MARC
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Greater Kansas City Regional Bikeway Plan

Toole Design Group
vireo
Sprinkle Consulting

MARC
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Thank you to all the local government and public stakeholders who participated in the planning process.

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Figure 1 | Bicycling activities, such as the 2013 Tweed Ride, draw bicycling enthusiasts from around the Kansas City region.

EXECUTIVE SUMMARY

The Greater Kansas City Regional Bikeway Plan envisions a cohesive regional network of bikeways, connected across city, county and state boundaries, that promotes active transportation.

Bicycling provides a wide range of benefits, including economic benefits from lower transportation costs; environmental benefits from reducing auto dependence and auto emissions; and health benefits from increased physical activity. The Regional Bikeway Network proposed in this plan will make it easier for people across the metro to use bicycling not only for recreation, but as a viable transportation alternative to reach a wide variety of destinations.

When fully implemented, this plan will expand active transportation choices for area residents over a 2,000-mile network of on-road and off-road facilities that spans eight-counties in the bistate Kansas City region.

The plan was developed over a year-long process that included public engagement and input from city and county officials. Residents from across the region participated in open house workshops and used an online mapping tool to help identify important, priority corridors. Local government officials provided information on current planning efforts and existing facilities to help develop the network. Additionally, city, county and state personnel participated in Steering Committee sessions and Bicycle and Pedestrian Advisory Committee meetings to review priority corridors, current planning efforts and the direction of the plan.

The Regional Bikeway Plan evaluates current conditions and discusses gaps and barriers that exist in the system today. It introduces a new GIS-based demand model that was used to identify and prioritize corridors and connections, both within the region and to larger state and national trail networks. The plan also includes per-mile cost estimates for constructing a variety of bicycle facility types, ranging from wayfinding signage to paved shoulders. Costs will vary widely, depending on the type of facility and whether it is constructed independently or as part of a larger roadway project. The plan estimates implementation costs for the entire system at approximately $603 million.

Figure 2 | Transportation/Recreation Riding
During the development of Regional Bikeway Plan study, it became clear that there should be no differentiation in the level of bikeway implementation for recreational riders versus transportation-oriented riders. They are often one and the same.

The plan also identifies a variety of potential funding options and best practices for implementation. Recognizing that implementation of the Regional Bikeway Network will rely heavily on local funding, the plan outlines a number of federal and state funding programs that can potentially support construction of bikeway facilities.

Finally, the plan shares recommendations for:

- **A prioritized network of regional bikeways** to support regional and local planning and investment in active transportation.
- **Regional planning and coordination** to help implement the Regional Bikeway Plan by creating and sustaining necessary partnerships.
- **Data collection and technical capacities** to update and maintain GIS information on constructed, programmed and planned bikeways and trails, obtain accurate user counts and monitor crash data.
- **Education and encouragement campaigns** to raise public awareness of bikeway and trail resources in the region and educate the public about safe driving, walking and cycling behaviors.
- **Enforcement efforts** to allow all users to share a safe roadway system and address roadway safety issues.
- **Encouraging national designation applications** to support communities that apply for Bicycle Friendly Community and Walk Friendly Community recognition.

In short, the plan strives to link regional and local destinations with bikeways, increase transportation choices for residents, promote active and healthy living and preserve the environment for residents of all ages and abilities. The Kansas City metro area has a great opportunity to enhance active transportation through the adoption and implementation of this plan.

INTRODUCTION

Figure 3 | Bicyclists enjoy bicycling on-street in Lee's Summit, Missouri.

The Greater Kansas City Regional Bikeway Plan is designed to help local governments better coordinate on-street bicycle facilities — particularly their alignment as they pass from one jurisdiction to another, crossing city limits, county borders and state lines. This plan will help create a cohesive, regional system of bikeways with long-distance corridors that serve users of non-motorized, active transportation. While the focus of the plan is primarily on-street facilities, such as bike lanes and shared-use markings, it can also help with implementation of various facility types within local government rights-of-way, including cycle tracks and shared-use paths.

Regional planning

While many local governments have their own bikeway plans, no regional bikeway plan has existed until now. This plan brings elements of local plans together in a way that will inform and strengthen other regional transportation plans.

Over many years, previous planning efforts across the region have guided local jurisdictional bike plans. All of these local efforts have informed the development of this regional, eight-county bikeway plan.

TRANSPORTATION OUTLOOK 2040

The Regional Bikeway Plan informs the 2015 update to *Transportation Outlook 2040*, the region's long-range Metropolitan Transportation Plan (MTP). Key strategies and recommendations from the Regional Bikeway Plan will be incorporated in the policies and strategies outlined in the Active Transportation Chapter of *Transportation Outlook 2040*.

Once formally adopted as part of regional transportation policy, the Regional Bikeway Plan can be used to identify priorities for phased network development.

METROGREEN

MetroGreen, the regional vision of a system of interconnected trails and greenways first conceived in 1991 by the local chapter American Society of Landscape Architects and updated in 2002, has a long history of success in guiding trail development. MetroGreen has functioned as a greenway plan, protecting and restoring streamways with stream setback ordinances and coordinating bicycle and pedestrian connections through these corridors.

The Regional Bikeway Plan supplements MetroGreen in three ways.

1. The plan recommends adding 128 miles of stream and river corridors in Miami County, Kansas to the MetroGreen System.
2. The plan expands the concept of MetroGreen Type 5: Bike & Pedestrian Facilities in Right-of-Way to a complete-streets approach using new recommended design guides.
3. Once fully implemented, the plan will substantially expand the MetroGreen system, adding hundreds of miles of roadway corridors.

As a part of the update, MetroGreen's Type 5 trail category, which effectively illustrated trail provisions within road rights-of-way, is modified. The category's cross-section is amended to include on-street facilities that are now recommended as state-of-the-practice complete street bicycling solutions by the National Association of City Transportation Officials (NACTO). More information on these facilities is included later in this document.

How the plan works

The Regional Bikeway Plan serves as a guide for planners, providing a conceptual vision of a network of regional connections. Implementation of the plan will require further refinement of priorities. The plan provides a new tool — the Regional Bikeway Demand Model — to identify those segments of the Regional Bikeway Network that could provide the greatest regional impact by connecting activity centers that serve more people and providing links to key destinations beyond the metro. This model can also help communities with their own processes as they identify priorities. Ultimately, it will help local governments move from planning to design and construction of regional bikeway corridors.

A three-step process is proposed:

1. Adopt the vision for a Regional Bikeway Network (this plan).
2. Identify the best opportunities in the region for further study.
3. At the city and county level, investigate the corridors that provide the greatest opportunity.

This is a conceptual plan that will adapt over time. A set of recommendations is provided to guide the implementation of the plan.

Figure 4 | Transit extends the reach of the bicycle commuter in Kansas City by providing bicycle racks on Metro buses.

Intended users

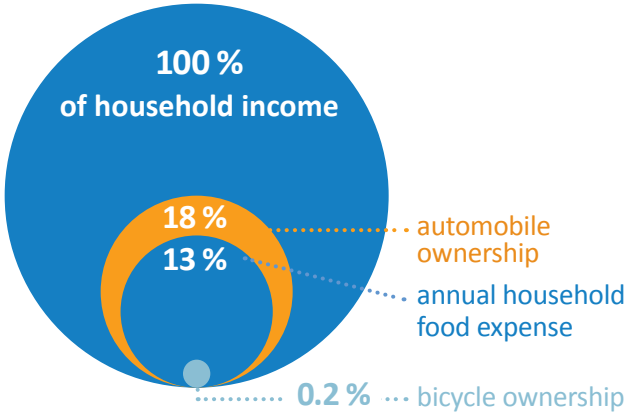
This plan functions as the guiding document for the Mid-America Regional Council (MARC) as it works to help cities and counties implement their local plans, coordinating with the regional plan to emphasize connections and continuity of facility types along long-distance corridors.

The plan also provides best practices and guidance for local governments in the Greater Kansas City region to use as a resource at any stage of bicycle infrastructure implementation.

Planning and implementation take into account the needs of the full range of skills and desires among the cycling community. The plan promotes cycling as an alternative form of transportation to the automobile.

This document will also serve MARC programming committees that select and recommend projects for sub-allocated federal funds, providing information that will help them evaluate the connectivity potential of submitted projects.

Figure 5 | **The average American household spends 18 percent of its income on automobile ownership, compared to 13 percent on food. In comparison, owning and maintaining a bicycle can cost as little as 0.2 percent of the average American household income.**



Benefits of a Regional Bikeway Plan

SOCIO-ECONOMIC

The yearly cost of owning and operating a vehicle is more than $9,000, or 18 percent of the average U.S. household's annual spending. That is significantly more than the 13 percent of income typically spent on food for the family.[1] Comparatively, owning and maintaining a bicycle can cost as little as $120 per year.[2]

Cycling can provide disadvantaged groups with a means of transportation and a greater sense of independence. In areas of the region where household incomes are below the national average, there are more households without cars. These households are often dependent on alternative modes of transportation such as transit, walking and bicycling. Effective cycling infrastructure provides low-cost transportation for everyone, particularly the young and those without access to a driver's license or to a car. Cycling also extends the reach of public transit by allowing people to ride short distances to a transit stop and then use transit for the rest of their trip (Figure 4).

Bicycling also provides economic benefits to the community as a whole. The city of Sydney, Australia, conducted a study that found adding 200 km (124 miles) of bikeways would deliver at least $500 million in economic benefits to the city over a 30-year period, a return of $3.88 for every dollar spent.[3] Those gains are enjoyed by all people in the city, not just those who cycle.

HEALTH

With over 60 percent of the population categorized as overweight or obese,[4] the nation is suffering from an epidemic often attributed to sprawling development, a dependence on cars and unhealthy diets. Studies suggest the more time Americans spend in their cars, the higher their obesity rate. In fact, one study concluded that if American adults each drove one mile less per day, it would reduce the adult obesity rate by 2.16 percent over six years — leading to 5 million fewer obese adults.[5]

Researchers from the Center for Disease Control report that Americans who exercise three or more times per week for 30-minutes have, on average, 25 percent lower annual medical expenditures compared to those who do not exercise.

The health consequences of obesity include hypertension, coronary artery disease and type 2 diabetes, all of which cost the U.S. billions in health care annually. Increasing participation in cycling enough to reduce obesity by about 3 percent would reduce national medical expenditures by $6 billion.[6]

The annual individual medical cost of inactivity ($622) is more than 2.5 times the cost per user of bike and pedestrian trails ($235).[7] Providing active transportation choices — through complete streets and the built environment — is a public wellness strategy to combat inactivity and thereby reduce health care costs.

Figure 6 | **Communities enjoy an economic return of $3.88 for every $1.00 spent on bikeway improvements, based on a study in Sydney, Australia.**

People who cycle regularly in mid-adulthood typically enjoy a level of fitness equivalent to someone 10 years younger[8] and a life expectancy two years above the average.[9] Additionally, bicycle commuters report lower stress and greater feelings of freedom, relaxation and excitement than car commuters. [6, 10]

SAFETY

Increasing the number of cyclists on the road increases safety. Where cyclists are more visible, automobile drivers are more aware of their presence and respond accordingly. A review of 23 studies of on-street bicycle transportation infrastructure and bicyclist safety concluded that on-street, bicycle-specific facilities reduce crashes and injuries among cyclists. The data suggest that sidewalks and multi-use trails pose the highest crash risk to cyclists; major roads are more hazardous than minor roads; and the presence of bicycle facilities (e.g., on-road bike routes, on-road marked bike lanes, and other bike-only facilities) is associated with the lowest risk.[11]

AIR AND WATER QUALITY

The choice of cycling (or another non-motorized mode), instead of driving, leads to less air pollution, by reducing vehicle miles traveled (VMT) in the region. Even modest changes in personal travel choices are beneficial. Short trips made in single occupancy vehicles can be replaced with cycling or walking. An Environmental Protection Agency (EPA) analysis found that of all contributing factors currently monitored, motor vehicles are the second greatest contributor to atmospheric warming (electricity generation is first) because of the pollutants and greenhouse gases they release during operation.[12]

Additionally, there are 800 million car parking spaces in the U.S., totaling 160 billion square feet of concrete and asphalt. The environmental impact of all car parking spaces adds 10 percent to the CO_2 emissions of the average automobile.[13]

Reducing the surface area of pavement allocated to parking can have a positive impact on the heat-island effect in urban areas. Less pavement means less heat storage from solar radiation, which can reduce outdoor temperatures and save energy costs to cool surrounding buildings. Less pavement also reduces stormwater runoff, which can lead to healthier waterways in the region.

By cycling, rather than driving, to work just two days a week, one person can reduce carbon pollution by an average of two tons per year.[14]

Figure 7 | The cost of inactivity far outpaces the investment in facilities that encourage activity.

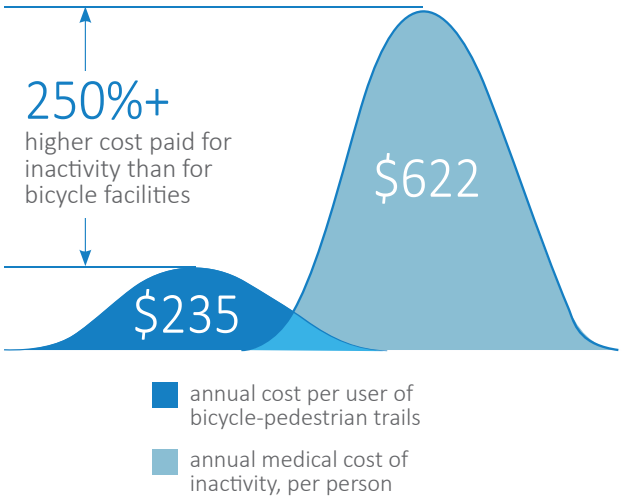


Figure 8 | The safest place for a bicyclist is in a designated bicycle facility like an on-road bike route, bike lane or separated bicycle-only path; the least safe is on a sidewalk.[11]

Public and Stakeholder Input

The Regional Bikeway Plan was developed over a 12-month period that included extensive public and stakeholder engagement.

From the project's inception, staff and project consultants met bimonthly with a plan-specific Steering Committee and the MARC Bicycle Pedestrian Advisory Committee (BPAC). Members of both groups reviewed plan progress and evaluated the plan's direction as it evolved. The Steering Committee, representing area cities and counties, also engaged in several activities to help mold the identity of the plan and make it a joint document between MARC and the local governments.

The planning team held stakeholder meetings for constituents in often underserved areas of the eight-county region, and facilitated a series of four county-wide, open-house public meetings to unveil the first draft corridor plan and gain public feedback.

A WikiMap public survey, widely publicized before and during the first series of public meetings, allowed interested parties who were not able to attend the meetings to provide feedback from the convenience of their own homes. The planning team used Wikimapia.org, which offers an online collaborative forum that allows participants to map their knowledge of a place in an interactive way. Information gathered included routes currently bicycled, routes people would like to bicycle if there were facility improvements, barriers to bicycling, and high- or low-stress experience of the routes mapped.

During the time the WikiMap was available, 380 people logged into the website and created accounts. The majority of participants (370) completed the Intro Survey, and 172 people provided input on the map itself. Those 172 people entered 1,759 comments on the map. This rate of participation by registered users is consistent with the consultant team's prior WikiMap experience, and the total number of comments far exceeds that observed in similar projects. Appendix A supplies additional information and a report of the WikiMap results.

As the plan approached final draft status, meetings were held with local government officials in each county to ask them to vet the network from a local perspective, especially as it pertains to local planning efforts already underway.

The final draft of the Regional Bikeway Plan was presented at a public open house and at a joint meeting of the Steering and BPAC committees, before submission to the Total Transportation Policy Committee and the MARC Board of Directors for final approval.

As a result of this extensive process, the Regional Bikeway Plan shares ownership among many interested stakeholders. Its development as a joint product of MARC and the local governments in the region will be beneficial as implementation — also a joint effort — continues in the coming years.

Figure 9 | Bicycling advocates who attended public meetings were enthusiastic about plans for facilities that will help them travel to their desired destinations.

Existing conditions

THE KANSAS CITY REGION

The Mid-America Regional Council serves as the association of local governments and Metropolitan Planning Organization for the bistate Kansas City region. Eight counties are included in the transportation planning boundary and the Regional Bikeway Plan: Leavenworth, Wyandotte, Johnson and Miami Counties in Kansas, and Platte, Clay, Jackson and Cass Counties in Missouri. These eight counties cover 3,849 square miles and include 109 separate municipalities.

With so many jurisdictions involved, the Regional Bikeway Plan is an important tool for spanning boundaries through planning and implementation to ensure that a fully aligned, contiguous and consistent network is available for bicycle transportation.

The total population in the planning boundary, according to 2010 census figures, is 1,895,595. Of this number, 25.7 percent are under the age of 18, 62.6 percent between the ages of 18 and 65, and 11.7 percent aged 65 or older. The region's population is following an aging trend, with the median age expected to increase by 3.8 percent — from 36.2 to 37.6 years — by 2019.

WikiMap survey results, which offer a snapshot of 370 bicyclists within the region, suggest the majority of current cyclists:

- Rate themselves as confident cyclists.
- Are male.
- Are between the ages of 26 and 65.

However, a full, statistical survey of the region's population would provide a clearer picture of who the region's bicyclists are; what percentage of people bicycle and for what reasons; and their perceptions of the current bikeway system.

EXISTING FACILITIES

Local governments have already constructed 1,282 miles of bicycle facilities — including bicycle lanes, signed bicycle routes, signed and unsigned share-the-road routes, and shared-use paths — in the region. Figure 12 lists the number and types of facilities currently in place by city or county, as of August 2014.

PROPOSED FACILITIES

This plan's development included extensive review of proposed bikeway and trails information from local authorities. Research information included area plans and corridors studies along with open-space, park, master streets and comprehensive plans. These plans vary from conceptual to advanced planning efforts. The map in Figure 11 illustrates both built and planned facilities in the region.

BIKEWAY GAP ANALYSIS

To be most useful for both transportation and recreation, a bikeway need to be continuous and connected across city, county and state boundaries so that bicyclists can count on the facility to get where they want to go. However, because bikeways are generally developed at the municipal level, they commonly end at municipal borders. This problem is particularly acute because some of the 109 municipalities in the planning boundary are as small as two of square miles. A bicycle trip may pass through a half-dozen or more cities, and bikeways may appear or

disappear from one to the next. It is important that the Regional Bikeway Network form a continuous network of bikeways across jurisdictional boundaries.

An analysis of gaps in the existing and proposed bikeway network was performed as part of the planning process. The analysis used GIS software to examine where existing and planned bikeways end at municipal and county borders. The results of this analysis are shown in Figure 14.

