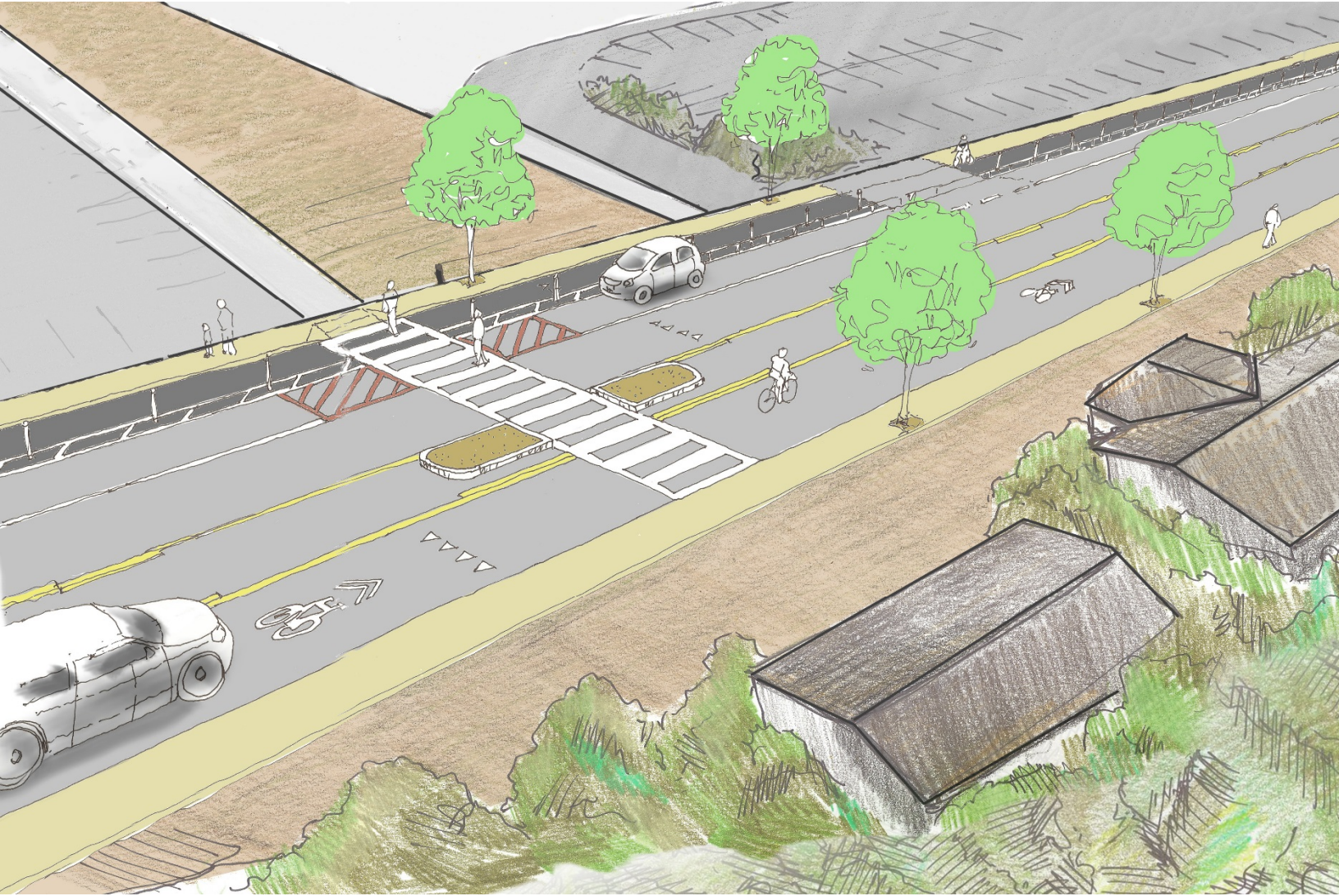


Appendix B

Active Transportation Facility Toolbox



County of San Diego
Active Transportation Plan Toolbox



Appendix B

Active Transportation Toolbox



This appendix presents the ATP Toolbox. An active transportation toolbox was developed to support and implement pedestrian and bicycle infrastructure with a variety of facility types and supporting measures. The toolbox summarizes the appropriate context and application for each tool along with additional considerations such as maintenance.

County of San Diego Active Transportation Plan

Bicycle Improvement Tools

Bike Box / Advance Stop Bar

A bike box, or an advance stop bar, is a designated area at the head of a traffic lane that provides people biking a visible way to get ahead of queuing traffic during the red signal phase. A bike box or advance stop bar gives people biking priority when traffic enters the intersection during the green signal phase. This facility can be used in conjunction with bicycle signal heads or bicycle loop detectors.



Bicycle Signals

A bicycle signal is an electrically powered traffic control device that is used in combination with a conventional traffic signal. Bicycle signals are typically used to improve safety or operational problems involving bicycle facilities or to provide guidance at intersections to indicate a bicycle-only movement or leading bicycle interval.



Bicycle Loop Detectors

A bicycle loop detector is an induction loop embedded in the pavement that is actuated when a person biking stops on a certain spot, often indicated with paint or pavement cuts. When a loop detector is used in conjunction with a bicycle signal head, the detector indicates to the bicycle signal head that a bicycle phase is necessary. When used in conjunction with a traditional traffic signal, the detector indicates that a change of phase is needed.



Bicycle Signal Push Button

A bicycle signal push button provides a similar type of actuation as bicycle loop detectors but requires the person biking to press a button to trigger the crossing phase. This type of actuation is commonly used at less frequented bicycle facilities or where a major road intersects with a minor road with a bike facility.



Share the Road Signage

Share the road signage is typically used in conjunction with Class III bike routes and indicates to drivers that people biking will be utilizing the travel lane.



9

Active Transportation Toolbox

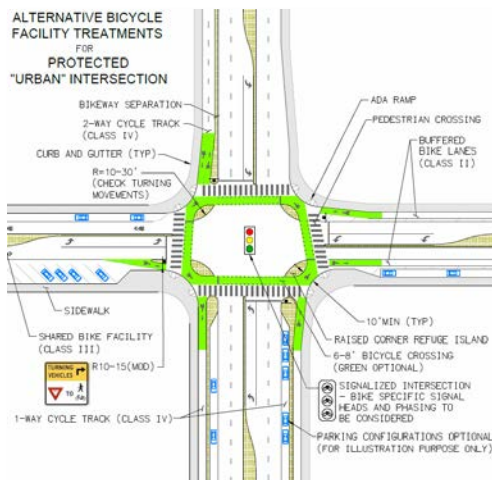
An active transportation toolbox was created as a resource for the ATP to describe various tools that may be used to implement active transportation facilities or serve as supplemental improvements within the unincorporated County. The toolbox includes a list of facilities and descriptions of the benefits and considerations in the application of each tool. A variation of the tools has been recommended with the priority projects described in this chapter.



The toolbox is designed to assist in the process of determining which tools best apply to achieve particular needs or goals.

The toolbox also includes ATP engineering design guidelines that incorporate active transportation features for the following facilities:

- Protected Signalized Intersection
- Protected Roundabout
- 1-Way Cycle Track
- 2-Way Cycle Track



The ATP engineering design guidelines for Protected Intersections and Protected Roundabouts include “urban” and “rural” treatments to account for the village, semi-rural and rural settings within the unincorporated County. The urban treatments are intended for more dense and populated locations such as the County villages. The rural treatments are intended for the less dense areas that have less activity and prefer more rustic and natural features, such as a DG pathway in lieu of a paved sidewalk. The guidelines illustrate alternative facility treatments with different context scenarios along each leg of the intersection to showcase applications to various built conditions, such as a two vs. four lane roadway or with vs. without on-street parking. The images do not represent a complete intersection application and deliberately represent a multitude of contexts to encourage innovation and flexibility in planning transportation improvements within village, semi-rural, and rural areas.

COUNTY OF SAN DIEGO
ATP TOOLBOX AT-A-GLANCE

	Land Use Category			Applicable on...						Applicable for...								Page
	Village	Semi-Rural	Rural Lands	Prime Arterial Series (6 Lane)	Major Road Series (4 Lane)	Boulevard Series (4 Lane)	Community Collector Series (4 Lane)	Light Collector Series (2 Lane)	Minor Collector Series (2 Lane)	Improving Quality of Walking Experience	Improving Visibility	Reducing Crossing Distance	Reducing Traffic Speeds	Increasing Separation between travel modes	Reducing Level of Traffic Stress (bicycles)	Reducing biking delay	Increasing Driver Awareness of People Walking and Biking	
Pedestrian Improvement Tools																		
Advance Yield Markings	•	•				•	•	•	•	•	•		•					•
Continental Crosswalks	•	•	•	•	•	•	•	•	•	•	•							•
Midblock Crossings	•	•	•			•	•	•	•	•	•	•	•					•
Curb Extensions/Bulb-outs	•	•		•	•	•	•	•	•	•	•	•	•					•
Raised Crosswalk	•	•				•	•	•	•	•	•		•					•
Median Refuge Island	•	•		•	•	•	•	•	•	•	•	•		•	•			•
Rectangular Rapid Flashing Beacons	•	•				•	•	•	•	•	•		•		•			•
Bicycle Improvement Tools																		
Share the Road Signage			•							•	•							•
Bike Boxes/ Advance Stop Bar	•	•		•	•	•	•	•	•		•			•		•		•
Bicycle Signals	•			•	•	•	•	•	•					•	•	•		
Bicycle Loop Detectors	•	•		•	•	•	•									•		
Bicycle Signal Push Button Actuation	•	•		•	•	•	•									•		
Class I Bike Path		•	•								•			•	•	•		
Class II Bike Lanes	•	•	•	•	•	•	•	•	•					•	•			
Class III Bike Route	•	•	•												•			
Class IV Cycle Track	•	•		•	•	•	•	•	•		•			•	•	•		
Neighborhood Traffic Circles	•	•	•								•		•		•	•	•	
<i>End-of-Trip Improvement Tools</i>																		
Bike Parking	•	•																
Bike Corral	•	•																
Bike Lockers	•																	
Multi-Modal Improvement Tools																		
Signs	•	•	•	•	•	•	•	•	•	•			•					•
Way-finding Signage	•	•	•	•	•	•	•	•	•	•								•
Lighting	•			•	•	•	•	•	•	•	•							•
Protected Intersection	•	•		•	•	•	•	•	•	•		•		•	•	•		•
Protected Roundabout	•	•		•	•	•	•	•	•	•		•	•	•	•	•		•
Integrated Green Street	•	•	•	•	•	•	•	•	•	•				•				

Flexibility in Road Design

The following table provides an outline of flexible designs for the County of San Diego Mobility Element Road Classifications. These flexible design dimensions show possible configurations of future road designs that include robust biking and walking facilities, while maintaining the Mobility Element classifications for vehicle travel lanes.

