GRAND FORKS - EAST GRAND FORKS MPO

BICYCLE & PEDESTRIAN DESIGN GUIDE

Grand Forks - East Grand Forks
METROPOLITAN
PLANNING ORGANIZATION

January 2023


GRAND RIDES
Altru
Enjoy the Ride
Altru
Enjoy the Ride
Altru
Altru

Table of Contents

INTRODUCTION

Context

This toolbox presents guidance for local planners, engineers, and advocates to improve the walkability and bikability of Grand Forks - East Grand Forks MPO and create more comfortable streets for pedestrians and bicyclists of all ages and abilities. Planners and project designers should refer to these guidelines in developing the infrastructure projects recommended by this plan, but they are not a substitute for thorough project-by-project evaluation by a landscape architect or engineer upon implementation.

Future roadway planning, engineering, design and construction will continue to strive for a balanced transportation system that includes a seamless, accessible bicycle and pedestrian network and encourages bicycle and pedestrian travel wherever possible.

There are many reasons to integrate bicycle and pedestrian facilities into typical roadway development policy. The goal of a transportation system is to better meet the needs of people - whether in vehicles, riding a bicycle or walking - and to provide access to goods, services, and activities.

Supporting active modes gives users important transportation choices, whether it is to make trips entirely by walking or bicycling, or to access public transit. In urban or suburban areas, walking and bicycling are often the fastest and most efficient ways to perform short trips.

Convenient non-motorized travel provides many benefits, including reduced traffic congestion, user savings, road and parking facility savings, economic development, and a better environment by helping reduce greenhouse gases.

The design guidelines in this document are for use on Grand Forks - East Grand Forks MPO roadways. Projects must not only be planned for their physical aspects as facilities serving specific transportation objectives; they must also consider effects on the aesthetic, social, economic and environmental values, needs, constraints and opportunities in the larger community setting. This is commonly known as Context Sensitive Design, and should be employed when determining which standard is applicable in each scenario.

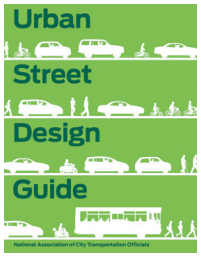
All walkway and bikeway design guidelines in this document meet or exceed the minimums set by the Americans with Disabilities Act Accessible Design Guidelines (ADAAG) and the Public Right of Way Accessibility Guidelines (PROWAG).

All traffic control devices, signs, pavement markings used and identified in this document must conform to the "Manual on Uniform Traffic Control Devices" (MUTCD).

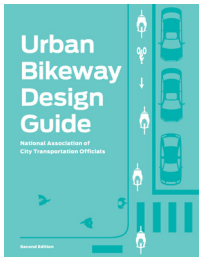
Guidance Basis

The sections that follow serve as an inventory of pedestrian and bicycle design treatments and provide guidelines for their development. These treatments and design guidelines are important because they represent the tools for creating a pedestrian- and bicycle-friendly, accessible community. The guidelines are not, however, a substitute for a more thorough evaluation by a professional engineer prior to implementation of facility improvements. The following guidelines are incorporated in this Design Guide.

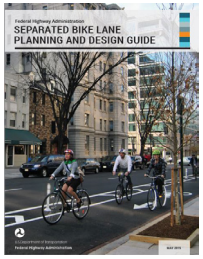
National Guidance



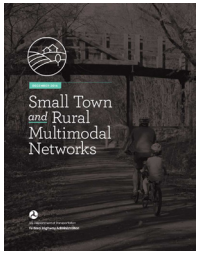
The National Association of City Transportation Officials' (NACTO) **Urban Street Design Guide (2013)** *is a collection of nationally recognized street design standards. The Guide outlines both a clear vision for complete streets and a basic road map for how to bring them to fruition.*



The National Association of City Transportation Officials' (NACTO) **Urban Bikeway Design Guide (2012)** *provides cities with solutions that can help create complete streets that are safe and enjoyable for bicyclists. The designs were developed by cities for cities, since unique urban streets require innovative solutions. In August 2013, the FHWA issued a memorandum officially supporting use of the document.*



Separated Bike Lane Planning and Design Guide (2015) *is the latest national guidance on the planning and design of separated bike lane facilities released by the Federal Highway Administration (FHWA). The resource documents best practices as demonstrated around the U.S., and offers ideas on future areas of research, evaluation and design flexibility.*



The Federal Highway Administration's **Small Town and Rural Multimodal Networks Report (2016)** *offers resources and ideas to help small towns and rural communities support safe, accessible, comfortable, and active travel for people of all ages and abilities. It connects existing guidance to rural practice and includes examples of peer communities.*

State Level Guidance

The North Dakota Department of Transportation's **Active and Public Transportation Facility Planning Best Practice Recommendations** *provides North Dakota specific guidance on pedestrian and bicycle facility selection and design - for various land use and corridor contexts.*

Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD) *defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic.*

The Minnesota Department of Transportation's **Minnesota's Best Practices for Pedestrian and Bicycle Safety (2021)** *identifies proven strategies and treatments. The manual should be used in conjunction with the current versions of the MnDOT Road Design Manual and the Minnesota Manual on Uniform Traffic Control Devices.*

The Minnesota Department of Transportation's **Bicycle Facility Design Manual (2020)** *establishes uniform design criteria for Minnesota roadways. The manual should be used in conjunction with the current versions of the MnDOT Road Design Manual and the Minnesota Manual on Uniform Traffic Control Devices.*

HOW TO SELECT FACILITIES

Sidewalk Zones & Widths

Sidewalks are the most fundamental element of the walking network, as they provide an area for pedestrian travel separated from vehicle traffic. Providing adequate and accessible facilities can lead to increased numbers of people walking, improved accessibility, and the creation of social space.

Design Features

Enhancement Zone	Amenity Zone	Pedestrian Through Zone	Frontage Zone
The curbside lane can act as a flexible space to further buffer the sidewalk from moving traffic, and may be used for a bike facility. Curb extensions and bike corrals may occupy this space where appropriate.	The amenity zone, also called the furnishing or landscaping zone, buffers pedestrians from the adjacent roadway, and is also the area where elements such as street trees, signal poles, signs, and other street furniture are properly located. When context and space allows, this is the ideal zone to include stormwater infrastructure and plantings such as bioswales and infiltration basins, as well as shade trees	The pedestrian through zone is the area intended for pedestrian travel. This zone should be entirely free of permanent and temporary objects. Wide pedestrian zones are needed in areas or where pedestrian flows are high.	The frontage zone allows pedestrians a comfortable "shy" distance from the building fronts, fencing, walls and vertical landscaping. It provides opportunities for window shopping, to place signs, planters, or chairs.