Looking at the mapped results, it is clear that gaps primarily occur where a local government has planned or existing bikeways that lead up to its border, but do not continue into the adjoining jurisdiction, either because that city or county has not planned for bikeways at all, or has not worked with neighboring jurisdictions to plan connecting routes. This bikeway gap analysis is one of the factors used to develop the Regional Bikeway Network recommended later in this plan.

PHYSICAL BARRIERS

Physical barriers such as challenging bridge crossings of rivers or freeways can deter bicyclists from making a trip to a specific destination if they are intimidated by the traffic they will encounter. Physical barriers can add unreasonable distance to trips if safe and comfortable crossings are not provided at regular intervals. For the purposes of this project, physical barriers to bicycling are divided into three primary categories: topographical barriers (hills), water barriers (rivers), and roadway barriers (freeway crossings). Each barrier type is examined in more detail below.

Toole Consulting developed a bridge "bikeability" rating system and applied it to all bridge crossings of the Missouri and Kansas rivers, as well as existing and planned bikeway crossings of limited-access freeways at bridges or underpasses. Details of this analysis and its findings can be found in Appendix B.

Assessing barriers at the regional level often presents a different picture from assessments at the local level. At the regional level, a much larger area is examined and the likelihood for barriers increases.

The policy framework for *Transportation Outlook 2040*, the region's long-range Metropolitan Transportation Plan, calls for future transportation investments to consider including accommodations for bicyclists and pedestrians.

TOPOGRAPHICAL BARRIERS

Topographical barriers to bicycling primarily include steep or lengthy hills, or a combination of the two. Each bicyclist has his or her own threshold for hills, and that threshold will vary widely. Hills can be overcome with multiple gears and electric pedal assistance, but exertion by the bicyclist is still necessary. Generally, any grade of more than 5 percent can deter bicycling, especially if the hill continues for more than a city block (500 feet). Even grades of less than 5 percent can cause problems if the grade continues for more than a quarter mile. Although most people react most negatively to the exertion required by the uphill grade, some bicyclists are also unnerved about steep downhill segments and the hard braking often required.

The Kansas City metro area has gently rolling terrain with moderate hills throughout the region. However,

Figure 10 | Physical barriers can deter bicyclists.

there are some significant hills rising up from the Missouri River flood plain. Because the geography of the region is relatively consistent, with rolling hills throughout the eight-county area, mitigation of topographic barriers should be made through use and evaluation of alternate routes and design solutions, whenever possible. Closer evaluation is needed for these areas during the planning and implementation processes.

WATER BARRIERS

Water barriers in the Kansas City metro region are primarily rivers and streams. A number of large lakes exist within the planning area, but they are not in the heavily urbanized areas and tend to serve as destinations for bicyclists rather than barriers. The region also has a large network of streams; these minor waterways are frequently bridged, and are not typically major barriers to bicycling. Additionally, many of these minor waterways have had shared-use paths constructed within their corridors, serving to increase bikeway connectivity throughout the region.

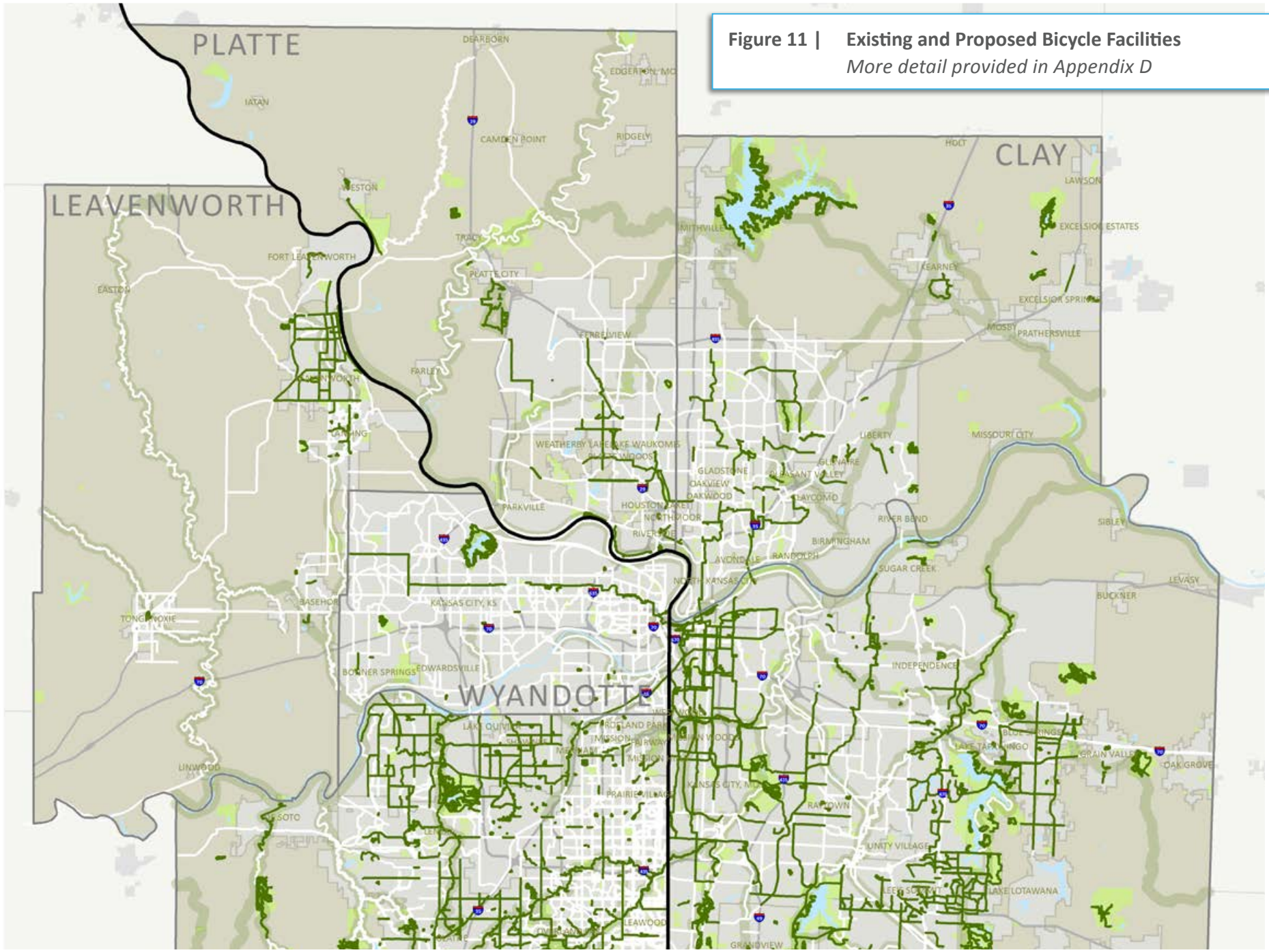


Figure 11 | Existing and Proposed Bicycle Facilities
More detail provided in Appendix D

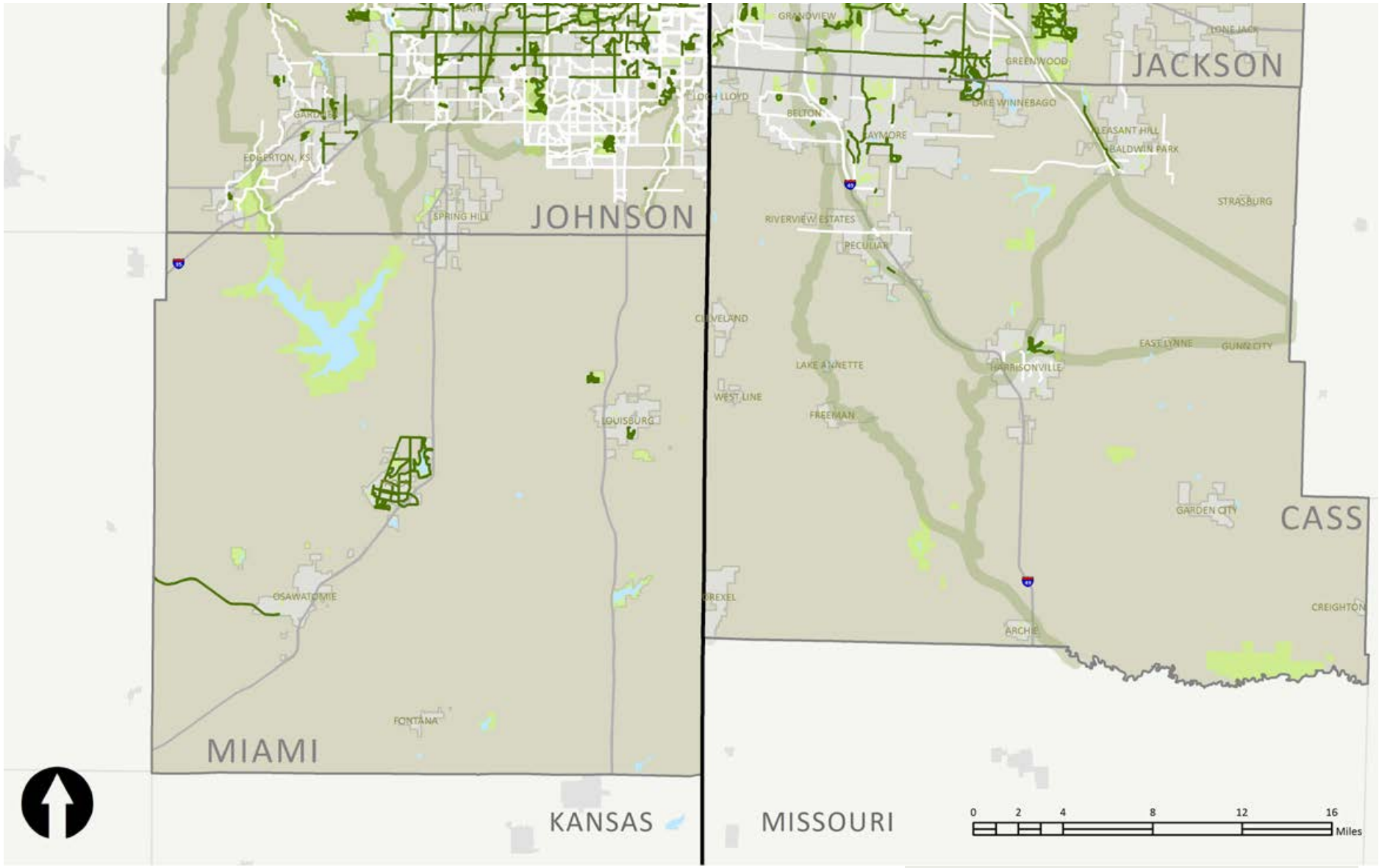

JOHNSON
JACKSON
CASS
MIAMI
KANSAS
MISSOURI
EDGERTON, KS
SPRING HILL
LOUISBURG
OSAWATOMIE
FONTANA
GRANDVIEW
GREENWOOD
LONE JACK
LAKE WINNEBAGO
BELTON
RAYMORE
PLEASANT HILL
BALDWIN PARK
STRASBURG
RIVERVIEW ESTATES
PECULIAR
CLEVELAND
LAKE ANNETTE
HARRISONVILLE
EAST LYNNE
GUNN CITY
WEST LINE
FREEMAN
GARDEN CITY
DREXEL
ARCHIE
CREIGHTON
0 2 4 8 12 16
Miles
Existing Bikeways
Proposed Bikeways
MetroGreen Plan
Parks
Cities
Counties

Figure 12 | Center-line Bicycle Facilities by City/ County Government
Updated August 2014

Facility types:

BL	Bicycle Lane
SBR	Signed Bicycle Route
SR	Share the Road*
SRNS	Share the Road, No Signs
SUP	Shared Use Path

* Share the Road miles include both roads with share the road signs and those with shared lane markings.

City/County	Facility Type	Miles
Basehor	SUP	0.5
Belton	SUP	1.9
Blue Springs	SR	28.7
	SUP	16.7
De Soto	SUP	3.0
Excelsior Springs	SBR	2.0
	SUP	0.7
Gardner	SUP	8.8
Gladstone	BL	1.2
	SUP	3.7
Grain Valley	SUP	1.7
Grandview	SUP	8.4
Harrisonville	SUP	0.8
Independence	SBR	1.7
	SR	9.0
	SUP	32.8
Jackson County	SR	1.5
	SUP	6.9
Johnson County	SUP	11.6
Kansas City, Kan.	BL	0.9
	SRNS	24.6
	SUP	8.0
Kansas City, Mo.	BL	20.3
	SBR	173.7
	SR	29.8
	SUP	78.9
Kearney	SBR	1.6
	SUP	4.5
Lake Tapawingo	SUP	0.4
Lansing	SUP	6.7
Leavenworth	SR	27.2
	SUP	16.3
Leawood	BL	1.1
	SUP	15.9
Lee's Summit	BL	37.9
	SBR	15.5
	SR	15.4
	SRNS	0.9
	SUP	57.2
Lenexa	SR	4.7
	SUP	41.9
Liberty	SUP	11.1
Merriam	SUP	7.6
Mission	SUP	1.8
Mission Hills	BL	0.9
North Kansas City	SBR	2.2
	SUP	0.4
Olathe	BL	16.4
	SR	36.9
	SRNS	6.3
	SUP	43.4
Overland Park	SRNS	137.6
	SUP	88.3
Parkville	SUP	8.3
Platte City	SUP	8.3
Platte County	SUP	4.4
Pleasant Hill	SRNS	0.6
	SUP	2.7
Prairie Village	BL	0.7
	SUP	1.4
Raymore	SR	1.2
	SUP	11.6
Raytown	BL	4.2
	SR	5.4
	SUP	2.1
Riverside	SUP	6.4
Roeland Park	SUP	0.4
Shawnee	BL	9.7
	SR	73.1
	SUP	16.7
Smithville	SUP	40.1
Sugar Creek	SR	2.2
Tonganoxie	SUP	1.7
Weston	SUP	3.4

Figure 13 | Bridge crossings over freeways and rivers without bicycle facilities can intimidate bicyclists and prevent them from making a bicycle trip to a destination. This bridge on Lamar Avenue has lower car traffic volumes than others and is currently bicyclists' choice for crossing over I-435.

An 88-mile stretch of the Missouri River passes through the planning area. It is a very significant barrier to bicycling in the region, as the river has relatively few crossings and most of those crossings carry high volumes of motor vehicle traffic. Additionally, the river's flood plain is quite wide, which results in lengthy bridge spans. There are only 10 river crossings in the region (not including a number of railroad bridges), four of which are interstate bridges which do not permit bicycles. This limits bicyclists to only six possible places to cross the Missouri River. Of those six crossings, only the Heart of America Bridge and the North Chouteau Trafficway Bridge offer acceptable conditions for bicycling.

Approximately 50 miles of the Kansas River flows through the planning area, merging with the Missouri River at the state line. The Kansas River and its flood plain are not as wide as the Missouri River, and have more frequent crossings. However, most of the crossings provide a low level of service for bicyclists, and, in general, only the most skilled and confident bicyclists are willing to use the on-street crossings. The sidewalks on the South 12th and South 7th Street bridges provide crossing opportunities for less confident bicyclists and youths, but they are narrow and are not ideal for use as bikeways. For most bicyclists, the only crossing of the Kansas River considered to be good is the shared-use path under the I-70 bridge.

FREEWAYS

Freeways and major highways can present a significant barrier to bicycling where the roadway is grade-separated from the rest of the street network. Grade-separated freeways serve as a barrier in three ways. First, they break up the existing street network and typically have infrequent crossings, which may force bicyclists to ride significant distances to access a crossing of the highway. Second, the limited crossings of freeways often carry high traffic volumes, and may have interchanges that are difficult or hazardous for bicyclists to navigate. Third, the limited crossings are often bridges or underpasses that were not originally built with bicycle or pedestrian accommodations in mind and often lack the space to add such accommodations.

In general, bridge and underpass bikeway crossings of freeways in the planning area rate very poorly for bikeability. Bikeway crossings tend to occur at bridges or underpasses that serve as freeway interchanges, which typically have high traffic volumes and speeds. Additionally, interchange crossings often require crossing multiple ramps, which may not be controlled by signals. Even if shared-use or bike lanes are provided at these crossings, theses often provide a uncomfortable, intimidating experience for the majority of bicyclists. To address these issues, careful mitigation planning and design efforts should be made. When designating future bikeways in the Kansas City area, every effort should be made to use non-interchange crossings of freeways rather than crossings that involve an interchange.

