HARFORD COMMUNITY COLLEGE TO BEL AIR CONNECTOR STUDY

HARFORD COUNTY, MARYLAND
MARCH 2023

ACKNOWLEDGMENTS

PROJECT SPONSORS

Maryland Department of Transportation

Harford County Planning and Zoning

Harford County Parks and Recreation

TECHNICAL ADVISORY COMMITTEE

Harford County Parks and Recreation

Angie Hoover

Paul Magness

Harford County Planning and Zoning

David Culver

Joel Gallihue

Jenny Jarkowski

Alex Rawls

Deborah Price (project coordinator)

Harford County Public Works

Glen Hebel

Steve Walsh

Bel Air Department of Planning

Kevin Small

Harford County Community College and Bike Harford

Ed Augustitus

Shane Grimm, Director
Harford County Planning and Zoning
22 S. Main Street
Bel Air, Maryland

PROJECT STAKEHOLDERS

Baltimore Metropolitan Council

Bel Air Planning Department

Bike Harford

East Coast Greenway

JAM Squad

Harford Community College

Harford County Council

Harford County Parks and Recreation

Harford County Planning and Zoning

Harford County Public Schools

Harford County Public Works

Healthy Harford

Maryland State Highway District Engineering

The MA and PA Heritage Trail, Inc.

Landowners, businesses,

civic entities, and elected officials

CONSULTANT

Whitman, Requardt & Associates, LLP

CONTENTS

APPENDICES

FIGURES

PROPOSED CORRIDOR AND INTERSECTION TREATMENTS

INTRODUCTION

BACKGROUND

Safely connecting the Town of Bel Air to Harford Community College (HCC) with traffic-separated bicycle and pedestrian facilities is a vital component of the bicycle and pedestrian network envisioned in the 2013 *Harford County Bicycle and Pedestrian Plan*. The area analyzed for this study is located in the center of Harford County and is roughly bounded by US 1/ Bel Air Bypass in the north, MD 22/Churchville Road in the south, Harford Community College in the east, and the Town of Bel Air in the west. The distance between the Town of Bel Air and HCC is less than 4 miles.

In response to a recommendation from the County's comprehensive plan HarfordNEXT (2016), the *Bicycle and Pedestrian Master Plan* (2021 Plan) was updated administratively in 2021 to ensure efforts to extend the network of non-motorized facilities are synchronized with other land use and transportation decisions. Although the 2021 Plan was not formally adopted by the County Council, the updated plan is the guiding policy document of the Harford County Department Planning and Zoning. Future updates may be made with the approval of the Planning Director. The recommendations from this study will be incorporated into the next update to the *Harford County Bicycle and Pedestrian Master Plan*.

HCC is a centrally located educational facility and key employment center; however, it is located east of the Town of Bel Air in a lower density part of the County. Without a safe traffic-separated connection for bicyclists and pedestrians, HCC will remain less accessible, and most trips will be taken with an automobile. A new traffic-separated connection would link the MA & PA Trail in downtown Bel Air to HCC, expanding the low-stress network and benefiting many other users in the community beyond HCC students and employees. Finally, the East Coast Greenway (ECG) traverses Harford County without any traffic-separated facility. The ECG alignment is roughly parallel to the alignment. The completion of this connection would allow the ECG to re-routed and take advantage of the new traffic-separated facility and existing and future phases of the MA & PA Trail heading north. A map of the study area highlighting the route identified in the 2013 Plan and the ECG is shown in **Figure 1**.

GOALS

The goals of this study are as follows:

- Identify a preferred alignment for a bikeway connecting HCC and the Town of Bel Air, and the preferred bicycle facility type(s) along the preferred alignment
- Advance the design of critical gap segments in Harford County's bicycle network through a feasibility study and formal design/engineering documentation that will help the County plan for critical capital projects and funding for implementation
- Develop designs for bicycle infrastructure that provide a safer and more comfortable riding experience for users of all ages and abilities and mitigate conflicts with other transportation modes
- Leverage creative community engagement methods to test design concepts, build support among community stakeholders and project partners, and expand the visibility of the bicycle network

STUDY METHODOLOGY

In order to determine the feasibility of a low-stress bicycle and pedestrian connection between the Town of Bel Air and HCC the steps below were followed:

Evaluation of Prior Plans, Studies, and Design Guidance

The following documents served as the basis for this study:

- *Town of Bel Air Comprehensive Plan,* 2022*,* Town of Bel Air
- *Business US 1 and MD 22 Multi-modal Corridor Study*, 2015, Harford County and the Town of Bel Air
- *Bel Air Pedestrian Safety Study*, 2014, the Maryland State Highway Administration
- *Harford County Strategic Highway Safety Plan 2021-2025*, 2021, Harford County Traffic Safety Advisory Board
- *HarfordNEXT – A Master Plan for the Next Generation*, 2016, Harford County
- *Harford County Bicycle and Pedestrian Plan*, 2013, update 2021, Harford County
- *2040 Maryland Bicycle and Pedestrian Master Plan*, 2019, Maryland Department of Transportation

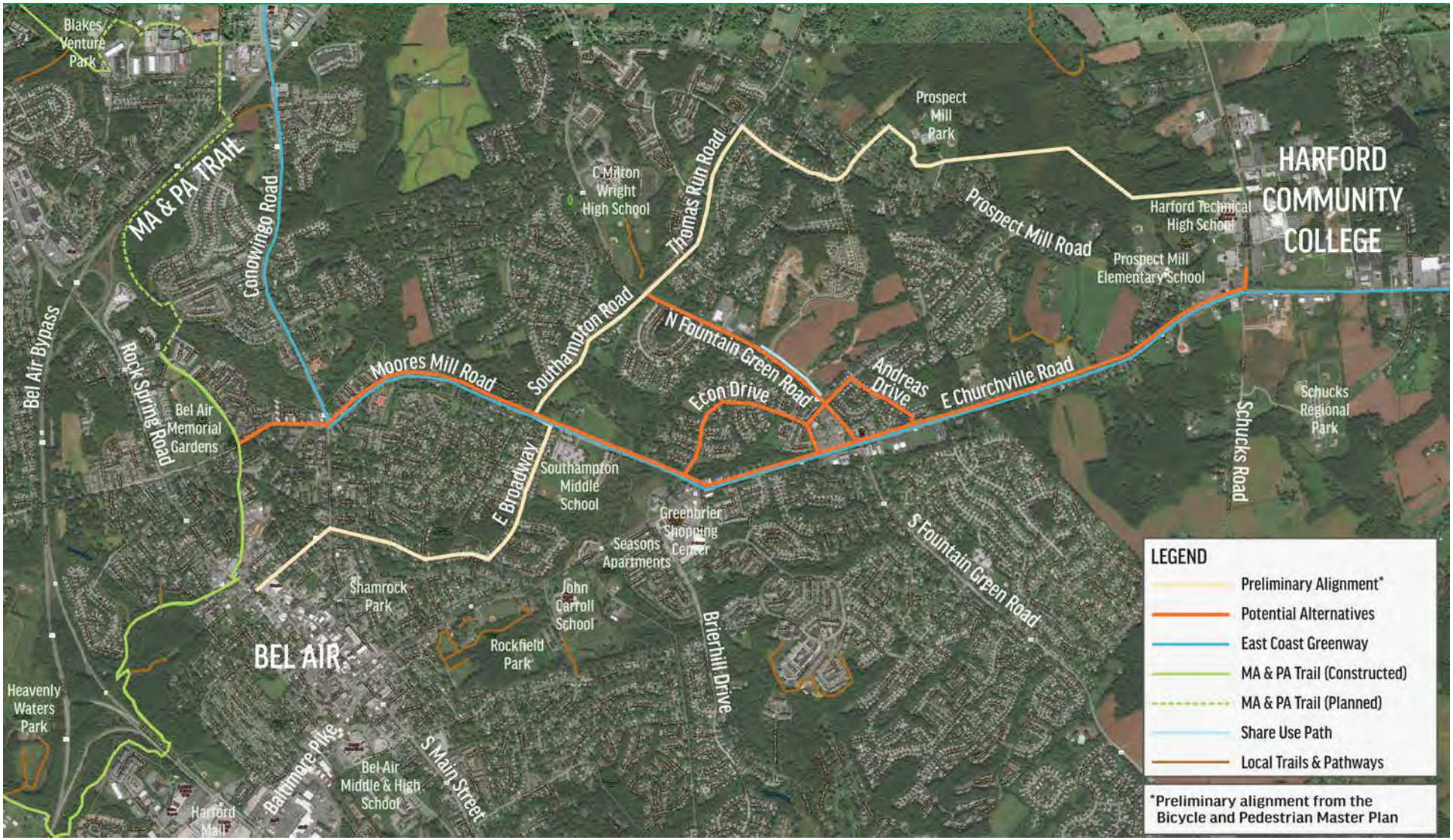


FIGURE 1. PROJECT AREA MAP

- *Maryland's Bicycle and Pedestrian Plans and Programs* webpage, 2022, Maryland Department of Transportation
- *Zero Deaths Maryland* website, 2022, Maryland Department of Transportation
- *Context Driven – Access & Mobility For All Users* website, 2022, Maryland Department of Transportation State Highway Administration
- *Bikeway Selection Guide*, 2019, Federal Highway Administration
- *Bicycle Policy & Design Guidelines*, 2015, Maryland State Highway
- *A Policy on Geometric Design of Highways and Streets*, Seventh Edition, 2018, AASHTO
- *Low-Stress Bicycling and Network Connectivity*, Mekuria, Furth, and Nixon, Research Report 11-10, Mineta Transportation Institute, 2012

Base Mapping & Existing Conditions Documentation

A project area base map was developed using current data from the State of Maryland and Harford County. A field visit was conducted to review existing facilities and observe existing conditions to better understand how bicycle and pedestrian facilities could be incorporated into the existing context. The project team met with the Technical Advisory Committee to review the results of the base mapping and confirm the goals of the study. The constraints and opportunities along each corridor in the study area were prepared based on the base mapping and field visits.

Corridor Analysis & Network Development

Level of Traffic Stress (LTS) analysis and mapping, further described on page 12, documents how stressful every street in the study area feels for people riding a bicycle. Existing trails like the MA & PA Trail are considered low-stress and accessible for people of all ages and abilities. Most local neighborhood streets carry low volumes of traffic at low speeds, creating a low-stress environment that does not merit a traffic-separated facility. These existing low-stress streets can be used to form the basis of a network of low-stress bikeways between the Town of Bel Air and HCC. Higher-stress roads will require the addition of a traffic-separated facility to connect the existing islands so people walking and biking feel safe.

This study recommends connecting the existing low-stress streets with phased traffic-separated bicycle and pedestrian facilities to connect where people live to area destinations. Once all the recommended projects are constructed, there will not just be one route between the Town of Bel Air and HCC, but instead an interconnected network of traffic-separated bicycle facilities and low-stress neighborhood streets that allow area residents to reach destinations throughout the study area. Looking at the location of new traffic-separated facilities and potential trail connections as a network allows for phased improvements based on greatest demand from higher population density, a larger percentage of residents without access to a motor vehicle, or the presence of institutions such as area schools.

Concept Development

Recommended improvements for each corridor and intersection were developed based on the methodology described in the FHWA *Bicycle Selection Guide*. The improvements were evaluated with respect to:

- Anticipated impacts to right-of-way, trees, and other elements noted during the existing conditions documentation
- LTS under proposed conditions
- Compliance with guidance such as FHWA's 2019 *Bikeway Selection Guide*, which was published after the *Harford County Bicycle and Pedestrian Plan* was developed
- Potential operational concerns
- Concepts were revised and re-evaluated to address public and County comments.

Community Outreach and Engagement

Harford County conducted an initial round of public outreach via an online survey asking stakeholders to submit comments/concerns about bicycling in the study area. This survey was supplemented with an in-person workshop. The feedback was used to inform the technical analysis and support the network and concept development. Another public workshop was held to present the phased improvements and seek feedback. Workshop materials and surveys were also available for review on the Harford County website after each public workshop.

Concept Refinement, Estimates, and Final Report

Input from the public meeting and County officials were used to adjust the conceptual typical sections and plans. Planning-level cost estimates were developed for each corridor for programming purposes. Estimates were developed using the Kim Lamphier Bikeways Network Program Project Cost Estimator.

PRIOR PLANS & STUDIES

Several prior studies and resources provided background for the study and the development of recommendations. Highlights of these reports are included below.

LOCAL

Town of Bel Air Comprehensive Plan

(2022), Town of Bel Air

The plan is a broad view of land use and public services. It adopts goals and objectives needed to guide the day to day decisions concerning development, financing, public improvements and regulatory needs. This plan provides the public with information needed to understand where social, economic and environmental policy is headed. The Vision for Chapter 6, Transportation, is to "Provide a safe, efficient and well-maintained travel network for all modes of transportation and enhance the transit, bicycle, and pedestrian friendly assets of the community." Map G shows current and proposed bicycle routes and pedestrian connections as well as proposed pedestrian crossing improvements. The plan notes that "'Share the Road' pavement markings and signage delineating bicycle routes have been added to provide access through Town and eventually to County routes such as a planned route to HCC." Additionally, "efforts to reduce vehicle conflict are considered a priority along designated routes."

Business US 1 and MD 22 Multi-modal Corridor Study

(2015), Harford County and the Town of Bel Air

The Business US 1 and MD 22 Corridor is a major east-west corridor linking Main Street, commercial properties, residential communities, educational facilities, and government offices. The study identifies feasible and cost-efficient improvements to provide complete streets, encourage better multi-modal cohesion and connectivity, provide mobility choices, and ensure positive results. The investigation found the overall roadway capacity was adequate for vehicular commuting patterns, but most trips are not through trips and could not be diverted onto other roadways. Challenges include lack of good mobility choices for non-motorized vehicles, incomplete networks, and excessive access points. Detailed recommendations by geographic area provided key pedestrian and bicycle, roadway, and intersection improvements.

Bel Air Pedestrian Safety Study

(2014), Maryland State Highway Administration

This study evaluates pedestrian-related concerns from members of the public for MD 924 from Baltimore Pike to Lee Street in Bel Air. It includes technical details of the project site, including ADA compliance, intersection and corridor geometrics, and traffic control measures; a capacity and operations analysis; and recommendations for pedestrian safety, circulation, and connectivity.

COUNTY

Harford County Strategic Highway Safety Plan 2021-2025

(2021), Harford County Traffic Safety Advisory Board

The safety plan, designed to align with the Maryland State Highway Safety Plan, analyzes five problem areas, identifies strategies to address them, and identifies goals and targets for the reduction in County injuries and fatalities by 2025. The emphasis areas of greatest concern for Harford County included speeding, impaired driving, distracted driving, infrastructure-related, and occupant protection. Strategies included use of best-practices, enforcement through multiple means, use of technology, education, outreach, and media campaigns. Implementation of the plan began in 2021.

HarfordNEXT – A Master Plan for the Next Generation

(2016), Harford County

Harford County's Comprehensive plan identified five overarching strategies, or "Big Ideas". They include innovative development emphasizing sustainability, green infrastructure planning, promotion of historical and cultural resources, use of a collective impact model to establish health goals, create features of a "Blue Zone Community" (i.e., a community well-being, improvement initiative) and holistic transportation planning. The plan incorporates several themes for implementing their strategies, including: growing with purpose, preserving heritage, mobility and connectivity, promoting healthy communities, environmental stewardship, and economic vitality; the principles and goals from these themes correspond to implementation strategies that guide County policies and their work over course of the plan's 25-year horizon.

Harford County Bicycle and Pedestrian Master Plan

(2013, update 2021), Harford County

The focus of this master plan is to increase pedestrian and bicycle activity throughout the County by providing improvements that offer desirable levels of accessibility, mobility, convenience, and safety. The plan includes the goals, guiding principles, planning process, public engagement, benefits of increased pedestrian and bicycling activity, an analysis of the trail, pedestrian, and bicycle networks in the County and recommendations for site specific projects, policies, and programs. Project improvements included walkways, bicycle facilities, multi-use trails, and regional bikeways. The 2013 plan was updated in 2021. Future updates may be made with the approval of the Planning Director.

STATE

2040 Maryland Bicycle and Pedestrian Master Plan

(2019 Update), Maryland Department of Transportation

This master plan's vision is for Maryland to be "a great place for biking and walking that safely connects people." It provides an overview of statewide bicycling and walking trends related to demographics, infrastructure, and safety; a brief profile for the five different regions in the state; an explanation of the plan's updated goals, objectives, and strategies; and the plan's key initiatives. Those initiatives, including improving statewide connectivity, developing planning and policy tools, defining and refining programs, developing better data, and others identify specific actions the state will take to meet the goals of the plan.

Maryland's Bicycle and Pedestrian Plans and Programs

webpage (2022), Maryland Department of Transportation

This site includes the results of MDOT's Bicycle Level of Traffic Stress (LTS) analysis. Each road has been assigned a score of 0-5 including 0 for all ages and abilities, 1 almost everyone, 2 interested but concerned, 3 enthused and confident, 4 strong and fearless, and 5 bicycles prohibited.

- Maryland's Bicycle Level of Traffic Stress (LTS) story map provides a high-level explanation to the public how MDOT determined how bikeable the state's transportation network is and how the scores were assigned.

- The technical description of the LTS Methodology addresses MDOT's transition from a Bicycle Level of Comfort (BLOC) model to the Traffic Stress (LTS) approach to measure the "bikeability" of the roadway network. The LTS scale is assigned to roadway segments according to bicyclists level of comfort and is based on roadway characteristics, including motor vehicle speed, number of lanes assigned to motor vehicles, degree of separation from motor vehicles, and width of bicycle facility.

- The Level of Traffic Stress Map Application identifies all roads, roadway functional class, speed limit, and LTS score.

Zero Deaths Maryland

website (2022), Maryland Department of Transportation

This site is focused on traffic safety programs and resources that have been developed to prevent injuries and save lives on Maryland roads by reducing motor vehicle crashes. The site includes the Maryland Strategic Highway Safety Plan, 2021 which identifies six "emphasis areas" that have been identified as the major causes of motor vehicle crashes and fatalities, including infrastructure, occupant protection, and bicycle and pedestrian concerns.

BASE MAPPING & EXISTING CONDITIONS DOCUMENTATION

A project area base map was developed using the Harford County WebGIS application and the Open Data Portal. The base map was used throughout the analysis process, and included available aerial photography, 2-foot contours, right of way information, utility information, and environmental data like streams and wetlands locations. A field visit was conducted to review existing facilities and conditions to better understand how bicycle and pedestrian facilities could be incorporated into the existing context.

The project team met with the Technical Advisory Committee near the beginning of the study to review the results of the base mapping and confirm the next steps for documenting existing conditions:

- Review prior concept plans and applicable County policies
- Review record drawings and other existing conditions documentation, especially related to potential utility conflicts
- Conduct community outreach and engagement, including stakeholder interviews and public workshops
- Develop conceptual designs based on existing conditions evaluation and public feedback

This section includes an overview of relevant existing conditions considered throughout the development of recommendations.

LAND USE

The primary land use classification in the study area is light- and medium-intensity residential. The area east of Prospect Mill Road is classified as agricultural, although some low density single-family homes are located there. Harford Community College (HCC) is located at the eastern edge of the study area, and is classified on the land use map as "HCC" (the County does not use "institutional" as a land use designation). Harford Community College (HCC) is primarily a commuter school. While the majority of students commute by personal vehicle, some students also commute via transit or bicycle. Class schedules were recently changed to better accommodate transit commuters. There are other schools within the study area, including Southampton Middle School on Moores Mill Road, C. Milton Wright High School on North Fountain Green Road, and Prospect Mill Elementary School on Prospect Mill Road.

The only high-intensity residential development in the study area is the Seasons at Bel Air Apartments, located on the south side of MD 22/ Churchville Road west of Brierhill Drive. According to HCC, many of students live in this apartment complex and commute along Churchville Road to the HCC Campus.

DEMOGRAPHICS

A low-stress pathway connector would serve the general community, as well as several specific populations residing in or adjacent to the study area. Some of these areas include higher densities of people without access to a car, people living below the federal poverty level, and people with a disability who are more likely to benefit from improved access low-stress bicycle and pedestrian facilities for transportation.

- In general, the population density in the study area is high ranging from 1,000 to 8,400 people per square mile, as compared to the County average of 591 people per square mile. There is a significantly higher density in the Brierwood area due to the Seasons Apartments, where density is about 30 times the County average.
- The households south of MD 22/Churchville Road, which includes Brierwood and Fountain Green Heights, are over 7 times less likely to have a car available to them than the rest of the County.
- People living in poverty levels in the study area are highest in Bel Air (north of MD 22) are about two and a half times greater than the County average.
- The population density of those with a disability in certain locations of the study area were more than twice County's average of 8%. Those areas include communities south of MD 22, including Brierwood, Fountain Green Heights, Green Ridge, Winchester Springs, and Meadow Springs.
- The dependent population, consisting of those under 18 years of age and those aged 65 and older, are more than 6% higher than the County average in Bel Air South and in the area south of MD 22 which includes Green Ridge, Winchester Springs, and Meadow Springs.

Key demographics for the whole of Harford County are shown on **Figure 2**.

