APPENDIX C:
BIKEWAY DESIGN GUIDELINES

BIKEWAY DESIGN GUIDELINES

The bicycle facility designs included in this guide are important for creating an all ages and abilities network in the Madera region. Creating a network of facilities that is comfortable for users of all ages is a key step in encouraging "interested but concerned" bicyclists to ride on new bicycle routes. These design guidelines supplement the bicycle network recommendations presented in ATP and inform the development of all new and enhanced bikeway projects in the Madera region.

This section presents preferred treatments and preferred and minimum dimensions for all bikeways with emphasis on those in the All Ages and Abilities Vision Network such as separated bikeways, neighborhood bikeways, and protected intersections. In addition to those guidelines, this chapter includes clarifying policies and preferred and minimum dimensions for select active transportation facilities.

CHANGING THE CULTURE AROUND MULTI-MODAL SAFETY IN THE MADERA REGION

The implementation of the ATP should involve national best practices in multi-modal complete streets design. The Steering Committee and other stakeholders involved in the ATP realized a need to ensure all modes of transportation are included in design treatment selections. The following national best practice resources should be used when assessing potential treatments in multi-modal corridors:

- NACTO Urban Bikeway Guide, 2nd Edition
- NACTO Urban Streets Design Guide
- NACTO Transit Street Design Guide
- Federal High Administration (FHWA) Small and Rural Multi-modal Networks Guide
- AASHTO Guide for the Development of Bicycle Facilities, 4th Edition
- Caltrans Highway Design Manual Chapter 1000 Bicycle Transportation Design
- Caltrans Class IV Bikeway Guidance
- Federal Highway Administration (FHWA) Separated Bicycle Lane Planning and Design Guide

- MassDOT Separated Bike Lane Planning and Design Guide
- CROW Design Manual for Bicycle Traffic 2017
- ITE Recommended Practices on Accommodating Pedestrian and Bicyclists at Interchanges

The ATP includes recommendations for newer facility types and treatment options such as Class IV Separated Bikeways and protected intersections that have not yet been implemented in the Madera region. These newer facility types have begun to be implemented throughout California and in the Central Valley. These new treatments and resources can increase the safety of cyclists by providing adequate separation along heavily trafficked arterials or truck routes and have the ability to reduce vehicle conflicts at intersections. Priority use and safety considerations should be given to cyclists on corridors and at intersections identified as part of the regional network.

Recent trends in multi-modal safety revolve around Vision Zero planning efforts, which create strategies to eliminate all traffic fatalities and severe injuries while increasing safety, health, and equitable mobility for all users. Vision Zero projects identify high-injury networks by analyzing collision data and assessing future risk through predictive forecasting. Caltrans also introduced grants that can be geared toward Vision Zero planning known as the Systemic Safety Analysis Report Program (SSARP). As Madera County is a recent SSARP recipient, they have the opportunity to tailor this funding to meet the goals of the ATP and to reduce all collision types in the unincorporated areas. Chowchilla and Madera could seek similar funding in the future.

TRAVEL LANE WIDTHS

The Madera region and local agencies should accept 10- to 11-foot lane widths on most roadways. At turn pockets, the local agencies should consider 9- to 10-foot pocket width.

BICYCLE FACILITY SELECTION

Selection of the most appropriate type of bicycle facility requires consideration of a variety of factors. On the regional network, this decision is critical, as the facility must be comfortable enough for bicyclists representing a wide range of experience levels. Characteristics of the roadway such as auto volumes, number of travel lanes, typical auto speeds, and available roadway width are also important considerations that significantly influence bicyclist safety and comfort. While other engineering and feasibility considerations also influence the type of bicycle facility proposed, **Table C-1** presents the key bicycle facility selection criteria for the All Ages and Abilities Network. If the bikeway type does not meet these criteria, it likely is not comfortable enough to be considered part of the All Ages and Abilities Network. As development throughout the region is ongoing, this section should be used to select bikeway facilities for roadways that are not depicted on the regional network.

The following guidelines should also be considered when selecting bicycle facilities for facilities not located on the regional network:

- Proposed facilities should provide access with logical start and end points that facilitate connections to schools, major employment centers, services, or connect to the Backbone Network.
- Proposed facilities should strive to implement all ages and abilities treatments recommended in the design guidelines in Table C-1.
- When roadway resurfacing or other maintenance projects occur, new bikeway facilities should be considered. The new facilities should connect with other bikeway facilities or destinations even if the new bikeway treatments extend beyond the original project limits to ensure they tie in with other facilities and/or the larger regional network.

TABLE C-1: ALL AGES AND ABILITIES BICYCLE FACILITY SELECT BASED ON SPEED AND NUMBER OF TRAVEL LANES

Typical Speed	Bicycle Facility Type	Number of Travel Lanes		
		2	3	4 or more
25MPH or less	Path[1]			
	Separated Bikeway			
	Bicycle Lanes or Buffered Bicycle Lanes[2]	■	■	■
	Bicycle Boulevards[3]	■	■	
	Bicycle Routes	■	■	
26-30 MPH	Path[1]		■	■
	Separated Bikeway		■	■
	Bicycle Lanes or Buffered Bicycle Lanes[2]	■	■	■
	Bicycle Boulevards			
	Bicycle Routes[4]			
31-34 MPH	Path[1]		■	■
	Separated Bikeway		■	■
	Bicycle Lanes or Buffered Bicycle Lanes[2]	■	■	■
	Bicycle Boulevards			
	Bicycle Routes[4]			

TABLE C-1: ALL AGES AND ABILITIES BICYCLE FACILITY SELECT BASED ON SPEED AND NUMBER OF TRAVEL LANES

Typical Speed	Bicycle Facility Type	Number of Travel Lanes		
		2	3	4 or more
35 MPH or more	Path[1]			
	Separated Bikeway			
	Bicycle Lanes or Buffered Bicycle Lanes[2]			
	Bicycle Boulevards[3]			
	Bicycle Routes[4]			

Suggested treatment to accommodate people of all ages and abilities

1. According to the MassDOT Separated Bike Lane Planning & Design Guide, paths could be considered instead of dedicated bicycle facilities (e.g. separated bikeway) only where walking and biking demand is low and expected to remain low.
2. Assumes bicycle lane blockages are rare and that bicycle lanes are a minimum of six feet. If parking is present, assumes bicycle lane width and parking width is greater or equal to 14 feet. When there are four or more travel lanes, a median must be present.
3. Per NACTO Urban Bikeway Guide, 1,500 vehicles per day (VPD) is preferred with a maximum of 3,000 VPD. Above 3,000 VPD, bicycle lanes, separated bikeway, or volume-control traffic calming measures should be considered.
4. If the street is classified as residential or does not have a marked centerline, speed can be up to or equal to 30MPH.

