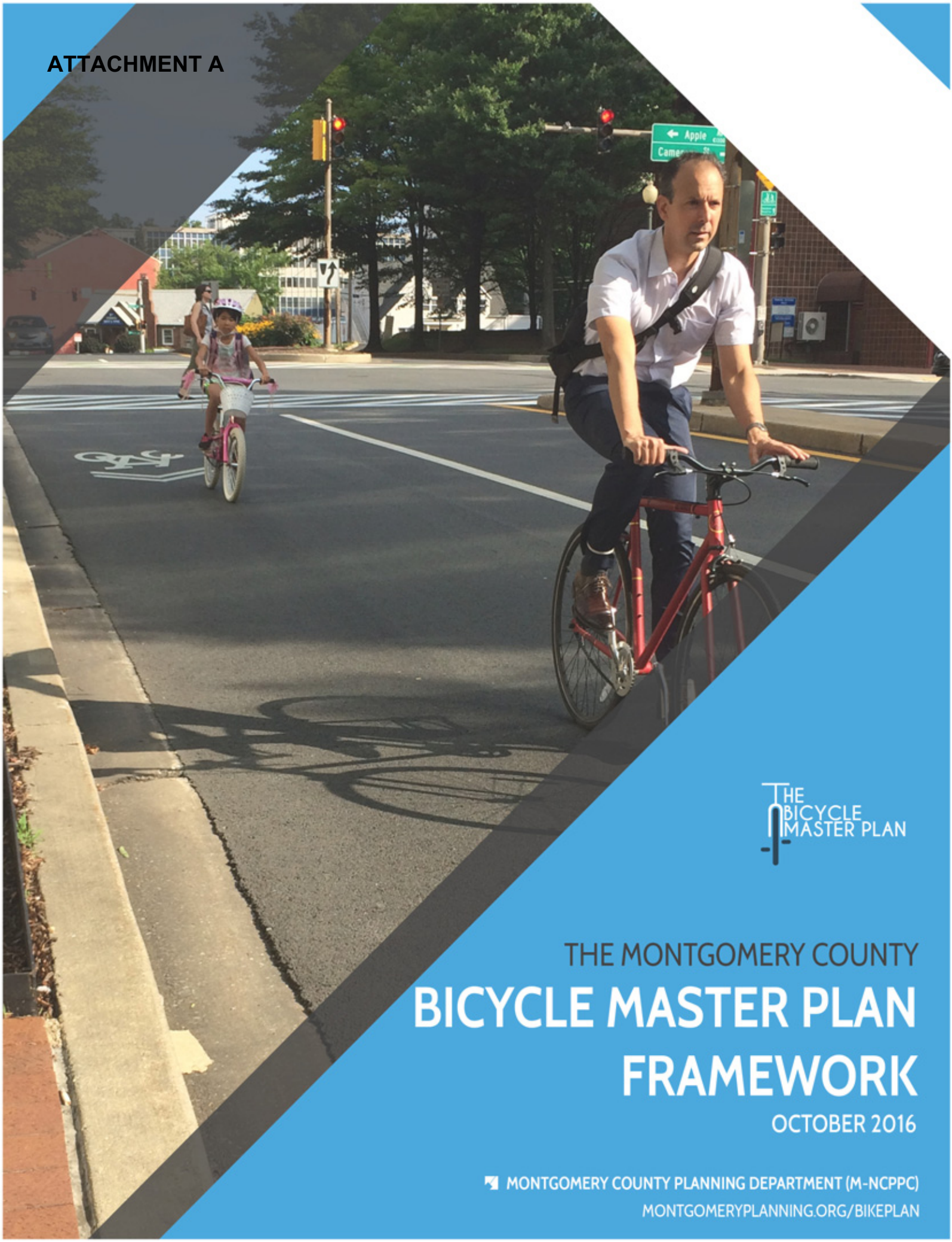
ATTACHMENT A



THE BICYCLE MASTER PLAN

THE MONTGOMERY COUNTY BICYCLE MASTER PLAN FRAMEWORK

OCTOBER 2016

MONTGOMERY COUNTY PLANNING DEPARTMENT (M-NCPPC)
MONTGOMERYPLANNING.ORG/BIKEPLAN

abstract

This report outlines the proposed framework for the Montgomery County Bicycle Master Plan. It defines a vision by establishing goals and objectives, and recommends realizing that vision by creating a bicycle infrastructure network supported by policies and programs that encourage bicycling. This report proposes a monitoring program designed to make the plan implementation process both clear and responsive.

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01 INTRODUCTION

On September 10, 2015, the Planning Board approved a Scope of Work for the Bicycle Master Plan. Task 4 of the Scope of Work is the development of a methodology report that outlines the approach to the Bicycle Master Plan and includes a discussion of the issues identified in the Scope of Work. This report is intended to fulfill Task 4 of the Scope of Work, and will be used to develop the Working Draft of the Bicycle Master Plan.

This report addresses many of the issues identified in the Scope of Work:

- What is the state of practice in using data and performance metrics to develop a bicycling network?
- What are acceptable levels of traffic stress for current and potential cyclists?
- How should the plan classify bikeway recommendations, including bikeway type (such as bike lanes, shared use path, separated bike lane, etc.)?
- If separated bikeways are needed to create a low-stress bicycling environment, when should they be implemented as separated bike lanes (a bike-only facility) or shared-use paths (a facility shared with pedestrians)?
- In what contexts are neighborhood greenways appropriate and what are the best practices for design elements?
- What is the value of signed shared roadways in master plans?
- In what conditions are separated bike lanes a replacement for dual bikeways?
- Where are long-term bicycle storage facilities needed in the County and how much space do they require for bicycle parking and other bicycle-supportive elements (such as showers, lockers, repair facilities and changing rooms)?
- How should the plan prioritize bikeways (such as countywide bikeways and local bikeways)?
- Are there any hard surface park trails that should be designated as bikeways and, if so, what does that designation mean for the design, operation and maintenance of the trails?
- What are best practices in bicycle parking in residential and commercial locations?
- How can Montgomery County implement on-road bikeways incrementally through a combination of private development and County-funded projects?
- What are the best practices in developing signed bike routes?
- How can Montgomery County maintain a "living" Bicycle Master Plan that displays all current master plan recommendations in one location?
- How can space be provided for bicyclists while maintaining and enhancing a safe, active pedestrian and urban environment?

master plan purpose

The Bicycle Master Plan is intended to set forth a vision for Montgomery County as a world-class bicycling community, where people in all areas of the County have access to a comfortable, safe and connected bicycle network, and where bicycling is a viable transportation option that improves our quality of life. The plan framework is composed of three interconnected steps (below).

The plan will focuses on increasing bicycling among the so-called "interested but concerned" population of people who want to bicycle more but are concerned for their safety.[1] These bicyclists are less tolerant of bicycling close to traffic and require separated bikeways to encourage them to bicycle on wider and faster roads. They represent about 50 percent of the population and, therefore, present the greatest opportunity to increase bicycling in Montgomery County.

> **The Bicycle Master Plan is intended to set forth a vision for Montgomery County as a world-class bicycling community...**

1

The first step is **Defining the Vision** by imagining a future that meets the goal of providing all residents access to a comfortable, safe and connected bicycle network, and expressing that vision through the goals and objectives of the Bicycle Master Plan.

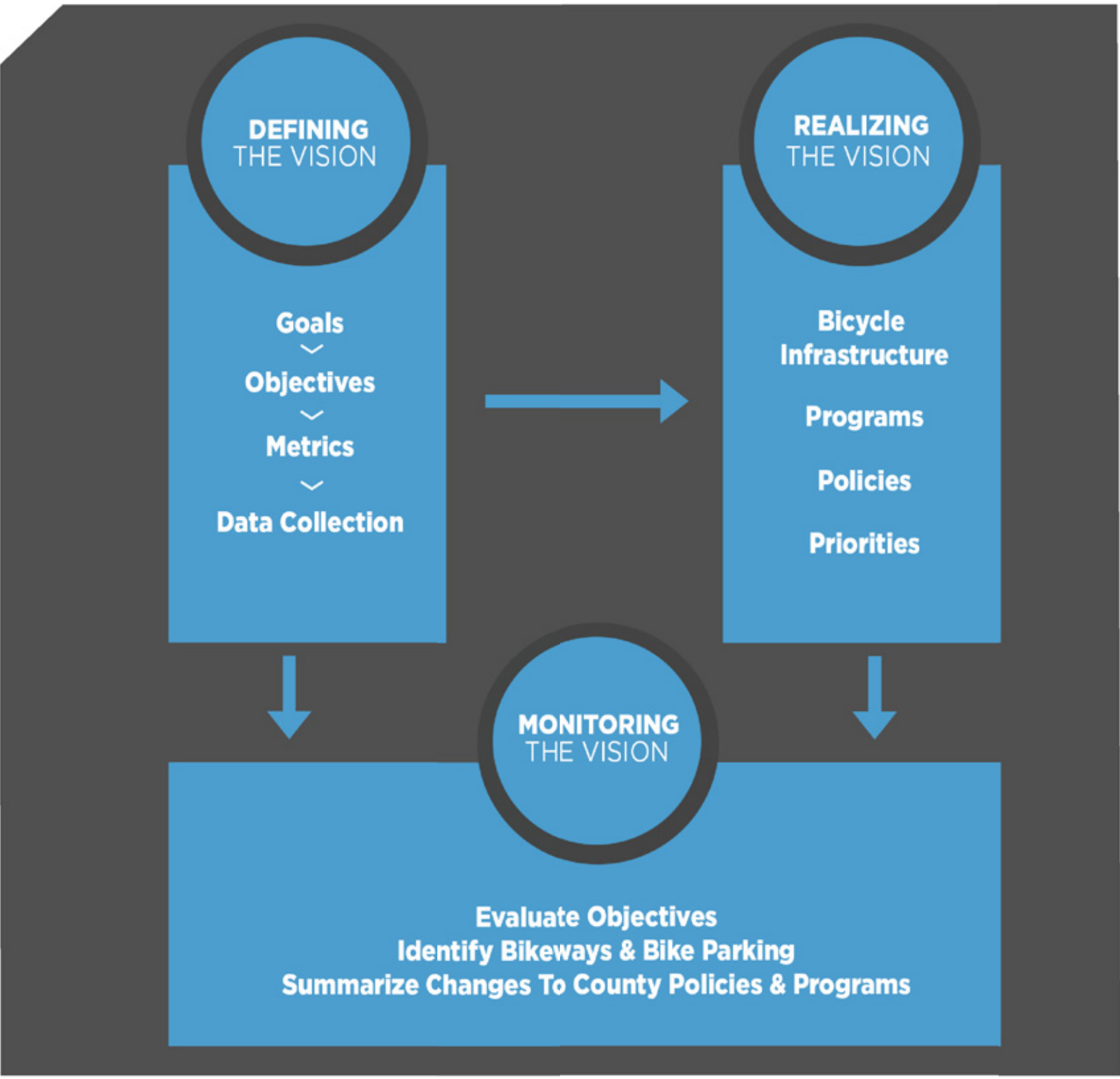
2

The second step is **Realizing the Vision** by describing specific actions that the government, property owners, stakeholders and the public can take to fulfill the vision. These actions include establishing bicycling-supportive infrastructure, programs and policies needed to make the vision a success.

3

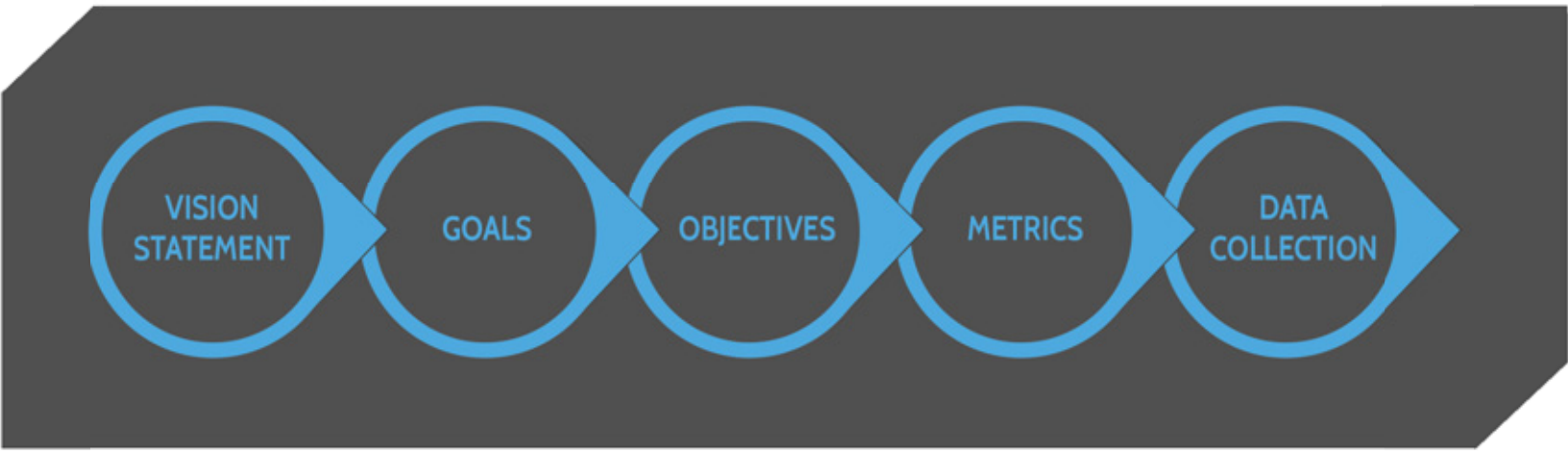
The third step consists of **Monitoring the Vision** by setting up an ongoing monitoring and evaluation program to track how well the vision of the plan is being fulfilled by evaluating our success in meeting the goals and objectives of the plan. This monitoring program supports the implementation of the plan by providing an ongoing assessment of how effective we are in creating the bicycle environment envisioned in the plan.

[1] The "interested but concerned" population is one of the "Four Types of Transportation Cyclists," an approach coined by Roger Geller, a bicycle planner for the City of Portland, Oregon. See https://www.portlandoregon.gov/transportation/article/158497


DEFINING
THE VISION
Goals
Objectives
Metrics
Data Collection
REALIZING
THE VISION
Bicycle
Infrastructure
Programs
Policies
Priorities
MONITORING
THE VISION
Evaluate Objectives
Identify Bikeways & Bike Parking
Summarize Changes To County Policies & Programs

02
DEFINING THE VISION

An essential first step in preparing the Bicycle Master Plan is to define the plan's vision. This effort begins by imagining a future that meets the goal of providing all residents access to a comfortable, safe and connected bicycle network, and expressing that vision through the goals and objectives of this plan. Defining a vision for the Bicycle Master Plan does not simply mean stating the goals on paper. It also lays the foundation for a strong monitoring program, which supports the implementation of the plan by providing an ongoing assessment of how effective we are in meeting plan goals and objectives. Of course, a vision is only as good as its components. One way the Bicycle Master Plan can deliver a world-class bicycle plan is by defining a clear and measurable vision.



Vision statements paint a clear picture of what the plan is intended to achieve. They can be further explained through goals that identify the conditions needed to achieve the vision statement.

Goals are broad conditions that are needed to achieve the plan's vision statement. They are general and brief and can always be improved. Goals do not prejudge a solution, but rather articulate the conditions that might lead to a particular solution. Each goal is described by one or more objectives that indicate the steps that need to be taken to realize the plan's goals. Goals are only as effective as the objectives that describe them.

Objectives are specific conditions that must be met to advance a particular goal. They are achievable, measurable and time-specific. Objectives are effective when they show a meaningful change among different scenarios. They do not prejudge a solution, but rather articulate the conditions that might lead to a particular solution. Objectives are more likely to be evaluated when they are carefully defined, avoid "wiggle room," and do not require substantial new data collection.

Metrics are the standards of measurement applied to objectives. They determine the data needed to assess how well the objectives are being met.

Data Collection obtains specific information that is required to derive each metric. It indicates the source of the data and whether the data is currently available, could be available with modifications to existing survey instruments or need to be collected through a new survey.

review of other bicycle plans

Staff reviewed numerous bicycle plans developed by nearby jurisdictions and municipalities outside the region, including many of the leading bicycling communities,[2] and determined that the state of the practice in using data and performance metrics is poor. The goals and objectives sections of most of these plans were found to lack coherence and links to the development and implementation of the plans.

Goals and objectives in many of these plans are used interchangeably, even though they have different meanings in a planning process. Most objectives reviewed were not measurable, not achievable and not time-specific, and, therefore, it is difficult to determine how well the plans are being implemented.

Davis, California is considered one of the most progressive bicycling communities in the country. However, the goals in its bike plan are not well defined and the stated objectives are not measurable or time-specific (example on the right).

A major drawback with these objectives is that it is not possible to definitely state when each of the objectives has been achieved because the analysis is subjective. Objectives must be objective to be effective.

The goals and targets section of the Cambridge, Massachusetts bike plan are better because many of the targets are measurable, but Goal 1 requires clarification and two of the objectives are not measurable. The Cambridge bicycle plan takes the approach of developing three goals and six targets. Goal 1, "make a significant shift towards bicycling as a sustainable mode of transportation," is probably intended to increase the amount of bicycling in the city, but by adding the phrase "as a sustainable transportation mode," it is unclear whether it is intended as a ridership goal, a sustainability goal or whether planners were intending to merge two ideas. Goal 3, "innovate and be an early adopter of best practices in bicycle infrastructure," seems to be more of an implementation goal than a master plan goal because it is difficult for master plans to anticipate innovations.

City of Davis Bike Plan

GOAL

Provide complete, safe, and attractive accessibility for bicyclists using sound engineering and planning, interagency coordination, and public involvement.

OBJECTIVES

- Ensure that bicycle facilities are an integral part of street design so that lanes and pathways form an integrated network.
- Provide a complete and safe bicycle network.
- Build on Davis' cycling past by experimenting or piloting new technology or programs for bicycles.

[2] Staff reviewed the goals and objectives for these plans: Arlington, VA, Boston, MA, Cambridge, MA, Davis, CA, Fort Collins, CO, Minneapolis, MN, Portland, OR, San Diego, CA, Salt Lake City, UT, Sacramento, CA, Seattle, WA, and Washington, DC.

While the Cambridge plan's Targets A, B, C and D (refer to chart on the right) are solid metrics, Targets E and F are too broadly defined. There are ways to measure both targets, but it is unclear how this plan proposes to determine the bicycle-friendliness of streets and prioritization of new facilities.

The proposed approach for the Bicycle Master Plan seeks to make goals, objectives and performance metrics integral parts of the planning process. We will use them to develop and prioritize the plan's recommendations, and establish a monitoring program that tracks how well the vision of the plan is being fulfilled through its goals and objectives.

The strength of our approach, shown in the example below, is that the goal is clearly articulated and the objective is achievable, measurable and time-specific. The metric identifies how the objective will be derived, and the required data is identified.

Cambridge Bike Plan

GOALS

1. Make a significant shift towards bicycling as a sustainable transportation mode
2. Create a transportation system that is safe for users of all ages and abilities
3. Innovate and be an early adopter of best practices in bicycle infrastructure

TARGETS

A. By 2020, 10% of all trips in Cambridge will be made by bicycle.
B. By 2030, 20% of all trips in Cambridge will be made by bicycle.
C. By 2020, the percentage of children walking and bicycling to school will increase 20% over 2015 numbers
D. Crash rates will continue to decrease with a goal of zero fatalities or serious injuries by 2030
E. All streets will be bicycle friendly
F. New facility are prioritized based on the Bicycle Network Vision

Bicycle Master Plan Approach to Goals, Objectives, Methods and Data Collection

GOAL 1

Increase bicycling trips in Montgomery County.

METRIC

Percentage of residents who commute by bicycle.

OBJECTIVES

Increase the percentage of Montgomery County residents who commute by bicycle to # percent by 20##.

