DRAFT REPORT
City of Hopkins
Pedestrian and Bicycle Plan - Appendix

A community where walking and biking are safe, comfortable, convenient and fun everyday activities.

FINAL DRAFT
03/11/13

Delivering sustainable, people-centered solutions, to mobility and place
community design group
212 3rd Avenue North, Suite 515, Minneapolis MN 55401
Phone: 612-354-2901 : Web: www.c-d-g.org

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Appendix

This section provides additional resources and information related to the work of this Plan.

In this section

A.1 Online survey

Survey: City of Hopkins Pedestrian and Bicycle Plan

City of Hopkins Pedestrian and Bicycle Plan

This survey is part of a project to develop a Pedestrian and Bicycle Plan for the City of Hopkins.

Your answers will help us understand your ideas and concerns about walking and bicycling in the city. Your responses will be kept confidential.

Part 1: Walking in Hopkins

During the summer months - how often do you walk to a destination in or around Hopkins?

- ○ Never, or almost never
- ○ Once or twice a week
- ○ More than a couple of times a week, but not everyday
- ○ Everyday, or almost everyday

Which destinations?
(Please list up to your top 3 destinations)

Destination 1

Destination 2

Destination 3

What would help you walk more often?

Which destinations in or around Hopkins do you wish you could walk to more easily?
(Please list up to three)

Destination 1

Destination 2

Destination 3

Part 2: Bicycling in Hopkins

During the summer months - how often do you ride your bicycle to a destination in or around Hopkins?

- ○ Never, or almost never
- ○ Once or twice a week
- ○ More than a couple of times a week, but not everyday
- ○ Everyday, or almost everyday

Which destinations?
(Please list up to your top 3 destinations)

Destination 1

Destination 2

Destination 3

What would help you ride your bicycle more often?

Which destinations in or around Hopkins do you wish you could ride a bicycle to more easily?
(Please list up to three)

Destination 1

Destination 2

Destination 3

Part 3: Additional comments

Please provide any additional information or ideas that you think could help improve conditions for walking or bicycling in Hopkins:

OPTIONAL

I want to continue to be involved in this process. You can reach me at:

Name / Daytime phone / Email

(OPTIONAL) My residential address is:

A.2 Rules of the road for Minnesota cyclists

This is a summary of Minnesota laws describing cyclists' rights and responsibilities (from M.S. 169.222, and M.S. 169.18). Sharing this information as part of education campaigns for children, seniors and other adults will help improve safety on Hopkins' roads and trails.

1) Ride on the right with traffic; obey all traffic signs & signals; bicyclists have all the rights and duties of any other vehicle driver. (subd. 1)
2) Legal lights and reflectors are required at night. (subd. 6a)
3) Arm signals required during last 100' prior to turning (unless arm is needed for control) and while stopped waiting to turn. (subd. 8)
4) Cyclists may ride two abreast on roadways as long as it does not impede normal and reasonable movement of traffic. (subd. 4c)
5) When passing a bicycle or pedestrian, motor vehicles shall leave at least 3 feet clearance until safely past the bicycle or pedestrian (169.18 subd. 3)
6) Ride as close as practicable to the right hand curb or edge of roadway except;
   a) When overtaking a vehicle
   b) When preparing for a left turn
   c) When necessary to avoid conditions that make it unsafe, e.g. fixed or moving objects, such as hazards, or narrow-width lanes. (subd. 4a)
7) Yield to pedestrians on sidewalks and in crosswalks; give audible signal when necessary before overtaking. (subd. 4d)
8) Riding on sidewalks within business districts is prohibited unless locally permitted. (subd. 4d)
9) It is illegal to hitch rides on other vehicles. (subd. 3)
10) Only one person on a bike unless it's equipped for more, or a legal baby seat is used. (subd. 2)
11) It is illegal to carry anything that prevents keeping one hand on handlebars or proper operation of brakes. (subd. 5)
12) Bicycle size must allow safe operation. Also, handlebars must not be above shoulder level. (subd. 6c & 6d)
13) Unless locally restricted, parking on the sidewalk is legal as long as it does not impede normal movement of pedestrian or other traffic. (subd. 9a)
14) Legal parking on a roadway, that does not obstruct legally parked motor vehicles, is allowed. (subd. 9b)

A.3 Best Practices

The City of Hopkins Pedestrian and Bicycle Plan
Survey of Best Practices

INTRODUCTION

PUBLIC HEALTH BENEFITS

PEDESTRIAN FACILITIES

BICYCLE FACILITIES

ADDITIONAL RESOURCES AND REFERENCES

The City of Hopkins Pedestrian and Bicycle Plan
Survey of Best Practices - Introduction

CREATING A ROBUST AND EFFECTIVE NETWORK

A carefully thought out, well-designed and consistently-maintained pedestrian and bicycle network, that connects community destinations and provides comfortable conditions for its users will encourage walking and bicycling for transportation and recreation and improve safety, accessibility and convenience for all users.

A good network also encourages safety. A network with gaps along desired routes will increase the probability that pedestrians and cyclists may act in ways that endanger themselves or others on the street. An interrupted or unsafe network also discourages use, especially among novice cyclists and pedestrians with special needs or disabilities.

To develop and achieve a good and effective network, appropriate facilities for travel, safety, and wayfinding must be employed such that there are no significant gaps in the infrastructure that might create barriers or obstacles for pedestrians and cyclists. This applies to both mid-trip and post-trip facilities, especially in regards to cyclists. The following document is a series of best practice recommendations with design guidelines and applications to the specific context of Hopkins.