Typical Application

- Wider sidewalks should be installed near schools, at transit stops, or anywhere high concentrations of pedestrians exist.
- At transit stops, an 8 ft by 5 ft clear space is required for accessible passenger boarding/alighting at the front door location per ADA requirements.
- Sidewalks should be continuous on both sides of urban commercial streets, and should be required in areas of moderate residential density (1-4 dwelling units per acre).
- When retrofitting gaps in the sidewalk network, locations near transit stops, schools, parks, public buildings, and other areas with high concentrations of pedestrians should be the highest priority.

Materials and Maintenance

Sidewalks are typically constructed out of concrete and are separated from the roadway by a curb or gutter and sometimes a landscaped boulevard. Less expensive walkways constructed of asphalt, crushed stone, or other stabilized surfaces may be appropriate. Ensure accessibility and properly maintain all surfaces regularly. Surfaces must be firm, stable, and slip resistant. Colored, patterned, or stamped concrete can add distinctive visual appeal. See 'Sidewalk Maintenance' for more information.

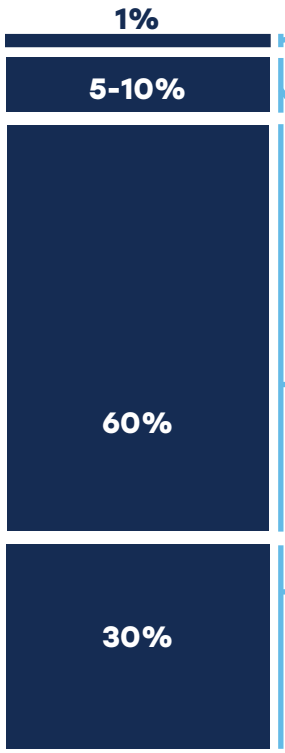
Street Classification	Amenity Zone	Primary Pedestrian Zone	Building Frontage Zone*
Local Streets	4 - 6 ft	6 - 8 ft	2 ft
Pedestrian Priority Areas	6 - 10 ft	8 ft	2 - 8 ft
Arterials and Collectors	4 - 6 ft	6 - 8 ft	4 - 6 ft

**Indicates ideal frontage zone space. Actual frontage zone is contingent upon the City's development code and required set backs*

Bicycle Facility Selection: User Types

The current AASHTO Guide to the Development of Bicycle Facilities encourages designers to identify their rider type based on the trip purpose (Recreational vs Transportation) and on the level of comfort and skill of the rider (Casual vs Experienced). A user-type framework for understanding a potential rider's willingness to bike is illustrated in the figure below. Developed by planners in Portland, OR* and supported by research**, this classification identifies four distinct types of bicyclists.

TYPICAL DISTRIBUTION OF BICYCLIST TYPES



Strong and Fearless
This group is willing to ride a bicycle on any roadway regardless of traffic conditions. Comfortable taking the lane and riding in a vehicular manner on major streets without designated bicycle facilities.

Enthused and Confident
This group of people riding bicycles who are riding in most roadway situations but prefer to have a designated facility. Comfortable riding on major streets with a bike lane.

Interested but Concerned
This group is more cautious and has some inclination towards bicycling, but are held back by concern over sharing the road with cars. Not very comfortable on major streets, even with a striped bike lane, and prefer separated pathways or low traffic neighborhood streets.

No Way, No How
This group comprises residents who simply aren't interested at all in bicycling and may be physically unable or don't know how to ride a bicycle, and they are unlikely to adopt bicycling in any way.

** Roger Geller, City of Portland Bureau of Transportation. Four Types of Cyclists. http://www.portlandonline.com/transportation/index.cfm?&a=237507. 2009.*
*** Dill, J., McNeil, N. Four Types of Cyclists? Testing a Typology to Better Understand Bicycling Behavior and Potential. 2012.*

Bicycle Facility Selection: Comfort

In order to provide a bikeway network that meets the needs of the Grand Forks - East Grand Forks MPO's "Interested but Concerned" residents (the majority of the population), bikeways must be low-stress and comfortable. By using a metric called Level of Traffic Stress (LTS), specific facility types can be matched to the needs of people who bicycle in the MPO. Generally, "Interested but Concerned," users will only bicycle on LTS 1 or LTS 2 facilities.