DATA REQUIREMENTS & SOURCE

Method of transportation that people use for the longest distance segment of their trip to work (source: American Community Survey).

Note: the recommended objectives in this report lack target values and target years at this time. We plan to develop proposed values for each objective over the coming months in coordination with the Montgomery County Department of Transportation.

> Montgomery County will become a world-class bicycling community.

vision statement, goals, objectives, metrics & data requirements

We propose the following vision statement for the Bicycle Master Plan:

Montgomery County will become a world-class bicycling community. Everyone in Montgomery County will be able to travel by bicycle on a comfortable, safe and connected bicycle network. Bicycling will become a viable transportation option and elevate the quality of life in the County.

The vision statement will be defined by four goals:

GOAL 1

Increase bicycling rates in Montgomery County.

GOAL 2

Create a highly-connected, convenient and low-stress bicycling network.

GOAL 3

Provide equal access to low-stress bicycling for all members of the community.

GOAL 4

Improve the safety of bicycling.

Source: Michael Tercha/Chicago Tribune

GOAL 1

Increase bicycling rates in Montgomery County

The most important measure of success for the Bicycle Master Plan is the extent to which the amount of bicycling increases in Montgomery County. Goal 1 evaluates how bicycling increases over time among different groups of people, destinations and trip types. Success in advancing this goal is largely driven by success in advancing the other three goals of the plan and, therefore, the recommendations for bicycle infrastructure, policies and programs.

1.1 OBJECTIVE

Increase the percentage of Montgomery County residents who commute by bicycle to # percent by 20##.

METRIC

Percentage of residents who commute by bicycle.

DATA REQUIREMENT & SOURCE

- Method of transportation that people use for the longest distance segment of their trip to work (source: American Community Survey).

1.2 OBJECTIVE

Increase the percentage of people who commute by bicycle to Montgomery County's Transportation Management Districts (TMD) by 20## to:

- # percent in Downtown Silver Spring
- # percent in Downtown Bethesda
- # percent in North Bethesda
- # percent in Friendship Heights
- # percent in Greater Shady Grove
- # percent in White Oak Science Gateway (when funded)

METRIC

Percentage of commuters who bicycle as part of their commute to a Transportation Management District (Bethesda, Friendship Heights, North Bethesda, Shady Grove, Silver Spring, White Oak).

DATA REQUIREMENT & SOURCE

- Number of respondents who bicycle to work by Transportation Management District (requires changes to the existing Commuter Survey).
- Number of respondents by Transportation Management District (Commuter Surveys).

1.3 OBJECTIVE

Increase the percentage of people who access a Montgomery County transit station by bicycle to:

- # percent for Red Line stations by 20##.
- # percent for Brunswick Line stations by 20##.
- # percent for Purple Line stations by 20## (future objective when Purple Line opens).

METRIC

Percentage of boardings at rail stations that access the station by bicycle (Red Line, Brunswick Line, Purple Line).

DATA REQUIREMENT & SOURCE

- Number of boardings at each Red Line, Brunswick Line and Purple Line station that are accessed by bicycle (WMATA, MTA).
- Number of boardings at each Red Line, Brunswick Line and Purple Line station (WMATA, MTA).

1.4 OBJECTIVE

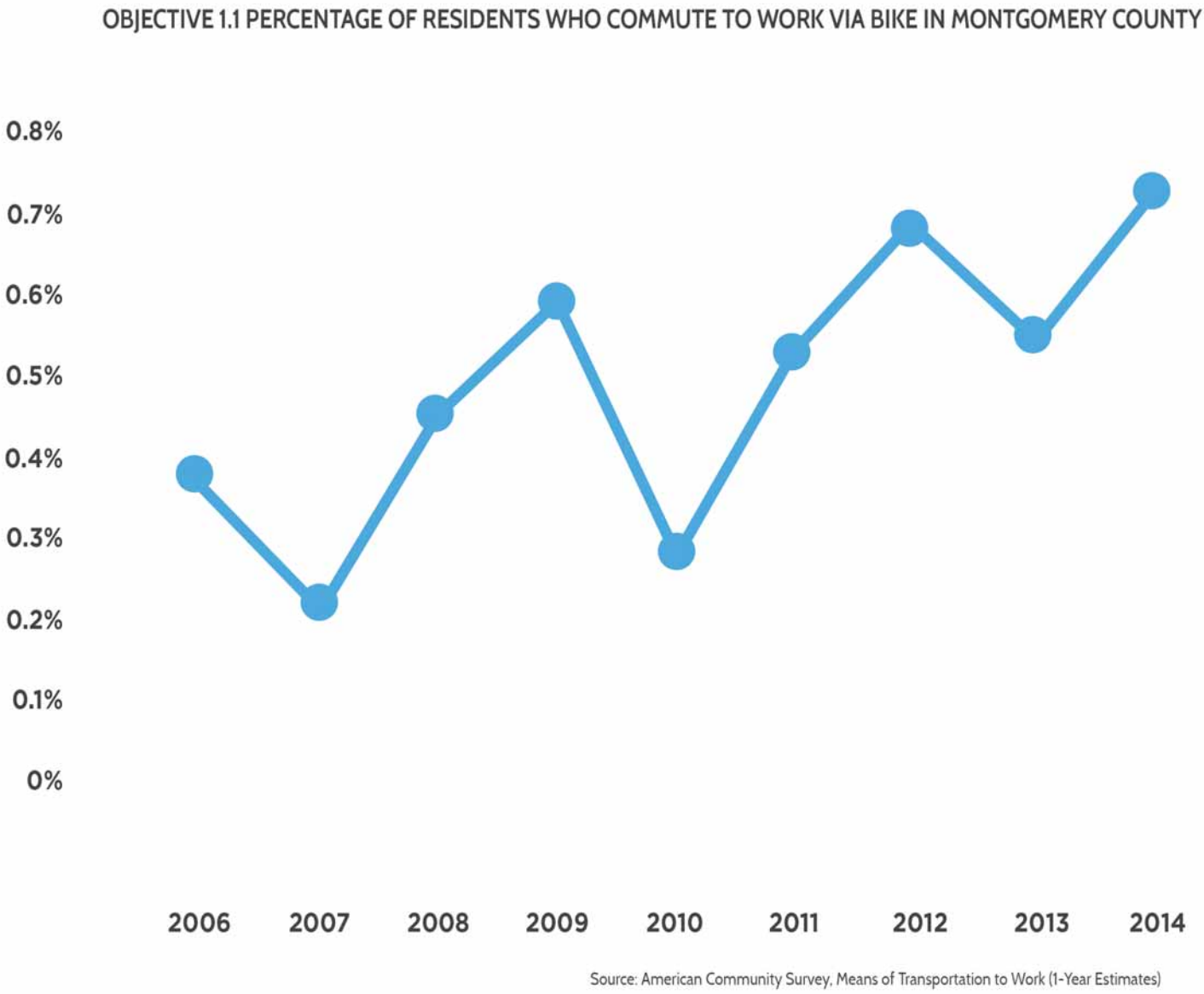
Increase the percentage of public elementary, middle and high school students who bicycle to school to # percent by 20##.

METRIC

Percentage of public school students who bicycle to elementary, middle and high school.

DATA REQUIREMENT & SOURCE

- The number of elementary school students who bicycle to school. (requires new survey conducted by MCPS).



While bicycling represents only a small share of the trips to work by Montgomery County residents, it is growing. With the emergency of a robust bicycling network connecting people to jobs and transit, this number will continue to increase.

Montgomery County Planning Department Bicycle Stress Map

GOAL 2

Create a highly connected, convenient and low-stress bicycling network

Bicycling can become a mainstream mode of transportation in Montgomery County if a low-stress network is developed that enables people to travel to the places they want to go by bicycle. While about 70 percent[3] of the roads in the County are already low-stress, they are often surrounded by high speed and high volume roads, effectively creating "islands" of connectivity. Where feasible, reductions in traffic lanes and speeds can link these "islands;" where infeasible, bicycle infrastructure, such as sidepaths, separated bike lanes and conventional bike lanes, are needed.

Simply providing a comfortable bicycling network is insufficient if people do not have a secure place to leave their bicycles when they get to their destinations. This goal also considers bicycle parking at major destinations, such as transit stations, commercial areas and public facilities, including schools, libraries, recreation centers and parks.

[3] Based on a Level of Traffic Stress evaluation of all roads where it is legal to bicycle in Montgomery County.

2.1 OBJECTIVE

percent of potential bicycle trips can be made through a low-stress bicycle network by 20##.

METRIC

Percentage of potential bicycle trips that can be made on a low-stress bicycle network.

DATA REQUIREMENT & SOURCE

- Level of Traffic Stress network (M-NCPPC).
- Regional Travel Demand Model Trip table (M-NCPPC).
- Bicycle trip length decay function (MWCOG Household Travel Survey or other source).
- Location of dwelling units (M-NCPPC).

2.2 OBJECTIVE

percent of dwelling units located within 2.0 miles of each Red Line, Brunswick Line, Purple Line and Corridor Cities Transitway station that will be connected to the rail station through a low-stress bicycling network by 20##.

METRIC

Percentage of dwelling units within 2.0 miles of Red Line, Brunswick Line, Purple Line, and Corridor Cities Transitway stations that can access the station on a low-stress bicycling network.

DATA REQUIREMENT & SOURCE

- Level of Traffic Stress network (M-NCPPC).
- Location of existing and planned Metrorail, MARC, and Purple Line stations (M-NCPPC).
- Location of dwelling units (M-NCPPC).

2.3 OBJECTIVE

percent of dwelling units located within the attendance zone of elementary, middle and high schools will be connected to the school through a low-stress bicycle network by 20##.

METRIC

Percentage of dwelling units located within the attendance zone of elementary, middle and high schools that are connected to each school through a low-stress bicycle network.

DATA REQUIREMENT & SOURCE

- Level of Traffic Stress network (M-NCPPC).
- Location of Montgomery County public schools (M-NCPPC).
- School boundaries (M-NCPPC).
- Location of dwelling units (M-NCPPC).

2.4 OBJECTIVE

percent of dwelling units located within 2.0 miles of public facilities will be connected to that facility through a low stress bicycling network by 20##.

METRIC

Percentage of dwelling units within 2.0 miles of each public library, recreation center and regional/ recreational park that can access the library on a low-stress bicycling network.

DATA REQUIREMENT & SOURCE

- Level of Traffic Stress network (M-NCPPC).
- Locations of public libraries (M-NCPPC).
- Locations of recreation centers (M-NCPPC).
- Locations of regional and recreational parks (M-NCPPC).
- Location of dwelling units (M-NCPPC).

2.5 OBJECTIVE

By 20##, ## of 12 Red Line stations, ## of 11 Brunswick Line stations and ## of 11 Purple Line stations in Montgomery Co will have a bike station.

METRIC

Number of rail stations in Montgomery County with a bike station (Red Line, Brunswick Line and Purple Line).

DATA REQUIREMENT & SOURCE

- Locations of bike stations (M-NCPPC).

2.6 OBJECTIVE

percent of Montgomery County public schools will have 1 bicycle parking space for each 20 students of planned capacity by 20##.

METRIC

Percentage of Montgomery County public schools with at least 1 bicycle parking space for each 20 students of planned capacity (elementary schools middle schools, high schools).

DATA REQUIREMENT & SOURCE

- Number of bike racks at each Montgomery County public school (RackSpotter, www.rackspotter.com).
- Planned capacity at each Montgomery County public school (MCPS).

2.7 OBJECTIVE

percent of blocks in commercial areas will have at least ## percent of the amount of short-term bicycle parking spaces required by the current zoning code by 20##.

METRIC

Percentage of blocks in commercial areas that have at least ## percent of the amount of short-term bicycle parking spaces required by the current zoning code.

DATA REQUIREMENT & SOURCE

- Locations of bike racks in Montgomery County (RackSpotter, www.rackspotter.com).
- Short-term bicycle parking requirements by zoning category (Montgomery County Planning Department).
- Existing land use in commercial areas (Montgomery County Planning Department).

2.8 OBJECTIVE

percent of Montgomery County public libraries and recreation centers will have 1 short-term bicycle parking space per 10,000 square feet of floor area by 20##.

METRIC

Percentage of Montgomery County public libraries and recreation centers with 1 short-term bicycle parking space per 8,000 sq. ft. of floor area that are "acceptable" bike rack styles per the standard in the Assoc. of Pedestrian and Bicycle Professionals' *Bicycle Parking Guidelines 2nd Edition*.

DATA REQUIREMENT & SOURCE

- Location of libraries and recreation centers (M-NCPPC).
- Square feet of floor area per library and recreation center (Department of General Services).

2.9 OBJECTIVE

percent of Montgomery County regional and recreational park facilities will have bike racks by 20##.

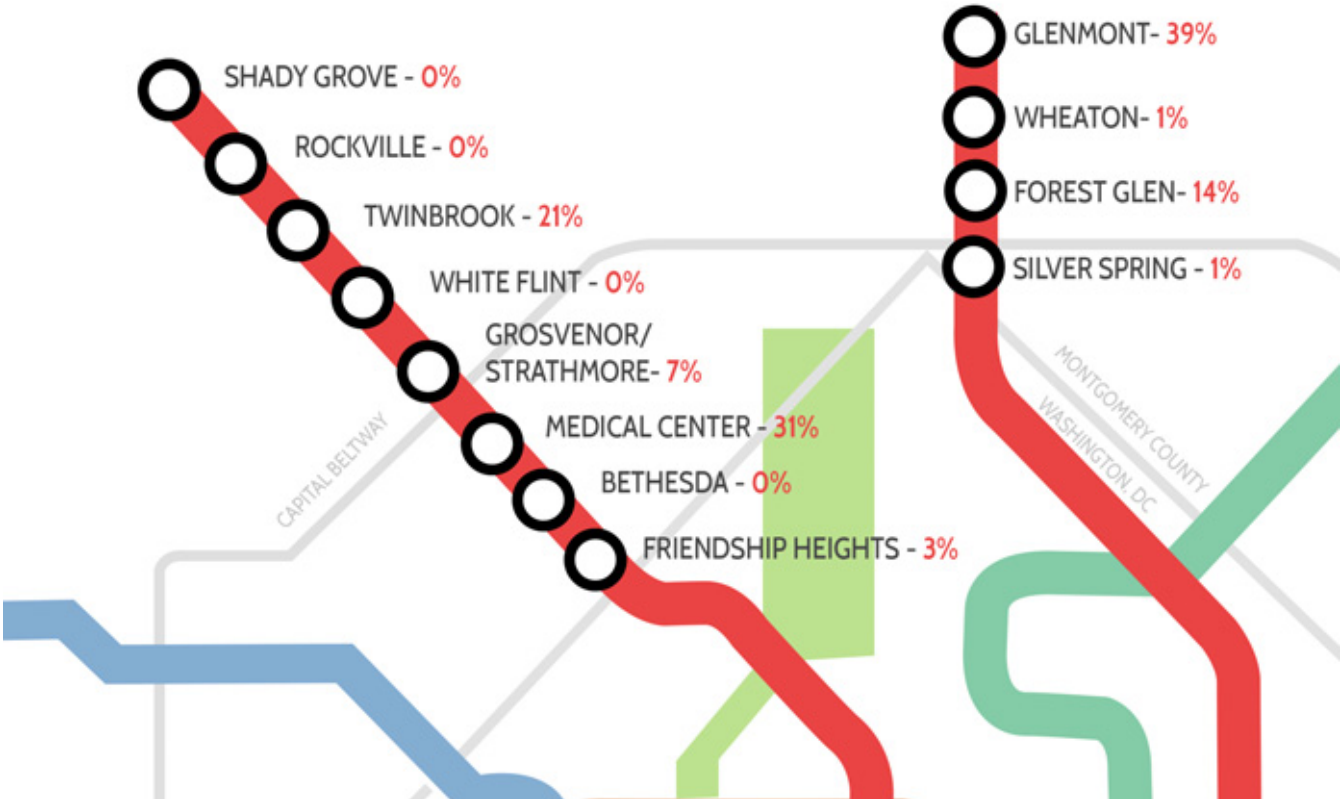
METRIC

Percentage of Montgomery County regional and recreational park facilities that have bike racks.

DATA REQUIREMENT & SOURCE

- Location of regional and recreational parks (M-NCPPC).
- Locations of bike racks in Montgomery County (RackSpotter, www.rackspotter.com).

OBJECTIVE 2.2: PERCENTAGE OF DWELLING UNITS WITHIN 2.0 MILES OF EACH RED LINE STATION THAT ARE CONNECTEDTO THE STATION THROUGH A LOW-STRESS BICYCLING NETWORK



Bike Lane on Carroll Avenue, Takoma Park

GOAL 3

Provide equal access to low-stress bicycling for all members of the community

Equal access to low-stress bicycling for all members of the community, including people with incomes below the average median income for the County, is a critical aspect of a world-class bike plan. Since many of these areas may be far from a Red Line, Brunswick Line or future Purple Line station, this goal also considers the ability of residents in these areas to access bus stops on a low-stress bicycling network.

3.1 OBJECTIVE

The percentage of bicycle trips that can be made on a low-stress bicycling network in Census tracts where the median income is below 60 percent of the County average median income will be the same as or greater than the County overall.

METRIC

Percentage of potential bicycle trips that can be made on a low-stress bicycling network in Census tracts where the median income is below 60 percent of the County average median income.

DATA REQUIREMENT & SOURCE

- Level of Traffic Stress network (M-NCPPC).
- Regional Travel Demand Model Trip table (M-NCPPC).
- Bicycle trip length decay function (MWCOG Household Travel Survey).
- Location of dwelling units (M-NCPPC).
- Census tracts where the median income is below 60 percent of the County average median income (US Census).

3.2 OBJECTIVE

The # percentage of dwelling units within 0.5 miles of the nearest Metrobus or RideOn bus stop that will be connected to the bus stop through a low-stress bicycling network in areas where the median income is below ## percent of the County average median income will be the same as or greater than the County overall.

METRIC

Percentage of dwelling units within 0.5 miles of the nearest Metrobus or RideOn bus stop that will be able to access the bus stop on a low-stress bicycling network in areas where the median income is below ## percent of the County average median income.

DATA REQUIREMENT & SOURCE

- Level of Traffic Stress network (M-NCPPC).
- Location of bus stops (Montgomery County).
- Location of dwelling units (M-NCPPC).
- Areas where the median income is below ## percent of the County average median income (US Census).

GOAL 4

Improve the safety of bicycling

The intent of this goal is to make bicycling safe by reducing the rate of crashes at dangerous locations, thereby reducing injuries and eliminating fatalities. While safety can be improved by taking active measures to reduce travel speeds and providing separation from traffic, this goal will be evaluated by reactive metrics based on crash reports.

4.1 OBJECTIVE

Reduce the ratio of bicycle crashes to bicycle trips at the ## highest crash locations in the County to ## percent by 20##.

METRIC

The ratio of bicycle crashes to bicycle trips at the ## highest crash locations in the County.

DATA REQUIREMENT & SOURCE

- A bicycle crash is when a bicycle collides with another vehicle, pedestrian, animal, road debris or other stationary obstructions, such as a tree or utility pole.
- Bicycle crash reports (Montgomery County CountyStat).
- Bicycle counts at major crash locations (requires new data collection).

4.2 OBJECTIVE

Eliminate bicycle deaths by 20## (based on adoption of Vision Zero by the Montgomery County Council in October 2016)

METRIC

The number of bicyclist fatalities per year.

DATA REQUIREMENT & SOURCE

- Bicycle crash reports (Montgomery County CountyStat).

goals & objectives considered but not recommended

Numerous bicycle master plans from communities as diverse as Fairfax County, Virginia and Portland, Oregon were reviewed for their goals and objectives and considered for inclusion in the Bicycle Master Plan. Most of the goals in these plans fit into eight categories:

1. Increased bicycling
2. Connectivity
3. Equity
4. Safety
5. Economic development
6. Environmental quality
7. Health
8. Livability

Of these eight categories, only the connectivity, equity and safety goals express **conditions** that are needed to achieve the plan's vision. Furthermore, each goal can be continuously improved upon and described by one or more objectives that are measurable based on readily available data.