The City of Hopkins Pedestrian and Bicycle Plan
Survey of Best Practices - Public Health Benefits

PROMOTING ACTIVE LIFESTYLES THROUGH THE BUILT ENVIRONMENT

The built environment impacts our daily decisions about how we get to the places we are going. By providing infrastructure that invites the use of active modes of transport such as biking and walking, we can potentially reduce the incidence of chronic diseases linked to inactivity such as diabetes, asthma, heart disease, hypertension, stroke, colon cancer, osteoporosis, depression, and breast cancer, and can also reduce the prevalence of risk factors like overweight and obesity.

A lack of physical activity especially impacts young people, who as a population are showing drastic increases in rates of obesity and diabetes. Increased opportunities for walking and cycling not only address these conditions, but also help to instill life-long habits of healthy and routine physical activity.

By providing safe and comfortable routes to schools and other popular destinations within Hopkins, residents can easily participate in meaningful and regular exercise by walking or biking. Other beneficial health effects include a reduction of air pollution, reduced incidents of injuries caused by car crashes, and an increased feeling of independence and empowerment.

The City of Hopkins Pedestrian and Bicycle Plan
Survey of Best Practices - Pedestrian Facilities

Sidewalks
Sidewalks - General
Sidewalk Frontage Zone
Sidewalk Pedestrian Zone
Sidewalk Furniture Zone
Sidewalk Curb Zone
Curb Ramps

Intersections
Marked Crossings
Median Crossing Islands
Curb Extensions

Signals
Pedestrian Hybrid Beacon (HAWK)
Rectangular Rapid Flash Beacon (RRFB)
Countdown Timers
Leading Pedestrian Interval (LPI)

Best Practices Curb Ramps

Description

Curb ramps allow for people with disabilities or limited mobility to easily enter and exit pedestrian crossings. They also make walking generally more comfortable and safe for all pedestrians.

Design guidance

- Preferred design is to provide two perpendicular ramps rather than one on the corner in order to better place wheelchair users and reduce conflicts with traffic
- The slope of a ramp should be no greater than 8.3%
- Ramp width is a minimum of 48", with a corresponding landing of equal width
- Detectable warnings must be included for people with vision impairments

Advantages and Constraints

- Properly designed curb ramps make the pedestrian realm accessible to people of all ages and abilities
- Properly designed curb ramps encourage safe and easy crossing of streets
- Improperly designed or positioned curb ramps can encourage pedestrian/automotive conflict

General Application

- Curb ramps should be employed at all locations where pedestrians are expected to cross

Perpendicular curb ramps.

Best Practices Marked Crossings

Description

Marked crossings are a visual indication of where pedestrian crossing can legally and safely occur.

Advantages and Constraints

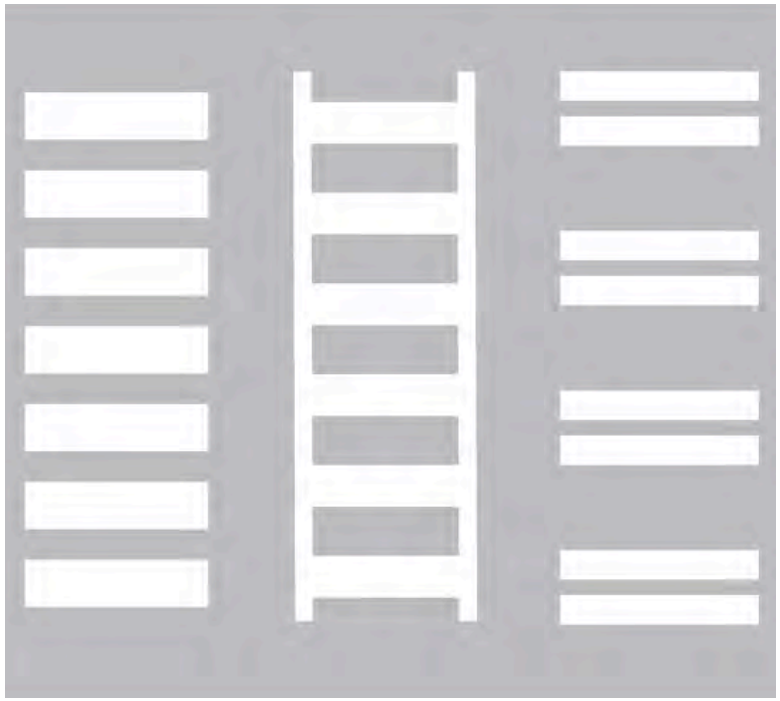
- Alert motorists to potential pedestrian presence in an intersection or at a crossing
- Create a safe crossing environment for pedestrians
- Low cost

Design guidance

- Should be combined with Advanced Stop Bars in order to minimize risk of "Hidden Threat" crashes
- High visibility crossings are longitudinally marked and are easier for motorists to see
- Crossings marked with pavers or decorative treatments are discouraged as they can be difficult for those with mobility impairments
- Longitudinal high-visibility marked crossings are preferred
- Minimum markings consist of solid white lines between 6-24" in width (MUTCD)

General Application

- Should be used at all controlled intersections (stop signs or traffic lights)
- Should be used at uncontrolled crossings only when speeds do not exceed 40 mph to discourage unsafe crossings
- Trail or school routes should have marked crossings
- At least every 1/8 mile



Examples of high visibility marked crossings: Continental, Ladder, Staggered Continental. Image courtesy of Michele Weisbart, Model Design Manual for Living Streets.

Best Practices Median Crossing Island

Description

Crossing islands make pedestrian crossings safer and easier by dividing them into two stages so that pedestrians only have to worry about crossing traffic one direction at a time.

