DMC TRANSPORTATION & INFRASTRUCTURE PROGRAM

INTEGRATED TRANSIT STUDIES

City Loop Study Report

Prepared for:

Destination Medical Center Corporation

City of Rochester, Minnesota

DMC Transportation & Infrastructure Program

DMC
A Global Destination for Health & Healing

CITY OF ROCHESTER MINNESOTA

DMC TRANSPORTATION INFRASTRUCTURE PROGRAM MANAGEMENT

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PLANNING + DESIGN

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City Project No. J8620

This report is one of five Integrated Transit Studies (ITS) Reports and an Executive Summary that were prepared for the Destination Medical Center Corporation (DMCC) and the City of Rochester, Minnesota. The ITS reports were accepted by the DMCC on June 28, 2018 (Resolution No. 69-2018) and by the City of Rochester on July 2, 2018 (Resolution 237-18).

The Integrated Transit Studies are comprised of the following reports:

- Executive Summary
- Transit Circulator Study Report
- Parking & Transportation Management Authority (TMA) Study Report
- City Loop Study Report
- Street Use & Complete Streets Study Report
- Street Operations Study Report

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I. CITY LOOP INTRODUCTION

The 2015 Destination Medical Center (DMC) Development Plan recommended a world-class pedestrian and bicycle urban trail, the City Loop, to better meet the needs of current and future residents of, and visitors to downtown Rochester.

The following document refines and advances the concepts described in the DMC Development Plan and puts forwards recommendations for facility design, route alignment, and implementation of the City Loop.

WHAT IS THE CITY LOOP?

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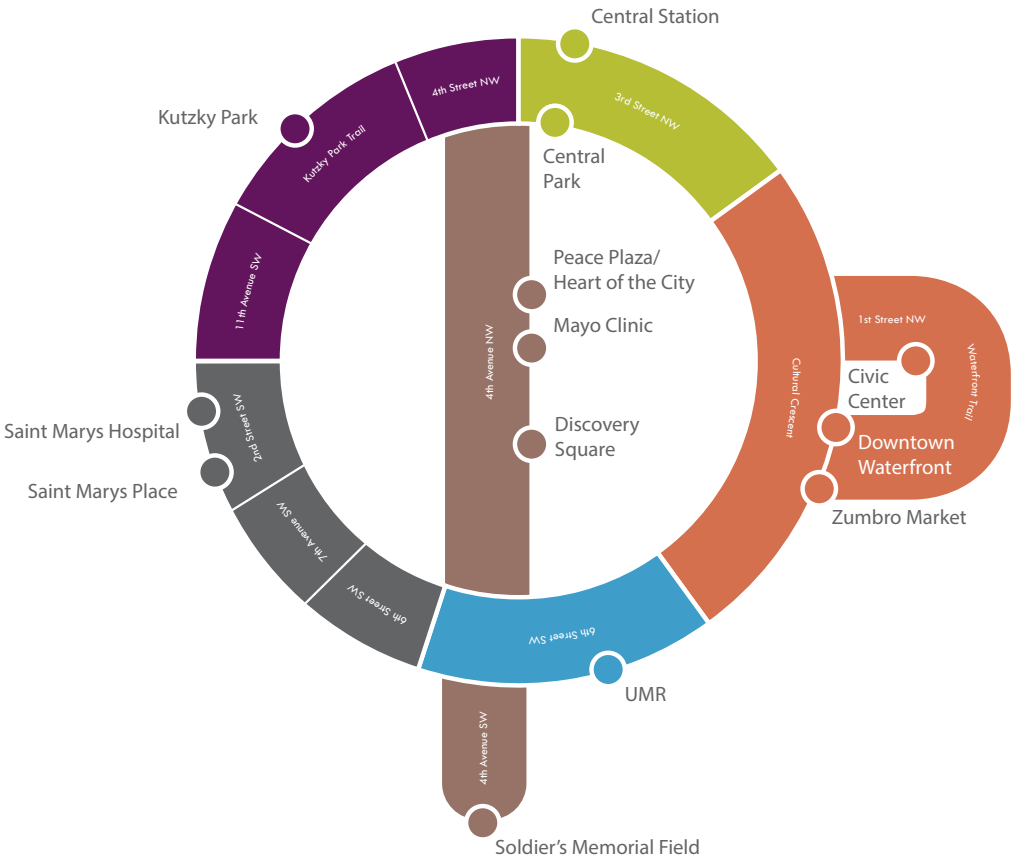
Designed to put Rochester on the map, the City Loop is envisioned as a defining iconic investment that will help to improve the lives of current visitors and residents while attracting new visitors and residents to the DMC. As a world-class pedestrian and bicycle trail in downtown Rochester, both residents and visitors will benefit from:

- A safe and convenient means for recreation and active transportation
- Improved connectivity to downtown amenities, destinations, and subdistricts
- Catalyzed land use development around a high quality and attractive amenity
- Extension of the trails and open space system into the downtown core

The vision for the City Loop is to create a safe, enjoyable, and healthy way to move about the Development District to experience the sites, visit local shops, and dine in local restaurants and eateries. Like its name suggests, the City Loop creates a ring around and through downtown Rochester, connecting six DMC sub-districts on one identifiable and convenient system.

Acting as a sidewalk and protected bikeway circulator, it provides a variety of distinct user-experiences as people walk, roll and bike between sub-districts. Visitors to St. Mary's Hospital will have a safe and enjoyable walk or bike into the heart of the city for a bite to eat while they wait for a loved one. Residents will be encouraged to walk or bike to work on the high quality facilities, improving physical and mental health while helping to relieve traffic congestion within the DMC. Branding and wayfinding will make it easy for visitors and residents to navigate the City Loop and make their way to popular destinations. It will also provide connections to the extensive parks and trails system within the City of Rochester and the region.



The City Loop will not only provide a low stress and attractive walking and biking facility for residents and visitors, but it will help to meet the vision, purpose and goals of the DMC.

DMC
A Global Destination for Health & Healing

Vision, Purpose, and Goals of the DMC:

The City of Rochester, Olmsted County, and State of Minnesota have the unique opportunity to establish the world's foremost medical destination built around a vibrant and growing urban center. The DMC initiative will sustain and support a new 24-hour community where employees are able to enjoy dinner after work without fear of missing their ride home; where patients and their families arrive in a city with a multitude of activities connected by beautiful streets and numerous mobility options; and where downtown residents can meet their daily needs within a short walk. Transportation investments herein provide the connective fabric to tie the DMC vision together and spur economic development.

The DMC has established goals to increase the downtown workforce by 35,000 or more employees and to increase visitation to 6-7 million visits annually. Accommodating Mayo Clinic growth along with other private commercial and residential development will require substantial mode shift from single occupant vehicles to transit, non-motorized travel, and ridesharing. This mode shift will be engendered by unprecedented infrastructure investment and other policy mechanisms discussed in subsequent sections. These investments are fundamental to sustain quality access to downtown for workers and visitors and to move people within the downtown area. They also support the broader goal of the DMC Development Plan – to make Downtown Rochester a world class destination city with the world's best medical center at its core.

- 2015 DMC Development Plan Report

The 8 core areas of the DMC Transportation Plan:

- Commercial Research and Technology
- Health and Wellness
- Transportation
- Entertainment
- Learning Environment
- Livable City, Retail and Dining
- Hotel and Hospitality
- Sports, Recreation and Nature

The City Loop plan is intended to integrate seamlessly with other DMC transportation initiatives from expanded perimeter parking and enhanced transit service to a broader on-street bikeway network. This report summarizes active transportation facility planning and design work focused on refining and advancing City Loop concepts described in the 2015 DMC Development Plan. Below is a map of the original DMC City Loop concept that was used as the basis for further analysis in this report.

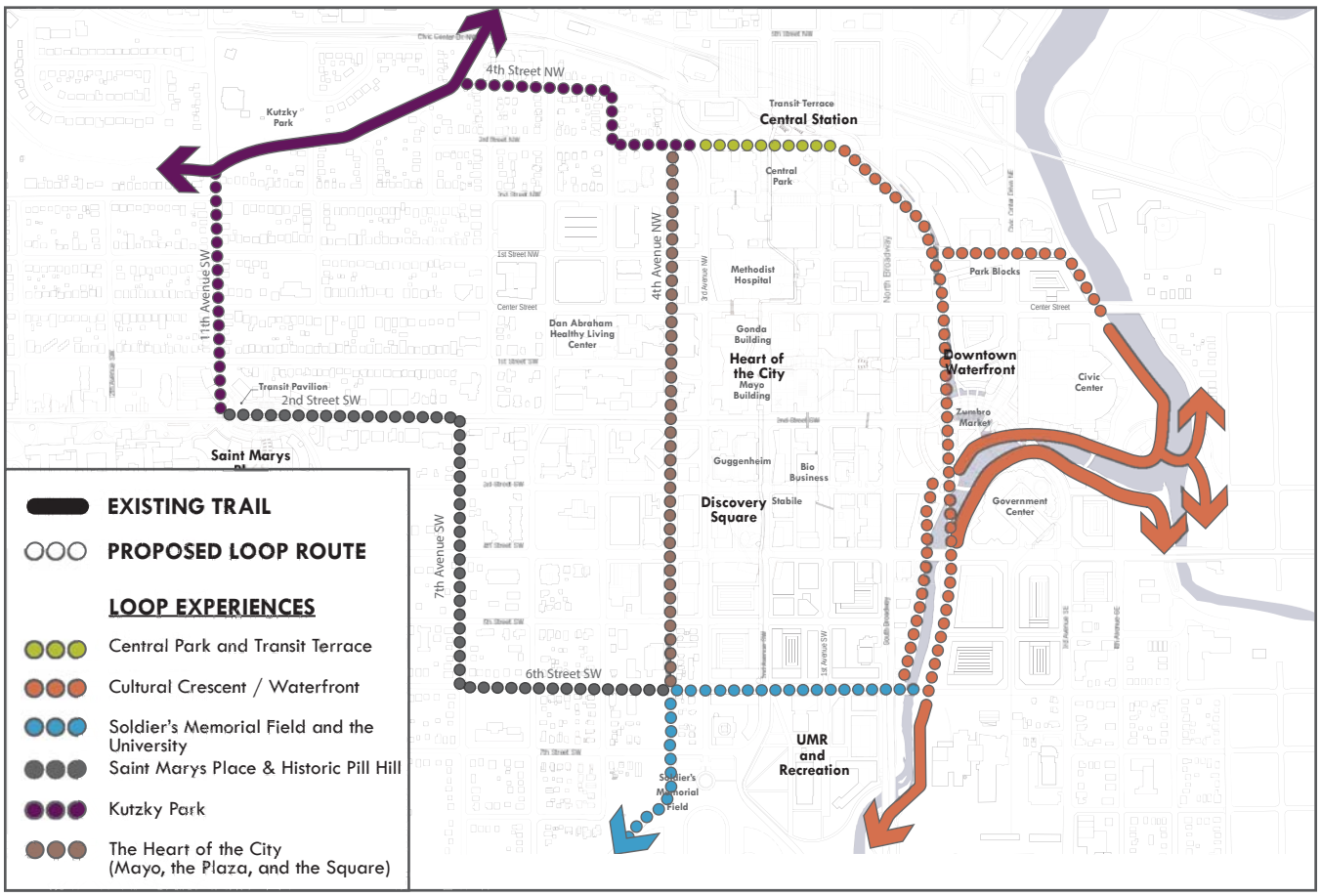


Figure 01: Original DMC City Loop concept from the 2015 DMC Development Plan Report

PURPOSE AND NEED

WHAT IS A PURPOSE AND NEED STATEMENT?

The Purpose and Need statement is the foundation of any transportation improvement project. It establishes issues to be addressed and the means for judging the potential value of alternative solutions. It includes an assessment of travel and development markets, findings of previous studies, a review of existing conditions, and public / stakeholder input. The Purpose and Need statement then translates into project goals and objectives that help define the criteria by which transportation solutions are evaluated.

In the case of a non-motorized, active transportation facility such as the City Loop, the development of a Purpose and Need statement is based on a combination of qualitative and quantitative information due to the limitation of available cycling and walking travel market and user data. Where possible, relevant data developed for the Transit Circulator and Street Use studies was utilized.

The Purpose and Need statement comprises the following five key elements:

1. **STUDY AREA:**

   Identifies the geographic location or setting in which solutions to address the project purpose and goals will be implemented.

2. **PLANNING CONTEXT:**

   Review and analysis of relevant past plans and policies establishing the foundation for the proposed project.

3. **PROJECT PURPOSE:**

   Statement of the fundamental reason for the project.

4. **NEEDS:**

   Description of the transportation issues or problems in the area that the project is intended to address.

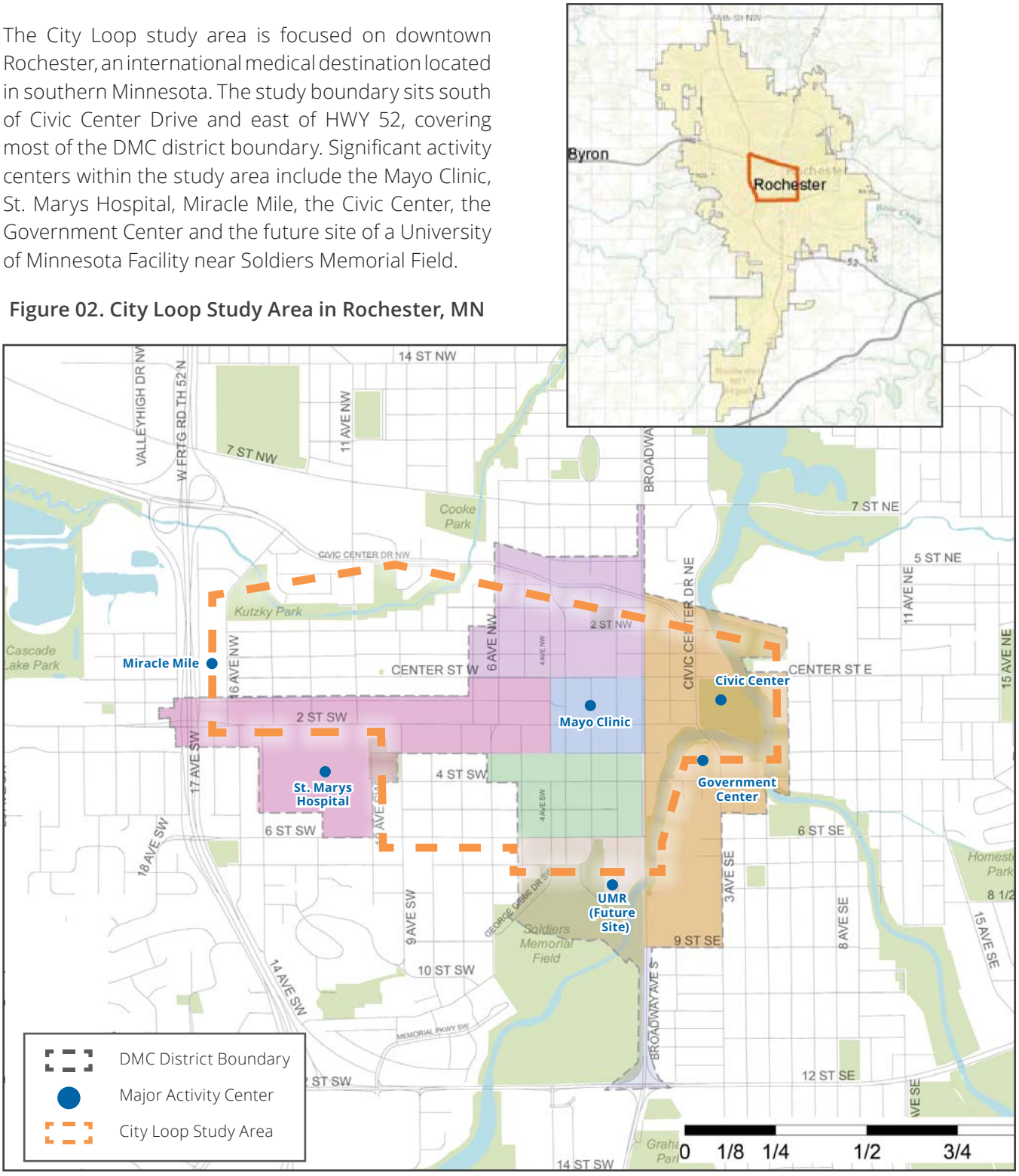
5. **GOALS:**

   Desired outcomes of the project, and the framework to identify and evaluate the performance of a proposed transit alternative.

1 STUDY AREA

The City Loop study area is focused on downtown Rochester, an international medical destination located in southern Minnesota. The study boundary sits south of Civic Center Drive and east of HWY 52, covering most of the DMC district boundary. Significant activity centers within the study area include the Mayo Clinic, St. Marys Hospital, Miracle Mile, the Civic Center, the Government Center and the future site of a University of Minnesota Facility near Soldiers Memorial Field.

Figure 02. City Loop Study Area in Rochester, MN



2 PLANNING CONTEXT

Documents and studies that were reviewed in development of this Purpose and Need include:

- Rochester Downtown Mater Plan Report, 08/2010
- DMC Development Plan, 01/2015
- Rochester 2nd St. Corridor Framework Plan, 02/2009
- Mayo Special Service District Plan Five Year Update, 11/2016
- Rochester Area Bicycle Master Plan, 03/2012
- Rochester Comprehensive Plan 2040 (Draft), 11/2017
- DMC Integrated Transit Studies - Transit Circulator and Street Use Studies, 2017
- Rochester Bike Share Feasibility Study and Business Plan, 12/2013

3 PURPOSE

The purpose of the City Loop is to provide a uniquely identifiable low stress, attractive, high quality walking and biking facility providing a connective greenway throughout the DMC District that encourages private investment and enhances the quality of life.

For Whom:

DMC area employees, businesses, customers, residents, visitors, Civic Center patrons, medical patients, and patient companions. These groups have different needs:

- Patients/companions need quiet, contemplative spaces with access to nature
- Customers / Civic Center Patrons need access to business and social gathering spaces
- Residents / Employees need active transportation amenities, social gathering spaces and access to nature

City Loop can address these needs by providing convenient, safe, high quality connections:

- To landscaped plazas, parks, and natural areas
- To work places, shops, restaurants and other activity centers
- To city-wide and regional shared-use path network

Bicyclists are a subgroup of targeted users of special concern due to the lack of adequate infrastructure in the downtown area of Rochester that provides safe connections to key destinations.

Bicyclists can generally be organized into four categories:

- Strong and Fearless: 1% of the overall population
- Enthused and Confident: 5-10% of the overall population
- **Interested but Concerned:** 60% of the overall population
- No way, No how: 30% of the overall population

City loop will focus on addressing needs of the 60% (Interested but Concerned), since the top 2 user groups are already accustomed to and comfortable using mixed traffic / bike facilities. It is a way to increase bike mode share by providing a safe and comfortable protected bikeway for a large portion of the population.

Why an Exclusive Walking and Biking Facility?

- Supports the DMC Vision by improving year-round active transportation and recreation options
- Improve community health and wellness by providing an attractive option for walking and biking as an alternative to driving for short trips or recreational purposed in downtown Rochester
- Support environmental sustainability by improving air quality, reducing Rochester's carbon footprint
- Walking and biking supports Mayo strategic initiatives such as the Healthy Living Program
- Strengthen walking and biking connections to each DMC sub-district and to the City's existing shared-use path network, linking visitors, patients/companions, residents and workers to nature, arts, culture, and entertainment – serving users of all abilities

Why a Loop?

Measurable health and wellness benefits:

- With a loop system, travel distance and time can be easily and accurately measured, allowing downtown workers, residents and visitors to rely on the loop for regular exercise
- Health care professionals can prescribe a trip around the loop as part of treatment

Easy to understand and navigate:

- Providing a highly legible, looped pathway system reduces first-time users' concerns of getting lost while increasing the likelihood people will venture out to explore and enjoy the city's shops, eateries, parks and gardens
- The City Loop is intentionally designed to connect to key destinations and attractions in the downtown area and link to other shared-use path networks

Supports memorable branding:

- An interconnected loop design strengthens the ability to communicate a consistent brand through repetition of signature signage, lighting, furnishings, and paving regardless of which neighborhood, district or development site the City Loop is moving through
- Consistent branding and design supports people of all ages and abilities in confidently and independently navigating the City Loop

Rochester is a city of loops:

- With twelve current trail loops providing a foundation for the city's park and trail system, the new DMC City Loop respects tradition while expanding the system

4 NEEDS

Transportation Related Needs

As described in the DMC Development Plan, the DMC District is expected to experience significant growth in travel demand in the next 20 years resulting from growth including:

- Approximately 10.2 million square feet of employment based development that will bring 26-28,000 new workers downtown daily
- Approximately 1,380 new hotel rooms that will bring an average of 1,000 overnight guests to the downtown each day
- Approximately 3,800 new housing units that bring 500-600 new residents to downtown
- Approximately 680,000 square feet of new Retail/Dining/Entertainment space
- Approximately 80,000 people downtown on an average weekday

The current capacity of the street network will not be able to handle the projected increase in peak period traffic volumes if the current mode split is maintained. As such, there is a need to move more people towards transit, walking and biking to alleviate the anticipated congestion. The current bikeways and bike support facilities (such as bike parking) in the DMC area do not support the needed increases in bicycle mode share. In addition, not all existing sidewalks within the DMC area meet requirements of the Americans with Disabilities Act (ADA), posing further barriers to increasing pedestrian mode share.

It is well documented that roadway safety is one of the biggest barriers to increasing the rate of walking and biking. This is one of the reasons that the DMC City Loop will offer bicycle and pedestrian facilities that are separated from road traffic. Studies have shown that bicycling may increase by as much as 75 percent after implementing separated bike lanes, and pedestrian safety is also shown to benefit. By providing a high quality pedestrian and bicycle facility, The DMC City Loop will specifically target the 60 percent of people who are interested in biking and walking throughout the city in order to shift users to active modes of transportation.

Health Related Needs

The City of Rochester aspires to be a city of health. In order to holistically achieve this goal, investment in active transportation infrastructure and programming are an essential part of the equation. The physical, mental, and social health benefits of active travel, as well as the reduction in localized road network congestion and conflicts will help propel Rochester into the next generation of healthy living.

A review was conducted of health conditions within and surrounding the DMC district. It found that:

- The rate of Coronary Heart Disease (CHD) in Rochester is 5%, compared to 3.5% in the State of Minnesota and 4.4% in the United States.
- There are higher rates of CHD, poor mental health, obesity, and diabetes within DMC district and in adjacent neighborhoods compared to other neighborhoods in Rochester.
- Obesity effects 22.5% of adults (18 years and older) within and adjacent to the DMC district.

Chronic disease is the leading cause of death and disability in the United States, which results in approximately 70% of deaths each year. It is well understood that increasing physical activity levels is one of the most effective ways to reduce the risk of chronic diseases and related risk factors. Specifically, physical activity is associated with reductions in the risk of overweight/ obesity, high blood pressure, abnormal cholesterol, diabetes, coronary heart disease, some cancers, depression, and all-cause mortality.[i-viii]

Determinants of health are factors that contribute to a person's current state of health. These determinants are clinical care, biology and genetics, social and economic factors, health behaviors,

physical environment. Scientists do not know the precise contribution of each determinant, but health behaviors, the physical environment, and social and economic factors account for approximately 60-75% of the health factors that contribute to shaping health outcomes, which are all factors that can be impacted by physical activity.

Physical activity is one of the best ways to reduce the risk of overweight/obesity, high blood pressure, and abnormal cholesterol, all risk factors for diabetes. For example, thirty minutes of moderate-intensity physical activity has also been shown to directly reduce the risk of diabetes up to 30-50 percent. [ix]

However, in order to realize the benefits that physical activity can have for Rochester residents, people who work in Rochester, and those visiting the city, the city's active transportation infrastructure must be designed to meet a high level of safety and comfort to encourage walking and biking. With the help of the City Loop, Rochester will not only be known for its world-class medical facilities and services, but also for its exemplary active transportation facilities that promote physical activity and overall wellness.

Note: A fully detailed health analysis for Rochester can be found in Tech Memo 2 of the Appendix.

i-ix. See Citations page at end of document

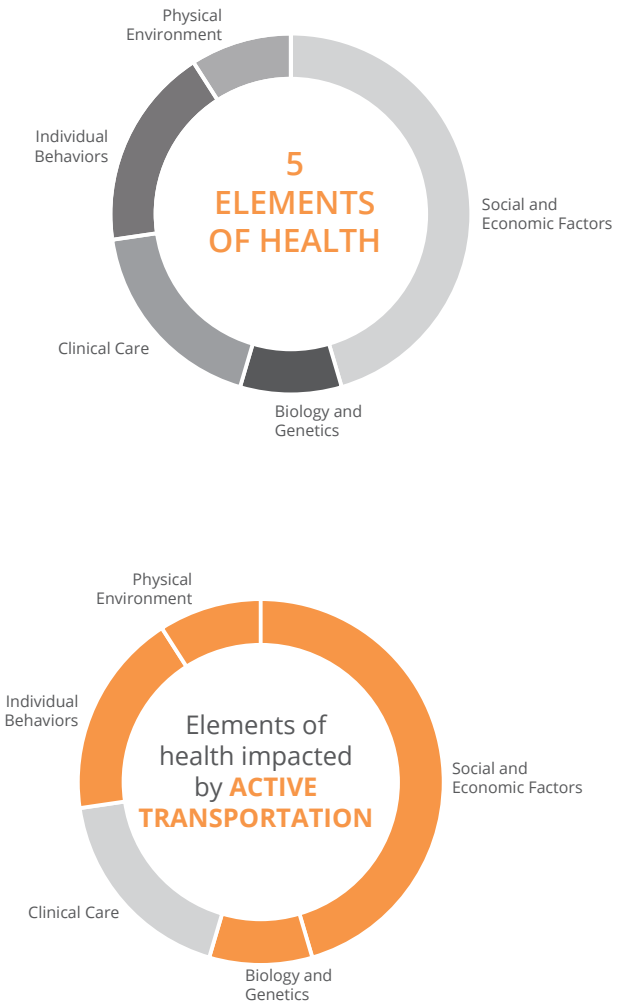


Figure 03. Elements of Health

Sources:https://www.cdc.gov/nchhstp/socialdeterminants/faq.html, County Health Rankings & Roadmaps. University of Wisconsin Population Health Institute. Accessed January 2017. Retrieved from http://www.countyhealthrankings.org/our-approach

5 GOALS

Based on the needs described in the previous section, a set of goals have been developed to guide the City Loop process. These goals provided, and will continue to provide, the framework to ensure that the overall vision for the City Loop is met. The goals listed below address 8 of the 10 transportation principles identified by the DMC Development Plan and they are listed in no particular order.

- Reduce motor vehicle trips
- Boost business vitality at the street level
- Reduce the ecological footprint of the city
- Improve public health (physical, mental and social)
- Create an exceptional public realm for healthy, human-powered, transportation that is, attractive, distinctive, accessible and inclusive to people of all ages, abilities, and states of wellness
- Support DMC economic development initiatives
- Increase walking and biking in Rochester and increase the number and percentage of commuter bike/walk trips to downtown Rochester from an existing bike/walk mode split of 7% (2008) to 13% by 2035
- Strengthen connections to passive and active places and spaces, improve connectivity within downtown and thoughtfully connect downtown to its adjacent neighborhoods

Guided by these goals, the following section provides a detailed analysis and set of recommendations for the design of the City Loop.

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II. PRELIMINARY PLANNING AND DESIGN

A. Facility Type Analysis
B. Route Analysis
C. Design Vocabulary
D. Bike Share
E. Green Infrastructure

FACILITY TYPE ANALYSIS

Included in this section:

1. User Types
2. Bikeway Facility Classification
3. Facility Selection and Recommendations

INTRODUCTION

Preliminary planning and design efforts for the DMC City Loop focus on advancing conceptual-level planning and design work described in the January 2015 DMC Development Plan. As with previous efforts, this new work continues to apply pedestrian and bicycle facility best practices while calibrating for local context, site-specific conditions, refinement of project goals, stakeholder input and financial parameters.

USER TYPES

The Facility Type Analysis takes a deeper look into the variety of users and how the City Loop facility can be designed to best meet their recreation and active transportation needs. As it was stated in the previous section, The City Loop is intended to serve DMC area employees, businesses, customers, residents, visitors, Civic Center patrons, medical patients, and patient companions. Each of these groups will use the facility in different way. Since the City Loop is intended to serve both pedestrians and bicyclists, it's important to consider the needs and preferences of all potential users.

PEDESTRIANS

Pedestrians are anticipated to utilize the City Loop for walking and rolling (via hand or motor-powered wheel chairs). Addressing the principles of walkability is an important consideration when planning and designing pedestrian pathway systems, including the following elements:

1. A walk should be safe
2. A walk should be comfortable
3. A walk should be useful
4. A walk should be interesting

Addressing aspects of **safety** are primarily centered on interactions with moving vehicles from cars, trucks, buses and trains to bicyclists, and skateboarders. Aspects of pedestrian safety includes such things as visibility and sight distance, especially at intersections, traffic control devices (signs & signals), physical separation between pedestrians and vehicles (including bikes), vehicle speed (speed limits), lighting, pavement materials and ADA (Americans with Disabilities Act) requirements. Reductions in vehicle speeds can have a significant influence on pedestrian crashes and injuries. Pedestrians suffer much more serious injuries when struck by high-speed vehicles (over 30 mph) than when struck by vehicles going more slowly.

Another important safety consideration is the type of land uses and buildings that a pathway travels along. Facilities with minimal user activity such as parking garages or industrial buildings typically have low pedestrian activity and don't provide eyes on the street. Conversely, a mix of commercial, office, lodging and residential buildings are typically more active for longer periods of time and provide opportunities for building inhabitants to observe people on adjacent sidewalks and streets.

Pedestrian **comfort** elements includes things like prevalence of plantings to provide shade (especially street trees), benches, evenly spaced, non-glare lighting and level walking surfaces.

Supporting a more **useful** walk includes maximizing connections to shops and restaurants, places of employment, schools, arts and culture venues, parks and greens spaces and adjacent neighborhoods.

For a walk to be **interesting** a pathway should move through a variety of places and spaces from downtown central business districts to residential neighborhoods, to parks and natural areas. It can also include the introduction of public art, cultural heritage interpretive and/or wayfinding signage.

The four elements of walkability have been considered throughout the planning of the City Loop and various aspects of the elements have been included and addressed in the criteria used for evaluating alternative route scenarios.

Universal Design

Establishing a base level of awareness about potential needs and preferences of people with differing abilities is important to designing for universal accessibility. The lists below are not intended to be comprehensive, but to provide examples of the kinds of considerations that are important for accessibility.

Only 10% of people with visual impairment are completely blind. Pedestrians with low vision:

- May have difficulty with depth perception
- Problems in judging location of vehicles
- Problems in judging approach speed of vehicles
- May have reduced contrast sensitivity
- May have difficulty reading signs and signals
- May use the sound of traffic to orient themselves
- May be sensitive to glare

People with hearing impairment:

- Tend to maintain a wider distance from others to facilitate clear visual communication
- May experience fatigue with poor lighting conditions
- May find reverberation caused by sound waves reflecting off hard surfaces distracting and/or painful

People using wheelchairs:

- May experience pain from traveling over bumpy terrain
- If using electric wheelchairs, pay attention to battery levels when planning travel
- Seek smooth, wide, and level surfaces

BICYCLISTS

Bicyclists lack the protection from the elements and roadway hazards provided by an automobile's structure and safety features. By understanding the unique characteristics and needs of bicyclists, a facility designer can provide quality facilities and minimize user risk.

The current American Association of State Highway and Transportation Officials' (AASHTO) Guide to the Development of Bicycle Facilities encourages designers to identify their rider type based on the trip purpose (Recreational vs Transportation) and on the level of comfort and skill of the rider (Causal vs Experienced). An alternate framework for understanding the US population's relationship to transportation focused bicycling is illustrated in the figure below. Developed by planners in Portland, OR[x] and supported by research[xi], this classification identifies four categories to address varying attitudes towards bicycling in the US.

Strong and Fearless (approximately 1% of population) Characterized by bicyclists that will typically ride anywhere regardless of roadway conditions or weather. These bicyclists can ride faster than other user types, prefer direct routes and will typically choose roadway connections -- even if shared with vehicles -- over separate bicycle facilities such as shared-use paths.

Enthused and Confident (5-10% of population) - This user group encompasses bicyclists who are fairly comfortable riding on all types of bikeways but usually choose low traffic streets or shared-use paths when available. These bicyclists may deviate from a more direct route in favor of a preferred facility type. This group includes all kinds of bicyclists such as commuters, recreationalists, racers and utilitarian bicyclists.

Interested but Concerned (approximately 60% of population) – This user type comprises the bulk of the cycling population and represents bicyclists who typically only ride a bicycle on low traffic streets or shared-use paths under favorable weather conditions. These bicyclists perceive significant barriers to their increased use of cycling, specifically traffic and other safety issues. These people may become "Enthused & Confident" with encouragement, education and experience.

No Way, No How (approximately 30% of population) – Persons in this category are not bicyclists, and perceive severe safety issues with riding in traffic. Some people in this group may eventually become more regular bicyclists with time and education. A significant portion of these people will not ride a bicycle under any circumstances and may not be physically able to do so.

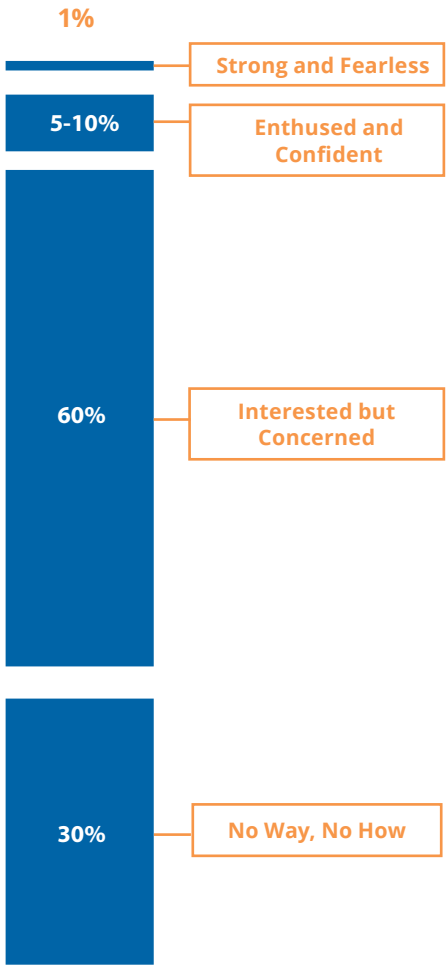


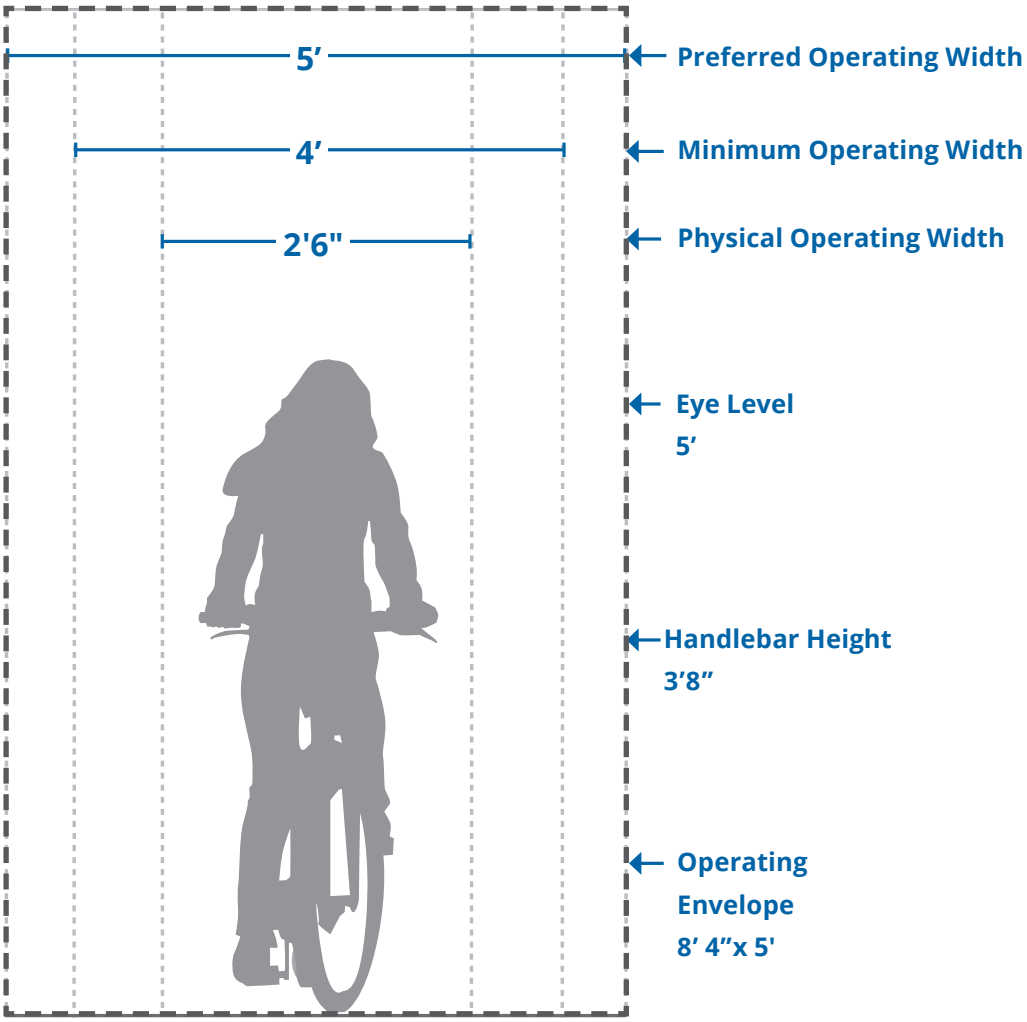
Figure 04. Typical Distribution of Bicyclist Types

USER DESIGN DIMENSIONS

The purpose of this section is to provide the facility designer with an understanding of how bicyclists operate and how their bicycle influences that operation. Bicyclists, by nature, are much more affected by poor facility design, construction and maintenance practices than motor vehicle drivers.

Bicyclists lack the protection from the elements and roadway hazards provided by an automobile's structure and safety features. By understanding the unique characteristics and needs of

Figure 05. Bicycle Rider - Typical Dimensions



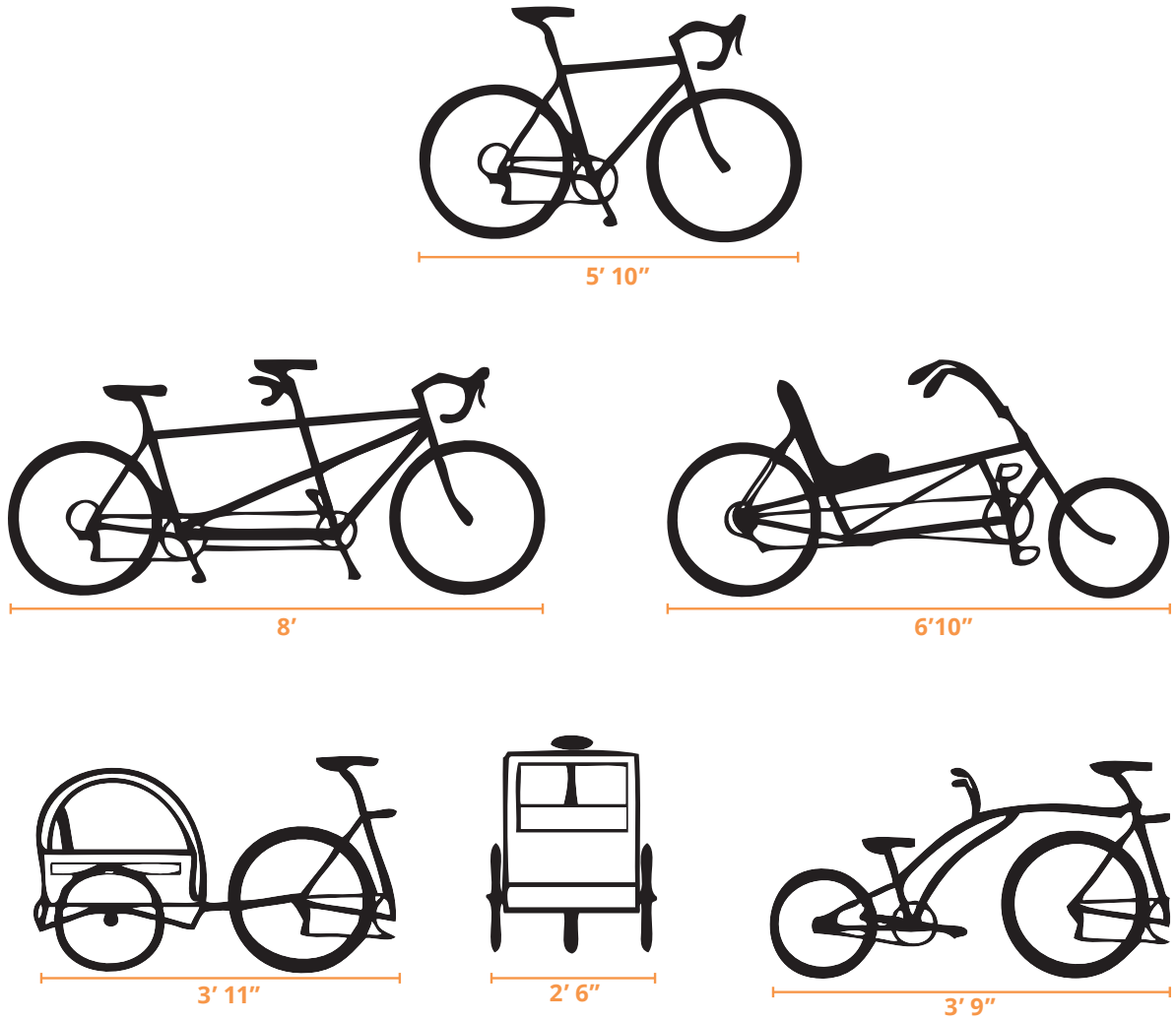


Figure 06. Typical Bicycle Dimensions

Source: AASHTO ***Guide for the Development of Bicycle Facilities***, 4th Edition

Design Speed Expectations

The expected speed that different types of bicyclists can maintain under various conditions also influences the design of facilities such as shared use paths. The table to the right provides typical bicyclist speeds for a variety of conditions.