HARFORD COUNTY DEMOGRAPHICS

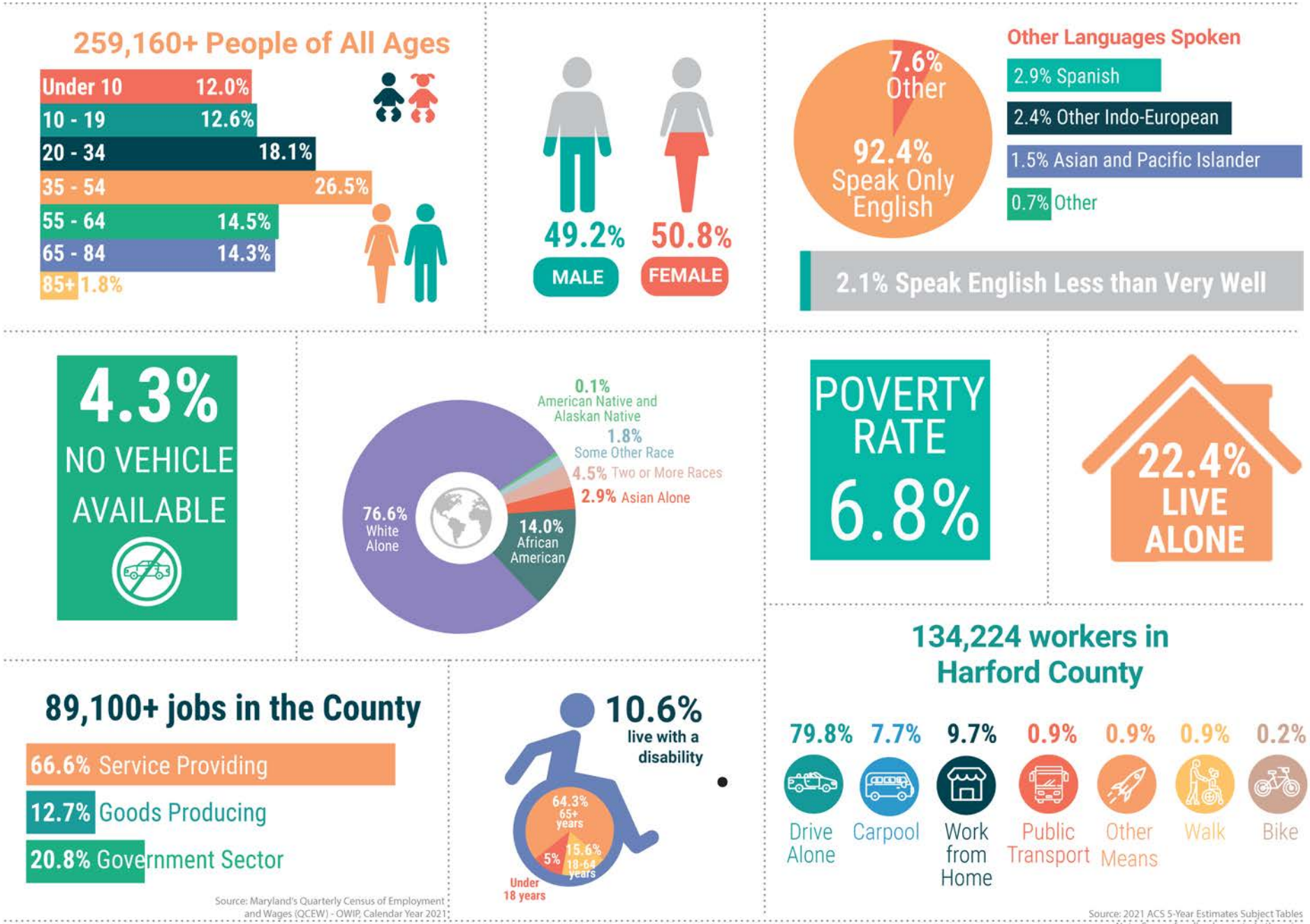


FIGURE 2. HARFORD COUNTY KEY DEMOGRAPHICS

TRANSPORTATION NETWORK

MD 22/Churchville Road is the primary east/west roadway in the study area. It is classified as a Principal Urban Arterial with a 2021 Average Annual Daily Traffic (AADT) of approximately 25,700 according to MDOT SHA. Churchville Road serves as the most direct route between the Town of Bel Air and HCC, with only 2.6 miles between the eastern Town limits and western edge of HCC's campus. Harford LINK Bus Route 1 travels along Churchville Road between the Town of Bel Air and Aberdeen. It takes approximately 15 minutes to travel between HCC and the Town of Bel Air via bus. The MTA Commuter Bus Route 410 Churchville-Baltimore also travels along Churchville Road, with the eastern end of the line extending just past HCC. Portions of Churchville Road have bike lanes, but given the speeds and volumes of vehicles, the bike lanes are considered high-stress. There are some sidewalks located along Churchville Road west of Andreas Drive, but the sidewalks are not continuous. There are marked pedestrian crossings on Churchville Road South Hickory Avenue, Moores Mill Road, North Fountain Green Road, Prospect Mill Road, and Thomas Run Road. Primary north/south roadways (listed from west to east) are summarized in **Figure 3**.

EAST COAST GREENWAY (ECG)

The East Coast Greenway (ECG) is a non-profit organization with a bold vision for a 3,000-mile safe route for walking and biking that stretches from Maine to Florida. The route is also called the East Coast Greenway. Currently, the ECG is 35% complete, with approximately 1,050 miles of off-road, protected multi-use paths designated to be included. The remainder of the route, including the portion of the ECG located within Harford County, utilizes the existing road network. The portion of the ECG in the project area is located on Churchville Road, Moores Mill Road, and Conowingo Road as shown on the map in **Figure 1**. The eventual goal is for the entire ECG to feature traffic-separated facilities for people walking and biking. Design standards for the East Coast Greenway are detailed in the East Coast Greenway Design Guide.

The mission of the ECG is to "Partner with local, state, and national agencies and organizations to promote the establishment, stewardship, and public enjoyment of a safe and accessible multi-user greenway linking cities and towns from Maine to Florida." The ECG supports this study, and considers the current ECG alignment an interim route that will shift to new trails and separated facilities as they are constructed, eventually tying into the MA & PA Trail and the Northern Central Railroad (NCR) Trail, as shown in **Figure 4**.

Road	Classification	2021 AADT	Speed Limit	Transit	Bike Facilities	Sidewalks
South Hickory Avenue	Urban Major Collector	7,514	25 mph	Walking distance to Harford LINK routes 1, 2, and 3	On-road, LTS 3-4	Yes, both sides
South Shamrock Road	Urban Minor Collector	2,390	25 mph	N/A	On-road, LTS 3	Yes, both sides
Moores Mill Road	Urban Major Collector	7,790	30 mph	N/A	On-road, LTS 3	Yes, primarily on southbound side
North Fountain Green Road	Urban Minor Arterial	17,844	45 mph	N/A	Shared use path between Amyclae Drive and just east of Eva Mar Blvd and on-road LTS 3-4	No
Prospect Mill Road	Urban Major Collector	6,642	30 mph	N/A	On-road, LTS 4	No
Thomas Run Road	Rural Minor Collector	4,343	30 mph	Harford LINK Route 1 services a portion of Thomas Run Road to access HCC	On-road, LTS 3-4	Short segment on northbound side from MD 22 intersection

FIGURE 3. PRIMARY NORTH/SOUTH ROADWAYS IN PROJECT AREA

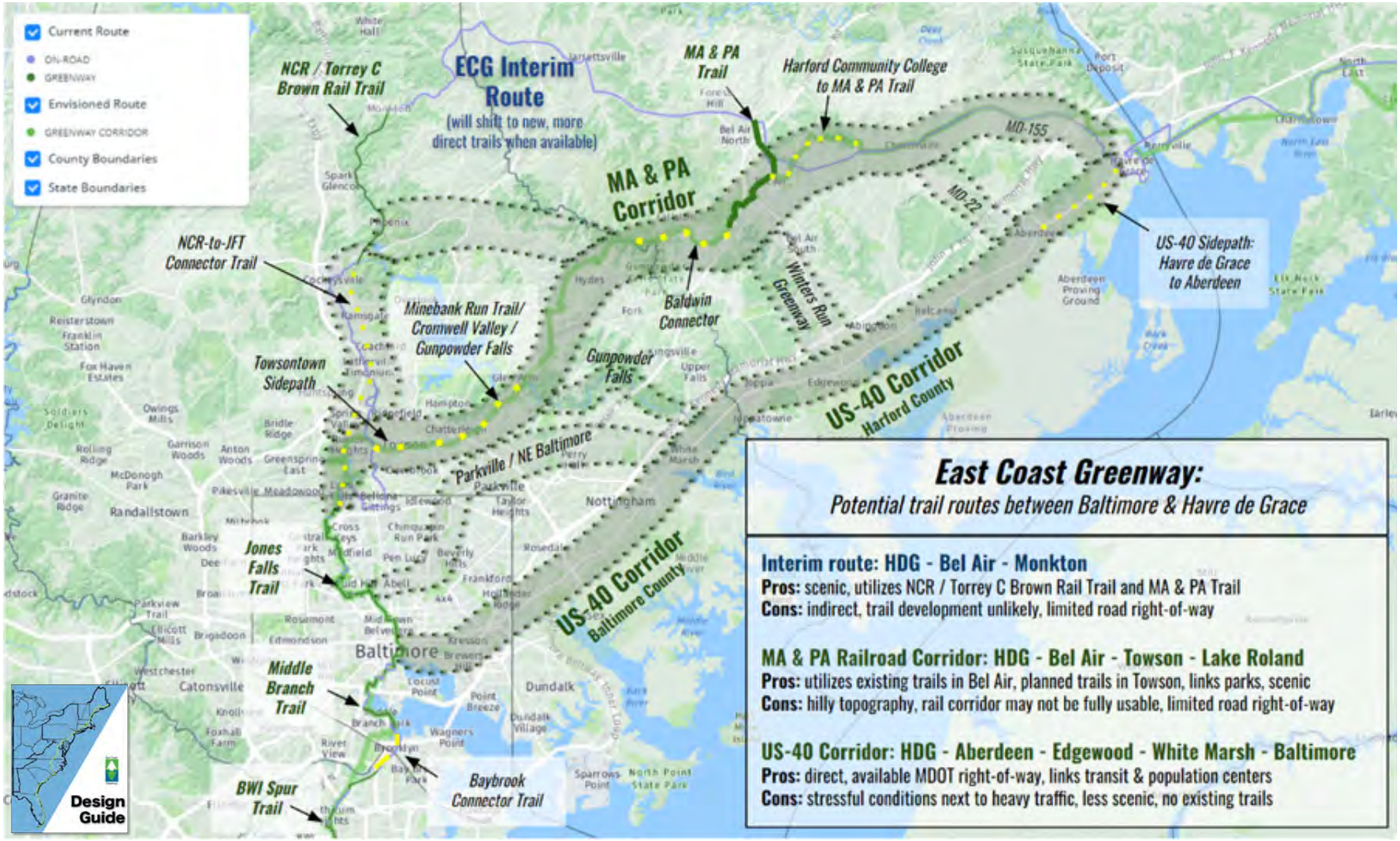


FIGURE 4. EAST COAST GREENWAY, POTENTIAL TRAIL ROUTES BETWEEN BALTIMORE AND HAVRE DE GRACE

Source: East Coast Greenway

WALLS-COOK TRAIL NETWORK

The Walls-Cook Trail is a single-track hiking trail network located in wooded land owned by HCC and bounded by Thomas Run Road in the east and Prospect Mill road in the west. The east side of the trail network can be accessed behind the HCC Observatory or behind the Towson University in Northeastern Maryland Campus, adjacent to Lundy's Lane. The west side of the trail network can be accessed from Prospect Mill Park, near the outfield of the baseball diamond. The trail is approximately one mile in length. Although bikes are allowed to use the trail network, the trails are steep in sections, and feature a rocky dirt surface. There are multiple stream crossings that have foot bridges that do not incorporate ramps on the approach. For these reasons, the trails are not useful to people interested in commuting by bike.

Due to the steep slopes and desire to retain the ecological significance of the area, a 10'-wide crushed gravel recreational trail built to U.S. Access Board standards is recommended to provide access to users from Prospect Park to Thomas Run Road by Towson University property. This option will reduce the impacts to the hillside, forest cover, and natural drainage patterns while provide an accessible route for users. **Figure 5** shows the proposed trail alignment and depicts the slopes and stream crossings along the trail. Pages 24 and 25 provide additional information on the proposed crushed gravel recreational trail and phasing.

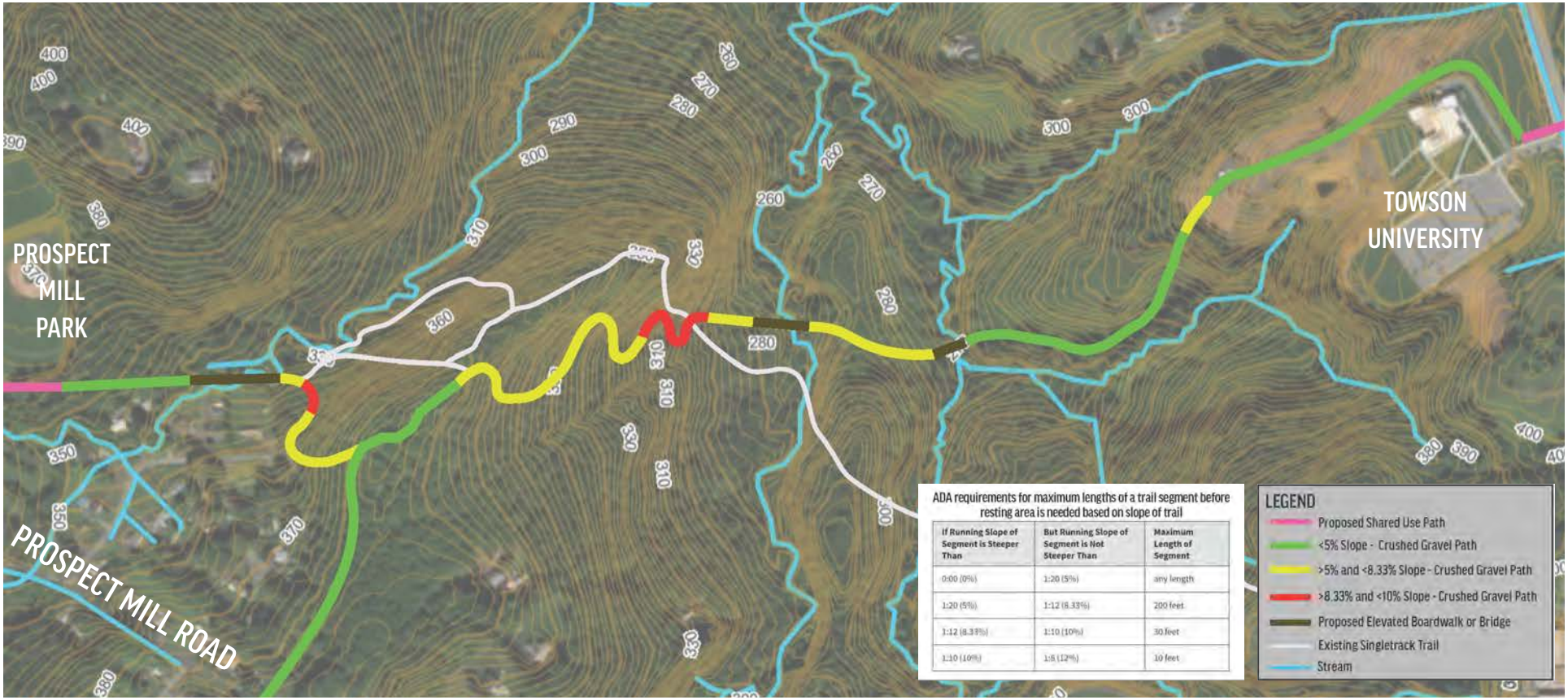


FIGURE 5. PROPOSED HCC WALLS-COOK RECREATIONAL TRAIL ROUTE AND SLOPES

CONSTRAINTS

The constraints and opportunities along each corridor in the study area were evaluated based on the base mapping and field visits. Categories evaluated for the existing conditions documentation included the following:

- Property impacts: shown based on number of properties impacted and linear feet of property impacted by potential improvements
- Overhead utilities: shown based on linear feet of impact
- Other obstructions: including facilities such as fire hyrdants, street lights, or signal poles
- Challenging slopes: shown based on linear feet of challenging slopes or location description
- Stream crossings: number of stream crossings required
- Forest/tree impacts
- Driveway impacts: number of driveways that would be crossed by the proposed facility, and whether driveways are commercial or residential

The constraints for specific corridor segments are documented on the project sheets beginning on page 23.

CORRIDOR ANALYSIS & NETWORK DEVELOPMENT

LEVEL OF TRAFFIC STRESS (LTS) ANALYSIS

Maryland Department of Transportation (MDOT) is transitioning from using Bicycle Level of Comfort (BLOC) to Level of Traffic Stress (LTS) for measuring the "bikeability" of the roadway network. LTS is used in coordination with MDOT State Highway Administration's (SHA) *Context Driven Design Guidelines* and other national and departmental initiatives. LTS is preferred over BLOC because LTS requires fewer variables to calculate. MDOT's LTS methodology is based on the metrics established by Mineta Transportation Institute (MTI) Report 11-19, "Low-Stress Bicycling and Network Connectivity" (May 2012, refined by Dr. Peter G. Furth in June 2017) and on Montgomery County's revised LTS.

Using the methodology outlined in MDOT Level of Traffic Stress Technical Memo (2022) and shown in the bicycle level of traffic stress file and road-separated bike routes file available in Maryland's GIS Data Catalog, the level of traffic stress (LTS) was reviewed for all the streets in the study area vicinity. This methodology uses readily available criteria, including number of lanes, traffic volume, bike lane width, parking lane width, speed limit or prevailing speed, and traffic volume to evaluate the generalized stress levels that bicyclists are expected to experience and assigns a value from 0-5 as shown in **Figure 6**. Zero is the lowest-stress facility, appropriate for riders of all ages and abilities and LTS 4 is the highest-stress facility that only appeals to strong and fearless riders. Bicycle access is prohibited on LTS 5 streets. Documented LTS levels were compared to other datasets and field observations. In some cases, adjustments were made to street segments that were found to be higher in stress than shown in the state's LTS mapping. The LTS for the study area is shown on the map in **Figure 7**.

As indicated by the categorization of LTS levels, different types of bike riders are comfortable on different facility types. According to the FHWA Bikeway Selection Guide, over half of adults with a stated interest in biking have a low stress tolerance and are classified as LTS 2"interested but concerned" as shown in **Figure 8**. These riders are generally not comfortable riding with traffic, but instead prefer traffic-separated facilities like the MA & PA Trail or quite neighborhood streets classified as LTS 0 - LTS 2. Somewhat confident riders (5-9%) are comfortable riding on roads classified LTS 3 and lower. Only a small subset of the biking population (4-7%) classified as "highly confident," have a high stress tolerance and are comfortable riding with traffic on roads classified as LTS 4. For this reason, on-road bike lanes on higher stress roads may go unused by the vast majority of the cycling population, while traffic-separated facilities can be used by all user types, from "interested and concerned" up to "highly confident." The LTS analysis identifies the gaps in the low-stress network to be visualized. By connecting the existing low-stress neighborhood streets with traffic-separated facilities like shared use paths on higher stress roadways, all riders can bicycle throughout the study area safely and comfortably. For the purposes of this analysis, shared use paths (all ages and abilities), LTS 1 (almost everyone), and LTS 2 (interested but concerned) were considered low-stress.

LTS	Target Audience	Bicycle Facility Types
0	All ages and abilities	Rail-trails, shared-use paths
1	Almost everyone	Protected bikeways, sidepaths
2	Interested but concerned	Bike lanes, bike boulevards
3	Enthused and confident	Bike lanes, shared lanes, shoulders
4	Strong and fearless	No bike facility or bike lane on a major roadway
5	Bicycle Access Prohibited	Bicycle access is prohibited by managing roadway agency

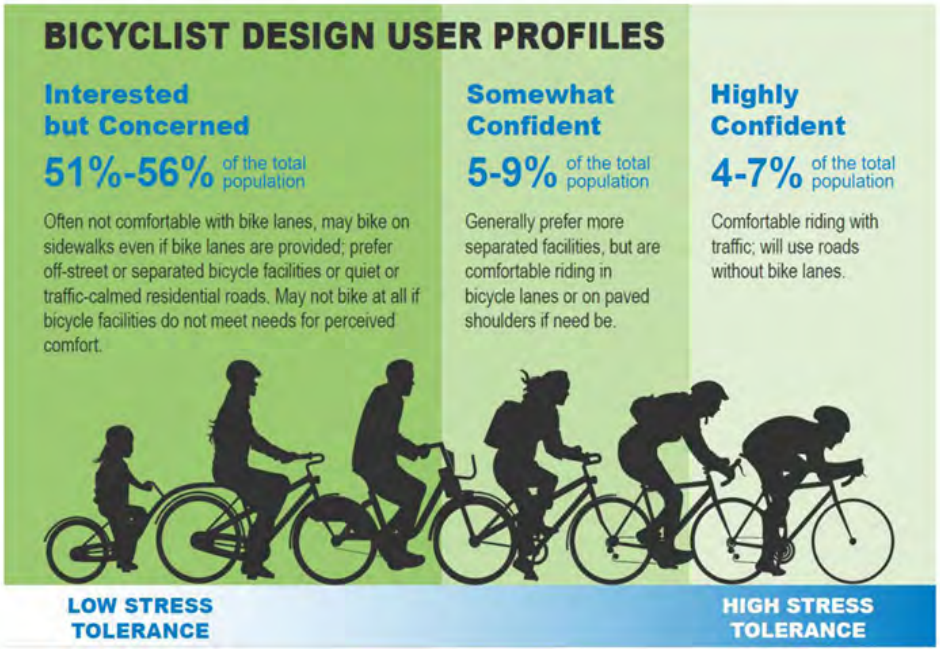
FIGURE 6. MDOT'S LEVEL OF TRAFFIC STRESS RATING

Source: MDOT Level of Traffic Stress Technical Memo, 2022

Note: MDOT's LTS has been updated to reflect LTS 4 for the Bel Air Bypass. Bel Air Bypass is shown as LTS 5 on this map.

FIGURE 7. PROJECT AREA LEVEL OF TRAFFIC STRESS

Source: MDOT bicycle level of traffic stress data



Note: Above percentages reflect only adults who have stated an interest in biking.

FIGURE 8. BICYCLIST DESIGN USER PROFILES

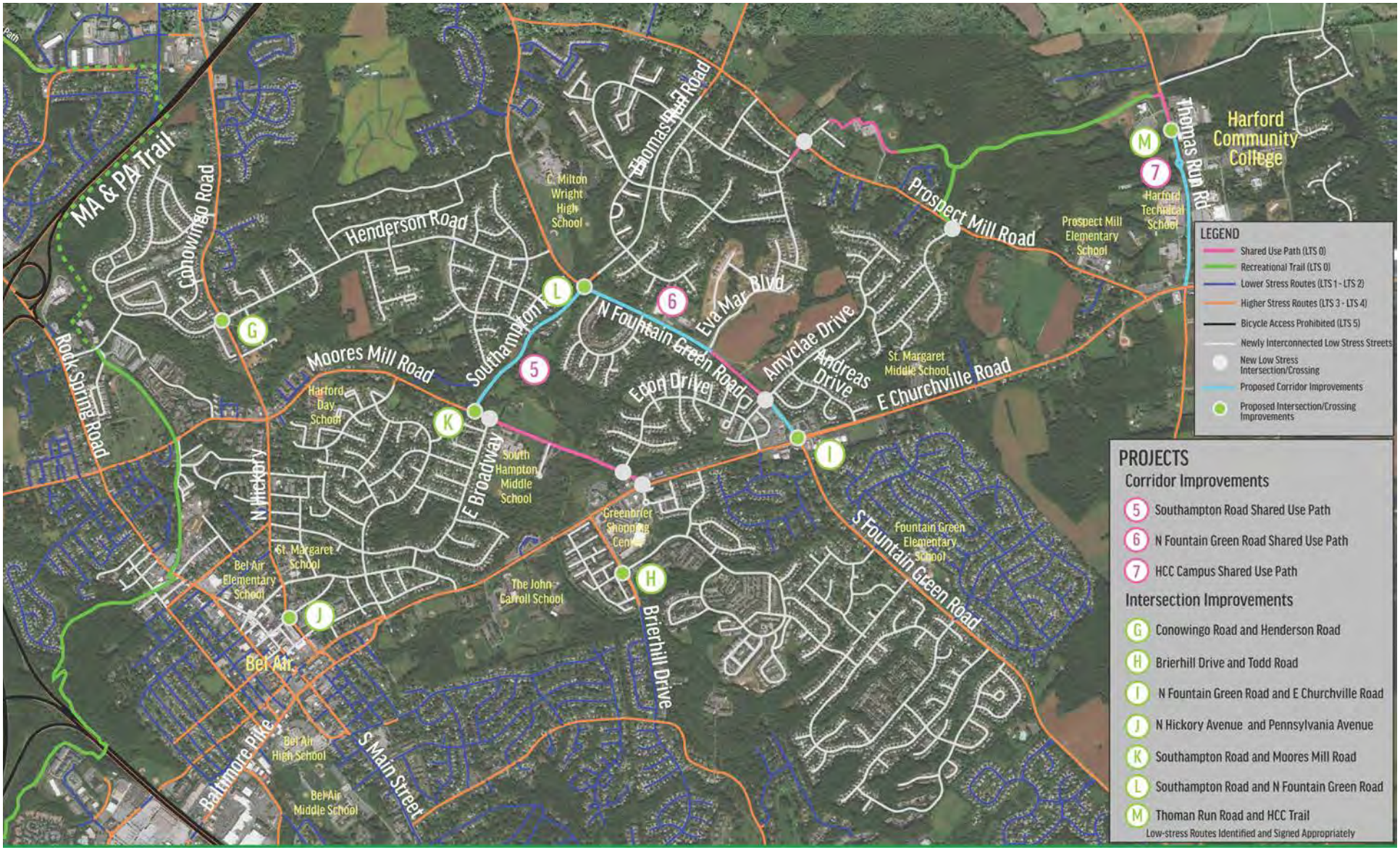
Source: Federal Highway Administration Bikeway Selection Guide (2019)

PROJECT PHASING

In order to have an interconnected low stress bike network in the project area, a number of corridor and intersection improvements will be necessary. Due to limited staff and financial resources, all of these projects cannot be completed at once, but instead must be phased in over time. The proposed project phasing shown in the below map series was based on an analysis of improvements to the low-stress network – projects that connect more residences to the low-stress network and area commercial and institutional destinations were prioritized first.