Design guidance

- Trees and low ground cover increase visibility beyond signage to alert drivers to the presence of the median island.
- Minimum width of 6'
- Adequate lighting must be provided
- Pedestrian path in the median should be angled so the pedestrian faces traffic before crossing (MUTCD)

Median crossing island (Bainbridge Island, WA, pictured above). Image courtesy of FHWA.

Advantages and Constraints

- Make crossing of high volume roads safer and easier
- They allow for slower walkers such as children and the elderly to cross wider roads without worrying about getting caught in the middle
- Requires additional space for the provision of a median in the center of the road

General Application

- Wide roads
- Roads where speeds are high or there are high volumes of traffic
- Schools, transit hubs, trails, shopping centers and work centers

Best Practices Curb Extensions

Description

Curb extensions are the extension of the sidewalk and curb into the travelway at corners.

Design Guidance

- Curb extensions are not to interrupt travel lanes, including bike lanes.

Illustration: Curb extensions at an intersection.

Advantages and Constraints

- Increased pedestrian visibility
- Shorter crossing distances
- Increased waiting space on corners; additional room for perpendicular curb ramps
- Additional room for street furnishings
- Reduced speed of turning vehicles
- Might complicate turning for larger vehicles
- Compatible with snow plowing operations, but should be communicated to maintenance crews

General Application

- Curb extensions should only be applied where street parking is present
- Should never extend into travel lanes, including those designated for cyclists

Best Practices Pedestrian Hybrid Beacons (HAWK Signals)

Description

The pedestrian hybrid beacon is a pedestrian-activated red-indication signal designed for locations where a standard traffic light is not justified by warrants.

Design Guidance

- An advanced stop bar should be installed in front of the crosswalk.
- When used, signs and crosswalks should be used in conjunction with the beacon.

Illustration: HAWK Signal at a pedestrian crossing.

Advantages and Constraints

- Gives pedestrians the ability to cross a uncontrolled intersections that may be relatively busy
- Can be applied to less busy pedestrian routes than standard traffic signals
- Less expensive than a standard traffic light
- New treatment; many engineers and agencies are unfamiliar with it
- More expensive than some options

General Application

- Where no traffic signal is present
- Where a crosswalk exists
- Where 20 or more pedestrians per hour cross a given location

Example Cities

- Vancouver, British Columbia
- Lawrence, KS
- Tucson, AZ

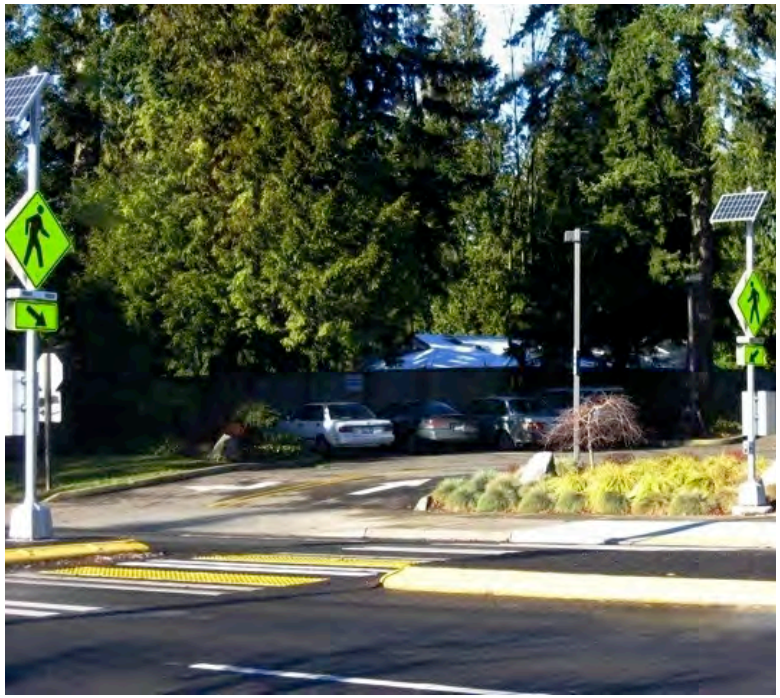
Best Practices Rectangular Rapid Flash Beacon (RRFB)

Description

The Rectangular Rapid Flash Beacon (RRFB) is a flashing LED that is placed ahead of a crosswalk. It helps alert drives to the presence of the crosswalk.

Design guidance

- Employing RRFB's only at crossing problem areas, school routes, or other high volume routes in order to prevent a decrease in compliance
- A beacon should be placed between the pedestrian crossing sign and the attached arrow plaque



Solar-powered RRFB installation. Image courtesy of ELTEC Corporation.

Advantages and Constraints

- Relatively inexpensive
- High levels of driver compliance
- Ubiquity of RRFB's could reduce their tendency to be noticed by drivers

General Application

- RRFB's can be used at crosswalks where no traffic signal is present.

Example Cities

- St. Petersburg, FL
- Calgary, Alberta
- Tucson, AZ

Best Practices Countdown Timers

Description

This device consists of a standard pedestrian crossing signal which works in conjunction with a timer that counts down during the period in which the 'red hand' symbol would normally be blinking. The timer indicates exactly how much time is left until the light changes

Design guidance

- Can be used to replace existing standard pedestrian crossing signals at intersections with high traffic volumes or pedestrian populations with need for greater protection such as elderly citizens and school children.
- Costs range from $300-$800 per installation, generally

Pedestrian countdown timer at a pedestrian crossing at an intersection. Image courtesy of Bike Walk Lincoln Park.

