North San José Bicycle and Pedestrian Plan

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I. Introduction

The North San José Bicycle and Pedestrian Master Plan guides the future development of bicycle and pedestrian facilities in the North San José area. The purpose of this plan is two-fold. First, it complements the Vision North San José, which seeks to redevelop North San José into a place where people live, work and play. The Vision provides pedestrian-oriented development concepts and includes a detailed set of pedestrian facility and streetscape design guidelines. Second, this Bicycle and Pedestrian Master Plan identifies policies, specific projects, and programs that will make North San José a model bicycle and pedestrian community. Many recommendations in this Plan have been drawn from best practices of the most bicycle friendly cities and countries around the world, are still viewed as "innovative" in the United States, giving San José the opportunity to be a leader in innovative designs.

North San José already provides basic bicycle and pedestrian facilities. Sidewalks exist along most major roads, with very few gaps in the network. Bicycle lanes are also striped on the roadways that provide the most direct access to transit, employment centers and Downtown San José. North San José's bicycle network incorporates nearly 25 miles of existing on-street bikeways. The area is bound to the east and west by the unpaved Guadalupe River and Coyote Creek multi-use paths, which are part of the City of San José's goal of creating a 100 mile trail network.

Certainly the foundation has been set to accommodate bicyclists and pedestrians within the existing land use in North San José. However, the City has a vision to dramatically transform the North San José land use patterns, which provides an opportunity to greatly enhance the bicycle and pedestrian experience in the area.

North San José Urban Design and Implementation Study (Draft 7/08)

In July 2007, the City formed a North San José Task Force to engage the residential and commercial communities in the development of for the Guiding Principles for the implementation of the Development Area Policy. The implementation plan, referred to as Vision North San José, provides the guidelines to transform the area into a bicycle and pedestrian friendly area.

> *8.1.1 Walkabilitiy – Strive to make North San José districts and neighborhoods walkable.*
>
> *8.1.2 Pedestrian-Friendly Environment – Create an urban environment that is visually attractive, pedestrian- and bike-friendly and designed to the human scale."*[1]

The proposed changes to North San José are dramatic. While existing block lengths in the area are longer than 1,000 feet, the Vision suggested block lengths are 200-500 feet, depending on the adjacent land use, with shorter lengths suggested for residential areas than for office areas. Where the addition of a street is not feasible, and the block length is long, paths, trails, or paseos are

[1] North San José Neighborhoods Planning Taskforce Guiding Principles Final Unanimously Adopted 3-6-08.

suggested through mid-blocks. Trails along the Guadalupe River and Coyote Creek will be connected with three proposed east-west trails. This trail network will further enhance the bicycle and pedestrian mobility of the residents of North San José, providing a combination of on and off street trails and paths. The guidelines also suggest various traffic calming treatments, including bulb-outs, chicanes, and street trees to create a bicycle and pedestrian friendly community.

Vision Statement for the Bicycle and Pedestrian Master Plan

This Bicycle and Pedestrian Master Plan has a vision of making North San José a model bicycle and pedestrian community. This vision will guide the City to prioritize bicycle and pedestrian travel through policies, programs and the selection of facilities that will most positively affect the safety and mobility of bicyclists and pedestrians.

Vision Statement

"North San José will strive to become a model bicycle and pedestrian community. State-of-art bicycle and pedestrian facilities will always be considered in ensuring the safety and comfort of bicyclists and pedestrians."

Funding

The City of San Jose has identified approximately $519 million in needed roadway/intersection and transit/pedestrian/bicycle facility improvements in the North San Jose area. The identified improvements will be funded primarily by the North San Jose traffic impact fee that will be collected from private property owners and developers, with a portion of these costs to be funded the City/ Redevelopment Agency, and other funding sources such as regional, state, and federal grant opportunities.

Approximately $60 million of the total improvement package is for needed bicycle, pedestrian, and transit facilities in North San Jose. The improvements identified in the North San Jose Bicycle and Pedestrian Master Plan are included as part of the North San Jose Traffic Impact Fee program and will be funded as part of that program. There is no set schedule for priorities for the implementation of the transportation improvement package. The appropriate priorities will be determined on an as needed basis based on a number of factors including the NSJ phasing plan, location of planned improvements, and available funding.

II. Existing and Proposed Environment

North San José is located in the northernmost section of the City of San José. The area is bound by Coyote Creek to the east, the Guadalupe River to the west, Highway 237 to the north, and the intersection of Highways 101 and 880 to the south. The area is approximately 6 square miles in size and is relatively flat – excellent for bicycling and walking.

The City of San José has a population of about 989,000, making it the 10th most populous city in the United States. Approximately 1% of the City's total population resides in the area known as North San José. The City of San José, including North San José, has experienced rapid growth since 1990. North San José was one of the fastest growing areas in the City between 1990 and 2000, with an increase of over 1,500 persons during that time.[2] However, it remains one of the least dense areas in the city due to the predominant light-industrial land use, with the exception of the existing residential areas north of Tasman Boulevard that are zoned for high-density residential with over 50 persons per acre.

North San José contains a variety of land uses, but the majority of land is zoned "Industrial Park." The City's municipal code defines "Industrial Park" as "…research and development, manufacturing, assembly, testing, and offices."[3] The major employers located in this area include Cisco Systems and Ebay. Other land uses include agricultural and residential, single family or multi-family. These areas are located along the northern and southern boundaries. The North San José Development Area Policy slates many of these areas for major redevelopment. Specifically, the policy seeks to change the current land use dramatically, encouraging high density development, intensifying employment opportunities, increasing residential capacity and traffic circulation by introducing denser housing and breaking apart super blocks.

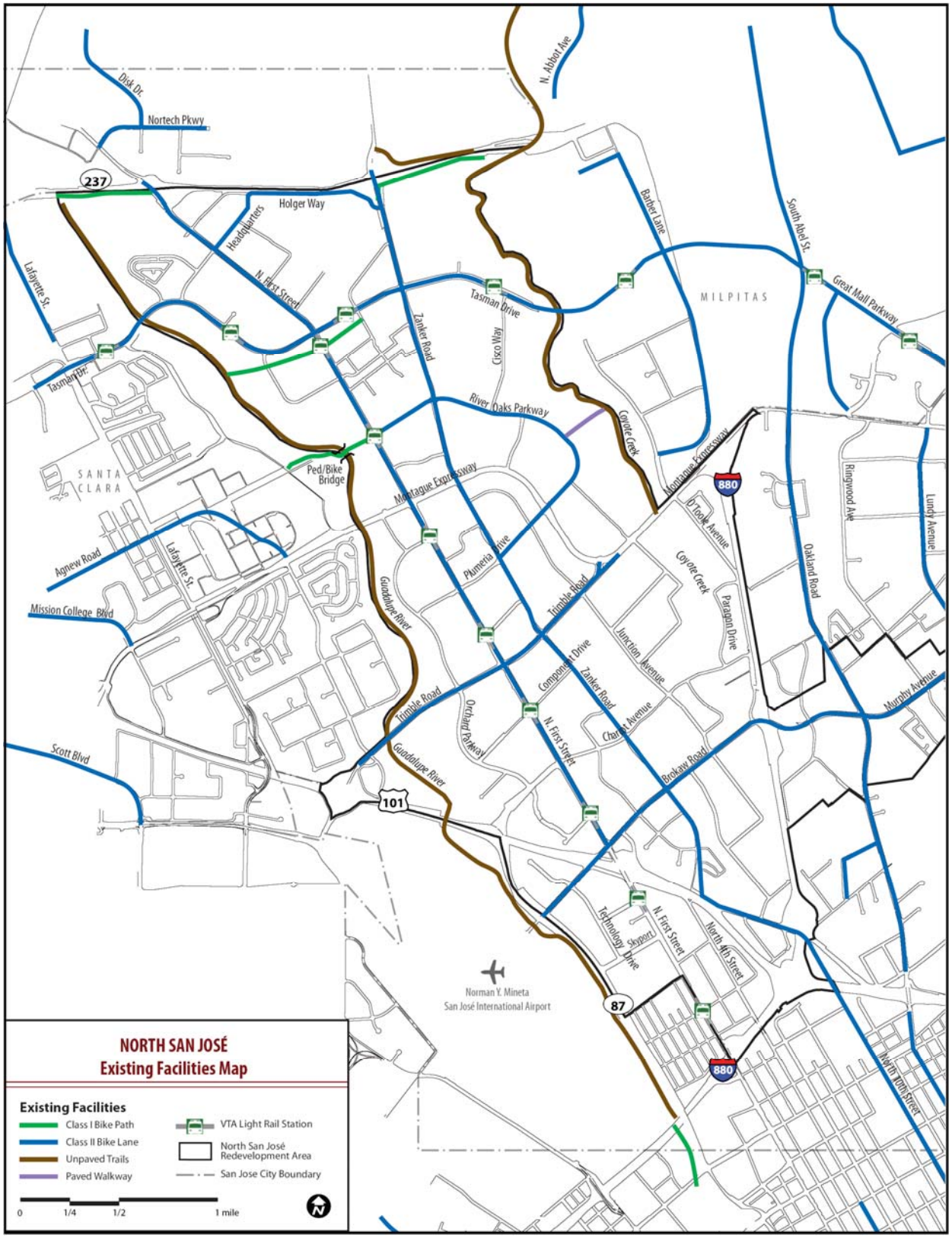
As the City developed North San José, and adopted a bicycle and pedestrian policy, bicycling and walking infrastructure has become more common. The existing bike network and the built out pedestrian infrastructure provide a solid foundation for future projects.

Existing Facilities

The City has installed a variety of bicycle and pedestrian supporting facilities. While the facilities themselves aid in non-motorized travel, North San José's wide, multi-lane arterial roadways, long super blocks, and large areas of automobile surface parking still present barriers to non-motorized travel, including conflicts with automobiles and inconvenient pedestrian access. Unpaved trails line the perimeter of the area, providing opportunities for both recreational and utilitarian bicycle and pedestrian travel.

[2] US Census, 2000
[3] City of San José Municipal Code 20.50.010

Figure 1: Existing Bicycle Facilities



Bicycle Facilities

The existing bikeway network in North San José incorporates approximately 9 miles of off-street bicycle paths and 17 miles of bike lanes. The major off-street paths run along the Guadalupe River and Coyote Creek, while bicycle lanes line most of the major roadways. Bicycle parking is mostly found within corporate campuses, primarily for employee use.

The future North San José will make utilitarian bicycle trips, such as this woman transporting her child, much easier with an extensive bicycle network.

Pedestrian Facilities

Sidewalks and crosswalks are located along most of the roadways in North San José. Although North San José provides key elements for promoting walkability, one major drawback is the prominence of super blocks. Over 2000 ft. in perimeter, many of these blocks feature a central building compound, surrounded by acres of parking. With fewer intersections, pedestrians are forced to seek mid-block crossings. Along streets with light rail transit lines, like Tasman and 1st St, at grade mid-block crossings are not permitted.

Trail Facilities

Bicyclists and pedestrians can also use the North San José's trail network, which follows the Guadalupe River to the west, Coyote Creek to the east and Highway 237 to the north. Areas of these trails provide paved and unpaved surfaces. A pedestrian bridge crosses the Guadalupe River directly west of the River Oaks Place cul-de-sac.

Proposed Conditions for NSJ

Vision North San José proposes land use and circulation changes that provide the opportunity to make the area more bicycle and pedestrian friendly. Perhaps the most dramatic proposal in the Vision is increasing access by all modes, primarily in the area west of Zanker Road. A trail network is also proposed. Three east-west trails will connect the exiting Guadalupe River and Coyote Creek trails. These connectors will be a combination of on and off-street trails.

Bicycle facilities are included on most street cross sections, while pedestrians will be accommodated through a variety of design elements, in addition to the trail network. Streetscape designs are proposed for the three defined types of roadways: residential, collector, and arterial. Each streetscape provides a wealth of pedestrian-friendly elements including street trees, wide sidewalks, furniture, pedestrian scale lighting and ground floor retail and entertainment opportunities.

Land Use and Development

The Vision proposes to ensure economic prosperity, and promote high quality workplace environments and walkable, livable neighborhoods close to public transit in North San José's Innovation Triangle. One goal of the Vision is to increase bicycle and pedestrian access, as in the rendition image of a future commercial office park to the right.

Before and After: Proposed redevelopment of a commercial office park (top) to a denser area that encourages walking and bicycling (below). Source: North San José Overview Presentation

Circulation

Roadways and Transit

While the VTA Light Rail line and stations will remain in their existing locations, access to them will increase with additional bicycle and pedestrian facilities.

Appendix A includes a summary of how the Vision roadway categorizes and their respective proposed bicycle and pedestrian facilities.

Bicycle Facilities

The San José General Plan provides bicycle lanes on all arterial and residential roadways, varying from five to eight feet in width, depending on the roadway category. The Plan suggests installing bicycle parking as a general measure to accommodate bicyclists.

Trail Connections

North San José is bound by trails to the east and west. These trails are a great asset for commuters and recreational users alike, providing an automobile-free corridor along two water ways. Three east-west connector trails are proposed in the Vision, providing access to the future parks, schools, employment centers and retail outlets.

III. Recommended Policies

The City of San José has been proactive in developing policies that accommodate bicyclists and pedestrians. The City's General Plan emphasizes that San José is "planning a balanced, multi-modal transportation system with livable streets that accommodate vehicular as well as appropriate pedestrian, bicycle and transit facilities." The policies changes below are recommended to ensure this Bicycle and Pedestrian Plan's projects and programs have adequate and defined support. These policies are recommended for inclusion in Vision North San José.

Summary of Policy Recommendations

This chapter presents the following recommendations for improving policies to promote bicycle and pedestrian mobility in North San José:

1. Adopt a Complete Streets Policy.
2. Strengthen the city's bicycle parking and end of trip facilities policies in North San José.
3. Pursue innovative special event bicycle parking policies.
4. Encourage multi-unit residential complexes and large employers to host carsharing programs.

Complete Streets Policy (New Policy)

"Complete Streets" are streets that address the needs of all modes of transportation, including walking and bicycling. This approach includes providing for transit, ADA compliance, and facilities for people of all ages and abilities.

In California, AB 1358 was signed into law on October 1, 2008. This bill requires the legislative body of a city or county, upon revision of the circulation element of their general plan, to identify how the jurisdiction will provide for the routine accommodation of all users of the roadway including motorists, pedestrians, bicyclists, individuals with disabilities, seniors, and users of public transportation.

In the Bay Area, the Metropolitan Transportation Commission adopted a complete streets policy in 2006. This policy requires that all projects funded by the MTC consider the needs of bicyclists and pedestrians.

Recommendation: San José should adopt a citywide Complete Streets policy. The proposed text of a Complete Streets policy follows.

Proposed Draft

City of San José Complete Streets Policy for North San José

Purpose:

A City of San José "Complete Streets" policy will ensure consistency of planning, design and operational characteristics of bicycle transportation and recreation facilities as an integral element of roadway, bridge, transit and transportation, recreation and public works projects in North San José.

Proposed Policy:

City of San José hereby adopts the policy of "Complete Streets" as a guiding principle for our infrastructure. "Complete Streets" are defined as facilities that *"are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and bus riders of all ages and abilities are able to safely move along and across a complete street."*

The City will support the development of a complete system of bikeways, pedestrian facilities and shared use paths, bicycle parking and safe crossings connecting residences, businesses, transit stops and public places. The City will promote bicycling and walking for health, environmental sustainability, exercise, transportation, and recreation.

Bicycle and pedestrian facilities shall be provided in new construction, reconstruction and maintenance projects in the City, including traffic impact mitigations by private developers, unless one of the following conditions is met:

- Bicyclists and pedestrians are prohibited by law from using the roadway. In this instance, bicyclists and pedestrians will be accommodated elsewhere within the right of way or within the same transportation corridor. The same transportation corridor is defined as a parallel route within 1/8 mile.
- The cost of establishing bikeways or walkways would be excessively disproportionate to the need or probable use. Disproportionate is defined as exceeding twenty percent of the cost of the larger project. In cases where cost or right-of-way constraints will tend to prevent improved bicycle and pedestrian accommodation, other measures such as developing strategic crossings, improving bridges and use of parallel street networks should be considered.
- In cases where the existing right-of-way or other constraints do not allow for sidewalks, bike lanes, paths or other improvements, potential alternatives will include signage, traffic calming and/or enhanced education and enforcement measures.
- Bicycle and pedestrian facilities will be provided and maintained in accordance with guidelines adopted by the USDOT, Caltrans and AASHTO. In cases where established standards cannot be met, professional judgment should be used to determine whether variations from the standard, such as path width, improvements to a parallel facility or other alternatives might be appropriate given adequate safety evaluation.

In addition, private sector development projects will address traffic impacts for all modes of travel, including walking and bicycling. Site plan and subdivision reviews of private sector developments conducted by the City will incorporate facilities for bicyclists and pedestrians. On City maintained

roadways, bicycle and pedestrian facilities will be provided in accordance with this policy. City offices and public buildings will provide bicycle parking, lockers and showers in accordance with local zoning and planning regulations.

Bicycle Parking and End of Trip Facilities Policy (Application of Policy)

The City of San José's General Plan contains many policies that encourage the use of bicycle facilities, including end of trip facilities. The amount of required bicycle parking spaces and shower/changing facilities are defined by land use and required number of automobile parking spaces in the City's municipal code 20.90.310 and 20.90.340. While these policies and codes support bicycle facilities, their application is not apparent in North San José. For instance, Transportation Policy 54 of the General Plan states that bicycle parking should be provided at all light rail stations. Field work conducted in 2008 has confirmed that bicycle parking is not provided at the light rail stations in North San José, except at River Oaks Station.

Recommendation: The City should diligently apply its extensive bicycle facility requirements in North San José.

Event Bicycle Parking (Expanded Policy)

The City of San José currently partners with the Silicon Valley Bicycle Association to provide bicycle valet parking for events. While the City does not have a large event venue in North San José, valet bicycle parking should be provided at street fairs, especially those celebrating bicycling, walking, or the eco-friendly initiatives of San José.

Recommendation: San José should continue to partner with the Silicon Valley Bicycle Association to provide valet bicycle parking at large City-sponsored events, and should require event organizers of non-City-sponsored events in North San José to provide bicycle valet parking.

The City of San Francisco requires valet bicycle parking at large events. (Photo Source: SFBC)

Encouraged Carsharing for Multi-Unit Complexes (New Policy)

To compensate for the reduction of required automobile parking spaces in the proposed maximum parking concept policy above, the City should develop a policy that requires multi-unit residential complexes and large employers to "host" carshare parking spaces or "pods". This requirement could be based on residential unit density and square footage or employee population of employment centers. Because of carsharing's presumed social, environmental and economical benefits, the cost of its parking spaces have been subsidized in other cities. The City of San José could obtain funding/subsidies through federal or regional sources or could require the cost paid for by the property owner.

The purpose of this policy is to reduce the need for North San José residents to own personal automobiles, and therefore reduce the land required to park them. The policy may also result in decreased automobile traffic and increased walking and biking in North San José.

Recommendation: San José should require multi-unit residential complexes and large employers to host carshare "pods".

Example: San Francisco, California

To help mitigate the reduced parking requirements, in its Downtown Commercial districts, the City of San Francisco has encouraged carsharing pods in these areas as well as making them more bicycle and pedestrian-friendly.

Carsharing has gained popularity in the past years, with private companies offering subscribers the ability rent automobiles on an hourly basis. Carsharing companies typically store their vehicles at parking spaces throughout a city. Preferred parking locations are near transit stations, employment and retail centers, and neighborhoods.

IV. Recommended Bicycle Facilities

This section provides recommendations for bicycle facilities, and is based on innovative strategies that have succeeded in cities from around the world. Recommended locations are based on the Vision North San José's recommendations for future land use and streetscapes in the area.

Summary of Bicycle Facility Recommendations

This chapter presents the following recommendations for bicycle facilities in North San José:

1. Construct new bicycle facilities, including bicycle boulevards, bicycle lanes, bicycle paths and cycle tracks in North San José. (Specific locations given below.)

2. Develop or improve bicycle access to the Norman Mineta Airport, Alviso Development, Milpitas/Bay Trail and Downtown San José.

3. Develop a trail loop around North San José by constructing trails that connect the existing Guadalupe and Coyote Trails.

4. Provide the following improvements at signalized intersections in North San José, as appropriate: bicycle actuated signals, bike boxes, colored bicycle lanes across right-slip turns, bicycle traffic lights. Eliminate right-slip turns at intersections with bicycle facilities whenever possible. (Specific locations and recommendations are given below.)

5. Develop a wayfinding system for bicyclists in North San José.

6. Install California MUTCD approved destination signage at every turn in a primary bikeway or every quarter mile, whichever is closer.

7. Install parallel path warning signage at intersections along all proposed cycletracks and side paths in North San José.

8. Enforce San José's existing bicycle parking requirements, particularly at Norman Mineta Airport, public buildings, major transit stops, in pedestrian-oriented commercial areas, schools and parking garages in North San José. Provide electronic bicycle lockers.

9. Enforce San José's existing shower requirements in North San José.

Bicycle Facilities

Bicycle facilities are physical treatments that increase the safety and comfort level of bicyclists. Facilities include bikeways and engineering improvements to intersections. Some improvements, including right-slip turn elimination are not directly considered bicycle facilities but are recommended to reduce automobile and bicyclist conflict.

Bikeways

This plan refers to bikeways using Caltrans standard designations. The three types of bikeways identified by Caltrans in Chapter 1000 of the Highway Design Manual, in addition to cycle tracks, are defined below.

Class I Bikeway: Typically called a "bike path," a Class I Bikeway provides bicycle travel on a paved right-of-way completely separated from any street or highway.

Class II Bikeway: Often referred to as a "bike lane," a Class II Bikeway provides a striped and stenciled lane for one-way travel on a street or highway.

Class III Bikeway: Generally referred to as a "bike route," a Class III Bikeway provides for shared use with pedestrian or motor vehicle traffic and is identified only by signing.

Cycle track designs are not currently recognized by Caltrans. However, they are used throughout the world, including New York City and Cambridge, Massachusetts.

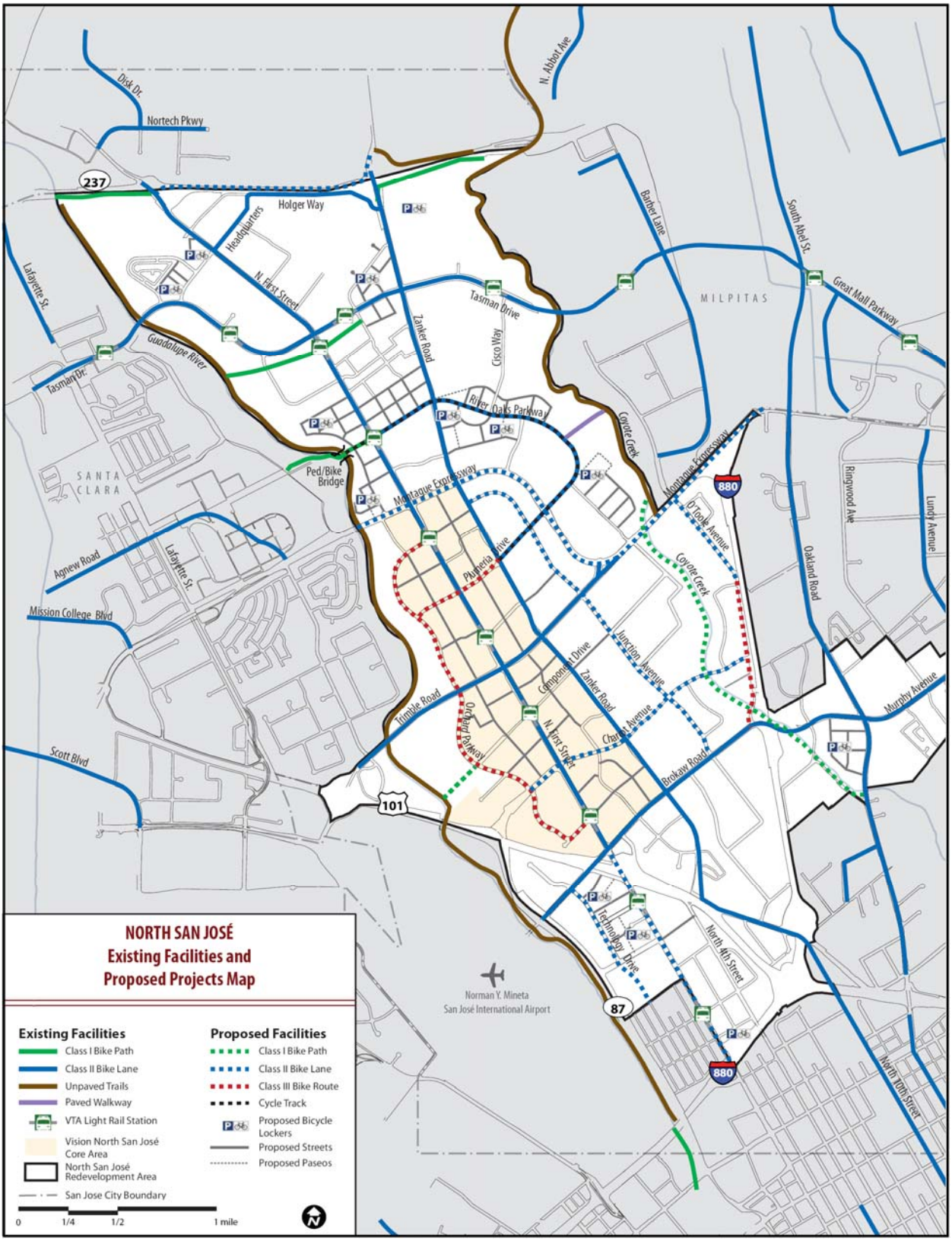
Cycle Tracks are bicycle-only paths that run alongside a roadway and are separated from motor vehicle traffic by a physical barrier (e.g. curb and bollards, planters or parking). Cycle tracks may be at the same level as the roadway or slightly raised. Cycle tracks can run along one or both sides of a roadway and be one-way or two-way. Recommended designs for cycle tracks are provided on page B-22 in Appendix B. Common issues associated with cycle tracks that should be considered include:

- Emergency vehicle access; flexible bollards and/or truck aprons may be used
- Transit stop/station access
- Automobile driveways should be minimized to avoid conflict with bicyclists
- Signalized intersections should use dedicated bicycle lights and phasing
- Vehicles allowed to turn right on red may conflict with bicyclists traveling through the intersection; minimizing driveways is recommended
- Parallel pedestrian walkways should be clearly designated and separated from the cycle track with a buffer if feasible
- Bicyclists may feel constricted if ample room is not provided for parallel bicycle travel (one or two way)
- Bicyclists turning left from cycle tracks should be considered through facilities

Recommended Bicycle Network

Figure 2: Existing and Recommended Bicycle Facilities illustrates the existing and recommended bicycle facilities is North San José. Proposed facilities identified in the draft Citywide Bicycle Master Plan and Vision North San José are included as facilities recommended by this plan.

Figure 2: Existing and Recommended Bicycle Facilities



Access to Adjacent Areas

North San José is adjacent to four areas that demand improved bicycle access. The Norman Mineta Airport is located to the southwest of North San José and does not currently provide an established bicycle connection. The Guadalupe River trail does offer access opportunities however. Alviso is a neighborhood currently being developed adjacent to the northwest boundary of North San José. The major barrier to accessing Alviso by bicycle is Highway 237; however there are crossing opportunities that could be maximized for bicycle access and include:

- To the northeast, the Coyote Creek and Bay Trail connection should be enhanced.

- To the south, bicycle access to downtown is currently provided along North First Street, but is restricted by limited right of way as this roadway crosses under Highway 101.

Recommendation: Bicycle connections to North San José's surrounding areas should be established or improved. Recommended locations include a Class I path connecting the west end of Charcot Avenue and the Norman Mineta Airport, the extension of the Class II bike lanes on North First Street and Zanker Road, and improvements to the First Street undercrossing of Highway 101.

Intersection Improvements

An intersection improvement program can be used to identify and prioritize intersections that warrant improved signage, striping, and signal timing. Of special interest are locations where freeway on and off ramps connect to surface streets. These intersections are generally designed to accommodate high volumes of automobile traffic at high speeds and are generally uncomfortable for even the most skilled bicyclists. A variety of recommended bicycle-related intersection improvements are given below.

Bicycle Actuated Traffic Signals (Loop Detectors)

Traffic signals may use devices that detect the presence of motor vehicles to actuate them. These devices may be calibrated to also detect bicycles. In California, Assembly Bill 1581 was adopted in 2007, requiring the installation of bicycle detectors upon the first placement or the replacement of a traffic actuated signal.

Recommendation: The City should ensure that all signals that require actuation by a motor vehicle can also be actuated by a bicycle—ideally through in-pavement bicycle loop detectors or video recognition. When bicycle-actuated loop detectors are used, a pavement stencil should be installed that shows cyclists where to stop to activate the loop. Bicycle actuation should be located in the outside through lane and in left turn pockets. In cases where this is not possible, bicycle actuation push-buttons may be used, and installed so that bicyclists can reach them from the roadway.

Bike Boxes

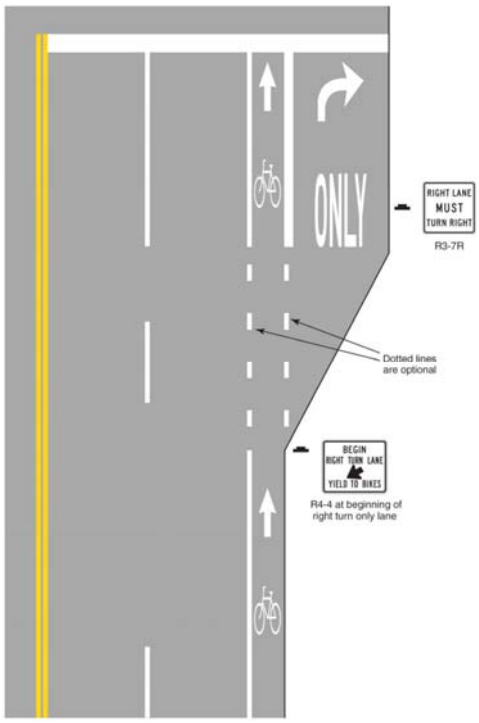
A bike box is a roadway marking that moves the automobile stop line at an intersection 6'-10' back from its standard location, allowing bicyclists to "take the lane" in front of the automobile when the traffic signal is red. Bike boxes allow cyclists to move to the front of a line of cars to more easily make a left turn, and allow cyclists to wait away from car exhaust. Bicycle boxes are used in conjunction with bicycle lanes.

Bicycle boxes increase awareness of bicyclists among motorists at intersections.

Recommendation: Within North San José, bicycle boxes should be installed at appropriate signalized intersections along roadways with bicycle lanes.

Bicycle Lanes across Intersections

In North San José, many arterial intersections are designed with separate (free) right-turn lanes. The bicycle lane is typically dropped approaching the right-turn lane. This and dashing the bicycle lane lines through the right turn lane are CAMUTCD standard designs. Portland, Oregon has filled bicycle lanes in similar situations with a solid color to increase the awareness of bicyclists. Examples of this are provided on page B-17 in **Appendix B.**



This California MUTCD diagram illustrates one scenario of bicycle and right turn lanes at an intersection. Portland, Oregon has colored bicycle lanes blue at some intersections with right turn lanes.

Recommendation: Right turns lanes should be used only when found necessary in North San José. Highway access ramps may be the only suitable location. Intersections that have Class II bicycle lanes and right turn lanes, the City should fill the bicycle lane will a solid color.

