District 7 Bicycle Plan

Guiding MnDOT's investments in bicycle facilities

March 2019

Photo Credit: Mankato River Ramble, photo by Jerry Hass

MinnesotaGO
A Collaborative Vision for Transportation

Acknowledgements

The following individuals supported the MnDOT District 7 Bicycle Plan development:

Technical Advisory Committee

Craig Beckman, Minnesota Department of Natural Resources

Mark Daly, Faribault County

Mark Dehen, City of North Mankato

Tom Engstrom, Greater Mankato Bike and Walk

Annette Fiedler, Southwest Regional Development Commission

Drew Hage, City of Windom

Max Kaufman, Southwest Regional Development Commission

David Kittleson, Faribault County Trails

Matthias Leyrer, Public

Leah Mahoney, Brown, Nicollet, Le Sueur and Waseca County SHIP

Sam Parker, Region Nine Development Commission

Sara Remes, Minnesota Department of Natural Resources

Roger Risser, Watonwan County

Tom Schmitz, City of New Ulm

Casey Wytaske, Public

MnDOT District 7 Staff

Lisa Bigham

Ronda Allis

Peter Harff

Everson Murzyn

Angelica Altamirano

Tony DeSantiago

Angie Piltaver

MnDOT Central Office, Office of Transit and Active Transportation

Jake Rueter, Multimodal Planner

Liz Walton, Landscape Architect

Eric DeVoe, Research Analyst

Jasna Hadzic-Stanek, Principal Planner

Consultant Team – Toole Design

Connor Cox

Ciara Schlichting, AICP

Chris Bower, P.E.

K.C. Atkins, P.E.

Galen Omerso

Jacob Nigro

Michael Blau, AICP

Sally Sharrow, AICP Candidate

Evan Moorman

Spencer Gardner, AICP

Russell Isler

Greta Alquist, AICP

Table of Contents

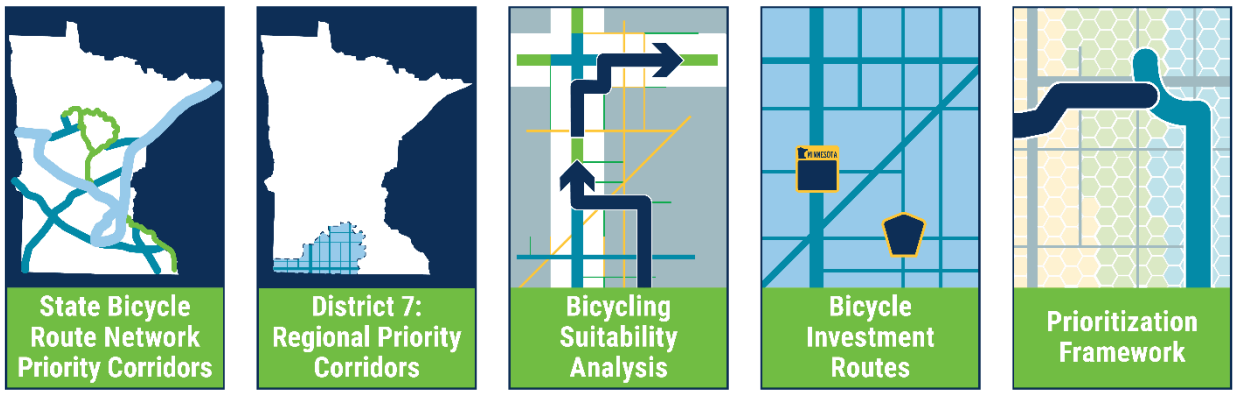
CHAPTER 1 | Introduction

The Minnesota Department of Transportation (MnDOT) Statewide Bicycle System Plan (SBSP) was completed in 2016 and includes goals, strategies, and actions for bicycling in Minnesota. One of MnDOT's SBSP goals is to develop a connected network of state bicycle routes with partners. The SBSP identified search corridors for a state priority bicycle network. The District 7 Bicycle Plan (Plan) builds on the SBSP by identifying specific Bicycle Investment Routes (occasionally referred to as "routes" throughout the Plan) within the state priority bicycle network search corridors. **Bicycle Investment Routes are planning tools that will guide future investments in bicycle facilities across the District. They are not intended to be used as navigational tools, except designated and mapped state bikeways and U.S. Bicycle Routes.**[1] MnDOT staff coordinated with local partners to develop these routes to better understand where it is most appropriate to make investments in bicycle infrastructure throughout District 7. The Plan also helps MnDOT staff prioritize bicycle investments across District 7 using a route prioritization framework.

The District 7 bicycle planning process built on the work from the SBSP, and included five major components (Figure 1):

1. Identifying state bicycle route network priority corridors (completed in the SBSP)
2. Identifying district regional priority corridors (completed in the SBSP)
3. Analyzing bicycling suitability on all roadways across the state
4. Identifying Bicycle Investment Routes
5. Developing a prioritization framework to help MnDOT prioritize bicycle investments

Figure 1: The planning process for the District 7 Bicycle Plan.



[1] Route guidance information can be found by viewing Minnesota's State Bicycle Map.

Statewide Bicycle System Plan Vision, Goals, and Strategies

The 2016 SBSP provides a framework for how MnDOT will address bicycling needs and interests in Minnesota. Through the community engagement process in the SBSP, people from across Minnesota expressed a desire for bicycling facilities that feel safe and comfortable for all types of people, regardless of their age or ability. This desire for safe and comfortable bicycling facilities is reflected in Plan's vision and goals, which align with the SBSP vision and goals.

Vision

Bicycling is safe, comfortable and convenient for all people.

Goals

Safety and Comfort: *Build and maintain safe and comfortable bicycling facilities for people of all ages and abilities.*

Local Bicycle Network Connections: *Support regional and local bicycling needs.*

State Bicycle Routes: *Develop a connected network of state bicycle routes in partnership with national, state, regional and local partners.*

Ridership: *Increase the number of bicycle trips made by people who already bike and those who currently do not.*

Strategies

The SBSP includes 19 strategies that demonstrate MnDOT's commitment to addressing local bicycling needs, developing the state bikeway network, and increasing ridership through the 6Es – engineering, education, enforcement, evaluation, encouragement and evolution. MnDOT introduced a sixth E, termed Evolution, to describe how MnDOT will respond to the changing bicycling landscape beyond adoption of the SBSP.

District 7 Bicycle Plan Purpose

The purpose of the Plan is to support local bicycle networks, prioritize MnDOT bicycle investments in District 7, and identify actions District staff can take to implement the SBSP strategies and achieve the SBSP goals and vision.

Technical Advisory Committee

A Technical Advisory Committee (TAC), composed of regional stakeholders from across District 7, helped develop the Plan. TAC members included representatives from Mankato/North Mankato Area Planning Organization, MnDNR, Faribault County, City of North Mankato, Greater Mankato Bike and Walk, Southwest Regional Development Commission, Faribault County Trails, Nicollet County, Region Nine Development Commission, City of New Ulm, and community members.

The TAC met four times, with the role of:

- Reviewing the project approach
- Reviewing data analysis results
- Identifying and prioritizing district Bicycle Investment Routes, and
- Reviewing the draft Plan

CHAPTER 2 | State and Regional Bicycle Route Corridors

State Bicycle Route Network

The State Bicycle Route Network (Figure 2), a series of prioritized corridors, is defined in SBSP as "a network of envisioned connections that link destinations throughout the state by bicycle". The SBSP priority corridors reflect public preferences expressed during SBSP plan outreach, the potential for connectivity to the U.S. Bicycle Route System, potential connectivity to other bicycle route corridors, potential for designation as a U.S. Bicycle Route, and continuity across the state. The connections are presented in the SBSP as search corridors between two points; the SBSP identified 10-mile wide corridors instead of specific route alignments. Identifying more refined route alignments in coordination with local stakeholders for the SBSP search corridors is a primary objective of the district bicycle planning process. The alignments are referred to in this plan as 'Bicycle Investment Routes.' Further collaboration and planning between MnDOT District staff and local partners is necessary to develop bicycling projects along the Bicycle Investment Routes.

District 7 State Priority Search Corridors

Four State Priority Corridors are in District 7 (Figure 3):

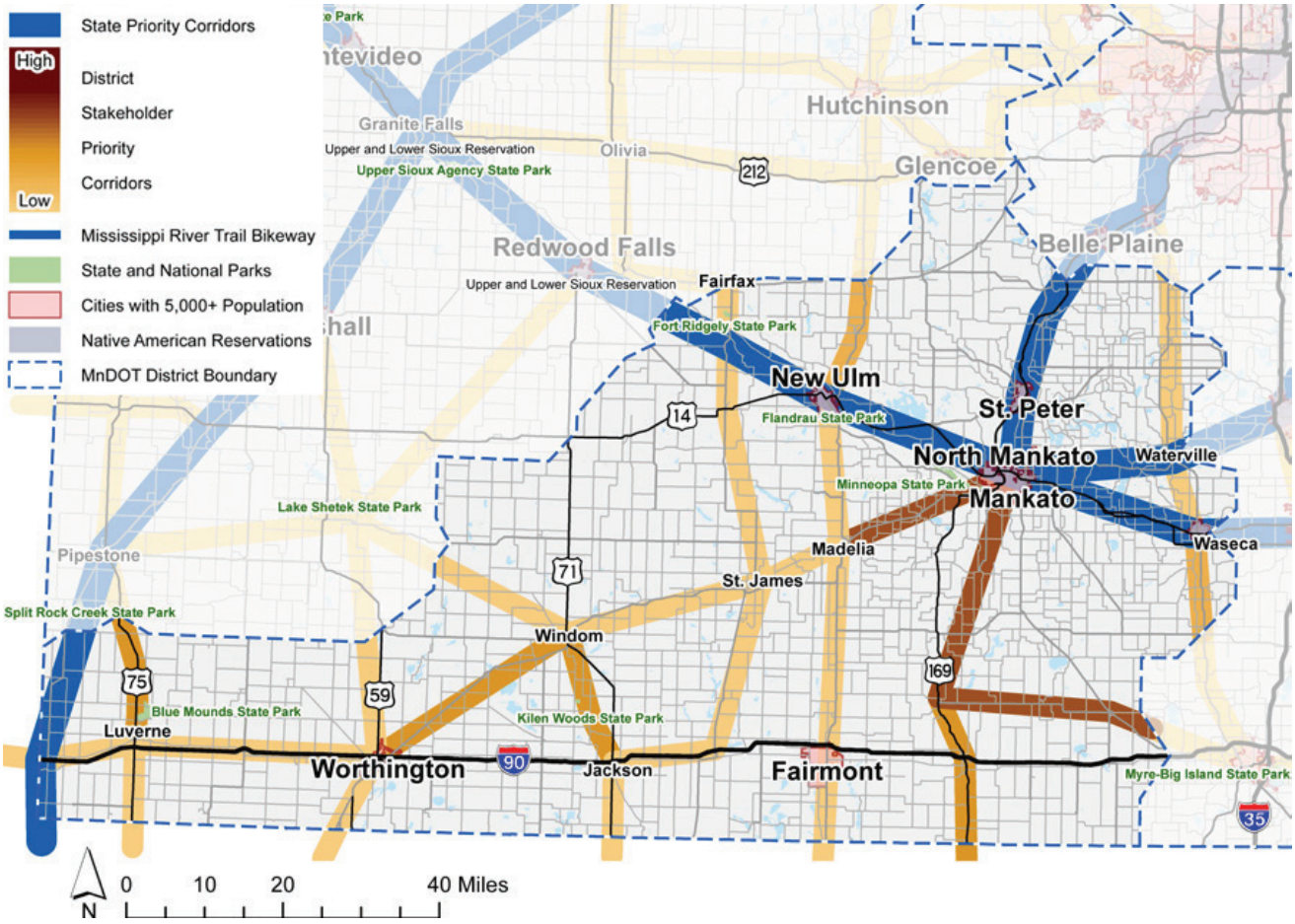
- A priority route extends along the district's western border, continuing into District 8.
- A priority route travels east-west from Waseca, through Mankato/North Mankato and New Ulm and into District 8.
- A priority route runs between Mankato/North Mankato and the Metro District border to Belle Plaine.
- There is a priority route between Mankato/North Mankato and Waterville.

District 7 Regional Priority Corridors

Through the planning and public outreach process for the SBSP, participants shared regional bicycle route preferences for the low priority statewide corridors on the State Bicycle Route Network. The results of the regional prioritization process in MnDOT District 7 are shown in Figure 3 as District Stakeholder Priority Corridors. This indicates that some low priority statewide routes are regional priorities.

Figure 2: State Bicycle Route Network Priority Corridors identified in the 2016 SBSP.

Figure 3: District 7 State and Regional Priority Corridors from the SBSP.



CHAPTER 3 | Bicycle Investment Routes

This chapter describes the process for selecting Bicycle Investment Routes in District 7. The process included a bicycling suitability analysis as well as coordination with local partners in the district to select preferred Bicycle Investment Routes.

Bicycling Suitability Analysis

Analysis Overview

The bicycle planning process included a bicycling suitability analysis of all public roadways in Minnesota. A bicycling suitability analysis uses measurable attributes of the roadway to approximate how well it accommodates people traveling by bicycle. Through the SBSP planning process, MnDOT found that most participants greatly prefer to bicycle in low-stress environments (i.e., low traffic speeds and/or volumes). Therefore, the analysis conducted for the District Bicycle Plans only recognized low-stress roadways and shared use paths as preferable bicycling options. Additional information about the methodology used to complete the bicycling suitability analysis can be found in **Appendix G**: Bicycling Suitability Analysis Methodology.

Selecting Bicycle Investment Routes

Using the bicycling suitability rating analysis as a starting point, District 7 staff worked with the TAC to identify Bicycle Investment Routes within the priority corridors from the SBSP. Some of the Bicycle Investment Routes are located on MnDOT state highways, while others are located on local or regional roadways or shared use paths. The routes were identified through collaboration with many agencies and partners across the district, including cities, counties, and regional governments. Routes were selected by balancing current conditions and patterns of use with a long-term vision of where bicycle infrastructure investments would make the most sense. The bicycling suitability rating analysis resulted in many comments as the system analysis was unable to consider key variables like surface type and turning movements (crossings) that resulted in illogical travel routes between communities.

The District 7 Bicycle Investment Routes are planning tools that guide MnDOT's future investments in bicycle facilities on state highways. They are not designated bicycle routes or routes used for navigation.

The Bicycle Investment Routes are planning tools that will guide future investments in bicycle facilities across the district. **They are not designated bicycle routes or routes to be used for navigation.**[2] Just as the State Bicycle Map functions today, bicyclists will not be encouraged to take specific on-road routes

[2] Route guidance information can be found by viewing Minnesota's State Bicycle Map.

but instead make decisions based on traffic volume and shoulder availability. The state highway investment routes will help guide MnDOT's investments on the state highway network in District 7.

The Bicycle Investment Routes identified in District 7 are shown in Figure 4 , and can also be viewed on the online, interactive map. To view the Bicycle Investment Routes map, click on the layers icon on the menu bar on the top left of the screen, then select the "District 7 Bicycle Investment Routes" layer. To view the map legend, click the arrow to the right of the 'District 7 Bicycle Investment Routes' label, then click 'Legend'.

