b. Recommend traffic management strategies for regional roadways including traffic signal system operations;
- d) Revision of regional travel demand models to identify future traffic levels and support planning and land use development guidelines;
- e) Understanding and addressing concerns identified by the public.

B. Overview

This final report will summarize all components of the Parole Mobility Study that have been done to date and will contain all previous submittals (Existing Conditions Report, Future Traffic Conditions Memo), comments, and public input.

This report is split into five sections:

- Introduction
- Existing Conditions
- Future Conditions Analysis
- Recommendations
- Incorporation into the Parole Urban Design Plan

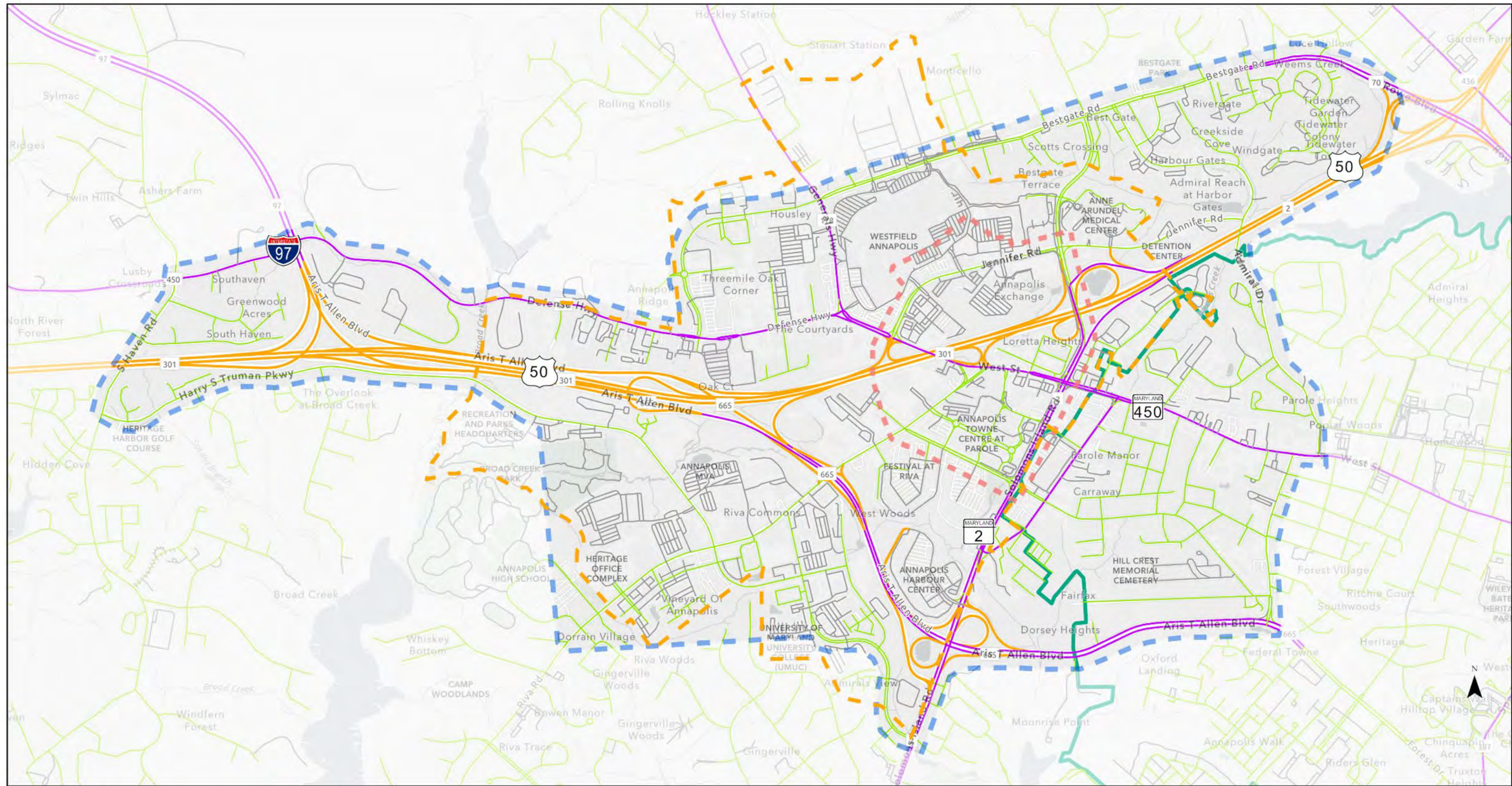
II. EXISTING CONDITIONS

The Existing Conditions Report, dated June 2020, describes existing connectivity and gaps for pedestrian and bicycle facilities, transit service/coverage, and operations and safety of roadways. The study area for the Parole Mobility Study is defined in **Figure 17** below.

Figure 1: Study Area Map

Parole Town Center Transportation Master Plan

Study Area



Road Ownership

- National Highway System
- State of Maryland
- Local Governments
- Private

- Core Area
- Study Area
- PGMA Boundary
- City of Annapolis Boundary

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A. Summary of Findings

The Existing Conditions Report summarized the connectivity, operational, and safety issues identified within the Parole Town Center study area and helped guide the process for determining future vehicle, pedestrian, bicycle, and transit improvements. The findings of the Existing Conditions Report are described below:

Vehicle Operations

Areawide

- Based on the capacity of a freeway per lane per hour, US 50 is at capacity in the eastbound direction during the PM peak hour and near capacity in the WB direction during the AM peak hour.
- Peak hour directional volumes on MD 450 (West Street) are highest between the US 50 ramps and MD 450 (Defense Highway) /MD 178. In this section there are over 1,600 westbound vehicles during the AM peak hour and over 1,800 vehicles during the PM peak hour. These volumes indicate that westbound MD 450 (West Street) is at or near the capacity, particularly during the PM peak hour.
- Peak hour directional volumes on CO 3266 (Riva Road) are highest between the MD 665 ramps and Harry S. Truman Parkway. In this section there are nearly 1,900 southbound vehicles during the AM peak hour and up to 2,000 northbound vehicles during the PM peak hour. These volumes indicate this segment of CO 3266 (Riva Road) is near or at capacity during both the AM/PM peak hours.
- Significant congestion on MD 2, MD 450 (West Street), MD 178 (Generals Highway), Riva Road, and Chinquapin Round Road can be seen during the AM and PM peak hours.
- Slow speeds are also shown on Jennifer Road and Bestgate Road during the PM peak hour.
- From the speed data, the intersections of MD 450 at MD 178, MD 450 at Jennifer Road/US 50 WB Off-ramp, MD 450 at Riva Road, MD 2 at MD 450, MD 665 Ramps at Riva Road, MD 178 at Bestgate Road, and MD 2/Medical Parkway at Jennifer Road can be identified as sources of congestion.
- Recommendations will evaluate congestion mitigation strategies including roadway configuration, signal operations, and active traffic management strategies such as dynamic lane use and turn regulations.

Study Intersections

- The results show that the following intersections do not meet the County's level of service thresholds:
 - o MD 450/MD 178 at Defense Highway/Mall Entrance operates with a LOS E during the PM peak hour
 - o MD 2 at MD 450 operates with a LOS E during the PM peak hour
- Both of the intersections operating over the County's level of service threshold (listed above) are on MD 450 during the PM peak hour, which coincides with the relatively low speeds approaching these intersections.
- Recommendations will evaluate congestion mitigation strategies for these intersections including roadway configuration, signal operations, and active traffic management strategies such as dynamic lane use and turn regulations.

Pedestrians and Bicycles

The following concerns were identified for the existing pedestrian and bicycle network:

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Pedestrians

Areawide

- MD 2, which is a major commercial corridor particularly south of US 50, remains a barrier between commercial and residential areas as it has limited pedestrian crossings of the corridor and generally does not provide any sidewalks/paths.
- US 50 and MD 665 are fully access controlled facilities with pedestrian crossings limited to interchanges (e.g. underpasses) and serve as a barrier between generators and land uses within the PGMA.
- Defense Highway contains one of the access points to Annapolis Waterworks Park, which contains 600 acres of hiking and biking trails. The park is operated by the City of Annapolis Recreation and Parks Department and accessible to the public by permit. Accessing the park via Defense Highway by foot is difficult given the limited sidewalk infrastructure. The other access point is on Housley Road, which also has sidewalk gaps.
- Several sidewalk network gaps exist between the residential neighborhood at Parole Manor (south of MD 450 and north of Forest Drive) and Walter S. Mills-Parole Elementary School to the east and the Anne Arundel Community Library to the north (across MD 450 on Gibraltar Avenue). A signal was recently installed at the intersection of MD 450 at Gibraltar Avenue.
- There is no safe crossing from the residential area south of Bestgate Road to the church or Bestgate Park on the north side of Bestgate Road. In order to cross safely at a signalized intersection, residents from the neighborhood would have to walk west to Admiral Drive.
- Recommendations for enhancing walkability will include additional controlled mid-block pedestrian crossing locations, construction of missing sidewalks and creation of a refined street grid in core areas to include shorter walkable block lengths.

Study Intersections

- Two of the study intersections, MD 450 at Jennifer Road/US 50 WB Off-ramp and MD 665 Ramps at Riva Road, have marked crosswalks at signalized intersections but do not have pedestrian signals.
- Seven of the study intersections are missing detectable warning surfaces on at least one ramp.
- Recommendations for enhancing walkability will include additional pedestrian crossing locations, addition of missing pedestrian signals, and upgrades of ADA ramps.

Bicycles

- There is a lack of path/ trail connections in the study area north-south across major roadways including MD 665 and US 50. There is a lack of path/ trail connections in the study area east-west across MD 2.
- The existing on-road bicycle network largely rates high stress for many of the major collectors and arterials.
- Gaps in the bicycle network exist on key arterial and collector roads including MD 450 east of MD 2, Jennifer Road, Admiral Drive, Harry S. Truman Parkway, Admiral Cochrane Drive, and Forest drive between MD 2 and Riva Road. Filling these gaps would better connect the already-existing bicycle network. Additional network connections may be considered, such as along Defense Highway and West Street.
- Admiral Drive, Jennifer Road, and MD 450 are considered high-stress roadways, which limits low-stress connections for residential areas east of Admiral Drive. This impacts the ability of residents in this area to bike recreationally, reach destinations such as the mall and Town Centre, as well as access the shared-use path on Admiral Drive.
- There are several side-paths that are considered high stress, including those on Admiral Drive, MD 2, and MD 450. Shared-use paths are considered higher stress when they are next to high-

Parole Mobility Study for the Parole Town Center Master Plan

speed roadways without significant separation. Further, bicyclists using shared-use paths next to major roadways must still cross intersections, which can be a high-stress experience without the proper provisions. In the Parole bicycle network, intersections that connect to shared-use paths include:

- o MD 2 with Forest Drive, West Street, and Jennifer Road
 - o Bestgate Road with Medical Parkway, Admiral Drive, and Commerce Park Drive
 - o Jennifer Road and Admiral Drive
 - o Defense Highway and Hensley Road
 - o Riva Road with Forest Drive and H. S. Truman Pkwy
- Bicycle connections are particularly important around schools, as most students are not of driving age. High-quality bicycle lanes between residential areas and schools takes pressure off parents to provide transportation, reduces demand on the school transportation system, and provides a way for students to naturally get exercise. Currently, there is little opportunity for students at Annapolis High School and Walter S. Mills-Parole Elementary School to safely bike to school, although bike share data has shown spikes in usage around Annapolis High School.
- The development of bicycle network recommendations for the study area will include completing missing connections along existing roadways, creating new grade separated connections across major freeway barriers, enhancing the quality of the existing bicycle network to reduce stress, enhancing wayfinding signage, and evaluating increasing right-of-way for bike facilities through road diets, neighborhood bikeways, and identifying new routes such as loops around the major retail uses.

Transit

- The highest daily ridership is on the Annapolis Transit routes, which run more frequently than other transit operators.
- Overall transit service is not very frequent, even during the peak hours, with headways for all routes being 30 minutes or more and many headways exceeding an hour.
- Transit span of service does not extend late enough on weekdays to match most retail hours, meaning the service may not be accessible for service industry employees
- Multiple transit routes operate on key roadways (e.g. MD 450, Riva Road, Jennifer Road) and do serve major generators (retail, library, Hospital, etc.)
- Service patterns are oriented towards downtown Annapolis, or longer distance commuters (Baltimore, Washington D.C. and western Anne Arundel/ Howard County)
- Access to transit and ridership is hindered by gaps in the pedestrian and bicycle network that create longer distances for potential transit riders to walk/bike. In many cases, people will walk to transit if it is close enough. However, on either end of a public transit trip, the origin or destination may be difficult or impossible to access by a short walk, which may make potential riders rethink their decision to use transit.
- Recommendations for enhancing transit will focus on changing service patterns to create a circulator style service for Parole Town Center using variable routing and on-demand service models, supporting a multi-modal transit center, and enhancing pedestrian access to bus stops.

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Safety Analysis

- Most vehicle crashes resulted in property damage only (69%), rear end crashes (34%), and occurred during day light hours (69%).
- Intersection-related crashes were most frequent along state corridor segments. Specifically, MD 450 (West St/Defense Highway) and MD 2 (Solomons Island Rd) combined account for almost 40% of the crashes. County roads are second in having a high frequency of intersection crashes with Riva Road, Forest Drive, and Jennifer Rd accounting for over 25% of the 638 intersection related crashes.
- Intersections experiencing the most intersection-related crashes were Riva Road & MD 450, Jennifer & MD 450, MD 2 & MD 450, Admiral Cochrane Dr & Riva Rd, and Forest Drive & Harker Place.
- Several segments on MD 450, MD 2, and US 50 have been identified as Primary and Secondary Candidate Safety Improvement Locations over the last three years. Segments on MD 450 between Chinquapin Round Road and MD 178 (Defense Highway), MD 2 between Admiral Cochrane Drive and the Ramps to US 50, and US 50 through the study area consistently make the lists.
- Crashes involving pedestrian (41) and cyclists (10) numbered 51 in total (3%) during the past three years. While this may not be high compared to the total crashes in Parole, Anne Arundel identifies nearly 20% of the County's pedestrian and bicycle crashes as occurring in Parole. Pedestrian and bicycle crashes were most prominent along MD 450 with other hotspots on Forest Drive, Riva Road, and Jennifer Road.
- A high number of pedestrian/bicycle crashes occur on MD 450 (West Street). There are a limited number of crossings of MD 450 (West Street) in the study area and relatively large distances between them. For example, there are no crossings of MD 450 (West Street) between MD 178/Defense Highway and MD 2 (Solomons Island Road), which is over a half mile in length. Additionally, the intersection of MD 450 at Jennifer Road only has a crosswalk on one leg without pedestrian signals and crossings are only provided on two legs of the intersection of MD 2 at MD 450. This gives pedestrians few crossing opportunities and leads to crossings at unsignalized/unmarked locations.

B. Existing Conditions Report

The full Existing Conditions Report can be found in **Appendix A** or on the County's website below: <https://www.aacounty.org/departments/transportation/reports-studies/active-studies/parole-mobility-study/index.html>

Appendix B and **Appendix C** contain the traffic volumes and HCM reports referenced in the Existing Conditions report, respectively.

C. Public Input

The Existing Conditions Report and a presentation of the findings were posted on the County's website and the public was notified through the County's press release channels. The presentation on existing conditions is included for reference in **Appendix D**.

Three weeks after posting the report and presentation, a virtual Q&A session was held via Zoom software on July 8th, 2020 at 7 PM. In addition to questions posted during the Zoom Q&A, the public had the opportunity to email the project's email address with any other questions/comments. The chat log from the Zoom Q&A session and any questions submitted via email are included in **Appendix E**.

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D. Public Survey Results

In addition to public comment on the Existing Conditions Report and presentation, a public survey and interactive map were utilized to get additional public feedback as well. These were posted for the entire time that the 30-day comment period was open. The findings from the survey and interactive map are included in **Appendix F**.

III. FUTURE CONDITIONS ANALYSIS

The Mobility Study for the Parole Town Center Master Plan will support the Office of Planning and Zoning's update of the Parole Urban Design Concept Plan (PUDCP), the master plan for the Parole Growth Management Area (PGMA). The draft Vision of the PUDCP states that Parole will be a community that is redeveloped and revitalized to serve the region as an economic and transportation hub, absorbing much of the County's growth pressure into a well-designed urban place, while respecting and enhancing the character of its less urban surroundings. Two future land use scenarios (2045 and Ultimate) have been developed by the Anne Arundel County Office of Planning and Zoning (OPZ) and Baltimore Metropolitan Council (BMC).

These socioeconomic growth and land use demand forecasts project the future build out/redevelopment scenarios for the Parole Town Center study area in 2045. The 2045 scenario is based on the latest adopted regional forecasts. The demographic control totals (i.e. households and jobs) for this scenario were based on the Round 9A cooperative forecasts endorsed by the Baltimore Regional Transportation Board (BRTB). The Ultimate scenario was based on an ultimate zoning buildout for 2045, which included additional development (beyond the Round 9A cooperative forecasts) on certain key sites/areas. These sites/areas were identified for redevelopment by County staff and included sites such as Festival at Riva and Forest Plaza and the Westfield Mall Site.

Traffic analysis for the 2045 and Ultimate scenarios was performed. The traffic analysis projects future vehicle operations in the study area by forecasting future vehicular volumes and performing intersection and roadway segment capacity analysis as well as projecting future roadway speeds.

A. Summary of Findings

The following summarizes the operational issues identified as part of the future traffic analysis that will guide the process for determining future vehicle improvements in the Parole Town Center study area:

- Three additional roadways will operate at or over capacity in at least one direction during at least one peak hour under the 2045 and Ultimate conditions.
 - New roadways with at least one segment over capacity are MD 2, MD 178, and MD 665
- Additional segments and/or directions will operate over capacity on US 50, MD 450, and Riva Road in both the 2045 and Ultimate conditions.
- Reductions in speeds in the 2045 and Ultimate conditions are generally less than 10%. A few roadway segments have speed decreases greater than 10% but generally less than 20%, on Riva Road, Admiral Drive, Jennifer Road, MD 450, MD 2, and US 50.
- Three additional signalized intersections operate with a LOS E under 2045 conditions as compared to existing conditions, and four additional signalized intersections operate with a LOS E under Ultimate conditions as compared to existing conditions.