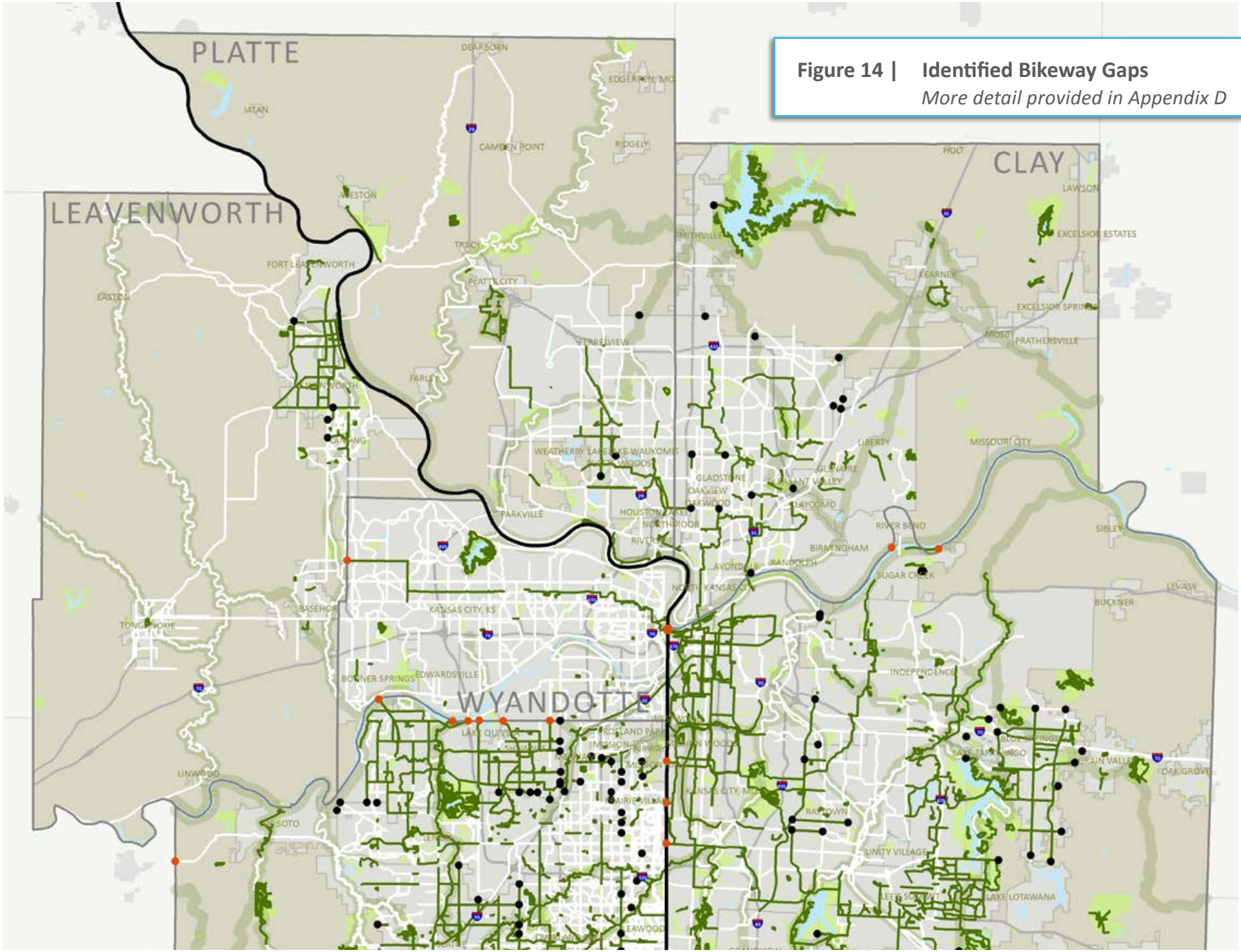
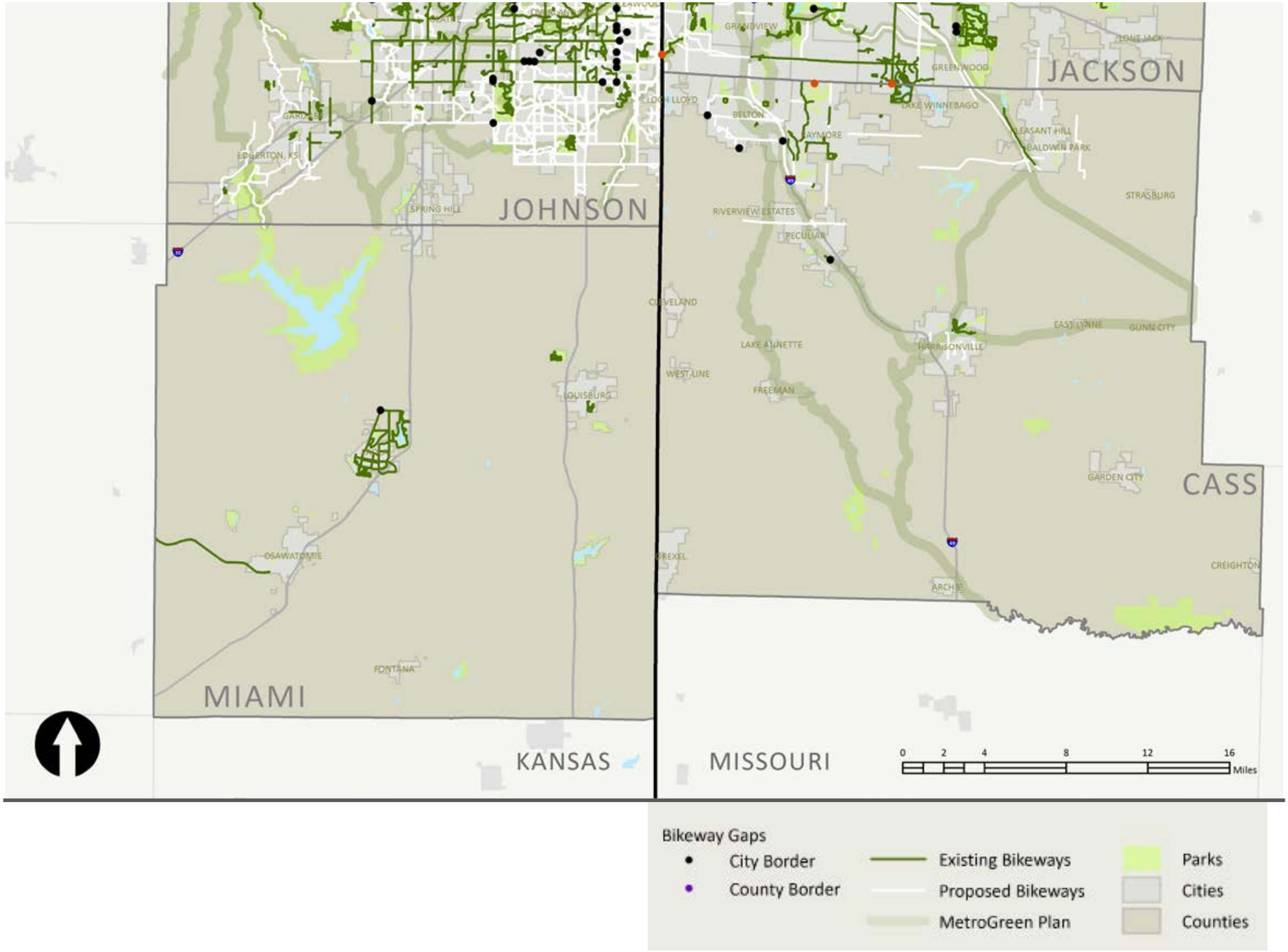


Figure 14 | Identified Bikeway Gaps
More detail provided in Appendix D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EDGERTON, KS
SPRING HILL
OSAWATOMIE
FONTANA
LOUISBURG
CLEVELAND
WEST LINE
FREEMAN
LAKE ANNETTE
HARRISONVILLE
EAST LYNNE
GUNN CITY
GARDEN CITY
CREIGHTON
ARCHIE
PECULIAR
RIVERVIEW ESTATES
STRASBURG
BALDWIN PARK
PLEASANT HILL
LAKE WINNEBAGO
GREENWOOD
LONE JACK
GRANDVIEW
BELTON
RAYMORE
0 2 4 8 12 16
Miles
Bikeway Gaps
City Border
County Border
Existing Bikeways
Proposed Bikeways
MetroGreen Plan
Parks
Cities
Counties

Figure 15 | Without provisions for bicycles like this protected lane on the Heart of America Bridge over the Missouri River, bridges often become barriers to bicycle traffic.

Photo credit: BikeWalkKC

The Kansas City region will use the adopted Kansas City Major River Crossings policy (approved by the MARC Board on April 25, 2006) and the Regional Complete Streets Policy (approved by MARC Board on March 27, 2012) to guide decisions concerning the planning and design of all surface transportation projects.

Appendix B provides more detail about the bikeability of both water and freeway crossings.

SAFETY

A safety analysis was conducted to review regional bicycle crash trends, identify temporal and demographic characteristics associated with crashes, and conduct a more detailed spatial analysis to identify hot spots where bicycle crash densities occur. A brief overview is provided below, and the full bicycle crash analysis is available in Appendix B. The findings were also used in recommendations for increasing safety for bicyclists found later in this report.

REGIONAL BICYCLE CRASH TRENDS

Bicycle crash trends in the planning boundary were analyzed over a four-year period, from 2009 to 2012. MARC provided a dataset that combines Missouri and Kansas data, although not all data fields are available for each jurisdiction. The analysis covered 590 bicycle crashes that occurred in the region over the study period.

FINDINGS

A comparison of bicycle fatality data in the Kansas City region as well as the two states, Kansas and Missouri, shows that each has a lower percentage of total fatalities than the national average with no distinguishable trend from year to year.

In comparing bicycle fatalities to total population, rates are also generally lower than the national average with no distinguishable trend from year to year.

Appendix B provides significantly more detail about the bicycle crashes that were reported, including analysis of the time of day, severity of crashes, and a number of other factors.

SPATIAL ANALYSIS

In addition to the tabular analysis of bicycle crash data, a geographical analysis of crashes within MARC's regional planning boundary area was conducted.

Using GIS coordinates, bicycle crash locations (shown as dots in Figure 16) were mapped for the eight-county region.

Crash densities were also mapped (shown by colored hot spots), with a focus on the majority of crashes located in the downtown Kansas City area. A large concentration of crashes occurred in the urban core, with events generally decreasing relative to distance from downtown.

The highest concentration of crashes was found in northwestern Jackson County, Missouri. Notable high crash concentrations also include the areas around Independence, Lee's Summit, Gladstone, Raytown and Grandview, Missouri. Notable high crash concentrations in Kansas include the cities of Leavenworth, Overland Park and Olathe. Many of these cities are located near major highways, suggesting a relatively high volume of bicyclists and motor vehicles.

More information about crash locations and densities is provided in Appendix B.

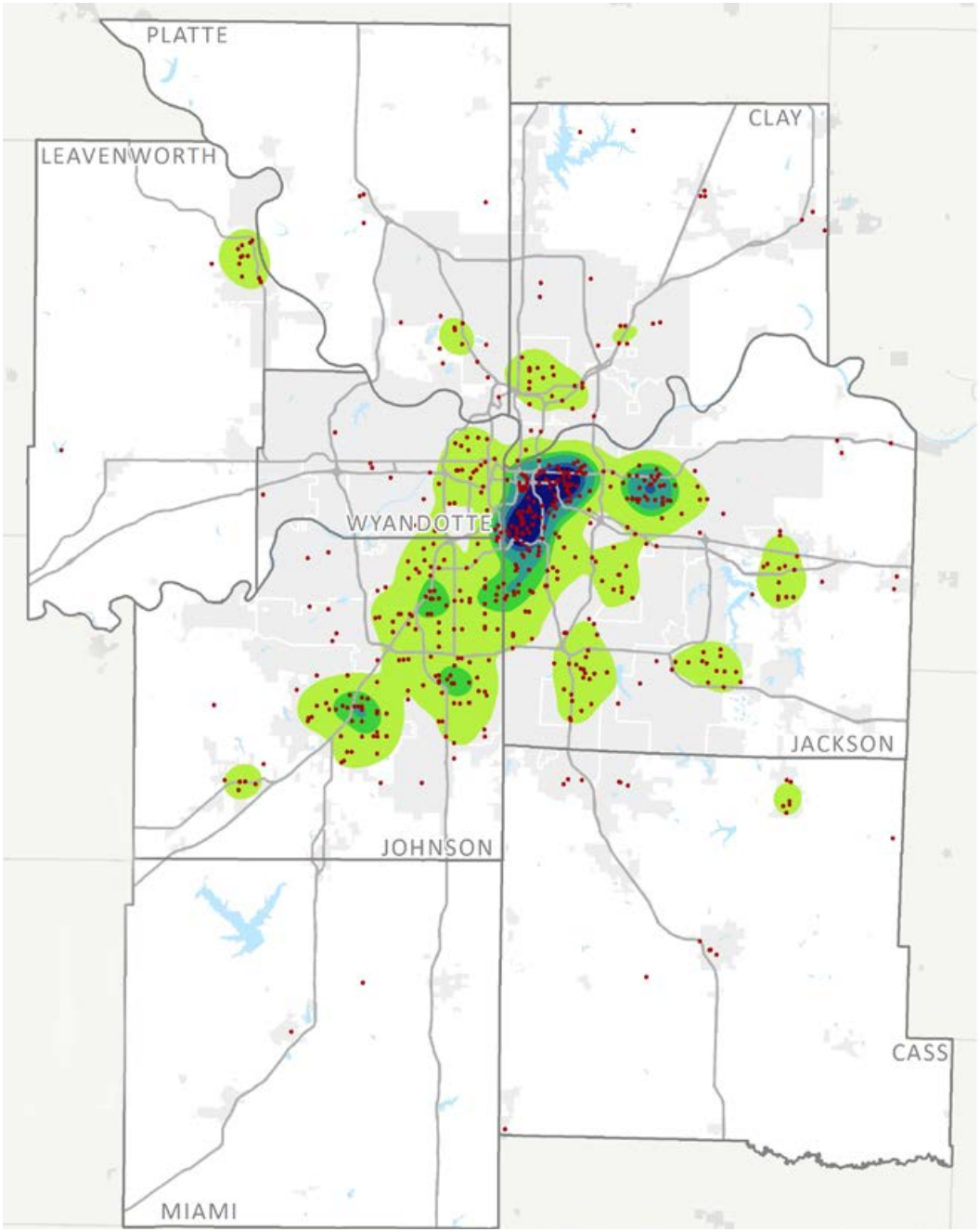


Figure 16 | Bicycle Crash Data Spatial Analysis for the Kansas City region (2009–2012)

Figure 17 | MARC developed a printed map and web app of the Kansas City region's trails and bikeway. In future updates this map will include constructed bicycle facilities informed by the Regional Bikeway Network.

marc.org/bikemap

Regional active transportation programs

MARC's active transportation programs include three components:

1. Public outreach to educate and encourage human-powered transportation.
2. Monitoring to evaluate shifts in active transportation traffic counts.
3. Focused technical assistance for walking and bicycling programs.

The role of active transportation in the total transportation system is significant. MARC promotes walking and bicycling as healthy, economical and environmentally friendly modes of travel that reduce congestion and fuel consumption, and protects air quality. Program goals are to:

- Increase the number of citizens who bike or walk to work, school and other destinations.
- Increase opportunities for physical activity.

EXPLORE KC

The Active Transportation Program funds Explore KC, a MARC public outreach campaign that encourages exploration of the Kansas City region by foot or bicycle. This work includes development of a regional bikeway and trails map and distribution of educational materials directed at pedestrians, bicyclists and motorists. Each year, spring and fall campaigns provide local governments with resources to promote walking and biking in their communities. The Explore KC campaign has remained a popular regional resource since its 2002 inception. It has changed over time to take advantage of new communication technologies and a growing community of walking and biking enthusiasts. The campaigns include paid advertising in print publications, billboards, local radio and social media.

Educational materials include the Regional Bikeways and Trails map (provided online, in print and through a web app) and promotional giveaways such as safety lights and reflective bands.

BICYCLE AND PEDESTRIAN COUNTS

In 2012, MARC purchased automated bike and pedestrian counters used to collect data with the assistance of partnering local jurisdictions. Demand for the equipment has been high and continues to grow. Using this compiled data, MARC can provide a leadership role in developing data collection standards and establishing long-term data sharing agreements.

Counts provide valuable information to planners, and may be used to evaluate safety; quantify crash exposure rates and facility use rates; reveal travel patterns for annual, monthly, daily and hourly trends; enhance travel demand forecasting; and assess air quality benefits.

Anticipated ongoing operating and capital expenses include:

- Automated counters (PYRO-boxes and pneumatic tubes).
- Subscription credits (Miovision).
- Technical training workshops.

TECHNICAL ASSISTANCE

In partnership with local governments, MARC and BikeWalkKC, a key nonprofit partner, provide technical assistance to communities seeking the Walk Friendly Community or Bicycle Friendly Community designations.

The Walk Friendly Community and Bike Friendly Community programs use comprehensive approaches that have been proven effective to increase walking and bicycling mode sharing.

LOCAL GOVERNMENT PROGRAMS

Many cities and counties have programs with dedicated staff and advisory boards that support local cycling and pedestrian programs.

Three communities in the region are recognized with bronze-level the Bicycle Friendly Community designation by the League of American Cyclists — Lee's Summit and Kansas City, Missouri, and Shawnee, Kansas. Lee's Summit is also recognized as a bronze-level Walk Friendly Community by the Pedestrian Bicycle Information Center. These designations represent significant local commitments to cycling and walking programs in the metro area.

KANSAS CITY B-CYCLE

B-cycle is a bike sharing program that allows people to check out bikes for short trips between any stations and provides a low-cost option for transportation, recreation and fitness. The Kansas City B-cycle program launched in 2012 and has grown from 12 to 20 stations located in the Downtown Kansas City area, Westport and the Country Club Plaza areas. This program is an active transportation program that expands choices, reduces motor vehicle travel, encourage physical activity and support placemaking programs. Both private and public funding were used to build and expand the B-cycle program.

Figure 18 | Public works staff installs pneumatic tube equipment to capture bicyclists counts in Independence, Missouri.

A Kansas City B-Cycle, bike-sharing station is part of a program that helps encourage alternative transportation. The program is operated by BikeWalkKC.

Figure 19 | The plan enhances bicycling safety for people of all ages and abilities.

Photo courtesy of Deb Ridgway, Kansas City, Missouri Public Works

The Regional Bikeway Plan is a plan for people of all ages and abilities to safely live, work and play using bikeways that link regional and local destinations, increase transportation choices, promote healthy, active living and improve the environment throughout Greater Kansas City.

Kansas City Regional Bikeway Plan Vision Statement

THE PLAN

Planning Directive

Guidance for the development of this Regional Bikeway Plan came from the project's Steering Committee, whose responsibility it was to develop a vision for the Plan. The vision statement was created, reviewed and approved by the Steering Committee and MARC staff as the guiding directive for the Regional Bikeway Plan.

The plan was developed during the *Transportation Outlook 2040* update process. The Regional Bikeway Plan works to inform regional long-range transportation plans and advance the goals outlined in *Transportation Outlook 2040*.

Plan Methodology

The MARC Regional Bikeway Network was developed using a multi-step process that took into account existing and planned bikeways, destinations and connections, barriers, public input, and other factors. This section describes the process that was used to develop the recommended network.

REGIONAL BIKEWAY FRAMEWORK

A regional bikeway network should have a clear framework for defining a regional bikeway versus a local bikeway. The MARC regional network relies on bikeways that have been planned primarily by individual municipalities and counties, but will consider their importance in the regional context. This section provides the generalized framework that was used to designate the Regional Bikeway Network.

NETWORK SPACING

Land use is an important consideration when proposing network spacing and can identify and usefully include incorporated and unincorporated areas. The network forms a grid of north-south and east-west corridors. In some case, a "spoke and hub" network forms where north-east and south-west corridors meet.

- In developed areas of urban or suburban land use, the regional bikeway should continue about every two to four miles on a north-south and east-west grid. A tighter network may be desired as the density of destinations increase.
- In undeveloped (rural) land use, the regional bikeway should maintain a four to eight mile interval on a north-south and east-west grid. The network serves to connect small communities and link to national and statewide systems. Limits to major barrier crossings may affect network spacing in undeveloped or rural areas.

NETWORK CONNECTIONS

The Regional Bikeway Network should seek to connect the following types of features and land uses:

- City centers.
- Outlying communities.
- Activity centers (employment districts, regional shopping districts).
- Major recreation attractions.
- Transit corridors and centers.
- National and statewide bikeway and trail assets.