Bicycle Traffic Lights

Bicycle traffic lights operate like standard traffic lights, illuminating red, yellow and green lights to control bicycle movement through intersections. They allow a separate phase for bicyclists, or allow bicyclists to start three to five seconds in advance of motor vehicles. Warrants for bicycle traffic lights are given in on page B-21 in **Appendix B.**

Recommendation: North San José should provide bicycle traffic lights at appropriate traffic signal controlled intersections with cycle tracks running through them, at intersections of multi-use paths and roadways, as well as at intersections with high automobile and bicycle volumes and significant bicycle-vehicle conflicts. Bicycle traffic lights should provide a three to five second lead interval for bicyclists to establish their movement before companion motor vehicles.

Supporting Bicycle Amenities

Bicycling is made much more convenient when supporting amenities are provided. These include signage, parking, showers, air stations and bike sharing. Each of these amenities and recommended applications in North San José are described below.

Bicycle Signage

Wayfinding Systems

Wayfinding systems provide bicyclists a way of navigating unfamiliar environments, while staying on bicycle networks. Bicycle wayfinding can include mile-markers and road identification at undercrossings and informational kiosks. Wayfinding can be affected by the design of the environment as well as, for example, the placement of bicycle parking, lighting, or road configurations. Well-designed wayfinding systems can lead bicyclists to safe and efficient bikeways, and may even encourage more people to bicycle.

Destination Signage

Destination signage provides directions to popular destinations. It serves to direct bicyclists along bikeways. This is most important along Class III bicycle routes, which do not have street markings or striping but have been identified as an appropriate route for bicyclists to share the roadway with motorists.

CAMUTCD provides standard signage, that when used in unison, provides bicycle wayfinding.

Recommendation: A wayfinding system for bicyclists should be installed for North San José, directing bicyclists to popular destinations including light rail stations, commercial areas, trailheads and the Norman Mineta Airport. The installation of signage should be at every turn in along a bicycle route or every quarter mile.

Bicycle Parking

Bicycle parking can be defined by the duration a bicycle is parked. Bicycle parking is considered short term when the bicycle is parked for less than two hours. Bicycle racks that provide two points of contact to which a bicycle can be locked are adequate for this duration. Long term bicycle parking refers to bicycles that are parked for more than two hours. Bicycle lockers that provide a fully enclosed area for each bicycle is recommended for this parking duration.

The amount of bicycle parking according to land use, and as a ratio of required automobile parking, is defined in City of San José's Municipal Code 20.90.310 and should be applied as North San José develops. Additionally, as stated in the City's General Plan, bicycle parking should be provided at every transit station.

Recommendation: Bicycle parking requirements as defined in Municipal Code 20.90.310 and the City's General Plan should be applied in North San José. New bicycle lockers should use e-locker technology, where users pay by the minute with a smart card.

Electronic bicycle lockers employ a pay-by-the-minute pricing scheme. (Source: bikelink.org)

Showers, Lockers and Changing Rooms

The City of San José currently has shower requirements based on the type of land use in Municipal Code 20.90.340. The application of this requirement is not only beneficial to bicyclists commuting to work, but also to employees who may exercise during their lunch break.

Recommendation: Showers, lockers and changing room requirements as defined in Municipal Code 20.90.340 should be applied in North San José.

Bicycle Sharing

Bicycle rental systems, often referred to as 'bikesharing' or 'PUB – Public Use Bicycles' provide bicycles at rental locations throughout a city. Users may return the bicycles to any of the rental locations, regardless of the location they rented it at. The operators are usually private companies that pay for the cost and maintenance of the bicycles and rental stations. In return, they receive advertising rights on public transit vehicles and stations.

Recommendation: Bikesharing should be investigated as a means to reduce automobile dependence in North San José.

Installing a bike share system next to transit, as pictured above in Lyon, France, will give VTA light rail passengers easy access to bicycles. (Photo Source: JCDecaux)

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V. Recommended Pedestrian Facilities

In 2008, the City of San José completed its *Pedestrian Master Plan* and *ADA Transition Plan for Sidewalks*, which should be referred to for general recommendations to improve pedestrian mobility in North San José. In addition, Vision North San José provides land use concepts and some design guidelines for accommodating pedestrians. The purpose of this section is to complement those plans by identifying specific improvements that increase the safety, comfort and mobility of pedestrians. Recommendations for the continuation of City policies and programs that implement pedestrian facilities are also included.

Summary of Pedestrian Improvement Recommendations

This chapter presents the following recommendations for pedestrian improvements in North San José:

1. Consider pedestrian recall along North San José's transit core and along all roadways with cycle tracks.

2. Design pedestrian-scale destination signage for North San José and apply so that pedestrians can easily understand where they are and travel to key destination points.

3. Evaluate locations for constructing new bicycle and pedestrian access to LRT stations.

4. Improve bus stops in North San José to provide seating, shelters, lighting, bus maps and other transit information, trash receptacles, bicycle parking.

5. As North San José redevelops, sidewalks should be repaired and sidewalk gaps should be filled, replaced or constructed according to the North San José Urban Design Guidelines.

6. Construct curb ramps at intersections in North San José based on the citywide implementation plan.

Recommended Pedestrian Improvements

The recommended improvements listed below include generic guidelines for implementation. Specific locations where these pedestrian improvements should be incorporated in North San José are provided on page A-9 in **Appendix A.**

Signal Controlled Intersection Improvements

Signage and Striping

An intersection with pedestrian oriented signage and striping provides the greatest level of traffic control for both automobiles and pedestrians. However, even with traffic controls, there may be

conflicts between vehicles and pedestrians due to vehicles stopping partially in the crosswalk, failing to yield to pedestrians when turning, or making a right turn on red movement while pedestrians are crossing. Although these conflicts are primarily due to motorist behavior (generally failing to yield), making signage and striping improvements can help to increase motorist awareness of their vehicle placement at intersections and need to yield.

Recommendation: The recommendations listed below are meant to maximize pedestrian safety and comfort and should be installed at appropriate signalized intersections in North San José.

- **Stripe stop lines five feet in advance of crosswalks**
- **Install "Turning Traffic Must Yield to Pedestrians" (MUTCD R10-15) signage where pedestrian volumes are high or turning conflicts exist**
- **Prohibit right turn on red where pedestrian volumes are high or turning conflicts exist**

Signal Timing Adjustment

The City follows California MUTCD standards that recommend four feet per second as a walking speed to provide sufficient curb to curb crossing time. Adjustments to this timing are made when warranted by data/investigations, and are generally instigated by public request. The City often provides a longer crossing time when a signal is located near senior citizen facilities, schools, parks, libraries and community centers.

Lead Pedestrian Intervals (LPI) are another way to increase the safety of pedestrians. LPIs allow the pedestrian to begin crossing the intersection three to five seconds before companion automobiles. This increases the awareness of a crossing pedestrian.

Recommendation: As North San José changes its development patterns according to the Vision, traffic signal timing should be adjusted to allow a pedestrian walking speed of 2.8 feet per second at appropriate locations listed in Appendix A. LPIs should be considered in conjunction with appropriate signal timing adjustments.

Pedestrian Push Buttons

About 93% of city signals are equipped with pedestrian push buttons that require a pedestrian to actuate the walk signal. The remaining 7% of signals are located in the downtown grid and automatically provide a walk signal with the green phase (pedestrian recall). The City requires pedestrian-actuated push buttons for all crosswalks provided by signal construction projects.

Recommendation: Within North San José's core area and along appropriate roadways with cycle tracks, all signalized intersections should be programmed to automatically provide a walk signal with the green phase (pedestrian recall). The recall period in the transit core can follow that of downtown San José—7:00 am to 7:00 pm. At a minimum, all other signals in North San José should have pedestrian-actuated push buttons.

Uncontrolled Crosswalk Improvements

Infrastructure improvements at uncontrolled crosswalk locations can help increase the visibility of pedestrians to motorists and improve the pedestrians' walking experience. North San José has a prevalence of large block lengths that require pedestrians to walk further out of their way to reach their destination. Mid-block crossing improvements will provide pedestrians more direct access to destinations located in the middle of blocks. These improvements will also provide motorists with a greater awareness of crossing pedestrians.

Pedestrian countdown signals display the time a pedestrian has to cross the intersection.

Mid-Block Crossing Criteria

Mid-Block pedestrian crossings can be enhanced in a variety of ways. Medians provide the pedestrian with a refuge while crossing a roadway. Where block lengths are not long, but the distance between signalized intersections is, mid-block crossings may be appropriate. Signalization may be required at mid-block crossings where motor vehicle speeds are high (over 30 miles per hour) and traffic volumes are high.

The prevalence of pedestrian generators and attractors should also be considered when deciding to install a mid-block crosswalk. This may include transit stops, schools, retail outlets or other land uses frequented by pedestrians.

Recommendations: Appropriate locations in North San José should be analyzed for mid-block crossings, with a consideration of the criteria above. Vision North San José recommends providing mid-block connections through blocks longer than 600 feet. This distance should also be applied to selecting mid-block crossings. The dimensions for pedestrian refuges and medians are provided in Appendix C.

Mid-Block Connectors

The Vision provides design guidelines for mid-block connections. It recommends that any block more than 600 feet in length, in industrial areas, should provide a mid-block connection via a paseo, additional street or path.

Transit Access

Encouraging transit use decreases dependence on the automobile, potentially reducing traffic and enhancing the bicycle and pedestrian environment. Transit stops and stations should be accessible by pedestrians, bicyclists, and—where appropriate—automobiles through park-and-ride lots.

VTA Light Rail

There are 12 Light Rail Stations in the North San José, most of which located along the North First Street corridor. This corridor will be the spine of the future core area of North San José, providing

a mix of uses and an enhanced bicycle and pedestrian atmosphere.

Bus Transit

North San José has 15 bus stops. The existing bus stops in North San José do not provide the necessary amenities that meet rider needs. Most consist of only a sign marking the bus stop, a bench and an extended pad of pavement. Bus riders, as a result, are not protected from the weather or sun. Nor are they provided with adequate lighting, area maps displaying transit routes, bicycle routes or popular destinations, or bicycle racks.

Bus stops should provide shelter, trash cans, pedestrian scale lighting, multi-modal and destination maps and bicycle parking.

Recommendation: Bus stops in North San José should be improved to provide seating, shelters, lighting, bus maps and other transit information, trash receptacles, bicycle parking, and, as available, live information of the next bus arrival.

ADA Improvements

As construction occurs in North San José, existing infrastructure should be retrofitted to meet ADA requirements. The sections below describe four types of ADA-related improvements.

Infill of Sidewalk Gaps

Sidewalk gaps are areas in North San José where there are no sidewalks, or the sidewalk ends abruptly, resulting in a discontinuous network. The City of San José's *ADA Transition Plan for Sidewalks* has prioritized known sidewalk gaps in the City based on citizen request, proximity to state and public facilities, proximity to public accommodations, and other factors. North San José has relatively few known sidewalk gaps, shown in Appendix C. However, known gaps are limited to those identified by the public.

Recommendation: Known sidewalk gaps in North San José should be evaluated and eliminated as soon as feasible. As North San José redevelops, sidewalks should be repaired, replaced or constructed according to the Vision North San José Design Guidelines.

Curb Ramps

Curb ramps allow people who use wheelchairs or other mobility devices to access sidewalks via a ramp cut through a curb. The City's *ADA Transition Plan for Sidewalks* prioritizes intersections that are missing curb ramps based on citizen request, proximity to state and public facilities, proximity to public accommodations, and other factors. Intersections that require curb ramps in North San José are listed in Appendix C.

Recommendation: The City should construct curb ramps at intersections in North San José based on the citywide implementation plan. Where possible, curb ramps should be constructed in conjunction with new construction.

Perpendicular Curb Ramp Retrofit

Perpendicular curb ramps are designed so two ramps are included at intersection corners. Perpendicular ramps allow pedestrians and people in wheelchairs to enter into the crosswalk directly in their line of travel. Perpendicular ramps do require more space to install than a single diagonal ramp, are more costly, and sometimes cannot be accommodated due to utilities or other obstructions at the corner. Further, all corner curb ramps must be reviewed for drainage. Accounting for these special considerations, it is recommended that perpendicular curb ramps be installed where feasible, especially at major intersections in high pedestrian activity zones.

Recommendation: Opportunities in North San José to install perpendicular curb ramps at all arterial/arterial intersections should be identified. A schedule for constructing them where feasible should then be established. Curb ramps at arterial/collector intersections should be evaluated on a case-by-case basis when the City is undertaking construction, maintenance or repair projects that affect the public right of way.

Truncated Dome Retrofit

Truncated domes provide a cue to visually-impaired pedestrians that they are entering a street or intersection. Since 2002, Americans with Disabilities Act (ADA) Guidelines have called for truncated domes on curb ramps. Many of North San José's curb ramps do not have truncated domes. Because most of North San José's curb ramps are in good condition, it is unlikely that they will be replaced soon.

Recommendation: The City should install truncated domes at all curb ramps in North San José in conjunction with other construction projects in order to comply with ADA standards. All future installations or reconstruction of curb ramps should include truncated domes as required by law. For more detailed recommendations refer to the City's *ADA Transition Plan for Sidewalks*.

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VI. Project Sheets

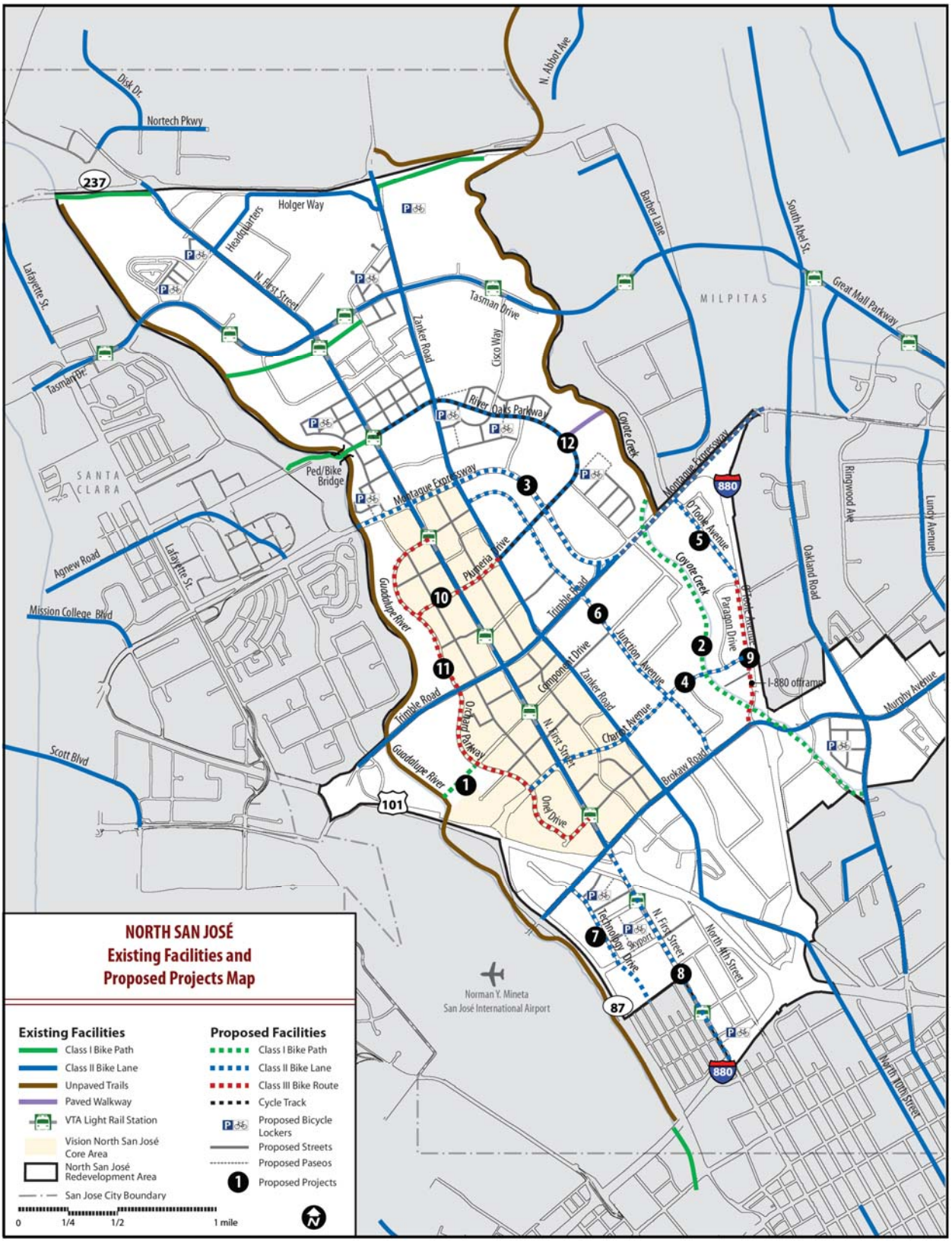
This chapter provides a map (**Figure 3**) illustrating the location of each recommended project and recommended bicycle locker locations. The locations of these lockers were determined through an account of future proposed land uses. A map of these land uses is provided in **Appendix D.** Each sheet includes a project description, map, estimated cost and the issues associated with the construction of the project. Sheets are organized by the type of facility the project offers.

The costs provided in the project sheets are meant to provide a planning level estimate, and may be subject to other cost elements associated with future development. Estimated costs, where appropriate, include the removal of street striping and markings, the installation of street striping, markings and signage. In the case of multi-use path facilities, the cost of brush removal, grading, asphalt, signage and striping is considered. Because cycle tracks are a relatively new facility, and may include a variety of supporting facilities depending on the existing and future roadway and land use, their planning level cost is estimated at $1,000,000 per mile.

Because improvements for pedestrians are generally focused on devices that increase their safety and accessibility at intersections, recommended pedestrian facilities are not project based. Rather, a matrix of the major intersections and their recommended improvements is provided on page A-9 in **Appendix A.**

Recommended paseo locations are indicated by a grey dashed line in the projects map. Project sheets for paseos are not provided because their design and location may be subject to change as future development is planned.

Figure 3: Proposed Projects Map



PROJECT 1

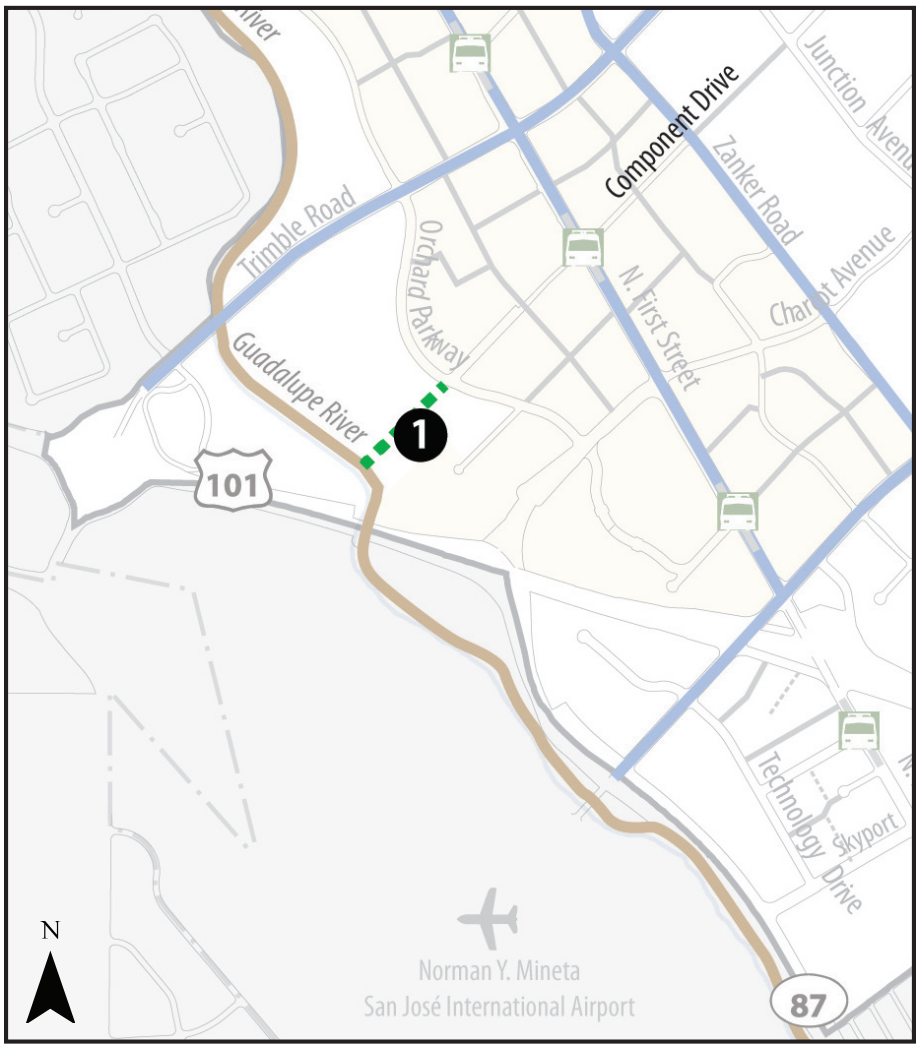
COMPONENT DRIVE

Class I Multi-Use Path

Description

The proposed multi-use path along Component Drive would provide direct access to the Guadalupe River Trail from the west end of Component Drive.

Project Length: 0.2 miles



Issues

- The City would need to acquire the easement.
- The preferred path alignment would follow the utility corridor.
- An alternate alignment for the path could follow the property lines south of the utility corridor.
- A stair and ramp would be required to provide access to the Lower Guadalupe River Trail.

Estimated Cost: $156,000

PROJECT 2

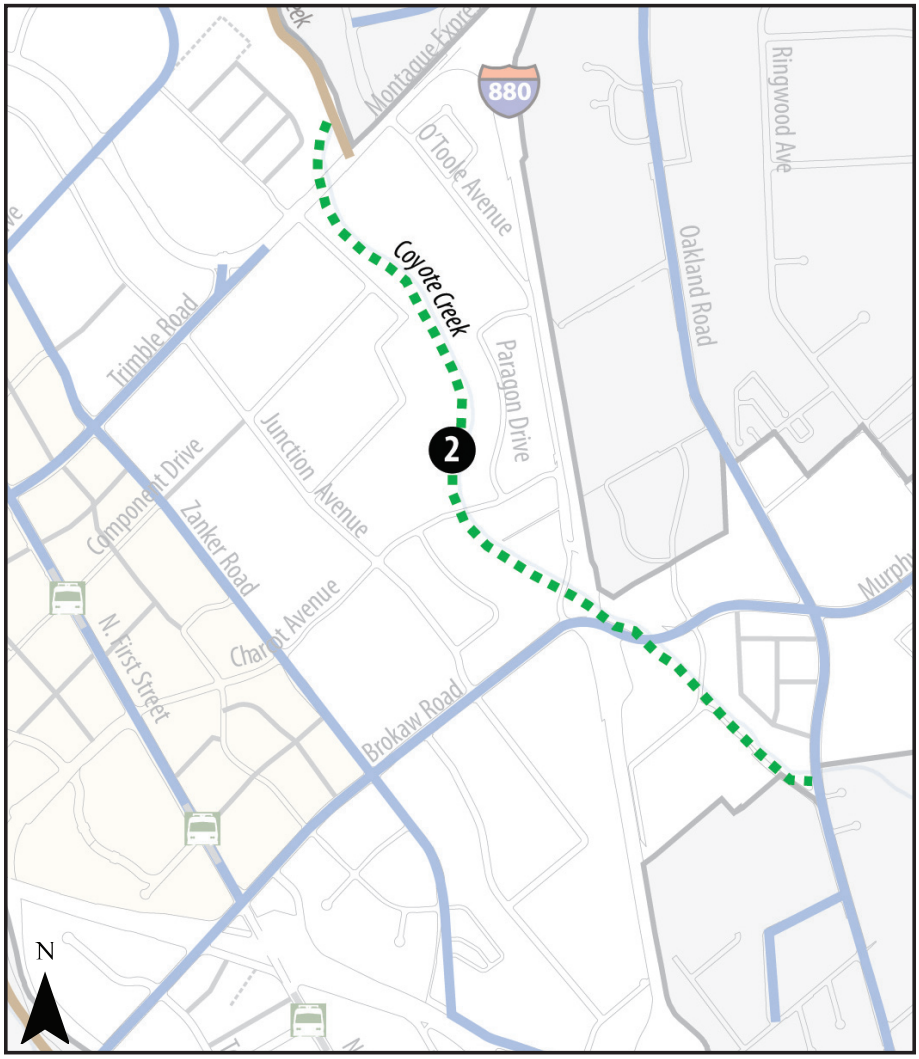
COYOTE CREEK EXTENSION

Class I Multi-Use Path

Description

The proposed Class I path would run along the west side of Coyote Creek from Montague Expressway to O'Toole Avenue. It would connect the Vision-proposed residential developments north of Trimble Road and the proposed regional retail development at Montague Expressway and O'Toole Avenue. It would also provide a scenic recreational path.

Project Length: 1.8 miles



Issues

- The City would need to acquire the easement.
- Path crossings at Charcot and O'Toole Avenues would need enhanced signage and striping.
- This project is identified by the San José Parks and Recreation Department as part of the City's future trail network.

Estimated Cost: $3,600,000

This cost estimate does not include easement acquisition

PROJECT 3

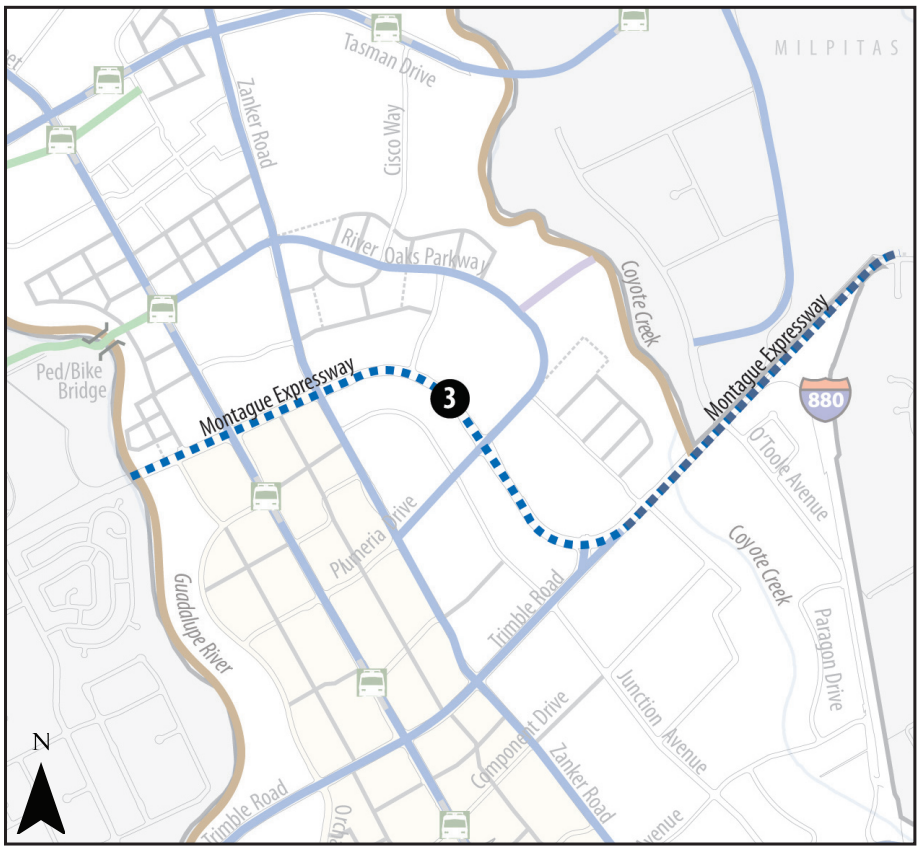
MONTAGUE EXPRESSWAY

Class II Bicycle Lanes

Description

The proposed bicycle lanes on Montague Expressway would extend from the Guadalupe River Trail to I-880. At the west end of the bicycle lanes, a high density residential development is proposed. At the east end, Vision North San José identifies the potential for neighborhood retail use. Between these areas, the bicycle lanes would pass north of the "Core Area" and connect to the existing bicycle lanes on North First Street and Zanker Road.

Project Length: 2.3 miles



Issues

- Striped shoulders exist along most of the project's length creating the potential for bicycle lane installation.
- Construction may be partially funded by a condition of development approval.
- Consider reducing the number of free turn lanes for automobiles at appropriate intersections.
- Montague Expressway is a County facility and project would require coordination.

Estimated Cost: $119,600

PROJECT 4

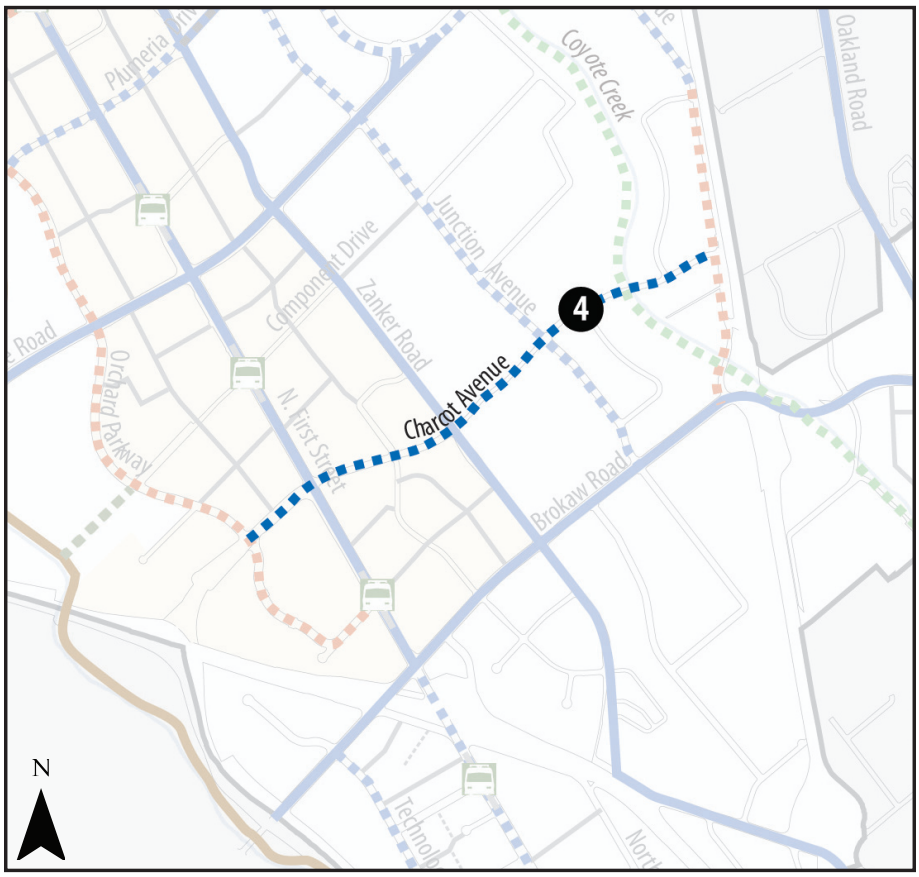
CHARCOT AVENUE

Class II Bicycle Lanes

Description

The proposed bicycle lanes on Charcot Avenue would serve as a primary east/west bicycle connection through North San José and the Core Area. In addition to intersecting existing and proposed north/south bikeways, these bicycle lanes would connect the Orchard Parkway bicycle route and the Coyote Creek trail.

