CITY OF HAGERSTOWN - BICYCLE MASTER PLAN UPDATE

Adopted by Mayor and City Council - May 24, 2016

Submitted to : **Hagerstown/Eastern Panhandle Metropolitan Planning Organization and the City of Hagerstown, Maryland**

Submitted by : **Michael Baker International, Inc.**

Michael Baker INTERNATIONAL

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ACKNOWLEDGMENTS

The City of Hagerstown Bicycle Master Plan Update was a collaborative effort on behalf of the City of Hagerstown and the Hagerstown/Eastern Panhandle Metropolitan Planning Organization (HEPMPO).

The City and HEPMPO would like to thank the Bicycle Advisory Committee (BAC) for its valuable contributions throughout the planning process.

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EXECUTIVE SUMMARY

What is the Bicycle Master Plan (BMP)?

The BMP is an update to the City's 2010 plan and represents a collaborative effort on behalf of the City of Hagerstown and the Hagerstown/Eastern Panhandle Metropolitan Planning Organization (HEPMPO). The BMP evaluates the city's existing bicycle environment (safety, connectivity, policies) and proposes a variety of new improvements over the next ten years. These plan recommendations include physical improvements, such as bike lanes and trails, and policy initiatives, such as safety programs and bicycle events.

What's been done since 2010?

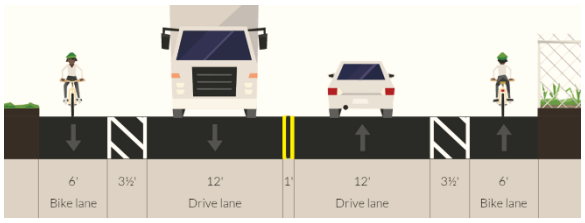
The City of Hagerstown added approximately 10 miles of bicycle facilities from 2010 to 2015. These improvements include bike lanes, shared-lane markings (sharrows), and multi-use paths.

How does the plan evaluate bicycle needs?

The plan relied on data analysis and public input to evaluate bicycle needs. A bicycle-level-of-service (BLOS) tool was used to assess bicycle comfort and a bicycle demand tool was used to gauge where potential bicycle demand is highest. The public provided key input through an interactive, web-based survey, while the Bicycle Advisory Committee (BAC) offered guidance throughout the planning process and was critical is helping to prioritize investments.

What does the plan recommend?

The BMP recommends a variety of on-road, off-road, and policy-oriented improvements to help cultivate a healthier bicycle environment. For example, the BMP recommends road diets on Northern Avenue and S. Burhans Boulevard, which would reduce the number of travel lanes and use the newly available space for bike lanes (buffered bike lanes, in the case of S. Burhans).



Proposed cross-section of S. Burhans Boulevard, including road diet and buffered bike lanes.

The plan also recommends safety and policy initiatives to help generate interest/awareness for cycling and ensure that cyclists and motorists understand their roadway responsibilities.

How can we get there?

The BMP includes an Implementation Plan that prioritizes investments based on a data-driven process, which examines projects' varying proximities to schools, parks, trails, housing, and jobs. The Implementation Plan also considers construction costs, sequencing, and anticipated funding constraints.

Did you know?

…the City is designated a bronze-level Bicycle Friendly Community by the League of American Bicyclists?

…the Hub City Bike Loop is a signed 10-mile bike loop around the city, utilizing on-street bike lanes and multi-use paths?

…the City has a bike safety video on its bicycling website and on YouTube?

…the BMP is available for download www.HEPMPO.net/HagerstownBMP?

INTRODUCTION

The City of Hagerstown Bicycle Master Plan (BMP) Update expands the City's vision of enhancing and promoting a healthy bicycle network and builds upon recent successes over the last five years. Bicycling is on the rise in cities across the United States and bicycle infrastructure, amenities, and policies are increasingly important elements of community life. Cycling represents much more than an environmentally friendly transportation alternative; it improves public health, enhances quality of life, generates tourism, and helps to attract and retain today's 21st century workforce. The City's commitment to safe, convenient, and comfortable bicycle facilities supports its "Complete Streets" efforts and ultimately contributes to a healthier, more vibrant Hagerstown.

Hagerstown is recognized as a "Bicycle Friendly Community" and is poised to become one of the first silver-level communities in Maryland. This update was a collaborative effort between the City of Hagerstown and the Hagerstown/Eastern Panhandle Metropolitan Planning Organization (HEPMPO). The plan seeks to build on the momentum generated by the 2010 BMP and introduce new ways in which to evaluate the City's existing and proposed bicycle infrastructure and amenities. Specifically, the goals of this plan update include the following:

- Measure progress towards implementing the Goals of the 2010 BMP
- Gauge cycling comfort in the City
- Evaluate potential bicycle demand in the City
- Update the existing bicycle network
- Develop revised recommendations
- Prioritize investments
- Identify implementation strategies over the next ten years

Progress since 2010

The 2010 BMP detailed key strategies for implementing goals, many of which have been accomplished. For example, the City has identified and signed bicycle routes as part of the Hub City Bicycle Network. The City has also adopted a "Complete Streets" Policy where bike planning, infrastructure, and routes are considered in new development projects. The Complete Streets policy helps ensure that streets are designed to accommodate bicyclists, pedestrians, motorists, or public transportation users. In addition, the City has intensified efforts to provide adequate bicycle parking and has adopted a Bicycle Advisory Committee (BAC). The 2010 BMP goals are shown below; the green checked boxes reflect goals in which the City has made significant progress.

- ☑ Goal 1: Creation of bike routes on the "Proposed Hub City Bicycle Network"
- ☑ Goal 2: Adopt a "complete streets" policy
- ☐ Goal 3: Develop a comprehensive bicycle marketing plan
- ☑ Goal 4: Provide adequate bicycle parking
- ☐ Goal 5: Install bicycle safe storm drains and illumination (partially complete)
- ☑ Goal 6: Adopt a Bicycle Advisory Committee to promote education, safety, and monitor maintenance of the Network

The 2010 BMP reviewed the existing bicycle network and proposed new facilities, such as the bicycle lanes on Maryland Avenue, Jonathan Street, Summit Avenue, and segments of Pennsylvania Avenue. The plan also identified various missing bicycle connections, such as the segment from South Prospect Street to Summit Avenue. As an alternative to providing on-road bicycle lanes through Park Circle, the City utilized land just northeast of the circle to construct a shared-use path from South Walnut Street (at South Prospect Street) to Summit Avenue. Please see the "Existing Bicycle Network" section for additional detail on the City's current bicycle infrastructure and the overall progress made since 2010.

Bi-directional bicycle lanes on Maryland Avenue provide a key north-south alternative and are also part of the "Hub City Bike Loop."

A cyclist proceeds to Virginia Avenue using the City's newly constructed shared-use path, just northeast of Park Circle. The new bicycle facility was recommended as part of the 2010 Bicycle Master Plan.

The City is also in the process of funding and installing the City's first bike boxes. The bike boxes, offering a designated area for cyclists to wait at the head of a traffic lane at a signalized intersection, will be installed at Prospect Avenue at Pennsylvania Avenue (westbound) and Oak Hill Avenue at Northern Avenue (southbound).

Bike box illustration. Source: National Association of City Transportation Officials (NACTO)

In addition, the City has launched various initiatives to help encourage cycling and promote bike safety. The City, working with local cycling organizations and bike shops, hosts the annual "Ride with the Mayor" event, which travels the acclaimed ten-mile Hub City Bike Loop. The City has also been working to educate residents on bicycle safety, providing detailed information on the City website and through a YouTube video. Other recent initiatives and improvements are mentioned throughout the plan.

A Bicycle Friendly Community

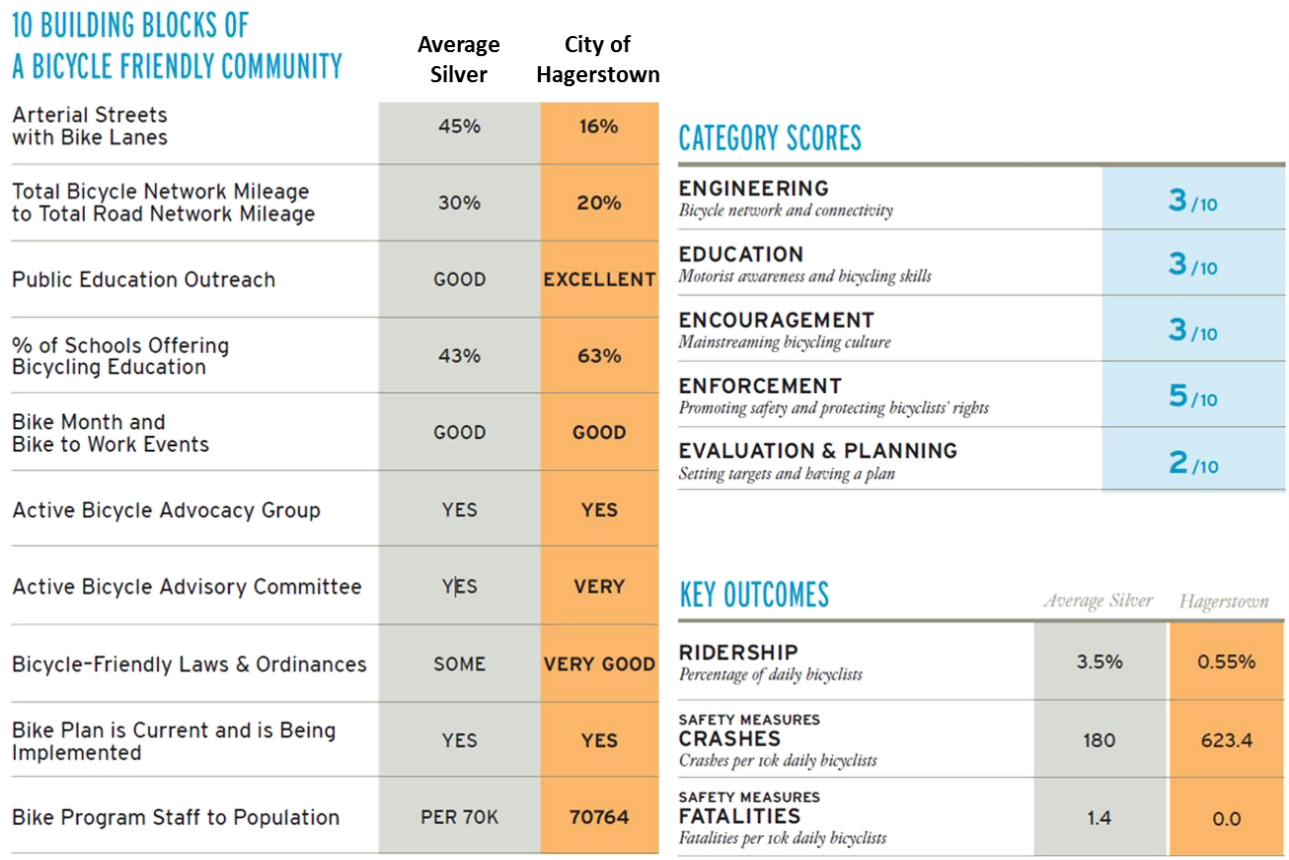
In November 2014, the City of Hagerstown was honored by the League of American Bicyclists with the distinction of being a bronze-level "Bicycle Friendly Community", making the City one of only six jurisdictions in Maryland with BFC status (all of which are "bronze").

As part of the application and award process, the League offers guidance on how cities can become more bike friendly and attain higher level status (Silver, Gold, and Platinum). These assessments and recommendations, some of which are highlighted in Figure 1, were used to develop plan goals and ultimately evaluate the plan's ability to transform the city into Maryland's first "Silver-level" Bicycle Friendly Community.

There are 75 Silver-level Bicycle Friendly Communities in the country, 46 of which are cities or towns with population less than 100,000. These communities vary in terms of size, location, and demographics, but they all share a common interest in creating safe and connected bicycle networks.

Table 1 shows several examples of Silver-level communities with similar characteristics to Hagerstown, indicating that smaller cities can also attain higher BFC status.

FIGURE 1: THE CITY'S REPORT CARD FROM THE LEAGUE OF AMERICAN BICYCLISTS



10 BUILDING BLOCKS OF A BICYCLE FRIENDLY COMMUNITY	Average Silver	City of Hagerstown
Arterial Streets with Bike Lanes	45%	16%
Total Bicycle Network Mileage to Total Road Network Mileage	30%	20%
Public Education Outreach	GOOD	EXCELLENT
% of Schools Offering Bicycling Education	43%	63%
Bike Month and Bike to Work Events	GOOD	GOOD
Active Bicycle Advocacy Group	YES	YES
Active Bicycle Advisory Committee	YES	VERY
Bicycle-Friendly Laws & Ordinances	SOME	VERY GOOD
Bike Plan is Current and is Being Implemented	YES	YES
Bike Program Staff to Population	PER 70K	70764

The figure above show snapshots of the City's most recent "report card" from the League of American Bicyclists. The report card compares the city's existing infrastructure and policies to those of average "silver" bike friendly communities. It also evaluates the city's progress in five key categories (engineering, education, encouragement, enforcement, and evaluation & planning).

TABLE 1: EXAMPLES OF SILVER-LEVEL BICYCLE FRIENDLY COMMUNITIES

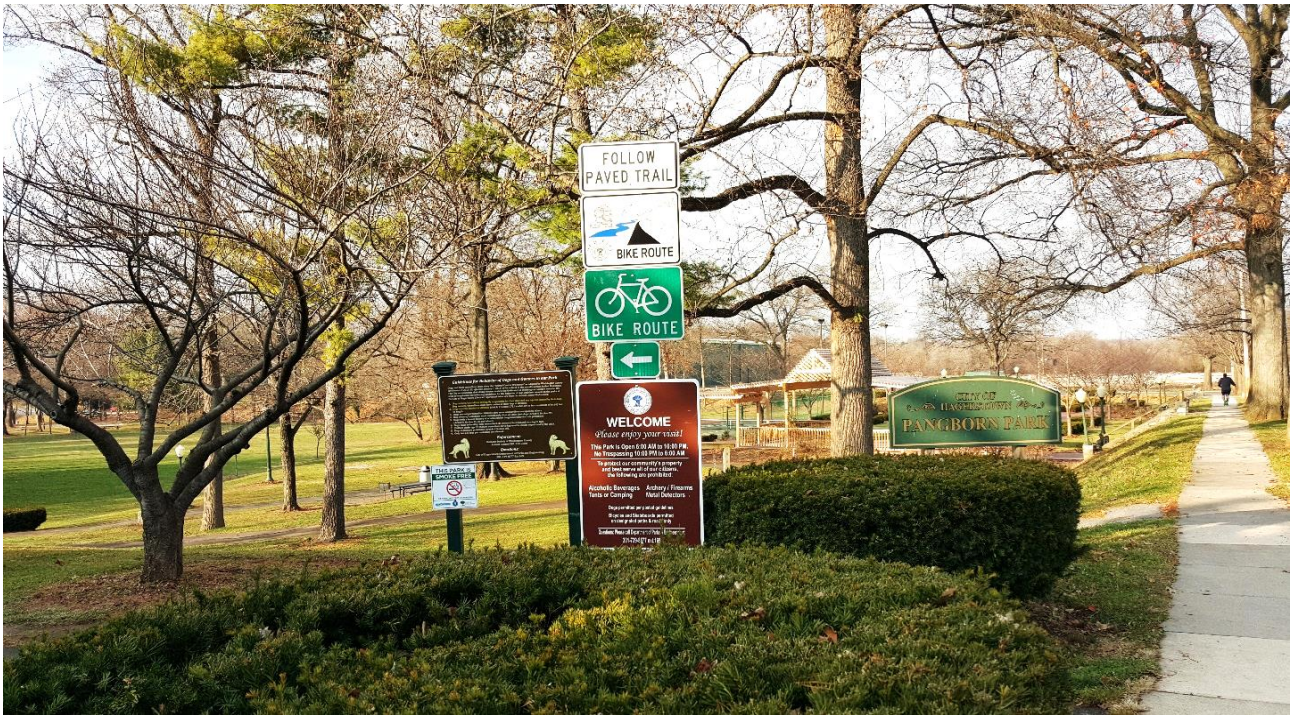
City	Population	Land Area (Square Miles)	Median household Income
La Crosse, Wisconsin	51,522	22.5	$39,727
Bozeman, Montana	41,660	19.2	$46,422
Fitchburg, Wisconsin	27,154	35.2	$53,958
Marquette, Michigan	21,491	19.5	$45,066
Venice, Florida	21,253	16.6	$46,404
**Hagerstown, Maryland*	*40,364*	*12.2*	*$38,080*

Potential Silver-level BFC.* ***Data source: U.S. Census*

The City of Hagerstown understands that being a "Bicycle Friendly Community" is about more than just recognition; it is about creating a safer, more attractive place for cyclists. Strategic investments in bicycle infrastructure and programs can go a long way in making cities more vibrant destinations for residents and visitors. In addition, businesses are increasingly more likely to (re)locate in cities with a healthy bicycle network.

The Advocacy Advance "Bicycle Means Business" report, a collaborative effort of the League of American Bicyclists and the Alliance for Biking and Walking, highlights the impact the bicycle industry and tourism can have on state and local economies. The study highlights that bicycling is popular across the country among all age groups and backgrounds. Communities that have fostered that popularity by providing bicycle infrastructure for transportation and recreation have seen considerable economic benefits by attracting businesses, tourism, and active residents. Neighborhoods become more desirable when traffic slows down and residents have more transportation choices. Individuals benefit from increased levels of fitness and health that result in real cost savings and employers have healthier employees who miss fewer days of work. David A. Wilson, a manager at Accenture in Minneapolis, one of America's most bike-friendly communities, recognizes the increasing importance of bicycle infrastructure and amenities to his employees. He remarked in 2012 that "five years ago, I don't think business people were even thinking about bikes as a part of business. Today it's definitely part of the discussion."

The City of Hagerstown, like the evolving 21st century businesses, understands the importance of cultivating healthy, multimodal communities and the Bicycle Friendly Community program provides a roadmap to assist in making this dream a reality.



The Entrance to Pangborn Park along the Hub City Bike Loop

Goals and Objectives

Given the significant progress in achieving the 2010 BMP goals, this updated plan proposes a new series of challenging goals, some of which echo the priorities and guidance from 2010. In addition, the goals of this update (below) reflect the League of American Bicyclists guidelines for a "Silver-level Bicycle Friendly Community" designation and include rigorous, measurable objectives to help accomplish the goals and provide a safer, more comfortable environment for cyclists.

Improve bicycle marketing and education efforts

- ☐ Host three (3) annual events to help promote bicycling for all ages, backgrounds, and abilities
- ☐ Sponsor an annual "bicycle safety week" in which the city provides daily bicycle safety tips, announcements, and trainings
- ☐ Promote the health benefits of bicycling at events and through social media
- ☐ Conduct an employer bicycle survey to help identify deficiencies and understand existing barriers to bicycle commuting
- ☐ Create a mobile application for the Hub City Bicycle Loop

Coordinate with City departments about bicycle planning and enforcement

- ☐ Meet with the Police Department to discuss enforcement of motor vehicle infractions
- ☐ Work with Washington County Transit on bicycle-related issues (e.g. installation of bicycle racks on buses, routes and signage near designated stops, updated driver training)
- ☐ Work with the Department of Public Works (DPW) to sweep bike lanes and minimize snow storage on bike lanes

Expand the bicycle network and enhance connectivity

- ☐ Add 20 miles of new bicycle facilities by December 2025[1]
- ☐ Add 20 bicycle racks by December 2025[2]
- ☐ Implement other types of bicycle-friendly facilities, such as bicycle boulevards and bike boxes
- ☐ Enhance the city's east-west bicycle connections
- ☐ Improve bicycle signage and way-finding along City routes

Increase daily bicycle ridership

- ☐ Double the share of bicycle commuters by December 2025 (from 0.6% to 1.2%)[3]
- ☐ Identify barriers to bicycle commuting to help target future strategies to increase ridership
- ☐ Extend bicycle infrastructure to areas with high potential bicycle demand/usage

Enhance bicycle safety

- ☐ Reduce bicycle-related crashes by 35 percent by December 2025
- ☐ Install bicycle safe storm drains and illumination
- ☐ Monitor potential safety hazards on bicycle facilities, including snow, ice, sand and other debris

[1] There are approximately 28 miles of bicycle facilities (lanes, sharrows, paths) in the City
[2] There are currently 24 bicycle racks in the City
[3] There were 104 bicycle commuters in 2013, up from 38 in 2008 (American Community Survey, 3-Year)

Implement the plan and explore funding opportunities

- ☐ Work with Bicycle Advisory Committee to conduct a bi-annual assessment, evaluating the progress in implementing the goals, objectives, and recommendations of this plan
- ☐ Identify funding sources for bicycle infrastructure, education, and awareness
- ☐ Partner with the Maryland State Highway Administration (SHA) to implement projects on state-maintained roads
- ☐ Achieve Silver-level Bicycle Friendly Community status by December 2020

The Existing Bicycle Network

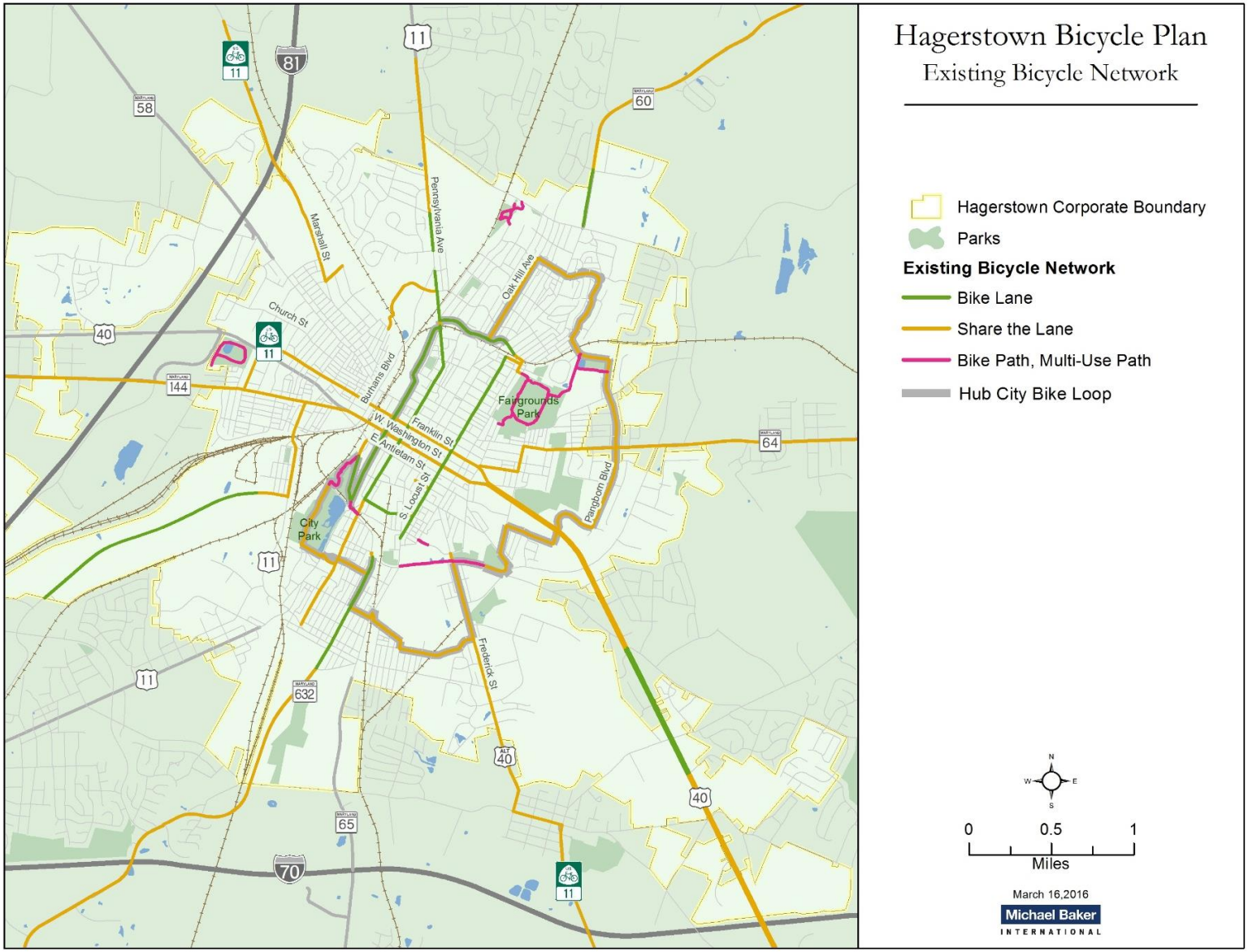
The City of Hagerstown has approximately 28 miles of existing bicycle infrastructure (bike lanes, shared-lane designations, and paths/trails), a 50 percent increase (10 miles) in facilities since 2010 (Figure 2).

FIGURE 2: COMPARING THE CITY'S 2010 AND 2015 BICYCLE NETWORKS

The mileage above reflects centerline miles.

Figure 3 illustrates the City's existing bicycle facilities and identifies U.S. Bicycle Route 11 and the Hub City Bike Loop.

