Harrisonburg & Rockingham Metropolitan Planning Organization Bicycle and Pedestrian Plan

Adopted on November 17, 2016

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Introduction

Across the country rates of bicycling and walking have increased, creating greater demand for bicycle and pedestrian facilities and the Harrisonburg-Rockingham region is experiencing this increase firsthand from both visitors to the region as well as increased ridership among local residents. The Harrisonburg-Rockingham Metropolitan Planning Organization (HRMPO) Bicycle and Pedestrian Plan, proposes a course of action to improve the non-motorized transportation network, offering residents and visitors safer, more comfortable, and more convenient options for walking and bicycling to key destinations throughout the region for recreation and for transportation.

The region benefits in multiple ways from having a well-connected and accessible bicycle and pedestrian network, encouraging more people to walk or bike for transportation or for recreation. These include but are not limited to the following:

- Safety benefits for school students, commuters, and other non-drivers;
- Health and environmental benefits;
- Improved livability, especially regarding mobility impaired residents;
- Increased tourism; and
- Economic benefits.

Public Involvement

Public input was crucial to the development of the HRMPO Bicycle and Pedestrian Plan. Throughout the planning process the study team sought out the input of Rockingham County residents to help determine existing conditions, identify needs, and propose solutions to improve the walking and bicycling environment.

Primarily, the study team solicited the input of local stakeholders. These stakeholders include the HRMPO Bicycle and Pedestrian Plan Subcommittee (BPC), the Rockingham Bicycle Advisory Committee (RBAC) the Harrisonburg Bicycle and Pedestrian Subcommittee, and the Harrisonburg & Rockingham Bike-Walk Summit Committee, all of whom remained actively involved throughout the development of this plan.

The study team developed two tools to gather input from the general public. These tools were 1) an online survey; and 2) an online mapping tool, called Wikimap.

Online Survey/Wikimap

Early in the development of this plan, the study team developed an online survey to capture public attitudes and opinions on walking and biking in the Harrisonburg-Rockingham region. The survey asked respondents to

describe their bicycling and walking habits and to identify any barriers that may prevent them from walking or biking more. This process provided valuable information on several metric including the level of demand for walking and bicycling facilities, what type of person would use such facilities, and where such facilities would be most impactful.

Once the initial Online Survey was completed, an online interactive mapping tool, called a Wikimap, was deployed by the study team to collect additional public comments. The Wikimap tool allowed users to draw lines, identify points and post comments and suggestions directly onto a map of the Harrisonburg-Rockingham County area. Points identified specific locations on walking or bicycling routes were spot improvements may be needed. Lines denoted routes that people like to bike or walk that need improvements. Comments and suggestions were collected using the Wikimaps tool through a text box attached to each point or line. A "like" button was also included with comment text boxes so other users could indicate their agreement with specific posted comments. The tool was heavily promoted and resulted in 155 unique users submitting over 400 comments.

The majority of comments focused on three major corridors: Spotswood Trail (US 33), from the Harrisonburg city line to Resort Drive; John Wayland Highway (SR 42), from the Harrisonburg city line to the Bridgewater town line; and Mount Clinton Pike (SR 763) from the Harrisonburg city line to Singers Glen Road (SR 763). These areas correspond to the Priority Focus Areas discussed in Chapter 6. Other comments identified rural roads as primarily recreational routes with lower traffic volumes; however, high vehicle speeds and the narrow and winding character of these roads make them uncomfortable for both drivers and bicyclists. In addition to the comments on roads, the map results show a significant amount of interest in shared-use path opportunities for connecting destinations throughout the region. These comments suggest an unmet desire for off-road facilities that provide both longer distance connections between municipalities, as well as shorter connections between local destinations.

Public Meeting

Once the public comment period was concluded and the study team had incorporated the comments and recommendations into the maps, the study team hosted a Stakeholders Workshop. The workshop consisted of a formal presentation by the study team which was followed by an open house. The open house was set up to provide attendees the opportunity to review the online survey results; and see comments and improvement recommendations that were made on the Wikimap. Several stations were set up so attendees had the opportunity to review several Wikimaps, with each map focusing on different portions of the region. These maps showed the initial recommendations for facility improvements. Attendees were provided the opportunity to vote for the corridor(s) they considered the most important to target for bicycle and pedestrian improvements.

Vision, Goals, Objectives, and Strategies

The following vision for the HRMPO Bicycle and Pedestrian Plan was developed collaboratively by the BPC and guided the formation of this plan.

"The Harrisonburg-Rockingham region will be a place where pedestrians and bicyclists can safely and conveniently reach key destinations for work, play, and everything in between."

To achieve this vision, the BPC adopted the five "E"'s strategies, focusing on Engineering, Education, Encouragement, Enforcement, and Evaluation to institute a successful bicycle and pedestrian program. This plan supports each "E" with a corresponding Goal which describes in broad terms what the HRMPO wants to achieve through the bicycle and pedestrian program. Goals are realistic and achievable in the long-term, but abstract and programmatic in scope. Following are the five Goals relate to each "E":

- **Engineering:** Implement and maintain a non-motorized transportation network for users of all comfort levels through collaboration with VDOT, member jurisdictions, and the private sector.
- **Education:** Promote bicycle and pedestrian safety education through the implementation of programs for bicyclists, pedestrians, and motorists, by coordinating with member jurisdictions and their appropriate departments and committees, schools, advocacy groups, and other organizations.
- **Encouragement:** Foster a walking and bicycling culture through programs and events that encourage business, schools, families, and individuals to increase the number of trips they make on foot or by bike, and to continue promoting the region as a prime destination for pedestrian and bicycle tourism.
- **Enforcement:** Improve traffic safety for all modes through collaboration with the public, VDOT, law enforcement agencies, public safety providers, local government, and appropriate non-governmental organizations.
- **Evaluation:** Sustain the momentum of this plan and evaluate progress toward these goals.

The HRMPO also developed objectives which define specific milestones necessary to reach a goal. Objectives are concrete and measurable and provide a path toward achieving the stated Goals. Following each Objective is a menu of Strategies that can be employed to help meet the Objective. These Objectives and Strategies can be found in **Chapter 3** along with additional details related to the Goals.

Existing Conditions

It is important to note that the region already has many existing bicycle and pedestrian facilities in place. Most of the City's urban core and areas near JMU have a sidewalk network; and a concerted effort has been made in recent years to advance the development of the City's bicycle and pedestrian network. However, many corridors within Harrisonburg and connecting with adjacent localities lack adequate bicycle and pedestrian accommodations. The Towns of Bridgewater, Dayton, and Mt. Crawford have small areas of sidewalk coverage and a minimal bicycle infrastructure. Also, bicycle and pedestrian facilities are extremely limited within the County.

Existing conditions were also evaluated through review of data collected through the National Bicycle and Pedestrian Documentation Program which the City and County have participated in since 2012. Data on crashes were also been collected to identify trends or problem areas related to bicycle and pedestrian crashes.

Facility Toolkit

A variety of options based on national best practices exist to improve the region's bicycle and pedestrian network. The study team used this toolkit to develop the recommendations for facility improvements in this Plan. The design of these facilities should be implemented in accordance with local codes and design standards.

Bicycle Facilities

- **Shared-use Path -** Shared-use paths, also referred to as a multi-use trail or a greenway (when incorporated into a linear park or open space), is a path serving both bicyclists and pedestrians, separated from the road and not open to motor vehicle traffic. Shared-use paths have the greatest potential to increase the number of pedestrian and bicycle trips in a community.
- **Bicycle Lanes -** A bicycle lane designates a four to five foot on-road travel lane for bicyclists with signage, pavement-striping, and symbols.
- **Sharrows -** Where bicycle lanes are desirable but not possible due to physical constraints, shared lane markings, also known as sharrows, may be used.
- **Climbing Lane -** Climbing lanes are implemented by having a bicycle lane for a steep uphill direction and a shared lane marking on the downhill direction to allow bicyclists safe clearance as their speeds slow going uphill.
- **Intersections and Signals -** Intersections can present problems for bicyclists which can be improved upon bicycle sensitive signal detection, pedestrian crossing signals, correct placement of

bicycle lanes related to turning lanes, bike boxes, and markings to define bicyclists space through intersections.

- **Paved Striped Shoulder (Widened Shoulder) -** Rural roads with little or no shoulder may use a paved striped shoulder to provide a designated area for bicyclists to travel.
- **Bicycle/Buggy Lane -** In rural areas of the region with high concentrations of Old Order Mennonites, eight- to ten-foot paved lanes on the outer edge of roadways that allow use by buggies as well as bicycles may be recommended.

Pedestrian Facilities

Pedestrian facilities are an essential component of the transportation system and must be considered in every transportation design decision. Pedestrian facilities directly improve the quality of the transportation system by attracting pedestrians and increasing safety. Pedestrian facilities primarily include sidewalks and shared-use paths and also must consider crosswalks and pedestrian signals at intersections and other pedestrian amenities.

As a general rule, sidewalks should be installed on both sides of every street where people live, work, go to school, or may desire to walk to other key pedestrian attractions; however, they are not considered as necessary in more rural areas with sparser density unless they are located within developed neighborhoods.

Funding Opportunities

All of the recommended improvements to the region's bicycle and pedestrian network will require funding. Some specific sources of funding are:

- **Building Bicycle/Pedestrian Accommodations into Other Projects –** The most cost-effective way to build bicycle and pedestrian infrastructure is to adopt a policy of including bicycle and pedestrian accommodations into other roadway improvement and development projects.
- **Locality Capital Improvement Programs –**These locality financial planning tools identify projects as funding priorities such as those that include bicycle and pedestrian facilities.
- **Revenue Sharing –** This state-funded program allows the City, County, and Towns to apply for state revenue for specific projects with the locality providing 50% of the project costs and the state providing the remainder.
- **Transportation Alternatives Program (TAP) –**The Federal TAP grant program can be used to fund a wide variety of projects focused on improvements to the bicycle and pedestrian network.

- **Highway Safety Improvement Program (HSIP) –** The Federal HSIP program emphasizes a data-driven strategic approach to addressing a highway safety problem, including those involving bicyclist or pedestrian movements.

- **Private Funding –** Local stakeholders and nonprofit groups such as local bicycling clubs, community health advocates, downtown redevelopment groups, major local employers, and local universities can play a key role in securing money to pay for bicycle and pedestrian network improvements.

- **Land and Water Conservation Funds** – The Land and Water Conservation Fund Act of 1965 established a federal reimbursement program for the acquisition and/or development of public outdoor recreation areas including trails.

- **Recreation Trails Program –** The Recreational Trails Program (RTP) is a matching reimbursement grant program for the building and rehabilitation of trails and trail related facilities. Funding may be awarded to a city, county, town or other government entity or registered nonprofit groups partnering with a governmental body.

- **Smart Scale (HB2) District Grant/High Priority Projects Grants –** The Smart Scale Grant program provides funding for projects that incorporate bicycle and pedestrian facilities as well as those that construct these facilities as stand-alone projects.

Evaluation and Prioritization

A fully developed bicycle network provides connections between destinations that are safe and comfortable for bicyclists' with a wide range of abilities. The pedestrian network, on the other hand, focuses on small areas of high demand that benefit most from improved pedestrian infrastructure. The recommended facilities and the prioritization of those recommendations in this Plan helps the HRMPO achieve both of these goals.

The development of the recommendations and priorities for this Plan began with a qualitative approach to define the study network and ended with a quantitative approach to refine the recommendations and priorities. Following is an overview of the process used to arrive at the list of prioritized recommendations:

Development of a Study Network

To design these networks, the study team initially identified a list of recommendations for facility improvements. Using existing and programmed bicycle and pedestrian infrastructure as well as planned and proposed projects, the study team identified routes for recommendations. This data was supplemented with

recommended routes provided by local and regional websites and input gathered from the public involvement phases of this planning process. This provided a set of routes where previous studies had identified needs: connections between existing infrastructures and facilities where bicyclists or pedestrians were currently riding or walking.

Input from the RBAC helped identify areas most likely to generate or attract pedestrian or bicycle trips. The study team also conducted a field review of the major corridors to capture basic information such as width, character, speed limits, traffic levels, and other details that might impact recommendations.

The BPC also provided a set of corridors and routes that provided connections to recreation, population, and employment centers; had high levels of vehicular, bicycle, and pedestrian traffic. This provided a set of routes where previous studies had identified needs, where connections between existing infrastructure was needed, and where bicyclists or pedestrians were currently riding or walking. From this information the study team developed and mapped a study network for review which became the basis for the next phase of evaluation, the identification of specific routes for improvement. **Map 2** in **Chapter 6** displays the Study Network.

Identification of Routes

In order to identify the specific routes for improvements or new facilities, the study team used a demand analysis Heat Map. Using attractors and generators of pedestrian or bicycle activity identified by the BPC, staff, and the public, the study team created a "weighted" Heat Map. By overlaying the Study Network onto the "weighted" Heat Map, routes that provide connections both between and within "hot" areas were identified. Then the study team assessed each route for needed infrastructure improvements. This analysis identified routes that both provide connections within and between the regional "hot" areas and also are in need of some type of improvement. These routes were then moved on to the next phase, in which the specific infrastructure improvement recommendation was selected. **Map 3** in **Chapter 6** displays the Identified Routes visually.

Proposed Facilities

The detailed factors of the Identified Routes were then examined to determine the appropriate facility to provide the desired safety and service for the bicycle or pedestrian user. The study team based all recommendations for facility improvements on the safety of the roadway, the constraints to development, and consistency with existing facilities. The study team reviewed all of this information in light of the improvement types discussed in the facility toolkit and assigned a recommended improvement type to each of the proposed facilities. Other criteria that were considered during designation of improvement type include traffic signals and stops, current bicycle and pedestrian use, and aesthetic considerations.

Project Prioritization

Project prioritization was accomplished using a quantifiable scoring process. This process resulted in the development of a ranked list of facilities/projects. To develop the ranked project list, the project team used four general evaluation factors: 1) Proximity, 2) Connectivity, 3) Safety, and 4) Feasibility; once evaluated, the project team scored the projects and assigned them to one of three project priority levels: 1st Priority, 2nd Priority, or Vision.

Recommendations

A prioritized list of facility improvements was developed that recognizes the complexity of building a network from the ground up. The facility improvements were assigned to one of three categories: First Priority Projects, Second Priority Projects, and Vision Projects. A total of 72 individual projects were identified. 24 projects have been termed 1st Priority, 23 projects have been termed 2nd Priority, and 25 projects have been termed Vision. In **Chapter 6**, **Table 7** lists the prioritized facilities; these facilities are displayed on **Map 3**.

Pedestrian Improvements

Sidewalks are generally recommended for all minor collectors and local/neighborhood streets in the developed areas of the region but not for more rural roads where the surrounding land use is principally agricultural or low-density residential. The greatest priority should be given to sidewalks that would connect a neighborhood with key pedestrian corridors, such as existing or proposed shared use paths; and sidewalks that would connect existing neighborhoods with nearby schools.

The Identified Routes were assessed for the need to add sidewalks and the following recommendations are the result:

- **R-60A: Rawley Pike (US 33) from Garber's Church Road to Belmont Drive**
- **R-59B: Erickson Ave from Flint Avenue to Garber's Church Road**
- **H-18: South Main Street (US 11) from Stone Spring Road to Pleasant Valley Road**
- **R-44: Shen Lake Drive from Port Republic Road to Massanetta Springs Road**
- **R-47B: Reservoir Street from Harrisonburg City Limit to Stone Springs Road**

Priority Focus Areas

Based on the prioritization process, current efforts underway, and input from the BPC, a number of corridors and/or projects stand out as focus areas for the near term. Following is a brief description of the potential improvements to address these Priority Focus Areas. All potential alignments that would rely on easements or fee-simple purchases of private lands are entirely conceptual and should be pursued only if and when the property owner is willing:

- **Connections from communities west of Harrisonburg to major corridors within the City**
- **Connections along or adjacent to the US 33 Corridor from downtown Harrisonburg to the HRMPO boundary**
- **Development of the Cooks Creek and Blacks Run Greenway Trails from the Belmont neighborhood through Dayton and Bridgewater and along Blacks Run to connect to the Bluestone Trail**
- **Connections along US 11 north of downtown Harrisonburg to the Research Park**

System-Wide Recommendations

General recommendations in addition to the specific facility treatments involve design and programming guidelines that can assist the County with implementing the overall network. These include marked crosswalks, pedestrian signals, traffic signal detection, curb-cuts and ADA compliance reviews, and bicycle parking and end of trip facilities.

I. Introduction

A. Purpose of the Plan

Throughout the past two decades, rates of bicycling and walking have increased across the country, creating greater demand for bicycle and pedestrian facilities. In response, communities have begun implementing new programs to improve their non-motorized transportation networks.

The Harrisonburg-Rockingham Metropolitan Planning Organization (HRMPO) - which encompasses the City of Harrisonburg, the urbanized areas of Rockingham County near Harrisonburg, and the Towns of Dayton, Bridgewater, and Mt. Crawford – have also seen increased demand for an improved pedestrian and bicycling transportation environment. The purpose of the HRMPO Bicycle & Pedestrian Plan is to develop a course of action to enhance the HRMPO transportation network which can offer residents and visitors safer, more comfortable, and convenient options for walking and bicycling to key destinations throughout the region for recreation and transportation trips. This plan is intended to build on some of the successes and improvements that have already been implemented in the region, as evidenced by the many accolades the region has received which include:

- Harrisonburg's recognition as a Bronze-level Bicycle Friendly Community by the League of American Bicyclists (LAB).
- Rockingham's recognition with a 2013 Honorable Mention by the League of American Bicyclist's Bicycle Friendly Community Program.
- The Harrisonburg-Rockingham region's recognition as a bronze-level Ride Center by the International Mountain Bicycling Association (IMBA).
- "Top Ten Cycling Destinations," (Harrisonburg) Virginia Living magazine, June 2013
- "Best Biking Community," (Harrisonburg) Blue Ridge Outdoors magazine, December 2012
- "Top Mountain Biking Mecca," (Harrisonburg) Blue Ridge Outdoors magazine, November 2012
- Appalachian Trail Community- Harrisonburg, May 2011

With natural amenities such as the Shenandoah National Park and a plethora of scenic roads surrounding a mid-size city and large university, the Harrisonburg-Rockingham region is becoming a bicyclist and hiker destination

that attracts and retains a vibrant and strong 21st century workforce. The region intends to capitalize on these achievements by improving the non-motorized transportation network for even greater success.

The overall purpose of this plan is to provide information to the HRMPO related to the bicycle and pedestrian program. Member jurisdictions may also use the information presented in this plan to inform their own planning processes or programs. Recommendations are intended to inform the HRMPO or its member jurisdictions. If any recommendations in this plan conflict with those of a particular jurisdiction the jurisdiction's recommendation should take precedence over the HRMPO Plan's recommendation.

B. Benefits to Investing in the Pedestrian and Bicyclist Network

There are many benefits to the HRMPO region that result from having a well-connected and accessible bicycle and pedestrian network that encourages more people to walk or bike for transportation or recreation. These include:

Safety

When networks are improved for the safety of bicyclists and pedestrians, all users benefit, including motorists. Strategies that calm traffic and improve visibility reduce crashes and potential conflicts between modes.

Commuting

Typically, walking is considered a viable mode of transportation within ½ mile of a destination; bicycling is considered a viable mode within two miles of a destination[1]. There are numerous residents within the HRMPO region who live within bicycling or walking distance of employment centers and other key destinations; however, under current conditions, many would find it difficult to walk or bike because of the lack of suitable accommodations. While some people will always drive, improving the pedestrian and bicycling network would offer more choices and could increase the number of people using these non-motorized modes of transportation for their commute, thereby decreasing the number of vehicles on the road.

Tourism

The HRMPO region is earning a reputation as a bicycle tourist destination in addition to the other attractions in the region, such as the draw of agri-tourism and Shenandoah National Park. With a network of scenic roads for on-road cycling providing dramatic views of the surrounding mountains; a growing network of mountain biking trails at Massanutten Resort, George Washington National Forest, and other parks for off-road bicycling; and

[1] Earl G. Brossard, *Envisioning Neighborhoods with Transit-Oriented Development Potential,* (San Jose, CA: Mineta Transportation Institute

over fifteen signature annual bicycling events in the Harrisonburg-Rockingham region, there is much to offer. Major population centers including Washington D.C. provide an endless pool of potential visitors looking to get out of major cities easily. By improving the pedestrian and bicyclist network and identifying ways to promote tourism, the region could attract even more visitors with the option to travel between the surrounding rural areas and the more urban areas at the core of the region.

Economic benefits

A comprehensive pedestrian and bicycling network can contribute to economic growth in the HRMPO region and can bring monetary benefits to its citizens. First, investments in pedestrian and bicycling infrastructure can help citizens and the region save money. Walking and bicycling cost significantly less to the user than motorized modes[2]; the average annual cost of automobile ownership is $8,220 while annual bicycle ownership costs $308 per year[3]. Moreover, the costs associated with bicycle and pedestrian infrastructure construction and maintenance are generally less than the costs associated with constructing and maintaining automobile infrastructure.

Secondly, residents who regularly use active transportation modes are in better health, resulting in significant health care cost savings, particularly for obesity- and heart-related diseases[4]. If one in ten adult Virginians started a walking program, obesity healthcare cost savings could be as much as $85 million per year[5].

Third, a well-connected pedestrian and bicycling network contributes to building adjacent walkable and bikeable neighborhoods which, in turn, can lead to increases in property value. Homes with above average levels of walkability command a $4,000-$34,000 increased property value premium over houses with just average levels of walkability in the typical metropolitan area[6]. One study in Delaware showed that properties within 164 feet of a bike path increased in value by at least $8,800[7]. These increases in property value stem in part from the improved access to an enhanced pedestrian and bicycle network.

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[2] Todd Litman, *Evaluating Active Transport Benefits and Cost: Guide to Valuing Walking and Cycling Improvements and Encouragement Programs,* (Victoria BC: Victoria Transport Policy Institute, 2013).
[3] The League of American Bicyclists, and the Sierra Club, *The New Majority: Pedaling Towards Equity,* (Washington, DC: League of American Wheelmen, May 2013).
[4] Alliance for Biking and Walking, *Bicycling and Walking in the United States: Benchmarking Report,* (Washington, DC: Alliance for Biking & Walking, 2012).
[5] Ibid.
[6] Joe Cortright, *Walking the Walk: How Walkability Raises Home Values in US Cities,* (Washington, DC: CEOs for Cities, August 2009).
[7] David Racca and Amardeep Dhanju, *Property Value/Desirability Effects of Bike Paths Adjacent to Residential Areas,* (Newark, DE: Delaware Center for Transportation, 2006).

Fourth, an interconnected pedestrian and bicycling network promotes the local economy. A user-survey of West Virginia's Greenbrier River Trail, a 78-mile rail trail operated by West Virginia State Park system, showed that nearly 40% of out-of-state visitors would spend more than $500 during their trip to the area. Retail stores, restaurants, cafes, and businesses are positively impacted when they can be accessed by non-motorized modes[8]. Additionally, streets with bicycle infrastructure generally have fewer commercial vacancies than comparable streets without bicycle facilities[9]. Walkability, bikeability, and ample outdoor recreation opportunities are features of a community and region that are increasingly viewed as those that attract businesses and retain skilled workers. Investing in and promoting these resources can help to attract the coveted 21st century workforce.

Health benefits

Regular physical activity is part of a healthy lifestyle. The Surgeon General recommends between 30-60 minutes of moderate exercise per day to prevent diseases commonly associated with a sedentary lifestyle such as obesity and heart disease. An improved pedestrian and bicycling environment will provide additional opportunity and incentive for area residents to incorporate physical activity into their daily lives.

Biking has also been shown to increase levels of productivity and reduce sick days. One specific study conducted between 2007 and 2008 aimed to find the relationship between commuting to work and sickness. The researchers found that those who rode a bicycle to work reported less sick days than other workers[10].