Project Length: 1.0 mile



Issues

- Railroad crossing between Zanker and Junction Roads may need additional bicycle crossing facilities.
- Evaluate the replacement of one automobile left turn lane on Charcot avenue with one bicycle left turn lane to provide access to the existing bicycle lanes on North First Street.
- Travel and turn lane widths will need to be reduced to allow for 5 foot bicycle lanes at appropriate intersections.

Estimated Cost: $52,000

PROJECT 5

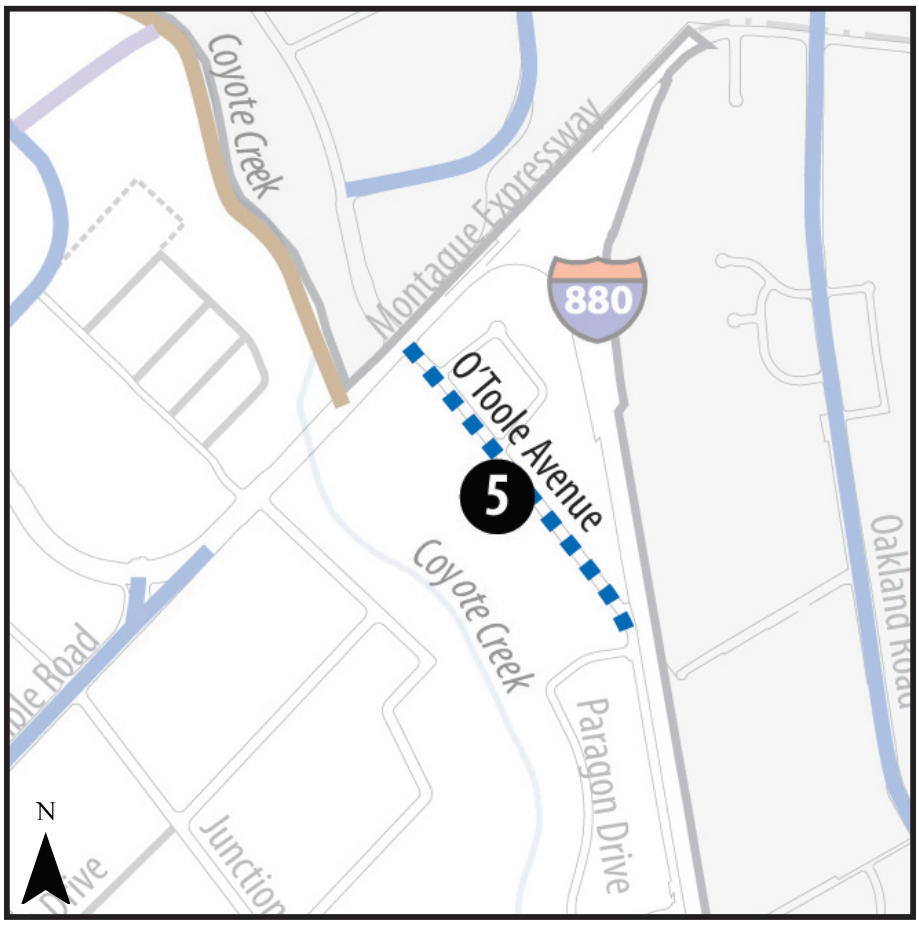
O'TOOLE AVENUE

Class II Bicycle Lanes

Description

The proposed bicycle lanes on O'Toole Avenue would provide direct access to the Vision proposed regional retail development at the intersection of O'Toole Avenue and Montague Expressway. They will also connect proposed bikeways on Montague Expressway and on O'Toole Avenue, south of Paragon Drive.

Project Length: 0.5 miles



Issues

- Construction of these bicycle lanes would need to be incorporated as a condition of developmental approval.

Estimated Cost: $26,000

PROJECT 6

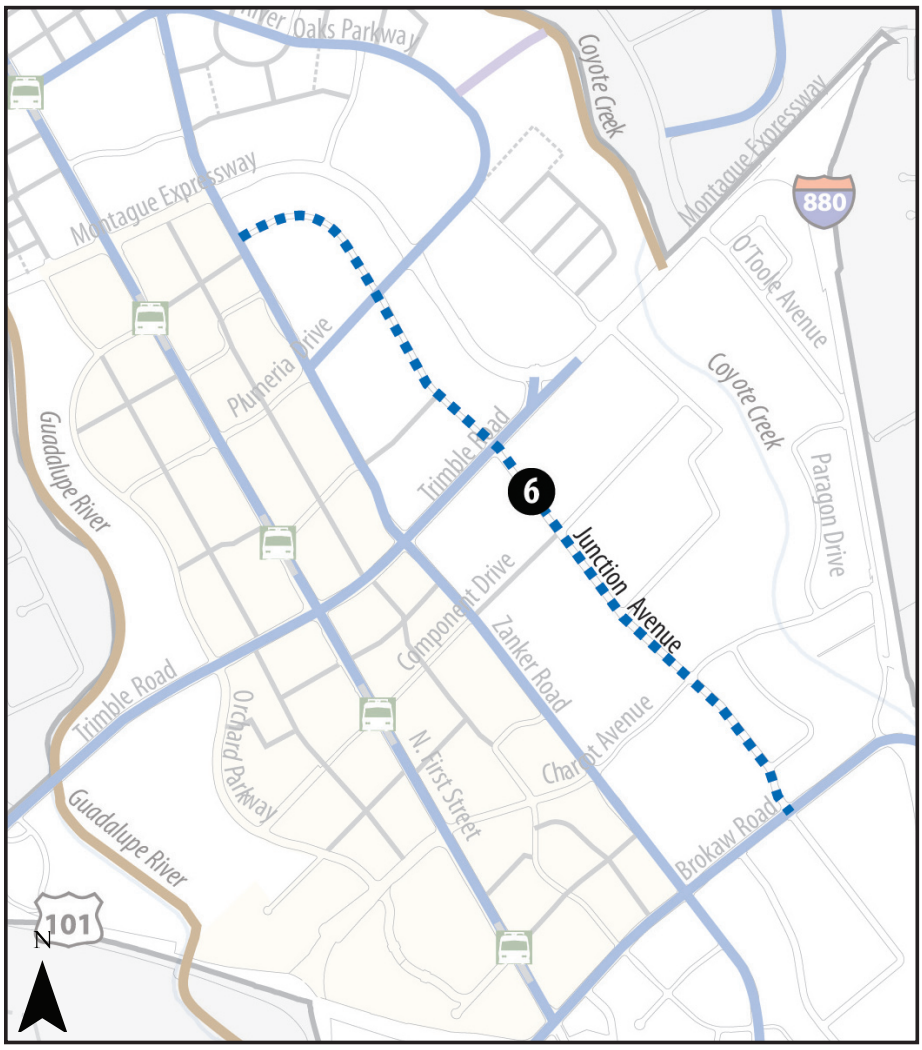
JUNCTION AVENUE

Class II Bicycle Lanes

Description

The proposed bicycle lanes on Junction Avenue would provide bicyclists with access to the existing employers and proposed neighborhood retail located on this stretch of roadway. It would also provide connections to existing bicycle lanes on Zanker, Trimble, and Brokaw Roads, in addition to the proposed River Oaks Parkway cycle track.

Project Length: 1.8 miles



Issues

- Construction of these bicycle lanes may be a condition of development approval.

Estimated Cost: $93,600

PROJECT 7

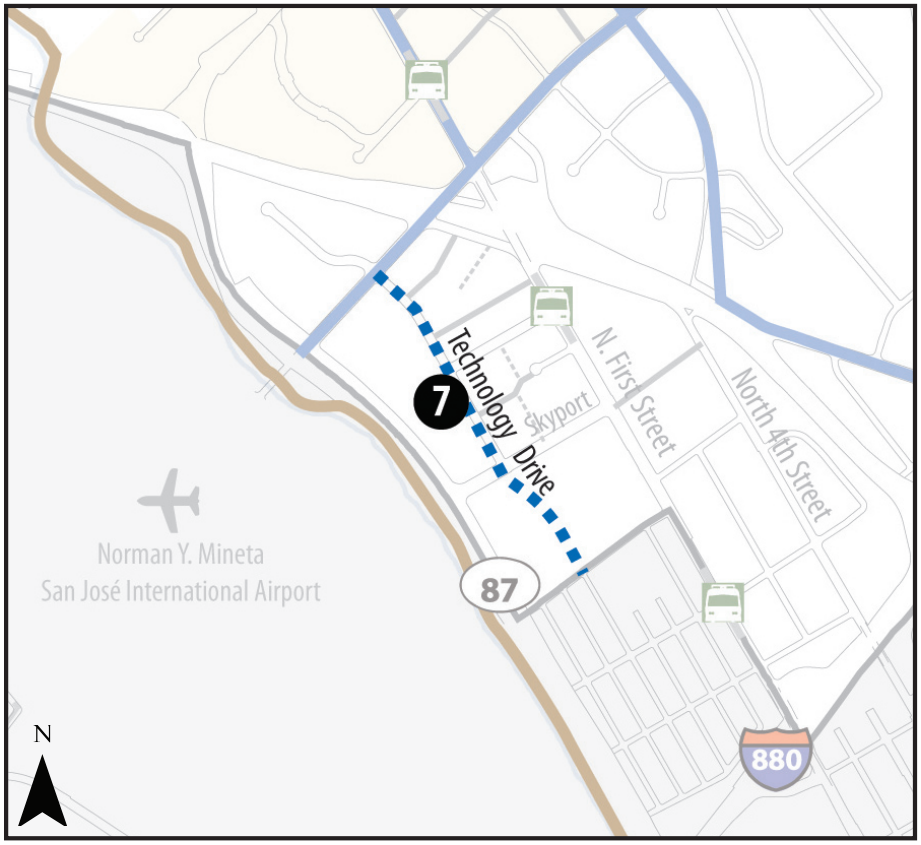
TECHNOLOGY DRIVE

Class II Bicycle Lanes

Description

The proposed bicycle lanes on Technology Drive would provide an alternate bicycle route to North First Street for accessing the airport via Skyport Drive. It also provides access to the west side of the Vision proposed residential development and parks.

Project Length: 0.7 miles



Issues

- Enhanced signalization and striping at the Skyport Parkway intersection should be considered.

Estimated Cost: $36,000

PROJECT 8

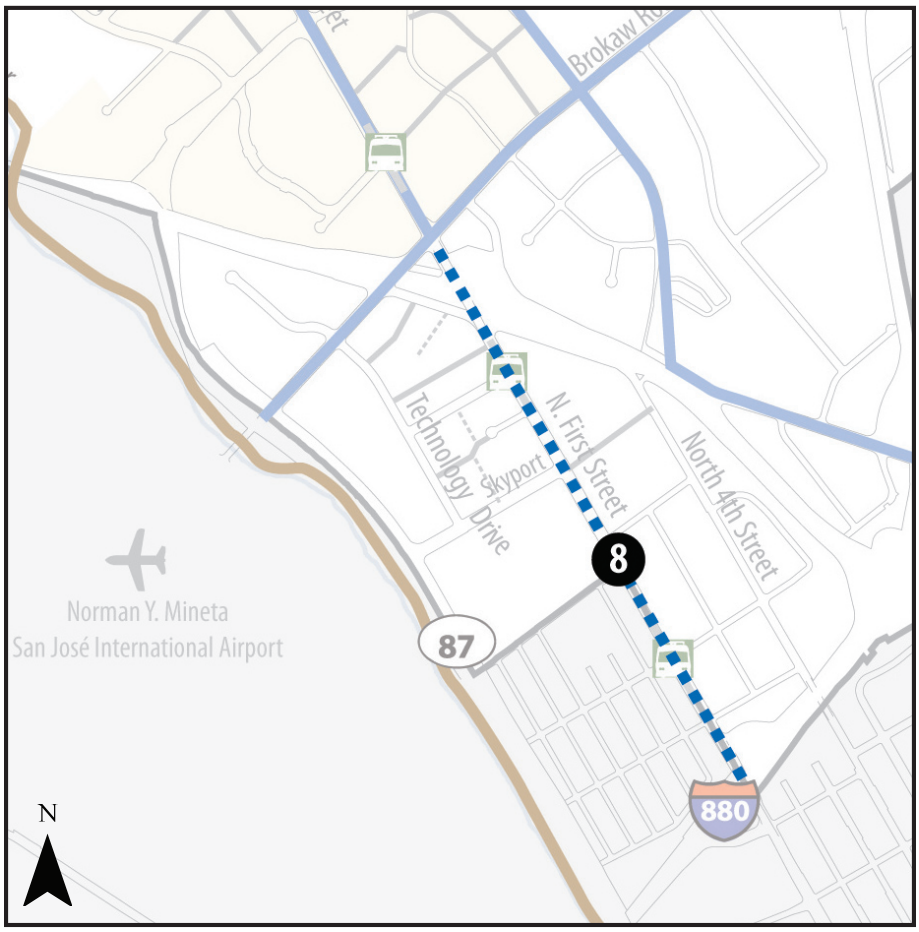
NORTH FIRST STREET

Class II Bicycle Lanes

Description

The proposed bicycle lanes on North First Street south of Brokaw Road will act as the main north/south connection between North San José and downtown San José. The bicycle lanes will runs adjacent to the proposed residential development between Brokaw Road and Skyport Drive.

Project Length: 1.2 miles



Issues

- Right of way at the Highway 101 undercrossing is too narrow to accommodate bicycle lanes; investigate alternatives.
- Construction of these bicycle lanes may be included as a condition of development approval.

Estimated Cost: $62,400

The estimated cost for this project does not include Highway 101 undercrossing improvements. Additonal right of way would be required. Cost is for construction only.

PROJECT 9

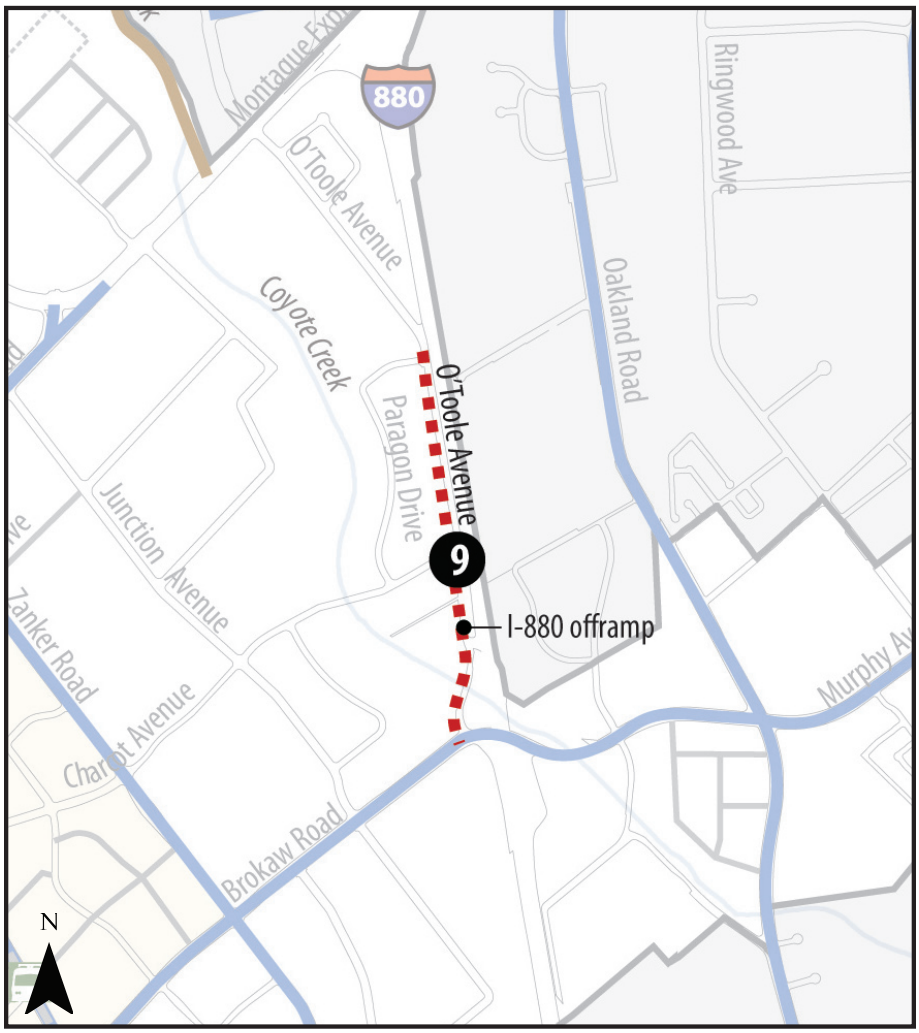
O'TOOLE AVENUE

Class III Bicycle Route

Description

The proposed bicycle route on O'Toole Avenue would run from Paragon Avenue to Brokaw Road. The southern end of the route will directly connect to the proposed Class I path along Coyote Creek and the existing bicycle lanes on Brokaw Road.

Project Length: 0.7 miles



Issues

- The existing roadway width between Paragon Drive and Coyote Creek is too narrow to accommodate Class II bicycle lanes
- O'Toole Avenue is one-way at its merge with the I-880 off-ramp; consider alternate routes for bicyclists wishing to access O'Toole Avenue at its southern end, e.g. destination signage along Brokaw Road, Junction Avenue and Charcot Avenue
- The O'Toole Avenue bridge crossing over Coyote Creek is narrow. Additional bicycle warning signage and markings such as sharrows may be appropriate.

Estimated Cost: $4,550

The estimated cost does not include additional signage and markings as described above.

PROJECT 10

PLUMERIA DRIVE

Class III Bicycle Route

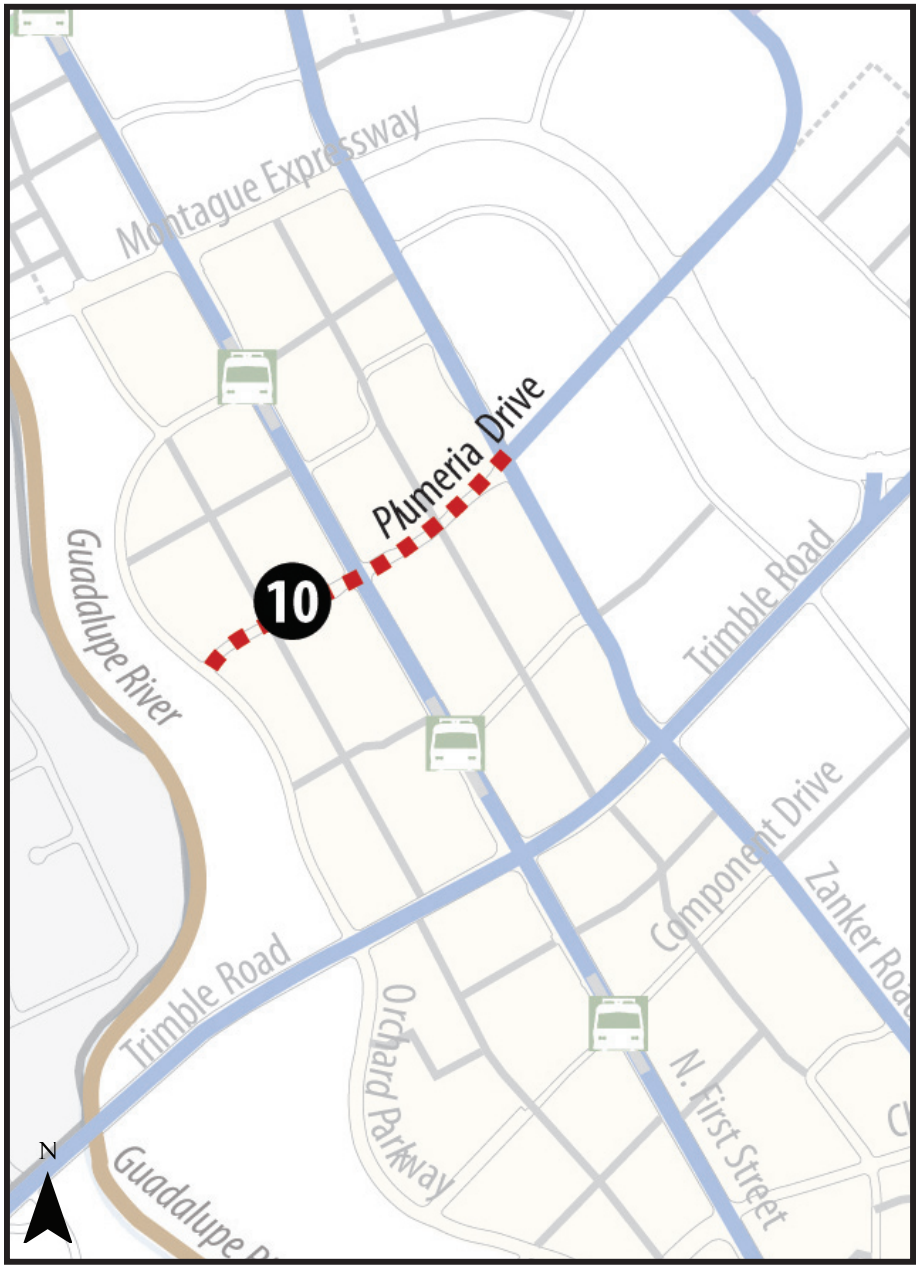
Description

The proposed bicycle route on Plumeria Drive would connect to River Oaks Parkway and North First Street, giving bicyclists access to the Core Area and light rail service.

Project Length: 0.8 miles

Issues

- Construction of this bicycle route may be included as a condition of the development approval.
- Use of sharrows to mark the route may be appropriate in some locations.



Estimated Cost: $5,200

ONEL DRIVE/ORCHARD PARKWAY

Class III Bicycle Route

PROJECT 11

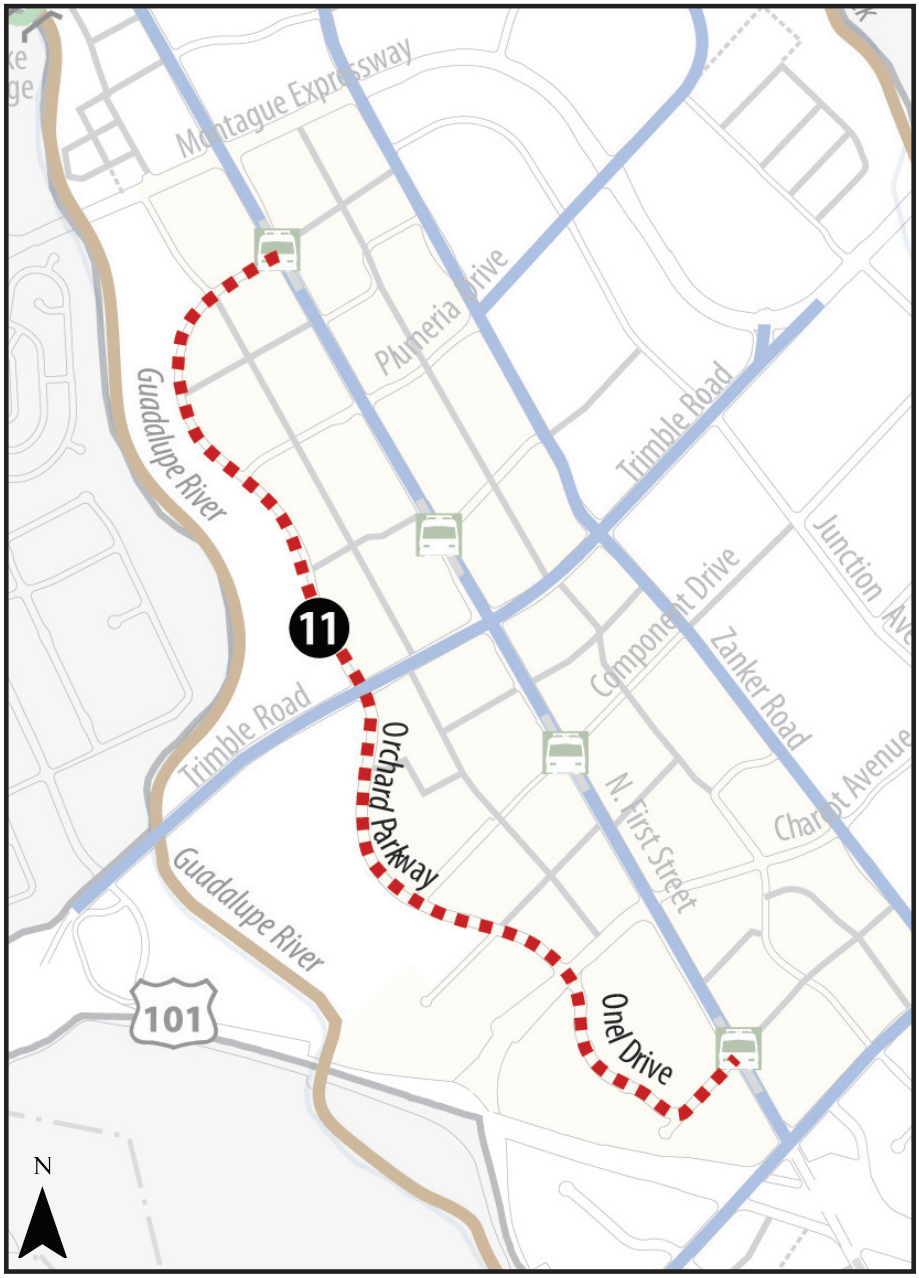
Description

The proposed bicycle route would provide alternate access to the Core Area office and proposed commercial development. This route would also connect with the proposed Component Drive Class I path extension.

Project Length: 1.9 miles

Issues

- Construction of this bicycle route could be included as a condition of development approval.
- Use of sharrows to mark route may be appropriate.



Estimated Cost: $12,350

RIVER OAKS PARKWAY

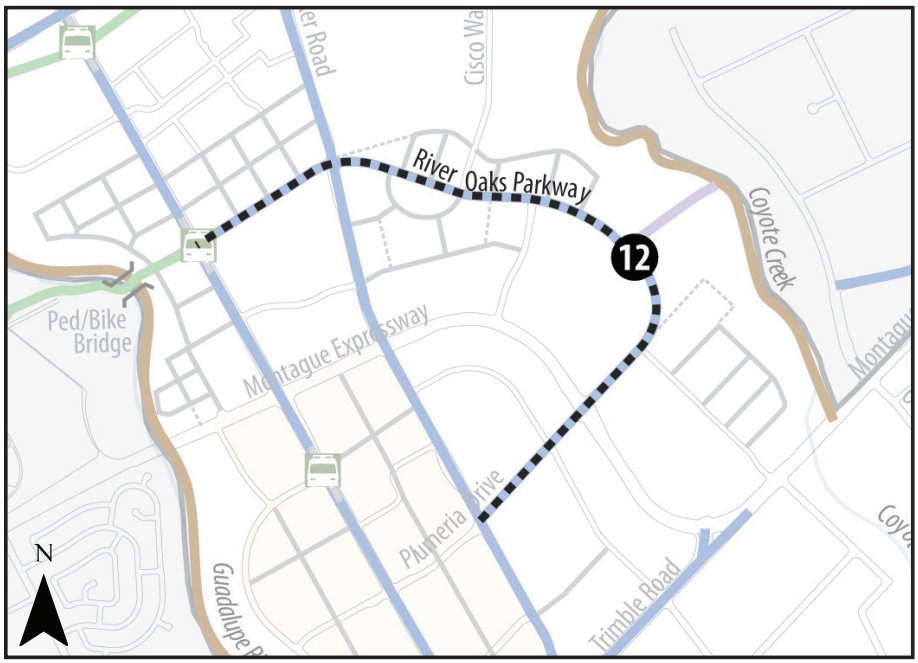
Cycle Track

PROJECT 12

Description

The proposed cycle track on River Oaks Parkway would serve as the main thoroughfare for the residents north of River Oaks Parkway. It would provide access to the area's major employment centers, the Core Area, and light rail transit, and would serve the six proposed high density residential developments and two parks that will be located along this corridor.

Project Length: 1.0 mile



Issues

- Construction of this bicycle route could be included as a condition of the development approval.
- Indicate appropriate access to the River Oaks Parkway light rail station.
- Existing travel and bicycle lane widths allow adequate width for proposed cycle track and buffer.
- Existing roadway segments with left turn lanes will not accomodate a cycle track without widening.

Estimated Cost: $1,300,000

VII. Encouragement Programs

For the purpose of this plan, only programs that specifically encourage bicycling and walking in North San José are recommended. The City of San José is developing a citywide bicycle plan, which includes a greater range of programs that will work to increase the frequency of bicycling and walking in the city as a whole, including North San José.

Summary of Encouragement Program Recommendations

This chapter recommends the following education, encouragement and enforcement programs to enhance bicycling and walking in North San José:

Encouragement Recommendations

1. Brand North San José as a model bicycling and walking community.

2. Develop a bicycle and walking map for North San José, based on the Downtown Walk Map for downtown San José.

3. Encourage employers in North San José to sponsor bicycling and walking challenges.

4. Develop a component of the City's Street Smarts program that focuses on North San José, and add traffic checkpoints so that Share the Road flyers and other materials can be given to bicyclists, pedestrians and drivers in the area.

Encouragement

Strategies for community involvement in bicycle and pedestrian improvements will be important to ensure broad-based support – which translates into political support – to help secure financial resources. Involvement by the private sector in raising awareness of the benefits of bicycling and walking can range from small incremental activities by non-profit groups, to efforts by the largest employers in the City. Targeting these encouragement programs to specific user groups improves their effectiveness. Specific programs are described below.

Branding of North San José as a Model Bicycling and Walking Community

Branding North San José as a model bicycle and pedestrian community will encourage more residents to walk and bike, will attract residents who want to walk and bike, and will attract visitors who want to walk and bike. Branding efforts have been used successfully by the City of Davis, California. Davis incorporated a bicycle into its official city crest, and uses the logo for bicycle loop detection stencils, as pictured to the right.

Walking and Biking Maps (for shopping, recreation and travel)

The City of Davis has successfully branded itself as a bicycling community.

One way to encourage people to bicycle and walk is through the use of maps and guides showing that the infrastructure exists, to demonstrate how easy it is to access different parts of the city by bike or on foot, and to highlight unique areas, shopping districts or recreational areas. Bicycling and walking maps can be used to promote tourism, encourage residents to walk, or promote local business districts. Maps can be citywide, district-specific, or neighborhood/family-friendly maps. They should have clear symbology, destinations and services attractive for cyclists, as well as a good selection of routes.

The City of San José currently produces the "Bikeways Map," plotting the bikeways in the city, and a "Downtown Walk Map." As the bikeway and walkway systems are further developed, the City should consider producing a bicycle and walking map specifically for North San José. Like the City's current maps, this map will show the bicycling and walking routes to transit, retail, schools, and other destinations. While automobile parking may be necessary for some visitors to North San José, it should not be highlighted on the map as it is on the Downtown Walking Map.

Sponsored Bicycling and Walking Challenges

North San José can take advantage of being home to some of the most innovative corporations in the world by asking them to sponsor a bicycling and walking challenge. For example, Clif Bar's "2-Mile Challenge" asks people to walk or bicycle to work or school once a week. The participants sign-up online an log the miles they walked or bicycled. The website provides a calculation of the amount of harmful air pollution avoided by not driving. The website also gives suggested bicycle and walking routes, as well as suggested bicycling gear that is specific to the rider.

For an example, see the Clif Bar Corporation's "2-Mile Challenge."
http://www.2milechallenge.com/#/home

Share the Road Education Campaign

Like the City of San José's "Street Smarts" campaign, the Share the Road campaign is intended to educate motorists, bicyclists and pedestrians about their legal rights and responsibilities on the road. Unlike the Street Smarts campaign, the Share the Road campaign take is proactive in delivering its message with checkpoints, as pictured to the right. The campaign is in meant to increase courtesy and cooperation to improve safety. The campaign targets not just youth, but all residents and visitors to a community.