NETWORK DIRECTNESS

Whenever possible, the Regional Bikeway Network should use the most direct connections between locations. This will often mean that an on-street bikeway is designated as part of the regional network over a nearby off-street bikeway that may not provide a very direct connection between points or is very short.

In special cases, dual-parallel routes may be appropriate along corridors separated by major waterways or freeways barriers with better access to destinations. Parallel routes may be proposed if accommodation within the desired right-of-way is not possible or alternate routes provides better connectivity. Decisions should consider the ability of alternate routes to provide direct access to destinations and continuity in neighboring communities.

BIKEWAY TYPES

The Regional Bikeway Network will comprise both on-street and off-street bikeways (shared-use paths). On-street bikeways that include signage and pavement markings may consist of one or more of the following:

- Cycle tracks.
- Bicycle lanes/paved shoulders.
- Bicycle boulevards/neighborhood greenways.
- Shared roadways with or without bicycle route signs.

Many regional routes may be located on shared roadways that do not have an official bicycle facility, particularly early in the process of implementing the Regional Bikeway Network.

THE CRITERIA CONSIDERED IN DEVELOPING THE DEVELOPMENT OF FRAMEWORK INCLUDE THE ABILITY OF THE REGIONAL NETWORK TO:

- Overcome barriers and close gaps.
- Connect identified regional destinations.
- Integrate bikeways identified in local plans.
- Use major bikeways identified as arterial or primary bikeways.
- Form connections to bikeways identified in neighboring county, regional or state bikeway plans.
- Accommodate and encourage bicycling among a broad range of bicyclists.
- Provide a reasonable distribution of bikeways among communities and counties.

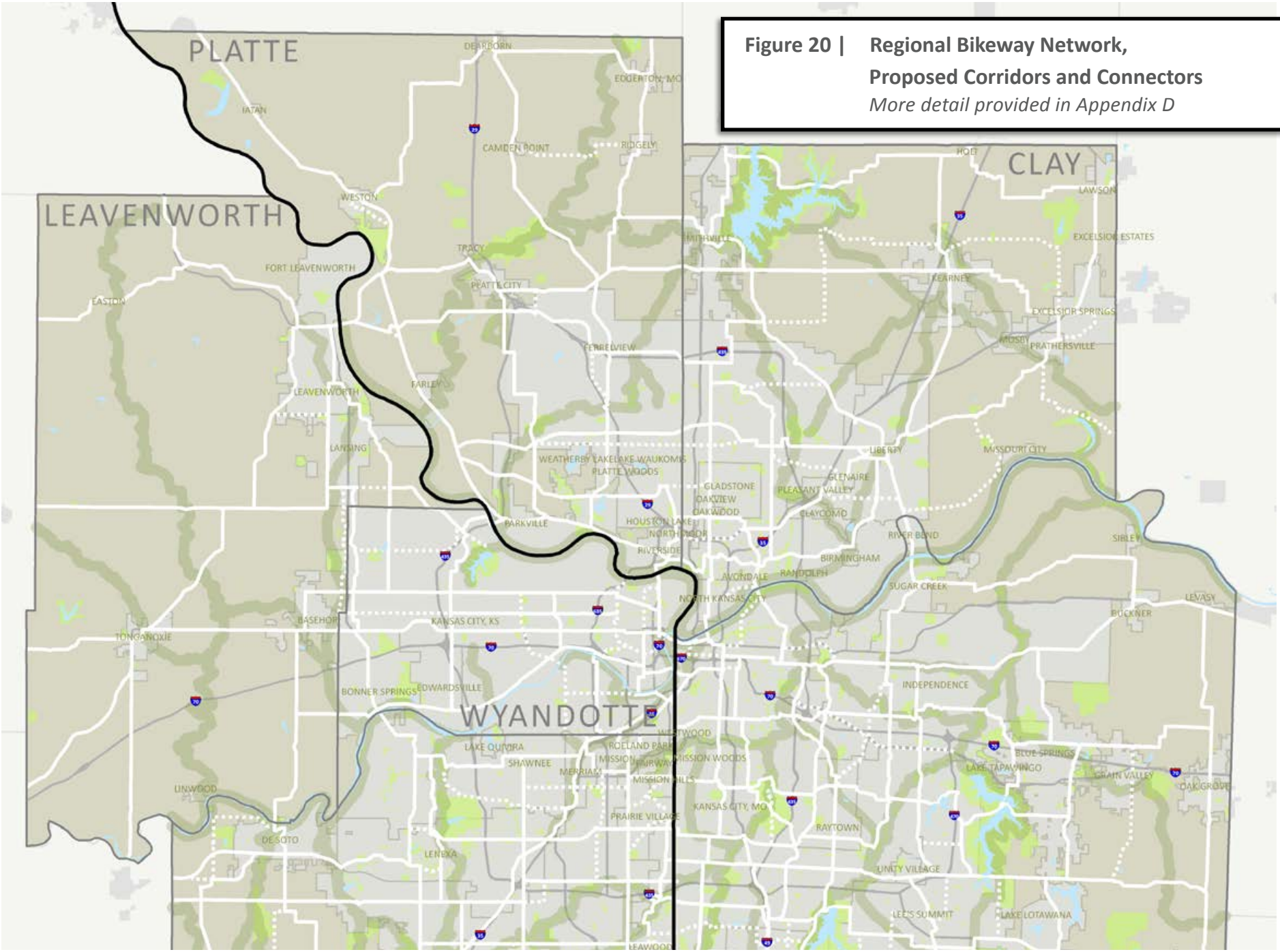
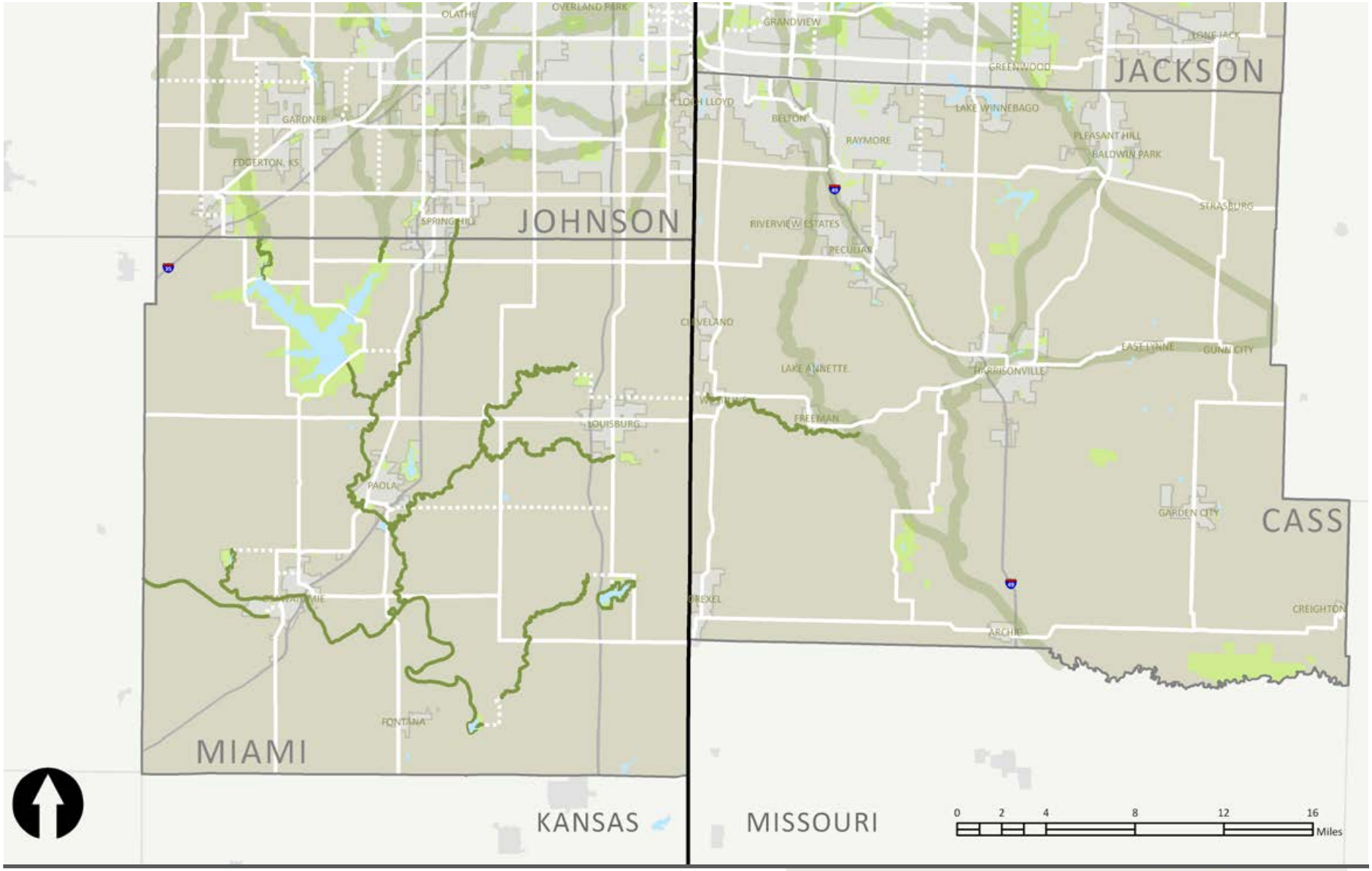


Figure 20 | Regional Bikeway Network, Proposed Corridors and Connectors

More detail provided in Appendix D


OLATHE
OVERLAND PARK
GRANDVIEW
LONE JACK
GREENWOOD
JACKSON
LOCH LLOYD
BELTON
LAKE WINNEBAGO
GARDNER
RAYMORE
PLEASANT HILL
BALDWIN PARK
EDGERTON, KS
SPRING HILL
JOHNSON
STRASBURG
RIVERVIEW ESTATES
PECULIAR
CLEVELAND
EAST LYNNE
GUNN CITY
LAKE ANNETTE
HARRISONVILLE
WEST POINT
FREEMAN
LOUISBURG
PAOLA
GARDEN CITY
CASS
PARKER
DREXEL
CREIGHTON
ARCHIE
FONTANA
MIAMI
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MISSOURI
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Miles
Proposed Regional Corridor
Proposed Regional Connector
MetroGreen Addition
MetroGreen Plan
Parks
Cities
Counties

Regional Bikeway Network

The map in Figure 19 displays the Regional Bikeway Network. The network was developed using the criteria listed under page 26, Plan Methodology, in particular connecting outlying communities and activity corridors in the urbanized area. The map displays more than 2,000 miles of regional bikeways and proposed MetroGreen streamway corridors which includes 1,797 mile of current, unimproved roadways as follows:

- Cass 234 miles
- Clay 245 miles
- Jackson 426 miles
- Johnson 420 miles
- Leavenworth 136 miles
- Miami 316 miles
- Platte 206 miles
- Wyandotte 144 miles

Corridors vs. Connectors

Figure 19 illustrates two levels of hierarchy for the network: regional corridors and regional connectors. Regional Corridors are primary, continuous routes that travel the longest distances with minimal jogs. Regional Connectors are routes that offer regional significance as ties between two regional corridors, or bridge between communities and regional corridors. Both types are equally viable components of the Regional Bikeway Network. Regional corridors hold a primary position in the network, while connectors should be viewed as holding a supporting role. As the Regional Bikeway Network is updated, these role designations may change when corridor alignments change.

Figure 21 | A commuter-bicyclist arrives at work in North Kansas City, Missouri.

Timelines and Priority

Bikeway construction is already underway in the Kansas City region. The Regional Bikeway Plan is intended to join existing planning efforts to give local planning vision a broader lens. As local governments plan for the development of their bikeway systems, the Regional Bikeway Plan is intended to highlight the bikeway corridors that provide the greatest regional impact; those that make connections between cities, counties and states.

These regional corridors potentially offer the greatest opportunity for bicycle commuting to and from destinations, and therefore are the priorities in bikeway development. A regional vision like this is intended to shift local planning priorities to well-informed target areas for bikeway development, but not replace the planning and construction efforts of the locally important facilities.

Build-out of the Regional Bikeway Plan could span 30 years or more and is wholly dependent upon the efforts of local communities, county and state agencies. MARC will provide guidance and distribute fiscal support where appropriate and when available to support local municipalities and counties as they build out the Regional Bikeway Network. The proposed process is a fair, efficient and systematic way to align local priorities and timelines.

Proposed Prioritization Process

PURPOSE

The vision for a Regional Bikeway Network encompasses more than 2,000 miles of roadway corridors. Development of the network, which will be built incrementally by local governments, will benefit greatly from an established prioritization process. Prioritization will help identify those corridors that demonstrate the greatest potential to increase bicycling and improve connections among trail systems. Prioritization also helps guide the allocation of limited federal, state and local resources. Building on the momentum of this plan, regional partners can investigate these corridors further to determine their viability and advance project implementation.

The proposed prioritization process uses three objectives to identify high-priority corridors. These objectives emerged out of discussions with local stakeholders, who wanted a process that would:

- Maximize connections between population and employment centers along multi-jurisdictional corridors.
- Connect the regional system to national and statewide trail systems.
- Provide connections across the region between urban activity centers and smaller communities.

Evaluating cycling demand along corridors helps determine the extent to which they meet transportation needs, as illustrated on the Demand Score map, Figure 22. The National and Statewide Routes map illustrates connections throughout out the region and beyond. Together, these two maps identify proposed high-priority corridors connecting all counties within the region.

DEMAND MODEL

The Regional Bikeway Network Demand Model was created to address the first objective. It is intended to aid local governments in the prioritization of planned infrastructure improvements. The Demand Model was created using geographic information systems (GIS) software. Bikeway corridors were scored objectively and consistently to establish a demand score for each segment across the region in an equitable way.

SOURCE

The project team researched working GIS-based prioritization models used by other MPOs and major cities, gleaning information about how these models are used to inform decision-making processes. Using this research and feedback from the Steering Committee, MARC developed a first-generation working model, the Regional Bikeway Network Demand Model.

The model is adapted from two similar processes previously employed in alternative transportation plans for Phoenix and the Mid-Ohio region, and modified to fit the Kansas City region.

The following information describes how the model works and the resulting demand scores.

METHODOLOGY

The methodology employs a GIS-based scoring system that evaluates short segments of each corridor for effectiveness at meeting public demand, connecting with transit routes and stops (including the SmartMoves transit network), connecting people to a density of destinations, and supporting areas of the region most dependent on and/or most desiring of alternative transportation.

The plan team found a strong relationship between identified demand and crash locations within the regions.

The prioritization process uses these steps:

1. Regional corridors are segmented at corridor intersections.
2. These segments are broken into shorter (1,000-foot) segments in order to show where demand changes along the corridor in greater detail, based on changing geospatial data.
3. Each corridor segment is assigned points using criteria and point ranges listed in Figure 21.
4. Points are totaled for each segment to establish its priority. More points equate to higher priority. The range of possible points is 0-50.
5. After each segment is assigned a score, the segment scores are grouped into ranges of demand — low, medium and high.
6. These three tiers of scoring are then graphically displayed to show a map of the system's bicycling demand. (Figure 22)

Figure 22 | The Regional Bikeway Network Demand Scoring system

Criteria	Class	Points
Proximity to parks	Inside a park	10
	0–.25 miles	8
	.25–.50 miles	6
	.50–1.0 miles	2
	Over 1 mile	0
SmartMoves *Flyovers and underpasses do not count as connections.*	On corridors	8
	Connected to corridors	4
Proximity to transit stops	0–.25 miles	8
	.25–.50 miles	6
	.50–1.0 miles	2
	Over 1 mile	0
Proximity to transit center	0–.25 miles	10
	.25–.50 miles	8
	.50–1.0 miles	4
	Over 1 mile	0

Criteria	Class	Points
Households with zero motorized vehicles per square mile — *2010 U.S. Census data, American Community Survey (ACS) 5-year tract data*	1,201–2,228	10
	601–1,200	8
	301–600	6
	51–300	4
	1–50	2
	Zero	0
Density of destinations — *Density of businesses weighted by importance or popularity as a destination.*	High	10
		8
		6
		2
	Low	1
Percent of workers using a bicycle as transportation to work	5% or greater	6
	3%–5%	4
	1%–2.99%	2
	Less than 1%	0
Environmental Justice Tracts	Inside EJ tracts	8
	Outside EJ tracts	0

MODEL RESULTS

Demand model scores were grouped as low (1–5), medium (6–14) and high (15 and above) scoring categories. The model determined existing bikeways of about 203 miles and 1,797 miles of unimproved bikeways. The model helps prioritize unimproved segments of the network and identify manageable corridors for planning and implementation.

The model shows about 372 miles of high-demand segments and just under 375 miles of medium-demand segments. The high-scoring segments may be evaluated to identify system gaps between existing bikeways and illustrate opportunities to connect existing bikeways. Additional information about the existing facilities is needed to develop a cohesive network of connecting corridors. Together high- and medium-demand segments total about 40 percent of the 1,797 miles of unimproved roadways.

The majority of the proposed segments produced low-demand scores. This represents the about 886 miles roadway segments, or 48 percent of the 1,797 miles of network.

