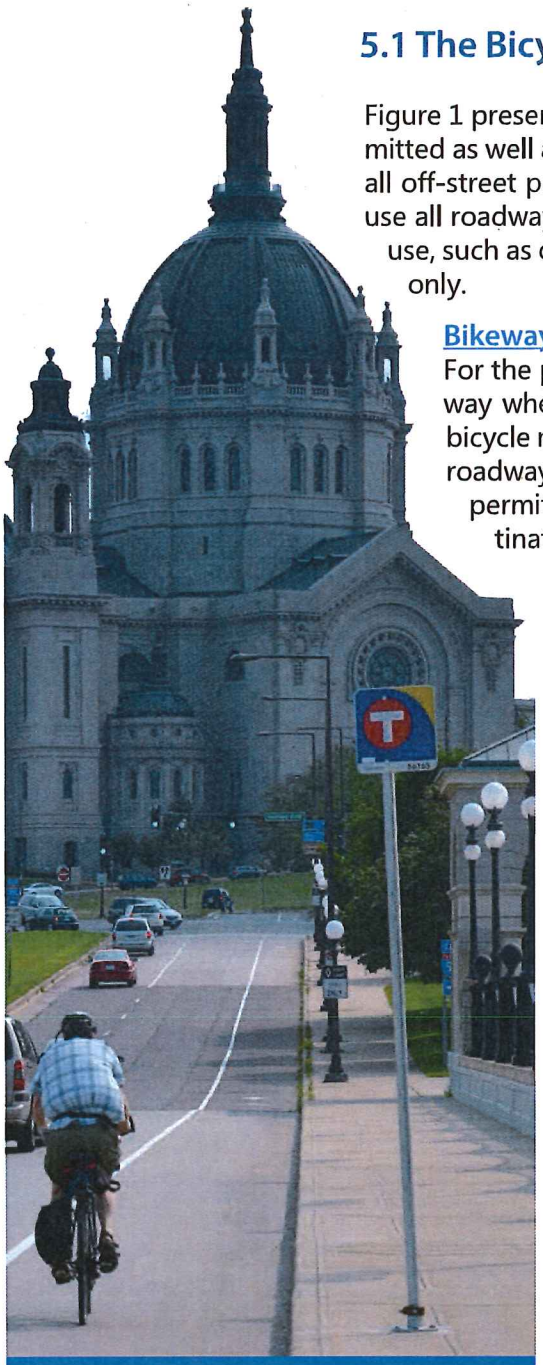
Chapter 5:
Bicycle Network Framework

Saint Paul
Bicycle Plan

5.0 BICYCLE NETWORK FRAMEWORK

Implementing a citywide network of bikeways throughout the city is the most basic way the city encourages and promotes the use of bicycles. Providing safe, comfortable, and intuitive space for people to ride bicycles is a prerequisite to increasing bicycle use throughout the city. For many people, the perception of safety is the most important factor in determining whether to use a bicycle.



5.1 The Bicycle Base Map

Figure 1 presents a base map that identifies all roadways where bicycles are permitted as well as all roadways where bicycles are prohibited. The map also shows all off-street paths that permit bicycle use. In general, bicycles are permitted to use all roadways and paths unless steps are taken specifically to prohibit bicycle use, such as on freeways, or on off-street paths that are marked for pedestrians only.

Bikeways and the Bicycle Network

For the purposes of this plan, the term "bikeway" will refer to any roadway where signage or pavement markings have been used to identify a bicycle route or to alert bicyclists and motorists that bicycles will be on the roadway. The term "bikeway" is also applied to all off-street paths that permit bicycle use. As bikeways intersect each other and connect to destinations, they combine to create the bicycle network. It is the primary function of this plan to identify and designate the planned bicycle network.

Other Streets that Permit Bicycle Use

It is critical to understand that bicycle use is not limited to the bicycle network. All other streets that permit bicycle use but are not designated as bikeways or considered part of the bicycle network serve as circulation routes that provide "front door" access to every destination in the city. Most trips made by bicycle will use these streets for some portion of the trip. Bicyclists should be anticipated on every street where bicyclists are permitted. No signage, striping, marking, or other investment for bicycles is anticipated on these corridors at this time.

Shared Lane Roadways

Bicycles are permitted to ride on most roadways within the city. A shared lane is a term used to describe any lane on a roadway to which motorists and bicyclists are granted equal access, whether or not that roadway or lane has been designated as a bikeway. These roadways may not have any signage, striping, or pavement markings specific to the operation of a bicycle. Bicyclists and motorists are expected to share the

roadway and bicycles are subject to all of the same applicable laws and expectations as motorists. This arrangement works best on low-volume, low-speed roadways, however, roadways with any volume of motorized traffic or traffic speeds may be considered shared lane roadways. Most low-volume, low-speed residential roadways function well for most people on bicycles without any additional investment.

Roadways where Bicycles are Prohibited

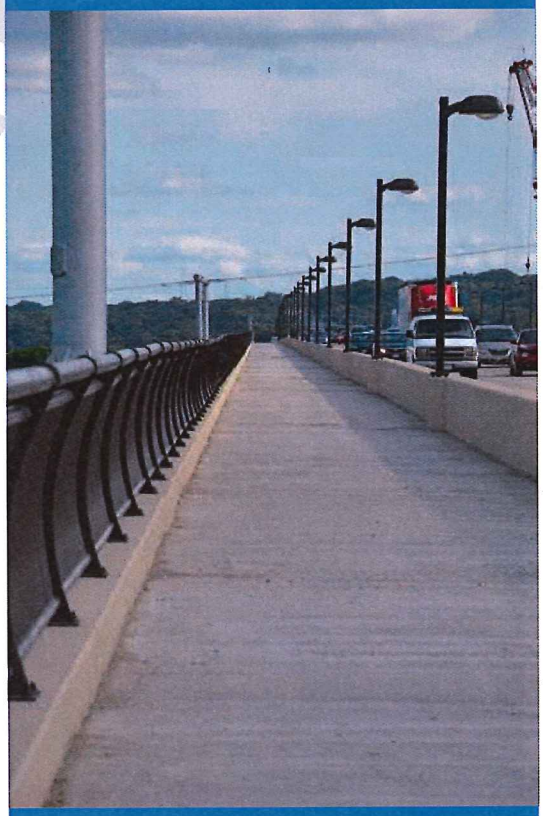
There are several roadways where bicycling is prohibited. These are limited access roadways and freeways and the accompanying ramps that have high motorized vehicle speeds and volumes. The roadways where bicycles are prohibited in the City of Saint Paul include the following:

- Interstate 94
- Interstate 35E
- Trunk Highway 280
- US Highway 52
- US Highway 61 (south of Lower Afton Road)
- Trunk Highway 5 (west of approximately Wheeler Street)
- Ayd Mill Road

While bicycles are prohibited from operating in the roadway in these corridors, several of them provide off-street accommodations for bicyclists. For example, the TH-52 (Lafayette) bridge over the Mississippi River provides an off-street path for use by bicycles and pedestrians. Similar accommodations are provided on the I-35E and TH-5 bridges over the Mississippi River.

5.2 Bicycle Network Functional Classification

This plan establishes a new bicycle network functional classification, which is intended primarily to ensure that the bikeway facility types developed within each transportation corridor are consistent with how bicyclists are anticipated to use the corridor. The functional classification system is also intended to encourage that the bicycle network provides appropriate facility types for the larger transportation context. The functional classification system does not specify a facility type for each corridor, however it suggests that the operational characteristics of the facility type assigned to each corridor should be consistent with the intended purpose of the bikeway.



Lafayette Bridge (US Highway 52) over the Mississippi River

Each element of the bicycle network is assigned to one of two bicycle network functional classifications:

- Major Bikeways
- Minor Bikeways

Bicycle network functional classification, much like the roadway functional classification system, is primarily a planning tool designed to help guide city policies regarding development, maintenance, and design of bikeways rather than something that will be visible to persons riding bicycles throughout the city.

Distinguishing features between the bicycle network functional classification system include:

- The level of investment anticipated on each corridor
- Connections to major attractions or trip generators
- The relative number of anticipated users
- Trip and facility length and connectivity to other bikeways or jurisdictions
- The appropriate modal balance relative to the competing needs of the multi-modal transportation system

In some cases, this plan identifies planned bikeways that cannot be easily implemented on a short-term time frame because there may be a substantial disruption or challenge involved, because development of the bikeway is contingent on another event occurring (e.g. redevelopment of a large parcel), or because the city has little control over the timeline. For example, this plan identifies the use of several active railroad corridors for the development of off-street path facilities. While the city is committed to pursuing these opportunities, the timeline for these projects is generally controlled by the railroad companies. These more challenging bikeways are identified in this plan as Long Term facilities.

Major Bikeways

Major bikeways form the backbone of the bicycle network. They carry the majority of longer-distance bicycle trips and provide the primary connections to major attractions and trip generators. Major bikeways provide the primary connections across major barriers (e.g. rivers, railroad tracks, freeways) or to other adjacent communities. Greater weight should be given to the needs of bicycles regarding questions of how to balance the competing multi-modal needs. Major bikeways should be designed to anticipate a larger number of users.

Major bikeways should be distributed throughout the city at approximately one-mile spacing. This plan prioritizes facility types on Major bikeways that provide dedicated space to cyclists, such as bike lanes, cycle tracks, or off-street paths. The designation of a corridor as a major bikeway emphasizes the needs of bicyclists along these corridors. In some cases (but not all cases), it may be necessary to remove parking, travel lanes, or other roadway features to establish space for use by bicycles, and when these occasions arise on a major bikeway, this designation gives greater weight to the needs of bicycles than on other bikeways.

Where space does not permit the development of dedicated space facilities, or other conditions do not warrant this treatment, shared space facilities such as bicycle boulevards or enhanced shared lanes may be recommended. When the major bikeway classification is applied to off-street trails where shared use with pedestrians is anticipated, the major bikeway classification does not imply that the needs of bicyclists outweigh the needs of pedestrians using the same facility.

