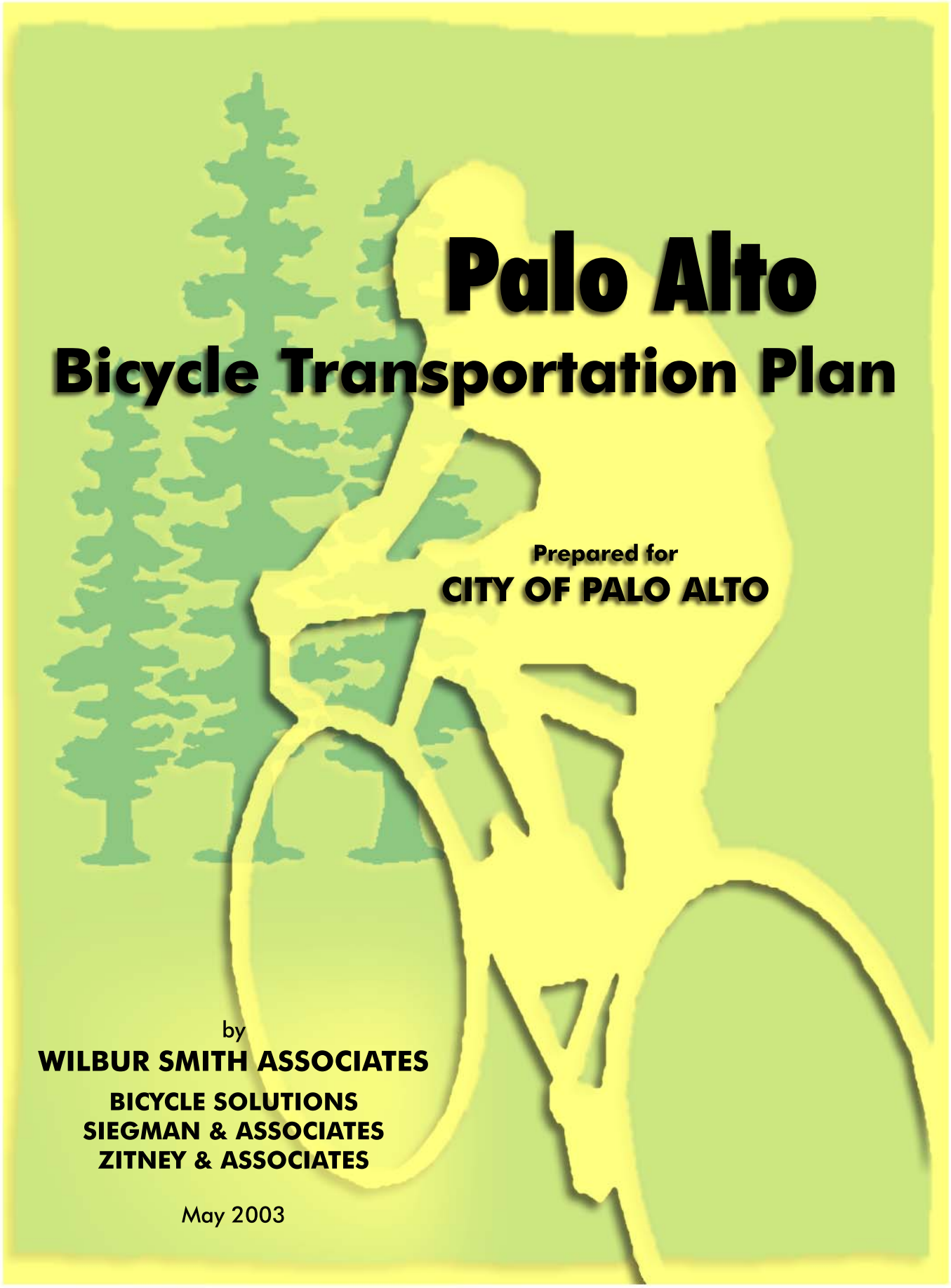

Palo Alto
Bicycle Transportation Plan

Prepared for
CITY OF PALO ALTO

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INTRODUCTION AND BACKGROUND

A. INTRODUCTION

The City of Palo Alto is a community with an estimated population of 61,000 residents, located approximately 35 miles south of San Francisco in Santa Clara County. The City lies in a relatively flat area with the San Francisco Bay to the east and the coastal range to the west. Over half of the city's land area is devoted to parks and open space. The built area is largely developed with single family neighborhoods, 17 public schools, a major research park and regional shopping center and commercial districts. See the City's Land Use map in Appendix B. With its walkable neighborhoods and thriving Downtown, Palo Alto still maintains many qualities of a small city.

The city's transportation system is essentially formed by a grid network of streets. Two freeways form barriers at the outer edges of the City, Highway 101 on the eastside and Interstate 280 on the westside. In addition, several major arterials provide for cross-city circulation including El Camino Real, Foothill Expressway, Alma Street, Middlefield Road, Embarcadero Road, Page Mill/Oregon Expressway and Charleston Road. The City is also crossed by several creeks draining from west to east. Finally, the Caltrain railroad right-of-way, runs east of and parallel to Alma Street. All of these transportation corridors present obstacles to bicyclists. Fortunately, many of these barriers have been spanned with bridges or tunnels so that bicyclists can cross.

All in all, from a bicyclist's perspective, Palo Alto is an excellent place to ride. First, its level terrain and quiet tree-shaded side streets offer comfort and safety. The temperate climate makes year round biking possible. Lastly, the size of the city makes practically all parts of the City accessible by all residents within a 30 minute ride.

This Bicycle Plan lays out specific recommendations that will provide the City with an attractive transportation alternative to the automobile. This plan addresses the many and various aspects of planning and infrastructure that affect bicycling mode choice including existing bikeways, recommendations for new bikeways, bicycle and pedestrian accident analysis, bicycle education and safety programs, bicycle parking, and design considerations for bicycle facilities.

The Palo Alto Comprehensive Plan calls for the development *and periodic update* of a comprehensive bicycle plan. It is not intended to be a static plan; it should evolve over time. It is recommended that this Plan be reviewed and updated every one to two years to reflect the implementation of new bike facilities or programs, further feasibility studies for specific recommended projects, and/or new policy direction approved by the City Council.

B. RELATIONSHIP TO OTHER PLANS AND STUDIES

This section describes the current transportation background and context for the bicycle plan. It briefly reviews and summarizes recent city documents and describes their relevance to the bicycle plan.

The Comprehensive Plan and Municipal Code

As "the primary tool for guiding the future development of the City," Palo Alto's recently adopted **Comprehensive Plan for 1998-2010** provides the policy framework within which the Bicycle Plan must be developed. As primary goals of transportation policy, the Plan includes *less reliance on single-occupant vehicles; facilities, services and programs that encourage and promote walking and bicycling; a transportation system with minimal impacts on residential neighborhoods;* and *a high level of safety for motorists, pedestrians and bicyclists on Palo Alto streets.* As the Introduction notes, it *includes specific provisions to reduce the dominance of the automobile in street design and other major public spaces.* The most relevant policies and programs regarding bicycling and walking are found on pages 1 to 7, 9 to 18 and 22 to 23 of the Transportation Element.[1] A Bikeways Map in the Plan also documents existing and proposed routes and connections.

The Transportation Element points out that on a typical day in 1995, some 600,000 one-way car trips were made in the Palo Alto/Stanford area, with an additional 150,000 daily trips made by car pool passengers, public transit riders, bicyclists, and pedestrians. Some ninety percent of the car trips either originate or end in Palo Alto or Stanford. The Plan concludes that "Palo Alto and Stanford are thus responsible for most of the travel in the area and can influence future traffic conditions through their policies." But the challenge of reaching the City's goals of increasing bicycling and reducing automobile use, while simultaneously providing additional housing and economic vitality, should not be underestimated. It will require implementing many of the substantial changes to transportation policies and planning codes that are contemplated in the Comprehensive Plan. Otherwise, it is quite possible that the past decade's trend of increasing auto traffic levels and declining bicycle use in Palo Alto will continue.

The **Comprehensive Plan Update Final Environmental Impact Report (EIR)** highlights the conflicts for bicyclists that would result from carrying out the Comprehensive Plan if no substantial changes to current planning and transportation practices were made. The Comprehensive Plan correctly points out that "low-density land use patterns generally dictate the use of an automobile, while higher density and mixed use patterns generally translate into higher transit usage and pedestrian activity. Palo Alto will recognize the relationship between transportation and land use and will promote a land use pattern that supports walking, bicycling and reduced dependence on cars." In support of this goal, and to meet other City goals, the policies, programs and specific land use designations of the Comprehensive Plan allow for additional development. The EIR traffic analysis estimates this could reach approximately 2500 new housing units and 3,000,000 square feet of non-residential development by the year 2010. Assuming no major changes to current policies, this would result in an additional 37,000 car trips per day generated by Palo Alto and Stanford - or a 6.9% increase over current levels. Traffic level increases expected on some major streets range from 16% to 34% with, for example,

[1] Policies T-1 through T-3, T-5, T-14 through T-23, T-25, T-27, T-28, T-39 and T-40 provide specific direction on policies regarding bicycling and walking, while Programs T-1 through T-5, T-18 through T-33, T-46 and T-47 outline specific actions.

University Avenue traffic increasing from 26,120 to 30,200 vehicles per day; El Camino from 42,900 to 57,500 per day, and Embarcadero from 26,800 to 33,400 per day. Thus, without policy changes to reduce auto trips, cyclists will perceive both riding along and crossing major streets to be less pleasant and more difficult due to the increasing traffic.

If the traffic increases described in the preceding paragraph (that is, the predicted results of the EIR traffic analysis for adding 2500 new housing units and 3,000,000 square feet of development, without significant policy changes), then implementing bicycle improvements on major streets, or other traffic calming measures proposed in the Comprehensive Plan's residential arterial traffic calming program, would become more difficult, since replacing travel lanes with bike lanes would be more likely to lead to traffic congestion and diversion of traffic to local residential streets. To mitigate the auto congestion, several major street intersections would need to be widened resulting in removal of existing bicycle lanes and/or wide curb lanes and increased complexity for cyclists. The EIR spells out in more detail the proposed modifications, the traffic monitoring programs that Palo Alto has established for these intersections, and the level of traffic delay that would trigger construction of each intersection modification. On local and collector streets, "cut-through traffic and its associated potential safety problems would be likely to increase in neighborhoods that are already experiencing these problems." Generally, the EIR finds that, "Increased traffic assumed in 2010 with the Comprehensive Plan Update would result in an overall adverse impact to bicyclists."

To avoid this potential traffic increase, however, the City is embarking on several new programs and policy reforms, and the Bicycle Plan recommendations will be able to inform several of them. The City has made a top priority of revamping the **Municipal Code** to align it with the goals of the Comprehensive Plan. The City's existing code, much of it originally written in the 1950's and 1960's, was largely designed to create conventional single-use, automobile-oriented developments. The code's minimum off-street parking requirements, for example, while allowing reductions for providing extra bicycle facilities, are based largely on the assumption of "one person, one car," assuming free parking, no financial incentives for cyclists or transit users, little or no transit service, and a requirement to provide for "worst-case" parking demands to avoid the possibility of parked cars overflowing onto neighborhood streets. By contrast, cities seeking to reduce auto trips and increasing bicycling and transit use often substantially reduce parking requirements while requiring parking cash-out programs for non-drivers. They may institute maximum parking requirements or area-wide parking caps, and prevent "spill-over" parking problems by instituting residential parking permit systems where necessary. Since the parking required by zoning codes often represents a city's single largest investment in transportation infrastructure, attention to them is a key component of reducing traffic and increasing bicycle use.

The code also contains Palo Alto's existing requirements for bicycle parking and support facilities, such as showers. These apply to new uses in buildings and enlargements of existing uses, with some exceptions for buildings in parking assessment districts.

Studies Regarding Palo Alto Bikeways

The **Citywide School Commute Safety Study** documents another important effort to improve bicycle and walking conditions. The **Phase 1 Study** of August, 1996 focused on seven schools in the north part of Palo Alto and adjacent unincorporated Santa Clara County (Nixon and

Escondido Elementary Schools). It documented detailed observation of school commute patterns and recommends physical and traffic engineering solutions for improving bicycle and pedestrian safety. The City's existing bicycle and traffic safety education efforts (for both parents, children and the general public) are also described, and improvements for these programs are recommended. Most of the recommendations have been implemented in full or in part, such as improvements to the bike lanes on Channing, Newell and Churchill Avenues, circulation improvements at Duveneck School. Other improvements, including those requiring cooperation with other agencies such as Caltrans and Santa Clara County, are yet to be approved. The **Phase 2 Study,** focusing on the ten schools in south Palo Alto began in 2002 and is expected to be completed in the Fall 2003.

The **1976 Bicycle-Pedestrian Deficiency Study** remains a highly useful review of barriers to bicycle travel in Palo Alto, and potential solutions for them. While many have been successfully resolved - by, for example, the construction of the Waverley and Alma Street bridges over San Francisquito Creek - others remain. With bicycle projects now eligible for many federal and state funding streams that were off-limits in 1976, remaining barriers (such as the scarcity of east/west crossings of Alma Street and the Caltrain tracks) may be overcome.

The **Citywide Stop Sign Map** is helpful in documenting all stop signs in Palo Alto. The City's guard-and-go policy of placing stop signs every other block on local residential streets (with additional stop signs often added in response to complaints of speeding vehicles) is helpful in discouraging through motor vehicle traffic, but also heavily deters bicycle use. With stopping for each stop sign requiring roughly the same effort as pedaling an additional 500', the stop sign map shows that bicycling on, for example, Hawthorne Street from Alma to Middlefield is only half a mile in actual distance, but with five stop signs, requires time and effort equivalent to pedaling a full mile.

San Francisco Bay Trail Plan: The main route of the **San Francisco Bay Trail** is complete in Palo Alto, but various "spur" trails are planned to be designated by adding existing Baylands trails onto the route. This appears to involve little or no new construction of actual facilities.

Traffic Calming Studies: Neighborhood traffic calming projects can provide important opportunities to add bicycle boulevard segments or other improvements for bicycling. The **Downtown North Traffic Calming Study** offers an early opportunity to incorporate an east-west bike boulevard segment. Several traffic calming alternatives for this neighborhood (which is bounded by Alma Street, Middlefield Road, San Francisquito Creek and Lytton Avenue) are being evaluated by the City, and the Bike Plan considered this effort to maximize benefits for bicyclists. Funding for a trial of the Downtown North Traffic Calming project was approved by the City Council at its budget meeting in June 2001. When the six-month trial is implemented in 2003, this project may offer an early opportunity to incorporate a portion of an east-west bike boulevard segment on Everett, extending from Alma to Middlefield. However, the current Downtown North Traffic Calming project does not include a bicycle boulevard. Thus, additional study of this possibility would be required.

The **Palo Alto Medical Foundation/South of Forest Avenue (PAMF/SOFA) Coordinated Area Plan Phase 2** is currently underway. It is intended to develop planning policies and development regulations for approximately 50 acres south of Forest Avenue. Regarding

bicycling, there are two chief recommendations of interest. The first is to convert the existing one-way traffic circulation pattern of Homer and Channing Streets back to two-way circulation, and to develop a bicycle route between the Bryant Street Bicycle Boulevard and the planned Homer Avenue Railroad Undercrossing. The suggested new bicycle route is Homer Avenue, "or as otherwise recommended by the Palo Alto Bicycle Advisory Committee."

The second is to support the construction of a Homer Avenue Railroad Undercrossing, which would connect the area to the new Medical Foundation buildings on the west side of the Caltrain tracks. The **Homer Avenue Crossing Feasibility Study** (Steven Grover & Assoc., November 1998) is a thorough feasibility study of overhead, at-grade and underpass options for this crossing. It was completed as part of the PAMF/SOFA plan, and is included as Appendix F of that plan. The City has secured $5.0 million in federal, state and local funding for design and construction. The design is complete and the project is scheduled for construction in Summer 2003. Steven Grover & Associates is now also conducting a similar **California Avenue Crossing Feasibility Study** to explore the options for replacing or improving the existing bike/pedestrian undercrossing.

The Santa Clara Valley Transportation Authority is currently developing a **1996 Measure A Program Caltrain Plan** which will include improvements to train service, and also to train stations within Palo Alto. For Americans with Disabilities Act (ADA) compliance, an at-grade crossing is proposed at the Palo Alto Station, which would ease access to the BikeStation. Similarly, the plan may fund improvements to or replacement of the California Avenue undercrossing, in order to comply with ADA.

A **University Avenue Intermodal Transit Station Conceptual Plan** following up on the 1993-94 "Dream Team" design study which addressed the area bounded by Alma Street, El Camino, Embarcadero and San Francisquito Creek, was completed and adopted by the City Council in March 2002. A major focus is to transform the awkward University Avenue/Alma Street/Caltrain underpass and looping roadways, in order to create a community gathering place and better and safer bicycle, pedestrian and vehicle circulation between the train station, downtown Palo Alto and Stanford University and Stanford Shopping Center.

The **Master Schematic Design Study for El Camino Real,** funded by a demonstration planning grant from the Caltrans Office of Community Planning, began in 2001 and will be completed in Summer 2003. The demonstration project will explore alternative road designs for El Camino Real that balance the needs of all travel modes, including people walking or riding bicycles on the street or crossing the street, transit riders, as well as local and regional vehicular traffic. The concept of installing bike lanes on El Camino Real is a key issue in this study.

Studies by Other Agencies

Santa Clara County and Stanford University prepared the **Stanford Community Plan** and **General Use Permit** (GUP), adopted December 12, 2000, to govern development on the campus lands in unincorporated Santa Clara. This plan continues the 1989 GUP goal of "no net new commute trips." The GUP will be effective for a minimum of 10 years[2]. The GUP permits

[2] Unlike California's public universities, which by law may not spend educational funds on parking, Stanford has traditionally heavily subsidized student and employee parking, resulting in higher auto usage and lower bicycling rates. However, the parking

2,035,000 net square feet of new academic and academic support uses, 2000 new student housing units, 350 new housing units for postdoctoral fellows and medical residents, 668 new housing units for faculty and staff, and 2300 new parking spaces.

No bicycle facilities or accommodation on roadways are required under the General Use Permit. Mitigation Measure TR-6B (Stanford Community Plan Mitigation Monitoring & Reporting Program, page 14-12) does state that:

"*Stanford shall be required by the County to prepare site-specific traffic studies for large projects allowed in the GUP development. These projects will potentially include, but not be limited to: redevelopment of Escondido Village that exceeds 100 units (including but not limited to housing along El Camino Real adjacent to Escondido Village), West Campus and Lagunita faculty/staff housing development, the Performing Arts Center, the sports arena expansion, Stanford Avenue housing, and major parking structures, among others. These traffic studies will address traffic generation, trip distribution, project access, safety and the effects of the project on nearby streets and intersections, pedestrian and bicycle facilities, parking, transit, and other facilities as deemed appropriate by the County Planning Office.*"

However, in the past, the County Planning Office has not required bicycle facilities or accommodation on roadways of any kind.

The Community Plan sets a non-binding goal of "no net new trips" as a traffic mitigation. If trip reduction monitoring does determine that Stanford commute trips are increasing, then Stanford would be required to contribute to the cost of widening several intersections (listed on page 14-9 of the Stanford Community Plan Mitigation Monitoring & Reporting Program). Traditionally, these "Intersection Capacity Enhancements" under the Stanford General Use Permit were often accomplished by removing bicycle lanes and/or shoulders: the Junipero Serra/Campus Drive West expansions, and the widening of Arboretum from Palm to Quarry, are two examples. Palo Alto may wish to consider requesting that future widenings not be accomplished through the removal of bicycle facilities.

VTA Bicycle Plan

The Valley Transportation Authority has developed a countywide bicycle plan. An integral part of this plan is the identification of 16 cross-county corridors. Five of these corridors pass through Palo Alto. Projects along the cross-county corridors will receive extra points in the evaluation system that the VTA uses to rate projects for funds they administer. These routes through Palo Alto are depicted in Figure 1.

and commute trip limits in the General Use Permits have given the University strong incentives to promote bicycling and other alternatives to driving, leading to somewhat reduced parking subsidies, and to the University's Clean Air Credit program, which pays employees and commuter students up to $90 per year in cash for *not* driving to campus.

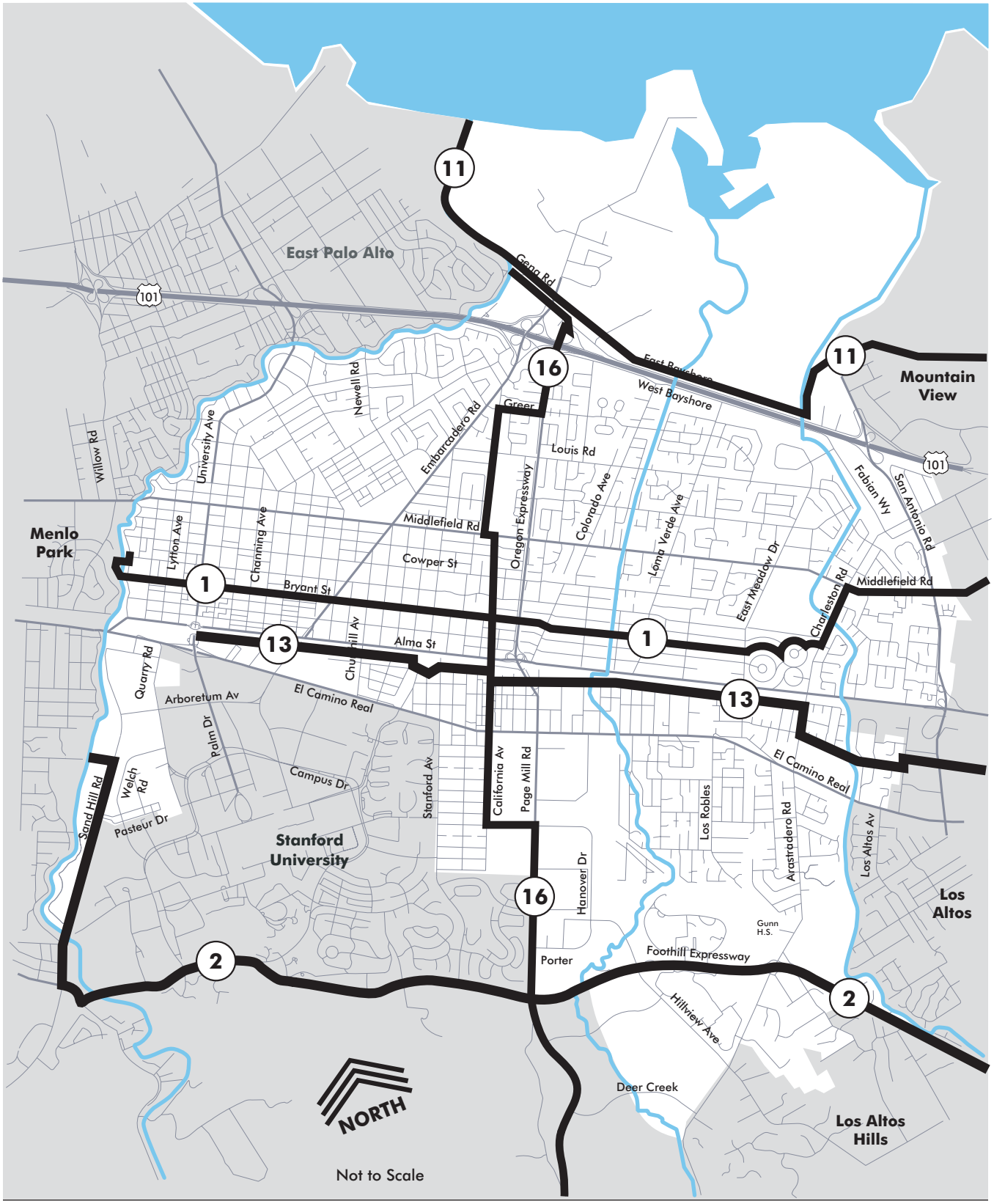


Figure 1
VTA CROSS COUNTY BICYCLE CORRIDORS IN PALO ALTO

C. AGENCY AND PUBLIC INPUT

The study process included extensive community input from adjacent jurisdictions, stakeholder groups including the Palo Alto Bicycle Advisory Committee, Palo Alto Unified School District and PTA, direct input from cyclists at local bike stops and via on-line input, and at a community workshop. The draft Plan was reviewed by the Palo Alto Bicycle Advisory Committee, City/School Traffic Safety Committee and the Palo Alto Planning and Transportation Commission.

Regional Coordination

The WSA Team contacted staff members of adjacent jurisdictions to determine the locations of existing bicycle routes that abut the City of Palo Alto and also to determine opportunities for to facilitate inter-jurisdiction bicycle travel. These comments are summarized below:

Menlo Park - Ken Rafanan City Traffic Engineer

1. Willow bridge needs to be replaced, funding is secured
2. San Mateo Drive bridge was replaced, in July 1999
3. Alma Street bridge was built in July 1997
4. Menlo Park recently repaved Middlefield from Willow to Ravenswood and added bike lanes by narrowing travel lanes, (spot widening), now only Middlefield in Palo Alto needs bike facilities
5. Will send a map of Menlo Park's bike ways
6. Menlo Park does not have bike counts or mode splits
7. There may be opportunities to cooperate in safety education somehow.
8. Menlo Park currently contracts with Safe Moves to conduct presentations and rodeos a couple times a year, although not part of school curriculum, these do take place during the school day.

Los Altos - David Donahue City Traffic Engineer

1. City boundary with Palo Alto is Adobe Creek;
2. 25 years ago, Los Altos built a bridge and Palo Alto built a path through to Arastradero, so the connection is there.
3. Only other connections are El Camino Real (a state highway) and Foothill Expressway (a county road).
4. No other planned or potential projects that affect both cities that he knows of.

Mountain View - Dennis Belluomini

1. The new San Antonio Caltrain station is also used by South Palo Alto residents. The easterly (southerly) undercrossing is used by up to 125 people a day (day light hours).
2. A new undercrossing on the westerly (northerly) side would serve Palo Alto residents and the bike lanes on Showers Drive

3. Wilkie Street bridge connects Mountain View with Palo Alto - there are signs on the Mountain View side.
4. Middlefield also connects the two cities and there are bike lanes on Middlefield in Mountain View and Palo Alto at the border.

East Palo Alto - Ellen Ellsworth, City Traffic Engineer (meeting 11/5/99)

1. There are now existing bike lanes on University Ave between Donohoe and the railroad tracks, and proposed bike lanes from Donohoe west to city limit; no other existing bike lanes in the city of East Palo Alto.
2. Safety of the University Avenue overcrossing will improve with:

- Planned rebuilding of the loops in the southwest quadrants (and removal of loops in the northwest quadrant) is scheduled for spring or summer of the year 2000. New design will improve pedestrian (and bicycle safety) on the northwest side since all ramps will intersect only the southwest side. Bicycle proceeding straight eastbound over the overcrossing will involve negotiating the new ramps design with double right-turn lanes.
- The city is planning to apply for a grant to construct a westbound bike lane and a pedestrian pathway on northside of overcrossing, which is felt to be more pleasant and safe than the existing sidewalk on the north side. No plans for pedestrian access on the southside of the overcrossing or eastbound bike lane on the southside of the overcrossing.

3. Redevelopment in the southeast corner - Gateway Development. City traffic engineer thinks that a pedestrian-bicycle overcrossing was considered but rejected due to lack of adequate space for touchdown and connections to major streets.

Summary of Public Input

The WSA Team solicited input from individuals and agencies with an interest in bicycle transportation and/or safety. A bike plan project email address was established and "wish list" notebooks and large maps of the existing and previously proposed bike network were provided at four bicycle shops: Palo Alto Bicycles (Downtown), Garner's (Town & Country), Midtown Bike Lane (Midtown), and Mike Bicycle Center (California Avenue district). Publicized the bike shop and email channels on several cycling email lists and by tagging over 500 bikes at a Stanford football game. About 30 comments were written in the notebooks or on the maps, and the email address has received over 50 messages. Finally, past wish lists developed by the Palo Alto Bicycle Advisory Committee and the Silicon Valley Bicycle Coalition were reviewed.

The public input is summarized below by general category. Appendix A contains a detailed list of all public input.

Needed New Routes - North-south route through Stanford Research Park from California Ave. to Hansen Way. Provide a route along Matadero Creek. Widen and extend the north fork of the Bol Park Path through Gunn High School's parking lot, up the Hetch Hetchy corridor, across Arastradero at a midblock refuge, to connect with Terman Path to Los Altos Avenue. Improve and sign the route through Cubberley from Montrose to Nelson.

Improvements to Existing Routes - Repave segments of Bryant that need it, such as through Old Palo Alto. Repave Palo Alto Avenue from Alma to Middlefield. Make Park/Maclane/Wilkie a bike boulevard. Add bike lanes on Hanover from California to Hillview, on Homer and Channing from Alma to Middlefield, on Middlefield from Menlo Park to Meadow and from Montrose to Old Middlefield, on Alma from San Antonio to Charleston or Loma Verde, on Embarcadero from 101 to El Camino. Add a Bay Trail spur from Faber Place to Byxbee Park. On Bryant, make Homer and Channing two-way stops and have the three downtown signals rest green for Bryant in the early morning. Connect Stanford's Searsville Path across creek to Menlo Park's Oak Avenue signal. Calm Old Page Mill to deter cut-through traffic.

Easier Crossings and Turns - Make it safer and easier to cross Charleston on Louis / Montrose, Meadow on Bryant, San Antonio on Charleston and Middlefield, El Camino on Charleston/Arastradero, Foothill Expressway on Arastradero, the I-280 interchange on westbound Page Mill, Page Mill at both ends of Old Page Mill, and from Hanover to/from the Bol Park Path. Connect San Antonio Way to Nita Ave. at a signal (in progress, scheduled for completion in Spring 2002). Get Stanford to make it safer to go past Arboretum on westbound Galvez.

Barrier Crossings - Keep the Adobe Creek (Benjamin Lefkowitz) undercrossing open all year. Add a crossing of Alma and Caltrain between California and Meadow and another between University and Embarcadero. Make it safer to cross Alma at Meadow. Redo, repave, and improve lighting in the University Avenue undercrossing. Widen or replace the California Avenue undercrossing. Fix the approaches to the Oregon/101 overcrossing. Modify or eliminate all barriers to admit tandems, bike trailers, and twin strollers.

Car Parking - Change streets where parked cars encroach into bike lanes, such as Newell, Lytton, and Cowper near Meadow. Make Barron Avenue between LaDonna and Whitsell safer to bike and walk. Enforce no parking in bike lanes on California and Newell during Jordan School commute.

General Traffic Engineering - Eliminate all combined through-and-left-turn lanes. Prohibit right turn on red where there is heavy through bicycle and pedestrian flow. Calm all neighborhood streets to bicycle speeds. Change more stop signs to circles or roundabouts. Make it legal for bikes to yield, not stop, at more intersections. Allow bikes to proceed without stopping in bike lanes across the top of T intersections. Make all signals sense bicycles and provide sufficient time to cross wide streets. Never use chip seal. For path bridges use smooth concrete, not wood. Enforce street patching standards.

Promotion / Encouragement - Encourage businesses to provide bike parking and reduce car parking. Hold a city sponsored bike race. Have civic figures ride bikes at events.

Education - Educate young cyclists better to not run stop signs. Publish rules of the road in utility flyer. Post Share The Road signs.

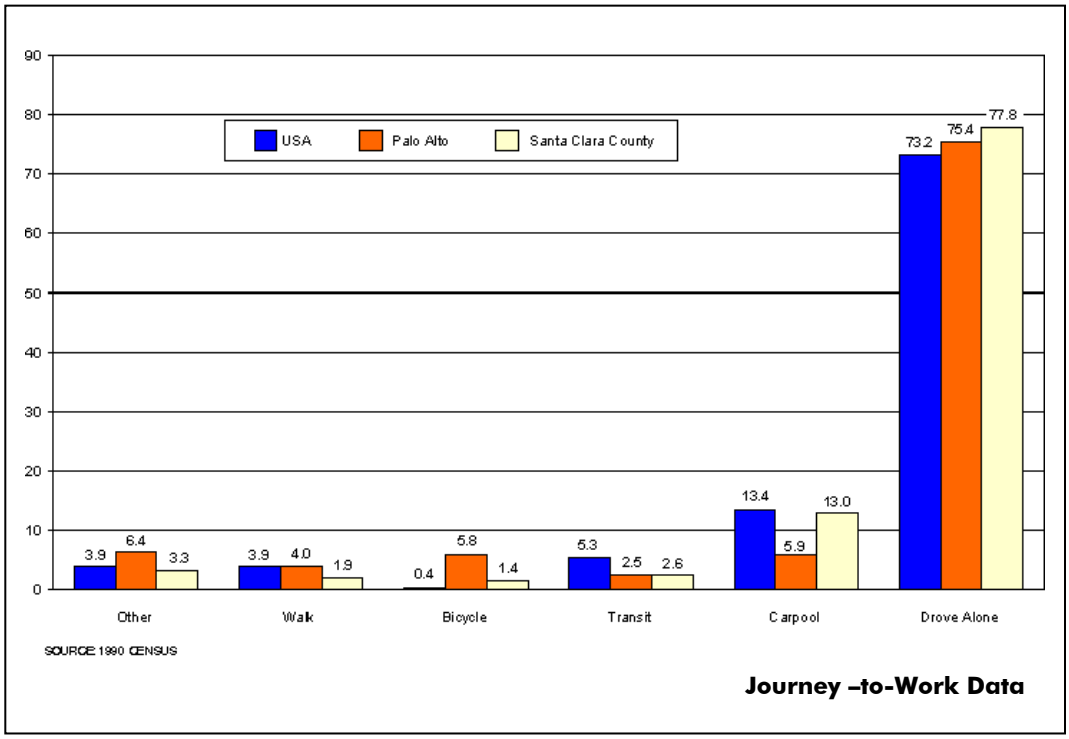
Enforcement - Downtown bike patrol should do more safety enforcement, also plainclothes patrols. Reduce bike fines (council approved, pending implementation by courts). Patrol Arastradero north of Page Mill.

Chapter 2
EXISTING CONDITIONS

A. BICYCLE USAGE AND DEMAND

Existing Bicycle Commute Data

Data on Journey-to-Work mode splits were obtained from the 1990 census information. As shown below, 5.8 percent of Palo Alto residents bike to work. This is fourteen times the national average of 0.4% and well above the average for Santa Clara County of 1.5 percent. When evaluated in term of worker location, 5.2 percent of workers in Palo Alto bike to work. This also is well above the County average of 1.4 percent. One of the largest employers in or near Palo Alto, Stanford University, experiences an even higher bicycle mode share. The 1990 census indicates that the number of Stanford residents who bike to work is 45.6 percent. Of those who work at Stanford, 21.3 percent bike to work.



RIDES for Bay Area Commuters has conducted mode split surveys[1] in the Bay Area annually since 1992 to update the 1990 census data. This data is available only at the county level. These surveys indicate the biking and walking trips have fallen dramatically since 1993, not only in Santa Clara County, but regionwide. As shown in Table 2-1, bicycle mode share fell from a high of 1.8 percent in 1994 and 1995 to 0.5 percent in 1999. The reasons for this are not entirely clear, although the wet El Nino weather of 1998 and a rainy season in Spring 1999 may have affected the results.

Table 2-1
Santa Clara County: Bike and Walk Commute Trips

	1990	1993	1994	1995	1996	1998	1999
Bicycle		1.3%	1.8%	1.8%	1.5%	0.0%	0.5%
Walk		1.8%	2.3%	1.0%	0.8%	0.5%	0.7%

Source: Rides for Bay Area Commuters, Commute Profile 1999: A Survey of San Francisco Bay Area Commute Patterns (August 1999) except 1990 data from 1990 Census-Journey to Work data.

However, commute-trips are only part of the picture; work trips account for only one of five trips, and essentially ignore travel by children and the elderly. Also, the journey to work is far less likely than other types of trips to be taken by cycling or walking. Table 2-2 shows the mode split by trip-purpose for Santa Clara County. The 8.5% bicycle-to-work rate for Palo Alto workers is approximately six times the county-wide average of 1.4%, and more than double Palo Alto's 3.5% share for transit, indicating bicycling's strong role in Palo Alto transportation. Gathering data on non-commute trips - that is to say, the other four out of five trips - whether by personal travel diary, classroom surveys, or other means, may be extremely helpful in revealing bicycling and walking's full role in the community. Data from the National Personal Transportation Survey conducted by FHWA indicates that only about 13 percent of bike trips are work trips. Bicycles are used for other trip purposes as well: 14 percent of bike trips are school trips, 14 percent are shopping trips, 18 percent are to conduct family or personal business and 31 percent for social or recreation. Thus, important as work trips are, only one in eight bike trips are work trips. Trip attractors and generators in the City of Palo Alto are shown on Figure 2.

[1] RIDES conducts a telephone survey in the Spring, usually March or April using random digit dialing, and asks the question "How do you usually get to work?" Thus, the results can be affected by the weather of that particular period when the survey is conducted. The sample size for Santa Clara county has historically been about 400. The data is felt to be valid at the county level, but not at the city level. More details about the study and the methodology is available on the RIDES wbesite: www.rides.org.

Table 2-2 Weekday Bicycle and Walk Trips by Purpose					
	Home-Based				Non-Home-Based
	Work	Shop	Soc/Rec	School	
Santa Clara					
Bicycle	1.1%	0.5%	0.9%	1.8%	0.6%
Walk	1.6%	2.6%	2.4%	6.3%	4.4%
Combined Nine-County Bay Area					
Bicycle	1.3%	0.7%	3.0%	4.2%	0.9%
Walk	3.0%	8.0%	10.8%	21.5%	13.7%
Combined Nine-County Bay Area, 1980					
Bicycle	1.7%			3.2% (Other)	1.1%
Walk	4.0%			13.7% (Other)	13.0%

Source: San Francisco Bay Area 1990 (and 1980), Regional Travel Characteristics, Working Paper #4, 1990 MTC Travel Survey.
Percents measures what percent of each trip purpose type is done by biking or walking. Numbers do not total 100%; all modes would need to be shown to total 100%.

