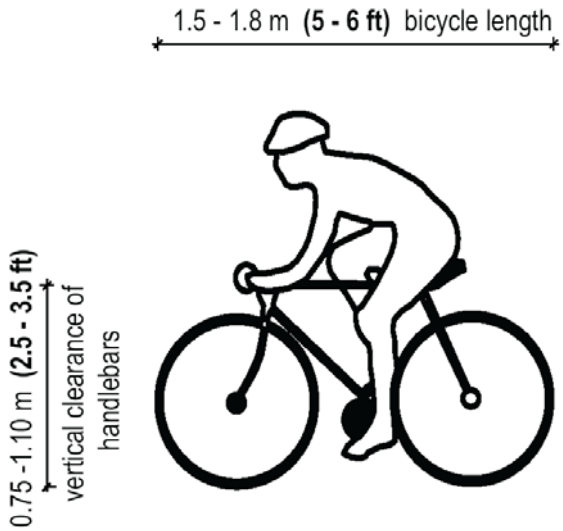
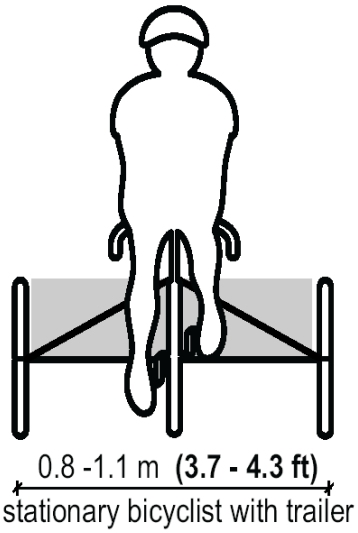
Bicycle Facility Design Guidelines
Chapter 2—Design Factors

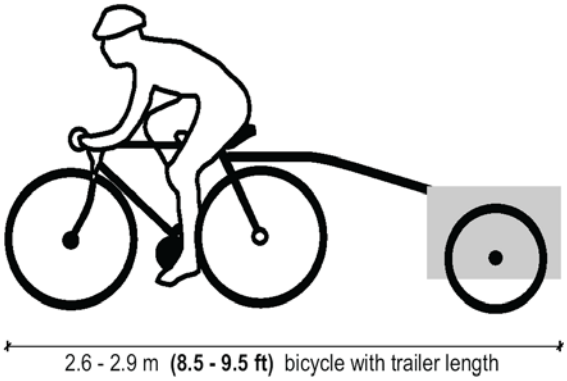
Bicyclist Considerations

Bicyclist Profile— Bicyclists need space to safely traverse trails and roadways. Bicycle facility design should consider the minimum widths required for a typical bicyclist. Multi-use trails should be at least 10 feet in width and bike lanes must be at least 5 feet in width to allow for lateral movement.



Side View

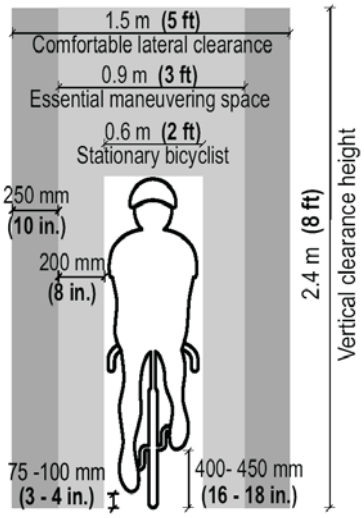




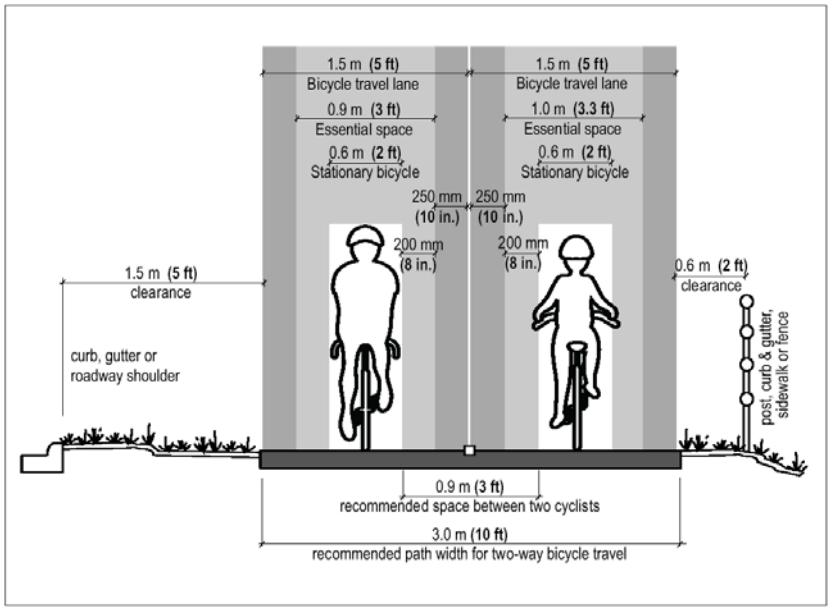
Side View

Diagrams: The figures show the minimum widths required by bicyclists with and without a trailer. The figures are taken from the March 2007 MnDOT Bikeway Facility Design Manual. These dimensions are also consistent with AASHTO guidance and are the basis for MMUTCD standards.

