



# River District Bicycle and Pedestrian Study



FINAL REPORT May 2017

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# River District Bicycle and Pedestrian Study

Date

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Prepared For

West Piedmont Planning District Commission

City of Danville, Virginia

Danville-Pittsylvania MPO

Virginia Department of Transportation

Federal Highway Administration

Prepared By

The logo for EPRPC features the letters 'EPR' in a large, blue, serif font, followed by 'PC' in a smaller, grey, serif font.

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# Introduction

## Danville's River District

### The River District

The Danville River District is an area that encompasses the historic center of the City of Danville, Virginia, and is primarily located on the south side of the Dan River. It served as the original business and commercial core of the city, featuring numerous offices and storefronts on streets like Main Street and Union Street. It also includes historic warehouses and production facilities, most notably in the Tobacco Warehouse District along Craghead Street and Bridge Street. The full extent of the River District, as officially defined today, is highlighted in green in Figure 1 on the following page.

*Once revitalized, these historic centers can serve as unique and important activity areas that are capable of contributing essential elements to a community's civic, economic, and social vitality.*

### The Decline and Revitalization of the River District

At one time, the River District not only served as the commercial core of the City of Danville, but also of much of the surrounding southern Virginia region. Anecdotal stories shared by older residents during this study recalled times when the crowds drawn to it on weekends and evenings would fill the sidewalks so that people would be forced to walk shoulder to shoulder as they moved from one business to the next.

Beginning in the mid 20th century, however, the River District entered a period of decline. Similar declines were experienced by the central business districts of many, if not most, cities in America during that time. There were many factors that contributed to this change. Partly, it was the result of new technologies used in production, transportation, and communication, which transformed trading markets and led to the loss of many of the businesses that had operated in areas such as these. Additionally, major public investments in highways and governing policies that provided incentives for new housing construction led many people to move to homes in decentralized and auto-oriented suburban neighborhoods. Stores and offices followed closely behind, establishing themselves in areas that were closer to these new neighborhoods and able to offer ample parking and direct highway access. Investments in these new locations, however, were typically accompanied by disinvestments in the historic central business districts. Like many others, the River District was slowly abandoned and left with an uncertain future.



Beginning in the late 1900s and continuing through the early decades of the 2000s, however, many central business districts began to experience reinvestment and revitalization. This new trend has been driven by the recognition that the distinct built form of these areas creates a dense, dynamic, active, and walkable environment that holds great appeal to certain businesses and residents. Furthermore, studies and books such as Richard Florida's *The Rise of the Creative Class* recognized that these types of urban areas often attract leaders in the high tech and

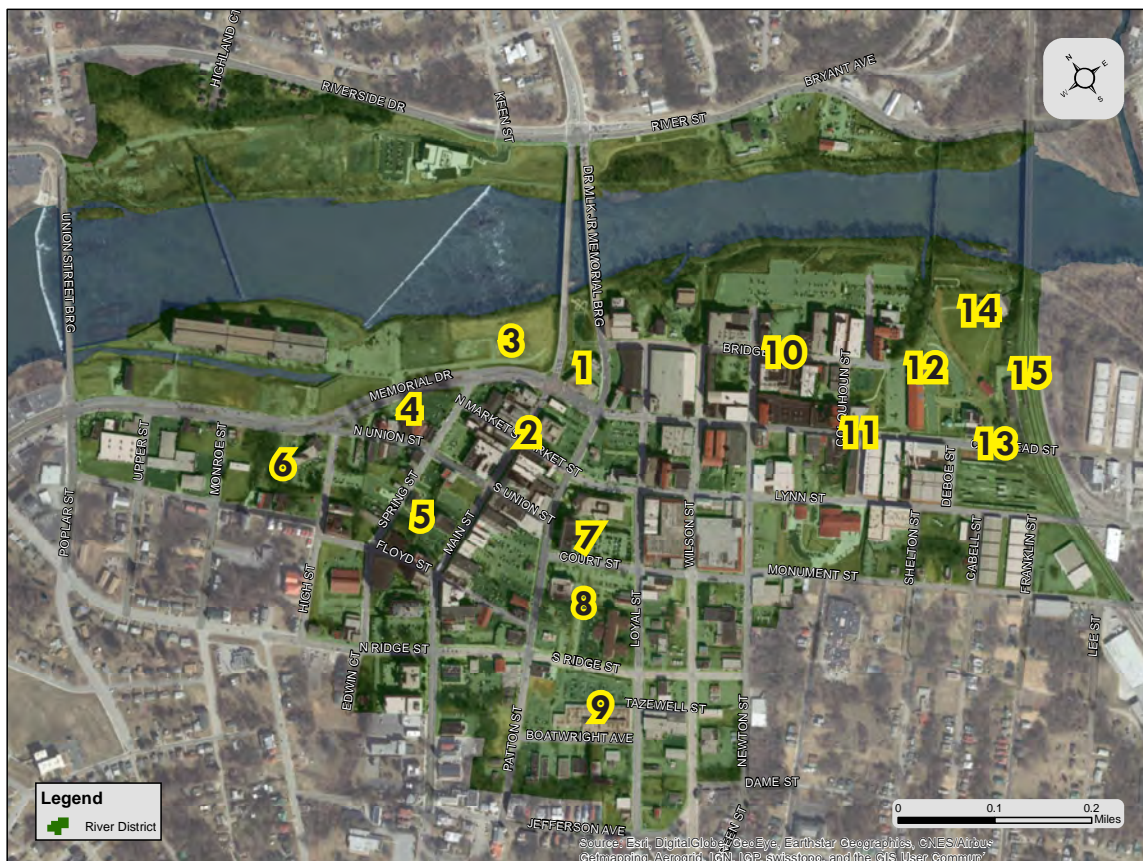
service industries that are increasingly important in the modern American economy. Once revitalized, these historic centers can serve as unique and important activity areas that are capable of contributing essential elements to a community's civic, economic, and social vitality.

Recognizing the potential of the River District to serve as this type of activity center, the City of Danville completed the *River District Redevelopment Plan* in 2011. This plan established official strategies for revitalizing the River District and encouraging redevelopment activities. In the years following, these strategies have succeeded in attracting significant reinvestment in the River District, which is now well on its way to reestablishing itself as an important activity center for the City of Danville.

A list of some of the important destinations (with numbers corresponding to the map in Figure 1) includes:

1. Main Street Plaza
2. Main St Central Business District
3. Riverfront Park (Planned)
4. Union Street Business District
5. Danville Transit Center
6. City of Danville Utilities and Financial Services Center
7. City of Danville Municipal Building and City Circuit Court
8. City of Danville Downtown Public Library
9. Galileo Magnet High School
10. Averett University Graduate and Professional Studies Center
11. Tobacco Warehouse District
12. Community Market Building
13. Danville Science Center
14. Carrington Pavilion
15. Danville Amtrak Station

**Figure 1: Danville River District Extent and Major Destinations**



## Pedestrian and Bicycle Travel in the River District

In order for the River District to establish itself as a unique activity area within the City of Danville, it is important that redevelopment efforts are directed towards enhancing the distinct characteristics and strengths of the area that distinguish it from other activity centers in the city.

The appeal of the River District lies not only in its destinations, but in the spaces surrounding those destinations. The diverse historic architecture and broad store-front windows provide frequent visual interest, while the narrow streets, wide sidewalks, and slow moving traffic create an environment where people can feel comfortable while walking along the street.

These characteristics, combined with the large variety of destinations and activities that are found in the area, result in streets that are often busy with a rich energy. These streets not only serve as places for movement, but also for interaction, experience, and observation. **In that sense, the streets in the River District do not simply provide access to destinations, but rather serve as an important part of the destination itself.**

While the success of a street in a suburban setting depends on cars driving quickly, the success of these streets might better be defined as people moving comfortably and enjoyably. Cars are not to be eliminated from this environment, but the “needs” of auto traffic should instead be balanced against the safety and comfort of the human beings with whom they share the streets.

Bicycle travel assumes great importance in these environments as well. Bicycles allow people to travel at greater speeds and to comfortably cover greater distances than they can while walking, but they achieve this while continuing to operate at the “human scale.” The bicycle therefore serves as an important supplement to, rather than replacement for, pedestrian travel.

By attending to the needs of these modes and creating a vibrant pedestrian and bicycle environment, the River District can further distinguish itself as a unique and desirable destination for living, working, dining, and shopping in the greater Danville region.



*The transportation and street design concerns of suburban shopping areas like Mount Cross Road (top) are very different than those of urban centers like the River District (bottom).*

## Study Purpose

The purpose of this study is to assess the conditions of the River District as they relate to pedestrian and bicycle travel in order to better identify concerns and opportunities for improvement. The report begins by documenting existing conditions, continues by assessing areas in need of improvement, and concludes with a broad series of recommendations that could be used to address those needs.

This report is intended to serve as a guiding document that will help to direct future efforts to enhance bicycle and pedestrian travel in the area. The recommendations need not be implemented in any particular order, but should be pursued as funding and support allow.



# Existing Conditions

## Sidewalks

Sidewalks are a critical element of an effective and safe pedestrian environment. In the River District, sidewalks are widely available and provide nearly continuous access to all of its major destinations. No major gaps in sidewalk access were identified by this study.

While the availability of sidewalks is excellent in the River District, the condition of the sidewalks is occasionally in need of improvement. Notable issues include intermittent sidewalk obstructions and missing curb ramps to permit a smooth transition from the sidewalk to the street, both of which can create obstacles and safety concerns for people with limited mobility.



This sidewalk on Bridge Street lacks curb ramps and also is obstructed by flag poles.

**Figure 2: Danville River District Existing Sidewalks**



# Riverwalk Trails

The Danville Riverwalk Trail network currently features over 9 miles of multi-use trails, most of which run along the banks of the Dan River. While the primary Riverwalk Trail corridor is located on the north side of the Dan River, a spur of the trail crosses the Dan River along a historic railroad bridge and provides direct access to destinations in the River District. The primary River District access points (numbered corresponding to Figure 3 below) include:

1. The Community Market Building and Carrington Pavilion
2. Bridge Street at Wilson Street
3. The Main Street Plaza

These direct connections between the Riverwalk Trails and the River District offer numerous opportunities to combine outdoor recreation with urban amenities.

**One notable condition, however, is the lack of information and signage to direct River District visitors to the Riverwalk Trails, or to direct Riverwalk Trail users to major destinations in the River District.** This type of information could greatly enhance the collaboration between these community assets.



*This trail connection at the Community Market Building provides excellent access but no wayfinding information.*

**Figure 3: Danville River District Existing Riverwalk Trails**



# Bicycle Pavement Markings

Although bicyclists are permitted to travel on almost all roads (with the exception of some major highways), the difference between the speed and size of a bicycle and of a car can potentially result in conflicts that can endanger both bicyclists and motorists. In order to help avoid situations such as these, pavement markings can be added to streets to alert drivers to the potential presence of bicyclists or to designate a portion of the street for the exclusive use of bicycles.

Two common types of pavement markings include bicycle lanes and shared-lane, or “sharrow”, markings. (For more information about sharrow markings, see page 29) Currently, bicycle lanes are provided on Wilson Street between Craghead Street and Ridge Street, while sharrow markings are provided on Ridge Street between Main Street and Wilson Street.

One notable condition found in the River District is the fact that most streets are too narrow to be able to allow space for a designated bicycle lane. On many of these streets, however, low traffic volumes and slow speed limits will allow sharrow markings to be a sufficient form of pavement marking.



Examples of bicycle lanes (left) and sharrow markings (right)

**Figure 4: Danville River District Existing Bicycle Accommodation Pavement Markings**



## Crosswalks

Street crossings present considerable dangers to pedestrian travel. When crossing a street, a person is fully exposed to moving vehicles, and is very likely to be seriously injured or even killed if struck.

Crosswalks help minimize these dangers in two primary ways. First, they direct pedestrians to cross the street at locations where visibility, vehicle movements, and infrastructure accommodations are best able to facilitate a safe crossing. Secondly, they alert drivers to the possibility of pedestrian crossings with features like pavement markings, signs, or lights. This awareness allows drivers to react more quickly and safely to crossing pedestrians.

Many crosswalks in the River District could benefit from improvements. Major issues include:

### Brick Crosswalks

Several crosswalks, especially on Main Street, have brick-paver surface treatments. These crosswalks are often used to enhance the both historic character of an area, as well as the aesthetic appearance of the street. When these crosswalks are not given painted borders, however, they often become difficult for drivers to distinguish from the pavement itself.

### Painted Crosswalks

Most crosswalks in the River District are designated by two parallel painted white lines, such as that seen in the middle image on this page. In many cases, however, these lines are very thin and consequently have limited visibility to drivers.

### Curb Ramps

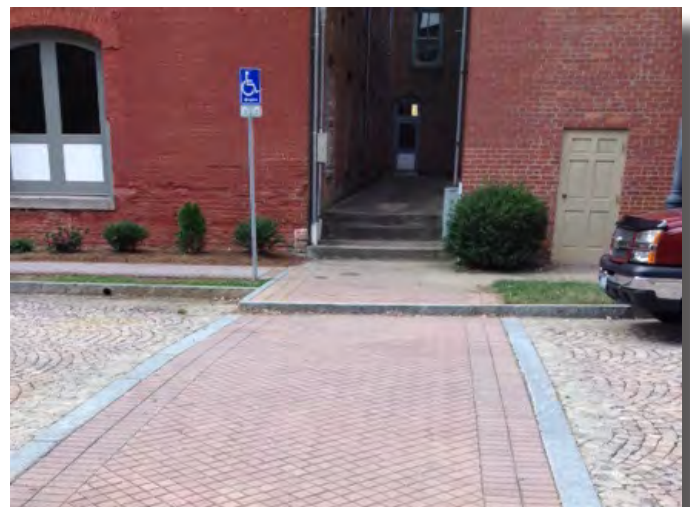
As mentioned previously in the discussion on sidewalks, several crosswalks are missing curb ramps that provide a smooth incline from the street to the sidewalk. This condition is especially problematic for users with physical handicaps or other conditions limiting mobility. As a result, curb ramps are required by the Americans with Disabilities Act (ADA) and have a specific design slope associated with them.



*Brick crosswalks can be difficult for drivers to distinguish from the surrounding pavement.*



*Crosswalks marked with thin white lines, such as this example on Patton St shown above, have low visibility for drivers.*



*An example of a crosswalk on Bridge St without curb ramps.*

# Bicycle Racks

In order for the bicycle to be a viable and practical mode of transportation, a community must not only address the streets and trails that the bicycles will be traveling on, but also provide safe and convenient locations to park bicycles after users have reached their destinations. Bicycle racks provide this service and thus are an essential consideration of effective bicycle planning.

The map below documents the location of existing bicycle racks in the River District. This information is based on a review of the primary activity areas surrounding Main St, Union St, Patton St, Craghead St, and Bridge St. Bicycle racks located outside of these areas may not be shown on the map below.

The bicycle racks currently available in the River District are primarily located along Main St and Patton St, but significant areas of the River District remain remote from bike rack access.

