ACTIVE TRANSPORTATION PLAN

City of Coachella, CA

2020 | Transpo Group

ACKNOWLEDGEMENTS

CITY OF COACHELLA

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ACTIVE TRANSPORTATION PLAN FOR DISADVANTAGED COMMUNITIES GUIDANCE FOR PLANS

A city, county, county transportation commission, regional transportation planning agency, MPO, school district, or transit district may prepare an active transportation plan (bicycle, pedestrian, safe-routes-to-school, or comprehensive). An active transportation plan prepared by a city or county may be integrated into the circulation element of its general plan or a separate plan which is compliant or will be brought into compliance with the Complete Streets Act, Assembly Bill 1358 (Chapter 657, Statutes of 2008). An active transportation plan must include, but not be limited to, the following components or explain why the component is not applicable.

COMPONENTS	DESCRIPTION	CHAPTER(S) IN THIS PLAN)
A. Mode Share	The estimated number of existing bicycle trips and pedestrian trips in the plan area, both in absolute numbers and as a percentage of all trips, and the estimated increase in the number of bicycle trips and pedestrian trips resulting from implementation of the plan.	**2**
B. Description of Land Use/ Destinations	A map and description of existing and proposed land use and settlement patterns which must include, but not be limited to, locations of residential neighborhoods, schools, shopping centers, public buildings, major employment centers, major transit hubs, and other destinations. Major transit hubs must include, but are not limited to, rail and transit terminals, and ferry docks and landings.	**2**
C. Pedestrian Facilities	A description of existing and proposed pedestrian facilities, including those at major transit hubs and those that serve public and private schools.	**4, 5**
D. Bicycle Facilities	A map and description of existing and proposed bicycle transportation facilities, including those at major transit hubs and those that serve public and private schools.	**3**
E. Bicycle Parking	A map and description of existing and proposed end-of-trip bicycle parking facilities. Include a description of existing and proposed policies related to bicycle parking in public locations, private parking garages and parking lots and in new commercial and residential developments. Also include a map and description of existing and proposed bicycle transport and parking facilities for connections with and use of other transportation modes. These must include, but not be limited to, bicycle parking facilities at transit stops, rail and transit terminals, ferry docks and landings, park and ride lots, and provisions for transporting bicyclists and bicycles on transit or rail vehicles or ferry vessels.	**3**
F. Wayfinding	A description of existing and proposed signage providing wayfinding along bicycle and pedestrian networks to designated destinations.	**3**

COMPONENTS	DESCRIPTION	CHAPTER(S) IN THIS PLAN)
G. Non-Infrastructure	A description of existing and proposed bicycle and pedestrian safety, education, and encouragement, enforcement, and evaluation programs conducted in the area included within the plan. Include efforts by the law enforcement agency having primary traffic law enforcement responsibility in the area to enforce provisions of the law impacting bicycle and pedestrian safety, and the resulting effect on collisions involving bicyclists and pedestrians.	**3**
H. Collision Analysis	The number and location of collisions, serious injuries, and fatalities suffered by bicyclists and pedestrians in the plan area, both in absolute numbers and as a percentage of all collisions and injuries, and a goal for collision, serious injury, and fatality reduction after implementation of the plan.	**2**
I. Equity Analysis	Identify census tracts that are considered to be disadvantaged or low-income and identify bicycle and pedestrian needs.	**2**
J. Community Engagement	A description of the extent of community involvement in development of the plan, including disadvantaged and underserved communities.	**1**
K. Coordination	A description of how the active transportation plan has been coordinated with neighboring jurisdictions, including school districts within the plan area, and is consistent with other local or regional transportation, air quality, or energy conservation plans, including, but not limited to, general plans and a Sustainable Community Strategy in a Regional Transportation Plan.	**1**
L. Prioritization	A description of the projects and programs proposed in the plan and a listing of their priorities for implementation, including the methodology for project prioritization and a proposed timeline for implementation.	**7**
M. Funding	A description of future financial needs for projects and programs that improve safety and convenience for bicyclists and pedestrians in the plan area. Include anticipated cost, revenue sources and potential grant funding for bicycle and pedestrian uses.	**6**
N. Implementation	A description of steps necessary to implement the plan and the reporting process that will be used to keep the adopting agency and community informed of the progress being made in implementing the plan.	**7**
O. Maintenance	A description of the policies and procedures for maintaining existing and proposed bicycle and pedestrian facilities, including, but not limited to, the maintenance of smooth pavement, ADA level surfaces, freedom from encroaching vegetation, maintenance of traffic control devices including striping and other pavement markings, and lighting.	**5**
P. Resolution	A resolution showing adoption of the plan by the city, county or district. If the active transportation plan was prepared by a county transportation commission, regional transportation planning agency, MPO, school district or transit district, the plan should indicate the support via resolution of the city(s) or county(s) in which the proposed facilities would be located.	**Attached**

CONTENTS

CHAPTER 1. INTRODUCTION

PURPOSE, VISION & GOALS

The City of Coachella has developed an Active Transportation Plan (ATP) that incorporates bicycling, walking and safe routes to school. This ATP establishes a vision for the City and will guide the community toward a future where active transportation is a viable option for all ages who live, work, and play within Coachella and the greater Coachella Valley.

PROJECT CONTEXT

The City of Coachella is well advanced in planning and providing for bicyclists and pedestrians. With its Vision Plan in 2006 Coachella began planning for smart growth. Coachella had its first Pedestrian Plan in 2007, at a time when few cities had such plans. The City also produced one of the first Safe Routes to School (SRTS) plans in 2007. Coachella became one of the first, if not the first, city to update its Safe Routes to School Plan in 2012. The Coachella Valley Association of Governments (CVAG) Non-Motorized Transportation Plan in 2001 produced a citywide bicycle plan for Coachella. That plan was updated by CVAG in 2010, and again in 2016. Further, each of the SRTS plans produced detailed plans for bikeways to connect to schools. Due to the fact that schools are well distributed throughout Coachella, these essentially produced plans for a citywide network of bikeways and plans for pedestrian improvements that closed many of the gaps in the sidewalk network and planned improvements at most of the key intersections.

The City has been very assertive and successful at pursuing funding for the projects in each of these plans and has either constructed or funded most of the projects in previous plans. This ATP update produces the next round of projects for the City to apply for funds for, and to construct.

COORDINATION WITH NEIGHBORING JURISDICTIONS

This ATP was produced with links to neighboring jurisdictions in mind. These are bikeways that connect to existing and planned bikeways in neighboring Indio and unincorporated Riverside County. The following tables list these existing and planned projects along with their bikeway type in the neighboring jurisdiction

TABLE 1: BIKEWAY LINKS TO INDIO

STREET OR CORRIDOR	BIKEWAY TYPE
Ave. 44	bike lanes
Ave. 48	bike lanes
Ave. 49	bike lanes
Ave. 50	buffered bike lanes
Ave. 51	bike lanes
Ave. 52	bike lanes
Calhoun St.	bike lanes
Coachella Canal	bike path
CV Link (Whitewater River)	bike path
Dillon Rd.	bike lanes
Grapefruit Blvd.	bike lanes
Jackson St.	bike lanes
Van Buren St.	bike lanes

TABLE 2: BIKEWAY LINKS TO UNINCORPORATED RIVERSIDE COUNTY

STREET OR CORRIDOR	BIKEWAY TYPE
Ave. 52	bike lanes
Ave. 54	bike lanes
Ave. 56 (Airport Blvd.)	bike lanes
Grapefruit Blvd.	bike lanes
Harrison St.	bike lanes
Pierce St.	bike lanes
Polk St.	bike lanes
Tyler St.	bike lanes
Van Buren St.	bike lanes
CV Link (Whitewater River)	bike path

Additionally, as the CV Link plan is implemented, the Coachella Valley Association of Governments is coordinating with Coachella, Indio and La Quinta to plan the bike lanes along Avenue 48 as buffered bike lanes.

COMMUNITY OUTREACH

The City sent our survey questionnaires to people who attended a Movies in the Park on a Friday evening in June of 2018. The questionnaire asked attendees:

- What intersections near their school where safety improvements are needed for pedestrians to cross
- Where sidewalks near their school are missing
- Where bikeways near their school are needed.

Table 3 displays the results.

TABLE 3: SCHOOL QUESTIONNAIRE RESULTS

PLEASE LIST UP TO THREE INTERSECTIONS NEAR YOUR SCHOOL WHERE SAFETY IMPROVEMENTS ARE NEEDED FOR PEOPLE CROSSING THEM	PLEASE LIST ANY LOCATIONS NEAR YOUR SCHOOL WHERE SIDEWALKS ARE MISSING	PLEASE LIST ANY LOCATIONS NEAR YOUR SCHOOL WHERE BIKEWAYS ARE NEEDED
Ave. 52 @ Calle Techa	3RD St.	Valley Rd.
Ave. 52 @ Calle Camacho	Ave. 52	Ave. 54
Ave. 53 @ Bonita St.	Airport Blvd.	Cesar Chavez St.
Ave. 53 @ Calle La Paz	Calle Camacho	Orchard St.
Ave. 54 @ Airport Blvd.	Frederick St.	Tyler St.
Ave. 54 @ Cesar Chavez St.	Morgan Ave.	Ave. 53
Ave. 54 @ Van Buren St.	Tyler St.	
3rd St. @ Orchard St. **Valley Rd. @ Cesar Chavez St.**	Via Misionera	

In July of 2020 the City circulated a survey questionnaire to principals of the public schools to learn what traffic safety issues they see, and improvements they would like the City to make. The results are shown below.

TABLE 4: SCHOOL PRINCIPAL SURVEY RESULTS

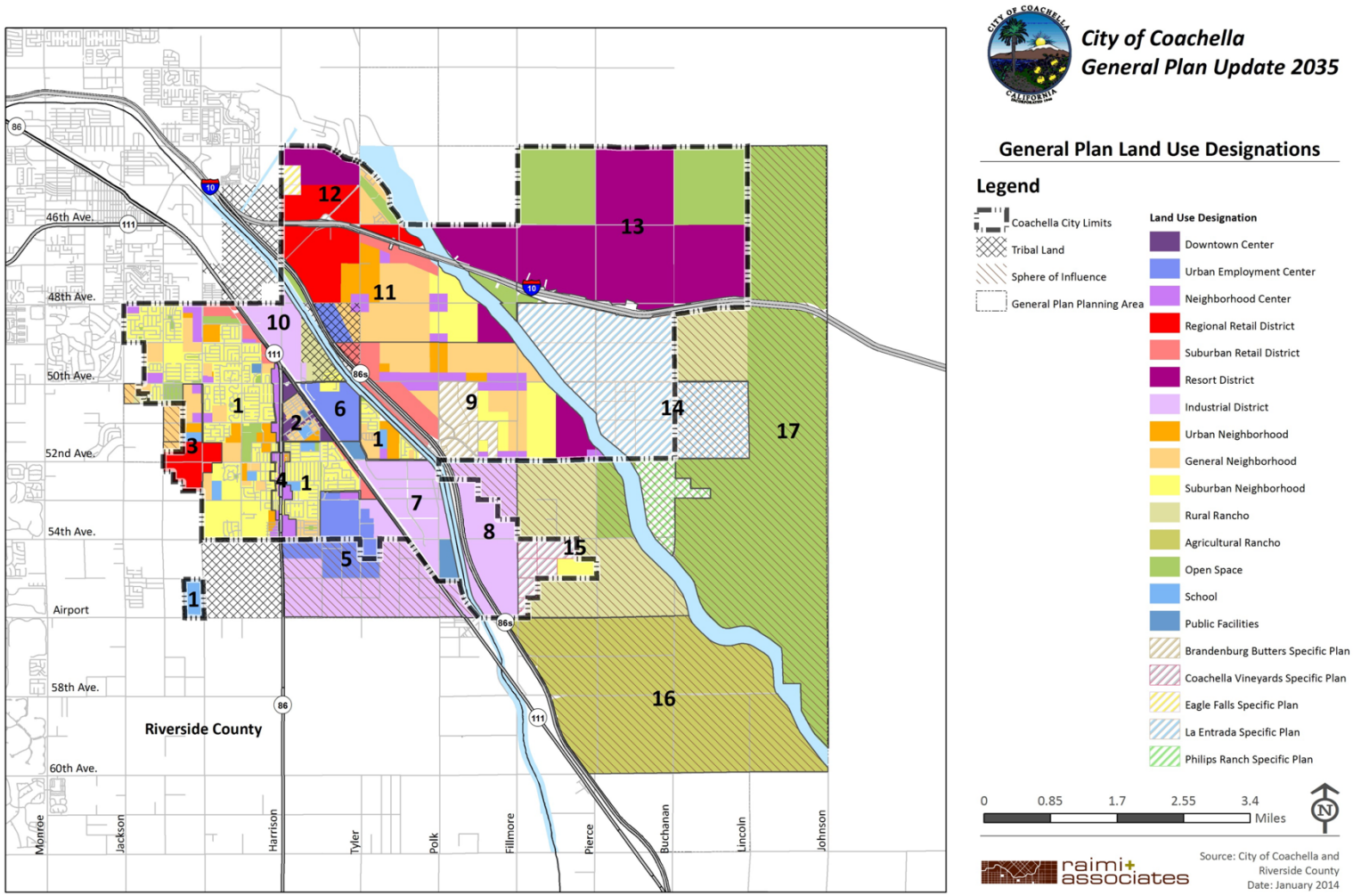
SCHOOL	MISSING SIDEWALKS	INTERSECTIONS NEEDING IMPROVEMENT	STREETS NEEDING IMPROVE-MENTS?	DO YOU HAVE BICYCLE PARKING?	IF YOU HAVE BICYCLE PARKING, HOW MANY BICYCLES CAN BE ACCOMMO-DATED?	PLEASE LIST AND DESCRIBE AND EDUCATION, ENCOURAGEMENT OR ENFORCEMENT PROGRAMS YOU HAVE TO MAKE IT SAFER AND TO ENCOURAGE STUDENTS TO WALK OR BICYCLE TO YOUR SCHOOL.
Bobby Duke Middle School		speed bumps and flashing lights for crosswalks; change the flashing crosswalk lights to a traffic signal on Ave 52 and Shady Lane.				
Cesar Chavez Elementary School	A walkway leading to kinder and pre-school entry			no	NA	We recognize students with Star tickets when they are respectful, responsible and safe which includes to and from school.
Coachella Valley High School	in front of the school on Airport Blvd.; on Calhoun St.	Van Buren St. and Calhoun St.; Airport Blvd. and Van Buren St. has no streetlights	no streets around the school have bike lanes	yes	10	no
Coachella Valley Adult School		8th St. and Orchard St.		yes	4	no
Coral Mountain Academy	both sides of Van Buren St. between Ave. 50 and Ave. 52	the intersection entering the school at Van Buren St. and Coral Mountain Way; needs crosswalk improvements and something to address flooding when it rains		yes	10	Safe Routes to School International Walk-to-School Day
Palm View Elementary School	one side of Pendleton Way	Dateland Park and Veterans' Park (transients); 9th St. and Pendleton Way	9th St. and Pendleton Way	no		Positive Behavior Support and Incentive Management Program
Valle del Sol Elementary School		1. Speed bumps along Education Way leading to the school will reduce car speeds and enhance the safety for students walking and biking to school. 2. Flashing Crosswalk at the entrance of Education Way when a button is pushed. 3. Enhance the secure bike area at the school.4. Crosswalks along Tyler Street into the side streets. 5. Educational Programs about bike and walking safety. 6. Walking path parallel to the southern border of the school. The path would connect the apartment complex with Education Way and would allow parents and students the ability to walk on a path instead of uneven dirt to school.				
Valley View Elementary School			Valley Rd. speeding and drop-off issues	yes	10	Safe Routes to School; Walk-to-School Day; Positive Behavior Support and Incentive Management Program

CHAPTER 2. EXISTING CONDITIONS

LAND USE & DESTINATIONS

The Official General Plan Map shows the current and future land uses of Coachella as presently zoned. Coachella consists primarily of low-density residential, commercial and industrial land uses. Most of the retail is concentrated along Cesar Chavez Street, 6th Street and Grapefruit Boulevard/SR 111. Most of the industrial uses are planned along the Southern Pacific railway corridor. Eight public schools are located throughout the community. Six public parks are located between Avenue 48 and Avenue 52. Presently, Coachella's first large hotel complex is under construction along Avenue 48 near Dillon Road. A one-square-mile section of southwestern Coachella is zoned for agriculture.

Figure 1


City of Coachella
General Plan Update 2035
General Plan Land Use Designations
Legend
Coachella City Limits
Tribal Land
Sphere of Influence
General Plan Planning Area
Land Use Designation
Downtown Center
Urban Employment Center
Neighborhood Center
Regional Retail District
Suburban Retail District
Resort District
Industrial District
Urban Neighborhood
General Neighborhood
Suburban Neighborhood
Rural Rancho
Agricultural Rancho
Open Space
School
Public Facilities
Brandenburg Butters Specific Plan
Coachella Vineyards Specific Plan
Eagle Falls Specific Plan
La Entrada Specific Plan
Philips Ranch Specific Plan
0 0.85 1.7 2.55 3.4 Miles
raimi+ associates
Source: City of Coachella and Riverside County
Date: January 2014
46th Ave.
48th Ave.
50th Ave.
52nd Ave.
54th Ave.
Airport
58th Ave.
60th Ave.
Riverside County
Monroe
Jackson
Harrison
Tyler
Polk
Fillmore
Pierce
Buchanan
Lincoln
Johnson

DOCUMENT REVIEW

This section discusses adopted plans and policies relevant to walking and bicycling in the City of Coachella. This ATP coincides with planning efforts conducted regionally and locally. This Plan compliments and expands upon these previous efforts to create a well-connected network for pedestrians and bicyclists throughout the City.

CITY OF COACHELLA GENERAL PLAN AND MOBILITY ELEMENT

The Coachella General Plan contains a vision that supports and encourages active transportation. The Vision for the General Plan says the in the future Coachella will become:

- A healthy city where people can walk to the store and bicycle to school
- A walkable city where destinations are within walking distance and streets are safe and inviting to all
- A city with multi-modal streets with a highly connected network of walking and bicycling amenities
- A connected city small blocks with a comprehensive network of bikeways
- A city with walkable neighborhoods.

The Mobility Element contains street typology cross sections with bikeway facilities. It also contains the following goals that are consistent with this ATP:

- Complete Streets: A balanced transportation system that accommodates all modes of travel safely and efficiently without prioritizing automobile travel at the expense of other modes.
- Traffic Calming: A transportation system that limits negative impacts from vehicular travel on residents and workers.
- Pedestrian Network: A safe pedestrian network that provides direct connections between residences, employment, shopping and civic uses.
- Bicycle Trail Network: A bicycle and multi-use trail network that facilitates bicycling for commuting, school, shopping and recreational trips.

COACHELLA VALLEY ASSOCIATION OF GOVERNMENTS NON-MOTORIZED TRANSPORTATION PLAN

In 2016 the Coachella Valley Association of Governments (CVAG) updated the regional non-motorized transportation plan (NMTP). This updated the bikeway plans for all jurisdictions in the Coachella Valley. Input was taken from each city and unincorporated Riverside County to ensure that the proposed projects coincide with each of their planning efforts. This plan is consistent with the NMTP. In addition to a regionwide network of bikeways, the NMTP planned pedestrian improvements and Neighborhood Electric Vehicle (NEV) routes. This ATP updates the bikeway plans in Coachella.

COACHELLA VALLEY (CV) LINK

The CV Link Plan proposes a bicycle/NEV path along the Whitewater River in the Coachella Valley. The core alignment stretches from Palm Springs to the southern edge of Coachella. The CV Link Plan also contains provisions for future extensions to Desert Hot Springs and the Salton Sea. This project would enable someone to walk, bicycle, take an NEV, or use another non-motorized mode such as a skateboard or scooter throughout Coachella Valley communities. This ATP incorporates the facility along the Whitewater River in Coachella.

MODE SHARE

The 2016 American Community Survey of the United State Census identified 1% (approximately 177) of workers 16 years of age or older (17,666) who walk to work. It found no one who commute to work bicycle. This ATP sets a goal of 5% (approximately 883) of workers to commute by bicycle and 10% (1,767) to commute by walking by the year 2030. Given the progress that has been made in other cities that have implemented ambitious ATPs, this is well within the achievable range.

Although the Census doesn't track people who walk or bicycle for non-work purposes, as a relatively small city geographically, many more people likely walk or bicycle. The 2012 Safe Routes to School plan conducted surveys and found that between 29% and 51% walked to school at each school, except Coral Mountain Academy which had 9% walking in the morning, and 15% walking in the afternoon. The percentage of students bicycling to school ranged from 0.3% to 3%.

Likely with implementation of this ATP, the numbers of people walking and bicycling for all purposes should increase significantly

COLLISION ANALYSES

Table 4 below provides an analysis of bicycle and pedestrian collisions for the most recent five-year period that data is available.

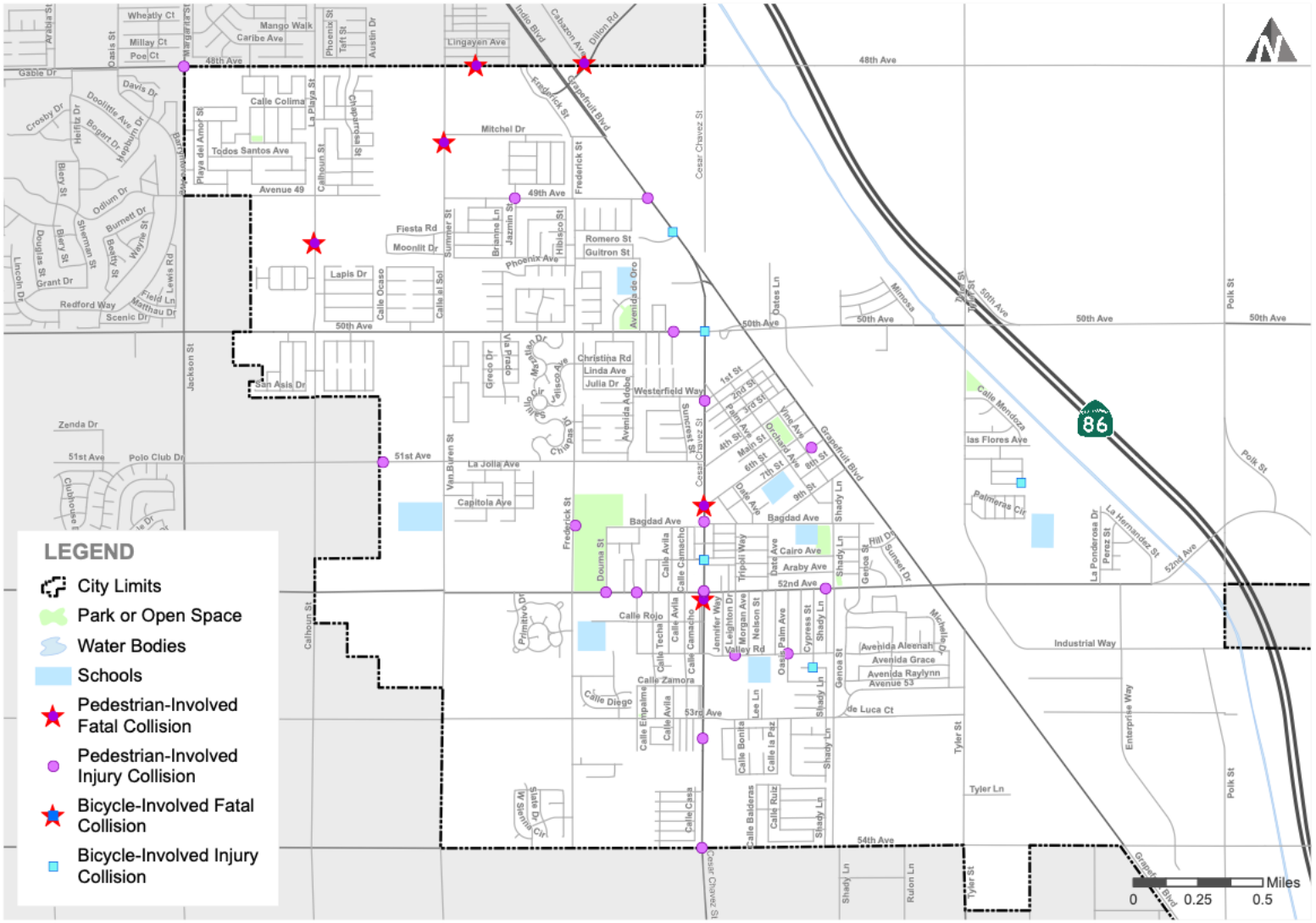
TABLE 5: COLLISION ANALYSIS 2013-2017

YEAR	TOTAL # OF BICYCLE COLLISIONS	FATAL	SEVERE INJURY	TOTAL # OF PEDESTRIAN COLLISIONS	FATAL	SEVERE INJURY
2013	0	0	0	6	3	2
2014	2	1	0	2	0	1
2015	1	0	0	4	0	2
2016	1	0	0	10	3	1
2017	2	0	0	5	0	1

Source: California Highway Patrol Statewide Integrated Traffic Records System (SWITRS)
Note: 2015 - 2017 is provisional and subject to change

Figure 2 on the following page displays where these crashes occurred.

Figure 2



2013-2017 Bicycle and Pedestrian Collisions

City of Coachella Active Transportation Plan

Source: California Highway Patrol Statewide Integrated Traffic Records System (SWITRS)

M:\18\1.18083.00 - Coachella Active Transportation Plan\GIS\ArcGISPro\CoachellaATP\CoachellaATP.aprx

transpogroup

Figure 2

EQUITY ANALYSIS

Coachella is a disadvantaged community. The text below illustrates this with a census tract analysis, the California EnviroScreen and the percentage of students receiving free or reduced lunches.

CENSUS TRACTS BELOW MEDIAN HOUSEHOLD INCOME (ALL DATA FROM US CENSUS BUREAU 2016)

The median household income of Coachella is $36,124. Fully 30.1% of Coachella residents are in poverty. Table 5 below shows the median income of Coachella census tracts that are below the Median Household Income (MHI) and the percentage of MHI.

TABLE 6: CENSUS TRACTS BELOW 80% MHI

CENSUS TRACT	MHI	% RANGE OF MHI
9404	$42,604	65% through < 70% of MHI
457.07	$39,667	<65% of MHI
457.06	$30,801	<65% of MHI
457.04	$23,073	<65% of MHI
457.05	$31,086	<65% of MHI
457.03	$31,615	<65% of MHI
456.09	$29,548	<65% of MHI

CALIFORNIA ENVIROSCREEN

Three census tracts within Coachella are defined as disadvantaged by the California EnviroScreen. They are shown in Table 6 below with their scores.

TABLE 7: CALIFORNIA ENVIROSCREEN FOR COACHELLA CENSUS TRACTS

CENSUS TRACT	CAL ENVIRO SCREEN 3.0 SCORE	CAL ENVIRO SCREEN 3.0 PERCENTILE RANGE	POLLUTION BURDEN PERCENTILE	POPULATION CHARACTERISTICS PERCENTILE	TOTAL POP.
6065940400	$47	86-90%	80.9	78.17	6,504
6065045706	$44	81-85%	64.62	84.37	4,821
6065045707	$40	76-80%	55.88	82.51	6,397

ELIGIBILITY FOR FREE OR REDUCED LUNCHES

Table 8 below shows the percentage of school children in each Coachella school that are eligible for free or reduced lunches. The results show that a strong majority of Coachella students are eligible.

PAST EXPENDITURES

The City has won the following grants to fund active transportation projects.

- Federal Safe Routes to School Cycle 2 - $482,500
- State Safe Routes to School Cycle 8 – $438,750
- Federal Safe Routes to School Cycle 3 - $496,100
- State Safe Routes to School Cycle 10 – $447,700
- Cycle 1 Active Transportation Program – $1.7 million
- Cycle 2 Active Transportation Program - $2.5 million
- Congestion Management and Air Quality funds - $550,000
- Urban Greening Grant : $3,19 million
- Affordable Housing Sustainable Communities (AHSC): $696,500
- Infill Infrastructure Grant (IIG): $300,000

These grants funded miscellaneous bikeways and pedestrian improvements at intersections and new sidewalks. These projects came from Coachella's two Safe Routes to School plans and previous bicycle plans.

