

Purple Line

Bicycle Access and Bicycle Hub Location Study

PREPARED FOR THE MARYLAND NATIONAL CAPITAL PARK AND PLANNING COMMISSION AND
PRINCE GEORGE'S COUNTY PLANNING DEPARTMENT

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TRANSPORTATION LAND USE CONNECTION (TLC) PROGRAM

ABOUT THE TLC PROGRAM

The Transportation and Land Use Connections (TLC) Program provides support to local governments in the metropolitan Washington region as they work to improve transportation/land use coordination. Through the program, the Transportation Planning Board provides communities with technical assistance grants to catalyze or enhance planning efforts. TLC projects are generally targeted to a fairly small area or discrete set of issues. Lessons learned from these planning studies may then be implemented around the region.

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EXECUTIVE SUMMARY

Communities across the US are investing in light rail transit systems because they have proven to be a form of transportation that makes urban areas stronger and more sustainable. Light rail can connect a community with stations becoming mini-neighborhood hubs. Access on foot and by bicycle can strengthen these linkages. Developing an integrated plan that incorporates multimodal access, land use, urban design and other elements is critical to a light rail system's initial success. This report offers a piece of this holistic plan by providing initial analysis and recommendation for pedestrian and bicyclist access to and travel along the Purple Line in Prince George's County, Maryland.

This report was developed for the Maryland-National Capital Park and Planning Commission-Prince George's County (M-NCPPC-PG), with a grant from the Metropolitan Washington Regional Council of Governments TLC program. Toole Design Group conducted the study and developed the report based on three primary recommendations:

1. Use the access shed approach to identifying and prioritizing pedestrian and bicyclist station access and commit to a 10-year program to plan, design, and fund bicycle and pedestrian improvements that are necessary to fully develop each bicycle and pedestrian access shed to reach desired non-motorized access mode share goals.

2. Develop a parallel multi-use trail system and, where it is adjacent to the light rail alignment or within the same roadway corridor, include facility design and costs as an essential component of the Purple Line project.
3. Establish bicycle parking standards for each station, with the capacity to adjust parking levels and facilities as demand increases.

Construction on the Purple Line is not anticipated to begin until 2016, with service beginning closer to 2020. A number of development projects and sector planning efforts are underway. These projects provide opportunities for incorporating highly functional bicycle and pedestrian facilities along the light rail corridor and at stations. This report will inform decisions that policy makers, planners and engineers are making as the Purple Line project moves into design, construction and revenue operation.

Adequate access infrastructure is critical to meeting and exceeding ridership projections. Maximizing both the access mode share and aggregate numbers for pedestrian and bicyclist access trips can best be achieved by implementing recommendations detailed here.

BICYCLE AND PEDESTRIAN ACCESS SHEDS

The access shed analysis identifies areas for each station from which transit riders can or are likely to access on foot or by bicycle. Access sheds are determined by the interaction of physical conditions including distance, topography, street layout and connectivity, existing conditions for bicycling and walking, existing facilities, and physical barriers.

Some access sheds are ready to serve Purple Line riders. Others have underperforming infrastructure or missing links that, if provided, would create a fully functional shed. Fully functional access sheds are essential to ensure the attractiveness of the Purple Line to potential transit riders.

Access sheds closest to Purple Line stations with the greatest potential to generate light rail users, especially those accessing the station on foot, should be functional from the first day of light rail service. Activating access sheds farther out according to their potential to attract trips to a station by bicycle or on foot should follow as quickly as possible after the start of service. Several infrastructure improvements that will increase the functionality of sheds or will remove a barrier that blocks the shed are identified in this plan. In some cases the improvements may have already been identified in the Prince George's County Master Plan of Transportation. Other proposed improvements are new connections not currently planned, or are modifications to the County's Master Plan of Transportation.

The responsibility for implementing access shed improvements depends upon where the needed improvement is located. Those along the Purple Line should be made by MTA and SHA as part of Purple Line construction. Improvements away from the Purple Line will be the responsibility of other organizations, such as Prince George's County DPWT, local municipalities, the MNCPPC, the University of Maryland, or private developers.

CROSS-COUNTRY MULTI-USE TRAIL: PINK LINE

Anticipated demand for a multi-use trail along the Purple Line corridor can be satisfied by developing one that also serves bicyclist and pedestrian station access needs. Conceptually branded the Pink Line, this trail travels both along the Purple Line alignment in the public right-of-way, and through nearby neighborhoods using public roads, existing and proposed trails, and other connections. The Pink Line will be a mix of cycle tracks, sidewalks, bicycle lanes, sidepaths, shared use park trails, and signed/shared roadways on low volume/low speed residential streets. Most of the trail would be newly constructed facilities; however some portions will use facilities already in existence.

The report recommends a reallocation of the right-of-way in certain areas in order to build on-road bicycle facilities such as bicycle lanes, cycle tracks, and sidepaths, and to improve conditions for pedestrians traveling along and across wide streets with high traffic volumes. Immediate design issues include: revising proposed cross-sections; acquiring adequate right-of-way; and planning for adequate sidewalks, buffers and bicycle facilities concurrently with design and construction of the Purple Line so that the access infrastructure is in place when the light rail system opens. While the strategic value of planned or anticipated development is a contributing factor to where the Pink Line is located, relying solely or primarily on developer participation will result in piecemeal construction and a discontinuous bicycle and pedestrian system.

