Appendix A: Bicycle & Pedestrian Facility Design Guidelines

FARMINGTON ACTIVE TRANSPORTATION PLAN

MARCH 2016

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Farmington Creek Trail (shared-use path) near Farmington Pond

1: Context and Guidance

Introduction

This technical handbook is intended to assist the City of Farmington in the selection and design of bicycle and pedestrian facilities. The following sections combine best practices and design guidance provided by a number of national sources including ITE, NCHRP, FHWA, and NACTO. Within the design chapters, treatments are covered within a single or double sheet format relaying important design information and discussion, example photos, schematics (if applicable), and existing summary guidance from current or upcoming draft standards. Existing standards are referenced throughout and should be the first source of information when seeking to implement any of the treatments featured here.

Guiding Principles

The following are guiding principles for these bicycle and pedestrian design guidelines:

- The walking and bicycling environment should be safe and comfortable. Safe means minimal conflicts with external factors, such as noise, vehicular traffic and protruding architectural elements. Safe also means routes are clear and well marked with appropriate pavement markings and directional signage.
- The trail and bicycle network should be accessible. Shared-use paths, bike routes and crosswalks should permit the mobility of residents of all ages and abilities. The trail and bicycle network should employ principles of universal design. Bicyclists have a range of skill levels, and facilities should be designed with a goal of providing for inexperienced/recreational bicyclists (especially children and seniors) to the greatest extent possible.
- Trail and bicycle network improvements should be economical. Trail and bicycle improvements should achieve the maximum benefit for their cost, including initial cost and maintenance cost, as well as a reduced reliance on more expensive modes of transportation. Where possible, improvements in the right-of-way should stimulate, reinforce and connect with adjacent private improvements.
- The trail and bicycle network should connect to places people want to go. The trail and bicycle network should provide continuous direct routes and convenient connections between destinations such as homes, schools, shopping areas, public services, recreational opportunities and transit. A complete network of on-street bicycling facilities should connect seamlessly to existing and proposed shared-use paths to complete recreational and commuting routes.
- The walking and bicycling environment should be clear and easy to use. Shared-use paths and

crossings should allow all people to easily find a direct route to a destination with minimal delays, regardless of whether these persons have mobility, sensory, or cognitive disability impairments. All roads are legal for the use of pedestrians and bicyclists (except freeways, from which each is prohibited unless a separate facility on that right of way is provided). This means that most streets are bicycle facilities and should be designed, marked and maintained accordingly.

- The walking and bicycling environment should be attractive and enhance community livability. Good design should integrate with and support the development of complementary uses and should encourage preservation and construction of art, landscaping and other items that add value to the community. These components might include open spaces such as plazas, courtyards and squares, and amenities like street furniture, banners, art, plantings and special paving. These along with historical elements and cultural references, should promote a sense of place.
- Design guidelines are flexible and should be applied using professional judgment. This document references specific national guidelines for bicycle and trail facility design, as well as a number of design treatments not specifically covered under current guidelines. Statutory and regulatory guidance may change. For this reason, the guidance and recommendations in this document function to complement other resources considered during a design process, and in all cases sound engineering judgment should be used.

National Standards

The Federal Highway Administration's **Manual on Uniform Traffic Control Devices** (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 MUTCD is the primary source for guidance on lane striping requirements, signal warrants, and recommended signage and pavement markings.

To further clarify the MUTCD, the FHWA created a table of contemporary bicycle facilities that lists various bicycle-related signs, markings, signals, and other treatments and identifies their official status (e.g., can be implemented, currently experimental). See **Bicycle Facilities and the Manual on Uniform Traffic Control Devices**.

Bikeway treatments not explicitly covered by the MUTCD are often subject to experiments, interpretations and official rulings by the FHWA. The **MUTCD Official Rulings** is a resource that allows website visitors to obtain information about these supplementary materials. Copies of various documents (such as incoming request letters, response letters from the FHWA, progress reports, and final reports) are available on this website.

American Association of State Highway and Transportation Officials (AASHTO) **Guide for the Development of Bicycle Facilities**, updated in June 2012 provides guidance on dimensions, use, and layout of specific bicycle facilities. The standards and guidelines presented by AASHTO provide basic information, such as minimum sidewalk widths, bicycle

lane dimensions, detailed striping requirements and recommended signage and pavement markings.

The National Association of City Transportation Officials' (NACTO) 2012 **Urban Bikeway Design Guide** offers guidance on the current state of the practice designs. The NACTO Urban Bikeway Design Guide is based on current practices in the best cycling cities in the world. The intent of the guide is to offer substantive guidance for cities seeking to improve bicycle transportation in places where competing demands for the use of the right of way present unique challenges. All of the NACTO Urban Bikeway Design Guide treatments are in use internationally and in many cities around the US.

FHWA's 2015 **Separated Bike Lane and Planning Design Guide** is the newest publication of nationally recognized bicycle-specific design guidelines, and outlines planning considerations for separated bike lanes, presents a suite of design recommendations based on corridor context, and highlights notable case studies from across the US.

Some of these treatments are not directly referenced in the current versions of the AASHTO Guide or the MUTCD, although many of the elements of these treatments are found within these documents. In all cases, engineering judgment is recommended to ensure that the application makes sense for the context of each treatment, given the many complexities of urban streets.

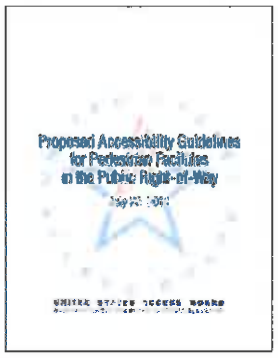
Local Standards

The Utah Department of Transportation's (UDOT) **Pedestrian and Bicycle Guide** provides design guidance and maintenance best practices for pedestrian and bicycle facilities. It also includes resources on funding, education and enforcement, and UDOT's project development process. The 2014 **State Bike Plan** incorporated a route condition inventory and safety gap analysis for each UDOT urban region and identified a regional bicycle network that includes key connections to transit and existing bicycle facilities as part of the Utah Collaborative Active Transportation Study. Farmington is located in UDOT Region 1.

Additional US Federal Guidelines

Meeting the requirements of the Americans with Disabilities Act (ADA) is an important part of any bicycle and pedestrian facility project. The United States Access Board's proposed **Public Rights-of-Way Accessibility Guidelines** (PROWAG) and the **2010 ADA Standards for Accessible Design** (2010 Standards) contain standards and guidance for the construction of accessible facilities. This includes requirements for sidewalk curb ramps, slope requirements, and pedestrian railings along stairs.

The 2011 AASHTO: **A Policy on Geometric Design of Highways and Streets** commonly referred to as the "Green Book," contains the current design research and practices for highway and street geometric design.

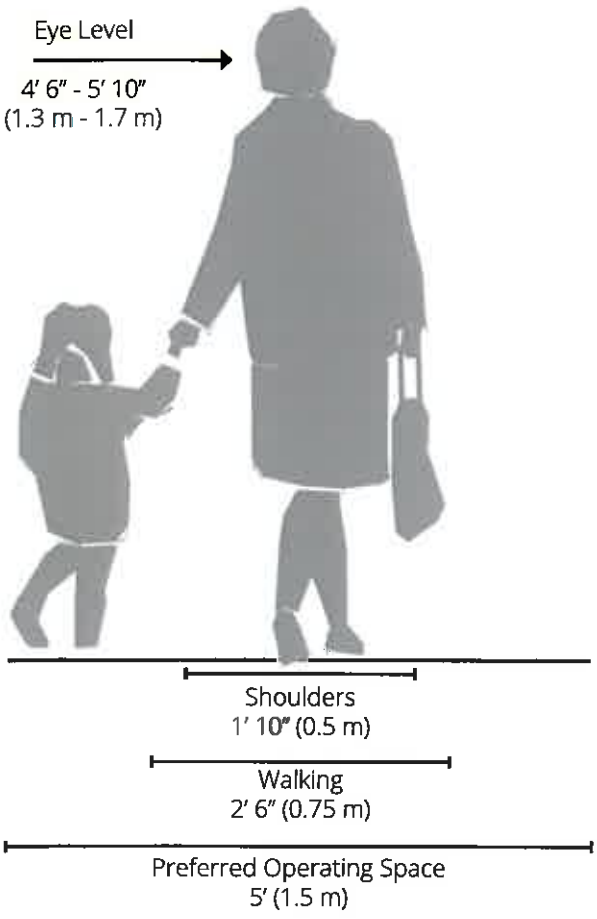


Design Needs of Pedestrians

Types of Pedestrians

Pedestrians have a variety of characteristics and the transportation network should accommodate a variety of needs, abilities, and possible impairments. Age is one major factor that affects pedestrians' physical characteristics, walking speed, and environmental perception. Children have low eye height and walk at slower speeds than adults. They also perceive the environment differently at various stages of their cognitive development. Older adults walk more slowly and may require assistive devices for walking stability, sight, and hearing. The table below summarizes common pedestrian characteristics for various age groups.

The MUTCD recommends a normal walking speed of 3.5 feet per second when calculating the pedestrian clearance interval at traffic signals. The walking speed can drop to 3 feet per second for areas with older populations and persons with mobility impairments. While the type and degree of mobility impairment varies greatly across the population, the transportation system should accommodate these users to the greatest reasonable extent.



Pedestrian Characteristics by Age

Age	Characteristics
0-4	Learning to walk
	Requires constant adult supervision
	Developing peripheral vision and depth perception
5-8	Increasing independence, but still requires supervision
	Poor depth perception
9-13	Susceptible to "darting out" in roadways
	Insufficient judgment
	Sense of invulnerability
14-18	Improved awareness of traffic environment
	Insufficient judgment
19-40	Active, aware of traffic environment
41-65	Slowing of reflexes
65+	Difficulty crossing street
	Vision loss
	Difficulty hearing vehicles approaching from behind

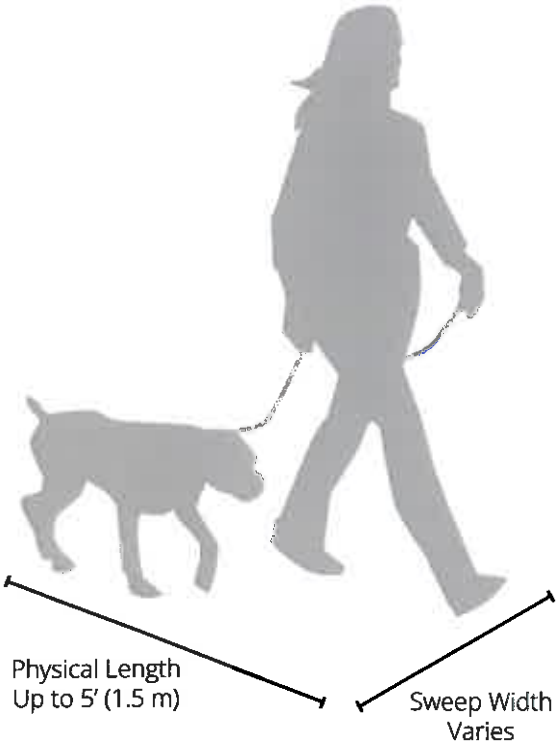
Source: AASHTO. ***Guide for the Planning, Design, and Operation of Pedestrian Facilities***, Exhibit 2-1. 2004.

Design Needs of Pedestrians

Design Needs of Dog Walkers

Dog walking is a common and anticipated use on shared-use paths. Dog sizes vary largely, as does leash length and walking style, leading to wide variation in possible design dimensions.

Shared-use paths designed to accommodate wheelchair users are likely to provide the necessary dimensions for the average dog walker. Amenities such as dog waste stations may enhance conditions for dog walkers.

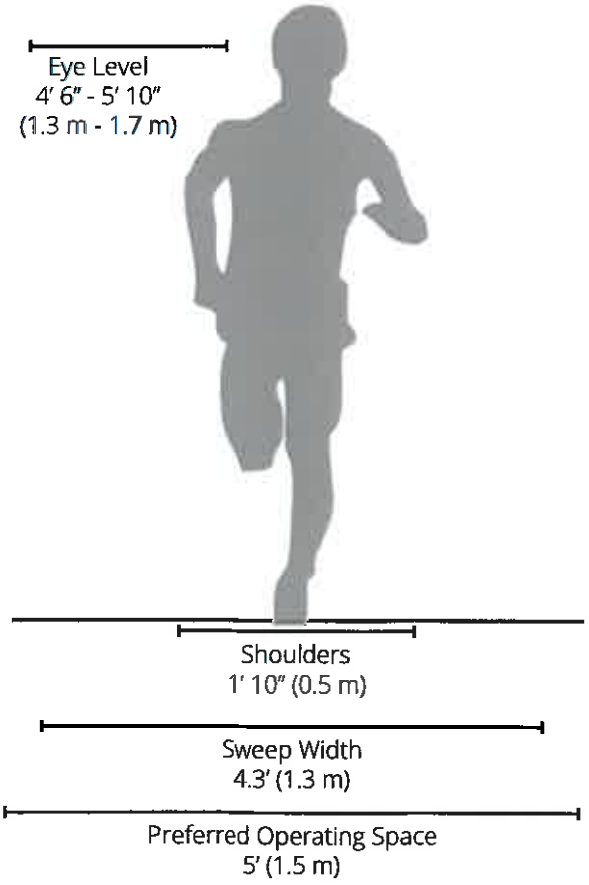


Design Needs of Runners

Running is an important recreation and fitness activity commonly performed on shared-use paths. Many runners prefer softer surfaces (such as rubber, bare earth or crushed rock) to reduce impact. Runners can change their speed and direction frequently. If high volumes are expected, controlled interaction or separation of different types of users should be considered.

Runner Typical Speed

User	Typical Speed
Runner	6.2 mph



Source: FHWA. ***Characteristics of Emerging Road and Trail Users and Their Safety.*** (2004).

Design Needs of Pedestrians

Design Needs of Wheelchair Users

As the American population ages, the number of people using mobility assistive devices (such as manual wheelchairs, powered wheelchairs) increases.

Manual wheelchairs are self-propelled devices. Users propel themselves using push rims attached to the rear wheels. Braking is done through resisting wheel movement with the hands or arm. Alternatively, a second individual can control the wheelchair using handles attached to the back of the chair.

Power wheelchairs user battery power to move the wheelchair. The size and weight of power wheelchairs limit their ability to negotiate obstacles without a ramp. Various control units are available that enable users to control the wheelchair movement, based on their ability (e.g., joystick or breath controlled).

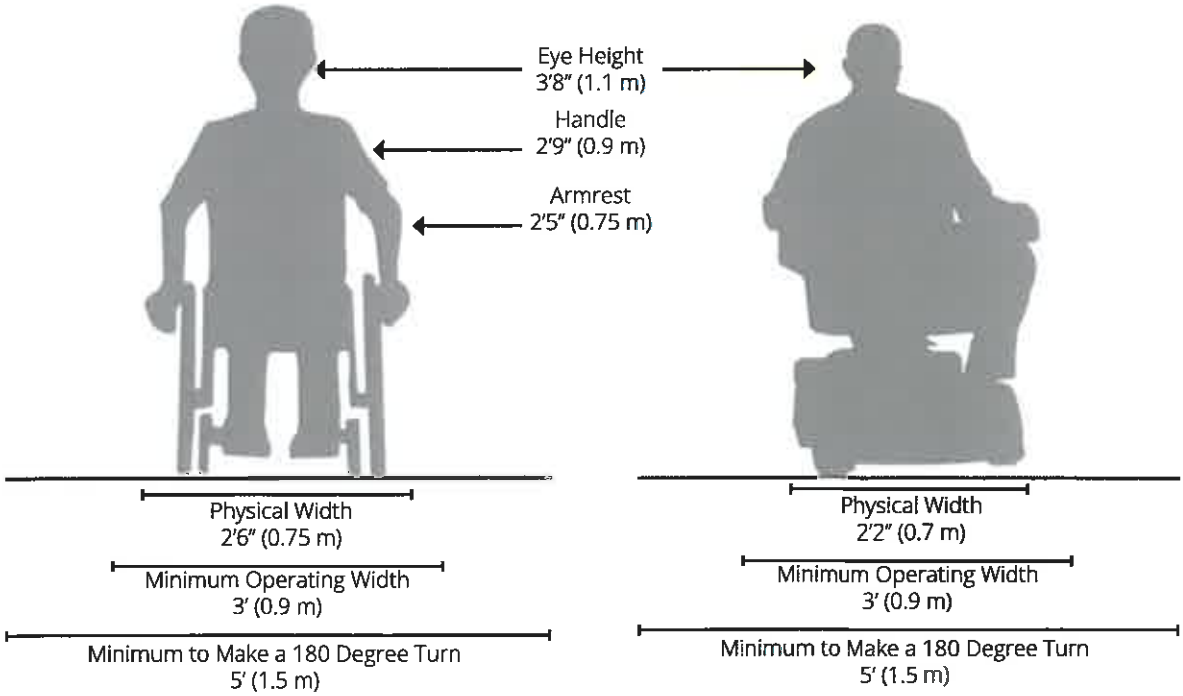
Maneuvering around a turn requires additional space for wheelchair devices. Providing adequate space for 180 degree turns at appropriate locations is an important element for accessible design.

Wheelchair User Typical Speed

User	Typical Speed
Manual Wheelchair	3.6 mph
Power Wheelchair	6.8 mph

Design Considerations

Effect on Mobility	Design Solution
Difficulty propelling over uneven or soft surfaces	Firm, stable surfaces and structures, including ramps or beveled edges
Cross-slopes cause wheelchairs to veer downhill.	Cross-slopes of less than two percent.
Require wider path of travel	Sufficient width and maneuvering space



*Source: FHWA. **Characteristics of Emerging Road and Trail Users and Their Safety.** 2004.*
*USDOJ. **2010 ADA Standards for Accessible Design.** 2010.*

Pedestrian Crossing Location and Facility Selection

Mid-block Crossings

Mid-block crossings are an important street design element for pedestrians. They can provide a legal crossing at locations where pedestrians want to travel, and can be safer than crossings at intersections because traffic is only moving in two directions. Locations where mid-block crossings should be considered include:

- Long blocks (longer than 600 ft) with destinations on both sides of the street.
- Locations with heavy pedestrian traffic, such as schools, shopping centers.
- At mid-block transit stops, where transit riders must cross the street on one leg of their journey.

Crossing Treatment Selection

The specific type of treatment at a crossing may range from a simple marked crosswalk to full traffic signals or grade separated crossings. Crosswalk lines should not be used indiscriminately, and appropriate selection of crossing treatments should be evaluated in an engineering study should be performed before a marked crosswalk is installed. The engineering study should consider the number of lanes, the presence of a median, the distance from adjacent signalized intersections, the pedestrian volumes and delays, the average daily traffic (ADT), the posted or statutory speed limit or 85th-percentile speed, the geometry of the location, the possible consolidation of multiple crossing points, the availability of street lighting, and other appropriate factors.

PEDESTRIAN CROSSING CONTEXTUAL GUIDANCE At unsignalized locations	Local Streets 15-25 mph		Collector Streets 25-30 mph			Arterial Streets 30-45 mph							
FACILITY TYPE	2 lane	3 lane	2 lane	2 lane with median refuge	3 lane	2 lane	2 lane with median refuge	3 lane	4 lane	4 lane with median refuge	5 lane	6 lane	6 lane with median refuge
Crosswalk Only (high visibility)	✓	✓	EJ	EJ	X	EJ	EJ	X	X	X	X	X	X
Crosswalk with warning signage and yield lines	EJ	✓	✓	✓	✓	EJ	EJ	EJ	X	X	X	X	X
Active Warning Beacon (RRFB)	X	EJ	✓	✓	✓	✓	✓	✓	X	✓	✓	X	X
Hybrid Beacon	X	X	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓	✓	✓
Full Traffic Signal	X	X	EJ	EJ	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓
Grade separation	X	X	EJ	EJ	EJ	X	EJ	EJ	EJ	EJ	EJ	✓	✓

LEGEND
Most Desirable ✓
Engineering Judgement EJ
Not Recommended X

Design Needs of Bicyclists

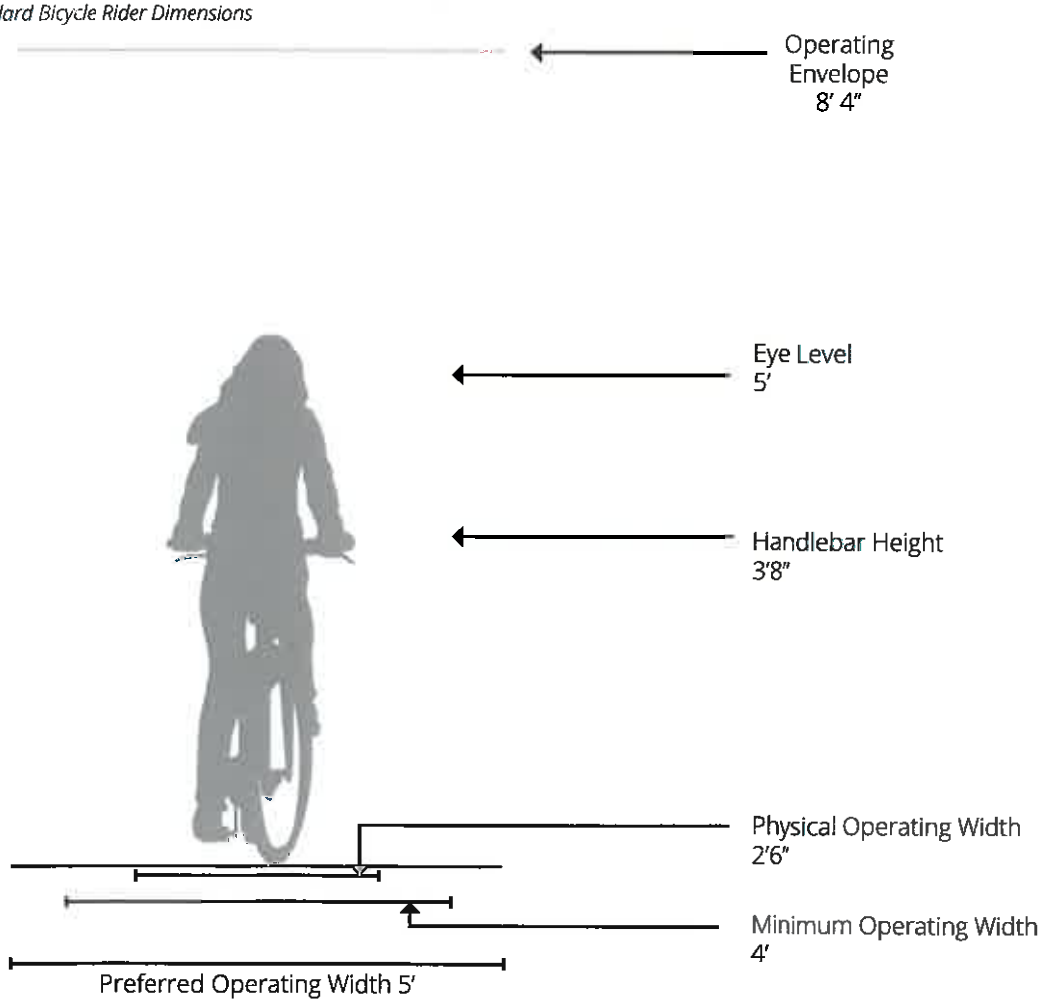
The purpose of this section is to provide the facility designer with an understanding of how bicyclists operate and how their bicycle influences that operation. Bicyclists, by nature, are much more affected by poor facility design, construction and maintenance practices than motor vehicle drivers. Bicyclists lack the protection from the elements and roadway hazards provided by an automobile's structure and safety features. By understanding the unique characteristics and needs of bicyclists, a facility designer can provide quality facilities and minimize user risk.

Bicycle as a Design Vehicle

Similar to motor vehicles, bicyclists and their bicycles exist in a variety of sizes and configurations. These variations occur in the types of vehicle (such as a conventional bicycle, a recumbent bicycle or a tricycle), and behavioral characteristics (such as the comfort level of the bicyclist). The design of a bikeway should consider reasonably expected bicycle types on the facility and utilize the appropriate dimensions.

The figure below illustrates the operating space and physical dimensions of a typical adult bicyclist, which are the basis for typical facility design. Bicyclists require clear space to operate within a facility. This is why the minimum operating width is greater than the

Standard Bicycle Rider Dimensions



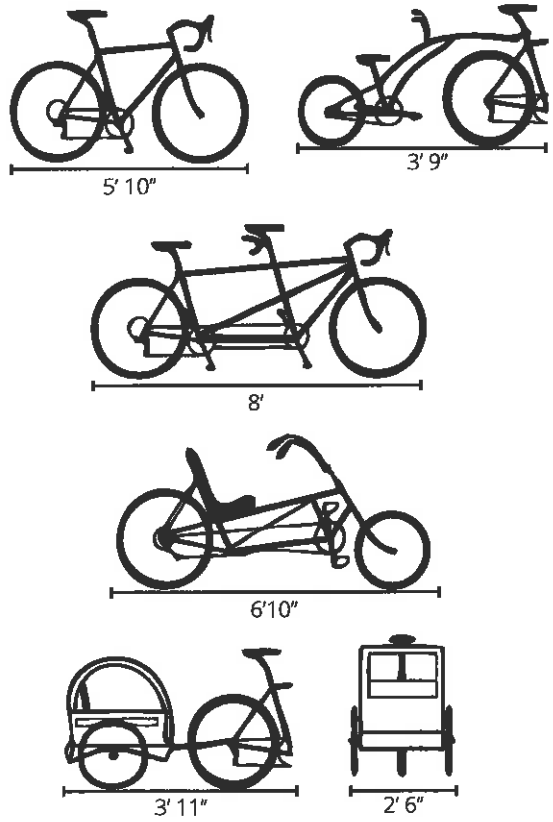
Source: AASHTO Guide for the Development of Bicycle Facilities, 4th Edition. 2012.

physical dimensions of the bicyclist. Bicyclists prefer five feet or more operating width, although four feet may be minimally acceptable.

In addition to the design dimensions of a typical bicycle, there are many other commonly used pedal-driven cycles and accessories to consider when planning and designing facilities. The most common types include tandem bicycles, recumbent bicycles, and trailer accessories. The figure below and table at right summarize the typical dimensions for bicycle types.

Design Speed Expectations

The expected speed that different types of bicyclists can maintain under various conditions also influences the design of facilities such as shared-use paths. The table at right provides typical bicyclist speeds for a variety of conditions.



Bicycle as Design Vehicle - Typical Dimensions

Source: AASHTO ***Guide for the Development of Bicycle Facilities***, 4th Edition *AASHTO does not provide typical dimensions for tricycles.

Bicycle as Design Vehicle - Design Speed Expectations

Bicycle Type	Feature	Typical Speed
Upright Adult Bicyclist	Paved level surfacing	15 mph
	Crossing intersections	10 mph
	Downhill	30 mph
	Uphill	5 -12 mph
Recumbent Bicyclist	Paved level surfacing	18 mph

***Tandem bicycles and bicyclists with trailers have typical speeds equal to or less than upright adult bicyclists.**

Bicycle as Design Vehicle - Typical Dimensions

Bicycle Type	Feature	Typical Dimensions
Upright Adult Bicyclist	Physical width	2 ft 6 in
	Operating width (Minimum)	4 ft
	Operating width (Preferred)	5 ft
	Physical length	5 ft 10 in
	Physical height of handlebars	3 ft 8 in
	Operating height	8 ft 4 in
	Eye height	5 ft
	Vertical clearance to obstructions (tunnel height, lighting, etc)	10 ft
	Approximate center of gravity	2 ft 9 in - 3 ft 4 in
Recumbent Bicyclist	Physical length	8 ft
	Eye height	3 ft 10 in
Tandem Bicyclist	Physical length	8 ft
Bicyclist with child trailer	Physical length	10 ft
	Physical width	2 ft 6 in

Design Needs of Bicyclists

Types of Bicyclists

It is important to consider bicyclists of all skill levels when creating a non-motorized plan or project. Bicyclist skill level greatly influences expected speeds and behavior, both in on-street bikeways and on shared roadways. Bicycle infrastructure should accommodate as many user types as possible, with decisions for separate or parallel facilities based on providing a comfortable experience for the greatest number of people.

The bicycle planning and engineering professions currently use several systems to classify the population which can assist in understanding the characteristics and infrastructure preferences of different bicyclists. 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 (Causal vs. Experienced). A more detailed framework for understanding of the US population's relationship to transportation focused bicycling is illustrated in the figure at right. Developed by planners in Portland, OR[1] and supported by research[2], this classification provides the following alternative categories to address varying attitudes towards bicycling in the US:

- Strong and Fearless (approximately 1% of population) – Characterized by bicyclists that will typically ride anywhere regardless of roadway conditions or weather. These bicyclists can ride faster than other user types, prefer direct routes and will typically choose roadway connections -- even if shared with vehicles -- over separate bicycle facilities such as shared-use paths.
- Enthused and Confident (5-10% of population) - This user group encompasses bicyclists who are fairly comfortable riding on all types of bikeways but usually choose low traffic streets or shared-use paths when available. These bicyclists may deviate from a more direct route in favor of a preferred facility type. This group includes all kinds of bicyclists such as commuters, recreational riders, racers and utilitarian bicyclists.
- Interested but Concerned (approximately 60% of population) – This user type comprises the bulk of the cycling population and represents bicyclists who typically only ride a bicycle on low traffic streets or shared-use paths under favorable weather conditions. These bicyclists perceive significant barriers to their increased use of cycling, specifically traffic and other safety issues. These people may become "Enthused & Confident" with encouragement, education and experience.
- No Way, No How (approximately 30% of population) – Persons in this category are not bicyclists, and perceive severe safety issues with riding in traffic. Some people in this group may eventually become more regular cyclists with time and education. A significant portion of these people will not ride a bicycle under any circumstances.

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

Bicycle Facility Selection Guidelines

The specific bicycle facility type that should be provided depends on the surrounding environment (e.g. auto speed and volume, topography, and adjacent land use) and expected bicyclist needs (e.g. bicyclists commuting on a highway versus students riding to school on residential streets).

Facility Selection Guidelines

There are no 'hard and fast' rules for determining the most appropriate type of bicycle facility for a particular location – roadway speeds, volumes, right-of-way width, presence of parking, adjacent land uses, and expected bicycle user types are all critical elements of this decision. Studies find that the most significant factors influencing bicycle use are motor vehicle traffic volumes and speeds. Additionally, most bicyclists prefer facilities separated from motor vehicle traffic or located on local roads with low motor vehicle traffic speeds and volumes. Because off-street pathways are physically separated from the roadway, they are perceived as safe and attractive routes for bicyclists who prefer to avoid motor vehicle traffic. Consistent use of treatments and application of bikeway facilities allow users to anticipate whether they would feel comfortable riding on a particular facility, and plan their trips accordingly. This section provides guidance on various factors that affect the type of facilities that should be provided.

Facility Classification

Description

Consistent with bicycle facility classifications throughout the nation, these Bicycle Facility Design Guidelines identify the following classes of facilities by degree of separation from motor vehicle traffic.

Shared Roadways are bikeways where bicyclists and cars operate within the same travel lane, either side by side or in single file depending on roadway configuration. The most basic type of bikeway is a signed shared roadway. This facility provides continuity with other bicycle facilities (usually bike lanes), or designates preferred routes through high-demand corridors.

Shared roadways may also be designated by pavement markings, signage and other treatments including directional signage, traffic diverters, chicanes, chokers and /or other traffic calming devices to reduce vehicle speeds or volumes. Such treatments often are associated with **Bicycle Boulevards**.

On-Street Bikeways, such as conventional or buffered bike lanes, use signage and striping to delineate the right-of-way assigned to bicyclists and motorists. Bike lanes encourage predictable movements by both bicyclists and motorists.

Another variant of on-street bikeway is **Separated Bike Lanes** which are exclusive bike facilities that combine the user experience of a separated path with the on-street infrastructure of conventional bike lanes.

