

CHAPTER 7

BICYCLE AND PEDESTRIAN INVESTMENT DIRECTION

Overview

Bicycling and walking have become increasingly important in the Twin Cities for commuting to work or school, running personal errands, and traveling to entertainment and activity venues. Bicycling and walking also support healthier communities. The potential for further expanding bicycling and walking in the region for transportation purposes is significant.

According to data from the U.S. Census Longitudinal Employer Household Dynamics, approximately 20% of all employees who work in one of the major employment clusters in the Twin Cities live less than three miles from their workplace. About 20% of all bicycle trips in the region are less than one mile long and nearly 45% are less than three miles in length, according to the Metropolitan Council's 2010 Travel Behavior Inventory. So the proximity of the region's residents to their places of employment aligns well with residents' tendencies to travel by bike or walk for shorter trips.

Walking accounts for a higher percentage of all trips region wide (6.5%), than either biking (2%) or transit (3%) and is imperative to the start and end of trips by any mode. The high levels of importance of walking and biking in connecting to the regional transit system should also be noted; there are many more residents who live within three miles of transit service (compared to proximity to where they work) who could take advantage of improved opportunities to combine transit with walking or biking.

Improvements to facilitate and encourage these connections (like bike lockers and storage facilities at transit stations or new local bikeway and sidewalk connections) will go a long way to expanding the reach of the transit system and in creating new opportunities for people to walk and bike for transportation. As a more comprehensive regional bicycle system and pedestrian facilities continue to develop over time (including better options for bicyclists and pedestrians to get across or around physical barriers like rivers, rail corridors, freeways, and multi-lane arterial roadways), walking and biking trips may continue to increase in volume and distance.

The regional trail system and other off-street, multi-use trails have played increasingly important roles in walking and bicycling for transportation, particularly in the urban and suburban areas of the region. According to Metropolitan Council estimates, there were over 13 million visits to the 360 miles of regional trail in 2016, which represents an 80% increase over the previous 10 years. Past studies by Three Rivers Park District have shown that commuter use has grown as much as 7% per year on some of its urban trails.

This demand for on- and off-street bikeway facilities offers a significant opportunity for a modal shift that would help to reduce congestion, improve air quality, improve personal health, and is an attractive and marketable component for making the Twin Cities a desirable place to live. It is important to acknowledge that recreational bicycling is also growing and, combined with increasing bicycle trips for

transportation, there is a corresponding need for developing more protected or separated bikeways to serve a broader range of demographic groups, levels of experience, and physical abilities around the region than more traditional bicycling infrastructure can provide. In addition, bicycling for recreation and transportation provides local economic benefits around the metro area.

Within and near congested activity centers, biking and walking can be effective transportation options because they accommodate shorter-distance trips and require less space and less costly infrastructure compared to other transportation modes. Because walking is fundamentally tied to the end points of any trip (no matter the mode of travel) and pedestrian planning is integral to transportation planning for other modes, there are multiple references and detailed descriptions of pedestrian facility planning, design, and funding in other sections of this Transportation Policy Plan. Pedestrian planning issues are addressed as they relate to state highway funding in the Highway Investment Direction and Plan, connecting to the regional transit system in Transit Investment Direction and Plan, and to land use planning and urban design best practices in Land Use and Local Planning.

Minnesota Walks, a statewide framework created by a partnership with MnDOT and the Minnesota Department of Health, provides a vision and strategies for making walking and rolling in all communities in the state safe, convenient, and desirable. This framework emphasizes strategies that can be implemented at all levels – state, regional, and local. The Metropolitan Council will work with its transportation partners to identify potential implementation of regional strategies to get more people walking and to improve accessibility, safety, and connections.

The longer range of bicycle trips (and the facilities they rely on) often requires that they cross between cities or counties. More than half of the region's bicycle trips (approximately 55% according to the Metropolitan Council's 2010 Travel Behavior Inventory) are greater than three miles in length. The Metropolitan Council and its transportation partners will plan for these longer bicycle trips, along with the shorter trips within communities, to maximize the potential impact of choosing bicycling over driving alone for transportation.

Existing Regional Bicycle and Pedestrian Facilities

Description of Facilities

Walking and bicycling are essential modes within the regional transportation system and have numerous benefits at local, regional, and global levels. These modes allow people to make daily trips without adding to roadway congestion and vehicle-related air pollution, including carbon and greenhouse gas emissions that contribute to climate change. They make it possible to connect with bus and rail transit and allow people to choose active lifestyles by incorporating exercise into their daily routines. In addition, walking and biking can reduce a household's transportation costs, while also providing global benefits by helping to reduce our dependence on non-renewable energy sources.

Walking and biking trips tend to be relatively short in the region, averaging about one-quarter to one-half mile for walking, and between one and three miles for bicycling; however, more than half of the region's trips by bicycle (about 55% according to the Metropolitan Council's 2010 Travel Behavior Inventory) are greater than three miles in length. Regional transportation planning must account for

these longer bicycle trips to maximize the potential benefits of increasing bicycling as a travel mode choice compared to driving alone.

Except for a few state trails in the metro area, the region's bicycle and pedestrian facilities consist of regional trails (designated in the Metropolitan Council's Regional Parks Policy Plan), local on-street bikeways, off-road multi-use trails, and sidewalks for which local agencies have primary responsibility for planning, development, and maintenance.

The Metropolitan Council assists in planning for the development of bikeways and multi-use trails for biking and walking, and provides some direct funds for regional trails. The Metropolitan Council's current roles with respect to biking and walking facilities include:

- Planning for local and regional networks that strives to ensure continuity and connectivity between jurisdictions
- Assisting in coordinated planning to determine solutions for regional barriers to biking and walking
- Providing guidance for biking and walking facilities to support other regional initiatives, such as transit investments, Livable Communities investments, and equity
- Providing guidance to local comprehensive plans to ensure biking and walking are key factors in land use and transportation planning.

Pedestrian Facilities

Pedestrian facilities, like sidewalks and curb ramps, are often constructed or improved in conjunction with public roadway projects implemented by the state and local governments. They can also be planned in partnership with cities and constructed as part of private developments to provide connections throughout a community. Sidewalks with curb ramps are commonly thought of as the backbone of the pedestrian infrastructure network; in more rural areas, paved shoulders may be used by pedestrians. Street crossing treatments are just as critical for safe travel for pedestrians. Street crossing facilities can include a wide range of treatments, from differing types of marked crosswalks, advance stop lines, accessible pedestrian signals for people with vision impairments, curb extensions to reduce crossing distances, pedestrian crossing islands, and other signal treatments. Shared use trails also serve trips made by pedestrians.

Overall pedestrian safety and connectivity are vital components of regional multimodal transportation planning. As the operator of the largest transit system within the region, the Metropolitan Council has a specific interest in pedestrian infrastructure to ensure safe and convenient pedestrian connections to transit stops and stations, including adequate waiting areas for transit users and full accommodations for the disabled or visually impaired. In addition, the Metropolitan Council encourages transit-oriented design in all transitway corridors or near bus transit centers (including transit stations and park-and-ride facilities). Transit-oriented design includes the appropriate spacing and orientation of buildings to facilitate efficient pedestrian movement.

Usable pathways are particularly important to people with disabilities, and the Americans with Disabilities Act (ADA) of 1990 requires all government entities that provide transportation services

and/or infrastructure to ensure that people with disabilities can use the transportation system in an accessible and safe manner. The federal government has recently put greater emphasis on ensuring compliance with the ADA, and federal law requires that all government agencies with 50 or more employees develop an ADA Transition Plan that details the steps to making the community accessible for all. Public agencies with fewer than 50 employees must still conduct a self-evaluation of facilities, programs, and services to identify any that must be modified to meet ADA requirements. Because existing sidewalks can potentially be barriers for people with disabilities due to slope, width, or other elements, they should be included in self-evaluations or transition plans. In the Twin Cities region, one in every 11 residents has a disability. As people age, disabilities become more common, so the region will likely have significantly more people with disabilities as the percent of residents who are 65 or older increases. Disabilities are also more common among some people of color. About one in every six residents who are American Indian have a disability, and about one in every eight black residents have a disability. Ensuring the region is accessible for people with disabilities is an equity issue in many different ways.

Bicycle Facilities

In regard to bicycling, the Twin Cities region is fortunate to have a well-developed system of on-street or adjacent-street bicycle facilities in the core and suburban cities and widespread networks of off-road trails throughout much of the region. Over time, the Twin Cities region has supported and funded bicycle-friendly infrastructure more successfully than most other U.S. cities of similar size. The state and region have made investments that mirror this traditionally high level of support. This strong support is evidenced by the extensive networks of off-road trails, including the regional trail system that has been developed over more than a century to provide multi-use connections between regional parks and other major activity nodes. Many of these trails parallel the region's rivers and creeks or make use of abandoned rail lines.

Existing bikeways take on several characteristics in the region. On-road bicycle facilities have been developed in various forms. There are collector and arterial streets with bike lanes, roads with advisory bike lanes, roads with shared road markings (i.e., "sharrows"), and bicycle boulevards, as well as many designated bike routes that have either striped shoulders or are low-volume roads but without pavement markings. Typical bicycle transportation routes may include several or all of these types of bikeway facilities. In addition, several protected bikeways have been constructed in Minneapolis and Saint Paul and more are planned. These bike-only facilities within street corridors have some vertical separation from traffic lanes and are intended to provide a more comfortable user experience, similar to a trail, to serve a broad range of ages and abilities.