**Figure 5: Danville River District Existing Bicycle Racks (Located in Primary Activity Areas)**



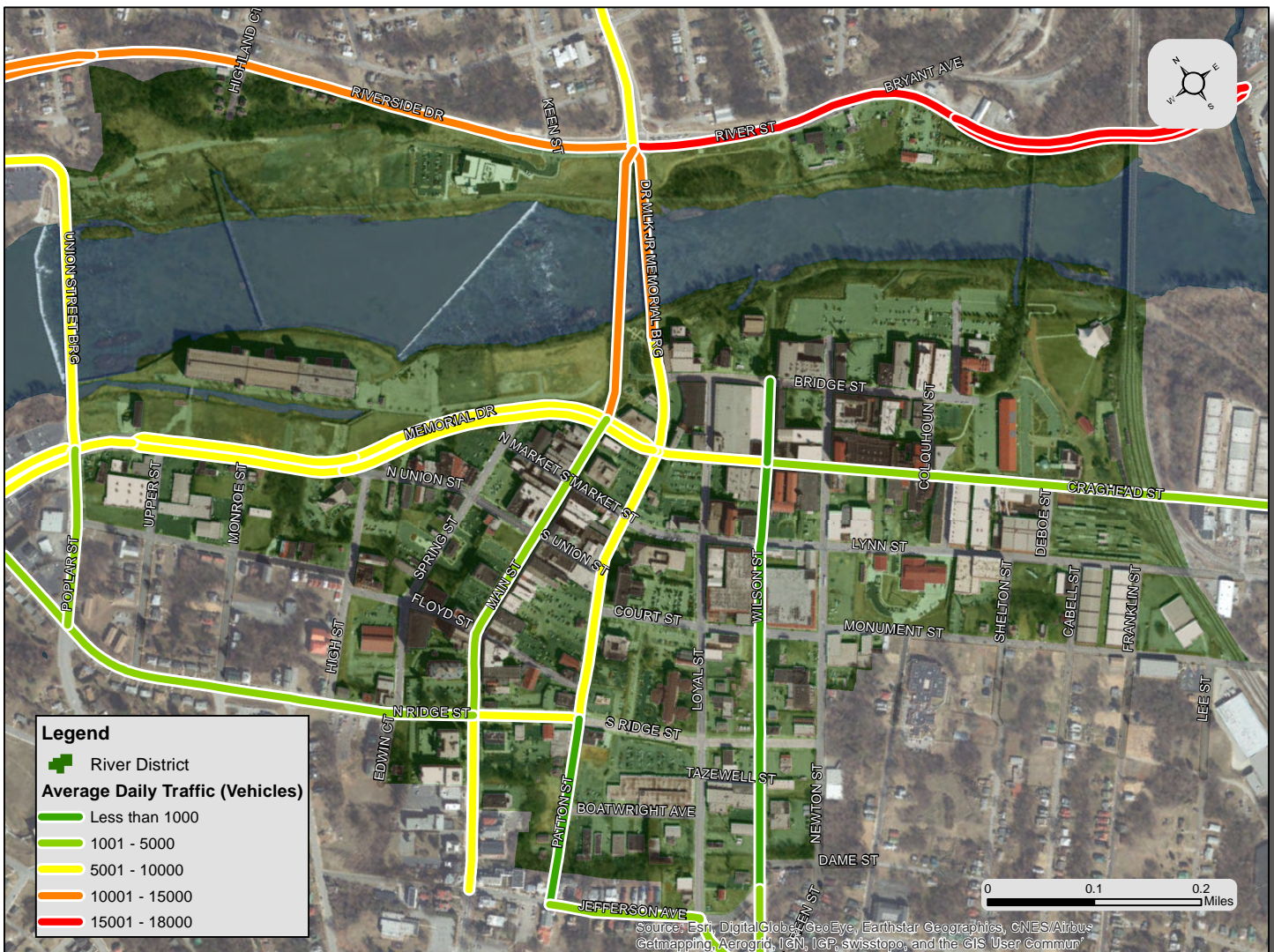
# Traffic Information

## Average Daily Traffic (ADT) Volumes

Traffic volumes for streets in the River District are generally low. On the south side of the Dan River, where the majority of major destinations in the River District are located, no streets are reported as having typical volumes greater than 10,000 vehicles per day.

The highest average traffic volumes in the district are reported on River Street, north of the Dan River. This street carries 15,000-18,000 vehicles per day. Riverside Drive and the Main Street bridges follow as the next busiest corridor segments, with each carrying 10,000 to 15,000 vehicles per day.

**Figure 6: Danville River District 2015 Average Daily Traffic (ADT) Volumes**



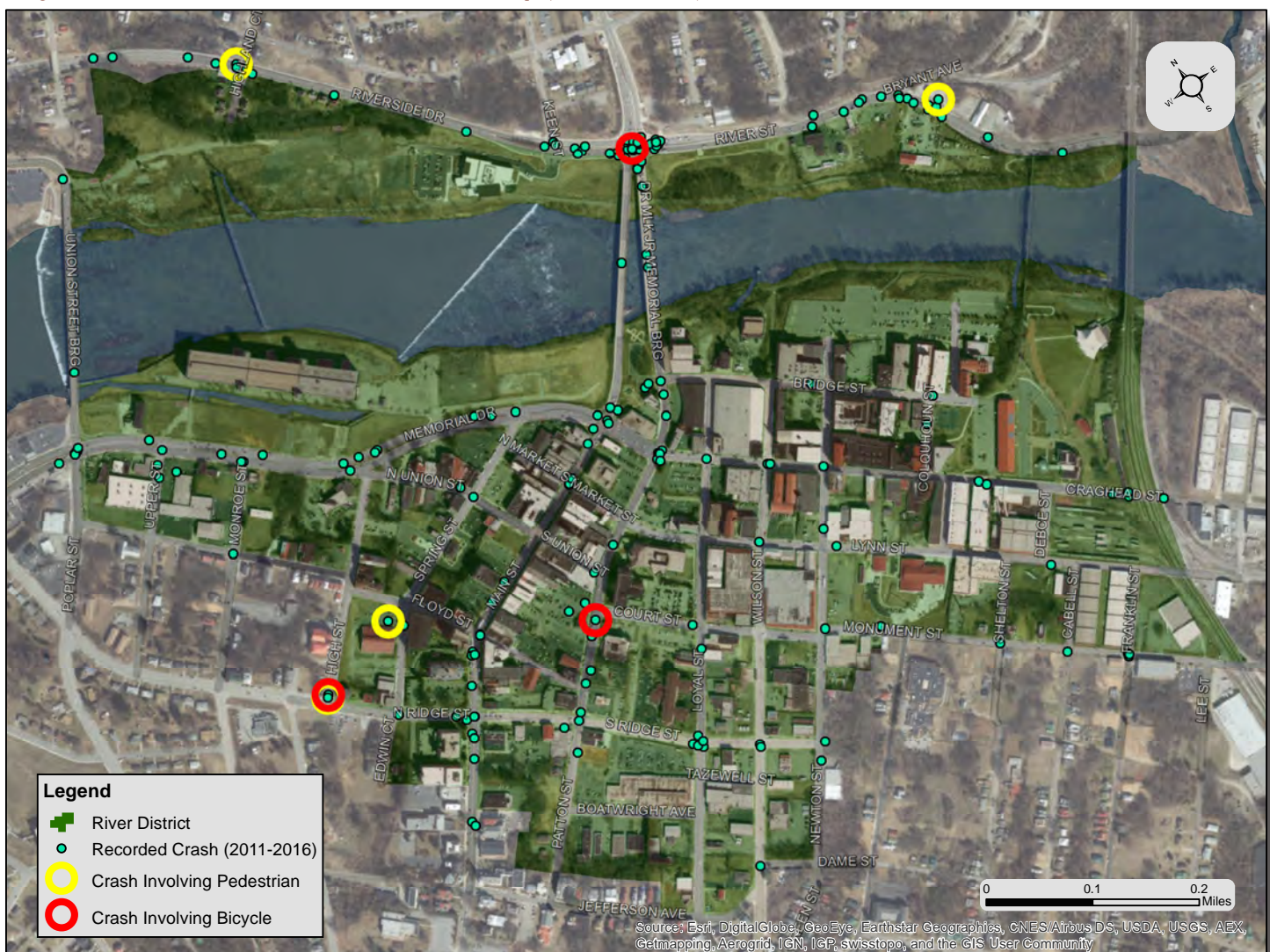
## Crash History

From 2011-2016, there were over 200 crashes reported in the River District. Of particular interest to this study, seven of these incidents involved a pedestrian or bicyclist.

Of the four crashes involving pedestrians, one occurred on River Street, one on Riverside Drive, one Ridge Street, and one in a parking lot adjacent to Spring Street. Of the pedestrian crashes that occurred on streets, all appear to have occurred when a pedestrian attempted to cross a four-lane street at a location without a crosswalk.

The three crashes involving bicyclists occurred on Ridge Street, Patton Street, and at the intersection of Main Street and Riverside Drive. Two of the three crashes occurred at intersection crossings of four-lane roads.

**Figure 7: Danville River District Crash History (2011-2016)**



# Assessment of Needs

A series of meetings was held as part of this study on November 10, 2016 in the Pepsi Building in Danville, Virginia. Roundtable discussions were arranged with specific stakeholder individuals and groups during the morning and early afternoon, followed by an open house meeting in the evening that was open to the general public.

The goal of these meetings was to collect insights and ideas that would be used to inform the content and priorities of the recommendations produced by the study. Participants were encouraged to offer ideas on any matters concerning bicycle and pedestrian travel that they considered to be important, but particular attention was given to the following subjects:

- Identification of desired destinations in the River District for bicyclists and pedestrians (as possible locations for amenities such as bicycle racks and wayfinding information)
- Desired bicycle routes in the River District
- Identification of sidewalks or crosswalks in need of improvement (or construction)
- Strategies to enhance the connections between the River District, the Riverwalk Trails, and surrounding neighborhoods
- Intersections presenting actual or perceived safety concerns to bicyclists and pedestrians

The roundtable discussions were attended by multiple staff members of the City of Danville, including representatives from the departments of Planning and Zoning, Parks and Recreation, and Public Works. Stakeholders also included downtown merchants and representatives of the River District Foundation, the Danville Regional Foundation, the Danville YMCA, and Wilkins Realty. The open house public meeting was attended by approximately 10 people, including residents, city council members, and a representative from the Danville Historical Society. In addition, all of the meetings were attended by representatives from the Virginia Department of Transportation (VDOT), the Danville Metropolitan Planning Organization (MPO), and the project consultants from EPR PC.

This section summarizes the feedback collected during those meetings. Part I summarizes major topics of discussion that occurred during the meetings, while Part II provides maps that document the results collected from mapping exercises that were conducted during the meetings.

## Part I: Major Topics of Discussion

### Enhancing Bicycle and Pedestrian Culture

One of the issues that was cited most frequently during the meetings was the importance of enhancing the bicycle and pedestrian culture in Danville. In part, this involves finding ways to encourage residents to become more personally involved in biking and walking activities. Equally important, however, would be efforts to change the behaviors of motorists to make them more sensitive to and aware of the safety of bicyclists and pedestrians that they encounter along the roads. Multiple participants specifically spoke of the failure of drivers to yield to pedestrians in crosswalks as a significant deterrent to pedestrian activity in the River District.

### Increasing Activity

Meeting participants verified that pedestrian activity in the River District has increased significantly in the past five years, especially in the vicinity of the Tobacco Warehouses along Craghead St and Bridge St. Anecdotal reference to an event as simple as people walking along Craghead St in the evenings with leftover food from



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restaurants was shared as an example of activities that residents would not have expected to see prior to the past two or three years. These observations support the timeliness of this study and the importance of this issue in relation to the continued growth and revitalization of the River District.

## Bicycle Resources

One of the suggested keys to increasing the amount of bicycle activity in the River District was the provision of more supporting resources for bicyclists, including bicycle racks, bicycle maintenance stations, and bicycle accommodations on downtown buses.

### Bicycle Racks

Participants acknowledged that some bicycle racks were available in the River District, but that the number of racks would significantly increase with time. Priority locations include the shopping areas along Main St, in the areas around the lofts on Craghead St, the community market and science center, and at government offices. It was also suggested that the city could install bicycle racks in the new parking garage at Bridge St and Loyal St, as well as investing in large portable bike racks to use for special events. Finally, it was suggested that the city should provide some covered bicycle racks, especially in areas near employment centers for people who use their bicycles to commute to work.

### Bicycle Maintenance Stations

In addition to installing more bicycle racks, it was suggested that the city invest in more maintenance stations in the vicinity of the racks. These stations offer a basic assortment of tools that allow users to conduct simple repairs that may be required during their trips.

### Bus Accommodations

Participants expressed the desire for bicycle racks to be added to city buses that serve the downtown in order to allow residents to ride the bus into the downtown and then continue their trips on their bicycles.

### Riverwalk Trails

Meeting participants expressed unanimous appreciation for the city's Riverwalk Trails. Many indicated that they regularly use them and encounter numerous other people along the trails. Some improvements were suggested during the meetings, however, including:

- **Trail Lighting:** Adding lighting along the trail to improve safety and allow use during the early mornings and evenings—especially during winter months.
- **Trail Maintenance:** Ensuring that trails are kept clear of natural debris such as leaves and sticks.
- **Trail Awareness:** Increasing outreach efforts to city residents to make more people aware of the trail network.
- **Book Stations:** One participant cited the “free libraries” (small enclosed stands containing used books that users can take or exchange as they desire) that have been installed along a trail in Martinsville, Virginia as a possible way to attract a greater number and diversity of people to the trails.

## Crossings

Several street crossings were specifically identified by meeting participants as being difficult or dangerous for pedestrians. Three that were discussed on repeated occasions include:

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## North Main St at River St/Riverside Dr

Pedestrians were said to feel unsafe crossing River St/Riverside Dr at this intersection, as well as crossing Main St on the south side of the intersection. Reasons were said to be the large width of the roads and the lack of median refuges during the crossings.

## Patton St/Main St at Bridge St

Meeting participants reported feeling unsafe when crossing Patton St/Main St at Bridge St near the Main St Plaza. Although this intersection features rapid-flash beacons to alert drivers of pedestrian crossings, pedestrians still feel concerns due to the high rate of vehicle speeds and the short line of sight before the intersection resulting from the obstruction of adjacent buildings.

## Craghead St

Pedestrian travel along Craghead St was reported to be difficult along the entire corridor due to the numerous intersecting streets and the short lines of site resulting from the close proximity of buildings to the road.

## Neighborhood Connections

In addition to discussing strategies to improve bicycle and pedestrian travel within the River District, several meeting participants also identified neighborhoods or surrounding destinations that they believe would benefit the most from enhanced connections to and from the River District. Three areas in particular include:

- The neighborhood commercial district on North Main St at Keen St and the surrounding neighborhood
- The neighborhood commercial district at the intersection of Loyal St and Jefferson Ave
- The neighborhood directly south of the River District, including streets such as Shelton St, Cabell St, and Franklin St

## Road Diets

A “road diet” is a short-hand term for a project that restripes or reconstructs a multi-lane street corridor to remove some lanes of travel. These types of projects typically occur on roads with 4 or more vehicle travel lanes but traffic volumes that are low enough to be accommodated with 2 or 3 lanes. The vehicle lanes removed by these projects are typically repurposed for uses such as bicycle lanes or on-street parking.

Meeting participants suggested that analyses be conducted on both Ridge St and Memorial Dr to determine if these corridors might be candidates for this type of work. Both are very wide roads with relatively low volumes of traffic and may be able to benefit from the addition of bicycle lanes.

## Expecting Change

A general sentiment that was expressed by multiple participants in reference to all of these issues was to caution the study to account for the possibility of substantial changes in the River District. It was suggested that project recommendations react more to the conditions that are expected in the future than the conditions that have been observed in the past, especially due to the relatively sudden and substantial increases in activity that the area has been experiencing. Specific examples that were given included the expectation for large increases of traffic on Craghead St due to the activity generated by the new apartment lofts, as well as the suggested expectation of more bicycle and pedestrian traffic along Wilson St and Loyal St as warehouses along those corridors are converted into storefront businesses.

## Part II: Mapping the Results

Meeting attendees were asked to participate in multiple map exercises to help the study team identify areas of concern, as well as areas of interest and/or important destinations. The results are summarized below, and the corresponding maps are provided on the following pages.

### Map Exercise 1: Desired Destinations

On one map board, participants were asked to place green dots “on locations or destinations to which you would like to bike or walk.” Results of this exercise are displayed in Figure 1. Individual responses were digitally recorded with a translucent green circle. Multiple responses in the same area result in a darker shade of green in the places where these circles overlap.

The map shows that the highest concentration of responses was in the area around the Main St Plaza. Activity extended up both Main St into the downtown as well as down Craghead St into the warehouse district. The area around the Community Market, Science Center, train station, and Carrington Pavilion also received several responses. Finally, several dots were placed just north of the River District on North Main St by participants indicating the desire to bike and walk to the commercial center on North Main St.