Front View



Front View



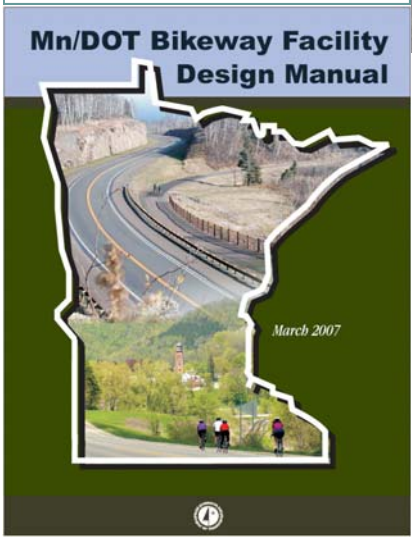
Bicycle Facility Design Guidelines
Chapter 2—Design Factors

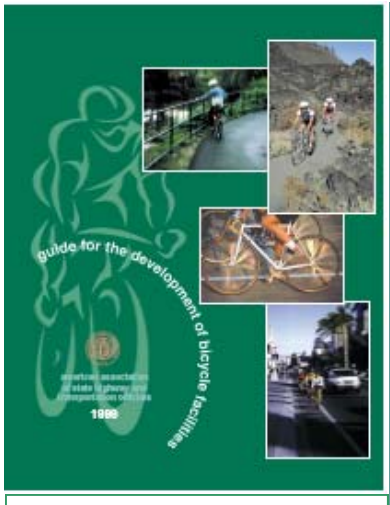
Bicyclist Considerations

Types of Users and Types of Trips—Every bicyclist has different skills and abilities. Some adult bicyclists prefer to ride on-street with traffic and others prefer to ride on designated facilities like off-street trails and on-street bike lanes. As AASHTO suggests, children and seniors have different needs and also require consideration. The Mn/DOT Bikeway Facility Design Manual addresses the various user needs and will be referenced throughout this document.

Above: Stone Arch Bridge

There are a number of categories of bicyclists based on the types of trips taken. Both recreational and commuter bicycling (trips to work) is on the rise throughout the city and has been well documented. The City of Minneapolis has worked hard over the years to develop and market facilities that serve commuter bicyclists. Similarly the Minneapolis Park and Recreation Board (MPRB) has created an excellent network of routes and complimentary programming with recreational users in mind. Utilitarian bicycling (functional bicycling trips) is much tougher to track, but offers a great deal of potential. Many residents are now considering bicycling as a means of transportation to complete short trips to retail and commercial nodes to complete errands. This design guidelines will attempt to serve all types of bicyclists for all types of trips.





Above: AASHTO defines three major user groups; A, B, and C riders. The City of Minneapolis provides an assortment of facility types to meet the diverse needs of the community.

Advanced or experienced riders are generally using their bicycles as they would a motor vehicle. They are riding for convenience and speed and want direct access to destinations with a minimum of detour or delay. They are typically comfortable riding with motor vehicle traffic; however, they need sufficient operating space on the traveled way or shoulder to eliminate the need for either themselves or a passing vehicle to shift position.

Basic or less confident adult riders may also be using their bicycles for transportation purposes, e.g., to get to the store or to visit friends, but prefer to avoid roads with fast and busy motor vehicle traffic unless there is ample roadway width to allow easy overtaking by faster motor vehicles. Thus, basic riders are comfortable riding on neighborhood streets and shared use paths and prefer designated facilities such as bike lanes or wide shoulder lanes on busier streets.

Children, riding on their own or with their parents, may not travel as fast as their adult counterparts but still require access to key destinations in their community, such as schools, convenience stores and recreational facilities. Residential streets with low motor vehicle speeds, linked with shared use paths and busier streets with well-defined pavement markings between bicycles and motor vehicles, can accommodate children without encouraging them to ride in the travel lane of major arterials.

Types of Users and Types of Trips—Minneapolis streets and trails serve a diverse group of users. Every bicyclist has different skills and abilities and it is important to design a network of facilities that meet all bicyclists needs. Specific design treatments are suggested below.

A Riders: AASHTO "A" riders are adults comfortable riding on all streets and are capable of riding in most conditions. Although "A" riders often ride with traffic and take the most direct route possible; good street and trail design is critical. It is important to make sure that all streets and trails are properly designed and maintained so that every street is suitable for biking. Bicycle lanes on major roadways and wide trails with plenty of passing room make cycling safer and more comfortable for this user group. In addition to bike lanes, innovative treatment such as bicycle detection at signals, bike boxes, destination and way-finding signage, and colored pavement markings may be considered to serve this user group. Wide outside lanes help vehicles and bicyclists safely pass and are recommended when there is not enough room for bike lanes.

B Riders: AASHTO "B" riders are adults that are comfortable riding with traffic but prefer routes that have less vehicle traffic and greater separation from motorists. Bicycle lanes and shared use pavement markings help this user group feel more comfortable on busier streets. In corridors where a bike lane can not be installed along a major roadway, a bicycle boulevard may be considered on an adjacent street. Most cyclists in this group are comfortable riding with traffic on local streets.

C Riders: AASHTO "C" riders consist of children, seniors, and vulnerable adults who are only comfortable riding on trails, sidewalks, and local streets. This is one of fastest growing segments of the population and thought must be given on how to safely design streets and trails to accommodate this user group. In many cases a bicycle is the sole form of transportation for many children and seniors. It is recommended that trails be designed wide enough to allow slower bicyclists to better mix with faster bikers and that busy intersections be designed with seniors and children in mind. When designing bicycle facilities it is important to keep sightlines clear since children tend to be more difficult to see. In addition, parents with children often have trailers, and seniors tend to travel more slowly.

Bicyclist Considerations

Selecting a Bicycle Facility: On-Street Bikeways—Before selecting an on-street bicycle facility, several factors should be considered. The MnDOT Bikeway Facility Design Manual outlines the following key factors that are used to determine appropriate facility design:

- Motor vehicle speeds
- Urban or rural location
- Roadway functional classification
- Average daily traffic volumes
- On-street parking
- Intersections and driveways
- Right-of-way constraints
- Vehicle turn lane configuration
- Number of traffic lanes
- Topography, grades, sight distances, and sight lines
- Traffic compostion, especially volumes of large trucks
- Bus routes
- Peak-hour vehicle traffic volume
- Average daily and peak-hour bicycle traffic volume
- Bicyclist characteristics (type of bicyclists served)

Above: The Nicollet Mall is a shared bus/bike facility in Downtown Minneapolis. From 1997 to 2010 bicycle were not allowed to use the Nicollet Mall during weekdays due to the high number of bus conflicts.