Bicycle, Pedestrian Trends since Previous Plan Update

Data Collection

Pedestrian and bicycle data collection efforts by cities and counties have continued and are expanding, in accordance to new guidance on how to conduct these counts. The Federal Highway Administration (FHWA) updated its Traffic Monitoring Guide to include standard guidance for counting pedestrians and

bicyclists. Between 2014 and 2016, MnDOT's Bicycle and Pedestrian Counting Initiative further expanded the work within the state to institutionalize this data collection. MnDOT developed a Bicycle and Pedestrian Data Collection Manual to supplement the FHWA Traffic Monitoring Guide. Other elements in MnDOT's initiative have included annual training programs for local government staff on how to conduct counts; the installation of permanent monitoring stations throughout the state, including the Twin Cities region; and the development of a MnDOT district-based portable counting equipment loan program to support MnDOT districts and local governments in conducting bicycle and pedestrian counts. The two largest cities in the region, Minneapolis and Saint Paul, have been conducting regular bicycle and pedestrian counts for several years. In Minneapolis, the city counts bicyclists at 30 benchmark locations and pedestrians at 23 benchmark locations each year. Minneapolis also has over 380 additional locations where it counts bicyclists and pedestrians on a three-to-four year rotation. In Saint Paul, the city counts bicyclists at 30 benchmark locations and pedestrians at 25 benchmark locations each year. Collecting this data at consistent benchmark sites allows the cities to measure trends in bicycling and walking over time. For example, in its 2016 Bicyclist and Pedestrian Count Report, the City of Minneapolis shows that from 2007 to 2016, bicyclists have increased 49 % and pedestrians have increased 23 % at the annual benchmark locations.

Just like vehicle count data, bicycle and pedestrian count data can be used in many ways. Having reliable data on traffic volumes and patterns for people traveling by walking or rolling or by bicycling is important for informing planning and engineering done at all levels, whether state, regional, or local. Analysis of the data can be used to further traffic safety, physical activity and health, economic development, and environmental goals.

Cities may use count data to help measure changes with installing bicycle or pedestrian facilities. The City of Saint Paul collected bicycle counts before and after bike lanes were installed at locations throughout the city to be able to measure changes in bicycle traffic. The City of Minneapolis has used its data to analyze the average percentage of bicyclists riding on sidewalks compared to bicycle facilities. MnDOT's Bicycle and Pedestrian Data Collection Manual includes other case studies of how data has been used in local communities in the state to guide decisions, such as installing mid-block pedestrian crossings.

As with any data, caution is needed in how it is used. The national Pedestrian and Bicycle Information Center notes that "Low counts should not be used as a justification for not providing facilities or safety improvements at certain locations or along a corridor. People on foot or bike may need to access a destination, but roadway conditions could be so intimidating that few people attempt the trip."

Regional Bicycle System Inventory

A new regional bicycle system inventory was compiled in 2016 with the help of counties and their member cities in combining all local bike plan data into unified county datasets. The Metropolitan Council then assembled a unified regional dataset that included most cities with existing bike plans. The data include, at a minimum, existing and planned, on-street and off-street bikeways. Some cities and counties provided more detailed data regarding bicycle facility type, which eventually will be incorporated at the regional level in collaboration with Metro GIS. The purpose of the inventory dataset

is to assist local planning agencies when developing or updating local bike plans or in reviewing regional and adjacent city plans. The Metropolitan Council will rely on regular bicycle facility updates from the counties to keep the regional bicycle system inventory current; ideally, annual updates compiled at the end of every construction cycle are preferred.

Table 7-1 shows the regional bicycle system mileage totals for all local, state, and regional facilities compiled in the 2016 bikeways inventory.

Table 7-1. Regional Bicycle System Mileage Summary

Bikeways Status	On-street	Off-street	Undefined	Total
Existing	1,878	2,030	--	3,908
Planned	1,032	820	1,013	2,865
Total	2,910	2,850	1,013	6,773

Bicycle and Electric Scooter Sharing Technologies

Nice Ride Minnesota is a non-profit organization that has been operating a public bike-sharing system in the Twin Cities since 2010. The system was designed to complement the transit system and to provide convenient and affordable transportation by enabling short bicycle connections between activity centers. Beginning operations with about 700 bikes and 65 fixed parking module stations, the system grew to more than 1,800 bikes at 200 stations by 2017. In 2016 the system served more than 430,000 shared bicycle trips during the traditional April through November biking season.

Transition to a Dockless Bicycle System

As has been recently implemented in cities such as Seattle, San Francisco and Aurora, Colorado, Nice Ride Minnesota has proposed transitioning to a “dockless” bicycle sharing model. The proposal would gradually phase out the fixed-bicycle share stations, and replace them with new dockless bicycles that can be locked and parked anywhere and accessed via smart phone apps. These new bikes and sharing system are proposed to be managed by a private partner to increase the convenience, cost and accessibility to many more potential bicyclists. The expectation is that the number of shared bicycles in circulation could increase by more than five times, to 10,000 bikes or more in a just a few years. Aside from the increased convenience and affordability the new system would offer, there may also be challenges due to the vast number of bikes and limited designated bike parking areas in the core and surrounding cities. In order to manage these possible unintended impacts, local land use regulations will need to address this new bicycle sharing technology.

The Advent of Electric Scooters

In early 2018, the emerging technology of e-scooters debuted on Minneapolis and Saint Paul streets. Similar to a dockless bicycle sharing system, e-scooters are owned and managed by private vendors and activated with personal on-line accounts via smart phones. Scooter share is in the very early

stages of what might become a viable urban mobility option, but at least one study noted a very high early adoption rate and the potential to attract a greater percentage of women (who are nearly matching the early adoption rates by men) compared to traditional, station-based bike sharing systems. In addition, there have been higher rates of acceptance among lower-income groups pointing to potential support in meeting the Healthy and Equitable Communities Goal. This emerging technology will be monitored to determine what next steps may be needed if the early high adoption rates are sustained.

Protected Bikeways

Protected bikeways are on-street or off-road bicycle facilities that are physically separated from lanes of moving traffic. Also known as “separated bike lanes” or “cycle tracks” for on or adjacent-street applications, protected bikeways are typically designed to be separated from general traffic lanes with vertical elements such as plastic or concrete bollards, or an elevated curb. These urban street treatments are intended to make bicycling as safe as possible for the widest range of cyclist age and ability.

The planning, programming and construction of protected bikeways is an emerging trend in the core cities of Minneapolis and Saint Paul, and other cities and counties are beginning to follow suit. Minneapolis adopted a Protected Bikeways Plan in 2015 that called for the construction of more than 30 miles of new, on-street protected bikeways by 2020. As of late 2017 about 13 miles of on-street protected bikeways had been constructed and opened for daily use within Minneapolis. The City of St Paul completed the first leg of its downtown Capital City Bikeway in 2017; the city’s bike plan calls for this network to be expanded to four miles to ultimately create a full downtown protected loop with connections to incoming state and regional trails. Other local agencies such as the cities of Edina and Hopkins and Hennepin and Ramsey counties, have adopted bicycle plans that include some form of an enhanced bicycle network (including on-street, protected bikeways) and/or policies for “complete streets” road design and active transportation principles.

Growth in Purchase and Use of E-Bicycles

E-bicycles, or electric bikes, are an emerging trend in the Twin Cities bicycle market and are beginning to be seen on local streets and trails with some regularity. While not as universally popular as in China (where 9 out of 10 e-bikes in use around the world reside), nor as big of an expansion “boom” market as the Netherlands has experienced (up to 20% of all bike sales in recent years), there is an expectation in the U.S. that it is only a matter of time before e-bikes catch on as a highly-regarded option for commuting, off-road adventure cycling or bicycle touring. Already popular among retiring baby boomers who just want an occasional power assist in the pedaling stroke to climb hills or navigate more efficiently alongside vehicles, the newest trends in e-bike design features are targeted for the daily commutes of younger generations. While up-front cost remains relatively high (\$1,600 to \$4,000 and up) the operational costs compared to those of typical auto ownership are low enough that e-bikes tend to pay for themselves within their useful lives. As average prices decline over time, the clean energy benefits of e-bikes will attract the carbon-footprint consciences of millennials and younger generations. In addition, as advancing smart vehicle technologies are incorporated into e-bike designs and options, bicycling via e-bike can be made safer (thru advance obstacle or oncoming vehicle

warnings) and more convenient (from options like a “no sweat mode” that can apply power assist in response to a cyclist’s heart rate). All of these factors point to growing numbers of cyclists who may opt for e-bikes over conventional bicycles.

What e-bikes will ultimately mean for regional and local bicycle planning remains to be seen, but there are a few potential changes, regarding who and how one bikes in the future, that can be surmised:

- Upper age limits for healthful biking will be extended
- Average commute or bicycle trip distance will increase due to higher average speeds with less energy expended
- More demand for on-street bicycle facilities may result due to higher levels of confidence and safety from more people having the means to maintain bike speeds closer to average vehicle speeds
- Daily bicycle routes become more direct, especially in hilly areas, now that most anyone can ride with ease over long, steep hills
- Greater need to manage/enforce speed limits of off-road trails and/or need to legislate greater separation of bikes and pedestrians

Winter Cycling is an Essential Transportation Need

As one of the coldest metro areas in North America, the Twin Cities has been referred to as the “nerve center” of winter biking in the United States. While detailed statistics have not yet been compiled for the region, there are other notable indications that winter cycling is alive and thriving in the Twin Cities. Spurred by the local innovation of the fat tire bike circa 2005, and subsequent locally developed, winter-specific bicycle gear, parts and cold-weather apparel, a vital urban cycling culture has emerged. This was most evident from Minneapolis and Saint Paul’s selection to host the 4th Annual International Winter Cycling Congress held in February 2016. This event drew more than 300 city planners, engineers, and bicycle advocates and enthusiasts from around the world including nations such as Finland, Sweden, and the Netherlands. In addition, local events have been springing up in recent years that celebrate the thrill of winter cycling, such as the Winter Bike Expo, Fatbike Frozen 40, and Fat Tire Loppet, which draw several hundred winter biking enthusiasts from casual riders to everyday commuters and hard-core competitors. Aside from the growth in popularity of “fat bikes” for recreation and transportation, more common road and mountain bikes continue to be adapted for winter use, at lower cost and by those who rely on bicycles for transportation throughout the year. With increasing numbers of winter cyclists who continue to rely on well-maintained bicycle facilities for transportation throughout the year, it is imperative for all road authorities to provide timely snow and ice removal along the most depended on winter bikeways.

Pedestrian and Bicycle Safety

Pedestrians and bicyclists are the most vulnerable travelers on our transportation networks. Increases in the number of people walking and bicycling can help improve safety by creating greater visibility and driver awareness. Research has shown that as more people bike and walk, crash rates for these modes tend to decline.