The increased bicycling category is an **outcome** rather than a condition needed to achieve the plan's vision. It is measurable and time specific, can show a meaningful change and relies on existing data sources.

The economic development, environmental quality and health categories are all relevant to Montgomery County, and are frequently cited by decision makers, planners and designers as reasons for supporting bicycling. However, we do not believe they should be included as goals because developing effective objectives for them would:

- Require an extensive data collection program.
- Present challenges to prove different bicycling scenarios can significantly change economic, environmental and health conditions in the County.
- Hinder monitoring programs and policy changes by presenting broad, ambitious objectives that cannot be easily measured or funded.

For these reasons, we strongly recommend against including the categories of economic development, environmental quality and health. If the means to collect the data to evaluate these goals becomes easier to collect, these goals should be reconsidered.

Livability is also relevant to Montgomery County, but is exceedingly difficult to define. In fact, is it likely that all of the preceding goals are a component of livability. So rather than include it as a separate goal, we have included livability in the vision statement.

The proposed objectives for the goals in this plan reflect what can be realistically measured at this time. If too many objectives are included that require new data collection or are overly cumbersome, the assessment of the objectives may fail.

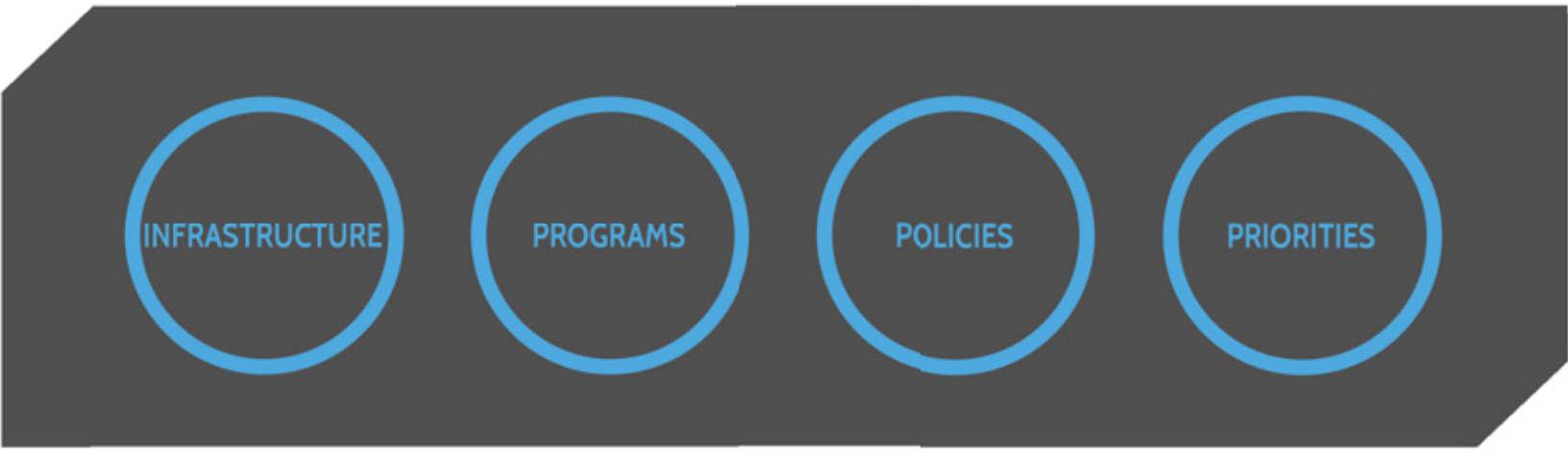
Therefore, we propose to focus the initial master plan assessment on the objectives of increase bicycling, connectivity, equity and safety. Once we can successfully assess these objectives, we should consider the following aspirational objectives, which would make the evaluation of the goals more comprehensive:

Aspirational Objectives

- Increase the percentage of people who access a Montgomery County bus rapid transit (BRT) station by bicycle to # percent by 20##.
- Increase the percentage of people who bicycle for non-work and non-school trips by # percent by 20##.
- Increase the percentage of people who bicycle to work in:
    - Clarksburg Town Center to ## percent by 20##.
    - Germantown Town Center to ## percent by 20##.
    - Olney Town Center to ## percent by 20##.
- # percent of dwelling units located within 1.0 mile of each BRT station will be able to access the rail station on a low-stress bicycling network by 20##.
- # percent dwelling units located within 0.5 miles of each Metrobus and RideOn bus stop will be able to access the bus stop on a low-stress bicycling network by 20##.
- # percent of jobs located within 1.0 miles of each rail station will be able to access the rail station on a low-stress bicycling network by 20##.
- ## percent of existing apartment and condo buildings will have secure, enclosed bicycle parking by 20##.
- Reduce the ratio of serious injuries per bicycle trip in the County by ## percent by 20##.
- Reduce the ratio of fatalities per bicycle trip in the County by ## percent by 20##.
- Increase the number of youth in bike safety classes by # percent by 20##.

03
REALIZING THE VISION

An essential step in preparing the Bicycle Master Plan is to make recommendations on how to realize the plan's vision. This section includes concrete actions that government, property owners, stakeholders and the public can take to fulfill the vision. It includes identifying a network of bicycle parking and bikeways, and recommending bicycling-supportive programs and policies.



Bicycle-supportive **infrastructure** focuses on a highly-connected and low-stress bikeway network. This network includes physical improvements on higher stress roads so that the majority of roads and trails in Montgomery County that are already appropriate for people of all ages and bicycling abilities can be knitted together.

Bicycle-supportive infrastructure also includes adequate and secure bicycle parking, since many people will not ride a bicycle as part of their work, school or shopping trip if they are concerned that their bicycles will be damaged or stolen. This infrastructure includes privately maintained bicycle parking spaces at residential and commercial buildings, and publicly maintained parking spaces at activity centers, such as transit stations, employment centers and commercial areas.

Bicycle programs encourage bicycling by identifying bicycle-supportive events, services, opportunities and projects. **Bicycle policies** guide actions taken by the government that affect bicycling, including laws, policies, standards and guidelines.

Since infrastructure, programs and policies take time and resources to implement, the Bicycle Master Plan will **prioritize** those that contribute most to the vision of the plan as measured by the goals and objectives.

low-stress bicycling

In 2006, Peter Geller, a bicycle planner with the city of Portland, Oregon, proposed an approach to classifying people who bicycle that he called the "four types of transportation cyclists." These types included the "strong and fearless" group, who are comfortable bicycling regardless of road conditions; the "enthused and confident" group, who are comfortable sharing the roadway with traffic, but prefer their own space; the "interested but concerned" group who would bicycle more if they felt safer; and the "no way no how" group, who are not currently interested in bicycling.

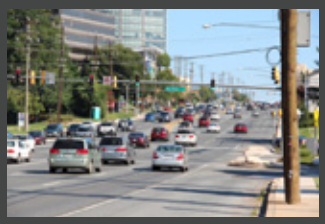
While Portland spent many years working to improve bicycling, Geller argued that the city's efforts were largely focused on improving bicycling for the "enthused and confident" group, and that new approaches were needed to attract the "interested but concerned" population to bicycle for transportation.

A recent nationwide study by Portland State University indicates that while the "strong and fearless" and "enthused and confident" bicyclists account for about 12 percent of the population in the United States, "interested but concerned" bicyclists account for about 50 percent of the population and therefore represent the greatest opportunity for increasing numbers of people who bicycle.[4]

7%

STRONG & FEARLESS

Very comfortable on non-residential streets without bike lanes.



5%

ENTHUSED & CONFIDENT

Very comfortable on non-residential streets with bike lanes.

51%

INTERESTED BUT CONCERNED

Less than very comfortable on non-residential street with or without bike lanes.

37%

NO WAY, NO HOW

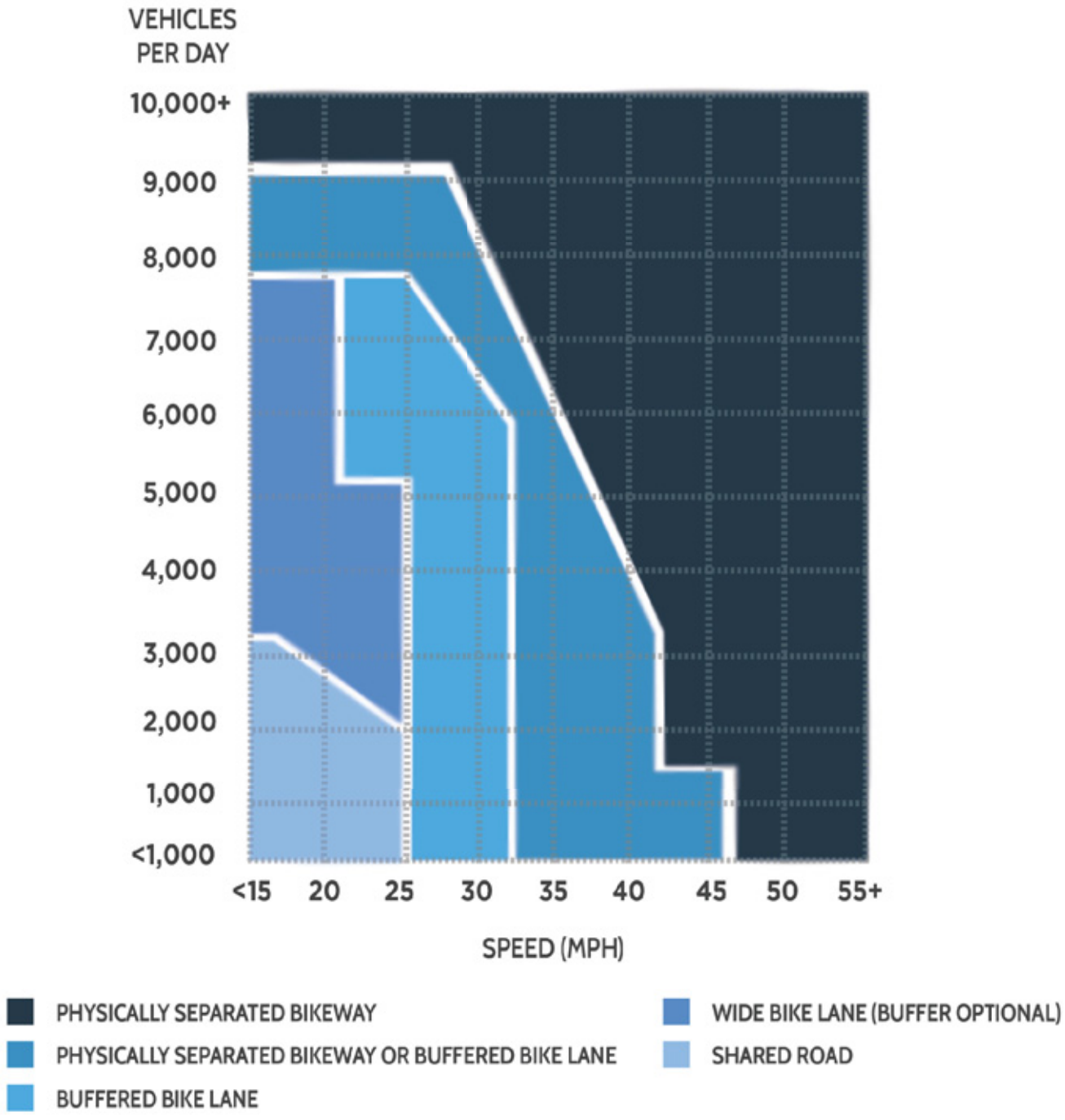
Everyone else.

THE FOUR TYPES OF TRANSPORTATION CYCLISTS

[4] Jennifer Dill and Nathan McNeil, "Revisiting the Four Types of Cyclists: Findings from a National Survey," Transportation Research Record: Journal of the Transportation Research Board, forthcoming.

The Bicycle Master Plan team is using two tools to identify those Montgomery County streets that are excessively stressful for the "interested but concerned" population.

The first tool, shown in the graph below, conveys the types of bikeways that are needed to make bicycling mainstream under different combinations of traffic speed and volume. For instance, a road with a posted speed limit of 35 mph and a daily traffic volume of 9,000 vehicles would require a separated bikeway to attract the "interested but concerned" population.



The Level of Traffic Stress methodology[5] is a more detailed planning tool used to evaluate the amount of traffic stress that bicyclists experience on road segments, intersection approaches and unsignalized crossings. Using this approach, a street network can be classified according to four stress levels, ranging from low stress to high stress:

For a bicycle network to attract the broadest segment of the population, it must provide low-stress connectivity, defined by the methodology as "providing routes between people's origins and destinations that do not require cyclists to use links that exceed their tolerance for traffic stress, and that do not involve an undue level of detour." This tool will be used to identify roadway segments and crossings where a bicycle treatment is needed to reduce the stress level.

The Level of Traffic Stress method offers several advantages over other planning tools. First, the data is generally available through publicly accessible mapping tools, such as Google Streetview. Second, it provides a consistent approach to evaluating traffic stress. Third, it can be tied to the "four types of transportation cyclists" classification so that planners can determine how well existing planned bicycle networks are connected for different user groups.

The analysis applies a "weakest link" logic, wherein the stress level is assigned based on the lowest-performing attribute of the street. For example, even if a segment has mostly low stress characteristics, the occurrence of one higher-stress attribute (for example, frequent bike lane blockage) dictates the stress level for the segment.

[5] Mekuria, Maaza, Peter G. Furth, and Hilary Nixon, Low-Stress Bicycling and Network Connectivity, San Jose, CA: Mineta Transportation Institute, 2012.

The Level of Traffic Stress methodology identifies four stress levels:

- LTS 4 – High stress, suitable for few adults (about 7 percent of adults).
- LTS 3 – Moderate traffic stress, for some adults (about 12 percent of adults).
- LTS 2 – Low traffic stress, suitable for most adults (about 63 percent of adults).
- LTS 1 – Very low traffic stress, suitable for most children.

The Level of Traffic Stress (LTS) methodology focuses on the following criteria for evaluating traffic stress on road segments, intersection approaches and unsignalized crossings:

Segments

- Number of traffic lanes.
- Speed limit or prevailing speed.
- Frequency of on-street parking turnover.
- Presence of a bikeway facility (such as sidepaths, bike lanes, separated bike lanes, etc).

Intersection Approaches

- Presence of right turn lane(s).
- Length of right turn lane.
- Turn lane configuration (bike lane shifts vs. bike lane continues straight).

Unsignalized Crossings

- Width of cross street.
- Speed limit of cross street.
- Presence or absence of median refuge.

Generally, "strong and fearless" cyclists will be comfortable bicycling on roads of all stress levels. "Enthused and confident" cyclists will be comfortable bicycling on roads with a LTS of 3 or lower. "Interested but concerned" bicyclists will be comfortable on facilities with an LTS of 1 or 2.

The Bicycle Master Plan team evaluated more than 3,500 miles of roads and trails in Montgomery County – including all roads where it is legal to ride a bicycle – using a modified version of the Level of Traffic Stress methodology. Our analysis found that 78 percent of roads and trails in the County can be considered lower stress while 22 percent of roads and trails can be considered higher stress.

To achieve a bicycling network that appeals to the "interested but concerned" population, the Bicycle Master Plan will focus on reducing traffic stress levels to a low stress (LTS 2) countywide and to a very low stress (LTS 1) around places visited by children, including schools, libraries, parks and recreation centers.

To convey level of traffic stress to decision makers and the public, Planning Department staff created a Bicycle Stress Map that describes traffic stress, provides videos of several traffic stress levels and indicates how each road and trail in the County was evaluated.

The Montgomery County Planning Department's Bicycle Stress Map
www.mcatlas.org/bikestress

infrastructure

The Bicycle Master Plan will recommend at least two types of bicycle infrastructure: bikeways and bicycling parking.

bikeways

Bikeway recommendations will focus on increasing bicycling among the "interested but concerned" population by identifying a network of bikeways composed of neighborhood streets, off-road paths and infrastructure improvements on streets where bicycling is stressful for most people.

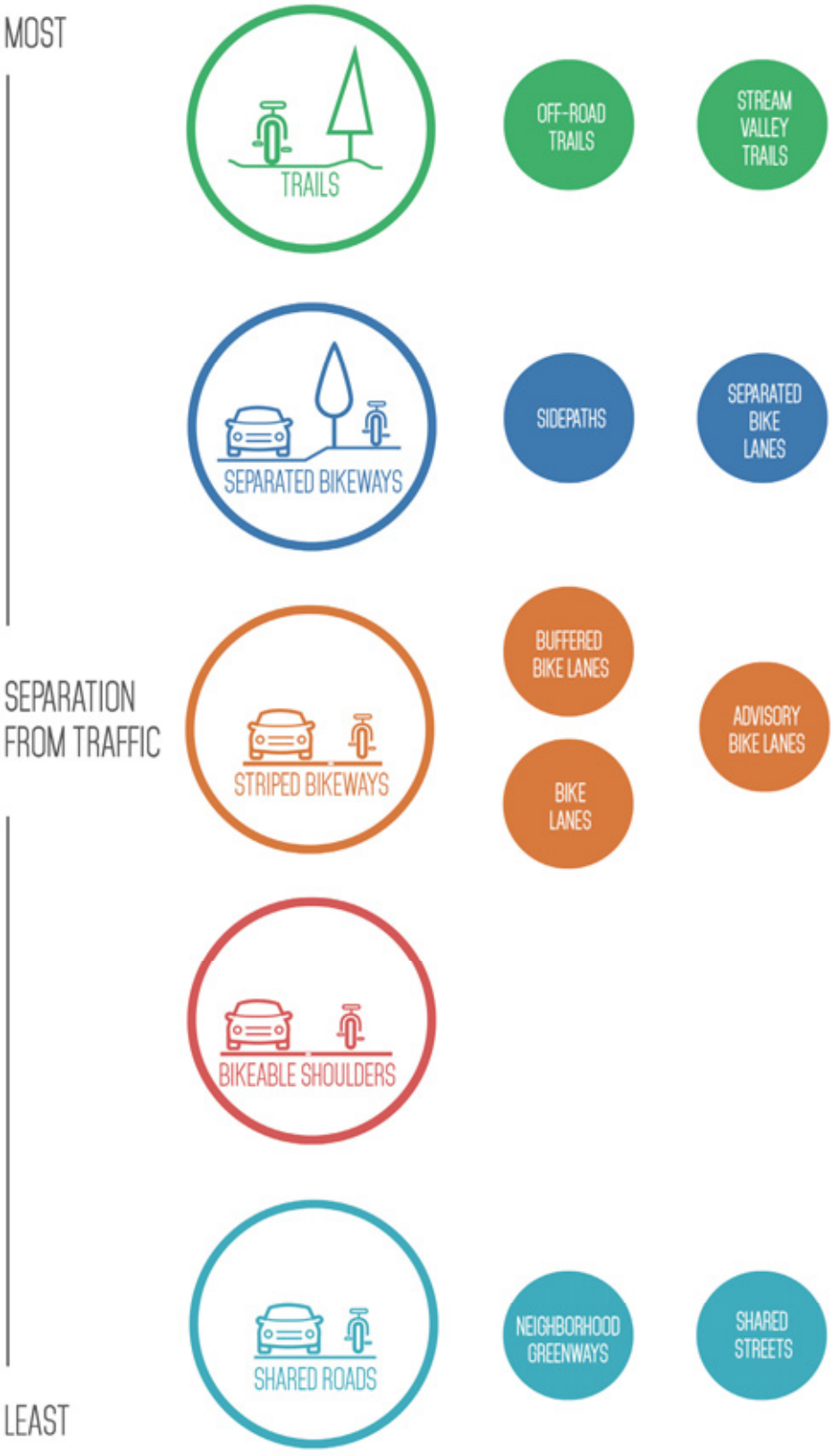
Montgomery County currently classifies each master-planned bikeway as one of five facility types:

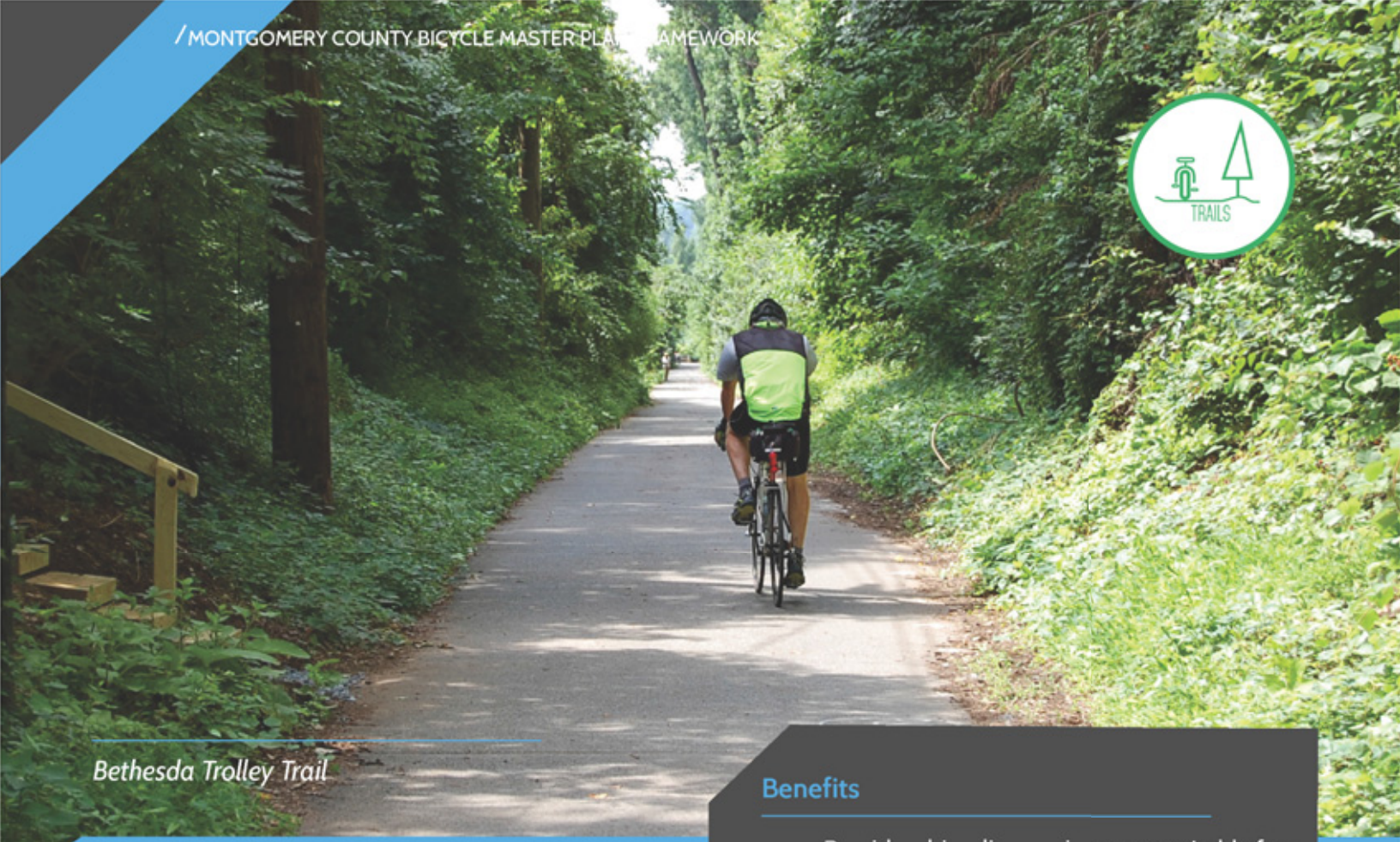
- **Shared use paths** are paved, two-way paths that are typically 10 feet wide, but can vary between 8 feet and 14 feet wide, and are designated for walking, bicycling, jogging and skating. They are separated from motorized traffic by a curb, barrier or landscaped panel. Shared use paths are sidepaths when they are located within a street right-of-way, and trails when they are located within a separated right-of-way.
- **Separated bike lanes** are exclusive bikeway facilities that combine the user experience of a separated path with the on-street infrastructure of a conventional bike lane. They are physically separated from motor traffic by curbs, landscaped panels and /or parking and distinct from the sidewalk.
- **Signed shared roadways** are streets that are shared by both bicycle and motor vehicle travel and are signed as such. They include streets with wide curb lanes, streets with paved shoulders or low volume and low speed streets with no additional accommodation for bicycles.
- **Dual bikeways** feature two types of bikeways: a shared use path and bike lanes, or a shared use path and signed shared roadway. The dual bikeway accommodates both on-road and off-road bicycling along the same roadway.
- **Bike lanes** are a portion of a street designated for the exclusive use of bicycles and are distinguished from traffic lanes by striping, signing and pavement markings.

PROPOSED BICYCLE FACILITY CLASSIFICATION

As part of the Bicycle Master Plan, a new bikeway facility classification system (right) is proposed for Montgomery County. This classification system organizes bikeway facility types into five facility classifications based on their level of separation from traffic. It includes bikeway facility types that were unavailable or not commonly used when the County last comprehensively amended its bikeway plan in 2005 and removes obsolete bikeway facilities.

BICYCLE FACILITY CLASSIFICATION





Bethesda Trolley Trail

TRAILS

Trails are paths that are located outside of the road right-of-way. They provide two-way travel designated for walking, bicycling, jogging and skating. Trails are typically 10 feet wide, but can vary between 8 feet (in constrained locations) and 14 feet wide (where usage is likely to be higher). On trails with very high levels of walking and bicycling, spaces for pedestrians and bicyclists are often separated to reduce conflicts and improve comfort. Trails include **Off-Road Trails** and **Stream Valley Trails**.

Benefits

- Provide a bicycling environment suitable for all ages and abilities.
- Tend to have fewer at-grade crossings than other bikeways.

Typical Application

- Often located within existing or unused railroad rights-of-way, utility rights-of-way or along linear environmental features, such as streams and rivers.

Examples in Montgomery County

Stream Valley Trails:

- Rock Creek Trail
- Sligo Creek Trail

Off-Road Trails:

- North Bethesda Trail
- Capital Crescent Trail

Separated Bike Lanes on Woodglen Drive, North Bethesda

SEPARATED BIKEWAYS

Separated bikeways provide physical separation from traffic and include **sidepaths** and **separated bike lanes**. Generally, they will be considered on any road with one or more of the following characteristics:

- Traffic lanes: 4 lanes or more.
- Posted speed limit: 35 mph or faster.
- Traffic: 6,000 vehicles per day or more.
- On-Street parking turnover: frequent.
- Bike lane obstruction: likely to be frequent.

Once the decision is made to provide a separated bikeway from traffic, planners must determine whether the bikeway should also be separated from pedestrians.

Pedestrian demand will be the primary consideration for determining whether a separated bikeway should be implemented as a sidepath or a separated bike lane. All other things being equal, sidepaths will be recommended where observed or anticipated pedestrian demand is lower, since conflicts between people walking and bicycling will be infrequent. Separated bike lanes will be recommended where pedestrian volumes are observed or anticipated to be higher.

Another closely related factor is the land use type and density of the surrounding environment. Sidepaths tend to be more appropriate in suburban areas where pedestrian travel is less and where pedestrian movements tend to be more predictable. In urban areas, pedestrian travel is characterized by meandering and stop-and-go movements as people socialize, enter and exit stores, dine outdoors, access transit or walk to and from on-street parking. Pedestrians movements are less predictable in urban locations, so providing separated bike lanes and sidewalks is recommended in the vicinity of commercial and higher-density mixed-use areas and major transit facilities.

Sidepath on MacArthur Boulevard, Bethesda

SIDEPATHS

Sidepaths are shared use paths that are located within the road right-of-way. They provide two-way travel designated for walking, bicycling, jogging and skating. Sidepaths are typically 10 feet wide, but can vary between 8 feet (in constrained locations) and 14 feet wide (where usage is likely to be higher). Sidepaths are separated from motorized traffic by a curb, barrier or landscaped panel.

Benefits

- More attractive to a wider range of bicyclists than striped bikeways on higher volume and higher speed roads

Typical Application

- See section overview.
- Adjacent to the roadway.
- Recommended on higher volume and higher speed roads where pedestrian volumes are low, including suburban streets.

Examples in Montgomery County

- MacArthur Boulevard
- Key West Avenue
- Olney-Laytonsville Road
- Briggs Chaney Road

Separated Bike Lanes on Nebel Street, North Bethesda

Benefits

- More attractive to a wider range of bicyclists than striped bikeways on higher volume and higher speed roads.
- Eliminate the risk of a bicyclist being hit by an opening car door.
- Prevent motor vehicles from driving, stopping or waiting in the bikeway.
- Provide greater comfort to pedestrians.

Typical Application

- See section overview.
- Adjacent to the roadway.
- Recommended on higher volume and higher speed roads where pedestrian volumes are high, including higher density areas, commercial and mixed-use development, and near major transit stations.

Examples in Montgomery County

- Woodglen Drive
- Nebel Street (forthcoming)
- Spring Street (forthcoming)

SEPARATED BIKE LANES

Separated Bike Lanes are an exclusive bikeway facility type that combines the user experience of a sidepath with the on-street infrastructure of a conventional bike lane. They are physically separated from motor vehicle traffic and distinct from the sidewalk.

Separated bike lanes can provide different levels of separation:

- Separated bike lanes with flexible delineator posts ("flex posts") alone offer the least separation from traffic and are appropriate as interim solution.
- Separated bike lanes that are raised with a wider buffer from traffic provide the greatest level of separation from traffic, but will often require road reconstruction.
- Separated bike lanes that are protected from traffic by a row of on-street parking, such as shown in the image of Woodglen Avenue, offer a high-degree of separation, but would benefit from additional design features.

Bike Lanes on Battery Lane, Bethesda

STRIPED BIKEWAYS

Striped bikeways are designated spaces for bicycling that are distinguished from traffic lanes and shoulders by striping and pavement markings. Until a few years ago, **conventional bike lanes** were the gold standard of North American bicycle planning in urban areas. Currently, 150 miles of bike lanes are recommended in Montgomery County's master plans and about 30 miles have been fully implemented.

Over the past few years, a variety of new bike lane types have arisen, including **buffered bike lanes** and **advisory bike lanes**. Collectively, this reports refers to the variety of bike lanes as striped bikeways.

While striped bikeways remain a useful tool to reduce traffic stress, they are insufficient to attract "interested but concerned" bicyclists in many environments because they do not provide sufficient separation from traffic and are often obstructed by motorized vehicles.

Striped bikeways will generally be considered on any roads with one or more of the following characteristics:

- Traffic lanes: 3 lanes or less.
- Posted speed limit: 30 mph or less.
- Traffic: 9,000 vehicles per day or less.
- On-Street parking turnover: infrequent.
- Bike lane obstruction: likely to be infrequent.
- Where a separated bikeway is infeasible or not desirable.

Buffered Bike Lanes on East Capitol Street SE, Washington, DC

BUFFERED BIKE LANES

Buffered Bike Lanes are conventional bicycle lanes paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane.

Benefits

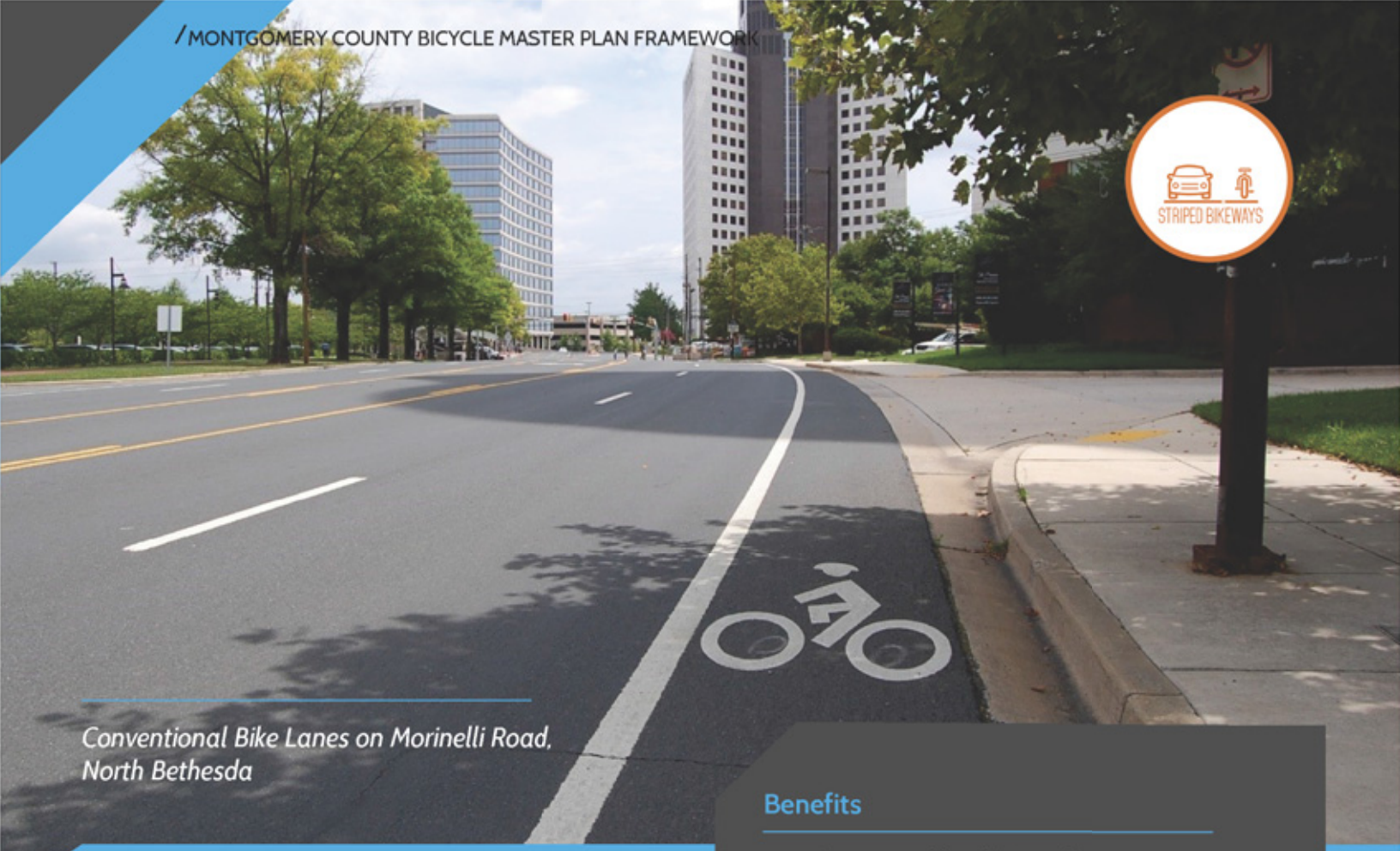
- Provides greater separation between motor vehicles and bicyclists.
- Provides space for one bicyclist to pass another without encroaching into the adjacent motor vehicle travel lane.
- Encourages bicyclists to ride outside of the door zone when the buffer is between parked cars and the bike lane.
- Provides a greater space for bicycling without making the bike lane appear so wide that it might be mistaken for a travel lane or a parking lane.
- Appeals to a wider cross-section of bicycle users.

Typical Application

- See section overview.

Examples in Montgomery County

- None



Conventional Bike Lanes on Morinelli Road, North Bethesda

CONVENTIONAL BICYCLE LANES

Conventional Bicycle Lanes (or simply bicycle lanes) are portions of the roadway that have been designated by striping, signage and pavement markings for the preferential or exclusive use of bicyclists. They are typically 5 to 6 feet wide in Montgomery County.

This category also includes climbing lanes and contra-flow bike lanes. **Climbing Lanes** include a bicycle lane in the uphill direction and a shared lane in the downhill direction. These lanes are used to improve safety on hills where there is a higher speed differential between bicyclists and motor vehicles. **Contra-flow Bicycle Lanes** are bicycle lanes designed to allow bicyclists to ride in the opposite direction of motor vehicle traffic. They convert a one-way traffic street into a two-way street: one direction for motor vehicles and bikes, and the other for bikes only.

Benefits

- Increases bicyclist comfort and confidence on busy streets.
- Creates separation between bicyclists and automobiles.
- Increases predictability of bicyclist and motorist positioning and interaction.
- Increases total capacities of streets carrying mixed bicycle and motor vehicle traffic.
- Visually reminds motorists of bicyclists' right to bicycle in the street.

Typical Application

- See section overview.

Examples in Montgomery County

- Dufief Mill Road
- Battery Lane
- Bonifant Road
- Fairland Road

STRIPED BIKEWAYS

Advisory Bike Lanes on Potomac Green Drive, Alexandria, Virginia

Benefits

- Require less space to implement than conventional bike lanes.
- Encourage motorists to safely pass bicyclists.
- Visually reminds motorists of bicyclists' right bicycle in the street.
- Removing the center line reduces the speed of motor vehicles.

Typical Application

- Where there is insufficient space for conventional bike lanes and two lanes of traffic.
- Residential land uses.
- Number of travel lanes: un-laned, bi-directional streets.
- Street width: The un-laned two-way travel space should be 12 to 18 feet.
- Posted speed: 30 mph or less.
- Traffic: 2,000 to 4,000 vehicles per day.
- Parking: May be used on streets with or without on-street parking.

Examples in Montgomery County

- None

ADVISORY BIKE LANES

Advisory Bike Lanes are a way to reduce the stress of bicycling on lower volume and lower speed residential streets where there is insufficient space to provide two bike lanes and two travel lanes. Space is provided for bike lanes by removing the center line from the road and narrowing the area for automobiles.

Unlike a conventional bike lane where motorists are discouraged from entering the bike lane marked by a solid lane line, the advisory bike lane is continuously dashed to allow motorists to temporarily enter the bike lane to provide oncoming traffic sufficient space to safely pass, as long as a bicyclist is not approaching. This behavior is similar to the passing behavior on many narrow residential, un-laned, two-way "yield" streets where traffic lanes are not designated with striping and motorists must pull to the side (into parking gaps or driveways) to let oncoming vehicular traffic pass.

Bikeable Shoulders on Sanibel Causeway, Sanibel Island, Florida.
Source: http://bikewalklee.blogspot.com

BIKEABLE SHOULDERS

Bikeable shoulders are portions of the roadway that accommodate stopped or parked vehicles, emergency use and bicycles and motor scooters. Bikeable shoulders of at least three feet in width can improve comfort on some roadways for some bicyclists. They are more likely to be present in suburban and rural locations in the county, often where posted speed limits are 40 mph and higher.

Bicyclists often encounter potentially hazardous conditions while using roadway shoulders, which are often inconsistent in their width and pavement quality. Shoulders sometimes end unexpectedly or are otherwise unusable because of parked vehicles, forcing bicyclists to move into the travel lane.

It is unlikely that the Working Draft of the Bicycle Master Plan will recommend widening the road to create new bikeable shoulders where they would not otherwise be implemented. emergency use and stopped vehicles because on most roads they do not create a low-stress bicycling environment. However, where bikeable shoulders are provided, roadway shoulders should be upgraded to provide a consistent width and pavement quality.