The recommendations, detailed in the next section, help address these expected operational issues.

B. Future Conditions Analysis Memo

The full *Parole Mobility Study - Future Traffic Conditions* memorandum can be found in **Appendix G** and contains the forecasting methodologies and analysis results.

IV. RECOMMENDATIONS

Using the input from the public comments, survey, Existing Conditions Report, and Future Traffic Conditions memo, improvement options were identified for all modes of transportation (pedestrian, bicycle, transit, and vehicle).

A. Introduction / Framework

The purpose of this study is to identify necessary short-term and long-term improvements to meet the Parole Town Center's future multi-modal mobility needs and provide a connected transportation network supporting all users of the right-of-way including pedestrians, bicyclists, transit riders, and motorists. Using local, statewide, and national complete street guidance and a context sensitive solutions approach, recommendations were developed for all modes. It should also be understood that there are limited opportunities for roadway widening and intersection widening. The goals of the recommendations will be to increase connectivity for all modes by:

- Adding new roadway extensions, bridges, frontage roads, etc.
- Building a shared-use path network
- Improving pedestrian facilities and reducing block sizes to increase walkability
- Providing access to transit
- Providing congestion relief to existing roadways at/near capacity
- Encouraging an increase in use of non-vehicular modes or rideshare

B. Roadway Typology / Cross-sections

Traditionally, streets have been classified into one of several functional street classifications, as defined by the Federal Highway Administration (FHWA) and American Association of State Highway and Transportation Officials (AASHTO), and their primary use has typically been for moving vehicles from one place to another as efficiently as possible. This traditional functional street classification system defines street types based on vehicle mobility versus property access. Traffic volumes, travel speeds, and other design characteristics are often based on the assigned classifications. These classifications are meant almost exclusively for vehicular circulation rather than a multimodal perspective.

Recently, AASHTO developed context sensitive classifications better incorporating surrounding land-use and needs for multi-modal uses. Context sensitive solutions should also take into account other factors such as functional classification, posted speed limits, traffic volumes, number lanes, and area type (i.e. Town Center, suburban, etc.). For Parole, several local guidance documents are also available including the Anne Arundel County Complete Streets Policy (2014), Design Manual Updates – Updated Road Sections (August 2020), and Bicycle Policy & Design Guidelines (Maryland State Highway Administration, January 2015). The current Parole Urban Design Concept Plan also contains requirements that influence the typologies, such as requirements for ten (10) to fifteen (15) foot sidewalks. When the Design Manual Updates – Update Road Sections guidance was released in August 2020 (shown in **Table 1** below (refer to manual for conditions)), it was anticipated that additional urban cross-sections would need to be developed as part of town center master plan updates, including the one for Parole.

A complete streets typology was developed in order to incorporate more considerations into the thought process of street design and planning. Complete streets are healthy streets that balance the needs of pedestrians, bicyclists and transit users in addition to vehicle traffic. The expectation is not to include facilities for every mode in every street segment, but rather that each mode is thoroughly accommodated city-wide as part of the overall network. For example, two parallel streets do not

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Table 1: County's Updated Road Sections Guidance

STANDARD CROSS-SECTION REQUIREMENTS

July 1, 2020

Facility	Road Classification	Principal Arterial - Closed	Principal Arterial - Open	Minor Arterial Closed	Minor Arterial Open	Collector - Closed	Collector - Open	Local - Closed	Local - Open
A. Slope (outside R/W line)		C1	C1	C1	C1	C1	C1	C1	C1
B. Stormwater Conveyance		C2	C2	C2	Y; 9' min	C2	Y; 9' min	C2	Y; 9' min
C. Street Trees/Buffer (see C14)		5' min	5' min	5' min	5' min	5' min	5' min	5' min	5' min
D. Sidewalk ¹		5' min	C3; 5' min	5' min	C3; 5' min	5' min	C3; 5' min	5' min	C3; 5' min
E. Shared Use Path		C4; 10' min	C4; 10' min	C4; 10' min	C4; 10' min	C4; 10' min	C4; 10' min	N	N
F. Utility Strip		C5; 4' min	C5; 4' min	C5; 4' min	C5; 4' min	C5; 4' min	C5; 4' min	C5; 4' min	C5; 4' min
G. Curb/Gutter		2'	N	2'	N	2'	N	2'	N
H. Shoulder (see C15)		12' min	10' min	8' min	8' min	N	N	N	N
I. Parking Lane		N	N	N	N	C6; 7'	C6; 8'	C6; 7'	C6; 8'
J. Dedicated Bicycle Facilities		C7; 6-10'	C7; 6-10'	C7; 6-10'	C7; 6-10'	C9; 4-6'	C9; 4-6'	N	N
K. Right Turn Lane		C10; 10' min	C10; 10' min	C10; 10' min	C10; 10' min	C10; 10' min	C10; 10' min	N	N
L. Through Lane		C11; 11-12'	C11; 11-12'	C11; 10-12'	C11; 10-12'	C11; 10-11'	C11; 10-11'	10'	10'
M. Left Turn Lane		C12; 10' min	C12; 10' min	C12; 10' min	C12; 10' min	C12; 10' min	C12; 10' min	N	N
N. Median		C13; 16'min	C13; 16'min	C13; 6'min	C13; 6'min	C13; 6'min	C13; 6'min	N	N

C - Conditional; see notes below

Y - Required

N - Not Required

¹ - Within Core, sidewalks shall be 10-15 feet wide.

necessarily need to each feature the same bicycle accommodations if one is inherently better suited to bicycle traffic. While the functional classification of each street in Parole will continue to have relevance with regard to integration with the street networks of neighboring jurisdictions and the application of state and federal transportation funding resources, the complete streets typology will serve as the primary design guidelines for Parole streets going forward.

These guidelines provide a classification system that help guide future street improvements and road design projects. It is critical to organize the street design of Parole as a part of reaching the objectives of the Parole Urban Design Concept Plan (PUDCP). The street typology will address the needs of all modes of travel and ensure safe accommodations for all users. The street types described in this plan are shown in the optimal condition. It should be noted that available right-of-way, land use, grade, utilities and existing roadway geometry will ultimately impact design, and the layout shown for each street type will not be achievable in every instance. In those instances, a thorough roadway design effort incorporating local conditions should determine which amenities are prioritized. The objective is to strive to meet as many of the typology elements described as possible.

The typology defines road geometry, utility/buffer widths, and pedestrian and bicycle amenities for each street type. There are six roadway types included in the typology:

- 1) Principal Arterial
- 2) Minor Arterial
- 3) Collector
- 4) Collector (Urban)
- 5) Local
- 6) Local (Urban)

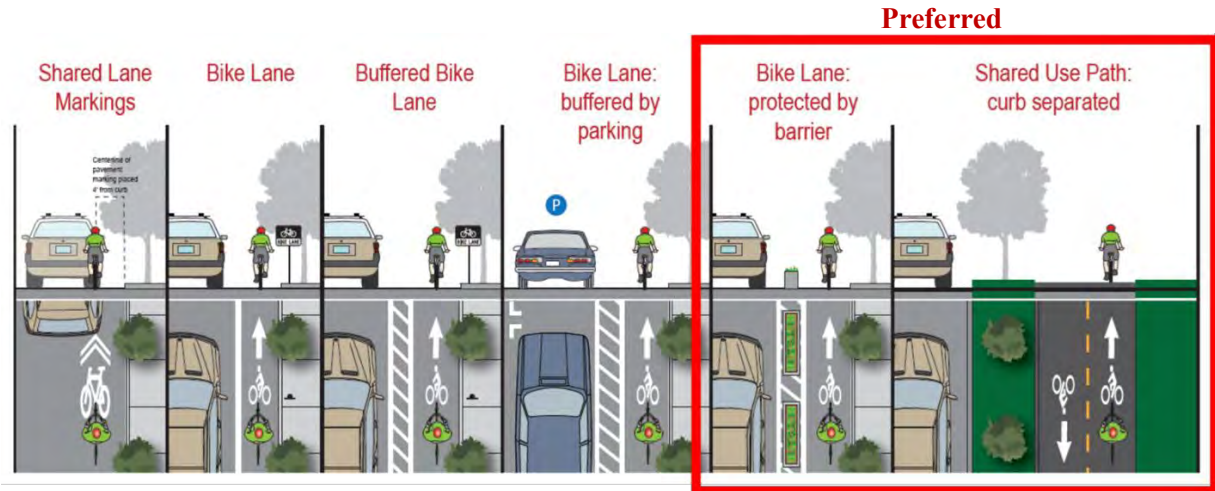
The preferred street layout for each street type is defined in the sections below, which will serve as the County's design goals for new or re-designed streets in the future. Typical section details for each segment in the study area are included in **Appendix H**. The spreadsheet contains roadway characteristics including functional classification, posted speed limits, Existing AADT, existing and ultimate (2045) peak hour directional volumes, and the number of lanes. Additionally, it contains

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proposed cross-section information including minimum required ROW width, minimum required roadway width, median, parking, buffer width, sidewalk width, bike facility type and width, and shared-use path placement and width.

Where bicycle facilities are considered, separated bike lanes or shared-use paths as preferred (as shown in **Figure 2** below). Bike lanes should be separated by vertical barriers wherever possible.

Figure 2: Bicycle Facility Types



STREET TYPE DESCRIPTIONS

1) Principal Arterial

These are the widest, highest volume commercial streets for regional and longer trip types. The speed limit is typically 40 mph or greater; daily volumes are greater than 35,000 on average. **Figure 3**, to the right, shows an existing principal arterial roadway within Parole.

Figure 3: Existing Principal Arterial Roadway - MD 2 (Solomons Island)

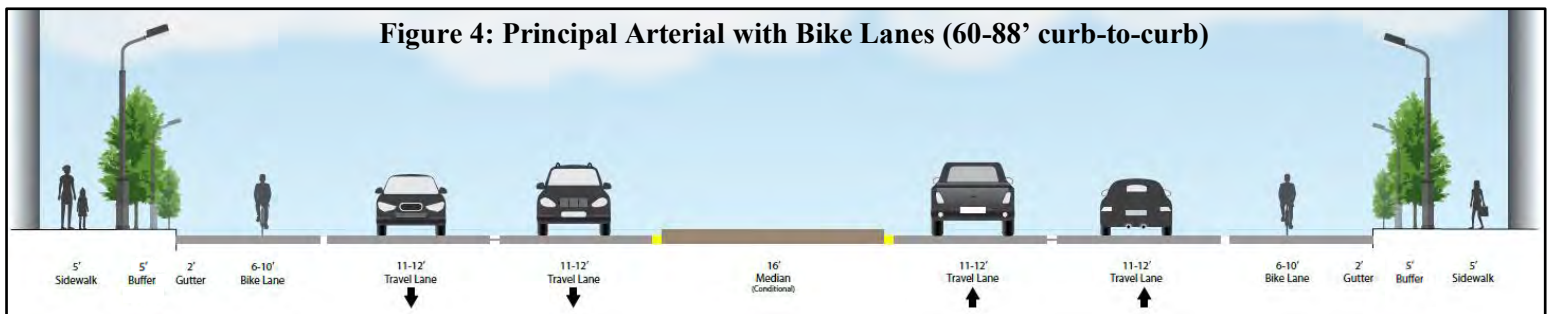


Key Features:

Principal Arterial With Bike Lanes (**Figure 4**)

- 2 lanes in each direction, 11-12'
- Bike lanes, 6-10'
- Buffer, 5'
- Sidewalk, both sides, 5' (In Town Center Core, sidewalks shall be 10-15 feet as indicated in the typical section details/maps.)
- Center median if space allows, up to 16'

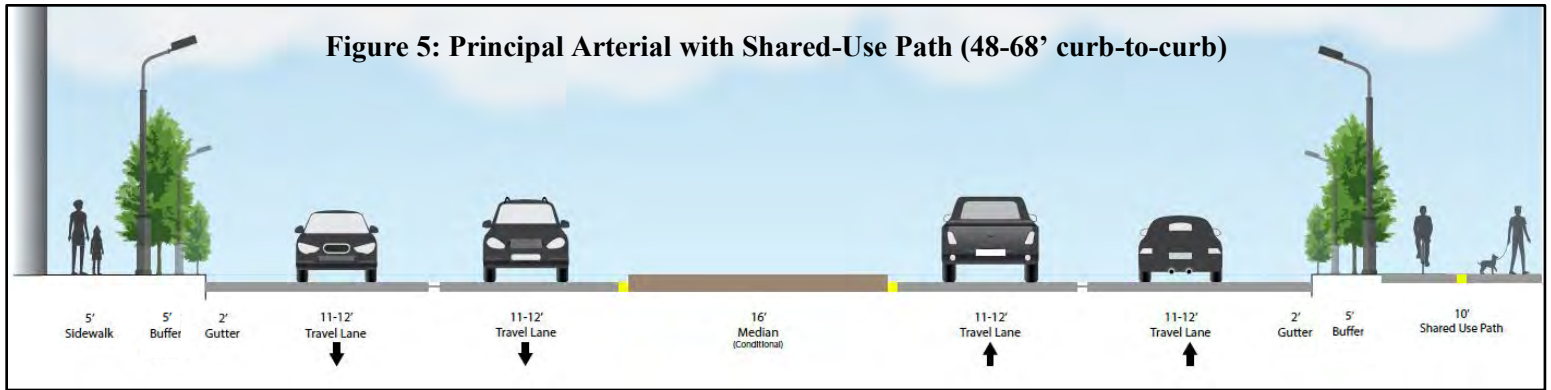
Figure 4: Principal Arterial with Bike Lanes (60-88' curb-to-curb)



Parole Mobility Study for the Parole Town Center Master Plan

Principal Arterial With Shared-Use Path (Figure 5)

- 2 lanes in each direction, 11-12'
- Buffer, 5'
- Sidewalk, one side, 5' (In Town Center Core, sidewalks shall be 10-15 feet as indicated in the typical section details/maps.)
- Shared-use path, opposite side, 10'
- Center median if space allows, up to 16'



Example Streets: MD 2

2) Minor Arterial

These are the primary routes between one part of Parole and another. Most of the minor arterials have two lanes in each direction with speed limits between 30-40 mph and daily volumes are greater than 20,000 vehicles. **Figure 6**, to the right, shows an existing minor arterial roadway within Parole.

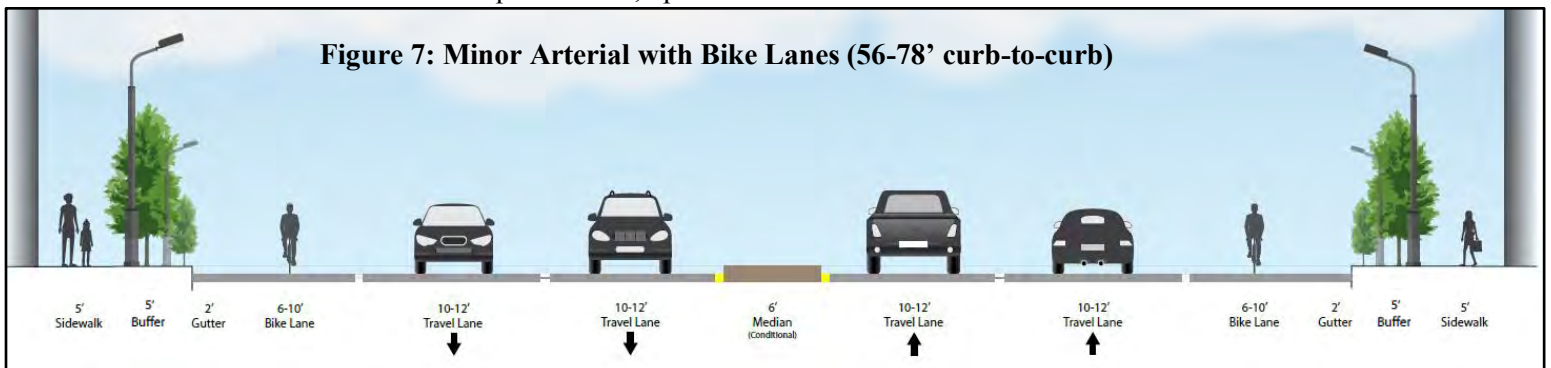
Figure 6: Existing Minor Arterial Roadway – Bestgate Road



Key Features:

Minor Arterial With Bike Lanes (Figure 7)

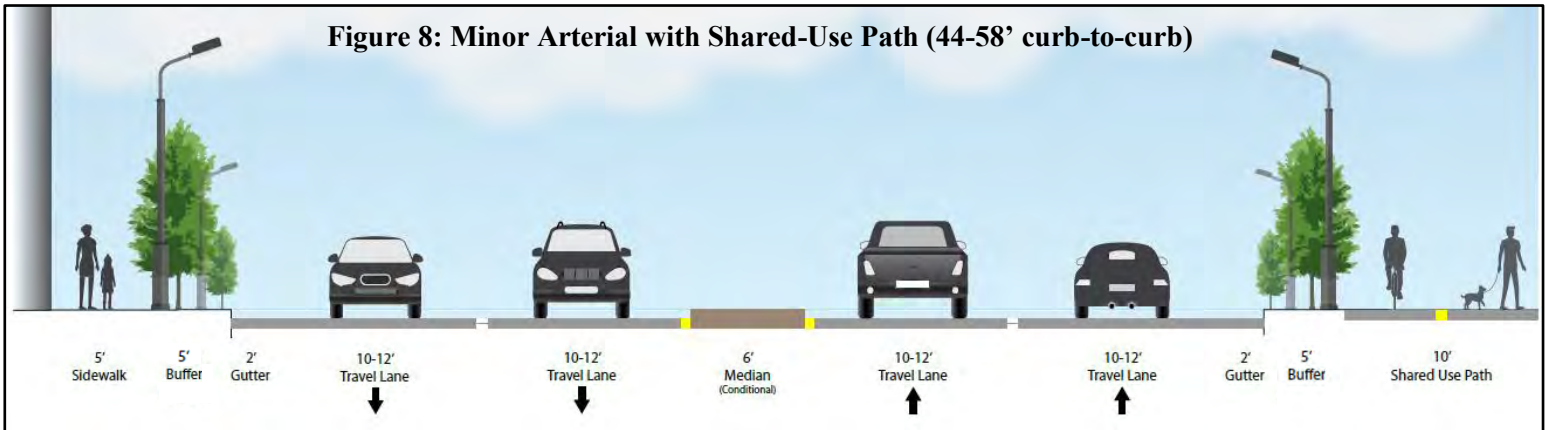
- 2 lanes in each direction, 10-12'
- Bike lanes, 6-10'
- Buffer, 5'
- Sidewalk, both sides, 5' (In Town Center Core, sidewalks shall be 10-15 feet as indicated in the typical section details/maps.)
- Center median if space allows, up to 6'



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Minor Arterial With Shared-Use Path (Figure 8)

- 2 lanes in each direction, 10-12'
- Buffer, 5'
- Sidewalk, one side, 5' (In Town Center Core, sidewalks shall be 10-15 feet as indicated in the typical section details/maps.)
- Shared-use path, opposite side, 10'
- Center median if space allows, up to 6'



Example Streets: Bestgate Road, Riva Road and Jennifer Road

3) Collector

These are the more heavily trafficked streets within neighborhoods, which provide important connections to major streets. These streets are typically wider than local streets and have a marked center line. While speeds are relatively low, they require some additional protection for cyclists. Speed limits are typically 25-35 mph and daily volumes are between 7,500-20,000. **Figure 9**, to the right, shows a collector roadway within Parole.