FIGURE 3: CITY OF HAGERSTOWN EXISTING BICYCLE NETWORK



PUBLIC INPUT

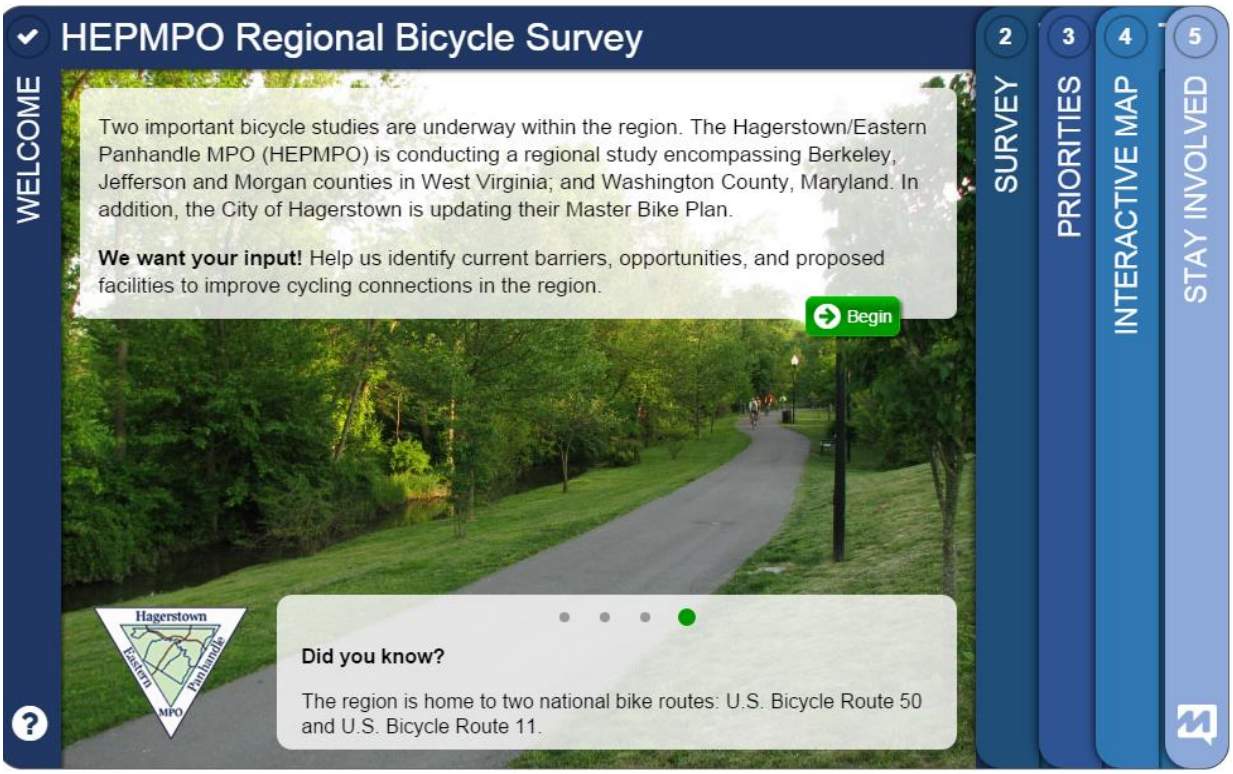
The following section summarizes the plan's public engagement initiatives, highlighting the roles that the Bicycle Advisory Committee, web survey, and public meeting played in the planning process. Appendix B includes additional detail on the results received through the public forums.

Bicycle Advisory Committee

The Hagerstown Bicycle Advisory Committee (BAC) contributed significantly and were highly involved in the development of the plan. Over the course of the project, the BAC reviewed the results of the web survey and participated in a project prioritization exercise. This exercise enabled BAC members to assign each recommended improvement to the preferred year of implementation in order to weigh the importance of proposed projects. This local expertise and input became one of the key criteria for prioritizing the plan recommendations.

Web Survey

In January 2016, the HEPMPO, in conjunction with the City of Hagerstown, launched a web-based survey. The survey was open for one month and asked participants about their cycling habits, concerns, and priorities. The survey also included an interactive map where users could drop pins on a map to identify their homes, destinations, safety concerns, and locations for new bicycle facilities and amenities. While the survey was open to residents of the region, respondents in the City of Hagerstown were identified using the survey zip code field, the home map marker, and the location of the IP address.



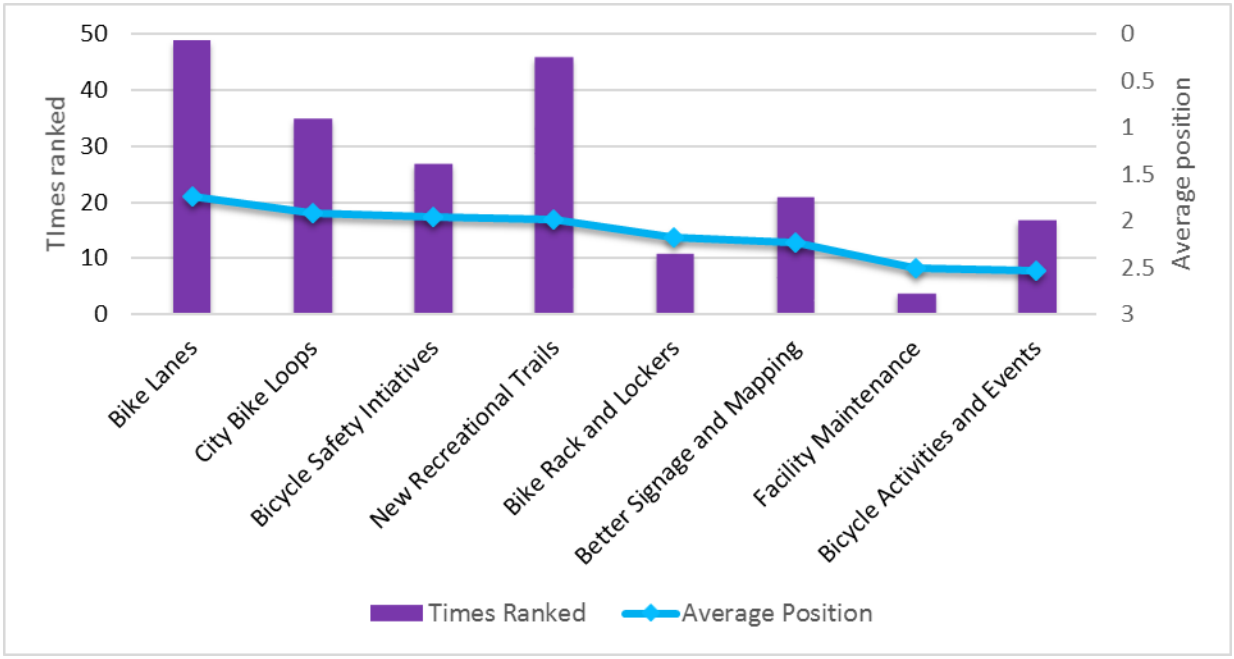
The MetroQuest public survey "Welcome Screen"

Overall, the 89 survey respondents from Hagerstown tended to be:

- Frequent cyclists: over two-thirds of respondents cycle more than five days per month
- Long-distance cyclists: nearly half of respondents average over 10 miles per trip
- Experienced cyclists: 60 percent of respondents are either always or sometimes comfortable cycling in traffic

Respondents were asked to rank their top three strategies for improving cycling within the City. As shown in Figure 4, the highest and most frequently ranked improvement strategy was adding bike lanes to streets. Following bike lanes, city bike loops, bicycle safety initiatives, and new recreational trails were the next most popular strategies.

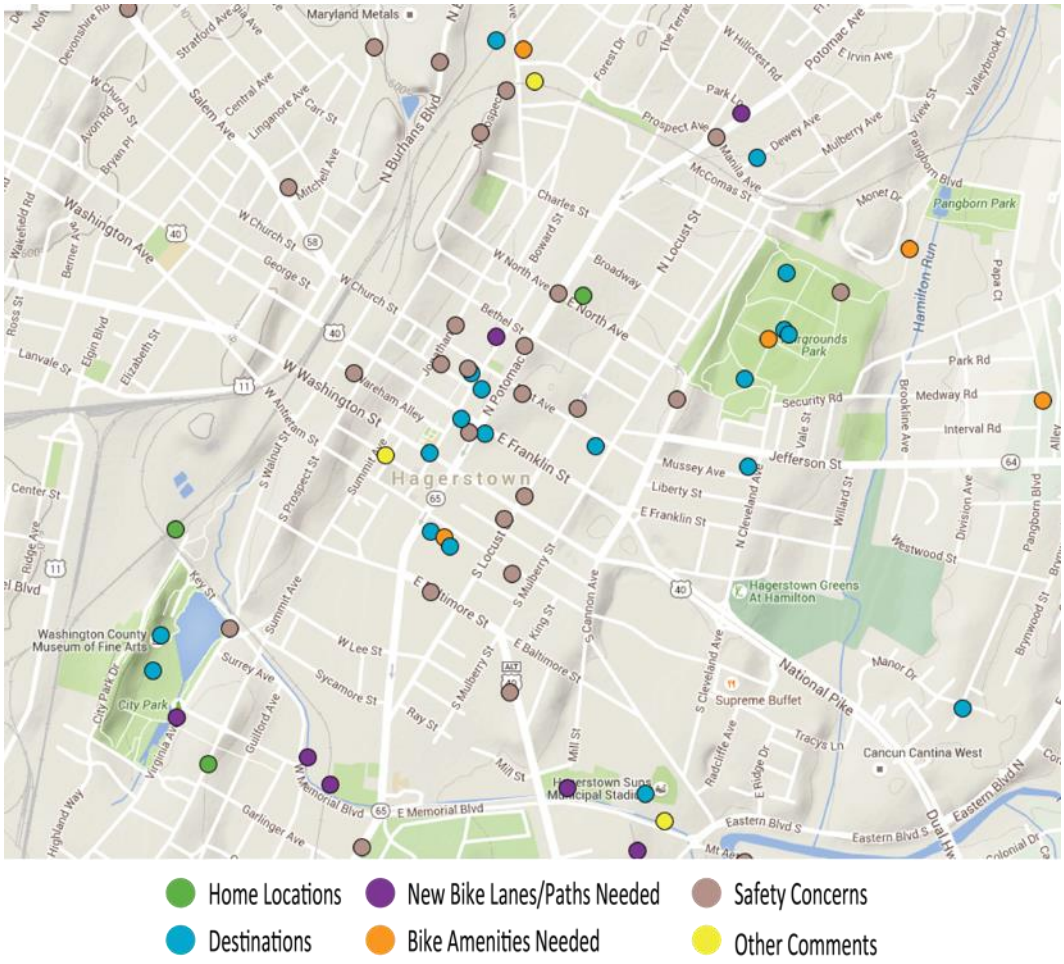
FIGURE 4: PREFERRED STRATEGIES



Over the course of the survey, 112 map markers (Figure 5) were dropped within the City of Hagerstown and consisted of the following:

- Home: 13
- New Bike Lane or Trail: 15
- Safety Concern: 42
- Bike Amenity: 9
- Bike Destination: 30
- Other Comments: 3

FIGURE 5: METROQUEST WEB SURVEY INPUT



Appendix B provides a summary of the map data received from the web survey.

Public Meeting Summary

A public meeting was held on April 6, 2016 to introduce the draft plan and give the public an opportunity to prioritize recommendations. The meeting, held at the Washington County Free Library, included a brief presentation and a workshop component where participants were asked to identify their top five priority projects. Approximately 22 attended the meeting, providing key input on the recommendations and on additional items for consideration. For example, several attendees identified a need to address rails-to-trails opportunities. As a result, the final BMP now includes a section dedicated to rail-trail conversion.

ANALYSIS

An analysis of bicycle comfort and demand indicators were used in tandem with public input to help identify bicycle needs in the City of Hagerstown.

Bicycle Comfort

Introduction

Bicycle Level of Service (BLOS) is a nationally used tool for quantifying the "bike friendliness" of a roadway. While BLOS was used to approximate the relative quality of service that a "typical" cyclist could expect along different stretches of the network, it should also be recognized that cyclists vary greatly in terms of competency and level of comfort.

The plan's BAC reviewed the BLOS model's results on an interactive web-map and provided comments to the study team, ultimately helping visualize the actual comfort that cyclists experience on the region's roads.

BLOS results can be useful in evaluating existing cycling conditions. Specifically, the analysis can help identify "weak links" in the existing bicycle network and help prioritize roads for future improvements. BLOS, when combined with bicycle demand analyses and public input, can help tell a story about safety concerns, barriers to cycling, gaps in frequently used routes, and where cyclists would want to bike under optimal conditions.

Methodology

The study's BLOS analysis replicates the formula (Version 2.0) developed by Sprinkle Consulting, Inc. The Maryland State Highway Administration (SHA) and the Baltimore Metropolitan Council have used the same formula to approximate bicycle comfort at the state and metropolitan level, respectively. The formula's calculations are based on various roadway characteristics and conditions (Figure 6).

FIGURE 6: BICYCLE LEVEL OF SERVICE RESULTS

Image sources: Michael Baker International, creativecommons.org, pixbay.com

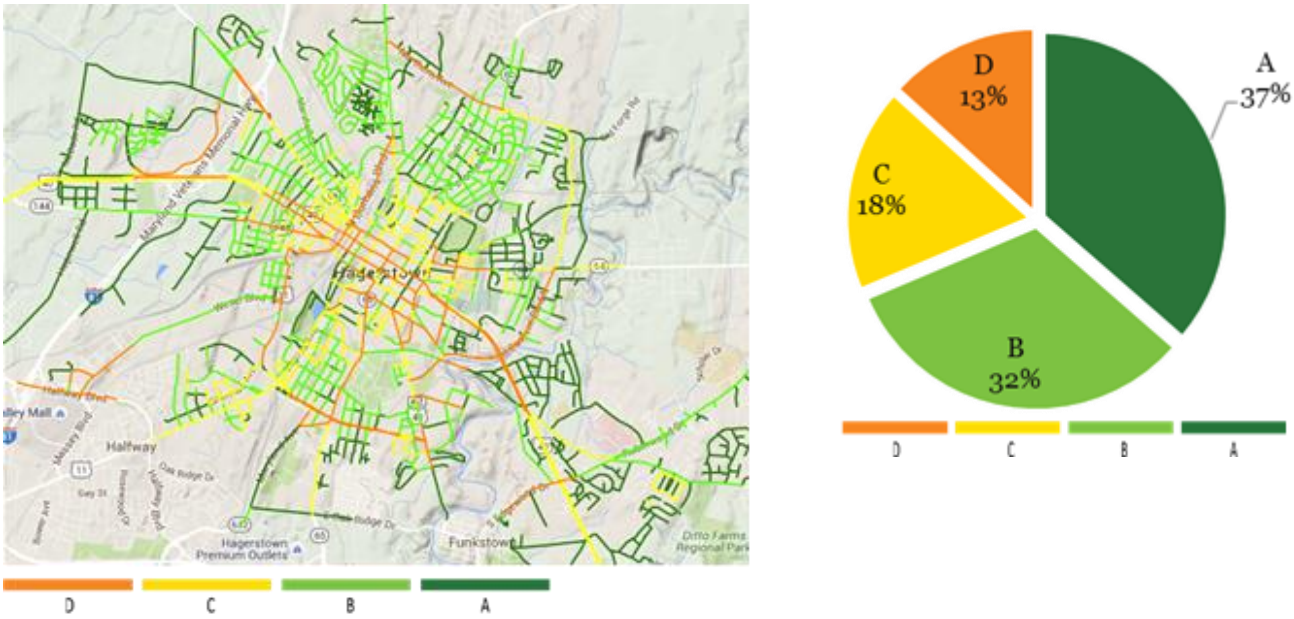
The City of Hagerstown's Street Centerlines GIS data were used to obtain the roadway characteristics and calculate BLOS throughout the study area. The City's Street Centerlines data, while generally very comprehensive, required several additions. Bicycle lane widths were manually added to the data, while typical roadway volumes (based on functional class) were applied to segments with missing traffic data.[4] The BLOS scale is based on six letter grades, A through F (from best to worst), to approximate the quality of a roadway segment for bicycle travel.

The results were displayed on a Google Map interface and shared with the BAC for validation and revisions. The committee suggested dozens of revisions, ultimately helping formulate a much more accurate understanding of cycling comfort in the City. The final results, reflecting the BAC's proposed changes, are discussed and visualized below.

Results

The bicycle-level-of-service analysis indicates that the City of Hagerstown's roadways are generally comfortable for cyclists. Over two-thirds (69 percent) of all roads in the city (excluding interstates, interstate ramps, and alleys) are characterized as having a BLOS equivalent to "A" or "B" (Figure 7). The majority of the "A" and "B" facilities are characterized by wide, low-volume neighborhood streets, such as those found in the city's North Side.

FIGURE 7: CITY BICYCLE-LEVEL-OF-SERVICE RESULTS



The city's network of bicycle lanes have significantly increased bicycle comfort. Prospect Street and Prospect Avenue, for example, improve from a "C" BLOS without bike lanes to an "A" or "B" with bike lanes, depending on the segment. Maryland Avenue, from Downsville Road to East Memorial Boulevard, is equipped with bi-directional bike lanes and is an extremely comfortable facility for cyclists (BLOS = "A" except at approach to West Wilson Boulevard).

[4] In cases where a roadway was missing average daily traffic (ADT) data, the study team developed a surrogate value for ADT using the averages for comparable roadways in the City (based on the roadway class).

Prospect Avenue, from Hamilton Avenue to Pennsylvania Avenue, is part of the Hub City Bike Loop and represents a very comfortable bicycle facility (BLOS = "A") due to low traffic volume and a continuous bike lane

The **Hub City Bicycle Loop** is generally very comfortable for cycling. The vast majority of the loop (9.31 miles) functions at a BLOS equivalent to "A" or "B". Pennsylvania Avenue (.04 miles), Cleveland Street (.18 miles), and Frederick Street (.47 miles) are the only exceptions, operating at BLOS equivalent to "C", "D", and "C", respectively. This plan seeks to address some of these existing deficiencies.

According to the analysis and Committee review, Downtown Hagerstown is less comfortable for cycling, particularly when traveling east-west. For example, East Franklin Street and West Washington Street have narrow lanes, high parking occupancy, no shoulders, and host over 15,000 vehicles per day, all of which combine to create an uncomfortable environment for cycling ("D" BLOS). Several arterial roadways are also currently uncomfortable for cyclists, such as Burhans Boulevard, East Wilson Boulevard, and segments of Eastern Boulevard. This need for better east-west connectivity, particularly in Downtown, served as the foundation for many of the recommended improvements (discussed later).

While bicycle level of service is useful in evaluating cycling conditions in a city or region, it only captures existing roadways and does not help us understand cycling behavior, habits, and preferences. Public outreach and demand analyses can be used in tandem with BLOS to help address these gaps and ultimately identify concerns, needs, and priorities for current and future cyclists.

Bicycle Demand

Introduction

According to the 2009 National Household Transportation Survey (NHTS), approximately 40 percent of U.S. trips are 2 miles or less in length. Many of these shorter trips can be accomplished by bicycle, which is certainly true in the City of Hagerstown. There are many factors that help encourage and discourage cycling, including the environment (ex: weather, hills), land use patterns, demographics, and the existence of bicycle facilities. This plan, in an effort to help identify opportunities and constraints for cycling, used geospatial analysis to approximate potential bicycle demand throughout the City.

Methodology

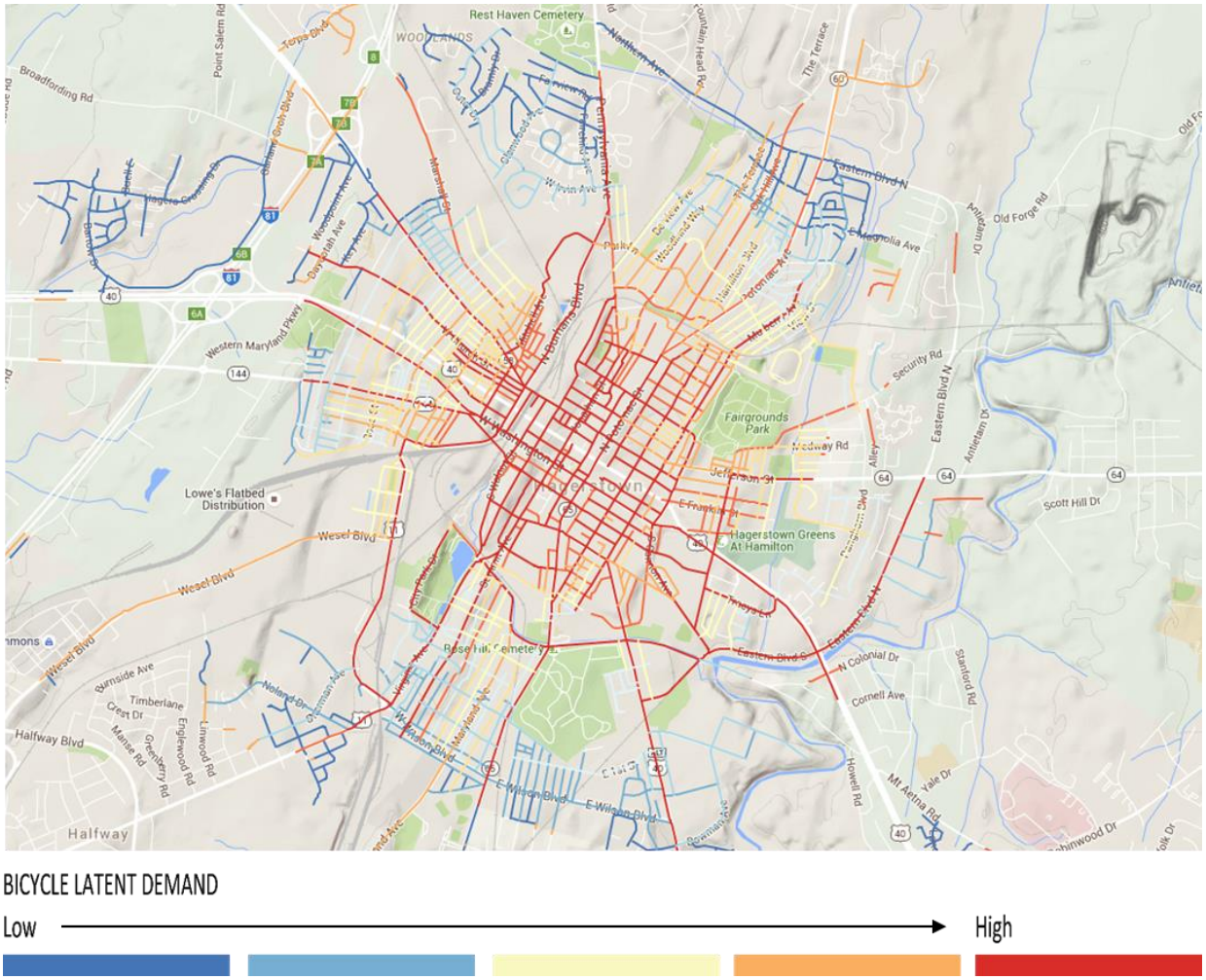
A Latent Demand model was used to estimate the amount of bicycle travel (or "demand") likely to occur along existing street segments based on surrounding population, employment, and selected land uses. It is important to note that the demand is calculated based on network distances and without regard to existing traffic or the presence of bicycle facilities (trails, lanes, sidewalks). In other words, the model results are not constrained by existing bicycle facilities. The model evaluated roadway segments' proximity to a range of activity centers, such as parks, schools, universities, employment centers, and transit routes (Figure 8). The model is described in more detail in **Appendix C.**

FIGURE 8: KEY TRIP BICYCLE TRIP ATTRACTORS

Results

The model results are shown in the map below (Figure 9). Not surprisingly, the results indicate that the highest potential bicycle demand is in the city center. In addition, demand also appears high along many prominent corridors outside downtown, such as South Burhans Boulevard, Virginia Avenue, Frederick Avenue, Potomac Avenue, Oak Hill Avenue, and Pennsylvania Avenue. Marshall Street, West Church Street and others also exhibit high demand due to their proximity to schools.