Based on these factors and using engineering judgment, an appropriate bicycle treatment can be selected for a given corridor. The MnDOT Bikeway Facility Design Manual states that the selection of a bikeway suited for a travel corridor depends on many factors including bicyclists' abilities, corridor conditions, current and future land use, topography, population growth, roadway characteristics, and the cost to build and maintain the bikeway. Within any travel corridor, more than one option may be needed to serve all bicyclists. However, no one type of bikeway or road design suits every bicyclist.

Competition for space in a given right-of-way often requires difficult choices to be made. Often there is not enough room to allow for bicycle lanes, adequate vehicle capacity, transit accommodations, parking needs, ample green space, and sidewalks. In many cases competing modal interests must share space or use other adjacent corridors. It is helpful to solicit neighborhood and citizen input to determine modal priority and to create a reasonable cross section. The Minneapolis Bicycle Master suggests design treatments for specific corridors. As the design process matures, suggested route treatments may be adjusted to reflect community needs, more detailed technical information, and advances in best practices.

Bicyclist Considerations

Above: Bicycle riding on sidewalks is allowed within the City of Minneapolis in residential areas, but is not permitted by ordinance in commercial areas including Downtown, Dinkytown, and Uptown. Photo of Rachel Speck.

Selecting a Bicycle Facility: Off-Street Bikeways—Off-street bikeways are often constructed in grade separated corridors or corridors with limited crossings. According to the MnDOT Bikeway Facility Design Manual the goals in selecting and designing a bikeway type are:

- The bikeway needs to allow for bicyclists to operate in a manner that is consistent with traffic laws.
- The needs of motorists, pedestrians, and bicyclists need to be integrated into the design of the bikeway.
- Road crossings and connections are provided that provide access to other bikeways.
- In an urban setting it is recommended that Shared Use Paths be constructed along roadways that exceed 10,000 vehicles per day on a 2-lane section, along roadways that exceed 20,000 vehicles per day on a 4-lane section, and when motor vehicle speeds exceed 45 mph or greater.

Per the Minneapolis Bicycle Master Plan, off-street facilities should be spaced 2 miles apart.

Table 4-1: Bikeway Design Selection for Urban (Curb and Gutter) Cross Section – English Units

Motor Vehicle ADT (2 Lane)		<500	500-1,000	1,000-2,000	2,000-5,000	5,000-10,000	>10,000
Motor Vehicle ADT (4 Lane)		N/A	N/A	2,000-4,000	4,000-10,000	10,000-20,000	>20,000
Motor Vehicle Speed	25 mph	SL	WOL	WOL	WOL	BL = 5 ft	Not Applicable
	30 mph	SL with sign	WOL	BL = 5 ft	BL = 5 ft	BL = 6 ft	BL = 6 ft
	35 - 40 mph	WOL	BL = 5 ft	BL = 5 ft	BL = 6 ft	BL = 6 ft	BL = 6 ft or PS = 8 ft
	45 mph and greater	BL = 5 ft	BL = 5 ft	BL = 6 ft	BL = 6 ft	BL = 6 ft or PS = 8 ft	SUP or PS= 10 ft

BL = Bicycle Lane, SL = Shared Lane, WOL = Wide Outside Lane, SUP = Shared-Use Path, PS = Paved Shoulder

Above: The MnDOT Bikeway Facility Design Manual includes the guidance above for how to select a type of bicycle facility given variable roadway conditions. As speeds and volumes increase, so does the degree of separation. This chart is used by MnDOT to review federal projects.

Bicyclist Considerations

Selecting a Bicycle Facility: Substitute Treatments—In some cases traditional treatments or methods do not result in improved safety or higher bicycle mode share. Other communities throughout the world have found that bicycle boulevards/on-street greenways, corridors with shared use markings with signage, and corridors with cycle tracks more effectively attract bicyclists. In Minneapolis Bicycle Boulevards and Shared Use Pavement Markings with Signage will no longer be treated as innovative or experimental and will be used as substitute treatments when it has been determined that traditional treatments will not adequately address safety concerns or mode share goals. Specific guidance for each of these treatments can be found in the on-street facility chapter.

Above: Bike boulevard on Fillmore Ave NE.

Degrees of Separation	Location	Type of Treatment (MnDOT Table 4-1)	Substitute Innovative Treatment
Integration	On-Street	Shared Lane (SL)	Bicycle Boulevard/ On-Street Greenway (Under 2,000 ADT)
↕		Shared Lane With Signage	
		Wide Outside Lane (WOL)	Shared Use Markings with Signage (2,000-10,000 ADT)
		5-Foot Bike Lane (BL)	
		6-Foot Bike Lane (BL)	
		8-Foot Paved Shoulder (PS)	Cycle Track (5,000-20,000 ADT)
		10-Foot Paved Shoulder (PS)	
	Off-Street	Multi-Use Trail (SUP)	
Separation		Separated Off-Street Trail	

Above: The table above shows degrees of separation and types of recommended treatments based on Table 4-1 in the MnDOT Bikeway Facility Design Manual . When specific criteria are met, substitute treatments may be used in lieu of traditional types of bikeways.

Bicycle Facility Design Guidelines
Chapter 2—Design Factors

Bicyclist Considerations

Bicycle Safety —Bicycle Safety is the most important aspect of bicycle facility design. Understanding how the most common types of crashes occur results in better design treatments with fewer crashes, injuries, and fatalities. Although many crashes are the result of drivers and bikers not following the rules of the road, special attention must be given to maintaining standards and guidelines. Maintaining good sightlines, using appropriate traffic control devices, and following geometric standards help minimize crashes. Crash trends should be analyzed to determine if there is a problem and then appropriate countermeasures should be applied using engineering judgment.