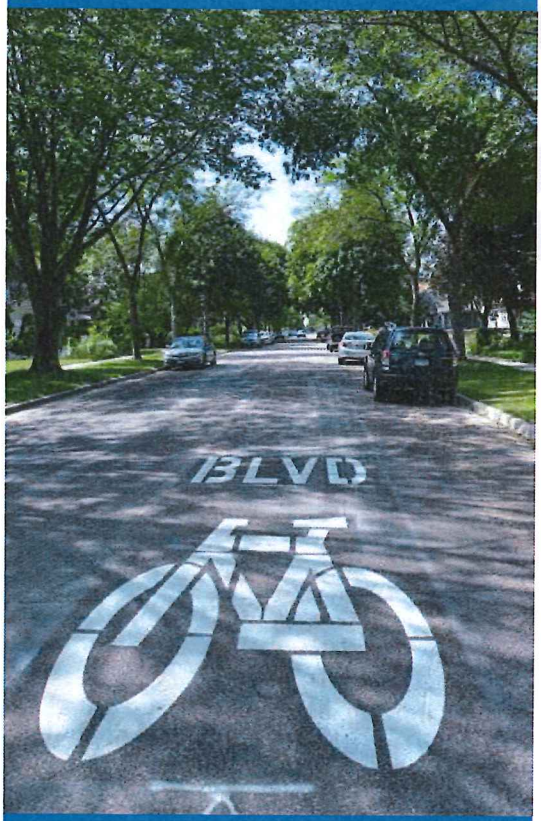
All facilities and corridors that have been designated by the Metropolitan Council as a component of the regional bicycle transportation network (RBTN) will be considered major bikeways in this plan. At the time of this writing, the Metropolitan Council is in the process of updating the Transportation Policy Plan (TPP). The draft TPP includes a discussion of the newly developed RBTN. This is a first step towards identifying a regional functional classification system for bikeways. In some cases, the RBTN does not identify a particular alignment, but rather identifies a half-mile wide search corridor. Additional work should identify specific alignments for all segments of the RBTN. Future updates to this plan should consider introducing the RBTN as a separate tier in the city's bicycle network functional classification system.

Action Item 5.2.1

Identify specific alignments citywide for the regional bicycle transportation network (RBTN) and incorporate this designation into the functional classification system.

Bruce Vento Regional Trail

An example of a minor bikeway on Prior Ave



Bicycle boulevard facility type on Charles Ave

Minor Bikeways

Minor bikeways are anticipated to provide neighborhood level connectivity to the major bikeway network. They should be spaced at approximately a half-mile apart and ensure that every destination in the city is within a quarter-mile of a major or minor bikeway.

Minor bikeways may be recommended for the development of dedicated space facilities (in-street separated lane or off-street path facilities) depending on the space available and the larger roadway and traffic context, however the minor bikeway designation does not establish the same preference for bicycles relative to other transportation modes as the major bikeway designation. Designation as a minor bikeway should not be interpreted as a willingness to compromise on elements of bikeway design related to safety.

5.3 Bikeway Facility Type Groups

There are many different types of bikeway facilities, and each has inherent operational characteristics. Some of the most common facility types in Saint Paul include bike lanes and off-street paths. In recent years, the City of Saint Paul has begun developing a new type of bike facility often called a "bicycle boulevard." Across the U.S., a number of cities are also developing relatively new bicycle facilities referred to as "cycle tracks" or "protected bike lanes". In addition, there is a wide array of signage and pavement markings that can be used to designate and improve bikeways.

The range of bicycle facility types available to engineers is rapidly evolving and expanding, and the task of determining which facility type is appropriate for each corridor requires a detailed engineering examination of each corridor, which is beyond the scope of this planning effort. However, this planning effort has established several facility type groups that identify bikeway facility types with similar operational characteristics. Rather than identifying a specific facility type for each corridor, this planning effort identifies the preferred facility type group for each corridor, leaving final decisions about the specific facility type for a later date when additional data can be collected.

For example, this plan may identify a corridor for the development of an off-street path facility. There are many varia-

tions that this facility could take – it could be a shared-use path with pedestrians, or it could be a path intended only for bicycles adjacent to a sidewalk for pedestrians. This plan will not specify on which side of the street the trail should be located, or how wide that trail should be. It will not identify which signage or pavement markings should be used along that trail. These questions will need to be answered through an engineering study at the time of implementation.

A second example – this plan may identify a corridor for the development of an in-street separated lane facility. This may take the form of a bike lane established through the use of paint. It may have bike lanes in both directions on the street, or only one direction. The bike lane may include a painted buffer zone between moving traffic and the bicycle lane. The design may also include locating a parking lane between moving traffic and the bike lane, a strategy sometimes referred to as a "cycle track." Each of these variations of in-street separated lane facilities may be appropriate in different locations depending on circumstances. The final configuration of the facility will be determined through an engineering study at the time of implementation.

This planning document is not intended to provide engineering design guidance for the various types of bikeway facilities. For additional discussion of the operational characteristics or design considerations of various bicycle facility types, readers are referred to the Saint Paul Street Design Manual.

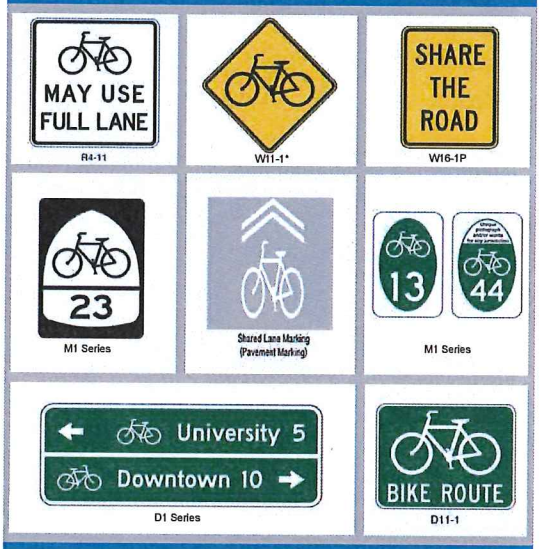
The four bikeway facility type groups discussed in this plan are as follows:

- Group 1: Enhanced Shared Lane
- Group 2: Bicycle Boulevard
- Group 3: In-Street Separated Lane
- Group 4: Off-Street Path

Group 1: Enhanced Shared Lane

An enhanced shared lane uses pavement markings or signage to reinforce the rights and responsibilities of roadway users. These are corridors where bicyclists and motorists share the roadway and bicyclists are subject to all of the same applicable laws and expectations as motorists. These corridors are identified using some form of signage or pavement markings intended to provide greater visibility for cyclists, or as wayfinding guides for cyclists to find preferred routes. Enhanced shared lanes are best suited to roadways with lower opera-

Shared lane markings were installed on Prior Ave in 2013, establishing the corridor as an enhanced shared lane facility



Identification and wayfinding signage options for enhanced shared lanes

Bicycle boulevard type facilities designate low-stress bikeways on local residential streets

Bicycle boulevards generally do not impact on-street parking

tional speeds and traffic volumes.

Specific treatments for these corridors will depend on context, however, common treatments may include:

- Shared Lane Markings ("Sharrows")
- W11-1 or W15-1P Bicycle Warning or SHARE THE ROAD Signage
- R4-11 BIKES MAY USE FULL LANE signage
- D1 series wayfinding signage
- D11-1 series BIKE ROUTE signage
- M1 series identification signage

These facilities are similar to Group 2: Bicycle Boulevard facilities in that they both rely on motorists and bicyclists sharing space. However, enhanced shared lane strategies may be used on roadways with higher traffic volumes or speeds than would be appropriate for a bicycle boulevard facility.

Group 2: Bicycle Boulevard

A bicycle boulevard is a shared lane facility that has been identified for prioritizing non-motorized travel above motorized travel. These streets remain open and usable by motorists, and these facilities generally do not impact on-street parking. However, longer motorized trips on bicycle boulevards are discouraged, providing a lower-speed, traffic-calmed environment where longer-distance trips by bicycle are more attractive.

Specific treatments for these corridors will depend on context, however, common treatments may include:

- Traffic calming elements
- Bump-outs
- Neighborhood traffic circles
- Elements to facilitate bicycle movement, such as crossing medians where a bicycle boulevard crosses a larger roadway
- Shared lane markings ("sharrows")
- Bicycle boulevard pavement markings
- D1 series wayfinding signage
- M1 series identification signage

These facilities are similar to Group 1: Enhanced Shared Lane facilities in that they both rely on motorists and bicyclists sharing space. However, bicycle boulevards are limited in applicability to streets with very low traffic volumes and speeds

and are characterized through an emphasis on traffic calming.

Group 3: In-Street Separated Lane

An in-street separated lane designates a portion of a roadway for exclusive use by bicyclists. These facilities provide dedicated space for cyclists on a roadway, and typically accommodate a higher bicycle operating speed than other facility types. These facilities are most appropriate on roadways with higher operating speed or volumes. Separated lane facilities enhance the safety of people on bicycles by providing dedicated space, which allows motorists to more easily pass cyclists. This facility type group includes the following types of facilities:

- Bike lanes (shared lane markings may be used for short segments)
- Buffered bike lanes
- Bike shoulders
- Protected bike lanes or cycle tracks (including one-way or two-way facilities)
- Climbing bike lane (bike lane provided only in uphill direction)

A two-way cycle track, protected with optional flexible bollards and buffer

Group 4: Off-Street Path

An off-street path provides bicyclists with space separated from motor vehicle travel. These facilities are often (but not always) shared with pedestrians, and thus typically have a lower operating speed for bicyclists than other facility types.

A bike lane on Burns Avenue was established in 2013

A buffered bike lane

A one-way cycle track protected by a parking lane and buffer and showing optional green paint

Trail through Battle Creek Regional Park

Path adjacent to Mississippi River Boulevard

Off-street paths tend to attract the widest variety of users. When at-grade street crossings are kept to a minimum, off-street paths can greatly enhance safety for cyclists.

Sidewalks are not off-street paths. Minnesota statutes permit bicycle riding a bicycle on sidewalks except for in business districts, though riding on sidewalks is discouraged for adult cyclists. However, the distinction between sidewalks and off-street paths is not always clear to users, as both sidewalks and paths may have various widths and be constructed of various pavement materials. A typical concrete sidewalk along residential streets in Saint Paul is approximately 5 feet in width and is not a recommended place for adult cyclists. A wider concrete sidewalk outside of residential neighborhoods may provide a better user experience than cycling in the street, depending on conditions.

This plan considers all pedestrian bridges (e.g. over freeways) to be shared-use paths, even in cases where the existing bridge includes stairs on the approaches or is relatively narrow and may require walking a bicycle. In current form, such conditions may be a significant deterrent to bicycle travel. However, as pedestrian bridges age and are replaced, the replacement bridges should be designed to accommodate bicycles.