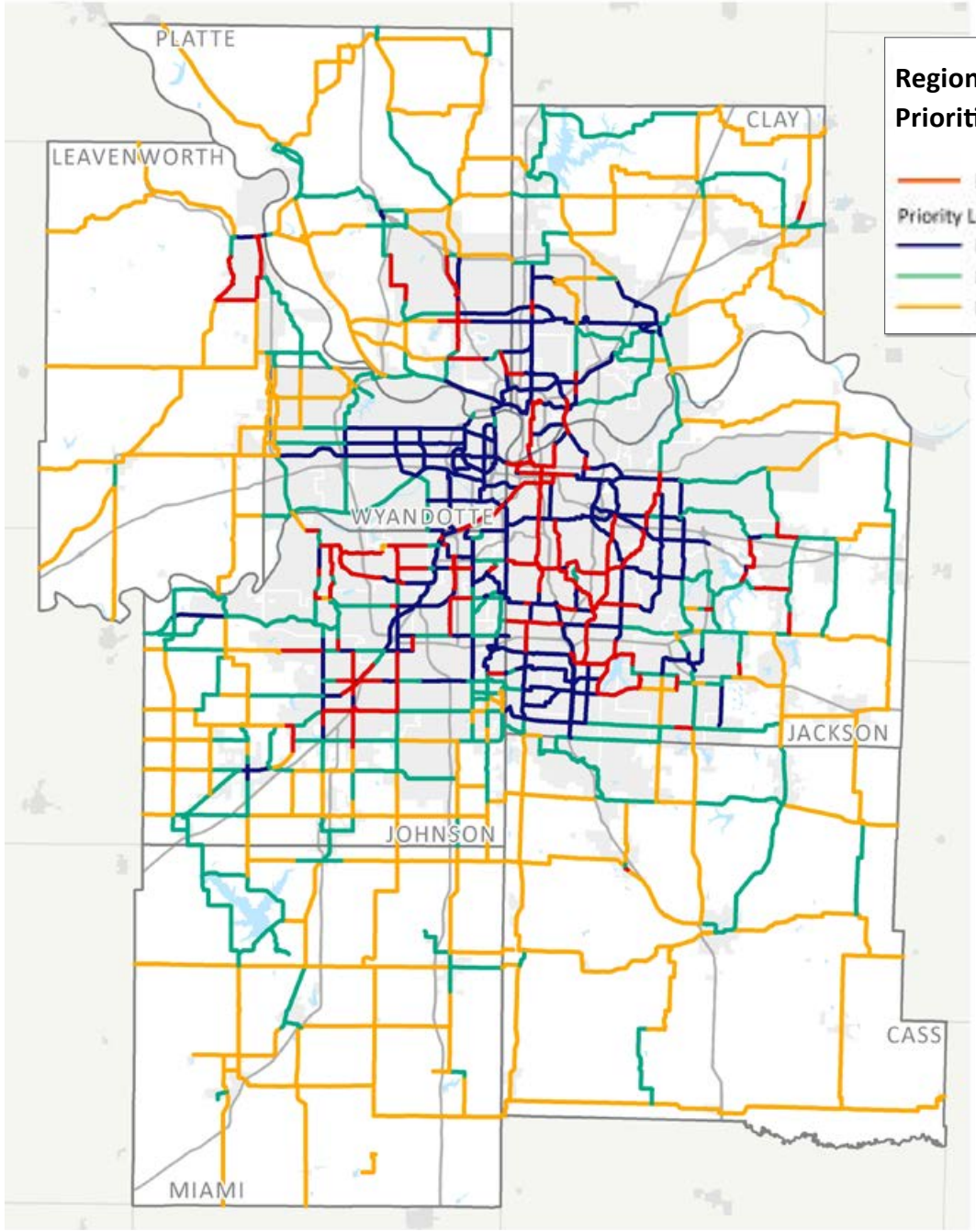


Figure 23 | **The Demand Score Map was created through use of the plan's Demand Model and helps identify priority, unimproved bikeway corridors in the region.**

Demand	Miles
Low	868
Medium	558
High	371

PROPOSED CONNECTIONS TO NATIONAL AND STATEWIDE ROUTES

Evaluating the ability of corridors in the Regional Bikeway Network to provide connections to trails systems of national and statewide significance uses criteria outlined rather than a GIS-based model. This process addresses the second and third objectives listed on page 31, and is intended to aid local governments in the prioritization of planned infrastructure improvements.

SOURCE

The project team collected information about national and statewide significant routes near the Kansas City metropolitan area. Information was gathered from the National Rails to Trails Conservancy, the Kanza Rails-to-Trails Conservancy, the Missouri Department of Natural Resources and the Adventure Cycling Association. Existing plans, including the Quad-State Trails Plan and U.S. Bicycle Routes System, were also consulted during the development of proposed routes.

National and Statewide Systems

American Discovery Trail

www.discoverytrail.org

The American Discovery Trail includes 6,800 miles of non-motorized trail connecting wilderness to city, mountains to prairies, and deserts to ocean.

The American Discovery Trial Society currently manages the ADT and requires a formal process to propose alteration to its current route.

Flint Hills Nature Trail

kanzatrails.org/flint-hills-nature-trail

The Flint Hills Nature Trail stretches for 117 miles across east-central Kansas, beginning in Osawatomie. It is the seventh-longest rail-trail in America, and the longest trail in Kansas. It follows the general route of the Santa Fe National Historic Trail and forms a component of the coast-to-coast American Discovery Trail, west of Ottowa, Kansas.

Rock Island Trail

mostateparks.com/park/rock-island-trail-state-park

Rock Island Trail State Park is a hiking and biking path currently under development. When complete, the rail-trail will connect Pleasant Hill with Windsor, Missouri, a link of approximately 45 miles. The Rock Island Trail State Park will curve through gently sloping farmland and woodlands, providing an abundance of recreation and wildlife viewing opportunities.

Ameren has officially submitted a letter indicating its plans to rail bank 145 miles of the Rock Island line stretching from Windsor to near Washington, Missouri, where it will eventually connect with the Katy Trail, the nation's longest rail-trail, at 240 miles. When the Katy and Rock Island trails are completed, they will span 453 miles.

Lewis & Clark Bicycle Trail

www.adventurecycling.org/routes-and-maps/adventure-cycling-route-network/lewis-clark

The Lewis & Clark Bicycle Trail was created to celebrate the anniversary of the Corps of Discovery's 1804-1806 historic journey and offers cyclists the opportunity to follow the path of explorers Meriwether Lewis and William Clark. The main route of the Lewis & Clark Bicycle Trail is made up of approximately 4,686 miles of paved roads, bike paths, and unpaved rail-trails, with occasional short sections of gravel roads.

METHODOLOGY

The entry and exit points of systems served as a both beginning and end points of proposed routes. Corridors were selected for their ability to make connections. Directness to major destinations and critical bridge crossing points also strongly influenced the process. Routes were selected to provide every county with access to at least one of the proposed routes. The resulting proposed routes are mapped below. This process does not preclude the addition of more routes. The entire proposed system identifies approximately 277 miles of corridors within the Regional Bikeway Network.

Proposed route connections provide communities in the Kansas City region with opportunities to link in to facilities beyond our area. Routes may change or even take on new names after further consideration. The proposed network is 277 miles of routes or 13 percent of the 2,000-mile bikeway network.

Katy/Flint Route — approximately 56 miles

The proposed route follows roadway corridors that connects from the Rock Island Trail traveling west through the Missouri communities of Harrisonville, Freeman and the Kansas communities of Louisburg, Paola and Osawatomie before it completes a connection to the Flint Hills Trail.

Flint Hills Route — approximately 47 miles

The proposed route follows roadway corridors that connect on the north end Kansas communities of Leavenworth, Lansing, Kansas City, Bonner Springs,

Figure 24 | **The Kansas City region offers several important connection opportunities to national and regional trail systems.**

Shawnee, Lenexa, Olathe, Spring Hill and Paola. The route joins the proposed American Discovery Route, completing the connection to Osawatomie, Kansas, and the Flint Hills Trail.

Lewis & Clark Route — approximately 165 miles

This collection of routes connects the northeast portions of Clay County, traveling southwest to the confluence of the Missouri and Kansas Rivers. This part of the route connects the Missouri communities of Lawson, Excelsior Springs, Liberty and Kansas City. Gladstone, Claycomo and North Kansas City are all within a few miles of the route. North of the Missouri River, the communities of Kansas City, Riverside, Parkville and Weston are connected. South of the Missouri River, the proposed route connects the Kansas communities of Kansas City, Lansing, and Leavenworth. The proposed routes link to connections beyond the region, including Atchison, Kansas, and St. Joseph, Missouri. A route is also proposed traveling southwest through Wyandotte and Johnson Counties, connecting the communities of Kansas City, Mission, Roeland Park, Merriam, Lenexa and Olathe, where it connects to the proposed Flint Hills Route.

Rock Island Route — approximately 9 miles

This is a high priority rails-to-trails corridor for the region. The proposed route would provide a roadway connection from the Lewis & Clark Route east to the northern end of the Rock Island Trail.

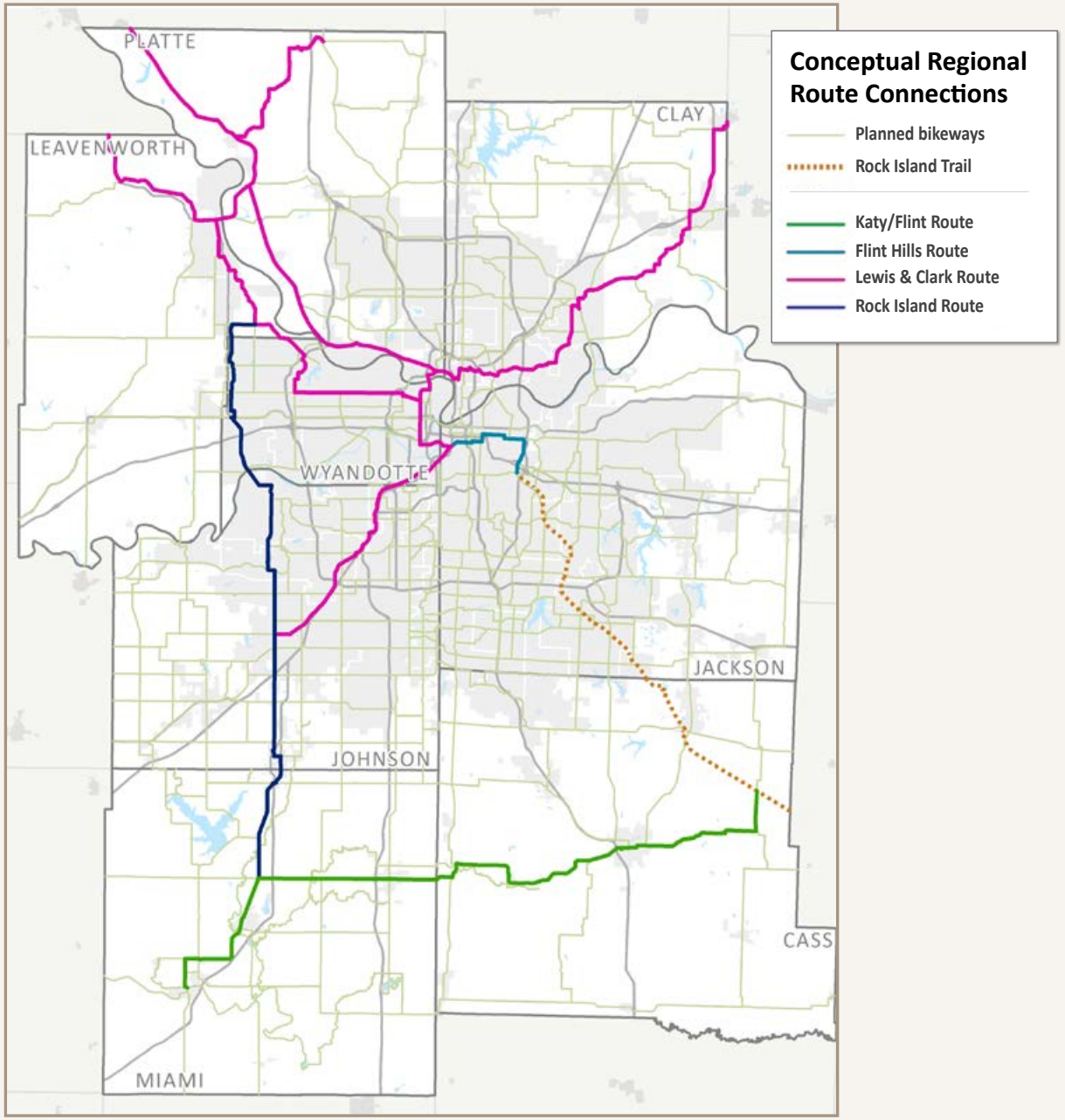


Figure 25 | Costs can vary based on whether facilities are created as part of larger projects or as stand-alone plans.

Average cost: the cost to construct bicycle facilities independent of other projects.

*Although the **average cost** to build paved shoulders to accommodate bicyclists is presented at $462,800 per mile, **the marginal cost** to add the same set of paved shoulders would be substantially less than this cost if the shoulders were added as part of a new street construction project.*

Marginal cost: The cost to construct bicycle facility improvements as subsidiary components of roadway projects.

Estimating Costs

This section provides planning-level cost estimates for implementing the bikeway recommendations included in this report. These estimates are intended to provide a general idea of the costs associated with implementing bikeways; while they may serve as a baseline, each jurisdiction should develop it's own detailed cost estimates.

The cost estimates provided were arrived at using a combination of national and local costs for street and path construction, marking and signage. The table in Figure 25 displays the planning level cost estimates per mile for the bikeway types included in this report.

Accurately estimating costs for projects is one of the most difficult tasks involved in developing a report of this nature. However, providing some general cost estimates is worthwhile, as it can help local jurisdictions project funds needed for capital budgeting purposes and prioritize projects.

There are three primary challenges in estimating costs:

- **Determining all factors affecting costs.** Gathering and assessing all of the factors that might impact bikeway costs is difficult. Many costs may not be known until preliminary engineering work is done.
- **Determining the true marginal cost of adding bicycle facilities.** In some cases, this is straightforward, such as the added costs for marking bicycle lanes. In other cases, it becomes much more complex. For instance, adding paved shoulders to new construction projects where adequate shoulder width already exists or would be added as part of the project, would result in a very low marginal cost attributable to bikeways. Conversely, adding bikeways to a project that does not already have sufficient roadway width for adequate accommodations would be considerably more expensive.
- **Accurately attributing costs and benefits when bicycle accommodations benefit a multitude of users.** Cost/benefit studies have conclusively shown that motorists, transit users and even pedestrians benefit when bicycle lanes or paved shoulders are added to a project, but there is no formula available to help parse the costs and benefits to each mode of travel.

The costs in Figure 25 are averages for constructing facilities independent of other projects. The marginal cost for many of these facilities may actually be much less if they are implemented as part of a broader project.

For example, the cost to build paved shoulders to accommodate bicyclists is estimated at $462,800 per mile, but the marginal cost to add the same set of paved shoulders would be substantially less if the shoulders were added as part of a new street construction project.

One approach to reduce costs would be to implement bicycle accommodations that adds facilities when a street is constructed or reconstructed. This will save money in two ways. First, adding these types of bicycle accommodations as part of a larger project takes advantage of the economies of scale of the larger project. Second, if the street project includes the necessary width for the bikeway (such as gravel shoulders for the paving of bicycle lanes), the true marginal cost for the bikeway is significantly less.

Figure 26 | Planning-level, Per Mile (Both Sides of Street), Estimated Costs*

Estimated costs include expenses for maintenance of traffic (rerouting during facility installation) and other lump-sum costs where appropriate. The cost figures also include a 25 percent contingency amount. Estimates do not include potential costs such as intersection geometric improvements, signal timing or utility relocation.

Facility Estimated Cost per Mile (Average cost, independent of other projects)	
Signed Route / Add signs	$2,900
Wayfinding Signage	$8,000
Shared Lane Marking (Sharrows), No major action/add markings and signs	$10,000
Bicycle Lanes (Conventional) — Paint (No major action/add striping and signs)	$11,800
Bicycle Lanes (Conventional) — Thermoplastic (No major action/add striping and signs)	$19,100
Bicycle Lanes (Conventional) — (Widen road 4’ each side and add signs)	$470,700
Bicycle Lanes (Buffered) — Thermoplastic (No major action/add striping and signs)	$31,900
Striped Shoulders (Add thermoplastic pavement marking and striping to paved shoulders)	$15,500
Paved Shoulders (Build shoulders — 4’ each side, and stripe)	$462,800
Road Diet (4-lane undivided to 2 lanes with two-way left turn lane and bike lane/shoulder)	$100,000
Road Diet (6-lane divided to 4-lane divided with bike lane/shoulder)	$80,000
Sidepath (Construct new 10’ asphalt, one side of the street only)	$452,300
Sidewalk (Construct new 5’ concrete, one side of the street only)	$150,000

Source: Toole Design Group, Vireo, 2014

**Figures are in 2014 dollars, include materials and construction and are based upon national averages tempered by local construction data from various project-related sources. Actual construction costs will vary with site conditions, economic climate, bidding conditions, economies of scale and other variables. Construction costs do not include engineering, right-of-way acquisition, maintenance and similar non-construction expenses.*

Does not include eradication of existing striping.

For protected bike lanes, duplicate bicycle lanes “buffered” but add flex-posts as a feature.

Figure 27 | Bike Lane — Conventional

Figure 28 | Bike Lane — Buffered

Corridor Classification
(The New MetroGreen Type 5)

As an extension of the MetroGreen Plan, the Regional Bikeway Plan builds upon MetroGreen's five trail types. Within MetroGreen, Types One through Four indicate trail facilities that might be present in areas outside of road rights-of-way. "Type Five: Bike and Pedestrian Facilities in Rights-of-Way" is modified with the introduction of this Regional Bikeway Plan.

Modifications indicate the inclusion of new facility types that were not a common part of the practice of bikeway planning at the time MetroGreen was developed. However, those typologies are now in use in communities across the United States, warranting inclusion in this Plan.

The plan recommends six primary resources that are commonly used for planning and design, more information under *Engineering* on page 47. Commonly understood terminology is necessary to coordinate and communicate effectively between jurisdictions. The plan strongly encourages local governments to use the standardized definitions from the *2012 Best Practices Local Bikeway Planning and Design Guide*.

Bikeway and facility designs identified as the Type Five classification include, but are not limited to, the following:

BICYCLE LANE — CONVENTIONAL

- Designates an exclusive space on street for bicycles with pavement markings and signage. Located adjacent to vehicle lanes; bicycles travel in the same direction as motor vehicles.
- Typically on the right side of the street between the motor vehicle travel lane and curb, edge, or pavement or parking lane.
- Used on medium and high volume streets.

BICYCLE LANE — BUFFERED

- Conventional bicycle lanes paired with a designated painted buffer space.
- Buffer may separate the bicycle lane from the adjacent vehicle travel lane, the parking lane, or both.
- Increases operating space and comfort for bicyclists.
- Typically used on medium and high volume streets.

CYCLE TRACK

- A facility physically separated from motor traffic and distinct from the sidewalk.
- Shared design elements provide space for exclusive or primary bicycle use and separated from motor vehicle travel lanes, parking lanes and sidewalks.
- Figure 28 shows example of on-street parking allowance with adjacent, curb-side cycle tracks, in contrast to bike lanes. (NACTO)

PAVED SHOULDERS

- Provide a variety of safety, operation and maintenance purposes and can be used by cyclists.
- May include designation as bicycle route withs signs or markings for use similar to bicycle lanes.
- Should range from four to eight feet.

BICYCLE LANE – PROTECTED (CYCLE TRACK)

- Bicycle facility within the street right-of-way that provides physical separation from the adjacent travel lane.
- Separation may be provided with curbs, bollards, parked cars or other means.
- Cycle track may be at street level, sidewalk level or an intermediate level.
- Typically used on medium- and high-volume streets with few intersections or driveways.