TABLE 8: COACHELLA STUDENTS ELIGIBLE FOR FREE OR REDUCED MEALS

SCHOOL	ENROLLMENT	FREE OR REDUCED MEAL COUNT	%ELIGIBLE FOR FREE OR REDUCED MEALS
Coachella Valley High School	2,684	2,307	86.00%
Bobby Duke Middle School	714	685	95.90%
Cesar Chavez Elementary School	931	812	87.20%
Coral Mountain Academy	924	766	82.90%
Palm View Elementary School	501	483	96.40%
Peter Pendleton Elementary School	564	535	94.90%
Valle del Sol Elementary School	805	642	79.80%
Valley View Elementary School	663	617	93.10%

California Department of Education Free or Reduced Meals Data 2016-2017

CHAPTER 3. EXISTING AND PROPOSED BICYCLE FACILITIES AND PROGRAMS

BIKEWAYS

EXISTING BIKEWAYS

Table 9 below shows existing bikeways in Coachella. Figure 3 on the following page displays these.

TABLE 9: EXISTING BIKEWAYS

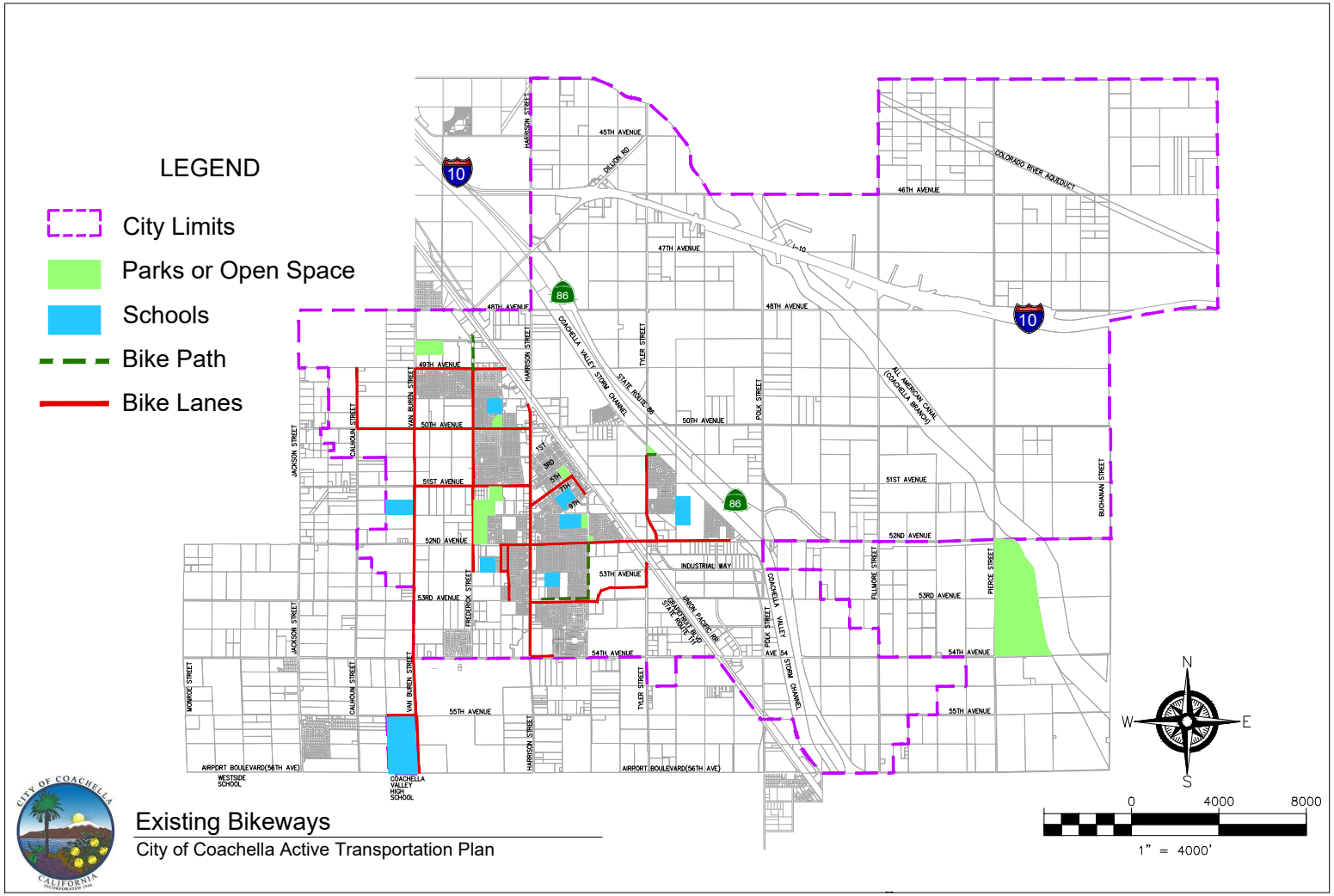
STREET	FROM	TO	TYPE	LENGTH (MI.)
Ave. 49	Van Buren St.	Grapefruit Blvd.	bike lanes	0.7
Ave. 50	Van Buren St.	Cesar Chavez St.	bike lanes	1.0
Ave. 50	Calhoun St.	Van Buren St.	bike lanes on north side	0.5
Ave. 51	Van Buren St.	Cesar Chavez St.	colored bike lanes	0.5
Ave. 52	Van Buren St.	Calle Enpalme	colored bike lanes	0.75
Ave. 52	Calle Enpalme	Cesar Chavez St.	colored bike lanes	0.25
Ave. 52	Cesar Chavez St.	Shady Ln.	bike route with greenback sharrows	0.5
Ave. 52	Grapefruit Blvd.	Hernandez St.	colored bike lanes	0.9
Ave. 53	Cesar Chavez St.	Shady Ln.	bike path on the north side	0.5
Ave. 53	Cesar Chavez St.	Shady Ln.	colored buffered bike lanes	0.5
Ave. 53	Shady Ln.	Tyler St.	colored bike lanes	0.6
Ave. 54	Cesar Chavez St.	Calle Balderas	colored bike lanes on the north side	0.1

STREET	FROM	TO	TYPE	LENGTH (MI.)
Ave. 55	1/4 mi. west of Van Buren St.	Van Buren St.	colored bike lanes	0.25
6th St.	Cesar Chavez St.	Vine Ave.	bike route with greenback sharrows	0.5
Calhoun St.	475' north of Las Plumas Ct.	Shadowrock Dr.	colored buffered bike lanes	0.1
Calhoun St.	Shadowrock Dr.	Ave. 50	buffered bike lanes on east side, bike lanes on west side	0.1
Calhoun St.	Ave. 50	south city limit	bike lanes	1.3
Calle Enpalme	Ave. 52	Calle Verde	bike route with greenback sharrows	0.2
Calle Techa	Ave. 52	Ave. 53	bike route with greenback sharrows	0.5
Calle Verde	Calle Enpalme	Calle Techa	bike route with greenback sharrows	0.1
Cesar Chavez St.	Park Ln.	Ave. 54	colored bike lanes	2.0
Education Way	Ave. 52	north 0.1 mi.	bike path on west side	0.1
Frederick St.	Ave 49	Mitchell Dr.	bike path	0.25
Frederick St.	Ave. 49	1/4 mile south of Ave 52	bike lanes	1.7
Shady Lane	Ave. 52	Ave. 53	bike path	0.5
Tyler St.	Calle Mendoza	Ave. 52	colored bike lanes	0.7
Tyler St.	Grapefruit Blvd.	Ave. 53	colored bike lane on the west side	0.1
Van Buren St.	Ave. 49	Fiesta Rd.	colored bike lanes on the east side	0.1
Van Buren St.	Fiesta Rd.	Ave. 50	colored bike lanes	0.4
Van Buren St.	Ave. 50	450' south of Via Merida	colored bike lanes on the east side; colored buffered bike lanes on the west side	0.4

STREET	FROM	TO	TYPE	LENGTH (MI.)
Van Buren St.	450' south of Via Merida	Ave. 51	bike lanes	0.1
Van Buren St.	Ave. 51	Ave. 52	colored bike lanes on the east side	0.5
Van Buren St.	Ave. 52	Ave. 55	buffered bike lanes	1.5
Van Buren St.	Ave. 55	Airport Blvd.	bike lanes	0.5
Vine Ave.	6th St.	7th St.	bike route with greenback sharrows	0.1
Vine Ave.	7th St.	9th St.	colored bike lanes	0.1

Some of the bikeways in Table 10 are now under construction now and will soon become existing bikeways.

Figure 3


LEGEND
City Limits
Parks or Open Space
Schools
Bike Path
Bike Lanes
Existing Bikeways
City of Coachella Active Transportation Plan
N
W
E
S
0
4000
8000
1" = 4000'

BIKEWAYS UNDER CONSTRUCTION OR FUNDED

The City of Coachella has been very aggressive in pursuing funding for new bikeways. Table 10 below lists those bikeways that are currently under construction, and those that are funded and will soon be constructed. Figure 4 displays these bikeways.

TABLE 10: BIKEWAYS UNDER CONSTRUCTION OR FUNDED

STREET	FROM	TO	TYPE	LENGTH (MI.)
1st St.	Cesar Chavez St.	Grapefruit Blvd.	colored bike lanes	0.3
2nd St.	western end	Grapefruit Blvd.	colored bike lanes	0.3
3rd St.	western end	Grapefruit Blvd.	colored bike lanes	0.3
4th St.	Cesar Chavez St.	Grapefruit Blvd.	colored bike lanes	0.4
5th St.	western end	Orchard Ave.	colored bike lanes	0.15
5th St.	Vine Ave.	Grapefruit Blvd.	colored bike lanes	0.07
7th St.	Tripoli Way	Grapefruit Blvd.	colored bike lanes	0.05
8th St.	Date Ave.	Pendleton Way	colored bike lanes	0.07
8th St.	Orchard Ave.	Grapefruit Blvd.	colored bike lanes	0.15
9th St.	Date Ave.	Pendleton Way	colored bike lanes	0.05
Ave. 50	Calhoun St.	Van Buren St.	colored bike lanes	0.5
Ave. 50	Calhoun St.	Van Buren St.	buffered bike lanes on the south side	0.5
Calle Rojo	Calle Enpalme	Calle Techa	bike route with greenback sharrows	0.1
Date Ave.	6th St.	8th St.	colored bike lanes	0.15
Frederick St.	1/4 mi. south of Ave. 52	Ave. 53	colored bike lanes on the east side	0.25
Grapefruit Blvd.	Leoco Ln.	9th St.	protected bike lanes	0.7

STREET	FROM	TO	TYPE	LENGTH (MI.)
Orchard Ave.	1st St.	9th St.	colored bike lanes	0.5
Palm Ave.	1st St.	7th St.	colored bike lanes	0.4
Pendleton Way	7th St.	9th St.	colored bike lanes	0.15
Vine Ave.	1st St.	6th St.	colored bike lanes	0.3

Figure 4

Funded or Under Construction Bikeways
City of Coachella Active Transportation Plan

PROPOSED BIKEWAYS

In total, this ATP proposes 52.8 miles of new bikeways. This includes:

- 16.2 miles of bike paths
- 27.8 miles of bike lanes
- 1.05 miles of colored bike lanes
- 0.45 miles of buffered bike lanes
- 0.6 miles of colored buffered bike lanes
- 5.2 miles of signed bike routes
- 1.2 miles of signed bike routes with greenback sharrows.

The buffered bike lanes in this ATP can be converted later on to separated/protected bike lanes.

Table 11 includes proposed bikeways from the CVAG Non-Motorized Plan as well as those that were added per new field work conducted. Figure 5 illustrates these bikeways.

TABLE 11: PROPOSED BIKEWAYS

STREET	FROM	TO	TYPE	LENGTH (MI.)
Ave. 44	Cesar Chavez St.	Dillon Rd.	bike lanes	1.0
Ave. 48	Jackson St.	Van Buren St.	buffered bike lanes	1.0
Ave. 48	Van Buren St.	Dillon Rd.	buffered bike lanes	0.3
Ave. 48	Tyler St.	Coachella Canal	bike lanes	1.6
Ave. 49	west city limit	Van Buren St.	bike lanes	1.0
Ave. 52	Shady Ln.	Industrial Way	colored buffered bike lanes	0.6
Ave. 52	Industrial Way	Coachella Canal	bike lanes	3.3
Ave. 53	Frederick St.	Calle Enpalme	colored bike lanes	0.25
Ave. 53	Calle Enpalme	Calle Avila	buffered bike lanes	0.15
Ave. 53	Calle Avila	Cesar Chavez St.	bike route with greenback sharrows	0.1
Ave. 54	Van Buren St.	Whitewater River	bike lanes	3.2
Ave. 54	Cesar Chavez St.	Tyler St.	bike path	1.3

STREET	FROM	TO	TYPE	LENGTH (MI.)
1/2 way between Ave. 51 and Ave. 52	Van Buren St.	Frederick St.	bike path	0.5
Access road along east side of Spotlight 29 Casino	just south of I-10	Harrison Pl.	bike lanes	1.1
Airport Blvd.	east city limit	west city limit	bike lanes	0.7
Bagdad Ave.	Douma St.	Grapefruit Blvd.	bike route with greenback sharrows	1.1
Calhoun St.	Ave. 50	south city limit	bike lanes	0.5
Connector to 1-10	Ave. 50	I-10	bike lanes	1.1
Connector to Coachella Canal	Polk St.	1930' west of Pierce St.	bike path	2.4
Dillon Rd.	Ave. 44	Harrison Pl.	bike lanes	1.5
Dillon Rd.	Ave. 48	north city limit	bike lanes	1.4
Enterprise Way	Ave. 52	Ave. 54	bike lanes	1.0
Frederick St.	Ave. 49	Ave. 51	bike lanes	1.0
Frederick St.	Ave. 53	Ave. 54	colored bike lanes	0.5
Grapefruit Blvd.	northern city limit	Leoco Ln.	protected bike lanes	1.25
Grapefruit Blvd.	Leoco Ln.	Tyler St.	protected bike lanes	1.45
Grapefruit Blvd.	Tyler St.	Ave. 54	bike lanes	1.0
Harrison Pl.	Access road along east side of Spotlight 29 Casino	Dillon Rd.	bike lanes	0.3
Industrial Way	Enterprise Way	Polk St.	bike lanes	0.3
Jackson St.	Ave. 48	Ave. 49	bike lanes	0.5

STREET	FROM	TO	TYPE	LENGTH (MI.)
Mitchell Dr.	Grapefruit Blvd.	Van Buren St.	bike lanes	0.6
Orchard St.	9th St.	Shady Ln.	bike lane	0.1
Polk St.	Ave. 48	Ave. 52	bike lanes	2.0
Polk St.	Industrial Way	Ave. 54	bike lanes	0.8
Shadow View Blvd.	Dillon Rd.	Tyler St.	bike lanes	1.2
Shady Ln.	Orchard. St.	Ave. 52	bike lanes	0.5
Shady Ln.	9th St.	Ave. 54	bike path on east side	1.5
SR - 86 Expressway	Dillon Rd.	south city limit	signed bike route	5.2
Tyler St.	Dillon Rd.	Vista del Norte	bike path	0.5
Tyler St.	Ave. 48	Ave. 50	bike lanes	1.0
Tyler St.	Ave. 50	Calle Mendoza	colored bike lanes	0.3
Tyler St.	Ave. 53	Ave. 54	bike lanes	0.5
Vista del Norte	Tyler St.	Coachella Canal	bike lanes	0.6
Whitewater River	Tyler St.	Airport Blvd.	bike path	5.3
Frederick St. extension	Mitchell Dr.	Dillon Rd. at Ave. 48	bike path	0.3
Grapefruit Blvd. adjacent	northern city limit	southern city limit	bike path	4.4

FIELDWORK RESULTS

As part of this ATP, new fieldwork was conducted. This resulted in some new projects as well as upgrades to bikeways that were previously planned.

OTHER NEW BIKEWAY PROJECTS

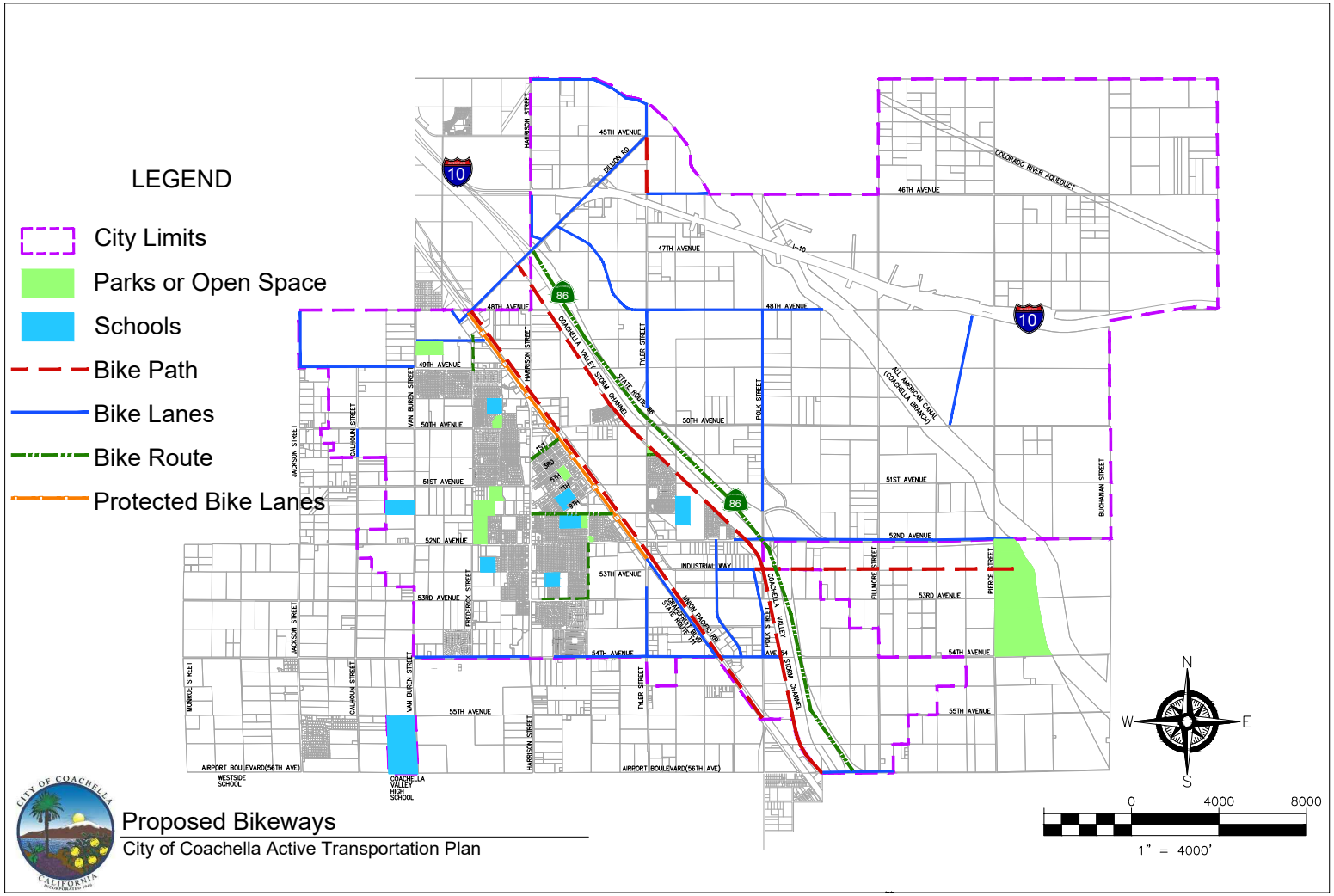
- A new bike path connecting Mitchell Drive as extension of Frederick Street could link bicyclists to Dillon Road that would connect to the CV Link bikeway and other points east of Grapefruit Boulevard and the parallel railroad. This bike path would connect just west of Dillon Road at Avenue 48.

- Another bike path could use the right-of-way along the east side of Grapefruit Boulevard from the north city limit to the south city limit.

- A new traffic signal at the intersection of Bagdad Avenue and Grapefruit Boulevard would enable bicyclists to cross Grapefruit Boulevard to access the new bike path along Grapefruit Boulevard. It would be put in at the same time the bike path is paved.

A new traffic signal at 6th Street and Grapefruit Boulevard to access the new bike path along Grapefruit Boulevard.

Figure 5


LEGEND
City Limits
Parks or Open Space
Schools
Bike Path
Bike Lanes
Bike Route
Protected Bike Lanes
Proposed Bikeways
City of Coachella Active Transportation Plan
N
W
E
S
0
4000
8000
1" = 4000'

BICYCLE PARKING

Bicycle parking can be provided in two general types: racks and high-security bicycle parking. Racks are best for short-term needs such as quick shopping trips or stops at the library or post office. Racks are also beneficial in commercial corridors where bicyclists may want to get a meal or go from store to store. Racks should be placed at dispersed locations to take advantage of the point-to-point flexibility of the bicycle. Commuters and those who park for longer times need higher security. High-security parking may consist of lockers, attendant parking or automated parking. Presently, the City uses wave racks.

Table 12 shows where bike racks exist.

Existing Bike Parking: Wave Racks in Bagdouma Park

TABLE 12: EXISTING BIKE PARKING

LOCATION	SPECIFIC LOCATION	BICYCLE PARKING TYPE	# BICYCLES ACCOMMODATED
Along 6th St	NE corner of Grapefruit Blvd.	rack	3
	NE corner of Vine Ave.	rack	3
	NW corner of Vine Ave.	rack	3
	In front of City Hall	2 racks	6
	NE corner of Palm Ave.	rack	3
Bagdouma Park	at the north end of the park	3 racks	6
	at the Bagdad Park Community Center in the center of the park	2 racks	8
	Lee Espinoza Coachella Valley Boxing Club at the south end of the park	rack	3
Rancho Las Flores Park	NW corner of the park	rack	3
Veterans' Memorial Park	east side of the park	rack	3
	west side of the park	rack	3
Walgreens	NE corner of Cesar Chavez St. and Ave. 50	rack	4

PROPOSED BICYCLE PARKING

Table 13 shows where bicycle parking is proposed.

TABLE 13: PROPOSED BIKE PARKING

LOCATION	SPECIFIC LOCATION	BICYCLE PARKING TYPE	# BICYCLES ACCOMMODATED
Bagdouma Park	each of 2 baseball fields	racks	8
	swim center	racks	4
	soccer field	racks	4
	basketball courts	racks	4
Dateland Park	center of the park	racks	4
Rancho De Oro Park	NE, SE, SW corners of the park	racks	12
Rancho Las Flores Park	north end of the park	racks	4
Shady Lane Park	SW corner of the park	racks	4
Sierra Vista Park	SW corner of the park	racks	4
Coachella Valley High School	secure, convenient location	racks	12
Bobby Duke Middle School	secure, convenient location	racks	12
6 elementary schools	secure, convenient location	racks	8 at each school (48 total)
Boys and Girls Club 85-350 Bagdad Ave.	near the front door	racks	6
CV Link (Whitewater River path)	every ½ mile (9 locations in Coachella_	racks	18

Additionally, the City will purchase 50 racks to be distributed at stores where they don't exist now. Altogether, this ATP proposes new racks to accommodate 194 bicycles. As demand demonstrates itself at specific locations, more can be added. It is recommended that the City use racks with an "inverted-U" design for support, security and ease of locking.

Inverted U-Rack

The City does not have an ordinance that requires bicycle parking in new developments. New non-residential developments must follow the requirements of the California Green Building Standards Code which requires that new or add-ons to non-residential buildings with over 10 tenant-occupants provide bike racks for 5 percent of new visitor motorized vehicle parking spaces with at least one rack that accommodates two bicycles. The code also requires that new or add-ons to non-residential buildings with over 10 tenant-occupants provide long-term storage for bicycles for 5 percent of vehicle parking spaces, with a minimum of one space. These facilities must be convenient from the street and meet one of the following requirements:

- Covered, lockable enclosures with permanently anchored racks; or
- Lockable bicycle rooms with permanently anchored racks; or
- Lockable permanently anchored bicycle lockers.

LINKS TO TRANSIT

Sunline Transit that serves the Coachella Valley has bike racks on the front of all its buses. The older buses have racks that support two bicycles. Sunline Transit is now purchasing newer racks the accommodate three bicycles each. Additionally, the City will add bicycle parking at key bus stops as displayed below in Table 14. Altogether, this ATP proposes new racks to accommodate 18 bicycles and bicycle lockers to accommodate 12 bicycles at bus stops.

TABLE 14: PROPOSED BICYCLE PARKING AT BUS STOPS

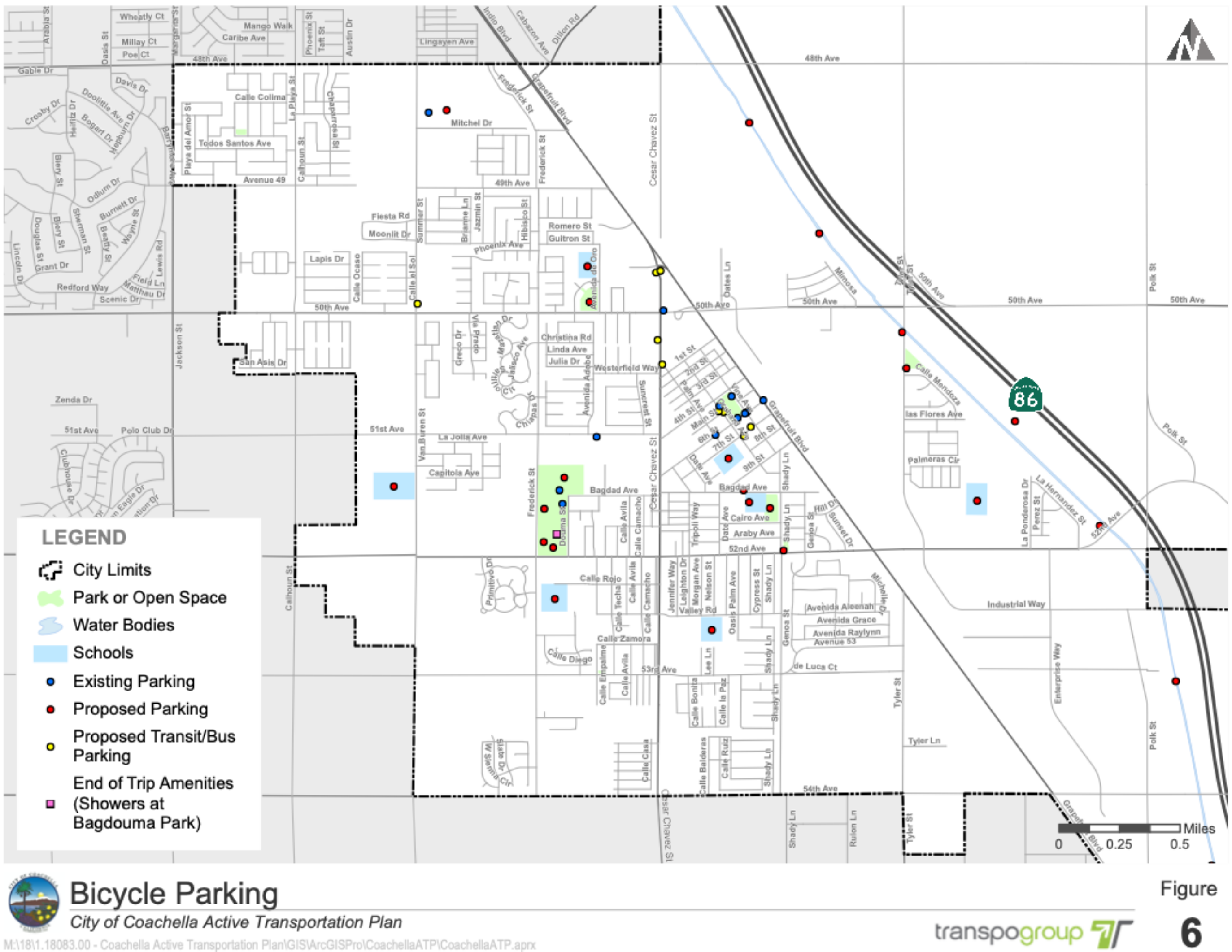
BUS LINE	STREET	CROSS STREET	STOP #	BICYCLE PARKING
91	Cesar Chavez St.	Grapefruit Blvd.	304	rack for 2 bicycles, locker for 2 bicycles
91	Cesar Chavez St.	Grapefruit Blvd.	305	rack for 2 bicycles
90/111	Cesar Chavez St.	Ave. 50	356	rack for 2 bicycles, locker for 2 bicycles
90/91	Orchard Ave.	5th St.	361	rack for 2 bicycles, locker for 2 bicycles
90	Orchard Ave.	5th St.	452	rack for 2 bicycles
90	Van Buren St.	Ave. 50	453	rack for 2 bicycles, locker for 2 bicycles
90/91	Cesar Chavez St.	Ave. 50	815	rack for 2 bicycles, locker for 2 bicycles
90	7th St.	Orchard Ave.	968	rack for 2 bicycles
90/111	7th St.	Orchard Ave.	514	rack for 2 bicycles, locker for 2 bicycles

Sunline Transit Bus with Bike Rack

END-OF-TRIP AMENITIES

Bagdouma Park has showers that could be used by bicycle commuters. There are no City ordinances that require showers and/or clothing lockers that are open to the public. The California Green Building Standards Code requires that new non-residential buildings provide showers and changing facilities to accommodate bicycle commuters. Specifically, the Code requires that buildings with over 10 tenant-occupants provide changing/shower facilities or make arrangements with nearby changing/shower facilities.