The campaign can include Share the Road flyers, one targeting bicyclists and one targeting motorists. Each flyer outlines safe and courteous behavior, collision reporting procedures and local bicycling resources and hotlines. These flyers can be handed out at police administered check points though out North San José where bicycle traffic is high. This might be along the proposed parkways or where the Guadalupe and Coyote Creek trails cross major roadways. At the checkpoints, motorists, bicyclists and pedestrians are stopped, given a Share the Road flyer and have the opportunity to provide feedback to officers regarding the campaign ideas. Public service announcements on radio and TV can promote the Share the Road campaign, including publicity about the Share the Road checkpoints.

An officer hands out Share the Road flyers at a Marin checkpoint. (Source: Marin County Bicycle Coalition)

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Appendix A: Recommended Improvements

This appendix provides bicycle and pedestrian improvements for North San José. The appendix is organized as follows:

Bicycle Corridor Improvements

Table A-1 lists the bicycle corridor improvement projects recommended in this plan. There are 1.9 miles of Class I Multi-Use Paths, 7.5 miles of Class II Bicycle Lanes, 3.4 miles of Class III Bicycle Routes and 3.0 miles of Cycle Track recommended. The total length of the improvements is 15.8 miles.

Table A-1: Corridor Bicycle Improvements

Project #	Corridor	Start	End	Type of Facility	Mileage
1	Component Drive	Orchard Parkway	Guadalupe River	Class I	0.2
2	Cisco	River Oaks/Zanker	Coyote Creek	Class I	0.6
3	Coyote Creek Extension	Montague Expressway	Oakland Road	Class I	1.8
				Class I Total	**2.6**
4	Montague Expressway	Guadalupe River	I-880	Class II	2.3
5	Charcot Avenue	Onel Drive	O'Toole Avenue	Class II	1.0
6	O'Toole Avenue	Trimble Road	Paragon Drive	Class II	0.5
7	Junction Avenue	Zanker Road	Brokaw Road	Class II	1.8
8	Technology Drive	Airport Parkway	Sonora Avenue	Class II	0.7
9	North First Street	Brokaw Road	I-880	Class II	1.2
				Class II Total	**7.5**
10	O'Toole Avenue	Paragon Drive	Brokaw Road	Class III	0.7
11	Plumeria Drive	Orchard Parkway	Zanker Road	Class III	0.8
12	Onel Drive/Orchard Prkwy	Katrina Court	North First Street	Class III	1.9
				Class III Total	**3.4**
13	River Oaks Parkway	Guadalupe River	Zanker Road	Cycle Track	1.0
14	North First Street	Montague Expressway	Brokaw Road	Cycle Track	2.0
				Cycle Track Total	**3.0**
				Project Total	**16.5**

Intersection Improvements for Bicyclists

Table A-2 lists facilities that may increase bicyclist safety at intersections. General and specific locations for the installation of these facilities are also given.

Table A-2: Bicycle Facility Improvements for Intersections

Intersection Treatment	Locations
Bike Boxes	• At appropriate signalized intersection along a bikeway
Solid Bicycle Lanes	• Continue Class II bicycle lanes as solid bicycle lanes to the left of right-slip-turns, right turn lanes and bus stop lanes
Right Slip Turn Removal	• Montague Expressway at Zanker Road and North First Street • Zanker Road and Charcot Avenue • Trimble Avenue and Zanker Road
Loop/Video Detectors	• At every signalized intersection along a bikeway that requires actuation
Bicycle traffic lights	• At appropriate signalized intersection along a roadway with a cycle track. • Locations where significant numbers of bicyclists will be making left turns. • At appropriate intersections of a multi-use path and major roadway. • North First Street & Brokaw Road – to allow southbound bicyclists to start in advance of motor vehicles and more easily take the lane under the 101 bridge.

Recommend Intersection Bicycle Improvements

Table A-3 lists each major intersection in North San José, the type of traffic control at the intersection, and the possible facilities that may improve the safety of bicyclists. An intersection received an "X" for each appropriate facility. Descriptions of each facility are given in Chapter IV: Recommended Bicycle Facilities.

Table A-3: Recommended Intersection Bicycle Improvements

Arterial/Major Roadway	Collector/Cross Street	Type of Control	Bike Box	Bicycle Signal	Loop/Video Detector	Left Turn Bike Lane	Solid Bicycle Lanes	Right Slip Turn Removal
North First Street	Vista Montana	Traffic Signal	x					
North First Street	Rose Orchard Parkway	Traffic Signal	x					
North First Street	Tasman Drive	Traffic Signal	x		x			
North First Street	River Oaks Parkway	Traffic Signal	x	x			x	
North First Street	Innovation Drive	None						
North First Street	Montague Expressway	Traffic Signal	x	x			x	x
North First Street	Orchard Way	None	x	x				
North First Street	Daggett Drive	None		x			x	x
North First Street	Plumeria Drive	Traffic Signal	x	x	x	x		
North First Street	Bonaventura Drive	Traffic Signal		x				
North First Street	Trimble Road	Traffic Signal	x	x	x			
North First Street	New Road South of Trimble	N/A		x				
North First Street	Component Road	Traffic Signal	x	x	x		x	x
North First Street	New Road South of Component Road	N/A		x				
North First Street	Charcot Avenue	Traffic Signal	x	x				
North First Street	New Karina Court Extension	Traffic Signal	x	x	x			

Arterial/Major Roadway	Collector/Cross Street	Type of Control	Bike Box	Bicycle Signal	Loop/Video Detector	Left Turn Bike Lane	Solid Bicycle Lanes	Right Slip Turn Removal
North First Street	Browkaw Road	Traffic Signal	x				x	x
North First Street	Skyport Drive	Traffic Signal	x				x	x
North First Street	Highway 101	None	x				x	x
Zanker Road	Highway 237	Traffic Signal	x				x	
Zanker Road	East Tasman Drive	Traffic Signal	x				x	x
Zanker Road	River Oaks Parkway	Traffic Signal	x	x			x	x
Zanker Road	Montague Expressway	Traffic Signal	x				x	x
Zanker Road	Plumeria Drive	Traffic Signal	x				x	x
Zanker Road	Trimble Road	Traffic Signal	x				x	x
Zanker Road	Charcot Avenue	Traffic Signal	x	x			x	x
Zanker Road	Brokaw Road	Traffic Signal	x				x	x
Brokaw Road	I-880	None		x				
Charcot Avenue	Junction Avenue	Traffic Signal			x			
Charcot Avenue	Orchard Way	Traffic Signal						
Trimble Road	Montague Expressway	Traffic Signal	x				x	
Montague Expressway	Plumeria Drive	Traffic Signal	x				x	

Bicycle Access to Adjacent Locations

North San José is located next to areas that generate and attract bicyclists. These areas may currently exist, or there may be developments proposed for them. It is important to consider these areas to maintain continuity within the recommended bicycle network as it is implemented.

Table A-4: Bicycle Access to Adjacent Locations

Location	Recommended Improvement
Norman Mineta Airport	• Extend a Class I path from Component Drive to Guadalupe River Trail*
Alviso Development	• Extend Class II Bicycle Lane northward on North First Street • Extend Class II Bicycle Lane northward on Zanker Road
Downtown San José	• *Short term*: Construct ramps up to sidewalk to allow northbound cyclists to use sidewalk to travel under 101. Consider advance bicycle traffic signal at Brokaw and North First Street and traffic calming devices to reduce vehicle speeds to 20-25 mph in this lane. • *Long-term*: Widen undercrossing of 101 or construct bicycle and pedestrian bridge over 101. Improve north-south bicycle and pedestrian connections as part of Fourth Street and Zanker Road projects.

** Also recommended as part of Vision NSJ and by the City's Parks, Recreation, and Neighborhood Department*

Bicycle Parking Locations

The City of San José requires employers to provide bicycle parking as a ratio of the required number of automobile parking spaces. The recommended bicycle parking locations listed in Table A-5 are meant to supplement and support the City's requirements.

Table A-5: Recommended Bicycle Parking Locations

Location	Notes
Norman Mineta Airport	Bicycle racks are already provided at the Norman Mineta Airport. Because of security reasons, bicycle lockers are not provided. With this consideration, bicycle racks at the airport should be well lit, in a visible location, monitored by security staff regularly and installed at the closest feasible location to the airport entrance. The City should also work with the Airport to provide long-term secure bicycle storage, such as lockers or bicycle cages that meet security requirements.
Public Buildings	Short-term parking at the entrances of libraries, schools, and community centers; Bicycle cages or lockers installed in the rear for employees.
Major Transit Stops	Short-term parking should be provided at every transit stop, including light rail and bus stops. Bicycle lockers should be provided at the North San José light rail station with the highest bicycle mode share. Bicycle lockers are currently available at the River Oaks Light Rail Station. Attended bicycle parking may be necessary if light rail experiences very high bicycle mode share.
Pedestrian Oriented Commercial Districts	Bicycle racks installed on the sidewalks, out of the way of pedestrian travel
Auto-Oriented Shopping Plazas	Short term bicycle racks installed near the entrance of the plaza, long term parking installed in rear of the plaza for employees.
Schools	Bicycle racks for all levels of schools, located near school entrances. Bicycle cages installed on campuses of middle schools and higher education level campuses.
Parking Garages	Bicycle racks should be installed within clear sight of the parking attendant.

Note: The City of San José has defined bicycle parking requirements in Municipal Code 20.90.310.

Bicycle Locker Locations

Table A-6 lists the locations where bicycle lockers should be installed in coordination with proposed developments. At proposed residential developments, bicycle lockers provide safe and secure parking for residents who may not have room in their dwelling to house a bicycle. At proposed regional retail developments, bicycle lockers, which are commonly installed in the rear of the developments, provide a safe and secure parking option for employees of the regional retail outlets.

Table A-6: Bicycle Locker Locations

Bicycle Lockers (Approximate Location)
Proposed Residential @ Vista Montana
Proposed Regional Retail @ Zanker Road and Hwy 237
Proposed Regional Retail @ Trimble Road and I-880
Proposed Residential @ River Oaks and North First Street
Proposed Residential @ River Oaks between North First Street and Zanker Road
Proposed Residential @ River Oaks between North First Street and Zanker Road
Proposed Residential @ Crescent Park
Proposed Residential @ Cadence Campus (North and South Ends)
Proposed Residential @ Bayshore/Foster
Proposed Residential @ Schmidt/Seufferlein
Proposed Residential @North First Street and East Rosemary Street

Intersection Pedestrian Improvements

Table A-7 lists the major intersections in North San José, their cross street and the recommended pedestrian facility improvement. The improvements are described in Chapter V.

Table A-7: Recommended Intersection Pedestrian Improvements

Arterial/Major Roadway	Collector/Cross Street	Extended Crossing Time	Truncated Domes	Pedestrian Countdown	LRT Xing Ped Warning Signage	Fill Sidewalk Gap
North First Street	Vista Montana	x	x	x		
North First Street	Rose Orchard Parkway		x			
North First Street	Tasman Drive		x	x		
North First Street	River Oaks Parkway	x	x	x		
North First Street	Innovation Drive	x	x		x	
North First Street	Montague Expressway		x	x	x	x
North First Street	Orchard Way		x	x	x	
North First Street	Draggett Drive		x	x	x	
North First Street	Plumeria Drive	x	x			
North First Street	Bonaventura Drive	x	x	x		
North First Street	Trimble Road	x	x	x		
North First Street	New Road South of Trimble	x	x	x	x	
North First Street	Component Road		x	x		
North First Street	New Road South of Component Road		x			
North First Street	Charcot Avenue		x	x		
North First Street	New Karina Court Extension	x	x	x		
North First Street	Brokaw Road	x	x	x		

Arterial/Major Roadway	Collector/Cross Street	Extended Crossing Time	Truncated Domes	Pedestrian Countdown	LRT Xing Ped Warning Signage	Fill Sidewalk Gap
North First Street	Skyport Drive		x	x		
North First Street	Highway 101					
Zanker Road	Highway 237					
Zanker Road	East Tasman Drive	x	x	x	x	
Zanker Road	River Oaks Parkway	x	x	x	x	
Zanker Road	Montague Expressway	x	x	x		
Zanker Road	Plumeria Drive	x	x	x		
Zanker Road	Trimble Road	x	x	x		
Zanker Road	Charcot Avenue	x	x	x		
Zanker Road	Brokaw Road	x	x	x		
Brokaw Road	I-880		x	x		
Charcot Avenue	Junction Avenue		x			
Charcot Avenue	Orchard Way		x	x		
Trimble Road	Montague Expressway		x	x		
Montague Expressway	Plumeria Drive	x	x	x		
Montague Expressway	Between North First Street and Zanker Road					x

Signal Timing Adjustment

A walking speed of 2.8 feet per second is recommended for crosswalks that may be used by elderly persons, impaired persons or children. Table A-8 lists the locations where this signal timing should be applied.

Table A-8: Signal Timing Adjustment Locations

Location	Notes
Hospitals/Personal Care Facilities	At intersections within 500 feet and at intersections leading to transit stops and shopping districts within 1000 feet
Schools	At intersections within 1000 feet of a school
Senior centers	At intersections within 1000 feet of a school
Parks, libraries, community centers	Intersections immediately adjacent
Transit Stops	Intersections immediately adjacent
Retail/Shopping Districts	Intersections immediately adjacent
Side Path/Roadway Crossings	Intersections along the paths
Major Employers	Intersections immediately adjacent

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Appendix B: Bicycle Design Guidelines

Appendix B provides bikeway planning and design guidelines for use in developing the North San José bikeway system and support facilities. Where noted, designs are based on guidelines provided by California Manual of Uniform Traffic Control Devices Chapter 1000 "Bikeway Planning and Design." Also included in this appendix are experimental or nonstandard best practices with information about optional innovative bikeways and support facilities that have not been adopted by the federal or California MUTCD.

Bikeway Facility Classifications

Caltrans defines the term "bikeway" as a facility that provides for bicycle travel. Caltrans has defined three types of bikeways: Class I, Class II, and Class III. "Additional Design Recommendations" are provided as guidelines to assist with design and implementation of facilities and include alternate treatments approved or recommended but not required by Caltrans. **Figure B-1** illustrates these three types of bicycle facilities.

Class I Bikeway Design

Typically called a "bike path" or "shared use path," a Class I bikeway provides bicycle travel on a paved right-of-way completely separated from any street or highway. The recommended width of a shared use path is dependent upon anticipated usage:

- 8' is the minimum width for Class I facilities
- 8' may be used for short neighborhood connector paths (generally less than one mile in length) due to low anticipated volumes of use
- 10' is the recommended minimum width for a typical two-way bicycle path
- 12' is the preferred minimum width if more than 300 users per peak hour are anticipated, and/or if there is heavy mixed bicycle and pedestrian use

A minimum 2' (0.6 m) wide graded area must be provided adjacent to the path to provide clearance from trees, poles, walls, guardrails, etc… On facilities with expected heavy use, a yellow centerline stripe is recommended to separate travel in opposite directions. **Figure B-1** illustrates the Caltrans Bicycle Facility Types and **Figure B-2** illustrates a typical cross-section of a Class I multi-use path.

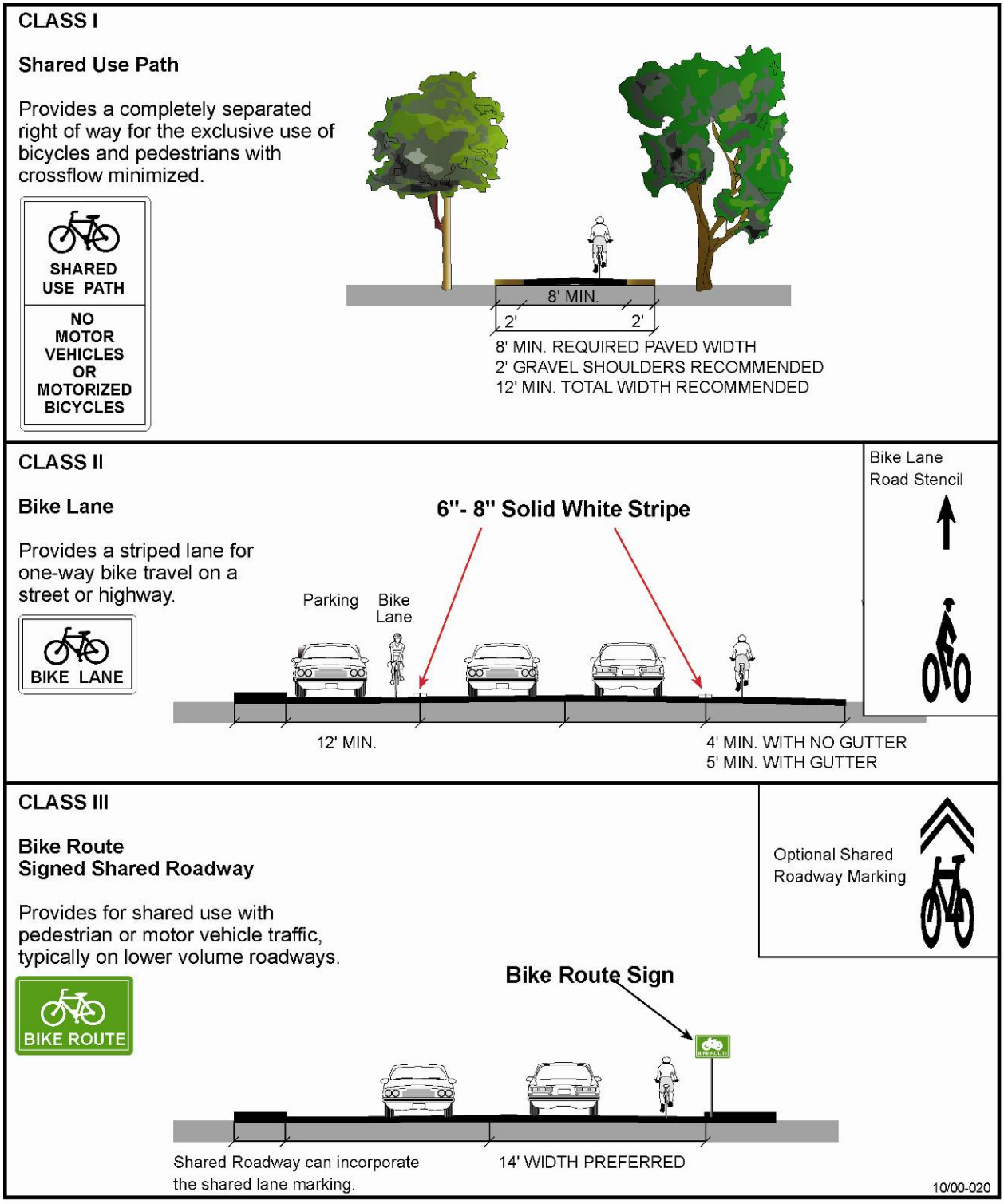


Figure B-1: Bicycle Facility Types

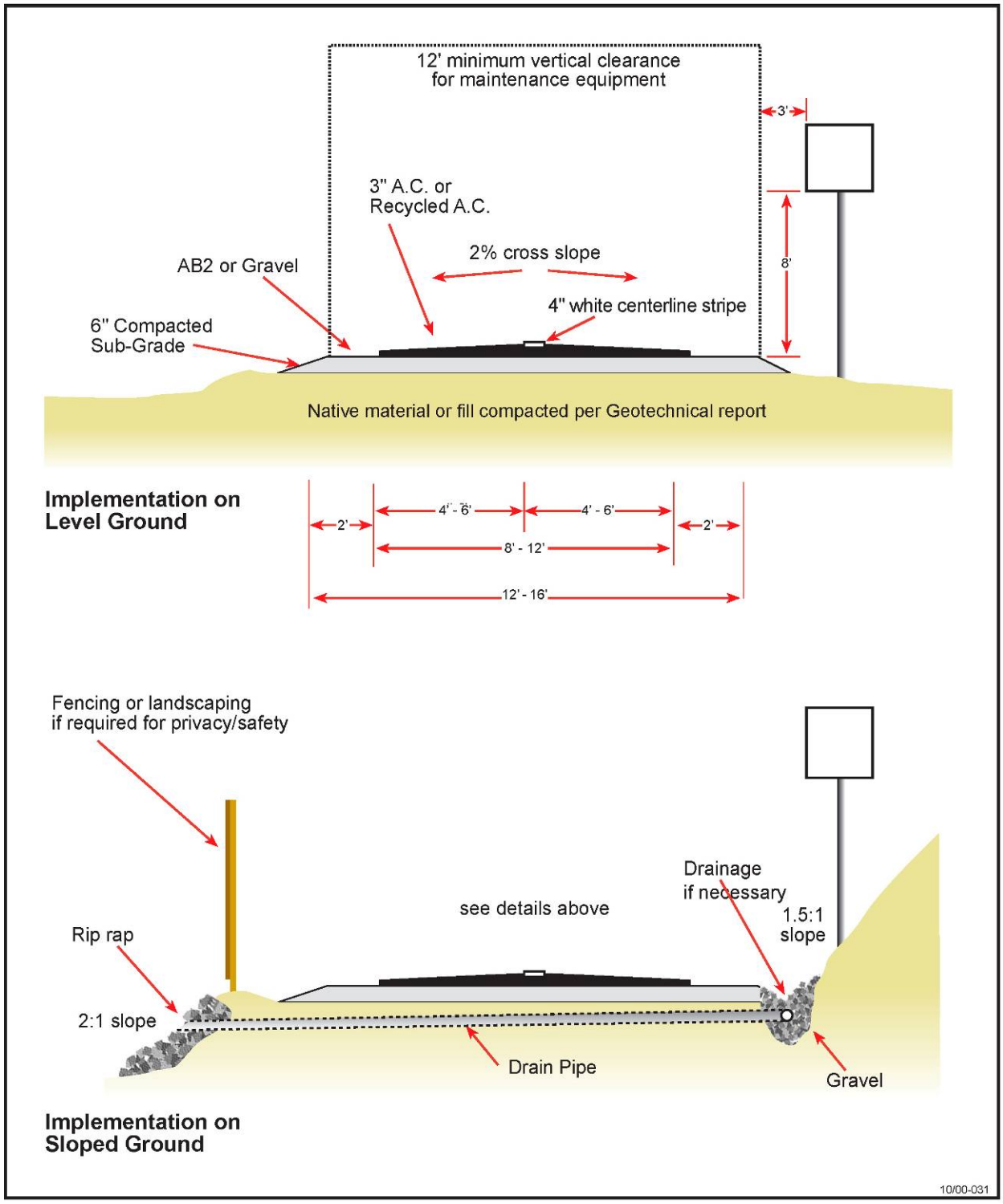


Figure B-2: Typical Class I Cross Section

Class I Bikeway Crossing Designs

At-Grade Intersection

When shared-use paths cross streets, striping, signage and intersection alignments should be designed to reduce conflicts between motor vehicles and pathway users. Mid-block crossing locations may require an actuated signal. Treatments for this type of crossing are shown in **Figure B-3**. If a signal is or is not needed, appropriate signage and pavement markings should be installed, including stop signs and bike crossing pavement markings.

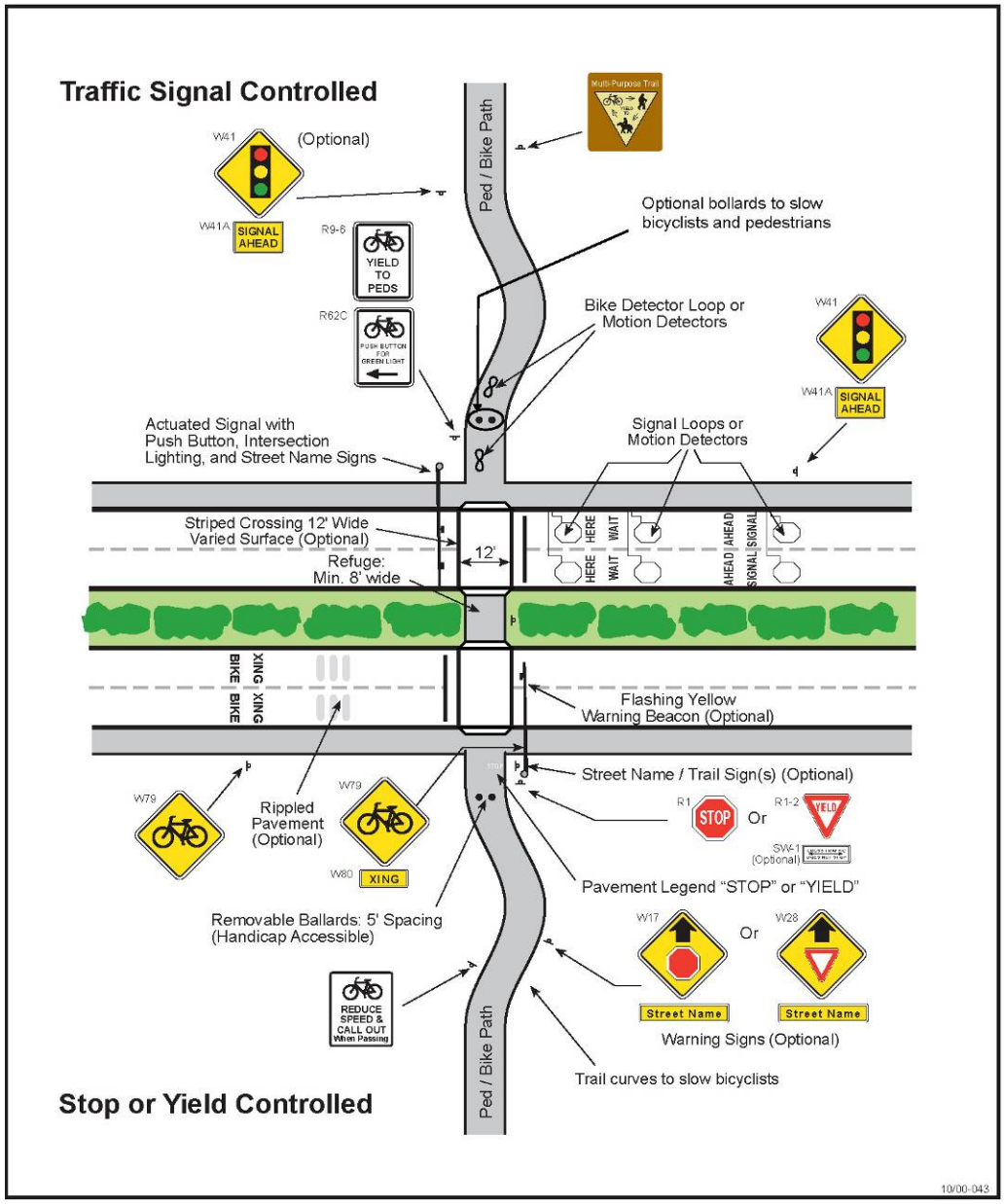


Figure B-3: Shared Use Path Mid-Block Crossing

Undercrossings

Undercrossings are an important component of Class I bikeway design. This may be most applicable for the North First Street undercrossing of Highway 101. **Figure B-4: Undercrossing** Design Guidelines shows designs for undercrossings. Some considerations for undercrossings include:

- Must have adequate lighting and sight distance for safety
- Must have adequate over-head clearance of at least 10 ft
- Tunnels should be a minimum 14 ft for several users to pass one another safely; a 10 ft x 20 ft arch is the recommended standard
- "Channeling" with fences and walls into the tunnel should be avoided for safety reasons
- May require drainage if the sag point is lower than the surrounding terrain.

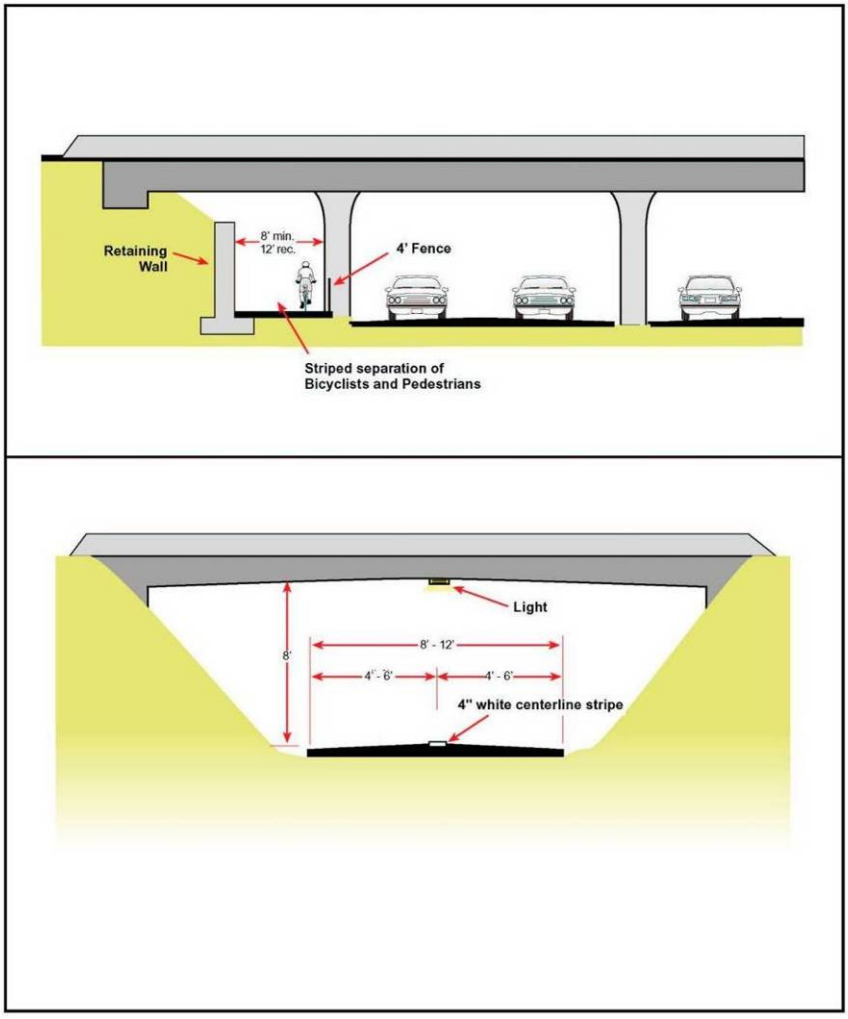


Figure B-4: Undercrossing Design Guidelines

Class II Bikeway Design

Often referred to as a "bike lane," a Class II bikeway provides a striped and stenciled lane for one-way travel on either side of a street or highway.

Figure B-5 shows a typical Class II cross-section. To provide bike lanes along corridors where insufficient space is currently available, extra room can be provided by removing a traffic lane, narrowing traffic lanes, or prohibiting parking. The width of the bike lanes vary according to parking and street conditions. Note that these dimensions are based on minimum CA MUTCD standards, and may not meet North San José Standards.

- 4' minimum if no gutter exists, measured from edge of pavement
- 5' minimum with normal gutter, measured from curb face; or 3' (0.9 m) measured from the gutter pan seam
- 5' (1.5 m) minimum when parking stalls are marked
- 11' (3.3 m) minimum for a shared bike/parking lane where parking is permitted but not marked on streets without curbs; or 12' (3.6 m) for a shared lane adjacent to a curb face.