SHARED LANE MARKING (SHARROW)

- Street markings that indicate a shared lane for bicyclists and motorists.
- Sharrows indicate to bicyclists where they should position themselves in a lane.
- Sharrows reinforce to motorists that bicycles belong in the lane.
- Typically used on low- and medium-volume streets where bicycle lanes cannot be accommodated.

Figure 29 | Bike Lane —Protected / Cycle Track

Figure 30 | Sidepath

Figure 31 | Sidewalk

Figure 32 | Wayfinding Signage

BICYCLE BOULEVARD/NEIGHBORHOOD GREENWAY

- Streets with low motorized traffic volumes and speeds designated to provide priority to bicyclists.
- Designed to discourage speeding and cut through traffic.
- Often used to connect schools and parks and as an alternative to a nearby busy street.
- May include traffic-calming devices such as speed bumps or traffic circles.

SIDEPATH

- Shared use paths that are located adjacent to a street or roadway.
- Allow bicyclists to avoid bicycling on streets with high traffic volumes or high speeds.
- Require careful design at driveway crossings and intersections to reduce conflicts with motor vehicles crossing the path.

SIDEWALK

- The pedestrian facility adjacent to most streets.
- Typically concrete and five feet wide.
- Sidewalks may be used by some bicyclists who are not comfortable bicycling in streets where it is legal to do so.
- Bicyclists should always yield to pedestrians when using sidewalks and should travel at lower speeds than they would on the street or a path.

WAYFINDING SIGNAGE

- Signage to indicate to users the direction to specific locations.
- May include distance and approximate travel time.
- Placed at key intersections and decision points.

Figure 33 | Cost estimate scenario for the Regional Bikeway Network*

	Average cost per mile**	High Priority		Medium Priority		Low Priority		Total System	
	Cost	Miles	Cost	Miles	Cost	Miles	Cost	Miles	Cost
On Street Facilities (i.e., signage, sharrows, bike lanes, paved shoulders, road diets)	$121,270	167	$20,246,027	251	$30,450,897	391	$47,368,062	809	$98,064,986
Off Street Facilities (shared-use paths)	$452,300	204	$92,291,815	307	$138,810,870	477	$215,928,020	988	$447,030,705
Proposed MetroGreen corridors (new)	$452,300							128	$57,894,400
Total		**382**	**$115,965,544**	**380**	**$115,380,105**	**1156**	**$350,656,994**	**1,925**	**$602,990,091**

* The scenario estimate includes some assumptions (based on historical data and information), however, should not serve as a recommendation for a build-out scenario.

**2014 prices, assuming construction independent of other projects

Cost and Funding Evaluation

The planning team used average per-mile costs of different on-street and off-street improvements (listed previously in Figure 25) to develop build-out estimates for the Regional Bikeway Network. While costs may vary widely, depending on facility type and other variables, these estimates provide a baseline that can be compared to forecast revenues.

The Regional Bikeway Network will include a variety of improvement types; each local government will determine the appropriate design and timeline for development, often in cooperation with state agencies and MARC committees. The following assumptions were used to arrive at an overall cost estimate for adding bicycle facilities to the unimproved bikeways in the regional network.

- In a 2013 inventory of the existing 1,014 miles of bikeways in the region, we found that 459 miles (45 percent) are on-street facilities and 555 miles (55 percent) are off-street. We assume that similar percentages are likely for the 1,894 miles of currently unimproved bikeways in the network.
- For off-street facilities, we used the average cost per mile of $452,300 per mile to construct a new 10’ asphalt shared-use path.
- For on-street facilities, covering a wide range of options from signage to paved shoulders, we averaged the costs per mile listed in Figure 25 to arrive at an estimated cost of $121,270 per mile.
- The estimate uses 2014 dollars. The system will be built over time, and costs are likely to increase with inflation.
- The estimate uses costs per mile for improvements made independent of other projects. Actual costs could be much lower where bikeway facilities are added as part of roadway reconstruction or other projects.

Using these assumptions, building the entire network of 1,925 miles would cost an estimated $603 million. Adjusting for inflation, this same system would cost $720 million to build in 2020, $968 million in 2030 or $1.3 billion in 2040.

The update to Transportation Outlook 2040, underway at the same time as the Regional Bikeway Plan was developed, includes preliminary forecasts of $987 million in federal suballocated funds and $22.2 billion dollars local revenue.

Bikeway projects compete against many other types of projects for federal funds, so local government funding will be essential to complete the Regional Bikeway Network. Project prioritization, using tools such as the demand model described earlier, will help make the best use of limited resources.

Figure 34 |

The Five Common Traits of Successful Bicycle Programs

1. Commitment to bicycling and walking

A clear commitment provides the necessary passion to affect the changes that support bicycling and walking.

2. A well-honed plan

Most community efforts to improve bicycling conditions begin with a plan that forms the backbone of implementation decision-making.

3. The ability to move plans into practice

Once the plan is established, communities can work with consultants for implementation and/or follow the steps outlined in documents such as BikeWalk.org's "Creating a Road Map for Producing & Implementing a Bicycle Master Plan."

4. An understanding of funding processes

Know what funding is available and how to put it into play.

5. Public involvement and political support

Public input begins with the planning process and continues throughout implementation with the oversight of an advisory committee.

IMPLEMENTATION TOOLKIT

Best Practices and Strategies

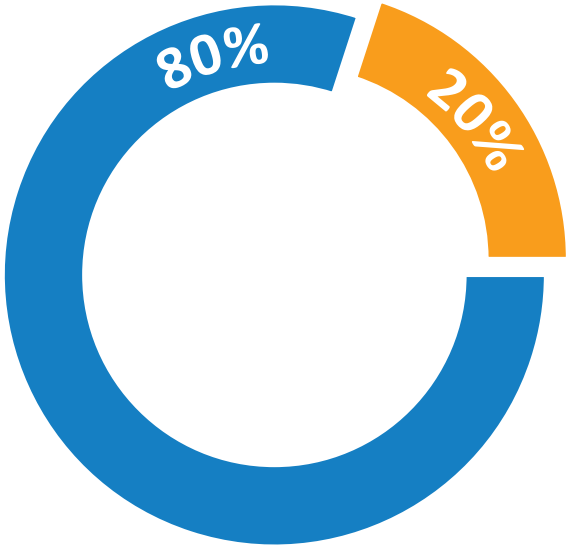
The five common traits of successful bicycle programs are provided below, followed by specific best practices that research indicates are strongly associated with a successful Metropolitan Planning Organization (MPO) bicycle and pedestrian program. A complete memorandum on the research is included in Appendix C.

COMMON TRAITS OF SUCCESSFUL PROGRAMS

These traits were first identified in a report entitled "Taking Steps: An Assessment of Metropolitan Planning Organization Support for Bicycling and Walking" from the National Center for Bicycling and Walking. The wording is tailored to fit this plan.

1. **Commitment to bicycling and walking:** A clear commitment provides the necessary passion to affect the changes that support bicycling and walking.
2. **A well-honed plan**: Most community efforts to improve bicycling conditions begin with a plan that forms the backbone of implementation decision making.
3. **The ability to move plans into practice**: For communities developing their own plans or hiring consultants to help with the work, "Creating a Road Map for Producing & Implementing a Bicycle Master Plan"[15] offers a multi-step process and a complete planning approach. It contains an important chapter on the steps involved in putting the plan into action, including how to get the plan adopted, establishing annual work plans, seizing opportunities to incorporate bicycle projects, and more.
4. **An understanding of how funding works and a means to direct it to bicycle and pedestrian projects**. Four main types of funding for bicycle facilities are:
   - **Incorporation, mainstreaming, complete streets**. This approach incorporates bike facilities as part of larger street and highway projects and is the most important funding strategy.
   - **Budget set aside**. Communities budget funds from their own general revenue sources to fund smaller projects like painting bicycle lanes, installing wayfinding signs or bicycle racks, and to match larger grants.
   - **Federal and state funds**. State and federal funds can sometimes cover up to 80 percent of project costs. More information on this is provided in the funding section of this document.
   - **Other funding sources**. These opportunities may take a variety of forms, including recreational trails and park funds, private foundation funding, and public and private utility funding. Consider partnerships with power transmission companies, fiber optic carriers and other utilities that are often willing to construct or reconstruct paths for the opportunity to share corridors.
5. **Public involvement and political support**: Public input often begins with the planning process of a successful bicycle program and continues throughout implementation with the oversight of an advisory committee.

Figure 35 | State and federal funding sources can typically cover up to 80% of a project's cost leaving just 20% to be covered by local funds.



LEADERSHIP AT THE REGIONAL LEVEL

At the regional level, MPOs provide several important functions related to bicycle planning:

- Coordinate bicycle planning between jurisdictions.
- Develop regional bicycle plans.
- Establish regional project priorities.
- Provide technical assistance to communities.
- Create overall regional plans that coordinate transportation with land use, which can have a significant impact on creating an environment that supports the practicality of bicycling for transportation.
- Oversee the competitive funding requirements of federal grants.

Every MPO is required by federal transportation rules to plan for bicycles. Many MPOs have developed detailed bicycle plans, often with pedestrian elements included. Although this produces capable and comprehensive bicycle plans, the network component and other recommendations from these plans must still be included in the MPO's long-range Metropolitan Transportation Plan. Like most MPOs, MARC includes bicycle planning as part of its long-range transportation plan, *Transportation Outlook 2040*.

Best practices for improving bicycling conditions in any given jurisdiction include planning, public involvement, institutionalization/complete streets, design standards and consideration of funding. For MPO-scale implementation, efforts should focus on regionally significant routes, considering bicycle projects that are multi-jurisdictional, cross major barriers, and connect existing facilities. As currently indicated in *Transportation Outlook 2040*, "Regional bicycle and pedestrian facilities link jurisdictions, mitigate major barriers to non-motorized travel such as rivers or highways, or connect gaps between existing facilities. These facilities could also provide connections to regional activity centers, livable communities and transit routes."

TECHNICAL ASSISTANCE

With planning, design standards and prioritization in place, the MPO's role is to provide technical assistance to counties and cities in the region.

Not all counties in the MARC region have established bikeway planning committees. Many corridors within the Regional Bikeway Network require coordination among multiple jurisdictions and stakeholders. MARC recommends that each county develop such a committee to coordinate local bikeway planning efforts. Cities in the region often coordinate bikeway planning with MARC through their parks and recreation or public works departments.

A list of recommended best practices for technical assistance that MARC, as the region's designated MPO, can provide includes:

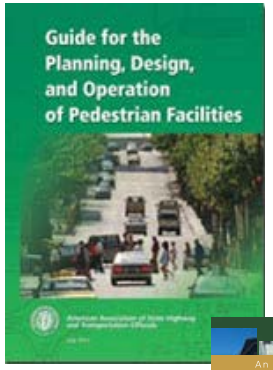
- **Guidelines**: MARC may provide guidance on how to design bicycle facilities. This plan sets forth recommended guidelines for the MARC region.
- **Workshops and conferences**: MARC is poised to help inform communities about current and best practices in bikeway planning, design, education and enforcement by hosting conferences, workshops and webinars.
- **Technical tools**: MARC helps local governments assess their system's bicycling demand rankings through GIS modeling and translates data into recommendations for first phase construction.
- **Planning coordination**: While MARC focuses on regional bikeway routes, cities and counties also work on locally significant routes that tie into the regional network. MARC helps coordinate this work in order to achieve a more complete bikeway system and provide opportunities for communities to learn more about the Regional Bikeway Plan and resources available through MARC.

Figure 36 | Successful implementation of the MetroGreen plan has resulted in a vibrant system of off-street bicycle/pedestrian paths. The Regional Bikeway Plan is set to continue this success and provide on-street facilities to address active transportation needs.

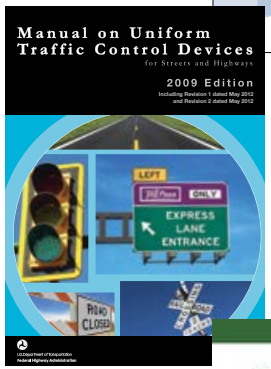
Figure 37 | Recommended Design Guides

MARC Best Practices, Local Bikeway Planning and Design Guide, 2012

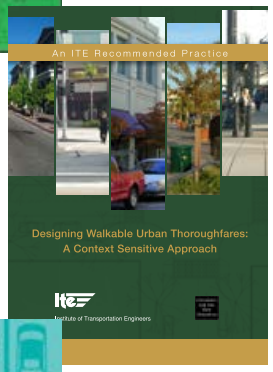
AASHTO Guide for Planning, Design and Operation of Pedestrian Facilities.



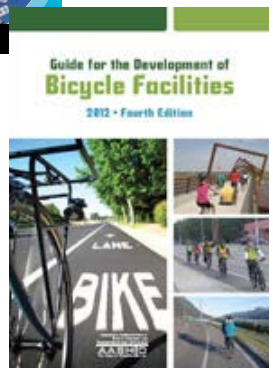
Manual on Uniform Traffic Control Devices (MUTCD), 2009



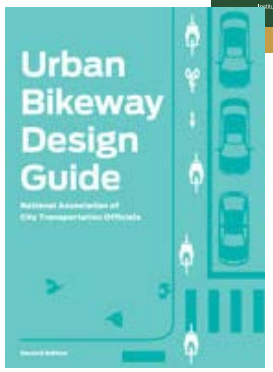
ITE Designing Walkable Urban Thoroughfares



Guide for the Development of Bicycle Facilities, 2012



NACTO Urban Bikeway Design Guide



The FIVE Es of Transportation Implementation

As with traditional transportation implementation methodologies, the five "E"s of **Engineering**, **Education**, **Enforcement**, **Encouragement** and **Evaluation** apply in bicycle infrastructure construction programs. The following are the Regional Bikeway Plan recommendations for each category.

ENGINEERING

There are six primary resources for bicycle and pedestrian facility design information. These sources are commonly used to properly engineer bicycle facilities in the MARC region.

1. *Best Practices Local Bikeway Planning and Design Guide,*MARC and the Kansas City Metropolitan Chapter of the American Public Works Association — This guide to fosters multijurisdictional uniformity in the planning, design and construction of bikeways through the establishment of common definitions, design guidelines and system marking devices. The resource is free and available to download at http://kcmetro.apwa.net/content/chapters/kcmetro.apwa.net/file/Specifications/2012_MARC_Local_Bikeway_Best_Practices.pdf.

2. *Manual on Uniform Traffic Control Devices (MUTCD),* Federal Highway Administration — The MUTCD is the national standard for signing, markings, signals and other traffic control devices.

3. *Guide for the Development of Bicycle Facilities,* American Association of State Highway and Transportation Officials (AASHTO) — This document presents information on how to accommodate bicycle travel and operations in most riding environments. Most state and local bicycle design guidelines are based on this document, which in many jurisdictions is considered to set the minimum values for bicycle design.

4. *Guide for the Planning, Design, and Operations of Pedestrian Facilities,* AASHTO — This document presents information on how to accommodate pedestrian travel and operations, primarily in roadway environments. Most state and local pedestrian design guidelines are based on this document, which in many jurisdictions is considered to set the minimum values for pedestrian design.

5. *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach,* Institute of Transportation Engineers — This document's development was supported by the Federal Highway Administration. It helps designers understand the flexibility for roadway design that is inherent in the AASHTO guide, "A Policy on the Geometric Design of Highways and Streets," with a focus on balancing the needs of all users.

6. *Urban Bikeway Design Guide,* National Association of City Transportation Officials (NACTO) — FHWA has issued a memo supporting the use of this document to further develop non-motorized transportation networks, particularly in urban areas. Many of the designs in this document have been used successfully in urban areas. However, care should be exercised when applying the treatments described in this document to suburban or rural areas.

All six of these resources were consulted to develop Regional Bikeway Plan design guidelines for the following facilities, which are set forth in detail in Appendix C:

- Sidewalks.
- Curb ramps.
- Bike lanes.
- Shared lane markings.
- Bike boulevards.
- Buffered bike lanes.
- Cycle tracks.
- Mid-block crossings.
- Wayfinding signage.

Figure 38 | Educational Billboard Campaign

Figure 39 | Example Horizontal Sign

EDUCATION

Educating motorists and bicyclists about safe driving habits can help reduce the risks of crashes. Numerous educational programs are aimed at students. Younger children often participate in bike rodeos. For older youths, driver's education classes should promote safe motorist and bicycle interaction. Unfortunately, most adult motorists and bicyclists are not in a school environment where they can have lectures on bike safety. Consequently, other methods must be used to deliver safety messages. Billboard campaigns promoting safe passing distances or "same-road, same-rules, same-responsibilities" programs have been used in numerous jurisdictions around the country. Working with employers to provide bicycle commuter training is another technique that is often used to educate bicyclists. Driver safety courses for those who receive traffic tickets can be used to promote bike safety messages. Other programs can range from television and radio news items to fliers inserted into utility bill envelopes.

TARGETING COMMON CAUSES OF CRASHES

The most common contributing cause of bicycle crashes at the national level (local data is unavailable) is motorists turning right from a side street or driveway and failing to first look for traffic coming from their right on the sidewalk. Two potential countermeasures may be appropriate to address this behavior:

- Horizontal signing (messages painted on the sidewalk). Horizontal signing could be used at driveways to alert bicyclists and pedestrians to the dangers of drivers turning right. Signage like this has been recommended to mitigate similar crashes in other parts of the country. Such a treatment, if installed, should be evaluated for its effectiveness.
- Public information campaigns to heighten awareness. An education campaign including fliers or advertising on bus shelters and/or benches may be an effective way to alert bicyclists and drivers about unsafe practices and encourage them to be aware of each other.

Some crashes involve bicyclists riding on the roadway against traffic. This is not legal and educational campaigns on this topic should be supplemented by law enforcement.

Educational campaigns could also help improve the night time visibility of bicyclists. People often believe themselves to be more visible than they are. Bicyclists assume that because motorists have headlamps they can see bicyclists at great distances. By letting cyclists know how hard it is for motorists to see them, bicyclists may be induced to improve their visibility.

IMPROVING CRASH DATA

There are opportunities to improve the safety data used for program evaluation in the MARC region by educating emergency response and medical professionals in the roles of reporting injuries and educating the public.

It may seem that emergency responders and medical professionals, because they are involved after a crash, are not in a position to prevent crashes. However, like law enforcement, medical professionals fill out reports that describe the reasons for injuries and the severity

of injuries. This data, when accurately and thoroughly entered into databases such as the National Electronic Injury Surveillance System (NEISS) or other hospital discharge or trauma registries, can help researchers identify behaviors that lead to crashes or increase their severity.