Crash Statistics

Within the seven-county core of the Twin Cities region, an average of 17 pedestrians and 3 bicyclists died each year, based on traffic crash data from 2013-2015. According to crash data from the Minnesota Department of Public Safety for 2013 through 2015, there were 1,159 traffic fatalities in Minnesota; over 26%, or 304, of these happened in the Twin Cities region. Of these 304 people who died in traffic crashes in the metro, 51 were pedestrians and 9 were bicyclists. A little over 58% of all traffic crashes and 28% of the overall traffic fatalities in the state happen in the Twin Cities region. However, the region's share of crashes looks much different for pedestrians and bicyclists because of its more urbanized area. Although the region has an average of 26% of the overall traffic fatalities that happen in the state, we have almost 55% of the state's pedestrian fatalities and almost 43% of the state's bicyclist fatalities.

While walking trips are 6% of all trips made within the region, pedestrian fatalities are a disproportionately larger percentage of the region's traffic deaths with almost 17% of all traffic fatalities from 2013-2015. The numbers are not as disproportionate for bicyclists, but they still are 3% of all Twin Cities traffic fatalities, compared to making 2% of all trips. Future additional analysis of crash data would provide more information about the nature of these crashes and safety issues within the region.

Other analyses of pedestrian crash data have shown that people of color are overrepresented in pedestrian fatalities or crashes. The Dangerous by Design 2016 report from Smart Growth America found that in Minnesota, people who identify as indigenous (Native American) or black or African-American have higher percentages of pedestrian deaths when compared to their proportion of the state's population. Within the Twin Cities region, the 2017 City of Minneapolis Pedestrian Crash Study found that there are more pedestrian crashes (regardless of crash severity) per capita in areas of the city where the majority of residents are people of color with lower incomes.

For crashes with less severity, perceived underreporting is a challenge with pedestrian and bicycle crashes. Many police departments may not file reports for crashes where an injury is not apparent. For the information made available on the city's web site, the City of Saint Paul Police Department began tracking basic data for pedestrian and bicycle crashes based on calls to the department instead of only on crash reports. The Minneapolis Pedestrian Crash Study compared police reports of pedestrian injury crashes with hospital records and found an overall trend of underreported pedestrian injuries; however, the degree of underreporting is difficult to determine.

Pedestrian Safety

Pedestrians are the most vulnerable travelers on our transportation network and they include different groups of people with various trip types: children walking to school, people with different disabilities requiring a range of mobility devices (e.g., wheelchairs, power chairs, walkers, canes or guide dogs), or senior citizens with limited mobility options. Planning for safe accommodations throughout the year should be routine. Reliable and timely winter maintenance for pedestrian networks is critical to ensure people can continue to meet their daily travel needs.

Analyzing crash data can help determine the best approaches to improving pedestrian safety. The 2017 Minneapolis Pedestrian Crash Study analyzed pedestrian crash data for a 10-year period to determine trends and contributing factors for these crashes. This study found that the majority of pedestrian crashes in the city are at intersections, and two thirds are at signalized intersections. Within the city, 80% of pedestrian crashes happened on just 10% of the streets; when looking just at crashes that were fatal or resulted in serious injuries for pedestrians, 75% of those crashes happened on just 5% of the city's streets.

Transit is another factor in the city's pedestrian crashes. The data analysis found that over half of the city's pedestrian crashes happened within 100 feet of a bus stop. While only 8% of the street mileage in Minneapolis carries high-frequency transit routes, those streets had 63% of the city's pedestrian crashes. As travel speeds increase, so do the risks for death or severe injuries in a crash. The city's study showed that most pedestrian crashes happen on streets with a 30 mile per hour speed limit; unsurprisingly, the crash severity increased on streets with higher speed limits. A 2017 National Transportation Safety Board study, *Reducing Speeding-Related Crashes Involving Passenger Vehicles*, cites a European Transport Safety Council study that showed 5% of pedestrians struck by a vehicle traveling at 20 miles per hour (mph) are killed; however, "this likelihood increases to 45% at 30 mph, and 85% at 40 mph." In Minnesota, the minimum speed limit on streets in urban districts is 30 mph. With a vehicle traveling at this speed, only about 5 out of 10 pedestrians survive being hit in a crash.

Failure of drivers to yield to pedestrians is a common contributing factor in pedestrian crashes. A Local Road Research Board project to be completed in 2019 in Saint Paul will evaluate driver yielding rates and speed compliance on arterial and collector roads within the city. The project will include engineering treatments, enforcement, education, and social norming over the two-year study period. Through this study, the project aims to develop a template for use by other Minnesota cities.

Tools like Pedsafe (https://safety.fhwa.dot.gov/ped_bike/tools_solve/) can help select appropriate infrastructure treatments for people on foot or using mobility devices. In addition to walkways, the Federal Highway Administration has identified four proven pedestrian-related safety countermeasures (https://safety.fhwa.dot.gov/ped_bike/). These include street medians and pedestrian crossing islands in urban and suburban locations, road diets, leading pedestrian intervals, and pedestrian hybrid beacons. Road diets typically convert a four-lane undivided roadway to three lanes with two through lanes and a center turn lane; this reduces the number of lanes pedestrians need to cross. Leading pedestrian intervals give pedestrians a walk signal a few seconds before the vehicle signal turns green, allowing time for pedestrians to be further into the crosswalk and more visible to drivers who need to yield. Pedestrian hybrid beacons have two red lights above one yellow light that are activated by a pedestrian using a push button. Once activated, drivers see a sequence of yellow and red lights signaling they should stop to allow pedestrians to cross. Conducting a road safety audit with a pedestrian focus is another good way to help agencies identify safety issues and potential solutions.

Regional Bicycle Transportation Network

The Regional Bicycle Transportation Network (RBTN) was established in the last TPP update as the official regional bikeway network that sets the region's priority vision for planning and investment. The network was based on a Regional Bicycle System Study analysis and prioritization of potential corridors based on factors such as bicycle trip demand, network connectivity, social equity, population and employment density, and connections to transit. Further details on the study completed in 2014 can be found on the Metropolitan Council's website.

Purpose of the Regional Bicycle Transportation Network

The purpose of the RBTN is shaped by the following goals:

- Establish an integrated and seamless network of on-street bikeways and off-road trails;
- Provide the vision for a “backbone” arterial network to accommodate daily bicycle trips by connecting regional destinations and local bicycle networks
- Encourage cities, counties, parks agencies, and the state to plan and implement future bikeways in support of the network vision.

In support of these overall goals, cities and counties are encouraged to plan and implement the RBTN and its connections to local bikeway networks through local bicycle, transportation and/or comprehensive plans.

Guiding Principles

A set of guiding principles for defining the Regional Bicycle Transportation Network was developed during the Regional Bicycle System Study to identify a regional bikeways network that would:

- **Overcome physical barriers and eliminate critical system gaps.** Specifically addressing gaps and barriers in the regional system will improve convenience and continuity for bicyclists.
- **Facilitate safe and continuous trips to regional destinations.** Developing and upgrading bicycle facilities along the RBTN will improve the convenience and safety of bicycling along these facilities.
- **Function as arteries to connect regional destinations and the transit system year round.** Designating alignments within RBTN corridors and implementing bikeways on the RBTN will provide the needed connections to regional destinations and the regional transit system.
- **Accommodate a broad range of cyclist abilities and preferences to attract a wide variety of users.** Bicyclists have varying levels of comfort to ride based on facility type (on-street facility vs. off-road trail), roadway characteristics, and personal levels of experience and ability. In some urban, high demand corridors it may be appropriate to develop both an on-street facility and an off-road trail to accommodate the full range of cyclist preferences.
- **Integrate and/or supplement existing and planned infrastructure.** When developing the RBTN, existing and planned infrastructure should be used when possible to reduce the need

to purchase new right-of-way and to minimize the growing financial burden of preserving and maintaining existing facilities.

- **Provide improved opportunities to increase the share of trips made by bicycle.** Implementing a complete RBTN that provides convenient connections to key regional destinations and the regional transit system will increase the likelihood of choosing bicycling for transportation over other travel modes.
- **Connect to local, state, and national bikeway networks.** Connecting to other established bicycle networks will expand the reach and effectiveness of the regional network.
- **Consider opportunities to enhance economic development.** New bicycling investments can be an effective tool for creating local economic development opportunities and to foster the Twin Cities' image as a highly livable region with many bike-friendly destinations.
- **Be equitably distributed throughout the region.** Social equity and regional geographic balance were emphasized in identifying the RBTN. By focusing on population and employment concentrations, the network will be able to attract the greatest number of riders. By also applying the Metropolitan Council's identified Areas of Concentrated Poverty (where at least 50% of the residents are people of color), the network will offer equitable access to bicycling and the economic opportunities and health benefits afforded by bicycle infrastructure.
- **Follow spacing guidelines that reflect established development and transportation patterns.** The RBTN corridors were developed in a way that applied spacing concepts based on urban and suburban development patterns and plans. The resulting network is denser and has greater accessibility compared to regional bikeway corridors found in other metropolitan regions.
- **Consider priorities reflected in adopted plans.** The RBTN was developed to reflect local bicycle plans and policies that inform regional priorities.

In addition to developing the initial RBTN, these guiding principles were used in reviewing potential RBTN map revisions proposed by local agencies since the last TPP update. In response to agency comments that a more structured process was needed for considering revisions or additions to the RBTN between TPP updates, an item was added to the Work Program in Chapter 14 to implement this task.

Description of Corridors and Alignments

As shown in Figure 7-1 below, and as a basic primer to the RBTN concept first introduced in the previous Transportation Policy Plan, the RBTN consists of a series of corridors and general alignments. The corridors are established where there is existing or potentially high bicycle trip demand between regional destinations and activity centers and also connecting to moderate-to-higher density local neighborhoods or commercial areas. Corridors reflect where alignments have not yet been identified; the presence of corridors allow for local planning processes to determine the most appropriate alignment that follows the orientation of the corridor and combines on-street bikeways with off-road trails, where appropriate.