**Figure 8: Desired Bicycle and Pedestrian Destinations**



## Map Exercise 2: Safety Concerns

On the same map board as Exercise 1, participants were also asked to place red dots “on intersections or street crossings that are difficult or unsafe for bicyclists and pedestrians to cross.” Results of this exercise are displayed in Figure 2. The sizes of the red dots shown on the map are proportional to the number of responses placed on that intersection. Intersections receiving the largest number of responses included:

- North Main St at River St/Riverside Dr (7 Responses)
- Memorial Dr at Main St (6 Responses)
- Patton St at Bridge St (6 Responses)
- Main St at Ridge St (3 Responses)
- Patton St at Ridge St (2 Responses)
- Patton St at Memorial Dr (2 Responses)
- Union St at the Riverwalk Trail (2 Responses)
- Craghead St at the Community Market Building (2 Responses)

**Figure 9: Safety Concern Locations**

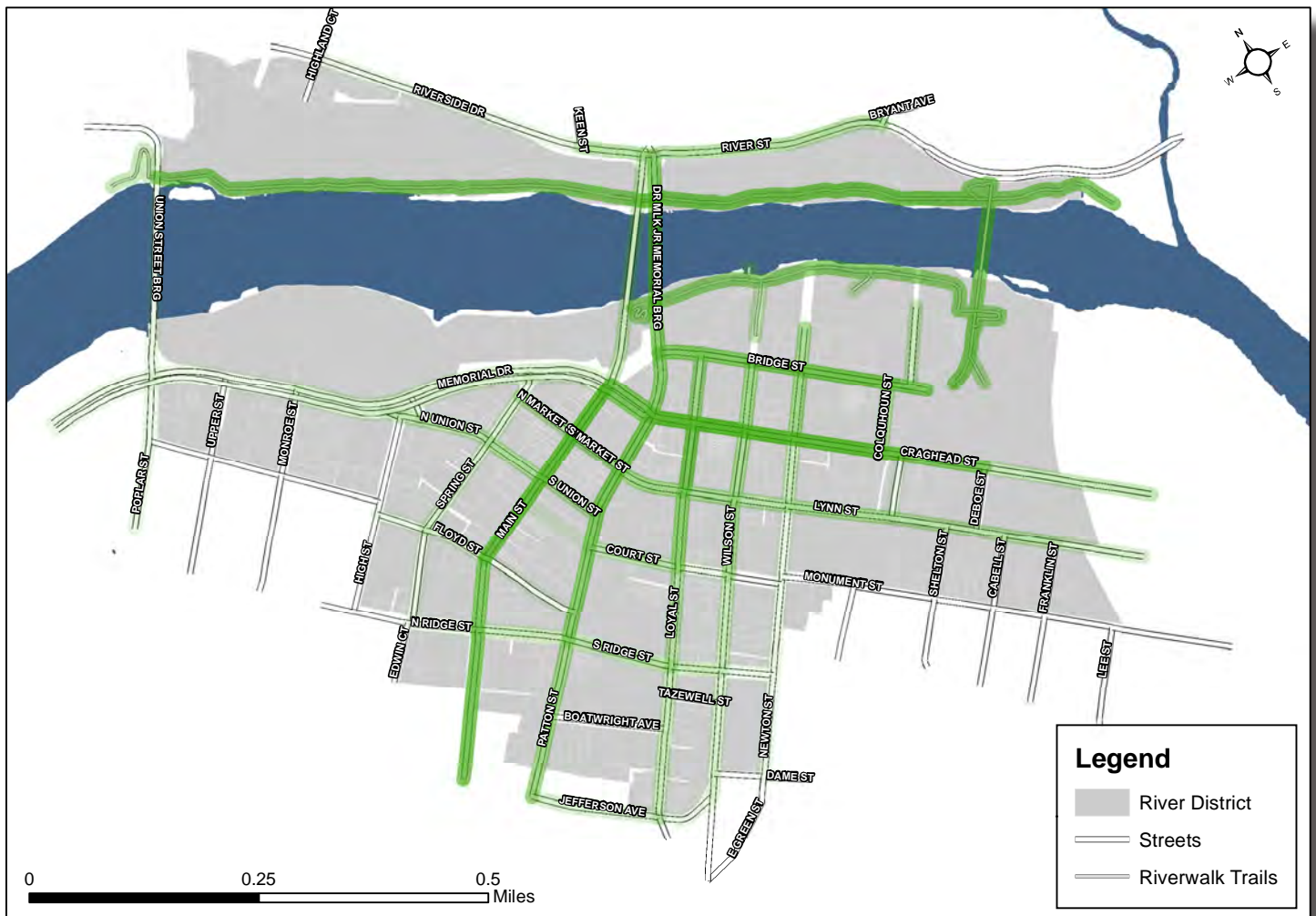


## Map Exercise 3: Active Street Corridors

On individual map sheets, participants were asked to use a colored marker to identify “the streets or roads that **you currently use** when walking or biking in the River District.” Similar to the results of Map Exercise 1, these results were recorded and then digitally displayed with a translucent green line. All the results were layered onto a single map, which is shown in Figure 3. The darkest green lines subsequently appear on the streets that were identified by the largest number of responses.

These results indicate that Main St and Craghead St are among the most active street corridors in the River District for bicycle and pedestrian users, followed closely by Patton St and Bridge St. A large number of respondents also indicated the use of the Riverwalk Trails.

**Figure 10: Active Bicycle and Pedestrian Corridors**



## Map Exercise 4: Desired Street Corridors

On the same individual map sheets as those used by Map Exercise 3, participants were asked to use a different colored marker to identify “the streets or roads that you that **you would like to use** for biking or walking if conditions were improved.” Using the same method as the previous exercise, these results were recorded and then digitally displayed with a translucent red line. All the results were then layered onto a single map, which is shown in Figure 4. The darkest red lines appear on the streets that were identified by the largest number of responses.

Memorial Dr was identified by the largest number of responses as the road that they would like to use more for biking or walking if conditions were improved. No other streets received a substantial number of responses, although several other streets and segments were identified by more than one participant.

**Figure 11: Desired Bicycle and Pedestrian Corridors**

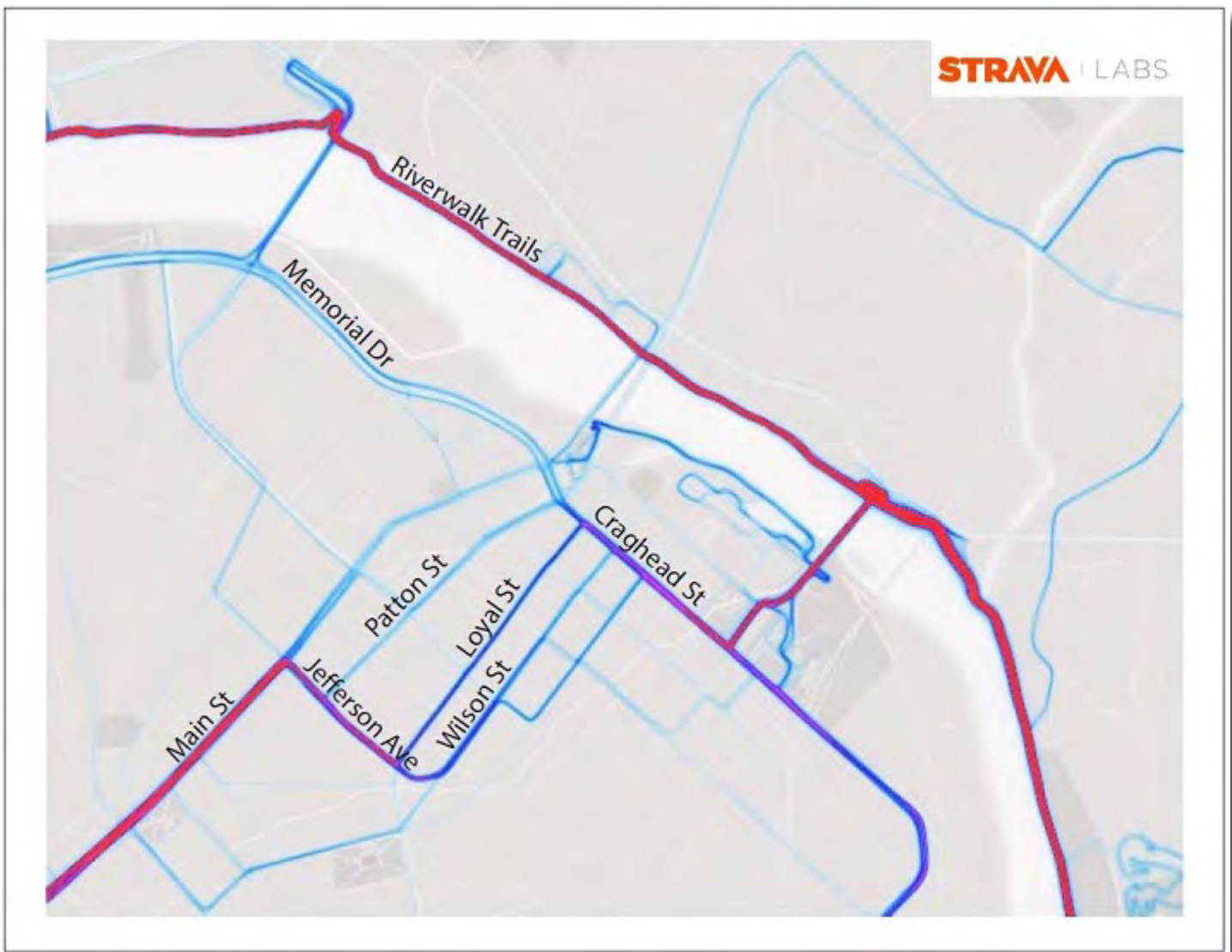


## Strava Heat Map

Strava is a mobile app and website that helps track and record the exercise activities of bikers and runners. The Strava website offers a “heat map” feature that aggregates all of the route information shared by its users over the course of a year. The information collected for the River District is shown below and has been used to supplement the user information collected at the first meeting.

The heatmap information, shown in Figure 12 below, is displayed in a light blue to dark blue to red spectrum. Streets and trails with light bicycle/pedestrian use are highlighted in light blue, those with moderate use in dark blue, and those with heavy use in red.

**Figure 12: Strava Activity Heat Map**



Source: Strava Labs Global Heat Map, ([labs.strava.com/heatmap/](https://labs.strava.com/heatmap/))

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# Improvement Recommendations

The improvement recommendations provided in the following section of the report are intended to address deficiencies or opportunities that were identified through field observations and in feedback collected at public meetings. The recommendations are organized by topic, including:

- Education and Events
- Pavement Markings
- Traffic Signal Equipment
- Bicycle Infrastructure
- Bicycle Routes
- Pedestrian Crossings
- Lighting
- Road Diets

## Craghead Street

Craghead Street is a critical corridor for bicycle and pedestrian travel in the River District. While certain recommendations for Craghead Street are included in this document, some more detailed street design opportunities such as bicycle and pedestrian pavement markings and enhanced pedestrian crossings are noted by reference. The City has a separate planning document, recently developed, that addresses curb extensions, sharrows, and pedestrian signage. Thus that information will further reinforce recommendations made in this bicycle and pedestrian plan document.



## Education and Events

One of the major concerns that was identified by citizens in the public meetings was the lack of a strong pedestrian and bicycle culture in Danville. In part, this was identified as a lack of interest that many residents of the city are perceived to have in participating in bicycling or walking. This could be attributed to many factors, including a lack of enjoyment, confidence, physical ability, perceived safety, or social acceptance.

In addition, the lack of a pedestrian and bicycle culture was discussed as being reflected by the failure of many drivers to be aware of or sensitive to the needs of pedestrians and bicyclists. Vehicles were said to frequently fail to yield to pedestrians in crosswalks, as well as failing to pass bicyclists with sufficient space for safety.

Communities can institute a variety of programs to help begin addressing issues such as these. These efforts can span from campaigns to raise awareness, to education programs that train users in skills and etiquette, to events that promote active travel and recreation. City governments, school districts, active-fitness organization, and equipment dealers can all participate in these efforts, each contributing their unique resources or knowledge to help the community achieve these goals.

Some sample programs or efforts that other communities have used include:

### Awareness

#### Public Service Announcements

Public service announcement campaigns can be used to raise general awareness of bicycle and pedestrian issues that are relevant for the community.

These announcements can be shared through a variety of mediums, including television, radio, and social media, as well as on posters, signs, or informational brochures. The messages can encourage people to bike and walk more frequently, notify them about upcoming events or classes, or share important safety tips and information for bicyclists, pedestrians, and drivers alike.

#### Social Rides

Social rides are community events that are typically organized by local bicycle groups or bicycle shops.

Participants meet at parks or other central locations and then ride their bicycles as a group to restaurants, events, or other social venues in their town or city. It provides the opportunity to develop a fun and community-oriented atmosphere around bicycling, while simultaneously supporting local businesses and events.



### Education

#### Bicycle Rodeos

A rodeo is a bicycle skills event which provides an opportunity for children to practice and develop skills that will help them to become better bicyclists and avoid typical crashes.

Some rodeos are designed as large, municipal events with skills activities, exhibits and games, while others are

much smaller in format, requiring a smaller number of volunteers. The goal of any bicycle rodeo is to provide an opportunity for the participants to learn, practice, and demonstrate their bicycle handling skills in a fun, noncompetitive atmosphere.

## Urban Cycling Workshops

An urban bicycling workshop is similar to a bicycle rodeo, but oriented to adult riders who are interested in learning more about using a bicycle as a transportation option to travel around the city.

The classes aim to increase confidence and knowledge of riding safety on city streets including skills such as using hand signals, understanding local road markings/signage, positioning in road, merging when bike lanes end, smooth and stable reaction to obstacles, and bike functions. Class time may be divided between lectures, performing drills on a bike in a controlled setting, and short rides to practice lessons on the city streets.



## Promotion

### Bicycle Friendly Business Program

The Bicycle Friendly Business program is a national initiative organized by the League of American Bicyclists. It recognizes the efforts of employers to create bicycle-friendly conditions for employees and guests with facilities such as secure bicycle parking and in-office showers.

Cities or other public organizations can encourage businesses to participate in the program, both by raising awareness of the initiative, as well as by assisting businesses with the application process or directing them to resources that help them fulfill certain conditions of the Bicycle Friendly Business designation.

### Earn-a-Bike Programs

Youth in the community are given the opportunity to earn a bicycle of their own in exchange for time spent working as an assistant at a bicycle shop or participating in bicycle riding workshops.

Participants in the program agree to work for a pre-determined amount of time (25 hours, for example) in order to earn their bicycle. During this time, they learn basic bicycle repair skills and bicycle safety practices that prepare them for effective bicycle ownership and use. Some programs offer additional levels of achievement and award for participants that want to remain involved in the program beyond the initial phase.

## Pavement Markings

Pavement markings are important elements of a successful pedestrian and bicycle environment. They help direct pedestrians and bicyclists to appropriate places to cross or travel in the road. They also help draw the attention of motorists to the locations where pedestrians and bicyclists are likely to be present, which improves their ability to react and respond as necessary. Elements to consider include:

### Crosswalks

It is recommended that all crosswalks in the River District be marked or bordered with broad white lines in order to make them more visible to drivers. Ten priority locations have been identified in Figure 13 on the following page. These include all of the intersections on Main Street and Patton Street between Ridge Street and Memorial Drive.

The City of Danville uses brick crosswalk surfaces at several locations throughout the River District in order to make the crosswalks more aesthetically pleasing and to enhance the historical character of the district. Unfortunately, the color of these surfaces is often difficult for drivers to distinguish from asphalt pavement, especially in low-light conditions.

In order to enhance the visibility of the crosswalks, therefore, this study will recommend that all brick crosswalks be bordered with high visibility white paint borders, such as that pictured below.

**Existing Conditions**



**Recommended Treatments**



Figure 13: Recommended Locations of Crosswalk Marking Enhancements



## Bicycle Markings

Pavement markings for bicycle travel help to position bicyclists in the safest and most appropriate locations on the street, while also increasing the awareness of drivers to the presence of bicycle travel. Two of the most common bicycle pavement markings include:



### Bicycle Lanes

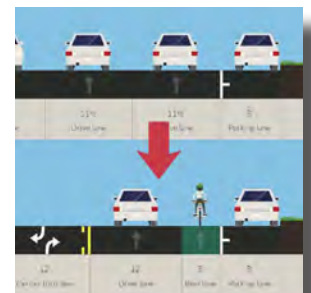
Where street widths permit, a bicycle lane can be added to the street to designate a travel lane exclusively for the use of bicyclists. In high traffic conflict areas, a bicycle lane may be filled with paint to further draw attention to the lane presence. In Figure 14 on the following page, streets that are highlighted with solid red lines are recommended for bicycle lane markings.



### Sharrows

On streets with more narrow widths that are unable to accommodate a bicycle lane, bicycle travel can be guided by shared-lane markings, also known as sharrows. These markings help bicyclists find the appropriate position on the road for travel, while also drawing drivers attention to the presence of bicycle travel. In Figure 14 on the following page, streets that are highlighted with orange lines are recommended for sharrow markings.

Figure 14 also features several streets that are marked with dashed red lines. These streets are recommended to be subject to a “road diet” effort that would replace unnecessary travel lanes with bicycle lanes and center turn lanes. These efforts are discussed in greater detail in the “Road Diet” section, which begins on page 43.