FIGURE 9: LATENT DEMAND RESULTS

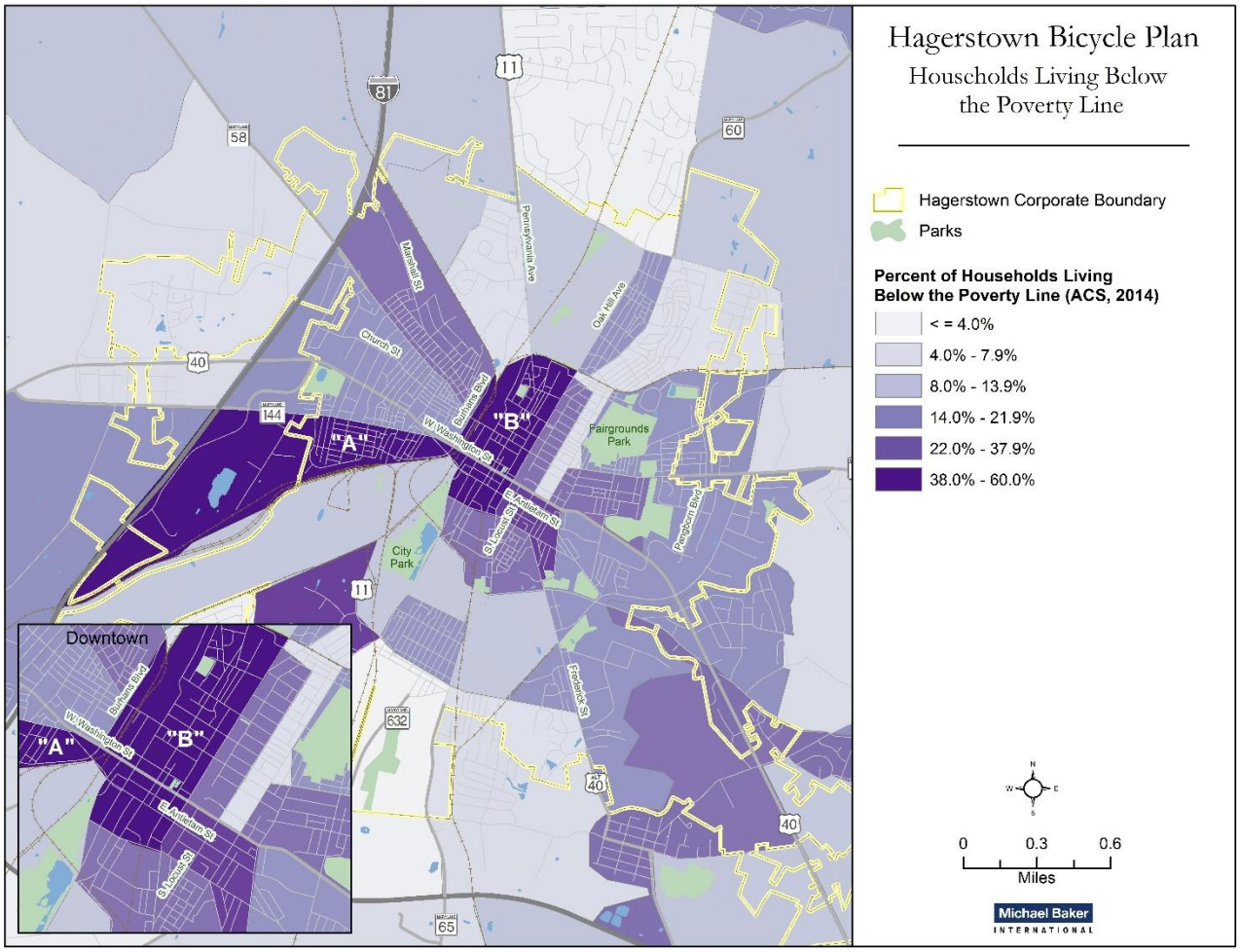


While the latent demand model incorporates school locations and enrollment, it does not consider the future impacts of school closures and redistricting on bicycle demand. For example, Winter Elementary School is expected to close in 2016. As a result, schools such as Salem Street Elementary School are expected to grow as Winter Street Elementary students transfer to Salem Elementary. These anticipated changes were considered when developing recommendations.

The plan also evaluated the proximity of bicycle facilities to underprivileged communities, with the understanding that many residents do not have access to personal vehicles and whose livelihood may depend on safe and connected bicycle and pedestrian infrastructure. Census data (American Community Survey – ACS, 2014) were used to evaluate socioeconomic conditions in the City and to determine which areas may require better bicycle connectivity. The analysis considered households living below the poverty line (Figure 10), zero-car households, and minorities. Several examples of neighborhoods which need safer, more accessible bicycle infrastructure include:

- South of West Washington Street and north of South Burhans Boulevard ("A" in Figure 10).
  - Approximately 40 percent of households in this neighborhood live below the poverty line.
  - The median household income in this neighborhood is only $22,736.
  - Approximately one of four households do not have a vehicle.
  - Approximately 34 percent are minorities.
- Downtown (three Census Block Groups), between North Burhans Boulevard and Potomac Avenue and from East Baltimore Street to Prospect Avenue ("B" in Figure 10)
  - Approximately half (48 percent) of the households in this neighborhood live below poverty line.
  - The median household income is less than $20,000 per year.
  - Over half (56 percent) of the households do not have a vehicle.
  - Approximately half (49 percent) are minorities.
  - There are many instances where children can be seen bicycling against traffic without helmets (as shown in the following section).

FIGURE 10: PERCENT OF HOUSEHOLDS LIVING BELOW THE POVERTY LINE



Safety

The City of Hagerstown continues to find ways in which to evaluate and improve bicycle and pedestrian safety. The Safe Speed for Students Program was implemented by the City of Hagerstown in April of 2012 with a goal to increase safety for students around our schools with the use of automated speed enforcement. Based on traffic studies conducted before the launch of the program, the presence of speed cameras has contributed to as much as an 80% - 90% decrease in the number of drivers exceeding the speed limit by 12 miles per hour or more in school zones. The cameras were strategically placed in areas where students typically cross the street and where the traffic studies indicated a higher occurrence of speeding drivers.

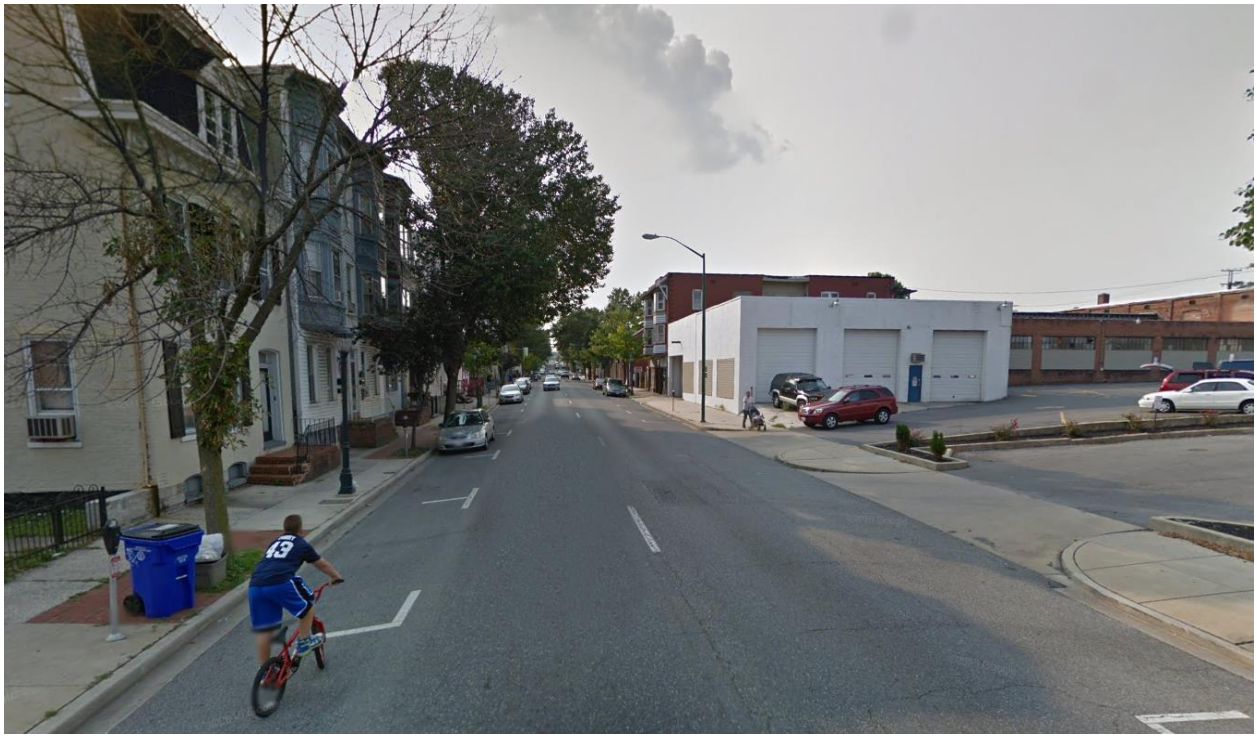
There are 13 designated school zones in the city of Hagerstown approved for automated speed enforcement. Each area is marked with appropriate signage to notify drivers that the school zone is photo-enforced.

Automated speed enforcement cameras are used to manage motor-vehicle speeds in 13 school zones throughout the City. Image source: Ric Dugan, Herald-mail.com

In order to further evaluate bicycle safety, the study team mapped all motor vehicle-bicycle crashes occurring between 2009 and 2014 to identify any crash patterns and ultimately help formulate recommendations to improve existing infrastructure or convey cyclists to safer streets. There were 74 crashes in the city from 2009 to 2014 that involved motorists hitting cyclists. While many crashes appear to be random in nature, several roadways, highlighted below, exhibited particularly high frequency of crashes relative to other streets in the city.

- **West Washington Street**: there were 10 crashes (9 with injuries) from 2009 to 2014 involving motor vehicles hitting cyclists. The median age of the cyclists involved was 14.
- **Locust Street**: there were seven motor vehicle-bicycle crashes on Locust Street through downtown from 2009 to 2014.
- **Mulberry Street**: there were four motor vehicle-bicycle crashes on Mulberry Street during the six-year period.

This plan includes various recommendations to help create a safer environment for cyclists traveling in, around, and through the city. These recommendations, discussed in the following sections, include physical improvements (ex: bike lanes) and policy initiatives that help generate interest in and awareness of cycling.



There are not many comfortable east-west connections for cyclists in Downtown Hagerstown.
Photos above shows a child biking in the parking lane against traffic on West Washington Street.
Image sources: Google Street View.

RECOMMENDATIONS

The recommendations section below includes proposed policy and infrastructure improvements for the City of Hagerstown over the next ten years. The section begins with safety recommendations, primarily focusing on youth safety, and transitions to events/marketing, signage, infrastructure (on-road and off-road improvements), bike parking, and concludes with projects for further study.

Safety

A safer bicycle network can be achieved through engineering and infrastructure, but also through policy, education, and increased awareness. The plan's infrastructure recommendations, discussed in the following sub-sections, highlight some of physical improvements needed to make the City safer for cyclists. Meanwhile, the list below provides examples of other non-infrastructure initiatives that can help enhance safety for cyclists, particularly for children.

- **Sponsor a "bicycle safety week"** in which the city provides daily bicycle safety tips, announcements, and trainings. Work with local organizations, media outlets, and businesses, such as bike shops, to help facilitate the events and circulate information. Some of the recommendations below could be included as part of the bicycle safety week.
- **Bike programs in public schools.** Starting Fall 2015, all DC second graders learned how to ride a bike, bike safety (including hand signals), and basic bike maintenance (things to check). The program culminates with a ride to the park and ties in with fitness, map-reading skills, and decision-making lessons. District Department of Transportation (DDOT) funded the purchase of 475 durable bikes (which rotate around schools).
- **Actively build bike lanes in low-income neighborhoods.** In many cities, there are fewer bike lanes (and less safe bike lanes) in low-income neighborhoods.
- **Have a dedicated funding source for helmet/safety programs.** North Carolina uses funding from specialty "Share the Road" license plates to fund helmet purchase programs to buy/distribute helmets to low-income kids through school and law enforcement offices.
- **Invest in helmet Give-Away Programs, especially through schools.** Children who were given free helmets were significantly more likely to wear their helmets (61.4%) than children who already owned helmets (43.4%) and children who attended the school in which free helmets were distributed showed a significant increase in helmet use.
- **Include helmet-fitting education for kids.** Safe Routes to School has a good guide for this.
- **Establish a safe "bike" zone around schools.** Washington State developed a guidebook for this process in 2015. The state focused on a small radius around the school (school districts are responsible for developing these plans) emphasizing maximum separation from high vehicle speeds; there are also strict vehicle speed enforcement (and have implemented traffic calming) around schools. The City of Hagerstown has already taken important steps in installing speed cameras in school zones.
- **Include safety materials in Spanish** (and/or other prominent local languages). Safe Routes to School has safety tips in Spanish.
- Use **community bicycle patrols** to help police stay aware of hazards facing bicyclists in your community.

- **Design streets for 20 mph travel speeds** through design rather than signage because at a collision speed of less than 25 miles per hour, 90% of cyclists/pedestrians survive a crash with a vehicle. Raised crosswalks, mini traffic circles, speed tables, and road diets are all good tools for lowering design speeds. The traffic circles along Summit Avenue in Hagerstown offer a good example of how design features can reduce motor vehicle travel speeds.

The traffic circles along Summit Avenue are nicely landscaped and help reduce motor-vehicle travel speeds

Events

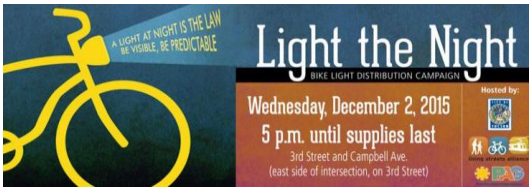
The 2010 plan included a goal to "develop a comprehensive bicycling marketing strategy." The recommendations below, pertaining to events and outreach, offer examples of potential initiatives to help generate interest and awareness for cycling. These activities, among others, could help form the foundation for a larger citywide bicycle marketing strategy.

- In addition to helmet giveaways (discussed above), consider holding other events such as free **Light Giveaways**. Work with government and corporate sponsors to help fund the events. There are many examples of these programs throughout the country.

"**Bike Brightly", Portland, Maine:** The Bike Coalition of Maine hosted a large-scale bike giveaway in 2013, focused on educating commuters. The giveaway was followed by a night ride around the city. The lights were donated by Nite Ize.

Source: Bicycle Coalition of Maine.

"Light the Night", Tucson, Arizona: The City's Bicycle and Pedestrian Program, in collaboration with the regional Metropolitan Planning Organization (MPO) and the Living Streets Alliance, held a light giveaway event in 2015. Volunteers also distributed free bicycle helmets for youth and safety education material, available in both Spanish and English.



Promotional materials for Tucson's "Light the Night" Source: City of Tucson, Arizona

Bicycle accessory giveaways, Wichita, Kansas: In 2015, the city received a safety grant from the Kansas Department of Transportation (KDOT) to distribute 1,200 bicycle headlights, 400 bicycle bells, 250 bicycle taillights, and 66 reflector sets. In addition, the League of American Bicyclists provides nearly 700 bike safety guides. The city's Police Department helped distribute the safety equipment to cyclists. This is a great example of agency coordination and also allowed the police department to connect with the community.

Promotional materials for Tucson's "Light the Night" Source: City of Tucson, Arizona

- Form local or regional groups to participate in the **National Bike Challenge**, a nationwide event that unites bicyclists and encourages ridership for commuting and recreational purposes. Consider promoting the group through social media channels, such as the City's Facebook page (8,141 likes). The National Bike Challenge website helps participants log miles throughout the year, not just during the challenge (May through September),
- **Host Bike-To-School Days** which include a safety education component and a neighborhood bike train. Adopt a local champion, possibly a member of the Bicycle Advisory Committee, to help organize this effort. Work with local bike shop owners to see if they would be willing to help with the event.

Neighborhood bike trains. Source: West Seattle Herald

- Promote cycling through **utility inserts**. The City of Hagerstown has used utility inserts in the past to promote outreach initiatives and could broaden these initiatives to include a cycling-specific insert. The example below, from Billings, Montana, graphically encourages cycling and includes important safety tips.

Utility bill insert. Source: City of Billings, Montana

- Pursue a "Ciclovia" or Open Streets type event, closing off a major commercial corridor to auto traffic and offering the space for active transportation users. This type of event can be held annually, monthly, or even weekly.
- Continue advertising bicycle-related events through graphical calendars, such as the City's 2016 "National Bike Month Calendar" (example below)

City of Hagerstown 2016 National Bike Month Calendar. Source: City of Hagerstown

Signage

The following includes recommendations for wayfinding and route signage, as well as general considerations when designating and marking bike lanes and sharrows (shared lane markings). Please see the following section for project-specific signage recommendations and visit the Maryland Bicycle Policy and Design Guidelines for additional guidance on signage specifications and bicycle design treatments.

- Install wayfinding (guide) signage to key destinations, such as Potterfield Pool and City Park. This was a recommendation from the web-based public survey. Recommend installing at prominent decision points. For example, consider installing a D1-3b plaque on Frederick Street at southbound approach to Memorial Drive, with arrows for Potterfield Pool, City Park, and the Stadium. An example is provided on the right.

Example of potential wayfinding signage

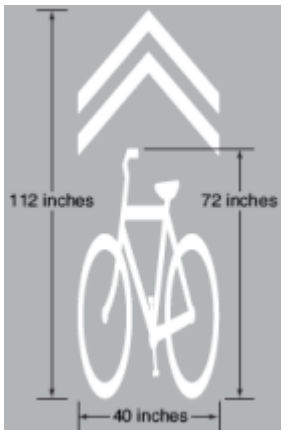
- Install wayfinding (guide) signage along West Washington Street, Buena Vista Ave, Lanvale Street, South Burhans Boulevard, and Antietam Street, conveying cyclists to "downtown".
- Work with the MPO, Washington County, and the Maryland Department of Transportation to sign U.S. Bicycle Route 11 through the City and the County using the new green M1-9 signs.

USBR 11 (M1-9) signage

- Remove duplicate or conflicting signage, if appropriate. For example, "share the road" signage on Elgin Boulevard is not needed since the road already has sharrows (see Maryland Bicycle Policy & Design Guidelines, 3.4)
- Improve Hub City Bike Loop signage at the approach to the stadium, where the shared-use path transitions to the parking lot.
- **Bike lanes, general guidelines.** Please visit Chapter 2 of the *Maryland Bicycle Policy & Design Guidelines* for additional detail and guidance.
  - Ensure that bike lane pavement markings are placed after major intersections and placed approximately every ¼ mile along continuous bike lane segments.
  - Install "Bike Lane Ends" signage in cases where a bike lane ends. Signage should be placed as close as practicable to the point where the bike lane ends. In some locations, it may be necessary to temporarily end the bike lane in advance of an intersection and then regain the bike lane after the intersection. If the resulting gaps exceeds 200 feet length, not including the width of the intersection itself, the "bike lane ends" signage should be used. *This is likely required for the recommended bike lanes on Frederick Street and Potomac Street.*

Bike lane sign (R3-17) with "ends" plaque

- **Sharrows, general guidelines.** Please visit Chapter 3 of the *Maryland Bicycle Policy & Design Guidelines* for additional detail and guidance.
  - According to NACTO, the number of markings along a street should correspond to the difficulty bicyclists experience taking the proper travel path or position. Sharrows used to bridge discontinuous bicycle facilities or along busier streets should be placed more frequently (50 to 100 feet) than along low traffic bicycle routes (up to 250 feet or more).
  - Sharrows should be placed a minimum of 4 feet from the face of curb or roadway edge to the center of the sharrow marking. When used adjacent to a parking lane, they should be placed a minimum of 4 feet from the edge of the parking edge line to the center of the sharrow marking
  - Do not use both Shared Lane Markings and "Share the Road" Assemblies.
  - Shared Lane Markings may be used only where the posted speed limit is 35 mph or less.



Sharrow dimensions (Source: Maryland Design Guidelines)

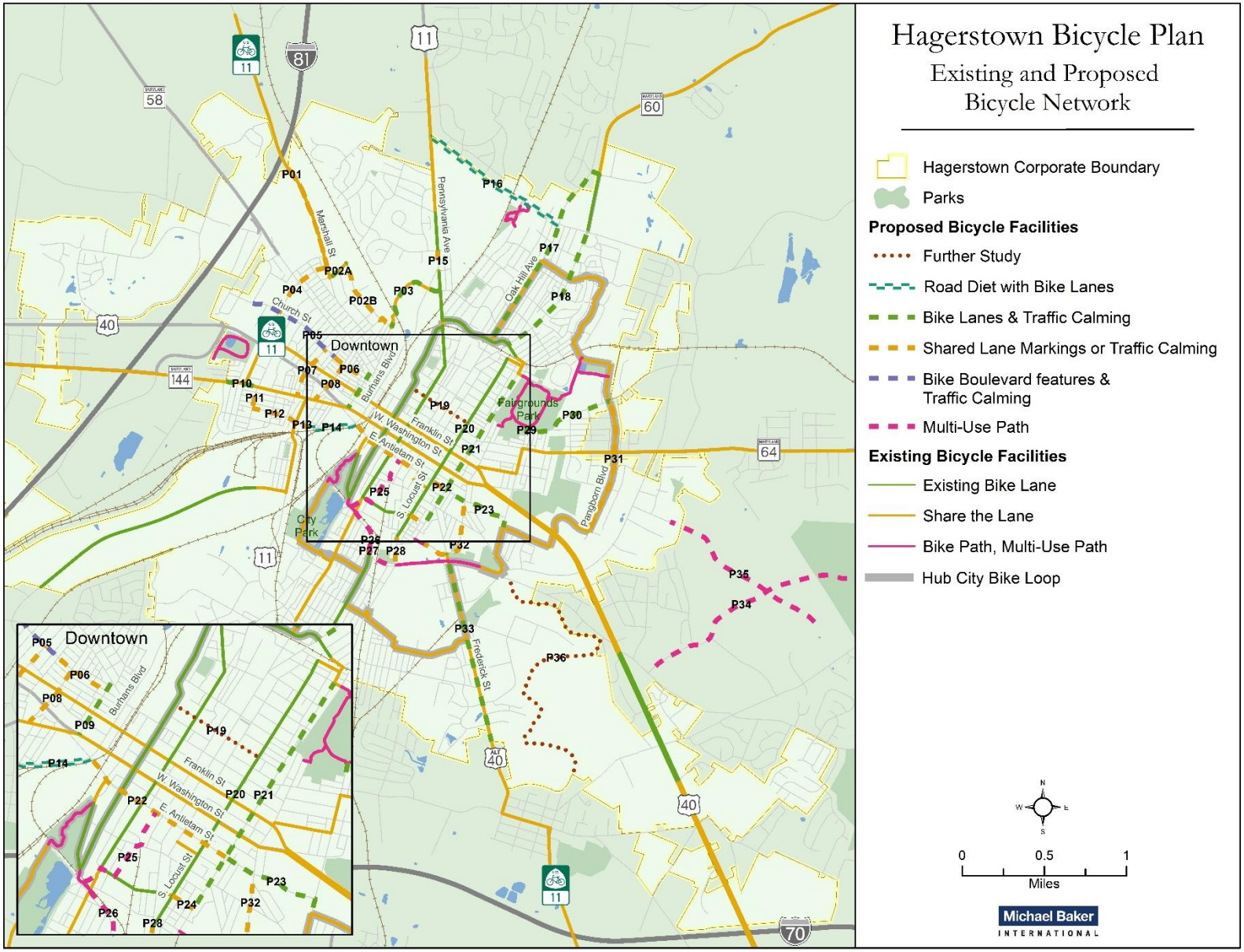
Infrastructure

This section includes the plan's recommendations for bike lanes, sharrows, trails, and other physical improvements. Each recommendation has a unique project ID and includes a photo of the existing conditions and a cross-sectional diagram to help visualize the improvements. Please see **Appendix D** for detailed design guidelines and illustrations of the different types of facilities. Table 2 lists the recommendations and anticipated costs, while Figure 11 maps the existing and proposed bicycle network.