Figure 9: Existing Collector Roadway – Admiral Drive

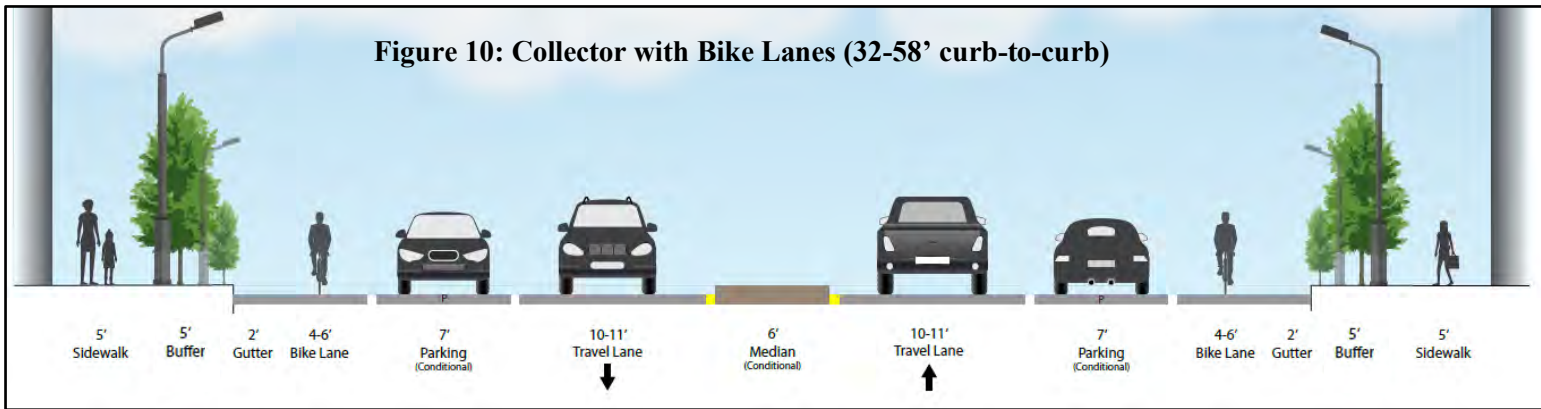


Key Features:

Collector With Bike Lanes (Figure 10)

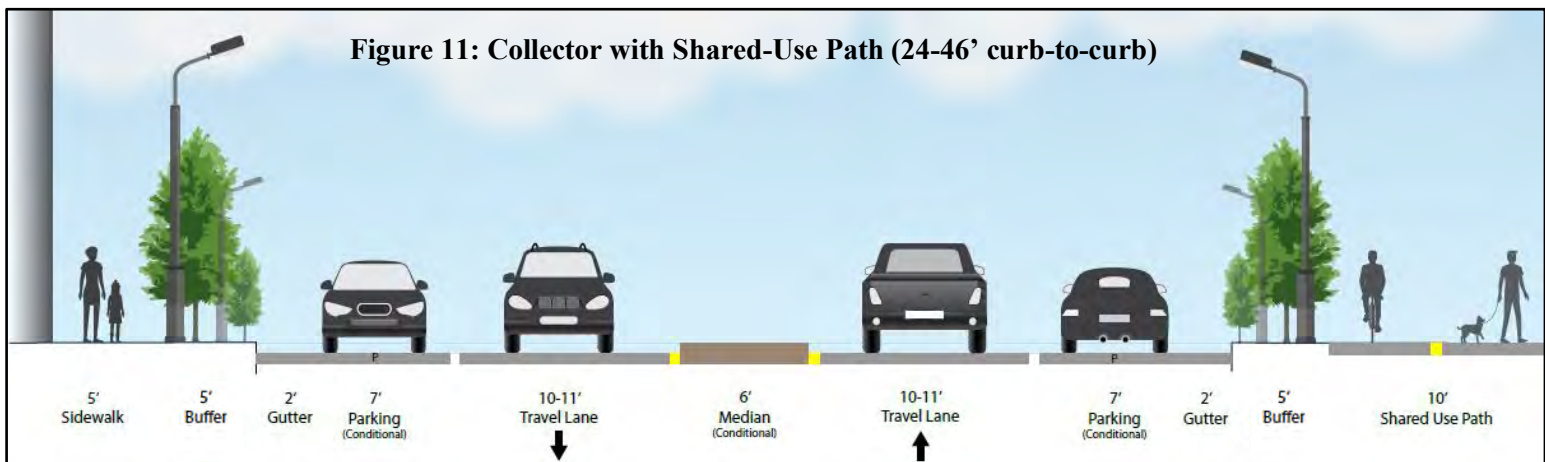
- 1 lane in each direction, 10-11'
- Parking lanes if space allows, 7'
- Bike lanes (parking protected), 4-6'
- Buffer, 5'
- Sidewalk, both sides, 5' (In Town Center Core, sidewalks shall be 10-15 feet as indicated in the typical section details/maps.)
- Center median if space allows, up to 6'

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Collector With Shared-Use Path (Figure 24)

- 1 lane in each direction, 10-11'
- Parking lanes if space allows, 7'
- Buffer, 5'
- Sidewalk, one side, 5' (In Town Center Core, sidewalks shall be 10-15 feet as indicated in the typical section details/maps.)
- Shared-use path, opposite side, 10'
- Center median if space allows, up to 6'



Example Street: Admiral Drive, south of US 50

4) Collector (Urban)

These roadways are located in the Town Center Core area. They include additional sidewalk space for increased pedestrian activity, furnishings, and frontage to allow opportunities for outdoor dining and other public uses. There are several options for bicycle facility types, depending on available roadway width, volume of bicycle and motorized vehicle traffic, and budget.

Key Features:

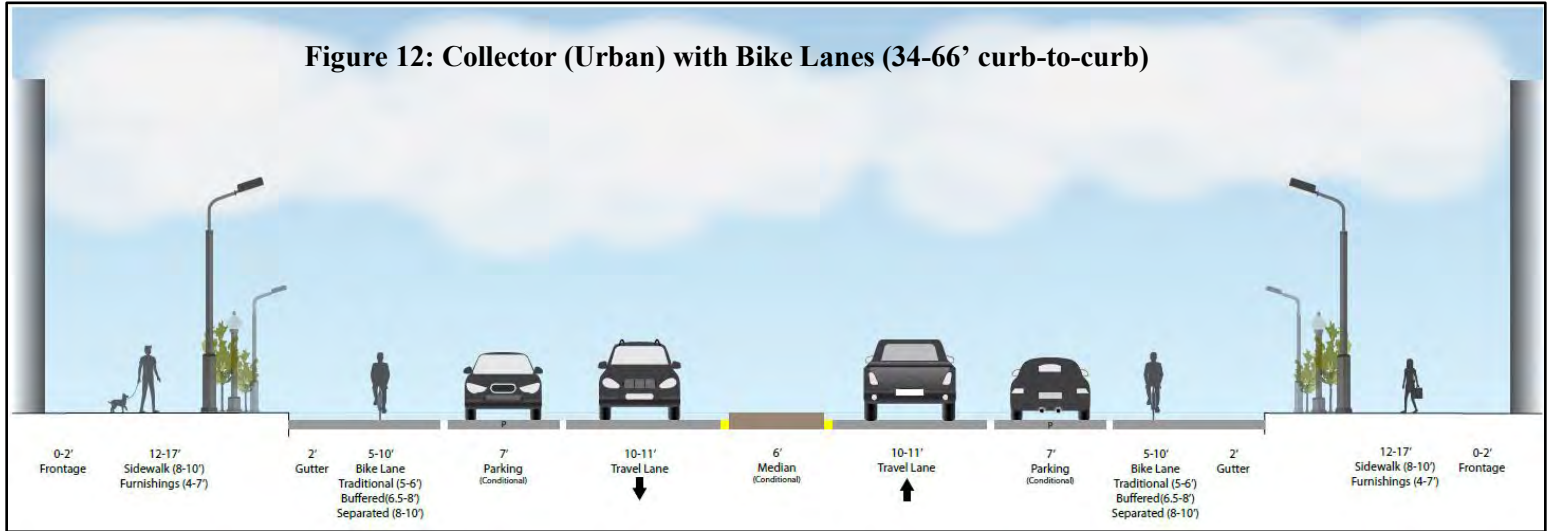
Collector (Urban) With Bike Lanes (Figure 12)

- 1 lane in each direction, 10-11'
- Parking lanes if space allows, 7'
- Bike lanes, parking protected, 5-10' (depending on conditions listed above)
- Sidewalk and furnishings, 12-17' (sidewalk 8-10' and furnishings 4-7')

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- Frontage, if space allows, 0-2'
- Center median if space allows, up to 6'

Figure 12: Collector (Urban) with Bike Lanes (34-66' curb-to-curb)



Example Street: Forest Drive between Riva Road and MD 2

5) Local

These are narrow, neighborhood streets that provide access to primarily residential and/or institutional (school, house of worship, etc.) uses. They are naturally more bicycle- and pedestrian-friendly by the nature of their low speeds and low traffic volumes. The speed limits are typically 25-30 mph and usually have less than 7,500 daily vehicle trips. **Figure 13**, to the right, shows a local roadway within Parole.

Figure 13: Existing Local Roadway – Oak Court



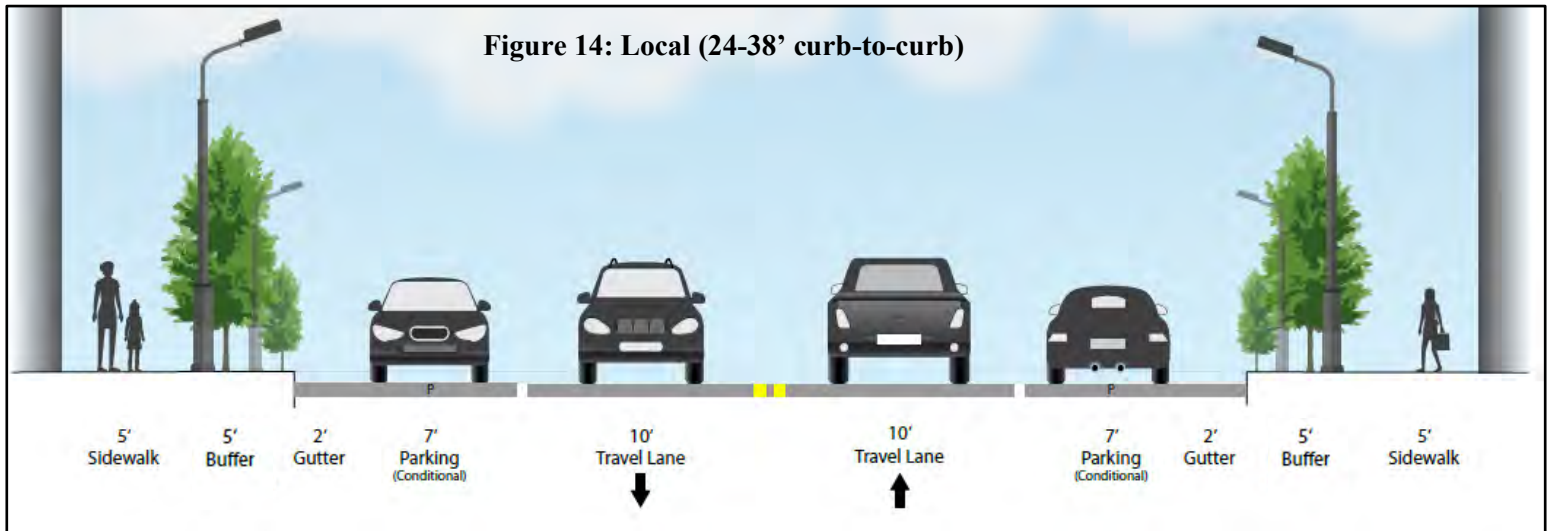
These roads are low stress for bicyclists due to their low speeds and traffic volumes. Bicyclists would share travel lane.

Key Features:

Local Roadway (**Figure 14**)

- 1 lane in each direction, 10'
- Parking lanes if space allows, 7'
- Buffer, 5'
- Sidewalk, both sides, 5' (In Town Center Core, sidewalks shall be 10-15 feet as indicated in the typical section details/maps.)

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Example Street: Oak Court

6) Local (Urban)

These are recommended for local roadways in the Town Center Core area. They include additional sidewalk space for increased pedestrian activity, furnishings, and frontage to allow for opportunities such as outdoor dining. This design may include bicycle facilities.

Key Features:

Local (Urban) Roadway (**Figure 15** and **Figure 16**)

- 1 lane in each direction, 10'
- Parking lanes if space allows, 7'
- Sidewalk and furnishings, 12-17' (sidewalk 8-10' and furnishings 4-7')
- Frontage, if space allows, 0-2'
- Optional: Bike lanes, parking protected, 5-10' (depending on conditions listed above)

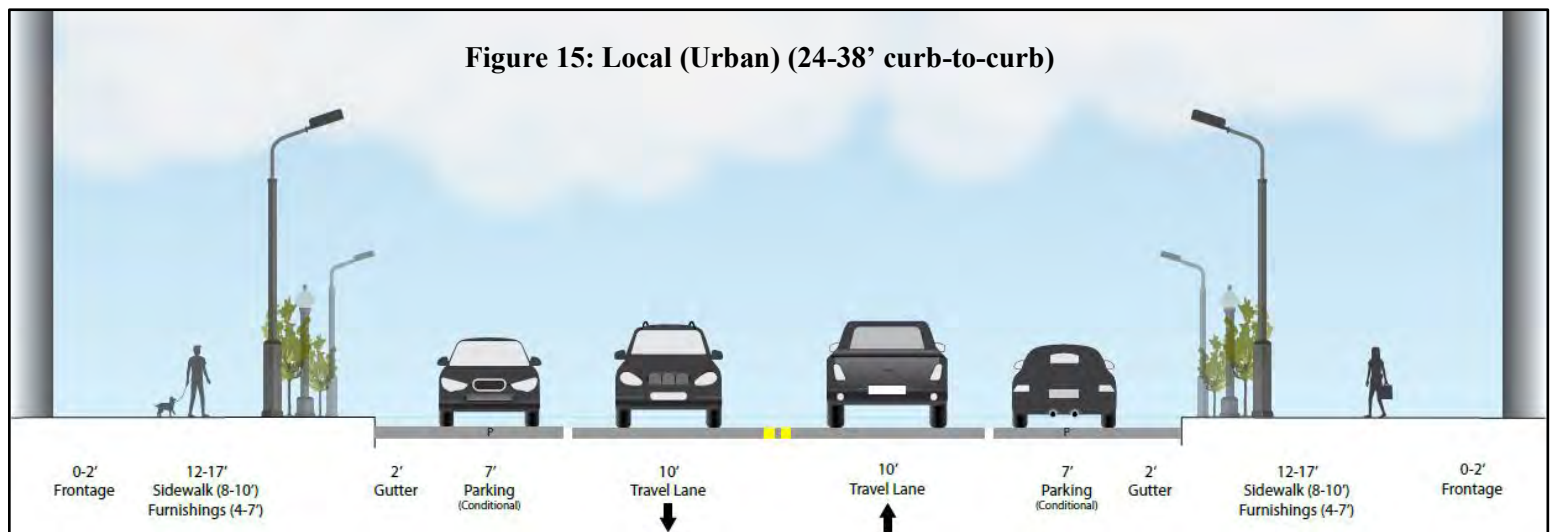
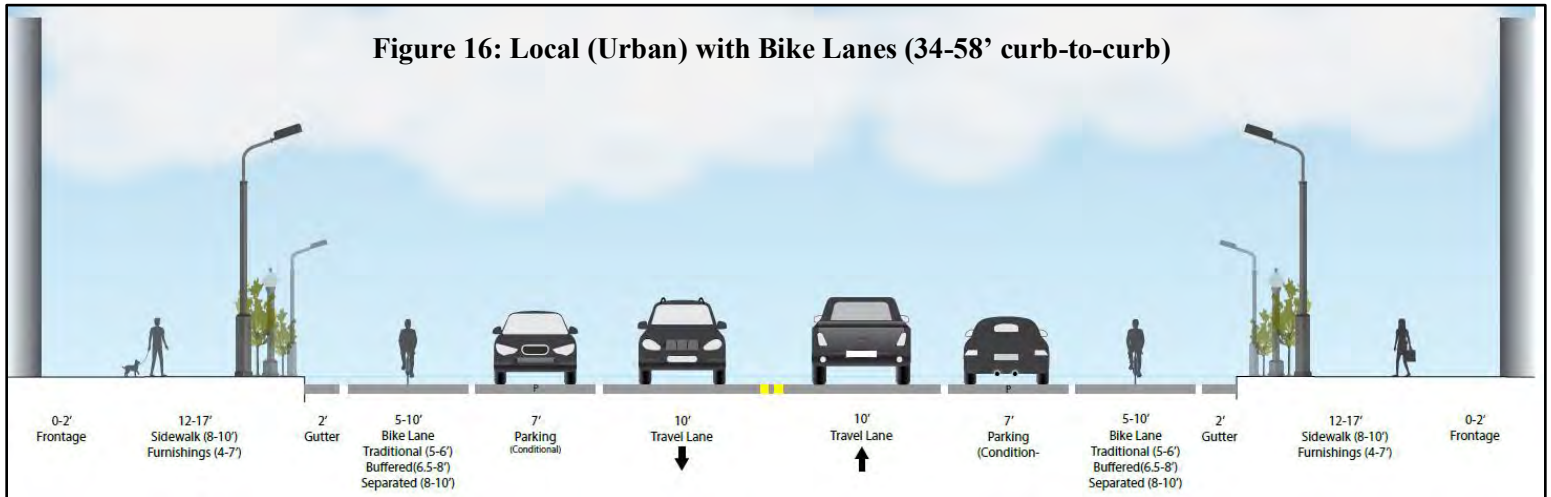