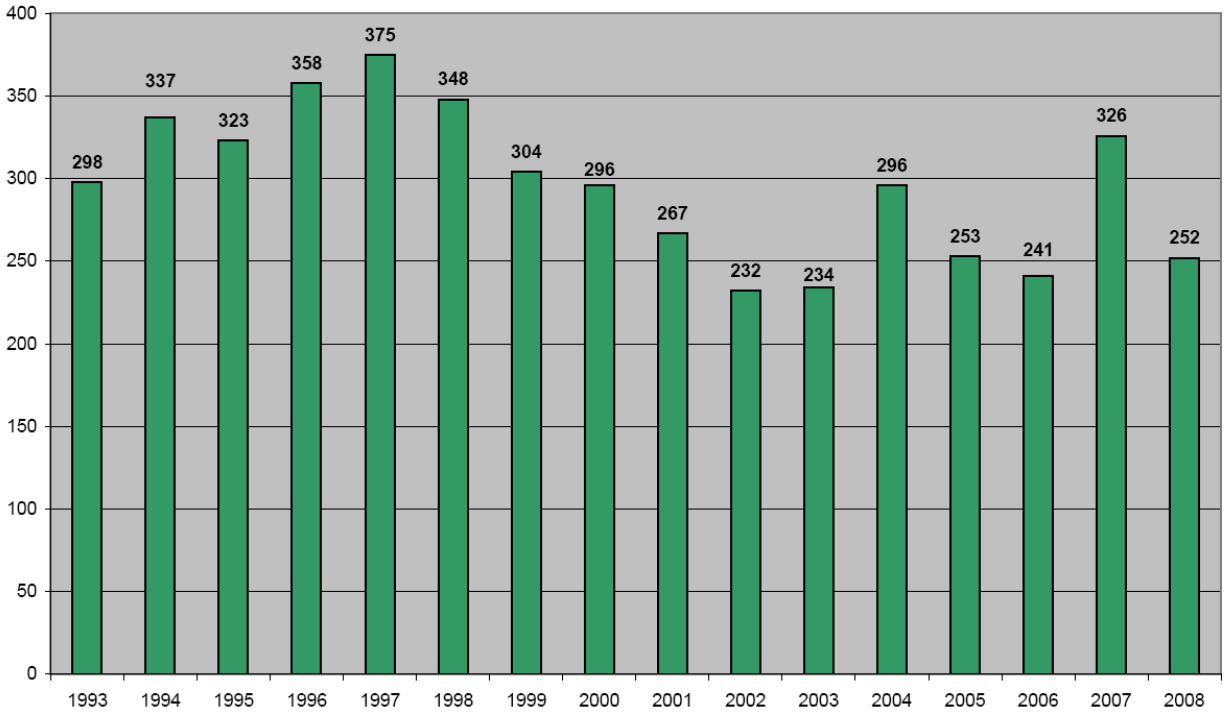
Above: Example of a bike lane in the "door zone". Good design can avoid these types of crashes.

The 6 most common types of bicycle-vehicle crashes:

- Motorist's Failure to Yield
- Bicyclist's Failure to Yield
- No Lights at Night
- Wrong-Way Riding
- Being Hit From Behind
- Opening Car Doors

Minneapolis Bicyclist-Motorist Crashes by Year (1993 to 2008)*

**as reported to Minneapolis Public Works, from the MPD and Minneapolis Park Police*



Above: The chart shows the total number of bicycle crashes decreasing in Minneapolis from 1993 to 2008. Bicycle mode share in Minneapolis has jumped from 1.9% in 2000 to 4.3% in 2008, resulting in a lower crash rate.

Bicyclist Considerations

Increasing Bicycling —Increasing the number of bicyclists is a core goal of the Minneapolis Bicycle Program. The Minneapolis Bicycle Master Plan focuses on the 6 E's; Encouragement, Education, Engineering, Enforcement, Evaluation, and Equity. Although this manual mainly focus on engineering details, it is just as important to focus on the other elements of the bicycle program to increase the amount of trips taken by bicycle.

Minneapolis has one of the largest bicycling mode shares in the United States and the number of bicyclists continue to grow. Clearly much of the growth of bicycling in Minneapolis over the last 20 years can be attributed to the number of miles of dedicated bicycle lanes and trails in addition to the number of bike racks and other bicycle accommodations such as bike racks on buses, bike centers, and educational/promotional programs. Continuing these investments should further increase bicycling in the city.

Bicycle facility planning in Minneapolis has always been done at a grass roots level, involving stakeholders at all levels. Bicycle facilities should reflect community values and priorities. Efforts should be made not to force bicycle projects on neighborhoods or communities that do not want them. However, in recent years the demand for bicycle facilities has far outweighed the resources available so difficult funding choices are often made

Ensuring modal balance is also an essential component in the effort to increase bicycling. Mulit-modal connections and reasonably spaced connected bikeways are key elements.

Above: Bicyclist crossing the Nicollet Mall.

Above: Bicycle parked at the Central Library.

Bicyclist Considerations

Access Management—Access management limits the number of driveways, midblock crossings, and access points along an on-street bike route or a trail corridor. By limiting access there are fewer conflict zones between bicycles and motor vehicles therefore improving safety and mobility.

Above: West River Parkway Trails.

Above: Trail along Godfrey Parkway near Minnehaha Falls.

Off-Street Trails: Off street trails are typically located in corridors with few at grade crossings. Trail corridors are often part of active or former railroad corridors, located along lakes and rivers, placed parallel to parkways, and constructed near uninterrupted natural features. Most arterial trails have fewer than 3 at-grade crossings per mile and new crossings should be regulated. Off-street trails placed along roadways with driveways must have good visibility for bicyclists and vehicles.