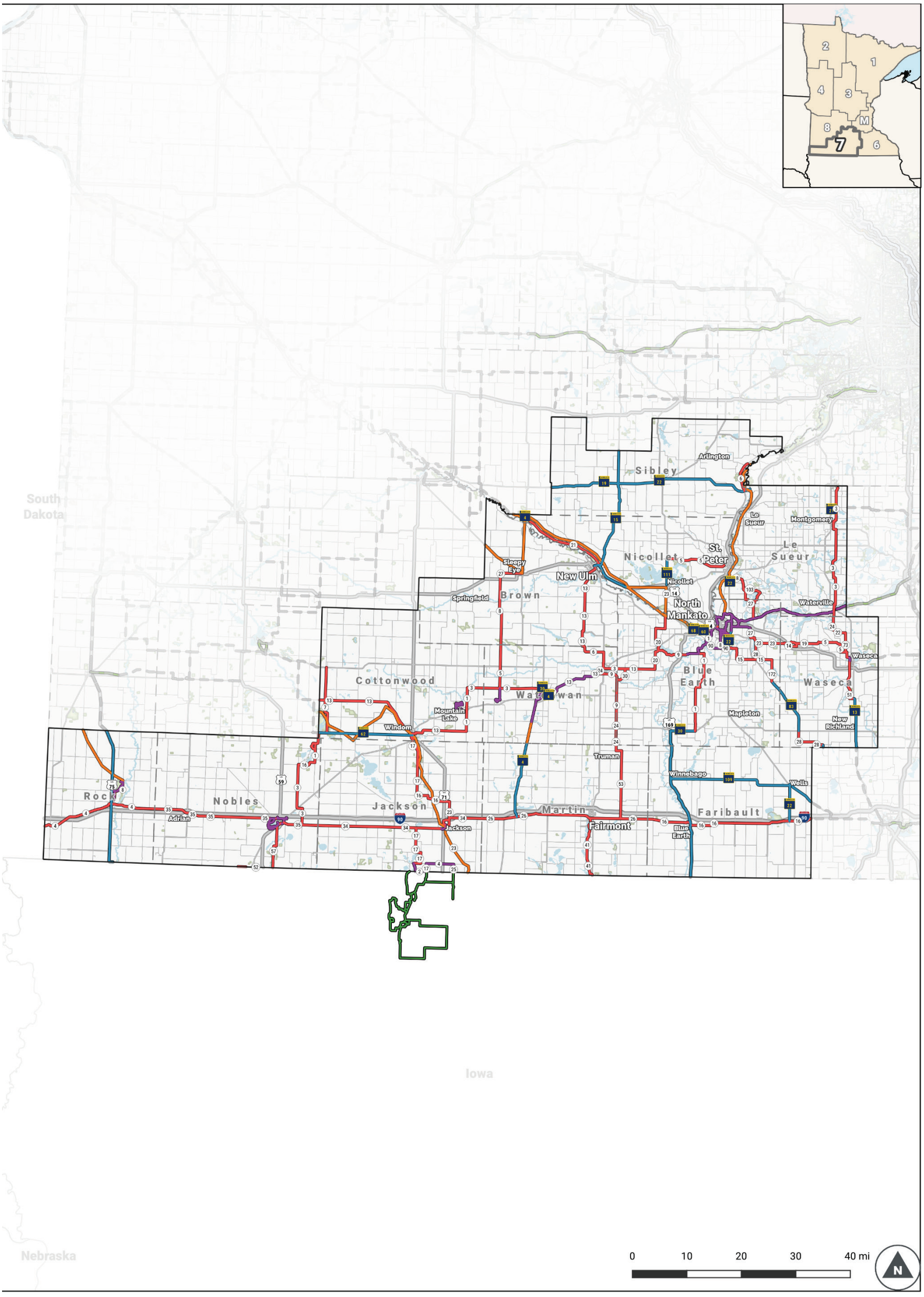
Supporting Local Bicycle Travel

One of the objectives of the Plan is to support local and regional bicycling networks. **Through the SBSP, participants rated investments that support local travel as being two to three times more important than investments for statewide bicycle travel.** MnDOT roadways typically form a small percentage of local and regional bicycling networks, yet MnDOT has a role in facilitating local trips along and across state highways. The scoring criteria in the route prioritization framework (described in further detail in the following chapter) emphasize local connections, which elevates the scores for state highway segments that provide local and regional bicycle connections. Many of the Bicycle Investment Routes on state highways may serve local trip purposes when they connect to other existing or planned local bicycle routes. Figure 4 also displays the Bicycle Investment Routes that are located on local or county roadways. It is important to note that MnDOT may continue to invest in local bicycle infrastructure beyond identified Bicycle Investment Routes when its Complete Streets policy finds needs for people bicycling along or across a project corridor. This will be especially true in the case of projects that travel through communities.[3]

Bicycle facility planning and implementation at the local level is performed by a variety of partners, including municipalities, counties, RDCs, public health professionals, and bicycle advocates. Each partner plays an important role in implementing bikeways in District 7, including developing shared use paths or bicycle facilities on local or county roadways. In future updates to the Plan, MnDOT intends to collect and disseminate more information about existing bicycle facilities and local bicycle planning efforts. This could include documenting all local plans related to bicycling, active transportation, or Safe Routes to School.

[3] MnDOT Statewide Bicycle System Plan, Chapter 7 – Next Steps & Lessons Learned

Figure 4: District 7 Bicycle Investment Routes.



* Other than designated US Bicycle Routes, Bicycle Investment Routes are not designated bicycle routes or routes to be used for navigation.

CHAPTER 4 | Bicycle Investment Route Prioritization

MnDOT has a limited amount of funding available for bicycle infrastructure. Establishing priorities helps identify Bicycle Investment Routes that offer the greatest public benefit as part of the statewide network. In the spring and summer of 2018, MnDOT's Office of Transit and Active Transportation, in collaboration with TAC members from each MnDOT district, developed a prioritization framework for the District Bicycle Plans. The framework helps each district identify and prioritize state highway projects that have the greatest need for bicycle facility investment. This high-level analysis aggregates data of key characteristics across the entire state. The goals of the Bicycle Investment Route prioritization framework are to be:

- Comprehensive
- Transparent
- Defensible
- Easily updated in the future

Prioritization Criteria

The Bicycle Investment Route prioritization framework evaluates each Bicycle Investment Route based on several scoring criteria. Draft criteria were initially developed by staff in MnDOT's Office of Transit and Active Transportation, and then reviewed and modified based on input from TAC members in each district and MnDOT District staff across the state. Some criteria in the framework are data-based and use statewide data or census data to score investment routes relative to a defined scoring threshold. Other criteria in the route prioritization framework do not have statewide data available and could not be analyzed through the data-driven process; those criteria were scored by TAC members on a segment-by-segment basis and are used to supplement the data-driven prioritization analysis (see **Appendix F**). A segment is one section of a Bicycle Investment Route.

The Bicycle Investment Route prioritization framework is divided into six categories, listed below. Each category includes one or more criteria with scoring thresholds to determine how many points are awarded to each segment. See **Appendix A** for a full table of subcategories and scoring criteria.

- **Local Connections** – segments that travel through one or more urban areas. Urban areas are defined by the U.S. Department of Agriculture as 'Urbanized Areas' with 50,000 or more people, or 'Urban Clusters' in more rural areas with at least 2,500 but less than 50,000 people.
- **Population & Equity** – segments in areas with underserved populations receive points in this category. Underserved groups are defined in Minnesota Walks (p. 14) as "priority populations" and include: children, Native Americans, older adults, people with disabilities, immigrants, low-income populations, and zero-vehicle households. Segments that are developed based on environmental justice areas of concern and projects in areas with high residential population density also receive points in this category.
- **Activity Generators** –segments in areas that attract a significant number of people bicycling. Activity generators include: high-priority destinations, such as state parks, regional parks, museums, scenic byways, community centers, shopping centers, and high tourism locations;

Minnesota Walks top destinations (p. 9); areas with growth in business registrations; and areas where transportation hubs are located, such as rail stations or intercity bus stops.

- **Network** –segments that increase bikeway network connectivity. Examples include projects that connect to existing local bikeways, existing or planned shared use paths, close existing gaps, and address known barriers to bicycling, such as bridges and highways.
- **Plan Consistency** – segments that are identified for bicycle improvements in a local plan or Capital Improvement Plan (CIP) or would further local policies to increase bicycling fall under this category.
- **Safety** – segments identified in a MnDOT District Safety Plan or an identified high crash area.

The criteria to score Bicycle Investment Routes are consistent in the seven greater Minnesota districts, and the route prioritization can be updated in the future as new data becomes available or as Bicycle Investment Routes are updated. While there is some variability between districts in the weights assigned to each criterion, the overall method is consistent. Each District TAC had the opportunity to participate in a survey and rate the importance of each prioritization subcategory. TAC members were asked to weight each subcategory by distributing 100 points amongst the 14 subcategories. Ten TAC members participated in the survey, and the average scores for each prioritization subcategory are shown in Table 1.

Table 1: Results of a survey to TAC members that asked them to rank the 14 subcategories in the prioritization framework.

Rank	Prioritization Subcategory	Average Score
1	Connects to existing state trail or U.S. Bicycle Route	13.5
2	Serves children and youths	10.7
3	25% or more of people w/in 0.5mi of supermarket	9.5
4	Connects to transit/multi-modal hubs	9.3
5	Serves areas with significant poverty	9.2
6	Population density > MN average	8.6
7	Workers with no vehicle access	7.2
8	Serves immigrant populations	6.3
9	Project is in a MnDOT District Safety Plan	5.7
10	Growth in businesses over last 5 years	5.5
11	Serves older adults	4.6
12	USDA Urbanized Areas	3.6
13	Serves Native American populations or Tribal Reservations	3.2
14	Serves people with disabilities	3.1

Data-Based Prioritization Criteria Scoring

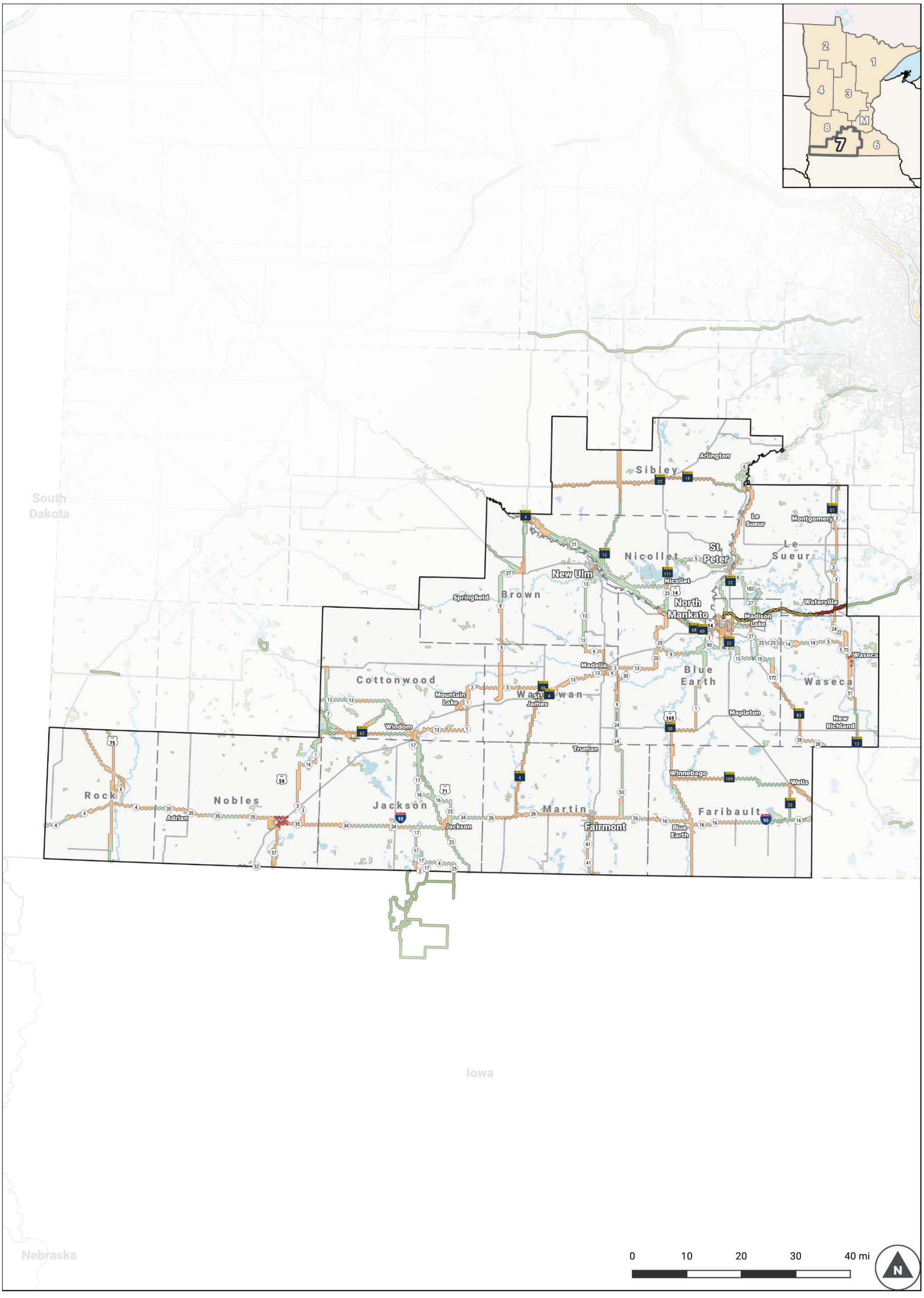
To determine prioritization scores, the entire state of Minnesota was divided into 522,263 hexagons.

- Each hexagon is ½ mile wide and approximately 104 acres in size.
- Each hexagon was scored based on the 14 data-based criteria in the route prioritization framework (**Appendix A**).
- Each criterion score (up to two points for each of the 14 criteria) was multiplied by the average score (weight) from the TAC criteria ranking exercise (see Table 1).
- Each hexagon's cumulative weighted score for all 14 criteria was normalized to 100.

Data for all criteria was derived from national or statewide sources. Datasets included both internal MnDOT sources and external datasets from other organizations. Average Annual Daily Traffic and crash data are examples of MnDOT data. External data included school program locations (Department of Education), demographic data (US Census), and other sources.

Figure 5 displays the prioritization scoring results from the data-based prioritization criteria along the District 7 Bicycle Investment Routes. All hexagons that intersected a Bicycle Investment Route are displayed. The prioritization scores for each hexagon are sorted into five tiers; the red hues represent hexagons with the highest prioritization scoring results, and the blue and green hues represent hexagons with the lowest prioritization scoring results.

Figure 5: District 7 Bicycle Investment Routes overlaid on top of the route prioritization framework scoring results.



CHAPTER 5 | Implementation

The Plan builds upon the SBSP by taking the priority search corridors from the SBSP and identifying Bicycle Investment Routes. Planning and programming the Bicycle Investment Routes will happen over the course of many years and in partnership with local and regional agencies. Once new bikeways are constructed, maintaining the system then plays a critical role in providing safe and comfortable accommodations for bicycle users of all ages and abilities.

This section provides strategies and actions to plan, program and maintain MnDOT's existing and planned bikeway network in a state of good repair. Short-term strategies will help guide initial plan implementation. Each strategy is supported by a set of actions. This phased approach sets realistic expectations to help MnDOT implement changes in the short term. Following the short-term strategies are a list of recommendations that represent aspirational, long-term strategies that MnDOT may consider when sufficient resources are available to pursue them.