Note: Additional roadway characteristics and engineering study should always be considered, particularly for separated bikeways. Facilities should be designed to preferred dimensions and best practices per the PATP Design Guidelines. Guidance is based on Level of Traffic Stress criteria.

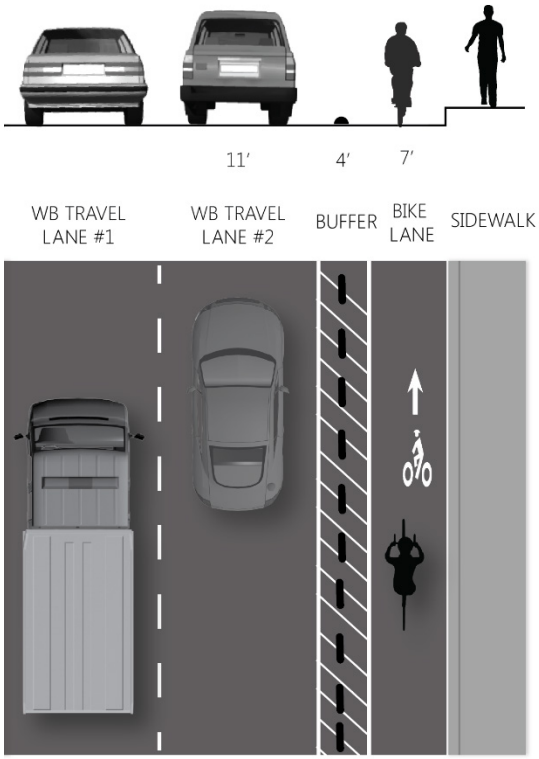
SEPARATED BIKEWAYS

This section defines the preferred cross-section and materials for separated bikeways in the Madera region. The NACTO *Urban Bikeway Guide, 2nd Edition,* FHWA *Protected Bicycle Lane Planning and Design Guide*, and MassDOT *Separated Bike Lane Planning and Design Guide* should also be consulted when planning for and designing separated bikeways in the Madera region.

Separated bikeways are needed in order to provide all ages and abilities facilities on most major roadways in the Madera region. For example, multi-lane roadways with speeds over 30 MPH generally need a separated bikeway in order to provide a comfortable bikeway for the average rider. Separated bikeways can also be considered on narrower or slower roadways where there may be vulnerable roadway users such as children riding near schools, or to provide important and/or complex connections between bikeways.

PREFERRED DESIGN

A Class IV Separated Bikeway is an on-street bicycle facility that is physically separated from automobile traffic and distinct from the sidewalk. These facilities offer a higher level of safety and comfort than bicycle lanes. While all Class IV facilities separate bicyclists from motor vehicle travel lanes, there are many different designs for these facilities. They may be at street level ("in roadway"), sidewalk level, or intermediate level. They are always separated from auto traffic by a raised element such as plastic delineators, median islands, on-street parking, and/or landscaping. Pavement material, streetscape elements, or landscape may separate the facility from the sidewalk. Typically, separated bikeways are located with the direction of traffic, one in each direction. Sometimes two-way separated bikeways are appropriate, where both separated bikeways are located side-by-side. Directional or "one-way" separated bikeways are usually preferred.



Preferred Separated Bikeways Dimensions

The minimum width of the buffer is dependent on the type of buffer used. In the MCTC ATP, the preferred design of the separated bikeway is typically a striped buffer with flexible delineator posts. As additional funding becomes available, these can be replaced with concrete islands or landscape islands to provide high-quality streetscapes.

The preferred separated bikeway design has a three- to four-foot striped buffer with vertical barriers and a seven-foot bicycle lane. The minimum striped buffer width is 1.5 feet with a five-foot bicycle lane. A minimum of four feet of rideable surface must be clear of gutter pans. Posts are recommended to be placed consistently every 20 to 24 feet, on center, and require low initial capital cost at $8 per linear foot. As grant funding or

developer funding is available, raised concrete buffers with decorative stamped pavement can be phased in. The separated bikeway must remain wide enough to allow street sweepers to maintain the area or specially sized street sweepers can be purchased as well.

PREFERRED BARRIER SEPARATION: INTERIM DESIGN

The preferred interim design is a "paint and plastic" that will allow the Madera region to build out its separated bikeway network sooner. As larger funding sources become available, high-quality improvements such as median islands and, where feasible, landscape islands, can replace the striped buffer and plastic posts.

"Armadillo" or "zebra" traffic separators

Rubber curb traffic separator

Flexible Delineator/Soft-Tipped Posts

PREFERRED BARRIER SEPARATION: LONG-TERM OR GRANT-FUNDED DESIGN

Reconfiguring streetscapes to use raised medians, on-street parking, curbs, bollards, planters, or other features to separate the bikeway is more expensive and labor-intensive. As such, these design options are considered for long-term or grant-funded implementation.

Bikeway separated by landscaping and raised concrete curb

SEPARATED BIKEWAYS AND TRANSIT

When separated bikeways are provided along a bus route, the preferred design is for bus boarding islands to separate bicycle, pedestrian, and bus intersections as much as possible. Where roadways have a higher speed limit, consideration should be given to whether or not in-lane stopping should be encouraged. Bus boarding islands should be wide enough to house a bus shelter and provide ADA clear paths of travel and a comfortable pedestrian waiting environment. To reduce bicycle-pedestrian interactions, fencing is encouraged to channelize pedestrians and provide clearly marked crosswalks across the separated bikeway.