School students

Safe Routes to School (SRTS) programs work to improve the pedestrian and bicycle routes near schools and encourage school children to bike and walk more often. HRMPO localities have initiated multiple SRTS programs to improve the pedestrian and bicycle routes near various elementary and middle schools such as Waterman Elementary School in Harrisonburg and Mountain View Elementary School in Rockingham. Beyond the benefit of reducing trips on roadways and costs of busing, there is evidence that regular participation in physical activity and higher levels of physical fitness have been linked to improved academic performance and

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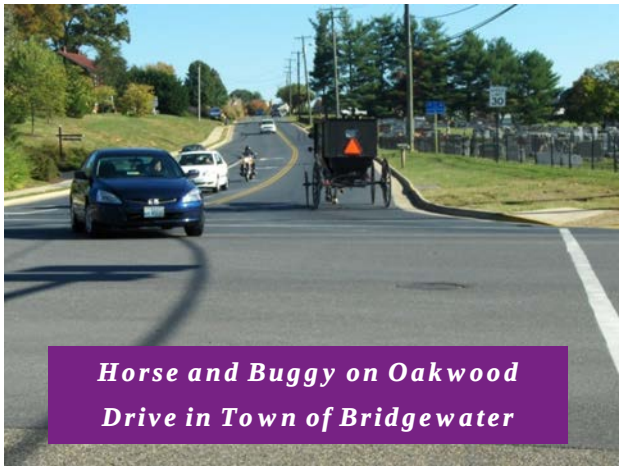
[8] Lynne March, *Economic Impacts of Walking and Bicycling in Sonoma County,* (Sant Rosa, CA: Sonoma County Transportation Authority, January 2013).
[9] New York City Department of Transportation, *Measuring the Street: New Metrics for 21st Century Streets*,(New York City, NY: New York City Department of Transportation 2012).
[10] Ingrid J. M. Hendriksen, Monique Simmons, Francisca Galindor Garre, and Vincent H. Hildebrandt, "The association between commuter cycling and sickness absence," Preventive Medicine 51, no. 2 (august 2010): 132-135.

brain function, including attention and memory[11]. Allowing children to safely walk and bike to school may increase their chances of success in school. Implementing more SRTS programs, as well as constructing an interconnected pedestrian and bicyclist network, can provide the option for many more students to walk or bike to school. In addition, improving the pedestrian and bicyclist network surrounding James Madison University, Eastern Mennonite University, and Bridgewater College can allow the many students and staff at those growing colleges to be able to choose non-motorized modes of transportation to get to campus.

Non-drivers

Many residents of the HRMPO region cannot drive or do not own automobiles. This includes children, college students, and low-income residents who must rely on walking, cycling, or transit as their only option for traveling and Old Order Mennonite residents who rely on walking, bicycling, or horse-drawn buggies. Pedestrian and bicyclist network improvements provide additional benefits to Old Order Mennonites because they not only use walking or bicycling to travel around the region, but infrastructure improvements such as wider shoulders or paved shared-use paths, also may be used by horse-drawn buggies.



Horse and Buggy on Oakwood Drive in Town of Bridgewater

Lower-income residents also may rely on Harrisonburg Department of Public Transportation (HDPT) or other transit service for mobility, however some HDPT transit stops are in areas that lack any type of bicycle or pedestrian accommodation, and/or in areas where it is difficult to cross the street, making it difficult for those whose destination is a short distance away from the nearest bus stop. The lack of facilities makes it difficult for transit riders to access their stops or destinations

Apartment/retail complex in downtown Harrisonburg features bicycling and walking as one of its selling points –including easy access to downtown, public transportation, and JMU

[11]Safe Routes to School National Partnership, "Academic Performance and Attendance," Safe Routes to School National Partnership, saferoutespartnership.org (accessed October 20, 2015).

Improved livability

Residents enjoy living in areas with access to bicycling and walking facilities, as reflected in studies that have compared property values in places with high walkability to places with low walkability. For example, a 2012 Brookings Institution study of the metropolitan Washington, DC, area found that places with good walkability (as measured by the "Walk Score" index created by www.walkscore.com) found that homes in highly walkable areas command $300/month more in residential rents and $81/square foot more in residential property values as compared to areas with low walkability scores. Similar benefits were found for commercial rents, office rents, and retail sales.

In addition, having a workplace that is accessible by walking or bicycling can be an important asset to businesses trying to recruit professional employees to relocate to the Harrisonburg-Rockingham region as well as communities trying to retain the 21st Century workforce. Larger and highly visible projects such as greenways and shared-use paths can capture the attention of residents and visitors and improve their satisfaction with the community.

Environment

Bicycling and walking don't contribute to noise or air pollution and thus contribute to the environmental health of the community. Bicycling and pedestrian infrastructure improvements can also be integrated into projects that enhance the streetscape and landscape of an area.

Mobility-impaired

Certain types of pedestrian and bicycling network improvements – including sidewalks, shared-use paths, curb cuts, and crosswalk/pedestrian signal improvements – can go a long way in providing more options and a better quality of life for mobility-impaired individuals. This allows them to more fully participate in society and can also reduce their reliance on expensive paratransit services. The country's mobility-impaired population is expected to increase in future years as baby boomers continue to age.

C. HRMPO Bicycle & Pedestrian Committee

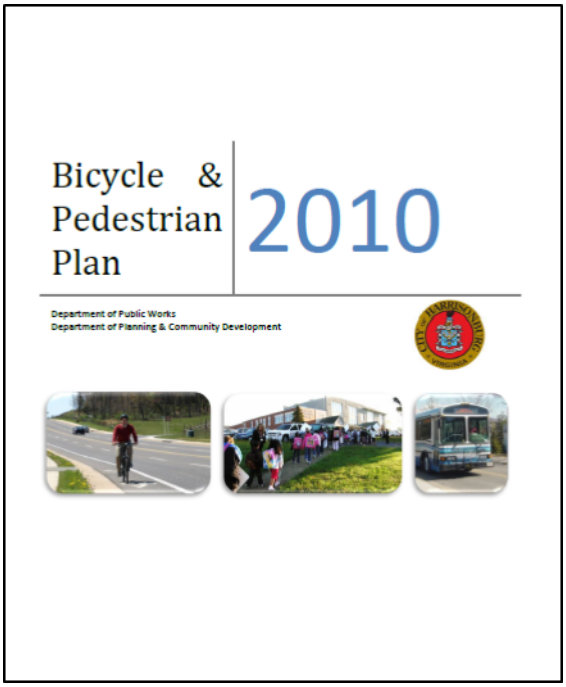
The development of this plan was overseen by the HRMPO Bicycle & Pedestrian Committee (BPC), which is made up of representatives from the member localities, James Madison University (JMU), Sentara RMH, members of local bicycling committees, and HRMPO staff. This committee was developed to provide oversight and feedback to the project team during the development of the plan, as well as aid in providing outreach to the community.

The BPC worked closely with other advocacy groups in the region, including the City's Bicycle and Pedestrian Subcommittee (a subset of the Transportation Safety and Advisory Commission), the Rockingham Bicycle Advisory Committee, and the Shenandoah Valley Bicycle Coalition.

D. Relationship to Other Planning Documents

The study team did extensive reviews of previous planning documents when developing the current plan. These documents include:

- **Rockingham Bicycle & Pedestrian Plan (expected 2016 approval) –** This plan is currently under development in coordination with the HRMPO Bicycle & Pedestrian Plan. This plan is separate from the HRMPO plan; however, there is considerable overlap between the two. In addition, all public involvement activities have been held jointly for both planning efforts. This plan is currently being finalized and is expected to go before the Rockingham County Board of Supervisors in mid-2016.



- **Central Shenandoah Valley Bicycle Plan (2005) –** This plan was developed by the Central Shenandoah Planning District Commission (CSPDC), which is the regional planning agency for Rockingham, Augusta, Rockbridge, Bath, and Highland Counties, as well as the Cities and Towns within those Counties.
- **Harrisonburg Bicycle & Pedestrian Plan (2010) –** This plan (adopted in July 2010 and last amended in 2011) was developed by City staff with support from the City's Bicycle & Pedestrian Subcommittee. The City has recently initiated the process to update the plan. (expected 2017 approval)
- **Virginia Outdoors Plan (2013) –** The Central Shenandoah Recreational Planning Region identified in this plan includes the counties of Augusta, Bath, Highland, Rockbridge, and Rockingham, as well as the cities and towns within these counties. The plan proposes several recreational trails and greenways to connect population centers, such as Harrisonburg and Bridgewater, with protected natural areas, such as the Shenandoah National Park and the George Washington National Forest.
- **Comprehensive Plans –** Each locality within the HRMPO has its own Comprehensive Plan. These comprehensive plans must be reviewed every five years according to state law. The purpose of these

plans is to serve as long-term guides for future transportation, land use, and public works issues within the respective localities. During the development of the Bicycle & Pedestrian Plan, each Comprehensive Plan was reviewed with regards to transportation-related issues, and in particular bicycle and pedestrian facilities. In the future, localities can incorporate the recommendations of this plan into their Comprehensive Plan update.

- **Zoning and subdivision ordinances –** Each locality within the HRMPO is responsible for their zoning and subdivision ordinances. These ordinances can be used as tools to require new developments to be designed with pedestrians and bicyclists in mind.

E. Relationship between MPO, VDOT, and Localities

It is important to note that the HRMPO is not a regulatory body and many of the objectives and recommendations presented in this plan would be implemented by the individual localities and/or VDOT. However, these goals, objectives, and recommendations can be used to provide valuable guidance. Furthermore, it is VDOT's policy to comply with the MPO's approved bicycle and pedestrian plan when planning and designing future roadway improvements on state-maintained roads.

This plan must ultimately be approved by the MPO Policy Board, which is comprised of senior staff and elected officials from the City, County, and Towns, and a representative from VDOT.

Table 1 describes the general control of roads in the HRMPO region:

Table 1. HRMPO Region Control of Roads

Locality	Control of Roads
City of Harrisonburg	• The City is responsible for virtually all streets and roads within the City (except for private streets), including both maintenance and capital improvements. • VDOT is responsible for I-81, and has some responsibility for roads within JMU's campus. • VDOT provides some oversight for City capital improvement projects with state and/or federal funding, such as Transportation Alternatives or Highway Safety Improvement Program projects.

Table 1. HRMPO Region Control of Roads

Locality	Control of Roads
Rockingham County	• VDOT is responsible for all primary and secondary roads within the County, including both maintenance and capital improvements. • VDOT works closely with Rockingham County and the MPO to identify projects for the six-year plan. • On certain capital improvement projects Rockingham County may also choose to act as lead manager/sponsor (locally-administered project).
Town of Bridgewater	• As a larger town (population > 5000), the Town is responsible for all primary and secondary roads within its boundaries, including both maintenance and capital improvements. • VDOT coordinates with the Town on capital improvement projects with state and/or federal funding, such as Transportation Alternatives or Highway Safety Improvement Program projects.
Towns of Dayton and Mt. Crawford	• For smaller towns, VDOT is responsible for most maintenance and capital improvements on primary roads. VDOT also manages all traffic signals within these towns. • The Town is responsible for maintenance and capital improvements to local streets.

F. Design of the Plan

The design of this plan follows a comprehensive approach and as such addresses the "five Es" of improving the HRMPO Region's pedestrian and bicyclist environment:

- **Engineering—**improving the physical pedestrian and bicyclist network
- **Enforcement—**identifying initiatives that local and state police and other organizations can take to enforce proper behavior by motorists, pedestrians, and bicyclists so that all users can properly share the transportation network

- **Encouragement—**developing programs to encourage residents and visitors to consider walking and bicycling as an alternative to driving
- **Education—**educating citizens on the benefits of walking and bicycling, educating bicyclists and pedestrians on safe riding and walking techniques, and educating motorists on the rules of the road as it relates to pedestrians and bicyclists
- **Evaluation—**evaluating the progress the region is making on the goals of this plan, and periodically updating the plan in response to changing conditions and to reflect the progress the region has made

II. PUBLIC INVOLVEMENT

A. Project Website

A project page on the HRMPO website was established for this plan and used as a tool to provide the public with general information about the plan, information about upcoming events, and hyperlinks to the online public opinion poll and the interactive online mapping tool. The website can be accessed at hrvampo.org/bicycle-pedestrian-program.

The HRMPO established a BPC as a subcommittee of the Technical Advisory Committee (TAC). The BPC is comprised of HRMPO staff and TAC representatives from the City, County, Towns, and JMU, as well as citizen representatives from the bicycle and pedestrian committees that have been established at the City and the County level.

The BPC has met multiple times over the course of this study to provide guidance and oversight during the development of the plan.

B. Online Public Opinion Poll

Early in the development of this plan, an online survey, using the SurveyMonkey platform, was used to capture public attitudes and opinions regarding walking and biking in the Harrisonburg-Rockingham region. The survey was conducted and available on line from March 1st through March 29th 2013. Public outreach included heavy advertising in the local media and websites; Facebook pages; and through BPC members individual public outreach efforts. The survey was an overwhelming success with in excess of 1,000 respondents. Results of the survey are detailed in Figure 1.

The survey showed that of the respondents, 63% lived in the City of Harrisonburg; 22% lived in Rockingham County; 7% lived in various smaller Towns in the region; and the remaining 8% resided outside the City of Harrisonburg or Rockingham County.

Figure 1: Public Opinion Poll Results

29. Which of the following is a factor in your decision not to have your school children walk or bike to school more often? (please select up to three)

	Response Percent	Response Count
Too far	62.3%	129
Amount of traffic on route	56.0%	116
Speed of traffic on route	44.4%	92
Weather conditions	15.5%	32
Lack of crossing guards	11.6%	24
Challenging crossings	24.2%	50
Lack of sidewalks or separated paths	42.5%	88
Concerned about violence or crime	8.2%	17
Prefer that my child ride the bus	7.2%	15
Prefer to drive my child to school	6.8%	14
I don't find anything unpleasant or uncomfortable about having my schoolchildren walk or bike to school	4.8%	10
	answered question	207

The survey asked a series of questions, including basic identifying information (place of residence, place of employment, basic demographic information), bicycling and walking habits, barriers preventing them from walking or biking more, and other questions such as whether they have children that walk or bike to school.

Some salient results include:

- Have you bicycled in the Harrisonburg/Rockingham Region within the last two years?
  - 63%—yes
  - 37%—no
- On average, how many days per month do you make trips using your Bike? (note – Respondents who answered "no" to the previous question were not asked this question)
  - 13%—more than 25 days per month
  - 20%—16-24 days per month
  - 20%—9-15 days per month
  - 25%—1-8 days per month
  - 22%—sporadic, less than once per month
- What do you like about bicycling in the Harrisonburg/Rockingham region? (Respondents could select multiple options; the top five responses are shown below)
  - 364 respondents—within bicycling distance of many important destinations
  - 334 respondents—feel like I am helping the environment
  - 258 respondents—it is a quick way to get around
  - 253 respondents—the network of on-street bicycle facilities
  - 182 respondents—road surfaces are well maintained
- Which of the following factors make it difficult or unpleasant to walk in the Harrisonburg/Rockingham region (Respondents could select up to three options; the top seven responses are shown below.)
  - 441 respondents—not enough sidewalks or many gaps in the sidewalk network
  - 302 respondents—places I need to go are beyond walking distance
  - 247 respondents—drivers not yielding or stopping for pedestrians at corners
  - 196 respondents – speeding traffic
  - 178 respondents—heavy traffic
  - 147 respondents—inadequate lighting/too dark
  - 133 respondents—worries about personal security (vulnerability to crime)

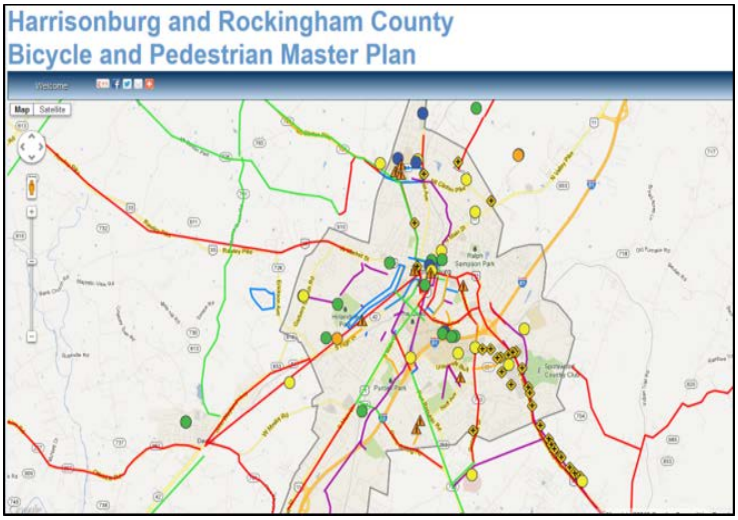
A complete summary of the survey is available in **Appendix B.**

C. Interactive Online Mapping Tool (Wikimaps)

Another public involvement tool that proved invaluable in developing the recommended physical improvements to the region's bicycle and pedestrian network was an interactive online mapping tool (called a Wikimap). Users registered their email address (or login through Facebook) so that the number of unique users could be documented in addition to the comments posted. The mapping tool was promoted on the project website, on locality websites and Facebook pages, and through outreach by BPC members to multiple other stakeholders in the region. The tool was also shared with participants of the online survey who requested to be added to the mailing list for continued involvement in the project.

The tool provided users with the ability to draw points and lines on a map. Lines denoted routes that people like to bike or walk or routes that people thought needed improvements. Points denoted specific origins or destinations for walking or bicycling trips or locations where spot improvements may be needed. In addition, users could provide comments or "like" suggestions made by other users. While the mapping tool covered all of Harrisonburg and Rockingham County, the majority of the comments were concentrated in the HRMPO region.

Figure 2: Master Plan Wikimap Responses



The 155 unique users submitted over 400 comments between April 19 and June 28, 2013. The comments, points, and lines identified routes for further study, as described below. **Figure 2** displays these responses graphically.

As with many public input mechanisms, most of the input came from a small number of users; the top five users were responsible for just over 50% of the input on the map. However, it is likely that these users are frequent walkers or bikers in the Harrisonburg-Rockingham region and, as a result, have a good amount of specialized knowledge to share via the map. Other users may have determined that their opinions were already represented by input on the map and so chose not to add their feedback. The median number of inputs was three comments; the majority of users provided one comment.

Totals of input in the various available comment categories are displayed on the following page, in **Table 2**.

Table 2. Total Wikimap Comments by Category

Road needs bike improvement	92	Place to which I bike	25
Off-road connection needed	61	Difficult pedestrian crossing	18
Route I like to ride	56	Route I like to walk	13
Difficult bike intersection	46	Place to which I would like to walk	8
Place to which I would like to bike	40	Place to which I walk	9
Road needs pedestrian improvement	28		

The majority of comments on the map centered on major corridors: Route 33, Route 42, and Mount Clinton Pike. Route 33, from Harrisonburg to Resort Drive leading to the Massanutten Resort, received the largest number of comments, with an initial comment noting that a safe bicycling connection between these destinations is needed. That comment was "liked" by six other users and commented upon by five others. One user also suggested a shared-use path in this corridor all the way from Harrisonburg to Skyline Drive; this comment was "liked" by two other users. One user's comment summarizes the others': "The entire stretch of 33 from here [University Blvd] east is way too dangerous to use. Fix this, please."

Along Route 42, favorable comments noted the southern section where wide shoulders accommodate buggies and bicycles. Conversely, a number of comments noted the lack of accommodation north of Dayton into Harrisonburg, especially from Walmart to the city limits. Another user noted that all of the intersections along this stretch are dangerous for bicyclists and pedestrians.

Many users also commented upon the lack of bicycle and pedestrian accommodations along Mount Clinton Pike west of Route 42. Local runners (both adults and school teams) use this stretch of road, and if the route were improved, residents in the Singers Glen area could use this road to access Harrisonburg. Eastern Mennonite University is a major pedestrian and bicycle traffic generator, with one user noting that at all crossings of Mt. Clinton Pike, drivers do not appear to respect pedestrians in crosswalks.

Comments on other roads in the more rural areas focused on the twisting and narrow nature of roads that makes them dangerous for bicyclists and pedestrians. These roads have lower traffic volume, but speeds are high, and the road character creates uncomfortable situations for both drivers and bicyclists. These are primarily recreational routes according to the comments, but it appears that even experienced road riders feel uncomfortable.

In addition to the comments on roads, the map results show a significant amount of interest in shared-use path opportunities for connecting destinations throughout the region. In addition to the proposed shared-use path along Route 33, several other shared-use path comments centered on providing alternatives to the high-traffic streets that already connect destinations. These comments suggest an unmet desire for shared-use facilities that provide longer distance connections between municipalities, as well as shorter paths that provide connectivity between local destinations, such as neighborhoods and parks.

D. Stakeholder Workshop

The HRMPO hosted a Stakeholders Workshop in Harrisonburg on July 30, 2013. Led by the study team, a total of 25 stakeholders attended, including several BPC members. This meeting was organized as a combined stakeholders meeting for both the HRMPO Bicycle & Pedestrian Plan and the Rockingham County Bicycle & Pedestrian Plan, which are being developed concurrently.

The meeting consisted of a formal presentation followed by an open house. The presentation covered the following:

- Project description
- Goals, objectives, and strategies
- Project activities to date
- Toolkit of potential improvements
- Project schedule


Stakeholder Meeting

Following that, attendees reviewed maps set up around the room at five stations that included the first draft of recommended facility improvements. Each station covered a different portion of the Harrisonburg-Rockingham region. Participants were given three stickers at each station to vote for the corridor(s) they considered the most important corridors to target for bicycle/pedestrian improvements in this plan.

This feedback helped inform the first draft of the prioritization of the network. A complete summary of the stakeholder workshop is available in **Appendix B**.

III. VISION, GOALS, AND OBJECTIVES

A. Introduction

To guide the development of the plan, the BPC agreed on a Vision Statement that encapsulated the type of region the HRMPO strives to be relative to bicycle and pedestrian issues.

VISION STATEMENT: The Harrisonburg-Rockingham region will be a place where pedestrians and bicyclists can safely and conveniently reach key destinations for work, play, and everything in between.

Goals, objectives, and strategies were developed to help the region achieve this vision. The goals are based on the five "E"s developed by the League of American Bicyclists that are recognized as the pillars of development of a successful bicycle and pedestrian program. These "E"'s include:

- **Engineering**
- **Enforcement**
- **Education**
- **Encouragement**
- **Evaluation**

Goals are overarching statements describing what the HRMPO wants to achieve through the Bicycle and Pedestrian program. These should be realistic and achievable in the long-term but are more abstract and programmatic in scope than objectives or strategies. In order to achieve these goals, the HRMPO also developed a set of objectives. Objectives are intended to state the desired outcomes of the program and sequencing for achieving them. These are concrete and measurable and should work towards achieving the stated goals. Following each objective is a menu of programmatic strategies that can be employed throughout the region when opportunities are presented. Most of these suggestions are not specifically within the purview of the HRMPO but likely fall under the responsibilities of the HRMPO localities or within programs operated by other public or non-governmental organizations such as local bicycle advocacy groups, healthcare providers, or regional organizations. However, the HRMPO can play a key role in these activities by providing funding where appropriate to advance these strategies, by promoting their use, and assisting the member jurisdictions with staff time to advance the strategies.

B. Engineering

Engineering comprises the planning, design, and installation of the physical infrastructure that most people associate with a bike and pedestrian plan.

Goal: Implement and maintain a non-motorized transportation network for users of all comfort levels through collaboration with VDOT, member jurisdictions, and the private sector.

1. Build the non-motorized transportation network presented in this plan as funding permits.
    a. Encourage VDOT to add pedestrian, bicycle, and buggy accommodations on new road projects where existing or future demand for these facilities exist.
    b. Work with VDOT and the member jurisdictions to identify bicycle and pedestrian facilities recommended in this plan, or others that may be appropriate for inclusion in planned transportation projects and assist in planning for those facilities.
    c. The HRMPO will offer assistance to its member jurisdictions to review land use and site plans with the support of non-motorized accommodations in mind. This includes requirements for sidewalks and other pedestrian/bicyclist improvements as part of the new developments in urbanized areas, inclusion of sidewalks in subdivision street design guides, and adherence to thresholds for bicycle parking standards.
    d. Use VDOT's Policy for Integrating Bicycle & Pedestrian Accommodations and the Bicycle and Pedestrian Accommodation Decision Process to assist in the development of appropriate bicycle and pedestrian infrastructure. Encourage use of these policies as well as this HRMPO Bicycle and Pedestrian Plan during the planning phase of transportation projects.
2. Annually evaluate recommendations for facilities in order to identify potential projects eligible for state, federal, and non-governmental grant programs.
    a. Work with VDOT and the member jurisdictions to identify and apply for grant opportunities to plan, design, and construct non-motorized facilities.
    b. Coordinate with local jurisdictions and agencies to identify public and private resources to address bicycle, pedestrian, and buggy needs.
3. Establish facility maintenance protocols in collaboration with VDOT and member jurisdictions that clearly identify roles and responsibilities related to non-motorized accommodations.
    a. Develop a process to assist in the review of annual maintenance and paving projects to identify potential locations for shoulder widening and restriping of lanes to accommodate pedestrians or bicyclists.

b. Reach out to City, Town, and County Managers, Councils, Boards, and Commissions for coordination of projects and programs to improve bicycle and pedestrian accommodations and safety.