Short Term (0-5 years) Planning and Programming Strategies and Actions

Strategy 1: Incorporate bicycle routes into CHIP projects

Action 1.1: Focus early implementation efforts on Bicycle Investment Route segments that overlap with projects identified in the District 7 10-year Capital Highway Investment Plan (CHIP)

Lead: MnDOT District 7
Support: MnDOT Office of Transit and Active Transportation

Incorporating bicycle facilities into projects already funded is a cost-effective strategy to build out the bicycle network and ensure compatibility amongst modes. Although not all projects in the CHIP will be constructed within the next five years, most projects in the CHIP will have at least gone through the scoping process. Appendix F provides a full list of Bicycle Investment Routes that overlap with CHIP projects, including prioritization scoring results of individual segments based on a survey distributed to TAC members.

Strategy 2: Use the Bicycle Scoping Guide for future state highway projects

Action 2.1: Utilize the Bicycle Scoping Guide to determine appropriate locations for bicycle facilities

Lead: MnDOT District 7
Support: MnDOT Office of Transit and Active Transportation

The Bicycle Scoping Guide (**Appendix D**) can help District staff refine project scopes to address bicycling needs for each project before it enters the State Transportation Improvement Plan (STIP).

Strategy 3: Plan for bicycle facility projects not currently identified in the CHIP

Action 3.1: Focus early planning efforts on Bicycle Investment Routes not currently identified in the CHIP but that are identified in local or regional plans

Lead: MnDOT District 7
Support: MnDOT Office of Transit and Active Transportation

Even when a Bicycle Investment Route is not identified in the CHIP, MnDOT should still start early bicycle facility planning efforts on those roadways. Planning for future Bicycle Investment Route projects is especially important when the route is also identified in a local or regional transportation plan.

Strategy 4: Document existing bicycle facilities on MnDOT right-of-way

Action 4.1: Develop an inventory of existing bicycle facilities on MnDOT right-of-way, including shared use paths, bicycle lanes, signed bicycle routes, bikeable shoulders, and designated bicycle routes, including information on maintenance agreements and limited use permits for each facility.

Lead: MnDOT Office of Transit and Active Transportation
Support: MnDOT District 7

MnDOT collects data on paved shoulders, designated bicycle routes and shared use paths every two years and presents this information in the Minnesota State Bicycle Map. Currently, MnDOT relies on county and city staff to provide updated information on roadway conditions, including bicycle facilities.

An accurate and regularly updated bicycle facility inventory will help MnDOT make more informed decisions about bicycle infrastructure investments. An implementation strategy from the SBSP is to develop an inventory. Once developed, this dataset could be put to various analytical uses, such as:

- Identifying bikeways that MnDOT currently performs routine maintenance on, including snow removal, vegetation/mowing, and surface repairs
- Identifying bikeways under MnDOT's responsibility for major maintenance (resurfacing or repair)
- Cataloging existing maintenance agreements and determining the need for new agreements (see Action 8.1)
- Notifying local partners about maintenance issues (see Action 9.3)
- Establishing maintenance schedules and cost analyses
- Developing future projects based on maintenance needs
- Understanding the distribution of facility types across the statewide bikeway network

Central Office will develop a standard process for collecting data about existing bicycle facilities for use in the Minnesota State Bicycle Map and future bicycle planning activities. The process will include information on the frequency of data collection and will be made available to the public through the Minnesota State Bicycle Map.

Strategy 5: Continue to convene the District Bicycle Plan TAC

Action 5.1: Convene the District Bicycle Plan TAC on an annual basis

Lead: MnDOT District 7
Support: MnDOT Office of Transit and Active Transportation

District TACs should meet one to two times per year to discuss updates to MnDOT plans and programs, local plans and projects, resource sharing, and Plan implementation opportunities and challenges. MnDOT should encourage TAC members and other local partners to build upon the partnerships that started through the district bicycle planning process.

Strategy 6: Measure performance

MnDOT uses performance measures to evaluate achievement toward agency goals. The SBSP identified eight performance measures to track progress toward meeting the plan's goals. The performance measures address the topics of ridership, safety, and assets. More detailed information on these measures are in Chapter Six of the SBSP. Performance measures will be tracked statewide by MnDOT's Office of Transit and Active Transportation; however, District staff can support this effort.

Action 6.1: Continue providing data on addressing bicycling needs to MnDOT's Office of Transit and Active Transportation

Lead: MnDOT District 7
Support: MnDOT Office of Transit and Active Transportation, MnDOT Office of Transportation System Management

The SBSP defines "MnDOT projects that address bicycling needs" as a performance measure. This measure helps MnDOT evaluate progress toward addressing known bicycling infrastructure gaps and issues on its roadway system. This is measured by the percentage of MnDOT projects where existing conditions do not adequately meet bicycling needs and improvements for bicyclists are included in the final project scope. Data from District staff is needed to track this performance measure.

Action 6.2: Encourage local and regional partners in the district to participate in MnDOT's Bicycle and Pedestrian Counting Program

Lead: MnDOT District 7
Support: MnDOT Office of Transit and Active Transportation, Statewide Health Improvement Partnership Grantees

MnDOT's Office of Transit and Active Transportation (OTAT) started a Statewide Pedestrian and Bicycle Counting Program in 2013, which uses automated technologies to monitor bicycle and pedestrian traffic volumes and patterns throughout Minnesota. The program generates walking and bicycling information that can be used to inform state, regional, and local planning and engineering initiatives and to assess important transportation policies and programs such as Complete Streets and Toward Zero Deaths. Expanding the count program and increasing the amount of bicycle count locations across the state will make the program more valuable to future MnDOT planning and engineering projects.

MnDOT's Central Office facilitates the counting program and offers the resources to conduct bicycle counts, but they rely on counties, local governments, and other partners across the state to conduct the

counts. District staff can encourage local partners to participate in the program. MnDOT offers portable counters that partners can borrow to collect local and regional bicycling and walking data. More information on MnDOT's bicycle and pedestrian traffic count data program can be found here. Region Nine Development Commission also has portable trail counters that can be deployed in nine of the thirteen District 7 counties.

Strategy 7: Fund projects located along Bicycle Investment Routes

Action 7.1: Consider revisiting the TA criteria used by the ATP to score bicycling projects for federal funding

Lead: MnDOT District 7

To further District staff's progress towards implementing the Bicycle Investment Routes, the ATP may consider revisiting the criteria used to score bicycling projects for federal funding to help fund projects located on identified Bicycle Investment Routes. This would allow local partners to strategically target federal funds to build bicycle facilities along Bicycle Investment Routes.

Action 7.2: Provide a list of bicycle funding sources to counties and municipalities in each district

Lead: MnDOT Office of Transit and Active Transportation
Support: MnDOT District 7

MnDOT should serve as a resource to connect local partners with potential funding sources to help develop bicycle facilities on municipal or county roads. MnDOT Central Office could develop a webpage with information dedicated to bicycle funding and a comprehensive, updated list of funding sources that could be used to develop bicycle facilities on local or county roads.

Short Term (0-5 years) Bikeway Maintenance Strategies and Actions

The strategies in this section are focused on maintaining bicycle facilities located on the MnDOT State Highway network. These strategies and actions are considered short term, with the goal of achieving them within five years.

Strategy 8: Clarify maintenance responsibilities for bicycle facilities within MnDOT right-of-way

Action 8.1: Continue to use maintenance agreements with local jurisdictions and partner agencies to identify responsibilities for maintenance activities, including snow clearing

Lead: MnDOT District 7

The jurisdiction that owns the facility is generally responsible for maintenance and operations. However, a maintenance agreement and/or a limited use permit can be used to assign maintenance responsibilities to another agency and specify reimbursement of maintenance costs.[4] Without

[4] Minnesota Department of Transportation (2007), *MnDOT Bikeway Facility Design Manual*, *Chapter 9*, page 219. Retrieved from: https://www.dot.state.mn.us/bike/pdfs/manual/manual.pdf

maintenance agreements, confusion over maintenance responsibilities can occur. Effective maintenance programs include coordination between the government agencies that own and maintain the infrastructure.

Maintenance agreements can transfer responsibility from MnDOT to local agencies and can provide for payments to local agencies for performing maintenance responsibilities that MnDOT operations would normally perform. For example, a local agency may agree to conduct plowing, mowing, and other maintenance activities on shared use paths constructed and owned by MnDOT. Clarifying responsibilities for maintenance costs and operations ensures that maintenance problems can be directed to the responsible party and resolved in a timely manner to maintain safe facilities for users. Ideally, one agency would be responsible for the length of an individual facility.[5] Facilities managed by a single entity are more likely to have a consistent level of maintenance that users come to expect.

The bicycle facility inventory (Action 4.1) could include maintenance agreements. MnDOT could review existing maintenance agreements with local jurisdictions to determine how they will affect implementation of this plan. MnDOT can establish maintenance agreements where they do not exist or are lacking, especially with jurisdictions located along the investment priority routes identified in this plan.

MnDOT's Bikeway Facility Design Manual encourages the use of maintenance agreements to clarify the roles and responsibilities of each agency.[6] The Cost Participation and Maintenance Responsibilities with Local Units of Government Manual provides further guidance on maintenance agreements.[7]

Strategy 9: Develop a proactive pavement preservation program

Action 9.1: Continue to explore potential inventory and pavement condition assessment approaches with District Maintenance, Office of Materials and Road Research, and the ADA (Americans with Disabilities Act) Unit

Lead: MnDOT Office of Transit and Active Transportation
Support: MnDOT District 7

A consistent pavement inspection and maintenance schedule is one of the most effective ways to ensure user safety on shared use paths. Regular and preventive maintenance can also extend the service life of a facility and reduce long-term expenses by delaying or eliminating the need for costly rehabilitation projects.

There are several condition assessment approaches that could be used by MnDOT staff. District 1 is partnering with the Arrowhead Regional Development Commission to purchase a bicycle that includes pavement quality sensors and will be piloting its use in the summer of 2019. This assessment could

[5] University of Delaware (2007), *Sidewalks and Shared-Use Paths: Safety, Security, and Maintenance, Part 3: Key Maintenance Issues,* page 61. Retrieved from: https://www.americantrails.org/files/pdf/SharedUsePathSafetyDE.pdf
[6] Minnesota Department of Transportation (2007), *MnDOT Bikeway Facility Design Manual*. Retrieved from: https://www.dot.state.mn.us/bike/pdfs/manual/manual.pdf
[7] Minnesota Department of Transportation (2017), *Cost Participation and Maintenance Responsibilities with Local Units of Government Manual*. Retrieved from: http://www.dot.state.mn.us/policy/financial/fm011.html

evaluate four shared use path characteristics: roughness (ride), surface distress (condition), surface skid characteristics, and structure (pavement strength and deflection). A rating system could then be used to score each characteristic. Based on the resulting score, recommended actions may range from "no maintenance required" to "routine maintenance" or even "reconstruction." [8] Data collected can inform maintenance decisions, in conjunction with other considerations, such as shared use path user volumes.

MnDOT Office of Transit and Active Transportation should lead this task, and staff from the ADA Unit can be included in this process to determine if existing maintenance issues are causing accessibility problems. If a facility is deemed noncompliant due to lack of maintenance, it could be prioritized for improvement. Materials and Road Research can also be consulted for its expertise in pavement engineering.

Action 9.2: Conduct pavement preservation repairs to MnDOT-owned facilities on an as-needed basis, including crack sealing, patching, fog sealing, microsurfacing, and asphalt resurfacing

Lead: MnDOT District 7

Many short- and mid-term maintenance techniques are used for pavement preservation. These include crack sealing, patching, fog sealing, microsurfacing, asphalt resurfacing, grinding and cutting, and tree root barriers. MnDOT can perform minor repairs and maintenance activities for bikeway pavement preservation as needed. The need for repairs could be identified through various channels, such as updating MnDOT's bicycle facility inventory, requests from local agencies, or public demand (see Action 11.1).

Action 9.3: Continue to notify the responsible agency about maintenance issues on bicycle facilities

Lead: MnDOT District 7

Once the bicycle facility inventory in Action 4.1 is developed, it can be used to inform local agencies about maintenance issues and request that they be resolved. Where an existing maintenance agreement identifies a local agency as the responsible entity (see Action 8.1), MnDOT can inform that agency and could offer support as it addresses the problem, if needed. Where no maintenance agreement is in place and the facility in need of maintenance is within a local jurisdiction's boundaries, MnDOT could inform the appropriate agency of the problem and request that it be addressed.

While the inventory would likely be developed by and housed at Central Office, District staff (planners and maintenance crews) would have access to the information and could be responsible for communicating maintenance requests to local partners. Both Central Office and District staff could initiate a request.

[8] Indiana Local Technical Assistance Program (2014). *Best Practices in Trail Maintenance*. Retrieved from: https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1007&context=inltappubs

Strategy 10: Assess current maintenance policies and practices for on-street bicycle facilities

Action 10.1: Work with Office of Maintenance and Office of Transportation System Management to understand and assess current policies and practices for year-round routine maintenance on on-street bicycle facilities, including bicycle lanes and shoulder facilities

Lead: MnDOT District 7
Support: MnDOT Office of Transit and Active Transportation, MnDOT Office of Transportation System Management

This action would establish a common understanding of current maintenance policies and practices for on-street bicycle facilities. As MnDOT continues to install more on-street bicycle facilities it is important to understand what maintenance activities are described in the Cost Participation Policy and to assess whether or not the currently designated responsible agency makes the most sense. MnDOT should also explore how to best implement on-street bicycle maintenance while reviewing existing policy and practice.

Strategy 11: Engage the public in maintaining the bikeway network

Action 11.1: Continue to explore the use of a public-facing platform for reporting bikeway maintenance issues

Lead: MnDOT Office of Transit and Active Transportation

Direct communication with the public allows government agencies to control their messaging and promote maintenance efforts. MnDOT already provides reliable, timely, and regular updates via social media on many issues, from roadway maintenance to special events. It also operates a sophisticated 511 traveler information system, with an interactive website, mobile application, and conventional phoneline. With some modification, the public could use any of these platforms to report bikeway maintenance issues, such as poor pavement conditions, overgrown vegetation, snow or ice accumulation, or bikeway signs in poor condition.

Alternatively, a standalone web-based maintenance reporting system could be developed. For example, the California Department of Transportation (Caltrans) has a webpage[9] where users can submit service requests for maintenance issues. Bicyclists in Mankato can use the SeeClickFix[10] platform to report maintenance and other issues. Providing a similar statewide platform for public feedback would generate awareness of MnDOT's current maintenance activities.

Action 11.2: Raise awareness of MnDOT's sponsorship agreement program and other initiatives to assist with volunteer maintenance activities

Lead: MnDOT Highway Sponsorship Program

In 2017, Minnesota Statutes § 160.801 authorized the establishment of a statewide highway sponsorship program to encourage businesses, civic groups, or individuals to support the enhancement and maintenance of state highways. This program could be extended to bicycle facilities to build local

[9] https://csr.dot.ca.gov/
[10] https://en.seeclickfix.com/minneapolis

support for and investment in the bikeway network. In some areas nonprofits and other groups already maintain off-road facilities with trash removal, beautification, and similar initiatives. Launching a statewide initiative with these groups could harness untapped partnerships for local bikeway maintenance. MnDOT already has a strong working relationship with the Bicycle Alliance of Minnesota. This advocacy group could identify local bicycling organizations who could participate in volunteer maintenance activities.