On–Street Bikeways: On street bikeways including roadways with bike lanes and signed bike routes should be placed along corridors with few driveways to minimize conflicts. A bicycle lane should be striped solid perpendicular to any driveway or alley entrance and should only be interrupted for a turn lane/roadway intersection or a bus stop. Driveways should be minimized and/or consolidated in both commercial and residential zones. Bicycle crashes can also be avoided by keeping sightlines clear.

Above: Bicyclist riding in Chicago, Illinois.

Bicyclist Considerations

Bicycle Level-of-Service—Bicycle Level-of-Service (LOS) is an important concept on roadways with very high bicycle volumes. In situations where bicycle volumes are high or where a large percentage of traffic in a corridor is bicycles, adjustments in the cross section may be made. In cases with limited space, designers must often choose between a bike lane, on-street parking, or a turn lane in order to make a roadway properly function. Determining LOS for bicycles, pedestrians, and vehicles help designers allocate space in the roadway cross section, and ensure that a corridor moves as smoothly as possible for all.

Off-Street Routes: Guidance for determining off-street trail widths based on projected bicycle and pedestrian volumes can be found in the off-street segment of this document. Congestion on narrow trails can often lead to crashes and significant delay. Many of the trails in Minneapolis separate bicycles from pedestrians and are wide enough to accommodate thousands of users per day.

On-Street Routes: The Highway Capacity Manual (HCM) provides calculations for arriving at bicycle level-of-service for signalized intersections with on-street bike lanes. LOS A is a free flow condition and LOS F is a major delay. Some communities are now looking at quality of service and not capacity as the means of measuring bicycle level-of-service. Level-of-service calculations that follow this model use pavement condition, number of driveway crossings, average daily traffic volumes, width of pavement, presence of parking/parking lane width, percentage of heavy vehicles, number of lanes of traffic, and posted speed limit as criteria for determining LOS for a given corridor or intersection. These calculations help determine whether a bike lane is justified.

Above: A wide trail along Minnehaha parkway.

Above: Bike passing lane in Portland, Oregon

Above: Nicollet Mall congestion

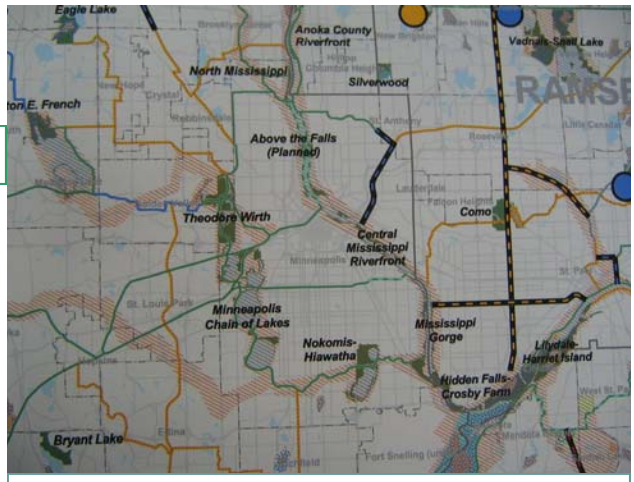
Bicycle Facility Design Guidelines
Chapter 2—Design Factors

Bicycle Facility Networks

Regional Planning—The Metropolitan Council and Minnesota Department of Transportation help guide the development of bicycle facilities in the Twin Cities region. All communities must submit Comprehensive Plans to the Metropolitan Council every 10 years. Most Comprehensive Plans address bicycle facility development and connectivity. Both agencies administer federal funding for new bikeways and set funding, design, and construction criteria for regional facilities.

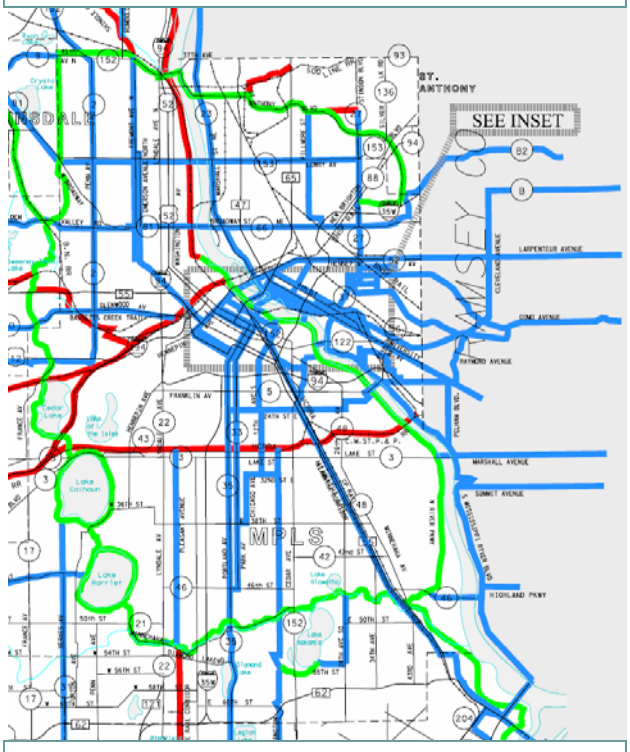
Community Involvement—Community involvement is an essential component in the development of a local bicycle plan. Residents, business owners, and commuters provide valuable insight in the design process and can be helpful in determining needs and priorities. The Minneapolis Bicycle Master Plan included a large public input process.

Local Planning—The Hennepin County Bicycle Transportation Plan is a good example of a bicycle plan that integrates local and regional plans into one comprehensive document. The plan shows seamless bikeways that cross jurisdictional boundaries without changes in routes or type of facility. The plan also shows a reasonable spacing of bikeways based on employment and population density in addition to a mix of on-street and off-street facilities. It is important to recognize the different types of bicyclists and the types of facilities needed to accommodate the various user groups. Other planning considerations should include proximity to popular destinations, gaps in the bikeway system, physical barriers (freeways, rivers, hills, and railroads), project cost, and right-of-way constraints. Bicycle planning may also include setting goals, objectives, and benchmarks.



