

District 4 Bicycle Plan

Guiding MnDOT's investments in bicycle facilities

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Photo Credit: Patrick Hollister

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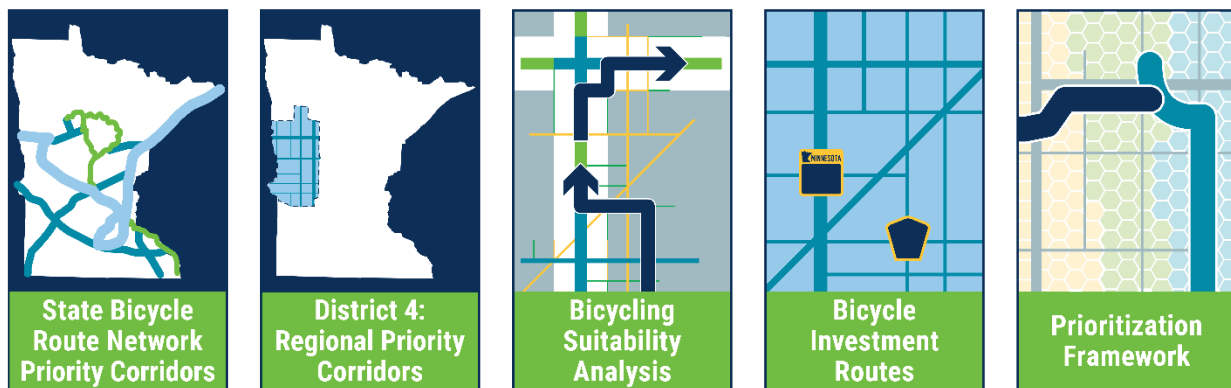
CHAPTER 1 | Introduction

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 4 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 4. Bicycle Investment Routes in District 4 are not restricted to the specific roadway that they are identified on – suitable parallel routes may be available when implementing improvements on the bicycle network. The Plan also helps MnDOT staff prioritize bicycle investments across District 4 using a route prioritization framework.

The District 4 bicycle planning process built on the work from the SBSP, and included five major components:

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 4 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 the District 4 Bicycle 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 4 Bicycle Plan Purpose

The purpose of the District 4 Bicycle Plan is to support local bicycle networks, prioritize MnDOT bicycle investments in District 4, and identify actions District staff can take to implement the SBSP strategies and achieve the SBSP goals and vision.

Technical Advisory Committee (TAC)

A Technical Advisory Committee (TAC), composed of regional stakeholders from across District 4, helped develop the MnDOT District 4 Bicycle Plan (Plan). TAC members included representatives from MnDNR, Douglas County, Headwaters Regional Development Commission (HRDC), Fargo-Moorhead Metro Council of Governments, City of Detroit Lakes, PartnerSHIP 4 Health, West Central Initiative, Upper Minnesota Valley Regional Development Commission (UMVRDC), Countryside Public Health, Stevens

County, City of Fergus Falls, City of Glyndon, Horizon Public Health, City of Alexandria, City of Starbuck, and Grant County.

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, p. 5), a series of prioritized corridors, is defined in the MnDOT Statewide Bicycle System Plan (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 outreach, the potential for connectivity to the U.S. Bicycle Route System (USBRS), 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 4 State Priority Search Corridors

Three High Priority State Corridors are in District 4 (Figure 3, p. 6):

- In the northern part of the district, a state priority corridor extends from Moorhead through Detroit Lakes and into District 2.
- A state priority corridor beginning in Detroit Lakes travels south to Fergus Falls and then turns southeast, connecting to Alexandria and extending into District 3.
- In the southern part of the district, a state priority corridor begins in Browns Valley and follows the state line southeast to Ortonville before passing into District 8.

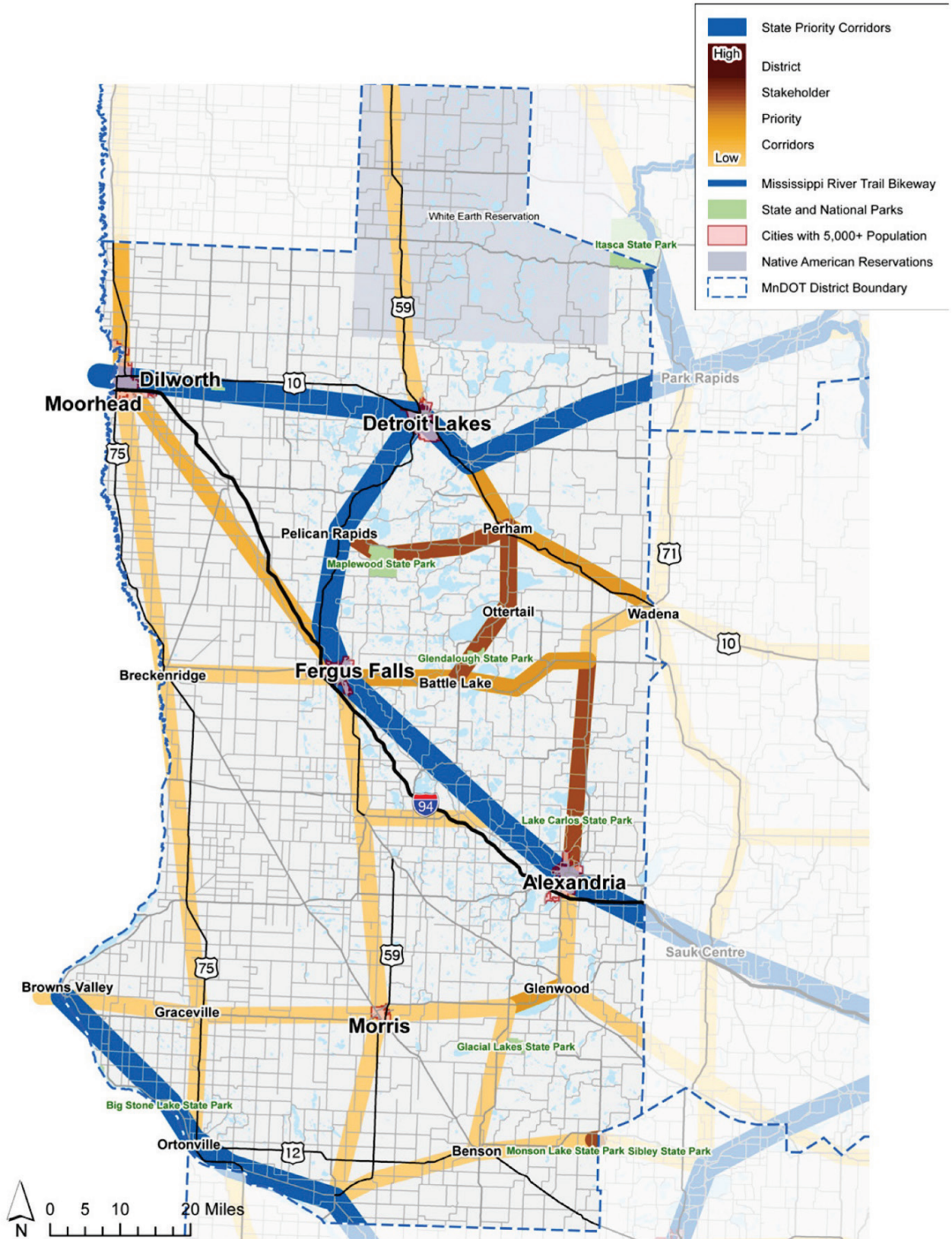
District 4 Regional Priority Corridors

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 (Figure 2). The results of the regional prioritization process in MnDOT District 4 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 MnDOT Statewide Bicycle System Plan.



Figure 3: District 4 State and Regional Priority Corridors from the Statewide Bicycle System Plan.



CHAPTER 3 | Bicycle Investment Routes

This chapter describes the process for selecting Bicycle Investment Routes in District 4. Bicycle Investment Routes in District 4 are not restricted to the specific roadway that they are identified on – suitable parallel routes may be available when implementing improvements on the bicycle network. 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

The bicycle planning process included a bicycling suitability analysis of all 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 4 staff worked with the TAC to identify Bicycle Investment Routes within the priority corridors from the SBSP. District 4 staff also held additional outreach meetings with counties, cities, and local bicycle advocates across the district to gather their input on route alignments. These stakeholder meetings were a key part of developing the Bicycle Investment Route network. 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 4 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 The

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

state highway investment routes will help guide MnDOT’s investments on the state highway network in District 4.

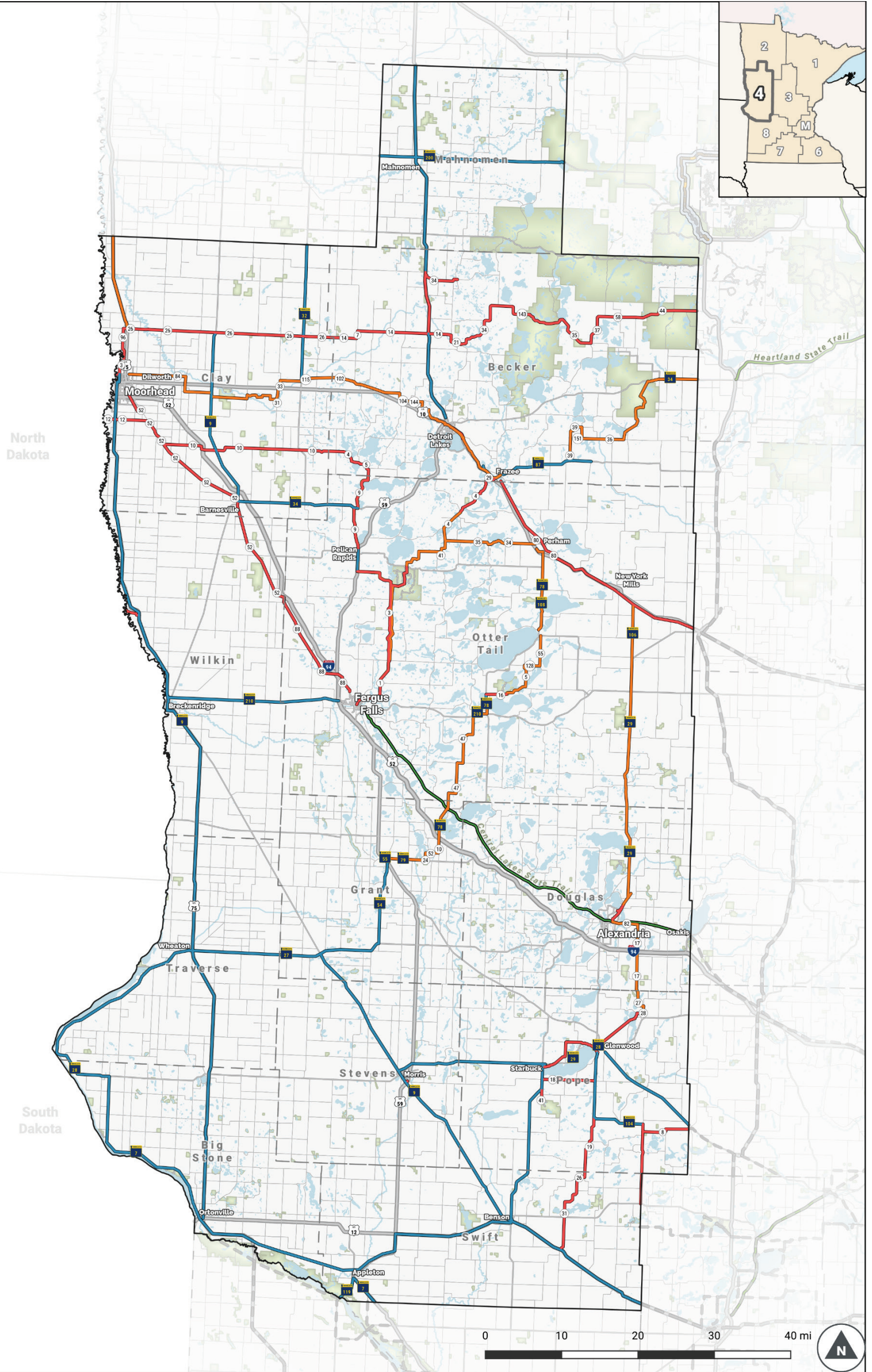
The Bicycle Investment Routes identified in District 4 are shown in Figure 4, and can also be viewed on the [online, interactive map](#). To view the Bicycle Investment Routes map, click on the layers icon on the menu bar on the top left of the screen, then select the “District 4 Bicycle Investment Routes” layer. To view the map legend, click the arrow to the right of the ‘District 4 Bicycle Investment Routes’ label, then click ‘Legend’.

Supporting Local Bicycle Travel

One of the objectives of the District 4 Bicycle 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 In addition to complete streets we are also involved in state and local trail development.

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

Figure 4: District 4 Bicycle Investment Routes.



Bicycle Investment Routes*		Roads	Other	Existing Bicycle Facilities
—	County/Local Road	Interstate	District Boundary	— Existing On-Road Route
—	State Highway	US Highways	Water	— Existing Trail
—	Existing Trail	State Highway	Parks	
—	Future Trail	County		
- - -	Routes Outside District			

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



Figure 5: A shared use path along U.S. 59 in Mahanomen.



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 4, including developing shared use paths along state highways (Figure 5) or bicycle facilities on local or county roadways. In future updates to the District 4 Bicycle 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.

CHAPTER 4 | Bicycle Investment Route Prioritization

MnDOT has a limited amount of funding available for bicycle infrastructure. Establishing priorities helps identify Bicycle Investment Routes (occasionally referred to as “routes” throughout the Plan) 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. Eleven TAC members in District 4 participated in the survey, and the average scores for each prioritization subcategory are shown in Table 1.

Table 1: Results of a survey to District 4 TAC members that asked them to rank the 14 subcategories in the prioritization framework.

Rank	Prioritization Subcategory	Average Score
1	Serves areas with significant poverty	14.5
2	Connects to existing state trail or U.S. Bicycle Route	12.3
3	Serves children and youth	11.8
4	Serves older adults	8.6
5	Workers with no vehicle access	8.2
6	25% or more of people w/in 0.5mi of supermarket	7.7
7	Serves immigrant populations	5.5
8	Connects to transit/multi-modal hubs	5.0
9	Serves people with disabilities	5.0
10	Serves Native American populations or Tribal Reservations	5.0
11	USDA Urbanized Areas	4.5
12	Project is in a MnDOT District Safety Plan	4.5
13	Population density > MN average	4.1
14	Growth in businesses over last 5 years	3.2

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 corridor prioritization framework (**Appendix A: Route Prioritization Framework**).
- 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.