Advantages and Constraints

- Relatively low-cost
- Well understood
- Reduces the number of pedestrians in the crosswalk at the time of the light change
- Easy installation

General Application

- Wide crossings
- Crossings with high pedestrian or vehicle traffic volumes
- School crossings
- Crossings where elderly citizens are expected

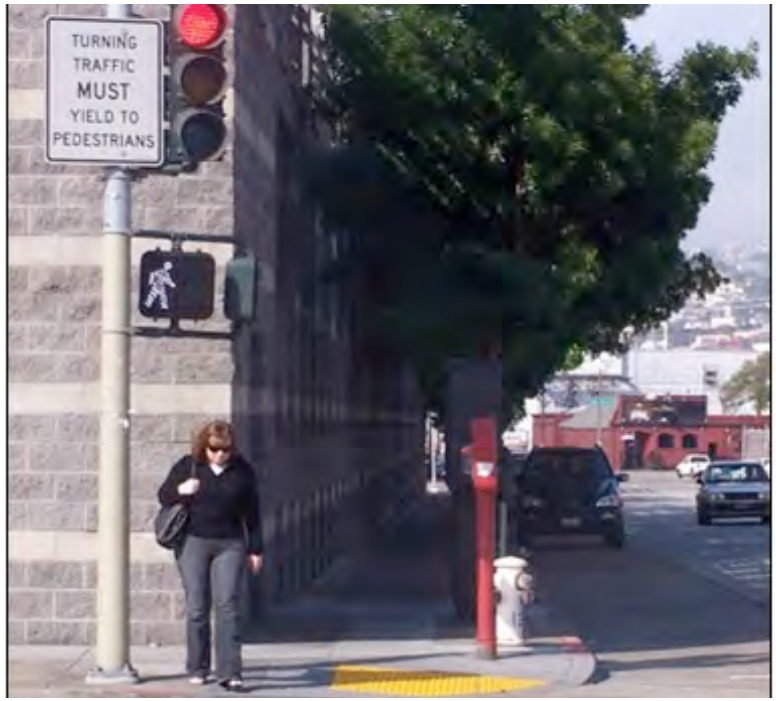
Best Practices Leading Pedestrian Interval (LPI)

Description

LPI refers to a method wherein the traffic signal is programmed so that the pedestrian walk sign occurs several seconds before the 'green light' at the parallel street. This gives pedestrians a head start into the intersection so that they are more easily seen when cars begin to move forward.

Design Guidance

- A LPI of 3 seconds has been shown to provide an adequate lead for pedestrians without reducing the green light time significantly



The Leading Pedestrian Interval allows pedestrians to proceed before motorized vehicles. Image courtesy of FHWA.

Advantages and Constraints

- Requires only reprogramming, not additional equipment, and is therefore inexpensive
- Gives pedestrians a longer, safer crossing period
- Increases visibility, reducing collisions
- LPI's have received positive feedback from pedestrians and drivers alike in that they reduce conflicts

General Application

- Particularly useful for school crossings
- Also useful for crossings where elderly citizens are expected
- Any intersection where high volumes of pedestrian traffic are expected

Example Cities

- St. Petersburg, FL
- Orlando, FL
- New York City, NY
- Minneapolis, MN

The City of Hopkins Pedestrian and Bicycle Plan
Survey of Best Practices - Bicycle Facilities

Urban Bikeways
Conventional Bike Lanes
Buffered Bike Lanes
Contraflow Bike Lanes
Advisory Bike Lanes
Cycletracks
Bike Boulevards

Intersections
Bike Boxes
Median Refuge Island
Forward Stop Bar
Combined Bike Lane/Right Turn Lane

Signing and Marking
Colored Bike Facilities
Shared Lane Markings

Signals and Wayfinding
Traffic Signals for Bicycles
Loop Detector for Bicycles
Bicycle Route Wayfinding Signage

Best Practices Conventional Bike Lanes

Description

Bike lanes designate a portion of the roadway for preferential use by bicyclists. Lanes are defined by striping, pavement markings and signage.

Design Guidance

- Lane Width
- "Dooring Zone" clearance when bike lanes are located adjacent to parked vehicles
- Frequency of paved markings indicating bike lane
- Place pavement markings out of the turning vehicles path to minimize wear
- Minimum width recommendation for implementation of on-street bike lanes is 5 ft wide

Bike Lane on the right side of a one-way street (San Francisco, pictured above).

Advantages and Constraints

- Create separation between cyclists and motor vehicles
- Allow for cyclists to travel at their preferred speed
- Increases cyclist visibility to motorists
- Space availability can be a constraint

General Application

- Bike lanes are recommended for streets with ≥ 3,000 motor vehicle average daily traffic
- Bike lanes should be provided on all streets where traffic speeds exceed 25 mph

Best Practices Buffered Bike Lanes

Description

Buffered bike lanes provide cyclists with extra space between the bike lane and moving traffic, increasing their comfort. Buffers can provide cyclists with adequate room to pass without having to merge into automobile traffic.

Design guidance

- Bicycle pavement markings indicating the lane to all road users that the space is designated for cyclists
- Color may be used at the beginning of each block to clearly indicate to motorists that the space is a buffered bike lane
- Buffer shall be marked with 2 solid white lines with diagonal hatching of 3'
- Buffered bike Lane: 3' buffer and 4' bike lane next to curb may be considered a 7' bike lane

A buffered bike lane. This example has a buffer on the left for separation from moving vehicles and a buffer on the right for separation from parked cars (Park Avenue, Minneapolis, pictured above).