C. Enforcement

Enforcement strategies ensure a safe environment, and roads, for all users (bicyclists, walkers, and drivers) and are applied to reduce unsafe behaviors. Enforcement is closely tied to Education, as law enforcement officers have an important role to play in educating members of the community on rules of the road for pedestrians, bicyclists, and motorists. This is particularly true when law enforcement officers speak to children and demonstrate safe walking and bicycling techniques such as wearing bicycle helmets and looking before crossing.

Goal: Improve traffic safety for all modes through collaboration with the public, VDOT, law enforcement agencies, public safety providers, local government, and appropriate non-governmental organizations.

1. Improve safety by identifying and removing structural safety hazards that are acting as impediments to bicycling and walking.
    a. Develop and promote a resource where people can report issues on the ground such as debris, damaged infrastructure, potholes, non-working street lights and pedestrian signals, etc.
2. Monitor safety and use trends and provide detailed evaluations of any locations where there is an identified safety issue such as increased numbers of bicycle-related, buggy-related, or pedestrian related crashes over time while also monitoring trends in bicycling and pedestrian activity.
    a. Develop and promote a resource that collates data related to bicycle and pedestrian crashes, near misses, and other incidents that both law enforcement and the public can submit to.
    b. Work with the member localities to participate in the National Bicycle and Pedestrian Documentation Project. This data collection (which started in 2012) will allow the region to develop a fuller picture of trends in bicycling and walking, as well as providing a metric by which to compare the region against other similar regions across the country.
    c. Work with VDOT and/or member jurisdictions to provide traffic monitoring counts of all users at key locations to develop recommendations when improvements may be necessary.
3. Provide bicycle and pedestrian law education along with law enforcement officers for those cited for moving violations related to safety for bicyclists and pedestrians.
    a. Organize meetings between local law enforcement officers, local government staff, and advocacy groups to discuss ongoing enforcement issues and ensure awareness of laws that affect bicyclists and pedestrians.

b. Encourage the enforcement of the state's laws intended to protect bicyclists and pedestrians such as requiring a three-foot minimum distance when passing bicyclists.

4. Develop and promote a campaign, in coordination with local law enforcement, advocacy groups, and public safety providers, to educate the public on unsafe or illegal behaviors such as failing to yield and failing to stop at traffic controls, and enforce violations by motorists, pedestrians, and bicyclists.
    a. Work with local law enforcement agencies to implement a progressive education/ticketing campaign where police officers give verbal or written warnings to pedestrians, bicyclists, and motorists observed behaving unsafely. This could be coupled with providing the offending individual with educational materials about the rules of the road when it comes to walking and bicycling.
    b. Conduct other types of educational/enforcement campaigns such as distracted driver campaigns and "Keep Kids Alive – Drive 25" campaigns near schools.
    c. Encourage local elected officials to pursue changes to Virginia state law to strengthen and update bicycling and walking laws and promote additional safety for all users such as requiring motorists to stop rather than yield to pedestrians in crosswalks.

D. Education

Education includes identifying safe routes to bicycle and walk; teaching community members to walk, bike and drive safely; and sharing methods to handle potentially dangerous situations. This "E" is closely tied to Encouragement and Enforcement strategies. Police departments have a major role in pedestrian, bicyclist, and driver safety education; however, the message is even more effective when it is reinforced by schools, parents, elected officials, public health educators, business owners, chambers of commerce, and neighbors.

Goal: Promote bicycle and pedestrian safety education through the implementation of programs for bicyclists, pedestrians, and motorists, by coordinating with member jurisdictions and their appropriate departments and committees, schools, advocacy groups, and other organizations.

1. Seek out training and workshop opportunities for all stages of bicycle and pedestrian planning and development (i.e. tourism, economic development, engineering, land use, recreation).
    a. Hold educational sessions for agency, City, County, and Town staff, law enforcement officials, and local advocates who will work on the implementation of recommendations in this plan. On a statewide level, the University of Virginia's Transportation Training Academy offers multiple workshops on transportation planning and design for bicycle and pedestrian facilities. Other key resources are webinars offered by the Association of Pedestrian and Bicycling Professionals.

   b. Educate bicyclists and pedestrians on safe riding and walking techniques. On a national level, the Ride Smart campaign of the LAB offers a wealth of information on safe bicycling and provides the opportunity to train to become certified bicycle safety instructors.

2. Assist in the development and promotion of events and programs such as Bike to Work Day and International Walk to School Day. These programs, and others, provide training to adults and children about bike safety and confident cycling as well as awareness of pedestrians and bicyclists.
   a. Support high school physical education and driver education programs by helping the teachers to organize bike rodeos, duathlons, bike driving course challenges and bike olympics for their students. Students would participate in these events during their physical education classes.
   b. Work with regional schools to continue to encourage the use of the SRTS program.
3. Continue to partner with advocacy groups to promote bicycle and pedestrian safety education for adults, children, and families.
   a. Facilitate a program with regional schools where teachers instruct students on bicycle, pedestrian, and motorist safety and rules of the road and distribute bike helmets, bicycle headlights/taillights, reflective items, other safety gear, and educational handouts.
   b. Sponsor booths at local festivals and special events where literature regarding safe walking and riding can be distributed. This could also be used as an opportunity to give away low-cost safety devices such as blinking lights for bicycles and reflective strips that walkers and joggers can wear to improve their visibility.
   c. Develop a campaign to educate and inform residents of the region for whom English is not the primary language on bicycle and pedestrian safety and resources.
   d. Partner with local advocacy groups to provide youth safety campaigns. Examples include using International Walk to School Day as an opportunity to teach school children about the health benefits of walking and to train them on safe methods for walking and bicycling, as well as providing youth bicycle safety education programs and bicycle rodeos.
   e. Sponsor bicyclist education programs that are led by community organizations or advocacy groups such as the Shenandoah Valley Bicycle Coalition's Education Committee or Bicycles for Refugees Programs.

E. Encouragement

Encouragement and Education complement each other. Encouragement combines and further builds on the results of the other "Es" to improve knowledge, facilities, and enforcement to encourage more people to walk or ride safely. Most importantly, encouragement activities build interest and enthusiasm, and help grow a local biking culture and promote walkability.

Foster a walking and bicycling culture through programs and events that encourage business, schools, families, and individuals to increase the number of trips they make on foot or by bike, and to continue promoting the region as a prime destination for pedestrian and bicycle tourism.

1. Foster a walking and biking culture that encourages more people to choose to make trips on foot or by bike because it is a pleasant, comfortable mode of travel that engages people in the community.
    a. Work with member localities to develop community events such as Cyclovia or other bicycle and pedestrian festivals that would temporarily close streets to vehicles for a specified time.
    b. Support local bicycling clubs and bicycling events, social rides, mountain bicycling competitions, local running events such as 5ks, 10ks, and marathons, and local hiking and walking events such as guided hikes in local parks and bird-watching.
    c. Work with regional schools to provide incentives for students to walk and bike to school, such as mile counters, reflective bracelets, and keychains while supporting events such as bike to school day.
    d. Provide information and links relative to walking and biking on the HRMPO website. The region has already made substantial progress through its "Bike the Valley" website, run by the CSPDC. This website includes information on recommended on-road and off-road recreational routes, tips on safe riding, and links to local bicycling resources such as local bicycling clubs and shops.
    e. Encourage community based youth recreation programs to consider policies that promote shorter (bikeable or walkable) trips for families to attend events, etc.
2. Promote the HRMPO region as a destination for recreational walking, hiking, running, and riding.
    a. Create a system of bicycle- and pedestrian-oriented wayfinding signs.
    b. Develop bicycle tourism maps. As previously noted, this region has become a popular destination for bicycle tourism, with visitors coming to enjoy the region's beautiful scenery, scenic rural roads, and expansive network of mountain biking trails. Visitors who specifically ask about local bicycling routes could be provided maps showing popular regional bicycle tourism destinations, existing paved and unpaved trails, and roads with existing bicycle facilities or recommended bicycling routes. These maps could potentially include bike comfort level information to further improve the visitor experience for cyclists of different abilities.

       While this plan includes long-term recommendations for most of these arterial roadways, in the short term these maps can help tourists plan trips that take advantage of the built network and promote a positive impression of the region.
3. Encourage local employers to incentivize walking and biking for commuting purposes with programs that reward their employees.

a. Support efforts to encourage regional employers to incentivize bicycle commuting. This could include providing information about bicycle commuting, providing rewards to employees who commute by bicycle, providing areas for bicycle parking, and providing showers or locker rooms.
b. Continue sponsoring Bike Month and Bike to Work Day in partnership with local communities and advocacy organizations and continue to encourage expanding these and other existing events.

4. Seek out and celebrate national recognition as Bicycle Friendly and Walk Friendly Communities.
    a. Encourage jurisdictions, universities, and local businesses to continue to apply for progressively higher recognition from the League of American Bicyclists' Bicycle Friendly America program, and provide assistance with the application process as necessary.
    b. Encourage appropriate jurisdictions to apply to be Walk Friendly Communities, a recognition program developed to encourage towns and cities to support safer walking environments, and provide assistance with the application process as necessary.

F. Evaluation

Evaluation involves monitoring progress made towards achieving the goals and recommendations of the other four "Es". Evaluation can examine the physical network (e.g. miles of new bicycle lanes built, number of traffic signals retrofitted), as well as the resulting patterns of use (e.g. number of bicyclists and pedestrians on the road, crash statistics), and the number of people reached through activities and events. Many of the strategies discussed under evaluation could fall to the HRMPO TAC to assist in the implementation with and for inclusion in future Unified Planning and Work Plans.

Sustain the momentum of this plan and evaluate progress toward these goals.

1. Maintain and grow the bicycle and pedestrian program of the HRMPO.
    a. Continue to talk to other regional stakeholders regarding bicycle and pedestrian issues, using forums such as joint meetings with the JMU Bicycle and Pedestrian Advisory Committee, the Rockingham Bicycle Advisory Committee, and the Harrisonburg Bicycle and pedestrian Subcommittee, as well as at the annual Harrisonburg and Rockingham Bike-Walk Summit.
2. Ensure the HRMPO's ability to achieve the goals identified in its creation.
    a. The HRMPO TAC should regularly evaluate the implementation of the plan, monitor the progress of infrastructure and other improvements, and periodically provide updates to the plan. The HRMPO BPC should continue to meet on an as-needed basis to assist in that process.

b. Maintain a list of stakeholders with representatives of committees, advocacy groups, agencies, and other bicycle and pedestrian supporters that would benefit from or play a role in this plan's implementation.

3. Periodically update this plan in response to changing conditions and to reflect the progress that has been made.

IV. EXISTING CONDITIONS

A. Existing Facilities

The region has numerous existing bicycle and pedestrian facilities that are displayed on **Map 1**.

Most of Harrisonburg's urban core including areas near JMU have excellent connectivity, however not all are ideal and would benefit from improvements such as new/improved curb ramps and relocation of utility poles currently in the sidewalk through-way. A concerted effort has been made in recent years to advance the development of the City's bicycle and pedestrian network, particularly following the completion of Harrisonburg's 2010 Bicycle and Pedestrian Plan. However, many corridors within Harrisonburg and connecting with adjacent localities lack adequate bicycle and pedestrian accommodations. In addition, many key intersections present distinct difficulty, where wide roads, fast/heavy traffic, and a lack of proper traffic control devices such as pedestrian signal heads and marked crosswalks make it difficult to safely cross. Lastly, numerous older sidewalks within the study area do not meet the Americans with Disabilities Act (ADA) design guidelines.

The Towns of Bridgewater, Dayton, and Mt. Crawford have small areas or individual segments that begin to form a sidewalk network, but lack a sufficient bicycle infrastructure. Within the County (outside the Towns) bicycle and pedestrian facilities are extremely limited. The majority of subdivisions and residential areas lack sidewalks, as do most key corridors.

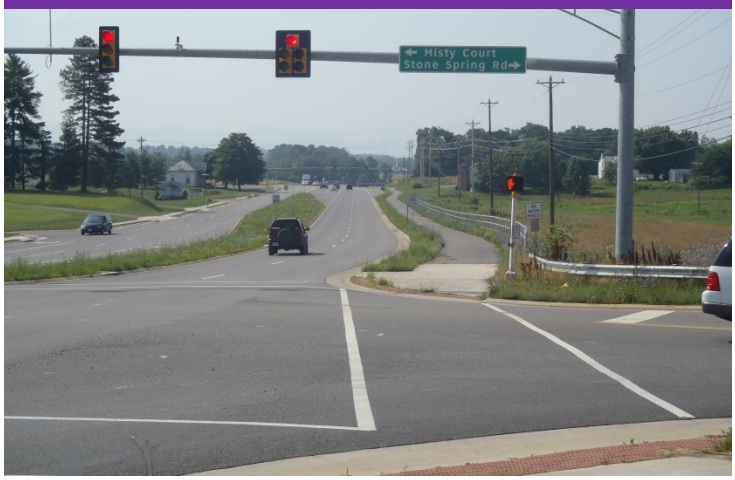
The majority of the County's roads are two-laned with a maximum speed limit of 55 mph. Experienced and confident bicyclists will use these roads for recreational and commuting purposes; however, most of these roads have minimal shoulders and thus require bicyclists to use the travel lane with traffic. Using the travel lane with motorized traffic is generally acceptable for lower-volume roads, but this is more challenging for roads that have higher traffic volumes (Average Daily Traffic [ADT]), such as above 3,000 vehicles per day. Wider shoulders or other bicycle accommodations would allow bicyclists to more comfortably ride these roads.

Some notable existing facilities within the HRMPO Region include:

- **James Madison University Campus** – The JMU campus is well connected by a system of sidewalks, shared-use paths, and other bicycle and pedestrian infrastructure and amenities. JMU has a Campus Bicycle and Pedestrian Plan that guides development of its facilities.

- **Port Republic Road Shared Use Path –** This ten-foot paved path was completed in 2009. It currently extends from Neff Ave/Peach Grove Ave (near the University Park stadium) in the City, south to Boyers Road in the County. At its midpoint it passes by the bicycle lanes on Stone Spring Road and by Sentara RMH.

Port Republic Road Shared Use Path



- **Linda Lane Shared Use Path –** This ten-foot paved path, constructed in 2009, connects from Country Club Road to the Linda Lane/Smithland Road roundabout, all in the City of Harrisonburg. It also has potential to provide an important connection for school children at Skyline Middle School/Smithland Elementary School complex once additional facilities from neighborhoods are constructed.
- **Harrisonburg On-Road Bike Network –** The City has made considerable strides in implementing striped bicycle lanes and shared lane markings ("sharrows"). Notable corridors with bike lanes include Stonewall Drive/Chestnut Ridge Drive connecting Reservoir Street and E. Market Street, Port Republic Road between Forest Hill Road and Neff Ave (acting as a northward extension of the Port Republic Road shared use path), and Neff Avenue between Reservoir Street and Port Republic Road. Harrisonburg (Harrisonburg-BikeMap) and JMU (JMU-BicycleMap) have also developed a bicycle comfort maps that identifies streets that are relatively comfortable to bike on due to lower volumes and speeds.
- **Erickson Avenue/Stone Spring Road (Southeast Connector)** – This corridor was constructed as a new alignment road that connects from Garbers Church Road in the southwestern part of Harrisonburg, past SR 42, US 11, I-81, and Port Republic Road, to US 33 in the County east of the City. This project includes bicycle lanes and sidewalk on the portions within the City, and bicycle lanes but no sidewalk on the portion adjacent to Sentara RMH within the County.
- **SR 42, Bridgewater to Dayton –** This section of SR 42 was widened in 2007 to provide 10-foot shoulders. These wide shoulders have been a benefit to both the bicycling community and the Old Order Mennonite community, as the shoulders allow horse and buggies to travel the busy SR 42 arterial without motorists needing to change lanes to pass. In discussions with Old Order Mennonites, they generally have been able to coexist well with bicyclists on this facility.

- **SR 42, Harrisonburg to Broadway –** A bicycle lane is present on SR 42, beginning at Greenmount Road, approximately 1.5 miles north of Harrisonburg's city limits and extends north to the Town of Broadway. This bicycle lane is approximately 7-feet wide, and is marked with bike lane symbols along the section where no curb and gutter exists.
- **Safe Routes to School Projects** – Various SRTS projects have been completed in the HRMPO region including sidewalk, bike lane, and pedestrian signal improvements at Mountain View Elementary School in Rockingham and Keister, Waterman, and Stone Spring Elementary Schools in Harrisonburg.

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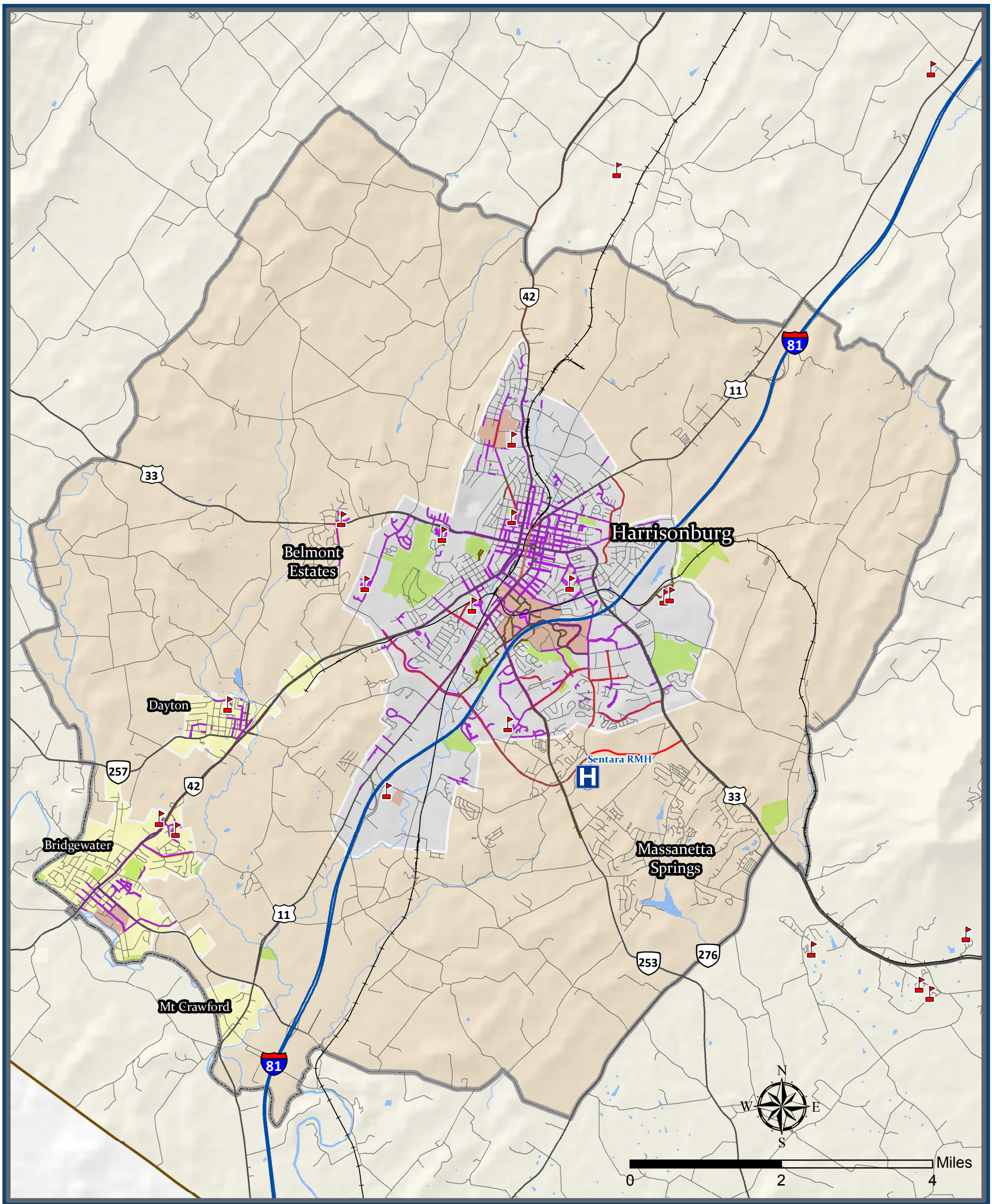

HRMPO Bike/Ped Plan - Existing Network

- Public School
- Higher Education
- City Boundary
- Town Boundary
- Local Park
- Railroads
- HRMPO Boundary

Existing Bike/Ped Facilities

- Bike Lane
- Sharrow
- Shared Use Path
- Sidewalk

Data Source(s):
Commonwealth of VA, USGS,
VDEM, McCormick & Taylor,
Rockingham County, City of Harrisonburg.

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September 2015

Map 1

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B. Existing Plans, Projects, and Programs

There are several important bicycle/pedestrian improvement projects in various stages of planning and development. When completed, these will close critical gaps in the system. All of these projects have been included in this plan and are represented as recommendations as they are not yet completed. Some of the more notable projects include:

- **Northend Greenway** – This paved shared use path, currently in preliminary design, would provide access through the north part of the City from Eastern Mennonite University in the northwest to East Washington Street, just north of downtown.
- **SR 42 Widening, Dayton/Rockingham County** – VDOT has acquired right-of-way and done preliminary design for the widening of SR 42 to include wider shoulders (to better accommodate bicycle and buggy traffic) from Eberly Road in Dayton to Garbers Church Road, just south of the City. Rockingham County was recently awarded a grant to construct this segment of the facility.
- **Reservoir Street Widening, Harrisonburg/Rockingham** – This City project is currently under construction for a project to widen Reservoir Street from University Blvd to the City/County Line from two lanes to five lanes. This project will include bicycle lanes and sidewalk on both sides of the new facility. Rockingham County is also in final design for the extension of that widening into the County as far south as Stone Spring Road and Sentara RMH. That project is currently anticipated to include striped 5' shoulders with open drainage (no curb & gutter) and a 40 mph speed limit.
- **Bridgewater Bypass** – In 2009, VDOT completed an Environmental Assessment for this proposed limited-access four-lane road that would connect from Dinkel Avenue (SR 257) on the east side of Bridgewater to SR 42 north of Bridgewater. This facility will include a 14' adjacent shared use path that will accommodate horse and buggies as well as pedestrians and bicyclists.

C. Existing Bicycle and Pedestrian Counts

Starting in 2012, the City and County have cooperatively participated in the National Bicycle and Pedestrian Documentation Program. At 27 locations in 2015, City and County staff and volunteers counted the number of bicyclists and pedestrians during weekday peak and weekend hours. The most recent counts were done between September 12 and September 15, 2015, the same week that similar counts were being done across the country. **Table 3** displays the data during this program over the past four years.

Table 3. Bicycle Pedestrian Count Data, 2012-2015

Year	# of Sites	Bicyclists	Pedestrians
2012	18	426	1,857
2013	26	776	3,084
2014	36	386	3,653
2015	27	387	3,868

D. Regional Bicycle and Pedestrian Crashes

The information below is provided by the Virginia Department of Motor Vehicles. It is important to note that this data only includes reportable crashes – crashes that involved injury, fatality, or significant property damage. It is likely that there are many crashes that are not reflected in these statistics because they were minor crashes (for example, a motorist striking a bicyclist but the bicyclist able to ride away unscathed) that were either never reported to police or for which the police were not required to submit a crash report to the statewide database.

The region has experienced seven to fourteen annual bicycle-related crashes for the period from 2008 to 2012. On a statewide level, Virginia has seen a 12% increase in crashes for this same period.

Two fatal bicyclist accidents were recorded in the Harrisonburg-Rockingham region during the 2008-2012 period, both occurring in 2009. Ten bicycle injuries were reported in Rockingham and four were reported in Harrisonburg during the 2008-2012-time period. Bicycle-related crash data is displayed in **Table 4**.

Table 4. Total Reported Bicycle-Related Crashes, 2008-2012

Year	Harrisonburg	Rockingham**	Harrisonburg-Rockingham Total	Statewide
2008	3	4	7	716
2009	3	8	11	643
2010	7	3	10	641
2011	10	4	14	749
2012	4	8	12	804
TOTAL	**27**	**27**	**54**	**3553**

**data includes both MPO and non-MPO sections of the County.

The region saw a spike in crashes involving pedestrians in 2010. Otherwise, the 2012 data is generally consistent with the 2008 data. This does not correlate with the statewide experience, which has shown a 10% increase in the number of pedestrian-injury crashes from 2008 to 2012. (Note that data is not available on crashes involving pedestrians in which the pedestrian was not injured.) Four pedestrian fatalities in Rockingham and three in Harrisonburg occurred during the 2008-2012-time period. Pedestrian-related crash data is displayed in **Table 5**.