Active Transportation Plan Flexibility in Roadway Design Guidelines						
Mobility Element Road Classification	General Travel Lanes (#/Width)	Median Width	Shoulder/ Parking	Bikeway	Parkway	ROW Width
Expressway (6.1)	6/12'	24'	2/6'	2/12'	14'	146'-158**
Prime Arterial (6.2)	6/11'	14'	-	2/12'	12'	122'-134**
Major Road						
With raised median (4.1A)	4/11'***	14'	-	2/12'	12'	98'-110**
With Intermittent turn lane (4.1B)	4/11'***	-	-	2/12'	12'	98'-110**
Boulevard						
With raised median (4.2A)	4/11'	14'	2/7'	2/9'	10'	106'-118**
With intermittent turn lanes (4.2B)	4/11'	-	2/7'	2/9'	10'	106'-118**
Community Collector						
With raised median (2.1A)	2/11'	10'	-	2/12'	10'	74'-84**
With turn lanes or no median (2.1B, C, D, E)	2/11'	-	2/7'	2/12'	10'	74'-84**
Light Collector						
With raised median (2.2A)	2/11'	10'	-	2/14'	10'	78'-88**
With turn lanes or no median (2.2B, C, D, E)	2/11'	-	2/7'	2/10'	10'	78'-88**
Minor Collector						
With raised median (2.3A)	2/11'	10'	-	2/15'	12'	82'-92**
With turn lanes or no median (2.3B, C)	2/11'	-	2/7'	2/10'	12'	82'-92**
Residential Collector/Road	2/11'	-	2/7'	-	2/12'	60'

A "-" indicates that particular road feature is not present (or intermittent) and the space has been repurposed.

* per Note 8 of the Public Road Standards: ME roads designated with Bike Ways will require an additional 10' of pavement and ROW. This may be increased to 12' for four-lane roads and above based upon the provision in Section 7.3 of these standards.

**Depending on the volumes/speeds lane widths should be evaluated for reduction from standard 12' (ex. > 40,000 ADT & >50MPH).

Pedestrian Improvement Tools

Advance Yield Markings

An advance stop or yield line placed approximately 20 to 50 feet ahead of a crosswalk can greatly reduce the likelihood of a collision. The markings encourage drivers to stop back far enough to allow a pedestrian to cross and have visibility of vehicles in other travel lanes. Parking is typically restricted between the stop or yield line and the crosswalk to allow for better visibility. Advance yield markings should be supplemented with additional signage or beacons, such as a RRFB and are often used at midblock crossings.



Continental Crosswalks

Continental crosswalks are high visibility markings that establish clear limits of the crossing zone. These crosswalks are more visible to approaching vehicles and improve yielding behavior when compared to traditionally striped crosswalks. Continental crosswalks are the standard for all new or upgraded crosswalks in the unincorporated County of San Diego. Continental crosswalks are also encouraged to should be used at midblock crossings.



Median Refuge Island

Median refuge islands are typically provided in between opposing travel lanes to provide pedestrians or bicyclists with a resting place while crossing the street. These islands are generally raised and reduce the exposure time of a person crossing by allowing them to cross in front of one direction of traffic at a time. Median refuge islands help facilitate crossing wide roadways.



Rectangular Rapid Flashing Beacon (RRFB)

RRFBs are user-actuated LED lights that supplement warning signs and other treatments at unsignalized intersections or midblock crossing. They are triggered either manually by a push button or by a detection system, and serve to increase driver awareness of people crossing.



Midblock Crossing

Midblock crossings are pedestrian or bicycle crossings that occur away from an intersection. These crossings are often used to facilitate crossings on long blocks or between two destinations which are not near an intersection. In order to facilitate a safer crossing, midblock crossings are installed with continental striping, as well as, one or multiple of the following treatments: RRFBs, median refuge islands, and advance yield markings.



Signs

Signs are used throughout all active transportation facilities to convey important things about changes in the roadway, the other road users, and proper road behavior. This toolbox provides specific guidance on signs for protected intersections and protected roundabouts, as well as, share the road signage, and wayfinding signage.

Bulb Outs/Curb Extensions

Description and Purpose

Bulb outs, also known as curb extensions, extend the curb at the corners of an intersection into the parking lane or shoulder. By narrowing the width of the roadway, bulb outs can reduce vehicular speeds, reduce the crossing distance for people walking, and improve visibility of those crossing. Bulb outs may be installed at an intersection or at mid-block. Bulb outs placed at mid-block are also known as Chokers.

Advantages

- Improves walking environment
- Improves visibility of pedestrians
- Reduces crossing distance
- Reduces turning speeds
- Increases driver awareness of people walking and biking
- Opportunities to implement green infrastructure

Considerations

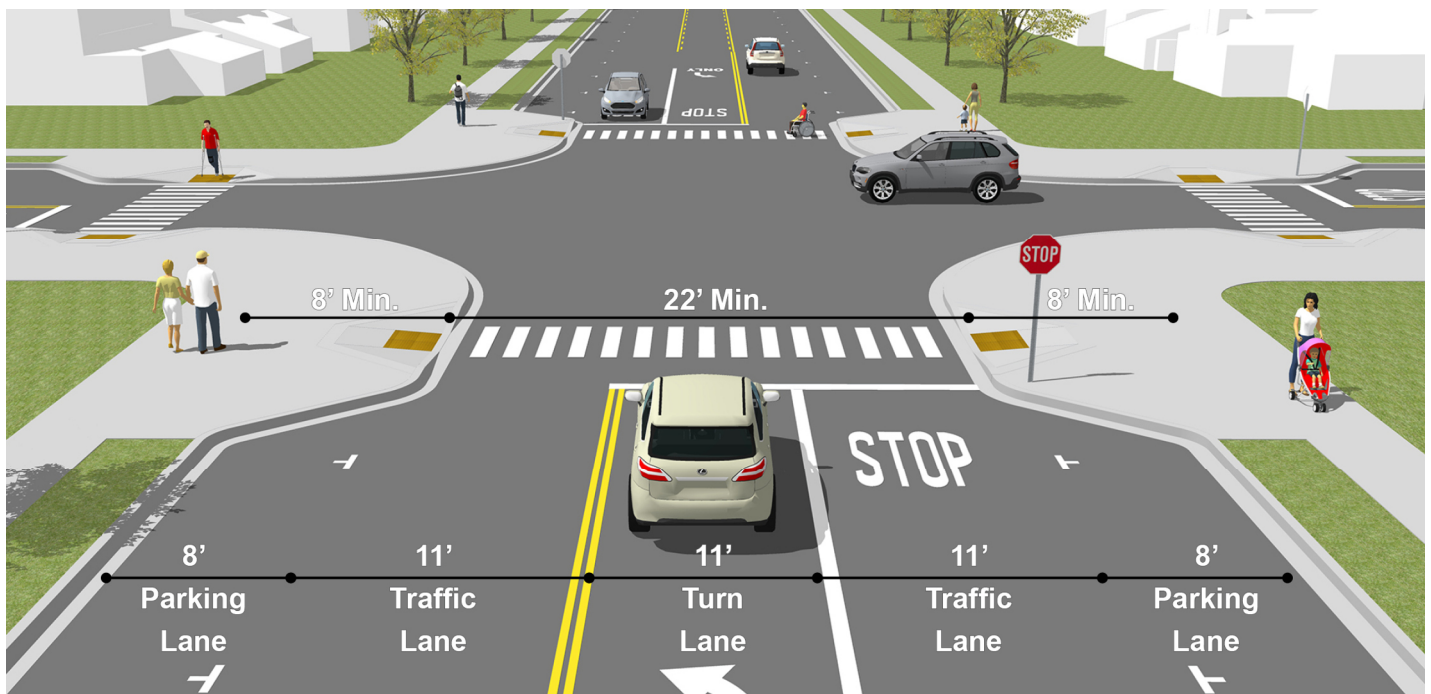
- Increases regular maintenance
- May affect turning radius for larger vehicles



Facility Facts

Land Use Categories	Village Semi-Rural
Applicable On	Prime Arterial Series (6 lane) Major Road Series (4 lane) Boulevard Series (4 lane) Community Collector Series (4 lane) Light Collector Series (2 lane) Minor Collector Series (2 lane)
Applicable For	Improving visibility Reducing traffic speeds Increasing separation between travel modes Reducing level of traffic stress for bicycles Reducing biking delay Increasing driver awareness of people walking and biking

Typical Cross Section



Raised Crosswalk

Description and Purpose

A raised crosswalk is a flat-topped speed hump or speed table that requires motorists to slow down as they proceed through the elevated section of the road. The elevation of a raised crosswalk is the same as the sidewalk and enables pedestrians to cross the street without a change in elevation. Truncated domes are provided at each approach to indicate that the person walking is entering a crossing. Raised crosswalks may be built with a variety of materials, including asphalt, concrete, stamped concrete, or pavers.

Advantages

- Reduces travel speeds
- Improves walking environment
- Improves visibility of pedestrians and bicyclists
- Eliminates need for curb ramps
- Advantageous at school entrances to slow traffic and accommodate pedestrians

Considerations

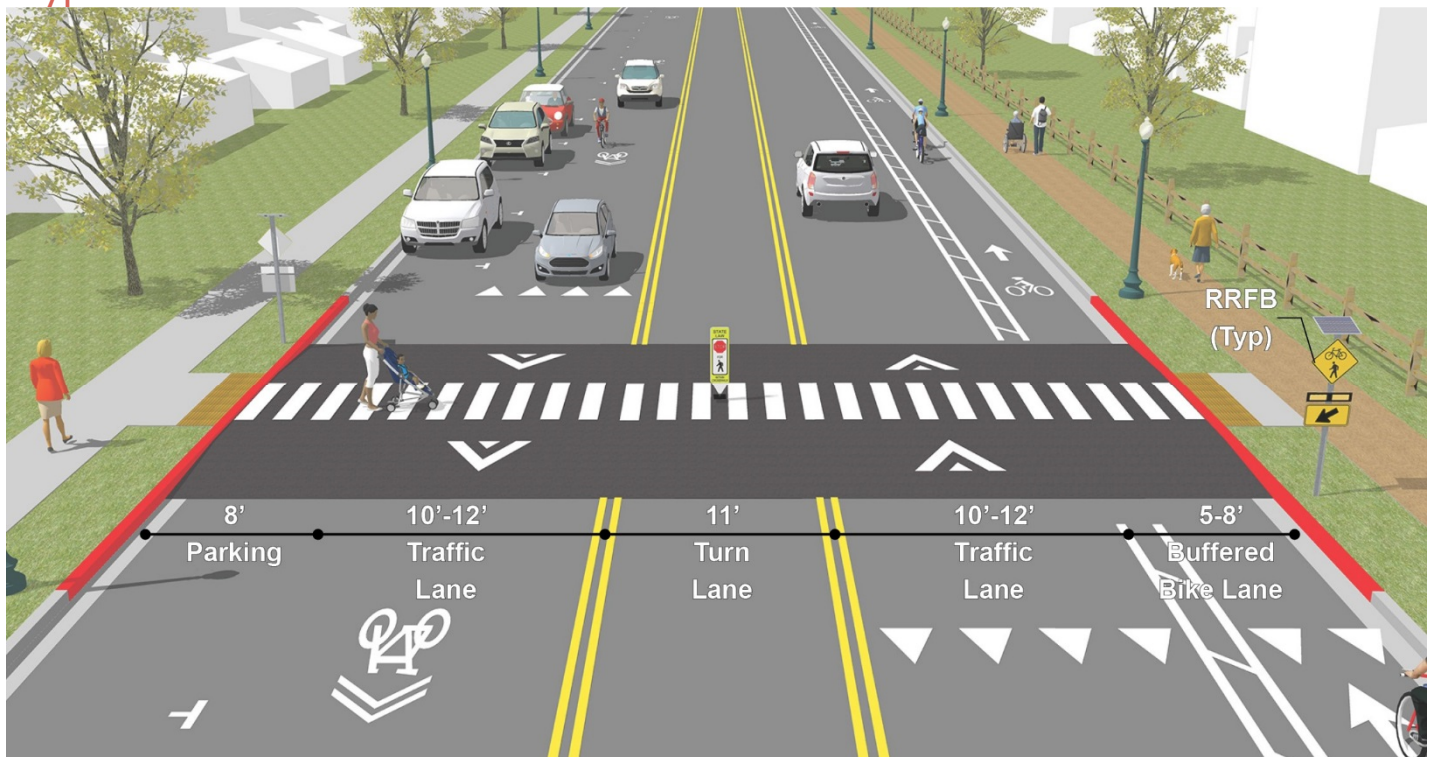
- Increases regular maintenance
- May require loss of parking
- May require modifications to drainage
- May be inappropriate for crossings on curves or steep roadway grades
- May be inappropriate along bus routes or emergency routes



Facility Facts

Land Use Categories	Village Semi-Rural
Applicable On	Boulevard Series (4 lane) Community Collector Series (4 lane) Light Collector Series (2 lane) Minor Collector Series (2 lane)
Applicable For	Improving quality of walking experience Improving visibility of people walking Reducing traffic speeds Increasing driver awareness of pedestrians

Typical Cross Section



Bicycle Improvement Tools

Bike Box / Advance Stop Bar

A bike box, or an advance stop bar, is a designated area at the head of a traffic lane that provides people biking a visible way to get ahead of queuing traffic during the red signal phase. A bike box or advance stop bar gives people biking priority when traffic enters the intersection during the green signal phase. This facility can be used in conjunction with bicycle signal heads or bicycle loop detectors.