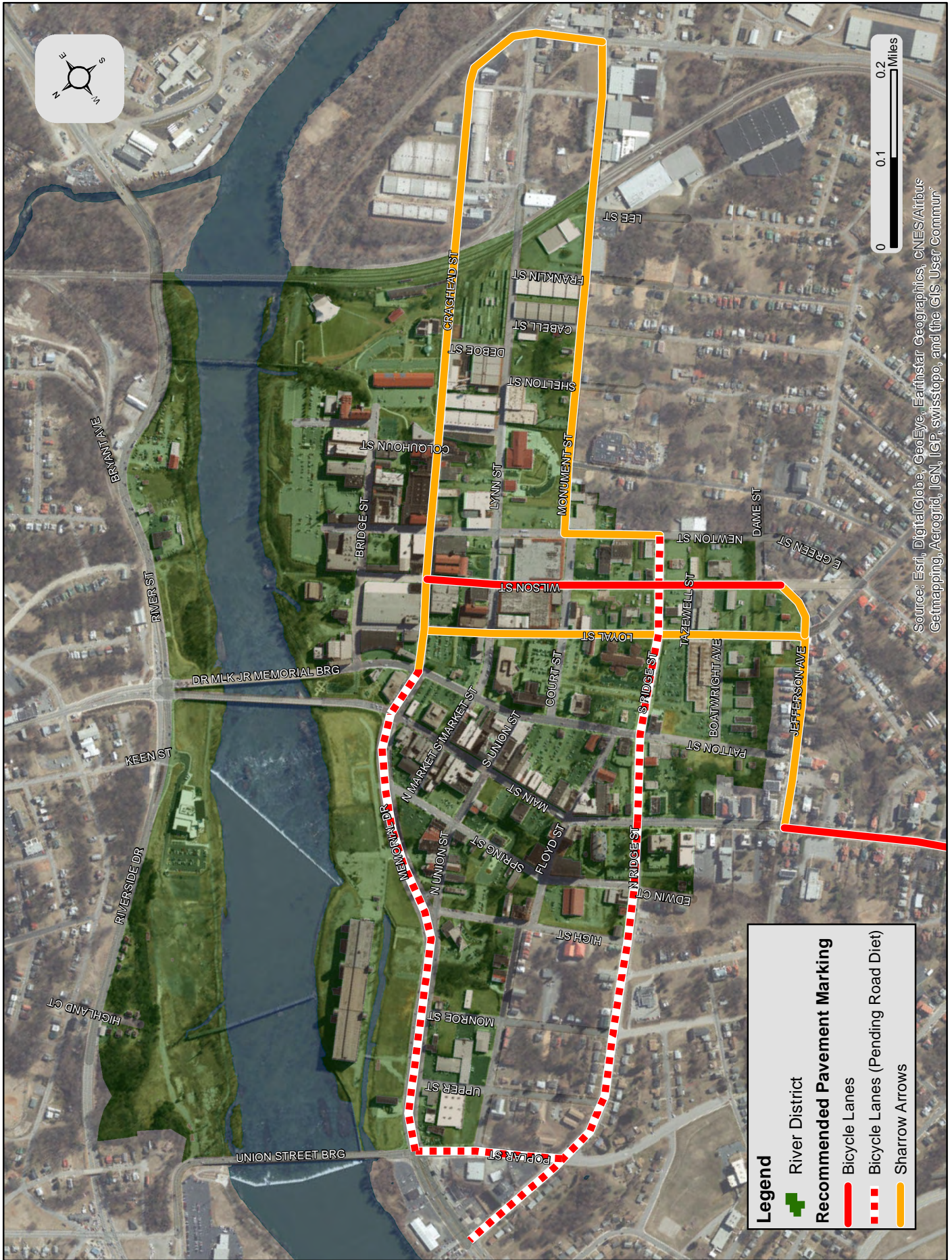


## Complete Streets Policy

As described by the U.S. Department of Transportation, “Complete Streets are streets designed and operated to enable safe use and support mobility for all users. Those include people of all ages and abilities, regardless of whether they are traveling as drivers, pedestrians, bicyclists, or public transportation riders. The concept of Complete Streets encompasses many approaches to planning, designing, and operating roadways and rights of way with all users in mind to make the transportation network safer and more efficient.”

Many cities have adopted Complete Streets Policies that officially require public road improvement efforts to consider the needs of all travel modes and to provide accommodations for non-automobile users whenever feasible. The possibility of such a policy was discussed in a National Complete Streets Coalition Workshop Program held with the City of Danville in May 2016. As part of the broader effort to further support bicycle and pedestrian travel throughout the city, this study recommends the eventual adoption of such a policy by the City of Danville.

Figure 14: Recommended Bicycle Accommodation Pavement Markings



## Traffic Signal Equipment

In areas like the River District, traffic signals should be deliberately designed and equipped to facilitate the movement of pedestrians and bicyclists as well as automobile traffic. Two major considerations include:

### Main Street at Riverside Drive: Pedestrian Signal Heads

The existing pedestrian signal heads at the Main Street and Riverside Drive intersection provide a “walk” and a “do not walk” symbol, but do not provide a countdown timer to inform pedestrians of how much time remains in the protected crossing phase.

Given the width of these crossings, it is recommended that these signal heads be replaced with signals that do provide a countdown timer in order to better guide pedestrian movements. These signal heads will reduce the frequency with which pedestrians are caught part-way across the intersection when the pedestrian crossing phase ends.



*Existing pedestrian signal heads (left) and recommended “countdown” pedestrian signal heads (right)*

### Bicycle Detection at Traffic Signals

One concern expressed by bicyclists was the failure of some traffic signals to detect their presence. This can be especially problematic during low-traffic situations when the absence of vehicle traffic may result in the failure of a signal to provide a green phase for the bicyclist, thus forcing them to cross an intersection illegally.

These situations can be corrected with special camera or pavement detection equipment. If these are not practical measures, another possible solution is the installation of traffic signal activation buttons, such as the one pictured below. These buttons are similar to pedestrian activation buttons, but are positioned along the curb for easy access by bicyclists.



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# Bicycle Infrastructure

## Bicycle Racks

In order for the bicycle to be a viable and practical mode of transportation, a community must not only address the streets and trails that the bicycles will be traveling on, but also provide safe and convenient locations to park bicycles after their users have reached their destinations. Bicycle racks provide this service and thus are an essential consideration of effective bicycle planning.

The map in Figure 15 on the following page offers recommended locations for new bicycle racks. Locations are based on two strategic concepts. The first concept is that at least one bicycle rack should be provided along every block of the primary business and activity corridors of Main St, Union St, and Craghead St.

The second concept is that bicycle racks should be provided at all major destinations within this activity area. When the recommended location is based on this strategy, the corresponding destination has been identified on the map below.

The City of Danville is also recommended to consider creating a bicycle rack request program, in which qualifying businesses in the River District can request the placement of a bicycle rack in front of their store or office, free of charge.

## Bicycle Share

A bicycle-sharing system is a service in which bicycles are made available for shared use to individuals on a very short term basis. Bicycle share programs typically offer multiple locations to rent and return bicycles, thereby allowing people to borrow a bike from one location and return it to another. The City of Danville has been engaged in the planning process for a new bicycle share program during the same time as this study. Based on public input received during this study, the following recommendations were made for potential bicycle share locations:

### Strong Recommendations

- **Carrington Pavilion/Community Market:** For use by those attending events at the market or pavilion, as well as for visitors to the Science Center and train station. Provides easy access to Riverwalk Trails and destinations in the Tobacco Warehouse District.
- **Main Street Plaza:** Provides easy access to the Riverwalk Trails, as well as Main St and other downtown locations.
- **Danville Transit System Hub:** Provides service and multimodal travel options for those arriving in the River District by bus.

### Other Potential Locations

- **Danville YMCA**
- **Downtown parking lots**
- **Craghead Street nearby Community Market**
- **Other popular Riverwalk Trail access locations**



**Figure 15: Recommended Bicycle Rack Locations**



## Bicycle Commuter Stations

Along with the general the bicycle rack location recommendations, this study has identified six potential sites for “commuter stations” that are intended to serve the unique needs to people who commute to work on bicycle.

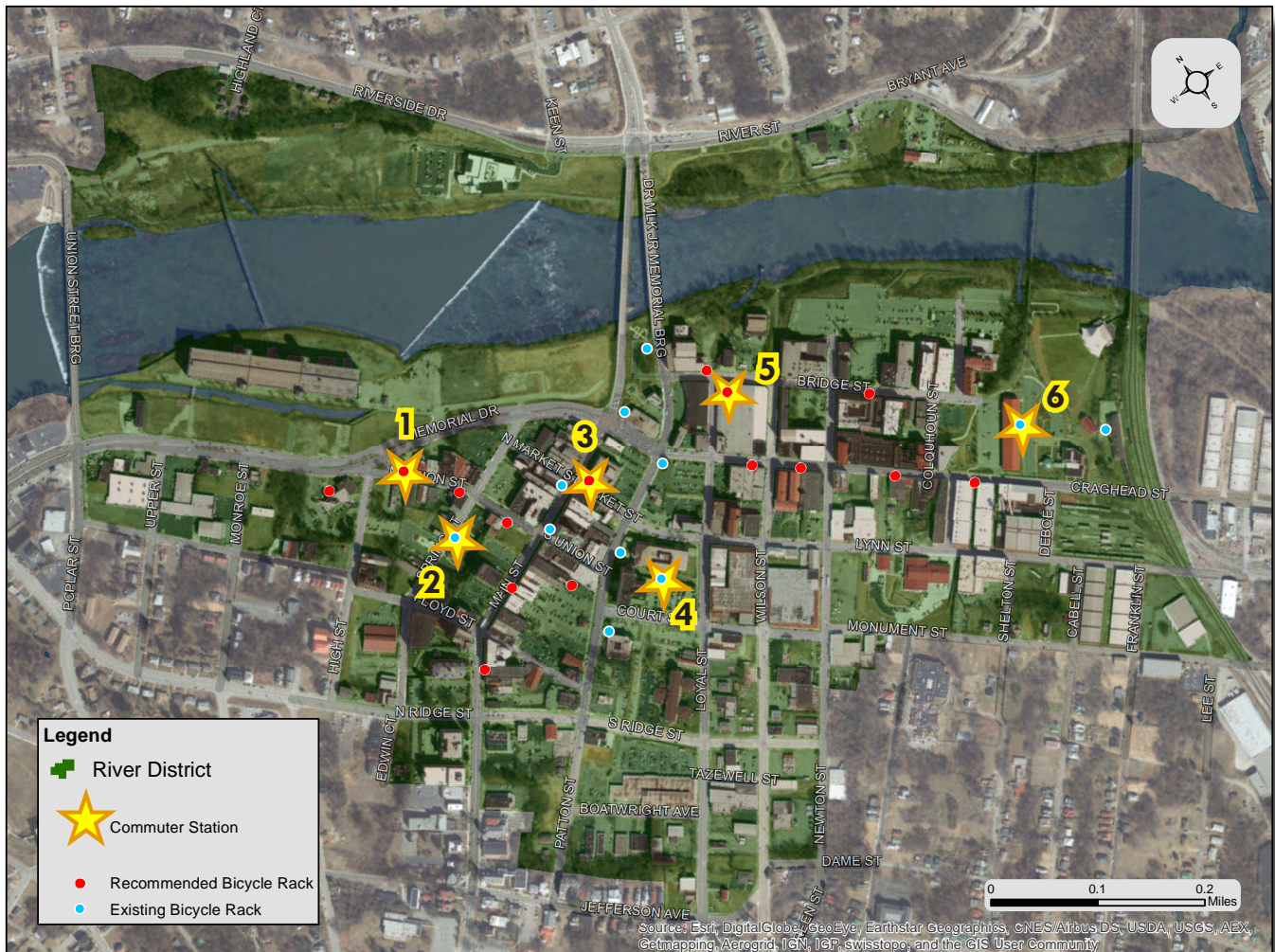
In addition to providing space for multiple bicycles, it is suggested that these commuter station bicycle racks be sheltered in order to protect the bicycles from weather elements throughout the work day. It is also recommended that bicycle maintenance stations be installed at these locations that provide tools to allow users to perform basic bicycle repair tasks like changing tire tubes or adjusting breaks.

It may be advisable to correspond the location of some or all of these commuter stations to the locations of the forthcoming bicycle share racks. Pending the final locations of that program, the suggested commuter station locations are identified with yellow stars on the map in Figure 16 below. They include the following locations (listed numbers correspond to the numbers on the map):

1. Union Street Business District
2. Danville Transit Center
3. Courtyard adjacent to the Danville Public Schools office
4. Danville Municipal Building and City Circuit Court
5. Bridge Street Parking Garage
6. Danville Community Market Building



**Figure 16: Recommended Bicycle Commuter Station Locations**



## Bicycle Routes

Bicycle routes encourage and facilitate bicycle travel by identifying safe and continuous routes that bicyclists can use to travel between destinations in a community. The map on the following page provides a recommended network of bicycle routes for the River District. These routes generally correspond with the recommended bicycle pavement markings shown on page 30.

The primary bicycle routes were identified as corridors that provide continuous routes into and through the River District, while avoiding many of the most congested areas such as the Main Street business district. In addition to these primary routes, two types of connection routes are identified on the maps. These include:

### North Main Street Connection Route

The North Main Street Connection Route is intended to direct bicyclists to the multi-use path that is located on the Dr. Martin Luther King Jr. Memorial Bridge. This pathway is separated from auto traffic and provides a safe route between North Main Street and destinations in the River District located south of the Dan River.



*The separated bridge pathway, highlighted in pink in the image above, provides a safe route across the Dan River for bicyclists and pedestrians alike.*

### Riverwalk Trail Connection Routes

One purpose of the proposed bicycle routes is to better facilitate connections between the Riverwalk Trails and the River District. By combining the shopping, dining, and entertainment opportunities of the River District with the scenic and recreational opportunities provided by the Riverwalk Trails, downtown Danville can further establish itself as a sought-after destination for residents and tourists alike.

The Riverwalk Trail Connection Routes would provide wayfinding information that would direct visitors in the River District to the Riverwalk Trails, while also providing information to direct trail users from the trail heads to major River District destinations.



Figure 17: Recommended Bicycle Routes



## Bicycle Route Signage

The map in Figure 18 on the following page provides a **draft** plan for the placement of street signs that will help identify the bicycle routes and direct users to their destinations. Sign markers are distinguished according to the type of sign that is expected to be used at that location. These sign types are explained in greater below.



### Confirmation Sign

Indicates to bicyclists that they are on a designated bicycle route. Make motorists aware of the bicycle route.



### Decision Sign

Marks the junction of two or more bicycle routes. Informs bicyclists of the designated bicycle route to access key destinations.

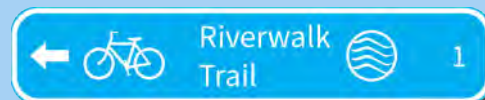


### Turn Sign

Indicates where a bicycle route turns from one street onto another street. Can be used with pavement markings.

## Riverwalk Trail Signage

In order to emphasize this connection between the Riverwalk Trails and the River District, The City of Danville should consider using special Riverwalk Trail signs or symbols as part of its bicycle wayfinding information to clearly guide users to trailhead connections.



**Figure 18: Draft Bicycle Route Signage Plan**



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

## Pedestrian Crossings

In addition to crosswalk markings and pedestrian signals, pedestrian safety can be enhanced by the construction of street features such as curb extensions and median refuge islands that shorten crossing distances and improve visibility. Three recommendations for projects such as these are included in this report.

### Memorial Drive at Main Street

The City of Danville is currently involved in the planning stages for the creation of a riverfront park in the empty lot on the north-east side of the intersection of Memorial Drive and Main Street. When this park is completed, heavy pedestrian movements between the Main Street business district and the Riverfront Park should be expected.

In order to enhance pedestrian safety and comfort when making this street crossing, it is recommended that the median on the north side of the intersection be widened in order to create a pedestrian refuge island. This would allow pedestrians to cross one direction of Memorial Drive at a time, rather than being forced to make the entire crossing at a single pass.

In order to widen the median, the left-most thru lane of Memorial Drive approaching the intersection from the north/west would be eliminated. Instead of having two thru lanes and one dedicated right turn lane, this approach would now have one thru lane and one thru/right turn lane.

**Figure 19: Existing Memorial Dr Crossing**



**Figure 20: Recommended Memorial Dr Crossing**



## Patton Street Crosswalks

Three important public institutions are located on east side of Patton Street, one block adjacent to Main St: The Danville City Circuit Court, the City of Danville Municipal Building, and the Danville Public Library. Pedestrians walking to any of these buildings from Main St must cross Patton St in order to reach their destinations, but the visibility of the existing crosswalks is limited. In the case of the public library, a crosswalk is not provided at all.

In order to improve pedestrian access to these buildings, this study will recommend the enhancement of two existing crosswalks, as well as the addition of a new crosswalk for access to the public library. The crosswalks will be recommended to include high-visibility pavement markings and signs, as well as potential “curb extensions” (example provided in the picture, below) to improve pedestrian visibility and shorten street crossing distances.

**Figure 21: Patton St Crosswalk Enhancement Locations**



The existing crosswalk at Patton St and S Union St.

**Figure 22: Patton St Crosswalk Enhancement Rendering**



Example of a high-visibility crosswalk with curb extensions



## Main Street at Riverside Drive/River Street

During the first public meeting, the intersection that was most frequently cited as a safety concern for bicyclists and pedestrians was Main Street at Riverside Drive.

Field observations indicated that many of the lanes entering the intersection are significantly wider than necessary. One recommendation, therefore, is to reduce the width of all lanes to 11' and then shift the lanes to their respective sides of the road.

This adjustment would not change any of the traffic operations at the intersection, but would create a space in the middle of the road that could be occupied by a raised median. The resulting condition will provide some “shadow area” for pedestrians and would eliminate excessive pavement, thus giving the intersection a slightly tighter feel for motorists and creating a condition that would be less intimidating for pedestrians.