Advantages and Constraints

- Provides greater distance between motor vehicles and bicyclists
- Improves cyclist comfort
- Provides bicyclists space to pass another bicyclist without merging into motor vehicle lane

- Buffered bike lanes may require more maintenance (painting / maintenance of markings) than a traditional bicycle lane

General Application

- Anywhere a bike lane is proposed
- On streets with high travel speeds and/ or high travel volumes
- On streets with extra lane width

Example Cities

- Minneapolis, MN
- Austin, TX
- New York, NY
- Portland, OR
- San Francisco, CA

Best Practices Contraflow Bike Lanes

Description

Contraflow bike lanes are bike lanes designed for a one way motor vehicle street which allow for a bike-only lane traveling in the opposite direction. Contraflow bike lanes improve bicycle access to destinations.

Design guidance

- Accompanying signage: Bicycle lane symbol should be used to define the bike lane and direction. A "ONE WAY" sign with "EXCEPT BIKES" should be posted along the facility and at intersections to inform motorists of contraflow treatment.
- Separation of contra-flow lanes from motor vehicle lane should be shown with a solid double yellow line.
- Contraflow lane width: 5.0' minimum

A contraflow bike lane in Madison, WI.

Advantages and Constraints

- Provides greater connectivity
- Cyclists do not have to make detours as a result of one-way streets, reducing trip distances
- Decreases sidewalk riding

General Application

- One-way streets
- Narrow streets
- On corridors where alternative routes require cyclists to make detours
- Low speed, low volume streets

Example Cities

- Minneapolis, MN
- Madison, WI
- Cambridge, MA
- San Francisco, CA
- Portland, OR

Best Practices Advisory Bike Lanes

Description

An advisory bike lane is a treatment applied to narrow residential streets. Advisory lanes allow for two way traffic while still allowing room for two bike lanes. In the instance that two cars meet going opposite directions, a car is allowed to merge into the bike lane with caution.

Design Guidance

- Advisory bike lane width: 5'-6'
- 2-way motor vehicle lane: 12'-18'
- Curb to Curb: 23'-28'
- Colored pavement on the edges of the roadway to indicate to drivers that space is designed for bicycles

Advisory bike lanes along each side of a street. Image courtesy of the City of Edina.

Advantages and Constraints

- Allows for bicycles to have priority on a roadway that would otherwise be too narrow to allow for bike lanes
- Motorists generally travel with more caution due to the tight space and the oncoming of other vehicles
- Motor vehicles often are forced to merge into bike lane to avoid other vehicles
- Less protection for cyclists than an exclusive lane designated for bicycles

General Application

- Corridors with low motor vehicle traffic volumes and speeds
- Narrow two way streets
- No centerline separating traffic lanes

Example Cities

- Minneapolis, MN
- Edina, MN

Best Practices Cycletracks

Description

A cycletrack is ann exclusive lane for cyclists separated from motor traffic by a physical barrier and distinct from the sidewalk.

Different forms of cycletracks include:

- One-way protected cycletracks
- Raised cycletracks
- Two-way cycletracks

Design guidance

- Include consideration of
  - Cycletrack width
  - Separation
  - Crossing driveways
  - Signalized intersections
- Colored pavement may be used to further define the bicycle space
- Cycletrack width:
  6 to 12 ft, depending on bicycle traffic intensity
- Cycletrack widths should be larger in locations where the gutter seam extends more than 12" from the curb

A one-way protected cycletrack.

Advantages and Constraints

- Improves safety by providing significant separation between bicyclists and automobile traffic
- Reduces incidence of 'dooring' accidents
- Invites use by bicyclists of all ages, experience and comfort levels
- Space availability
- Cost required for additional infrastructure
- Difficult to implement where there are many cross streets

General Application

- Adjacent to roadways with few cross streets and longer blocks
- Major roadways with high motor vehicle speeds and traffic volume
- Streets with parking lanes

Example Cities

- Boston, MA
- Portland, OR
- New York, NY
- Chicago, IL
- Multiple cities across Europe

Best Practices Neighborhood Slow Street (Bike Boulevard)

Description

A Neighborhood Slow Street (also sometimes known as a Neighborhood Greenway or Bicycle Boulevard) is a neighborhood residential street modified to calm automobile traffic, discourage cut-through traffic, and make walking and bicycling in those streets more comfortable.

Design guidance

- Stop signs should face cross streets as to reduce the amount of stops for cyclists
- Traffic calming devices will reduce motor vehicle speeds and create a safer environment for cyclists and pedestrians
- Wayfinding markers should be employed to assist cyclists and to warn motorists of the presence of cyclists
- Signals, roundabouts, and/or median refuges should be used at major intersections when necessary

Illustration: Bike boulevard with traffic circle intersection treatment.

Advantages and Constraints

- Calms traffic and reduces conflicts between cyclists and motorists
- Gives priority to cyclists traveling through intersections
- Slower automobile speeds create a safer pedestrian environment as well
- Does not work well on non-grid streets

General Application

- Residential streets where traffic calming is desired
- Residential streets a block or two away from a major thoroughfare with high traffic volumes

Example Cities

- Minneapolis, MN
- Portland, OR

Best Practices Bike Boxes

Description

A bike box is a designated area for cyclists at the head of an intersection. Pavement markings signal to motorists to stop a greater distance before crosswalk, allowing cyclists to stop in the box. This treatment gives cyclists greater priority over motorists, while making cyclists more visible.