BICYCLE PARKING AND BICYCLE HUBS

Providing appropriate bicycle parking at Purple Line stations will help the new light rail line meet its ridership goals by facilitating access for bicyclists. Bicycle parking is recommended for all stations, and must be supplied with modest surplus capacity to accommodate ongoing growth.

Determining the number, type and locations of bicycle parking spaces at each station is an iterative process. An initial estimate of supply has been made from ridership estimates and the average usage rate based on WMATA's experience with its heavy rail stations. However, as demand increases over time, additional parking will be needed. Station planning today should allocate space in anticipation of increased demand over time. Additionally, improvements to, and activation of, bicycle access sheds will affect the number of transit riders bicycling to Purple Line stations. In short, the provision of bicycle parking should be treated as a dynamic element of the light rail system. It affects initial station design, and how transit riders will think about their access options when service is in place.

Bicycle hubs are identified for stations where the highest volumes of bicycle parking will be needed and where related bicycle transportation services are located, such as indoor and outdoor parking, an attendant, rest rooms, showers, day and long term lockers, food (vending or café), bicycle rentals and shared bicycles, bicycle accessories and repair, and accommodations for police bicycle patrol. Hubs should be developed at several stations, located near the station along with other retail operations, ideally operated by a third party. Bicycle hubs should be designed for and equipped with best and emerging technologies found in the United States and abroad.

Corollary issues for bicycle access to the Purple Line include: Bicycle parking requirements for new residential and commercial development, rail car design, on-board policies, the potential for bicycle sharing services, and inclusion of

bicycle access promotion and parking supply management in TDM programs. These issues should be explored in greater detail in future planning efforts.

PLAN ORGANIZATION

Four chapters form the basis of this report. Chapters on Bicycle and Pedestrian Access Sheds, Bicycle Parking Demand Analysis, Station Area Planning for Bicycle Parking and Hubs, and the Cross-County Multi-use Trail describe the research and recommendations included here. Maps provide a rich resource of this information, supplemented by explanatory narrative. The report's last chapter consolidates recommendations from all chapters, organized around the three key recommendations listed above.

1 INTRODUCTION

Communities across the U.S. are investing in light rail transit systems because they have proven to be a form of transportation that makes urban areas stronger and more sustainable. Light rail can connect a community with stations becoming mini-neighborhood hubs. Access on foot and by bicycle can strengthen these linkages. Developing an integrated plan that incorporates multimodal access, land use, urban design and other elements is critical to a light rail system's initial success. This report offers a piece of this holistic plan by providing initial analysis and recommendation for pedestrian and bicyclist access to and travel along the Purple Line in Prince George's County, Maryland.

This report was developed for the Maryland-National Capital Park and Planning Commission-Prince George's County (MNCPPC-PG), with a grant from the Metropolitan Washington Regional Council of Governments TLC program. Toole Design Group conducted the study and developed the report based on three primary recommendations:

The purpose of the proposed project is to provide faster, more direct and more reliable east-west transit service in the Purple Line corridor, which would connect the four major activity centers, including the Metrorail services located there, to each other, and with the communities located between them. The existing and expected future roadway congestion in the corridor will have an increasingly detrimental effect on the travel times and reliability of east-west bus transit services in the corridor. The proposed Purple Line corridor transit improvements are intended to improve travel times and reliability by providing more direct services that will operate on dedicated and exclusive lanes and guideways.

1. Use the access shed approach to identifying and prioritizing pedestrian and bicyclist station access and commit to a 10-year program to plan, design, and fund bicycle and pedestrian improvements that are necessary to fully develop each bicycle and pedestrian access shed to reach desired non-motorized access mode share goals.
2. Develop a parallel multi-use trail system and, where it is adjacent to the light rail alignment or within the same roadway corridor, include facility design and costs as an essential component of the Purple Line project.
3. Establish bicycle parking standards for each station, with the capacity to adjust parking levels and facilities as demand increases.

Construction on the Purple Line is not anticipated to begin until 2016, with service beginning closer to 2020. A number of development projects and sector planning efforts are underway. These projects provide opportunities for incorporating highly functional bicycle and pedestrian facilities along the light rail corridor and at stations. This report will inform decisions that policy makers, planners and engineers are making as the Purple Line project moves into design, construction and revenue operation.

PLANNING CONTEXT AND EXISTING CONDITIONS

Engineers, planners and architects developing the Purple Line are working within a set of physical, policy and funding constraints. Based on a "small footprint" approach to this light rail line and its operation, no additional motor vehicle parking will be constructed at stations as part of this project, and ROW acquisition is being kept to the minimum. Purple Line riders will arrive at stations by walking, bicycling, riding feeder bus or by using Kiss & Ride facilities.

While the alignment of the Purple Line is primarily on streets, station placement and the limited number of stations resemble heavy rail transit. In Prince George's County, current planning for Purple Line tracks and stations places them along or in roadways. Aerial and below grade structures are anticipated in a limited number of locations. Some stations are in densely developed areas; some are located in areas where future transit-oriented development is desired and/or being planned. Others are not, making station access more difficult.