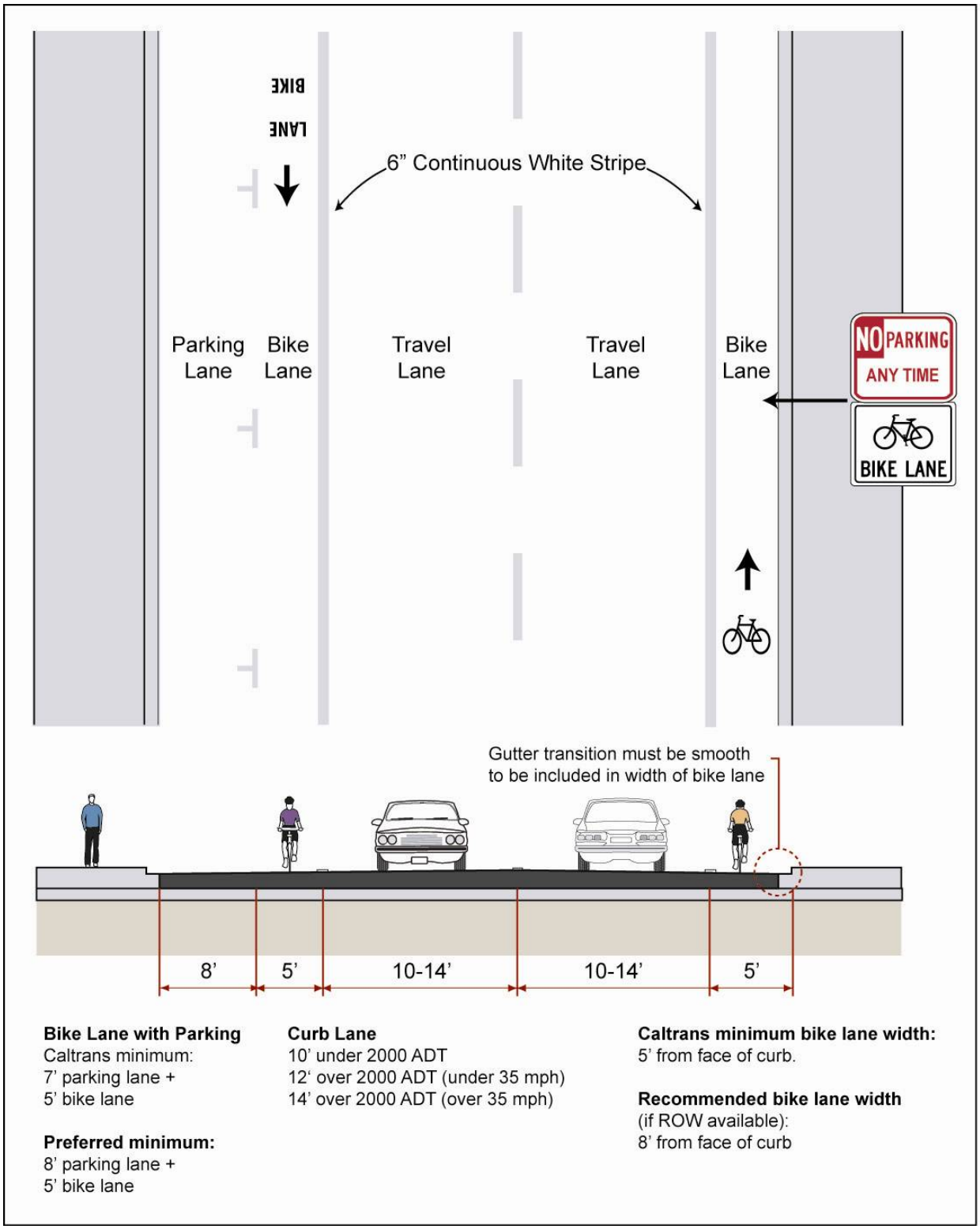


Figure B-5: Typical Class II Cross Section

Bike Lanes

The optional CA MUTCD optional pavement markings figure below provides examples for bike lane marking and striping. Further details regarding bicycle lane demarcation—specifically addressing turn movements—can be found in the CA MUTCD. **Figure B-5** illustrates CA MUTCD optional word and symbol markings for bicycle lanes.

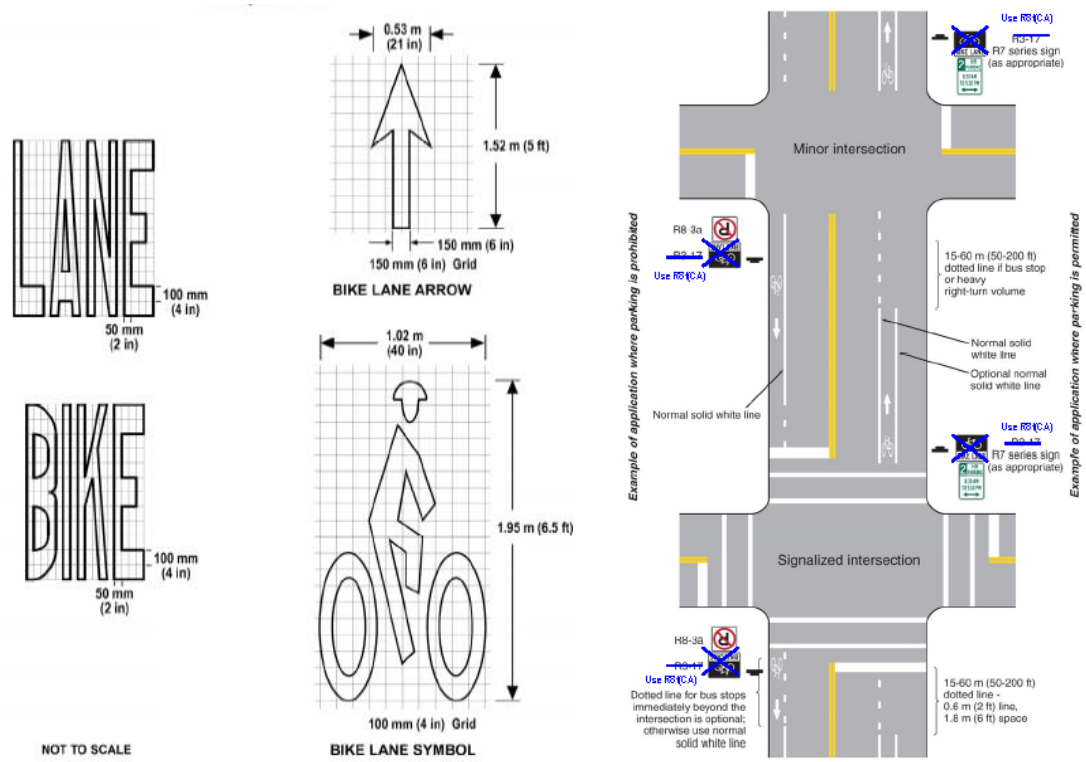


Figure B-6: CA MUTCD Examples of Optional Word and Symbol Pavement Markings for Bicycle Lanes

Class II Intersection Design

Signalized Intersections

Automobile and bicyclist collisions occur more frequently at roadway intersections. Intersections with the proper signals to control both automobile and bicyclist traffic can reduce these collisions. **Figure B-7** illustrates how to configure bicycle lanes at intersections with minimal vehicle lanes. Large, multi-lane intersections are more difficult for bicyclists to travel through than smaller, two-lane intersections. **Figure B-8** illustrates possible designs for managing traffic at multi-lane intersections, including left-turn bicycle only lanes.

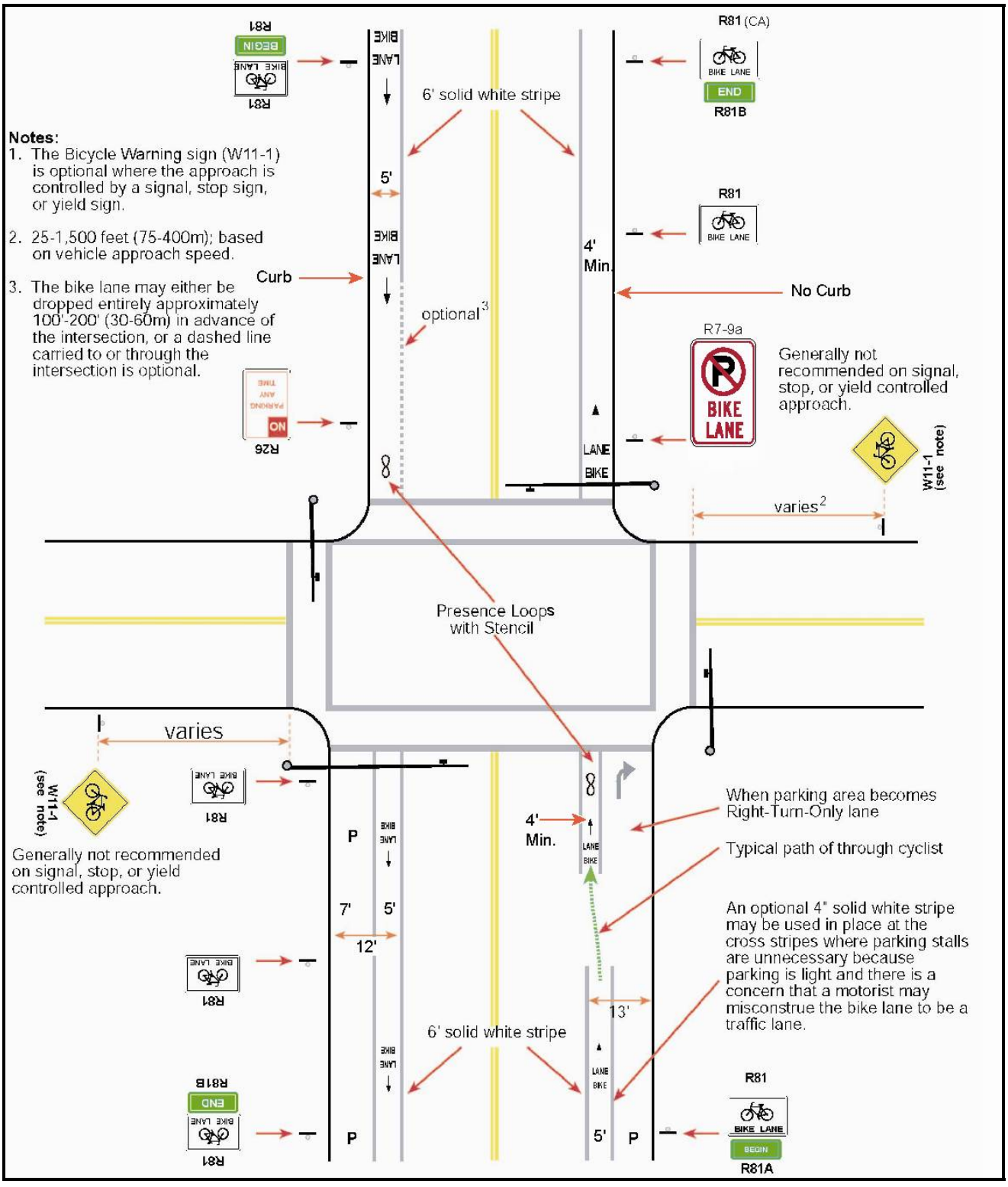


Figure B-7: Bicycle Lane Configurations at Intersections

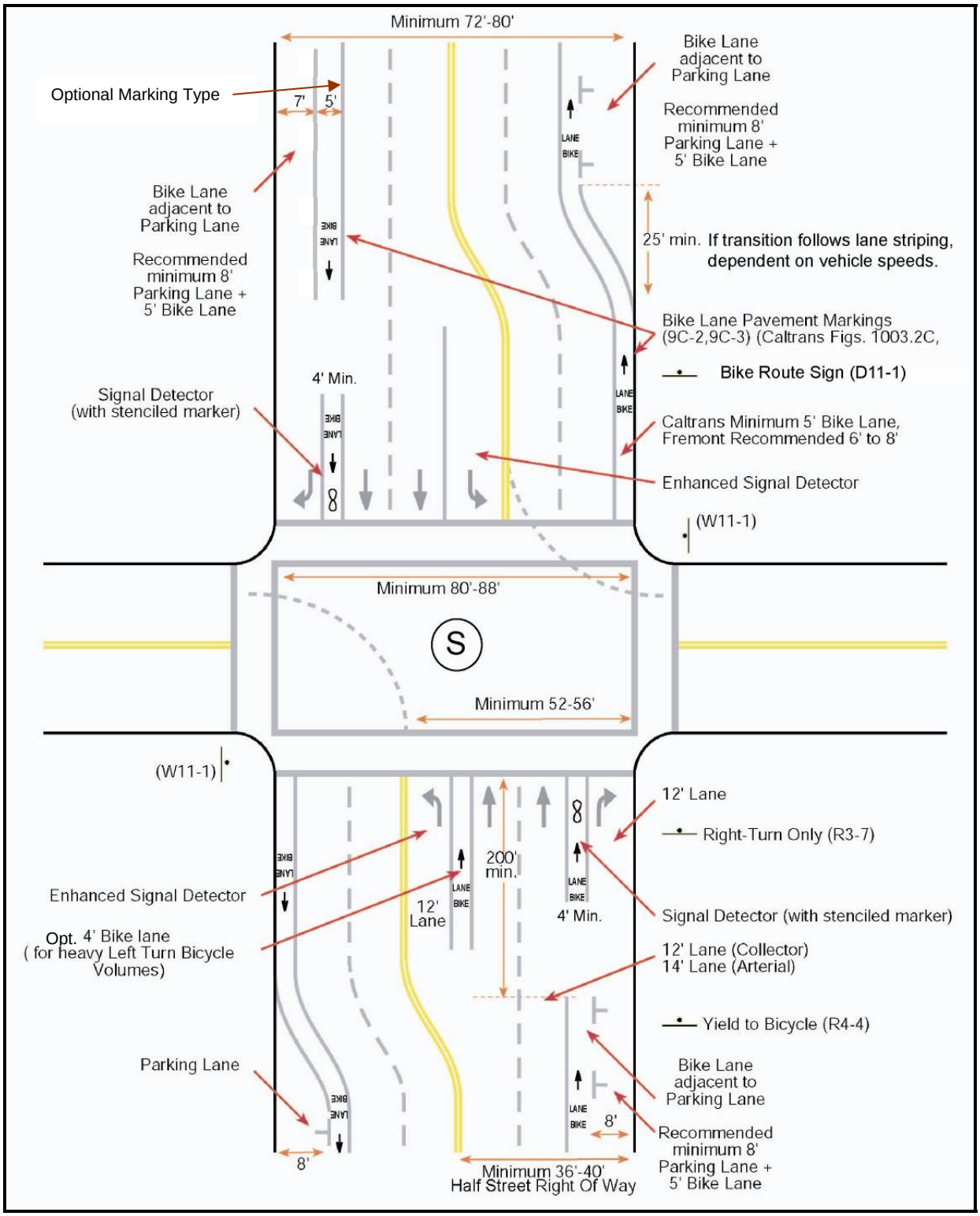


Figure B-8: Dedicated Bike Turn Lanes at an Intersection

Challenges and potential solutions for bicyclists at large signalized intersections include:

- Signals may not be timed to allow slower-moving bicyclists to travel across the intersection.
    - Solution: Bicycle adaptive signal timing.
- Loop or video detectors that are used to actuate the signal may not be calibrated to detect bicyclists.
    - Solution: Calibrate to detect bicyclists.
- Bicyclists may not know how to actuate the signal using loop detectors, even if it is calibrated.
    - Solution: Use of bike loop detector symbol and signage.
- Bicyclists who wish to turn left may be required to travel across several motor vehicle lanes to reach the left hand turn lane.
    - Solution: Enhanced signage and bicycle boxes.
- Bicyclists who are traveling straight may have to merge across motor vehicle traffic that is turning right from a right-turn lane.
    - Solution: Bike lane pockets at intersections, between through and right turn lanes or colored bicycle lane extensions.
- Motorists may not be aware of bicyclists at large, multi-lane intersections due to higher traffic volumes, more lanes of traffic and the complexity of large intersections.
    - Solution: Enhanced bike lane signage, provide bike lanes, and "share the road" signage.
- Large intersections without bicycle facilities are very auto-centric, leading motorists to assume that bicyclists are not supposed to be on the roadway.
    - Solution: Installation of bicycle facilities, including pavement markings and signage.

Bicycle Actuated Signals & Adaptive Signal Timing

Making intersections "bicycle friendly" may require the modification of how they operate. Improved signal timing, calibrating loop detectors to detect bicyclists, and camera detection make intersections easier for bicyclists to cross intersections.

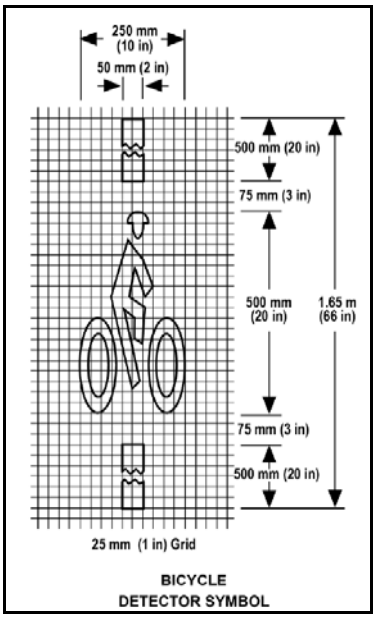
Loop detectors are installed within the roadway to allow the metal of a motor vehicle to trigger a change in the traffic signal. Many standard motor vehicle loop detectors can be calibrated to detect bicycles. This allows the bicyclist to stay within the lane of travel and avoid maneuvering to the side of the road to trigger a push button. Signals can be configured so that if a bicycle is detected, an extended green time can be provided.

The City should install bicycle-sensitive loop detectors at intersections along bikeways during roadway construction in North San José. It is recommended that the City use Type D for lead loops in all lanes except bike lanes, where a narrow Type C may be appropriate. Details of saw cuts and winding patterns for inductive detector loop types appear on Caltrans Standard Detail ES5B. Loop

types B (5' square diamond), C (quadruple), D (diagonal-slashed), Q and modified Type E (circle with a slash) can reliably detect bicycles across their full width. Type D loop is preferred as it has a good, uniform response to bicycles across its area. Types A (6' square) and E (unmodified circle) are not bike-sensitive in their center.

At some signalized intersections, vehicles (motor vehicles and bicycles) need to trigger loop detectors in order to activate a green light. Since many people do not know how loop detectors work, it is recommended to mark a pavement stencil that shows cyclists where to stop to activate the loop. Stencils should be repainted when needed. As opportunities arise, loop detector stencils should be installed in coordination with striping maintenance or resurfacing projects.

Standard bicycle detection markings should be applied in the center of the appropriate lane for all bicycle loop locations to show bicyclists the best place to wait. The State standard bicycle detection marking appears on Caltrans Standard Plan A24C.



The California Manual on Uniform Traffic Devices has specific standards for loop detector pavement markings

To increase understanding about how to use bicycle loop detectors, the City may want to include information about how to activate a bicycle loop detector in its bicycle educational materials.

Right-Turn Only Lanes

Right-turn only lanes can present challenges for bicyclists traveling through an intersection, especially those with free-right turn lanes. Bicyclists must merge to the left to position themselves in the through travel lane. Jurisdictions will sometimes stripe bike lanes on the right-side of right-turn only lanes, which places the through-cyclist in direct conflict with a right-turning vehicle. The appropriate treatment for right-turn only lanes is to either drop the bike lane entirely approaching the right-turn lane, or to place a bike lane pocket between the right-turn lane and the right-most through lane. **Figure B-9** shows an example of the through bike lane pocket.

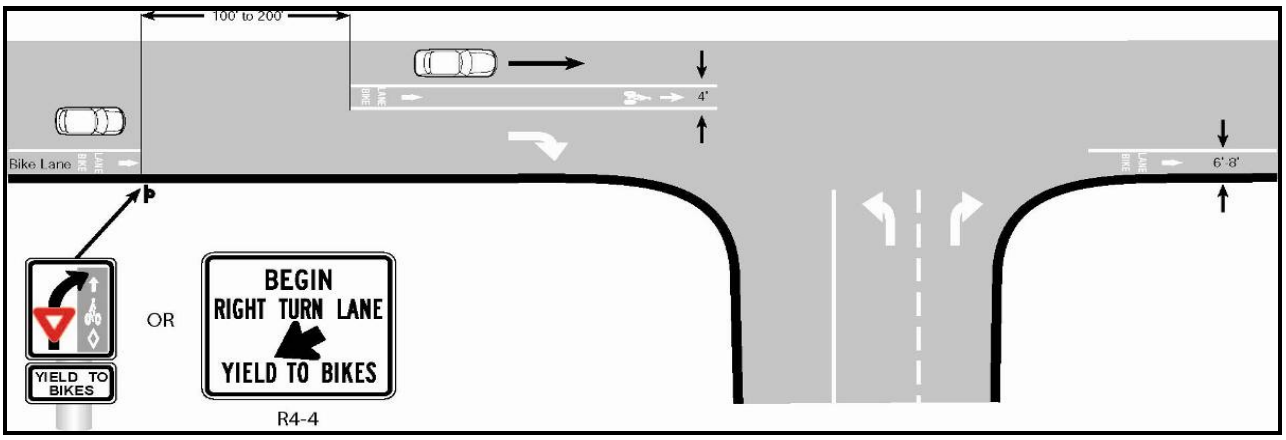


Figure B-9: Bike Lane Adjacent to Right Turn Only Lane

Freeway Ramps

Freeway on- and off-ramp crossings present a potential conflict zone for bicyclists and motorists, as bicycle lanes are typically dropped and bicyclists must merge across travel lanes where vehicles are accelerating or decelerating from freeway speeds. The appropriate bicyclist behavior is to merge left away so as to be positioned in the through lane well before the mouth of the on-ramp, and to remain out away from the curb until past the off-ramp. Implementation of interchange improvements requires coordination with Caltrans District 4 regarding placement of signage and striping because these areas are in Caltrans' right-of-way. Two guidelines for these improvements are:

- The bicycle merge should begin 250 feet in advance of the freeway on-ramp.
- Appropriate signage and striping should be used to warn bicyclists and motorists of the merge.

Bicycle improvements to freeway ramps are shown in **Figure B-10**.

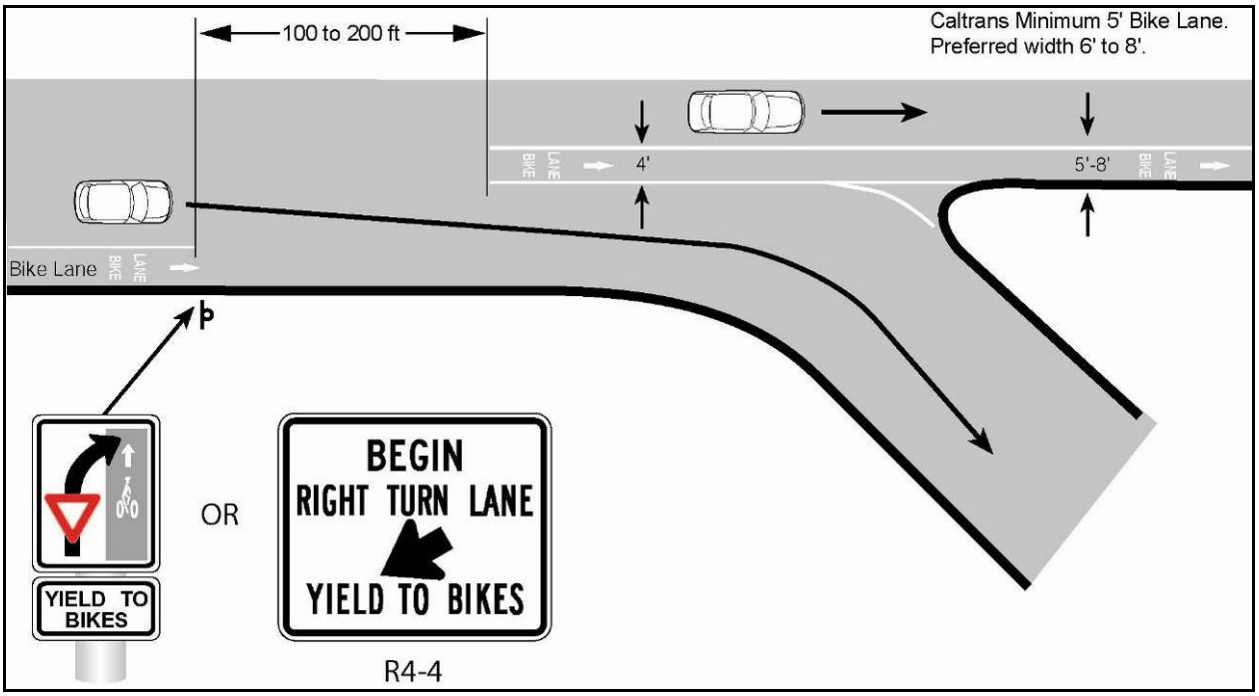


Figure B-10: Bike Crossing of Freeway Ramps

Right-Slip Turn Elimination

Many arterial intersections are designed with free right-turn lanes at each corner, separated from the through lanes by triangular "pork chop" islands. The free right turn lanes are typically yield controlled. While the pork chop configuration can provide a pedestrian refuge area, they can present some difficulties to bicyclists. The bicycle lane is typically dropped approaching the right-turn lane. Bicyclists traveling straight must merge left across the right-turn lane in order to position themselves along the right side of the through lane. Some bicyclists may wait until too late to merge, which can cause conflicts because of the wider turn radius and relatively higher turning speeds afforded by the free right configuration. A vehicle in the free right lane would not be anticipating a bicyclist along the curb to suddenly merge over near the island to continue straight. In addition, the pork chop island configuration provide no dedicated space for bicyclists waiting to proceed straight, as the concrete island, if not well designed, cuts off the normally available shoulder width. Right slip turns should be used only when absolutely necessary in North San José. Highway access ramps may be the only suitable location for right-slip turns. Locations recommended for right-slip turn removal are listed in **Appendix A: Table A-6**.

Colored Bicycle Lanes

Where right slip turns have been found necessary, and Class II bicycle lanes cross them, the City should make the bicycle lane a solid color. This bicycle lane marking is not a CA MUTCD standard; however, the City of Portland has followed European designs, resulting in an increase of awareness of bicyclists on their roadways. The color blue was chosen by Portland because green and red are already associated with traffic control in the United States.

Portland has installed warning signage for colored bicycle lanes, specific for the type of intersection, as illustrated in **Figure B-11**. The left sign is used for highway entrance ramps, while the right sign is used for highway exit ramps.

Painted bicycle lanes at intersections and other areas with high incidences of auto-bicycle conflict bring awareness to bicyclists.

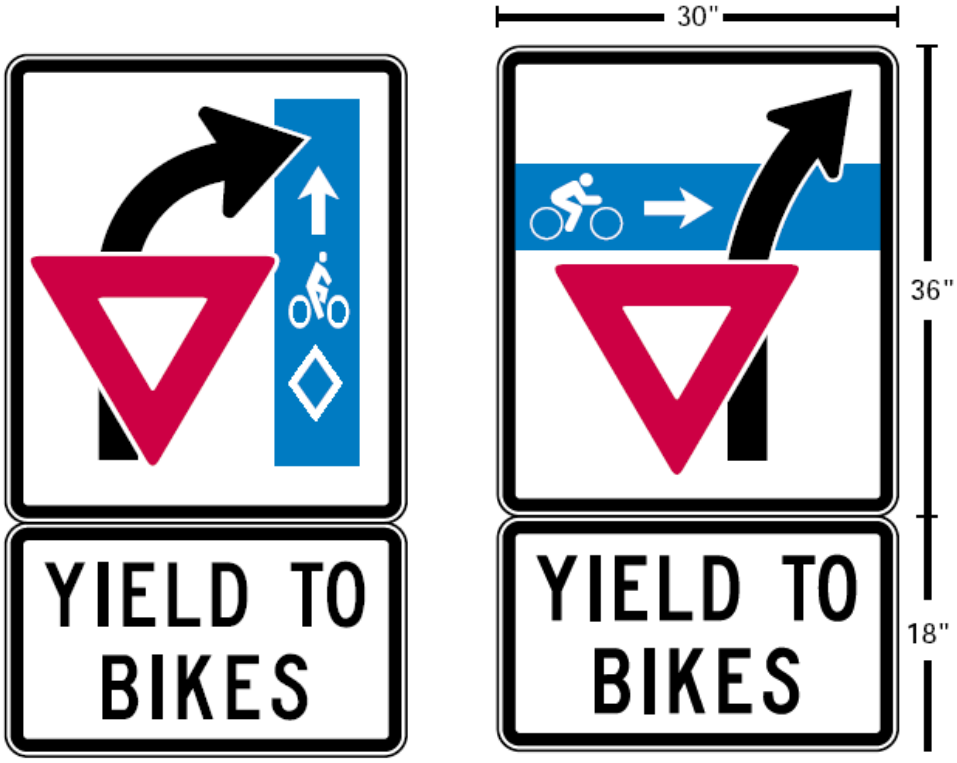


Figure B-11: Colored Bicycle Lane Signage

Figure B-12 illustrates two highway exit ramp configurations with blue bicycle lanes in Portland, Oregon and **Figure B-13** illustrates two entrance ramp configurations.