Table 01. Typical Bicycle Speeds by Type

Bicycle Type	Feature	Typical Speed
Upright Adult Bicyclist	Paved level surfacing	8-12 mph*
	Crossing Intersections	10 mph
	Downhill	30 mph
	Uphill	5 -12 mph
Recumbent Bicyclist	Paved level surfacing	18 mph

* Typical speed for casual riders per AASHTO 2013.

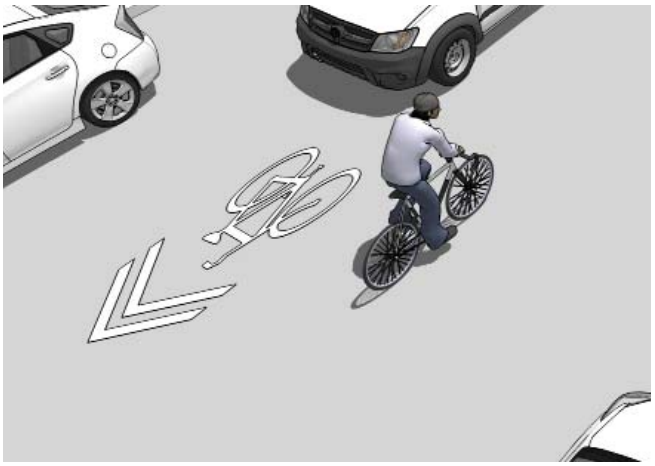
BIKEWAY FACILITY CLASSIFICATION

Bicycle facilities can be identified by the degree of separation from motor vehicle traffic. These are generally classified into three categories: shared roadways, on-street striped bikeways, and protected bikeways.

SHARED ROADWAYS

Bicyclists and cars operate in the same travel lane, either side by side or in single file depending on roadway configuration.

- **Signed Routes** simply provide wayfinding navigation between designated bicycle routes
- **Bicycle Boulevards** designate bicycle routes with signs, pavement markings, and include speed and volume controls (traffic calming and diversion) to optimize the roadway for bicycle travel



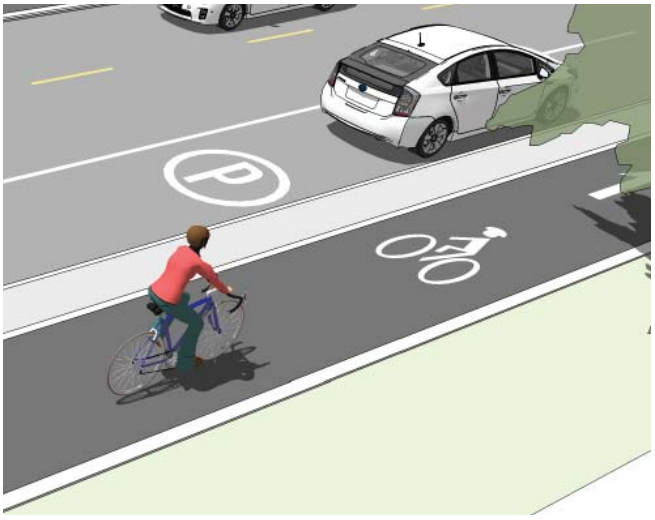
ON-STREET STRIPED BIKEWAYS

Bicyclists operate in a portion of the right of way delineated by striping and signage.

- **Bicycle lanes** are dedicated space for bicyclist travel adjacent to and distinct from travel lanes, either adjacent to a curb or parking lane
- **Buffered bicycle lanes** provide an additional painted buffer between the bicycle lane and the travel lane

PROTECTED BIKEWAYS

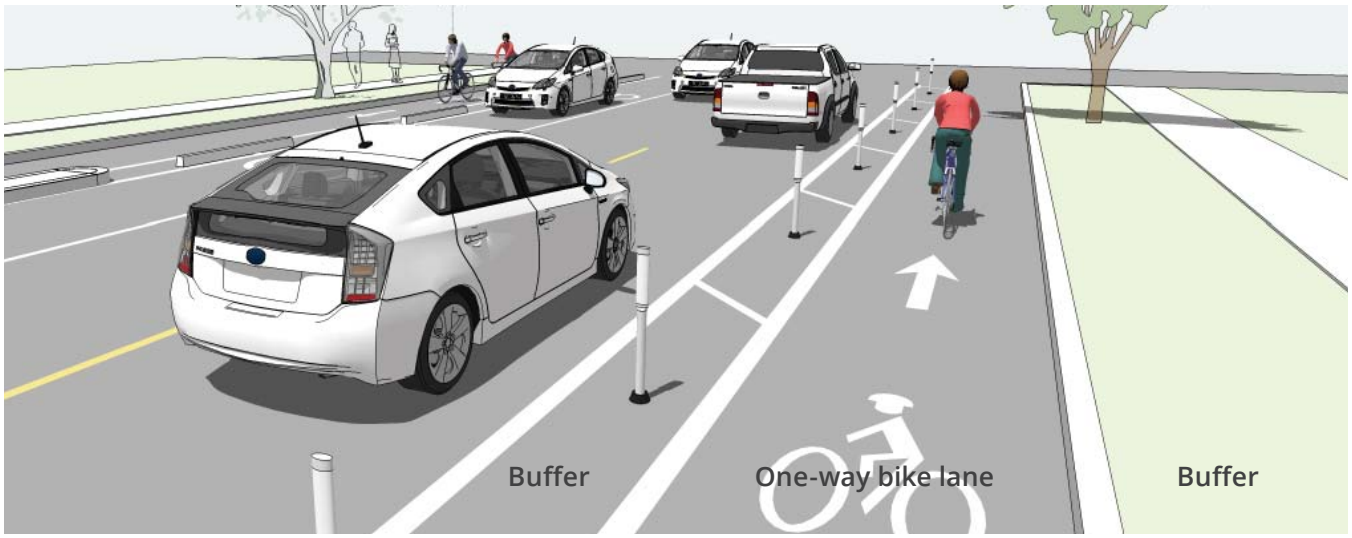
Exclusive bicycle facilities that combine the user experience of a separated path with the on-street infrastructure of bike lanes. Protected bike lanes can be at street level, raised to the level of the sidewalk or set at an intermediate level between the roadway and the sidewalk. They may be one directional or bi-directional depending on available width and other design considerations.



PROTECTED BIKEWAY DESIGN

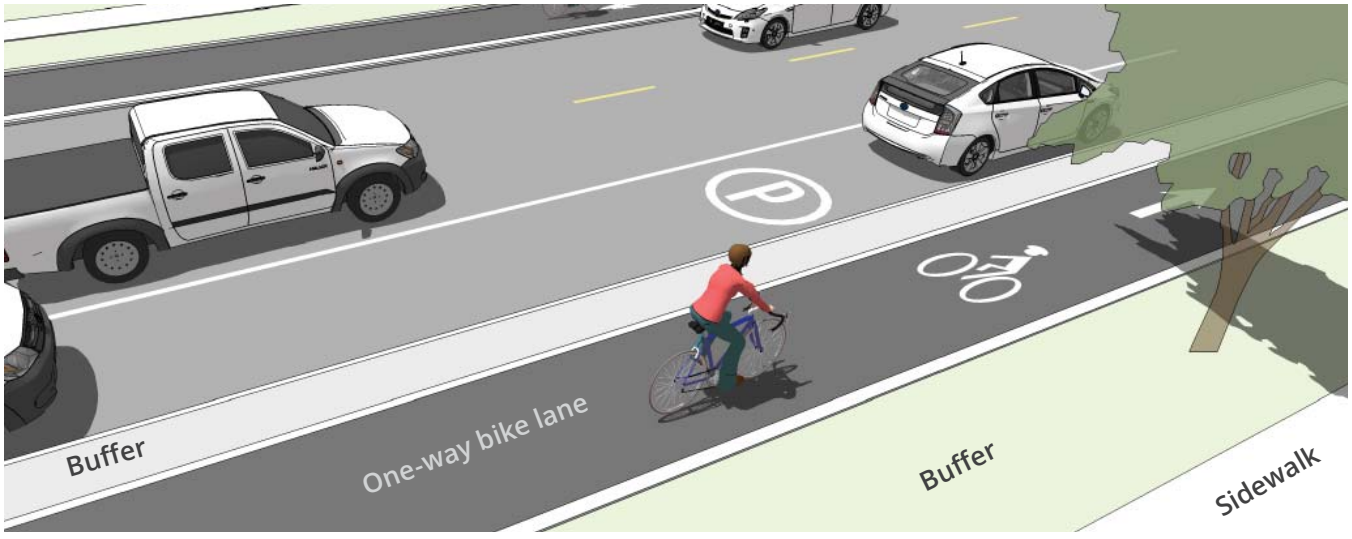
STREET LEVEL PROTECTED BICYCLE LANES

Street-level protected bicycle lanes could be considered for pilot or interim implementation of the City Loop. This design provides protection through physical barriers and can include flexible delineators, planters, curbs, on-street parking or other barriers. A street level protected bike lane shares the same elevation as adjacent travel lanes. The primary advantage of street-level protected bike lanes is their lower cost and shorter time frame for implementation. However, street-level protected facilities are generally not as desirable from an urban design perspective, and are not as comfortable for users as raised protected bike lanes.



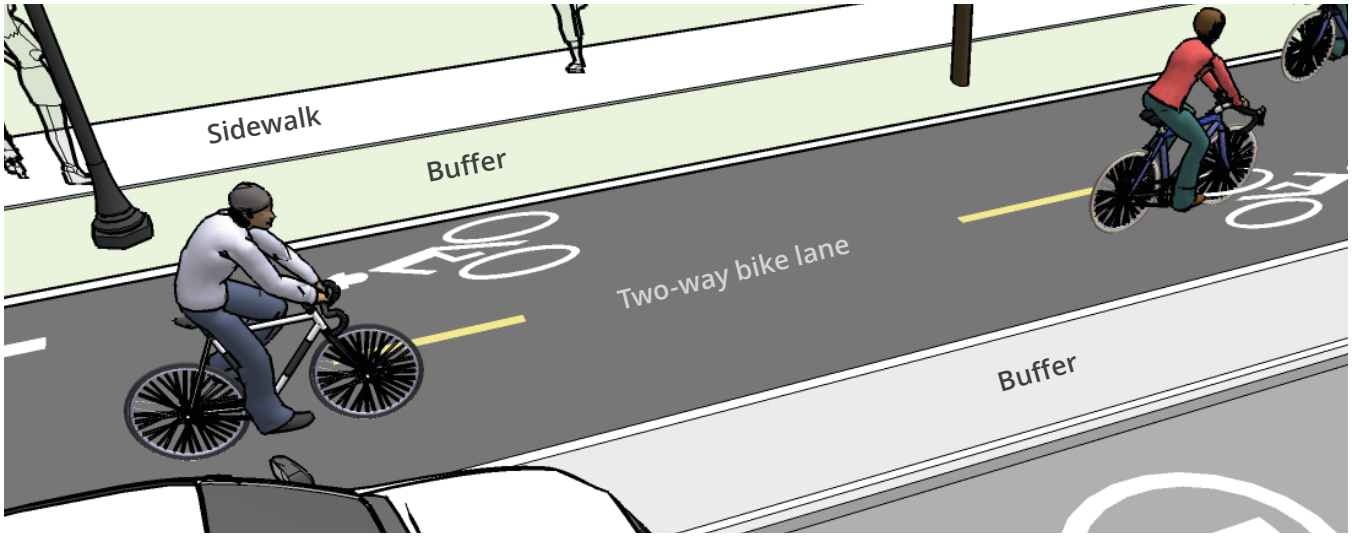
RAISED ONE-WAY PROTECTED BICYCLE LANES

Raised protected bicycle lanes may be at the level of the adjacent sidewalk or set at an intermediate level between the roadway and sidewalk to separate the bike lane from the pedestrian. Raised one-way protected bicycle lanes at sidewalk level could be considered in some locations of the City Loop.



RAISED TWO-WAY PROTECTED BICYCLE LANES

Two-Way Protected Bicycle Lanes allow bicycle movement in both directions on one side of the road. The facility may be at the level of the adjacent sidewalk or set at an intermediate level between the roadway and sidewalk. Two-way protected bicycle lanes share some of the same design characteristics as one-way protected bicycle lanes, but may require additional considerations at driveway and side-street crossings. The City Loop is primarily envisioned as a network of two-way protected bicycle lanes raised to the sidewalk level.



FACILITY SELECTION

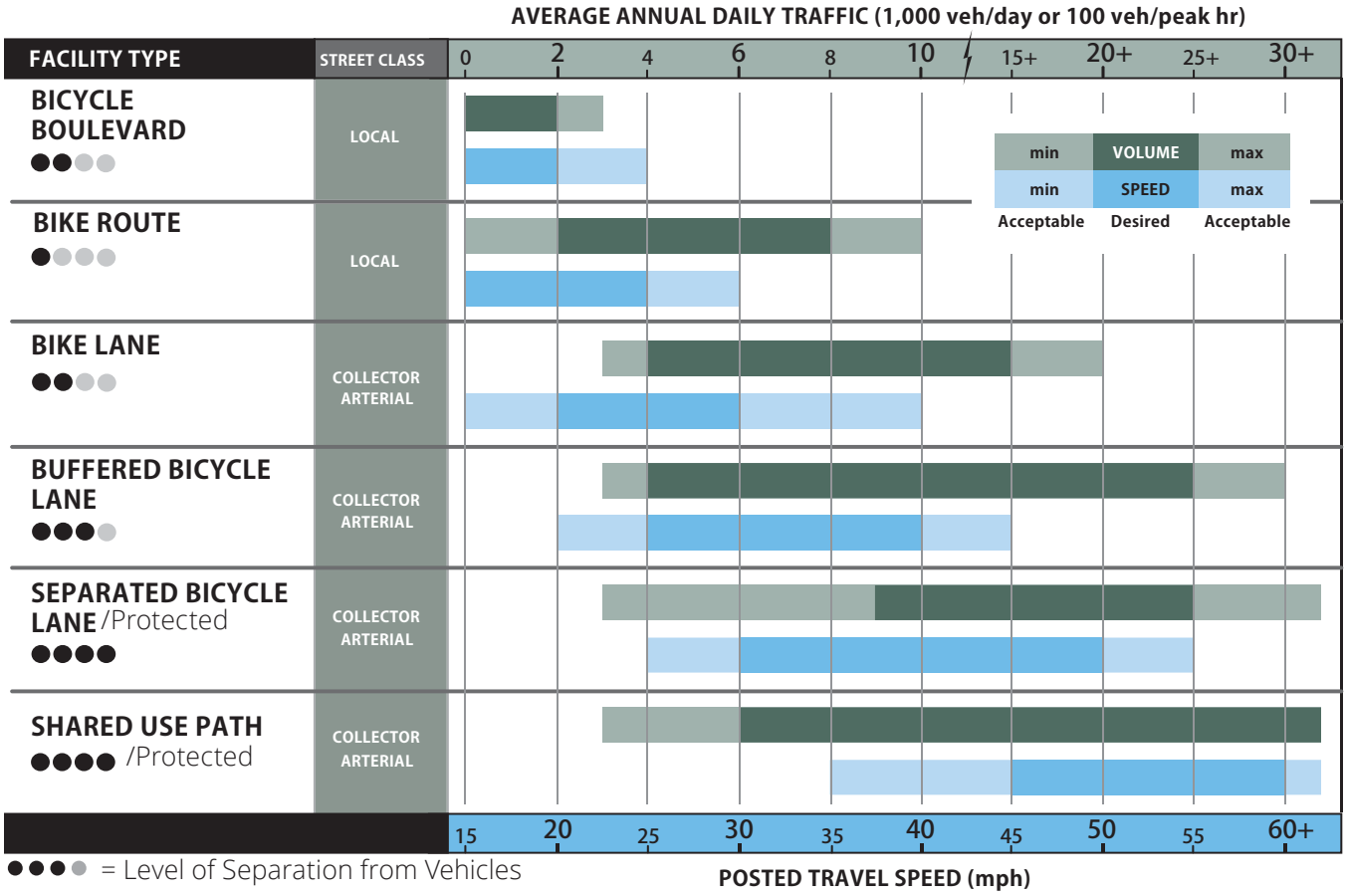
Selecting the best bikeway facility type for a given roadway can be challenging, due to the range of factors that influence bicycle users' comfort and safety. There is a significant impact on cycling comfort when the speed differential between bicyclists and motor vehicle traffic is high and motor vehicle traffic volumes are high.

FACILITY SELECTION TABLE

As a starting point to identify a preferred facility, the chart below can be used to determine the recommended type of bikeway to be provided in particular roadway speed and volume situations. To use this chart, identify the appropriate daily traffic volume and travel speed on or the existing or proposed roadway, and locate the facility types indicated by those key variables.

Other factors beyond speed and volume which affect facility selection include traffic mix of automobiles and heavy vehicles, the presence of on-street parking, intersection density, surrounding land use, and roadway sight distance. These factors are not included in the facility selection chart below, but should always be considered in the facility selection and design process.

Figure 07. Recommended Bicycle Facility Types by Level of Traffic and Speed



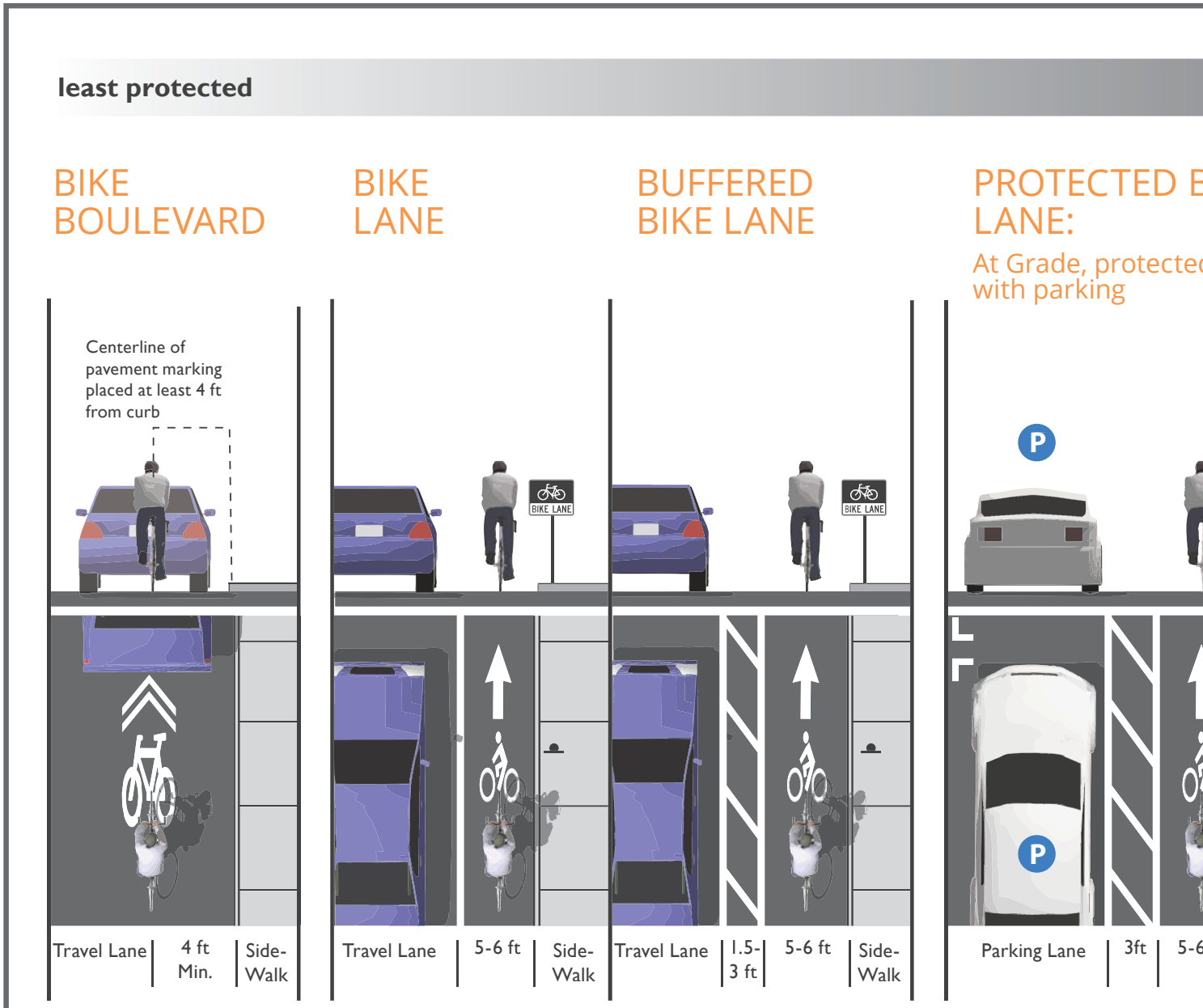
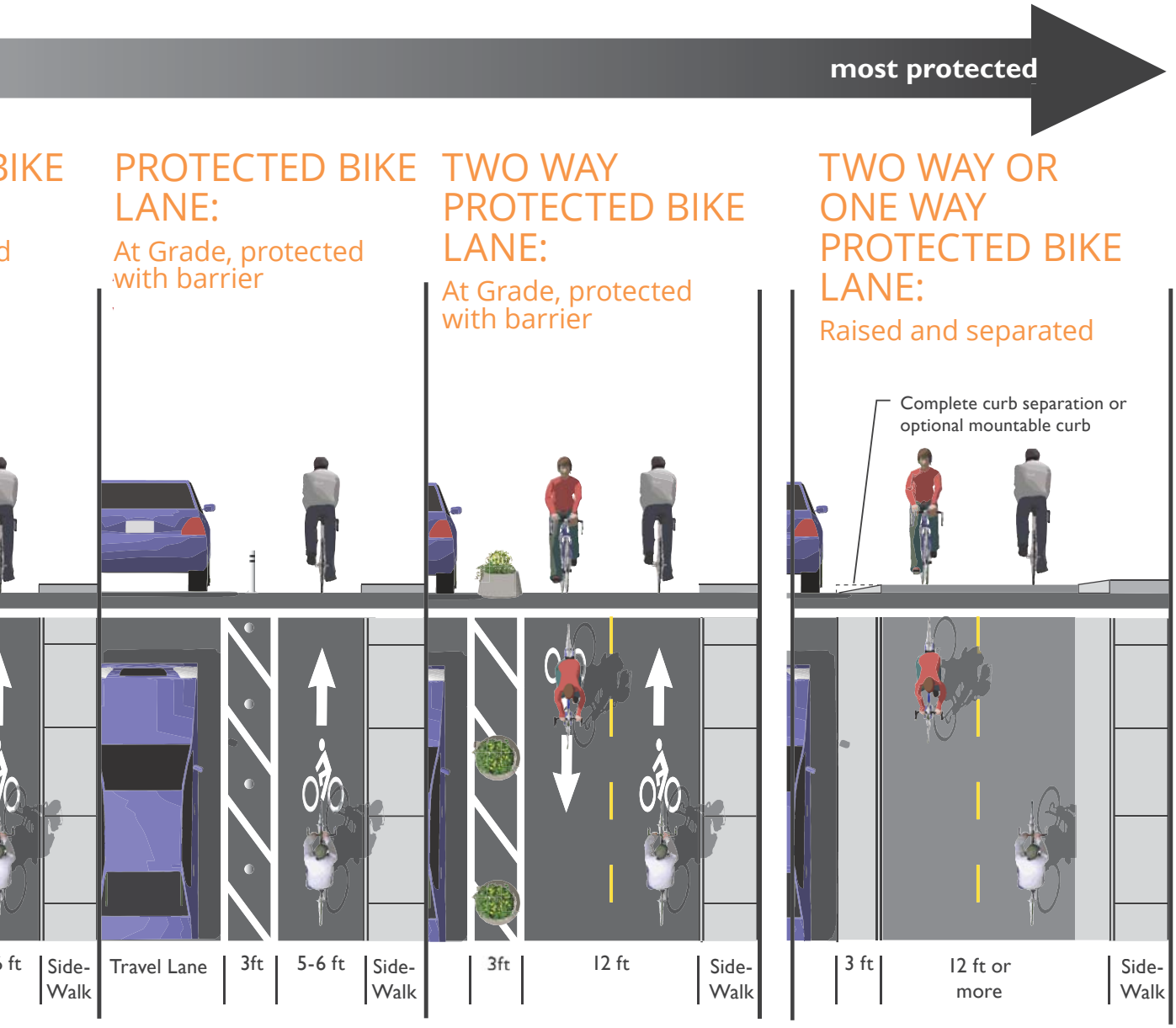


Figure 08. Bicycle Facility Types by Level of Protection from Motorized Vehicles

This figure shows a sample cross section for each of the bicycle facility types discussed on the previous page, ranked by level of protection from motor vehicles. The Bike Boulevard on the far left provides the lowest level of protection from motor vehicles with bicyclists sharing a lane marked by shared lane symbols, also known as sharrows. As the level of traffic and speed increase, so does the level of protection. The Two Way Protected Bike lane on the far right hand side of the graphic is raised to the curb level and separated by buffers on either side. This option provides the highest level of protection, encouraging use by bicyclists of all comfort levels and abilities.

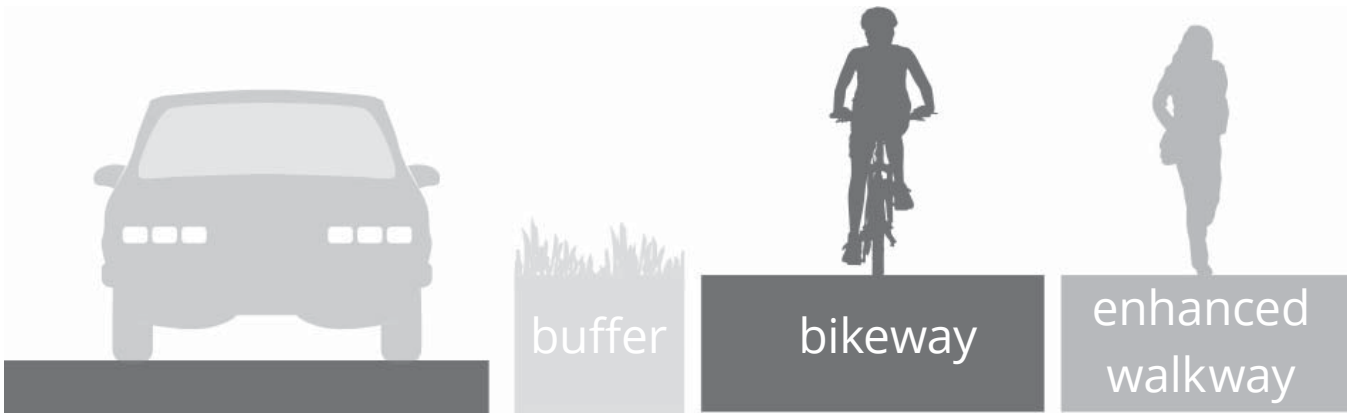

most protected
BIKE
d
PROTECTED BIKE LANE:
At Grade, protected with barrier
TWO WAY PROTECTED BIKE LANE:
At Grade, protected with barrier
TWO WAY OR ONE WAY PROTECTED BIKE LANE:
Raised and separated
Complete curb separation or optional mountable curb
ft
Side-Walk
Travel Lane
3ft
5-6 ft
Side-Walk
3ft
12 ft
Side-Walk
3 ft
12 ft or more
Side-Walk

FACILITY RECOMMENDATIONS: AN ELEVATED EXPERIENCE

The City Loop will prioritize walking and biking by physically separating the City Loop from vehicles with a six inch tall curb and where possible, a planted buffer. The experience of being removed from the flow of vehicular traffic will give people confidence to walk and bike at their own pace without the concern of potential conflicts with vehicles. At intersections the City Loop could remain elevated above the street grade via raised crosswalks or table intersections to allow for a seamless user experience that would not require people on foot or on bike to use curb ramps or negotiate with vehicular traffic. Elevated crosswalks and intersections could also play a significant role in calming traffic by slowing vehicular speeds when crossing with the City Loop. This approach would require intersection reconstruction including modifications to existing storm water drainage infrastructure. Where intersection reconstruction is impractical the City Loop would need to transition to meet existing grades.

The key benefits of a raised City Loop are:

- Maximized safety
- Increased user comfort
- Traffic Calming
- Reduced conflicts between all modes
- Legible route through the city
- Unique and distinct facility



City Loop Composition

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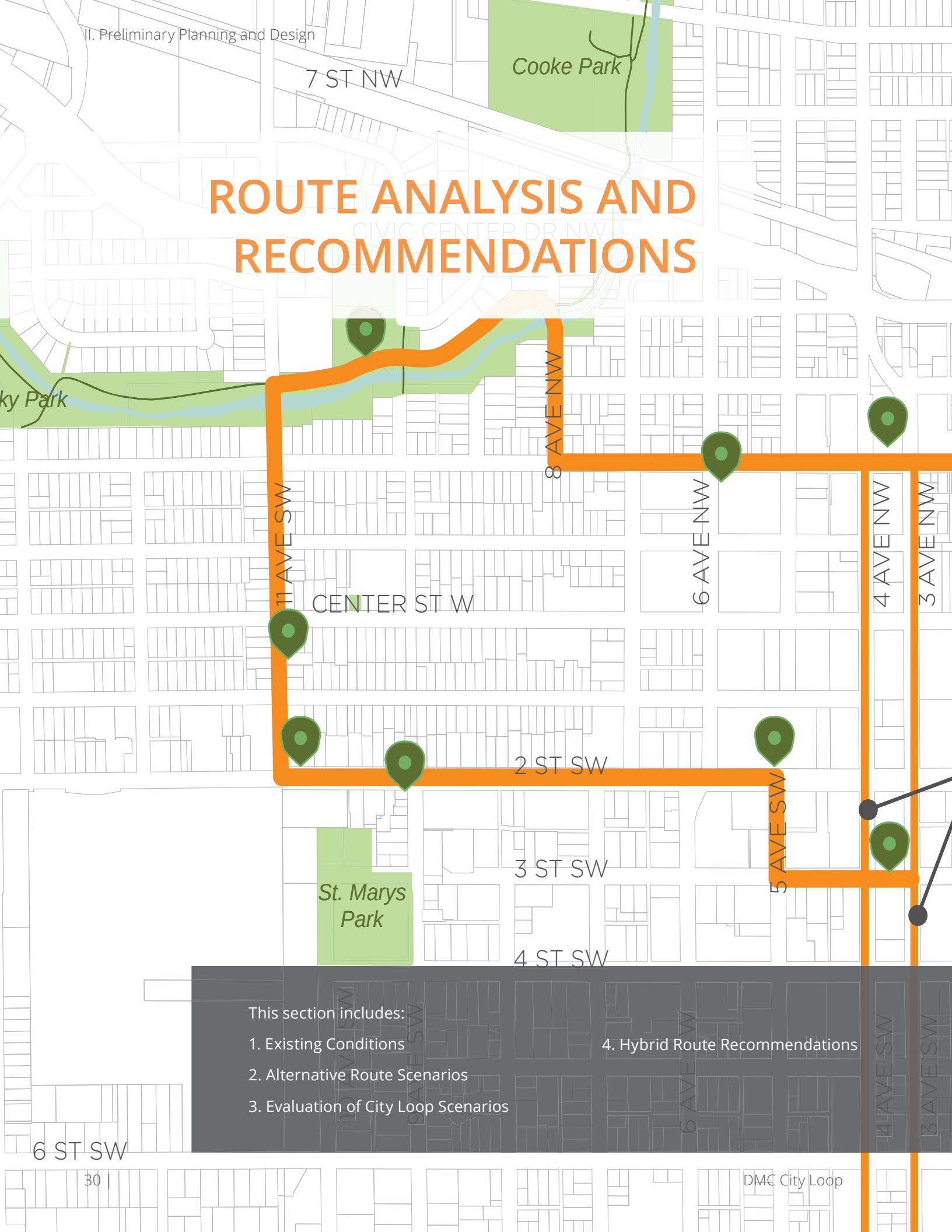
ROUTE ANALYSIS AND RECOMMENDATIONS



This section includes:

1. Existing Conditions
2. Alternative Route Scenarios
3. Evaluation of City Loop Scenarios
4. Hybrid Route Recommendations

EXISTING CONDITIONS

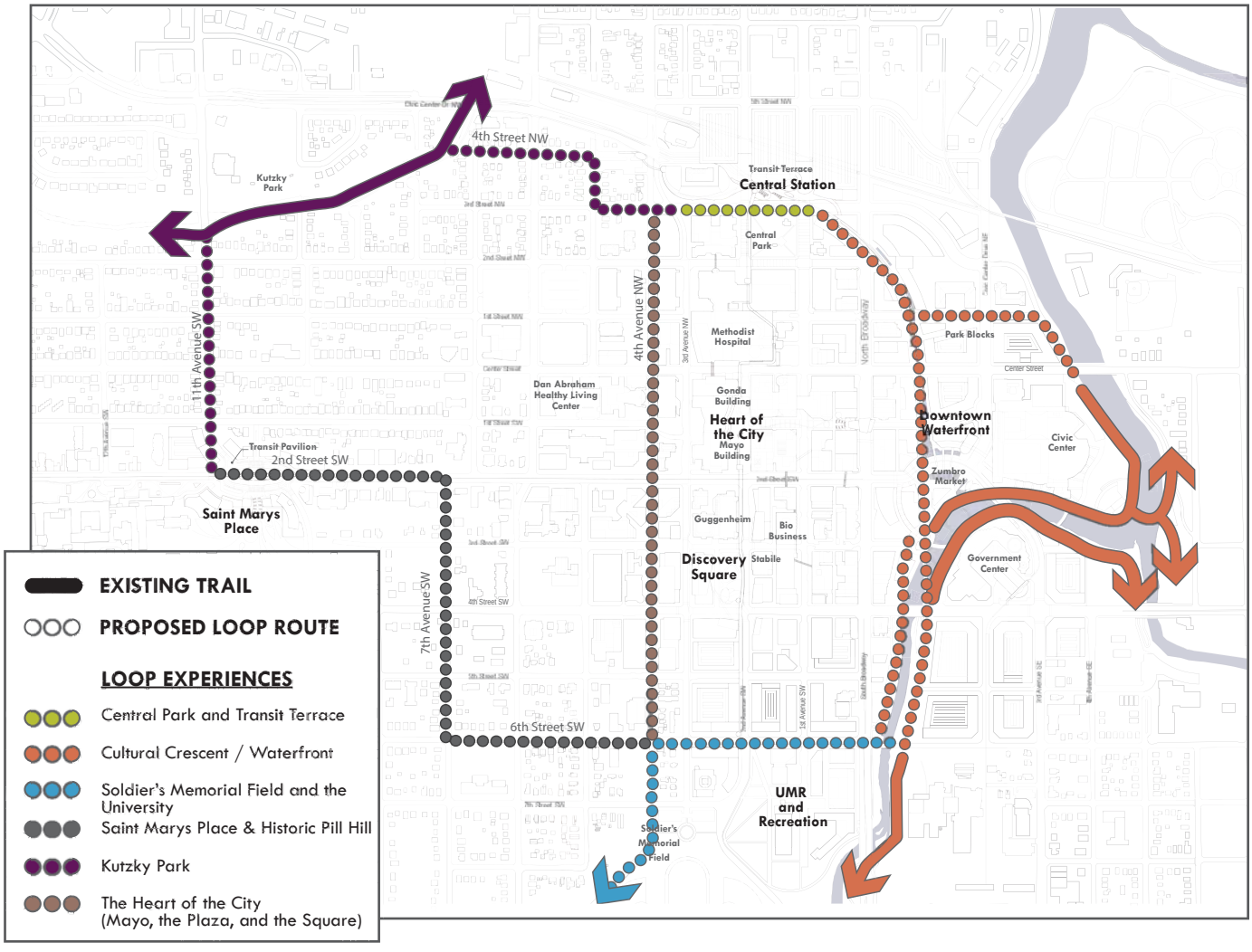
INITIAL DMC DEVELOPMENT PLAN ROUTE ASSESSMENT

The City Loop route assessment and refinement process began with a detailed review of the initial route described in the DMC Development Plan (Figure 09). A spatial analysis of the initial route was conducted using the provided GIS data and aerial photography. The analysis examined ADA parameters as well as physical constraints such as street widths, presence of street trees, pinch points and parking. Land use, connectivity and potential trade-offs required for implementing a protected bike facility were also considered.

This work included walking and cycling the proposed route on multiple occasions between July and October 2016. Conditions were recorded using digital photography, and noted on 1":100' scale aerial photos with embedded 2 foot contour interval mapping. The map below shows the original route alignment from the 2015 DMC Development Plan.

Figure 09. Original City Loop Route and Corridor Experiences

Source: 2015 DMC Development Plan



HIGH LEVEL ADA ASSESSMENT

The City Loop route in the DMC Development Plan appear to meet ADA requirements for centerline gradient (less than 5%) and cross sectional gradient (2% or less) with the exception of two areas:

- Existing shared-use path connection from Kutzky Park to the sidewalk along the south side of Civic Center Dr. includes a short segment of approximately 12.5% gradient
- The gradient of 7th Avenue SW ranges from 5% up to 12.8%

The 7th Avenue corridor includes several other constraints such as numerous large street trees, stone retaining walls and tree lawns (also commonly referred to as "boulevards") of varying widths and continuous overhead utility lines. Existing buildings appear to be a mix of single and two family residences. In total, these conditions make it difficult for the 7th Avenue route segment to support the type of high quality walkway and bikeway envisioned for the City Loop.

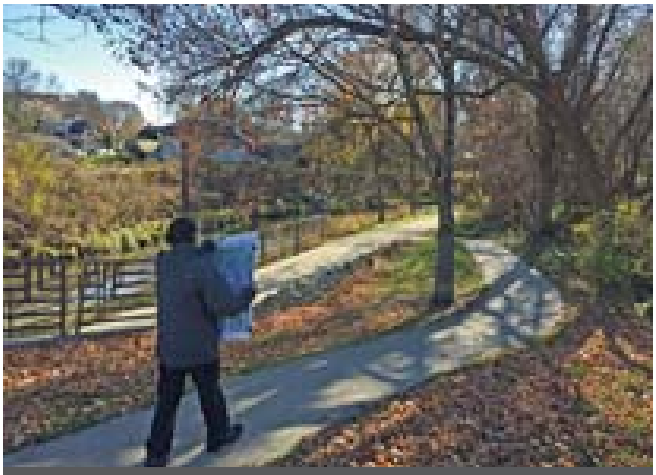
The segment along 6th Avenue SW was reviewed as an alternate to 7th Avenue, but was also found to exceed ADA gradients over several blocks. With the flatter segment of 4th Avenue lying three blocks to the east, it is more practical to use 4th Avenue instead of 7th.

Additional ADA issues concerning wheel chairs and bicycles having to cross existing rail tracks at oblique angles were observed along the proposed Cultural Crescent segment between 2nd. St. NW and 3rd St. NW.

The final recommended route (see Hybrid Scenario, page 44) is more accessible. It avoids 6th and 7th Ave SW and the Cultural Crescent section between 2nd St. NW and 3rd St. NW.

A variety of pedestrian ramp treatments were found. Ramp treatments included weathered steel detectable warnings and drop curbs, exposed aggregate detectable warning areas with drop curbs and detectable warning with a drop curb. Intersections were rated using a rating of 8 out 8 for a fully compliant 4-way intersection. It appears that the City is in the process of upgrading pedestrian curb ramps throughout the project area on an ongoing basis.

A detailed map of the ADA analysis can be found in Technical Memorandum 1 of the Appendix.



Kutzky Park

View of steep gradient and retaining walls on 7th Ave SW

BICYCLE LEVEL OF TRAFFIC STRESS

As part of the planning and concept development, an investigation of existing bicycle comfort was completed using a Bicycle Level of Traffic Stress (LTS) Analysis. This analysis uses street characteristics to rate the roadway from 1 – 4, from most to least comfortable for bicyclists. This analysis acknowledges that comfort and perceived safety are strongly tied to bicycle use. If people do not feel comfortable or safe biking on city streets, they are unlikely to choose to bike for transportation or recreation.

As the City of Rochester considers bicycle improvements that make up the proposed City Loop, the LTS analysis performed and detailed below will help highlight locations where potential improvements could have the biggest effect on a safe, comfortable, and connected bicycle network.

The approach outlined in the Oregon Department of Transportation's (ODOT) Analysis Procedure Manual [xii] uses roadway network data, including posted speed limit, the number of travel lanes, and the presence and character of bicycle lanes, as a proxy for bicyclist comfort level. Road segments are classified into one of four levels of traffic stress based on these factors.

The lowest level of traffic stress, LTS 1, is assigned to low-traffic residential roads that would be suitable for bicycle use by people of all ages and abilities, including children, and also to multi-use paths that are separated from motorized traffic. LTS 2 roads are those that could be comfortably ridden by the most adults. These roads typically have moderate traffic volumes, but low speeds.

The higher levels of traffic stress (LTS 3 and 4) correspond to types of facilities that would be used by more skilled cyclists, as characterized by Portland's bicycle coordinator Roger Geller in his Four Types of Cyclists report[xiii]. This categorization of cyclist types is accepted throughout the bicycling planning practice across the United States. LTS 3 is the level assigned to roads that would be acceptable to current "enthused and confident" cyclists, who are typically comfortable bicycling in striped bike lanes and on low to moderate traffic roads with no dedicated bicycle facilities. LTS 4 is assigned to segments that are only acceptable to "strong and fearless" bicyclists, who will tolerate riding on roadways with higher motorized traffic volumes and speeds, with or without dedicated bicycle facilities. The definitions for each level of traffic stress are shown in Table 02, and Figure 10 shows existing Rochester streets at each LTS level.

A route consisting of stretches of connected low stress streets may be interrupted by needing to cross a high stress intersecting street. Because of this, a trip along a comfortable route might be avoided altogether by a person on a bike – just because of a single uncomfortable crossing. It is critical to acknowledge that stressful streets in an otherwise low stress network will often discourage a person from making a trip by bicycle.