Bicycle Counts

The City has collected bicycle counts for most of the underpasses and overcrossings and these are depicted in Figure 3 on Page 2-8. The current and historical bike counts are also presented in Table 2-3 below

Table 2-3 Historical Bicycle Counts Existing Underpasses/Overcrossings			
Location	**1978**	**1982/83**	**1997**
Willow/Waverley Bridge	530	549	411
San Mateo Drive Bridge	587	517	525
Terman Bridge	na	na	228
Wilkie Way Bridge	na	na	253
Bol Park Matadero Creek	na	na	256
Embarcadero Road Underpass	1617	1257	364
California Avenue Underpass	1072	1517	898
University Avenue Underpass	na	1504	879
Adobe Creek Undercrossing	na	na	95
Hwy 101 Overpass	138	na	175

Note: 12 hour counts: 7 AM to 7 PM
na = not available

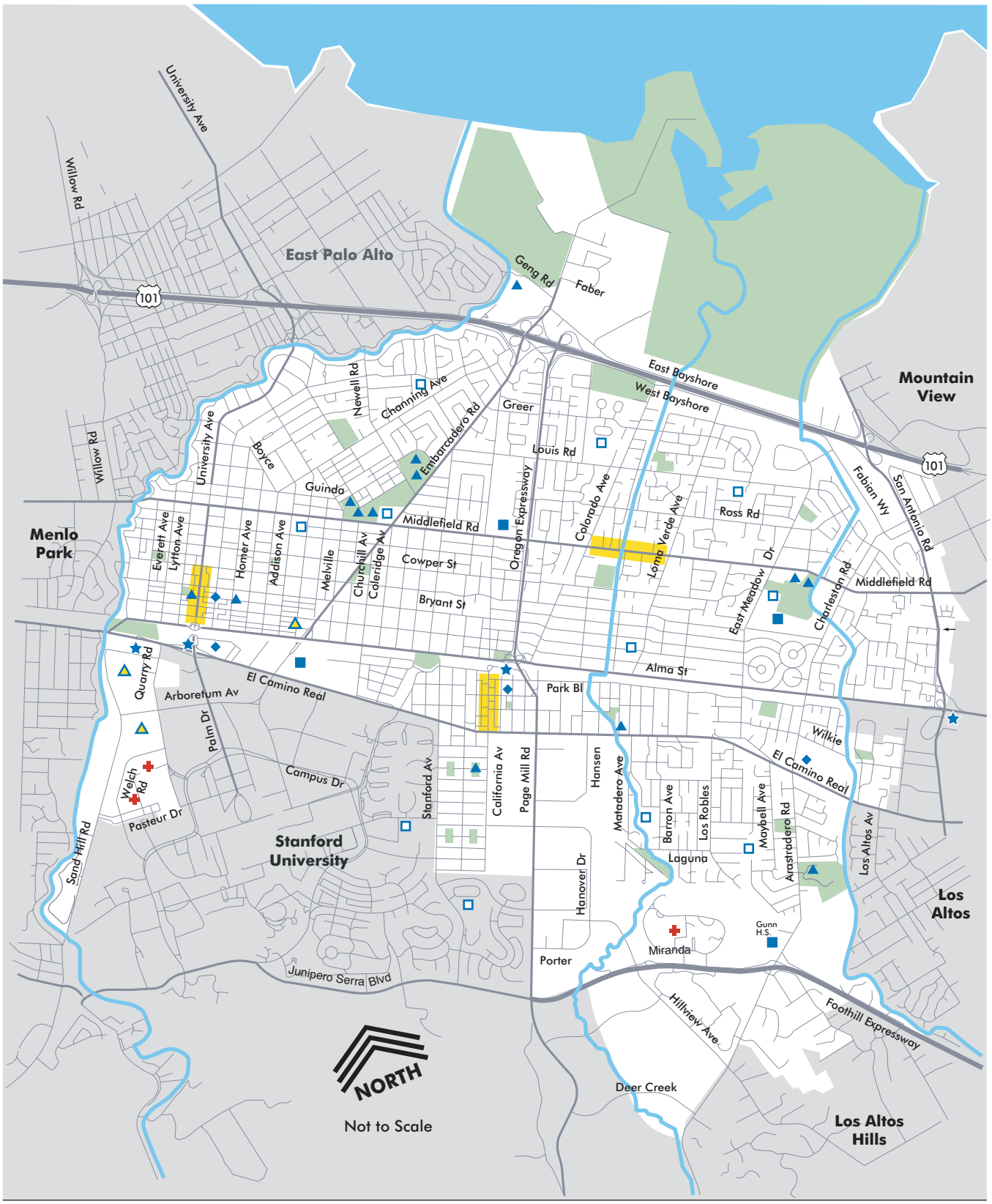


Figure 2
ATTRACTORS AND GENERATORS

B. EXISTING POLICIES AND PROGRAMS

Signal Detection and Loop Marking

The city uses Caltrans Type D loops in the forward position at most signalized intersections. The Type D is a rectangle with several diagonal windings, sensitive to bicycles across its entire area. A staff report dated May 28, 1981 and titled "Identification of Traffic Signal Detection Loops" sets forth the city's policy regarding loop markings. It recommends that forward-position loops which are "bicycle sensitive" be marked whenever the outline of the loop is not visible on the roadway surface, or when several loops are visible and it is unclear which will activate the signal. In addition, video detection has been installed at signals along Sand Hill Road, Arboretum and Quarry Roads as part of the Stanford/Sand Hill corridor project.

Until recently the locations of forward loops on city streets were marked with a six-foot white square. In 1996 Caltrans approved a new loop detector bicycle pavement marking (Standard Detail A24C) which consists of a bicycle-and-rider icon preceded and followed by dashes showing where to position the bicycle's wheels for successful detection. The city has begun applying this detail at signalized intersections; examples are found at the Wilkie Way / Charleston Road and intersection Bryant Street / Embarcadero Road intersections.

County Intersections - At this writing the Foothill Expressway / Page Mill intersection is being rebuilt, and video zone detection equipment is replacing inductive detector loops - the first such installation on Santa Clara County expressways. The video equipment can detect cyclists regardless of the metallic content of the bicycle and eliminates the need to mark detector locations.

State Highways (El Camino Real) - At several locations where city streets cross El Camino Real (State Route 82) at signals, Caltrans has converted lead loops to Type D or permitted the City to do so. Current Caltrans District 4 policy prohibits the installation of bicycle-specific signs and pavement markings on any state highway that is not designated as a Class II (bike lanes) or Class III (bike route) facility. Cities may obtain Caltrans' permission to mark loops on their cross streets. However, because El Camino Real itself has no bicycle facility designation, state engineers currently refuse to mark its left-turn loops so cyclists can locate them, even if such a loop has been paved over and cannot be located by its surface cuts.

Signal Timing

In 1985 City staff conducted bicycle timing studies at several intersections on El Camino Real (State Route 82) and Oregon / Page Mill Expressway (County Route G-4) to determine adequate minimum signal timings for crossing these arterial streets.

In general the city uses a seven-second minimum green, optional three-second green extension where needed, three-second yellow, and 0.5 to 1.0 second all-red. Staff says the green time alone is sufficient for cyclists to cross all but wide streets, where the other intervals come into play.

Signs

Palo Alto uses several city-specific bikeway signs.

Bike Lanes – Many if not most of the bike lane signs used in Palo Alto are not the Caltrans Standard R 81, with black letters on a white background. In some cases, Bike Route signs (green and white) are used in conjunction with the BIKE LANE pavement legends. In other cases, a unique Palo Alto sign is posted reading "Parking Permitted Along Curb - Bike Lane Bicycles Only." These also use green letters on a white background. The City uses a variant of the Caltrans R31-R sign to indicate parking permissions and prohibitions in bike lanes. The top half of the sign indicates either "Parking Permitted Along Curb," or "No Parking" combined with applicable loading zone, time-of-day, or day-of-week restrictions. The bottom half of the sign reads "Bike Lane / Bicycles Only" on the front, optionally with time-of-day limitations, and "Bicycles Prohibited This Direction" on the back. The design of this R31-R variant is detailed in the Design Guidelines.

Bike Boulevard - Bryant Street has features that allow nonstop cycling without attracting non-local motor traffic, a combination Palo Alto has named "Bicycle Boulevard." On Bryant Street wherever a white-on-green "Bike Route" sign would appear, "Bike Boulevard" is posted instead.

Traffic Calming - Palo Alto has numerous examples of spot traffic calming measures, including traffic circles, road bumps ("speed humps"), curb bulb-outs, and full and half-street closures. A city traffic calming program is being developed by the Transportation Division but will not be available as a staff report for several months.

Maintenance

Pavement Repair - In the interest of cyclist safety, Palo Alto has set high standards for street repairs. An April, 1991 memorandum from the Public Works Department describes the city's standards for utility trenching, compaction of patches prior to final repaving, wedge cuts at gutters, water ponding in bike lanes, striping, and street maintenance management. These are represented in the Best Practices and Design Guidelines.

Street Sweeping - The managers of the city's street sweeping programs, say that all Palo Alto streets are swept weekly and that the city sweeps its segment of El Camino Real under an agreement with Caltrans. According to staff at the Santa Clara County Department of Roads West Area Maintenance Facility, Oregon - Page Mill Expressway is swept approximately once every two weeks.

Zoning

Bicycle Parking and Storage - The Off-Street Parking section of the Palo Alto Municipal Code Zoning Ordinance sets requirements on a use-specific basis for Class II or III bicycle parking (i.e. unprotected bike racks) and Class I storage (bike lockers or shared secure facilities). Though most of the specified uses are workplaces, Class I capacity is also required at multifamily residences. Some complexes implement this requirement by providing conventional bike lockers, while others have constructed shared secure bicycle rooms or closets.

Employee Showers - Palo Alto Municipal Code, Title 18 (Zoning), section 18.43.070(e) - Special Requirements for CC (Community Commercial) district, requires employee shower facilities in new buildings and additions based on square footage, with no shower required below a certain area based on building use.

Drive-In Facilities - Zoning ordinance section 18.43.040 requires that drive-in facilities, excluding carwashes, provide full access to pedestrians and bicyclists. The ordinance does not apply retroactively to facilities built prior to adoption of the ordinance unless the building is expanded or modified.

Other Policies

Bicycle Usage and Mileage Reimbursement - In 1992, Palo Alto's Policy and Procedures Manual, section 2-9, was revised to provide for the reimbursement of private bicycle use for authorized city business at the rate of $0.07 per mile, and requires prior approval, helmet use and lawful cycling by bicycle users on such business.

C. EXISTING BIKEWAYS INVENTORY

The existing bikeway network is depicted in Figure 3. A detailed field review of the existing on-street bikeway system was conducted by riding each bikeway. This inventory is summarized in the database in the Technical Appendix to this report. The conditions of each bikeway was noted along with the widths of the bike lanes (if any), any hazards or obstacles, posted speed limits and other characteristics that affect the safety and convenience of bicycle transportation. The major problems areas are summarized in Appendix including the gaps or obstacles in the existing bike route system, other needed improvements such as substandard bike lane widths, and streets or paths in need of resurfacing.

During the course of the field review, several practices and designs were documented that affect bicycling and the bicycle network, either positively or negatively. These are described below. More findings of the field review are discussed in Chapter 3 – Needs Assessment.

Parking Restricted to One Side of Street - With Time Limits

Parking is often prohibited on one side of the street in order to make room for bike lanes. While this in itself is not unusual, in some cases the bike lane created by the parking removal is only temporary: e.g. parking is only prohibited between 7 AM and 7 PM. Thus, the bike lane essentially disappears at 7 PM and on-street parking is again permitted on both sides of the street. While at first this may seem bicycle-unfriendly, this practice results in bike lanes being provided during the hours of heaviest traffic, and allows homeowners the use of the public street adjacent to their property frontage evenings and weekends. However, there are a couple of locations where the frontage is office or light industrial which does not require evening or weekend parking.

Wide Gutter Pans

During the course of the field review, it was noted that in some locations on Charleston Road and Middlefield Road, the gutter pan is wider than average, 36 inches compared to 24 inches. (It is

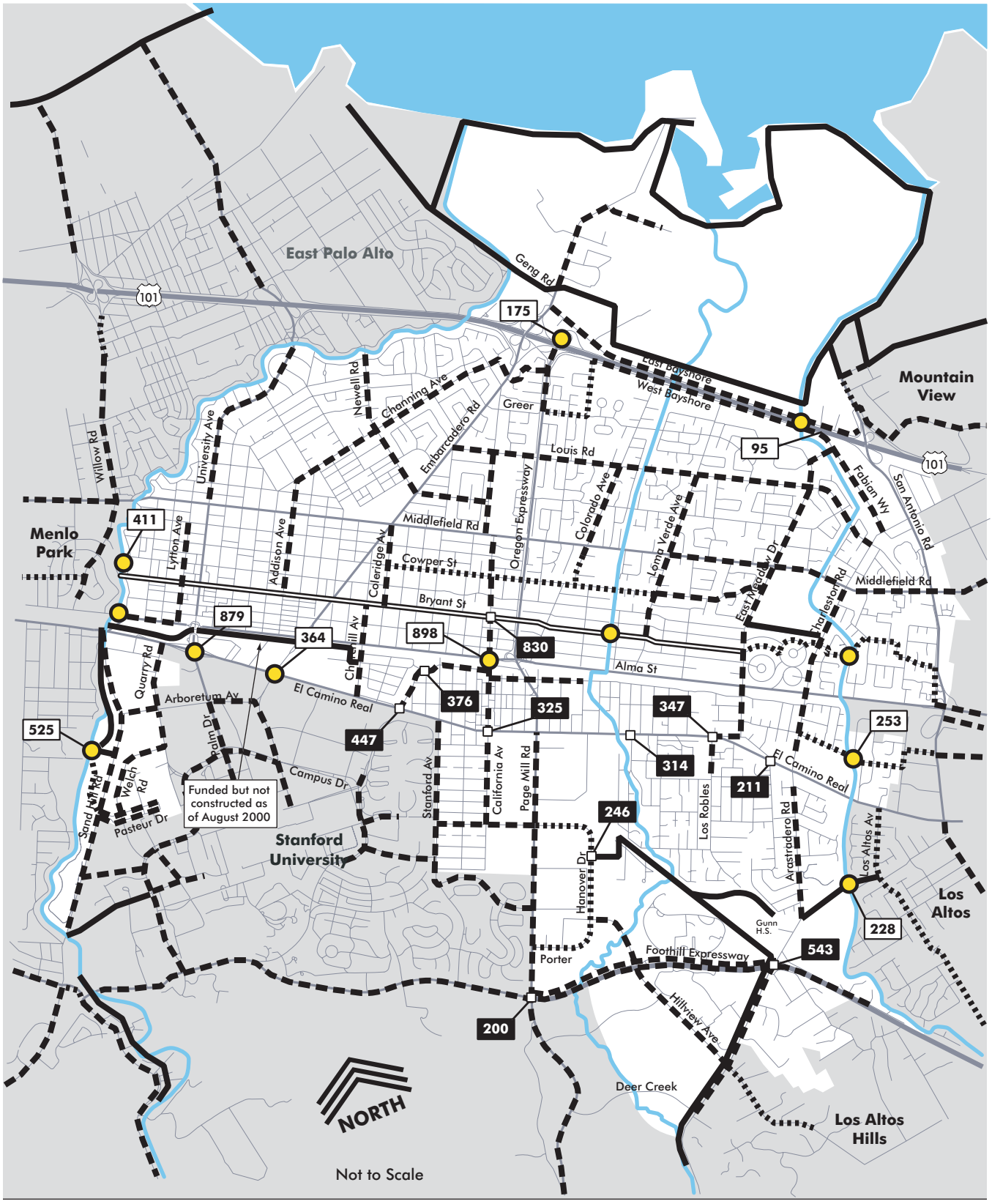


Figure 3
EXISTING PALO ALTO BICYCLE FACILITIES

not known if this is the case the entire length of these streets.) Where parking is permitted, this does not impact bicycle travel, but where parking is prohibited, it forces bicyclists to ride further out into the travel lane.

Rolled Curbs

Some of the residential areas were built with 36" shallow rolled curbs and gutters. Where bike lanes are provided with parking, there is no practical difference to the bicyclist. (However, pedestrians are impacted when the sidewalk is located immediately adjacent to the gutter without a buffer strip). When parking is prohibited next to bike lanes, the bike lane is immediately adjacent to this gutter. This means that while a bike lane may measure at a very comfortable 6'8" it is in fact only 3'8" of usable space (e.g., on East Meadow Drive). However, this still exceeds Caltrans minimum requirement of 3' 0" (36") from the lip of the gutter.

Sidewalk Bike Paths

Palo Alto permits bicyclists to ride on the sidewalks along several arterials and has designated them as "Sidewalk Bike Paths" on the current bike route map of the City. During the field review, these sidewalk paths were noted on streets where they are signed as such, but the field review consigned itself to the roadway and the feasibility of providing an on-road bikeway. The sidewalk was not reviewed as a bicycle facility.

D. EDUCATION PROGRAMS

Education - Youth Cyclists School District Program

The Palo Alto Unified School District (PAUSD) currently conducts a bicycle safety program in grades 3, 5 and 6 (grade 6 is the first middle-school year). For several years this program has used pamphlets in the Kindergarten and Grade 3 "Back To School" parent packet, in-classroom video presentations by a child's regular teacher, classroom and assembly presentations by Ken Gonzalez of the Palo Alto Fire Department (PAFD), and parking-lot practice sessions assisted by a changing group of parent volunteers.

Over the past year a working group known as the Bicycle Safety Education Task Force has been charged by the City/School Traffic Safety Committee (C/STSC) to identify a sustainable and institutionalized bicycle/traffic safety program for PAUSD students which would augment the current volunteer-dependent program. Its recommendations appear in the May 28, 1999 document titled "Palo Alto Bicycle Safety Program: A Proposed Model for the 2000-2001 School Year" and were implemented beginning in Fall 2000. A key element is the hiring of a part-time contract Palo Alto School Program Bicycle Safety Coordinator to manage K-6 bicycle and pedestrian safety programs. The Coordinator would maintain a trained group of volunteers, arrange the parking-lot practice sessions, and assume responsibility for parent outreach. The Task Force recommends that the contractor have a basic level of certification in vehicular cycling (successful completion of the League of American Cyclists' Bike Ed Road I class; see Adult Cyclists below).

Current Program

Kindergarten: Parent packet contains AAA "Parents, Safeguard Your Child" pamphlet.

Grades K-2: Assembly

- Walking/Traffic Safety Program (Assembly-based, 2400 K-2 students reached by 40 to 50 assemblies of up to 60 students, all sites covered every year.
- Coordinator to book assemblies and schedule the program provider.

Grade 3: Classroom, assembly, and on-bike practice and Program Coordinator

- Classroom video presentation by teacher (Bicycle Federation of America video)
- School site visit and video presentation by Palo Alto Fire Department personnel (Ken Gonzales)
- Parking lot practice (Intersections, Yielding, Eye Contact) using PAFD person (Ken) and 2-3 PTA volunteers.
- Coordinator schedules in-school presentations, arrange parking-lot practice sessions, and train and manage volunteer teams.
- Back To School Packet contains AAA "5 Rules to Live By When Riding a Bike" and "Use Your Helmet" pamphlets plus cover letter from the Chair of the PTA Traffic Safety Committee outlining the program and requesting that the parent review it with the child.

Grade 5: Classroom visit and discussion by PAFD staff

Grade 6: Classroom video presentation by PAFD staff

Proposed Program (Bicycle Safety Education Task Force 5/28/1999)

Parent Outreach: Coordinator to handle pamphlet selection/ordering, cover letter.

Grade 5: Existing program, plus voluntary middle-school rides

- Provide option for students to go on voluntary group rides to the middle schools they will attend the following year, escorted by parent volunteers.
- Coordinator to train parent volunteers.

Grade 6: Existing program, possibly with new video and after-school option

- The "Bike L.A. Safety Training" video may be substituted for the current video. A bicycle safety element may be added to the current After School Sports Program, which is available to 6th through 8th grade students.

Grades 4 and 7: Possible addition of components after 2002 school year.

Education - Adult Cyclists

Effective Cycling™ is a modular curriculum for adult and youth cyclists developed by the League of American Bicyclists (LAB), who operates a national team of instructor trainers. Several residents of Palo Alto and nearby cities are certified as Effective Cycling Instructors (ECIs) and periodically offer Effective Cycling classes. The core class for adults and older teens, Effective Cycling Road I, includes five hours of on-bike training and four to five hours of classroom instruction. However, at best these EC classes reach only several dozen Palo Alto residents each year.

In 2001, City began offering a four-hour "Street Skills for Cyclists" class for adult cyclists.

Education - Motorists

The City has applied for a state Office of Traffic Safety (OTS) grant for a two-year Community Traffic Safety Outreach and Education program. This is an outgrowth of the Citywide School Commute Traffic Safety Study's recommendations for school zone activity. The outreach program will produce printed and other materials for distribution to motorists, in particular parents who transport their children to and from school or who are considering doing so.

Enforcement

Palo Alto holds bicycle traffic school classes for youths who are cited by the Palo Alto Police Department for bicycle moving violations such as running stop signs and red lights, riding the wrong way. Attendance removes the offender's citation and fine. Such classes are known in enforcement circles as "bicycle diversion programs" because they are in lieu of a citation. The Palo Alto Fire Department conducts a diversion program class on Saturdays.

The Palo Alto Police Department includes a bicycle mounted patrol unit which operates in downtown (University Avenue and nearby streets). Police bicycle patrol officers are trained in street cycling and the use of the bicycle during pursuit and capture of suspects; the street cycling training is derived from Effective Cycling classes available to the general public.

E. COLLISION ANALYSES

The reported bicycle accidents in Palo Alto for the six year period 1993 to 1998 were obtained from the City. These accidents include all reported injury accidents and may include Property Damage Only (PDO) crashes. These statistics do not include unreported accidents or accidents responded to only by paramedics for which Police accident records were not filed. The number of accidents per year are presented below in Table 2-4 and ranged from 58 to 106.

These accidents were plotted and are depicted in Figure 4. It should be acknowledged that some of these accidents appear to be in unincorporated areas, but all accidents that were sent to us are included in the summaries and in Figure 4.

Table 2-4
Summary of Bicycle Accidents by Year 1993-1998

Year	Number of Accidents
1993	91
1994	58
1995	106
1996	91
1997	69
1998	89
Total	**504**

The high accident locations are listed in Table 2-5 below. The accidents are recorded below by nearest intersection; these did not necessarily take place in the immediate vicinity of these intersections.

As might be expected, the highest accident locations take place on the arterials, where the traffic volumes are the highest: El Camino Real, Alma, Page Mill, Middlefield Road and University Avenue.

Table 2-5
Summary of High Bicycle/Motor Vehicle Collision Locations
1993-1998

Intersection (at or near)	Number of Accidents
University & El Camino Real	9
Alma St & Churchill	9
Page Mill & Hanover St.	8
El Camino & El Camino Real	8
El Camino & Page Mill	7
Charleston & Middlefield	7
Lytton Ave & Middlefield	7
Ventura A & El Camino	6
Arastradero & El Camino	6
Bryant St & University	6
Middlefield & Colorado	5
University & Crescent	5
Charleston & El Camino	5
Arastradero & Foothill Expy	5
Alma St & Loma Verde	5
Foothill & Arastradero	5
Bryant St & Hamilton	4
Page Mill & Arastradero	4
El Camino & Embarcadero	4
Bryant St & Everett Ave.	4
Sand Hill & Pasteur Dr.	4
Seneca St & University	4
Middlefield & Embarcadero	4
Charleston & San Antonio	4
Middlefield & Loma Verde	4
Carlson C & Charleston	4
Curtner A & El Camino	4
California & El Camino	4
East Meadow & Middlefield	4
Middlefield & Middlefield	4
Middlefield & San Antonio	4
University & High St	4

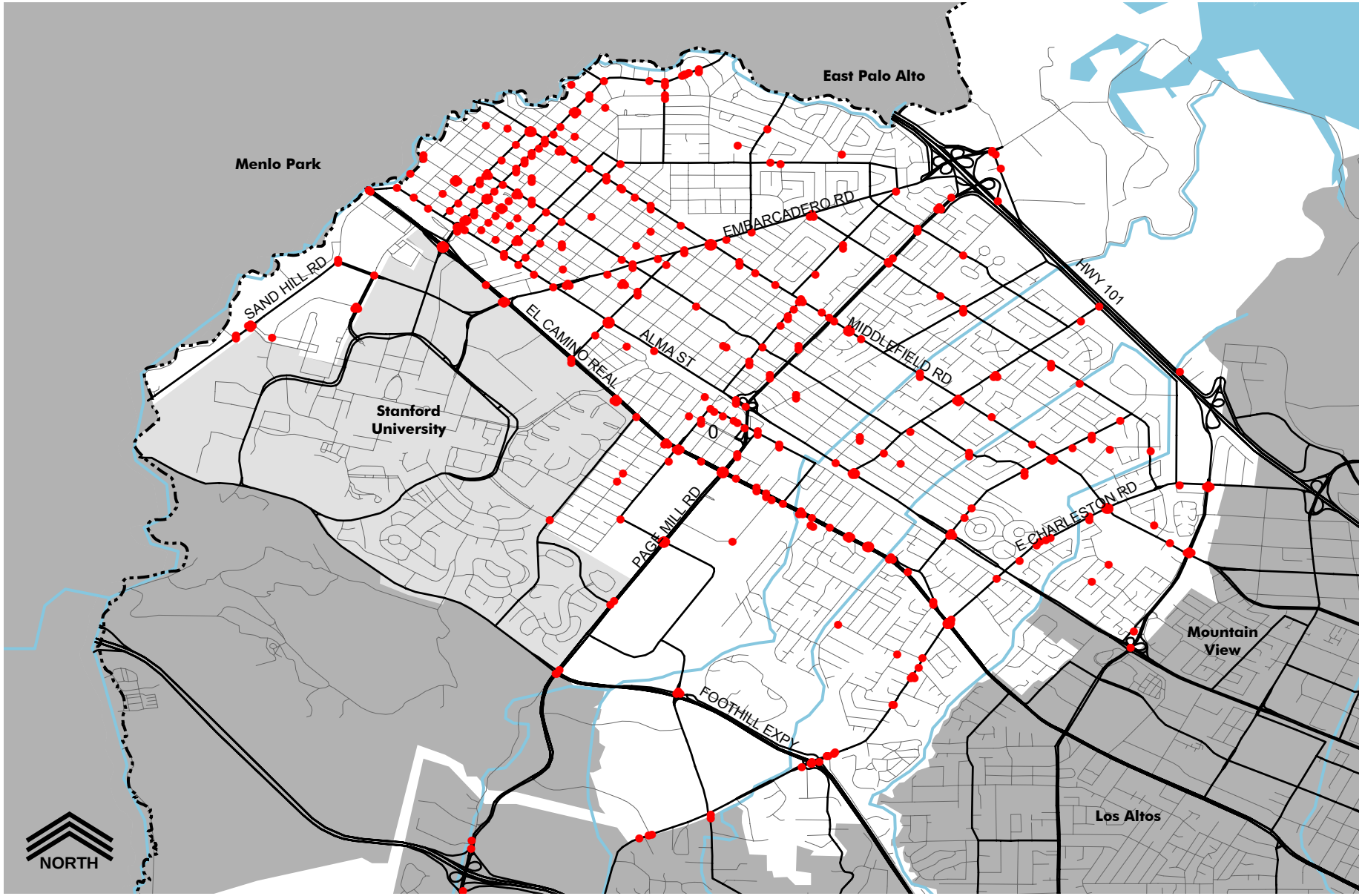


Figure 4

BICYCLE ACCIDENT LOCATIONS (1993-1998)

Chapter 3
NEEDS ASSESSMENT AND ANALYSIS

INTRODUCTION

This chapter presents the analyses of the needs and opportunities for expanding the Palo Alto bikeway network. Before developing recommendations for specific projects, the opportunities and potential for developing a comprehensive system must be evaluated. This chapter also addresses maintenance needs as well as connectivity to adjacent jurisdictions.

BIKEWAY NETWORK NEEDS AND OPPORTUNITIES

Based on the field review, several types of issues and opportunities were identified that would improve the Palo Alto Bikeway Network. The text that follows describes these general issues but does not attempt to list every opportunity discovered in our field reviews. The types of facilities assessed for inclusion in the comprehensive bicycle network fall into one of five categories.

1. All existing routes in the City's bicycle network (depicted in Figure 3).
2. All arterial streets.
3. New bicycle boulevards
4. Connecting routes
5. Bicycle paths

Arterial Streets

Arterial streets are important for transportation cycling because they are fast, direct, bridge many barriers and serve many destinations. Consequently they are already frequently used by bicyclists regardless of whether they have bicycle lanes, bicycle route or sidewalk bike path designation.[1]

The features of an arterial that affect the safety and comfort of bicyclists include:

- Motor Vehicle Speeds;
- Motor Vehicle Volumes;
- Number of traffic lanes;
- Exclusive right turn lanes, free right turn lanes, large curb radii and/or high speed merges at intersections;

[1] Lisa Aultman-Hall, a professor of civil engineering and commuter cyclist reports, "In one study of 397 routes used by commuter cyclists, the characteristics of the shortest path routes between each individual's origin and destination were compared to the actual travel routes used by cyclists…Most commuters divert very little from their minimum path (0.4 km on average) and are found to use major road routes." Lisa Aultman-Hall. "Using Route Data for Quantitative Assessment of Bicycle Use, Safety and Exposure." *ProBike/ProWalk 98 Resource Book*, p. 163, Bicycle Federation of America, 1998.

- Presence of a bike lane or striped shoulder;
- Width of bike lane, striped shoulder or outside through lane;
- Presence of parking, usage of such parking, and parking turnover;
- Presence of a raised median;
- Constricted lane width at intersections;
- Frequency of turning movements into and out of driveways;
- Length of blocks;
- Continuity and directness of the route;
- Absence of stop signs; and
- Favorable signal timing and signal responsiveness.

Many of the criteria cited above are interrelated. For example streets with multiple lanes in each direction, often generate higher speeds.

A *qualitative* assessment of each arterial street in Palo Alto as an indication of its suitability for an average person to ride (i.e. whether they would feel comfortable on the route)[2] was made. The results are presented in Appendix C.

Improvements to Existing Bikeways

Some existing bikeways in Palo Alto need slight modifications or improvements, but not enough to change the route type. General changes, applicable to many routes, fall into three categories: signage, restriping, and parking prohibitions. Signage is needed throughout the city on most routes. More way-finding signage is needed in several places to help bicyclists find specific destinations, bicycle bridges, pathways and short-cuts. For example, the route to the bike bridge that connects Duncan Way at the south end of Bryant Street to the Green Meadow neighborhood should have more signage particularly for the bicyclists travelling in the northbound direction. For southbound bicyclists, the existing bike route sign at Redwood before Carlson is obscured by trees. The bridge itself should be signed to indicate its destinations on both ends. Specific restriping and parking prohibitions are recommended for specific locations in the next chapter.

Maintenance issues are needed citywide, not just on existing bikeways and are addressed in a separate section below. Spot improvements such as difficult intersections and needed new undercrossings/ bridges are also addressed in a separate category below.

Improvements to Bryant Street Bicycle Boulevard - Some Palo Altan bicyclists, particularly children and the elderly, find it uncomfortable to navigate the Bryant Street Bicycle Boulevard as it passes through downtown (from approximately Forest Avenue, next to City Hall, to Lytton Avenue). Several modifications could improve this section:

[2] The WSA Team considered conducting a quantitative assessment, such as a Bicycle Level of Service, Roadway Condition Index or Bicycle Suitability Index rating, but concluded that given the extensive data gathering and analysis required for these ranking systems, and the ultimate reliance of these models on subjective weightings of roadway characteristics, time and resources would be better used by conducting a simple qualitative ranking, and devoting more time to other tasks in the plan.

1. Replacing the head-in diagonal parking with reverse-in diagonal parking would greatly improve motorists' ability to see oncoming cyclists, without losing any parking spaces. (The city of Tucson has done so on one street in their downtown and is satisfied with its operation).
2. Alternatively, replacing the diagonal parking in these blocks with parallel parking plus bike lanes would improve cycling comfort. The new garage at Bryant and Lytton would help to make up for the resulting loss of some on-street spaces.
3. With the current signal timing, cyclists almost always encounter three red lights (at Lytton, University and Hamilton) as they proceed through downtown. Cyclists starting with a fresh green light at any of these lights are able to make the light in the next block only if they are fast cyclists, ride at top speed, and do not have to slow for vehicles that are parking or turning. Changing the signal timing to give this north/south movement more time would allow cyclists to pass through downtown without being caught at so many red lights. Diverting to faster, but less comfortable alternate routes such as Middlefield, Alma and El Camino Real is not a practical option for those bicyclists traveling on Bryant Street. In addition, many cyclists commute Bryant during early morning period when downtown signals are set to blinking-yellow for Lytton, University, and Hamilton, and blinking-red on all cross streets. It is worth considering whether Bryant should have the blinking-yellow priority during these hours.
4. Adding traffic calming devices such as raised crosswalks, raised intersections, or speed humps in the midblock sections of these blocks would slow motor traffic, and help give cyclists the confidence they need to take the lane instead of hugging the curb; this would reduce the chance they will be struck by drivers entering or exiting driveways and parking spaces.

Sidewalk Bike Paths - Many streets with heavy traffic volumes have parallel sidewalks on one or both sides of the streets. Many years ago, the City signed these sidewalks as bike paths. The signs attempted to ameliorate one of the negative impacts of sidewalk riding, i.e., wrong-way riding, by installing the message "Bicycles Prohibited this Direction" on the back. However, for a number of other reasons, the use of sidewalks by adult competent cyclists is not advisable[3]. As bikeway design has evolved since its U.S. inception in the 1970's, it has become clear that on-street cycling is considerably safer than sidewalk cycling, and the city now plans to remove all of its sidewalk bike path signs. These streets are important to keep on the network and while the city may still wish to permit the use of the sidewalk without the possibility of a citation, they should be changed to a different bikeway type. It is recommended that the *sidewalk bike path* category be eliminated and that these streets be reclassified. These streets are listed below and recommended improvements are described in Chapter 4.

- Middlefield north of Loma Verde and approaching Charleston Road
- Alma
- Charleston east of Middlefield

[3] A definitive article on this subject appeared in the ITE Journal, September 1994, titled *Risk Factors for Bicycle-Motor Vehicle Collisions at Intersections* by Alan Wachtel and Diana Lewiston. It compared safety records of on-street bike lanes with sidewalk cycling in Palo Alto, and concluded that on-street cycling was two to six times safer than sidewalk cycling.

- Embarcadero
- University between Alma and El Camino Real
- San Antonio between Charleston and East Bayshore Boulevard

Daytime Bike Lanes - Many of the bike lanes on residential streets were created by prohibiting parking during the day time, usually from 7 AM to 7 PM. However, this practice results in the bike lanes disappearing at 7 PM to become a parking lane. While this practice provides a bike lane during the hours when most bicycling is occurring, it is frustrating for the bicyclist not to have consistent facilities. However, as traffic volumes usually taper off after 7 PM, the need for the bike lane to provide a comfortable space for bicyclists is also reduced.

Ideally bike lanes should be 24 hour bike lanes, but in most cases, it appears that the 7 AM to 7 PM bike lanes are an effective compromise between providing bike lanes during the hours when they are needed most and providing residents with evening parking in front of their homes. There may be locations, however, where the parking prohibitions could or should be extended to be in place 24 hours a day. For example, Fabian Way between Meadow Way and Charleston Road has daytime only (7 AM to 7 PM) on the north side. However, the frontage here is industrial, not residential, and parking could be prohibited on the north side 24 hours a day without inconveniencing anyone. The existing onstreet parking on the south side would remain unaffected.

In addition, the sign describing the daytime bike lanes should be reworded to more clearly indicate their purpose.

Substandard Width Bike Lanes - Several streets in Palo Alto have less than the minimum bike lane width as specified in the Caltrans Highway Design Manual (HDM). The HDM states that bike lanes without onstreet parking should be a minimum of four feet with at least three feet between the lane stripe and the longitudinal joint of the gutter pan. Next to parked cars, bike lanes should be 12 feet wide, and 13 feet is recommended where there is substantial parking or parking turnover is high. Eleven feet is permitted where there is a rolled curb. The locations in Palo Alto that do not meet these standards are listed in Appendix D.

An issue to be resolved is how best to stripe a street with a width of 36 feet curb-to-curb. Many of the streets listed in Appendix D are 36 feet wide and are striped with ten-foot bike/parking lanes, ten-foot travel lanes and 6-foot day time bike lanes that revert to parking lanes at night. In order to provide the minimum bike lane width standard next to a parking lane described above, parking needs to be prohibited on one side of the street and the street would need to be striped with 9.5 foot wide travel lanes. Although, there are concerns with striping minimum bike lane widths on streets with heavier traffic volumes and /or high speeds, most of the streets in Appendix D have lower speeds and volumes. It is recommended that the 36-foot wide streets that retain bike lanes be striped as follows: one 12-foot bike and parking lane, two 9.5-foot travel lanes and one 5-foot bike lane.

New On-street Routes

Several new routes are recommended on arterials and collectors. Ideally these would be Class 2 (bike lane) facilities. However, due to existing constraints the recommendations vary from street to street.

- El Camino Real is direct, fast, serves many destinations, and is already well used by adult and older teen cyclists. El Camino Real has curbside parking over much of its length in Palo Alto. This is compatible with bicycle travel if the outside lane width is wide enough to enable cyclists to maintain lateral separation from outer-lane vehicles to their left while avoiding the deadly "door zone" to their right. Because of traffic speeds and high parking turnover it is advisable for the outer lane to be as wide as possible or for bike lanes to be installed.
- Oregon Expressway, West Bayshore to Cowper is currently used by commuter cyclists due to its wide outside lanes along this stretch. Shoulder stripes or bike lanes could be added at no cost as part of the upcoming resurfacing and restriping by Santa Clara County Roads.
- University Avenue west of Middlefield is desirable for directness by through cyclists from El Camino Real to Middlefield and beyond, and serves downtown.
- Alma Street is the only direct connection from San Antonio Road to Charleston Road, and is also valuable along its remaining length for directness. Certain street reconfiguration options being considered for Embarcadero Road could potentially help reconfigure Alma for bike lanes or wide outside lanes.
- Hanover Street/Porter Avenue, California to Bol Park Path currently has bike lanes from California to midway down the block toward Page Mill Road, and a parallel wide-sidewalk facility from Page Mill to the path entrance. This is a well-used commuter and school route from Stanford University and College Terrace residences with Stanford Research Park employment, Barron Park residences, and Gunn High School.
- Hansen Way, a home-to-work connector, will assume increased importance as routes are added to close the network gaps between Midtown and El Camino through the Ventura neighborhood.
- West Meadow Drive, El Camino Way and Maybell Avenue are all part of an important school route for Barron Park.
- Los Robles to Laguna would help to complete the network through Barron Park, and also connects past Juana Briones School.
- Loma Verde, Louis to West Bayshore and Bryant to Alma – The former segment closes a gap for commuters to West Bayshore employment centers. The latter should be considered part of a package of improving Alma to wide outside lane or bike lane status.
- Colorado, Middlefield to Bryant and Louis to West Bayshore – The former segment adds to the bikeway network an already-used connector from the Bryant Bike Boulevard to Midtown shopping and residences east of Middlefield. It would be extended to Alma if Alma were improved for on-street cycling. The latter segment completes a link to the south entrance of Greer Park, to West Bayshore businesses, and to the Class I (path) opportunity that could connect Greer Park to Barron Creek along the back property line of those businesses.

- Middlefield Road is an important intercity commuter route. Bike lanes are currently discontinued south of Montrose and north of Loma Verde.
- Matadero from El Camino Real to Josina is an important school commute route.

New Bike Paths

Several new bike paths are recommended in accordance with the Comprehensive Plan. Some of these are longer term than others; all are included here with phasing and prioritization issues to be addressed in Chapter 6. The Comprehensive Plan identifies the following trails either as a specific program or on Map T-5 as a "Proposed Bikeway" or "Opportunity for Bikeway Segment."

- Bay to Foothill path (alignment to be determined most likely on creek corridors and Stanford lands).
- Ridge Trail - nearly complete in Palo Alto.
- Adobe Creek Levee east of US-101 to meet Mountain View's Bay Trail segment, and west of US-101 to East Meadow Drive.
- Matadero Creek Levee.
- San Francisquito Creek.
- Bol Park Path extension to El Camino Real.

The following multi-use path opportunities are recommended but are not in the Comprehensive Plan:

- Bol Park fork through Gunn High School property and Hetch Hetchy parcel to Arastradero Road.
- Barron Creek connector to Louis Road near the intersection of Greer Road.
- Greer Park to Adobe Creek linear park. A north-south connection, perhaps valuable mostly for walkers, from Greer Park to Barron Creek on the west edge of the West Bayshore businesses. This would pass by the electrical substation and could incorporate an existing, smaller (currently private) linear park on the same alignment.

Bicycle Boulevards

Bicycle Boulevard Purpose and Benefits - Palo Alto was the pioneer in the USA in creating a bicycle boulevard – turning Bryant Street, a residential street, into a street that improves bicycle safety and circulation. According to the Comprehensive Plan, *a bicycle boulevard is a low volume through street where bicycles have priority over automobiles, conflicts between bicycles and automobiles are minimized and bicycle travel time is reduced by the removal of stop signs and other impediments to bicycle travel. The removal of STOP signs is especially important in Palo Alto due to the large number of stop signs on local and collector streets.*

Figure 5 illustrates Bryant Street and the pertinent features that make a Bicycle Boulevard. The key characteristics of the Bryant Street Bicycle Boulevard that make it attractive and safer for bicyclists are:

- low traffic volumes;
- discouragement of non-local motor vehicle traffic;
- free-flow travel for bikes by assigning the right-of-way to the bicycle boulevard at intersections wherever possible; and
- traffic control to help bicycles cross major streets (arterials).