Figure 16: Local (Urban) with Bike Lanes (34-58' curb-to-curb)



Example Street: Somerville Road (which is recommended to include bike lanes)

C. Recommendations / Improvements

1. Bicycle / Pedestrian Improvements

The master plan vision and public input illustrated a desire for improving bicycle and pedestrian infrastructure in Parole. Specifically, two of the top three recommendations from the survey are related to biking and walking: residents want better connectivity for bicycle and pedestrian networks and more safe roadway crossings for walking and biking. Additionally, as the land use and zoning evolve to allow Parole to develop a more urban sense of place, it will be necessary to have safe and connected walking and biking facilities. The bicycle and pedestrian improvements, including bike lanes, shared-use paths, intersection improvements, sidewalks, and new connections, are illustrated in the **Figure 17** overview map below. For each element, additional details can be found in **Appendix I**. Each improvement type described below has a detailed table describing the improvement including intersection or road segment limits, source of recommendation (e.g. previous studies), timeline for construction, length, lead actor (e.g. AA DPW, MDOT SHA, etc.), location of improvement (i.e. side of road), benefits of each improvement, and justification. The improvement number for each category matches the numbers shown on the improvement maps for each type of recommendation.

a) Shared-use Paths

Shared-use paths are an important element of a bicycle network because they allow people of all ages and abilities to get around safely. They can be critical to increasing biking and walking mode share, they provide an important opportunity for recreation, they offer a low-stress experience, and they can provide access to areas that are otherwise only served by limited access roadways closed to bicycles and pedestrians.

The proposed network improvements would complete gaps in segments on Housley Road, Harry Truman Parkway, and Admiral Cochrane Drive. Additionally, they would complete sections of the Colonial Annapolis Route and provides connections to Annapolis High School. Overall, the proposed network includes 13 new miles of shared-use paths. The existing and proposed networks can be seen in **Figure 18** below. The numbering in the figure matches the numbering in the detailed shared-use path table located in **Appendix I**. The limits and the side of the road the shared-use paths are recommended on are shown below in **Table 2**.

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Table 2: Shared-use Path Summary

#	Road	From	To	Shared-use Path Side
1	MD 665	MD 2	Bywater Road	South side of MD 665
2	MD 450	MD 2	Admiral Dr.	North side of MD 450
3	MD 450	Defense Highway	MD 2	North side of MD 450
4	Jennifer Rd.	Pavilion Parkway	Admiral Dr.	North side of Jennifer Road
5	Jennifer Rd.	MD 450 (West St.)	Medical Parkway	North side of Jennifer Road
6	Admiral Dr.	Jennifer Rd.	Poplar Ave.	West side of Admiral Drive
7	MD 178	MD 450	Bestgate Rd.	East side of MD 178
8	Bestgate Rd.	MD 178	N. Bestgate Rd.	North side of Bestgate Road
9	Housley Rd.	MD 450	MD 178	North/West Side of Housley Road
10	Riva Rd.	Speicher Drive	Forest Drive	-South side of Riva Road (Forest Drive to Harry S. Truman Parkway) -North side of Riva Road (Harry S. Truman Parkway to Speicher Drive)
11	MD 450	Alton Lane	MD 178	North side of MD 450
12	MD 2	Admiral Cochrane	Forest Dr.	West side of MD 2
13	Harry S Truman	Riva Rd.	Park & Ride Ent.	East side of Harry S. Truman Parkway
14	Admiral Cochrane	Riva Rd.	MD 2	East side of Admiral Cochrane Drive
15	Riva Rd.	Forest Dr.	MD 450	South side of Riva Road
16	Parallel to MD 450	Gibraltar Ave.	Admiral Dr.	Parallel to MD 450
17	Chinquapin Round Rd. /Fairfax Rd.	MD 665	Forest Dr.	West of Chinquapin Round Road / North of Fairfax Road
18	Harry S Truman	Riva Rd.	Admiral Cochrane Dr.	East side of Harry S. Truman Parkway

b) Bike Lanes

Bicycle infrastructure comes in a variety of shapes and sizes. It can be as simple as a shared lane on a residential street to a buffered bike lane, sometimes with a vertical barrier, to a shared-use path. These options are progressively more attractive for a wider range of bicyclists, therefore proposed bike lanes will be separated by vertical barriers where possible.

The proposed bike lanes will provide connections to Waterworks Park. Separated bike lanes will also be provided to the Town Center Core area on Somerville Road and Forest Drive. In total, over 5 miles of bike lanes are proposed. A detailed map of the proposed bike lanes can be seen in **Figure 19** below. The numbering in the figure matches the numbering in the detailed bike lane table located in **Appendix I**. The limits and the side of the road the shared-use paths are recommended on are shown below in **Table 3**.

Table 3: Bike Lane Summary

#	Road	From	To	Type
1	Forest Drive	MD 2	Fairfax Road	Marked
2	MD 178	Bestgate Rd.	Knollwood Dr.	Marked
3	MD 450	S Haven Road	Alton Lane	Separated
4	Harry S. Truman	Park & Ride Ent	S. Haven Road	Separated
5	Somerville Road	MD 450	Old Solomons Island Rd	Separated
6	Old Solomons Island Rd.	MD 450	Forest Dr.	Separated
7	Chinquapin Round Rd	MD 450	McGuckian St.	Marked

Parole Mobility Study for the Parole Town Center Master Plan

c) Sidewalks

Sidewalks are an essential element of any transportation system. They increase transportation options because they allow people to access transit more easily and they improve public health because they decrease pedestrian crashes and allow people to recreate in their neighborhoods.

Proposed sidewalks will fill in gaps on existing roads with partial sidewalks (Forest Drive, Jennifer Road, Housley Road, Riva Road, Bestgate Road and Riva Town Center Boulevard) and provide new sidewalks on roads where they are missing (Harry Truman Parkway, Defense Highway, Generals Highway and Solomons Island Road). The 13 miles of proposed sidewalks can be seen in **Figure 20** below. The numbering in the figure matches the numbering in the detailed sidewalk table located in **Appendix I**. The limits and the side of the road for each recommended sidewalk segment are shown below in **Table 4**.

Table 4: Sidewalk Summary

#	Road	From	To	Sidewalk Side
1	Forest Drive	MD 2	Chinquapin Round Rd.	South
2	MD 450	Defense Highway	MD 2	North/South
3	Jennifer Rd.	MD 450 (West St.)	Medical Parkway	South
4	Housley Rd.	MD 450	MD 178	South
5	Riva Rd.	Speicher Dr.	Forest Dr.	South
6	MD 450	Alton Lane	MD 178	South
7	MD 178	Knollwood Dr.	Bestgate Rd.	East/West
8	Bestgate Rd	N Lawrence Ave.	N Bestgate Road	South
9	MD 450	S Haven Road	Alton Lane	North/South
10	MD 2	Admiral Cochrane	Jennifer Rd.	East
11	Harry S. Truman	Park & Ride Ent	S. Haven Road	North/South
12	Riva Town Center Blvd	Forest Dr	Hearne Rd/Ct	South

d) New Connections

There are five specific connections for people biking and walking to help reduce block sizes and break down barriers created by freeways. These improvements can be seen in **Figure 21** below. The numbering in the figure matches the numbering in the detailed new ped/bike connection table located in **Appendix I**. The limits of each recommended ped/bike new connection are shown below in **Table 5**.

Table 5: Ped/Bike New Connection Summary

#	Road	From	To
1	MD 665 Overpass	Spruill Road	Riva Town Center Blvd
2	Bike/Ped Bridge	Harbour Center	Festival at Riva
3	US 50 Overpass	Admiral Cochrane Dr. Extension	Housley Rd.
4	Admiral Cochrane Dr.	Riva Road	Harry S. Truman Pkwy
5	Gateway Village Dr.	Housley Rd.	MD 178 at Mall Entrance

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e) Intersection Improvements

It is important that network design continues through intersections, for the sake of connectivity and safety. Most of the 26 proposed intersection improvements are at signalized intersections, but some are at unsignalized intersections. They primarily provide ADA upgrades and new crosswalks connecting key biking and walking facilities such as sidewalks and shared-use paths. They can be seen in **Figure 22** below. The numbering in the figure matches the numbering in the detailed ped/bike intersection improvement table located in **Appendix I**. The intersection list is shown below in **Table 6**. In addition to the recommendations detailed Appendix I, further enhancements can be provided at certain intersections (e.g. green paint for shared-use path or trail crossings).

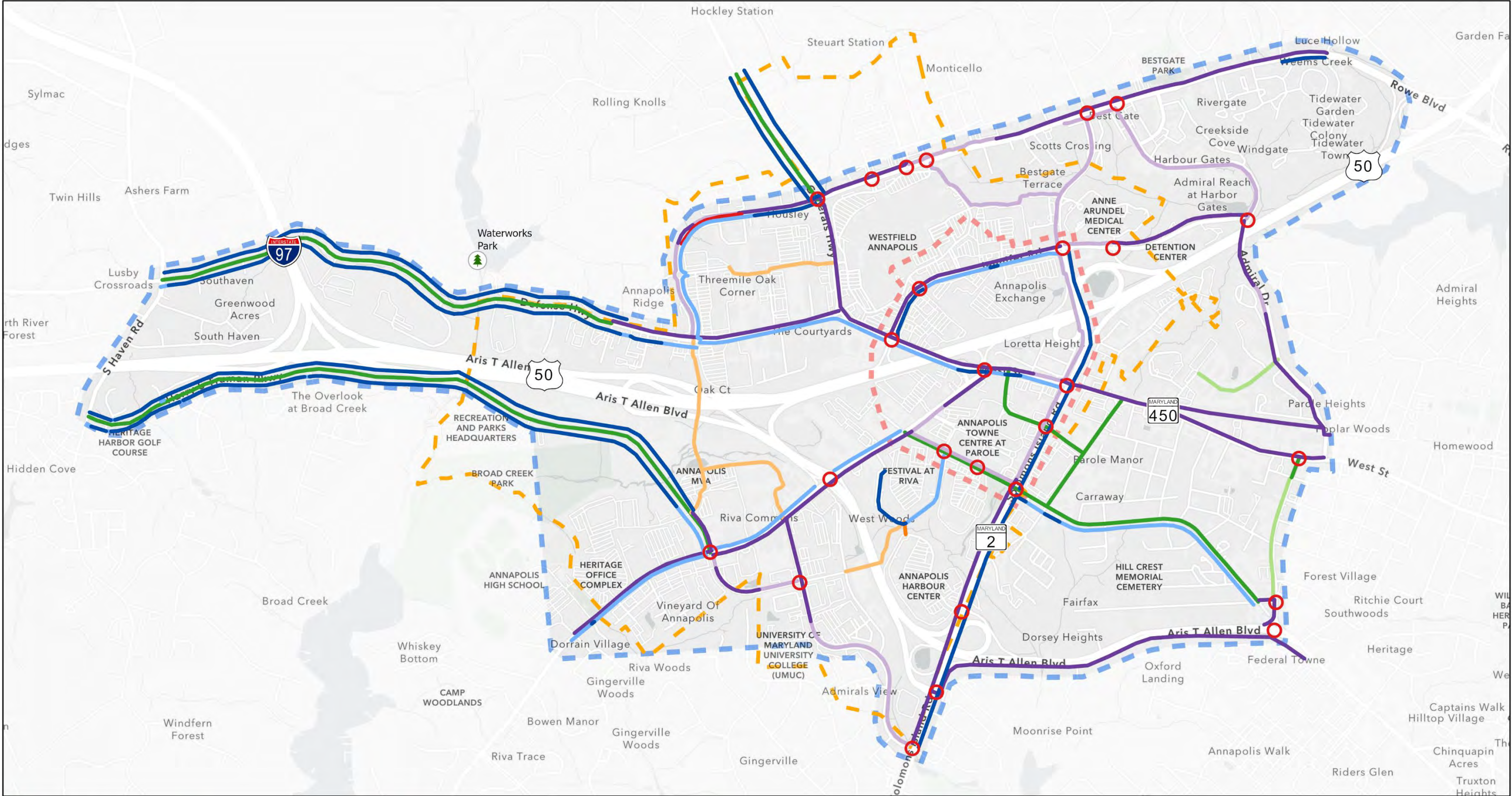
Table 6: Ped/Bike Intersection Improvement Summary

#	Intersection
1	MD 178 at Bestgate Road/Housley Road
2	Industrial Drive at Bestgate Road
3	Admiral Drive at Bestgate Road
4	Medical Parkway at Bestgate Road
5	Commerce Park Drive at Bestgate Road
6	Research Drive at Bestgate Road
7	MD 665 at Riva Road
8	MD 450 at Chinquapin Round Road
9	Chinquapin Round Road at Forest Drive
10	MD 450 at Jennifer Road
11	MD 665 at Chinquapin Round Road/Forest Drive
12	MD 2 at MD 450
13	Jennifer Road at Annapolis Mall Road
14	Jennifer Road at Medical Parkway
15	Jennifer Road at Pavilion Parkway
16	Jennifer Road at Admiral Drive
17	MD 450 at Riva Road/US 50 Ramps
18	Harry S. Truman Parkway at Admiral Cochrane Drive
19	Forest Drive at Tower Place
20	Forest Drive at Harker Place
21	MD 2 at Forest Drive
22	MD 2 at Somerville Road
23	MD 2 at Annapolis Harbor Center Dr.
24	MD 2 at MD 665 EB Ramp
25	MD 2 at Admiral Cochrane Drive
26	Housley Road in Vicinity of Waterworks Park trailhead
27	Riva Road at Harry S. Truman Parkway

Figure 17: Pedestrian/Bicycle Improvements Overview

Parole Mobility Study

Recommended Bike & Pedestrian Improvements



- Core Area
- Study Area
- PGMA Boundary
- Proposed Bike Lane
- Existing Bike Lane
- Proposed Intersection Improvement
- Proposed New Connection
- Proposed Shared-Use Path
- Existing Shared-Use Path
- Proposed Sidewalk
- Existing Sidewalk