5.4 Merging Facility Types and Functional Classification

The framework presented in this plan establishes a loose connection between the functional classification and facility type that is identified for each corridor. The facility type assigned to each corridor should be consistent with the larger transportation context of that corridor. As such, facilities that are identified as major bikeways should anticipate higher volumes of bicyclists and thus provide facility types that will be attractive to the largest number of bicyclists.

Facility types that provide dedicated space for cyclists, specifically off-street paths and in-street separated lane facilities, are better suited to accomplish the purposes of the major bikeway functional classification, and they are the preferred facility types for major bikeways. In some cases bicycle boulevards may also effectively serve this purpose if they are of sufficient length and provide direct connections. Enhanced shared lane facilities are discouraged from use within the ma-

jor bikeway network as they typically provide the least degree of separation from motorized traffic, however, in some cases, other suitable alternatives cannot be identified.

5.5 Planned Bikeway Identification Process

The planned improvements to the bikeway network are based on a set of mapping criteria established early in the planning process for this plan. The full mapping criteria used to develop the recommendations in this plan are provided in Appendix D and are summarized below. The bikeways identified in this plan are based on a combination of the recommendations adopted from previous planning efforts as well as field work to identify new corridors.

Spacing

The 2008 Comprehensive Plan established the spacing and facility type standard that "bikeways should be no more than a half-mile apart, and arterial striped bike lanes and/or off-street trails should be no more than one mile apart." This plan interprets and fulfills this directive by establishing spacing guidelines for major and minor bikeways at one-mile and half-mile spacing respectively.

This plan strives to identify bikeways that achieve geographic and socio-economic equity. Spacing bikeways at no greater than one-half mile apart guarantees that most properties and residents in the city will be no more than a quarter mile from a bikeway.

Previous Planning Efforts

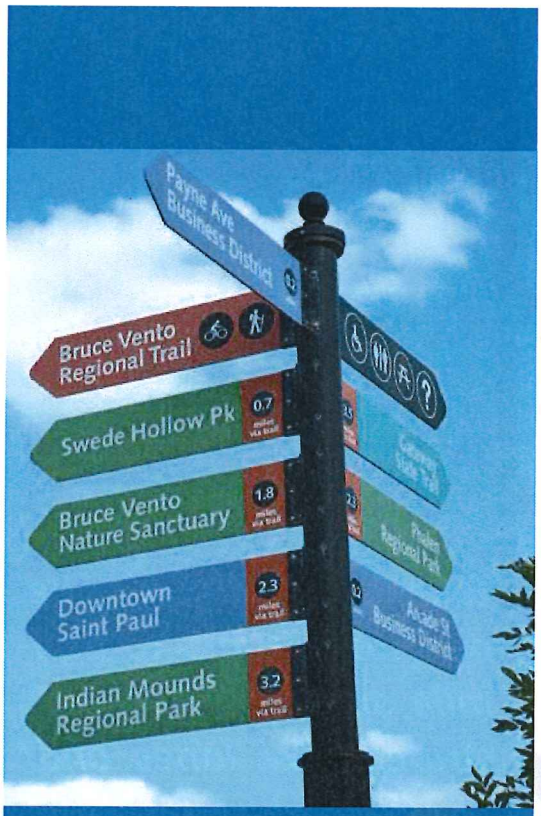
Much planning has been completed in the past by both the City and other partner agencies. This plan strives to be consistent with these other planning efforts to the extent possible.

Making Direct Connections

The bicycle network should provide direct and continuous routes between destinations. Bicycle routes that meander or make unnecessary turns are less likely to be an effective means of increasing the number of bicyclists using the facility. Especially in the case of signed bike routes or bicycle boulevards, facilities that turn or meander for reasons that are not readily apparent to people riding bicycles may be confusing for users. In some cases, cyclists may be willing to travel additional distance to utilize a more attractive route, but this is dependent on a number of variables that are not easily identified. This plan places a high priority on providing direct, straight, and continuous bikeways.

"Bikeways should be no more than a half-mile apart, and arterial striped bike lanes and/or off-street trails should be no more than one mile apart."

- Saint Paul Comprehensive Plan



Wayfinding signage displaying connections to nearby destinations.

The bicycle network should connect key destinations to each other, and connect residential neighborhoods with employment and commercial centers, schools, and other key destinations. The bicycle network should build off and connect with existing bikeways and transitways.

Modal Balance

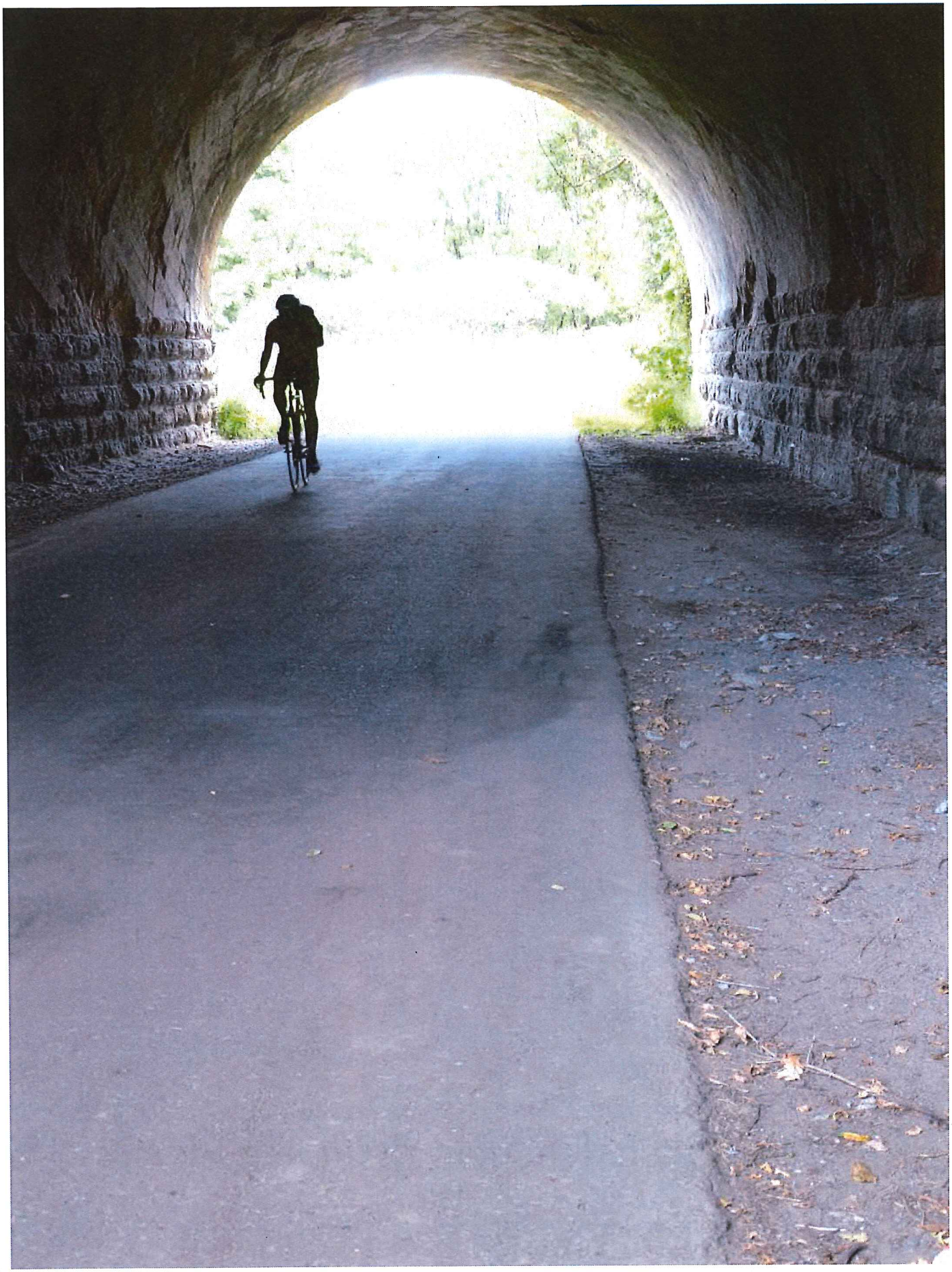
Bikeway facility types and locations must be a reflection of the existing context, including both topography and the context of the built environment. Bikeway recommendations must consider factors such as roadway motorized traffic volume, signal locations, roadway width, right-of-way width, and topography. In some cases, providing appropriate accommodations for bicycles requires tradeoffs from other transportation systems, such as narrowing travel lanes, removing travel lanes, or removing on-street parking. This plan strives to achieve a balance between the needs of various modes, and seeks to identify opportunities for bicycling to complement other modes as much as possible.

Effectiveness

This plan seeks to identify a bicycle network that will increase bicycle ridership, improve safety conditions, and address critical gaps in the network. This plan does not propose development of bikeways where this potential is limited. The effectiveness of each bikeway is weighed against the relative cost.

Safety

This plan identifies a bicycle network that minimizes conflict with other travel modes and accommodates people with varying levels of experience and diverse preferences. Special consideration is given to areas where there are known safety concerns. This plan recommends a bicycle network that utilizes proven safety design features that provide dedicated operating space for bicyclists (e.g. a route where dedicated bike lanes can be developed is preferred over a route with similar traffic characteristics where dedicated bike lanes can not be developed).