Bicycle Signals

A bicycle signal is an electrically powered traffic control device that is used in combination with a conventional traffic signal. Bicycle signals are typically used to improve safety or operational problems involving bicycle facilities or to provide guidance at intersections to indicate a bicycle-only movement or leading bicycle interval.



Bicycle Loop Detectors

A bicycle loop detector is an induction loop embedded in the pavement that is actuated when a person biking stops on a certain spot, often indicated with paint or pavement cuts. When a loop detector is used in conjunction with a bicycle signal head, the detector indicates to the bicycle signal head that a bicycle phase is necessary. When used in conjunction with a traditional traffic signal, the detector indicates that a change of phase is needed.



Bicycle Signal Push Button

A bicycle signal push button provides a similar type of actuation as bicycle loop detectors but requires the person biking to press a button to trigger the crossing phase. This type of actuation is commonly used at less frequented bicycle facilities or where a major road intersects with a minor road with a bike facility.



Share the Road Signage

Share the road signage is typically used in conjunction with Class III bike routes and indicates to drivers that people biking will be utilizing the travel lane.



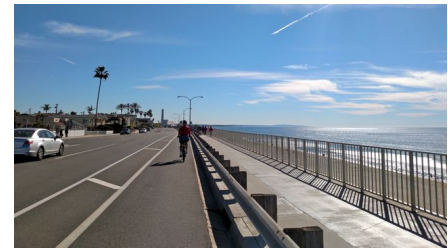
Class I Bikeway (Bike Path)

Bike paths provide a completely separated right of way for the exclusive use of people walking and biking to minimize crossflow with motorists. These facilities are generally completely off-road and in some cases do not follow the same alignment as a road.



Class II Bikeway (Bike Lane)

Bike lanes provide a striped lane for one-way bike travel on a street or a highway. These facilities have a width of at least 5 feet and in some cases have a painted buffer on the side of the travel lane to separate people biking from the “door zone” next to parked cars.



Class III Bikeway (Bike Route)

Bike routes provide for shared use with vehicular traffic within the travel lane. These facilities are often used in conjunction with Share the Road signage or Bikes May Use the Full Lane signage. In some cases bike routes function as bicycle boulevards with preference given to people on bikes via vehicular stop control on intersecting streets.



Class IV Cycle Track

Description and Purpose

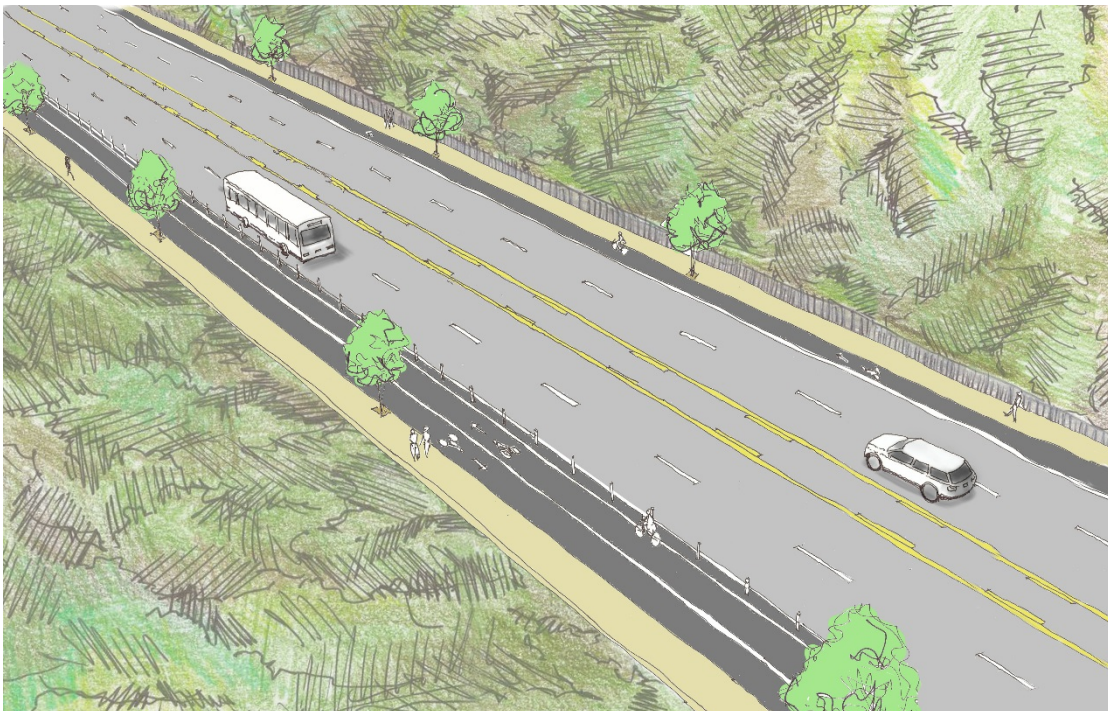
Class IV cycle tracks are exclusive bike facilities that combine the user experience of a separated path with the on-street infrastructure of a conventional bike lane. Cycle tracks are physically separated from vehicular traffic through a variety of physical elements ranging from reflective bollards, planters, raised curbs, and parked vehicles. They can be separated from the sidewalk with grade separation. Cycle tracks can be designed as one-way or two-way depending on the street network, available right-of-way, and adjacent land use.

Advantages

- Improves visibility of people biking
- Increases separation between travel modes
- Reduces levels of stress for people biking
- Reduces biking delay
- Increases driver awareness of people biking
- Opportunities to implement green infrastructure

Considerations

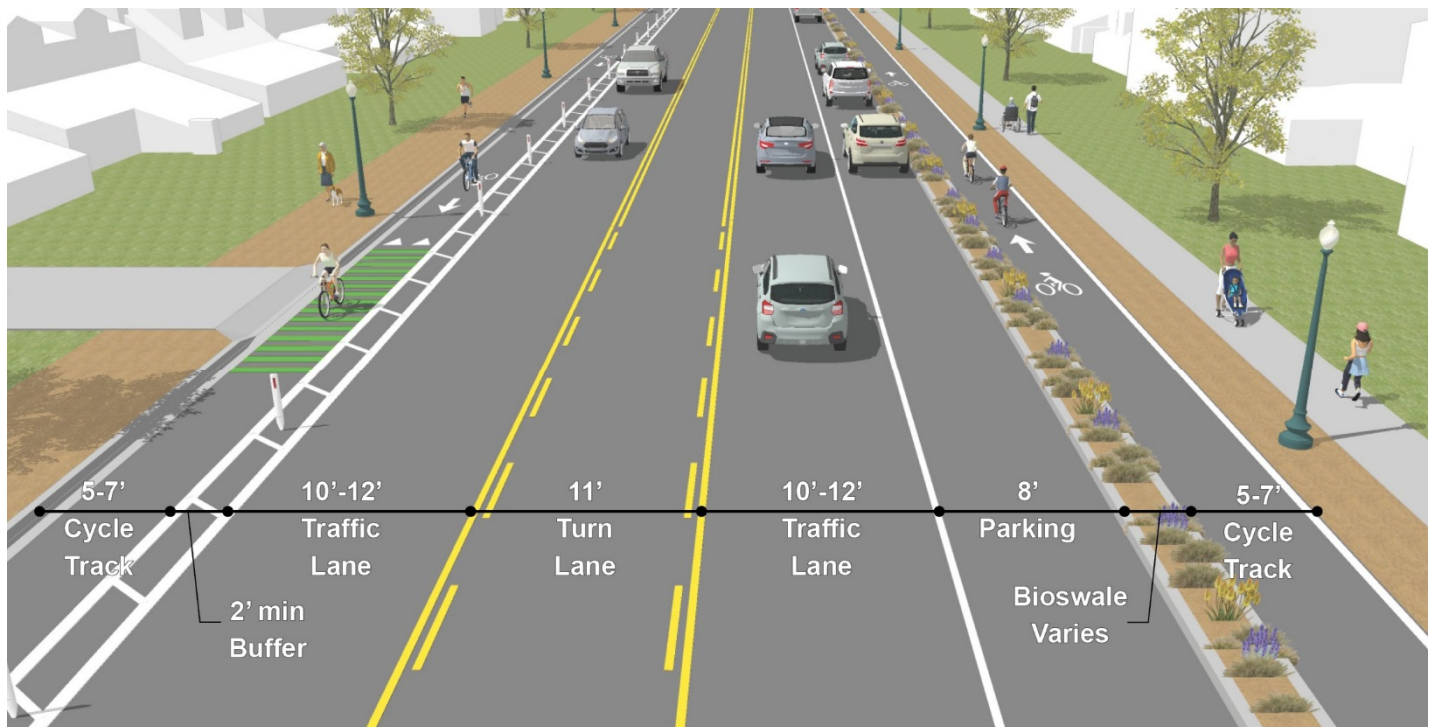
- Requires buffer from on-street parking and the door zone
- May require additional right-of-way or require reductions in travel lane widths
- Must provide and be integrated with appropriate crossing facilities at intersections