Light rail alignments are typically through the core of urban communities so riders can easily get to stations. It is essential that existing and proposed sector plans for neighborhoods along the Purple Line corridor in Prince George's County promote light rail-friendly communities that support ridership forecasts.

PLAN DEVELOPMENT

Recommendations in this report were developed from a variety of meetings, field visits, document reviews, and analyses using GIS and aerial photography. Conversations on a large and small level were held with project planners and engineers from the Maryland Transit Administration (MTA) and the State Highway Administration (SHA), and with other local and regional stakeholders to gather information, test recommendations and understand the policies guiding Purple Line planning. Several plans from Prince George's County informed recommendations, including the Comprehensive Master Plan of Transportation, the Central US Corridor 1 Sector Plan, the Takoma-Langley Sector Plan, and other sector and development plans. The Purple Line Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS) provided relevant technical information.

The project team augmented its local knowledge of Purple Line communities with information available through GIS data and aerial photographs and targeted field work for determining both the Pink Line alignment and the functionality of bicycle and pedestrian sheds. Finally, conversations with WMATA staff and a best practices review supplied information for the bicycle parking recommendations.

Understanding the Inter-related Analysis. Each recommendation should not be considered in isolation. They form an inter-related system that is strengthened and supported by pursuing them all simultaneously.

- The bicycle shed analysis identifies bicycle routes to stations and potential station access volumes which relate directly to establishing needs for various segments of the Pink Line and demand for bicycle parking.
- Because of the shed analysis, the Pink Line alignment and facility study was not only conducted with through and longer cross-county bicycle movements in mind, but to facilitate station access movements for both bicyclists and pedestrians.

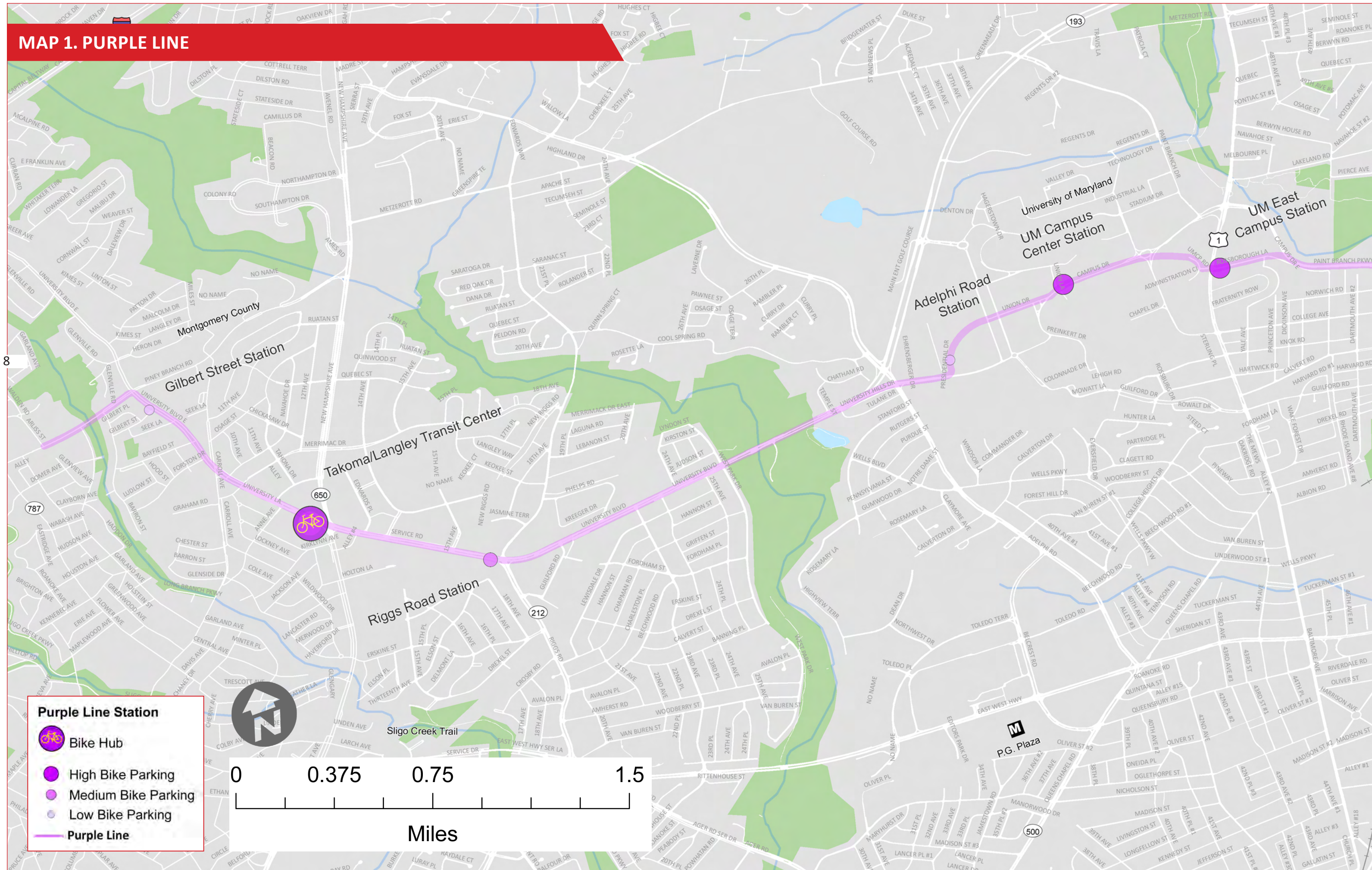
- A deeper understanding of potential bicycle parking demand has implications for station design and public space needs around each station, as well as determining which stations may support the higher grade and volume of services offered by a Bicycle Hub.