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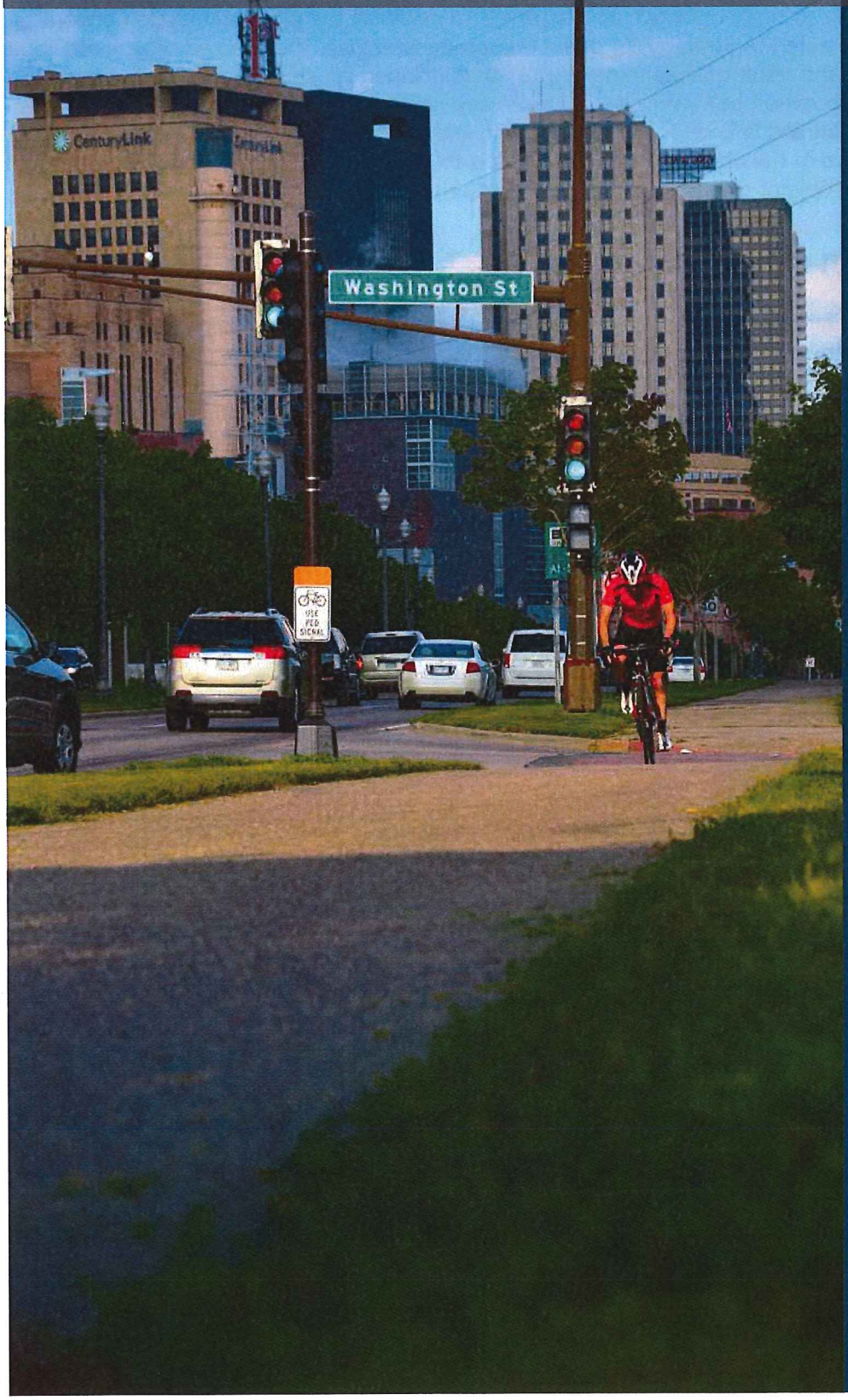
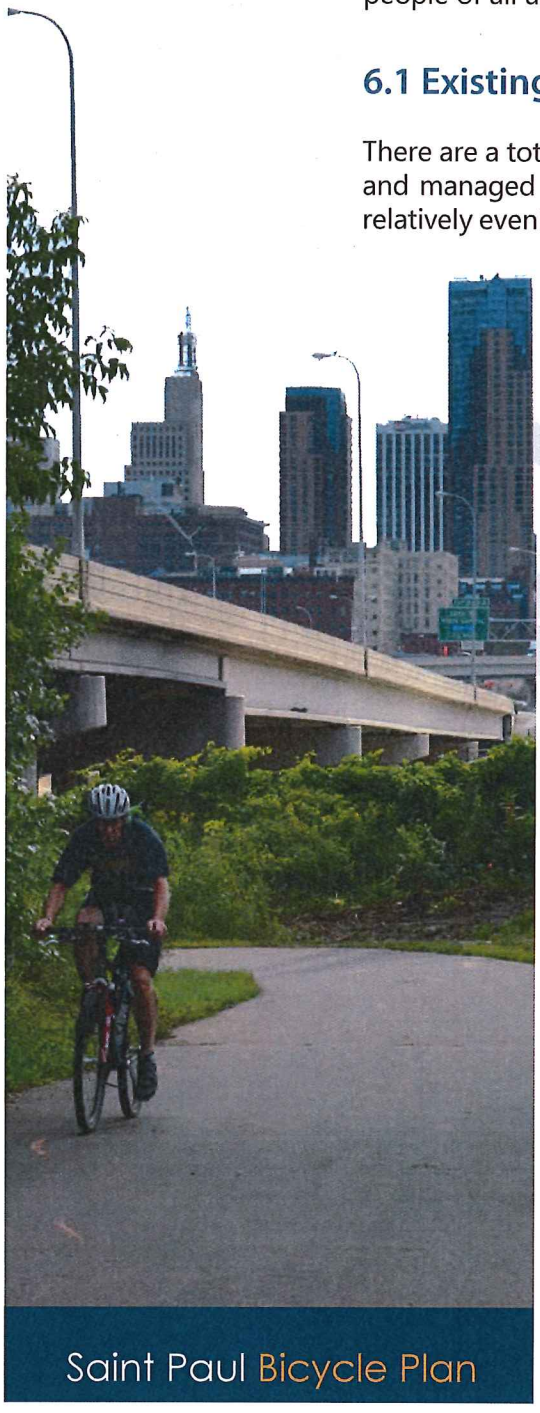
Chapter 6:
Expanding the Bicycle Network



Saint Paul
Bicycle Plan

6.0 EXPANDING THE BICYCLE NETWORK

The primary objective of this plan is to establish the planned bicycle network as directed by Strategy 3.4 of the Comprehensive Plan. The planned bicycle network is the result of a planning process that included substantial public input and collaboration between city staff from several departments, including Public Works, Planning & Economic Development, and Parks & Recreation. The primary objective of the planned bicycle network is to provide safe and comfortable places for people of all ages, abilities, and preferences to ride a bicycle.



6.1 Existing Bicycle Network

There are a total of 153 miles of bikeways in Saint Paul, including facilities owned and managed by agency partners. The network of existing bikeways is divided relatively evenly between off-street paths and on-street facilities of various types. About 48% of the existing facilities throughout the city are off-street paths, with bike lanes and shoulders composing an additional 35% of the bike network. The remaining 17% of the existing bicycle network is comprised of bicycle boulevards or enhanced shared lanes. The existing bicycle network is identified on **Figure 2**.

Facility Type		Existing* Facilities (miles)	Percent of Bikeway Network
Off Street Facilities	Off-Street Paths	73.9	48%
	Off-Street SubTotal:	*73.9*	*48%*
On-Street Facilities	Bike Lanes**	33.5	22%
	Bikeable Shoulders**	19.8	13%
	Bike Boulevards	7.2	5%
	Enhanced Shared Lanes	18.3	12%
	On-Street SubTotal:	*78.8*	*52%*
TOTAL		**152.7**	**100%**

*This table excludes bikeways that are planned, funded, or under construction, but not yet open for public use.

**This table reports total miles of roadway, not mileage of lanes. Roadways with bike lanes on one side of the street only are not differentiated from roadways with bike lanes on both sides.

6.2 Planned Bicycle Network

This plan identifies a full bicycle network of 346 miles, an increase of 195 miles of new bikeways. This is a 127% increase in bikeways, compared to the existing 153 miles of bikeways. The

planned bicycle network was designed to serve major destinations throughout the city based on the mapping criteria presented in **Appendix D**. The complete functional classification and facility types for each link in the bicycle network are shown on **Figure 3** and **Figure 4**.

This plan envisions a bikeway system based primarily on off-street paths and in-street separated lane facilities such as bike lanes or cycle tracks to appeal to the widest range of potential users. Approximately 71% of the planned bicycle network is comprised of off-street path or in-street separated lane facilities. An additional 13% of the full bikeway network is comprised of bicycle boulevard facilities. Roughly 17% of the planned bicycle network are enhanced shared lane facilities. In many cases this facility type recommendation was made where space or traffic characteristics did not permit for the implementation of one of the other three facility types. Roughly 60% of the planned bicycle network is identified as major bikeways, 4% of which were identified as long term facilities.

In some cases, the planned bicycle network includes improvements to existing bikeways. For example, this plan recommends that the 19.8 miles of roadway with "bikeable shoulders" should be modified to fit into one of the planned bikeway facility type groups. In many cases, the existing shoulders can be converted into bicycle lanes relatively easily, though in other cases this plan recommends development of an alternate facility type.

Facility Type		Existing Facilities (miles)	Proposed Facilities (miles)	Total Facilities (miles)	Percent of Bikeway Network
Off Street Facilities	Off-Street Paths	74	56	130	37%
	Off-Street SubTotal:	*74*	*56*	*130*	*37%*
On-Street Facilities	In-Street Separated Lanes*	53	60	113	33%
	Bicycle Boulevards	7	39	46	13%
	Enhanced Shared Lanes	18	40	59	17%
	On-Street SubTotal:	*79*	*139*	*218*	63%
TOTAL		**153**	**195**	**348**	**100%**

*This table reports total miles of roadway, not mileage of lanes. Roadways with bike lanes on one side of the street only are not differentiated from roadways with bike lanes on both sides. Existing mileage inclues bikeable shoulders. All corridors that currently have bikeable shoulders are proposed to transition to other facility types.

Functional Class	Total Facilities* (miles)	Percent of Bikeway Network
Major	194	56%
Major Long Term	13	4%
Minor	132	38%
Minor Long Term	7	2%
TOTAL	**346**	**100%**
*Includes existing facilities		

The major bikeway network stresses separation between motor vehicles and bicycles, while the minor bikeway network relies more heavily on shared facilities. Nearly 90% of the major bikeways are off-street paths or in-street separated lane facilities. In contrast, only 42% of the minor bikeways are off-street paths or in-street separated facilities. Nearly 24% of the minor bikeways are bicycle boulevard facilities.

Facility Type		Major Bikeways			Minor Bikeways			Total Facilities (miles)
		Near Term Facilities (miles)	Long Term Facilities (miles)	Total Major Facilities (miles)	Near Term Facilities (miles)	Long Term Facilities (miles)	Total Minor Facilities (miles)	
Off Street Facilities	Off-Street Paths	87	13	100	29	1	30	130
	Off-Street SubTotal:	*87*	*13*	*100*	*29*	*1*	*30*	*130*
On-Street Facilities	In-Street Separated Lanes*	84	0	84	27	2	29	113
	Bicycle Boulevards	12	0	12	34	0	34	46
	Enhanced Shared Lanes	11	0	11	43	4	47	58
	On-Street SubTotal:	*106*	*0*	*107*	*103*	*6*	*110*	*216*
TOTAL		**194**	**13**	**207**	**132**	**7**	**139**	**346**

*This table reports total miles of roadway, not mileage of lanes. Roadways with bike lanes on one side of the street only are not differentiated from roadways with bike lanes on both sides.