Table 5. Total Reported Pedestrian-Related Crashes, 2008-2012

Year	Harrisonburg	Rockingham**	Harrisonburg-Rockingham Total	Statewide
2008	14	8	22	1696
2009	9	8	17	1402
2010	27	6	33	1586
2011	10	8	18	1712
2012	11	12	23	1862
TOTAL	**71**	**42**	**113**	**8258**

**data includes both MPO and non-MPO sections of the County.

INFRASTRUCTURE DESIGN STRATEGIES

There are many different engineering strategies for improving the bicycle and pedestrian network that make up the toolkit of infrastructure improvements for the HRMPO. The following chapter provides a list of the potential design strategies that the region can evaluate as potential infrastructure improvements. These strategies have been used to develop the comprehensive recommendations for the facilities and priorities put forth in this Plan.

The design of these facilities should be implemented in accordance with local codes and design standards along with the following:

- AASHTO – Guide for the Planning Design, and Operation of Pedestrian Facilities
- ADA 2010 – Standards for Accessible Design & Guidance
- American Association of State Highway and Transportation Officials (AASHTO), Guide for the Development of Bicycle Facilities
- Association of Pedestrian and Bicycle Professionals (APBP) – Bicycle Parking Guidelines
- Commonwealth Transportation Board (CTB) – Policy for Integrating Bicycle and Pedestrian Accommodations
- Federal Highway Administration (FHWA) – Memorandum: Bicycle & Pedestrian Facility Design Flexibility
- FHWA – Separated Bike Lane Planning & Design Guide
- FHWA – Manual on Uniform Traffic Control Devices (MUTCD)
- FHWA – Separated Bike Lane Planning and Design Guide
- National Association of City Transportation Officials (NACTO): The Urban Bikeway Design Guide:
- NACTO – Urban Street Design Guide
- Public Rights-of-Way Access Advisory Committee – Special Report: Accessible Public Rights-of-Way Planning and Design for Alterations
- United States Department of Transportation: Policy Statement on Bicycle & Pedestrian Accommodation Regulations and Recommendations
- US Access Board – Accessibility Guidelines for Outdoor Areas
- US Access Board – Proposed Rights-of –Way Guidelines (PROWAG)
- VDOT – Virginia Supplement to the Manual on Uniform Traffic Control Devices (MUTCD)
- VDOT – Road Design Manual, Section A-5
- VDOT – Road & Bridge Standards
- VDOT – Structure & Bridge Manual, Vol. V, Part 2, Chap. 6 (Geometrics)

A. Bicycle Facilities

The following types of bicycle facilities and treatments are recommended in this plan:

Shared-use Path

Where space and right-of-way are available, shared-use paths have the greatest potential to increase the number of pedestrian and bike trips in a community. The comfort and safety benefits of shared-use paths go far beyond those offered by any other potential improvement type and should be seen as the best option and focus of any region's bicycle and pedestrian system.

A shared-use path, sometimes also referred to as a multi-use trail or a greenway when incorporated into a linear park or open space, is a path separated from the road and not open to motor vehicle traffic (except emergency service providers and maintenance vehicles). They serve both bicyclists and pedestrians including wheelchair users, as well as other recreational users like in-line skaters and joggers. Shared-use paths often attract high numbers of pedestrians and bicyclists, especially those who would otherwise not make a trip on foot or by bike along a busy corridor or in traffic with motor vehicles.

Shared-use paths should be a minimum of ten feet wide with two-foot shoulders. Wider (12-14 foot) trails should be considered where possible, particularly in areas with high volumes of users. Shared-use paths can be narrowed to eight feet for short sections of trail where there are unusual constraints that prohibit a wider trail and lower volumes of users are expected. These narrower paths are recommended only in areas where bicyclist and pedestrian volumes are expected to be low even during peak hours; where the horizontal and vertical alignment provides frequent passing and resting opportunities; and where the path won't be regularly subjected to maintenance vehicle operations that could cause pavement edge damage. Shared-use paths are typically maintained either by a local, regional, or statewide agency. This should include prompt plowing of these paths following a snow fall.

A shared-use path that is parallel to a road is sometimes called a side-path. Side-paths should be separated from the road by at least five feet. Examples in this region include the recently-constructed paths parallel to Linda Lane and Port Republic Road. Side-paths are only recommended for roads that have few crossing intersections and driveways, because of the higher potential for driver/bicyclist conflict at each of those crossing points. Other popular locations for a shared-use path include former railroad alignments (Rails To Trails) or current railroad alignments (Rails With Trails).

Greenways

Greenways are linear natural areas often following streams or rivers that can include shared-use paths or other active transportation opportunities. They connect recreational facilities, historic sites, and cultural features with each other and with population centers. They also may serve as parks unto themselves. As natural areas, they are often scenic and offer recreational opportunities such as hiking, bicycling, horseback riding, and other opportunities. Areas suited for greenway development typically are existing trails, ridgelines, abandoned railways, utility corridors, scenic roads, and river/stream corridors. In some situations, greenways following a river can provide access to blueways, water systems used for canoeing, kayaking, and fishing among other activities.

Bluestone Trail

Communities seeking ways to enhance and protect their natural resources, strengthen the local economy, and enhance transportation alternatives often look to greenways as a potential solution. Greenways not only offer recreation opportunities, but also impact economic and community development, tourism, and generally improve quality of life for residents. Greenways offer communities a way to integrate housing, education, employment, transportation, tourism, and recreation into a comprehensive system by linking people with natural areas, parks, neighborhoods, schools, and commercial areas.

The Bluestone Trail in Harrisonburg is a recently opened example of a shared-use path and greenway which is already seeing high use and popularity locally. The trail is currently one mile in length but plans to extend it are already progressing. It is recommended that the regional entities explore development of comprehensive Greenways Plans to identify all the potential alignments, funding opportunities, and design specifications in detail.

Wayfinding System

In many cases bicyclists can be served by simply using the travel lanes with motor vehicles. However, identifying these routes through signage can help inform bicyclists as to which roadways are more preferable routes to reach certain destinations and indicate to motorists to expect bicyclists.

This treatment applies to roads which most bicyclists would be comfortable riding on under the existing conditions. On roads with low to medium levels of motor vehicle traffic, where constraints present a barrier to construction of a facility, this

option can provide additional comfort to bicyclists for a small cost. Wayfinding signs are appropriate on routes that provide a primary connection to a destination or that follow a particularly popular recreation route. Bicyclists' comfort level is generally based on the traffic volumes, speeds, and truck volumes on the road, as well as terrain.

Many of the lower-volume two-lane roads in the region are very scenic roads, and widening these roads to provide shoulders could detract from their scenic nature. In previous years, it has been common in Virginia and elsewhere to post a yellow diamond-shaped Bicycle Sign with a "Share the Road" plaque below it. However, the meaning of these signs is somewhat ambiguous and more recently, bicycle advocates and planners have suggested reducing the use of that sign.

Bicycle destination/wayfinding signs can serve a similar purpose as the "Share the Road" signs do, in that they make drivers and other bicyclists aware that there is likelihood that bicyclists will be present. It is recommended that the region pursue a region-wide network of bicycle wayfinding signs to both make the region more welcoming to visitors and to improve safety by focusing bicyclists onto roads where awareness by motorists is higher.

It is also recommended that bicyclist use Harrisonburg's Bike Comfort Map to identify and assist with navigation through the City on roads that provide greater motorist awareness of bicyclists. (Harrisonburg-BikeMap)

Sharrows

Shared lane markings, also known as sharrows, are typically used in locations where bicycle lanes are desirable but not possible because of physical constraints. Another common location for them is in downtown urban areas (for example the Court Square area of downtown Harrisonburg) where widening the road is simply not feasible. Sharrows are only intended for roads with a speed limit of 35 mph or less. They should typically be placed immediately downstream of intersections and at intervals of no greater than 250 feet. In addition to alerting motorists to the potential presence of bicyclists and reinforcing their legitimacy on the road, sharrows also aid bicyclists in proper lane positioning. It is a common misperception among bicyclists and motorists alike that bicyclists must hug the far right edge of the travel lane, when in reality it is often safer for bicyclists to ride more towards the middle of the lane (to increase their visibility and discourage motorists from trying to pass the bicyclist at a very close distance without waiting for a gap in oncoming traffic). This positioning is particularly important when there is adjacent on-street parking. Sharrows encourage bicyclists to place themselves far enough away from parked cars that they are not at risk of being "doored" when a motorist opens a car door into the path of a bicyclist.

Shared Lane Marking in Downtown Harrisonburg

Bicycle Lanes

Bike Lane Between On-Street Parking & Travel Lane

A bicycle lane designates an on-road travel lane for bicyclists with signage, pavement-striping, and symbols. Striped bicycle lanes should be a minimum of four feet wide (excluding the gutter pan) on roads with a gutter pan, five feet wide on roads without gutter pans, and wider adjacent to on-street parking. Bicycle lanes are almost always located on both sides of the road (except for one-way streets) and usually carry bicyclists in the same direction as adjacent motor traffic. In some cases, contra-flow bike lanes where bicyclists travel against traffic are necessary to make connections in a bicycle network. Design of bicycle lanes should avoid stormwater inlets in the lane except those that are designed to be bicycle-friendly (because they will not catch the wheel), and should also be designed to avoid crossing railroad tracks at acute angles.

Bicycle lanes are typically considered most appropriate on urban or suburban roads with a posted speed of ≥ 25 to 45 mph and ≥ 3,000 ADT. It is recommended that a physical separation in the form of buffered or protected bike lanes be used wherever possible, and it is highly recommended for roads with higher traffic volumes and speeds. On roads with a more rural character, a striped/signed bicycle lane is typically not used.

A key consideration for bicycle lanes is a careful assessment of where they are placed when passing through intersections or adjacent to on-street parking. Bicyclists may need to leave a bike lane to make a left turn, pass other bicyclists, or avoid obstacles and debris in the lane.

Bicycle/Buggy Lane

Bicycle/Buggy Lane, Shipsewana, IN

In rural areas of the county with high concentrations of Old Order Mennonites, bicycle/buggy lanes may be recommended. These are eight- to ten-foot paved lanes on the outer edge of roadways which allow use by buggies as well as bicycles. VDOT has approved and developed a specific sign for use on bicycle/buggy lanes in the Commonwealth which should be used in such cases.

Road Diet/Lane Diet

On some roads it may be possible to achieve bicycle lanes with simple restriping. Two separate but similar strategies are a lane diet (reducing the width of the travel lanes) and road diet (restriping the road to reduce the number of vehicular lanes). Road diets and lane diets could also involve reconfiguring or eliminating on-street parking. Reducing the number of lanes often means lowering design speeds for motor vehicles as well. Benefits derived from lowered vehicle speeds include improving safety, traffic operations and area livability. FHWA has published a "Road Diet Information Guide". This guide provides greater detail about the benefits and tradeoffs associated with Road/Lane Diets (FHWA Road Diets)

Road Diet before and after in Reston, VA

Paved Striped Shoulder (Widened Shoulder)

This treatment is applicable to more rural roads, most of which have open drainage (no shoulder). These are very similar to bicycle lanes, except that they are not explicitly signed and striped as bicycle facilities.

Paved striped shoulders are generally recommended on higher-volume rural roads (above 3000 vehicles per day), where most bicyclists would not feel comfortable sharing the lane with motorists. The shoulders provide a designated area for bicyclists to travel without impeding traffic approaching from behind. Paved shoulders also provide safety benefits to motorists by reducing the risk of collisions with bicyclists and providing additional space to utilize in emergencies.

Ideally, shoulders should have at least four feet of paved width in order to provide adequate accommodations for bicyclists. However, in the interest of providing some safety benefit to bicyclists in cases where a four-foot shoulder is not possible, it is recommended that through its typical maintenance programs VDOT strive to provide whatever

shoulder is possible, working within available right-of-way and budget constraints. On larger construction or reconstruction projects a four foot shoulder should be pursued.

These striped shoulders should be kept free of inlets and other obstructions. In addition, on roads with rumble strips, the rumble strips should be designed to be bicycle-friendly (VDOT RS-5 standards). These bicycle-friendly rumble strips provide periodic breaks in the rumble strips (approximately every 50 feet) so that bicyclists have the ability to shift from riding on the shoulder to riding in the road without having to dismount, for example when a bicyclist is approaching an intersection intending to turn left.

Climbing Lane

For roads with a steep hill and only enough width for a bicycle lane on one side of the street, a climbing lane may be an appropriate treatment. Climbing lanes are implemented by having a bicycle lane for the uphill direction and a shared lane marking on the downhill direction. The intention of the treatment is to allow bicyclists safe clearance as their speeds slow going up the hill.

Intersections and Signals

Bike lanes and sharrows can also extend through an intersection to further define the bicyclist's space in traffic. Dotted line extensions mark the bicyclist's space through the crossing, while chevrons or green paint can also be used to raise bicyclist's visibility in the intersection.

Signage and pavement markings are also useful for preventing "right hook" crashes between bicyclists and vehicles when the driver turns right and hits a bicyclist traveling straight through the intersection. Placing the bike lane to the left of the right turn bay solves this problem. Combined bike lanes/vehicle turn lanes are another option where a right turn lane exists, yet there is not enough space to maintain a bicycle lane at the intersection; however such configurations may only be comfortable for confident cyclist.

Signalized intersections are often a challenge for bicyclists if an in-ground loop detector system is used to control the signal interval. As signals are upgraded or funding is available, signal detectors should also be upgraded to add systems that detect bicycles, or video-based detection in the shoulder should be considered.

Intersection Striping

Combined Bike Lane/Turn Lane

B. Pedestrian Facilities

As a general rule, sidewalks should be installed on both-sides of every street where people live, work, go to school, or may desire to walk to other key pedestrian attractions. Sidewalks are typically only recommended in urban and suburban areas; they are not considered as necessary in more rural areas with sparser density unless they are located within developed neighborhoods.

Sidewalks should be designed to meet all ADA and VDOT standards wherever possible. This includes providing a five-foot minimum width, and ideally should include a four-foot buffer space between the sidewalk and back of curb. ADA-compliant curb ramps should be installed at all intersection crossings. Pedestrian signals and marked crosswalk should be provided at all signalized intersection crossings where there is sidewalk on both sides of the intersection.

Sidewalks are just one component of making an area a pedestrian-friendly area. Other amenities, such as shared use paths, street trees or other landscaping buffers, pedestrian-scale lighting, and street furniture are all significant additions that will encourage people to walk.

C. Funding Opportunities

All of the recommended improvements to the region's bicycle and pedestrian network will require funding. The development of this plan is an important first step in getting specific projects on a locality's Capital Improvements Plans and/or the state's Six-Year Improvement Plan, which are the plans that set aside the funding earmarked for specific projects.

Some specific sources of funding are:

- **Building Bicycle/Pedestrian Accommodations into Other Projects –** The most cost-effective way to build bicycle and pedestrian infrastructure is to adopt a policy of including bicycle and pedestrian accommodations into other roadway improvements projects. This could include major roadway projects, as well as incorporating bicycle lanes, where appropriate, when restriping/repaving projects are scheduled.

- **Locality Capital Improvement Budgets –** For localities that maintain their own roads (Harrisonburg and Bridgewater), projects can be funded with money from the locality's capital improvements budget.

- **Revenue Sharing –** This state-funded program allows localities (Counties, Cities, or Towns) to apply for state revenue to be earmarked to specific projects. This funding can be applied to a wide variety of projects, including new roadways, expansion/widening of existing roadways, improvements to existing pedestrian/bicycle facilities, or construction of new bicycling/walking facilities.

Revenue Sharing projects typically require a local match, with the locality providing 50% of the project costs and the state providing the remainder. The VDOT Local Assistance Division webpage is a good resource for additional information on this program (VDOT Local Assistance).

- **Transportation Alternatives Program (TAP) –** This federally-funded program became effective October 2012 as a part of federal transportation-funding legislation. The TAP program combines several programs that used to be considered separate stand-alone programs, including the Transportation Enhancement (TE), Recreational Trails, and SRTS programs.

  The TAP program funding is available for a wide variety of projects. With respect to bicycle and pedestrian infrastructure, it can be used to fund the development of safe routes to schools bicycle/pedestrian network improvements or other types of improvements to the bicycle and pedestrian network.

  In Virginia, TAP projects are typically administered by the localities or by the local MPO with VDOT oversight. A great source for additional information about this program is the VDOT website on the TAP program (VDOT Transportation Alternatives Set Aside).

- **Highway Safety Improvement Program (HSIP) –** The Federal HSIP program emphasizes a data-driven strategic approach to improving highway safety. A highway safety improvement project corrects or improves hazardous road locations or addresses a highway safety problem, including safety problems involving bicyclist or pedestrian movements.

  In Virginia, HSIP projects are typically administered directly by VDOT, or by localities but with VDOT oversight. A great source for additional information about this program is the VDOT website on the HSIP program (VDOT HSIP).

- **Land and Water Conservation Funds –** The Land and Water Conservation Fund Act of 1965 established a federal reimbursement program for the acquisition and/or development of public outdoor recreation areas including trails. The Land and Water Conservation Fund (LWCF) is administered by the Department of Conservation and Recreation (DCR) on behalf of the National Park Service. A key feature of the program is that all LWCF assisted areas must be maintained and opened, in perpetuity, as public outdoor recreation areas. (LWCF Coalition)

- **Recreation Trails Program –** The Recreational Trails Program (RTP) is a matching reimbursement grant program for the building and rehabilitation of trails and trail related facilities. DCR partners with the FHWA to run the program. Funding may be awarded to city, county, town or other government entities or registered nonprofit groups partnering with a governmental body. (FHWA Recreational Trails)

- **Private Funding –** With state and federal transportation dollars becoming more scarce, it is increasingly important to recognize the role that key area stakeholders and local nonprofit groups can play in securing money to pay for bicycle and pedestrian network improvements. Non-profit organizations can be especially helpful in securing funding for on-going maintenance. Possible sources of private funds could include local bicycling clubs, community health advocates, downtown redevelopment groups, major local employers, and local universities.

- **SMART SCALE Grant Program –** The SMART SCALE Grant program provides funding for projects that incorporate bicycle and pedestrian facilities as well as those that construct these facilities as stand-alone projects. These two grant programs combine to distribute more than half of all federal and state transportation construction funds in the Commonwealth through a performance-based scoring system. Projects involving bicycle and pedestrian facilities are awarded points through the prioritization process not available to projects that do not include them. This effectively results in bicycle and pedestrian facility based projects scoring well and having higher probability of being funded.

VI. FACILITY IDENTIFICATION & PRIORITIZATION

The overarching goal of developing the bicycle network is to create connections among destinations that will be safe and comfortable for a wide range of bicyclists' abilities. The goal of the pedestrian network is to focus on small areas of high demand that would benefit most from improved sidewalk, crosswalk, and other infrastructure.

The City of Harrisonburg has a detailed Bicycle and Pedestrian Plan that was previously developed and is currently going through an update with an expected completion date in 2017. It should be noted that because of the population density in the City, a greater level of bicycle and pedestrian connectivity is needed. This plan is focused on a more general or regional view of needs. Recommendations in this plan do not address all of the needs within the City, or all of the potential recommendations to address those needs. The City's Bicycle and Pedestrian Plan should be referenced for that more detailed assessment.

Rockingham County is in the process of creating its first Bicycle and Pedestrian Plan, which addresses needs and recommendations for projects outside the MPO planning area. The prioritization methodology for the County's Plan is very similar that that of the MPO Plan, and recommended projects for the MPO area are intended to complement and connect to projects in the more rural areas of the County.

A. Initial Methodology

There were two separate phases in the development of the recommended facilities and priorities for this plan. The study team initially performed an analysis that identified a list of recommendations for facility improvements. However, staff and the local committees felt the process was too qualitative and in the end were unable to fully agree on the proposed improvements recommended. Therefore, the study team went back and reevaluated all recommendations through a more in depth and quantitative approach. In doing so the study team took into account the data collected, the initial recommendations and all comments received on those recommendations. This resulted in some duplication of efforts in separate phases but also provided improved assessments at each level of analysis. Public input from the initial online survey, the online wikimap, and the stakeholder meeting were all performed early in the process and information from these efforts informed each subsequent step of the process.

The development of the initial recommendations involved the following methods in addition to the public outreach.

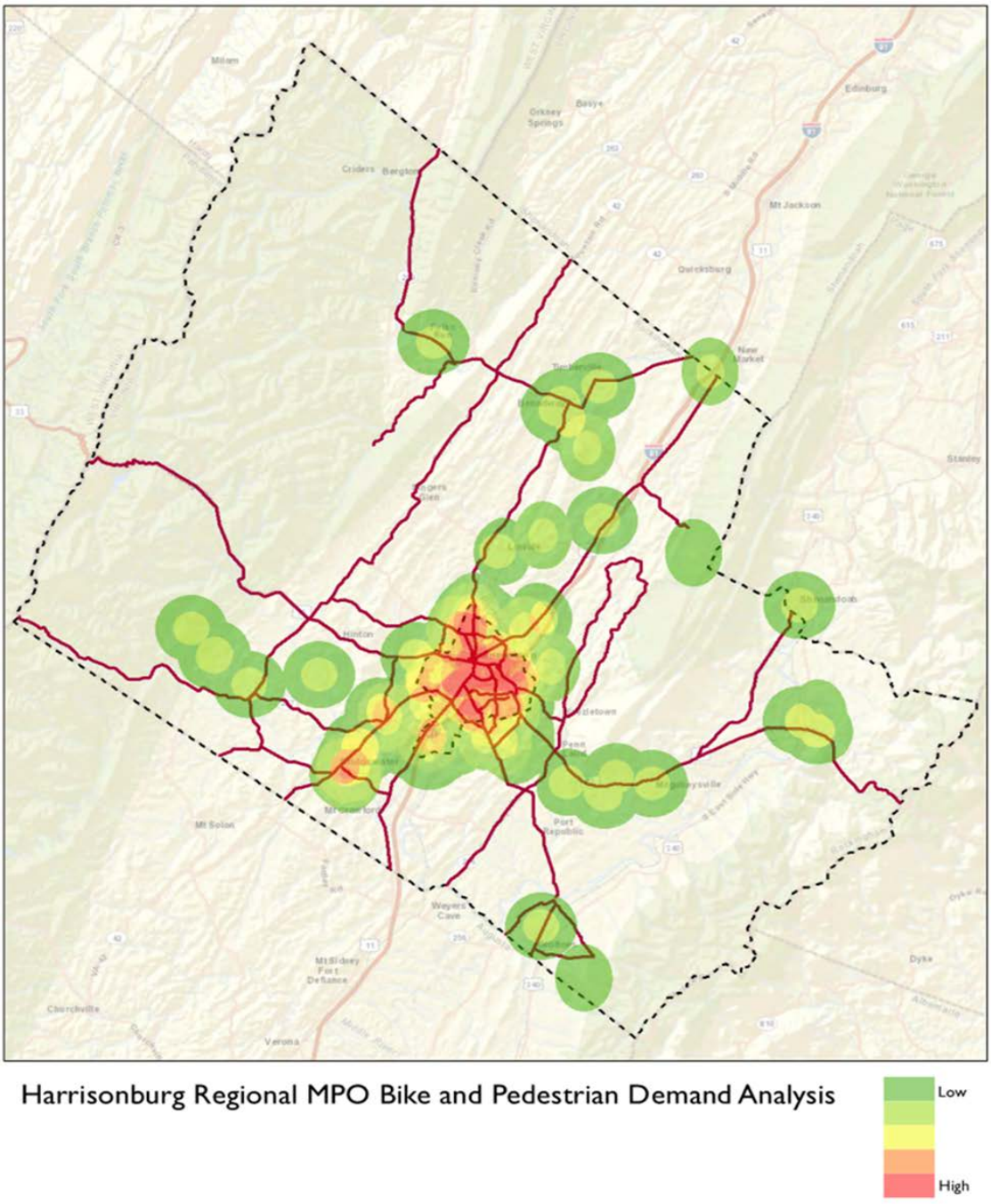
Demand Analysis

Input gathered from the HRMPO BPC and RBAC meetings helped develop an initial demand analysis map that identified those areas of the region that are most likely to generate or attract pedestrian or bicycle trips. This demand analysis was created by coding individual locations that are likely attractors or generators of pedestrian or bicycle activity, such as schools, major shopping destinations, and areas of high residential density. Input from the

HRMPO BPC was used to weight these locations, giving them greater significance in the final analysis. Each type of land use was also assigned a radius of influence ranging from ¼ mile or ¾ mile based on an assessment of how far pedestrians or bicyclists would travel to access the given location. These weighted geographies were layered upon each other to create a "heat-map" where the "hottest" areas are those that scored highly because they contain multiple attractors or generators. **Figure 3** displays the Initial Heat-map.