Figure 10. Levels of Traffic Stress Definitions

Source: ODOT Analysis Procedure Manual, Version 2

Table 02. Levels of Traffic Stress (LTS) Definitions

Source: ODOT Analysis Procedure Manual, Version 2

LTS 1	Represents little traffic stress and requires less attention, so is suitable for all cyclists. This includes children who are trained to safely cross intersections (around 10 yrs. old/5th grade) alone and supervising riding parents of younger children. Generally, the age of 10 is the earliest age that children can adequately understand traffic and make safe decisions which is also the reason that many youth bike safety programs target this age level. Traffic speeds are low and there is no more than one lane in each direction. Intersections are easy to cross by children and adults. Typical locations include residential local streets and separated bike paths/cycle tracks.
LTS 2	Represents little traffic stress but requires more attention than young children can handle, so is suitable for teen and adult cyclists with adequate bike handling skills. Traffic speeds are slightly higher but speed differentials are still low and roadways can be up to three lanes wide in total for both directions. Intersections are not difficult to cross for most teenagers and adults. Typical locations include collector-level streets with bike lanes and local streets that might intersect arterials.
LTS 3	Represents moderate stress and suitable for most observant adult cyclists. Traffic speeds are moderate but can be on roadways up to five lanes wide in both directions. Intersections are still perceived to be safe by most adults. Typical locations include low-speed arterials without bike lanes.
LTS 4	Represents high stress and suitable for experienced and skilled cyclists. Traffic speeds are moderate to high and can be on roadways from two to over five lanes wide in both directions. Intersections can be complex, wide, and or high volume/speed that can be perceived as unsafe by adults and are difficult to cross. Typical locations include high-speed or multilane roadways with narrow or no bike lanes or shoulders.

The LTS analysis performed and discussed above highlights the need for safe and comfortable connections in and around the DMC Development District. While there are existing roadways comfortable enough for adults and most children, they are limited to shared use paths and the residential areas of the city and have limited connections to destinations within the DMC Development District. The original City Loop alignment from the DMC Development Plan provides significant benefits in terms of network connectivity and leverages places that are already safe and rideable, such as low stress city streets. Prioritizing improvements that make connections between existing low stress clusters will be critical to expanding areas that are comfortable for people on bikes.

The City Loop does not address the lack of safe and comfortable roadways in the downtown area. Further projects should consider addressing this gap. Although the distance of uncomfortable roadways in this area is relatively low, even the shortest gap will discourage the vast majority of people from choosing to ride a bicycle. The City Loop alignment provides a framework off which a comfortable downtown network can be built.

Figure 11. Existing Level of Traffic Stress (LTS)

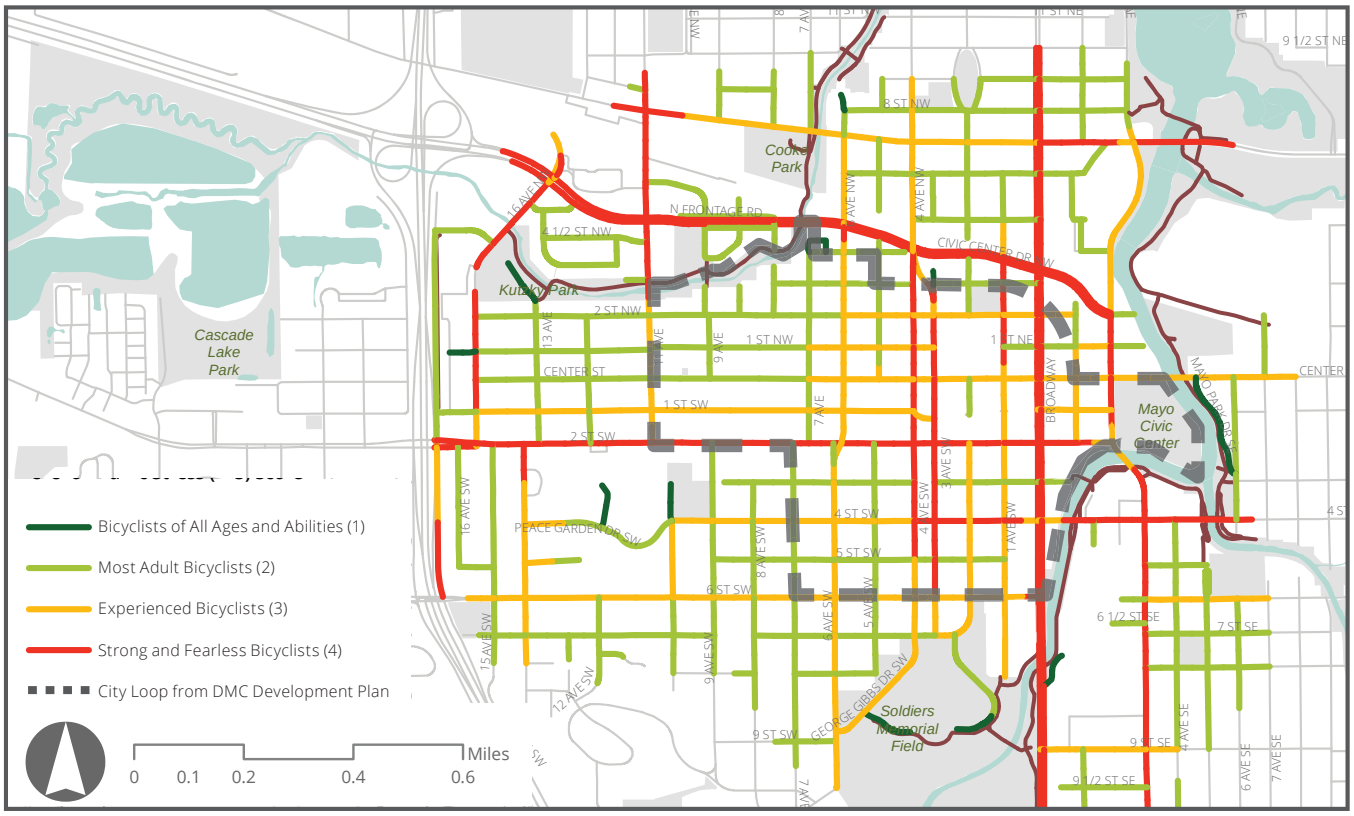
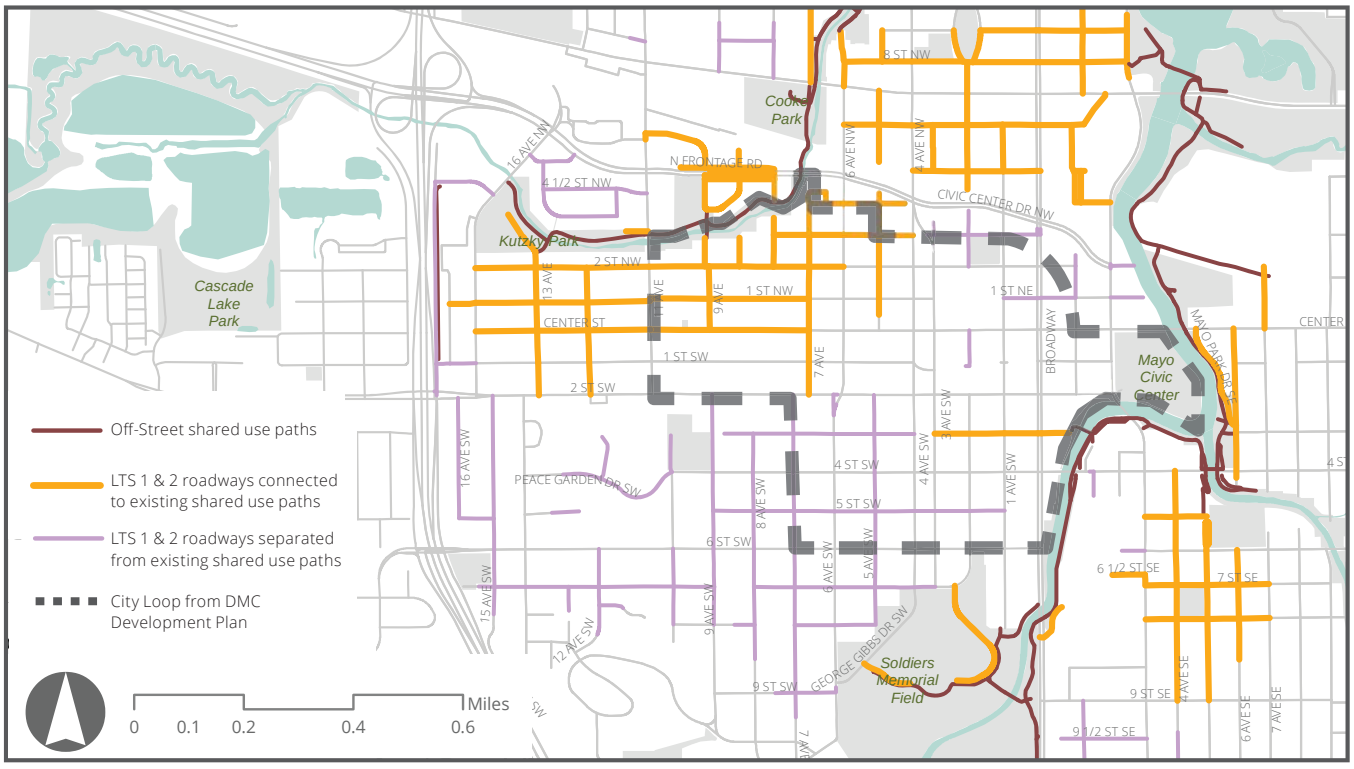


Figure 12. Existing Gaps Between Shared Use Paths and LTS 1 & 2 Roadways



CONSTRAINTS AND PINCH POINTS

The DMC Development Plan proposed a City Loop route and facility typology (raised, protected bike lane and walkway). In addition to the ADA parameters, the DMC Development plan was reviewed with respect to existing potential physical constraints such as overhead utilities, significant street trees, street width, on-street parking, driveway curb cuts, integration with or addition to existing shared use paths and adjacent supportive land use and visual quality or urban design character.

Utilizing the western segments of the existing riverfront Downtown Loop, at least initially provides a convenient and attractive alignment for the waterfront portion of the City Loop. Connections to the east side of the river can easily be made using the existing riverfront paths and bike/pedestrian bridges. In the range of 10 feet wide, the riverfront shared use paths are limited in their ability to fully provide the low stress, high safety, uniquely branded user experience ultimately envisioned for the City Loop. Making improvements to some of these paths such as adding width, adding separate walking paths, and adding signature pavement treatments, lighting, signing and furnishings would help to create and reinforce the City Loop brand.

Avoiding the historic southwest Rochester neighborhood area along 6th or 7th Avenues and extending the use of 2nd St. SW (St. Marys Place segment) eliminates ADA issues, however, it also modifies the user experience emphasizing efficiency over diversity of visual character and charm.

A spatial analysis of pinch points along the City Loop route from the DMC Development Plan was conducted in coordination with the other DMC Integrated Transit Studies, available data, as well as field reconnaissance. It was determined that Right of Way (ROW) widths are sufficient for accommodating the introduction of the City Loop's proposed 26 - 32 ft. width along the majority of the proposed route. Six pinch points resulting from narrow ROW, steep slopes and narrow bridge facilities have been identified:

1. Ten foot wide Downtown River Loop pedestrian trail between 6th St. SW and 2nd St. SE.
2. Ten foot wide shared-use path area along the east side of Cascade Creek between the existing path and adjacent child care facility at 4th St. NW and 7th Ave. NW.
3. Ten foot wide Cascade Creek bridge sidewalk along the south side of Civic Center Dr.
4. A steeply sloping segment of the Kutzky Park shared-use path immediately south of Civic Center Drive on both the east and west sides of Cascade Creek.
5. Steep slope gradients along 7 Ave. SW between 2nd St. SW and 6th St. SW.
6. Variable widths of existing spur line rail road corridor (including the river crossing bridge) between 6th St. SE and 2nd St. NW.

The Hybrid Scenario (see page 44) avoids pinch points 2, 3, 4, and 5. The interim version of the Hybrid Scenario includes pinch point 1, and the long-term Hybrid Scenario version includes pinch point 6.

LAND USE

Land uses along the DMC Development Plan City Loop route were reviewed with respect to interpreted influences on supporting and or boosting the City Loop's user population. As identified in the DMC Development Plan, each Loop Experience (route segment) includes a mix of uses described in Table 03.

Table 03. Land Use Analysis

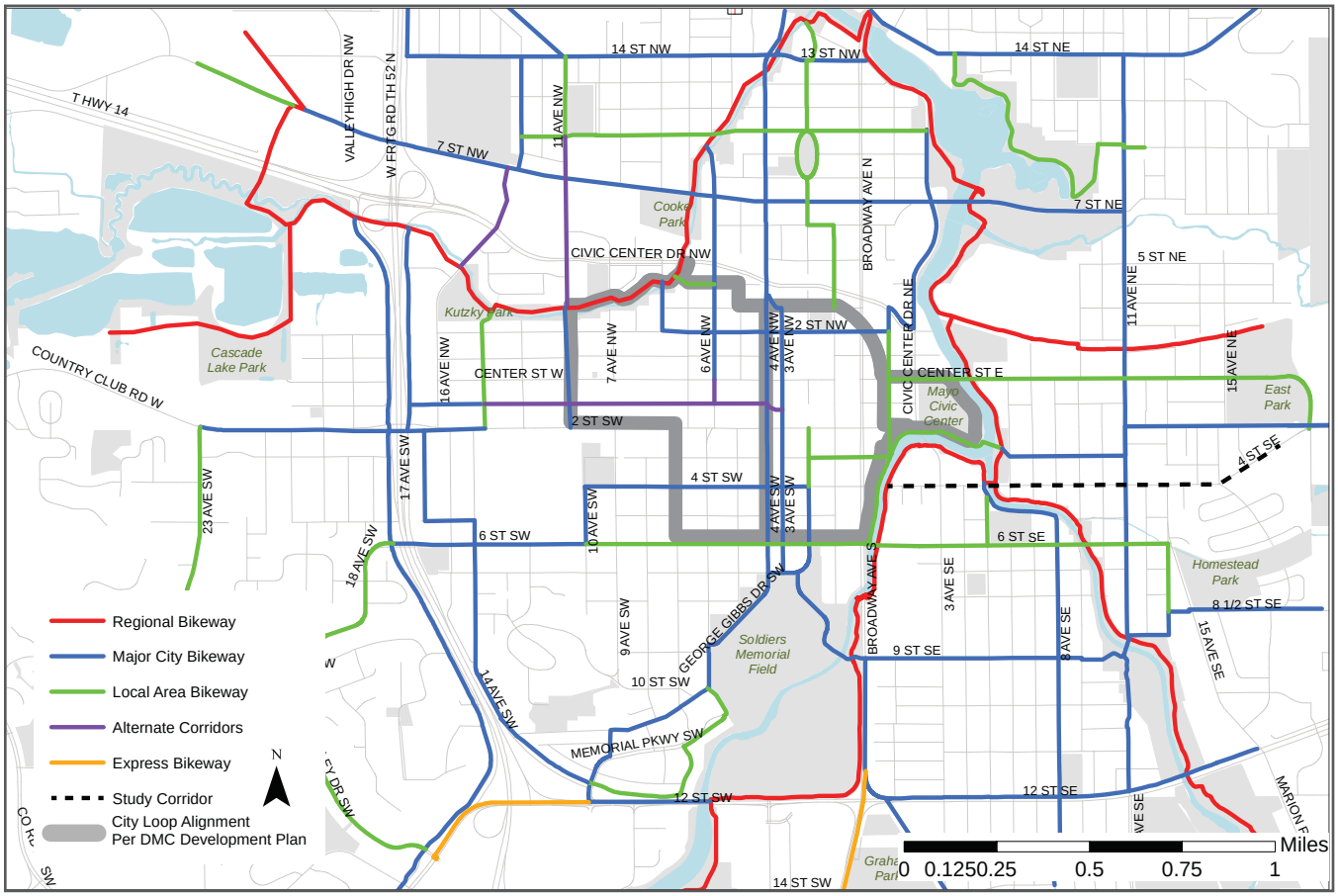
LOOP EXPERIENCES / ROUTE SEGMENTS	LAND USE ANALYSIS
Central Station	Mix of civic/park open space, institutional physical plant and employee surface parking, social service, and high density residential. Existing multifamily residences and Central Park provide a pool of potential riders/ users as well as an attraction/destination along the City Loop.
Cultural Crescent / Waterfront	Mix of commercial / retail, high density residential, social service/residential, high rise lodging, office/industrial, structured parking and civic uses (library, event center and open space trails). The diversity of uses provides a supply of employees, residents and visitors to potentially use the City Loop users. Existing users of the existing Downtown Loop shared-use path within the river corridor provide an initial City Loop user group.
Soldier's Memorial Field and University of Minnesota	Mix of civic / park and open space, institutional, social service, commercial, lodging, surface parking and moderate density residential. Includes multiple community assets that serve as attractions and destinations for residents, employees and visitors. The City Loop can support increases walking and cycling as a preferred transportation mode for accessing these attractions. The area's high redevelopment potential (parking lots, U of M Master Plan implementation) will also contribute to new City Loop users over the long term.
Saint Mary's Place and Historic Pill Hill	Mix of healthcare, institutional, commercial and moderate to low density residential. Current job density is concentrated at Saint Mary's Place. Future Mayo expansion plans will boost the number of City Loop users. Residential densities are highest along 2nd St. SW and taper off within the Historic Pill Hill neighborhood. Future residential and or mixed use redevelopment could help increase City Loop's user base.
Kutzky Park	Mix of low to moderate density residential, day care, and park-open space. Current job and housing densities could add a modest number of City Loop users. As residential and mixed use redevelopment in the area continues, the City Loop will likely see an increase in users. Kutzky Park and serves as a local attraction and provide an attractive, low stress environment for City Loop users.
The Heart of the City	Mix of healthcare, educational, office/commercial, lodging, institutional-worship, structured and surface parking. Job density and visitor levels provide the strongest potential for supporting City Loop investments from the outset. Future Mayo expansion and DMC redevelopment will help increase City Loop user base over the long term.

CONNECTIVITY TO EXISTING AND PLANNED BIKEWAY NETWORK

The DMC City Loop route corresponds with numerous existing and planned bikeways. The eastern most segments utilize a portion of the existing Downtown Loop, Zumbro South Trail and walking pathways while a portion of the northern segment will repurpose part of the existing shared-use pathway within Kutzky Park. Figure 13 further illustrates connections and overlaps with existing and planned bikeways including those in downtown at 4th St. SW. and 6th St. SW. Strengthening connections between the City Loop and Rochester's existing and planned bikeways was a high priority In refining the City Loop route.

Figure 13. Existing and Planned Bikeways

Source: 2012 Rochester Area Bicycle Master Plan



CONNECTIVITY TO EXISTING ENHANCED STREETSCAPES

2nd St. SW is the most prominently streetscaped corridor within downtown Rochester. Enhancements reflect Mayo Clinic's site design program seen in other areas of downtown with low height, native limestone walls, black steel fencing, linear plantings of street trees and lushly planted boulevards, some of which also function as green infrastructure. The corridor also includes enhanced bus shelters and extensive planting within the center median. The City Loop is proposed to run on the north side of this corridor.

Building upon the City Loop's vision of a distinct identity and recognizable aesthetic requires the City Loop to use different streetscape amenities and furnishings than those currently in use throughout the 2nd St. corridor and downtown Rochester.

City Loop will connect to enhanced streetscape elements and Mayo Clinic semipublic green spaces as it runs within the 4th Avenue SW corridor.

CP RAIL SPUR

The City Loop is planned to run within the right of way utilized by the Canadian Pacific Railway spur line as a part of the proposed Cultural Crescent area within the Downtown Waterfront District. Situated within a variable width ROW, the line runs through the east side of downtown providing rail service for several industries located to the south. Rail traffic is slow moving and variable in frequency ranging from several trips per day to several trips per month.

Locating the City Loop within the rail spur strengthens development of the Cultural Crescent and Waterfront Districts by providing safe, convenient and attractive active transportation alternatives to cars and trucks. Given the current high levels of mixed and multi-use development occurring within downtown Rochester it would be prudent for the City to continue pursuing acquisition of spur line ROW in order to set the stage for implementation of the City Loop and DMC Waterfront District when rail service is no longer needed.

View of CP Rail spur line looking south.

ALTERNATIVE ROUTE SCENARIOS

Building upon the analysis performed while also working in coordination with the other DMC Integrated Transit Study teams, three alternative City Loop route scenarios were developed for review and evaluation. The three alternative route scenarios provide options for integrating with various transit and parking options as well as addressing project goals and purpose and need. In developing the three alternatives it was found that certain routes are best suited for locating the City Loop regardless of interactions with other elements of the DMC Integrated Transit Studies. These consistent route segments, highlighted in black in Figure 14, include:

- 2nd St. NW between 5th Ave. NW and North Broadway
- Downtown River Loop between 2nd St. SE and 6th St. SW
- 6th St. SW between South Broadway and 4th Ave. SW
- 4th Avenue SW between 6th St. SW and 2nd St. NW
- 2nd St. SW between 9th Ave. SW and 4th Ave. SW

The three scenarios differ the most in the northwest quadrant of the DMC District. While all scenarios run through Kutzky Park, connections to the park and length of the Kutzky Park segment vary. The other major area of variation is in the area in and around the Mayo Civic Center. The alternatives are highlighted in Figure 14 and described in Table 04 on the following page.

Figure 14: Map of three alternative City Loop route scenarios

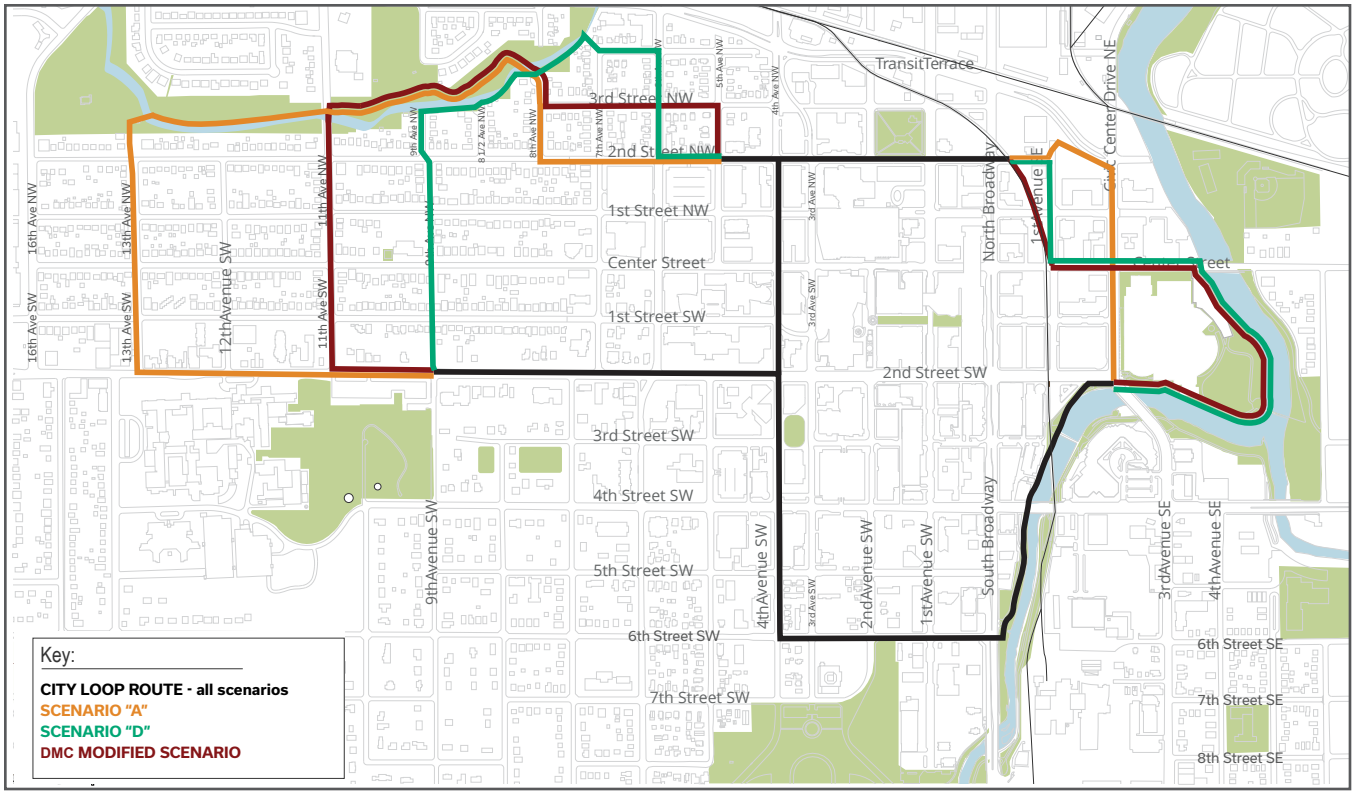


Table 04: Description of Differences in City Loop Route Alternatives

DMC Modified Scenario

- Follows 11th Avenue NW from 2nd St. SW to the north side of Kutzky Park, a distance of about 1,200 feet where it crosses Cascade Creek, then traverses east to a new north-south bridge to connect to 8th Ave. NW.
- Runs along 8th Ave. NW to 3rd St. NW and east along 3rd St., then jogs along 5th Avenue NW where it turns south to connect with 2nd St. NW.
- Utilizes a portion of the existing spur line rail right-of-way to connect 2nd St. NW and Center St. E. While rail-right-of-way is currently unavailable for use by the City Loop, its long-term future is unclear and the area my be acquirable in years to come.
- Runs along Center St., then uses the existing segment of Downtown Loop trail running along the east side of the Civic Center through Mayo Park.

Scenario A

- Follows 13th Ave. NW from 2nd St. SW into Kutzky Park, then running for about 2,400 feet east along the north side of the creek where it also crosses the creek at new north-south bridge to connect to 8th Ave. NW. At 8th Ave, the City Loop connects to 2nd St. NW and extends east to the Waterfront District.
- This alignment provides access to future parking garage development planned along the south side of 2nd St. NW.
- East of the rail right-of-way on 2nd St. NW, Scenario A jogs north to Civic Center Dr. NE , then follows Civic Center Dr. NE south until it meets up with the waterfront.

Scenario D

- From 2nd St. SW, scenario D follows 9th Ave NW through a low to moderate density residential district 4 1/2 blocks to Kutzky Park. A number of residential properties located between 1st and Center Streets would need to be acquired to create sufficient public right-of-way to complete the connection.
- Runs along the south bank of Cascade Creek, formally introducing public access to an area that has traditionally been inaccessible and relatively private. Is the only alternative to follow along the south bank of Cascade Creek and does not require a new pedestrian/bike bridge. Western access into Kutzky Park is from 9th Ave NW via an existing trail bridge.
- Is the shortest route within Kutzky Park at approximately 825 feet in length.
- After leaving Kutzky Park, scenario D follow 4th St. NW before turning south on 6th Ave NW where it meets up with 2nd St. NW running east.
- Runs along 2nd St. SE from North Broadway to 1st Ave. SE. Follows 1st Ave. SE between 2nd St. NW and Center St. and runs along Center St. E to the Downtown Loop trail.
- Similar to the DMC Modified scenario, this route scenario uses the existing segment of Downtown Loop trail running along the back side of the Civic Center through Mayo Park.

EVALUATION OF CITY LOOP SCENARIOS

An overall evaluation framework was developed for use by all of the Integrated Transit Study teams including the City Loop. The framework defined primary users being served by the various integrated transit and infrastructure projects as well as evaluation account (categories) within which project specific evaluation criteria were developed. The four evaluation accounts include: Economy, Community and Experience, Health and Wellness (includes safety) and Delivery (implementation). The intent of organizing the evaluation under multiple "accounts" is to ensure that different perspectives and/or outcomes that are critical to the plan and its stakeholders are represented in the evaluation process and organized so that decision makers can make informed choices about important trade-offs.

The overall evaluation framework guided the development of a set of City Loop-specific evaluation criteria which were used in evaluating alternative route scenarios. Study teams were directed to consider five key questions while developing their specific evaluation criteria:

1. Do the criteria consider economic impacts and risks?
2. Do the Transportation Principles tie to the study's outcomes and influences? If so, can project, program, or policy support of that principle be measured?
3. Do the criteria consider person measures to quantify benefits/costs (e.g. person capacity, person throughput, and person delay)?
4. Do the criteria provide for quantitative and qualitative measures to capture experiential outcomes?
5. Do the criteria account for all user groups identified in the DMC Plan (e.g. residents, commuters, businesses, patients, and visitors)?

The evaluation framework also further defined primary users being served by the various Integrated Transit and Infrastructure Projects:

Primary Users

- Residents
- Commuters
- Patients and patient companions
- Visitors

Table 05 on the following page details the 12 evaluation criteria that were development specifically to be applied to each of the City Loop route scenarios. A scoring system was developed to summarize the results of the evaluation. Based upon the application of the evaluation criteria, the DMC Modified Scenario scored 68.9 points, Scenario A scored the highest at 79.4 and Scenario D scored the lowest at 61.3. Since it received the highest rating, Scenario A was used as the starting point for developing a hybrid scenario. Individual score sheets can be found in Technical Memorandum 4 of the Appendix.

Based on the evaluation of the three scenarios, a City Loop alignment representing a hybrid of the three scenarios is recommended and illustrated on pages 44-45. Features of the Hybrid Scenario including the length of various City Loop segments, connectivity to major destinations and the existing and planned bike network, and connections to low stress streets for biking and walking are illustrated on the following pages.

Table 05: Route Alignment Evaluation Criteria

Twelve evaluation criteria for evaluating alternative City Loop route scenarios

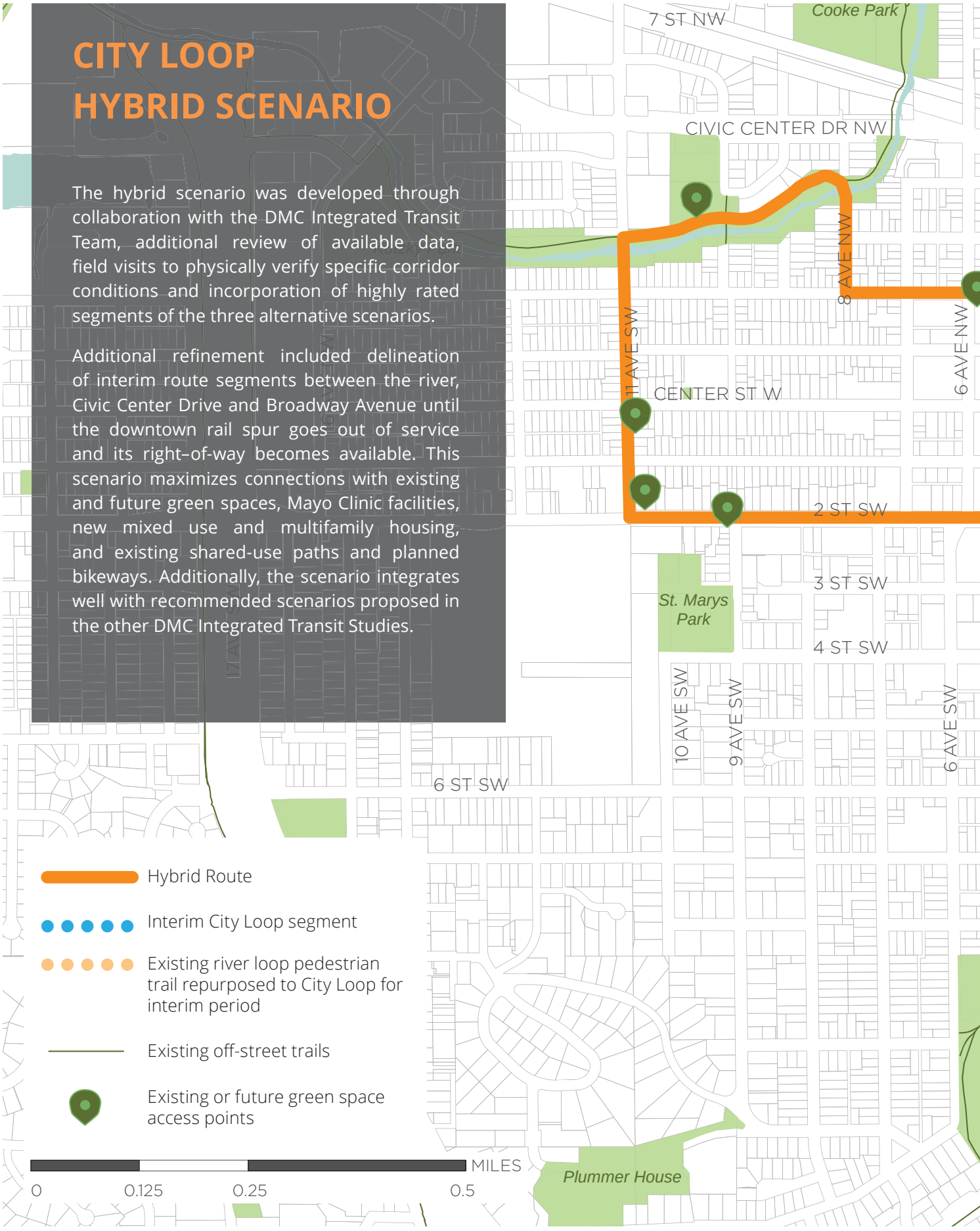
Users:	R- Resident, C - Commuter, B - Business, P/C - Patient and Companion, V - Visitor, A - All

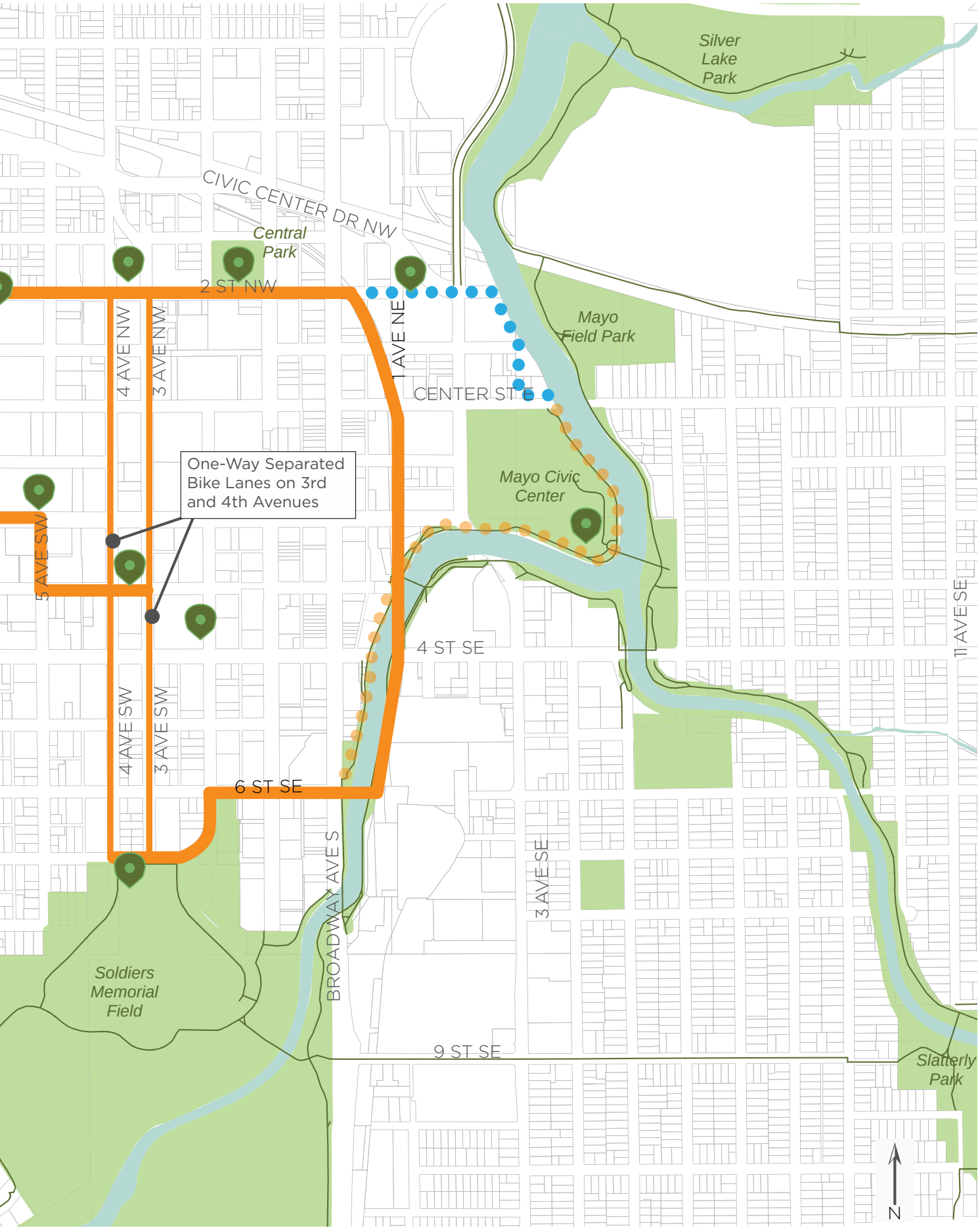
Economy- Economic Development	Community + Experience	Health + Wellness + Safety	Delivery
Connects to DMC Districts. Rate the level of accessibility for people and jobs (adjacent land use - higher density of residential/commercial = higher score) (A)	Maximizes connections to public and semi-public social spaces, natural areas and quiet spaces (A)	** Potential to increase physical activity and reduce injury (A) (As a proxy for increasing physical activity; evaluate safety of the City Loop alternatives as a way to measure the potential increased usage by multiple age and ability)	Fundable total project capital cost, describe in per mile terms (A)
Connections with existing and planned regional transit hub, regional bus, circulator stations and PTN Crossings (A)	Quantify: Maximizes connections to existing and planned parking to support a park-once environment (A)	Provides direct connections with Mayo facilities for patients, visitors, and wellness retreat participants (P/C,V)	Transition Plans /ability to be phased in a logical and useful manner (A)
	Meets the principles of walkability: useful, comfortable, direct, safe, and interesting routes (A)	Minimizes reliance on wayfinding for navigation and legibility: follows existing street grid, minimizes changes/shifts in route (V,P/C)	Connections to existing surface parking facilities; Catalyst and likelihood for financial partnership w/ future redevelopment, private development, and partnership for funding (A)
		Length of Loops	

CITY LOOP HYBRID SCENARIO

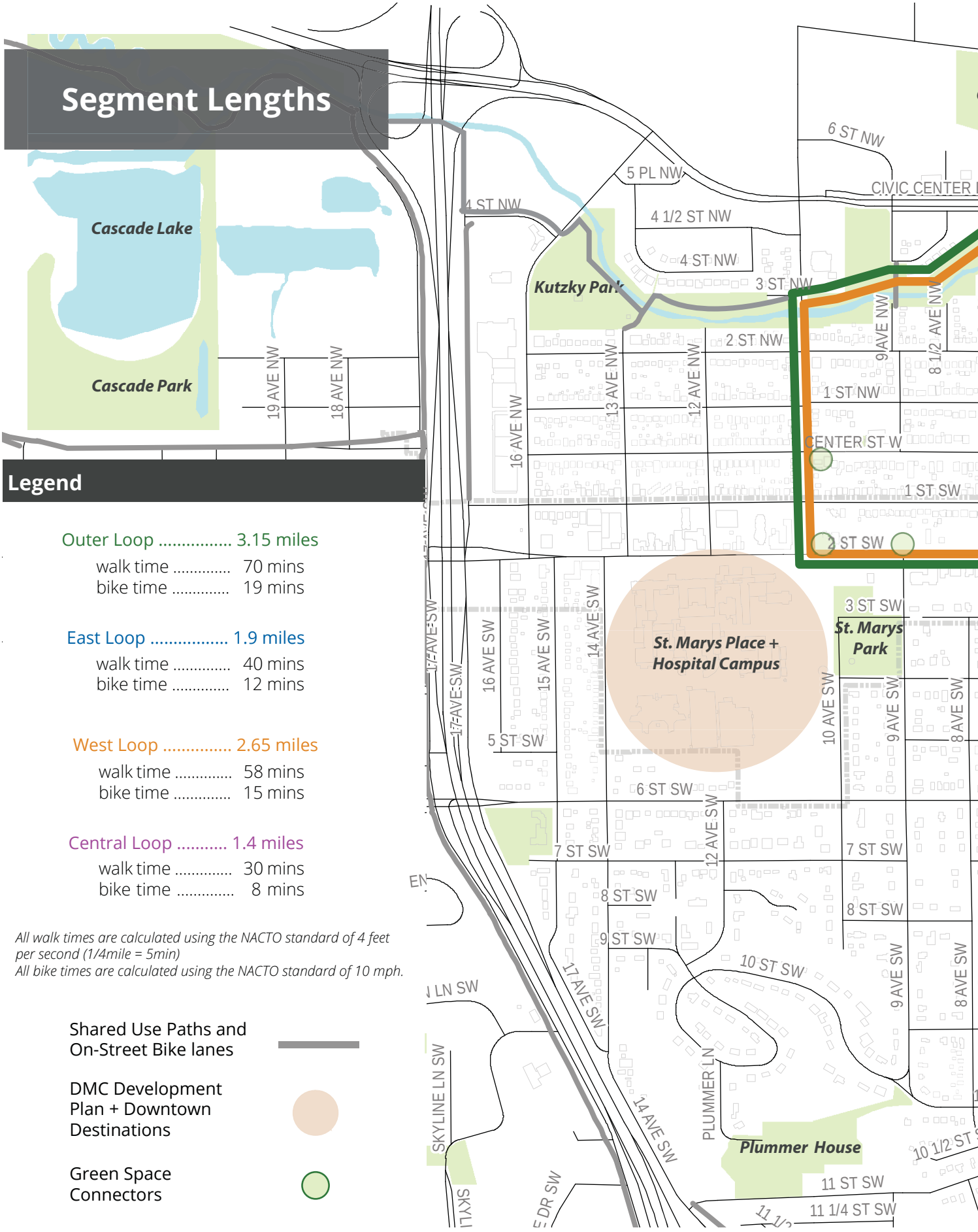
The hybrid scenario was developed through collaboration with the DMC Integrated Transit Team, additional review of available data, field visits to physically verify specific corridor conditions and incorporation of highly rated segments of the three alternative scenarios.

Additional refinement included delineation of interim route segments between the river, Civic Center Drive and Broadway Avenue until the downtown rail spur goes out of service and its right–of-way becomes available. This scenario maximizes connections with existing and future green spaces, Mayo Clinic facilities, new mixed use and multifamily housing, and existing shared-use paths and planned bikeways. Additionally, the scenario integrates well with recommended scenarios proposed in the other DMC Integrated Transit Studies.