Design Guidance

- Box may be ineffective if it is not properly marked with surface color
- The box may be disregarded by motorists if it is not commonly filled by bicyclists.
- Box depth: 10'-16' (NACTO)
- Ingress bike lane should be used to define bicycle space and allow bicycles to bypass stopped motor vehicles
- Pavement markings and colored pavement surfacing
- "WAIT HERE" marking should be used to guide motorists to stop before the box

Illustration: A bike box.

Advantages and Constraints

- Increase visibility of bicyclists
- Gives bicyclists priority
- Helps reduce right-hook collisions
- Groups bicyclists together to cross and intersection more quickly
- Prevents right turns on red
- Maintenance cost for pavement coloring
- Bike boxes are a fairly new pavement treatment—there is potential for drivers to be confused by the bicycle box

General Application

- Signalized intersections with high volumes of bicycles and/or motor vehicles, especially those with frequent bicyclist left-turns and/or motorist right-turns. (NACTO)

Example Cities

- Minneapolis, MN
- Boston, MA
- Madison, WI
- Portland, OR
- Vancouver, BC

Description

A median of full curb height providing a protected space in the center of the street that allows pedestrians and bicyclists to divide their crossing movement and take refuge from traffic while crossing the street.

Design Guidance

- Adequate width of 10' or greater to provide bicyclist with a trailer to be protected from both travel lanes
- Reflective pavement markings should be used on the approach to the refuge island to enhance visibility
- The refuge area should be wide enough to accommodate two way bike traffic
- Median width: minimum width 6'-10' is preferred (NACTO)
- Height of the island should be curb level, 6" high

A median refuge island in Hopkins.

Advantages and Constraints

- Allows pedestrians and bicyclists to cross multi lane or high-volume streets more comfortably
- Reduces the length of each crossing movement
- Allows bicyclists to focus on one direction of traffic at a time while crossing
- Calms traffic via narrowing
- May restrict left-turns to be made by automobiles
- Additional cost

General Application

- Where bikeway crosses a moderate to high volume or high speed street (NACTO)
- Wide multi-lane roadways
- At intersections
- Along streets with heavy pedestrian and bicycle traffic

Best Practices Forward Stop Bar

Description

A forward stop bar is a second stop bar located closer to intersection than stop bar designated for motorists. Forward stop bars provide bicyclists with better visibility of cross-street traffic.

Design guidance

- Adequate space should be provided for pedestrians to cross the street
- Stop bar should be marked by thermoplastic due to heavy traffic of space
- Forward stop bars should only be implemented on streets with low volume of right-turning motorists
- Stop bar should be thermoplastic for durability

Illustration: A forward stop bar for bicyclists.

Advantages and Constraints

- Bicyclists have better visibility of cross-street traffic
- Bicyclists are more visible to motorists
- Bicyclists are permitted to bypass queuing automobiles
- Crossing distance intersection is shortened
- Potential right-turn conflicts

General Application

- Along roadways with bike lanes
- Low-volume, stop controlled intersections

Example Cities

- Portland, OR

Best Practices Combined Bike Lane/Right Turn Lane

Description

A combined bicycle lane/right turn lane positions a suggested bike lane within the inside portion of the roadway dedicated for motor vehicle turn lane.

Design Guidance

- Advance warning to alert bicyclists and motorists of approaching shared lane
- A combine bike lane / turn lane is not an appropriate treatment at intersections with high automobile turn demand
- The combined lane width should be a minimum of 9', and a maximum of 13'
- Shared lane marking in the lane to show through bicycle movement
- A dotted 4" line and bicycle lane marking should be used to clarify bicycle positioning within the shared lane

Illustration: A combined bike lane/right turn lane.

Advantages and Constraints

- Maintains bicyclists comfort and priority in the absence of a dedicated bicycle through lane
- Reduces the risk of dangerous right hook collisions at intersections
- Allows dual use of lane where the bicycle lane would otherwise be cut off before the intersection
- Bicyclists traveling through may block right-turning motorists

General Application

- On streets where a bike lane approaches an intersection with a lane for right turn lanes of vehicles
- On streets where there is a right turn lane but not enough space to maintain an exclusive lane for bicyclists

Example Cities

- Austin, TX
- Eugene, OR
- New York, NY
- San Francisco, CA
- Vancouver, WA

Best Practices Colored Bike Facilities

Description

Bike lanes are made more visible by colored pavement. This treatment distinguishes the lane from the rest of the roadway, making cyclists more visible.

- Recommend high-friction surfacing over standard paint:
  - more slip resistant
  - don't have to reapply as often—standard paint has to get reapplied annually or twice a year

Design Guidance

- Provide appropriate signage to accompany pavement markings
- Use green thermoplastic rather than paint
- Consistency in coloring bike facilities is important
- Color can be provide in conflict areas alone, or throughout the facility
- Green color is standard in US applications
- White border lines should be provided along the edges of the colored lane to maintain consistency with other bike facilities

A colored bike lane being installed in Minneapolis near the University of Minnesota. Image courtesy of the Minneapolis Bicycle Coalition.

Advantages and Constraints

- Increases comfort of bicyclists through a clearly delineated space
- Enhanced visibility of bike lane
- Reinforces priority of bicyclists in conflict areas
- Discourages illegal parking in bike lane
- Maintenance requirements

General Application

- Within bike lanes and cycletracks
- Corridors with heavy auto and bicycle traffic
- At busy intersections
- Driveways
- Areas where illegal parking in the bike lane is common

Example Cities

- New York, NY
- Portland, OR
- San Francisco, CA
- Minneapolis, MN

Color Recommendation

- PMS 375

PMS 375

Best Practices Shared Lane Markings (Sharrows)

Description

Pavement markings used to indicate to drivers and cyclists that roadway is a shared lane environment.