Plan Organization. Four chapters form the basis of this report. Chapters on Bicycle and Pedestrian Access Sheds, Bicycle Parking Demand Analysis, Station Area Planning for Bicycle Parking and Hubs, and the Cross-County Multi-use Trail describe the research and recommendations included here. Maps provide a rich resource of this information, supplemented by explanatory narrative. The report's last chapter consolidates recommendations from all chapters, organized around the three key recommendations listed at the beginning of this chapter.

A FINAL INTRODUCTORY WORD

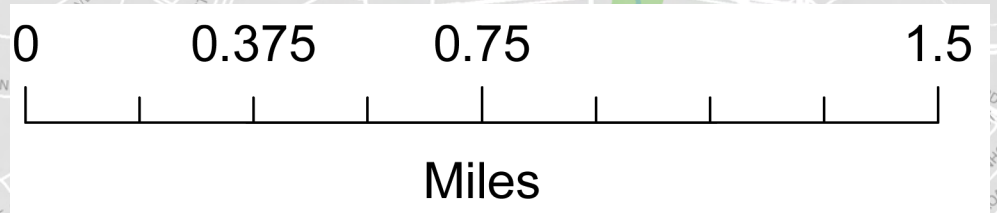
Ridership projections will only be met or exceeded with adequate access infrastructure in place. Maximizing both the mode share and aggregate numbers for pedestrian and bicyclist access trips relies on several elements, including implementing the recommendations detailed in this report.