Note: MDOT's LTS has been updated to reflect LTS 4 for the Bel Air Bypass. Bel Air Bypass is shown as LTS 5 on this map.

FIGURE 9. PHASE 1 PROJECTS: CORRIDOR AND INTERSECTION IMPROVEMENTS



Note: MDOT's LTS has been updated to reflect LTS 4 for the Bel Air Bypass. Bel Air Bypass is shown as LTS 5 on this map.

FIGURE 10. PHASE 2 PROJECTS: CORRIDOR AND INTERSECTION IMPROVEMENTS

Note: MDOT's LTS has been updated to reflect LTS 4 for the Bel Air Bypass. Bel Air Bypass is shown as LTS 5 on this map.

FIGURE 11. PHASE 3 PROJECTS: CORRIDOR AND INTERSECTION IMPROVEMENTS

Note: MDOT's LTS has been updated to reflect LTS 4 for the Bel Air Bypass. Bel Air Bypass is shown as LTS 5 on this map.

FIGURE 12. PHASE 4 PROJECTS: CORRIDOR AND INTERSECTION IMPROVEMENTS

CONCEPT DEVELOPMENT

DESIGN GUIDANCE

The recommended bikeway type was determined based on the *Federal Highway Administration (FHWA) Bikeway Selection Guide, the Maryland Context Driven Design Guide,* and the Maryland *Bicycle Policy & Design Guidelines*.

Bikeway Selection Guide

(2019), Federal Highway Administration

The FHWA guidelines are a resource to help transportation practitioners make appropriate decisions when selecting among different bicycle facilities. The guide addresses the connection between the process for bicycle facility selection and transportation planning. The focus of the recommendations include engineering judgment, design flexibility, documentation, and experimentation.

Context Driven - Access & Mobility For All Users

website (2022), Maryland Department of Transportation State Highway Administration

This website provides planning and design resources and guidelines to practitioners focused on establishing safe and effective multi-modal transportation systems. The *Maryland SHA Context Driven Guide* (2020), included on the website, identifies six "contexts" in Maryland, including urban, suburban, and rural settings. Each setting reflects different land use and development patterns which impact travel choices and traffic safety. The *Context Driven Toolkit* describes specific road and street design elements (i.e., safety countermeasures) that can be used to improve safety. The *Pedestrian Safety Action Plan* (PSAP) includes MDOT efforts working together with communities to improve pedestrian safety.

Bicycle Policy & Design Guidelines

(2015), Maryland State Highway

The purpose of this Bicycle Policy & Design Guidelines is to provide transportation planners and engineers guidance for accommodations to improve bicycling in the state. It recommends criteria for selection of bicycle facilities to develop a consistent statewide approach to bicycle design, including design best practices and accepted national guidelines and standards.

BIKEWAY TYPE SELECTION

The *Bikeway Selection Guide* gives practitioners the information they need to assign a preferred bikeway type that will support "the development of connected, safe, and comfortable bicycle networks that meet the needs of people of all ages and abilities." Data collected for the existing conditions documentation was used to assess the preferred bikeway type for each corridor identified as a critical part of the low-stress bike network. The chart in **Figure 14** from the *Bikeway Selection Guide* has been modified to include local streets based on the volume of vehicles per day and the travel speed. While low-speed, low-volume streets like East Broadway fall in the "shared lane or bike boulevard" category, the majority of roadways in the study area require a separated bike facility such as a "separated bike lane or shared use path."

Maryland's *Context Driven Guidelines* provides additional guidance on whether a separated bike lane or shared use path is the appropriate bicycle treatment for Harford County. The majority of the project area is "Suburban," which is described as follows:

> With a moderate to low diversity of uses, the suburban context typically contains primarily single-family residential development on lot sizes ranging from one-eighth of an acre to one acre. Office parks and small commercial strip retail are scattered throughout the area, along with neighborhood-level civic and cultural facilities. Developments are typically larger in area and single-use, discouraging non-automobile trips. Buildings are primarily oriented toward parking, which is usually provided off-street.

Below are some key design treatments and Maryland safety statistics for the Suburban context:

- **Shared-use path/side path**: reduces on-street bicycle crashes by 37%
- **Median refuge**: reduces pedestrian crashes by up to 56%
- **Roundabout**: reduces total crashes by 37% and injury crashes by 51%
- **Continental crosswalk striping**: promotes the highest driver compliance and is the most visible of all crosswalk markings

Additional design guidance for shared use paths is provided on next page.

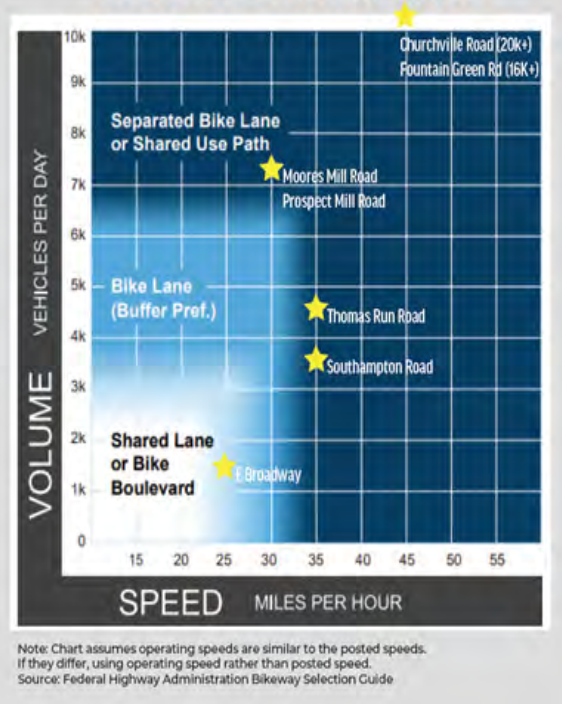


FIGURE 13. MODIFIED BIKEWAY SELECTION GUIDE CHART AND BIKEWAY TYPES

Source: Federal Highway Administration Bikeway Selection Guide (2019)

SHARED USE PATH STANDARDS

Shared use paths are physically separated from motorized vehicular traffic by an open space buffer or barrier and are typically located within the public right-of-way. A five-foot buffer is preferred between the edge of the shared use path and the street in order to accommodate necessary road signage, and increase the separation between path users and moving motor vehicle traffic. Shared use paths are designed for transportation, and must meet ADA standards for bicyclists and pedestrians. Shared use paths are 10-feet wide, except at pinch points where they can be as narrow as 8-feet wide. They can be made out of asphalt or concrete. Asphalt is generally the material used for shared use paths in the Harford County, including parts of the MA & PA Trail and the existing shared use path along North Fountain Green Road. Since asphalt does not use joints it is much smoother to bike on. However, up front installation costs for concrete are higher, but properly maintained concrete will last about three times longer than asphalt.

RECREATIONAL TRAIL STANDARDS

Recreational trails typically do not run not parallel to the road and are designed primarily for recreational purposes. Recreational trails can be planned according to U.S Access Board trail standards to provide an accessible option for pedestrians and bicycles through challenging terrain while limiting the impacts to the existing hillside, forest, and drainage. Recreational trails improvements should include:

- Widening the existing path to a 10’-wide crushed gravel path
- Maintaining a slope of <10% for the path
- Adjusting the current path alignment, where needed, to reduce path slope to <10%
- Installing an elevated boardwalk or bridge over stream crossings and frequently wet areas
- Providing path connections to existing trails and proposed shared use paths
- Providing a new path connection to the Prospect Mill Road roundabout

Source: www.montgomerycountymd.gov

Example of 10'-wide asphalt shared use path with grass buffer and curb

Source: Unknown

Example of trail bridge over stream for shared use path or recreational trail

Source: www.greenway.org

Example of recreational trail elevated boardwalk section

Source: www.visitmaryland.org

Example of crushed gravel recreational trail

FIGURE 14. SHARED USE PATH AND RECREATIONAL TRAIL TREATMENTS PHOTOS

PROPOSED CORRIDOR AND INTERSECTION TREATMENTS

Beginning on page 23, an overview of the proposed treatments for each identified project are highlighted in the phasing maps. Potential constraints, challenges, and calculations including a high-level design and construction cost estimate have been provided for each of the shared use path and recreational trail segments (cost estimate does not include intersection recommendations). Proposed typical sections are provided for each shared use path segment. Recommendations and high-level concepts are provided for each of the intersection improvements highlighted as part of this study.

Note: MDOT's LTS has been updated to reflect LTS 4 for the Bel Air Bypass. The Bypass is shown as LTS 5 on this map.

FIGURE 15. ALL PHASED IMPROVEMENTS

MOORES MILL ROAD SHARED USE PATH

E Churchville Road to E Broadway

PHASE: 1
ID: 1

This segment, approximately 3,200 linear feet, can either follow the south side of Moores Mill Road or a combination of either sides of Moores Mill Road from East Broadway to East Churchville Road. The proposed development on the large parcel north of Moores Mill Road includes an asphalt path that could be used for 900 to 1,500 linear feet of the path (ID: C) and roundabout crossing improvements (ID: K). A shared use path on the north side of Moores Mill Road would require a mid-block crossing at or before Dawes Court due to right-of-way constraints. A shared use path east of Dawes Court requires two stream crossings and the replacement of the existing 5' sidewalk with a shared use path. A mid-block crossing exists 290' west of Econ Drive that would be included in the intersection improvements of Econ Drive (ID: B). The shared use path continues on the north side of Moores Mill Road to the intersection improvements at East Churchville Road (ID: A).

Engineering Calculations & Constraints

JURISDICTION: Harford County Department of Public Works, Division of Highways

RESPONSIBLE AGENCIES: Harford County Department of Public Works, Division of Highways

LENGTH: 3,200 LF (0.68 Mile)

HIGH-LEVEL DESIGN AND CONSTRUCTION COST: $4,000,000

IMPLEMENTATION: Moderate

PRIVATE PROPERTY IMPACTS: Yes; potentially 5

UTILITIES: Overhead utilities east of mid-block crossing; fire hydrants

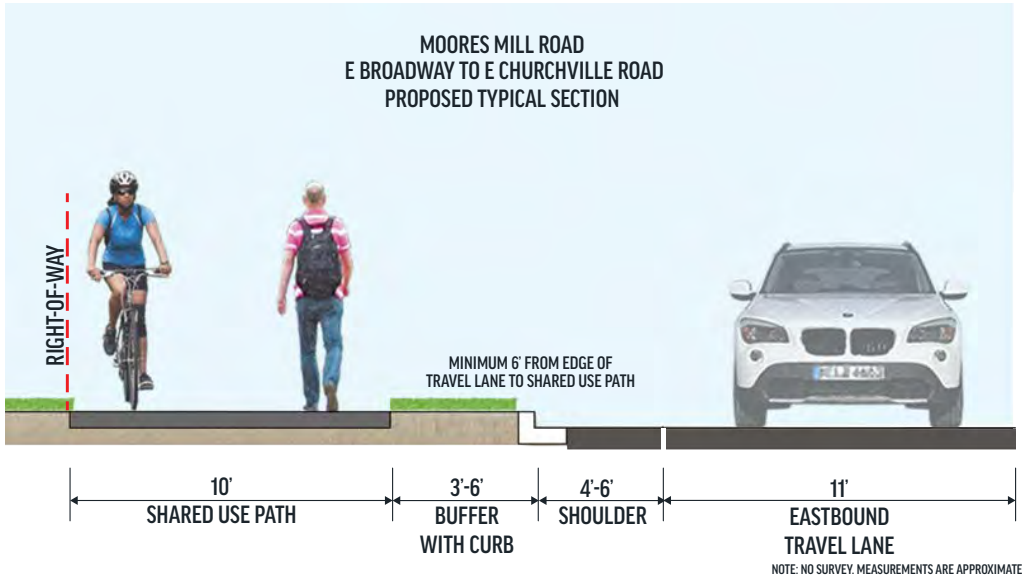
INFRASTRUCTURE: Drainage pipes/swales; two bridges

TREE/FOREST IMPACTS: Minimal

CHALLENGING SLOPES: N/A

STREAM CROSSINGS: 2 - has existing 5' sidewalk; environmental impacts

OTHER: May require 2 mid-block crossings; traffic study recommended



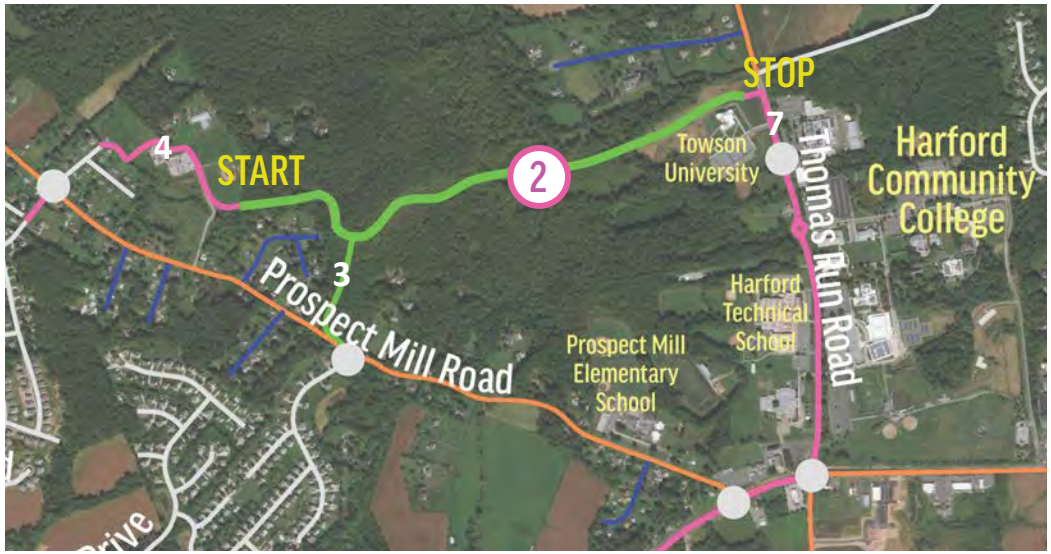
Typical Section for Moores Mill Road Shared Use Path

HCC WALLS-COOK RECREATIONAL TRAIL

Prospect Mill Park to Thomas Run Road

PHASE: 1
ID: 2

This segment is a proposed recreational trail through a wooded area on a property owned by Harford Community College. A 10'-wide crushed gravel recreational trail following the trail guidelines provided by the U.S Access Board to minimize impacts to the forest, slope, and drainage areas. The path connects the Prospect Mill Park shared use path (ID: 4) and to the Phase 2 HCC Campus shared use path on Thomas Run Road (ID: 7). Additionally, this trail provides a connection to Prospect Mill Road roundabout (ID: 3). The trail will also provide connections to the existing trail system on the property. Refer to **Figure 5** for more details on the trails route, slopes, and connections.



Engineering Calculations & Constraints

JURISDICTION: Harford County College

RESPONSIBLE AGENCIES: To be determined

LENGTH: 6,350 LF (1.20 Miles)

HIGH-LEVEL DESIGN AND CONSTRUCTION COST: $10,000,000

IMPLEMENTATION: Challenging

PRIVATE PROPERTY IMPACTS: Yes; HCC property

UTILITIES: None observed

INFRASTRUCTURE: Existing foot bridges

TREE/FOREST IMPACTS: Moderate to Severe

CHALLENGING SLOPES: Yes (see Figure 5)

STREAM CROSSINGS: Yes; multiple

OTHER: Will require multiple bridges/elevated boardwalks

Crushed Gravel Path Example for HCC Recreational Trail

HCC WALLS-COOK RECREATIONAL TRAIL CONNECTION TO ROUNDABOUT

HCC Trail to Prospect Mill Road Roundabout

PHASE: 1
ID: 3

This segment's path connects the HCC Walls-Cook Recreational Trail (ID: 2) to the roundabout on Prospect Mill Road with a connection to Wagner Farm Road. This path provides a connection to a low-stress network and adjacent neighborhoods. The proposed path is 1,350' gravel path through the wooded area on the top of a ridge and transitions to a 250'-long, 10'-wide asphalt shared use path along Prospect Mill Road to a roundabout crossing (ID: F).

Engineering Calculations & Constraints

JURISDICTION: Harford Community College

RESPONSIBLE AGENCIES: To be determined

LENGTH: 1,600 LF (0.30 Mile)

HIGH-LEVEL DESIGN AND CONSTRUCTION COST: $2,000,000

IMPLEMENTATION: Moderate

PRIVATE PROPERTY IMPACTS: Yes; potentially 4

UTILITIES: Overhead utilities along Prospect Mill Road

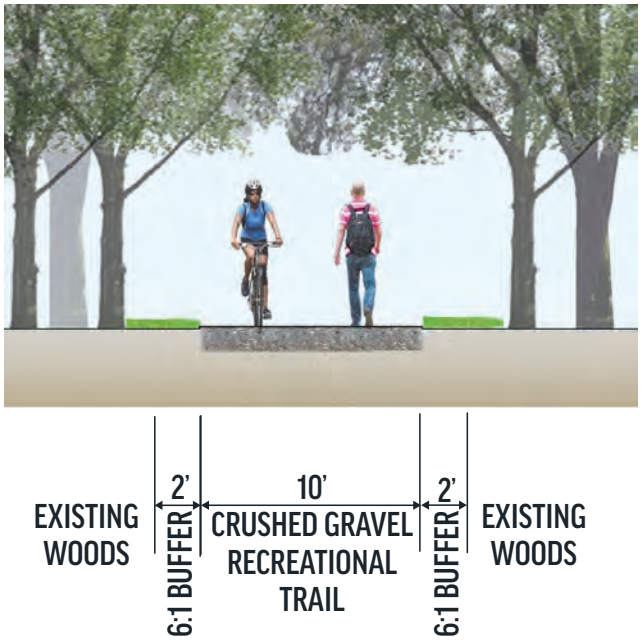
INFRASTRUCTURE: None observed

TREE/FOREST IMPACTS: Moderate to Severe

CHALLENGING SLOPES: Prospect Mill Road to roundabout; approx. 350'

STREAM CROSSINGS: None

OTHER: N/A



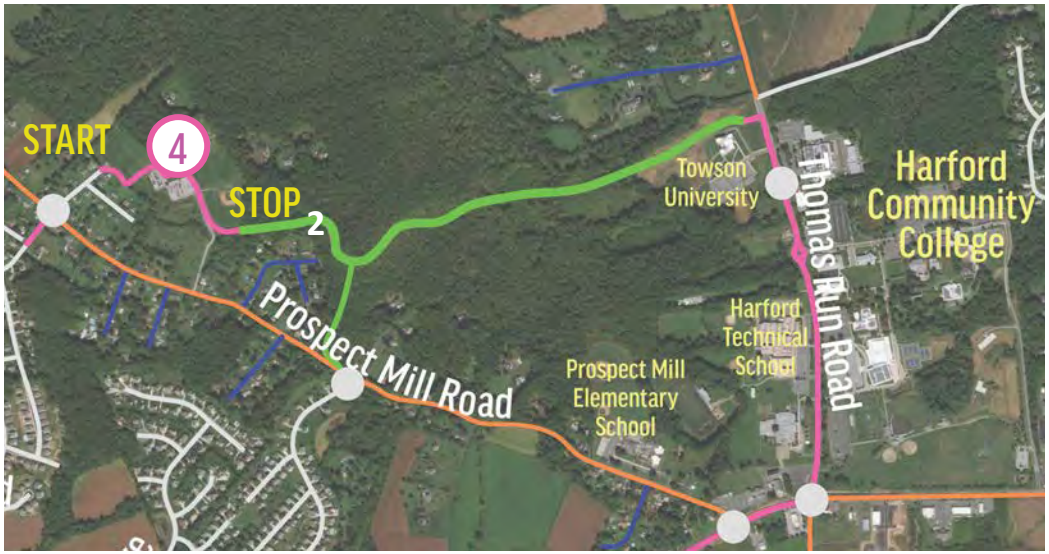
Typical Section for Recreational Trail to Prospect Mill Road

PROSPECT MILL PARK SHARED USE PATH

Mark Street to HCC Wall-Cook Recreational Trail

PHASE: 1
ID: 4

This segment's path connects from the low-stress street, Mark Street, through Prospect Mill Park to the HCC Walls-Cook Recreational Trail and trail system. The path upgrades the existing gravel path to a 10'-wide asphalt path and extends around the parking lot on the north side. The path continues past the existing baseball field before connecting to the HCC Walls-Cook Recreational Trail (ID: 2).