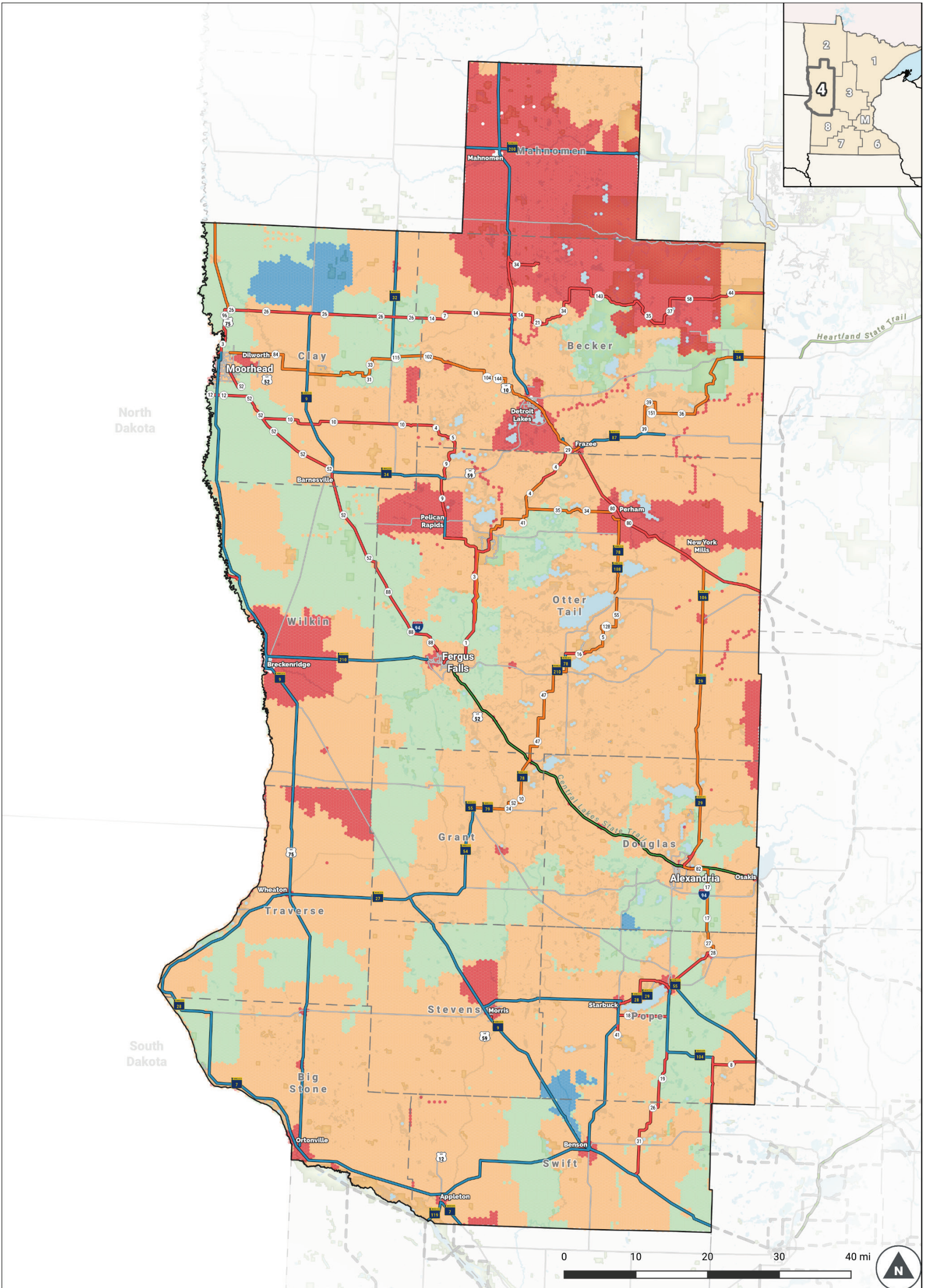
Data for all criteria was derived from national or statewide sources. Datasets included both internal MnDOT sources and external datasets from other organizations. Average Annual Daily Traffic and crash data are examples of MnDOT data. External data included school program locations (Department of Education),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

Figure 6 displays the District 4 Bicycle Investment Routes overlaid on a district basemap with the prioritization scoring results from the data-based prioritization criteria. 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.

Additional Prioritization Criteria for CHIP Projects

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 additional criteria are not included in the data-based Bicycle Investment Route prioritization scoring (Figure 6). These additional criteria were scored separately from the data-driven process and should be used to supplement the scoring results from the data-based prioritization ([see Appendix F: Supplementary Prioritization Criteria](#)).

Figure 6: District 4 Bicycle Investment Routes overlaid on top of the route prioritization framework scoring results.



Prioritization Scores	Bicycle Investment Routes	Existing Bicycle Facilities	Roads	Other
Tier 1	County/Local Road	Existing On-Road Route	Interstate	District Boundary
Tier 2	State Highway	Existing Trail	US Highways	Water
Tier 3	Existing Trail		State Highway	Parks
Tier 4	Future Trail		County	
Tier 5	Routes Outside District			

CHAPTER 5 | Implementation

The District 4 Bicycle 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 4 10-year Capital Highway Investment Plan \(CHIP\)](#)

Lead: MnDOT District 4

Support: MnDOT OTAT

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 4

Support: MnDOT OTAT

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, including Bicycle Investment Routes that are not currently identified in the CHIP

Lead: MnDOT District 4

Support: MnDOT OTAT

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 ROW

Action 4.1: Develop an inventory of existing bicycle facilities on MnDOT ROW, 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 OTAT

Support: MnDOT District 4

MnDOT collects data on paved shoulders, designated bicycle routes and shared use paths every two years and presents this information in the Minnesota 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 4

Support: MnDOT OTAT

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 4

Support: MnDOT OTAT, 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 4

Support: MnDOT OTAT, Statewide Health Improvement Partnership Grantees

MnDOT's Office of Transit and Active Transportation 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](#).

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 4

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 OTAT

Support: MnDOT District 4

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 4

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 maintenance agreements, confusion over maintenance responsibilities can occur. Effective maintenance

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>

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 OTAT

Support: MnDOT District 4

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. MnDOT 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 evaluate four shared use path characteristics: roughness (ride), surface distress (condition),

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>

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 4

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 4

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 4

Support: MnDOT OTAT, 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 OTAT

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 phonenumber. 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](https://www.caltrans.gov/transportation-services/511)⁹ where users can submit service requests for maintenance issues. Bicyclists in Minneapolis can use the [SeeClickFix](https://en.seeclickfix.com/minneapolis)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

⁹ <https://csr.dot.ca.gov/>

¹⁰ <https://en.seeclickfix.com/minneapolis>

and maintenance of state highways. This program could be extended to bicycle facilities to build local 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 OTAT

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 4

Support: MnDOT OTAT

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 District Bicycle Plan on a regular basis

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

Lead: MnDOT OTAT

Support: MnDOT District 4

The District Bicycle Plans are intended to be updated every five years, alternating with the Statewide Bicycle System Plan 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 LGU in place

Lead: MnDOT District 4

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 4

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 4

This section provides hypothetical, preliminary cost estimates for the implementation of the Bicycle Investment Route network in District 4. 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 – 564 miles
2. County/Local Road Bicycle Investment Routes – 350 miles
3. Bicycle Investment Route on Future Shared Use Paths – 272 miles

The Bicycle Investment Routes shown in Chapter 3 do not identify specific facility types for each route. Therefore, estimating costs for implementing the District 4 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 4 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%	141
BIKE LANE	\$14,000	\$20,000	7.0%	39
BUFFERED BIKE LANE	\$17,000	\$25,000	5.0%	28
DELINEATOR-SEPARATED BIKE LANE	\$25,000	\$36,000	1.5%	8
CURB-SEPARATED BIKE LANE	\$1,900,000	\$2,700,000	1.5%	8
SHARED USE PATH (TRAIL)	\$250,000	\$360,000	20.0%	114
EXISTING BICYCLE FACILITIES ^d	N/A	N/A	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 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%	88
BIKE LANE	\$14,000	\$20,000	7.0%	25
BUFFERED BIKE LANE	\$17,000	\$25,000	5.0%	18
DELINEATOR-SEPARATED BIKE LANE	\$25,000	\$36,000	1.5%	5
CURB-SEPARATED BIKE LANE	\$1,900,000	\$2,700,000	1.5%	5
SHARED USE PATH (TRAIL)	\$250,000	\$360,000	20.0%	70
EXISTING BICYCLE FACILITIES ^d	N/A	N/A	40.0%	140

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 shared use paths.

BICYCLE INVESTMENT ROUTE ON FUTURE SHARED USE PATHS			
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	272

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 U.S. 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 (MnDNR state trail, local trail)	Segment expands access to a MnDNR state trail or United State Bicycle Route	Is the segment connected to or located within ½ mile of a MnDNR 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 4 Bicycle Project Design Meeting Summary

Design Meeting Overview

As part of each of the District Bicycle Plans, the project team developed starter idea design concepts for selected projects in each district. In District 4, the project chosen by District staff was TH 59 and TH 108 through Pelican Rapids. This project was selected because these roadways are tentatively scheduled for reconstruction between 2024 and 2026 to replace underground utilities.

MnDOT District 4 staff hosted a meeting with select stakeholders to review and discuss each of the design concepts. Each of the design concepts provided alternative ideas for addressing bicycle accommodations on the selected roadway. 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 4 meeting took place at Pelican Rapids City Hall on November 8th, 2018 and was attended by the City of Pelican Rapids, MnDOT District 4, and PartnerSHIP 4 Health.

Design Challenges Along Corridor

At the beginning of the meeting, attendees discussed general design challenges along the Highway 59 and 108 corridors. Some general themes that emerged during that conversation included:

Convenient Parking is Important

Several attendees discussed the importance of preserving on-street parking along the corridor, when presented with alternatives that converted on-street parking into pedestrian or bicycle space. The group was concerned about public reaction to alternatives that eliminated any existing on-street parking, generally feeling that there would not be public support for these alternatives. The group also had concerns about how people would be able to access the sidewalk from parking, and if they would have adequate space to open car doors without conflicts with motor vehicles or pedestrians.

In addition to on-street parking concerns for passenger vehicles, attendees noted that sometimes delivery trucks would stop in the roadway to facilitate deliveries. When considering alternatives that removed parking or reduce the overall roadway width, finding alternatives that address deliveries will likely be a challenge.

Winter Maintenance Challenges

The group discussed winter maintenance challenges with some of the alternatives presented. Some alternatives included flexible delineator posts, and the group had concerns that they would be difficult to remove snow around, or that they would become damaged or displaced over time and pose an ongoing maintenance issue. Other concepts included a 6' wide street-level bikeway, separated from vehicles with a curb, and the group was concerned that a 6' wide curb separated bikeway would be too

narrow to maintain (relative to a street-level or sidewalk-level bikeway that could accommodate larger maintenance equipment).

Creating a Vibrant Sense of Place

As the group discussed examples of what the future roadway corridor would look like, there were discussions about maximizing sidewalk space to allow landscaping and street furnishings (ideas that were not a focus in creating the initial concept drawings).

Starter Idea Design Concepts

The project team developed typical sections for each starter idea design concept, which can be found in **Appendix C: Design Concepts Typical Sections**. The project was divided into three sections, and the total length of all three sections combined is 2.12 miles.

Section 1: TH 59, Northbound (NB) and Southbound (SB)

Section 2: Western segment of TH 108, Eastbound (EB) and Westbound (WB)

Section 3: Eastern segment of TH 108, Eastbound (EB) and Westbound (WB)

Figure B-1: Context map showing the extents of Sections 1, 2, and 3 through Pelican Rapids.



The concepts are not proposed designs; they were developed to be used as conversation starters for District staff and other local stakeholders. Below is a summary of the discussion and feedback received around certain design elements:

Street-level, Curb-separated Bikeway Options (Section 1 Option 2; Section 3 Option 2 and 4)

- The group had concerns about how a 6' wide bikeway would be maintained in the winter (the narrow width may preclude some maintenance equipment)
- Where curb separated the bikeway from parked cars, the group had concerns about how drivers would need to step over the bikeway separation curb to reach the sidewalk

Street-level, Delineator-separated Bikeway Options (Section 1 Option 3 and 5; Section 2 Option 1; Section 3 Option 3)

- The group had concerns about the long-term maintenance of delineator-separated bikeway options, preferring in a reconstruction project to provide separation with more permanent materials that require less maintenance
- Delineator-separated bikeway options may have more utility if there was a desire to pilot potential roadway configurations prior to reconstruction, on a temporary basis only

Street-level, Planter-separated Bikeway Option (Section 2 Option 2)

- If used, the City may be responsible for the initial cost of the planters as well as ongoing maintenance responsibilities.
- While the group generally liked the aesthetic appeal of a planter-separated bikeway, the group thought there may be a better way to incorporate aesthetics than with on-street planter boxes

Street-level, Buffered Bikeway Option (Section 1 Option 1, Section 2 Option 3)

- The group discussed how a buffered bikeway (with no separation that holds existing curb lines) may create an overly wide roadway, leading to higher motor vehicle speeds, similar to what exists currently
- The group had questions about how access to driveways and minor streets would work with a raised median (for Section 2 Option 3).

Street-level, Curb Bikeway Option (Section 1 Option 1, Section 2 Option 3)

- The group discussed how a buffered bikeway (with no separation that holds existing curb lines) may create an overly wide roadway, leading to higher motor vehicle speeds, similar to what exists currently
- The group had questions about how access to driveways and minor streets would work with a raised median (for Section 2 Option 3).

Paved Shoulder Option (Section 2 Option 5)

- This alternative, intended for the more rural section west of town, would require parking restrictions if the shoulder is to be suitable for bicycling

Shared Use Path Option (Section 2 Option 6)

- The group preferred this alternative for the more rural section west of town, potentially placing the proposed shared use path in a utility corridor along the south side of the roadway

Sidewalk-level Bikeway Option (Section 2 Option 4 and 7, Section 1 Option 4 and 6)

- Sidewalk-level, curb separated bikeways were preferred over delineator-separated options due to the reduced long-term maintenance needs
- Two-way bikeway options were less preferred over one-way bikeway options, due to concerns about the lack of bicycle access
- The group preferred having a one-way sidewalk level bikeway for all corridors, which may pose a challenge in section 3 which has a reduced amount of width available
- A one-way version of these concepts represents the group's preferred option (similar to what's been done in Glenwood)

Opportunities for Resolving Design Challenges

Through the group discussion, there were a few recurring challenges that repeatedly were discussed. The following includes some opportunities to resolve some of these challenges.