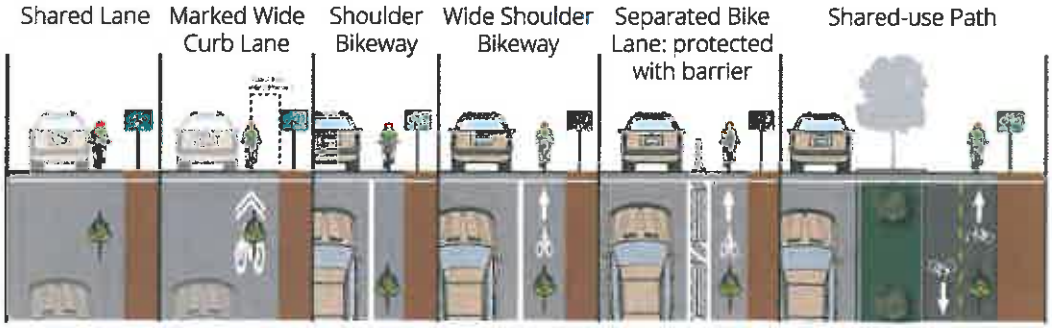
Shared-use Paths are facilities separated from roadways for use by bicyclists and pedestrians.

Facility Continua

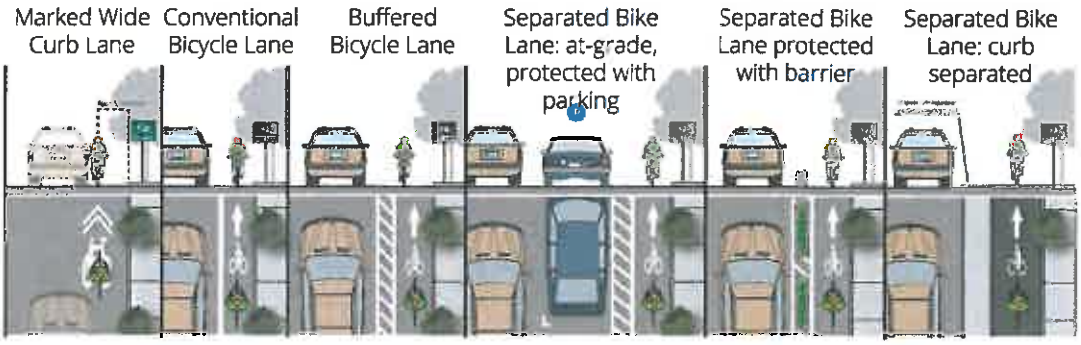
The following continua illustrate the range of bicycle facilities applicable to various roadway environments, based on the roadway type and desired degree of separation. Engineering judgment, traffic studies, previous municipal planning efforts, community input and local context should be used to refine criteria when developing bicycle facility recommendations for a particular street. In some corridors, it may be desirable to construct facilities to a higher level of treatment than those recommended in relevant planning documents in order to enhance user safety and comfort. In other cases, existing and/or future motor vehicle speeds and volumes may not justify the recommended level of separation, and a less intensive treatment may be acceptable.

Least Protected → Most Protected

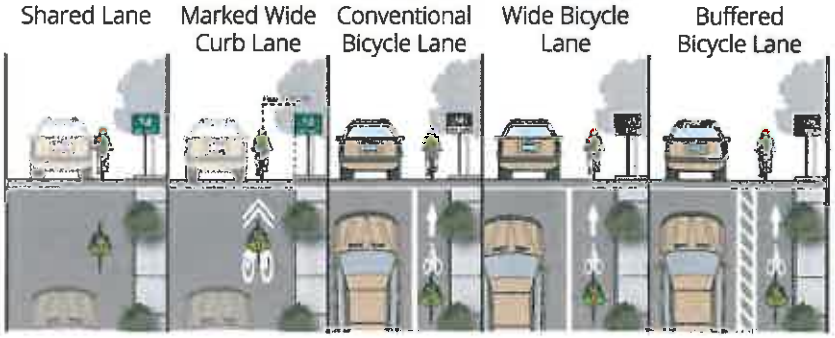
Arterial/Highway Bikeway Continuum (without curb and gutter)



Arterial/Highway Bikeway Continuum (with curb and gutter)

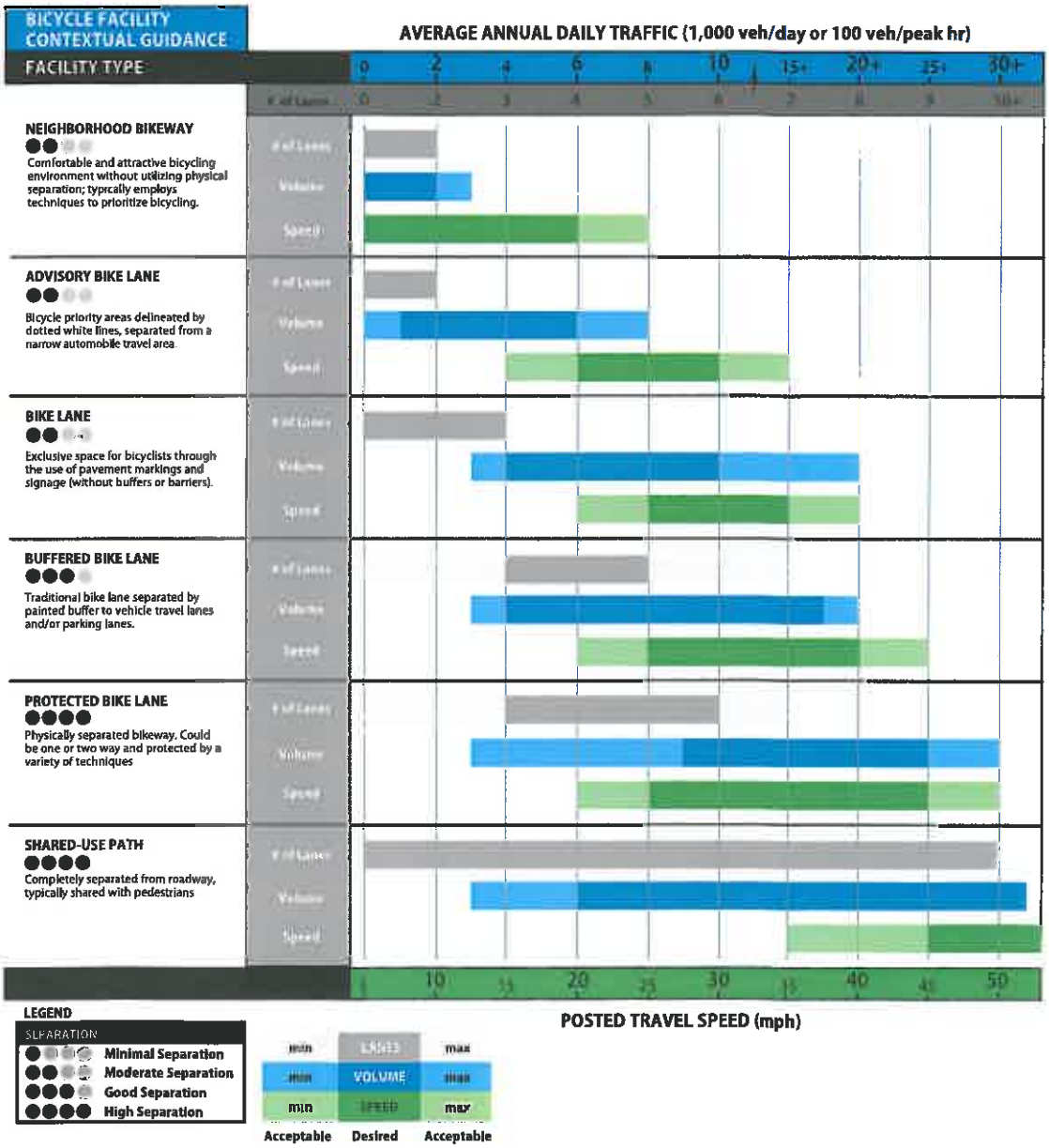


Collector Bikeway Continuum



Bicycle Facility Contextual Guidance

Due to the range of factors that influence bicycle users' comfort and safety, selecting the best bicycle facility type for a given roadway can be challenging. There is a significant impact on cycling comfort when the speed differential between bicyclists and motor vehicles is high and when traffic volumes and speeds are also high. The chart below can help to determine the type of bikeway best suited for particular configurations, speeds, and volumes. To use this chart, identify the number of lanes, daily traffic volume, and travel speed, and locate the facility types indicated by those key variables. Other factors beyond speed and volume that are not included in the chart below but that still affect facility selection include traffic mix of heavy vehicles, on-street parking, intersection density, surrounding land use, and roadway sight distance. These additional factors should be considered in the facility selection and design process.



A pedestrian crossing with a median refuge island near Snow Horse Elementary in Kaysville (Photo: Shaunna Burbidge)

2: Pedestrian Crossing Treatments

Introduction

Attributes of pedestrian-friendly intersection design include:

Clear Space: Corners should be clear of obstructions. They should also have enough room for curb ramps, for transit stops where appropriate, and for street conversations where pedestrians might congregate.

Visibility: It is critical that pedestrians on the corner have a good view of vehicle travel lanes and that motorists in the travel lanes can easily see waiting pedestrians.

Legibility: Symbols, markings, and signs used at corners should clearly indicate what actions the pedestrian should take.

Accessibility: All corner features, such as curb ramps, landings, call buttons, signs, symbols, markings, and textures, should meet accessibility standards and follow universal design principles.

Separation from Traffic: Corner design and construction should be effective in discouraging turning vehicles from driving over the pedestrian area. Crossing distances should be minimized.

Lighting: Adequate lighting is an important aspect of visibility, legibility, and accessibility.

These attributes will vary with context but should be considered in all design processes. For example, suburban and rural intersections may have limited or no signing. However, legibility regarding appropriate pedestrian movements should still be taken into account during design.

Crossing beacons and signals facilitate crossings of roadways for pedestrians. Beacons make crossing intersections safer by clarifying when to enter an intersection and by alerting motorists to the presence of pedestrians.

Flashing amber warning beacons can be utilized at unsignalized intersection crossings. Signage and pavement markings may be used to highlight these facilities for pedestrians, bicyclists and motorists.

Determining which type of signal or beacon to use for a particular intersection depends on a variety of factors. These include speed limits, traffic volumes, lane configuration, presence of a median or refuge, and the anticipated levels of pedestrian and bicycle crossing traffic.

An intersection with crossing beacons may reduce stress and delays for a crossing users, and discourage illegal and unsafe crossing maneuvers.

Unmarked Crossings

Description

Crosswalks exists at the corners of roadway intersections, whether they are marked or unmarked. An unmarked crosswalk is the area is defined by the edges of the sidewalk. This area is absent of crosswalk markings, though other related traffic control markings may be present.

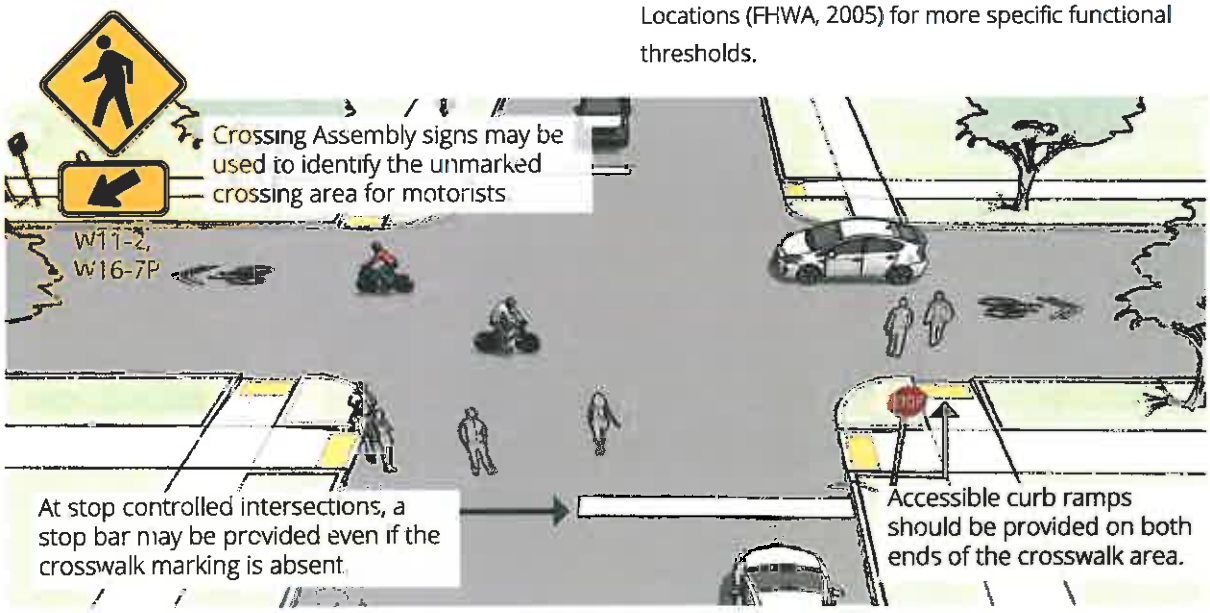
Unmarked crosswalks area not applicable at mid-block locations. Crosswalk pavement markings must be used to formally establish the crosswalk in these areas.

Guidance

Unmarked crosswalks are most comfortable on streets with:

- One lane in each direction
- Motor vehicle speeds of 25 mph or lower
- Motor vehicle volumes of 3,000 ADT or lower

Unmarked crosswalks may operate safely at locations with higher speeds and volumes than noted above, but may result in uncomfortable conditions and discourage pedestrian activity. See Safety Effects of Marked Vs. Unmarked Crosswalks at Uncontrolled Locations (FHWA, 2005) for more specific functional thresholds.



Discussion

The Uniform Vehicle Code requires that motorists yield right-of-way to pedestrians in marked and unmarked crosswalks. The UVC is ambiguous about whether an unmarked crosswalk exists at intersections where no sidewalk are present.

If a pedestrian is 700 feet or farther from a formal pedestrian crossing they may cross mid-block at any location, but they must yield to motor vehicles. At mid-block crossings, a yield line may be provided even if the crosswalk marking itself is absent.

Additional References and Guidelines

AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.
FHWA. *Safety Effects of Marked Vs. Unmarked Crosswalks at Uncontrolled Locations.* 2005.

Materials and Maintenance

Unmarked crosswalks should be maintained free of debris. Surrounding landscaping should be maintained to not negatively impact sight lines.

Marked Crosswalks at Intersections

Description

A marked crosswalk signals to motorists that they must stop for pedestrians and encourages pedestrians to cross at designated locations. Installing crosswalks alone will not necessarily make crossings safer especially on multi-lane roadways.

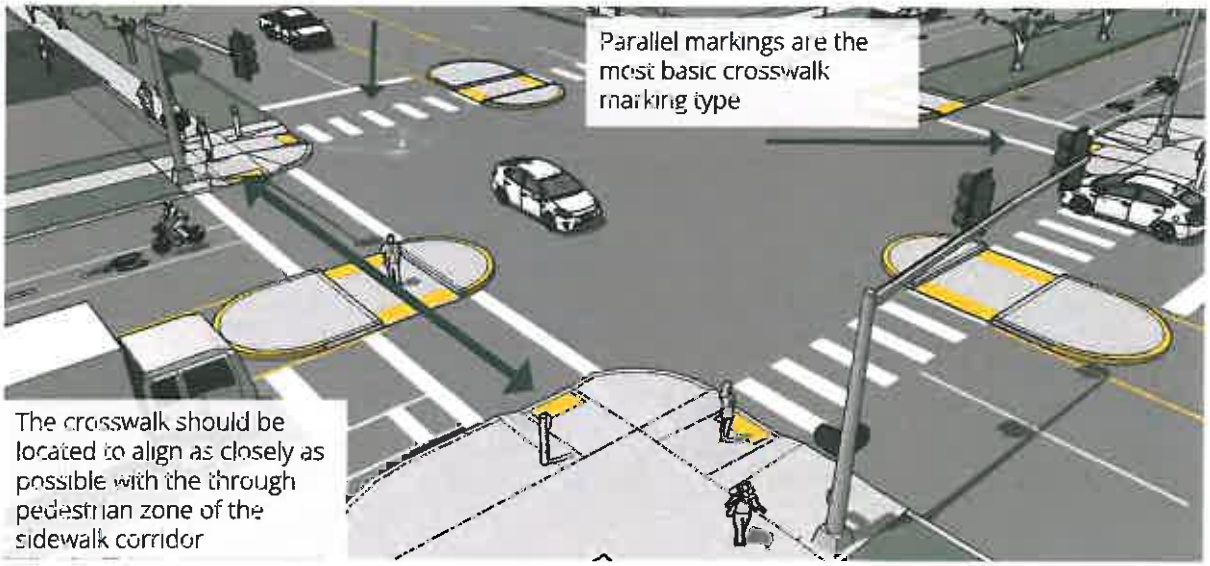
At mid-block locations, crosswalks can be marked where there is a demand for crossing and there are no nearby marked crosswalks.

Guidance

At signalized intersections, all crosswalks should be marked. At unsignalized intersections, crosswalks may be marked under the following conditions:

- In downtowns or other high pedestrian activity centers
- At a complex intersection, to orient pedestrians in finding their way across.
- At an offset intersection, to show pedestrians the shortest route across traffic with the least exposure to vehicular traffic and traffic conflicts.
- At an intersection with visibility constraints, to position pedestrians where they can best be seen by oncoming traffic.
- At an intersection within a school zone on a walking route.

Continental markings provide additional visibility



Discussion

Continental crosswalk markings should be used at crossings with high pedestrian use or where vulnerable pedestrians are expected, including: school crossings, across arterial streets for pedestrian-only signals, at mid-block crosswalks, and at intersections where there is expected high pedestrian use and the crossing is not controlled by signals or stop signs. See intersection signalization for a discussion of enhancing pedestrian crossings.

Additional References and Guidelines

FHWA. *Manual on Uniform Traffic Control Devices. (3B.18).* 2009.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.
FHWA. *Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations.* 2005.
FHWA. *Crosswalk Marking Field Visibility Study.* 2010.
NACTO. *Urban Street Design Guide.* 2013.

Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority. Thermoplastic markings offer increased durability than conventional paint.

Marked/Unsignalized Mid-Block Crossings

Description

A marked/unsignalized crossing typically consists of a marked crossing area, signage and other markings to slow or stop traffic. The approach to designing crossings at mid-block locations depends on an evaluation of vehicular traffic, line of sight, pathway traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions.

When space is available, using a median refuge island can improve user safety by providing pedestrians and bicyclists space to perform the safe crossing of one side of the street at a time.

Guidance

Maximum traffic volumes

- ≤9,000-12,000 Average Daily Traffic (ADT) volume
- Up to 15,000 ADT on two-lane roads, preferably with a median
- Up to 12,000 ADT on four-lane roads with median

Maximum travel speed

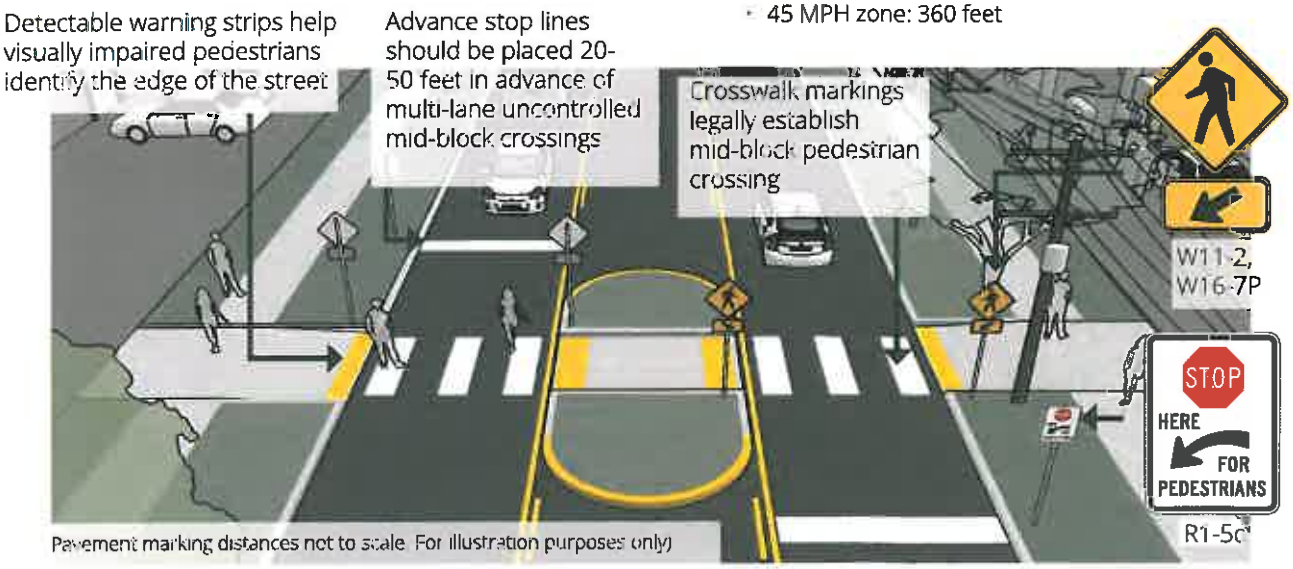
- 35 MPH

Maximum number of lanes

- 3 lanes with a refuge

Minimum line of sight

- 25 MPH zone: 155 feet
- 35 MPH zone: 250 feet
- 45 MPH zone: 360 feet



Discussion

Unsignalized crossings of multi-lane arterials over 15,000 ADT may be possible with features such as sufficient crossing gaps (more than 60 per hour), median refuges, and/or active warning devices like rectangular rapid flash beacons or in-pavement flashers, and excellent sight distance. For more information see the discussion of active warning beacons. On roadways with low to moderate traffic volumes (<12,000 ADT) and a need to control traffic speeds, a raised crosswalk may be the most appropriate crossing design to improve pedestrian visibility and safety.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.

Materials and Maintenance

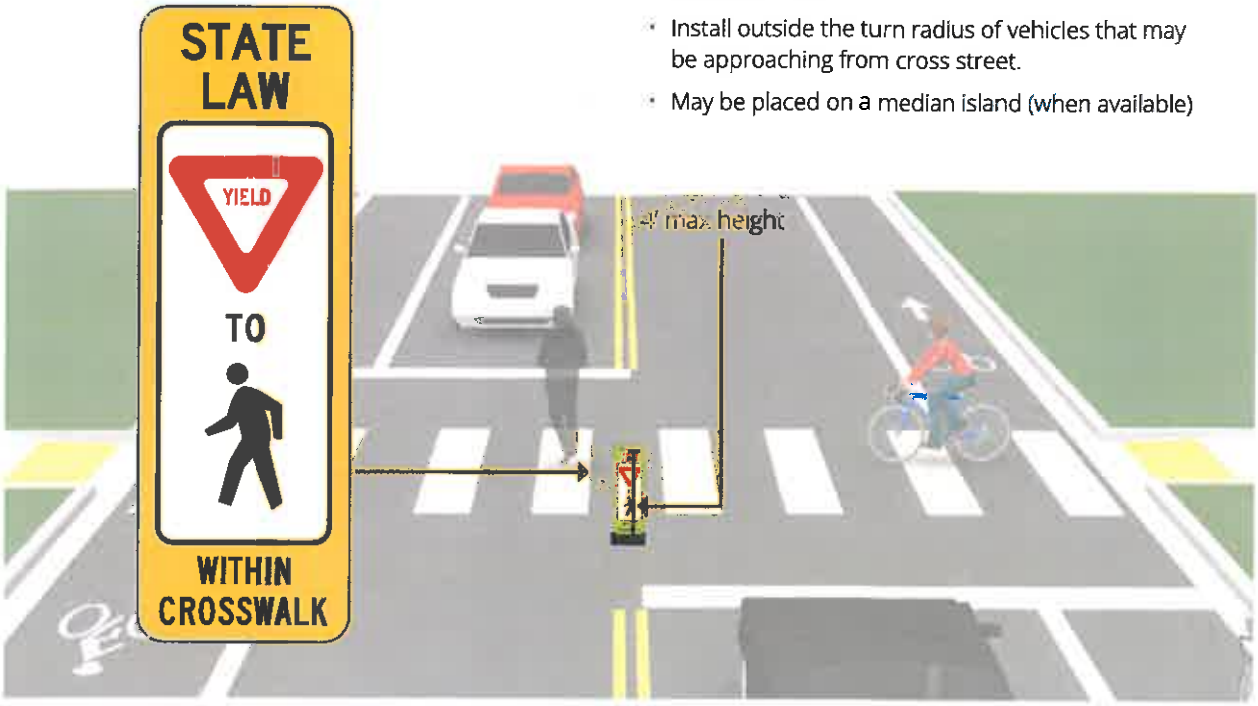
Locate markings out of wheel tread when possible to minimize wear and maintenance costs.

In Street Pedestrian Crossing Signs

Description

In-street pedestrian crossing signs are attached to a flexible plastic bollard on the center line of the roadway. They are used to reinforce the presence of crosswalks and remind motorists of their legal obligation to yield for pedestrians in marked or unmarked crosswalks. This signage is often placed at high-volume pedestrian crossings that are not signalized.

R1-6



Guidance

- The in-street pedestrian crossing sign shall be placed in the roadway at the crosswalk location on the center line, on a lane line, or on a median island.
- The top of an In-Street Pedestrian Crossing sign shall be a maximum of 4 feet above the pavement or median island surface.
- The signs perform better on narrow roadways, where the visibility of the signs is maximized
- Install in a manner that does not impede pedestrian flow.
- Install outside the turn radius of vehicles that may be approaching from cross street.
- May be placed on a median island (when available)

Discussion

These flexible signs must be extremely durable to withstand potential impacts with motor vehicles . Semi-permanent installations are also possible when the sign is combined with a moveable base. This allows for day-time only applications. On multi-lane roadways, consider active warning beacons for improved yielding compliance.

Additional References and Guidelines

Caltrans. *California Manual on Uniform Traffic Control Devices.* 2012.
Redmon, Tamara. *Evaluating Pedestrian Safety Countermeasures. Public Road.* 2011.
Hua, Jenna. *San Francisco PedSafe II Project Outcomes and Lessons Learned.* TRB Annual Meeting. 2009.

Materials and Maintenance

Unless the In-Street Pedestrian Crossing sign is placed on a physical island, the sign support shall be designed to bend over and then bounce back to its normal vertical position when struck by a vehicle.

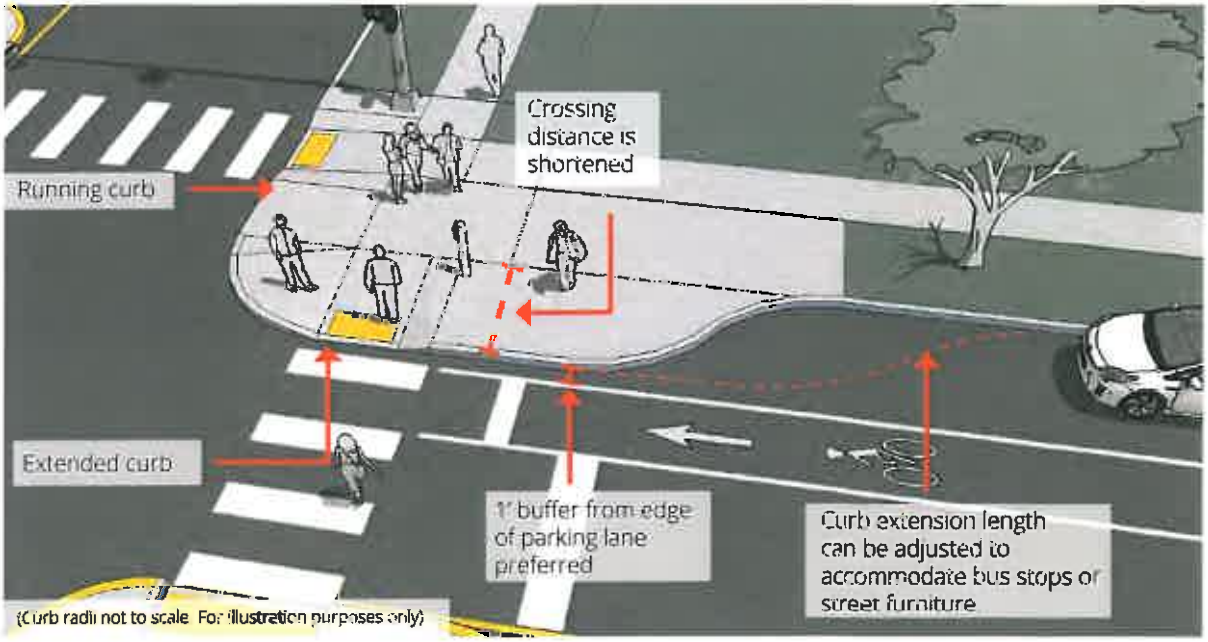
Curb Extensions

Description

Curb extensions minimize pedestrian exposure during crossing by shortening crossing distance and giving pedestrians a better chance to see and be seen before committing to crossing. They are appropriate for any crosswalk where it is desirable to shorten the crossing distance and there is a parking lane adjacent to the curb.

Guidance

- In most cases, the curb extensions should be designed to transition between the extended curb and the running curb in the shortest practicable distance.
- For purposes of efficient street sweeping, the minimum radius for the reverse curves of the transition is 10 ft and the two radii should be balanced to be nearly equal.
- Curb extensions should terminate one foot short of the parking lane to maximize bicyclist safety.



Discussion

If there is no parking lane, adding curb extensions may be a problem for bicycle travel and truck or bus turning movements. Additional traffic calming tools can be found in Chapter 8 of this appendix.

Additional References and Guidelines

AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.
AASHTO. *A Policy on Geometric Design of Highways and Streets.* 2004.
NACTO. *Urban Street Design Guide.* 2013.

Materials and Maintenance

Planted curb extensions may be designed as a bioswale, a vegetated system for storm water management.

Median Refuge Islands

Description

Median refuge islands are located at the mid-point of a marked crossing and help improve pedestrian safety by allowing pedestrians to cross one direction of traffic at a time. Refuge islands minimize pedestrian exposure by shortening crossing distance and increasing the number of available gaps for crossing.

Guidance

- Can be applied on any roadway with a left turn center lane or median that is at least 6' wide.
- Appropriate at signalized or unsignalized crosswalks
- The refuge island must be accessible, preferably with an at-grade passage through the island rather than ramps and landings.
- The island should be at least 6' wide between travel lanes (to accommodate bikes with trailers and wheelchair users) and at least 20' long.
- On streets with speeds higher than 25 mph there should also be double center line marking, reflectors, and "KEEP RIGHT" signage.

Discussion

If a refuge island is landscaped, the landscaping should not compromise the visibility of pedestrians crossing in the crosswalk. Shrubs and ground plantings should be no higher than 1 ft 6 in. On multi-lane roadways, consider configuration with active warning beacons for improved yielding compliance. Additional traffic calming tools can be found in Chapter 8 of this appendix.

Additional References and Guidelines

FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.
NACTO. *Urban Bikeway Design Guide.* 2012.
NACTO. *Urban Street Design Guide.* 2013.

Materials and Maintenance

Refuge islands may collect road debris and may require somewhat frequent maintenance. Refuge islands should be visible to snow plow crews and should be kept free of snow berms that block access.