Engineering Calculations & Constraints

JURISDICTION: Harford County Parks & Recreation

RESPONSIBLE AGENCIES: Harford County Parks & Recreation

LENGTH: 1,900 LF (0.36 Mile)

HIGH-LEVEL DESIGN AND CONSTRUCTION COST: $750,000

IMPLEMENTATION: Easy

PRIVATE PROPERTY IMPACTS: N/A

UTILITIES: None observed

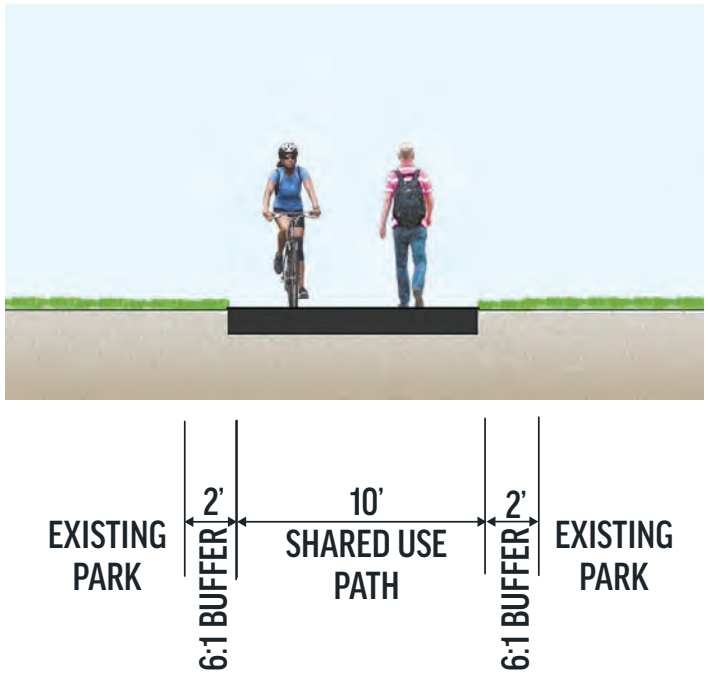
INFRASTRUCTURE: Potential drainage swales

TREE/FOREST IMPACTS: None to Minimal

CHALLENGING SLOPES: Between Park Road and baseball field; 350'

STREAM CROSSINGS: None

OTHER: Provide path connection to parking lot sidewalks

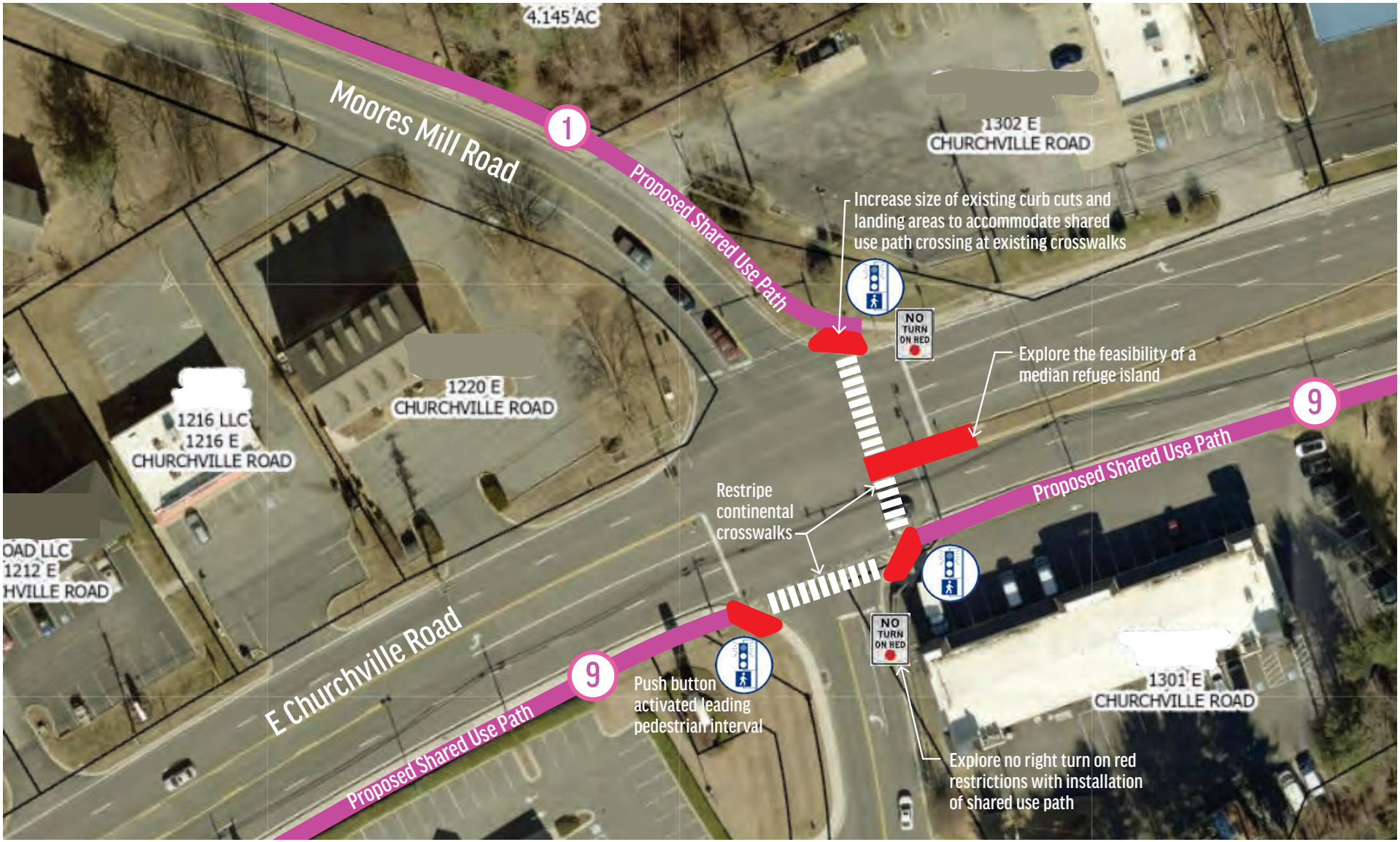


Typical Section for Prospect Mill Park Shared Use Path

MOORES MILL ROAD AND E CHURCHVILLE ROAD INTERSECTION IMPROVEMENTS

PHASE: 1
ID: A

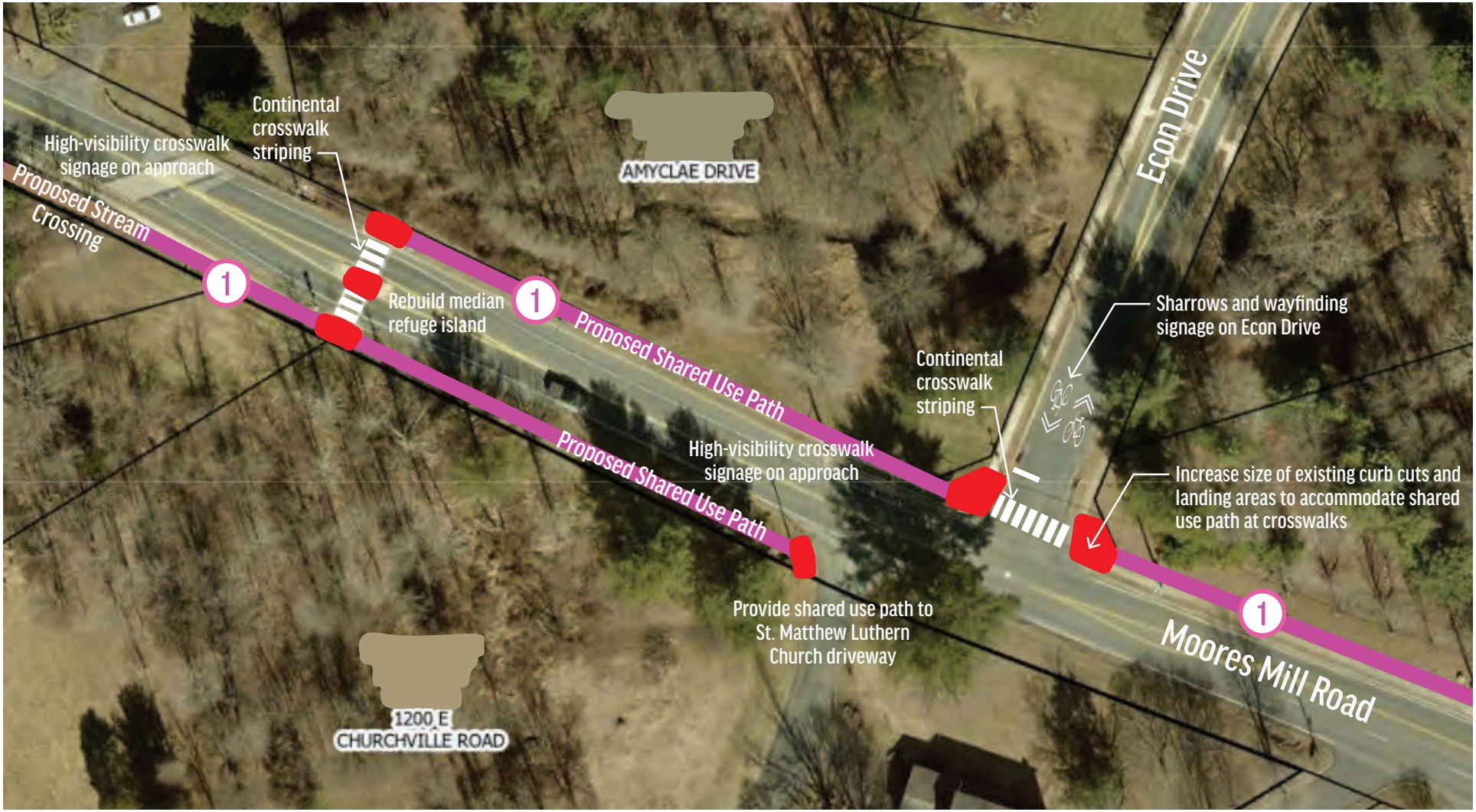
Recommendations include increasing the size of the curb cuts and landing areas at crosswalks to accommodate the shared use path and ADA compliance, exploring the reduction of crossing widths by use of a median refuge island, and recommending corner radii consistent with control vehicle recommendations that meet the *Context Driven Guide* standards. Additional recommendations include exploring a no right turn on red restriction with the installation of shared use path, restriping continental crosswalks, and push-button activated leading pedestrian interval (LPI).



MOORES MILL ROAD AND ECON DRIVE INTERSECTION IMPROVEMENTS

PHASE: 1
ID: B

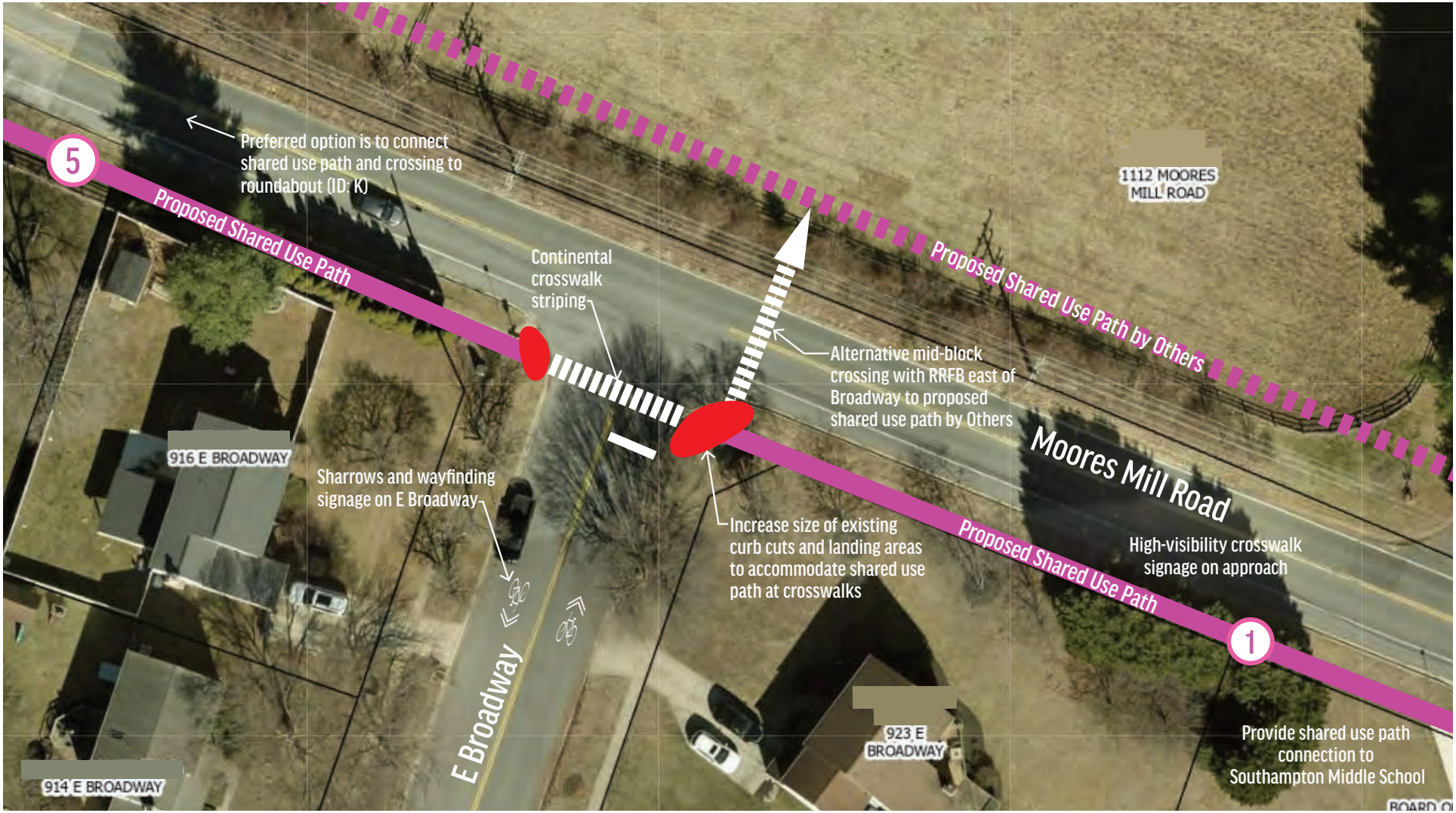
Recommendations include increasing the size of the curb ramps to accommodate the shared use path and ADA compliance, upgrading the existing mid-block crossing west of Econ Drive to shared use path standards, and installing continental crosswalk striping at both crossings. Provide shared use path connection to entrance drive to St. Matthew Luthern Church. Additional recommendations include adding sharrows and wayfinding signage on Econ Drive and high-visibility crosswalk signage that are consistent with Maryland MUTCD standards on the approach to mid-block crossing.



MOORES MILL ROAD AND EAST BROADWAY INTERSECTION IMPROVEMENTS

PHASE: 1
ID: C

Recommendations include increasing the size of the curb cuts and landing areas at crosswalks to accommodate the shared use path and ADA compliance, installing continental crosswalk striping, and sharrows with wayfinding signage on East Broadway. The preferred crossing option is to connect the shared use path to the roundabout (ID: K). Alternatively, a mid-block crossing with Rapid Rectangular Flashing Beacon (RRFB) could be installed east of East Broadway to provide a connection to the proposed shared use path by others. Install high-visibility crosswalk signage that are consistent with Maryland MUTCD standards on the approach of all crossings. A shared use path connection should be provided to Southampton Middle School.



NORTH FOUNTAIN GREEN ROAD AND AMYCLAE DRIVE INTERSECTION IMPROVEMENTS

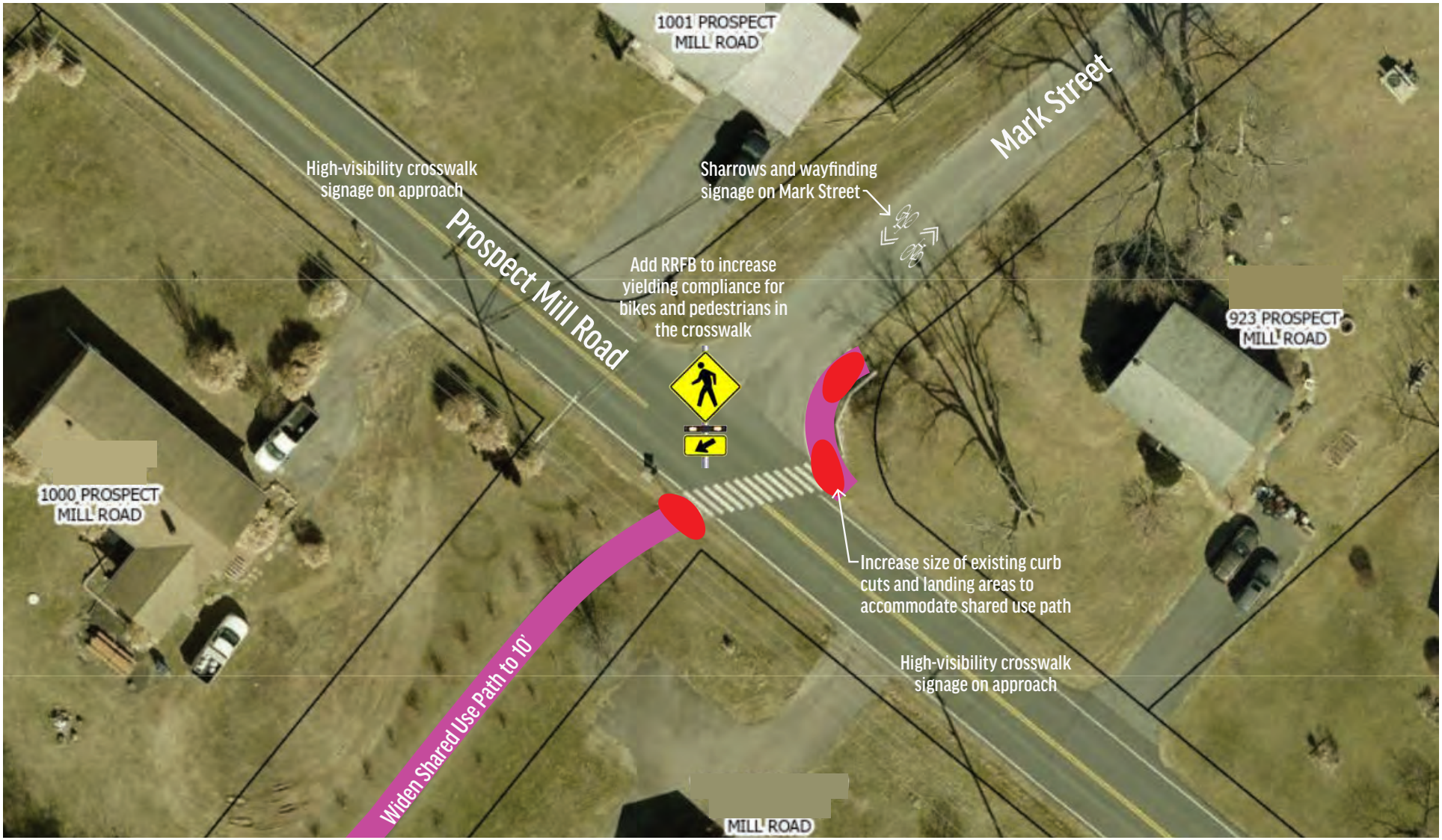
PHASE: 1
ID: D

The most significant recommendation for this intersection improvement is to conduct a feasibility study to explore signalizing the intersection to improve safety for vulnerable users. Speeds, traffic volumes, and crossing distance on North Fountain Green Road are safety concerns for any recommendation other than a signal. Additional recommendations to accommodate the shared use path include curb ramp upgrades, continental crosswalk striping at all crossings, sharrows and wayfinding signage on Amyclae Drive, push-button activated LPIs, and high-visibility crosswalk signage that are consistent with Maryland MUTCD standards on the approach to all crossings.

PROSPECT MILL ROAD AND MARK STREET INTERSECTION IMPROVEMENTS

PHASE: 1
ID: E

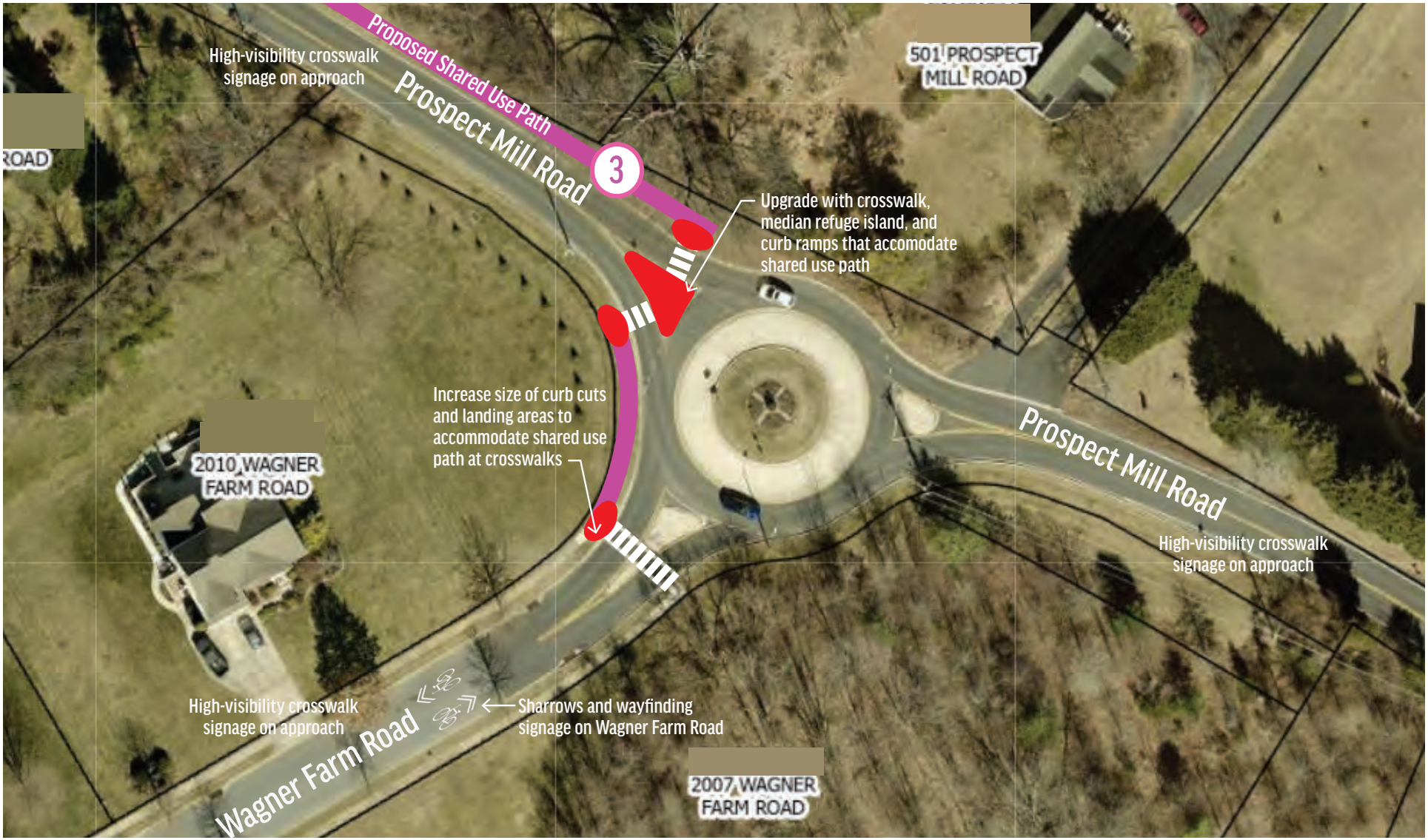
Recommendations include installing a RRFB to increase vehicle yielding compliance for bicycles and pedestrians, increasing the size of the curb ramps to accommodate a shared use path, and widening the existing walkway south of Prospect Mill Road to 10'. Additional recommendations include adding sharrows and wayfinding signage on Mark Street and high-visibility crosswalk signage that is consistent with Maryland MUTCD standards on the approach to the mid-block crossing.