Alignments are defined where there are existing or planned bikeways, or in the absence of these, a consensus of which road or roadways would most efficiently meet the regional corridor’s intent. When alignments are identified within an existing corridor, the original corridor will dissolve and be replaced by the alignment on the RBTN map. Corridors and alignments are classified as Tier 1 or Tier 2 priorities, with Tier 1 representing the region’s highest priorities for bikeway planning and investment. Tier 1 corridors and alignments are planned in locations where they can attract the most riders and where they can most effectively enhance mode choice in favor of biking, walking, and transit over driving alone. High rates of bicycle travel demand, as well as current and planned population and employment densities, were heavily weighted in the Regional Bicycle System Study used to develop the RBTN.

Regional Bicycle Transportation Network Implementation Status

As this is the second Transportation Policy Plan to include the RBTN as the established regional network, it is appropriate to begin to monitor progress on its implementation. This performance measure may be adjusted over time, but for this TPP update, Table 7-2 shows the centerline miles of existing and planned RBTN alignments and corridors and the percentage of total RBTN centerline miles with existing bikeways.

Table 7-2. RBTN Implementation Status*

RBTN Facility Status	On-Street	Off-Street	Undefined	Total	% of Total
Existing Bikeways (Alignments)	140	454	55	650	44.7%
Planned Bikeways					
RBTN Alignments	40	260	91	390	48.6%
RBTN Corridors	NA	NA	413	413	51.4%
Total Planned Bikeways	40	260	504	803	55.3%
Total RBTN centerline miles	180	714	559	1453	100%

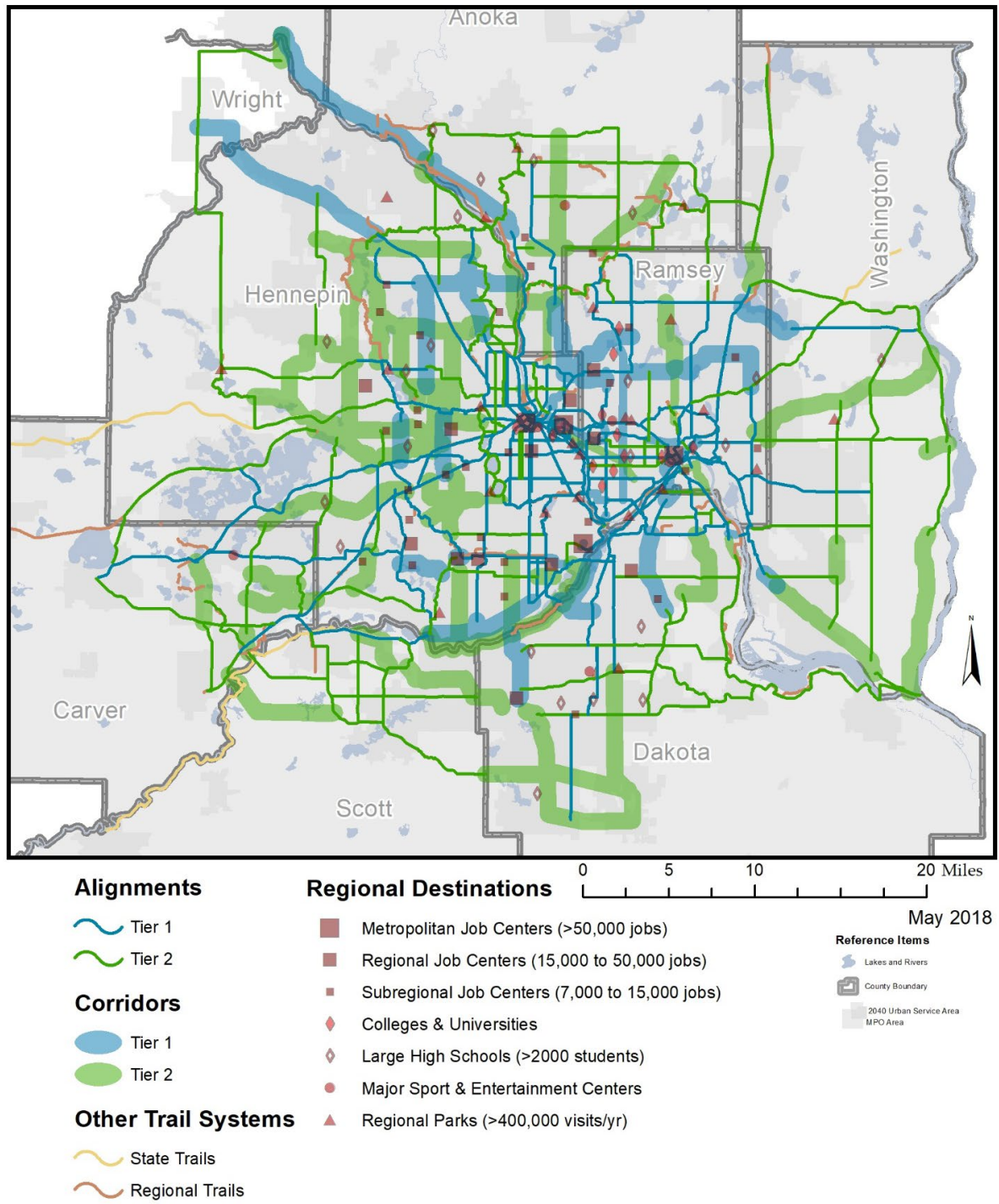
* Table values are RBTN centerline miles approximated from the Regional Bicycle System Inventory, compiled as of October 2016

Regional Bicycle Transportation Network Revisions since the Previous Plan Update

Since the last TPP update, multiple changes have been incorporated into the RBTN. First, there were dedicated alignments within existing corridors which are defined as administrative adjustments in this plan and do not require a plan update or amendment. More substantive changes that are proposed in this update include corridor centerline adjustments, corridor or alignment extensions or deletions, and new corridors or alignments. The proposed adjustments and additions are the result of direct meetings or communications with counties and cities, as well as changes proposed by local agencies and approved by the Transportation Advisory Board for the 2016 regional solicitation of federal

transportation funds. Figure 7-1 shows the updated RBTN with cumulative revisions since the version published in the TPP adopted in January 2015.

Figure 7-1. Regional Bicycle Transportation Network with Cumulative Changes



Visit the Metropolitan Council's website for a more detailed online interactive map.

Regional Bicycle Transportation Network and Regional Trails

Many regional trails have been identified as important alignments within the RBTN. Existing and planned regional trails, as well as general regional trail search corridors, are identified in the Regional Parks Policy Plan and are designed as multi-use facilities to serve both recreation and transportation trips. Regional trail alignments are identified by the regional park implementing agencies through the development of trail-specific master plans; these master plans must be consistent with the Regional Parks Plan to be approved by the Metropolitan Council. Regional trails are required to provide connections between components of the Regional Parks System and are primarily multi-use recreational trails, although many trails also serve and support bicycle transportation.

Regional trails were an important input in the original RBTN and while there is significant overlap between the two networks, there are also some distinct differences. For example, the RBTN is planned to facilitate bicycling for transportation which include commute trips to work and school, shopping trips, trips to entertainment venues and trips to visit family/friends, while regional trails are planned and designed primarily for recreation. Consistent with the RBTN's focus on transportation is its emphasis on connecting regional destinations by integrating on-street bikeways and off-road trails to create the most direct route that values trip efficiency over route aesthetics. For regional trails the planning philosophy is more focused on connecting regional parks and trails mainly through the development of off-road facilities that are planned to maximize scenic value rather than route efficiency.

Recreational bicycling, although not the focus of the Transportation Policy Plan, is significant to the region in that it represents an important entry point for many cyclists to become familiar with the regional transportation and trail systems. Ultimately, many recreational cyclists will become users of these systems for commuting and other transportation purposes.

Regional trails that are not included in the RBTN may provide a transportation function at a local level, just as there are many trails and on-street bikeways within the RBTN that also serve recreational needs in urban and suburban areas. In practice, the RBTN, regional trails, and all local trail and bikeway networks should complement each other to serve the overall bicycle transportation and recreation needs of the region.

Critical Bicycle Transportation Links

There are several physical barriers to bicycle transportation that disrupt the connectivity of regional and local bikeway networks and act as major obstacles for residents trying to access key destinations. The links overcoming these barriers are defined as critical bicycle transportation links.

Critical bicycle transportation links serve to accomplish any of the following:

- Close a gap in the Regional Bicycle Transportation Network or connect a local bikeway to a major regional destination.
- Improve continuity and connections between jurisdictions (on or off the regional network).
- Improve or remove a physical barrier (on or off the regional network).

Closing a Gap in the Regional Bicycle Transportation Network

Gaps in the RBTN can be addressed by:

- Providing a missing link between existing or improved segments of the Regional Bicycle Transportation Network.
- Improving bikeability within an RBTN corridor to better serve all bicycling skill and experience levels within the corridor (for example, providing a safer, more protected on-street facility; improving traffic signals, signage, and pavement markings at busy intersections; or adding a bike route parallel to a highway or arterial roadway along a lower-volume neighborhood collector or local street).
- Providing a short (up to one mile) but critical link connecting a local bikeway to the Regional Bicycle Transportation Network, a major regional destination, a major transit-oriented development, or to a high-volume, multimodal transit station.

Improving Continuity and Connections between Jurisdictions

There are many cases around the region where an existing bikeway may stop at one city's border and not carry through to an adjacent city or county. Creating more consistent, continuous and connected bikeways will improve access between local and regional bicycle networks, as well as the convenience and overall experience of bicycling.

Removing or Circumventing a Physical Barrier

Physical barriers to biking can be natural or man-made and include major rail corridors, rivers and streams, freeways or expressways. In 2017, the Metropolitan Council conducted a Regional Bicycle Barriers Study to begin addressing the need for bikeway improvements across the region's physical barriers. This study is described in more detail below. Projects that remove or provide more bikeable options around or across physical barriers (for example, providing grade-separated crossings where appropriate) can arise in a number of ways. Planning work may underscore the need for a local bikeway to improve options through a major barrier.

Additionally, major roadway infrastructure projects can provide opportunities to create bicycle connections across one or several barriers, particularly in instances where there is not a usable parallel alternative within a reasonable biking distance. For roadway bridges crossing the region's major rivers, see the major river barrier crossings assessment below.