Facility Facts

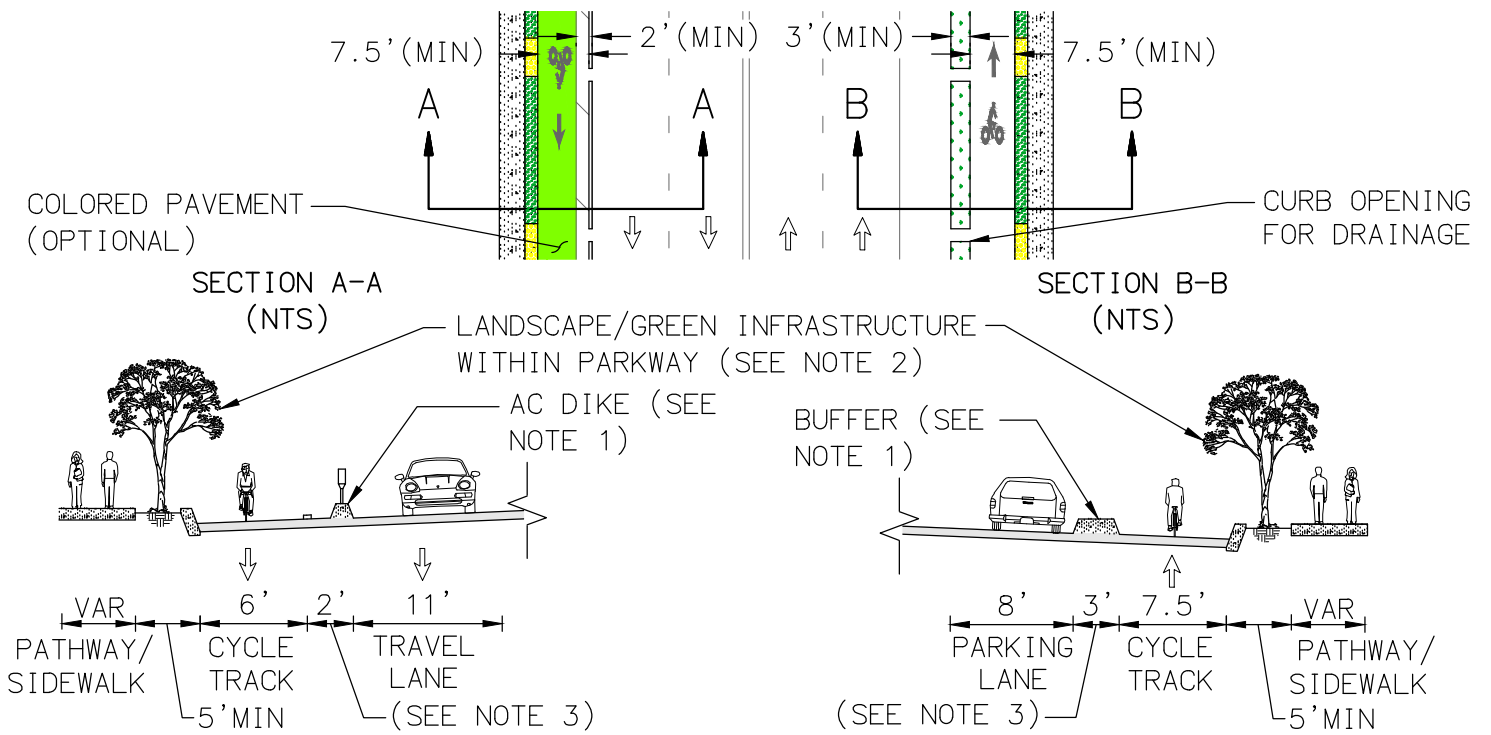
Land Use Categories	Village Semi-Rural
Applicable On	Prime Arterial Series (6 lane) Major Road Series (4 lane) Boulevard Series (4 lane) Community Collector Series (4 lane) Light Collector Series (2 lane) Minor Collector Series (2 lane)
Applicable For	Improving visibility Increasing separation between travel modes Reducing level of traffic stress for bicycles Reducing biking delay Increasing driver awareness of people walking and biking

Typical Cross Section

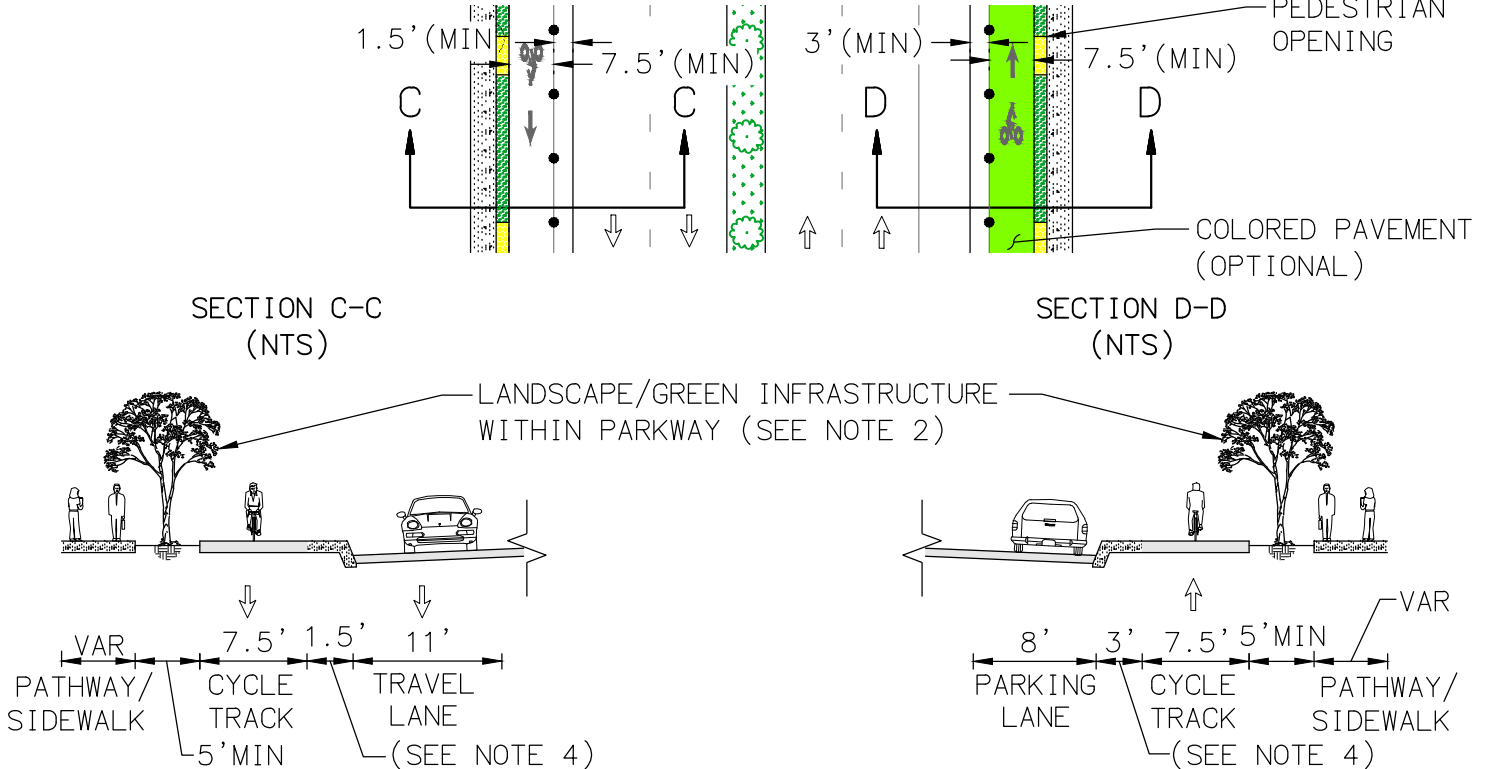


1-WAY CYCLE TRACK

SEPARATED BIKEWAY ON STREET



GRADE SEPARATED BIKEWAY



NOTES:

1. MAY BE A RAISED ISLAND OR FLEXIBLE POST/INFLEXIBLE BARRIER WITH CURB/DIKE.
2. PERIODIC OPENINGS SHOULD BE PROVIDED FOR ACCESS.
3. MINIMUM CLEARANCE CAN BE REDUCED TO 2' IF NO ON-STREET PARKING IS PROVIDED.
4. MINIMUM CLEARANCE CAN BE REDUCED TO 1.5' IF NO ON-STREET PARKING IS PROVIDED.