TRAIL CONNECTION AND PROSPECT MILL ROUNDABOUT IMPROVEMENTS

PHASE: 1
ID: F

Recommendations include retrofitting the roundabout to allow for crosswalk and curb ramps over Paper Mill Road, increasing the size of the curb ramps to accommodate the shared use path and ADA compliance, and to install continental crosswalk striping at both crossings. Additional recommendations include adding sharrows and wayfinding signage on Wagner Farm Road and high-visibility crosswalk signage that is consistent with Maryland MUTCD standards on the approach to all crossings.



SOUTHAMPTON ROAD SHARED USE PATH

Moores Mill Road to N Fountain Green Road

PHASE: 2
ID: 5

This segment begins at the Moores Mill Road roundabout improvements (ID: K). The path may potentially connect into the future development that includes a path and crossing northeast of the roundabout. The proposed 10'-wide shared use path will run along the west side of Southampton Road and replace the existing sidewalk to Runnymede Lane. Where right-of-way allows, provide a 6' buffer from the edge of travel lane. The shared use path crosses Bynum Run and will require a new stream crossing. North of Bynum Run, the alignment of the shared use path should not impact the overhead utilities or fire hydrant. Minimize or mitigate impacted development plantings and provide a new crossing at Runnymede Lane. Provide a second stream crossing prior to the intersection. This segment ends at the Southampton Road and North Fountain Green Road intersection improvements (ID: L).

Engineering Calculations & Constraints

JURISDICTION: Harford County Department of Public Works, Division of Highways

RESPONSIBLE AGENCIES: Harford County Department of Public Works, Division of Highways

LENGTH: 3,200 LF (0.68 Mile)

HIGH-LEVEL DESIGN AND CONSTRUCTION COST: $4,500,000

IMPLEMENTATION: Moderate

PRIVATE PROPERTY IMPACTS: Yes; HOA

UTILITIES: Overhead utilities, fire hydrant, lamp post

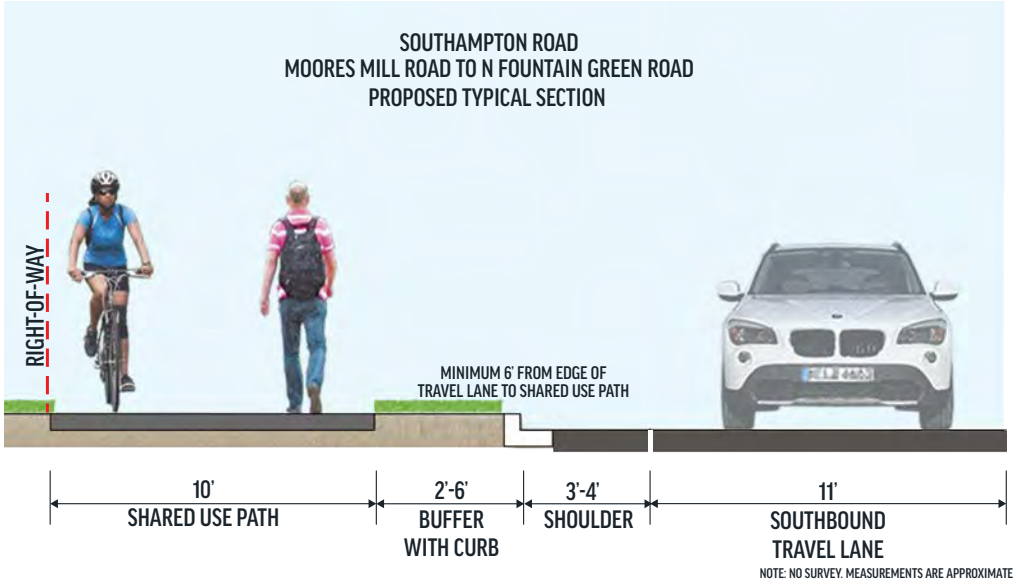
INFRASTRUCTURE: Existing sidewalk (1,950'), curb and drainage inlets

TREE/FOREST IMPACTS: Minimal to Moderate

CHALLENGING SLOPES: Approximately 200' near stream crossings

STREAM CROSSINGS: Two

OTHER: Unsignalized crossings; impacts to development plantings



Typical Section for Southampton Road Shared Use Path

N FOUNTAIN GREEN ROAD SHARED USE PATH

Southampton Road to E Churchville Road

PHASE: 2
ID: 6

This segment begins at the Southampton Road and North Fountain Green Road intersection improvements (ID:L). Although both sides of the road are feasible for a path, the south side was prioritized for the 10'-wide shared use path because of available right-of-way, fewer driveway impacts, and absence of overhead utilities. Slopes are the main constraint. The south side provides a connection to adjacent neighborhoods. There is one stream crossing that will require a culvert extension. The path crosses North Fountain Green Road prior to Sparta Court at a signalized intersection. The path continues on the existing shared use path for 1,350' toward Amyclae Drive. It is also recommended to provide a connection to Econ Drive and Amyclae Drive intersection improvements (ID: D). The path to the East Churchville Road intersection (ID:I) has major constraints on both sides. The north side has overhead utilities and the south side has challenging slopes. Potential to reduce roadway width to provide space for the path.

Engineering Calculations & Constraints

JURISDICTION: MDOT State Highway Administration

RESPONSIBLE AGENCIES: To be determined

LENGTH: 5,100 LF (1,350 LF existing) (0.97 mile)

HIGH-LEVEL DESIGN AND CONSTRUCTION COST: $2,500,000

IMPLEMENTATION: Moderate to Amyclae Dr; Challenging to E Churchville

PRIVATE PROPERTY IMPACTS: Yes; HOA and parcel at E Churchville Road

UTILITIES: Overhead utilities, fire hydrant

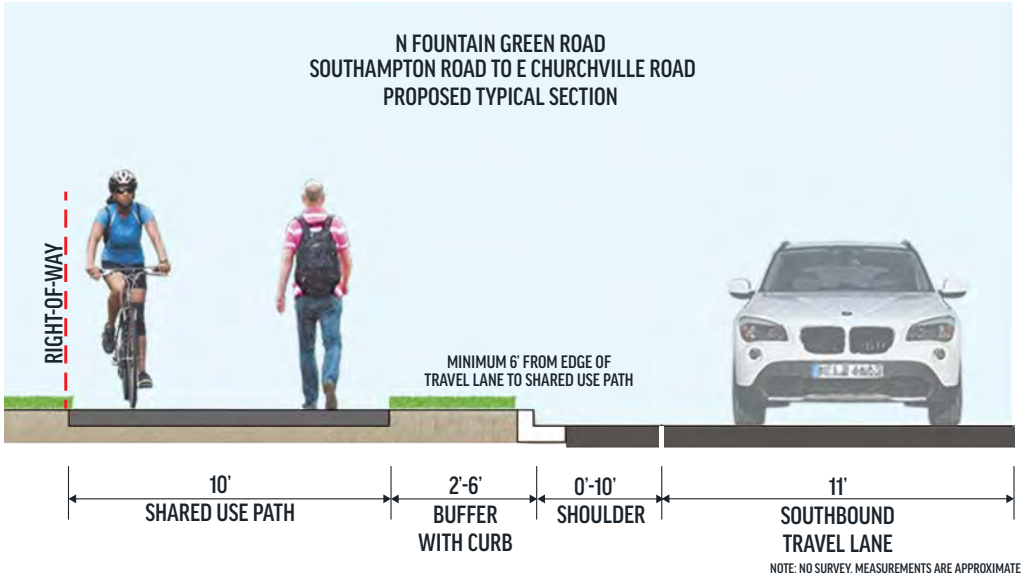
INFRASTRUCTURE: Existing sidewalk, guardrail

TREE/FOREST IMPACTS: None to Minimal

CHALLENGING SLOPES: Between Amyclae Drive and E Churchville Road

STREAM CROSSINGS: One - potential culvert extension

OTHER: Challenging slopes east of Crescent Knoll Drive



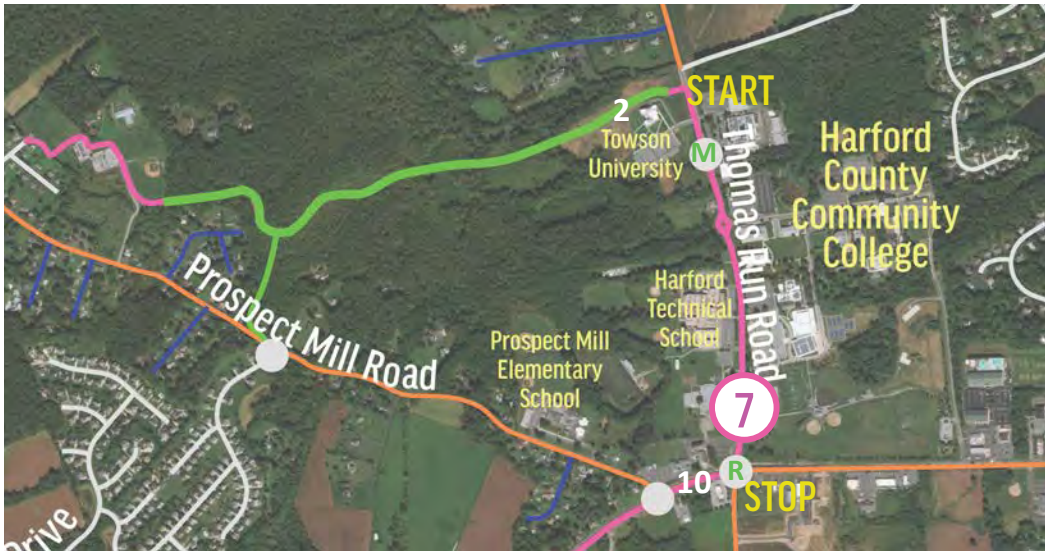
Typical Section for N Fountain Green Road Shared Use Path

HCC CAMPUS SHARED USE PATH

HCC Walls-Cook Recreational Trail to E Churchville Road

PHASE: 2
ID: 7

This segment connects the proposed HCC Trail (ID: 2) to the East Churchville Road intersection improvements (ID: R) and shared use path (ID: 10) via a 10'-wide shared use path to the east of Thomas Run Road. This section would require collaboration between Harford County and Harford Community College because the shared use path would primarily fall on Harford Community College property. It is also recommended that the shared use path provide connections to destinations on the campus and improve the connection to the technical school across the street. The shared use path will cross seven roadways leading to the campus, including a roundabout with an existing crossing. The main constraints are the roadside drainage swales and overhead utilities near the roundabout. Available open space exists on the campus property beyond these constraints and may allow for easier path design and construction.



Engineering Calculations & Constraints

JURISDICTION: Harford County & Harford County Community College

RESPONSIBLE AGENCIES: Harford County & Harford County Community College

LENGTH: 3,040 LF (0.57 Mile)

HIGH-LEVEL DESIGN AND CONSTRUCTION COST: $2,500,000

IMPLEMENTATION: Easy

PRIVATE PROPERTY IMPACTS: Yes; HCC property

UTILITIES: Overhead utilities, above and below-ground utilities

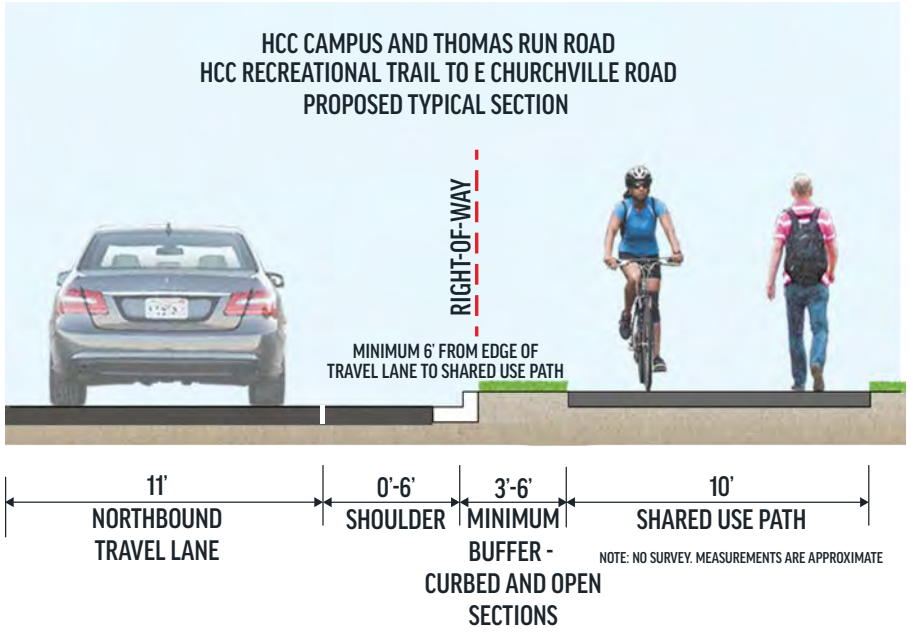
INFRASTRUCTURE: Some curbed sections and drainage swales

TREE/FOREST IMPACTS: Minimal; specimen trees

CHALLENGING SLOPES: Roadside drainage swales

STREAM CROSSINGS: None

OTHER: Provide connections to college buildings and technical school

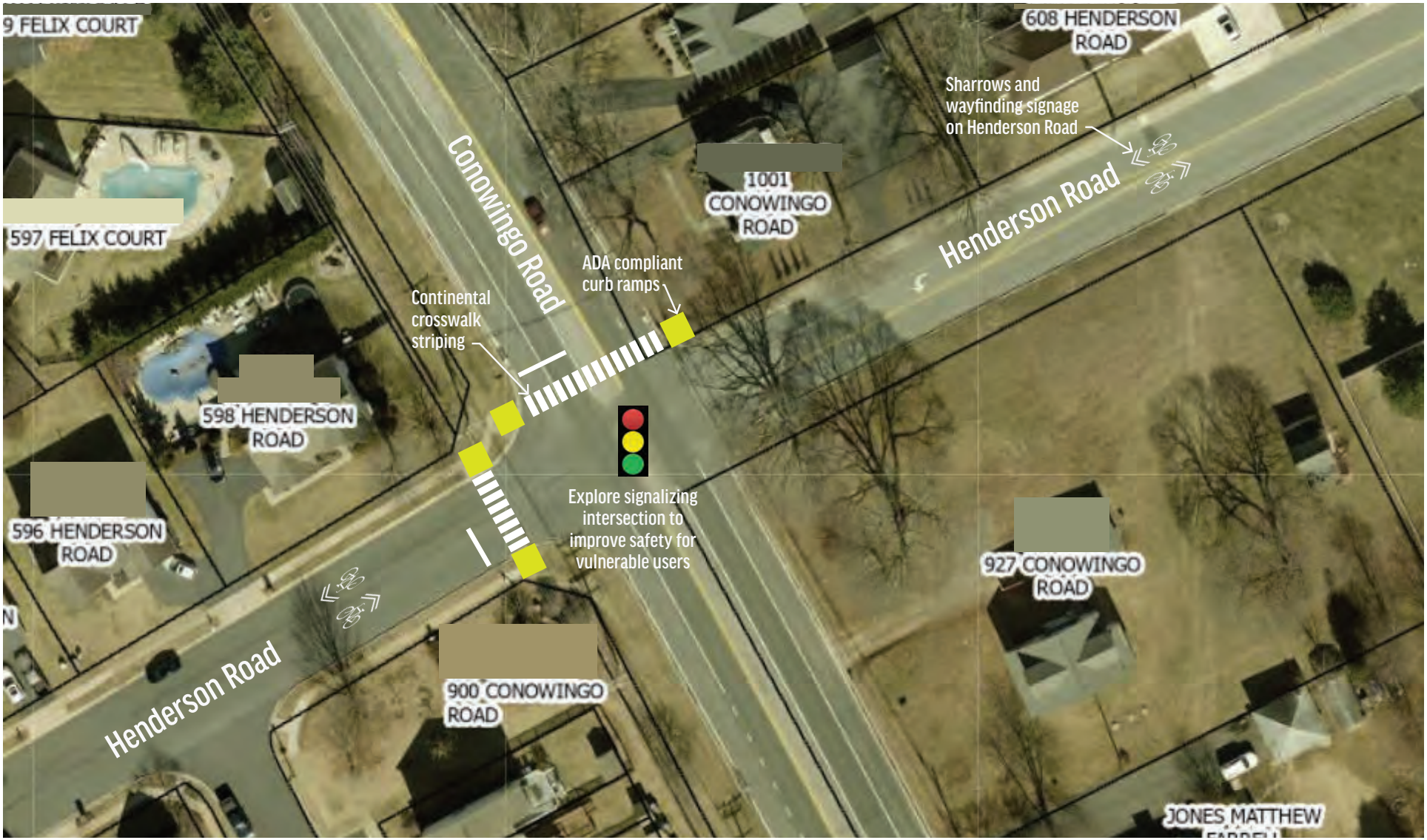


Typical Section for HCC Campus Shared Use Path

CONOWINGO ROAD AND HENDERSON ROAD INTERSECTION IMPROVEMENTS

PHASE: 2
ID: G

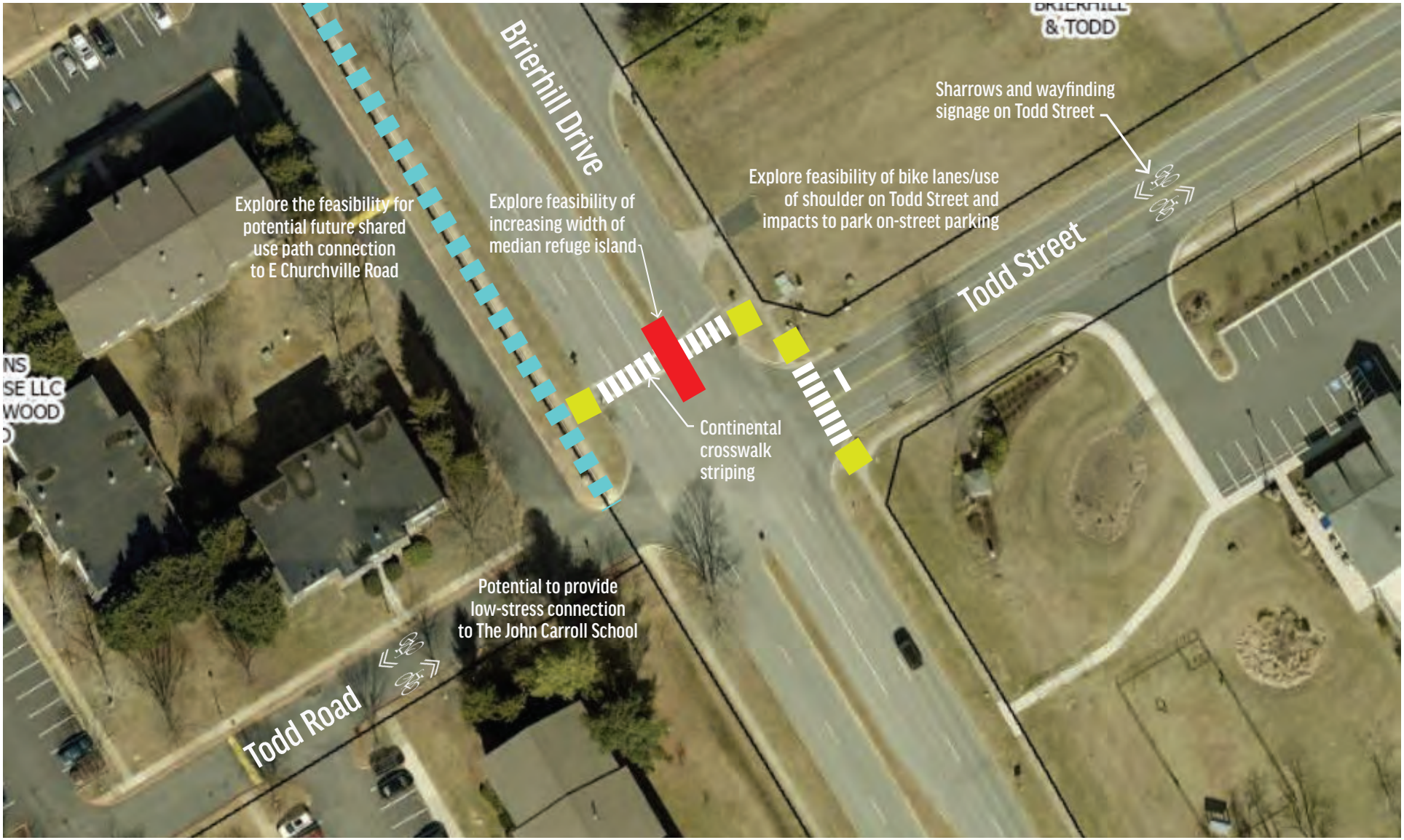
It is recommended to conduct feasibility study to explore signalizing the intersection to improve safety for vulnerable users. Recommendations include installing continental crosswalk striping, retrofitting curb ramps to meet ADA standards, and adding sharrows with wayfinding signage on Henderson Street.