Figure 6


LEGEND
City Limits
Park or Open Space
Water Bodies
Schools
Existing Parking
Proposed Parking
Proposed Transit/Bus Parking
End of Trip Amenities (Showers at Bagdouma Park)
Miles
0
0.25
0.5
Bicycle Parking
City of Coachella Active Transportation Plan
M:\18\1.18083.00 - Coachella Active Transportation Plan\GIS\ArcGISPro\CoachellaATP\CoachellaATP.aprx
transpogroup
Figure
6

PROGRAMS

Coachella doesn't have any formal education or encouragement programs for active transportation. The Police Department enforces all traffic laws.

The City will apply for a grant to fund a start-up of a Safe Routes to School education and encouragement program.

WAYFINDING SIGNS

The City doesn't currently have wayfinding signs. It will seek funds to provide wayfinding signs to the CV Link when it is completed.

MAINTENANCE PRACTICES

The City restripes all major and arterial streets twice per year. The City has a pavement management program that gets updated every three years. The pavement management study prioritizes streets for resurfacing and spends $1.5 million per year on the highest priority streets. Bike paths will be part of the pavement management program and will be resurfaced as needed.

REPORTING PRACTICES

The City follows all required protocols for reporting on grants that are won as prescribed by each funding agency.

CHAPTER 4: PROPOSED PEDESTRIAN IMPROVEMENTS

Based on comments received from the two surveys conducted, the City plans the following pedestrian improvements.

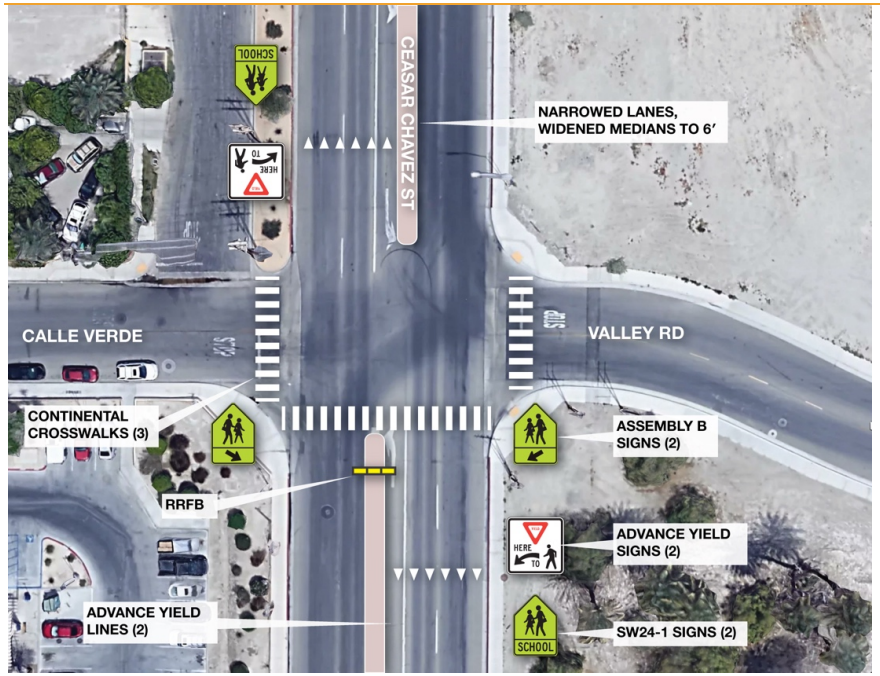
NEW SIDEWALKS

Generally, new sidewalks in Coachella are added with new development. New sidewalks are proposed at the following locations to fill in gaps where they are missing.

TABLE 15: PROPOSED BICYCLE PARKING AT BUS STOPS

STREET	SIDE	FROM	TO	LENGTH (FEET)
Van Buren St.	west	Ave. 51	630' south to existing sidewalk	630
Van Buren St.	east	Ave. 51	650' north to existing sidewalk	650
Tyler St.	east	Ave. 53	Ave. 54	2,550
Pendleton Way	west	8th St.	9th St.	320
Pendleton Way	west	7th St.	130' south	130
Ave. 52	north	Tyler St.	Education Way	1,300
Ave. 54	north	Calle Balderas	Cesar Chavez St.	1,000

VALLEY RD. AND CESAR CHAVEZ ST.



Existing

- Cesar Chavez St. has 4 lanes, a center-turn lane, buffered bike lanes and a 3' median, 80' wide
- Valley Rd. has 2 lanes and on-street parking
- No marked crosswalks

Proposed

- Add continental crosswalks to the east, west and south legs (3)
- Narrow the lanes to widen the median to 6' to create crossing islands (1 pair)
- Add rectangular rapid-flash beacons to the south leg (1 set)
- Add SW24-1 signs to each approach of the south leg (2)
- Add Assembly B signs to both sides of the south leg (2)
- Add advance yield lines to each approach of the north leg (2)
- Add advance yield signs (R1-5) to each approach of the north leg (2)

AVE. 53 AND CALLE LA PAZ

Existing

- 3-way stop
- Ave. 53 has 2 lanes, a center-turn lane and buffered bike lanes
- Calle La Paz has 2 lanes and on-street parking
- Yellow ladder crosswalk on the west leg
- Crossing islands on west leg
- School crossing signs on both approaches on Ave. 53

Proposed

- Color the crosswalk white (1)
- Add an advance stop line to the west leg (1)

AVE. 53 AND CALLE BONITA

Existing

- 3-way stop
- Ave. 53 has 2 lanes, a center-turn lane and buffered bike lanes
- Calle Bonita has 2 lanes and on-street parking
- Yellow ladder crosswalk on the east leg
- School crossing signs on both approaches on Ave. 53

Proposed

- Narrow lanes to fit in 6' crossing islands on the east leg crossing (1 pair)
- Color the crosswalk white (1)
- Add an advance stop line to the east leg (1)

9TH ST. AND PENDLETON WAY

Existing

- 3-way intersection
- Stop for Pendleton Way
- Stop for school drop-off exit
- No controls for 9th St.
- Yellow ladder crosswalk on the north leg (Pendleton Way)

Proposed

- Add curb extensions to the north leg (Pendleton Way) (2)
- Add a continental crosswalk over the school drop-off exit (1)
- Add raised crosswalks on the north leg and the school drop-off leg (2)

ORCHARD ST. AND 8TH ST.

Existing

- 3-way intersection
- 1-way stop for 8th St.
- Yellow ladder crosswalk on the north leg
- School crossing sign at the crosswalk

Proposed

- Add R1-6 sign on a small island on the north leg (1)
- Add SW24-1 signs to each approach of the north leg (2)
- Add advance yield lines to each approach of the north leg (2)
- Add advance yield signs (R1-5) to each approach of the north leg (2)
- Add curb extensions to the north leg (2)

ORCHARD ST. AND 3RD ST.

Existing

- 2-way stop for 3rd St.
- No marked crosswalks
- Both streets have 2 lanes and on-street parking

Proposed

- Add continental crosswalks to north, east and west legs (3)
- Add SW24-1 signs to each approach of the north leg (2)
- Add Assembly B signs to the crosswalk on the north leg (2)
- Add advance yield lines to each approach of the north leg (2)
- Add advance yield signs (R1-5) to each approach of the north leg (2)
- Add curb extensions to the north leg (2)

AVENIDO DE ORO SOUTH OF NORTH SCHOOL PARKING LOT ENTRANCE

Existing

- No marked crosswalks

Proposed

- Add a continental crosswalk just south of the parking lot entrance (1)
- Add advance yield lines to each approach (2)
- Add advance yield signs (R1-5) to each approach (2)
- Add an R1-6 sign to this crosswalk (1)
- Add a SW24-1 sign to each approach (2)
- Add curb extensions to this crosswalk (2)

VALLEY RD. BETWEEN TRIPOLI WAY AND LAS PALMAS ST.

Speeding problem

Existing

- Yellow ladder crosswalks on the north and east legs of Tripoli Way, the north, east and west legs of Morgan Ave., and the north and east legs of Nelson Ave.
- 4 Speed humps

Proposed

- Add curb extensions to the east legs of Valley Rd. at Tripoli Way, Morgan Ave., and Nelson Ave. (6)
- Add raised crosswalks to the east legs of Valley Rd. at Tripoli Way, Morgan Ave., and Nelson Ave. (4)

CHAPTER 5: DOWNTOWN STREET PLAN

Coachella downtown streets are wide and have a number of issues that can be improved.

- There is a lack of landscaping
- Many drivers speed
- Many of the sidewalks have no parkways and the driveways cause people in wheelchairs and baby strollers to go over a cross-slope when traversing over driveways.

These downtown streets include:

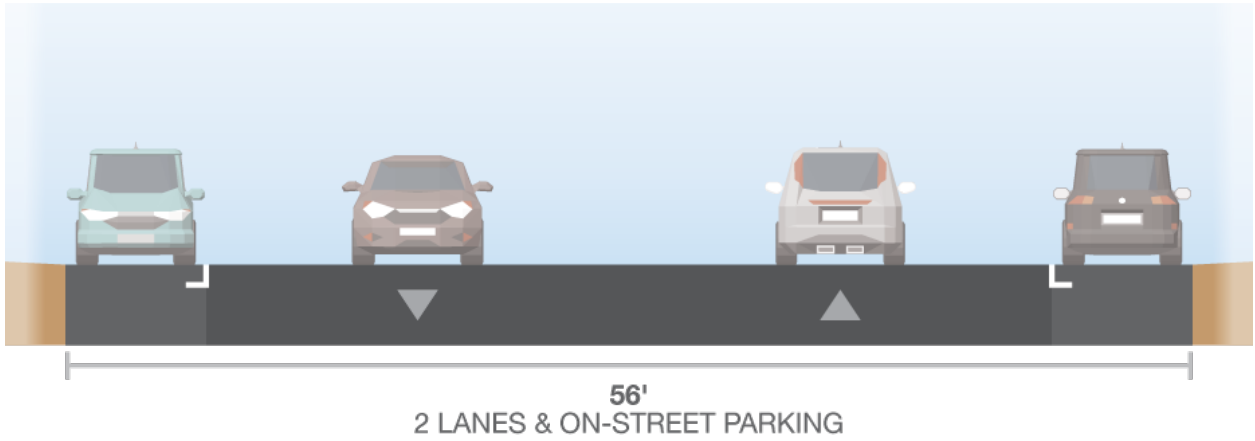
- 1st Street
- 2nd Street
- 3rd Street
- 4th Street
- 5th Street
- 7th Street
- Palm Avenue
- Orchard Street
- Vine Avenue.

They range in width from 52 feet to 64 feet, although most of the cross sections are 56 feet wide. The travel lanes can be reduced to 10 feet wide each and parking to 7 feet wide. This leaves 22 feet on most segments that can be repurposed to address these shortcomings. The City may choose from a variety of treatments including, but not limited to:

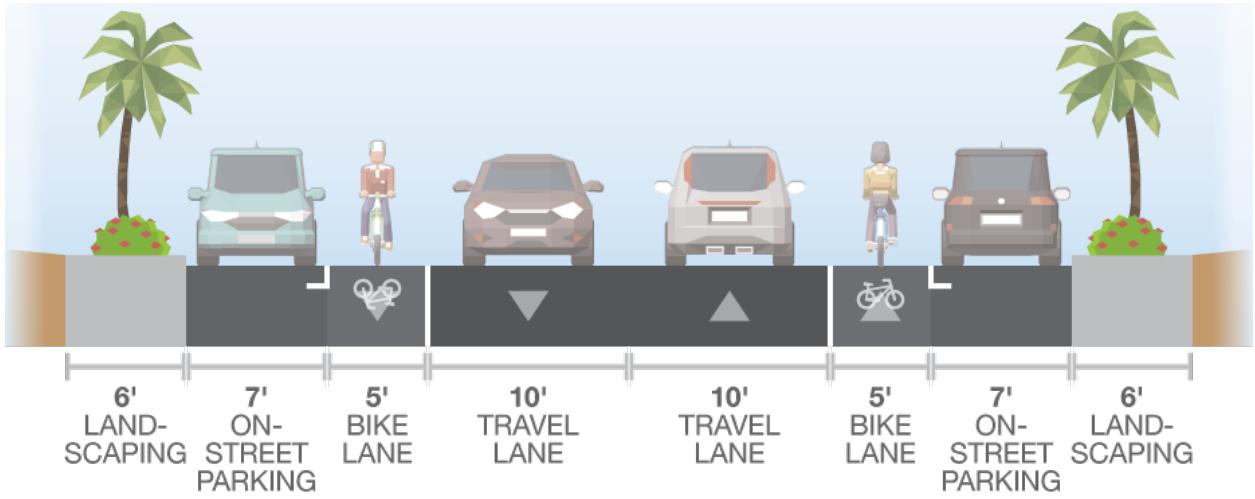
- Adding parkways either by moving curbs or by simply adding landscaping
- Adding bike lanes
- Traffic calming
- Creating a wide usable area within the street right-of-way.

The following graphics illustrate how a typical cross section could be modified. The City could choose to create “yield” streets in this neighborhood whereby the travel portion of the street is further narrowed from 20 feet to 16 or 18 feet. This would allow for wider parkways and/or bike lanes.

Existing Cross-Section



Proposed Cross-Section

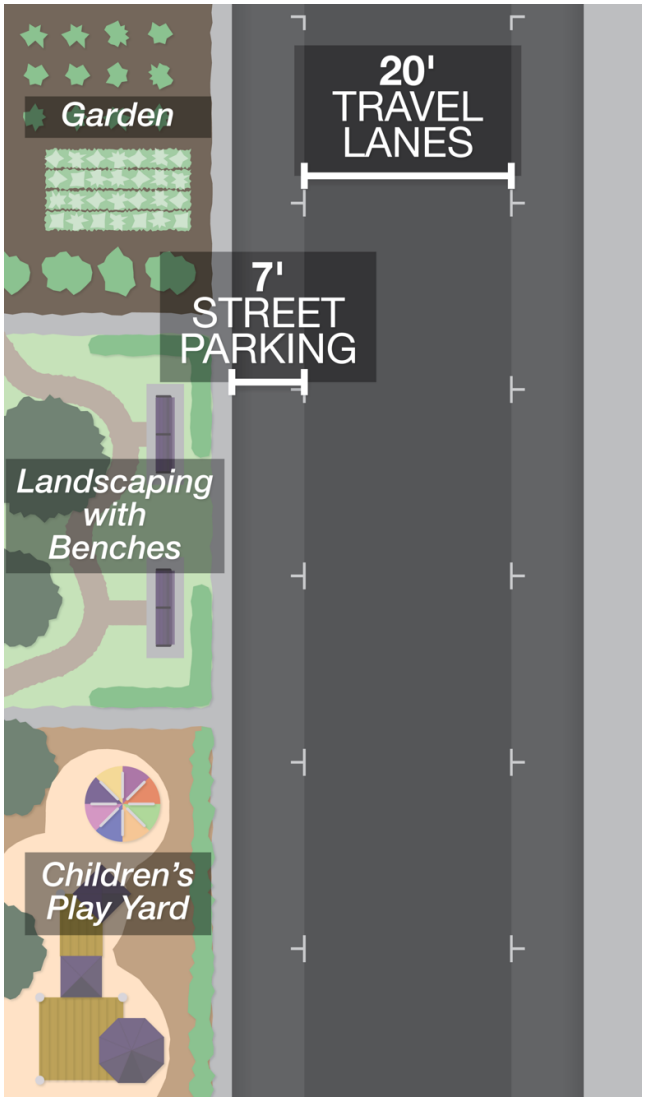


The street cross section modification doesn't have to be expensive. It is possible, for example, to use plastic or rubber pre-fabricated curbing that attaches to the street to designate the new curb instead of poured concrete as shown below.

Pre-Fabricated Curbing

The following graphic shows another way, among many, that the City could choose to reconfigure the streets. As traffic volumes are low, bike lanes aren't as necessary as on faster moving and busier streets. The City could choose to consolidate the new space to one side as to create enough space that it could become usable. Some possible uses would be a place to garden, a children's play yard, or landscaping with benches as shown in the adjacent graphic.

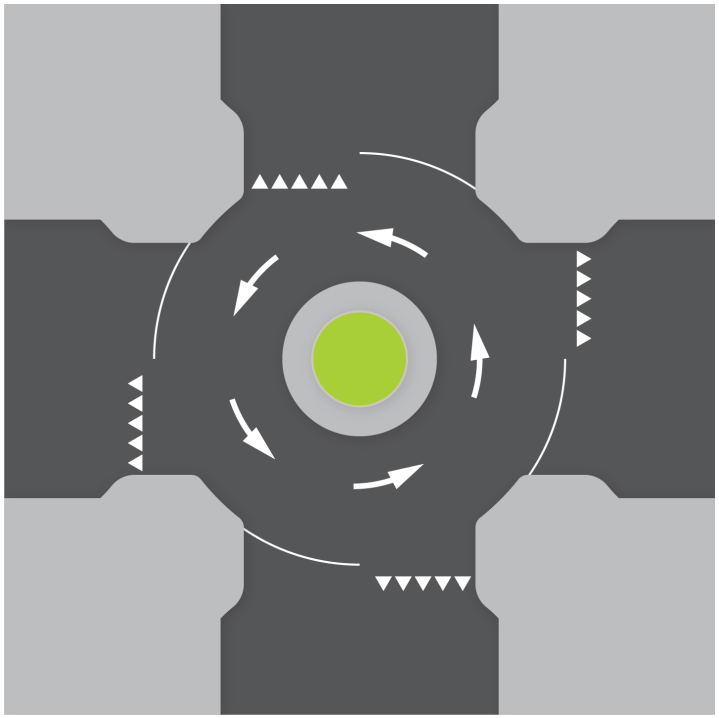
Proposed Alternative Cross-Section



Existing Intersections

Another way to address speeding and improve pedestrian safety is to add curb extensions to the intersection corners and replace stop-controlled intersections with mini traffic circles. Given the amount of space available, the curb extensions could be large and still enable cars, buses and emergency vehicles through. The graphic above (right) illustrates this concept.

Proposed Intersection Treatment



These concepts would address the aforementioned issues, as well as improve safety for pedestrians and bicyclists. They would also make the streets more conducive to social interaction.

CHAPTER 6: FUNDING SOURCES

FEDERAL FUNDING

FIXING AMERICA'S SURFACE TRANSPORTATION (FAST) ACT

Passed in December 2015, the Fixing America's Surface Transportation (FAST) Act is five-year legislation starting in the current Federal fiscal year, FY2016 to improve the Nation's surface transportation infrastructure, including our roads, bridges, transit systems, and rail transportation network. Over the five-year period FY 2016-2020, $305 billion in spending has been set aside for all modes. The FAST Act eliminates the 2012 Moving Ahead for Progress in the 21st Century Act (MAP-21), but since MAP-21 projects were still carried over under the FAST Act, bicycling and walking projects are also eligible for the following core programs:

SURFACE TRANSPORTATION BLOCK GRANT (STBG)

The STBG program has the most flexible eligibilities among all Federal-aid highway programs and promotes flexibility in State and local transportation decisions to best address their transportation needs.

ADMINISTERING AGENT: FHWA apportions funding for the State (Caltrans) that then divides that total among apportioned Programs.

ELIGIBLE PROJECTS: Flexible in eligibility requirements; STBG may be used for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects. Specifically, the TA set-aside funds include a variety of smaller scale transportation projects such as pedestrian and bicycle facilities, recreational trails, safe routes to schools, and community improvements.

DISTRIBUTION & FREQUENCY: STBG requires a Transportation Alternatives (TA) set-aside. Between $11-12 billion annually nationwide under the STBG; approximately $850 million annually nationwide of the STBG funds is dedicated towards the TA set-aside. California administers these funds through the Active Transportation Program (ATP).

More information can be found at:

http://www.fhwa.dot.gov/fastact/factsheets/stbgfs.cfm

HIGHWAY SAFETY IMPROVEMENT PROGRAM (HSIP)

The HSIP program aims to achieve a significant reduction in traffic fatalities and serious crashes through the implementation of infrastructure-related highway safety improvements.

ADMINISTERING AGENT: FHWA apportions funding for the State (Caltrans) that then divides that total among apportioned programs.

ELIGIBLE PROJECTS: Project applications must demonstrate that the proposed engineering improvements will increase the safety of the proposed project area. Project areas that have a prior history of injuries or fatalities are more likely to be funded. These improvements may be on any public road or publicly owned bicycle and pedestrian pathway or trail and can include the use of devices such as traffic signals, curb extensions, and crosswalks.

DISTRIBUTION & FREQUENCY: Between $2-3 billion annually nationwide; in California, Caltrans releases HSIP funds approximately every one to two years. HSIP assigned approximately

$158 million in Cycle 7 (2015) and approximately $219 million in Cycle 8 (2-16).

More information can be found at:

http://www.dot.ca.gov/hq/LocalPrograms/hsip.htm and
https://www.fhwa.dot.gov/fastact/factsheets/hsipfs.cfm

CONGESTION MANAGEMENT AND AIR QUALITY (CMAQ)

THE CMAQ program is implemented to support surface transportation projects and other related efforts that contribute air quality improvements and provide congestion relief.

ADMINISTERING AGENT: FHWA apportions funding for the State (Caltrans) that then divides that total among apportioned programs.

ELIGIBLE PROJECTS: While the legislation places emphasis on air quality projects or other elements of flexible federal aid highway spending such as diesel engine retrofits and alternative fuel infrastructure, funds may also be used for bicycle and pedestrian-related projects such as bikeways, bicycle parking, crosswalks, sidewalks, signs and signals.

DISTRIBUTION & FREQUENCY: Approximately $2-3 billion annually nationwide.

MATCH REQUIREMENTS: 20% local or state match is required for these funds.

More information can be found at:

http://www.fhwa.dot.gov/environment/air_quality/cmaq/

The FAST Act also creates a priority safety fund to focus on education and enforcement programs that reduce pedestrian and bicycle fatalities. Only states in which 15% or more of overall fatalities are bicyclists or pedestrians will receive funds. California is one of these states and should be eligible.

More information can be found at:

https://www.fhwa.dot.gov/fastact/

http://www.fhwa.dot.gov/map21/summaryinfo.cfm

TRANSPORTATION INVESTMENTS GENERATING ECONOMIC RECOVERY (TIGER) GRANT PROGRAM

The Consolidated Appropriations Act, 2017 appropriated $500 million, available through September 30, 2020, for National Infrastructure Investments otherwise known as TIGER Grants. The TIGER Grant Program allows State and local agencies to obtain funding for multi-modal, multi-jurisdictional projects that are more difficult to support through traditional DOT programs. TIGER can provide capital funding directly to any public entity, including municipalities, counties, port authorities, tribal governments, and MPOs (rather than traditionally only to State DOTs).

ADMINISTERING AGENT: U.S. Department of Transportation

ELIGIBLE PROJECTS: Capital projects include bridge and infrastructure repairs, safety improvements to reduce fatalities and serious injuries, access to critical health services; projects that connect communities and people to jobs, services, and education; and, projects that anchor economic revitalization and job growth. Projects that demonstrate significant non-Federal financial contributions will increase their competitiveness.

DISTRIBUTION & FREQUENCY: Annually. Based on guidelines FY 2017, maximum grant award was $25-50 million to a single State; for projects located in urban areas, the minimum award is $5 million (minimum total project cost for a project located in an urban area must be $6.25 million to meet match requirements).

MATCH REQUIREMENTS: Grants may be used for up to 80% of project cost (In other words, the implementing agency would need to be able to fund 20% of project cost).

More information can be found at:

https://www.transportation.gov/tiger/about

COMMUNITY DEVELOPMENT BLOCK GRANTS (CDBG)

CDBG entitlement program allocates annual grants to larger cities and urban counties to develop viable communities by providing decent housing, a suitable living environment, and opportunities to expand economic opportunities, principally for low and moderate-income persons.

ADMINISTERING AGENT: US Department of Housing and Urban Development (HUD)

ELIGIBLE PROJECTS: Projects address affordable housing needs and fair housing issues, assist homeless persons, provide adequate infrastructure, and support programs that enhance civic/community design. Bicycle and pedestrian facilities are eligible uses of these funds.

DISTRIBUTION & FREQUENCY: Annually; CDBG funds only pay for projects in areas of economic need. HUD determines the amount of each grant by using a formula comprised of several measures of community need. Cities must certify with the HUD that at least 70% of all funding received will be used to benefit persons of low and moderate income in CDBG eligible areas. Additionally, up to 15% of CDBG program funds may be for public services in eligible areas.

MATCH REQUIREMENTS: N/A

More information can be found at:

https://www.hud.gov/program_offices/comm_planning/communitydevelopment/programs

STATE FUNDING

ACTIVE TRANSPORTATION PROGRAM (ATP)

The Active Transportation Program (ATP) results from Senate Bill 99, Chapter 359, and Assembly Bill 101, Chapter 354 that passed and was signed by Governor Brown. The purpose of ATP is to increase the use of active modes of transportation such as bicycling and walking by funding projects that improve options.

ADMINISTERING AGENT: State (Caltrans) administers the ATP, MPOs (SCAG) oversees the competitive project selection process.

ELIGIBLE PROJECTS: ATP funds are available for design and construction of any bicycle or pedestrian project, including infrastructure projects, plans, and non-infrastructure projects; capital improvements such as environmental design, right-of-way, and construction are also eligible.

DISTRIBUTION & FREQUENCY: Caltrans has administered three cycles of ATP grants in 2014, 2015, and 2017. The 2019 Cycle 4 Call-for-Projects is out as of the preparation of this ATP. The funds are distributed through competitive grants with the following formula:

- 40% to Metropolitan Transportation Organizations in urban areas with populations greater than 200,000
- 10% will funnel to small urban and rural areas with 200,000 or fewer people
- 50% will be available statewide in competitive grants.

MATCH REQUIREMENTS: N/A

More information can be found at:

http://www.dot.ca.gov/hq/LocalPrograms/atp/

STATE TRANSPORTATION IMPROVEMENT PLAN (STIP)

The State Transportation Improvement Program (STIP) is a multi-year capital improvement program of transportation projects on and off the State Highway System. Each STIP will cover a 5-year period and add two new years of programming capacity.

The STIP consists of two state programs: The Interregional Transportation Improvement Program (ITIP), prepared by the State (Caltrans); and the Regional Transportation Improvement Program (RTIP), prepared by regional planning agencies (SCAG). Approximately 75% of new STIP funding is allocated to RTIP, which is sub-allocated to counties per formula basis, and 25% is distributed to the ITIP, which is allocated to the State (Caltrans) for projects with interregional significance.

ADMINISTERING AGENT: State (Caltrans); cities work through their regional planning agency, County Transportation Commission (RCTC), or MPO (SCAG) to nominate projects to be included in the STIP.

ELIGIBLE PROJECTS: Bicycle and pedestrian projects may be programmed in the STIP so long as they are eligible for State Highway Account or Federal funds.

DISTRIBUTION & FREQUENCY: Generally, occurs every two years.

MATCH REQUIREMENTS: N/A

More information can be found at:

http://dot.ca.gov/hq/LocalPrograms/STIP.htm

http://www.dot.ca.gov/hq/transprog/ocip/adopted_2018_stip_guidelines/2018-stip-guidelines-adopted-081617.pdf

CALTRANS TRANSPORTATION PLANNING GRANT PROGRAM

A total of $40.8 million for the FY 2018-2019 is available for transportation planning projects statewide. Caltrans administers these grants every year. The following transportation grants are awarded on the competitive basis.

SUSTAINABLE COMMUNITIES GRANT ($29.5 MILLION)

Encourage local and regional planning that furthers state goals, including, but not limited to, the goals and best practices cited in the Regional Transportation Plan (RTP) Guidelines adopted by the California Transportation Commission.

ADMINISTERING AGENT: State (Caltrans) will distribute to MPOs (SCAG) through via competitive grants and formula-based grants.

ELIGIBLE PROJECTS: Multimodal transportation and land use projects that contribute to the State's greenhouse gas reduction targets, employ the goals and best practices cited in the 2017 RTP guidelines, and address the needs of disadvantaged communities.

DISTRIBUTION & FREQUENCY: Grants are available in amounts from $50,000 to $500,000.

MATCH REQUIREMENTS: 11.47% local match.