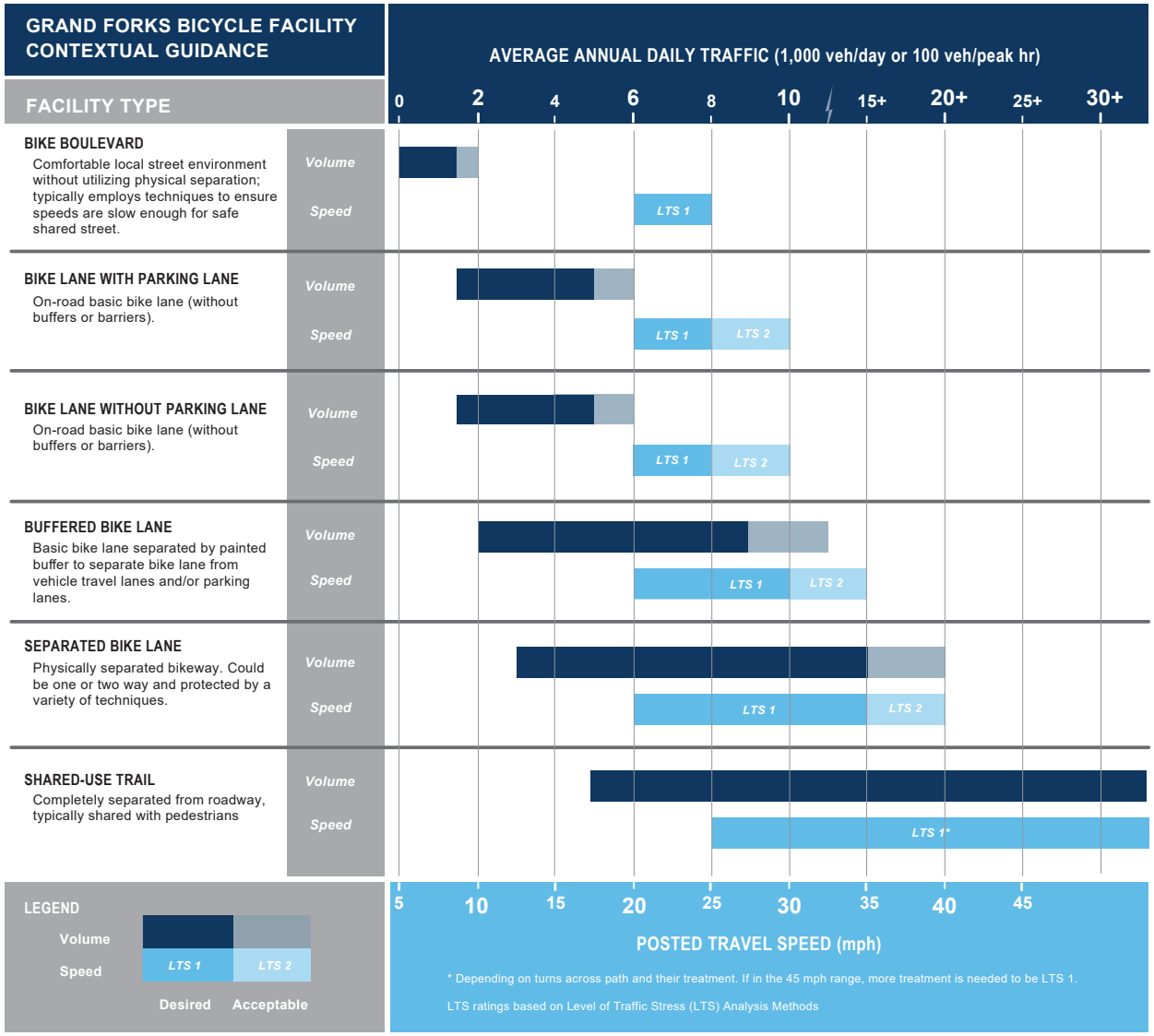
LEVELS OF TRAFFIC STRESS (LTS)

LTS LEVEL	DESCRIPTION	WHAT TYPE OF BICYCLISTS WILL RIDE ON THIS LTS FACILITY?		
		STRONG & FEARLESS	ENTHUSIASTIC & CONFIDENT	INTERESTED BUT CONCERNED
LTS 1	Presents the lowest level of traffic stress; demands less attention from people riding bicycles, and attractive enough for a relaxing bicycle ride. Suitable for almost all people riding bicycles, including children trained to ride in the street and to safety cross intersections.	YES	YES	YES
LTS2	Presents little traffic stress and therefore suitable to most adults riding bicycles, but demandsmore attention than might be expected from children.	YES	YES	SOMETIMES
LTS3	More traffic stress than LTS2, yet significantly less than the stress of integrating with multilane traffic.	YES	SOMETIMES	NO
LTS4	A level of stress beyond LTS 3. Includes roadways that have no dedicated bicycle facilities and moderate to higher vehicle speeds and volumes OR high speed and high volume roadways WITH an exclusive riding zone (lane) where there is a significant speed differential with vehicles.	YES	NO	NO

Bicycle Facility Selection: Bikeways

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

The chart at right can be used to help determine the recommended type of bikeway to be provided in particular roadway speed and volume situations. To use this chart, identify the appropriate daily traffic volume on the existing or proposed roadway, and locate the facility types indicated by those key variables. Other factors beyond volume which affect facility selection include traffic mix of including heavy vehicles, the presence of on-street parking, intersection density, surrounding land use, and roadway sight distance. These factors are not included in the facility selection chart below, but should always be considered in the facility selection and design process.



This chart can be used to identify a preferred bicycle facility, or facilities, that would provide an LTS 1 or 2 experience at a selected location. For street segments, desired and acceptable vehicular volumes for each facility are shown. These are the motor vehicle volume ranges that are appropriate for that facility. The correspondence between motor vehicle speed on the street and the LTS score for each facility are also shown. The speed entries determine the LTS scores for the facility. A facility should only be chosen when both the street volumes and LTS scores are appropriate. Since ranges overlap, it is important to allow more than one facility type to meet the desired LTS. Other factors should be considered when selecting a treatment, such as proximity to schools, parks, or trailheads.

LOCAL STREET

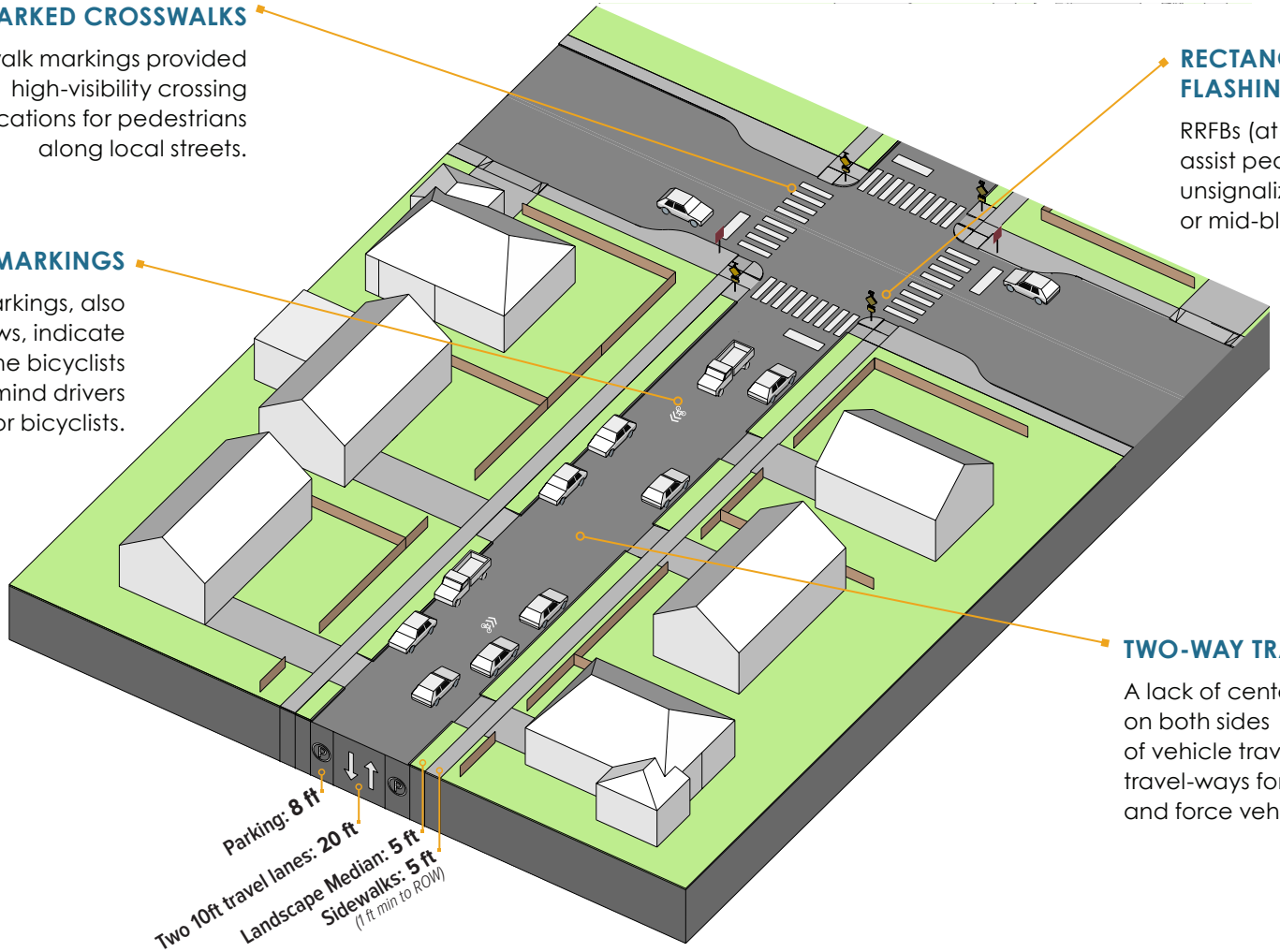
TYPICAL TRAFFIC VOLUMES	0-2,000	POSTED SPEED LIMIT	25	ROW WIDTH	80’