Convenient Parking is Important

In constrained corridors, there are important trade-offs to be made when deciding how to best allocate limited roadway space. There are several ways to help determine the need for parking along a corridor and determine how to best allocate space:

- Conduct a parking study. By evaluating parking demand, both on the state highway and adjacent streets, stakeholders can develop a better understanding of parking needs and availability to make more informed decisions.
- Conduct robust stakeholder outreach. Businesses often have concerns about the economic impact of losing parking – when discussing tradeoffs, it is also important to discuss the potential economic benefits of improving bicycle access or providing more pedestrian amenity space.
- Explore alternative options for facilitating deliveries, including using cross streets or backage roads
- Conduct a temporary trial. Before making permanent changes to the roadway configuration, pilot a proposed design with temporary materials (such as temporarily converting parking to a bicycle lane with cones). This will allow the public to have an opportunity to explore the benefits and drawbacks that may come with the new roadway configuration.

Winter Maintenance Challenges

Any new infrastructure that is added, whether a roadway, bikeway, or sidewalk, brings additional maintenance requirements over the life of the facility. Routine maintenance for bikeways includes snow and ice removal in the winter.

For removing snow from bikeways, specialized equipment is typically required due to the narrower bikeway widths. This may include pickup trucks or jeeps if the bikeway is 8' wide or larger, or smaller specialized equipment such as Toolcats or similar utility machines.

A key element in developing bikeways for effective winter maintenance is to consult with local maintenance staff early in project development and determine what types of equipment are likely to

use the bikeway. Designers should then ensure that adequate width is provided for the bikeway (clear of signs, furniture, or other obstacles) to facilitate ongoing routine maintenance.

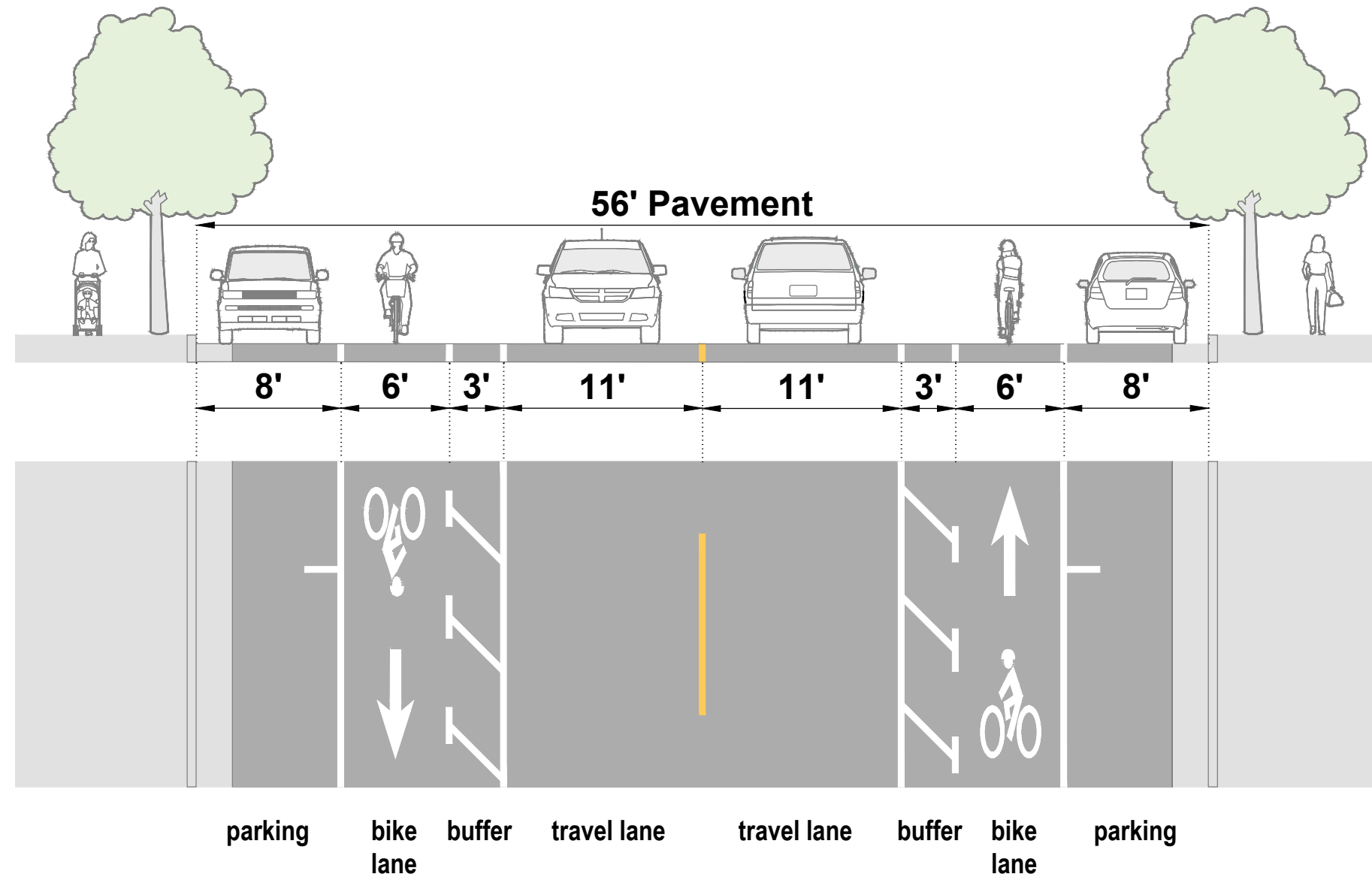
Creating a Vibrant Sense of Place

By maximizing available sidewalk space, a community can increase the curb appeal of the roadway corridor and provide a place for people to eat and meet while shopping or visiting local businesses. Curbside amenities can also be useful in traffic calming (reducing motor vehicle speeds) and separating bicycle and pedestrian space – an important consideration to reduce pedestrian-bicycle conflicts and to help provide cues for visually-impaired pedestrians on where the sidewalk space ends and the bicycle space begins.

Appendix C: Design Concepts Typical Sections

The following pages contain the typical sections for the design concepts that were presented at the District 4 Bicycle Project Design Meeting on November 8th, 2018.

Section 1 Option 1: Buffered Bike Lane



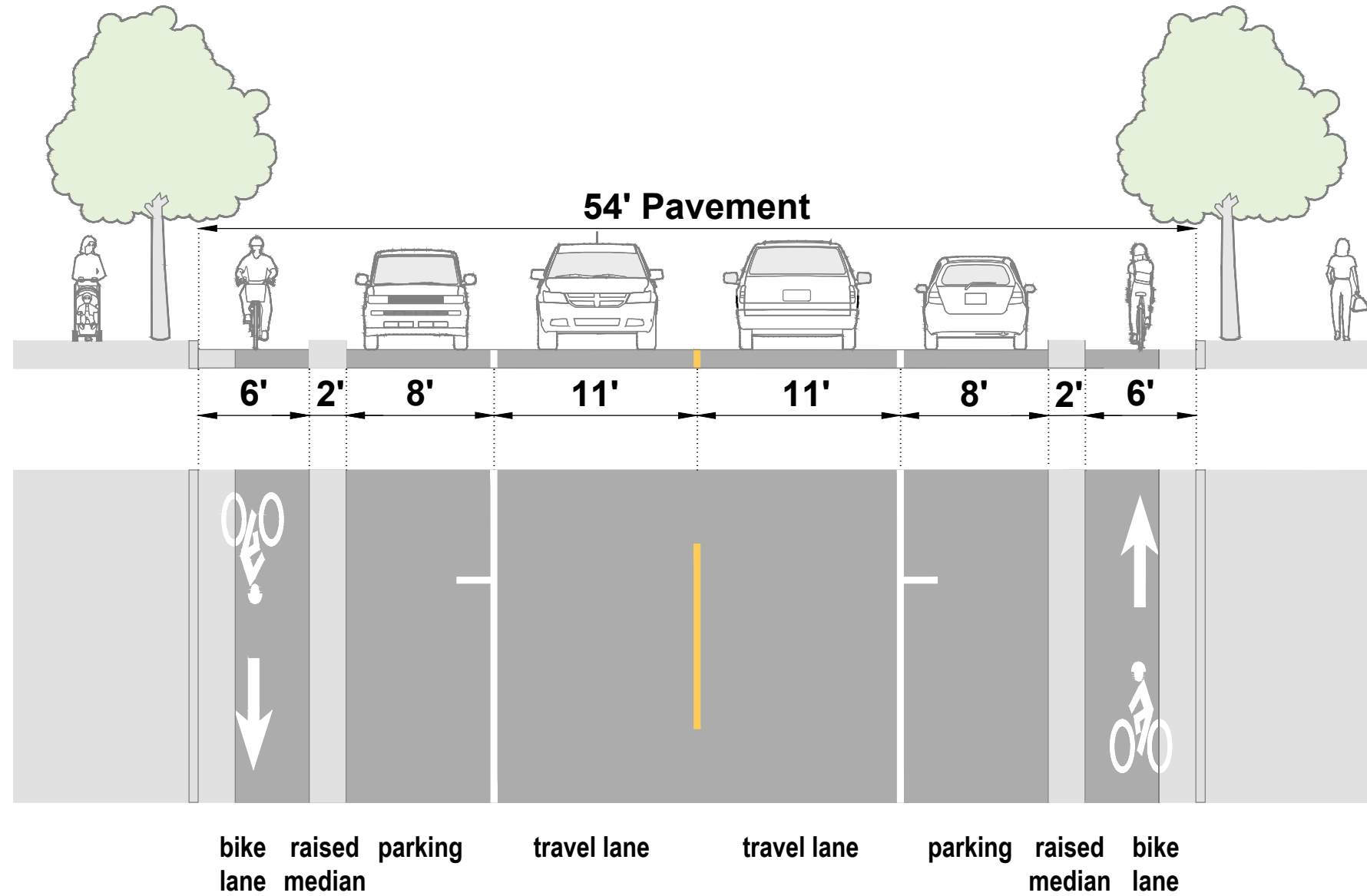
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SECTION 1: OPTION 1
BETWEEN 3RD AVENUE SW & 2ND AVENUE NW
MN-59 & MN-108 EB/WB TYPICAL SECTIONS
PRELIMINARY CONCEPT - NOT FOR CONSTRUCTION
MnDOT DISTRICT BICYCLE PLANS-D4 PELICAN RAPIDS
11/07/18

Section 1 Option 2: Raised Median And Parking Protected



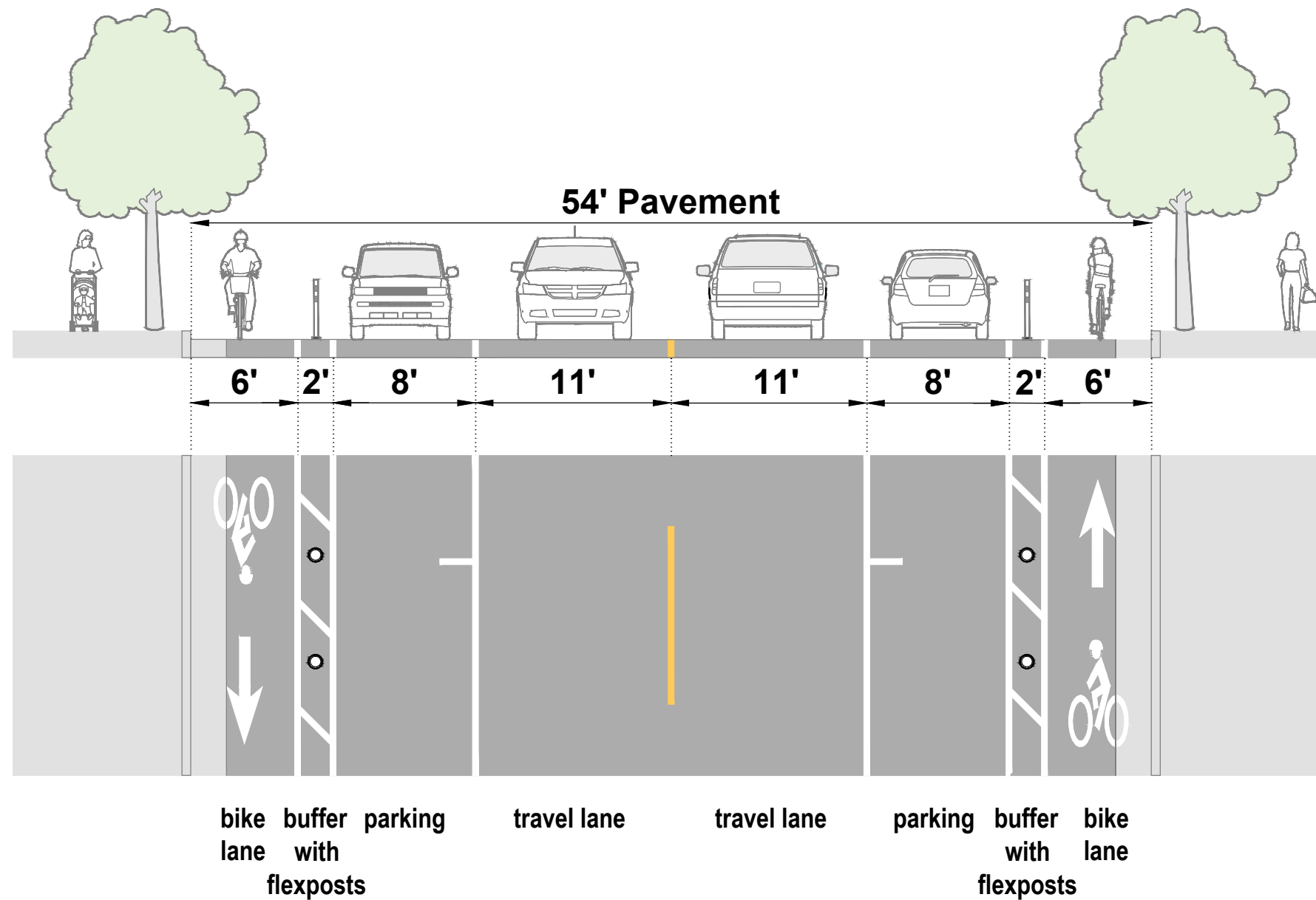
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SECTION 1: OPTION 2
BETWEEN 5TH AVENUE SW & 3RD AVENUE SW
AND 2ND AVENUE NW & COUNTY HWY 9
MN-59 & MN-108 EB/WB TYPICAL SECTIONS
PRELIMINARY CONCEPT - NOT FOR CONSTRUCTION
MnDOT DISTRICT BICYCLE PLANS-D4 PELICAN RAPIDS
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Section 1 Option 3: Buffered With Flexposts And Parking Protected