BRIERHILL ROAD AND TODD ROAD INTERSECTION IMPROVEMENTS

PHASE: 2
ID: H

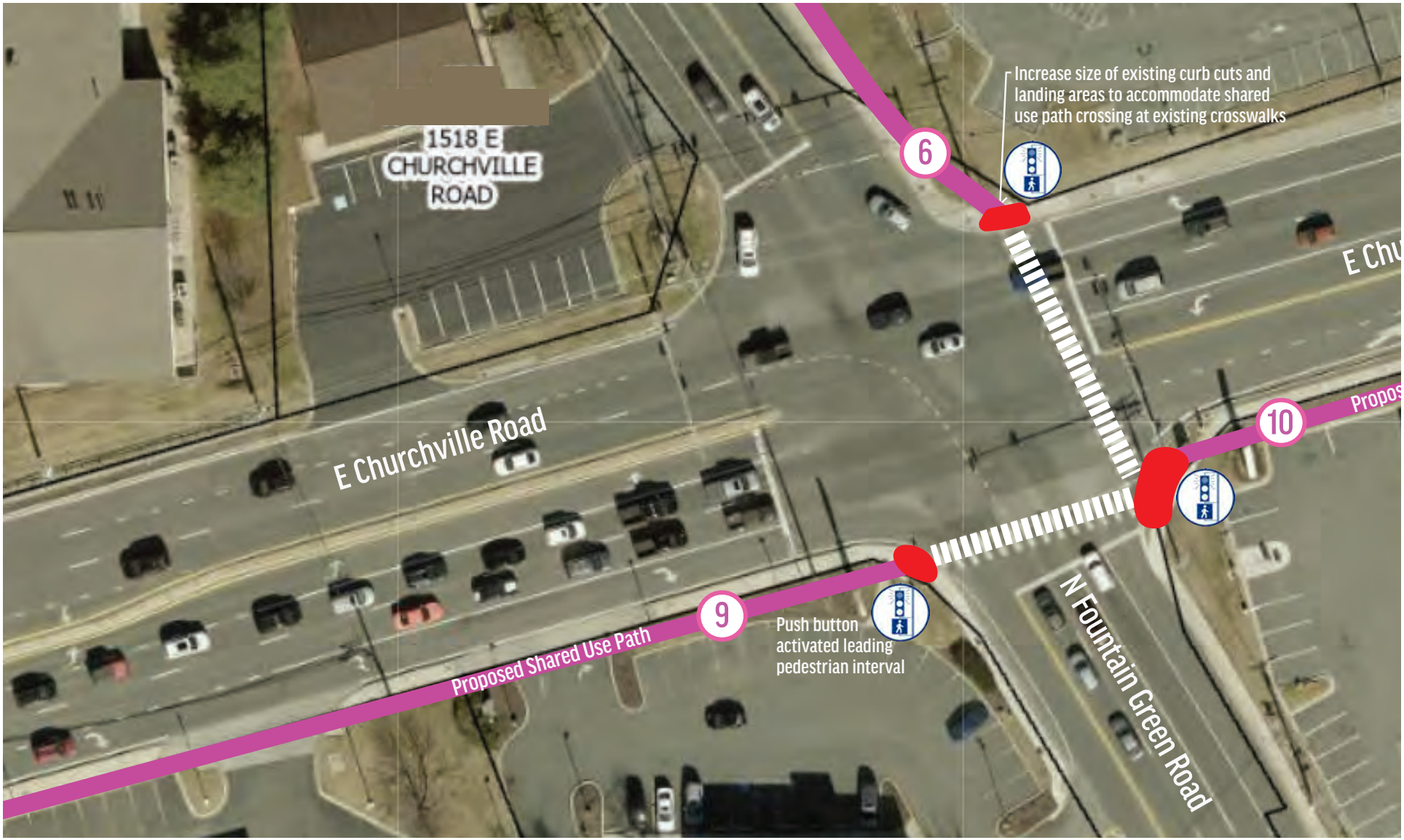
Recommendations at this intersection include exploring the feasibility of increasing the width of the median refuge island, ADA-compliant curb ramps, installing continental crosswalk striping at all crossings, and adding sharrows with wayfinding signage on Todd Street. An additional recommendation includes exploring the feasibility of bike lanes on Todd Street if desired by the community. An additional recommendation is to explore the feasibility of a potential shared use path connection on Brierhill Drive and a low-stress connection to The John Carroll School.



N FOUNTAIN GREEN ROAD AND E CHURCHVILLE ROAD INTERSECTION IMPROVEMENTS

PHASE: 2
ID: I

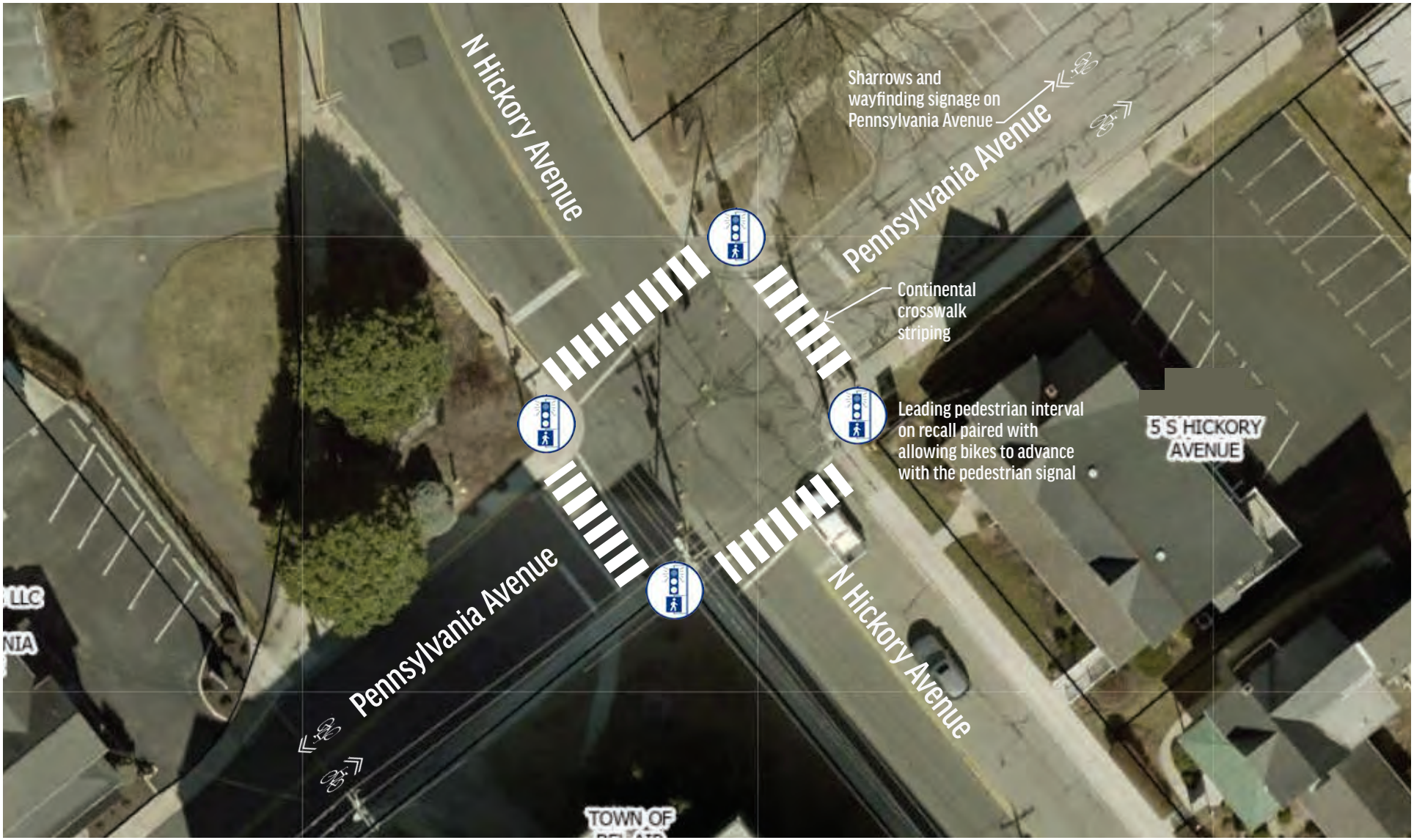
Intersection recommendations to accompany the shared use path includes increasing the size of existing curb cuts and landing areas at existing crosswalks, restriping continental crosswalks, and push-button activated leading pedestrian interval (LPI).



N HICKORY AVENUE AND N PENNSYLVANIA AVENUE INTERSECTION IMPROVEMENTS

PHASE: 2
ID: J

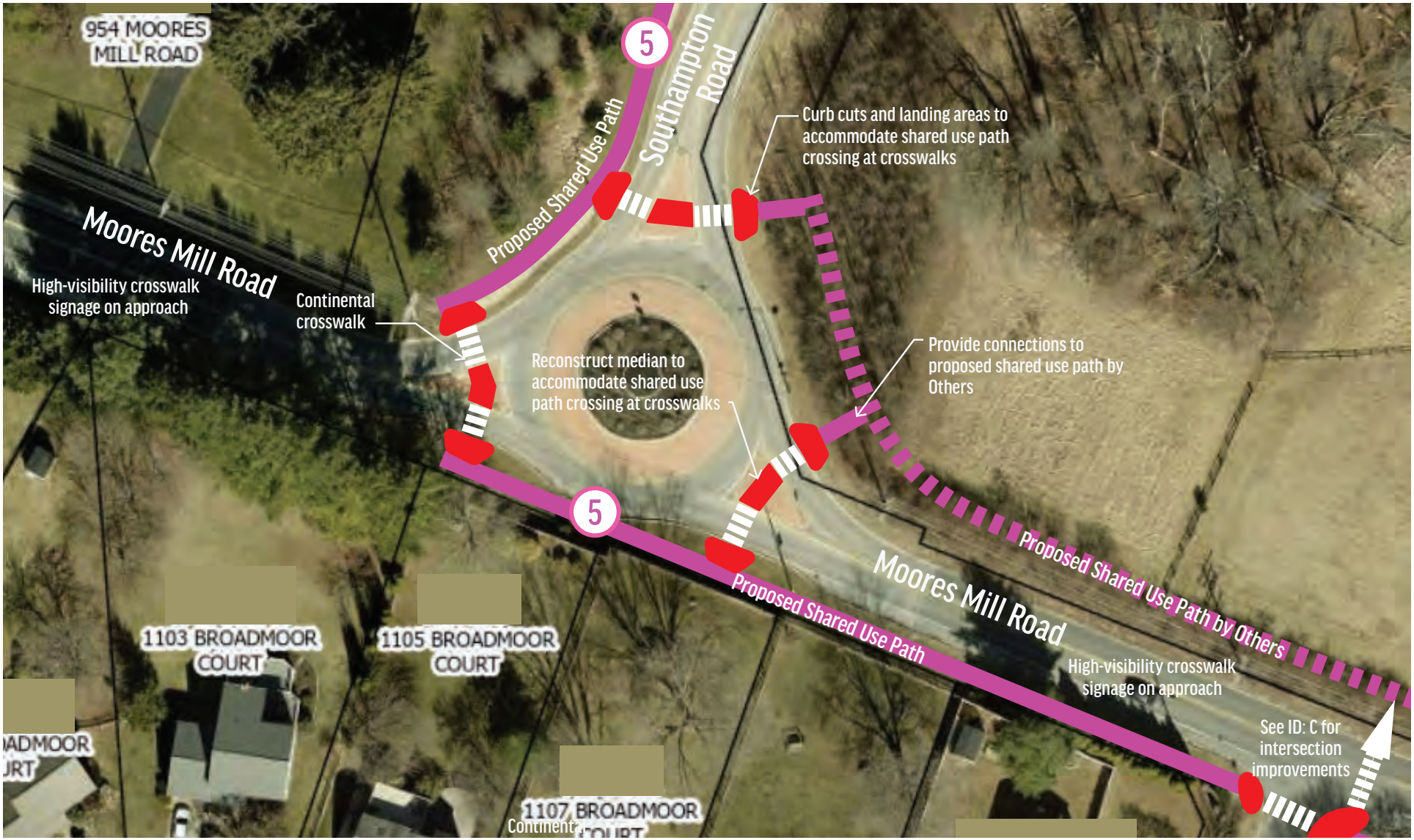
Recommendations at this signalized intersection include installing continental crosswalk striping, adding sharrows with wayfinding signage on Pennsylvania Avenue, and exploring the option for a leading pedestrian interval on recall and permitting bicycles to advance with pedestrian signal.



SOUTHAMPTON ROAD AND MOORES MILL ROAD ROUNDABOUT IMPROVEMENTS

PHASE: 2
ID: K

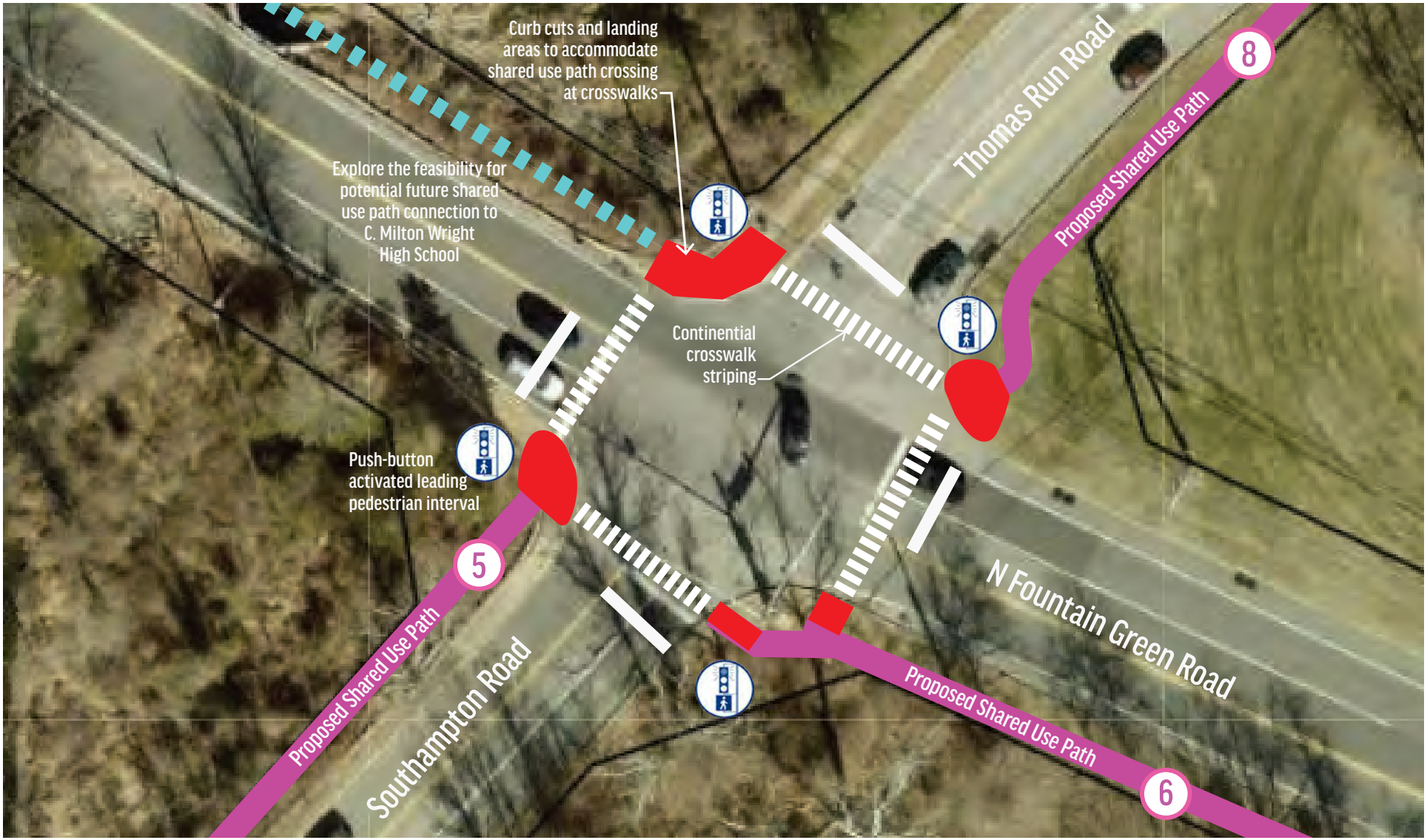
Recommendations at this location include retrofitting the roundabout to include crosswalks and curb cuts with ADA-compliant landing areas to accommodate a shared use path, installing continental crosswalk striping at all crossings, and high-visibility crosswalk signage on approach to roundabout. An additional recommendation includes providing a connection to the shared use path by Others on Moores Mill Road.



SOUTHAMPTON ROAD AND N FOUNTAIN GREEN ROAD INTERSECTION IMPROVEMENTS

PHASE: 2
ID: L

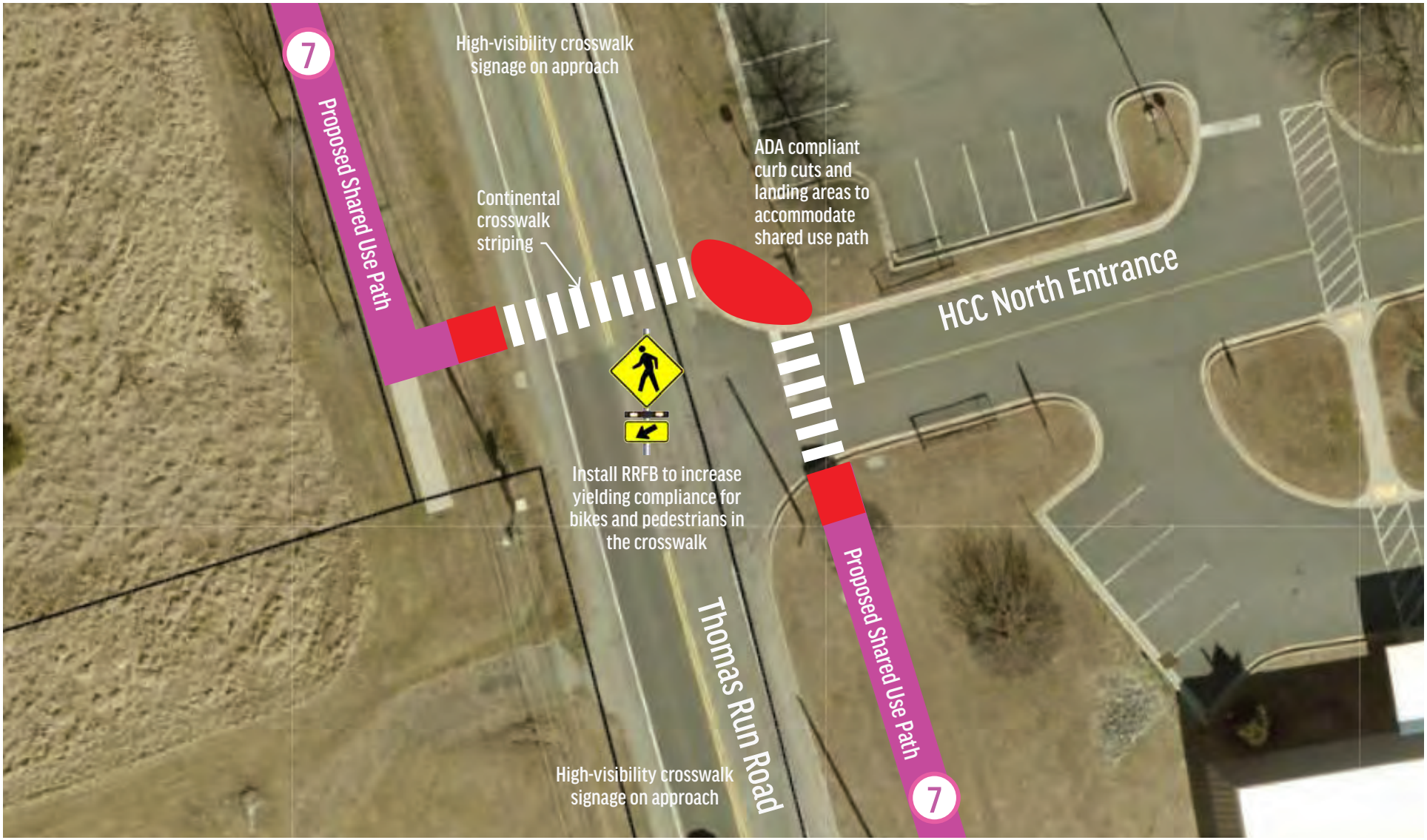
Recommendations at this signalized intersection include crosswalks and curb cuts with ADA compliant landing areas to accommodate a shared use path, installing continental crosswalk striping at all crossings, and push-button activated leading pedestrian interval (LPI). Additionally, feasibility for a shared use path connection to C. Milton Wright High School could be explored.



THOMAS RUN ROAD AND HCC TRAIL INTERSECTION IMPROVEMENTS

PHASE: 2
ID: M

Recommendations at this unsignalized location to supplement the shared use path at this intersection include includes providing curb cuts and landing areas at the crosswalks, striping continental crosswalks, introducing high-visibility crosswalk signage, and installing a rectangular rapid flashing beacon (RRFB) to increase vehicle yielding compliance to protect bicycles and pedestrians in the crosswalk.



THOMAS RUN ROAD SHARED USE PATH

Southampton Road to Milchling Drive

PHASE: 3
ID: 8

This segment begins at the Southampton Road and North Fountain Green Road intersection improvements (ID:L) with a connection on the northeast side. The east side was selected to avoid challenging slopes and a historic property to the west. The existing roadway has a 6' shoulder and curbed section with 10'-12' of space to the edge of right-of-way. The 6' shoulder would provide the buffer and the 10'-wide shared use path would follow the curb for the majority of the segment. The largest constraints include the above-ground utility boxes within the right-of-way and specimen trees. This improvement project should be coordinated with the three intersection improvements (ID: O, P, Q) to connect the shared use path to residential neighborhoods west of Thomas Run Road.

Engineering Calculations & Constraints

JURISDICTION: Harford County Highway

RESPONSIBLE AGENCIES: Harford County Highway

LENGTH: 3,800 LF (0.72 Mile)

HIGH-LEVEL DESIGN AND CONSTRUCTION COST: $2,000,000

IMPLEMENTATION: Easy

PRIVATE PROPERTY IMPACTS: Potential temporary impacts for grading

UTILITIES: Above-ground utility boxes, fire hydrant

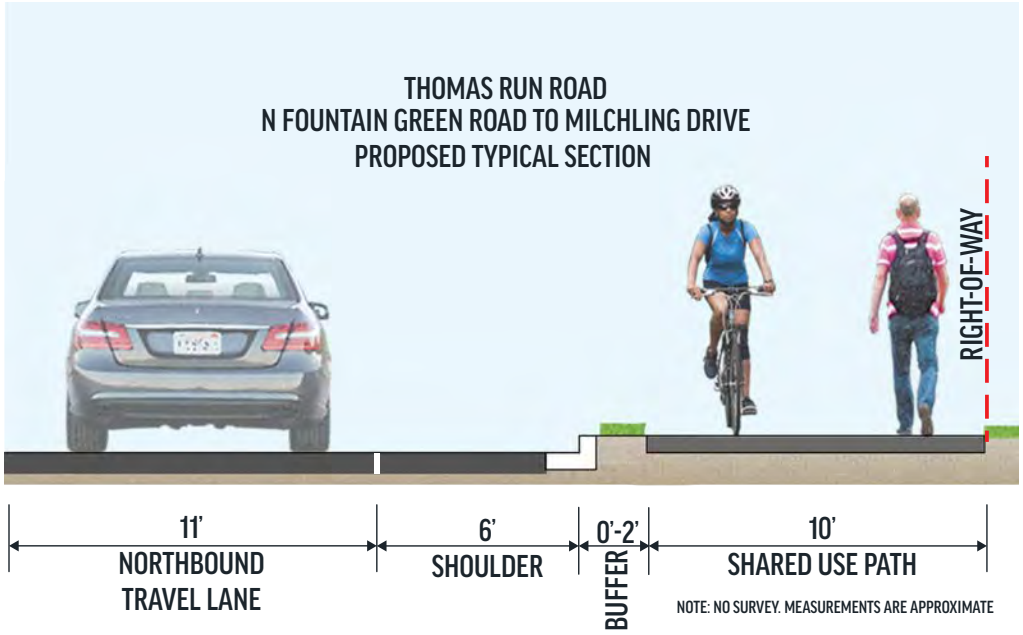
INFRASTRUCTURE: Curb and drainage inlets

TREE/FOREST IMPACTS: Minimal to Moderate

CHALLENGING SLOPES: N/A

STREAM CROSSINGS: N/A

OTHER: Opportunity to provide connection to high school



Typical Section for Thomas Run Road Shared Use Path

E CHURCHVILLE ROAD SHARED USE PATH

Brierhill Road to N Fountain Green Road

PHASE: 3
ID: 9

This segment connects the proposed intersection improvements at Brierhill Road (ID: N), Moores Mill Road (ID: A), and N Fountain Green Road (ID: I) with a 10'-wide shared use path and buffer to replace the existing sidewalk on the south side of East Churchville Road. An adequate buffer is strongly recommended for the segment because of the road volumes, vehicle speeds, and lack of shoulders. There is insufficient right-of-way to accommodate the shared use path and partial property takes or easements are necessary. An additional study could be conducted to analyze the possibility of reducing the roadway width and medians to minimize private property impacts. The existing overhead utilities and challenging slopes make construction challenging. The shared use path crosses eight commercial driveways and two neighborhood streets.