As might be expected, the urban core of the region generates the most heat; however, the map also illustrates other key corridors including the Bridgewater-Dayton-Harrisonburg corridor along SR 42 and the US 33 corridor east of Harrisonburg.

Figure 3: Initial Heat Map



Field Review

The purpose of the field review was to capture basic information about each road. The study team recorded curb-to-curb widths, pavement widths, roadway configuration, character, speed limits, extents of existing right of way, and any notable land uses or existing facilities that might impact recommendations.

The *curb-to-curb* and *roadway widths* are vital to making on-road recommendations as bicycle and pedestrian facilities require roadway space that may need to be reallocated to fit those facilities. In some cases, pavement widening or right-of-way acquisition may also be necessary.

Roadway configuration and *width of lanes* was gathered because some recommendations may impact the number, configuration and width of lanes. Implementation of these types of recommendations will often require further traffic study to understand how current and future traffic levels would be impacted by a potential lane removal.

Motor vehicle travel speeds have a large impact on how comfortable bicyclists and pedestrians feel sharing road space with or walking near moving automobiles. *Speed limit* data was collected to inform recommendations for this reason.

Further notes were made about *notable destinations* that may spur bicycle or pedestrian traffic that were not previously identified. *Existing facilities* such as buffer strips between the road and sidewalk, parking lanes, and crosswalks were also noted. The team also noted the character of the road itself, whether it was hilly or twisting which can have a large impact on all vehicles' speeds and ability to see other road users.

Given the large geography covered, most of the field evaluation was done via car, however the study team also arranged for a bicycle-based field view. This ride was focused on the Port Republic Road corridor south of Neff Avenue, Peach Grove Avenue, and the residential neighborhood between Port Republic Road and Reservoir Street just south of the City/County line. This field evaluation provided a valuable opportunity for the study team, staff, and committee members to view the differing conditions (good and bad) that bicyclists and pedestrians currently experience in the region.

Bicycle Field Evaluation on Port Republic Road

Average Daily Traffic Evaluation

After completing field work, the team reviewed existing data about ADT on roads within the study network. ADT is an important piece of information in determining what bicycle facility is appropriate for a given roadway. In the City of Harrisonburg and the Towns or other high-demand areas identified in the demand analysis map, facilities were chosen that made network connections and were focused, as much as possible, on roads with lower ADT and speed limits. In outlying areas, there are many locations where only one road connects destinations, so facilities were recommended for these roads. Pedestrian infrastructure recommendations were focused on an identified set of areas within the region and aim to fill gaps in existing infrastructure and connect high-demand areas.

Consistency Evaluation

The preliminary network was reviewed for consistency of facilities. Bicyclists, and other road users, prefer a consistent facility for the length of a given road since it creates an expectation of where bicyclists will be on the road. Facilities may change when the roadway character changes, such as entering a town from a more rural context.

Public and Committee Review

A preliminary set of network recommendations was presented to community stakeholders at a meeting on July 30, 2013. Attendees prioritized corridors in the region and identified areas that lacked recommendations. Feedback from this meeting was incorporated into new network recommendations and into the prioritization of facilities. These recommendations then went back to the HRMPO BPC and RBAC for further review and refinement.

B. Secondary Methodology

The following sections describe the four phases of analysis used to develop the final plan recommendations of prioritized infrastructure improvements. These four phases include the following which are described in detail in the next sections.

- **Level 1 –** Development of a Study Network
- **Level 2 -** Initial Route Identification
- **Level 3 –** Identification of Improvement Type
- **Level 4 –** Project Prioritization

Level 1 - Development of a Study Network

The first step in developing recommendations for bicycle and pedestrian infrastructure in the HRMPO Region was to create a Study Network. This set of routes and corridors can be generally described as the system that would form a complete network of bicycle and pedestrian connections throughout the region. The Study Network was identified

to guide further investigation through the following phases and was created based on a number of sources described below.

The study team used data collected on the existing and programmed bicycle and pedestrian infrastructure in the county, city, and towns as well as existing bicycle and pedestrian plans or proposed projects. These were supplemented with various recommended routes provided by local and regional websites, and input gathered from the public involvement phases of this planning process. This data provided routes where previous studies had identified needs, where connections between existing infrastructure were needed, and where bicyclists or pedestrians were currently riding or walking.

Direct input was then gathered from the HRMPO BPC during meetings to provide a set of routes throughout the region where infrastructure improvements should be focused. These routes were identified because of the connections to major recreation destinations, population, and employment centers; the high levels of vehicular, bicycle, and pedestrian traffic; and their locations along major transportation corridors where development tends to focus. The region overall was examined on a general level to anticipate future needs as development occurs, to address the needs of more rural residents, and to identify corridors that see high numbers of recreational bicyclists.

Greenways were also evaluated at this stage in order to identify potential corridors that could be utilized for off-road connections. Suitable locations for greenways include existing parks and trails, ridgelines, railways, utility corridors, scenic roads, and river/stream corridors. The region has many wooded landscapes, river valleys, and large tracts of open space and parks which offer exceptional opportunities to develop and extend greenways for walking and bicycling.

In order to identify potential corridors, Geographic Information System (GIS) program was used to map floodplains, railroad corridors, and utility corridors. These areas were focused on because they can be more easily acquired and developed by local government as a result of their lower desirability for residential or commercial development. The region has many potential areas for greenway development but one major corridor stood out for its location, connections to existing and planned facilities, and potential connections to population centers and corridors identified with needs. This corridor is a loop connecting the proposed Northend Greenway, through downtown Harrisonburg and the JMU campus, to the existing Bluestone Trail, then south along Blacks Run to Monger Park, and joining Cooks Creek north to Dayton then on to US 33.

Finally, all projects that were examined in the previously described initial analysis to identify a list of recommendations for facility improvements were carried forward as components of the Study Network. This data was collected in GIS format and mapped for review by the jurisdictions staff and the BPC. All of these routes combined collectively formed the Study Network. **Map 2** displays the Study Network.

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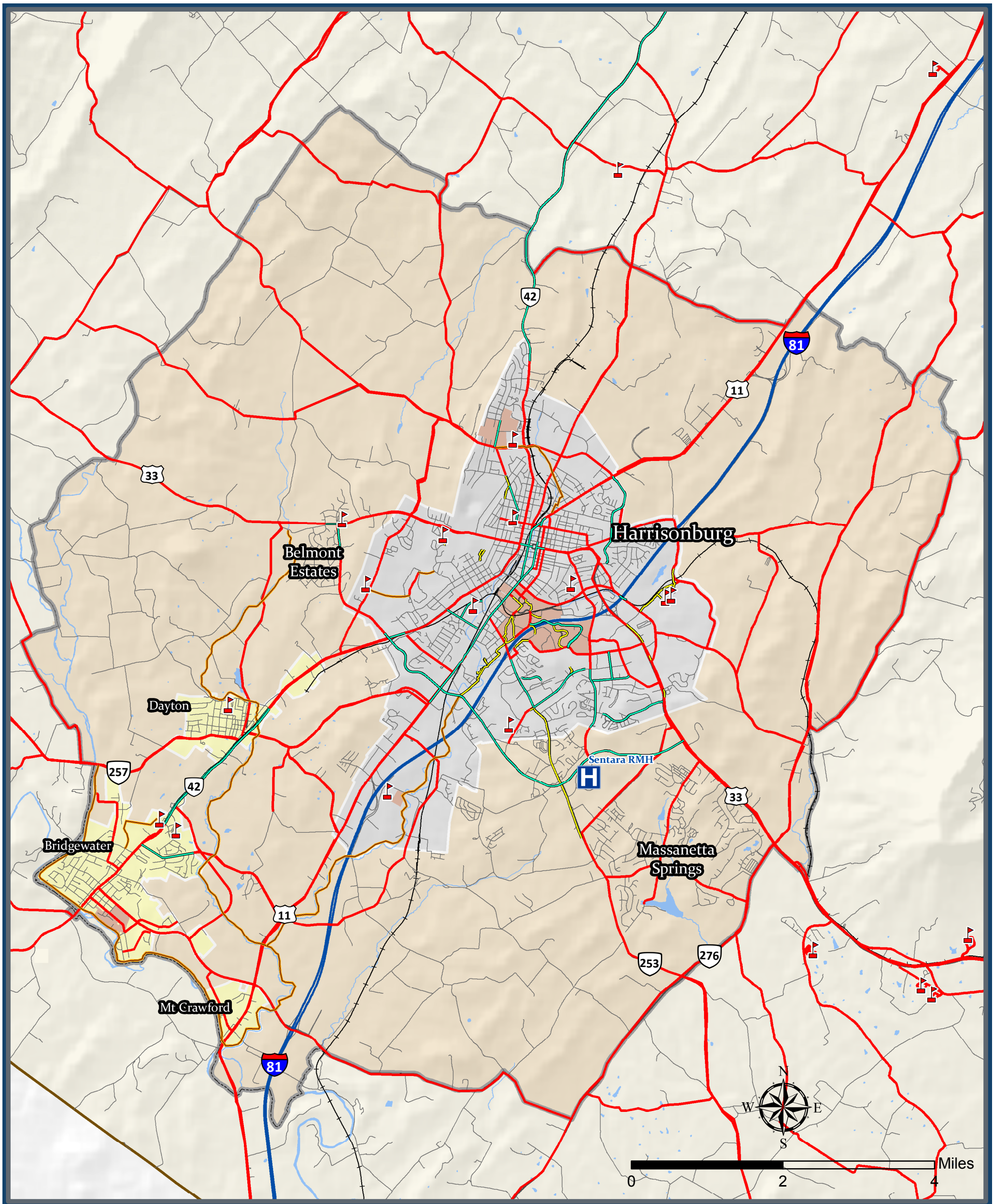

HRMPO Bike/Ped Plan - Study Network

- Public School
- Higher Education
- City Boundary
- Town Boundary
- Local Park
- Railroads
- HRMPO Boundary
- Existing Bike Facilities
- Existing Shared Use Paths
- Shared Use Path Study Network
- Bicycle Study Network

Data Source(s):
Commonwealth of VA, USGS,
VDEM, McCormick & Taylor,
Rockingham County, City of Harrisonburg.

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September 2015

Map 2

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Level 2 - Identification of Routes

The identification of routes selects those that will be focused on for facility improvements or recognition as important routes to be evaluated in further studies such as for wayfinding or recreation. This process was completed through the refinement of the demand analysis process that was created for the initial recommendations; however, the analysis at this level was much finer grained and resulted in a deeper picture of where in the city, county, and towns demand for bicycle and pedestrian facilities was greatest. The result was a map that quantified those areas of the HRMPO region that are most likely to generate or attract pedestrian or bicycle trips. **Map 2** displays the Study Network visually.

This demand analysis was developed in a similar manner as the earlier demand analysis, by coding individual locations that are likely attractors or generators of pedestrian or bicycle activity, such as schools, major shopping destinations, and areas of high residential density. **Figure 4** lists the data points analyzed for this exercise. Input from the HRMPO BPC, staff of the local jurisdictions, and public was once again used to "weight" these locations, giving them greater significance in the final analysis. These weighted geographies were layered upon each other to create a "heat-map" where the "hottest" areas are those that scored highly because they contain multiple attractors or generators.

Through this analysis, routes that are initially identified as both providing connections within and between the regional "hot" areas and those in need of some type of improvement are initially identified and then moved on to Level 3 analysis (**Map 3**). The remaining routes from the study network do not move on to the next round of the assessment although they could be further reviewed in the future for potential recreation routes and possible inclusion on a list for future planning consideration.

Table 6 provides a list of all initial Identified Routes recommended to advance to the next level of assessment.

Figure 4: Study Network Data Points

• Primary/Secondary schools	• James Madison University
• Harrisonburg Downtown Business District	• Parks
• Population density based on residential structures	• Wikimap points[12]
• Town Centers	• Hospital
• Community Centers & Libraries	• Major employers
• HDPT Transit Transfer Centers	• Major Shopping Centers
• Eastern Mennonite University	• Bridgewater College

[12] Wikimap points were gathered from the public input phase through the online wikimap program. Users were able to draw points and lines to provide input on bicycle and pedestrian needs in the region. Points were used to denote locations where they felt spot improvements are needed or origins/destinations people walk/bike to (or would like to walk/bike to).

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HRMPO Bike/Ped Plan - Identified Routes

- Public School
- Higher Education
- City Boundary
- Town Boundary
- Local Park
- Railroads
- HRMPO Boundary
- Existing Bike Facilities
- Existing Shared Use Paths
- Identified Routes

Data Source(s):
Commonwealth of VA, USGS, VDEM, McCormick & Taylor, Rockingham County, City of Harrisonburg.

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Map 3

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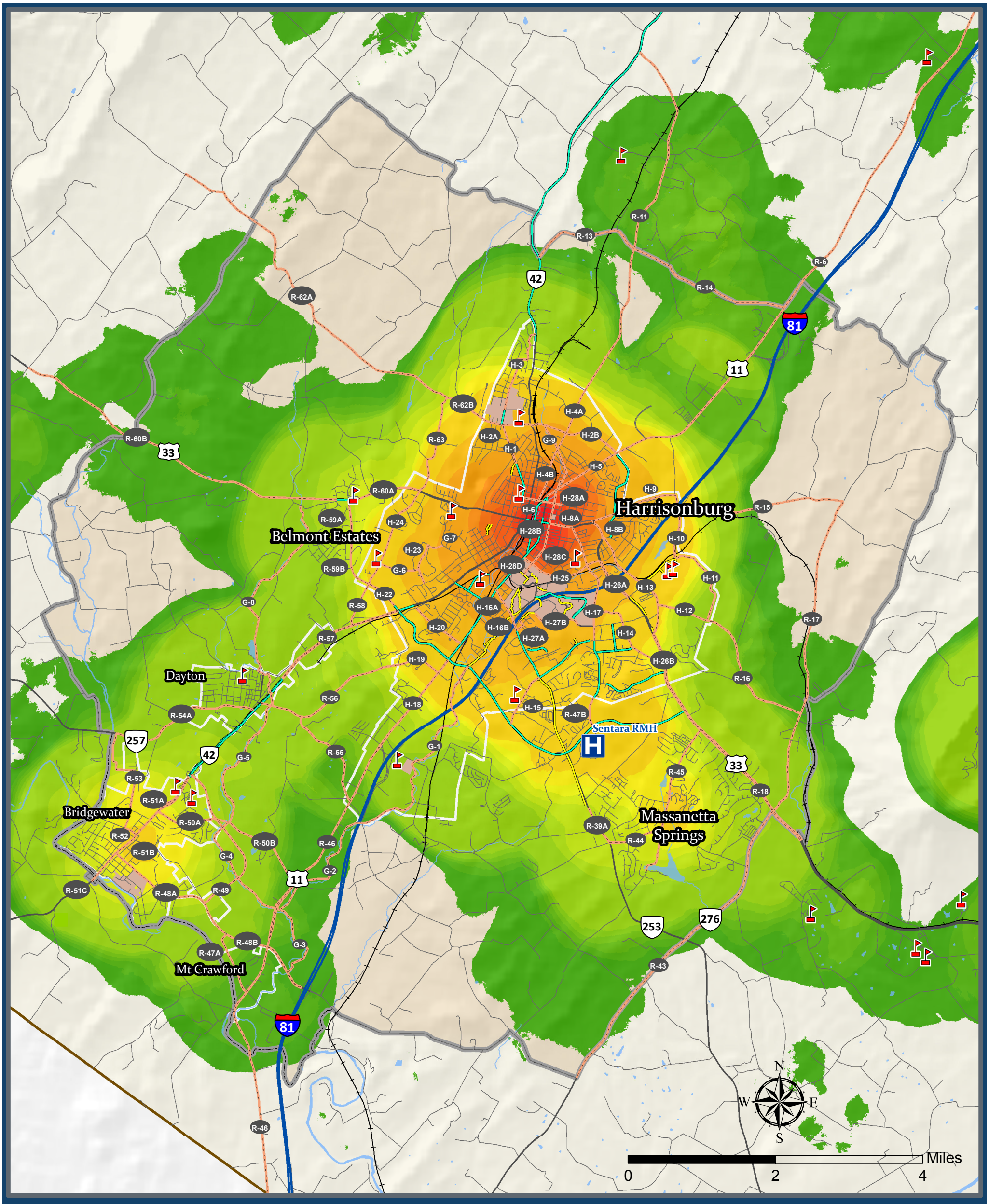

HRMPO Bike/Ped Plan - Identified Routes & Heat Map

- Public School
- Higher Education
- City Boundary
- Town Boundary
- Local Park
- Railroads
- HRMPO Boundary

Heat Mapping

- High Density
- Low Density

- Existing Bike Facilities
- Existing Shared Use Paths
- Identified Routes

Data Source(s):
Commonwealth of VA, USGS, VDEM, McCormick & Taylor, Rockingham County, City of Harrisonburg.

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Map 4

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Table 6. Identified Routes

Project ID	Route	From	To
G-1	Blacks Run Greenway	Bluestone Trail	Harrisonburg City Limit
G-2	Blacks Run Greenway	Rockingham County Line	Cooks Creek
G-3	Cooks Creek Greenway South	Blacks Run	Rockingham County Line
G-4	Cooks Creek Greenway Middle	Bridgewater Bypass	Blacks Run
G-5	Cooks Creek Greenway North	Bridgewater Bypass	W Mosby Rd
G-6	Hillandale South	Garbers Church Rd	Hillandale Ave
G-7	Hillandale North	Hillandale Ave	Circle Dr
G-8	Cooks Creek Greenway Extension	W Mosby Rd	Rawley Pike (US 33)
G-9	Northend Greenway	Mount Clinton Pike	Main Street
H-1	Chicago Ave	Mt Clinton Pk	Rockingham Drive
H-10	Smithland Rd	Old Furnace Rd	Linda Ln
H-11	Smithland Rd	Linda Ln	Keezeltown Rd
H-12	Keezletown Rd	Country Club Rd	Harrisonburg City Limit
H-13	Country Club Rd/Vine Street	Market Street (US 33)	Market Street (US 33)
H-14	Evelyn Byrd Ave	Reservoir St	Market Street (US 33)
H-15	Peach Grove Ave	Port Republic Rd	Stone Spring Rd
H-16	Port Republic Rd (SR 253)	S Main St (US 11)	Forest Hill Rd
H-17	Reservoir Street	Market Street (US 33)	University Boulevard
H-18	S Main St (US 11)	Stone Spring Rd	Harrisonburg City Limit
H-19	W Mosby Rd	S Main St (US 11)	Harrisonburg City Limit
H-2A	Mt Clinton Pike	Harrisonburg City Limit	Virginia Ave (SR42)
H-2B	Mt Clinton Pike	Virginia Ave (SR42)	N Main St (US 11)
H-20	Pleasant Hill Rd	S Main St (US 11)	S High St (SR 42)
H-22	Erickson Ave	S High St (SR 42)	Garbers Church Rd
H-23	Hillandale Ave	S Dogwood Dr	End
H-24	Garbers Church/Switchboard Rd	Erickson Ave	W Market St (US 33)
H-25	Martin Luther King Jr Boulevard	S Main St (US 11)	W Market St (US 33)
H-26A	E Market St (US 33)	Martin Luther King Jr Way	Burgess Rd/Linda Ln

Table 6. Identified Routes

Project ID	Route	From	To
H-26B	E Market St (US 33)	Country Club Rd	Harrisonburg City Limit
H-27A	Forest Hill Road/Oak Hill Dr	Port Republic Rd	University Boulevard
H-27B	University Blvd	Driver Drive	Reservoir Street
H-28	S Mason Street	Grace Street	Main Street (US 11)
H-3	Park Rd/Harmony Dr	Mt Clinton Pike	Virginia Ave (SR42)
H-4A	N Liberty St	Harrisonburg City Limit	Mt Clinton Pike
H-4B	N Liberty St	Mt Clinton Pike	Gay St
H-5	N Main St (US 11)	Harrisonburg City Limit	N Liberty St
H-6	E Gay St/Summit St	Chicago Ave	E Wolfe St
H-8A	E Market St (US 33)	N Mason St	Reservoir Street
H-8B	E Market St (US 33)	Wolfe St	Vine St
H-9	Old Furnace Rd	Vine St	Smithland Rd
R-11	Kratzer Rd	Harpine Hwy (SR 42)	Harrisonburg City Limit
R-13	Buttermilk Creek Rd	Harpine Hwy (SR 42)	Kratzer Rd
R-14	Gravels Rd	Kratzer Rd	N Valley Pike (US 11)
R-15	Old Furnace Rd	Smithland Rd	Indian Trail Rd
R-16	Keezletown Rd	Harrisonburg City Limit	Indian Trail Rd
R-17	Indian Trail Rd	Old Furnace Rd	Spotswood Trl (US 33)
R-18	Spotswood Trl (US 33)	Harrisonburg City Limit	Penn Laird Dr
R-39A	Port Republic Rd	Stone Spring Rd	Shen Lake Dr
R-43	Cross Keys Rd (SR 276)	Spotswood Trl (US 33)	Freiden's Church Rd
R-44	Shen Lake Dr	Port Republic Rd	Massanetta Springs Rd
R-45	Massanetta Springs Rd	Spotswood Trl (US 33)	Izaak Walton Dr
R-46	S Valley Pike/Lee Hwy (US 11)	Harrisonburg City Limit	Rockingham County Line
R-47A	Old Bridgewater Rd	Dinkel Ave (SR 257)	S Valley Pike/Lee Hwy (US 11)
R-47B	Reservoir St	Harrisonburg City Limit	Stone Spring Rd
R-48A	Dinkel Ave (SR 257)	Main St (SR 42)	I-81
R-48B	Dinkel Ave (SR 257)	Bridgewater Town Limits	I-81

Table 6. Identified Routes

Project ID	Route	From	To
R-49	Bridgewater Bypass	Main St/John Wayland Hwy (SR 42)	Dinkel Ave (SR 257)
R-50A	Oakwood Dr	Main St/John Wayland Hwy (SR 42)	S Valley Pike/Lee Hwy (US 11)
R-50B	Oakwood Dr	Bridgewater Town Limits	Main St/S Valley Pike/Lee Hwy (US 11)
R-51A	Main St/John Wayland Hwy (SR 42)	Bridgewater Bypass	Rockingham County Line
R-51B	Main St/John Wayland Hwy (SR 42)	Oakwood Drive	East Riverside Drive
R-52	North River Rd	Main St/John Wayland Hwy (SR 42)	Dry River Rd
R-53	Dry River Rd	North River Rd	Ottobine Rd/Mason St (SR 257)
R-54A	Ottobine Rd/Mason St (SR 257)	Main St/John Wayland Hwy (SR 42)	Dry River Rd
R-55	Pike Church Rd	Harrisonburg City Limit	W Mosby Rd
R-56	W Mosby Rd	Harrisonburg City Limit	Main St/John Wayland Hwy (SR 42)
R-57	John Wayland Hwy (SR 42)	Harrisonburg City Limit	Eberly Rd
R-58	Garbers Church Rd	Erickson Ave	Main St/John Wayland Hwy (SR 42)
R-59A	Erickson Ave	Rawley Pike (US 33)	Flint Ave
R-59B	Erickson Ave	Flint Ave	Garbers Church Rd
R-6	N Valley Pike (US 11)	Mayland Rd (SR 259)	Harrisonburg City Limit
R-60A	Rawley Pike (US 33)	Harrisonburg City Limit	Belmont Dr
R-60B	Rawley Pike (US 33)	Belmont Drive	Clover Hill Rd
R-62A	Mt Clinton Pike/Singers Glen Rd	Clover Hill Rd	Switchboard Rd
R-62B	Mt Clinton Pike/Singers Glen Rd	Switchboard Rd	Harrisonburg City Limit
R-63	Switchboard Rd	Mt Clinton Pike/Singers Glen Rd	Harrisonburg City Limit

Sidewalk Network Improvements

Evaluating the Study Network and the Heat Map at this level additionally provided key information that was used to identify potential sidewalk network improvements. As discussed earlier, the pedestrian improvements evaluation was concentrated on specific areas of high activity, which are very apparent through analysis of the Heat Map. Through layering of the Heat Map, the existing sidewalk network, the study network, and the collected wikimap data related to pedestrian infrastructure a clear picture begins to appear of pedestrian needs.

The Study Team analyzed this data along with information collected from the field review and input from the HRMPO BPC and RBAC to identify locations where sidewalk network connections were needed on segments of the Identified Network. Seven recommendations for sidewalk improvements were identified. The identified locations are discussed in detail in **Chapter 7, Recommendations**. The remaining levels of analysis focus specifically on the bicycle network.