Above: Met Council Regional Trails Map

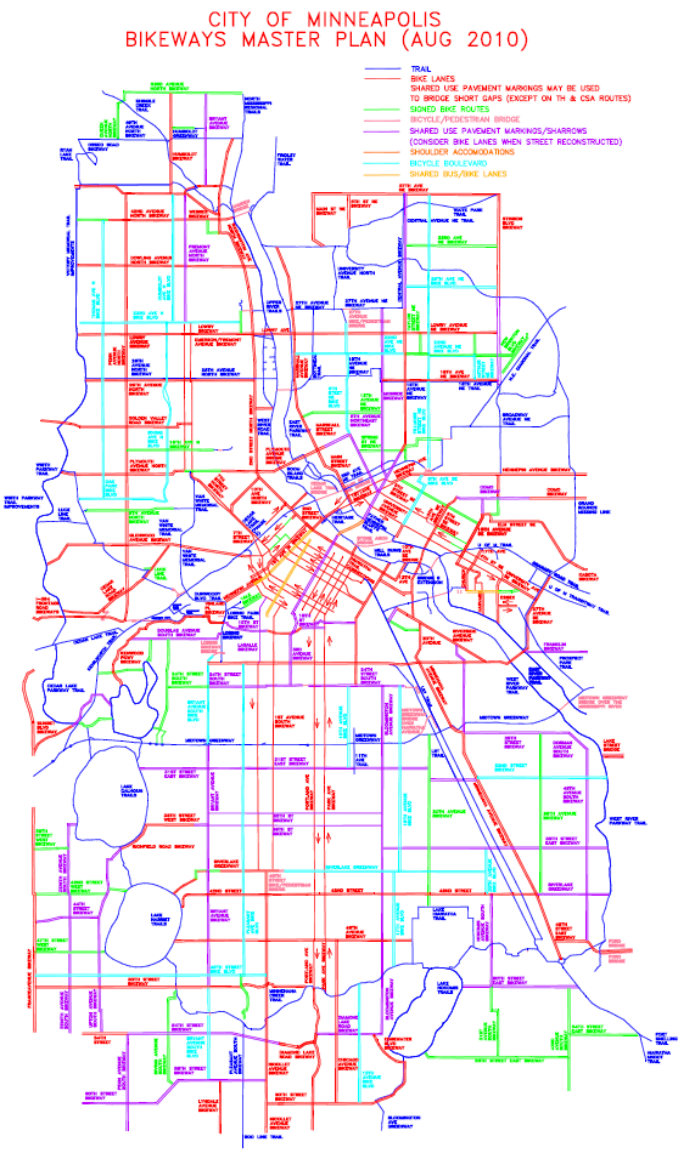
Above: Planning Meeting at City Hall



Above: Hennepin County Bicycle Plan

Bicycle Facility Networks

Bikeway Route Planning—It is very important for a community to establish a bike plan that is updated on a regular basis. A bike plan should include a map of proposed bikeways in addition to criteria that prioritize bikeways. Most bike plans also include program goals, objectives, and benchmarks to measure success. In Minneapolis an assortment of bicycle facilities have been suggested to meet the diverse needs of bicyclists. Different skill levels require different bicycle treatments in a regularly spaced corridor grid. In Minneapolis an attempt is made to place trails every 2 miles so that anyone in the city is within a mile of a trail. Bike lanes are spaced approximately every 1 mile and signed routes are spaced every 1/2 mile so that bicyclists are within 1/2 mile of a bike lane and 1/4 mile of a signed bike route. A number of considerations including bikeway spacing, gaps and barriers, community support, employment and population density, accessibility to other modes, and readiness should be evaluated before adding a route to the Bikeways Master Plan. The plan may include funding strategies for projects.



Above: A map of proposed and existing bicycle facilities in Minneapolis.

Jurisdictional Responsibilities—Minneapolis bikeways are owned and maintained by several agencies with different goals in mind. The majority of the trail system in Minneapolis is owned and operated by the Minneapolis Park and Recreation Board (MPRB). Much of the parkway system is now comprised of trails that meet MnDOT Bicycle Facility Design Guidelines, which is a requirement for federally funded projects. Three Rivers Park District has also taken an active role in the development and maintenance of several trails entering the city including the SW LRT Trail and NE Diagonal Trail. Hennepin County has been responsible for several community development projects including the Humboldt Greenway and the Midtown Greenway trails. The City of Minneapolis has constructed dozens of miles of off-street trails, on-street bike lanes, and signed bike routes. The majority of bikeways throughout the city are maintained by the Minneapolis Park and Recreation Board and the City of Minneapolis. The MPRB and City Council approved 2000 Bikeways Report defines maintenance responsibilities.

Bicycle Facility Networks

Bicycle Plan Criteria—The following criteria should be met before a bikeway is added to a Bicycle Master Plan:

- Bikeway is reasonably spaced from existing bikeways and other candidate bikeways (what is reasonable is based on existing or future housing/employment density, physical or natural features, or land use).
- Scope of candidate bikeway must be technically and economically realistic based on existing or proposed conditions.
- Bikeway does not conflict with a cities transportation goals and policies.