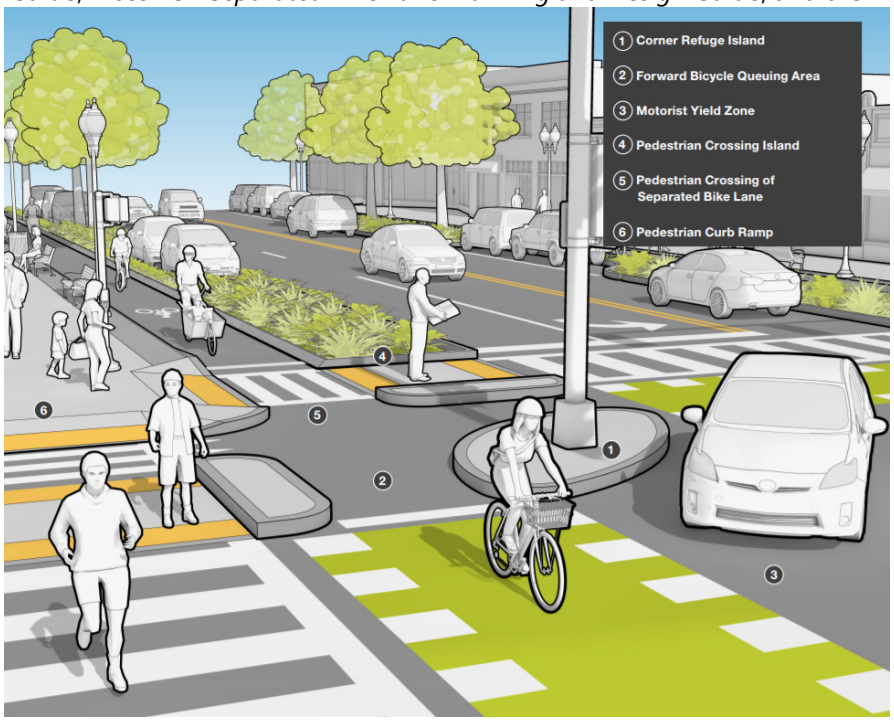
SEPARATED BIKEWAY INTERSECTION CONTROL

Separated bikeways require special design consideration at intersections to ensure the facility is safe and comfortable for bicyclists. Signalized intersections require additional design treatment to ensure turning automobiles do not conflict with bicycle traffic, as the separated bikeway places bicyclists to the right of turning vehicles. Preferred solutions include protected intersections or protected right and left turns to remove the right-hook conflict between bicyclists and autos. Separated bicycle lanes should continue up to an intersection to maximize protection for bicyclists and to truly be considered an All Ages and Abilities facility. A variety of design solutions are available at both signalized and unsignalized locations. For more information, see the FHWA *Separated Bike Lane Planning and Design Guide*, MassDOT *Separated Bike Lane Planning and Design Guide*, and the NACTO *Urban Bikeway Guide*, 2nd edition.

Protected Intersections

Protected intersections should be provided wherever Separated Bikeways and Buffered Bike Lanes intersect in the Madera region, where room allows. Protected intersections give bicyclists a head start at intersections, improve sight lines between drivers and bicyclists, and reduce pedestrian exposure to automobiles. They also facilitate left-turns for bicyclists. Protected intersections continue the separated bikeway all the way to the intersection and include additional islands that provide queuing space for turning bicyclists and refuge islands for pedestrians. They create predictability of movement, making them comfortable and intuitive.

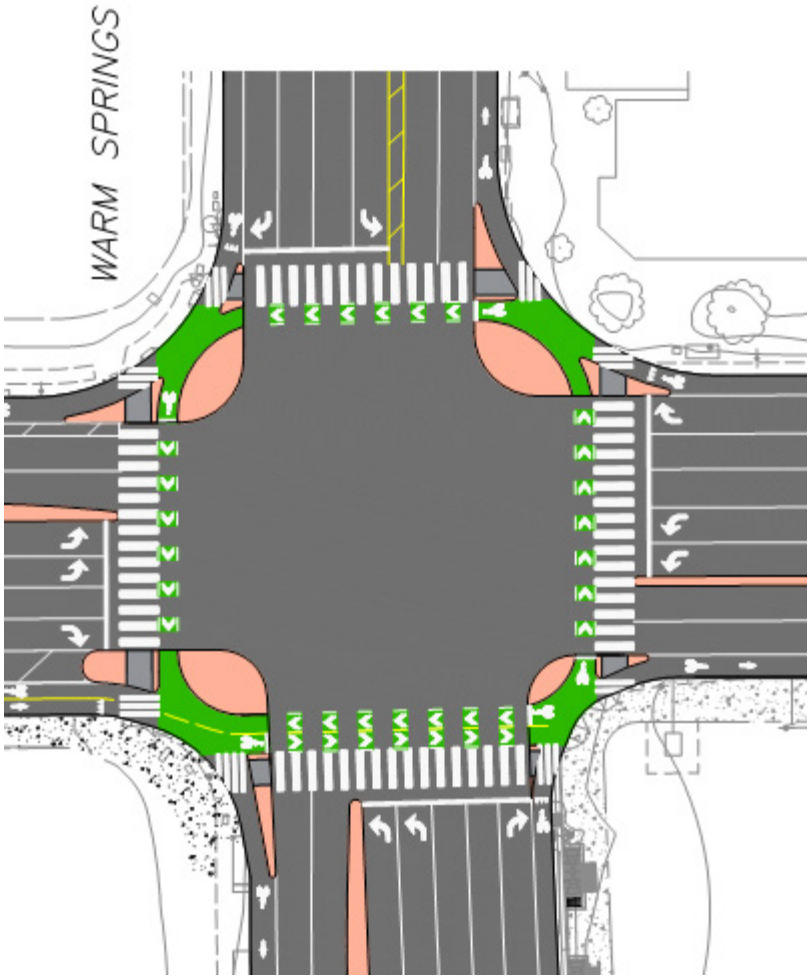
Protected intersections should generally be provided where two bikeways in the low stress network intersect. Protected intersections should also be considered:



Example protected intersection showing how pedestrians, bicyclists, and drivers use the intersection. Source: MassDOT Separated Bikeway Guide

- Where any dedicated bikeways in the network intersect
- At major intersections along separated bikeways where bicyclists need improved sightlines and additional protection from heavy traffic volumes
- Opportunistically at any intersection where bicyclists need assistance making turning movements

Where automobile right-turn volumes are heavy, protected intersections may need to be supplemented with bicycle signals and protected right-turns for autos. For more information, see the FHWA *Separated Bike Lane Planning and Design Guide* and MassDOT *Separated Bike Lane Planning and Design Guide*.



Example protected intersection (at bottom of image) from planned improvements on Warm Springs Boulevard at the future Wisdom Road. A two stage

MULTI-USE PATHS

The AASHTO *Guide for the Development of Bicycle Facilities*, 4th Edition should be consulted when planning for and designing trails in the Madera Region. The following section provides general information and focuses on trail crossing design guidance.

TYPICAL DESIGN

Class I Paths or Multi-Use Paths provide a completely separate right-of-way for bicyclists and pedestrians. In most cases, paths provide the most comfortable option for people walking and bicycling as paths are separated

from the roadway and typically have few intersections with autos. Where paths intersect the roadway network, trail crossings are critical. An unsafe trail crossing can diminish the value of the trail itself and has the highest collision rate. For these reasons, minimizing vehicle and pedestrian cross-flow at crossings to improve the safety of path users is essential. Paths intersecting many driveways and roadways have a high collision potential for cyclists, because drivers exiting driveways or traveling on intersecting roads often do not look for cyclists approaching in the opposite direction of traffic. Thus, the local agencies should consider warning signs and pavement markings wherever driveways and side streets must cross Class I Paths. The preferred dimension for multi-use paths is 10 to 14 feet wide. The minimum dimension for a path to be considered multi-use is eight feet wide with shoulders.

PREFERRED CROSSING DESIGN

Providing a consistent trail crossing design in the Madera Region will provide a consistent message to drivers, pedestrians, and bicyclists alike. The preferred crossing design consists of high-visibility ladder striping or "triple-four" striping, which consists of three 4' segments, two dashed lines on the outside, with a clear space in the center to direct pedestrian traffic. Where the volume of trail users is high, the crosswalk should be widened. A bicyclist and pedestrian pavement legends with arrows may be placed within the triple-four striping to indicate to bicyclists and pedestrians they share the space, indicate the preferred directional path of travel, and reinforce the validity of bicyclists riding through the crossing. The preferred trail crossing design also includes wide curb ramps oriented parallel to the crosswalk, to orient those with mobility impairments as well as bicyclists directly into the marked crossing. Trail crossing enhancements, such as signals and lighted beacons, should be considered at uncontrolled locations.

Trail Crossing Signage

Modified triple-four striping with bicycle legends

BUFFERED AND STANDARD BICYCLE LANES

The NACTO *Urban Bikeway Guide*, 2nd Edition should be consulted whenever designing bicycle lanes or buffered bicycle lanes in the Madera region. The following section provides general guidance, definition of terms, and preferred dimensions and practices for the Madera region.

TYPICAL DESIGN

A Class II bicycle lane is typically a six foot dedicated area for bicyclists designated by striping, signage, and pavement markings for the use of bicyclists. Bicycle lanes improve bicyclist safety by reducing interactions between cyclists and traffic, and by facilitating predictable behavior. Unlike Class IV Separated Bikeways, bicycle lanes have no physical barrier between bicyclists and motorized traffic. Bicycle lanes and buffered bicycle lanes are not necessarily All Ages and Abilities bikeways. They can be low stress facilities when speeds are 30MPH or less and on multi-lane roadways separated with a median. On wider and higher speed roadways, separated bikeways are needed to provide All Ages and Abilities bicycle facilities. When bicycle lanes are installed adjacent to a parking lane, the width of the parking lane and bicycle lane should total 14 feet or greater (i.e., six-foot bicycle lane next to eight-foot parking lane). Dimensions narrower than 14 feet can be stressful for bicyclists relative to drivers getting into and out of vehicles and potential conflicts in the "door zone."

A striped buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane distinguishes buffered bicycle lanes. Buffered bicycle lanes feature painted buffers of typically 2 feet or more in width, marked with two solid white lines and interior diagonal cross-hatching. The buffers do not include a raised separation, but that can be phased in with special consideration at intersections to provide separated bikeways. The recommended striped buffer width is 3 feet next to a 6-foot bicycle lane. The minimum striped buffer width is 1.5 feet next to a 5-foot bicycle lane.