Silver Lake Park
CIVIC CENTER DR NW
Central Park
2 ST NW
1 AVE NE
Mayo Field Park
CENTER ST E
4 AVE NW
3 AVE NW
One-Way Separated Bike Lanes on 3rd and 4th Avenues
Mayo Civic Center
5 AVE SW
4 ST SE
11 AVE SE
4 AVE SW
3 AVE SW
6 ST SE
BROADWAY AVE S
3 AVE SE
Soldiers Memorial Field
9 ST SE
Slatterly Park
N

Segment Lengths



Legend

Outer Loop ..... 3.15 miles
- walk time ..... 70 mins
- bike time ..... 19 mins

East Loop ..... 1.9 miles
- walk time ..... 40 mins
- bike time ..... 12 mins

West Loop ..... 2.65 miles
- walk time ..... 58 mins
- bike time ..... 15 mins

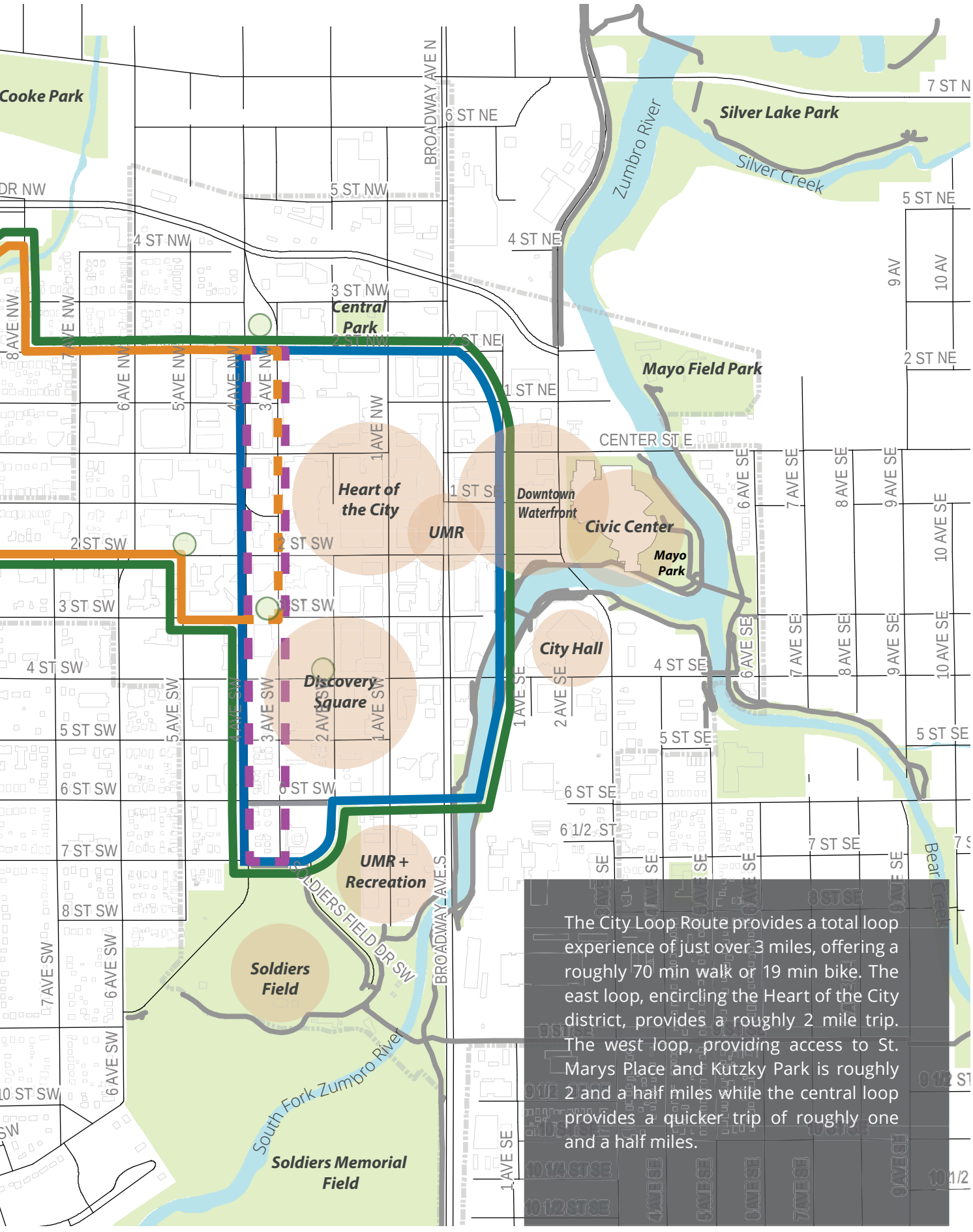
Central Loop ..... 1.4 miles
- walk time ..... 30 mins
- bike time ..... 8 mins

All walk times are calculated using the NACTO standard of 4 feet per second (1/4mile = 5min)
All bike times are calculated using the NACTO standard of 10 mph.

Shared Use Paths and On-Street Bike lanes

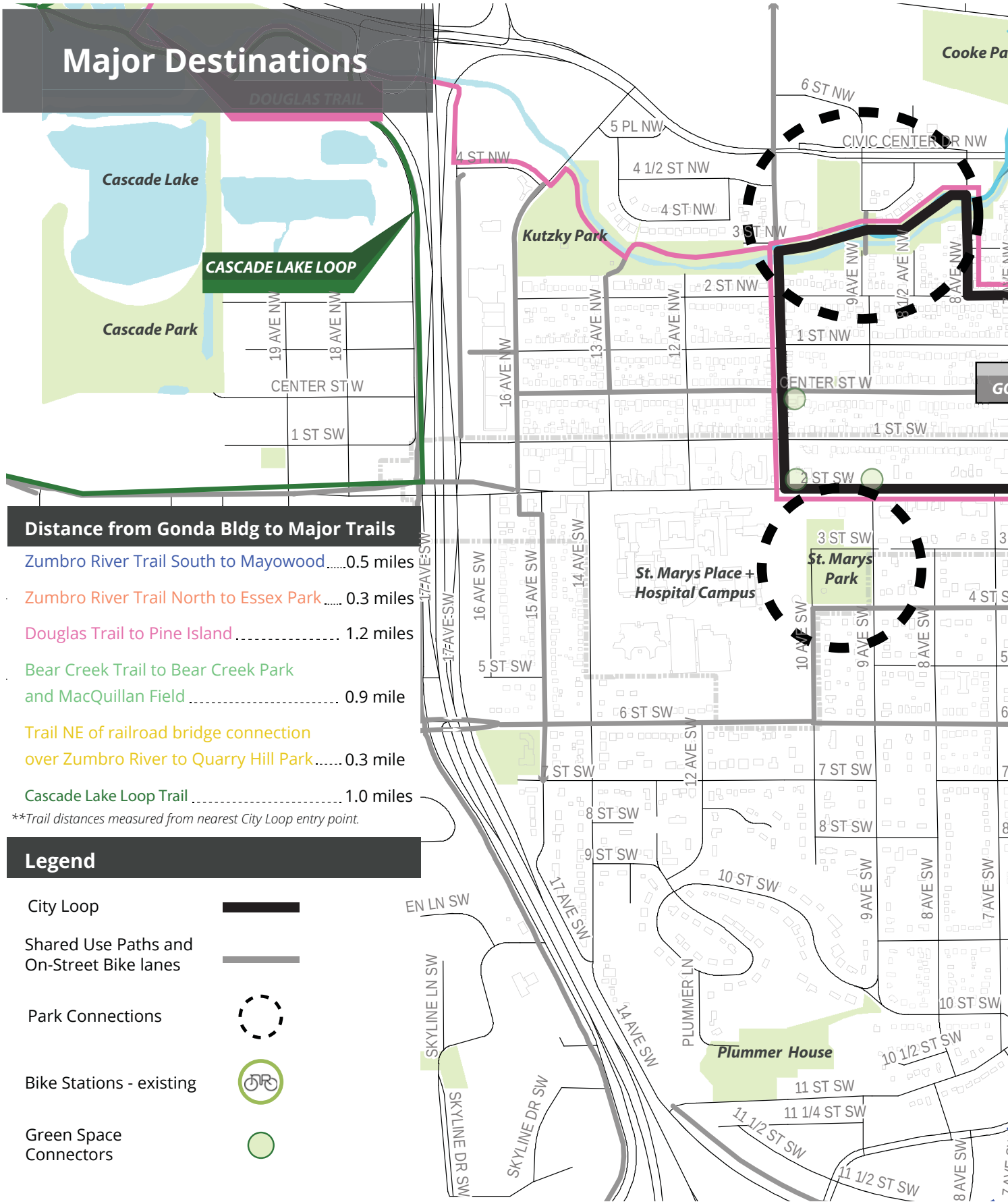
DMC Development Plan + Downtown Destinations

Green Space Connectors



The City Loop Route provides a total loop experience of just over 3 miles, offering a roughly 70 min walk or 19 min bike. The east loop, encircling the Heart of the City district, provides a roughly 2 mile trip. The west loop, providing access to St. Marys Place and Kutzky Park is roughly 2 and a half miles while the central loop provides a quicker trip of roughly one and a half miles.

Major Destinations



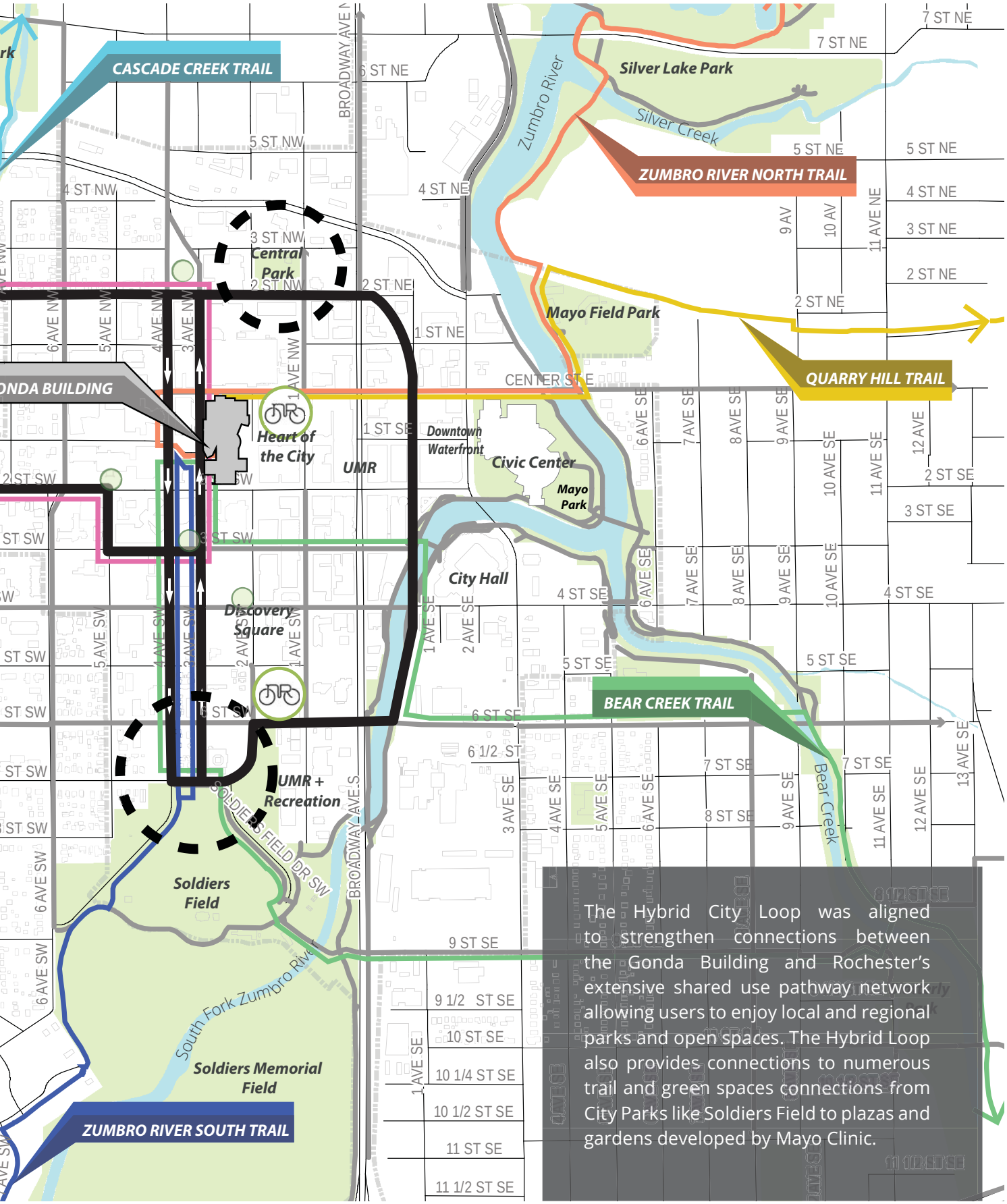
Distance from Gonda Bldg to Major Trails

Zumbro River Trail South to Mayowood	0.5 miles
Zumbro River Trail North to Essex Park	0.3 miles
Douglas Trail to Pine Island	1.2 miles
Bear Creek Trail to Bear Creek Park and MacQuillan Field	0.9 mile
Trail NE of railroad bridge connection over Zumbro River to Quarry Hill Park	0.3 mile
Cascade Lake Loop Trail	1.0 miles

***Trail distances measured from nearest City Loop entry point.*

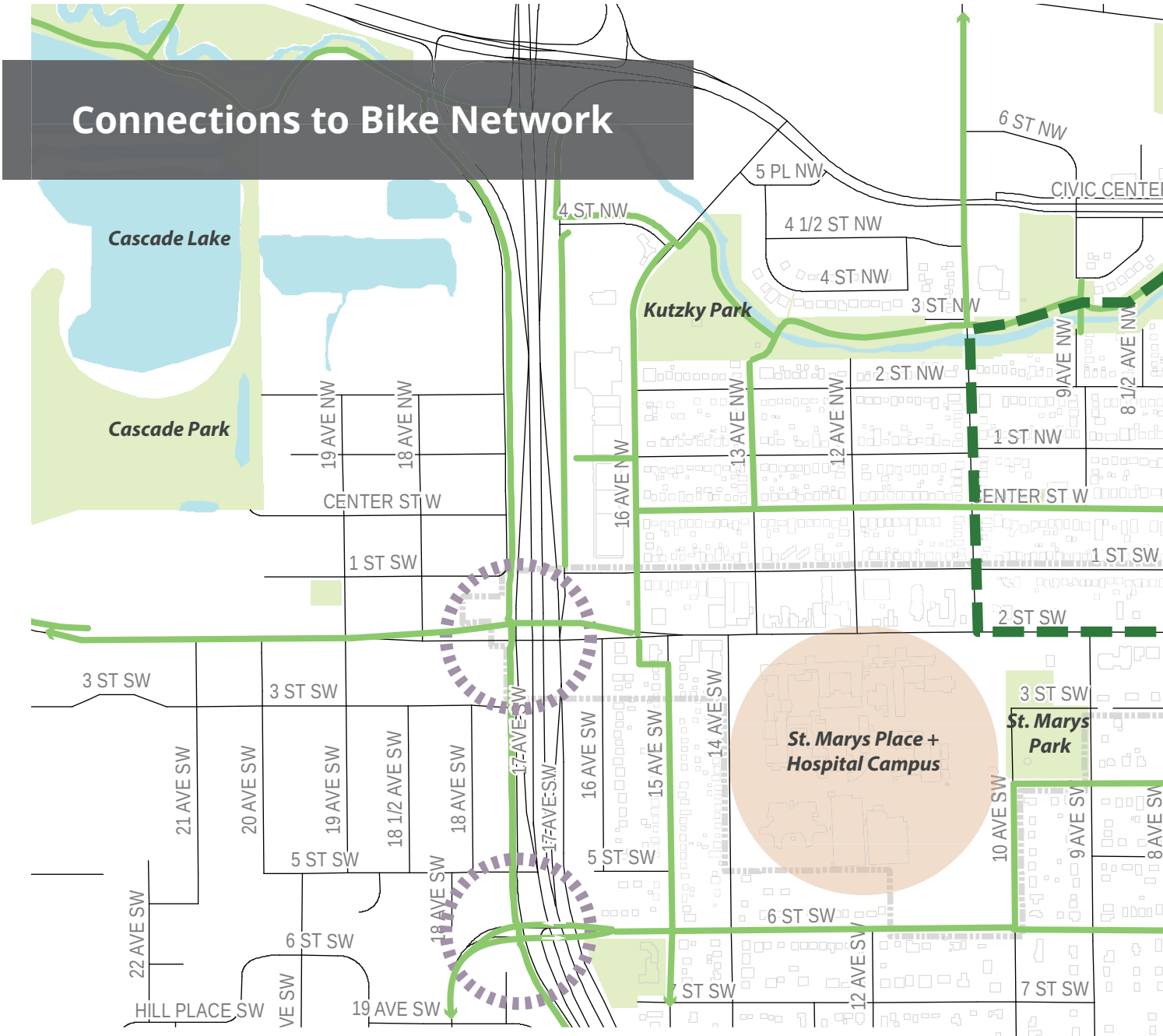
Legend

- City Loop
- Shared Use Paths and On-Street Bike lanes
- Park Connections
- Bike Stations - existing
- Green Space Connectors



The Hybrid City Loop was aligned to strengthen connections between the Gonda Building and Rochester's extensive shared use pathway network allowing users to enjoy local and regional parks and open spaces. The Hybrid Loop also provides connections to numerous trail and green spaces connections from City Parks like Soldiers Field to plazas and gardens developed by Mayo Clinic.

Connections to Bike Network



Legend

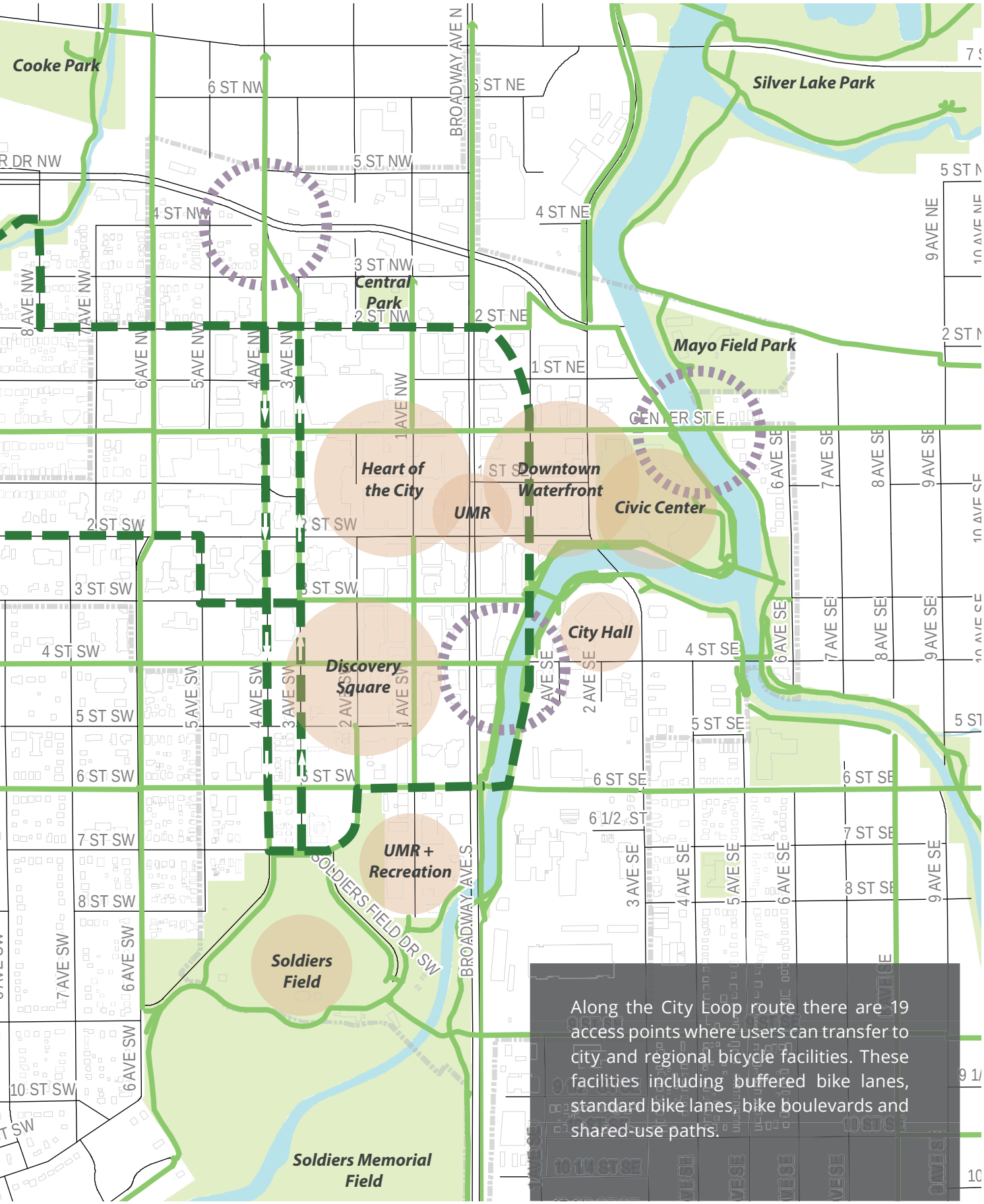
- City Loop
- Buffered Bike Lanes (protected if possible)
- Standard Bike Lanes
- Bike Boulevard
- Existing Shared-Use Paths

Bicycle Portals into Downtown

DMC Development Plan + Downtown Destinations

Typical User Groups

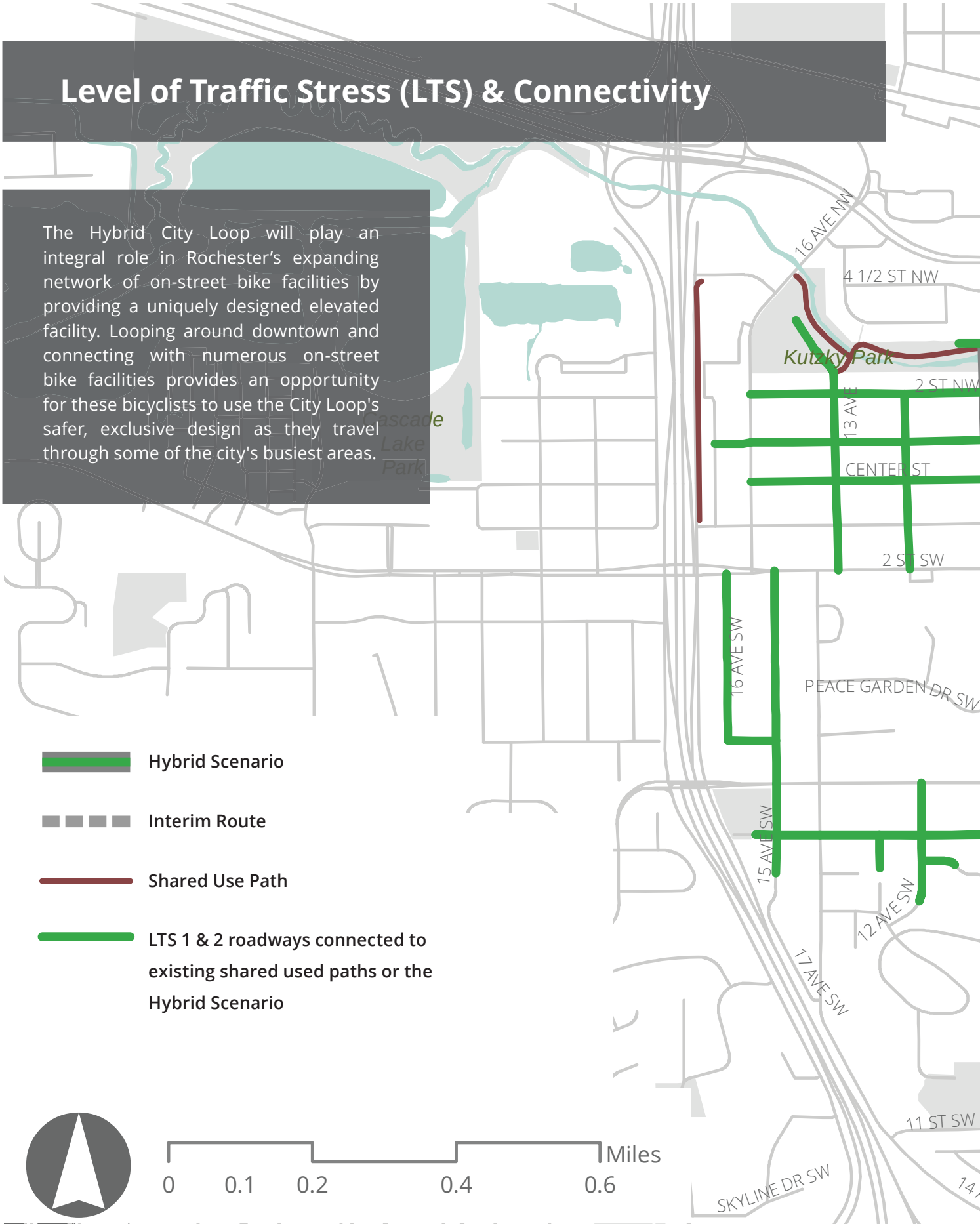
Strong & Fearless	thused & Confident	ed but Concernted	No Way, No How
●	●	●	●
●	●	●	
●	●		
●	●	●	
●	●	●	●

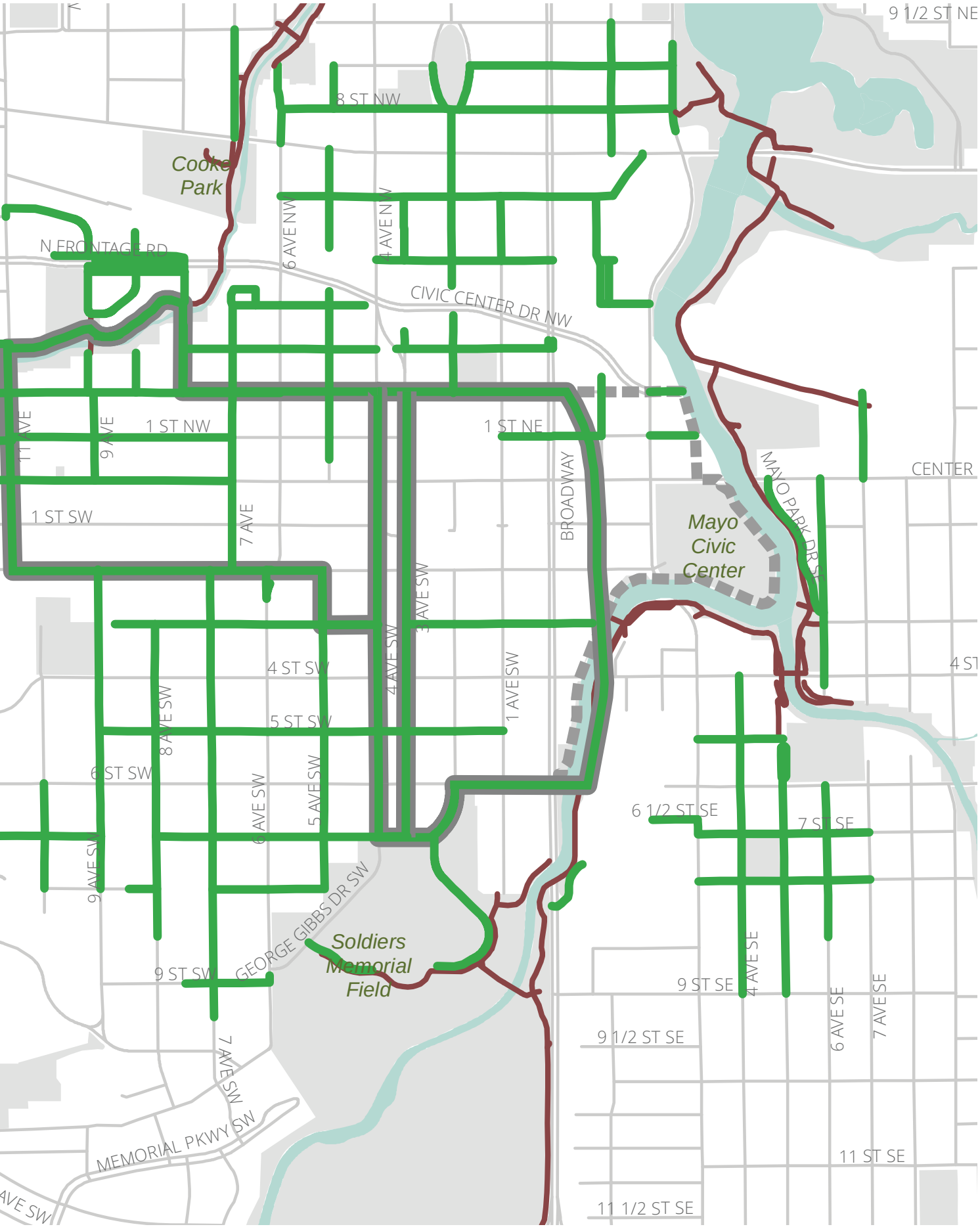


Along the City Loop route there are 19 access points where users can transfer to city and regional bicycle facilities. These facilities including buffered bike lanes, standard bike lanes, bike boulevards and shared-use paths.

Level of Traffic Stress (LTS) & Connectivity

The Hybrid City Loop will play an integral role in Rochester's expanding network of on-street bike facilities by providing a uniquely designed elevated facility. Looping around downtown and connecting with numerous on-street bike facilities provides an opportunity for these bicyclists to use the City Loop's safer, exclusive design as they travel through some of the city's busiest areas.




9 1/2 ST NE
8 ST NW
Cooke Park
N FRONTAGE RD
6 AVE NW
4 AVE NW
CIVIC CENTER DR NW
1 ST NW
1 ST NE
9 AVE
1 ST SW
7 AVE
BROADWAY
MAYO PARK DR SE
CENTER
Mayo Civic Center
4 ST SW
4 AVE SW
3 AVE SW
1 AVE SW
8 AVE SW
5 ST SW
6 ST SW
6 AVE SW
5 AVE SW
9 AVE SW
6 1/2 ST SE
7 ST SE
GEORGE GIBBS DR SW
Soldiers Memorial Field
9 ST SW
9 ST SE
4 AVE SE
6 AVE SE
7 AVE SE
9 1/2 ST SE
7 AVE SW
MEMORIAL PKWY SW
11 ST SE
11 1/2 ST SE

DESIGN VOCABULARY

Included in this section:

1. Precedents
2. Typical Cross Sections
3. Materials and Furnishings
3. Amenities
4. Visualizations

To achieve the world class urban trail envisioned by the DMC Development Plan, a Design Vocabulary has been created for the City Loop in order to provide visual and structural consistency throughout the project. This section will cover project precedents as well as recommended cross sections, intersection designs, materials, furnishings, and amenities. It also introduces 3D visualizations to help illustrate the overall vision for the City Loop.

PROJECT PRECEDENTS

With its strong emphasis on user safety, public health and wellness, and high quality design, the City Loop represents an innovative approach to urban active transportation facilities. This section provides information on applicable precedents exhibiting important aspects of the City Loops design.

Using project precedents serves multiple purposes during the planning and design of transportation projects like the City Loop. For example precedents:

- Provide technical data and lessons learned that can be applied to the design of new, similar facilities
- Allow people to visualize and understand multiple aspects of a project
- Identify places for policy makers, planners and other project participants to visit and examine similar aspects of a project first hand

While the City Loop is a unique facility designed to meet the specific needs of the city, there are local, regional and international precedents that can offer examples in providing a high level of service and design. The Indianapolis Cultural Trail provides an excellent example of a pedestrian and bicycle trail around a downtown area while cities across the globe offer examples of high quality urban design. The City Loop team drew inspiration from these project precedents while developing the recommendations in this section.

INDIANAPOLIS CULTURAL TRAIL

An 8-mile bike trail in and around downtown Indianapolis, IN with extensive streetscape, identity, and wayfinding elements. Called “The biggest and boldest step by any American City”, this $62.5 million dollar investment put Indianapolis on the map for its focus on stylish paving features for bicyclists and pedestrians, and $2 million allocation on public art. Since its construction, the Indianapolis Cultural Trail is estimated to have had an $865 million dollar economic impact on the area. The Rochester City Loop has the opportunity to improve access to active transportation while at the same time capitalize on the economic benefits that these high end facilities often provide.

Firm: Rundell Ernstberger Associates

Date of Completion: 2013

Cost: $62.5 Million

INDIANAPOLIS MONON RAIL TRAIL AND CANAL WALK

Two trails connect to the Indianapolis Cultural Trail and add connections to more rural locations in the area. Monon trail adds 18.1 miles of pedestrian and bike trails to the city; created from an unused railroad track. The Canal Walk gives user access to the river cutting through downtown. Both connectors add experiential value to the Indianapolis Cultural Trail by highlighting the waterfront cutting through town and the history of industry and transport in the city. These elements can be highlighted through the City Loop as well by adding connection to the River and reusing rail lines that cut through the city.

Firm:Rundell Er nstberger Associates.

Date of Completion: 2003.

Cost: $42 Million

URBAN DESIGN PRECEDENTS

HEALTH AND WELLNESS

Public spaces that encourage fitness activities not only improve physical health, but provide the opportunity for improved mental health through social interactions and access to nature. Elements, such as these, could be incorporated into spaces that adjoin the City Loop.

1. "POP UP" EXERCISE PLAZA, PLAZA BOGOTA COLOMBIA

Firm: Unknown

Date of Completion: 2012-current

Cost: N/A

Features: Multi-functional design supports informal and formal fitness activities

2. EXERCISE PARK, COFFMAN PARK, OH

Firm: MSI Design

Date of Completion: 2003

Cost: $7 million parks expansion plan

Features: Equipment in outdoor public space strengthens connections with others and with nature

3. TARGET STATION PLAZA, MINNEAPOLIS, MN

Firm: SEH Inc. + Perkins Eastman

Date of Completion: 2014

Cost: N/A

Features: Multi-functional design supports informal and formal exercise /fitness

4. TIANJIN BRIDGED GARDENS

Firm: Turenscape

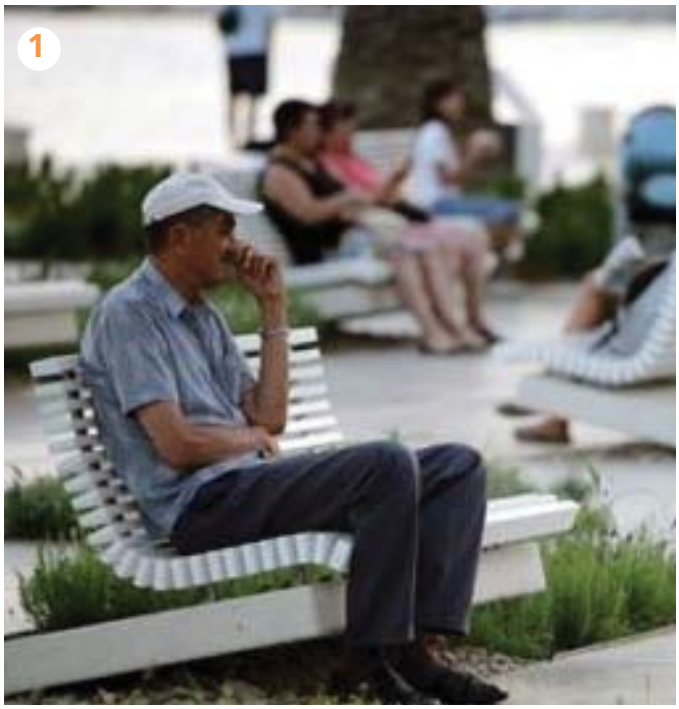
Date of Completion: 2011

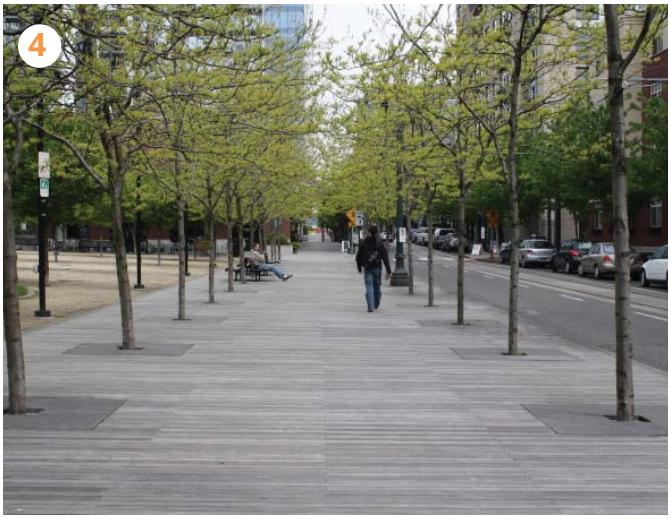
Cost: N/A

Features: Contemplation gardens supports mental health, strong identity, sense of place and wayfinding

STREETSCAPES

Successful public spaces provide places to rest, linger, and observe in a safe and inviting environment. Streetscape elements such as benches, lighting, plantings and decorative paving help cities effectively and efficiently create safe and healthy public spaces for pedestrians, bicyclists, businesses, and even pets. Including similar elements in the City Loop will also help the City achieve its Complete Streets goals by providing spaces for all users.





1. RIVA SPLIT WATERFRONT, CROATIA

Firm: 3LHD

Date of Completion: 2005

Cost: 9 Million Euros

2. HANDICAPABLE CROSSING US DOT EXAMPLE

Date of Completion: 2015

Cost: Varies

3. LUCKY LAB BEER GARDEN, PORTLAND, OR

Date of Completion: 2010

4. JAMISON PARK, PORTLAND, OR

Firm: PWP. LA

Date of Completion: 2006

Cost: $3.6 Million

CITY LOOP ELEMENTS

The City Loop will consist of the following major design elements:

- Protected bike lanes, raised to sidewalk level
- Wide, decorative sidewalk
- Buffers, comprised of either landscapes plantings or ornamental paving
- Branded wayfinding signage
- Pedestrian and bicyclist support amenities, such as benches, bike parking and repair stations, and lighting

BEST PRACTICES

The City Loop will create a signature bicycle and pedestrian facility in the heart of Rochester. It is designed to encourage movement and physical activity, provide access to parks for therapeutic respite, and connect DMC districts to regional trails and local destinations for residents, businesses, patients and their companions, and visitors of all ages and abilities.

An all ages and abilities facility means that it feels safe and comfortable to someone who is 8 years old or 80 years old. From a design perspective, this means providing clear physical separation between people walking and riding bikes from those in motor vehicles, and further separating people riding bikes from those walking. Raised, protected bike lanes, separate from the adjacent roadway are the gold standard for increasing user comfort and improving safety. In the following typical sections, raised protected bike lanes will be referred to as a bikeway and the decorative sidewalk is referred to as an enhanced walkway.

TYPICAL CROSS SECTIONS

The City Loop is to be retrofitted into existing streets within the City of Rochester. The initial City Loop illustrations in the DMC Development Plan provided the basis for the development of this Design Vocabulary. The following pages provide typical cross sections for each segment of the City Loop.

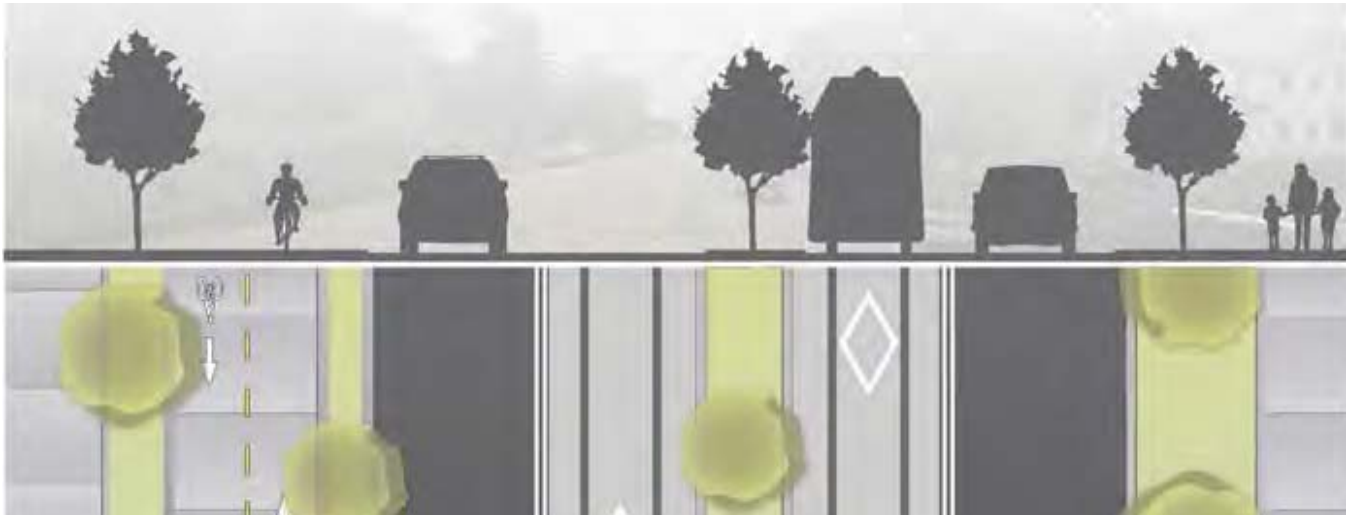


Figure 15. Cross section from 2015 DMC Development Plan

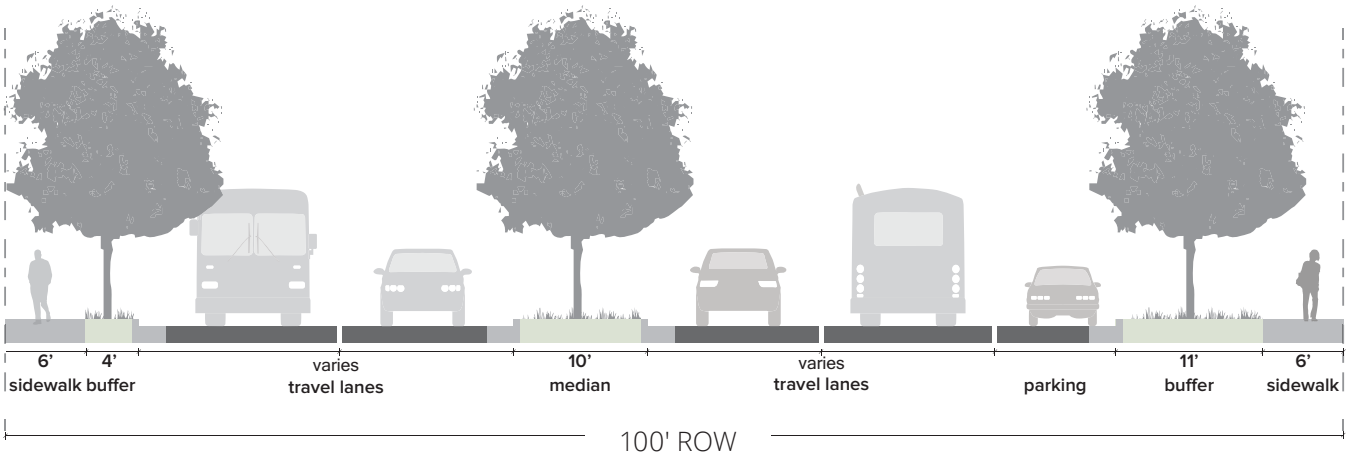
2ND ST. SW - TYPICAL CROSS SECTIONS

2nd St. SW has a 100 ft. existing right of way (ROW) along the City Loop route. The City Loop will be located on the north side of the street and will include:

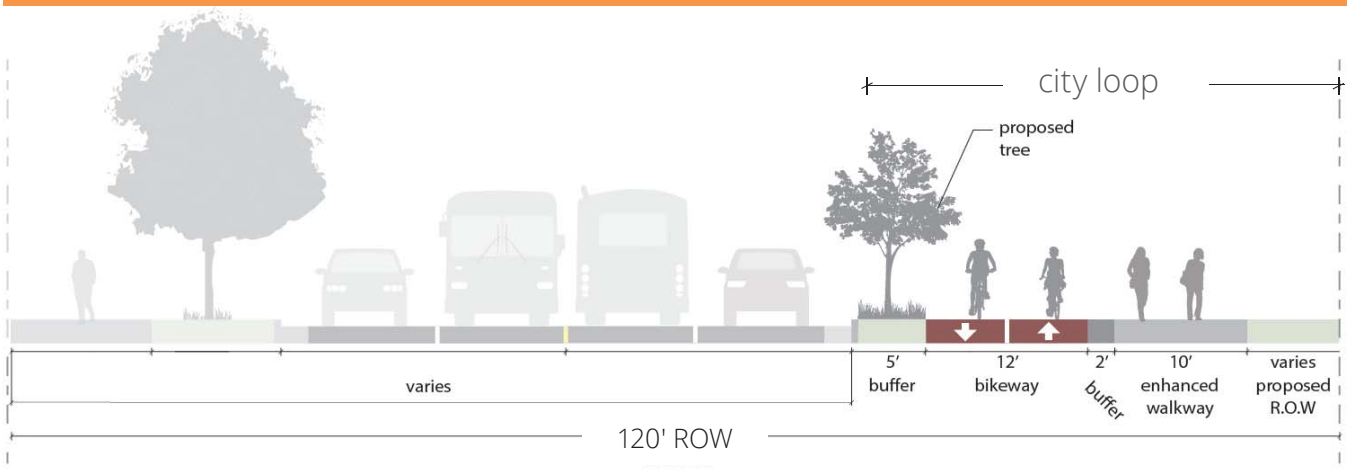
- A 12 ft. wide bikeway separated from vehicles by a 5 ft. planted buffer
- A 10 ft. enhanced walkway with a 2 ft. paved buffer (i.e., unit pavers) between the enhanced walkway and the bikeway

The 2nd St. SW corridor is planned to include the proposed Downtown Transit Circulator. It is recommended that additional right of way be secured on the north side of the street between 4th Ave and 11th Ave to provide more flexibility in accommodating all the modes including the City Loop and transit improvements.