MARKED CROSSWALKS

Crosswalk markings provided high-visibility crossing locations for pedestrians along local streets.

SHARED LANE MARKINGS

Shared lane markings, also known as sharrows, indicate where in the lane bicyclists should ride, and remind drivers to look out for bicyclists.



RECTANGULAR RAPID FLASHING BEACONS (RRFB)

RRFBs (at select locations) assist pedestrians at unsignalized intersection or mid-block crossings

TWO-WAY TRAVEL LANE

A lack of center line and parking on both sides narrows the path of vehicle travel. Narrower travel-ways for slow traffic speeds and force vehicles to yield.

Bike Boulevards

Typical Use

- On low-volume, low-speed streets. Utilize traffic calming to maintain or establish low volumes and discourage vehicle cut through / speeding.
- Follow a desire line for bicycle travel that is ideally long and relatively continuous (2-5 miles).

Design Features

- Signs, pavement markings, and traffic calming elements such as speed humps or traffic circles are the minimum treatments necessary to designate a street as a bike boulevard.
- Implement volume control treatments based on the context of the bike boulevard, using engineering judgment.
- Intersection crossings should be designed to enhance comfort and minimize delay for bicyclists of diverse skills and abilities.

Further Considerations

- Bike Boulevard retrofits to local streets are typically located on streets without existing signalized accommodation at crossings of collector and arterial roadways. Without treatments for bicyclists, these intersections can become major barriers.
- Traffic calming can deter motorists from driving on a street.

Materials and Maintenance

- Bike Boulevards require few additional maintenance requirements to local roadways. Signage, signals, and other traffic calming elements should be inspected and maintained according to local standards.

Traffic Calming

Typical Use

- Traffic calming measures should be implemented when the safety of all roadway users, especially pedestrians and bicyclists, is at risk due to high vehicular speeds. They can be more applicable in areas with high potential for conflict between pedestrian/ bicyclist and motor vehicles.
- Traffic calming measures may be most appropriate in areas with predominantly residential or mixed-use land use.
- Traffic calming measures should not infringe on bicycle space. Provide a bicycle route outside of the element so bicyclists can avoid having to merge into traffic at a narrow pinch point.

Design Features

- Priority traffic calming measures are primarily focus on safety. They are meant to regulate, warn, inform, enforce, and educate motorists, cyclists, and pedestrians on the road. Examples include: signage, pavement markings, turn restrictions, temporary speed bumps.
- Secondary traffic calming measures are used to reduce traffic speeds. Examples include, speed tables, chicanes, traffic circles, and tree planting.
- Traffic diversion may be employed. Examples include, diverters, partial street closures, and median barrier/forced turn islands.

Benefits:

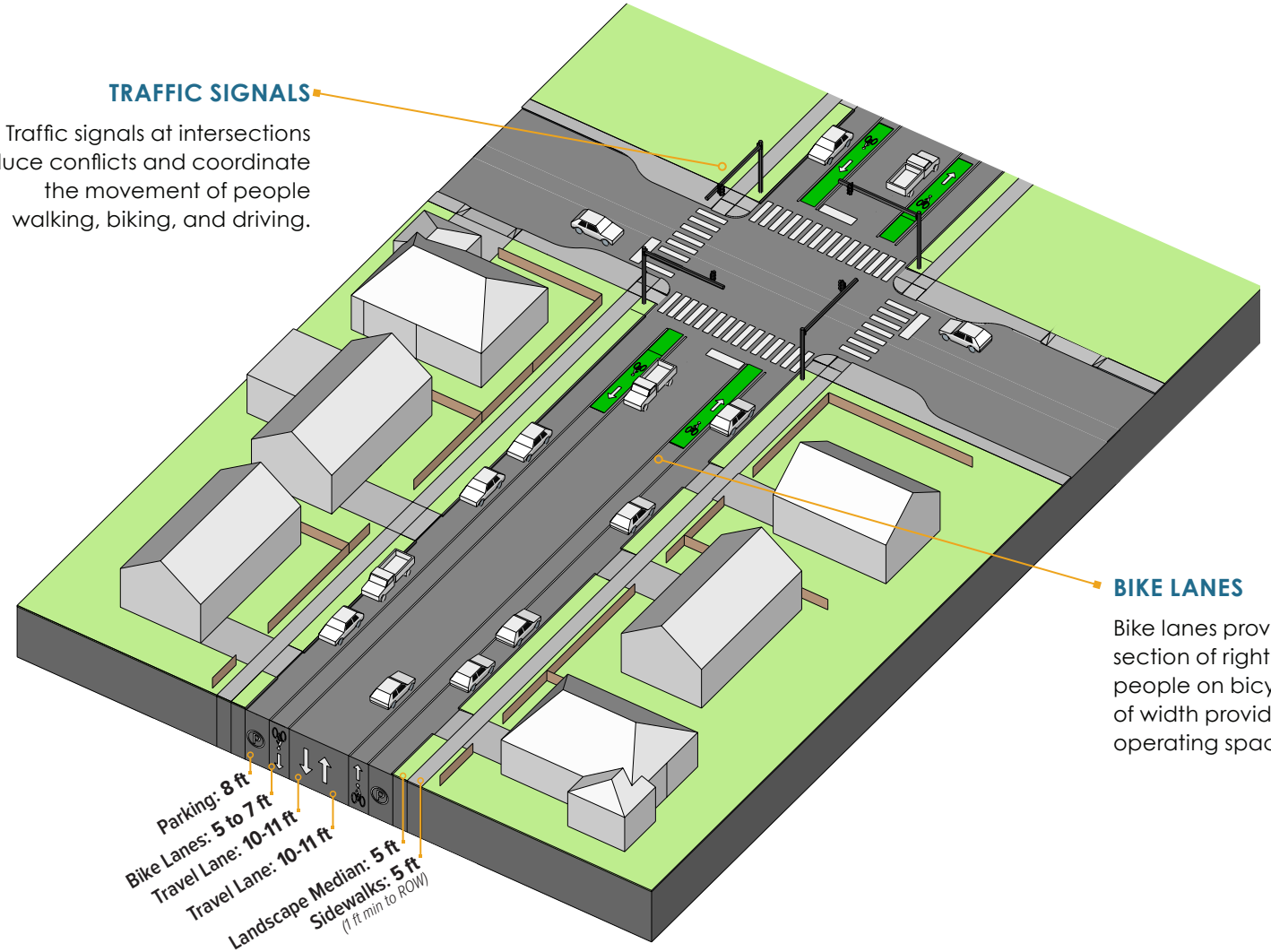
- Improves conditions for bicyclists, pedestrians, and residents on local streets.
- Reduced travel speeds decreases the exposure risks between bicyclists/ pedestrians and motor vehicles.
- Reduced travel speeds result in reduced injury severity in the event of a collision.
- Helps achieve a safer and more livable neighborhood while balancing the transportation needs of the roadway.

COLLECTOR WITH BIKE LANE

TYPICAL TRAFFIC VOLUMES	2,000 - 10,000	POSTED SPEED LIMIT	25 TO 30	ROW WIDTH	80' TO 100'

TRAFFIC SIGNALS

Traffic signals at intersections reduce conflicts and coordinate the movement of people walking, biking, and driving.



BIKE LANES

Bike lanes provide a dedicated section of right of way for people on bicycles. 7 feet of width provides sufficient operating space.

Standard Bike Lanes

On-street bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signs. The bike lane is located directly adjacent to motor vehicle travel lanes and is used in the same direction as motor vehicle traffic.

Typical Application

- Bike lanes may be used on any street with adequate space, but are most effective on streets with moderate traffic volumes ≤ 5,000.
- Appropriate for skilled adult riders on most streets.
- May be appropriate for children when configured as lanes of 6 feet or more in width on lower-speed, lower-volume streets with one lane in each direction.

Design Features

- Use 6 inch wide white lines.
- Include a bicycle lane marking at the beginning of the bike lane, beginning and end of bike lane pockets, approaches and far side of arterial crossings, and major changes in direction. MUTCD recommends every 80 feet to 1,000 feet depending on land use context.
- Minimum width of the bike lane is 5 feet. However, 7 feet is preferred - to facilitate safe passing behavior.
- Buffer preferred when parking has high turnover, see Buffered Bike Lanes.
- The R3-17 "Bike Lane" sign is optional, but recommended in most contexts.

Materials and Maintenance

- Bike lane striping and markings will require higher maintenance where vehicles frequently traverse over them at intersections, driveways, parking lanes, and along curved or constrained segments of roadway.
- Bike lanes should also be maintained so that there are no pot holes, cracks, uneven surfaces or debris.

Intersection Corners

The design of intersection corners has a large effect on the safety of pedestrians and the turning speed of vehicles.

Corner Radii

- A smaller curb radius provides more pedestrian area at the corner, allows more flexibility in the placement of curb ramps, results in a shorter crossing distance, and requires vehicles to slow more on the intersection approach. During the design phase, the chosen radius should be the smallest possible for the circumstances and consider the effective radius in any design vehicle turning calculations.

Curb Ramps

- The level landing at the top of a ramp should be at least 4 feet long and at least the same width as the ramp itself. The slope of the ramp should be compliant to current standards.
- The edge of an ADA compliant curb ramp should be marked with a detectable warning surface (also known as truncated domes) to alert people with visual impairments.
- Where feasible, separate directional curb ramps for each crosswalk at an intersection should be provided rather than having a single ramp at a corner for both crosswalks.