Benefits

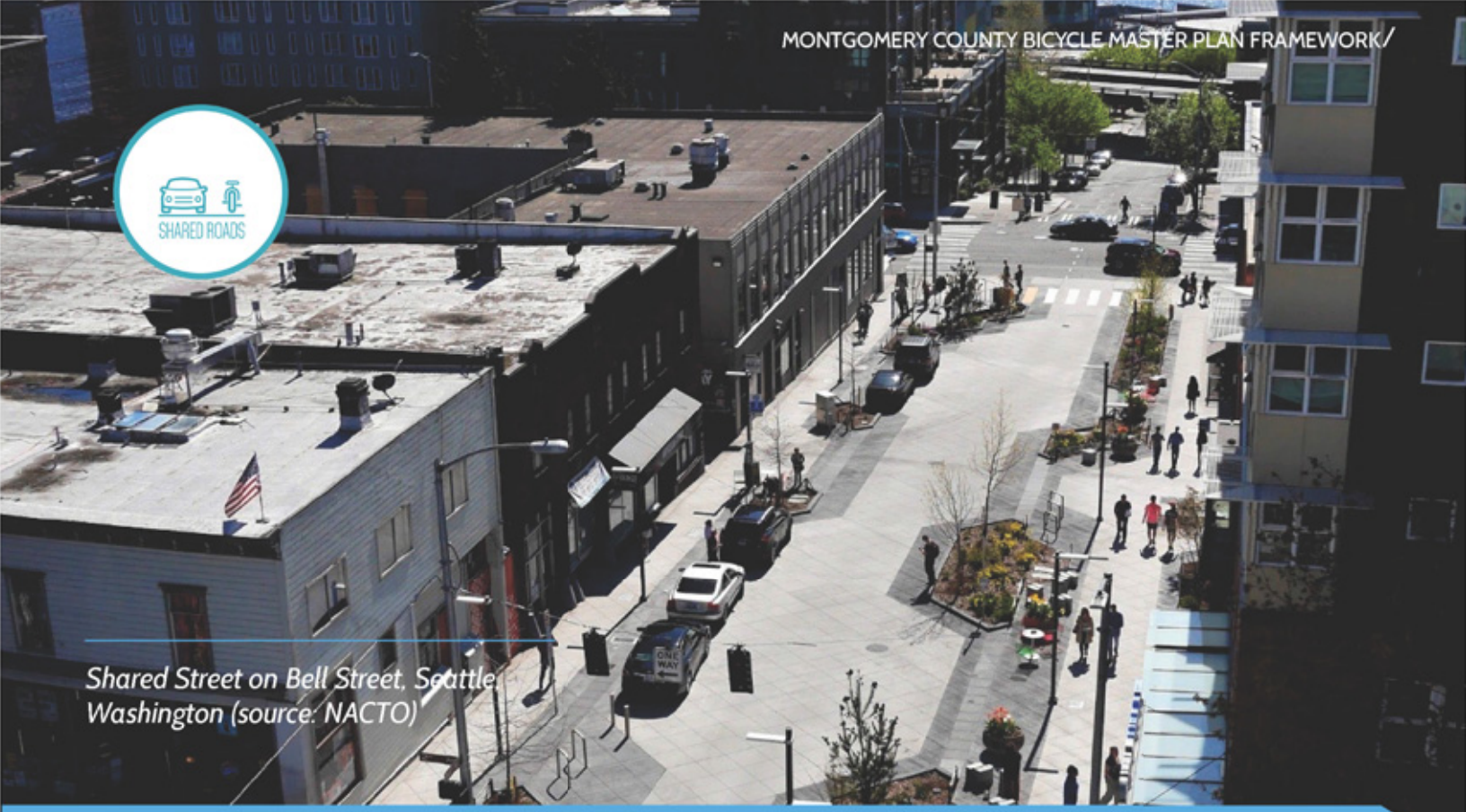
- Provide separation from traffic.

Typical Application

- Primarily found in suburban or rural locations.
- Posted Speed Limit: ≥ 40 mph

Examples in Montgomery County

- River Road
- New Hampshire Avenue from MD 198 to MD 108
- Norwood Road from MD 182 to MD 650



Shared Street on Bell Street, Seattle, Washington (source: NACTO)

SHARED ROADS

Shared Roads are bikeways that share space with automobiles. They include neighborhood greenways in suburban areas and shared streets in urban areas. Of course, all roadways where bicycles share space with automobiles are de facto shared roads, but only some are master-planned.

SHARED STREETS

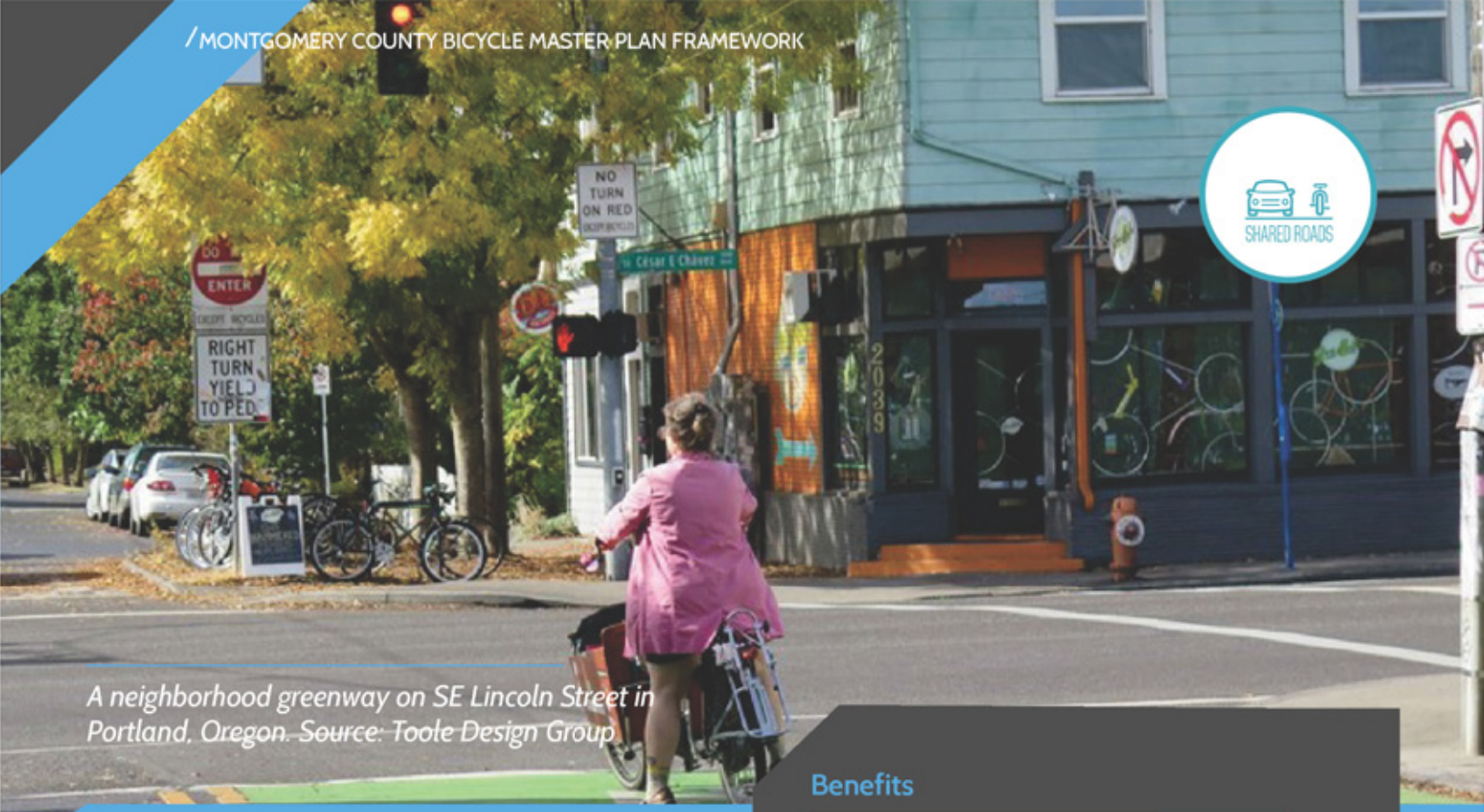
Shared Streets constitute an urban design approach where pedestrians, bicycles and motor vehicles can comfortably coexist. They are typically located on low traffic volume, low traffic speed and high pedestrian volume streets, and often eliminate design features such as curbs, road surface markings, traffic signs and traffic lights.

Shared streets will be included in the Working Draft of the Bicycle Master Plan as a bikeway facility type. However, this facility type is dependent on the roadway and land use contexts, which are typically addressed in area master plans, so only existing shared streets will be reflected in the Working Draft of the Bicycle Master Plan.

Note: The Montgomery County Department of Transportation is not currently pursuing shared streets along public roads, as they present maintenance and liability issues. At this time, shared streets are most likely to be realized as part of privately owned and maintained facilities.

Examples in Montgomery County:

- None.



A neighborhood greenway on SE Lincoln Street in Portland, Oregon. Source: Toole Design Group

NEIGHBORHOOD GREENWAYS

Neighborhood Greenways (also called bicycle boulevards) are streets with low motorized traffic volumes and speeds, designated and designed to give walking and bicycling priority. They use signs, pavement markings and speed and volume management measures to discourage through trips by motor vehicles and create safe, convenient crossings of busy arterial streets. The Working Draft of the Bicycle Master Plan will include a concept plan for a neighborhood greenway between Downtown Silver Spring and Wheaton.

Neighborhood greenways incorporate several design elements:

- Traffic diverters at key intersections to reduce through motor vehicle traffic while permitting passage for through bicyclists.
- At two-way, stop-controlled intersections, priority assignment that favors the neighborhood greenway, so bicyclists can ride with few interruptions.
- Neighborhood traffic circles and mini-round-abouts at minor intersections to slow traffic but allow bicyclists to maintain momentum.
- Traffic-calming to lower motor traffic speeds.
- Wayfinding signs to guide bicyclists along the route and to key destinations.
- Shared-lane markings (sharrows) where appropriate to alert drivers to the path bicyclists need to take on a shared roadway.
- Crossing improvements where the boulevard crosses major streets (including traffic signals, median refuges and curb extensions).

Benefits

- Attractive to a wide range of bicyclists.
- Reduce the speed and volume of traffic.
- Prioritize walking and bicycling at minor street crossings.
- Improve safety and reduce delay for walking and bicycling at major street crossings.

Typical Application

- Posted Speed Limit: ≤ 25 mph.
- Context: areas where through traffic can be diverted to parallel streets.
- Street pattern: where a continuous route for bicycling is possible.

Examples in Montgomery County

- None

NON-MASTER PLANNED ROADS

Just like motorists and pedestrians, bicyclists travel on all roads where it is legal to ride a bike to access their homes, jobs, shopping and other local destinations. While only a portion of roads in Montgomery County will be master-planned bikeways, all non-master-planned roads where it is legal to bicycle should be designed with the understanding that people of all ages and abilities will bicycle on them. As such, these roads are candidates for traffic-calming measures on residential and business district streets to ensure a low speed of travel by all forms of traffic.

The Silver Spring Green Trail in front of Fenwick Station Apartments, Silver Spring

ADDITIONAL POLICY CONSIDERATIONS

Reclassifying Sidepaths as Wide Sidewalks in Areas with Higher Pedestrian Activity

There are many areas in Montgomery County with higher pedestrian volumes and higher density development where sidepaths either exist or are recommended in a master plan. These communities include Silver Spring, White Flint, Glenmont, Germantown, Olney and White Oak.

One prominent example of an existing urban sidepath is the Silver Spring Green Trail, which exists in segments along Second and Wayne Avenues between Spring Street and Whole Foods in Downtown Silver Spring. Many urban sidepaths are indistinguishable from wide sidewalks (see image of the Silver Spring Green Trail).

Even where sidepaths like the Silver Spring Green Trail provide both a sidewalk and a bikeway, many bicyclists are reluctant to bicycle on these surfaces because they are heavily used by pedestrians.

The Working Draft of the Bicycle Master Plan will reclassify existing and master-planned sidepaths as wide sidewalks in areas with high pedestrian volumes and with higher density land use (such as commercial areas) and will not carry them forward as bikeways. An alternate bikeway recommendation will be considered in these locations.

Sidepaths should continue to be an interim bikeway in urban areas where the master-plan-recommended separated bike lane is not yet implemented due to right-of-way, funding or other constraints. This recommendation will be further discussed in the Working Draft of the Bicycle Master Plan.

Two-Way Separated Bikeways on Both Sides of the Street

Montgomery County has many multi-lane, high-speed, high-volume roads with limited crossings and multiple destinations on both side of the streets. These roads create barriers for bicycling, especially when the bikeway is split by the direction of travel (as in conventional bike lanes) or when there is a two-way bikeway on one side of the road (such as a sidepath or separated bike lanes), requiring bicyclists to cross the same street twice to reach their destination.

Where the barrier is excessive, bicyclists may be deterred from bicycling. They may ride in the bikeway in the wrong direction, or on the sidewalk. Two-way bikeways on both sides of the street will encourage short bicycle trips by minimizing the need to cross wide roadways and travel excessive distances to cross at a safe location.

Since constructing a two-way bikeway on both sides of the road requires a substantial investment, this type of facility will only be applied where the following conditions are met:

- Long distances between safe, comfortable crossings (typically 800 to 1,000 feet).
- Wide automobile travel way cross section (four or more lanes).
- Presence of destinations/active land uses on both sides of the street.

Before settling on the choice to recommend a two-way bikeway on both sides of the street, planners will investigate other network and roadway reconfiguration options. Parallel routes on lower-volume, lower-speed streets may be available that require a minimal detour and a lower level of investment. The Bicycle Master Plan team will also consider whether changes are feasible to the street in regard to:

- Adding or improve crossings to be safe and comfortable.
- Reducing the width of the road (lane diet and/or road diet).
- Changing the posted speed.

Rockville Pike in North Bethesda's White Flint area is perhaps the quintessential example of a street that is well-suited to a two-way bikeway on both sides of the street. The Pike has excessive distances between safe, comfortable crossings (approximately 850 feet), a wide street cross section (a six-lane road with multiple turn lanes) and presence of active commercial destinations on both sides of the street. A two-way bikeway on both sides of the street will be considered between Flanders Avenue and the City of Rockville[6]. Implementing a two-way bikeway on both sides of the street will result in tradeoffs, but is critical to transforming the White Flint area into a bikeable community.

Rockville Pike at Edson Lane, North Bethesda

[6] The March 2016 Draft Rockville Pike Plan recommends two-way separated bike lanes from the city line to Veirs Mill Road.

Elimination and Replacement of Signed Shared Roadways

Signed shared roadways have been a bicycle facility classification in Montgomery County since the 1978 Master Plan of Bikeways. Currently, there are more than 400 miles of roads recommended as signed shared roadways in the County. The Working Draft of the Bicycle Master Plan will make the following recommendations for signed shared roadways:

- Eliminate signed shared roadways, including those with wide outside lanes, as a bikeway facility classification.
- Include bikeable shoulders, neighborhood greenways and shared streets as bikeway facility types.
- Continue use of wayfinding signs, regulatory signs (such as "bikes may use full lane") and pavement markings (such as sharrows) as implementation tools for the Montgomery County Department of Transportation (MCDOT) and Maryland State Highway Administration (SHA), but not master planning tools.
- Encourage MCDOT to develop a comprehensive wayfinding plan.
- Encourage MCDOT to develop a sharrow policy.

While signed shared roadways provide value to bicyclists, they should be eliminated as a bicycle classification. Signed shared roadways do not improve the comfort of bicycling. In fact, the three main reasons for designating signed shared roadways (wayfinding, public bicycle maps and identification of locations where pavement markings and signs could be added) are outside the scope of most master plans. They are operational and regulatory approaches that are the responsibility of the Montgomery County Department of Transportation and the Maryland State Highway Administration.

While we recommend eliminating signed shared roadways as a bikeway facility classification, the Working Draft of the Bicycle Master Plan will add shared roads as a bikeway facility classification and consider the use of another bikeway facility type in locations where signed shared roadways are currently recommended, including buffered bike lanes, bike lanes, advisory bike lanes, bikeable shoulders and neighborhood greenways. However, many residential streets will no longer be designated as master-planned bikeways.

Wide outside lanes should be discontinued as a bikeway facility type. While wide outside travel lanes provide space for both bicyclists and drivers to operate within the same lane, there is a general consensus that they provide more space for a driver to pass a bicyclist. This additional width does not increase a bicyclist's comfort, especially on roadways with high speeds. Additionally, wide lanes tend to increase automobile travel speeds and may make bicyclists less comfortable next to higher speed traffic than on a similar roadway with standard width lanes.

The County should consider restriping wide outside lanes as narrowed lanes with shoulders if three feet are available for the shoulder width. Striped shoulders have been shown to increase bicyclists' comfort even if the total width of the outside lane and shoulder are the same as a wide outside lane, i.e, a 11-foot travel lane and a 3-foot shoulder versus a 14-foot travel lane.[7]

Wide outside lanes

[7] The Bicycle Level of Service methodology says that riders who were part of that study indicate an increased level of comfort with shoulder striping. This visual separation may not increase comfort for all riders, but some, likely more confident riders, will feel more comfortable in the restriped context.

Bikeable shoulders will be identified as a new bikeway facility classification.

A wayfinding plan should be developed by the Montgomery County Department of Transportation through a separate planning process from the master plan. Implementation of wayfinding routes is already underway by MCDOT and has been based, in part, on previously recommended signed shared roadways. However, in developing the detailed sign plans for routes, planners have found a need to deviate from the identified routes to take advantage of more comfortable crossing locations.

A wayfinding plan would identify the most suitable routes for bicycling based on existing conditions and should be updated every few years as new bikeways and bikeshare stations are constructed and new destinations emerge.

Montgomery County DOT has implemented some wayfinding routes

Elimination and Replacement of Dual Bikeways

The dual bikeway facility classification was developed in the 2005 Countywide Bikeways Functional Master Plan to "meet the needs of the total range of bicyclists." A dual bikeway consists of both an off-road sidepath and an on-street bikeway facility type on the same street. In locations where space is available, the on-road facility is typically recommended to be a bike lane; where space is not available, the on-street facility it is typically recommended to be a signed shared roadway.

The dual bikeway facility classification is unique to Montgomery County and was recommended in locations where the County wanted to provide separation from high-speed, high-volume traffic for what today the industry refers to as "interested but concerned" riders. Currently, there are about 48 miles of road in Montgomery County that are recommended to be a dual bikeway with both a sidepath and bike lanes, of which 9 miles have been implemented.

The dual bikeway facility classification was recommended to accommodate more confident cyclists who are comfortable riding near or sharing the road with higher-speed, higher-volume traffic, would prefer to travel at a higher speed and do not want to be impeded by slower moving bicyclists and pedestrians on a sidepath. In addition, a segment of the bicycling population believe they create safety problems for faster traveling cyclists at intersections and because they require bicyclists to slow down, yield or stop when crossing side streets and driveways.

While these concerns are valid, they have more to do with the poor design of sidepaths than an inherent weakness of sidepaths.
Sidepaths in Montgomery County are often constructed with a thin layer of asphalt, leading to a bumpy surface over time. Driveway crossings and intersections are almost an afterthought. In fact, sidepaths are a common feature in suburban settings in the Netherlands, which has a higher level of bicycling and a much lower injury and fatality rates, compared to the United States. **The Working Draft of the Bicycle Master Plan will recommend standards for a network of high-quality sidepaths** (see page 66).

> **"The Working Draft of the Bicycle Master Plan will recommend standards for a network of high-quality sidepaths.**

Additionally, bike lanes on high volume and high speed roads are likely to be used by only a small segment of the population. Most people would prefer to bicycle in a separated bikeway and a small percentage would prefer to bicycle in the road. In an environment where tradeoffs with cost, right-of-way, pedestrian safety and stormwater management are key factors in design, it is hard to justify providing 11 to 12 feet in the roadway for bike lanes when additional space is already needed to improve sidepaths.