Table 2: Proposed Bicycle Facilities

Proj. ID	Direction	One-Way	Location	Type	Estimated Costs
P01	East/West	No	**Marshall Ave.**	Proposed Sharrows	$19,200
P02A	West	Yes	**Arlington Ave.**	Proposed Bike Lane	$2,300
P02B	East/West	No	**Florida Ave.**	Proposed Sharrows	$7,400
P03	North/South	No	**Mitchell / Park**	Proposed Bi-Directional Bike Lanes	$20,300
P04	North/South	No	**Nottingham Rd.**	Proposed Sharrows	$7,900
P05	East/West	No	**Church St.**	Proposed Traffic Calming - Bike Blvd Features	$84,700
P06	East/West	No	**Church St.**	Proposed Sharrows	$1,500
P07	North/South	No	**West Side Ave.**	Proposed Sharrows	$4,500
P08	North/South	No	**Winter St.**	Proposed Sharrows	$3,600
P09	North	Yes	**High St.**	Proposed Bike Lane	$4,100
P10	East/South	No	**West Washington St.**	Proposed Bike Lane	$3,300
P11	North/South	No	**Buena Vista Ave.**	Proposed Sharrows	$1,800
P12	East/West	No	**Lanvale St.**	Proposed Sharrows & Traffic Calming	$33,300
P13	East/West	No	**South Burhans Blvd.**	Proposed Sharrows	$1,000
P14	East/West	No	**South Burhans Blvd.**	Proposed Road Diet/Buffered Bike Lanes	$31,400
P15	North/South	No	**Pennsylvania Ave.**	Proposed Sharrows	$1,600
P16	East/West	No	**Northern Ave.**	Proposed Road Diet/Bike Lanes/Traffic Calming	$102,000
P17	North/South	No	**Oak Hill Ave.**	Proposed Bike Lanes/Traffic Calming	$55,300
P18	North/South	No	**Potomac Ave.**	Proposed Bi-Directional Bike Lanes	$28,900
P19	West	Yes	**Bethel St.**	Further Study	NA
P20	North	Yes	**S. Locust St.**	Proposed Green Painted Bike Lane	$23,600
P21	South	Yes	**Mulberry St.**	Proposed Bike Lane	$17,700
P22	East/West	No	**Antietam St.**	Proposed Sharrows	$9,000
P23	East/West	No	**Antietam St.**	Proposed Bi-Directional Bike Lanes	$15,400
P24	East/West	No	**Lee St.**	Proposed Sharrows	$1,500
P25		No	**Cultural Trail**	Proposed Multi-Use Path	NA
P26		No	**Marsh Run Trail**	Proposed Multi-Use Path	NA
P27		No	**Marsh Run Trail**	Proposed Multi-Use Path	NA
P28	North/South	No	**South Potomac St.**	Proposed Sharrows	$2,200
P29	North	Yes	**Fairgrounds Park**	Proposed Bike Lane	$700
P30	East/West	No	**Security Rd.**	Proposed Bi-Directional Bike Lanes	$18,400
P31	North/South	Yes	**Pangborn Blvd.**	Proposed Sharrows	$10,900
P32	North/South	No	**Mill St. / Cannon St.**	Proposed Sharrows	$6,900
P33	North/South	No	**Frederick St.**	Proposed Bi-Directional Bike Lanes	$38,600
P34		No	**Yale Drive**	Proposed Multi-Use Path	NA
P35		No	**Professional Blvd.**	Proposed Multi-Use Path	NA
P36		No	**Antietam Creek Trail**	Further Study	NA

FIGURE 11: THE EXISTING AND PROPOSED BICYCLE NETWORK



P01: Install "share the road" signs or sharrows on Marshall Avenue

- City Limits to Mitchell Avenue
- Purpose and need
  - Better east-west connectivity
  - Improve access to Salem Elementary and Western Heights Middle School
  - High bicycle demand score
- **Recommendation**
  - Marshall Street – install "share the road" signage from City Line to Arlington Avenue
  - Arlington Avenue / Florida Avenue / Langton Street – install sharrows every 200 feet and "bike route" assemblies (possibly with destination signs such as "School" and "Penn. Ave")

P02A: Install bike lane on Arlington Avenue

- Marshall Avenue to Florida Avenue
- Purpose and need
  - Better access to Western Heights Middle School
- Recommendation
  - Replace parking on north side of Arlington Avenue with a 5' bike lane

P02B: Install sharrows on Florida Avenue / Langdon Street (contra-flow bike lane on one-way segment of Langdon)

- Arlington Avenue to Mitchell Street
- Purpose and need
  - East-west connections
- Recommendation
  - Install sharrows on Florida Avenue and Langdon Street
  - Install contra-flow bike lane on Langdon Street from McDowell Avenue to Mitchell Avenue
    - Install "one-way" signage (Manual on Uniform Traffic Control Devices or MUTCD, R6-1) with "except bikes" plaques on Mitchell Street, notifying motorists of oncoming cyclists
    - Install "except bikes" plaques under the "do not enter" signs on Langdon Street at McDowell Avenue
    - Install stop sign at Mitchell Street for eastbound cyclists on Langdon

See Lanvale Street in Baltimore for an example of a contra-flow bike lane (shown above, far left image)

P03: Install sharrows and bidirectional bike lanes on Mitchell Street / Park Lane

- Langdon Street to Pennsylvania Avenue
- Purpose and need
  - Better east-west connectivity
  - Recreational addition to the Hub City Loop (frequently utilized for recreational purposes, as seen on www.ridewithgps.com
- Recommendation
  - Install sharrows from Langdon Street to the underpass
  - Install bidirectional 5' bike lanes from the underpass to Pennsylvania Avenue
    - Include "Bike Lane Ends" signage (MUTCD: R3-17, R3-17bP) at northbound approach to Pennsylvania Avenue and at southbound approach to the underpass
  - Improve underpass
    - Consider replacing northbound sidewalk with 5' buffered bike lane with cross-hatched buffer
    - Install sharrows in southbound direction
    - Consider installing fluorescent signage at approaches to underpass, notifying of cyclists "ahead" (MUTCD: W11-1, W16-6P)
    - Trim vegetation at the approaches to improve visibility

The Mitchell Avenue underpass has a dilapidated sidewalk

P04: Install sharrows on Nottingham Road / Indiana Avenue

- West Washington Street to Marshall Street (0.6 miles)
- Purpose and Need
  - North-south connection in the west end
  - Connectivity to other routes and to Western Heights Middle School
  - Improve bicycle facilities on USBR 11 through the City
- Recommendation
  - Install sharrows every 200 feet
  - Consider working with SHA to sign USBR 11 on this segment

P05: Evaluate potential for a bicycle boulevard on W. Church Street

- Key Avenue to Alexander Street
- Purpose and need
  - East-west connections needed
  - Improve access to Salem Elementary School, which is even more critical with the potential influx of students from Winter Street Elementary (2016)
- Recommendation – evaluate potential for bicycle-boulevard features
  - Install traffic calming measures (roundabouts, speed tables, curb extensions)
  - Mini traffic circles: recommend installing at low-curb landscaped traffic circles at Nottingham Road, Devonshire Road, and Wakefield Road. Consider removing stop signs on Church Street (not at intersection streets) at these locations.
  - Speed tables: consider installing speed table on West Church Street on segment between Avon Road and West Side Avenue.

- Curb extensions: consider installing 4' curb extensions on Church Street at other intersections, such as Avon Street. Install crosswalks at these extensions to reduce crossing length for pedestrians.
- Install bicycle route signage and pavement markings along corridor
- Conduct a "trial evaluation" that gives residents a chance to "try out" the design features and allows planners to evaluate and address impacts on traffic patterns
- Involve emergency services in the planning/design process

P06: Install sharrows on Church Street (one-way segment)

- Alexander Street to High Street
- Purpose and need
  - Better east-west connectivity
- Recommendation
  - Install sharrows along this segment

P07: Install sharrows on West Side Avenue

- West Church Street to West Washington Street
- Purpose and need
  - North-south connections in the West End
  - County Commuter stop at West Side Avenue and Salem Avenue
- Recommendation
  - Install sharrows every 200 feet
  - Consider installing bike route signage (D11-1)

P08: Install sharrows on Winter Street

- North Washington Street to Church Street
  - Additional connections west of downtown
- Recommendation
  - Install southbound sharrows
  - Alternative – install bike lane southbound to serve as a one way pair with High Street

P09: Install bike lane on High Street

- West Washington Street to Salem Avenue
- Purpose and Need
  - Additional connections west of downtown
- Recommendation
  - Install northbound bicycle lane on the east side of High Street
  - It is approximately 16’ from the parking stripe to the opposite curb, allowing for a 6’ bike lane

P10: Install bike lanes on West Washington Street (MD Rt. 144)

- City limits to Lanvale Street via Buena Vista Avenue
- Purpose and need
  - Better east-west connections
  - Connectivity to other existing/proposed facilities
- Recommendation
  - Install bidirectional bike lanes (existing general purpose lanes are 18')
  - Convey eastbound cyclists onto Buena Vista with bike route signage to "Downtown" (MUTCD: D1-C)

P11: Install sharrows on Buena Vista Avenue

- West Washington Street to Lanvale Street
- Purpose and need
  - Better east-west connections, safe access to downtown
  - Access to Washington County Commuter stop
- Recommendation
  - Install sharrows
  - Convey eastbound cyclists onto Lanvale Street with bike route signage to "Downtown" (MUTCD: D1-C)

P12: Install sharrows on Lanvale Street

- Buena Vista Avenue to Elgin Boulevard
- Purpose and need
  - Better east-west connections
- Recommendation
  - Install sharrows
  - Consider removing the stop sign at Ross Street and installing traffic calming measures, such as a mini traffic circle. This will facilitate movement for cyclists while managing motor vehicle speeds

P13: Install sharrows on S. Burhans Boulevard

- Elgin Boulevard to Elizabeth Street
- Purpose and need:
  - Establish connection between proposed sharrows on Lanvale Street (P12) and proposed buffered bike lanes on S. Burhans Boulevard (P14)
- Recommendation
  - Install sharrows as a transition between the proposed adjacent bicycle facilities

P14: Perform road diet and install bidirectional buffered bike lanes on S. Burhans Boulevard

- Elizabeth Street to West Antietam Street
- Purpose and need
  - Provide a safe, express bikeway from west side to downtown. Will serve as an alternative to West Washington Street where there were 10 crashes between motor vehicles and cyclists between 2009 and 2014
  - Provide access to Elgin Station Community Center
  - High latent bicycle demand score
  - Serve approximately 600 households on the west side, many of which do not have personal vehicles.
  - Consistent with the city's "Complete Streets" guidelines for Ring Roads
- Recommendation
  - Road diet: reduce from four lanes to two lanes
    - Average daily traffic (ADT) ~ 9,900, which is low for four lanes of travel
    - By comparison, North Burhans (from Mechanic Street to Pennsylvania Avenue is two lanes, with ADT ~ 12,000)
  - Widen remaining two lanes to 12 feet
  - Install 3.5' cross-hatch markings adjacent to reconfigured lanes and install 6.5' curb-running bike lanes (existing roadway width = 44')
  - Reconfigure storm drains
  - Connect to proposed sharrows on W. Antietam Street
  - Convey eastbound cyclists onto Antietam with bike route signage to "Downtown" and "Library" (MUTCD: D1-2b)
  - Install "Bike Lane Ends" signage (MUTCD: R3-17, R3-17bP) at eastbound approach to W. Antietam Street and westbound approach to Elizabeth Street

P15: Install sharrows on Pennsylvania Avenue

- Install sharrows from West Hillcrest Road to West Irvin Avenue
- Purpose and need
    - Provide transition for cyclists heading north or south on existing bike lanes
- Recommendation
    - Install sharrows and transition signage

P16: Perform road diet and install bi-directional 5' bike lanes on Northern Avenue

- Pennsylvania Avenue to Oak Hill Avenue
- Purpose and need
    - Better east-west connections in the North End
    - Improve access to schools (Fountaindale Elementary and Northern Middle School)
    - Traffic calming (public input) on a four-lane undivided roadway with ADT ~ 15,000, making Northern Avenue an ideal candidate for a road diet approach
    - Anticipated 29 percent reduction in overall crashes with road diet (*NCHRP, Project 17-25 Final Report*).
- Recommendation
    - Road diet: reduce from four lanes to three lanes (two through lanes and one two-way left turn lane) with 5' bidirectional bike lanes
    - Install bike route signage (MUTCD: D11-1)

P17: Install bidirectional 6' bike lanes on Oak Hill Avenue

- Prospect Avenue to Leitersburg Pike
- Purpose and need
  - Safe connection from Prospect Avenue and Hub City Bike Loop to points north
  - Provides access to shopping centers and recreational rides out of town
- Recommendation
  - Install bidirectional 6' bike lanes, adjacent to 8' parking lanes
    - *Existing curb-to-curb width is 50'*
  - Install three speed tables to reduce motor vehicle speeds (between Park Lane and West Hillcrest Road, between West Irvin Avenue and Cypress Street, and between West Magnolia Avenue and Country Club Road)

Oak Hill Avenue has ample space for bike lanes and could serve as a prominent north-south corridor for cyclists

P18: Install bidirectional 5' bike lanes on Potomac Avenue

- McComas Street to Eastern Boulevard
- Purpose and need
  - Better connectivity to areas north of downtown
  - High bicycle demand score
  - 2010 recommendation
- Recommendation
  - Install 5' bidirectional bike lanes where space permits. Install sharrows where bike lanes are not feasible (due to on-street parking and turn lanes)
  - Bike lanes cannot be continuous due to the presence of turn lanes
  - Transition signage may be needed in cases where the gaps exceed 200 feet excluding intersection, itself (example: at northbound approach to Eastern Boulevard)
  - Refer to the Maryland SHA Bicycle Policy and Design Guidelines, Chapter 5 for additional detail on transition signage

Potomac Avenue is another potential north-south corridor for cyclists

P19: Conduct further study regarding bicycle lane installation on Bethel Street / Randolph Street

- N. Prospect Street to N. Locust Street
- Purpose and need
  - High bicycle demand score
  - Provides critical east-west connection and access to key north south bike lanes (S. Prospect Street, Jonathan Street, N. Locust Street)
  - Improves access for approximately 1,000 households in the adjacent neighborhoods
- Recommendation
  - Replace parking spaces on the north side of the street with a 5' bike lane
  - The conversion would require removing approximately 60 parking spaces on the north side of Bethel and Randolph
  - Conduct parking counts and discuss with residents (Bing Maps shows 17% occupancy, Google Maps shows 50% occupancy)
  - *See "Further Study" section for additional detail*

P20: Painted bike lane on Locust Street

- McComas Street to S. Potomac Street
- Purpose and need
  - Seven (7) crashes on Locust through downtown since 2009
  - Several MetroQuest comments about motorists parking in the bike lane (image above)
- Recommendation
- Paint the bike lane green to increase the awareness of cyclists and to deter motorists from parking in the bike lane

Truck parked in the bike lane (looking northbound)

Visualization of green painted bike lane on Locust Street (looking northbound)

P21: Install bike lane (5') southbound on Mulberry Street

- Fairground Avenue to Lee Street
- Purpose and need
  - Improve access to school
  - Improve safety
  - Connect to other recommended east-west facilities, such as proposed bike lanes on Antietam Street
- Recommendation
  - 1.3 mile bicycle lane
  - Serve as a one-way pair with S. Locust Street (on east side of town)
  - 16 feet of pavement from sidewalk to on-street parking
  - Install on west side of the street
  - Install shared-lane marking at the approach to East Baltimore Street since the pavement cannot accommodate a shared right/thru lane, a left turn lane, and a bike lane (resume bicycle lane south of Baltimore Street). Do not need a "bike lane ends" sign (R3-17 and R3-17bP) since the gap is only 115 feet (Maryland Policy and Design Guide 2.3 recommends installing if segment is greater than 200 feet).
  - Install sharrows to connect to north pedestrian entrance of Bester Elementary School

P22: Install sharrows on Antietam Street

- S. Mulberry Street to S. Burhans (0.7 miles) every 250 feet
- Purpose and need
  - Need for better east-west connections for cyclists
  - High bicycle demand score, low traffic volume, low vehicle speeds

- Recommendation
  - Install sharrows every 250 feet
  - Parking occupancy likely too high to consider remove parking lane (for bike lanes)

P23: Install bike lanes on East Antietam Street and sharrows on S. Cleveland Street

- S. Mulberry Street to S. Cleveland Street
- Purpose and need
  - Need for better east-west connections for cyclists
  - Connect the Hub City Bike Loop and southeast Hagerstown (380 households, 22 percent of which are minorities) with Downtown
  - High bicycle demand score
  - Connect to library
  - ADT range from 1,000-8,000 (compared to 8,600-16,800 on Washington, which is one-way)
- Recommendation
  - East Antietam Street from S. Cleveland Street to S. Mulberry Avenue (.41 miles).
    - Remove on-street parking (20 spaces) on East Antietam Street from S. Cannon Avenue to S. Mulberry Street (low occupancy, vacant parcels).
    - Lane widths, including underutilized parking spaces, range from 16’ to 20’ along this segment
  - South Cleveland Avenue from Tracys Lane to East Antietam Street (324 feet) - install sharrows or bike lanes (if left-turn lane is removed on S. Cleveland)

P24: Install sharrows on Lee Street

- Locust Street to Mulberry Street
- Purpose and need
  - Improve connectivity
- Recommendation
  - Install sharrows on Lee Street from Locust to Mulberry

P25: Install multi-use path (Cultural Trail), linking the north and south sides of downtown

- City Park to W. Antietam Street
- Purpose and need
  - Create a more vibrant downtown environment
  - Connect some of the City's prominent activity centers
- Recommendation
  - Finalize plans and designs for the "Cultural Trail", which includes public art, landscaping and other features
  - *Note: the project was approved by City Council in March 2016*

P26 / P27: Install multi-use path (Marsh Run Trail)

- S. Potomac Street to Summit Avenue
- Purpose and need
  - Improve off-road bicycle connectivity
  - Link to other existing and proposed bicycle facilities and points of interest
- Recommendation
  - Complete final designs and begin construction
  - *Note: the project has received funding through the Maryland Bikeways Grant program*

P28: Install sharrows on S. Potomac Street

- From West Memorial Drive to S. Locust Street
- Purpose and need
  - Improve safety from Bester Elementary to the bike lanes on S. Locust Street
- Recommendation
  - Install every 250 feet, with first marking just north of crosswalk to Bester Elementary and second marking at the approach to S. Locust Street

P29: Install bike lanes into Fairgrounds Park

- Entrance to Fairgrounds Park
- Purpose and Need
  - Improved connections to Fairgrounds Park
- Recommendation
  - Install bike lanes at the southern entrance to Fairgrounds Park

P30: Install 5' bidirectional bike lanes on Security Road

- Fairgrounds Park to Pangborn
- Purpose and need
  - 2010 recommendation
  - Better east-west connections in the eastern part of Hagerstown
  - Connectivity between neighborhoods, parks, and Downtown
- Recommendation
  - Install 5' bidirectional bike lanes
  - Prohibit on-street parking from North Cleveland Avenue to Medway Road
  - May need to transition to sharrows at the eastbound approach to Pangborn Boulevard due to on-street parking

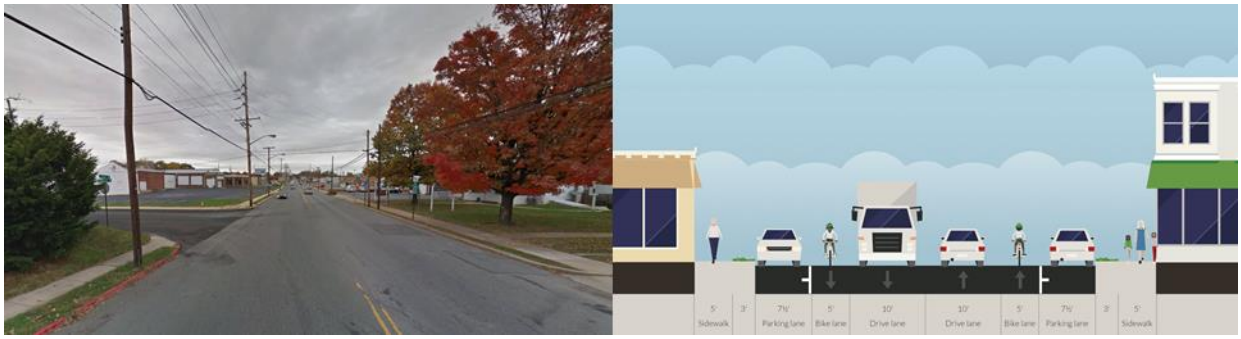
P31: Install northbound 5' bike lane on Pangborn Boulevard

- Manor Drive to Security Drive
- Purpose and need
  - Improves bicycle connectivity for approximately 1,700 households in surrounding neighborhoods and enhances the overall comfort of the Hub City Bike Loop
- Recommendation
  - Install northbound bike lane on Pangborn, in the direction of the Hub City Loop
  - Lanes are typically 18' and wide enough to accommodate a 5' lane
  - *Note: one segment is located outside the City Limits*

P32: Install sharrows and bike route signs on Mill Street and Cannon Street

- Memorial Boulevard (via Frederick Street) to East Antietam Street
- Purpose and need
  - Provide cyclists with a low traffic alternative to Frederick Street
  - High bicycle demand score – access to ball fields, Hager Park
- Recommendation
  - Install sharrows every 250 feet
  - Install bike route signs in southbound direction on Mill Street, directing cyclists towards Hub City Loop

P33: Install 5' bidirectional bike lanes on Frederick Street



- Mill Street to southern City Limits (just south of Kenly Ave) (1.4 miles)
- Purpose and need
  - Poor bicycle-level-of-service due to high volumes and insufficient bicycle facilities
  - Improved access to Potterfield Pool and other existing and proposed bicycle facilities
  - 2010 recommendation
- Recommendation
  - Install 5' bidirectional bike lanes where space permits. Install sharrows where bike lanes are not feasible (due to on-street parking and turn lanes)
  - Transition signage may be needed in cases where the gaps exceed 200 feet excluding intersection, itself (example: at the northbound approach to Eastern Boulevard)
  - Refer to the Maryland SHA Bicycle Policy and Design Guidelines, Chapter 5 for additional detail

P34: Install multi-use path as part of Yale Drive improvements (roadway construction)

- Mount Aetna Road to Scholar Drive
- Purpose and need
  - Improve bicycle connectivity southeast of the City
  - Improve connections to Eastern Elementary School and Hagerstown Community College
- Recommendation
  - Design and construct a multi-use path as part of the Yale Drive improvements

P35: Install multi-use path as part of Professional Boulevard improvements (roadway construction)

- Professional Court to Robinwood Drive
- Purpose and need
  - Provide a bicycle-friendly connection between the City and regionally-significant activity centers, such as Hagerstown Community College and the Meritus Medical Center
  - Link the Robinwood Drive neighborhoods to the City of Hagerstown
- Recommendation
  - Design and construct a multi-use path as part of the Professional Boulevard improvements
  - Consider alternatives to connect to Pangborn Boulevard and the Hub City Bike Loop. For example: covey cyclists onto Professional Court, Champion Drive, and then onto Monroe Avenue via the existing path

P36: Conduct further study regarding the development of the Antietam Creek Trail

- Mount Aetna Road to S. Edgewood Drive in Funkstown
- Purpose and need
  - Improve the City's off-road bicycle and trail network
  - Connect the City of Hagerstown and Funkstown
  - Offer a scenic recreational route for cyclists
- Recommendation
  - Conduct a study to evaluate the proposed project's opportunities (public health, economic benefits) and constraints (environmental impacts, property impacts)
  - *See "Further Study" section for additional detail*

Bicycle Parking

Bicycle parking is a critical element in encouraging bicycling at the local level. Bicyclists need a safe and convenient place to park their bicycles along and at the end of most trips. Currently in Hagerstown, bike racks are clustered throughout Downtown Hagerstown, at City Park, and at Fairgrounds Park, but are missing at other key locations, such as other parks and shopping centers.

Bike racks are recommended at the following locations, as shown in Figure 12.

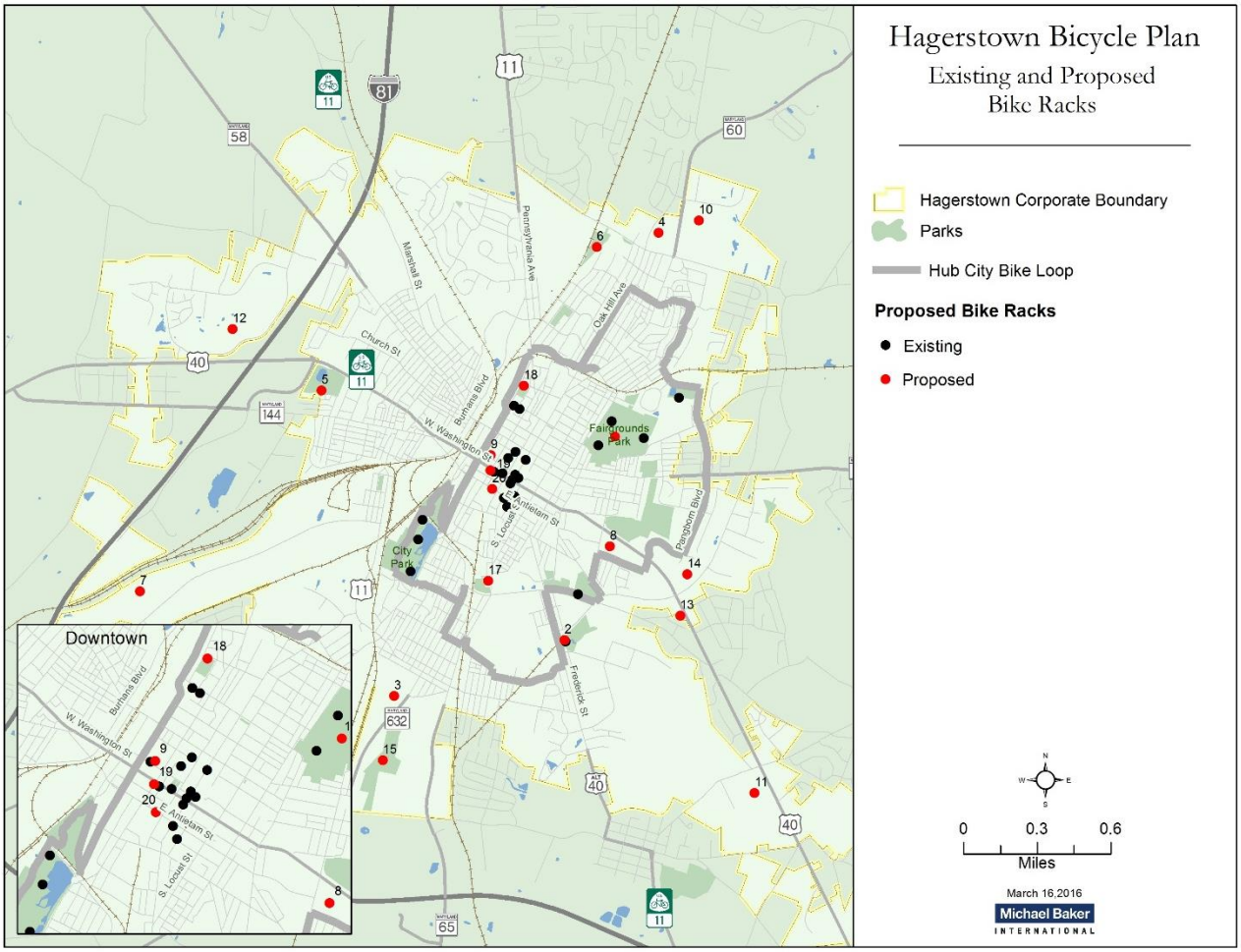
Map ID	City Area
1	Fairgrounds Park
2	Potterfield Pool
3	South End Shopping Center
4	Long Meadow Mall
5	Hullane Park
6	Mills Park
7	Valley Park Commons
8	Aldi Shopping Center
9	Hagerstown Transit Center
10	Stone House Square
11	Hagerstown Commons
12	Hagerstown Centre
13	Always Building
14	Centre at Antietam Creek
15	Doub's Woods Park (South)
16	Doub's Woods Park (North)
17	Hagerstown Community Garden
18	Wheaton Park
19	Discovery Station/Law Library
20	District Court/Start of Cultural Trail

** Map IDs correspond to map on next page*

All bicycle racks are not equally effective. The Association of Pedestrian and Bicycle Professionals (APBP) publication, *Essentials of Bike Parking*, suggest that bicycle racks:

- Support bike upright without putting stress on wheels
- Accommodate a variety of bicycles and attachments
- Allow locking of frame and at least one wheel with a U-lock
- Provide security and longevity features appropriate for the intended location
- Are easy and intuitive to use

FIGURE 12: PROPOSED BIKE RACK LOCATIONS



The recommended racks, as shown in Figure 13, such as the Inverted U or the Post & Ring, support the bike with at least two points of contact, minimize the potential for damage by not binding to the wheel, and allows the frame and at least one wheel to be locked to the rack. Commonly used racks that are not recommended, as shown in Figure 14, are the Wave, which is not intuitive to use and only allows one point of contact, and the Schoolyard, which does not allow locking of the frame and can lead to wheel damage.