STRATEGIC PARTNERSHIP GRANTS ($4.3 MILLION)

Identify and address statewide, interregional, or regional transportation deficiencies on the State highway system in partnership with Caltrans. New for FY 2018-19 is a transit component that will fund planning projects that address multimodal transportation deficiencies with a focus on transit.

ADMINISTERING AGENT: State (Caltrans) will distribute to MPOs (SCAG) through via competitive grants and formula-based grants.

ELIGIBLE PROJECTS: Projects that address multi-modal deficiencies with a focus on transit.

DISTRIBUTION & FREQUENCY: Grants are available in amounts from $100,000 to $500,000.

MATCH REQUIREMENTS: State highway systems via FHWA funds require 20% local match; transit projects via FTA funds require 11.47% local match.

ADAPTION PLANNING GRANTS

Support planning actions at local and regional levels that advance climate change efforts on the transportation system.

ADMINISTERING AGENT: State (Caltrans)

ELIGIBLE PROJECTS: Projects that have adaption planning efforts, including transportation adaptation planning. Eligible projects must have a transportation nexus per Article XIX Sections 2 and 3 of the California Constitution.

DISTRIBUTION & FREQUENCY: Grants are available in amounts from $100,000 to $1,000,000.

MATCH REQUIREMENTS: 11.47% local match.

More information can be found at:

http://www.dot.ca.gov/hq/tpp/grants.html

SUSTAINABILITY PLANNING GRANT PROGRAM – ACTIVE TRANSPORTATION CALL FOR PROPOSALS

SCAG provides its Sustainability Planning Grants Program for agencies that were not awarded funds in preceding cycles to develop capacity and be competitive for future funding by developing active transportation plans or participating in the region's successful Go Human event series.

ADMINISTERING AGENT: SCAG

ELIGIBLE PROJECTS: Planning and non-infrastructure projects that promote walking and bicycling, and to provide preliminary funding for future applicants that submit active transportation projects.

DISTRIBUTION & FREQUENCY: For SCAG's first 2017 Call for Proposals, the program allocated $2 million in grant awards of up to $200,000 each. Public agencies that have been previously awarded a California Active Transportation Program Grant are ineligible.

MATCH REQUIREMENTS: N/A

More information can be found at:

http://sustain.scag.ca.gov/Pages/DemoProjApplication.aspx

TRANSPORTATION DEVELOPMENT ACT (TDA)

The Transportation Development Act (TDA) provides two major sources of funding for public transportation: The Local Transportation Fund (LTF) and the State Transit Assistance fund (STA). These funds are for the development and support of public transportation needs that exist in California and are allocated to areas of each county based on population, taxable sales and transit performance. Some counties have the option of using LTF for local streets and roads projects, if they can show there are no unmet transit needs.

ADMINISTERING AGENT: State (Caltrans)

ELIGIBLE PROJECTS: The TDA funds a wide variety of transportation programs, including planning and program activities, pedestrian and bicycle facilities, community transit services, public transportation, and bus and rail projects.

MATCH REQUIREMENTS: N/A

More information can be found at:

http://dot.ca.gov/hq/MassTrans/State-TDA.html

OFFICE OF TRAFFIC SAFETY

The California Office of Traffic Safety (OTS) seeks to reduce motor vehicle fatalities and injuries through the pedestrian and bicycle safety program. Funding is provided for education, enforcement, and engineering projects that improve safety on existing facilities. Eligible projects include traffic safety studies, helmet giveaways, and safety education programs.

ADMINISTERING AGENT: California OTS

ELIGIBLE PROJECTS: Bicycle safety programs are eligible programs for OTS start-up funds.

DISTRIBUTION & FREQUENCY: The OTS provides grants for one to two years. There is no set maximum for grants.

MATCH REQUIREMENTS: Not required; however, contributions of other funds may make projects more competitive.

More information can be found at:

http://www.ots.ca.gov/Grants/

SCAQMD AB 2766 CLEAN AIR FUNDS SUBVENTION PROGRAM

South Coast Air Quality Management District (SCAQMD) receives approximately $20 million in motor vehicle fee annually. Since these funds are generally not fully spent every year, local governments also can carry over fund balances indefinitely, which allows flexibility in accumulating funding for future projects or secure additional grant matches.

ADMINISTERING AGENT: SCAQMD

ELIGIBLE PROJECTS: Projects are up to the discretion of the city and may be used for, but not limited to, the following: new bikeways, pedestrian and bicycle facilities, bike loan programs (i.e., for police, members of the community or the public), transportation demand management strategies, traffic management and signal coordination, and safety education and encouragement programs that promote bicycling and/or walking in lieu of driving.

DISTRIBUTION & FREQUENCY: 40% of the first $4 of each vehicle registration fee is distributed to local jurisdictions quarterly according to their prorated share of population for projects that reduce mobile source emissions. Since these funds are generally not fully spent every year, local governments also have the ability to carry over fund balances indefinitely, which allows flexibility in accumulating funding for future projects or secure additional grant matches.

MATCH REQUIREMENTS: N/A

More information can be found at:

http://www.aqmd.gov/home/programs/local-government/local-governmentdetail?

title=ab2766-motor-vehicle-subvention-program

LAND AND WATER CONSERVATION FUND (LWCF)

The State Side of the LWCF provides matching grants to States and local governments for the acquisition and development of public outdoor recreation areas and facilities.

ADMINISTERING AGENT: California State Parks Department

ELIGIBLE PROJECTS: Cities, counties, recreation and park districts, and any other entity that has the authority to develop or maintain a public park is eligible to apply. Chosen applications are then forwarded to the National Park Service for formal approval and obligation of federal grant monies. Bike paths and recreational trails are eligible uses of this money.

DISTRIBUTION & FREQUENCY: States initiate a statewide competition for the amount available annually.

MATCH REQUIREMENTS: One for one match is required, and federal funds cannot be used as a match, except Community Development Block Grants.

More information can be found at:

https://www.nps.gov/subjects/lwcf/index.htm

LOCAL AND REGIONAL FUNDS

MEASURE A

In 1998, voters approved Measure A, Riverside County's half-cent sales tax for transportation. Funds are allocated to each of three districts—western Riverside County, the Coachella Valley, and the Palo Verde Valley—in proportion to what they contribute. In 2002, Measure A was extended by Riverside County voters to fund transportation improvements through 2039.

Non-motorized transportation projects are not included in a specific category of funding under Measure A. Individual projects can be included by each city under the Local Streets and Roads program's allocation of funds. Local Streets and Roads funds are remitted to local jurisdictions on a monthly basis. In order for individual projects to receive these funds, cities must provide an annual Maintenance of Effort certification and five-year capital improvement plan/program (CIP) that lists projects that will be funded under Measure A. Projects not included in the five-year CIP would not be eligible for Measure A funding.

Of the $870 million of 20-year Measure A revenues, approximately $240 million is allocated for the Coachella Valley and $13 million for the Palo Verde Valley, which may or may not include those for on-street bicycle facilities. Often, bicycle lane projects are included as part of larger roadway projects and would not be called out specifically as a bicycle project.

The Riverside County Transportation Commission administers Measure A funds. Thirty-five percent of Measure A funds are distributed to cities and 15 percent is distributed to SunLine Transit, with the remaining 50 percent administered by CVAG.

More information can be found at:

www.rctc/org/planning-and-funding/

TRANSPORTATION UNIFORM MITIGATION FEE (TMPF)

As part of Measure A, an innovative Transportation Uniform Mitigation Fee or TUMF was created. Under the TUMF,

developers of residential, industrial, and commercial property pay a development fee to fund transportation projects that will be required as a result of the growth the projects create. CVAG administers the fee program. The TUMF program does not have a specific category set aside for non-motorized transportation projects; however, the TUMF Advisory Subcommittee will recommend whether non-motorized projects should be considered in the Total Regional Transportation System Cost used in the TUMF calculations. Eligible projects must be included in a city's general plan circulation element.

The Transportation Project Prioritization Study, the Regional Arterial Cost Estimate, and the TUMF Nexus Study update guidelines for TUMF funds.

RESURFACE AND REPAVING

A jurisdiction is able to add bicycle lanes and sharrows when resurfacing and repaving streets. While other lanes are restriped, the bike facilities can be painted as well.

NEW CONSTRUCTION

Future road widening and construction projects are one means of providing bike lanes. To ensure that roadway construction projects provide bike lanes where needed, it is important that an effective review process is in place to ensure new roads meet the standards and guidelines presented in this plan. Developers may also be required to dedicate land toward the widening of roadways in order to provide for enhanced bicycle mobility.

More information can be found at:

www.rctc/org/planning-and-funding/

CHAPTER 7. IMPLEMENTATION

The following table provides a capital cost estimate of all the proposed projects in this ATP. It doesn't include the cost of the downtown improvements since the project is conceptual at this point.

The total capital cost of all proposed projects is $36,861,500. The City will apply for funds for ongoing education, encouragement and enforcement programs at a cost of approximately $50,000 per year.

TABLE 16: TYPICAL CAPITAL COSTS

PLANNING-LEVEL COST ESTIMATE	PER MILE COST	PER UNIT COST
Bike lanes	$100,000/mi.	
Colored bike lanes	$130,000/mi.	
Buffered bike lanes	$120,000/mi.	
Colored buffered bike lanes	$150,000/mi.	
Bike paths	$2,000,000/mi.	
Protected bike lanes	$200,000/mi.	
Signed bike routes	$20,000/mi.	
Bike routes with greenback sharrows	$45,000/mi.	
Sidewalk with curb and gutter	$150/linear ft.	
Traffic signals		$350,000
Bicycle racks (2 bikes per rack)		$800
Bicycle lockers		$2,500
Signs		$400
Curb extensions		$30,000

PLANNING-LEVEL COST ESTIMATE	PER MILE COST	PER UNIT COST
Raised crosswalks		$20,000
Rectangular rapid-flash beacons (1 set)		$35,000
Crossing islands (1 pair)		$20,000
Continental crosswalks (2-lane street)		$400
Continental crosswalks (4-lane street)		$800
Advance stop/yield lines		$200
Narrow travel lanes to create room for median widening		$30,000

TABLE 17: PROPOSED CAPITAL BICYCLE COSTS

STREET	FROM	TO	TYPE	LENGTH (MI.)	COST PER MILE/UNIT	COST
Ave. 44	Cesar Chavez St.	Dillon Rd.	bike lanes	1.0	$100,000	$100,000
Ave. 48	Jackson St.	Van Buren St.	buffered bike lanes	1.0	$120,000	$120,000
Ave. 48	Van Buren St.	Dillon Rd.	buffered bike lanes	0.3	$120,000	$36,000
Ave. 48	Tyler St.	Coachella Canal	bike lanes	1.6	$100,000	$160,000
Ave. 49	west city limit	Van Buren St.	bike lanes	1.0	$100,000	$100,000
Ave. 52	Shady Ln.	Industrial Way	colored buffered bike lanes	0.6	$150,000	$90,000
Ave. 52	Industrial Way	Coachella Canal	bike lanes	3.3	$100,000	$330,000
Ave. 53	Frederick St.	Calle Enpalme	colored bike lanes	0.25	$130,000	$32,500

STREET	FROM	TO	TYPE	LENGTH (MI.)	COST PER MILE/UNIT	COST
Ave. 53	Calle Enpalme	Calle Avila	buffered bike lanes	0.15	$120,000	$18,000
Ave. 53	Calle Avila	Cesar Chavez St.	bike route with greenback sharrows	0.1	$45,000	$4,500
Ave. 54	Van Buren St.	Whitewater River	bike lanes	3.2	$100,000	$320,000
Ave. 54	Cesar Chavez St.	Tyler St.	bike path	1.3	$2,000,000	$2,600,000
1/2 way between Ave. 51 and Ave. 52	Van Buren St.	Frederick St.	bike path	0.5	$2,000,000	$1,000,000
Access road along east side of Spotlight 29 Casino	just south of I-10	Harrison Pl.	bike lanes	1.1	$100,000	$110,000
Airport Blvd.	east city limit	west city limit	bike lanes	0.7	$100,000	$70,000
Bagdad Ave.	Douma St.	Grapefruit Blvd.	bike route with greenback sharrows	1.1	$45,000	$49,500
Calhoun St.	Ave. 50	south city limit	bike lanes	0.5	$100,000	$50,000
Connector to 1-10	Ave. 50	I-10	bike lanes	1.1	$100,000	$110,000
Connector to Coachella Canal	Polk St.	1930' west of Pierce St.	bike path	2.4	$2,000,000	$4,800,000
Dillon Rd.	Ave. 44	Harrison Pl.	bike lanes	1.5	$100,000	$150,000
Dillon Rd.	Ave. 48	north city limit	bike lanes	1.4	$100,000	$140,000
Enterprise Way	Ave. 52	Ave. 54	bike lanes	1.0	$100,000	$100,000
Frederick St.	Ave. 49	Ave. 51	bike lanes	1.0	$100,000	$100,000
Frederick St.	Ave. 53	Ave. 54	colored bike lanes	0.5	$130,000	$65,000

STREET	FROM	TO	TYPE	LENGTH (MI.)	COST PER MILE/UNIT	COST
Grapefruit Blvd.	northern city limit	Leoco Ln.	protected bike lanes	1.25	$200,000	$250,000
Grapefruit Blvd.	9th St.	Tyler St.	protected bike lanes	1.45	$200,000	$290,000
Grapefruit Blvd.	Tyler St.	Ave. 54	bike lanes	1.0	$100,000	$100,000
Harrison Pl.	Access road along east side of Spotlight 29 Casino	Dillon Rd.	bike lanes	0.3	$100,000	$30,000
Industrial Way	Enterprise Way	Polk St.	bike lanes	0.3	$100,000	$30,000
Jackson St.	Ave. 48	Ave. 49	bike lanes	0.5	$100,000	$50,000
Mitchell Dr.	Grapefruit Blvd.	Van Buren St.	bike lanes	0.6	$100,000	$60,000
Orchard St.	9th St.	Shady Ln.	bike lane	0.1	$100,000	$10,000
Polk St.	Ave. 48	Ave. 52	bike lanes	2.0	$100,000	$200,000
Polk St.	Industrial Way	Ave. 54	bike lanes	0.8	$100,000	$80,000
Shadow View Blvd.	Dillon Rd.	Tyler St.	bike lanes	1.2	$100,000	$120,000
Shady Ln.	Orchard. St.	Ave. 52	bike lanes	0.5	$100,000	$50,000
Shady Ln.	9th St.	Ave. 54	bike path on east side	1.5	$2,000,000	$3,000,000
SR - 86 Expressway	Dillon Rd.	south city limit	signed bike route	5.2	$20,000	$104,000
Tyler St.	Dillon Rd.	Vista del Norte	bike path	0.5	$2,000,000	$1,000,000
Tyler St.	Ave. 48	Ave. 50	bike lanes	1.0	$100,000	$100,000
Tyler St.	Ave. 50	Calle Mendoza	bike lanes	0.7	$100,000	$70,000

STREET	FROM	TO	TYPE	LENGTH (MI.)	COST PER MILE/UNIT	COST
Tyler St.	Ave. 53	Ave. 54	bike lanes	0.5	$100,000	$50,000
Van Buren St.	Ave. 48	Ave. 49	colored buffered bike lanes	0.5	$150,000	$75,000
Vista del Norte	Tyler St.	Coachella Canal	bike lanes	0.6	$100,000	$60,000
Whitewater River	Tyler St.	Airport Blvd.	bike path	5.3	$2,000,000	$10,600,000
Frederick St. extension	Mitchell Dr.	Dillon Rd. at Ave. 48	bike path	0.3	$2,000,000	$600,000
Grapefruit Blvd. adjacent	northern city limit	southern city limit	bike path	4.4	$2,000,000	$8,800,000
Traffic signal at 6th St. and Grapefruit Blvd.				1	$350,000	$350,000
Traffic signal at Bagdad Ave. and Grapefruit Blvd.				1	$350,000	$350,000
Bicycle racks (2 bikes per rack)				106	$800	$84,800
Bicycle lockers				6	$2,500	$15,000
TOTAL BICYCLE PROJECT COST						**$37,184,300**

TABLE 18: NEW SIDEWALK COSTS

STREET	SIDE	FROM	TO	LENGTH (FT.)	COST PER LINEAR FT	TOTAL COST
Van Buren St.	west	Ave. 51	630' south to existing sidewalk	630	$150	$94,500
Van Buren St.	east	Ave. 51	650' north to existing sidewalk	650	$150	$97,500
Tyler St.	east	Ave. 53	Ave. 54	2,550	$150	$382,500
Pendleton Way	west	8th St.	9th St.	320	$150	$48,000
Pendleton Way	west	7th St.	130' south	130	$150	$19,500
Ave. 52	north	Tyler St.	Education Way	1,300	$150	$195,000
Ave. 54	north	Calle Balderas	Cesar Chavez St.	1,000	$150	$150,000
TOTAL				**6,540**		**$987,000**

TABLE 19: PROPOSED INTERSECTION IMPROVEMENT COSTS

LOCATION	# SIGNS	UNIT COST	# CURB EXTENSIONS	UNIT COST	# RAISED CROSSWALKS	UNIT COST	RAPID-FLASH BEACONS (SET)	UNIT COST	# CROSSING ISLANDS (PAIR)	UNIT COST	# CONTINENTAL CROSSWALKS	UNIT COST	# CONTINENTAL CROSSWALKS	UNIT COST	# ADVANCE STOP/YIELD LINES	UNIT COST	NARROW LANES FOR MEDIAN	UNIT COST	TOTAL COST PER LOCATION
Valley Rd. and Cesar Chavez St.	6	$400		$30,000		$20,000	1	$35,000	1	$20,000	1	$800	2	$400	2	$200	1	$30,000	$89,400
Ave. 53 and Calle La Paz		$400		$30,000		$20,000		$35,000		$20,000		$800	1	$400	1	$200		$30,000	$600
Ave. 53 and Calle Bonita		$400		$30,000		$20,000		$35,000	1	$20,000		$800	1	$400	1	$200	1	$30,000	$50,600
9th St. and Pendleton Way		$400	2	$30,000	2	$20,000		$35,000		$20,000		$800	1	$400		$200		$30,000	$100,400
Orchard St. and 8th St.	5	$400	2	$30,000		$20,000		$35,000		$20,000		$800		$400	2	$200		$30,000	$62,400
Orchard St. and 3rd St.	6	$400	2	$30,000		$20,000		$35,000		$20,000		$800	3	$400	2	$200		$30,000	$64,000
Avenida de Oro South of North School Parking Lot Entrance	5	$400	2	$30,000		$20,000		$35,000		$20,000		$800	1	$400	2	$200		$30,000	$62,800
Valley Rd. between Tripoli Way and Las Palmas St.		$400	6	$30,000	3	$20,000		$35,000		$20,000		$800		$400		$200		$30,000	$240,000
TOTAL	22		14		5		1		2		1		9		10		2		$670,200

PRIORITIZATION METHODOLOGY

The City will need to prioritize these projects. Tables 20, 21, 22, 23 and 24 below recommend breaking the projects into three tiers. These priorities considered the following criteria:

- Destinations served
  - Schools
  - Parks
  - Downtown
  - Stores
- Centrality
- Links to CV Link (Whitewater River)
- Completion of networks
- Bus routes
- Preferences of City staff

As the City implements this ATP the priorities may change, especially if other street projects arise that are scheduled that could be done along with the bikeways.

If the City is able to attract $800,000 per year (adjusted for 2020 dollars) it will take just over four years to complete the short-term projects, approximately 20 years to complete the mid-term projects, and 21 years to complete the long-term projects. This assumes $50,000 per year for the ongoing education, encouragement and enforcement programs.

PRIORITY PROJECTS & PLANNING-LEVEL COST ESTIMATES

TABLE 20 SHORT-TERM BICYCLE PROJECTS

STREET	FROM	TO	TYPE	LENGTH (MI.)	COST PER MILE/UNIT	COST
Ave. 48	Jackson St.	Van Buren St.	buffered bike lanes	1.0	$120,000	$120,000
Ave. 48	Van Buren St.	Dillon Rd.	buffered bike lanes	0.3	$120,000	$36,000
Ave. 48	Tyler St.	Coachella Canal	bike lanes	1.6	$100,000	$160,000
Ave. 53	Frederick St.	Calle Enpalme	colored bike lanes	0.25	$130,000	$32,500
Ave. 53	Calle Enpalme	Calle Avila	buffered bike lanes	0.15	$120,000	$18,000
Ave. 53	Calle Avila	Cesar Chavez St.	bike route with greenback sharrows	0.1	$45,000	$4,500
Bagdad Ave.	Douma St.	Grapefruit Blvd.	bike route with greenback sharrows	1.1	$45,000	$49,500
Frederick St.	Ave. 49	Ave. 51	bike lanes	1.0	$100,000	$100,000
Frederick St.	Ave. 53	Ave. 54	colored bike lanes	0.5	$130,000	$65,000
Orchard St.	9th St.	Shady Ln.	bike lane	0.1	$100,000	$10,000
Shady Ln.	Orchard. St.	Ave. 52	bike lanes	0.5	$100,000	$50,000
Shady Ln.	9th St.	Ave. 52	bike path on east side	0.5	$2,000,000	$1,000,000
Bicycle racks (2 bikes per rack)				106	$800	$84,800
Bicycle lockers				6	$2,500	$15,000
Wayfinding signs				50	$400	$20,000
TOTAL CAPITAL COST						**$1,765,300**

TABLE 21: SHORT-TERM SIDEWALK PROJECTS

STREET	SIDE	FROM	TO	LENGTH (FT)	COST PER LINEAR FT	TOTAL COST
Van Buren St.	west	Ave. 51	630' south to existing sidewalk	630	$150	$94,500
Van Buren St.	east	Ave. 51	650' north to existing sidewalk	650	$150	$97,500
Tyler St.	east	Ave. 53	Ave. 54	2,550	$150	$382,500
Pendleton Way	west	8th St.	9th St.	320	$150	$48,000
Pendleton Way	west	7th St.	130' south	130	$150	$19,500
Ave. 52	north	Tyler St.	Education Way	1,300	$150	$195,000
Ave. 54	north	Calle Balderas	Cesar Chavez St.	1,000	$150	$150,000
TOTAL				**6,580**		**$987,000**

TABLE 22 SHORT-TERM INTERSECTION PROJECTS

LOCATION	TOTAL COST PER LOCATION
Valley Rd. and Cesar Chavez St.	$89,400
Ave. 53 and Calle La Paz	$600
Ave. 53 and Calle Bonita	$50,600
9th St. and Pendleton Way	$100,400
Orchard St. and 8th St.	$62,400
Orchard St. and 3rd St.	$64,000
Avenida de Oro South of North School Parking Lot Entrance	$62,800
Valley Rd. between Tripoli Way and Las Palmas St.	$240,000
TOTAL INTERSECTION IMPROVEMENT COSTS	**$670,200**

TABLE 23: MEDIUM TERM PROJECTS

STREET	FROM	TO	TYPE	LENGTH (MI.)	COST PER MILE	COST
Ave. 52	Shady Ln.	Industrial Way	colored buffered bike lanes	0.6	$150,000	$90,000
Ave. 52	Industrial Way	Coachella Canal	bike lanes	3.3	$100,000	$330,000
Ave. 54	Van Buren St.	Whitewater River	bike lanes	3.2	$100,000	$320,000
Ave. 54	Cesar Chavez St.	Tyler St.	bike path	1.3	$2,000,000	$2,600,000
1/2 way between Ave. 51 and Ave. 52	Van Buren St.	Frederick St.	bike path	0.5	$2,000,000	$1,000,000
Calhoun St.	Ave. 50	south city limit	bike lanes	0.5	$100,000	$50,000
Grapefruit Blvd.	northern city limit	Leoco Ln.	protected bike lanes	1.25	$200,000	$250,000
Grapefruit Blvd.	9th St.	Tyler St.	protected bike lanes	1.45	$200,000	$290,000
Grapefruit Blvd.	Tyler St.	Ave. 54	bike lanes	1.0	$100,000	$100,000
Van Buren St.	Ave. 48	Ave. 49	colored buffered bike lanes	0.5	$150,000	$75,000
Whitewater River	Tyler St.	Airport Blvd.	bike path	5.3	$2,000,000	$10,600,000
Frederick St. extension	Mitchell Dr.	Dillon Rd. at Ave. 48	bike path	0.3	$2,000,000	$600,000
TOTAL CAPITAL COST						**$16,305,000**

TABLE 24: LONG-TERM PROJECTS

STREET	FROM	TO	TYPE	LENGTH (MI.)	COST PER MILE/UNIT	COST
Ave. 44	Cesar Chavez St.	Dillon Rd.	bike lanes	1.0	$100,000	$100,000
Ave. 49	west city limit	Van Buren St.	bike lanes	1.0	$100,000	$100,000
Access road along east side of Spotlight 29 Casino	just south of I-10	Harrison Pl.	bike lanes	1.1	$100,000	$110,000
Airport Blvd.	east city limit	west city limit	bike lanes	0.7	$100,000	$70,000
Connector to 1-10	Ave. 50	I-10	bike lanes	1.1	$100,000	$110,000
Connector to Coachella Canal	Polk St.	1930' west of Pierce St.	bike path	2.4	$2,000,000	$4,800,000
Dillon Rd.	Ave. 44	Harrison Pl.	bike lanes	1.5	$100,000	$150,000
Dillon Rd.	Ave. 48	north city limit	bike lanes	1.4	$100,000	$140,000
Enterprise Way	Ave. 52	Ave. 54	bike lanes	1.0	$100,000	$100,000
Harrison Pl.	Access road along east side of Spotlight 29 Casino	Dillon Rd.	bike lanes	0.3	$100,000	$30,000
Industrial Way	Enterprise Way	Polk St.	bike lanes	0.3	$100,000	$30,000
Jackson St.	Ave. 48	Ave. 49	bike lanes	0.5	$100,000	$50,000
Mitchell Dr.	Grapefruit Blvd.	Van Buren St.	bike lanes	0.6	$100,000	$60,000
Polk St.	Ave. 48	Ave. 52	bike lanes	2.0	$100,000	$200,000
Polk St.	Industrial Way	Ave. 54	bike lanes	0.8	$100,000	$80,000
Shadow View Blvd.	Dillon Rd.	Tyler St.	bike lanes	1.2	$100,000	$120,000
SR - 86 Expressway	Dillon Rd.	south city limit	signed bike route	5.2	$20,000	$104,000

STREET	FROM	TO	TYPE	LENGTH (MI.)	COST PER MILE/UNIT	COST
Tyler St.	Dillon Rd.	Vista del Norte	bike path	0.5	$2,000,000	$1,000,000
Tyler St.	Ave. 48	Ave. 50	bike lanes	1.0	$100,000	$100,000
Tyler St.	Ave. 50	Calle Mendoza	bike lanes	0.7	$100,000	$70,000
Tyler St.	Ave. 53	Ave. 54	bike lanes	0.5	$100,000	$50,000
Vista del Norte	Tyler St.	Coachella Canal	bike lanes	0.6	$100,000	$60,000
Grapefruit Blvd. adjacent	northern city limit	southern city limit	bike path	4.4	$2,000,000	$8,800,000
Traffic signal at 6th St. and Grapefruit Blvd.				1	$350,000	$350,000
Traffic signal at Bagdad Ave. and Grapefruit Blvd.				1	$350,000	$350,000
TOTAL CAPITAL COST						**$17,134,000**

DESIGN GUIDELINES

APPENDIX

A

PREPARED BY: transpogroup

BICYCLE DESIGN GUIDELINES

BICYCLE DESIGN GUIDELINES

The following guidelines present the recommended minimum design standards and other recommended ancillary support items for:

BIKE PATHS
Class I Bike Paths

BIKE LANES
Class II Bike Lanes
Colored Bike Lanes
Buffered Bike Lanes
Double Buffered Bike Lanes

BIKE ROUTES
Class III bike routes
Sharrows
Greenback Sharrows

PROTECTED BIKE LANES
Class IV Protected Bike Lanes
One-way Protected Bike Lanes
Two-way Protected Bike Lanes

BIKEWAY REFERENCE MATRIX

SIGNING AND MARKINGS
Colored Pavement Treatments
Bike Route Wayfinding Signage

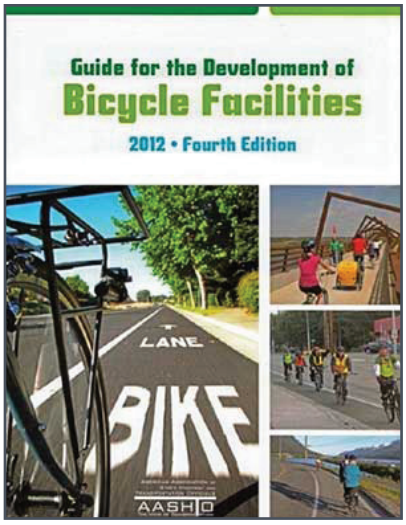
INTERSECTIONS
Bikeway Markings at Intersections
Bike Boxes
Two-Stage Turn Queue Boxes
Protected Intersections

BICYCLE SIGNALS
Bicycle Signal Heads
Bicycle Signal Detection
Bicycle Countdowns
Leading Bicycle Intervals

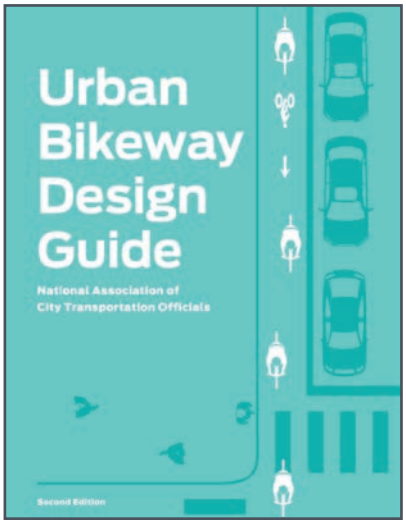
BICYCLE PARKING

LEGAL STATUS

RECOMMENDED BIKEWAY CROSS SECTIONS



AASHTO Guide for the Development of Bicycle Facilities, 2012 Edition



NACTO Urban Bikeway Design Guide, 2014 Edition

DESIGN STANDARDS

Where possible, it may be desirable to exceed the minimum standards. These guidelines cover basic concepts. The Caltrans Highway Design Manual (HDM) Chapter 1000 contains more detailed standards and guidance and should be followed. The City may also reference the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities (2012), and the National Association of City Transportation Official (NACTO) Urban Bikeway Design Guide (2014) where the HDM is silent.