Level 3 – Selection of Improvement Type for Proposed Facilities

The analysis at Level Three examines detailed factors of the Identified Routes to determine the appropriate improvement treatment that will provide the desired safety and service to the bicycle user. Data is gathered on the Identified Routes and either added to the associated table, reviewed on the maps, or considered in a more qualitative manner depending on the type of information available.

The first data points to be added to the Identified Routes Table (Table 6) are those that deal with safety. Traffic levels based on VDOT Average Annual Daily Traffic (ADT) data are represented on a scale from 1- 5 with 1 being extremely low ADT and 5 being extremely high. Speed limits are also added to the table. Routes with higher ADT and higher speed limits should be the focus of a higher level of improvements that would better protect bicycle and pedestrian users.

The next data point added to the table is a qualitative constraint rating developed by the project team. The constraint rating is a preliminary examination of right-of-way or physical constraints that would need to be addressed in order to provide the average amount of space needed to construct improvements. These ratings are based on review of aerial and online imagery, field visits, and information provided from the public and committee. A rating system of 1-5 is used and assigned qualitatively based on identified physical and right-of-way constraints on average over the entire route. Constraints include adjacent terrain, presence of bridges, existing shoulder and lane/pavement width, and frequency of structures or other developments near the roadway. A rating of 5 means little to no constraints and a rating of 1 means a high level of constraints that could result in extremely high construction costs.

A map review of identified routes in conjunction with the existing bicycle and pedestrian accommodations was done at this level to ensure connectivity is considered. At the same time, many of the region's important generators and attractors are considered spatially to ensure needs are being met. Other criteria that are considered during designation of improvement type include traffic signals and stops, current bicycle and pedestrian use, and aesthetic considerations.

All of this information is collated and reviewed in light of the improvement types that were discussed in the previous chapter and a recommended improvement type is assigned to each of the proposed facilities. Review of facilities in conjunction with the data and selection of improvement type also resulted in a recommendation of no improvement on a number of the Identified Routes. In some cases, near-term and long-term recommendations were evaluated in the event that a project could benefit from a short-term solution when a long-term solution is unlikely to be feasible.

Level 4 – Project Prioritization

Project prioritization is assessed through the assignment of a quantifiable scoring process results in a ranked list of improvements which are then assigned to one of three priority levels: 1st Priority, 2nd Priority, or Vision. The Project Prioritization was based on four general factors: Proximity, Connectivity, Safety, and Feasibility. Each factor is worth a total of ten points for a grand total of 40 points.

Proximity

Proximity refers to the relative distance between the route and the nearby attractors or generators of bicycle and pedestrian activity such as residential development, employment, shopping, schools, community centers, and other important destinations throughout the County. The proposed facility received points based on its proximity to any of the identified locations. The Study Team assigned each of the following location points based on the potential bicycle and pedestrian traffic it could attract or generate.

100 - JMU
45 - Bridgewater College
40 - Town Centers
30 - Primary/Secondary Schools
30 - Massanutten Resort
20 - HDPT Transit Transfer Centers
20 - Community Centers & Libraries
1 - Residence

75 - Harrisonburg Downtown Business District
45 - EMU
30 - Parks
25 - Hospital
25 - Shopping Centers
20 - Major employers
15 - Commercial Structures
5 - Wikimap points (Place I like to...)

The Study Team ran a proximity analysis in GIS to identify the number of structures and associated points located within a quarter of a mile of each Identified Route. The same analysis was then run for a half mile which correlates to a five-minute bicycle ride for the average rider, or what is known as a bikeshed; this allowed the Study Team to estimate the number of bicyclists each location could attract or generate. For example, a route running from the hospital to Albert Long Park would receive 25 points for the proximity of the hospital, 30 points for the proximity of the park, and one point for each residence. The two scores were then summed together, effectively giving twice the points for those generators within the quarter-mile radius. This provided the total score for each route.

All projects were then organized from highest to lowest and then categorized into ten roughly equal brackets with the lowest scoring tenth receiving one point and the highest scoring tenth receiving ten points.

Connectivity

Connectivity is an assessment of how each project links to the system of bicycle and pedestrian facilities. The connectivity assessment also incorporates previous planning efforts as the existing and proposed facilities both reflect the identified needs from previous plans. Points are awarded as follows:

- 10 – Project links to existing facilities at each end and one or more existing facilities within its length
- 8 – Project links to two or more existing facilities
- 6 – Project links to one existing facility
- 4 – Project links to Recommended Facilities at each end and one or more Recommended Facilities within its length
- 2 – Project links to 2 or more Recommended Facilities
- 0 – Project links to one or no existing or Recommended Facilities

Safety

Roadways with high speeds and high ADT present a danger to bicyclists and pedestrians. These roadways should be placed at a higher priority for improvements to remove the potential for crashes before they occur. As in the Level 3 analysis, Safety is measured by both speed of traffic and level of traffic. Depending upon the average speed derived in Level 3, each route was assigned a score as follows:

- 55 and over – 5 points
- 45 to 50 – 4 points
- 35 to 40 – 3 points
- 25 to 30 – 2 points
- 20 and below – 1 points

Similarly, using the ADT per lane deduced in Level 3, routes were evenly distributed into one of five brackets. The score assigned was based on the bracket the route fell in. The scoring was defined as follows with the numbers representing the average annual daily traffic per lane:

- 4237 to 8481 vehicles – 5 points
- 2825 to 4236 vehicles – 4 points
- 1931 to 2824 vehicles – 3 points
- 1093 to 1930 vehicles – 2 points
- 208 to 1092 vehicles – 1 point

Feasibility

The plan's feasibility rating has been incorporated into the prioritization process by promoting smaller, more economical projects over large-scale and less economical projects. Scoring Feasibility has been accomplished using two separate but related measures: constraints and costs. This approach was taken because this is the first HRMPO Bicycle and Pedestrian Plan, and because, once outside the City of Harrisonburg, very few biking or pedestrian facilities exist. This plan intentionally prioritizes more modest, economical improvements over larger, more complex and expensive projects that would likely not be completed for many years. This strategy will help the Region build a Bicycling and Pedestrian network that is flexible and accommodates future expansion and growth.

In order to assess constraints, the Constraint Rating used in the Level 3 analysis has been included in the scoring for the prioritization. The Cost Score is based on a planning level cost estimate. As such, this number relies on the cost of a type of facility multiplied by the length of the facility; it is extremely generalized. The cost estimates do not provide a specific cost but allow a comparison between and against each project. To generate the cost score, the Proposed Improvements were ranked from most to least expensive. These were then divided into five sets, with the least expensive projects receiving five points and the most expensive projects receiving one point. The sum of these two scores provided the overall feasibility score.

Table 7 displays the prioritized list of recommended bicycle facility improvements which are broken up into 24 First Priority projects, 23 Second Priority and 25 Vision projects. These are displayed visually in **Map 5**.

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Table 7. Prioritized Recommendations (First Priority)

Project ID	Locality	Route	From	To	Length (mi.)	Recommendation	Proximity Rating 1 - 10	Connectivity Rating 1 - 10	Speed limit Rating 1 - 5	AADT Rating 1 - 5	Cost Rating 1 - 5	Constraint Rating 1 - 5	Priority Score	HRMPO Rank
H-5	Harrisonburg	N Main St (US 11)	Harrisonburg City Limit	N Liberty St	1.12	Bike Lane	10	8	2.50	4.50	4	3.00	32.00	1
R-47B	Rockingham	Reservoir St	Harrisonburg City Limit	Stone Spring Rd	0.55	Bike Lane	8	8	3.00	4.00	5	3.00	31.00	2
H-16B	Harrisonburg	Port Republic Rd (SR 253)	Bluestone Dr	Forest Hill Rd	0.21	Shared Use Path	8	10	3.00	5.00	3	1.00	30.00	3
H-6	Harrisonburg	Gay St	Chicago Ave	Broad St	1.09	Sharrows	10	8	2.00	3.00	5	1.00	29.00	4
H-20	Harrisonburg	Pleasant Hill Rd	S Main St (US 11)	S High St (SR 42)	0.78	Climbing Lane/Sharrows	8	6	2.00	5.00	4	3.50	28.50	5
R-6	Rockingham	N Valley Pike (US 11)	Mayland Rd (SR 259)	Harrisonburg City Limit	9.12	Wide Shoulder	8	6	4.50	4.00	2	4.00	28.50	5
H-27A	Harrisonburg	Forest Hill Road/Oak Hill Dr	Port Republic Rd	University Boulevard	0.21	Shared Use Path	8	10	2.00	2.50	3	2.50	28.00	7
H-2A	Harrisonburg	Mt Clinton Pike	Harrisonburg City Limit	Park Rd	0.26	Bike Lane	8	6	2.00	3.50	5	3.00	27.50	8
R-60A	Rockingham	Rawley Pike (US 33)	Garber's Church Rd	Belmont Dr	0.67	Bike Lane	7	6	4.00	4.00	4	2.50	27.50	8
R-48A	Bridgewater	Dinkel Ave (SR 257)	Main St/John Wayland Hwy (SR 42)	I-81	1.76	Bike Lane	8	2	4.00	5.00	4	4.5	27.50	8
R-56	Rockingham	W Mosby Rd	Harrisonburg City Limit	Main St/John Wayland Hwy (SR 42)	2.13	Wide Shoulder	6	6	4.00	3.50	3	3.50	26.00	11
G-9	Harrisonburg	Northend Greenway	Mount Clinton Pike	Main Street	1.58	Shared Use Path	10	4	5.00	5.00	1	1.00	26.00	11
R-51B	Bridgewater	Main St/John Wayland Hwy (SR 42)	Oakwood Drive	East Riverside Drive	1.16	Sharrows	9	2	3.00	4.50	5	2	25.50	13
H-8A	Harrisonburg	E Market St (US 33)	N Mason St	Reservoir Street	0.32	Bike Lane	10	2	3.00	3.00	5	2.50	25.50	13
H-13	Harrisonburg	Country Club Rd/Vine Street	Market Street (US 33)	Market Street (US 33)	1.62	Shared Use Path	9	6	3.00	4.50	1	2.00	25.50	13
R-18	Rockingham	Spotswood Trl (US 33)	Harrisonburg City Limit	Penn Laird Dr	2.82	Shared-Use Path	6	6	4.50	5.00	1	3.00	25.50	13
H-25	Harrisonburg	Martin Luther King Jr Boulevard	S Main St (US 11)	W Market St (US 33)	1.18	Shared Use Path	10	6	2.50	4.00	1	1.75	25.25	17
R-59A	Rockingham	Erickson Ave	Rawley Pike (US 33)	Flint Ave	0.36	Bike Lane	4	6	3.00	4.00	5	3.00	25.00	18
H-1	Harrisonburg	Chicago Ave	Mt Clinton Pk	Rockingham Dr	0.39	Bike Lane	9	6	2.00	3.00	4	1.00	25.00	18
H-15	Harrisonburg	Peach Grove Ave	Port Republic Rd	Stone Spring Rd	0.60	Bike Lane	6	8	2.00	2.50	4	2.50	25.00	18
R-57	Rockingham/Dayton	John Wayland Hwy (SR 42)	Harrisonburg City Limit	Eberly Rd	2.97	Bicycle/Buggy Lane	4	6	5.00	4.00	1	5.00	25.00	18
G-8	Rockingham	Cooks Creek Greenway Extension	W Mosby Rd	Rawley Pike (US 33)	3.41	Shared Use Path	7	6	5.00	5.00	1	1.00	25.00	18
R-59B	Rockingham	Erickson Ave	Flint Ave	Garbers Church Rd	0.72	Climbing Lane/Sharrows	5	6	3.00	4.00	4	2.50	24.50	23
H-19	Harrisonburg	W Mosby Rd	S Main St (US 11)	Harrisonburg City Limit	0.61	Bike Lane	4	6	2.00	3.75	5	3.50	24.25	24

Table 7. Prioritized Recommendations (Second Priority)

Project ID	Locality	Route	From	To	Length (mi.)	Recommendation	Proximity Rating 1 - 10	Connectivity Rating 1 - 10	Speed limit Rating 1 - 5	AADT Rating 1 - 5	Cost Rating 1 - 5	Constraint Rating 1 - 5	Priority Score	HRMPO Rank
H-9	Harrisonburg	Old Furnace Rd	Vine St	Smithland Rd	1.52	Bike Lane	10	6	2.00	1.00	3	2.00	24.00	25
G-1	Harrisonburg	Blacks Run Greenway	Bluestone Trail	Harrisonburg City Limit	3.17	Shared Use Path	6	6	5.00	5.00	1	1.00	24.00	25
R-60B	Rockingham	Rawley Pike (US 33)	Belmont Drive	Clover Hill Rd	4.73	Wide Shoulder	5	6	4.00	4.00	2	2.75	23.75	27
H-22	Harrisonburg	Erickson Ave	S High St (SR 42)	Garbers Church Rd	0.56	Bike Lane	3	6	2.00	4.00	5	3.50	23.50	28
H-27B	Harrisonburg	University Blvd	Existing Shared Use Path	East of Carrier Dr	0.92	Shared Use Path	5	8	2.00	2.50	2	4.00	23.50	28
H-2B	Harrisonburg	Mt Clinton Pike	Northend Greenway	N Main St (US 11)	1.12	Shared Use Path	7	6	3.00	2.00	2	3.50	23.50	28
R-39A	Rockingham	Port Republic Rd	Stone Spring Rd	Shen Lake Dr	0.56	Shared-Use Path	3	6	4.00	5.00	2	3.00	23.00	31
R-54A	Rockingham/Dayton	Ottobine Rd/Mason St (SR 257)	Main St/John Wayland Hwy (SR 42)	Dry River Rd	2.06	Bicycle/Buggy Lane	6	6	4.00	2.00	2	3.00	23.00	31
H-26B	Harrisonburg	E Market St (US 33)	Country Club Rd	Harrisonburg City Limit	0.72	Shared Use Path	4	6	3.00	5.00	1	3.75	22.75	33
H-14	Harrisonburg	Evelyn Byrd Ave	Reservoir St	Market Street (US 33)	1.29	Bike Lane	6	6	2.00	4.00	3	1.50	22.50	34
R-51A	Bridgewater	Main St/John Wayland Hwy (SR 42)	Bridgewater Bypass	Rockingham County Line	1.26	Bike Lane	4	4	3.00	4.00	4	3	22.00	35
H-8B	Harrisonburg	E Market St (US 33)	Wolfe St	Vine St	0.26	Shared Use Path	9	2	3.00	3.00	3	2.00	22.00	35
H-17	Harrisonburg	Reservoir Street	Market Street (US 33)	University Boulevard	1.64	Bike Lane	10	2	2.50	2.50	3	2.00	22.00	35
G-5	Rockingham	Cooks Creek Greenway North	Bridgewater Bypass	W Mosby Rd	1.93	Shared Use Path	4	6	5.00	5.00	1	1.00	22.00	35
H-28B	Harrisonburg	S Mason Street	E Wolfe St	Franklin St	0.33	Bike Lane	9	2	2.00	2.50	5	1.00	21.50	39
H-28C	Harrisonburg	S Mason Street	Franklin St	Martin Luther King Jr Ave	0.42	Climbing Lane/Sharrows	9	2	2.00	2.50	5	1.00	21.50	39
H-28D	Harrisonburg	S Mason Street	Martin Luther King Jr Ave	E Grace St	0.19	Shared Use Path	7	6	2.00	2.50	3	1.00	21.50	39
R-50A	Bridgewater	Oakwood Dr	Main St/John Wayland Hwy (SR 42)	S Valley Pike/Lee Hwy (US 11)	0.78	Sharrows	6	4	2.00	2.00	5	2	21.00	42
R-62B	Rockingham	Mt Clinton Pike/Singers Glen Rd	Switchboard Rd	Harrisonburg City Limit	0.58	Bike Lane	5	2	5.00	1.50	5	2.50	21.00	42
R-50B	Rockingham	Oakwood Dr	Bridgewater Town Limits	Main St/S Valley Pike/Lee Hwy (US 11)	1.53	Wide Shoulder	4	6	2.00	2.00	4	3.00	21.00	42
R-48B	Rockingham	Dinkel Ave (SR 257)	Bridgewater Town Limits	I-81	2.27	Wide Shoulder	1	4	4.00	4.50	3	4.50	21.00	42
G-7	Harrisonburg	Hillandale North	Hillandale Ave	Circle Dr	0.22	Shared Use Path	5	2	5.00	5.00	3	1.00	21.00	42
H-28A	Harrisonburg	S Mason Street	Main Street (US 11)	E Wolfe St	0.31	Shared Use Path	10	2	2.00	2.50	3	1.00	20.50	47

Table 7. Prioritized Recommendations (Vision)

Project ID	Locality	Route	From	To	Length (mi.)	Recommendation	Proximity Rating 1 - 10	Connectivity Rating 1 - 10	Speed limit Rating 1 - 5	AADT Rating 1 - 5	Cost Rating 1 - 5	Constraint Rating 1 - 5	Priority Score	HRMPO Rank
R-58	Rockingham	Garbers Church Rd	Erickson Ave	Main St/John Wayland Hwy (SR 42)	0.56	Bike Lane	2	4	3.00	2.00	5	4.00	20.00	48
R-13	Rockingham	Buttermilk Creek Rd	Harpine Hwy (SR 42)	Kratzer Rd	1.56	Wide Shoulder	1	6	3.00	1.00	4	5.00	20.00	48
R-46	Rockingham/ Mt Crawford	S Valley Pike/Lee Hwy (US 11)	Harrisonburg City Limit	Rockingham County Line	6.82	Wide Shoulder	3	4	4.50	4.00	2	2.50	20.00	48
R-44	Rockingham	Shen Lake Dr	Port Republic Rd	Massanetta Springs Rd	0.74	Bike Lane	5	2	3.00	3.00	4	2.00	19.00	51
H-11	Harrisonburg	Smithland Rd	Linda Ln	Keezeltown Rd	1.25	Bike Lane	2	6	3.00	1.00	4	3.00	19.00	51
G-6	Harrisonburg	Hillandale South	Garbers Church Rd	Hillandale Ave	0.56	Shared Use Path	4	2	5.00	5.00	2	1.00	19.00	51
R-49	Rockingham/ Bridgewater	Bridgewater Bypass	Main St/John Wayland Hwy (SR 42)	Dinkel Ave (SR 257)	2.26	Bicycle/Buggy Lane	5	6	3.00	1.50	1	2.00	18.50	54
R-63	Rockingham	Switchboard Rd	Mt Clinton Pike/Singers Glen Rd	Harrisonburg City Limit	1.21	Bike Lane	3	2	4.00	2.00	4	3.00	18.00	55
R-14	Rockingham	Gravels Rd	Kratzer Rd	N Valley Pike (US 11)	2.26	Wide Shoulder	2	4	3.00	2.00	3	4.00	18.00	56
R-43	Rockingham	Cross Keys Rd (SR 276)	Spotswood Trl (US 33)	Freiden's Church Rd	4.61	Wide Shoulder	2	2	5.00	3.00	2	4.00	18.00	57
G-4	Rockingham	Cooks Creek Greenway Middle	Bridgewater Bypass	Blacks Run	1.00	Shared Use Path	3	2	5.00	5.00	2	1.00	18.00	58
H-10	Harrisonburg	Smithland Rd	Old Furnace Rd	Linda Ln	0.60	Shared Use Path	2	6	3.00	1.00	2	3.50	17.50	59
R-11	Rockingham	Kratzer Rd	Harpine Hwy (SR 42)	Harrisonburg City Limit	5.08	Wide Shoulder	1	6	3.50	1.50	2	3.00	17.00	60
H-4A	Harrisonburg	N Liberty St	Harrisonburg City Limit	Mt Clinton Pike	0.63	Wide Shoulder	1	2	3.00	2.00	5	3.50	16.50	61
H-12	Harrisonburg	Keezletown Rd	Country Club Rd	Harrisonburg City Limit	0.77	Wide Shoulder	3	2	3.00	1.00	5	2.50	16.50	62
R-62A	Rockingham	Mt Clinton Pike/Singers Glen Rd	Clover Hill Rd	Switchboard Rd	5.03	Wide Shoulder	2	2	5.00	3.00	2	2.50	16.50	63
H-23	Harrisonburg	Hillandale Ave	S Dogwood Dr	End	0.59	Shared Use Path	6	2	1.00	1.00	2	4.50	16.50	64
H-24	Harrisonburg	Garbers Church/Switchboard Rd	Erickson Ave	W Market St (US 33)	1.72	Shared Use Path	7	2	2.00	1.50	1	2.50	16.00	65
R-45	Rockingham	Massanetta Springs Rd	Spotswood Trl (US 33)	Izaak Walton Dr	2.13	Shared-Use Path	7	2	2.00	1.50	1	2.50	16.00	66
R-53	Rockingham/Bridgewater	Dry River Rd	North River Rd	Ottobine Rd/Mason St (SR 257)	1.56	Bike Lane	7	0	2.00	1.50	3	2.25	15.75	67
R-15	Rockingham	Old Furnace Rd	Smithland Rd	Indian Trail Rd	2.23	Wide Shoulder	2	2	4.00	1.00	3	3.50	15.50	68
G-3	Rockingham	Cooks Creek Greenway South	Blacks Run	Rockingham County Line	1.20	Shared Use Path	1	2	5.00	5.00	1	1.00	15.00	69
G-2	Rockingham	Blacks Run Greenway	Rockingham County Line	Cooks Creek	1.90	Shared Use Path	1	2	5.00	5.00	1	1.00	15.00	70
R-16	Rockingham	Keezletown Rd	Harrisonburg City Limit	Indian Trail Rd	1.91	Wide Shoulder	1	2	2.00	1.50	4	4.00	14.50	71
R-55	Rockingham	Pike Church Rd	Harrisonburg City Limit	W Mosby Rd	1.31	Wide Shoulder	1	0	4.00	2.00	4	3.25	14.25	72

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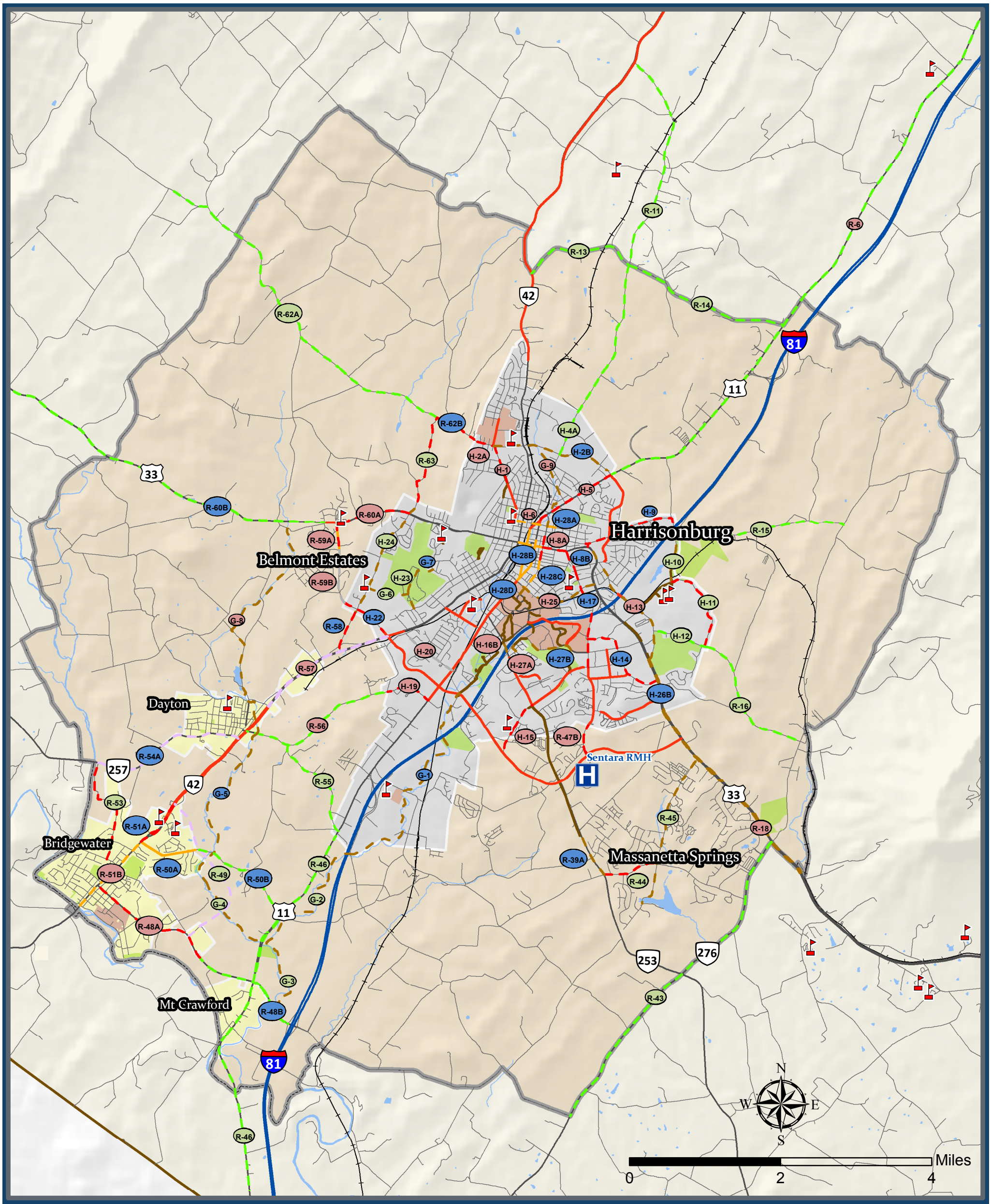
VII. Recommendations

A. Prioritized Facilities

The methodology presented in Chapter 6 describes the process by which a quantitative scoring system was used to develop a prioritized list of improvements for bicycle facilities in the region. These facility improvements were assigned to one of three levels of prioritization: First Priority Projects, Second Priority Projects, and Vision Projects. Facility improvement projects were prioritized based upon the potential for use, the relative safety of the existing roadway, and the relative difficulty of completing the project. Some roadways require only limited improvements, while others require significant design applications to improve safety for motorists and non-motorists alike. Each recommendation should be viewed as a preferred option. The rankings are based upon the best information available at the time of analysis.