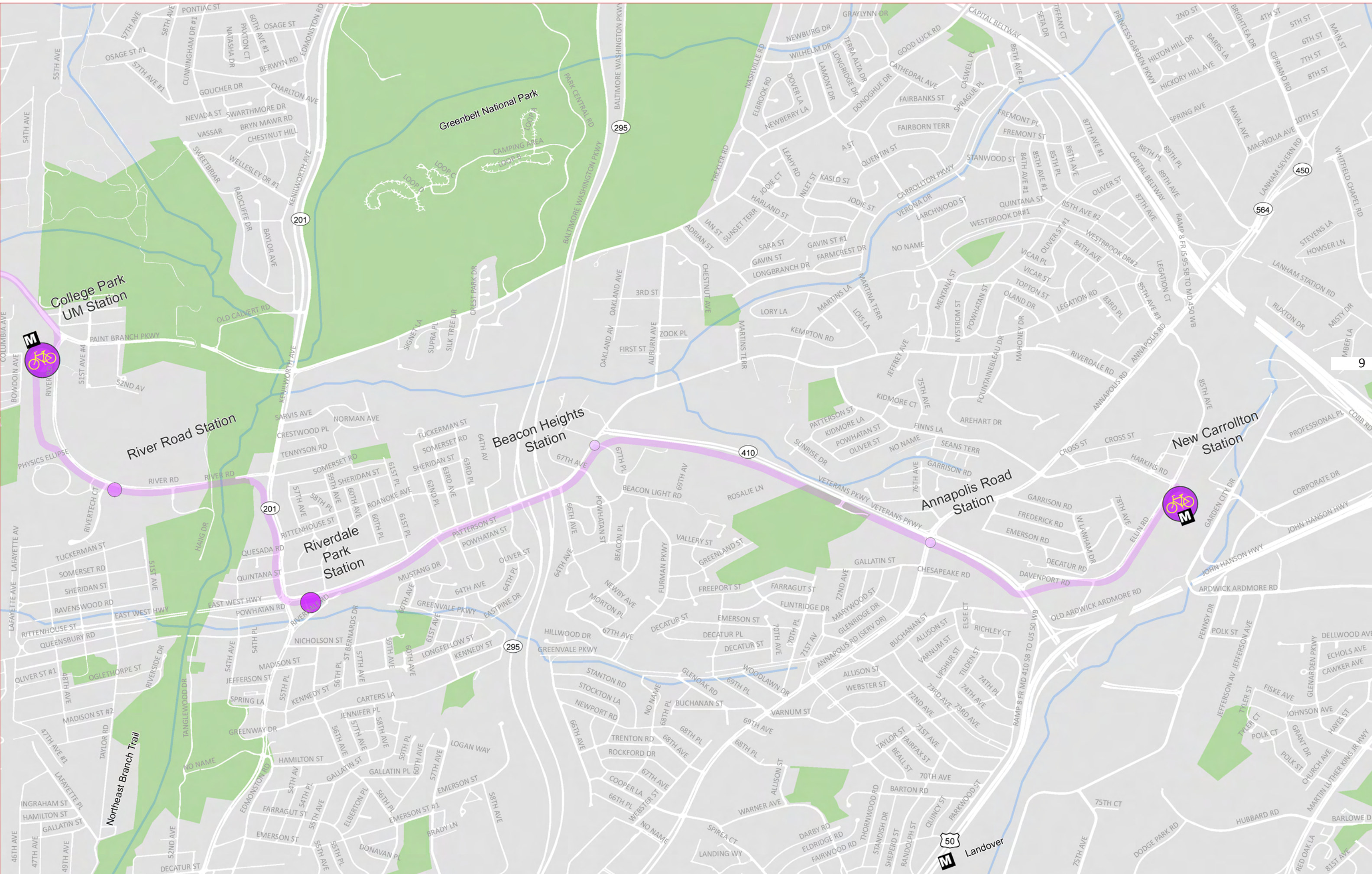
MAP 1. PURPLE LINE



Purple Line Station

-  Bike Hub
-  High Bike Parking
-  Medium Bike Parking
-  Low Bike Parking
-  Purple Line



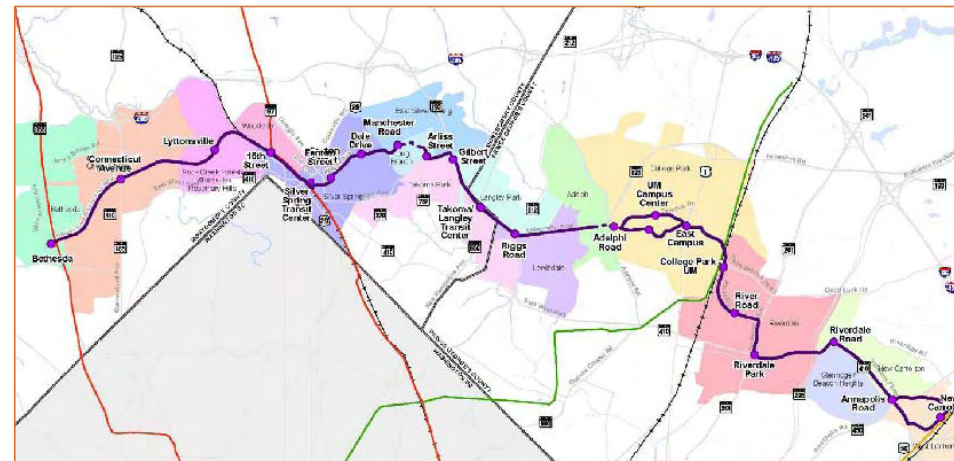


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BICYCLE AND PEDESTRIAN ACCESS SHEDS

Bicycle and pedestrian access sheds (or catchment areas) are geographic areas, to and from which light rail users can access a Purple Line station on foot or by bicycle. Access sheds are generally limited by distance or defined by barriers through which a bicyclist or pedestrian cannot readily pass. Access sheds are further limited by the travel conditions a bicyclist or pedestrian will experience making the trip, such as street crossings, topography, the presence, lack of and quality of infrastructure to facilitate the trip, and other factors.

To understand the service area of the Purple Line and the communities it serves, a Socioeconomic Report was completed as part of the AA/DEIS. The figure below is a map of Purple Line neighborhood from that report. The Bicycle and Pedestrian Shed analysis looked at access for these communities and others that will be within bicycle range of the Purple Line stations.



For this study, it was determined that bicycle sheds would extend no more than 3 miles from a station and typically extend only 1.5 to 2.0 miles. Pedestrian sheds do not extend more than a mile, and are generally up to 0.5 miles from the station. Access sheds for the

University of Maryland campus area were excluded from this analysis primarily because they are being looked at through other ongoing studies. See Appendix A for details.

PEDESTRIAN SHED RESULTS

Prior to identifying Bicycle Sheds, 21 Pedestrian Access Sheds were identified 16 sheds need improvements; 5 sheds are non-functioning. A principal assumption was that people living within walking distance would probably choose to walk instead of bicycle. Therefore, mapping which residential areas were generally close enough to walk to the station established the first limit on the Bicycle Sheds.¹ However, since bicycle access is the focus of this study, minimal analysis was completed on these sheds. See Appendix B for a map of the Pedestrian Access Sheds.

BICYCLE SHED RESULTS

The first step in the bicycle shed analysis was to identify discrete bicycle access sheds, associate them with specific stations, and delineate their boundaries. The following factors were used in this analysis:

1. Challenging physical barriers to bicycle travel
2. Actual and perceived distance²
3. Street layout and connectivity
4. Directness of optimal route(s)

1 - While there is no standard distance for this factor in the field of transit access planning, it was assumed that bicycle use would begin to be attractive from trip origins 0.35 miles from the station, and be preferred over walking from most locations 0.75 miles or more from the station. However, due to the fine-grained nature of these assumptions and the lack of existing residential density within 0.25 miles of most stations, this analysis did not attempt to account for this factor.

2 - Actual distances were measured "as the crow flies," not by length of actual usable route. Perceived distance refers to the transit users likely perception of how far the station is, or whether the station is perceived to be within the users neighborhood or an adjacent neighborhood.