6.3 Barrier Crossings

One of the most significant challenges to bicycling in Saint Paul is the challenge of finding safe locations to cross linear barriers, such as freight railroads and freeways. In addition, while the Mississippi River is a major attractor for bicyclists looking to enjoy the scenic riverbanks, opportunities to cross the Mississippi River are limited.

Most barrier crossing locations take the form of bridges over the river, a freeway, or a railroad. However, some crossings are underpasses below the barrier, and there are a number of existing locations where bicyclists (as well as pedestrians and motorists) are permitted to cross freight railroads at-grade.

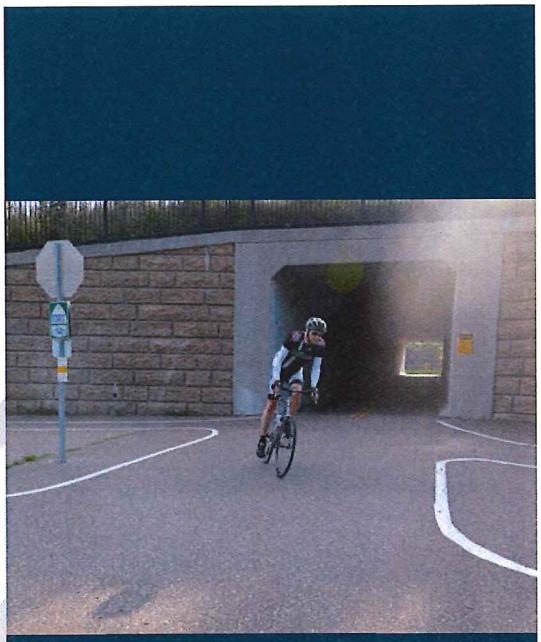
For this reason, this plan intentionally uses the generic term "crossing" to describe locations where the bicycle network crosses barriers. **Figure 5** presents all of the crossings located on the existing or planned bicycle network.

While there are examples of locations where off-street paths cross freight railroads at-grade both in Saint Paul as well as other places in the metropolitan area, recent history suggests that new at-grade crossings of mainline freight railroads are unlikely, and that any new crossings will require a bridge or underpass.

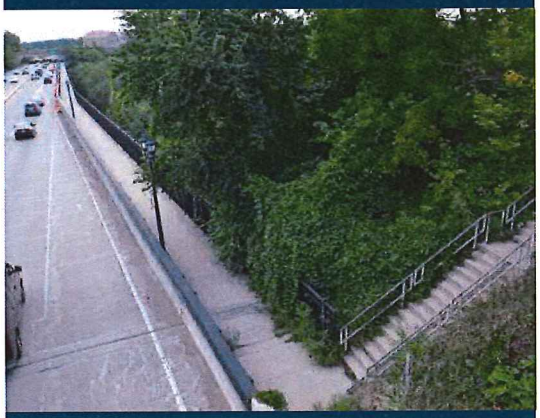
This plan envisions seven new bridges or underpasses, which are identified on **Figure 5**, the majority of which were first identified in previous planning efforts. Planned crossings were identified based on the spacing between adjacent crossings, the feasibility of identifying alternate routes, and an informal engineering feasibility analysis. Of the seven planned crossings, five of them will be bicycle and pedestrian crossings only. The remaining two crossings will be constructed in connection with planned new roadway bridges. In particular, this plan identifies the Kittson Road bridge over the freight rail to intersect Warner Road as well as the Transfer Road extension across the freight rail to intersect Como Avenue.

One of the planned bicycle and pedestrian crossings will replace and relocate an antiquated existing bridge over I-94 on the eastern side of the city. The existing bridge at Hazelwood Street is planned to be relocated to approximately Kennard Street to the east. This location will provide increased visibility of the bridge and improve access to the planned Flandreau Street Bikeway and the shopping center south of I-94.

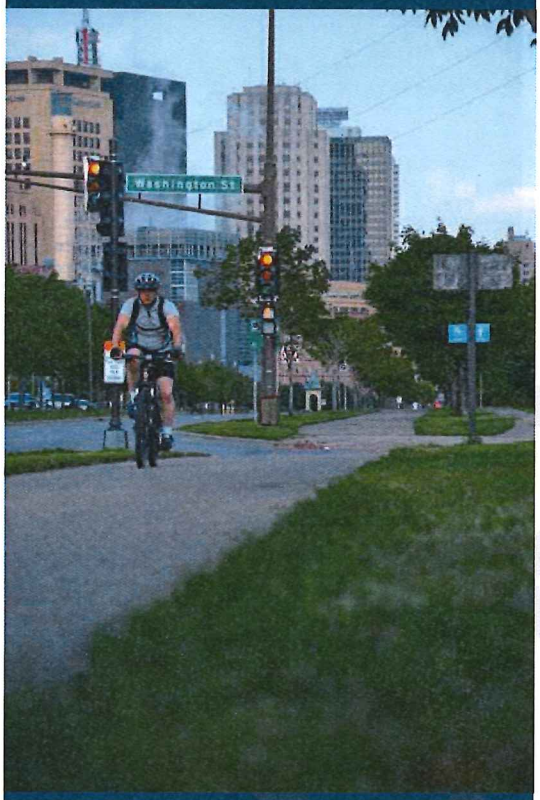
A number of the existing bridge structures are not conducive to bicycle use due to width or because they have stairs on the approaches, such as the Trunk Highway 5 bridge over the Mississippi River or the Hazelwood Street bridge over I-94. In addition, many older bridges over freeways were constructed primarily for pedestrians and were not designed with bicyclists in mind. However, as aging bridges are replaced, current regulations require all new bridge structures to be designed with ramps rather than stairs, and these bridges will be designed to accommodate both bicycles and pedestrians.



Bicycle and pedestrian underpass at I-35E on the Mississippi River Trail



Stairway-only access to the Trunk Highway 5 Bridge limits accessibility



Samuel Morgan Regional Trail

Action Item 6.3.1

Complete detailed feasibility studies of the planned crossings to identify concept designs, cost estimates, and impacts.

6.4 Regional Trails

Regional trail corridors are intended to provide for recreational travel along linear pathways throughout the metropolitan area. Regional trails must be designated by the Metropolitan Council and are intended to pass through or provide connections between components in the Regional Parks System. Regional trails are defined in the Metropolitan Council's Regional Parks Policy Plan. Facilities that have been designated as regional trails are eligible for additional regional funding sources.

In urban areas such as Saint Paul, the regional trail network also plays an important function for transportation bicycling and often forms the backbone of the bicycle transportation network. Regional trail facilities are often developed along natural or linear features, which can limit the number of intersections, greatly enhancing safety and comfort for trail users.

Four facilities in Saint Paul have been designated as Regional Trails:

- Samuel Morgan Regional Trail
- Bruce Vento Regional Trail
- Trout Brook Regional Trail
- Summit Avenue

Historically, the Metropolitan Council has been hesitant to designate trails that are wholly contained within regional parks as regional trails. However, many of these trails are critical in connecting the various regional parks and trails together into a cohesive system. In Saint Paul, these facilities are:

- Mississippi River Boulevard (Mississippi Gorge) Trail
- Lilydale/Harriet Island Trail
- Cherokee Trail
- Indian Mounds Trail
- Battle Creek Trail

Figure 6 identifies the existing and planned regional trails

and other significant trails that pass through regional parks. The Metropolitan Council requires the city to prepare a master plan document for all planned regional trails. Corridors are identified as planned regional trails if the alignment is relatively well-known. In some cases, the planned trail alignment needs further study, and these are identified as regional trail search corridors.

Action Item 6.4.1

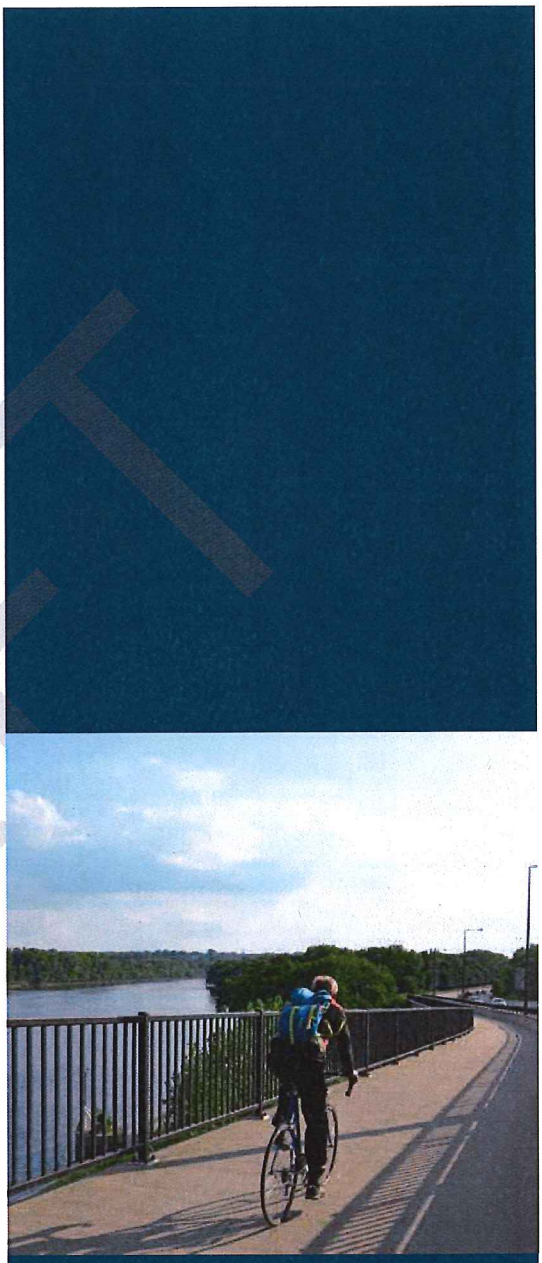
Actively pursue designation and development of additional regional trails as shown on Figure 6. Identify regional trail alignments within the regional trail search corridors.