The Working Draft of the Bicycle Master Plan will discontinue use of dual bikeways as a facility classification and instead refer to their individual components, such as separated bike lanes, bike lanes, sidepaths and shoulders, to better communicate the actual bikeway facility type recommendation.

As noted previously, signed shared roadways will not be continued as a master-planned bikeway facility type. However, MCDOT and SHA should consider use of regulatory signs, such as "bikes may use full lane," sharrows and wayfinding signs.

In suburban locations, bike lanes should remain an interim treatment on higher volume and higher speed roads where there is sufficient space in the existing roadway to quickly and cheaply install bike lanes through restriping and:

- **A sidepath is either recommended but does not exist, or**
- **The existing sidepath does not meet the high-quality design standards identified on page 66.**

However, over time, the bike lanes should be eliminated if space is needed to implement a high-quality separated bikeway with wide adequate separation from the road. For instance, Darnestown Road is an existing dual bikeway with an 8-foot-wide sidepath, about 3-foot-wide separation from the road in places and a 5.5-foot-wide bike lane on the north side of the road. A 3-foot-wide buffer is not wide enough for many children to bicycle safely along a 40 mph road with three lanes of traffic in each direction. Overtime, the bike lanes should be repurposed to create a wider buffer between the sidepath and curb.

Dual Bikeway on Darnestown Road, Gaithersburg

BICYCLE PARKING

As the number of bicyclists continues to grow in Montgomery County, the need for safe, secure and accessible bicycle parking is becoming more apparent. Bicycle parking is needed at all destinations, including residences, commercial and office locations, and major transit stations.

Bicycle Parking at Major Transit Stations

Bicycling is one of the least used modes of access to Metrorail stations, but it is growing at a fast rate. In 2012, 1 percent of all trips to Metrorail were by bicycle, up from 0.4 percent in 2002. The Washington Metropolitan Area Transit Authority (WMATA) has adopted a bicycle access mode share goal of 2.1 percent by 2020 and 3.5 percent by 2030.

People in Montgomery County have a few options when they arrive at a Metrorail station by bicycle. They can bring their bicycles on Metrorail trains outside of peak periods or leave their bicycles at existing bike lockers and bike racks. If arriving by bikeshare, they can leave their bikes at a dock in the station area.

Bicycle Parking at the Kramer Station in Austin, Texas

Secure bicycle parking stations – not to be confused with bikeshare stations – offer another means to store bicycles. These enclosed or covered facilities offer high volume and high security bicycle parking for use by bicyclists who are traveling for transportation. They make bicycle transportation a convenient and a more attractive choice for regular commuting, for accessing transit by bicycle, and for a variety of other utilitarian bicycle trips, especially when the travel distance is between one and three miles from the station.

Secure bicycle parking stations can offer services such as bicycle repair, bicycle rental, bicycle retail, food service, showers and changing rooms, lockers for personal belongings, bicycling information, etc. Bicycle parking stations are often located at multi-modal transit hubs, but can be also be located in dense urban neighborhoods and central business districts (CBDs).

Secure bicycle parking stations can expand the use of bicycling to transit by attracting people who:

- Are uncomfortable locking their bicycle to a rack for an extended period.
- Live beyond areas served by bikeshare.

In addition to being more secure than bike racks, they are a more efficient use of space than bike lockers, which require more space and are typically rented to one person for an extended time period.

Secure bicycle parking stations in the United States vary widely with regard to parking capacity and services provided. Smaller bicycle stations have the capacity to park 20 to 25 bicycles, while the largest bicycle stations can accommodate more than 300 bicycles.

Within the metropolitan Washington region, bicycle parking stations exist at the Union Station, College Park and Reston-Wiehle Metrorail stations, and are under construction at the East Falls Church and Vienna Metrorail stations. WMATA operates the College Park bike station and will operate the East Falls Church and Vienna Metrorail stations.

The Working Draft of the Bicycle Master Plan will consider recommendations for bicycle parking stations at all major existing and planned high-quality transit lines, including the Red Line, Brunswick Line, Purple Line and future bus rapid transit stations. Specific locations may be identified for transit stations that are existing (Red Line and Brunswick Line) or in an advanced stage of design (Purple Line and Corridor Cities Transitway), but general locations are more likely for Montgomery County's bus rapid transit stations. Sizing of the stations will be goal-based: for example, a recommendation could be to provide bicycle parking for 3 percent of station boardings[8]. For smaller transit stations such as those on the Corridor Cities Transitway, bicycle parking stations are likely to serve multiple transit stations.

> **The Working Draft of the Bicycle Master Plan will consider recommendations for bicycle parking stations at all major existing and planned high-quality transit lines...**

A bike station at the Berkeley BART Station, Berkeley, California

[8] This approach was used by WMATA to plan for bicycle parking at each Metrorail station and by the Planning Department in the Bethesda Minor Master Plan Amendment and as part of the Silver Spring Bicycle Parking Station Study.

Bicycle Parking at Residential, Commercial and Office Developments

In 2014, Montgomery County completed a major overhaul to the bicycle parking requirement for new developments in its revised zoning ordinance. Whereas the previous ordinance calculated bicycle parking requirements as a percentage of automobile parking with a maximum of 20 bicycle parking spaces, the new ordinance calculates bicycle parking requirements based on the land use category with a maximum of 100 bicycle parking spaces.

While the revisions to the zoning code made a big improvement in the quantity of long-term bicycle parking, the improvements to the quality of long-term bicycle parking were limited. The Working Draft of the Bicycle Master Plan will include recommendations about how to improve the quality of bicycle parking in the zoning code.

Bicycle Parking at Public Facilities

The Working Draft of the Bicycle Master Plan will include recommendations on the quantity and quality of short-term and long-term bicycle parking at public facilities, including schools, libraries, recreation centers and parks.

programs

The Working Draft of the Bicycle Master Plan will identify a number of events, services, opportunities and projects that encourage and support bicycling in Montgomery County.

For example, to encourage bicycling among children, programs could target the public school system:

- Bicycle education in the public school curriculum (Montgomery County Public Schools).
- Provide bike racks at all public schools (Montgomery County Public Schools).
- Bike to School Day (Montgomery County Public Schools).

A more detailed list of programs will be recommended in the Working Draft of the Bicycle Master Plan to advance the goals of the plan.

policies

Policies are actions that are intended to guide decisions that affect bicycling. A few examples include:

- Making separated bike lanes the default form of bike lane in urban areas (MCDOT).
- Making protected intersections the default form of intersection to improve the safety of crossings for bicycles (MCDOT).[9]
- Updating the County's road design standards to include all of the bikeway facility types included in the Bicycle Master Plan and remove or replace road design standards with wide outside lanes (MCDOT).
- Prepare a monitoring report for the Bicycle Master Plan (M-NCPPC).

A more detailed list of policies will be recommended in the Working Draft of the Bicycle Master Plan to advance the goals of the plan.

[9] Protected intersections are a way to extend the safety of separated bike lanes to the intersection. They will be described in greater detailed in the Working Draft of the Bicycle Master Plan. For more information on protected bike lanes, see http://www.protectedintersection.com.

prioritization

Since bicycle infrastructure, programs and policies take time to implement, the Working Draft of the Bicycle Master Plan will prioritize those that contribute most to the vision of the plan as measured by the goals and objectives.

BIKEWAY PRIORITIZATION

Since 2005, Montgomery County has prioritized master-planned bikeways by designating them as a Countywide Bikeway or a Local Bikeway. Countywide Bikeways are intended to receive priority consideration for funding. They are often located on arterial streets and provide longer distance connections, linking major destinations, such as municipalities, central business districts, town centers, employment centers, major transit stations and regional parks and trails.

Local Bikeways provide important connections from Countywide Bikeways to community facilities, such as schools, libraries, recreation centers and local retail centers. While Countywide Bikeways were intended to be prioritized, that importance is diluted in practice because Countywide Bikeways comprise about two-thirds of all master-planned bikeways providing no way to distinguish the most important bikeways from this group.

A new bikeway prioritization system is proposed for Montgomery County that designates each road as either a High Priority Bikeway, Priority Bikeway or Bikeway. Unlike the Countywide Bikeway / Local Bikeway approach, this **classification system will have policy implications by assigning each bikeway a level of priority in the bicycling network. The higher the priority, the higher of quality design, greater weight in trade-offs for space among other transportation modes and potentially greater levels of funding.**

High Priority Bikeways are the most important master-planned bikeways in the network. They are likely to experience the greatest amount of bicycling because they connect to major commercial areas, rail stations or bridges, include a long corridor that serves many neighborhoods or collect traffic from other routes. To achieve a high quality design, they may require greater funding than other bikeway projects and should be prioritized in discussions related to limited space and trade-offs between transportation modes.

High Priority Bikeways are master-planned bikeways that are designated with a bikeway facility type, such as a neighborhood greenway, bike lane or separated bike lane. They are intended to consist of approximately 10 – 20 percent of the mileage of all master-planned bikeways.

Priority Bikeways are master-planned bikeways that provide direct and convenient access but are likely to experience less use than High Priority Bikeways. They are designated with a bikeway facility type, such as a neighborhood greenway, bike lane or separated bike lane, and are likely to consist of approximately 80 to 90 percent of the mileage of all master-planned bikeways.

Bikeways are not master-planned bikeways, but include all other roads where it is legal to bicycle in Montgomery County. They reflect the simple fact that, just like motorists and pedestrians, people bicycle on all roads available to them to access their homes, jobs, shopping, other local destinations. While they are not designated with a bikeway facility type and will not appear on the bikeway map, they should be designed with the understanding that people of all ages and abilities will bicycle on them. As such, they are candidates for traffic-calming measures on residential and business district streets to ensure a low speed of travel by all forms of traffic.

PROGRAMS & POLICIES

Prioritization of programs and policies will be undertaken for the Working Draft of the Bicycle Master Plan.

04
MONITORING THE VISION

An essential third step for the Bicycle Master Plan is to establish a monitoring program that tracks how well the vision of the plan is being fulfilled through the goals and objectives, and enables transparency and a ccountability in plan implementation. While regular monitoring would occur every one or two years after the Bicycle Master Plan is adopted, target values and a baseline evaluation are now being developed as part of the plan. The monitoring template below reflects each of the plan's objectives and includes target values for the plan to achieve in 2022 and 2027, five and 10 years after the plan is adopted.

A template for a detailed monitoring report is provided in Appendix A.

OBJECTIVE	METRIC		ACTUAL		TARGET	
			2017 (BASELINE)	2019 (FUTURE YEAR)	2022 (5-YEAR TARGET)	2027 (10-YEAR TARGET)
GOAL 1: INCREASE BICYCLING RATES IN MONTGOMERY COUNTY						
1.1	Percentage of residents who commute by bicycle.		0.7% (2014)			
1.2	Percentage of commuters who bicycle as part of their commute to a Transportation Management District.	Bethesda	Data Not Yet Surveyed			
		Friendship Heights				
		North Bethesda				
		Shady Grove				
		Silver Spring				
		White Oak				
1.3	Percentage of boardings at rail stations that access the station by bicycle.	Red Line	TBD			
		Brunswick Line	TBD			
		Purple Line	N/A			
1.4	Percentage of public school students who travel to school by bicycle.	Elementary Schools	Data Not Yet Surveyed			
		Middle Schools				
		High Schools				
GOAL 2: CREATE A HIGHLY-CONNECTED, CONVENIENT AND LOW-STRESS BICYCLING NETWORK						
2.1	Percentage of potential bicycle trips that can be made on a low-stress bicycle network.		TBD			
2.2	Percentage of dwelling units within 2.0 miles of Red Line, Brunswick Line, Purple Line, and Corridor Cities Transitway stations that can access the station on a low-stress bicycling network.	Red Line	18%			
		Brunswick Line	12%			
		Purple Line	15%			
		Corridor Cities Transitway	23%			

OBJECTIVE	METRIC		ACTUAL 2017 (BASELINE)	ACTUAL 2019 (FUTURE YEAR)	TARGET 2022 (5-YEAR TARGET)	TARGET 2027 (10-YEAR TARGET)
GOAL 2: CREATE A HIGHLY-CONNECTED, CONVENIENT AND LOW-STRESS BICYCLING NETWORK						
2.3	Percentage of dwelling units located within the attendance zone of elementary, middle and high schools that are connected to each school through a low-stress bicycle network.	Elementary Schools	20%			
		Middle Schools	10%			
		High Schools	5%			
2.4	Percentage of dwelling units within 2.0 miles of a public facility will be connected to that facility through a low-stress bicycling network.	Public Libraries	11%			
		Recreation Centers	22%			
		Recreational and Regional Parks	31%			
2.5	Number of rail stations in Montgomery County with a bike station.	Red Line	0			
		Brunswick Line	0			
2.6	Percentage of Montgomery County public schools with at least 1 bicycle parking space for each 20 students of planned capacity.	Elementary Schools	TBD			
		Middle Schools	TBD			
		High Schools	TBD			
2.7	Percentage of blocks in commercial areas that have at least ##% of the amount of short-term bicycle parking required by the current zoning code.		TBD			
2.8	Percentage of Montgomery County public facilities with 1 short-term bicycle parking space per 8,000 sq. ft. of floor area that are "acceptable" bike rack styles per the standard in the Assoc. of Pedestrian and Bicycle Professionals' *Bicycle Parking Guidelines 2nd Edition*.	Public Libraries	90%			
		Recreation Centers	80%			
2.9	Percentage of Montgomery County regional and recreational park facilities that have bike racks.		25%			
GOAL 3: PROVIDE EQUAL ACCESS TO LOW-STRESS BICYCLING FOR ALL MEMBERS OF THE COMMUNITY						
3.1	Percentage of potential bicycle trips that can be made on a low-stress bicycling network in Census tracts where the median income is below 60 percent of the County average median income.		TBD			
3.2	Percentage of dwelling units within 0.5 miles of the nearest Metrobus or RideOn bus stop that will be able to access the bus stop on a low-stress bicycling network in areas where the median income is below ## percent of the County average		TBD			
GOAL 4: IMPROVE THE SAFETY OF BICYCLING						
4.1	The ratio of bicycle crashes to bicycle trips at the ## highest crash locations in the County.		TBD			
4.2	The number of bicyclist fatalities per year.		3			

05 IMPLEMENTATION

The working draft of the Bicycle Master Plan will include an implementation section that includes the following items:

approach to phasing separated bike lane implementation

To implement low-stress bicycling networks quickly, many jurisdictions are installing separated bike lanes through lower cost improvements, such as flexible delineator posts. While "flex posts" discourage automobiles from stopping or waiting in the bike lane, they do not create a bikeway that is comfortable for all users, require frequent maintenance and lack aesthetic treatments. The Working Draft of the Bicycle Master Plan will discuss how these lower-cost bikeways can transition to more permanent separation, such as raised separated bike lanes, with aesthetic treatments and stormwater management facilities.

Cesar Chavez Street, San Francisco, CA (source: PeopleForBikes.org)

approach to implementing on-road bicycle facilities incrementally

Like many jurisdictions, Montgomery County implements bicycle facilities as part of facility planning projects and through the development approval process. There is a long history of constructing discontinuous sections of sidepaths along the frontage of development projects, with the idea that, over time, continuous facilities can be completed at a lower cost and with less impact to the community. While this is a reasonable approach for off-road bikeways, it creates challenges when using the approach for on-road facilities. The Working Draft of the Bicycle Master Plan will develop an incremental approach to implementing on-road facilities, such as separated bike lanes, buffered bike lanes and conventional bike lanes, as part of the development review process.

selecting a bikeway

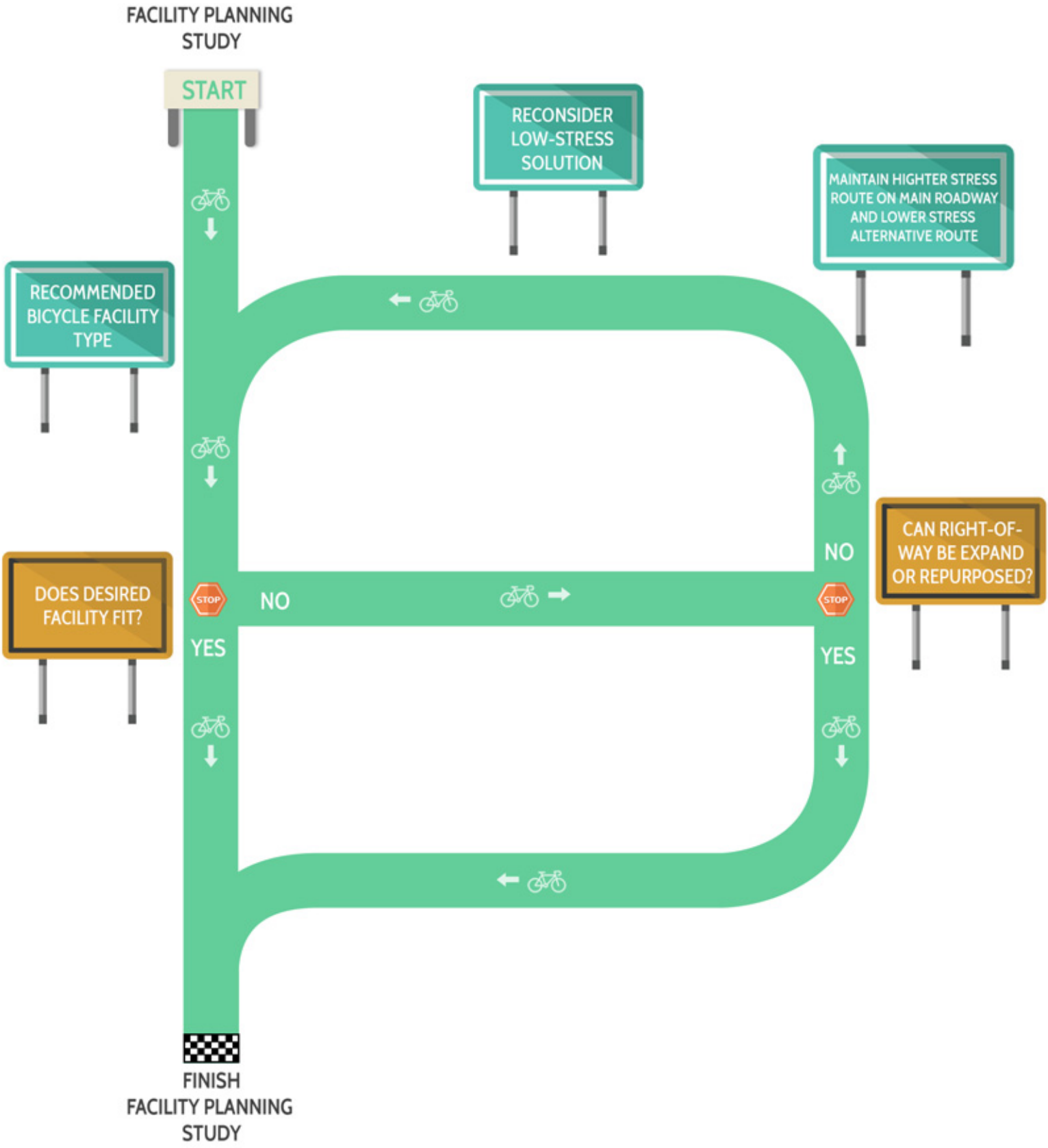
The Bicycle Master Plan will be recommending a vision for creating a low-stress bicycling network, but what happens during project implementation when a particular project may not be able to achieve the plan's low stress vision? Should the design team drop the project altogether or is there an alternative approach that should be considered?

Begin Facility Planning Study
The starting point for any facility planning study should be to implement the master plan recommended bikeway along the study corridor.