FIGURE 13: RECOMMENDED BIKE RACK STYLE (SOURCE: APBP)

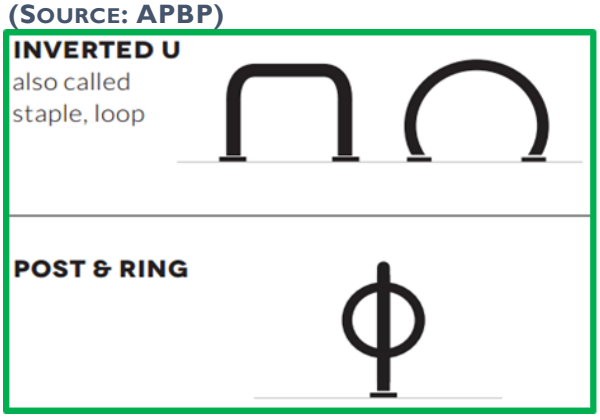
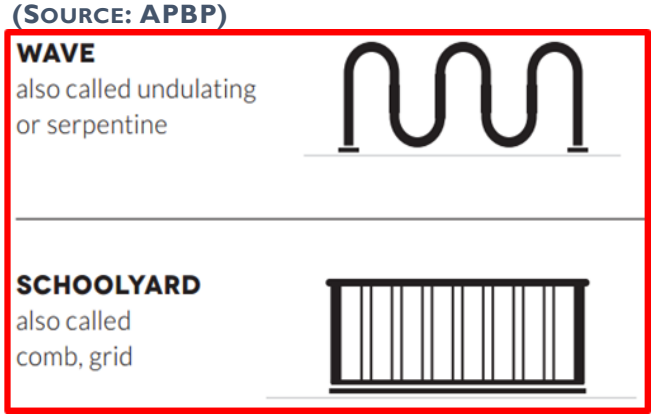


FIGURE 14: NOT RECOMMENDED BIKE RACK STYLE (SOURCE: APBP)



The recommended design criteria above do not need to limit creativity. Creative designs should balance form with function, supporting the bike in two places and allowing the bicycle to be securely locked. A well-designed bike rack enhances the visual appeal of the area in which it is placed. Though custom racks cost more than a standard bike rack, the returns on investment include heightened visibility and improved public perception of cycling in the city. Potential creative bicycle racks include:

- Baseball bicycle racks at Municipal Stadium
- Music note bicycle racks at the Maryland Theatre
- Flower bicycle rack at the Hagerstown Community Garden

Bike rack variations. Source: Pinterest

Further Study

Further study is needed for several of the plan recommendations, including the proposed trail along Antietam Creek and the proposed bike lane on Bethel Street/Randolph Street.

P19: Bethel Street/Randolph Street Bike Lanes. Further study is needed to evaluate the feasibility of installing an eastbound bike lane from North Prospect Street to North Locust Street. This street provides a critical east-west connection and access to key north-south bike lanes ((S. Prospect Street, Jonathan Street, North Locust Street). In addition, a bike lane would help improve access for approximately 1,000 households in the adjacent neighborhoods, 33 percent of which don't have a vehicle and 44 percent of which are living below the poverty line. The installation of a five-foot bike lane would require the City to remove approximately 60 parking spaces on the north side of Bethel and Randolph. Further study is needed to evaluate existing parking occupancy and discuss the recommendation with the neighboring communities.

Bethel Street, Hagerstown, Maryland.

P36: Antietam Creek Trail. The proposed trail, identified in the City's Comprehensive Plan, would run from Mt. Aetna Road and follow the east side of the creek to Funkstown. While the project does not appear to impact any existing structures, the environmental and property impacts are unknown and require further study. It is anticipated that this project would cost approximately $1.5-$2.5 million, assuming a 10-foot asphalt path (excluding land acquisition costs). The project, while not included in the BMP's overall project prioritization process due the complexities and uncertainties associated with the trail's implementation, received support from the public during the plan's public input phase.

Antietam Creek, Hagerstown, Maryland.

Rails to Trails

The public continues to express interest in rails-to-trails initiatives throughout the country and in the Hagerstown/Eastern Panhandle region. The Western Maryland Rail Trail (WMRT), running from Big Pool Station, Maryland to Pearre, Maryland, shows how analysis, coordination, and public support can come together to make rails-to-trails a reality. While an in-depth evaluation of railway abandonment and conversion is beyond the scope of this BMP, the following section provides guidance on rails-to-trails initiatives and highlights several case studies from around the country. The section concludes with preliminary insights and recommendations as they pertain to the City of Hagerstown.

What are "Rails to Trails"?

Rails to trails projects involve the conversion of former railway into a multi-use path for active transportation uses, typically walking and cycling.

Benefits

- Abandoned railway right-of-ways make great multi-use trails because the property is typically long, relatively flat, and continuous.
- Many states and municipalities have made use of funding to convert abandoned railway into multi-use paths.
- The conversion of rails-to-trails can provide economic, quality of life, health, accessibility and mobility benefits to the surrounding communities.

Challenges

- The conversion of railway property requires that the section of property be abandoned by the railroad. Rail companies are often reluctant to abandon property even if it is rarely, if ever, used because abandonment can make it difficult to re-acquire the property should the companies' plans change.
- Paved trails are typically much more expensive than on-road infrastructure and more difficult to service (often because they are not as accessible to repair vehicles). For example, one mile of on-road bike lanes could cost approximately $30,000 per mile to construct, while one mile of asphalt trail could cost $700,000 per mile to construct.

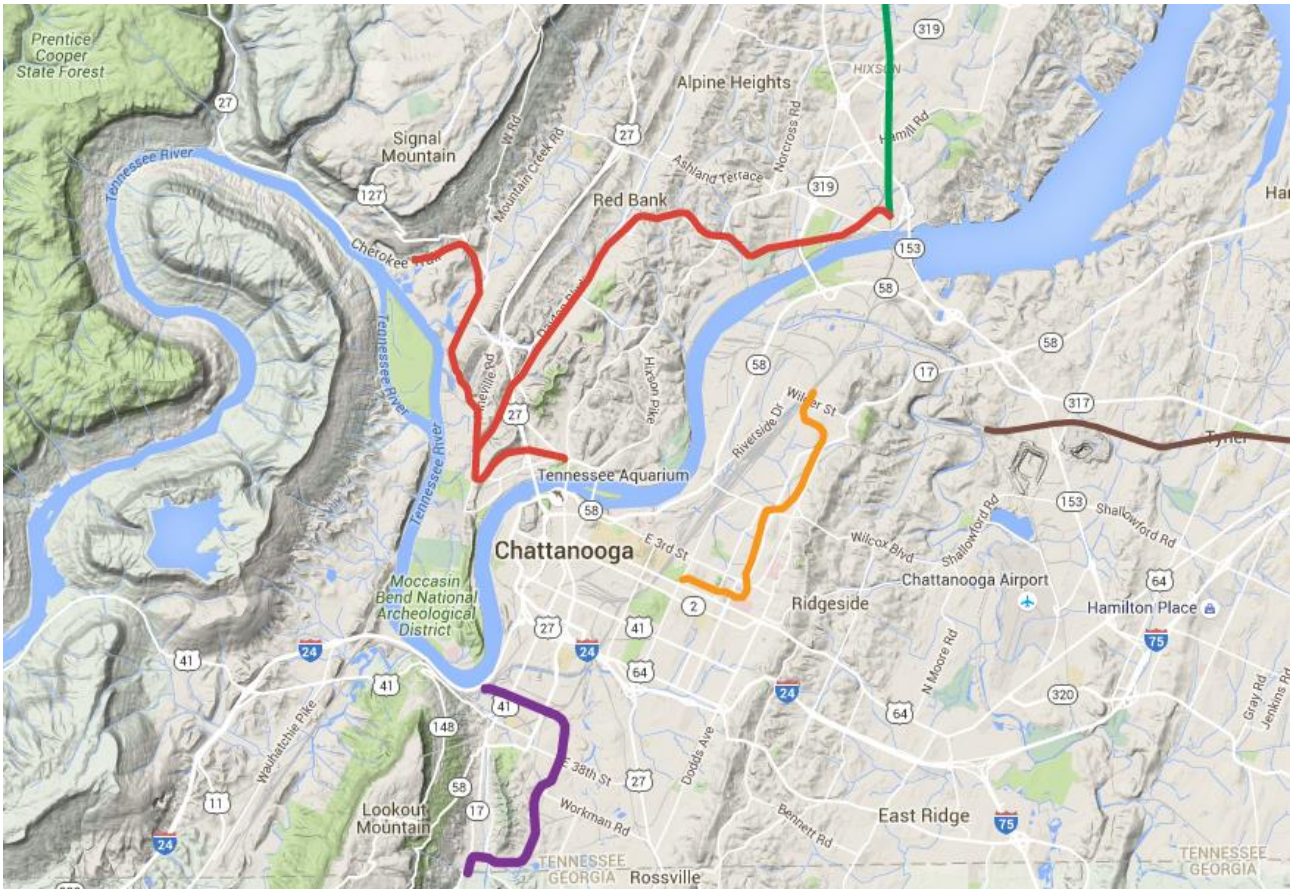
Rails to Trails Planning Case Study: Connecting Chattanooga (Chattanooga, TN)

The City of Chattanooga is ambitiously expanding its active transportation network through bike lanes, sharrows, signage, and off-road paths. Trails, like the Tennessee Riverwalk, are connecting neighborhoods and providing safe, dedicated facilities for pedestrians and cyclists. In 2014, the City and the Rails-to-Trails Conservancy (RTC) began evaluating rail-trail opportunities across the city's vast 190-mile rail network.

The Tennessee Riverwalk. Source: The Trust for Public Land

The City's preliminary rails-to-trails evaluation began with an assessment of the existing rail network. The study used data from the Federal Railroad Administration (FRA), the Center for Transportation Analysis (CTA), and other local sources to understand the railroad status (active, unused, abandoned), right-of-way width, ownership, service type (passenger, freight) and train frequency. The data analysis and stakeholder coordination helped identify five priority corridors.

The study's five priority corridors offer unique opportunities for the City of Chattanooga. While several of the priority corridors are located on abandoned lines, others, such as the "River Park to Collegedale/Apison" corridor, have frequent service, but also substantial right-of-way. Right-of-way on the River Park corridor, for example, ranges from 100 feet to 150 feet – providing ample space for a "rail with trail" scenario.



The Five Priority Rail Corridors. Source: Chattanooga Department of Transportation (CDOT)

While the rail-trail conversions will not happen overnight, the plan's data analysis and stakeholder input serve as an important foundation for future evaluation and coordination. The Chattanooga study ultimately recommends additional steps, including:

- Study and identify additional corridors, especially shorter segments that could augment existing or planned bicycle facilities if only for a matter of blocks.
- Conduct feasibility studies on one or more priority corridors, which would create a vision for the trail project, evaluate the project's potential and establish guidelines for its implementation.
- Develop strategies for approaching railroads and government officials and to identify potential funding sources.

Rails to Trails Implementation Case Study: Minnesota's Midtown Greenway (Minneapolis, MN)

The Midtown Greenway. Rails-to-Trails Conservancy (RTC).

This paved, 5.5-mile multi-use pathway is a green trench running through the city's southern neighborhoods, only minutes from downtown. Located 20 feet below street level in an early 20th-century railroad trench, the trail bypasses the street traffic passing overhead on over two dozen historical bridges. The design incorporates westbound and eastbound biking lanes with accessible ramps and includes a separate walking path to create a greenway ideal for recreational and transportation.

The Martin Olav Sabo Bike-Ped Bridge, opened 2007

The creation of this greenway was a long process. The Midtown Greenway Coalition, which formed in 1992 as a group of volunteers, was instrumental in the trail's development. The trail's west end opened in 2000 and construction subsequently progressed eastward, with two additional sections opening in 2004 and 2006. In 2007, the Martin Olav Sabo Bridge, which offered pedestrians and bicyclists safe passage over busy Hiawatha Avenue, opened. Today, the trail is illuminated at night, plowed and cleaned all year round and open 24 hours a day[5]. Further, it is operated and maintained by the public works department as a transportation facility[6].

[5] Stark, Laura. "Minnesota's Midtown Greenway." Rails-to-Trails Conservancy. 16 Oct. 2015. Web. 15 Apr. 2016. <http://www.railstotrails.org/trailblog/2015/october/16/minnesota-s-midtown-greenway/?tag=Trail of the Month>.

[6] Stark, Laura. "Minnesota's Midtown Greenway." Rails-to-Trails Conservancy. 16 Oct. 2015. Web. 15 Apr. 2016. <http://www.railstotrails.org/trailblog/2015/october/16/minnesota-s-midtown-greenway/?tag=Trail of the Month>.

The total project cost was $36.5 million ($41.9 million in 2016 dollars)[7]. However, this includes land acquisition, engineering and construction as well as site clean-up and additional infrastructure (such as lights and signage). The 2007 bridge over Hiawatha Avenue cost $5.2 million at the time ($6.0 million in 2016 dollars). However, the project cost per road mile was only $7.6 million which is low compared to the cost of building new vehicle roadways. Minnesota Department of Transportation estimates that urban roadway construction costs per mile can run as high as $50.0 million/mile[8].

Further, the trail has led to the revitalization of a former industrial area. The $200.0 million in nearby real estate investment since the trail's opening would have been unthinkable in the 1990s, when the trench was seldom-used and had become littered with trash[9]. Since the trail's opening, "property values along the corridor have gone up 90 percent or more"[10].

Recommendations for Hagerstown

Initial conversations with the CSX Corporation, a national railroad company with a large presence in Hagerstown, suggests that the City's CSX railroad corridors are still operational. The City and rail advocates should continue to monitor local rail activity and communicate with rail companies, such as CSX and Norfolk Southern, in order to remain up-to-date on potential abandonment proceedings. The City should also identify and understand the rail companies' concerns as they pertain to at-grade crossings or other modal conflicts. This communication will ultimately help the City and railroads achieve smoother, more favorable acquisition terms should the railroads abandon corridors in the future. Finally, the City of Hagerstown, like the City of Chattanooga, should consider initiating a rail-trail study (at the municipal or regional level) to better understand the existing rail network and identify unique opportunities for rails-trail conversions.

[7] "Approximate Midtown Greenway Costs and Funding Sources as of September 2007." Http://midtowngreenway.org/. 1 Oct. 2007. Web. 15 Apr. 2016. <http://midtowngreenway.org/files/mgc/ckfinder/files/capcostssumforpublicGreenway200709.pdf>.

[8] "Road Construction- Funding." Minnesota Department of Transportation a Project. Web. 15 Apr. 2016. <http://www.dot.state.mn.us/roadconstruction/ittakestime/funding.html>.

[9] Fisher, Thomas. "Streetscapes: Midtown Greenway Spurs Urban Development, Especially in Uptown." Star Tribune. 9 May 2015. Web. 15 Apr. 2016. <http://www.startribune.com/midtown-greenway-spurs-urban-development-especially-in-uptown/303081591/>.

[10] Stark, Laura. "Minnesota's Midtown Greenway." Rails-to-Trails Conservancy. 16 Oct. 2015. Web. 15 Apr. 2016. <http://www.railstotrails.org/trailblog/2015/october/16/minnesota-s-midtown-greenway/?tag=Trail of the Month>.

IMPLEMENTATION PLAN

Project Prioritization and Fiscal Constraints

The plan's recommendations could cost over $550,000 (excluding those requiring further study), which far exceeds the City's anticipated annual funding for bicycle infrastructure. As such, prioritization is a critical step in implementing the plan's recommendations. The plan uses a multi-dimensional prioritization process that scores projects based on several key criteria (listed below) and then assigns projects to two-year phases based on the relative scores and the associated fiscal constraints. The BMP prioritization process did not include projects for further study or projects that have dedicated funding sources.

Criteria

The prioritization criteria were developed and scored based on public input, BAC input, and existing conditions data. All criteria were weighted evenly (1.0), except for Safety and BAC input. Safety, considered the most important criteria, received a weight of 2.0, while the BAC input received a weight of 1.5. The prioritization scoring methodology and prioritization factors are outlined below. Table 3, on the following page, shows the prioritization scores.

- Bicycle Advisory Committee
  - Projects were individually ranked by the BAC and then scored on a 0 to 1.5 scale
- Access to schools or colleges – *does the project improve access?*
  - Yes = 1, No = 0
- Access to parks or recreational trails – *does the project improve access?*
  - Yes = 1, No = 0
- Improve east-west connections to Downtown – *does the project improve east-west connections?*
  - Yes = 1, No = 0
- Employment and population
  - Total population within a ¼ mile of the proposed project. Normalized on a 0 to 1 scale.
  - Total employment within a ¼ mile of the proposed project. Normalized on a 0 to 1 scale.
  - Sum Population and Employment scores (0 to 1).
- Socioeconomic factors
  - Sum of zero-car households, households below the poverty line, and number of minorities within a ¼ mile of the proposed project. Normalized on a 0 to 1 scale.
- Safety – combination of crash data (2009 to 2014) and BLOS results (approximating bicycle comfort)
  - Crash data
    - Bicycle crash reported along project extent = 0.5
    - No bicycle crash reported along project extent = 0
  - Bicycle Level of Service (BLOS)
    - Higher scores were awarded to projects on "less comfortable" facilities
    - A = 0, B = 0.1, C = 0.3, D = 0.5
  - Sum Crash Data and BLOS scores and multiply by two
- Public input
  - 0 to 1 scale, with "1" indicating the most frequently ranked project. Note: several projects did not receive any votes as a "top 5" project. While several "further study" projects received votes by the public, these projects were not incorporated into the overall project prioritization process.

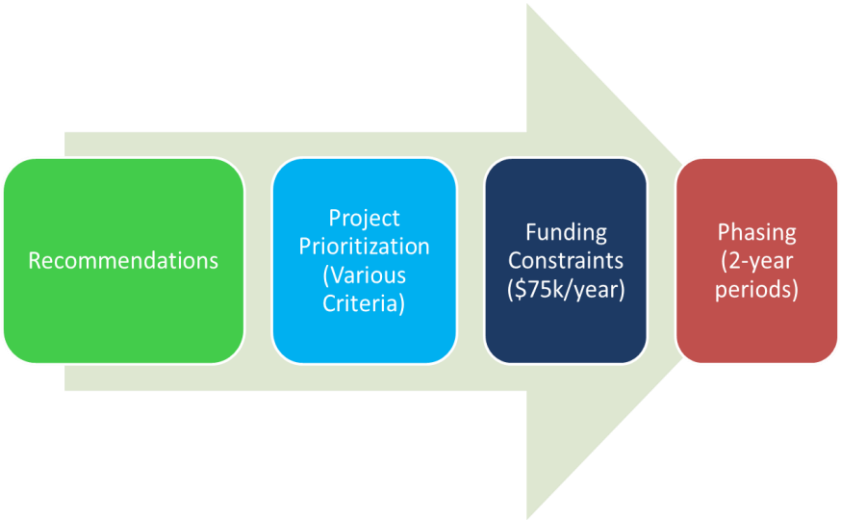
TABLE 3: PROJECT PRIORITIZATION SCORES

Project ID	Location	BAC Score (0 to 1.5)	Access to Schools or Colleges (0 = no, 1= yes)	Access to Parks or Rec. Trails (0 = no, 1= yes)	Improve East-West Connections to Downtown? (0 = no, 1= yes)	Employment + Population (0 to 1)	Socio-Economic (0 to 1)	Safety (0 to 1) x2	Public Input (0 to 1)	Total Score
P21	Mulberry St.	1.3	1.0	1.0	0.0	0.7	0.8	0.8	0.5	**6.9**
P16	Northern Ave.	0.9	1.0	1.0	0.0	0.2	0.1	1.0	1.0	**6.2**
P28	South Potomac St.	1.1	1.0	1.0	0.0	0.2	0.2	1.0	0.3	**5.8**
P17	Oak Hill Ave.	1.1	1.0	1.0	0.0	0.4	0.3	0.6	0.8	**5.8**
P22	Antietam St.	0.8	0.0	0.0	1.0	0.8	0.7	1.0	0.4	**5.7**
P33	Frederick St.	1.5	1.0	1.0	0.0	0.4	0.2	0.5	0.4	**5.5**
P10	W. Washington St.	1.2	1.0	0.0	1.0	0.1	0.1	1.0	0.0	**5.4**
P13	South Burhans Blvd.	1.4	0.0	1.0	1.0	0.2	0.2	0.5	0.0	**4.8**
P30	Security Rd.	1.2	0.0	1.0	0.0	0.2	0.3	0.8	0.4	**4.7**
P14	South Burhans Blvd.	1.3	0.0	0.0	1.0	0.4	0.4	0.5	0.3	**4.4**
P12	Lanvale St.	1.0	0.0	0.0	1.0	0.2	0.2	0.8	0.3	**4.3**
P05	Church St.	0.6	1.0	0.0	1.0	0.2	0.3	0.3	0.3	**4.1**
P20	South Locust St.	0.5	0.0	0.0	0.0	0.9	1.0	0.8	0.0	**4.0**
P32	Mill St. / Cannon St.	1.1	0.0	1.0	0.0	0.3	0.3	0.5	0.3	**4.0**
P23	Antietam St.	0.9	0.0	0.0	1.0	0.4	0.3	0.5	0.0	**3.6**
P31	Pangborn Blvd.	0.6	1.0	0.0	0.0	0.3	0.3	0.6	0.0	**3.4**
P04	Nottingham Rd.	1.4	1.0	0.0	0.0	0.2	0.1	0.3	0.0	**3.3**
P15	Pennsylvania Ave.	0.9	1.0	0.0	0.0	0.1	0.0	0.3	0.6	**3.2**
P18	Potomac Ave.	0.8	0.0	0.0	0.0	0.3	0.2	0.8	0.3	**3.2**
P02B	Florida Ave.	1.5	1.0	0.0	0.0	0.2	0.1	0.1	0.0	**3.1**
P01	Marshall Ave.	1.5	1.0	0.0	0.0	0.2	0.1	0.1	0.0	**3.0**
P08	Winter St.	0.6	0.0	0.0	0.0	0.3	0.4	0.8	0.0	**3.0**
P29	Fairgrounds Park	1.2	0.0	1.0	0.0	0.1	0.1	0.0	0.3	**2.8**
P06	Church St.	0.5	0.0	0.0	1.0	0.3	0.4	0.3	0.0	**2.8**
P24	Lee St.	1.4	0.0	0.0	0.0	0.3	0.3	0.3	0.0	**2.5**
P11	Buena Vista Ave.	1.0	0.0	0.0	1.0	0.1	0.1	0.1	0.0	**2.5**
P09	High St.	0.7	0.0	0.0	0.0	0.3	0.4	0.3	0.0	**2.0**
P03	Mitchell / Park	1.5	0.0	0.0	0.0	0.1	0.1	0.1	0.0	**2.0**
P02A	Arlington Ave.	0.8	1.0	0.0	0.0	0.2	0.0	0.0	0.0	**2.0**
P07	West Side Ave.	0.7	0.0	0.0	0.0	0.3	0.4	0.1	0.0	**1.6**

Fiscal Constraints

Funding, although unpredictable in timing and scope, is critical to the success of any transportation plan. The City of Hagerstown has not traditionally used local taxpayer dollars for bicycle improvements and thus relies heavily on competitive grant programs. Fortunately, city staff have been very diligent about pursuing grant opportunities through programs, such as the **Maryland Bikeways Program**. For example, in March 2016 the City received $90,000 through the Maryland Bikeways Program that will be used for various improvements, including final design of the Marsh Run Trail.