Engineering Calculations & Constraints

JURISDICTION: MDOT State Highway Administration

RESPONSIBLE AGENCIES: To be determined

LENGTH: 4,230 LF (0.80 Mile)

HIGH-LEVEL DESIGN AND CONSTRUCTION COST: $5,500,000

IMPLEMENTATION: Very Challenging

PRIVATE PROPERTY IMPACTS: Yes; Minimum 13 parcels

UTILITIES: Overhead utilities, signal poles, above and below-ground utilities

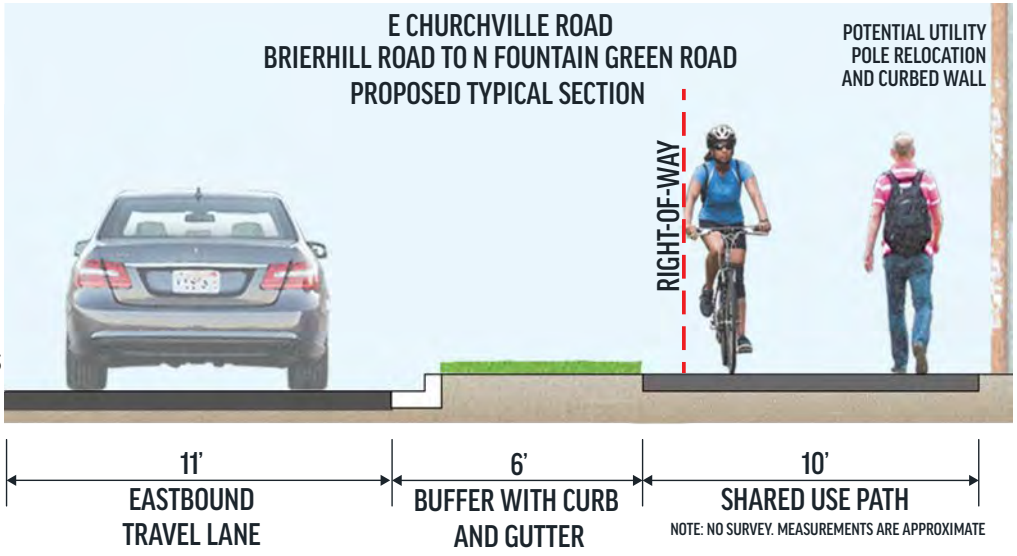
INFRASTRUCTURE: Curb walls, curb and gutter with drainage inlets

TREE/FOREST IMPACTS: None to Very Minimal

CHALLENGING SLOPES: Yes; existing curbed wall on backside of sidewalk

STREAM CROSSINGS: N/A

OTHER: No shoulder; must provide adequate buffer

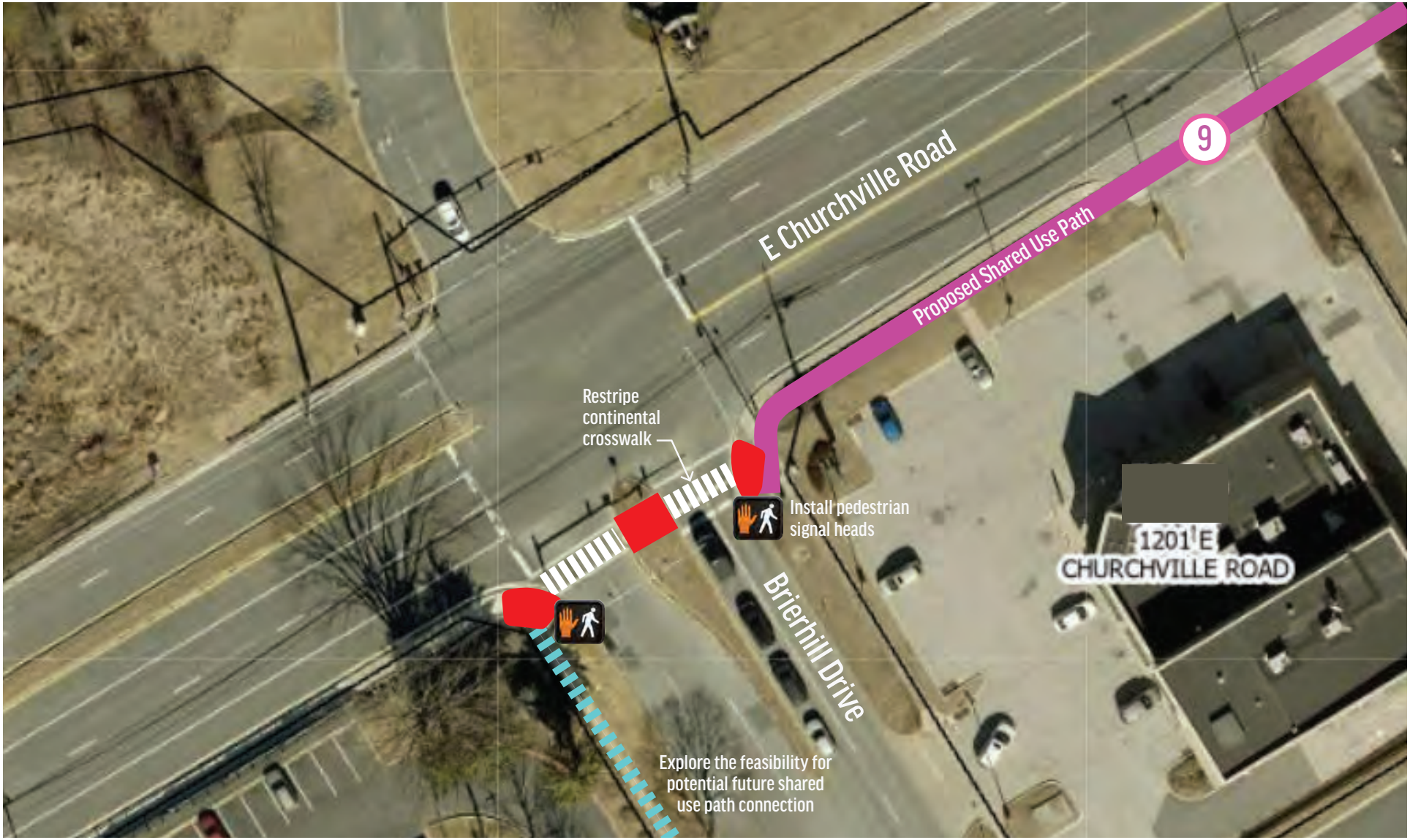


Typical Section for E Churchville Road Shared Use Path

BRIERHILL ROAD AND E CHURCHVILLE ROAD INTERSECTION IMPROVEMENTS

PHASE: 3
ID: N

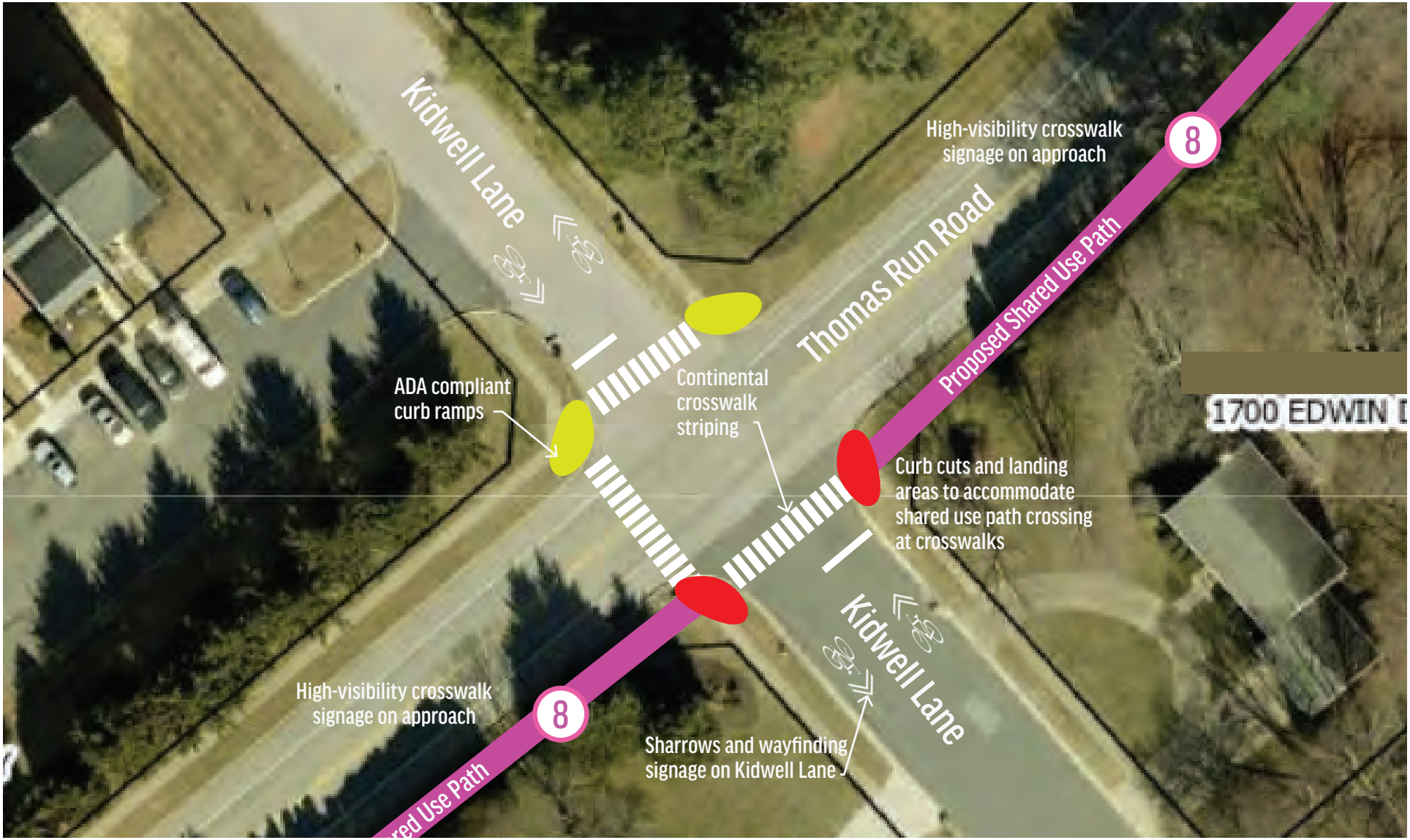
Recommendations at this signalized intersection include replacing curb cuts at the crosswalk with ADA-compliant landing areas to allow for the shared use path, installing continental crosswalk striping, and installing pedestrian signal heads. An additional recommendation is to explore the feasibility of a potential shared use path connection on Brierhill Drive.



THOMAS RUN ROAD AND KIDWELL LANE INTERSECTION IMPROVEMENTS

PHASE: 3
ID: 0

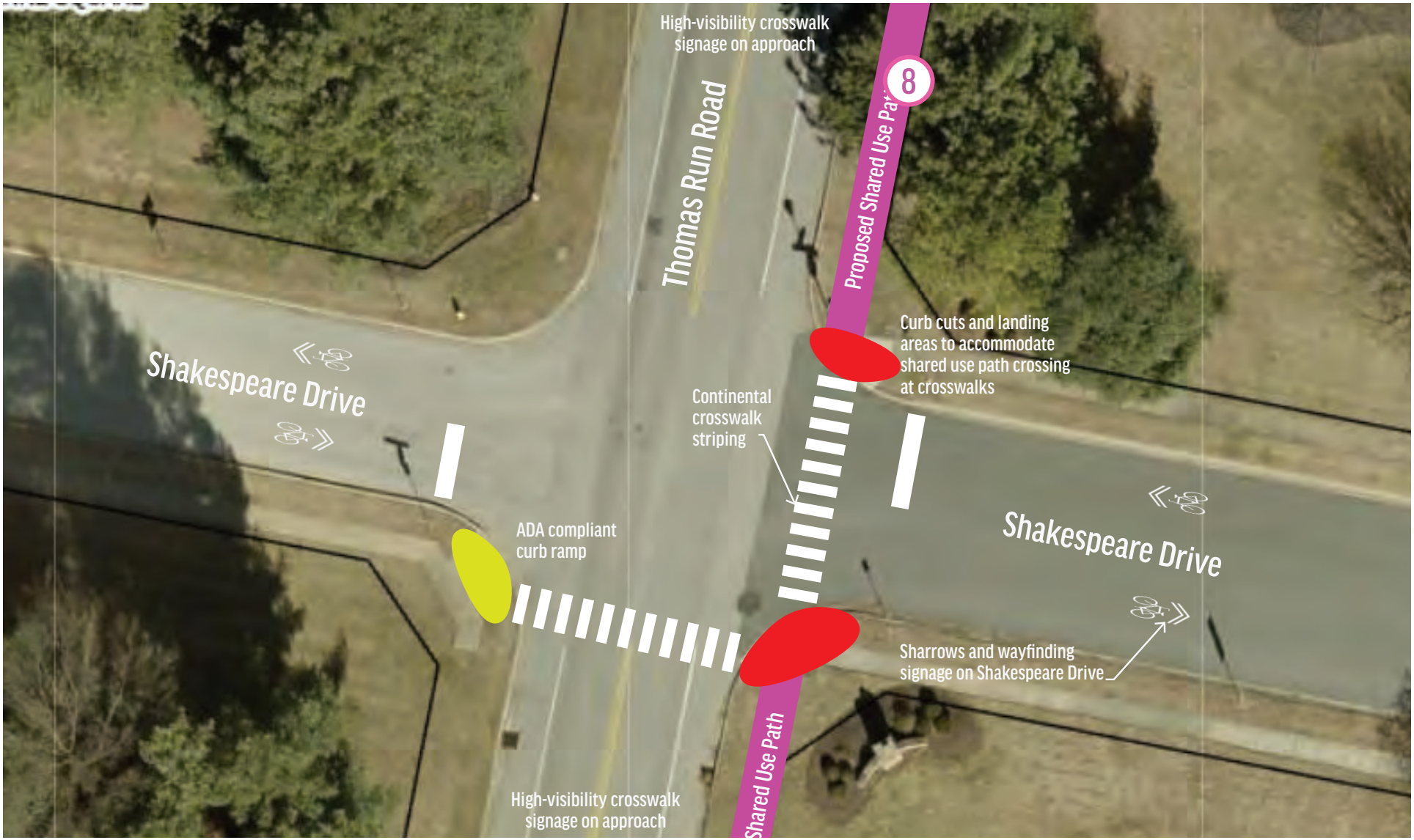
Recommendations at this unsignalized intersection include curb cuts at crosswalks with ADA-compliant landing areas accessing the shared use path, installing continental crosswalk striping, and high-visibility crosswalk signage on the approach to crossings. Additionally, provide sharrows and wayfinding signage could be introduced on Kidwell Lane.



THOMAS RUN ROAD AND SHAKESPEARE DRIVE INTERSECTION IMPROVEMENTS

PHASE: 3
ID: P

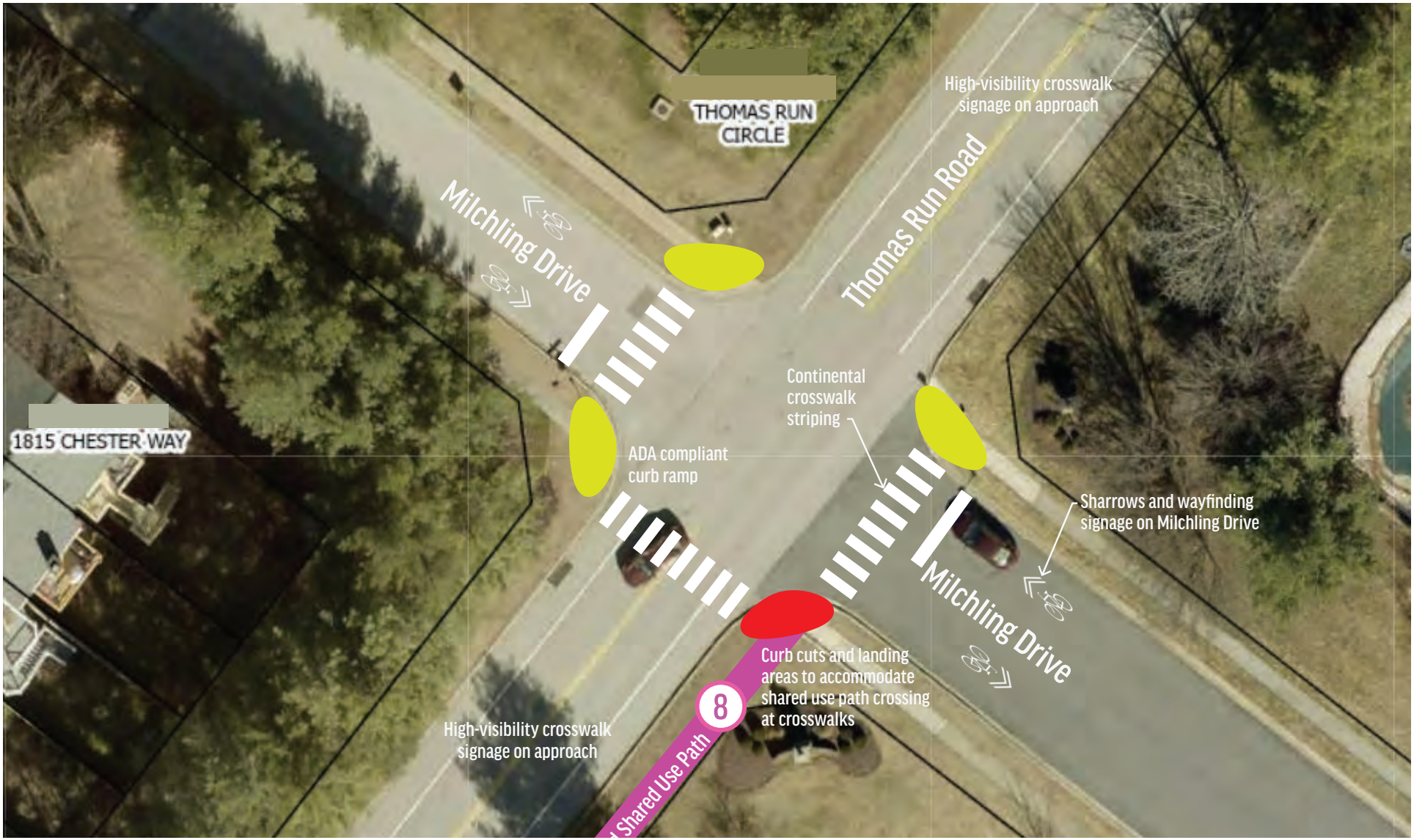
Recommendations at this unsignalized intersection include curb cuts at crosswalks with ADA-compliant landing areas to accommodate a shared use path, installing continental crosswalk striping, and high-visibility crosswalk signage on the approach to crossings. Additionally, provide sharrows and wayfinding signage on Shakespeare Drive.



THOMAS RUN ROAD AND MILCHLING DRIVE INTERSECTION IMPROVEMENTS

PHASE: 3
ID: Q

Recommendations at this unsignalized intersection include curb cuts at crosswalks with ADA-compliant landing areas allowing for a shared use path, installing continental crosswalk striping, and high-visibility crosswalk signage on the approach to the crossings. Additionally, sharrows and wayfinding signage on Milchling Drive is recommended.

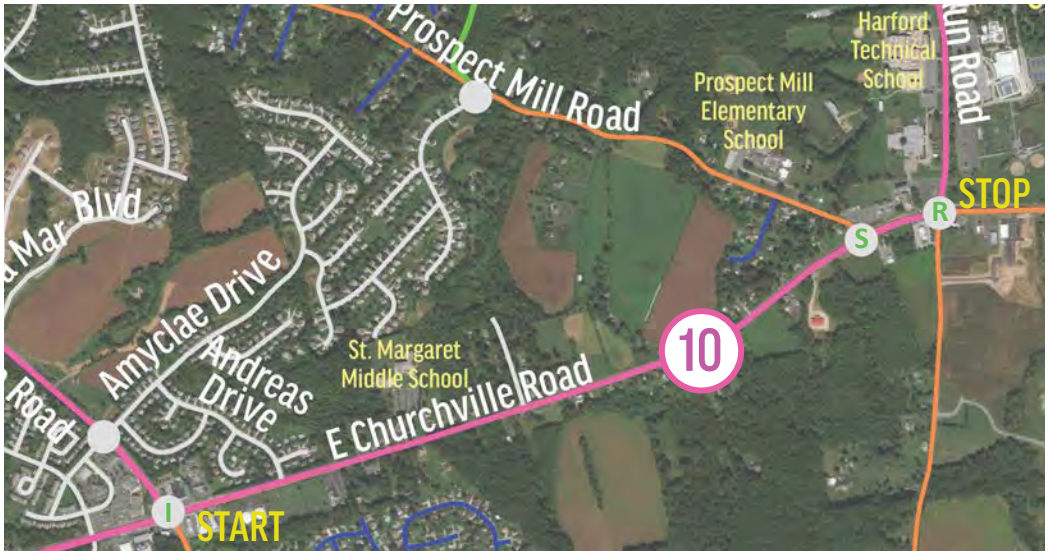


E CHURCHVILLE ROAD SHARED USE PATH

N Fountain Green Road to Thomas Run Road

PHASE: 4
ID: 10

This segment connects the intersection improvements at North Fountain Green Road (ID: I) to Thomas Run Road (ID: R) with a 10'-wide shared use path and buffer on the north side of East Churchville Road. There is inadequate right-of-way to accommodate the shared use path and buffer without private property impacts or the reconfiguration of the existing roadway. An additional study is needed to analyze reducing the roadway width to allow for the shared use path and minimize private property and overhead utility impacts. The existing and proposed typical sections show the potential for single travel lanes in each direction. The largest constraints for this segment are the overhead utilities, roadway ditches, limited right-of-way, and steep slopes.