Strategy 12: Explore the development of a Bicycle Facility Maintenance Guide to accompany the Bicycle Facility Design Guide

Action 12.1: Explore the development of a Bicycle Facility Maintenance Guide

Lead: MnDOT Office of Transit and Active Transportation

As MnDOT continues to make investments in improved places for people to bicycle it is important to clearly articulate maintenance expectations on facilities that are installed. MnDOT's Office of Transit and Active Transportation could develop a maintenance guide as an appendix to MnDOT's Bicycle Facility Design Guide to clearly define expectations for maintenance of different types of bicycle infrastructure. This includes winter maintenance activities like snow and ice removal, along with other activities like vegetation management and repainting.

Long Term (5+ years) Planning and Programming Strategies and Actions

Strategy 13: Develop a better understanding of local bicycle planning efforts

Action 13.1: Collect and disseminate information about existing and planned bikeways and other local bicycle planning efforts

Lead: MnDOT District 7
Support: MnDOT Office of Transit and Active Transportation

This could include documenting all local plans related to bicycling, active transportation, or Safe Routes to School within each district, or creating an online mapping database of all planned and existing bicycle routes in the district.

Strategy 14: Update the Plan on a regular basis

Action 14.1: Work with local partners to update the Plan every five years.

Lead: MnDOT Office of Transit and Active Transportation
Support: MnDOT District 7

The District Bicycle Plans are intended to be updated every five years, alternating with the SBSP update. Plans should reflect any updates that have been achieved since the development of this plan, as well as reexamining the route prioritization framework, updating the Bicycle Investment Routes, and revising the strategies and actions to better achieve the goals of the SBSP and unique district needs.

Long Term (5+ years) Bikeway Maintenance Strategies

Due to limited resources, the best practices outlined in this section should be considered as long-term bikeway maintenance strategies. They are widely recognized as cost-effective programs that improve maintenance practices overall. These strategies are aspirational, long-term goals that MnDOT may consider when sufficient resources are available to pursue them.

Strategy 15: Continue to clear all signed or marked shoulder bicycle facilities after snowfall on all state-owned facilities that do not have a maintenance agreement with a local governmental unit in place

Lead: MnDOT District 7

In rural areas, on-shoulder bicycle routes comprise most of the bikeway network. It is important to keep these facilities clear and functional in the winter. Often, shoulder maintenance is the responsibility of the jurisdiction that owns the road. Removing snow from shoulders is a recommended maintenance task in MnDOT's Bikeway Facility Design Manual.[11]

Strategy 16: Explore approaches to routinely inspect pavement markings for bicycle infrastructure and replace as needed

Lead: MnDOT District 7

Bicycle facilities that are subject to significant wear and tear from motor vehicles require a strong and durable material; materials such as thermoplastic should be used. Thermoplastic has a raised profile and is easily damaged by snowplows. Some agencies recess thermoplastic to decrease the likelihood of snowplow damage, but this is expensive. Generally, thermoplastic is used for on-street facilities due to its longevity, while less durable, paint-based materials (latex or epoxy) are used for off-street bikeways. On-street bikeways are subject to more wear and tear than shared use paths. Agencies should frequently inspect pavement markings and replace degraded markings as needed. Shared use paths and other off-street facilities can be inspected less frequently. This strategy connects with a review of maintenance activities proposed in Strategy 10.

[11] Minnesota Department of Transportation (2007), *MnDOT Bikeway Facility Design Manual*. Retrieved from: https://www.dot.state.mn.us/bike/pdfs/manual/manual.pdf

Planning-Level Cost Estimates

The cost of implementing bicycle facilities varies widely depending on unique, project-specific circumstances, details of the facility design, and economic factors at the time of project construction. To aid in planning and programming future bicycle implementation projects, basic planning-level cost estimates are provided.

The cost estimates are based on MnDOT 2017 statewide average bid prices. Actual bid prices may vary and estimates for construction in future years should be adjusted to account for anticipated construction cost inflation. The cost estimates do not include an allowance for engineering, utility, or right-of-way costs, but the higher estimate includes a 40% contingency that may account for some of those costs.

The cost estimates account for adding the bicycle facility on **both** sides of the roadway (to allow for directional travel), except for shared use paths. Shared use paths would allow for two-way travel and are estimated on only one side of the roadway. Note that whether a shared use path is constructed on one or two sides is a context–sensitive design decision.

Planning-Level Cost Estimate Assumptions

Paved Shoulder

$250,000 to $510,000 per mile

- Includes costs to add a paved shoulder to both sides of an existing roadway, regardless of existing shoulder widths.
- The lower range cost ($250,000/mile) includes adding 6’ of pavement to both sides of an existing roadway shoulder with no contingency for additional unexpected costs.
- The higher range cost ($510,000/mile) includes adding 10’ of pavement to both sides of an existing roadway shoulder with a 40% contingency for additional unexpected costs.
- Includes embankment, aggregate base and asphalt pavement.
- Includes an allowance for landscaping/turf establishment, pavement markings, and drainage work.
- Estimate does not account for unusual site-specific grading challenges, such as adding guardrail or retaining walls.

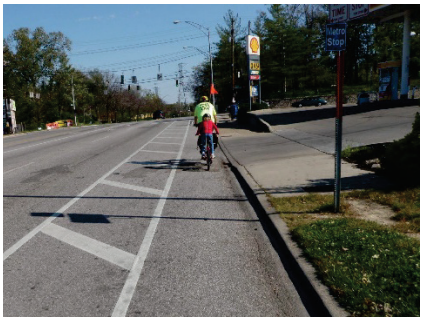
Bicycle Lane

$14,000 to $20,000 per mile

- Includes costs to add painted bike lane pavement marking symbols (one symbol every 250 feet) and bicycle lane and wayfinding signs (one sign every 1,000 feet and two wayfinding signs every 2,640 feet) to an existing roadway.
- Estimate includes costs to add bike lane only and does not include removal or replacement of existing markings.
- Estimate assumes that existing roadway width can accommodate bicycle lanes.

Buffered Bicycle Lane

$17,000 to $25,000 per mile



- Includes costs to add painted bike lane pavement marking symbols (one symbol every 250 feet) and bicycle lane and wayfinding signs (one sign every 1,000 feet and two wayfinding signs every 2,640 feet) with a 4’ striped buffer every 40’ to an existing roadway.
- Estimate includes costs to add buffered bike lane only and does not include removal/replacement of existing markings.
- Estimate assumes that existing roadway width can accommodate buffered bicycle lanes.

Delineator-Separated Bicycle Lane

$25,000 to $36,000 per mile

- Includes costs to add painted bike lane pavement marking symbols (one symbol every 250 feet) and bicycle lane and wayfinding signs (one sign every 1,000 feet and two wayfinding signs every 2,640 feet) with a 4’ striped buffer and tube delineators every 40’ to an existing roadway.
- Estimate includes costs to add delineator-separated bike lane only and does not include removal/replacement of existing markings.

Curb-Separated Bicycle Lane

$1,900,000-$2,700,000 per mile

- Includes costs to relocate existing 5-foot sidewalks with adjacent sidewalk-level, one-way, 7’ wide concrete bicycle paths (5’ bicycle lane plus 2’ shy distance).
- Includes an allowance for landscaping/turf establishment, signing and pavement markings, and drainage work. This work may be done at a lower cost when performed in conjunction with a planned roadway reconstruction.
- Cost estimate assumes bicycle lanes do not require right of way acquisition and facility can be constructed within MnDOT right of way by narrowing lane widths, removing motor vehicle travel lanes, removing parking or reconfiguring parking lanes.

Shared Use Path (Trail)

$250,000-$360,000 per mile

- Includes costs to construct a single, 10' shared use asphalt path along one side of a roadway.
- Includes an allowance for landscaping/turf establishment, signing/markings, and drainage work.
- This estimate does not include potential right-of-way acquisition, retaining walls, bridges, or other non-typical cost elements.

Hypothetical Cost Estimate for District 7

This section provides hypothetical, preliminary cost estimates for the implementation of the Bicycle Investment Route network in District 7. The cost estimates are intended to provide a sense of the long-term investment needed to build-out the bicycle network. The combined amount of funding needed to build-out the bicycle network are immense; however, implementation costs will be spread out over many years.

Estimates include only miles in each district that are identified as Bicycle Investment Routes. Additional bicycle investments within local communities will be evaluated on a project by project basis and may not be included in the provided cost estimates. This section includes cost estimate tables for the Bicycle Investment Route categories:

1. State Highway Bicycle Investment Routes – 221 miles (Table 2)
2. County/Local Road Bicycle Investment Routes – 564 miles (Table 3)
3. Bicycle Investment Route on Existing Trail – 132 miles (Table 4)
4. Bicycle Investment Route on Future Shared Use Path – 176 miles (Table 4)

The Bicycle Investment Routes shown in Chapter 3 do not identify specific facility types for each route. Therefore, estimating costs for implementing the District 7 Bicycle Investment Route network is not possible without making assumptions about the breakdown of bicycle facility types of the Bicycle Investment Routes. Each of the tables display the assumed future network percentages for each facility type.

The cost estimate tables can be used to estimate future costs for the hypothetical future bikeway network constructed on a stand-alone basis; they do not include costs for ongoing maintenance and operations. It is likely that projects would be combined with the roadway program to achieve cost efficiencies.

The cost estimate information is intended to provide more clarity to the magnitude of investment needed for a future bikeway network. These estimates are subject to further refinement through engagement with MnDOT and local partners. MnDOT and partners can use the cost estimates developed in the District Bicycle Plans to educate partners and funding bodies about the amount of bicycle infrastructure investment need that exists. Further refinement of the estimates can occur between the publishing of this plan and the development of MnSHIP to better reflect the urban/rural mix of investments that may occur.

For context, MnSHIP estimated a statewide need of $580 million for bicycle infrastructure over a 20-year period through 2037. The need for bicycle investments for an individual district in MnSHIP would be a fraction of this total amount, likely less than $100 million. Additionally, to arrive at the network envisioned by this plan, investments will be needed on local and county street networks. For this reason, this district-focused hypothetical cost estimate exceeds the estimated funding needs developed for MnSHIP. There are several reasons why this district-focused hypothetical cost estimate exceeds the estimated needs developed for MnSHIP:

- MnSHIP estimated needs on the State Highway system only, whereas a completed future bicycle network in District 7 will require investment on City and County systems, in addition to the State Highway investments addressed within MnSHIP.
- MnSHIP's estimated need of $580 million for bicycle infrastructure is focused on add-ons to existing pavement and bridge projects. Some future bicycle infrastructure investment may come not as standalone projects, but in conjunction with other needed roadway improvements.
- MnSHIP's estimated needs are focused on a 20-year period, through the year 2037. Without additional funding sources, it will likely take longer than 20 years to fully construct this hypothetical future bikeway network.

Table 2: Cost estimate ranges for state highway Bicycle Investment Routes.

STATE HIGHWAY BICYCLE INVESTMENT ROUTES				
TYPE	Unit Cost per Mile (low range)[a, c]	Unit Cost per Mile (high range)[a, c]	Assumed future network percentage[b]	Future network mileage
PAVED SHOULDER	$250,000	$510,000	25.0%	55
BIKE LANE	$14,000	$20,000	7.0%	15
BUFFERED BIKE LANE	$17,000	$25,000	5.0%	11
DELINEATOR-SEPARATED BIKE LANE	$24,000	$34,000	1.5%	3
CURB-SEPARATED BIKE LANE	$1,770,000	$2,490,000	1.5%	3
FUTURE SHARED USE PATH (TRAIL)	$250,000	$360,000	20.0%	44
EXISTING BICYCLE FACILITIES[D]	N/A	N/A	40.0%	88

Cost Estimate Notes

There are many unknown factors in this hypothetical cost exercise, some of which are noted below:

a) Unit cost estimates for individual facility types and projects may vary, these planning-level cost opinions do not take into consideration localized specifics of each project such as right-of-way acquisition, utility relocation, topography, etc. These unit costs also make assumptions about the amount of work necessary to construct some of these facilities – most projects should typically fall within the ranges provided, but some basic or complex projects may cost more or less than the unit costs shown. Unit costs are calculated using 2017 statewide average bid prices, future costs may be subject to inflation depending on market conditions.

b) At this time, the proportion of future bikeway types, or the amount of existing facilities that can be used without modification, are unknown. In order to develop a theoretical level of investment for bikeway construction, it is necessary to make assumptions about the composition of a future bikeway network. These assumptions should be updated in the future as additional planning information is available.

c) These costs are provided for a hypothetical scenario, with assumptions as noted. These costs may not be suitable for aggregate-level budget planning without additional work to better refine the composition and total mileage of future bikeway networks.

d) Existing bicycle facilities include a variety of types such as paved shoulders, bike lanes, and shared use paths.

Table 3: Cost estimate ranges for county/local road Bicycle Investment Routes.

COUNTY/LOCAL ROAD BICYCLE INVESTMENT ROUTES				
TYPE	Unit Cost per Mile (low range)[a, c]	Unit Cost per Mile (high range)[a, c]	Assumed future network percentage[b]	Future network mileage
PAVED SHOULDER	$250,000	$510,000	25.0%	141
BIKE LANE	$14,000	$20,000	7.0%	39
BUFFERED BIKE LANE	$17,000	$25,000	5.0%	28
DELINEATOR-SEPARATED BIKE LANE	$24,000	$34,000	1.5%	8
CURB-SEPARATED BIKE LANE	$1,770,000	$2,490,000	1.5%	8
FUTURE SHARED USE PATH (TRAIL)	$250,000	$360,000	20.0%	113
EXISTING BICYCLE FACILITIES[d]			40.0%	226

Cost Estimate Notes

There are many unknown factors in this hypothetical cost exercise, some of which are noted below:

a) Unit cost estimates for individual facility types and projects may vary, these planning-level cost opinions do not take into consideration localized specifics of each project such as right-of-way acquisition, utility relocation, topography, etc. These unit costs also make assumptions about the amount of work necessary to construct some of these facilities – most projects should typically fall within the ranges provided, but some basic or complex projects may cost more or less than the unit costs shown. Unit costs are calculated using 2017 statewide average bid prices, future costs may be subject to inflation depending on market conditions.

b) At this time, the proportion of future bikeway types, or the amount of existing facilities that can be used without modification, are unknown. In order to develop a theoretical level of investment for bikeway construction, it is necessary to make assumptions about the composition of a future bikeway network. These assumptions should be updated in the future as additional planning information is available.

c) These costs are provided for a hypothetical scenario, with assumptions as noted. These costs may not be suitable for aggregate-level budget planning without additional work to better refine the composition and total mileage of future bikeway networks.

d) Existing bicycle facilities include a variety of types such as paved shoulders, bike lanes, and shared use paths.

Table 4: Cost estimate ranges for Bicycle Investment Routes on future and existing trails.