Figure 18: Recommended Shared-Use Paths

Parole Mobility Study Recommended Shared-Use Paths

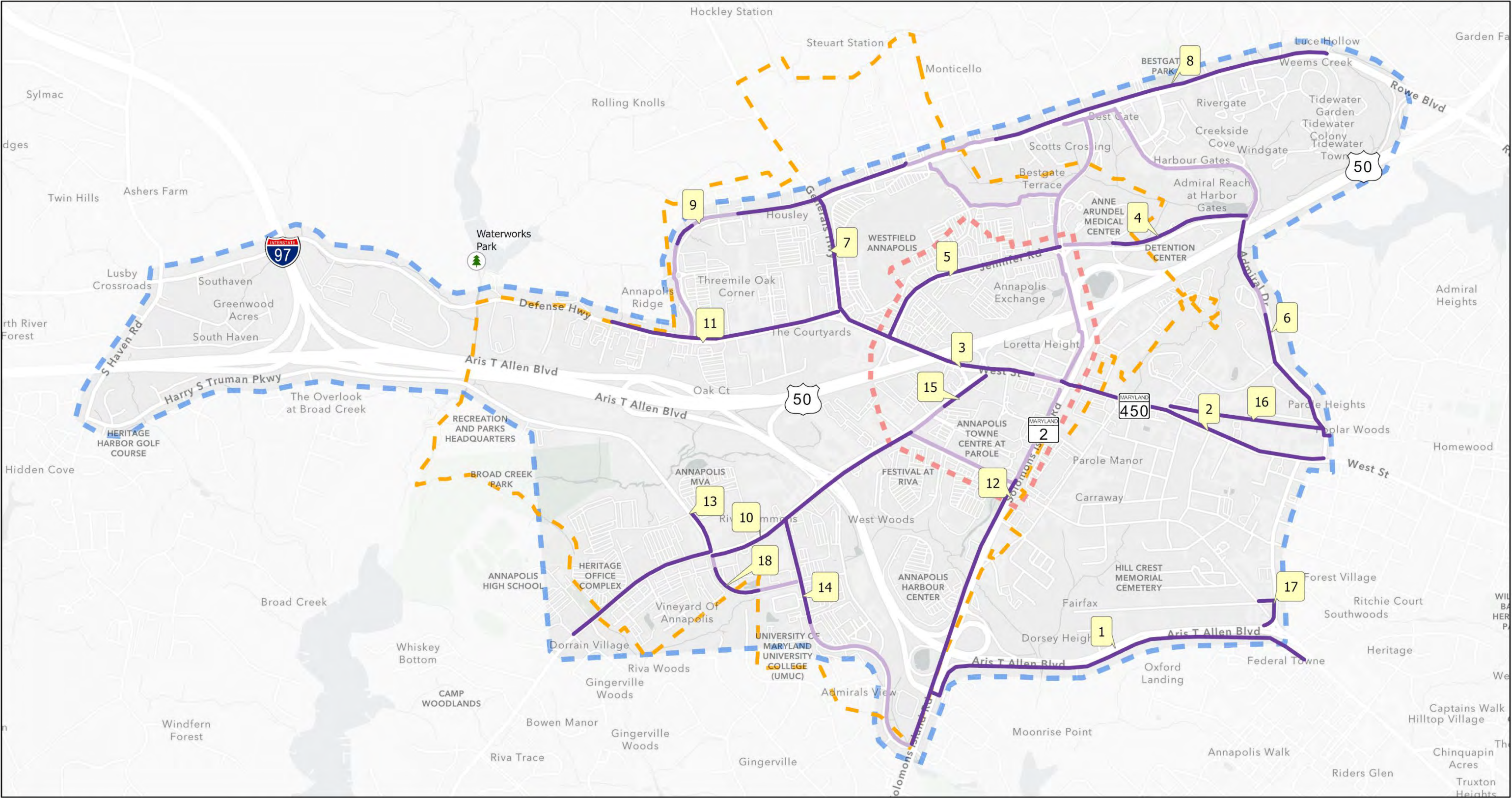
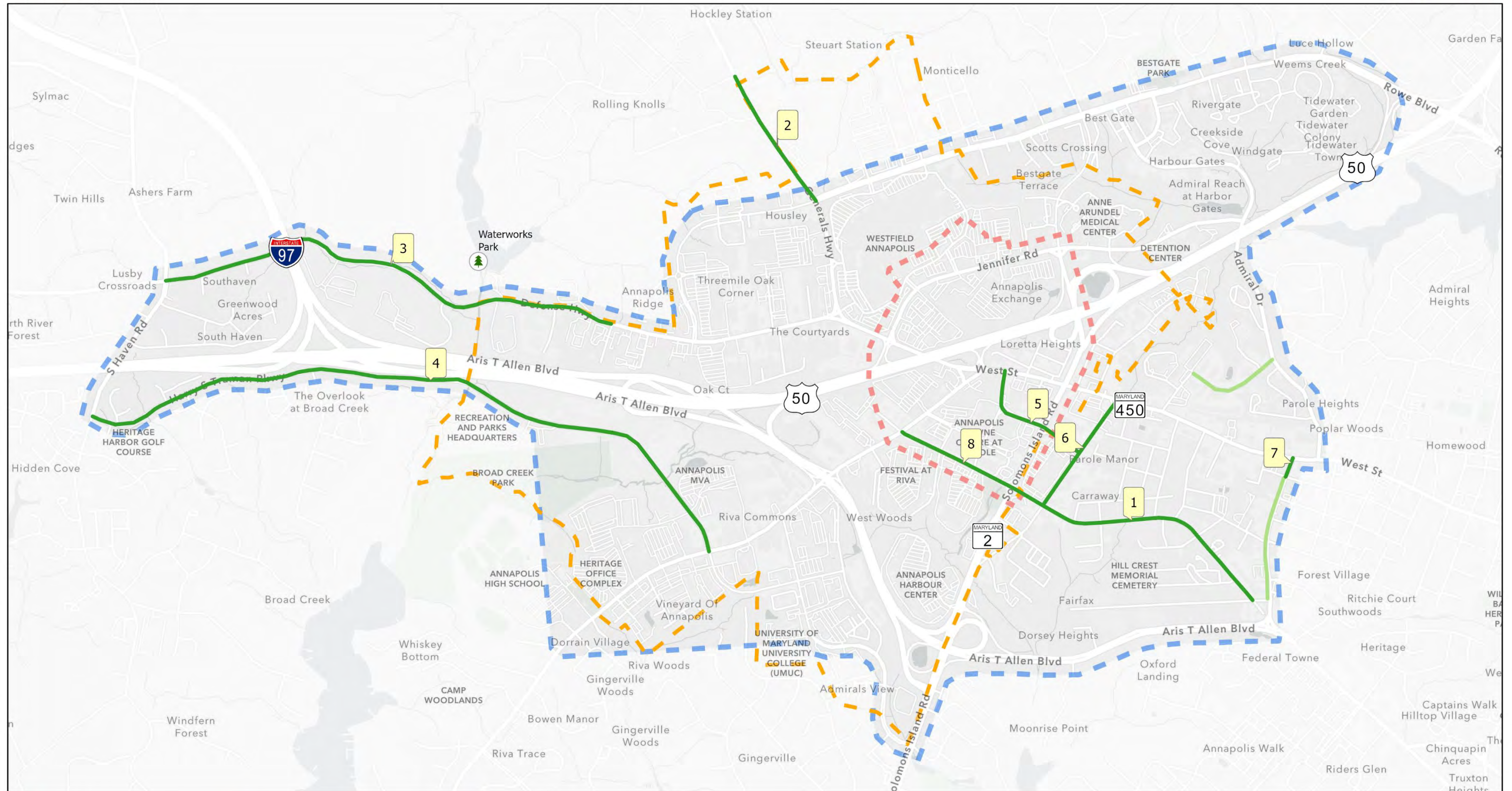


Figure 19: Recommended Bike Lanes

Parole Mobility Study Recommended Bike Lanes



-  Core Area
-  Study Area
-  PGMA Boundary
-  Existing Bike Lanes
-  Proposed Bike Lanes
-  # Number Matched with Attached Table

Figure 20: Recommended Sidewalks

Parole Mobility Study Recommended Sidewalks

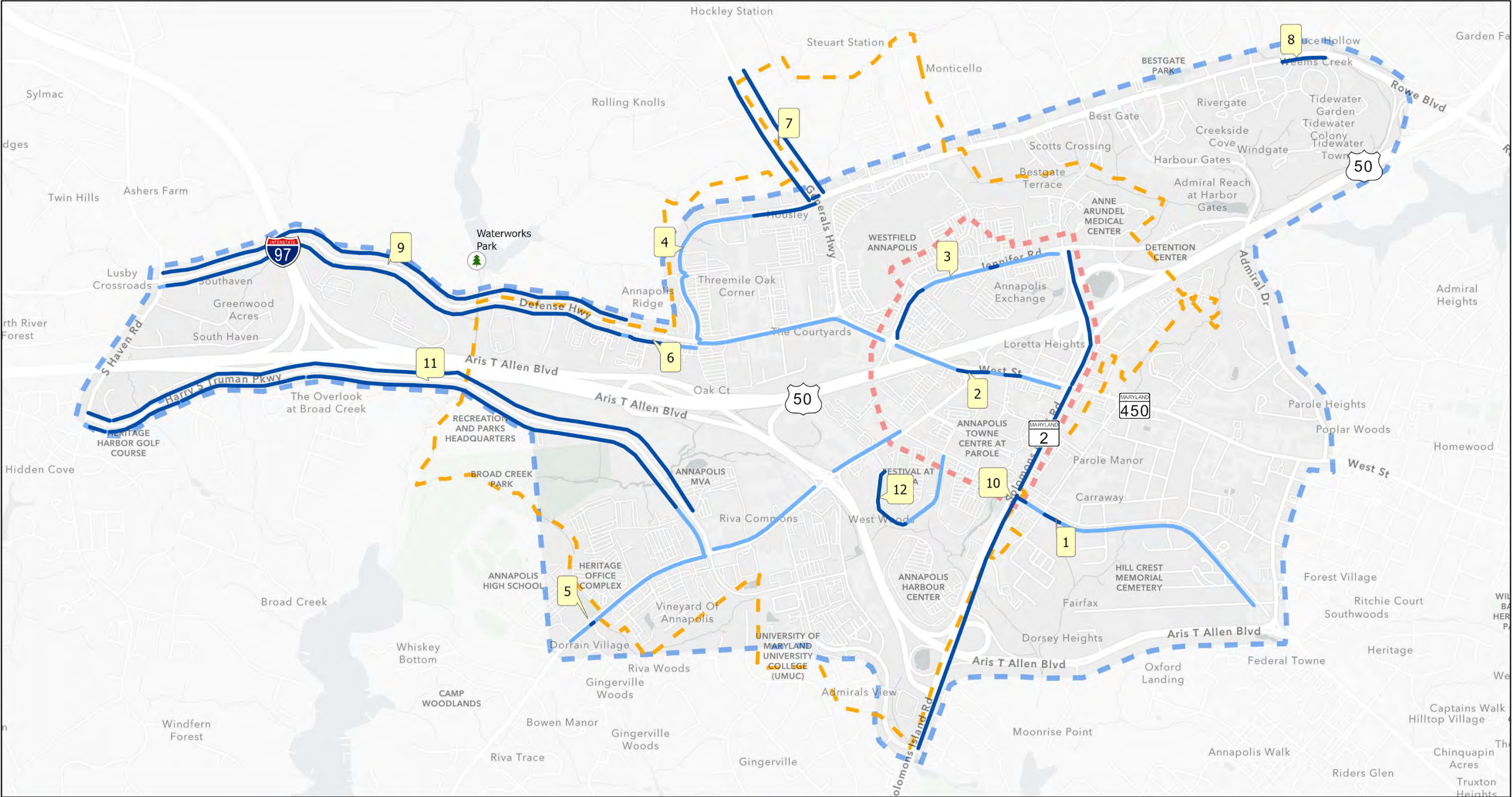
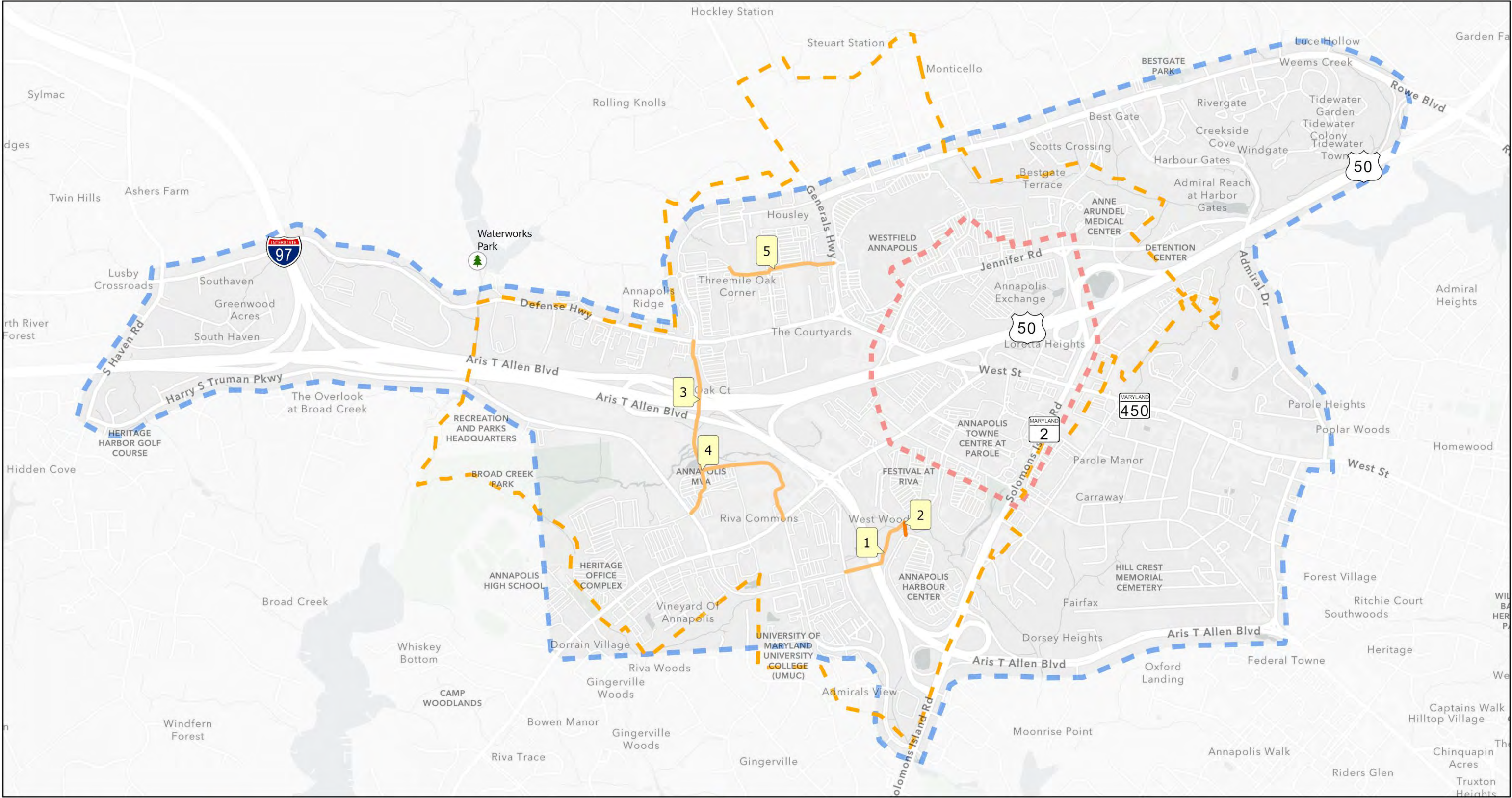


Figure 21: Recommended New Connections

Parole Mobility Study

Recommended Bike/Pedestrian New Connections



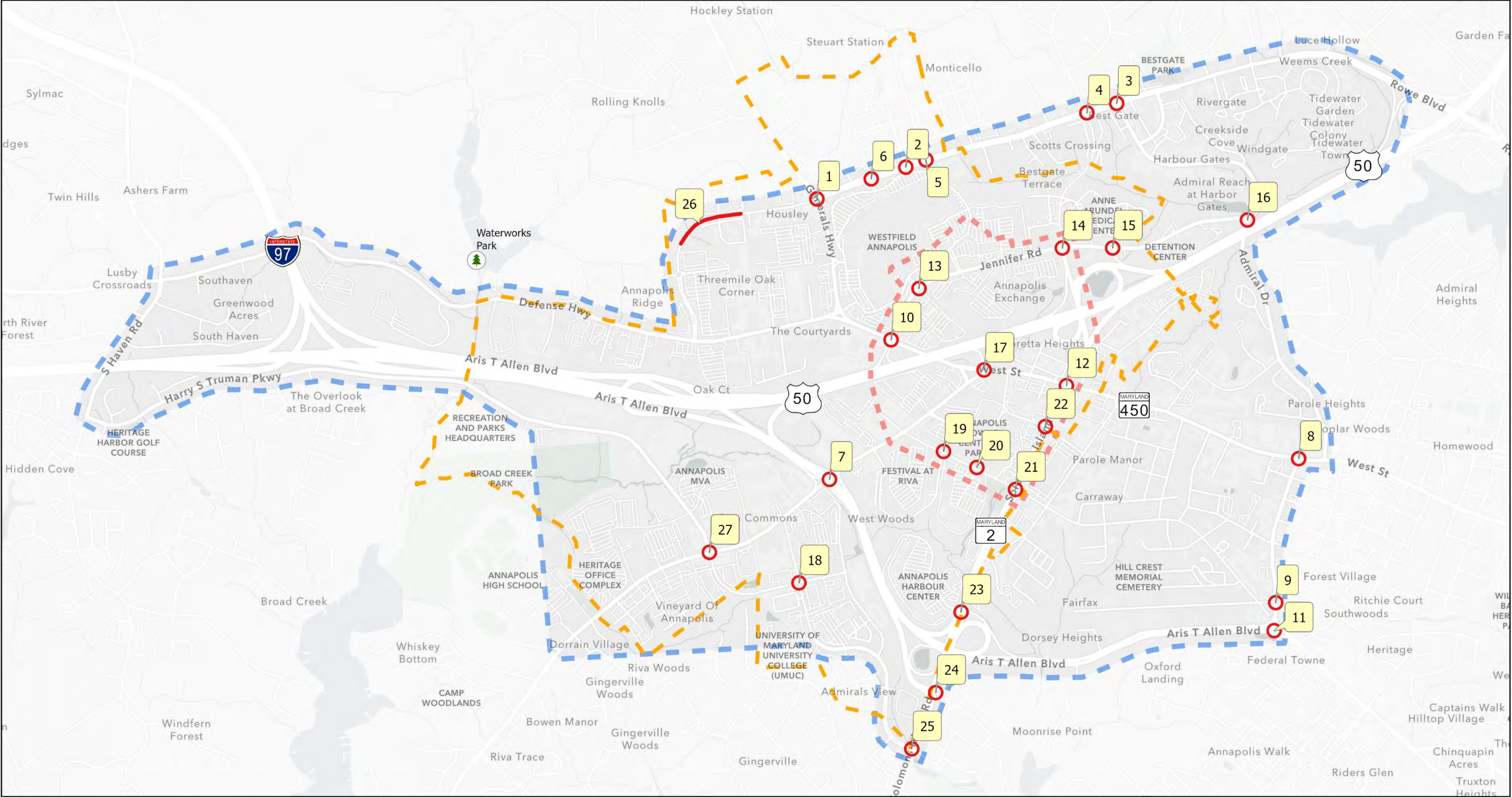
-  Core Area
-  Study Area
-  PGMA Boundary
-  Proposed New Connection (All Modes)
-  Proposed New Connection (Bike/Pedestrian Improvements Only)

 # Number Matched with Attached Table

Figure 22: Recommended Intersection Improvements

Parole Mobility Study

Recommended Intersection Improvements



Core Area
Study Area
PGMA Boundary

Proposed Intersection Improvements
Number Matched with Attached Table

Parole Mobility Study for the Parole Town Center Master Plan

f) Bicycle/Pedestrian Analysis with Improvements

To analyze the benefits of the pedestrian and bicycle recommendations, a walkshed analysis and level of traffic stress analysis was completed.

(1) Walkshed

A walkshed is a term used to define an area that is easily accessible by foot around a specific location. For example, the half-mile walkshed around a bus station can be defined as the number of households that are within a half-mile walk (about 10 minutes) of that bus station. An analysis of walksheds can help us better understand gaps in the infrastructure, safety issues, and other barriers.