Existing 2nd St. SW - Typical 100' ROW, West Facing



Proposed 2nd St. SW Cross Section - Typical 120' ROW, West Facing



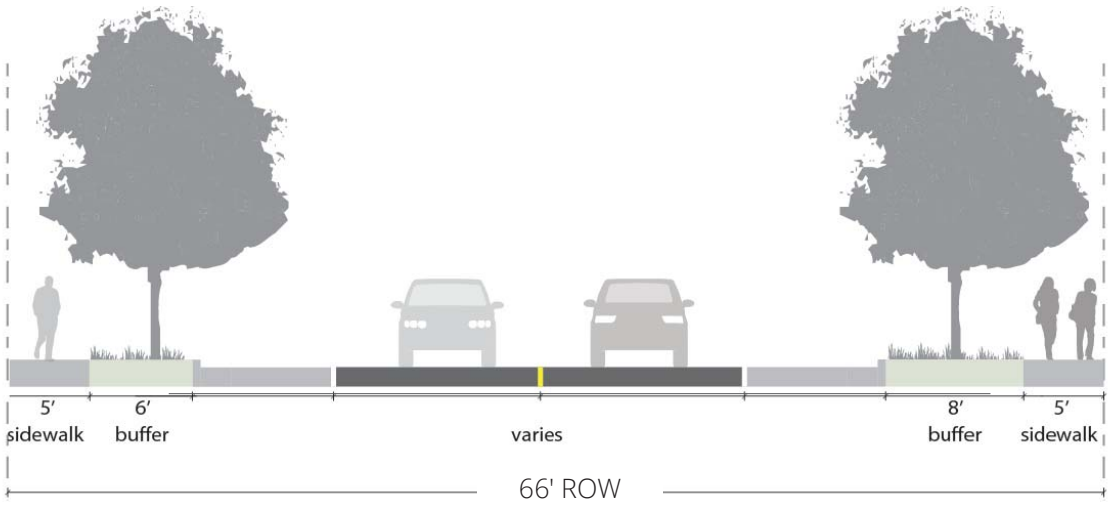
11TH AVE. - TYPICAL CROSS SECTIONS

11th Ave. between 2nd St. SW and Kutzky Park has an existing ROW of approximately 66'. The City Loop will be located on the east side of the street and will include:

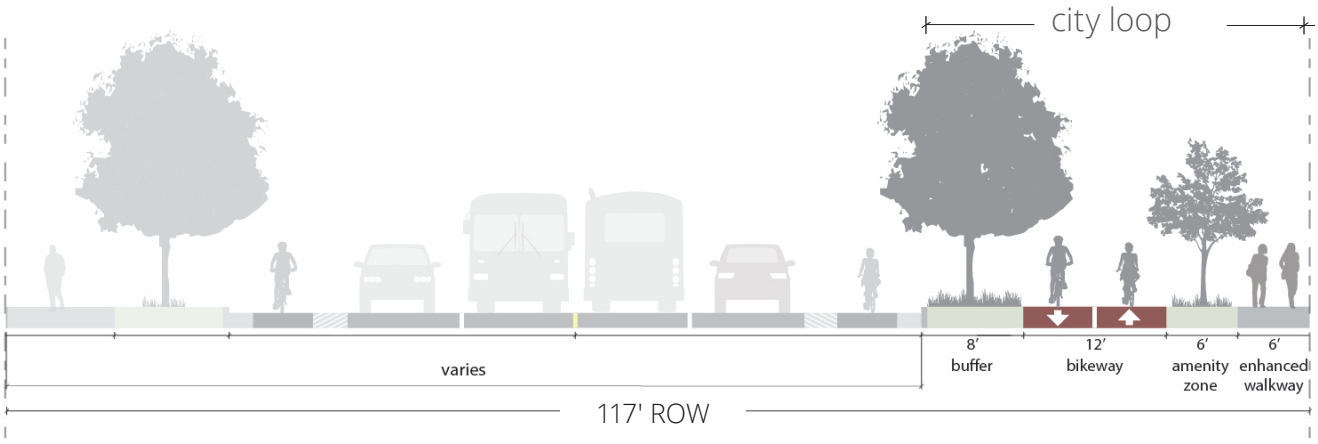
- A 12 ft. wide bikeway separated from vehicles by an 8 ft. planted buffer
- A 6 ft. enhanced walkway with a 6 ft. planted buffer between the enhanced walkway and the bikeway

The 11th Ave. corridor is also planned to include the proposed Downtown Transit Circulator. It is recommended that additional right of way be secured on the east side of the street between 2nd Ave. SW and Kutzky Park to provide more flexibility in accommodating all the modes including the City Loop and transit improvements.

Existing 11th Ave. Cross Section - Typical 66' ROW, North Facing



Proposed 11th Ave. Cross Section - Typical 117' ROW, North Facing



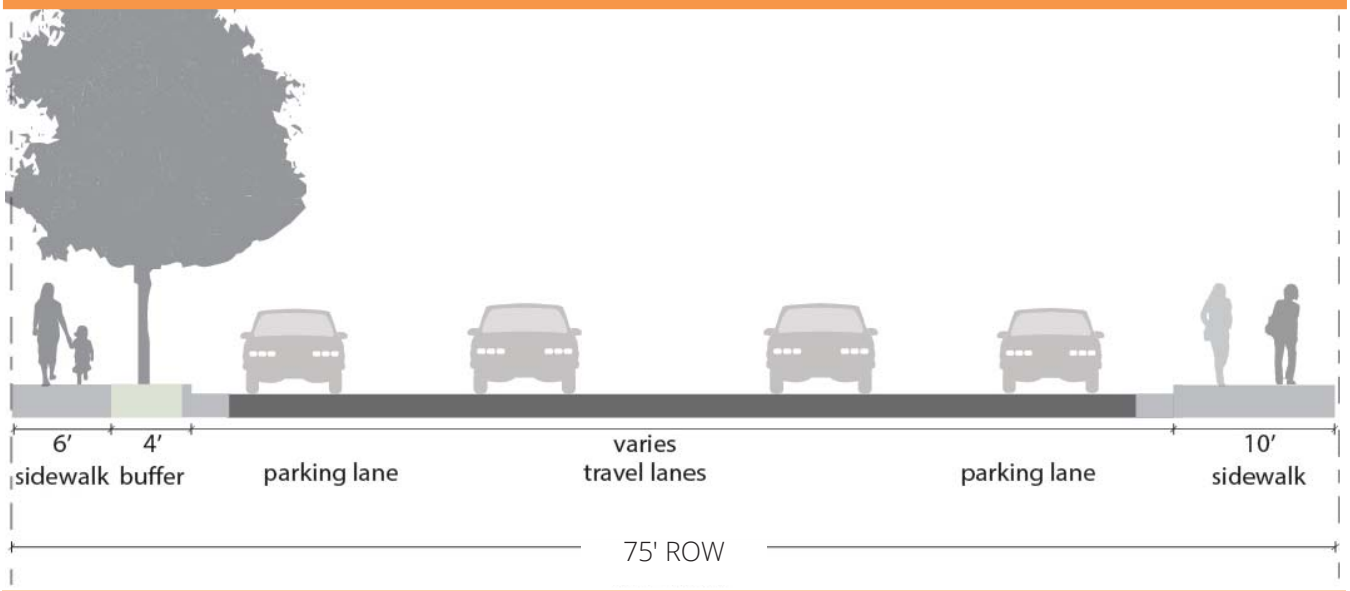
3RD AVE. - TYPICAL CROSS SECTIONS

3rd Ave. between 7th St. SW and 2nd St. NW has an existing ROW of approximately 75'. The City Loop will be located on the west side of the street and will include:

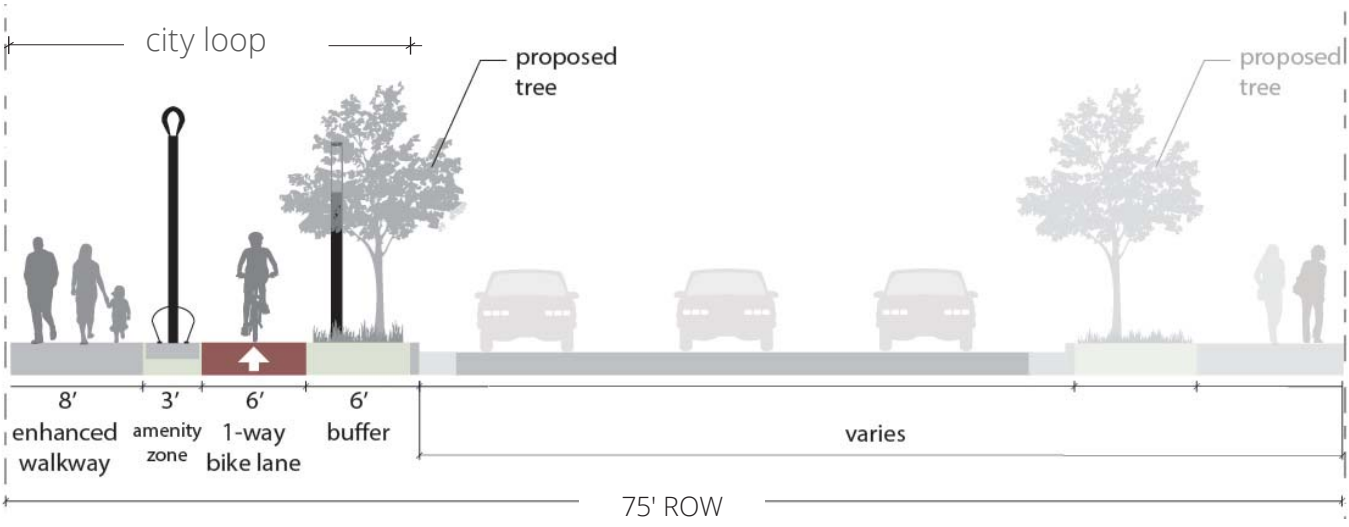
- A 6 ft. wide on-way bikeway separated from vehicles by a 6 ft. planted buffer
- An 8 ft. enhanced walkway with a 3 ft. paved buffer (i.e., unit pavers) between the enhanced walkway and the bikeway

The bicycle lane along 3rd St. will provide a northbound connection while a southbound connection mirroring this cross section will be provided along the east side of 4th Ave.

Existing 3rd Ave. - Typical 75' ROW, North Facing



Proposed 3rd Ave. - Typical 75' ROW, North Facing

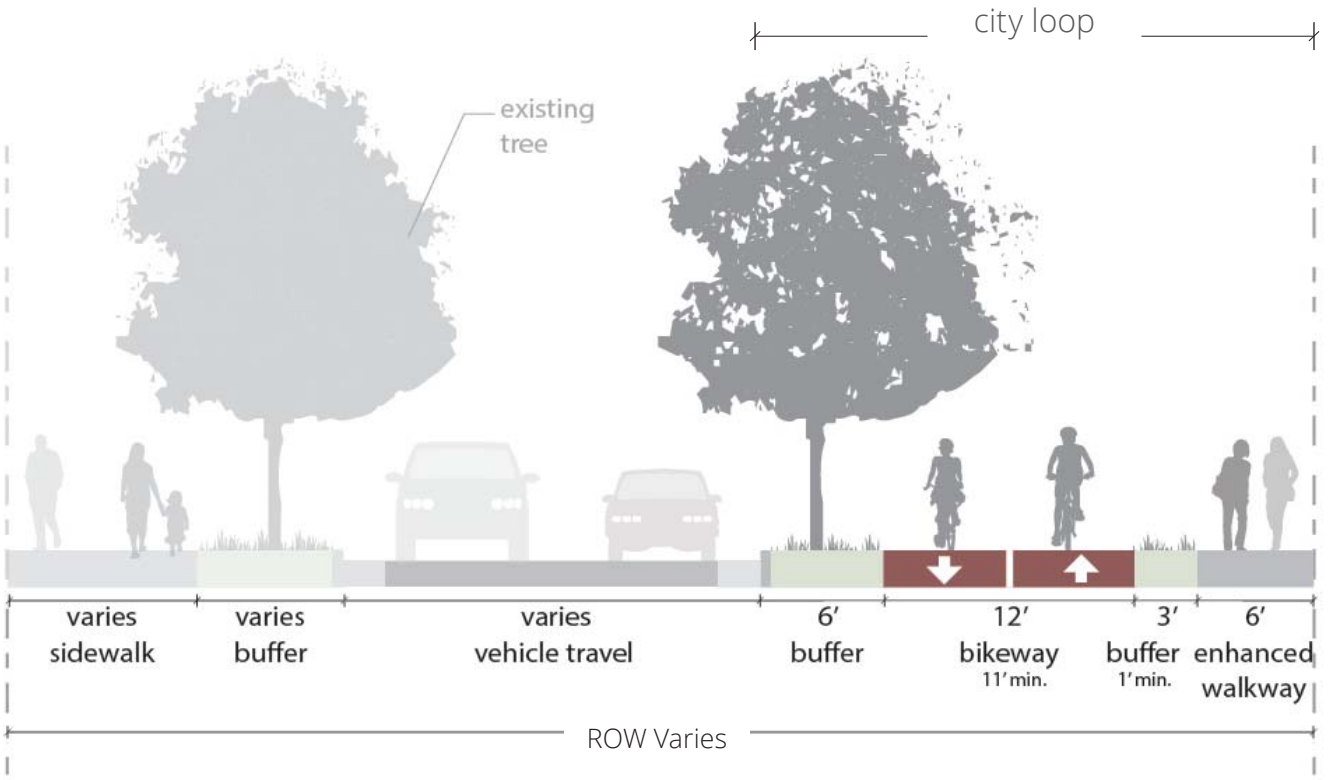


TYPICAL RESIDENTIAL NEIGHBORHOOD

Along residential streets it is critical to minimize impacts to existing driveways and street trees. In these areas the City Loop will need to be configured with at least a six ft. buffer between the bikeway and street. With lower foot traffic expected, walkways in these areas can be reduced to six ft. to allow for wider buffers. The illustration below identifies minimum dimensions for these sections. Streets where these sections could apply include:

- 8th Ave. NW
- 2nd Ave. NW

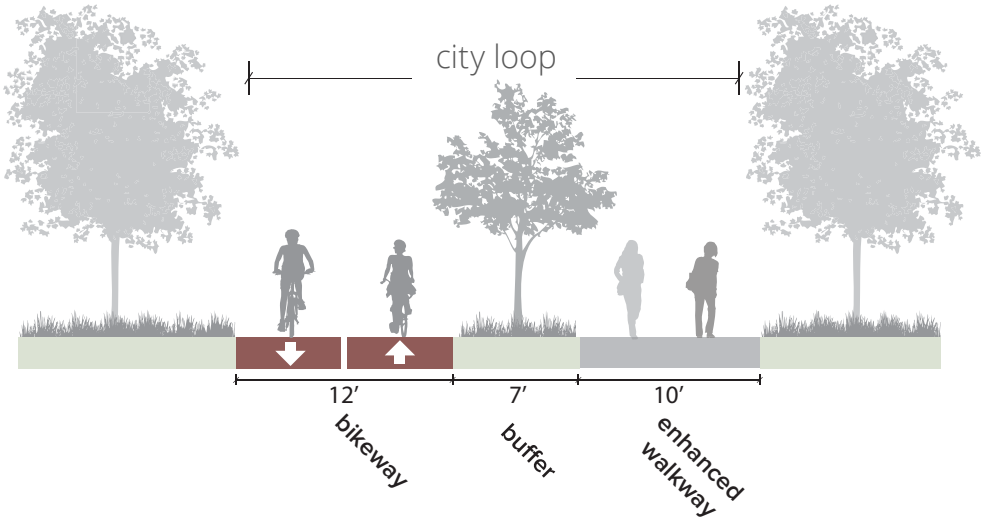
Proposed Section in a Residential Neighborhood



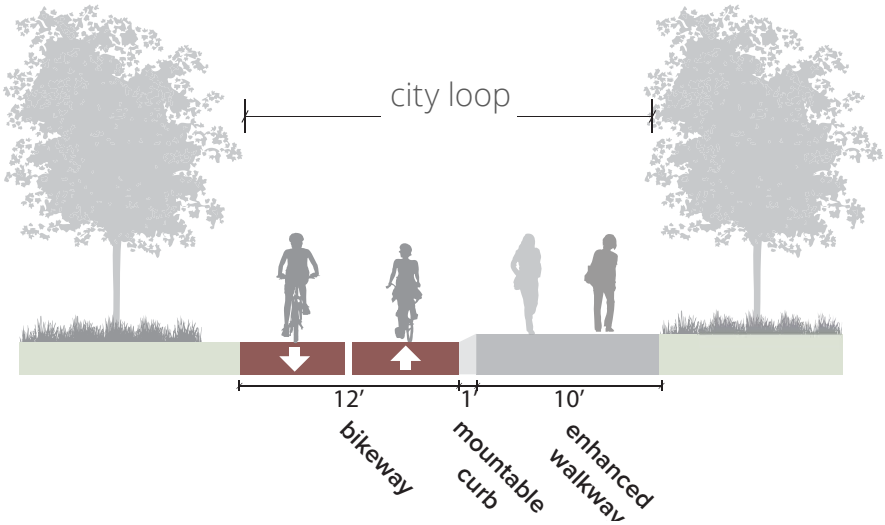
TYPICAL TRAIL CROSS SECTIONS

The shared use path segments of the City Loop will be rebuilt with the City Loop design vocabulary to provide a seamless, high quality experience. It consists of a 12 ft. bikeway and ten ft. walkway. Where space permits, a vegetated buffer for green stormwater infrastructure separates the enhanced walkway and bikeway. In constrained areas, the buffer will be reduced and the enhanced walkway will be elevated above the bikeway with a mountable curb. The illustrations below show a westbound segment of Kutzky Park and southbound segment along the railroad ROW following the Zumbro River. Since the railroad ROW is not currently available, the following pages describe the long term and interim route plans for the downtown waterfront segment of the City Loop.

Kutzky Park & Interim Connection North of Central- Typical Trail with Buffer



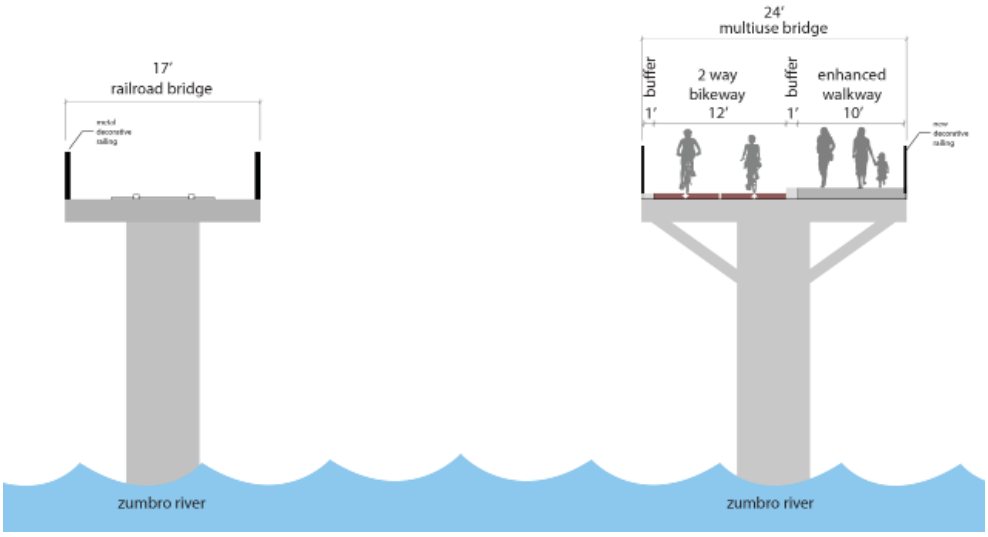
Proposed River Trail along the railroad ROW- Typical Trail without Buffer



RAILROAD BRIDGE CONVERSION

Once the railroad corridor from 2nd St. NW to 6th St. SE becomes available for redevelopment, the bridge across the Zumbro River will be repurposed into a City Loop connection. This section of the City Loop will include a 12 ft. bikeway with 1 ft. buffers on either side as well as a 10 ft. enhanced walkway. Until this segment becomes available, the interim route through Mayo Civic Center Park will be utilized.

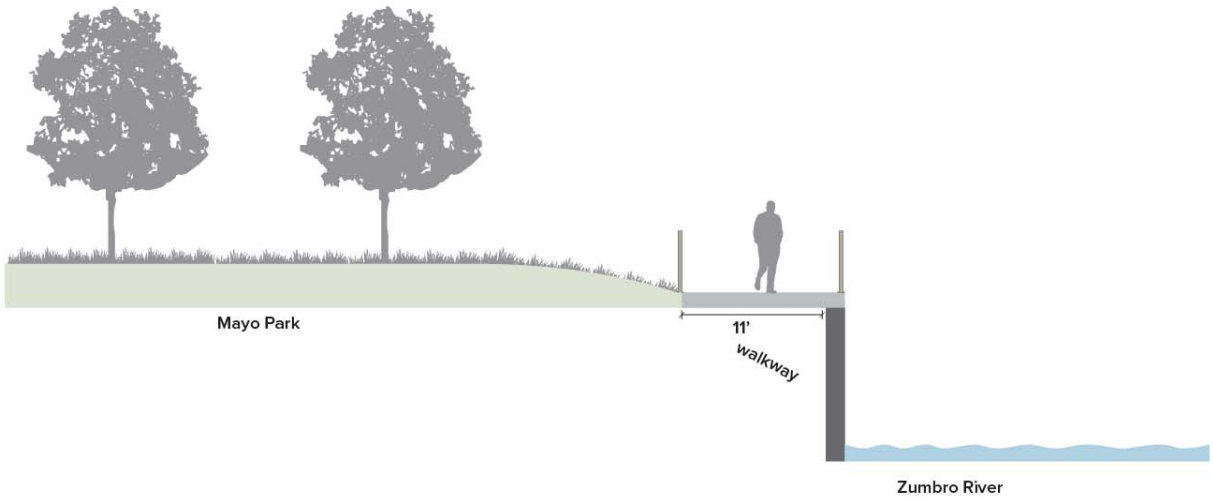
Existing and Proposed Railroad Bridge Conversion



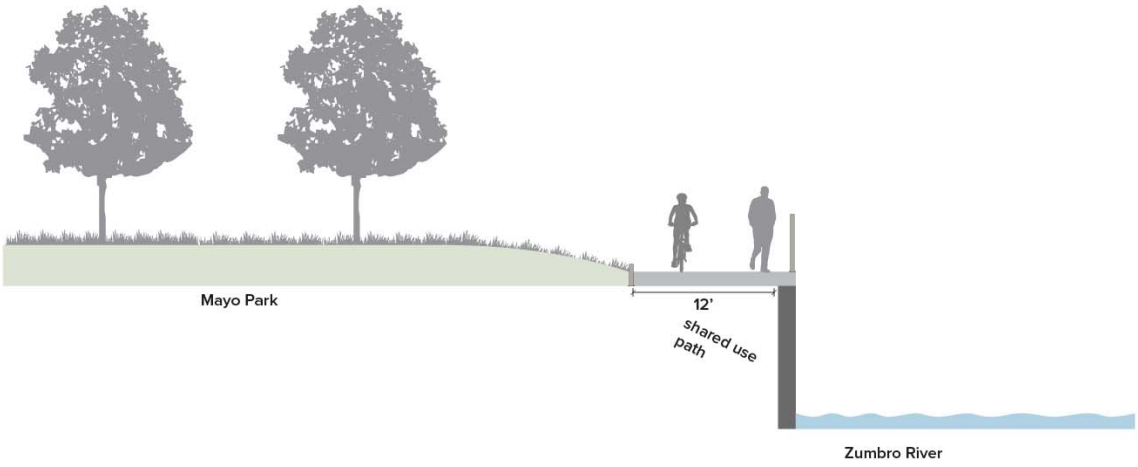
TYPICAL MAYO CIVIC CENTER PARK - INTERIM ROUTE

The existing trails along the Zumbro River at Mayo Civic Center Park will be expanded from a 10-11' walkway to a 12' shared-use path. This will provide a interim connection from 6th St. SE to 2nd St. NW until the railroad corridor becomes available.

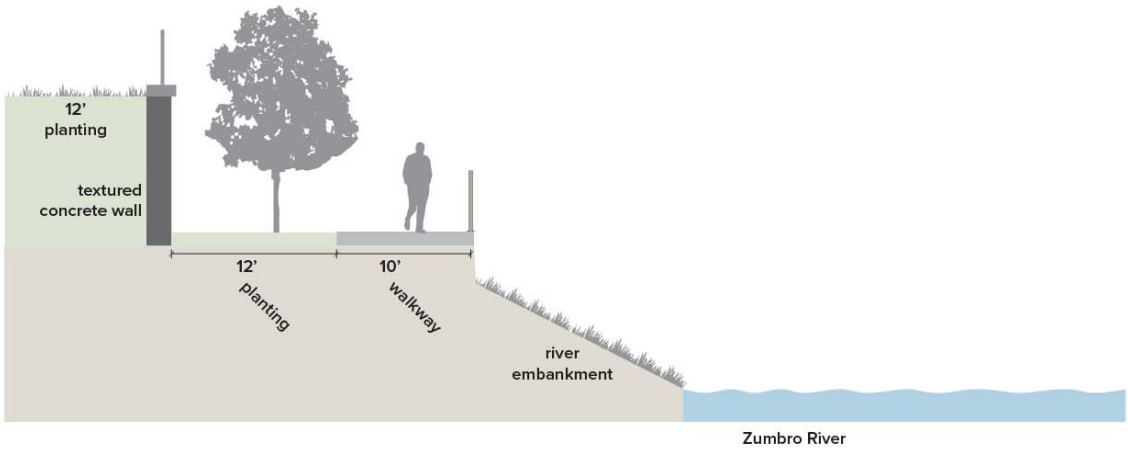
Existing Civic Center Park Section 1 - North Facing



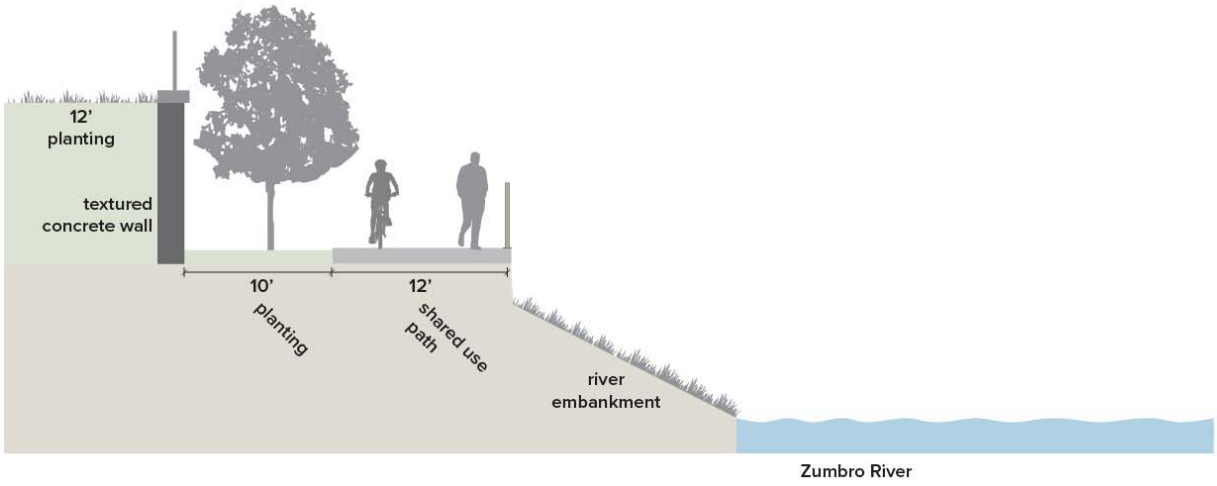
Proposed Civic Center Park Section 1 - North Facing



Existing Civic Center Park Section 2 - North Facing



Proposed Civic Center Park Section 2 - North Facing



TYPICAL INTERSECTION DESIGN

Intersections are junctions at which different modes of transportation meet and facilities overlap. An intersection facilitates the interchange between bicyclists, motorists, pedestrians and other modes in order to advance traffic flow in a safe and efficient manner. Designs for intersections with protected bicycle facilities should reduce conflict between bicyclists and motor vehicles by heightening the level of visibility, denoting clear right-of-way and facilitating eye contact and awareness with other modes.

Protected intersections are recommended throughout the loop at all crossings to maintain a safe and comfortable experience for all users. The following section will show typical intersection designs with protected bikeways as well as preliminary intersection designs for select intersections throughout the City Loop.

Key protected intersection elements include an approach taper for the bikeway, setback crossbike, yield to pedestrian markings, and corner safety islands that are raised six inches above the roadway. Where the City Loop alignment turns at an intersection, the bikeway tapers towards the enhanced walkway to allow buffer space for curb ramps and to indicate to cyclists that a change in direction is upcoming. Crosswalks from the intersection should continue across the bikeway to indicate to bicyclists that pedestrians crossing the bikeway have priority. Yield line markings can also supplement the crosswalk marking across the bikeway to reinforce that people riding bikes must yield to those walking.

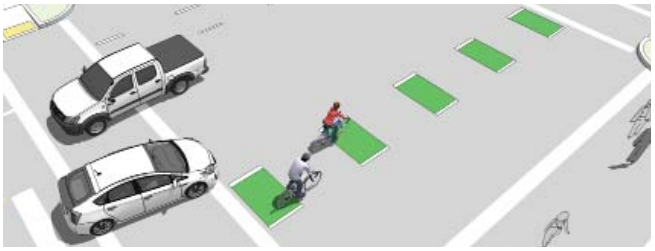
SAMPLE OF PROTECTED INTERSECTION ELEMENTS

Protected Bicycle Signal Phase

Protected bicycle crossings of signalized intersections can be accomplished through the use of a bicycle signal phase. It reduces conflicts with motor vehicles by separating bicycle movements from any conflicting motor vehicle movements. Bicycle signals are traditional three lens signal heads with green, yellow and red bicycle stenciled lenses.

Intersection Crossing Markings

Bicycle pavement markings through intersections guide bicyclists on a safe and direct path through the intersection and provide a clear boundary between the paths of through bicyclists and vehicles in the adjacent lane.

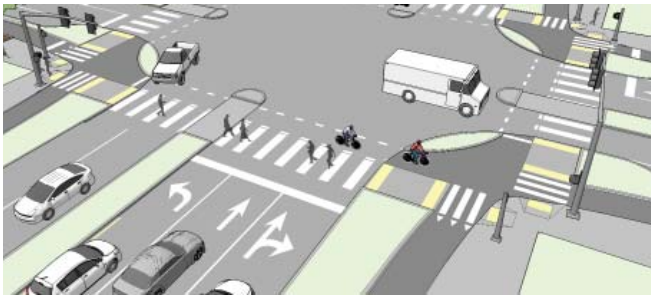


Transit Stop Integration

Where transit routes and protected bikeways overlap, space may be provided to bicyclists between a transit boarding island and the pedestrian space. Where space for a transit island isn't available, the sidewalk, bikeway, and transit boarding zone share space and more mixing is expected. It will be important to carefully address transit stop design at locations of existing and planned transit stops along the City Loop.

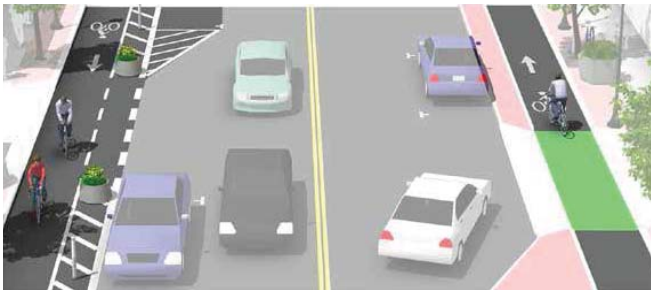
Protected Intersection or "Bend-Out"

A protected intersection, or “bend-out” intersection approach, maintains physical separation within the intersection to define the turning paths of motor vehicles, slow vehicle turning speed, and offers a comfortable place for people bicycling to wait at a red signal. Protected intersections will be important to consider on the City Loop to enhance bicyclist safety and comfort.



Driveways and Minor Street Crossings

The added separation provided by protected bike lanes creates additional considerations at minor street intersections and driveways that should be addressed. At driveways and crossings of minor streets a small number of automobiles will cross the protected bikeway.

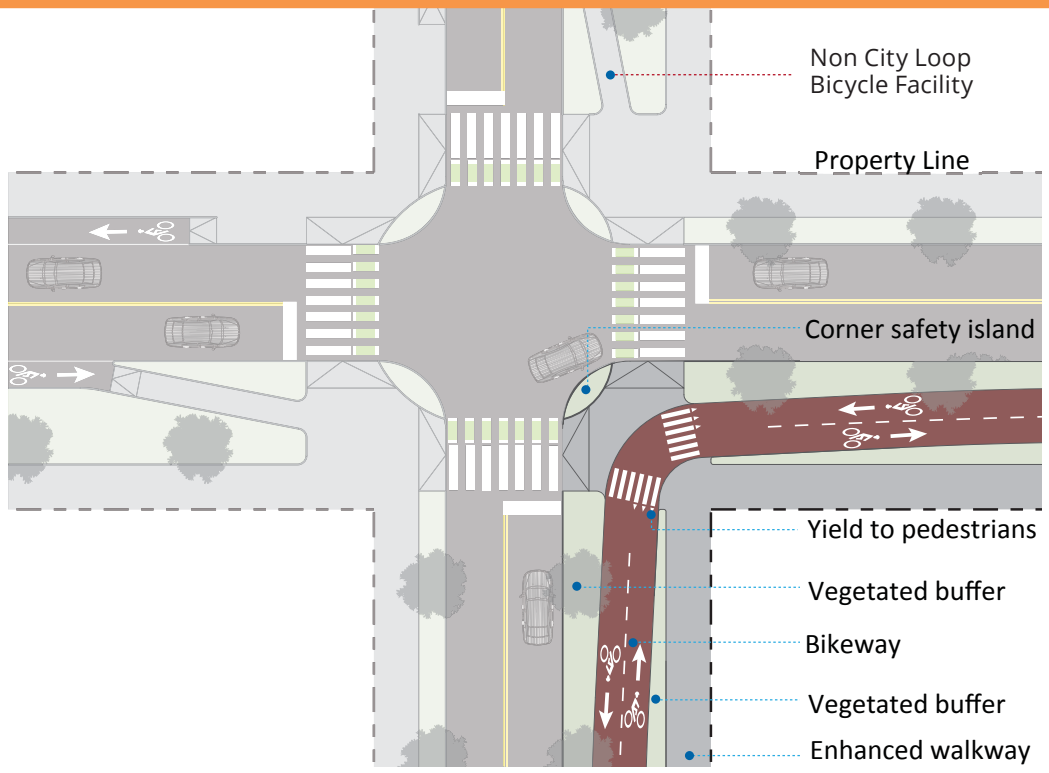


No Right Turn on Red

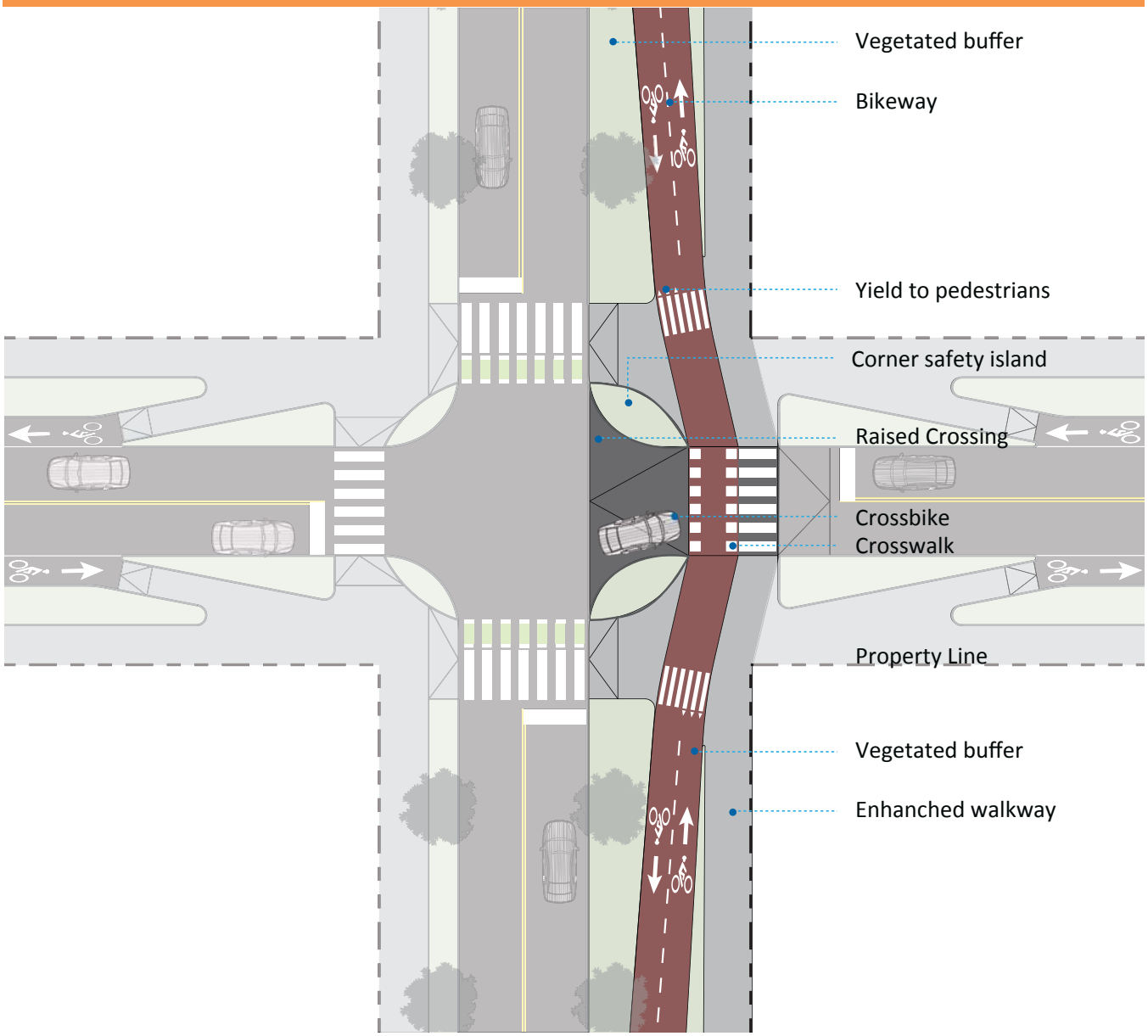
Prohibiting right turns on red may enhance safety for pedestrians and bicyclists by reducing unpredictability and minimizing conflicts with motor vehicles.

The following layouts depict best practices for intersection design. Actual implementation may vary based on site specific conditions.