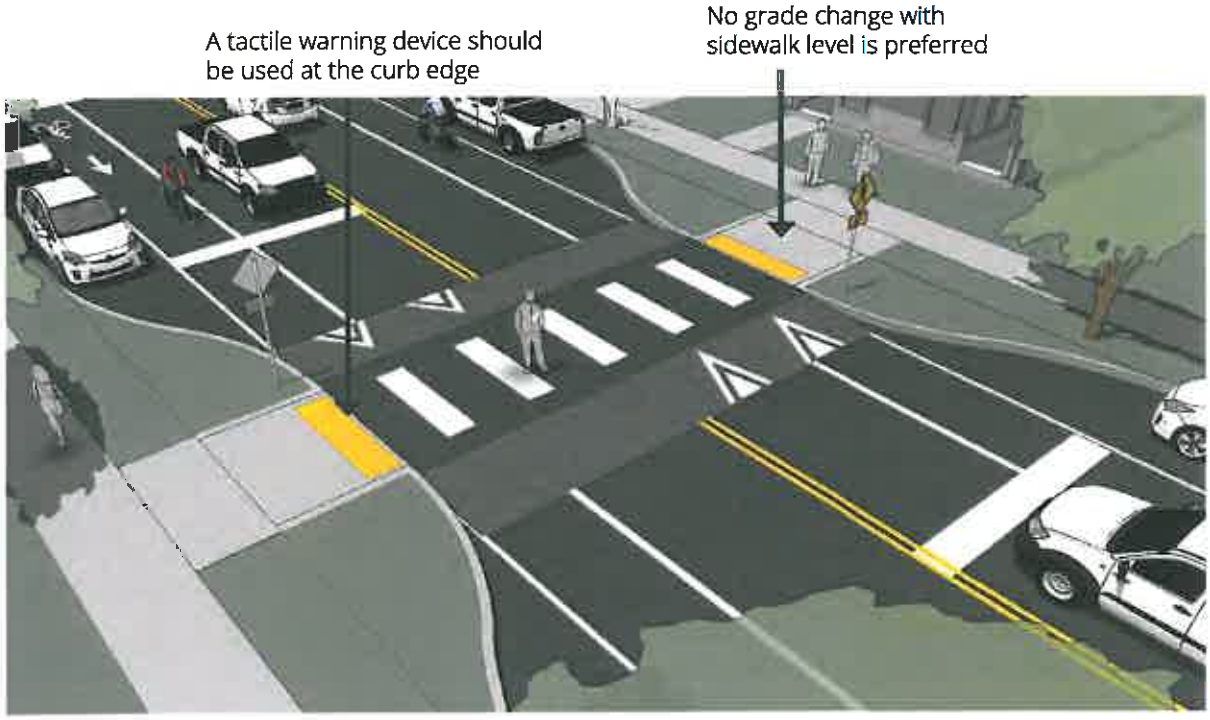
Raised Crosswalks

Description

A raised crosswalk or intersection can eliminate grade changes from the pedestrian path and give pedestrians greater prominence as they cross the street. Raised crosswalks should be used only in very limited cases where a special emphasis on pedestrians is desired; review on case-by-case basis.

Guidance

- Use detectable warnings at the curb edges to alert vision-impaired pedestrians that they are entering the roadway.
- Approaches to the raised crosswalk may be designed to be similar to speed humps.
- Raised crosswalks can also be used as a traffic calming treatment.



Discussion

Like a speed hump, raised crosswalks have a traffic slowing effect which may be unsuitable on emergency response routes. Additional traffic calming tools can be found in Chapter 8 of this appendix.

Additional References and Guidelines

FHWA. *Manual on Uniform Traffic Control Devices. (3B.18).* 2009.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.
USDOJ. *ADA Standards for Accessible Design.* 2010.
NACTO. *Urban Street Design Guide.* 2013.

Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority.

Pedestrians at Signalized Crossings

Description

Pedestrian Signal Head

Pedestrian signal heads indicate to pedestrians when to cross at a signalized crosswalk. Pedestrian signal indications are recommended at all traffic signals except where pedestrian crossing is prohibited.

Countdown pedestrian signals are particularly valuable for pedestrians, as they indicate whether a pedestrian has time to cross the street before the signal phase ends. Countdown signals should be used at all new and rehabbed signalized intersections

Signal Timing

Adequate pedestrian crossing time is a critical element of the walking environment at signalized intersections. The length of a signal phase with parallel pedestrian movements should provide sufficient time for a pedestrian to safely cross the adjacent street. The MUTCD recommends a walking speed of 3.5 ft per second.

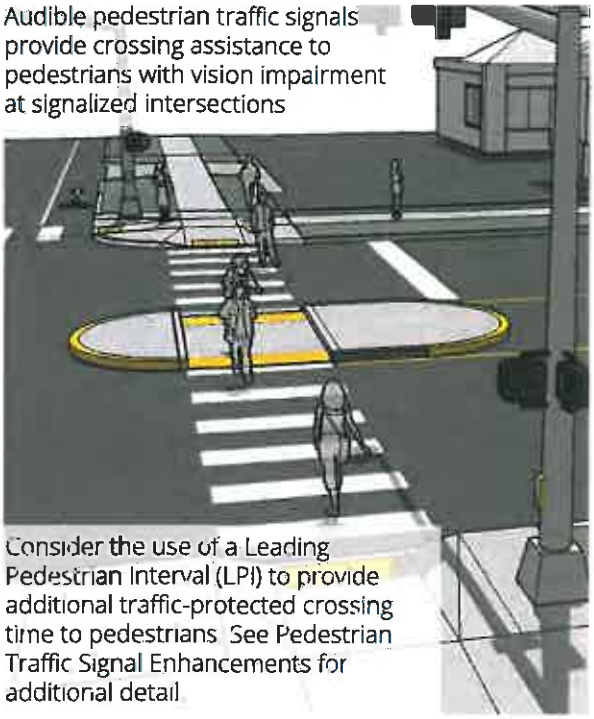
At crossings where older pedestrians or pedestrians with disabilities are expected, crossing speeds as low as 3 ft per second should be assumed. Special pedestrian phases can be used to provide greater visibility or more crossing time for pedestrians at certain intersections (See Pedestrian Traffic Signal Enhancements).

Large pedestrian crossing distances can be broken up with median refuge islands. A pedestrian push-button can be provided on the median to create a two-stage pedestrian crossing if the pedestrian phase is actuated. This ensures that pedestrians are not stranded on the median, and is especially applicable on large, multi-lane roadways with high vehicle volumes, where providing sufficient pedestrian crossing time for a single stage crossing may be an issue.

Additional References and Guidelines

United States Access Board. *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public-Right-of-Way (PROWAG).* 2011.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.
NACTO. *Urban Street Design Guide.* 2013.

Audible pedestrian traffic signals provide crossing assistance to pedestrians with vision impairment at signalized intersections



Consider the use of a Leading Pedestrian Interval (LPI) to provide additional traffic-protected crossing time to pedestrians. See Pedestrian Traffic Signal Enhancements for additional detail

Discussion

Push-buttons should be located so that someone in a wheelchair can reach the button from a level area of the sidewalk without deviating significantly from the natural line of travel into the crosswalk. Push-buttons should be marked (for example, with arrows) so that it is clear which signal is affected. In areas with very high pedestrian volumes, consider an all-pedestrian signal phase, also known as a Pedestrian Scramble or Barnes Dance, to give pedestrians free passage in the intersection when all motor vehicle traffic movements are stopped, including diagonally in some cases. This greatly reduces pedestrian and vehicle conflicts, but does make for a longer signal cycle length. Right turns on red must not be permitted in conjunction with an exclusive pedestrian phase.

Materials and Maintenance

It is important to repair or replace traffic control equipment before it fails. Consider semi-annual inspections of controller and signal equipment, intersection hardware, and loop detectors.

Pedestrian Traffic Signal Enhancements

Description

Pedestrian-vehicle conflicts can occur when drivers performing turning movements across the crosswalk do not see or yield to pedestrians who have the right-of-way. Pedestrians may also arrive at an intersection late, or may not have any indication of how much time they have to safely cross the intersection. Pedestrian traffic signal enhancements can be made to provide pedestrians with a safe crossing environment.

Guidance

Pedestrian recall is a traffic signal controller setting that automatically provides a pedestrian walk phase during every cycle. Since Pedestrian recall does not require detection or actuation, it eliminates the need for push buttons or other costly detection equipment. This makes pedestrian crossings predictable, minimizes unnecessary pedestrian delay, and does not leave pedestrians wondering whether they have been detected or not. The most appropriate use of pedestrian recall is in locations and/or times of day with high pedestrian volumes.

Push buttons can be configured to provide additional crossing time when pedestrians arrive at the crossing during the flashing don't walk interval. The MUTCD requires signage indicating the walk time extension at or adjacent to the push button (R10-32P).

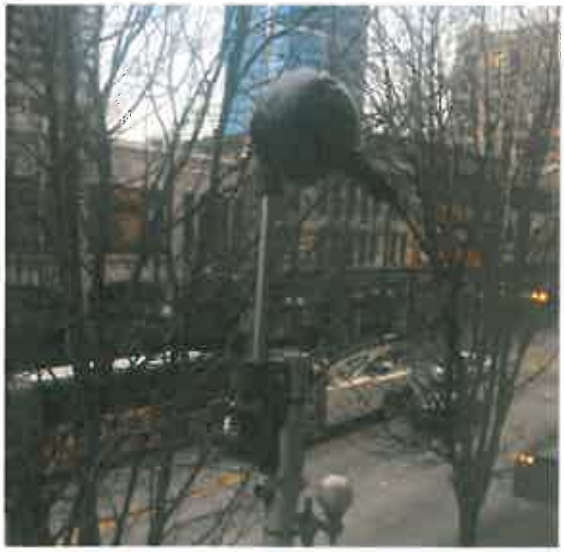
Passive pedestrian detection devices save pedestrians the trouble of having to locate a push button. They are also capable of tracking pedestrians as they cross the intersection, and can be configured to extend the walk/flashing don't walk interval when pedestrians are still in the intersection, and/or not dedicate walk time in the absence of pedestrians.

Leading Pedestrian Intervals (LPI) are used to reduce right turn and permissive left turn vehicle and pedestrian conflicts. The through pedestrian interval is initiated first, in advance of the concurrent through/right/permissive left turn interval. The LPI minimizes vehicle-pedestrian conflicts because it gives pedestrians a 3-10 second head start into the intersection, thereby making them more visible, and reducing crossing exposure time.

Accessible Pedestrian Signals (APS) are designed to be accessible by individuals with visual disabilities. They provide audible tones or verbal messages to convey when it is appropriate to walk, when they must wait, and feedback when the signal has been actuated via push-button. This eliminates the need for pedestrians to rely entirely on the audible cues provided by moving cars, which may be deceiving depending on the complexity of traffic signal operations at the intersection.

Pedestrian Traffic Signal Enhancements

Leading Pedestrian Interval



Passive Infrared Pedestrian Detector

Push-buttons will require regular inspection

Materials and Maintenance

Detection and actuation equipment will require regular maintenance. As a result, fixed operations require less maintenance than actuated operations. Intersections employing split phasing, right turn overlaps, or protected-permitted left-turn signals should be monitored to ensure that conflicting pedestrian and vehicle movements do not occur.

Additional References and Guidance

FHWA. *Signal Timing Manual.* 2008.
FHWA. *Signalized Intersections: Informational Guide. 2nd Edition.* 2013.
Caltrans. *California Manual on Uniform Traffic Control Devices.* 2012.
NACTO. *Urban Street Design Guide.* 2013.

Active Warning Beacons (RRFB)

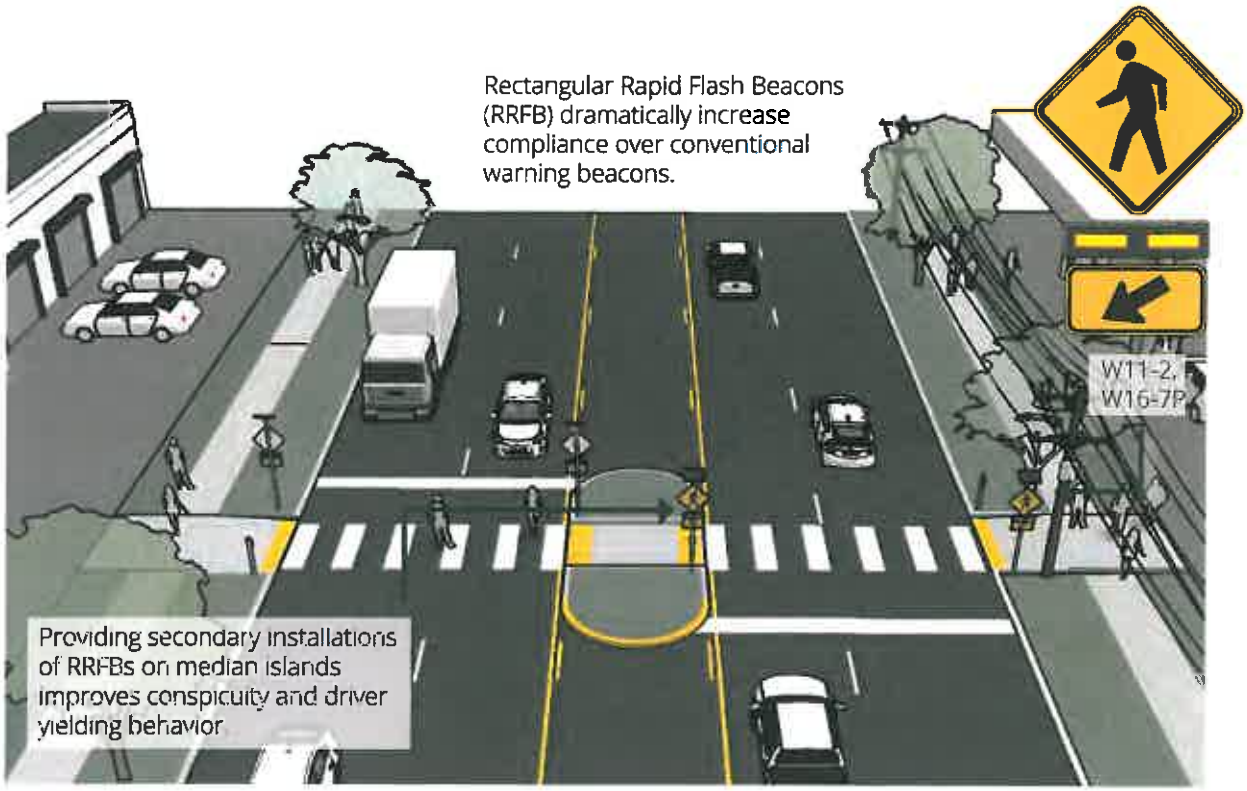
Description

Active warning beacons are user actuated illuminated devices designed to increase motor vehicle yielding compliance at crossings of multi lane or high volume roadways.

Types of active warning beacons include conventional circular yellow flashing beacons, in-roadway warning lights, or Rectangular Rapid Flash Beacons (RRFB).

Guidance

- Warning beacons shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic signals.
- Warning beacons shall initiate operation based on pedestrian or bicyclist actuation and shall cease operation at a predetermined time after actuation or, with passive detection, after the pedestrian or bicyclist clears the crosswalk.



Discussion

Rectangular rapid flash beacons have the most increased compliance of all the warning beacon enhancement options. A study of the effectiveness of going from a no-beacon arrangement to a two-beacon RRFB installation increased yielding from 18 percent to 81 percent. A four-beacon arrangement raised compliance to 88 percent (according to a 2009 FHWA study). Additional studies over long term installations show little to no decrease in yielding behavior over time.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
FHWA. *MUTCD - Interim Approval for Optional Use of Rectangular Rapid Flashing Beacons (IA-11).* 2008.

Materials and Maintenance

Depending on power supply, maintenance can be minimal. If solar power is used, RRFBs should run for years without issue.

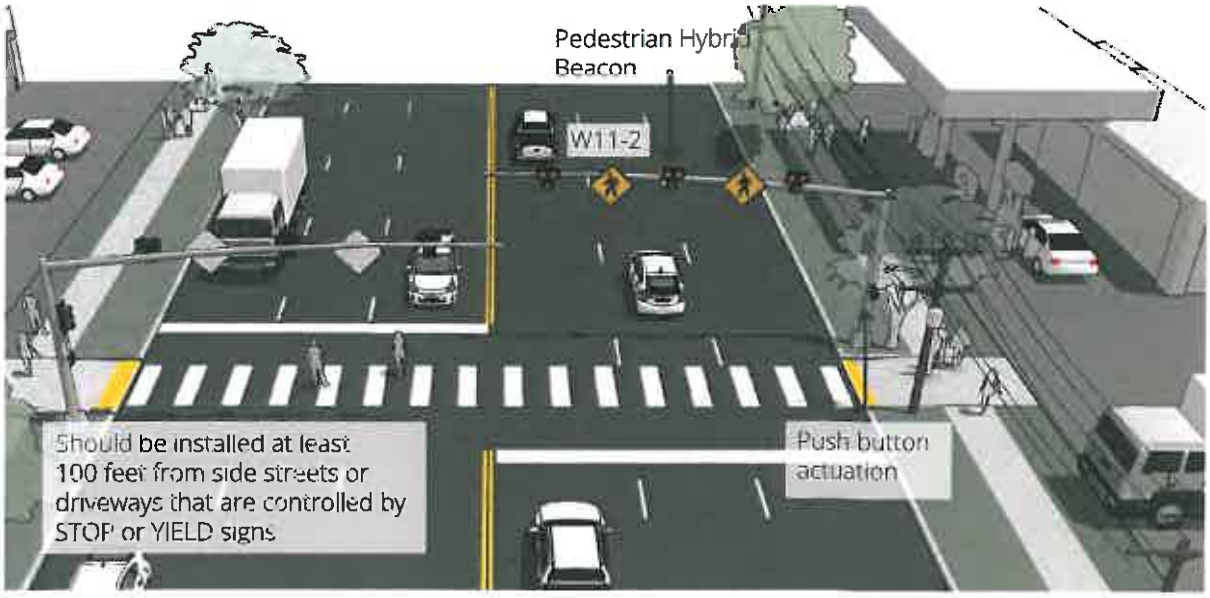
Hybrid Beacons

Description

Hybrid beacons are used to improve non-motorized crossings of major streets. A hybrid beacon consists of a signal-head with two red lenses over a single yellow lens on the major street, and a pedestrian signal head for the crosswalk.

Guidance

- Hybrid beacons may be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable pedestrian crossings.
- If installed within a signal system, signal engineers should evaluate the need for the hybrid signal to be coordinated with other signals.
- Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk to provide adequate sight distance.



Discussion

Hybrid beacon signals are normally activated by push buttons, but may also be triggered by infrared, microwave or video detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street. Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity, and safety.

Additional References and Guidelines

FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

Hybrid beacons are subject to the same maintenance needs and requirements as standard traffic signals. Signing and striping need to be maintained to help users understand any unfamiliar traffic control.

Toucan Signals

Description

"Toucan" crossings of streets are a type of signal configuration that provides minor street or mid-block signal indication for bicyclists and pedestrians, but not for motor vehicles, so that "two can" cross the major street.

Typical Application

- Appropriate at mid-block or carefully designed intersection locations.
- Across higher traffic streets where pedestrians and bicyclists are crossing together.
- Across higher traffic streets where a conventional traffic signal or pedestrian hybrid beacon is considered to assist in pedestrian and bicyclist crossings.

Design Features

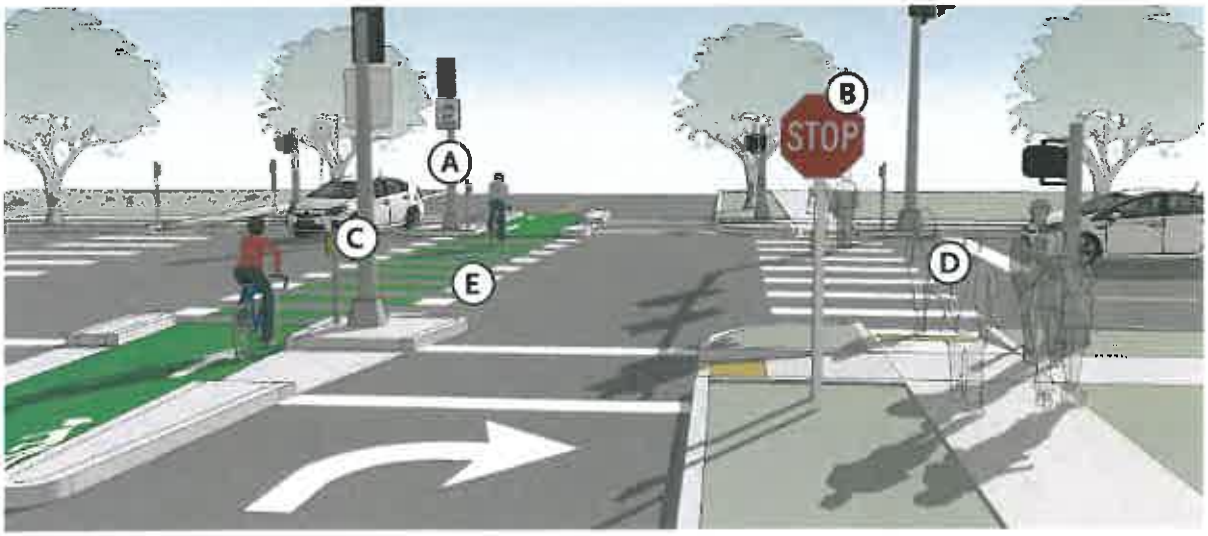
(A) A toucan signal assembly may be created by pairing a bicycle signal head with a pedestrian signal head.

(B) If located at an intersection, the major street receives standard traffic signal control, and the minor cross street has STOP sign to control motor vehicle traffic. The design may be paired with access management or other measures to reduce potential conflicts.

(C) The pedestrian/bike phase is typically activated by a push button or passive detection.

(D) Stop lines, high visibility crosswalk markings and bicycle lane dotted line extensions should be used to clarify crossing expectations.

(E) Green colored pavement may be used to highlight the bike lane crossing.



Additional References and Guidelines

NCHRP 562: Improving Pedestrian Safety at Unsignalized Crossings. 2006.

FHWA Interim Approval 16 (I.A. 16). (Note: Because this is an unconventional configuration at intersections, it is important to operate all Toucan signals consistently across the city for maximum safety and understanding. (NCHRP 562). FHWA has approved bicycle signals for use, if they comply with requirements from F.C. Interaction Approval 16 (I.A. 16).

Implementation & Costs

Cost will depend on the complexity and size of the intersection, but in general, costs are comparable to the installation of conventional traffic signals (i.e. controller boxes, detection devices, mast arms, etc.).

Toucan Signals

Toucan signal with channelized crossing island

This central island also functions as a right-out channelization island for motor vehicles. (Tucson, AZ)

Toucan signal at mid-block location

A mid-block toucan signal uses high visibility crossing markings to separate user types. (Berkeley, CA)

Further Considerations

- MUTCD guidance discourages installation of half signals at intersection locations. However, based on an engineering study or engineering judgment, a jurisdiction can decide to install the device at such an intersection if it determines that is the best location for it, considering all pertinent factors, and/or there are mitigating measures.
- Pedestrians typically need more time to travel through an intersection than bicyclists. Signal timing and recall phases may be configured to be responsive to the detection and actuation by different user types with different signal and clearance intervals.
- Bicycle detection and actuation systems include loop detectors, video detection, microwave, radar, or other technologies that trigger the activation of the bicycle signal when a bicycle is detected.
- Toucan signals operate in a similar fashion to Pedestrian Hybrid Beacons (PHB). PHBs have shown a crash reduction of 29% for all crash types (CMF ID: 2911) and 15% for fatal or serious injury crashes (CMF ID: 2917).

Full Traffic Signal

Description

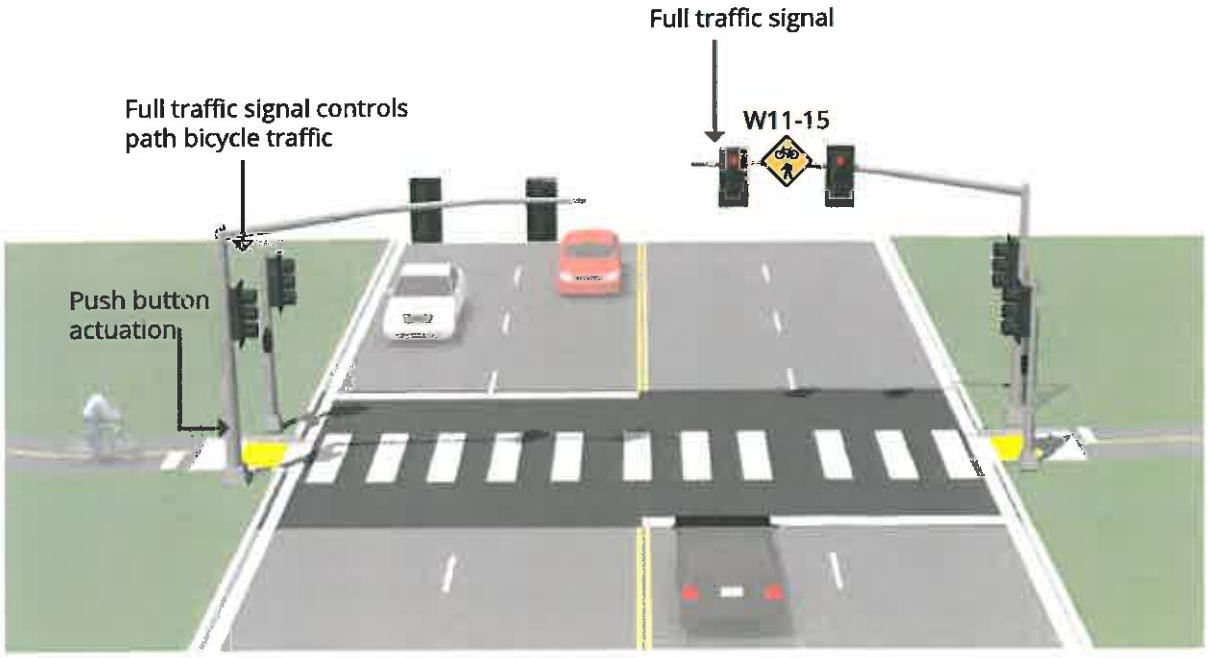
Signalized crossings provide the most protection for crossing path users through the use of a red-signal indication to stop conflicting motor vehicle traffic.

A full traffic signal installation treats the path crossing as a conventional 4-way intersection and provides standard red-yellow-green traffic signal heads for all legs of the intersection.

Guidance

Full traffic signal installations must meet MUTCD pedestrian, school or modified warrants. Additional guidance for signalized crossings:

- Located more than 300 feet from an existing signalized intersection
- Roadway travel speeds of 40 MPH and above
- Roadway ADT exceeds 15,000 vehicles



Discussion

Shared-use path signals are normally activated by push buttons but may also be triggered by embedded loop, infrared, microwave or video detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street.

Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity and safety.

Additional References and Guidelines

FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Traffic signals require routine maintenance. Signing and striping need to be maintained to help users understand any unfamiliar traffic control.

Grade-Separated Crossings

Description

Grade separated crossings provide critical non-motorized system links by joining areas separated by barriers such as railroads, waterways and highway corridors. In most cases, these structures are built in response to user demand for safe crossings where they previously did not exist. There are no minimum roadway characteristics for considering grade separation. Depending on the type of facility or the desired user group, grade separation may be considered in many types of projects.

Guidance

Overcrossings require a minimum of 17 feet of vertical clearance to the roadway below versus a minimum elevation differential of around 12 feet for an undercrossing. This can result in greater elevation differences and much longer ramps for bicycles and pedestrians to negotiate. Overcrossings should be at least 8 feet wide with 14 feet preferred and additional width provided at scenic viewpoints. Undercrossings should be designed at minimum 10 feet height and 14 feet width.

Discussion

Overcrossings for bicycles and pedestrians typically fall under the Americans with Disabilities Act (ADA), which strictly limits ramp slopes to 5% (1:20) with landings at 400 foot intervals, or 8.33% (1:12) with landings every 30 feet. Overcrossings pose potential concerns about visual impact and functional appeal, as well as space requirements necessary to meet ADA guidelines for slope. Safety is a major concern with undercrossings. Shared-use path users may be temporarily out of sight from public view and may experience poor visibility themselves. To mitigate safety concerns, an undercrossing should be designed to be spacious, well-lit, equipped with emergency cell phones at each end and completely visible for its entire length from end to end.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.

Materials and Maintenance

14 foot width allows for maintenance vehicle access. Potential problems include conflicts with utilities, drainage, flood control and vandalism. Overcrossings can be more difficult to clear of snow than undercrossings.

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Denver Rio Grande Western Rail Trail in Farmington near Burke Lane

3: Shared-use Paths

Introduction

A shared-use path allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. These facilities are frequently found in parks, along rivers, beaches, and in greenbelts or utility corridors where there are few conflicts with motorized vehicles. Path facilities can also include amenities such as lighting, signage, and fencing (where appropriate).

Key features of shared-use paths include:

- Frequent access points from the local road network.
- Directional signs to direct users to and from the path.
- A limited number of at-grade crossings with streets or driveways.
- Terminating the path where it is easily accessible to and from the street system.
- Separate treads for pedestrians and bicyclists when heavy use is expected.

Path Crossings

In most cases, at-grade path crossings can be properly designed to provide a reasonable degree of safety and can meet existing traffic and safety standards. Path facilities that cater to bicyclists can require additional considerations due to the higher travel speed of bicyclists versus pedestrians.

Consideration must be given to adequate warning distance based on vehicle speeds and line of sight, with the visibility of any signs absolutely critical. Directing the active attention of motorists to roadway signs may require additional alerting devices such as a flashing beacon, roadway striping or changes in pavement texture (see Chapter 2 of this appendix). Signing for path users may include a standard "STOP" or "YIELD" sign and pavement markings, possibly combined with other features such as bollards or a bend in the pathway to slow bicyclists. Care must be taken not to place too many signs at crossings lest they begin to lose their visual impact.

A number of striping patterns have emerged over the years to delineate path crossings. A median stripe on the path approach will help to organize and warn path users. Crosswalk striping is typically a matter of local and state preference, and may be accompanied by pavement treatments to help warn and slow motorists. In areas where motorists do not typically yield to crosswalk users, additional measures may be required to increase compliance.

General Design Practices

Description

Shared-use paths can provide a desirable facility, particularly for recreation, and users of all skill levels preferring separation from traffic. Bicycle paths should generally provide directional travel opportunities not provided by existing roadways.

Guidance

Width

- 8 feet is the minimum allowed for a two-way bicycle path and is only recommended for low traffic situations.
- 10 feet is recommended in most situations and will be adequate for moderate to heavy use.
- 12 feet is recommended for heavy use situations with high concentrations of multiple users. A separate track (5' minimum) can be provided for pedestrian use.

Lateral Clearance

- A 2 foot or greater shoulder on both sides of the path should be provided. An additional foot of lateral clearance (total of 3') is required by the MUTCD for the installation of signage or other furnishings.
- 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.

Overhead Clearance

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

Striping

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

Discussion

Terminate the path where it is easily accessible to and from the street system, preferably at a controlled intersection or at the beginning of a dead-end street.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
Flink, C. *Greenways: A Guide To Planning Design And Development.* 1993.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Shared-Use Paths Along Roadways

Description

Shared-use paths along roadways, also called Sidepaths, are a type of path that run adjacent to a street. Because of operational concerns it is generally preferable to place paths within independent rights-of-way away from roadways. However, there are situations where existing roads provide the only corridors available.

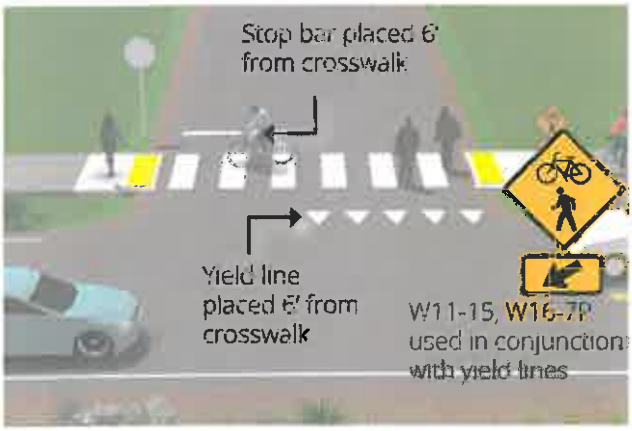
Along roadways, these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding where bicyclists enter or leave the path. The AASHTO Guide for the Development of Bicycle Facilities cautions practitioners of the use of two-way sidepaths on urban or suburban streets with many driveways and street crossings.

In general, there are two approaches to crossings: adjacent and setback crossings, illustrated below.

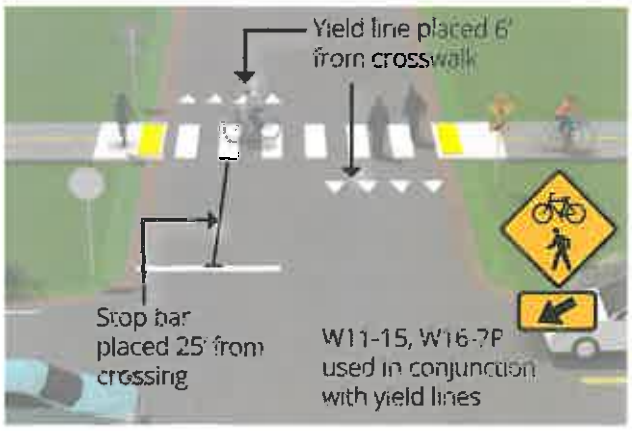
Guidance

- Guidance for sidepaths should follow that for general design practises of shared-use paths.
- A high number of driveway crossings and intersections create potential conflicts with turning traffic. Consider alternatives to sidepaths on streets with a high frequency of intersections or heavily used driveways.
- Where a sidepath terminates special consideration should be given to transitions so as not to encourage unsafe wrong-way riding by bicyclists.
- Crossing design should emphasize visibility of users and clarity of expected yielding behavior. Crossings may be STOP or YIELD controlled depending on sight lines and bicycle motor vehicle volumes and speeds.