If the proposed improvements were implemented, the half-mile walkshed size from Westfield Annapolis Mall, Annapolis Towne Center, and Government Park would be increased; the connectivity between Westfield Annapolis Mall and Gateway Village would be increased; connectivity along MD 450 would be improved; and connectivity to Annapolis Corporate Park and the Harry S. Truman Park and Ride Lot would be improved (see **Figure 23** below). Additionally, there would be significant increases to the 1-mile walkshed size from Westfield Annapolis Mall, Annapolis Towne Center and Government Park. The overlap between the walksheds from the key locations indicates more opportunity for biking and walking between key locations, and new connections would help break the freeway barriers as shown in **Figure 24** below.

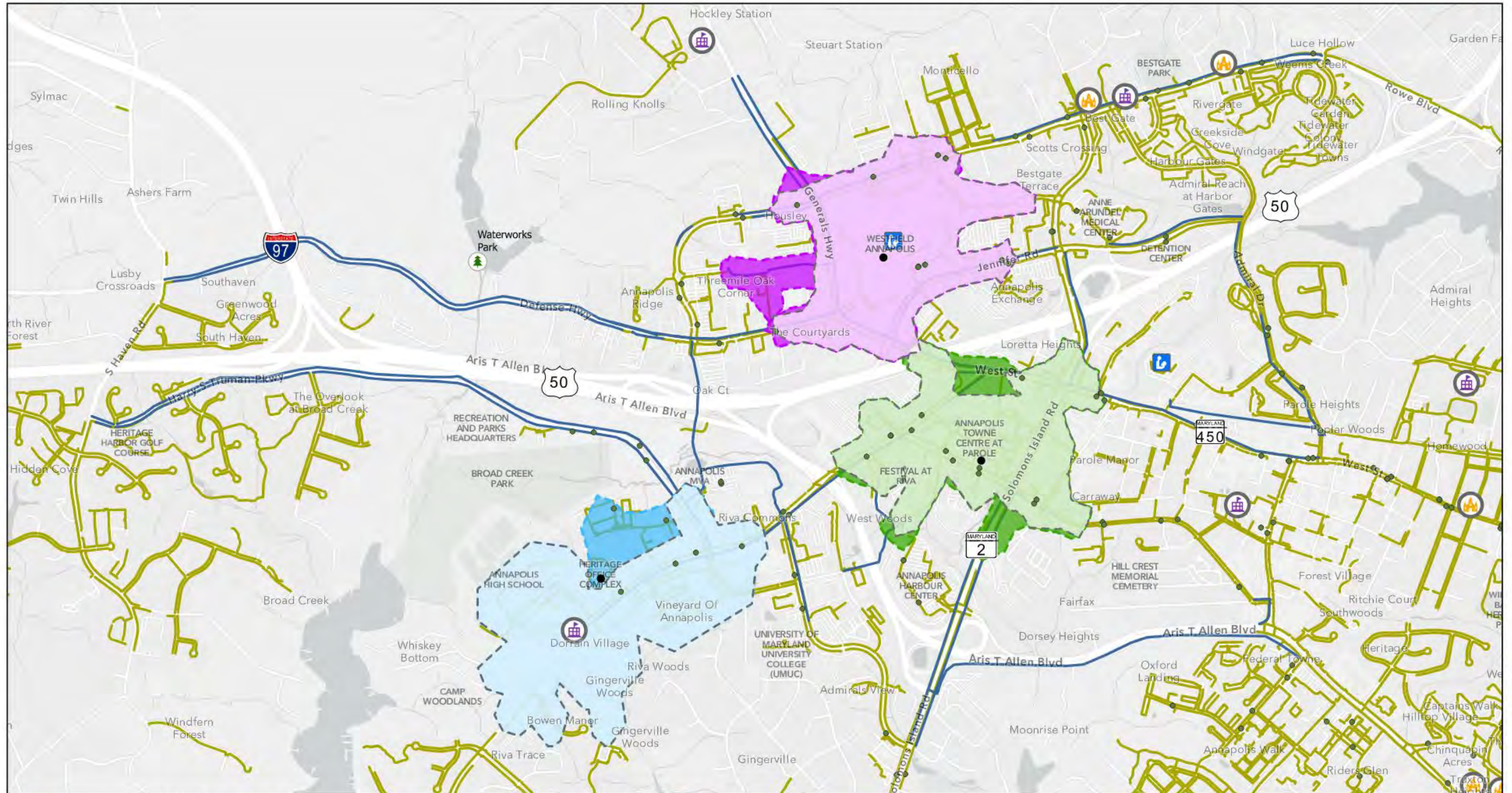
(2) Level of Traffic Stress (LTS)

The Level of Traffic Stress (LTS) is a measure of the level of comfort for bicyclists using a bike facility. Contributing factors can include traffic speeds, traffic volumes, width of bike lane, distance between bike lane and through lane for motorized traffic, etc. People who ride bikes are often divided into groups based on their overall comfort. There are “strong and fearless” riders who will ride no matter what. There are “enthused and confident” riders who will ride on a wide variety of facilities and in a variety of conditions. There are “interested but concerned” riders who will only ride on safe and connected bicycle facilities. And finally, there are “no way, no how” riders who are always unwilling to ride. These typologies help planners and engineers identify when and where to invest in bicycle facilities, and specifically which type of facilities, based on which user group will use them. Wider, separated bicycle facilities will create the most low-stress network and are therefore prioritized in the proposed bike lane network. As shown in **Figure 25** below, the improvements help create a low-stress bike network that provides more options and directness to key points of interest. The recommendations provide over 18 miles of new bicycle facilities in the Parole area (13 miles of shared-use path and over 5 miles of bike lanes). These new facilities greatly improve the low-stress bike network from existing conditions and improve the following low-stress connections:

- Connection of Waterworks Park to Downtown
- Connections to Harry S. Truman Park & Ride, Government Park, and Annapolis High School
- Crossing of freeway barriers with low-stress facilities
- More options for connections to the Westfield Annapolis Mall, Anne Arundel Medical Center, and Annapolis Town Center

Parole Town Center Transportation Master Plan

Half Mile Pedestrian Walksheds with Proposed Improvements



- | | | |
|--|---|---|
| Proposed Half-Mile Walkshed at the Annapolis Town Centre | Proposed Pedestrian Facilities | Park and Ride |
| Proposed Half-Mile Walkshed at Westfield Annapolis | Existing Pedestrian Facilities | P Schools |
| Proposed Half-Mile Walkshed at Government Park | | ✠ Places of Worship |
| Existing Half-Mile Walkshed | | b Libraries |
| | | • Transit Stop |
| | | Core Area |
| | | Study Area |
| | | Parole Growth Management Area (PGMA) |

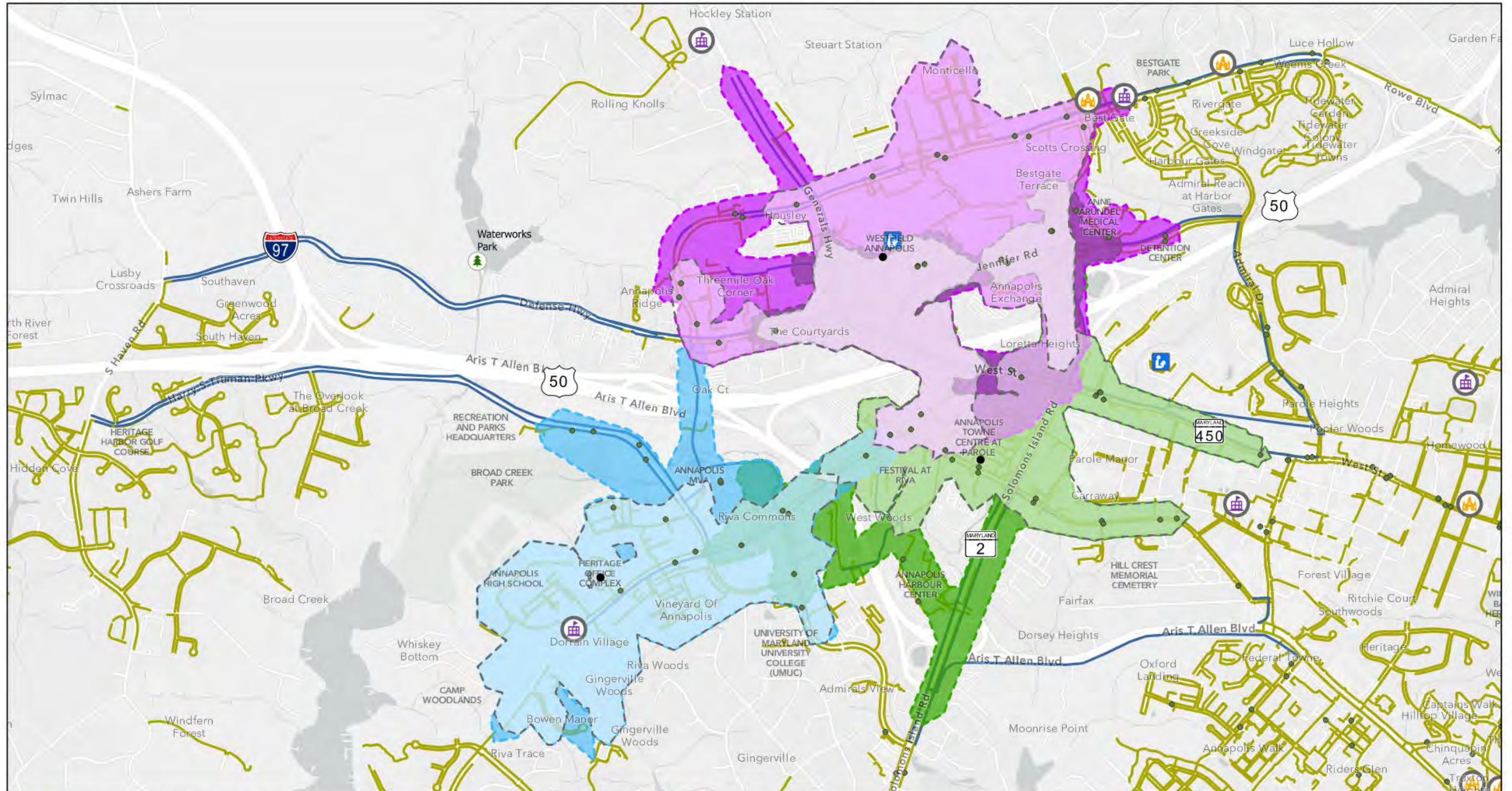
Data Source:
Anne Arundel County
MD iMap

0 0.25 0.5 1 Miles

Figure 24: One Mile Walkshed

Parole Town Center Transportation Master Plan

One Mile Pedestrian Walksheds with Proposed Improvements



- Proposed 1 Mile Walkshed at the Annapolis Town Centre
- Proposed 1 Mile Walkshed at Westfield Annapolis
- Proposed 1 Mile Walkshed at Government Park
- Existing 1 Mile Walkshed

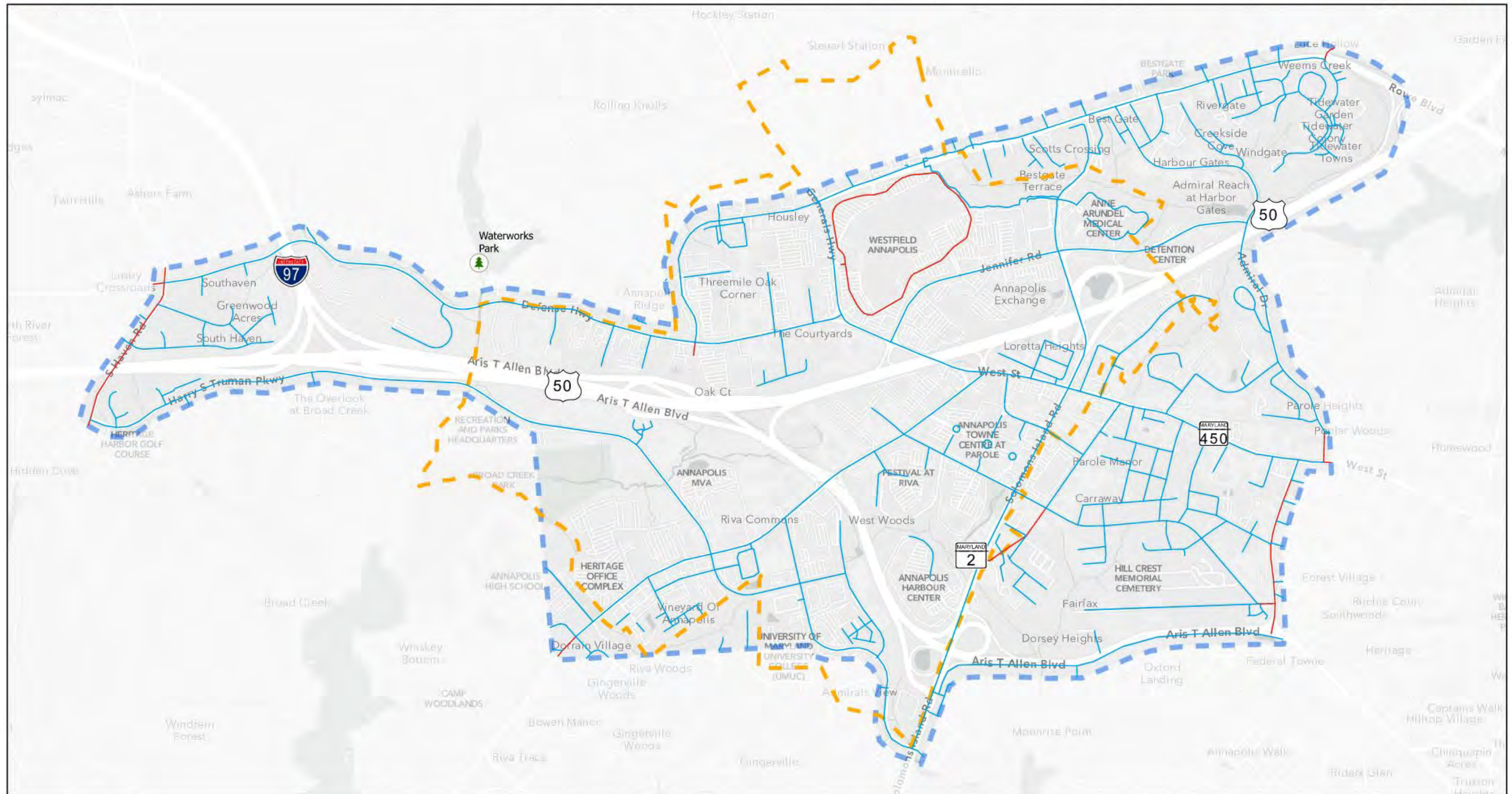
- Proposed Pedestrian Facilities
- Existing Pedestrian Facilities

- P Park and Ride
- Ⓜ Schools
- Ⓜ Places of Worship
- ℓ Libraries
- Transit Stop

- Core Area
- Study Area
- Parole Growth Management Area (PGMA)

Data Source:
Anne Arundel County
MD iMap

0 0.25 0.5 1 Miles



Bicycle Level of Stress

— Low Stress

— High Stress

 Core Area

 Study Area PGMA Boundary

Page 32

Data Source:
Anne Arundel County
MD iMap

0 0.25 0.5 1 Miles

Parole Mobility Study for the Parole Town Center Master Plan

2. Transit Network Improvements

Transit improvements have wide-ranging benefits. Investments in high quality transit treatments combined with increased service levels and amenities can result in increased ridership due to increased frequency, increased coverage, decreased delays, and safer and more comfortable bus stops. Because these improvements discourage single-occupancy vehicle travel, they reduce air pollution, increase fuel efficiency, reduce traffic congestion, and improve public health outcomes. Therefore, it is recommended that Parole invest in improvements to the transit network. Potential high frequency routes for a local, demand responsive County or privately operated shuttle service include:

a) Bus Priority Treatments

Committing to transit means prioritizing transit vehicles as a key component of the transportation network and maintaining bus speed and reliability through a variety of geometric and traffic control strategies.

This can be accomplished by dedicating a travel lane to buses only or allowing buses to travel on the shoulder of a roadway. Another option is to institute bus priority at intersections through measures such as queue jumps, transit signal priority, and enhanced signal coordination. Queue jumps allow high capacity transit vehicles their own lane at signalized intersections so that they may jump in front of other personal vehicles. They often have their own signal which allows them to travel through the intersection before the other lanes have a green signal, allowing them to merge back into the regular travel lanes immediately beyond the signal. Signal priority and enhanced coordination strategies may prioritize bus movements over those of passenger vehicles, with a goal of optimizing the corridor signals so that transit vehicles can move through a corridor stopping less frequently and improving travel times. Additionally, an assessment of the traffic signals may result in replacing or retiming one or more intersections to prioritize the flow of transit vehicles.

Curb management can provide modal priority to transit on key corridors using any of the following treatments, or a combination. Transit lanes are dedicated specifically to transit vehicles and are typically designated with signing and pavement markings. Bus queue jumps were discussed earlier but may use the curb lane. Bus bulbs and bus boarding islands are curb extensions that align a transit stop with the parking lane, allowing buses to stop without leaving the travel lane. They reduce lane changes and can therefore improve speed and reliability and help reduce conflicts between travel modes. They can also be an opportunity to use public space for art, improved amenities, and a visible display of a communities' commitment to active transportation. Additional curb space can also provide access for other mass mobility operators. For example, a community could provide limited access to the public transit stops for commuter shuttles, private transit, or other micromobility options in order to reduce unsafe passenger loading, minimize travel on restricted streets, collect data, and address lack of vehicle accessibility.

b) Bus Stop Infrastructure

The infrastructure provided at bus stops can have a significant impact on the number of users who are willing and able to use transit. A concrete pad, benches, a bus stop sign and basic information, such as the station name and a route map, should be provided at every stop. Bus stops on high use routes should also include bus shelters and real-time information about what time the next bus will arrive. MTA's recently released "Bus Stop Design Guide" gives guidance on where these amenities should be placed and includes eligibility scoring criteria for items like shelters based on boardings, transfers, frequencies, etc.

c) Inter-Modal Connections

Inter-modal connections allow passengers to use a combination of modes and are key to increasing ridership and accessibility. Shared mobility options such as microtransit, scooter share, bike share, car

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share, and Transportation Network Companies (Lyft and Uber), address the first/last mile challenges; allow one-way trips, eliminating risks and hassles; increase the geographic bounds to include areas with limited or no public transit; increase public transit access to low-income neighborhoods; and generally fill in the gaps where traditional transit is absent or inadequate. These complementary mobility options should have hubs at bus stops to minimize walking between transfers.