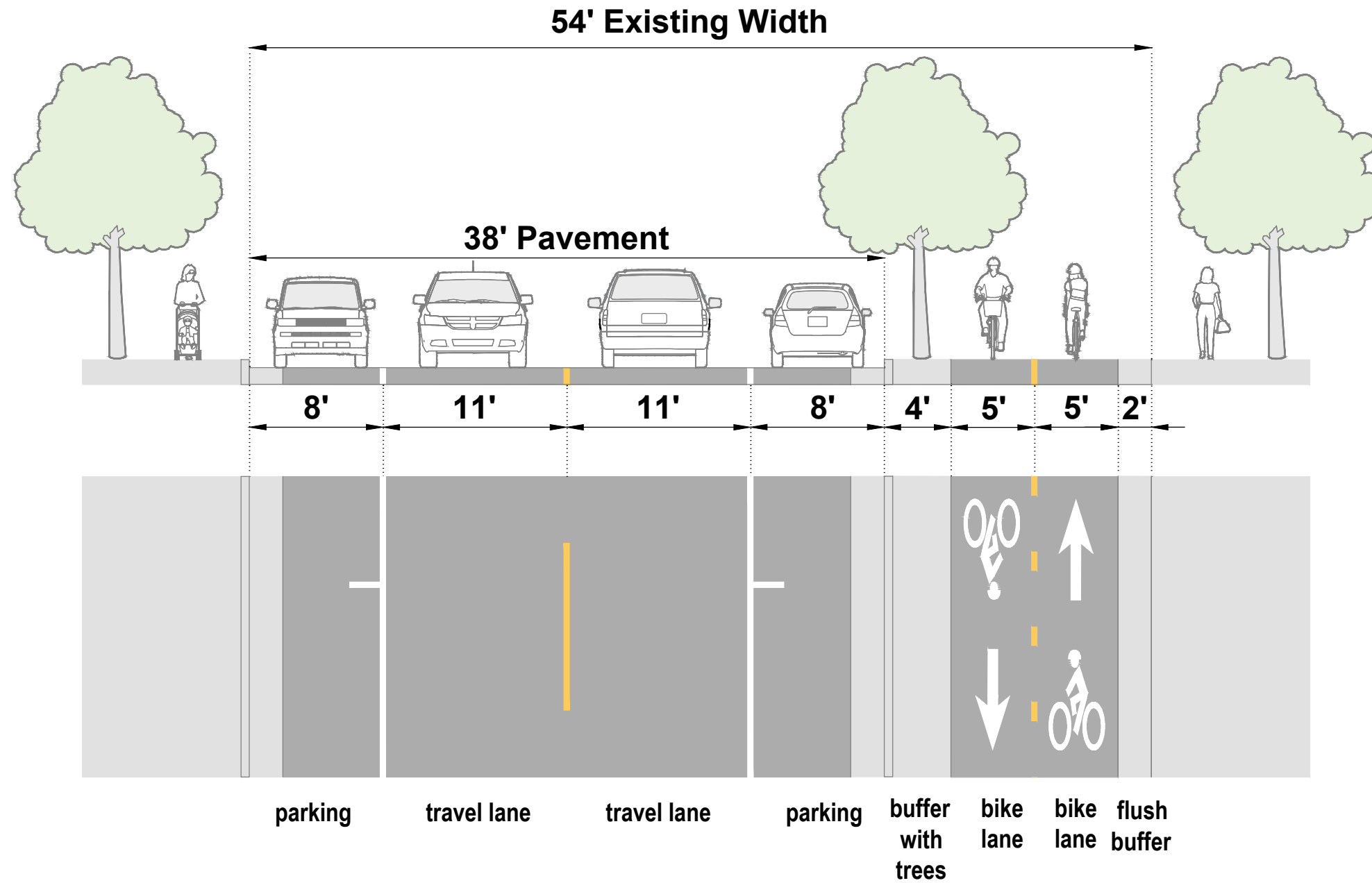


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Section 1 Option 4: Sidewalk Level Two Way



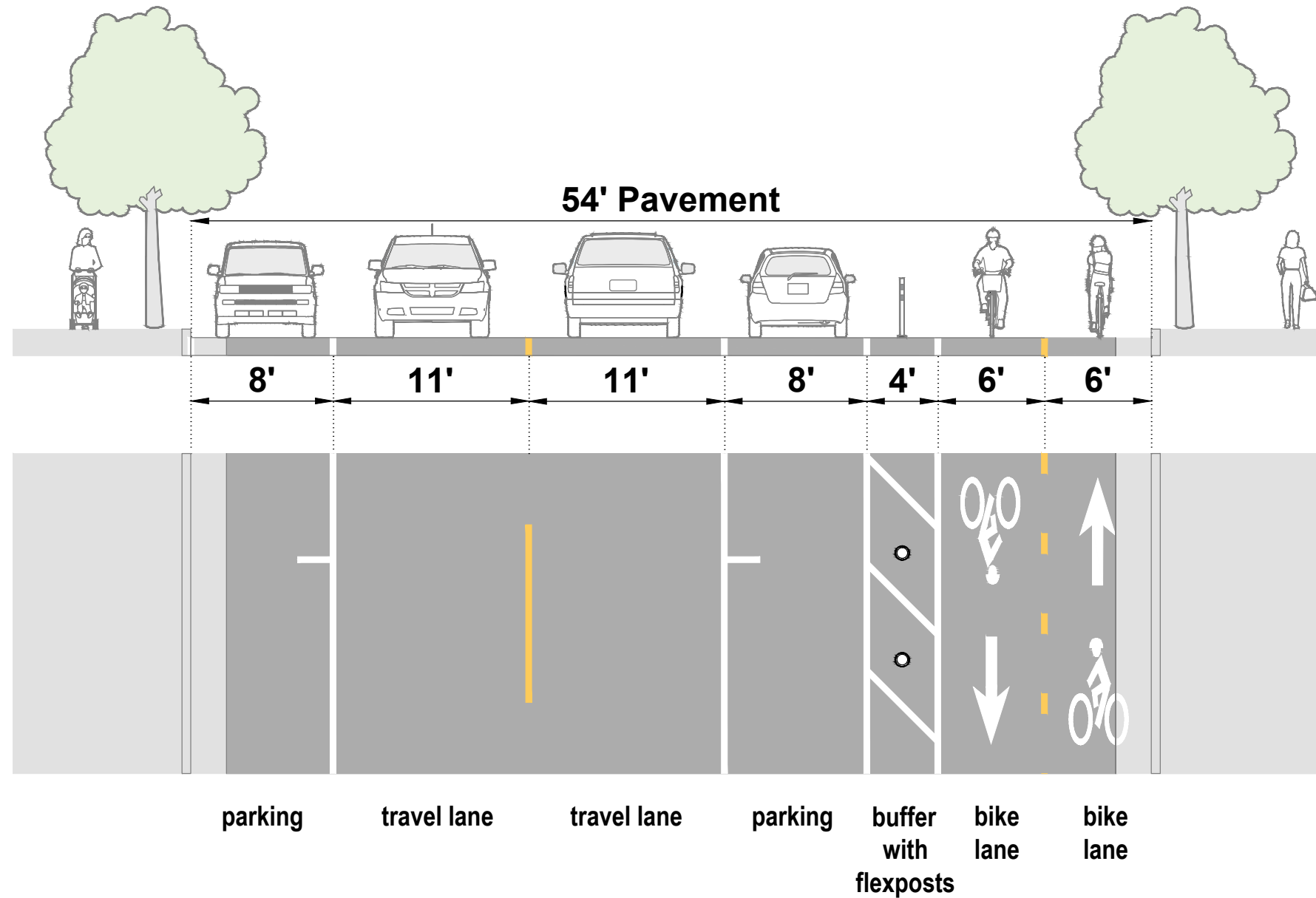
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Section 1 Option 5: Two Way Parking Protected With Flexposts

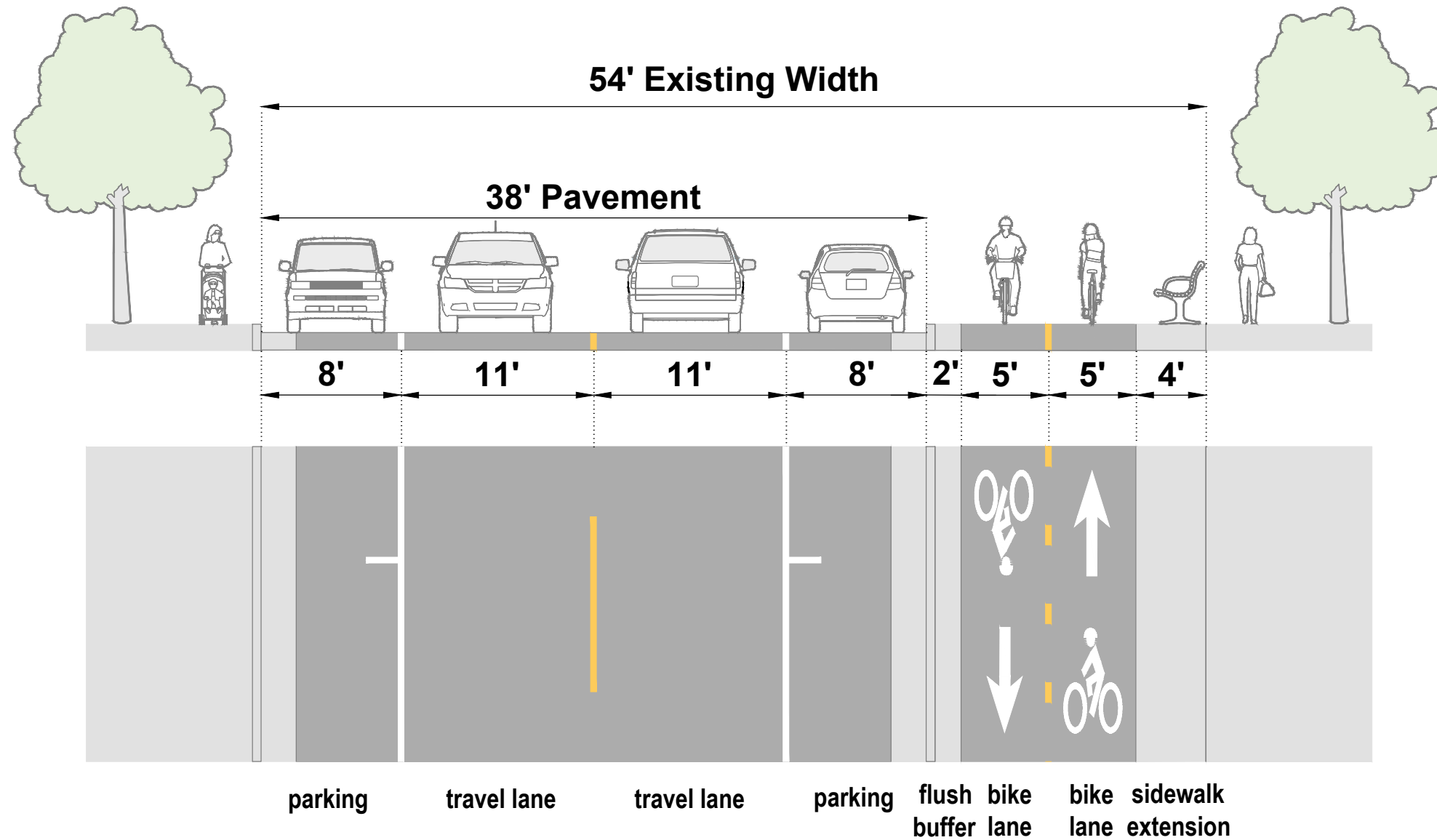


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Section 1 Option 6: Sidewalk Level Two Way

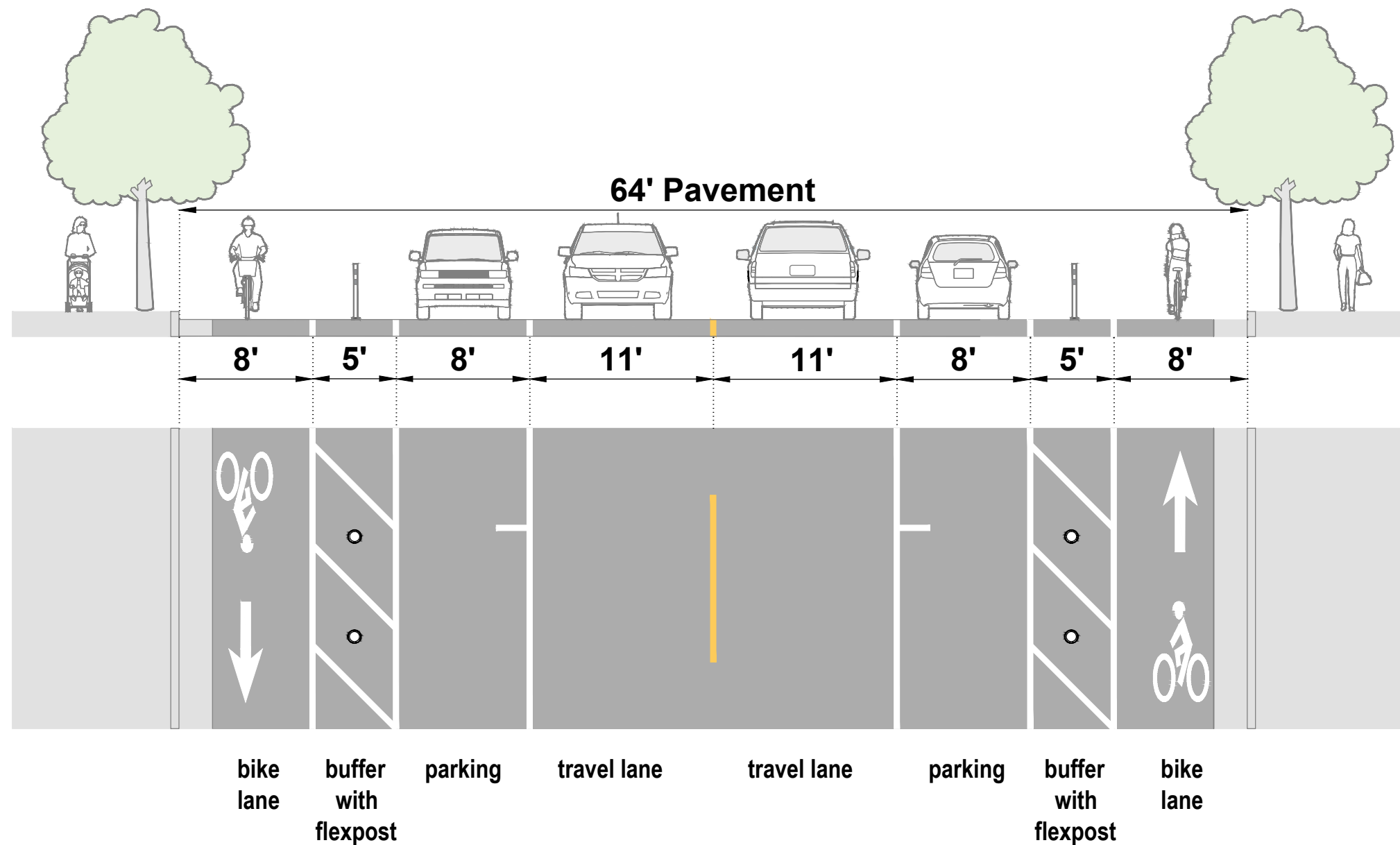


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Section 2 Option 1: Buffered With Flexposts And Parking Protected