Turn at Intersection

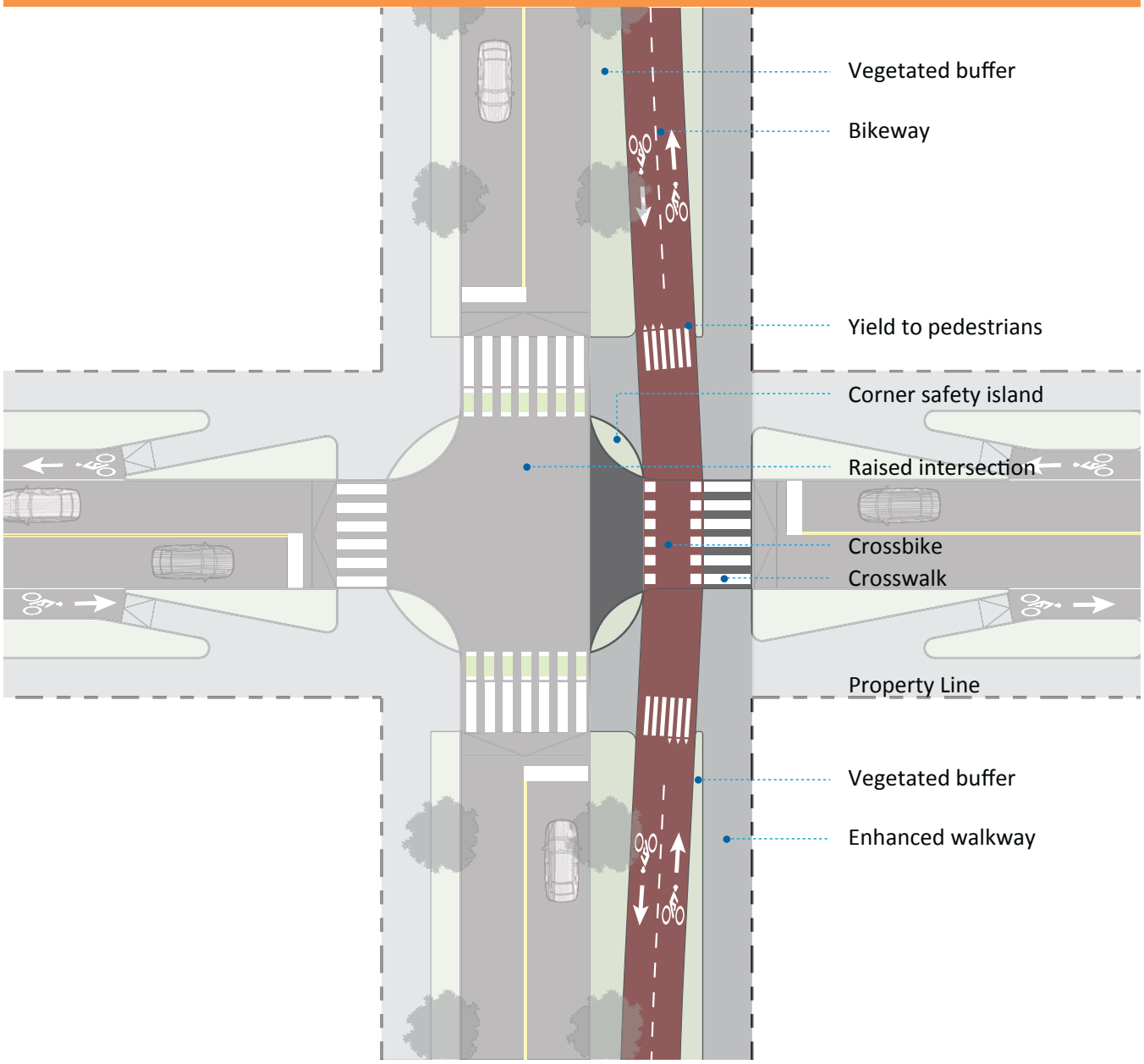


Crossing at Minor Intersection



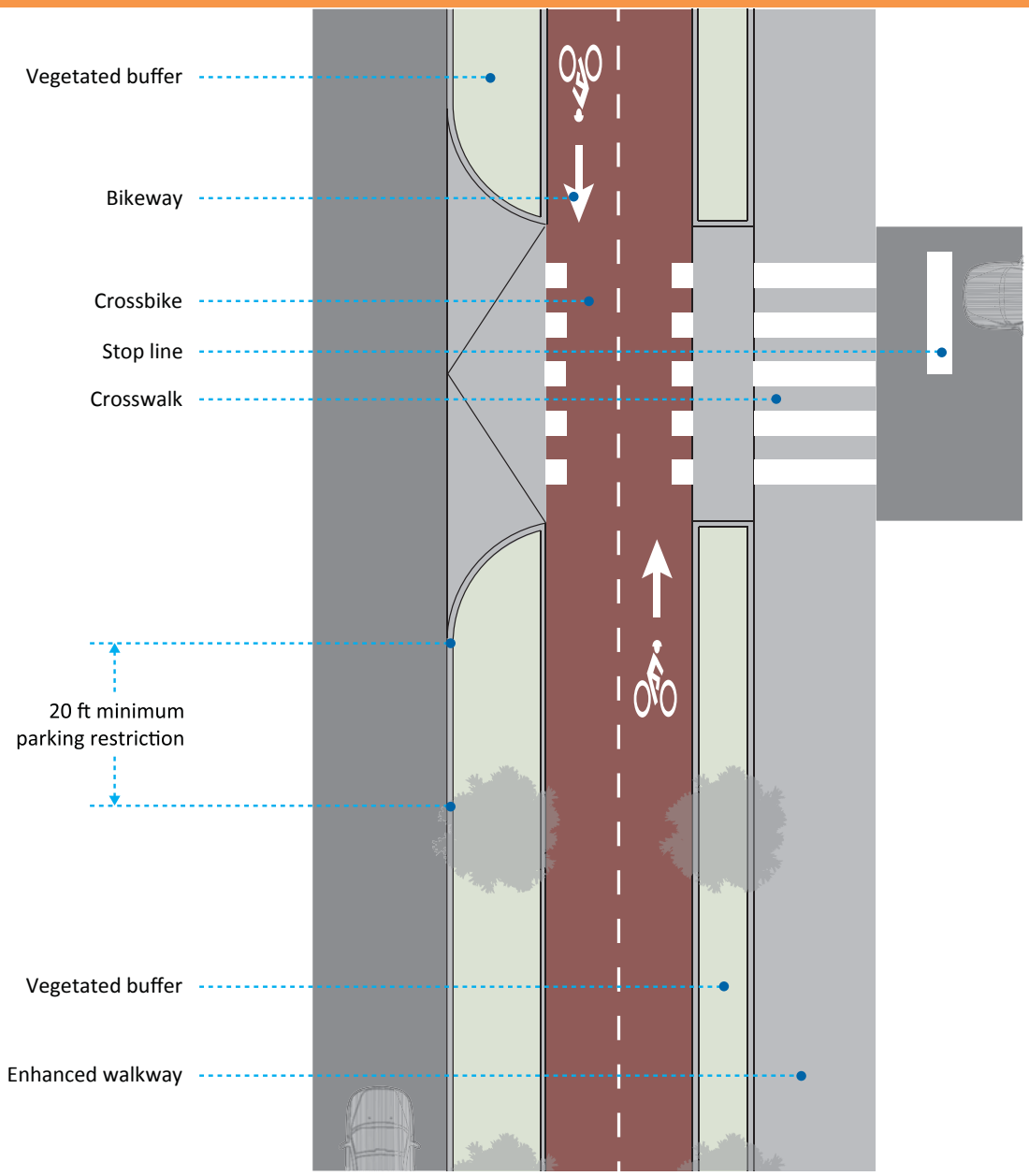
At minor intersections, such as a low volume side streets, the City Loop should have priority over the roadway. An elevated crossbike and crosswalk maintains a continuous experience for City Loop users and slows approaching vehicles that will cross the City Loop. Similar to the turn plan, the bikeway should taper towards the enhanced walkway in advance of the crossing. This taper allows a buffer to be maintained between the roadway and the bikeway by a corner safety island. This buffer space allows a turning vehicle to turn, then queue before crossing the City Loop. This focuses the driver's attention on people walking and biking through the intersection separately from the turning movement.

Crossing at Major Signalized Intersection



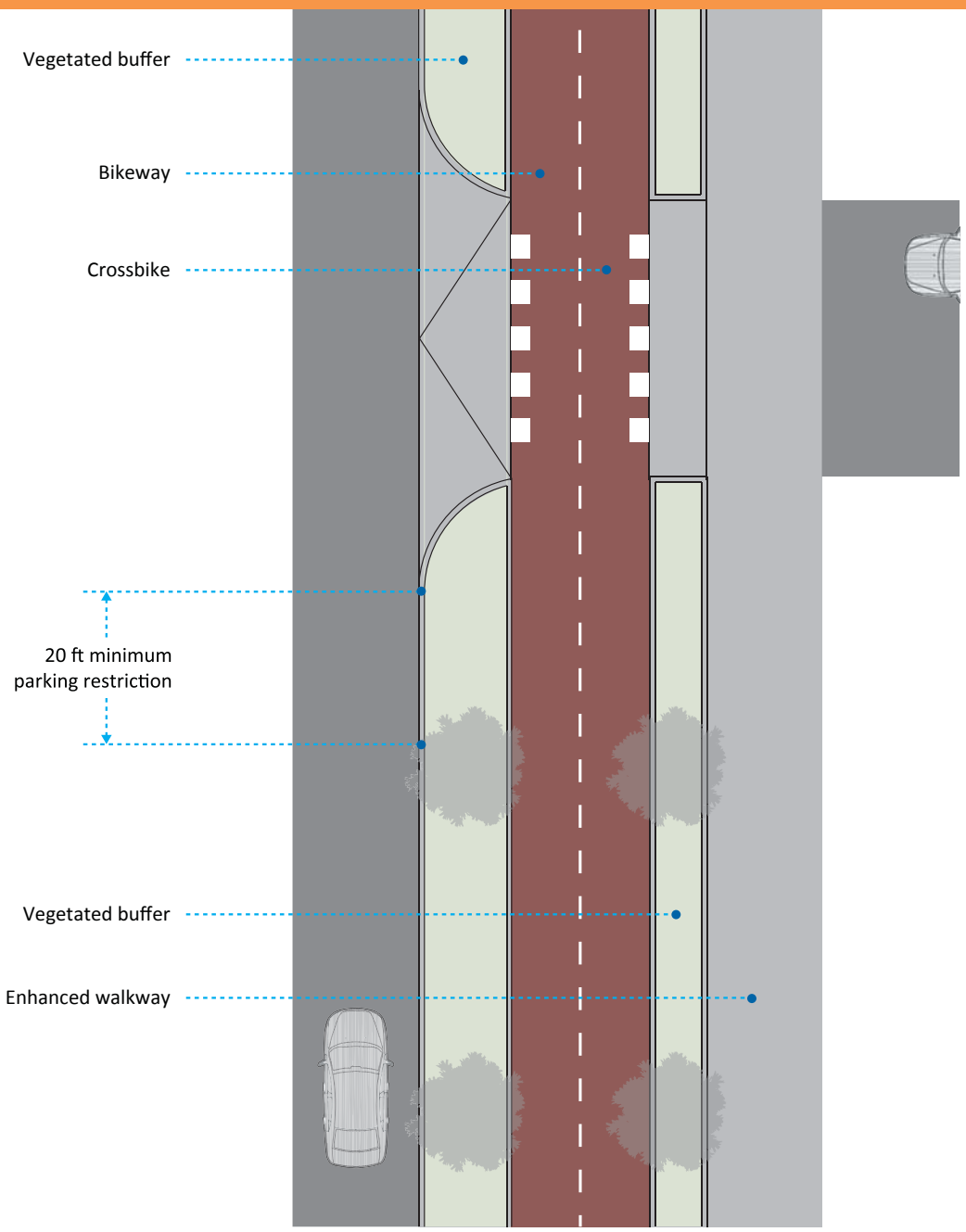
At major intersections with high vehicle volumes and buses, it is not practical to have one leg of an intersection raised. To provide a continuous experience for City Loop users while also minimizing disruption to traffic flow, the entire intersection can be elevated as a table with gradual transitions. The geometry of the City Loop is the similar to the layout of a minor intersection shown on the previous page, with a bikeway taper and corner safety islands to minimize turning conflicts. Crosswalk markings should continue across the bikeway to the sidewalk.

Commercial Driveway Crossing



Along the City Loop, walking and biking is prioritized at commercial driveway crossings by continuing the bikeway and enhanced walkway through the driveway intersection. White elephant feet markings and high visibility crosswalk markings are used to demarcate the bike and pedestrian crossings. Bicycle symbols may be used to add extra visibility to the driveway crossing. Vehicles approaching from driveways must stop and yield to City Loop users.

Residential Driveway Crossing



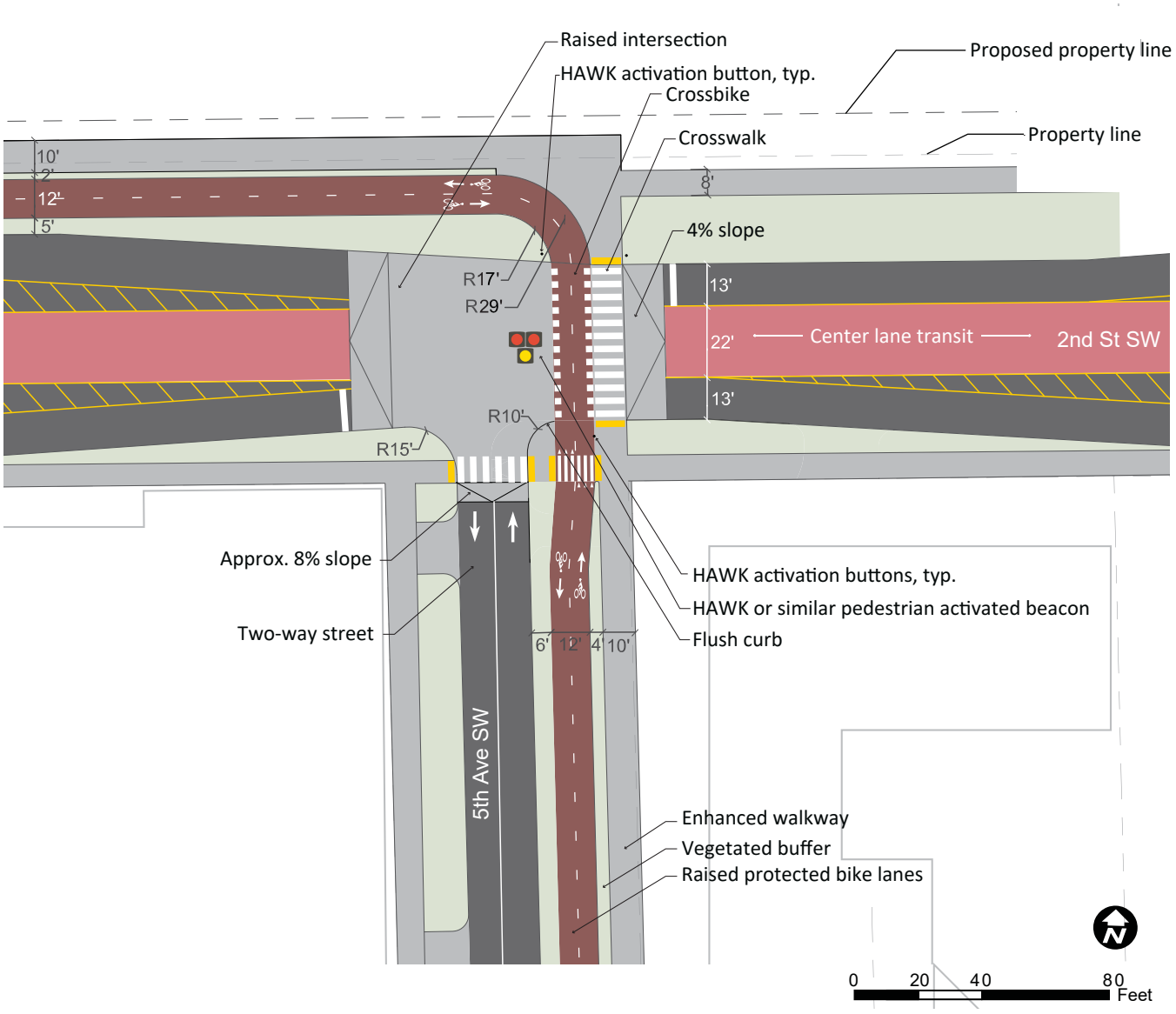
At residential driveways, the number of pavement markings can be reduced to a center skip line on the bikeway to indicate bidirectional flows, and elephant feet markings to alert both people biking on the City Loop and the driver of a potential conflict.

PRELIMINARY INTERSECTION DESIGNS

The following illustrations show preliminary designs for four different intersections along the City Loop hybrid route. These intersection were chosen to represent different interactions between motor vehicle and bicycle/ pedestrian traffic.

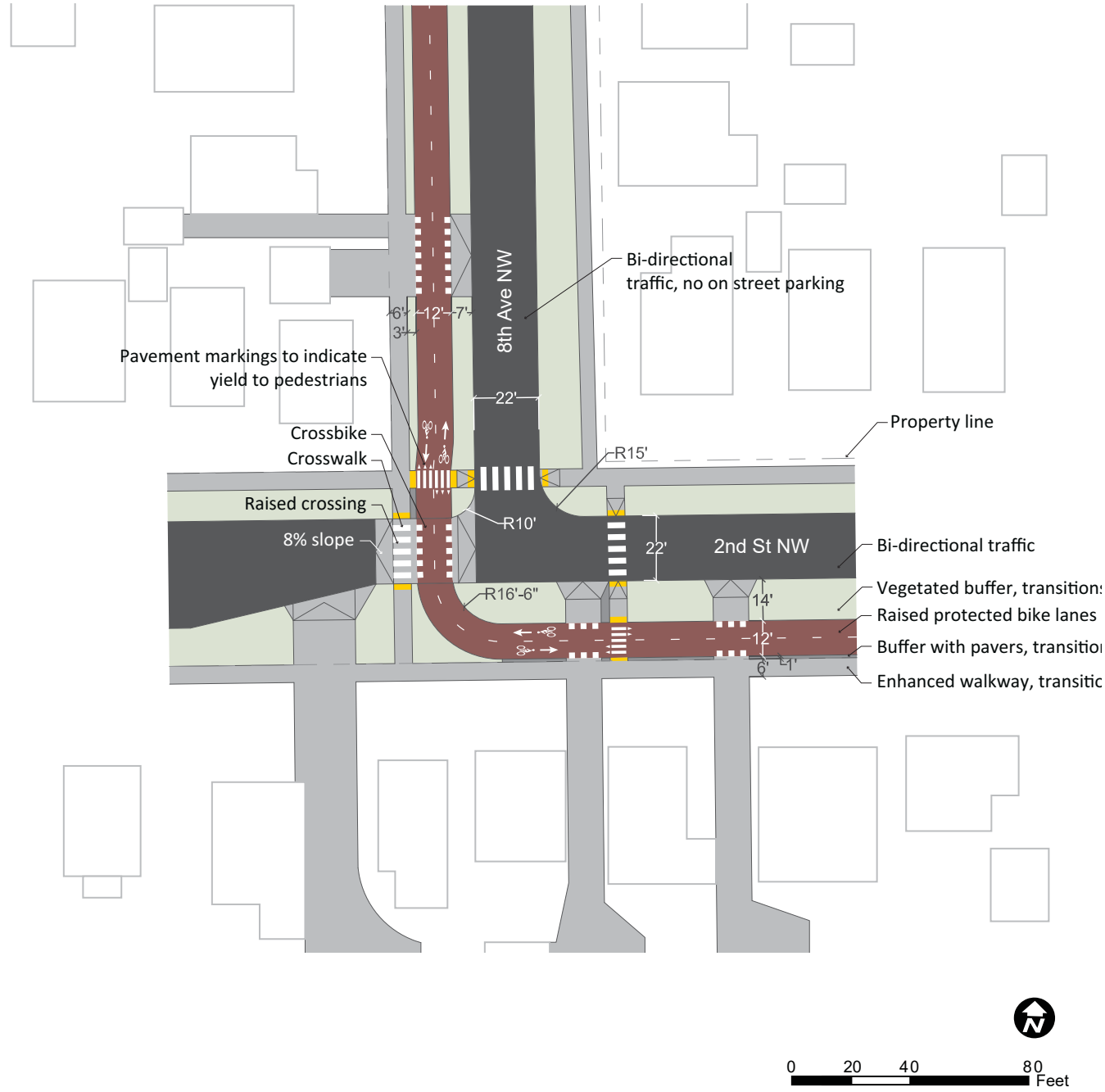
5th Ave SW and 2nd St. SW

From the north side of 2nd St. SW, the City Loop turns south onto the east side of 5th Ave SW. This is a "T" intersection as 5th Ave. SW does not continue north of 2nd. Bicycle and pedestrian design elements include: narrow turning radii, a raised intersection, curb extensions, HAWK or similar pedestrian signals, high visibility crosswalks and crossbikes, bicycle yields, and ADA ramps and warning strips.



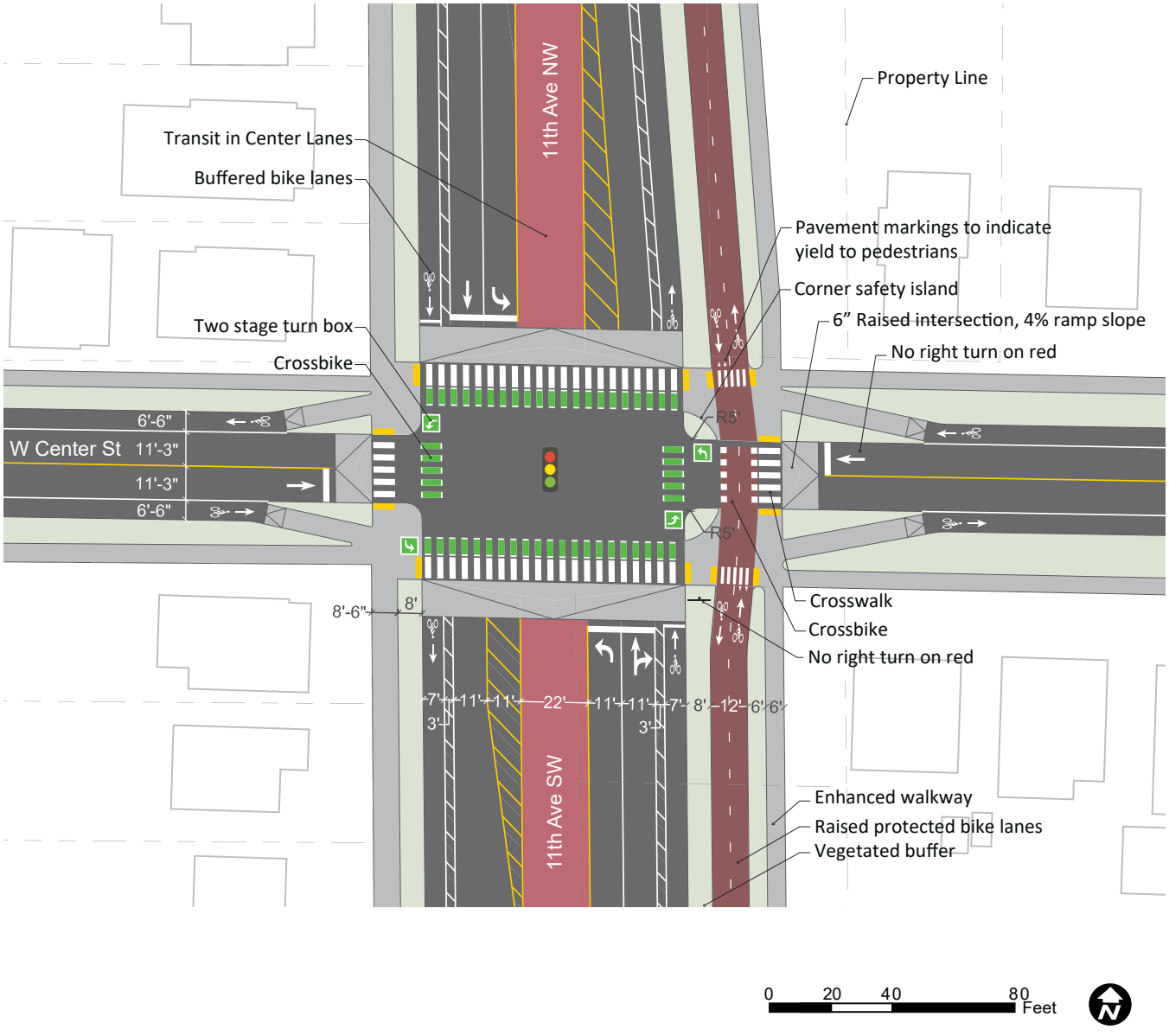
8th Ave. NW and 2nd St. NW

The intersection at 8th Ave. NW and 2nd St. NW shows another "T" intersection, but this time in a more residential setting. Bicycle and pedestrian design elements include: narrow turning radii, a raised crossing, curb extensions, high visibility crosswalks and crossbikes, bicycle yields, and ADA ramps and warning strips.



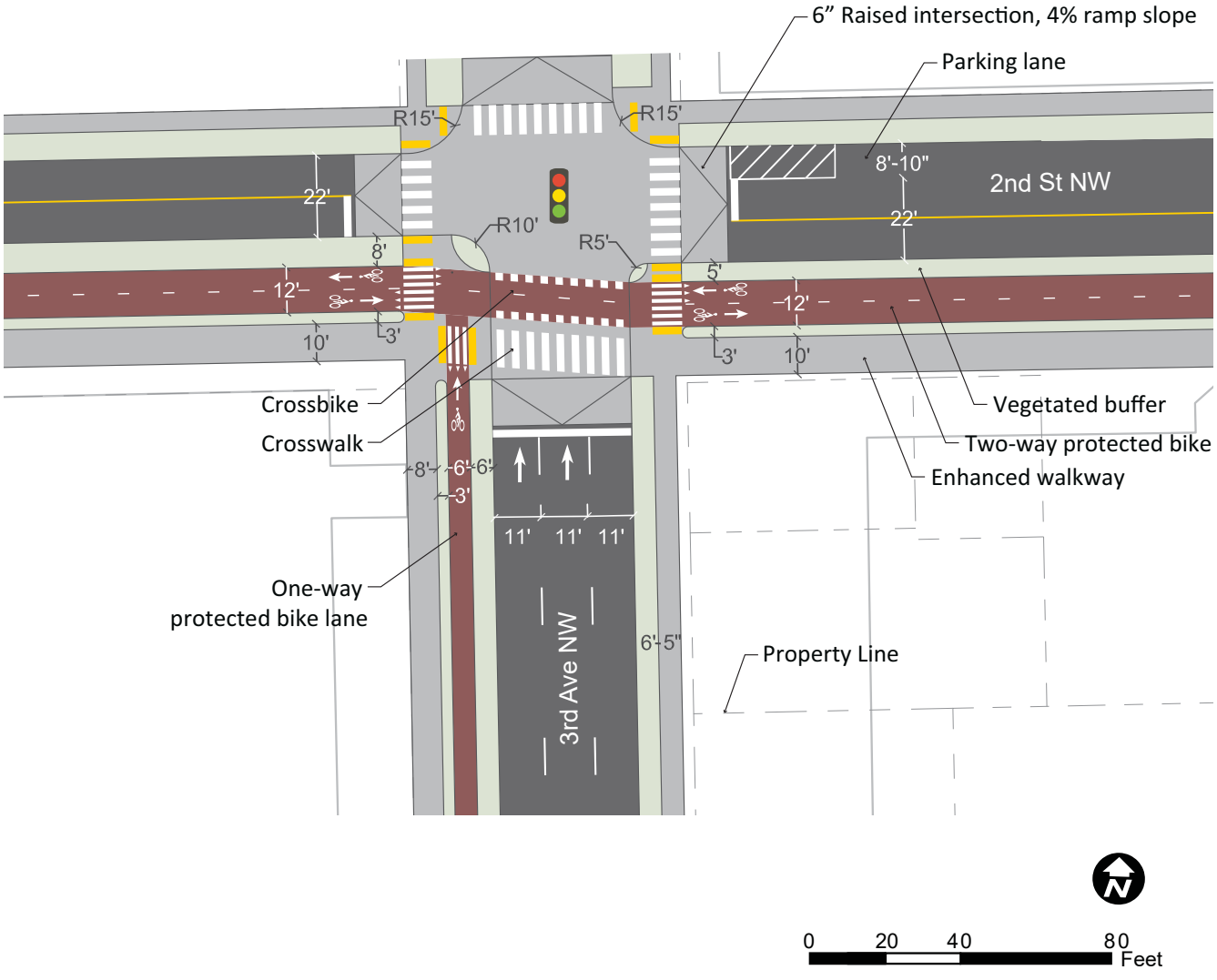
11th Ave. NW/SW and W Center St.

The intersection at 11th Ave. SW and W Center St. shows how the City Loop will interact with existing or proposed on street bike lanes at a major signalized intersection. Bicycle and pedestrian design elements include: narrow turning radii, curb extensions, raised intersection, high visibility crosswalks and crossbikes, bicycle yields, two stage bike turn boxes, corner safety islands, and ADA ramps and warning strips.



3rd Ave NW and 2nd St. NW

The intersection at 3rd Ave. NW and 2nd St. NW shows a one way to a two way intersection where two segments of the City Loop come together. Bicycle and pedestrian design elements include: narrow turning radii, raised intersection, high visibility crosswalks and crossbikes, bicycle yields, corner safety islands, and ADA ramps and warning strips.



MATERIALS AND FURNISHINGS

In order for the City Loop to serve residents, commuters, and visitors from around the world, it must provide high quality aesthetics that act as an attraction for facility users and developers. The following material and furnishing recommendations provide a set of recommendations for the future landscape design of the facility.

PAVING MATERIALS

When determining surface type for paved trails, consider topography, surrounding landscape, underlying soils, material sourcing and user needs. All surfaces have advantages and disadvantages, and each must be analyzed to determine which surface is appropriate in any given location. American Disabilities Act Accessibility Guidelines (ADAAG) compliant trails require firm, stable, slip resistant surfaces, which in most instances is a paved surface for access and ease of use. When possible, consider using recycled content and those with high Solar Reflectance Index (SRI) value to reduce the urban heat island effect.

Paved Surface Materials

A proper foundation will increase the longevity of the trail surface. Two inches of surfacing material over six inches of base course gravel over geotextile fabric is recommended for construction.

Asphalt is a common surface for bikeways, offering substantial durability for the cost of installation and maintenance. Asphalt is popular with users for its smooth, continuous surface and has the benefit of lower cost, but requires more upkeep than concrete. As a flexible pavement, asphalt can also be considered for installing a paved trail on grades steeper than 3%. If constructed properly on suitable sub-grade, asphalt has a life span of about half that of concrete, or 10 to 15 years.

Concrete can last twenty five years or more when properly constructed and maintained on a regular basis. The high cost of concrete is often the most limiting factor since it is one of the most expensive surfaces to install. It is recommended that concrete be used for its superior durability and lower maintenance requirements in areas prone to frequent flooding, and for intensive urban applications. To prevent expansion joints from jarring cyclists or in line skaters, 1/4 inch saw cut concrete joints (rather than troweled) improve user experience.

Permeable paving is twice the cost of asphalt to install and is only recommended in very special bikeway applications. Permeable paving should only be used in areas with proper drainage, and is not suitable in floodplain or areas with ponding or sedimentation. Permeable paving also requires a maintenance schedule for vacuuming debris after storm events to retain permeability.

Pavers are not recommended for bikeways because it is very difficult to provide a surface that is smooth enough to meet the expectations of bicyclists. Freeze-thaw cycles can further diminish the ride quality for bicyclists, as individual pavers shift over the years.

Bike lane

Bike lanes will be constructed with asphalt to provide a smooth, uniform surface.

A surface material incorporating EVIzero or a similar ecological binder for coloring asphalt surfaces should be applied to create a distinctive and defined bikeway. This is easily replaced (average 12 yr life span), and repairs can be done when refreshing surfaces is needed.

Pedestrian walkways should be enhanced with integrally colored concrete organized in curving patterns to further reinforce the City Loop identity. Saw cutting contraction joints is recommended for improving surface uniformity and reducing chatter or rumble for users employing mobility devices such as walkers or scooters. Markings and color will continue over intersections to make vehicular traffic aware of a major crossing. Additional signage and wayfinding at major intersections may be added as needed.

Pedestrian Walkway - Enhanced

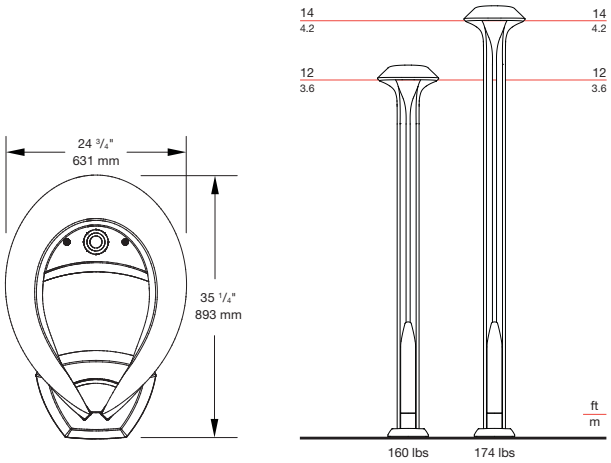
Buffer Areas

Buffer areas serve as a pedestrian and bicyclist amenity zones. In areas where the buffer between the bikeway and the enhanced walkway is used as a seating area or pedestrian amenity, paving materials similar to the images below can distinguish this area from the through walkway. This paving has a fine grain detail appropriate for pedestrian areas, and provides visual interest.

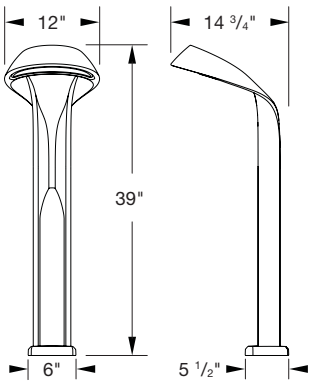
FURNISHINGS

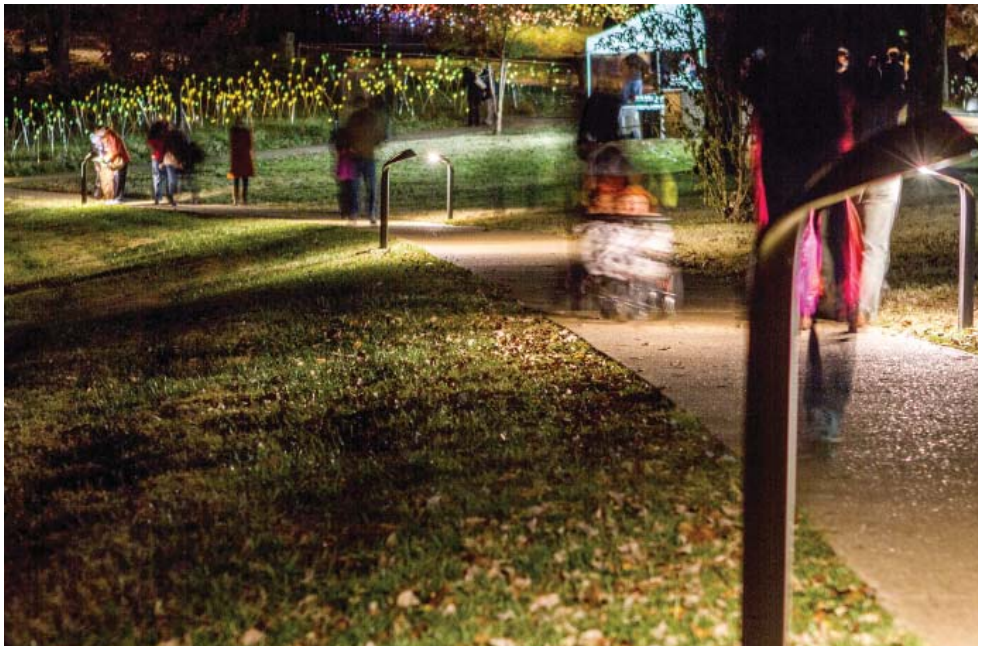
Lighting - Metro 40 Hi-Glo

Lighting along the City Loop can provide 24 hour access to walking and bicycling and provides a sense of safety to users after sundown. Pedestrian scaled lights should be installed at frequent intervals. Shorter bollard type lighting can be added in key locations such as at seating nodes. The Metro-Glo fixtures are recommended for their loop-like design which will reinforce the City Loop brand. Light columns are included for further enhancements within the downtown core.

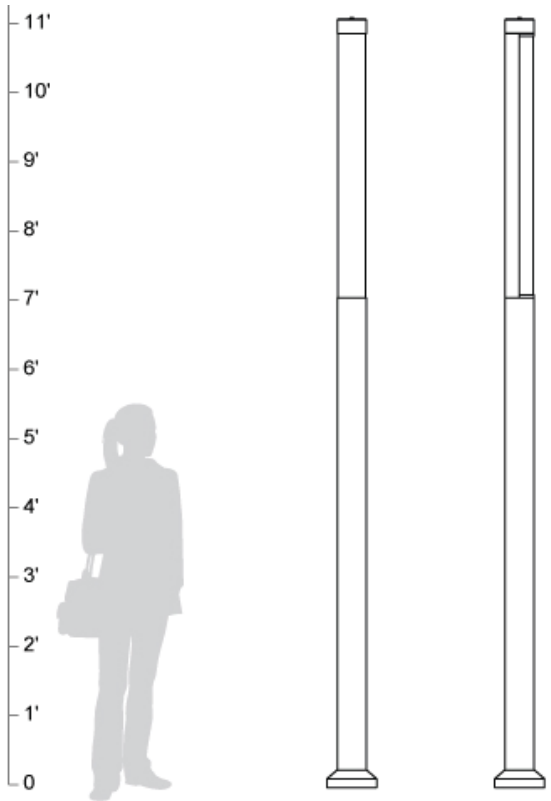


Lighting - Metro 40 Lo-Glo





Lighting - Column Pedestrian Light

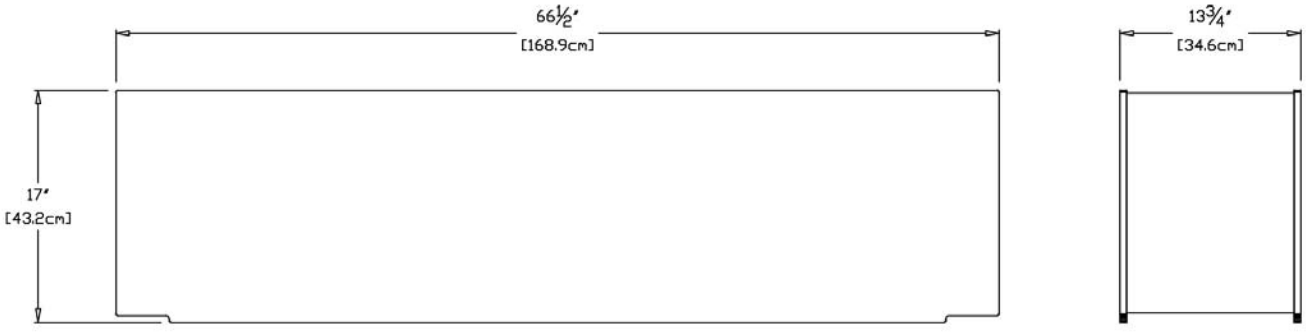


Planters

The Skinny Planter by Loll Designs of Duluth, MN provides a clean, modern product for introducing seasonal plantings while simultaneously providing vertical separation between pedestrians, bikes and or motor vehicles. Constructed of 100 percent recycled plastic, it is moveable and made to withstand the test of time and extreme weather. Holes can easily be drilled in the bottom to allow for irrigation service and slow, seeping drainage.

Planters are designed to be easily removed for winter storage or short term events.

Opportunity areas for applying City Loop identity/logo.



Plantings

Plantings that reinforce comfort, identity and ecological performance help create places that are welcoming and nurturing for people and urban wildlife.

Incorporating tree plantings and mixed beds provides practical microclimate benefits such as shade in the hot summer months. It can also strengthens the local and national agricultural economy by focusing on species that are native to the region and that are pollinator friendly.

In addition to the ecological benefits, plantings fulfill cognitive needs for connecting with the 'natural' environment. These restorative mental and physical health benefits are increasingly important as people become more disconnected with the natural environment.

Prairie Dropseed (Sporobolis heterolepis), a native grass, is attractive to the endangered rusty patched bumblebee

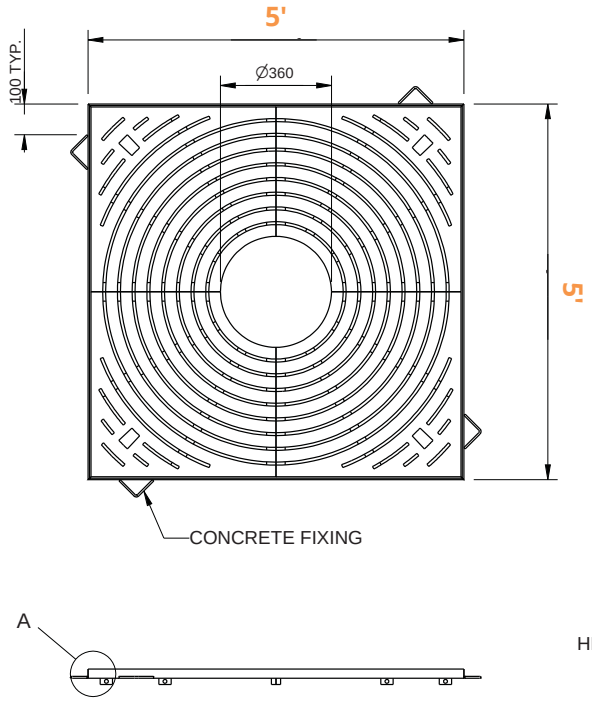
Rough Blazing Star (Liatris aspera), a native forb, is attractive to butterflies

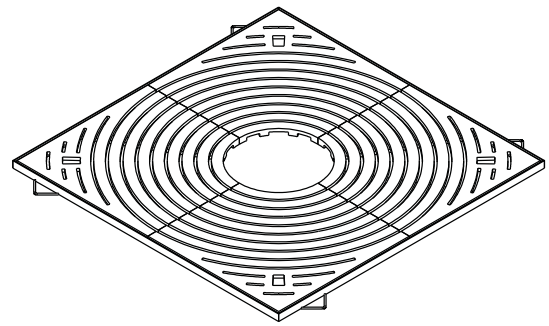
Swamp White Oak (Quercus bicolor), a native shade tree with proven performance in urban conditions, often hold its leaves in winter.

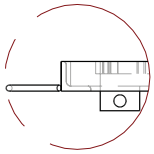
Tree Grates

Tree grates may be needed in commercial areas where additional paving is needed for pedestrian circulation. The distinctive design of this radiating circle patterned tree grate reinforces the City Loop brand/identity.

photo source: Furphy Foundry







Detail A
LUG PLACEMENT
HIDDEN LINES SHOWN

Certified System
Quality
ISO 9001
SAI GLOBAL

SPECIFICATION:

MATERIALS:
Grate - Recycled Aluminum
Frame - Mild Steel

DIMENSIONS:
All in mm unless otherwise stated

FINISH:
Frame - Galvanised & Optional Powder Coat
Grate - Mill or Optional Powder Coat

Seating and Gathering

A diversity of public seating options should be provided on the City Loop to provide opportunities for group and individual resting areas, places to eat, and places to meet. Conventional tables and benches as well as unique block or terraced seating should be considered.