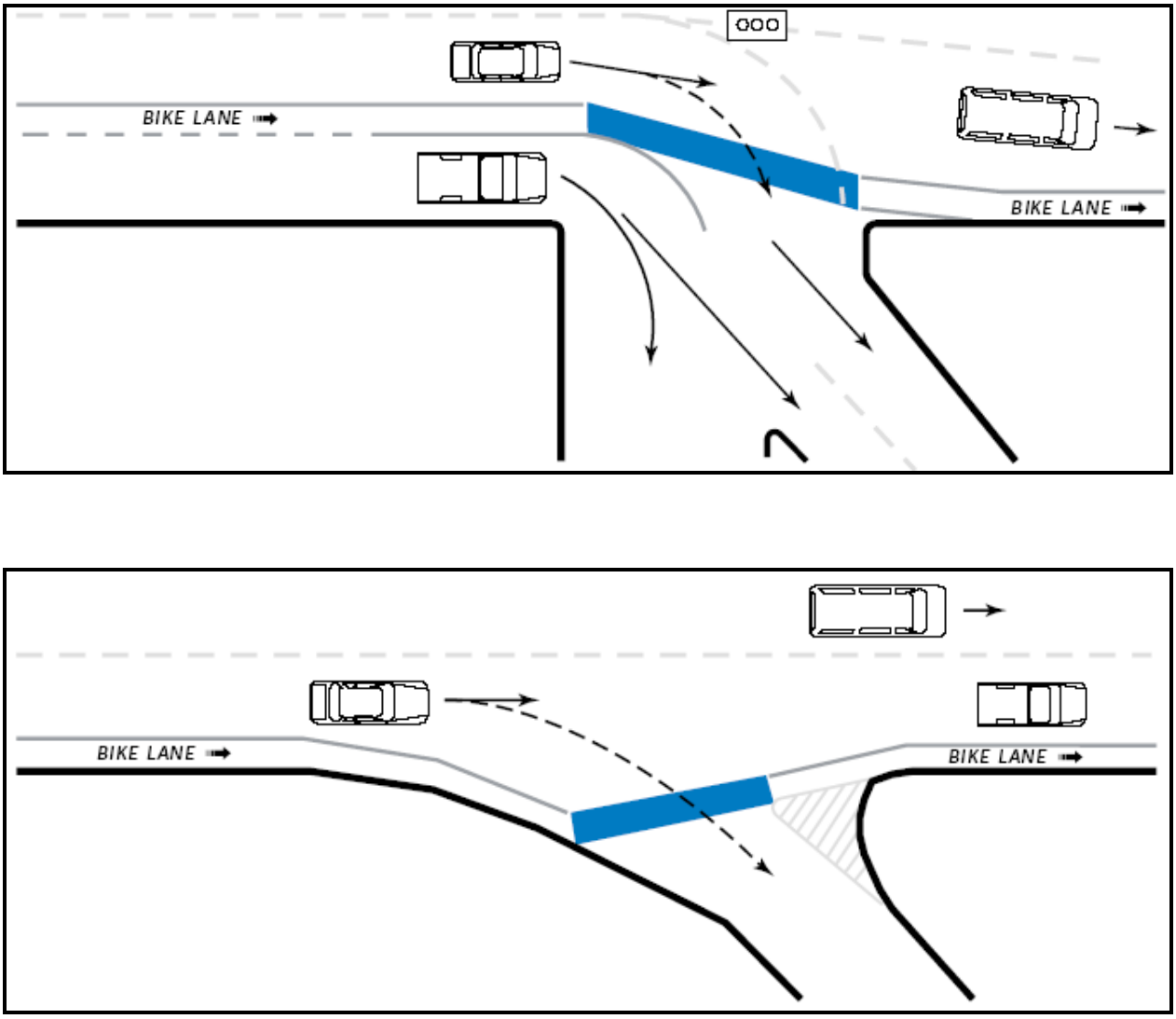
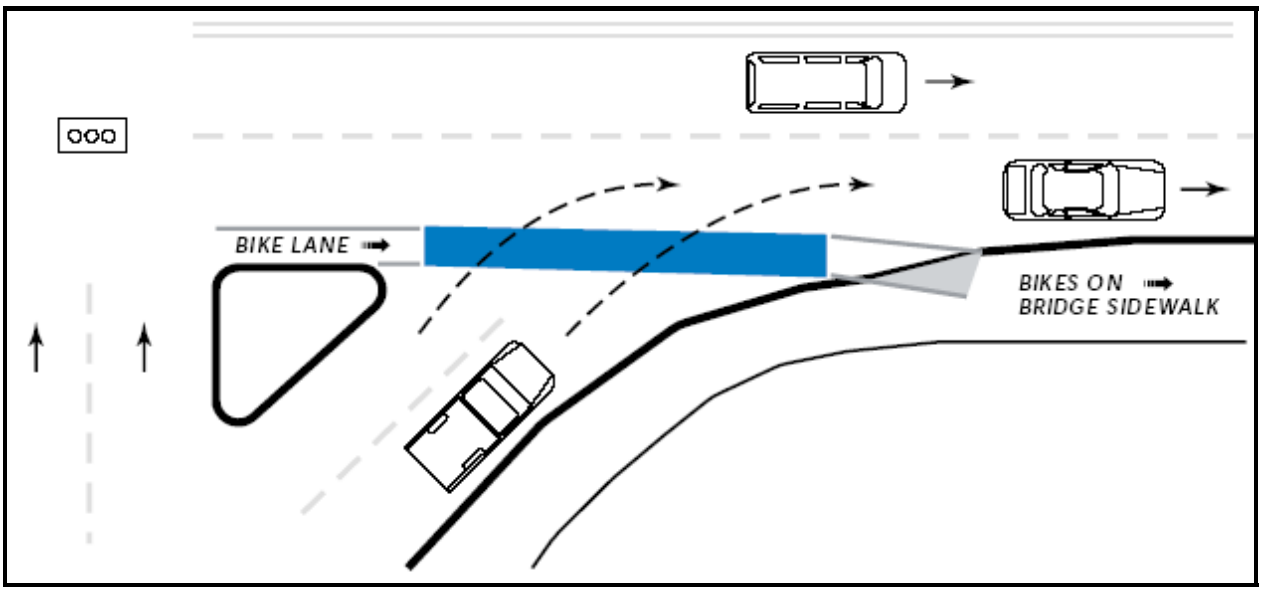


Figure B-12: Blue Lanes at Exit Ramps



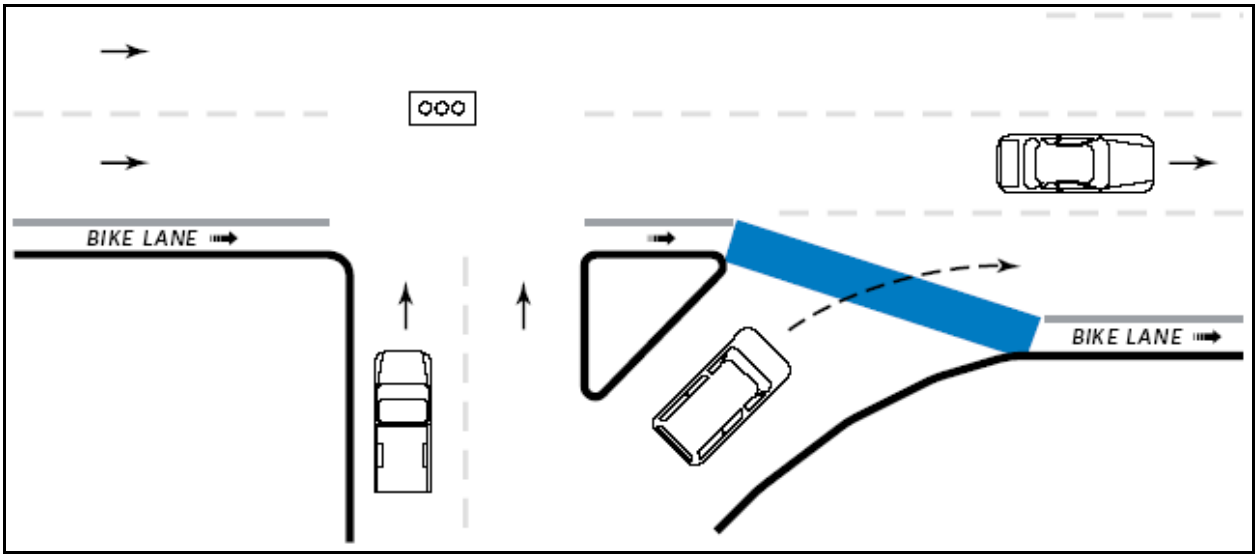


Figure B-13: Blue Bike Lane at Entrance Ramps

Table B-1 lists material considerations for colored bicycle lanes, with the known vendors, approximate cost, durability and color availability.

Table B-1: Solid Color Bicycle Lane Materials

Material	Approx. Materials Cost	Durability	Availability of Colors
Paint	$0.04-$0.10/linear foot	Poor	Wide Variety
Thermoplastic	$2.66/sq.ft	Good. Withstands significant volume & turning movements	Blue, red, yellow, white
Methyl methcrylate-based marking	$0.50-$0.60 linear foot	Potentially good	Yellow, while, red
Cold Plastic	$4.50 sq. foot	Durability good with inlay, not with existing asphalt, unlikely to hold up to heavy turn movements	Blue, red, yellow, white
Dyed Asphalt	Very costly, applied with fresh asphalt	Excellent	Earth tones
Imprinted and sealed asphalt	Costly, applied with fresh asphalt	Unknown	Earth tones
Colored acrylic coating	Unknown	Potentially good	Blue, green, red, yellow

Source: City of Portland, Oregon

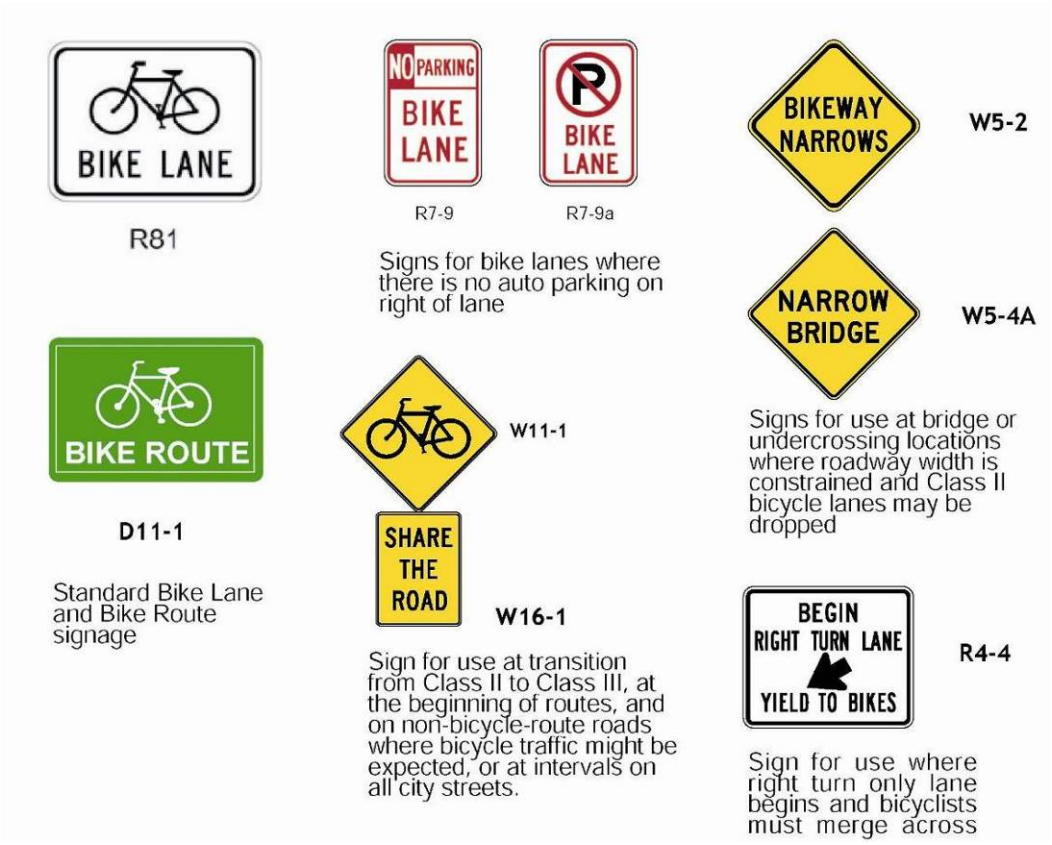
Class III Bikeway Design

Generally referred to as a "bike route," a Class III bikeway provides routes through areas not served by Class I or II facilities or to connect discontinuous segments of a bikeway.

Class III facilities can be shared with either motorists on roadways or pedestrians on a sidewalk (not advisable) and is identified only by signing. There are no recommended minimum widths for Class III facilities, but when encouraging bicyclists to travel along selected routes, traffic speed and volume, parking, traffic control devices, and surface quality should be acceptable for bicycle travel. Although it is not a requirement, a wide outside traffic lane (14') is typically preferable to enable cars to safely pass bicyclists without crossing the centerline. Caltrans Chapter 1000 provides details regarding the design requirements for placement and spacing of bicycle route signage.

On-Street Regulatory & Warning Bike Signs

Signage for on-street bikeways includes standard BIKE LANE and BIKE ROUTE signage, as well as supplemental signage such as SHARE THE ROAD and warning signage for constrained bike lane conditions. Signage should be installed on existing signposts if possible, reducing visual clutter along the path or roadway.



Innovative Bikeway Treatments

Bicycle Traffic Lights

Bicycle traffic lights operate like standard traffic lights, illuminating red, yellow and green lights to control bicycle movement through intersections. North San José should provide bicycle traffic lights at all traffic signal controlled intersections with cycle tracks or side paths running through them. Bicycle traffic lights are also encouraged at intersections with high automobile volumes and bikeways. Recommended locations for bicycle traffic lights are listed in **Appendix A: Table A-1. Table B-2: Typical** Warrants for Bicycle Traffic Lights describes the typical factors to meet for bicycle traffic light warrants.

Table B-2: Typical Warrants for Bicycle Traffic Lights

Factor	Description
Volume	W = B *V W>50,000 B>50 o W is the volume warrant. o B is the number of bicycles at the peak hour entering the intersection. o V is the number of vehicles at the peak hour entering the intersection. o B and V shall use the same peak hour.
Collision	o When two or more bicycle/automobile collisions of types susceptible to correction by a bicycle signal have occurred over a 12-month period and the responsible public works official determine that a bicycle signal will reduce the number of collisions.
Geometric	o Where a separate bicycle/multi-use path intersects a roadway. o At other locations to facilitate a bicycle movement that is not permitted for an automobile.

Bicycle traffic light give bicyclists their own light phase.

Cycle Tracks

A cycle track is a hybrid type bicycle facility that combines the experience of a separated path with the on-street infrastructure of a conventional bike lane. Cycle tracks have different forms, but all share common elements. Cycle tracks provide space that is intended to be exclusively or primarily for bicycles, and is separated from vehicle travel lanes, parking lanes and sidewalks. Cycle tracks can be either one-way or two-way, on one or both sides of a street, and are separated from vehicles and pedestrians by pavement markings or coloring, bollards, curbs/medians or a combination of these elements.

Example of a cycle track

Cycle Tracks should be a minimum of seven feet in width to allow passing and obstacle avoidance. For two-way cycle tracks, a minimum of twelve feet in width is recommended. **Figure B-14** and **Figure B-15** illustrate the recommended cycle track designs where automobile parking is present and where it is not.

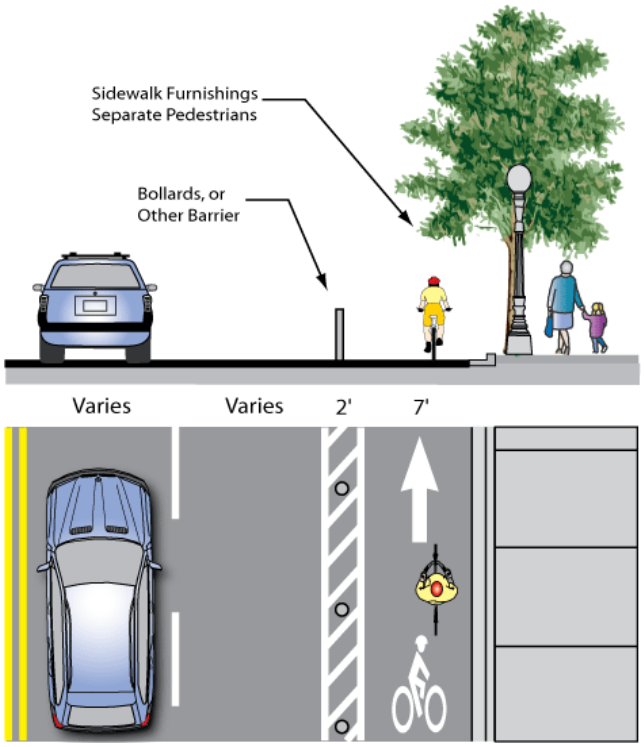


Figure B-14: Cycle Track without Parking

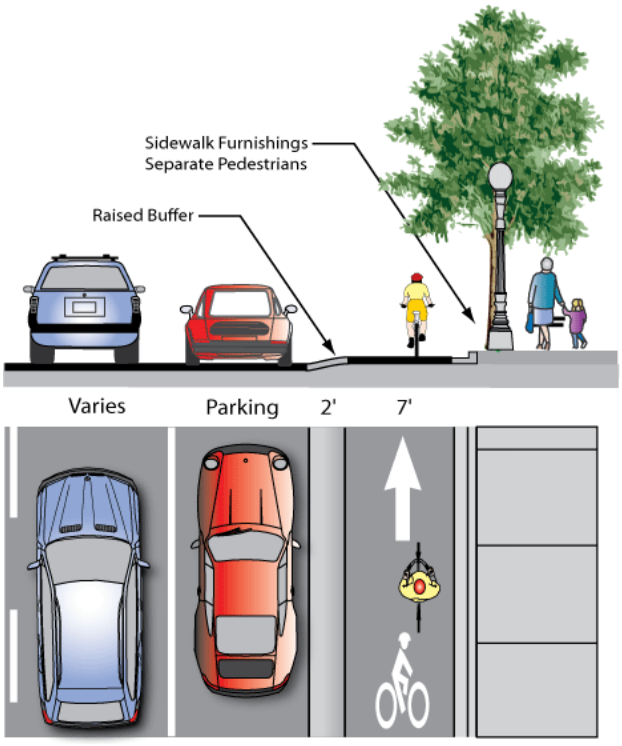


Figure B-15: Cycle Track with Parking

Bike Boxes

A bike box is a roadway marking that moves the automobile stop line at an intersection 6'-10' back from its standard location, allowing bicyclists to "take the lane" in front of the automobile when the traffic signal is red. On one-way roadways, or at intersections where bicyclists may need to turn left, bike boxes are marked across all travel lanes. This allows bicyclists riding on the right side of the road to position themselves across the roadway to make a left turn. Bike boxes have been implemented in Portland, Oregon, New York City and Cambridge, Massachusetts.

Bicycle boxes increase awareness of bicyclists among motorists at intersections.

Appendix A: Table A-6 lists recommended locations to implement bike boxes in North San José.

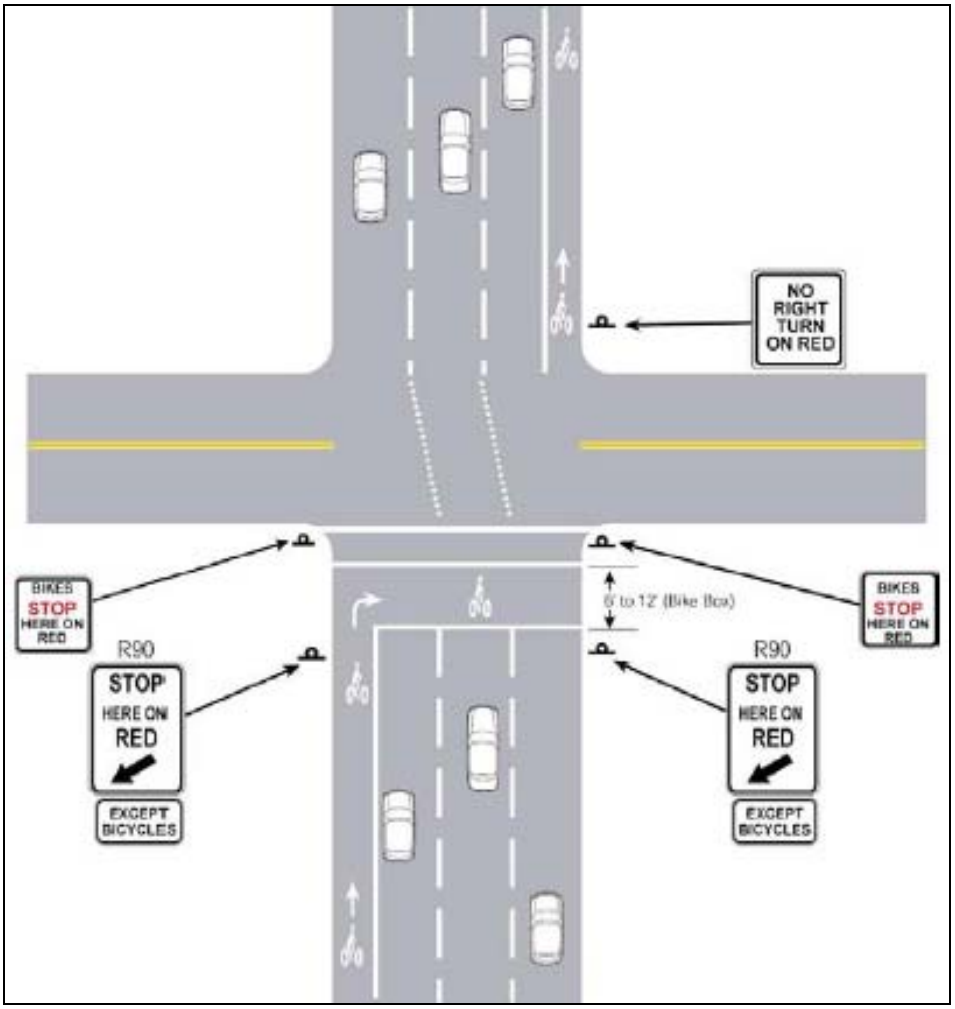


Figure B-16: Bike Box Design

Bicycle Boulevards

The bicycle boulevard treatment is typically a lower volume street with traffic calming treatments that parallels a higher volume arterial. Traffic calming typically includes a set of improvements to slow traffic and prevent cut-through traffic such as: traffic circles, chokers, and medians. In addition, stop signs favor bicyclists by stopping perpendicular traffic. Sensor loops activate traffic signals to allow safe crossings of higher volume roadways

A bicycle boulevard sign in Berkeley, CA

Figure B-17 shows the typical design features of bicycle boulevards, these include:

- Traffic calming devices such as traffic circles and curb bulbouts
- Bicycle destination signage
- Pavement stencils indicating status as a Bicycle Boulevard
- Crossing improvements at major arterials such as traffic signals with bicycle-detection, four-way stops and high-visibility crosswalks
- Bicycle-friendly signal preemption at high-volume signalized intersections.
- Stop signs on streets crossing the Bicycle Boulevard

Bicycle Boulevards can be designed to accommodate the particular needs of the residents and businesses along the routes, and may be as simple as pavement markings with wayfinding signs or as complex as streets with traffic diverters and bicycle signals. Many good candidates for Bicycle Boulevards may benefit most from signage and public education. Substantial capital improvements may not be necessary.

Lower volume roadways may be modified to function as a through street for bicycles, while maintaining only local access for automobiles. Traffic calming devices can lower traffic speeds and through trips, limiting conflicts between motorists and bicyclists and providing priority to through bicycle movement.

Bicycle boulevards may be appropriate along future North San José residential roadways including, Technology Drive from Brokaw Road to Sky Port Drive or other roadways that bound and traverse the Sobrato, Riverview, Hyundai, Crescent Park and Cadence developments.

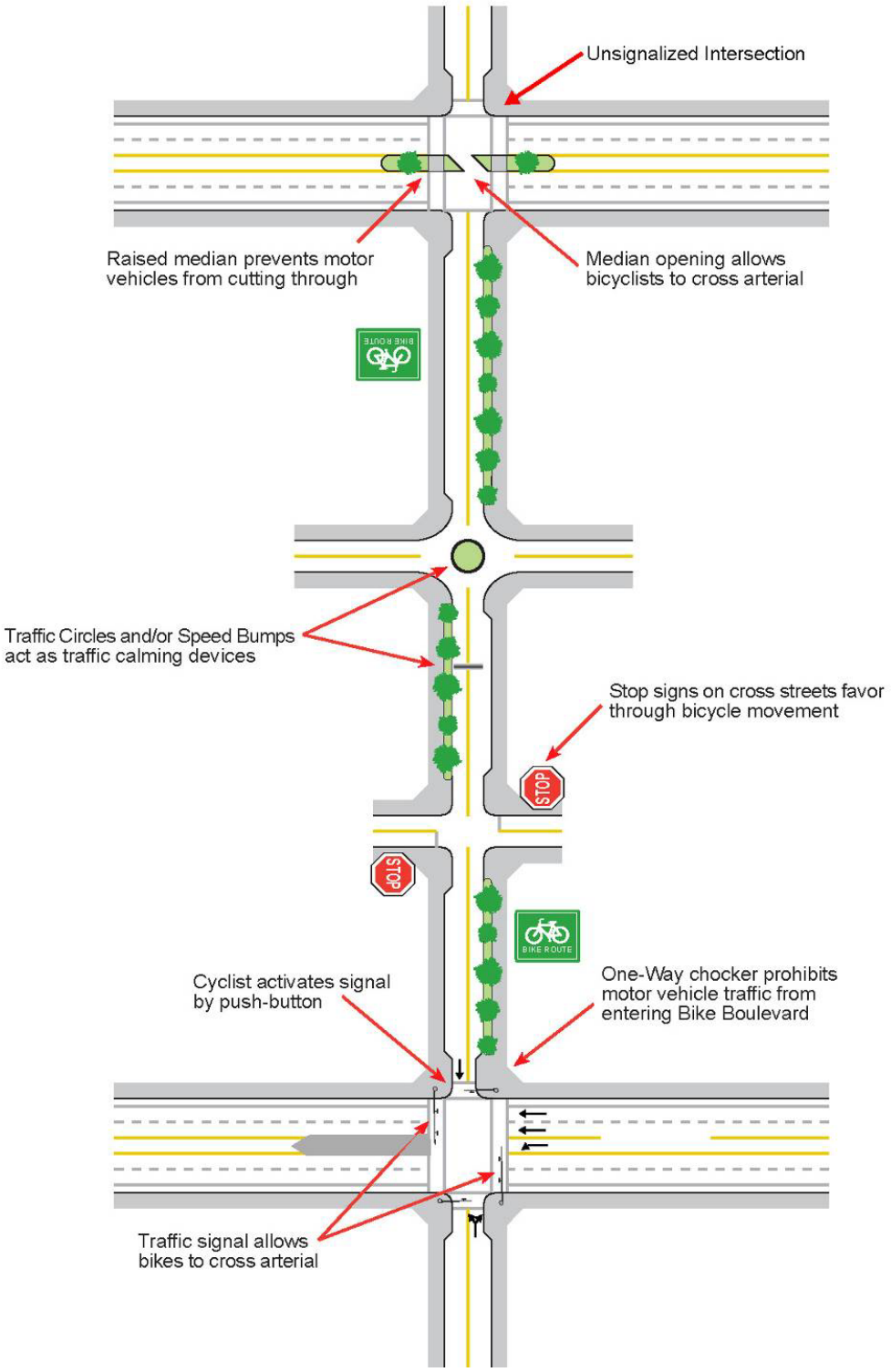


Figure B-17: Bicycle Boulevard Lane Configuration

Shared Roadway Bicycle Marking

Recently, Shared Lane Marking stencils have been introduced for use in California as an additional treatment for Class III facilities. The stencil can serve a number of purposes, such as making motorists aware of bicycles potentially in their lane, showing bicyclists the direction of travel, and, with proper placement, reminding bicyclists to bike further from parked cars to prevent "dooring" collisions. The City of Denver has effectively used the "bike-in-house" shared marking treatment for several years, and San Francisco recently tested two designs of the shared lane marking stencil for use on Class III facilities where lanes are too narrow for sharing.

Figure B-18 illustrates the recommended placement of the stencil in the roadway and the "Chevron" marking design recommended by Caltrans, which adopted the following pavement markings for official use in 2005 as part of the California MUTCD.

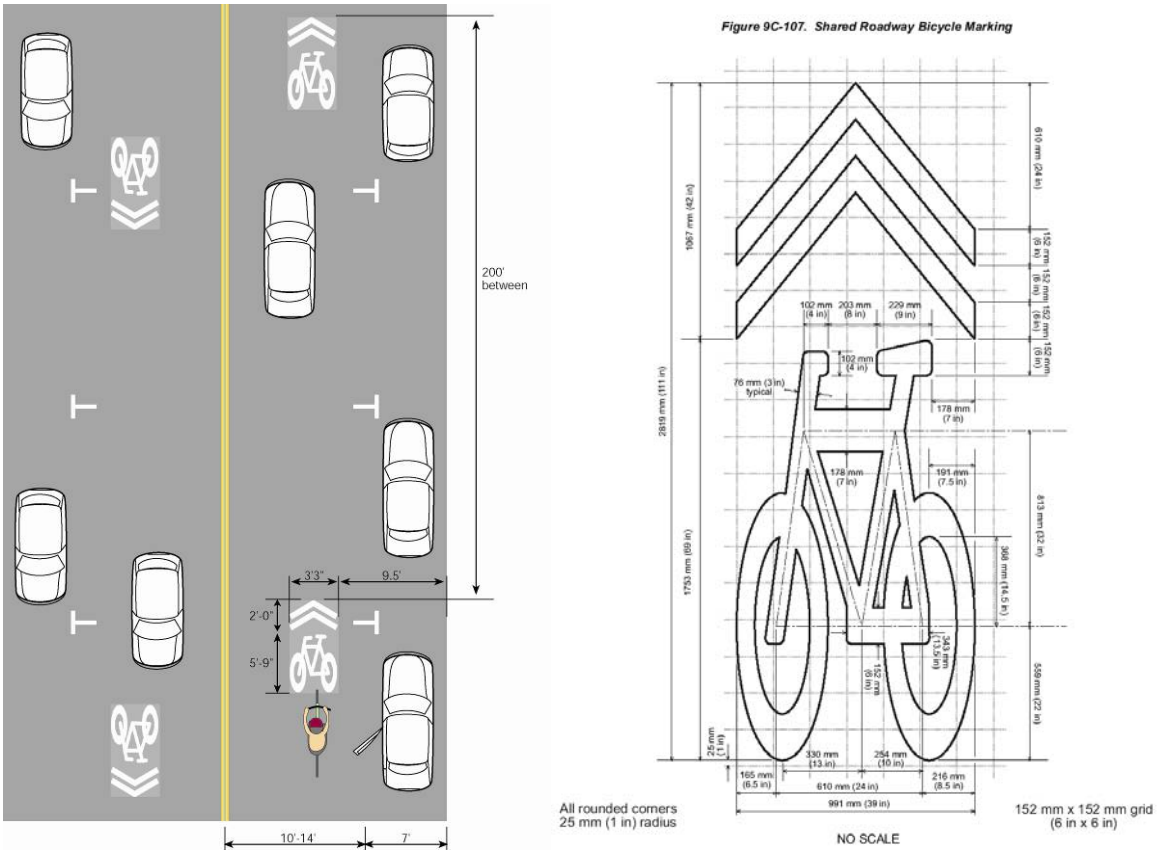
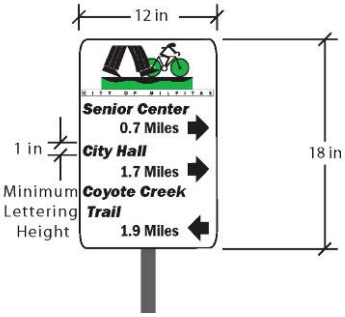


Figure B-18: Shared Lane Marking Placement and Shared Roadway Bicycle Marking

Signage and Wayfinding

Wayfinding

Wayfinding signage is an important part of the bicycle network by improving the clarity of travel while illustrating the distance to popular destinations. Wayfinding signage should be used through out North San José. The signage should display distances to transit stations, trails, schools, public buildings and other popular destinations. The installation location of this signage should be along bicycle and pedestrian routes.



Wayfinding Signage used in Portland, Oregon

Bike Route Signage

CA MUTCD standard for bicycle route signage should be used in North San José. Route numbering for these signs should be coordinated with neighboring jurisdictions where bikeways cross the City's boundary.

For bike route signs, CA MUTCD requires a green background and white lettering. The top portion of the sign is customizable for the city or region where it located. For example, the City of San Francisco shows the Golden Gate Bridge on its bike route signs. The figure to the right shows an example from San Francisco.

Wrong-Way Signs

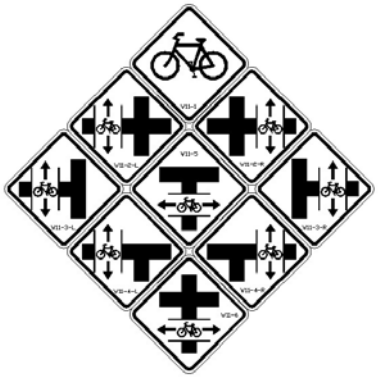
Bicyclists should be encouraged and notified of California Traffic Law requiring bicyclists to travel in the direction of vehicle travel on roadways. Wrong-way signs may be installed on the back side of bicycle signage, as pictured to the right.

Wrong-Way Sign in Sunnyvale

Parallel Path Warning Signage

When paths are located parallel and adjacent to roadways, vehicles turning into and out of streets and driveways must cross the path. Conflicts between bicyclists and pedestrians and turning motorists are common at these types of intersections. Turning motor vehicles do not expect to see bicyclists or pedestrians coming in the opposite direction of traffic.