LAW ENFORCEMENT TRAINING

Some targeted training of law enforcement may also be appropriate. Some questions that could be covered in this training include:

- "When is it okay for bicyclists to 'claim the lane?'"
- "What width constitutes 'traffic lanes too narrow for a bicycle and a vehicle to travel safely side-by-side within the lane?'"
- "Why is it important for a bicyclist to use headlamps and tail lamps?"
- "Why is riding against traffic such a problem?"

By answering these and similar questions, and discussing what infractions are most likely to lead to bike crashes, trainers can encourage law enforcement to help promote bike safety by targeting the most dangerous behaviors. Some communities educate local law enforcement at standing roll-call meetings, while others send officers to the League of American Bicyclists' Traffic Skills 101 courses.

Medical and law enforcement personnel can also play a significant role in educating the public about safe bicycling and driving behaviors. They are often called upon to give presentations at schools, civic organizations or other venues where their opinions and advice are respected, making them excellent spokespersons for bicycle safety.

See the Crash Analysis and Effective Promotion and Marketing reports in Appendix C for more detailed information on educational programs.

Figure 40 | Example Educational Flyer

Figure 41 | Night Time Visibility Campaign

Figure 42 | Educating bicyclists on how to use the lane in a roundabout increases safety.

ENFORCEMENT

The effort to enforce traffic laws as they relate to bicycle safety should be addressed in an area-wide, coordinated, bicycle enforcement campaign. Sporadic enforcement will not result in significant changes to motorists' or bicyclists' behavior and will likely result in resentment of law enforcement personnel. Behaviors to be targeted should be determined at the outset of the enforcement campaign. These behaviors include:

- Violating traffic signs and signals.
- Illegal turns on red.
- Failure to make complete stops at stop signs.
- Unsafe passing (emphasis on 3-foot passing rules, which require motorists to keep a 3-foot buffer when passing bicyclists)
- Riding at night without lights.
- Riding on sidewalks in downtown areas.
- Texting or using headphones.
- Riding against traffic on the roadway.

These eight behaviors were chosen for two reasons. First, they represent particularly hazardous behaviors which result in many crashes. Second, the dangers caused by these behaviors are easily understood by the public, especially when coupled with a large-scale education campaign.

Not all enforcement needs to result in a ticket — many law enforcement agencies provide bike lights to cyclists they stop at night. To others they may issue a warning and educational materials.

Enforcement of 3-foot passing laws has been sporadic around the country. Austin, Texas, has used police officers on bikes in a sting operation to ticket drivers violating the 3-foot rule; they issued more than 100 citations. Palm Beach, Florida, implemented a multimodal law enforcement campaign which included enforcement of motorist yielding and passing behaviors, resulting in 175 citations and 148 warnings.

Motorist speeding is not listed as a contributing cause for bicycle crashes. This does not, however, mean that speed is not a contributing cause of crashes. The probability that a crash will occur increases with the speed of motorists, and the risk of serious injury or death to bicyclists and pedestrians increases dramatically at speeds above 25 miles per hour. Targeted speed enforcement should be considered on crash hot spot corridors.

Another key role enforcement professionals play in reducing bicycle crashes is filling out crash reports. By accurately identifying the conditions surrounding crashes and contributing circumstances, law enforcement professionals can help transportation professionals identify specific countermeasures to prevent future crashes. See "Standardizing Crash Reports" inset on page 55 for more about this.

ENCOURAGEMENT

Encouragement programs focus on creating a welcoming bicycling community that invites people to participate in cycling. These programs provide incentives, recognition or services that make cycling a more convenient and desirable mode of transportation. Encouragement programs that are recommended for implementation at the regional and/or local level are listed below. Some of these programs are already in place in the Kansas City region, but could be expanded.

- **Bike sharing programs**. Major cities around the world offer bike sharing stations that successfully encourage more bicycling trips and reduce car commutes. In Kansas City, Missouri, the B-Cycle program is enjoying great success in its first two phases, with 20 bicycle sharing stations in Downtown, the Crossroads, Crown Center, and now Westport and the Country Club Plaza.
- **National Bike Month**. Recognize those who commute by bike and encourage people to become new bicycle commuters or increase their bicycle trips during National Bike Month in May. This program features a month-long calendar of events that offers organized rides for different ages and abilities, bike-handling skills and maintenance workshops, and a Bike to Work Day commuter challenge. The program is most successful when led by a community-based organization with financial support from the region and business community. In the MARC region, that organization is BikeWalkKC.

Figure 43 | Expanding Safe Routes to School will make bicycling to school safer for children in the metro.

- **Bicycle ambassadors**. Organize a group of bicycle ambassadors to attend community-based events and present information, teach bicycling skills, offer helmet fits, help with route planning, and host bike rodeos and commuting 101 workshops. Community members can call on a team of ambassadors to make appearances at businesses, schools or locations along the bikeway system.
- **Bike light campaigns**. In the late summer/early fall when schools and universities return to session and days become shorter, when more evening commutes fall during dusk and dark hours, a bike light campaign is a great way to remind cyclists that proper equipment is required when riding at night. This program can offer discounts on bicycle headlights and rear red reflectors and lights, and is a great way to introduce cyclists to local bicycle shops and strengthen partnerships between local governments and retailers. The program should roll out in September, and finish before peak holiday season when bike shops are busy and less interested in offering discounts.
- **Bicycle Friendly Community status**. The Bicycle Friendly Community program created by the League of American Bicyclists offers the opportunity for communities to be recognized for achievements in supporting bicycling for transportation and recreation. It also serves as a benchmark to identify improvements yet to be made.
- **League-Certified Instructor training courses**. The League of American Bicyclists offers certification courses to train people to teach others to ride their bikes safely and legally as a form of transportation. League-Certified Instructors are a valuable asset to the community and can offer a variety of workshops for adults who lack the confidence to ride in traffic and for children learning to ride for the first time.

Figure 44 | Wayfinding signage boosts recognition of Network routes and increases the perception of safety, both of which encourage more individuals to get out and ride.

- **Safe Routes to School (SRTS) program**. SRTS is a national program that addresses barriers that inhibit students from walking and biking to school. SRTS programs should become a cooperative effort involving school districts across the entire region.
- **Bike maps**. MARC has created a regional bike map that is updated on a regular basis. The free map includes information on available bicycle facilities, bicycle suitability ratings, safety information for bicyclists, a list of area bicycle shops and repair services, location of bicycle lockers and how to obtain access to use them, information about how to use bike racks on buses, and a list of multi-use trails in the region.
- **Contests**. Recognize those who choose to bike, walk or ride transit through contests such as a "Commuter of the Year" award in order to encourage others to reduce their drive-alone motor vehicle trips.
- **Business bike pool program**. Offering employees the opportunity to check out bikes and ride to meetings, lunch or errands is a great job benefit. In large organizations, the employer manages a fleet of bikes for this purpose and the program offers subsidies for the purchase and ongoing maintenance of bikes as part of an agreement to track use and reduce vehicle miles traveled and greenhouse gas emissions. Employees sign up, make reservations and log their trips using a web-based management tool. Smaller organizations may opt for a more simplified approach.
- **Provide identification and wayfinding signage**. Identifying the bicycle network with signage elevates awareness, encouraging those who might not know about the system to learn more and give it a try. Boosting navigational success makes cycling trips easier and increases the likelihood that people will become comfortable finding their way via bicycle.

Standardizing Crash Reports

While reviewing crash reports for the MARC region, differences were experienced in how the state agencies (MoDOT and KDOT) document crash reports. To equivocally evaluate safety in both halves of the MARC region (both Kansas and Missouri), a standardized method for reporting crash data is key.

This plan encourages the MARC Bicycle Pedestrian Advisory Committee to make recommendation of a single, standardized crash reporting form and methodology for both reporting agencies. The following paragraphs list the differences between the agencies' reports.

1. **Injury severity.** The main difference in how Kansas and Missouri reported crashes involves injury severity. There was a difference in certain language when categorizing injury severity. For example, while both states report fatal crashes in the same manner, it is unclear how to define other levels of severity.

   For the purpose of this report, the lack of universal language led to some assumptions on how best to group reported injuries with varying degrees of severity. While Missouri used categories such as minor, disabling, and property damage only to describe injury severity, Kansas used the categories possible, serious, and non-disabling to describe severity. This led to grouping serious and disabling injuries into one category. Minor and non-disabling injuries together were also grouped together. How each state defines these terms is uncertain. Possibly, there is some overlap between these definitions, but it is clear that each state intends to distinguish between severities of injuries.

   To remedy this difference, it is suggested that both states adopt a standard language based on quantitative and/or qualitative observations. This way, injury severity reporting will be less subjective.

   For example, Georgia DOT uses a crash report which allows police officers five ways to code for differing injuries. The injury codes are:

   - Not injured
   - Serious
   - Complaint
   - Killed
   - Visible

   Using similar terminology is advisable. Setting guidelines that explain when it is appropriate to use each code is recommended. For example, perhaps an officer should only code "serious" if the person involved is treated at the scene by emergency medical services.

   How terms for injury severity are defined is a topic for thorough discussion. Once terms are established, they should be reported consistently and accurately in order to obtain useful data.

2. **Contributing Circumstance.** A lack of data and inconsistency in reporting were also factors identified when viewing Kansas and Missouri crash data. Kansas reported data for contributing circumstance to the crash, while Missouri did not. However, Kansas only reported this condition for approximately 40 percent of the data. The lack of completed data in reporting could lead to incorrect presumptions about overall trends.

3. **Crash location reporting.** The Kansas and Missouri datasets report location information differently. In the datasets, 45 percent of the Kansas-area crashes occurred at intersections, versus 76 percent in Missouri. Missouri's figure may include "intersection-related crashes," which represent another 25 percent of the Kansas crashes. It is recommended the methodology and detail of crash locations be standardized between the states.

EVALUATION

Regular evaluation of the safety and effectiveness of the Regional Bikeway Network will help guide future construction decisions and may alter the layout of some corridors. Funding sources are limited, and evaluation can guide the decision-making process when determining the appropriate facility types for particular locations and how much to invest to meet cyclist needs.

Regular evaluation of bicycling in the region will give MARC and local governments an understanding of which implementation activities are successful and should continue to be pursued or expanded, and which activities may need to be reorganized or replaced.

SAFETY OF NETWORK

Safety should be regularly evaluated by reviewing crash trends based on reports made available from the Kansas and Missouri Departments of Transportation. Reviewing data and comparing trends to the crash analysis data presented in the Existing Conditions segment of this report will reveal the effectiveness of education and enforcement measures, and point to facility designs that are most effective at providing safe travel for bicycles.

It is important to note safety evaluations could be enhanced by standardized reporting of motor vehicle crashes, particularly where a bicyclist or pedestrian is involved in the crash, between the two states. Details of how current reporting methods differ and recommendations are provided on preceding pages.

NATURAL RESOURCE IMPACTS

As the Regional Bikeway Plan is implemented, proposed facilities should be evaluated for potential impacts on the natural systems through which they pass. Opportunities to protect or restore ecosystems and their functions should be captured with each project wherever feasible.

MARC's Natural Resource Inventory (NRI) is a valuable planning tool for local governments to use in protecting their natural assets. Proposed bikeway projects should use this tool during the funding application process to assess opportunities for natural resource conservation and restoration.

While the majority of the Regional Bikeway Network mileage follows existing roadways, where there is less potential for natural systems protection, bikeways may be a part of a complete and green street project where reforestation and stormwater management measures will be implemented. Complete streets approaches are recommended by regional transportation plans.

Updates proposed by this plan to MetroGreen stream corridors create much greater opportunities for natural system conservation and restoration. Review of the NRI along each corridor will serve as an important first step toward the long-term protection of these natural assets.

The Natural Resource Inventory (NRI)

The Natural Resource Inventory (NRI) is a group of data sets which uses Geographic Information Systems (GIS) to aid planners and decision makers whom assess when future community investments may complement the environment. Communities use the NRI as a tool to prioritize conservation and restoration of MetroGreen streamways. Working from this principle, the NRI establishes conservation and restoration areas based on water, air, energy, wildlife, habitat and quality-of-life data.

The NRI was used to evaluate both existing and planned MetroGreen corridors. New data sets show opportunities to invest in priority places to maximize environmental benefits.

Analysis of natural resource priorities with the proposed Regional Bikeway Network will enable planners to develop proposed transportation projects that achieve multiple objectives articulated in the MTP.

For instance, projects proposed on the Regional Bikeway Network may be eligible for additional funding to incorporate green streets components into related streetscapes. Potential components of green streets include:

- Native plantings to treat stormwater runoff at the source.
- Street landscaping to reduce heat island effect and provide shade.
- Solar-powered street lights.

Green Streets

The term “Green Street” is used to describe roadway planning that enhances environmental suitability by using natural systems to manage stormwater by reducing flows, improving water quality, and enhancing watershed health. The use of trees and vegetation reduce greenhouse gases and urban heat island effect. Green Streets principles also promote the use of renewable energy to operate street lights, and uses energy-efficient technologies to reduce carbon footprint. Applying these principles conserves natural systems for future generations.

BICYCLIST COUNTS

MARC and local government agencies currently collect a limited number of bicycle and pedestrian volume counts. Most of these counts are collected for project specific purposes. A few years ago, MARC purchased mobile bicycle/pedestrian infrared and pneumatic counters as part of an equipment loaner program. The counters are loaned out to partner agencies on request to collect short-duration counts on multi-use paths.

MARC has also instituted some preliminary Miovision testing that has proven to have promisingly accurate bicycle and pedestrian counting results. Miovision is a collection and processing system that uses video cameras to capture traffic counts for agencies. It may be a useful tool for monitoring the number of bicyclists on paths and roadways moving forward.

Miovision and the counting equipment are good first steps, but much more will be required to develop a comprehensive regional bicycle and pedestrian volume counting program.

Standardized regional counting programs require two program elements to ensure accurate volume statistics: short-duration counts and a continuous counting program. These two elements are documented throughout the Federal Highway Administration's Traffic Monitoring Guidebook.[16] Without both continuous and short-duration counting program elements, reliable statistics such as the annual average daily bicycle (AADB) and the annual average daily pedestrian (AADP) cannot be calculated using nationally accepted statistical calculation methods.

Figure 45 | Flowchart for Selecting Non-Motorized Count Equipment

Source: FHWA Traffic Monitoring Guide, 2013

1. What Are You Counting?

	Technology	Bicyclists Only	Pedestrians Only	Pedestrians & Bicyclist Combined	Pedestrians & Bicyclist Separately	Cost
Permanent	Inductance Loops[1]	●			◐	$$
	Magnetometer[2]	○				$-$$
	Pressure Sensor[2]	○	○	○	○	$$
	Radar Sensor	○	○	○		$-$$
2. How Long?	Seismic Sensor	○	○	○		$$
	Video Imaging: Automated	○	○	○	○	$-$$
	Infrared Sensor (Active or Passive)	○[3]	●	●	◐	$-$$
	Pneumatic Tubes	●			◐	$-$$
	Video Imaging: Manual	○	○	○	●	$-$$$
Temporary/ Short Term	Manual Observers	●	●	●	●	$$-$$$

○ Indicates what is technologically possible.
● Indicates a common practice.
◐ Indicates a common practice, but must be combined with another technology to classify pedestrians and bicyclists separately.
$, $$, $$$: Indicates relative cost per data point.
[1] Typically requires a unique loop configuration separate from motor vehicle loops, especially in a traffic lane shared by bicyclists and motor vehicles.
[2] Permanent installation is typical for asphalt or concrete pavements; temporary installation is possible for unpaved, natural surface trails.
[3] Requires specific mounting configuration to avoid counting cars in main traffic lanes or counting pedestrians on the sidewalk.

MARC's counting equipment is being used to collect short-duration counts throughout the Kansas City region. Currently there are no continuous counting bicycle and pedestrian stations in the metropolitan area.

In order to establish a counting program that produces nationally accepted statistical calculation methods, 10 recommendations for a regional program are offered below:

1. Develop a continuous counting program for bicycle and pedestrian counts.
2. Follows the seven-step process outlined in Chapter 4 of FHWA's Traffic Monitoring Guidebook to develop a comprehensive non-motorized (bicycle and pedestrian) continuous and short-duration counting volume program.
3. As part of the continuous count program, consider installing at least three to five continuous count stations per factor group.
4. Since factor groups are not yet established, develop a Strategic Data Collection and Standardized Methods Plan.
5. Once a regional Data Collection Plan is completed, establish a traffic data committee to ensure consistent and standardized data collection methods are implemented in the region.
6. Hold a regional bicycle and pedestrian volume counting workshop for all potential agency stakeholders.
7. Appoint a regional data wrangler.
8. After steps 4 through 7 are in place, complete an analysis of the regional data collected.
9. Develop a list of research projects to ensure, support and provide accurate bicycle and pedestrian volume statistics.
10. Establish site selection criteria to determine optimal locations in which to install and collect data from continuous and short-duration counting stations.

Additional information on these bicycle count recommendations can be found in Appendix C.

Figure 46 | Table of recommended maintenance activities and their range of frequencies.

Recommended Maintenance Tasks and Range of Recommended Frequencies	
Regular Inspection	Monthly — twice per year
Sweep bikeway	Weekly – twice per year
Sign replacement	Annually – every 10 years
Pavement marking replacement	Annually – every three years
Shoulder and mowing	Weekly
Weed control	Monthly – every six months
Tree/shrub trimming	Every four months – annually
Pruning	Annually – every four years
Pavement sealing, potholes	Every five years – every 10 years
Path resurfacing	Every 10 years – every 20 years
Maintain furniture	Biannually – annually
Litter removal	Weekly – every two months

Cooperative Implementation

A MULTI-JURISDICTIONAL SUCCESS STORY

The Merriam Avenue/Turkey Creek corridor runs approximately 10 miles — from Southwest Boulevard in Kansas City, Missouri, to 75th Street near the border between Shawnee and Merriam along Interstate 35 in Kansas. Crossing multiple county and city jurisdictions, the corridor provides both on- and off-street bicycling opportunities for riders of all skill level.

Inter-jurisdictional cooperation for the completion of this corridor has been exemplary and may serve as a model to emulate for the construction of other regional corridors. Some of the individual local government actions taken to date along this corridor are:

- Johnson County — Designated Turkey Creek as a component of the county's Streamway Park System through the cities of Merriam, Overland Park and Mission.
- City of Merriam — Completed nearly four miles of trail; identified the MetroGreen trails system in the city's comprehensive plan.
- City of Mission — Identified Turkey Creek as a future trail corridor in the city's comprehensive plan; began requiring right-of-way or easement dedications on properties abutting Turkey Creek.
- City of Overland Park — Completed a one-mile extension from Merriam to Mission, Kansas.
- City of Roeland Park — Identified a connection to the MetroGreen trail system via Nall Park.
- Wyandotte County — Currently planning a 1-mile segment as part of a U.S. Army Corps of Engineers watershed restoration plan; the MetroGreen trails system is included in the Unified Government's comprehensive plan.