6.5 Grand Round

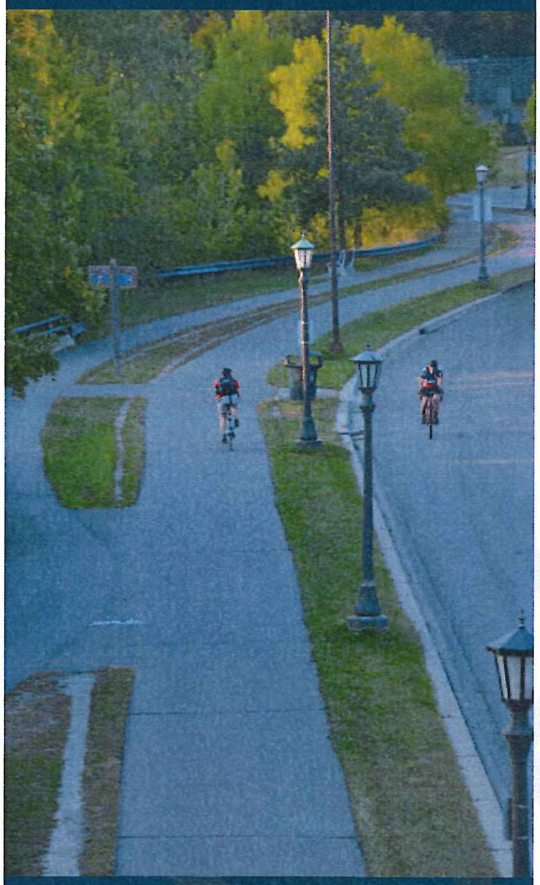
The 2010 Saint Paul Parks and Recreation System Plan describes the desire to enhance the 27 mile Grand Round system throughout the city: "Trails are currently the most desired parks and recreation facility by Saint Paul residents. They are an important quality of life element and a factor in choosing where to locate for many residents and businesses. [···] Trails and parkways are advantageous from a fiscal and a recreation standpoint. Trails allow self-directed recreation which is immensely popular, does not require any staffing (besides periodic maintenance) and requires less initial investment than [other types of facilities]. Due to their linear nature, they have large service areas, and can expand the service areas of parks connected by trails. [···] For these reasons, trails, especially those associated with the historic Grand Round, are a key part of the 21st Century Parks and Recreation System." The Grand Round is identified on **Figure 7**.

While the Grand Round was initially perceived as a recreational facility, the portions of the route that are already in place also form the backbone of the bicycle network for transportation cycling as well. The potential for high-quality parkway trails to encourage bicycle use for transportation purposes and to attract a new segment of the population to bicycles should not be underestimated.

An enhanced system of parkways and multi-use off-street paths will allow connections to and between the regional parks, downtown, and other key destinations. The Grand



The Samuel Morgan Regional Trail / Mississippi River Trail comprises the southern section of the Grand Round



The Grand Round / Mississippi River Boulevard

Round - a scenic green parkway for drivers, pedestrians, and people on bicycles around the entire city - has been a vision for Saint Paul for over 100 years.

The Saint Paul Grand Round was conceived by famed landscape architect H.W.S. Cleveland over one hundred years ago. His vision led to the completion of several parkway segments in the early 1900's. By the 1930's, however, implementation of the remainder of the system was halted. Many residents are familiar with the alignment of the Grand Round through participation in the Saint Paul Classic Bike Tour, the largest annual bicycle tour in Minnesota that follows the scenic loop around the city.

The ideal Grand Round is comprised of low-speed scenic parkways and off-street pedestrian and bicycle paths. Wherever possible, bicycles and pedestrians should be provided with separate paths or sidewalks to minimize conflict between the two modes, either on the same side or opposite sides of the parkway. The Grand Round should include bicycle and pedestrian facilities that are useable and maintained year-round, including snow removal in the winter.

The Saint Paul Grand Round plays an important role in the bicycle transportation and recreation network. This plan establishes a vision for much of the Grand Round to accommodate all types of users by providing multiple facility types within the same corridor. Providing both off-street paths and on-street bike lanes along portions of the Grand Round is envisioned to attract users of all preferences. Off-street paths will attract slower bicyclists and pedestrians, while on-street bike lanes will attract faster cyclists.

While the off-street paths attract a wider range of cyclists and are critical to establishing the inclusive nature of the Grand Round, the city should strive to provide on-street bicycle facilities where space permits as well. As many of the off-street paths will permit both bicycles and pedestrians, providing the in-street bicycle facilities will immensely help to encourage faster-moving bicyclists to use the roadway rather than the trail.

In addition, the Saint Paul Grand Round should include a number of other features, including wayfinding, interpretive signing, bike racks, connections to local parks, drinking fountains, appropriate lighting, historical markers and interpretive elements, landscaping, public art, street furniture, sce-

nic overlooks, and other amenities that add to the comfort, safety, and enjoyment of visitors.

Some portions of the Grand Round have already been implemented with multiple facility types in the same corridor. For example, Wheelock Parkway between Arcade Street and Phalen Boulevard provides on-street and off-street bicycle facilities. This plan envisions extending these facilities to other parts of the Grand Round, including Wheelock Parkway west of Arcade Street, Johnson Parkway, and portions of Pelham Boulevard and Como Avenue.

However, this plan does not present a singular vision for the Grand Round, and the planned improvements must be guided by existing constraints. This vision does not propose in-street facilities where the Grand Round follows the Sam Morgan Regional Trail. On-street bicycle facilities are not recommended for Shepard Road or Warner Road. This vision also does not propose off-street path facilities along Raymond Avenue and portions of Como Avenue where right-of-way is limited. In-street bicycle facilities are recommended in these locations.

6.6 State Trails

State trails are owned, operated, and maintained by the Minnesota Department of Natural Resources (DNR). The DNR operates one trail facility in the City of Saint Paul. The Gateway State Trail was opened for public use in 1993, originally as an extension of the Minnesota-Wisconsin Boundary Trail, which was envisioned to connect the Twin Cities with Duluth. Approximately 2.1 miles of the trail is located within Saint Paul.

At the time if this writing, the southern terminus of the Gateway State Trail is located at Cayuga Street west of I-35E, though in conjunction with the I-35E Cayuga Interchange project, the Gateway State Trail will be extended approximately 0.7 miles south to University Avenue by 2016. The 1986 master plan created by the DNR established a desire to extend the trail into the "downtown area", though a preferred alignment for this extension was not identified.

Action Item 6.6.1

Coordinate with the DNR to identify the appropriate long-term southern terminus of the Gateway State Trail.

The Mississippi River Trail (MRT) in Saint Paul

6.7 Mississippi River Trail (MRT) - U.S. Bike Route (USBR) 45

MnDOT has been the lead agency on the development of the Mississippi River Trail (MRT), also known as U.S. Bike Route (USBR) 45, which is a 3,000 mile long planned bikeway from the Mississippi River headwaters to the Gulf of Mexico. The U.S. Bike Route System is a national effort to establish a network of numbered interstate bicycle routes across the nation. Approximately five numbered routes have been identified at a conceptual level that pass through Minnesota. One of these, the MRT, passes through Saint Paul. MnDOT has been the lead agency in identifying the specific alignment of the MRT, and is the lead agency in establishing all signage designating the route. In Saint Paul, the MRT is established entirely on existing bikeway corridors through signage and wayfinding.

Action Item 6.7.1

Coordinate with MnDOT to determine possible future revisions to the alignment of the Mississippi River Trail, particularly as it passes through Lilydale. Consider revising the MRT alignment to include the South Saint Paul to Harriet Island Regional Trail after it is constructed (planned for 2017).

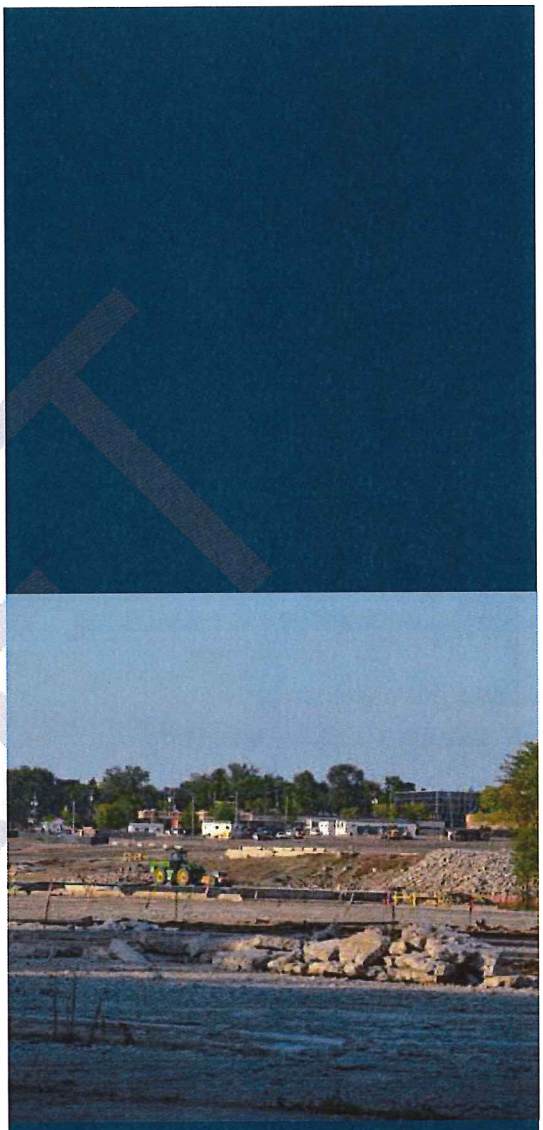
6.8 Ford Site

The 125-acre Ford Motor Company Twin Cities Assembly Plant is currently in the process of undergoing a major transformation. The former assembly plant has been removed and the city is currently in the process of planning for future redevelopment. The city has established a vision for a "21st Century Communty", and the site will be a livable, mixed use neighborhood that looks to the future with clean technologies and high quality design for energy, buildings, and infrastructure. The site will place a high priority on encouraging walking, biking, and transit.