The key feature of bicycle boulevards that greatly improves efficiency for bicyclists over normal residential streets is the reduced stopping and delay compared to other local streets. This dramatically improves travel time and reduces fatigue. By reducing the number of STOP signs on a street, the travel time of a typical bicycle trip of 30 minutes can be decreased by up to one-third (i.e. to 20 minutes) compared to a street with a STOP sign at every block. This extra time also takes a significant amount of extra energy on the part of the bicyclist. Reducing fatigue increases the feasible length of a trip by bicycle, and may be especially important to bicyclists who are hauling trailers carrying children or groceries.

Improvements Needed to Convert Streets to Bicycle Boulevards - There are several key elements to turning the potential alignments into new bicycle boulevards. These are:

- Remove unwarranted STOP signs - One of the biggest obstacles for a typical residential street to serve as an effective commute corridor is the prevalence of STOP signs. STOP signs significantly increase delay and consequently the travel time for bicyclists. In addition to time, it take additional energy to reaccelerate after coming to a stop. This reduces the distance a bicyclist can travel within their energy level and within their timeframe, be it ten minutes, thirty minutes, or more.
- Providing traffic signals to help bicyclists safely cross busy arterials - bicyclists need to be able to safely and conveniently cross these major streets. Bryant Street would not be an effective commute route without the traffic signals at Oregon Expressway and Embarcadero Road which enable bicyclists to safely cross these major streets.
- Traffic calming measures - One of the biggest concerns neighbors have with removing unwarranted STOP signs is that the street might become a speedway for motor vehicles. This is why Bryant Street has two barriers/diverters. Other traffic calming devices could also be effective such as speed humps and traffic circles, both of which have been used in other parts of City, and there is a traffic circle on Bryant Street at Addison Street.
- Bridges - In some cases, a bike/pedestrian bridge or tunnel can be a key feature in closing a gap to create a continuous through route that has low motor vehicle traffic volumes. This not only closes a gap making it possible for bicycles to use the alignment in question, but also by its very nature does not allow motor vehicles. Thus, a bridge serves as a natural traffic barrier that keeps the roadway from becoming a speedway and keeps traffic volumes low on the segments of the route that adjoin the pathway. This is the case at the Matadero Creek bike/pedestrian bridge on Bryant Street.

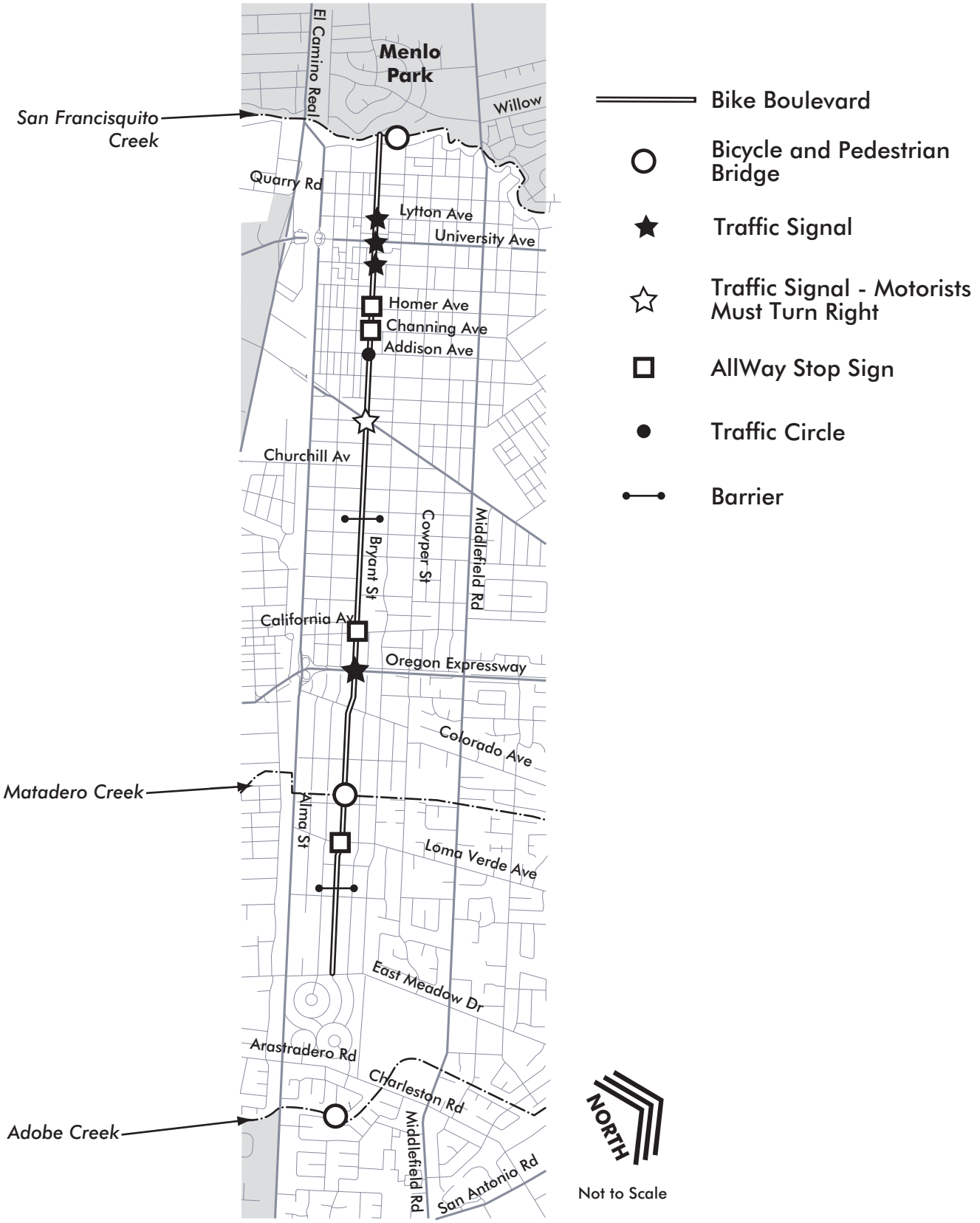


Figure 5
EXISTING BRYANT STREET BICYCLE BOULEVARD

- Paths - Again, in some cases a pathway is necessary to connect two sections of a bicycle boulevard. Thus a bike path also serves as a natural traffic barrier that keeps the roadway from becoming a speedway and keeps traffic volumes low on the segments of the route that adjoin the pathway.

Alternatives for New Bicycle Boulevards

There are many opportunities for new bicycle boulevards in Palo Alto. Seventeen potential alignments were identified in Working Paper No. 3. The options for bicycle boulevards range in type from a single street a la the existing Bryant Street prototype to those that involve the use of several streets and/or short connecting pathways between street segments. The potential alignments identified are presented in Appendix F along with the existing traffic calming devices along these alignments. The fact that some of these routes already have traffic calming devices essentially means that they are one-step closer to implementation.

Integration of Bicycle Boulevards with the Citywide Neighborhood Traffic Calming Program -

Neighborhood traffic calming projects create important opportunities to implement new bicycle boulevard segments. Currently, the City has just one active traffic calming study underway, for the Downtown North neighborhood. However, several other neighborhood groups have requested traffic calming, and guidelines for a city-wide traffic calming program are now being drafted by the Transportation Division.

The advantages of creating bicycle boulevards in conjunction with overall neighborhood traffic calming plans are numerous. For example, if an Everett Street bicycle boulevard were conceived solely as an independent project, with barriers to through motor traffic installed only on Everett, it would be likely to raise serious concerns about diverting traffic to parallel neighborhood streets. But as part of this overall neighborhood plan, traffic calming measures for the parallel streets are already proposed. See Appendix E for a discussion of how a neighborhood traffic calming plan can serve to also create a new bicycle boulevard.

Recommendations for integrating the Bicycle Plan and future traffic calming studies are listed below:

1. Neighborhood traffic calming projects provide excellent opportunities to create bicycle boulevard segments. All future calming projects should specifically include completing relevant portions of the Bicycle Plan as a major goal.
2. Recommended street corridors for bicycle boulevards should be defined as part of the Bicycle Plan, and future neighborhood traffic calming plans required to help, rather than hinder, the completion of those planned boulevards. Bike boulevard corridors need to be defined as a coherent overall network, with an eye to citywide connectivity, and this cannot be accomplished via uncoordinated individual neighborhood traffic calming studies. In the case of the Downtown North study, for example, Everett Street proves to be the only truly useful bicycle boulevard segment in the area, since the alternative street corridors do not cross Middlefield, and do not connect well to the train station.

3. Bicycle boulevard plans should be flexible about the type and exact placement of the traffic calming measures needed to create them. If an opportunity arises to implement a planned bicycle boulevard segment as part of a neighborhood traffic calming plan, City staff can then work closely with residents to decide which devices (e.g. a traffic circle, a raised intersection, a speed hump, or a closure) would be preferred, and exactly which blocks the measures would go on.
4. Bicycle boulevards could still be implemented as independent projects, rather than waiting for a traffic calming study to be initiated first. In this case, adopting some of the techniques of traffic calming studies – for example, actively recruiting neighborhood residents for a project advisory committee, and mailing alternatives to the neighborhood for review – may help ease implementation.

PROBLEM SPOTS

Problem Intersections - There are numerous intersections in Palo Alto that pose a difficulty of one kind or another to bicyclists. Some of these are:

- El Camino Real at Alma Street- high speed right-turn merge;
- El Camino Real at University Avenue-high speed right-turn merge, narrow lane widths, bikes on sidewalks;
- El Camino Real at Embarcadero Road- high speed right-turn merge;
- El Camino Real at Arastradero/Charleston –high speed right turn, narrow lane widths, bikes on sidewalks;
- Middlefield at California – jogged intersection; and
- East Meadow Drive at Fabian Way.

Caltrain crossings - The Comprehensive Plan supports one or more bikeway tunnels under Alma Street/Caltrain tracks:

- Existing tunnel under Caltrain at California Avenue – upgrade to improve slope and sight distance, and possibly separate pedestrians.
- Existing undercrossing at University Avenue (topic of Intermodal Transit Study).
- New tunnels at Everett or Lytton, Homer, Churchill, Matadero Creek, East Meadow, Charleston Road and San Antonio Road.

Highway 101crossings - Highway 101 is also a major barrier to bicyclists; the comprehensive plan identifies the following barriers at Highway 101:

- University Avenue-need for better striping and exit details.
- San Francisquito Creek.
- Embarcadero Road-opportunity to restripe lanes to create bike shoulder.
- Matadero Creek-opportunity for Bay Trail connection to Greer Park.
- Adobe Creek-need for year-round access.

MAINTENANCE ISSUES

Maintenance is a continuing part of every bicycle-friendly city. Following the construction and implementation of a bikeway, whether it be a major construction project such as a bridge, a project involving minimal construction such as a bicycle boulevard or a simple spot improvement such as a median refuge, it needs to be maintained to ensure maximum utility as well as safety. The areas listed here are and will always need to be an integral part of the City's major functions to keep Palo Alto a place where bicycling is a practical and safe option.

- Pavement Quality - streets with existing marginal pavement were identified in the field review. Palo Alto has excellent policies regarding pavement overlays, trench and pothole patching. However the City's Pavement Management System doesn't factor in bicyclists needs and many streets with poor pavement surface in bike lanes do not score well in the PMS evaluation process.
- Markings - bike lane lines and bike lane legends are generally marked with thermoplastic which needs less maintenance than paint.
- Shrubbery encroachment into bike lanes and shoulders; this currently needs to be addressed on Arastradero, East Bayshore and West Bayshore.
- Bridge decks of bicycle/pedestrian bridges are in need of repair at the following locations: Willow/Waverley bridge (scheduled to being replaced by Menlo Park in 2001. This will involve complete bridge replacement and a new abutment on the Palo Alto side); Terman bridge deck still needs repair (Los Altos jurisdiction). The Duncan Place bridge was installed by the Santa Clara Valley Water District in the early 1990's. It is concrete construction integral with the channel walls and is in excellent condition. Wilkie bridge deck was recently resurfaced with ECO Tile (recycled plastic).
- Responsive signal timing and proper signal detection are important at all signalized intersections.
- Drainage grates – there are two bad drainage grates on St. Francis Drive at east of Oregon Avenue; these should be replaced with bicycle-safe grates as depicted in Palo Alto's Specifications.

INTERFACE WITH OTHER JURISDICTIONS

The following projects in the cities adjoining Palo Alto would benefit cyclists living in and traveling to and through Palo Alto. Although outside of the purview of the City of Palo Alto, these projects are identified here as placeholders to enable City staff, citizens and activists to work with neighboring cities to establish seamless bicycle transportation opportunities in the south peninsula communities.

Menlo Park

1. Caltrain undercrossing at Cambridge / Willow - Provides better access to downtown Menlo Park west of El Camino. Greatly improves and shortens the Willow Road commute route to Stanford University (via San Mateo Drive bike bridge), which currently traverses downtown Menlo Park.

2. Alma Street crossing/turning improvements at Ravenswood Avenue - Provides better access to downtown Menlo Park west of El Camino.
3. Alma / Willow turning movement calming - High speed left turners onto Willow Road currently intimidate northbound Alma through cyclists.
4. San Francisquito Creek bridge between El Camino and Arboretum, possibly at University Drive - Connects downtown Menlo Park to Stanford Shopping Center, Palo Alto Transit Center, downtown Palo Alto. Enables residents of Stanford's new senior facilities near Arboretum / Sand Hill to access Menlo Park senior attractions such as Allied Arts.

East Palo Alto

1. US-101 (Bayshore Freeway) overcrossing between University and Embarcadero - Provides access for west-of-101 residents to east-of-101 commercial and access for east-of-101 students to west-of-101 schools (if any are currently bussed).
2. Bay Trail segment from Bay Road to San Francisquito Creek at end of Geng Road - Recreational and commuter access to the Baylands and Dumbarton Bridge.

Mountain View

1. Charleston Road bike lanes, San Antonio Road to US-101 - Improves access to shopping (Costco, Office Max), North Bayshore workplaces, Shoreline Park (via Rengstorff).
2. San Antonio Caltrain station north-end track crossing or grade separation - Would eliminate long walking delay to south-end undercrossing, for access from San Antonio Way signal.
3. Del Medio to California Circle link - Missing link from Wilkie Way bridge to San Antonio Caltrain. Open now, but via private driveway along tracks.
4. Charleston / Park to California Circle link - Biking/walking connection between Park Boulevard and San Antonio Caltrain. Also creates walking route from Monroe Drive (Palo Alto single-family, Mountain View multifamily) to station.
5. Nita Avenue: replacing speed bumps with speed humps - Especially important once Nita / San Antonio Way connection is made at signal.

Los Altos

1. Extension of Terman Path to El Camino Real and new Del Medio Avenue signal - Alternative to El Camino and its sidewalks for Gunn High / JCC area travelers to San Antonio Caltrain and shopping center. Path currently terminates at Los Altos Avenue. (Mountain View is signalizing Del Medio / El Camino).

Stanford University

1. Lasuen Street connection to El Camino Real signal at Medical Foundation Way - Connects Stanford Medical Center (Med School, hospitals) to Palo Alto Medical Foundation avoiding Palm/University/El Camino. Commute route to Stanford once Homer Avenue Undercrossing is completed.
2. Serra Street bike lanes - Closes a gap in the major Park Boulevard route to campus.
3. Galvez / Arboretum intersection and bike lanes - Slow or eliminate high speed west-to-north turn across westbound Galvez bike lane. Arboretum/ Galvez could become a bicycle commute corridor to Palo Alto High School from Stanford West housing.

Los Altos Hills / Caltrans / Santa Clara County Roads

Cyclist safety and comfort improvements to Page Mill / I-280 interchange.

Chapter 4
RECOMMENDED BIKEWAY NETWORK

INTRODUCTION

This chapter presents the recommendations for the Palo Alto Bikeway Network. It includes recommendations for new bikeways, revisions to the dimensions and designations of existing bikeways, and associated infrastructure improvements such as traffic signals and overcrossings.

First the philosophy used to develop the Palo Alto bikeway network is described. The three standard bikeway types are then described along with the recommended bikeway types and when to use them. Then the recommended Palo Alto Bikeway Network is presented along with a list of projects to implement the network. A list of other improvements that would improve existing bicycle circulation and safety is also presented. Other recommendations to maximize the bicycle friendly infrastructure are presented in Chapter 6. Best Practices is presented in a separate document.

METHODOLOGY

Opportunities and constraints for new bike routes were determined via extensive field reviews, analysis of existing bikeway locations, and other sources such as collision histories, review of existing planning documents, input from area bicyclists, and analysis of attractor and generator locations. It should be noted that this Plan does not distinguish between routes used primarily for transportation or recreation. Many routes which at first appear to be primarily recreational are indeed used for commuting or other transportation purposes, and vice-versa. Just as roadways are built and maintained for motorists without regard to trip purpose, all the recommended routes described in this plan should be considered important regardless of whether they are primarily used for transportation or recreation. It is acknowledged that some routes may be more often used for transportation than recreation or vice versa. This is accounted for in the prioritization criteria. It is also acknowledged that some funding sources are exclusively for transportation bicycle facilities.

The primary goals that were considered in developing the bikeway network for the City of Palo Alto were:

- to serve bicyclists of all levels and abilities;
- to serve all attractors and generators with direct, non-circuitous routes; and
- to improve safety for bicyclists, motorists, and pedestrians alike.

Each of these goals is addressed below.

1. Types of Bicyclists

The bikeway network was designed to serve all types of bicyclists. Bicyclists vary in skill and in their willingness to ride in traffic, ranging from experienced adult cyclists who will ride on any

street, to casual adult cyclists or novice cyclists who are intimidated by high traffic volumes and/or high speeds, to child cyclists. There are many gradations of cycling competency and confidence and there are just as many opinions as to what makes an ideal bike route. For example, some experienced cyclists avoid separate bike paths, preferring to share the roads with cars with or without bike lanes. Other cyclists will ride on arterials only with bike lanes and others will only ride on residential roads.

Children also have special needs; young children under ten usually are limited to neighborhood riding and bike paths with their parents. Children approximately ten years and older, whose parents feel confident in their ability to walk or bike by themselves, can usually use the same bikeway network as adults. Children first learn to ride on residential streets, whose major arterial intersections are controlled by traffic signals. As they get older, many parents will allow them to ride on busier streets with bike lanes.

A network composed of arterial routes, bike lanes, local streets and bike paths has enough options so that all types of bicyclists are served.

2. Convenience – To Serve All Attractors and Generators with a Direct Non-Circuitous Route

In order to serve all attractors and generators, a fairly fine-grained bikeway network is needed. It must geographically cover the entire city, have a route within each major neighborhood, and include all major arterials. Recognizing that some cyclists prefer the most direct route regardless of its official status as a bike facility, this plan includes all major arterials in the City. Some of these roads have or are proposed to have bike lanes, while others have severe right-of-way restrictions and bike lanes are impossible, at least in the short-term. The latter roads are still included as part of the overall bicycle network. By being a part of the bikeway network, projects that improve the safety of bicyclists on these major roadways can be prioritized for funding opportunities. Such projects include but are not limited to upgrading drainage grates, providing signal detectors sensitive to bicycles, signal retiming for safe bicycle clearance intervals, restriping for wider curb lanes, and provision of wide shoulders.

3. Safety

In order to have a safe bikeway network, it is important that the bikeway types meet minimum design standards. It is also important that no part of the network be an attractive nuisance. These considerations are the reasons behind several recommendations including the discontinuation of the sidewalk path designation as discussed further on Page 3.

RECOMMENDED BIKEWAY TYPES

Chapter 1000 of the Caltrans Highway Design Manual (HDM) describes three types of bicycle facilities. However we have expanded on these categories in order to better describe the type of facility that is being provided. The following categories are used for the bikeway network of the City of Palo Alto.

- Class I-Shared-Use Path
- Class II - Bike Lanes

- Class IIIA- Shared Arterial Roadway - Signed Route
- Class IIIB - Bicycle Boulevard – Continuous Route prioritized for bicycles primarily on residential streets.
- Class IIIC - Shared Local Roadway - Signed Route primarily on residential streets. The approach used in developing the Palo Alto Bikeway network is described below along with the HDM definition (presented in italics).

1. Class I Shared-Use Path

Provides a completely separated right of way for the exclusive use of bicycles and pedestrians with cross-flow minimized.

Bike paths are an important component of every bikeway network. Some paths are long enough and well-located enough to provide a car-free environment for a large portion of a bicycling trip. However, their popularity with slow cyclists including families with children and non-bicyclists such as joggers, roller-bladers, parents with baby strollers, people walking their dogs, etc., limit their usefulness cyclists who ride over 15 mph. Serious bicyclists can rarely ride as fast on a bike path as they can on city roads. This is due both to the design of the bike path and also due to the high numbers of slower users. Other bike paths are used to close gaps in a route such as connecting two dead-end roads or traversing parks. Both types of bike paths are included in the Palo Alto Bikeway Network.

While in theory, paths can be excellent facilities for bicycle transportation, sidewalk bike paths do not provide the same degree of convenience or safety. Bicyclists need to ride slowly to avoid colliding with walkers, and there are severe safety issues when bicyclists enter intersections from the sidewalks and additional risks at every driveway. Although the City should continue to permit children to ride on some sidewalks without fear of receiving a citation, it is recommended the category of sidewalk bike paths be eliminated from the Palo Alto bikeway network.

2. Class II Bike Lane

Provides a striped lane for one-way bike travel on a street or highway.

The bike lane is for the exclusive use of bicycles with certain exceptions: for right-turning vehicles must merge into the lane prior to turning; pedestrians are allowed to use the bike lane when there is no adjacent sidewalk and the Palo Alto Municipal code allows skateboards.

Bike lanes should be provided when traffic volumes exceed a certain threshold, e.g., 4,000 vehicles per day on a two-lane street. Below this traffic volume, there should be adequate gaps in oncoming traffic for motor vehicles to safely pass bicyclists.

The Highway Design Manual specifies the minimum width for bike lanes under three conditions:

1. **Next to a curb - on-street parking allowed:** minimum width is five feet where there is a vertical curb and the parking stalls are marked (or a continuous parking stripe is present.) Where parking and/or turnover is infrequent and no parking stalls are marked, twelve feet is the minimum (unless there is a rolled curb when 11 feet is the minimum).

2. **Next to a curb - on-street parking prohibited:** minimum width is four feet with the proviso that there is at least 36 inches to the longitudinal joint where the asphalt meets the gutter pan.
3. **On roadways without curb and gutter -** where infrequent parking is handled off the pavement: minimum width is four feet.

The HDM also states that, "for greater safety," widths wider than the minimums should be provided "wherever possible." While some bike lanes in Palo Alto are wider than these minimums, many bike lanes in Palo Alto are less than these minimum widths. In the latter cases, recommendations have been made to provide bikeways that meet HDM standards.

3. Class III Route

Provides for shared use with pedestrian or motor vehicle traffic.

Class III has traditionally been used to designate anything from low volume residential roads that have no need for bike lanes to arterials with heavy traffic volumes where widening to provide bike lanes would be infeasible. In order to eliminate the resulting confusion over what a Class III route means, this plan subdivides Class III into three categories in order to more precisely describe the features of the bike route. This also helps to differentiate the various types of bicycle improvements envisioned for each roadway.

In the American Association of State Highway and Transportation Officials' (AASHTO) *Guide for the Development of Bicycle Facilities,* 1999, Class III is called a *Designated Shared Roadway* rather than a *Bike Route*. We have used this terminology for the proposed Class 3 routes.

a. Class III - Shared Arterial Roadway

This designation is used where bike lanes would be preferable but are politically or economically infeasible due to right-of-way or topographical constraints. It is acknowledged that only serious cyclists ride on arterials with heavy traffic volumes. Nevertheless, bike lanes are still the preferred treatment on arterials as most cyclists appreciate the greater width afforded by bike lanes. Therefore bike lanes should be considered in any long-term reconstruction or redevelopment plans of the adjacent properties where a new roadway cross-section is possible.

By their very nature, wide curb lanes and Class III bike routes require no special markings, and typically only bike route signs are installed. However, these routes should be well maintained in terms of providing a uniform pavement surface and frequent street sweeping. Other recommendations to improve bicycling conditions on arterials is presented in "Best Practices."

In addition, it is recommended that mid-block pavement stencils be considered in the right-hand portion of the lane. These would be used on roadways with heavy traffic volumes and narrow lanes, i.e., more than 600 vehicles per hour per lane and curb lane widths of 14 feet or less. These stencils would be supplemented with the "Share the Road" signs currently used in the City of Denver and the City of San Francisco. See "Best Practices" for guidance.

b. Class III - Bicycle Boulevards

As discussed in more detail in Chapter 3, Bryant Street was redesigned to have low traffic volumes and few STOP signs and is referred to as a Bicycle Boulevard. It is recommended to expand this treatment to several new routes in the City. The roads chosen for bicycle boulevards make excellent bike routes because traffic volumes are low and speeds are slow, and together the streets will form continuous low-stress bike routes across a good portion of the City. As originally conceived back in 1982, the purpose of a bicycle boulevard is to improve bicycle convenience and safety by having or creating one or more of the following conditions:

- low traffic volumes
- discouragement of non-local motor vehicle traffic;
- free-flow travel for bikes by assigning the right-of-way to the bicycle boulevard at intersections wherever possible;
- traffic control to help bicycles cross major streets (arterials)

In order to improve conditions for bicycles on the recommended bicycle boulevards, therefore, the same types of measures implemented on Bryant Street may be necessary e.g. traffic control at major intersections, removal of unwarranted STOP signs, stopping side street traffic and some traffic calming. But in most cases, the routing builds upon the location of existing traffic calming and traffic control devices. In some instances in the past, all-way STOP controls have been used to address community concerns regarding motorists driving above the posted speed limit. STOP signs add significantly to the travel time of bicyclists, and have been demonstrated to be ineffective in slowing traffic speed between stops. This strategy should not be used on designated bike routes in general and on bicycle boulevards in particular.

The following criteria were used to the select the roadways that make up the proposed new bicycle boulevards:

- Local street, and not a transit or truck route.
- Spaced between ¾ and 1½ miles from another Bicycle Boulevard, (approximately the traditional spacing of major streets).
- Reasonably continuous; (i.e., it extends over half of the cross-section of the City.)
- Few jogs with main segments at least 0.5 mile long.
- Traffic signals exist at major intersections or new traffic signals are feasible.

c. Class III - Shared Local Roadway

There are several local roads that are recommended for bike routes, but which do not meet the criteria listed on above and/or are only a few blocks long. These are simply designated bike routes.

RECOMMENDATIONS

This section describes the recommendations to improve and expand the bikeway system of the City of Palo Alto. The first set of recommendations is to expand the bikeway network as depicted in Figure 6. The second set of recommendations is for action steps the City can take to improve existing routes.

Expanded Bikeway Network

The bikeway network recommendations include both adding new streets to the network and revising the bikeway type for some existing bike routes. The capital improvements needed to implement these routes have been divided into fifty projects and are described in detail in Appendix G. Note that these projects have been assigned numbers for planning purposes only.

The new recommended bikeways are listed in Table 4-1 by bikeway type. While this is a planning study and detailed traffic engineering assessments of the recommendations were outside the scope, a preliminary assessment was made of the most feasible way of implementing the recommendations. This is based on the existing curb-to-curb width, traffic engineering principles and knowledge of the needs of bicyclists. This assessment is indicated for each roadway segment in detail in Appendix G. Implementing bike lanes can vary from laying down the stripe where there is adequate pavement width to removing a travel lane or on-street parking. The most common strategies to implement bike lanes in Palo Alto are listed below. Finally the three types of Class 3 Bike Route each call for different types of improvements as described below.

Bike path

- Construct bike path on public easement.
- Construct bike path on private easement.
- Improve existing bike path.

Bike Lanes

- Stripe bike lanes using existing pavement width; retain lane/parking configuration.
- Provide bike lanes by widening roadway and/or eliminating left-turn lane mid-block. This recommendation mainly applies to Alma Street where there is room along the landscape strip on both sides of the roadway. Exactly how much can be obtained from which side of the road would need to be the subject of another study.
- Remove parking on one side to provide standard bike lane widths. This has been recommended on the streets with 36 foot cross-section that have substandard bike lane widths. The City is currently implementing this on sections of Channing, Churchill and Newell. The new cross-section provides one 12 foot bike/parking lane, two 9.5 foot wide travel lanes and one five foot bike lane.
- On several streets, mostly residential arterials, bike lanes are recommended and implementation would require parking and/or lane removal. Some studies have been done for some streets such as Embarcadero Road and Charleston Road. Implementation

of bike lanes on the residential arterials will be coordinated with the City's current residential arterial traffic calming projects.

Shared Arterial

- Install Bike Route signs and make arterial improvements such as wider curb lanes. (See "Best Practices" for a more detailed description of possible types of improvements.)

Bicycle Boulevard

- Remove unwarranted stop signs, traffic calm if necessary.

Shared Local Roadway

- Install bike route signs.
- Remove bike lanes and install bike route signs.

Table 4-1
RECOMMENDED ADDITIONS TO THE BIKEWAY NETWORK

Class 3 Shared Roadway – Arterial	
• University Avenue	
Class 3 Bicycle Boulevard	**Class 3 Bike Routes**
• Castilleja/Park Boulevard/Wilkie Way	• Old Page Mill Road
• Ross Road	• Barron/La Donna/Laguna/Josina
• Greer Road	• Colorado Avenue
• Chaucer/Boyce/Guinda/Melville	• Loma Verde Avenue
• Everett Avenue/Palo Alto Way	• Coleridge Ave (eliminate bike lanes)
• Homer Avenue	• San Antonio Way
• Matadero Avenue	• Montrose
• Maybell Avenue/Donald Drive/El Camino Way	• Arastradero Road (Page Mill to Alpine)
Class 2 Bike Lanes	**Class 1 Bike Paths and Grade Separations**
• Alma Street	• Matadero Levee
• Middlefield Road	• Montrose/Cubberly Path
• Hanover Street/Porter Avenue	• Bol Park to Gunn H.S. Path
• Hansen Way	• Miranda Road Extension Bike Path
• San Antonio Road	• South Palo Alto Caltrain Undercrossing
• Embarcadero Road	• Everett Avenue Caltrain Undercrossing
• Oregon Expressway	• Homer Avenue Caltrain Undercrossing
• Colorado Ave	• New or improved all year Hwy 101 under or overcrossing near San Antonio Road
• Charleston Road	• New or improved Caltrain undercrossing at California Avenue
• El Camino Real	
• Deer Creek Road	
• Hwy 280/Page Mill Interchange	

Improve Existing Bikeways and Connections

In addition to the projects listed in Table 4-1, there are several opportunities to make improvements to bicycle circulation. Some of these are on designated bike routes and some are not. Ideally these improvements, listed in Table 4-2, should be implemented in conjunction with other projects that affect these locations but they could also be implemented with grant funding or from the general fund.

TABLE 4-2
RECOMMENDED IMPROVEMENTS/EXTENSIONS TO EXISTING STREETS AND PATHS

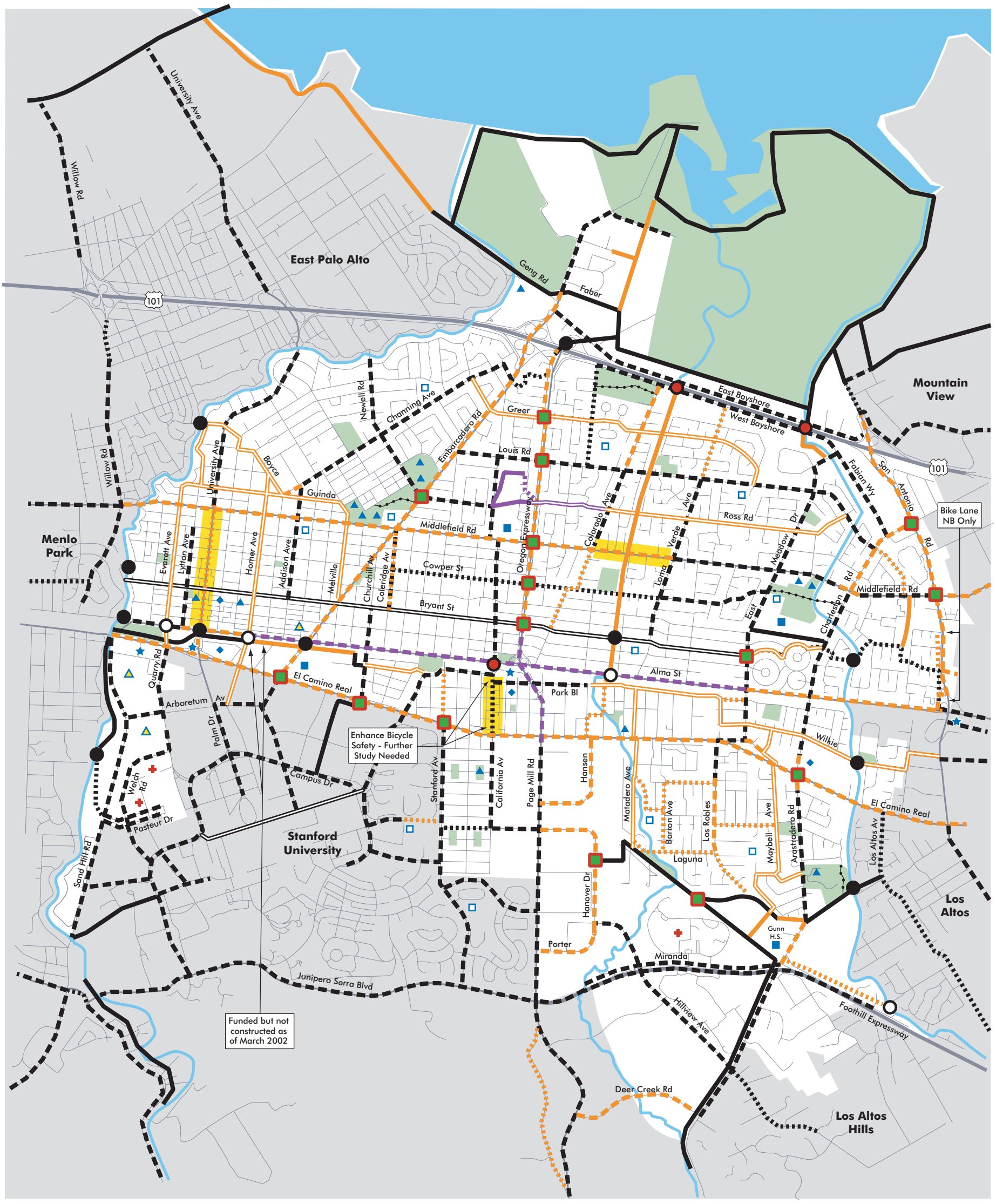
Street	Location	Issues and Opportunities
Bay Trail		Opportunity to extend east of Faber to Byxbee Park.
Bay Trail	Along Faber Place	Extend Geng Rd to Baylands to south; "Bay Trail" designation currently carried by Faber Place, which is 100% parked along both sides on wkdays.
Bol Park Path		Turns to/from Hanover are dangerous due to blind curve; add median refuge. Opportunity for spur link to Terman Path to Los Altos Ave via Gunn HS lot, Hetch Hetchy parcel, and Arastradero median refuge. Explore opportunity for Class I spur extending major axis toward Hansen Way, at least to currently private street through Varian parcel.
Bryant Street		Improvements to this route are described in Chapter 3.
California	(Louis-Middlefield)	School drop-off/pickup occurs illegally in bike lane, work with school to reduce impacts on bicycle circulation.
Charleston	El Camino to San Antonio	Has existing bike lanes but cars turning right at Alma block bike lane during AM peak. By restriping roadway as recommended in *the Charleston Road Corridor Traffic Management and Safety Study,* bike lanes could be striped between the through and right-turn only lanes. The intersections of Charleston /Middlefield and San Antonio/Middlefield present problems for bicyclist. Extend bike lanes from Middlefield to San Antonio.
East Bayshore		Bike lane/shoulder goes up/down abruptly over two creek bridges. Path between Oregon/101 overcrossing and Bay Trail could use better street junction/crossing.
El Camino Real		Work with Caltrans to improve safety and bicycle facilities at intersections with Churchill Avenue, Stanford Avenue and Arastradero Road.
El Camino Way		High parking turnover along bike lane on school bike route.
Foothill Expwy	At Arastradero	Work with County to improve Arastradero/Miranda intersection.
Hillview	Hanover to Foothill Expressway	Substandard bike lanes with parking. Discontinuous sidewalks lead walkers/joggers to use the bike lane.
Middlefield Rd	At San Antonio	Extend bike lanes from just north of intersection to south city limits.
Oregon and Page Mill Expwys	Signalized intersections	Work with County to improve and mark left-turn signal detectors and signal timing/phasing.
Pasteur	At Welch	Opportunity to remove delays by replacing Welch signals with roundabouts.
Quarry	El Camino Real	Ensure safe bike access and detection at and across El Camino to future Transit Center redevelopment area. Strong desire for link across Caltrain to Alma near Lytton or Everett.
W. Bayshore	SB from Amarillo to 3500	Fast traffic, long blocks, occasional parked cars force cyclists out.

Long Term Projects

Several segments of the bikeway network appear to have serious challenges facing their implementation. These have been identified as recommended projects acknowledging that they will need to be studied further determine their feasibility.

They are referred to as long term projects, and they have not been prioritized in Chapter 6. They are:

1. Bike Lanes on Alma Street north of E Meadow Drive
2. Bike Lanes on Oregon Expressway west of Bryant
3. Bicycle Boulevard along Ross from Colorado to N. California



EXISTING PROPOSED

- Bike Path
- Bike Lane
- Bike Route
- Bike Boulevard
- Park Path

NORTH

Not to Scale

- Existing Bike/Ped Bridges or Tunnels
- Improve Existing Bike/Ped Bridges or Tunnels
- Proposed Bike/Ped Bridges or Tunnels
- Potential Long-Range Projects with Serious Implementation Issues
- Spot Improvement Needed

- Employment Centers
- Shopping Centers/Areas
- Transportation Facilities
- Medical Centers
- Community Centers, Libraries and Museums
- Elementary Schools
- Middle/High Schools
- Parks

Figure 6
RECOMMENDED BICYCLE NETWORK

Chapter 5
BICYCLE SUPPORT FACILITIES AND PROGRAMS

This chapter discusses the bicycle parking, showers and lockers for bicycle commuters and intermodal access. It also contains recommendations for Bicycle Education/Promotion Programs.

BICYCLE PARKING

Current Policy Status

Chapter 18.83 of the Palo Alto Municipal Code, "Off-Street Parking and Loading Regulations," contains the City's requirements for providing bicycle parking facilities. Bicycle parking facilities are required "for any new building constructed and for any new use established, for any addition or enlargement of an existing building or use, and for any change in the occupancy of any building or the manner in which any use is conducted that would result in additional spaces being required." However, land uses existing prior to July 20, 1978, are essentially exempt from parking requirements (for both automobile and bicycle parking). Typically, the number of bicycle spaces required is 10% or 25% of the automobile parking space requirement for a particular use. In addition, development regulations and design standards in the code are intended to ensure the usefulness of the bicycle facilities provided.

In most cases, the City's current bicycle parking requirements appear to have resulted in new buildings being supplied with sufficient quantities of fair-to-excellent quality bicycle racks and lockers. There are exceptions, however.

Class II Bicycle Parking Requirement: The Class II bicycle parking requirement calls for *"A stationary object to which the user can lock the frame and both wheels with only a lock furnished by the user. The facility shall be designed so that the lock is protected from physical assault. A Class II rack must accept padlocks and high security U-shaped locks."* There are very few racks on the market that meet this specification for a rack which the protects both wheels and frame with only a padlock supplied by the user, and additionally require that the padlock be protected from assault. This requirement has typically been met with 'Rack III' brand racks. Today, however, very few cyclists carry a padlock, and the 'Rack III' racks have proven awkward and unpopular with the vast majority of cyclists (who generally use U-locks). Defining the code provisions for Class II racks to be able to utilize a U-lock to lock the frame of a bicycle is recommended.