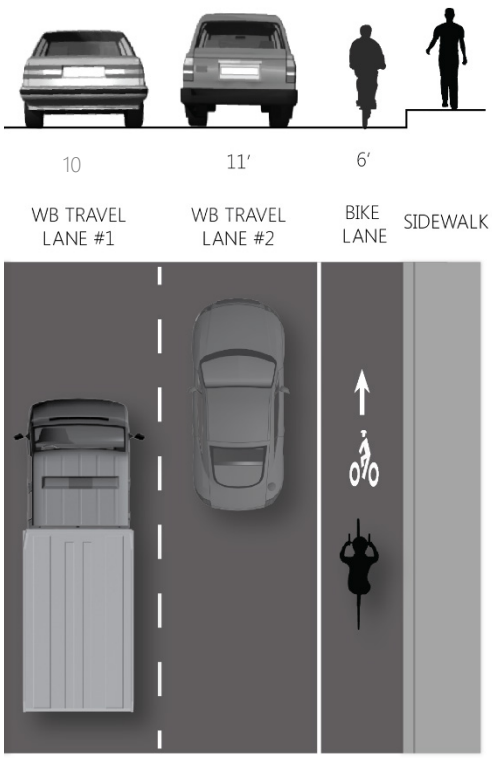
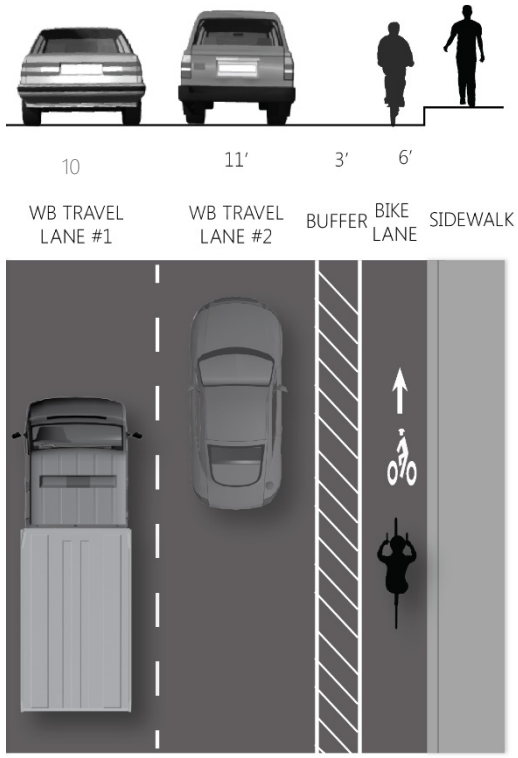


Figure A-8 Bicycle Lanes Preferred Width



Note: recommended buffer width is 3 or greater, if extra road width is available.

Figure A-9 Buffered Bicycle Lanes Preferred Width

Typical Design Elements

In addition to those described above, green "skip" striping should be applied at conflict zones and major driveways where cars will frequently turn or merge across the bicycle lane. This includes slip lanes, right-turn pockets, and large commercial driveways with heavy turnover. Where right-turn lanes or pockets are added, such as at signalized intersections or at freeway ramps, the bicycle lane should remain adjacent to the curb until approximately 200 feet or less before the intersection, at which point the bicycle lane should transition with colorized green markings between the

through and right travel lanes. Bicycle lanes should always be striped up to the stop bar/crosswalk and should not drop to allow for turn pockets to be added.

Buffered bicycle lane with wayfinding signage

Green skip-striping at intersection where cars may merge across or into the bicycle lane

Design Issues to Consider

The minimum width of a bicycle lane should be five feet against a curb or adjacent to a parking lane, with six feet as the preferred standard with. A minimum of four feet of rideable surface must be clear of gutter pans. Poor pavement quality and inconsistent striping or disappearing lanes are also design issues of concern for bicycle lanes and other on-street facilities.

Bicycle lane painted over gutter pan

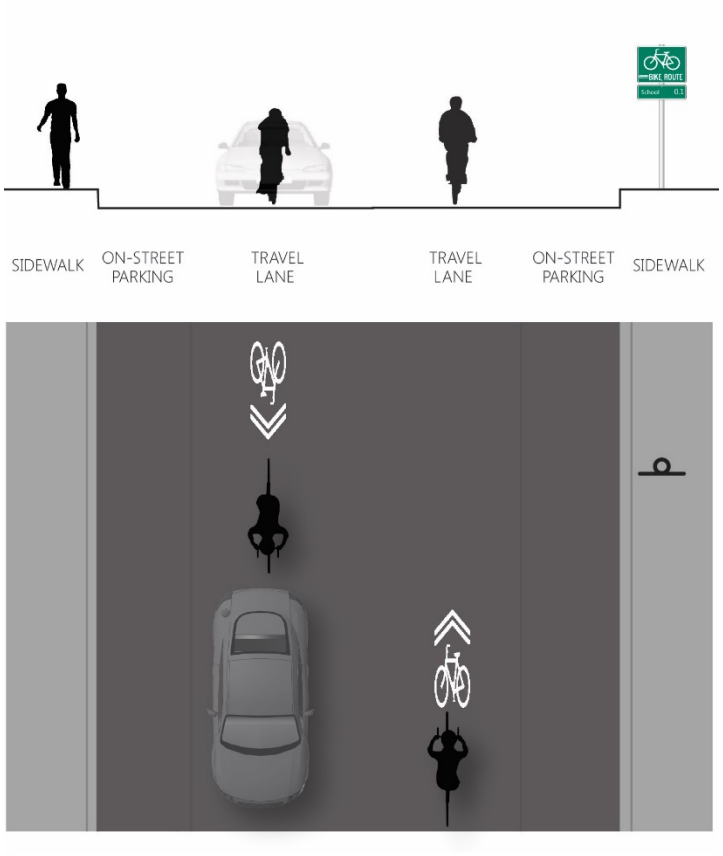
Poor pavement quality in a bicycle lane

NEIGHBORHOOD BIKEWAYS

The NACTO *Urban Bikeway Guide*, 2nd Edition should be consulted whenever planning for or designing neighborhood bikeways in the Madera region. This section provides general guidance on neighborhood bikeways.

TYPICAL DESIGN

Neighborhood bikeways are low-volume, low-speed streets shared by bicyclists and autos. These are comfortable for bicyclists due to the low number of interactions with automobile traffic. Typically, these are located as alternative routes to higher speed collector and arterial roadways. Neighborhood bikeways have sharrows, wayfinding signage, enhanced facilities at crossings of major arterials, and traffic calming measures where appropriate. Neighborhood bikeways are intended for local/residential streets with low speeds and volumes. Maintaining low volumes and speeds on these streets is critical, as many of these routes serve children – who have less experience riding – as bicycle routes to school.



STANDARD NEIGHBORHOOD BIKEWAY ELEMENTS

In addition to the elements described above, wayfinding is an important element of neighborhood bikeways. This is because in taking advantage of quieter streets, neighborhood bikeways often involve some turns. Wayfinding confirms bicyclists are on the preferred path and provides information about how to get to nearby destinations. Wayfinding signs also help brand the local bicycle networks, and inform cyclists by identifying intersecting bikeways and travel times to nearby destinations.