*Under existing conditions, pedestrian crossings at the intersection are lengthy and offer little to no median refuge space.*

**Figure 23: Main Street at Riverside Drive/River Street Median Enhancements**



*After the recommended improvements, each pedestrian crossing would feature a “shadow area” adjacent to a wide median that would be removed from direct vehicle travel lanes.*

## Lighting

Several participants in the first public meeting suggested that lighting should be addressed throughout the River District in order to improve the safety and comfort of pedestrians and bicyclists at night.

One area of particular concern was the industrial warehouse district around Loyal Street, Wilson Street, Newton Street, Lynn Street, and Monument Street. These streets are highlighted in yellow in Figure 24, below, and function as a barrier between the River District and the historic neighborhood located directly to the south-east. City staff indicated that active efforts are underway to redevelop many of the homes in this neighborhood, which may make these connections even more important in the future. Additionally, some of this warehouse space is being converted to space for small businesses, who would also benefit from better lighting for visibility and the comfort of their clientele.

**Figure 24: Areas of Lighting Concern**



## Riverwalk Trail Lighting

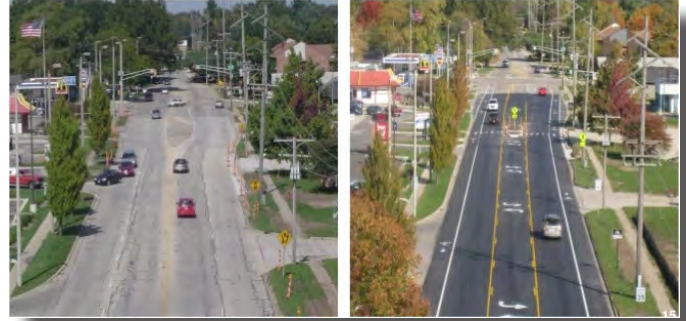
Several public meeting participants expressed the desire to see lighting installed along the Riverwalk Trails. It is also understood, however, that it is the official city policy that the Riverwalk Trails are not to be used after sundown.

If this policy were to change in the future, however, this study would recommend that lighting be installed along the trails, or at least along portions of the trails immediately adjacent to the River District.

# Road Diets

A road diet, also called a lane reduction, is a technique whereby the number of travel lanes on a road is reduced in order to achieve systematic improvements. The space previously used for travel lanes can be repurposed for elements such as bicycle lanes, center turn lanes, or street parking.

This technique is primarily used on roads with four or more lanes, but low traffic volumes. Roads with an average daily traffic (ADT) volume less than 15,000 vehicles are typically considered strong candidates for a road diet.



A before (left) and after (right) example of a road diet treatment.

Three roads in the River District were identified as candidates for road diet treatments:

- Poplar Street (2015 ADT: 2,100 vehicles)
- Ridge Street (2015 ADT: 2,800 vehicles)
- Memorial Drive (2015 ADT: 6,800-10,000 vehicles)

**Figure 25: Potential Road Diet Corridors**



## Traffic Growth Projections

In order to better understand the effects that proposed changes will have upon future auto traffic conditions, the study has attempted to establish an annual growth rate based on the City's latest Traffic Analysis Zone (TAZ) model. In particular, it considered the growth projected in the 10 zones included in the River District. These zones are shown on the map below. The projected growth of resident population and employment in each zone is provided in the tables on the following page.

These calculations suggest that between 2010 and 2040, the River District will experience approximately a 2.25% annual growth rate in residential population (for a 95% total increase of population by 2040) and a 0.4% annual growth rate in employment (for a 13% total increase of employment by 2040). Considering that a portion of downtown residents are likely to also work downtown and thus commute by walking or biking, traffic growth has subsequently been calculated using a 2% annual growth rate (for a 58% increase in traffic between 2017 and 2040).

**Figure 26: River District Traffic Analysis Zones (TAZs)**



## Traffic Analysis Zone (TAZ) Growth Tables

**Figure 27: River District Population Growth Projections**

TAZ ID	2010 Population	2040 Projected Population	Projected Population Growth	Percent Growth
1	0	0	0	NA
2	44	64	20	45%
3	254	432	178	70%
4	107	107	0	0%
5	48	48	0	0%
6	17	33	16	94%
7	32	13	-19	-59%
8	242	418	176	73%
9	0	20	20	NA
10	202	706	504	250%
<b>Total</b>				
	<b>946</b>	<b>1841</b>	<b>895</b>	<b>95%</b>
<i>Approximate Annual Growth Rate</i>				<i>2.25%</i>

**Figure 28: River District Employment Growth Projections**

TAZ ID	2010 Employment	2040 Projected Employment	Projected Employment Growth	Percent Growth
1	121	126	5	4%
2	198	198	0	0%
3	1649	1709	60	4%
4	108	108	0	0%
5	211	211	0	0%
6	60	65	5	8%
7	79	79	0	0%
8	498	498	0	0%
9	169	169	0	0%
10	353	728	375	106%
<b>Total</b>				
	<b>3446</b>	<b>3891</b>	<b>445</b>	<b>13%</b>
<i>Approximate Annual Growth Rate</i>				<i>0.40%</i>

# Poplar Street

The first street in the River District that is recommended for a road diet is Poplar St between Memorial Dr and Ridge St. In 2015, the annual average daily traffic (AADT) volume of Poplar St was 2,100 vehicles. Given a 2% annual growth rate, the 2040 AADT of Poplar St is projected to be 3,500 vehicles. This traffic volume can be accommodated with a reduced lane street configuration.

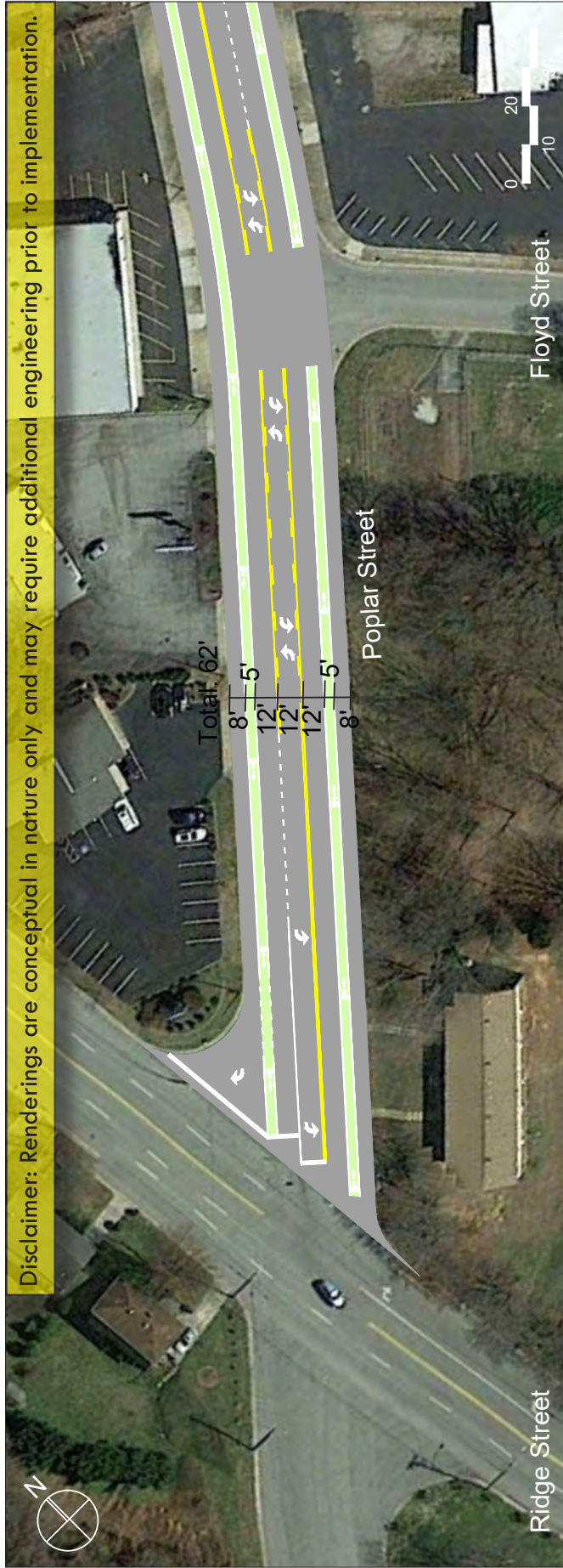


The existing lane configuration includes two travel lanes in each direction and street parking on both sides of road. The proposed road diet configuration would include one travel lane in each direction, a center turn lane, bicycle lanes in each direction, and street parking on both sides of the road. These changes are illustrated as typical street sections in Figure 29 below, as well as in the corridor rendering on the following page.

**Figure 29: Poplar Street Typical Street Section Comparison**



**Figure 30: Poplar Street Road Diet Rendering**



# Ridge Street

A second street in the River District that is being recommended for a road diet is Ridge St between Memorial Dr and Newton St. In 2015, the annual average daily traffic (AADT) volume of Ridge St was 2,800 vehicles. Given a 2% annual growth rate, the 2040 AADT of Ridge St is projected to be 4,600 vehicles. These traffic volumes can be accommodated with a reduced lane street configuration.



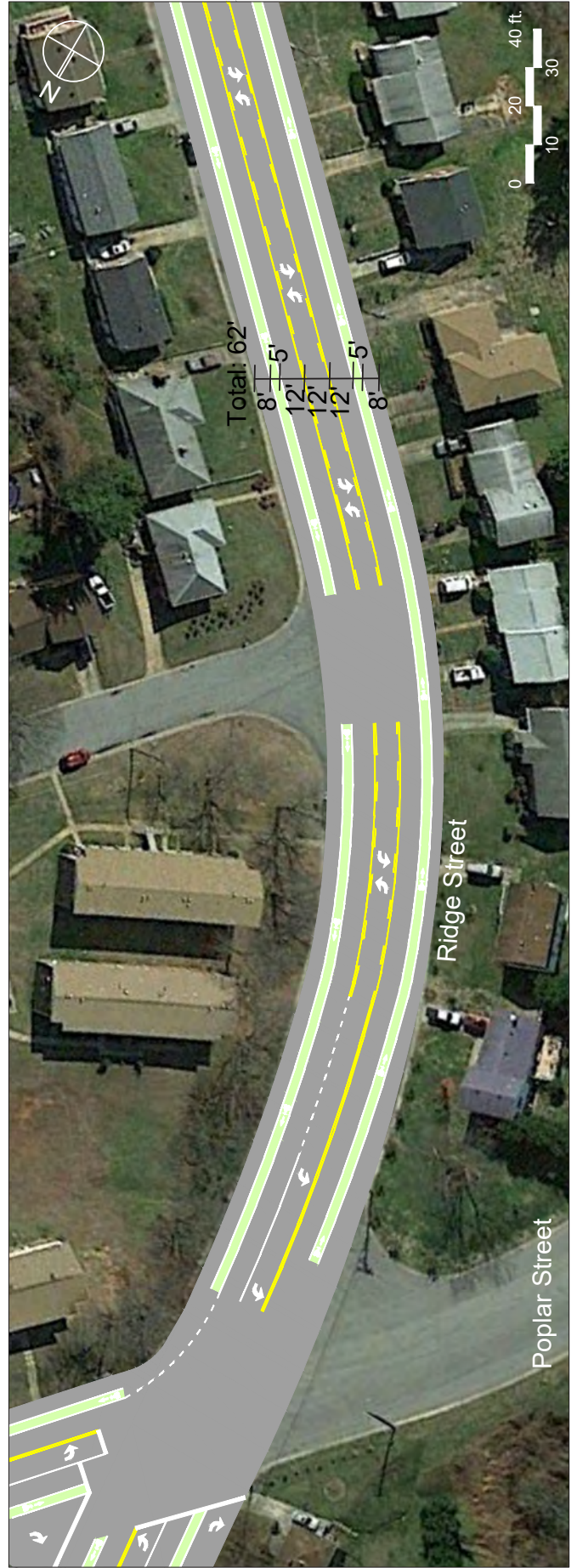
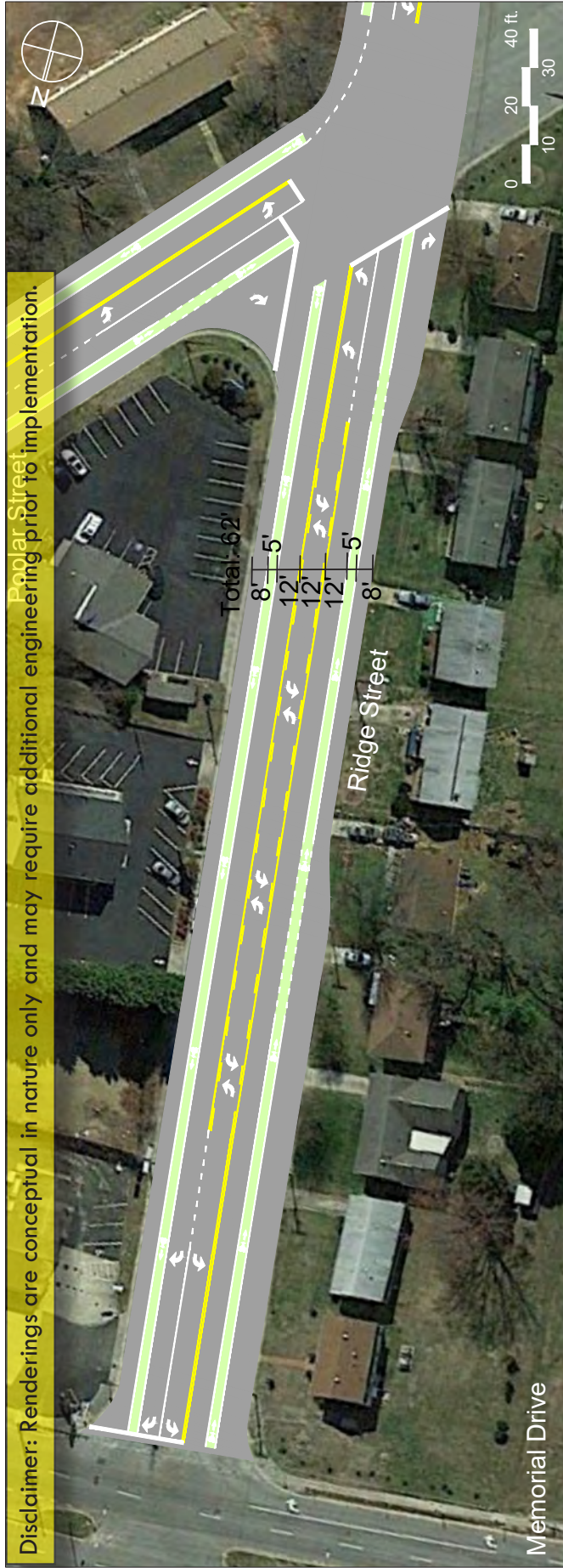
The existing lane configuration includes two travel lanes in each direction and street parking on both sides of road. The proposed road diet configuration would include one travel lane in each direction, a center turn lane, bicycle lanes in each direction, and street parking on both sides of the road. These changes are illustrated as typical street sections in Figure 31 below, as well as in the corridor renderings on pages 48-51.