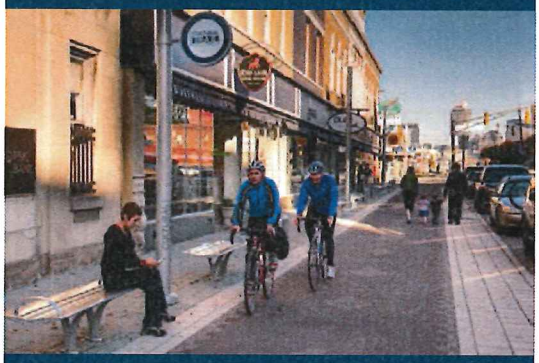
The city is currently in the process of setting a vision for new roadways, transit access, walkways, and bikeways throughout the site, and planning should be complete in 2016. This ongoing planning process should include establishing a plan

for bikeways to be developed throughout the site. Special care should be taken to identify bikeways that both serve the planned development site as well as facilitate bicycle passage through the site. At a minimum, the following bikeway priorities should be set for the Ford Site and the surrounding areas:

- Off-street and in-street bikeways, as well as support facilities such as bicycle parking, should be incorporated to the fullest extent possible within the Ford site redevelopment, to provide a strong network of bicycle connections to, from, and within the site for all types of users.
- Improvements to the existing facilities along Mississippi River Boulevard – The existing trails adjacent to the Ford Site along the west side of Mississippi River Boulevard are not of sufficient width to accommodate existing users, and space to expand the trails is limited given the current location of Mississippi River Boulevard. Improvements to Mississippi River Boulevard that result in additional space to develop higher quality off-street trail facilities along the west side of Mississippi River Boulevard adjacent to the Ford Site should be considered, including the existing trail bottleneck where Mississippi River Boulevard passes underneath Ford Parkway.
- Improved connections between Mississippi River Boulevard and Ford Parkway – The existing connections between Mississippi River Boulevard and the Ford Parkway bridge are insufficient and opportunities to improve these connections should be explored.
- Ford Rail Spur – Ford site planning should anticipate reuse of the freight railroad spur as a public transportation opportunity and include off-street paths for walking and biking, in addition to other potential modes such as transit. Ford site planning efforts should develop a plan to connect trail users to both Mississippi River Boulevard and the Ford Parkway bridge.
- Montreal Avenue Extension – Montreal Avenue is an important existing east/west bicycle route. Concepts should be developed that facilitate east-west travel between the current western terminus of Montreal Avenue and Mississippi River Boulevard.
- Ford Parkway Improvements – This plan identifies an enhanced shared lane strategy for a portion of Ford Parkway adjacent to the Ford site. However, this is not an optimal solution given the traffic volumes and speeds on Ford Parkway. Ford site planning efforts should consider alternative options to accommodate east/west bi-



The Ford site in 2014



Indianapolis Cultural Trail

cycle travel on Ford Parkway.

6.9 Downtown Trail Loop and Shared Lanes

This plan recommends the development of a unique off-street trail network throughout the downtown area as well as enhanced shared lanes on most downtown streets. This strategy is designed to make downtown a hub in the city bicycle network and to effectively and safely accommodate cyclists of all preferences. The trails are designed to accommodate slower bicyclists and to encourage new or casual cyclists to visit downtown. The enhanced shared lanes throughout downtown will accommodate faster cyclists who are seeking the operational and speed benefits of integrating with motorized traffic.

The planned downtown trail network can be described as a loop alignment as well as connections between the loop and the existing bikeways approaching downtown. The loop trail will effectively place a majority of downtown within two or three blocks of the trail.

The trails are planned to be off-street path type facilities that accommodate two-way bicycle traffic, even when adjacent to one-way streets. The trails throughout downtown will be of a different aesthetic character than other trails throughout the city. Generally off-street path facilities are constructed using asphalt, and are surrounded by turf, landscaping, or other boulevards on both sides where space permits. The downtown trails will take on more of an urban character and may be constructed out of a number of different materials, including concrete to provide a distinctive appearance. Despite the different look and feel of these urban trails, they will share similar operational characteristics with other popular off-street trails throughout the city. People who are comfortable riding a bicycle on off-street paths in other contexts will find these facilities familiar and attractive.

The downtown trail network is a unique recommendation that places Saint Paul at the forefront of bicycle planning in the U.S. Very few other cities have developed similar facilities. Saint Paul may look to the Indianapolis Cultural Trail for design inspiration. The Indianapolis Cultural Trail is a similar 8-mile network of off-street paths through downtown Indianapolis connecting the major cultural institutions throughout the city. In Saint Paul, the off-street trail network would connect popular attractions such as the Xcel Center, the Or-

dway Theater, the Science Museum of Minnesota, the Minnesota History Center, the Union Depot, the Farmers Market, the Lowertown Ballpark, the Landmark Center, the Minnesota Children's Museum, and other institutions and businesses throughout downtown.

The recommendation to develop a network of off-street trails throughout the downtown has larger objectives than simply accommodating bicycle transportation. At a basic level, this is a recommendation to develop vibrant urban spaces that encourage city residents and visitors to enjoy being outdoors whether or not they are using a bicycle. This strategy is best implemented within the context of full reconstruction of adjacent sidewalks (if not the full right-of-way), when the needs of pedestrians and ground floor activity in adjacent buildings can be enhanced. The call for utilizing unique and innovative design features extends beyond the bicycle facilities to the sidewalks, plazas, and other public spaces.

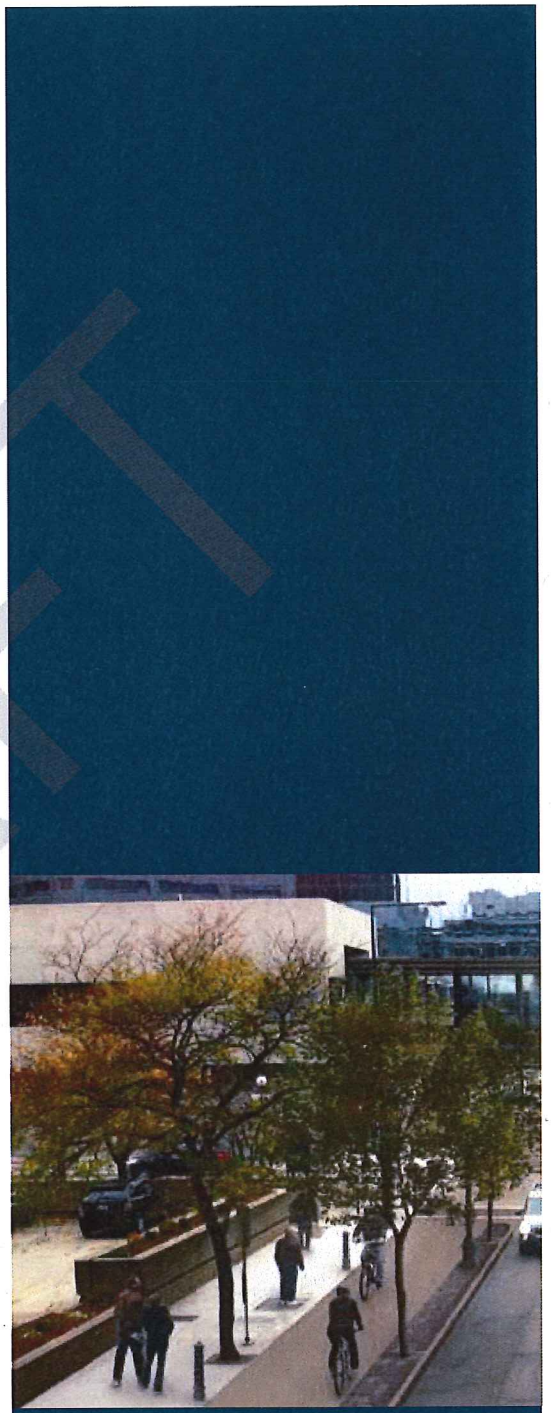
This recommendation is designed to be an economic development catalyst for downtown businesses. Companies that choose to locate in downtown must be confident that downtown is a place where employees will want to work and spend time. Businesses must be confident that the downtown built environment will help them attract top talent from across the nation, in addition to encouraging graduates from the many colleges and universities in Saint Paul to want to stay and work locally. Businesses of all types will flourish as downtown becomes a place where people want to spend time outdoors.

Phase I - Jackson Street

The first phase of the downtown bicycle facilities will be developed on Jackson Street, from Shepard Road to 11th Street. Jackson Street is a logical choice to be developed as phase one of the downtown trail loop because of the wide right-of-way, and the need to invest in the corridor to correct other deficiencies such as poor pavement quality. In addition, development of this first phase of the loop will help make the connection between the Gateway State Trail and the Sam Morgan Regional Trail, a critical missing link in the regional trail network. The trail is initially envisioned to be along the west side of Jackson Street, though this recommendation should be confirmed as detailed design progresses.

Additional Trail Alignments

As work progresses on developing a trail along Jackson Street,



Rendering of off-street trail along Jackson Street

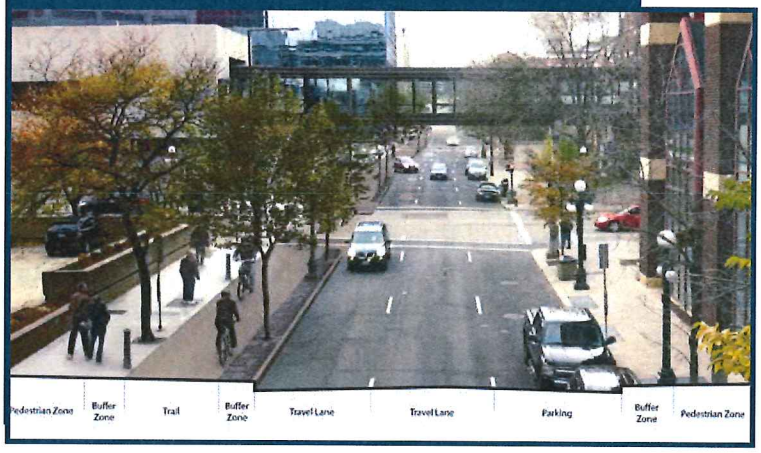
further study is needed to determine the final alignment of the loop trail network as well as connections between the loop and the existing bikeways that approach downtown. The following corridors should be evaluated to determine the most appropriate final alignment for the remaining three sides of the loop:

- Saint Peter Street or Wabasha Street
- Kellogg Boulevard or 4th Street
- 10th Street or 11th Street