Bicycle route wayfinding with destinations and distances

Enhanced crossing of arterial via median refuge traffic diverter

POTENTIAL TRAFFIC CALMING ENHANCEMENTS

Consideration of enhancing neighborhood bikeway streets should be based on roadway volumes and speeds. To be an All Ages and Abilities bikeway, speeds and volumes should be low. The NACTO *Urban Bikeway Guide* establishes volume and speed thresholds for neighborhood bikeways. These treatments benefit bicyclists while also helping to create "quiet" streets for residents and other road users.

Speed lump

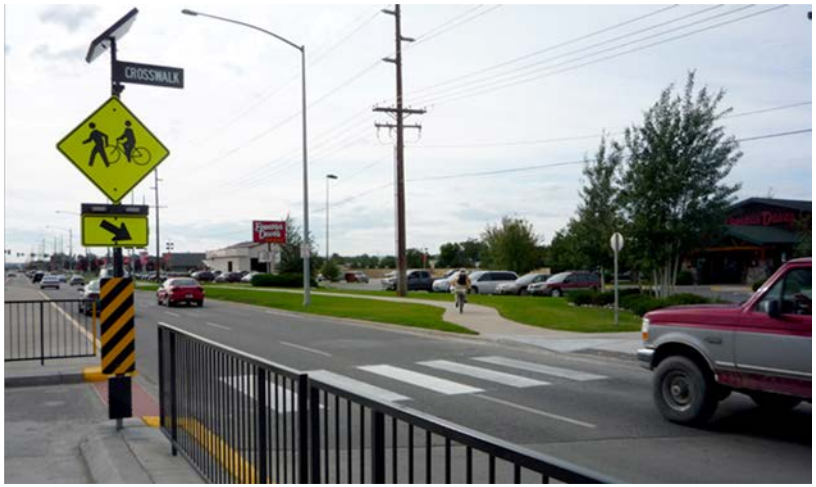
Chicane

Traffic circle on neighborhood bikeway

NEIGHBORHOOD BIKEWAY CROSSING TREATMENTS

Where neighborhood bikeways intersect major arterial and busy collector roadways, additional support is needed to assist bicyclists in crossing these roadways. In the Madera region, many of these locations are signalized, which is helpful, but additional enhancements can be provided. Example neighborhood bikeway crossing treatments at may include:

- **Bicycle Video Detection** (at signals) – bicycle detection legends and operating bicycle video detection can be used to detect, count and better utilize bike crossing green timing
- **Bicycle Clearance Intervals** (at existing signals) – at neighborhood bikeway crossings where children or seniors are expecting, slower crossing times should be anticipated
- **Bike Boxes** – Described in Section A.3.7, these provide a place for bicyclists to wait ahead of auto traffic on the side street



Example uncontrolled bicycle and pedestrian crossing with RRFBs

- **Traffic Diverters** – where feasible, consider traffic diverters to provide bicycle-exclusive access. These can be located at the entrance to streets or as median refuges to allow bicyclists to cross the major roadway in two stages.
- **Flashing Beacons** (at uncontrolled locations) – rectangular rapid flashing beacons (RRFBs) can be used support bicyclists crossing the street. Bicyclists can activate these to signal their intent to cross, similar to how pedestrians would cross the street. Where feasible, these can be used with median refuges.
- **Pedestrian Hybrid Beacons** (at existing uncontrolled locations) – these devices require autos to come to a full stop when activated by a bicyclist or pedestrian.

For more information, see the *NACTO Urban Bikeway Guide* on neighborhood bikeway crossing treatments: http://nacto.org/publication/urban-bikeway-design-guide/bicycle-boulevards/major-street-crossing/.

OTHER INTERSECTION TREATMENTS

Other treatments that can be implemented at intersections include bicycle boxes, two stage turn boxes, and intersection crossing markings. Two-stage turn boxes facilitate bicyclist left turns, allowing them to cross the intersection in two stages, making an "L" through the intersection. First, the bicyclist proceeds straight with traffic and a green box provides them a space to queue ahead of opposing traffic that has a red signal. When the cross street receives a green signal, the bicyclists proceeds straight with traffic. Bike boxes are similar to advanced stop bars and provide a designated space for bicyclists to queue ahead of traffic. This discourages right-hook collisions between drivers and bicyclists, and can provide a space for bicyclists to make two stage turns. Both should be implemented with no right turn on red restrictions to avoid motorists encroaching into the bike space.

Intersection crossing markings such as green conflict zone striping and extending the bike lane through the intersection indicate the intended path of bicyclists through the intersection. These markings can reduce conflicts between bicyclists and motorists by raising awareness for both to potential conflict areas; guiding bicyclists through the intersection and making bicycle movements more predictable; and reinforcing that through bicyclists have priority over turning vehicles or vehicles entering the roadway. This type of treatment is typically used along roadways with bike lanes or separated bikeways across signalized

Bicycle Box

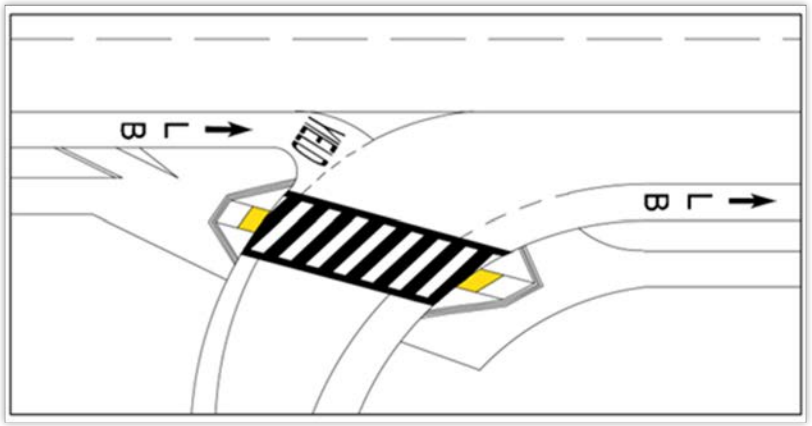
Two-Stage Turn Box

intersections, especially wide or complete intersections, as well as across driveways and Stop or Yield-controlled cross streets.