Adjacent Crossing - A separation of 6 feet emphasizes the conspicuity of riders at the approach to the crossing.



Setback Crossing - A set back of 25 feet separates the path crossing from merging/turning movements that may be competing for a driver's attention.



Discussion

The provision of a shared-use path adjacent to a road is not a substitute for the provision of on-road accommodation such as paved shoulders or bike lanes, but may be considered in some locations in addition to on-road bicycle facilities. To reduce potential conflicts in some situations, it may be better to place one-way sidepaths on both sides of the street.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
NACTO. *Urban Bikeway Design Guide.* See entry on Raised Cycle Tracks. 2012.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the user experience.

Local Neighborhood Accessways

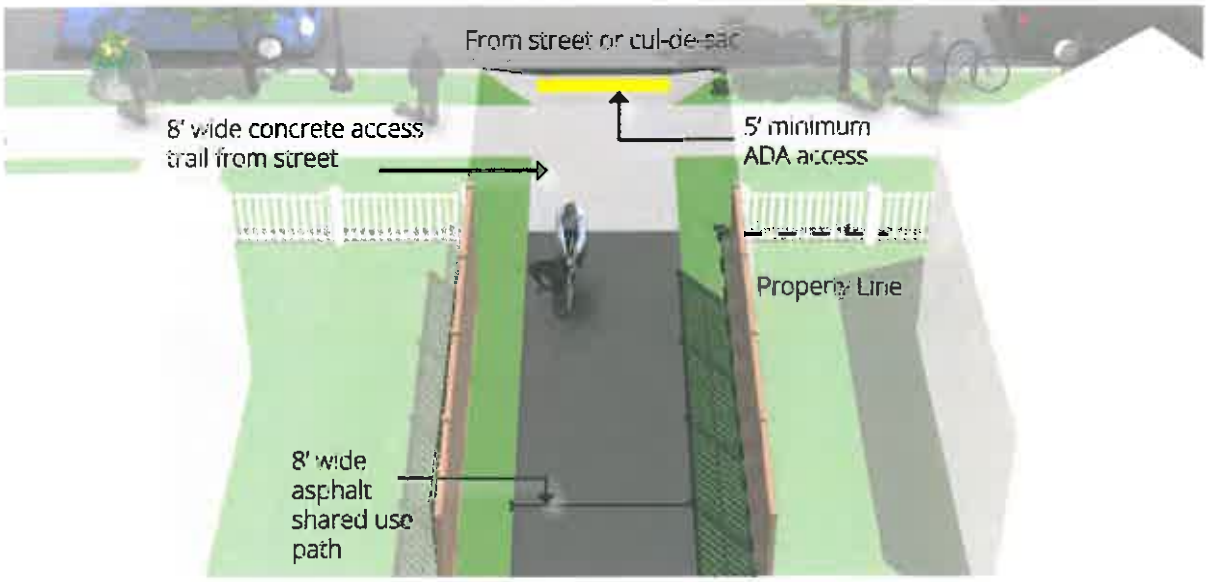
Description

Neighborhood accessways provide residential areas with direct bicycle and pedestrian access to parks, shared use paths, green spaces, and other recreational areas. They most often serve as small shared use path connections to and from the larger shared use path network, typically having their own rights-of-way and easements.

Additionally, these smaller shared use paths can be used to provide bicycle and pedestrian connections between dead-end streets, cul-de-sacs, and access to nearby destinations not provided by the street network.

Guidance

- Neighborhood accessways should remain open to the public.
- Shared use path pavement shall be at least 8' wide to accommodate emergency and maintenance vehicles, meet ADA requirements and be considered suitable for multi-use.
- Shared use path widths should be designed to be less than 8' wide only when necessary to protect large mature native trees over 18" in caliper, wetlands or other ecologically sensitive areas.
- Access trails should slightly meander whenever possible.



Discussion

Neighborhood accessways should be designed into new subdivisions at every opportunity and should be required by City/County subdivision regulations. For existing subdivisions, Neighborhood and homeowner association groups are encouraged to identify locations where such connects would be desirable. Nearby residents and adjacent property owners should be invited to provide landscape design input.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
FHWA. *Federal Highway Administration University Course on Bicycle and Pedestrian Transportation. Lesson 19: Greenways and Shared Use Paths.* 2006.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

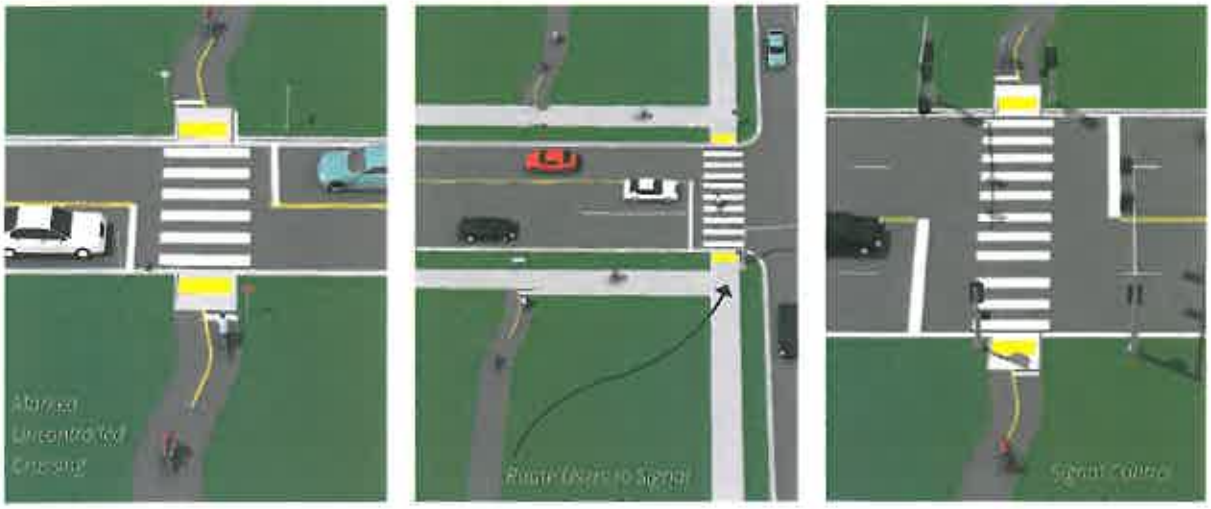
Shared-use Path Crossings

Description

At-grade roadway crossings can create potential conflicts between path users and motorists, however, well-designed crossings can mitigate many operational issues and provide a higher degree of safety and comfort for path users.

Guidance

The approach to designing path crossings of streets depends on an evaluation of vehicular traffic, line of sight, pathway traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions.



Discussion

Marked Crossings are appropriate on a two lane road with ≤9,000-12,000 Average Daily Traffic (ADT) volume, and speeds below 35 mph. Crossings of streets with higher speeds, higher volumes, and additional lanes require additional enhancements such as median islands or active warning beacons.

Path crossings should not be provided within approximately 400 feet of an existing signalized intersection. If possible, **route the path directly to the signal**. Barriers and signing may be needed to direct shared-use path users to the signalized crossings

At **signal-controlled crossings**, full traffic signal installations must meet MUTCD pedestrian, school or modified warrants. Signalized crossings should be located more than 300 feet from an existing signalized intersection, and include push button actuation for shared-use path users. The maximum delay for activation of the signal should be two minutes.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
FHWA. *Pedestrian Hybrid Beacon Guide - Recommendations and Case Study.* 2014.
FHWA. *MUTCD - Interim Approval for Optional Use of Rectangular Rapid Flashing Beacons (IA-11).* 2008.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Locate markings out of wheel tread when possible to minimize wear and maintenance costs. Signing and striping need to be maintained to help users understand any unfamiliar traffic control. If a sidewalk is used for crossing access, it should be kept clear of snow and debris and the surface should be level for wheeled users. Traffic signals and hybrid beacons require routine maintenance.

Bollard and Gate Alternatives at Shared-use Path Crossings

Description

Bollards are physical barriers designed to restrict motor vehicle access to the multi-use path. Unfortunately, significantly-vertical physical barriers create obstacles to legitimate trail users and are often ineffective at preventing access. Alternative design strategies use signage, landscaping, and curb cut design to reduce the likelihood of motor vehicle access and slow trail users before crossings.

Guidance

- Bollards or other barriers should not continue to be used unless there is a documented history of unauthorized intrusion by motor vehicles.
- "No Motor Vehicles" signage (MUTCD R5-3) may be used to reinforce access rules.
- At intersections, split the path tread into two sections separated by low landscaping.
- Vertical curb cuts should be used to discourage motor vehicle access.
- Consider targeted surveillance and enforcement at specific intrusion locations

Discussion

Bollards or other barriers should not be used unless there is a documented history of unauthorized intrusion by motor vehicles. If unauthorized use persists, assess whether the problems posed by unauthorized access exceed the risks and issues posed by bollards and other barriers.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.

Materials and Maintenance

Landscaping separation between treads should be maintained to a height easily straddled by emergency vehicles.

Conventional bicycle lane on State Street in Farmington

4: Bicycle Facilities

On-Street Bikeways

Designated exclusively for bicycle travel, on-street bikeways are segregated from vehicle travel lanes by striping, and can include pavement stencils and other treatments. On-street bikeways are most appropriate on arterial and collector streets where higher traffic volumes and speeds warrant greater separation.

On-street bikeways can increase safety and promote proper riding by:

- Defining road space for bicyclists and motorists, reducing the possibility that motorists will stray into the bicyclists' path.
- Discouraging riding on the sidewalk.
- Reducing the incidence of wrong way riding.
- Reminding motorists that bicyclists have a right to the road.

Shared Roadways

On shared roadways, bicyclists and motor vehicles use the same roadway space. These facilities are typically used on roads with low speeds and traffic volumes, however they can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided.

Shared roadways employ a large variety of treatments from simple signage and shared lane markings to more complex treatments including directional signage, traffic diverters, chicanes, chokers, and/or other traffic calming devices to reduce vehicle speeds or volumes.

Bicycle boulevards are a special class of shared roadways designed for a broad spectrum of bicyclists. They are low-volume local streets where motorists and bicyclists share the same travel lane. Treatments for bicycle boulevards are selected as necessary to create appropriate automobile volumes and speeds, and to provide safe crossing opportunities of busy streets. See the Bicycle Boulevards section on Page 36 for more information.

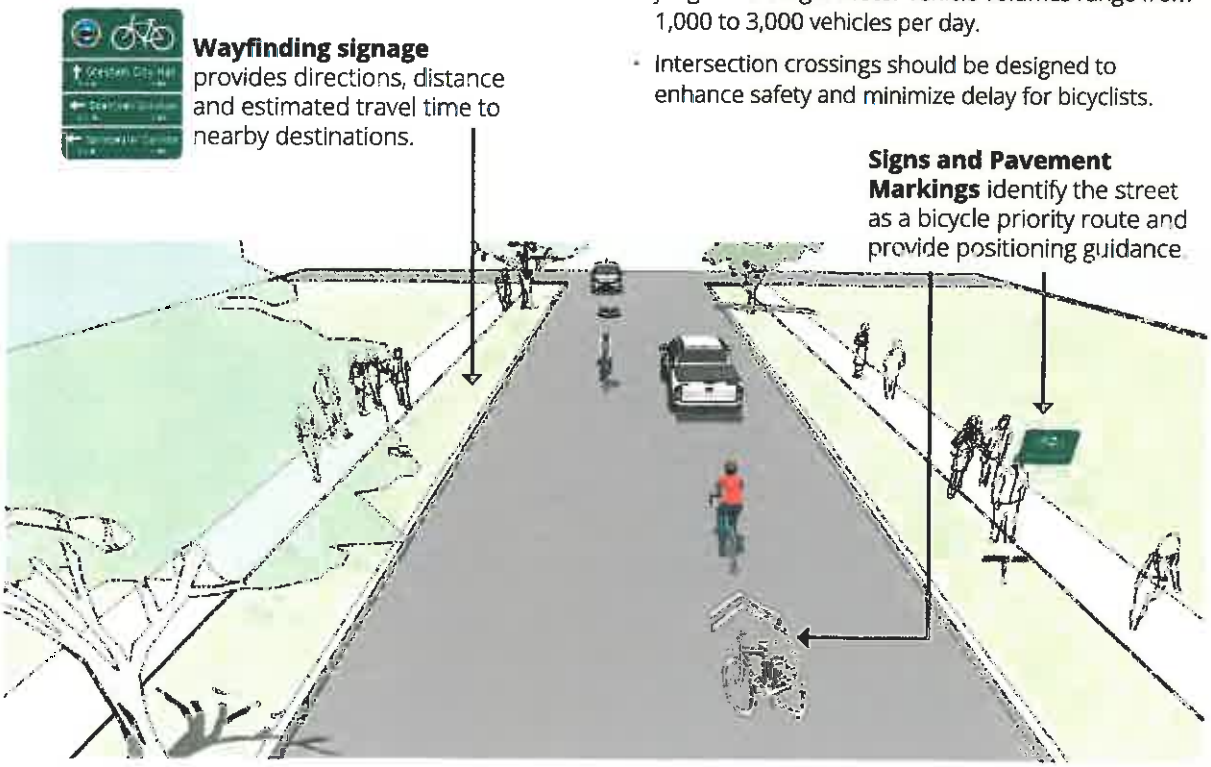
Bicycle Boulevards

Description

Bicycle boulevards are low-volume, low-speed streets modified to enhance bicyclist comfort by using treatments such as signage, pavement markings, traffic calming and/or traffic reduction, and intersection modifications. These treatments allow through movements of bicyclists while discouraging similar through-trips by non-local motorized traffic.

Guidance

- Signs and pavement markings are the minimum treatments necessary to designate a street as a bicycle boulevard.
- Bicycle boulevards should have a maximum posted speed of 25 mph. Use traffic calming to maintain an 85th percentile speed below 22 mph.
- Implement volume control treatments based on the context of the bicycle boulevard, using engineering judgment. Target motor vehicle volumes range from 1,000 to 3,000 vehicles per day.
- Intersection crossings should be designed to enhance safety and minimize delay for bicyclists.



Discussion

Bicycle 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 along the bicycle boulevard and compromise safety. Traffic calming can deter motorists from driving on a street. Anticipate and monitor vehicle volumes on adjacent streets to determine whether traffic calming results in inappropriate volumes. Traffic calming can be implemented on a trial basis.

Additional References and Guidelines

Alta Planning + Design and IBPI. *Bicycle Boulevard Planning and Design Handbook.* 2009.
BikeSafe. *Bicycle countermeasure selection system.*
Ewing, Reid. *Traffic Calming: State of the Practice.* 1999.
Ewing, Reid and Brown, Steven. *U.S. Traffic Calming Manual.* 2009.

Materials and Maintenance

Vegetation should be regularly trimmed to maintain visibility and attractiveness.

Conventional Bicycle Lanes

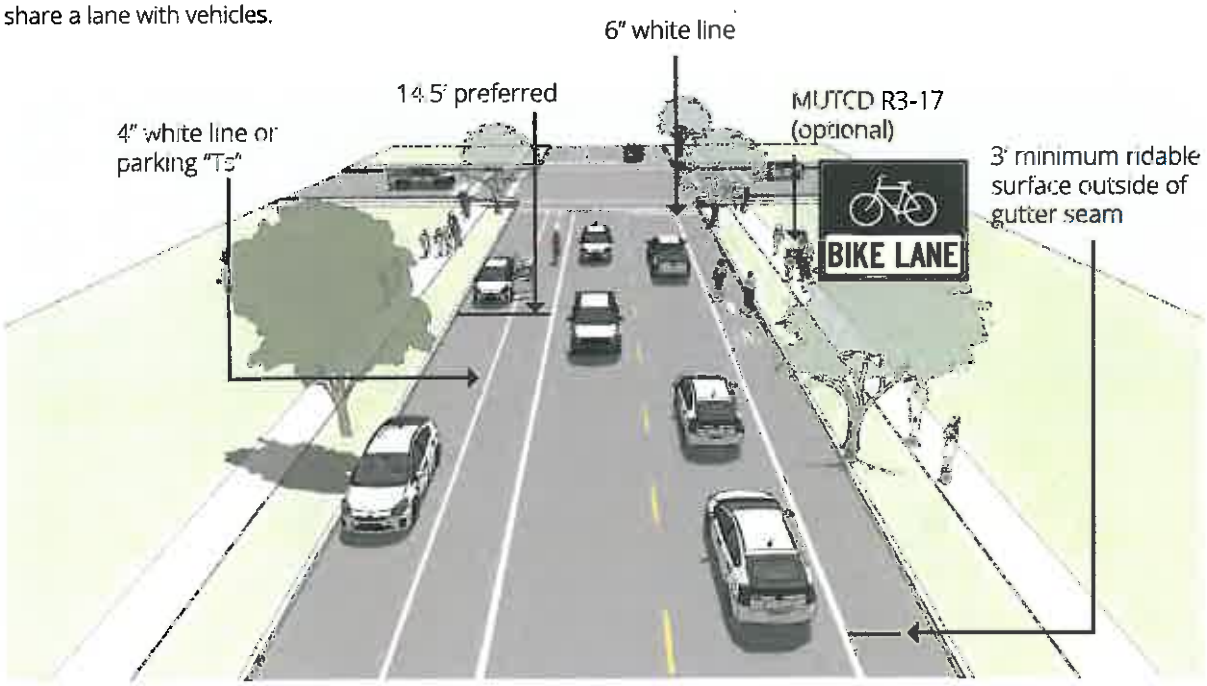
Description

Conventional bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signage. The bike lane is located adjacent to motor vehicle travel lanes and is used in the same direction as motor vehicle traffic. Bike lanes are typically on the right side of the street, between the adjacent travel lane and curb, road edge or parking lane.

Many bicyclists, particularly less experienced riders, are more comfortable riding on a busy street if it has a striped and signed bikeway than if they are expected to share a lane with vehicles.

Guidance

- 4 foot minimum when no curb and gutter is present.
- 5 foot minimum when adjacent to curb and gutter or 3 feet more than the gutter pan width if the gutter pan is wider than 2 feet.
- 14.5 foot preferred from curb face to edge of bike lane. (12 foot minimum) when adjacent to parallel parking.
- 7 foot maximum width for use adjacent to arterials with high travel speeds. Greater widths may encourage motor vehicle use of bike lane.



Discussion

Wider bicycle lanes are desirable in certain situations such as on higher speed arterials (45 mph+) where use of a wider bicycle lane would increase separation between passing vehicles and bicyclists. Appropriate signing and stenciling is important with wide bicycle lanes to ensure motorists do not mistake the lane for a vehicle lane or parking lane. Consider buffered bike lanes when further separation is desired.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Bicycle lanes should be cleared of snow through routine snow removal operations.

Advisory Bicycle Lanes

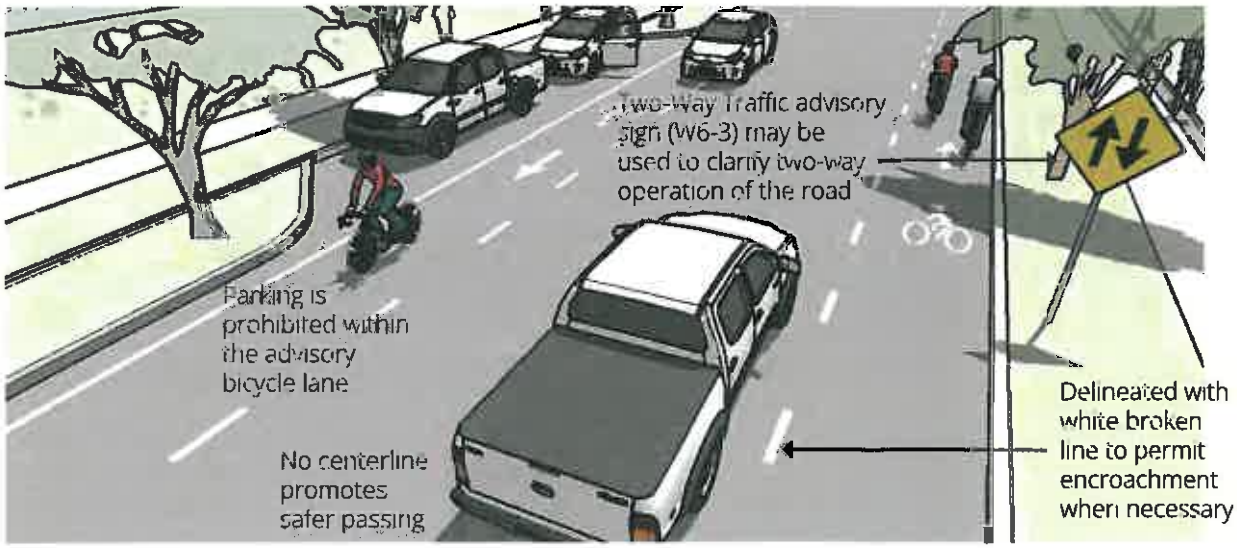
Description

Advisory bicycle lanes (also called dashed bicycle lanes) provide a bicycle-priority space 5-7 feet wide with bicycle lane markings on a roadway too narrow for conventional bicycle lanes. Similar in appearance to bicycle lanes, advisory bicycle lanes are distinct in that they are temporarily shared with motor vehicles during head-on approaching maneuvers and turning movements.

Benefits of advisory bicycle lanes include creating priority for people bicycling in what would otherwise be a shared-roadway condition, increasing predictability and clarifying positioning between people bicycling and people driving, and encouraging increased separation while passing.

Guidance

- This treatment is most appropriate on narrow (20-30 feet), two-lane roadways where there is insufficient space for conventional bicycle lanes and that have low volumes. Streets with travel area wider than 30 feet can support conventional bike lanes.
- Motor vehicle traffic volumes are low-moderate (1,500-4,500 ADT), but may function on streets with as high as 6,000 ADT.
- The roadway is preferably straight with few bends, inclines or sightline obstructions.
- Should not be implemented in areas where parking demand is high enough that parked cars would obstruct the advisory bicycle lanes.
- Recommended two-way motor vehicle travel lane width of 16 ft, though some are as narrow as 10 ft.



Discussion

This treatment is considered experimental by FHWA and may require a Request to Experiment as described in Section 1A.10 of the MUTCD. Specific design detail should conform to MUTCD and any experimentation requirements. Advisory bicycle lanes may be appropriate on low volume streets in freight districts. Required passing widths for truck or emergency vehicles should be considered on routes where such vehicles are anticipated.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities and A Policy on Geometric Design of Highways and Streets.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Consider the use of colored pavement within the advisory bicycle lane area to discourage unnecessary encroachment by motorists or parked vehicles.

Buffered Bike Lanes

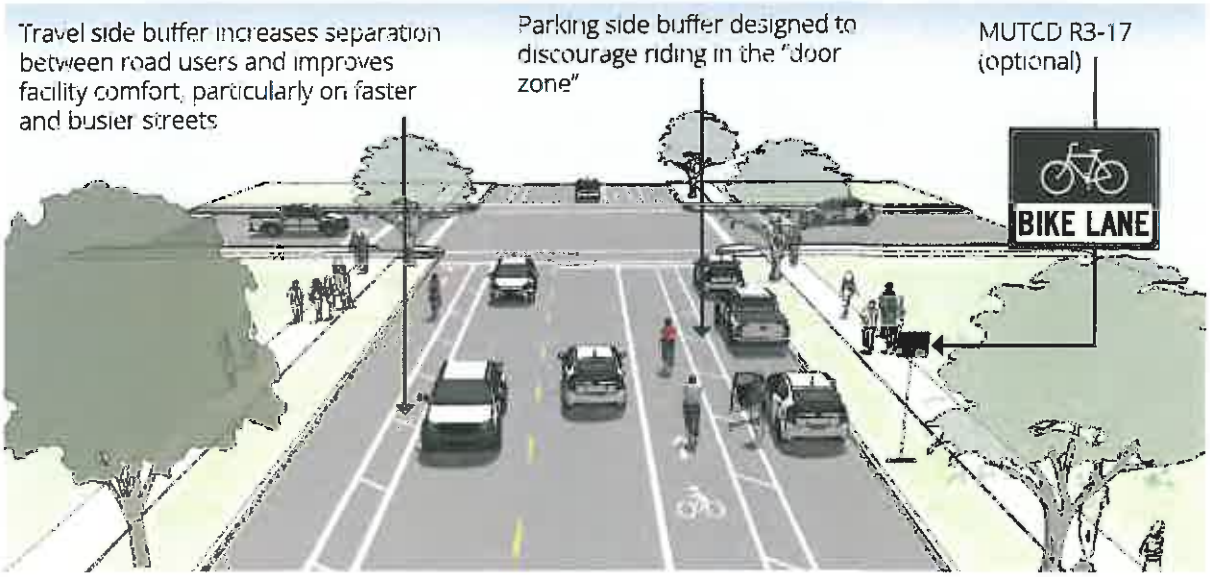
Description

Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space, separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. Buffered bike lanes follow general guidance for buffered preferential vehicle lanes as per MUTCD guidelines (section 3D-01).

Buffered bike lanes are designed to increase the space between the bike lane and the travel lane and/or parked cars. This treatment is appropriate for bike lanes on roadways with high motor vehicle traffic volumes and speed, adjacent to parking lanes, or a high volume of truck or oversized vehicle traffic.

Guidance

- The minimum bicycle travel area (not including buffer) is 5 feet wide.
- Buffers should be at least 2 feet wide. If 3 feet or wider, mark with diagonal or chevron hatching. For clarity at driveways or minor street crossings, consider a dashed line for the inside buffer boundary where cars are expected to cross.
- Buffered bike lanes can buffer the travel lane only, or parking lane only depending on available space and the objectives of the design.



Discussion

Frequency of right turns by motor vehicles at major intersections should determine whether continuous or truncated buffer striping should be used approaching the intersection. Commonly configured as a buffer between the bicycle lane and motor vehicle travel lane, a parking side buffer may also be provided to help bicyclists avoid the 'door zone' of parked cars.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices. (3D-01).* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Bicycle lanes should be cleared of snow through routine snow removal operations.

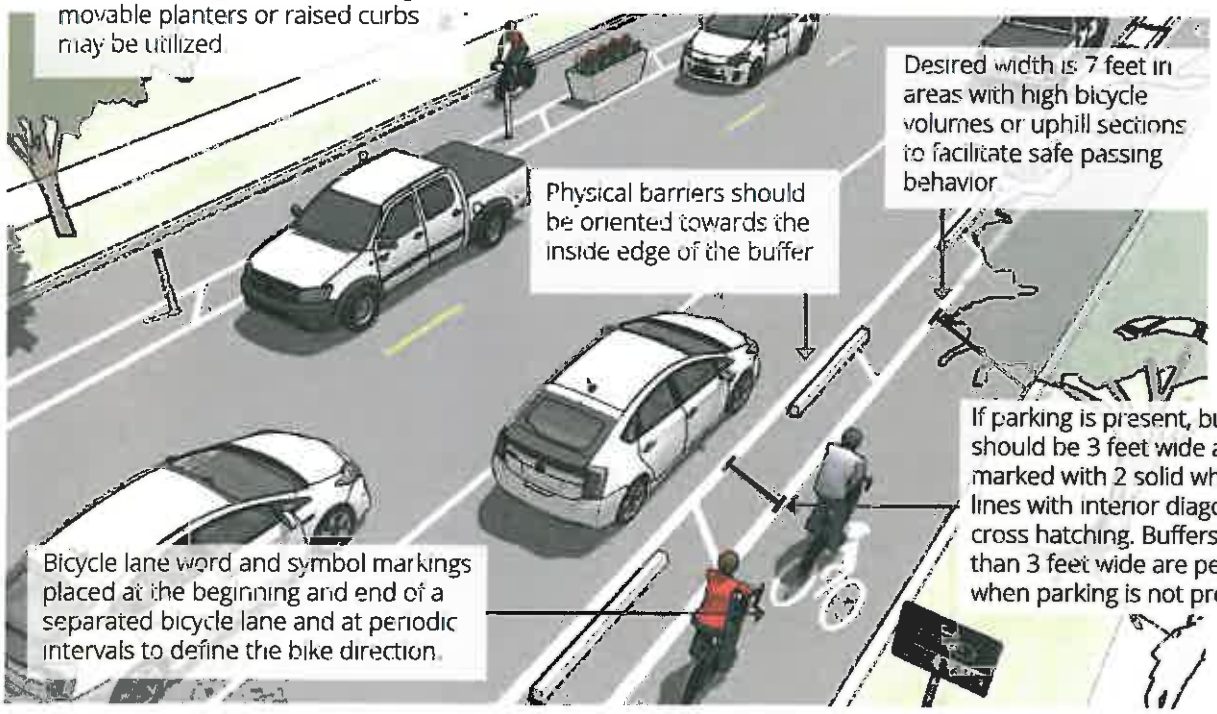
One-Way Separated (or Protected) Bike Lanes

Description

One-way separated bike lanes, also known as cycle tracks or protected bike lanes, are physically protected from motor traffic and distinct from the sidewalk. Separated bike lanes are either raised or at street level and use a variety of elements for physical protection from passing traffic.

Guidance

- 7 foot recommended minimum to allow passing.
- 5 foot minimum width in constrained locations.
- When placed adjacent to parking, the parking buffer should be three feet wide to allow for passenger loading and to prevent door collisions.
- When placed adjacent to a travel lane, one-way raised bike lanes may be configured with a mountable curb to allow entry and exit from the bicycle lane for passing other bicyclists or to access vehicular turn lanes.



Discussion

Special consideration should be given at transit stops to manage bicycle and pedestrian interactions. Driveways and minor street crossings are unique challenges to separated bike lane design. Parking should be prohibited within 30 feet of the intersection to improve visibility. Color, yield markings and "Yield to Bikes" signage should be used to identify the conflict area and make it clear that the bike lane has priority over entering and exiting traffic. If configured as a raised separated bike lane, the crossing should be raised so that the sidewalk and separated bike lane maintain their elevation through the crossing.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

In cities with winter climates, barrier separated and raised bike lanes may require special equipment for snow removal.

Two-Way Separated (or Protected) Bike Lanes

Description

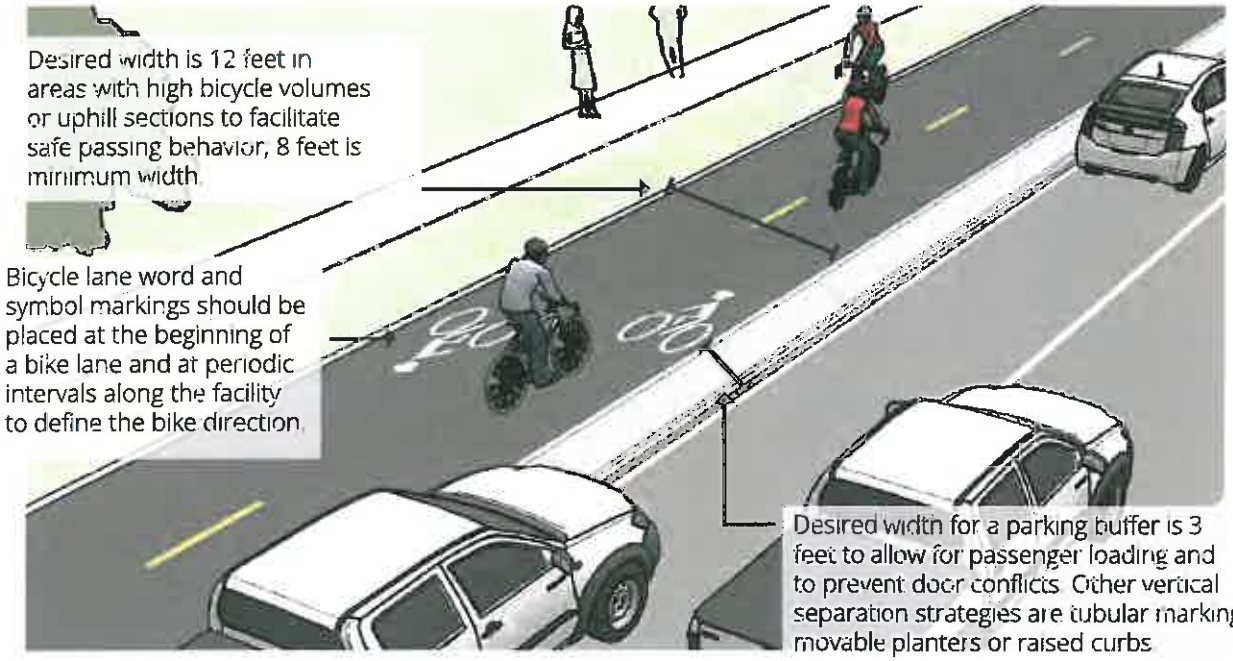
Two-way separated bike lanes, also known as cycle tracks or protected bike lanes, are physically separated facilities that allow bicycle movement in both directions on one side of the road. Two-way bike lanes share some of the same design characteristics as one-way facilities, but may require additional considerations at driveway and side-street crossings.