In addition to the criteria above, a candidate bikeway should meet one or more of the following criteria:

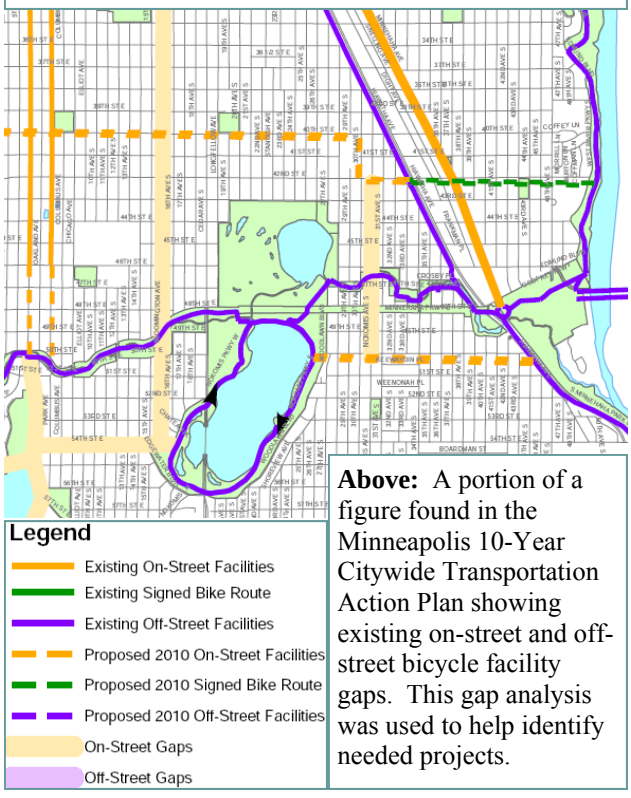
- Connects to a transit hub (ie LRT, bus stops, commuter rail stations).
- Is needed to improve safety.
- Enhances, improves, or replaces an existing bikeway.
- Closes a gap or discontinuity in the existing bikeways system or removes a significant barrier to bicyclists.
- Is in reasonable proximity to popular destination spots including parks, schools, office zones, retail/shopping, or cultural centers.

Before a bikeway can be constructed the following criteria must be met:

- Maintenance responsibility determined
- Design standards met
- Right-of-way established
- Funding secured
- Community generally in favor

The Minneapolis Bicycle Master Plan lists both qualifying and prioritizing criteria for selecting and prioritizing candidate bikeway projects.

Above: The Minneapolis Bicycle Master Plan defines projects and initiatives based on the criteria on the left.



Above: A portion of a figure found in the Minneapolis 10-Year Citywide Transportation Action Plan showing existing on-street and off-street bicycle facility gaps. This gap analysis was used to help identify needed projects.

Bicycle Facility Networks

Prioritizing Bikeways— The following topics were expanded to create the qualifying and prioritizing criteria found in the Bicycle Master Plan. The Bicycle Advisory Committee uses this information to rank bicycle projects and to make recommendations to the Mayor/City Council.

Use/Demand: Facility demand and projected use are significant factors in whether or not to invest in a bicycle facility. A typical bike lane in the city accommodates an average of 300-1000 people per day whereas a regional trail accommodates an average of 500-3000 people per day. It is recommended that bicycle routes be placed at an appropriate spacing. As can be seen on the photo on the right, people will make their own path if one is not provided for them.

Above: "Cow path" at Powderhorn Park

Barrier/Gap Importance: Gaps and barriers in the bikeway system create serious problems for bicyclists, especially those who are not comfortable riding with traffic. Trail projects that close a significant gap in the bikeways system or eliminate a barrier such as a freeway or river should be given higher priority. The photo on the right shows a trail that comes to an abrupt end. Eventually this trail will be extended to the north, eliminating a major gap in the trail system. Projects that are "low hanging fruit" should be done before more difficult projects.

Above: West River Road Trail near 22nd Ave N

Safety and Security: When a facility improves safety along a corridor it should be given a higher priority than a proposed facility that does not. Studies have shown that separating bicycles from motor vehicle traffic improves safety and perception of safety. Separation also attracts more bicyclists to a given corridor by making it more comfortable to bike. Additional preference should also be given to improving personal safety. The photo on the right shows lighting, code blue phones, and surveillance cameras along the Midtown Greenway.

Above: Midtown Greenway at Nicollet Avenue

Bicycle Facility Networks

Prioritizing Bikeways— See below:

Regional Significance: Regional trails are significant because they connect major nodes and are intended to serve large amounts of users over long distances. Facilities that serve a regional purpose should be given priority.

Regional Equity: There are several neighborhoods throughout the city and region where there are few or no bicycle facilities within a reasonable distance. The Minneapolis Bicycle Master Plan identifies proposed bicycle facilities in all neighborhoods so that any resident is within 1 mile of a trail or within 1/2 mile of an on-street facility. Priority should be given to proposed facilities in communities that do not have a designated bikeway.

Cost: Cost effectiveness should be determined for all projects. A typical regional trail project in Minneapolis can cost upwards of $3 million per mile and bike lanes cost approximately $50,000-$350,000 per mile. Bicycle and pedestrian bridges are also significant investments costing between $2 and $5 million. Operation and maintenance expenses are also important to consider. Over time, operations and maintenance expenses can add up to more than the original capital cost.

Multi-Modal Connections: Bicycle facilities that connect to transit facilities significantly improve mobility and convenience for bicyclists and significantly reduce traffic congestion. Nearly all busses in the Metropolitan area are equipped with bicycle racks. Placing bicycle racks and lockers at bus stops and park and rides are also critical improvements that can not be overlooked. Both the Hiawatha LRT and North Star Commuter Rail accommodate bicycles at all times of the day. Giving priority to facilities that improve safety and mobility through multi-modal connections is essential.

Above: Midtown Greenway

Above: Pedestrian Bridge in NE Minneapolis

Above: Wall Street

Above: Bus with bike racks on the Nicollet Mall

Bicycle Facility Networks

Prioritizing Bikeways— See below:

Community Support: Community support is essential when planning and prioritizing bikeways. It is critical that projects within the city involve numerous stakeholders and that community involvement is taken seriously. The Minneapolis Bicycle Master Plan routes are based on community ideas and neighborhood input. A project that does not have community support is likely to fail, so efforts must be made to involve as many stakeholders as soon as possible when developing a community bicycle plan. The Minneapolis Bicycle Advisory Committee (BAC) is instrumental in this process and represents an assortment of bicycle advocates, agency representatives, and neighborhoods.