Connections to and from bus stops, such as well-maintained sidewalks, street crossings, curb ramps, and clear pathways, are essential for all transit users, but particularly for people using wheelchairs and strollers. Additionally, at key transfer locations, signals should be timed to provide longer pedestrian crossing times, preferably with the crossing located behind the bus stop. Protected or separated bicycle facilities are essential to accommodate the widest variety of users who would use a bike in combination with transit.

A Parole Transportation Center should be established, which would be a regional transit center for the greater area. The County recently completed a feasibility study to provide a regional transit center for the state capital, Annapolis, in the Parole area. The study recommends improvements to the Harry S. Truman Park and Ride Lot, which is state owned, in addition to improvements at the Annapolis Mall. At the Harry S. Truman Park and Ride Lot bike racks and lockers are recommended. Additionally, the County should coordinate future regional bus service with new stops along Forest Drive within the City of Annapolis.

d) New Traditional and Non-Traditional Service

Improvements to existing service frequency and span will help make transit more convenient and ultimately increase ridership. When people can count on transit, they are more likely to use it. Implementing a circulator style service for the Parole Town Center using variable routing and on-demand service models will diversify the types of transit users in Parole. **Figure 26**, to the right, shows an example autonomous shuttle which is being used in National Harbor and proposed in other areas of Maryland such as Westminster. Additionally, supporting the US 50 BRT from New Carrollton to Parole will increase regional transit options which decreases individual inequity by providing transportation options for more people, helps boost local economies by breaking down barriers for workers to get to their places of employment or shopping destinations, and decreases environmental impacts of many single-occupancy vehicles using the same route.

Figure 26: Example Autonomous Shuttle



e) Transit Supportive Policy

Transit supportive policies are necessary. The County should partner with employers to encourage their employees to ride transit. At stops and stations, it is important to provide adequate site area for dedicated vehicle boarding and discharge lanes, bicycle storage racks and shelters. Transit stops should be arranged for easy and direct pedestrian access from nearby retail and residential areas. Some of these requirements should be tied to the development review process by encouraging and promoting transit-oriented development: compact, walkable, pedestrian-oriented, mixed-use communities centered around high-quality transit systems. Developments like this decrease dependence on a cars

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for mobility. Lastly, the County should investigate the value and feasibility of establishing a parking authority for the PGMA similar to the one in Prince George's County.

3. Roadway Improvements

Currently, the primary mode of travel within and through Parole is driving, both due to the high volume of regional traffic as well as the lack of density, and lack of multimodal infrastructure. The vision of the PUDCP and the multi-modal improvements recommended as part of this study attempt to begin changing that dynamic and shift people from single occupancy vehicles to other modes for local travel within Parole. With that said, there are still improvements that can be made to roadway network, where capacity constraints exist or where missing connections are not provided. These improvements will not only help vehicle traffic but will also provide reduced block sizes for walking and biking and improve mobility for transit vehicles as well by reducing congestion. Recommendations include new bridges, roadway extensions, interchange/intersection improvements, new roads/frontage roads, and other proposed improvements (**Figure 27**).

a) Roadway Extensions

Two roadway extensions are recommended. These roadway extensions decrease block sizes, provide interconnectivity between adjacent land uses, and provide opportunity to reduce access points on congested roadways. Specifically, the Admiral Cochrane Drive Extension would provide access management in the vicinity of the MD 665 at Riva Road interchange and the Gateway Village Drive Extension would provide interconnectivity between commercial developments without the need for traveling on already busy roadways (i.e. MD 450/MD 178). The roadway extensions are shown in **Figure 28** below. The numbering in the figure matches the numbering in the detailed roadway extension table located in **Appendix I**. The limits of the roadway extensions are summarized in **Table 7**.

Table 7: Roadway Extensions Summary

#	Road	From	To
1	Admiral Cochrane Dr. Extension	Riva Road	Harry S. Truman Pkwy
2	Gateway Village Dr. Extension	Housley Rd.	MD 178 at Mall Entrance

b) New Bridges

Two new vehicular bridges, which also will carry pedestrian and bicycles, help to break barriers through the Parole area created by freeways (i.e. US 50 and MD 665) and will divert vehicles away from already congested roadways (i.e. Riva Road and MD 450). The new bridges are shown in **Figure 29** below. The numbering in the figure matches the numbering in the detailed new bridges table located in **Appendix I**. The new bridges and limits are summarized below in **Table 8**.

Table 8: New Bridges Summary

#	Road	From	To
1	US 50 Overpass	Admiral Cochrane Dr. Extension	Housley Rd.
2	MD 665 Overpass	Spruill Road	Riva Town Center Blvd
3	MD 2 Bridge	Old Solomons Island Road	Town Centre Boulevard

c) New Roads/Frontage Roads

Two new roads/frontage roads are proposed including a road parallel to Forest Drive between MD 665 and Greenbriar Lane, providing congestion relief to Forest Drive, and a new road connecting

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Annapolis Corporate Park and Heritage Office Complex to Riva Road. The new roads/frontage roads are shown in **Figure 30** below. The numbering in the figure matches the numbering in the detailed new roads/frontage road table located in **Appendix I**. The new roads/frontage roads and limits are summarized below in **Table 9**.

Table 9: New Roads/Frontage Roads Summary

#	Road	From	To
1	Parallel to Forest Dr. (south)	MD 665	Greenbriar Ln.
2	Annapolis Corporate Park/Heritage Office Complex Connector	Harry S. Truman Parkway	Riva Road

d) Intersection / Interchange Improvements

Intersection and interchange improvements will target intersections and interchanges with capacity and/or safety concerns. The improvements include the following:

- An additional southbound left-turn lane at the intersection of MD 665 at Chinquapin Round Road would provide additional capacity at this intersection.
- Intersection realignment of MD 450 at Chinquapin Round Road / Admiral Drive to combine these unaligned intersections into a single intersection.
- Addition of signalization or conversion to a roundabout at the intersection of MD 450 at Old Solomons Island Road providing capacity and safety benefits.
- Short-term and long-term improvements at the MD 665 at Riva Road interchange.
 - Short-term – Restrict left-turns on Riva Road (from MD 665) to Admiral Cochrane Drive with barriers and/or flex posts
 - Long-term – Upgrade the interchange
- Intersection realignment and signalization of MD 450 at Lubrano Drive / Oak Court to combine these unaligned intersections into a single intersection.

The intersection/interchange roads are shown in **Figure 31** below. The numbering in the figure matches the numbering in the detailed intersection/interchange improvements table located in **Appendix I**. The improvements are summarized below in **Table 10**.

Table 10: Intersection/Interchange Improvements Summary

#	Intersection
1	MD 665 at Chinquapin Round Rd – Additional Left-turn Lane
2	MD 450 at Chinquapin Round Road / Admiral Drive – Intersection Realignment
3	MD 450 at Old Solomons Island Road – Signalize or Roundabout
4	MD 665 at Riva Road - Restrict left-turns on Riva Road (from MD 665) to Admiral Cochrane Drive with barrier/flex posts (short-term). Upgrade interchange of Riva Road at MD 665 (long-term).
5	MD 450 at Lubrano Dr./Oak Ct, – Align Lubrano Dr. / Oak Ct. and signalize
6	Forest Drive at Chinquapin Round Road - Signalize

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e) Other Improvements

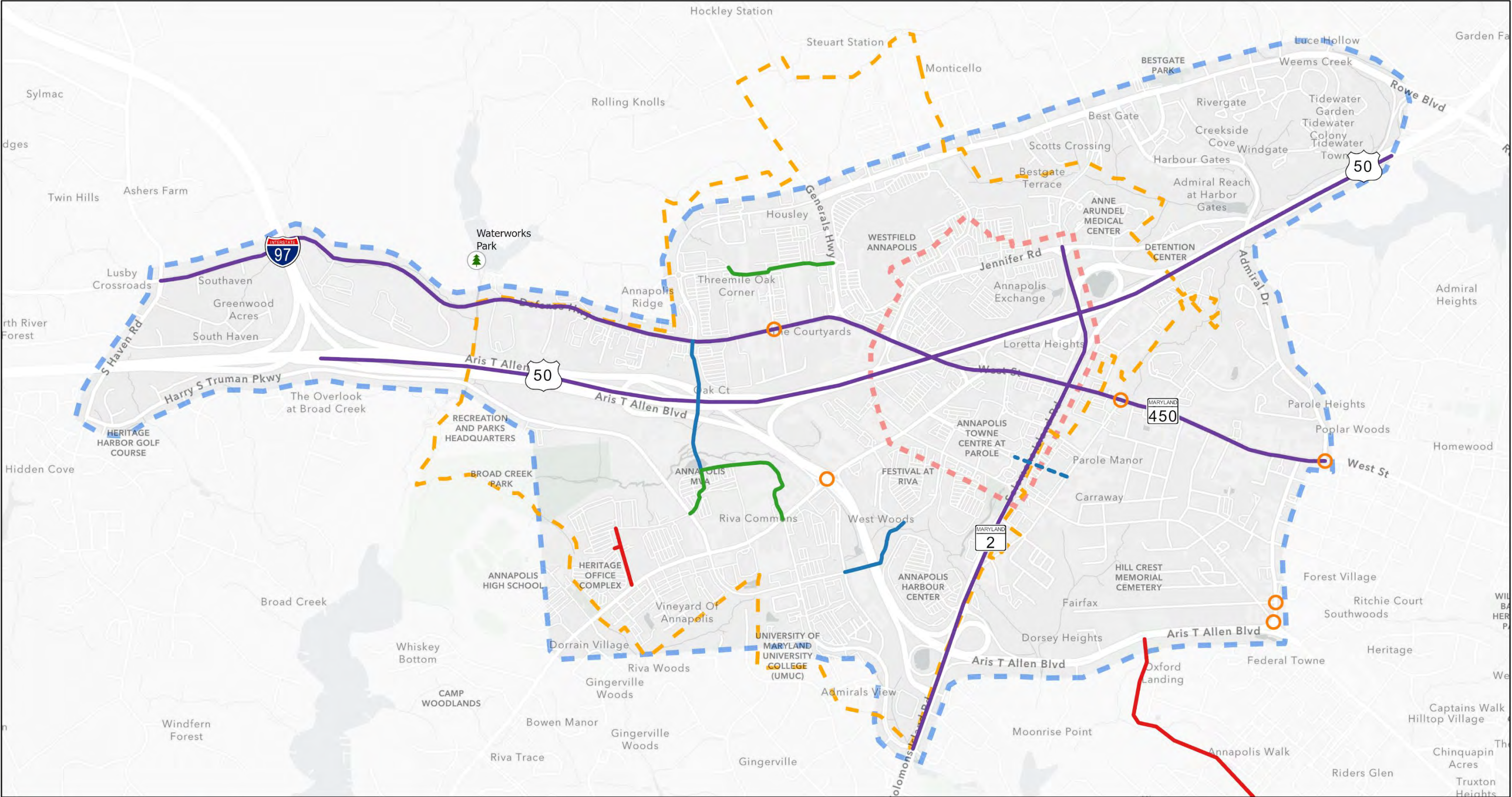
A few other roadway improvements are proposed in the Parole study area. These improvements are shown in **Figure 32** below. The numbering in the figure matches the numbering in the detailed other improvements table located in **Appendix I**. The improvements are summarized below in **Table 11**.

Table 11: Other Improvements Summary

#	Road	From	To	Improvement
1	MD 450	S. Haven Rd.	Admiral Dr.	Solutions to reduce and minimize frequency of flooding
2	US 50	I-97	MD 2 (North)	Widen from 6-8 lanes
3	MD 2	Jennifer Rd.	Admiral Cochrane Dr.	Frontage road creation to reduce access points (i.e. between Forest Drive and Annapolis Harbor Center Drive) and streetscape

Figure 27: Roadway Improvements Overview

Parole Mobility Study Recommended Roadway Improvements



- Core Area
- Study Area
- PGMA Boundary
- Proposed Bridge (proposed by City's Upper West Street Corridor Study)
- Proposed Bridge
- Proposed Extension
- Proposed Interchange/Intersection
- Proposed New Road/Frontage Road
- Proposed Other

Figure 28: Recommended Roadway Extensions

Parole Mobility Study Recommended Road Extensions

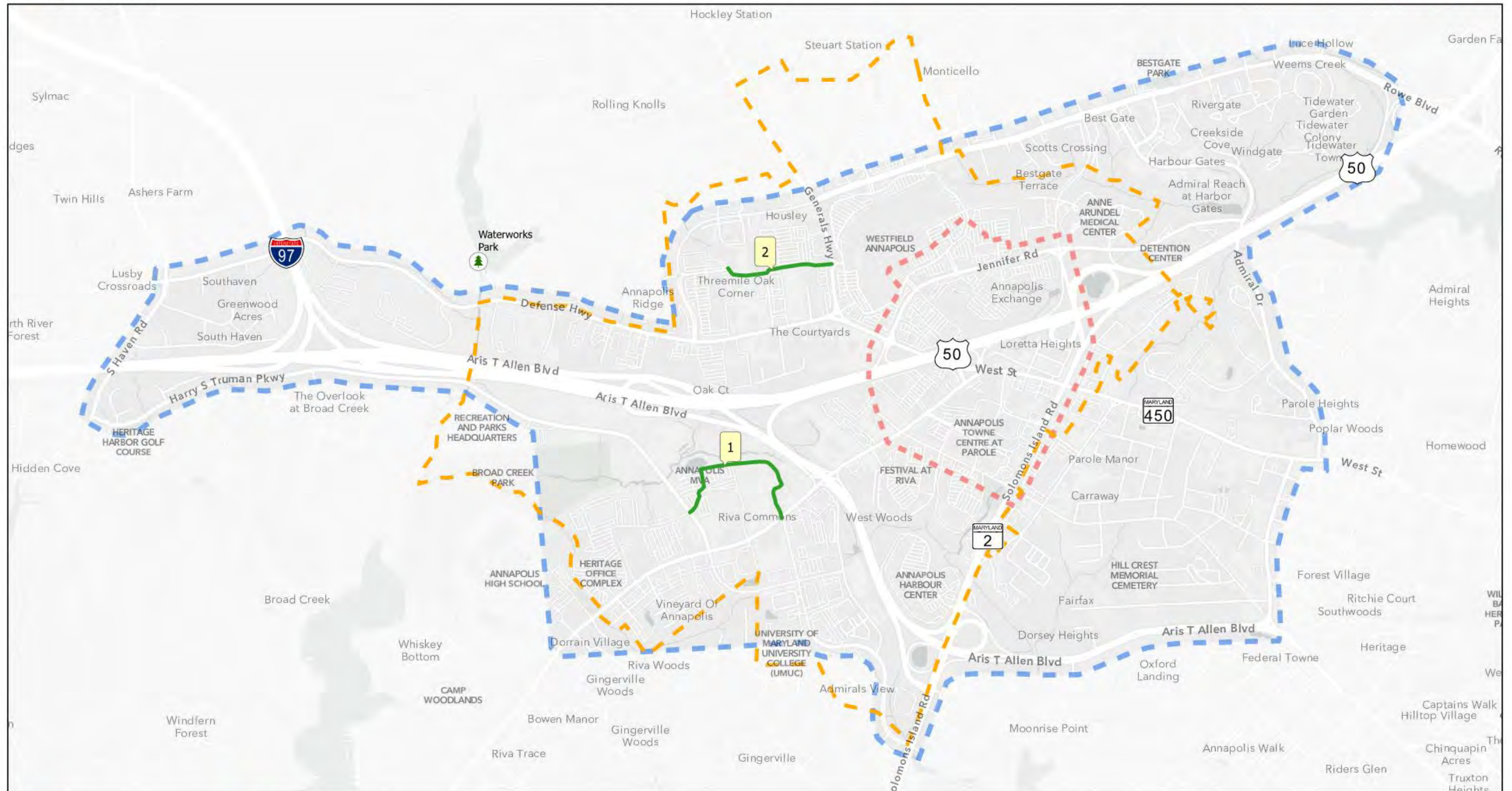
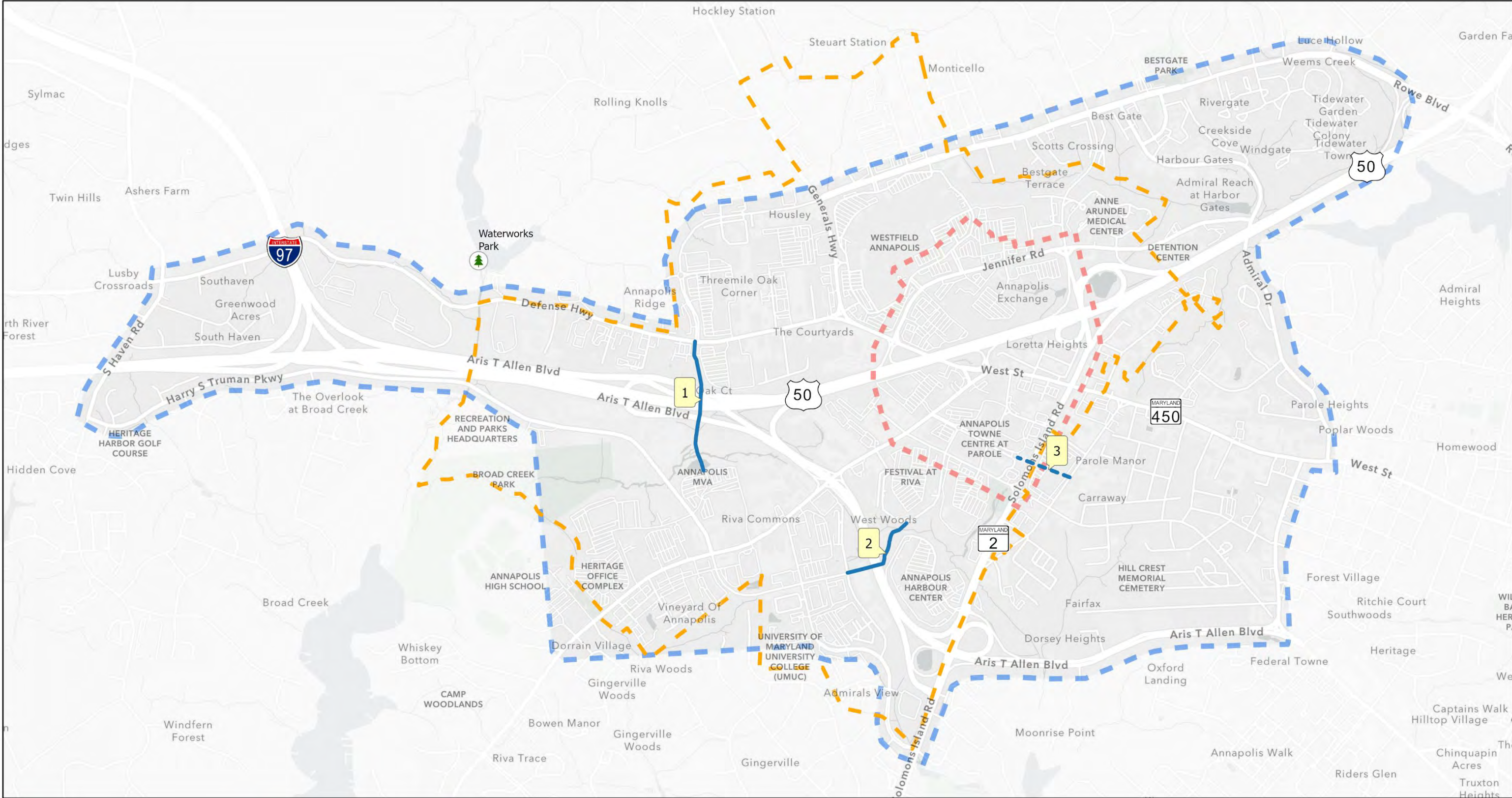