Intersection Crossing Markings

BICYCLISTS AT INTERCHANGES

Interchanges are difficult to navigate and stressful for pedestrians and bicyclists due to the high speeds and volume of vehicles. New techniques have been developed for improved interchange design to better accommodate both pedestrians and bicyclists with respect to safety and accessibility while effectively moving auto traffic. ITE's *Recommended Design Guidelines to Accommodate Pedestrians and Bicycles at Interchanges* presents preferred concepts for providing safe, comfortable connections for bicyclists and pedestrians through a variety of highway ramp geometries that are fully compliant with national design standards. The report should be consulted when considering enhancements at interchanges. The following should always be considered as pedestrian facilities and bikeways are considered near and/or through interchanges:

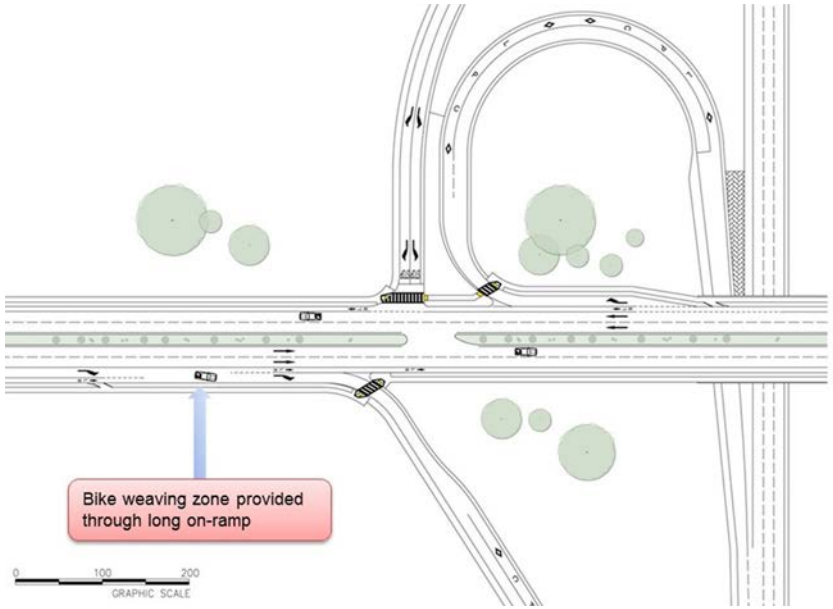


Bike Lane Crossing Detail at Highway Interchanges

- Upgrade interchange to square up all ramps to improve multi-modal safety
- Providing single lane approaches at on-ramps, where possible, to minimize the number of conflict points between pedestrians, bicyclists, and vehicles (e.g. start HOV lanes downstream of the crosswalk),
- Site crosswalk to "split the difference" between the shortest crossing distance and slowest vehicle speed through the turn, where speed is lowest and visibility is highest (see inset image)
- Use the X-Walk+ ASAP-branded Tool[1] (or other current best practice resource) to select appropriate crossing treatments, which can range from advance yield or stop lines, raised crosswalks, to a pedestrian hybrid beacon or a pedestrian traffic signal

[1] Fehr & Peers (2017). Xwalk+ ASAP Tool. See http://asap.fehrandpeers.com/complete-streetslayered-networks/xwalk/ for more information.

- Provide multiple options for bicyclists to navigate through interchanges, including separated bikeways on the street and enhanced crosswalks and bicycle ramps to allow bicyclists to use the sidewalk through the ramps
- Implement bike weaving zone at long on-ramps (see inset figure below), placing the bicycle lane between two lanes of auto traffic for no longer than 150'
- Keep bicycle lanes curbside until 150' before the ramp intersection to minimize the distance bicyclist have to ride between two auto travel lanes
- Minimize ramp geometries to reduce vehicle speeds for vehicles entering/exiting on/off ramps (see inset image)



Recommended Bicycle and Pedestrian Improvements at On Ramp Entered from Long, Single Right Lane

Recommended Bicycle and Pedestrian Improvements at Arterial Entered from Stop/Merge Off Ramp (Combined Ramps)

BICYCLE PARKING

Bicycle parking facilities are necessary to provide safe, convenient, and secure places to park bicycles while people are working, going to school, accessing transit, shopping or doing other activities. Lack of adequate, secure bicycle parking can be a major deterrent to riding a bicycle. Bicycle parking facilities are typically classified either as long-term (also known as Class I) or short-term (Class II). Class I parking is meant to be used for more than two hours and is typically used by employees at work, students at school, commuters at transit stations and residents at home. Class I facilities are secure and weather-protected: examples include bicycle lockers and "bicycle corrals" (fenced-in areas usually secured by lock and

opened by keys provided to users). Class I facilities are typically located in civic centers, office buildings and multi-family residential buildings. Class II, or short-term parking, is meant for visitors, customers at stores and other users who normally park for less than two hours. The most common example of Class II parking is bicycle racks. All bicycle parking facilities should be purchased, installed, and sited per the design guidelines in the APBP *Bicycle Parking Guidelines*, 2nd Edition.

Recommended Enhancements

The following enhancements to the bicycle-parking program are recommended:

1. Update the local agency Municipal Codes to provide bicycle parking and end-of-trip facilities (e.g. shower and lockers) requirements with all new development, using the parking generation factors from the Association of Bicycle and Pedestrian Professional's (APBP's) *Bicycle Parking Guideline,* 2nd edition.
2. Select, site, and install bicycle parking fixtures and facilities per the APBP *Bicycle Parking Guidelines*, 2nd edition.
3. Require new developments to provide the location and amount of bicycle parking to the local agency's Traffic Engineering Division to allow for easy tracking and mapping. Also, record the location of new bicycle racks installed by transit agencies.
4. Develop and implement campaign to educate users on how to securely park bicycle and prevent theft.
5. Consider working with local artists and across the region to create decorative branded racks for major destinations.