The scores from the four Prioritization Factors – Proximity, Connectivity, Safety, and Feasibility – were summed and the list of the projects ranked by the total score. A total of 72 individual projects were identified and have been divided generally evenly between the three priority categories. In order to avoid having projects with the same prioritization score fall within different priority categories 24 projects have been termed First Priority, 23 projects have been termed Second Priority, and 25 projects have been termed Vision. **Table 7**, in the previous chapter, provides a prioritized project list; **Map 5** displays the prioritized recommended improvement types. These improvements constitute this Plan's bicycle and pedestrian recommendations. **Chapter 7** discusses the Priority Focus Areas in a more detailed fashion.



HRMPO Bike/Ped Plan - Recommended Facilities

- Public School
- Higher Education
- City Boundary
- Town Boundary
- Local Park
- Railroads
- HRMPO Boundary

Existing Bike/Ped Facilities

- Bike Lane
- Sharrow
- Shared Use Path

Recommended Facilities

- Bicycle/Buggy Lane
- Bike Lane
- Climbing Lane/Sharrows
- Shared Use Path
- Sharrows
- Wide Shoulder

- H-15 First Priority
- H-22 Second Priority
- R-46 Vision Projects

Data Source(s):
Commonwealth of VA, USGS, VDEM, McCormick & Taylor, Rockingham County, City of Harrisonburg.

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March 16, 2015

Map 5

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Priority Focus Areas

Based on the prioritization process, current efforts underway, and input from the HRMPO BPC, a number of corridors and/or projects clearly stand out as potential focus areas for the near term.

Following is a detailed description of the potential improvements to address these Priority Focus Areas. All potential alignments that would rely on easements or fee-simple purchases of private lands are entirely conceptual and should be pursued only if and when the property owner is willing.

Cost estimates are provided for facility improvements recommended in the Priority Focus Areas. These cost estimates are 2016 costs for design and construction only, not right-of-way. The costs have been adapted from the VDOT Planning Cost Estimating System (PCES) Version 5 and other local sources of general construction estimates for bicycle facilities. A range has been provided to account for site specific conditions found in each recommendation. These estimates are for informational purposes only. They are intended to provide a general idea of the potential costs involved with each project. Prior to any grant application or budgeting process a more detailed evaluation of the potential costs should be conducted to ensure accurate expectations of costs.

Belmont Neighborhood

Connections from communities west of Harrisonburg to major corridors within the City.

The Belmont neighborhood and surrounding communities are located just to the west of the Harrisonburg City Line and approximately two and a half miles from downtown Harrisonburg. The 2010 Census shows that 3,735 people lived in the two Census Block Groups that make up this area, most of them living in the Belmont neighborhood itself. The primary transportation connections in the area are US 33 (Rawley Pike) and Erickson Avenue with few other options connecting it to Harrisonburg. Inside the City, Garber's Church Road connects US 33 and Erickson Avenue and provides access to Harrisonburg High School and Bluestone Elementary School which is currently under construction.

Mountain View Elementary School in Rockingham County is located on the north side of US 33 adjacent to the Belmont neighborhood. In 2013, a SRTS project was completed which added bike lanes and sidewalks on US 33 between Belmont Drive and Erickson Avenue and sharrows and a sidewalk on Erickson Avenue between US 33 and Flint Avenue. Pedestrian crossing improvements were also completed at the Erickson Avenue/US 33 intersection.

The Belmont neighborhood contains a relatively large population in a fairly dense community. Its proximity to the city, to which many of these residents travel frequently, makes this an ideal location where pedestrian and

bicycle improvements could provide additional travel options to many people and improve safety for those who currently bike or walk along the local roads.

US 33 and Erickson Avenue, the two roadways that connect this community to the more developed areas in the city and along SR 42 (South High Street), are both relatively high volume roadways with high travel speeds. As mentioned, there are existing facilities on these roadways near their intersection; however, they do not make a connection into the city at this time. Harrisonburg has completed improvements at the Erickson Ave/South High Street intersection within the city Line. Additionally, the City has recently advertised for design services related to pedestrian and bicycle facilities that would provide connections along Garber's Church Road (recommendation H-24) and throughout the vicinity (recommendations G-6, G-7, and H-23)

- **R-60A – US 33 from the Garber's Church Road to Erickson Avenue** is recommended for a bike lane along its entire length. This would connect to the bike lane on eastbound US 33 between Belmont Drive and Erickson Ave. US 33 is currently a two-lane roadway with approximately 12- to 14-foot lanes and a 45 mph speed limit. Public right-of-way is approximately 60 feet in this area providing enough space within the right-of-way to add a five-foot paved bike lane in each direction. Some constraints exist along the route including private driveways and utilities. Preliminary cost estimates to construct bike lanes in this segment are approximately $250,000-$450,000.

- **R-59A – Erickson Avenue from US 33 to Flint Avenue** currently has sharrows on both the north and southbound lanes and a sidewalk on the west side of the roadway. The pavement width is approximately 32 feet including two 12-foot lanes and a parking lane on the west side. Public right-of-way is variable; a portion of it would allow additional pavement width to include five-foot bike lanes in each direction but would require acquisition of additional right-of-way for the remainder. In addition to right-of-way concerns, other constraints include a drainage ditch and topographic impediments along the east side of the roadway. Preliminary cost estimates to construct bike lanes in this segment are approximately $160,000-$270,000.

- **R-59B – Erickson Ave from Flint Avenue to the Harrisonburg City Line** is recommended for a climbing lane on the northeast side of the roadway to allow bicyclists to safely make the ascent from Garbers Church Road to Nutmeg Court. Sharrows are proposed on the southwest downhill side of the roadway where most bicyclists would feel comfortable traveling adjacent to the traffic. The roadway between Nutmeg Court and Garbers Church Road consists of two 12-foot lanes with about 60 feet of public right-of-way. There are topographic constraints that would need to be dealt with to accommodate the proposed improvements. The segment between Flint Avenue and Nutmeg Court is similar to the conditions found in R-59A. However, the topographic constraints and right-of-way issues

may result in the need to go with sharrows in both directions through this segment. Preliminary cost estimates to construct a climbing lane and sharrows in this segment are approximately $230,000-$430,000

- **H-22 – Erickson Avenue from the Harrisonburg City Line to US 42 (S. High St)** is recommended for a bike path that would link to R-59B. Erickson Ave currently consists of two 11-foot travel lanes with turn lanes located at Garbers Church Road. As Erickson approaches SR 42, the City has completed intersection improvements to expand the roadway to five lanes with a sidewalk on the north side and bike lanes in each direction. Right-of-Way in this segment is approximately 95 feet providing enough space to continue the roadway profile through the remainder of the segment. The City has begun the process to construct a shared-use path along Garbers Church Road that would connect to Erickson Avenue. Construction estimates for H-22 range from approximately $210,000-$230,000.

Projects recommended in this plan that would create the needed connections include R-60A, R-59A, R-59B, and H-22 which were all ranked as first or second priorities. Following is a description of the recommended improvements which are displayed on **Map 6.**

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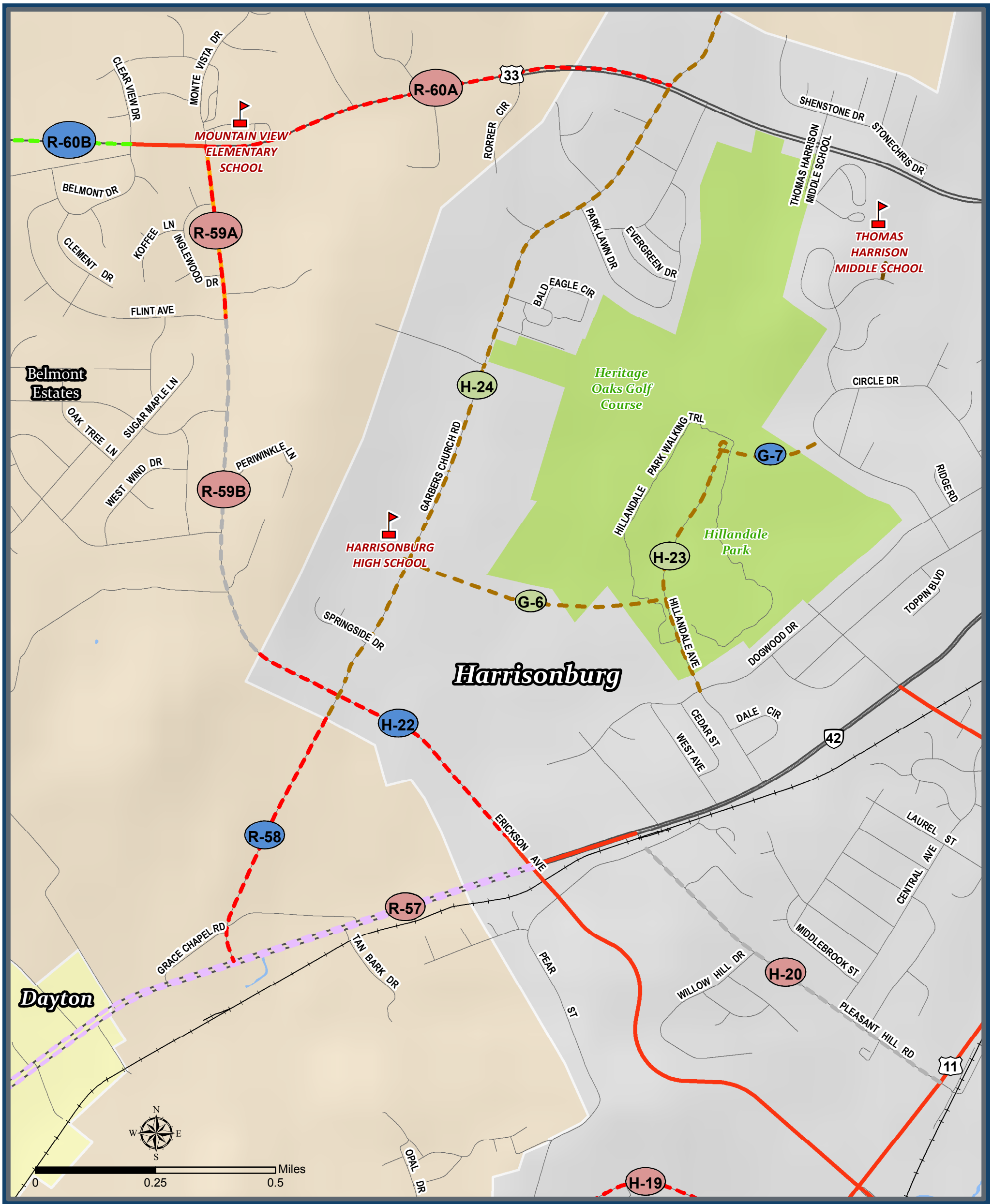
HRMPO Bike/Ped Plan - Belmont Connections



Existing Bike/Ped Facilities

- Bike Lane
- Sharrow
- Shared Use Path

Recommended Facilities

- Bicycle/Buggy Lane
- Bike Lane
- Climbing Lane/Sharrows
- Shared Use Path
- Sharrows
- Wide Shoulder

- Public School
- Higher Education
- City Boundary
- Town Boundary
- Local Park
- Railroads
- HRMPO Boundary

- H-15 First Priority
- H-22 Second Priority
- R-46 Vision Projects

Data Source(s):
Commonwealth of VA, USGS, VDEM, McCormick & Taylor, Rockingham County, City of Harrisonburg.

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July 1, 2016

Map 6

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US 33 Corridor

Connections along or adjacent to the US 33 Corridor from downtown Harrisonburg to the HRMPO boundary.

The US 33 Corridor stretching from Old Furnace Road east of downtown Harrisonburg to the eastern edge of the HRMPO boundary at Cross Keys Road in Rockingham County was identified early on as a corridor in need of bicycle and pedestrian improvements because of the large amount of vehicular, bicycle, and pedestrian traffic utilizing this corridor for recreation and connections to important daily functions. This stretch of US 33 is developed with a variety of cross-sections and includes turn lanes at all major intersections and a median separating the two-directions throughout most of the corridor. Beginning at the western end of the focus area at Old Furnace Road it is a four-lane roadway until it reaches I-81 where it goes to six-lanes until it reaches Country Club Road. From there to the city line is two-lanes westbound and three lanes eastbound. Once in the county the highway goes to two-lanes in both directions. Between Evelyn Byrd Avenue within the City, to the HRMPO Boundary there are no parallel roadways that offer options for connections through the corridor.

Within the City of Harrisonburg, US 33 (East Market Street) is the primary connection from downtown to I-81. East of I-81, US 33 passes through the largest retail area in the city surrounding the Valley Mall before crossing into the county. Between the City of Harrisonburg and the Town of Elkton to the east, US 33 passes through or provides a primary connection to the communities of Massanetta Springs, Penn Laird, McGaheysville, and Massanutten. The county's new Albert Long Park is located at the corner of Indian Trail Road and US 33.

The entire US 33 Corridor is made up of numerous segments and adjacent roadways, all of which have different sets of constraints and opportunities associated with them. This plan contains specific recommendations to provide bicycle and pedestrian access for each segment and/or adjacent roadway. Following is a description of the recommended improvements which are displayed on **Map 7.**

> **H-8B – US 33 from Old Furnace Road to Vine Street** is the first segment of this focus area because the City's gridded street network surrounding downtown begins here, offering options for bicyclists to take a variety of low traffic streets for connections to the east. The right-of-way is variable but constrained to approximately 80 feet through the middle of the segment. This space is nearly entirely occupied by the roadway profile which includes four 12-foot travel lanes with 5-foot sidewalks and a 3-foot buffer on each side of the road. The recommendation for this quarter-mile segment is for a 10-foot shared-use path on the north side of US 33 either adjacent to or incorporating the existing sidewalk. Additional right of way would be required to construct this facility. The cost estimate for this segment is $285,000 - $320,000.

- **H-13 – Country Club Road from Vine Street to US 33** was first identified for improvements in the 2010 Harrisonburg Bicycle and Pedestrian Plan and continues to be a high priority for the alternative it provides to US 33, which is considered far too heavily trafficked to offer bicyclists a safe route to and from the downtown area. The profile of this segment varies with approximately 42 feet of right of way through a curb-and-gutter section consisting of approximately 37 feet of pavement width including two 11-foot travel lanes and two 8-foot parking lanes stretching from Vine Street to Blue Ridge Drive. The recommended improvement for this section could involve a road diet to remove one side of on-street parking (all homes in this section have private driveways) and restriping could add bike lanes in each direction. In the future, if the City determines it is necessary, the Shared-Use Path could be added on one side with reconstruction of the curb-and-gutter.

  The remainder of Country Club Road to the intersection with US 33 is currently a 2-lane section with 11-foot lanes and no curb and gutter. There are turn lanes at some locations through this segment and right-of-way is approximately 70 feet although it varies throughout the segment. There are some constraints including the underpass below I-81, drainage, and topographic features. The City of Harrisonburg has a future plan convert this segment to a three lane road with a sidewalk and Shared-Use Path. If placed directly adjacent to the roadway a protected path should be considered. Estimates for this improvement using the road diet and bike lanes on the initial 0.25 mile section are approximately $1,460,000 - $1,550,000.

- **H-26B – US 33 from Country Club Road to the City Line** recommends construction of a Shared-Use Path or protected side-path. The 154-foot right-of-way through this segment is occupied by three 11-foot eastbound lanes, an approximately 42-foot median, two 11-foot westbound lanes, and turn lanes at all major intersections. The north side of the roadway would be the best location for this facility as there would be fewer conflicts with turning vehicles as a result of the fewer access points. Additional right-of-way is available in this area, however, with the constraints present, including the steep slopes, it is likely additional right-of-way will be needed to construct a shared-use path. The estimate for construction improvements of this segment of shared-use path are approximately $1,000,000-$1,200,000.

- **R-18 – US 33 from the Harrisonburg City Line to Penn Laird Drive** was one of the higher scoring project in the US 33 East Corridor. The score reflects the segment's proximity to residential populations, the new Albert Long Park, numerous schools in the vicinity, as well as the potential connections to other facilities that could be made. This segment of US 33 also has speed limits of 45-55 miles/hour and a high vehicular traffic level, making it a particularly dangerous roadway for bicyclists and generally unusable for pedestrians.

The ultimate recommendation for this segment of US 33 is a shared-use path, which, in some sections, will be more aptly described as a side-path because of its location adjacent to the highway. The current right-of-way and constraints in the area make the best location for this facility to be on the north side of the roadway. There are fewer developed properties on the north side of the highway than the south side and by locating the path here the county can take advantage of the connection that would be provided to the new Albert Long Park. Constraints in the segment include a sporadic drainage ditch, some topographic changes, and sections where private right-of-way is in near proximity to the roadway. This would result in an approximately 2.8-mile path.

There is an opportunity to do initial improvements in this segment through shoulder widening adjacent to the roadway. Some segments of the proposed shared-use path will likely work best running directly adjacent to the roadway and by doing initial work to widen the shoulders, this could help advance the work on the future shared-use path. The total cost of constructing a separated shared-use path for the length of this segment is $2,750,000 - $2,940,000. This cost could be reduced by making some portions of the path directly adjacent to the roadway including a barrier separation for safety. The constraints discussed earlier and opportunities presented as a result of the wide median make this a preferred option for this segment.

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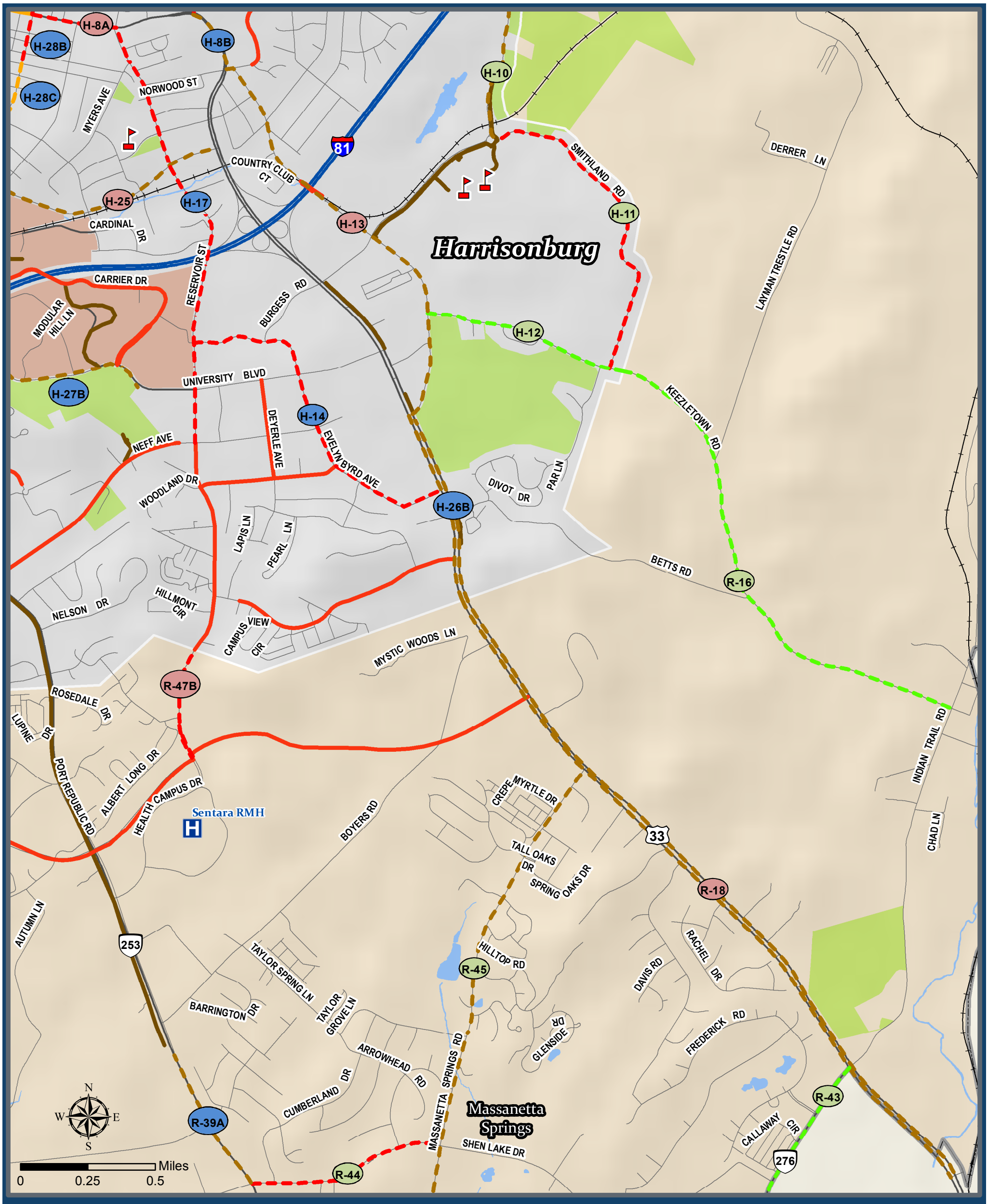
HRMPO Bike/Ped Plan - Route 33 East



Existing Bike/Ped Facilities

- Bike Lane
- Sharrow
- Shared Use Path

Recommended Facilities

- Bicycle/Buggy Lane
- Bike Lane
- Climbing Lane/Sharrows
- Shared Use Path
- Sharrows
- Wide Shoulder

- Public School
- Higher Education
- City Boundary
- Town Boundary
- Local Park
- Railroads
- HRMPO Boundary

- H-15 First Priority
- H-22 Second Priority
- R-46 Vision Projects

Data Source(s):
Commonwealth of VA, USGS, VDEM, McCormick & Taylor, Rockingham County, City of Harrisonburg.

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Map 7

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Cooks Creek and Blacks Run Greenway

Development of the Cooks Creek and Blacks Run Greenway Trails from the Belmont neighborhood through Dayton and Bridgewater, running north-south along Blacks Run to connect to the Bluestone Trail

Cooks Creek and Blacks Run are small- to mid-sized perennial streams running through the southern portion of the HRMPO. Cooks Creek runs from near Mt Clinton Pike in central Rockingham County, south through the towns of Dayton and Bridgewater, meeting Blacks Run at Monger Park just north of Mt Crawford. The creek runs predominantly through rural areas of Rockingham County consisting of large parcels zoned for and currently in use as agricultural lands. Blacks Run begins in northern Harrisonburg and passes directly through the downtown area, mostly below ground. It continues running south before converging with Cooks Creek just east of the Town of Bridgewater and north of the Town of Mt. Crawford.

The proposed Cooks Creek Greenway Trail consists of numerous segments that follow Cooks Creek from Monger Park north to US 33 west of the Belmont neighborhood. Blacks Run is another proposed greenway that runs from Monger Park north into the city eventually connecting to the existing Bluestone Trail. Additional plans exist to eventually connect the Bluestone Trail through downtown to the proposed Northend Greenway. The system of greenways and shared-use paths, including some on-street facilities to make small connections, could eventually form a loop that would connect many of the bicycle and pedestrian origins and destinations of the urbanized areas in the region.