Does Desired Facility Fit?
One of the initial considerations facing designers is whether the master-planned bikeway fits within the existing right-of-way without excessive impacts to the community. If the master-planned bikeway fits, the project should begin more detailed design with the master plan recommendation. If the master-planned bikeway does not fit, designers need to consider whether it is feasible to expand the existing right-of-way or repurpose space used within the existing right-of-way to accommodate the master-planned bikeway.

Expand or Repurpose Right-of-Way?
In determining whether existing space can be repurposed, designers should consider road diets and lane diets. If sufficient space can be repurposed from existing elements in the roadway, the project should begin more detailed design with the master plan recommendation. If sufficient space within the existing right-of-way cannot be repurposed, designers need to consider an interim solution.

Interim Solutions
Interim solutions should identify a moderate stress bikeway along the corridor and a low-stress bikeway on a parallel route where possible. Over the long-term, designers should revisit the corridor to determine whether it becomes feasible to implement a low-stress bikeway on the corridor, either because additional right-of-way is available, fewer lanes are needed, or some other reason.


FACILITY PLANNING STUDY
START
RECONSIDER LOW-STRESS SOLUTION
MAINTAIN HIGHTER STRESS ROUTE ON MAIN ROADWAY AND LOWER STRESS ALTERNATIVE ROUTE
RECOMMENDED BICYCLE FACILITY TYPE
DOES DESIRED FACILITY FIT?
STOP
NO
YES
NO
STOP
YES
CAN RIGHT-OF-WAY BE EXPAND OR REPURPOSED?
FINISH
FACILITY PLANNING STUDY

breezeway network

The Bicycle Master Plan will identify a network of low-stress bikeways that are suitable for a wide range of users. To accommodate the full range of cyclists, these bikeways must not only provide a high level of comfort, but also a high level of convenience, safety and efficiency. To that end a subset of the low-stress network will be identified to enable higher speed bicycle travel between major activity centers, including CBDs, transit stations and job centers. This network, which staff is tentatively calling the Breezeway network, will consist of sidepaths, separated bike lanes and trails and will accommodate and encourage longer trips by bicycle, since people are more likely to travel longer distances when the travel time for their trip is closer to that by driving.

To ensure the Breezeway network can provide an equivalent traveling experience for bicyclists as motorists are provided on highways, the design standards for the Breezeway network will have to be significantly improved from past design practices. Improved design will require the following:

- High-quality construction and maintenance that avoids pavement cracking and buckling.
- Separation between pedestrians and bicyclists in areas with higher levels of activity.
- Intuitive and safe intersection and driveway crossings.
- Adequate widths to enable side-by-side travel and passing.
- Appropriate buffers from traffic.
- Straight alignments to allow higher speed, and direct travel.
- Removal of poles, trees or other obstructions that are present in many existing sidepath locations.
- Direct and seamless connections to destinations and other bikeways.
- Lighting.

typical sections for new bikeway facility types

The Working Draft of the Bicycle Master Plan will prepare typical sections for:

Separated bike lanes:

- One-way and two-way separated bike lanes at sidewalk level.
- One-way and two-way separated bike lanes at a vertical level between the street and sidewalk.
- One-way and two-way separated bike lanes at sidewalk level at street level without on-street parking.
- One-way and two-way separated bike lanes at sidewalk level at street level with on-street parking.

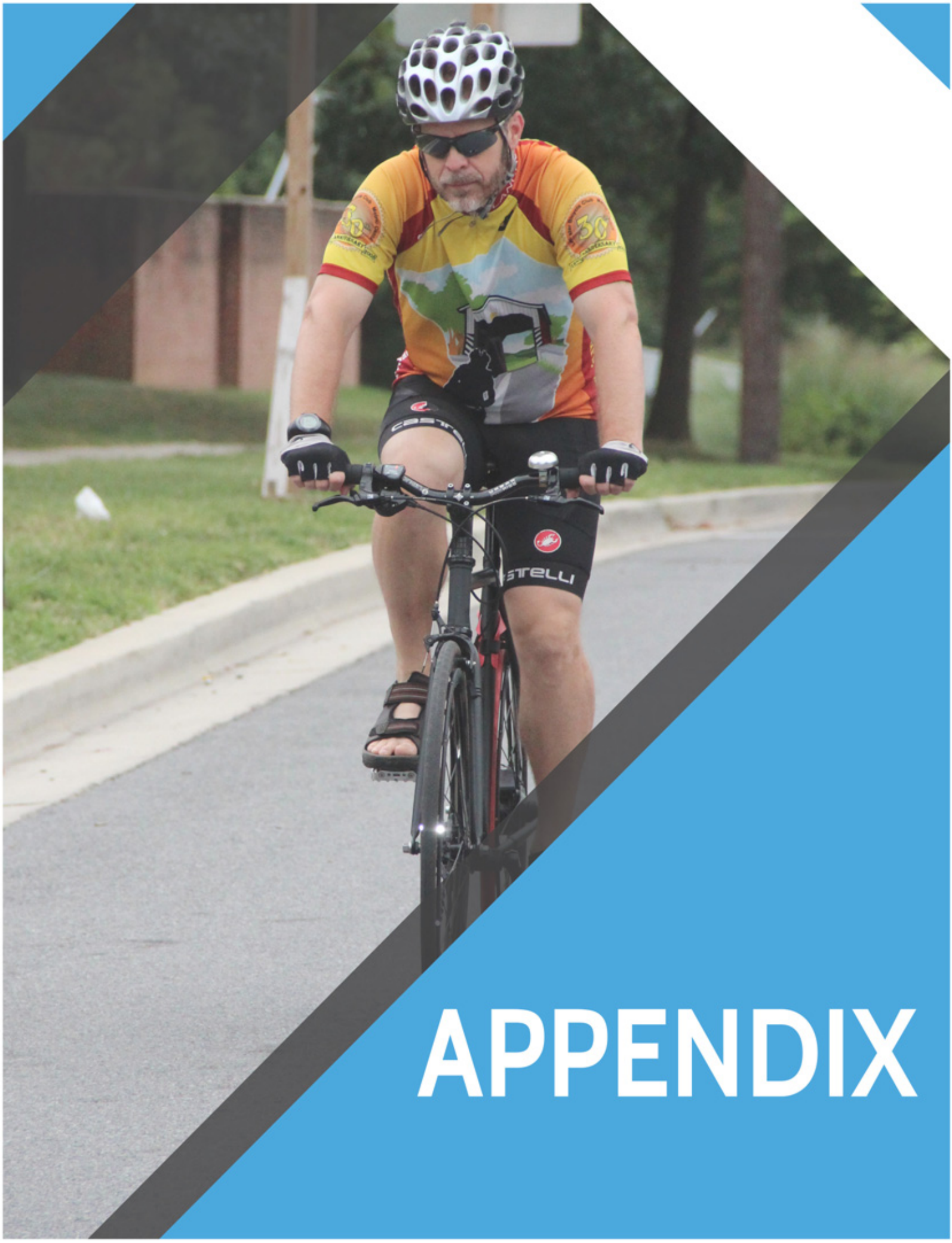
Buffered bike lanes:

- With and without on-street parking.
- Others as recommended by the consultant.
- Advisory bike lanes:
- With and without on-street parking.
- Others as recommended by the consultant.

intersection templates

The Working Draft of the Bicycle Master Plan will prepare typical sections for:

- Protected intersections with and without on-street parking.
- Bike boulevard treatments (such as diverters and refuges).
- Transition from one-way to two-way bikeways.
- Facilitating left turns, such as with two-stage bike boxes and left turn pockets, etc.



APPENDIX

Appendix A: Detailed Monitoring Report

Staff continues to collect detailed data for each of the recommended objectives. At this time data is only available for Goal 2.

- Objective 2.2: Percentage of dwelling units within 2.0 miles of each station that are connected to the station through a low-stress bicycling network:
    - Red Line
    - Brunswick Line
    - Purple Line
    - Corridor Cities Transitway

- Objective 2.3: Percentage of dwelling units within the attendance zone of each public school that are connected to each school through a low-stress bicycle network:
    - Elementary Schools
    - Middle Schools
    - High Schools

- Objective 2.4: Percentage of dwelling units within 2.0 miles of a public facility will be connected to that facility through a low-stress bicycling network:
    - Libraries
    - Recreation Centers
    - Regional and Recreational Parks

- Objective 2.6: Percentage of Montgomery County elementary schools with at least 1 bicycle parking for each 20 students of planned capacity AND that are "acceptable" rack styles per the standard in the Association of Pedestrian and Bicycle Professionals' *Bicycle Parking Guidelines 2nd Edition*:
    - Elementary Schools
    - Middle Schools
    - High Schools

- Objective 2.7: Percentage of blocks in the Silver Spring CBD that have at least the amount of short-term bicycle parking required by the current zoning code.
    - Bethesda CBD (forthcoming)
    - Friendship Heights CBD (forthcoming)
    - Germantown (forthcoming)
    - Silver Spring CBD

  - Wheaton CBD (forthcoming)
  - White Flint Sector Plan Area (forthcoming)

- Objective 2.8: Percentage of Montgomery County libraries with 1 short-term bicycle parking space per 8,000 square feet of floor area AND that are "acceptable" bike rack styles per the standards set out in the Association of Pedestrian and Bicycle Professionals' *Bicycle Parking Guidelines 2nd Edition*:

  - Libraries
  - Recreation Centers

- Objective 2.9: Percentage of Montgomery County regional and recreational park facilities with short-term bicycle parking.

Objective 2.2: Percentage of dwelling units within 2.0 miles of each Red Line station that are connected to the station through a low-stress bicycling network.

Red Line Station	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Glenmont	39%			
Wheaton	1%			
Forest Glen	14%			
Silver Spring	1%			
Takoma	26%			
Shady Grove	0%			
Rockville	0%			
Twinbrook	21%			
White Flint	0%			
Grosvenor	7%			
Medical Center	31%			
Bethesda	0%			
Friendship Heights	3%			
Average	**18%**			

Objective 2.2: Percentage of dwelling units within 2.0 miles of each MARC Brunswick Line station that are connected to the station through a low-stress bicycling network.

Brunswick Line Station	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Dickerson	5%			
Barnesville	1%			
Boyds	2%			
Germantown	18%			
Metropolitan Grove	16%			
Gaithersburg	7%			
Washington Grove	6%			
Rockville	0%			
Garrett Park	44%			
Kensington	0%			
Silver Spring	0%			
Average	**12%**			

Objective 2.2: Percentage of dwelling units within 2.0 miles of each Purple Line station that are connected to the station through a low-stress bicycling network.

Purple Line Station	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Bethesda	13%			
Connecticut Avenue	5%			
Lyttonsville	18%			
Woodside	0%			
Silver Spring Transit Center	1%			
Silver Spring Library	0%			
Dale Drive	0%			
Manchester Place	13%			
Long Branch	0%			
Piney Branch Road	0%			
Takoma / Langley	0%			
Average	**15%**			

Objective 2.2: Percentage of dwelling units within 2.0 miles of each Corridor Cities Transitway station that are connected to the station through a low-stress bicycling network.

Corridor Cities Transitway Station	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
East Gaither	32%			
West Gaither	65%			
Crown Farm	0%			
DANAC	0%			
LSC Central	0%			
LSC West	n/a			
LSC Belward	n/a			
Kentlands	27%			
NIST	n/a			
First Field	0%			
Metropolitan Grove	16%			
Average	**23%**			

Objective 2.3: Percentage of dwelling units within the attendance zone of each elementary school that are connected to each school through a low-stress bicycle network.

Elementary School	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Arcola	25%			
Ashburton	18%			
Bannockburn	18%			
Barnsley	16%			
Beall	17%			
Bel Pre	15%			
Bells Mill	25%			
Belmont	100%			
Bethesda	4%			
Beverly Farms	0%			
Bradley Hills	54%			
Brooke Grove	2%			
Brookhaven	0%			
Brown Station	0%			
Burning Tree	32%			
Burnt Mills	12%			
Burtonsville	0%			
Candlewood	17%			
Cannon Road	31%			
Carderock Springs	55%			
Rachel Carson	4%			
Cashell	0%			
Cedar Grove	0%			
Chevy Chase	33%			
Clarksburg	4%			
Clearspring	34%			
Clopper Mill	5%			
Cloverly	0%			
Cold Spring	23%			
College Gardens	6%			
Cresthaven	0%			
Daly	0%			
Damascus	0%			
Darnestown	0%			
Diamond	35%			
Drew	20%			

Elementary School	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
DuFief	69%			
East Silver Spring	29%			
Fairland	13%			
Fallsmead	0%			
Farmland	20%			
Fields Road	0%			
Flower Hill	0%			
Flower Valley	51%			
Forest Knolls	43%			
Fox Chapel	41%			
Gaithersburg	0%			
Galway	21%			
Garrett Park	11%			
Georgian Forest	6%			
Germantown	0%			
Glen Haven	80%			
Glenallan	1%			
Goshen	6%			
Great Seneca Creek	2%			
Greencastle	4%			
Greenwood	58%			
Harmony Hills	14%			
Highland	41%			
Highland View	60%			
Jackson Road	46%			
JoAnn Leleck	4%			
Jones Lane	0%			
Kemp Mill	66%			
Kensington Parkwood	73%			
Lake Seneca	10%			
Lakewood	11%			
Laytonsville	0%			
Little Bennett	0%			
Luxmanor	0%			
Marshall	45%			
Maryvale	53%			
Matsunaga	42%			
McAuliffe	50%			

Elementary School	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
McNair	4%			
Meadow Hall	0%			
Mill Creek Towne	39%			
Monocacy	0%			
Montgomery Knolls	42%			
New Hampshire Estates	0%			
North Chevy Chase	0%			
Oak View	23%			
Oakland Terrace	42%			
Olney	31%			
Page	16%			
Pine Crest	65%			
Piney Branch	4%			
Poolesville	35%			
Potomac	9%			
Resnik	8%			
Ride	91%			
Ritchie Park	25%			
Rock Creek Forest	14%			
Rock Creek Valley	0%			
Rock View	12%			
Rockwell	15%			
Rolling Terrace	71%			
Roscoe Nix	4%			
Rosemary Hills	24%			
Rosemont	5%			
Sargent Shriver	28%			
Sequoyah	26%			
Seven Locks	5%			
Sherwood	0%			
Singer	30%			
Sligo Creek	12%			
Somerset	11%			
South Lake	7%			
Stedwick	0%			
Stone Mill	2%			
Stonegate	82%			
Strathmore	8%			

Elementary School	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Strawberry Knoll	0%			
Summit Hall	6%			
Takoma Park	3%			
Travilah	0%			
Twinbrook	60%			
Viers Mill	63%			
Washington Grove	20%			
Waters Landing	0%			
Watkins Mill	29%			
Wayside	26%			
Weller Road	41%			
Westbrook	68%			
Westover	64%			
Wheaton Woods	50%			
Whetstone	10%			
William B. Gibbs Jr.	27%			
Wilson Wims	47%			
Wood Acres	18%			
Woodfield	59%			
Woodlin	7%			
Wyngate	74%			
Average	20%			

Objective 2.3: Percentage of dwelling units within the attendance zone of each middle school that are connected to each school through a low-stress bicycle network.

Middle School	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Argyle	4%			
John T. Baker	0%			
Benjamin Banneker	3%			
Cabin John	19%			
Briggs Chaney	19%			
Roberto W. Clemente	3%			
Eastern	0%			
William H. Farquhar	4%			
Forest Oak	0%			
Robert Frost	16%			
Gaithersburg	3%			
Herbert Hoover	1%			
Francis Scott Key	2%			
Dr. Martin Luther King, Jr	4%			
Kingsview	0%			
Lakelands Park	34%			
Col. E. Brooke Lee	3%			
A. Mario Loiederman	28%			
Montgomery Village	2%			
Neelsville	0%			
Newport Mill	2%			
North Bethesda	23%			
Parkland	9%			
Rosa M. Parks	38%			
John Poole	52%			
Thomas W. Pyle	13%			
Redland	0%			
Ridgeview	28%			
Rocky Hill	48%			
Shady Grove	1%			
Silver Spring International	16%			
Sligo	22%			
Takoma Park	3%			
Tilden	0%			
Julius West	0%			
Westland	0%			

Middle School	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
White Oak	16%			
Earle B. Wood	16%			
Average	**10%**			

Objective 2.3: Percentage of dwelling units within the attendance zone of each high school that are connected to each school through a low-stress bicycle network.

High School	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Bethesda-Chevy Chase	7%			
Montgomery Blair	0%			
James Hubert Blake	46%			
Winston Churchill	1%			
Clarksburg	13%			
Damascus	4%			
Albert Einstein	5%			
Gaithersburg	3%			
Walter Johnson	0%			
John F. Kennedy	0%			
Col. Zadok Magruder	0%			
Richard Montgomery	0%			
Northwest	16%			
Northwood	19%			
Paint Branch	0%			
Poolesville	32%			
Quince Orchard	0%			
Rockville	0%			
Seneca Valley	0%			
Sherwood	9%			
Springbrook	1%			
Watkins Mill	1%			
Wheaton	9%			
Walt Whitman	0%			
Thomas S. Wootton	11%			
Average	5%			

Objective 2.4: Percentage of dwelling units within 2.0 miles of a public library will be connected to that library through a low-stress bicycling network.

Library	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Aspen Hill	0%			
Bethesda	14%			
Chevy Chase	7%			
Damascus	1%			
Davis/Special Needs	9%			
Fairland	0%			
Gaithersburg	0%			
Germantown	0%			
Kensington Park	0%			
Little Falls	0%			
Long Branch	20%			
Noyes Childrens	20%			
Olney	0%			
Poolesville	11%			
Potomac	24%			
Quince Orchard	0%			
Rockville	0%			
Silver Spring	0%			
Twinbrook	34%			
Wheaton	25%			
White Oak	20%			
Average	**11%**			

Objective 2.4: Percentage of dwelling units within 2.0 miles of a recreation center will be connected to that recreation center through a low-stress bicycling network.

Recreation Center	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Activity Center At Bohrer Park	0%			
Apple Ridge Ball Field	21%			
Bauer Drive Recreation Center	0%			
Casey Community Center	2%			
Charles W Gilchrist Ctr for Cultural Diversity	0%			
Clara Barton Recreation Center	40%			
Croydon Creek Nature Center	36%			
Damascus Community Recreation Center	0%			
East County Community Recreation Center	43%			
Fairland Community Recreation Center	0%			
Friendship Heights Village Center	0%			
Gaithersburg Arts Barn	54%			
Gaithersburg Community Museum	0%			
Gaithersburg Miniature Golf Course	0%			
Gaithersburg Skate Park	0%			
Gaithersburg Youth Center	10%			
Germantown Recreation Center	0%			
Good Hope Neighborhood Recreation Center	0%			
Gwendolyn E Coffield Recreation Center	17%			
Heffner Park Community Center	31%			
Kensington Community Center	14%			
Kentlands Mansion	54%			
Lake Marion Community Center	0%			
Leland Community Recreation Center	14%			
Lincoln Park Community Center	18%			
Long Branch Community Recreation Center	21%			
Longwood Community Recreation Center	0%			
Mid County Community Center (2008)	11%			
North Creek Community Center	21%			
North Potomac Recreation Center (2011)	25%			
Plum Gar Neighborhood Recreation Center	14%			
Potomac Community Recreation Center	0%			
Rockville Climbing Gym	34%			
Rockville Skate Park	26%			
Ross Boddy Recreation Center	1%			
Sam Abbott Citizens Center	36%			

Recreation Center	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Scotland Neighborhood Recreation Center	2%			
Stedwick Community Center	7%			
Takoma Park Recreation Center	3%			
Twinbrook Community Rec Center	25%			
Upper County Neighborhood Recreation Center	0%			
Wheaton Neighborhood Recreation Center	25%			
Whetstone Community Center	2%			
Average	**22%**			

Objective 2.4: Percentage of dwelling units within 2.0 miles of each regional or recreational park will be connected to that park through a low-stress bicycling network.