5. Topography
6. Existing bicycle and pedestrian facilities on route(s)
7. New facilities or facility upgrades needed
8. Bicycling and walking conditions along usable access routes
9. Expected comfort crossing arterial roadways
10. Proximity to another Purple Line station or a Metrorail station
11. Continuity of neighborhood

The analysis was done using GIS data and other map resources, field verification, online aerial photography, and knowledge of the locally-based consulting team.

This analysis identified 49 bicycle sheds which are mapped as polygons in GIS (See Maps A and B). Each shed is named, numbered and associated with the station to which it “drains.” See Appendix C for a list of the Bicycle Sheds and their associated data.

Some areas between stations offer neighborhood residents a choice between two stations that are relatively equal in accessibility. Three of these areas are identified by hatched shading on Maps A and B.

EVALUATE FUNCTIONALITY OF DESIRED ROUTE(S) IN BICYCLE SHEDS

The following characteristics were examined to assess the functionality and quality of access within each shed:

- What routes exist for bicycling and walking today? Are these routes fully functional or compromised in some way? What are traffic conditions like along the route?
- What are the off-site barriers to bicycle and pedestrian travel to and from a station, and could they be significantly mitigated by typical bicycle/pedestrian infrastructure improvements, such as sidewalks, signed bicycle routes, bicycle lanes, safety improvements at intersections, trails, bridges over streams, lighting, etc.?
- What bicycle and pedestrian facilities will be needed along and within the Purple Line corridor to provide high quality bicycle and pedestrian access?
- How should Transit-Oriented Development site or area plans be designed to provide high quality bicycle and pedestrian access? Are changes in existing street layouts needed? Are improvements to above or below grade crossings needed? What is needed in the immediate vicinity of the station to ensure high quality bicycle and pedestrian access?
- What are the facilities already in place that support bicycle access? How can they be built upon to increase the attractiveness of bicycling to a Purple Line station?

From this analysis a basic functionality rating was assigned to each shed. Because the access values inherent in these characteristics could not be easily quantified, three subjective ratings were developed; their criteria are described following:

Type 1. Functional Sheds (Green): These sheds are functional under existing conditions, have relatively bicycle friendly conditions along easily identified routes. Many of these sheds have trails that provide access for a major portion of the route. Wayfinding signs and other minor improvements are all that would be necessary to make these sheds fully functional when the Purple Line opens.

Type 2. Sheds Needing Improvement (Yellow): These sheds have routes to stations, but have key portions of the route that would need improvements to conditions to make them sufficiently bicycle friendly to draw meaningful numbers of bicycle access trips to the Purple Line. Improvements needed may include crossing safety upgrades at major intersections, new access links to improve directness, or bicycle facilities on arterial or other key roads serving the shed.

Type 3. Non-Functional Sheds (Red): Under existing conditions these sheds meet one or both of the following criteria: a) A new facility such as a trail through a park or a bridge over a stream is needed to make the shed functional, or b) existing bicycle conditions on usable routes are sufficiently poor or existing routes are sufficiently indirect such that it is expected that no (or very few) bicycle access trips would be generated by the shed.

POPULATION ANALYSIS

To evaluate the relative potential for each bicycle shed to generate bicycle access trips, a population analysis was conducted using U.S. Census 2008 residential population estimates for census block groups. It should be noted that a number of major redevelopment areas will increase residential populations around some stations significantly, such as the East Campus Station. Moreover, unspecified but expected redevelopment in the Langley Park area and other station areas will increase residential densities as well. These factors could not be addressed in a quantitative manner in this analysis, but are factored in, in a general way when comparing the potential for each bicycle shed to generate bicycle trips to its respective station.³

Table 1. Estimated Bicycle Shed Population by Shed Status

Bicycle Shed Status (2010)	Estimated Residential Population in Mapped Sheds	Percentage
Functional Sheds	27,482	20%
Sheds Needing Improvement	45,853	33%
Non-Functional Sheds	66,086	47%
	139,421	100%

³ - Mixed Use Transit Oriented Development is generally expected to occur at most Purple Line Stations, in keeping with state and local planning and zoning policies. However, because that development will take place primarily within 0.5 miles of each station, it is expected that it will generate more pedestrian access trips to the station than bicycle trips.

BICYCLE SHED FINDINGS

Good bicycle access to Purple Line stations will be available to Type 1, Functional Sheds, when light rail service begins. However, the residential population in these sheds is just one-fifth of the population living along the light rail corridor. Table 1 indicates that if further bicycle improvements are not made prior to the opening of the Purple Line, 80% of the potential transit riders that live within bicycling distance of a station will likely be without viable bicycle access to a station. Further study should be undertaken to determine if current ridership projections are dependent on some of these populations having bicycle access to the stations. If so, bicycle access improvements may be necessary to ensure that early-year ridership projections are met.