Charlie Table, photo source: Landscape Forms

Trio Bench, photo source: Forms+Surfaces

Trio Bench, photo source: Forms+Surfaces

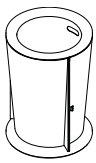
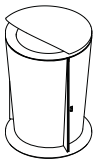
Cross Table with Vista Chairs, photo source: Forms+Surfaces

Union Concrete, photo source: Jangir Maddadi Design Bureau

Trash and Recycling

Landscape Forms Austin Litter Receptacle

Opportunity area for applying City Loop identity/logo.

	STYLE	DIAMETER	HEIGHT	PRODUCT WEIGHT
	Top-Opening	24"	35"	172 lb
	Side-Opening	24"	42"	186 lb

The Austin litter receptacle by Forms and Surfaces provides a distinctive look and will contribute to branding the City loop. The smooth steel product provides opportunities for applying enhancements such as a City Loop identity graphic, and or location map. The top cover keeps litter or recycling dry while the side opening provides for easy, stress free maintenance.

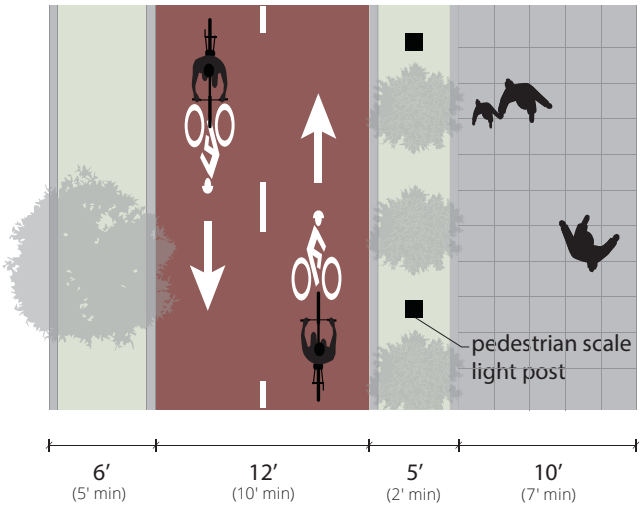
AMENITIES

The City Loop will provide amenities throughout the downtown area such as additional bike parking, benches and plantings. The illustrations below shows some of the zones of the City Loop in which these amenities might be located.

AMENITY ZONES

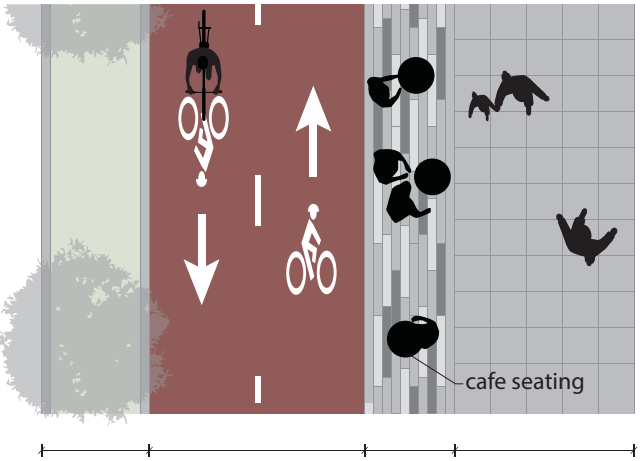
Planted Buffers

In a typical City Loop section, the buffer between the bikeway and the enhanced walkway can be used as an area for turf grass, ornamental planting or stormwater infrastructure. Pedestrian scaled lighting should also be provided in this buffer, spaced adequately to provide illumination to both the bikeway and the walkway.



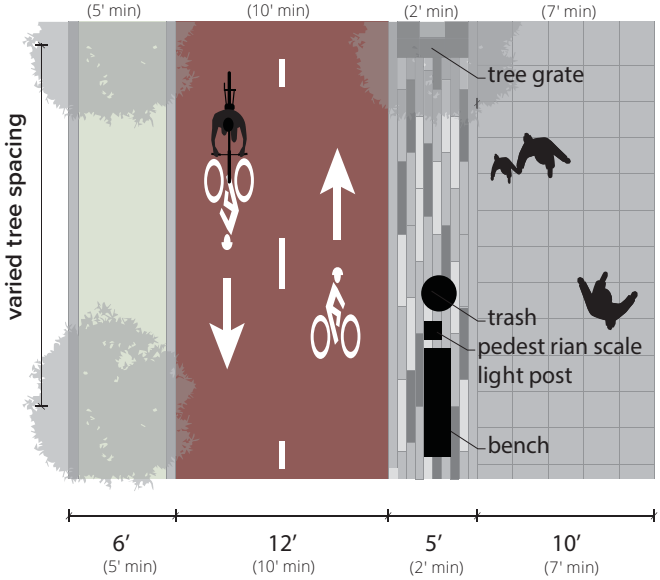
Pedestrian Amenity Zone | Cafe

In particularly urban contexts, the buffer between the bikeway and the enhanced walkway can be utilized as an extension of the sidewalk with cafe seating and tables. However, this area should be distinguished from the through walkway with a different paving type, such as elongated pavers.



Pedestrian Amenity Zone

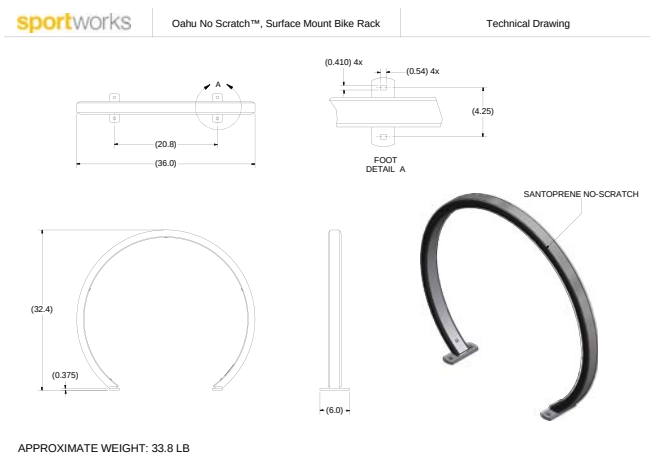
Similar to the previous examples, the buffer space can also be used in a conventional streetscape manner, with benches, trash receptacles, lighting, and tree pits. Tree grates should be given careful consideration to avoid hazards for bike wheels that may pass over them.



BIKE PARKING

A bike rack provides a convenient and secure location for a City Loop rider to leave their bicycle. Racks should provide two points of support on a bicycle frame. This ensures that a bicycle is not damaged while it is parked on the rack, and is not susceptible to falling over in wind or from other users accessing the rack. An ideal rack type for the City Loop is a circular bike rack. The photo on the left shows a rack manufactured by Sportworks. This rack provides adequate support to a parked bicycle, and the rubber coating on the face of the rack does not scratch the bicycle frame or components. This rack is a high end amenity which values a bicycle rider and their bicycle.

Where possible, bike racks should be provided under shelter. Shelters provide protection from sun, rain, and snow and can be lit at night for safety. Shelters can be conventional, or custom designed to fit the City Loop brand. The images on the bottom of the page present a sample bike parking shelter.



BIKE REPAIR STATION

Publicly accessible bicycle repair stations allow people to perform minor repairs on their bikes while travelling on the City Loop. This simple amenity allows users to self-repair flats or adjust seats where a bike shop is too far or not open. These repair stations typically have a stand to hold up a bicycle, an air pump, and a set of basic tools. This is a useful amenity that can be combined with wayfinding elements such as a map or information kiosk, or a rest area with seating. These repair stands are ideally located with bike racks under shelters to protect the tools from rust and to allow City Loop users to make repairs in a comfortable dry location in inclement weather.

WAYFINDING

The main principles of a wayfinding system are to connect places, be predictable, be inclusive, and keep information simple. Good wayfinding makes it easier to walk, bike and take transit; reduces the risk of getting lost or disoriented; improves access to destinations; and can create a community identity. The City Loop should have a distinct wayfinding family specific to the City Loop brand to clearly indicate to users when they are on the loop as well as provide orientation and direction to nearby destinations. Key components of a bicycle and pedestrian wayfinding family for the City Loop could include information kiosks, area maps, directional signs, confirmation signs, mile markers, gateway markers, pavement markings and other route identifiers such as sign toppers and distinctive crosswalk markings.

Providing time (minutes to destination) of trip instead of distance is a more useful way of orienting users to key destinations and connections while using the City Loop.

The City Loop's wayfinding system should also investigate applications of advanced visual and telecommunications technologies as way to conserve energy and improve performance and durability.

BRANDING AND IDENTITY

The City Loop will be a world-class pedestrian and bicycle urban trail that creates safe, enjoyable, and healthy ways to move about the Development District to experience the sites, visit local shops, and dine in local restaurants and eateries. With such a large and diverse route, the objective is to create a distinct and instantly recognizable identity that connects the entire route. The identity needs to be simple and intuitive to serve as a quick, consistent reassurance to the City Loop user that they are on the right path. With that in mind, it also needs to be flexible enough to be able to integrate across the City's other wayfinding systems. Finally, the brand needs to distinctly reflect Rochester's character as defined by community input, as well as the vision for the Destination Medical Center.

For St. Paul, MN's Grand Round pathway system, designers developed a system of logo variations to respond to a range of conditions and applications such as the web, site signage and printed materials.

INDIANAPOLIS CULTURAL TRAIL®
A Legacy of Gene & Marilyn Glick

The Indianapolis Cultural Trail is a great example of branding and wayfinding. The route features high quality graphic signs placed at intervals along the path.

PUBLIC ART OPPORTUNITIES

Integrating public art prepared by local, regional and national artists into the City Loop provides opportunities for supporting health and well-being, reinforcing identity, placemaking and beauty.

Multiple opportunities are available including:

- Artist designed / constructed furnishings such as benches, bike racks, railings, drinking fountains, etc.
- Separate artworks such as paving designs, mosaics, sculpture, lightworks, banners, murals or soundworks.
- Programmed activities / events such as music, dance and or theater performance.
- Artist prepared planting designs

Art installations provide a great opportunity for the City to partner with local artists and organizations such as the Rochester Center for the Arts. They can provide temporary or permanent works throughout the City Loop route that can serve as a reason to take the path or simply a pleasant surprise.

Though art installations are an amenity that can be enjoying by all, special consideration must be given to long term funding for proper maintenance.

River Monolith, Andy Kincaid & Rob Neilson

Sentient Beings, Cliff Gartner

Stone Boat, Stanton Sears

CITY LOOP VISUALIZATIONS

Visualizations have been developed to illustrate the visual character of the City Loop in five key areas:

- 3rd Ave. SW, a one-way downtown transit corridor
- 11th Ave. SW, a two-way transit corridor with a new greenway along its eastern edge
- Kutzky Park, a significant community green space incorporating Cascade Creek
- 2nd St. NW, a two-way residential street
- 6th St. SW, a two-way transit corridor with significant future development proposed by the University of Minnesota


City Loop

3RD AVE. SW

A one-way downtown transit corridor

As the City Loop travels along 3rd Avenue it runs through the DMC's Heart of the City and Discovery Square districts and connects users to a number of Mayo Clinic facilities and landscaped open spaces as well as to Central Park to the north and Soldier's Field to the south. It also integrates with a new DMC circulator proposed to operate within the 3rd Avenue right-of-way.

Illustrated features:

- Walking path with color patterned concrete
- Decorative brick paving buffer area
- 14 ft. tall signature LED lighting with signage and wayfinding capability
- Signature bike loop parking with dockless bike-share capability
- One-way elevated bike path with eco-colored asphalt paving and directional markings
- Curb-side buffer with decorative brick paving
- 10 ft. tall signature LED light columns
- Rectangular planter pots with branding capability

11TH AVE. SW

A two-way transit corridor with a new greenway along its eastern edge

The City Loop runs through the Kutzky Park neighborhood as it connects Kutzky Park with 2nd St. SW, St. and Marys Place Park. As 11th Avenue NW/SW is transformed with a new DMC circulator and on-street bike lanes, the City Loop helps establish a new, landscaped open space / greenway within the expanded right-of-way.

Illustrated features:

- Landscaped greenway / buffer between existing homes and 11th Avenue
- Signature benches and litter receptacles with branding capability
- Walking path with color patterned concrete
- Linear rain garden buffer between pathways
- 14 ft. tall signature LED lighting with signage and wayfinding capability
- Two-way elevated bike path with eco-colored asphalt paving and center striping
- Curb-side tree lawn buffer

KUTZKY PARK

A significant community green space incorporating Cascade Creek

This City Loop segment transforms a portion of the existing park trail running along the north side of Cascade Creek into a branded, high amenity dual waking and cycling facility.

Illustrated features:

- Walking path with color patterned concrete
- Linear rain garden buffer between pathways
- 14 ft. tall signature LED lighting with signage and wayfinding capability
- Two-way bike path with eco-colored asphalt paving and center striping

2ND ST. NW

A two-way residential street

The western portion of the City Loop's 2nd St. NW segment travels through the Kuzky Park neighborhood as it provides connections between the Heart of the City DMC District, Kutzky Park and the Cascade Lake trail loop west of HWY 52.

Illustrated features:

- Walking path with color patterned concrete
- Linear planted buffer
- 14 ft. tall signature LED lighting with signage and wayfinding capability
- Safety striping along residential driveways
- Two-way elevated bike path with eco-colored asphalt paving and center striping
- Curb-side tree lawn buffer
- On street parking along the north side of 2nd St.

6TH ST. SW

A two-way transit corridor with significant future development proposed by the University of Minnesota

The 6th St. SW segment integrates with a new DMC circulator and provides access to Soldier's Field park and trail facilities, the University of Minnesota's Rochester campus expansion and existing Zumbro River trails.

Illustrated features:

- Landscaped buffer with signature benches
- Walking path with color patterned concrete
- Linear rain garden buffer between pathways
- 14 ft. tall signature LED lighting with signage and wayfinding capability
- 3 ½ ft. tall signature LED bollard lighting
- Two-way elevated bike path with eco-colored asphalt paving and center striping
- Curb-side tree lawn buffer

BIKE SHARE

Included in this section:

1. What Is Bike Share?
2. Bike Share Precedent
3. Bike Share in Rochester

Cities all over the world are trying to attract younger workers in the wake of the demographic shift that is changing the way that cities are competing. Communities see the availability of a bike share system as one of the amenities needed to attract and retain younger workers and residents. In this way, bike share should be seen as a tool for community development and not solely as a means to facilitate recreational activity.

Bike share is a fast-growing phenomenon around the United States and the world. Most bike share programs are locally based with a few exceptions outside the United States. The opportunity to create a bike share program in Rochester will help to expand the range of mobility opportunities available to residents and visitors.

WHAT IS BIKE SHARE?

The history of bike share goes back decades. The first bike share "systems" were the so-called yellow bikes. Cities deployed yellow bikes around town and anyone could ride one and leave it where they wanted for the next person to ride. Maintenance and theft plagued those systems until, one by one, they were abandoned. In the last 20 years, beginning in Europe, bike share systems became automated. A customer could, through the use of a credit card, take out a bike for trips of limited times and distances. Cities had service areas within which bikes were placed. The concept spread to North America with Montreal, Washington D.C. and Minneapolis leading the way. Now dozens of cities with systems of all kinds are in operation. Systems typically take the form of:

Smart Dock Systems

- Bikes all reside at a station.
- Each station has docks for bikes and a kiosk for the transaction to get a bike.
- Bikes are returned to any station within the system service area.
- Advantages: Rebalancing (keeping bikes where customers are) is simplified; customers can identify bike share stations; opportunities to promote brand through station ads.
- Disadvantages: Capital costs are highest in this form of bike share programming; lack of flexibility for future technologies.

Smart Bike Systems

- Bikes can located anywhere in a defined service area.
- Bikes can be rented through on-bike technology.
- Bikes can be left anywhere in the service area.
- Advantages: Capital costs lower; system flexibility allows for more customer options.
- Disadvantages: Tracking bikes dependent on battery life; Re-balancing is more complex and expensive.

Hybrid Systems

- Bikes can be located at designated stations or anywhere in the service area.
- Once a ride is complete, the bike can be left anywhere within the service area or returned to a station. Usually financial incentives are used to encourage customers to return the bikes to stations.

- Both smart dock and smart bike providers are increasingly moving to this scheme.
    - Advantages: Capital costs approach the smart bike systems; different areas of the city can be served in different and appropriate ways; flexibility will allow changes in the future; Manufacturers and suppliers are increasingly moving to this technology.
    - Disadvantages: Rebalancing can be more cumbersome and expensive.

Bike share systems operate in different sized markets. Some examples are:

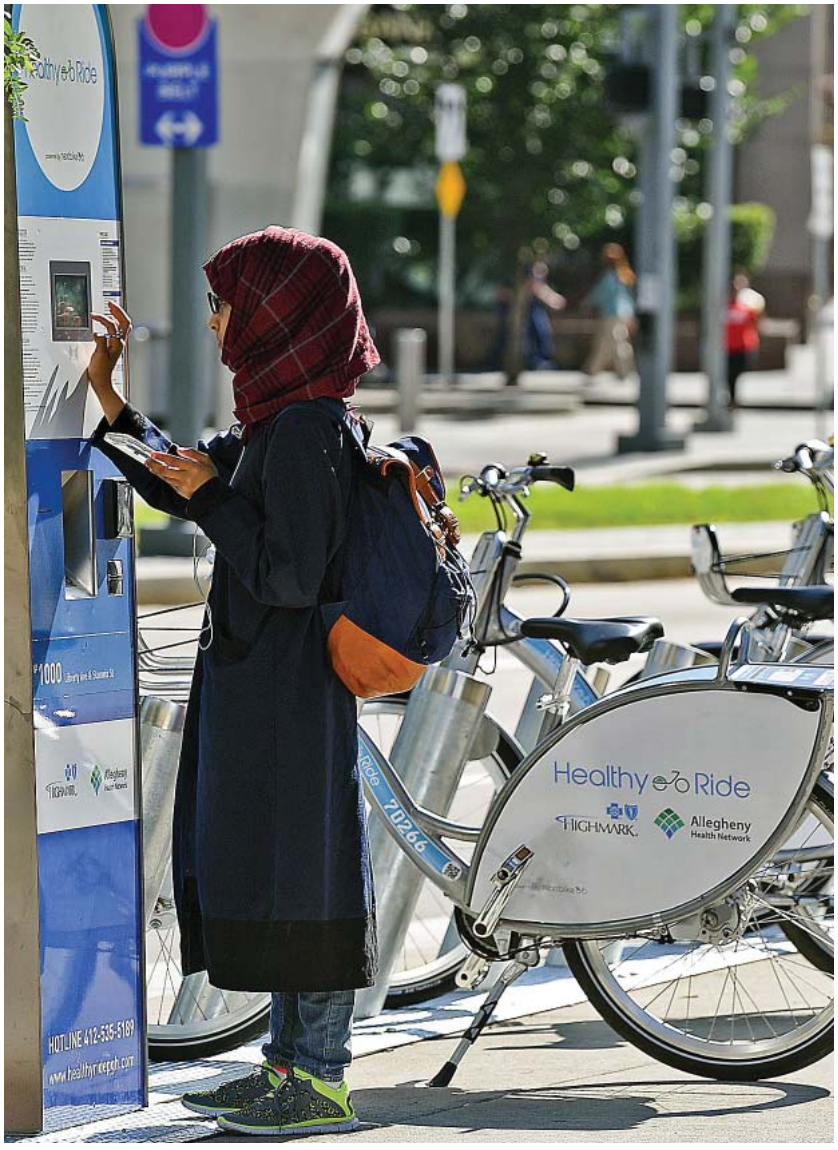
- Large City – New York City – Smart Dock System
    - 10,000 bikes
    - 600 stations
    - Annual membership - $155.00
    - Day pass - $12.00 for unlimited 30 minute trips within 24 hours
    - Open year-round
    - Title sponsor – Citibank
- Mid-sized City – Portland, OR – Hybrid System
    - 1,000 bikes
    - 100 stations
    - Annual membership - $144.00 per year for 90 minutes of ride time per day
    - Casual use - $12.00 per day for 180 minutes of ride time
    - Open year-round
    - Title sponsor – Nike
    - Riders are charged $2.00 to leave a bike within the service area but NOT at a station and $20 for leaving the bike outside of the service area
- Mid-sized City – Minneapolis/St. Paul – Smart Dock System
    - 2,000 bikes
    - 200 stations
    - Annual membership - $85.00
    - Casual use - $4.00 per half hour
    - Open April through October
    - Title sponsor – Blue Cross Blue Shield of MN Center for Prevention
- Small city – Fargo, ND – Smart Dock System
    - 100 bikes
    - 11 Stations
    - Annual membership - $75.00 – North Dakota State University students ride as part of their student fees – unlimited 30 minute rides.
    - Casual use - $4.00 per hour
    - Open 6:00 – midnight
    - Closed for winter
- Very Small City – Bemidji, MN (pop. 13,000) – No-tech System
    - 200 bikes
    - 4 staffed locations
    - Market rate rental rates ($6/hour)
    - Monday – Thursday free for local residents
    - Open 8:00 AM – 8:00 PM
    - Program sponsor - Blue Cross Blue Shield of MN Center for Prevention

(NOTE: The current program in Rochester operated by Nice Ride Minnesota is similar to Bemidji's program)

BIKE SHARE PRECEDENT

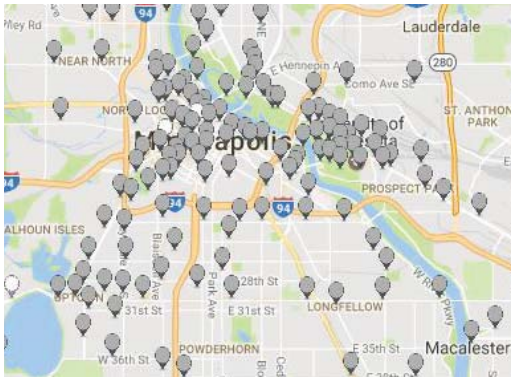
Bicycling has an extensive and comprehensive impact on the local and regional economy. According to a recent study by the University of Minnesota, as the number of Nice Ride bike-sharing stations in the Twin Cities has grown, so has the economic activity in the areas surrounding them. The study estimated that bicyclists spent $150,000 more annually near bike sharing stations as a result of the Nice Ride program. More directly, bicycling supports local Saint Paul bike shops, manufacturers and distributors, rental outlets, wholesalers, and non-profit organizations. These impacts are wholly positive, and represent a bicycling-specific local economy. Other bike share programs such as the one in Pittsburgh have seen similar successes in providing an inexpensive means of active transportation to residents and visitor.

While Rochester may be smaller in size than the Twin Cities and Pittsburgh, it still has significant opportunities for a bike share network.



Are bike share stations associated with local economic activity?

- Yes — **Station activity model** of retail destinations and controls
- Probably — **Business Perceptions** of Nice Ride users and value of stations
- Yes — **User Survey** of expenditure patterns on trips made using Nice Ride



Emerging Trend: Dockless Bike Share

In 2016, the bike share industry began to dramatically change in Asia. Bike share shifted from a publicly-funded docked bike model towards a privately-funded dockless model. Venture capitalists have poured funds into private bike share companies, dramatically increasing the size of bike fleets in Asian cities.

The move towards privately-funded dockless bike share has now reached the United States, with Seattle launching a pilot program from July to December 2017 that allows bike share companies to operate in the city with a permit. The Twin Cities will begin the transition to a privately-funded dockless bike share system in 2018. In some cities like Austin, TX, dockless bike share operators have begun operations without permission. Most operators now know they must work with cities to manage the launch and growth of a system.

As the name suggests, dockless bike share does not require a docking station—an expense that could sometimes limit the number of bikes a city could afford. With dockless systems, bicycles can be parked within a defined district at a bike rack or along the sidewalk. Dockless bikes can be located and unlocked using a smartphone app.

Dockless bike share is designed for short, spontaneous trips. While the cost of using traditional bike share for a single trip (typically, $7/day) could be seen as a barrier to ridership, most dockless bike share models offer single trips for $1. Although $1 per ride is not ideal for multiple trips in one day, it is great for that one way trip for a tourist, to cruise around shortly, or the quick ride to meet friends or ride to a meeting. To address more frequent users, LimeBike, a bike sharing company that operates in 23 cities, offers a monthly package of $30/100 rides.

Dockless bike share adds even more convenience for users who no longer need to worry about empty bike share stations at the front end of the trip, or full stations upon arrival. However, this convenience for users can be a problem for both system operators (who must rebalance bikes to meet demand) and cities (who must manage a clutter of bicycles on sidewalks already under pressure from competing uses). The wide, scattered nature of operations also poses drawbacks related to maintenance, bicycle durability, economic sustainability, and potential lack of visibility that established stations provide.

Misplacement of dockless bikes can be an issue. To manage parking issues, cities and operators can institute incentives and disincentives as part of a regulatory framework. Several operators like oBike and LimeBike give credit points for returning bikes to a designated parking location.

Mobike, which operates more than five million bikes and has 100 million registered users (taking 25 million trips per day at peak times), encourages users to park at Mobike Preferred Locations (MPL) and provides bike parking best practices on their website. The company also offers incentives for reporting bad parking practices, stating in their company FAQ, “If you see any illegal or poorly parked Mobike, please send us feedback and you will be rewarded with Mobike Credits.”

WHAT ARE BIKE SHARE KEY SUCCESS FACTORS?

The answer to this question is varied. There are several ways to measure success. The most successful programs will generally see positive benefits from several of the following:

1. **The number of bike share trips taken**
    - New York and Fargo lead this measurement in the US for different reasons. New York has a high-density service area and Fargo offers service free to students. Both have among the highest trips per bike per day in North America.

2. **How well a bike share system meets the needs of its users**
    - If a city is a tourist destination, bike share use will differ from cities where the bikes will be used as transportation.
3. **Revenue**
    - Revenue will help municipalities improve the customer experience.
    - Revenue will ease the need for sponsorships.
    - Revenue will fuel bike share as a more attractive partner in the shared mobility ecosystem.
4. **Integration with other modes of transportation**
    - Using bike share as an adjunct to other modes of transportation will enhance its contribution to communities. Local transit organizations should be able to integrate their ID and payment systems with bike share so that transit and bike share customers can have a seamless trip experience. Metro Bike Share in Los Angeles comes close by allowing reloadable transit card users to ride transit and take a bike. Payment systems, however, remain separate.
    - There are models, particularly Helsinki, Finland for how to integrate transit successfully into bike share operations.
5. **Effects of biking – mode share, new cyclists, equity**
    - Does having bike share in a community increase the number of cyclists?
    - Does bike share add to other measurable community outcomes?
6. **Positive environmental, health and economic outcomes**
    - Does bike share create a positive environmental impact?
    - Will bike share improve health outcomes?
    - Will bike share stimulate the local economy by delivering customers directly to local businesses?
7. **Positive experience for all customers/users**
    - Availability of safe places to ride
    - User-friendly rental systems

BIKE SHARE IN ROCHESTER

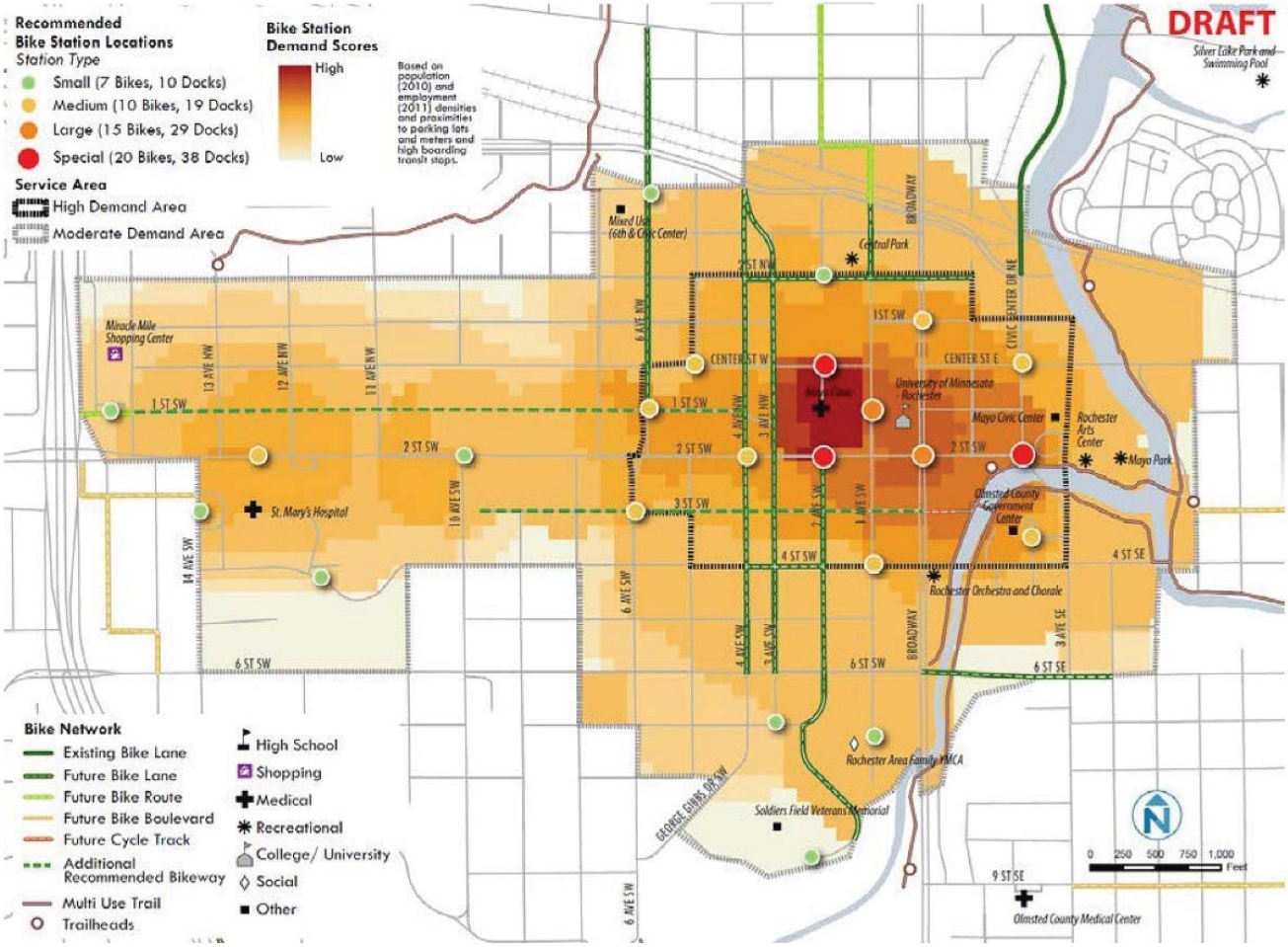
2013 Study

In 2013, Nice Ride Minnesota and Blue Cross Blue Shield Center for Prevention commissioned Nelson\Nygaard to conduct a bike share study to determine if bike share would be feasible in Rochester. In part, the study considered population density, potential use, and the extent to which the Mayo Clinic would influence the location of stations. After studying bike share programs in three comparable cities, Madison, WI, St. Paul, MN and Chattanooga, TN, the study estimated that revenues would cover just 7% of operations costs due to people not feeling comfortable renting and riding. This was due in large part to the lack of bikeways in and near Downtown Rochester. A similar pattern is seen in the Twin Cities; Nice Ride sees one trip in Downtown St. Paul, which lacks good facilities, for every ten trips in Downtown Minneapolis. For bike share to be successful, people need to feel safe riding.

The development of the City Loop scenarios discussed in this report and other proposed bike infrastructure discussed in the Street Use report, would bode well for bike share in Rochester. This infrastructure would align well with the 22 stations shown on Figure 16 (Recommended Initial Service Area and Station Locations). The system described by Nelson\Nygaard primarily served the area from the downtown Mayo campus and adjacent Central Business District east to the Civic Center. Given the number of trips between St. Mary's and the Mayo Clinic, we believe the number of stations located near St. Mary's Hospital might be too few.

Figure 16. Recommended Initial Service Area and Station Locations

Source: Nelson\Nygaard Bike Share Report



The 2013 study concluded that, with the current number of miles and quality of safe bicycle infrastructure in Downtown Rochester, an urban automated bike share was not feasible and could not be financially sustained. However, the study did not consider the feasibility of a bike share system in Rochester that included the addition of safe and efficient biking and walking infrastructure such as the City Loop. The DMC Development Plan introduced the concept of integrating a downtown bike share system with the City Loop as a means to expand the options and opportunities for bicycling in the DMC area.

There is an opportunity to serve the DMC Development Districts as they come online. All of the DMC Development District locations are close enough to one another to allow for bicycling or walking from place to place. With the completion of the City Loop and other Downtown bikeways, riding will be safer and more comfortable. Higher development density, long seen as a key success factor of bike share, will also come as a result of the new DMC development.

Since the report was completed, advances in smart bike technology have made it a better choice for some communities that need more flexibility. Additionally, the arrival of privately-funded dockless bike share opens the door to new funding possibilities. However, if Rochester chooses a docked bike share model, the following changes are recommended to the Nelson\Nygaard map of station locations based on the envisioned DMC development. Shifting the location at 1st Avenue SW and 4th Street SW to 2nd Avenue SW and 5th Street SW will better serve Discovery Square. In addition, a station was added at 1st Street SW and 6th Avenue SW at the Peoples' Coop block to serve the people who are currently using Nice Ride at this location.

The Nelson\Nygaard study assumed that a smart dock system would be the best alternative, but developments in bike share allow for viable alternatives that could better serve the city. It's recommended that the station locations shown on the map serve as racks for dockless bike share. Customers could be incentivized to return the bikes to these locations, but would have the ability to leave them elsewhere in the bike share service area.

Evolution of Bike Share System in Rochester

Nice Ride Minnesota, working with a stakeholder group that included: the Mayo Clinic, the City of Rochester, DMC staff, Rochester Parks and Recreation Department, Rochester Convention and Visitors Bureau, and others, met many times over two years to determine the configuration of a bike program that would be best for the city under current circumstances.

As a result, Nice Ride Minnesota began a non-automated bike program in the summer of 2016 with two staffed locations (Peace Plaza and the People's Coop) and a service center where bikes are maintained and stored. They provided 180 bikes for the rental program as well as future ancillary programs.

Customers rent the bikes at market rates for rides around town and along the many trails in the city and surrounding area. In addition, Nice Ride Minnesota arranges and facilitates events to encourage people to ride. The program is designed to appeal primarily to tourists, family members of Mayo Clinic patients, and residents who live or work downtown.

In fall 2016, Nice Ride conducted a pilot project that offered free rides from St. Marys to and from the Dan Abraham Healthy Living Center. As part of an intercept survey, riders were asked a number of questions about their experience. The survey identified that parking limitations, rush-hour congestion, the expense, and health implications were all factors that would point to riding a bike for transportation as a viable alternative to driving, especially within the Rochester city limits.

The survey accounted for only two locations but both were popular destinations in Rochester and one can

Nice Ride non-automated bike program

expect that surveys at any future DMC Development District locations would see similar results. As future development in the DMC Development Districts occurs, more opportunities for active transportation from one place to another in the center of Rochester will be realized and bike share can support this.

Nice Ride has voiced hopes to engage the Mayo Clinic with a program to provide bikes for patients who are receiving longer term care, but are able to ride, and need something healthy to occupy their time. Nice Ride has also indicated that it plans to convert the program to a technology driven urban bike share program. There is potential for plans to shift as privately-funded dockless bike share changes the industry.

Planning for Dockless Bike Share

Nice Ride released a Request for Proposals (RFP) in September 2017 to transition to dockless bike share in the Twin Cities. Nice Ride plans to shift from an operating organization to an organization that contracts with a privately funded partner who will operate and maintain the current docked bike share system as well as provide and operate dockless bikes. Operation of Nice Ride in Rochester is not included in this RFP, and Nice Ride has not released any public statements related to future plans for Nice Ride Rochester.

The City of Rochester may have the opportunity to host privately-funded dockless bike share. Much is uncertain about the operation of private dockless bike share companies in American cities. Key steps for the city to consider, should it wish to implement a dockless bike share, include:

- Establish program goals for mobility and how dockless bike share fits into the overall mobility system.
- Create a regulatory framework. Seattle, Washington for example, requires operators to obtain a permit that covers safety, parking, insurance requirements, operations, and data sharing with the city.

- Establish system boundaries. For system planning, most operators work with cities on boundaries for both testing pilots and program growth. Using geo-fencing technology, operators can collect (and share) data that tracks usage, routes, system problems and more.
- Establish a plan for data collection that addresses data privacy, analysis, storage, and decision support. Access to data means that the city can establish and track performance metrics related to dockless systems and bicycling overall.
- Make sure to include a focus on bike parking. Dockless does not mean users are able to leave bikes anywhere. Dockless bike share is likely to spur expanded design and policy discussion regarding bicycle parking and infrastructure overall. In the near term, the city can fast-track bicycle corrals and find more efficient design options close to bike lanes and trails. Over time, the city may replace on-street parking or work with building operators with excess vehicle parking to identify additional space for bike parking. Bike parking should typically be located in areas where users are likely to check out or return a bike, for example near transit stations, civic buildings, and entertainment venues. Alternative approaches to physical bike racks may include using GPS geo-fences (to create pseudo-stations/discreet areas to park bikes or painting rectangles on the ground to designate parking areas.
- Integrate dockless bike sharing into the city's overall mobility programs, including the menu of Transportation Demand Management services provided, planning for First/Last Mile connections to work or services, and transit system plans.
- Continuously monitor, improve and innovate. Dockless bike share is likely to encounter a number of issues around rebalancing bicycles, proper bicycle parking, and more. Launching a dockless bike sharing system will require flexibility and a willingness to innovate.

The landscape for bike share has changed in Rochester. Things have changed in planning, in projects recently built, and in the bike share industry as a whole. Downtown developments are signaling a greater density in the center of Rochester. This together with the DMC Development Districts and expansion of privately-funded models suggest that bike share will be more feasible in the years to come. The success of bike share depends largely on development density and on the availability of safe places to ride. As both come to Rochester, expect bike share to be a success.

GREEN INFRASTRUCTURE

Included in this section:

1. Introduction
2. Precedents
3. Goals
4. Green Infrastructure Strategies
3. Project Approach
4. Benefit Outcomes

GREEN INFRASTRUCTURE

For the purpose of this study, green infrastructure is defined as sustainable practices, tools, or techniques that may be applied to the design, construction, and the on-going maintenance of the City Loop facility. These sustainable practices may or may not be readily visible to the everyday user but are integral part of the facility.

The overarching goal is to build green infrastructure into the City Loop that will support the vision and goals of the DMC Development Plan as well as Rochester's Comprehensive Plan. For example, the DMC Development plan states "Create World-class public spaces that attract visitors, provide opportunities for economic and social connection, and create opportunity for rest and contemplation," while the Comprehensive Plan includes "Rochester is a city that cares: where the land and environment are renewed and sustained for the benefit of all."

This section of the report provides explanations of green infrastructure strategy types including detailed information for employing sustainable stormwater management strategies along the City Loop. This design guide provides a focus on sustainable stormwater management as these quantifiable practices have in-place regulations and guidelines at the state level that have proven beneficial in similar applications. The stormwater practices should not preclude the consideration of other sustainable practices included in this design guide. It is recommended to apply several sustainable practices as appropriate to maximize the benefit outcomes for the City Loop.

In addition, at a city-wide and DMC view, the integration of sustainability-focused infrastructure with human-powered mobility infrastructure provides a district approach for the City Loop. A district systems approach produces inhabitable (often contiguous and networked) environments that fully function on an individual level, yet together create a heightened and more meaningful experience for a diverse set of users. This approach for the City Loop will uniquely promote environmental, economic, and social progress for the City of Rochester.

PRECEDENT

Green infrastructure can be used to mitigate urban heat island effects, help capture greenhouse gases, improve air quality, manage stormwater to reduce flooding and facilitate reuse, and provide access to green space to improve physical and mental health. Green infrastructure techniques such as the ones shown below also provide economic pay-off in urban settings due to lower energy costs and fewer repairs over time. Including elements such as the rain gardens and waste water management systems seen below can help make the City Loop an example in environmental sustainability, creating a more resilient and sustainable Rochester.

1. 2ND ST. RAIN GARDEN, ROCHESTER

Firm: Yaggy Colby, Assoc.

Date of Completion: Phases, 1 and 2: 2010-2012

Cost: Unknown

2. GREEN ALLEYS PROJECT, CHICAGO

Firm: CDOT, Hitchcock Design Group, Hey and Associates

Date of Completion: 2006-2010

Cost: Varies by implementation techniques

3. STORMWATER INLET, PORTLAND

Firm: ODOT, Green Street Steward program

Date of Completion: Ongoing

Cost: $1.2 Million

Types of Places

The type of a places will vary along the City Loop. Generally, they may be characterized into the following groupings: 1) Downtown Core, 2) Downtown along River, 3) Residential, 4) Neighborhood Commercial Node, and 5) Park. Exactly how and what combinations of green infrastructure are applied along the City Loop may depend in part on the locale and the characteristics of the place.

However, even though these places may offer unique opportunities for sustainable applications, bringing a sense of continuity throughout the City Loop is an important design consideration that may be supported by the green infrastructure design vocabulary.

Existing Conditions: Downtown Riverfront Trail

Existing Conditions: 2nd St. SW by Saint Marys Campus

Existing Conditions: Kutzky Park

Existing Conditions: 6th St. SW & 3rd Ave SW

GOALS

Specific goals and benefit outcomes for the City Loop are defined further in the Purpose and Need section of the Introduction, however, overarching goals for the City Loop related to green infrastructure include the following:

- Improve community health and wellness; through the City Loop's human-powered mobility opportunities and access to green space
- Support environmental sustainability by improving air quality and reducing Rochester's carbon footprint; through the City Loop's human-powered mobility opportunities which help to reduce vehicular carbon dioxide emissions
- Reduce the ecological footprint of the City; through implementation of City Loop's green infrastructure strategies

GREEN INFRASTRUCTURE: STRATEGIES

The green infrastructure strategies discussed in these design guidelines include Stormwater Management, Solar Applications, Materials Sustainability, and Vegetation.