BICYCLE INVESTMENT ROUTE ON FUTURE AND EXISTING TRAILS

TYPE	Unit Cost per Mile (low range)[a, b]	Unit Cost per Mile (high range)[a, b]	Future network mileage
FUTURE SHARED USE PATH (TRAIL)	$250,000	$360,000	176
EXISTING SHARED USE PATH (TRAIL)	$0	$0	132

Cost Estimate Notes

There are many unknown factors in this hypothetical cost exercise, some of which are noted below:

a) Unit cost estimates for individual facility types and projects may vary, these planning-level cost opinions do not take into consideration localized specifics of each project such as right-of-way acquisition, utility relocation, topography, etc. These unit costs also make assumptions about the amount of work necessary to construct some of these facilities – most projects should typically fall within the ranges provided, but some basic or complex projects may cost more or less than the unit costs shown. Unit costs are calculated using 2017 statewide average bid prices, future costs may be subject to inflation depending on market conditions.

b) These costs are provided for a hypothetical scenario, with assumptions as noted. These costs may not be suitable for aggregate-level budget planning without additional work to better refine the composition and total mileage of future bikeway networks.

Bikeway Funding Sources

Designing, building, and maintaining roadways that accommodate bicycling supports MnDOT's Complete Streets Policy. In addition, one of the goals in Minnesota Statutes §174.01 is to "promote and increase bicycling and walking as a percentage of all trips as energy-efficient, nonpolluting, and healthy forms of transportation".

A forthcoming update to the MnDOT Bicycle Facility Design Guide will include a list of funding sources for various levels of government. The guide includes the funding type (planning, design) as well as information on the eligible uses for each funding source. The US DOT also publishes an exhaustive list of bicycle-related improvements that are eligible for various sources of federal funding.[12] Table 5 lists federal funding sources for bicycle and pedestrian infrastructure projects based on project type and eligibility. MnDOT should continue to make investments that benefit people bicycling through pavement, bridge, and safety projects. MnDOT should continue to make investments that benefit people bicycling through the MnSHIP categories of Pavement Condition, Bridge Condition, Jurisdictional Transfer, Traveler Safety, and Regional and Community Improvement Priorities.

[12] https://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/funding_opportunities.cfm

Table 5: Pedestrian and bicycle funding opportunities.

Facility Type	BUILD	TIFIA	FTA	ATI	HSIP	NHPP	STBG	TA	RTP	SRTS
Bicycle and pedestrian overpasses	A	A	A	A	A	A	A	A	A	A
Bicycle parking	C	C	A	A	D	A	A	A	A	A
Bicycle and pedestrian scale lighting	A	A	A	A	A	A	A	A	A	A
Curb ramps	A	A	A	A	A	A	A	A	A	A
Bike lanes	A	A	A	A	A	A	A	A	D	A
Paved shoulders	A	A	D	D	A	A	A	A	D	A
Separated bike lanes	A	A	A	A	A	A	A	A	D	A
Shared use paths	A	A	A	A	A	A	A	A	A	A
Signed routes	A	A	A	A	A	D	A	A	A	D
Signs and signals	A	A	A	A	A	A	A	A	A	D
Streetscaping	C	C	C	A	D	D	A	A	A	D
Traffic calming	A	A	A	A	D	A	A	A	A	D
Shared use path bridges	A	A	A	D	B	A	A	A	A	A
Shared use path crossings	A	A	A	D	B	A	A	A	A	A
Shared use path facilities (e.g. restrooms)	C	C	C	D	D	D	D	B	B	B
Tunnels/ underpasses	A	A	A	A	B	A	A	A	A	A

Source: Adapted from the U.S. Department of Transportation (2018), https://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/funding_opportunities.cfm

Table Key

A	Funds may be used for this activity
B	See program-specific notes for restrictions (https://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/funding_opportunities.cfm)
C	Eligible, but not competitive unless part of a larger project
D	Not eligible

Program Abbreviations

BUILD: Better Utilizing Investments to Leverage Development

TIFIA: Transportation Infrastructure Finance and Innovation Act (loans)

FTA: Federal Transit Administration Capital Funds

ATI: Associated Transit Improvement (1% set-aside of FTA)

HSIP: Highway Safety Improvement Program

NHPP: National Highway Performance Program

STBG: Surface Transportation Block Grant Program

TA: Transportation Alternatives Set-Aside (formerly Transportation Alternatives Program)

RTP: Recreational Trails Program

SRTS: Safe Routes to School Program/Activities

Appendix A: Route Prioritization Framework

Category	Subcategory	Objectives	Scoring Criteria
Local Connections	USDA Urbanized Areas	Segment serves an urban area as defined by the United States Department of Agriculture (USDA). USDA's urban areas include the Twin Cities Metro Area, as well as Greater Minnesota metropolitan areas and rural downtowns, for all municipalities with more than 100 residents.	Does the segment travel through one or more urban areas, as identified by the USDA?
Population & Equity	Serves children and youth	Segment serves area with children and youth	Does the segment travel through an area with a population between 5-17 years of age equal to or greater than 17.1% (statewide average)?
	Serves Native American populations and/or Tribal Reservations	Segment serves Tribal lands or Native American communities	Does the segment travel through a Native American Tribal Reservation or have at least 1% of the population (statewide average) that identifies as Native American?
	Serves older adults	Segment serves population over the age of 65	Is the percentage of the population aged 65+ greater than or equal to 14.3% (statewide average)?
	Serves people with disabilities	Segment travels through an area with a significant portion of the population reporting a disability	Is the percentage of the population in the area that report having a disability 10.6% or greater (statewide average)?
	Serves immigrant populations	Segment travels through an area with a significant portion of the population born in a foreign country	Is the percentage of the population that is foreign born, non-citizen greater than or equal to 4% (statewide average)?
	Route serves low income populations	Segment serves areas with low income populations	Does the segment travel through an area where more than 40% of the population makes less than 185% of the federal poverty line?
	Route serves populations without motor vehicle access	Segment serves areas where the population without motor vehicle access is greater than the statewide average	Does the segment serve areas where the population without motor vehicle access is greater than the statewide average?
Activity Generators	Connects to Minnesota Walks priority destinations	Presence of Minnesota Walks priority destinations (grocery, bus/transit, housing, parks, and/or schools) within ½ mile of the segment corridor	Is the segment located within ½ mile of one or more Minnesota Walks priority destinations (grocery, bus/transit, housing, parks, and/or schools)?
	Serves areas with significant growth in business registrations	Segment serves an area with significant growth in business registrations between 2011-2015	Does the segment serve an area with growth in business registrations between 2011-2015 that is higher than the statewide average?
	Connects to public transportation/multi-modal transportation hubs	Segment will increase access to public transportation and/or multi-modal transportation hubs including rail stations, intercity bus stops, and airports with passenger service	Is the segment located within 500 feet of a bus stop or public transit station?
Network	Connects to existing or planned trail (DNR state trail, local trail)	Segment expands access to a DNR state trail or U. S. Bicycle Route	Is the segment connected to or located within ½ mile of a DNR state trail or U.S. Bicycle Route?
Safety	Segment is in a MnDOT District Safety Plan or is in an identified high crash area	Segment includes an identified improvement in MnDOT's District Safety Plan	Does the segment include high-risk bike/ped intersections per analysis from MnDOT's Office of Traffic Engineering?

Appendix B: District 7 Bicycle Project Design Meeting Summary

Design Meeting Overview

As part of the planning process, the project team developed starter idea design concepts for selected projects. In District 7, District staff chose to have a general discussion around bicycle design at roundabouts and Reduced Conflict Intersections (RCIs).

MnDOT District 7 staff hosted a meeting with select stakeholders to review and discuss possible bicycle treatments at each intersection type. Project team members discussed the opportunities and design challenges for each option, but the meeting was not intended to identify a preferred alternative. The District 7 meeting took place at MnDOT Mankato Northwoods Conference Room on November 16th, 2018 and was attended by twelve people from MnDOT District 7 and partner agencies.

Design Challenges Along the Corridor

At the beginning of the meeting, attendees discussed general design challenges at roundabouts and RCIs. Some general themes that emerged during that conversation included:

Roundabout Motorist Yielding Behavior

The roundabouts in the City of Mankato on TH 22 were discussed as roundabout examples. These are two-lane roundabouts, with right turn bypass lanes at most entries. People have observed motorists not yielding to people walking or bicycling on both the entry and exits of the roundabouts.

Roundabout Speeds

The group discussed how motorist speeds seem to be increasing as drivers get used to the roundabouts and their design. There was a lot of concern about people taking risks with perceived gaps in motor vehicle traffic and accelerating through the crosswalks in order to enter the roundabout in a perceived gap.

Semi-Trucks at Roundabouts

There is a lot of semi-truck traffic using the roundabouts on TH 22 in Mankato. Semi-truck traffic is important to the City and businesses within the City. The group discussed the need to accommodate these larger vehicles through the roundabouts, and concerns for load shift as the truck circulates the roundabout. The group noted that semi-trucks operate at slow speeds through the roundabouts.

RCI Motorist Speed and Expectations

The group discussed motor vehicle speeds and expectations at RCIs. RCIs are typically placed in high speed locations on divided highways, where signals are rare. RCIs are a proven safety countermeasure for severe motor vehicle crashes along high-speed corridors, but present challenges for people walking

or bicycling across the highway. Motorists may not be likely to expect a person walking or bicycling across the highway and would need enough time to react, slow down, and stop for a pedestrian. This creates concerns for the possibility of a high speed, rear end crash as well.

Where and How to Accommodate Bicycle Crossings at RCIs

The group discussed various options for where and how to accommodate crossings for people walking and bicycling at RCIs. In some instances, an underpass or overpass may be a better option given surrounding land use and users crossing the road. In other instances, an at-grade crossing may be considered. The group reviewed options for where to cross people walking or bicycling, including through the median of the RCI or across specific turn lanes. The group understood that while it may not be desirable to cross a high-speed location, people walking and bicycling are unlikely to go very far out of their way to make the crossing.

Starter Idea Design Concepts

Due to the nature of the discussion, the project team did not develop starter ideas for designing roundabouts and RCIs. The project team used existing locations to spur discussions around possible treatments for people bicycling through roundabouts and RCIs. Following the meeting, the project team developed graphics for some design options based on the discussion from the District 7 meeting.

The concepts are not proposed designs; they were developed to be used as conversation starters for District staff and other local stakeholders. Concepts can be found in **Appendix C**.

Roundabout Yield Behavior and Speeds

Motorist speed and yield behavior at roundabouts are interrelated. By slowing motorists down at crosswalks, drivers are more likely to see a person walking or bicycling and yield to them. Some options for encouraging slower speeds and better yielding behavior include:

- Raised crosswalks
- Pull crosswalks away from the roundabout approximately 1 to 2 passenger vehicle lengths, including outside of the bypass lanes. This allows for people to exit the circle, then yield without being worried about rear end crashes. By pulling the crosswalk away from the bypass lane, this allows a driver to look for motor vehicle conflicts to the left, make their turn, and then address a person walking or bicycling
- Review entry and exit radii. It is important to accommodate semi-trucks and their load shift, while also balancing radii to reduce speeds through the roundabout. Consider using tighter entry and exit radii where feasible.

Bikeway Access at Roundabout

Depending on the roundabout location, different access for people bicycling are appropriate. It is recommended to provide an opportunity for people bicycling to leave the roadway and not have to navigate the roundabout as a motorist. Some options include:

- Having shared use paths on all approaches to the roundabout
- Provide ramps from an on-street bikeway to access a shared use path or separated bike lane that circulates around the roundabout

- In some instances (schools, parks, etc.), it may be beneficial to grade separate people walking and bicycling at a roundabout using underpasses or bridges

RCI Crossing Options

There are a range of crossing options at RCIs, and motor vehicle speeds are a concern. In high speed scenarios, MnDOT typically recommends grade separation for people walking and bicycling. The cost of grade separation may be restrictive in many RCI scenarios. Treatments that allow people to bike or walk across highways at these locations should be carefully considered since drivers on high speed facilities are not expecting them and may have to suddenly stop for them. This can result in pedestrian/bicyclist-vehicle crashes as well as rear-end crashes that result from sudden stops.

There are different options for where an at-grade crossing can occur. One option is to cross people walking and biking to the center of the right turn pork chop island, through the center median island, to the opposing pork chop island, and back over. This option removes conflicts between the person crossing the highway and left turning motorists, but also requires more crossings to access the pork chop islands.

Another option is to cross the person walking or bicycling on one side of the RCI. This creates a seamless crossing for people traveling on one side of the road but may require those traveling in the opposite direction to cross multiple times. This scenario also places the person crossing in the left turn lanes where they may not be expected by motorists, and the motorists may be traveling at higher speeds. In addition, people crossing must conflict with right turning motorists on the cross street who will be looking to the left for other motor vehicles, while also accelerating quickly to enter the highway where they may encounter a person crossing.

Other options include signing and striping of the crossing to draw attention to the area. Overhead and advance rectangular rapid flashing beacons (RRFB) can be push-button activated when there is a person crossing to warn the motorist to slow down and yield. The timing could be adjusted so that advance warning is also given to motorists who may be behind the yielding vehicle to reduce the risk for a rear end crash (similar to the signal warning lights that MnDOT uses on Highway 169 or 22 in the Mankato area). Table B-1 shows the relative costs of various treatments for consideration at RCI crossings.

Table B-1: Relative crossing treatment costs (vary depending on site conditions).

Treatment	Approximate Cost
Underpass	~$250,000-750,000
Overpass	~$750,000-1,500,000
Pedestrian Hybrid Beacon	~$200,000
Marked Crossing	~$1,000
Standard RRFB	~$10,000
Overhead RRFB with median refuge	~$150,000

Appendix C: Design Concepts

The following pages contain the design concepts that were requested by District 7 staff. The designs look at different ways to accommodate people bicycling at roundabouts and reduced conflict intersections.

Roundabout of MN-22 and Madison Avenue

Roundabout of MN-22 and Madison Avenue
Date Plotted: 12/2018
Drawn By: MGC Checked By: KCA
Draft Not for Construction - Subject to Change

TOOLE DESIGN
212 THIRD AVE NORTH, SUITE 476
MINNEAPOLIS, MN 55401
PHONE: 612.584.4094
FAX: 301.927.2800
www.tooledesign.com

0 50 100
HORIZONTAL SCALE IN FEET
SCALE 50

Legend:

MnDOT Existing Facilities
- Existing Roadway

Potential Pedestrian/Bicycle Modifications
- Proposed Raised Crosswalk
- Proposed Concrete Ramp or Sidewalk
- Truncated Domes
- White Pavement Markings
- White Pavement Message

Notes:
1. Crosswalks should begin either 20', 45', or 75' away from ICD. Distance may be controlled by median width (6' minimum for pedestrian refuge).

Roundabout of MN-22 and Adams Street

Roundabout of MN-22 and Adams Street
Date Plotted: 12/2018
Drawn By: MGC Checked By: KCA
Draft Not for Construction - Subject to Change

TOOLE DESIGN
212 THIRD AVE NORTH, SUITE 476
MINNEAPOLIS, MN 55401
PHONE: 612.584.4094
FAX: 301.927.2800
www.tooledesign.com

0 50 100
HORIZONTAL SCALE IN FEET
SCALE 50

Legend:

MnDOT Existing Facilities
- Existing Roadway

Potential Pedestrian/Bicycle Modifications
- Proposed Shared Use Path
- Proposed Concrete Ramp or Sidewalk
- Truncated Domes
- Landscape

Notes:
1. Shared use path connections for bikes exiting the street should be located at a minimum of 100 feet from the ICD.
2. It is desired that the shared use path connections for bikes re-entering the street be located 50 feet from the crosswalk.
3. Prefered alignment is shown for the north bound leg of the roundabout only.