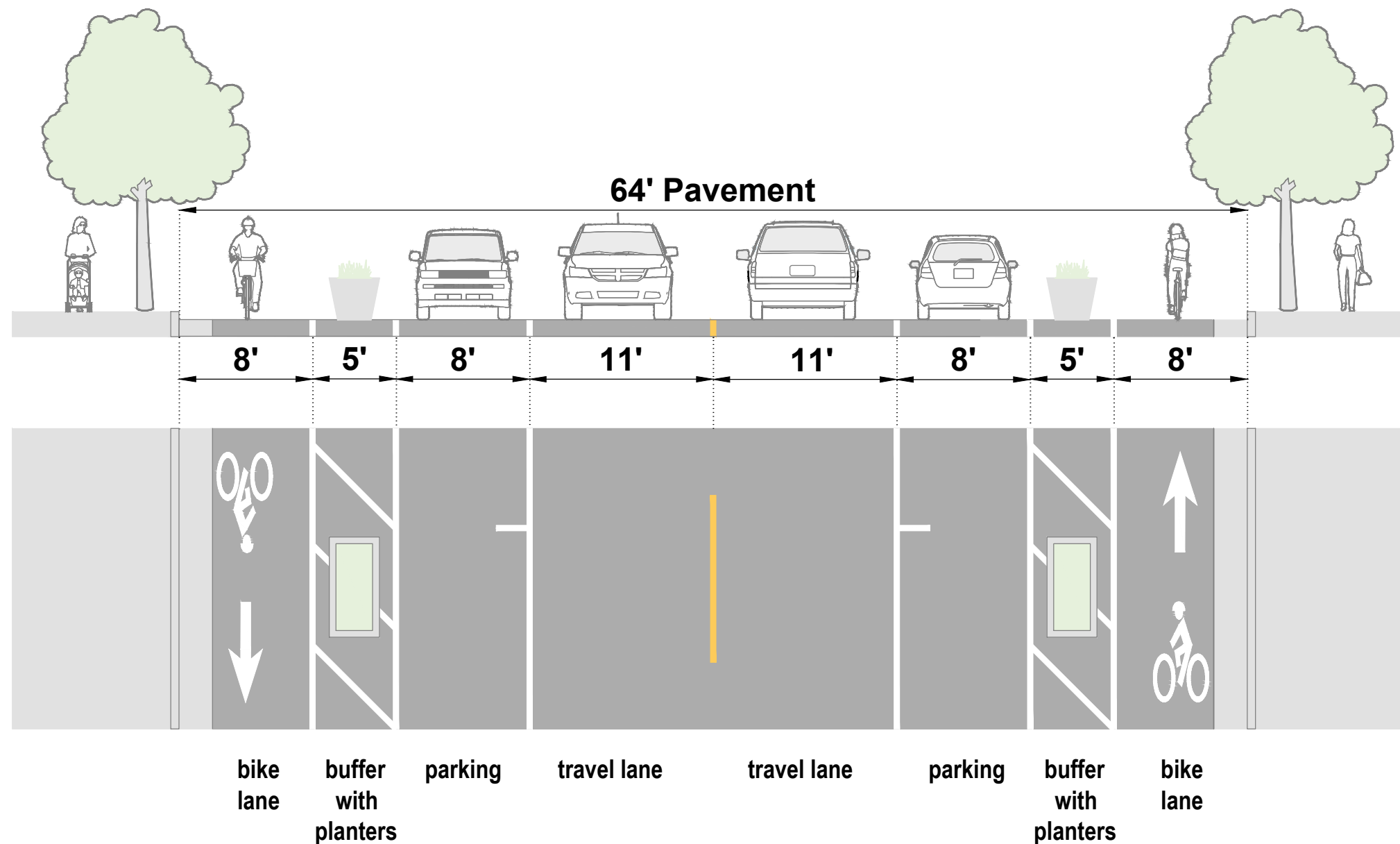
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SECTION 2: OPTION 1
BETWEEN MN-59 & 3RD STREET NW
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Section 2 Option 2: Buffered With Planters And Parking Protected



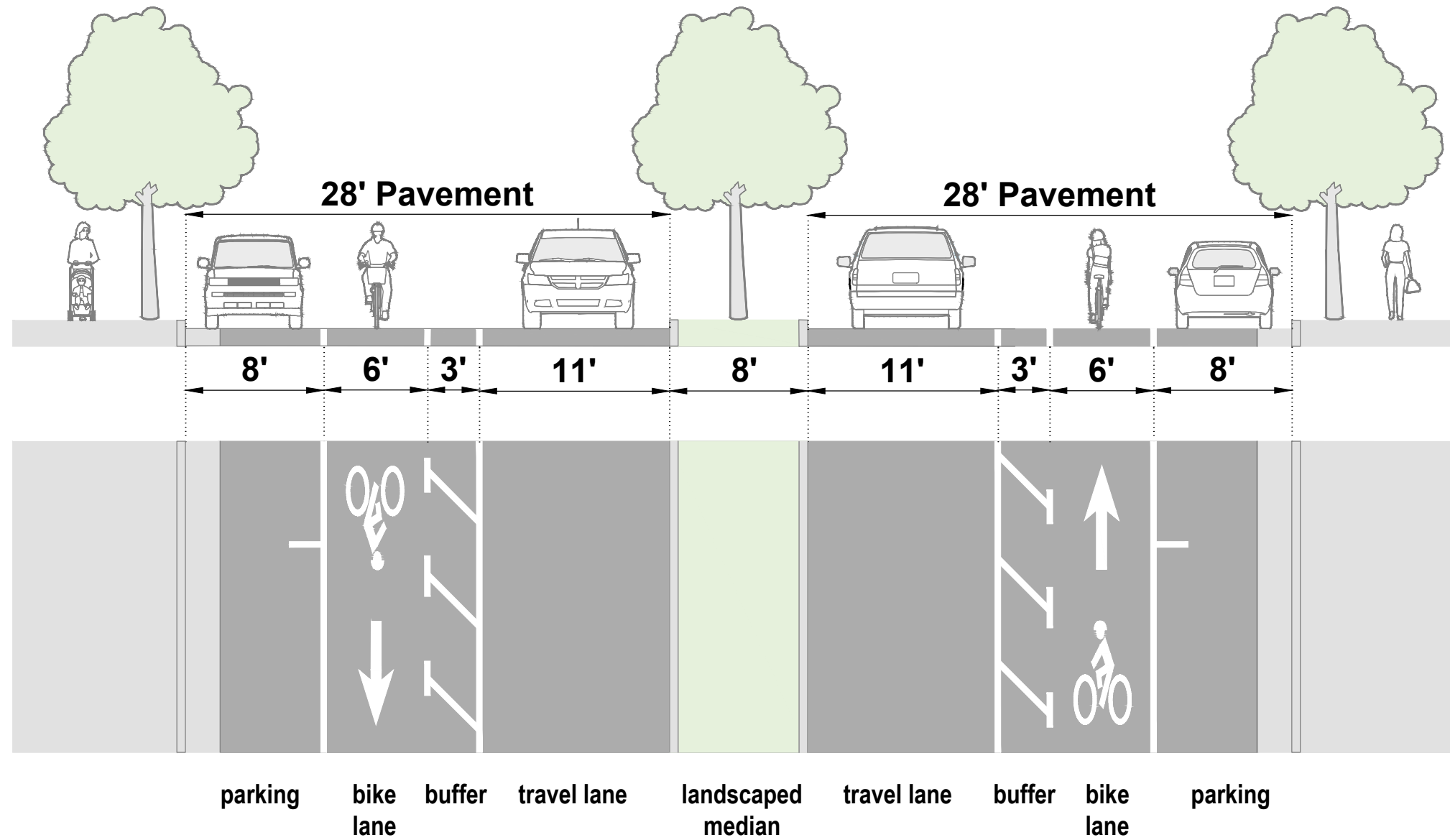
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Section 2 Option 3: Buffered With Landscaped Median

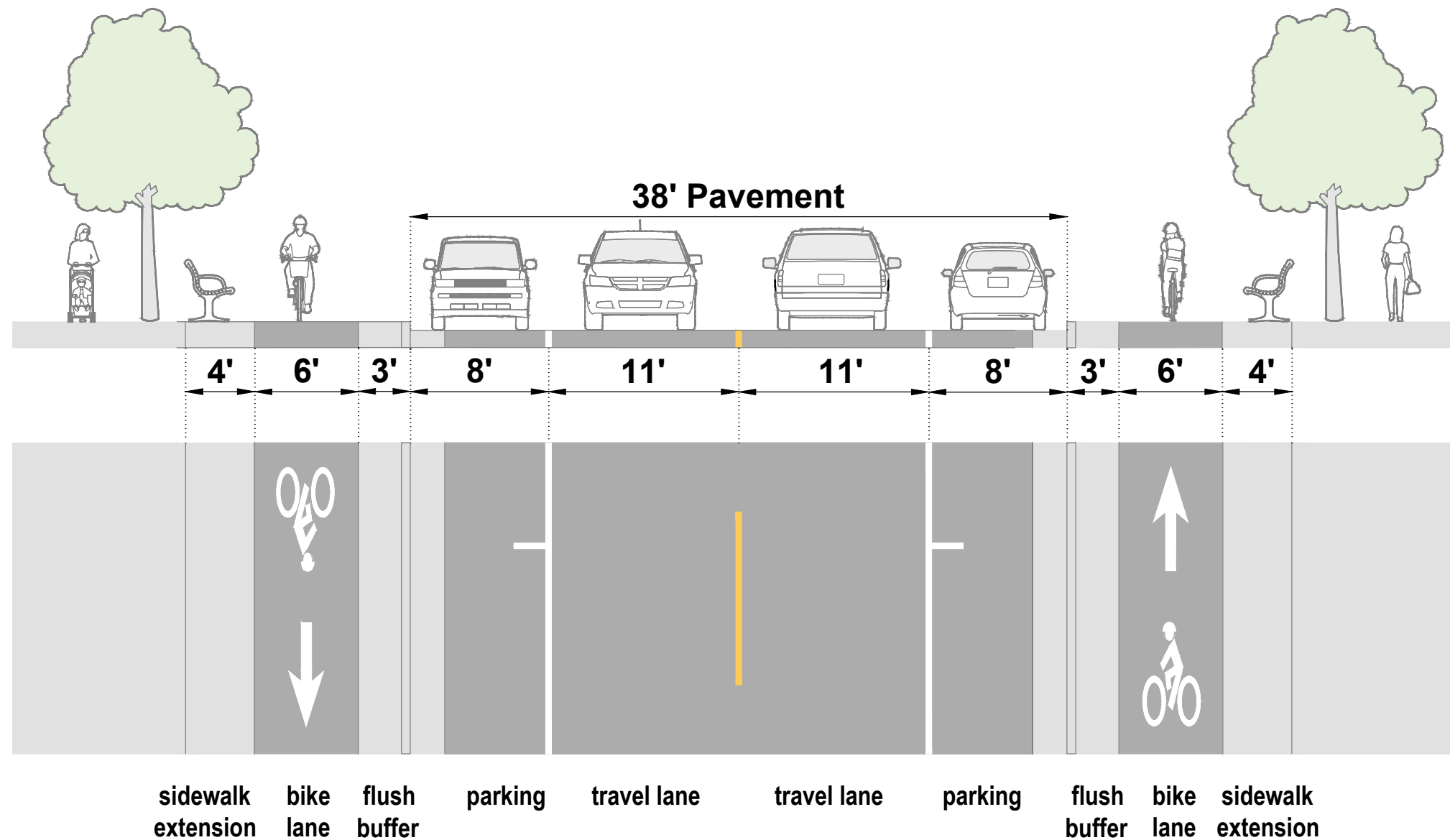


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Section 2 Option 4: Sidewalk Level With Sidewalk Extension