Access planning decisions. Beyond the overall assessment presented above, the Bicycle Shed analysis can be used to inform a number of important bicycle access planning decisions (and later ridership promotion programs). For example:

- All Purple Line stakeholder agencies can better understand the potential demand for bicycle parking at each station, and how that demand will be manifested over time based upon which, if any access improvements are made and when they come on line.
- State, County and Municipal planning, parks and public works agencies can determine which improvements to bicycle access, including components of the Pink Line, may have the greatest yield in terms of increased numbers of bicycle access trips to the Purple Line. Appendix D provides a list of these physical improvements to both bicycle and pedestrian access sheds.
- The sheds provide a base, or framework, upon which further analysis of specific residential populations can be conducted. Using existing demographic data, or direct surveys of these potential customers, TDM programs or other agencies can inexpensively find out about other factors that might affect use of bicycles to access Purple Line stations.
- The County or Purple Line operating agency can use the bicycle sheds for bicycle use promotional communications that are customized to particular sheds, allowing particular stations to be targeted and particular routes, conditions or improvements to be referenced or announced.

Chapter 3 provides additional analysis of how bicycle access sheds will affect the demand for bicycle parking at stations. The effect of bicycle parking demand on station area planning and design, along with more information on bicycle hubs is included in Chapter 4.

BIKE SHED A

12

UMD Campus Routes

- Blue
- Green
- Purple
- Yellow
- orange

Pink Line By Facility

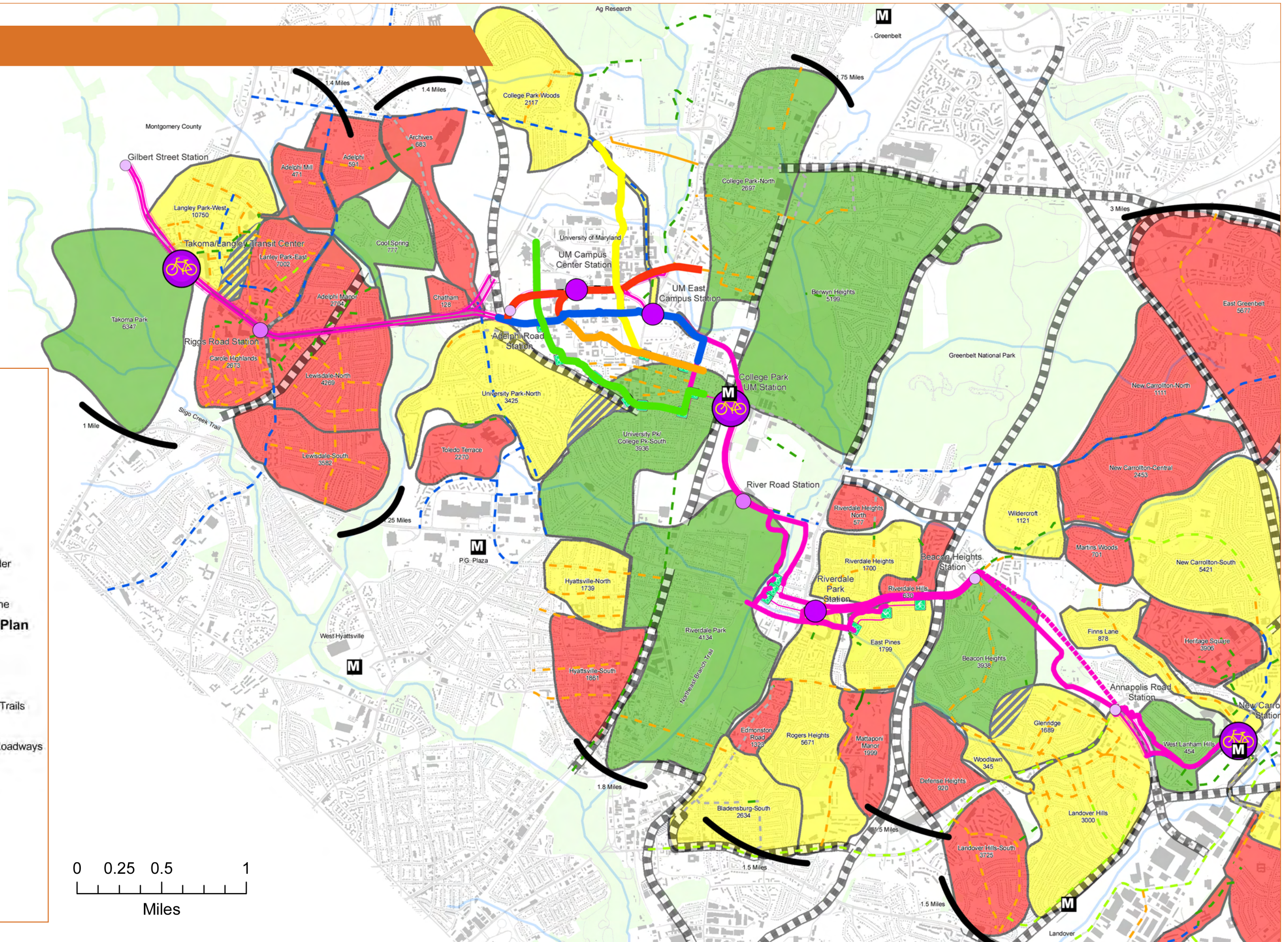
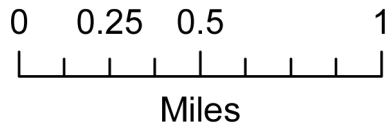
- Cycletrack & Sidewalk
- On Road
- Shared Bike Ped Shoulder
- Shared Use Path
- Slow Bike/Walk Bike Zone