**Figure 31: Ridge Street Typical Street Section Comparison**

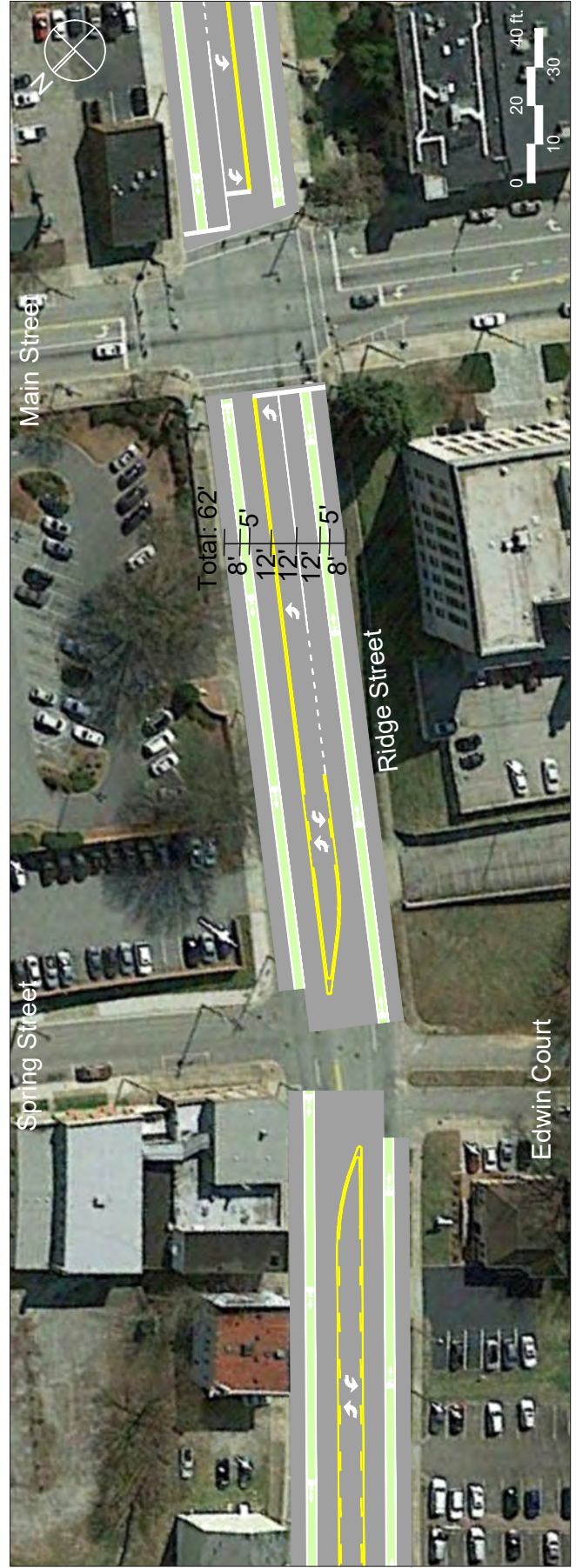
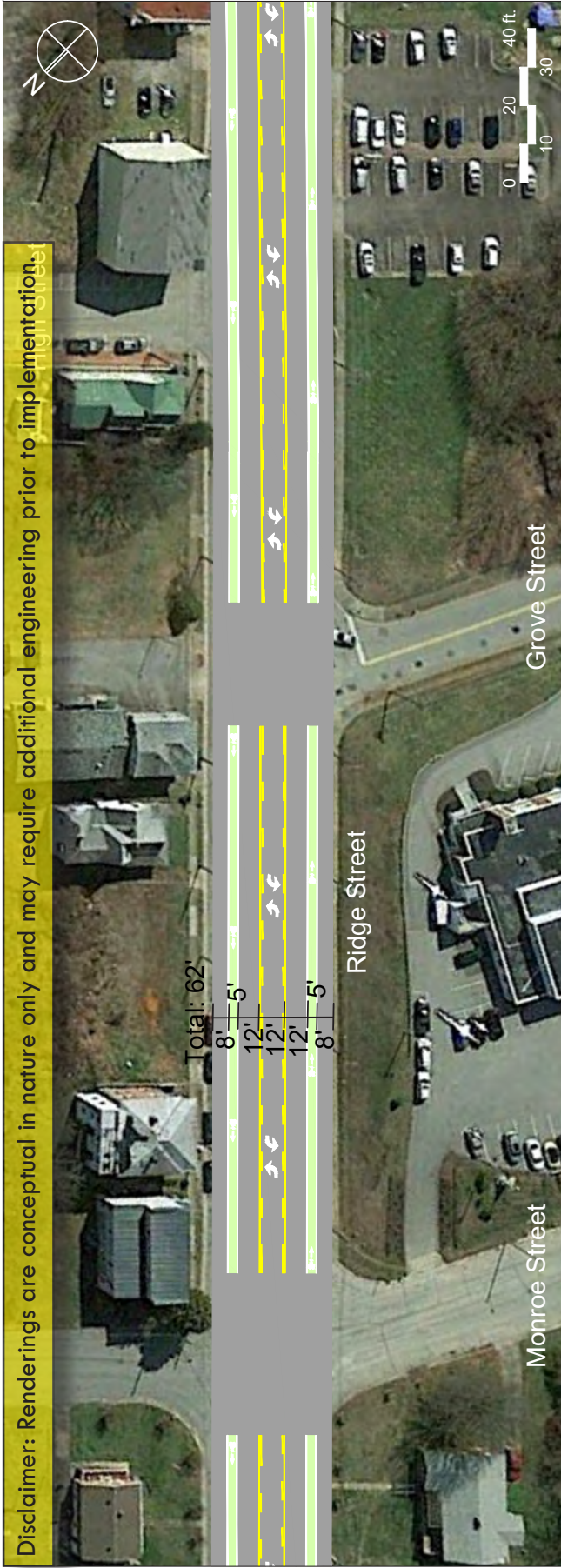




**Figure 32: Ridge Street Road Diet Rendering (Page 1 of 4)**

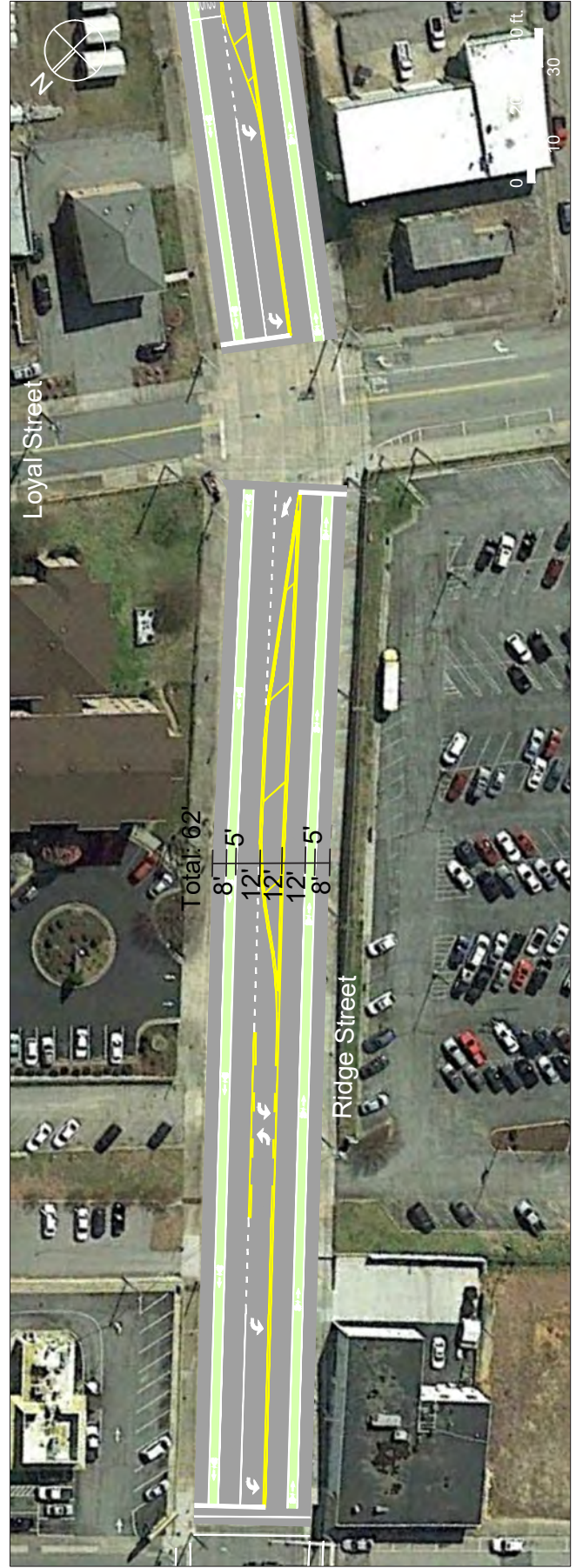


**Figure 33: Ridge Street Road Diet Rendering (Page 2 of 4)**

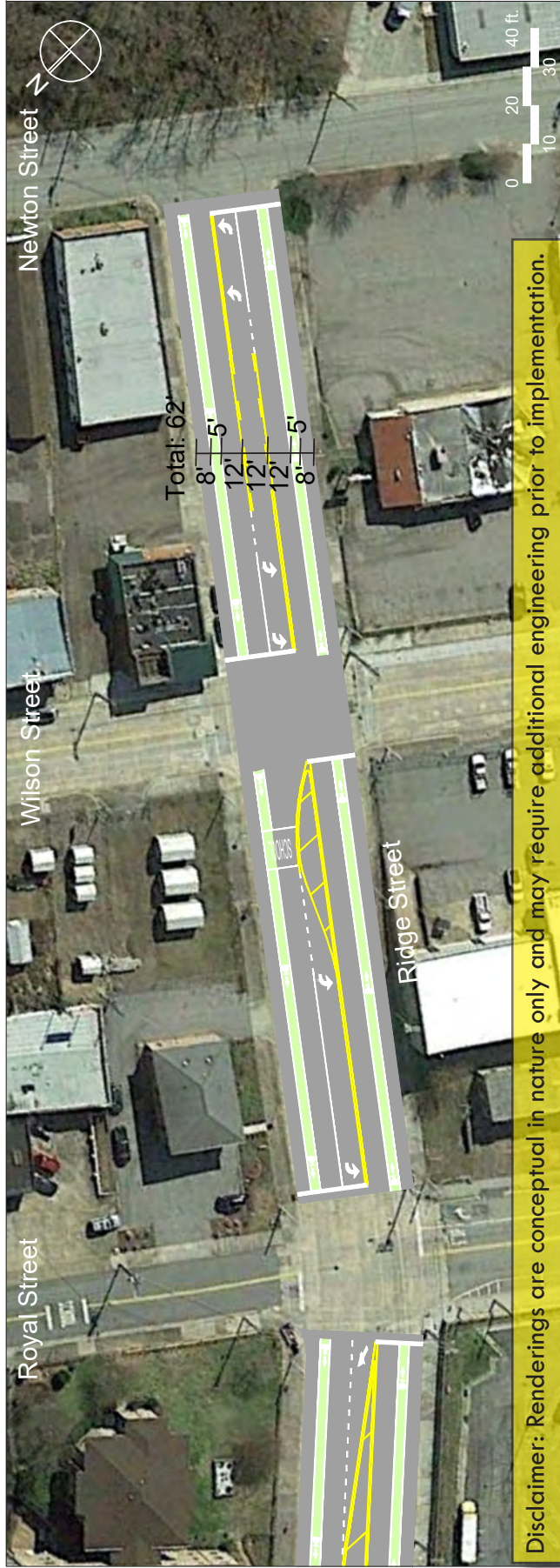


**Figure 34: Ridge Street Road Diet Rendering (Page 3 of 4)**

Disclaimer: Renderings are conceptual in nature only and may require additional engineering prior to implementation.



**Figure 35: Ridge Street Road Diet Rendering (Page 4 of 4)**



## Memorial Drive

The third street in the River District that is being recommended for a road diet treatment is Memorial Drive between Poplar Street and Patton Street. This road has higher traffic volumes than Ridge St and Poplar St, but the volumes are still low enough for the road to be well within consideration for the lane-reduction strategy.

The analysis and renderings of Memorial Drive are presented on the following pages in three parts:

- **Part 1:** Poplar Street to High Street
- **Part 2:** High Street to Spring Street
- **Part 3:** Spring Street to Patton Street



## Future Traffic Concerns

When considering these recommendations, it is important to remember that the proposed changes **would not involve the elimination of any pavement surface**, but only the remarking of the existing pavement surface. If traffic volumes on Memorial Drive increase more rapidly than projected and the street begins to experience high levels of congestion in the future, the road could be reverted back to the existing lane configurations simply by remarking the pavement.

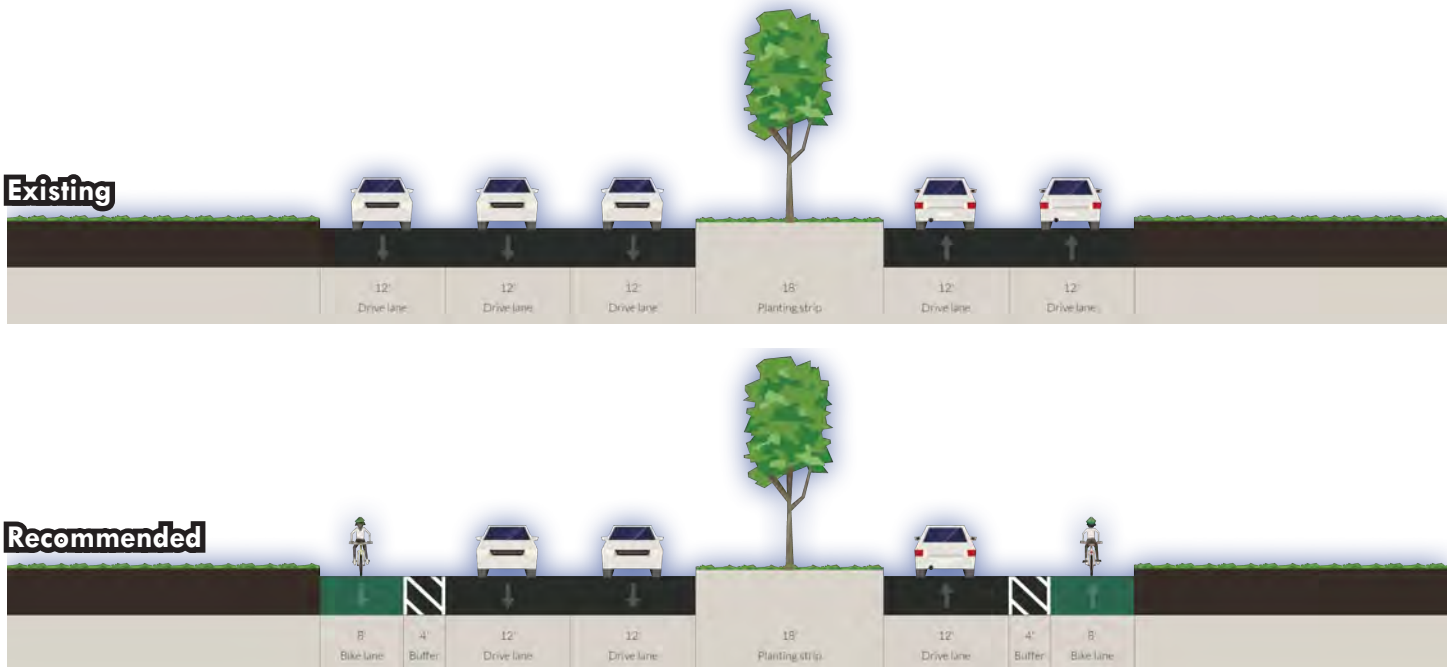
## Memorial Drive (Part 1): Poplar Street to High Street

In 2015, the annual average daily traffic (AADT) volume of Memorial Dr in the segment from Poplar St to High St was 10,000 vehicles. Given a 2% annual growth rate, the 2040 AADT of this segment is projected to be 16,400 vehicles. These traffic volumes would still be within the effective capacity of a reduced lane street configuration.



The existing lane configuration includes three travel lanes in the east-bound direction, two travel lanes in the west-bound direction, and a center median/turn lane. The proposed road diet configuration would include two travel lanes in the east-bound direction, one travel lane in the west-bound direction, a center median/turn lane, and buffered bicycle lanes in each direction. These changes are illustrated as typical street sections in Figure 36 below, as well as in the corridor rendering on the following page.

**Figure 36: Memorial Drive (Part 1) Typical Street Section Comparison**



**Figure 37: Memorial Drive (Poplar Street to High Street) Road Diet Rendering**



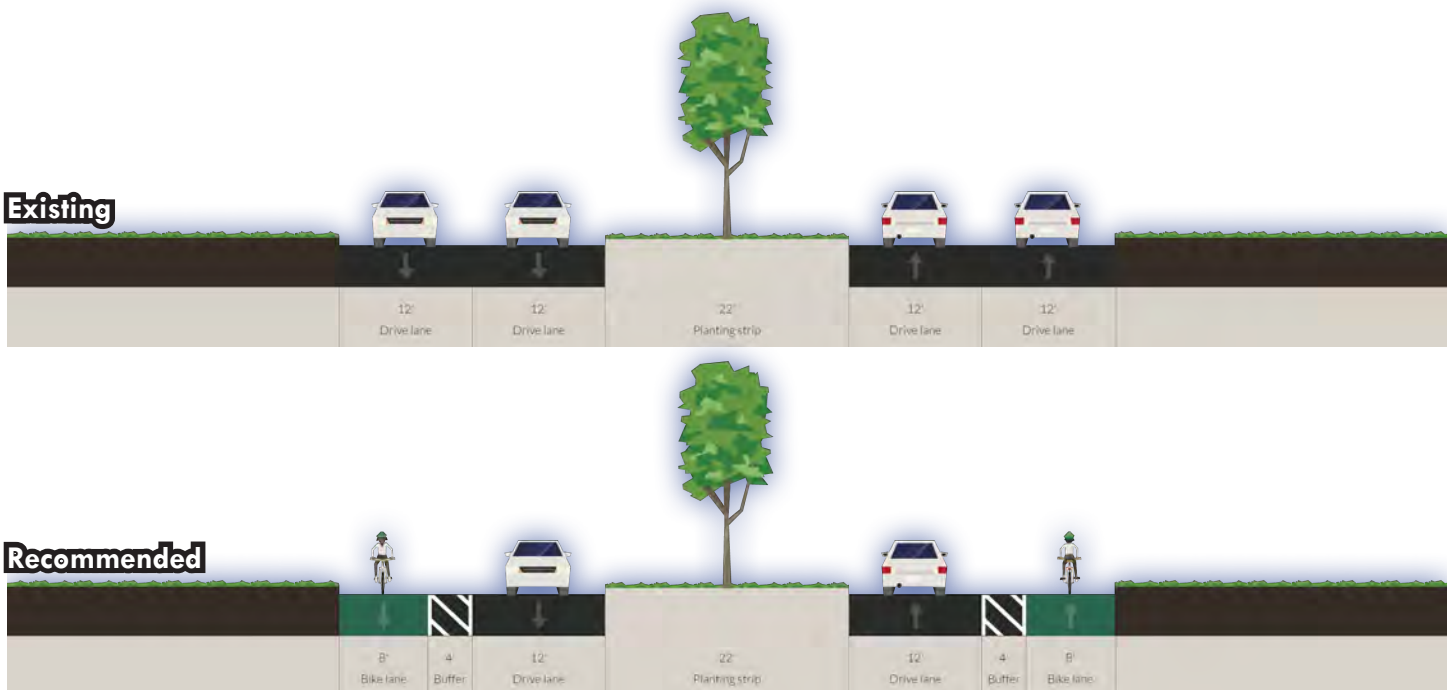
## Memorial Drive (Part 2): High Street to Spring Street

In 2015, the annual average daily traffic (AADT) volume of Memorial Dr in the segment from High St to Spring St was 7,200 vehicles. Given a 2% annual growth rate, the 2040 AADT of this segment is projected to be 11,800 vehicles. These traffic volumes can easily be accommodated with a reduced lane street configuration.