Given the unpredictable nature of funding, this plan only includes the Maryland Bikeways grants as a reasonable source for annual funding over the next ten years. Specifically, the plan anticipates that $75,000 per year will be available through the program. Please see **Appendix E** for information about additional funding opportunities.



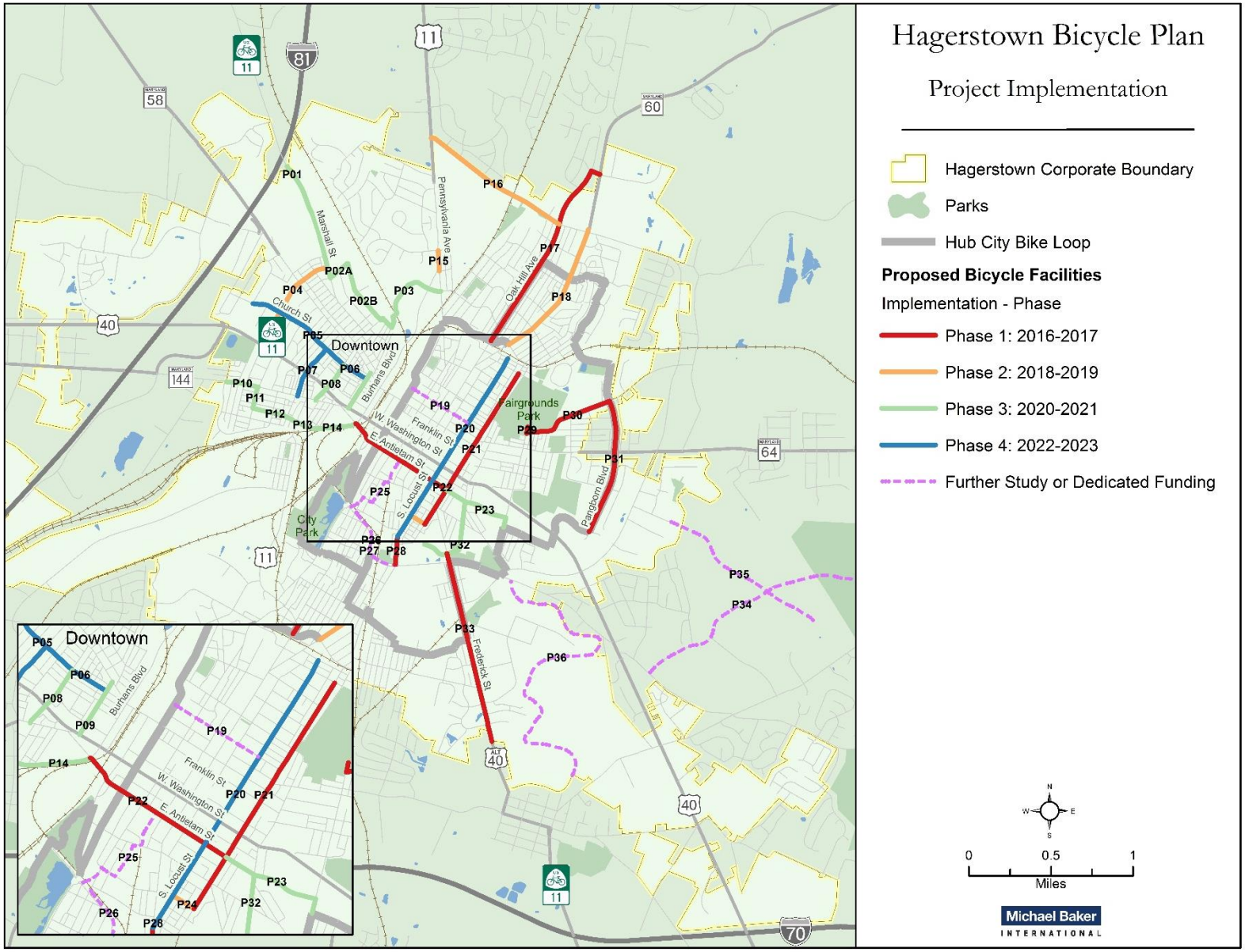
Phasing

Next, projects were assigned to 2-year periods based on their overall prioritization scores and their estimated costs (versus available funding). In some cases, funding shortfalls in one phase may have caused a project to shift to a later phase despite its high overall prioritization score. In addition, the prioritization process considered the logical sequencing of projects. This ensures that projects are constructed in a connected fashion, rather than a piecemeal approach. Table 4 shows the recommended implementation timeline and phasing for the plan's proposed projects, along with project costs and prioritization scores. Figure 15 maps the recommendations by phase, showing the continuity and sequencing of projects.

TABLE 4: RECOMMENDED IMPLEMENTATION TIMELINE

Project ID	Location	Type	Cost Estimate	Prioritization Score	Phase
P17	Oak Hill Ave.	Proposed Bike Lanes/Traffic Calming	$55,300	**5.8**	Phase 1: 2016-2017
P21	Mulberry St.	Proposed Bike Lane	$17,700	**6.9**	Phase 1: 2016-2017
P22	Antietam St.	Proposed Sharrows	$9,000	**5.7**	Phase 1: 2016-2017
P28	South Potomac St.	Proposed Sharrows	$2,200	**5.8**	Phase 1: 2016-2017
P29	Fairgrounds Park	Proposed Bike Lane	$700	**2.8**	Phase 1: 2016-2017
P30	Security Rd.	Proposed Bi-Directional Bike Lanes	$18,400	**4.7**	Phase 1: 2016-2017
P31	Pangborn Blvd.	Proposed Sharrows	$10,900	**3.4**	Phase 1: 2016-2017
P33	Frederick St.	Proposed Bi-Directional Bike Lanes	$38,600	**5.5**	Phase 1: 2016-2017
P04	Nottingham Rd.	Proposed Sharrows	$7,900	**3.3**	Phase 2: 2018-2019
P15	Pennsylvania Ave.	Proposed Sharrows	$1,600	**3.2**	Phase 2: 2018-2019
P16	Northern Ave.	Proposed Road Diet/Bike Lanes/Traffic Calming	$102,000	**6.2**	Phase 2: 2018-2019
P18	Potomac Ave.	Proposed Bi-Directional Bike Lanes	$28,900	**3.2**	Phase 2: 2018-2019
P24	Lee St.	Proposed Sharrows	$1,500	**2.5**	Phase 2: 2018-2019
P01	Marshall Ave.	Proposed Sharrows	$19,200	**3.0**	Phase 3: 2020-2021
P02A	Arlington Ave.	Proposed Bike Lane	$2,300	**2.0**	Phase 3: 2020-2021
P02B	Florida Ave.	Proposed Sharrows	$7,400	**3.1**	Phase 3: 2020-2021
P03	Mitchell / Park	Proposed Bi-Directional Bike Lanes	$20,300	**2.0**	Phase 3: 2020-2021
P08	Winter St.	Proposed Sharrows	$3,600	**3.0**	Phase 3: 2020-2021
P09	High St.	Proposed Bike Lane	$4,100	**2.0**	Phase 3: 2020-2021
P10	West Washington St.	Proposed Bike Lane	$3,300	**5.4**	Phase 3: 2020-2021
P11	Buena Vista Ave.	Proposed Sharrows	$1,800	**2.5**	Phase 3: 2020-2021
P12	Lanvale St.	Proposed Sharrows & Traffic Calming	$33,300	**4.3**	Phase 3: 2020-2021
P13	South Burhans Blvd.	Proposed Sharrows	$1,000	**4.8**	Phase 3: 2020-2021
P14	South Burhans Blvd.	Proposed Road Diet/Buffered Bike Lanes	$31,400	**4.4**	Phase 3: 2020-2021
P23	Antietam St.	Proposed Bi-Directional Bike Lanes	$15,400	**3.6**	Phase 3: 2020-2021
P32	Mill St. / Cannon St.	Proposed Sharrows	$6,900	**4.0**	Phase 3: 2020-2021
P05	Church St.	Proposed Traffic Calming - Bike Blvd Features	$84,700	**4.1**	Phase 4: 2022-2023
P06	Church St.	Proposed Sharrows	$1,500	**2.8**	Phase 4: 2022-2023
P07	West Side Ave.	Proposed Sharrows	$4,500	**1.6**	Phase 4: 2022-2023
P20	S. Locust St.	Proposed Green Painted Bike Lane	$23,600	**4.0**	Phase 4: 2022-2023

FIGURE 15: RECOMMENDED IMPLEMENTATION TIMELINE



Conclusions

The City added approximately 10 miles of bicycle facilities from 2010 to 2015, a substantial accomplishment for a City that is only 12.2 square miles. This plan proposes to add another 22.3 miles by 2025, meaning that 31 percent of all roads in the City will have some type of bicycle facility in the next ten years (the average Silver-level Bicycle Friendly Community has 30 percent coverage). Figure 16 shows the progress since 2010 and the expectations for 2025.

The City the Hagerstown possesses all of the right ingredients to become a Silver-level Bicycle Friendly Community. The City has forward-thinking leaders, an extremely dedicated Bicycle Advisory Committee, active local cycling groups, residents who care about bicycling, and a burgeoning bicycle network. While there is no "one size fits all" approach to attaining a Silver-level Bicycle Friendly Community status, this plan's policy and infrastructure recommendations provide a roadmap for how the City can encourage cycling, improve bicycle safety, and raise awareness to create a healthier environment for cyclists.

FIGURE 16: THE PAST, EXISTING, AND PROPOSED BICYCLE NETWORKS

APPENDICES

Appendix A: Key Terms

ADT (Average Daily Traffic) – The total traffic volume during a given time period, ranging from 2 to 364 consecutive days, divided by the number of days in that time period, and expressed in VPD (vehicles per day).

Bicycle – A pedal-powered vehicle upon which the human operator sits to include three and four-wheeled human-powered vehicles, but not tricycles or similar vehicles for children. *Source: Maryland Design Guidelines*

Bicycle Boulevard – Bicycle boulevards are streets with low motorized traffic volumes and speeds and are designated and designed to give bicycle travel priority. Bicycle Boulevards use signs, pavement markings, and speed and volume management measures to discourage through trips by motor vehicles and create safe, convenient bicycle crossings of busy arterial streets. *Source: NACTO Urban Bikeway Guidelines*

Bicycle (Latent) Demand Score – The Latent Demand Score (LDS) method provides a way to estimate the latent or potential demand for bicycle travel, i.e., the level of travel that would occur if a bicycle facility existed on a road segment. The LDS method may be combined with supply-side facility analysis methods, such as bicycle level of service measures, to indicate facilities with the greatest need for improvement. *Source: U.S. Federal Highway Administration*

Bicycle Lane (General Term) – A portion of a roadway that has been designated by signs and pavement markings for preferential or exclusive use by bicyclists (from MUTCD, Section 1A.13, 7. Bicycle Lane). The designation of a BIKE LANE has specific legal consequences under Maryland Law. *Source: Maryland Design Guidelines*

Bicycle Level of Service (BLOS) – A mathematical model used to estimate an average bicyclist's perception of the quality of service of a section of roadway.

Bicycle Network – A system of bikeways within a specific jurisdiction. The system may include bike lanes, bike routes, shared-use paths, and other identifiable bicycle facilities. *Source: Maryland Design Guidelines*

Bicycle Route – A roadway, bikeway, or combination of both; designated by a jurisdiction with the appropriate authority; along which bicycle guide signs (See MUTCD, Section 9B.20 Bicycle Guide Signs) have been posted to provide directional and distance information. Unique route designation signs may be used, particularly for interstate routes. The installation of signs providing directional, distance, or destination information for bicyclists does not necessarily establish a BIKE ROUTE. *Source: Maryland Design Guidelines*

Bidirectional Bike Lanes – A pair of bike lanes on either side of a two-way street where each bike lane travels in the same direction as vehicle traffic but in the right-most side of the road.

Bike Boxes – A bike box is a designated area at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible way to get ahead of queuing traffic during the red signal phase. *Source: NACTO Urban Bikeway Guidelines*

Bicycle Parking Rack – A stationary fixture to which a bicycle can be securely attached (typically using a bicycle lock) to prevent theft.

Bicycle Carrier – A device attached to a vehicle (e.g. to a car or bus) to which bicycles can be mounted for transport.

Bollards – Short, thick posts that is used to stop vehicles from going on to a road or part of a road. Posts can be flexible or inflexible depending on a locality's priorities.

Buffered Bike Lane – Conventional bicycle lanes paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. A buffered bike lane is allowed as per MUTCD guidelines for buffered preferential lanes (section 3D-01). *Source: NACTO Urban Bikeway Guidelines*

Contra-Flow Bike Lane – 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 for bicycles. Contra-flow lanes are separated with yellow center lane striping. The contra-flow design introduces new design challenges and may introduce additional conflict points, as motorists may not expect oncoming bicyclists. *Source: NACTO Urban Bikeway Guidelines*

Conventional Bike Lane – A bike lane is located adjacent to motor vehicle travel lanes and flowing in the same direction as motor vehicle traffic. Bike lanes are typically on the right side of the street, between the adjacent travel lane and curb, road edge, or parking lane. This facility type may be located on the left side when installed on one-way streets. Because they lack a buffer, conventional bike lanes are only recommended on streets with less than 3,000 ADT and with posted speed limits of 25mph or less. *Source: NACTO Urban Bikeway Guidelines*

Cross-hatching – Parallel white lines, running diagonal to curb-running white lines, which delineate the buffer zone of a buffered bike lane.

Crosswalks – a part of a road where vehicles must stop to allow people to cross.

Curb-Extensions – Extensions of the curb (in the form of chicanes, lateral shifts, and chokers) which create a narrow two-lane gap or a single lane. Chicanes shift traffic alternately from side to side of the street to create an S-shaped path of travel. Lateral shifts are curb extensions that cause travel lanes to bend one way and then back the other way. Chokers are midblock curb extensions that narrow the street by expanding the sidewalk or adding a planting strip and often are installed at midblock crossings. *Source: U.S. Federal Highway Administration*

Hub City Bike Loop – A signed 10-mile loop around the City, which starts and ends in Fairgrounds Park and utilizes both on-street bike lanes and multi-use paths. The loop connects beautiful neighborhoods, City parks, and points of interest as it traverses counterclockwise around the City. *Source: HagerstownMd.org*

"Liveable Streets" – A 2015 policy supported by Hagerstown, which "challenges people to think differently and to demand a transportation system that balances transit, walking, and biking with automobiles". *Source: BikeMaryland.org and http://www.livablestreets.info/*

Mini Traffic Circles – A small traffic junction in which vehicles move circularly in one direction around a central island and are required to stop and signal before entering. *Source: Virginia Department of Transportation*

One-Way Paired Lane – A pair of one-directional bicycle lanes on two opposite-direction, nearby parallel streets.

Painted (Green) Bike Lane – A conventional or buffered bike lane that has been painted green to increase visibility.

Parking Occupancy – The percent of parking (either on or off-street) being utilized at the time of measurement.

Path/Trail (also "Greenway") – A bicycle facility that is physically separated and disconnected from roadways, often running through rural or park areas. These facilities can also operate as mixed-use trails by creating space for pedestrian use.

Pedestrian Crossing Length – The distance a pedestrian must walk between curbs.

Right of Way – A general term denoting land devoted to transportation purposes. The land may be owned outright by the agency responsible for the roadway or the agency may have a perpetual easement to use it for transportation purposes. *Source: Maryland Design Guidelines*

Road Diet (also "Lane Reduction") – A technique which reduces the number of travel lanes and/or the width of vehicle travel lanes to slow traffic, accommodate bicycle lanes and/or widen sidewalks.

Right User – A vehicle operator, bicyclist, or pedestrian within the highway, including persons with disabilities (from MUTCD, Section 1A.13, 67. Road User). *Source: Maryland Design Guidelines*

Roundabouts – A traffic junction in which vehicles move circularly in one direction around a central island and are only required to yield before entering. *Source: Virginia Department of Transportation*

Rumble Strip – A series of intermittent, narrow, transverse areas of rough-textured, slightly raised, or depressed road surface that is installed to alert road users to unusual traffic conditions (from MUTCD, Section 1A.13, 69. Rumble Strip). Longitudinal rows of rumble strips may be placed along the centerlines and/or shoulder edge-lines of highways to alert drivers that they are straying outside the appropriate lane. Transverse rows of rumble strips may be placed on the roadway surface in the travel lane(s) to alert motorists of upcoming significant speed changes. *Source: Maryland Design Guidelines*

Shared-Lane – A shared travel lane where motorized vehicles can pass bicycles without changing lanes. The lane is the furthest right travel lane. Its minimum width is 13 feet measured from the edge of the gutter pan or the edge of paving. *Source: Maryland Design Guidelines*

Shared-Lane "Sharrow" markings – A pavement marking symbol that indicates appropriate bicycle positioning in a shared lane. See Section 9C.07 Shared Lane Marking and Figure 9C-9 of the MUTCD for the design and additional information. *Source: Maryland Design Guidelines*

Shared Use Path – A roadway where motorized vehicle traffic is prohibited, that is physically separated from motorized vehicle traffic by either open space or a barrier. Shared use paths are generally open to any form of non-motorized travel, including but not limited to: pedestrians (walkers, joggers, and runners), bicycles, roller skates, wheelchairs, scooters, and horses. *Source: Maryland Design Guidelines*

Speed Tables (or Speed Humps) – Raised sections of pavement placed across the street to force motorists to travel at reduced speeds. Speed humps are more effective at slowing traffic than speed bumps because the driver actually benefits from traveling at slower speeds -- Speed bumps typically jar the motorist regardless of speed. Speed humps have a more gradual slope than traditional speed bumps. *Source: U.S. Federal Highway Administration*

Traffic-Calming – A general term referring to the variety of small-scale design strategies proven to slow down cars, increase the visibility of pedestrians and bicyclists, prevent crime, increase safety of vulnerable road users, reduce cut-through traffic, maximize street life and pedestrian activity. Traffic circles are best implemented in an area with well-designed existing sidewalks. *Source: U.S. Federal Highway Administration*

Traffic Control Device – A sign signal, marking, or other device used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, pedestrian facility, or shared-use path by authority of a public agency having jurisdiction (from MUTCD, Section 1A.13, 87. Traffic Control Device). *Source: Maryland Design Guidelines*

Transition Zone – The portion of a conventional or buffered bike lane where lane markings (often green hatching) indicate that bicycle traffic and vehicle traffic turning right should cross before the intersection.

CITY OF HAGERSTOWN - BICYCLE MASTER PLAN UPDATE

Welcome to the Hagerstown Bicycle Master Plan workshop! Please help us prioritize the project recommendations by selecting your top-five projects in the table (right). Use the display boards and map (see back of this page) for reference and let a staff member know if you have any questions. Thank you!

Types of Bicycle Facilities

Do you have other suggestions? Enter them below.

Which projects are most important to you? Please mark your top five projects in the empty column.

Project ID *(see map on back of this page)*	One-Way	Location	Recommendation Type	Miles	**Project Priority? *Please mark your top five projects ☑***
P01	No	Marshall Ave.	Sharrows	1.47	
P02A	Yes	Arlington Ave.	Bike Lane	0.14	
P02B	No	Florida Ave..	Sharrows	0.51	
P03	No	Mitchell / Park	Bi-Directional Bike Lanes	0.52	
P04	No	Nottingham Rd.	Sharrows	0.60	
P05	No	Church St.	Traffic Calming	0.61	
P06	No	Church St.	Sharrows	0.24	
P07	No	West Side Ave.	Sharrows	0.34	
P08	No	Winter St.	Sharrows	0.28	
P09	Yes	High St.	Bike Lane	0.25	
P10	No	W. Washington St.	Bike Lane	0.20	
P11	No	Buena Vista Ave.	Sharrows	0.14	
P12	No	Lanvale St.	Sharrows & Traffic Calming	0.28	
P13	No	S. Burhans Blvd.	Sharrows	0.08	
P14	No	S. Burhans Blvd.	Road Diet/Buffered Bike Lanes	0.29	
P15	No	Pennsylvania Ave.	Sharrows	0.12	✓
P16	No	Northern Ave.	Road Diet/Bike Lanes	0.95	✓
P17	No	Oak Hill Ave.	Bike Lanes/Traffic Calming	1.27	✓
P18	No	Potomac Ave.	Bi-Directional Bike Lanes	0.88	✓
P19	Yes	Bethel St.	Further Study	0.40	
P20	Yes	S. Locust St.	Green Painted Bike Lane	1.28	
P21	Yes	Mulberry St.	Bike Lane	1.08	✓
P22	No	Antietam St.	Sharrows	0.69	
P23	No	Antietam St.	Bi-Directional Bike Lanes	0.47	
P24	Yes	Lee St.	Sharrows	0.23	
P25	No	path	Multi-Use Path	0.50	
P26	No	Marsh Run Trail	Multi-Use Path	0.46	
P27	No	Marsh Run Trail	Multi-Use Path	0.01	
P28	No	S. Potomac St.	Sharrows	0.17	
P29	Yes	Fairgrounds Park	Bike Lane	0.04	
P30	No	Security Rd.	Bi-Directional Bike Lanes	0.56	
P31	Yes	Pangborn Blvd.	Sharrows	0.83	
P32	No	Mill St. / Cannon St.	Sharrows	0.53	
P33	No	Frederick St.	Bi-Directional Bike Lanes	1.18	
P34	No	Yale Drive	Multi-Use Path	1.47	
P35	No	Professional Blvd.	Multi-Use Path	1.10	
P36	No	Antietam Creek Trail	Further Study	2.23	

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Types of Bicycle Facilities

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P04	No	Nottingham Rd.	Sharrows	0.60	
P05	No	Church St.	Traffic Calming	0.61	
P06	No	Church St.	Sharrows	0.24	
P07	No	West Side Ave.	Sharrows	0.34	
P08	No	Winter St.	Sharrows	0.28	
P09	Yes	High St.	Bike Lane	0.25	
P10	No	W. Washington St.	Bike Lane	0.20	
P11	No	Buena Vista Ave.	Sharrows	0.14	
P12	No	Lanvale St.	Sharrows & Traffic Calming	0.28	
P13	No	S. Burhans Blvd.	Sharrows	0.08	
P14	No	S. Burhans Blvd.	Road Diet/Buffered Bike Lanes	0.29	
P15	No	Pennsylvania Ave.	Sharrows	0.12	✓
P16	No	Northern Ave.	Road Diet/Bike Lanes	0.95	✓
P17	No	Oak Hill Ave.	Bike Lanes/Traffic Calming	1.27	
P18	No	Potomac Ave.	Bi-Directional Bike Lanes	0.88	
P19	Yes	Bethel St.	Further Study	0.40	
P20	Yes	S. Locust St.	Green Painted Bike Lane	1.28	
P21	Yes	Mulberry St.	Bike Lane	1.08	
P22	No	Antietam St.	Sharrows	0.69	
P23	No	Antietam St.	Bi-Directional Bike Lanes	0.47	
P24	Yes	Lee St.	Sharrows	0.23	
P25	No	path	Multi-Use Path	0.50	
P26	No	Marsh Run Trail	Multi-Use Path	0.46	✓
P27	No	Marsh Run Trail	Multi-Use Path	0.01	✓
P28	No	S. Potomac St.	Sharrows	0.17	
P29	Yes	Fairgrounds Park	Bike Lane	0.04	
P30	No	Security Rd.	Bi-Directional Bike Lanes	0.56	
P31	Yes	Pangborn Blvd.	Sharrows	0.83	
P32	No	Mill St. / Cannon St.	Sharrows	0.53	
P33	No	Frederick St.	Bi-Directional Bike Lanes	1.18	
P34	No	Yale Drive	Multi-Use Path	1.47	
P35	No	Professional Blvd.	Multi-Use Path	1.10	
P36	No	Antietam Creek Trail	Further Study	2.23	✓

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Types of Bicycle Facilities

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P16	No	Northern Ave.	Road Diet/Bike Lanes	0.95	✓
P17	No	Oak Hill Ave.	Bike Lanes/Traffic Calming	1.27	✓
P18	No	Potomac Ave.	Bi-Directional Bike Lanes	0.88	
P19	Yes	Bethel St.	Further Study	0.40	
P20	Yes	S. Locust St.	Green Painted Bike Lane	1.28	
P21	Yes	Mulberry St.	Bike Lane	1.08	
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P25	No	path	Multi-Use Path	0.50	
P26	No	Marsh Run Trail	Multi-Use Path	0.46	✓
P27	No	Marsh Run Trail	Multi-Use Path	0.01	✓
P28	No	S. Potomac St.	Sharrows	0.17	
P29	Yes	Fairgrounds Park	Bike Lane	0.04	
P30	No	Security Rd.	Bi-Directional Bike Lanes	0.56	
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P33	No	Frederick St.	Bi-Directional Bike Lanes	1.18	
P34	No	Yale Drive	Multi-Use Path	1.47	
P35	No	Professional Blvd.	Multi-Use Path	1.10	
P36	No	Antietam Creek Trail	Further Study	2.23	✓

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Types of Bicycle Facilities

never had an issue w/ oak hill traffic 3x/wk. Ride

* Please review road crossings at St Clair's and Penn Ave to W. Irvin & Cross from Fountainhead over Longmeadow road.