Stormwater Management

Stormwater Management as a green infrastructure strategy plays a key role for sustainability and is a measurable benefit outcome. In an effort to minimize impacts of stormwater to downstream systems and be better armored against disaster-scale rainfall events the approach to stormwater management has shifted to promote capture and infiltration at the point of rainfall. Methods for mitigating stormwater runoff:

Infiltration and Filtration -

- Bioswales, infiltration beds, subsurface filtration/ treatment trenches, and Silva Cells for trees – Vegetated swales, raingardens, and specially engineered tree root spaces under pavements.
- Permeable pavements – Special pavements such as porous pavers or porous asphalt allowing for traversable pavement surfaces and infiltration of rainwater.
- Underground stormwater detention and infil tration–Engineered systems collect stormwater runoff, detain in underground storage systems and infiltrate into subsoils or hold excessive volumes of runoff for release after large rain events.
- Greywater catchment for infiltration or reuse – Collection of rainwater from impervious surfaces (i.e. roof tops) and storage for infiltration or reuse such as rain barrels/ cisterns and reusing greywater for irrigation.

Other Methods/ Opportunities -

- Plantings and street trees – Vegetation provides more surface area for rainwater to be captured, naturally evaporated, and less overall runoff.

Solar Applications

Applications of active solar voltaic panels as a forward-thinking green infrastructure strategy provides renewable resource opportunities within the City Loop. Solar technology may be used to power wayfinding signage for the City Loop, assisting pedestrians, recreational bicyclists, and commuting bicyclists. Bike share programs, such as Nice Ride, employ solar powered self-service kiosks. Solar applications may also assist with powering special safety features such as in-ground flashing lights at pedestrian- bicycle transition zones. Solar Applications also provide economic benefits in lowered electrical utility loads for the City Loop, especially as up-front costs are reduced due to increased market prevalence.

Materials Sustainability

Materials Sustainability includes a green infrastructure approach that employs locally derived, repurposed, or recycled materials within the City Loop. For example, site furniture and amenities such as benches, columns, landscape garden features, edging materials, mile markers, or signage, may originate from local resources or be manufactured from recycled materials.

Using locally or regionally sourced materials and products promotes sustainability. This is achieved by reducing hauling distances of products. The longer the hauling distances the greater the negative impact to the environment through use of non-renewable resources (i.e. fossil fuels) and greater the potential for vehicle emissions detrimental to air quality.

Specifically for the City Loop project, Minnesota offers many opportunities for quality, durable and local products such as Minnesota River Valley dolomitic limestone. This natural stone material derived from local sources can provide high-quality and aesthetically pleasing site elements. As this material is presently used in building and site materials throughout the City of Rochester, it will reinforce the visual and experiential connection between the City Loop and the surrounding context.

There may be opportunities to incorporate materials that not only provide repurposing but may evoke a deeper meaning through the inherent historic quality. For example, cities may have resources of historic materials such as granite pavers or granite curbs that were removed as the city infrastructure has been upgraded over time. These types of materials can be reused and repurposed in creative ways within an amenity such as the City Loop.

Another sustainable consideration is the specific chemical composition of products and materials to be used within the City Loop. Selecting products that minimize the presence of chemical hazards and off-gassing will reduce the risks of exposure to the public and promote public health.

In addition, it is recommended to consider companies supplying materials and products for the City Loop to have incorporated sustainable practices or follow Leadership in Energy and Environmental Design (LEED) requirements. These sustainable practices at the manufacturing level may include using recycled materials, using energy-efficient processes, or reducing amounts of polluted and harmful by-products.

Reduction of Heat Island Effect

The reduction of Urban Heat Island Effect may be achieved by planting trees, shrubs and perennial grasses and forbs along the City Loop. Heat island effect, an overall increase of ambient temperatures within a certain area, is mainly caused by the prevalence of buildings, pavements and other surfaces in urban environments that retain the sun's energy by heating up. Other factors such as material thermal properties, solar aspect and orientation, air pollution, and loss of evapotranspiration can contribute to the heat island-effect. Canopy trees provide shade and physical relief for people during the summer months. In addition, shade/ street trees have been shown to lower the surrounding ambient air temperatures through evapotranspiration.

Trees also absorb harmful air pollutants and release oxygen into the environment. Replacing building surfaces with groups of plantings may help reduce ambient temperatures as vegetative materials have lower thermal capacity than most building materials. Also, plants may retain more moisture promoting cooler microclimates.

Combining Strategies

The four distinct green infrastructure strategy types as outlined above, can be applied in a multi-layered approach to help promote the maximum benefit outcomes for the City Loop. How these strategy types are combined may be a factor of the contextual or site conditions at a particular point or segment along the City Loop. However, we can look at applying these strategies in general by qualifying number of strategies used, defined here as Tier 1, Tier 2 and Tier 3:

- Tier 1: A location where only one strategy type is used
- Tier 2: A location or segment where two strategy types are used
- Tier 3: A location or segment where three (or more) strategy types are combined

The graphics on the following pages illustrate examples of a Tier 1, Tier 2 and Tier 3 strategy approach to improving the sustainability of the City Loop project.

Benefit Outcome *is defined as a resultant, positive, quantitative (or qualitative) impact to the DMC user groups, stakeholders, and community at large that meets the project goals and objectives.*

A LAYERED APPROACH

Green infrastructure for the City Loop employs a layering methodology, which applies green infrastructure strategy types at different levels of intensity for maximizing benefits at multiple scales. These green infrastructure strategy types include:

- **A** Stormwater Management
- **B** Active Solar Applications
- **C** Materials Sustainability
- **D** Trees and Vegetation

This overall strategy for the City Loop pro-actively addresses the future quality of living conditions for people as connected to the quality of the surrounding environment. As public health and wellness continue to pose challenges for subsequent generations, now is the time to plan for maximizing the return on investment from building healthy, vibrant, and sustainable places. The specific strategies, combination of strategies, and resulting benefit outcomes are described further in the following green infrastructure design guide sections.

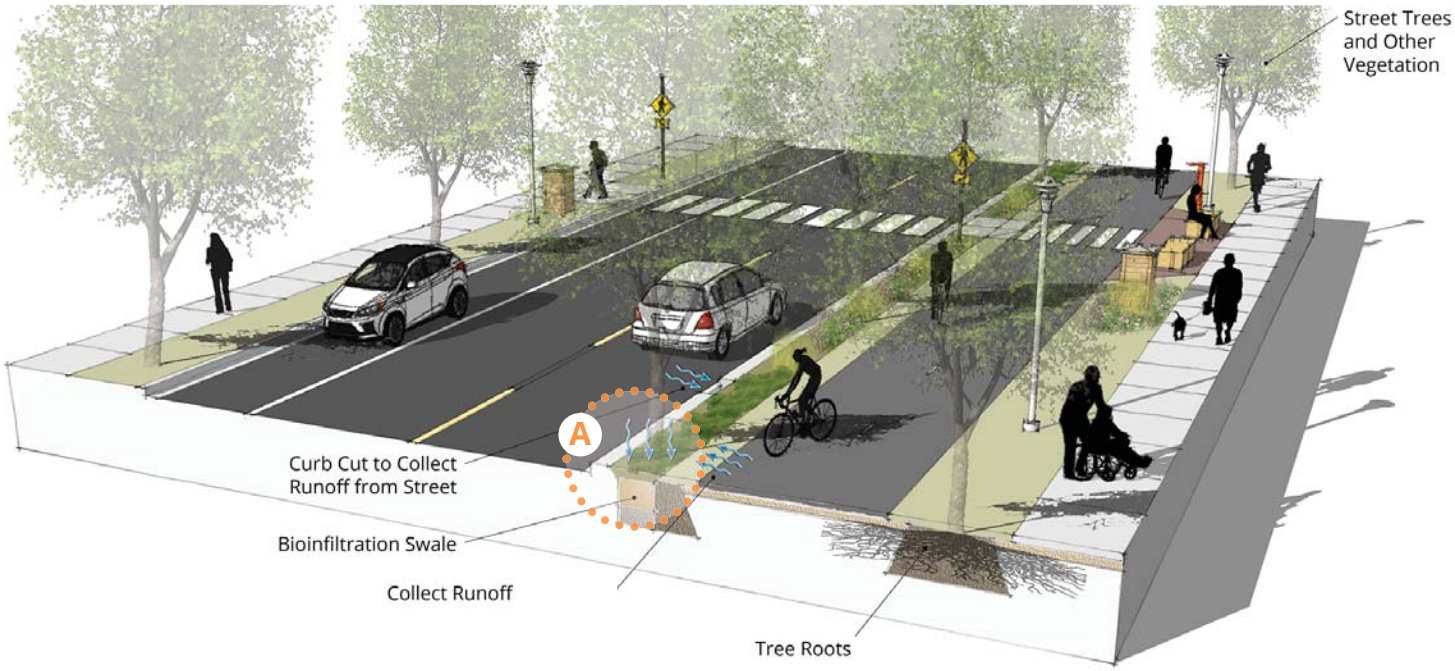
COMBINING STRATEGIES

Tier 1: One Strategy is incorporated into the project

Example of applying a Tier 1 approach:

A Stormwater infiltration measures are combined for more meaningful management of stormwater. Other measures that could be used in a Tier 1 approach include:

- Solar-powered signage
- Permeable pavers
- Street trees
- Other



Note: conceptual illustrations for portrayal of green infrastructure strategies, not intended to illustrate specific City Loop design details.

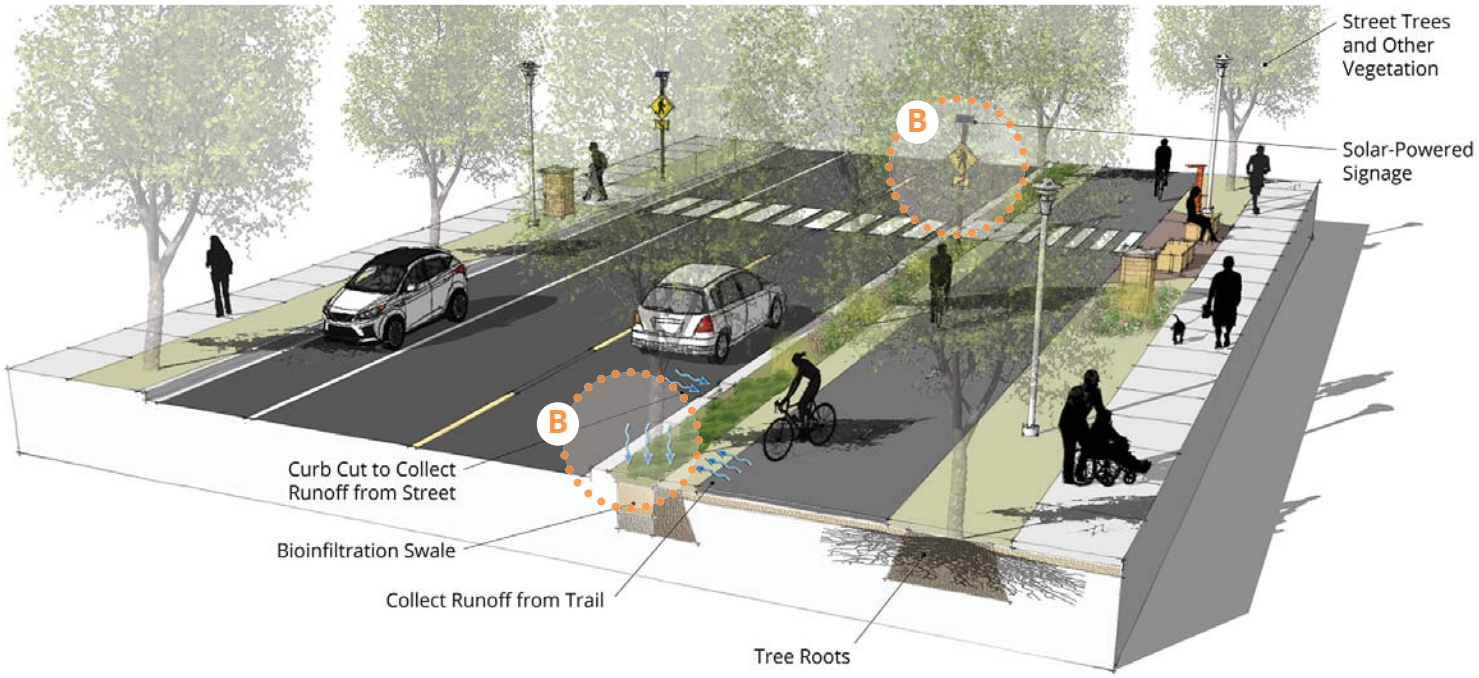
COMBINING STRATEGIES

Tier 2: Two Strategies are incorporated into the project

Examples of applying Tier 2 approach:

B Stormwater infiltration + Solar-powered signage measures are incorporated. Other measures that could be used in a Tier 2 approach include:

- Stormwater infiltration + Permeable pavers
- Bioswales + Recycled site furniture
- Other



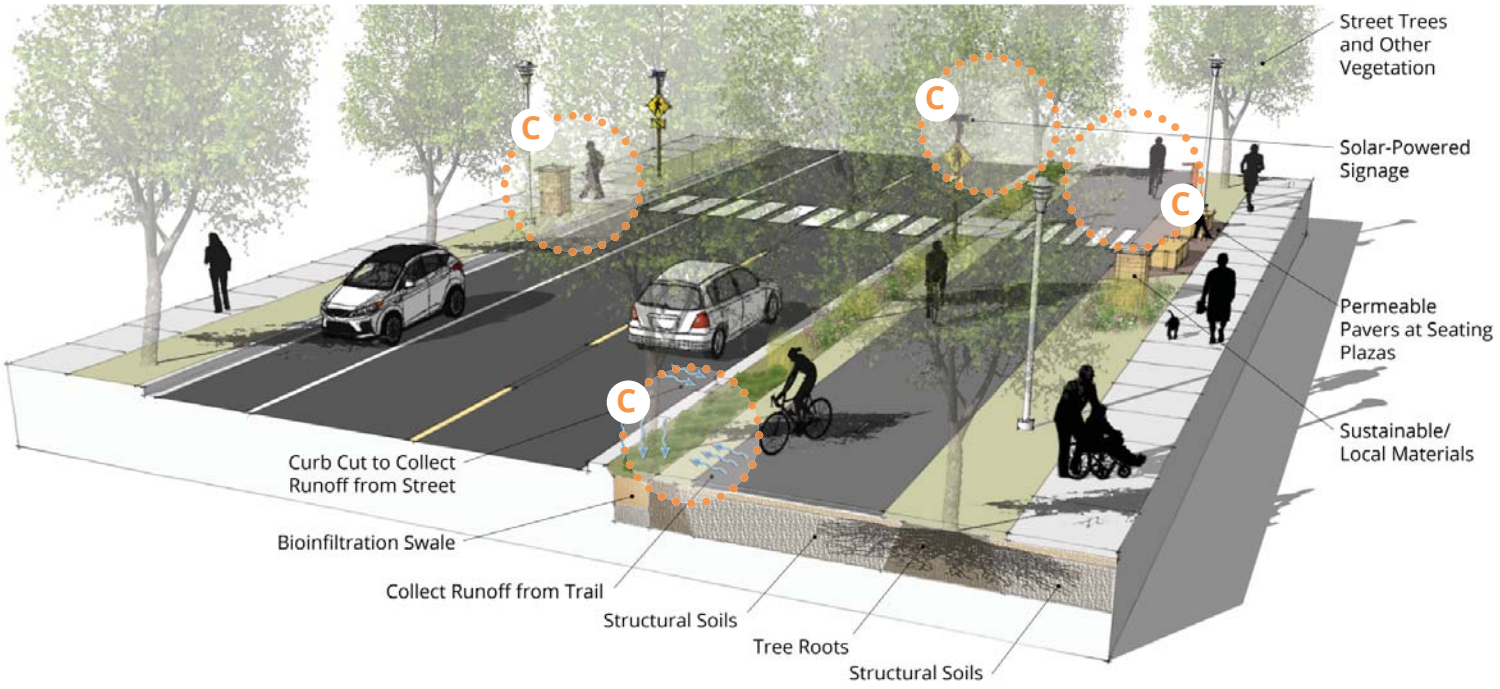
Note: conceptual illustrations for portrayal of green infrastructure strategies, not intended to illustrate specific City Loop design details.

COMBINING STRATEGIES

Tier 3: Three (or more) Strategies are incorporated into the project

Examples of applying Tier 3 approach:

- **C** Stormwater infiltration + Solar-powered signage + Permeable pavers + Locally sourced materials



Note: conceptual illustrations for portrayal of green infrastructure strategies, not intended to illustrate specific City Loop design details.

BENEFIT OUTCOMES

Benefit outcomes exist on several levels, which may be directly quantifiable (i.e. stormwater quality) or others not readily measurable (i.e. social benefits). Benefit outcomes also may be immediate or span years, depending on the type. For this discussion, we focus on the 10 DMC Transportation Principles for guidance on potential benefit outcomes of green infrastructure strategies that may be applied to the City Loop.

Besides addressing ecological and environmental sustainability, these guiding design principles indicate a level of equity for the human component of transportation infrastructure. The inclusion of people-powered mobility and people in general is now recognized as equally important for transportation infrastructure planning. The healthy environments derived from City Loop green infrastructure systems will provide direct benefits to the people of Rochester, including residents, business owners, visitors, patients, and patient companions. In general benefit outcomes of green infrastructure include the following:

- Improved Stormwater Quality
- Renewable Energy Resources through Solar Power
- Materials Sustainability and Durability
- Heat Island Effect Reduction
- Social and Economic Benefits

Green infrastructure strategies can create places that are welcoming to people from a physical and mental capacity. For example, incorporating tree plantings and planting beds not only provide practical microclimate benefits (i.e. shade in summer) but also fulfill cognitive needs to reconnect with the 'natural' environment. Landscape plantings in built environments go beyond mere aesthetics as these systems provide restorative mental and physical health benefits, especially as people become more disconnected with nature in general.

Applying green infrastructure provides opportunities to educate the public on processes and importance of these systems. Interpretive signage, art, or interactive features can create another human-scaled experience within the City Loop. These experiences start to build a foundation of accepted practices for the good of the community, economics, environment, and public health. In addition, specialized training for construction, maintenance and inspection can provide new workforce opportunities, such as the National Green Infrastructure Certification Program and public-private partnerships.

By creating a City Loop that is people-focused, businesses will also realize economic benefits. As residents, visitors, patients and companions are drawn to the City Loop public amenities, people will look to private entities to fill their other subsequent needs: cafes, dining, shopping and entertainment, as examples, will follow suit. Quality spaces will also increase adjacent property values. According to an assessment conducted for the Indianapolis Cultural Trail (*Assessment of the Impact of the Indianapolis Cultural Trail: A Legacy of Gene and Marilyn Glick, March 2015*) between the years of 2008 to 2014 property values of parcels adjacent to this trail increased an overall amount of 148 percent[ix]. The cooperative relationship between public and private entities will help establish the City Loop as a vibrant, safe, populated, and healthy resource opportunity in the city.

The City Loop provides an opportunity to integrate layered green infrastructure strategies that will promote public health, improve the environment, spur economic growth, and foster social progress of the city as a whole.

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III. ESTIMATED CONSTRUCTION AND MAINTENANCE COSTS

A. Cost Estimates and Funding
B. Operations and Maintenance

COST ESTIMATES AND FUNDING

CONCEPT LEVEL COST ESTIMATE

The concept-level estimate of construction cost for the City Loop was developed using 2017 Minnesota contract bid price data from trail and steetscape projects that included similar elements and types of construction. Its important to remember, this estimate was based upon consideration of typical cross sections and concept level layout plans, not actual construction plans, specifications, surveys or geotechnical analyses. As typical at this stage of project development, 20% was applied to account for continued design and engineering services as an additional 30% contingency to account for unknown conditions and inflation.

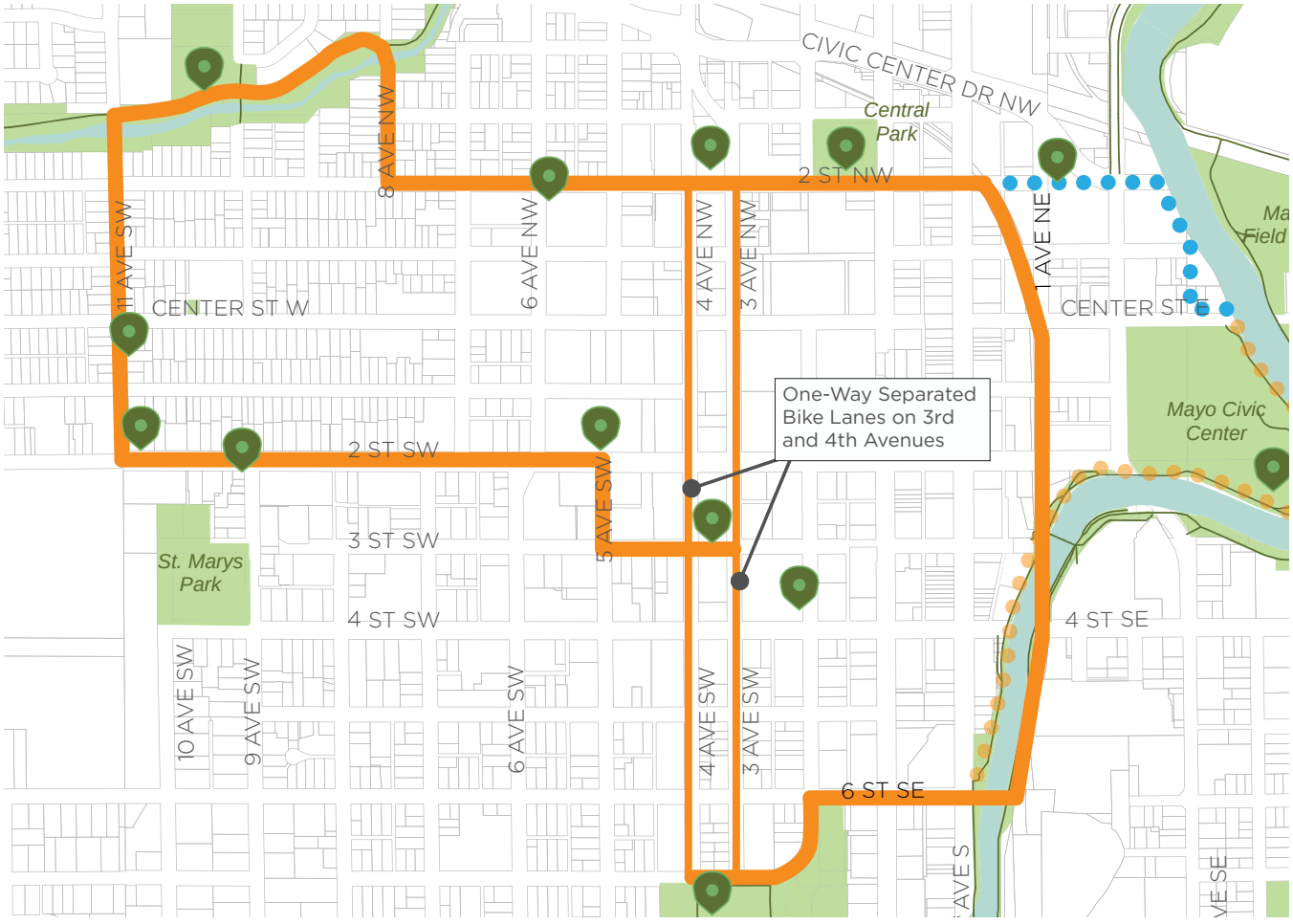

Table 06. Concept Level Cost Estimate

Concept Level Cost Estimates	
City Loop Segments	**Estimated Cost***
11th Ave SW	$1,537,000
Kutzky Park	$1,633,000
2nd St NW from 4th Ave to 8th Ave	$1,730,000
2nd St NW from 1st Ave NE to 4th Ave NW	$1,580,000
1st Ave NE	$3,827,000
6th St SE	$1,660,000
3rd & 4th Ave SW Incl 3rd St SW & 5th Ave SW	$3,551,000
3rd & 4th Ave SW from 3rd St SW to 2nd St NW	$3,002,000
2nd St SW	$2,008,000
Design & Construction Administration (20%)	$4,105,000
Contingency (30%)	$6,157,000
City Loop Interim Segment Cost	$1,754,000
Design & Construction Administration (20%) (Interim Segment)	$351,000
Contingency (30%) (Interim Segment)	$527,000
Right-of-way and/or Easement Acquisition	$2,800,000
CITY LOOP TOTAL	$36,222,000

Estimated Operations & Maintenance Costs for 1 Year (7%)	$309,000

Table 06. Concept Level Cost Estimate Notes

- Contingency was applied at 30% of construction costs
- Design and Const Administration costs were 20% of construction costs
- O&M costs were provided as 7% of baseline capital costs and rounded
- All costs are in 2018 dollars and do not include any escalations

* Costs for each segment include the following elements (as applicable):

- Removals
- Earthwork and erosion control
- Bituminous bikeway and colored concrete walkways
- Pedestrian and Bicycle bridges
- Stormwater management and green infrastructure
- Intersection modifications
- Lighting
- Signage
- Landscape Plantings
- Public Art
- Site amenities and furnishings (benches, waste receptacles, bike racks, tree grates, prefabricated planters, bike repair stations, tables and chairs, light columns)

FUNDING OPTIONS

A wide array of funding options are available for funding the City Loop's implementation. These range from local governmental units funding the local match requirements of State or Federal grant programs; requiring financial participation as a part of abutting or adjacent land development; to participation in public-private partnerships with real estate developers, construction companies, institutions and or non-profit organizations. Given the City Loop's extensive geography and catalytic potential, utilization of multiple funding sources, programs and partnerships is likely.

The following funding options could be used for implementing the City Loop:

Table 08. Sources for Funding

SOURCES FOR FUNDING			
Opportunity	**FUNDING AMOUNT**	**Details**	**CONTACT INFO**
Greater Minnesota Regional Parks and Trails Commission - Parks and Trail Legacy Program	No match required, but makes application stronger if provided	To provide grants to local units of government to support parks and trails of regional or statewide significance.	Joe Czapiewski 218.556.3651 coordinator@ gmrptcommission.org
Legislative-Citizen Commission on Minnesota Resources (LCCMR) - Environment and Natural Resources Trust Fund	No min. or max, most recent round averaged $1M/ project	To provide a long-term, consistent, and stable source of funding for activities that protect, conserve, preserve, and enhance Minnesota's air, water, land, fish, wildlife, and other natural resources	LCCMR staff: lccmr@lccmr.leg.mn (651) 296-2406
Minnesota Department of Natural Resources - Regional Trail Grant Program	75% up to $250,000	To provide grants to local units of government to promote development of regionally significant trails outside the seven-county metropolitan area.	Dan Golner 651.259.5599 Daniel.Golner@state. mn.us
Minnesota Department of Natural Resources - Local Trail Connections Program	75% up to $150,000	To provide grants to local units of government to promote relatively short trail connections between where people live and desirable locations, not to develop significant new trails.	Dan Golner 651.259.5599 Daniel.Golner@state. mn.us
State Legislature - Bonding Bill	50% of capital costs	Capital improvement projects throughout the state are addressed through the bonding bill process. Projects should be regional or state significance.	Jennifer Hassemer 651.201.8079 Jennifer.Hassemer@ state.mn.us
FHWA FAST Act Transportation Alternatives (TA)	$7.5 million distributed each year across Minnesota	Includes projects defined as transportation alternatives, including on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation and enhanced mobilityThe Fixing America's Surface Transportation (FAST) Act replaced the former Transportation Alternatives Program (TAP) with a set-aside of funds under the Surface Transportation Block Grant Program (STBG). For administrative purposes, the Federal Highway Administration (FHWA) will refer to these funds as the TA Set-Aside.	Transportation Alternatives data exchange: http://trade. railstotrails.org/index MnDOT TA webpage: http://www.dot.state. mn.us/ta/

SOURCES FOR FUNDING CONTINUED			
Opportunity	**FUNDING AMOUNT**	**Details**	**CONTACT INFO**
Transportation Investments Generating Economic Recovery (TIGER)	No less than $5 million, with a 20 percent local match	Includes shovel ready, surface transportation projects. Projects involving highways, bridges, bicycle and pedestrian facilities, transit, rail, and intermodal are eligible. Detailed application must be completed. Projects are highly competitive, and require a minimum 20 percent local match funding. While this funding source currently exists, it could be discontinued in the future.	https://www.transportation.gov/tiger
Partnership for Sustainable Communities	It is not a formal agency with a regular annual grant program. Nevertheless, it is an important effort that has already led to some new grant opportunities	Includes bicycle and pedestrian infrastructure. Joint project of the Environmental Protection Agency (EPA), the U.S. Department of Housing and Urban Development (HUD), and the U.S. Department of Transportation (USDOT). It is based on five Livability Principles, one of which explicitly addresses the need for pedestrian and bicycle infrastructure.	https://www.sustainablecommunities.gov/
Federal Transit Administration (FTA) Funding	Varies	Includes bicycle and pedestrian infrastructure. Multiple FTA funding sources exist. Most FTA funding can be used to fund pedestrian and bicycle projects "that enhance or are related to public transportation facilities."	https://www.transit.dot.gov/regulations-and-guidance/environmental-programs/livable-sustainable-communities/fta-program-bicycle
Mayo Clinic Community Contributions Program	Limit of no more than 20 percent of an organization's operating or capital budget	Includes capital projects supporting a healthy lifestyle. Qualifying community investments that support a healthy environment in Olmstead County. Funding for capital projects is available as financial resources allow. Contact the Mayo Clinic Community Relations Program for more information.	http://www.mayo.edu/pmts/mc5000-mc5099/mc5097-52.pdf?_ga=1.106830859.945911346.1446575788
Blue Cross Blue Shield of Minnesota Center for Prevention	Varies	Includes active living infrastructure, among others. The Center for Prevention funds different initiatives at different times, all related to healthy living	http://www.centerforpreventionmn.com/what-we-do
People for Bikes Community Grant	up to $10,000 per project	Requests must support a specific project or program related to bicycling construction costs or labor The PeopleForBikes Community Grant Program supports bicycle infrastructure projects and targeted advocacy initiatives that make it easier and safer for people of all ages and abilities to ride.	http://peopleforbikes.org/grant-guidelines/
Rails-to-Trails Conservancy	range from $15,000-$50,000	Each year, 1-2 Project Transformation Grants area awarded. The intention of these grants is to enable an organization to complete a significant trail development or improvement project. RTC launched a new grant program in 2015 to support organizations and local governments that are implementing projects to build and improve rail-trails. Under the Doppelt Family Trail Development Fund, RTC will award a total of $85,000 per year through a competitive process, which is then distributed among several qualifying projects.	https://www.railstotrails.org/our-work/doppelt-family-trail-development-fund/application-instructions/

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OPERATIONS AND MAINTENANCE

USER NEEDS

PEDESTRIANS

Pedestrians and wheelchair users depend on having a level, slip-resistant surface for their travel. Walking surfaces that are free from unexpected bumps, holes or cracks, and free from ice or other slippery materials, are paramount for their safety and comfort.

BICYCLE RIDERS

A cyclist rides on two very narrow, high-pressure tires. What may be an adequate roadway surface for automobiles (which have suspension and shock-absorbing systems and travel on four wide, low-pressure tires) can be treacherous for cyclists: small rocks can deflect a bicycle wheel; a crack in the pavement or a poorly-placed drainage grate can trap a wheel; wet leaves, ice, and the gravel that gets blown off the travel lane are slippery and can cause a fall.

DUAL USE

Both pedestrians and bicycle riders depend on the ability of motorists to anticipate and respond to their presence while crossing streets or when otherwise exposed to motor vehicle traffic; therefore, signs, signals and markings should be maintained and kept in good working condition.

This is especially important at intersections where the City Loop crosses active roadways. One of advantages of the City Loop concept is that it will provide much improved sense of security and comfort to users. However, this enhanced sense of comfort may make users less vigilant at intersection locations, and will likely also invite less experienced users who are less able to anticipate potential conflicts with motor vehicles.

GENERAL CONSIDERATIONS

MAINTENANCE BUDGET

Preventive maintenance reduces hazards and future repair costs. Maintenance costs and responsibility for maintenance should be assigned when projects are planned and budgets developed. Typical annual maintenance costs range from 5 to 7 percent of infrastructure replacement costs - for example, at 5 percent, a $100,000 facility should include a $5,000 annual maintenance budget. Life-cycle cost analysis is recommended to determine the net value of using longer-lasting, higher-quality materials during construction if they reduce yearly maintenance expenditures.

ASSET MANAGEMENT

The trail system should be managed under a central authority with maintenance and operations activities centralized. This will ensure that the high-level of service needed to maintain the trail system can be accommodated consistently and over the long-term. Critical components of an asset management system should include funding to accommodate the needed level of service and clear identification of responsibilities.

MANAGEMENT PLAN

A management plan is a tool to identify maintenance needs and responsible parties. A management plan that includes the maintenance component for a proposed facility should be in place before construction. Additionally, a management plan should include a means for users of the system to report maintenance and related issues and to promptly address them.

A facility's management plan answers basic operational and staffing questions such as frequency of maintenance tasks and who is responsible for the following issues:

- Filling potholes
- Removing downed or dangerous trees
- Responding to vandalism and trespassing
- Removing litter
- Replacing stolen or damaged signs/site furnishings
- Watering and weeding landscaping
- Vegetation pruning and replacement
- Acting as the main contact
- Paying bills and expenses
- Pavement preservation tasks and schedule
- Snow clearing and removal
- Green infrastructure maintenance
- Pavement marking maintenance

USER-INITIATED MAINTENANCE REQUESTS

Users of Rochester's City Loop will likely be the first to notice hazards, maintenance issues, and opportunities to improve the system. A formal mechanism for receiving requests for maintenance can help focus and prioritize investments, avert deterioration of the city's infrastructure investments, provide effective management, and reinforce resident-ownership of the city's non-motorized network assets.

Currently, Rochester (SeeClickFix https://en.seeclickfix.com/rochester) and the city's Service Request mechanism (https://www.rochestermn.gov/i-want-to-/submit-a/service-request) are two tools that may be used by residents to report non-emergency issues to the city.

Rochester should consider updating its Service Request mechanism to increase its user-friendliness and streamline reporting by app, phone, or online. Develop a public marketing campaign to increase public awareness and use of the tools when available, as well as inclusion (using QR code on City Loop wayfinding) are also recommended.

WINTER MAINTENANCE

SNOW AND ICE REMOVAL

Snow removal is a critical component of pedestrian and bicycle safety. The presence of snow or ice on sidewalks, curb ramps, or bikeways will deter pedestrian and cyclist use of those facilities to a much higher degree than cold temperature alone.

Seniors and other vulnerable adults will avoid walking in locations where ice or snow accumulation creates slippery conditions that may cause a fall. Curb ramps that are blocked by ice or snow effectively sever access to pedestrian facilities for wheelchair users and seniors. Additionally, inadequately maintained facilities may force people walking or biking to take a route that is unsafe, uncomfortable or inconvenient.

Snow and ice removal during Minnesota winters is critical for extending the use of pedestrian and bicycle facilities throughout the year.

When the surface of a road is covered by snow, the pavement markings that guide and warn people walking, biking, or driving may be difficult to see. The trail system should be treated as a transportation facility and snow and ice removed from the entire trail surface within 24 hours so pavement is accessible and markings are identifiable.

A YEAR-ROUND APPROACH

Snow and ice removal should be planned with the expectation that walking and bicycle facilities will continue to be used during winter months. Snow and ice should be cleared from the City Loop and from connecting sidewalks, bike lanes and shoulders used by pedestrians and bicyclists. Pedestrian and bicycle facilities including sidewalks, gutters, and curb ramps should not be used to store snow removed from streets.

PRIORITIZING SNOW CLEARING OPERATIONS

A useful approach for maximizing the efficiency of maintenance investments is to identify locations where accumulation of snow or ice would significantly impede pedestrian and bicycling access and safety so that these locations are prioritized for clearing immediately after a storm event.

The City Loop should be identified as a priority route for winter maintenance, with the city (or another designated entity) assuming responsibility for snow and ice-clearing operations. In many cases, adjoining property owners maintain sidewalks and shared-use paths. On priority routes not maintained by the city, the city should work directly with property owners to encourage and/or enforce snow removal.

Maintain trail and intersection walkways/bikeways clear of debris and with visible markings.

ROUTINE MAINTENANCE

TRAIL AND STREET SWEEPING

Loose gravel, sand, leaves, and other debris on the surface of bicycle lanes, paved shoulders, and paved sections of shared use paths should be removed twice a year by machine, normally in the spring and fall. When needed, additional spot sweeping should be swept by hand or with blowers.

MARKINGS

Signs and pavement markings are important features of walkways, bikeways and roadways, and help ensure continued safe and convenient use of these facilities. It is critical that bikeway signs, striping, and legends be kept in a legible condition.

Recommendations to address these infrastructure elements include:

- Annual inspection of bikeway signs and legends, including an inventory of signs to account for missing or damaged signs;
- Prompt replacement of defective or obsolete signs;
- Annual inspection of markings, trail striping, street crossing markings and materials, and prompt reapplication/replacement as needed.
- Consider durable cold plastic for skip-striping bike lanes across right turn lanes.

SURFACE REPAIRS

People walking and biking are more sensitive and more vulnerable to problems with paved surfaces than people driving. A smooth surface, free of potholes, cracks and other major surface irregularities, should be provided and maintained. Surface condition inspections should be done annually. Requests for surface improvements could be made through the user-initiated maintenance request program described above.

Potholes should be patched with in-kind paving materials. Bituminous portions of trail can be temporarily repaired with a cold mix; permanent repair should consist of saw-cutting the damaged area and infilling with new bituminous. Loose asphalt materials from patching operations on bituminous trails can adhere to the existing surfacing, creating a very rough surface for biking. Fresh loose materials should be swept off the trail before they have a chance to adhere to the pavement.

Concrete repairs should be saw cut and infilled with new concrete to match the existing condition. Pavers should be removed and reset as needed; replacements should match the existing condition.

Cracks should be filled and sealed and root barriers should be placed where vegetation roots are encroaching upon City Loop pavement.

UTILITY CUTS

Utility cuts can leave a rough surface for people biking if not back-filled with care. Cuts should be backfilled and compacted so that the cut will be flush with the existing surface when completed. Extra care should be used when cuts are made parallel to bicycle traffic to avoid a ridge or groove in the bicycle wheel track. Considerations should be given to adding the above specifications to utility permit requirements.

Vegetation should be trimmed to minimize walkway/bikeway encroachment.

VEGETATION

Vegetation encroaching into and under a sidewalk or a shared-use path a nuisance and a hazard for people walking (especially for those with sight or mobility impairments) and biking. To provide long-term control of vegetation, its management should be considered during design and construction of the City Loop.

Vegetation management helps to maintain smooth pavement surface, as well as clear zones, sightlines, and sight corners to promote pedestrian and cyclist safety. City maintenance staff are generally responsible for vegetation management and should inspect the trail system monthly during the growing season. Regular seasonal maintenance activities should include weekly mowing of turf areas within the trail ROW, annual trimming of vegetation, weed control, raingarden maintenance and sweeping and blowing of vegetation and turf debris from the City Loop Pavement and root cutting as needed.

Vegetation management issues identified by users (e.g. tree roots causing heaving of sidewalk surfaces, encroachment and maintenance issues) may be reported through the user-initiated maintenance request program.

AMENITIES

Biannual inspections of City Loop amenities should take place in the spring and fall to ensure furnishings are properly functioning and are not posing safety hazards. Inspections should include, but are not limited to, benches, bike racks, litter receptacles, picnic tables, kiosks, site lighting and bollards. Repairs and/or replacements should be made as soon as possible when a need is identified.

LITTER REMOVAL

Litter removal from the City Loop is important for both a safety and aesthetics and includes removing loose debris from the ground and emptying litter receptacles. Trash removal should take place on a weekly basis.

STORMWATER MANAGEMENT

Effective stormwater management conveyance and removal collects and dissipates stormwater runoff in an efficient and sustainable manner, utilizing natural topography and vegetation to aid in sediment control as well as water filtration and infiltration. Raingardens and similar BMPs such as infiltration basins, vegetated filter strips, bioswales, etc. should be well-designed and maintained in working order to ensure successful functioning.

Drainage facilities may change grades and deteriorate over time. Ensuring bicycle-safe drainage grates are located at the proper height greatly improves cyclist safety; it is sometimes necessary to adjust or replace catch basins to ensure continued safe operations and improve drainage.

Drainage systems should be inspected monthly during the growing season for erosion, invasive plant materials, litter, standing water and blockages. Annually, plants should be trimmed or removed as needed, and leaf removal, mulching, plant replacements and erosion stabilization activities should be completed.

Event-related drainage issues (e.g. backed-up grates) and long-term drainage hazards (unsafe grates) can be reported through the user-initiated maintenance request program, and should be proactively addressed whenever street improvements are made.

DOCUMENT CITATIONS

I.B INTRODUCTION - PURPOSE AND NEED

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ii. http://atvb.ahajournals.org/content/early/2013/04/04/ATVBAHA.112.300878.abstract

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II.A. FACILITY TYPE ANALYSIS - USER TYPES

x. Roger Geller, City of Portland Bureau of Transportation. Four Types of Cyclists. http://www.portlandonline.com/transportation/index.cfm?&a=237507. 2009.

xi. Dill, J., McNeil, N. Four Types of Cyclists? Testing a Typology to Better Understand Bicycling Behavior and Potential. 2012.

II. B. ROUTE ANALYSIS - BICYCLE LEVEL OF TRAFFIC STRESS

xii. Analysis Procedure Manual methodology relies heavily on the 2012 Mineta Transportation Institute Report 11-19: Low-Stress Bicycling and Network Connectivity

xiii. Roger Geller. Four Types of Cyclists. http://www.portlandoregon.gov/transportation/article/237507

II.E. GREEN INFRASTRUCTURE - BENEFIT OUTCOMES

ix. http://indyculturaltrail.org.s3.amazonaws.com/wp-content/uploads/2015/07/15-C02-CulturalTrail-Assessment.pdf

PHOTO SOURCES

UNLESS SPECIFICALLY NOTED ON THE IMAGE, ALL PHOTOGRAPHS USED IN THIS REPORT WERE PROVIDED BY THE CONSULTANT TEAM

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IV. APPENDIX

A. Technical Memorandum 1
B. Technical Memorandum 2
C. Technical Memorandum 3
D. Technical Memorandum 4

Documents included in the Appendix reflect the current thinking at the time they were developed. While a substantial portion of the content is still relevant, some items may have evolved and may be slightly different in the final report.