A two-way separated bike lanes may be configured as a protected facility at street level with a parking lane or other barrier between the bike lane and the motor vehicle travel lane and/or as a raised bike lane to provide vertical separation from the adjacent motor vehicle lane.

Guidance

- 12 foot recommended minimum for two-way facility
- 8 foot minimum in constrained locations
- When placed adjacent to parking, the parking buffer should be three feet wide to allow for passenger loading and to prevent door collisions.

Two-way separated bike lanes work best on one-way streets. Single direction motor vehicle travel minimizes potential conflict with bicyclists.



Discussion

Two-way separated bike lanes require a higher level of control at intersections to allow for a variety of turning movements. These movements should be guided by separated signals for bicycles and motor vehicles. Transitions into and out of two-way bike lanes should be simple and easy to use to deter bicyclists from continuing to ride against the flow of traffic. At driveways and minor intersections, bicyclists riding against roadway traffic in two-way bike lanes may surprise pedestrians and drivers not expecting bidirectional travel. Appropriate signage is recommended.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

In cities with winter climates barrier, separated and raised separated bike lanes may require special equipment for snow removal.

Separated Bike Lane Protection Methods

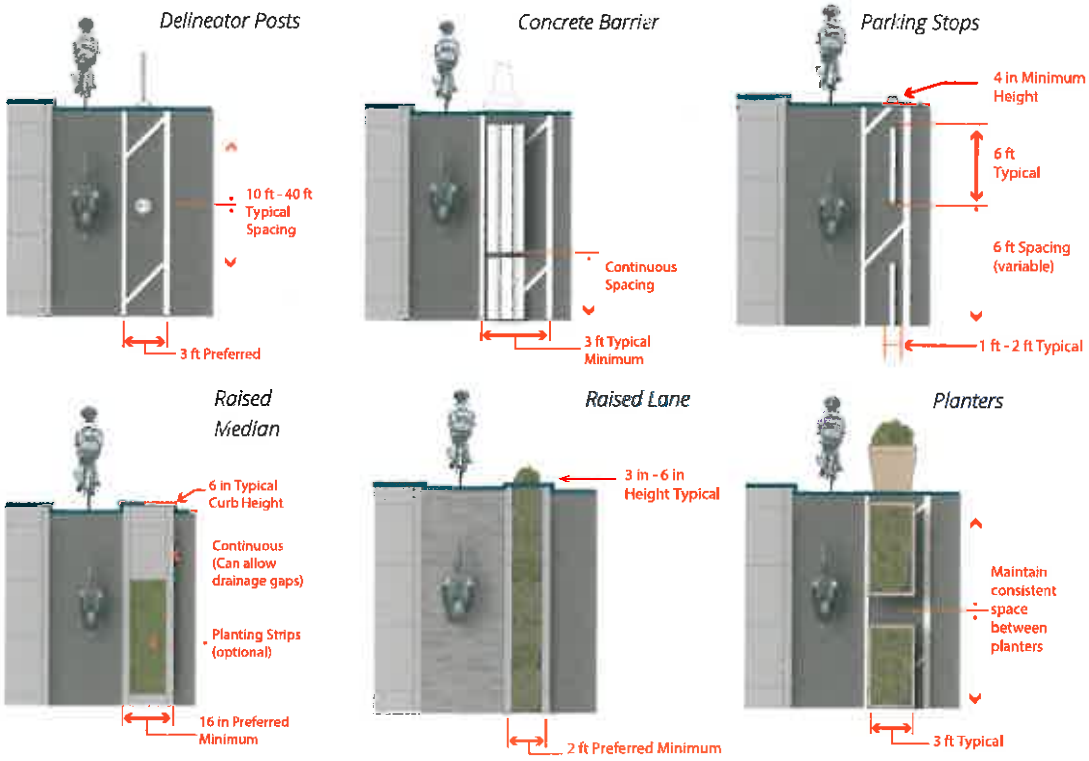
Description

Protection is provided through physical barriers and can include bollards, parking, a planter strip, an extruded curb, or on-street parking. Separated bike lanes using these protection elements typically share the same elevation as adjacent travel lanes.

Raised separated bike lanes may be at the level of the adjacent sidewalk or set at an intermediate level between the roadway and sidewalk to distinguish the separated bike lane from the pedestrian area.

Guidance

- Separated bike lanes should ideally be placed along streets with long blocks and few driveways or mid-block access points for motor vehicles. Separated bike lanes located on one-way streets have fewer potential conflict areas than those on two-way streets.
- In situations where on-street parking is allowed, separated bike lanes shall be located between the parking lane and the sidewalk (in contrast to bike lanes).



Source: FHWA Separated Bike Lane Planning and Design Guide. 2015.

Discussion

Sidewalks or other pedestrian facilities should not be narrowed to accommodate the separated bike lane as pedestrians will likely walk on the separated bike lane if sidewalk capacity is reduced. Visual and physical cues (e.g., pavement markings & signage) should be used to make it clear where bicyclists and pedestrians should be travelling. If possible, distinguish the separated bike lane and pedestrian zone with a furnishing zone.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

In cities with winter climates, barrier protected and raised separated bike lanes may require special equipment for snow removal.

Bicycles May Use Full Lane sign on Shepard Lane

5: Bicycle Signs and Markings

Introduction

Signage helps to regulate traffic, indicate to bicyclists and other users that a particular roadway is suitable or preferred (or not) for travel by bicycle, and may also indicate nearby destinations accessible by bicycle.

The ability to navigate through a city is informed by landmarks, natural features and other visual cues. Signs throughout the city should indicate to bicyclists:

- Direction of travel
- Location of destinations
- Travel time/distance to those destinations

These signs will increase users' comfort and accessibility to the bicycle systems.

Signage can serve both wayfinding and safety purposes including:

- Helping to familiarize users with the bicycle network
- Helping users identify the best routes to destinations
- Helping to address misconceptions about time and distance
- Helping overcome a "barrier to entry" for people who are not frequent bicyclists (e.g., "interested but concerned" bicyclists)

A community-wide bicycle wayfinding signage plan would identify:

- Sign locations
- Sign type – what information should be included and design features
- Destinations to be highlighted on each sign – key destinations for bicyclists
- Approximate distance and travel time to each destination

Bicycle wayfinding signs also visually cue motorists that they are driving along a bicycle route and should use caution. Signs are typically placed at key locations leading to and along bicycle routes, including the intersection of multiple routes. Too many road signs tend to clutter the right-of-way, and it is recommended that these signs be posted at a level most visible to bicyclists rather than per vehicle signage standards.

Wayfinding Sign Types

Description

A bicycle wayfinding system consists of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes. There are three general types of wayfinding signs:

Confirmation Signs

Indicate to bicyclists that they are on a designated bikeway. Make motorists aware of the bicycle route.

Can include destinations and distance/time. Do not include arrows.

Turn Signs

Indicate where a bikeway turns from one street onto another street. Can be used with pavement markings.

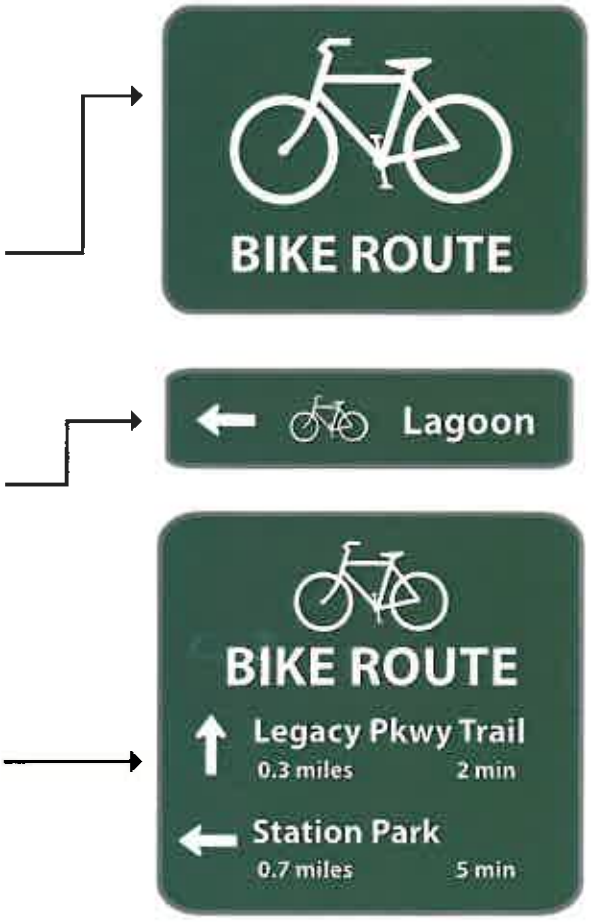
Include destinations and arrows.

Decisions Signs

Mark the junction of two or more bikeways.

Inform bicyclists of the designated bike route to access key destinations. Includes destinations and arrows and distances.

Travel times are optional but recommended.



Discussion

There is no standard color for bicycle wayfinding signage. Section 1A.12 of the MUTCD establishes the general meaning for signage colors. Green is the color used for directional guidance and is the most common color of bicycle wayfinding signage in the US, including those in the MUTCD.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs and will need periodic replacement due to wear.

Wayfinding Sign Placement

Guidance

Signs are typically placed at decision points along bicycle routes – typically at the intersection of two or more bikeways and at other key locations leading to and along bicycle routes.

Decisions Signs

Near-side of intersections in advance of a junction with another bicycle route.

Along a route to indicate a nearby destination.

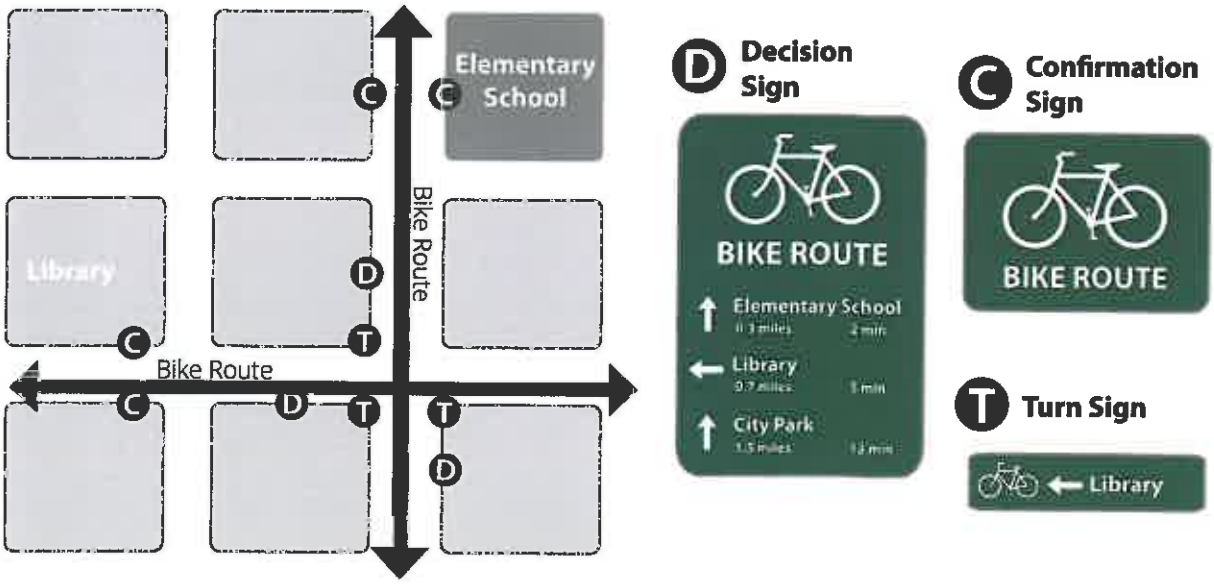
Description

Confirmation Signs

Every ¼ to ½ mile on off-street facilities and every 2 to 3 blocks along on-street bicycle facilities, unless another type of sign is used (e.g., within 150 ft of a turn or decision sign). Should be placed soon after turns to confirm destination(s). Pavement markings can also act as confirmation that a bicyclist is on a preferred route.

Turn Signs

Near-side of intersections where bike routes turn (e.g., where the street ceases to be a bicycle route or does not go through). Pavement markings can also indicate the need to turn to the bicyclist.



Discussion

It can be useful to classify a list of destinations for inclusion on the signs based on their relative importance to users throughout the area. A particular destination's ranking in the hierarchy can be used to determine the physical distance from which the locations are signed. For example, primary destinations (such as the downtown area) may be included on signage up to 5 miles away. Secondary destinations (such as a transit station) may be included on signage up to two miles away. Tertiary destinations (such as a park) may be included on signage up to one mile away.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs and will need periodic replacement due to wear.

Regulatory and Warning Signs

Description

Regulatory signs give a direction that must be obeyed, and apply to intersection control, speed, vehicle movement and parking. They are usually rectangular or square with a white background and black, white or colored letters. Regulatory signs with a red background are reserved for STOP, YIELD, DO NOT ENTER or WRONG WAY messages. Red text indicates a restricted parking conditions, and a circle with a line through it means the activity shown is not allowed.

Warning signs call attention to unexpected conditions on or adjacent to a street, and to situations that might not be readily apparent to road users. Warning signs alert users to conditions that might call for a reduction of speed or an action in the interest of safety and efficient traffic operations. They are usually diamond-shaped or square with a retroreflective yellow or fluorescent yellow-green background with black letters.

Common Bicycle Oriented Regulatory Signs

Guidance

- Small-sized signs or plaques may be used for bicycle-only traffic applications, such as along shared-use paths.
- See the MUTCD 9B for a detailed list of regulatory sign application and guidance.
- Fieldwork and engineering judgment are necessary to fine-tune the placement of signs.
- The SHARE THE ROAD plaque (W16-P) shall not be used alone, and must be mounted below a W11-1 vehicular traffic warning sign. It is typically placed along roadways with high levels of bicycle usage but relatively hazardous conditions for bicyclists. The sign should not be used to designate a preferred bicycle route, but may be used along short sections of designated routes where traffic volumes are higher than desirable.

Additional Bicycle-Oriented Warning Signs

Bicycle Crossing Assembly

Additional warning are available to call attention to unexpected conditions for people riding bicycles, such as steep grades, rail crossings, and slippery conditions. A Bicycle Crossing Assembly using W11-1 and W16-7P arrow plaque may be used at the location of a bikeway crossing to warn other road users.

Share the Road Sign

The sign serves to make motorists aware that bicyclists might be on the road, and that they have a legal right to use the roadway.

Discussion

Signs for the exclusive use of bicyclists should be located so that other road users are not confused by them. Installation of "Share the Road" signs is an ongoing process. Each new route system that is developed is assessed for "Share the Road" signing needs. Periodic field inspections of existing routes should identify areas where changing traffic conditions may warrant additional "Share the Road" signs. The mixing of standard yellow and fluorescent yellow-green backgrounds within a zone or area should be avoided.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.

Materials and Maintenance

Maintenance needs for regulatory and warning signs are similar to other signs and will need periodic replacement due to wear.

A through bike lane next to a right turn lane on a UDOT road in Salt Lake County

6: Bicyclists at Intersections and Crossings

Introduction

Intersections are junctions at which different modes of transportation meet and facilities overlap. An intersection facilitates the interchange between bicyclists, motorists, pedestrians and other modes in order to advance traffic flow in a safe and efficient manner. Designs for intersections with bicycle facilities should reduce conflict between bicyclists (and other vulnerable road users) and vehicles by heightening the level of visibility, denoting clear right-of-way and facilitating eye contact and awareness with other modes. Intersection treatments can improve both queuing and merging maneuvers for bicyclists, and are often coordinated with timed or specialized signals.

The configuration of a safe intersection for bicyclists may include elements such as color, signage, medians, signal detection and pavement markings. Intersection design should take into consideration existing and anticipated bicyclist, pedestrian and motorist movements. In all cases, the degree of mixing or separation between bicyclists and other modes is intended to reduce the risk of crashes and increase bicyclist comfort. The level of treatment required for bicyclists at an intersection will depend on the bicycle facility type used, whether bicycle facilities are intersecting, and the adjacent street function and land use.

Intersection Crossing Markings

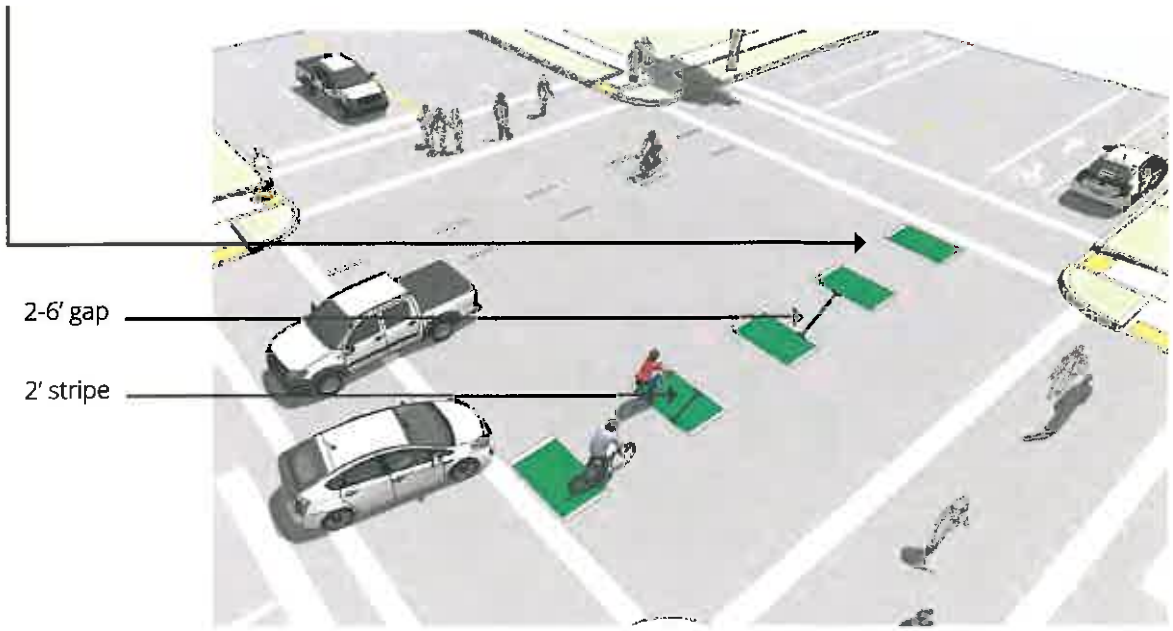
Description

Bicycle pavement markings through intersections indicate the intended path of bicyclists through an intersection or across a driveway or ramp. They guide bicyclists on a safe and direct path through the intersection and provide a clear boundary between the paths of through bicyclists and either through or crossing motor vehicles in the adjacent lane.

Skip stripe markings alert bicyclists and motorists that they are entering a conflict zone and should proceed with caution.

Guidance

- See MUTCD Section 3B.08: "dotted line extensions"
- Crossing striping shall be at least six inches wide when adjacent to motor vehicle travel lanes. Dashed lines should be two-foot lines spaced two to six feet apart.
- Chevrons, shared lane markings, colored bike lanes, or skip striping in conflict areas may be used to increase visibility within conflict areas or across entire intersections. Elephant's Feet markings are common in Europe and Canada.



Discussion

Additional markings such as chevrons, shared lane markings, or colored bike lanes in conflict areas are strategies currently in use in the United States and Canada. Cities considering the implementation of markings through intersections should standardize future designs to avoid confusion.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
FHWA. *Manual on Uniform Traffic Control Devices. (3A.06)*. 2009.
NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority.

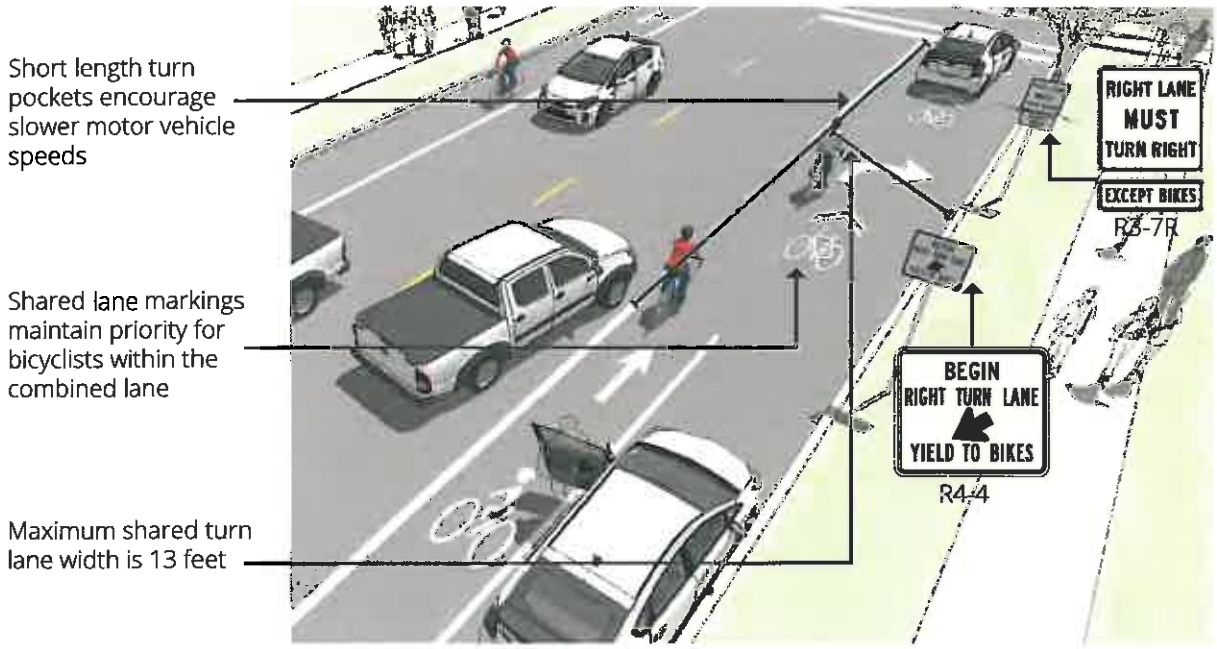
Combined Bike Lane / Turn Lane

Description

The combined bike lane/turn lane places shared lane markings within a right turn only lane. A dashed line delineates the space for bicyclists and motorists within the shared lane. Where there isn't room for a conventional bicycle lane and turn lane, a combined bike/turn lane creates a combined lane where bicyclists can ride and turning motor vehicles yield to through traveling bicyclists. This treatment includes markings advising bicyclists of proper positioning within the lane and is recommended at intersections lacking sufficient space to accommodate both a standard through bike lane and right turn lane.

Guidance

- Maximum shared turn lane width is 13 feet; narrower widths promote single file operation.
- Shared lane markings maintain bicycle priority and indicate preferred positioning of bicyclists within the combined turn lane.
- Use R4-4 BEGIN RIGHT TURN LANE YIELD TO BIKES signage to indicate that motorists should yield to bicyclists through the conflict area.
- An R3-7R "Right Turn Only" sign with an "Except Bicycles" plaque may be needed to make it legal for through bicyclists to use a right turn lane.



Discussion

Case studies cited by the Pedestrian and Bicycle Information Center indicate that this treatment works best on streets with lower posted speeds (30 MPH or less) and with lower traffic volumes (10,000 ADT or less). May not be appropriate for high-speed arterials or intersections with long right turn lanes. May not be appropriate for intersections with large percentages of right-turning heavy vehicles.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

Locate markings out of tire tread to minimize wear. Because the effectiveness of markings depends on their visibility, maintaining markings should be a high priority.

Bike Lanes at Right Turn Only Lanes

Description

The appropriate treatment at right-turn lanes is to place the bike lane between the right-turn lane and the right-most through lane or, where right-of-way is insufficient, to use a shared bike lane/turn lane.

The design (right) illustrates a bike lane pocket, with signage indicating that motorists should yield to bicyclists through the conflict area.

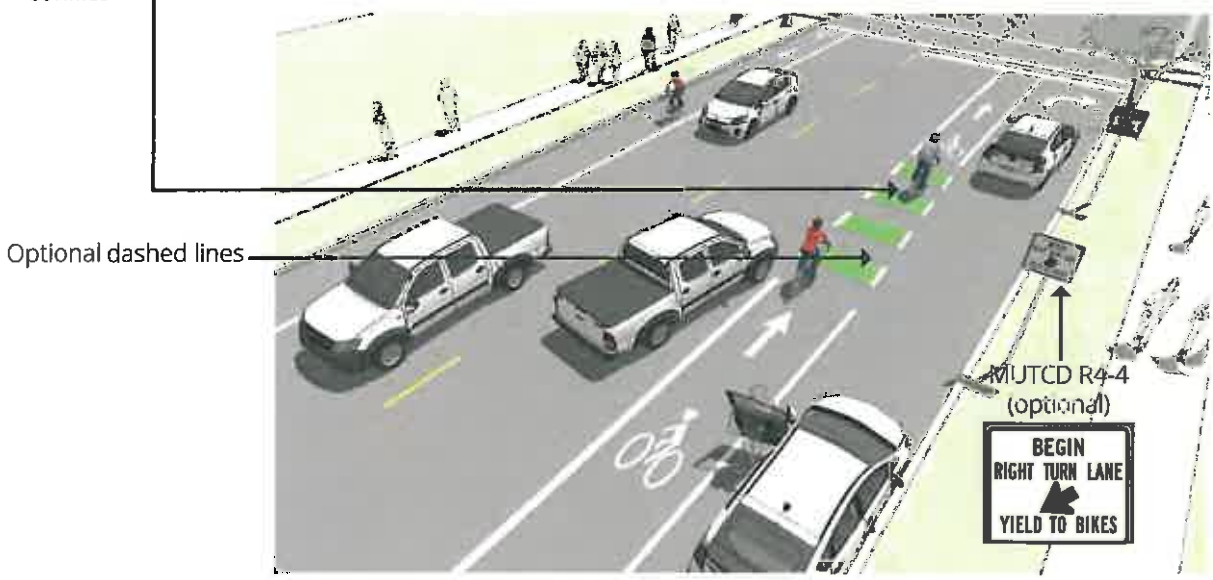
Guidance

At auxiliary right turn only lanes (add lane):

- Continue existing bike lane width; standard width of 5 to 6 feet or 4 feet in constrained locations.
- Use signage to indicate that motorists should yield to bicyclists through the conflict area.
- Consider using colored conflict areas to promote visibility of the mixing zone.

Where a through lane becomes a right turn only lane:

- Do not define a dashed line merging path for bicyclists.
- Drop the bicycle lane in advance of the merge area.
- Use shared lane markings to indicate shared use of the lane in the merging zone.
- For additional information, see NACTO's *Urban Bikeway Design Guide* under "Intersection Treatments"



Discussion

For other potential approaches to providing accommodations for bicyclists at intersections with turn lanes, please see guidance on shared bike lane/turn lane, bicycle signals, and colored bike facilities.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

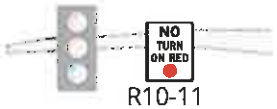
Because the effectiveness of markings depends entirely on their visibility, maintaining markings should be a high priority.

Bike Box

Description

A bike box is a designated area located at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible space to get in front of queuing motorized traffic during the red signal phase. Motor vehicles must queue behind the white stop line at the rear of the bike box.

No Turn on Red restriction for motorists



R10-11

Guidance

- 14' minimum depth
- A "No Turn on Red" (MUTCD R10-11) sign shall be installed overhead to prevent vehicles from entering the Bike Box.
- A "Stop Here on Red" sign should be post-mounted at the stop line to reinforce observance of the stop line.
- A "Yield to Bikes" sign should be post-mounted in advance of and in conjunction with an egress lane to reinforce that bicyclists have the right-of-way going through the intersection.
- An ingress lane should be used to provide access to the box.
- A supplemental "Wait Here" legend can be provided in advance of the stop bar to increase clarity to motorists.

May be combined with intersection crossing markings and colored bike lanes in conflict areas

Colored pavement can be used in the box for increased visibility

Wide stop lines used for increased visibility

If used, colored pavement should extend 50' from the intersection

R10-15

Discussion

Bike boxes are considered experimental by the FHWA. Bike boxes should be placed only at signalized intersections, and right turns on red shall be prohibited for motor vehicles. Bike boxes should be used in locations that have a large volume of bicyclists and are best utilized in central areas where traffic is usually moving more slowly. Prohibiting right turns on red improves safety for bicyclists yet does not significantly impede motor vehicle travel.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide*. 2012.
FHWA. Interim Approval (IA-14) has been granted. Requests to use green colored pavement need to comply with the provisions of Paragraphs 14 through 22 of Section 1A.10. 2011.

Materials and Maintenance

Because the effectiveness of markings depends entirely on their visibility, maintaining markings should be a high priority.

Two-Stage Turn Boxes

Description

Two-stage turn queue boxes offer bicyclists a safe way to make left turns at multi-lane signalized intersections from a right side separated or conventional bike lane.

On right side separated bike lanes, bicyclists are often unable to merge into traffic to turn left due to physical separation, making the provision of two-stage left turn boxes critical. Design guidance for two-stage turns apply to both conventional and separated bike lanes.

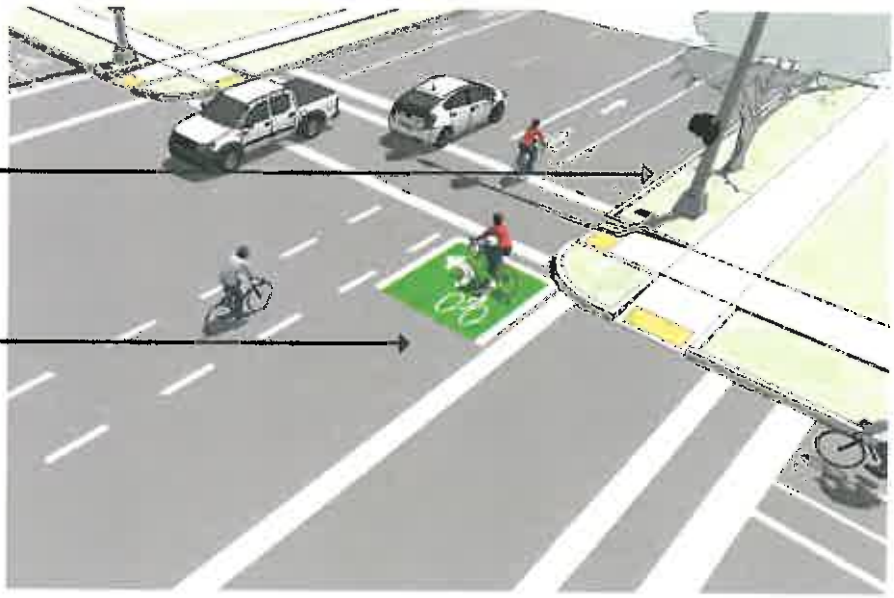
Guidance

- The queue box shall be placed in a protected area. Typically this is within an on-street parking lane or separated bike lane buffer area.
- 6.5' minimum depth of bicycle storage area
- Bicycle stencil and turn arrow pavement markings shall be used to indicate proper bicycle direction and positioning.
- A "No Turn on Red" (MUTCD R10-11) sign shall be installed on the cross street to prevent vehicles from entering the turn box.