Code enforcement: At some buildings constructed since the passage of the bicycle facilities ordinance, required Class I bike parking facilities may have been modified (lockers, restricted access rooms and enclosed cages) and/or required signs are not provided. Similarly, some Class II and III racks at other buildings are installed so close to walls and other obstructions that they are rendered useless. To solve these problems, additional training of code enforcement officers; brochures for builders to show proper installation techniques for bike facilities; and follow-up enforcement spot-checks may be helpful.

Existing Bike Parking Supply

An inventory of existing bicycle parking facilities at schools and the major shopping areas in Palo Alto was performed. The results of this inventory are contained in Appendix I.

Recommendations to Improve Parking Supply

Retrofitting Older Buildings: Clearly, many older buildings (pre-1978 generally) noticeably lack convenient bicycle parking facilities. These facilities range from shopping centers to offices to schools to apartment buildings. Several strategies can be used to retrofit such buildings, and they are listed below by area of the city.

Retrofitting older buildings – downtown: In the downtown, the need for bike parking is partially filled by the many racks distributed along University, and by city-owned bicycle lockers located in public parking lots. However, almost all buildings along the cross-streets to University and along Homer and Lytton lack convenient racks. Narrow sidewalks with parallel parking make it difficult to fit in racks on these streets, so many bikes are locked to parking signpoles and trees. To solve this, the careful placement of some racks may be feasible. Alternatively, adding curb bulb-outs at intersections along Homer and Lytton would provide ample space for new racks, while also shortening crossing distances for pedestrians.

Retrofitting older buildings – California Avenue district, and El Camino Real: As in the University Avenue area, while good racks are located along California Avenue, the many businesses and offices located on cross-streets and the adjacent parallel streets in the California Avenue Business District lack bike parking. Here too, careful placement of some additional on-street racks, or adding new racks in curb bulb-outs at intersections, would help. Similarly, new racks along El Camino Real in the blocks where buildings directly front the sidewalk would be well-used.

Retrofitting Buildings Set Back From The Street: Where buildings are set back considerably from the public right of way (for example, at shopping centers, apartment complexes and post-war office parks), installing racks or lockers along the public street is of little use: most cyclists will only use parking facilities within a few steps of their final destination. However, several cities have had success with initiatives to provide all or part of the cost of bicycle facilities installed on private property. Usually, an installation agreement specifies that the owner will keep these racks maintained and in use for a minimum number of years, or else reimburse the City for its full costs.

Marketing City-Owned Lockers: Currently, not all of the City-owned bike lockers are rented, and better marketing appears to be needed. Many downtown employees interviewed indicated that they were unaware that bike lockers are available for rent downtown, and the majority of passers-by interviewed by the team were unable to guess the intended purpose of the anonymous boxes that are the City bike lockers. It would be helpful to provide signage on the lockers of a minimum of twelve inches by twelve inches in size indicating: (a) that it is a bicycle locker for rent; (b) the rental rate; and (c) the contact information for renting the locker. In addition, advertising the lockers, particularly in conjunction with Bike-to-Work-Day efforts, would be useful. Adding signage and advertising in Spanish would be useful for Palo Alto's many Spanish-speaking employees.

Bike Parking at Connections with Other Transportation Modes

Both train stations and the VTA park-and-ride lots provide lockers for long-term rent. The new Palo Alto BikeStation at the Palo Alto Transit Center (at University Avenue) is an excellent facility for free guarded storage, rentals, repairs and accessories. Racks are also available at both stations and at the park-and-ride lots, but many are poor quality and at the Palo Alto Transit Center in particular, many are clogged with abandoned and/or half destroyed bicycles. The Palo Alto BikeStation has two short term use Bike Lid lockers that can be used on an on-call basis by BikeStation users. Previous attempts in the Bay Area to create coin-operated day-use lockers were often plagued by vandalism and abandoned. The Long Beach BikeStation appears to have found one good solution for providing short-term secure bike storage: they issue keys to bike lockers, which commuters then return to a drop-box when they return after-hours to the station. So far, this pilot project has been a success.

Other Palo Alto bus stops generally have no bicycle parking facilities, in part because experienced cyclists often find cycling all the way to their destination faster than taking a local bus; and in part because all VTA and SamTrans buses can now carry at least two bikes on-board. Surprisingly, however, Stanford University surveys of Marguerite commuters have indicated that a substantial percentage use a bike to reach their Marguerite stop, and it is not uncommon to see bikes locked to trees and poles near local bus stops. Typically, these cyclists are uncomfortable riding on arterial streets, or not in good physical condition for a ride of several miles. As a pilot project, it may be useful to test the demand for bike parking at local bus stops by adding racks at some stops where bikes have been observed, and then noting if these racks become regularly used. If they are well-used, more can then be added at other stops.

Showers

The Municipal Code also contains Palo Alto's requirements for employee shower facilities. Showers are normally required for all new buildings and/or additions which house employees when the new construction is at least 10,000 square feet (25,000 square feet in a few cases). Retrofitting older buildings which lack showers is sometimes costly and difficult, and while it may be possible for the city to provide incentives for employers to do so, we know of no cities which have instituted such a program already. For City Hall, the proposed move of the police and fire departments to a new facility may offer an opportunity to re-establish access to the existing showers and lockers that are currently accessible to only police personnel.

BICYCLE ACCESS TO TRANSIT SYSTEMS SERVING PALO ALTO

The Bay Area and Santa Clara County are at the forefront of U.S. bicycle accommodation aboard transit vehicles. All systems allow folding bicycles aboard when folded, even when conventional bike space is full or access-restricted. Most allow electric-assisted bicycles but not liquid-fueled motorized bicycles. Tandem bicycles are prohibited except on BART and on ferries. On all systems bicycle boarding is first-come, first-served. None of the systems listed below require a bicycle permit or surcharge, though several did so in the early 1990's when onboard bike access was just beginning. Detailed information and web links for all Bay Area transit rail, bus, shuttle, and ferry systems, including bicycle policies, is available at http://www.transitinfo.org. Another high-quality nationwide bike-on-transit resource, with some photos, is http://www.bikemap.com.

Specific information regarding transit service providers that serve Palo Alto is presented below.

Caltrain

Caltrain runs between San Francisco and San Jose with some trains also serving Morgan Hill and Gilroy to the south. Palo Alto has two Caltrain stations and a game-day-only station serving Stanford Stadium; the San Antonio Road station is just across the city limit in Mountain View. Caltrain operates 68 weekday trains plus weekend service.

Caltrain has a 32-capacity bike car on every train and two bike cars on 18 of the weekday trains; availability of the second bike car is subject to equipment maintenance. Caltrain bike cars each have six 4-bike racks; bikes are nested together against each other in stacks held together by bungie cords. This arrangement is very space-efficient but does not offer independent access; cyclists cooperate by stacking bikes by destination and by affixing "bike tags" with the name of their destination station.

Only single-rider bicycles no larger than 80 inches long by 48 inches high may board; no tandems, three-wheel, or motorized bicycles are allowed though electric-assist units are frequently seen aboard. Cyclists are instructed to board and deboard after other passengers. Cyclists must be 12 years of age or older, in part because the railcars have a high set of steps and younger children cannot lift their bikes aboard. Caltrain experiences well over 2,000 cyclists boardings every weekday during the warmer, lighter months of the year. Unfortunately the popularity of the service results in many bicyclists being denied access due to space constraints.

Santa Clara Valley Transportation Authority ("VTA") Light Rail

VTA operates Santa Clara County's bus and Light Rail system. All VTA light rail cars are equipped with interior racks for 4 bicycles, and two more bicycles may stand on the floor in the center section (the turntable area of these articulated cars). Maximum bicycle size is 80 by 48 inches, as with Caltrain. VTA Light Rail trains typically consist of 2 or 3 cars, giving a total train capacity of 12 or 18 bicycles.

VTA has equipped every bus in its fleet with 2-bike front-mounted racks which allow independent insertion and removal. All buses in the fleets of SamTrans (San Mateo County), Golden Gate Transit (Marin County), and Santa Cruz County have also been equipped with the 2-bike front racks. Alameda County ("AC") Transit plans to have most of its fleet equipped during 2000. Muni (San Francisco City and County) buses on routes 17, 35, 36, 37, 39, 53, 56, 66, 76, and 91 have bicycle racks. The jointly-operated Highway 17 Express (San Jose to Santa Cruz) and Dumbarton Express (Palo Alto and Menlo Park to Union City BART) buses have 2-bike front racks.

VTA policy allows two additional bikes inside the bus subject to driver's discretion; this policy enables more cyclists to use buses at times when the bus is partly empty but there are already two cyclists aboard. SamTrans also allows two additional bikes aboard, space permitting.

BART

The BART (Bay Area Rapid Transit) rapid-rail/subway system accommodates bicycles aboard. BART does not serve Palo Alto or Peninsula cities south of Millbrae, but connects with Caltrain at Millbrae and with the Dumbarton Express bus at Union City.

Bikes are allowed in any car except the first car, which has priority for wheelchair users. BART cars have no bike racks; cyclists must hold their bikes and not block aisles or doors. Cyclists under 14 years of age must be accompanied by an adult. Bikes are prohibited from BART escalators. Because BART trains run completely full inbound to San Francisco in the morning rush and outbound in the evening rush, bikes are prohibited on trains during peak periods in the peak commute direction and in downtown Oakland and San Francisco stations during peak hours.

Amtrak Capitol Trains

Amtrak's Capitol intercity train does not directly service Palo Alto; it runs between San Jose and Sacramento and serves Santa Clara, western Alameda County, western Contra Costa County, Martinez, Suisun City, and Davis. Capitol trains have two or more "California Cars," each with vertical racks for three bicycles, for a total train capacity of six or more bikes.

Altamont Commuter Express

ACE commuter trains run inbound from Stockton to San Jose on weekday mornings, serving cities in the Central Valley, Tri-Valley (Livermore, Pleasanton), Fremont, and Santa Clara (Great America station, Tasman at Lafayette). They make the outbound trip in the evening. ACE accommodates bicycles aboard the lower level of its cars; bikes are distributed over several cars, unlike Caltrain.

RECOMMENDED BICYCLE EDUCATION PROGRAMS

Bicycle education is critical for encouraging both bicycling and bicycle safety. Although improving bicycle facilities is the most effective way to increase bicycle use, bicycle education and safety encourages safe bicycling. Unfortunately, too many bicyclists in the United States lack the basic skills or knowledge to safely ride a bicycle in traffic. Bicycle education programs are designed to increase bicycle safety by improving the ability of cyclists to ride with traffic as well as by heightening motorist awareness. The difficulties faced in helping cyclists to develop this skill and knowledge stem from the wide range of age groups that require this training and the necessity of tailoring the programs for each one. For example, young children should be taught the basic rules of the road in conjunction with hands-on bicycling instruction. Adults benefit most from a program designed to impart the responsibilities of bicycle riding by both demonstrating how to safely share the road with motor vehicle traffic and providing tips on the benefits and methods of bicycle commuting. Bicycle education programs should be directed at the following groups:

- Child Bicyclists
- Adult Bicyclists
- Motorists
- Law Enforcement Officials

Attempts by a community to provide all of these programs can definitely put stress on a system that is already overloaded; money and staffing are in short supply in every jurisdiction. For this reason, a community must explore all possible avenues in designing and implementing a bicycle education strategy. Public agencies such as city planning, public works, police, public health, community development and school districts must be brought into the effort. Community and civic organizations, employers, local businesses and cycling clubs should also be tapped as resources. Some of the most successful programs are the result of coalitions of public agencies and private groups working together toward a common goal.

In general, bicycle education programs can be described as those which develop awareness and provide information such as posters, brochures and videos; and those which change behavior and/or develop skills, such as programs with on-bike instruction. Programs vary, including hands-on riding instruction, teaching adults who supervise children, public awareness programs, and instruction for motorists, law enforcement officers and community events. The key to any bicycle education program is to reach your target audience, in other words, getting people to participate. Bicycle promotion programs, discussed at the end of this chapter, are intended to increase the community's awareness of the benefits of bicycling and can also serve to improve safety for bicyclists.

As previously mentioned, bicycle education programs can take many forms and are generally directed at either child or adult bicyclists and/or motorists, law enforcement officials or the community at-large. Children are at the greatest risk for injuries due to bicycle-related accidents. Therefore, children tend to receive more attention in bicycle education strategies than do adults, motorists and law enforcement officials. The following sections discuss the characteristics of the bicycle education programs most suitable for each group listed above. Additional information on education programs is presented in Appendix J.

Child Bicyclists

School children benefit most from an action-oriented teaching approach. Most bicycle safety programs target elementary school-aged children and their parents. Programs targeted at beginning bicyclists, between the ages of five and eight, focus on the role parents play in selecting the proper size and type of equipment, in supervising their child's use of that equipment, and in teaching the basic mechanical skills needed to start, balance, steer and stop a bicycle. Parents may be reached through parent-teacher associations and children through programs sponsored by the schools, day care centers, summer camps, and boys and girls clubs.

Children pose a special safety problem as they learn to ride bicycles. Skills such as learning to ride by the rules, looking for traffic and using hand signals need to be learned. Bicycle education programs should start as early as children learn to ride, and should be modified as the years go by to focus on the needs of each age group. There is a critical window of opportunity for learning and integrating traffic skills defined by children's development on one end and the age at which they are most at risk for crashes and injuries on the other end. Children between the ages of nine and ten are the optimal target for learning how to enter and exit the roadway; scanning ahead, behind and to the side while riding straight, and communicating and cooperating with other road users. Bicycle education programs directed at children should include basic instruction on rules of the road and training to develop the skills necessary to ride a bike.

Professor William Moritz at the University of Washington has proposed that the one-shot method of Driver's Education for high school sophomores be replaced with a curriculum that spans most of their primary and secondary school career. Four major areas of instruction would be taught in four stages of students' development. In Grades K-3, students would learn basic pedestrian skills, stranger danger, crossing residential streets, using pedestrian push buttons, taking a school bus, etc. Older students in Grades 4 to 5 would be ready to learn bike safety and handling skills, including bike operation on streets with supervised bike rides on neighborhood streets. This is being done in many states including Hawaii, Montana, Florida and North Carolina. Later, in Grades 7-9, they would learn basic mobility skills for getting around town, including using transit for utilitarian and recreational trips (reading a bus schedule, executing a transfer, taking rapid transit), and more on safe bicycling practices. By the time students reach Grade 10, they would be transit-independent and able to go places without needing a ride. In tenth grade, students would also take driver's education, as they do now. But driver's education would include focused instruction on how motorists should interact with pedestrians and bicyclists, how to predict bicyclist and pedestrian movements, pass safely, learn when different modes have the right-of-way, etc.

Palo Alto has a slightly modified approach that incorporates most of these same elements. It is recommended that the bicycle education program for children currently offered in Palo Alto continue and be expanded to include the following elements:

- **Kindergarten through Second Grade** - Pedestrian and bicycling safety education/safety training.
- **Third Grade** - *Basics of Bicycling* (curriculum developed by Bicycle Federation of America) including classroom instruction and on-bike practicum to teach bike-handling skills.
- **Fourth through Sixth Grades** – Bicycle safety education assemblies and street skills seminars or other classroom/on-bike program to teach bike-handling skills.
- **Middle School and High School** - Should cover commuting as well as recreational uses, touring, and racing; conducted by volunteer cycling advocates. High School - include bicycle education as part of driver's training courses. *Bike Ed* (developed by the League of American Bicyclists) should serve as the foundation for training cyclists to ride safely in traffic and on the road. Street skills for cyclist courses for Middle and High School students.
- **Local Universities** - Promote cycling on campus; introduce *Bike Ed* as physical education course (similar to racquetball, tennis, etc.).
- **Bicycle Traffic School for Juveniles** - Continue the Fire Department's Bicycle Traffic School diversion program for juveniles who receive bicycle citations.

Bicycle Helmets - Bicyclists under the age of 18 are required by California state law to be wearing a properly fitted and fastened bicycle helmet. Before 1994 when this law went into effect, over 25% of bicycle accidents involved head injuries. Of these, more than one-half were life-threatening. Many communities have developed special programs to encourage the purchase and use of bicycle helmets. Helmet companies and bicycle shops have offered discounts for community and school programs to provide helmets at little or no cost.

Adult Bicyclists

Few materials and programs exist that focus on the adult rider, with the exception of *Bike Ed*. Most adult bicyclists have not had any formal bicycle education in childhood outside of learning the basic mechanical skills. At the same time, there are misconceptions, myths and outdated advice that further challenge adult bicyclists' safety. For instance, some believe a bicyclist should ride facing traffic, and many bicyclists bike at night without the required headlights and reflectors. Bicycle education programs developed for the adult cyclist need to educate cyclists about bicyclists' rights and responsibilities on the road and techniques for sharing the road with motorists. In addition, publicizing typical behaviors that cause accidents help bicyclists avoid common crashes.

Most unsafe bicycle riding occurs simply because the violator does not know the laws. Educating non-English-speaking cyclists poses an additional barrier. The American Automobile Association (AAA) has numerous brochures in English and Spanish on the vehicle codes. Last year, the City of Half Moon Bay implemented an aggressive program to educate their Latino/Hispanic communities in response to several bicycle accidents and three fatalities. Spanish-speaking police officers stop cyclists who are riding on the wrong side of the road or at night without a light. Instead of issuing a citation, the officer explains the relevant laws to the cyclist, distributes information brochures in the cyclist's native language and, when the cyclist is riding at night without a light, gives them a free light and tells them how to use it correctly. This form of education works because it addresses the problem directly and, in the case of the free lights, the recipient is excited about receiving free equipment. In addition, the Half Moon Bay Police Department also works through employers. Spanish-speaking police officers give bicycle-safety presentations at large nurseries that have a number of Spanish-speaking employees.

The *Bike Ed* course by the League of American Bicyclists (LAB) would serve the public need for cycling education and can be offered at work sites, bike shops, bike clubs, schools, churches and community centers. Promotional events also provide an opportunity to enhance bicycle education and encourage motorists to share the road. While it is often difficult to get adults to attend classes, community events such as charity bike rides, bike fairs and bicycle rodeos are useful in attracting adults and families in more recreational surroundings. The Western Wheelers is the key organizer of bicycling outings and events such as the 100-mile Century Ride to encourage bicycling. Since most adult cyclists are also motorists, they can also be reached through programs discussed in the next section.

Motorists

Motorists are probably the most difficult group to reach with bicycle education. Existing motorist-oriented programs typically reach their intended audience only at specific points. Some amount of bicycle education is distributed during driver education courses, driver licensing exams and traffic schools for violators, but these events will only occur once every several years and are generally felt to be ineffective in changing driving behavior.

Public awareness campaigns are most useful for educating motorists on how to safely share the road with bicyclists, while at the same time reminding bicyclists of their rights and responsibilities. Media campaigns, community events and family activities can be useful in

raising awareness regarding bicycle/motorist safety. For example, the City of Sunnyvale distributes information on sharing the road with bicyclists in its utility bills. In addition, parents who attend bicycle education events with their children may learn something themselves about bicycle/motorist safety that can help to reinforce the safe-cycling of their children.

Law Enforcement Officials

The most common violations causing accidents are cycling on the wrong side of the road, failure to stop at stop signs and signals, cycling at night without lights, or behaving unpredictably while proceeding down the road. Consequently, enforcement should be viewed as an integral part of the bicycle education program and as the most effective way to reduce the frequency of bicycle/automobile accidents. Palo Alto has a downtown ordinance that prohibits bicycles from riding on sidewalks

In order for Palo Alto's bicycle traffic enforcement program to work effectively, officers need education on how best to approach an offender and what violations should be earmarked for enforcement. The bicycle fine structure should be reviewed periodically to ensure that fines are not excessive. Several local police department have recently implemented a program "Bicycle Diversion Training" to integrate bicycle safety education with citations. When given a ticket for illegal (unsafe) riding, a cyclist must attend safety training in lieu of paying a fine or appearing in court. This is accompanied by a media campaign to inform residents that bicycling offenders will be cited. Palo Alto has such a program for juvenile offenders but not adults. Juvenile offenders are required to attend a safety class with their parents, thereby providing the opportunity to educate both children and adults.

To enhance the observance of the traffic regulations by bicyclists, this plan encourages the continuation of the Police Department's bicycle patrol. Throughout the country, many cities have demonstrated the effectiveness of community-based policing utilizing bicycles in place of patrol cars. Clearly, an officer on a bicycle can speak with greater authority about unsafe cycling practices and code violations committed by bicyclists.

BICYCLE PROMOTION PROGRAMS

This section proposes several possible programs and activities, which are appropriate for a bicycle promotion program in Palo Alto. Bicycle promotion programs are most easily integrated into a city's overall trip reduction program, since they can be staff-intensive. The City's commute coordinator is currently assigned the tasks of a TDM coordinator. The three main components of a bicycle promotion program are described below. It is recommended that the following items, if not already, be integrated in to the city's TDM program.

1. **Identify benefits of bicycle commuting** - Bicycle commuting is an enjoyable, low cost and healthy alternative to the traditional motorized commute. Bicycle commuting reduces the costs of commuting to the employee, improves health through exercise, can save time for the employees during the actual commute, and can replace time and money spent in lengthy workouts in a gym. Bicycle commuting also does not consume fossil fuels or pollute the air.

2. **Provide an incentive to use bicycle commuting** - Many of the existing TDM programs use monetary or other incentives to lure the prospective participant out of his/her single-occupant-vehicle and into a carpool or transit. These TDM programs should be expanded to include incentives for bicycle commuting.

3. **Support and applaud bicycle commuting** - Endorsement of bicycle commuting by those in charge is a significant aspect of a promotion program. Prospective bicycle commuters are more apt to try out this underutilized mode if it is accepted and supported by elected officials and city department heads. Endorsement from "the people in charge" of city government will go a long way towards persuading individuals to bicycle commute, and companies to establish bicycle commute programs of their own.

Description of potential bicycle promotion programs has been divided into two parts, one directed at city employees and the other aimed for the general population of Palo Alto.

City Employee Campaign

Identify Benefits of Bicycle Commuting

- **Info Flyer** - Publish a "Bicycle Commute Info sheet" with information on bicycles and other needed equipment, where safe and secure bicycle parking is located, where bike shops are located, and the available transit-access options.
- **Informational Materials** - Make available bicycle route maps, safety information, effective-cycling pamphlets and flyers of upcoming bicycle events.
- **Bicycle Club** - Start a bicycle commuter club and information network to advise potential bicycle commuters of their best commute routes, to locate experienced bicycle commuters in their area ("Bicycle Buddies") who are willing to assist and escort them during their first bicycle commutes, and to find out what events and activities are coming up. RIDES for Bay Area Commuters provides this service for potential bicycle commuters, including information about bicycle access on bridges and transit throughout the area.
- **Bicycle Safety Demonstrations** – Hold demonstrations during the lunch hour on safe-riding, how to bicycle commute, and bicycle repair. The City, local businesses, local bicycling clubs or advocacy groups can sponsor these events.
- **Bicycle Commute Competition –** Hold a competition between city departments and agencies to determine who has the most bicycle commuters during a week.

Provide Incentives for Bicycle Commuting

- **Parking** – Secure and protected long-term parking must be provided. Options include bicycle lockers, bicycle storage rooms, attendant parking or allowing bicycles into the workplace.
- **Cash Incentives –** There are many types of cash incentives which can be used to encourage bike commuting. The cost of these programs can be mitigated by soliciting sponsorships from stores, restaurants and other retailers. They include:
  - Cash dividends for each day of bicycling, similar to a transit subsidy;
  - Monthly drawings for prizes;

- Mileage reimbursement for city business travel by bike; (policy in place)
- Discount coupons or credit at bike stores, restaurants or other retail businesses;
- Bike purchase financing;
- Parking cash-out program.

- **Convenience Incentives** – One of the major obstacles to bicycle commuting is the perceived inconvenience factor. The following list of programs addresses these concerns.
  - 'Guaranteed Ride Home'
  - Fleet bicycles for business travel
  - Trial commute bikes
  - On-site bicycle repair kits
  - On-call bicycle repair services
  - Flex hours
  - Showers and locker rooms (or gym membership)
  - Relaxed dress codes

Support and Applaud Bicycle Commuting

- **"Ride with an Elected Official"** – Sponsor a ride for city employees with an elected official and/or department heads to demonstrate their support and enthusiasm for bicycle commuting.
- **Special Programs** – Organize Palo Alto bicycle commute events for city employees to coincide with regional and national events such as Bike to Work Day, Beat the Backup Day, Earth Day and Transit Week.

Elements of a Citywide Campaign for All

Identify Benefits of Bicycle Commuting

- **Media Campaigns** – Television and radio public service announcements can help reach a broad audience. A weekly bicycle newspaper column can discuss local bicycling news as well as advertise upcoming events.
- **Bicycle Hot Line** – Telephone Hot Line for reporting potholes, missing bike route signs or other bicycle-related hazards. The system could also be expanded to provide bicycle news on upcoming events. Also provide comparable service on the World Wide Web.
- **Bicycle safety demonstrations** – Expand the program of demonstrations discussed above to include presentations at schools, fairs or other city events. As described on Page 4-6, the Police Department is now developing and presenting a safety program.
- **"Palo Alto Bicycle Safety Week"** – Develop a week-long event to promote the benefits of bicycling to a citywide audience. Include activities in the schools as part of the program. This event can culminate in a "Palo Alto Fun Ride", one evening bringing together all the participants.
- **City Bicycle Rides** - To maintain interest and attention on bike commuting after the "Bicycle Safety Week" is over, a monthly or quarterly City ride could be organized. These rides should be supervised and designed with clear safety guidelines and a pre-determined route. A Bike Day could be instituted once a month when everyone is encouraged to use a

bicycle for that day's trips. Alternatively, a ride could be organized with a popular Palo Alto personality, like a writer or athlete.

Provide Incentives for Bicycle Commuting

- **Bikeways -** Implementation of the bicycle network in this Plan will be critical to a successful encouragement program. Bicycle route maps and identifiable route signage systems are also necessary to support the route network.
- **Parking -** The provision of secure, protected, convenient and inexpensive bicycle parking, as identified in this Plan, is crucial to lure the commuter to the bicycle.

Support and Applaud Bicycle Commuting

The City of Palo Alto could encourage other Palo Alto employers to organize bicycle commute programs of their own. In particular, the City should encourage the junior college and the school district, two of the largest employers in Palo Alto, to promote bicycling to their staff, faculty, students, and parents. An employer resource kit could be provided to each interested employer. The kit could include:

- Text for a letter from the CEO/President explaining the Bicycle Commute Program and urging his/her employees to consider the bicycle when making commute choices.
- Articles about bicycling as a great commute alternative. These stories can be used in company newsletters, as all-staff memos, bulletin board fliers, or any other outreach method in place at the company.
- A list of programs and events for use in the company's program. The list will provide details of existing events as well as new programs that could be implemented. City-sponsored events should be included in this list.
- A resource list detailing sample bicycle promotion programs, resource centers for bicycle promotion assistance, and local bicycle clubs. This list will be invaluable for companies which may not be aware of the benefits of bicycle commuting.
- Route maps showing the best bike commute routes in Palo Alto to the particular employer's work site could be distributed and/or posted.
- Bicycle Safety and Road Sharing Brochures developed through the education program earlier in this chapter.
- Sample bicycle promotional items such as T-shirts, water bottles, etc.
- Listing of local bicycle stores where employees can find the correct equipment for their bicycle commute.

Chapter 6
IMPLEMENTATION PLAN

INTRODUCTION

This chapter presents the implementation plan for the bikeway network for the City of Palo Alto. It first describes the many ways that projects can be implemented. The action steps necessary to implement and maintain a bicycle-friendly street network are then presented. The prioritization criteria are presented followed by the high priority projects. Finally the cost estimate for constructing the bicycle network is presented.

IMPLEMENTATION PROCESS

The actual implementation of this plan will occur incrementally in a variety of ways. Many projects can be incorporated into the Capital Improvement Program (CIP) process and will be implemented as the CIP projects get funded. Others will happen as part of regular maintenance and operations practices and road resurfacing projects. Redevelopment in some areas of the City will present the opportunity to implement some of the recommendations of this plan. Finally, outside funding can be obtained to finance the design and construction of other projects, improvements and programs. The most likely funding sources are discussed in Appendix M.

Implementation Action Steps

- Maintain a local capital improvement program that provides regular funding for the bicycle program to construct new facilities, retrofit inadequate facilities, and refurbish older facilities.
- On arterials and collectors, re-evaluate lane widths to fit bike lanes wherever possible, by restriping for narrower inside travel lanes or reducing the number of travel lanes. If bike lanes are not possible, provide wider curb lanes.
- Include funding for regular facility evaluation, maintenance, and repair, as well as funding to review development and zoning proposals for effect on bicycle mobility, in the annual staff, operations, and maintenance budgets.
- Assign staff the responsibility and authority to carry out bicycle-related policies, and to coordinate the city's planning, education, enforcement and promotion programs, capital improvement programming, budgeting, and maintenance.
- Establish a spot improvement program for low-cost, small-scale improvements, such as pavement maintenance, hazard removal, or bike rack installation.

Policies and Action Steps

The Palo Alto Comprehensive Plan includes a number of policies and programs dealing with bicycle and pedestrian traffic. This section suggests specific actions for carrying out those policies and programs. Also see Best Practices in Appendix N.

1. Maintenance:

Comprehensive Plan Policy T-20 is to "Improve maintenance of bicycle and pedestrian infrastructure." Program T-28 under this policy is to "Adjust the street evaluation criteria of the City's Pavement Management Program to ensure that areas of the road used by bicyclists are maintained at the same standards as, or at standards higher than, areas used by motor vehicles." The following action steps are recommended:

1.1 **Objectives/Action Steps:** Special attention should be paid to the right-hand portion of the roadway, where bicyclists normally ride.
1.2 Establish a dedicated 5% of Street Maintenance budget for bicycle route street resurfacing in Street Resurfacing CIP (it is now 2.5% of the CIP).

Program T-29 is to "Provide regular maintenance of off-road bicycle and pedestrian paths, including sweeping, weed abatement, and pavement maintenance." The following action steps are recommended:

Objectives/Action Steps:

1.3 Establish a field review program to survey all off road bikeways once a year for deficiencies and obstacles such as potholes, shrubbery encroachment, the condition of bikeway signing, striping and other markings, signal detection. etc.
1.4 Sweep streets regularly, with priority given to those with higher bicycle traffic.
1.5 Trim overhanging and encroaching vegetation.
1.6 Repair surface defects such as potholes and ruts, giving priority to the right-hand portion of the outside lane.
1.7 Establish standards for new and replacement pavement quality. Inspect work done by contractors, and have it replaced if defective.
  1.7.1 Asphalt pavement overlays should be flush with the concrete gutter.
  1.7.2 Utility covers should be flush with the pavement.
1.8 Establish a spot improvement program for low-cost, small-scale improvements, such as pavement maintenance, hazard removal, or bike rack installation.
  1.8.1 Provide a postcard, phone, or e-mail program for the public to report hazards and suggest spot improvements.
1.9 Where existing curb and gutter is being replaced, redesign the drainage such that a 12 inch gutter pan can accommodate the storm water runoff. This will increase the usable surface of the roadway by 2 feet.
1.10 Establish a resurfacing, reconstruction, preventative maintenance, scheduling and budget for all off road paths, trails, bridges etc.

2. Operations:

Objectives/Action Steps:

2.1 Limit the use of stop signs on bike routes where there are impediments to through vehicle traffic.
  2.1.1 Consider the effect on bicycles when evaluating new stop sign requests.

2.2 Adjust traffic signals to accommodate bicyclists.
- 2.2.1 Provide Adequate Minimum Green Time for side streets at actuated signals.
- 2.2.2 Provide adequate clearance time for bicyclists who enter intersection at end of green phase.
- 2.2.3 Ensure that traffic-actuated signals detect cyclists in a lawful position on the road. Identify sensitive points with a standard marking (See Standard Plans A 24C).
- 2.2.4 Develop guidelines for when to provide markings/signage and video detection locations

2.3 Modify Do Not Enter signs to add Except Bicycles, where appropriate.

2.4 Eliminate sidewalk bike paths from the City's bikeway network and remove existing signs where they exist.

3. Construction/Renovation:

Policy T-14 is to "Improve bicycle and pedestrian access to and between local destinations, including public facilities, schools, parks, open space, employment districts, shopping centers, and multi-modal transit stations." This is a broad goal that encompasses the provision of access in new corridors and the addition or improvement of access by modifying existing corridors. Since Palo Alto is a built-up city with little opportunity for new roads or developments, the emphasis must be on existing corridors.

Program T-24 under this policy is to "Provide adequate outside through-lane widths for shared use by motorists and bicyclists when constructing or modifying roadways, if feasible." Roadway modification might include restriping (most conveniently performed after resurfacing), repair, rehabilitation, or reconstruction, maintenance, and occasionally widening. All these activities provide opportunities to improve bicycle access.

Objectives/Action Steps:

3.1 Use gutters with a maximum width of 12 inches on all new or renovated construction projects.

3.2 Evaluate all streets during the pavement resurfacing to determine if bike lanes or wider curb lanes can be provided when the striping is reapplied.

3.3 Construct or retrofit arterials and collectors with wide curb lanes. To obtain the necessary width within a limited right of way, consider the following options:
- 3.3.1 Remove parking from one side of the street, or restrict it to nighttime hours.
- 3.3.2 Convert diagonal parking to parallel parking.
- 3.3.3 Reduce four-lane roads to two lanes plus a two-way left turn lane.
- 3.3.4 Consider the use of modern roundabouts in place of traffic signals. (Roundabouts reduce the storage room needed at intersections, enabling fewer lanes to carry the same volume of traffic.)

3.4 The City should adopt design guidelines that provide for shared use of all roadways by bicycles and vehicles, such as the VTA Bicycle Technical Guidelines.

3.5 The City should add its own adopted policies, such as the intersection design guidelines dated August 1990, which provide for lane widths at intersections and signal detection and timing.

3.6 Consolidate the City policies for signal timing at state highways and county roads, backfill smoothness, wedge cuts at gutter pans into a single readily available document. The consolidated guidelines should be disseminated to the Public Works and Utilities Departments, contractors, County Roads, Caltrans, and other relevant agencies, and policies established to ensure that they are followed regardless of who designs or carries

out the roadwork.

3.7 Establish procedures to enhance cross-departmental coordination and communications (among Planning, Public Works, Police and Utilities departments) to ensure that the safety of bicyclists is addressed in the planning and implementation of construction work on public rights-of-way.

4. Planning:

Objectives/Action Steps:

4.1 Conduct yearly counts of bicycle traffic.

4.2 Collect and analyze comprehensive information about police- and hospital-reported bicycle accidents to identify causes and remedies.

4.3 Establish procedures for cooperating with adjacent cities on projects which benefit cycling to or through Palo Alto.

4.4 Review existing city ordinances for appropriateness and for consistency with the California Vehicle Code and updated as needed.

4.5 Include paths and bike routes through city parks on bicycle route maps.

4.6 Evaluate all major development projects in terms of how they affect bicycle (and pedestrian) access and use. Provide right-of-way for bicycle/pedestrian paths when feasible.

4.7 Incorporate bicycle enhancement concepts in the neighborhood traffic calming program.

5. Education/Safety

Program T-46 of the Palo Alto Comprehensive Plan encourages extensive educational programs for safer use of bicycles, mopeds and motorcycles, including City-sponsored bicycle education programs in the public schools and the bicycle traffic school program for juveniles.

Objectives/Action Steps:

5.1 Consider City-sponsored bicycle driver education classes for residents and workers.

5.2 Expand bicycle education programs (e.g. Street Skills for Cyclists) for middle and high school students and their parents.

5.3 Implement a school commute corridor signage pilot project, evaluate trial and community response and expand program to other corridors.

5.4 Continue to develop and enhance the bicycle safety education programs at the elementary, middle and secondary levels in cooperation with the school district.

Program T-47 of the Palo Alto Comprehensive Plan promotes utilizing engineering, enforcement and education tools to improve traffic safety on City roadways.

5.5 Provide targeted enforcement of traffic laws against both bicyclists and motorists who commit offenses most likely to cause injury, such as running red lights, wrong-way riding, riding at night without lights, and endangering pedestrians.

5.6 Expand patrols by police on bikes.

5.7 Provide training for police officers through the International Police Mountain Bicycling Association.

5.8 Reduce fines for bicycle related infractions as permitted by the California Vehicle Code.

6. Promotion

Objectives/Action Steps:

6.1 Continue to reimburse city employees for travel by bicycle on official business.
6.2 Work with employers to promote programs encouraging employees to bicycle to work.
6.3 Work with the Palo Alto Unified School District and PTA groups to encourage students to bike to school in conjunction with safe routes to schools program.
6.4 Continue development of the bicycling pages on the City website.
6.5 Improve the city bike map to include suitability information about city streets, to serve as an educational tool for safe bicycling practices, and to provide information about bicycle clubs and stores. Work with Stanford University and surrounding cities to develop a multi-jurisdictional mid- peninsula bicycle route map.
6.6 Work with Stanford University to inform students and commuters about safe bicycling.
6.7 Continue to provide funding support for the Bicycle Station at the Palo Alto Caltrain Station.

7. Funding/Implementation

Objectives/Action Steps:

7.1 Maintain a local capital improvement program that provides regular funding for the bicycle program to acquire right of way, construct new facilities, retrofit inadequate facilities, and refurbish older facilities.
7.2 Include funding for regular facility evaluation, maintenance, and repair, as well as funding to review development and zoning proposals for effect on bicycle mobility, in the annual staff, operations, and maintenance budgets.
7.3 Pursue outside funding sources, such as TDA, BTA, TFCA and TEA-21 programs such as CMAQ and TEA.
7.4 Assign staff the responsibility and authority to carry out bicycle-related policies, and to coordinate the city's planning, capital improvement programming, budgeting, and maintenance.

8. Environmental Protections

Objectives/Action Steps:

The following environmental protection action steps/performance standards will be implemented in conjunction with future projects for the protection of biological and cultural resources:

8.1 Prior to implementing new portions of the Bay Trail in the Palo Alto Baylands Nature Preserve area, the City will complete additional environmental review and meet the following performance standards:
  8.1.1 The City will consult with the Corps of Engineers, Fish and Wildlife Service, Department of Fish and Game, Bay Conservation and Development Commission, and other appropriate agencies as necessary to identify potential impacts and mitigation opportunities. If necessary, appropriate permits (Section 404 of the Clean Water Act, Endangered Species Act, etc.) will be obtained before any disturbance takes place for implementation.
  8.1.2 Implementation will not result in a net loss of wetlands or threatened or endangered species habitat, or in the loss of individuals of protected species, except as may be authorized by any required federal or state permits.

8.2 Should any proposed bicycle projects propose the removal of established trees, the City will conduct surveys where necessary and follow the City's tree protection ordinance and mitigation requirements prior to implementing affected segments of the Bicycle Plan.
8.3 All surface-disturbing bike path and bike lane projects in areas of archaeological sensitivity will be subjected to archaeological assessment, intensive surface survey and/or subsurface testing as part of the project planning efforts.
8.4 Bicycle paths located near creeks will be designed so as not to cause erosion of creek banks consistent with policies and programs in the Natural Environment Element of the Comprehensive Plan.

RECOMMENDED BIKEWAY NETWORK

The draft Bicycle Transportation Plan proposes a strategic network of through, continuous bicycle facilities - on and off-street - designed to encourage bicycling. The core of this network includes the bicycle boulevards and the grade separated bicycle (and pedestrian) crossings for cyclists of all abilities, including the school aged cyclists, and bicycle accommodation on the major street network for more experienced cyclists. This strategic network is connected to the rest of Palo Alto's network of local and collector streets to form a highly interwoven pattern of cycling routes serving cyclists of all skill and experience levels and connecting to all destinations cyclists wish to reach.