This section also references the uniform standards and specifications for traffic control devices under the 2014 California Manual on Uniform Traffic Control Devices (CA MUTCD).

EXPERIMENTAL DEVICES

As of the writing of this manual, a number of recommended devices are considered experimental. They have not yet been fully adopted by the FHWA MUTCD or CA MUTCD.

These devices appear to be promising improvements in bicycle and pedestrian access and safety as they have been widely used in Europe and experimented with in the US. Any jurisdiction wishing to use these treatments should follow the appropriate experimental procedures. Colored bike lanes have been given blanket interim approval for use in California. For these, the City only needs to notify Caltrans that it will use these. Bike boxes and colored treatments of shared lane markings are approved for experimentation by the Federal Highway Administration (FHWA). To conduct these experiments, the City would need to follow the guidelines set forth by the FHWA here: https://mutcd.fhwa.dot.gov/condexper.htm and to the California Traffic Control Device Committee following their guidelines set forth in Section 1A.10 of the CA MUTCD.

CLASS I BIKE PATHS

TYPICAL APPLICATIONS

Class I Bike Path

No Motor Vehicles (R5-3) Sign

- **Facility Design**
  Class I bike paths should generally be designed as protected facilities away from parallel streets. They are commonly planned along rights-of-way such as waterways, utility corridors, railroads, and the like that offer continuous protected riding opportunities.

- **Adherence to Design Guidelines**
  All Class I bike paths should conform to the design guidelines set forth by Caltrans. Sidewalk paths and unpaved facilities that are not funded with federal transportation dollars and that are not designated as Class I bike paths do not need to be designed to Caltrans standards.

- **Where Possible, Separate from Sidewalks**
  Both AASHTO and Caltrans recommend against using most sidewalks for bike paths. This is due to conflicts with driveways and intersections. Where sidewalks are used as bike paths, they should be placed along routes with few driveways and intersections, be properly separated from the roadway, not contain obstructions (bus stops, signs, trees, trash receptacles, etc.) and have carefully designed intersection crossings.

- **Recommended Widths**
  Bike paths should have a minimum of 8’ of

pavement, with at least 2’ of unpaved shoulders for pedestrians/runners, or a separate pathway for pedestrians/runners where feasible. A pavement width of 12’ is preferred.

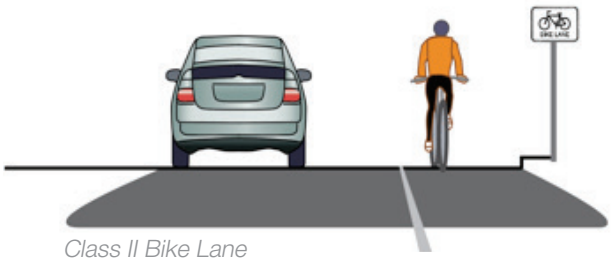
- **Roadway Crossings Design**
  Class I bike path roadway crossings should be carefully engineered to accommodate safe and visible crossing for users. The design needs to consider the width of the roadway, whether it has a median, and the roadway’s average daily and peak-hour traffic volumes. Crossings of low-volume streets may require simple stop signs. Crossings of streets with Average Daily Traffic (ADT) of over 15,000 vehicles per hour should be assessed for signalized crossing, flashing LED beacons, crossing islands, or other devices. Roundabouts may be a desirable treatment for a bike path intersecting with roadways where the bike path is not next to a parallel street.

- **Lighting**
  Lighting should be provided where bicyclists will likely use the bike path in the late evening, such as along commuter routes.

- **Physical Barriers & Signs**
  Barriers at path entrances to prevent motorized vehicles from entering, such as obstacle posts and gates, can obstruct bicyclists and should be avoided when possible. Typically, barriers should not be considered until after it has been determined that other measures to prevent motor vehicles from entering have failed, and where the safety and other issues posed by unauthorized vehicles are more serious than the safety and access issues posed to path users. Signs and other design solutions are preferred.

- **Maintenance & Emergency Vehicle Access**
  Bike path construction should take into account vertical requirements and the impacts of maintenance and emergency vehicles on shoulders.

CLASS II BIKE LANES



Class II Bike Lane

TYPICAL APPLICATIONS

- **Facility Design**
  Class II bike lanes are a portion of the roadway designated for preferential use by bicyclists; they have been designated by striping, signage, and pavement markings.

  Bike lanes run adjacent to the travel lanes and flows 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.

- **Adherence to Design Guidelines**
  The following guidelines should be used when designing Class II bikeway facilities. The Caltrans HDM Chapter 1000, AASHTO, the CA MUTCD, and the Caltrans Traffic Manual provide these guidelines.

- **Recommended Widths**
  Class II Bike Lane facilities should conform to the minimum design standard of 5’ in width in the direction of vehicle travel adjacent to the curb lane. Where space is available, a width of 6’ to 8’ is preferred, especially on busy arterial streets, on grades, and adjacent to parallel parking.

  Under certain circumstances, bike lanes may be 4’ in width. Situations where this is permitted include:

  » Bike lanes located between through

Bike Lane (R81) and Bike Route (D11-1) Sign

Bike Lane Striping and Stencil

traffic lanes and right turn pockets at intersection approaches

- » Where there is no parking, the gutter pan is no more than 12” wide, and the pavement is smooth and flush with the gutter pan
- » Where there is no curb and the pavement is smooth to the edge

- **Signs**
  “Bike Lane” (R81) and “Bike Route” (D11-1) Signage shall be posted after every significant intersection along the route of the bike lane facility. “Begin” and “End” plaques (R81A or R81B) should accompany the “Bike Lane” sign when appropriate. The route number shown on the Bike Route Identification sign should correspond to the latest City Bicycle Routes and Facilities Map. The Bike Route Identification sign can also be used in conjunction with an arrow plaque (M6 series) in advance of another approaching bike lane or route to direct bicyclists. If a bike lane exists where parking is prohibited, “no parking” signage may accompany bike lane signage.

- **Striping**
  Bike lanes should be striped with a 6” wide solid white stripe of (CA MUTCD Detail 39) and should be dashed (Detail 39A) at an intersection approach. The length of Detail 39A shall be 100’ when the block is short (less than 400’) and 200’ where the block is longer or vehicle speeds are high (greater than 35 mph). The dashed bike lane stripe allows for use of the bike lane as a right-turn pocket for motor vehicles.

  Bike lanes with two stripes are more visible than those with one and are preferred. The second inside stripe (4” solid white) would differentiate the bike lane from the parking lane where appropriate.

- **Markings**
  At the beginning of each and end of each block and at approximately 150’ to 250’ intervals, pavement stencils of a bicycle and arrow shall be used to show the direction of travel. The stencils

at the end of the block should be placed just before the dashed bike lane stripe (Detail 39B).

- **Intersection Treatments**
  Where space permits, intersection treatments should include bike lane 'pockets'.

  At signalized intersections, loops or other means of bicycle detection should be installed near the limit line in the bike lane and all vehicle lanes that have detection. Signal timing and phasing should be set to accommodate bicycle acceleration speeds. Painted bicycle detector stencils may be placed at detection zones located within the bike lane to notify bicyclists where they can actuate the signal.

  Traffic signals can be timed and coordinated for cyclists (where appropriate).

- **Transitions from Class II Bike Lanes to Class III Bike Routes**
  Where bike lanes terminate, they typically should transition to a Class III bike route when possible. Cyclists should be notified through a sign that includes the Bike Lane sign (R81) with End plaque (R81B). Shared lane markings (sharrows) should be placed in the transition zone to help guide cyclists to the proper place to ride in the lane. Class III bike route time, distance and destination signs should help provide continuity.

- **Roadway Conditions**
  When bike lanes are to be implemented on existing roadway surfaces, it is important to identify and remediate any longitudinal cracking greater than ½" wide, vertical deformations such as utility covers that are not flush, and other conditions that may affect rideability.

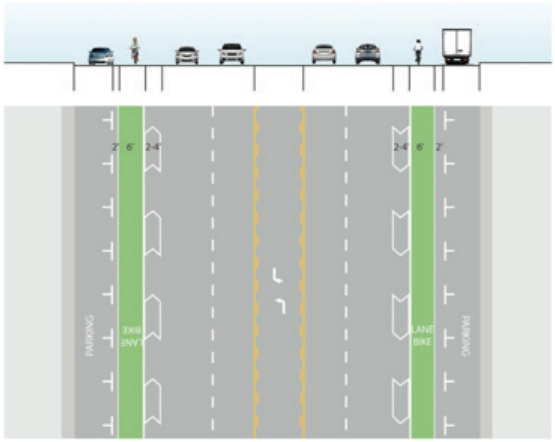
Green Bicycle Lanes

COLORED BIKE LANES

Buffered Bicycle Lane

Green bicycle lanes increase visibility for cyclists. The Federal Highway Administration (FHWA) and the California Traffic Control Device Committee have approved green bike lanes on an interim basis per CA MUTCD IA-14; Interim Approval for Optional Use of Green Colored Pavement for Bike Lanes. The State of California has requested and received approval from the FHWA to implement CA MUTCD IA-14 statewide. Consequently, the City may implement green bike lanes without need to notify the State or FHWA, provided the CA MUTCD guidelines are followed.

Green bicycle lanes are sometimes used as “conflict zone” treatments. They are short lanes that are used at right-turn pockets or driveways to alert right-turning motorists of the bike lane. Green bicycle lanes can also be used as a continuous treatment spanning the extended length of a bike lane corridor.



Buffered Bicycle Lane Schematic

BUFFERED BIKE LANES

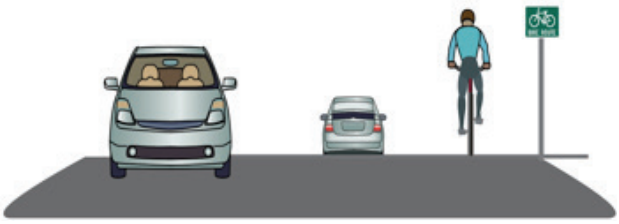
Buffered bike lanes provide a painted divider between the bike lane and the adjacent travel lane. This additional space can improve the comfort of cyclists, as they don’t have to ride as close to motor vehicles. Buffered bike lanes can also be used to narrow travel lanes, which slows traffic. Buffered bike lanes are most appropriate on wide, busy streets. They can be used on streets where physically separating the bike lanes with protected bike lanes is undesirable for cost, operational, or maintenance reasons.

Double Buffered Bike Lanes

DOUBLE BUFFERED BIKE LANES

Double buffered bike lanes provide a painted divider on both the travel lane and the parking lane. This additional buffer between parked cars and bike lanes directs cyclists to ride outside of the door zone of the parked cars. These are most important with significant parking turnover.

CLASS III BIKE ROUTES



Class III Bike Route

TYPICAL APPLICATIONS

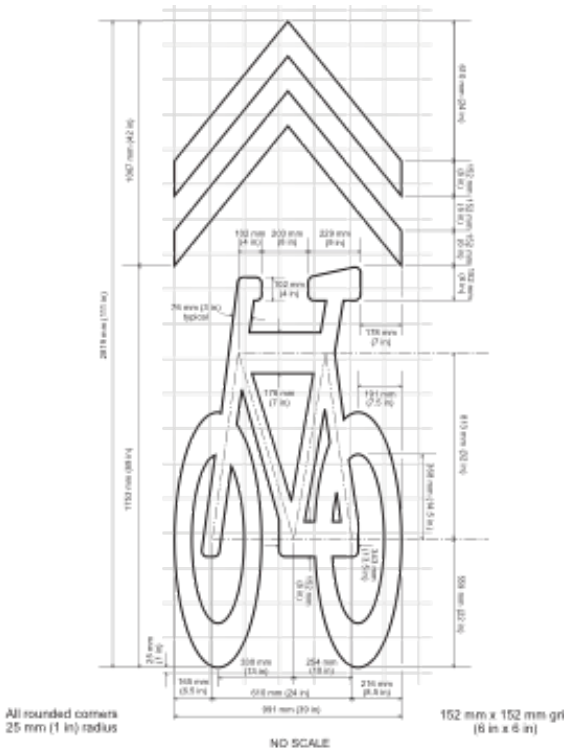
- **Facility Design**
  Class III bike routes are typically simple signed routes along street corridors, usually local streets and collectors. With proper route signage, design, and maintenance, bike routes can be effective in guiding bicyclists along a route suited for bicycling that does not have enough roadway space for a dedicated Class II bike lane. Class III bike routes can be designed in a manner that encourages bicycle usage, convenience, and safety.

  Bike routes can become more useful when coupled with the following techniques:

  - » Route, directional, and distance signage
  - » Wide curb lanes
  - » Shared lane marking stencils painted in the traffic lane along the appropriate path of where a bicyclist would ride in the lane
  - » Accelerated pavement maintenance schedules
  - » Traffic signals timed and coordinated for cyclists (where appropriate)
  - » At signalized intersections, loop detectors or other means of bicycle detection should be installed near the limit lane in all vehicle lanes that have vehicle detection.
  - » Traffic signals can be timed and coordinated for cyclists (where

appropriate). Signal timing and phasing should be set to accommodate bicycle acceleration speeds.
  - » Traffic calming measures
  - » Remediation of longitudinal cracking greater than ½" wide, utility covers that are not flush, vertical deformations, and other conditions that may affect rideability.

- **Signs**
  "Bike Route" (D11-1) signage should be posted after every intersection along the route to inform bicyclists that the bikeway facility continues and alert motorists to the presence of bicyclists. "Begin" and "End" plaques (M4-14 and M4-6) should accompany the Bike Route sign when appropriate. The route number shown on the Bike Route Identification sign should correspond to the latest City Bicycle Routes and Facilities Map. The Bike Route sign can also be used in conjunction with an arrow plaque (M6 series) in advance of another approaching bike route or lane to direct bicyclists. If a bike route exists where parking is prohibited, "no parking" signage may accompany bike lane signage.



Sharrow Stencil

SHARROWS

TYPICAL APPLICATIONS

- **Facility Design**
  Sharrow stencils are recommended as a way to enhance the visibility and safety of Class III bike routes. Sharrows (officially known as "shared lane markings") indicate to cyclists the proper position to ride within the travel lane and assist with wayfinding. They also alert motorists that the travel lane is to be shared with bicyclists.

- **Adherence to Design Guidelines**
  CA MUTCD, Section 9C.103(CA) Shared Roadway Bicycle Markings states: "The shared roadway bicycle marking shall only be used on a roadway (Class III Bikeway (Bike Route) or Shared Roadway (No Bikeway Designation))."

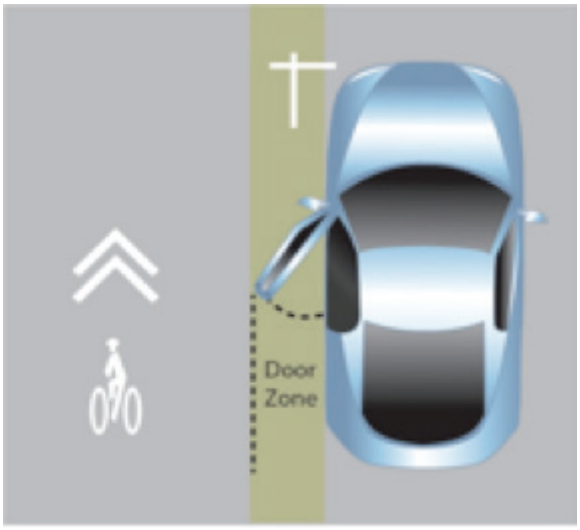
- **Placement & Spacing of Sharrows**
  When used on streets with on-street parking, sharrows are to be placed such that the centers of the markings are a minimum of 11' from the curb face or edge of paved shoulder on streets with on-street parallel parking. Where space is

available, 12’ or more from the curb is preferred. On streets without on-street parking that have an outside travel lane that is less than 14’ wide, the centers of the sharrows should be at least 4’ from the face of the curb.

On two-lane roadways, these minimum distances allow vehicles to pass bicyclists on the left within the same lane without encroaching into the opposite lane of traffic. (On multi-lane roadways, motorists must change lanes to pass a cyclist.)

On streets with on-street parking, installing sharrows more than 11’ from the curb will also move the bicyclist farther from the “door zone” (approximately 4’).

Sharrows should be placed in straight lines to encourage the bicyclist to travel in a straight line. This often means the sharrows are in the center of the lane, greater than the minimum guideline of 4’ or 11’ from the curb. Sharrows should always be placed outside the “door zone” where on-street parking is provided.



“Door Zone” and Sharrows

Sharrow Marking

Greenback Sharrows

GREENBACK SHARROWS

TYPICAL APPLICATIONS

- **Facility Design**
  Some cities use greenback sharrows, or sharrows with a square of green paint to make them more visible.

- **Adherence to Design Guidelines**
  The FHWA currently permits experimentation of greenback sharrows. Cities should use the same design guidelines are regular shared lane markings. They are likely to be more effective where spaced close together.

CLASS IV PROTECTED BIKE LANES

TYPICAL APPLICATIONS

- **Facility Design**
  Protected bike lanes, sometimes called "separated bike lanes" or "cycle tracks" provide a physical barrier between the bike lane and the adjacent travel lanes, parking lanes, and sidewalks. They are most effective in attracting users who are concerned about conflicts with motorized traffic.
  Protected bike lanes may be one-way or two-way. They may also be at the level of the street, at the level of the sidewalk, or between the two. If they are at the sidewalk level, different pavement colors and textures separate the bike lanes from the sidewalks. If at the street level, they can be separated from the travel lanes by physical barriers. If there is on-street parking they are placed between the sidewalk and parking.

- **Adherence to Design Guidelines**
  The design guidelines issued by Caltrans for Class IV separated bike lanes are compliant with HDM Chapter 1000 and the CA MUTCD.

- **Types of Protection**
  The methods of vertical protection can be implemented with a variety of design approaches. Protected bike lanes can be protected from motor traffic by raised medians, concrete curbs, landscaping, on-street parking, bollards, flexible delineator posts, or by a change in elevation between the bike lane and the travel lane.

- **Intersection Design**
  Protected bike lanes tend to work most effectively where there are few uncontrolled crossing points with unexpected traffic conflicts. These concerns include treatment at intersections, uncontrolled midblock driveways and crossings, and difficulty accessing or exiting the facility at midblock locations.
  If the protected bike lanes are parking protected, parking should be prohibited near the intersection to improve visibility. The recommended no-parking zone is 30' from each side of the intersection crossing.
  Two-stage turn queue boxes should be provided to assist in making turns from the protected bike lane facility.
  A dedicated bicycle signal phase can prevent conflicts at intersections between turning vehicles and bicyclists.

- **Markings**
  Pavement stencils of a bicycle and arrow markings shall be placed at the beginning of a protected bike lane facility and at periodic

intervals along the facility to define the bike lane direction and designate that portion of the street for preferential use by bicyclists.

- **Maintenance**
  The protected bike lane area to be used by bicycles should be designed with adequate width for street sweeping to ensure that debris will not accumulate.

- **Adherence to ADA Considerations**
  When providing accessible parking spaces along protected bike lanes, the following design considerations are recommended to accommodate persons with disabilities in the design of one-way and two-way protected bike lanes:

  » widened buffer space to accommodate a side mounted vehicle ramp or lift
  » mid-block curb ramps and tactile surfaces may be provided near accessible parking spaces
  » roadway cross-slopes that do not exceed a 2% grade
  » if bollards are used, to consider placement of bollards that avoid impeding access by disabled users

ONE-WAY PROTECTED BIKE LANES

Parking-Protected Bike Lanes with Flexible Delineator Posts

One-way protected bike lanes are bikeways that are at street level and use a variety of methods for physical protection from motor traffic. They are generally placed on both sides of the street.

- **Recommended Widths**
  The minimum recommended width for a one-way protected bike lane is 5', although 6' is preferred. Areas with high bicyclist volumes or uphill sections, the recommended minimum width is 7' to allow for bicyclists passing each other.
  At least 3' is recommended for a parking buffer to allow for passenger loading and to prevent "dooring" collisions. Without a parking buffer, 2' is preferred.

Wider widths allows for bicyclists passing

One-Way Protected Bike Lanes with Landscaping

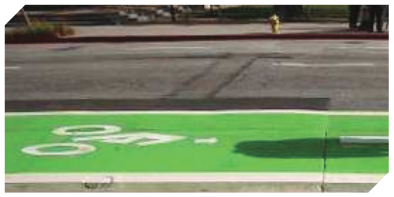
TWO-WAY PROTECTED BIKE LANES

Two-Way protected Bike Lanes

Two-way protected bike lanes are bikeways that are physically protected bikeways that allow bicycle movement in both directions on one side of the street. Two-way protected bike lanes share some of the same design characteristics as one-way protected bike lanes but may require additional design considerations at driveway and side-street crossings.

- **Recommended Widths**
  The preferred width for a two-way protected bike lane is 12'. Minimum width in constrained locations is 8'.
  At least 3' is recommended for a parking buffer to allow for passenger loading and to prevent "dooring" collisions. Without a parking buffer, 2' is preferred.

BIKEWAY REFERENCE MATRIX

DESCRIPTION	ADVANTAGES	DISADVANTAGES
BIKE PATHS  **Width:** 8’ min., 12’ preferred	• Provide a **protected** facility that serves recreational and utilitarian purposes • Attract new bicyclists • Increase community physical activity	• Cost more for construction and maintenance
BIKE LANES  **Width:** 5’ min., 6’ preferred	• Dedicate roadway for bicyclists • Increase cyclist’s comfort through visual separation	• Can preclude other possible uses based on space requirements • Provide no buffer between bicyclists and vehicular traffic • May not appeal to the majority of the non-cycling population
COLORED BIKE LANES  **Width:** 5’ min., 6’ preferred	• Increase the visibility of bicyclists • When used in conflict zones, raises motorists and cyclists awareness and mitigates conflicts • Can slow traffic by making the street appear	• Cost more for colored pavement • Require more maintenance
BUFFERED BIKE LANES  **Width:** 2’ min. buffer, 3’ preferred buffer	• Provide a buffer between bicyclists and vehicular traffic • Provide space for bicyclists to pass without encroaching into the travel lane • Will likely attract new bicyclists with lower-stress facility	• Require more space for the buffer

BIKEWAY REFERENCE MATRIX

DESCRIPTION	ADVANTAGES	DISADVANTAGES
DOUBLE BUFFERED BIKE  **Width:** 2' min. buffer, 3' preferred buffer	• Provide bicyclists with a buffer to avoid the "dooring zone" of the parking lane and a buffer from the travel lane • Will likely attract new bicyclists	• Require more space than basic bike lanes • Require more maintenance for the buffer striping
COLORED BUFFERED BIKE LANES  **Width:** 2' min. buffer, 3' preferred buffer	• Increase the visibility of bicyclists • Will likely attract new bicyclists	• Require more space than basic bike lanes • Require more maintenance for the buffer striping and colored pavement
ONE-WAY PROTECTED BIKE LANES  **Width:** 2' min. buffer, 3' preferred buffer	• Provide physical protection between motorists and bicyclists • Provide the highest level of comfort for on-street bicycling • Likely attract the highest number of new bicyclists of all the bike lane types • Calm vehicle traffic • Are simpler to design and less costly than two-way **protected** bike lanes	• Can require removal of travel lane or on-street parking • Cost more than basic bikes lanes, colored bike lanes and buffered bike lanes • Require conflict mitigation with driveways, bus stops, intersections and turning vehicular movement
TWO-WAY PROTECTED BIKE LANES  **Width:** 10' bike lane with 2' buffer min., 12' bike lane with 3' buffer preferred	• Provide physical protection between motorists and bicyclists • Provide the highest level of comfort for on-street bicycling • Likely attract the highest number of new bicyclists of all the bike lane types • Calm vehicle traffic • Require less space than one-way **protected** bike lanes	• Can require removal of travel lane or on-street parking • Cost more than basic bikes lanes, colored bike lanes and buffered bike lanes • Require conflict mitigation with driveways, bus stops, intersections and turning vehicular movement • Are more complicated to design and operate, and costs more than one-way **protected** bike lanes

BIKEWAY REFERENCE MATRIX

DESCRIPTION	ADVANTAGES	DISADVANTAGES
BIKE ROUTE  **Width:** No additional pavement width required	• Raises motorist awareness of the presence of bicyclists and to share the road • Helps to properly position bicyclists with wayfinding signage • Informs bicyclists of continuous and connected bikeway network	• Requires the bicyclists to share the lane with vehicular traffic • Provide little additional comfort for bicyclists • Attracts few new riders
BIKE ROUTE WITH GREENBACK SHARROWS  **Width:** No additional pavement width required; spacing placement no greater than 250' apart	• More visible than signed bike routes • Helps to properly position cyclists with visible pavement markings • Educates motorists that bicyclists may use the full lane	• Requires the bicyclists to share the lane with vehicular traffic • Provide little additional comfort for bicyclists • Requires slightly more maintenance and cost

BIKEWAY SIGNING & MARKINGS

Green Colored Bicycle Lanes

Greenback Sharrow

COLORED PAVEMENT MARKINGS

- Pavement coloring is useful for a variety of applications in conjunction with bicycle facilities. The primary goal of colored pavements is to differentiate specific portions of the traveled way, but colored pavements can also visibly reduce the perceived width of the street.

- Colored pavements are used to highlight conflict areas between bicycle lanes and turn lanes, especially where bicycle lanes merge across motor vehicle turn lanes. Colored pavements can be used in conjunction with shared lane markings (greenback sharrows) in heavily used commercial corridors where no other provisions for bicycle facilities are evident.

- While a variety of colored treatments have been used, FHWA has approved a bright green for interim use. Maintenance of color and surface condition are considerations. Traditional traffic paints and coatings can become slippery. Long life surfaces with good wet skid resistance should be considered.

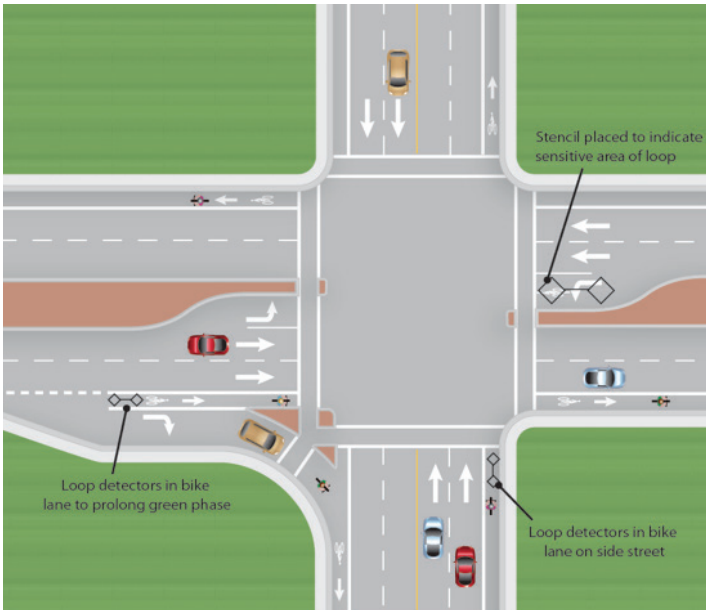
Bicycle Wayfinding Signs

WAYFINDING

The ability to navigate through a region is informed by landmarks, natural features, signs, and other visual cues. Wayfinding is a cost-effective and highly visible way to improve the bicycling environment by familiarizing users with the bicycle network, helping users identify the best routes to destinations, addressing misconceptions about time and distance, and helping overcome a barrier to entry for infrequent cyclists (e.g., “interested but concerned” cyclists).