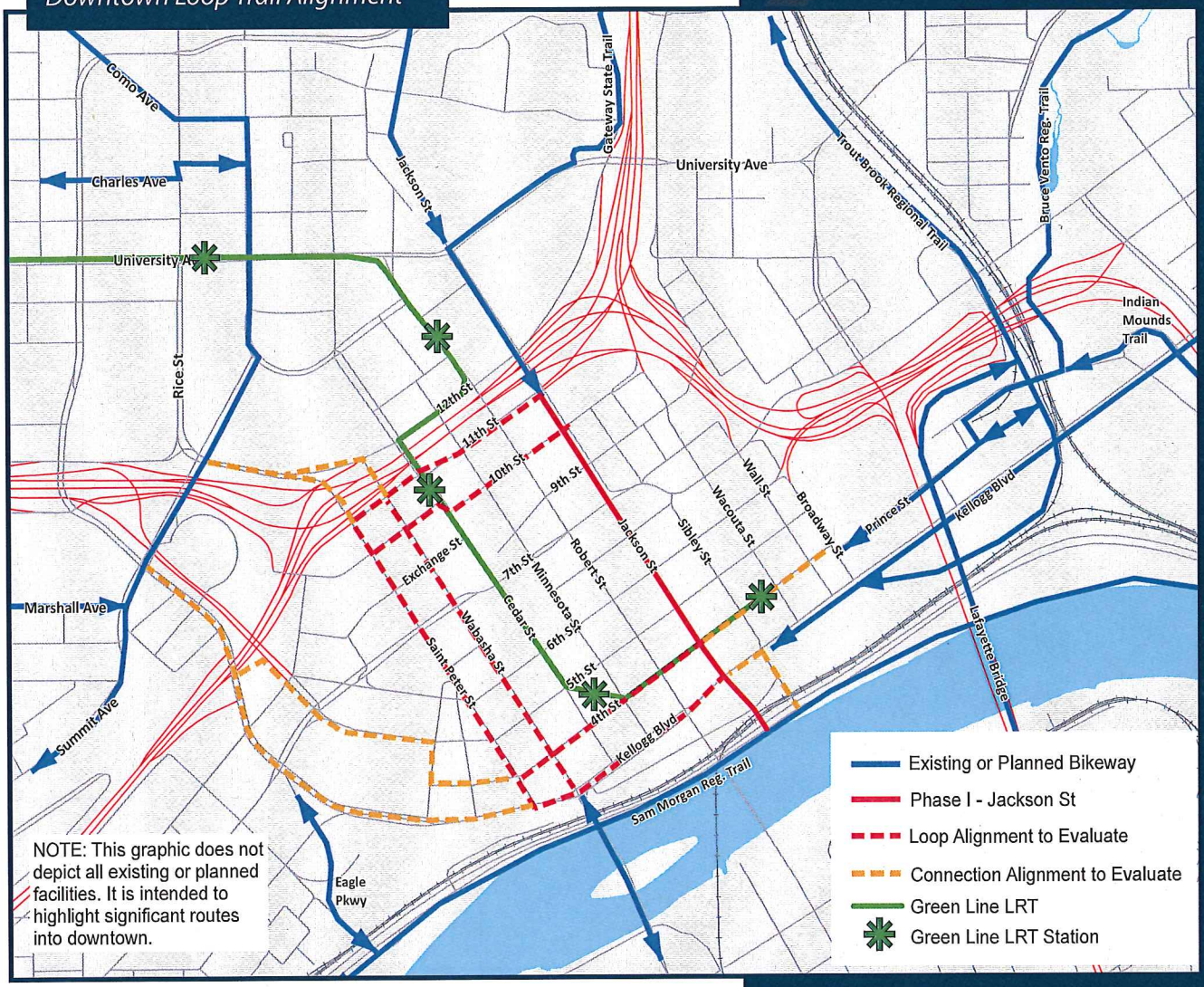
Connections between the loop and other existing and planned routes into and out of downtown will be developed to ensure connectivity to the surrounding bicycle network. The following corridors should be evaluated to determine the most appropriate connections between the loop and the surrounding areas:

- West along Kellogg Boulevard or 5th Street to connect to the bikeways on Summit Avenue, Marshall Avenue, and Eagle Parkway.
- East on Kellogg Boulevard or 4th Street to connect to the Union Depot Trail, Bruce Vento Regional Trail, Trout Brook Regional Trail, and Indian Mounds Trail.
- Northwest on Saint Peter Street or Wabasha Street to connect to the existing bike lanes on John Ireland Boulevard, Park Street, and Como Avenue, as well as the Charles Avenue Bikeway.
- South on Sibley St to connect to the Sam Morgan Regional Trail.
- The alignment should include a connection to the Wabasha Bridge.

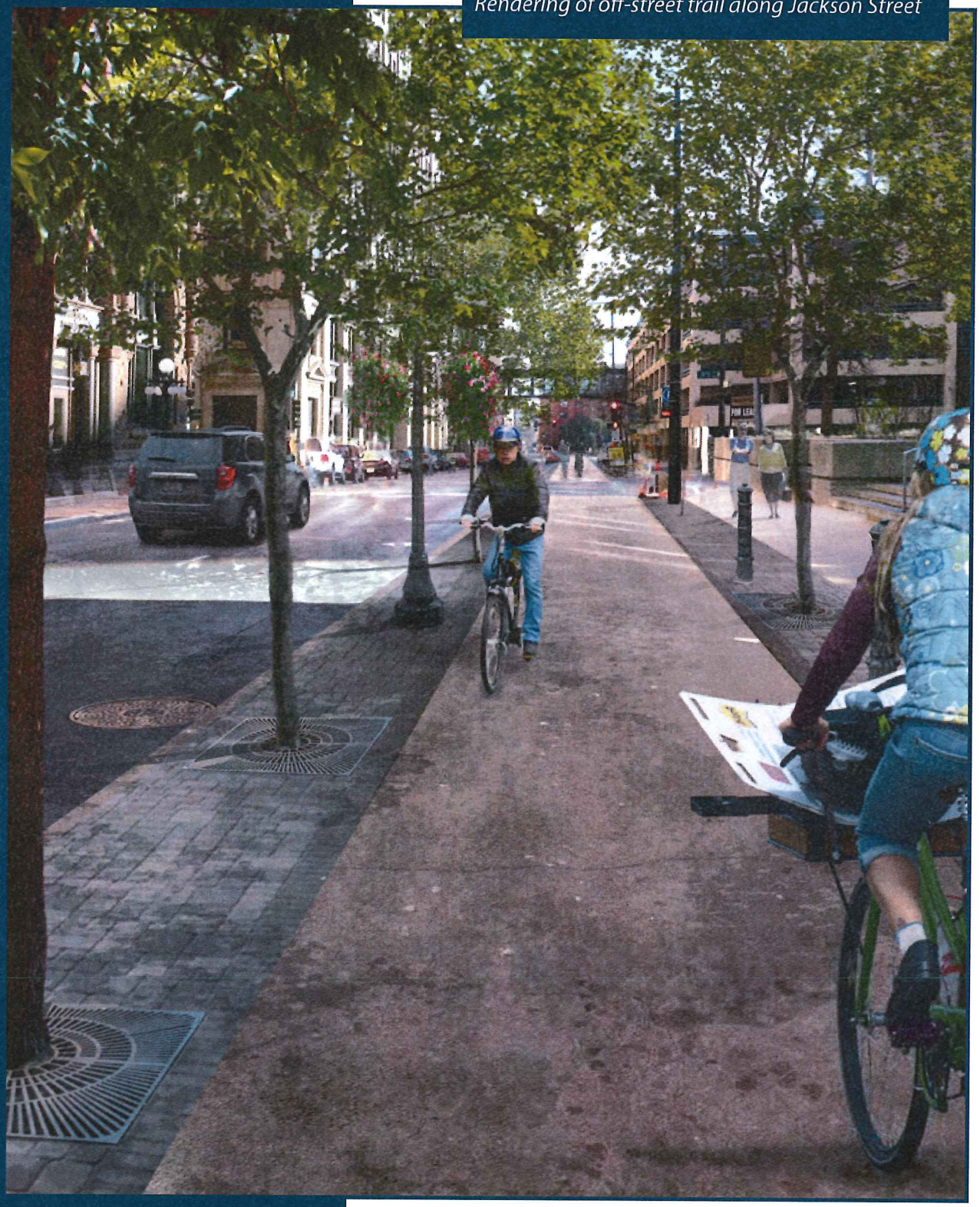
Rendering and cross-section of off-street trail along Jackson Street



Downtown Loop Trail Alignment



Rendering of off-street trail along Jackson Street



6.10 Interim Facilities & Other Notes

In some cases, the planned bikeways identified in this plan are intended to be an interim measure until alternative facilities can be developed. Several of the planned bikeways have been identified as interim facilities, while others have unique circumstances or conditions. A summary of these conditions is presented below:

Street Name	From	To	Length (miles)	Existing Facility Type	Proposed Facility Type Group	NOTES
Marshall Ave	Western Ave	John Ireland Blvd	0.4		In-Street Separated Lane	Counter-flow bike lane.
Manomin Ave	George St	Cherokee Ave	0.1	Enhanced Shared Lane	Enhanced Shared Lane	Existing interim route until Cherokee Ave Trail extension across Smith Ave is constructed.
George St	Cherokee Ave	Smith Ave	0.1	Enhanced Shared Lane	Enhanced Shared Lane	Existing interim route until Cherokee Ave Trail extension across Smith Ave is constructed.
George St	Smith Ave	Manomin Ave	0.1	Bike Lane	In-Street Separated Lane	Existing interim route until Cherokee Ave Trail extension across Smith Ave is constructed.
Hamline Ave	Montreal Ave	Pierce Butler Rte	3.8		In-Street Separated Lane	Implementation of bike lanes is contingent upon further engineering study and traffic analysis. Portions of this alignment may not be feasible with current traffic volumes.
Aldine St	Summit Ave	Carroll Ave	0.8		Bicycle Boulevard	Must convert roadway to 2-way traffic & remove parking.
Earl St	Wakefield Ave	Maryland Ave	1.7		In-Street Separated Lane	Northbound bike lane - One-way pair with Forest Street.
Forest St	Old Hudson Rd	Maryland Ave	1.7		In-Street Separated Lane	Southbound bike lane - One-way pair with Earl Street.
University Ave	Raymond Ave	Aldine St	1.4		Enhanced Shared Lane	Recommended as interim route until alternate parallel routes to north and south are established.
Vandalia St	Territorial Rd	Ellis Ave	0.2		Enhanced Shared Lane	Recommended as interim route until Minnehaha Avenue extension from Vandalia Street to Prior Avenue can be developed.
Ellis Ave	Vandalia St	Transfer Rd	0.2		Enhanced Shared Lane	Recommended as interim route until Minnehaha Avenue extension from Vandalia Street to Prior Avenue can be developed.
Charles Ave	Raymond Ave	Transfer Rd	0.6		Enhanced Shared Lane	Recommended as interim route until Minnehaha Avenue extension from Vandalia Street to Prior Avenue can be developed.