The plan also identifies important spot improvements at intersections along existing bicycle routes that need to be improved to make them more bicycle friendly and less of an obstacle to bicycling by all cyclists, but particularly school students, and thereby encourage cycling on otherwise convenient and accessible routes. Most of these spot improvements are located on the major street system, including the county expressway and state route 101.

Table 6-1 on the following page presents a summary of the bikeway network.

City of Palo Alto Prioritization Criteria

Three main categories were used in prioritizing the bikeway projects: Safety, Connectivity and Special. The Safety and Connectivity categories each have four issues on which the routes are rated. Each issue is scored on a three-part scale of High, Medium and Low. There are a total of nine subcategories and a maximum of three points per subcategory for maximum total of 27 points per project. The criteria used to prioritize the projects are listed below in Table 6-2.

The projects that comprise the Palo Alto Bicycle network were then rated using these criteria. The projects scoring in the top 25 to 30 percent are considered the High Priority projects with an approximately equal number of projects assigned to the in the low and medium tiers. The ratings of each project are presented in Appendix K.

It is envisioned that in response to changing conditions, including the implementation of some of the projects, the PABAC will re-assess these priorities annually and recommend revisions as needed.

Table 6-1
BICYCLE NETWORK SUMMARY

Bikeway Types (miles)					
	Path	**Lane**	**Route**	**Boulevard**	**Shoulder**
Existing	8.2	25.6	6.2	3.1	0.0
Proposed	5.1	29.9	12.5	12.3	0.4
When Completed*	**11.6**	**45.3**	**15.2**	**15.5**	**0.4**

Pedestrian/Bicycle Overcrossings	
Existing	13
New/Improved	7
When Completed	**17**

Estimated Cost	
Construction	$28,601,909
Contingency, Design and Administration	$8,580,573
Total Estimated Cost	**$37,182,482**

* Totals do not match because some existing bikeway types were converted to other bikeway types.

The projects within the High priority category have not been rated relative to each other at this time. Depending on the success of grant applications, there may be enough funds to implement all the high priority projects within five to ten years. The decision of which project to proceed with first will depend on the specifics of the funding availability, available grants and project readiness. If an objective basis is needed to determine which project within the high priority tier to proceed with first, then the high priority projects can be rated with a more quantitative methodology such as that presented in Appendix L.

High Priority Projects

The draft Plan implementation priorities balance the two broad categories of enhancements to cycling facilities: “strategic” and "spot" improvements. The strategic improvements include bicycle boulevards and grade separations which give bicyclists advantage and precedence over vehicular traffic by providing precedence or exclusive right-of-way to bicycles (with pedestrians) and improvements to linear arterial routes that bicyclists share with motor vehicles. The spot improvements at intersections are designed to improve safety at particularly difficult and complex crossings along existing bicycle routes where better design would enhance safety and access. The aims of these improvements are to make cycling safer and more convenient, so to increase the use of cycling as a mode of transportation for all categories of bicyclists.

Based on these criteria and with public input, 20 strategic improvements and 8 spot improvement categories were identified. These are listed in Table 6-3.

Table 6- 2
PROPOSED PRIORITIZATION CRITERIA FOR BICYCLE PROJECTS FOR THE CITY OF PALO ALTO
Maximum possible score = 27

Safety

1) Remedies obstacles

Obstacles interpreted to also include inconsistent width shoulder, sight distance problems, etc.

High	Road has two or more obstacles per mile
Medium	Road has average of one per mile
Low	Road has no safety obstacles

2) Accidents

High	Road with three or more reported accidents in last three years
Medium	Road with 1 to 2 accidents in last three years
Low	Road with no reported accidents in last three years

3) Narrow lanes or shoulders

High	Road has ≤12 foot outside through curb lanes
Medium	Road has > 12 but < 14 foot curb lanes
Low	Road has ≥14 foot curb lanes

Connectivity

4) Serves bicycle trips to schools

High	Directly serves elementary, middle or high school
Medium	Elementary, middle or high school is within one block
Low	Does not directly serve elementary, middle or high school

5) Gap Closure

Gap also interpreted to mean last unimproved link(s) of a long stretch of bikeway

High	Project a closes a gap that otherwise requires circulation travel
Medium	Project closes a gap that otherwise has a close alternative
Low	Project does not close a gap

6) Bicycle traffic volume

High	Route connects directly to major attractors and/or has more bike traffic than others (In general, routes used by all levels of cyclists will have more bicycle traffic than routes used by only experienced cyclists)
Medium	Serves only moderate number of bicyclists or only one type of bicyclist
Low	Relative to other routes, low bike volumes are predicted

7) Provide access to adjacent jurisdictions

High	Connects to adjacent city with a designated bikeway
Medium	Connects to adjacent city but adjacent city does not have designated bikeway
Low	Does not connect to adjacent jurisdiction

8) Serves bicycle commuters/utilitarian trips

High	Directly serves major employment centers or schools

Special

9) Special Significance

High	Funds have already been generated, ROW has already been donated, or other group is taking lead on implementation
Low-	No group has expressed interest and/or no money had been generated to fund the project

Route also could receive points if of special significance as determined by the BAC

Table 6-3
High Priority Projects – Total Estimated Cost

STRATEGIC IMPROVEMENTS

Project #		Estimated Cost*
A. Bicycle Boulevards – ***Serves All Cyclists, School Commute***		
2	Castilleja/Park Boulevard/Wilkie Way	$66,256
28	Matadero Avenue/Margarita Avenue	$20,000
31	El Camino Way/Maybell Avenue/Donald Drive	$14,034
12	Everett Avenue/Palo Alto Avenue	$22,824
14	Homer Avenue	$21,924
16	Chaucer/Boyce/Melville	$28,674
4	Extension of Bryant Street Bike Boulevard	$29,757
B. Undercrossings – ***Serves All Cyclists, School Commute, Pedestrians***		
66	South Palo Alto Caltrain Undercrossing	$5,000,000
61	Everett Avenue Caltrain Undercrossing	$5,000,000
60	California Avenue Caltrain Undercrossing	$5,000,000
62	Homer Avenue Caltrain Undercrossing	$5,000,000
C. Major Streets Routes		
1. Collectors & Residential Arterials – Serves Skilled Cyclists, School Commute		
30	Los Robles Avenue Bike Lanes	$81,545
24	Charleston Avenue/Arastradero Road Bike Lanes	$68,939
6	Middlefield Road Bike Lanes	$208,591
18	Embarcadero Road Bike Lanes	$190,568
2. Major Arterial Streets – Serves Skilled Cyclists and Commuters		
19	California Avenue (Business District)	$245,473
3	Alma Street	$836,727
27	Hanover Street/Porter Drive Bike Lanes	$671,765
1	El Camino Real Bike Route	$512,121
33	West Arastradero Road (Alpine to Page Mill)	$88,636

LOCAL OR SPOT IMPROVEMENTS

Intersections – ***Serves Skilled Cyclists and/or School Commute Routes***		
	Arastradero/El Camino Real	$68,939
	Five Signalized Oregon Expressway Crossings	TBD
	Stanford Avenue/El Camino Real	TBD
	Churchill/El Camino Real	$100,000
	San Antonio/Charleston	TBD
	San Antonio/Middlefield	TBD
	Newell/Embarcadero	TBD
	El Camino/Embarcadero	TBD

* Total estimated costs include 30% for contingency, design and administration.

Cost Estimates

The costs to implement the bikeway projects presented in Chapter 4 were developed using unit construction costs assumptions obtained from the City Public Works Department and other sources. The costs to implement each bikeway type are presented in Table 6-1. It should be recognized that unit costs vary considerably depending on the size of the job and the location. For example, the unit cost of striping only 1000 linear feet can easily cost two to three times that of a 15,000 foot project. Pavement widening costs also vary considerably depending on the terrain and other variables, such as presence of utility poles, drainage ditches and culverts. These costs are the straight construction costs in Year 2001 dollars, and do not include any contingencies. Typically, 15 percent is added for contingencies, and another 10 to 20 percent is added for design and administration (D/A). We have assumed an additional 30 percent to cover these costs. The total cost of constructing the entire network is about $29 million. With the contingency and D/A costs, the total cost of implementing the entire network would be $37 million.

Table 6-4
Unit Construction Cost Assumptions
For Bikeway Improvements

Capital Project	Unit	Cost*
Class 2 Bike Lanes		
• Bike lane treatment only –stripe bike lanes, add signs and pavement legends	Mile	$25,000
• Restripe travel lanes and add bike lane signs/markings	Mile	$40,000
• Remove lane and bike lane signs/markings *(for cost estimating purposes we have assumed that there would be a two-way left turn lane)*	Mile	$75,000
• Widen roadway to provide bike lanes	Mile	$180,000
Class 1 - Construct bike path- grading and some cut and fill	Mile	$250,000**
Class 1 - Repave/widen existing bike path	Mile	$100,000
Class 3 – Arterial – Bike route with wide curb lanes	Mile	$100,000
Class 3 - Widen shoulder- construct four foot shoulders	Mile	$180,000
Class 3 – Bicycle Boulevard	Mile	$20,000
Class 3 – Bike Route – local street	Mile	$6,000
New Traffic Signal	Each	$155,000
Construct Ped/Bike bridge/overcrossing	Each	$5,000,000
Reconstruct Ped/Bike bridge/overcrossing	Each	$3,000,000
Improve freeway interchange to accommodate bicycles	Each (can vary)	$300,000

Note: These costs are straight construction costs and do not include contingencies, design and administrative costs, right-of-way acquisition, or inflation factors.

** Cost can vary tremendously depending on terrain, right-of-way and design of the facility.

Wilbur Smith Associates May 2001.

Appendix A
PUBLIC INPUT

Comments on Roadways and Bikeways – May 31, 2001

Street/Path	From/At, To	Request / Comment
ALL	(All streets)	Eliminate all through-and-left lanes
ALL	(Loop detectors)	Make all loop detectors sense bicycles
ALL	(Chip seal, undesirability of)	Never repave any Palo Alto street with chip seal
ALL	(Path bridge decks)	Use smooth concrete, not wood planks
ALL	(Signal timing)	Provide sufficient crossing time for bikes at El Camino, other wide streets
ALL	(All streets)	Add thru bike lane slots wherever merging is unsafe
ALL	(Stop signs)	Change more stop signs to circles or roundabouts
ALL	(Neighborhoods)	Calm all neighborhood streets to bike speeds
ALL	Bike lanes with parking	Parked cars encroaching into bike lanes
ALL	Bike xings of major streets	Cycle is too short for parents biking with young kids. Lengthen bike crossing timing.
ALL	Bridges, tunnels, paths	Modify or eliminate mazes so that trailers, tandems, double strollers are accommodated
ALL	Right Turn On Red	Prohibit where there is heavy thru bike/ped motion
ALL	Stop signs at low-traffic ints	Post signs to allow bikes to yield, not stop
ALL	Substd bike lanes w/parking	Prohibit parking or restrict hours
ALL	Traffic circles	Replace 4-way stops with more circles with yield control (like Addison)
(Midtown?)	101 to El Camino	Need a good safe route
Adobe Creek	US-101 undercrossing	Modify to keep open year round, or at least until first rain
Alma St	Charleston to San Antonio	Add bike lanes by narrowing E side landscape
Alma / Caltrain	Matadero Creek / El Dorado	Add an overcrossing or to connnect Alma to Park
Alma bridge path	Palo Alto Ave	Add sign directing cyclists to Bryant Bike Blvd
Alma bridge path	Palo Alto Ave	Modify curb cut to not mislead cyclists
Alpine Rd	Junipero Serra / Santa Cruz	Redesign intersection to make safer for bikes
Arastradero Rd	Near Gunn HS	Add bike lanes
Arastradero Rd	Terman Path	Midblock refuge to enable left turns to/from path
Arastradero Rd.	Foothill Expwy	Thru bike lanes or shoulder areas at intersection. The traffic lights need work. Make it safer to cross Foothill.
Barron Ave	(El Camino?)	Crosswalks poorly marked

Street/Path	From/At, To	Request / Comment
Barron Ave	Barron Park	No bike lanes. (Make safer for kids biking to school.)
Barron Ave	La Donna to Whitsell	Parked cars force walkers and cyclists into street
Bay Trail	Faber Pl to Byxbee Park	Extend path so cyclists can avoid Embarcadero
Bol Park Path	Spur N. of Gunn HS fields	Connect across Arastradero Rd to Terman Path
Bol Park Path	Spur N. of Gunn HS fields	Widen path (currently <7') and entrances
Bol Park Path	Stanford Research Park	Make as many connections as possible to workplaces
Bryant St	Embarcadero Rd	Fix detectors
Bryant St	Embarcadero Rd	Modify forced-turn barriers to prevent through violations by motor traffic
Bryant St	Homer Ave, Channing Ave	Change 4-way stops to 2-way
Bryant St	Lytton, University, Hamilton	Keep signals green for Bryant at early/late hours
Bryant St	Oregon Expwy	Give bikes their own loop detectors and position
Bryant St	Palo Alto Ave	Add sign directing cyclists to Alma bridge
Bryant St	Palo Alto Ave to Meadow Dr,	Repave all segments that need it, especially the California to Oregon block. "Fix Bryant St." "Pavement quality is awful." esp. Santa Rita to Oregon, University to Hamilton.
Bryant St.	Addison Rd	Post sign prohibiting wrong-way left turns
Bryant St.	All 2-way stop cross streets	Stop sign violations by motorists
California Ave	Caltrain / Alma tunnel	Replace with a rideable overcrossing
California Ave	Caltrain / Alma tunnel	Modify mazes or replace undercrossing to admit trailers, tandems, double strollers
California Ave	Westbound at El Camino	Add a thru bike slot
Channing Ave	1-way segment	Make 2-way
Charleston Rd	El Camino Real	Add through bike lane slot. Consider 3-phase signal like Saratoga Ave / Williams to eliminate LT lanes
Charleston Rd	San Antonio Rd.	Reconfigure to make San Antonio crossing easier. Consider 3-phase signal to eliminate LT lanes
Churchill Ave	Alma to El Camino	Resurface, add (wider) bike lane
Churchill Ave	El Camino	Signal changes to support EB peds, cyclists
Coleridge Ave	Cowper	Need stop sign on Cowper (too hard to cross), Cars park too close to corner block sightlines
Cowper	Near Meadow	Parked cars encroaching into bike lanes
Cubberley campus	Middlefield Rd to Nelson Dr	Define and sign bike path through campus to Montrose Ave.
Donald (St?)	Bol Park Path fork @ Gunn lot, to Arastradero Rd.	Improve way-finding signage along on-street route. Check path entrance (narrow?)
E. Bayshore Rd.	Bike ramps on creek bridges	Make less abrupt, improve paving before/after
El Camino	Los Altos Ave	Retime signal for bikes
El Camino	Menlo Park to Page Mill Rd	Bike lanes

Street/Path	From/At, To	Request / Comment
El Camino	Routes to Barron School, Juana Briones	Need safer crossing of El Camino
Embarcadero Rd	Alma / Caltrain underpass	Dicey merging at either end
Embarcadero Rd	US-101 to El Camino	Add bike lanes
Fabian Way	Loral parking lot to San Antonio	Bike shortcut to San Antonio / 101 bridge (but would prefer Adobe Creek undercrossing open year round)
Fairmeadow Schl	Bike lane	Lots of people drive in the bike lane…. It would be nice if they didn't do that.
Foothill Expwy	Throughout Palo Alto	Repave ASAP
Foothill Park	(Trails)	Open up the trails …to mountain bikers. If some of the trails are open to horses then shouldn't mountain bikers get some trails too? Horses mess up the trails and s**t all over them. The park would make [money]….
Greer Park	(Next to skate bowl?)	Add BMX park with dirt jumps and "street" courses. "We need a BMX park". "Bike park = less riding on the street, downtown." Examples: San Diego BMX Park, San Jose Ramp Club, Pleasanton
Hanover St	Page Mill Road	Make it safer for bikes to avoid right turning cars
Hanover St	Page Mill to Bol Park Path	Midblock refuge to enable LT to/from path, either at path entrance or around curve where sightlines are better (i.e. onto sidewalk path).
Hanover St	Page Mill to Bol Park Path	Sign sidewalk to make it clear that bikes are OK
Hanover St	Page Mill to Bol Park Path	On-street bike lanes
Hanover St	Page Mill to Hillview	Bike lanes
Homer Ave	1-way segment	Make 2-way
Homer Ave	Middlefield to Alma	Make 1 lane 1 way for cars, add 2-way bike lanes
Los Robles	Villa Vera to Campana (Barron Park)	Parked cars encroaching into bike lanes
Louis Rd	Embarcadero Rd.	Check/mark loop detector for Louis LT onto WB Embarcadero
Matadero Creek	(Wherever it makes sense)	Add bike paths along creek
Meadow Dr	Alma / Caltrain	Crossing time too short. Cars too close to bikes. Add a bike overpass
Middelfield Rd	Menlo Park to Addison	Add bike lanes, removing a car lane if needed
Middelfield Rd	San Francisquito Creek bridge	Make safer for bicycle travel
Middelfield Rd	School commute to Jordan	Add bike lanes, possibly with 7am-7pm parking ban
Middlefield Rd	Montrose to San Antonio	Add bike lanes
Middlefield Rd	Oregon Expwy	Add bike lanes at Oregon
Middlefield Rd	San Antonio - Old Middlefield	Work with Mountain View to add bike lanes
Middlefield Rd	San Antonio Rd.	Consider 3-phase signal to eliminate LT lanes, like Saratoga Avenue @ Williams
Middlefield Rd	San Antonio Rd.	Add through bike lane slots.
Nelson Dr	Diablo Ct. (Cubberley field)	Modify path barrier to enable bike trailer access

Street/Path	From/At, To	Request / Comment
Newell Rd	Channing Ave.	Check loop detector
Newell Rd	Embarcadero Rd.	Check crosswalk sightline blockage by green utility box
Old Page Mill Rd	(entire length)	Better traffic control to reign in speeders avoiding Page Mill congestion
Old Page Mill Rd	Page Mill (N. end)	Redesign intersection
Old Page Mill Rd	Page Mill (S. end)	Redesign intersection
Oregon Expwy	?	Signage to direct cyclists off Oregon to California
Oregon/101 POC	(Entire facility)	No tight turns, steep grades, blind corners. Clear sightline to other end. Do not force dismount.
Oregon/101 POC	W end	Modify mazes to admit trailers, tandems, double strollers
Page Mill Expwy	Eastbound at I-280	Make it easier to cross 2 ramp lanes from I-280
Page Mill Expwy	El Camino	Red light runners during turn phase endanger cyclists and peds. Fix the problem.
Page Mill Expwy	Westbound at I-280	Restore previous (safer) striping.
Page Mill Expwy.	Westbound at I-280	Needs a (bike thru slot) like on Sand Hill at I-280
Palo Alto Ave.	Middlefield Rd. to Alma St.	Repave bumpy blocks
Park / Maclane / Wilkie	Lambert Ave to Mtn View	Support making this a bike boulevard
Park Blvd	Maclane to Whitclem	Better crossings of Meadow and Charleston. Add a refuge at Charleston?
Sand Hill Rd	San Francisquito Creek bridge	Add bike lanes
Searsville Path	San Francisquito Creek	Connect path over creek to Oak Ave signal
Stanford Research Park	Through superblocks	Investigate off-street route through parking lots
Terman path	Adobe Creek	Work with Los Altos to replace or repair bridge deck
University Ave	Alma/Caltrain undercrossing	Better indication for where pedestrians should walk
University Ave	Alma/Caltrain undercrossing	Redo the undercrossing
University Ave	Alma/Caltrain undercrossing	Repave and restripe
University Ave	Alma/Caltrain undercrossing	Improve lighting in undercrossing.
University Ave	Downtown	Close to cars, start on weekends, expand to 7 days
University Ave	El Camino to High St	EB direction: Move "bikes may use sidewalk" before the curb cut that enables this
Wilkie Way	James Dr.	Add stop for traffic from El Camino. Or, make Wilkie a bike boulevard (stops on all cross streets.)

Appendix B
BICYCLE TRANSPORTATION ACCOUNT REQUIREMENTS

This Appendix describes how this plan meets the requirements of the California Bicycle Transportation Act. Some of the information is presented in the body of this report and the remainder is presented here.

(a) The estimated number of existing bicycle commuters in the plan area and the estimated increase in the number of bicycle commuters resulting from implementation of the plan. *See Page B-2.*

(b) A map and description of existing and proposed land use and settlement patterns which shall include, but not be limited to, locations of residential neighborhoods, schools, shopping centers, public buildings and major employment centers. *See Land Use Designations Map at the end of Appendix B.*

(c) A map and description of existing and proposed bikeways by class number (I, II, III). *See Figures 3 and 6, and text beginning on Page 4-6.*

(d) A map and description of existing and proposed end of trip bicycle parking facilities. These shall include, but not be limited to, parking at schools, shopping centers, public buildings, and major employment centers. *See parking inventory in Appendix I. Bike parking locations are too numerous to map.*

(e) A map and description of existing and proposed bicycle transport and parking facilities for connections with and use of other transportation modes. These shall include, but not be limited to, parking facilities at transit stops, rail and transit terminals, ferry docks and landings, park-and-ride lots, and provisions for transporting bicyclists and bicycles on transit or rail vehicles or ferry vessels. *All transit operators in Palo Alto (VTA, Samtrans, Dumbarton Express, Caltrain) accommodate bicycles. See text beginning with Page 5-3.*

(f) A map and description of existing and proposed facilities for changing and storing clothes and equipment. These shall include, but not be limited to, locker, restroom, and shower facilities near bicycle parking facilities. *A description is provided on Page 5-3.*

(g) A description of bicycle safety and education programs conducted in the area included within the plan, efforts by the law enforcement agency having primary traffic law enforcement responsibility in the area to enforce provisions of the Vehicle Code pertaining to bicycle operation, and the resulting effect on accidents involving bicyclists. *See Chapter 5.*

(h) A description of the extent of citizen and community involvement in development of the plan, including, but not limited to, letters of support. *See Chapter 1 and Appendix A.*

(i) A description of how the bicycle transportation plan has been coordinated and is consistent with other local or regional transportation, air quality, or energy conservation plans, including, but not limited to, programs that provide incentives for bicycle commuting. *See Chapter 1.*

(j) A description of the projects proposed in the plan and a listing of their priorities for implementation. *See Chapter 5, Figure 6 in Chapter 4 and Table 6-3 in Chapter 6.*

(k) A description of past expenditures for bicycle facilities and future financial needs for projects that improve safety and convenience for bicycle commuters in the plan area. *See Table B-5 in Appendix B for past expenditures and Table 6-3 in Chapter 6 for future financial costs for top priority projects*.

ESTIMATED FUTURE DEMAND

Two key factors in predicting how many persons will bicycle in the future include the quality of the infrastructure and the logistics of the commute. The logistics of the commute can be approximated by looking at the number of residents who live within a reasonable bicycling distance of their workplace. In order to estimate the number of increased bicycle commuters as a result of implementing this plan, we first estimated the number of workers who live within an average to easy bike commute.

The following discussion is based on data from 1990. (2000 Census data will not be available until June 2002.) There have been many changes in several factors since then. While land use patterns have remained essentially the same, traffic congestion and demographics have changed. The commute distances are probably longer than in 1990 and the increased home prices have probably resulted in a more affluent population, both of which would tend to decrease the level of bicycling. However, increased traffic congestion and a younger resident population could tend to increase the level of bicycling in Palo Alto. For the lack of better data, we have assumed these will cancel each other out and have based the following analysis on the1990 data.

An easy bike commute distance - other factors such as hills and traffic conditions not-withstanding - is considered to be about six miles. (This is based on the generally accepted premise that a commute time of 30 minutes regardless of mode is what an average commuter will tolerate. This translates into a six-mile trip). Regionally, 40 percent of commuters in the Bay Area live within five miles of their workplace. Unfortunately, this statistic is not available just for the City of Palo Alto. What is available by city from census data is the number of minutes workers spend commuting. The census data indicate that about 15 percent of Palo Alto residents live within nine minutes of their workplace. Given the lack of other data, we have assumed that nine-minute car trip is approximately equivalent to a 30 minute bike ride. Therefore about 15 percent of Palo Alto residents live within an easy bike commute distance of their work place.

Data from other studies show that the further one lives from work, the less likely one is to bike commute. There are, however, significant numbers of bike commuters who bike distances that take longer than 30 minutes. Table B-1 below shows the breakdown of the duration of existing bicycle trips in the Bay Area. While almost 93 percent of existing bike commuters spend thirty minutes or less, 5 percent bike for 30 to 60 minutes and another 2.3 percent spend more than 60 minutes biking to work.

Table B-1 Commute Time to Work (minutes) by Bicycle or Walk Mode (SF Bay Area)		
	Bicycle	**Walk**
0-5 minutes	19.5%	28.9%
5.1-10 minutes	20.1%	21.0%
10.1-15 minutes	28.0%	26.7%
15.1-20 minutes	7.3%	5.6%
20.1-25 minutes	5.8%	3.7%
25.1-30 minutes	12.1%	8.0%
30.1-45 minutes	2.5%	3.1%
45.1-60 minutes	2.5%	2.1%
> 60 minutes	2.3%	1.0%
Source: San Francisco Bay Area 1990, Regional Travel Characteristics, Working Paper #4, 1990 MTC Travel Survey		

The 1990 census revealed that 5.8 percent of Palo Alto residents bicycle to work. This is five times higher than the county average but is fairly typical for a city in close proximity to a major university and for a city that is considered bicycle-friendly. For example, Boulder, Colorado has a bicycle mode split of 7.0 percent. In Davis, California, the bicycle to work mode split is 21.6 percent and represents possibly the high range of what Palo Alto can aspire to. In addition, the Davis Bicycle Plan estimates that about 25 percent of all daily trips (considering all trip purposes not just work trips) are made by bicycle.

Thus it appears that in Palo Alto, bicycling is currently capturing 38 percent of those who live within easy bike riding distance (5.7 percent divided by 15.1 percent). Based on these data, it is estimated that with improved facilities, Palo Alto could increase its commute rate to 50 percent of those who live close to work as well as capture 8 percent of those who live farther. If this were the case, then bicycling's total mode share in Palo Alto would almost double to 10.7 percent. While still only half the rate of Davis, the other features of Palo Alto such as longer commute distances contribute to keeping the bike rate relatively lower. The calculation is shown below in Table B-2.

Table B-2 Estimated Increase in Bicycle Commuting in Palo Alto						
Existing Palo Alto Residents who Bike to Work (%)	Existing Palo Alto Residents who Live within 9 Minutes (%)	Percent that would bike to work	Existing Palo Alto Residents who Live within 10-29 Minutes (%)	Percent that would bike to work	Potential future Bicycle Commuters (%)	Percent Increase over Existing
5.8	15.1	50	40.4	8	10.7	88

If one also considers those who bike to the bus or to Caltrain stations as bike commuters, (who are currently classified as transit commuters in census data), the bike mode share would be even

higher. Also if one considers middle school and high school students, their rates could also easily double or even triple if collectors and arterials were made safer for bikes.

According to the National Personal Transportation Survey conducted by FHWA in 1995, bicycles are used for other trip purposes as follows: 13 percent of all bike trips are work trips, 14 percent are school trips, 14 percent are shopping trips, 18 percent are family or personal business trips and 31 percent are social or recreation trips. An even more accurate way to estimate these other trip purposes is to start with the trip purposes data from the 1990 MTC travel survey. This travel survey determined the mode splits of not only work trips but all trip purposes for each county in the Bay Area. The Santa Clara County data is presented below. We have extrapolated trip purpose data for the City of Palo Alto based on the known work mode split from the 1990 census. For example, since 5.7 percent of Palo Alto residents bike to work compared to 1.1 percent of the county, we have assumed that the other trip purposes made by bicycle in Palo Alto would be five times the county rate. This is probably a conservatively low assumption, in that more school and shop trips are likely to be local than work trips thus more likely to be made by bike. The results are show below in Table B-3. It is estimated that almost three percent of shopping trips, five percent of social-recreation trips and ten percent of school trips are currently made by bicycle. With an increase in bicycle facilities, it is estimated that these mode splits could increase to five percent of shopping trips, nine percent of social-recreation trips and 18 percent of school trips. The net result would be almost nine percent of daily trips being made by bicycle. See Table B-4.

Table B-3
Weekday Bicycle Mode Split by Trip Purpose (percent)

Trip-purpose	Home-Based				Non-Home-Based
	Work	Shop	Soc/Rec	School	
Santa Clara County – 1990 [1]	1.1	0.5	0.9	1.8	0.6
Palo Alto – 1990 [3]	5.7 [2]	2.6	4.7	9.3	3.1
Palo Alto future [2]	10.7	5.2	9.4	18.6	6.2

1. Source: San Francisco Bay Area 1990, Regional Travel Characteristics, Working Paper #4, 1990 MTC Travel Survey.
2. 1990 Census Data
3. Estimate by Wilbur Smith Associates.

Table B-4
Total Daily Bicycle Trips in Palo Alto

Trip-Purpose	Percent of total trips [3]	Existing bicycle mode split	Future bicycle mode split
Work	26.0%	5.7%	10.7%
Shopping	24.9%	2.6%	5.2%
Social Recreation	11.2%	4.7%	9.4%
school	9.5%	9.3%	18.4%
Non-home based	27.6%	3.1%	6.1%
Total daily trips		**4.4%**	**8.6%**

Source: MTC Travel forecasting model.

Table B-5
LIST OF FUNDING FOR BICYCLE PROJECTS
Implemented by Palo Alto Since 1980

YEAR	PROJECT	TOTAL COST	LOCAL SHARE	OTHER FUNDS	SOURCE
1980	ARASTRADERO ROAD PATH	$120,000		$120,000	TDA
1980	BIKE LOCKERS AT TRAIN STATIONS	$5,000		$5,000	CALTRANS
1981	BIKE RACKS IN CALIFORNIA AVENUE BUS. DIST.	$10,000	$10,000	$0	
1982	BIKE BOULEVARD IMPLEMENTATION	$6,000	$6,000	$0	
1982	BAYLAND BIKE PATH	$350,000		$350,000	COASTAL CONSERVANCY
1982	BAYLANDS BIKE TRAIL	$242,350		$242,350	COASTAL CONSERVANCY
1984	BIKE LOCKER INSTALLATION BUS. DIST.	$13,000	$3,000	$10,000	TDA
1886	BRYANT STREET BIKE BRIDGE	$82,340	$34,640	$47,700	TDA
1988	BIKE PARKING	$6,000		$6,000	TDA
1988	BIKE PATH LIGHTING	$20,000		$20,000	TDA
1988	BIKE ROUTE SIGNING	$4,000		$4,000	TDA
1988	TERMAN/VARIAN BIKE PATH RESURFACING	$40,000		$40,000	TDA
1988	ADOBE CREEK UNDERCROSSING	$28,000		$28,000	TDA
1988	ALMA/CHURCHILL RAILROAD CROSSING	$35,000		$35,000	TDA
1989	BIKE PARKING FACILITIES	$10,000		$10,000	TDA
1989	BIKE SENSITIVE LOOP INSTALLATION	$3,000		$3,000	TDA
1990	BIKE PARKING FACILITIES	$10,000		$10,000	TDA
1990	BRYANT STREET BARRIERS	$22,000		$22,000	TDA
1990	BRYANT/EMBARCADERO TRAFFIC SIGNAL	$174,000	$99,000	$75,000	TDA
1991	ALMA/MEADOW IMPROVEMENTS	$77,000	$37,000	$40,000	TDA
1992	BIKE BOULEVARD EXTENSION	$69,000		$69,000	TDA
1992	LOMA VERDE/EL CAMINO WAY BIKE LANES	$25,000	$25,000	$0	
1992	URBAN LANE BIKEWAY FEASIBILITY STUDY	$10,000	$10,000	$0	
1996	ALMA STREET BIKE BRIDGE	$252,000	$33,000	$219,000	PROP 116
1999	BICYCLE PLAN	$40,000		$40,000	TDA
1999	WILKIE WAY BIKE BRIDGE REPLACEMENT	$187,000	$157,000	$30,000	TDA
1999	SAN MATEO DRIVE BIKE BRIDGE REPLACEMENT	$30,000		$30,000	TDA
2000	BARRIER REPLACEMENT IN BIKE UNDERPASS	$15,000		$15,000	TDA
2002	ARASTRADERO ROAD BIKE LANES	$460,000		$460,000	TDA, TFCA
2003	EMBARCADERO BIKE PATH AND BRIDGE	$1,800,000	$155,000	$1,645,000	CMAQ. TDA, TSM, TEA-21, VTA Measure B
2003	HOMER AVENUE CALTRAIN UNDERCROSSING	$5,131,000	$575,000	$4,556,000	TEA-21, STIP, TFCA, TDA, TEA. TLC, VTA Measure B
	TOTAL	**$9,276,690**	**$1,144,640**	**$8,132,050**	

Appendix C
ASSESSMENT OF EXISTING BIKEWAY NETWORK

Table C-1 includes discontinuities in Palo Alto's bikeway network and its extensions into adjacent jurisdictions. It also includes opportunities for shortcuts and links that significantly reduce travel time or trip stress levels. Gaps created by the removal of "sidewalk bike paths" from the network are noted with a "*" in the Remarks column.

Table C-1
Assessment of Existing Bikeway Network

Street/Path or (Need)	From / At	To	(Other Jurisdictions) / Remarks
(Cross Bayshore Fwy)	Clarke Ave (East Palo Alto)	Newell Rd	(East Palo Alto) Connects to Gateway 101 shopping center, Dumbarton bridge
(Cross Caltrain and Alma)	Alma St	Urban Lane	Homer Avenue vicinity
(Cross Caltrain and Alma)	Alma St	Park Blvd	Matadero Creek alignment
(Shortcut from Menlo Park / Stanford West to Stanford Med Center)	Sand Hill Rd, at new signal	Blake Wilbur Dr, just E. of 900 Blake Wilbur (Clinic)	Via 800 Welch Rd (Blood Center). Add Welch Rd median refuge. Avoids Vineyard Lane and Pasteur Dr.
[Path west of Caltrain]	P.A. Medical Foundation	Churchill Ave	Planned but not funded
Adobe Creek levee	Meadow Dr	E. Bayshore Rd	Alternative to Fabian Way / E. Bayshore
Adobe Creek Undercrossing	W. Bayshore Rd	E. Bayshore Rd	Currently closed October 15 – April 15; needed year-round
Alma St	Charleston Rd	San Antonio Rd	Narrow lanes *
Arastradero Rd	Miranda Ave	N. of Foothill Expwy	Bike lanes disappear near intersection
Bay Trail	Bay Rd	Geng Rd	(East Palo Alto) Connects to Baylands, Dumbarton Bridge
Bay Trail	Embarcadero Rd at Geng Rd	South of Embarcadero Rd	Faber Place unattractive, heavily parked on weekdays. Extend Geng alignment.
Bay Trail spur	E. Bayshore Rd	Oregon/101 bridge	Needs median refuge to facilitate crossing
Bay Trail spur	Faber Place	Byxbee Park	To avoid Embarcadero Rd
Bol Park Path N. spur	Current end at Gunn HS lot	Terman Path (to Los Altos Ave)	Shift Gunn HS driveway, use Hetch Hetchy corridor, add Arastradero refuge
Charleston Rd	Middlefield Rd	San Antonio Rd	Narrow lanes, needs bike lanes
Cowper St	Loma Verde Ave	Meadow Dr	Bike lane with parking much too narrow
Embarcadero Rd	Middlefield Rd	El Camino Real	Narrow lanes, needs bike lanes *
Embarcadero Rd	St Francis Dr	E. Bayshore Rd	Restripe US-101 bridge for 4' shoulder
Galvez St (Stanford)	El Camino Real	Arboretum Rd	Westbound must cross fast turning traffic
Hanover St	California Ave	Hillview Dr	Uphill-only bike lanes on big hill
Lasuen St (Stanford)	El Camino Real	Arboretum Rd	(Stanford) Link to PA Med Foundation
Louis Rd / Montrose Ave	Charleston Rd	Middlefield Rd	Widen Charleston median refuge
Mariposa or Castilleja	Churchill Ave	Park Blvd	Well-used extension of Park Blvd route
Middlefield Rd	Menlo Park	Loma Verde Ave	(Sidewalk bike path deleted) *
Middlefield Rd	Montrose Ave	Old Middlefield Rd	Add bike lanes, reconfigure San Antonio

Table C-1
Assessment of Existing Bikeway Network

Street/Path or (Need)	From / At	To	(Other Jurisdictions) / Remarks
Nelson/Shasta/Mackay	Charleston Rd	San Antonio Ave	Add route to network
Newell Rd	Embarcadero Rd	California Ave	Bike lane with parking much too narrow
Page Mill Expwy	Old Page Mill Rd	Christopher Lane	Eastbound: Need short path to close gap
Page Mill Expwy	Old Page Mill Rd	Arastradero Rd	Westbound: 2-lane crossing required
Park Blvd	Maclane	Wilkie Way via Whitclem Drive	Improve Meadow refuge, add Charleston refuge
Ramos Way	California Ave	Hansen Way	Sign/improve through Page Mill Square
San Antonio Rd	San Antonio Ave	Nita Ave (Mtn View)	Add ped/bike crossing as 4th leg of San Antonio / Nita signal
Sand Hill Rd	San Francisquito Creek	Oak Avenue (Menlo Park)	(Stanford, Menlo Park) Bridge has narrow lanes, no bike lanes
Searsville Path (Stanford)	Oak Ave (Menlo Park)	Searsville Path (existing N. end)	(Stanford, Menlo Park) Add path bridge over San Francisquito Creek
Serra St (Stanford)	El Camino Real	Campus Drive	(Stanford) Completes Park Blvd route
University Ave / Palm Dr	High St	Arboretum Rd	Sidewalks/sidepaths insufficient

Table C-2
Street Segments with Poor Pavement Quality

Street or Path	From / At	To	Remarks
Arastradero Rd	Deer Creek Rd	Foothill Expwy	Bike lane and sidepath
Arastradero Rd	Page Mill Rd	Deer Creek Rd	Shoulder
Bay Trail	Faber Place	E. Bayshore Rd	Many longitudinal cracks - rebuild
Bol Park Path N. spur	Bol Park Path	Gunn HS parking lot	Substandard width
Bryant St	California Ave	Oregon Expwy	Many blocks are bumpy
Bryant St	Embarcadero Rd	California Ave	This block is especially bad
Castilleja Ave	Churchill Ave	Sequoia Ave	Possible addition to network
Churchill Ave	Alma St	El Camino Real	Deep groove, N. side near Mariposa
Coleridge Ave	Bryant St	Embarcadero Rd	PCC concrete heavily cracked
E. Meadow	E. Meadow Circle	Fabian Way	
El Camino path	Alma St (Palo Alto Ave)	University Circle	Reconsider alignment, endpoints
Hanover St	Stanford Ave	California Ave	
JLS pathway	Meadow Dr	Charleston Rd	Bad on segment south of JLS
Lytton Ave	Alma St	Cowper St	
Lytton Ave	Tasso St	Middlefield Rd	
Mariposa Ave	Sequoia Ave	Park Blvd	1-block connector
Newell Rd	Woodland Ave	Channing Ave	
Park Blvd	Sheridan Ave	Page Mill Rd	
Terman Path bridge	Adobe Creek		Wood deck very bumpy
Wilkie Way bridge	Wilkie Way	Miller Ave (Mtn View)	Wood deck very bumpy

ARTERIAL STREETS

The discussion below describes the criteria for rating for Palo Alto's arterial streets. Table C-3 summarizes this application of these criteria to arterials. This is followed by Table C-4 which provides the assessment for all existing bike facilities on non-arterial streets which rated either "Fair" or "Poor." Both tables are intended to help define the need for future improvements.

(Good) means the existing route is acceptable or good in that most people would feel comfortable and the route needs few improvements to make an average person feel comfortable riding there. Purple (Fair) means that some bicyclists will feel comfortable riding the route, but modifications are needed to make most cyclists feel safe and comfortable. Red (Poor) means that the existing street is very uncomfortable for most people to ride on. Every fair and poor represents an opportunity for a new or improved bicycle facility to make cycling on that street segment substantially more comfortable.