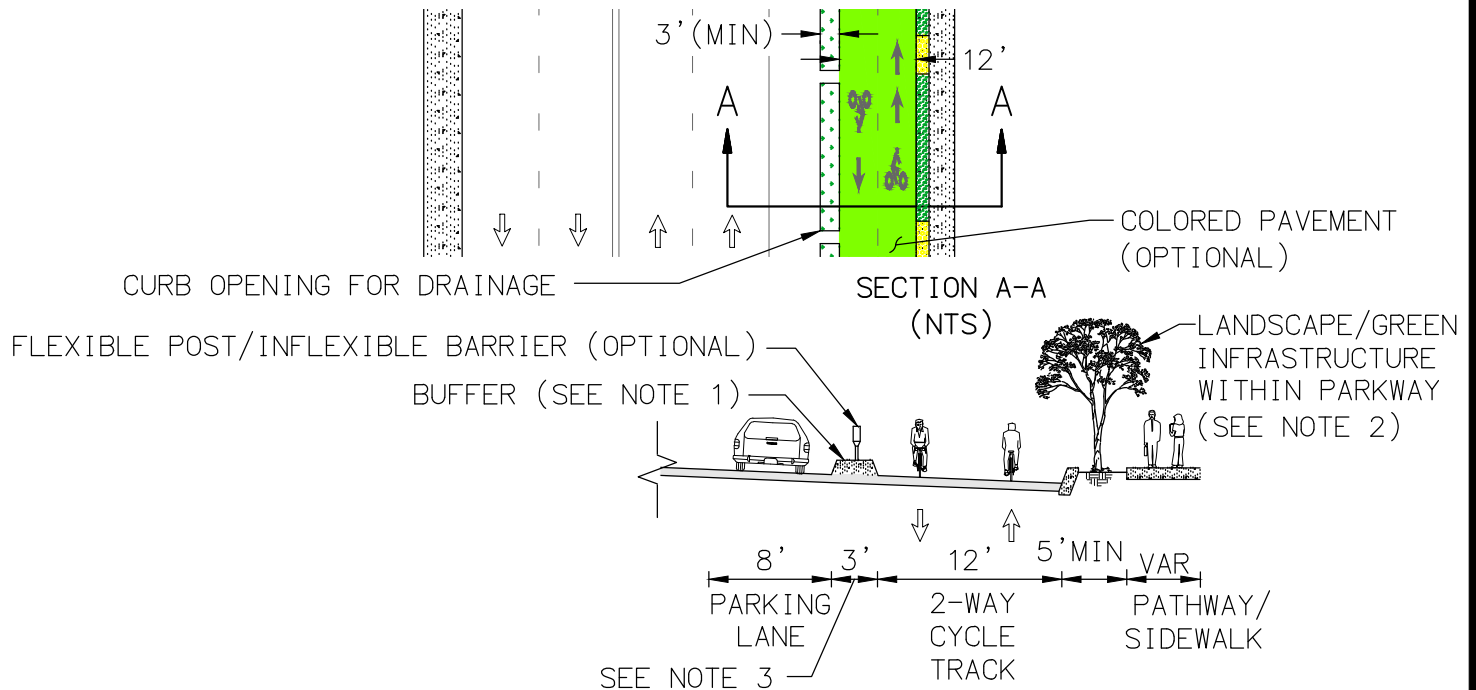


COUNTY OF SAN DIEGO
ACTIVE TRANSPORTATION PLAN

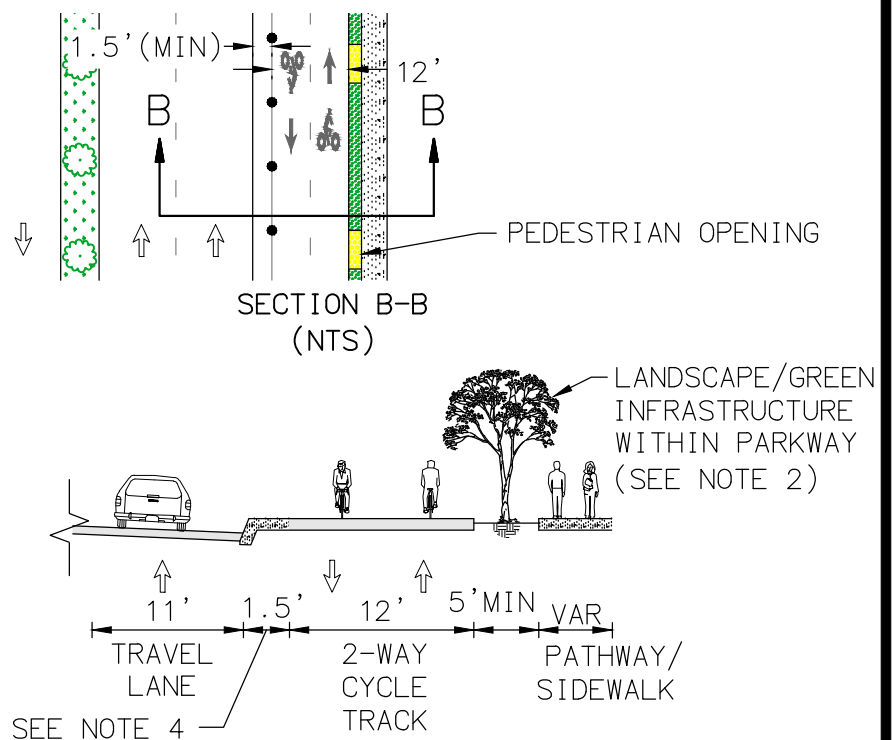


2-WAY CYCLE TRACK

SEPARATED BIKEWAY ON STREET



GRADE SEPARATED BIKEWAY



NOTES:

1. MAY BE A RAISED ISLAND OR FLEXIBLE POST/INFLEXIBLE BARRIER WITH CURB/DIKE.
2. PERIODIC OPENINGS SHOULD BE PROVIDED FOR ACCESS.
3. MINIMUM CLEARANCE CAN BE REDUCED TO 2' IF NO ON-STREET PARKING IS PROVIDED.
4. MINIMUM CLEARANCE CAN BE REDUCED TO 1.5' IF NO ON-STREET PARKING IS PROVIDED.



COUNTY OF SAN DIEGO
ACTIVE TRANSPORTATION PLAN



Neighborhood Traffic Circle

Description and Purpose

A neighborhood traffic circle is a raised island placed in an intersection for traffic to circulate around. A neighborhood traffic circle is typically used as a traffic calming device, as it requires drivers to slow to a speed that allows them to maneuver around the island. The intent of including a neighborhood traffic circle in the Active Transportation Toolbox is to encourage the incorporation of bicycle and pedestrian facilities to provide a multi-modal facility that accommodates all users.

Advantages

- Reduces traffic speed at intersection
- Reduces level of traffic stress for people biking
- Reduces biking delay
- Increases driver awareness of people walking and biking
- Opportunities to implement green infrastructure

Considerations

- Not applicable on roads with heavy traffic or higher roadway classifications
- One lane in each direction entering the intersection
- Not typically used at intersections with high volume of large trucks or buses turning left
- Must accommodate emergency vehicles
- If landscaping is provided in the traffic circle, adequate site distance must be maintained



Facility Facts

Land Use Categories	Village Semi-Rural Rural Lands
Applicable On	Light Collector Series (2 lane) Minor Collector Series (2 lane)
Applicable For	Improving visibility of people walking and biking Reducing traffic speeds Reducing level of traffic stress for people biking Reduces biking delay Increasing driver awareness of people walking and biking

Typical Cross Section



End of Trip Improvement Tools

Bike Parking

Bike parking can come in many different shapes and sizes and can sometimes double as public art. The most common types of bike parking are the inverted U rack and the post & ring rack. These bike parking options allow people biking to secure both their frame and a wheel. These bike parking solutions are generally installed on the sidewalk.



Bike Corral

Bike corrals provide bicycle parking in a street area adjacent to the curb, like a pre-existing parking space or a red curb area. Corrals are often used where sidewalk space is limited and bicycle activity is strong, like denser village areas. When bike corrals replace a single vehicular parking space, they can generally fit 8 to 12 bicycles.



Bike Lockers

Bike lockers are a form of long-term bicycle parking and are often installed at park-and-ride stations where a person may be leaving their bike for a day or more. A bike locker is a metal box specifically sized for a bicycle and only one individual has the key. In less frequented areas, bike lockers provide a more secure method of parking and greatly reduce bicycle thefts.



Multi-Modal Improvement Tools

Wayfinding

Wayfinding signs are used to provide directions to destinations, signify turns in a bikeway or pedestrian route or distance to features of the route – such as restrooms or water fountains. Wayfinding signs can be placed at different heights depending on the intended audience – higher for people biking and lower for people walking. These signs are intended to improve the walking and biking experience.



Lighting

Lighting at appropriate scales can be used to enhance active transportation facilities. Pedestrian scale lighting improves visibility of facilities and the person walking. As street lighting is often focused on travel lanes, lighting specifically for people biking can be added to bicycle facilities. This type of lighting is especially recommended for off-road bicycle facilities like bike paths or cycle tracks or for roads with adequate lighting.



Protected Intersection

Description and Purpose

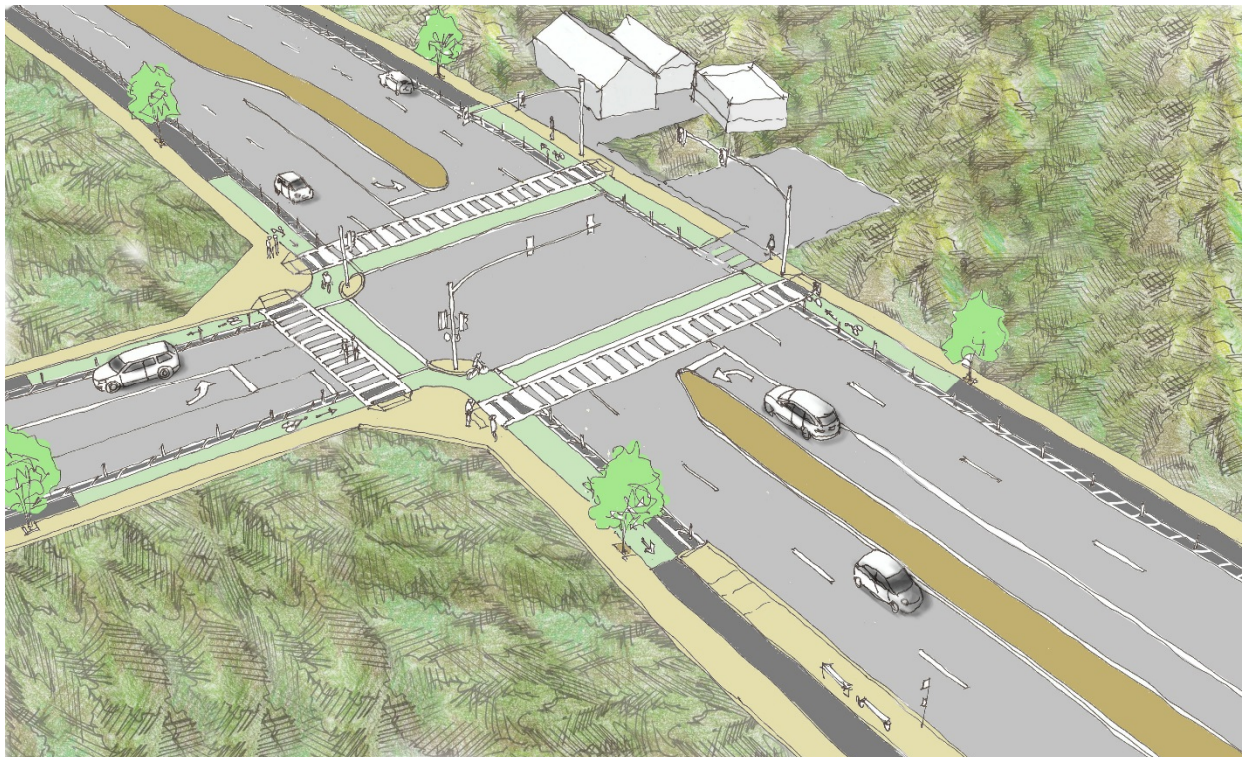
A protected intersection is an at-grade intersection treatment in which bicyclists and pedestrians are physically separated from vehicular traffic. Design typically includes a corner refuge island and a setback crossing of the pedestrian and bicyclists. Protected intersections promote improved crossing facilities for people walking and biking, particularly in comparison to a standard intersection where a bike lane ends upon approach or is merged with a turn lane.

Advantages

- Provides separated facilities for each user to navigate
- Improves visibility of people walking and bicycling
- Reduces crossing distance
- Reduces levels of traffic stress for bicyclist
- Reduces biking delay
- Improves left-turns at intersections for bicyclists
- Opportunities to implement green infrastructure

Considerations

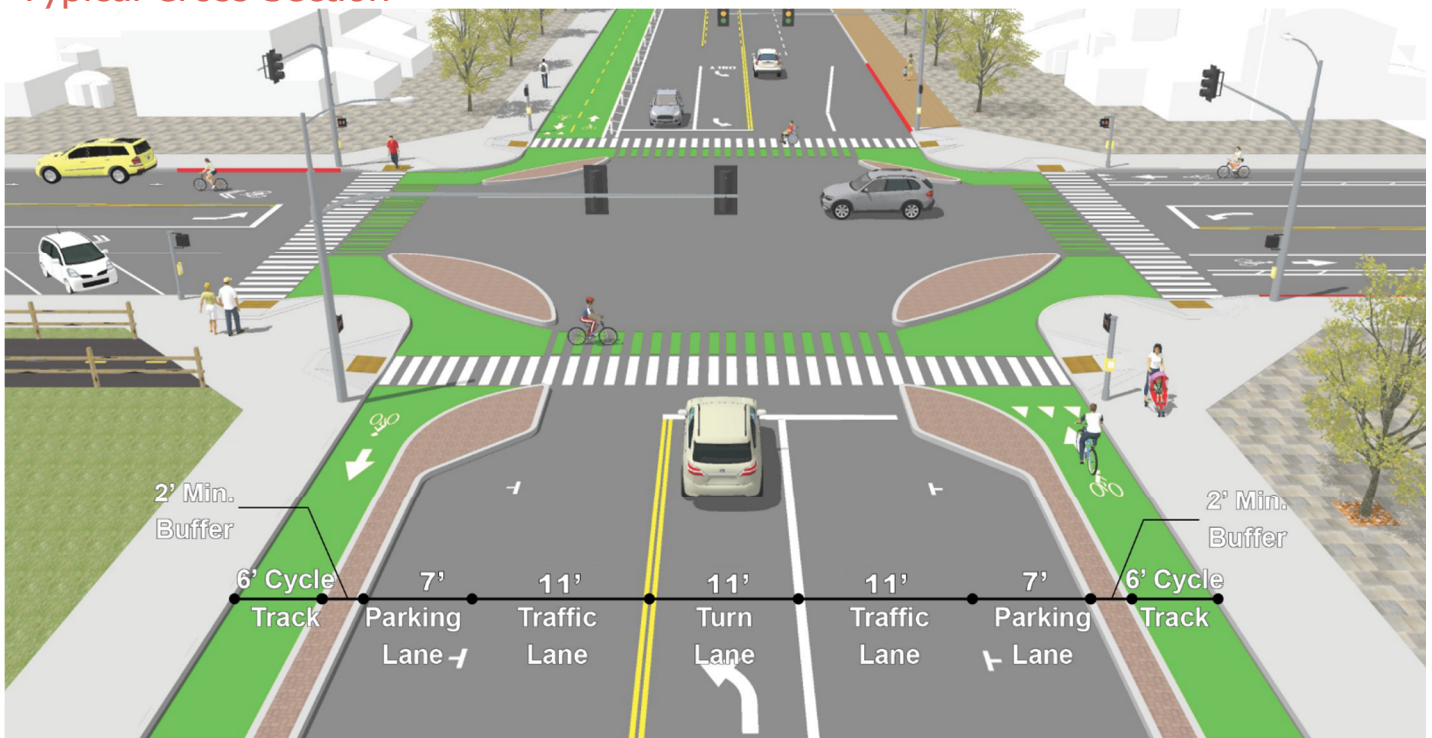
- Increases regular maintenance
- Adequate right-of-way
- Large truck turning movements
- Sidewalks may require narrowing to accommodate the lateral right shift of bicycles crossing
- ADA requirements and facilities