By their nature, projects to remove physical barriers can prove particularly costly and the potential to enhance such connections may be opportunity driven with respect to major highway, bridge, and transitway projects. Given the significant expense of building connections like bridges or underpasses and their anticipated long life, it is important to consider the inclusion of bicycle infrastructure in all projects that improve options to cross or get around these physical barriers, even if the full potential of the bicycle connection is not evident at the time of construction.

Addressing the Region’s Physical Bicycle Barriers

In beginning to address the region’s physical bicycle barriers, particularly as they relate to the definition of critical bicycle transportation links, Metropolitan Council staff performed a general review of the region’s major river crossings and conducted a Regional Bicycle Barriers Study to address the other regional physical barriers to bicycling. The region’s primary rivers (Mississippi, Minnesota and Saint Croix Rivers) were not analyzed in the Regional Bicycle Barriers Study because of the large differences in approach and scale that would be required for these major rivers compared to the other smaller and less challenging barriers that were evaluated through the study. Also, there are many different and non-bicycle related factors that are the primary drivers for developing new bridge crossing projects. That said, this plan recognizes the major rivers as the longest and most challenging physical barriers to bicycling in the region.

Major River Barrier Crossings Assessment

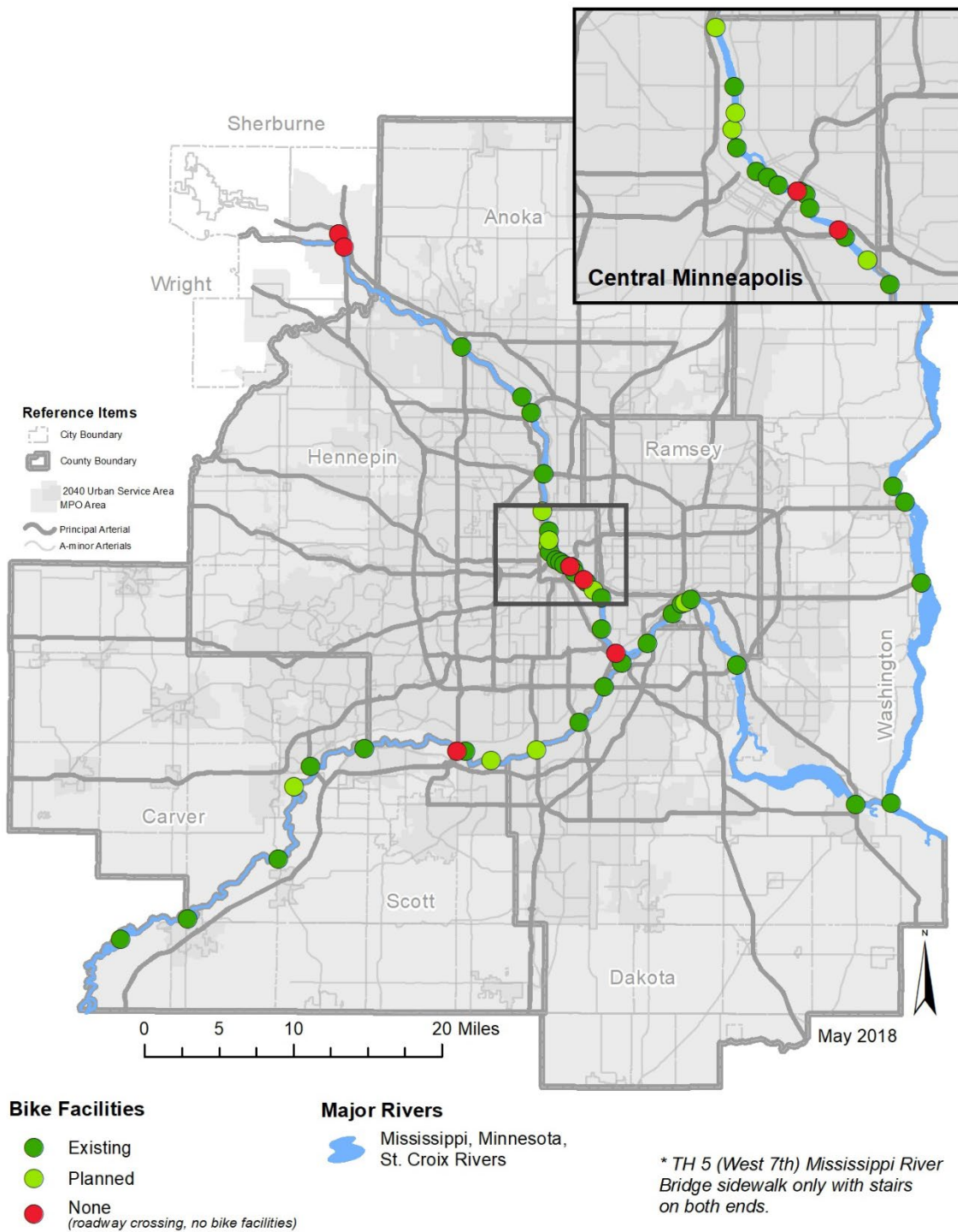
The Metropolitan Council conducted a high-level assessment of the existing roadway bridges and existing or planned stand-alone bikeway bridges crossing the region’s primary rivers. The Twin Cities has three primary rivers that run throughout the region that represent major barriers to all transportation modes. These include the Mississippi, Minnesota, and Saint Croix rivers which serve as the boundary lines between cities, counties, and in the case of the Saint Croix, the Wisconsin/Minnesota state line. There are currently 38 roadway bridges and five independent stand-alone bicycle/pedestrian bridges that cross these major river barriers. As shown in Table 7-3, of the 38 roadway bridges, 28 have existing bikeways, four have planned bikeways, and six have none existing or planned bicycle facilities.

In addition to five existing stand-alone bicycle bridges, there are four stand-alone or rail bridge-adjacent bicycle crossings planned in Minneapolis and the City of Carver. Figure 7-2 shows the locations of all major river roadway crossings, and all existing and planned independent bikeway crossings of the major rivers.

Table 7-3. Major River Crossings by Bridge Type

Bridge Type	Existing Bikeway	Planned Bikeway	None existing or planned	Total
Road bridges	28	4	6	38
Rail bridges	0	3	0	3
Stand alone bike-pedestrian bridges	5	1	0	6
Total	33	8	6	47

Figure 7-2. Major River Bicycle Barrier Crossings



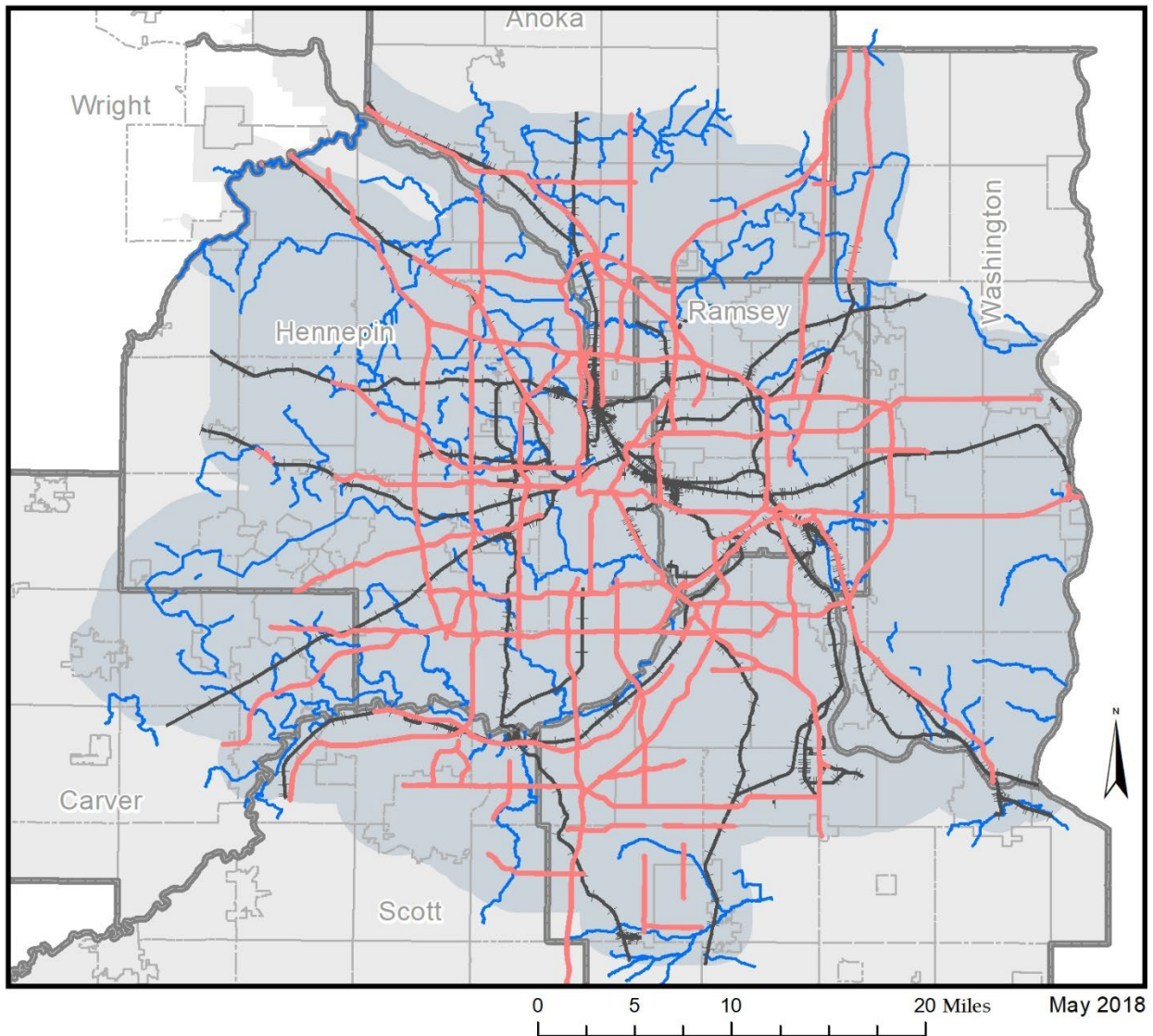
Because of high construction costs, long implementation timeframes, typically long distances between bridge crossings, and a much shorter range of bicycle trips compared to vehicle trips (average of under 3 miles, regionally) all of these crossings shown in Figure 7-2 are designated as major river bicycle

barrier crossings and projects that improve these crossings are considered a regional priority with respect to bicycling and walking modes. Guidelines for applying this new regional designation are discussed in the “Investment Direction” section provided later in this chapter.