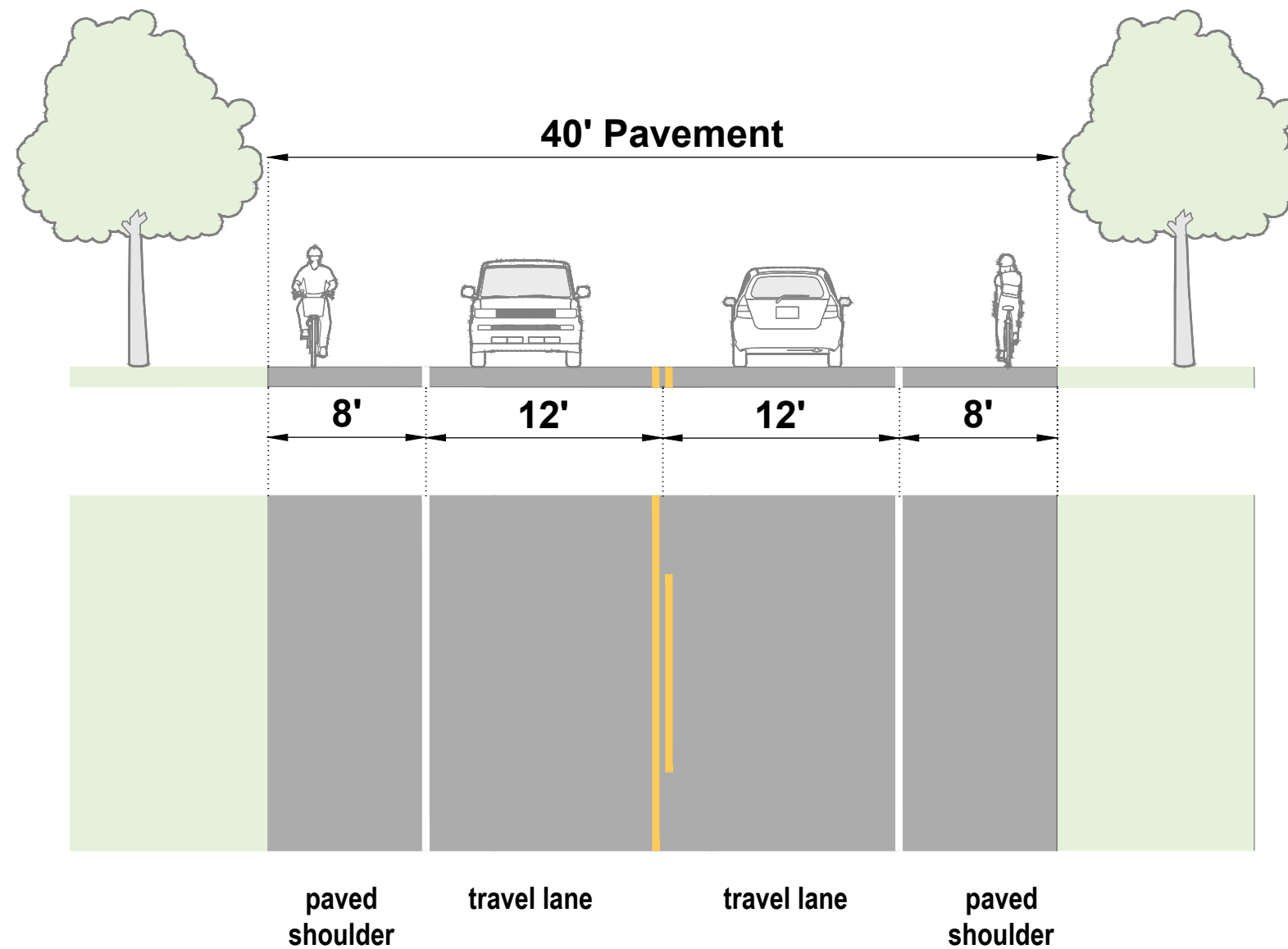


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Section 2 Option 5: Paved Shoulder



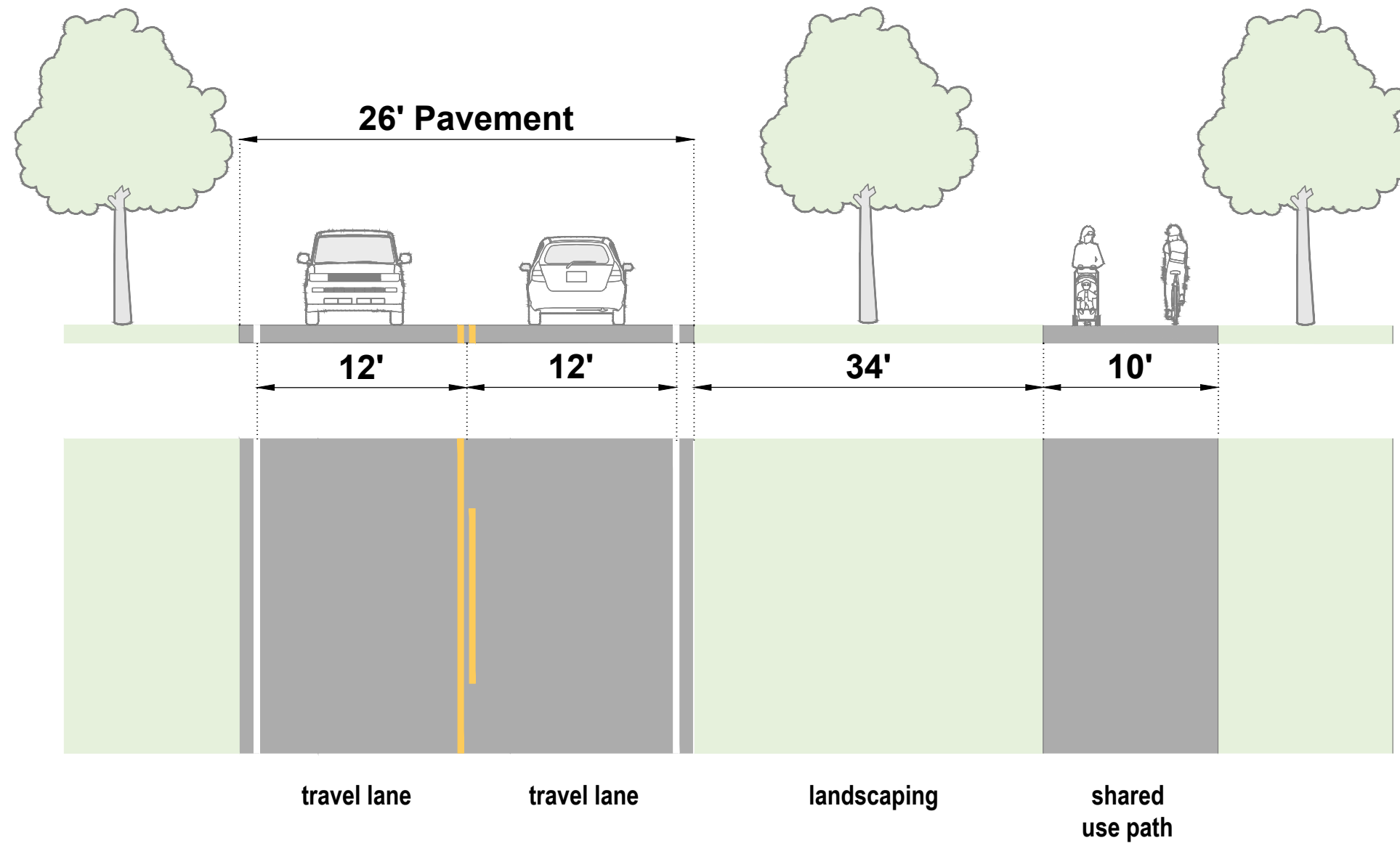
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MN-59 & MN-108 EB/WB TYPICAL SECTIONS
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Section 2 Option 6: Shared Use Path



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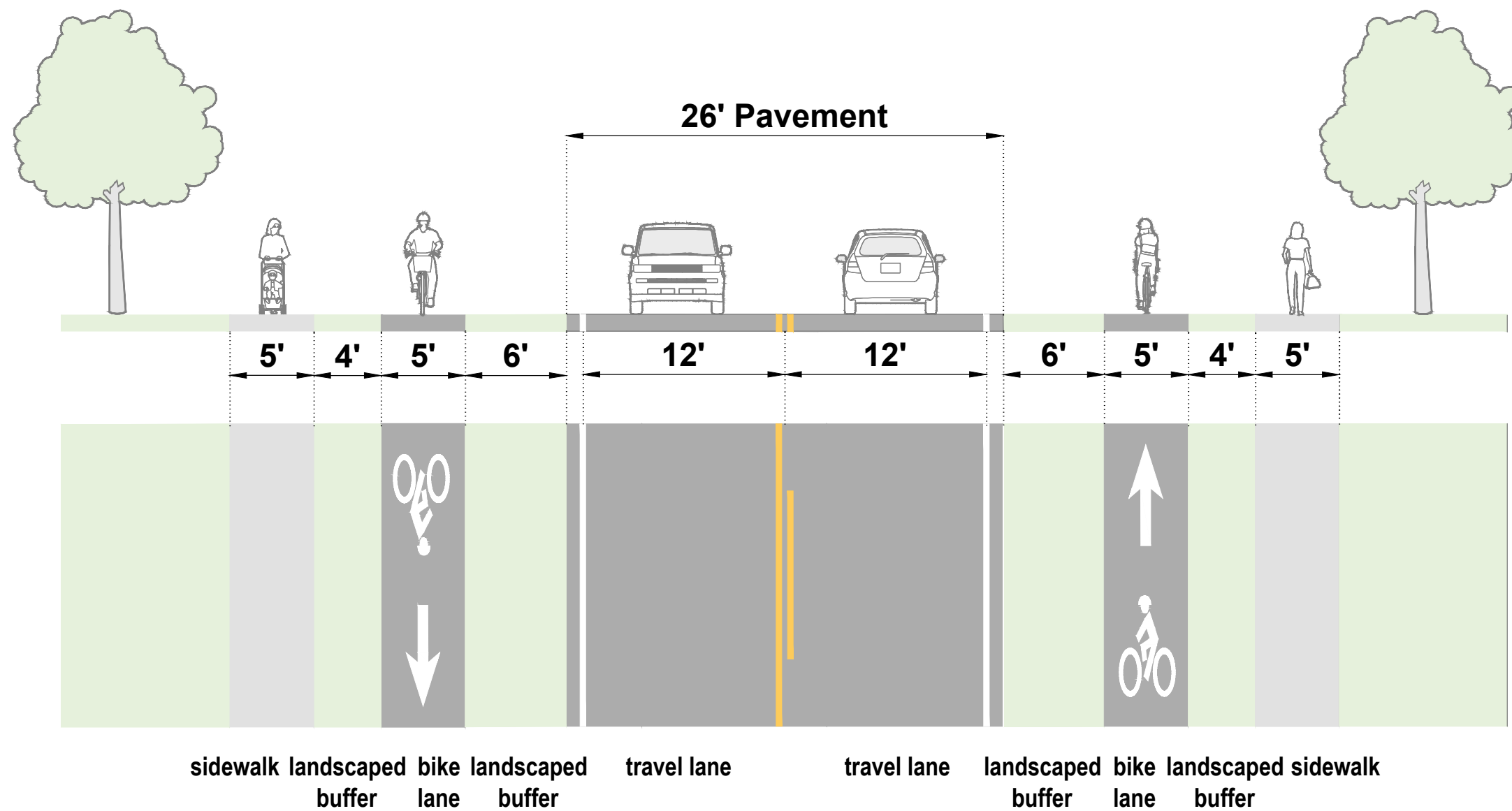
NOTE

1: MODIFICATION TO EXISTING ROW OR ROADWAY ALIGNMENT NEEDED TO ACCOMMODATE PROPOSED CROSS SECTION.

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Section 2 Option 7: Separated Bike Lanes And Sidewalks

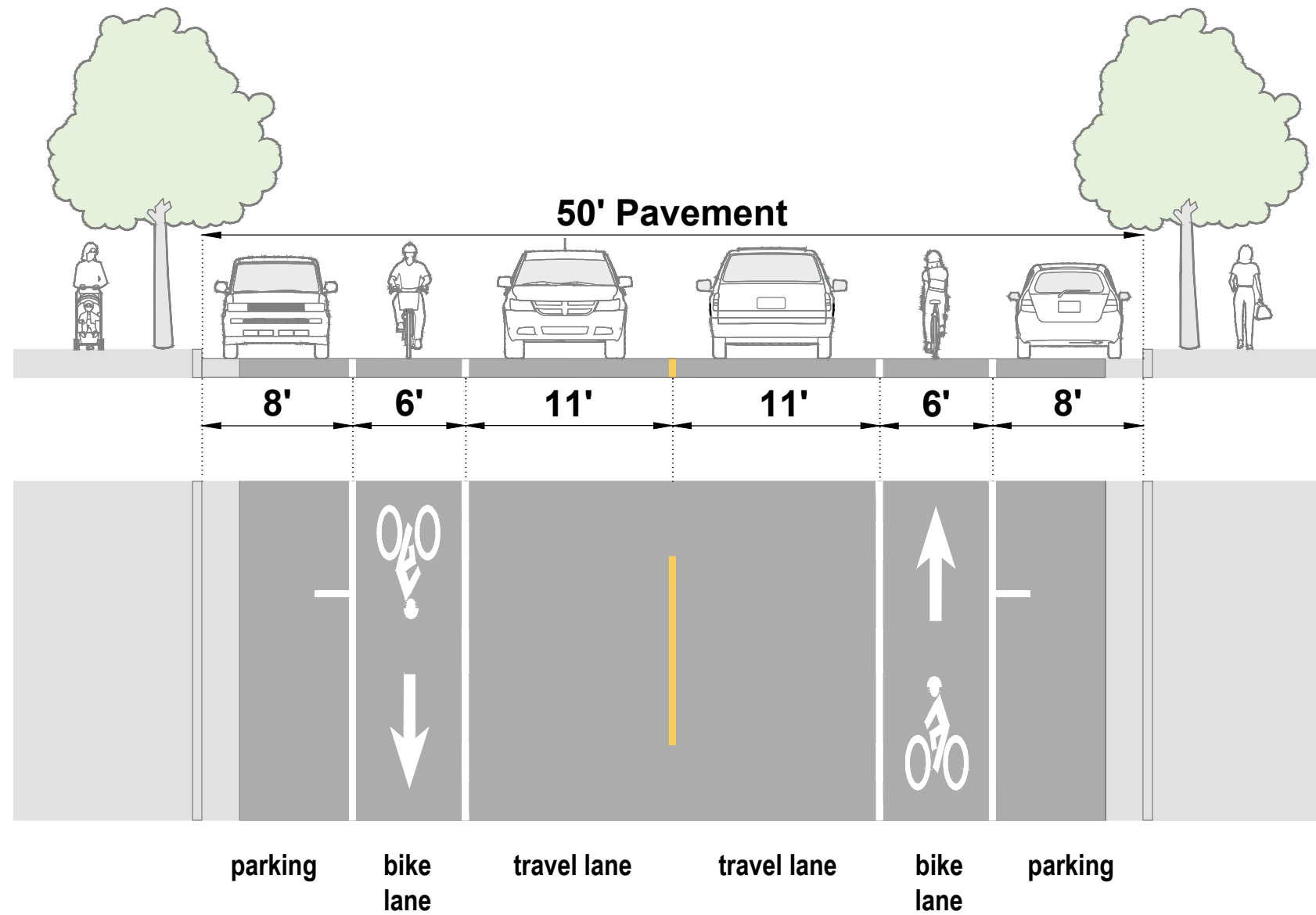


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SECTION 2: OPTION 7
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Section 3 Option 1: Bike Lane