Do you have other suggestions? Enter them below.

Any opportunities for rail trail or advancement on Antietam Creek or like trails off street. would be wonderful!

* You clearly put a lot of work & thought into all of this - thank you!

I thought your explanation of rail trail at end was good - (reasons why not listed).

Which projects are most important to you? Please mark your top five projects in the empty column.

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P14	No	S. Burhans Blvd.	Road Diet/Buffered Bike Lanes	0.29	
P15	No	Pennsylvania Ave.	Sharrows	0.12	3
P16	No	Northern Ave.	Road Diet/Bike Lanes	0.95	2
P17	No	Oak Hill Ave.	Bike Lanes/Traffic Calming	1.27	1
P18	No	Potomac Ave.	Bi-Directional Bike Lanes	0.88	
P19	Yes	Bethel St.	Further Study	0.40	
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Types of Bicycle Facilities

Do you have other suggestions? Enter them below.

Any means of giving X-ing crossing priority & or protection from traffic, for bikes, would be helpful. I very much appreciate all the recent years of bike lanes - yet even on Locust (at Antietam X-ing), I got hit by a car turned left into me, on 2/8/15.

Aaron Tussing
brian.tussing@volvo.com

Which projects are most important to you? Please mark your top five projects in the empty column.

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P16	No	Northern Ave.	Road Diet/Bike Lanes	0.95	✓ 1
P17	No	Oak Hill Ave.	Bike Lanes/Traffic Calming	1.27	✓ 3
P18	No	Potomac Ave.	Bi-Directional Bike Lanes	0.88	
P19	Yes	Bethel St.	Further Study	0.40	
P20	Yes	S. Locust St.	Green Painted Bike Lane	1.28	
P21	Yes	Mulberry St.	Bike Lane	1.08	
P22	No	Antietam St.	Sharrows	0.69	
P23	No	Antietam St.	Bi-Directional Bike Lanes	0.47	
P24	Yes	Lee St.	Sharrows	0.23	
P25	No	path	Multi-Use Path	0.50	
P26	No	Marsh Run Trail	Multi-Use Path	0.46	
P27	No	Marsh Run Trail	Multi-Use Path	0.01	
P28	No	S. Potomac St.	Sharrows	0.17	
P29	Yes	Fairgrounds Park	Bike Lane	0.04	
P30	No	Security Rd.	Bi-Directional Bike Lanes	0.56	
P31	Yes	Pangborn Blvd.	Sharrows	0.83	
P32	No	Mill St. / Cannon St.	Sharrows	0.53	
P33	No	Frederick St.	Bi-Directional Bike Lanes	1.18	
P34	No	Yale Drive	Multi-Use Path	1.47	✓ 4
P35	No	Professional Blvd.	Multi-Use Path	1.10	✓ 2
P36	No	Antietam Creek Trail	Further Study	2.23	✓ 5

CITY OF HAGERSTOWN - BICYCLE MASTER PLAN UPDATE

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Types of Bicycle Facilities

Do you have other suggestions? Enter them below.

Driver Ed - Bicyclists right to The Road!

Which projects are most important to you? Please mark your top five projects in the empty column.

Project ID *(see map on back of this page)*	One-Way	Location	Recommendation Type	Miles	**Project Priority? *Please mark your top five projects ☑***
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P06	No	Church St.	Sharrows	0.24	
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P08	No	Winter St.	Sharrows	0.28	
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P10	No	W. Washington St.	Bike Lane	0.20	
P11	No	Buena Vista Ave.	Sharrows	0.14	
P12	No	Lanvale St.	Sharrows & Traffic Calming	0.28	
P13	No	S. Burhans Blvd.	Sharrows	0.08	
P14	No	S. Burhans Blvd.	Road Diet/Buffered Bike Lanes	0.29	
P15	No	Pennsylvania Ave.	Sharrows	0.12	✓
P16	No	Northern Ave.	Road Diet/Bike Lanes	0.95	✓
P17	No	Oak Hill Ave.	Bike Lanes/Traffic Calming	1.27	✓
P18	No	Potomac Ave.	Bi-Directional Bike Lanes	0.88	
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P26	No	Marsh Run Trail	Multi-Use Path	0.46	
P27	No	Marsh Run Trail	Multi-Use Path	0.01	✓
P28	No	S. Potomac St.	Sharrows	0.17	✓
P29	Yes	Fairgrounds Park	Bike Lane	0.04	
P30	No	Security Rd.	Bi-Directional Bike Lanes	0.56	✓
P31	Yes	Pangborn Blvd.	Sharrows	0.83	✓
P32	No	Mill St. / Cannon St.	Sharrows	0.53	✓
P33	No	Frederick St.	Bi-Directional Bike Lanes	1.18	
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Types of Bicycle Facilities

Do you have other suggestions? Enter them below.

Be sure all potential rail trails are shown on a map

Which projects are most important to you? Please mark your top five projects in the empty column.

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P34	No	Yale Drive	Multi-Use Path	1.47	✓
P35	No	Professional Blvd.	Multi-Use Path	1.10	✓
P36	No	Antietam Creek Trail	Further Study	2.23	✓

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Types of Bicycle Facilities

Do you have other suggestions? Enter them below.

Add: biserdavid@gmail.com

entire section to study railtrail feasibility !!

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P36	No	Antietam Creek Trail	Further Study	2.23	#1 #1

just do it!

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P14	No	S. Burhans Blvd.	Road Diet/Buffered Bike Lanes	0.29	✓
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P17	No	Oak Hill Ave.	Bike Lanes/Traffic Calming	1.27	✓
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P36	No	Antietam Creek Trail	Further Study	2.23	✓

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Types of Bicycle Facilities

Do you have other suggestions? Enter them below.

P15
P17
P05
P36
P12

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P16	No	Northern Ave.	Road Diet/Bike Lanes	0.95	
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Types of Bicycle Facilities

Do you have other suggestions? Enter them below.

* Cyclist input on lanes as to whether they actually work for cyclists.
* Traffic circles have not been cyclist friendly in my experiences.

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Types of Bicycle Facilities

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Antietam Trail - ? 1996?
explore use of abandoned or shared use railroad beds.
Prioritize connecting existing paths or lanes.
road crossings? Bike crosswalks
Avoid round-a-bouts.

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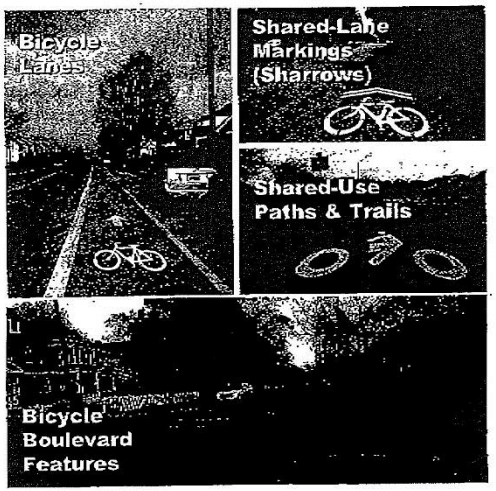
P22	No	Antietam St.	Sharrows	0.69	
P23	No	Antietam St.	Bi-Directional Bike Lanes	0.47	
P24	Yes	Lee St.	Sharrows	0.23	
P25	No	path	Multi-Use Path	0.50	(5)
P26	No	Marsh Run Trail	Multi-Use Path	0.46	(2)
P27	No	Marsh Run Trail	Multi-Use Path	0.01	(3)
P28	No	S. Potomac St.	Sharrows	0.17	
P29	Yes	Fairgrounds Park	Bike Lane	0.04	
P30	No	Security Rd.	Bi-Directional Bike Lanes	0.56	
P31	Yes	Pangborn Blvd.	Sharrows	0.83	
P32	No	Mill St. / Cannon St.	Sharrows	0.53	
P33	No	Frederick St.	Bi-Directional Bike Lanes	1.18	
P34	No	Yale Drive	Multi-Use Path	1.47	
P35	No	Professional Blvd.	Multi-Use Path	1.10	
P36	No	Antietam Creek Trail	Further Study	2.23	(4)

CITY OF HAGERSTOWN - BICYCLE MASTER PLAN UPDATE

Welcome to the Hagerstown Bicycle Master Plan workshop! Please help us prioritize the project recommendations by selecting your top-five projects in the table (right). Use the display boards and map (see back of this page) for reference and let a staff member know if you have any questions. Thank you!

Types of Bicycle Facilities



Do you have other suggestions? Enter them below.

Tal Mason

Which projects are most important to you? Please mark your top five projects in the empty column.

Project ID *(see map on back of this page)*	One-Way	Location	Recommendation Type	Miles	Project Priority? *Please mark your top five projects* ☑
P01	No	Marshal Ave.	Sharrows	1.47	
P02A	Yes	Arlington Ave.	Bike Lane	0.14	
P02B	No	Florida Ave.	Sharrows	0.51	
P03	No	Mitchell / Park	Bi-Directional Bike Lanes	0.52	
P04	No	Nottingham Rd.	Sharrows	0.56	
P05	No	Church St.	Traffic Calming	0.61	
P06	No	Church St.	Sharrows	0.24	
P07	No	West Side Ave.	Sharrows	0.34	
P08	No	Winter St.	Sharrows	0.28	
P09	Yes	High St.	Bike Lane	0.25	
P10	No	W. Washington St.	Bike Lane	0.20	
P11	No	Buena Vista Ave.	Sharrows	0.14	
P12	No	Lanvale St.	Sharrows & Traffic Calming	0.28	
P13	No	S. Burhans Blvd.	Sharrows	0.08	
P14	No	S. Burhans Blvd.	Road Diet/Buffered Bike Lanes	0.29	
P15	No	Pennsylvania Ave.	Sharrows	0.12	
P16	No	Northern Ave.	Road Diet/Bike Lanes	0.95	1
P17	No	Oak Hill Ave.	Bike Lanes/Traffic Calming	1.27	2
P18	No	Potomac Ave.	Bi-Directional Bike Lanes	0.88	
P19	Yes	Bethel St.	Further Study	0.40	
P20	Yes	S. Locust St.	Green Painted Bike Lane	1.28	
P21	Yes	Mulberry St.	Bike Lane	1.08	3
P22	No	Antietam St.	Sharrows	0.69	4
P23	No	Antietam St.	Bi-Directional Bike Lanes	0.47	
P24	Yes	Lee St.	Sharrows	0.23	
P25	No	path	Multi-Use Path	0.50	
P26	No	Marsh Run Trail	Multi-Use Path	0.46	
P27	No	Marsh Run Trail	Multi-Use Path	0.01	
P28	No	S. Potomac St.	Sharrows	0.17	
P29	Yes	Fairgrounds Park	Bike Lane	0.04	
P30	No	Security Rd.	Bi-Directional Bike Lanes	0.56	
P31	Yes	Pangborn Blvd.	Sharrows	0.83	
P32	No	Mill St. / Cannon St.	Sharrows	0.53	
P33	No	Frederick St.	Bi-Directional Bike Lanes	1.18	5
P34	No	Yale Drive	Multi-Use Path	1.47	
P35	No	Professional Blvd.	Multi-Use Path	1.10	
P36	No	Antietam Creek Trail	Further Study	2.25	

CITY OF HAGERSTOWN - BICYCLE MASTER PLAN UPDATE

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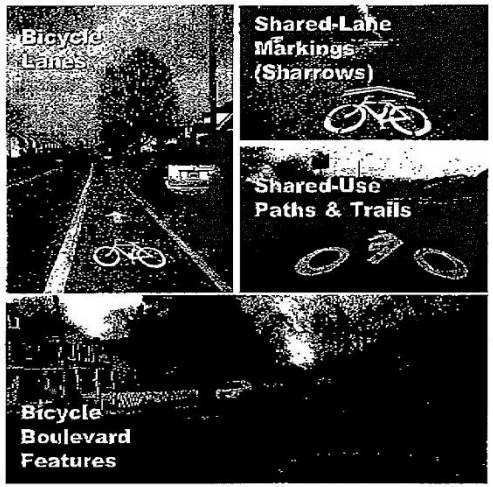
Types of Bicycle Facilities



Do you have other suggestions? Enter them below.

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P04	No	Nottingham Rd.	Sharrows	0.60	
P05	No	Church St.	Traffic Calming	0.61	
P06	No	Church St.	Sharrows	0.24	
P07	No	West Side Ave.	Sharrows	0.34	
P08	No	Winter St.	Sharrows	0.28	
P09	Yes	High St.	Bike Lane	0.25	
P10	No	W. Washington St.	Bike Lane	0.70	
P11	No	Buena Vista Ave.	Sharrows	0.14	
P12	No	Lanvale St.	Sharrows & Traffic Calming	0.28	
P13	No	S. Burhans Blvd.	Sharrows	0.08	
P14	No	S. Burhans Blvd.	Road Diet/Buffered Bike Lanes	0.29	
P15	No	Pennsylvania Ave.	Sharrows	0.12	
P16	No	Northern Ave.	Road Diet/Bike Lanes	0.95	1
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P35	No	Professional Blvd.	Multi-Use Path	1.10	
P36	No	Antietam Creek Trail	Further Study	2.23	

Appendix C: Latent Bicycle Demand

A Latent Demand model is used to identify the amount of bicycle travel (or "demand") likely to occur along existing street segments based on surrounding population, employment, and selected land uses. It is important to note that the demand is calculated based on network distances and without regard to existing traffic or the presence of bicycle facilities (trails, lanes, sidewalks). In other words, the model results are not constrained by existing bicycle facilities.

The latent demand model incorporates four general utilitarian trip purposes: work, school, shopping, and social/recreation. The trip purpose shares, expressed as percentages, were derived from the *National Household Travel Survey.*[11] The latent demand model relies heavily on geographic information systems (GIS) to quantify and analyze relative potential bicycle trip activity on the roadway network.

After compiling the jurisdiction bicycle GIS data, a series of key trip attractors were established. These attractors (shown on the right) were identified based on their trip generation capacities and their respective locations.[12] Once mapped, spatial analysis was performed in GIS to record the number of attractors within varying proximities (0.5 miles, 1.0 miles, 1.5 miles, and 2.0 miles) of each identifiable roadway segment. The spatial buffers were dissolved in GIS to ensure that the features did not overlap. This process avoids double-counting trip attractors for a given roadway segment.

Next, trip generations were assigned to each type of attractor. The *Institute of Transportation Engineers (ITE) Trip Generation Handbook (8th Edition)* was used to identify typical trip generation potential for parks, schools, colleges, and universities.

The trip generations were subsequently multiplied by the respective trip purpose shares for a given trip purpose. The calculation yields the relative number of potential bicycle trips generated, which must also be adjusted by a distance probability factor.

Once the potential bicycling trips were estimated, probabilities for making trips at various lengths were applied. The trip probability adjustments help account for the diminishing trip potential across longer distances, especially since distance between origins and destinations affects bicycling more dramatically than it does for automobile travel. The trip probabilities also account for different trip purposes. For example, people are typically willing to bicycle a greater distance to work than they are to simply pick up items at a local store. The trip lengths and probabilities (Table C1) were derived from the *National Household Travel Survey* and are similar to what were used in other regional studies, such as the *Atlanta Region Bicycle Transportation & Pedestrian Walkways Plan.*

[11] National Household Travel Survey (NHTS), 2009. For the purposes of this analysis, the social/recreational trip purpose reflects three NHTS categories: social/recreational, visiting friends/relatives, and other family/personal business.

[12] This study's trip attractors (which also act as generators) were the focus of this analysis because of the double counting which can occur when incorporating population-based trip generation and attractor-based trip generation.

TABLE C1: BICYCLE TRIP PROBABILITIES BASED ON DISTANCE AND PURPOSE

	Trip Purpose				
Average Trip Length	Work	School	Shopping	Social/Rec	Transit
0.5 miles	99.6%	99.0%	98.2%	99.5%	99.2%
1.0 mile	98.5%	86.4%	66.7%	96.2%	92.4%
1.5 miles	95.4%	45.1%	10.9%	84.2%	66.9%
2.0 miles	88.1%	0.0%	0.2%	59.1%	28.8%

The trip-making probabilities were multiplied by the relative number of generated bicycle trips for a particular bicycle segment, resulting in the number of bicycle trips for a particular purpose. These segment trips were aggregated for the four trip types.

Each segment was assigned a jurisdiction-specific quintile range based on its relative trip generation potential within its host jurisdiction. The quintiles, ranging from low demand to high demand, depict relative demand for bicycle facilities with little or no impedance.

Appendix D: Design Guidelines

The following tables and descriptions illustrate potential on-street and off-street bicycle improvements. While not all of the treatments are recommended as part of the BMP, the information can serve as a useful resource as the City continues to expand its bicycle network.

D.1.1 Conventional Bike Lane

Hagerstown (Photo credit: Google)

Description:

Bike lanes are a portion of a roadway, designated by striping, signage, and pavement markings, for the preferential or exclusive use of bicyclists. They are adjacent to and flow in the same direction as motor vehicle traffic. Bike lanes are typically on the right side of the street, between the adjacent travel lane and curb, road edge, or parking lane.

Benefits (NACTO, 2011)

- Increases comfort/confidence on busy streets.
- Creates separation between bicyclists and autos
- Increases predictability of cyclist and motorist positioning
- Increases total capacity for streets carrying mixed-mode traffic

Typical Application (NACTO, 2011)

- Streets with ≥ 3,000 vehicle average daily traffic and posted speed limits of ≥ 25 mph
- On streets with high transit vehicle volume

Guidance and Concerns:

Bicycle lanes must provide 5-6" of usable space for cyclists. Usable space does not include the gutter pan area as the joint between the gutter pan and pavement edge is a hazard for cyclists. Inadequate widths for bicycle lanes or auto travel lanes serve neither the bicyclist nor the auto. Minimum width and symbol/signage guidance must be followed. Refer to accepted publications such as MUTCD or NACTO Design Guide for required specifications. Intersections require specialconsideration to limit potential conflict between drivers of motor vehicles, bicyclists, and pedestrians.

D.1.2 Buffered Bike Lane

Photo credit: People for Bikes

Description:

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. (NACTO, 2011).

Benefits (NACTO, 2011)

- Provides additional passing distance between vehicles
- and bicyclists
- Provides space for cyclists to pass slower cyclists
- Can be used to keep cyclists out of the door zone in areas with street parking
- Provides greater space to cyclists without lane being mistaken for a motor vehicle travel lane+
- Appeals to a wider cross-section of bicycle users and
- contributes to perception of safety
- Increases total capacity for streets carrying mixed-mode traffic

Typical Application (NACTO, 2011)

- Anywhere a conventional bike lane is being considered.
- On streets with higher traffic volume, speed, or truck traffic.
- On streets with extra lanes or extra lane width
- Special consideration must be given at transit stops to manage bicyclist/pedestrian
- interactions with transit

Guidance and Concerns:

Buffers should be at least 2 feet wide. Where bicyclist volumes are high or where bicyclist speed differentials are significant, the desired bicycle travel area width is 7 feet." (NACTO, 2011). Intersections require special consideration to limit potential conflict between drivers of motor vehicles, bicyclists, and pedestrians. Refer to NACTO Urban Bikeway Design Guidelines for recommendations. (NACTO, 2011).

D.1.3 Contra-Flow Bike Lane

Photo credit: Streetsblog.org

Description:

Contra-flow bike lanes are allow bicyclists to ride in the opposite direction of motor vehicle traffic, typically on a one-way street for vehicles.

Benefits (NACTO, 2011)

- Allows cyclists to use low-traffic one-way streets in both directions
- Provides connectivity to cyclists travelling in both direction and de-creases overall trip distance
- Reduces wrong-way street riding

Typical Application (NACTO, 2011)

- On corridors where alternate routes require excessive out-of- direction travel or riding on streets with high traffic volumes or no bicycle facilities
- On one-way streets where bicyclists are already riding wrong way or on the sidewalk
- Where two-way bicycle facility connections are needed along one way streets
- On low-speed, low-volume roads to minimize risk of interactions between cyclists and turning motor vehicles

Guidance and Concerns:

Cross-street intersection treatments and signage may need to be considered to reduce dangerous conflicts between users when motorists do not anticipate contra-flow bicyclists. (e.g., No right-turn on red or similar). Bicycle lanes or combination of contra-flow lane and shared road markings should be used to prevent wrong way riding in the contra-flow vehicle travel lane. Small traffic signs may be used for bike-only traffic. Specific signage is required on these routes and planners should refer to NACTO Urban Bikeway Design Guide and MUTCD.

D.1.4 Bicycle Boulevard

Photo credit: Bikeplanet.org

Description:

A street segment, or series of connected streets, that has been modified to accommodate and encourage bicycle traffic while discouraging vehicle through-traffic. Bicycle boulevards streets with low vehicle volumes and speeds which have been optimized for bicycle travel with traffic calming, diversion, signage, pavement markings, and intersection treatments.

Benefits (PSU, 2009)

- Creates dedicated routes prioritized for bicycle use
- Provides comfortable, safe, convenient access on low-speed streets
- Reduces motor vehicle traffic on included roadway segments through traffic calming, diverters and signage
- Encourages bicyclists to use the bike lane, rather than
- sidewalks.

Typical Application (PSU, 2009)

- Roads with speeds ≥ 25 mph
- Roads with average daily vehicle traffic of <1500 (preferred) – 3000

Guidance and Concerns:

Intersections must be designed to reduce bicycle stop/starts and potential conflicts with motor vehicles. Roundabouts work well on bicycle boulevards because they slow vehicle traffic while allowing bicycle traffic to yield rather than stop at each junction. Traffic calming (such as diverters, speed tables, etc.) should be employed to reduce the attractiveness of the bicycle boulevard as a vehicle through-street. Routes should be selected for low volume and speed and to create direct, convenient connections for cyclists. Education and outreach efforts within both the community and residential areas along proposed boulevards are essential for project success. Communities wishing to implement bicycle boulevards should consider purchasing smaller emergency vehicles for easier access to all types of streets. When using traffic calming measures, special consideration must be given to avoid creating adverse conditions for bicyclists. Speed tables are more comfortable for cyclists than traditional speed bumps and "are more effective at slowing traffic than speed bumps because the driver actually benefits from traveling at slower speeds" (FHWA, 1999).

D.1.5 One-Way Cycle Track

Photo credit: People for Bikes

Description:

On street bike paths are at street level and use a variety of methods (such as bollards, planters, parked vehicles or a curb) for physical protection from passing traffic.

Benefits (NACTO, 2011)

- Dedicates and protects space for bicyclists in order to improve perceived comfort and safety
- Eliminates risk and fear of vehicle collisions
- Prevents vehicle double-parking, unlike in a conventional bike lane
- Low implementation cost by using existing pavement and drainage and by using parking lane as a barrier
- More attractive for bicyclists of all ages and skill levels

Typical Application (NACTO, 2011)

- Streets with parking lanes.
- Streets on which conventional bike lanes would cause many bicyclists to feel stress (multiple lanes, high traffic volumes, high speed traffic, high demand for double parking, and high parking turnover)
- Streets with sufficient roadway width to accomodate a cycle track

Guidance and Concerns:

Intersection treatments will be required to reduce conflicts between cyclists and turning vehicles. Cycle Track recommended lane width is 5‟ with 7‟ widths on uphill grades. Any method used to separate bicyclists from vehicle traffic should insure a minimum 3’ buffer between travel lanes and cycle track to reduce the risk of dooring. Special consideration should be given at transit stops to manage bicycle & pedestrian interactions.

D.1.6 Bike Path / Shared Use Path

Hancock, Maryland. Photo credit: Michael Baker International

Description:

A bike path is one exclusively used by bicyclists and is fully separated from the roadway. Bike paths may travel completely independent of vehicle roadway patterns. Shared use path design is similarly separated and paved but includes pedestrians and other non-motorized users.

Benefits (PSU, 2009)

- Provides facilities for cyclists & other non-motorists with complete separation from motor vehicles
- Can increase connectivity in areas where roadways exclude bicycles (e.g.: interstate highways and other limited use facilities)
- Can provide direct routes between destinations, exclusive of existing roadway infrastructure

Typical Application (PSU, 2009)

- Along right of ways (e.g., "rails to trails" or "rails with trails")
- When an opportunity for more direct connectivity between destinations can be provided through bicycle or shared use path (reduced travel distance).

Guidance and Concerns:

Width, clearance, grade, visibility, travel speeds, and user volumes/transportation modes must be considered in facility design. Connections to and from the path or shared use trail should be frequent and convenient. Shared use path should include clear signage or differentiated surface to delineate space for each type of user.

D.1.7. Through Bike Lanes

Hagerstown Photo credit: Google

Description:

Enables bicyclists to position themselves to the left of right turn lanes or to the right of left turn lanes or to the outward edge of a roundabout.