Regional Bicycle Barriers Study

In 2017, the Metropolitan Council conducted a Regional Bicycle Barriers Study to analyze the need for bikeway improvements across the region’s physical barriers. The study defined physical barriers to include secondary rivers and streams, rail line corridors, and freeways and expressways. Freeways are highways with full access control, meaning motorists do not encounter any cross-road intersections. Expressways, for this study, were defined to include the region’s non-freeway principal arterials that comprise of at least four lanes and are divided by a median. These highways differ from freeways in that they do have cross-road intersections with traffic signals and some partial stop sign-controlled intersections with right-turn-in and right-turn-out-only access. Some high-volume, higher-speed minor arterials were also included as “expressways” based on input from the study’s technical advisory work group. Regional bicycle barriers, based on the definitions developed through this study, are shown in Figure 7-3.

Figure 7-3. Regional Bicycle Barriers



Regional Barriers

-  Freeways/Expressways
-  Railroads
-  Streams

Regional Bicycle Barriers Study Area



In addition to defining regional bicycle barriers, the study analyzed a series of potential barrier crossing improvement locations based on four analysis factors that included safety and existing conditions,

bicycle trip demand, local and regional bike network connectivity, and social equity. The actual points to include in the study’s analysis of potential future crossings were determined with assistance from a technical advisory work group of bike transportation professionals and advocates, and from public input received through an interactive, on-line map questionnaire. The study included bicycle barrier crossing locations already identified in local plans, points within or on RBTN corridors or alignments, and additional points based on the spacing criteria shown in Table 8-4. Points on local networks and regional facilities were considered equally in the analysis. Preferred spacing distances between bikeable crossings were determined by the study’s technical work group and ranged from a ½-mile between crossings in urban centers to two miles between crossings in the region’s rural areas.

Table 8-4. Bicycle Barrier Crossing Spacing Criteria

Thrive Planning Area	Preferred Maximum Spacing	Example Cities
Urban Center	½-mile	Minneapolis, St Paul, Richfield, Hopkins, South St Paul
Urban	¾-mile	Golden Valley, Roseville, Maplewood, Crystal, Edina
Suburban, Suburban Edge, Emerging Suburban Edge	1 mile	Blaine, Woodbury, Maple Grove, Eagan, Lakeville
Diversified Rural, Rural Residential, Agricultural	2 miles	Grant, Afton, Ham Lake, Lake Elmo, Independence

Ultimately, the study determined a series of bicycle barrier crossing improvement areas along the identified regional bicycle barriers (see the sub-regional example in Figure 7-4 in the Investment Direction section). These improvement areas are shown as circles with diameters that represent the barrier segments where future crossings may be developed. The area circle diameters vary by aggregated Thrive community designation group and correspond to the preferred barrier crossing spacing distances also described in Table 8-4.

The intent of the study is to inform and guide regional investments in bicycle infrastructure through the Regional Solicitation of federal transportation funds and other state and local programs that fund projects in the region. The full regional set of barrier crossing points and resulting barrier crossing improvement areas will be revisited to ensure local planned crossings and existing conditions are best reflected within the initial analysis factors developed for the study. It is the Metropolitan Council’s intention that these adjustments will be reviewed by a regional group of peer bicycle planning professionals and discussed with the Technical Advisory Committee and its subcommittees prior to its use in future regional solicitations.

Find more information on the detailed analysis process for the Regional Bicycle Barriers Study at metro council.org.

Implementing the Regional Bicycle Transportation Network

Local Planning for Regional Bicycle Transportation Network Corridors and Alignments

The broad RBTN corridors shown in Figure 7-1 (one-mile wide in suburban/rural areas, one half-mile wide in the core cities) are intended to allow flexibility among local government agencies to tailor specific alignments for bikeway facilities through the local planning process. When specific alignments are designated through the local planning process, the regional corridor will be replaced on the RBTN map with the preferred alignment. These new alignment designations are periodically added to the RBTN map as an administrative task and will not require a TPP amendment.

In planning for specific RBTN alignments and developing bikeway improvement projects, agencies should consider all the guiding principles for regional bicycle corridors described previously but with special attention to the following subset of principles that are most effectively planned at the local level:

- **Overcome physical barriers and eliminate critical system gaps.** More attention and planning will be needed at the local level to identify existing gaps in the Regional Bicycle Transportation Network and opportunities to eliminate or divert from physical barriers. The Metropolitan Council will assist locals in planning for this critical element in developing the RBTN.
- **Facilitate safe and continuous trips to regional destinations.** Planning for the development of bicycle facilities along the RBTN, as well as for connections between the RBTN and local bikeway systems, should be coordinated with Metropolitan Council staff.
- **Accommodate a broad range of cyclist abilities and preferences to attract a wide variety of users.** Local roadway conditions and geometry, along with the available off-road trails network will largely determine what alignments and facility treatments may be feasible within an established regional bicycle corridor. Local agencies should try to accommodate cyclists of all ages and for the full range in abilities from novice to avid cyclist by providing a range of off-street and on-street bicycle facilities. In some urban, high demand corridors, it may be desirable to provide both an on-street bike facility (like a bike lane) and a parallel off-road trail. In most corridors with space for only an on-road facility, a buffered or protected bike lane may be the optimal solution to attract the widest range of cyclists.
- **Integrate and/or supplement existing and planned infrastructure.** Wherever possible, it is desirable to construct bicycle facilities along existing roadways or implement trails on corridors with minimal requirements for new land acquisition. This is important to ensure that limited dollars for bicycle infrastructure can be efficiently invested to complete the regional network in a shorter timeframe.
- **Consider opportunities to enhance economic development.** When planning specific alignments within the regional bicycle corridors, local transportation professionals should work closely with their economic development and land use planners to identify opportunities for the bikeway project to enhance and/or serve as a catalyst to community development

programs and projects. Connecting residential neighborhoods with shopping, entertainment, and work centers should be a major consideration when developing bicycle facility improvement projects.

Placement of Regional Bicycle Transportation Network Alignments on Roadways

When identifying roadways and highway corridors appropriate for implementing specific alignments for regional bikeways, it is imperative that transportation agencies coordinate and collaborate in their planning activities. This will help to ensure that trade-offs between opportunities for implementing a bikeway and the physical constraints of the roadway corridor are fully considered. To that purpose, for major corridor studies and projects, meetings and other opportunities for engaging the public will be critical to inform the project development process.

The provision of safe and comfortable bicycle facilities in the roadway corridor should be the goal in order to achieve continuity for regional bicycle corridors and to facilitate direct access to corridor destinations. Planning for cyclist bikeability and convenience across a range of experience levels and abilities is an important focus for any major roadway project. Other competing priorities, including safety for all users and mobility for all transportation modes, will also need to be considered. This balancing of priorities is especially needed on A-minor arterials in urban areas.

Some highways serve as the only practical and effective crossing over a major barrier (such as, rivers, freeways, multi-lane highways, and railroad corridors). In these cases, safe bicycle and pedestrian accommodations should be provided on the highway segment that crosses over (or under) the barrier. On some highways with high traffic volumes, an intensive mix of trucks and buses, and limited right-of-way to provide designated bicycle facilities, it may be appropriate to route the facility away from the highway when a nearby, parallel local street is available. This condition occurs more frequently on A-minor arterials in highly-developed, urban corridors than on A-minors in less developed, suburban or rural corridors; however, this will not always be the case and each corridor should be planned to address its unique issues and needs from both a local and regional perspective. As an alternative to locating regional bikeways along major highways, regional transportation partners could work together to plan and build new, continuous bicycle facilities that cross barriers via the local street system; with their lower traffic volumes and slower speeds, local streets can be improved to accommodate a broader range of cyclist abilities.

Facility Types that Meet Regional Bicycle Corridor Functionality

There is a range of bicycle facility treatments, both off road and on street, which may be applied in different parts of the region to accomplish the function of regional bicycle corridors and to maximize their attractiveness to potential bicyclists. Local planners will need to consider their community's local corridor context (for example, urban, suburban, rural) to determine the feasibility of an off-road trail facility, or to identify which on street bikeway type would be most appropriate for the specific corridor at hand.

In addition to off-road trails, the following list of on-street bicycle facility types provides a few suggested examples for implementing the Regional Bicycle Transportation Network and are listed in descending order of complexity:

- **Protected bikeways (sometimes known as “cycle tracks”):** Protected bikeways are on-road or off-road facilities that are physically separated from lanes of moving traffic. They can be designed as on- or off-road facilities and are often times separated from general traffic lanes with a vertical element such as a bollard or an elevated curb. There are one-way and two-way cycle track designs and in areas where on-street parking is allowed, they can be placed between the parking lane and sidewalk. Protected bikeways were initially developed in densely developed urban locations like commercial downtown districts in large cities, but have recently expanded to outside of downtowns and in suburban locations.
- **Buffered bicycle lanes:** Buffered bike lanes are conventional lanes that are combined with a buffer space designated with pavement markings that separate vehicle traffic from bike lane traffic. This treatment type may be appropriate for urban and suburban areas on streets with high traffic volumes, high speeds, and or high volumes of trucks or buses. Buffered bike lanes may also be appropriate along medium-to-high volume roads with lower speeds to provide greater separation and comfort for all cyclists.
- **Conventional bicycle lanes:** Bike lanes can facilitate a safer and more comfortable trip for cyclists by providing a dedicated space for on-street bicycle travel. These facilities are most often placed on the right-hand sides of the street (so they flow with traffic) between the general traffic lane and the curb or parking lane and are designated through pavement striping and markings and/or signage. These facilities are one of the more common treatment types in urban areas and are also suitable in suburban areas along medium or high-volume streets.
- **Bicycle Boulevards:** In urban and some suburban areas, bicycle boulevards may be an appropriate treatment to improve a designated regional bicycle corridor. Bike boulevards are low volume, lower speed roads that are designed to give cyclists priority over motorized vehicles. These facilities typically apply relatively low-cost treatments, such as signs and pavement markings, along with traffic speed and/or traffic volume management devices such as speed “bumps” or traffic “islands” at intersections. Bicycle boulevards can be especially effective in providing a more bicycle-friendly alternative to a parallel running, high volume, arterial street or highway.
- **Wide paved shoulders:** On some roadways, especially in the rural areas of the region, this may be the most feasible treatment. To make these facilities more prominent to cyclists and motorists, “Bike Route” or “Share the Road” signs and/or pavement markings may be added appropriately along the route.