Starting in the early 1990's, the City of Denver, Colorado began using experimental warning signage at its parallel paths. The



An example of Denver's parallel path warning signage

signage is modified from the standard MUTCD railroad warning signage.

Experimental signage, similar to the Denver parallel path warning signs, could help alert motorists to the presence of bicyclists and pedestrians on parallel paths.

Bicycle-Parking

As more bikeways are constructed and bicycle usage grows, the need for bike parking will increase. Short-term parking at shopping centers and similar land uses can support bicycling as well as long-term bicycle parking at transit stations and work sites.

Guidelines for Locating Bicycle Parking

Bicycle parking should be installed on public property, or available to private entities on an at-cost basis. Bicycle parking facilities should be provided at public destinations, including government buildings, community centers, parks, schools and shopping centers.

All bicycle parking should be in a safe, secure area visible to passersby. Commuter locations should provide secure indoor parking, covered bicycle corrals, or bicycle lockers. Bicycle parking on sidewalks in commercial areas should be provided according to specific design criteria, reviewed by merchants and the public, and installed as demand warrants. **Table A-3:** City of San José Bicycle Parking and Shower Requirements provides the City of San José's bicycle parking and shower requirements by land use.

Table A-3: City of San José Bicycle Parking and Shower Requirements

Land Use	Bicycle Parking Requirements	Shower Requirements
Industry-warehouse, catalog, distribution	1 bike space for every 20 code- required auto parking spaces	> 85,000 sf 1 shower > 635,000 sf 2 showers > 1,600,000 sf 3
Industry-R&D, mfg, lt ind.	1 bike space for every 20 code- required auto parking spaces	Same as Office
Offices & Financial Services	1 bike space for every 40 code-required auto parking spaces	0 to 9,999 sf 0 shower; 10k to <20k sf 1 shower; 20k to <50 k sf 2 showers ≥ 50,000sf 4 showers
Multi-Family Dwelling	1 space per 4 units	None
General Retail , Drive-Thru , Food services, General Services, Entertainment and Recreation, Commercial Outdoor Recreation, Public, Quasi-Public and Assembly eg museums, libaries	1 bike space for every 20 code- required auto parking spaces	0 to 24,999 sf 0 shower; 25k to < 50 k sf 1 shower; 50k to 100k sf 2 showers ≥ 100,000 sf 4 showers
Arena (major event entertainment)	1 space per 50 code required auto parking spaces	None
Public, Quasi-Public and Assembly Community services	1 space per 15,000 sq. ft.	Same as General Retail
Education & Training	Not tied to auto req parking so these sub caegories can stay the same -see below	Same as General Retail
Education & Training Daycare	1 space per 10,000 sq. ft	0 to 9,999 sf 0 showers ≥10,000 sf 1 shower

Land Use	Bicycle Parking Requirements	Shower Requirements
Education & Training Schools (K-5)	2 spaces per classroom	0-15 employees 0 showers ≥16 employees 2 showers (1 each for male and female employees)
Education & Training Schools (6-12)	4 spaces per classroom	0-15 employees 0 showers ≥16 employees 2 showers (1 each for male and female employees)
Education & Training Private learning institution (excluding dorms, see group living)	1 space per 20,000 sq. ft.	0-15 employees 0 showers ≥16 employees 2 showers (1 each for male and female employees)
Transportation – transit stations with auto parking	1 space per 20 code required auto spaces	None
Vehicle Related Uses	1 space per 50 code required auto spaces	Same as Office
Health & Veterinary Services	1 space per 20 code required auto spaces	Same as Office

Source: San José Municipal Code, with modifications

Short Term Bicycle Parking

Short term bicycle parking facilities are best used to accommodate visitors, customers, messengers and others expected to depart within two hours. Bicycle racks provide support for the bicycle but do not have locking mechanisms. Racks are relatively low-cost devices that typically hold between two and eight bicycles, allow bicyclists to securely lock their frames and wheels, are secured to the ground, and are located in highly visible areas. They are usually located at schools, commercial locations, and activity centers such as parks, libraries, retail locations, and civic centers. Refer to San José's bicycle parking requirement by land use for more details.

Bicycle racks should be installed with the following guidelines in mind:

- The rack element (part of the rack that supports the bike) should keep the bike upright, supporting the frame in two places and allowing one or both wheels to be secured.

- Install racks so there is enough room between adjacent parked bicycles. If it becomes too difficult for a bicyclist to easily lock their bicycle, they may park elsewhere. A row of inverted "U" racks should be installed with 15 inches minimum between racks.

- Empty racks should not pose a tripping hazard for visually impaired pedestrians. Position racks out of the walkway's clear zone.

When possible, racks should be in a covered area protected from the elements. Long-term parking should always be protected.

Generally, 'U' type racks bolted into the sidewalk are preferred and should be located intermittently or in front of key destinations. Bicycle racks should be installed to meet ADA standards and not block pedestrian through traffic.

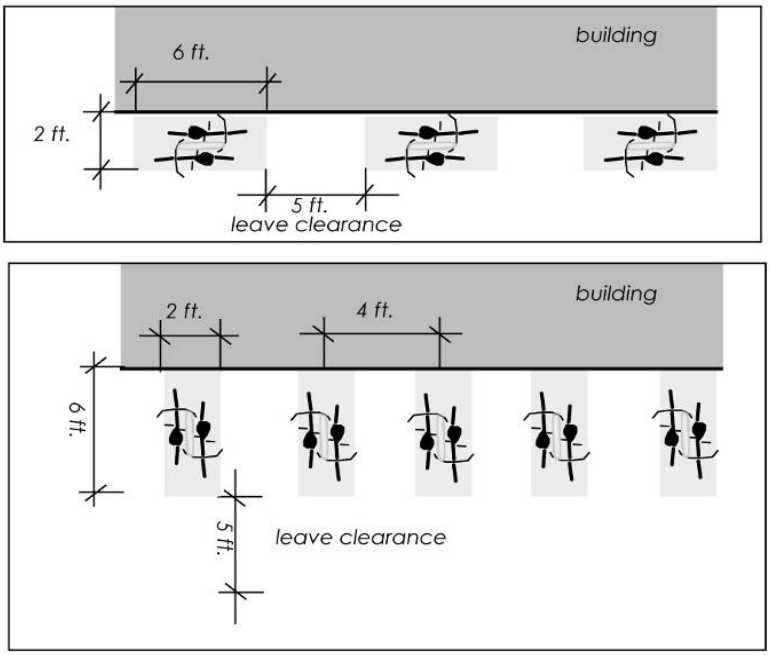


Figure B-19: Recommended Bicycle Parking Clearance

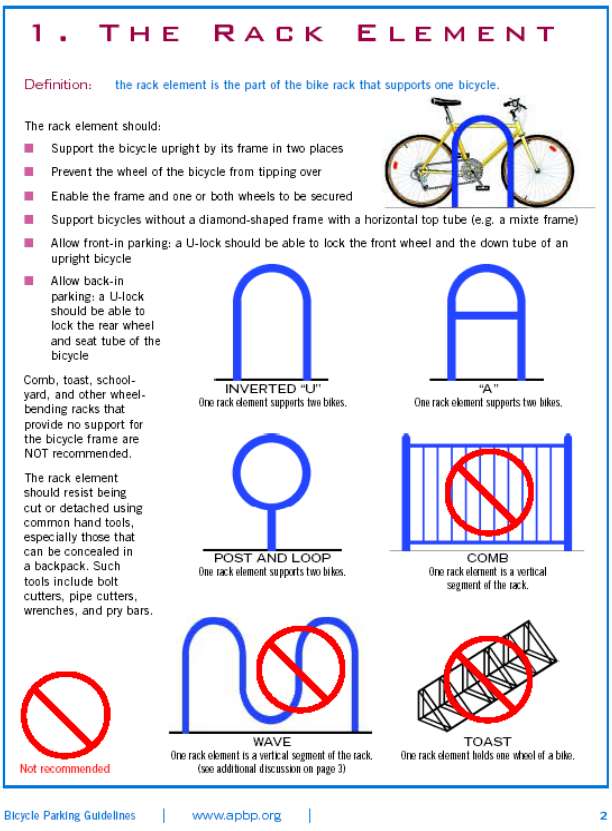


Figure B-20: Recommended Short-Term Bicycle Parking Facilities

The City may want to consider custom racks that can serve not only as bike racks, but also public artwork or as advertising for a specific business. The "post and ring" style rack is an attractive alternative to the standard inverted-U, which requires only a single mounting point and can be customized to have the city name or emblem stamped into the rings. These racks can also be easily retrofitted onto existing street posts, such as parking meter posts. While custom racks can add a decorative element and relate to a neighborhood theme, the rack function should not be overlooked: All racks should adhere to the basic functional requirement of supporting the bicycle by the frame (not only the wheel) and accepting a U-lock.

Possible alternatives to the inverted-U bike rack include the simple post-and-ring style (left), or a custom artistic rack (middle) or the abstract rack (right). All styles allow the bicycle to be secured by the frame with a U-lock.

Long Term Bicycle Parking

Bicyclists are usually more comfortable storing bicycles in lockers for long periods because they offer increased security and protection from natural elements. Long term bicycle parking facilities accommodate employees, students, residents, commuters, and others expected to park more than two hours. **Figure B-21** illustrates the recommended bicycle locker design.

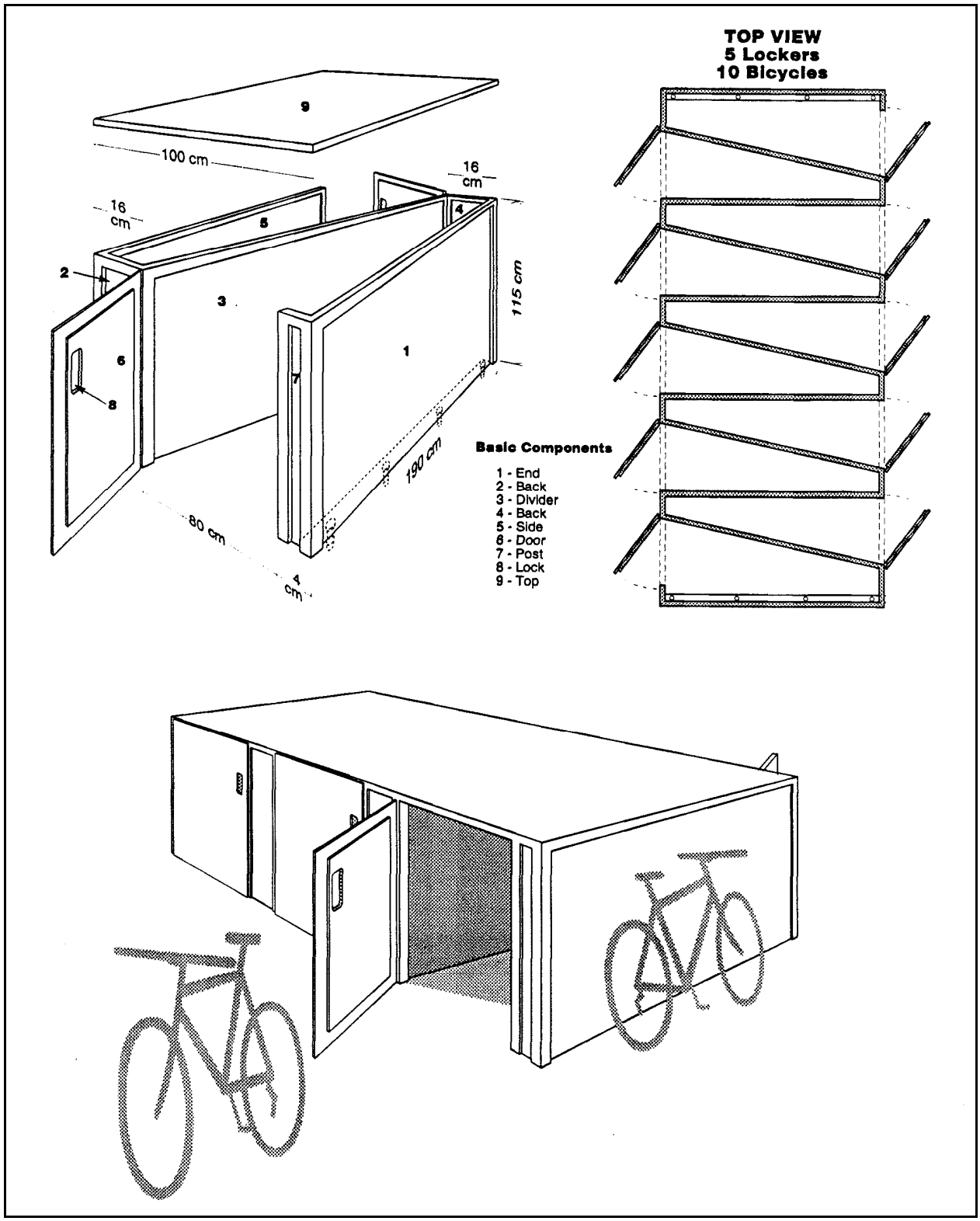


Figure B-21: Recommended Long-Term Bicycle Parking Facilities

Innovative High Volume Bicycle Parking

In many locations, individual U-racks located on the sidewalk can be sufficient to meet bicycle parking demand. Where bicycle parking demand is higher, more formal structures and larger facilities need to be provided. Several options for high-volume bicycle parking are outlined below.

Bike Oasis

In 2008, the City of Portland, Oregon began installation of several "Bike Oases" in commercial districts. These signature bicycle parking facilities are installed on curb extensions and consist of attractive covered bike parking and an information panel. Portland's Bike Oases provide parking space for ten bikes. Bike and walking maps are installed on the information panel.

Bike Oasis installed in Portland, OR near NE 43rd and Hancock

On-Street Bike Parking Corral

A relatively inexpensive solution to providing high-volume bicycle parking is to convert one or two on-street motor vehicle parking spaces into on-street bicycle parking. Bike racks are installed in the street and protected from motor vehicles with removable curbs and bollards. These Bike Parking Corrals move bicycles off the sidewalks, and leave space for sidewalk café tables or pedestrians. Bicycle parking does not block sightlines, so it may be possible to locate bicycle parking in no-parking zones near intersections and crosswalks.

Bike Corral in Portland, Oregon
Photo: Bill Stiles

Bike Stations

Bike stations serve as one-stop bicycle service centers for bicycle commuters. They include 24-hour secure bicycle parking and may provide additional amenities such as a store to purchase items (helmets, raingear, tubes, patch kits, bike lights, and locks), bicycle repair facilities, showers and changing facilities, bicycle rentals, and information about biking. Some bike stations provide free bike parking, while others charge a fee or require membership.

Mayor Daley of Chicago at the ribbon-cutting ceremony for Chicago's Millennium Bicycle Station
Photo: Chicagoland Bicycle Federation

Bike stations have been installed in several cities in California, including Long Beach, San Francisco, and Seattle, Washington. Most commonly, they are installed

at transit stations.

Valet Bike Parking

The City of San José partners with its Bicycle Pedestrian Advisory Committee and Silicon Valley Bicycle Coalition to provide valet bike parking at City festivals and other community events. Indoor locations for storing bicycles should be designed into venues that host sporting events, festivals, and other events where large numbers of people gather.

Bike Sharing

Bicycle rental systems, often referred to as 'bikesharing' or 'PUB – Public Use Bicycles', are gaining popularity in many metropolitan cities across the world. These systems provide bicycles at rental locations throughout a city and then users can return the bicycles to any of the rental locations. The operators are usually private companies that pay for the bicycles and rental stations, in return for advertising rights on public transit vehicles and stations. With the advances in technology, the risk of bicycle theft and malfunction is minimized. Bicycles can be outfitted with GPS tracking devices as well as digital sensors to alert the operator of malfunction. Pay systems are all similar in that they usually require a credit card deposit on a 'smartcard' that allows access to bicycles locked at rental stations. **Table B-4** provides the pricing schemes used by cities in Europe and the number of bicycles provided per population.

Metropolitan cities in the US are also developing PUB programs. Washington DC is beginning operation of its SmartBike DC program, operated by ClearChannel. The SmartBike DC bicycles are comfortable commuter bicycles with an upright seating position. An annual membership to use SmartBike DC will cost $40 a year and other prices, for daily and hourly uses, are still under consideration. In addition to Washington DC, ClearChannel and San Francisco are working on an agreement to bring PUBs to the City. As currently proposed, ClearChannel will pay San Francisco's Municipal Transportation Agency $30 million over a 20 year contract period for advertising rights on public transit vehicles and at stations in exchange for managing the PUB system.[1]

SmartBike DC will begin operation with 10 stations and 120 bikes, rented with a $40 annual subscription.

[1] SF Gate, "SF Moving to Catch Up with European Bike-Share Programs," (October 3, 2007).

Table B-4: Bike Share System Examples

Operator	City	Pricing Scheme (First 30 minutes free unless stated)	Persons/Bike
JCDecaux	Paris	$1.40/day	215
	Lyon	N/A	150
	Barcelona	$0.40/additional half hour	1000
	Oslo	$13/year	400
	Stockholm	$4.50/day (first 30 minutes free not available)	80
	Brussels	N/A	400
Cemusa	Pamplona	$0.70/additional half hour	570
Callbike	Frankfort	$0.08/minute, $20/day	900
City of Copenhagen	Copenhagen	$4.00 to unlock and ride, refunded when bike is returned	400

Source: The New York Bike Share Project, "Explore Bike Share in Other Cities," [accessed May 2, 2008]

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Appendix C: Pedestrian Design Guidelines

Vision North San José provides detailed design guidelines for creating pedestrian friendly streetscapes that include recommendations for building facades, sidewalk widths and attractive streetscape elements. The Pedestrian Guidelines provided in this section serve to compliment the design guidelines of the Vision with a focus on design requirements for compliance with the Americans with Disabilities Act (ADA) and the California Manual for Traffic Control Devices (CAMUTCD), in addition to innovative treatments and design.

Signalized Intersection Enhancements

Crosswalks and Striping

Crosswalk Defined

The California Vehicle Code Section 275 defines a crosswalk as either:

1) That portion of a roadway included within the prolongation or connection of the boundary lines of sidewalks at intersections where the intersecting roadways meet at approximately right angles, except the prolongation of such lines from an alley across a street.

2) Any portion of a roadway distinctly indicated for pedestrian crossing by lines or other markings on the surface.

Notwithstanding the foregoing provisions of this section, there shall not be a crosswalk where local authorities have placed signs indicating no crossing.

At intersections, a crosswalk is effectively a legal extension of the sidewalk across the roadway. Crosswalks are present at all intersections, whether marked or unmarked, unless the pedestrian crossing is specifically prohibited by the local jurisdiction. At mid-block locations, crosswalks only exist if they are marked. At these non-intersection locations, it is the crosswalk markings that legally establish the crosswalk.

According to the California MUTCD, crosswalk markings provide guidance for pedestrians who are crossing roadways by defining and delineating paths on approaches to and within signalized intersections, and on approaches to other intersections where traffic stops. Crosswalk markings also serve to alert road users of a pedestrian crossing point across roadways not controlled by highway traffic signals or STOP signs.

As noted in the FHWA report "Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations," the California MUTCD does not provide specific guidance relative to the site condition (e.g., traffic volume, pedestrian volume, number of lanes, presence or type of median) where marked crosswalks should or should not be used at uncontrolled locations. Nor does the MUTCD give specific guidance on the application of crosswalk enhancement features such as high-visibility striping, advanced warning signage, or flashing beacons. While the California MUTCD allows the use of these devices, decisions on their specific applicability to a given location have historically been left to the judgment of the local traffic engineers. This section summarizes the various types of crosswalk-related markings, signage and enhancement treatments available for use in the North San José and provides more specific guidance and recommendations to assist city traffic engineers with future implementation.

Crosswalk Markings

Marked crosswalks serve to alert road users to expect crossing pedestrians and to direct pedestrians to desirable crossing locations. In addition to the standard and ladder pedestrian crosswalk styles, a third crosswalk marking style for multi-use trail intersections used in Berkeley, California is provided

as an example. This additional multi-use trail marking was developed in order to provide a separation between the pedestrian crosswalk areas and the bicycle crossing areas of the crosswalk.

Table C-1: Crosswalk Types

Style	Sample
Standard – Two solid white lines, 12 to 24 inches wide, spaced at least 6 feet apart (refer to CA MUTCD Sec. 3B.17). Also called "transverse."	
Ladder – Adds cross bar "rungs" to the standard crosswalk marking described above. Width of ladder lines should be 1 foot, with minimum spacing between ladder lines of 1.5 feet.	
School Crosswalks. Crosswalks within the designated school zone must be painted yellow, per California MUTCD. Can be marked either standard or ladder. The school zone can be set a distance up to 500 feet from the school boundary.	

Crosswalks should extend across the full width of intersections, or to the edge of the intersecting crosswalk, to encourage pedestrians to cross perpendicular to the flow of traffic. Crosswalk markings can be applied with paint or reflective thermoplastic material. At controlled crosswalk locations (STOP signs or traffic signals), crosswalk markings by themselves are considered sufficient treatment, given the presence of a traffic control to stop vehicles. At uncontrolled crosswalk locations (either uncontrolled intersections or mid-block locations), marked crosswalks can be enhanced with crosswalk signage, advance warning signage, in-pavement flashers, or flashing beacons. These additional crosswalk enhancements are discussed in more detail below.

The decision to install standard or ladder crosswalk markings depends upon a variety of factors such as the number of pedestrians crossing, traffic speeds/volumes, number of lanes to cross, presence of nearby schools or senior centers, and history of collisions. In general, standard transverse markings are considered appropriate at controlled intersections, minor uncontrolled intersections, and other crossing locations with low traffic volumes/speeds, short crossing distance, and good visibility. High visibility ladder markings are generally applied at uncontrolled or mid-block locations, especially on major streets with high pedestrian volumes, heavy traffic volumes and speeds, and more than one lane each direction.

Crosswalk Markings in School Zones

To alert drivers to the presence of a public or private school, crosswalks within the designated school zone must be striped yellow rather than white. The MUTCD stipulates that crosswalks directly adjacent to schools must be yellow. Crosswalks within 600 feet may be yellow, and under special circumstances crosswalks within a half mile may be yellow. Special signage should also be located near school crossings in accordance with the guidelines provided in Chapter 7 of the California MUTCD. This document provides guidelines for enhancing crossings where one of the major concerns is the presence of school-aged children

School Crosswalk

Signage

Crosswalk Warning Signage and Pavement Markings

The California MUTCD provides guidance on the installation of warning signage and pavement stencils at and in advance of uncontrolled crosswalks. These signs are only for use at uncontrolled locations, because at STOP, YIELD, or signalized locations the presence of the traffic control serves to regulate the crosswalk at those intersections. Signage and pavement markings to supplement crosswalks are not required, and in fact the California MUTCD notes that such signs should be installed in locations where crossing activity is unexpected or not readily apparent.

In advance of the crosswalk, if used, the Pedestrian Crossing sign plate W11-2 is installed. At the crosswalk location itself, the Pedestrian Crossing sign plate plus a downward arrow are installed to show the exact location of the crosswalk. White "PED XING" pavement markings may be placed in each approach lane to a marked crosswalk, except at intersections controlled by traffic signals or STOP or YIELD signs.

Special signage is required at and in advance of school crosswalks, also described in the California MUTCD. Unlike the

MUTCD Crosswalk Warning Signage

crosswalk warning signage for a normal (white) crosswalk, school crosswalk signage is mandatory. At each yellow school crosswalk, the School Crosswalk Warning Assembly B shall be installed, consisting of a School Warning plate (S1-1) plus downward arrow. In advance of each yellow school crossing, a School Advance Warning Assembly D shall be used, consisting of a school crossing plate plus "AHEAD." Yellow "SLOW SCHOOL XING" markings can be used in advance of uncontrolled school crosswalks, placed at least 100 feet in advance of the crosswalks.

High Visibility Signage

One way of increasing the visibility of pedestrian-related signage is through the use of a fluorescent yellow-green (FYG) background. Use of this FYG signage is approved by the California MUTCD for use on pedestrian, bicycle and school signs. When the FYG background is used for corridor or school-area signing, a systematic approach should be used, so that the mixing of standard yellow and fluorescent yellow-green is avoided. It is recommended that the City of Berkeley use FYG signs for all new pedestrian and school signage installations and as old signs are replaced.

Fluorescent Yellow-Green School Sign

Parking Restrictions

Painting red curb zones (NO PARKING) adjacent to marked crosswalks can greatly improve safety at crosswalk locations. Particularly at mid-block locations, if vehicles park too close to a crosswalk, they can screen pedestrians from the view of oncoming motorists. Red zone areas adjacent to crosswalks help to improve visibility, allowing pedestrians stepping out into the roadway to check for oncoming vehicle, and allowing drivers to better see pedestrians about to step off the curb. Providing adequate length of red zones adjacent to crosswalks also helps to prevent parked vehicle encroachment into the crosswalk, as can sometimes occur if a legal parking space is situated very close to a crosswalk.

Guidance:

At all intersections, one stall length on each side measured from the crosswalk or end of curb return should have parking prohibited. A clearance of six feet measured from the curb return should be provided at alleys and driveways.

At signalized intersections parking should be prohibited for a minimum of two stall lengths on the near side and one stall length on the far side. **Figure C-1** illustrates these MUTCD design standards.

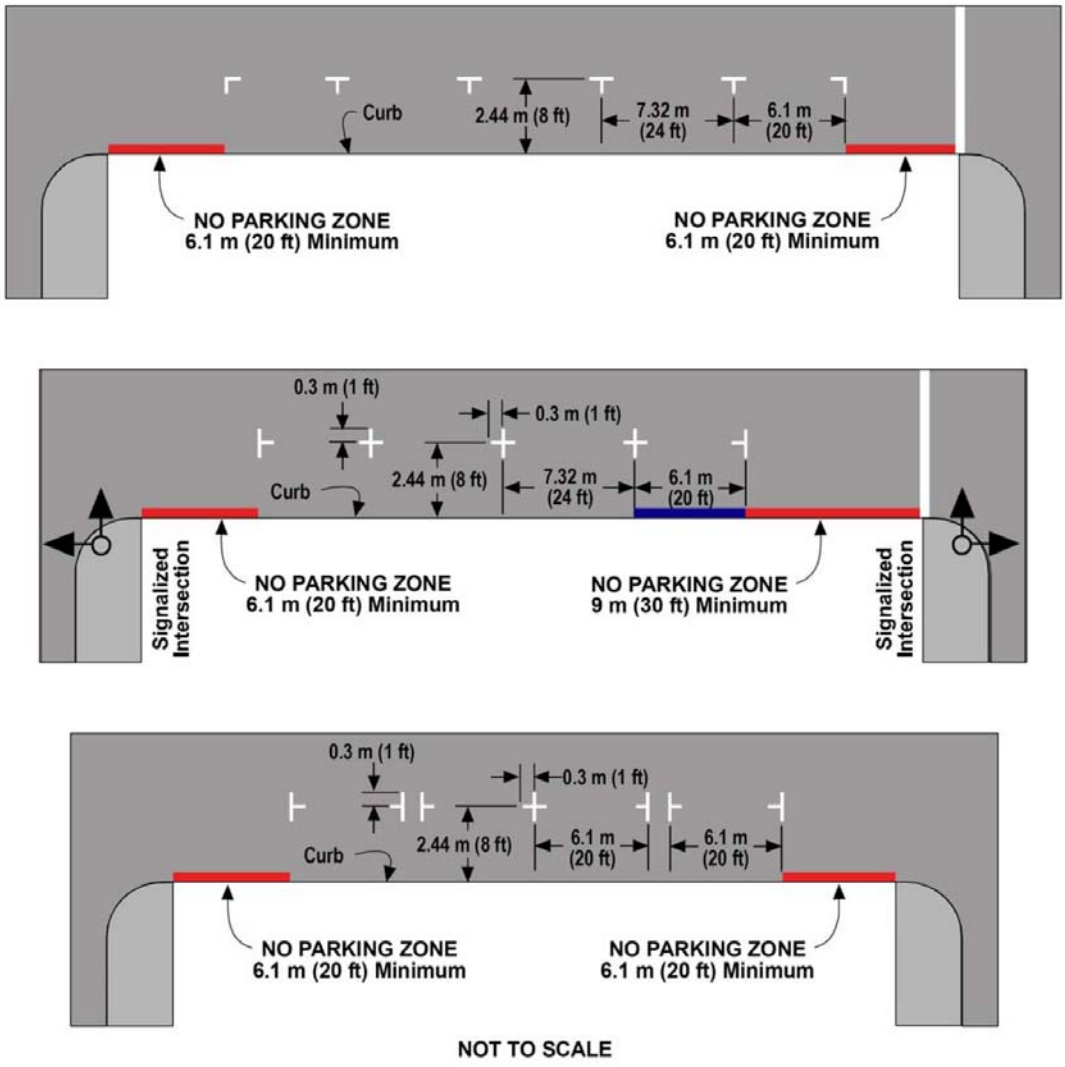


Figure C-1: Parking Restriction Specifications (MUTCD Figure 3B-18)

Signal Timing Adjustment

Traffic signal timing can have an effect on the ability of slower-moving pedestrians to safely cross the street. The length of the pedestrian clearance phase is determined by calculating a clearance interval, which is the length of time it takes a person to walk from the curb on one side to the center of the farthest travel lane on the other using a standard walking speed and distance. The standard walking speed used to calculate pedestrian clearance intervals recommended by the California MUTCD is four feet per second. However, where there are populations of pedestrians who walk more slowly, a lower walking speed should be considered in determining the pedestrian clearance time. Particularly where there are seniors or persons with disabilities, the MUTCD recommends a walking speed of 2.8 ft/sec. This recommendation may also be applied to locations near elementary schools, because young children commonly walk more slowly. Where signalized crossings are in

close proximity to North San José locations such as senior centers, senior housing, elementary schools, or centers generating significant volume of pedestrians with disabilities, walking speeds of 2.8 ft/sec should be utilized.

Special pedestrian phases can also be used to provide more crossing time for pedestrians at certain intersections. These include:

- Leading Pedestrian Interval (LPI) – At intersections where there are conflicts between turning vehicles and pedestrians, pedestrians are given a "walk" designation a few seconds before the associated green phase for the intersection begins.

- Pedestrian Scramble Phase – In areas with very heavy pedestrian traffic, an all-pedestrian signal phase gives pedestrians free passage in the intersection while no vehicle traffic is allowed. Pedestrian scramble phases are only recommend where pedestrian volumes are very high and should be used sparingly, given that the additional phase increases wait times for all modes.

Pedestrian Push Buttons

Pedestrian pushbuttons allow for actuation of pedestrian signals, and should be located at all intersection corners where pedestrian actuation is used. As required by the California MUTCD, pedestrian pushbuttons must be accompanied by signs explaining their use. Pedestrian pushbuttons should be easily accessible for those in wheelchairs and for the sight-impaired. This can be accomplished by locating them located approximately 3.5 ft. off the ground and provide a level surface to the push button. Pedestrian pushbuttons should not be used in locations where the pedestrian phase is set on a fixed cycle and cannot be actuated. One exception to this is the use of pushbuttons to activate audible pedestrian signals at non-actuated locations.