A bikeway wayfinding system is typically composed of signs indicating direction of travel, location of destinations, and travel time/distance to those destinations; pavement markings indicating to bicyclists that they are on a designated route or bike boulevard and reminding motorists to drive courteously; and maps providing users with information regarding destinations, bicycle facilities, and route options.

BIKEWAY INTERSECTIONS

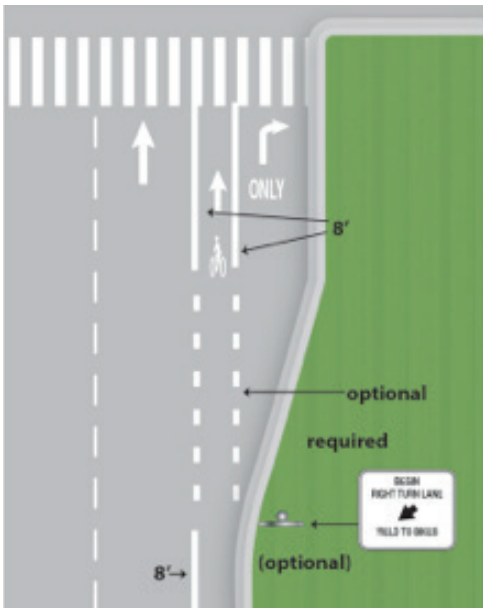


Bikeway Markings at Intersections

Intersections are junctions at which different modes of transportation meet and facilities overlap. A well-designed intersection facilitates the interchange between bicyclists, pedestrians, motorists, and transit so traffic flows in a safe and efficient manner. Designs for intersections with bicycle facilities should reduce conflicts between bicyclists (and other vulnerable road users) and vehicles by heightening visibility, denoting a clear right of way, and ensuring that the various users are aware of each other. Intersection treatments can resolve 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 additional elements such as color, signs, 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, the adjacent street function, and the adjacent land use.

BIKEWAY MARKINGS AT INTERSECTIONS



Bicycle Lane Markings at Intersections with Right-turn Lanes

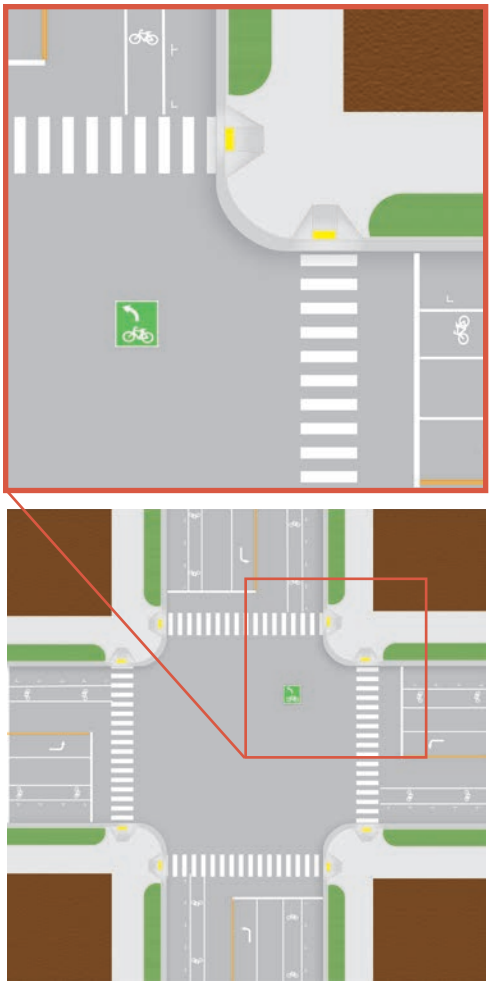
Continuing marked bicycle facilities at intersections (up to the crosswalk) ensures that separation, guidance on proper positioning, and awareness by motorists are maintained through these potential conflict areas. The appropriate treatment for right-turn only lanes is to place a bike lane pocket between the right-turn lane and the right-most through lane. If a full bike lane pocket cannot be accommodated, a shared bicycle/right turn lane can be installed that places a standard-width bike lane on the left side of a dedicated right-turn lane. A dashed strip delineates the space for bicyclists and motorists within the shared lane. This treatment includes signs advising motorists and bicyclists of proper positioning within the lane. Sharrows are another option for marking a bikeway through an intersection where a bike lane pocket cannot be accommodated.

BIKE BOXES

Bike Box

A bike box is a designated area at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible way to get ahead of queuing traffic during the red signal phase. Appropriate locations include:

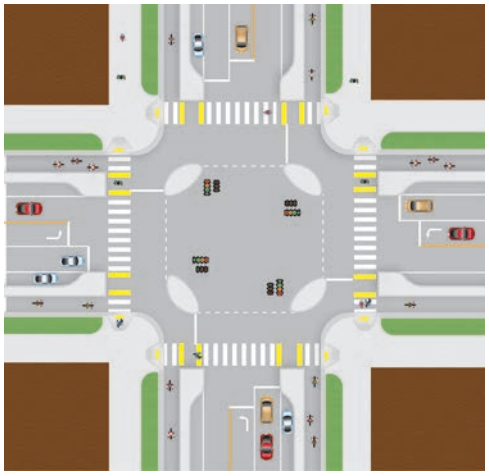
- At signalized intersections with high volumes of bicycles and/or motor vehicles, especially those with frequent bicyclist left-turns and/or motorist right-turns
- Where there may be right or left-turning conflicts between bicyclists and motorists
- Where there is a desire to better accommodate left-turning bicycle traffic
- Where a left turn is required to follow a designated bike route or boulevard or access a shared-use path, or when the bicycle lane moves to the left side of the street
- When the dominant motor vehicle traffic flows right and bicycle traffic continues through (such as at a Y intersection or access ramp)



Two-Stage Turn Queue Boxes

TWO-STAGE TURN QUEUE BOXES

On right side protected bike lanes, bicyclists are often unable to merge into traffic to turn left due to physical separation. This makes the provision of two-stage left turns critical in ensuring these facilities are functional. The same principles for two-stage turns apply to both bike lanes and protected bike lanes. 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.



Protected Intersections

PROTECTED INTERSECTIONS

At some intersections Holland is using protective treatments for bicycles similar to protected bike lanes. These intersections have islands and crosswalks that allow people on bicycles to advance further in the intersection than motor vehicles, and to stay to the right of motor vehicles. The islands protect bicyclists at the intersections. These treatments are designed in conjunction with and next to pedestrian crossings.

BICYCLE SIGNALS

BICYCLE SIGNAL HEADS

Bicycle signal heads may be installed at signalized intersections to improve identified safety or operational problems for bicyclists; they provide guidance for bicyclists at intersections where bicyclists may have different needs from other road users (e.g., bicycle-only movements and leading bicycle intervals) or to indicate separate bicycle signal phases and other bicycle-specific timing strategies. A bicycle signal should only be used in combination with an existing conventional or hybrid beacon. In the United States, bicycle signal heads typically use standard three-lens signal heads in green, yellow, and red with a stencil of a bicycle.

Bicycle Signal Head

LEADING BICYCLE INTERVALS

Based on the Leading Pedestrian Interval, a Leading Bicycle Interval (LBI) can be implemented in conjunction with a bicycle signal head. Under an LBI, bicyclists are given a green signal while the vehicular traffic is held at all red for several seconds, providing a head start for bicyclists to advance through the intersection. This treatment is particularly effective in locations where bicyclists are required to make a challenging merge or lane change (e.g., to access a left turn pocket) shortly after the intersection, as the LBI would give them sufficient time to make the merge before being overtaken by vehicular traffic. This treatment can be used to enhance a bicycle box.

BICYCLE SIGNAL DETECTION

Bicycle detection is used at actuated traffic signals to alert the signal controller of bicycle crossing demand on a particular approach. Bicycle detection occurs either through the use of push buttons or by automated means (e.g., in-pavement loops, video, and microwave). Inductive loop vehicle detection at many signalized intersections is calibrated to the size or metallic mass of a vehicle, meaning that bicycles may often go undetected. The result is that bicyclists must either wait for a vehicle to arrive, dismount, and push the pedestrian button (if available), or cross illegally. Loop sensitivity can be increased to detect bicycles.

Proper bicycle detection must accurately detect bicyclists (be sensitive to the mass and volume of a bicycle and its rider); and provide clear guidance to bicyclists on how to actuate detection (e.g., what button to push or where to stand).

Loop Detectors

BICYCLE COUNTDOWNS

Near-side bicycle signals may incorporate a “countdown to green” display to provide information about how long until the green bicycle indication is shown, enabling riders to push off as soon as the light turns green.

BICYCLE PARKING

"INVERTED-U" BIKE RACKS

MULTI-BICYCLE PARKING RACK

"BICYCLE" PARKING RACK

BICYCLE LOCKERS

BICYCLE PARKING SIGN (CALTRANS)

Bicycle parking is not standardized in any state or municipal code. However, there are preferable types of secure bicycle accommodations available. Bicycle parking is a critical component of the network and facilitates bicycle travel, especially for commuting and utilitarian purposes. The provision of bicycle parking at every destination ensures that bicyclists have a place to safely secure their mode of travel. Elements of proper bicycle parking accommodation are outlined below.

- Bike racks provide short-term parking. Bicycle racks should offer adequate support for the bicycles and should be easy to lock to. The figures to the right display a common inverted-U design, a multi-bicycle rack, and an innovative concept in which the bike rack itself looks like a bicycle.

- Long-term parking should be provided for those needing all day storage or enhanced safety. Bicycle lockers offer good long-term storage, as shown on the left. Attendant and automated parking also serves long-term uses.

- Bicycle parking should be clearly identified by signage, such as shown in the figure on the left. Signage shall also identify the location of racks and lockers at the entrance to shopping centers, buildings, and other establishments where parking may not be provided in an obvious location, such as near a front door.

- Bicycle parking should be located close to the front door of buildings and retail establishments in order to provide for the convenience, visibility, and safety of those who park their bicycles.

- Bicycle lockers should have informational signage, placards, or stickers placed on or immediately adjacent to them identifying the procedure for how to use a locker. This information at a minimum should include the following:

    - » Contact information to obtain a locker at City Hall or other administrating establishment
    - » Cost (if any) for locker use
    - » Terms of use
    - » Emergency contact information

- Bicycle lockers should be labeled explicitly as such and shall not be used for other types of storage.

- Bicycle racks and storage lockers should be bolted tightly to the ground in a manner that prevents their tampering.

SAFE ROUTES TO SCHOOL DESIGN GUIDELINES

SAFE ROUTES TO SCHOOL DESIGN GUIDELINES

Many traffic control devices, signs, markings, and other street design features can be used to make walking and bicycling to school safer. This section highlights some of the most important and most commonly recommended.

The following guidelines present the recommended minimum design standards and other recommended ancillary support items for:

CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CA MUTCD) SIGNS & MARKINGS

INTERSECTION TYPE GUIDANCE

SAFE ROUTES TO SCHOOL DEVICES

CROSSINGS
Audio Pedestrian Signals
Advance Stop Bars
Advance Yield Lines
Countdown Signals
Crosswalk Markings
Curb Extensions
Curb Ramps
Intersection Geometry Modifications
LED-Flashing Lights on Stop Signs
Lighting
Medians
Median Noses
Midblock Crossings
Neighborhood Traffic Circles
Pedestrian Crossing Islands
Pedestrian Hybrid Beacons
Pedestrian-Activated Pushbuttons
Raised Crosswalks
Rectangular Rapid-Flash Beacons
Reduced Curb Radius
Removable Pylons
Right-turn Channelization Islands
Roundabouts
Rumble Bars
Scramble Phases
Signal Timing/Phasing
Signs
Speed Feedback Signs

SIDEWALKS
Access Management
Streetscape Features

SIDEWALK DESIGN

SAFE ROUTES TO SCHOOL REFERENCE MATRIX

CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CA MUTCD)

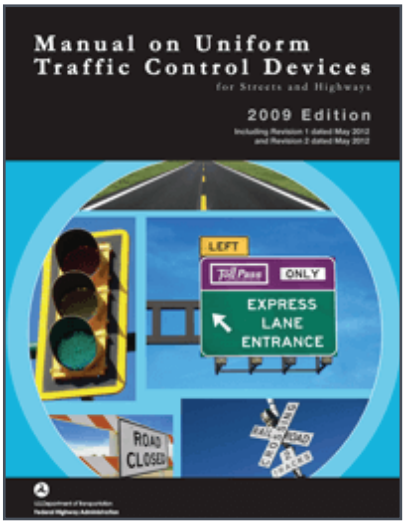
Many traffic control devices, signs, markings, and other street design features can be used to make walking and bicycling to school safer. This section highlights some of the most important and most commonly recommended.

The California Manual on Uniform Traffic Control Devices (CA MUTCD) has developed standards and guidance to be used for signs and markings. Some are mandatory, others are advisory, and some are optional. The following subsection shows the basic signs and markings used around schools. The recommendations provided in this document are based on the CA MUTCD, 2014 Edition.

CA MUTCD, 2014 Edition

EXPERIMENTAL DEVICES

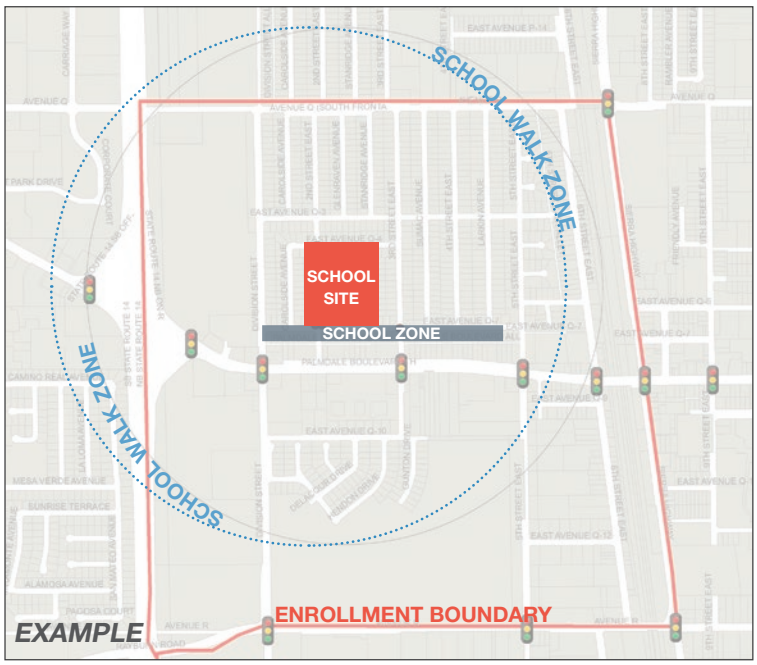
As of the writing of this manual, a number of recommended devices are considered experimental. They have not yet been fully adopted by the Federal Highway Administration Manual on Uniform Traffic Control Devices (FHWA MUTCD) or CA MUTCD. These devices appear to be promising improvements in bicycle and pedestrian access and safety as they have been widely used in Europe and experimented with in the US. Any jurisdiction wishing to use these treatments should follow the appropriate experimental procedures. Rectangular-rapid flash beacons (RRFBs) have been given blanket interim approval for use in California[1]. For these, the City only needs to notify Caltrans that it will use these. To conduct these experiments, the City would need to follow the guidelines set forth by the FHWA here: **https://mutcd.fhwa.dot.gov/condexper.htm** and to the California Traffic Control Device Committee following their guidelines set forth in Section 1A.10 of the CA MUTCD.



FHWA MUTCD, 2009 Edition wth Revisions in 2012

1 Federal Highway Administration. *Interim Approval for Option Use of Rectangular Rapid Flashing Beacons (IA-11).* 2008.

SCHOOL AREA SIGNS



SCHOOL AREA

- The **School Walk Zone** may be defined by State or Local policy, but if not, a general rule of thumb is walking boundary ½ mile or 1-mile out from an elementary school, sometimes further for middle and high schools. The dotted circle shown in this photo is intended to provide a visual of a "walk zone", but rarely is the walk zone an exact circle.
- The **School Zone** is the roadway (or roadways) immediately adjacent to the school, usually extending 1 to two blocks in each direction.

SCHOOL AREA SIGNS

SR1-1 (SCHOOL ZONE SIGN)

Many school signs begin with the basic School Advanced Warning sign labeled "S1-1". It is used to notify street users that they are entering a School Zone that includes school buildings or grounds, a school crossing, or a related activity adjacent to the street. It can identify the location of the beginning of a School Zone. It also combines with other signs, including Assembly B and D signs, to designate the location of and approach to school crossings.

ASSEMBLY A

The School Warning Assembly A includes the School (SP-4) plaque, and may be used to supplemente the SR1-1 sign. This should be posted at the school boundary, and may be posted up to 500 feet in advance of the school boundary. It may also be accompanied with arrows pointing to the school if on another street.

ASSEMBLY B

The School Crosswalk Warning Assembly B includes S1-1 with an arrow. It shall be posted at a crosswalk that is not controlled by a stop sign or traffic signal.

ASSEMBLY C

The School Speed Limit Sign (Assembly C) includes a Speed Limit (R2-1) sign, with a School (S4-3P) sign, and When Children Are Present (S4-2P). The Assembly C sign should be used where a reduced school speed limit zone has been established based on an engineering study or where a reduced school speed limit is specified by statute. The sign should be placed where the reduced school speed limit exists. It may be placed up to 500 feet in advance of the school boundary. The sign should be used on streets where speed limits contiguous to a school or school grounds are greater than 25 mph. The prima facie speed limit of 25 mph is in effect for Assembly C. With an engineering study (designated by the CA MUTCD) a city may reduce the school speed limit to 15 mph on a residential street where some other conditions are met.

ASSEMBLY D

The School Advanced Warning Assembly D includes the S1-1 sign along with either Ahead (W16-9P) or a distance sign e.g. “200 FT” (W16-2aP). It should be used on the approach of a crosswalk that is not controlled by a stop sign or traffic signal.

Assembly D signs shall be used in advance of any Assembly B or C signs. Assembly D signs are optional where an S1-1 sign or Assembly A sign is posted. It may also be accompanied with arrows pointing to the school if on another street.

R1-6

In-Street signs (R1-6) may include a School (S4-3P) and be placed in a crosswalk that is not controlled by a traffic signal. These are useful where speeding is a problem.

R1-5

Yield Here to Pedestrians (R1-5) signs may be used in advance of a crosswalk that crosses an uncontrolled multi-lane approach. They should be placed at the location of Advance Yield Lines (see page D-50).

W82-1

Railroad warning signs (W82-1) can be used to alert pedestrians of railroad crossings.

R15-8

Alternative to W82-1, R15-8 signs may be used.

INTERSECTION TYPE GUIDANCE

Every location needs tailored design and engineering judgment. That judgment should follow the guidelines described in each of the following device sheets, as well as other guidance from the CA MUTCD and other documents. We can, however, identify the treatments that are commonly used at different types of intersections. They are as listed below.

UNCONTROLLED CROSSINGS (NO SIGNAL OR STOP SIGN)

- High-visibility continental crosswalks
- Advance yield lines
- Signs
- Crossing islands (the most important device at multi-lane crossings)
- Rectangular rapid-flash beacons
- Hybrid beacons

As the number of travel lanes, traffic volume, street width and speed increases, more devices are needed. Pedestrians need signals to cross four-lane crossings with ADTs between 20,000 and 30,000 (or greater); the exact threshold depends on the number of lanes, speeds, and roadway width.

STOP-CONTROL CROSSINGS

- Marked crosswalks (high-visibility continental crosswalks depending on traffic volumes, number of lanes, street width, number of pedestrians, presence of schools nearby)
- Advance stop bars
- Perpendicular curb ramps with tactile warning devices
- Curb extensions where on-street parking exists (depending on traffic volumes, number of lanes, street width, number of pedestrians, presence of schools nearby)
- Crossing islands (depending on number of

SIGNALIZED CROSSINGS

- Countdown pedestrian signal heads
- Advance stop bars
- High-visibility continental crosswalks
- Accessible pedestrian signals
- Curb extensions where on-street parking exists
- Crossing islands (depending on available space, traffic volumes, number of lanes, street width, number of pedestrians, presence of schools nearby)

AUDIO PEDESTRIAN SIGNALS

DESCRIPTION

A device that communicates information to pedestrians in nonvisual format such as audible tones, verbal messages, and/or vibrating surfaces. These signals provide accessibility to those who have visual impairments. Verbal messages are generally preferred to tones.

Audio signal at signalized intersection tells pedestrians when it is safe to cross.

KEY DESIGN FEATURES

- Provide pedestrian signal information to those who cannot see the pedestrian signal head across the street
- Provide information to pedestrians about the presence and location of pushbuttons, if pressing a button is required to actuate pedestrian timing
- Provide unambiguous information about the WALK indication and which crossing is being signaled
- Use audible beaconing only where necessary
- Two poles should be installed for APS speakers, located close to departure location and crosswalk
- Ensure accessibility to for pushbutton placement

BENEFITS

- Create a more accessible pedestrian network
- Assist those who are visually impaired
- Can contain additional wayfinding information in messages
- More accurate judgments of the onset of the WALK interval
- Reduction in crossings begun during DON'T WALK
- Reduced delay
- Significantly more crossings completed before the signal changed

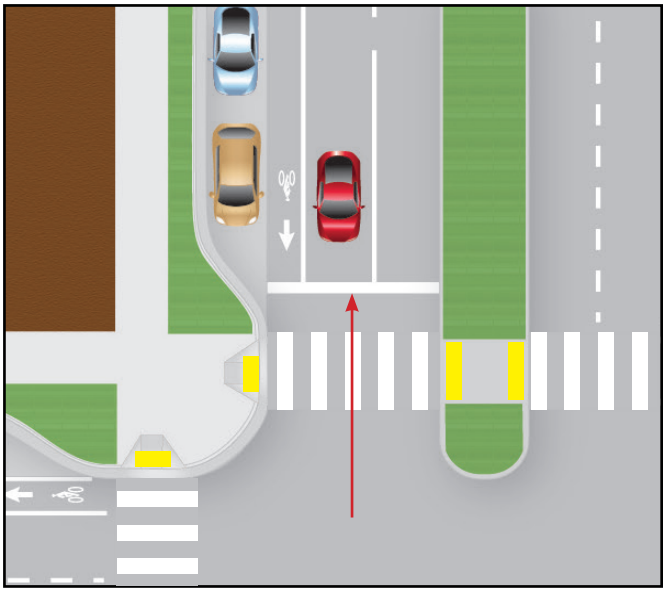
APPLICATIONS

- ADA requires newly constructed or altered public facilities to be accessible, regardless of the funding source
- Installed by request along a specific route of travel for a particular individual, or group of individuals who are blind or visually impaired

ADVANCE STOP BARS

DESCRIPTION

A placing of the stop limit line for vehicle traffic at a traffic signal behind the crosswalk for the added safety of crossing pedestrians.



KEY DESIGN FEATURES

- Vehicle stop line moved 4 to 6 feet further back from the pedestrian crossing

Car stops at advanced stop line, prior to crosswalk

BENEFITS

- Keep cars from encroaching on crosswalk
- Low cost, effective device
- Improve visibility of through cyclists and crossing pedestrians for motorists
- Allow pedestrians and motorists more time to assess each other's intentions when the signal phase changes

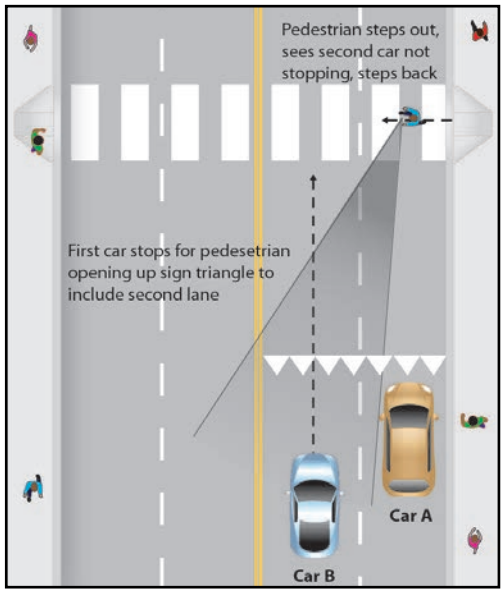
APPLICATIONS

- Can be used at any signalized or stop-controlled intersection
- Presence of advanced stop bar is more important on roadways with higher speeds (30 mph and greater)
- Should be included at all crossings of road with four or more lanes without a raised median or crossing island that has an ADT of 12,000

ADVANCE YIELD LINES

DESCRIPTION

A placing of the yield line (shark's teeth) for vehicle traffic in advance of a crosswalk at uncontrolled locations.



KEY DESIGN FEATURES

- Advance yield lines should be placed 20 to 50 feet in advance of crosswalks along with "Yield here to pedestrians" sign placed adjacent to the markings

Advanced yield line (shark's teeth) denote yield point to motorists

BENEFITS

- Inexpensive treatment
- Improve sight visibility of pedestrians and motorists when used correctly
- Help reduce potential of multiple-threat crashes
- Yielding vehicle does not screen the view of motorists in the pedestrian's next lane of travel
- Reduce likelihood that vehicle travelling behind yielding vehicle will cross centerline and strike pedestrian

APPLICATIONS

- Crosswalks on streets with uncontrolled approaches
- Right-turn slip lane crossings
- Midblock marked crosswalks
- Presence of advanced yield line are most important on multi-lane streets

COUNTDOWN SIGNALS

DESCRIPTION

A walk signal that provides a countdown to the next solid “don’t walk” signal phase in order to provide pedestrians with information on how much time they have to cross.

KEY DESIGN FEATURES

- Ensure that signals are visible to pedestrians
- When possible, provide a walk interval for every cycle
- Pedestrian push buttons must be well positioned and within easy reach for all approaching pedestrians

Pedestrian countdown signal shows there are 12 seconds left to cross before signal will turn

BENEFITS

- Indicate appropriate time for pedestrians to cross
- Provide pedestrian clearance interval

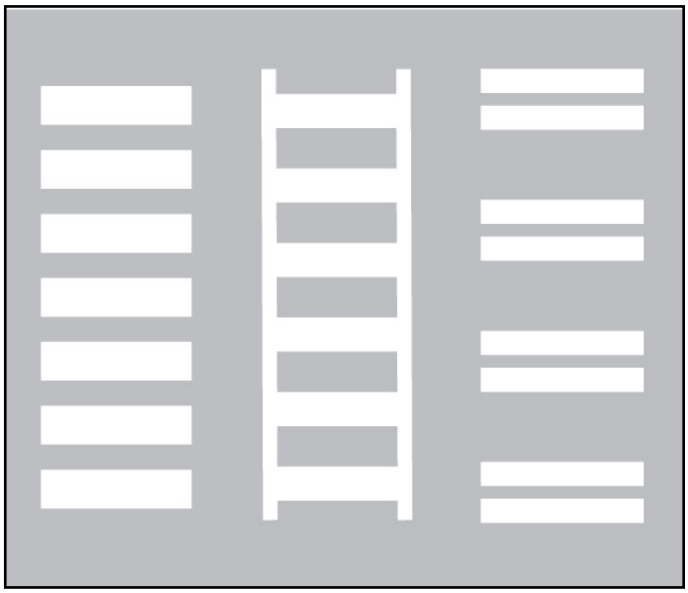
APPLICATIONS

- Should be placed for each crossing leg at signalized intersections

CROSSWALK MARKINGS

DESCRIPTION

High-visibility crosswalks — continental, zebra-stripe, piano key, or ladder style, should be provided at any intersection where a significant number of pedestrians cross. They are most important at uncontrolled crossings of multi-lane streets.