Pedestrian and Bicycle Planning Resources

The following resources represent a set of practical guidelines and design concepts for state and local transportation agencies engaged in the planning, design and implementation of pedestrian and bicycle

infrastructure. These resources include a range of urban, suburban, small town and rural planning perspectives and may be useful in identifying specific design treatments for individual communities.

- Minnesota’s Best Practices for Pedestrian/Bicycle Safety, MnDOT
- NACTO Urban Bikeway Design Guide, Second Edition, National Association of City Transportation Officials
- Bikeway Facility Design Manual, MnDOT
- Guide for the Development of Bicycle Facilities, American Association of State Highway and Transportation Officials (AASHTO)
- Separated Bike Lane Planning and Design Guide, Federal Highway Administration (FHWA)
- Essentials of Bike Parking, Association of Pedestrian and Bicycle Professionals
- Small Town and Rural Multimodal Networks, FHWA
- Pursuing Equity in Pedestrian and Bicycle Planning, FHWA
- Accessible Shared Streets: Notable Practices and Considerations for Accommodating Pedestrians with Vision Disabilities, FHWA
- Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, Institute of Transportation Engineers (ITE)

The national Pedestrian and Bicycle Information Center (<http://www.pedbikeinfo.org/>) provides a Design Resource Index that helps locate information for different pedestrian and bicycle design treatments in these and other design manuals.

Investment Direction

Potential Funding Sources

Federal Funding Sources

With the 2015 federal legislation Fixing America’s Surface Transportation (FAST) Act, two federal transportation funding programs available to the region changed. The Surface Transportation Program is now the Surface Transportation Block Grant (STBG) Program. The previous Transportation Alternatives Program, which was a core source of funding for bicycle and pedestrian facilities in the region, is now the Surface Transportation Block Grant Set-aside Program. Bicycle and pedestrian facilities remain eligible for funding under the federal STBG Program and the region has a history of funding larger bicycle facility projects using STBG funds. Congestion Mitigation Air Quality (CMAQ) funds are also eligible for bicycle and pedestrian projects that can demonstrate an air quality benefit, though the region has not traditionally used CMAQ funds for these purposes.

In the Twin Cities region, the Transportation Advisory Board (TAB) is responsible for allocating federal transportation funds available to the region through a biennial Regional Solicitation. As described in the Chapter 4, “Transportation Finance,” the solicitation was evaluated and revised to ensure it is consistent with the outcomes and principles of Thrive MSP 2040, the Transportation Policy Plan, and the requirements of the FAST Act. The solicitation process allocates federal funds through three modal

categories: roadways (including multimodal elements), transit and travel demand management projects, and bicycle and pedestrian facilities. Within the bicycle and pedestrian facilities category, there are three main project types: multiuse trails and bicycle facilities, pedestrian facilities, and Safe Routes to School infrastructure projects. Each solicitation will determine the amount of federal funds allocated within each modal category; however, it is assumed that at a minimum, the full amount of available STBG set-aside program funds will be allocated to bicycle and pedestrian facilities.

State and Local Funding Sources

MnDOT uses state highway funds to improve the trunk highway system with facilities for bicyclists and pedestrians. These investments are often made as part of larger highway pavement and bridge projects and may include trails and sidewalks parallel to the roadway or as part of a reconstructed bridge structure, as well as bike lanes in some urban corridors or wide paved shoulders in rural areas. See Chapter 5, “Highway Investment Direction and Plan,” for more on anticipated future highway funding levels for bicycle and pedestrian improvements on the trunk highway system.

Regional trails identified by the Metropolitan Council in its Regional Parks Policy Plan are eligible for funding through the Metropolitan Council’s regional parks capital improvement program (CIP). The parks CIP is funded with state bonds, Metropolitan Council bonds and Parks and Trails Legacy Fund appropriations. The state’s Parks and Trails Legacy Fund represents a dedicated funding source for outdoor recreation, to be used for parks and trails of state or regional significance. Regionally significant trails in the metro area are those defined in the Regional Parks Policy Plan. The Metropolitan Council disburses state funds to partially finance the costs of operating and maintaining the regional parks system. Regional park implementing agencies also use their local funds for constructing, maintaining, and operating regional trails.

City, county, and park agency funds have been integral to supporting the development, maintenance, and preservation of local multi-use trail and bikeway systems. These funds typically derive from local property taxes for trail system improvements and from property assessments in the case of city street improvements. Like MnDOT, counties and cities may also use their roadway state aid revenues from the state gas tax to invest in bicycle and pedestrian facilities as part of roadway and bridge reconstruction projects on county and municipal state aid roads.

Regional Funding Needs

The local funds identified above make up the bulk of revenue supporting bicycle and pedestrian networks and will continue to be critical to the provision of pedestrian and bicycle infrastructure so that these local investments can effectively complement and round out the regional system. However, as a result of diminishing tax revenues and the increasing costs of ongoing maintenance (including winter snow removal to accommodate year-round use), preservation, and rehabilitation needs for bicycle and pedestrian facilities, there is a large shortfall of dollars available to fund existing system needs. Current revenues are also inadequate to fund new infrastructure needs including the vision for the Regional Bicycle Transportation Network and the local bikeways systems needed to supplement the regional network.

The Metropolitan Council recognizes that, as with other modes, there are significantly more needs for bicycle and pedestrian infrastructure than there are available funds. As shown in Table 8-5, between 2011 and 2016 there were about \$90 million in stand-alone bicycle, pedestrian and safe routes to school projects funded with federal transportation funds through the Regional Solicitation directed by the Transportation Advisory Board. However, only about 40% of total project requests were funded over the three, 2-year cycles over this time period. On average, about 15.3% of the total regional funds available were allocated to bicycle and pedestrian funding categories per two-year regional solicitation cycle. This does not include, however, funds that were allocated to roadway and bridge projects that included bicycle and pedestrian facilities.

Table 7-5. Regional Solicitation Project Funding Summary, 2011 – 2016

Year	Funded (in \$M)	Funds Requested (in \$M)	% of Requests Funded	Total Fed. \$\$ to Region (\$M)	% of Total to Bike/Ped
2011	\$ 26.23	\$ 74.95	35.0%	\$ 177.89	14.7%
2014	\$ 27.70	\$ 63.33	43.7%	\$ 189.50	14.6%
2016	\$ 36.22	\$ 86.43	41.9%	\$ 221.17	16.4%
Total	\$ 90.15	\$ 224.70	40.1%	\$ 588.56	15.3%

As a result of a general shortage of funds to meet bicycle and pedestrian facility needs, any new state transportation funding package should include additional funding for bicycle and pedestrian infrastructure, on local and regional transportation networks.

Regional Solicitation

The Metropolitan Council, through its Transportation Advisory Board’s Regional Solicitation process, makes specific categories of federal transportation funds available to local governments on a competitive basis. Local governments may apply for stand-alone bicycle and/or pedestrian facilities, or these facilities may be included as part of related roadway projects.

The Transportation Advisory Board solicits applications for federal funding for these improvements through three project categories: roadways including multimodal elements, transit and travel demand management projects, and bicycle and pedestrian facilities. Bicycle and pedestrian projects are generally funded from the Surface Transportation Block Grant Set-aside Program, but Surface Transportation Block Grants, or the Congestion Mitigation and Air Quality program funds can also be applied to bicycle and pedestrian projects.

The sections that follow list and describe the basis for the region’s priorities for investment in bicycle and pedestrian infrastructure through the Regional Solicitation for federal transportation funds. Additional funding for bicycle and accessible pedestrian highway infrastructure through MnDOT is described in TPP Chapter 5, Highway Investment Direction and Plan.

Regional Bicycle Transportation Network

Projects proposed to enhance existing or complete new segments or connections of the RBTN will be given priority for federal transportation funding, provided that operations and maintenance commitments are made by the project applicant for the entire segment of proposed bikeway and any adjoining segments within the applicant's jurisdiction. The network is subdivided into two tiers for regional planning and investment prioritization:

- **Tier 1 RBTN Corridors and Alignments** (as previously shown in Figure 7-1) should be given the highest priority for transportation funding; these are the corridors and alignments determined through the Regional Bicycle System Study (2014) to provide the highest transportation function by connecting the most regional activity centers through the developed urban and suburban areas of the region.
- **Tier 2 RBTN Corridors and Alignments** (also shown in Figure 7-1) should be given the second highest priority for transportation investment. These corridors and alignments provide transportation connectivity to outlying regional destinations within and beyond the urban/suburban areas and serve to connect Tier 1 regional bicycle transportation corridors and alignments.

Major River Bicycle Barrier Crossings and Regional Barrier Crossing Improvement Areas

This TPP Update establishes a new regional designation for major river bicycle barrier crossings and references a forthcoming update of the regional bicycle barrier crossing improvement areas developed through the regional bicycle barriers study. This new priority designation and new information should be considered as potential added criteria for the Regional Solicitation of federal transportation funds, and also considered for inclusion in local and state programs that fund transportation projects in the region.

Major River Bicycle Barrier Crossings

Because roadway and stand-alone bicycle/pedestrian bridges crossing the Mississippi, Minnesota and Saint Croix Rivers are relatively infrequent outside of the Minneapolis and Saint Paul downtowns and the University of Minnesota campus, and thereby provide limited access and great inconvenience for the much shorter bicycle trips compared to vehicles, all of the region's existing roadway bridges and existing or planned bicycle/pedestrian bridges are designated as major river bicycle barrier crossings.