Figure 29: Recommended New Bridges

Parole Mobility Study Recommended Bridges



 Core Area

 Study Area

 PGMA Boundary

 Proposed Bridges

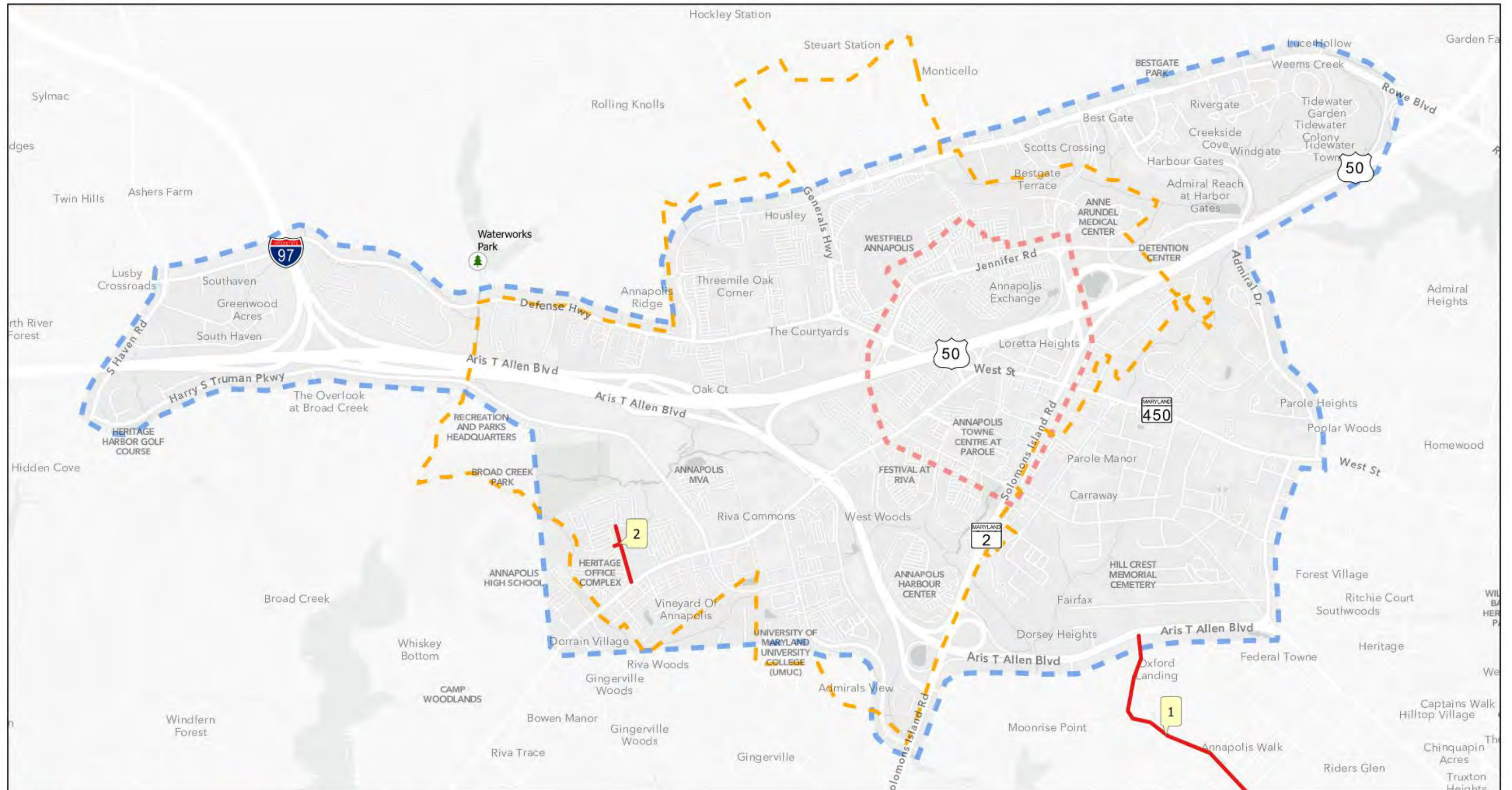
 # Number Matched with Attached Table

 Proposed Bridge (proposed by City's Upper West Street Corridor Study)

Figure 30: Recommended New Roads / Frontage Roads

Parole Mobility Study

Recommended New Roads/Frontage Roads

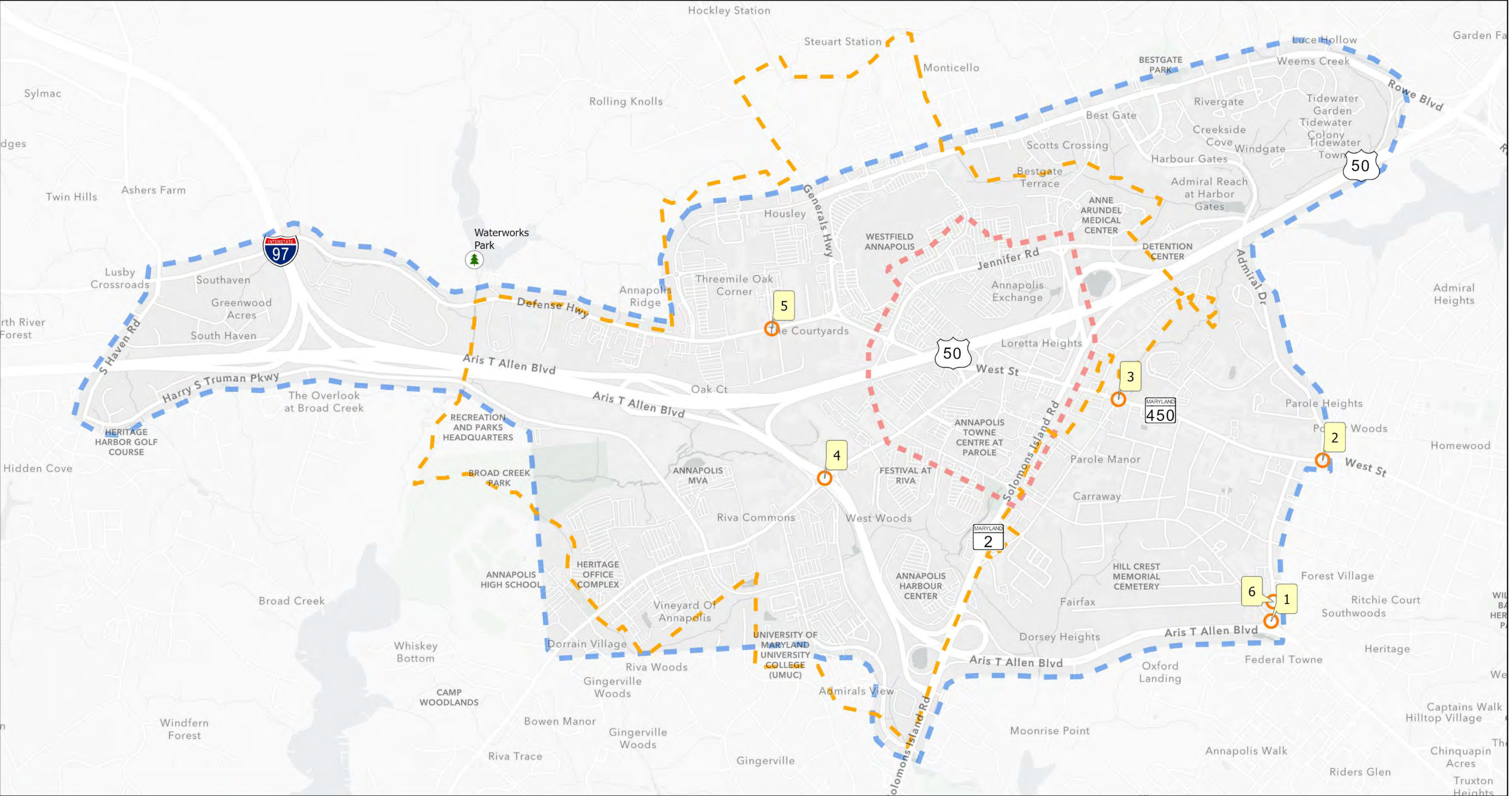


-  Core Area
-  Study Area
-  PGMA Boundary
-  Proposed New Road/Frontage Road
-  # Number Matched with Attached Table

Figure 31: Recommended Intersection / Interchange Improvements

Parole Mobility Study

Recommended Intersections/Interchanges

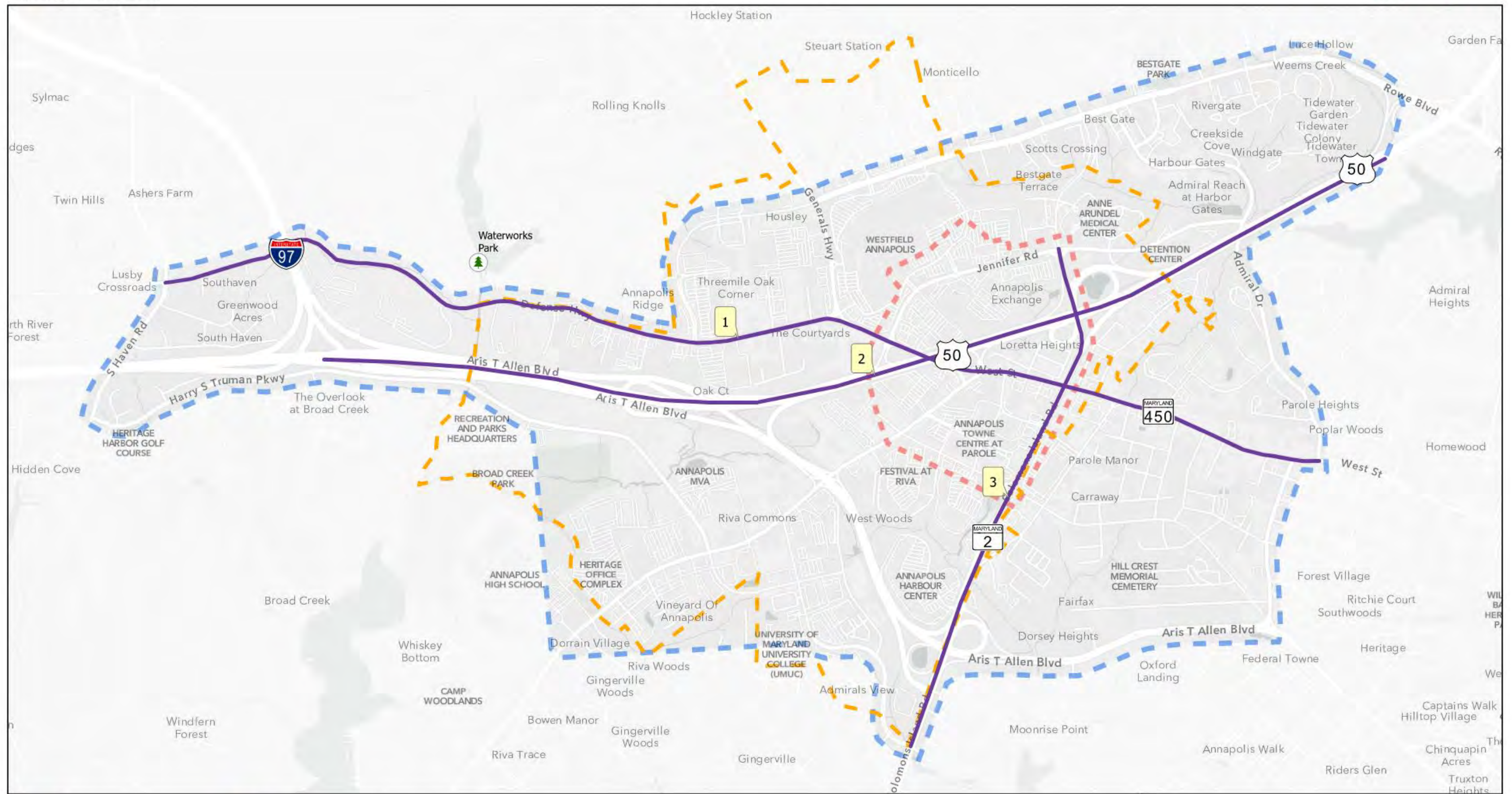


Core Area
Study Area
PGMA Boundary

Proposed Interchanges/Intersections
Number Matched with Attached Table



Parole Mobility Study Recommended Other



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4. Transportation Demand Management

Transportation Demand Management strategies are implemented to reduce vehicle trips during peak and congested times. These strategies may include congestion toll-pricing, telecommuting incentives, rideshare incentives, providing micromobility options, real time travel time information on changeable message signs, carpool/vanpool services, and reduced parking requirements. Over the course of the study, the Pace Annapolis bike share was shut down. It is recommended that a more robust micromobility system, with or without stations, be reintroduced to the area.

The County should also work with employers to encourage the private sector to set policies that encourage the use of alternative transportation by employees, such as walking, biking, car or van pooling, and public transit. Specific actions that would help to encourage alternative transportation include maintaining bike racks at shopping and activity centers and office buildings, employer subsidy toward transit pass, and providing showers and changing rooms with lockers for employees who walk, jog or bike to work.

5. Transportation Systems Management and Operations (TSMO)

Transportation Systems Management and Operations (TSMO) has emerged as a formal discipline for transportation agencies throughout the country. The intent of TSMO is to effectively manage and operate existing facilities and systems to maximize their full-service potential. TSMO strategies aim to address capacity limitations due to recurring and non-recurring congestion (crashes, incidents, severe weather, work zones, special events, and other factors) through business processes, ITS technologies and collaboration.

TSMO strategies recommended for Parole include:

- Access management plan
- Signal System coordination and optimization on additional corridors (e.g. Adaptive corridors similar to the adaptive control the County operates on Riva Road)
- Enhance Active and Event Traffic Management through implementation of variable speed limits, dynamic lane marking, Variable Message Signs (VMS), and enhanced traveler information systems
- MDOT SHA TSMO System #3 includes US 50 through Parole (part of system with MD 2, MD 3, and I-97)
- Preparing for Connected and Automated Vehicles (CAV). MDOT Office of CHART & Intelligent Transportation Systems Development (CHART), Office of Planning and Preliminary Engineering (OPPE), Office of Traffic and Safety, and Office of Policy and Research have collaboratively developed a Connected and Automated Vehicles (CAV) Strategic Action Plan to help achieve the safety, mobility and environmental benefits anticipated from this technology. These technologies would likely be implemented on state owned roadways within the Parole study area first.

D. Public Input

A presentation detailing the recommendations, along with supplemental spreadsheets and maps of the recommendations, were posted to the County's website and the public was notified through the County's press release channels.

This material was posted two weeks prior to the public meeting and remained open for comment until January 31st, 2021. The public meeting entailed a virtual presentation followed by a Q&A session, which was held via Zoom software on Thursday, November 19th at 6:30 PM. In addition to questions posted during the Zoom Q&A, the public had the opportunity to email the project's email address

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with any other questions/comments. The chat log from the Zoom Q&A session and any questions submitted via email for the second public meeting are included in **Appendix L**.

V. INCORPORATION INTO THE PAROLE URBAN DESIGN PLAN

The Parole Mobility Study will support the Office of Planning and Zoning's update of the Parole Urban Design Concept Plan (PUDCP), the master plan for the Parole Growth Management Area (PGMA). The draft Vision of the PUDCP states that Parole will be a community that is redeveloped and revitalized to serve the region as an economic and transportation hub, absorbing much of the County's growth pressure into a well-designed urban place, while respecting and enhancing the character of its less urban surroundings. This document and recommendations will inform the transportation component of the master plan update, which is still ongoing.

These improvements will be funded by a combination of developer improvements and County capital improvement projects (CIPs). Once the plan is fully approved, these projects would be candidates for future CIPs. Grants are also available to help advance some of the proposed improvement projects.