Turns from separated bike lanes may be protected by a parking lane or other physical buffer

Turns from a bicycle lane may be protected by an adjacent parking lane or crosswalk setback space.

Consider using colored pavement inside the box to further define the bicycle space



Discussion

Two-Stage turn boxes are considered experimental by FHWA. While two stage turns may increase bicyclist comfort in many locations, this configuration will typically result in higher average signal delay for bicyclists due to the need to receive two separate green signal indications (one for the through street, followed by one for the cross street) before proceeding.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates.

Bicycle Signal Heads

Description

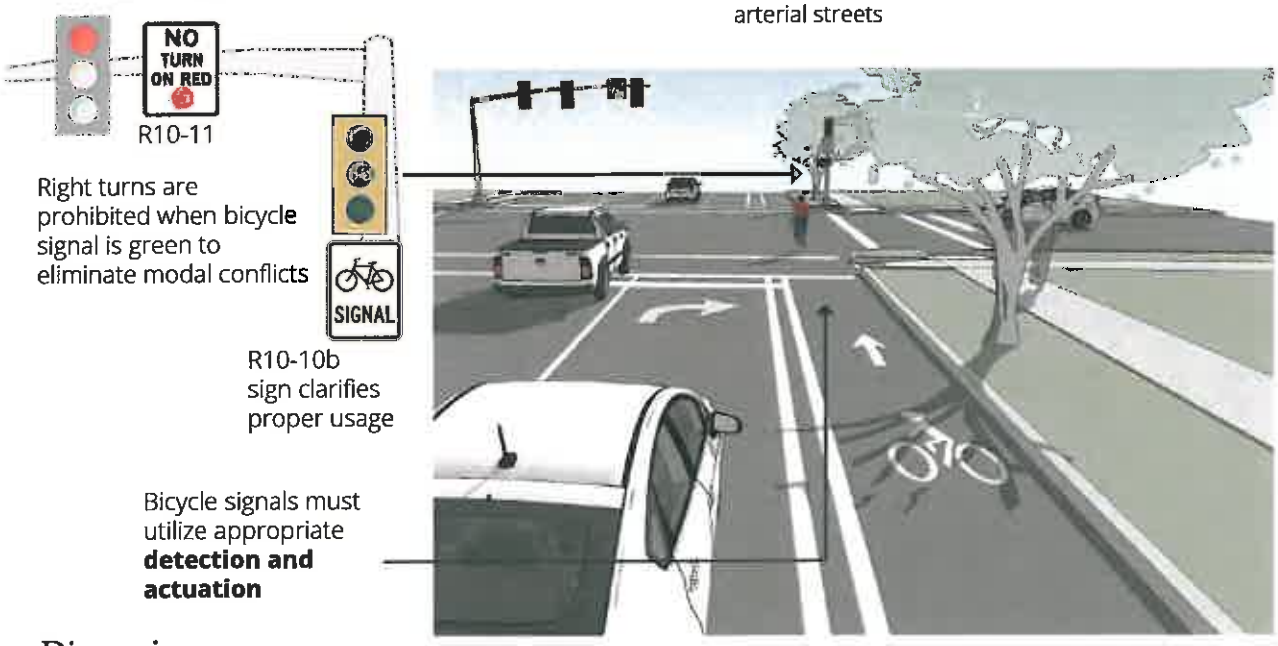
A bicycle signal is an electrically powered traffic control device that should only be used in combination with an existing traffic signal. Bicycle signals are typically used to improve identified safety or operational problems involving bicycle facilities. Bicycle signal heads may be installed at signalized intersections to indicate bicycle signal phases and other bicycle-specific timing strategies. Bicycle signals can be actuated with bicycle sensitive loop detectors, video detection, or push buttons.

Bicycle signals are typically used to provide guidance for bicyclists at intersections where they may have different needs from other road users (e.g., bicycle-only movements).

Guidance

Specific locations where bicycle signals have had a demonstrated positive effect include:

- Those with high volume of bicyclists at peak hours
- Those with high numbers of bicycle/motor vehicle crashes, especially those caused by turning vehicle movements
- At T-intersections with major bicycle movement along the top of the "T"
- At the confluence of an off-street bike path and a roadway intersection
- Where separated bike paths run parallel to arterial streets



Discussion

Local municipal code should be checked or modified to clarify that at intersections with bicycle signals, bicyclists should only obey the bicycle signal heads. For improved visibility, smaller (4 inch lens) near-sided bicycle signals should be considered to supplement far-side signals.

Additional References and Guidelines

FHWA. *MUTCD - Interim Approval for Optional Use of a Bicycle Signal Face (IA-16)*. 2013.
NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

Bicycle signal heads require the same maintenance as standard traffic signal heads, such as replacing bulbs and responding to power outages.

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A bike lane crossing of a high speed, motor vehicle priority off-ramp near Hwy 97 in Oregon

7: Bicyclists and Pedestrians at Interchanges

Introduction

Interchanges are grade-separated crossings where one roadway, typically a higher-order facility such as a limited-access freeway, is connected to another highway or surface street by high-speed ramps. In communities bisected by freeways, interchanges often provide the sole access point for several miles, but the presence of ramps often do not allow for safe or comfortable connections for bicycles or pedestrians.

The safest interchange configurations are those where motorists must slow down or stop before entering or exiting the highway, such as where the ramp intersects the cross-street at a 90 degree angle and is either signal or stop-controlled at the intersection, This design provides maximum priority for bicycle riders and pedestrians crossing the ramps and reduces impact severity in case of a collision because of slower vehicle speeds.

Interchanges that have free-flow slip ramps encourage turning movements at high speeds and can cause conflicts with pedestrians and bicyclists wishing to cross. This configuration creates major access barriers and can deter all but the most confident bicyclists. The most vulnerable road users, such as the elderly, children or people with disabilities, will particularly have difficulty with navigating through these facilities.

In these situations, crossings should be clearly marked and signed, and designed as perpendicular as possible to the ramp to increase visibility and safety for pedestrians and bicycles.

Channelized Turn Lanes

Description

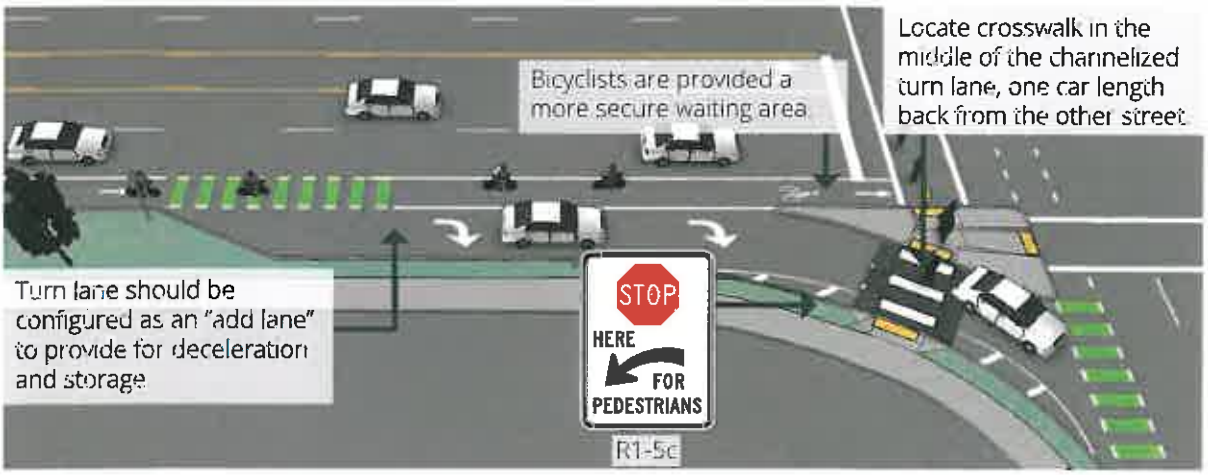
In some intersections of arterials streets, design vehicle requirements or intersection angles may result in wide turning radii at corners. Configuring the intersection as a channelized (or free-right) turn lane with a raised refuge island can improve conditions for pedestrians trying to cross the street.

Similar to a median refuge island, the raised refuge island can reduce crossing distances, allow staged crossing of the roadway, and improve visibility of pedestrians crossing the roadway.

To improve safety and comfort for pedestrians, measures to slow traffic at the pedestrian crossing are recommended such as provision of a raised crosswalk, signalized pedestrian walk phase, high visibility crosswalk, and/or pedestrian crossing signage.

Guidelines

- The preferred angle of intersection between the channelized turn lane and the roadway being joined is no more than 15 degrees to allow for simultaneous visibility of pedestrians and potential roadway gaps.
- Design with a maximum 30-35 foot turning radius.
- Signing: Pedestrian crossing sign assembly (W11-2) or Yield (R1-2) to encourage yielding. Yield to Bikes (R4-4) or similar if bike lanes are present.
- Raised crossings in the channelized turn lane may slow driver speed through the turning area.



Discussion

This design requires trucks to turn into multiple receiving lanes, and may not be appropriate on the approach to streets with one through lane. Channelized turn lanes can be very challenging for blind pedestrians. NCHRP 674 identified the use of sound strips (a full lane rumble strip-like device) in conjunction with flashing beacons to increase yielding compliance.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
TRB. *NCHRP 674 Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities.* 2011.
ITE. *Designing Walkable Urban Thoroughfares.* 2010.

Materials and Maintenance

Signage and striping require routine maintenance.

Bike Lanes at Entrance Ramps

Description

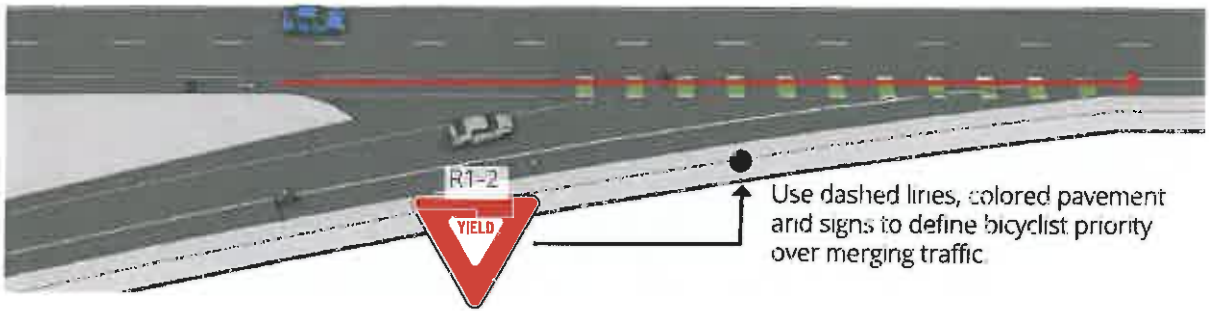
Arterials may contain high speed freeway-style designs such as merge lanes which can create difficulties for bicyclists. The entrance lanes typically have intrinsic visibility problems because of low approach angles and feature high speed differentials between bicyclists and motor vehicles.

Guidance

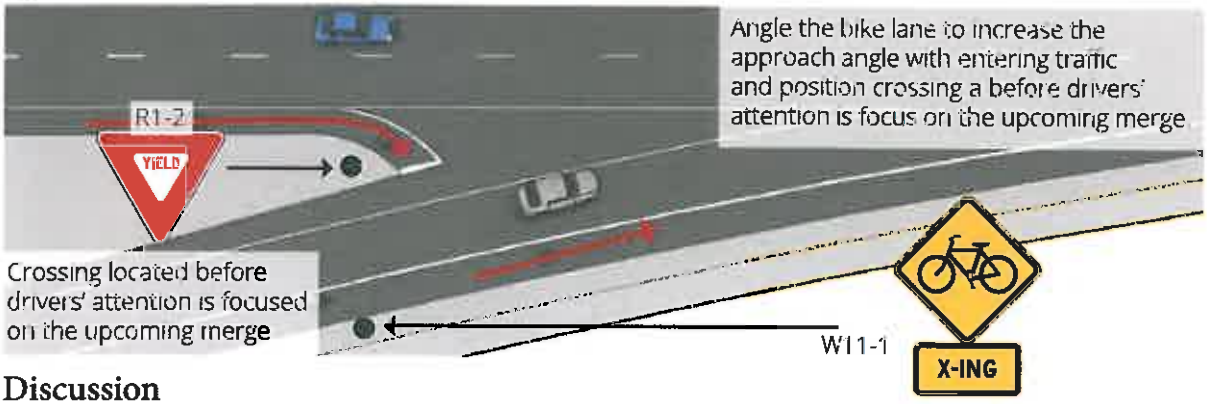
These treatments are typically found on streets with high speed freeway style merge lanes and where users are likely to be skilled adult riders.

Design strategies differ for low-speed and high-speed configurations. The bike lane should be angled to increase the approach angle with entering traffic, and the crossing positioned before drivers' attention is focused on the upcoming merge.

Low Speed Entrance Ramp (Bicycle Priority)



High Speed Entrance Ramp (Motor Vehicle Priority)



Discussion

On low-speed entrance ramps (≤ 40 mph) the bike lane should travel straight through the merge area. At high-speed entrance ramps (≥ 35 mph), with dedicated receiving lanes, bicyclists should be encouraged to yield to merging traffic and cross when safe. Even with signage and striping improvements, free-flow ramps present significant challenges for pedestrians and bicyclists; reconfiguring the intersection is the preferred treatment. While the jug-handle approach is the preferred configuration at entrance ramps, provide the option for through bicyclists to perform a vehicular merge and proceed straight through under safe conditions.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
Caltrans. *Complete Intersections. Chapter 9: Interchanges.* 2010.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
FHWA. *Bicycle and Pedestrian Transportation. Lesson 15: Bicycle Lanes.* 2006.

Materials and Maintenance

Locate crossing markings out of wheel tread when possible to minimize wear and maintenance costs.

Bike Lanes at Exit Ramps

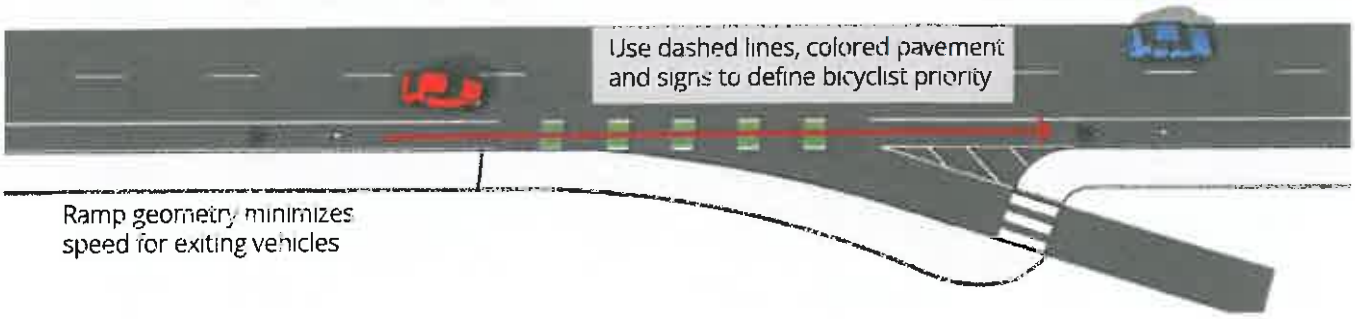
Description

Arterials with freeway-style exit ramps can create difficulties for bicyclists. Exit lanes typically have intrinsic visibility problems because of low approach angles and feature high speed differentials between bicyclists and motor vehicles.

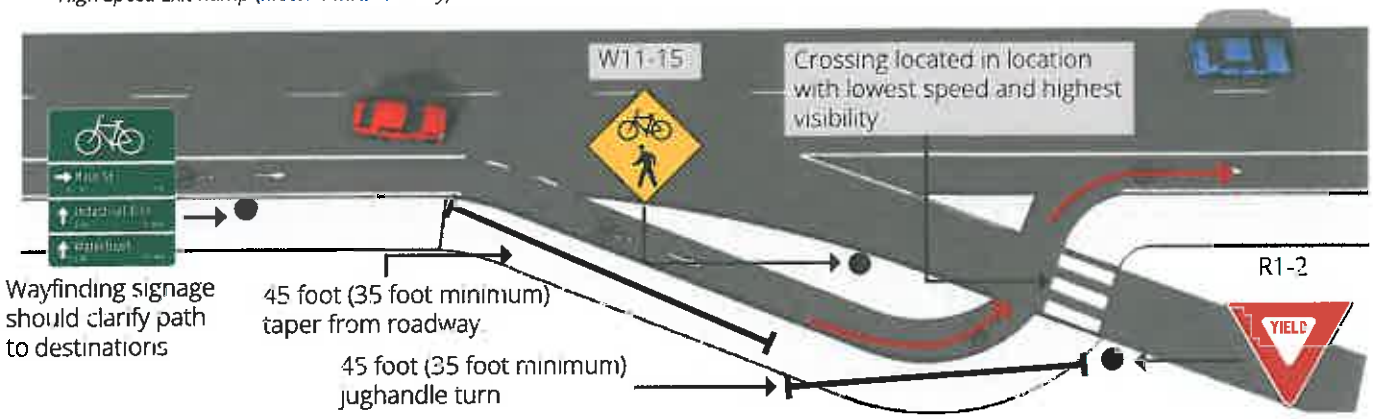
Guidance

These treatments are typically found on streets with bicycle lanes where there are freeway-style exit ramps and where users are likely to be skilled adult riders. A jug handle turn should be used to bring bicyclists to increase the approach angle with exiting traffic, and add yield striping and signage to the bicycle approach.

Low Speed Exit Ramp (Bicycle Priority)



High Speed Exit Ramp (Motor Vehicle Priority)



Discussion

On low-speed exit ramps (≤ 40 mph), the bike lane should travel straight through the merge area. On high-speed exit ramps (≥ 45 mph), use a jug handle turn to bring bicyclists to a visible location with exiting traffic. Grade separated crossings are preferred over at-grade crossings to offer low-stress crossings of high-speed interchange ramps. Grade separation designs utilizing a bicycle path could be used if the approach ramp elevations are appropriate, and if bicycle volumes are fairly high and motor traffic volumes are high. Standard bicycle path geometric guidelines would be applied to the approaches to a grade separated crossing for a bikeway.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
Caltrans. *Complete Intersections. Chapter 9: Interchanges.* 2010.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
FHWA. *Bicycle and Pedestrian Transportation. Lesson 15: Bicycle Lanes.* 2006.

Materials and Maintenance

Locate crossing markings out of wheel tread when possible to minimize wear and maintenance costs.

Curb extensions (or a choker or neckdown) at 100 West & Center St in Kaysville (Photo: Shaunna Burbidge)

8: Traffic Calming

Introduction

Motor vehicle speeds affect the frequency at which automobiles pass bicyclists as well as the severity of collisions that can occur. Maintaining motor vehicle speeds closer to those of pedestrians and bicyclists greatly improves comfort for pedestrians, bicyclists, and other vulnerable road users on a street. Slower vehicular speeds also improve motorists' ability to see and react to pedestrians and bicyclists and minimize conflicts at driveways and other turning locations.

Traffic calming can be applied on streets where a reduction of vehicle speeds and/or volumes is desired. Traffic calming measures may reduce the design speed of a street and can be used in conjunction with reduced speed limits to reinforce the expectation of lowered speeds. In short, traffic calming is a physical means of reducing speeds, whereas a speed limit sign is only a regulatory means of doing so.

All traffic calming operates on the principle of deflecting the direction of motor vehicles and interfering with the ability to travel a straight, level path. Vertical deflection such as speed humps, maintains a vehicles straight path, but requires a sudden, brief elevation change. Horizontal shifts, such as chicanes, require vehicles to travel a tightly meandering path and can narrow the visual field to reduce travel speeds.

Vertical Traffic Calming

Description

High motor vehicle speeds affect pedestrians and bicyclists by decreasing comfort for vulnerable users, decreasing motorists' reaction times, and increasing the severity of crashes that can occur. Reducing the speed differential between modes greatly improves safety and comfort for all users. Vertical speed control measures are slight rises in the pavement, on which motorists (and occasionally bicyclists) must reduce speed to cross.

Speed Hump

Offset Speed Hump

Temporary Speed Cushion

Raised Crosswalk

Guidelines

- Bicycle boulevards should have a maximum posted speed of 25 mph and traffic calming can be used to maintain an 85th percentile speed below 22 mph.
- Speed humps are 14' long raised areas usually placed in a series across both travel lanes, though they can also be offset to accommodate emergency vehicles. Gaps can be provided in the center or by the curb for bicyclists, depending on where bicyclists are operating on a particular facility. Speed tables are longer than speed humps and flat-topped. Raised crosswalks are speed tables that are marked and signed for a pedestrian crossing.
- Speed cushions have gaps to accommodate the wheel tracks of emergency vehicles.
- Slopes of vertical traffic calming should not exceed 1:10 or be less steep than 1:25. In order to reduce the risk of bicyclists losing their balance, tapers should be no greater than 1:6. The vertical lip should be no more than a 1/4" high.

Discussion

Emergency vehicle response times should be considered where vertical deflection is used. Because emergency vehicles have a wider wheel base than passenger cars, speed lumps/cushions allow them to pass unimpeded while slowing most other traffic. Alternatively, speed tables are recommended because they cannot be straddled by a truck, decreasing the risk of bottoming out. Traffic calming can also be used to deter motorists from driving on a street prioritized for other modes, however, monitoring vehicle volumes on adjacent streets will help to determine whether traffic calming results in inappropriate volumes elsewhere. Traffic calming can be implemented on a trial basis.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
Alta Planning + Design and IBPI. *Bicycle Boulevard Planning and Design Handbook.* 2009.
BikeSafe. *Bicycle countermeasure selection system.*
Ewing, Reid. *Traffic Calming: State of the Practice.* 1999.
Ewing, Reid and Brown, Steven. *U.S. Traffic Calming Manual.* 2009.
NACTO. *Urban Street Design Guide.* 2013.

Materials and Maintenance

Traffic calming should be designed to minimize impacts to snowplows. Vegetation should be regularly trimmed to maintain visibility and attractiveness.

Horizontal Traffic Calming

Description

Horizontal traffic calming devices cause drivers to slow down by constricting the roadway space or by requiring careful maneuvering.

Such measures may reduce the design speed of a street, and can be used in conjunction with reduced speed limits to reinforce the expectation of lowered speeds.

Temporary Curb Extension

Pinchpoint, Choker, or Neckdown

Chicane

Pinchpoint with Bicycle Access

Guidelines

- Maintain a minimum clear width of 20 feet (or 28 feet with parking on both sides), with a constricted length of at least 20 feet in the direction of travel.
- Pinchponts are curb extensions placed on both sides of the street, narrowing the travel lane and encouraging all road users to slow down. When placed at intersections, pinchpoints (or curb extensions) are known as chokers or neckdowns. They reduce curb radii, further lower motor vehicle speeds, and shorten pedestrian crossing distances.
- Chicanes are a series of raised or delineated curb extensions, edge islands, or parking bays on alternating sides of a street forming an "S"-shaped curb, which reduce vehicle speeds by requiring motorists to shift laterally through narrowed travel lanes.
- Pinchpoints allow for traffic to exit one-way from a local street while restricting entrance to the street from one of its entrances. This treatment diverts traffic, reduces volumes on local streets, improves the quiet feel of local streets, while still allowing two-way bicycle and pedestrian traffic.

Discussion

Horizontal speed control measures should not infringe on bicycle or pedestrian space. Where possible, provide a bicycle route outside of the element so bicyclists can avoid having to merge into traffic at a narrow pinch point. This technique can also improve drainage flow and reduce construction and maintenance costs. Traffic calming can also deter motorists from driving on a street. Monitor vehicle volumes on adjacent streets to determine whether traffic calming results in inappropriate volumes elsewhere. Traffic calming can be implemented on a trial basis.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
Alta Planning + Design and IBPI. *Bicycle Boulevard Planning and Design Handbook.* 2009.
BikeSafe. *Bicycle countermeasure selection system.*
Ewing, Reid. *Traffic Calming: State of the Practice.* 1999.
Ewing, Reid and Brown, Steven. *U.S. Traffic Calming Manual.* 2009.
NACTO. *Urban Street Design Guide.* 2013.

Materials and Maintenance

Traffic calming should be designed to minimize impacts to snowplows. Vegetation should be regularly trimmed to maintain visibility and attractiveness.

Traffic Diversion

Description

Motor vehicle traffic volumes affect the operation of a bicycle boulevard or a quiet, local street. Higher vehicle volumes reduce bicyclists' and pedestrians' comfort and can result in more conflicts. Implement volume control treatments, if necessary, based on the context of the bicycle boulevard, using engineering judgment. Target motor vehicle volumes range from 1,000 to 3,000 vehicles per day, either occurring naturally or accomplished with diversion or calming, above which the road should be striped as a bike lane or considered a signed and/or marked shared roadway.


Partial Closure

Diagonal Diverter


Median Diverter


Full Closure

Guidelines

- Traffic diversion treatments reduce motor vehicle volumes by completely or partially restricting through traffic on a bicycle boulevard or other local street that requires calming.
- Partial closures allow full bicycle passage while restricting vehicle access to one way traffic at that point. Pedestrian access usually remains the same and does not require modification.
- Diagonal diverters require all motor vehicle traffic to turn.
- Median diverters restrict through motor vehicle movements while providing a refuge for bicyclists and pedestrians to cross, in two stages, if necessary.
- Street closures create a "T" that encourages motor vehicles to divert onto another and restricts them from continuing on a bicycle boulevard, while bicycle travel can continue unimpeded. Full closures can accommodate emergency vehicles with the use of mountable curbs (maximum of six inches high).

Discussion

Bicycle boulevards on streets with volumes higher than 3,000 vehicles per day are not recommended, although a segment of a bicycle boulevard may accommodate more traffic for a short distance if necessary to complete the corridor. Providing additional separation with a bike lane, separated bike lane, or other treatment is recommended where traffic calming or diversion cannot reduce volumes below this threshold.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
Alta Planning + Design and IBPI. *Bicycle Boulevard Planning and Design Handbook.* 2009.
BikeSafe. *Bicycle countermeasure selection system.*
Ewing, Reid. *Traffic Calming: State of the Practice.* 1999.
Ewing, Reid and Brown, Steven. *U.S. Traffic Calming Manual.* 2009.
NACTO. *Urban Street Design Guide.* 2013.

Materials and Maintenance

Depending on the diverter type, these treatments can be challenging to keep clear of snow and debris. Vegetation should be regularly trimmed to maintain visibility and attractiveness.

Appendix B: Project Information

FARMINGTON ACTIVE TRANSPORTATION PLAN

MARCH 2016

FARMINGTON

alta PLANNING + DESIGN

ENSIGN

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Introduction

The cost estimates in this appendix approximate the cost for each project recommended in the plan (spot and linear improvements). The estimates are derived from industry standards and labor and material costs from similar projects in Utah and other communities nationally. They do not include costs related to inflation, permitting, environmental impacts, contingency, engineering, design, bidding services, mobilization, traffic control, or land acquisition. Because these preliminary estimates are based on a planning-level understanding of trail components, rather than on a detailed design, they should be considered as "Order of Magnitude". American Society for Testing and Materials (ASTM) Standard E2620 defines Order of Magnitude as being accurate to within plus 50% or minus 30%. This broad range of potential costs is appropriate given the level of uncertainty in the design at this point in the process.

The estimates assume that the City will use paint when installing bike lanes, buffered bike lanes, and some pavement markings (with the exception of school crosswalks, which are specified as high-visibility, piano key-style, thermoplastic crosswalks). Paint has a considerably cheaper capital cost, but has to be maintained more often and may be more expensive when considering maintenance costs. Thermoplastic, another pavement marking material made from pre-formed or molten plastic that is melted into place with a torch, is approximately 5-6 times more expensive for initial installation, but lasts longer than paint and does not require frequent maintenance. Other project notes and disclaimers are included in each table.

The tables in this appendix are, in the following order:

Spot Improvements

Off-Street Recommendations

On-Street Recommendations

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Spot Improvements

Proj ID	Address	City	Improvement Type	Partner Agencies	Regional Priority	Cost Est	Project Information
1	1875 W & Burke Lane to Foxhunter Neighborhood	Farmington	**Crosswalk**		No	$1,500	Improve proposed path crossing with crosswalks and signs.
2	2025 W & West Davis Corridor School Access	Farmington	**Crosswalk**		No	$1,500	Improve proposed path crossing with crosswalks and signs.
3	Bonanza Rd & Existing Path	Farmington	**Crosswalk**		No	$1,500	Improve path crossing with crosswalks and signs and ensure that design considers sight lines given the blind curve.
4	Browning Ln & Burke Lane to Foxhunter Neighborhood	Farmington	**Crosswalk**		No	$1,500	Improve proposed path crossing with crosswalks and signs.
5	Ranch Rd & West Davis Corridor School Access	Farmington	**Crosswalk**		No	$1,500	Improve proposed path crossing with crosswalks and signs.
6	Rose Cv & Existing Exterior Path	Farmington	**Crosswalk**		No	$1,500	Improve proposed path crossing with crosswalks and signs.
7	Stampede Dr & Rifleman/Hollybrook Adjacent Path South	Farmington	**Crosswalk**		No	$1,500	Improve proposed path crossing with crosswalks and signs.
8	**200 W & Steed Creek**	Farmington	Grade-Separated Crossing	UDOT	Yes	$2,000,000	An important connection between Frontage Rd Trail and bike lanes, and the on- and off-street facilities on 200 W, as well as schools, parks, and homes. Especially important considering speeds of traffic exiting and entering I-15.
9	D&RGW Rail Trail & Creek Path	Farmington	Grade-Separated Crossing		No	$300,000	Existing grade differences may make an undercrossing of the D&RGW Rail Trail the easiest option in terms of constructability and ease of use for users.
10	**I-15 & Legacy Flyover**	Farmington	Grade-Separated Crossing	UDOT	No	$4,000,000	Alternative or additional crossing where most of the highways are elevated and going under may be easier than over. Improve connections between east and west.
11	**I-15 & Park Ln**	Farmington	Grade-Separated Crossing	UDOT	Yes	$3,925,000	Existing bridge widening or separate bicycle/pedestrian structure across freeway/highway/rail span.
12	**I-15 & Shepard Ln**	Farmington	Grade-Separated Crossing	UDOT	Yes	$6,700,000	One of the most requested improvements in the whole plan. Requires a retrofit of existing structure to add path or a new bike/ped-specific bridge over I-15. UDOT may be planning a new interchange at Shepard Ln. In that case, ensure low stress facilities.
13	**Hwy 89 & Park Ln**	Farmington	Grade-Separated Crossing	UDOT	No	$3,925,000	Existing bridge widening or separate bicycle/pedestrian structure across freeway/highway/rail span.
14	200 W & Farmington Jr High	Farmington	Hybrid Beacon	UDOT, Davis School District	Yes	$110,000	Location of several bike and ped related crashes, this location should be upgraded to a hybrid beacon (non-intersection) with curb extensions and median refuge island.
15	D&RGW Rail Trail & Clark Ln	Farmington	Hybrid Beacon		Yes	$100,000	Improve unsignalized, unmarked crossing.
16	**Main St & 1075 W**	Farmington	Hybrid Beacon	UDOT	Yes	$100,000	Provides a pedestrian and bicyclist crossing away from the interchange, adding connectivity and utility to proposed facilities on either side of Main St and access to Cherry Hill.
17	Shepard Ln & Frontage Rd	Farmington	Hybrid Beacon		Yes	$80,000	Should be a hybrid beacon for now, but a new interchange may completely alter this recommendation.
18	Shepard Ln & Knowlton Elementary	Farmington	Hybrid Beacon	UDOT, Davis School District	Yes	$110,000	An existing school crosswalk with crossing guard. Hybrid beacon, median refuge island, and any traffic calming that does not disrupt the bike lanes.
19	**State St & 400 W**	Farmington	Hybrid Beacon		Yes	$80,000	Significant enough of an intersection that hybrid beacon will probably be required for sight lines and proper yielding.
20	**1100 W & Clark Ln**	Farmington	**Roundabout Improvement**		Yes	$58,000	Improve roundabout to comply with design guidelines and to accommodate pedestrians crossing at all four legs and bicyclists at at least two.
21	**1475 S & 1800 N**	Farmington	**Intersection Improvement**		No	$800	Blind curve, improve for all users. Possible stop sign or other controlling treatment. If improved significantly, may reduce or eliminate need for school crosswalk one block east at Stayner Dr.
22	Main St & US-89 NB Offramp	Farmington	**Intersection Improvement**	UDOT	Yes	$34,000	Improve slip lane design/configuration and access to sidewalks to give pedestrians priority when present.
23	Main St & US-89 SB Offramp	Farmington	**Intersection Improvement**	UDOT	Yes	$34,000	Improve slip lane design/configuration and access to sidewalks to give pedestrians priority when present.