Heron Lake - MN-60 & 10th Street NW
Concept Layout 1 - Center Crossing Option

Date Plotted: 12/2018
Drawn By: RI Checked By: KCA
Draft Not for Construction - Subject to Change

TOOLE DESIGN
212 THIRD AVE NORTH, SUITE 476
MINNEAPOLIS, MN 55401
PHONE: 612.584.4094
FAX: 301.927.2800
www.tooledesign.com

0 100 200
HORIZONTAL SCALE IN FEET
SCALE 100

Legend:

Potential Pedestrian/Bicycle Modifications
- Proposed Concrete Ramp or Sidewalk
- Proposed Landscaping
- Truncated Domes

MnDOT Proposed Design
- MnDOT Proposed Roadway Design

Heron Lake - MN-60 & 10th Street NW
Concept Layout 2 - Left Crossing Option

Date Plotted: 12/2018
Drawn By: RI Checked By: KCA
Draft Not for Construction - Subject to Change

TOOLE DESIGN
212 THIRD AVE NORTH, SUITE 476
MINNEAPOLIS, MN 55401
PHONE: 612.584.4094
FAX: 301.927.2800
www.tooledesign.com

0 100 200
HORIZONTAL SCALE IN FEET
SCALE 100

Legend:

Potential Pedestrian/Bicycle Modifications
- Proposed Concrete Ramp or Sidewalk
- Proposed Landscaping
- Truncated Domes

MnDOT Proposed Design
- MnDOT Proposed Roadway Design

10TH STREET NORTHWEST
MN-60
10' CROSSWALK
8' SIDEWALK
REFER TO MN MUTCD TABLE 2C-4: GUIDELINES FOR ADVANCED PLACEMENT OF WARNING SIGNS FOR DISTANCE NEEDED FOR PLACEMENT
AHEAD
PROPOSED MNDOT DESIGN

Heron Lake - MN-60 & 10th Street NW
Concept Layout 3-Center Crossing Option With RRFB's

Date Plotted: 12/2018
Drawn By: RI Checked By: KCA
Draft Not for Construction - Subject to Change

TOOLE DESIGN
212 THIRD AVE NORTH, SUITE 476
MINNEAPOLIS, MN 55401
PHONE: 612.584.4094
FAX: 301.927.2800
www.tooledesign.com

0 100 200
HORIZONTAL SCALE IN FEET
SCALE 100

Legend:

Potential Pedestrian/Bicycle Modifications
- Proposed Concrete Ramp or Sidewalk
- Proposed Landscaping
- Truncated Domes

MnDOT Proposed Design
- MnDOT Proposed Roadway Design

REFER TO MN MUTCD TABLE 2C-4: GUIDELINES FOR ADVANCE PLACEMENT OF WARNING SIGNS FOR DISTANCE NEEDED FOR PLACEMENT

REFER TO MN MUTCD TABLE 2C-4: GUIDELINES FOR ADVANCED PLACEMENT OF WARNING SIGNS FOR DISTANCE NEEDED FOR PLACEMENT

10TH STREET NORTHWEST

MN-60

MN-60

AHEAD

AHEAD

AHEAD

AHEAD

WIDENED BY 8'

6' SIDEWALK

10' CROSSWALK

10' CROSSWALK

PROPOSED MNDOT DESIGN

RAPID FLASH BEACON (TYP.)

8' SIDEWALK

10TH STREET NORTHWEST

Design Concept Questions and Answers

After the design concepts were developed, District 7 staff asked the consultant a number of questions about the design concepts. The questions from District 7 staff and the consultant responses are listed below.

Roundabout Design Concept Questions

RAB Concept 1 (Madison Ave):

Have other northern states implemented raised crossings on high-volume RAB's with high speed approaches? If so, what considerations were used?

Raised crossings are an emerging practice in general, so it's difficult to find good cold-climate examples at RAB approaches to draw conclusions from.

- While it's unknown where/if it's been implemented, NYDOT has guidance (https://www.dot.ny.gov/programs/completestreets/repository/ei_13-018_raised%20crosswalks.pdf) and details (https://www.dot.ny.gov/main/business-center/engineering/cadd-info/drawings/standard-sheets-us-repository/608-07_050116.pdf) for the use of raised crosswalks, including at single- and multi-lane roundabouts. NYDOT permits raised crossings at multilane roundabouts "regardless of approach speed" and specifies a reduced height (4") to accommodate a lowboy trailer.
- Golden, CO installed a temporary raised crossing in conjunction with a pedestrian hybrid beacon. They used a short (3") height crossing with a flat (1:15 taper). See NCHRP Report 674 for more info - http://www.trb.org/Publications/Blurbs/164715.aspx.

Drainage would have to be resolved to avoid creating a pond on the high side of the speed table.

- Correct. Raised crossings are best suited for new construction where drainage can be accounted for.
- The NYDOT details include an option for installing raised crossings without impacting drainage in retrofit applications, but that detail may not be applicable on roadways without a wide shoulder (such as roundabout entrances).

RAB Concept 2 (Adams St):

Aside from the change in location of the crosswalk, what is the intent/function of the geometry changes for the Northbound leg? Include in notes explanation of curb line geometry modifications.

- The intent of the geometry changes is to reduce the speed of motor vehicles exiting the roundabout. Traffic calming on roundabout exits is of heightened importance given that drivers' attention will be divided as they exit the circulatory roadway. It is also understood that there are many considerations with regard to roundabout geometrics, there may be some instances where this treatment may not be feasible.

TH22 would be a "high-stress" route (>45mph, >20,000 ADT), such that slip ramps would seem ill advised when there is a parallel shared use path available. Comment on suitability for slip ramp treatment.

- Given the traffic volumes and speeds on TH 22, most bicyclists would reasonably be expected to use the shared use paths rather than riding on the roadway, and thus have no use for a bicycle slip ramp. However, there may be a small percentage of bicyclists who intentionally or unintentionally wind up riding on the shoulder and would care to exit to the shared-use path rather than continue

through the roundabout, especially if there are no driveways or other exit opportunities near the roundabout. Engineering judgement should be used to determine if the construction and maintenance costs of bicycle slip ramps are warranted at these types of situations.

Reduced Conflict Intersection Design Concepts

Many likely RCI installations in District 7 will have low pedestrian volumes and high vehicle travel speeds (65+mph) such that TEM guidance would be for an unmarked pedestrian facilitation. Given an unmarked crossing, which of the pedestrian path alignments would best serve pedestrians in choosing an acceptable gap in vehicular traffic or reducing pedestrian exposure?

- A center crossing option will better align pedestrians with oncoming traffic, aiding in gap recognition and selection – generally better serving pedestrians, along with reducing bicycle speeds. However, a center crossing by design will shift pedestrians from one side of the road to the other – designers should consider if this travel path suits existing pedestrian demand, in some cases, a left- or right-crossing option may be more appropriate.

For Concept 2 – Left Crossing Option: would enhanced channelization (bringing the approaching pedestrian path further away from the curb line) increase pedestrian acceptance of the designed crossing location and discourage crossing through the Left Turn Island?

- Yes, as long as the channelization does not result in an increase in pedestrian travel distance or make the route to the crossing unclear.

Does either concept have maintenance benefits during snow/ice operations (i.e. would the center crossing incur more repeat clearing of the pedestrian path as snow plows clear the left turn lanes)?

- If local agencies maintain the crossings, an offset crossing may be easier for maintenance as it is less prone to establishing windrows during turn lane snow clearing operations.
- If local agencies do not maintain the crossings (not preferred), a center crossing may be marginally better, as MnDOT crews may be able to remove some amount of snow from the center crossing during clean-up operations, especially if designers provide plow noses on the center island and keep it relatively clear of signs or other impediments.

Appendix D: Bicycle Scoping Guide

Purpose

The purpose of the bicycle scoping guide is to supplement the scoping and subject guidance for bikeway development in MnDOT's existing Highway Project Development Process. This guide is designed to help District staff determine if bicycle facilities should be included on any given roadway and if crossing improvements are needed, generally during the scoping phase of project development.

Scoping Checklist

Existing Conditions	
Are bicyclists legally prohibited from using the roadway (is there signage prohibiting bicycles)? (If yes, skip to Projected Demand section)	☐ Yes ☐ No
Is there currently a dedicated facility for bicyclists? This may include: shared use path, bicycle lane (separated or not), and/or a wide paved shoulder	☐ Yes ☐ No
Projected Demand	
Is the project located directly on or travel across an existing or planned bikeway? (i.e. Transportation Plan, Bicycle Plan, MnDNR, County Plan)	☐ Yes ☐ No
Is the project within a half mile of a school, and if so, is there a Safe Routes to School Plan that identifies a need for improvements?	☐ Yes ☐ No
Improvement Opportunities Across the Roadway	
How does the project area score on the District Bicycle Plans route prioritization analysis?	☐ Tier 1 ☐ Tier 2 ☐ Tier 3 ☐ Tier 4 ☐ Tier 5
Are there other crossings that may warrant improvement due to a local plan? This may include: Safe Route to School Plan, MnDNR Trail Master Plan, City Comprehensive Plan, or any similar document that suggests there may be a future demand for an improved crossing.	☐ Yes ☐ No

Who would maintain the crossings?	☐ MnDOT ☐ Local partner has agreed to maintain ☐ Local partner would be responsible, but maintenance agreement has not been discussed
Improvement Opportunities Along the Roadway	
Is the project identified in a District Bicycle Plan? If so, what priority level does the plan identify?	☐ High Priority ☐ Medium Priority ☐ Low Priority ☐ Not identified
If the project is not identified as a Bicycle Investment Route in a District Bicycle Plan, how does the project score on the District Bicycle Plans route prioritization analysis? (Estimate the average priority level of the hexagons that the project traverses.)	☐ Tier 1 ☐ Tier 2 ☐ Tier 3 ☐ Tier 4 ☐ Tier 5
Who would maintain the facility?	☐ MnDOT ☐ Local partner has agreed to maintain ☐ Local partner would be responsible, but maintenance agreement has not been discussed
Project Budget Considerations	
Are improvements consistent with MnDOT's Complete Streets policy, MnSHIP and other applicable funding guidance? If yes, summarize below:	☐ Yes ☐ No
Should other funding be pursued for the project? (TAP, others?)	☐ Yes ☐ No
Does a local partner have a cost participation requirement?	☐ No ☐ Yes, and local partner has agreed to participate in costs ☐ Yes, but cost participation has not been discussed

Decision Making Guidance

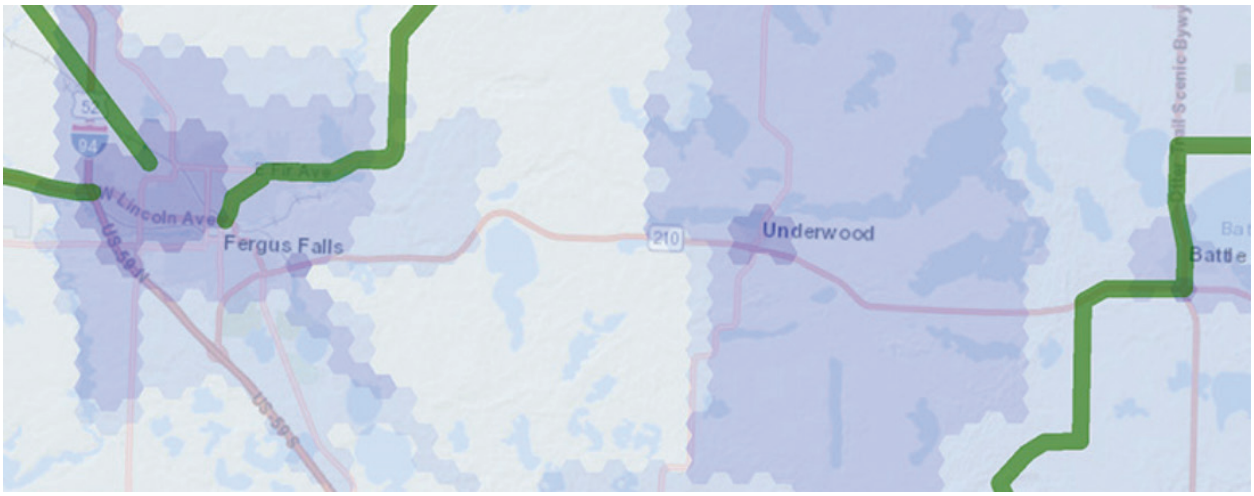
The decision on when to incorporate bicycle accommodations on a project depends on many different factors. The scoping worksheet is intended to help decision makers determine when it is appropriate to incorporate bicycle improvements.

Examples:

Example 1	
Is the project identified in a District Bicycle Plan? If so, what priority level does the plan identify?	☒ High Priority ☐ Medium Priority ☐ Low Priority ☐ Not identified

Projects on high priority bicycle routes should be strongly considered for a bicycle facility. If existing bicycle facilities are adequate, these facilities should generally be improved with the project (barring inability to agree with local partners on maintenance responsibilities). When determining the appropriate facility type or project design, consider future bicycle and pedestrian volumes (which may increase following installation).

Example 2	
How does the project area location score on the District Bicycle Plans route prioritization analysis?	☐ Tier 1 ☐ Tier 2 ☐ Tier 3 ☐ Tier 4 ☐ Tier 5



Consider a hypothetical project on TH 210 between Underwood and Fergus Falls which does not cross any Bicycle Investment Routes (green lines). In this situation, improvements should be considered for key crossings in areas that scored higher in the route prioritization analysis. This is likely limited to areas within Fergus Falls and Underwood with dark blue hexagons. The decision to improve any given crossing for bicycles will be a location-specific decision and should be funded from the project budget.

Appendix E: Statewide Policy and Planning Challenges

During the district planning process, District staff and the TAC identified different policy and planning challenges that are potential barriers to plan implementation. These challenges are not specific to one district and should be addressed by the MnDOT Central Office with collaboration from District planning staff.

- **Cost Participation Policy** – Recent updates to MnDOT's "Cost Participation and Maintenance Responsibilities with Local Units of Government" manual have increased MnDOT's ability to fund bicycle improvements. However, there are still opportunities for further improvements such as:
    - Reduce **ambiguity** under what circumstances bicycle improvements may be funded by MnDOT to align with other elements such as parking that lack qualifiers. From the current cost participation policy: "MnDOT will be responsible for up to 100% of costs of facilities **which MnDOT determines are necessary** to accommodate bicycle and other non-motorized transportation modes".
    - Allow MnDOT participation in bikeway accommodations when reconstructing a roadway bridge, even if those bikeway accommodations are **not** included in a published plan, given that the expected life of future bridges (50 years or greater) exceeds the duration of most planning documents and future development may necessitate bikeway accommodations where they may not be warranted at present.
    - Allow greater MnDOT participation in construction of shared use bridge construction, where MnDOT's Pedestrian Crossing Facilitation Technical Memorandum recommends grade separation, including up to 100% of costs where MnDOT-initiated construction would alter an existing at-grade crossing to meet warrants for a grade-separated crossing (such as adding additional lanes or increasing vehicle speeds).
    - Allow MnDOT participation on locally-initiated bikeway projects outside of state highway right-of-way, where the locally-initiated bikeway project serves a state highway purpose. An example of this could include a situation where a local partner constructs a bikeway on a route parallel to a state highway in lieu of MnDOT providing bicycle accommodation along the state highway.
- **State Aid Policy for Bicycle Design** – Bicycle design best practices are evolving and new treatments such as separated bicycle lanes or advisory bicycle lanes are not well-covered under existing State Aid policy and guidance, or MnDOT's Bicycle Facility Design Manual. To the extent practicable, State Aid policy and guidance should be updated to allow designers maximum flexibility when designing bicycle facilities.
- **MnDOT LRFD Bridge Design Guidance** - Revise section 2.1.2 – Bridge Deck Requirements – "Shared-use paths are provided on bridges where both pedestrian and bicycle traffic are expected. Bridge walkways are provided where only pedestrian traffic is expected.", to require provision of bicycle and pedestrian accommodations on all bridges where bicycles and pedestrians are not legally prohibited, rather than only where they are expected. The type of bicycle and pedestrian accommodation should vary based on the context of the roadway, anticipated volumes, and speeds; and may include shoulders only in rural contexts. Include similar revisions to the Bridge Geometrics guidance in Section 9-2.03.01.01 in the Road Design Manual.