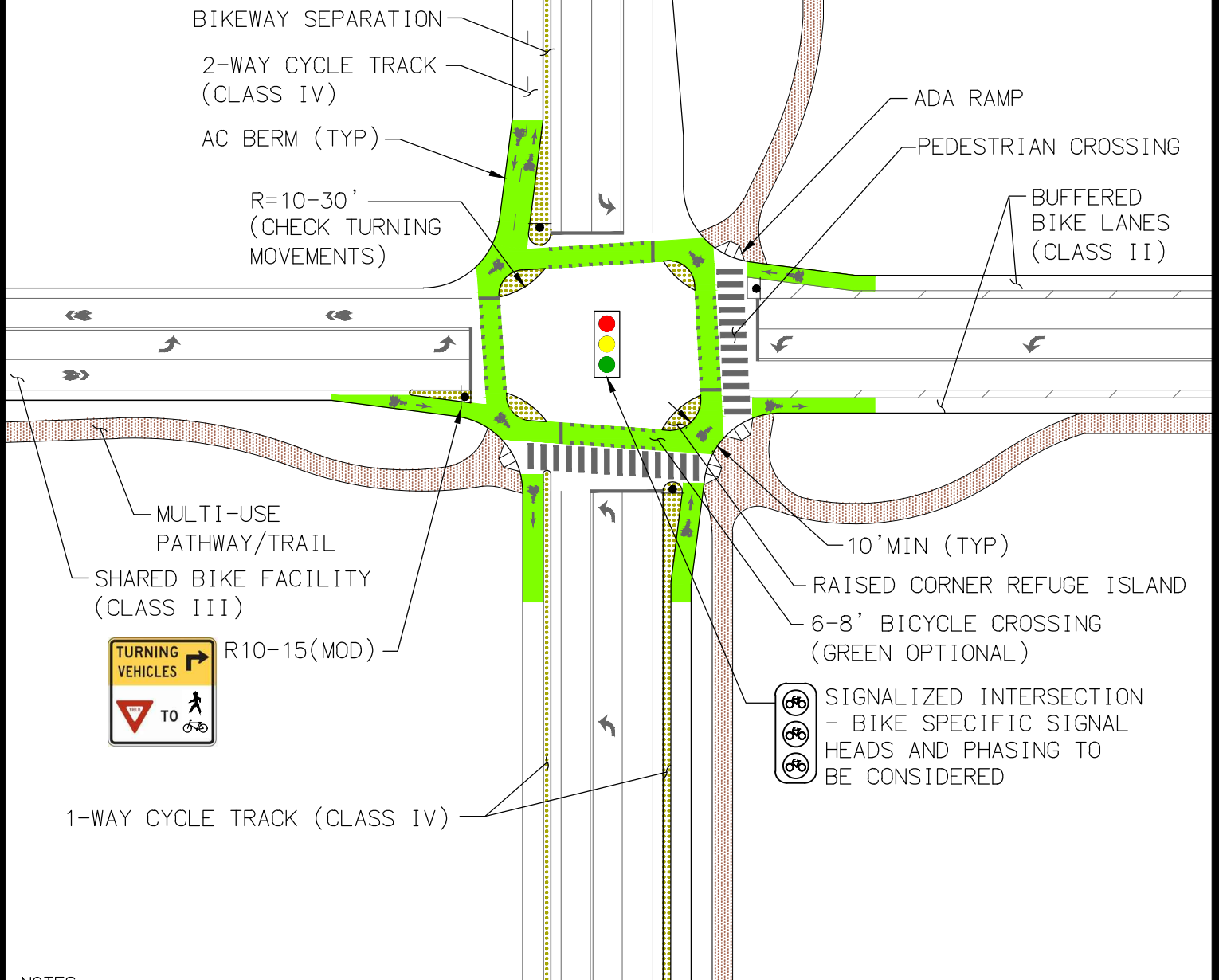
Facility Facts

Land Use Categories	Village Semi-Rural
Applicable On	Prime Arterial Series (6 lane) Major Road Series (4 lane) Boulevard Series (4 lane) Community Collector Series (4 lane) Light Collector Series (2 lane) Minor Collector Series (2 lane)
Applicable For	Improving quality of walking experience Incorporating pedestrian and bicycle facilities Increasing separation between travel modes Reducing levels of traffic stress for people biking Reduces biking delay Increases driver awareness of people walking and

Typical Cross Section



ALTERNATIVE BICYCLE FACILITY TREATMENTS FOR PROTECTED "RURAL" INTERSECTION



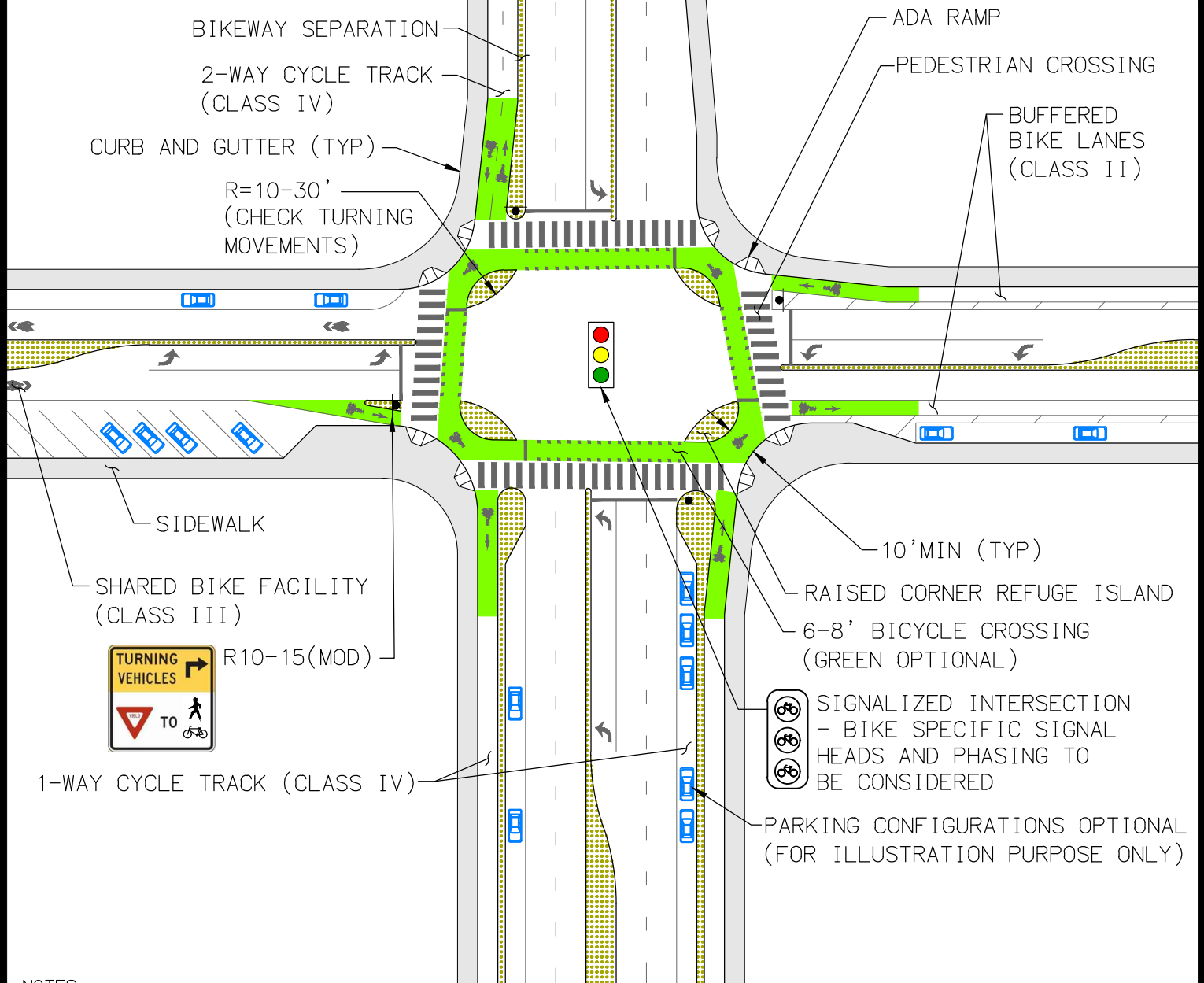
NOTES:

1. REFER TO COUNTY OF SAN DIEGO PUBLIC ROAD STANDARDS FOR INTERSECTION DESIGN GUIDELINES.
2. SEE CALTRANS DIB 89 FOR ADDITIONAL CLASS IV GUIDANCE.

FACILITY CONTEXT	
LAND USE CATEGORIES	SEMI-RURAL RURAL LANDS
RURAL FEATURES	NO PARKING FACILITIES INTERSECTING MULTI-USE PATHWAYS/TRAILS
APPLICABLE ON	BOULEVARD, MAJOR ROAD, AND COLLECTOR



ALTERNATIVE BICYCLE FACILITY TREATMENTS FOR PROTECTED "URBAN" INTERSECTION



NOTES:

1. REFER TO COUNTY OF SAN DIEGO PUBLIC ROAD STANDARDS FOR INTERSECTION DESIGN GUIDELINES.
2. SEE CALTRANS DIB 89 FOR ADDITIONAL CLASS IV GUIDANCE.