Spot Improvements

Proj ID	Address	City	Improvement Type	Partner Agencies	Regional Priority	Cost Est	Project Information
24	Park Ln & Lagoon Dr	Farmington	Intersection Improvement	UDOT	Yes	$15,000	Add crosswalks and curb extensions on the west leg of intersection.
25	Shepard Ln & US-89	Farmington	Intersection Improvement	UDOT	Yes	$43,000	Improving the sidewalks, crossings, and intersection geometries here will improve access for students attending Knowlton living west of 89. Consider traffic calming, reducing turn radii, and improving crosswalks at slip lanes per the design guidelines.
26	1525 W & ~475 S	Farmington	RRFB		No	$24,000	To provide access across 1525 W for existing and proposed paths.
27	1525 W & Creek Path	Farmington	RRFB		No	$24,000	This crossing will facilitate the proposed creek path crossing at grade. Will enhance new, proposed safe routes to school.
28	200 S & ~ 50 W	Farmington	RRFB	Davis School District	No	$38,000	Improves existing crosswalk with guard to a beacon-controlled crossing. Guard still recommended.
29	Clark Ln & Central Ave	Farmington	RRFB		Yes	$24,000	Improve access for pedestrians across Clark Ln on south side of Station Park by adding beacon-controlled crossing with median refuge island.
30	Clark Ln & Country Bend Rd	Farmington	RRFB	Davis School District	No	$24,000	Improves existing crosswalk with guard to a beacon-controlled crossing. Guard still recommended.
31	Clark Ln & Station Pkwy	Farmington	RRFB		Yes	$24,000	Improve access for pedestrians across Clark Ln on south side of Station Park by adding beacon-controlled crossing with median refuge island.
32	Clark Ln & Union Ave	Farmington	RRFB		Yes	$24,000	Improve access for pedestrians across Clark Ln on south side of Station Park by adding beacon-controlled crossing with median refuge island.
33	Countryside Rd & Eagle Bay Elementary SW Entrance	Farmington	RRFB	Davis School District	No	$37,000	Improve crossing of existing and proposed path leading to and from Eagle Bay Elementary. Will have a traffic calming effect as cars enter school zone. Combine with curb extensions.
34	Frontage Rd & 620 S	Farmington	RRFB		Yes	$24,000	Will allow a connection between neighborhoods to the east and Frontage Rd Trail on the west side of the road. There are not currently any entrances/exits for the trail except at beginning and end.
35	Frontage Rd & Between 620 S and Rawl Dr	Farmington	RRFB		Yes	$24,000	Will allow a connection between neighborhoods to the east and Frontage Rd Trail on the west side of the road. There are not currently any entrances/exits for the trail except at beginning and end.
36	Frontage Rd & Lund Ln	Farmington	RRFB		Yes	$38,000	Provides a crossing of Frontage Rd for pedestrians and bicyclists. If proposed path is built on west side of Frontage Rd, it will also offer a place to cross and access neighborhoods to the east and vice-versa.
37	Frontage Rd & Silverwood Dr	Farmington	RRFB		Yes	$38,000	Will improve access to and from Rotary Trail and Hess Farms neighborhood.
38	Frontage Rd & South Farmington Park	Farmington	RRFB		Yes	$38,000	Provides a crossing of Frontage Rd for pedestrians and bicyclists. If proposed path is built on west side of Frontage Rd, it will also offer a place to cross and access neighborhoods and park to the east and vice-versa.
39	Lagoon Dr & 400 W	Farmington	RRFB		Yes	$24,000	RRFB will enhance the crossing and the connection between an existing and a proposed path, linking Lagoon to points east, south, and west.
40	Lagoon Dr & Lagoon West Drop Off	Farmington	RRFB		Yes	$38,000	Connect proposed Lagoon Dr path to the Lagoon drop off/pick up area, assuming the path is on the west side of the road. Will also provide connectivity to transit.
41	Main St & 100 S	Farmington	RRFB	UDOT	Yes	$24,000	Location tentative pending UDOT study. Improves access to two schools.
42	Main St & 1470 S	Farmington	RRFB	UDOT	Yes	$24,000	Location tentative pending UDOT study. Four serious pedestrian crashes in vicinity in the last ten years.
43	Main St & 200 S	Farmington	RRFB	UDOT, Davis School District	Yes	$24,000	Location tentative pending UDOT study. Improves access to two schools.
44	Main St & 2025 N	Centerville	RRFB	UDOT	Yes		Location tentative pending UDOT study. Improves existing crossing with crossing guard.
45	Main St & 300 N	Farmington	RRFB	UDOT	Yes	$24,000	Location tentative pending UDOT study. Provides access to Lagoon Trail and bus stops.
46	Main St & ~950 North	Farmington	RRFB	UDOT	Yes	$24,000	Location tentative pending UDOT study.
47	Main St & Glovers Ln	Farmington	RRFB	UDOT	Yes	$24,000	Location tentative pending UDOT study.

Spot Improvements

Proj ID	Address	City	Improvement Type	Partner Agencies	Regional Priority	Cost Est.	Project Information
48	Main St & Lund Ln	Farmington	RRFB	UDOT	Yes	$24,000	Location tentative pending UDOT study. Four serious pedestrian crashes in vicinity in the last ten years.
49	Main St & Woodland Dr	Farmington	RRFB	UDOT	Yes	$24,000	Location tentative pending UDOT study.
50	Main St & Farmington Dr	Farmington	RRFB	UDOT	Yes	$24,000	Location tentative pending UDOT study.
51	Shepard Ln & 1290 W	Farmington	RRFB		Yes	$24,000	Will not only improve pedestrian crossings west of 1075 W, but it will also provide safer and more predictable crossings for golf carts at Oakridge.
52	State St Overpass	Farmington	RRFB		Yes	$34,000	To cross people on north side sidewalk over to ped bridge and vice versa.
53	Station Pkwy & Creek Path	Farmington	RRFB		No	$24,000	This crossing will facilitate the proposed creek path crossing and connection into the Legacy Pkwy Trail. Special consideration should be given to the design as it is on a near 90 degree curve.
54	Tippetts Ln & 250 S	Farmington	RRFB		No	$24,000	To provide access across Tippetts for trailhead and park.
55	1100 W & Fairgrounds	Farmington	Secure Bike Parking		No	$2,000	Secure bike parking for Fairgrounds patrons and other users.
56	City Hall	Farmington	Secure Bike Parking		No	$2,000	Secure bike parking for city hall visitors and employees. May be able to double as employee bike parking for library.
57	Lagoon Amusement Park	Farmington	Secure Bike Parking		No	$5,000	Secure bike parking for Lagoon patrons and employees located as near to the gate as possible in order to allow safe and easy access to the park and storage of bikes.
58	Main St & State St	Farmington	Secure Bike Parking		Yes	$5,000	Secure bike parking for downtown visitors and business patrons.
59	Shepard Ln Smith's Grocery Store	Farmington	Secure Bike Parking		No	$2,000	Secure bike parking for grocery store customers.
60	Station Park Fountain	Farmington	Secure Bike Parking		No	$2,000	Secure bike parking for Station Park patrons shopping or visiting on the west side of the development.
61	Station Pkwy & Ulta/Home Goods	Farmington	Secure Bike Parking		No	$2,000	Secure bike parking for Station Park patrons shopping on the east side of development.
62	200 W & 200 S	Farmington	Traffic Calming	UDOT, Davis School District	Yes	$30,000	Traffic calming will slow traffic, especially those exiting I-15, significantly before entering the area near both schools. Will also act as calming on 200 S so that bicycle boulevard can function properly.
63	Glovers Ln & Frontage Rd	Farmington	Traffic Calming		Yes	$43,000	An oft-mentioned intersection that needs improvement in order to make pedestrian crossings and the Frontage Rd Trail crossing safer and easier. Tighten turn radii, add curb extensions, and add crosswalks to west and south legs.
64	State St & 200 W	Farmington	Traffic Calming	UDOT	Yes	$43,000	Traffic calming where turning traffic is high and kids walk and bike to school.
65	State St & Main St	Farmington	Traffic Calming	UDOT	Yes	$38,000	Traffic calming where turning traffic is high and kids walk and bike to school.
					Farmington Only	$1,241,300	
					Farmington & UDOT	$21,323,000	
					Total	**$22,564,300**	

Note: All costs include labor and materials to install. Costs do not include design, engineering, or bidding services. They also do not include a contingency, or mobilization or traffic control as these costs will vary depending on how the projects are constructed and how they are bid. Cost estimate cells with no dollar amount are for projects outside of city limits or projects where costs will very likely be covered with a corresponding project on another sheet, by an outside agency (UDOT, developer, etc.), or where project is very long term. Costs that seem lower than usual are additions to already funded or soon-to-be-funded City projects.

Project IDs are for Farmington projects as well as projects in Centerville, unincorporated Davis County, and Fruit Heights that would be best for Farmington, rather than Kaysville, to coordinate.

Off-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Road Widening	Project Information
66A	~475 South	Farmington	Paved Path	1525 W	Western Terminus of 475 S		No	833	0.16	$80,000		Will require coordination with land owner to connect proposed bike lanes to existing path to the west.
67A	1100 West	Farmington	Paved Path	Clark Ln	D&RGW Rail Trail		No	1,515	0.29			Area currently lacking sidewalks. Providing the comfort of a path on one side of the road will connect the Park Ln path through the roundabout to the D&RGW Rail Trail and give residents to the south greater walking and bicycling access to Station Park.
67B	1100 West	Farmington	Sidewalk	Clark Ln	Glovers Ln		No	6,091	1.15		Yes	When road is widened and development occurs.
67C	1100 West	Farmington	Sidewalk	D&RGW Rail Trail	Glovers Ln		No	4,559	0.86		Yes	When road is widened and development occurs.
68A	1525 West	Farmington	Paved Path	D&RGW Rail Trail	Spring Meadow Ln		No	404	0.08			Sidepath likely on the west side of the road that will complete short, narrow section of road, connecting bike lanes to the south, bicycle boulevard to the west, and the D&RGW Rail Trail on the north.
68B	1525 West	Farmington	Sidewalk	Citation Dr	City Limit		No	3,189	0.60			When development occurs or when road is widened.
68C	1525 West	Farmington	Sidewalk	Citation Dr	City Limit		No	3,775	0.71			When development occurs or when road is widened.
68D	1525 West	Davis County	Sidewalk	City Limit	Glovers Ln	Davis County	No	1,179	0.22			When development occurs or when road is widened.
68E	1525 West	Davis County	Sidewalk	City Limit	Glovers Ln	Davis County	No	784	0.15			West side of 1525 W. Will be installed when road is widened following development.
69	1700 South to Skater Park Path	Farmington	Paved Path	Frontage Rd	1700 South		No	1,824	0.35	$87,000		Utilize a vacant, long parcel and part of private land to build connection from 1700 South to Skater Park.
503Y	200 East	Farmington	Sidewalk	Glovers Ln	Existing Sidewalk	UDOT	Yes	2,638	0.50	$126,600		Fill sidewalk gap on major north-south arterial and popular walking route to school.
503Z	200 East	Farmington	Sidewalk	Existing Sidewalk	Lund Lane	UDOT	Yes	1,828	0.35	$88,400		Fill sidewalk gap on major north-south arterial and popular walking route to school.
70A	200 West	Farmington	Paved Path	Frontage Rd	Steed Creek	UDOT	Yes	308	0.06	$15,000		Connects Frontage Rd path and on-street facilities with Steed Creek unpaved trail and crossing of 200 W, offset from intersection, thereby reducing conflicts.
70B	200 West	Farmington	Paved Path	Steed Creek	State St	UDOT	Yes	2,369	0.45	$113,000		Connects Farmington Jr, neighborhoods to the south, Frontage Rd path, and Lagoon/Farmington Creek Trail.
71	650 West	Farmington	Paved Path	Legacy Pkwy Trail Access Path	State St		No	579	0.11	$28,000		Short sidepath connecting State St overpass, proposed bike lanes, and southern Legacy Pkwy Trail access to northern access along 650 W.
72	Belmont Dr Access	Farmington	Paved Path	Belmont Dr	D&RGW Rail Trail		No	457	0.09	$44,000		Access to neighborhood from D&RGW Rail Trail through empty parcel.
73	Burke Lane to Foxhunter Neighborhood	Farmington	Paved Path	Existing East-West Path	Burke Ln		No	1,872	0.35	$178,000		Path through an existing open space between and behind houses that connects Burke Ln to inside of neighborhood and existing paths to the north and west.
74	Burke Lane/Old Red Barn	Farmington	Paved Path	D&RGW Rail Trail	Legacy Pkwy Trail		No	3,427	0.65	$163,000		Connection between rail trail and Legacy.
75A	Bus Park	Farmington	Paved Path	650 West	Bus Park		No	1,444	0.27	$138,000		Connects 650 West to Bus Park and eventually, through existing paths, to Legacy Pkwy Trail. Constructible in narrow, empty parcel just south of houses on Miller Way.
75B	Bus Park Access	Farmington	Paved Path	Miller Way	Bus Park Path		No	193	0.04	$19,000		Narrow parcel allows a cut through access path to the east-west Bus Park path and eventually, through existing paths, to Legacy Pkwy Trail.
76	Clark/Station Park Access	Farmington	Paved Path	Clark Ln	650 West		No	725	0.14	$35,000		Short connector and sidepath connecting Station Park to the Legacy Pkwy Trail access path.

Off-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Road Widening	Project Information
77A	Rifleman/Hollybrook Adjacent Path	Farmington	Paved Path	Existing Path	Silver Spur Way		No	3,693	0.70	$351,000		A path in a narrow, linear parcel behind (west of) homes on Hollybrook Way and Rifleman Dr. Features three accesses to the neighborhood and streets to the east.
77B	Rifleman/Hollybrook Adjacent Path South	Farmington	Paved Path	Rifleman/Hollybrook Adjacent Path	Stampede Dr		No	613	0.12	$59,000		Continuation of proposed path to the north between homes, connecting to existing path that leads to Farmington Ranches Park.
77C	Rifleman Drive Access	Farmington	Paved Path	Rifleman/Hollybrook Adjacent Path	Rifleman Dr		No	68	0.01	$7,000		Access to neighborhood from path behind homes.
77D	Dove Way Access	Farmington	Paved Path	Rifleman/Hollybrook Adjacent Path	Dove Way		No	42	0.01	$4,000		Access to neighborhood from path behind homes.
77E	Hollybrook Way Access	Farmington	Paved Path	Rifleman/Hollybrook Adjacent Path	Hollybrook Way		No	511	0.10	$49,000		Access to neighborhood from path behind homes.
77F	Prairie View Access	Farmington	Paved Path	Prairie View Dr	Rifleman/Hollybrook Adjacent Path		No	381	0.07	$37,000		Access to neighborhood from path behind homes.
78	Eagle Bay Elementary Internal Path	Farmington	Paved Path	Eagle Bay Elementary	Countryside Rd	Davis School District	No	634	0.12	$61,000		Coordination will be required in order to complete path onto school property and to the rear of Eagle Bay Elementary, in conjunction with providing a safer access to the existing fence gate in the southwest corner of property.
79	Farmington Crossing Access	Farmington	Paved Path	Willow Green Way	Existing Exterior Path		No	143	0.03	$14,000		Formally connecting roads and homes in the Farmington Crossing development to the existing exterior path on its perimeter.
80	Farmington Crossing Access	Farmington	Paved Path	Willow Green Way	Existing Exterior Path		No	77	0.01	$8,000		Formally connecting roads and homes in the Farmington Crossing development to the existing exterior path on its perimeter.
81	Farmington Crossing Access	Farmington	Paved Path	Spring Pond Dr	Existing Exterior Path		No	108	0.02	$11,000		Formally connecting roads and homes in the Farmington Crossing development to the existing exterior path on its perimeter.
82	Farmington Crossing Access	Farmington	Paved Path	Spring Pond Dr	Existing Exterior Path		No	110	0.02	$11,000		Formally connecting roads and homes in the Farmington Crossing development to the existing exterior path on its perimeter.
83	Farmington Crossing Access	Farmington	Paved Path	Spring Pond Dr	Existing Exterior Path		No	93	0.02	$9,000		Formally connecting roads and homes in the Farmington Crossing development to the existing exterior path on its perimeter.
84	Farmington Crossing Access	Farmington	Paved Path	Spring Pond Dr	Existing Exterior Path		No	112	0.02	$11,000		Formally connecting roads and homes in the Farmington Crossing development to the existing exterior path on its perimeter.
85	Farmington Crossing Access	Farmington	Paved Path	Existing Development Path	Park Ln	UDOT	No	798	0.15	$160,000		3-5% switchbacks for quicker access between Park Ln and housing.
86	Farmington Jr High and I-15	Farmington	Paved Path	State St	200 W	UDOT	No	3,023	0.57	$288,000		Requires coordination with UDOT.
87	Farmington Pond Parking Lot	Farmington	Paved Path	Parking Lot	Parking Lot		No	163	0.03	$8,000		Allows users to navigate parking lot safely, connecting to trailhead.
88A	Farmington Ranches Park Path	Farmington	Paved Path	Farmington Ranches Park	Spring Meadow Ln		No	1,461	0.28	$139,000		Path in the unimproved corridor, connecting neighborhoods via an interior, unused space. Provides an important link to a nearby elementary school, too.
88B	Farmington Ranches Park Path	Farmington	Paved Path	Farmington Ranches Park	Clark Ln		No	484	0.09	$46,000		Short connector between park and school crossing in order to provide a safe, off-street, low stress route for kids riding and walking to school.

Off-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Road Widening	Project Information
88C	Farmington Ranches Park Access	Farmington	Paved Path	Silver Spur Way	Farmington Ranches Park		No	194	0.04	$19,000		Access to Farmington Ranches Park path from neighborhood to the west through an empty parcel.
89	Farmington Ranches Creek	Farmington	Paved Path	Farmington Ranches Park	Station Pkwy		No	5,951	1.13	$566,000		Connects neighborhood, school, park with Legacy Pkwy Trail and possible with D&RGW Rail Trail.
90	Forbush Park	Farmington	Paved Path	Existing Forbush Park Path	Main St	Davis School District	No	1,025	0.19	$98,000		Likely to be built on park and School District property. Will provide a low-stress, off-street connection to two schools for students and others coming from the north and east.
91A	Foxhunter Neighborhood Internal	Farmington	Paved Path	Proposed East-West Path	Existing Internal Path		No	49	0.01	$5,000		Fills gap in existing path internal to neighborhood south of proposed, east-west path.
91B	Foxhunter Neighborhood Internal	Farmington	Paved Path	Existing Internal Path	Existing Internal Path		No	134	0.03	$13,000		Fills gap in existing path internal to neighborhood.
91C	Foxhunter Neighborhood Internal	Farmington	Paved Path	Existing Internal Path	Existing Internal Path		No	89	0.02	$9,000		Fills gap in existing path internal to neighborhood south of existing, east-west path.
92A	Frontage Road	Farmington	Paved Path	Glovers Ln	City Limit		Yes	4,742	0.90	$451,000		On one side of Frontage Rd in order to continue existing path to the north and give an off-street, low stress connection for people to the south to access downtown and recreation west of the freeway and rail corridor.
92B	Frontage Road	Centerville	Paved Path	City Limit	?		Yes	5,494	1.04			On one side of Frontage Rd in order to continue existing path to the north and give an off-street, low stress connection for people to the south to access downtown and recreation west of the freeway and rail corridor.
93	Frontage Road	Farmington	Sidewalk	1470 S	1600 S		Yes	1,002	0.19	$41,000		Only necessary is shared-use path is constructed on west, and not east, side.
94	Frontage Road	Farmington	Sidewalk	200 W	Glovers Ln		Yes	3,230	0.61	$130,000		Add sidewalk to improve connectivity on east side of Frontage Rd.
143G	Glovers Lane North	Davis County	Sidewalk	1525 W	City Limit	Davis County	No	1,286	0.24			Will be installed when road is widened following development.
143H	Glovers Lane South	Davis County	Sidewalk	1525 W	City Limit	Davis County	No	1,424	0.27			Will be installed when road is widened following development.
143I	Glovers Lane North	Farmington	Sidewalk	City Limit	325 W		Yes	5,858	1.11	$235,000		North side of Glovers. Will be installed when road is widened following development.
143J	Glovers Lane South	Farmington	Sidewalk	City Limit	325 W		Yes	6,067	1.15	$243,000		South side of Glovers. Will be installed when road is widened following development.
99	I-15 Adjacent Path	Farmington	Paved Path	Shepard Ln	930 N	UDOT	No	3,829	0.73	$364,000		Offers an off-street connection on the east side of I-15 to users of Frontage Road/Rotary Trail, Shepard Ln, and Farmington Crossing development.
100	Lagoon Drive	Farmington	Paved Path	Park Ln	400 W		Yes	4,335	0.82	$206,000		Path, in conjunction with other proposed paths, namely the one proposed on Park Ln, will improve access to and from Lagoon, which is currently accessible comfortably by bus and car.
101	Lagoon Lane	Farmington	Paved Path	Lagoon Trail	Main St		Yes	713	0.14	$34,000		Sidepath fills gap in Lagoon/Farmington Creek Trail along roadway.
102	Legacy Parkway Trail	Farmington	Paved Path	Shepard Ln	Red Barn	UDOT, UPRR	Yes	4,680	0.89	$450,000		Future extension of the Legacy Trail.
103	Legacy to Lagoon	Farmington	Paved Path	Legacy Pkwy Trail	Lagoon Dr Trail	UDOT	No	745	0.14			A long term recommendation that may be a redundant crossing, in addition to Park Ln and State St. Location of path and bridge spot improvement are tentative.
104	Legacy/Rail Trail Connector	Farmington	Paved Path	D&RGW Rail Trail	Legacy Pkwy Trail		No	2,191	0.41			Connection between Legacy and Rail Trail through potential development sites.

Off-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Road Widening	Project Information
105	Lund Lane/1700 South	Farmington	Sidewalk	Existing Sidewalk	Main St		No	1,577	0.30	$64,000		Fill sidewalk gap on city boundary.
503N	Main Street	Farmington	Sidewalk	Quail Run Rd	Park Ln	UDOT	Yes	3,546	0.67	$547,500		West side of Main St. Fill sidewalk gap when road is improved and curb, gutter, and bike lanes are also added.
503O	Main Street	Farmington	Sidewalk	Quail Run Rd	Park Ln	UDOT	Yes	3,443	0.65	$574,500		East side of Main St. Fill sidewalk gap when road is improved and curb, gutter, and bike lanes are also added.
106	Main Street	Farmington	Sidewalk	City Hall	200 S		No	402	0.08	$17,000		Complete missing piece of sidewalk in order to make route to schools, access to City Hall and library safer.
107	Park Lane	Farmington	Paved Path	D&RGW Rail Trail	Main St	UDOT	Yes	7,962	1.51			The single most requested improvement in both Farmington and Kaysville. Will be best accomplished through a separate bicycle and pedestrian crossing structure, or by widening existing structure in order to safely accommodate bicyclists and pedestrians.
108	Park Lane	Farmington	Sidewalk	Hotel Entrance	Main St	UDOT	Yes	348	0.07	$14,000		Fill small gap between hotel and Main St where older homes are.
500B	Shepard Lane	Farmington	Paved Path	City Limit	Frontage Rd	UDOT	Yes	1,770	0.34		Yes	One of the most requested improvements in the whole plan. Requires a retrofit of existing structure to add path or a new bike/ped-specific bridge over I-15. UDOT may be planning a new interchange at Shepard Ln. In that case, ensure low stress facilities.
109	Shoreline/200 East Access	Farmington	[illegible]	200 E	Bonneville Shoreline Trail		No	559	0.11	$7,000		Narrow parcel allows a cut through trail.
110A	Station Park North Entrance	Farmington	Paved Path	Park Ln	Station Park Roundabout		No	1,450	0.27	$69,000		Connects Park Ln, Station Pkwy, and Burke Ln to Station park and eventually to Legacy and the FrontRunner Station. There is not currently space on-street for bike lanes. Ensure that roundabout improvements follow design guidelines.
110B	Station Park FrontRunner Access	Farmington	Paved Path	Station Park Roundabout	Legacy Pkwy Trail	UTA	No	917	0.17	$44,000		Connects the Station Park roundabout with Farmington FrontRunner, ending with a little spur that will need to go through the existing fence to access the Legacy Pkwy Trail.
111	Station Parkway	Farmington	Paved Path	Burke Ln	Park Ln		No	2,492	0.47	$237,000		Connects Burke Ln path to crossing at Park Ln. Will connect D&RGW Rail Trail users and future residents of possible future development.
112	Steed Creek	Farmington	[illegible]	200 W	Woodland Park		No	1,386	0.26	$17,000		Unpaved connector between Woodland Park and 200 West. Will provide a completely off-street connection to Farmington Jr from the east and access to Woodland Park's facilities for those who live to the west and south.
113A	Tippetts Ln	Farmington	Paved Path	Clark Ln	Regional Park		No	612	0.12			Path on the west side will connect fairgrounds, Rec Center, and charter school.
113B	Tippetts Ln	Farmington	Paved Path	300 S	Glovers Ln		No	3,685	0.70			Path on the west side will connect fairgrounds, Rec Center, and charter school.
113C	Tippetts Ln	Farmington	Sidewalk	Clark Ln	Glovers Ln		No	5,511	1.04			Likely to occur when road is widened.
501B	West Davis Corridor	Farmington	Paved Path	City Limit	Proposed Glovers Ln Interchange	UDOT	Yes	22,300	4.22			Approximate alignment of Farmington's segment of the trail that will accompany the proposed West Davis Corridor highway. City will front cost for maintenance, while UDOT constructs it with their own capital.
114	West Davis Corridor Path Access	Farmington	Paved Path	West Davis Corridor	Rifleman/Hollybrook Adjacent Path	UDOT	No	932	0.18	$89,000		Access to neighborhood from West Davis Corridor through narrow, empty utility parcel.

Off-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Road Widening	Project Information
115	West Davis Corridor School Access	Farmington	Paved Path	West Davis Corridor	Eagle Bay Elementary	UDOT, Davis School District	No	2,807	0.53	$267,000		Will provide access to Eagle Bay Elementary from West Davis Corridor. Students are not only or primary users; path also provides access to and from homes west of elementary school and WDC, as well.
116	West Davis/Legacy Connector	Farmington	Paved Path	City Limit	Legacy Pkwy Trail		Yes	4,146	0.79			Connection between Legacy and West Davis Corridor through potential development sites.
							Farmington Only	102,577	19.43	$4,552,000		
							Farmington & UDOT	58,646	11.11	$2,647,000		
							Total	**161,223**	**30.53**	**$7,199,000**		

Note: All costs include labor and materials to install. Costs do not include design, engineering, or bidding services. They also do not include a contingency, or mobilization or traffic control as these costs will vary depending on how the projects are constructed and how they are bid. Cost estimate cells with no dollar amount are for projects outside of city limits or projects where costs will very likely be covered with a corresponding project on another sheet, by an outside agency (UDOT, developer, etc.), or where project is very long term. Costs that seem lower than usual are additions to already funded or soon-to-be-funded City projects.

Project IDs are for Farmington projects as well as projects in Centerville, unincorporated Davis County, and Fruit Heights that would be best for Farmington, rather than Kaysville, to coordinate. When on-street and off-street segments are part of the same project, they share a project ID. When the project will be done by both Kaysville and Farmington, the projects have a 500 series ID.

On-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Rem.	Lane Red	Road Widening	Project Information
117A	100 East	Farmington		Farmington Pond Parking Lot	600 N		No	2,165	0.41	$2,900				Markings will indicate where to go on this last stretch of 100 E before the Pond parking lot and the Shoreline trailhead.
117B	100 East	Farmington	Bike Lane	600 N	500 N		No	619	0.12	$1,300	2 sides			Main St alternative that more directly accesses Farmington Canyon with a gentler, more consistent grade.
117C	100 East	Farmington	Bike Lane	500 N	100 N		No	2,379	0.45	$6,400				Main St alternative that more directly accesses Farmington Canyon with a gentler, more consistent grade.
117D	100 East	Farmington		100 N	Main St		No	680	0.13	$1,800				Due to this section of 100 E being too narrow for dedicated, on-street facilities, a calmed bicycle boulevard or shared roadway for this section should be implemented as a Main St alternative.
118A	100 North	Farmington	Bike Lane	Main St	200 E		No	1,210	0.23	$3,300				On-street connection between Main St and, eventually, Bonneville Shoreline Trail.
118B	100 North	Farmington		200 East	Shoreline Access		No	1,016	0.19	$1,400				Part of an on-street connection between Main St and Bonneville Shoreline Trail.
119	1075 West	Farmington	Buffered BL	Main St	Shepard Ln		No	4,748	0.90	$13,800	2			Alternative to US-89 and an important north-south connection to Main St and neighborhoods for Farmington residents west of US-89.
67D	1100 West	Farmington	Buffered BL	D&RGW Rail Trail	Glovers Ln		No	4,565	0.86				Yes	When road is widened and development occurs.
120A	1500 West	Farmington		~1750 N	Shepard Ln		No	2,964	0.56	$7,800				Generally low-stress connection on north side of Farmington, though this section should be calmed further because existing width is not sufficient for dedicated facilities..
120B	1800 North	Farmington	Bike Lane	~1750 N	1075 W		No	2,135	0.40	$4,400	2			Generally low-stress connection on north side of Farmington.
68F	1525 West	Farmington	Bike Lane	Spring Meadow Ln	Citation Dr		No	3,447	0.65	$7,100	2			Connection between neighborhoods and, shortly to the north of the end of this section, the D&RGW Rail Trail. Removing parking will not be problematic because no houses front onto the street.
68G	1525 West	Farmington	Bike Lane	Citation Dr	City Limit		No	3,777	0.72		2		Yes	When development occurs or when road is widened.
68H	1525 West	Davis County	Bike Lane	City Limit	Glovers Ln	Davis County	No	838	0.16		2		Yes	When development occurs or when road is widened.
121	Lund Lane/1700 South Advisory Bike Lane	Farmington	Advisory BL	Frontage Rd	200 East		No	2,064	0.39	$3,500				24-foot roadway may be re-striped to provide two six-foot advisory bike lanes and a 12-foot center shared travel lane (bi-directional). Bike lane stripes are dashed.
122	200 South	Farmington		200 W	City Limit		No	3,902	0.74	$10,200				Will provide a low-stress, east-west connection that will serve three schools and provide a crossing of Main St, especially for students. Also provides access to and from Bonneville Shoreline Trail

On-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Rem	Lane Red	Road Widening	Project Information
123	200 West	Farmington		Lagoon/Farmington Creek Trail	State St		Yes	361	0.07	$500				Short section of road connecting on-street bike lanes, proposed path, connections to schools. Likely that is does not need calming because it is a dead end street already.
124	200 West	Farmington	Bike Lane	State St	Steed Creek	UDOT	Yes	2,309	0.44	$6,200				Intentionally redundant, on-street facility that provides connectivity to the same destinations as the adjacent sidepath, but aimed and designed for a different user group.
125	250 South	Farmington		650 W	Legacy Pkwy Trail		No	1,044	0.20	$1,400				Short section of road connecting regional park, likely road expansion, Legacy Pkwy Trail, and trailhead. Likely that is does not need calming because it is a dead end street already.
126	300 West	Farmington		State St	Southern Terminus		No	507	0.10	$700				Short section of road connecting on-street bike lanes and existing path that leads to Farmington Jr. Likely that is does not need calming because it is a dead end street already.
66B	475 South	Farmington	Advisory BL	Western Terminus of 475 S	1100 W		No	1,893	0.36	$3,200	2			27-foot roadway may be re-striped to provide two six-foot advisory bike lanes and a 15-foot center shared travel lane (bi-directional). Bike lane stripes are dashed. If another facility is desired, widening is required.
127	500 South	Farmington	Bike Lane	1100 W	Tippetts Ln		No	2,705	0.51	$5,600	2			On-street connection between two roads that will likely be improved in the near future. Providing east-west connectivity where only north-south network exists currently or planned.
128	600 North	Farmington	Bike Lane + SLM	Main St	100 East		No	780	0.15	$1,600				Access to and from Farmington Canyon. Because of the grade, bike lane is uphill and shared lane downhill.
129	700 West/Lagoon Drive	Farmington	Buffered BL	Shepard Ln	Park Ln		No	4,261	0.81	$12,400	2		Yes	To be built when road (37' pavement) is reconstructed and widened, and portions are added.
130A	Burke Lane/Foxhunter Drive	Farmington	Bike Lane	Northern Terminus	D&RGW Rail Trail		No	4,376	0.83	$9,000	2			On-street connection between D&RGW Rail Trail and neighborhood, park, and church to the west.
130B	Burke Lane/Station Pkwy	Farmington	Bike Lane	D&RGW Rail Trail	Park Ln		No	4,933	0.93	$840,000			Yes	Include bike lanes when road is widened.
131A	Clark Lane/2065 West	Farmington	Bike Lane	Buffalo Ranch Development Rd	Proposed East-West Path		No	975	0.18	$2,000	2			Finishing piece of Clark Ln as it turns north-south and connects to the proposed West Davis Corridor path.
131B	Clark Lane	Farmington	Buffered BL	2065 W	D&RGW Rail Trail		No	5,114	0.97	$10,500				Existing shoulders are sufficiently wide to install buffered bike lanes. Will give better access to Station Park and D&RGW Rail Trail for residents living west of former rail corridor. Will improve connectivity to Eagle Bay Elementary, as well.
132A	Clark Lane/State Street	Farmington	Buffered BL	Western Terminus	I-15 Overpass	UDOT	Yes	4,621	0.88	$9,500				Existing shoulders are sufficiently wide to install buffered bike lanes. Will give better access to Station Park and points east of freeway and rail corridor.