The total estimated cost to complete the entire trail segment is around $5.5 million.

Constructing on-street facilities along Merriam Lane would add a safer, more direct route for transportation-minded bicyclists, and afford access for all bicyclists to the retail destinations located along the roadway.

The Regional Bikeway Network includes this corridor and continues it further south to Olathe along connecting roads.

Facility Maintenance

Maintenance of pavement surfaces is critical to safe and comfortable bicycling. The full width of the travel path and shoulders of bicycle facilities should be maintained. Maintenance activities and their range of recommended frequencies are provided in the table in Figure 45. Additional information is provided in Appendix C.

Financing Implementation

Bikeways may be funded either as incidental parts of larger street and highway projects or as separate or independent projects. There are several ways to fund bikeway projects that fall under these basic practices or strategies:

- Mainstreaming bikeways into other projects.
- Budget set asides.
- Federal funds.
- Pursuing a variety of funding sources.

More detail about each of these strategies is provided in the following paragraphs.

MAINSTREAMING

Incorporating bikeways or roadway features (i.e., paved shoulders) that benefit and improve safety for bicyclists as incidental parts of larger street and highway projects is a most cost-effective strategy. This is also known as mainstreaming, inclusion and completing the street. It is a longer-term strategy, since bikeway improvements may be delayed until a street or highway project provides an opportunity for that bikeway to be incorporated. Including the bikeway facility at the time of street redesign can typically be done at a lower cost than adding it on later. The extra space found for bicyclists often benefits motorists as well. For instance, shoulders provide more space for turns, temporary snow storage, transit stops, disabled vehicles, postal delivery vehicles and more. This additional space, especially for rural cross-section streets (no curb or gutters), provides significant maintenance and safety benefits as volumes and speeds of traffic increase.

BUDGET SET-ASIDES

A committed community may not want to wait until streets need to be reconstructed before bikeways are considered. Many bikeway projects are not tied directly to street or highway projects and are located in separate corridors, and many arterial streets are so constrained that they cannot be widened for any purpose. Project sponsors should consider budgeting funds from general revenue sources to fund smaller projects or gradually stage development of larger projects. Given the constraints of current state and local budgets, project sponsors may only be able to afford small amounts, but even low-cost strategies such as painting bicycle lanes, adding wayfinding signs, installing bicycle racks and matching funds for larger grants can be an effective use of funds.

FEDERAL FUNDS

Since 1991, significant levels of federal funding have been made available for bicycle transportation projects. In 2012, the Moving Ahead for Progress in the 21st Century Act (MAP-21) restructured and redefined eligibility for several federal funding programs. Bicycle and pedestrian projects are currently eligible for funding through a number of Federal Highway Administration and Federal Transit Administration programs (see Figure 49).

Aside from projects that are incorporated into larger street and highway projects, several federally funded programs have become major sources for the funding of stand-alone or independent bicycle projects. As a recommended practice, local governments should become acquainted with these programs and their established criteria and determine how available programs might match up with local bikeway priorities. Bicycle-friendly communities actively pursue federal funds, which can fund up to 80 percent of project costs. This is an excellent source of funding for bikeway projects. However, it may not be cost-effective to pursue federal funding for every project because of the significant costs associated with requirements and development for projects as part of the federal aid process.

Figure 47 | Cities and counties should not be deterred from implementing their portions of the Regional Bikeway Network, even if road improvements won't occur for several years. Active transportation enthusiasts are using unpaved corridors today. Identification and wayfinding signage are ample near-term implementation efforts in many areas.

Figure 48 | Communities with paved roads need not wait for road reconstruction to incorporate bicycle facilities. Adding shared lane markings (sharrows) is a feasible, budget set aside project that will work well in many situations. Photo credit: Oregonlive.com

Nearly every community with more than 50,000 people within the Kansas City region has applied for federal funding for bicycle and pedestrian projects, so this practice is already common practice in the Kansas City metro area. (See Figure 48 for funding levels recently programmed for the region.)

FUNDING SOURCES

There are a variety of sources of funding that extend beyond those commonly available through federal transportation programs. Communities putting best practices into action will continue to look for funding opportunities in several places. These opportunities take a variety of forms including recreational trails and park funds, private foundation funding and public-and-private utility funding. The latter has considerable potential within path corridors where utilities — transmission companies, power utilities, fiber option carriers and others — are often willing to construct or reconstruct paths for the opportunity to share corridors.

There are numerous funding opportunities for bikeway development. Many of these funding sources have limitations which make them more or less appropriate for certain types of projects. Some funding sources are targeted to infrastructure while others target education and encouragement efforts. Some sources are not directly bicycle-related, but can be applied to bikeway projects that may have a connection with another public priority such as historic preservation or public health. Some sources may support grants of hundreds of thousands or even millions of dollars; others may be targeted to smaller amounts and require citizen volunteers or community involvement as a part of a required local match. The following sections provide a brief overview of the primary funding sources available to local communities.

FEDERAL FUNDING ADMINISTERED BY STATE AGENCIES

The 2012 federal transportation funding program, Moving Ahead for Progress in the 21st Century Act (MAP-21), consolidated three bikeway funding sources that previously existed as separate programs: Transportation Enhancements, Safe Routes to School and the National Recreational Trails programs. These combined programs are now known as the Transportation Alternatives Program (TAP). Under TAP, greater authority was given to Metropolitan Planning Organizations, such as MARC, regarding project selection. Figure 49 provides a summary of the types of bikeway projects that would be eligible for a wide range of federal transportation funding programs.

Programs that remain unchanged by MAP-21 are listed below. Most of these programs fall under a larger Surface Transportation Program (STP) with allocations to sub-programs.

The Surface Transportation Urban Program provides flexible funding that may be used by states and localities for projects on any federal-aid highway, including bridge projects on any public road, transit capital projects, and intracity and intercity bus terminals and facilities. These funds may be used for either the construction of bicycle transportation facilities, or non-construction projects such as maps, brochures and public service announcements related to safe bicycle use. Although seldom used for bicycle projects, this is still an excellent source of

funding for hard-to-finance bikeway projects. Up to 80 percent of project costs can be covered by STP Urban funds. MARC administers these funds.

The Transportation Alternatives (TAP) program will provide the best opportunity for federal funding of bicycle projects for many local communities. Projects that exceed $250,000 are the best fit for this program, since a significant amount of administrative work is involved. As previously indicated, this is a new program which combines former programs.

Ten percent of each state's annual Surface Transportation Program fund is set aside for the Highway Safety Improvement Program and Railway-Highway Crossing Program, which addresses bicycle and pedestrian safety at hazardous locations. These funds can be used for bicycle safety projects.

Funds from the Congestion Mitigation and Air Quality Improvement Program (CMAQ) may be used to construct bicycle facilities, pedestrian walkways or non-construction projects such as maps, brochures and public service announcements related to safe bicycle use. Some communities in the MARC region have been awarded CMAQ funds for bicycle-related projects.

Funds from the Recreational Trails Program (RTP) may be used for all kinds of trail projects. This is the only federal transportation funding source that can be used for maintenance activities. The program is administered through the Kansas Department of Wildlife, Parks and Tourism and the Missouri State Parks, a division of the Missouri Department of Natural Resources.

Figure 49 | Anticipated Federal Funding Programmed by MARC in 2014

Program	Period	Total Anticipated Funding*	
		KANSAS	MISSOURI
Congestion Mitigation/Air Quality (CMAQ)	2015- 2018	$9.1 M	$9.1 M
Surface Transportation Program (STP)	2017- 2018	$24.0 M	$53.0 M
Transportation Alternatives (TAP)	2014- 2018	$6.1 M	$11.0 M

* Since the majority of these funding years are outside the extent of MAP-21, some uncertainty remains about the level of funding available for programming by MARC and these estimates are subject to change.

The Highway Safety Grant Program (Section 402) is administered by the Kansas and Missouri Departments of Transportation. Federal 402 funds are used for pedestrian and bicycle public information and education programs. Funds are distributed to states annually from the National Highway Traffic Safety Administration (NHTSA) according to a formula based on population and road mileage. Government agencies or government-sponsored entities are eligible to apply for 402 funds, but this has not been a priority for this funding in Kansas.

Figure 49 provides a list of federal funding sources that may be available for bicycle projects. Additionally, Advocacy Advance provides an online Bicycle and Pedestrian Federal Funding Resources list with frequently updated links to each program.[17]

Complete Streets policy requirements

It is important to note that projects seeking MARC's suballocated federal funds such as CMAQ, STP or TAP, must satisfy the requirements of MARC's regional complete streets policy.[18]

STATE FUNDING SOURCES

Currently, there are no state programs that fund bicycle projects in Kansas or Missouri. However, the state departments of transportation administer the federally funded programs cited above and delegate the administration of these funds to MARC for distribution within the Kansas City region.

LOCAL FUNDING SOURCES

Local funds will be needed to implement many or most of the bikeways recommended in this plan as well as in local planning documents. In general, it

Figure 50 | Federal Programs and Projects they Fund

Table Key

FTA: Federal Transit Administration Capital Funds

ATI: Associated Transit Improvement

CMAQ: Congestion Mitigation and Air Quality Improvement Program

HSIP: Highway Safety Improvement Program

NHPP: National Highway Performance Program

STP: Surface Transportation Program

TAP: Transportation Alternatives Program

PLAN: Statewide or Metropolitan Planning

402: State and Community Traffic Safety Program

FLTTP: Federal Lands and Tribal Transportation Programs (Federal Lands Access Program, Federal Lands Transportation Program, Tribal Transportation Program)

■ One per state

◆ As part of Safe Routes to School programs; schools with programs for kindergarten to eighth grade are eligible.

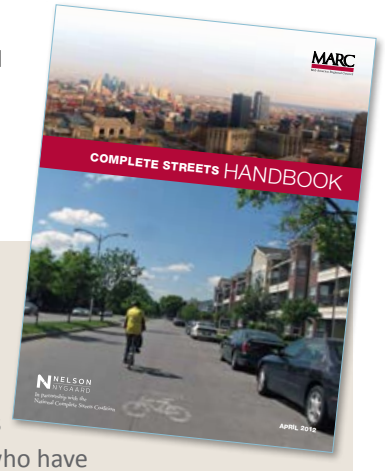
ACTIVITY	FTA	ATI	CMAQ	HSIP	NHPP	STP	TAP	PLAN	402	FLTTP
Access enhancements to public transportation	●	●	●			●	●			●
Bicycle and/or pedestrian plans	●					●		●		●
Bicycle lanes on road	●	●	●	●	●	●	●			●
Bicycle parking	●	●	●			●	●			●
Bike racks on transit	●	●	●			●	●			●
Bicycle share (capital/equipment; not operations)	●	●	●		●	●	●			●
Bicycle storage or service centers	●	●	●			●	●			
Bridges/overcrossings for bicyclists and pedestrians	●	●	●	●	●	●	●			●
Bus shelters	●	●				●	●			●
Coordinator positions (state or local)			■			●	◆			
Crosswalks (new or retrofit)	●	●	●	●	●	●	●			●
Curb cuts and ramps	●	●	●	●	●	●	●			●
Helmet promotion for bicyclists						●	◆		●	
Historic preservation (bike, ped, transit facilities)	●	●				●	●			●
Land/streetscaping (bike/ped route; transit access)	●	●				●	●			●
Maps (for bicyclists and/or pedestrians)	●	●	●			●	●		●	
Paved shoulders			●	●	●	●	●			●
Police patrols						◆	◆		●	
Recreational trails						●	●			●
Safety brochures, books						◆	◆		●	
Safety education positions						◆	◆		●	
Separate bike lanes (protected bike lanes or cycle tracks)	●	●	●	●	●	●	●			●
Shared use paths/transportation trails	●	●	●	●	●	●	●			●
Sidewalks (new or retrofit)	●	●	●	●	●	●	●			●
Signs/signals/signal improvements	●	●	●	●	●	●	●			●
Signed bicycle or pedestrian routes	●	●	●		●	●	●			●
Spot improvement programs	●		●	●		●	●			
Traffic calming	●			●	●	●	●			
Trail bridges			●	●	●	●	●			●
Trail/highway intersections			●	●	●	●	●			●
Training			●			●	●		●	
Tunnels/undercrossings for bicyclists and/or pedestrians	●	●	●	●	●	●	●			●

is cost effective to include bicycle facilities as part of resurfacing, reconstruction and construction projects. Local funds may be used for this purpose, or may be needed as a match for federal funding.

OTHER SOURCES

Statewide initiatives like the Sunflower Foundation in Kansas and the Health Care Foundation of Greater Kansas City solicit grant applications for projects that demonstrate the ability to increase the health of populations within their boundaries. Bicycle and pedestrian facilities are natural candidates and are regularly funded by each foundation. Grant funds are typically smaller than those available through federal sources, but should not be counted out, particularly when pairing with other funding or when looking to fund portions of projects that might get overlooked by federal sources.

Figure 51 | The Complete Streets Handbook is a guide for understanding and developing a complete streets policy for local communities. It is available at no cost for download on the MARC website.[19]



Regional Complete Streets policy highlights

- MARC seeks to achieve the region's vision of a safe, balanced, multimodal, equitable transportation system that is coordinated with land use planning and protective of the environment by implementing Complete Streets with context-sensitive solutions.
- This policy applies to the following:

  All MARC planning activities that involve public rights-of-way, including the Metropolitan Transportation Plan.

  Any activities conducted by MARC to program federal funds for projects in the Transportation Improvement Program.
- Projects shall provide safe accommodations for all travelers who have legal access and who may reasonably be expected to use the facilities, while being sensitive to the current and future community context.
- Project sponsors retain the design decision authority over their projects. Exceptions are specified and MARC committees will develop procedures to incorporate this policy in their work.

RECOMMENDATIONS

The following recommendation are the result of a full review of MARC programs and research of regional strategies and best practices of peer organizations. These recommendations intend to focus regional work into manageable core activities that will help advance the Regional Bikeway Plan, and provide local governments with necessary tools and resources. A set of key strategies are identified for existing programs and, in some cases, the development of new program initiatives.

REGIONAL PLANNING AND COORDINATION

MARC's role as the Metropolitan Planning Organization (MPO) is to help coordinate the implementation of the Regional Bikeway Plan by creating and sustaining necessary partnerships. MARC encourages regional partners and stakeholders to:

- Leverage the expertise of the Bicycle and Pedestrian Advisory Committee (BPAC) to help oversee implementation and updates of the Regional Bikeway Plan.
- Work with counties to develop county-wide bikeways planning committees.
- Partner with nonprofit advocacy groups to advance the Regional Bikeway Plan.
- Develop standards for a Regional Bikeway Network wayfinding system.
- Work with local and state partners to collect data on existing, high-priority corridors to determine next steps.
- Work with local and state partners to address and fully vet the planning and design of future bridges and interchanges.
- Work with local and state partners to advance projects through planning and programming implementation.
- Maintain consistent planning and design standards of Regional Bikeway Network corridors using the six primary resources identified in this plan.
- Prioritize corridors that fill gaps in the network, link facilities across jurisdictional boundaries and make connections across bicycling transportation barriers such as highways and rivers.

DATA COLLECTION AND TECHNICAL CAPACITIES

Data collection is a necessity in providing technical assistance to local governments. Its high level of importance sets it apart as apart a core regional strategy to implement the Regional Bikeway Plan. MARC will work with local, state and other partners to:

- Develop and deploy a data collection plan that supports system evaluation.
- Work with local governments and DOTs to update and maintain GIS information on constructed, programmed and planned bikeways and trails.
- Maintain the Regional Bikeway Demand Model to aid in regional prioritization processes.
- Use the Natural Resource Inventory to aid in conservation and restoration efforts.
- Work with local governments and DOTs to update and maintain local bridge informative data for planning and programming purposes.
- Work with local governments, state agencies and other partners to develop data collection plans for bicycle and pedestrian user counts.
- Monitor bicycle crash data.
- Work with DOTs and other partners to address standardized crash reporting forms and methodologies.

EDUCATION AND ENCOURAGEMENT CAMPAIGNS

Public education is necessary to raise awareness of bikeway and trail resources in the region. It also serves to educate about unsafe driving, walking a bicycling behaviors. Public education is essential to any reasonable plan. MARC encourages the following actions:

- Continue Explore KC campaign awareness programs including media outreach by print, radio, social media and billboards.
- Establish branding and education of the Regional Bikeway Network wayfinding system.
- Maintain access to the Explore KC Regional Bikeway and Trails Map, in print and mobile web app, for public use.
- In cooperation with non-profit advocacy groups, develop regional bike safety awareness and education campaigns targeting specific groups including motorists, bicyclists and emergency responders.
- Continue support of Explore KC's encouragement components, such as promotional safety lights and reflective bands giveaways.
- Organize and participate in programs such as Bike to School Day, Bike Month and Bike to Work Day.
- In conjunction with nonprofit advocacy groups, promote area bike-and-ride programs.

ENFORCEMENT

Traffic law and safety enforcement allows all users to share a safe roadway system. MARC works with Destination Safe, a regional coalition of safety professionals and advocates, to address road safety issues. MARC encourages:

- Continue work with the Destination Safe Pedestrian Cyclists Safety Task Team and Leadership Team to coordinate safety messages with local, regional and state partners.
- Local government and private partners support for task team work that addresses enforcement of traffic laws to make roadways safer for bicyclists.

WALK FRIENDLY AND BICYCLE FRIENDLY COMMUNITIES

- Promote these recognition programs and associative benefits to local communities.
- Continue to support and assist communities that apply for Bicycle Friendly Community and or Walk Friendly Community status through workshops, stakeholder engagements and other efforts.

Plan Updates

The Greater Kansas City Regional Bikeway Network is a living planning tool that responds to changing market, socio-economic and built conditions. As such, the plan should be updated at regular intervals to keep it relevant. The project team recommends that the Regional Bikeway Network be updated in odd-numbered years before each funding distribution cycle.

Local government bicycle plans also change over time and must be updated with the construction of new facilities. MARC will work with local governments to periodically update GIS information reflecting changes made to local systems and plans in advance of Regional Bikeway Network updates.

ENDNOTES

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The Greater Kansas City Regional Bikeway Plan and appendixes are available online at marc.org/bikeplan

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