As discussed previously, facilities that separate bicyclists and walkers from motor vehicles are highly desired and provide a level of comfort and safety for users that is unmatched by on-street facilities. Overwhelmingly, the feedback from the public, stakeholders, and committees has been that development of shared-use paths and greenways should be a focus of the bicycle and pedestrian system in the region. Greenway trails can offer pedestrians or bicyclists a means to travel to work, school, parks, commercial centers, and tourist attractions. Beyond the transportation benefits of greenway trails and shared-use paths, they offer economic and recreational benefits as well.

The northern two segments of the Cooks Creek Greenway, identified as **G-8** and **G-5**, running between US 33 and the Cooks Creek Arboretum in Bridgewater were identified as first priorities during the scoring process. These scores reflect their safety benefits and proximity to employment, housing, parks, schools, and town centers. Following is a description of the recommended improvements which are displayed on **Map 8.**

- **G-8 – Segment of Cooks Creek Greenway** is proposed to begin west of the Belmont neighborhood, south of US 33, and head southward following Cooks Creek or Silver Lake Road through Dayton ending where Cooks Creek meets West Mosby Road on the eastern side of the Town. Opportunities for the

alignment of the trail vary throughout the segment. At the northern end the trail could be a part of a greenway adjacent to Cooks Creek. This would only be possible if local landowners are willing to provide easements or if the county and landowners are interested in fee-simple purchases of property. This would allow the greenway trail to either connect into the southwest side of the Belmont neighborhood (which would then provide connections to US 33 and Erickson Ave), or to continue north to Old Thirty-Three Road. Another option for a connection is possible along the private road identified as Sunny Slope if the private landowners are willing to negotiate it.

Alternatively, the alignment could follow Silver Lake Road as a side-path the entire way from Silver Lake to Old Thirty-Three Road. Right-of-way along Silver Lake Road is entirely prescriptive resulting in very little available space for the path; therefore, additional right-of-way would need to be acquired adjacent to the roadway to accommodate any shared-use path in that location. Acquisition of right-of-way adjacent to the roadway would affect many more landowners than if the alignment were to follow the creek.

Somewhere north of the intersection of Silver Lake Road and Silling Road it is recommended that the shared-use path begin following the road alignment to avoid traveling further west than necessary and to allow the trail to connect to Silver Lake.

Silver Lake and the land surrounding it are owned by the City of Harrisonburg although the land is in the County. The Town of Dayton, which sits just to the south of Silver Lake, has expressed interest in developing a formal trail that would circle the lake and connect it to the Town, where many residents currently go for recreational walking. Dayton has opened discussions with local landowners that would be affected by this proposed path. Cooks Creek Park is located on the south side of Cooks Creek inside the Town. Conceptually the Town has examined the idea of the trail crossing Cooks Creek into this park then following the park east to College Street. Once at College Street the trail could then either follow the alignment of Cooks Creek or follow roads to continue around the northeast side of Dayton until it reaches West Mosby Road. Through this portion, very few landowners have property that abuts Cooks Creek, making it viable that right-of-way or easements could be acquired with willing landowners. Preliminary cost estimates to construct a 10-foot shared-use path in this segment are approximately $4,010,000-$4,580,000.

- **G-5 – Segment of Cooks Creek Greenway** continues from West Mosby Road east of Dayton southward to Cooks Creek Arboretum in Bridgewater. This segment passes predominantly through large parcels of agricultural lands and, unlike segment G-8, offers few options to divert to roadways. Between West Mosby Road and the arboretum, Cooks Creek only passes across six individual parcels making the

potential for easement acquisitions more possible in the event that local landowners are willing. It should be noted that this segment parallels SR 42 which currently has an existing bicycle/buggy lane. As such, this segment may be slightly less of a priority to complete than G-8. Preliminary cost estimates to construct a 10-foot shared use path in this segment are approximately $2,040,000-$2,200,000.

- **G-1 Segment of Blacks Run Greenway** beginning from the end of Bluestone Trail at Stone Spring Road and extending to the City line is approximately 3.17 miles long and follows Blacks Run through the southern portion of Harrisonburg crossing industrial and agricultural lands before entering the county.
- **G-2 Segment of Blacks Run Greenway** beginning at the City Line and running south for 1.9 miles to Monger Park.

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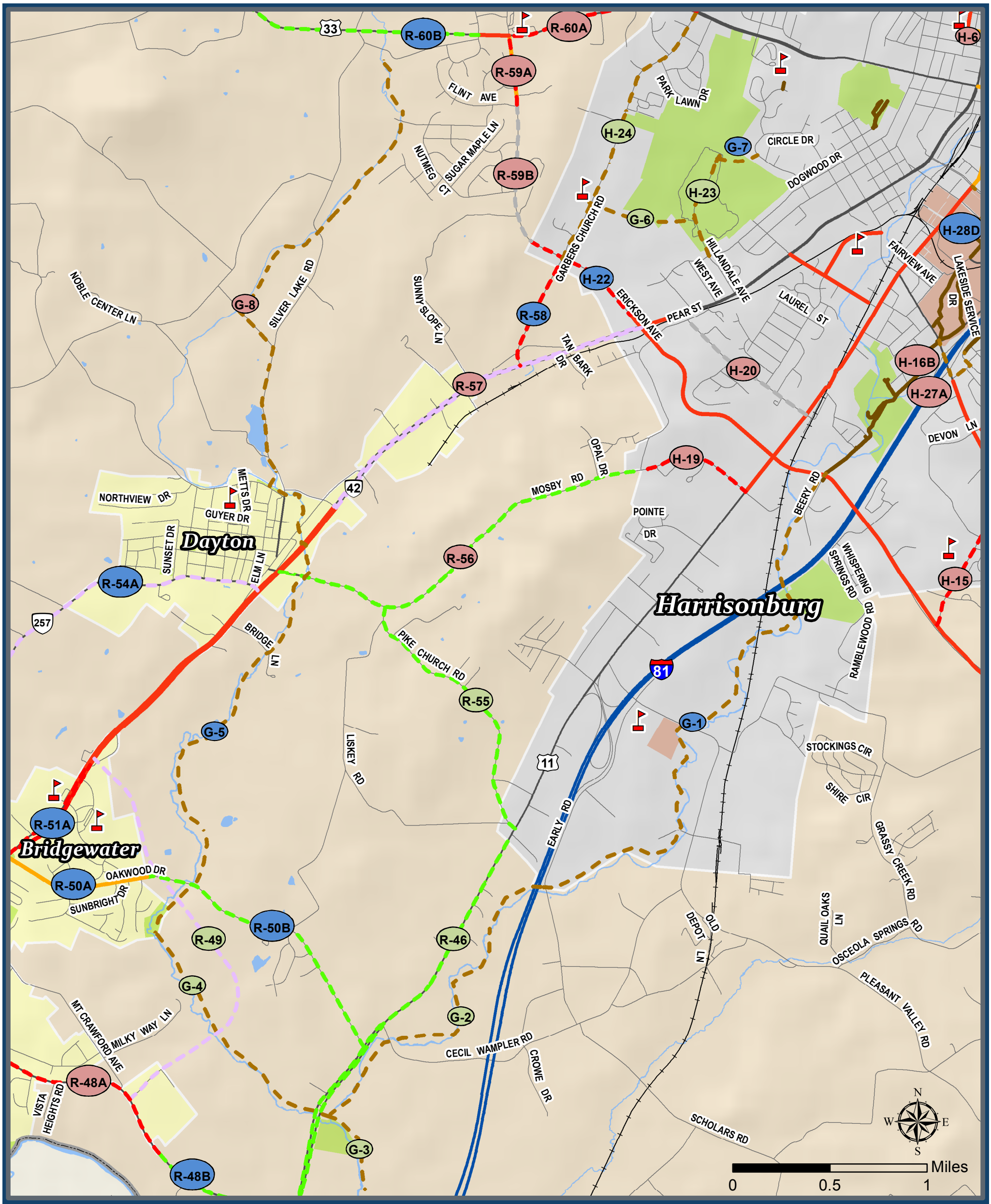

HRMPO Bike/Ped Plan - Blacks Run/Cooks Creek Greenway

- Public School
- Higher Education
- City Boundary
- Town Boundary
- Local Park
- Railroads
- HRMPO Boundary

Existing Bike/Ped Facilities

- Bike Lane
- Sharrow
- Shared Use Path

Recommended Facilities

- Bicycle/Buggy Lane
- Bike Lane
- Climbing Lane/Sharrows
- Shared Use Path
- Sharrows
- Wide Shoulder

- H-15 First Priority
- H-22 Second Priority
- R-46 Vision Projects

Data Source(s):
Commonwealth of VA, USGS, VDEM, McCormick & Taylor, Rockingham County, City of Harrisonburg.

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CSPDC
Central Shenandoah Planning District Commission

Map 8

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US 11

Connections along US 11 north of downtown Harrisonburg

This segment of US 11 is the primary north/south corridor in the northern part of the City of Harrisonburg and continues through to the northern edge of the HRMPO boundary. This corridor serves as a gateway to the City and was identified as a corridor needing bicycle and pedestrian facilities due to heavy traffic including heavy vehicle traffic, and the current lack of existing bicycle and pedestrian facilities. This section of US 11 is developed with a variety of commercial, light industrial, and residential uses moving from an urban setting at the southern end and becoming increasingly rural traveling northward. Starting in downtown Harrisonburg at the intersection of North Mason Street and extending to Charles Street the roadway consists of two 12 foot driving lanes with 8-foot parking lanes on each side for a total pavement width of approximately 40 feet. There is a sidewalk on each side of the roadway through most of this segment and left turn lanes at major intersections. North of Charles Street to the HRMPO boundary the profile changes to three 12-foot lanes including the center turn lane with no parking and no sidewalk. There are no alternative connections along this section of the US 11 corridor.

Future light industrial growth is anticipated along the US 11 Corridor both within and north of the City. The Rockingham Center for Research and Technology is located just north of the City line and as this research park continues to develop the need for improved access for bicyclists and pedestrians will also increase. The entire US 11 corridor has a large number of industrial businesses, high traffic, high speeds, and no existing facility for pedestrians or bicyclists making the corridor a safety concern for non-vehicular traffic. The locations identified below provide specific recommendations for this corridor to improve and/or provide bicycle and pedestrian facilities and are displayed on **Map 9**:

- **R-6 – US 11 (North Valley Pike) from the City Line to the HRMPO boundary** is an approximately 3.6-mile segment of a larger project recommended by the county for shoulder widening along the roadway. US 11 is approximately 36-foot pavement width in an 85-foot right-of-way providing enough room for a wide shoulder. There are occasional impediments throughout the length of this segment including guardrail, sections of curb and gutter, and some minor topographic constraints. The estimate for construction through this segment is $235,000-$350,000

- **H-5 – US 11 (North Main Street) from the City Line to the intersection with North Kratzer and North Liberty Street** is recommended for a bike lane for this 1.1-mile section of the US 11 Corridor. The area is made up of a mix of commercial and residential uses. An existing Bike Lane begins at Mason Street which this recommendation would connect to. The segment from Charles Street north to the City Line has no curb and gutter and right-of-way of approximately 80-feet, providing

additional space on both sides of the existing travel lanes. This would allow widening of the roadway to accommodate a five-foot bike lane on each side of the roadway. There are few constraints through this section, the most prevalent being some small sections of curb-and-gutter.

The segment from Mason Street to Charles Street has curb-and-gutter throughout and a narrower right-of-way of approximately 50 feet. Therefore, the best option for accommodating bike lanes is through a road diet to remove parking on one die of the roadway which would need to merge with vehicular traffic at intersections. Although not ideal, the lower traffic speeds in this area would allow it. The cost estimates for these improvements are approximately $295,000-$395,000.

HRMPO Bike/Ped Plan - Route 11 North

- Public School
- Higher Education
- City Boundary
- Town Boundary
- Local Park
- Railroads
- HRMPO Boundary

Existing Bike/Ped Facilities

- Bike Lane
- Sharrow
- Shared Use Path

Recommended Facilities

- Bicycle/Buggy Lane
- Bike Lane
- Climbing Lane/Sharrows
- Shared Use Path
- Sharrows
- Wide Shoulder

- H-15 First Priority
- H-22 Second Priority
- R-46 Vision Projects

Data Source(s):
Commonwealth of VA, USGS,
VDEM, McCormick & Taylor,
Rockingham County, City of Harrisonburg.

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reliability, or usefulness of any information depicted
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July 1, 2016

Map 9

Harrisonburg

HARMAN RD
COLLEGE AVE
VILLA DR
PARK RD
OAK DR
ACORN DR
KRATZER RD
R-11
PEACEFUL LN
H-4A
H-2A
MT CLINTON PIKE
H-2B
LIBERTY ST
H-1
ROCKINGHAM DR
WATERMAN DR
GRANT ST
STUART ST
G-9
H-5
WASHINGTON ST
EMERSON LN
H-6
GAY ST
DOGWOOD DR
WILLOW ST
MASON ST
WOLFE ST
H-28A
ROCK ST
HILL ST
ELIZABETH ST
TOWER ST
VINE ST
H-8A
H-28B
BRUCE ST
H-28C
H-17
NORWOOD ST
H-8B
H-13
BLUE RIDGE DR
RESEARCH DR
MOSSY ROCK LN
CHRIS ST
JEWELL ST
DANIEL SMITH LN
NOLAND DR
R-6
11
CORNERSTONE LN
H-9
OLD FURNACE RD
ORIOLE LN
THOMAS PAINE DR
GOLDFINCH DR
SMITHLAND RD
BUFFALO DR
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B. Pedestrian Improvements

Sidewalks are generally recommended for all minor collectors and local/neighborhood streets in the highly developed areas of the region, which include those with a higher density of residential and/or commercial development. Sidewalks are not recommended for more rural roads where the surrounding land use is principally agricultural or low-density residential, absent any other pedestrian-traffic generators such as schools.

Retrofitting new sidewalks adjacent to existing roads can be challenging because of the impacts to properties and the costs associated with impacting a street's drainage and utilities. As such, recommendations for adding new sidewalks on county roads have been kept to a minimum. The greatest priority for the county should be given to sidewalks that would connect a neighborhood with key pedestrian corridors, such as existing or proposed shared use paths; and sidewalks that would connect existing neighborhoods with nearby schools.

Within the Towns and the City of Harrisonburg where density is greater a more extensive sidewalk network should be pursued. This should involve retrofitting or new construction of sidewalks when new development or roadway reconstruction projects are undertaken. Examples of locations where combining sidewalk construction or improvements with roadway or development projects would make sense include the following:

- West Rock Street between High Street and Liberty Street – This is one of the few streets in the downtown Harrisonburg area where no sidewalks exist on either side of the roadway.
- Ott Street from East Market Street to Martin Luther King Jr Way – The existing street has disjointed sidewalks through this medium density residential neighborhood that provides a link to the JMU campus.
- SR 42 between Erickson Avenue and South Avenue – This is an extremely busy corridor with many businesses fronting the SR 42 and residential streets linking to it.
- University Boulevard from Evelyn Byrd Avenue to Reservoir Street – This roadway connects the University and passes through an extremely busy retail corridor.

These examples were identified through public and committee input, the regional heat-map exercise, and review of existing facilities. A list of high priority sidewalk improvement/construction projects were also identified through the prioritization described in **Chapter 6**. These improvements were identified through a similar process as described above but additionally moved through the prioritization process as Identified Routes that additionally were in need of pedestrian improvements. Projects are identified in maps on pages 59, 62, 65, 70 and 73.

- **R-60A: Rawley Pike (US 33) from Garber's Church Road to Erickson Avenue –** Either **i**n combination with the recommended bike lane along this segment of US 33, or as a stand-alone project,

this would provide improved pedestrian access to Mountain View Elementary School and for the residents in the Belmont neighborhood to connect into the City. In 2013, a Safe Routes to School funded project was completed which added bike lanes and sidewalks on US 33 between Belmont Drive and Erickson Avenue and sharrows and a sidewalk on Erickson Avenue between US 33 and Flint Avenue. Pedestrian crossing improvements were also completed at the Erickson Avenue/US 33 intersection. Construction of a 1.1-mile segment of sidewalk to Garber's Church Road would be an extension of these existing improvements. A further recommendation in this plan is construction of a shared-use path along Garber's Church Road (H-24) which would further improve pedestrian connectivity throughout the western edge of the City and into Rockingham County.

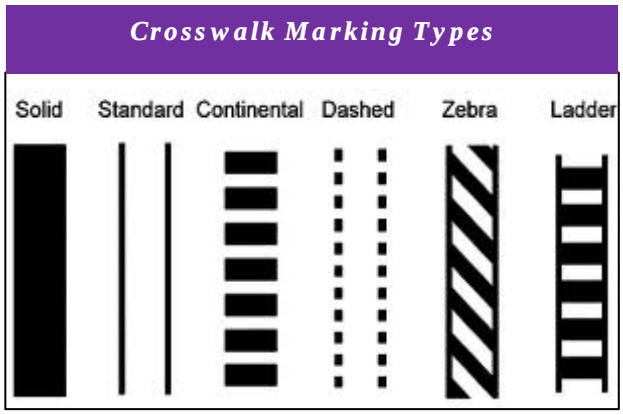
- **R-59B: Erickson Ave from Flint Avenue to Garber's Church Road** – This recommendation is related to similar factors as R-60A. However, R-59B would make a southern connection from the Belmont area to Garber's Church Road and the recommended shared-use path. Bicycle improvements are recommended along this segment of Erickson Avenue as well and would connect at the northern end to existing pedestrian and bicycle improvements completed as part of the Mountain View Elementary SRTS project.
- **H-18: South Main Street (US 11) from Stone Spring Road to Pleasant Valley Road** – This is a critical pedestrian link along a major highway corridor that currently offers no pedestrian space for most of its length. The entire segment is approximately 1.3 miles in length. The northern 0.4 mile currently has a sidewalk on one side of the highway. Throughout the segment the highway is lined with commercial and light industrial uses and with connecting streets that provide access to residential uses. Throughout the segment there is no alternative for bicyclists or pedestrians. A sidewalk would improve the safety of the corridor for pedestrian and provide a connection for employees and residents in the area to reach destinations on foot.
- **R-44: Shen Lake Drive from Port Republic Road to Massanetta Springs Road –** This sidewalk would provide a connection for pedestrians to the proposed shared-use path on Port Republic Road and enhance connectivity within the larger Shen Lake Community. A pedestrian crosswalk would be necessary to cross Port Republic Road to access the proposed shared-use path. The total length of the sidewalk would be approximately 0.74 mile in length and could be coordinated with the bike lane proposed along this same segment.
- **R-47B: Reservoir Street from Harrisonburg City Limit to Stone Spring Road** – Construction is currently underway on the portion of Reservoir Street from the City limits northward, which will include a 5-foot sidewalk on both sides of the roadway. The county portion of Reservoir Street to Stone Spring Road measures approximately 0.55 mile. The connection between the City facility and Reservoir could be completed in coordination with the recommended bike lane on this segment which was the

second highest prioritized project for the HRMPO region. The benefits of the bike lane are similar to those for the sidewalk primarily that it would provide a critical connection to Sentara RMH and the network of pedestrian facilities on Stone Spring Road and Port Republic Road.

C. System-Wide Recommendations

The following are general recommendations not specific to any one street or road within the County but are in addition to the specific facility treatments that are discussed above. These are suggested design and programming guidelines that can assist the County with implementing the overall network.

- Marked crosswalks – Where feasible, marked crosswalks should be installed. It should be noted that crosswalks are not always advisable at every crossing, especially when done as a stand-alone option not in conjunction with other geometric or signing improvements. Crosswalks installed at improper locations can cause more harm than good by leading pedestrians to be lulled into a false sense of security. For this reason, VDOT policy requires that engineering studies be conducted when installing new crosswalks across roads or legs of an intersection not controlled by a stop sign or a signal. However, crosswalks should be considered at locations where there is an existing or potential demand for pedestrians to cross at that location. This can be done by reviewing the surrounding land use and identifying whether sidewalks are within the area, and whether adjacent properties have the potential to generate pedestrian traffic (retail establishments, hotels, major centers of employment, schools, bus stops, etc.).



  The MUTCD notes that crosswalks should not be installed indiscriminately, particularly where the crosswalks would be across high-volume, high-speed (> 40 mph), and/or multilane approaches. At such locations, crosswalks should be considered in conjunction with other engineering improvements to improve the safety and visibility of pedestrians who will be crossing at that location.

  Where higher volumes of pedestrians are expected, the use of higher-visibility crosswalks such as the "continental" style crosswalk is recommended. Although such crosswalks are more expensive to install and to maintain, they command greater driver attention than the more typical parallel white lines.

- Pedestrian signals –Traffic signals located in potentially high pedestrian areas throughout the HRMPO region should be evaluated by VDOT to identify whether the existing traffic signals could be retrofitted with

pedestrian signals and pushbuttons. If a traffic signal is being reconstructed, pedestrian indications should be incorporated into the signal wherever possible. If the signal is located on a road that currently lacks sidewalks, but is located in a developing area where pedestrian generators are nearby, then VDOT should still incorporate pedestrian signals or, at a minimum, provide the wiring and hardware that would allow towns and the City easy installation of pedestrian signals in the future.

- Traffic signal detection – All traffic signals located on the routes identified in this plan as being a part of the recommended bicycle network should be redesigned to ensure that bicycles can be detected. Some traffic signals rely on a detection methodology (magnetic induction loops embedded in the pavement that detects large metallic masses passing over them) which easily detect cars and trucks but may not detect bicycles or buggies. Replacing loop detectors with alternative technologies such as video detection is recommended to ensure that bicycles and buggies are detected. Even greater consideration needs to be given to traffic signals on SR 42 or at intersections in Bridgewater and Dayton where there are higher concentrations of Old Order Mennonites who use horse and buggies for their transportation needs. This form of transportation is crafted with minimal amounts of metal, making them difficult to detect by loop systems.

- Curb cuts and ADA compliance reviews – Federal and state law requires that all new pedestrian/bicyclist facilities be built to current ADA standards; however, older sidewalks in the county often predate current ADA standards. Common deficiencies include lack of curb cuts, curb cuts that are too steep or too narrow to meet current standards, upheaved or broken sidewalks, and sidewalks that have utility poles or signs that narrow the sidewalk below the minimum four-foot width necessary for most mobility-impaired individuals to pass. VDOT, the City, County, and the Towns of Bridgewater and Dayton should develop a program for auditing existing facilities and developing a program for retrofitting existing sidewalks to meet current ADA standards.

- Bicycle parking and end-of-trip facilities – Getting bicyclists to their destination won't encourage bicycling if those bicyclists lack a way to securely lock their bicycle when they get to that destination. Well-designed bicycle parking can also reduce bicycle theft, a growing concern in many US cities as the number of bicycles grows.

  Bicycle parking can also be an attractive component of a streetscape design. Good bicycle parking racks should allow for

U-Shaped Bicycle Racks at Red Front Supermarket

a bicycle to be locked at two different points of contact, such as upside-down U-shaped racks[13].

Localities should consider installing bike racks and other bike amenities when planning new or retro-fitting existing publicly owned facilities like parks, schools, libraries and public buildings.

Localities should work with area employers to encourage installing bicycle parking and other end-of-trip facilities (e.g. showers and changing areas) on-site. These facilities are of benefit to employers by promoting healthier behavior by employees, reducing the amount of cars in the employee parking lot, and providing another amenity that can help them attract and retain employees.

The Association of Pedestrian and Bicycle Professions has published the "Bicycle Parking Guidelines" (apbp.org/Publications) and "Essentials of Bike Parking: Selecting and Installing Bike Parking that Works" (apbp.org/Essentials of Bike Parking).

[13] *Bicycle Parking Guidelines, 2nd Edition* – Association of Pedestrian And Bicycling Professionals, 2010

APPENDIX A. LIST OF ACRONYMS

AASHTO – American Association of State Highway Transportation Officials

ADA – American with Disabilities Act

ADT – Average Daily Traffic

APBP – Association of Pedestrian and Bicycling Professionals

BPC – HRMPO Bicycle and Pedestrian Committee

CSPDC – Central Shenandoah Planning District Commission

DCR – Department of Conservation and Recreation

FHWA – Federal Highway Administration

HDPT – Harrisonburg Department of Public Transportation

HRMPO – Harrisonburg-Rockingham Metropolitan Planning Organization

HSIP – Highway Safety Improvement Program

IMBA – International Mountain Bike Association

JMU – James Madison University

LAB – League of American Bicyclists

MUTCD – Manual of Uniform Traffic Control Devices

NACTO – National Association of City Transportation Officials

RBAC – Rockingham Bicycle Advisory Committee

SR – State Route

SRTS – Safe Routes to School

TAC – Transportation Advisory Committee

TAP – Transportation Alternatives Program

TE – Transportation Enhancement Program

VDOT – Virginia Department of Transportation

APPENDIX B: PUBLIC SURVEY RESULTS