Benefits (NACTO, 2011)

- Enables bicyclists to position themselves to the left of right turn lanes or to the right of left turn lanes.
- Provides bicyclists guidance to follow the preferred travel path.
- Leads to more predictable bicyclist and motorist travel movements.
- Alerts motorists to expect and yield to merging bicycle traffic.
- Signifies the designated place for motorists to merge across the bike lane into the turn lane.

Typical Application (NACTO, 2011)

- Streets with right-side bike lanes and right-turn only lanes at intersections.
- Streets with left-side bike lanes and left-turn only lanes at intersections.
- Streets where the right or left travel lane terminates in a turn lane across a bike lane.
- Streets with bike lanes and a parking lane that transition into a turn lane at intersections.

Guidance and Concerns:

The through bike lane shall be placed to the left of the right-turn only lane. Dotted lines signifying the merge area shall begin a minimum of 50 feet before the intersection. Dotted lines should begin 100 feet before the intersection if along a high speed/volume roadway. Dotted lane line transition areas to through bike lanes shall not be used on streets with double right turn lanes. Double right turn lanes are extremely difficult for bicyclists to negotiate. See MUTCD for further guidance.

D.1.8. Bike Box

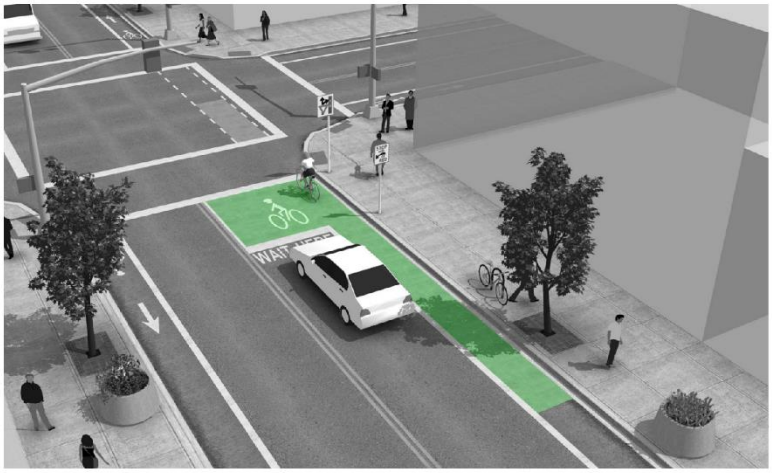

Image credit: NACTO

Description:

A designated area at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible way to get ahead of queuing traffic during the red signal phase.

Benefits (NACTO, 2011)

- Increases bicyclist visibility to other roadway users
- Full intersection bike boxes facilitate appropriate lane positions (e.g.: left turn) at intersections during red signal indications
- Facilitates transition from differently positioned bicycle facilities during red signal indication
- Helps prevent "right hook" conflicts with turning vehicles at the start of green signal indication
- Provides priority for bicycles at signalized crossings
- Groups cyclists together to clear intersections more quickly
- Cyclists breathe less exhaust while queued ahead of vehicles at signal
- Contributes to perception of safety and reduces vehicle encroachment into crosswalks

Typical Application (NACTO, 2011)

- At signalized intersections with high volumes of bicycles and/or motor vehicles, especially those with frequent bicyclist left-turns and/or motorist right-turns.
- Where there may be right or left-turning conflicts between bicyclists and motorists
- Where there is a desire to better accommodate left turning bicycle traffic
- Where a left turn is required to follow a designated bike route, access a shared-use path, or when the bicycle lane moves to the left side of the street

Guidance and Concerns:

A box formed by transverse lines shall be used to hold queuing bicyclists, typically 10-16 feet deep. A "no-right turn on red" sign must be used. Specific markings and signage are required; refer to NACTO, 2011 or MUTCD for guidance.

D.1.9. Two-Stage Turn Queue Boxes

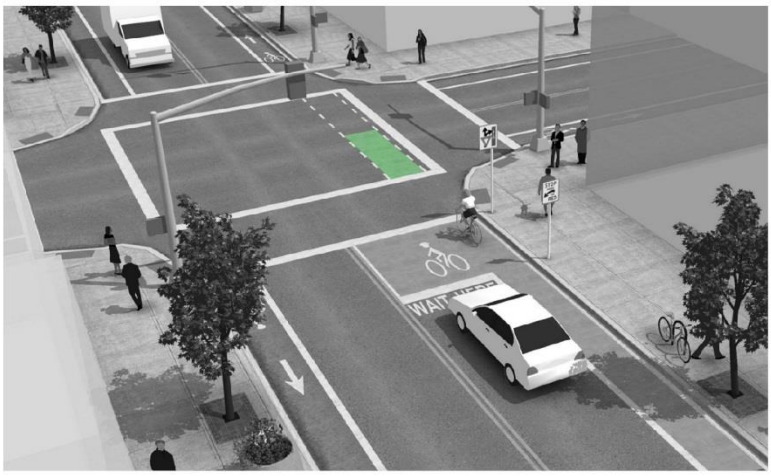

Image credit: NACTO

Description:

A type of bike box used to make left turns at multi-lane signalized intersections from a right side cycle track or bike lane, or right turns from a left side cycle track or bike lane. Two–Stage Turn Queue Boxes facilitate the cyclist"s movement from a bicycle facility to a visible position in traffic.

Benefits (NACTO, 2011)

- Improves bicyclist ability to safely and comfortably make left turns
- Provides a formal queuing space for bicyclists making a two-stage turn
- Reduces turning conflicts between bicyclists and motor vehicles
- Prevents conflicts arising from bicyclists queuing in a bike lane

Typical Application (NACTO, 2011)

- At signalized intersections
- Where a significant number of bicyclists turn left from a right side facility
- To assist bicyclists in navigating safely across streetcar tracks

Guidance and Concerns:

The queue box shall be placed in a protected area. Typically this is within an on-street parking lane, between the bicycle lane and the pedestrian crossing or in the protection of a cycle track curb. In cities that permit right turns on red signal indications, a “No Turn on Red” sign shall be installed overhead to prevent vehicles from entering the queuing area. Colored paving inside of the queuing area should be used to further define the bicycle space. See MUTCD for further guidance.

D.1.10. Median Refuge Islands

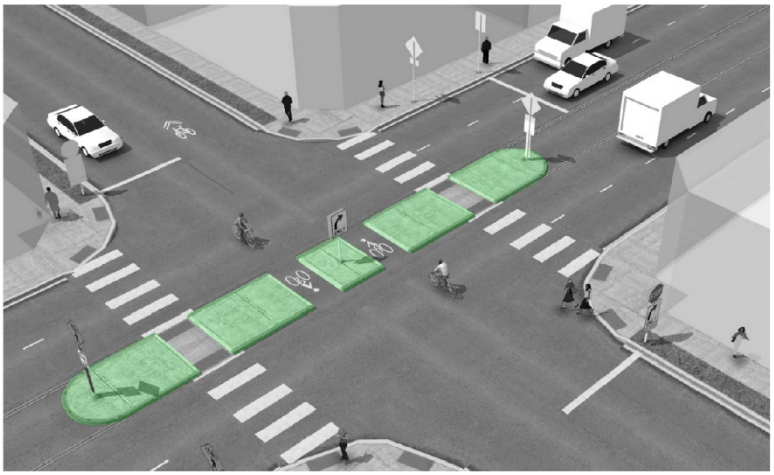

Image credit: NACTO

Description:

Median refuge islands are protected spaces placed in the center of the street to facilitate bicycle and pedestrian crossings. Crossings of two-way streets are facilitated by allowing bicyclists and pedestrians to navigate only one direction of traffic at a time.

Benefits (NACTO, 2011)

- Allows cyclists and pedestrians to more comfortably cross streets by waiting in a protected space for a gap in traffic.
- Reduces crossing length/exposure to traffic and decreases delay time to cross
- Narrows the roadway and restricts left-turn movement, contributing to traffic calming
- Establishes/reinforces bicycle priority on bicycle boulevards by restricting vehicle through-movement
- When used with a protected cycle track, raised medians that extend into the intersection can also provide a shelter for a bicyclist making a two-stage turn across traffic.or crosswalk

Typical Application (NACTO, 2011)

- Where a bikeway crosses a moderate to high volume or high speed street
- Along streets with high bicycle and pedestrian volumes
- Along streets with few safe places to wait to cross both directions of traffic
- At signalized or unsignalized intersections
- Where it is desirable to restrict vehicle through movements, a median can double as a diverter to prevent cut-through traffic on a bicycle route
- With protected cycle tracks

Guidance and Concerns:

The desirable width of the median refuge is 10 feet or greater. The absolute minimum width is 6 feet. When applied on a two-way street, the median refuge shall be placed along the centerline of the roadway between the opposing directions of travel. Pavement markings on the approach to the refuge island shall follow the guidance provided in Section 3I.02 of the MUTCD. The approach edge of the raised median shall be outlined in retroreflective white or yellow material. In areas with snow accumulation, reflective delineators shall be used to mark the island for increased visibility to snow plow crews.

D.1.11. Signal Detection and Actuation

Photo credit: NACTO

Description:

Signals that are actuated to alert the signal controller of bicycle crossing demand on a particular approach. Push signals, inpavement detection loops, video detection, etc.

Benefits (NACTO, 2011)

- Improves efficiency, convenience and safety for bicycle travel.
- Reduces delays for bicycle travel
- Discourages red light running by bicyclists without causing excessive delay to motorists.
- Can be used to prolong the green phase to provide adequate time for bicyclists to clear the intersection.

Typical Application (NACTO, 2011)

- In the travel lane on intersection approaches without bike lanes where actuation is required.
- Iintersections with bicycle signal heads and/or bicycle-specific phasing that are actuated.
- Bike lanes on intersection approaches that are actuated.
- Left turn lanes with actuated left-turn signals where bicyclists may also turn left.
- To increase the green signal phase on intersection approaches whose combined minimum green plus yellow plus all-red is insufficient for bicyclists to clear the intersection
- Clearly marked locations to designate where a bicyclist should wait.

Guidance and Concerns:

Standard detectors must be adjusted to ensure they detect bicyclists. Bicycle signal detection must be visible to cyclists, so that they know where to position themselves to activate the signal. Any push-button system must be located such that bicyclists can push the button without dismounting. Push button systems must have signs facing the bicyclists approach to increase device visibility. Refer to MUTCD for guidance on stencil marking and signage related to signal detection.

D.1.12. Shared Lane Marking / Signage

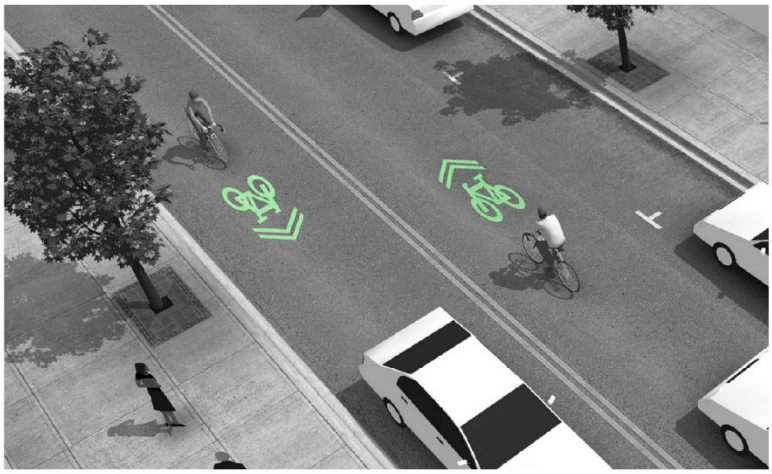

Image credit: NACTO

Description:

Shared Lane Markings (SLMs), or "Sharrows," are road markings used to indicate a shared lane environment for bicycles and automobiles. Sharrows reinforce proper bicyclist positioning on streets without bike lanes. The shared lane marking is not a facility type but a pavement marking with a variety of uses to support a complete bikeway network.

Benefits (NACTO, 2011)

- Helps bicyclists position themselves in the center of a vehicle travel lanes
- Alerts motor vehicle drivers to the likely presence of bicyclists.
- Alerts road users of the lateral position bicyclists are likely to
- occupy within the street.
- Provides a way-finding element along bike routes.
- Increases the distance between bicyclists and parked cars, keeping bicyclists out of the "door zone".
- Requires no additional street space.

Typical Application (NACTO, 2011)

- To indicate a shared lane situation where the speed differential between bicyclist and motorist travel speeds is very low
- As an alternative to a bike lane when vehicle speeds and volumes are very low
- To clarify bicyclist positioning on roads with no bike lane

Guidance and Concerns:

The shared lane marking in use within the United States is the bike-and-chevron "Sharrow," illustrated in MUTCD figure 9C-9 below. Shared lane markings shall not be used on shoulders, in designated bicycle lanes, or to designate bicycle detection at signalized intersections. Shared lane markings should be placed in the center of vehicle travel lanes too narrow to accommodate cyclists and vehicles in the same lane. The MUTCD outlines guidance for shared lane markings in section 9C.07. Additional educational information is vital to proper implementation for shared lane markings as many auto users are unfamiliar with this usage.

D.1.13. Colored Bike Facilities

Photo credit: Bike Arlington

Description:

Colored pavement within a bike lane. Commonly applied at intersections, along non-standard or enhanced facilities (cycle tracks), driveways, and other conflict areas such as places where illegal parking maybe common.

Benefits (NACTO, 2011)

- Increases the visibility of bicyclists and discourages illegal parking in the bike lane.
- Helps raise awareness in conflict areas to help reduce conflicts between cyclists and turning motorists.
- Increases cyclist comfort with delineated space.
- Improves motorist yielding behavior.

Typical Application (NACTO, 2011)

- Across conflicts zones within bike lanes or cycle tracks
- Across intersections, particularly through wide or complex intersections where the bicycle path may be unclear.
- Across driveways and other curb-cuts
- Where vehicle movements frequently encroach into bicycle space (illegal parking, etc.)
- Where prevailing speed of turning traffic at conflict point is low enough that motorist yielding behavior can be expected.
- Color may be applied along an entire corridor, with gaps in coloring to denote crossing areas.

Guidance and Concerns:

The color green shall be used to minimize confusion with other standard traffic control markings. Facility designers should match coloring strategy to desired design outcomes of projects. Normal white markings must also be used. Color may be applied in a dashed pattern to indicate merge areas. Refer to NACTO, 2011, or City and County of San Francisco (2010) “Evaluation of Solid and Dashed Green Pavement for Bicycle Lanes.” May not be applicable for crossings in which bicycles are expected to yield right of way, such as when the street with the bicycle route has Stop or Yield control at an intersection.

D.1.14. Wayfinding Signage

Hagerstown Photo credit: Michael Baker International

Description:

A wayfinding system that consists of comprehensive signing and/or pavement markings to guide cyclists to their destinations along preferred bike routes.

Benefits (NACTO, 2011)

- Familiarizes users with the bicycle network and identifies the best routes for destinations
- Overcomes a "barrier to entry" for infrequent bicyclists.
- Signage that includes mileage and travel time to destinations may help minimize the tendency to overestimate the amount of time it takes to travel by bicycle.
- Visually indicates to motorists that they are driving along a bicycle route and should expect cyclists.
- Passively markets the bicycle network by providing unique and consistent imagery throughout the jurisdiction.

Typical Application (NACTO, 2011)

- Along all streets and/or bicycle facility types that are part of the bicycle network.
- Along corridors with circuitous bikeway facility routes to guide bicyclists to intended destination.

Guidance and Concerns:

Follow MUTCD standards, including mounting height and lateral placement from edge of pavement. Comprehensive inventory of signage location and age should be kept for maintenance and future expansion of routes. Wayfinding signage requires additional planning steps prior to implementation to create a consistent and functional network.

Appendix E: Additional Funding Opportunities

In addition to the Maryland Bikeways Program, the city can explore other funding programs and strategies to help transform Hagerstown into a more bike-friendly community. Table E1 and Table E2 (below) indicate potential eligibility for different types of bicycle and pedestrian projects under various Federal and State programs. The funding programs, all of which typically require local matches, are listed after Table E3.

TABLE E1: BICYCLE FUNDING OPPORTUNITIES

Activity	TIGER	FTA	ATI	CMAQ	HSIP	NHPP	STP	TAP	RTP	SRTS	MDOT
Bicycle lanes on road	$	$	$	$	$	$	$	$		$	$
Bridges for bicyclists and/or pedestrians	$	$	$	$*	$	$	$	$	$	$	$
Curb cuts and ramps	$	$	$	$*	$	$	$	$	$	$	$
Paved shoulders for bicyclist use	$			$*	$	$	$	$		$	
Recreational trails	$*						$	$	$		$
Separated bicycle lanes	$	$	$	$	$	$	$	$		$	$
Shared use paths	$	$	$	$*	$	$	$	$	$	$	$
Sidewalks (new or retrofit)	$	$	$	$	$	$	$	$	$	$	
Stormwater impacts related to pedestrian and bike projects	$	$	$		$	$	$	$	$	$	
Traffic calming	$	$			$	$	$	$		$	
Trail bridges	$			$*	$	$	$	$	$	$	
Trail/highway intersections	$			$*	$	$	$	$	$	$	
Tunnels / undercrossings for bicyclists	$	$	$	$*	$	$	$	$	$	$	$

KEY: *$ - Funds may be used for this activity. Local match required (except for MDOT Priority Minor Retrofit projects).*

$ - Eligible, but not competitive unless part of a larger project.*

For more information, visit: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/

TABLE E2: BICYCLE FUNDING OPPORTUNITIES

Activity	TIGER	FTA	ATI	CMAQ	HSIP	NHPP	STP	TAP	RTP	SRTS	MDOT
Bicycle parking	$*	$	$	$		$	$	$	$	$	$
Bike racks on transit	$	$	$	$			$	$			
Bike share (capital and equipment; not operations)	$	$	$	$		$	$	$			
Bicycle storage or service centers	$*	$	$	$			$	$			
Crosswalks (new or retrofit)	$	$	$	$*	$	$	$	$	$	$	
Historic preservation (bike facilities)	$	$	$				$	$			
Landscaping, streetscaping (bicycle route)	$*	$	$				$	$			
Lighting	$	$	$		$	$	$	$	$	$	
Signs / signals / signal improvements	$	$	$	$	$	$	$	$		$	$
Signed bicycle routes	$	$	$	$		$	$	$		$	$
Spot improvement programs	$	$			$		$	$	$	$	$

KEY: $ *- Funds may be used for this activity. Local match required (except for MDOT Priority Minor Retrofit projects).*

$* *- Eligible, but not competitive unless part of a larger project.*

For more information, visit: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/

TABLE E3: BICYCLE FUNDING OPPORTUNITIES

Activity	TIGER	FTA	ATI	CMAQ	HSIP	NHPP	STP	TAP	RTP	SRTS	PLAN	402
Bicycle plans	$plan	$					$	$			$	
Coord. positions (State or local)				$ Limit 1 per state			$	$ as SRTS		$		
Counting equipment	$plan	$	$		$	$	$	$	$	$	$	
Data collection & monitoring for bicyclists and/or pedestrians	$plan	$	$		$	$	$	$	$	$	$	
Helmet promotion (for bicyclists)							$	$ as SRTS		$		$
Maps (for bicyclists and/or pedestrians)		$	$	$			$	$		$	$*	
Police patrols							$ as SRTS	$ as SRTS		$		$
Safety brochures/books							$ as SRTS	$ as SRTS		$	$*	$
Safety educ. positions							$ as SRTS	$ as SRTS		$		$
Training				$			$	$	$	$	$*	$

KEY: *$ - Funds may be used for this activity. $plan = Eligible for TIGER planning funds.*

$ - Eligible, but not competitive unless part of a larger project.*

$ as SRTS - Activities marked "as SRTS" means the activity is eligible only as an SRTS project benefiting schools for kindergarten through 8th grade.

For more information, visit: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/

Funding Programs Key:

ADA/504: Americans with Disabilities Act of 1990 / Section 504 of the Rehabilitation Act of 1973	**STP**: Surface Transportation Program
TIGER: Transportation Investment Generating Economic Recovery Discretionary Grant program	**TAP/TE**: Transportation Alternatives Program / Transportation Enhancement
FTA: Federal Transit Administration Capital Funds	**RTP**: Recreational Trails Program
ATI: Associated Transit Improvement (1% set-aside of FTA)	**SRTS**: Safe Routes to School Program (until expended)
CMAQ: Congestion Mitigation and Air Quality Improvement Program	**PLAN**: Statewide or Metropolitan Planning
HSIP: Highway Safety Improvement Program	**402**: State & Community Hwy. Safety Grant Program
NHPP/NHS: National Highway Performance Program/National Highway System	**MDOT**: Maryland Department of Transportation (Maryland Bikeways Program)

There are also several nontraditional funding sources, for which bicycle improvements may be eligible. These examples, highlighted below, pertain to advocacy, safety, historic preservation, and community development.

Additional Funding Sources:	
Advocacy Advance	Advocacy Support
Goal: To provide support local advocacy efforts through "Rapid Response Grants", "Big Idea Grants" and scholarships. **Requirements:** "Rapid Response Grants" do not fund organizations whose primary purpose is not advocacy, general or ongoing organizational support, events, rides or education activities, campaigns for political candidates, long-term campaigns or campaigns not directed at winning public funds for biking and walking projects. "Big Idea Grants" go to organizations pushing forward on some of the most important areas of bicycling/walking advocacy: equity; safety / Vision Zero; health / walking; and innovative local or state funding campaigns and are intended to help with unforeseen opportunities, short-term campaigns or to push campaigns into the end zone to win funding for biking and walking infrastructure and programs. **Contact:** http://www.advocacyadvance.org/grants	
Bicycle Retrofit (SHA Fund 88):	Bicycle Improvements on State Roadways
Goal: Improve conditions for bicyclists along state roadways. **Requirements:** Local jurisdiction must public input opportunity and must help secure right-of-way, easements. In cases of off-road improvements, such as a parallel or shared-use path, the local jurisdiction must agree to maintain improvements after completion. The parallel/shared-use path must be within 100 feet of a SHA roadway. If a shared-use path requested by a local jurisdiction is within a Priority Funding Area, the cost to construct shall be shared between the state (75%) and local government (25%). If SHA determines that a substantial public safety risk/significant impediment to pedestrian access exists and the adjacent roadway is not under concurrent construction or reconstruction, SHA may opt to fund 100% of the construction. If a shared-use path requested by a local jurisdiction is not within a Priority Funding Area, construction cost shall be shared between the state (50%) and local government (50%). **Contact:** Luis Gonzalez, SHA Innovative Contracting, 410-545-8826, lgonzalez@sha.state.md.us	
Community Legacy Program (DHCD):	Business Retention/Commercial Revitalization
Goal: To provide local governments and community development organizations with funding for essential projects aimed at strengthening communities through activities such as business retention and attraction, encouraging homeownership and commercial revitalization. **Requirements:** Projects must be located within an approved Sustainable Community to be eligible for funding. Bicycle and pedestrian opportunities include streetscape improvements and as part of mixed-use developments. **Contact:** Kevin Baynes, DHCD Community Programs, 410-209-5823, baynes@mdhousing.org	

Maryland Heritage Areas Financial Assistance Programs (MHT):	Historic Preservation
	Goal: To support for a wide variety of historic preservation-related activities. Bicycle and pedestrian opportunities involve inclusion in heritage tourism development and educational programs. **Requirements:** Designated Maryland Heritage Areas are eligible for various tax credits, grants, and loans. **Contact:** Richard Hughes, Heritage Areas Program Administrator, 410-514-7685, richard.hughes@maryland.gov
Maryland Highway Safety Office Grant (MVA):	Safety/Crash Reduction
	Goal: Aims to use data-driven approaches to reduce the number of motor vehicle-related crashes, deaths, and injuries on Maryland highways with a specific focus on pedestrian safety. **Requirements:** Projects must: develop processes to identify and prioritize high-incident locations and system-wide pedestrian safety issues; Develop and evaluate model approaches to engineering built environments that accommodate safe pedestrian travel; Develop and evaluate model approaches to improving pedestrian and motorist awareness and behavior, including education and enforcement efforts; Create partnerships among state, regional, and local stakeholders to develop action plans that address high-priority locations and system wide issues using comprehensive approaches to pedestrian safety. **Contact:** http://mhso.mva.maryland.gov/SafetyPrograms/program_regional_traffic_program.htm
The National Center for Safe Routes to School	Safe Routes to School
	Goal: To identify ways for communities to solicit non-government funding for Safe Routes to School activities. **Contact:** http://www.saferoutesinfo.org/funding-portal/private-funding
The PeopleForBikes Community Grant Program:	Bicycle Projects
	Goal: To provide funding for important and influential projects that leverage federal funding and build momentum for bicycling in communities across the U.S. **Requirements:** Projects can include bike paths and rail trails, as well as mountain bike trails, bike parks, BMX facilities, and large-scale bicycle advocacy initiatives. **Contact:** http://www.peopleforbikes.org/pages/community-grants
The Robert Wood Johnson Foundation:	Public Health
	Goal: Working to improve the health of all Americans. **Requirements:** The Robert Wood Johnson Foundation invests in grantees (e.g., public agencies, universities, and public charities) working to improve the health of all Americans. Current or past projects in the topic area "walking and biking" include greenway plans, trail projects, advocacy initiatives, and policy development. **Contact:** http://www.rwjf.org/