Appendix F: Supplementary Prioritization Criteria

Prioritization criteria that are subjective or that do not have statewide or national data are far more challenging to score on a district-wide basis. For that reason, these criteria are not included in the data-based Bicycle Investment Route prioritization scoring methodology described in Chapter 4. These criteria were scored separately from the data-driven process and should only be used to supplement the scoring results from the data-based prioritization. The supplementary scoring criteria and scoring thresholds are shown in Table F-1.

Table F-1: Supplementary prioritization criteria used by TAC members to score CHIP project segments that overlapped Bicycle Investment Routes.

Supplementary Scoring Criteria	Scoring
How many youth destinations are located within ½ mile of the project?	2= Five or more youth destinations are within ½ mile of project 1= One to four youth destinations are within ½ mile of project 0= No youth destinations are within ½ mile of project
How many senior centers, senior housing developments, or common destinations for seniors are located within ½ mile of the project?	2= Five or more senior housing developments or senior destinations are within ½ mile of project 1= One to four senior housing development or senior destinations are within ½ mile of project 0= No senior housing developments or senior destinations are within ½ mile of project
How many high-priority destinations are located within ½ mile of the project? (Priority destinations may include state parks, regional parks, museums, scenic byways, community centers, shopping centers, high tourism areas etc.)	2= Five or more identified destinations are within ½ mile of project 1= One to four identified destinations are within ½ mile of project 0= No identified destinations are within ½ mile of project
How many existing, local bikeways does the project connect to? (Existing local bikeways may include paved shoulders, bicycle lanes, buffered bicycle lanes, separated bicycle lanes, and off-street trails)	2= Connects to 2+ existing bikeways 1= Connects to 1 existing bikeways 0= Does not connect to any existing bikeways
Does this project close one or more gaps between existing bicycle facilities? (A gap is defined as the spacing between two or more existing bicycle facilities that is equal to or less than 1 mile)	2= Closes one or more gaps between existing bicycle facilities 0= Does not close any gaps between existing bicycle facilities

Supplementary Scoring Criteria	Scoring
How many bicycle barriers does this project address or improve? (Barriers may include, but are not limited to, freeways and expressways, rivers and streams, and rail corridors)	2= Addresses or improves 2+ barriers 1= Addresses or improve one barrier 0= Does not address or improve any barriers
Are there any plans that identify the project for bicycle improvements or that have policy support for increased bicycling?	2= Project is identified for bicycle improvements in one or more local plans 1= A local plan has policy support for increased bicycling 0= Project is not identified for bicycle improvements in a local plan and there is no policy support for increased bicycling in a local plan

Supplementary Prioritization Criteria Scoring for CHIP Projects

To score the supplementary scoring criteria, MnDOT developed a voluntary survey for TAC members to review individual route segments. The survey only addressed segments of the Bicycle Investment Routes that overlapped with projects currently identified in the District 7 10-year Capital Highway Investment Plan (CHIP) TAC members were encouraged to use their local knowledge to score the criteria for each segment, but they were asked to only score segments they are familiar with. Each segment could score up to 2 points for each criterion, with a total possible score up to 14 points.

The segment scores were intended to help MnDOT District staff identify and prioritize Bicycle Investment Routes that already have capital highway investment funding allocated in the next ten years. Eight members of the District 7 TAC completed the survey, so the scoring results shown in Table F-2 reflect limited survey participation.

Table F-2: Bicycle Investment Routes that overlap with CHIP projects were scored with the supplementary scoring criteria to provide additional prioritization information to the data-driven analysis.

District 7 CHIP Segment Extents	TAC Survey Score
CHIP Segment 7-1 (Rte 75 from Trosky to Iowa border)	9
CHIP Segment 7-2 (Hwy 169 from Blue Earth to Elmore)	7.5
CHIP Segment 7-3 (Hwy 13 from Otisco through New Richland)	2
CHIP Segment 7-4 (Hwy 19 from Henderson to Fairfax)	5

District 7 CHIP Segment Extents	TAC Survey Score
CHIP Segment 7-5 (Hwy 22 from Wells to Rice Lake)	5.5
CHIP Segment 7-6 (Hwy 22 from Terrace View Golf Course to Mankato)	9
CHIP Segment 7-7 (Existing trail in Mankato from Hoffman Rd to Basset Dr)	9
CHIP Segment 7-8 (Existing trail in Mankato from Rte 14 to Augusta Dr)	7.25
CHIP Segment 7-9 (Existing trail in Mankato from Augusta Dr to 227th St)	8.33

Use of the supplemental scoring criteria was experimental in this round of planning and represents an opportunity for a variety of future applications. The value and potential application of scoring supplementary criteria should continue to be a topic of discussion at annual District Bicycle TAC meetings in the future.

Appendix G: Bicycling Suitability Analysis Methodology

The analysis assumes that the stress levels of people bicycling are a function of roadway pavement width and average traffic levels. These assumptions are supported by scholarly research, which identifies motorized traffic volumes, speeds, and street widths as the most important factors affecting peoples' decision to bicycle.[13] However, these variables have different impacts on the comfort of people bicycling based on roadway character. For example, a narrow rural road can be comfortable if traffic volumes are very low, even if cars travel at high speeds. On a major urban thoroughfare, high speeds have a much greater impact on comfort levels due to higher traffic volumes.

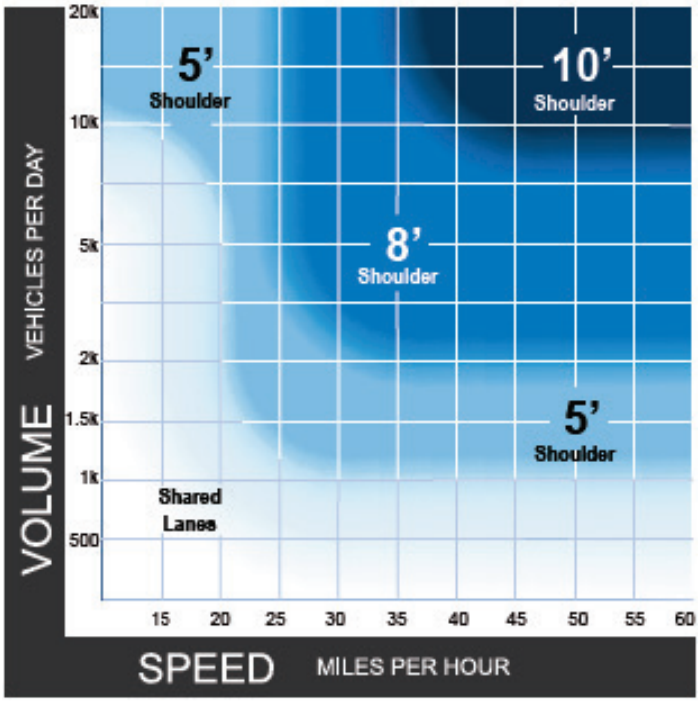
Figure G-1 and Figure G-2 show how traffic speeds and volumes affect desired shoulder width and facility type for people bicycling in rural, urban, and suburban areas. The areas on the charts shaded darker blue represent roadway conditions that are less comfortable for people bicycling due to high motor vehicle volumes and/or high motor vehicle travel speeds. The areas on the charts that are white or light blue are more comfortable for people bicycling due to lower motor vehicle volumes and/or lower motor vehicle travel speeds.

The analysis identifies suitable options for low-stress bicycling and high-stress barriers in the network. This information allows agencies to prioritize projects based on user preference and comfort level. For example, on an existing low-stress route, pavement markings or signage may be the only improvement necessary. On high-stress routes, separated bicycle facilities may warrant consideration. The bicycling suitability analysis data provides a more nuanced and comprehensive understanding of existing conditions for bicyclists than a conventional engineering or traffic safety study. A typical Level of Traffic Stress analysis includes existing bicycle facility types[14]. A statewide bicycle facility data inventory is not available; therefore, a LTS analysis was not used in the district bicycling planning process.

[13] Davis, W. J. (1995). Bicycle test route evaluation for urban road conditions. Presented at the Transportation Congress, ASCE, 1, 1063–1076; Kaparias, I., Bell, M. G. H., Miri, A., Chan, C., & Mount, B. (2012). Analysing the perceptions of pedestrians and drivers to shared space. Transportation Research Part F: Traffic Psychology and Behaviour, 15(3), 297–310. http://doi.org/10.1016/j.trf.2012.02.001; McAndrews, C., Flórez, J., & Deakin, E. (2006). Views of the Street: Using Community Surveys and Focus Groups to Inform Context-Sensitive Design. Transportation Research Record, 1981(1), 92–99. http://doi.org/10.3141/1981-15; Royal, D., & Miller-Steiger, D. (2008). Volume I: Summary Report (DOT HS 810 971) (No. I). National Highway Traffic Safety Administration. Retrieved from https://one.nhtsa.gov/Driving-Safety/Research-&-Evaluation/National-Survey-of-Bicyclist-and-Pedestrian-Attitudes-and-Behavior; Sener, I. N., Eluru, N., & Bhat, C. R. (2009). An analysis of bicycle route choice preferences in Texas, US. Transportation, 36(5), 511–539. doi:10.1007/s11116-009-9201-4

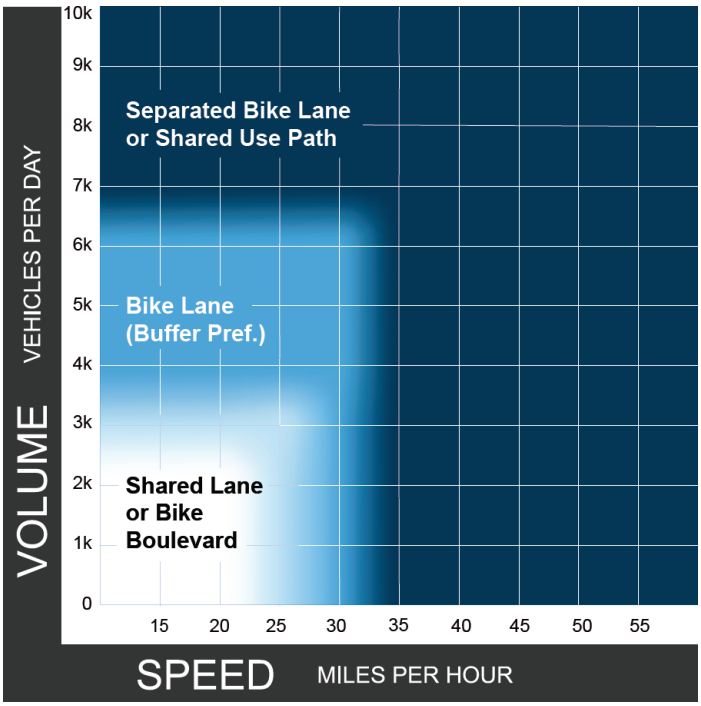
[14] Mekuria, Maaza C., PH.D., P.E., PTOE, Furth, Peter G., PH.D., Nixon, Hilary, PH.D. (2012), Low-Stress Bicycling and Network Connectivity, http://transweb.sjsu.edu/research/low-stress-bicycling-and-network-connectivity

Figure G-1: The relationship between traffic volumes and traffic speeds on recommended low-stress bicycle facility types on rural roadways.



Source: Toole Design

Figure G-2: The relationship between traffic volumes and traffic speeds on recommended low-stress bicycle facility types on urban and suburban roadways.

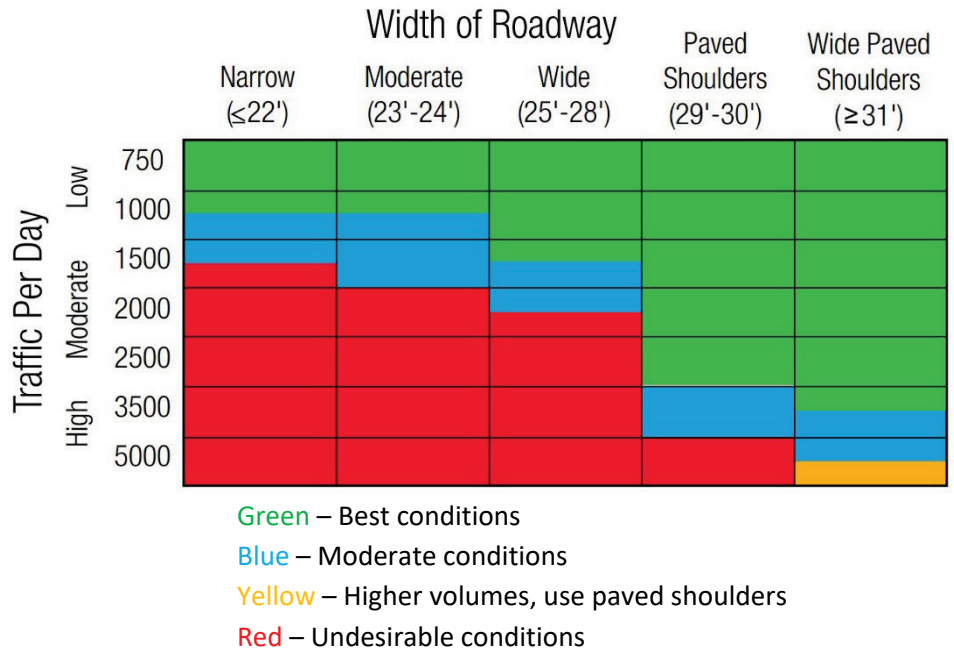


Source: Toole Design

Methodology

The bicycle suitability analysis for this Plan followed the standards of the *Wisconsin Rural Bicycle Planning Guide.*[15] Figure G-3, from the Guide, illustrates how pavement width and traffic volumes affect bicycling conditions.

Figure G-3: Bicycling suitability based on roadway width and traffic volumes.



Source: Wisconsin Rural Bicycle Planning Guide.

Two variables, shown in Figure G-3, were used for the District 7 bicycle suitability analysis: pavement width and traffic volumes. Pavement width includes the travel lanes and paved shoulders, both locations where bicyclists can legally ride. MnDOT staff provided pavement width values for the analysis. Average Annual Daily Traffic (AADT) was not available for the entire network, so the analysis included assumptions about traffic levels based on roadway ownership to fill in the data gaps (Table G-3):

Table G-3: Assumptions for average motor vehicle traffic levels based on roadway ownership.