On-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Rem.	Lane Red	Road Widening	Project Information
132B	Clark Lane/State Street	Farmington	Buffered BL	I-15 Overpass	400 W	UDOT	Yes	416	0.08	$560,400			Yes	Existing shoulders do not exist on this section of the bridge. Will require bridge retrofit. Will give better access to Station Park and points east of freeway and rail corridor.
133A	Hidden Springs Parkway	Fruit Heights	Bike Lane + SLM	Mountain Rd	Mahogany Dr		No	2,663	0.50		1			Because of grade, install bike lane uphill and a shared lane downhill. For this facility type, parking should be maintained on uphill side or wide parking lane on downhill side should be provided.
133B	Compton/1100 North/North Compton	Farmington	Bike Lane + SLM	City Limit	Main St		No	9,486	1.80	$18,800				Uphill bike lane and downhill shared lane. The side with the bike lane may switch as grade changes.
133C	Mahogany/Harvey	Fruit Heights	Bike Lane + SLM	Mountain Rd	City Limit		No	4,939	0.94					Uphill bike lane and downhill shared lane. The side with the bike lane may switch as grade changes.
134A	Frontage Road	Farmington	Buffered BL	200 W	~350' South of Curve		Yes	545	0.10	$47,400	2		Yes	Section of Frontage Rd that needs to be widened in order to accommodate buffered bike lanes on-street.
134B	Frontage Road	Farmington	Buffered BL	~350' South of Curve	620 S		Yes	689	0.13	$2,000	2			On-street bicycle facilities purposefully redundant with existing path on the west side of the road.
134C	Frontage Road	Farmington	Buffered BL	620 S	~550' South of 620 S		Yes	528	0.10	$45,900	2		Yes	On-street bicycle facilities purposefully redundant with existing path on the west side of the road.
134D	Frontage Road	Farmington	Bike Lane	~550' South of 620 S	Glovers Ln		Yes	1,465	0.28	$3,900				On-street bicycle facilities purposefully redundant with existing path on the west side of the road.
135	Glovers Lane	Davis County	Advisory BL	City Limit	1525 W	Davis County	No	3,157	0.60					24-foot roadway may be re-striped to provide two six-foot advisory bike lanes and a 12-foot center shared travel lane (bi-directional). Bike lane stripes are dashed.
143A	Glovers Lane	Davis County	Buffered BL	1525 W	City Limit	Davis County	No	1,376	0.26				Yes	Will be widened following development. When that occurs, ensure that buffered bike lanes fit.
143B	Glovers Lane	Farmington	Buffered BL	City Limit	D&RGW Rail Trail		No	3,447	0.65				Yes	Will be widened following development. When that occurs, ensure that buffered bike lanes fit.
143C	Glovers Lane	Farmington	Buffered BL	D&RGW Rail Trail	~400 W		Yes	2,238	0.42				Yes	Narrow part of road to be widened in the future, should accommodate on-street facilities.
143D	Glovers Lane	Farmington	Buffered BL	~400 W	Railroad Tracks		Yes	1,035	0.20	$3,100				Currently wide enough to install buffered bike lanes, but project may be better implemented along with roadway improvements to the west.
143E	Glovers Lane	Farmington	Buffered BL	Railroad Tracks	Frontage Rd	UDOT	Yes	727	0.14	$124,300			Yes	Widen narrow part of bridge to accommodate on-street facilities.
143F	Glovers Lane	Farmington	Bike Lane	Frontage Rd	Main St		Yes	1,657	0.31	$4,400				Connection between Frontage Rd and Main St will connect these and other neighborhoods to the east a connection to the Frontage Rd Trail and recreation west of the freeway and rail corridor.
503I	Main Street	Farmington	Buffered BL	City Limit	US-89 NB Offramp	UDOT	Yes	1,236	0.23	$2,600	2			Redesign interchange with buffered bike lanes and pedestrians as priorities, ensuring turn radii are appropriate for all vehicles and for safe crossings.
503J	Main Street	Farmington	Buffered BL	US-89 NB Offramp	~500' North of Shepard Ln	UDOT	Yes	4,206	0.80	$8,700	2			Critical regional bicycle connection and one of the most commonly requested improvements.

On-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Rem	Lane Red	Road Widening	Project Information
503K	Main Street	Farmington	Buffered BL	~500' North of Shepard Ln	Quail Run Rd	UDOT	Yes	905	0.17	$154,700	2		Yes	Very important link in the regional bicycle network. Because parking is so infrequently used and groups of bicyclists often stop traffic or cause it to go around, install bike lanes. Maintain center turn lane, other turn lanes as possible.
503L	Main Street	Farmington	Buffered BL	Quail Run Rd	Bus Stop North of Park Ln	UDOT	Yes	3,351	0.63	$658,000	2		Yes	Very important link in the regional bicycle network. Sidewalk and buffered bike lanes to be added once road is widened, improved.
503 M	Main Street	Farmington	Buffered BL	Bus Stop North of Park Ln	Park Lane Park	UDOT	Yes	336	0.06	$1,100	1			Very important link in the regional bicycle network. Because parking is so infrequently used and groups of bicyclists often stop traffic or cause it to go around, install bike lanes in order to accommodate groups.
503P	Main Street	Farmington	Buffered BL	Park Lane Park	~200' West of 200 W	UDOT	Yes	145	0.03	$24,800	2		Yes	Very important link in the regional bicycle network. Because parking is so infrequently used and groups of bicyclists often stop traffic or cause it to go around, install bike lanes in order to accommodate groups.
503Q	Main Street	Farmington	Buffered BL	~200' West of 200 W	500 N	UDOT	Yes	1,971	0.37	$4,100	2			Very important link in the regional bicycle network. Because parking is so infrequently used and groups of bicyclists often stop traffic or cause it to go around, install bike lanes in order to accommodate groups.
503R	Main Street	Farmington	Buffered BL	500 N	State St	UDOT	Yes	2,986	0.57	$8,700	2			Maintain center turn lane. Place buffer on parking side downhill and on travel lane side uphill.
503S	State Street	Farmington	Buffered BL	Main St	100 E	UDOT	Yes	532	0.10	$1,500	1			Maintain center turn lane. Maintain parking on whichever side needs to accommodate more or more frequent buses.
503T	State Street/185 East	Farmington	Buffered BL	100 E	Chevron Gas Station	UDOT	Yes	369	0.07	$1,100	2			Very important link in the regional bicycle network. Because parking is so infrequently used and groups of bicyclists often stop traffic or cause it to go around, install bike lanes in order to accommodate groups. Can maintain 10' center turn lane.
503U	185/200 East	Farmington	Buffered BL	Chevron Gas Station	Glovers Ln	UDOT	Yes	5,455	1.03	$15,900	2			Very important link in the regional bicycle network. Because parking is so infrequently used and groups of bicyclists often stop traffic or cause it to go around, install bike lanes in order to accommodate groups.
503V	200 East	Farmington	Buffered BL	Glovers Ln	~100' North of Lucky Star Way	UDOT	Yes	491	0.09	$42,700	2		Yes	Very important link in the regional bicycle network. Because parking is so infrequently used and groups of bicyclists often stop traffic or cause it to go around, install bike lanes in order to accommodate groups.
503 W	200 East	Farmington	Buffered BL	~100' North of Lucky Star Way	~100' South of Lucky Star Way	UDOT	Yes	184	0.03	$600	2			Very important link in the regional bicycle network. Because parking is so infrequently used and groups of bicyclists often stop traffic or cause it to go around, install bike lanes in order to accommodate groups.

On-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Rem.	Lane Red	Road Widening	Project Information
503X	200 East	Farmington	Buffered BL	~100' South of Lucky Star Way	1235 South	UDOT	Yes	1,183	0.22	$102,900	2		Yes	Very important link in the regional bicycle network. Because parking is so infrequently used and groups of bicyclists often stop traffic or cause it to go around, install bike lanes in order to accommodate groups.
503A A	200 East	Farmington	Buffered BL	1235 South	City Limit	UDOT	Yes	2,893	0.55	$8,400	2			Very important link in the regional bicycle network. Because parking is so infrequently used and groups of bicyclists often stop traffic or cause it to go around, install bike lanes in order to accommodate groups.
503A B	Main Street	Centerville	Buffered BL	City Limit	?	UDOT	Yes	6,816	1.29		2			Where possible, install wider than normal bike lanes to accommodate high number of bicyclist groups.
136	Main Street	Farmington	[illegible]	State St	200 S		No	1,301	0.25	$3,400				Calm this section of Main St as it only sees library, city hall, and some elementary school traffic, and no through traffic.
137A	Mountain Road	Fruit Heights	Bike Lane	Green Rd	City Limit		Yes	7,722	1.46		2			Entirely in Fruit Heights, Mountain Rd does provide a lower stress alternative to US-89 for the time being or assuming that the proposed shared-use path is not constructed.
137B	Mountain Road	Farmington	Bike Lane	City Limit	Main St		Yes	1,079	0.20	$2,900				Mountain Rd provides a lower stress alternative to US-89 for the time being or assuming that the proposed shared-use path is not constructed.
138	Park Lane	Farmington	Bike Lane	Lagoon Dr	Main St		Yes	855	0.16	$2,300				Add bike lanes for short on-street connector.
77G	Rifleman Drive	Farmington	[illegible]	Rifleman Drive Access	Foxhunter Dr		No	1,048	0.20	$2,800				Neighborhood access and connection between path and on-street bike lanes. Improving east-west connectivity at the neighborhood level.
139A	Shepard Creek Parkway	Farmington	Buffered BL	Shepard Ln	Spring Creek Dr Roundabout		No	2,621	0.50	$7,700	2			On-street connection into Farmington Crossing Development.
139B	Shepard Creek Parkway/Willow Green Way	Farmington	[illegible]	Spring Creek Dr Roundabout	Spring Pond Dr		No	1,283	0.24	$3,400				Calmed traffic increases likelihood of bicyclists on the road, pedestrians walking, and neighborhood interactions. Will also provide the last piece between the dedicated facility to the north and the exterior development path on the south.
504B	Shepard Lane	Farmington	Bike Lane	City Limit	Frontage Rd		Yes	1,690	0.32	$3,500			Yes	One of the most requested improvements. Requires lane narrowing or a retrofit of existing structure to add path or a new bike/ped-specific bridge over I-15. UDOT may be planning a new interchange at Shepard Ln. In that case, ensure low stress facilities.
504C	Shepard Lane	Farmington	Bike Lane	Frontage Rd	1290 W		Yes	1,871	0.35	$3,900	2			Buffered bike lanes on Shepard will connect west side residents to Main St and help calm the street for students trying to access Knowlton Elementary, Smith's, and other destinations.
504D	Shepard Lane	Farmington	Buffered BL	1290 W	1075 W		Yes	1,086	0.21	$2,300	2			Buffered bike lanes on Shepard will connect west side residents to Main St and help calm the street for students trying to access Knowlton Elementary, Smith's, and other destinations.

On-Street Recommendations

Proj ID	Name	City	Facility Type	North/West Limit	South/East Limit	Partner Agencies	Regional Priority	Length (ft)	Length (mi)	Cost Estimate	Pkg Rem	Lane Red	Road Widening	Project Information
504E	Shepard Lane	Farmington	Buffered BL	1075 W	US-89	UDOT	Yes	827	0.16	$2,400		2		Because roadway is already built out and lanes maximized with no shoulder, a road diet is necessary in order to complete this buffered bike lane corridor.
504F	Shepard Lane	Farmington	Buffered BL	US-89	Main St	UDOT	Yes	2,079	0.39	$4,300	2			Buffered bike lanes on Shepard will connect west side residents to Main St and help calm the street for students trying to access Knowlton Elementary, Smith's, and other destinations.
77H	Silver Spur Way	Farmington	[illegible]	Rifleman/Hollybrook Adjacent Path	Farmington Ranches Park Access		No	1,200	0.23	$3,200				On-street, inner neighborhood connection between two proposed paths, increasing connectivity within the neighborhood.
505C	Silverwood Dr/500 East	Farmington	[illegible]	City Limit	Frontage Rd		No	945	0.18	$2,500				Calm neighborhood entrance to allow bicyclists and pedestrians to feel comfortable accessing neighborhood and Frontage Rd path.
140	Spring Meadow Lane	Farmington	[illegible]	Foxhunter Dr	1525 W		No	3,024	0.57	$7,900				On-street, inner neighborhood connection between two proposed facilities and as a non-path connection, increasing connectivity within the neighborhood.
141	State Street	Farmington	Bike Lane	200 W	Main St		Yes	1,233	0.23	$3,300				Replicate bike lane design between 400 W and 200 W. Will provide a key connection into downtown Farmington from the west.
113D	Tippetts Ln	Farmington	Bike Lane	Clark Ln	Glovers Ln		No	5,625	1.07				Yes	To be installed when roadway is widened and development occurs.
142A	Woodland Drive	Farmington	Bike Lane + SLM	Main St	~570 S		No	2,560	0.48	$4,300	1			Access to and from Bonneville Shoreline Trail by way of a commonly used road. Because of the grade, bike lane is uphill and shared lane downhill.
142B	Woodland Drive	Farmington	Bike Lane + SLM	~570 S	Southern Terminus		No	1,524	0.29	$2,600	2			Access to and from Bonneville Shoreline Trail by way of a commonly used road. Because of the grade, bike lane is uphill and shared lane downhill.
							Farmington Only	112,655	21.34	$1,132,300				
							Farmington & UDOT	37,222	7.05	$1,742,900				
							Total	**149,877**	**28.39**	**$2,875,200**				

Note: All costs include labor and materials to install. Costs do not include design, engineering, or bidding services. They also do not include a contingency, or mobilization or traffic control as these costs will vary depending on how the projects are constructed and how they are bid. Cost estimate cells with no dollar amount are for projects outside of city limits or projects where costs will very likely be covered with a corresponding project on another sheet, by an outside agency (UDOT, developer, etc.), or where project is very long term. Costs that seem lower than usual are additions to already funded or soon-to-be-funded City projects.

Project IDs are for Farmington projects as well as projects in Centerville, unincorporated Davis County, and Fruit Heights that would be best for Farmington, rather than Kaysville, to coordinate. When on-street and off-street segments are part of the same project, they share a project ID. When the project will be done by both Kaysville and Farmington, the projects have a 500 series ID.

Total Farmington Only	215,232	40.76	$6,925,600
Total Farmington & UDOT	95,868	18.16	$25,712,900
Farmington Grand Total	**311,100**	**58.92**	**$32,638,500**

Appendix C: Priority Projects

FARMINGTON ACTIVE TRANSPORTATION PLAN

MARCH 2016

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Introduction

The project team, with direction from City staff, identified six priority projects for Farmington from the recommended facilities included in Chapter 4 and *Appendix B: Project Information*. Each priority project in this appendix includes one or two cut sheets that include more information than what appears in the project information tables or on the recommendations maps, such as benefits, maps, graphics, context, and estimated cost information. Developing Farmington's priority projects in this way is critical to communicating the City's priorities as well as pursuing future funding and grant opportunities.

The recommendations in this appendix and the plan as a whole may change as the City changes, as priorities shift, and as opportunities arise to complete project. The plan should be considered a fluid document that will move with the City. Some of the projects may need to be implemented incrementally and specific recommendations may be altered; specific and recommended facility types are the ultimate goal, but other treatments may need to be used in the interim.

Projects #4, #5, and #6 are regionally significant projects that should be implemented together with Kaysville City as they will extend beyond Farmington City limits. These projects do not benefit only residents or visitors of one city, but will improve connectivity and safety for everyone.

Project #1: Park Lane Overpass Improvements

Project Description

Similar to the Shepard Lane I-15 overpass improvements outlined in Priority Project #4, but on a larger scale, improvements to the the Park Lane overpass of I-15, US-89, Legacy Pkwy, and the UPRR/ UTA rail corridor will add a shared-use path and bicycle and pedestrian crossings to one side of the interchange area between the D&RGW Rail Trail and Main St, with the intention of improving perceived safety and comfort.

Context map of the Park Lane overpass and interchange area improvements, and the extents of the project highlighted in yellow (D&RGW Rail Trail to Main St). Blue lines represent proposed bike lanes, dashed bright green sidewalks, green shared-use paths, orange bicycle boulevards, and tan shared lanes. All dashed gray lines are existing facilities.

Context

Park Lane currently serves many different types of trips, providing a vital connection between two sides of Farmington and parts of southern Kaysville. It also provides local and regional access for motorists to the Farmington FrontRunner Station, Station Park, the Legacy Parkway Trail, the D&RGW Rail Trail, homes west of the D&RGW Rail Trail, Lagoon Amusement Park, downtown Farmington, I-15, US-89, and Legacy Parkway.

The interchange area is a regionally-significant structure, but the lack of shoulder, sidewalks, or other dedicated facilities combined with the popularity of new development and retail opportunities in the area has made traversing the interchange by bike or on foot nearly impossible for most users.

The existing Park Lane structure, pictured here spanning US-89 and looking north from the northbound offramp, does not accommodate pedestrians or bicyclists

This project was the single most requested project for the City, County, UDOT, and other state agencies to complete in the Active Transportation Plan public involvement process. In a January 26, 2016, City press release, Farmington City committed to make this "one of its top planning priorities and hopes the State of Utah will do the same."

Benefits

This project will be a major safety improvement for all Farmington residents, as well as regional users accessing the amenities, services, and homes mentioned earlier. The project will bridge two sides of the city that are currently divided by the freeway and rail corridor. It will also provide safe access for school children and employees of Lagoon Amusement Park, many of which are under 16. By improving access to Station Park by bicycle or walking, it will also reduce parking demand and the need to construct new parking spaces in the future.

Project #1: Park Lane Overpass Improvements (cont.)

Costs

When considering traffic volumes, delay, and level of service, UDOT has declared that the Park Lane interchange is failing. UDOT has alluded to plans to upgrade the structure to include more motor vehicles lanes to improve these deficiencies. Past cost estimates from UDOT, which included widening the bridge structures and approaches, and adding dedicated facilities for bicyclists and pedestrians as part of the structural renovation, were approximately $22,000,000.

Because project costs are so uncertain, vary widely, and depend on when and if the existing structure is improved (as well as the type of bicycling and walking improvements to be implemented) this priority project does not include detailed cost estimates. Rather, it is recommended that Farmington City, Davis County, and UDOT fast track this project as the number one priority in Farmington and undertake a feasibility study in order to identify in greater detail the facility type, materials, location, surveying, and implementation schedule for this crossing.

This project will improve the crossing over US-89 and I-15, as well as intersections, for bicyclists and pedestrians by installing a shared-use path with appropriate crosswalks and signage

Project #2: Main Street Widening, Bike Lanes, and Sidewalks

Project Description

This priority project would widen Main Street/Hwy 106 between Shepard Ln, on the north, and Park Ln, on the south. It does not increase motor vehicle lanes or vehicular capacity, but rather improves access and perceived comfort and safety for bicyclists and pedestrians where facilities do not currently exist. The improvements would widen the shoulder to accommodate buffered bike lanes and add curb, gutter, park strip, and sidewalk. Improving this section of the only continuous, north-south roadway in Farmington east of I-15 was requested many times during the Active Transportation Plan's public involvement process.

Additionally, at the segment's midpoint, the Active Transportation Plan also recommends adding a crossing that is improved with a Rectangular Rapid Flashing Beacon (RRFB).

Context

North of Shepard Ln, Main Street/Hwy 106 has been improved in a manner consistent with the proposed recommendations for this priority project, including wide shoulders/parking lanes (recommended to be converted to buffered bike lanes), curbs, gutters, and sidewalks on both sides.

Benefits

This priority project will improve bicycling and walking connections to Knowlton Elementary School, Smith's grocery store, neighborhoods, bus stops, Lagoon Amusement Park, and planned development between US-89 and Main Street. It will also improve connectivity between the two sides of Main Street itself.

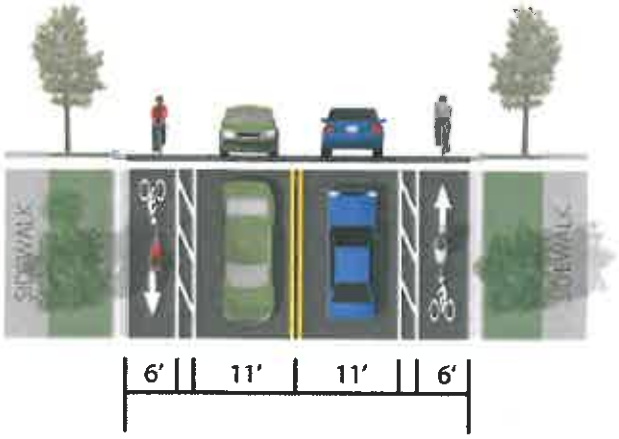
Costs

Buffered Bike Lane Striping, Symbols, & Signs: $8,000

Roadway Widening: $650,000

Curb and Gutter: $200,000

Context map for widening Main Street between Shepard Ln and Park Ln, with the extents highlighted in orange in order to provide contrast with bright green sidewalk lines. Blue lines represent proposed bike lanes, dashed bright green sidewalks, green shared-use paths, orange bicycle boulevards, and tan shared lanes. All dashed gray lines are existing facilities.



The proposed cross section for Main Street will include buffered bike lanes, two total travel lanes, park strip, and sidewalk

Driveway Aprons: $50,000

Storm Water/Drainage: $500,000

Sidewalk: $275,000

Park Strip & Trees: $70,000

RRFB: $22,000

Total Construction Costs: $1,770,000

Total Project Costs*: $2,200,000

* The total project cost, including engineering, mobilization, and a 10% contingency, is about 25% greater than the construction cost estimate.

Project #3: 200 East Widening, Bike Lanes, and Sidewalks

Project Description

This priority project would improve 200 East/Hwy 106 on the east side of the road in several sections between Glovers Ln and 1700 S. The improvements do not increase motor vehicle lanes or capacity, but they do improve mobility and perceived comfort and safety, primarily for pedestrians. The improvements would add a sidewalk to the east side and shift the lane striping slightly to accommodate buffered bike lanes on both sides of the existing roadway asphalt. Along this segment of 200 East, there are also three recommended crossings improved with RRFBs.

Context

Other than Frontage Rd, 200 East/Hwy 106 is the only continuous, north-south roadway in Farmington east of I-15. Due to intermittent and scattered development, many properties do not include sidewalks for pedestrians or adequate space for bicyclists to ride on-street without impeding motor vehicles. In most places, grading and adding sidewalk, as well as changing striping designs, will be sufficient. North of Glovers Ln, 200 East/Hwy 106 has a cross section similar to the proposed for this priority project, including wide shoulders/parking lanes (with recommended conversion to buffered bike lanes) and sidewalks.

Benefits

Improving this section of 200 East will provide a continuous north-south pedestrian corridor. The project will improve bicycling and walking connections to and between neighborhoods east and west of 200 East, bus stops, the Legacy Parkway Trail, the Frontage Rd Trail, and the planned Farmington High School west of I-15 and Legacy Pkwy.

Costs

Buffered Bike Lane Striping, Symbols, & Signs: $9,500

Sidewalk: $200,000

Grass & Other Plants: $15,000

RRFB: $22,000

Total Construction Costs: $247,000

Total Project Costs*: $310,000

* The total project cost, including engineering, mobilization, and a 10% contingency, is about 25% greater than the construction cost estimate.

A rendering of what 200 East would look like after adding sidewalks and buffered bike lanes

Project #4: Shepard Lane I-15 Crossing Improvments

Project Description

One of the principal goals of the Active Transportation Plan is to "unite the east and west, especially across US-89, I-15, and Legacy Parkway, with bicycle and pedestrian improvements that are safe enough to feel comfortable riding with a young child." Several plans, including the Farmington Trails Master Plan, the Farmington Active Transportation Plan, and the WFRC Wasatch Front Urban Area 2030 Bicycle Plan, recommend improved crossings over I-15.

Improvements to Shepard Lane between the D&RGW Rail Trail and Oakridge Country Club (crossing Interstate 15 and the Union Pacific and UTA rail corridor) were among the most requested by the public during the Active Transportation Plan. On-street bike lanes and a shared-use path adjacent to the roadway will require a retrofit of the existing bridge structure to add width to the road deck and space for a path on one side. An alternative to including a path on the retrofitted bridge is to construct a separate bicycle and pedestrian-specific structure.

There is a possibility that a new I-15 interchange will be constructed at Shepard Lane. This priority project should be included in the design and implementation of the interchange from the beginning in order to ensure that low stress bicycling and walking facilities are available to users of all ages and abilities.

Context

The Shepard Lane I-15 overpass is one of only two non-interchange crossings of I-15 and the UPRR/UTA corridor (the other is Burton Ln in Kaysville) in the seven miles between State St/Clark Ln in Farmington and Gentile Street in Layton.

Several of Farmington's I-15 overpasses, including Shepard Lane, currently have "Bicycles May Use Full Lane" signs and shared lane pavement markings, or sharrows. These existing treatments are insufficient to encourage anyone outside of the very strong and

Context map of the Shepard Lane improvements. One can see the unimproved area to the west and south, the crossing of I-15 and the rail corridor, and the extents of the project highlighted in yellow (Rail Trail to Country Club). Blue lines represent proposed bike lanes, green shared-use paths, and orange bicycle boulevards. All dashed gray lines are existing facilities

brave to cross on a bicycle, and the road deck is not wide enough currently to accommodate pedestrians safely. Nearly all crossings of I-15, and especially at Shepard Lane, are physical and psychological barriers to connectivity and the use of active transportation modes.

Because of poor connectivity, nearly all residents on one side of I-15 cannot access amenities, services, and homes on the opposite side on foot or by bicycle, including Smith's grocery store, the D&RGW Rail Trail and other trails, parks, schools, and Kaysville City.

Benefits

Proposed improvements to Shepard Lane will improve perceived comfort and safety; connectivity between the east and the west across I-15; access to transit, amenities, and services; and other economic, environmental, health, and quality of life benefits, some of which have already been expressed in the introductory chapter of the Active Transportation Plan.

Additionally, improving this important crossing will connect residents, businesses, employees, and other users of the currently unimproved area to the west

Project #4: Shepard Lane I-15 Crossing Improvments (cont.)

and south of Shepard Lane, which is subject to a form-based code enacted by the City and will also include complete streets and green infrastructure.

Costs

Project costs vary widely, depending on when and if the existing structure is improved to an interchange as well as the type of bicycling and walking improvements that can be implemented on the existing structure (dependent on structural analysis). Therefore, this priority project does not include detailed cost estimates. Rather, it is recommended that Farmington City, Kaysville City, Davis County, and UDOT undertake a feasibility study in order to identify in greater detail the possible future improvements to the site, bicycling and walking facility type, materials, location, surveying, and implementation schedule for this crossing.

Existing shared lane signage on Shepard Lane, looking west

Proposed bike lanes and shared-use path over I-15, looking west

Project #5: West Davis Corridor Trail

Project Description

Even though the establishment of a new highway on the west side of Davis County, known as the West Davis Corridor, is not guaranteed, a regional shared-use path within the highway right-of-way similar to the existing section of Legacy Parkway Trail, is recommended, if the highway is constructed, in the Active Transportation Plan.

Most of Farmington City's and Kaysville City's initial concerns with UDOT's West Davis Corridor shared-use path pertained to post-construction operations and maintenance. These concerns have been alleviated in recent years due to each City's and Davis County's experience maintaining the D&RGW Rail Trail and the Legacy Parkway Trail, respectively.

Context

The proposed, yet approximate, alignment of the West Davis Corridor Trail extends from Farmington on the south to Syracuse on the north. It would provide a facility similar to the Legacy Parkway Trail.

Benefits

In addition to increasing recreational opportunities north and west of the current terminus of the Legacy Parkway Trail, the West Davis Corridor Trail would also connect existing and future schools and planned housing developments in Farmington and points north. Extending north toward Ogden, it would provide a parallel facility about one mile west of the D&RGW Rail Trail. It would connect Davis County cities and the region's west side residents on a grade-separated, shared-use facility appropriate for users of all ages and abilities.

Costs

UDOT has agreed to fund and construct the capital improvements for this priority project if the West Davis Corridor roadway project comes to fruition. Operations and maintenance responsibilities will be with the municipality.

Annual Cost of Regular Maintenance Activities (i.e. sweeping, trash removal, mowing, weed abatement, snow removal, crack seal, sign repair) (per mi.): $1,500

10-Year Seal Coat (per mi.): $10,000

Annual Maintenance Costs (4.2 miles): $50,000

People who walk and ride a bicycle on the proposed West Davis Corridor Trail will have a similar experience to the Legacy Parkway Trail, which currently ends in Farmington

Project #6: Legacy Parkway Trail North Extension

Project Description

This priority project would extend the existing Legacy Parkway Trail, one of the most popular, regional shared-use paths along the Wasatch Front, nearly one mile farther north, and connect, on its northern extent, with Shepard Ln (see Priority Project #4).

Context

Of the more than 18 miles of existing paved shared-use paths in Farmington, the Legacy Parkway Trail is perhaps the most used and well-known. Constructed in 2008, it initially ran from the northern terminus of I-215 near Salt Lake City, on its south end, to Park Lane and the Farmington FrontRunner station, on its north end. Following housing development north of Park Ln, the trail was extended an additional 1/3 of a mile to 675 N/Burke Ln.

Benefits

This extension will complete an off-street, shared-use backbone for the city's walking and bicycling network that will run uninterrupted and grade-separated the entire length of Farmington. Together with nearby recommended improvements, the trail extension will connect Farmington City and Kaysville City and provide better access to transit and shopping at Station Park, as well as regional destinations to the south.

Filling this gap will also connect residents, businesses, employees, and other users to and through the currently unimproved area between the Legacy and the D&RGW trails. The area is subject to a form-based code enacted by the City and will also include complete streets and green infrastructure.

Costs

Total Construction Costs: $450,000

Total Project Costs*: $565,000

* The total project cost, including engineering, mobilization, and a 10% contingency, is about 25% greater than the construction cost estimate.

Context map of the north extension of Legacy Parkway Trail. One can see the unimproved area to the west, connections to transit, and the extents of the project highlighted in yellow (Shepard Ln to the current northern terminus). Blue lines represent proposed bike lanes, green shared-use paths, and orange bicycle boulevards. All dashed gray lines are existing facilities, including the existing Legacy Parkway Trail

People bicycling on the existing segment of the Legacy Parkway Trail south of the extents of this priority project

Rendering of the proposed north extension, as seen from the Shepard Ln overpass, looking south