FACILITY CONTEXT	
LAND USE CATEGORIES	VILLAGE
	SEMI-RURAL
URBAN FEATURES	PARKING FACILITIES
	SIDEWALKS
APPLICABLE ON	BOULEVARD, MAJOR ROAD, AND COLLECTOR



Protected Roundabout

Description and Purpose

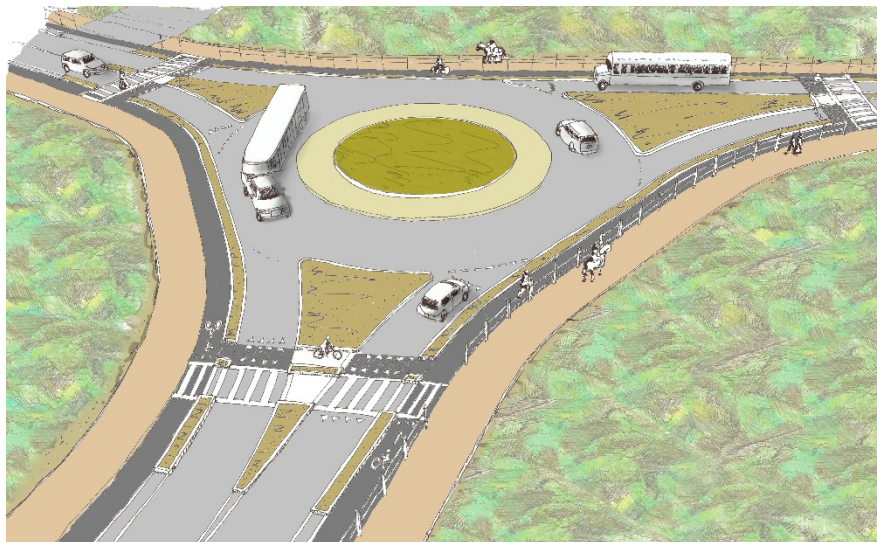
A protected roundabout is an intersection treatment that incorporates a roundabout with a protected bike lane and sidewalk. The concept of a protected roundabout is to increase safety and mobility for people walking and biking by providing all users with protected facilities separated from vehicular traffic. Providing dedicated bike facilities immensely helps bicyclists navigate through an intersection where a turn is required, thereby minimizing the need to use the sidewalk, cut across lanes for a left-turn, or merge with vehicular traffic in a standard roundabout.

Advantages

- Provides separated facilities for each user to navigate through an intersection
- Improves visibility of people walking and bicycling
- Maintains traffic flow
- Reduces crossing distance
- Reduces levels of traffic stress for bicyclist
- Reduces biking delay
- Opportunities to implement green infrastructure

Considerations

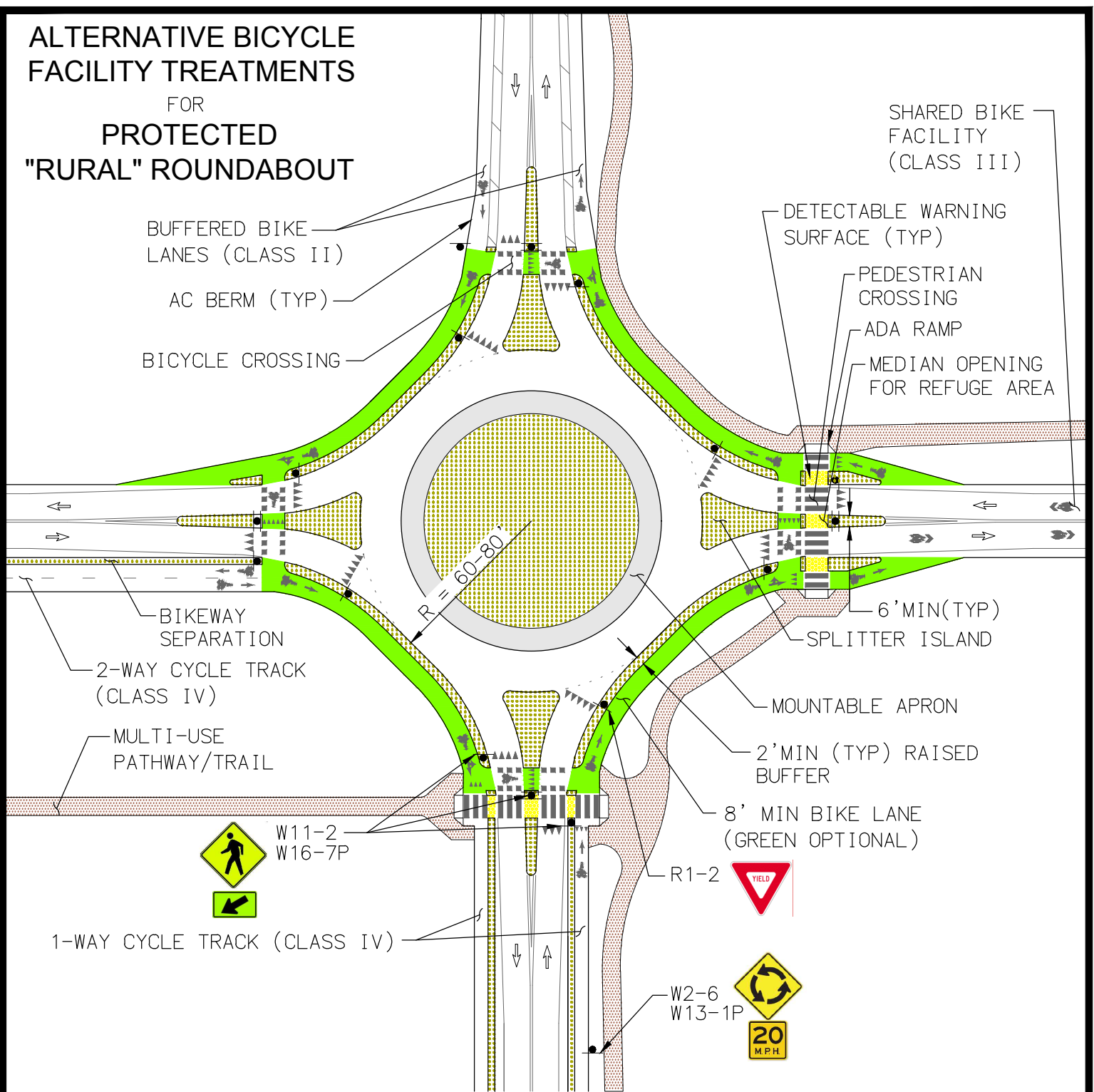
- Increases regular maintenance
- Requires adequate right-of-way and placement
- Roundabout design guidelines and warrants apply



Facility Facts

Land Use Categories	Village Semi-Rural
Applicable On	Prime Arterial Series (6 lane) Major Road Series (4 lane) Boulevard Series (4 lane) Community Collector Series (4 lane) Light Collector Series (2 lane) Minor Collector Series (2 lane)
Applicable For	Improves quality of walking experience Incorporate pedestrian and bicycle facilities

ALTERNATIVE BICYCLE FACILITY TREATMENTS FOR PROTECTED "RURAL" ROUNDABOUT



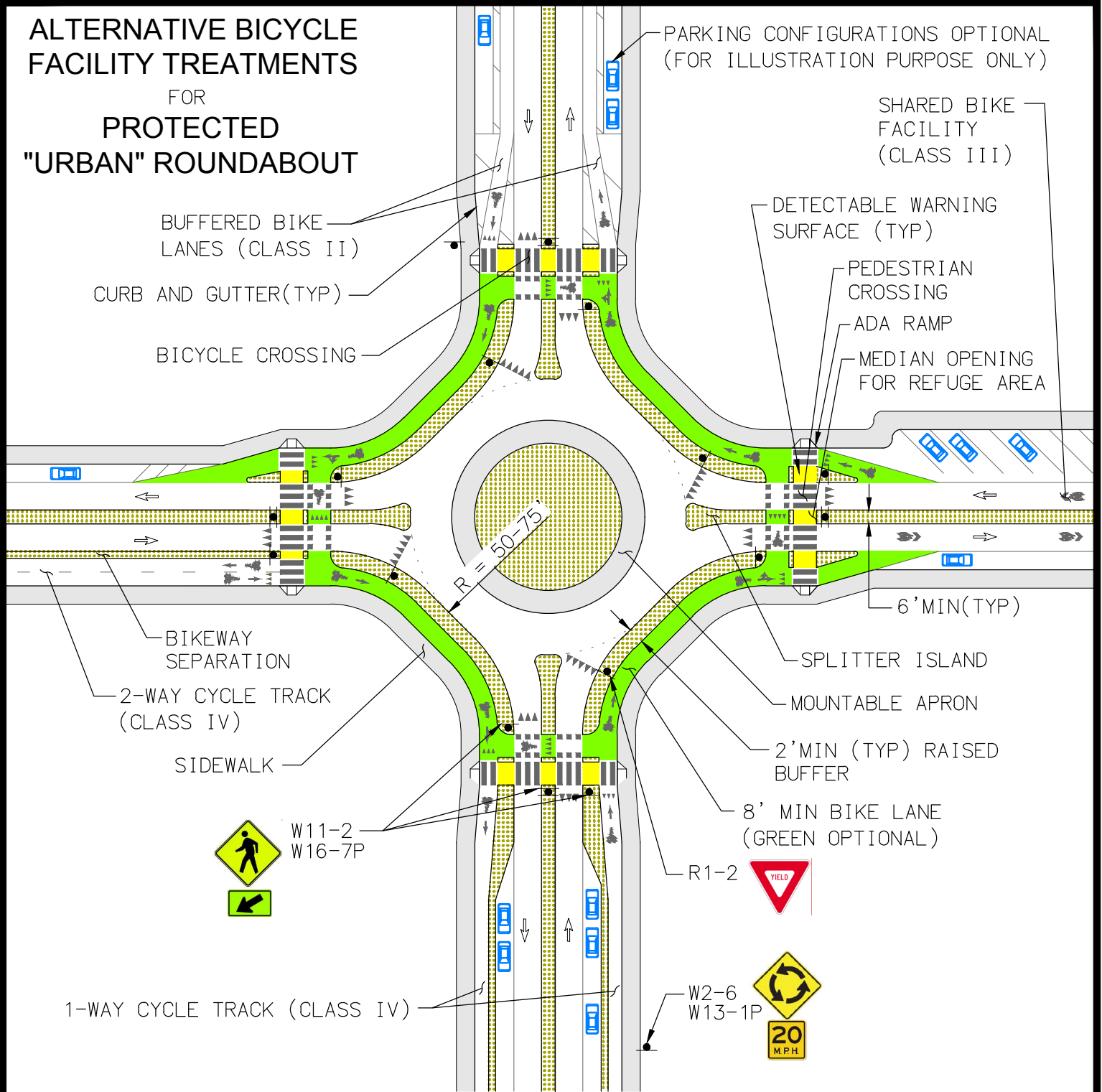
NOTES:

1. REFER TO FHWA ROUNDABOUT DESIGN GUIDELINES FOR ROUNDABOUT GEOMETRICS.
2. SEE CALTRANS DIB 89 FOR ADDITIONAL CLASS IV GUIDANCE

FACILITY CONTEXT	
LAND USE CATEGORIES	SEMI-RURAL RURAL LANDS
RURAL FEATURES	NO PARKING FACILITIES INTERSECTING MULTI-USE PATHWAYS/TRAILS
APPLICABLE ON	BOULEVARD, MAJOR ROAD, AND COLLECTOR



ALTERNATIVE BICYCLE FACILITY TREATMENTS FOR PROTECTED "URBAN" ROUNDABOUT



NOTES:

1. REFER TO FHWA ROUNDABOUT DESIGN GUIDELINES FOR ROUNDABOUT GEOMETRICS.
2. SEE CALTRANS DIB 89 FOR ADDITIONAL CLASS IV GUIDANCE

FACILITY CONTEXT	
LAND USE CATEGORIES	VILLAGE
	SEMI-RURAL
URBAN FEATURES	PARKING FACILITIES
	PEDESTRIAN SIDEWALKS
APPLICABLE ON	BOULEVARD, MAJOR ROAD, AND COLLECTOR



Green Street

Description and Purpose

Green Streets incorporate elements found in natural areas into the County road right of way. A green street includes a wide variety of Green Infrastructure design elements that connects impervious areas to landscape areas, natural areas, and waterways, which may include, but not limited to: tree wells, rain gardens, rock gardens, and permeable pavement. The use of Green Streets offers the capability of transforming a significant stormwater and pollutant source into an innovative treatment system. Planting more trees and landscaping in public spaces cleans the air, cools the land, provides more habitat for wildlife, and promotes a better, healthier quality of life.