KEY DESIGN FEATURES

- Locations should be convenient for pedestrian access
- Used in conjunction with other measures such as advance warning signs, markings, crossing islands, and curb extensions
- Place to avoid wear due to tires

Continental-style marked crosswalk at midblock crossing is visible from farther away

BENEFITS

- Indicate preferred pedestrian crossings
- Warn motorists to expect pedestrians crossing
- Higher visibility than typical lateral-line marked crosswalks
- Can be placed to minimize wear and tear (between tire tracks)

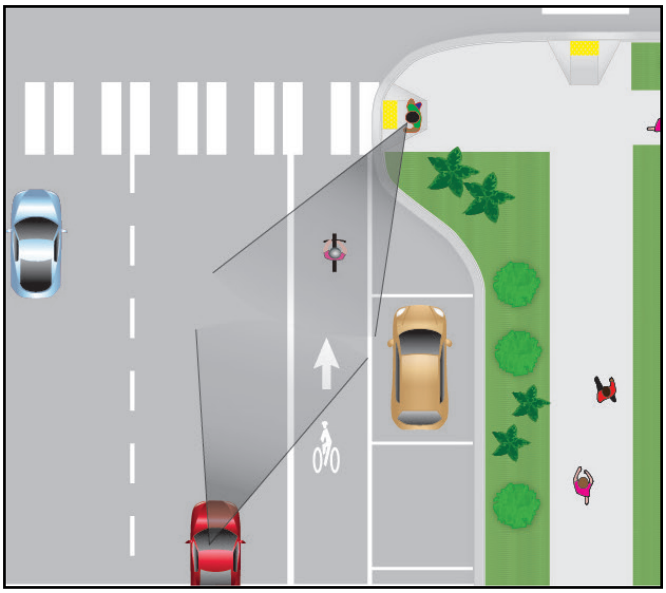
APPLICATIONS

- Enhance all marked crossings
- Necessary at marked midblock and uncontrolled crossing locations

CURB EXTENSIONS

DESCRIPTION

A segment of sidewalk, landscaping, or curb that is extended into the street at the corner, and usually associated with crosswalks. A curb extension typically extends out to align with the edge of the parking lane. They can be placed at locations where there is no on-street parking by tapering the extensions to the approach.



KEY DESIGN FEATURES

- Curb extensions sited at corners or midblock
- Extends out to approximately align with parking (typically 1’ to 2’ less than parking lane width)
- Reduced effective curb radius
- Can be tapered at approach in cases where there is no on-street parking
- Should not block travel or bicycle lanes
- Paired with bicycle lanes, curb extensions can increase the effective curb radius for larger vehicles
- Bulb-outs are a type of curb extension that has a distinct bulb-shape that extends into the on-street parking lane (see above graphic)

APPLICATIONS

- Areas with high pedestrian traffic (downtown, mixed-use areas) where traffic calming is desired
- Jurisdiction must evaluate placement on case-by-case basis, taking into account drainage, signal pole modification, lane widths, driveways, and bus stops

BENEFITS

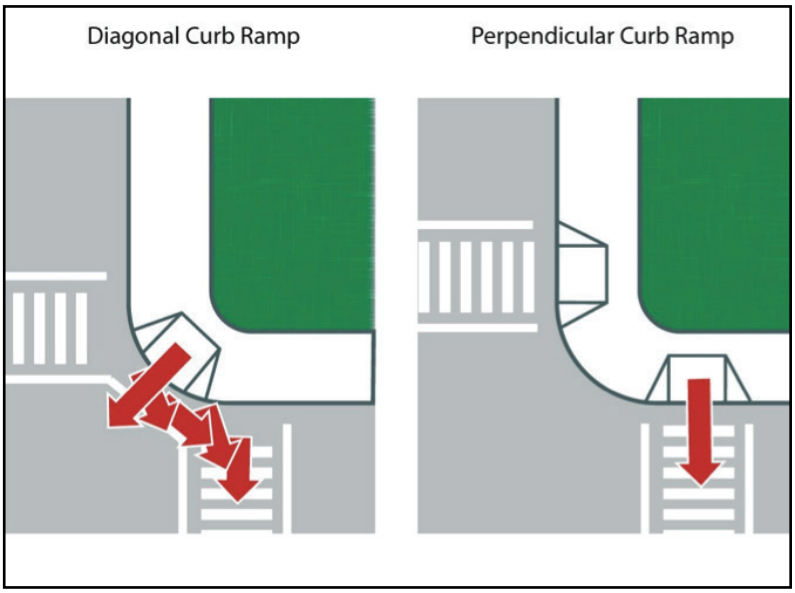
- Shorten pedestrian crossing
- Reduce curb radius, slowing turning vehicles
- Provide traffic calming
- Improve sight visibility for pedestrians and motorists
- Provide space for landscaping, beautification, water treatment, furnishings, signs, etc.
- Often can provide space for perpendicular curb ramps

Asheville, North Carolina curb extension

CURB RAMPS

DESCRIPTION

A ramp and landing that allows for a smooth transition between sidewalk and street via a moderate slope. The Americans with Disabilities Act requires wheelchair access at every street corner. On streets with low traffic volumes and short crossing distances, diagonal ramps may be acceptable.



KEY DESIGN FEATURES

- Where feasible, ramps for each crosswalk at an intersection are preferable
- Tactile warnings will alert pedestrians to the sidewalk/street edge
- Curb ramps must have a slope of no more than 1:12 (must not exceed 25.4 mm/0.3 m (1 in/ft) or a maximum grade of 8.33 percent), and a maximum slope on any side flares of 1:10

Perpendicular ramps with truncated domes assist sight-impaired and wheelchair users

BENEFITS

- Double curb ramps make the trip across the street shorter and more direct than diagonal ramps
- Provide compliance with ADA when designed correctly
- Improve pedestrian accessibility for those in wheelchairs, with strollers, and for children

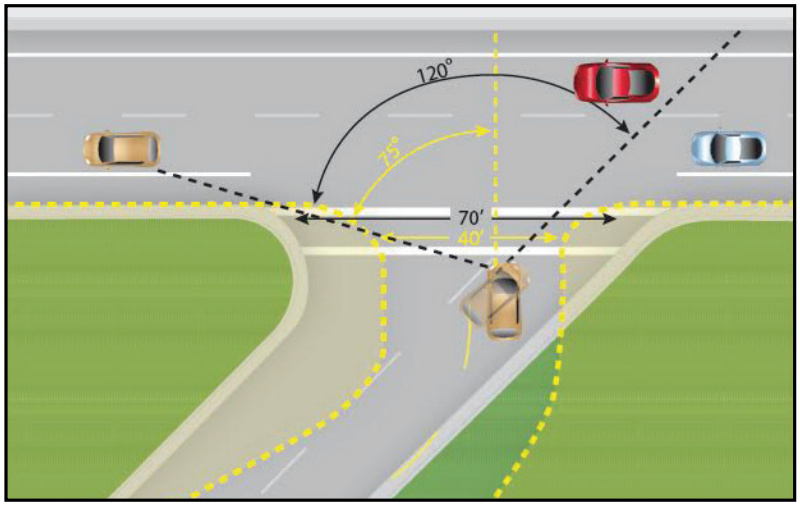
APPLICATIONS

- Curb ramps must be installed at all intersections and midblock locations where pedestrian crossings exist, as mandated by federal legislation (1973 Rehabilitation Act and 1990 Americans with Disabilities Act)
- Priority locations for curb ramps are in Downtown, near transit stops, schools, parks, medical facilities, and near residences with people who use wheelchairs

INTERSECTION GEOMETRY MODIFICATION

DESCRIPTION

Geometry sets the basis for how all users traverse intersections and interact with each other. Intersection skew can create an unfriendly environment for pedestrians. Skewed intersections are those where two streets intersect at angles other than right angles. Intersection geometry should be as close to 90 degrees as possible.



KEY DESIGN FEATURES

- Consider removing one or more legs from the major intersection and creating a minor intersection further up or downstream (if there are more than two streets intersecting)
- Close one or more of the approach lanes to motor vehicle traffic, while still allowing access for pedestrians and bicyclists
- Introduce pedestrian islands if the crossing distance exceeds three lanes (approximately 44 feet)
- General use, travel lanes, and bike lanes may be striped with dashes to guide bicyclists and motorists through a long undefined area

BENEFITS

- Skewed intersections are undesirable
- Slow turning vehicles by making angles more accute
- Shorten pedestrian crossing distances
- Improve sight visibility

APPLICATIONS

- Every reasonable effort should be made to design or redesign the intersection closer to a right angle

LED-FLASHING LIGHTS ON STOP SIGNS

DESCRIPTION

LED-Flashing Stop Signs heightens motorists' awareness and increases compliance.

KEY DESIGN FEATURES

- LED units may be used individually within the face of a sign and in the border of a sign
- LEDs units shall be red to go with stop signs. If flashed, all LED units shall flash simultaneously at a rate of between 50-60 times per minute
- LEDs visible during daytime and nighttime
- Commonly solar-powered and requres low power usage
- May be set to flash throughout the day or be vehicle or pedestrian activated

BENEFITS

- Increase motorists compliance with stop signs
- Enhance visibility and recognition of regulatory and warning signs to drivers, especially under low-light or low-visibility conditions

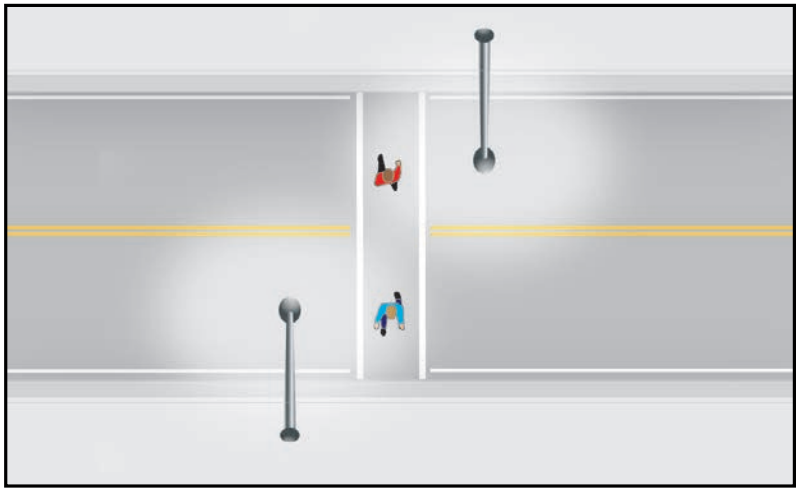
APPLICATIONS

- Apply at stop sign locations with sight visibility limitations (i.e. dusk/dawn glare) and documented problems of drivers failing to stop
- LED flashing stop signs are covered in the FHWA MUTCD under Section 2A.08

LIGHTING

DESCRIPTION

Lighting is important to include at all pedestrian crossing locations for the comfort and safety of the road users. Lighting should be present at all marked crossing locations. Lighting provides cues to drivers to expect pedestrians earlier.



KEY DESIGN FEATURES

- FHWA HT-08-053, The Information Report on Lighting Design for Mid-block Crosswalks, found that a vertical illumination of 20 lux in front of the crosswalk, measured at a height of 5 feet from the road surface, provided adequate detection distances in most circumstances.
- Illumination just in front of crosswalks creates optimal visibility of pedestrians
- Crosswalk lighting should provide color contrast from standard roadway lighting

APPLICATIONS

- Ensure pedestrian walkways and crosswalks are well lit
- Use uniform lighting levels
- When installing roadway lighting, install on both sides of wide streets
- Consider pedestrian vs. vehicular scale for lighting (each has a different application)

BENEFITS

- Enhance safety of all roadway users, particularly pedestrians
- Enhance commercial districts
- Improve nighttime safety

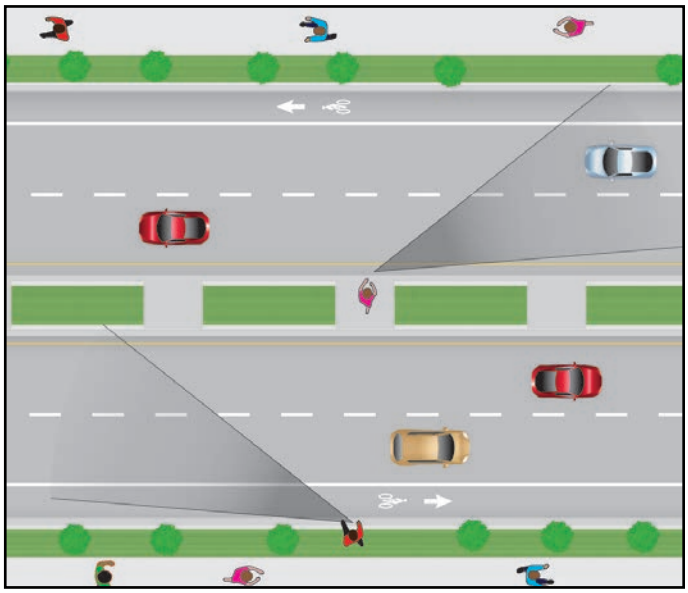
Well-lit crosswalk

MEDIANS

DESCRIPTION

Raised medians are the most important, safest, and most adaptable engineering tool for improving many street crossings. A median is a continuous raised area separating opposite flows of traffic.

Medians are a **FHWA Proven Safety Countermeasure.**



KEY DESIGN FEATURES

- Raised median with center area for landscaping
- Provide frequent breaks in median to assist crossing pedestrians
- Minimum of 6’ wide, but usually as wide as center-turn lane

A gap and channelization in this raised median places pedestrians in correct orientation to cross

BENEFITS

- Separate traffic flows
- Slow traffic
- Break crossings into shorter segments
- Provide space for landscaping and beautification
- Make street feel narrower
- Allow pedestrians to cross during a gap in one direction of traffic at a time

APPLICATIONS

Raised medians and crossing islands are commonly used between intersections when blocks are long (500 feet or more in downtowns) and in the following situations:

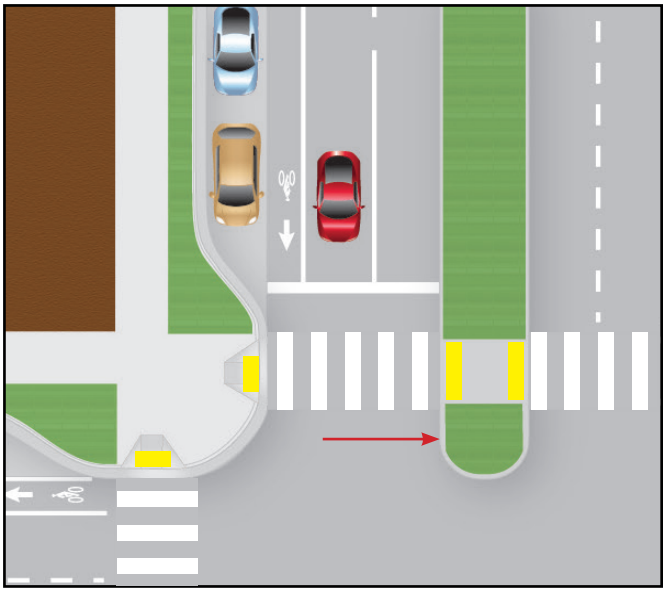
- Speeds are higher than desired
- Streets are wide
- Traffic volumes are high
- Sight distances are poor
- Raised islands have nearly universal applications and should be placed where there is a need for people to cross the street
- To slow traffic

MEDIAN NOSES

DESCRIPTION

A median nose, which extends past the crosswalk, protects people waiting on the median and slows turning drivers.

Median noses, which create refuge areas, are a FHWA Proven Safety Countermeasure.



KEY DESIGN FEATURES

- Should be as wide as the existing median but preferably a minimum of 6' wide
- Do not block through path for pedestrians and turning movements for vehicles
- Separate directions of vehicle travel

BENEFITS

- Allow pedestrians to cross one direction of traffic at a time
- Slow vehicles
- Provide refuge if crossing time is insufficient

A median nose reduces the exposure time experienced by a pedestrian in the intersection

APPLICATIONS

- Any bi-directional street with adequate width, typically where a raised median exists
- Especially important on multi-lane streets
- Intersections where there are mixtures of significant pedestrian and vehicle traffic (typically with more than 12,000 ADT and intermediate or high travel speeds)

MIDBLOCK CROSSINGS

DESCRIPTION

A crosswalk designed at a mid-point between intersections. These are best suited where there is a long distance (greater than 400 feet) between crosswalks on retail streets, in front of schools, etc. Intersections without traffic signals or STOP signs are considered uncontrolled intersections.

KEY DESIGN FEATURES

- High-visibility crosswalk marking
- Crossing islands, median gap, or short crossing
- Advanced crossing and crossing signs
- Advanced yield markings and signs
- Signs
- Rapid-flash beacons where traffic volumes and street width merit
- Pedestrian activated signals should be used for streets with high speeds and volumes

BENEFITS

- Bring both sides of the street closer for pedestrians
- Enhance visibility of pedestrians
- Informs drivers to expect pedestrians, and directs pedestrians to cross at specified locations
- Deter pedestrians from dashing across street at random

APPLICATIONS

- Decision to mark a crosswalk at an uncontrolled location should be guided by an engineering study
- Consider vehicular volumes and speeds, roadway width and number of lanes, stopping sight distance and triangles, distance to the next controlled crossing, night time visibility, grade, origin-destination of trips, left turning conflicts, and pedestrian volumes.
- On multi-lane roadways, marked crosswalks ALONE are not recommended under the following conditions: ADT > 12,000 without median; ADT > 15,000 with median; or speeds > 40 mph. Add devices such as advanced stop bar, crossing islands, etc.

Midblock crossing in Vancouver B.C., Canada

NEIGHBORHOOD TRAFFIC CIRCLES

DESCRIPTION

Neighborhood traffic circles, sometimes called “mini-circles” are small circles that are retrofitted into local street intersections to control vehicle speeds within a neighborhood. Typically, a tree and/or landscaping are located within the central island to provide increased visibility of the roundabout and enhance the intersection.

KEY DESIGN FEATURES

- The design of neighborhood traffic circles is primarily confined to selecting a central island size to achieve the appropriate design speed of around 15 to 20 mph
- Neighborhood traffic circles should generally have similar features as roundabouts, including yield-on-entry and painted or mountable splitter islands
- Can replace stop-controlled intersections in residential areas

APPLICATIONS

- Neighborhood traffic circles should be used on low-volume, neighborhood streets
- Larger vehicles can turn left in front of the central island if necessary
- Curb radius should be tight; may impede some large vehicles from turning
- Landscaped circles often require agreements from adjacent residents and maintenance

BENEFITS

- Create continuous, slow vehicle speeds
- Better for bicyclists than stop-controls
- Improve traffic flow
- Allow space for landscaping and beautification, as well as stormwater recapture
- Reduce crashes

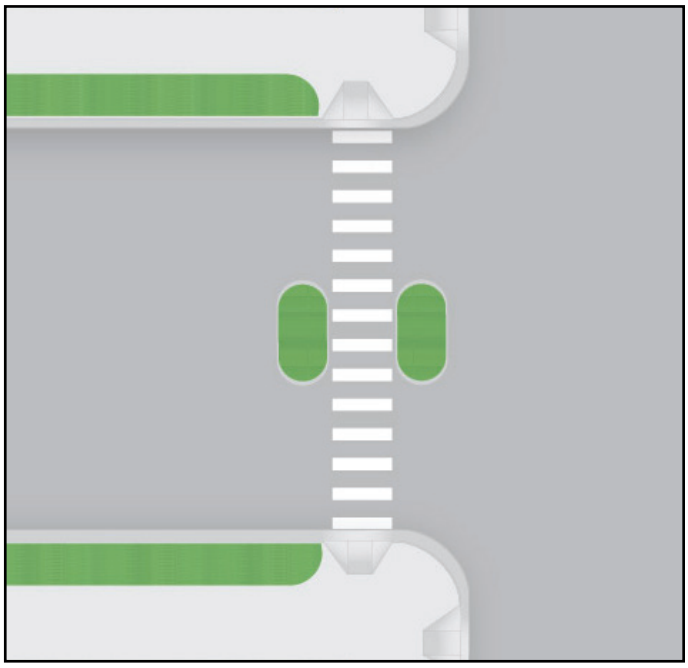
Neighborhood traffic circle in Vancouver B.C., Canada

PEDESTRIAN CROSSING ISLANDS

DESCRIPTION

A defined area in the center of the street that is raised and provides a refuge area for pedestrians crossing a busy street. They can be used at any street crossing, but are most important at uncontrolled crossings of multi-lane streets.

Pedestrian crossing islands are a **FHWA Proven Safety Countermeasure.**



KEY DESIGN FEATURES

- Raised, curbed islands that flank marked crosswalk
- Do not block through path
- Separate directions of vehicle travel
- Preferred width of at least 6' wide (minimum of at least 4' wide per FHWA)

Pedestrian crossing islands in a Downtown area

BENEFITS

- Allow pedestrians to cross one direction of traffic at a time
- Slow vehicles
- Provide refuge if crossing time is insufficient

APPLICATIONS

- Any bi-directional street with adequate width
- Especially important on uncontrolled multi-lane streets
- Can be placed in between lanes, in slip lanes, and replace center turn lanes
- Need to be designed to accommodate turning movements of large vehicles

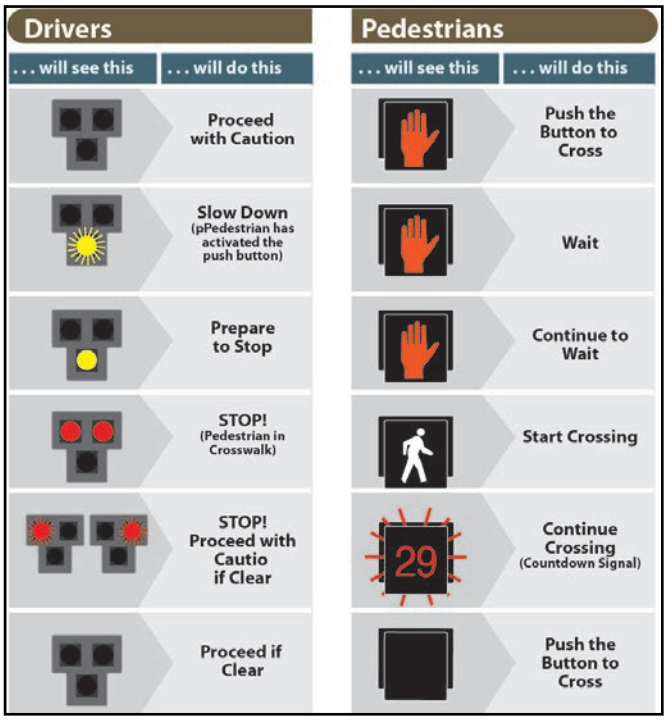
PEDESTRIAN HYBRID BEACONS

DESCRIPTION

A pedestrian hybrid beacon is used to warn and control traffic at an unsignalized location so as to help pedestrians cross a street or highway at a marked crosswalk.

The pedestrian hybrid beacon is an intermediate option between the operational requirements and effects of a rectangular rapid-flash beacon (RRFB) and a full pedestrian signal because it provides a positive stop control in areas without the high pedestrian traffic volumes that typically warrant the installation of a signal.

Pedestrian Hybrid Beacons are a FHWA Proven Safety Countermeasure.



KEY DESIGN FEATURES

- Minimum of 20 pedestrians per hour is needed to warrant installation
- Should be placed in conjunction with signs, crosswalks, and advanced yield lines to warn and control traffic at locations where pedestrians enter or cross a street or highway
- Should only be installed at a marked crosswalk

Pedestrian hybrid beacon on four lane street with high speeds and volumes

BENEFITS

- Can be used at a location that does not meet traffic signal warrants or at a location that meets traffic signal warrants but a decision has been made to not install a traffic control signal
- Additional safety measure and warning device at uncontrolled location
- Remain dark until activated

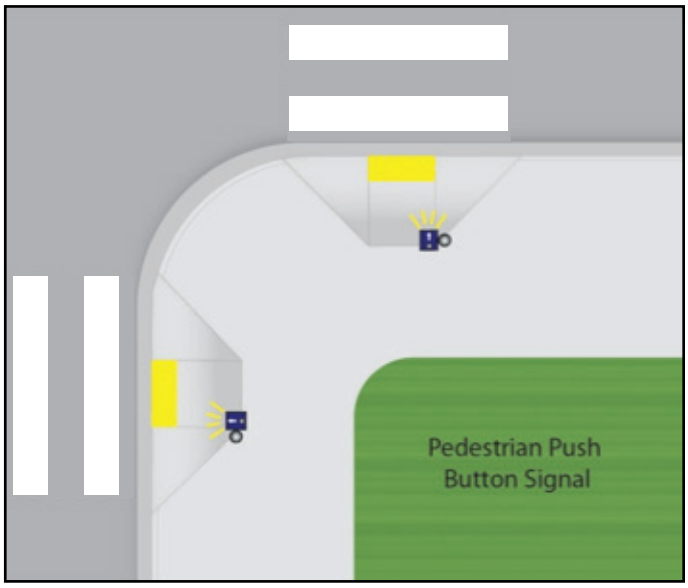
APPLICATIONS

- Installations should be done according to the Federal MUTCD and CA MUTCD Chapter 4F, “Pedestrian Hybrid Beacons.”

PEDESTRIAN-ACTIVATED PUSHBUTTONS

DESCRIPTION

Pedestrian-activated traffic controls require pedestrians to push a button to activate a walk signal. Where significant pedestrian traffic is expected, pedestrian-activated signals are generally discouraged. The "WALK" signal should automatically come on.



KEY DESIGN FEATURES

- Should be located as close as possible to top of curb ramps without reducing the width of the path
- Buttons should be at a level that is easily reached by people in wheelchairs near the top of the ramp.
- U.S. Access Board guidelines recommend buttons raised above or flush with their housing and large enough (a minimum of 2 inches) for people with visual impairments to see them.
- Buttons should also be easy to push

APPLICATIONS

- Areas where there are few pedestrians
- Midblock crossings at locations where signalized crossing is needed

BENEFITS

- Provide for smoother traffic flow if there are few pedestrians, and no need to provide walk signal for every cycle

Pedestrian push button

RAISED CROSSWALKS

DESCRIPTION

A crosswalk that has been raised in order to slow motor vehicles and to enhance the visibility of crossing pedestrians.

KEY DESIGN FEATURES

- Trapezoidal in shape on both sides and have a flat top where the pedestrians cross
- Level crosswalk area must be paved with smooth materials
- Texture or special pavements used for aesthetics should be placed on the beveled slopes, where they will be seen by approaching motorists
- Often require culverts or another means of drainage treatment

BENEFITS

- Increase visibility of pedestrian, especially to motorists in large vehicles
- Traffic calming
- Continuous level for pedestrians

APPLICATIONS

- Areas with significant pedestrian traffic and where motor vehicle traffic should move slowly, such as near schools, on college campuses, in Main Street retail environments, and in other similar places
- Effective near elementary schools where they raise small children by a few inches and make them more visible

Raised crosswalk on campus

RECTANGULAR RAPID-FLASH BEACONS

DESCRIPTION

The RRFB uses rectangular-shaped high-intensity LED-based indications, flashes rapidly in a wig-wag “flickering” flash pattern, and is mounted immediately between the crossing sign and the sign’s supplemental arrow plaque.

KEY DESIGN FEATURES

- Placed at crosswalk and in center median / crossing island
- Crosswalk sign with arrow
- Wig-wag flickering flash pattern mounted between crossing sign and arrow pointing to crosswalk

RRFBs at uncontrolled crossing location

BENEFITS

- Increase motorist compliance to yield to pedestrians crossing at uncontrolled marked locations
- Provide additional visibility to crosswalks
- Visible at night and during the day

APPLICATIONS

- Approved for interim use by the California Traffic Control Device Committee (CTCDC) and FHWA
- City should go through appropriate CTCDC steps to use
- Use of RRFBs should be limited to locations with the most critical safety concerns, such as pedestrian and school crosswalks at uncontrolled locations

REMOVABLE PYLONS

DESCRIPTION

Removable pylons, also know as flexible delineators are intended not so much to obstruct traffic as to guide it. They alert motorists to changing road conditions and especially useful in areas where side-swipe types of crashes are likely to occur.

For the purposes of this Plan, removable pylons have been proposed on wide streets where painted buffers have been used to delineate non-standard roadway shoulders. They are used to reduce the crossing distance for pedestrians and provide a physical buffer from vehicular traffic.

KEY DESIGN FEATURES

- High degree of visibility as they rise vertically from the road surface and reflective at night
- Typically used to alert motorists of changing road conditions

BENEFITS

- Provide a physical buffer from the travel lanes to increase comfort for pedestrians and bicyclists
- Narrow the streets to slow driver speeds

Low cost curb extension with paint and removable pylons

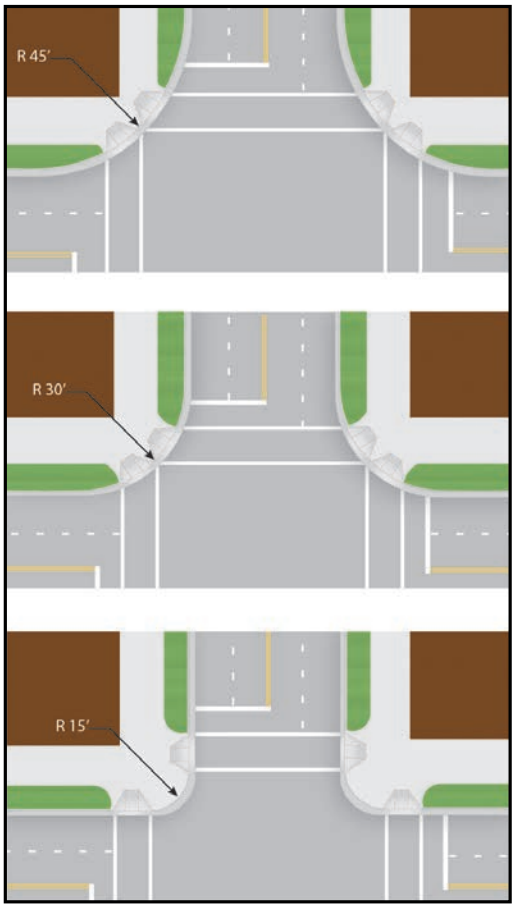
APPLICATIONS

- May be used to create temporary curb extensions
- May also be used delineate protected bike lanes
  - » 3’ minimum buffer width preferred per FHWA or 18” per NACTO
  - » 10’-40’ spacing desired by FHWA

REDUCED CURB RADIUS

DESCRIPTION

The geometry of the corner radius impacts the feel and look of a street. Tight corner radii create shorter crossing distances, and provide a traffic calming effect.