Regional or Recreation Park	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Black Hill Regional Park	34%			
Cabin John Regional Park	0%			
Damascus Recreational Park	57%			
Fairland Recreational Park	56%			
Laytonia Recreational Park (under construction)	0%			
Little Bennett Regional Park	0%			
Martin Luther King Jr. Recreational Park	24%			
Northwest Branch Recreational Park	0%			
Olney Manor Recreational Park	46%			
Ovid Hazen Wells Recreational Park	45%			
Ridge Road Recreational Park	19%			
Rock Creek Regional Park	27%			
South Germantown Recreational Park	42%			
Wheaton Regional Park	37%			
Average	**31%**			

Objective 2.6: Percentage of Montgomery County elementary schools with at least 1 bicycle parking for each 20 students of planned capacity AND that are "acceptable" rack styles per the standard in the Association of Pedestrian and Bicycle Professionals' *Bicycle Parking Guidelines 2nd Edition*.

Elementary School	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Arcola	No			
Ashburton	No			
Bannockburn	No			
Barnsley	No			
Beall	No			
Bel Pre	No			
Bells Mill	No			
Belmont	No			
Bethesda	No			
Beverly Farms	No			
Bradley Hills	No			
Brooke Grove	No			
Brookhaven	No			
Brown Station				
Burning Tree	No			
Burnt Mills	No			
Burtonsville	No			
Candlewood	No			
Cannon Road	No			
Carderock Springs	No			
Rachel Carson	No			
Cashell	No			
Cedar Grove	No			
Chevy Chase	No			
Clarksburg	No			
Clearspring	No			
Clopper Mill	No			
Cloverly	No			
Cold Spring	No			
College Gardens	No			
Cresthaven	No			
Daly	No			
Damascus	No			
Darnestown	No			

Elementary School	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Diamond	No			
Charles R. Drew	No			
DuFief	No			
East Silver Spring	No			
Fairland	No			
Fallsmead	No			
Farmland	No			
Fields Road	No			
Flower Hill	No			
Flower Valley	No			
Forest Knolls	No			
Fox Chapel	No			
Gaithersburg	No			
Galway	No			
Garrett Park	No			
Georgian Forest	No			
Germantown	No			
Glen Haven	No			
Glenallan	No			
Goshen	No			
Great Seneca Creek	No			
Greencastle	No			
Greenwood	No			
Harmony Hills	No			
Highland	No			
Highland View	No			
Jackson Road	No			
JoAnn Leleck	No			
Jones Lane	No			
Kemp Mill	No			
Kensington Parkwood	No			
Lake Seneca	No			
Lakewood	No			
Laytonsville	No			
Little Bennett	No			
Luxmanor	No			
Marshall	No			
Maryvale	No			

Elementary School	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Matsunaga	No			
Christa McAuliffe	No			
Ronald A. McNair	No			
Meadow Hall	Yes			
Mill Creek Towne	No			
Monocacy	No			
Montgomery Knolls	No			
New Hampshire Estates	No			
North Chevy Chase	No			
Oak View	No			
Oakland Terrace	No			
Olney	No			
Page	No			
Pine Crest	No			
Piney Branch	No			
Poolesville	No			
Potomac	No			
Resnik	No			
Dr. Sally K. Ride	No			
Ritchie Park	No			
Rock Creek Forest	No			
Rock Creek Valley	No			
Rock View	No			
Lois P. Rockwell	No			
Rolling Terrace	No			
Roscoe Nix	No			
Rosemary Hills	No			
Rosemont	No			
Sargent Shriver	No			
Sequoyah	No			
Seven Locks	No			
Sherwood	No			
Singer	No			
Sligo Creek	No			
Somerset	No			
South Lake	No			
Stedwick	No			
Stone Mill	No			

Elementary School	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Stonegate	No			
Strathmore	No			
Strawberry Knoll	No			
Summit Hall	No			
Takoma Park	No			
Travilah	No			
Twinbrook	No			
Viers Mill	No			
Washington Grove	No			
Waters Landing	No			
Watkins Mill	No			
Wayside				
Weller Road	No			
Westbrook	No			
Westover	No			
Wheaton Woods	No			
Whetstone	No			
William B. Gibbs Jr.	No			
Wilson Wims	No			
Wood Acres	No			
Woodfield	No			
Woodlin	No			
Wyngate	No			
Total	**1%**			

Objective 2.6: Percentage of Montgomery County middle schools with at least 1 bicycle parking for each 20 students of planned capacity AND that are "acceptable" rack styles per the standard in the Association of Pedestrian and Bicycle Professionals' *Bicycle Parking Guidelines 2nd Edition*.

Middle School	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Argyle	No			
John T. Baker	No			
Benjamin Banneker	No			
Cabin John	No			
Briggs Chaney	No			
Roberto W. Clemente	No			
Eastern	No			
William H. Farquhar	No			
Forest Oak	No			
Robert Frost	No			
Gaithersburg	No			
Herbert Hoover	No			
Francis Scott Key	No			
Dr. Martin Luther King, Jr	No			
Kingsview	No			
Lakelands Park	No			
Col. E. Brooke Lee	No			
A. Mario Loiederman	No			
Montgomery Village	No			
Neelsville	No			
Newport Mill	No			
North Bethesda	No			
Parkland	No			
Rosa M. Parks	No			
John Poole	No			
Thomas W. Pyle	No			
Redland	No			
Ridgeview	No			
Rocky Hill	No			
Shady Grove	No			
Silver Spring International	No			
Sligo	No			
Takoma Park	No			
Tilden	No			
Hallie Wells	No			

Middle School	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Julius West	No			
Westland	No			
White Oak	No			
Earle B. Wood	No			
Total	**0%**			

Objective 2.6: Percentage of Montgomery County high schools with at least 1 bicycle parking for each 20 students of planned capacity AND that are "acceptable" rack styles per the standard in the Association of Pedestrian and Bicycle Professionals' Bicycle Parking Guidelines 2nd Edition.

High School	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Bethesda-Chevy Chase	No			
Montgomery Blair	No			
James Hubert Blake	No			
Winston Churchill	No			
Clarksburg	No			
Damascus	No			
Albert Einstein	No			
Gaithersburg	No			
Walter Johnson	No			
John F. Kennedy	No			
Col. Zadok Magruder	No			
Richard Montgomery	No			
Northwest	No			
Northwood	No			
Paint Branch	No			
Poolesville	No			
Quince Orchard	No			
Rockville	No			
Seneca Valley	No			
Sherwood	No			
Springbrook	No			
Watkins Mill	No			
Wheaton	No			
Walt Whitman	No			
Thomas S. Wootton	No			
Total	**0%**			

Objective 2.7: Percentage of blocks in the Silver Spring CBD that have at least the amount of short-term bicycle parking required by the current zoning code.

Block	Supply	Demand	Gap
1000 BONIFANT ST Odd		3	3
1000 EAST WEST HWY Even		0	
1000 EAST WEST HWY Odd		0	
1000 KING ST Even		0	
1000 KING ST Odd		2	2
1000 RIPLEY ST Even		1	1
1000 Ripley St Odd	4	1	
1000 Spring St Even	2	1	
1000 WAYNE AVE Even		5	5
1000 Wayne Ave Odd	10	16	6
1100 BLAIR MILL RD Even		1	1
1100 BONIFANT ST Even		1	1
1100 BONIFANT ST Odd		0	
1100 DIXON AVE Odd		3	3
1100 EAST WEST HWY Even		6	6
1100 East West Hwy Odd	18	13	
1100 FIDLER LN Even		7	7
1100 Ripley St Even	12	5	
1100 RIPLEY ST Odd		3	3
1100 Spring St Even	2	2	
1100 WAYNE AVE Even		5	5
1200 BLAIR MILL RD Even		3	3
1200 East West Hwy Even	6	13	7
1200 EAST WEST HWY Odd		8	8
1200 FIDLER LN Odd		3	3
1200 SPRING ST Even		2	2
1300 APPLE AVE Even		0	
1300 APPLE AVE Odd		3	3
1300 BLAIR MILL RD Odd		3	3
1300 CAMERON HILL CT Even		0	
1300 CAMERON HILL CT Odd		0	
1300 EAST WEST HWY Even		1	1
1300 EAST WEST HWY Odd		39	39
1300 FENWICK LN Even		6	6
1300 FENWICK LN Odd		11	11
1300 SPRING ST Even		4	4
1400 Blair Mill Rd Odd	4	6	2
1400 EAST WEST HWY Even		5	5

Block	Supply	Demand	Gap
1400 EAST WEST HWY Odd		2	2
1400 FENWICK LN Odd		1	1
1400 SPRING ST Even		2	2
1500 FALKLAND LN Odd		3	3
700 ELLSWORTH DR Even		0	
700 ELLSWORTH DR Odd		0	
700 ROEDER RD Even		2	2
700 ROEDER RD Odd		2	2
7600 BLAIR RD Even		0	
7600 Blair Rd Odd	12	0	
7600 FENTON ST Even		0	
7700 BLAIR RD Even		1	1
7700 EASTERN AVE Odd		1	1
7700 FENTON ST Even		9	9
7800 EASTERN AVE Odd		0	
7800 FENTON ST Even		0	
7800 GEORGIA AVE Even		0	
7900 EASTERN AVE Odd		5	5
7900 FENTON ST Even		0	
7900 Georgia AVE Even		3	3
7900 Georgia Ave Odd	17	0	
800 BONIFANT ST Even		0	
800 BONIFANT ST Odd		0	
800 BURLINGTON AVE Even		0	
800 BURLINGTON AVE Odd		0	
800 EASLEY ST Even		4	4
800 EASLEY ST Odd		0	
800 ELLSWORTH DR Even		2	2
800 ELLSWORTH DR Odd		2	2
800 KING ST Odd		0	
800 Pershing Dr Even	10	3	
800 Pershing Dr Odd	2	1	
800 ROEDER RD Even		0	
800 ROEDER RD Odd		0	
800 SILVER SPRING AVE Even		0	
800 SILVER SPRING AVE Odd		1	1
800 SLIGO AVE Even		1	1
800 SLIGO AVE Odd		0	
800 Thayer Ave Even	4	2	
800 THAYER AVE Odd		4	4

Block	Supply	Demand	Gap
800 WAYNE AVE Even		0	
800 Wayne Ave Odd	8	5	
8000 13th St Even	2	3	1
8000 13th St Odd	12	2	
8000 BLAIR MILL DR Even		1	1
8000 BLAIR MILL DR Odd		1	1
8000 EASTERN AVE Odd		1	1
8000 EASTERN DR Even		1	1
8000 FENTON ST Even		3	3
8000 FENTON ST Odd		1	1
8000 GEORGIA AVE Even		1	1
8000 GEORGIA AVE Odd		4	4
8000 Kennett St Even	20	0	
8000 KENNETT ST Odd		2	2
8000 Newell St Even	4	3	
8000 Newell St Odd	8	6	
8070 BLAIR MILL RD Even		1	1
8100 Eastern Ave Odd	2	4	2
8100 FENTON ST Even		0	
8100 Fenton St Odd	2	0	
8100 Georgia Ave Even	20	4	
8100 Georgia Ave Odd	16	3	
8200 16TH ST Odd		3	3
8200 BLAIR MILL RD Odd		0	
8200 DIXON AVE Even		0	
8200 FENTON ST Even		0	
8200 Fenton St Odd	10	1	
8200 GEORGIA AVE Even		3	3
8200 Georgia Ave Odd	12	4	
8200 MAYOR LN Odd		0	
8300 Colesville Rd Even	5	5	
8300 COLESVILLE RD Odd		5	5
8300 DIXON AVE Odd		1	1
8300 FALKLAND LN Odd		3	3
8300 FENTON ST Even		2	2
8300 Fenton St Odd	2	1	
8300 GEORGIA AVE Odd		0	
8400 COLESVILLE RD Even		0	
8400 COLESVILLE RD Odd		20	20
8400 FENTON ST Even		0	

Block	Supply	Demand	Gap
8400 FENTON ST Odd		0	
8400 GEORGIA AVE Even		4	4
8400 Georgia Ave Odd	2	1	
8400 RAMSEY AVE Even		0	
8400 RAMSEY AVE Odd		0	
8500 16TH ST Odd		3	3
8500 2nd Ave Even	4	22	18
8500 2ND AVE Odd		0	
8500 Cameron St Even	4	0	
8500 CAMERON ST Odd		0	
8500 CARROLTON RD Odd		0	
8500 CEDAR ST Even		1	1
8500 COLESVILLE RD Even		0	
8500 Colesville Rd Odd	4	1	
8500 FENTON ST Even		20	20
8500 Fenton St Odd	8	6	
8500 Georgia Ave Even	4	5	1
8500 Georgia Ave Odd	6	4	
8500 WAYNE AVE Even		0	
8600 2nd Ave Even	2	1	
8600 2ND AVE Odd		3	3
8600 CAMERON ST Even		4	4
8600 Cameron St Odd	2	4	2
8600 Cedar St Even	2	2	
8600 Colesville Rd Even	20	10	
8600 Colesville Rd Odd	4	25	21
8600 FENTON ST Even		7	7
8600 FENTON ST Odd		2	2
8600 GEORGIA AVE Even		1	1
8600 GEORGIA AVE Odd		1	1
8600 RAMSEY AVE Odd		0	
8600 SECOND AVE Even		8	8
8600 SECOND AVE Odd		0	
8700 1ST AVE Even		3	3
8700 BLAIRMILL RD Even		0	
8700 Cameron St Even	6	6	
8700 CAMERON ST Odd		3	3
8700 COLESVILLE RD Even		1	1
8700 Colesville Rd Odd	8	4	
8700 FENTON Odd		2	2

Block	Supply	Demand	Gap
8700 FENTON ST Even		0	
8700 GEORGIA AVE Even		15	15
8700 Georgia Ave Odd	8	15	7
8700 RAMSEY AVE Even		0	
8700 RAMSEY AVE Odd		1	1
900 Bonifant St Even	2	1	
900 Bonifant St Odd	10	5	
900 BURLINGTON AVE Odd		2	2
900 Ellsworth Dr Even	10	22	12
900 Ellsworth Dr Odd	6	13	7
900 GIST AVE Even		0	
900 GIST AVE Odd		0	
900 JESUP BLAIR DR Even		0	
900 JESUP BLAIR DR Odd		0	
900 King St Even	10	0	
900 PHILADELPHIA AVE Even		0	
900 PHILADELPHIA AVE Odd		2	2
900 SELIM RD Odd		0	
900 SILVER SPRING AVE Even		2	2
900 SILVER SPRING AVE Odd		1	1
900 SLIGO AVE Even		1	1
900 SLIGO AVE Odd		2	2
900 Spring St Even	8	0	
900 THAYER AVE Even		1	1
900 THAYER AVE Odd		2	2
900 Wayne Ave Even	44	35	
900 Wayne Ave Odd	18	1	
Silver Spring Metro Station	158		
Silver Spring Transit Center	4		
Total	**580**	**602**	**401**

Objective 2.8: Percentage of Montgomery County libraries with 1 short-term bicycle parking space per 8,000 square feet of floor area AND that are "acceptable" bike rack styles per the standards set out in the Association of Pedestrian and Bicycle Professionals' *Bicycle Parking Guidelines 2nd Edition*.

Library	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Aspen Hill	No			
Bethesda	No			
Chevy Chase	No			
Damascus	No			
Davis/Special Needs	No			
Fairland	No			
Gaithersburg	Yes			
Germantown	No			
Kensington Park	No			
Little Falls	No			
Long Branch	No			
Noyes Childrens	No			
Olney	No			
Poolesville	No			
Potomac	No			
Quince Orchard	No			
Rockville	Yes			
Silver Spring	Yes			
Twinbrook	No			
White Oak	No			
Total	**15%**			

Objective 2.8: Percentage of Montgomery County recreation centers with 1 short-term bicycle parking space per 8,000 square feet of floor area AND that are "acceptable" bike rack styles per the standards set out in the Association of Pedestrian and Bicycle Professionals' *Bicycle Parking Guidelines 2nd Edition*.

Recreation Center	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Bauer Drive Recreation Center	Yes			
Clara Barton Recreation Center	No			
Damascus Community Recreation Center	No			
East County Community Recreation Center	No			
Fairland Community Recreation Center	No			
Germantown Recreation Center	Yes			
Gwendolyn E Coffield Recreation Center	No			
Kensington Community Center	No			
Leland Community Recreation Center	No			
Long Branch Community Recreation Center	No			
Longwood Community Recreation Center	No			
Mid County Community Center	No			
North Potomac Recreation Center	No			
Plum Gar Neighborhood Recreation Center	No			
Potomac Community Recreation Center	No			
Scotland Neighborhood Recreation Center	No			
Upper County Neighborhood Recreation Center	No			
Wheaton Neighborhood Recreation Center	No			
White Oak Community Recreation Center	No			
Wisconsin Place Recreation Center	Yes			
Total	**15%**			

Objective 2.9: Percentage of Montgomery County regional and recreational park facilities with short-term bicycle parking.

Regional or Recreation Park	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Black Hill Regional Park	**Yes**			
Park Office	No			
Visitor Center	Yes			
Picnic Areas	No			
Police Complex	No			
Dog Exercise Area	No			
Cabin John Regional Park	**No**			
Ice Rink	No			
Outdoor Tennis Courts/Baseball Fields	No			
Miniature Train/Dog Park/Tai Chi Court	No			
Indoor Tennis Center	No			
Locust Grove Nature Center	No			
Group Picnic Area	No			
Damascus Recreational Park	**No**			
Tennis/Basketball Courts	No			
Baseball Fields	No			
Soccer Fields	No			
Fairland Recreational Park	**No**			
North Basketball/Soccer Field	No			
North Baseball field	No			
Tennis Courts	No			
South Baseball/Soccer Field	No			
Little Bennett Regional Park	**Yes**			
Camp Grounds	No			
Maintenance Facility	Yes			
Day Use Picnic Area	No			
Martin Luther King Jr. Recreational Park	**No**			
Swim Center	No			
Tennis Courts	No			
South Baseball/Soccer Field	No			
Northwest Branch Recreational Park	**No**			
Olney Manor Recreational Park	**Yes**			
Swim Center	Yes			
Baseball Fields	No			
Ovid Hazen Wells Recreational Park	**Yes**			
North Athletic Fields	Yes			

Regional or Recreation Park	Actual		Target	
	2017 (baseline)	2019	2022 (5-year target)	2027 (10-year target)
Picnic Area	Yes			
South Baseball Fields	Yes			
Ridge Road Recreational Park	**No**			
Baseball Fields	No			
Soccer Fields	No			
Dog Park	No			
Rock Creek Regional Park	**No**			
Archery Range/Picnic Area	No			
GoApe Zip Line/Picnic Area	No			
Lake Needwood Boats Pavilion	No			
Lathrop E Smith Center (MCPS facility)	No			
Meadowside Nature Center	No			
South Germantown Recreational Park	**Yes**			
Castle Park/Adventure Playground	No			
East Picnic Area	Yes			
Washington Nationals Youth Baseball Fields	Yes			
Central Park Circle Soccer Fields	No			
Germantown Indoor Swim Center	Yes			
Splash Park & Mini Golf	Yes			
South Germantown Driving Range	No			
TennisPlex	No			
King Barn Dairy Mooseum	No			
SoccerPlex/Discovery Sports Center	Yes			
Wheaton Regional Park (various locations)	**Yes**			
Baseball Fields 1	No			
Baseball Fields 2	No			
Brookside Gardens Visitor Center	No			
Brookside Gardens Conservatory	Yes			
Brookside Gardens Nature Center	No			
Carousel & Miniature Train	No			
Wheaton Ice Arena	Yes			
Wheaton Sports Pavilion/Open-Air Skate Rink	Yes			
Tennis Courts	No			
Rate	**25%**			

THE BICYCLE MASTER PLAN

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