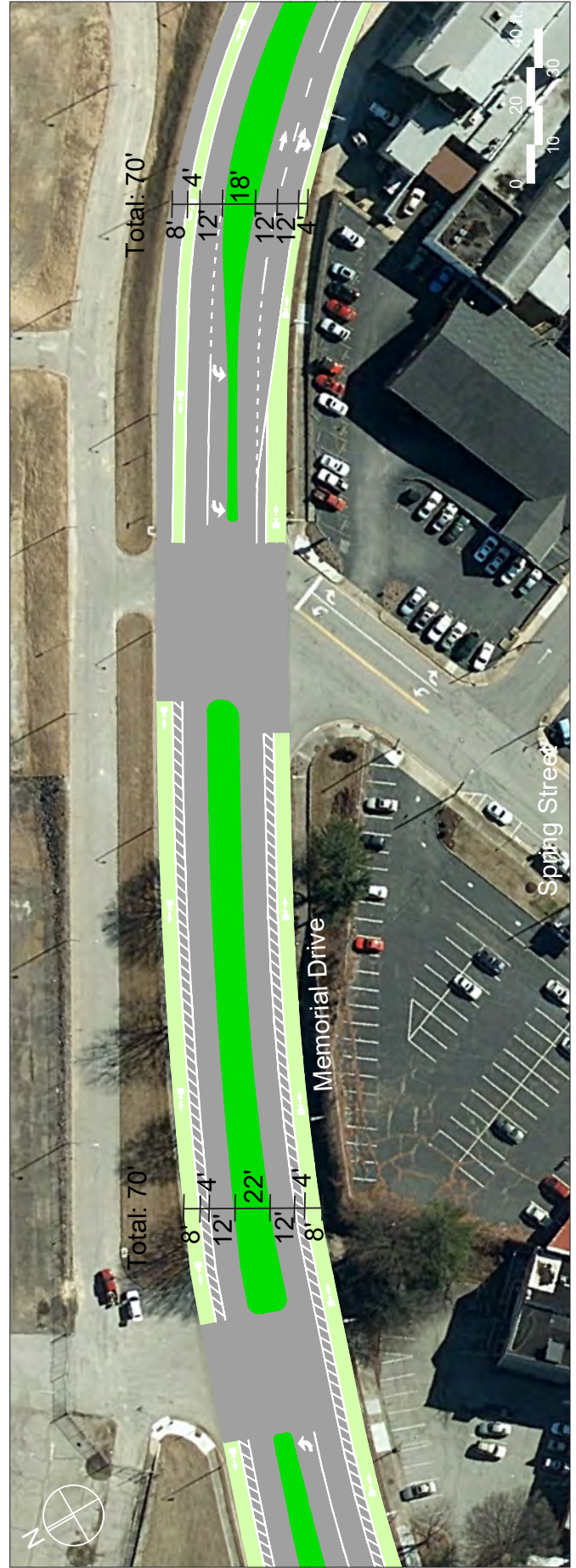
The existing lane configuration includes two travel lanes in each direction and a center median/turn lane. The proposed road diet configuration would include one travel lane in each direction, a center median/turn lane, and buffered bicycle lanes in each direction. These changes are illustrated as typical street sections in Figure 38 below, as well as in the corridor rendering on the following page.

**Figure 38: Memorial Drive (Part 2) Typical Street Section Comparison**





**Figure 39: Memorial Drive (High Street to Spring Street) Road Diet Rendering**



## Memorial Drive (Part 3): Spring Street to Patton Street

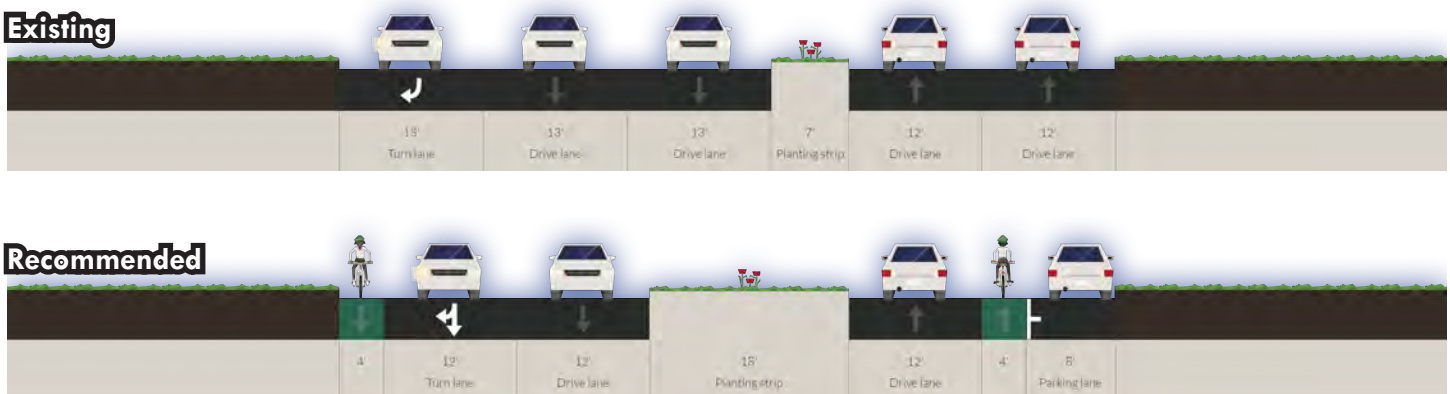
In 2015, the annual average daily traffic (AADT) volume of Memorial Dr in this segment was 7,200 vehicles from Spring St to Main St, and 6,800 vehicles from Main St to Patton St. Given a 2% annual growth rate, the 2040 AADT of these segments are projected to be 11,800 vehicles and 11,150 vehicles, respectively. These traffic volumes can be accommodated with a reduced lane street configuration.



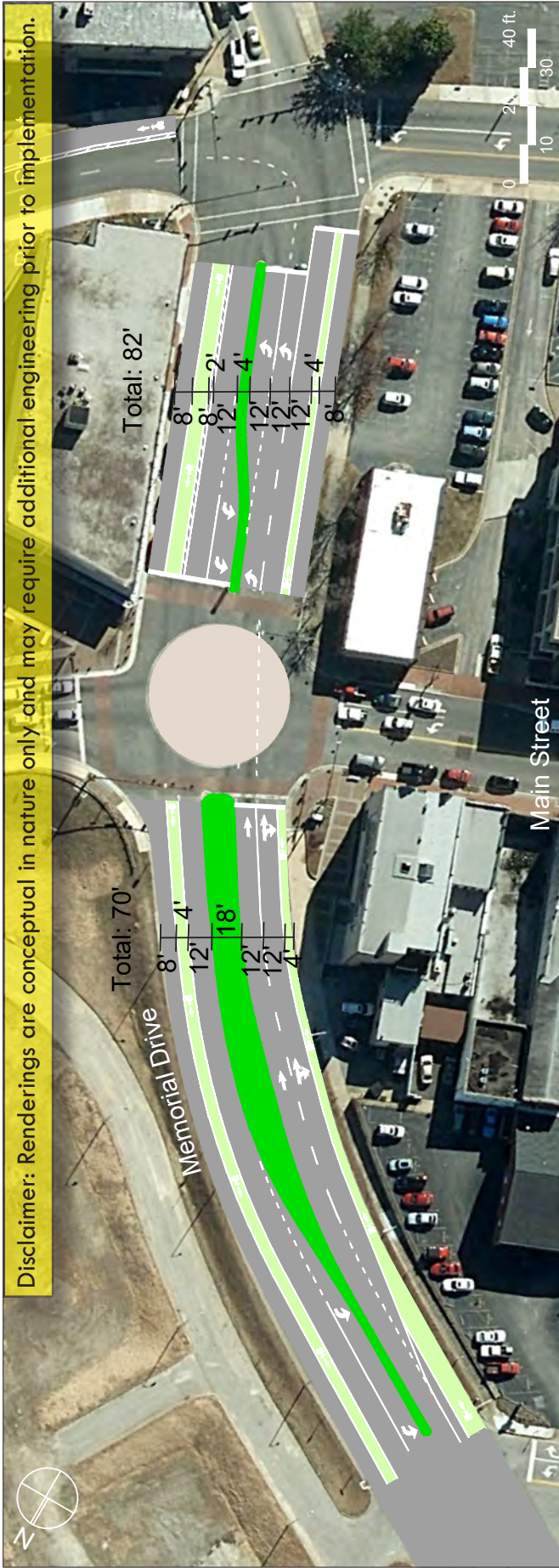
The west-bound lanes of Memorial Dr would be reduced from two travel lanes to one travel lane, with the outside lane being converted to a bicycle lane and street parking. This parking area would be available for downtown visitors, and especially for future visitors to the new city park that is being planned for the empty lot on the north side of Memorial Dr.

The configuration of the east-bound lanes approaching Main St would be changed from the existing setting of two thru-lanes and one right turn lane to one thru lane and one thru lane/right turn lane. The existing left-most thru lane (which uses the space previously used as a left-turn lane onto what is now the Main St Plaza) would be converted to a median and pedestrian refuge island, which would better facilitate pedestrian crossings between Main St and the future city park. These changes are illustrated as typical street sections in Figure 40 below, as well as in the corridor rendering on the following page.

**Figure 40: Memorial Drive (Part 3) Typical Street Section Comparison**



**Figure 41: Memorial Drive (Spring Street to Patton Street) Road Diet Rendering**



## Patton Street Reconfiguration

In addition to the changes proposed for Memorial Drive itself, the study also recommends that the right lane of Patton St between Memorial Dr/Craghead St and Bridge St be remarked from an extended right-turn lane to the design shown below.

Currently, some vehicles turning from Craghead Street and Memorial Drive onto Patton Street turn into this far-right lane, without realizing that it becomes a right-turn only lane at Bridge St. Any of those vehicles that intend to continue straight through the Bridge Street intersection are then forced to quickly merge into the thru lanes before the intersection, which creates potential vehicle conflicts and also distracts the attention of drivers away from pedestrians and turning vehicles that may be entering the street at the Bridge Street intersection.

This recommended change would be intended to eliminate these occurrences, while also potentially reducing vehicle speeds due to the decreased number of travel lanes.

**Figure 42: Patton Street Turn Lane Remarking**



Disclaimer: Renderings are conceptual in nature only and may require additional engineering prior to implementation.

## Memorial Drive Intersection Analysis

The recommended road diet configuration of Memorial Drive, combined with median enlargement that would eliminate the existing left-most thru lane on Memorial Drive as it approaches the Main Street intersection from the west, would effect the traffic operations at the intersections of Memorial Drive with Main Street and Patton Street. These proposed changes are noted in an image of the existing intersection configurations in the figure below.

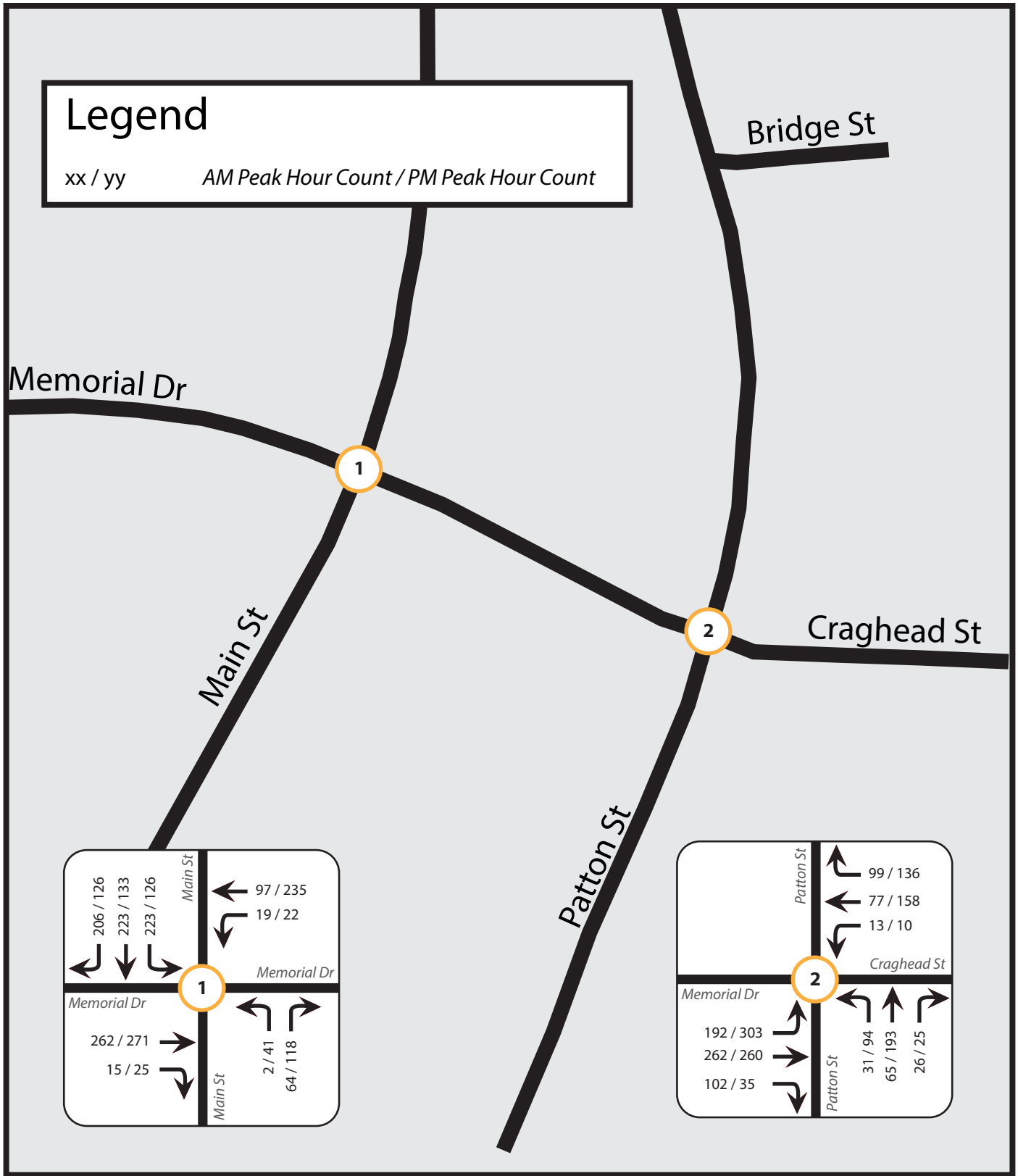
**Figure 43: Proposed Changes to Memorial Drive Intersections**