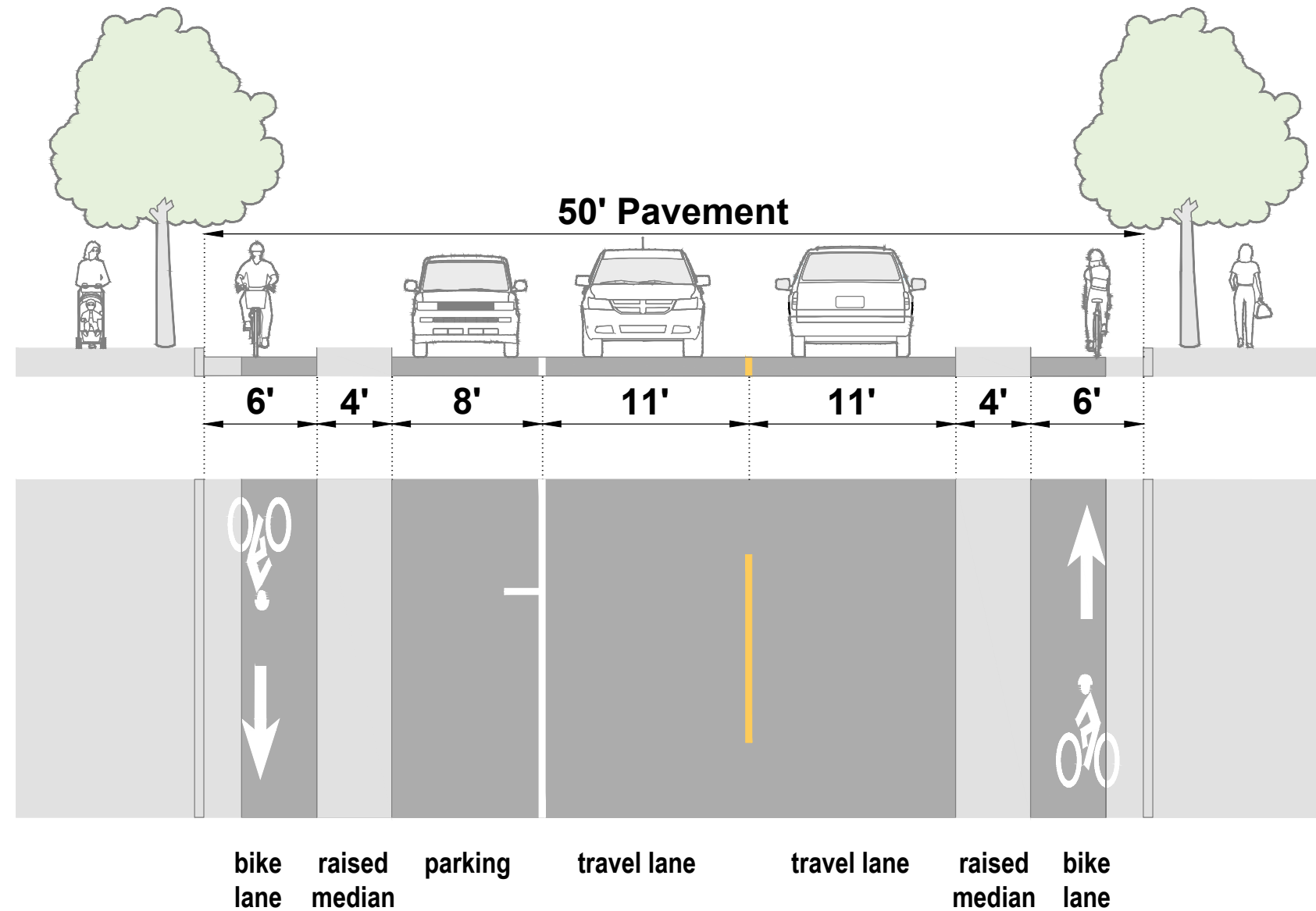
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SECTION 3: OPTION 1
BETWEEN MN-59 & 6TH STREET NE
MN-59 & MN-108 EB/WB TYPICAL SECTIONS
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MnDOT DISTRICT BICYCLE PLANS-D4 PELICAN RAPIDS
11/07/18

Section 3 Option 2: Raised Median With Parking Removal



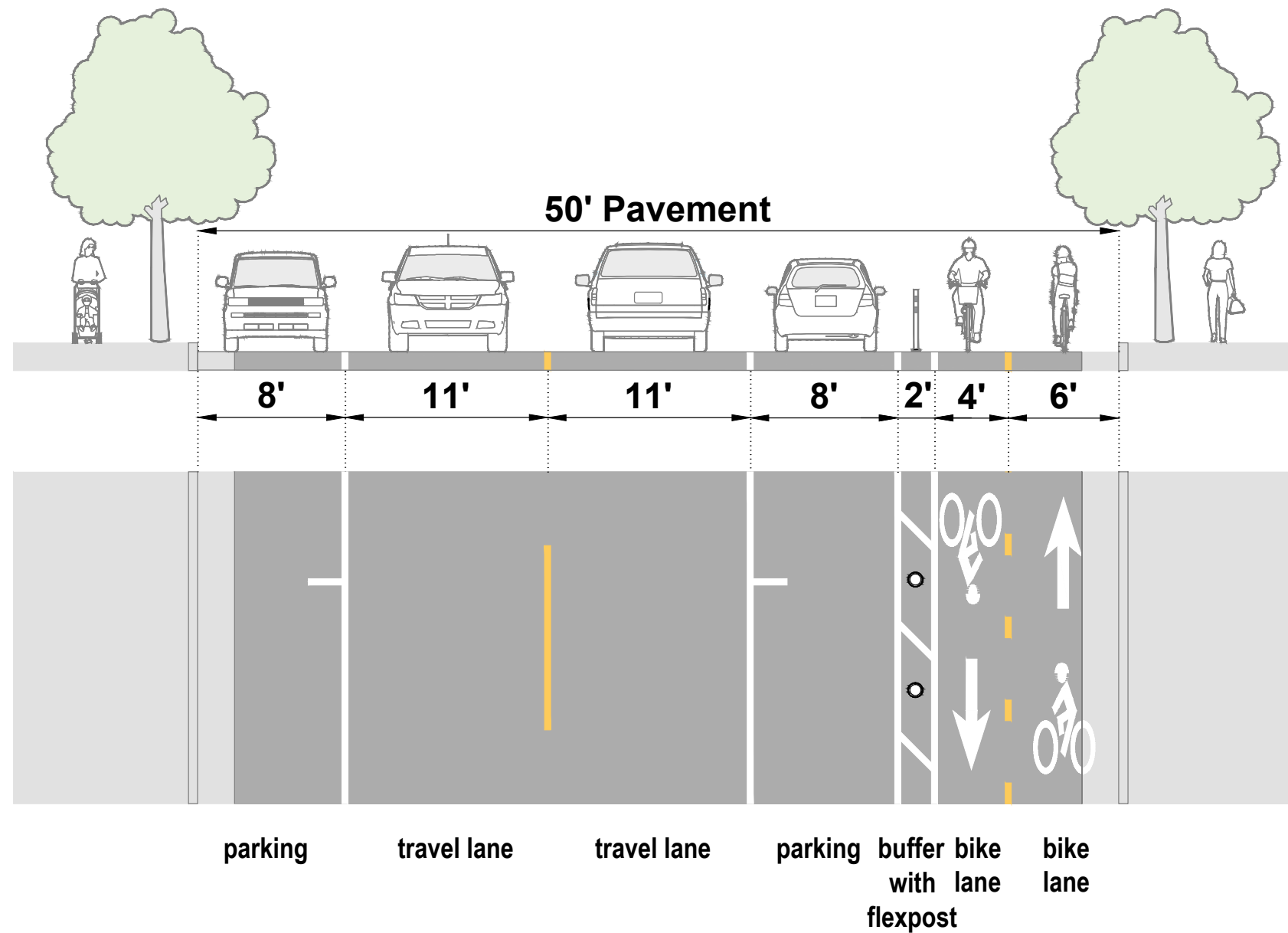
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MnDOT DISTRICT BICYCLE PLANS-D4 PELICAN RAPIDS
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Section 3 Option 3: Parking Protected Two Way With Buffer and Flexpost

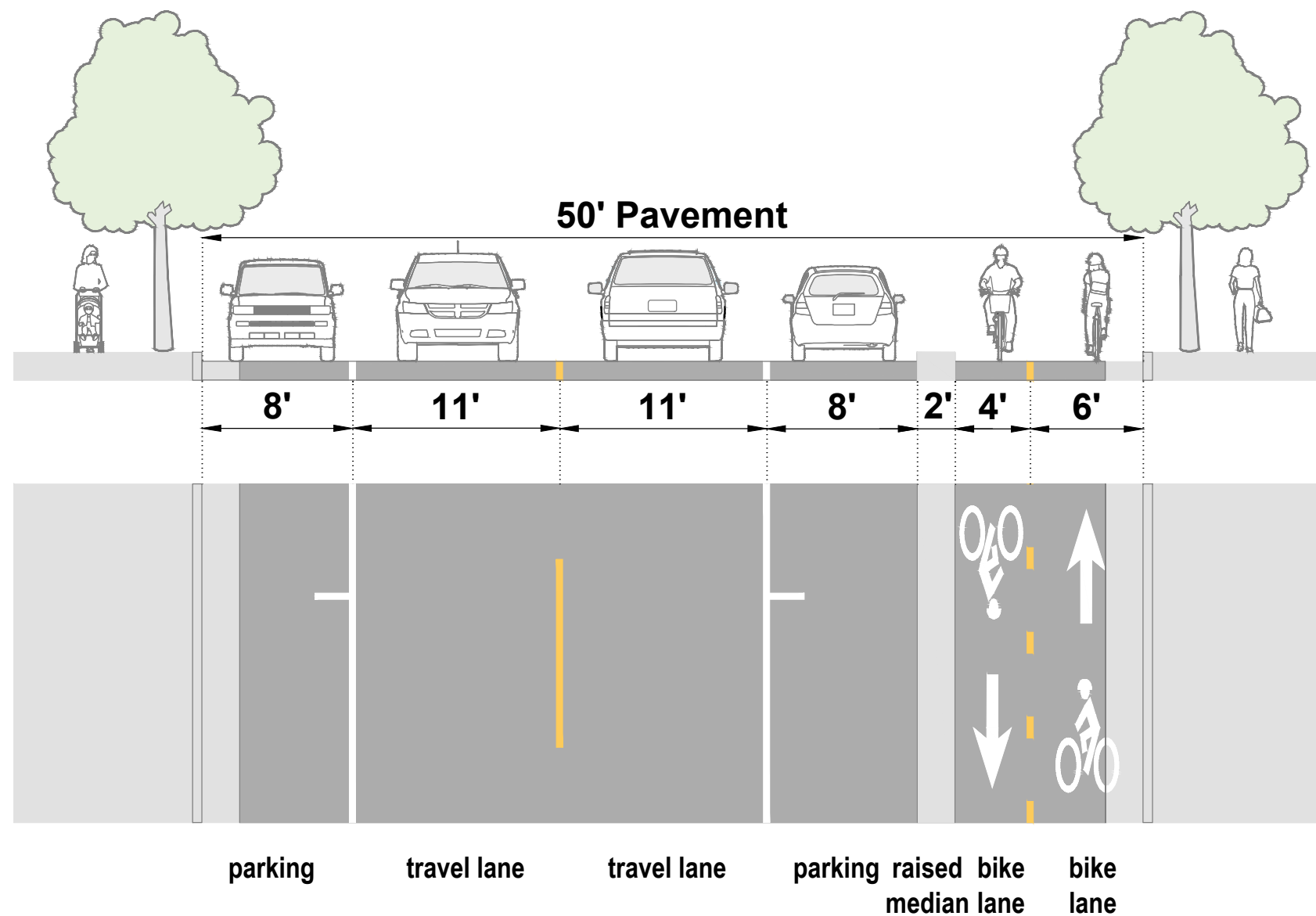


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SECTION 3: OPTION 3
 BETWEEN MN-59 & 6TH STREET NE
MN-59 & MN-108 EB/WB TYPICAL SECTIONS
 PRELIMINARY CONCEPT - NOT FOR CONSTRUCTION
 MnDOT DISTRICT BICYCLE PLANS-D4 PELICAN RAPIDS
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Section 3 Option 4: Parking Protected Two Way With Raised Median



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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)	<input type="checkbox"/> Yes <input type="checkbox"/> 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	<input type="checkbox"/> Yes <input type="checkbox"/> 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)	<input type="checkbox"/> Yes <input type="checkbox"/> 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?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Improvement Opportunities Across the Roadway	
How does the project area score on the District Bicycle Plans route prioritization analysis?	<input type="checkbox"/> Tier 1 <input type="checkbox"/> Tier 2 <input type="checkbox"/> Tier 3 <input type="checkbox"/> Tier 4 <input type="checkbox"/> 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.	<input type="checkbox"/> Yes <input type="checkbox"/> No

<p>Who would maintain the crossings?</p>	<p><input type="checkbox"/> MnDOT <input type="checkbox"/> Local partner has agreed to maintain <input type="checkbox"/> Local partner would be responsible, but maintenance agreement has not been discussed</p>
<p>Improvement Opportunities Along the Roadway</p>	
<p>Is the project identified in a District Bicycle Plan? If so, what priority level does the plan identify?</p>	<p><input type="checkbox"/> High Priority <input type="checkbox"/> Medium Priority <input type="checkbox"/> Low Priority <input type="checkbox"/> Not identified</p>
<p>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.)</p>	<p><input type="checkbox"/> Tier 1 <input type="checkbox"/> Tier 2 <input type="checkbox"/> Tier 3 <input type="checkbox"/> Tier 4 <input type="checkbox"/> Tier 5</p>
<p>Who would maintain the facility?</p>	<p><input type="checkbox"/> MnDOT <input type="checkbox"/> Local partner has agreed to maintain <input type="checkbox"/> Local partner would be responsible, but maintenance agreement has not been discussed</p>
<p>Project Budget Considerations</p>	
<p>Are improvements consistent with MnDOT's Complete Streets policy, MnSHIP and other applicable funding guidance? If yes, summarize below:</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>Should other funding be pursued for the project? (TAP, others?)</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>Does a local partner have a cost participation requirement?</p>	<p><input type="checkbox"/> No <input type="checkbox"/> Yes, and local partner has agreed to participate in costs <input type="checkbox"/> Yes, but cost participation has not been discussed</p>