Outside Funding Potential: Outside funding sources allow the city to pursue several bicycle projects at once. The vast majority of bicycle facilities within the city have been funded through state and federal grants. Private funding has also been secured for a number of projects. Grants often come with local match requirements and commitments to maintain the facility once constructed. Projects that tap into numerous outside funding sources are more likely to succeed and priority should be given to projects that maximize outside funding.

Project Readiness: There are several tasks that need to be done before a project can be constructed. First a project scope is determined and a funding source must be identified. Planning and design work involves community involvement, environmental assessment, and engineered drawings. On some projects right-of-way acquisition may be needed. The more steps that a project has accomplished in the pre-construction stage, the higher the project should be prioritized.

Above: Minneapolis City Hall

Above: Minnesota State Capitol

Above: Trail construction equipment

Bicycle Facility Networks

Support Facility Networks—Support facilities are often overlooked with regard to system planning. It is important that support facilities are spaced at regular intervals.

Above: On-street bike parking in Portland. OR.

Above: Freewheel Midtown Bicycle Center.

Above: A Luxembourg wayfinding plaque.

Above: Bike Station in Singapore.

Above: Bike share bicycles in Barcelona, Spain.

Above: Bike share bicycles in Tulsa, OK.

Bikeway Functional Classification— Bikeway Functional Classification is a means of creating a hierarchy of bicycle routes similar to that of a roadway system. Bikeway Functional Classification allows for a systematic approach to prioritizing bikeways and creates a mechanism for designing appropriate bicycle facilities based on significance, use, maintenance needs, and funding opportunities while maintaining a clear and uniform public expectation. Bicycle Functional Classification ensures that there are arterial routes through every travelshed throughout the city. It is important not to confuse roadway functional classification with bikeway functional classification as an arterial bikeway may be located on a collector street.

		Significance	Use				Maintenence Standards			Funding	
		Geographical Significance	Purpose for Bicycling	Types of User	Open to Public	Bike ADT	Bikeway Closures	Snow-plowing Frequency	Minimum Sweeping Frequency	Captal Costs	Maintenance Costs
Arterial Bikeway	Principal Arterial	Regional Significance	Any Purpose	AASHTO A, B, C Bicyclists.	24 Hour Per Day 7 Days Per Week Free to the Public	500+	Closed Bikeway Must be Replaced with "in kind" Detour Route	Within 24 Hours of Snowfall	Once Per Week	Federal or state funds with local match	Frequent maintenance
	Minor Arterial Bikeway		Any Purpose	AASHTO A, B, C bicyclists		300-500					
			Duplicative Minor Arterial Facility Needed if All User Needs are Not Met	Duplicative Minor Arterial Facility is Needed if All User Needs are Not Met							
Collector Bikeway		Inter-Neighborhood Significance	Any Purpose	AASHTO A, B, C Bicyclists.	24 Hours Per Day 7 Days Per Week Free to the Public	100-300	Closed Bikeway Must have Bicycle Detour Signage	Off-Street Trails: Within 36 Hours of Snowfall	Off-Street Trails: 3 Times Per Year	City of Mpls Funding	Maintenance same as city street
								On-Street Bike Lanes: Same Schedule as City Streets	On-Street: Same Schedule as City Streets		
Neighborhood Bikeway		Neighborhood Significance	Any Purpose	AASHTO A, B, C Bicyclists.	24 Hours Per Day 7 Days Per Week Free to the Public	Under 100	No Accomo-dations Made	Off-Street Trails: Within 36 Hours of Snowfall	Off-Street Trails: 3 Times Per Year	Local funds (NRP, Private funds, etc)	Maintenance same as city street
								On-Street Bike Lanes: Same Schedule as City Streets	On-Street: Same Schedule as City Streets		

Design Standards—The chart below shows how the type of bikeway should be designed based on Bikeway Functional Classification. The corresponding map of Minneapolis bikeways and Bikeway Functional Classification designations can be found in the Minneapolis Bicycle Master Plan. This chart differs somewhat from the MnDOT chart presented on the previous page to reflect urban densities, more stringent trail widths, and more detailed traffic volumes.

BIKEWAY FUNCTIONAL CLASSIFICATION		Design Standards						
		Satisfies State Aid Standards	Projected On-Street ADT	Facility Type	Minimum Bikeway Width	Bikeway Design Speed	Maximum Stops Per Mile	Bikeway Spacing
Arterial Bikeway	Principal Arterial Bikeway	Yes	NA	Grade Separated Trail With Mode Separation	5 feet each direction (7 feet each direction preferred)	20 mph (off-street) 30 mph (on-street)	Less than 3	Every 2 Miles
	Minor Arterial Bikeway		NA	Separated Asphalt Trail	5 feet each direction		Less than 20 or Located on Through Street	Every 1 Mile
				Shared Use	10 feet wide			
			10,000-	On-Street	6 foot wide			
			5,000-	On-Street	5 foot wide			
			1,000-5,000	On-Street Bike Lane (Parking next to curb)	5 foot wide bike lane			
				On-Street Bike Lane (No Parking next to curb)	5 foot wide bike lane			
Collector Bikeway		Yes	1,000 to 10,000 ADT	Separated/ Shared Use Trail or Bike Lane (Facility Type Same Standard as Minor Arterial Bikeways)	Bikeway Width Same Standard as Minor Arterial Bikeways	20 mph (off-street) 30 mph (on-street)	Less than 20 or Located on Through Street	Every 1/2 Mile
Neighborhood Bikeway		No	Less Than 1,000 ADT	Street with Signage	NA	20 mph (off-street) 30 mph (on-street)	Located on any street other than minor arterial	Every 1/4 Mile