Design guidance

- Frequency of paved markings indicating shared lane
- Place pavement markings out of the turning vehicles path to minimize wear
- Frequent pavement markings indicating shared lane environment
- Markings should be placed in the center of lane to minimize wear from automobile treads
- Bike-and-chevron symbol dimensions 9'3" by 3'3"
- Shared lanes are not a substitute for exclusive bike lanes

A green "sharrow" marking (San Francisco, CA, pictured above).

Advantages and Constraints

- Helps bicyclists position themselves safely in lanes too narrow for a motor vehicle and a bicycle to comfortably travel side by side with the same traffic lane (NACTO)
- Advertises the presence of cyclists to all road users
- Directs cyclists out of the "dooring zone"
- Encourages safe passing by motorists

General Application

- Streets with low to moderate motor vehicle traffic volume
- Streets with a designed speed of < 25 mph
- Clarify bicyclist movement and positioning in challenging environments: intersections, combined turn/bike lane

Example Cities

- New York, NY
- Portland, OR
- San Francisco, CA
- Montreal, Quebec
- Minneapolis, MN

Color Recommendation

- PMS 375

PMS 375

Best Practices Traffic Signals for Bicycles

Description

Traffic signals for bicycles are electrically powered traffic control devices used to provide guidance to bicyclists at intersections.

Traffic signals for bicyclist include:

- Bicycle Signal Heads
- Signal Detection and Actuation
- Active Warning Beacon
- Hybrid Signal for Bike Route Crossing of Major Street

Design Guidance

- Identify which signal treatment is appropriate by analyzing the factors involved: speed limit, average daily traffic, anticipated bicycle crossing traffic
- Determine a clearance interval appropriate for the specific intersection
- The bicycle clearance interval should be sufficient to accommodate 85% of bicyclists at their normal travel speed (NACTO)
- 14' per second or 9.5 miles per hour is standard in the absence of local bicycle traffic counts

A traffic signal for bicycles (NE Minneapolis, pictured above).

Advantages and Constraints

- Gives priority to bicyclists at intersection
- Increases the comfort of bicyclists by reducing stress and delays at intersection
- Discourages illegal and unsafe crossing maneuvers
- Potential motor-vehicle delay at intersections due to additional green time allowed for bicyclists

General Application

- Intersections with high volumes of bicyclists
- Intersections where cyclists travel at high speeds
- Intersections where bicyclists have different needs from other road users (i.e. bicycle only movements and leading bicycle intervals)

Example Cities

- Davis, CA
- San Francisco, CA
- Portland, OR
- New York, NY
- Minneapolis, MN

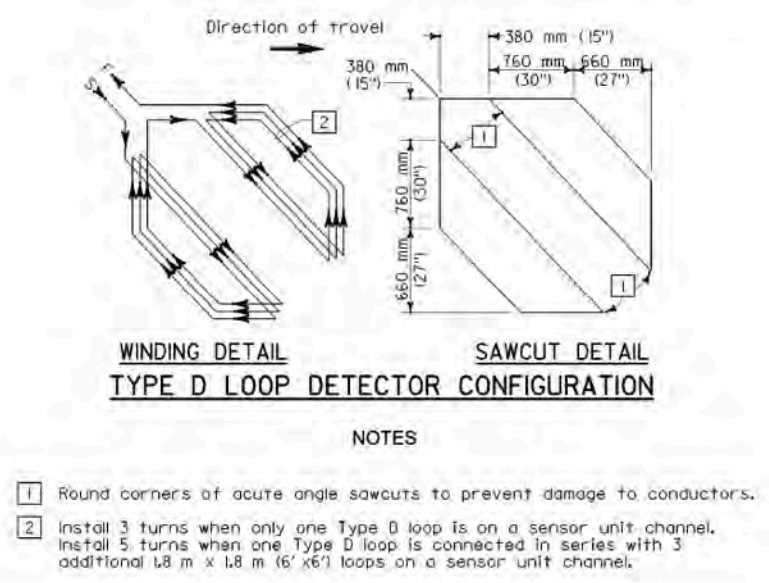
Best Practices Loop Detector for Bicycles

Description

Loop detectors detect the presence of bikes on the roadway. Detectors should be installed to cover areas of the road where cyclists are likely to ride, including the right edge of travel lanes and the center of bicycle lanes. Pavement markings can be used to direct cyclists to the proper spot where the signal device may detect their presence. These markings also alert motorists that bicycles will be present in various locations at signalized intersections.

Design Guidance

- The best standard design for detecting the presence of bikes is a Type D Loop, also known as a diagonal quadrupole pattern. This loop design is sensitive over its entire width with a quick drop off in sensitivity outside its perimeter, which helps avoid detection of vehicles in adjoining lanes
- Engineers should test and adjust the sensitivity setting for the loop amplifier to ensure that the detector is activated by using only a bicycle wheel



Diagonal quadrupole pattern. Image courtesy of California DOT.

Advantages and Constraints

- Allows cyclists to activate traffic control devices without having to press a button
- A bicycle's wheels have to cross a sensor in the pavement so the traffic signal can detect the vehicle's presence
- Riders may not know exactly where they need to place their vehicles to be detected

General Application

- Busy intersections with traffic control
- Crossings with traffic signals for bicycles

Best Practices Bicycle Route Way-finding Signage

Description

A bicycle way-finding system is a comprehensive network of signing and pavement markings indicating destinations along preferred bicycle routes.