Countdown Signals

Countdown pedestrian signals provide information on the amount of time remaining in the pedestrian change interval, which can assist pedestrians in making safe crossing judgments. Guidance on the use of these devices is now included in the California MUTCD. It is recommended that the City of

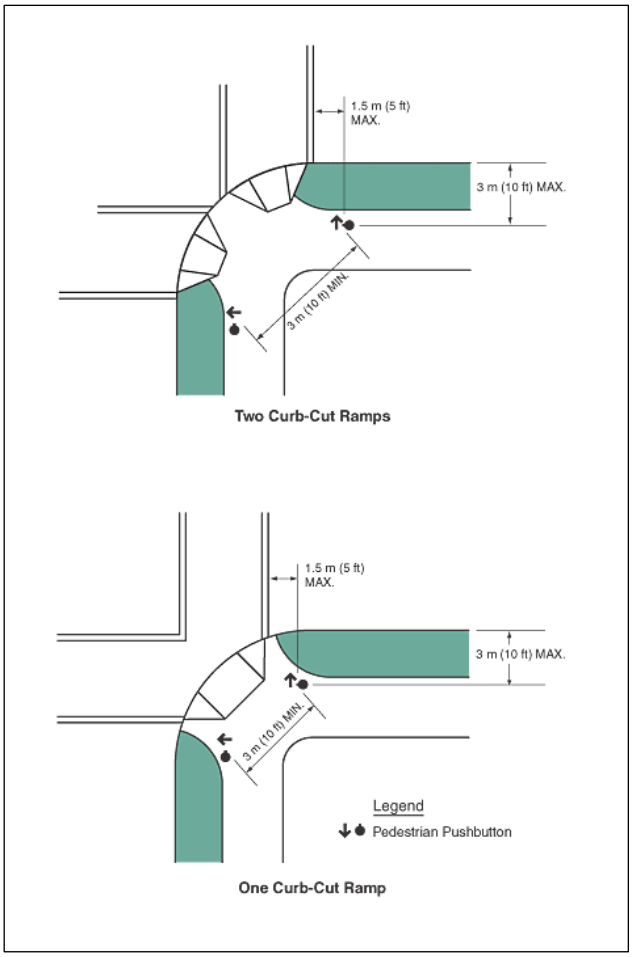


Figure C-2: Recommended Locations for Pedestrian Pushbuttons

San José install these devices on all new pedestrian signal installations in North San José.

Audible Signals

A variety of devices can be used to provide audible, visual and touch cues at pedestrian crossings. The most common is the audible pedestrian signal (APS) which emits audible tones to guide blind or visually impaired pedestrians. Some signals equipped with APS use different tones to indicate the direction of the crossing, using one sound for East-West crossings and another sound for North-South crossings. Other devices offer verbal information instructing the user when to cross or which direction to go.

Visually impaired pedestrians often have difficulty knowing about or locating pedestrian-activated control buttons. Some audible devices emit sound to help pedestrians locate the control buttons. Visual indicators also help partially sighted people find the control buttons. Some tactile devices use dots and lines to indicate how many lanes there are to cross, the direction of travel and the presence of a median. Vibrotactile devices also help people with visual impairments locate control buttons and vibrate to indicate the proper time to cross. New receiver-based systems provide audible information when triggered by a receiver carried by the pedestrian.

Pedestrian Push Button

No national guidelines have been established regarding the type of audible or vibrotactile devices to use. The best place to start using APS signals is at complex and wide intersections, followed by intersections with high pedestrian volumes.

Uncontrolled Crosswalk Improvements

Flashing Beacons

Pedestrian actuated flashing signs and beacons alert motorist of uncontrolled crosswalks,

Where the visibility of a crosswalk is poor, or where warranted by safety considerations, yellow flashing beacons can be installed to alert motorists to expect crossing pedestrians. Beacons can either be mounted on posts on the side of the roadway, or installed on mast arms over the roadway. Beacons can be set to operate at all times where the level of pedestrian activity along a corridor warrants, or can be set to be activated by pedestrians to only flash during the crossing time. All push-button activated flashing beacon locations should have "Cross with Caution" signs (R62-E) at every push button location.

When used to make motorists aware of school zones, flashing beacons should be timed to flash only during the

morning and afternoon school commute hours when children are present.

In-Pavement Flashing Light

The California MUTCD has approved the use of in-roadway warning lights at uncontrolled marked crosswalks. Also known as in-pavement flashing crosswalks, illuminated crosswalks, or "Santa Rosa lights," these lights are embedded just above the roadway surface and flash when activated (either by a pushbutton or by passive detection) by a crossing pedestrian, as shown in the figure to the right. The California MUTCD Sec. 4L.02 provides guidance on evaluating the need for in-roadway warning lights and offers standards for their placement.

Pedestrian actuated in-pavement flashers alert motorists of a crossing pedestrian.

Other Engineering Treatments

Bulb-Outs

Bulbouts, also called curb extensions, are engineering improvements intended to reduce pedestrian crossing distance and increase visibility. Curb extensions can either be placed at corners or at mid-block crosswalk locations, and extend out to about 8 feet to align with the edge of the parking lane, as shown to the right. In addition to shortening the crosswalk distance, bulb-outs serve to increase pedestrian visibility by allowing pedestrians to safely step out to the edge of the parking lane where they can see into the street, also making them more visible to oncoming drivers. At corners, bulb-outs serve to reduce the turning radius, and provide space for perpendicularly-aligned curb ramps. Where bus stops are located, bulb-outs can provide additional space for passenger queuing and loading.

Despite their advantages, bulb-outs can require major re-engineering of the street and are not appropriate for all situations. Installing bulb-outs can require costly drainage modifications, regardless whether drainage facilities exist at a curb or not. Bulbouts may not be possible in some locations due to existing driveways or bus pull-out areas. Bulbouts need to be designed to avoid conflict with bicycle facilities, and should never extend into a bicycle lane. Additionally, pedestrians using wheelchairs may find it difficult to access bulb-outs when exiting the driver's side of a parked vehicle.

Given their relatively high cost and challenges of implementation, bulb-outs are not recommended as a tool for widespread implementation along every street in the city. Each potential bulb-out location must be evaluated on a case-by-case basis, taking into account factors such as crossing volumes, parking lane widths, infrastructure challenges such as drainage or driveways, and locations of bus stops.

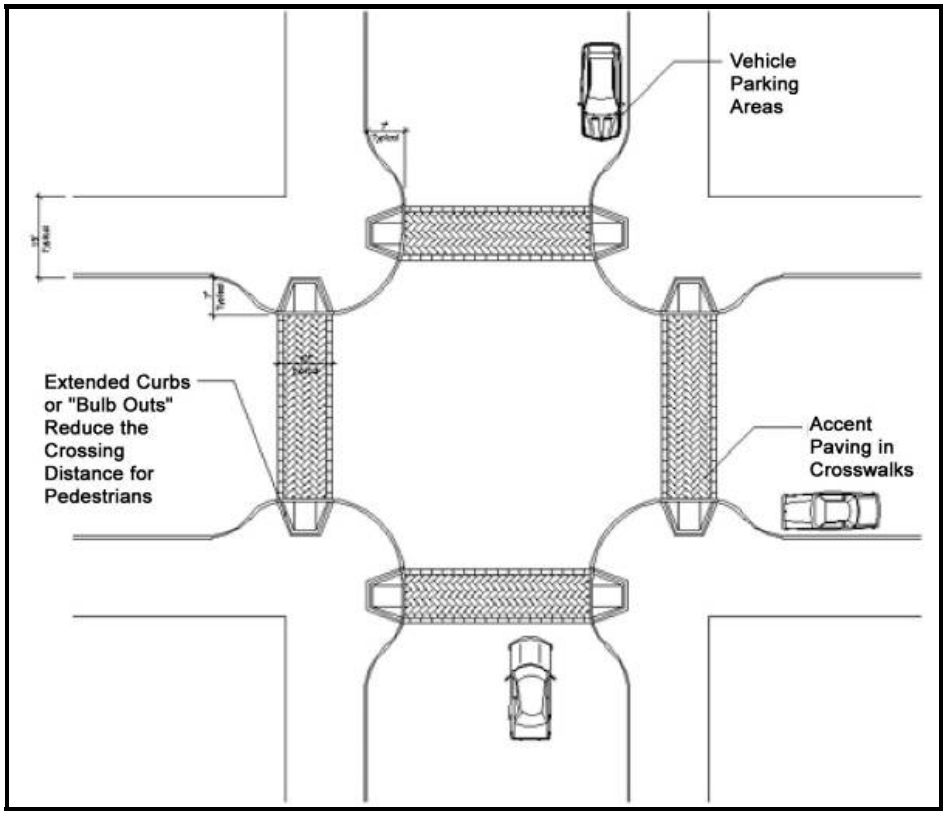


Figure C-3: Bulb-Out Diagram

Median Refuge Islands

On wide, multi-lane roadways, pedestrians can benefit from median refuge islands, which offer a place to wait after crossing only half of the street. Refuge islands increase the visibility of pedestrian crossings, and decrease pedestrian collisions by reducing pedestrian/vehicle conflicts, motor vehicle speeds, and exposure time for pedestrians.[1] They also allow pedestrians to consider cross traffic from one direction at time, making it easier to find a gap and simplifying crossing.

The MUTCD defines an island as an area between traffic lanes for control of vehicular movements or for pedestrian refuge. Under the MUTCD definition, a refuge island can be delineated by curbs (raised), pavement markings (painted), or other devices. The MUTCD does not give any specific guidance on minimum dimensions of a refuge island

The FHWA document "Pedestrian Accommodations at Intersections" advises that a refuge island should be a minimum of 4 feet wide and 12 feet long (or the width of the crosswalk, whichever is greater).[2] The Metropolitan Transportation Commission's Pedestrian Toolkit states that refuge islands should be a minimum of 4 feet wide and 8 feet long.[3]

[1] FHWA 2002b, p. 72
[2] Pedestrian Accommodation and Intersections, FHWA, http://safety.fhwa.dot.gov/ped_bike/univcourse/swless15.htm
[3] MTC Safety Toolbox http://www.mtc.ca.gov/planning/bicyclespedestrians/tools/pedRefugeIsland/index.htm

The recently revised ADA Access Board Guidelines on Accessible Public Rights of Way has a section on median islands.[4] The following guidelines are applicable:

Medians and pedestrian refuge islands in crosswalks shall contain a pedestrian access route, including passing space connecting to each crosswalk.

Regarding a minimum width for refuge islands, the guidelines state that medians and pedestrian refuge islands shall be 1.8 m (6.0 ft) minimum in length in the direction of pedestrian travel.

The guidelines permit both ramped up and cut-through design of refuge island, and advise that there are many factors to consider when deciding whether to ramp or cut-through a median or island. Those factors may include slope and cross slope of road, drainage, and width of median or island. They note that "curb ramps in medians and islands can add difficulty to the crossing for some users."

Medians and refuge islands are also required to have detectable warnings, with detectable warnings at cut-through islands separated by a 2-foot minimum length of walkway without detectable warnings.

For pedestrian refuge islands at intersections, installing a median "nose" (a small rounded area of median built to the intersection side of the crosswalk, so that the crosswalk passes through the median) can help to provide additional protection for pedestrians. Median noses can also prevent vehicles from encroaching into the refuge area when making left turns. However, median noses may not be feasible to install due potential to turning movement restrictions. Neither the MUTCD nor the ADA Access Board Guidelines have any requirement for median noses to be installed at intersection refuge islands.

Recommendation:

North San José has several major roadways with median refuge islands, including North First Street, Tasman Drive and Zanker Road. While these roadways have medians, they are not extended through the crosswalks at many intersections, thus requiring the pedestrian to leave the crosswalk to seek refuge on the medians. The City of San José should consider median nose installation on a case-by-case basis in North San José. Recommended locations are listed in **Appendix A: Table A-1.**

Curb Ramps

Curb ramps create a transition between the raised sidewalk and the crosswalk at street grade. Curb ramps are necessary for people who use wheelchairs or scooters, as well as people with strollers and rolling carts, but they benefit all pedestrians.

[4] http://www.access-board.gov/PROWAC/draft.htm#305

Two common curb ramp types for corners – diagonal and perpendicular curb ramps – are shown in Figure C-4 below. Perpendicular curb ramps are preferred for pedestrian safety because they align directly with the crosswalk. Perpendicular ramps take up more space, and in some cases due to site conditions, drainage, or utilities, installing two perpendicular ramps may not be feasible at a corner. In those cases a single diagonal curb ramp at the apex of the corner may be the only option. Diagonal ramps are less expensive to install, because they require one ramp per corner compared with two perpendicular ramps. However, diagonal ramps are not aligned directly with the crosswalk path of travel, and force wheelchair users and other pedestrians to travel a more circuitous route into the crosswalk.

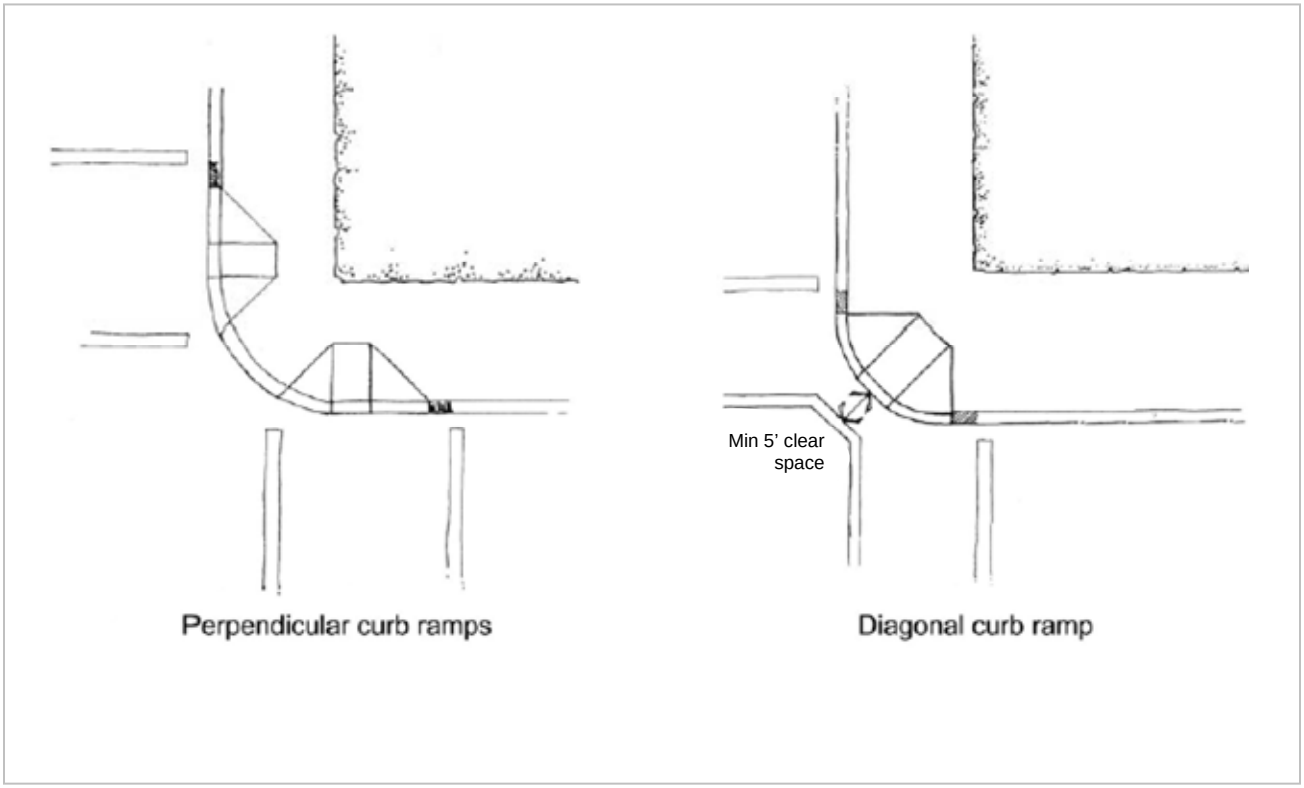


Figure C-4: Curb Ramp Designs

The Americans with Disabilities Act (ADA) recommends ADA-compliant curb ramps at all intersections. ADA Section II-5.3000 states that public entities must give priority to walkways serving State and local government offices and facilities, transportation, places of public accommodation and employees. More detailed curb ramp design recommendations and the City's curb ramp standard drawings are discussed below in the Accessibility Recommendations section.

The City of San José has a Sidewalk Accessibility Curb Ramp Program in place. The program takes requests from residents and prioritizes them by the criteria below.

1. Known routes used, and requests by persons with disabilities

2. Known locations in the walking route to school plans

3. Known routes to senior and community centers and around parks

4. Requests from the community

All newly constructed curb ramps are constructed to be ADA compliant. The City should adhere to this compliance and make perpendicular curb ramps standard barring engineering constraints in North San José.

Parallel Curb Ramps

Parallel curb ramps are two opposing ramps that slope down parallel to the direction of pedestrian travel. They are generally used on narrow sidewalks where inadequate space exists to install other ramp types. Parallel curb ramps can be useful in location with high curbs, as the ramps can be extended to ensure a gentle ramp grade without concern for right-of-way limitations. However, parallel curb ramps require pedestrians who are continuing along the sidewalk to ramp down and up.

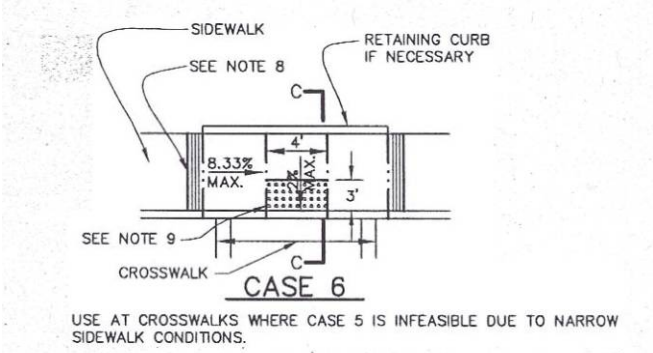


Figure C-5: Parallel Curb Ramp Design

Truncated Domes

Raised tactile devices alert people with visual impairments to changes in the pedestrian environment. They are used at:

- The edge of depressed corners
- The border of raised crosswalks and intersections
- The base of curb ramps
- The border of medians
- The edge of transit platforms where railroad tracks cross the sidewalk

Contrast between the raised tactile device and the surrounding infrastructure is important so that the change is readily evident. These devices are most effective when adjacent to smooth pavement so the difference is easily detected. The devices must provide color contrast so partially sighted people can see them.

Truncated domes alert visually impaired pedestrians of an upcoming roadway.

The ADAAG standards for detectable warnings are:

- Bottom diameter: 23mm (0.9 in)
- Top diameter: 10 mm (0.4 in)
- Height: 5 mm (0.2 in)
- Center-to-center spacing: 60 mm (2.35 in)
- Visual contrast: not specified

The US Access Board recommends:

- Visual contrast of at least 70 percent
- Width: 610 mm (24 in)

Location: 152 mm to 200 mm (6 in to 8 in) from the bottom of the ramp

Raised Tactile Devices Used for Wayfinding

In addition to use at curbs, raised tactile devices can be used for wayfinding along a pathway or across a road. This is particularly useful to visually impaired pedestrians in areas where the pedestrian environment is unpredictable. Complex intersections, roundabouts, wide intersections and open plazas are areas where raised tactile devices could be considered. No standards or guidelines for these devices have been adopted nationally. Raised devices with bar patterns can indicate the proper walking direction. Textured pavement that provides enough material and color contrast can be used to mark the outside of crosswalks, in addition to white paint or thermoplastic.

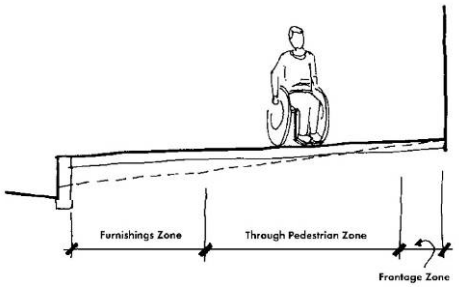
Currently the state of California is developing an evaluation and approval process which would result in specific standards for quality, colorfastness, and adhesion for detectable warning devices. Once adopted, this process would require that manufacturers of detectable warning products meet these standards in order to be certified.

Guidelines for Accessible Sidewalks and Pathways

ADAAG issues standards for "accessible routes," which include sidewalks and other pedestrian paths. The State of California Title 24 defines the term "sidewalk" as a surfaced pedestrian way contiguous to a street used by the public. Title 24 defines "walkway" as a surfaced pedestrian way not located contiguous to a street used by the public. The following guidelines apply to all three definitions.

Grade

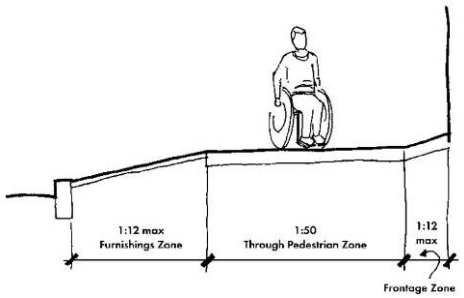
The grade of a sidewalk affects the issues of control, stability and endurance. Gentle grades are preferred to steep grades, allowing more people to go uphill, providing more control on the downhill, and minimizing loss of footing. The maximum grade of a sidewalk should be no more than 14 percent in any 2-foot section, while the running grade for a sidewalk should not exceed 5 percent, as shown in **Figure C-6**.



Raising the curb is one approach to maintaining the preferred cross slope.

The following terms apply to standards for grades:

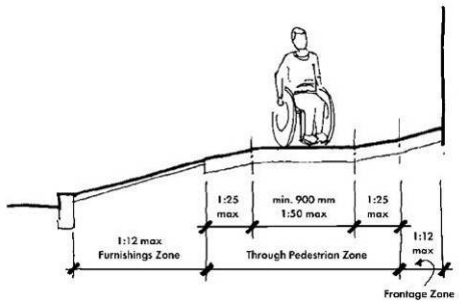
- Grade is the slope parallel to the direction of travel.
- Running grade is the average grade along an entire continuous path.
- Maximum grade covers a section of the sidewalk that is larger than the running grade. It is measured over a two-foot section.
- Rate of change is the change of the grade over a distance of two feet.
- Counter slope is the grade running opposite to the running grade.



The Furnishings Zone and the Frontage Zone may be sloped more steeply, provided the preferred cross slope is maintained in the Through Passage Zone.

Cross-Slope

Cross-slope describes the angle of the sidewalk from the building line to the street, perpendicular to the direction of travel. All sidewalks require some cross-slope for drainage, but a cross-slope that is too great will present problems for people who use wheelchairs, walking aids, or who have difficulty walking but do not use aids. The maximum cross-slope should be no more than 2 percent (1:50) for compliance with ADAGG, as shown in Figure C-6.[5]



If necessary, the Through Passage Zone may contain slopes up to 1:25, provided a 3'-0" wide area with a cross slope of no more than 1:50 is maintained within the zone.

Figure C-6: Cross Slope

If a greater slope is anticipated because of unusual topographic or existing conditions, the designer should maintain the preferred slope of 1:50 within the entire through passage zone, if possible. This can be accomplished either by raising the curb so that the cross-slope of the entire sidewalk can be 1:50, or by placing the more steeply angled slope within the Furnishings Zone and/or the Frontage Zone, as shown in **Figure C-6.**

[5] ADA Accessibility Guidelines, 4.3.7

If the above measures are not sufficient and additional slope is required to match grades, the cross slope within the Through Passage Zone may be as much as 1:25, provided that a 3-ft wide portion within the Through Passage Zone remains at 1:50 cross slope, as shown in **Figure C-6.**

Width

For newly constructed sidewalks, current standards generally accommodate the space needed for pedestrians in wheelchairs or using other assistance devices. The City of Berkeley requires a minimum 6-foot clear space be maintained on sidewalks. A through passage zone of six feet provides adequate space for two wheelchairs, or for a person to walk comfortably next to a person in a wheelchair.

Vertical Clearance

Vertical clearance is the minimum unobstructed vertical passage space along a sidewalk. The minimum vertical clearance for a sidewalk is 80" high. It is limited by such impediments as tree branches, signs, awning, and building overhangs. Vertical clearance must not present hazards to pedestrians, especially those with visual impairments.

Changes in Level

Changes in level are the vertical height transitions between adjacent surfaces. Changes in level can trip walkers and catch the casters of wheelchairs. These changes can be cause by such conditions as:

- Sidewalk cracks
- Curbs without ramps
- Drainage gates
- Buckled bricks
- Grooves in the surface
- Heaving due to tree roots
- Lips at the edges of curb ramps & driveways
- Railroad tracks
- Steps
- Tree grates
- Transitions between streets, gutters and ramps

Changes in level up to 1/4 inch do not require an edge treatment. Changes in level between 1/4 inch and 1/2 inch should be beveled with a slope no greater than 1:2, as shown in Figure 22. Any change in level greater than 1/2 inch requires maintenance to reduce the change in level. If a change in level is greater than ½ inch where a passage of travel passes over a curb, a curb ramp is required.

Grates and Hatch Covers

Grates and hatch covers should be located in the furnishings zone of a sidewalk, outside of the through passage zone. Grates are frameworks of latticed or parallel bars, such as tree wells or

drainage inlets that permit water and small debris to fall through. Grates can cause people to trip, and can catch wheelchair casters, crutches and canes.

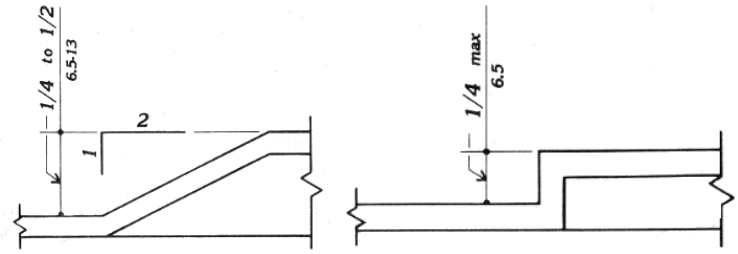


Figure C-7: Grate and Hatch Cover Design

All grates within the sidewalk should be flush with the level of the surrounding sidewalk surface, and should be located outside the through passage zone. Ventilation grates and tree well grates should have openings no greater than 1/2 inch in width. If gratings have elongated openings, they should be placed so that the long dimension is perpendicular to the dominant direction of travel.[6]

Hatch covers must have a surface texture that is rough, with a slightly raised pattern. The surface should be slip-resistant even when wet. The cover should be flush with the surrounding sidewalk surface.

Driveway Crossings

Driveway crossings present constant challenges for disabled pedestrians. Driveway crossings on sidewalks should be minimized. Where necessary, driveways should be designed to ramp down on the street side of the sidewalk while maintaining all guidelines for sidewalk slopes. Where driveways have been built with ramps in the sidewalk path, reconstruction to maintain the proper slope of the sidewalk is preferred. Short of this, driveways can be designed like parallel curb ramps, where the entire driveway slopes before it crosses the sidewalk and the sidewalk is then ramped down to the street level.

Light Rail Crossings

Light rail crossings are challenging for pedestrians to cross, especially for pedestrians with physical, visual and auditory impairments. Pedestrians must judge how much time they need to cross light rail tracks in front of an oncoming train. In addition, the tracks present a challenge for pedestrians with physical impairments to cross. These challenges can be minimized through a variety of design treatments that are illustrated in **Figure C-8**. Truncated domes can be installed leading up to the tracks. Railings can be installed on both sides of the pedestrian pathway next to the truncated dome pad. Railings will provide support for impaired pedestrians and discourage unauthorized crossing of the trackway. Pedestrian warning signs can be installed on the pedestrian pathway and between parallel trackways.

[6] ADA Accessibility Guidelines, 4.5.4

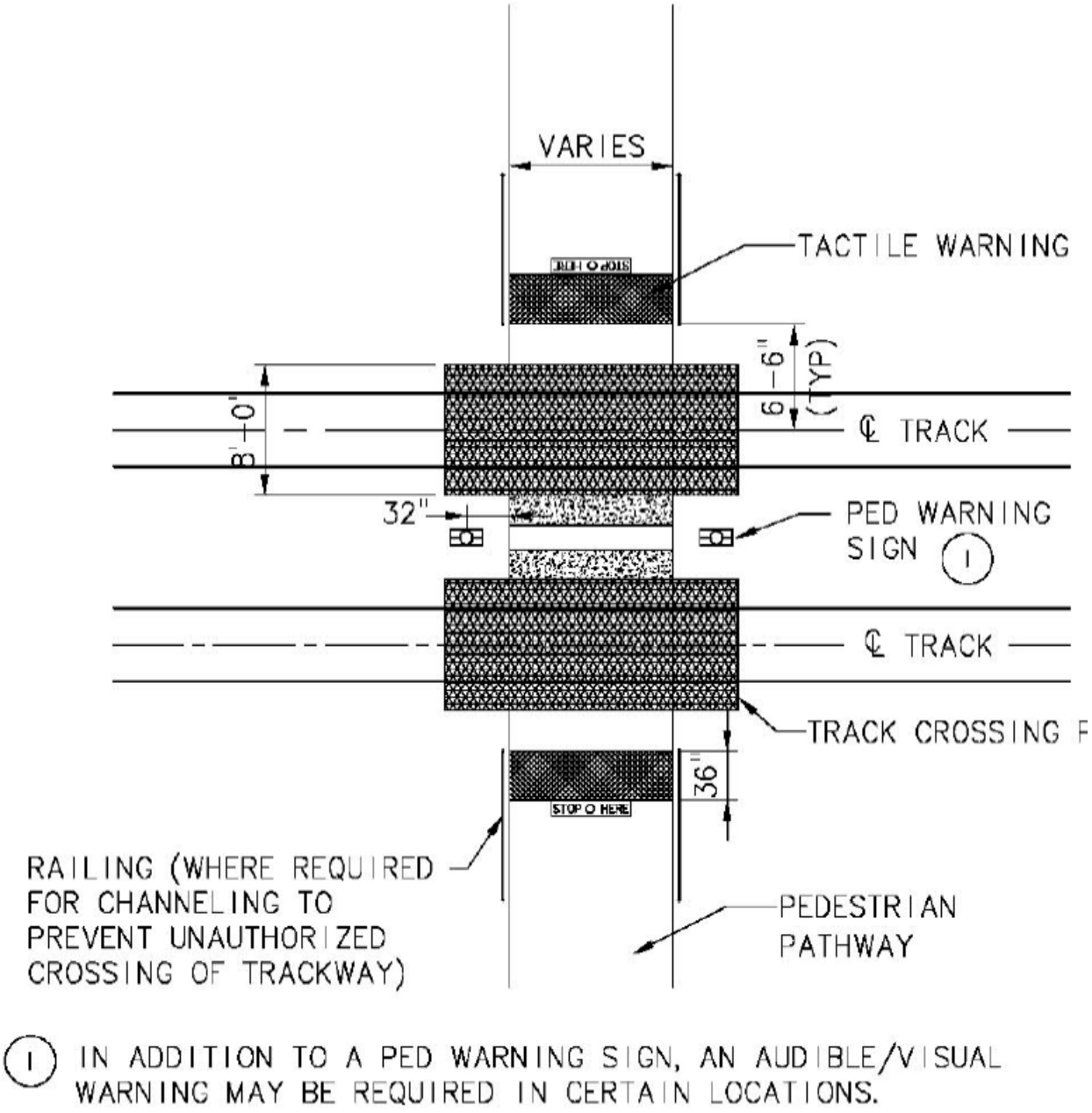


Figure C-8: Light Rail Track Crossing Design[7]

[7] Crossings and Shared Corridors: Safety Criteria for Light Rail Pedestrian Crossings, Transportation Research Circular E-C058.

Appendix D: Proposed Land Use for North San José

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Figure D-1: Existing and Proposed Land Use with Proposed Bikeways