Owner	Assumed AADT
State	5,000
County	3,000
Town	1,000
City	1,000

[15] Wisconsin Department of Transportation (2006), *Rural Bicycle Planning Guide*. Retrieved from: https://wisconsindot.gov/Documents/projects/multimodal/bike/rural-guide.pdf

Locally maintained roads in unincorporated areas were automatically assigned AADT of 300, regardless of owner. The final assumption is that shared use paths were automatically assumed to be the most comfortable facility, due to the absence of motorized traffic.

The analysis method in the *Wisconsin Rural Bicycle Planning Guide* includes the percent of truck traffic, which can have a significant negative impact on bicycling comfort levels; however, truck data was not included in this analysis because data was only available for MnDOT highways and not local or county roadways. Bicycling suitability ratings in locations with heavy truck traffic may decrease if that data were included. Truck data should be included in future updates to the Plan if the data is available. Thresholds for good, fair, and poor bicycling conditions were developed based on pavement width (travel lanes and shoulders combined) and average daily traffic volumes (Table G-4). The *Wisconsin Rural Bicycle Planning Guide* includes detailed thresholds for bicycling conditions, but as a general guide the following numbers may be used to determine bicycling suitability ratings:

Table G-4: Bicycling suitability ratings based on roadway pavement width and traffic volumes.

Bicycling Suitability	Good	Fair	Poor
Pavement Width (feet)	AADT	AADT	AADT
< 23	<1050	1051-1439	>1440
23 to 24	<1350	1351-1859	>1860
25 to 26	<2105	2106-2889	>2890
27 to 28	<2640	2641-3629	>3630
29 to 30	<3450	3451-4739	>4740
31 to 32	<3450	3451-6034	>6035
> 32	<4035	4036-7324	>7325

Source: Adapted from the Wisconsin Rural Bicycle Planning Guide

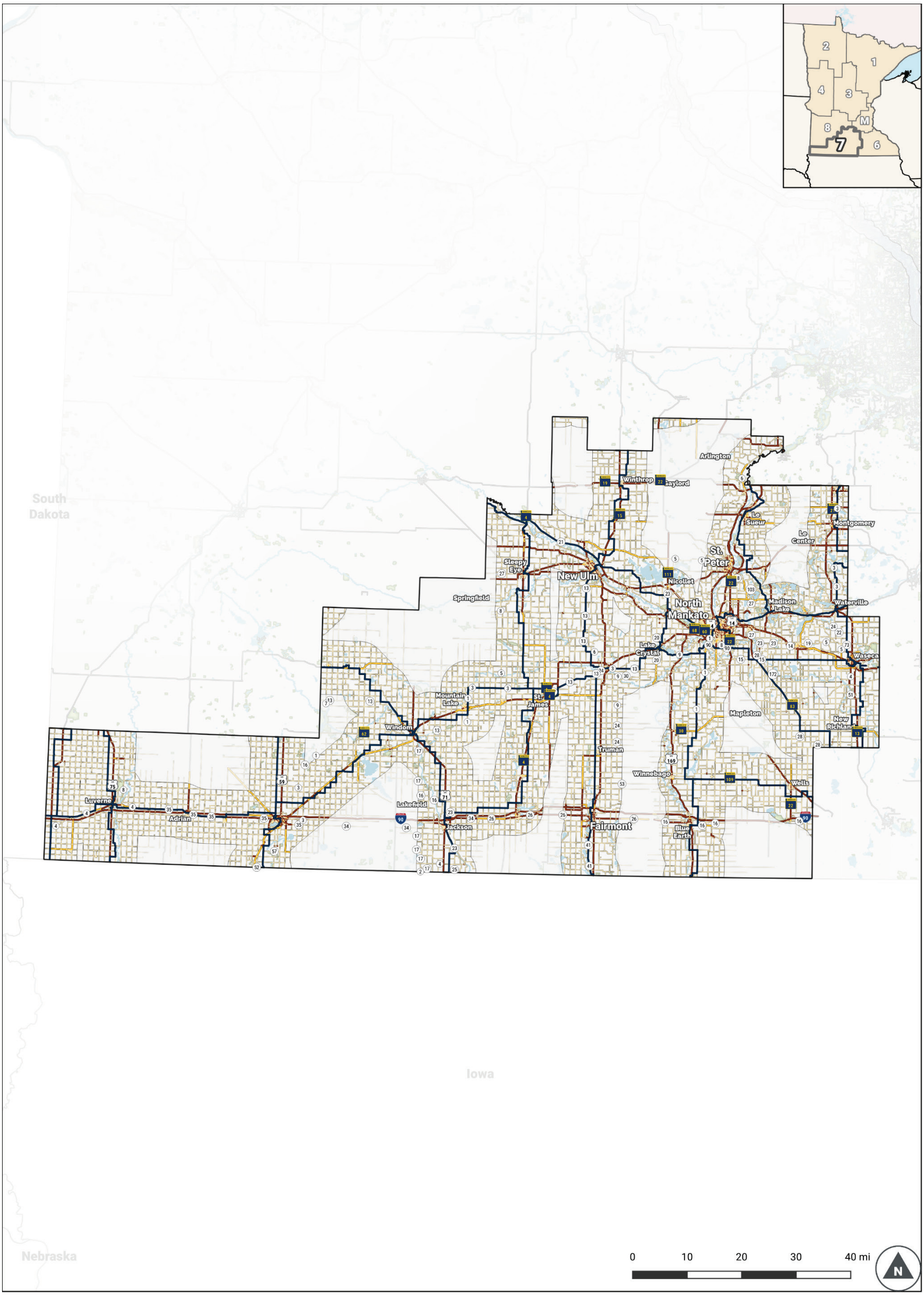
District 7 Bicycling Suitability Results

Figure G-4 displays results of the District 7 bicycling suitability analysis on all roadways within the state and regional priority search corridors, as previously described in the State and Regional Bicycle Routes section.

- All the roadways within the search corridor were scored with a value of good, fair, or poor for bicycling suitability.
- The dark blue lines on the map show routing results, which represent the automated route recommendations based on the bicycling suitability within each search corridor.

The District 7 online, interactive map allows you to zoom in and out on the results of the bicycling suitability analysis. To view the results, click on the layers icon in the menu bar on the top left of the screen, and then select “Bicycling Suitability Results” layer. To view the map legend, click the arrow to the right of the ‘Bicycling Suitability Results’ label, then click ‘Legend’.

Figure G-4: District 7 bicycling suitability analysis results.



Appendix H: Cost Estimate Methodology

The following pages contain breakdowns of the planning-level cost estimates found in Chapter 5. The cost estimates are based on MnDOT 2017 statewide average bid prices. The cost estimates do not include an allowance for engineering, utility, or right-of-way costs, but the higher estimate includes a 40% contingency that may account for some of those costs. In order to develop planning-level cost estimates, it was necessary to make some assumptions about the various types of bicycle facilities. The cost estimates include typical construction materials such as grading, base, pavement, pavement markings, and signage. Where appropriate, these estimates also include lump sum allowances for construction cost incidentals such as landscaping, drainage, and traffic control, as well as a 40% contingency allowance for unusual project-specific cost items. Individual project costs may vary; these estimates are only intended to be used at a planning level and should be refined throughout project development.

Adding Paved Shoulder

Includes adding a 10' or 6' paved shoulder (as noted below) to both sides of an existing roadway

Assumes no right of way acquisition is required
Unit Prices per MnDOT 2017 Statewide Average Bid Prices
All costs in 2017 dollars

Bid Item	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Common Embankment	CY	16427	$2.18	$35,810	Assume 14' wide, 3' deep on each side
Aggregate Base Class 5	CY	4693	$25.85	$121,323	Assume 12' wide, 1' deep on each side
Type SP 9.5 Wearing Course Mixture (3,C)	TON	2652	$54.06	$143,353	N/A
10' Shoulder Construction Cost Subtotal	-	-	-	**$300,486**	-

Bid Item	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Common Embankment	CY	11733	$2.18	$25,579	Assume 10' wide, 3' deep on each side
Aggregate Base Class 5	CY	3129	$25.85	$80,882	Assume 8' wide, 1' deep on each side
Type SP 9.5 Wearing Course Mixture (3,C)	TON	1591	$54.06	$86,012	N/A
6' Shoulder Construction Cost Subtotal	-	-	-	**$192,472**	-

Bid Item	Total Cost
Landscaping/Turf Establishment (5%)*	$250,000.00
Signing/Markings (5%)*	$15,024.28
Drainage (10%)*	$30,048.55
Contingency (40%)	$144,233.04

Estimate	Total Cost
Low Construction Cost/Mile (no contingency, 6' shoulders)	**$250,000.00**
High Construction Cost/Mile	**$510,000.00**

Actual costs may vary based on project scope and current market conditions.
Future project costs should be inflated relative to a base year of 2017.
* All lump sum items based off of a 10' shoulder width

Standard Bicycle Lanes

Includes street-level, one-way bicycle lanes (both sides of road). Requires striping and signing.

Unit Prices per MnDOT 2017 Statewide Average Bid Prices
All costs in 2017 dollars

Item	Unit	Quantity	Unit Cost	Total Cost	Assumptions
4" Solid Line Epoxy (Bike Lane Markings)	LF	10560	$0.29	$3,062	Long Lines - 2 solid lines entire length, each side
Pavement Message Preform Thermoplastic Ground In (Bike Symbols)	SF	367	$25.58	$9,390	Bike Symbol - 1 Symbol every 250 feet, each side of road
Sign Panels Type C	SF	44	$38.63	$1,687	Bike Lane Signs every 1000 feet, each side of road, 2 wayfinding signs every 2640 feet
Construction Cost Subtotal	**-**	**-**	**-**	**$14,139**	-

Item	Total Cost
Contingency (40%)	$5,655.72

Estimate	Total Cost
Low Construction Cost/Mile (no contingency)	**$14,000.00**
High Construction Cost/Mile	**$20,000.00**

Actual costs may vary based on project scope and current market conditions.
Future project costs should be inflated relative to a base year of 2017.

Buffered Bicycle Lanes

Includes street-level, one-way buffered bicycle lanes (both sides of road). Requires striping and signing.

Unit Prices per MnDOT 2017 Statewide Average Bid Prices
All costs in 2017 dollars

Item	Unit	Quantity	Unit Cost	Total Cost	Assumptions
4" Solid Line Epoxy (Bike Lane Markings)	LF	21120	$0.29	$6,125	Long Lines - 4 solid lines entire length, each side
8" Solid Line Epoxy (Buffer Hatching)	LF	1056	$0.61	$644	Buffer Lines - 1 solid line, 4 feet long, every 40 feet, both sides
Pavement Message Preform Thermoplastic Ground In (Bike Symbols)	SF	367	$25.58	$9,390	Bike Symbol - 1 Symbol every 250 feet, each side of road
Sign Panels Type C	SF	44	$38.63	$1,687	Bike Lane Signs every 1000 feet, each side of road, 2 wayfinding signs every 2640 feet
Construction Cost Subtotal	**-**	**-**	**-**	**$17,846**	-

Item	Total Cost
Contingency (40%)	$7,138.00

Estimate	Total Cost
Low Construction Cost/Mile (no contingency)	**$17,000.00**
High Construction Cost/Mile	**$25,000.00**

Actual costs may vary based on project scope and current market conditions.
Future project costs should be inflated relative to a base year of 2017.

Delineator Separated Bicycle Lanes (Temporary Installation)

Includes street-level, one-way bicycle lanes (in both directions). Requires striping, signing, and flexible delineators.

Unit Prices per MnDOT 2017 Statewide Average Bid Prices
All costs in 2017 dollars

Item	Unit	Quantity	Unit Cost	Total Cost	Assumptions
4" Solid Line Epoxy (Bike Lane Markings)	LF	21120	$0.29	$6,125	Long Lines - 4 solid lines entire length, each side
8" Solid Line Epoxy (Buffer Hatching)	LF	1056	$0.61	$644	Buffer Lines - 1 solid line, 4 feet long, every 40 feet, both sides
Pavement Message Preform Thermoplastic Ground In (Bike Symbols)	SF	367	$25.58	$9,390	Bike Symbol - 1 Symbol every 250 feet, each side of road
Sign Panels Type C	SF	44	$38.63	$1,687	Bike Lane Signs every 1000 feet, each side of road, 2 wayfinding signs every 2640 feet
Tube Delineator	EA	264	$27.83	$7,347	Every 40 feet, both sides
Construction Cost Subtotal	**-**	**-**	**-**	**$25,193**	-

Item	Total Cost
Contingency (40%)	$10,077.19

Estimate	Total Cost
Low Construction Cost/Mile (no contingency)	**$25,000.00**
High Construction Cost/Mile	**$36,000.00**

Actual costs may vary based on project scope and current market conditions.
Future project costs should be inflated relative to a base year of 2017.

Curb-Separated Bicycle Lanes (Permanent Installation)

Assumes relocation of existing 5-foot concrete sidewalks with adjacent sidewalk-level, one-way, 7' concrete bicycle paths

Requires grading, utility adjustment, and traffic control measures. Includes construction on both sides of road

Assumes bicycle lanes do not require right of way acquisition

Unit Prices per MnDOT 2017 Statewide Average Bid Prices

All costs in 2017 dollars

Item	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Excavation – Common	CY	4563	$5.60	$25,553	
Remove Concrete Sidewalk	SF	52800	$0.72	$38,016	
Aggregate Base Class 5	CY	1825	$25.85	$47,181	
6” Concrete Walk Special	SF	73920	$13.83	$1,022,314	Colored concrete for bikeway
4” Concrete Walk	SF	52800	$4.46	$235,488	To replace sidewalks
ADA Ramps	EA	32	$7,000.00	$224,000	Assume 4 intersections per mile
Construction Cost Subtotal	**-**	**-**	**-**	**$1,592,551**	-

Item	Total Cost
Landscaping/Turf Establishment (5%)	$79,627.56
Signing/Markings (5%)	$79,627.56
Drainage/Utilities (10%)	$159,255.12
Traffic Control (5%)	$79,627.56
Contingency (40%)	$764,424.59

Estimate	Total Cost
Low Construction Cost/Mile (no contingency)	**$1,900,000.00**
High Construction Cost/Mile	**$2,700,000.00**

Actual costs may vary based on project scope and current market conditions.

Future project costs should be inflated relative to a base year of 2017.

Shared Use Paths

Assumes a single 10' wide asphalt path with signage and intersection crossing/curb ramp improvements
Also includes an allowance for drainage and landscaping
Assumes shared use paths do not require any removals or right of way

Unit Prices per MnDOT 2017 Statewide Average Bid Prices
All costs in 2017 dollars

Item	Unit	Quantity	Unit Cost	Total Cost	Assumptions
Excavation – Common	CY	1956	$5.60	$10,951	
Aggregate Base Class 5	CY	782	$25.85	$20,220	
Type SP 9.5 Wearing Course Mixture (3,C)	TON	1326	$54.06	$71,676	
ADA Ramps	EA	16	$7,000.00	$112,000	Assume 4 intersections per mile
Construction Cost Subtotal	**-**	**-**	**-**	**$214,848**	-

Item	Total Cost
Landscaping/Turf Establishment (5%)	$10,742.40
Signing/Markings (5%)	$10,742.40
Drainage (10%)	$21,484.79
Contingency (40%)	$103,127.00

Estimate	Total Cost
Low Construction Cost/Mile (no contingency)	**$250,000.00**
High Construction Cost/Mile	**$360,000.00**

Actual costs may vary based on project scope and current market conditions.
Future project costs should be inflated relative to a base year of 2017.