Decision Making Guidance

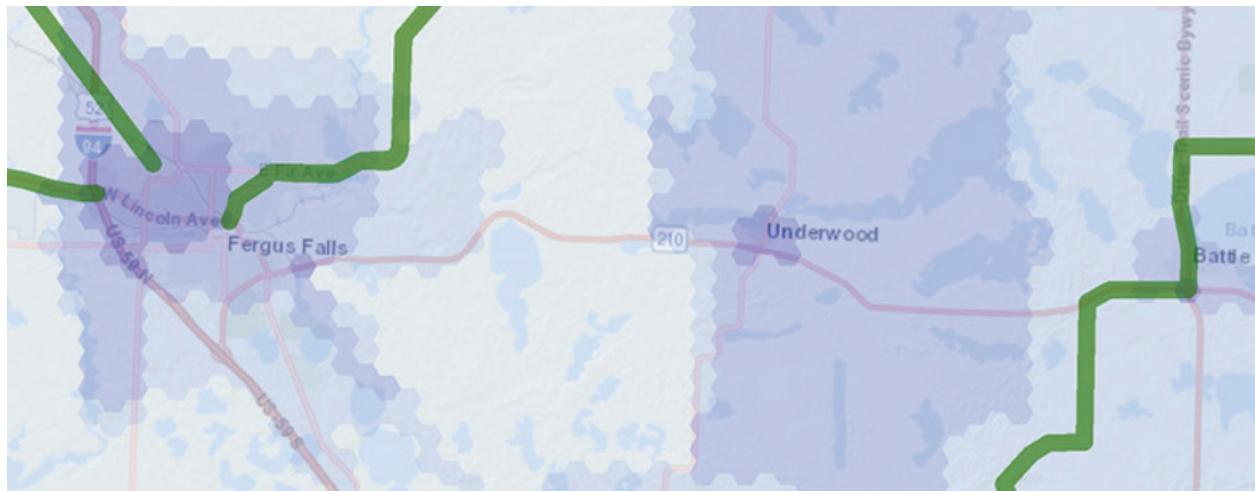
The decision on when to incorporate bicycle accommodations on a project depends on many different factors. The scoping worksheet is intended to help decision makers determine when it is appropriate to incorporate bicycle improvements.

Examples:

Example 1	
Is the project identified in a District Bicycle Plan? If so, what priority level does the plan identify?	<input checked="" type="checkbox"/> High Priority <input type="checkbox"/> Medium Priority <input type="checkbox"/> Low Priority <input type="checkbox"/> 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?	<input type="checkbox"/> Tier 1 <input type="checkbox"/> Tier 2 <input type="checkbox"/> Tier 3 <input type="checkbox"/> Tier 4 <input type="checkbox"/> 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 is 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 destination 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 destination 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 destination 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

Additional Prioritization Criteria Scoring

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 4 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. However, only four members of the District 4 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. N/A indicates that the individual CHIP segment was not scored in the survey by any TAC members.

CHIP Segment Extents	TAC Survey Score
CHIP Segment 4-1 (North side of TH 10 from Frazee to Perham)	N/A
CHIP Segment 4-2 (North side of TH 10 from Perham to New York Mills)	N/A
CHIP Segment 4-3 (South side of TH 10 from New York Mills to Wadena)	N/A

CHIP Segment Extents	TAC Survey Score
CHIP Segment 4-4 (Hwy 9 from 90th Ave to Barnesville)	N/A
CHIP Segment 4-5 (Old 52 through Barnesville)	N/A
CHIP Segment 4-6 (Old 52 from Barnesville to Fergus Falls)	N/A
CHIP Segment 4-7 (Hwy 104 from Barsness Park to Sunburg)	12
CHIP Segment 4-8 (Hwy 28 from Morris to Starbuck)	7
CHIP Segment 4-9 (Frazee to Park Rapids through Smoky Hills State Forest)	10.00
CHIP Segment 4-10 (Rte 75 from Breckenridge to Wheaton)	N/A

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

Analysis Overview

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.

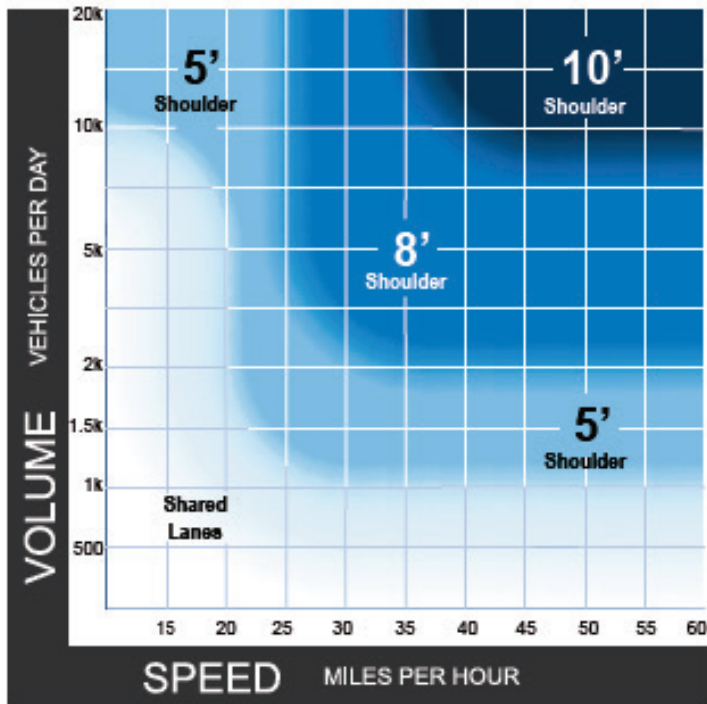
Figure G-1 and Figure G-2 show how traffic speeds and volumes affect desired shoulder width and facility type for people bicycling in rural, urban, and suburban areas. The areas on the charts shaded darker blue represent roadway conditions that are less comfortable for people bicycling due to high motor 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 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 (LTS) analysis includes existing bicycle facility types¹⁴. 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>

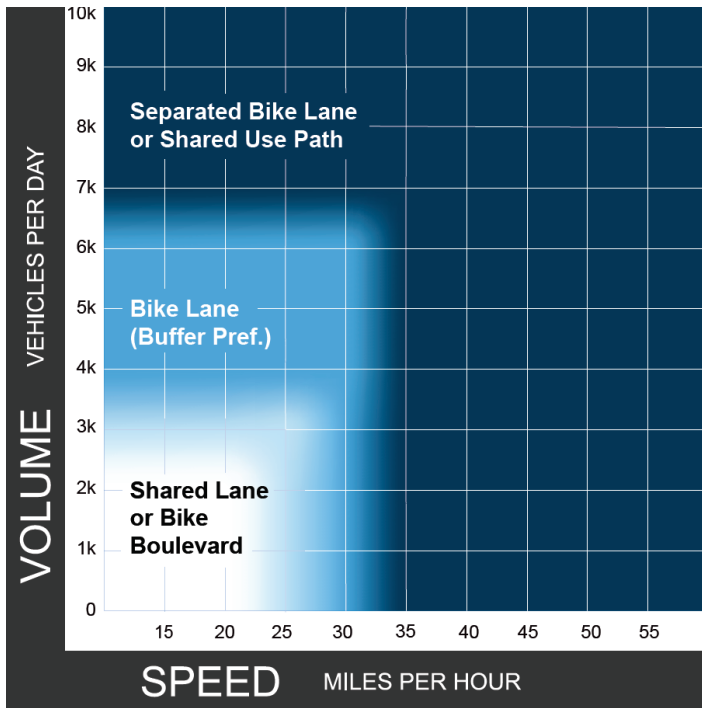
¹⁴ Mekuria, Maaza C., PH.D., P.E., PTOE, Furth, Peter G., PH.D., Nixon, Hilary, PH.D. (2012), Low-Stress Bicycling and Network Connectivity, <http://transweb.sjsu.edu/research/low-stress-bicycling-and-network-connectivity>

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.

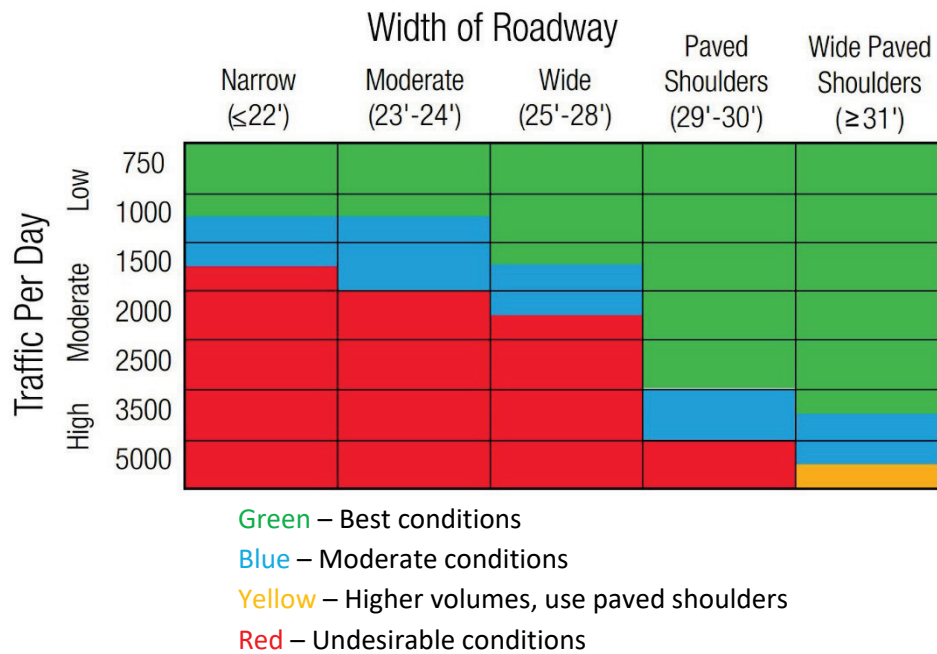


Source: Toole Design

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 4 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-1):

Table G-1: 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-2). 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-2: 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

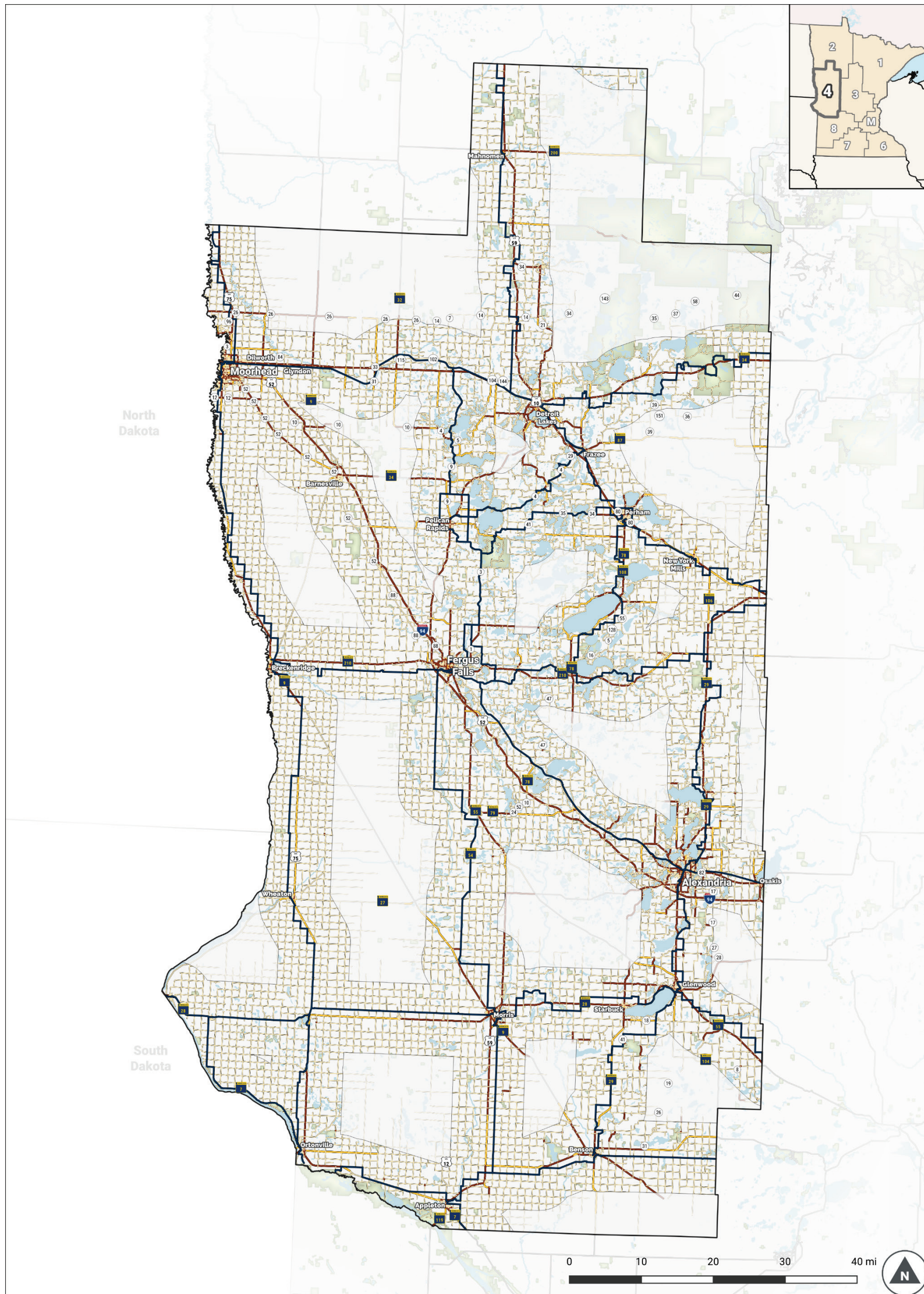
District 4 Bicycling Suitability Results

Figure G-4 displays results of the District 4 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 [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 4 bicycling suitability analysis results.



Bicycling Suitability Routing	Roads	Other
— Good	— Routing Results	□ District Boundary
— Fair	□ Outside Priority Search Corridor	■ Water
— Poor	— Interstate (94)	■ Parks
	— US Highways (10)	
	— State Highway (7)	
	— County (6)	

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.