Advantages and Constraints

- Identifies preferred bicycle routes
- Identifies destinations
- Signage makes bicycles more visible to motorists
- Encourages riders by familiarizing them with the bicycle network
- Can create sign clutter

Design guidance

- Should provide information on destination, direction and distance (in miles and in minutes, calculated at speed of 10 mph)
- Decision signage indicating the intersection of two or more bikeways should be placed well in advance of all decision points
- Consistent font such as Clearview Hwy font is recommended for maintaining consistency with other road signs
- Follow MUTCD standards, for mounting height and recommended distance from path or roadway
- The frequency of way-finding signs are important. Confirmation signs should be placed every 1/4 to 1/2 mile along of street bike routes and every 2 to 3 blocks along on street routes. (NACTO)

General Application

- Bike route intersections
- Along street and bicycle paths
- At decision points

Bicycle wayfinding signage should include both distances and times. Image courtesy of Bike Michiana.

Example Cities

- Minneapolis, MN
- Portland, OR
- San Francisco, CA
- New York, NY
- Chicago, IL

The City of Hopkins Pedestrian and Bicycle Plan
Survey of Best Practices - Additional Resources and References

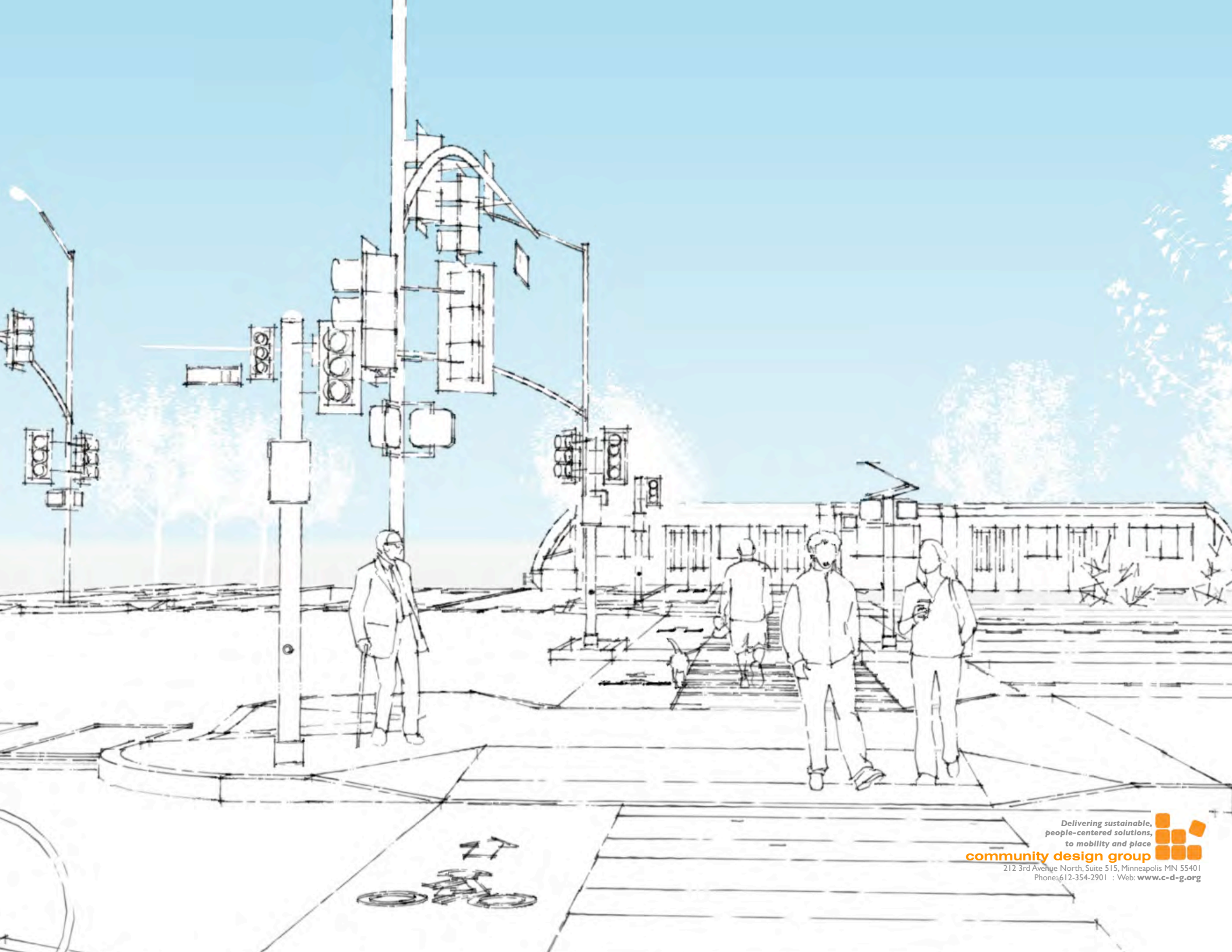
Los Angeles County,
Model for Living Streets Design Manual:
http://www.modelstreetdesignmanual.com/index.html

National Association of City Transportation Officials,
Urban Bikeway Design Guide:
http://nacto.org/cities-for-cycling/design-guide/

Pedestrian and Bicycle Information Center:
http://www.walkinginfo.org/
http://www.bicyclinginfo.org/

Federal Highway Administration,
Manual on Uniform Traffic Control Devices (MUTCD):
http://mutcd.fhwa.dot.gov/

Center for Disease Control.
"Physical Activity and Health":
http://www.cdc.gov/nccdphp/sgr/ataglan.htm



Delivering sustainable, people-centered solutions, to mobility and place
community design group
212 3rd Avenue North, Suite 515, Minneapolis MN 55401
Phone: 612-354-2901 : Web: **www.c-d-g.org**