Curb Extensions

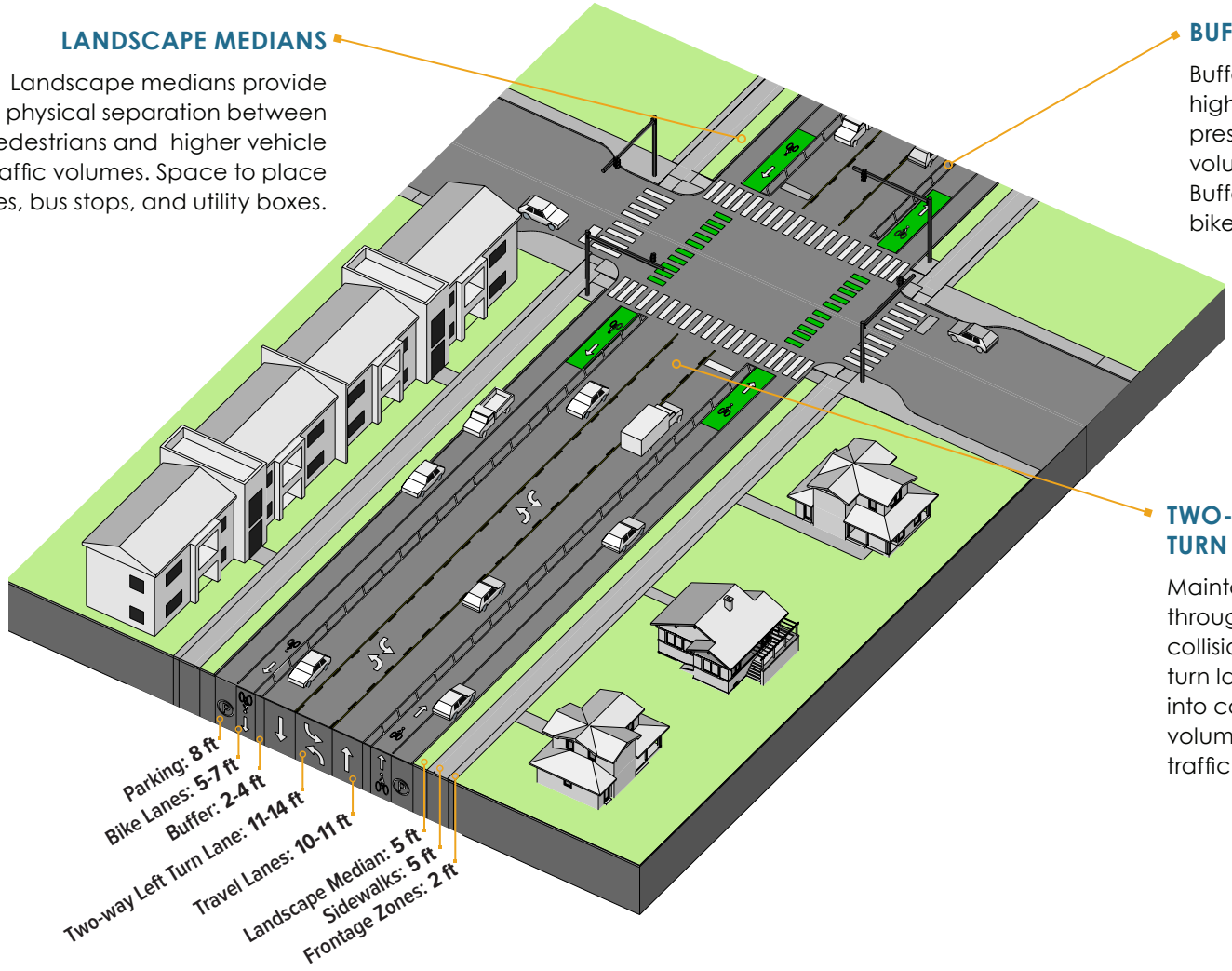
- Crossing distance is shortened by approximately 6-8 feet with a parallel parking lane or 15 feet or more with an angled parking lane.
- For purposes of efficient street sweeping, the minimum radius for the reverse curves of the transition is 10 feet and the two radii should be balanced to be nearly equal.
- The curb extension width should terminate 1 foot short of the parking lane to maximize bicyclist safety.

COLLECTOR WITH BUFFERED BIKE LANE

TYPICAL TRAFFIC VOLUMES	2,000 - 10,000	POSTED SPEED LIMIT	25 TO 30	ROW WIDTH	80' TO 100'

LANDSCAPE MEDIANS

Landscape medians provide physical separation between pedestrians and higher vehicle traffic volumes. Space to place trees, bus stops, and utility boxes.



BUFFERED BIKE LANE

Buffered bike lane provides higher comfort facility in the presence of higher vehicle volumes and/or speeds. Buffer is placed between bike lane and travel lane.

TWO-WAY LEFT TURN LANE

Maintains vehicle throughput and reduces collisions. Width of turn lane should take into consideration the volume of freight/truck traffic on the corridor.

Buffered Bike Lanes

Buffered bike lanes are conventional bike lanes paired with a designated buffer space, separating the bike lane from the adjacent motor vehicle travel lane and/or parking lane.

Typical Application

- Anywhere a conventional bike lane is being considered.
- While conventional bike lanes are most appropriate on streets with lower to moderate speeds (≤ 30 mph), buffered bike lanes provide additional value on streets with higher speeds (+30 mph) and high volumes or high truck volumes.
- On streets with extra lanes or lane width.
- Appropriate for skilled adult riders on most streets.

Design Features

- Minimum width of the bike lane is 5 feet. However, 7 feet is preferred - to facilitate safe passing behavior. These widths do not include the buffer.
- Buffers should be a minimum of 2 feet in width. However, 3 or 4 feet is preferred.
- For clarity at driveways or minor street crossings, consider a dotted line.

Further Considerations

- On multi-lane streets with high vehicles speeds, the most appropriate bicycle facility to provide for user comfort may be physically separated bike lanes.
- NCHRP Report #766 recommends, when space is limited, installing a buffer space between the parking lane and bicycle lane where on-street parking is permitted rather than between the bicycle lane and vehicle travel lane.[1] This buffer is particularly useful in commercial areas where parking turnover is higher.

Materials and Maintenance

- Bike lane striping and markings will require higher maintenance where vehicles frequently traverse over them at intersections, driveways, parking lanes, and along curved or constrained segments of roadway.
- Bike lanes should be maintained so that there are no pot holes, cracks, uneven surfaces or debris.

1 *National Cooperative Highway Research Program. Report #766: Recommended Bicycle Lane Widths for Various Roadway Characteristics.*

MINOR ARTERIAL

TYPICAL TRAFFIC VOLUMES	10,000 - 15,000	POSTED SPEED LIMIT	30 TO 40	ROW WIDTH	100’

WIDER SIDEWALKS

Wide sidewalks accommodate higher pedestrian volumes and allow pedestrians to pass each other or walk side by side.