Engineering Calculations & Constraints

JURISDICTION: MDOT State Highway Administration

RESPONSIBLE AGENCIES: To be determined

LENGTH: 8,025 LF (1.52 Miles)

DESIGN AND CONSTRUCTION COST: $15,000,000+

IMPLEMENTATION: Challenging

PRIVATE PROPERTY IMPACTS: Yes; depends on roadway width reduction

UTILITIES: Overhead utilities, above and below-ground utilities

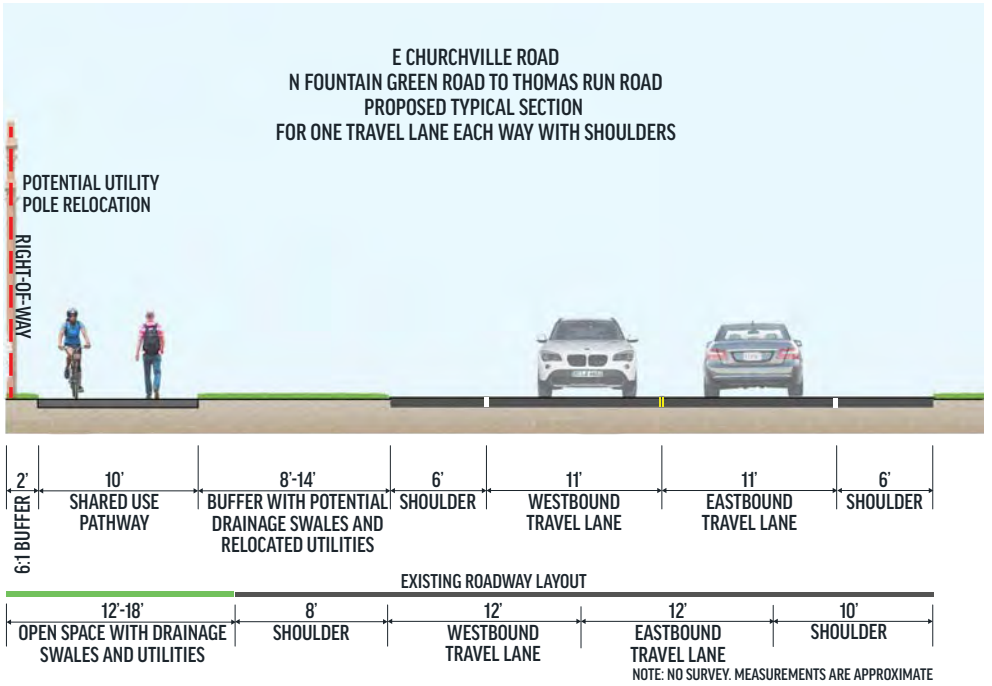
INFRASTRUCTURE: Roadway drainage swales/pipes, sidewalks

TREE/FOREST IMPACTS: Minimal

CHALLENGING SLOPES: Yes

STREAM CROSSINGS: Potentially 2

OTHER: Intersection approaches are a major constraint

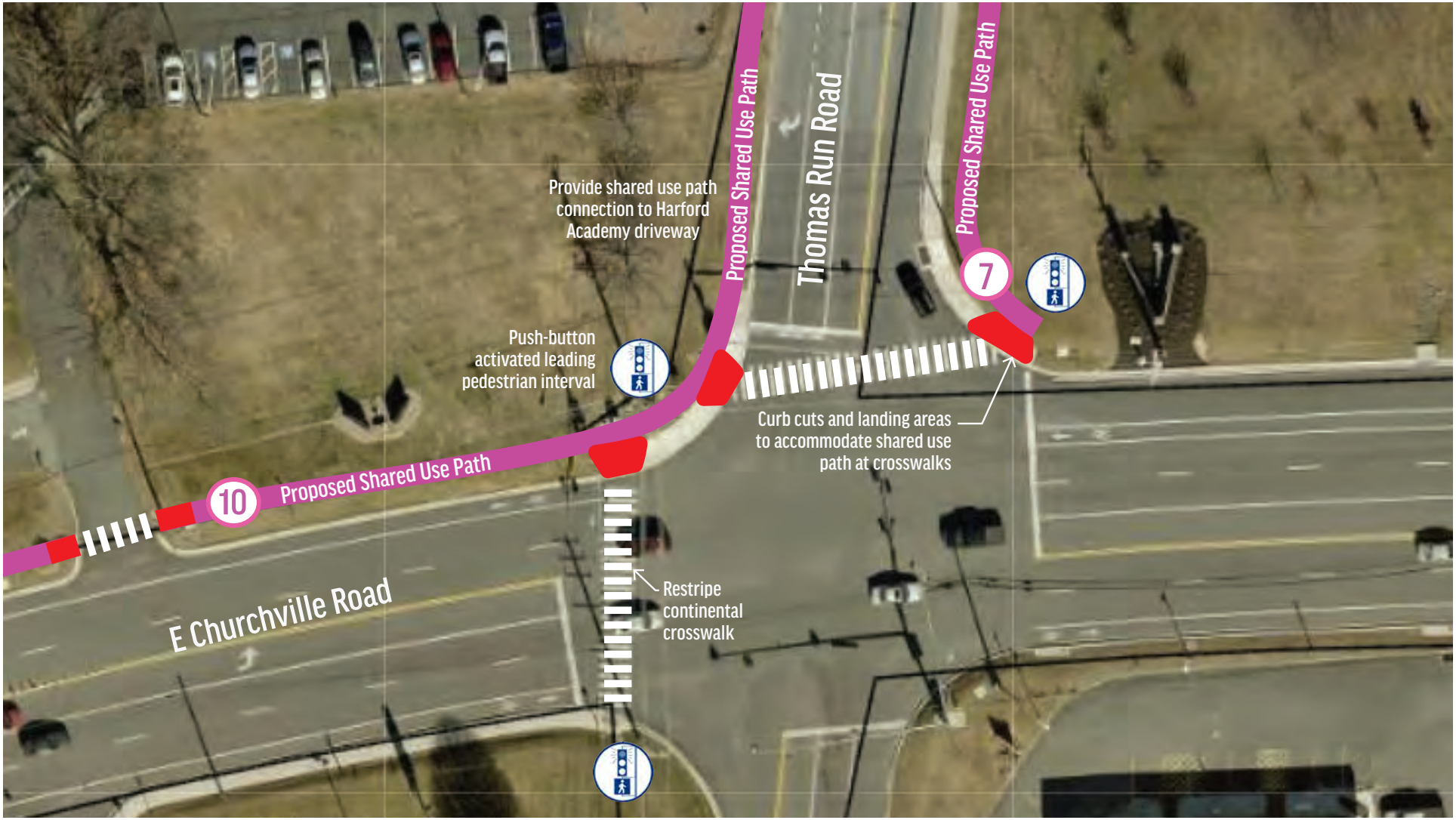


Typical Section E Churchville Road Shared Use Path

E CHURCHVILLE ROAD AND THOMAS RUN ROAD INTERSECTION IMPROVEMENTS

PHASE: 4
ID: R

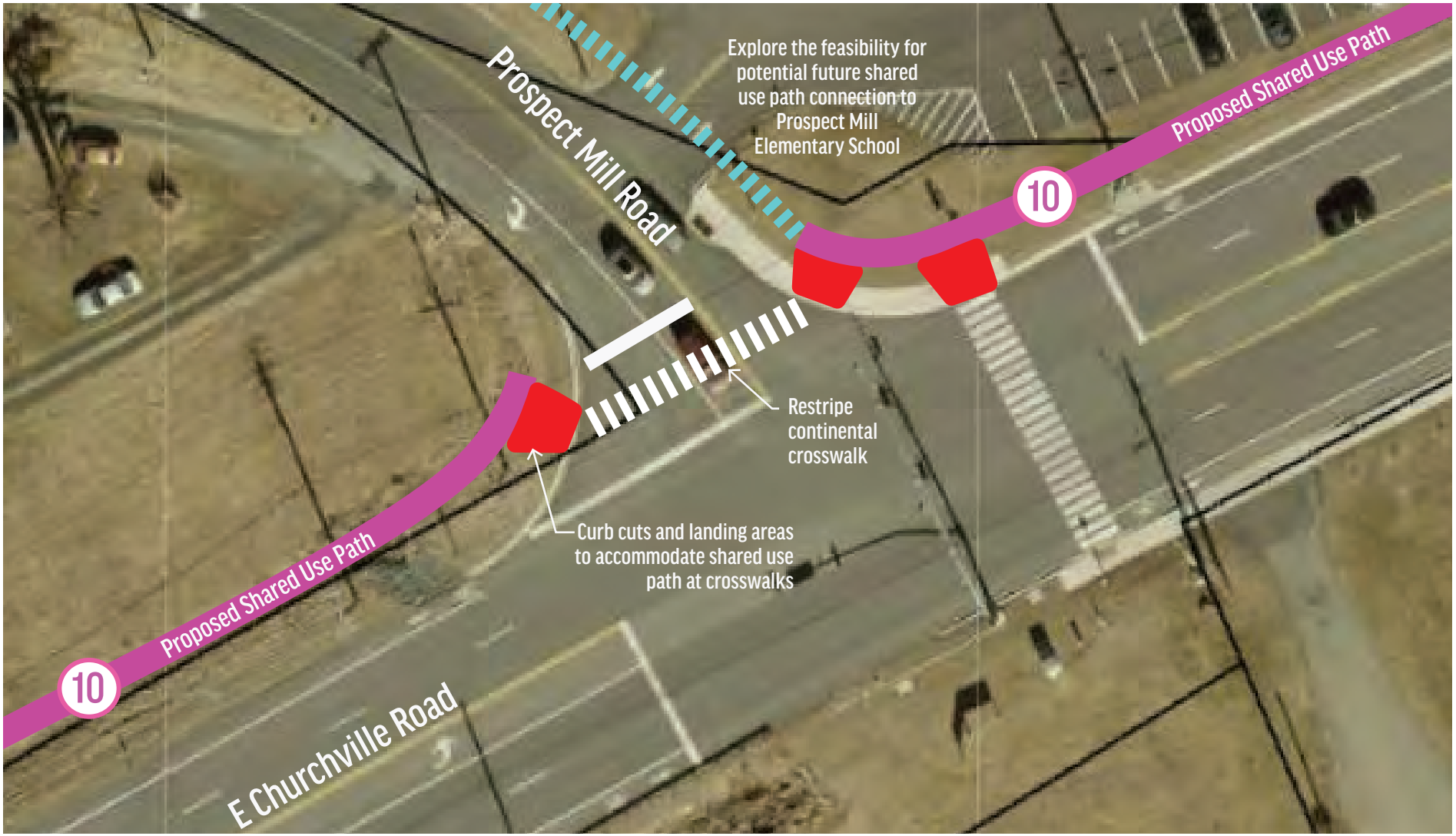
Recommendations at this signalized intersection include crosswalks and curb cuts with ADA compliant landing areas to accommodate a shared use path, installing continental crosswalk striping at all crossings, and push-button activated leading pedestrian interval (LPI).



E CHURCHVILLE ROAD AND PROSPECT MILL ROAD INTERSECTION IMPROVEMENTS

PHASE: 4
ID: S

Recommendations at this signalized intersection include crosswalks and curb cuts with ADA compliant landing areas to accommodate a shared use path and installing continental crosswalk striping at all crossings. An additional recommendation includes evaluating the corner radii to be consistent with control vehicle recommendations in the *Context Driven Guide*.



COMMUNITY OUTREACH & ENGAGEMENT

The public learned about the study at several special events in the County, including:

- An information table held at the in-person Bike to Work Day event on May 20.
- Informal conversations with stakeholders at the Bike Harford event on April 21 and the East Coast Greenway event on June 7.
- An online public survey that was open to the public from May 18 through June 22; 118 community members participated. A summary of the survey results are included as **Appendix 2**.
- A public workshop held on June 8 at the Harford County Offices in Bel Air. The project team gave a presentation on the study, encouraged participation in the survey, and led the attendees through an interactive mapping exercise. Nineteen members of the public attended.
- A survey designed by the project team and HCC specifically for HCC students. A summary of the survey results are included as **Appendix 3**.
- A second public workshop that was held on October 20 at the Harford County Offices in Bel Air. The project team gave a presentation on the proposed bikeway improvements between HCC and Bel Air focused on project phasing. Approximately 17 members of the public attended.
- A second online public survey that was open from October 20 through November 14; 4 members of the public participated. A summary of survey results are included as **Appendix 4**.

Figure 16 depicts photos from Bike to Work Day event, the second public workshop, and one of the public workshop flyers.

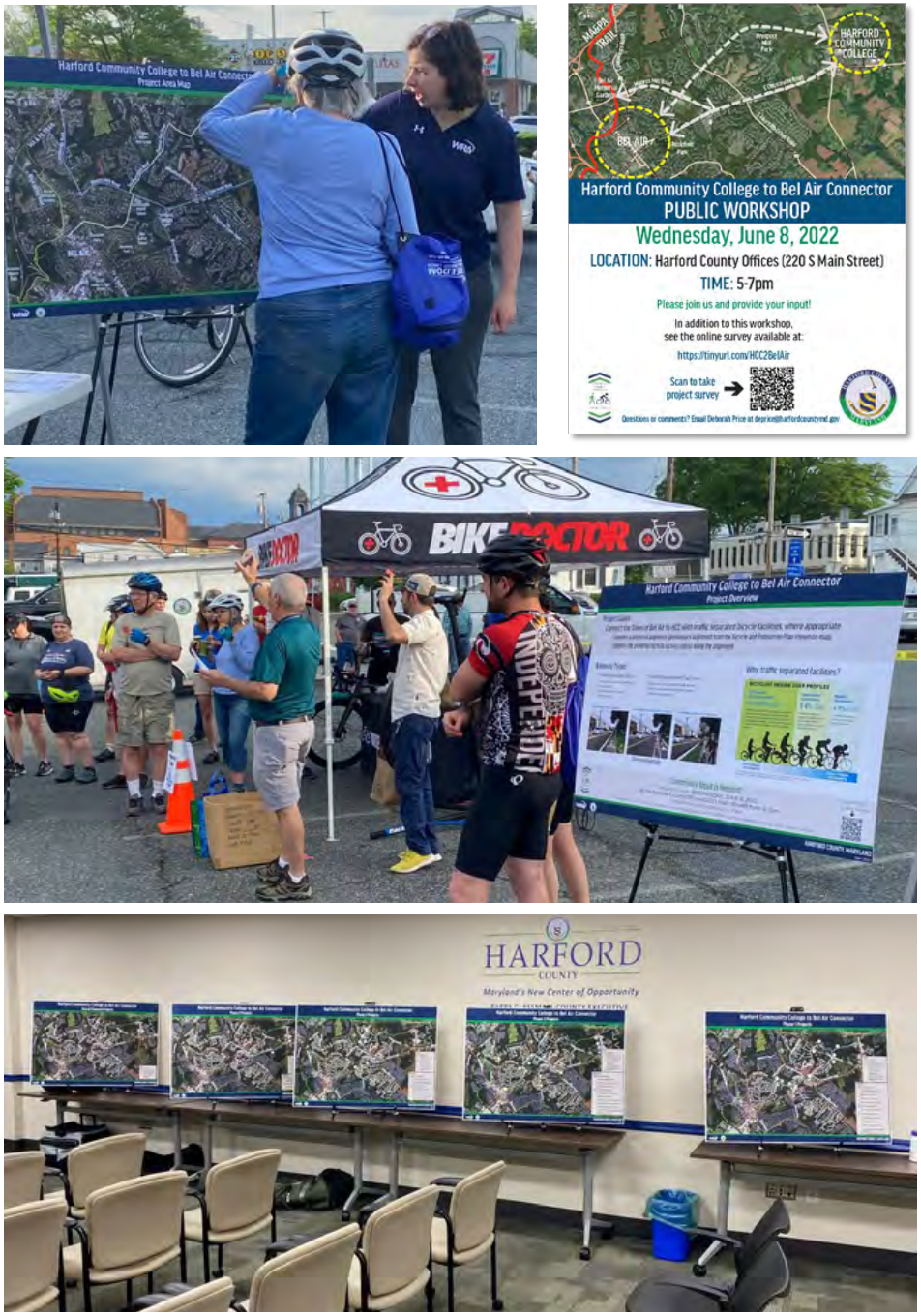


FIGURE 16. COMMUNITY ENGAGEMENT PHOTOS AND FLYER

IMPLEMENTATION PLAN & NEXT STEPS

FUNDING OPPORTUNITIES

FEDERAL FUNDING OPPORTUNITIES

Land and Water Conservation Fund (LWCF) State and Local Assistance Program

Organization: U.S. Department of the Interior, National Park Service

Funding can be used for the acquisition of land for parks and/or the development or rehabilitation of certain public recreational facilities. Municipalities, counties, state agencies, and regional park authorities are eligible to apply for funds. The program requires a 50% match, which can be cash or in kind. For more information, visit https://www.nps.gov/subjects/lwcf/stateside.htm and https://www.nrpa.org/our-work/advocacy/the-land-and-water-conservation-fund-lwcf/applying-for-lwcf-grants/, 23 U.S. Code § 133.

Surface Transportation Block Grant (STBG) Program

Organization: U.S. Department of Transportation, Federal Highway Administration

Eligible projects under the STBG include recreational trail projects that are eligible under the Recreational Trails Program (included in this list) and other bicycle and pedestrian facilities. States, local governments, and natural resource agencies, among others, are eligible to apply. Grants generally require a 20% funding match from non-federal sources. For more information, visit https://www.fhwa.dot.gov/specialfunding/stp/.

Transportation Alternatives (TA) Set-Aside from the STBG Program

Organization: U.S. Department of Transportation, Federal Highway Administration

The TA Set-Aside Program replaced the MAP-21 Transportation Alternatives Program (TAP). It is a set-aside from the STBG Program described above. Eligible projects include recreational trail projects that are eligible under the Recreational Trails Program (see below) and other bicycle and pedestrian facilities. States, local governments, and natural resource agencies, among others, are eligible to apply. MDOT administers the program for the State of Maryland. Grants require a 20% funding match from non-federal sources. For more information on the program as of 2022, visit https://www.fhwa.dot.gov/environment/transportation_alternatives/guidance/.

Recreational Trails Program (RTP)

Organization: U.S. Department of Transportation, Federal Highway Administration

The Recreation Trails Program (RTP) is a set-aside fund from the Transportation Alternatives (TA) Set-Aside. Funds may be used for a variety of public trail-related purposes, including the development of new trails, restoration and maintenance of existing trails, and acquisition of land or easements. The funds are administered by each state. Grants generally require a 20% funding match from non-federal sources. The RTP program is funded by the Federal TA program and administered by the MDOT SHA. For more information, visit https://www.fhwa.dot.gov/environment/recreational_trails/ and see 23 U.S. Code § 206 and https://www.roads.maryland.gov/mdotsha/pages/Index.aspx?PageId=98.

Safe Streets and Roads for All (SS4A)

Organization: U.S. Department of Transportation

This program seeks to prevent roadway deaths and serious injuries by helping local governments and others develop and implement comprehensive safety action plans. The action plan and implementation grants available through SS4A can connect and extend Vision Zero planning efforts that are underway. Counties, cities, towns, transit agencies, and others may apply. The program requires a 20% match from non-Federal sources. For more information, visit https://www.transportation.gov/grants/SS4A.

U.S. Department of Transportation Additional Funding Opportunities

U.S. Department of Transportation releases details on potential grants throughout the year, so additional grant opportunities applicable to this project may become available.

STATE FUNDING OPPORTUNITIES

Kim Lamphier Bikeways Network Program

Organization: Maryland Department of Transportation

The Kim Lamphier Bikeways grant program may be used for design or construction funds if they accomplish at least one of the following: advancing access to transit, providing bicycle access along missing trail links, advancing a project identified as a transportation priority in a County's most recent annual priority letter, enhancing bicycle circulation within a Maryland Sustainable

Community area, promoting bicycle circulation within a designated Maryland Main Street, or improving access to areas of low income or significant points of interest. A local 20% local match is required. For more information, visit https://www.mdot.maryland.gov/tso/pages/Index.aspx?PageId=28.

Maryland Department of Transportation State Highway Office (MHSO) Grants Program

Organization: MDOT Maryland Highway Safety Office

The MHSO grant program is federally funded and administered by the MDOT State Highway Office. Projects focus on reducing the number of motor vehicle-related crashes, deaths, and injuries on Maryland roadways by targeting one of the top safety priorities identified in the Strategic Highway Safety Plan. One of the six priorities is pedestrian and bicycle safety. Organizations eligible for grant awards include state and local governments, non-profit organizations, and others. For more information, visit https://gps.mva.maryland.gov/Web/Default.

Safe Routes to School (SRTS)

Organization: MDOT State Highway Administration (SHA)

SRTS program is funded by the Federal Transportation Alternatives (TA) program and administered by the MDOT State Highway Administration (SHA). Funds support activities – both infrastructure and non-infrastructure based - that enable and encourage children to safely walk, bicycle, or roll to school. The projects must benefit elementary and middle school children within a 2-mile radius of a school. Eligible applicants include local governments, regional transportation authorities, school districts, and others. Grants require a 20% local match. For more information, visit https://www.roads.maryland.gov/OPPEN/ComplianceResourceList.pdf.

Transportation Trust Fund

Organization: MDOT

The Transportation Trust Fund provides a dedicated fund to support the Maryland Department of Transportation (MDOT) and a variety of state transportation needs, including transportation service and infrastructure needs. For more information, visit https://www.mdot.maryland.gov/tso/Pages/Index.aspx?PageId=85.

LOCAL FUNDING OPPORTUNITIES

Impact Grant Program

Organization: Community Foundation of Harford County

This community foundation provides grants to improve the quality of life for the residents of Harford County. They are funded through private donations, are limited to $1,000, and must qualify under a specific program type such as homelessness, children and/or senior adults, or other human services. For more information, visit https://cfharfordcounty.org/cfhc-grant-programs/.

PRIVATE FUNDING OPPORTUNITIES

Funding may be available from private sources as well, including area businesses or additional foundations. One such opportunity is the AARP Community Challenge.

AARP Community Challenge

Organization: AARP

The AARP Community Challenge grant program is part of the nationwide AARP Livable Communities initiative that helps communities become great places to live for residents of all ages. The program is intended to help communities make immediate improvements and jump-start long-term progress in support of residents of all ages. For more information, visit https://www.aarp.org/livable-communities/community-challenge/.

FUTURE COORDINATION AND COMMUNITY OUTREACH

Since community outreach - both to inform and to engage members of the public - is critical to the long-term success of any project, Harford County should consider expanding their efforts in upcoming phases of the project. Such efforts could include the following:

By the County

- Continue coordination with members of the Technical Advisory Committee, East Coast Greenway, and MA & PP Trail, Inc.
- Create a project website with a description of the proposed project, past presentations, previous engagement efforts, and new materials as the project progresses.
- Use social media to post information on upcoming events or project milestones.
- Create a new listserv based on survey respondents, attendees of workshops, and relevant County advisory groups and provide updates on project progress.
- Email outreach materials used for project events to stakeholders and members of County Council for further distribution to contacts and constituents.
- Make presentations to community groups or personally invite those groups to attend project events.
- Issue press releases or include in County newsletters information on project milestones or events.
- Post event information at key community locations, including libraries, community centers, community pools, government buildings.

By the Town of Bel Air and Harford Community College

- Consider similar recommendations as those provided for Harford County government; leverage efforts by linking to existing materials, and using modes of communication already used by the Town of Bel Air and Harford Community College.

Additional Efforts

- Consider posting information using posters or lawn signs at key sites in the study area, including Seasons Apartments in Brierwood and other key off-campus housing sites.
- Email distribution of materials to Harford County non-profits and ask that they share with their membership.
- Submit project events for posting on the HarfordTV's events calendar at https://harfordtv.org/submit-your-event/,
  The Aegis events calendar (under the Baltimore Sun) at https://www.baltimoresun.com/events/calendar/#!/show, and
  the Chamber of Commerce Events calendar at https://business.harfordchamber.org/events/calendarcatgid/3.