KEY DESIGN FEATURES

- Default design vehicle should be the passenger (P) vehicle; initial corner radius is between 15 and 25 feet
- Larger design vehicles should be used only where they are known to regularly make turns at the intersection (such as in the case of a truck or bus route)
- Design based on the larger design vehicle traveling at near 5 mph or crawl speed
- Consider the effect that bicycle lanes and on-street parking have on the effective radius, increasing the ease with which large vehicles can turn

BENEFITS

- Slower vehicular turning speeds
- Reduced pedestrian crossing distance and crossing time
- Better geometry for installing perpendicular ramps for both crosswalks at each corner
- Simpler and more appropriate crosswalk placement that aligns directly with sidewalks on the other side of the intersection

APPLICATIONS

- All corners

RIGHT-TURN CHANNELIZATION ISLANDS

DESCRIPTION

A raised channelization island between the through lanes and the right-turn lane is a good alternative to an overly large corner radius and enhances pedestrian safety and access. Allow pedestrians to cross fewer lanes at a time.

KEY DESIGN FEATURES

- Provide a yield sign for the slip lane
- Provide at least a 60-degree angle between vehicle flows
- Place the crosswalk across the right-turn lane about one car length back from where drivers yield to traffic on the other street
- Typical layout involves creating an island that is roughly twice as long as it is wide. The corner radius will typically have a long radius (150 feet to 300 feet) followed by a short radius (20 feet to 50 feet)
- Necessary to allow large trucks to turn into multiple receiving lanes

APPLICATIONS

- Right-turn lanes should generally be avoided as they increase the size of the intersection, the pedestrian crossing distance, and the likelihood of right-turns-on-red by inattentive motorists who do not notice pedestrians on their right
- Heavy volumes of right turns (approximately 200 vehicles per hour or more)

BENEFITS

- Allow motorists and pedestrians to judge the right turn/pedestrian conflict separately
- Reduce pedestrian crossing distance, which can improve signal timing for all users
- Balance vehicle capacity and truck turning needs with pedestrian safety
- Provide an opportunity for landscape and hardscape enhancement
- Slow motorists

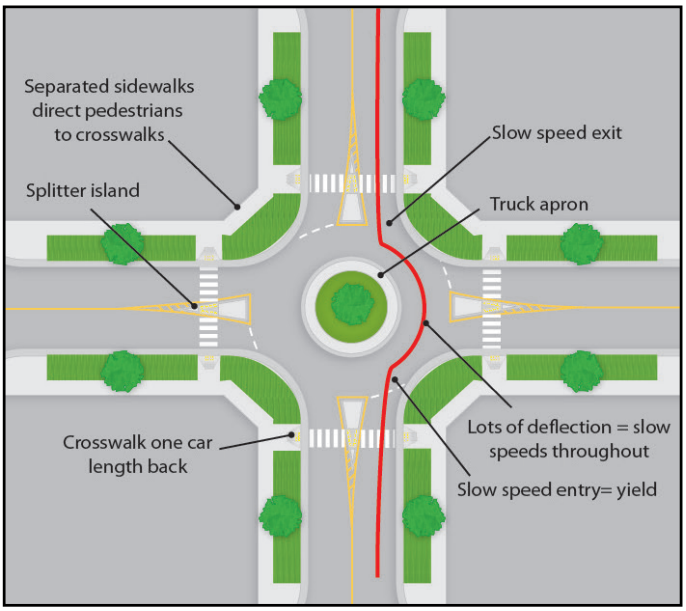
Right-turn lane in Orlando, Florida

ROUNDABOUTS

DESCRIPTION

A roundabout is an intersection design that can replace traffic signals. Users approach the intersection, slow down, stop and/or yield to pedestrians in a crosswalk, and then enter a circulating roadway, yielding to drivers already in the roundabout. The circulating roadway encircles a central island around which vehicles travel counterclockwise.

Roundabouts are a FHWA Proven Safety Countermeasure.



KEY DESIGN FEATURES

- Deflection encourages slow traffic speeds,
- Landscaped visual obstruction in the central island discourage users from entering the roundabout at high speeds
- Central island should not contain attractions
- Each leg of a roundabout has a triangular splitter island that prevents drivers from turning left (the "wrong-way")
- Truck apron

BENEFITS

- Reduce conflicts, all forms of crashes and crash severity (particularly left-turn and right-angle crashes)
- Little to no delay for pedestrians
- Improved accessibility for bicyclists
- Approximately 30% more vehicle capacity than signals (allowing possible reduction in number of lanes and roadway width)
- Reduced maintenance and operational costs, delay, travel time, and vehicle queue lengths

APPLICATIONS

Before starting the design of a roundabout it is very important to determine the following:

- Number and type of lane(s) on each approach and departure as determined by a capacity analysis
- Design vehicle for each movement
- Presence of on-street bike lanes
- Right-of-way and its availability for acquisition if needed
- Existence or lack of sidewalks
- Approach grade of each approach
- Transit, existing or proposed
- Roundabouts can be applied at nearly all intersections, but are more legible for single-lane approaches
- Must have adequate space

Single-lane roundabout in La Jolla, California

RUMBLE BARS

DESCRIPTION

Rumble bars, or transverse rumble strips, are used to alert drivers of an unexpected change in the roadway, such as the need to slow down or stop, or changes in the roadway alignment. They are a warning device used to supplement signing and alert drivers of the need to reduce speed.

Rumble bars are a **FHWA Proven Safety Countermeasure.**

KEY DESIGN FEATURES

- Can be raised bars or grooves placed across the travel lane
- If grooved rumble bars, limit maximum height or depth of ½ in to minimize the jarring action to vehicles. If thermoplastic materials are used to created raised bars, the material should be white

Transverse rumble bars

BENEFITS

- Provide visual and aural cues to alert motorists to slow down and pay attention to changes in the roadway
- Delineate and create awareness of a pedestrian crosswalk

APPLICATIONS

- Apply on approaches leading up to a pedestrian crosswalk or changing roadway conditions

SCRAMBLE PHASES

DESCRIPTION

A scramble phase provides a separate all-direction red phase in the traffic signal to allow pedestrians to cross linearly and diagonally. They are most appropriate in retail districts with heavy volumes of both pedestrians and motor vehicles, and/or many vehicle turning movements.

KEY DESIGN FEATURES

- Signs indicating scramble is permitted
- Countdown signals
- Markings indicating diagonal cross
- Allow pedestrians to cross straight and reduces delay

Sign indicating pedestrian scramble phase

BENEFITS

- Reduce pedestrian delay for those crossing both directions
- Reduce pedestrian-vehicle conflicts by providing an all-pedestrian crossing phase
- Does not necessarily eliminate regular walk phase

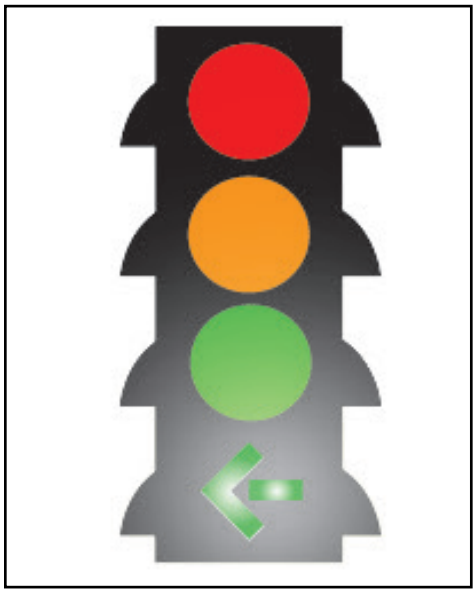
APPLICATIONS

- Exclusive pedestrian phases may be used where turning vehicles conflict with very high pedestrian volumes and pedestrian crossing distances are short
- Should be used in areas with high pedestrian volumes such as near shopping centers, downtown, university crossings, turning movements, etc.

SIGNAL TIMING/PHASING

DESCRIPTION

Signals provide control of pedestrians and motor vehicles. Signals can be used to control vehicle speeds by providing appropriate signal progression on a corridor. Traffic signals allow pedestrians and bicyclists to cross major streets with only minimal conflict with motor vehicle traffic. Signalized intersections often have significant turning volumes, which conflict with concurrent pedestrian and bicycle movements.



KEY DESIGN FEATURES

- Signal progression at speeds that support the target speed of a corridor
- Short signal cycle lengths
- Ensure signals detect bicycles
- Place pedestrian signal heads in locations where they are visible
- Time the pedestrian phase to be on automatic recall
- Where few pedestrians are expected, place pedestrian pushbuttons in convenient locations, using separate pedestals if necessary.
- Include adequate pedestrian crossing time of 3.5 feet per seconds or more
- Leading Pedestrian Intervals (LPI) allows pedestrians to begin crossing while all directions of traffic have red signal
- Protected left-turn phases are preferable to permissive movements

APPLICATIONS

- City must follow standard warrants in the California MUTCD

BENEFITS

- Reduces pedestrian-vehicle conflicts by providing separate phases for travel
- Limiting permissive turning movements at signalized intersections improves safety for pedestrians
- Walk signals timed at 3.5 feet / second reduce conflicts; less where large numbers of seniors or disabled pedestrians crossing

Traffic signal with pedestrian countdown signal and restricts right-turns on red

SIGNS

DESCRIPTION

Signs alert motorists to the presence of crosswalks and pedestrians. Center signs can help slow traffic. These are placed according to the CA MUTCD.

KEY DESIGN FEATURES

- Placed with adequate sight distance and according to MUTCD standards
- Should not block pedestrian view or obstruct pathways
- Kept free of graffiti and in good condition
- Should have adequate nighttime reflectivity

Pedestrian crossing sign indicating location of marked pedestrian crossing

BENEFITS

- Provide important information
- Give motorists advance warning
- Regulatory signs require certain driver actions and can be enforced

APPLICATIONS

- Overuse of signs can create noncompliance and disrespect
- Signs should be placed at locations where appropriate to enforce certain types of behavior
- Uncontrolled crossings
- Commonly used signs are advanced pedestrian crossing sign in advance of marked uncontrolled crossing; pedestrian crossing sign at uncontrolled crossing; and advanced yield signs

SPEED FEEDBACK SIGNS

DESCRIPTION

Alerts motorists when they are going over the speed limit. They are most appropriate where motor vehicles commonly speed and there are pedestrians or bicyclists.

KEY DESIGN FEATURES

- Must be placed in conjunction with speed limit sign
- Should flash “SLOW DOWN” message if driver is going above speed limit

BENEFITS

- Heighten awareness of speed limits
- Can be used to specify lower speed limit during school crossing times
- Alert drivers of their actual speed and posted speed
- Can record traffic counts and speeds

School speedfack sign placed after a School Assembly C sign

APPLICATIONS

- Place in school zones or corridors where speeding is a known issue

SIDEWALK DESIGN

SIDEWALKS

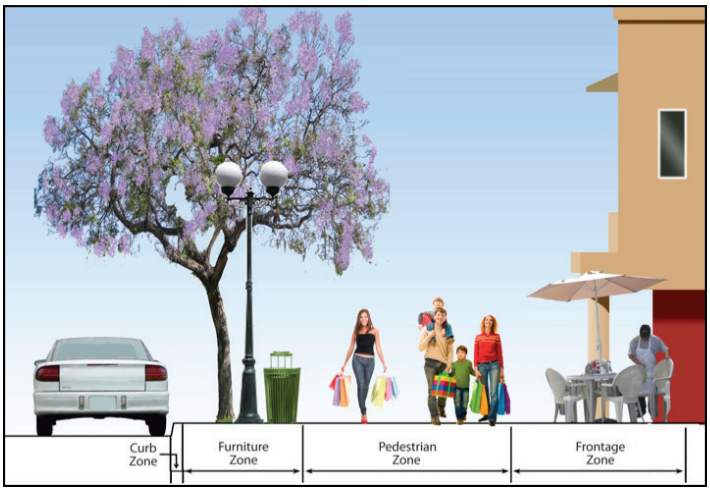
Sidewalks should provide a comfortable space for pedestrians between the roadway and adjacent land uses. Sidewalks along city streets are the most important component of pedestrian mobility. They provide access to destinations and critical connections between modes of travel, including automobiles, transit, and bicycles. General provisions for sidewalks include pathway width, slope, space for street furniture, utilities, trees and landscaping, and building ingress/egress.

Sidewalks in the public right-of-way are generally constructed of concrete, with construction details regarding materials, procedures, and design specified in the Standard Specifications for Public Works Construction (SSPWC), along with its companion SSPWC Standard Plans. However, sidewalks may also be constructed and maintained of other materials such as rubber, decomposed granite, or other hard unyielding surface.

Besides pedestrian mobility, sidewalks also add to people's outdoor enjoyment of landscape, urban forest, and streetscapes.

Sidewalk maintenance is also important since trees and large shrubs and plant life are common near and around sidewalks, and root systems sometimes lift sidewalks and create vertical displacements. These vertical displacements must be controlled and maintained to a maximum of one inch.

Sidewalks include four distinct zones: the frontage zone, the pedestrian (walking) zone, the furniture zone, and the curb zone. The minimum widths of each of these zones vary based on street classifications as well as land uses.



Left:
Four distinct sidewalk zones

FRONTAGE ZONE

The frontage zone is the portion of the sidewalk located immediately adjacent to buildings, and provides shy distance from buildings, walls, fences, or property lines. It includes space for building-related features such as entryways and accessible ramps. It can include landscaping as well as awnings, signs, news racks, benches, and outdoor café seating. In single family residential neighborhoods, landscaping typically occupies the frontage zone.

PEDESTRIAN ZONE

The pedestrian zone, situated between the frontage zone and the furniture zone, is the area dedicated to walking and should be kept clear of all fixtures and obstructions. Within the pedestrian zone, the Pedestrian Access Route (PAR) is the path that provides continuous connections from the public right-of-way to building and property entry points, parking areas, and public transportation.

This pathway is required to comply with ADA guidelines and is intended to be a seamless pathway for wheelchair and white cane users. As such, this route should be firm, stable, and slip-resistant, and should comply with maximum cross slope (transverse) requirements (2 percent grade). The walkway grade (longitudinal) shall not exceed the general grade of the adjacent street. Aesthetic textured pavement materials (e.g., brick and pavers) are best used in the frontage and furniture zones, rather than the PAR. The PAR should be a minimum of 4 feet, but preferably at least 5 feet in width to provide adequate space for two pedestrians to comfortably pass or walk side by side. All transitions (e.g., from street to ramp or ramp to landing) must be flush and free of changes in level. The engineer should determine the pedestrian zone width to accommodate the projected volume of users. In no case will this zone be less than the width of the PAR.

Non-compliant driveways often present significant obstacles to wheelchair users. The cross slope on these driveways is often much steeper than the 2 percent maximum grade. Driveway aprons that extend into the pedestrian zone can render a sidewalk impassable to users of wheelchairs, walkers, and crutches. They need a flat plane on which to rest all four supports (two in the case of crutches). To provide a continuous PAR across driveways, aprons should be confined to the furniture and curb zones.

FURNITURE ZONE

The furniture zone is located between the curb line and the pedestrian zone. The furniture zone should contain all fixtures, such as street trees, bus stops and shelters, parking meters, utility poles and boxes, lamp posts, signs, bike racks, news racks, benches, waste receptacles, drinking fountains, and other street furniture to keep the pedestrian zone free of obstructions. In residential neighborhoods, the furniture zone is often landscaped. Resting areas with benches and space for wheelchairs should be provided in high volume pedestrian districts and along blocks with a steep grade to provide a place to rest for older adults, wheelchair users, and others who need to catch their breath.

CURB ZONE

The curb zone serves primarily to prevent water and cars from encroaching on the sidewalk. It defines where the area for pedestrians begins, and the area for cars ends. It is the area people using assistive devices must traverse to get from the street to the sidewalk, so its design is critical to accessibility.

OTHER SIDEWALK GUIDELINES

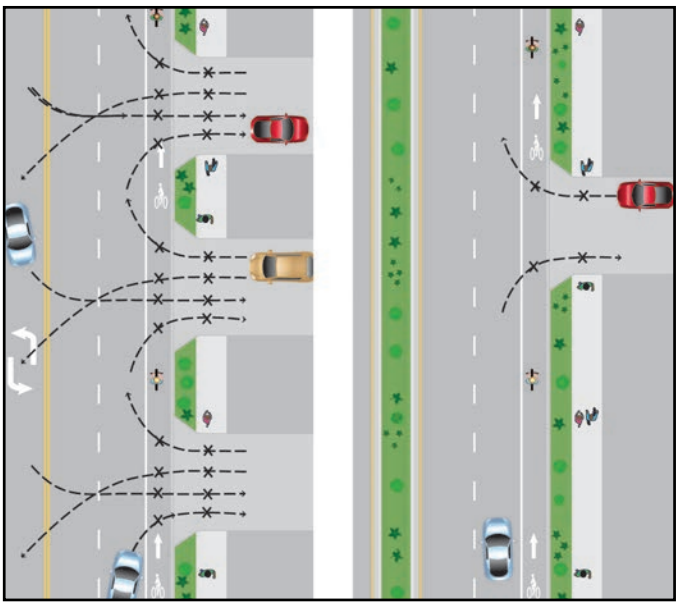
- Landscaped buffers or fences should separate sidewalks from off-street parking lots or off-street passenger loading areas.
- Pedestrian and driver sight distances should be maintained near driveways. Fencing and foliage near the intersection of sidewalks and driveways should ensure adequate sight distance as vehicles enter or exit.
- Where no frontage zone exists, driveway ramps usually violate cross slope requirements. In these situations, sidewalks should be built back from the curb at the driveway as shown in the adjacent photo.
- Construction tolerances require less than one quarter inch (1/4”) vertical displacement between panel levels
- Sidewalks should be maintained so that a one inch (1”) vertical displacement is not exceeded.

SIDEWALKS

ACCESS MANAGEMENT

DESCRIPTION

Most conflicts between users occur at intersections and driveways. The presence of many driveways in addition to the necessary intersections creates many conflicts between vehicles entering or leaving a street and bicyclists and pedestrians riding or walking along the street.



KEY DESIGN FEATURES

- When possible, new driveways should be minimized and old driveways should be eliminated or consolidated, and raised medians should be placed to limit left turns into and out of driveways

BENEFITS

- Number of conflict points is reduced
- Pedestrian crossing opportunities are enhanced with a raised median
- Universal access for pedestrians is easier, since the sidewalk is less frequently interrupted by driveway slopes
- Result in more space available for higher and better uses.
- Improved traffic flow may reduce the need for road widening

APPLICATIONS

- New development
- Redevelopment
- Where driveways make sidewalk inaccessible based on ADA guidelines

STREETSCAPE FEATURES

DESCRIPTION

Well-designed walking environments are enhanced by urban design elements and street furniture, such as benches, bus shelters, trash receptacles, and water fountains. Landscaping and streetwater management can create a more beautiful and sustainable environment.

KEY DESIGN FEATURES

- Street furniture should be carefully placed to create an unobstructed path and sight lines for pedestrians
- Good-quality street furniture will show that the community values its public spaces and is more cost-effective in the long run
- Include plans for landscape irrigation and maintenance at the outset
- Ensure adequacy of overhead clearances and detectability of protruding objects for pedestrians who are blind or visually impaired
- Create a theme
- Placemaking
- Sustainable drainage

APPLICATIONS

- Focus improvements in downtown areas and commercial districts
- Landscaping should focus on native plants that will not require excessive watering or maintenance
- Shade-giving trees or shelters are important in jurisdictions that have high temperatures

BENEFITS

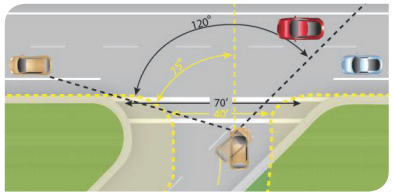
- Enhance the pedestrian environment
- Enliven commercial districts by providing improved public space
- Encourage visitors and residents to walk to destinations rather than drive

Street furniture and landscaping in Portland, Oregon

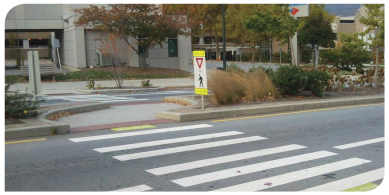
SAFE ROUTES TO SCHOOL DEVICES REFERENCE

DESCRIPTION	ADVANTAGES	DISADVANTAGES
AUDIO PEDESTRIAN SIGNALS 	• Create a more accessible pedestrian network than without • Assist those who are visually impaired	• Sound levels could create audible intrusion
ADVANCE STOP BARS 	• Cost very little • Reduce vehicular encroachment onto crosswalks • Improve visibility of pedestrians • Provide comfort to pedestrians	• Cost slightly more than without
ADVANCE YIELD LINES 	• Cost very little • Improve sight visibility of pedestrians and motorists when used correctly • Reduce potential of multiple-threat crashes	• Cost slightly more than without
COUNTDOWN SIGNALS 	• Indicate appropriate time for pedestrians to cross • Provide pedestrian clearance interval	• May cause motorists to speed through intersections
CURB EXTENSIONS 	• Shorten pedestrian crossing • Provide traffic calming • Improve sight visibility for pedestrians and motorists • Provide additional space for landscaping and street furniture • Are placed where on-street parking is present (does not take away existing parking)	• Are costly, especially where drainage needs to be relocated • Restrict right-turn movements

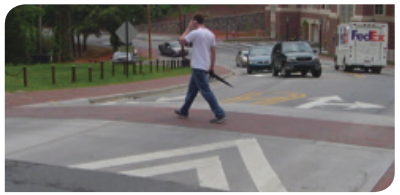
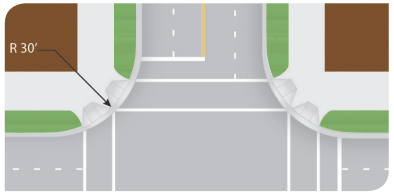
SAFE ROUTES TO SCHOOL DEVICES REFERENCE

DESCRIPTION		ADVANTAGES	DISADVANTAGES
CURB RAMPS		• Comply with ADA when designed correctly • Improve pedestrian accessibility for those in wheelchairs, with strollers, and for children • Double curb ramps make the trip across the street shorter and more direct than diagonal ramps	• May require modifications to street corners and crosswalk locations to accommodate curb ramps
INTERSECTION GEOMETRY MODIFICATIONS		• Slow turning vehicles by making angles more acute • Shorten pedestrian crossing distances • Improve sight visibility	• Can be challenging at intersections with larger vehicles
LED-FLASHING LIGHTS ON STOP SIGNS		• Increase motorists compliance with stop signs • Enhance visibility and recognition of regulatory and warning signs to drivers, especially under low-light or low-visibility conditions	• Require maintenance if lights are broken
LIGHTING		• Enhances safety of all roadway users, particularly pedestrians • Enhances commercial districts • Improves nighttime personal safety	• Can be expensive
MEDIANS		• Separate traffic flows • Slow traffic • Break crossings into shorter segments • Provide space for landscaping and beautification	• Potentially impact roadways, including lane narrowing and restricted turning movements • Require irrigation, drainage and maintenance if landscaped
MEDIAN NOSES		• Allow pedestrians to cross one direction of traffic at a time • Slow turning vehicles • Provide refuge if crossing time is insufficient	• May constrain vehicular turning movements • Can be challenging at intersections with larger vehicles

SAFE ROUTES TO SCHOOL DEVICES REFERENCE

DESCRIPTION	ADVANTAGES	DISADVANTAGES
MIDBLOCK CROSSINGS 	• Bring both sides of the street closer for pedestrians • Enhance visibility of pedestrians • Inform drivers to expect pedestrians, and directs pedestrians to cross at specified locations • Can be designed safer for pedestrians than intersection crossings because of fewer potential conflicts with vehicles	• Can eliminate left-turns • Requires supplemental signs to alert motorists of crossing location
NEIGHBORHOOD TRAFFIC CIRCLES 	• Reduce bicycle and vehicular conflicts • Calm traffic in all directions • Can replace stop signs	• Are moderately costly • Require irrigation, drainage and maintenance if landscaped • Must be designed to accommodate access for larger vehicles (i.e. trucks, emergency response vehicles)
PEDESTRIAN CROSSING ISLANDS 	• Allow pedestrians to cross one direction of traffic at a time • Slow vehicles • Provide refuge if crossing time is insufficient	• Can eliminate left-turns
PEDESTRIAN HYBRID BEACONS 	• Can be used at locations that do not meet traffic signal warrants • Effective safety measure and warning device at uncontrolled locations • Less costly than traffic signals	• Require pedestrians to push the push button to be effective • More costly than beacons and other pedestrian crossing treatments
PEDESTRIAN-ACTIVATED PUSHBUTTONS 	• Provide for smoother traffic flow if there are few pedestrians • Do not require providing a walk signal for every cycle	• Require pedestrians to push the push button • May lengthen wait times for pedestrians

SAFE ROUTES TO SCHOOL DEVICES REFERENCE MATRIX

DESCRIPTION	ADVANTAGES	DISADVANTAGES
RAISED CROSSWALKS 	• Increase visibility of pedestrian, especially to motorists in large vehicles • Calm traffic • Provide continuous level for pedestrians	• Present potential drainage challenges • Are more costly than basic crosswalks • Noise concerns if located near residences
RECTANGULAR RAPID-FLASH BEACONS 	• Increase motorist compliance to yield to pedestrians crossing at uncontrolled marked locations • Provide additional visibility to crosswalks • Are visible at night and during the	• Require pedestrians to push the push button to be effective • More costly than without
REDUCED CURB RADIUS 	• Slows vehicular turns • Reduces pedestrian crossing distances and crossing times • Provides better geometry for installing perpendicular curb ramps	• Decreases speed for right-turning vehicles • Can be challenging at intersections with large design vehicles
REMOVABLE PYLONS 	• Provide a physical buffer from the travel lanes to increase comfort for pedestrians and bicyclists • Narrow the streets to slow driver speeds • Provide a lower-cost solution than a curb extension	• Do not form a full barrier to prevent vehicles from crossing • Can be damaged if hit, would require additional maintenance cost to replace
RIGHT-TURN CHANNELIZATION ISLANDS 	• Allow motorists and pedestrians to judge the right turn/pedestrian conflict separately • Reduce pedestrian crossing distances • Improve signal timing for all users	• Where the slip lane is unsignalized, can create conflicts with crossing pedestrians

SAFE ROUTES TO SCHOOL DEVICES REFERENCE MATRIX

DESCRIPTION	ADVANTAGES	DISADVANTAGES
ROUNDABOUTS 	• Improve safety and reduce conflicts in all forms of crashes and crash severity • Shorten traffic queues • Allow approximately 30% more vehicle capacity than signals (allowing possible reduction in number of lanes and roadway width) • Break up the pedestrian crossings into short segments • Slow traffic	• Require space and grade considerations • Are costly • Require irrigation, drainage and maintenance if landscaped
RUMBLE BARS 	• Provide visual and aural cues to alert motorists to slow down and pay attention to changes in the roadway • Delineate and create awareness of a pedestrian crosswalk	• Noise concerns if located near residences
SCRAMBLE PHASES 	• Reduce pedestrian delay for those crossing both directions • Reduce pedestrian-vehicle conflicts by providing an all-pedestrian crossing phase	• Increase average waiting times for motorists and pedestrians crossing just one direction
SIGNS 	• Provide information and warning to motorists • Regulatory signs require certain driver actions and can be enforced • Are inexpensive to install	• May not be effective enough to calm traffic • Need to be combined with other treatments to be effective for pedestrian crossings
SPEED FEEDBACK SIGNS 	• Heighten awareness of speed limits • Can be adjusted to lower speed limit during school crossing times • Are moderately costly but highly effective in traffic calming	• Require power (DC or solar)