High motor vehicle speeds and volumes repeatedly emerge in surveys and research as inhibitors to bicycling. Local and regional surveys identify concerns about traffic safety among the top reasons for not bicycling, and when queried in workshops for the School Commute Safety Study, Palo Alto parents cited as specific safety concerns both traffic speeds and volumes. Numerous studies have also shown that traffic calming measures which reduce speeds and volumes result in higher levels of bicycling. After traffic calming on Berkeley's Milvia Street, for example, before and after counts showed a 49% increase in cyclists on one segment and a 117% increase on a second. Studies in Vinderup, Denmark, found a 39% increase in cyclists crossing an intercity highway as it passed through the town, after that highway segment was treated with traffic calming measures.

A large number of traffic lanes typically reduces cycling comfort: left turns and U-turns are made more difficult because cyclists must merge across multiple lanes of traffic; and traffic moves at higher speeds because passing is enabled. Cyclists who choose to cross the street as pedestrians at uncontrolled intersections (pushing their bicycles) have the legal right-of-way, yet find themselves exposed to the danger of 'multiple threat' collisions (where the oncoming driver in one lane yields, but the crossing pedestrian is then struck by a car in the next lane who fails to do so).

Most conflicts and collisions occur at intersections, and therefore design features which allow high speeds at intersections, including *exclusive right turn lanes, free right turn lanes with high-speed geometries, large curb radii and/or high speed merge lanes*, will reduce cycling comfort and safety. Changing intersection geometries or installing traffic calming measures (such as raised intersections or roundabouts) can both increase the likelihood that turning drivers will properly yield to cyclists, and number and severity of any accidents.

On busy streets, the *presence of a bike lane or striped shoulder* generally increases bicycling comfort, and increased usage by bicyclists is often found after bicycle lanes are installed. For example, the number of bicyclists on eight San Francisco striped with bicycle lanes between 1996 and 1998 increased by 57 percent. In Santa Barbara, counts taken in 1973 and repeated in 1996 at the same locations showed that bicycle volumes increased by 47% on streets where bicycle lanes had been striped, while bicycle counts declined by 1% on streets without bike lanes. When bicycle lanes are installed by narrowing the width of existing travel lanes, some

evidence has also been found of reduction in traffic speeds. For example, in Portland, Oregon, narrowing travel lanes by adding bicycle lanes on N. Ida Avenue resulted in speed reductions of 2-5 mph in 85th percentile speeds, as measured at four stations along the street.

Ample widths for bike lanes, striped shoulders and outside through lanes generally increase cycling comfort. The *Caltrans Highway Design Manual* recommends 12 foot minimum bike lanes where parking is permitted and vertical curbs exist, and recommends adding additional width where there is substantial parking or high turnover of parking. Thus, the *presence of parking, usage of such parking, and parking turnover* were also important criteria in assessing each street. Where parking is prohibited and vertical curbs exist, the *Highway Design Manual* recommends a minimum bike lane width of 5 feet, with 6 to 8 foot widths wherever possible to provide for greater safety. Such wider bike lane widths can often be created by using narrower travel lanes. The *Highway Design Manual* recommends that designers follow American Association of State Highway and Transportation Officials (AASHTO) guidelines for local streets, and in turn, the AASHTO "Green Book" declares that, "Where available or attainable width of right-of-way imposes severe limitations, 2.7 meter (9 foot) lanes can be used in residential areas." In Palo Alto, 9 foot lanes are frequently used on arterials (such as Embarcadero and Alma) to provide additional motor vehicle turn lanes, while 8 foot lanes are successfully used in the commercial portion of California Avenue to encourage low speeds and provide room for landscaped pedestrian refuges. Similar lane widths could be considered in other locations in order to provide more adequate bike lane widths, or to fulfill Comprehensive Plan Program T-24: *Provide adequate outside through-lane width for shared use by motorists and bicyclists when constructing or modifying roadways, when feasible.*

The *presence of a raised median* can be an important, and sometimes overlooked factor in determining the comfort and safety of a street for bicyclists and other users. Raised medians at intersections can provide an important refuge for crossing cyclists, allowing them to tackle one direction of traffic at a time. Between intersections, raised medians prevent the conflicts and collisions that can occur when oncoming motorists turn left into the path of a cyclist. For users overall, raised medians on suburban arterials provide significant safety benefits compared to roadways which are either undivided, or have a two-way left-turn lanes. Bowman & Vecellio's comprehensive study found a rate of 373 vehicular crashes per million vehicle miles for suburban arterials with a raised median, versus 676 vehicular crashes per million vehicle miles (or some 80 percent higher) for suburban arterials with a two-way left turn lane. The same study found pedestrian crash rates on the suburban arterials with a raised median to be 51 percent lower.

Turning movements into and out of driveways by motorists are a frequent cause of crashes and conflicts for bicyclists, while the "driveway ride-out" is a common collision type among younger children. Limiting the presence of driveways by consolidating driveways (in commercial areas), or encouraging the use of alleys for access to homes (for example, for the new housing developments proposed along Wilkie Way and elsewhere), can improve bicycling conditions.

Short block lengths reduce motorists' tendency to gather speed between intersections: on arterials, they introduce frequent legal crossing points for cyclists. Overall, short blocks also create a fine-grained street network that allows more direct routing for cyclists.

Continuous and direct routes, which carry cyclists over barriers like creeks and train tracks, with an a*bsence of stop signs* and *favorable signal timing,* make for good cycling. While Palo Alto's arterials rate poorly on some of the other criteria, they do very well on these.

The comfort of various streets for bicycling can also be judged by closely observing the ways that cyclists respond to conditions on different streets. On the Bryant Street bicycle boulevard, for example, observed rates of sidewalk riding and wrong-way bicycling are both under 1 percent. By contrast, Wachtel and Lewiston's study of bicyclists on three Palo Alto arterial streets (Middlefield, Embarcadero and El Camino Real) found much higher rates of misbehavior: 33 percent of bicyclists rode on the sidewalk; and 14 percent rode on the wrong side of the street. It seems likely that bicyclists are responding to difficult conditions on these arterials: riding on the wrong side in response to the difficulty of crossing to the right side; and riding on the sidewalk in response to narrow lanes, heavy traffic volumes and high motor vehicle speeds.

Table C-3
Evaluation of All Palo Alto Arterial Streets

Street	Rating(s)	Explanatory Notes
Alma St.	Fair, Poor	Fair N. of Lytton: bike lanes, but heavy traffic & few signals make crossings difficult. Poor S. of Lytton: narrow curb lanes w/high speeds & volumes, high speed merges at grade-separated interchanges, few signals. No median on the street.
Arastradero	Good, Poor	Ample bike lanes & medium speeds in Good sections, but lacks median and frequent easy crossing points. Poor sections near El Camino, Gunn High Driveway & Foothill intersections have narrow curb lanes, some free right turn lanes.
Charleston	Good, Poor	Like Arastradero, ample bike lanes & medium speeds in Good sections, but lacks median and frequent easy crossing points. Poor sections: narrow curb lanes near El Camino, and Fabian to City Limit. Large curb radii at El Camino & San Antonio.
El Camino Real	Poor	Has median, but high speeds & volumes, high speed merges at grade-separated interchanges, few signals & six lanes (making crossings and left turns difficult). High-speed free right turn lanes at many intersections. No bike lane. In commercial sections, narrow curb lanes with parking and frequent driveway turning movements.
Embarcadero	Poor	High speeds and volumes with narrow curb lanes. No median, lacks frequent easy crossing points. Turning movements into many residential driveways.
Foothill Expressway	Good	High speeds and volumes. Free right turn lanes at many intersections. However, ample bike lanes throughout, median, and no driveway turning movements.
Middlefield	Good, Poor	Good with ample bike lanes from Loma Verde to Montrose, though has relatively high volumes and speeds. Entire street lacks median. Poor from Montrose S. and Loma Verde N.: narrow curb lanes in most areas, high volumes. In Midtown commercial district, frequent driveway turning movements.
Oregon Expressway	Fair, Poor	Waverley to City Limit: Fair, with very wide curb lane, no driveways and median, but high speeds and volumes. Poor from Waverley to El Camino, with narrow lanes and some high speed merges through underpass, large curb radii at El Camino.
Page Mill Road	Good, Poor	Ample bike lanes, median and few driveways in Good sections, but lacks frequent easy crossing points. Poor sections at El Camino & Foothill intersections have large curb radii or free right turn lanes. Multiple lanes & high volumes make left turns difficult.
San Antonio	Poor	High speeds & volumes, high-speed merges at 101 and Alma St. overpasses.
Sand Hill	Good	High volumes, but ample bike lanes, medians, relatively frequent signals.
University	Good, Poor	Near City Limit to near Middlefield: Good, with ample bike lanes, infrequent parking, medium speeds, but no median. Poor: at Middlefield and at City Limit have narrow curb lanes. Through downtown, low speeds but narrow lanes and heavy parking turn-over. Narrow lanes and difficult merges through Alma/train track underpass.

NON-ARTERIAL STREETS

Table C-4
Evaluation of Non-Arterial Bikeways Rated "Fair" or "Poor"

Street	Rating(s)	Explanatory Notes
Addison	Fair	One bike lane only 10' with frequent parking.
Baylands Bike Path	Fair	Faber Place to E. Bayshore: deep longitudinal cracks – rebuild.
California	Fair	One bike lane only 10' with frequent parking.
Channing	Fair	One bike lane only 10' with frequent parking.
Churchill	Fair	4.5' bike lane in some sections, and 10'- 11' bike lanes with frequent parking.
Coleridge	Fair	One bike lane only 10' with frequent parking.
Colorado	Fair	One bike lane only 10' with frequent parking.
Cowper	Fair	Embarcadero to Loma Verde: bike route only; Loma Verde to E. Meadow: 7' bike lane with parking.
Hanover	Good,Fair	Fair: Page Mill to Hillview: Wide curb lane with fairly heavy traffic volumes and speeds in some portions, conflicts with pedestrians walking in street. Bike lane stops midblock between California & Page Mill.
Hillview	Good, Fair	Fair: Foothill to Hanover only 18 inch bike lane outside gutter, conflicts with pedestrians walking in bike lane.
Louis	Fair	One bike lane only 9'-10' with parking.
Lytton	Fair	11.5' bike lanes with heavily used parking and frequent parking turnover, high volumes, frequent driveway turning movements. Valet parking blocks bike lanes. Narrow curb lanes from Tasso to Middlefield.
Newell	Fair	One bike lane only 9.5' to 11' with parking.
Park	Fair	California to Lambert: bike lane only 11' to 12' with frequent parking turnover, relatively high volumes and speeds.
Porter	Fair	Wide curb lane with fairly heavy traffic volumes and speeds, conflicts with pedestrians walking in street.
Saint Francis	Fair	One bike lane only 11.5' with parking.
Stanford	Fair	12' bike lanes with heavy parking usage. Narrow curb lanes outside Escondido school.
West Bayshore	Fair	Bushes obstruct bike lane in places, on-street parking on section of west side creates discontinuous bike lane.

Appendix D
STREETS WITH SUBSTANDARD WIDTH BIKE LANES

Table D-1
Streets with Substandard Width Bike Lanes

Roadway	From	To	Curb To Curb Width	Shoulder/ Bike Lane Width	Parking Permitted	Curb Type	Bike lanes with time limits
Churchill Ave	El Camino Real	Alma St	36	4.5/11	1	V	
Churchill Ave	Alma St	Bryant St	36	10/6	1	V	
Coleridge Ave	Bryant St	Embarcadero Rd	36	7/10	1*	V	y-ss
Newell Rd	Woodland	Channing	36	10 and 6.5	1*	V	y-es
Newell Rd	Channing	Embarcadero	38	11 and 6.5	1*	V	y-ws
Newell Rd	Embarcadero Rd	California Ave	36	6.5/9.5	1*	R	y
California Ave	Louis Rd	Barbara Dr	36	5.5/10	1	VR	
California Ave	Barbara Dr	Newell Rd	36	7/10	1	V	
California Ave	Newell Rd	Middlefield Rd	36	7/10	1*	V	y
California Ave	Middlefield Rd	Alma St	36	10/6.5	1*	V	y
Colorado Ave	Middlefield Rd	Louis Rd	40	10/7	1*	V	y-ss
Louis Rd	Embarcadero	Sycamore	40	5-6 / 9-10	1*	R	y
Cowper St	Loma Verde Ave	Meadow Dr	40	7	2	R	
Park Blvd	Page Mill Rd	Olive Ave	40	5.5/11	1	V	
Park Blvd	Olive Ave	Lambert Ave	46	12/11	2	V	
Addison Ave	Waverley	Channing	36	10 and 7	1*	V	y-ss
St Francis Dr	Channing Ave	Embarcadero Rd	40	11.5 / 6.5	1	V	
Formerly substandard width bike lanes, corrected in 2001.							
Channing	Addison	Newell	36	10 and 6.5	1*		y-ns

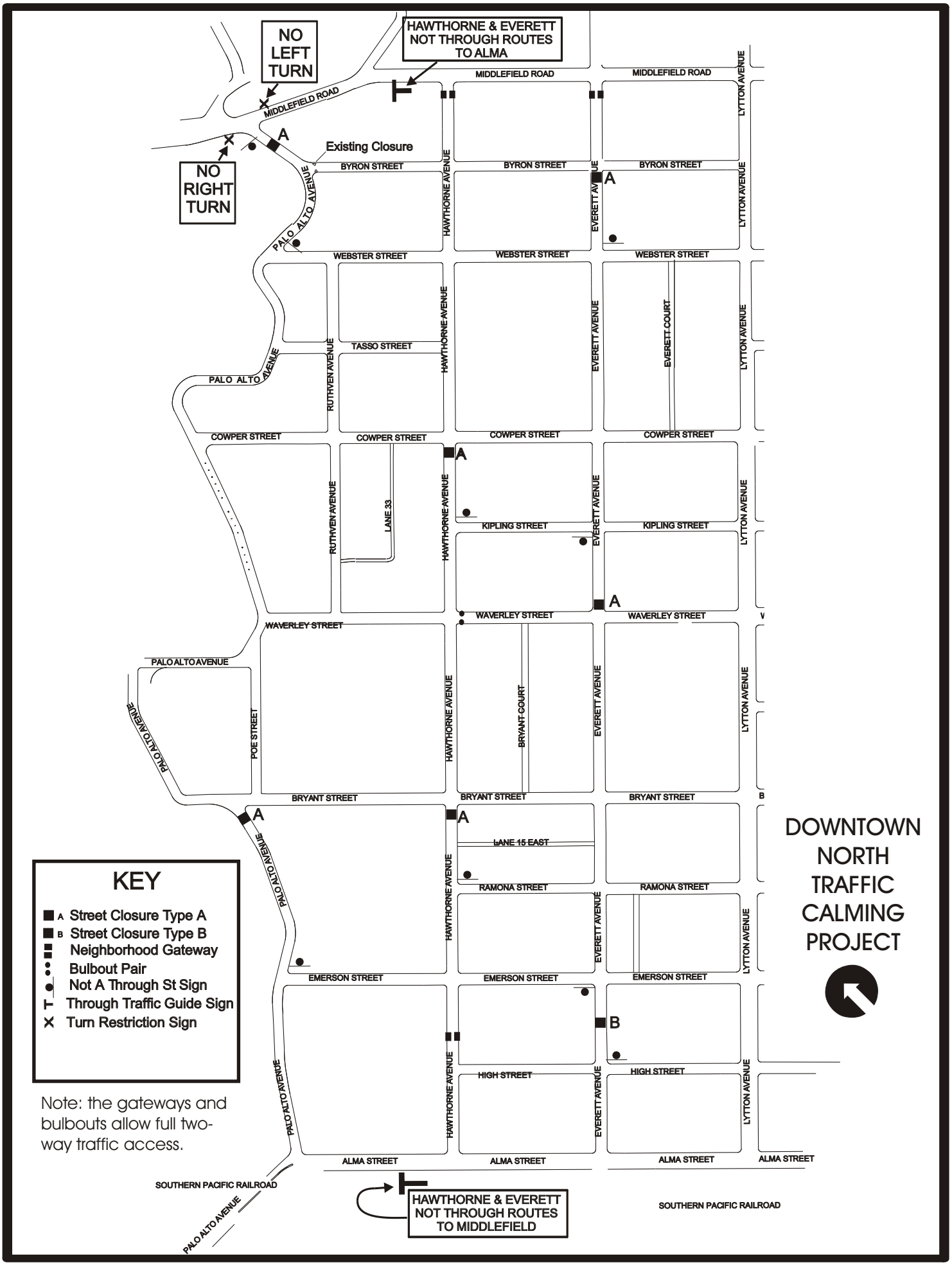
1= Parking permitted on one side only.
2= Parking permitted on both sides of street.
1*= Parking permitted on one side of street with night-time parking permitted on second side.
V= Vertical, R= Rolled, NS= Northside, SS= Southside, ES= Eastside, WS= Westside.

APPENDIX E
Downtown North Traffic Calming Study

The Downtown North Traffic Calming Study began a few months before the Bicycle Plan work began. Four alternative plans were initially generated, and reviewed by residents through both neighborhood meetings and a mailed-out survey. The alternatives were narrowed by the consultant team and a neighborhood advisory committee to a single Preferred Alternative.

The Preferred Alternative for the Downtown North study was approved by the City Council in December 2000 for a 6-month trial. The trial is scheduled to begin in Spring 2003. The Approved Plan provides an excellent example of how additions to a traffic calming plan could create a useful new bicycle boulevard segment. The Plan shows three new street closures installed on Everett Street to eliminate cut-through automobile commute traffic. Everett Street could work well as one of several new East/West bicycle boulevard segments. At its western end at Alma Street, it connects directly to the Caltrain Station parking lot and boarding platform. Everett Street also lines up directly with Quarry Road on the west side of the tracks, so that a future bike/pedestrian underpass at this location would connect conveniently to the new signal currently being installed at the intersection of El Camino Real and Quarry Road. At its eastern end, it is the only local street north of University Avenue that continues directly across Middlefield Road. East of Middlefield, it terminates at Palo Alto Avenue. Cyclists continuing further east on Palo Alto Avenue, which is already partially calmed by speed humps, can then connect to Menlo Park via the Chaucer Street bridge. Everett Street would provide a much quieter alternative to Lytton, which has substandard bike lanes with parking on some segments, valet parking operations which sometimes block the bike lane, no bike lanes near Middlefield Road, and which may grow busier with the opening of the new parking garage at Bryant & Lytton.

To enhance this segment of Everett Street as a bicycle boulevard, stop signs at (in order from west to east) High, Waverley, Cowper and Byron could be changed to favor Everett Street. At Bryant Street, the existing two-way stop could be converted to a local street roundabout, so that cyclists on either the Bryant or Everett bicycle boulevards could coast through after yielding. For the most part, the street closures proposed in the plan would eliminate speeding problems, because they break Everett into segments which are at most three blocks between closures. However, additional speed reducing measures, such as traffic circles or raised intersections, might be appropriate at High, Waverley (next to Johnson Park) and Cowper. At busy Alma Street, a wide median refuge would help cyclists cross. At four-lane Middlefield, a bicycle/pedestrian only signal (either activated only by pushbuttons located at the curb, or with turn restriction barriers similar to those at the bike boulevard signal at Bryant & Embarcadero) would be needed to help cyclists cross.


NO LEFT TURN
HAWTHORNE & EVERETT NOT THROUGH ROUTES TO ALMA
NO RIGHT TURN
Existing Closure
MIDDLEFIELD ROAD
BYRON STREET
WEBSTER STREET
TASSO STREET
COWPER STREET
KIPLING STREET
WAVERLEY STREET
BRYANT STREET
RAMONA STREET
EMERSON STREET
HIGH STREET
ALMA STREET
PALO ALTO AVENUE
HAWTHORNE AVENUE
EVERETT AVENUE
LYTTON AVENUE
EVERETT COURT
RUTHVEN AVENUE
LANE 33
LANE 15 EAST
BRYANT COURT
POE STREET
SOUTHERN PACIFIC RAILROAD
HAWTHORNE & EVERETT NOT THROUGH ROUTES TO MIDDLEFIELD
KEY
A Street Closure Type A
B Street Closure Type B
Neighborhood Gateway
Bulbout Pair
Not A Through St Sign
Through Traffic Guide Sign
Turn Restriction Sign
Note: the gateways and bulbouts allow full two-way traffic access.
DOWNTOWN NORTH TRAFFIC CALMING PROJECT

Appendix F
BICYCLE BOULEVARD ALTERNATIVES

EAST-WEST ROUTES

(Presented approximately north-to-south.)

1. Palo Alto Avenue (Alma to Chaucer Street Bridge)

General Comment: Most northerly possible cross-town connection.
Implementation Issues:

- Bike Boulevard treatment from Alma to Middlefield.
- Alma St. intersection improvements including better path/street interface, possible median refuge
- Help needed to cross Middlefield (e.g.)

Existing traffic calming:

- Barrier on Byron at Palo Alto Avenue
- Speed humps at Hale and Chaucer

2. Quarry / Everett (El Camino to Chaucer)

General Comment: Excellent commute route from downtown Palo Alto and East Palo Alto to Medical Center and Shopping Center area of Stanford University, while avoiding University Avenue and Palm Drive.

Implementation Issues:

- Path from Quarry / El Camino signal under Caltrain tracks

  NOTE: The Palo Alto Intermodal Transit Study (PAITS) may be exploring the possibility of a transit/bike/pedestrian Caltrain undercrossing in the vicinity of Everett or Lytton so buses and shuttles could access the transit center from Alma.

- Help needed to cross Alma (e.g. median refuge or signal)
- Help needed to cross Middlefield (e.g. median refuge or signal)

  NOTE: It is acknowledged that Comp Plan T-39 states that traffic signals should not be added on Alma between Lytton and Channing.

- Existing Palo Alto Avenue traffic calming, Guinda to Chaucer

Existing traffic calming:

- none

3. Hamilton (Middlefield to Wildwood)

General Comment: This could be a moderately useful route to connect East Palo Alto residents to downtown.

Implementation Issues:

- Bike Boulevard treatment.

Existing traffic calming:

- none

4. Homer / Medical Foundation Way / Lasuen (Boyce to Stanford campus core)

General Comment: With the Homer undercrossing, this could become a major commute route between University south and Stanford. Lasuen already functions as a bicycle route between Arboretum and White Plaza on the Stanford campus.

Implementation Issues:

- Bike Boulevard treatment from Boyce to Middlefield.
- Make Homer 2-way, at least for bikes, between High and Alma; exact treatment to be recommended later.
- Existing signal at Alma: add fourth leg to intersection
- Caltrain undercrossing between Alma and PAMF (planned)
- Add 4th (bike/ped) leg to Medical Foundation Way / El Camino signal
- [Stanford] Connect Lasuen path to El Camino signal
- [Stanford] Add median refuge on Arboretum Road at Lasuen

Existing traffic calming:

- none

5. Addison (Channing to Bryant/Alma)

Implementation Issues:

- Bike Boulevard treatment.

Existing traffic calming:

- Traffic circle at Bryant Street

6. Chaucer / Hamilton / Boyce / Guinda / Melville / Bryant

General Comment: Connects Bryant near Castilleja School past Lucie Stern Center to Menlo Park.

Implementation Issues:

- All needed signals already exist.
- Bike Boulevard treatment.

Existing traffic calming:

- Diverter at west end of Melville at Bryant

7. Seale/ Peers Park / Stanford Avenue

General Comment: Seale connects nicely to Newell and would avoid the Churchill / Alma / Caltrain grade crossing, but at the cost of a new bike/pedestrian grade separation.

Implementation Issues:

- Bike Boulevard treatment of Seale.
- Help needed to cross Middlefield (signal?)
- Alma / Caltrain undercrossing or overcrossing
- Path through Peers Park to Stanford Avenue / Park Blvd intersection

Existing traffic calming:

- Diverter at east end of Seale at Embarcadero

8. College / Amherst / path / to Nixon School

General Comment: Could be combined with College Avenue traffic calming being considered by College Terrace neighborhood.

Implementation Issues:

- Bike Boulevard treatment of College Avenue.
- Help needed to cross College / El Camino l
- [Stanford, optional] Peter Coutts Road median refuge

Existing traffic calming:

- Diverter at College at Park
- Diverter at Yale and College

9. Colorado (West Bayshore to Park)

General Comment: Could be combined with the following alignment, possibly by rerouting onto El Dorado Avenue and crossing Alma/Caltrain there.

Implementation Issues:

- Alma / Caltrain undercrossing or overcrossing
- Retention of Bike lanes on Colorado to be determined

  The Colorado route makes sense as a "hybrid" of bike lane (Middlefield to Louis, perhaps to West Bayshore), "boulevard" treatment (perhaps between Middlefield, or Cowper, and Bryant, or Alma), and general traffic calming. The bike-laned segment could be traffic-calmed.

Existing traffic calming:

- Speed Humps between Middlefield and Cowper

10. Lambert / Matadero Creek (El Camino to Middlefield)

General Comment: Would connect Midtown with Stanford Research Park employment and Ventura / El Camino commercial destinations such as Fry's.

Implementation Issues:

- Help needed to cross El Camino / Lambert (signal?)
- Alma / Caltrain overcrossing or undercrossing aligned with electric utility substation on Park near Lambert (at commercial/residential boundary)
- Multi-use path on Matadero Creek north levee, Cowper to Alma. Would require cantilevering the path around the only house that obstructs the levee (at Waverley).
- Median refuge on Middlefield, possibly combined with Middlefield Road change to 3-lane configuration.

Existing traffic calming:

- None

11. Margarita / Matadero / Josina / Barron / Bol Path

General Comment: Would assist Ventura parents with bicycling/walking to Barron Elementary School. Note that a Matadero / Josina / Barron routing would serve Barron Elementary.

Implementation Issues:

- The intersection of Matadero / El Camino is already signalized.

Existing traffic calming:

- Diverter at Margarita and Park

12. Barron / Wilton / Bol Path

General Comment: Alternative alignment for Margarita/Matadero route.
Implementation Issues:

- Help needed to cross El Camino Real at Barron / Wilton (e.g. signal)

Existing traffic calming:

- None

13. James / Maybell / Donald / Georgia (Bol Park Path spur)

General Comment: There is a Bol Path Spur entrance off Georgia.
Implementation Issues:

- Explore feasibility of easement from Tennessee Lane cul-de-sac to El Camino / Maybell (unlikely)
-

Existing traffic calming:

- Diverter on Clemo at Maybell

NORTH-SOUTH ROUTES

(Presented approximately west-to-east.)

14. Castilleja / Park / Maclane / Wilkie

Implementation Issues:

- Park / Meadow refuge upgrade if Park/Tennessee or Park/Carolina alignment is chosen
- Use alignment of Embarcadero Bike Path Project from University to Churchill

Existing traffic calming:

- Diverter on Park at northern bend
- Diverter on Park at Oxford
- Diverter on Park at Lambert
- Diverter on Park at Margarita
- Diverter on Park at W. Meadow
- De facto diverter at Wilkie Way Pedestrian/Bike Bridge

15. Bryant / Charleston alternate connector (Bryant Bike Boulevard spur)

Implementation Issues:

- Sign the Redwood Circle / Starr King Circle / Wright Place route

Existing traffic calming:

- none

16. Newell / Ross (Woodland to Louis)

General Comment: Would connect Midtown students with Jordan School while avoiding Middlefield, at the cost of an Oregon Expressway signal and a potentially expensive easement at the school boundary. There is currently a narrow short-cut path from the northernmost cul-de-sac off of Garland to the east end of the Jordan fields.

Implementation Issues:

- Path through Jordan School from Newell/California to Garland/Ross
- Purchase easement or remove house to Ross/Garland intersection.
- Help needed to cross Oregon Expressway (signal?)
- Bike Boulevard treatment along Ross

Existing traffic calming:

- Seven speed humps on Ross between Oregon Expressway and Colorado

17. Greer / Louis / Montrose / Cubberley / Nelson / Mackay / Nita

Implementation Issues:

- Improve Charleston crossing (Louis / Montrose) to add refuge
- Improve and sign route from Cubberley / Middlefield signal through Cubberley playing field area to Nelson
- Add 4th (bike/pedestrian) leg to San Antonio Road / Nita signal (CIP funded- slated for construction summer/fall 2000)

Existing traffic calming:

- Diverter at Montrose and E. Charleston

Appendix G
RECOMMENDED PROJECTS FOR THE PALO ALTO BIKEWAY NETWORK

Project Number 1 El Camino Real

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
El Camino Real	Menlo Park city limit	Los Altos city limit	None	Shared Arterial Roadway	Install Bike Route signs and make arterial improvements.

Analysis

It is acknowledged that only serious cyclists ride on El Camino Real. Ideally, all arterials would have bike lanes, and therefore El Camino Real ideally would also. However, the feasibility of providing continuous bike lanes is limited, due to constrained right-of-way and onstreet parking. The numerous driveways related to commercial activity reduces the benefits of bike lanes. It is included as a bike route to acknowledge the fact that it is an important route for some cyclists, to help procure funding to improve the safety for cyclists and to ensure that future roadway projects do not worsen conditions for bicyclists.

Intersection Crossing

Other Recommendations

Widen the outside lanes to improve conditions for cyclists; Implement other improvements as described in the text. Also there may be opportunity for "bike through" lanes at intersection approaches. Remove free-right turn lanes. Ensure that VTA-planned bus "queue-jumper" lanes also allow through travel for bikes.

Project Number 2 Park Blvd / Wilkie Way

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Castilleja Ave	Churchill Ave	Sequoia Ave	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Park Blvd	El Camino Real	Stanford Ave	Bike Lanes	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Park Blvd	Stanford Ave	California Ave	Bike Lanes	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Park Blvd	California Ave	Grant Ave	Bike Lanes	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Park Blvd	Grant Ave	Sheridan Ave	Bike Lanes	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Park Blvd	Sheridan Ave	Page Mill Rd	Bike Lanes	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Park Blvd	Page Mill Rd	Olive Ave	Substandard Width Bike Lanes	Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.
Park Blvd	Olive Ave	Lambert Ave	Substandard Width Bike Lanes	Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.
Park Blvd	Lambert Ave	Fernando Ave	Bike Route	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Park Blvd	Fernando Ave	Wilton Ave	Bike Route	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Park Blvd	Wilton Ave	MacLane	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 2 Park Blvd / Wilkie Way

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Park Blvd	MacLane	Charleston Rd	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
MacLane	Park Blvd	Wilkie Way	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Wilkie Way	Maclane	Charleston Rd	Bike Route	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Wilkie Way	Charleston Rd	Ped-bike Bridge	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Miller Ave	bridge	City limit	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.

Analysis

Many existing diverters on Park Blvd makes this street an existing traffic calmed street.

Intersection Crossing

Other Recommendations

Traffic circles would help at T-intersections. Widen bike lanes by 6 to 12 inches when roadway is resurfaced.

Project Number 3 Alma Street

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Alma Street	Lytton	Homer	Sidewalk Bike Path	Bike Lanes	Provide bike lanes by widening roadway.
Alma Street	E. Meadow	Charleston	Sidewalk Bike Path	Bike Lanes	Provide bike lanes by widening roadway and/or eliminating left-turn lane mid-block.
Alma Street	Charleston	San Antonio	Sidewalk Bike Path	Bike Lanes	Provide bike lanes by widening roadway and/or eliminating left-turn lane mid-block.

Analysis

All lanes are narrow, a challenge for widening outside lanes. A raised median would improve safety.
East-side uses need access to/from southbound direction, currently provided by a center turn/acceleration lane.

Intersection Crossing

Other Recommendations

Install signs informing bicyclists of the Bike Boulevard on Bryant Street. Continue to provide left-turn lanes at intersections. Provide raised median to prevent midblock left-turns.

Project Number 4 Bryant / Redwood Cir / Carlson / Duncan / Creekside / Nelson / MacKay / San Antonio

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Bryant St	E. Meadow Dr.	Redwood	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 4 Bryant / Redwood Cir / Carlson / Duncan / Creekside / Nelson / MacKay / San Antonio

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Redwood, Carlson, Ely, Duncan	Bryant	Charleston	Bike Route	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Creekside, Nelson, McKay	Charleston	San Antonio Way	Bike Route	Shared Residential Road	Install bike route signs.
San Antonio Way	MacKay	Briarwood	None	Shared Residential Road	Install bike route signs.
San Antonio Way	Briarwood	Alma	Bike Route	Bike Lanes	Remove parking on one side to provide standard bike lane widths.

Analysis	Intersection Crossing	Other Recommendations
This project officially extends the existing Bryant Street Bicycle Boulevard into Mountain View. Need to better sign the southern part to more effectively continue the bike boulevard	Meadow/Bryant- median refuge	Signing to better follow curves and turns in the route

Project Number 5 Cowper Street

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Cowper St	Loma Verde Ave	Meadow Dr	Substandard Width Bike Lanes	Daytime Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.

Analysis	Intersection Crossing	Other Recommendations
The forty foot cross section will support two ten foot travel lanes, a shared bike and parking lane and a daytime only bike lane.		

Project Number 6 Middlefield Road

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Middlefield Road	Palo Alto Ave	Hawthorne	Sidewalk Bike Path	Bike Lanes	Provide bike lanes by removing one lane such as in a four-to-three lane conversion.
Middlefield Road	Menlo Park City Limit	Palo Alto Ave	Sidewalk Bike Path	Bike Lanes	Provide bike lanes by removing one lane such as in a four-to-three lane conversion.
Middlefield Road	Hawthorne	Channing Ave	Sidewalk Bike Path	Bike Lanes	Provide bike lanes by removing one lane such as in a four-to-three lane conversion.
Middlefield Road	Channing Ave	Embarcadero	Sidewalk Bike Path	Bike Lanes	Provide bike lanes by prohibiting parking on one side and/or removing one travel lane.
Middlefield Road	Embarcadero Rd	California Ave	Sidewalk Bike Path	Bike Lanes	Provide bike lanes by prohibiting parking on one side and/or removing one travel lane.
Middlefield Road	California Ave	Garland Ave	Sidewalk Bike Path	Bike Lanes	Provide bike lanes by prohibiting parking on one side and/or removing one travel lane.

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 6 Middlefield Road

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Middlefield Road	Garland Ave	Oregon Expwy	Sidewalk Bike Path	Bike Lanes	Provide bike lanes by prohibiting parking on one side and/or removing one travel lane.
Middlefield Road	Oregon Expwy	Matadero Creek	Sidewalk Bike Path	Bike Lanes	Provide bike lanes by removing one lane such as in a four-to-three lane conversion.
Middlefield Road	Matadero Creek	Layne Ct	Sidewalk Bike Path	Bike Lanes	Provide bike lanes by prohibiting parking on one side and/or removing one travel lane.
Middlefield Road	Layne Ct	Loma Verde Ave	Sidewalk Bike Path	Bike Lanes	Provide bike lanes by prohibiting parking on one side and/or removing one travel lane.
Middlefield Road	Montrose	300 s/o Montrose	None	Bike Lanes	Provide bike lanes by prohibiting parking on one side and/or removing one travel lane.
Middlefield Road	300 s/o Montrose	San Antonio	None	Bike Lanes	Provide bike lanes by prohibiting parking on one side and/or removing one travel lane.

Analysis	Intersection Crossing	Other Recommendations
Curb-to-curb widths vary along Middlefield; as do the number of lanes and onstreet parking conditions. Techniques recommended in the Embarcadero Road Traffic Calming Study may be applicable here. Restrore bike lanes at approeaches to Charleston Road and San Antonio Road		Incorporate into recommendations of Residential Arterial Traffic Calming Project. For segments near midtown, coordinate with circulation plan for the Midtown Shopping District.

Project Number 7 Ross Road

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Ross Road	Colorado	Louis	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.

Analysis	Intersection Crossing	Other Recommendations
Seven speed humps currently exist on Ross. Long term project woul connect Midtown students with Jordan School, avoiding Middlefield, using existing narrow school access path from the northernmost cul-de-sac off of Garland to the east end of the Jordan fields. Alternatively an easement could be purchased to allow the route to continue on a straight alignment.	Long-term-Ped/Bike only signal at Oregon Expressway at Ross (similar to Embarcadero/Bryant).	Would require easement for path through Jordan School and/or Garland School site.

Project Number 8 Newell Road

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Newell Rd	Woodland	Channing Ave	Substandard Width Bike Lanes	Bike Lanes	Remove parking on one side to provide standard bike lane widths.

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 8 Newell Road

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Newell Rd	Channing Ave	Embarcadero	Substandard Width Bike Lanes	Bike Lanes	Remove parking on one side to provide standard bike lane widths.
Newell Rd	Embarcadero Rd	California Ave	Substandard Width Bike Lanes	Bike Lanes	Remove parking on one side to provide standard bike lane widths.

Analysis

Intersection Crossing

Other Recommendations

Project Number 9 Greer Road

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Greer Rd	Channing Ave	Embarcadero Rd	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Greer Rd	Embarcadero Rd	Oregon Expwy	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Greer Rd	Oregon Expwy	Amarillo Ave	Bike Route	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Greer Rd	Amarillo Ave	Louis	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.

Analysis

Intersection Crossing

Other Recommendations

VTA Bus route 88 uses Greer between Louis and Colorado. Ideally bicycle boulevards are not on bus routes, however the low frequency is compatible with a bike boulevard. The presence of buses does, however, affect the choice of traffic calming devices, if any, that could be used on Greer.

Project Number 10 West Bayshore Road / Fabian Way

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
W. Bayshore Rd	Amarillo Ave	#3460 W. Bayshore	Bike Lanes on One Side Only	Bike Lanes	Provide bike lanes by widening roadway.
W. Bayshore Rd	#3460 W. Bayshore	#3450 W. Bayshore	Bike Lanes on One Side Only	Bike Lanes	Provide bike lanes by widening roadway.
Fabian Way	E. Meadow	Charleston	Daytime Bike Lanes	Bike Lanes	Remove parking on one side to provide standard bike lane widths.

Analysis

Intersection Crossing

Other Recommendations

Industrial frontage on this section has no need for evening parking, so fulltime bike lanes are recommended.

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 12 Everett / Palo Alto Ave

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Everett Avenue	Alma	Palo Alto Ave	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Palo Alto Ave	Everett	Chaucer	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.

Analysis	Intersection Crossing	Other Recommendations
Excellent commute route from downtown Palo Alto and East Palo Alto to Medical Center and Shopping Center area of Stanford University, while avoiding University Avenue and Palm Drive.	Everett/Alma and Everett/Middlefield (e.g. median refuge or signal	Coordinate with the Downtown North Traffic Calming project and with the Palo Alto Intermodal Transit Station study.

Project Number 13 University Avenue

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
University Avenue	El Camino Real	Middlefield	None	Shared Arterial Roadway	Install Bike Route signs and make arterial improvements.
University Avenue	Middlefield	Fulton	Bike Route	Shared Arterial Roadway	Install Bike Route signs and make arterial improvements.

Analysis	Intersection Crossing	Other Recommendations
The many destinations along University Avenue downtown make it an important bicycle route. It is recommended as a Shared Arterial Bike Route.		Consider pavement stencils to inform bicyclists where to ride vis a vis the diagonall parked cars. Other arterial improvements should be evaluated such as signal timing, signal detector sensitivity to bicycles.

Project Number 14 Homer Avenue

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Homer Avenue	El Camino Real	Boyce Ave	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.