RAISED PROTECTED BIKE LANE

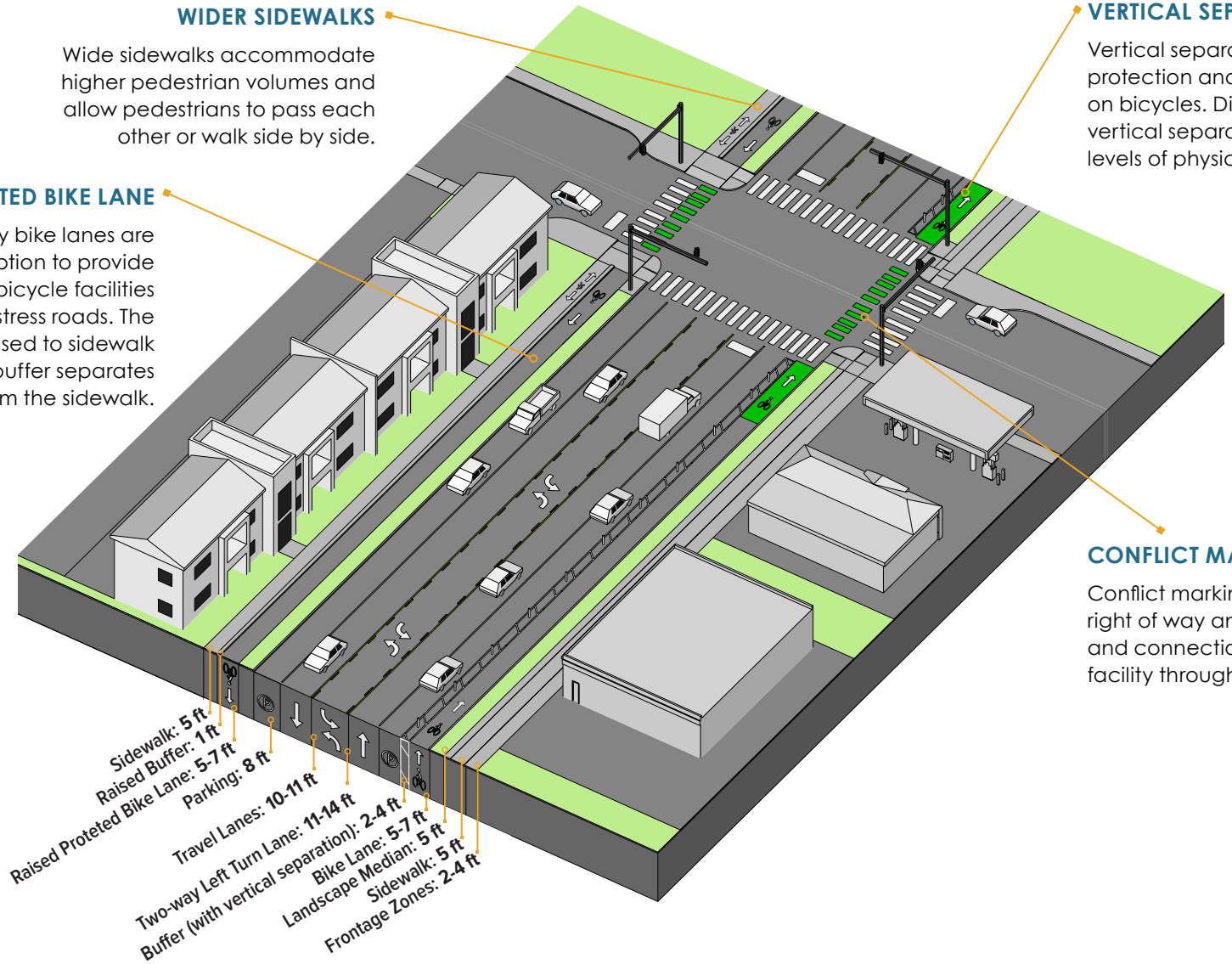
These one-way bike lanes are another option to provide comfortable bicycle facilities on higher stress roads. The bike lane is raised to sidewalk level, but a buffer separates the lane from the sidewalk.

VERTICAL SEPARATION

Vertical separation provides additional protection and comfort for people on bicycles. Differing types of vertical separation provide differing levels of physical protection.

CONFLICT MARKINGS

Conflict markings display the bicycle right of way and create continuity and connection of the bicycle facility through the intersection.



Separated Bike lanes

One-way separated bike lanes are on-street bikeway facilities that are separated from vehicle traffic. Physical separation is provided by a vertical element between the bikeway and the vehicular travel lane. These can include flexible posts, bollards, parking, planter strips, extruded curbs, or on-street parking. Separated bikeways using these barrier elements typically share the same elevation as adjacent travel lanes, but the bikeway could also be raised above street level, either below or equivalent to sidewalk level.

Typical Use

- Along streets on which conventional bicycle lanes would cause many bicyclists to feel stress because of factors such as multiple lanes, high bicycle volumes, high motor traffic volumes (10,000-15,000 ADT), higher traffic speeds (35+ mph), high incidence of double parking, higher truck traffic (10% of total ADT) and high parking turnover.
- Along streets for which conflicts at intersections can be effectively mitigated using parking lane setbacks, bicycle markings through the intersection, and other signalized intersection treatments.

Design Features

- Pavement markings, symbols and/or arrow markings must be placed at the beginning of the separated bikeway and at intervals along the facility based on engineering judgment.
- Minimum width of the bike lane is 5 feet. However, 7 feet is preferred to facilitate safe passing behavior.
- Buffers should be a minimum of 2 feet in width. However, 3 or 4 feet is preferred.
- Maximize effective operating space by placing curbs or delineator posts as far from the through bikeway space as practicable.
- Include green conflict marks at points crossing points like intersections or driveways.

Further Considerations

- A retrofit separated bikeway has a relatively low implementation cost compared to road reconstruction by making use of existing pavement and drainage and using a parking lane as a barrier.
- Gutters, drainage outlets and utility covers should be designed and configured as not to impact bicycle travel.
- For clarity at major or minor street crossings, consider a dotted line for the buffer boundary where cars are expected to cross.
- Parking should be prohibited within 30 feet of intersections and driveways to improve visibility. Clearly indicate the parking prohibition through the use of a red curb, signs, or other tools.

Materials and Maintenance

- Bikeway striping and markings will require higher maintenance where vehicles frequently traverse over them at intersections, driveways, parking lanes, and along curved or constrained segments of roadway. Green conflict markings (if used) will also generally require higher maintenance due to vehicle wear.
- Access points along the facility should be provided for street sweeper vehicles to enter/exit the separated bikeway.
- Install composite and reboundable delineator systems, which offer more durability.