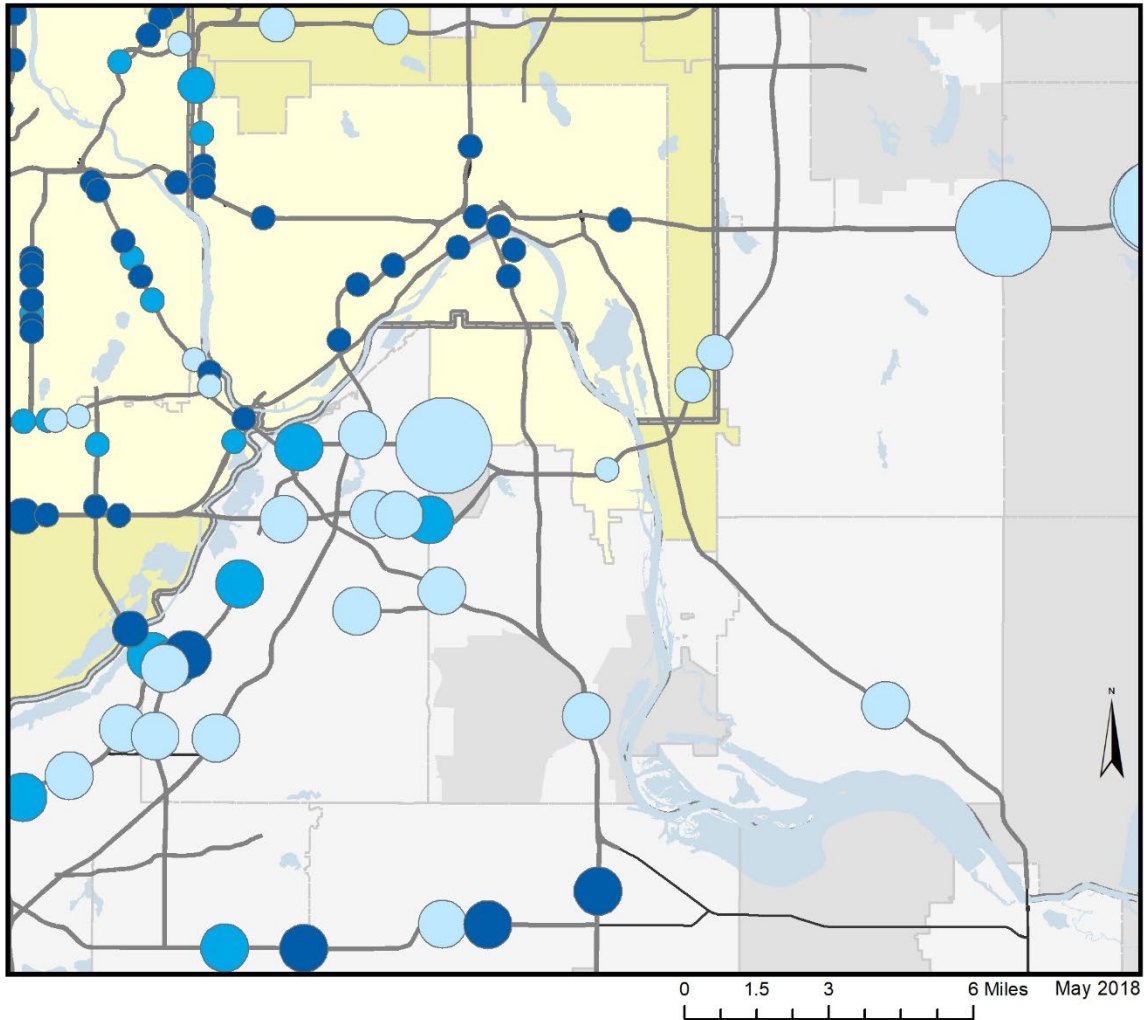
Given this designation, projects that add new or upgrade existing bicycle facilities on roadway bridges crossing the region's major rivers should be considered to receive additional points in the regional scoring process for federal transportation funding. Projects applying for regional funds in the "Multi-Use Trails and Bicycle Facilities" category that construct new, or upgrade existing, stand-alone bicycle-pedestrian bridges crossing these major rivers, should be considered to receive a high priority for federal transportation funds within this category.

Regional Barrier Crossing Improvement Areas

A set of regional bicycle barriers was determined through the Regional Bicycle Barriers Study as shown previously in Figure 7-3. These are the major physical barriers to bicycling that include freeways/expressways, rail corridors, and secondary rivers and streams. In addition, the study identified a series of tiered regional barrier crossing improvement areas shown as circles in the sub-regional example shown in Figure 7-4. The circle diameters in this example represent the barrier segments where future crossings may be developed and vary in length by aggregated Thrive community designation group. These improvement area circle diameters (i.e., barrier segments) correspond to the preferred barrier crossing spacing distances previously shown in Table 7-4 (under “Regional Bicycle Barriers Study”).

The full regional set of barrier crossing improvement areas will be revisited to ensure local planned crossings and existing conditions are best reflected within the initial analysis factors developed for the study. It is the Metropolitan Council’s intention that these adjustments will be reviewed by a regional group of peer bicycle planning professionals and discussed with the Technical Advisory Committee and its subcommittees prior to the 2020 regional solicitation.

Figure 7-4: Example of regional barrier crossing improvement areas for freeway/expressway barrier type.



**Freeway Barriers
Crossing Area Tiers**

- Tier 1
- Tier 2
- Tier 3

Crossing Area size (diameter) determined by Community Designation.
 Urban Center – 1/2 mile
 Urban (3/4 mile)
 Suburban (1 mile)
 Rural (2 miles)

Thrive Community Designation

- Rural (Diversified Rural, Rural Residential, & Agricultural)
- Suburban (Suburban, Suburban Edge, & Emerging Sub Edge)
- Urban
- Urban Center

Regional Barriers

- Freeways/Expressways

Assuming these adjustments are implemented and acceptable to the region in time for the 2020 Regional Solicitation, the following information and guidelines would apply:

- The bicycle barrier crossing improvement area circle diameters (Figure 7-4) represent barrier segments along which future barrier crossing improvement projects may receive additional points in the regional solicitation.
- Roadway expansion projects that add new or upgrade existing bicycle facilities on bridges or tunnels crossing these designated barrier segments, or that add or upgrade surface street level bicycle crossings of the barrier segments, should be considered to receive additional points in the regional scoring process for federal transportation funding.
- Projects applying for regional funds in the “Multi-Use Trails and Bicycle Facilities” category that construct new, or upgrade existing stand-alone bicycle-pedestrian bridges and tunnels crossing the designated barrier segments, or add a new bicycle facility or bike-specific safety improvement at an existing roadway crossing of a designated barrier segment, should be considered to receive a high priority for federal transportation funds within this category.

More information on the detailed analysis process for the Regional Bicycle Barriers Study can be found at metro council.org.

Other Key Investment Factors for Pedestrian and Bicycle Projects

Opportunities for Pedestrian Improvements

Regional funding priority will be geared toward stand-alone pedestrian projects that are connected to transit service or regional job concentrations. These include:

- Along existing or potential high-frequency arterial bus routes in the urban core and suburban communities.
- Transit-oriented developments around existing or programmed transitway stations.
- Existing transit stations, transit centers, or frequent-service park-and-ride locations that are within a reasonable walking distance to residential development or activity centers, or metropolitan job concentrations like the downtowns and the University of Minnesota.
- Projects that are included as part of a community’s Americans with Disabilities Act (ADA) transition plan and/or demonstrations of best practices in design for use by people of all ages and levels of mobility.
- Metropolitan, regional, and sub-regional job concentrations defined in Thrive MSP 2040.

Safety

Regional evaluation criteria will favor infrastructure projects that significantly improve safety for bicyclists and pedestrians while maintaining or enhancing the ease of bicycling or walking. Funding can also be provided to projects that do not improve network connectivity but significantly improve the safety of bicycling or walking (including users of all ages and levels of mobility) or that address an identified safety problem. An example of this type of project would be improvements to intersections that receive a high level of bicycle and/or pedestrian traffic but which were not originally designed with bicycle/pedestrian safety in mind.

Cost Effectiveness

Bicycle and pedestrian projects should be cost-effective to construct and to maintain. When determining the right solution for a safety or connectivity problem, local agencies should first consider methods that use existing right-of-way and infrastructure to improve the desirability of biking or walking before considering the construction of entirely new facilities that would require new right-of-way and/or increase operations and maintenance costs.

Continuity and Connections between Jurisdictions

Regional evaluation criteria should favor projects that improve continuity and/or connections between jurisdictions. This would include extending a specific bikeway facility treatment across jurisdictions to improve consistency and inherent bikeability and convenience for all cyclists. Creating more consistent, continuous and connected bikeways improves access between local and regional bicycle networks, as well as improving the overall bicycling experience.

Multimodal Projects

Roadway projects submitted for federal funding should include features that benefit all users of the transportation system including pedestrians and bicyclists (including users of all ages and levels of mobility) in addition to vehicular modes. Regional evaluation criteria should favor roadway projects that meet the needs of pedestrians and bicyclists with an emphasis on safety and barrier removal. In addition, evaluation criteria for stand-alone bicycle and pedestrian improvements should favor projects that support compact mixed-use transit-oriented development within employment centers and those that provide direct connections to high-service transit facilities.

Bicycle Connections to Transit

Regional evaluation criteria should favor local bicycle projects that connect to an existing or planned regional transitway or a bus transit stop or station location. These potential connections should be emphasized in the project development process in order that local opportunities to facilitate multimodal trips via bicycles and transit can be maximized.

Reconstruction of Existing Facilities

In addition to building new facilities for bicyclists and pedestrians, local jurisdictions are encouraged to apply for Regional Solicitation funds for reconstructing existing facilities where the project would improve the bikeway or pedestrian path to a quality level superior to that of the existing facility and where facilities have been properly maintained. Projects considered for federal funding should also have an approved plan for maintenance or a maintenance agreement to ensure that the facility remains in good repair and is passable.