GREEN INFRASTRUCTURE

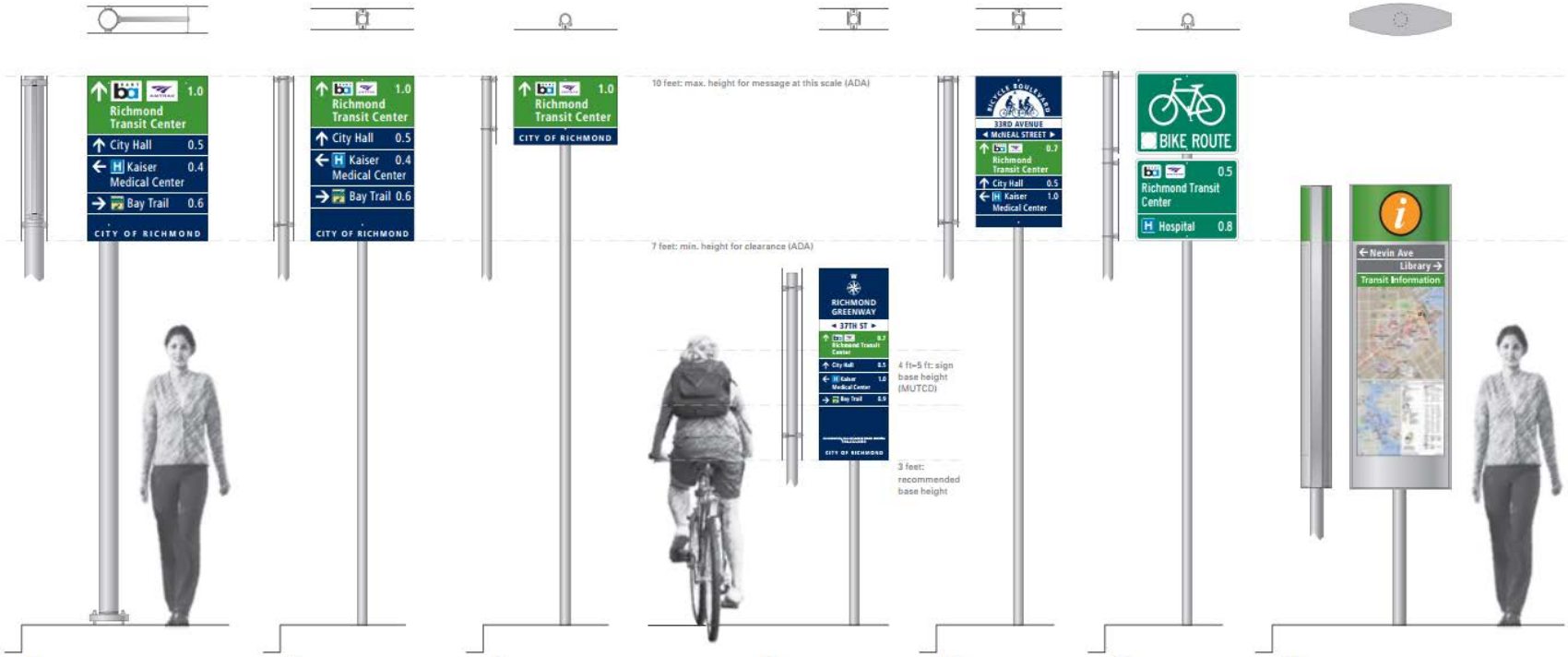
Green infrastructure and sustainable stormwater management treatments such as bioswales, flow-through planters, pervious strips, and pervious pavement should be used whenever possible with bikeway and complete streets design.

For more information, see the *NACTO Urban Street Design Guide* on stormwater management: http://nacto.org/publication/urban-street-design-guide/street-design-elements/stormwater-management/. The City of San Francisco also provides *Stormwater Design Guidelines*, as well as

construction level detail for stormwater design treatments in their *Green Stormwater Infrastructure Typical Details* document: http://sfwater.org/index.aspx?page=446.

WAYFINDING

A high quality bicycle network also includes wayfinding to assist residents and visitors in navigating the Madera region and accessing key destinations by bicycle. Wayfinding is important on trails and along on-street facilities, particularly neighborhood bikeways meandering through residential communities. Bicycle wayfinding should be placed at an appropriate height for bicyclists. Signs confirm directions to nearby destinations and typically include estimated time or distance to those destinations. Wayfinding signs should be CA MUTCD-compliant, installed at key decision points in the bicycle network, and include confirmation signs that display destinations and mileage. Local agencies and small communities should consider a branded wayfinding program for neighborhood bikeways, bicycle routes, trails, and other destinations.



P1
Pedestrian Wayfinding
Commercial Districts
28 x 36
2-sided (2 panels)
2 colors + retroreflective white + color logos

P2
Pedestrian Wayfinding
Residential Streets
24 x 36
2-sided (2 panels)
2 colors + retroreflective white + color logos

P3
Pedestrian Wayfinding
Transit Destination Only
24 x 15 (shown; may need to be 24 x 18)
1-sided (1 panel)
2 colors + retroreflective white + color logos

B1
Bike/Ped Wayfinding
Off-Street Path
16 x 42
2-sided (2 panels)
2 colors + retroreflective white + color logos

B2
Bicycle Wayfinding
Bicycle Boulevards
20 x 33
2-sided (2 panels)
2 colors + retroreflective white + color logos

B3
Bicycle Wayfinding
On-Street Routes
24 x 18 (vertical dimension of lower panel may vary)
1-sided (2 panels)
1 color + retroreflective white + color logos

M1
Map Kiosk (Transit Information)
Transit Centers
2-sided
Identical to MTC standard

Local agencies and communities could establish a branded wayfinding program similar to that developed by the West Contra Costa Transportation Advisory Committee (WCCTAC) Transit Enhancement Plan and Wayfinding Guide, shown above.