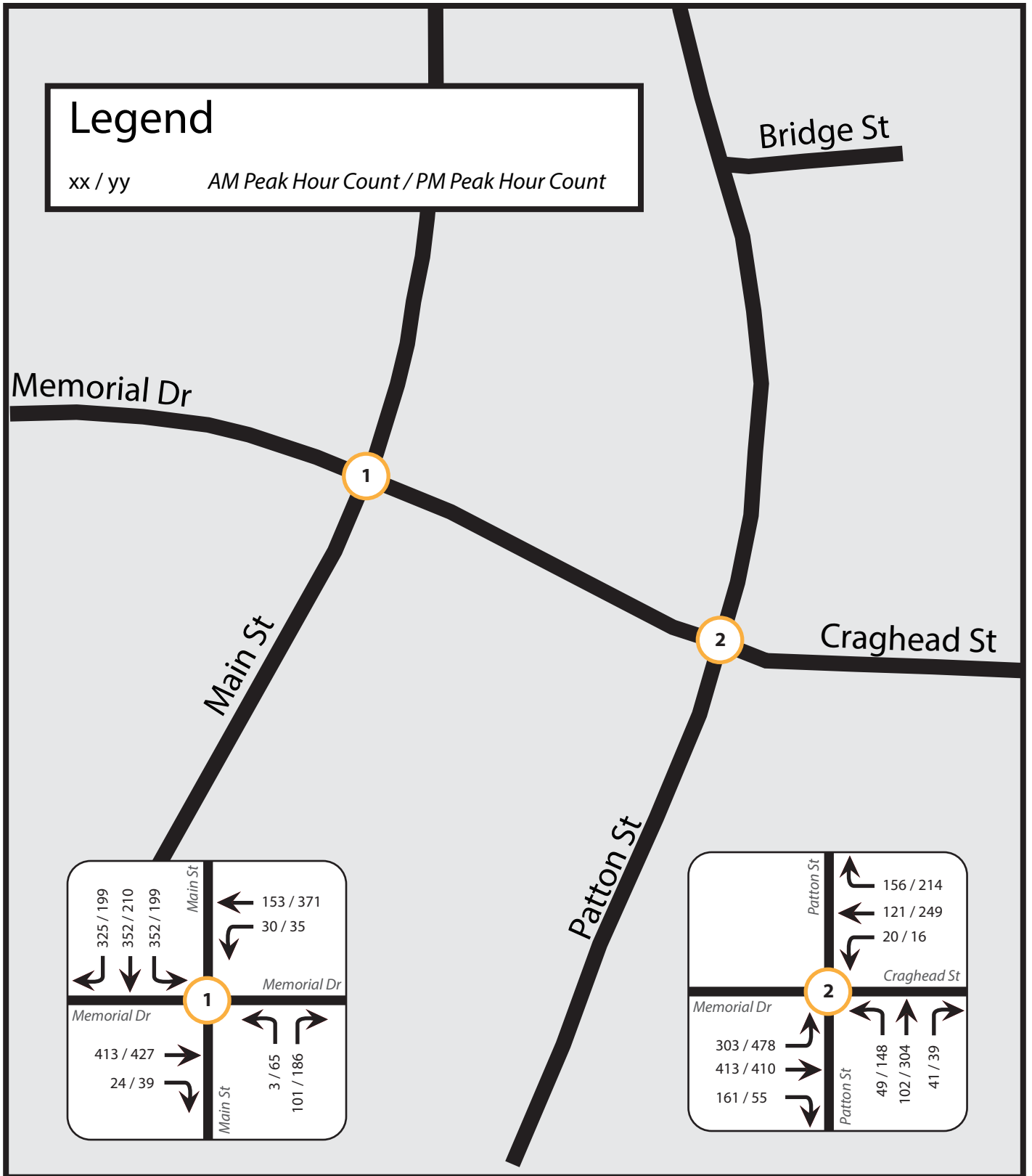
In order to analyze the feasibility of these changes, intersection analyses were performed for both intersections. These analyses indicate that the changes would not lead to defective operations at either of the intersections. The traffic projections used for this exercise and the subsequent traffic model results are provided on the following pages. Materials include:

- Page 62- Existing peak hour traffic volumes
- Page 63- Future (2040) peak hour traffic volumes (2% annual growth)
- Page 64- Existing and Future AM Peak Hour Intersection Level of Service (LOS)
- Page 65- Existing and Future PM Peak Hour Intersection LOS

**Figure 44: Existing Intersection Traffic Volumes**



**Figure 45: Projected Intersection Traffic Volumes**



**Figure 46: Memorial Dr at Main St- AM Peak Hour Level of Service (LOS)**

**Memorial Dr at Main St: AM Peak Hour- Existing Conditions**

2017	Main St					Memorial Dr				Intersection LOS
	EBL*	EBR*	WBL	WBT	WBR	NBL	NBT	SBT	SBR	
Existing Configuration	B	C	A	A	A	B	A	A	A	A
Alternative Configuration	B	C	A	A	A	B	A	A	A	A

\*HCM 2000 results

**Memorial Dr at Main St: AM Peak Hour- Projected Future Conditions (2% Annual Growth)**

2040	Main St					Memorial Dr				Intersection LOS
	EBL*	EBR*	WBL	WBT	WBR	NBL	NBT	SBT	SBR	
Existing Configuration	C	C	B	B	A	C	A	B	B	B
Alternative Configuration	C	C	B	B	A	C	A	B	B	B

\*HCM 2000 results

**Figure 47: Memorial Dr at Patton St- AM Peak Hour Level of Service (LOS)**

**Memorial Dr at Patton St: AM Peak Hour- Existing Conditions**

2017	Patton St			Memorial Dr			Craghead St			Intersection LOS
	EBL	EBT	EBR	SBL	SBT	SBR	NBL	NBT	NBR	
Existing Configuration	B	B	B	A	B	B	B	B	B	B
Alternative Configuration	B	B	B	A	B	B	B	B	B	B

**Memorial Dr at Patton St: AM Peak Hour- Projected Future Conditions (2% Annual Growth)**

2040	Patton St			Memorial Dr			Craghead St			Intersection LOS
	EBL	EBT	EBR	SBL	SBT	SBR	NBL	NBT	NBR	
Existing Configuration	B	C	C	A	B	B	C	C	B	B
Alternative Configuration	B	C	C	A	B	B	C	C	B	B



**Figure 48: Memorial Dr at Main St- PM Peak Hour Level of Service (LOS)**

**Memorial Dr at Main St: PM Peak Hour- Existing Conditions**

2017	Main St					Memorial Dr				Intersection LOS
	EBL*	EBR*	WBL	WBT	WBR	NBL	NBT	SBT	SBR	
Existing Configuration	B	C	B	B	A	B	A	A	A	A
Alternative Configuration	B	C	B	B	A	B	A	A	A	A

\*HCM 2000 results

**Memorial Dr at Main St: PM Peak Hour- Projected Future Conditions (2% Annual Growth)**

2040	Main St					Memorial Dr				Intersection LOS
	EBL*	EBR*	WBL	WBT	WBR	NBL	NBT	SBT	SBR	
Existing Configuration	C	C	B	B	B	B	A	A	A	A
Alternative Configuration	C	C	B	B	B	B	A	A	A	A

\*HCM 2000 results

**Figure 49: Memorial Dr at Patton St- PM Peak Hour Level of Service (LOS)**

**Memorial Dr at Patton St: PM Peak Hour- Existing Conditions**

2017	Patton St			Memorial Dr			Craghead St			Intersection LOS
	EBL	EBT	EBR	SBL	SBT	SBR	NBL	NBT	NBR	
Existing Configuration	B	B	B	B	B	B	B	B	B	B
Alternative Configuration	B	B	B	B	B	B	B	B	B	B

**Memorial Dr at Patton St: PM Peak Hour- Projected Future Conditions (2% Annual Growth)**

2040	Patton St			Memorial Dr			Craghead St			Intersection LOS
	EBL	EBT	EBR	SBL	SBT	SBR	NBL	NBT	NBR	
Existing Configuration	B	C	C	B	C	C	C	C	C	C
Alternative Configuration	B	C	C	B	C	C	C	C	C	C

# Costs and Funding

## Estimated Project Costs

**Figure 50: Sample Estimated Improvement Costs**

Item	Estimated Cost
<b>Pavement Markings</b>	
Bicycle Lane (Type B, Class 1 thermoplastic pavement line markings, 4" white)	\$200 per 100'
Sharrow Marking	\$275 per marking
<b>Traffic Signal Equipment</b>	
Pedestrian Signal Head with Countdown Timer Display	\$800 per signal head
<b>Bicycle Infrastructure</b>	
Bike Rack, permanent, 10' long, installed	\$2,000
Bicycle Maintenance Station, with air	\$
<b>Bicycle Routes</b>	
Bicycle Route Street Sign	\$200 per sign
<b>Pedestrian Crossing Enhancements</b>	
Memorial Drive and Main Street Median Expansion	\$270,000
Main Street at Riverside Drive/River Street Median Expansions	\$232,000
Patton Street Curb Extensions	\$150,000

## Potential Funding Sources

Smart Scale	
Purpose	SMART SCALE is a statewide program that intends to distribute funding based on a standard and objective evaluation of projects that will determine to how effectively they help the state achieve its transportation goals.
Funding	There are two main pathways to funding within the SMART SCALE process—the construction District Grant Program (DGP) and the High Priority Projects Program (HPPP). A project applying to funds from the DGP is prioritized with projects from the same construction district. A project applying for funds from the HPPP is prioritized with projects statewide. The CTB then makes a final decision on which projects to fund.
Eligible Projects	Projects must address improvements to a Corridor of Statewide Significance, Regional Network, or Urban Development Area (UDA). Project types can include highway improvements such as widening, operational improvements, access management, and intelligent transportation systems, transit and rail capacity expansion, and transportation demand management including park and ride facilities.
Eligible Applicants	Projects may be submitted by regional entities including MPOS and PDCs, along with public transit agencies, counties, cities, and towns that maintain their own infrastructure. Projects pertaining to UDAs can only be submitted by localities.
Evaluation Criteria	There are five factors evaluated for all projects: Safety, Congestion Mitigation, Accessibility, Environmental Quality, and Economic Development. MPOs with a population greater than 200,000 are also evaluated by land use policy consistency.
Website	<a href="http://www.vasmartscale.org/">http://www.vasmartscale.org/</a>

Highway Safety Improvement Program (HSIP)	
Purpose	Established by the federal transportation legislation MAP-21, this program is structured and funded to make significant progress in reducing highway fatalities and injuries on all public roads.
Funding	The Federal share for highway safety improvements is 90%, with certain types of projects (including, as relevant to this study, maintaining retro-reflectivity of pavement markings and the installation of traffic signs) eligible to be funded at 100%. If project cost is higher than what was originally submitted, the project manager and sponsor will be responsible for identifying sources for funding those estimates.
Eligible Projects	Projects involve the identification of high-crash spots or corridor segments, an analysis of crash trends and existing conditions, and the prioritization and scheduling of improvement projects.
Eligible Applicants	Local governments, VDOT District and Regional Staff.
Evaluation Criteria	<ul style="list-style-type: none"> <li>• Evaluated on a statewide basis rather than on a local or district basis.</li> <li>• Locations or corridors where a known “substantive safety” problem exists as indicated by location-specific data on severe crashes, and where it is determined that the specific project action can with confidence produce a measurable and significant reduction in the number and/or consequences of severe crashes.</li> <li>• To achieve the maximum benefit, the focus of the program is on cost-effective use of funds allocated for safety improvements.</li> <li>• Priority will be given to projects having higher total number of deaths and serious injuries.</li> </ul>
Website	<a href="http://www.virginiadot.org/business/ted_app_pro.asp">http://www.virginiadot.org/business/ted_app_pro.asp</a>

Transportation Alternatives Program (TAP)	
Purpose	This program is intended to help local sponsors fund community based projects that expand non-motorized travel choices and enhance the transportation experience by improving the cultural, historical, and environmental aspects of transportation infrastructure. It focuses on providing pedestrian and bicycle facilities and other community improvements.
Funding	TAP is not a traditional grant program and funds are only available on a reimbursement basis. It is therefore important to have the necessary funding available to pay for services and materials until appropriate documentation can be submitted and processed for reimbursement. The program will allow a maximum federal reimbursement of 80% of the eligible project costs and requires a 20% local match.
Eligible Projects	<ul style="list-style-type: none"> <li>• Pedestrian and bicycle facilities such as sidewalks, bike lanes, and shared use paths</li> <li>• Pedestrian and bicycle safety and educational activities such as classroom projects, safety handouts and directional signage for trails (Safe Routes to School)</li> <li>• Preservation of abandoned railway corridors such as the development of a rails-to-trails facility</li> </ul>
Eligible Applicants	Any local governments, regional transportation authorities, transit agencies, natural resource or public land agencies, school districts, local educational agencies, or school, tribal government, and any other local or regional government entity with responsibility for oversight of transportation or recreation trails.
Evaluation Criteria	<ul style="list-style-type: none"> <li>• Number of federal enhancement categories</li> <li>• Inclusion in a state, regional, or local plan</li> <li>• Public/private venture-cooperation (multi-jurisdictional)</li> <li>• Total cost and matching funds in excess of minimum</li> <li>• Demonstrable need, community improvement</li> <li>• Community support and public accessibility</li> <li>• Compatibility with adjacent land use</li> <li>• Environmental and ecological benefits</li> <li>• Historic criteria met, significant aesthetic value to be achieved and visibility from a public right of way</li> <li>• Economic impact and effect on tourism</li> </ul>
Website	<a href="http://www.virginiadot.org/business/prehancegrants.asp">http://www.virginiadot.org/business/prehancegrants.asp</a>

VDOT Revenue Share Program	
Purpose	This program provides additional funding for use by a county, city, or town to construct, reconstruct, improve, or maintain the highway systems within such county, city, or town and for eligible rural additions in certain counties of the Commonwealth. Locality funds are matched, dollar for dollar, with state funds, with statutory limitations on the amount of state funds authorized per locality.
Funding	Application for program funding must be made by resolution of the governing body of the jurisdiction requesting funds. Project funding is allocated by resolution of the CTB. Project costs are divided equally between the Revenue Share Fund and locality funding.
Eligible Projects	<ul style="list-style-type: none"> <li>• Supplemental funding for projects listed in the adopted in the six-year plan</li> <li>• Construction, reconstruction, or improvement projects not including in the adopted six-year plan</li> <li>• Improvements necessary for the specific subdivision streets otherwise eligible for acceptance into the secondary system for maintenance (rural additions)</li> <li>• Maintenance projects consistent with the department's operating policies</li> <li>• New hardsurfacing (paving)</li> <li>• New roadway</li> <li>• Deficits on completed construction, reconstruction, or improvement projects</li> </ul>
Eligible Applicants	Any county, city, or town in the Commonwealth
Evaluation Criteria	<ul style="list-style-type: none"> <li>• Priority 1: Construction projects that have previously received Revenue Sharing funding</li> <li>• Priority 2: Construction projects that meet a transportation need</li> <li>• Priority 3: Projects that address deficient pavement resurfacing and bridge rehabilitation</li> <li>• Priority 4: All other projects</li> </ul>
Website	<a href="http://www.virginiadot.org/business/local-assistance-access-programs.asp#Revenue_Sharing">http://www.virginiadot.org/business/local-assistance-access-programs.asp#Revenue_Sharing</a>

**VDOT Road Maintenance**

The VDOT Road Maintenance category of funding covers a wide variety of maintenance and operations activities. Road maintenance funds comprise the majority of VDOT's scheduled funding (versus new construction). Road maintenance funding addresses needs having to do with pavement management, signals, pavement markings, signs, stripes, guardrails, and ITS (Intelligent Transportation Systems) assets that are considered to be of critical safety and operational importance. Maintenance funding also addresses operation services comprising ordinary and preventative maintenance work such as cleaning ditches, washing bridge decks, patching pot-holes, debris removal, snow and ice removal, emergency response, incident management, mowing, and equipment management.

Development Proffer	
Purpose	Developer contributions, known as proffers, provide one source of funding for capital facilities. Proffers are typically cash amounts, dedicated land, and/or in-kind services that are voluntarily granted to the locality to partially offset future capital facility costs associated with specific land developments. Recent legislation has limited the ability of local governments to receive proffers, but through the rezoning process developers may still consider providing infrastructure improvements
Funding	The cost of the program can be financed with developer contributions.
Eligible Projects	<ul style="list-style-type: none"> <li>• Rezoning requests that permit residential and/or commercial uses in accordance with this policy</li> <li>• Limited to offsetting impacts that are directly attributable to new development</li> <li>• To "require" a proffer, a county must have completed an exhaustive study to document the real project costs</li> </ul>
Eligible Applicants	Any land developers seeking a rezoning

Transportation Investment Generating Economic Recovery (TIGER)	
Purpose	The TIGER Discretionary Grant program provides a unique opportunity for the DOT to invest in road, rail, transit and port projects that promise to achieve national objectives.
Funding	Since 2009, Congress has dedicated nearly \$4.6 billion for annual rounds of TIGER to fund projects that have a significant impact on the Nation, a region or a metropolitan area. The last year (2016) totaled nearly \$500 million made available for transportation projects across the country in the eighth round of the highly successful and competitive grant.
Eligible Projects	Innovative projects, including multi-modal and multi-jurisdictional projects, which are difficult to fund through traditional federal programs.
Eligible Applicants	TIGER can provide capital funding directly to any public entity, including municipalities, counties, port authorities, tribal governments, MPOs, or others in contrast to traditional Federal programs which provide funding to very specific groups of applicants (mostly State DOTs and transit agencies).
Evaluation Criteria	Applicants must detail the benefits their project would deliver for five long-term outcomes: safety, economic competitiveness, state of good repair, quality of life and environmental sustainability. DOT also evaluates projects on innovation, partnerships, project readiness, benefit cost analysis, and cost share.
Website	<a href="https://www.transportation.gov/tiger">https://www.transportation.gov/tiger</a>