Analysis	Intersection Crossing	Other Recommendations
With the Homer undercrossing, this could become a major commute route between University south and Stanford. Lasuen already functions as a bicycle route between Arboretum and White Plaza on the Stanford campus.	Add 4th (bike/ped) leg to Medical Foundation Way / El Camino signal. Existing signal at Alma: add fourth leg to intersection	Make Homer 2-way. At a minimum it should be two-way from Alma to Waverley. Caltrain undercrossing between Alma and PAMF (TEA-21 grant funded and in the STIP)

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 15 Addison Avenue/Channing Avenue / St Francis

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Addison Avenue	Waverley Rd.	Channing	Substandard Width Bike Lanes	Bike Lanes	Remove parking on one side to provide standard bike lane widths.
Channing Avenue	Guinda/ Boyce	Addison	None	Bike Lanes	Remove parking on one side to provide standard bike lane widths.
Channing Avenue	Addison	Newell	Substandard Width Bike Lanes	Bike Lanes	Remove parking on one side to provide standard bike lane widths.
Channing Avenue	Newell	St. Francis	Bike Lanes	Bike Lanes	Remove parking on one side to provide standard bike lane widths.
St Francis Dr	Channing Ave	Embarcadero Rd	Substandard Width Bike Lanes	Bike Route	Remove bike lanes and install bike route signs.
St Francis Dr	Embarcadero Rd	first curve toward Oregon	None	Bike Route	Install bike route signs.
St Francis Dr	first curve toward Oregon	Oregon Ave	None	Bike Route	Install bike route signs.

Analysis

The final design for Addison should be evaluated in conjunction with the access/circulation needs of Addison School and the pick-up/drop-off areas.

Intersection Crossing

Other Recommendations

Traffic calming may be a better alternative for Addison, if compatible with the school circulation recommendations.

Project Number 16 Chaucer / Boyce / Melville

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Chaucer	Palo Alto Ave	Hamilton	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Hamilton	Chaucer	Hale	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Hale	Hamilton	Boyce	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Boyce	Hale	Guinda	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Guinda St	Boyce	Melville	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Guinda St	Homer	Boyce/Channing	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Melville Ave	Guinda St	Bryant St	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 16 Chaucer / Boyce / Melville

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation

Analysis	Intersection Crossing	Other Recommendations
Connects Bryant near Castilleja School past Lucie Stern Center to Menlo Park.	All needed signals already exist.	

Project Number 17 Churchill Avenue / Coleridge Avenue

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Churchill Ave	El Camino Real	Alma St	Substandard Width Bike Lanes	Bike Lanes	Remove parking on one side to provide standard bike lane widths.
Churchill Ave	Alma St	Bryant St	Substandard Width Bike Lanes	Bike Lanes	Remove parking on one side to provide standard bike lane widths.
Churchill Ave	Bryant St	Embarcadero Rd	None	Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.
Coleridge Ave	Bryant St	Embarcadero Rd	Substandard Width Bike Lanes	Shared Residential Road	Remove bike lanes and install bike route signs.

Analysis	Intersection Crossing	Other Recommendations
Colerdige is low volume street, no need for bike lanes, and the bike lanes do not meet Caltrans standards. On Chruchill. median refuge at Castilleja. Have funding to improve signal phasing for peds/bikes crossing at El Camino into Stanford.	At El Camino Real	Consider widening on the northside instead of prohibiting parking.

Project Number 18 Embarcadero Road

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Embarcadero Rd	Geng Rd	E. Bayshore Rd	None	Bike Lanes	Provide bike lanes by widening roadway.
Embarcadero Rd	E. Bayshore	St Francis	None	Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.
Embarcadero Rd	St Francis	Alma	Sidewalk Bike Path	Bike Lanes	Provide bike lanes by removing one lane such as in a four-to-three lane conversion.

Analysis	Intersection Crossing	Other Recommendations
From El Camino to Middlefield in particular, there are narrow outside lanes, fast traffic, narrow shoulder on US 101 overpass, and narrow lanes from US 101 to Geng Rd. Existing sidewalk bike path designation encourages wrong way riding and inattention at intersections. Over US-101: narrow shoulder US-101 to Geng: narrow outside lanes		See also the recommendations developed under the Embarcadero Rd Traffic Calming Plan which would replace the existing five lane cross-section with two travel lanes, a raised median with left-turn lanes at intersections, bike lanes and street trees.

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 19 California Avenue

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
California Ave	Louis Rd	Barbara Dr	Substandard Width Bike Lanes	Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.
California Ave	Barbara Dr	Newell Rd	Substandard Width Bike Lanes	Bike Lanes	Reconstruct to have narrower gutter pan and provide bike lanes.
California Ave	Newell Rd	Middlefield Rd	Substandard Width Bike Lanes	Bike Lanes	Reconstruct to have narrower gutter pan and provide bike lanes.
California Ave	Middlefield Rd	Alma St	Substandard Width Bike Lanes	Bike Lanes	Remove parking on one side to provide standard bike lane widths.
California Ave	Park Blvd	El Camino Real	None	Bike Lanes	Provide bike lanes by removing one lane such as in a four-to-three lane conversion.

Analysis	Intersection Crossing	Other Recommendations
The three foot gutter pans necessitate a minimum six foot bike lane width to meet HDM standards. The Middle School creates traffic /circulation issues and the need for a drop-off area.		Existing undercrossing of Caltrain and Alma Street does not meet current standards, redesign is a Tier 1 project of the VTA Bicycle Element of the T2020 plan. Provide curbside drop off area in front of school by prohibiting parking on southside

Project Number 20 Oregon Expressway (County)

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Oregon Expy	W. Bayshore	Cowper	None	Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.
Oregon Expy	Cowper	Bryant	None	Bike Lanes	Provide bike lanes by widening roadway.

Analysis	Intersection Crossing	Other Recommendations
Bike lanes feasible north of Cowper, South of Cowper, there are very narrow lanes, narrow underpass under Alma/Caltrain/Park. Consider bike lane eastbound from El Camino to Birch, then up Page Mill Road (short connector along Agilent parcel) to Park Blvd.		Coordinate bike lanes on Oregon Expy with the future county roads project to reconstruct the Alma interchange

Project Number 21 Colorado Avenue

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Colorado Ave	Alma	Middlefield Rd	None	Shared Residential Road	Install Bike Route signs, traffic calm if necessary, remove unwarranted stop signs.

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 21 Colorado Avenue

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Colorado Ave	Middlefield Rd	Louis Rd	Substandard Width Bike Lanes	Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.
Colorado Ave	Louis Rd	W. Bayshore Rd	None	Bike Lanes	Remove parking on one side to provide standard bike lane widths.

Analysis	Intersection Crossing	Other Recommendations
Narrow bike lanes with parking, Middlefield-Louis Need to extend route to Bryant and to West Bayshore		Coordinate the Bryant to Alma segment with the improvements to Alma.

Project Number 22 Loma Verde Avenue

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Loma Verde Ave	Louis Rd	W. Bayshore Rd	None	Shared Residential Road	Install Bike Route signs, traffic calm if necessary, remove unwarranted stop signs.

Analysis	Intersection Crossing	Other Recommendations
Low existing traffic volumes do not justify bike lanes, if ADT approached 4000 vpd, bike lanes should be considered.		

Project Number 23 East Meadow Drive

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
E. Meadow Dr	E. Meadow Circle	Fabian	Daytime Bike Lanes	Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.

Analysis	Intersection Crossing	Other Recommendations
	Median refuge at Adobe Creek path.	Reconfigure striping/curb location at Fabian for more width for southbound bicyclists.

Project Number 24 Charleston Road. / Arastradero Road

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Arastradero Rd	Foothill Expwy	Alta Mesa cemetery	None	Bike Lanes	Project in progress.
Charleston Rd	El Camino Real	Alma Street	Bike Lanes	Bike Lanes	See discussion below.
Charleston Rd	Alma Street	Carlson	Bike Lanes	Bike Lanes	See discussion below.
Charleston Rd	Carlson	Middlefield	Bike Lanes	Bike Lanes	See discussion below.
Charleston Rd	Middlefield	Fabian	Sidewalk Bike Path	Bike Lanes	Remove parking on one side to provide standard bike lane widths.

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 24 Charleston Road. / Arastradero Road

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Charleston Rd	Fabian	San Antonio	Sidewalk Bike Path	Bike Lanes	Provide bike lanes by widening roadway.

Analysis

This important school route was recently studied in the Charleston Rd Corridoer Traffic Management and Safety Study, and several recommendations were developed for Charleston Rd. It is also a future subject of the Residential Artrerial Traffic Calming Study.

Intersection Crossing

Ped-bike signal at Arastradero/Terman Path

Other Recommendations

See recommendations of the Charleston Rd study. City project will add bike lanes from Georgia to Foothill Exp. Recommend median refuge at Bol Park Path spur extension to Gunn High lot through Hetch Hetchy parcel to meet Terman Path

Project Number 25 San Antonio Road

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
San Antonio Rd	Alma Street	Nita	None	Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.
San Antonio Rd	Nita	Charleston Rd	Sidewalk Bike Path	Bike Lanes	Remove parking on one side to provide standard bike lane widths.
San Antonio Rd	Charleston Rd	W. Bayshore	Sidewalk Bike Path	Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.

Analysis

San Antonio Rd is a crucial link for motorists and trucks and for these very same reasons also provides a crucial link for bicyclists. The inconsistent cross-section width and parking conditions make a consistent recommendation for bike lanes in the short-term impractical. It is recommended to provide bike lanes in the eastbound direction and bike lanes/wider curb lanes in the westbound direction. The limited parking between Charleston and Alma should be prohibited to provide 6 foot bike lanes.

Intersection Crossing

Improve bike crossing at Charleston Road and Middlefield Road

Other Recommendations

1) The existing striping and parking conditions should be futher studied to assess how westbound bike lanes can best be provided, including the feasibility of widening into frontage road area. In the interim, it appears that westbound between Charleston and Alma wide curb lanes can be provided where the cross section is 26 feet and bike lanes can be provided where the cross section is 32 feet. 2) Repair gutter pavement due to root upheaval.

Project Number 26 Hansen Way/ Portage/ Ash/ Lambert Avenue

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Hansen Way	Page Mill Rd	Curve, W end	None	Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 26 Hansen Way/ Portage/ Ash/ Lambert Avenue

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Hansen Way	Curve, W end	Curve, E end	None	Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.
Hansen Way	Curve, E end	850' from El Camino	None	Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.
Hansen Way	850' from El Camino	100' from El Camino	None	Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.
Hansen Way	100' from El Camino	El Camino Real	None	Bike Lanes	Stripe bike lanes using existing pavement width; retain lane/parking configuration.
Portage Ave	El Camino Real	Ash St	None	Shared Residential Road	Install Bike Route signs, traffic calm if necessary, remove unwarranted stop signs.
Ash St	Portage Ave	Lambert Ave	None	Shared Residential Road	Install Bike Route signs, traffic calm if necessary, remove unwarranted stop signs.
Lambert Ave	Ash	Alma	None	Shared Residential Road	Install Bike Route signs, traffic calm if necessary, remove unwarranted stop signs.

Analysis	Intersection Crossing	Other Recommendations
The existing no parking on Hansen makes this project easy to implement.		

Project Number 27 Hanover Street / Porter Drive

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Hanover St	Stanford Ave	California Ave	Bike Route	Shared Residential Road	Install Bike Route signs, traffic calm if necessary, remove unwarranted stop signs.
Hanover St	Fire station	Page Mill Rd	None	Bike Lanes	Reconstruct to have narrower gutter pan and provide bike lanes.
Hanover St	Page Mill Rd	start of storage lanes just south of Page Mill	Bike Route	Bike Lanes	Reconstruct to have narrower gutter pan and provide bike lanes.
Hanover St	start of storage lanes just south of Page Mill	Bol Park Path	Bike Route	Bike Lanes	Reconstruct to have narrower gutter pan and provide bike lanes.
Hanover St	Bol Park Path	Hillview Ave	Bike Route	Bike Lanes	Reconstruct to have narrower gutter pan and provide bike lanes.
Porter Dr.	Page Mill Rd.	Hillview Ave.	Bike Route	Bike Lanes	Reconstruct to have narrower gutter pan and provide bike lanes.

Analysis	Intersection Crossing	Other Recommendations
Three foot gutter pans interfere with providing standard width bike lane. Commercial frontage with adequate off street parking.	Median refuge at Hanover/Bol Park path	Paint KEEP CLEAR at Fire station driveway

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 28 Matadero / Margarita Avenues

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Margarita Ave	Park Blvd	El Camino Real	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Matadero Ave	El Camino Real	Bol Pol Bike path	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.

Analysis	Intersection Crossing	Other Recommendations
Would assist Ventura parents with bicycling/walking to Barron Elementary School. Lack of sidewalks creates more pressure on roadway.		Add walkway on south side between El Camino Real and Josina.

Project Number 29 Barron Avenue/ Laguna / La Donna

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Josina Ave	Barron	Matadero Ave	None	Shared Residential Road	Install bike route signs.
La Donna St	Los Robles	Barron	None	Shared Residential Road	Install bike route signs.
Barron Ave	El Camino Real	Laguna	None	Shared Residential Road	Install bike route signs.
Laguna Ave	Los Robles	Matadero Ave	None	Shared Residential Road	Install bike route signs.
Los Robles Ave	Laguna	Gunn High School path	None	Shared Residential Road	Install bike route signs.

Analysis	Intersection Crossing	Other Recommendations
Would assist Ventura parents with bicycling/walking to Barron Elementary School.		Use Curtner to take advantage of signal at El Camino Real as short-term route. Add walkway along Barron.

Project Number 30 Los Robles Avenue

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Los Robles Ave	La Donna	Laguna	None	Bike Lanes	Provide bike lanes by widening roadway.

Analysis	Intersection Crossing	Other Recommendations
Extends existing bike lanes further into the nieghborhood.		Improve pathway entrance barriers.

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 31 Maybell Avenue/ Donald / Georgia Avenue

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
James Road	Wilkie Way	El Camino Way	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Maybell Ave	El Camino Real	Bike Path	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Donald Drive	Georgia Avenue	Arastradero	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
El Camino Way	James Road	El Camino Real	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.
Georgia Avenue	Donald Drive	Arastradero	None	Bicycle Boulevard	Install Bike Blvd signs, remove unwarranted stop signs, traffic calm if necessary.

Analysis	Intersection Crossing	Other Recommendations
These street combine to serve as local school routes in Barron Park		Improve walkway between end of Georgia and the Bol Park Path.

Project Number 32 Stanford Avenue

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Stanford Ave	Dartmouth St	Harvard St	None	Bike Lanes	Provide bike lanes by widening roadway.
Stanford Ave	El Camino Real	Park Blvd	None	Shared Residential Road	Install Bike Route signs, traffic calm if necessary, remove unwarranted stop signs.

Analysis	Intersection Crossing	Other Recommendations
	At El Camino Real, improvements to bike/ped crossing are being planned with Caltrans.	

Project Number 33 West Arastradero Road

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
West Arastradero Rd	Page Mill	Alpine Rd	None	Shoulder	Provide wider shoulder.

Analysis	Intersection Crossing	Other Recommendations
This is an important section of a popular recreational loop.		

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 34 Miranda Avenue

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Miranda Ave	Arastradero Rd	southern city limit	None	Bike Route	Install bike route signs.

Analysis

Provides connection to Los Altos and an alternative to Foothill Expressway.

Intersection Crossing

Other Recommendations

Project Number 35 Old Page Mill Road

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Old Page Mill Road	Foothill Expy/Page Mill Road	Page Mill Road	None	Bike Route	Install bike route signs.

Analysis

Intersection Crossing

Other Recommendations

Project Number 36 Deer Creek Road

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Deer Creek Road	Page Mill Road	Arastradero	None	Bike Lanes	Provide bike lanes by widening roadway.

Analysis

This is an important section of a popular recreational loop.

Intersection Crossing

Other Recommendations

Project Number 50 Baylands Bike Path

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Baylands Bike Path	E. Palo Alto	Geng	Bike Path	Bike Path	Repave existing bike path.

Analysis

Many deep longitudinal cracks; path needs to be rebuilt.

Intersection Crossing

Other Recommendations

Project Number 51 Bol Park Bike Path Spur

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Bol Park Path /Gunn High path	BolPark Path	Arastradero Rd	None	Bike Path	Construct bike path on existing public easement.

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 51 Bol Park Bike Path Spur

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation

Analysis	Intersection Crossing	Other Recommendations
Connects the existing Bol Park Bike Path to Maybell Avenue and to Arastradero Road.		

Project Number 52 El Camino Multiuse Path

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
El Camino Mixed Use Path	Alma	University Circle	Bike Path	Bike Path	Construct bike path on existing public easement.

Analysis	Intersection Crossing	Other Recommendations
Funded but not yet constructed.		

Project Number 53 Bay Trail Extension to East P.A.

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Bay Trail extension	End of Geng Road	north city limit	None	Bike Path	Construct bike path on existing public easement.

Analysis	Intersection Crossing	Other Recommendations

Project Number 54 Path extension from Faber Road

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Path extension from Faber Road	Faber Road	existing path	None	Bike Path	Construct bike path on existing public easement.

Analysis	Intersection Crossing	Other Recommendations

Project Number 55 Geng Path

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Geng-Embarcadero path	Baylands Athletic Ctr	1860 Embarcadero Rd	Bike Path	Bike Path	Repave existing bike path.

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 55 Geng Path

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation

Analysis	Intersection Crossing	Other Recommendations
Root heaves at Eucalyptus grove. Low branches at curve away from Geng.		

Project Number 56 Matadero Creek Bike Path

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Matadero Creek	East Bayshore	Alma Street	None	Bike Path	Construct bike path on existing public easement.

Analysis	Intersection Crossing	Other Recommendations
This project is in the 1998 Palo Alto Comprehensive Plan and the 1995 Santa Clara County Trails Master Plan. Would connect Midtown with Stanford Research Park employment and Ventura / El Camino commercial destinations such as Fry's. Multi-use path on Matadero Creek north levee, Cowper to Alma. Would require cantilevering the path around the only house that obstructs the levee (at Waverley).	Median refuge on all cross streets, particularly Middlefield,	New Alma / Caltrain overcrossing aligned with electric utility substation on Park near Lambert (at commercial/residential boundary). Need to improve existing undercrossing at US 101.

Project Number 57 Cubberley Pathway

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Existing Cubberley path	Athletic field behind Cubberley	Nelson Dr.	Bike Path		Construct bike path on existing public easement.

Analysis	Intersection Crossing	Other Recommendations
Connects the Louis Rd bike lane extension with the Bryant St. Bicycle Boulevard extension on Nelson Drive.		

Project Number 58 Montrose Road Pathway

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Montrose	Charleston Rd	Middlefield Rd	None	Shared Residential Road	Install bike route signs.
Montrose extension on Cubberley driveway	Middlefield	Athletic field behind Cubberley	None	Bike Path	Construct bike path on existing public easement.

Analysis	Intersection Crossing	Other Recommendations
Continues the Louis Bike Route to the Adobe Creek bridge to Mountain View	Charleston crossing (Louis / Montrose) improve refuge	Install better way-finding signage for bicyclists using path and make other improvements to path for bicycling.

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 59 Miranda Road Extension Bike Path

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Miranda Road extension	Southern end of Miranda	Creek		Bike Path	Construct bike path on existing public easement.

Analysis	Intersection Crossing	Other Recommendations
Important alternative to Foothill Expressway that connects Palo Alto to Los Altos.		

Project Number 60 California Avenue Caltrain Undercrossing

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
California Ave	Alma St	Park Blvd	Pedestrian/Bike Under/Overcrossing	Pedestrian/Bike Under/Overcrossing	Reconstruct existing bicycle/pedestrian under/overpass.

Analysis	Intersection Crossing	Other Recommendations
Narrow steep undercrossing does not meet ADA standards		Tier One project in the VTA Bicycle Plan

Project Number 61 Everett Caltrain Undercrossing

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Everett/Caltrain undercrossing	Alma St	Quarry Road	None	Pedestrian/Bike Under/Overcrossing	Construct new bicycle/pedestrian under/overpass.

Analysis	Intersection Crossing	Other Recommendations
Will connect bicycle boulevard to Caltrain station and Stanford		

Project Number 62 Homer Avenue Caltrain Overcrossing

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Homer/Caltrain overcrossing	east side	west side	None	Pedestrian/Bike Under/Overcrossing	Construct new bicycle/pedestrian under/overpass.

Analysis	Intersection Crossing	Other Recommendations
Programmed in the Palo Alto CIP.		

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Project Number 63 Miranda to Los Altos Bridge

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Miranda Bridge over creek	Miranda	Blue Lane	None	Pedestrian/Bike Bridge	Construct new bicycle/pedestrian bridge over creek.

Analysis	Intersection Crossing	Other Recommendations
Will connect Miranda to Blue Oak Lane in Los Altos parallel to Foothill Expressway		

Project Number 64 Adobe Creek / 101 Undercrossing

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Adobe Creek / 101 Undercrossing	east side	west side	Pedestrian/Bike Under/Overcrossing	Pedestrian/Bike Under/Overcrossing	Reconstruct existing bicycle/pedestrian under/overpass.

Analysis	Intersection Crossing	Other Recommendations
Existing undercrossing closed during winter and wet weather.		Improve lighting in the tunnel.

Project Number 65 Matadero Creek / 101 Undercrossing

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Matadero Creek / 101 Undercrossing	east side	west side	Pedestrian/Bike Under/Overcrossing	Pedestrian/Bike Under/Overcrossing	Reconstruct existing bicycle/pedestrian under/overpass.

Analysis	Intersection Crossing	Other Recommendations
Existing undercrossing closed during winter and wet weather.		Improve lighting in the tunnel.

Project Number 66 Matadero Creek / Caltrain Overcrossing

Roadway	From	To	Existing Bikeway Type	Proposed Bikeway Type	Recommendation
Matadero Creek / Caltrain overcrossing	east side	west side	None	Pedestrian/Bike Under/Overcrossing	Construct new bicycle/pedestrian under/overpass.

Analysis	Intersection Crossing	Other Recommendations
Will connect proposed trail to Barron Park		

NOTE: Project numbers 1-36 are onroad bikeways. Project numbers 50-59 are offroad pathways. Project numbers 60-66 are bridges/overcrossings/tunnels.

Appendix H
SIGNALIZED INTERSECTION RECOMMENDATIONS

The following discussion of roads crossing Oregon Expressway may also be useful for analyzing other arterials, such as El Camino Real, Middlefield, University, Embarcadero, Charleston, and Arastradero. Oregon Expressway is a County road, and improvements at its intersections with City streets may be subject to County approval. The Oregon Expressway is considered to run east and west, and streets crossing it north and south.

The intersection of Greer Road northbound with Oregon Expressway illustrates a problem found at several locations. The southeast curb radius is large to allow room for right turns. The crosswalk from southeast to northeast corner begins on the straight part of the Oregon curb to minimize crossing distance, and the pedestrian pushbutton is also located there. This location places pedestrians well to the right of traffic waiting to turn right from Greer to Oregon, and thick foliage that screens adjacent houses from the expressway tends to block the view (especially one or two cars back from the intersection), creating the potential for conflict when the light turns green. This conflict is even more pronounced for bicyclists, who travel faster and are less maneuverable than pedestrians.

Improvements should therefore focus on encouraging bicyclists to cross on the roadway, not in the crosswalk. One way to do this may be to provide a through bike lane at the intersection to the left of a right-turn-only lane, even on streets that do not otherwise have bike lanes.

The City's agreement with the County for signal timing at streets crossing Oregon Expressway calls for a 7-second minimum green, 3-second yellow, and 2-second red clearance. All signals observed complied with this policy. All inductive loops were capable of detecting bicycles in the right location, but the most sensitive spot varies with the type of loop and should be identified by the standard Caltrans marking. Some intersection also have two loop cuts superimposed, making it difficult to identify the active loop.

Recommendations for improving these crossings include:

- Trimming foliage that obscures sight lines.
- Marking the sensitive spots of detector loops.
- Adding through bicycle lanes at intersections, where space allows.

The following sections discuss individual intersections in more detail.

West Bayshore Road

Bicycle traffic at this intersection is not heavy, because the West Bayshore bike lane ends at Amarillo.

Northbound - Bicyclist movements here differ from motorist movements in two respects. Motorists approaching from the south must turn left or right at a T intersection. Bicyclists

cannot turn right, because that direction leads only to Highway 101 entrance ramps. But after initially turning left, they can continue north by turning into a short pedestrian path to the Oregon Avenue frontage road on the north side.

It might be beneficial to restripe the West Bayshore approach to provide a wider shared left-turn lane or a bicycle left-turn lane. The right-turn lane now has excess width and can be correspondingly narrowed.

Detection is provided by diamond loops that do not lie entirely within the left-turn lane.

The pedestrian path on the far side traverses a narrow gap in a foliage-covered fence separating Oregon Expressway from Oregon Avenue. The path has 3-ft curb cuts at each end, slightly offset, and is blocked by a heavy bollard in the center that leaves a 4-ft gap on its west side. Maneuvering a bicycle trailer around this bollard would be difficult. The surface has many joints and a few cracks. A Stop sign for bicyclists exiting the path is placed high on the right side, and might be easier to see if it were on the left side.

Oregon Avenue leads on the east to a bicycle-pedestrian overcrossing of 101, but no directional sign faces pedestrians or bicyclists entering this street from the path, or for that matter traveling east on Oregon Avenue itself. The only sign faces traffic southbound on St. Francis. The sidewalk curb cut leading to the overcrossing requires a steep and narrow 90-degree turn.

Southbound - No signs direct pedestrians or bicyclists leaving the overcrossing and traveling west on Oregon Avenue to the pedestrian gap, which is not easy to spot amid the foliage.

Bicyclists traveling south from Oregon Avenue to West Bayshore Road must ride in the pedestrian crosswalk (otherwise the offset forces them to ride in the wrong direction on Oregon Expressway). Only a pedestrian signal head (called by pushbutton) faces this direction; it regulates bicyclists who choose to walk their bikes, but technically not those who are riding them. A vehicular head (or bicycle signal head) should be added. A passage should also be cut in the median divider to enable bicyclists to cross without swerving around it (it would also serve wheelchairs).

Suggested Improvements

- Widen left-turn lane from West Bayshore to Oregon Expressway, or add bicycle left-turn lane.
- Provide bicycle detection near the right side of this lane, with the sensitive spot marked (halfway between center and edge for a diamond loop).
- Widen and repave pedestrian path.
- Move Stop sign to more visible location.
- Trim foliage near path to improve sight lines.
- Improve signage from Oregon Expressway to Oregon Avenue, from path and Oregon Avenue to overcrossing, and from overcrossing to path.
- Improve approach to overcrossing.

- Install vehicular signal head facing path.
- Cut opening in median divider.

Greer Road

Greer Road angles as it crosses Oregon Expressway. The Oregon Avenue frontage road crosses Greer immediately north of the expressway.

Northbound - Northbound Greer is narrow, about one-and-a-half lanes—that is, a left-through lane that leaves enough room for right-turning traffic to squeeze slowly by.

Detection is provided by circular loops marked by faded 6-foot white squares.

The large-radius turn and foliage screen northbound bicyclists who use the crosswalk from the view of right-turning motorists. But it would not be possible to square off the intersection without narrowing it further.

Southbound - Southbound detection is provided by two lanes of circular loops enclosed in faded 6-foot squares. The intersection is very wide, with room for separate left and through movements and for right-turn traffic to pull out of the way, though no lanes are marked. Combining the left and through movements in one lane would provide room for a through bike lane. Drain grates in the Keep Clear continuation of the frontage road are bicycle-safe.

Southbound bicyclists tend to end up in the gutter on the far side, because of the offset. This gutter is smoothly paved and patched with asphalt. A drain grate is bicycle-safe.

Suggested Improvements

- Mark the sensitive spot of detection loops (tangent to a circular loop).
- Trim foliage on southeast corner as much as possible to improve sight lines.
- Combine southbound left and through movements to provide room for a through bike lane.

Louis Road

Louis Road has bicycle lanes on both sides of Oregon Expressway.

Northbound - The road is one and a half lanes wide (to make room for a bike lane on the southbound side). The corner is fairly square, but sight lines are obscured by a tree and ivy belonging to the corner residence. A circular loop and a superimposed diamond loop are marked by a faded square.

Southbound - The frontage road has no outlet at Louis; the ends are landscaped by thick foliage. The intersection is currently wide enough for a combined left-through lane and a wide area that serves only right turns because of its offset. There may be room here for a through bike lane as well.

Bicyclists in the crosswalk are well hidden by foliage and a signal controller box. Detection is by circular loops marked by faded squares.

Suggested Improvements

- Mark the sensitive spot of detection loops.
- Trim foliage on southeast and northwest corners as much as possible to improve sight lines.
- Add a through bike lane in the southbound direction.

Middlefield Road

Middlefield is a busy arterial that carries two narrow lanes of heavy traffic in each direction (merging into one for northbound traffic on the north side of the intersection). The signal is split for traffic on Middlefield. Visibility at the crosswalks is obscured by heavy foliage on opposite corners. The markings on the circular loops are heavily worn by traffic, but bicycle detection is secondary precisely because there is already so much traffic to actuate them.

The frontage road does not have an outlet at Middlefield, but a paved pedestrian ramp leading from the west-side frontage road to the northwest crosswalk invites bicyclists to follow the same path, encouraging them to cross in the crosswalk.

It might be possible to create a through bicycle lane at the southbound stop line by offsetting the center line. Since this might leave inadequate room for two lanes of northbound traffic to merge, the northbound lanes would have to be marked for combined left-through and right-turn-only. The split signal timing permits this to be done, but its effect on traffic flow would have to be analyzed.

Suggested Improvements

- Mark loops.
- Trim foliage on southeast and northwest corners.
- Investigate adding a through bike lane at the southbound stop line.

Cowper Street

Cowper Street is a bike route on both sides of Oregon Expressway.

Northbound - The road is one and a half lanes wide northbound. There is a one-block frontage road on the west side, Anton Court. The view at the southeast corner of Oregon and Cowper is thoroughly blocked by a tall, thick hedge that appears to be in the public right-of-way. The pedestrian pushbutton, however, is better placed than on Louis and Greer, at the corner rather than on the far side.

Southbound - The Oregon Avenue frontage road crosses Cowper and is therefore not landscaped, creating good sight lines looking south and a wide intersection that would allow a through lane for bicycles. The westbound frontage road has no Stop sign, and the Stop pavement marking is hidden by parked traffic.

Suggested Improvements

- Mark loops.
- Trim foliage on southeast corner.
- Add a through bike lane in the southbound direction.
- Install Stop sign for westbound traffic on Oregon Avenue.

Bryant Street

Bryant Street is a bicycle boulevard, with priority given to bicycles over vehicular traffic.

Northbound - Loops are circle, diamond in a circle, diamond in a circle. The road is one and a half lanes wide; the corner is well squared off, and there are no sight line problems.

Southbound - The Oregon Avenue frontage road crosses Bryant, again creating good sight lines and a very wide intersection that would easily allow a through bike lane at the stop line. Loops are one diamond and three circles; the head loop is marked by a painted square.

The stop line seems to protrude slightly into the Oregon Expressway traffic lanes, probably so waiting vehicles will not block the frontage road. Bicyclists might be more comfortable if it were moved back.

Suggested Improvements

- Mark loops.
- Add a through bike lane in the southbound direction.
- Move stop line back slightly, if possible.

SIGNAL TIMING ON BRYANT STREET

The Bryant Street bicycle boulevard has only two signalized intersections outside the timed downtown signals at Lytton, University, and Hamilton. These two intersections are at Embarcadero and Oregon Expressway. Oregon Expressway was discussed above.

Bryant at Embarcadero

Bryant at Embarcadero channelizes motorists into forced right turns, while a narrow slot permits bicyclists to continue through or left. Right Turn Only signs in both directions are missing Except Bicycles plates. A painted rectangle in the slot contains a Caltrans loop detector bicycle logo, showing where bicyclists can actuate the signal. Signs that at one time instructed bicyclists where to stop are also missing from both directions.

In a few minutes of observation, I saw four bicyclists traveling southbound at this intersection. One grew tired of waiting and crossed the intersection on a red light. Two sped right past the painted rectangle and stopped at the far edge of the crosswalk. One stopped in the rectangle, but at the side, not over the detection area.

Of two bicyclists northbound, one arrived on a green light. The other swerved over to the left-side sidewalk, crossed in the crosswalk, traveled on the wrong side of Bryant, and then swerved back to the right side of the roadway past the channelization island.

It is clear that bicyclists do not understand how to negotiate this intersection. It may be worth adding some kind of indicator light to the channelization island that would provide visual feedback showing bicyclists that they have been detected and a green light will follow. The principle is the same one used by elevator pushbuttons that light when pressed, and by some pedestrian pushbuttons in Europe. Electrically this should not be difficult, because the detector has to send a signal to the controller in any case; it somewhat resembles the rat boxes invented in Cupertino for signal enforcement. I do not know of any commercially available product.

Indicator lights would also be very helpful at other signalized intersections in encouraging bicyclists to wait for the green light, assuring them that it will be displayed, educating them in how to actuate it, and positioning them properly in the intersection. Indicators would be especially useful at arterial crossings where the cycle length is long and cannot be shortened without affecting coordination on the arterial. A standard size, color, and location for the indicator light would have to be devised.

The timing at this intersection is 24 seconds green, 3 seconds yellow, and 1 or 2 seconds red clearance (this short interval is hard to measure). Considering that Embarcadero, although an arterial, is undivided and only four lanes wide, the green phase may be excessive.

Suggested Improvements

- Install "Except Bicycles" plates on Right Turn Only signs.
- Install signs instructing bicyclists where to stop.
- Consider an indicator light providing a visual indication that bicycles have been detected.
- Consider reducing length of green interval.

Carlson Court at Charleston Road

Although the Bryant Street bicycle boulevard ends in the south at Redwood Circle, the continuation bike route on Carlson Court crosses Charleston Road at another signal, which I also investigated. The sign marking the left turn from Bryant Street to Redwood Circle is poorly located, well off to the left; this is fine for bicyclists who know the route and are already looking left, but out of place for those looking ahead, who could easily miss it. A second sign should be added. The sign for the left turn from Redwood Circle to Carlson Court is somewhat hidden behind a tree.

Carlson southbound at Charleston has two diagonal loops side by side. Both are active, because right turns on red are prohibited from 7 a.m. to 6 p.m. Monday through Friday and detection is needed. The northbound direction has the same turn prohibition, but only one diagonal loop, toward the center of the intersection. It would be easy for bicyclists to miss, and I don't know how right-turning traffic calls the green. Timing appears to be 6 seconds green, 3 seconds yellow, and 1 second red clearance. The green interval may be slightly below the City's standard of 7 seconds.

Suggested Improvements

- Install additional directional sign on Bryant at Redwood Circle.
- Move directional sign on Redwood Circle at Carlson Court, or trim foliage obscuring it.
- Mark loops.
- Check signal timing, and increase green interval if necessary.

Appendix I
BICYCLE SUPPORT FACILITIES INVENTORY

BICYCLE SUPPORT FACILITIES

This section tabulates the bicycle "destination facilities" at workplaces, schools, transit stations, and major shopping areas throughout the city. We counted racks and lockers at major shopping areas, transit centers, and public schools. Because Palo Alto has had a very effective workplace bicycle facility ordinance in effect for 22 years, we did not survey individual workplaces.

How we counted bike racks

- Single and multiple inverted-U racks were counted as two spaces per "U" because a bike can be easily leaned against each side of the rack and locked to one of the two uprights. (At sidewalk sites with adequate clearance it is actually possible to support and lock four bikes on a single inverted-U, but this requires cooperation that is realistic only if all four cyclists arrive at once.)
- Rack types such as square-spirals, which function like inverted-U's, were counted as 2 bike spaces per "U".
- Wave ("ribbon") racks were counted as one bike space per upright.
- Racks with individual wheelholders (e.g. Lindcraft, PW "Loop Rack", Rack-III) were counted as one bike space per wheelholder.
- Racks with suspended "hangers" (e.g. Cora Expo) were counted as one bike per hanger if installed in a 1-sided site, and two bikes per hanger if installed in a 2-sided site.
- "Comb" (a.k.a. "dishrack", "ladder", "wheelbender") racks were counted as one bike per two lineal feet if installed in a 1-sided site, or one bike per lineal foot if installed in a 2-sided site.

Workplaces

Since 1978 the Palo Alto Zoning Code has required that worksites of 50 or more employees provide bicycle racks, bicycle storage lockers (or other secure storage such as a bike room), and employee showers. Quantities of each item are tied to the type of business and are scaled to number of employees or number of car parking spaces. These bicycle support facilities must be in place before a building receives its occupancy permit. Copies of the bicycle parking, storage, and shower ordinances appear in the Appendix.

Because we feel that the city's zoning ordinance achieves the desired outcome for a bicycle transportation plan and because the requirements have been in place for almost 25 years, we did not count these facilities at worksites. However, we note that a large fraction of Palo Alto's jobs are in office and R&D buildings subject to these zoning requirements, so workers throughout the city are likely to enjoy adequate to excellent bicycle destination facilities. The ordinance applies to almost every building in the following areas:

- Stanford Research Park (Page Mill Road, Hanover Street, California Avenue, Hansen Way, Hillview Avenue, Coyote Hill Road, Deer Creek Road, Arastradero Road, Foothill Expressway). This is by far the city's largest workplace concentration.
- Stanford Medical Center-area medical offices on Welch Road
- Fabian Way
- West Bayshore Road
- East Bayshore Road
- Geng Road
- Embarcadero Road east of US-101

Additional large workplaces covered by the ordinance include:

- Palo Alto Medical Foundation
- City Hall (secure commuter bike storage room located in parking garage)
- Stanford University Hospital and Packard Childrens Hospital.

Note: The city limit line passes through the Stanford Hospital complex such that the Stanford Medical School wing and several adjacent medical research buildings are on Stanford lands (unincorporated Santa Clara County) and thus not subject to Palo Alto requirements. However, the University's portion of the Stanford Medical Center has hundreds of bike rack spaces and one medical research building has a secure bike room.

Major Shopping Areas

Stanford Shopping Center

154 rack spaces (5 unusable due to siting). Mostly inverted-U, Rack-III, and "comb" types.

26 chain-link short-term bike lockers. 12 long-term bike lockers.

Downtown (University, Lytton, and Hamilton Avenues, plus Webster garage)

139 spaces. Majority are inverted-U, with some Lindcraft and Rack-III.

14 long-term bike lockers.

Does not count the many office buildings throughout downtown which provide their own bicycle facilities (see Workplaces above).

California Avenue

48 spaces, about 40% on one long "comb" rack near El Camino Real.

Transit Centers

University Avenue Caltrain Station and Transit Center

58 rack spaces. 48 long-term bike locker spaces. 2 short-term ("Bike Lid") locker spaces. 90 secure attended spaces in Palo Alto Bikestation.

California Avenue Caltrain Station

22 rack spaces. 70 long-term bike locker spaces.

Public Schools

Bike parking appears adequate at all public schools, though siting reduces capacity substantially at several. Many double-sided racks are either placed near walls and fences so only one side can be used, or racks are placed so close together that there is no aisle area.