The County of San Diego has adopted Green Street standards within the “Green Streets Guidelines: A Guide to Green Street Implementation in the County of San Diego” which outlines Green Street strategies, procedures, design examples, implementation, design, construction, and maintenance protocols. The intent of including Green Streets in the Active Transportation Toolbox is to encourage the incorporation of bicycle and pedestrian facilities to provide a multi-modal green facility.

Advantages

- Provides innovative stormwater treatment and green infrastructure system
- Reduces stormwater runoff
- Provides variety of treatment options
- Improves environment for people walking and biking
- Applicable in the median, street, bike lane, shoulder, parkway, and slope and drainage easements

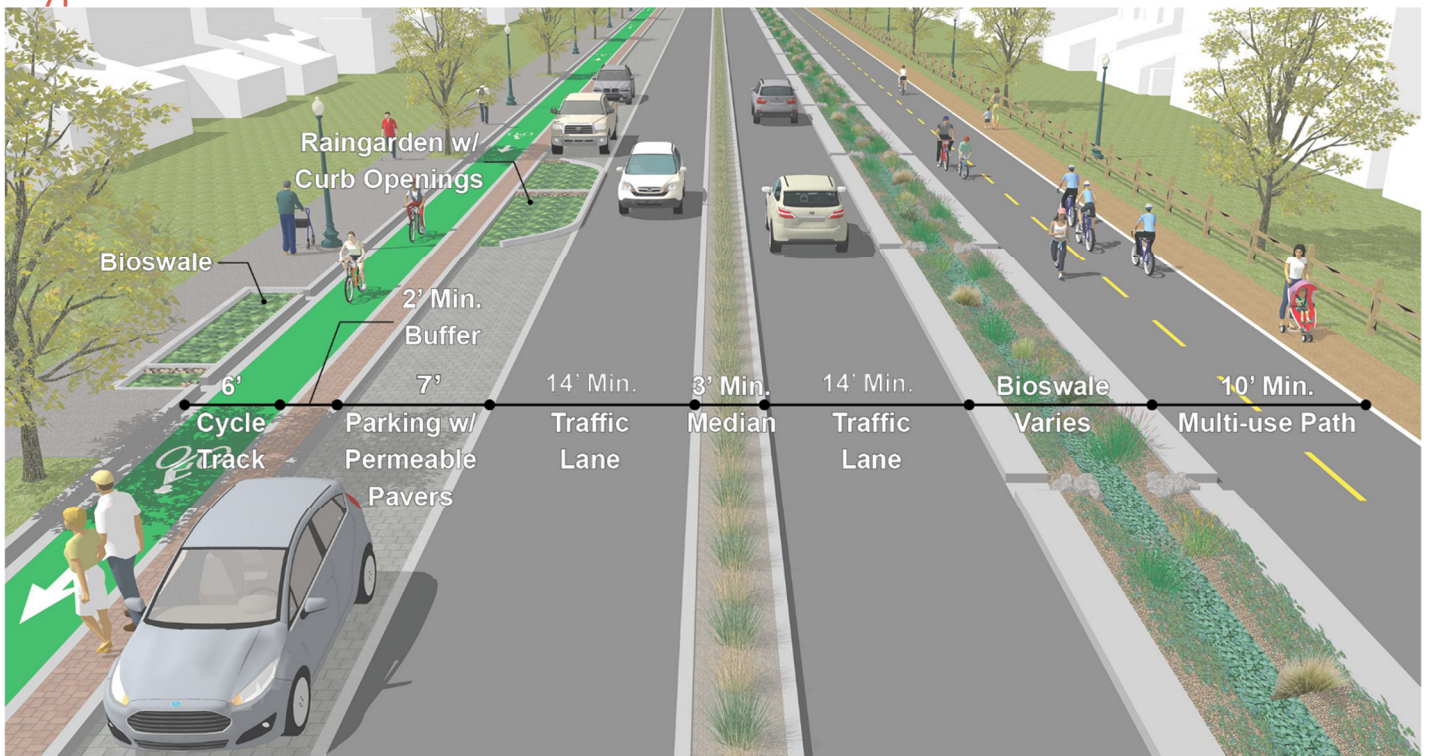
Considerations

- Increases regular maintenance
- Adequate right-of-way
- Requires supporting irrigation
- Must adhere to County guidelines

Facility Facts

Land Use Categories	Village Semi-Rural Rural Lands
Applicable On	Prime Arterial Series (6 lane) Major Road Series (4 lane) Boulevard Series (4 lane) Community Collector Series (4 lane) Light Collector Series (2 lane) Minor Collector Series (2 lane)
Applicable For	Improves quality of walking experience Incorporate pedestrian and bicycle facilities

Typical Cross Section



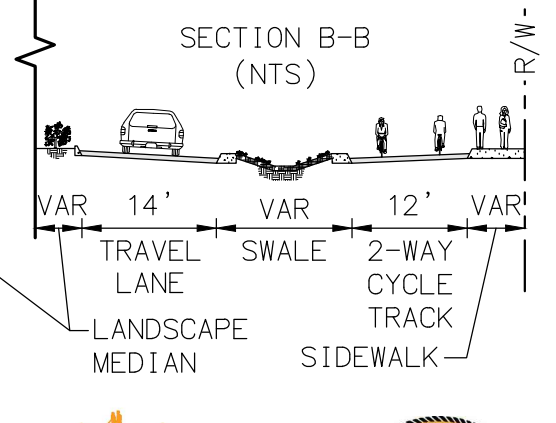
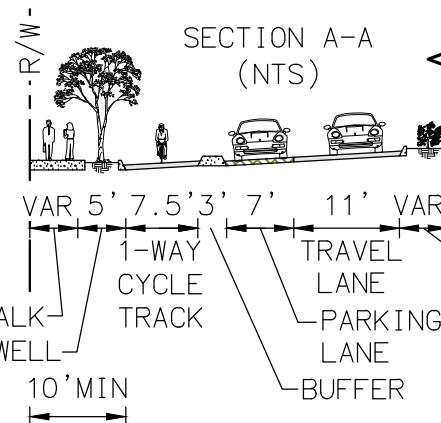
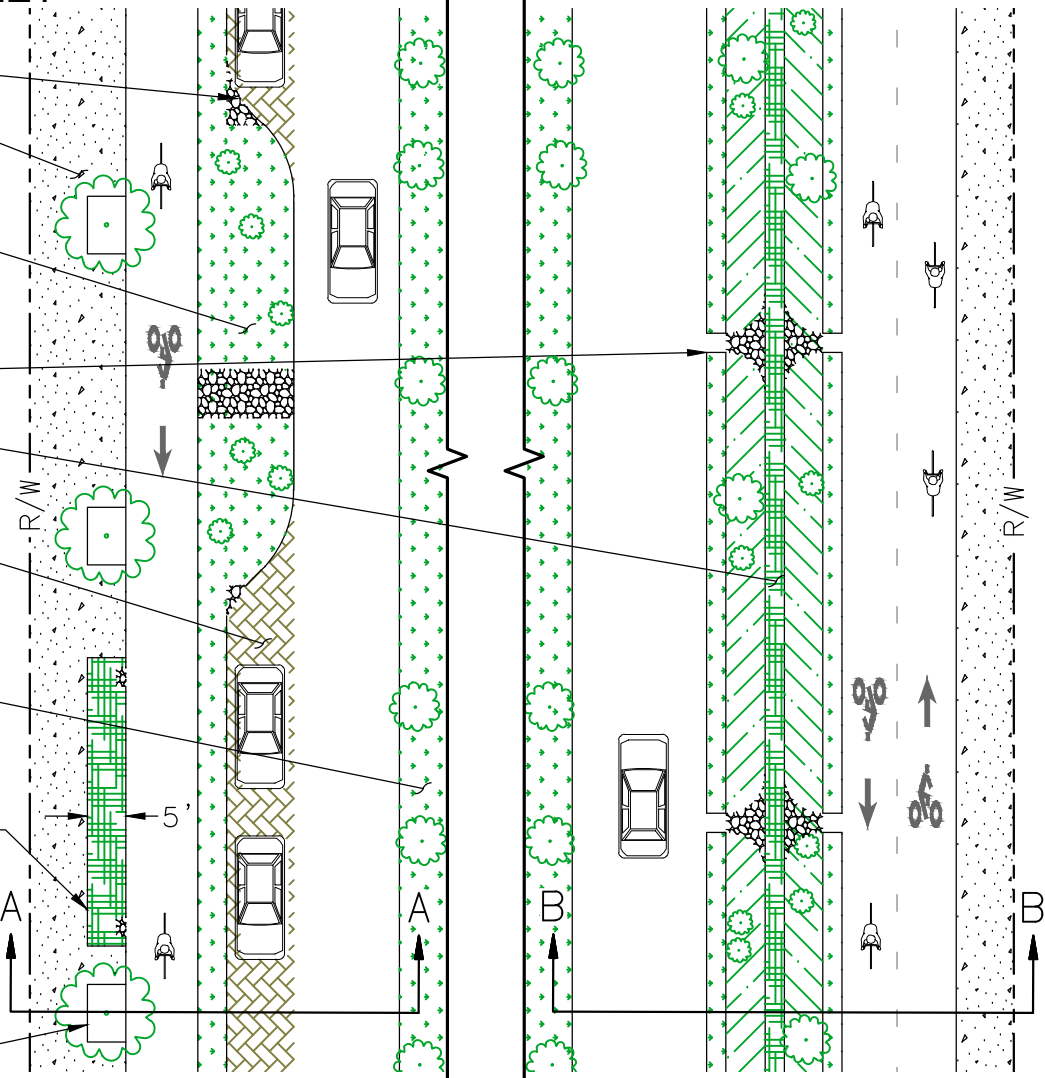
ALTERNATIVE BICYCLE FACILITY TREATMENTS

FOR TYPICAL GREEN STREET

GREEN STREET WITH ONE-WAY CYCLE TRACK & ON-STREET PARKING

GREEN STREET WITH TWO-WAY CYCLE TRACK & SWALE

- DRAINAGE OPENING
- PERMEABLE CONCRETE SIDEWALK (SD CO. DESIGN STD. GS-4.1)
- CURB EXTENSION WITH PLANTING STRIP (SD CO. DESIGN STD. GS-3.5)
- CURB CUT (TYP)
- VEGETATED SWALE (SD CO. DESIGN STD. GS-2.8)
- PARKING LANE WITH PERMEABLE PAVERS (SD CO. DESIGN STD. GS-4.3)
- RAISED MEDIAN WITH DROUGHT TOLERANT LANDSCAPING
- RAIN GARDEN PLANTER (SD CO. DESIGN STD. GS-2.1)
- TREE WELL (SD CO. DESIGN STD. GS-1.3A)



NOTE:
REFER TO COUNTY OF SAN DIEGO BMP DESIGN MANUAL; APPENDIX "K" FOR GUIDANCE ON GREEN STREETS DESIGN.