PRINCIPAL ARTERIAL

TYPICAL TRAFFIC VOLUMES	> 15,000	POSTED SPEED LIMIT	40+	ROW WIDTH	100' TO 150'

PROTECTED CORNERS

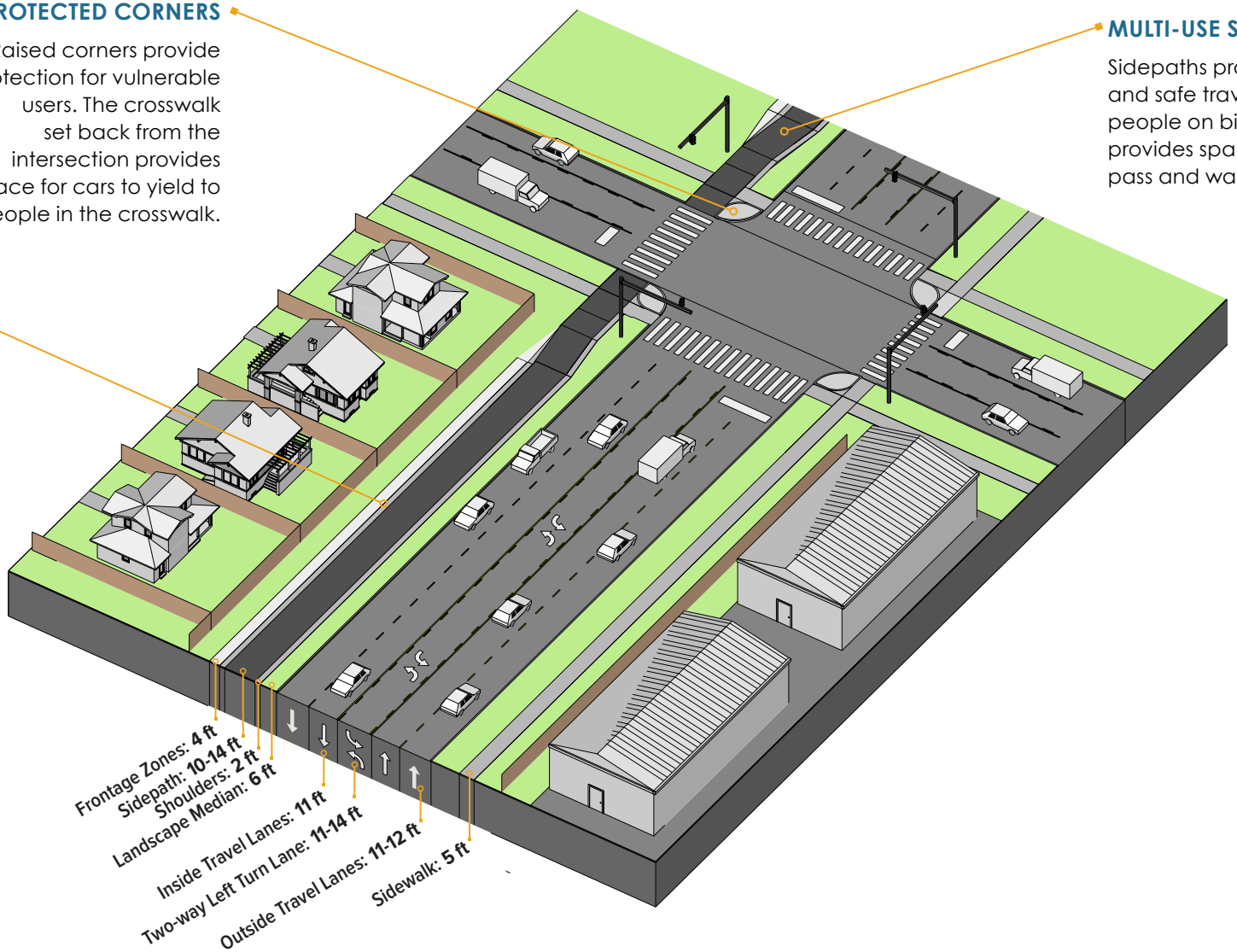
Raised corners provide protection for vulnerable users. The crosswalk set back from the intersection provides space for cars to yield to people in the crosswalk.

MULTI-USE SIDEPATHS

Sidepaths provide a low-stress and safe travel experience for people on bicycles. Ample width provides space for people to pass and walk side by side.

SHOULDERS

A 2-foot zone clear of vertical obstructions needs to be provided to allow for full use of the sidepath width. Shoulders in urban areas may be concrete or turf, while shoulders in rural areas or on greenways may be gravel.



Sidepaths

A side paths provides a travel area separate from motorized traffic for bicyclists, pedestrians, skaters, wheelchair users, joggers, and other users. They are desirable for bicyclists of all skill levels preferring separation from traffic.

Typical Use

- In waterway corridors, such as along canals, drainage ditches, rivers, and creeks.
- In abandoned rail corridors (commonly referred to as Rails-to-Trails or Rail-Trails).
- In active rail corridors, trails can be built adjacent to active railroads (referred to as Rails-with-Trails).
- In utility corridors, such as power line and sewer corridors.
- Along roadways.

Design Features

- A path 12 to 14 feet in width is preferred and recommended in most situations. Additional width is especially important for locations with heavy use and high concentrations of multiple users. A separate track (5 feet minimum) can also be provided for pedestrian use.
- 10 feet is the minimum width allowed for a two-way bicycle path.

LATERAL CLEARANCE

- A 2 feet or greater shoulder on both sides of the path should be provided if the trail is constructed from asphalt. If the trail is constructed out of concrete these clearances should be maintained, but no gravel shoulder is required.

OVERHEAD CLEARANCE

- Clearance to overhead obstructions should be 8 feet minimum, with 10 feet recommended.

STRIPING

- Solid centerlines can be provided on tight or blind corners and transitions, and on the approaches to roadway crossings.
- When striping is desired, use a 4 inch dashed yellow centerline stripe with 4 inch solid white edge lines.

Further Considerations

- Under most conditions, centerline markings are not necessary. However, paths with a high volume of bidirectional traffic should include a centerline. This can help communicate that users should expect traffic in both directions.
- Terminate the path where it is easily accessible to and from the street system, preferably at a trailhead, controlled intersection, or at the beginning of a dead-end street.
- Use of bollards should be avoided when possible. If bollards are used at intersections and access points, they should be colored brightly and/or supplemented with reflective materials to be visible at night.

Sidewalks

The sidewalk is an essential space for people walking and using wheelchairs and other personal mobility devices, and it is also the location where many other important activities take place.

Design Features

- All sidewalks should be a minimum of 5 feet wide.
- Sidewalks should be installed with a minimum of 1 foot of buffer between them and the outside edge of the right of way.
- Where pedestrian demand (or volume) is especially especially high, consider extra sidewalk width to prevent congestion and allow pedestrians to pass one another.
- The primary pedestrian zone must remain free and clear of obstacles and impediments. This is the primary accessway for people traveling along streets and to and from adjacent properties, and must be maintained to ADA standards.