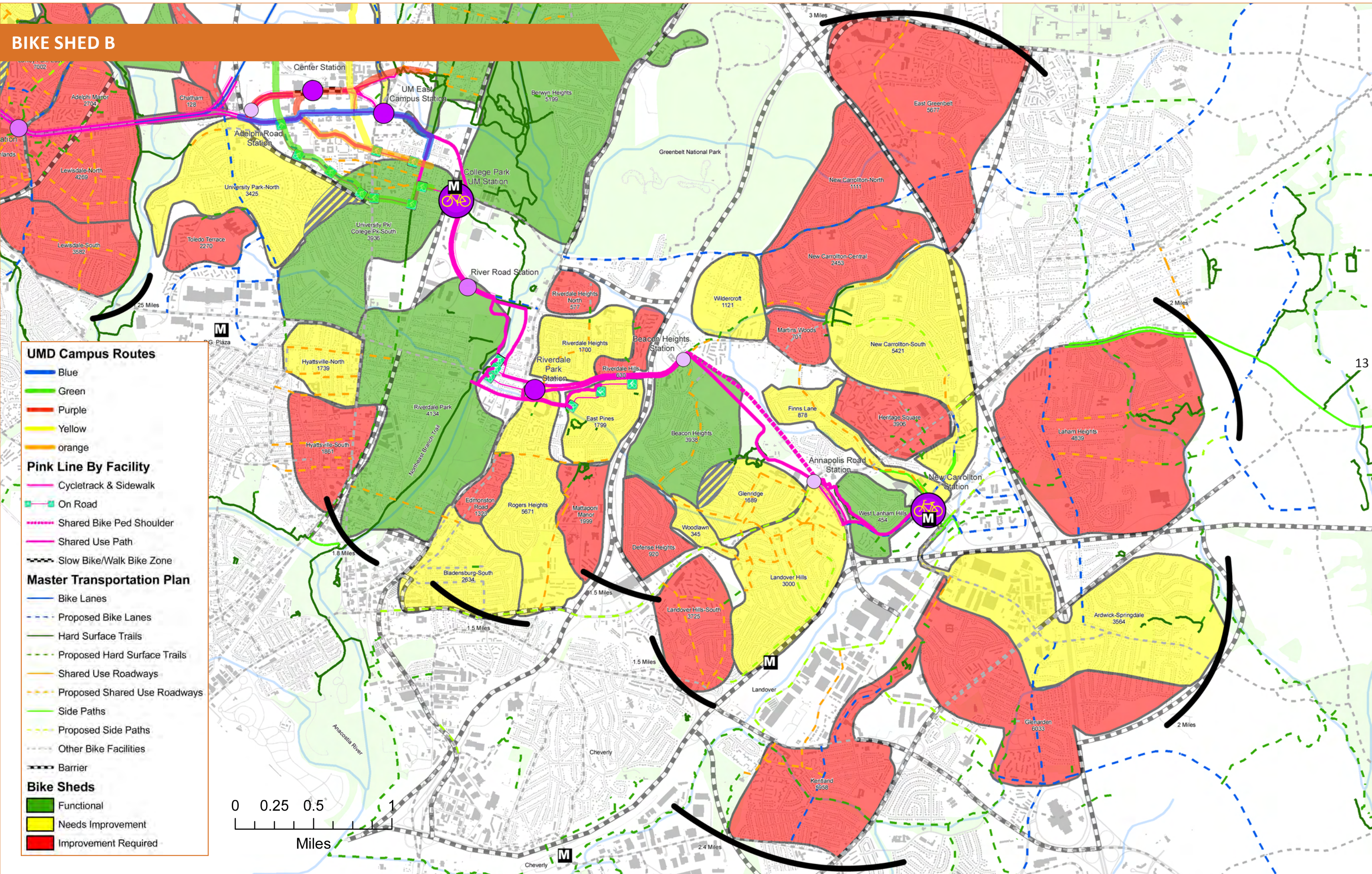
Master Transportation Plan

- Bike Lanes
- Proposed Bike Lanes
- Hard Surface Trails
- Proposed Hard Surface Trails
- Shared Use Roadways
- Proposed Shared Use Roadways
- Side Paths
- Proposed Side Paths
- Other Bike Facilities
- Barrier

Bike Sheds

- Functional
- Needs Improvement
- Improvement Required





BIKE SHED B

- UMD Campus Routes**
 - Blue
 - Green
 - Purple
 - Yellow
 - orange
- Pink Line By Facility**
 - Cycletrack & Sidewalk
 - On Road
 - Shared Bike Ped Shoulder
 - Shared Use Path
 - Slow Bike/Walk Bike Zone
- Master Transportation Plan**
 - Bike Lanes
 - Proposed Bike Lanes
 - Hard Surface Trails
 - Proposed Hard Surface Trails
 - Shared Use Roadways
 - Proposed Shared Use Roadways
 - Side Paths
 - Proposed Side Paths
 - Other Bike Facilities
 - Barrier
- Bike Sheds**
 - Functional
 - Needs Improvement
 - Improvement Required