We noted two features which would be valuable to implement at all schools:

- Simple but effective tin-roof rain shelters at two elementary schools
- Fenced "bike compounds" at both middle schools and one high school

Elementary Schools

School	Rack spaces	Notes
Addison	90	Only about 65 usable due to rack siting
Barron Park	80	40 in rain shelter; all 80 will be sheltered after all grade levels are filled.
Duveneck	100	Only about 70 usable due to rack siting
El Carmelo	65	
Escondido	112	
Fairmeadow	90	Only about 45 usable due to rack siting
Hoover	70	Only about 50 usable due to rack siting
Juana Briones	55	
Nixon	76	
Ohlone	190	170 spaces in rain shelter – GOOD!
Palo Verde	70	Only about 35 usable due to rack siting. 20 additional spaces currently unused.
Walter Hays	60	Only about 50 usable due to rack siting

Middle Schools

School	Rack spaces	Notes
Jane Lathrop Stanford ("JLS")	620	Two fenced compounds. Siting blocks many spaces.
Jordan	531	In two fenced compounds

High Schools

School	Rack spaces	Notes
Gunn	345	330 in fenced compound. About 1/2 unusable due to rack siting
Palo Alto High	469	

BICYCLE PARKING AND STORAGE INVENTORY

Key to Bicycle Parking and Storage Table Columns

Area Key	CAL	California Avenue district
	CC	Civic Center
	DTN	Downtown (University Avenue district)
	EBS	East Bayshore
	EMB	Embarcadero, Geng, Lucky's
	MID	Midtown / Middlefield Road
	S	Schools
	SMC	Stanford Medical Center and nearby medical offices
	SRP	Stanford Research Park
	SSC	Stanford Shopping Center
	VA	Veterans Administration Hospital and Miranda Avenue
	WBS	West Bayshore
Number	Street number	
Street	Street name	
Companies	Occupant at time of survey (April 2000)	
Building	Building within multi-building site	
Location	Location on site.	
	N, NE, E, SE, S, SW, W, NW = compass points.	
	C	C = curbside (used for business district sidewalks) G = parking
	G	garage
	I	I = in building
	L	L = parking lot
	R	R = roadway
	Y	Y = interior courtyard
Unit	A	Attended enclosure
	I	In-building enclosure
	O	Outside enclosure
	L	Locker
	R	Rack
Type or Mfr	Type or manufacturer of unit (best guess)	
	Comb = generic wheelbender, a.k.a. "dishrack", "ladder"	
	Bike Lokr = Bike Lokr OR Lokr Systems OR Bicycle Lockers Co.	
	XXX-N/1 = Mfr/Model XXX, N bike positions, 1-sided	
	XXX-N/2 = Mfr/Model XXX, N bike positions, 2-sided	
Unit sides	1 or 2-sided access provided by unit	
Site sides	1 or 2-sided access to unit (1-sided = against a wall, hedge, or edge)	
Rack bikes	Rack actual capacity	
Secure bikes	Locker, enclosure, or attended facility: actual capacity	
Usable	blank = all usable. 0-0.9 = less than all usable	
Rain cover	Y = racks protected from rain by roof or building above	

Bicycle Parking and Storage Inventory

Area Key	#	Street	Companies	Building or Area	Location	Unit	Type or Mfr	Unit sides	Site sides	Rack bikes	Secure bikes	Usable 0.0 to 1.0 (1.0 if blank)	Rain cover	Notes
CAL		California	Retail district (California, Cambridge, cross streets) Does not include workplaces with their own facilities	Many	C	R	Several Inverted-U, Lindcraft, PW Loop	*	*	38				
CAL		California	Retail district (California, Cambridge, cross streets) Does not include workplaces with their own facilities	Many	C	R	Comb-20	2	1	10		0.5		Parked bikes constrict sidewalk
CAL		California	Caltrain station	Marguerite stop	S	R	Comb-4	2	1	2				
CAL		California	Caltrain station	Undercrossing E end	E	R	Lindcraft-1/30	1	1	30				Must lift bike over rack to lock frame
CAL		California	Caltrain station	Undercrossing W end	N	L	Creative Pipe CS-2	2	2		28			
CAL		California	Caltrain station	Undercrossing W end	N	L	Bike Lokr	2	2		42			
CAL		California	Caltrain station	Undercrossing W end	N	R	Lindcraft-1/10	1	1	10				Must lift bike over rack to lock frame
CAL		California	Caltrain station	Undercrossing W end	N	R	Inverted U	1	1	14				
CC	777	Embarcadero	Rinconada Pool		S	R	Comb	2	1	10				
CC	777	Embarcadero	Rinconada Pool		S	R	Rack-III	2	1	4				
CC	777	Embarcadero	Rinconada Pool		W	R	Comb	2	1	10				
CC	1213	Newell	Palo Alto Main Library		S	R	Comb	2	1	10		0.5		
CC	1213	Newell	Palo Alto Main Library		S	R	Rack-III	2	1	8				
CC	1213	Newell	Palo Alto Main Library		E	R	Rack-III	2	1	3				
CC	1213	Newell	Palo Alto Main Library		N	R	Rack-III	2	1	4				
CC	1305	Middlefield	Lucie Stern Community Center		SE	R	Comb	2	1	15				
CC	1313	Newell	Palo Alto Art Center		N	R	PW Loop-1	1	1	15				
CC	1313	Newell	Palo Alto Art Center		N	R	Comb	2	1	10		0.5		
CC	1451	Middlefield	Palo Alto Junior Museum		N	R	Inverted U	2	2	6				
CC	1451	Middlefield	Palo Alto Junior Museum		N	R	PW Loop-1/4	1	1	4				
CC		Hopkins @ Newell	Tennis Courts		S	R	Comb	2	2	5				
DTN	250	Hamilton	Palo Alto City Hall		G	I	Bike room			18	25		Y	
DTN	250	Hamilton	Palo Alto City Hall		G	R	Lindcraft-1	1	1	8			Y	
DTN	250	Hamilton	Palo Alto City Hall		N	R	Inverted U	2	2	4				
DTN	380	Hamilton	Downtown Post Office		-	-				0				Add racks
DTN	450	Bryant	Avenidas (Senior Center)		-	-				0				Add racks

Bicycle Parking and Storage Inventory

Area Key	#	Street	Companies	Building or Area	Location	Unit	Type or Mfr	Unit sides	Site sides	Rack bikes	Secure bikes	Usable 0.0 to 1.0 (1.0 if blank)	Rain cover	Notes
DTN		Downtown	Retail district (University, Lytton, Hamilton, cross streets) Does not include workplaces with their own facilities	Many	C, G	R	Mostly Inverted-U, some Rack-III, Lindcraft	*	*	139				
DTN		Downtown	Retail district (University, Lytton, Hamilton, cross streets) Does not include workplaces with their own facilities	Many	*	R	various	*	*		14			
DTN	90	University	Caltrain station	Bikestation	I	A	Custom 2-level racks	*	*		90			
DTN	90	University	Caltrain station	East parking lot	L	L	Hannan, Bike Lokr	2	2	48				
DTN	90	University	Caltrain station	East parking lot	L	R	Multi-inverted-U	2	2	16				
DTN	90	University	Caltrain station	East platform		R	Multi-inverted-U	2	2	8				
DTN	90	University	Caltrain station	West platform	S	L	Bike Lid	1	1		2			
DTN	90	University	Caltrain station	West platform	S	R	Multi-inverted-U	2	2	24				
EBS	1010	Corporation Way			S	R	PW Loop-1/8	1	1	8				
EBS	1023	Corporation Way	Metagraphics		N	L	Hannan	2	2		2			
EBS	1023	Corporation Way	Metagraphics		E	R	Inverted U	2	2	2				
EBS	1029	Corporation Way	Southwall		N	L	Bike Lokr	2	2		4			
EBS	2191	East Bayshore	Whitelight		E	L	Cycle Safe	2	2		12			
EBS	2275	East Bayshore			NW	R	PW Loop-1/4	1	1	4				
EBS	2465	East Bayshore	(several)		N	R	PW Loop-1/8	1	1	8				
EBS	2479	East Bayshore	(several)		E	R	PW Loop-1/8	1	1	8				
EBS	3201	East Bayshore	Palo Alto Municipal Service Center		W	L	Cycle Safe	2	2		6			
EBS	3201	East Bayshore	Palo Alto Municipal Service Center		W	R	Comb-10	2	2	10				
EBS	3281	East Bayshore	Palo Alto Animal Services		W	R	Comb-4	2	1	2				
EBS	3281	East Bayshore	Palo Alto Animal Services		W	R	PW Loop-1/2	1	1	2				
EBS	3921	East Bayshore	Peninsula Conservation Center		E	R	Inverted U	2	2	8				
EMB	1755	Embarcadero Rd	Sterling Group		N	L	uperSecur stainles	2	2		18			
EMB	1860	Embarcadero Rd	(several)		L	R	Comb-10	2	1	10				
EMB	2080	Channing	Lucky		Y	R	Comb-6	2	1	6				
EMB	2080	Channing	Lucky		N	R	Comb-10	2	1	10				
EMB	2200	Geng	(several)		N	L	Cycle Safe	2	2		42			
EMB	2200	Geng	(several)		E	L	Cycle Safe	2	2		24			
EMB	2450	Embarcadero Way	(several)		W	R	Wave-4	2	2	4				

Bicycle Parking and Storage Inventory

Area Key	#	Street	Companies	Building or Area	Location	Unit	Type or Mfr	Unit sides	Site sides	Rack bikes	Secure bikes	Usable 0.0 to 1.0 (1.0 if blank)	Rain cover	Notes
MID	704	Colorado	Round Table Pizza		N	R	Lindcraft-1/10	1	1	0		0		Wheel holders pushed together
MID	2605	Middlefield	Co-Op Market		NW	R	PW Loop-1/7	1	1	7				
MID	2615	Middlefield	Baskin Robbins		R	R	Inverted U	2	2	2				
MID	2676	Middlefield	Peninsula Hardware		R	R	Inverted U	2	2	2				
MID	2700	Middlefield	Best Video		R	R	Inverted U	2	2	2				
MID	2701	Middlefield	Long's Drugs		W	L	(1-sided plastic)	1	1		2			
MID	2701	Middlefield	Long's Drugs		W	R	Inverted U	2	2	2				
MID	2740	Middlefield	Midtown Cleaners		SE	R	Comb-4	2	1	2		0.5		
MID	2741	Middlefield	1-hour Photo		W	R	Inverted U	2	2	2				
MID	2750	Middlefield	Harmony Bakery		R	R	Inverted U	2	2	2		0.5		
MID	2790	Middlefield	Delia's Cleaners		R	R	Inverted U	2	2	2				
MID	2811	Middlefield	Safeway		SW	R	Comb-10	2	1	6		0.5		
MID	2846	Middlefield	Washington Mutual		SE	R	Wave-4	2	1	2		0.5		
MID	3163	Middlefield	Century Store		W	R	Rack-III	1	1	0		0		Set back too far to admit a bike
MID	3200	Middlefield	Medical building		N	R	Comb-4 (WOOD)	1	1	0		0		Wood!
MID	3672	Middlefield	Palo Alto Little League Field		L	R	Comb-5	2	1	5				
MID	3700	Middlefield	Mitchell Park Library		S	R	Inverted U	2	2	6				
MID	3800	Middlefield	Mitchell Park Community Center		N	R	Inverted U	2	2	6				
MID	3800	Middlefield	Mitchell Park Community Center		S	R	Inverted U	2	2	4				
MID	3860	Middlefield	Achieve		L	R	Comb-5	2	1	5				
MID	3864	Middlefield	CAR - Community Association for Rehabilitation	Dropoff area	E	R	PW Loop-2/8	2	1	8		0.5		
MID	3864	Middlefield	CAR - Community Association for Rehabilitation	Swim Center	NW	R	PW Loop-2/4	2	1	4		0.5		
MID	3942	Middlefield	Charleston Shopping Center		W	R	Comb-10	2	1	10			Y	
MID	4151	Middlefield	(Office building next to Woolworth Garden Center)		E	L	Bike Lokr	2	2		2			
MID		Colorado	(at Middlefield)		R	R	Inverted U	2	2	2				
S	50	Embarcadero	Palo Alto High School	Bike rack area		R	Comb, PW Loop	2	2	469				
S	445	E Charleston	Hoover Elementary School		*	R	Comb	2	*	50		0.7		Several installed 1-sided
S	480	E Meadow	Jane Lathrop Stanford Middle School	Inner bike compound		R	Comb	2	2	100				Many not installed properly (spacing)
S	480	E Meadow	Jane Lathrop Stanford Middle School	Inner bike compound		R	PW Loop-2/15	2	2	180				Many not installed properly (spacing)

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S	480	E Meadow	Jane Lathrop Stanford Middle School	Inner bike compound		R	W Loop-2/15, Con	2	2					95 bikes worth, stacked / not in use
S	480	E Meadow	Jane Lathrop Stanford Middle School	West bike compound		R	Comb	2	2	280				
S	480	E Meadow	Jane Lathrop Stanford Middle School	West bike compound		R	PW Loop-2/15's	2	2	60				
S	500	East Meadow	Fairmeadow Elementary School		*	R	Comb	2	1	45		0.5		Installed 1-sided
S	650	Addison	Addison Elementary School		*	R	Comb	*	*	65		0.7		Some against walls, reducing capacity
S	705	Alester	Duveneck Elementary School		*	R	Comb	2	2	70		0.7		
S	750	N California	Jordan Middle School	East bike compound		R	Comb, PW Loop	*	*	275				
S	750	N California	Jordan Middle School	West bike compound		R	Comb, PW Loop	*	*	256				
S	780	Arastradero	Gunn High School	Elsewhere on site		R	PW Loop-2/15	2	2	15				
S	780	Arastradero	Gunn High School	Main bike compound		R	Various, 330 space	*	*	150		0.4		Less than 1/2 of spaces usable due to layout
S	800	Barron	Barron Park Elementary School		S	R	Comb	2	2	40				Will move to rain shelter after construction
S	800	Barron	Barron Park Elementary School		N	R	Comb	2	2	40			Y	
S	890	Escondido	Escondido Elementary School		E	R	Comb	2	2	63				
S	890	Escondido	Escondido Elementary School		W	R	Comb	2	2	49				
S	950	Amarillo	Ohlone Elementary School	Rain shelter	E	R	Lindcraft-like	1	1	170			Y	Nice shelter, though rack is obsolete
S	950	Amarillo	Ohlone Elementary School		NW	R	Comb	2	2	20				
S	1525	Middlefield	Walter Hays Elementary School			R	Comb	2	*	50		0.8		
S	1711	Stanford	Nixon Elementary School	Lower lot		R	PW Loop-2/42	2	2	42				Vulnerable to cars
S	1711	Stanford	Nixon Elementary School	Upper circle		R	PW Loop-2/34	2	1	17		0.5		
S	3024	Bryant	El Carmelo Elementary School		*	R	Comb	2	1	65				
S	3450	Louis	Palo Verde Elementary School			R	Comb	2	1	35		0.5		All installed 1-sided. 2 spare
S	4100	Orme	Juana Briones Elementary School			R	Comb	2	2	40				
S	4100	Orme	Juana Briones Elementary School			R	PW Loop-2/15	2	2	15				
SMC	211	Quarry	Hoover Pavillion		S	R	PW Loop-1	1	1	8				
SMC	211	Quarry	Hoover Pavillion		N	R	PW Loop-1	1	1	19				
SMC	211	Quarry	Hoover Pavillion Child Care Center		S	R	Lindcraft-1	1	1	11				
SMC	300	Pasteur	Stanford University Medical Center	C wing	N	L	Cycle Safe	2	2	8				
SMC	300	Pasteur	Stanford University Hospital	C wing	N	R	Multiple inverted-U	2	1	8				
SMC	300	Pasteur	Stanford University Hospital	C wing	N	R	PW Loop-1	1	1	8				
SMC	300	Pasteur	Stanford University Hospital	Credit Union steps	S	R	Multiple inverted-U	2	1	40				

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SMC	300	Pasteur	Stanford University Medical Center	Parking Structure 3	SW	L	Bike Lokr	1	1	8				
SMC	300	Pasteur	Stanford University Medical Center	Parking Structure 3	SE	L	Bike Lokr	2	2	10				
SMC	300	Pasteur	Stanford University Medical Center	Parking Structure 3	NE	L	Bike Lokr	2	2	10				
SMC	300	Pasteur	Stanford University Hospital		S	R	PW Loop-1	1	1	15				Backwards
SMC	401	Quarry	Psychiatry		W	R	Wave	2	1	20				
SMC	701	Welch			N	R	Comb, PW Loop-1	*	*	11				
SMC	701	Welch			N	R	Comb	2	1	7				
SMC	703	Welch			Y	R	Rack-III	2	2	2				+5 concrete pods
SMC	725	Welch	Lucille Salter Packard Childrens Hospital		N	L	Sunshine, 1-level	2	2	10				
SMC	725	Welch	Lucille Salter Packard Childrens Hospital		N	R	Rack-III	2	2	10				
SMC	725	Welch	Lucille Salter Packard Childrens Hospital		E	R	Rack-III	2	2	10				
SMC	730	Welch	UCSF Outpatient Services		E	R	PW Loop-1	1	1	8				
SMC	730	Welch	UCSF Outpatient Services		N	R	Concrete pods	-	-	0				
SMC	750	Welch			N	R	Comb	2	1	4				
SMC	750	Welch			E	R	Comb	2	2	10				
SMC	770	Welch			-	-		-	-	0				No racks
SMC	777	Welch								0				
SMC	780	Welch			S	R	PW Loop-1	1	1	6				
SMC	800	Welch	Stanford Medical School Blood Center		E	R	Comb	2	2	8				
SMC	800	Welch	Stanford Medical School Blood Center		W	R	Comb	2	2	5				
SMC	801	Welch	California Ear Center at Stanford		S	R	PW Loop-1	1	1	3				
SMC	851	Welch			N	R	PW Loop-1	1	1	7				
SMC	900	Blake Wilbur	Stanford University Medical Center	Outpatient Clinic	E	L	SuperSecur stainles	2	2	14				
SMC	900	Blake Wilbur	Stanford University Medical Center	Outpatient Clinic	E	R	Multiple inverted-U	2	1	8				
SMC	900	Blake Wilbur	Stanford University Medical Center	Outpatient Clinic	SW	R	Lindcraft-1	1	1	13				
SMC	900	Welch			E	R	Comb	2	2	8				
SMC	1000	Welch			E	R	Comb	2	2	5				
SMC	1100	Welch	Surgical Residence "Hotel"		Y	L	Wood, built in	-	-		50			50 estimated units
SMC	1100	Welch	Surgical Residence "Hotel"		S	R	Rally-2	2	1	8				By office
SMC	1101	Welch			L	R	Rack-III	1	2	8				
SMC	300	Pasteur	Stanford University Medical Center	Edwards	N	R	PW Loop-1	1	1	56				
SMC	300	Pasteur	Stanford University Medical Center	Edwards	N	R	Multiple inverted-U	2	1	8				
SMC		Pasteur	Center for Clinical Sciences Research (CCSR)		W	R	reative Pipe LR-X	2	2	128				
SMC		Pasteur	Center for Clinical Sciences Research (CCSR)		S	R	Creative Pipe LR-I	1	1	28				
SMC		Quarry	Falk Cardiovascular Center		E	R	Lindcraft-1	1	1	12				
SRP	600	Hansen	(several)		E	O	Rally-1's	1	1		16			

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Area Key	#	Street	Companies	Building or Area	Location	Unit	Type or Mfr	Unit sides	Site sides	Rack bikes	Secure bikes	Usable 0.0 to 1.0 (1.0 if blank)	Rain cover	Notes
SRP	601	California	Wilson-Sonsini		E	L	Hannan	1	1		6			
SRP	601	California	Wilson-Sonsini		W	L	Hannan	1	1		6			
SRP	601	California	Wilson-Sonsini		E	R	Wave-8	2	1	4		0.5		
SRP	601	Hansen	Communications and Power Industries (CPI)		Y	L	Bike Lokr	2	2		4			
SRP	620	Hansen	(several)		N	O	Rally-1's	1	1		16			
SRP	650	Page Mill	Wilson-Sonsini		W	L	Lokr Systems	1	1		12			Wedge-shaped (nice site!)
SRP	650	Page Mill	Wilson-Sonsini		E	L	Lokr Systems	1	1		22			1/8 circle wedge
SRP	650	Page Mill	Wilson-Sonsini		W	R	Bike Root	2	1	12				
SRP	650	Page Mill	Wilson-Sonsini		E	R	Bike Root	2	1	8				
SRP	725	Page Mill	Paine Webber		N	R	Inverted U	2	1	4				
SRP	755	Page Mill	Page Mill Square: YMCA, Morrison & Forster		S	R	Rally-1's	1	1	4				
SRP	777	California	Marcus & Milchap, Summerhill, Hamilton Financial, Pacific Property		G	L	Bike Lokr	2	2		8			
SRP	777	California	Marcus & Milchap, Summerhill, Hamilton Financial, Pacific Property		W	L	Bike Lokr	2	2		8			
SRP	850	Hansen	Mitsubishi, Flehr et.al		N	L	Bike Lokr	2	2		8			
SRP	855	California	RR Donnelley, Stanford Genome, Sentinel Biosciences		N	L	Cycle Safe	2	2		14			
SRP	855	California	RR Donnelley, Stanford Genome, Sentinel Biosciences		W	L	Cycle Safe	2	2		8			
SRP	855	California	RR Donnelley, Stanford Genome, Sentinel Biosciences		W	R	PW Loop-1/8	2	1	0		0		Blocked
SRP	901	California	DNAX		E	O	(3) Comb-10's	1	1	30				3 10-bike shelters w/ roll-up doors
SRP	911	Hansen	Varian		W	L	Bike Lokr	2	2		36			
SRP	911	Hansen	Varian		E	L	Plastic wedge	1	1		12			
SRP	911	Hansen	Varian		E	R	Comb-4	2	2	4				
SRP	925	Page Mill	Genencor		S	L	Sunshine, 2-level	2	2		48			
SRP	925	Page Mill	Genencor		E	R	Inverted U	2	2	10				
SRP	950	Page Mill	(remodeling)		W	L	Cycle Safe	2	2		24			Nice area!
SRP	975	California	(Vacant) Rudolph & Sletten		S	L	Hannan	2	2		36	0.9		Doors droop
SRP	975	California	(Vacant) Rudolph & Sletten		E	R	Comb-10	2	1	0		0		Blocked
SRP	1050	Arastradero	Yamanouchi / Shaklee		S	L	Hannan-plastic	2	2		10			
SRP	1050	Arastradero	Yamanouchi / Shaklee		W	L	Hannan-plastic	2	2		6			
SRP	1050	Arastradero	Yamanouchi / Shaklee		W	R	Inverted U	2	2	6				

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Area Key	#	Street	Companies	Building or Area	Location	Unit	Type or Mfr	Unit sides	Site sides	Rack bikes	Secure bikes	Usable 0.0 to 1.0 (1.0 if blank)	Rain cover	Notes
SRP	1050	Page Mill	Beckman/Coulter		E	L	Hannan	2	2		16			
SRP	1050	Page Mill	Beckman/Coulter		E	L	Bike Lokr	2	2		20			Doors droop
SRP	1117	California	Wilson-Sonsini		E	L	Hannan	2	2		16			
SRP	1117	California	Wilson-Sonsini		Y	R	Cora-4	2	1	6				
SRP	1450	Page Mill	Crescendo, Protogene (vacant?)		E	L	Stainless	2	2		10			
SRP	1450	Page Mill	Crescendo, Protogene (vacant?)		W	L	Stainless	2	2		12			
SRP	1450	Page Mill	Crescendo, Protogene (vacant?)		W	R	Comb-7	2	1	7				Wood frame! Not very secure
SRP	1451	California	Ernst & Young		E	R	(3) PW Loop-1/8's	1	1	12		0.5		Installed backwards
SRP	1500	Page Mill	Page Mill Center: Cunningham Commnications, Interval, SU Federal Credit Union, Daimler Chrysler, Lucille Packard Childrens Hospital satellite office		G	R	Rack-III	1	2	6			Y	Garage not secure
SRP	1501	California	Alza bldg PA-11, Incyte Genomics		G	-	(secure garage)	-	-	0	0		Y	(Bikes locked in garage would be secure)
SRP	1501	Page Mill	Hewlett-Packard	5	W	R	Rack-III	1	1	32				
SRP	1501	Page Mill	Hewlett-Packard	(unknown 1)	W	L	Cycle Safe	2	2		8			
SRP	1501	Page Mill	Hewlett-Packard	(unknown 1)	W	R	Rack-III	1	1	16				
SRP	1501	Page Mill	Hewlett-Packard	(unknown 2)	?	L	Cycle Safe	2	2		18			
SRP	1501	Page Mill	Hewlett-Packard	(unknown 2)	N	R	Rack-III	1	1	8				
SRP	1501	Page Mill	Hewlett-Packard		N	R	Lindcraft-12	1	1	12				Must lift bike over rack to lock frame
SRP	1501	Page Mill	Hewlett-Packard		N	R	Rack-III	1	1	12				
SRP	1601	California	Agilent		W	L	Bike Lokr	2	2		30	0		Doors have no locks or hasps!
SRP	1601	California	Agilent		S	L	Cycle Safe	2	2		18			
SRP	1601	California	Agilent		S	L	Bike Lokr	2	2		10			
SRP	1601	California	Agilent		N	R	Comb-8 (Graber)	2	1	8				
SRP	1601	California	Agilent		S	R	Comb-8 (Graber)	2	1	8				
SRP	1651	Page Mill	Systemix		N	L	Bike Lokr	1	1		11			
SRP	1651	Page Mill	Systemix		W	L	Bike Lokr	1	1		9			
SRP	1661	Page Mill	Andersen Consulting		SE	L	Bike Lokr	2	2		8			
SRP	1661	Page Mill	Andersen Consulting		W	R	(3) Inverted U	2	2	6				
SRP	1661	Page Mill	Andersen Consulting		N	R	(3) Inverted U	2	2	6				
SRP	1701	Page Mill	Wall Street Journal (printing plant)		I	I	ikes allowed insid	-	-					Spoke with front desk attendant
SRP	1801	Page Mill	Lockheed, Interval, Incyte		W	L	Bike Lokr	2	2		16			Hasps. 3 occupied

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SRP	1801	Page Mill	Lockheed, Interval, Incyte		S	L	Bike Lokr	2	2		16			Hasps. 4 occupied
SRP	1801	Page Mill	Lockheed, Interval, Incyte		E	L	Sunshine, 2-level	2	2		40			
SRP	1801	Page Mill	Lockheed, Interval, Incyte		L	R	PW Loop-1/8	2	2	14		0.7		2 positions damaged
SRP	1801	Page Mill	Lockheed, Interval, Incyte		E	R	Wave-10	2	1	6				
SRP	2400	Hanover	Credit Suisse		W	R	Inverted U	2	1	10				
SRP	2550	Hanover	Pillsbury Madison Sutro		W	L	(Plastic wedge)	2	2		16			"Cheese wedge" shape
SRP	2550	Hanover	Pillsbury Madison Sutro		N	R	Wave-10	2	1	6				
SRP	2550	Hanover	Pillsbury Madison Sutro		E	R	Wave-10	2	1	6				
SRP	2575	Hanover	Alza bldg D		E	L	uper Secur stainles	2	2		8			
SRP	2575	Hanover	Alza bldg D		S	R	Concrete pods	2	1	0		0		Unusable, so counted as 0
SRP	2625	Hanover	Alza, Xenoport		E	L	uper Secur stainles	2	2		8			
SRP	2625	Hanover	Alza, Xenoport		Y	L	Cycle Safe	2	2		10			Nicely integrated along walkways
SRP	2670	Hanover	UCSF Stanford Health Care		W	I	(bike in stairwell)	-						
SRP	2670	Hanover	UCSF Stanford Health Care		W	R	PW Loop-1/8, -1/9	1	1	17				Installed backwards
SRP	2670	Hanover	UCSF Stanford Health Care		W	R	PW Loop-1/8	1	1	8				Installed backwards
SRP	3000	Hanover	Hewlett-Packard	(unknown 1)	?	R	Rack-III	1	1	4				
SRP	3000	Hanover	Hewlett-Packard	20D	W	R	Rack-III	1	1	12				
SRP	3000	Hanover	Hewlett-Packard		L	R	Rack-III	1	1	6				
SRP	3000	Hanover	Hewlett-Packard											
SRP	3100	Hanover	Varian		N	L	Cycle Safe	2	2		2			
SRP	3100	Hanover	Varian		N	L	Bike Lokr	2	2		6			
SRP	3100	Hanover	Varian		Y	R	Rack-III	1	1	12				
SRP	3100	Hanover	Varian		N	R	PW Loop-1/8	1	1	8				
SRP	3100	Hanover	Varian		Y	R	(5) Concrete pods	1	1	0		0		
SRP	3130	Hanover	Varian		Y	R	Rack-III	1	1	4				
SRP	3135	Hanover	Varian		S	L	Bike Lokr	2	2		32			
SRP	3150	Porter	McCutcheon-Doyle		E	R	Wave-4	2	1	4				
SRP	3150	Porter	McCutcheon-Doyle		G	R	(unknown)	1	1	7			Y	Secure in garage. Could not see rack type.
SRP	3155	Porter	Systemix		E	R	Comb-10	2	1	10		0.5		
SRP	3165	Porter	Tibco		W	R	Wave-4	2	1	8				
SRP	3165	Porter	Tibco		E	R	Rack-III	1	1	22				
SRP	3170	Porter	Incyte		W	L	Bike Lokr	2	2		10			
SRP	3170	Porter	Incyte		W	L	Hannan	2	2		8			

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SRP	3170	Porter	Incyte		S	L	Hannan	2	2		28			
SRP	3170	Porter	Incyte		NE	R	'reative Pipe LR-P	1	2	4				
SRP	3170	Porter	Incyte		N	R	'reative Pipe LR-P	1	1	6				P6 with square tubing!
SRP	3175	Hanover	Cooley Godward		W	L	Plastic	2	2		12			
SRP	3175	Hanover	Cooley Godward		S	1	Plastic	2	2		18			
SRP	3175	Hanover	Cooley Godward		E	L	Plastic	2	2		4			
SRP	3176	Porter	?		S	L	Sunshine, 1-level	2	2		16			Day use (memo attached)
SRP	3176	Porter	?		S	R	Rally-2's (6)	2	1	6				
SRP	3180	Porter	Lucent		SW	L	Sunshine, 1-level	2	2		12			
SRP	3180	Porter	Lucent		SE	R	Inverted U	2	1	4				
SRP	3200	Hillview	Hewlett-Packard		W	L	Cycle Safe	2	2		6			
SRP	3210	Porter	Legato		N	L	Sunshine, 1-level	2	2		28			
SRP	3210	Porter	Legato		N	R	Inverted U	2	2	6				
SRP	3215	Hillview	Hewlett-Packard		N	L	Cycle Safe	2	2		8			
SRP	3215	Hillview	Hewlett-Packard		E	R	PW Loop-2/8	2	1	8		0.5		
SRP	3215	Hillview	Hewlett-Packard		NE	R	PW Loop-2/8	2	1	8		0.5		
SRP	3221	Porter	Reviews.com		N	R	U-4	2	1	8				
SRP	3240	Hillview	CNF		N	O	(transit shelter)	-	-		12		Y	4 bikes seen inside
SRP	3251	Hanover	Lockheed	(various)	W	L	Bike Lokr	2	2		10			
SRP	3251	Hanover	Lockheed	(various)	E	L	Bike Lokr	2	2		10			
SRP	3251	Hanover	Lockheed	(various)	NE	L	Bike Lokr	2	2		10			
SRP	3251	Hanover	Lockheed	(various)	S	L	Bike Lokr	2	2		10			
SRP	3251	Hanover	Lockheed	(various)	N	R	Wave-6	2	2	6				
SRP	3300	Hillview	Merrill Lynch		W	L	Hannan	2	2		12			
SRP	3300	Hillview	Merrill Lynch		E	R	Rally-2's (4)	2	1	8				
SRP	3333	Coyote Hill	Xerox		E	R	Rack-III	1	1	54			Y	Under rain roofs
SRP	3333	Hillview	Watkins-Johnson	3	?	R	Post-and-ear?	2	2	6				Information from guard, did not see racks
SRP	3333	Hillview	Watkins-Johnson	4	?	R	Post-and-ear?	2	2	8				
SRP	3333	Hillview	Watkins-Johnson	5	?	R	Post-and-ear?	2	2	8				
SRP	3333	Hillview	Watkins-Johnson	6	?	R	Post-and-ear?	2	2	16				
SRP	3340	Hillview	Gray Cary Ware Friedenrich		E	L	Bike Lokr	2	2		14			
SRP	3375	Porter	Tibco, Reuters, Simpson Thatcher Barltett		S	L	Sunshine, 1-level	2	2		8			
SRP	3375	Porter	Tibco, Reuters, Simpson Thatcher Barltett		E	L	Sunshine, 1-level	2	2		28			
SRP	3375	Porter	Tibco, Reuters, Simpson Thatcher Barltett		N	R	Inverted U	2	2	6				

Bicycle Parking and Storage Inventory

Area Key	#	Street	Companies	Building or Area	Location	Unit	Type or Mfr	Unit sides	Site sides	Rack bikes	Secure bikes	Usable 0.0 to 1.0 (1.0 if blank)	Rain cover	Notes
SRP	3375	Porter	Tibco, Reuters, Simpson Thatcher Barltett		E	R	Inverted U	2	1	6				
SRP	3400	Hillview	Syva	1	N	L	Bike Lokr	1	1		24			
SRP	3400	Hillview	Syva	2	E	L	T-M (rollup door)	1	1		28			
SRP	3400	Hillview	Xerox, ArtX		S	L	Bike Lokr	2	2		30			
SRP	3400	Hillview	Xerox, ArtX		N	L	Bike Lokr	2	2		36			
SRP	3400	Hillview	Xerox, ArtX		E	R	Inverted U	2	1	20				
SRP	3401	Hillview	Roche	(unknown 1)	SW	R	Comb	2	1	10				
SRP	3401	Hillview	Roche	(unknown 2)	E	R	PW Loop-1/8	1	1	8				Installed backwards
SRP	3401	Hillview	Roche	(unknown 2)	E	R	PW Loop-1/8	1	1	8				Installed backwards
SRP	3401	Hillview	Roche	(unknown 2)	E	R	Comb-3	2	1	3				
SRP	3401	Hillview	Roche	Admin 5	S	L	(Plastic wedge)	2	2		30			
SRP	3401	Hillview	Roche	Corp Admin	N	R	Comb	2	1	4				
SRP	3401	Hillview	Roche	Gallery Conf Ctr	S	R	(2) Concrete pods	1	1	0		0		
SRP	3401	Hillview	Roche	Gallery Conf Ctr	S	R	PW Loop-1/8	1	1	8				Blocked by (movable) table
SRP	3401	Hillview	Roche	R2	W	R	Rally-1	1	1	3			Y	Building above
SRP	3401	Hillview	Roche	R2	W	R	Rally-2	1	1	20			Y	Building above
SRP	3406	Hillview	dpiX		N	R	Rack-III	1	1	8				
SRP	3408	Hillview	Corsair		N	R	Lindcraft-16/2	2	1	8		0.5		Must lift bike over rack to lock frame
SRP	3410	Hillview	(vacant)		S	R	Rack-III	1	2	8				
SRP	3412	Hillview	Electric Power Research Institute (EPRI)		N	R	Lindcraft-16/1	1	1	14		0.8		Way out of the way - not useful
SRP	3412	Hillview	Electric Power Research Institute (EPRI)		S	R	Lindcraft-8/1	1	1	8				Must lift bike over rack to lock frame
SRP	3420	Hillview	Electric Power Research Institute (EPRI)		SW	R	(8) Rally-1's	1	1	8			Y	Building above
SRP	3420	Hillview	SAP		W	R	(9) Rally-1's	1	1	9			Y	Building above
SRP	3475	Deer Creek	SAP		E	L	Bike Lokr	1	1		8			1/8 circle wedge
SRP	3475	Deer Creek	SAP		N	L	Bike Lokr	1	1		8			1/8 circle wedge
SRP	3475	Deer Creek	SAP		N	R	PW Loop-1/8	1	1	8				
SRP	3495	Deer Creek	Agilent		S	L	Sunshine, 1-level	2	2		4			
SRP	3495	Deer Creek	Agilent		E	O	(9) Rally-1's	1	1		9			
SRP	3500	Deer Creek	Agilent		W	L	Sunshine, 1-level	2	2		6			
SRP	3500	Deer Creek	Agilent		S	L	Sunshine, 1-level	2	2		8			
SRP	3500	Deer Creek	Agilent		W	R	Rack-III	1	2	6				
SRP	3500	Deer Creek	Agilent		S	R	Rack-III	1	1	12				
SRP	3401a ?	Hillview	Nosh		E	L	T-M (rollup door)	1	1		16			

Bicycle Parking and Storage Inventory

Area Key	#	Street	Companies	Building or Area	Location	Unit	Type or Mfr	Unit sides	Site sides	Rack bikes	Secure bikes	Usable 0.0 to 1.0 (1.0 if blank)	Rain cover	Notes
SRP	3401p	Hillview	Oread		E	L	T-M (rollup door)	1	1		10			
SRP	3401p	Hillview	Oread		W	R	Wave-6	2	1	30				
SRP		Palo Alto Square	(several)	1	Y	R	PW Loop-1/8	1	1	8				
SRP		Palo Alto Square	(several)	4	Y	R	PW Loop-1/8	1	1	8				
SSC		Stanford Shopping Center	Stanford Shopping Center	Macy's main store	W	L	Chain link, canvas roof	1	1		26			
SSC		Stanford Shopping Center	Stanford Shopping Center	Several	Y	L	Crate & Barrell	2	2		12			
SSC		Stanford Shopping Center	Stanford Shopping Center	Several	*	R	Mostly Inverted-U, Rack-III, Comb	*	*	149		0.9		
T&C		El Camino Real	Palo Alto Town and Country Village (Shopping Center)	Garner's bike shop	SW	R	Comb	2	2	14				
T&C		El Camino Real	Palo Alto Town and Country Village (Shopping Center)		Ctr	R	Comb	2	2	4				
T&C		El Camino Real	Palo Alto Town and Country Village (Shopping Center)		Ctr	R	Comb	2	2	8				
VA	3801	Miranda	Palo Alto Veterans Administration Hospital	4	Y	L	Bike Lokr	2	2		40			
VA	3801	Miranda	Palo Alto Veterans Administration Hospital	5	Y	L	Bike Lokr	2	2		4			
VA	3801	Miranda	Palo Alto Veterans Administration Hospital	5	Y	R	PW Loop-1/8	1	2	8				
VA	3801	Miranda	Palo Alto Veterans Administration Hospital	6	W	L	Bike Lokr	2	2		16			
VA	3801	Miranda	Palo Alto Veterans Administration Hospital	6	W	R	PW Loop-1/8	1	1	8				
VA	3801	Miranda	Palo Alto Veterans Administration Hospital	51	W	R	PW Loop-1/7	1	1	7				
VA	3801	Miranda	Palo Alto Veterans Administration Hospital	100/101	S	R	PW Loop-1/8	1	1	16				
VA	3801	Miranda	Palo Alto Veterans Administration Hospital	100/101	S	R	Wave-8	2	1	8				
VA	3801	Miranda	Palo Alto Veterans Administration Hospital	100/101	S	R	Wave-6	2	1	6				
VA	4005	Miranda	Affymax		NE	L	Plastic	2	2		16			

Bicycle Parking and Storage Inventory

Area Key	#	Street	Companies	Building or Area	Location	Unit	Type or Mfr	Unit sides	Site sides	Rack bikes	Secure bikes	Usable 0.0 to 1.0 (1.0 if blank)	Rain cover	Notes
VA	4005	Miranda	Stanford Human Genome, NTT Data, 3i, Technofyn		N	R	Inverted U	2	2	12				
VA	4009	Miranda	(vacant)		N	L	Plastic	2	2		20			
WBS	851	San Antonio	Kentucky Fried Chicken / Pizza Hut		N	R	PW Loop-1/5	1	1	5				
WBS	851	San Antonio	Kentucky Fried Chicken / Pizza Hut		E	R	PW Loop-1/7	1	1	7				
WBS	925	East Meadow	Essex		NW	L	Cycle Safe	2	2		6			
WBS	960	San Antonio	Sun Microsystems	Palo Alto 1	S	L	uperSecur stainles	2	2		14			
WBS	960	San Antonio	Sun Microsystems	Palo Alto 1	E	L	uperSecur stainles	2	2		24			
WBS	960	San Antonio	Sun Microsystems	Palo Alto 1	W	R	Wave-4	2	1	4				
WBS	1020	East Meadow Circle	Clontech		E	L	Sunshine, 1-level	2	2		12			
WBS	1020	East Meadow Circle	Clontech		E	R	Wave-4	2	2	6				
WBS	1050	East Meadow Circle	Space Systems / Loral		S	R	Lindcraft-2(low)	1	1	0		0		Can't lock frame - don't count
WBS	1050	East Meadow Circle	Space Systems / Loral		S	R	Comb-6	2	1	0		0		Blocked
WBS	1059	East Meadow Circle	Omnicell		W	R	Wave-6	2	1	6				
WBS	1060	East Meadow Circle	Surromed		N	R	Wheelholder-8	2	1	0		0		Can't lock frame - don't count
WBS	3270	West Bayshore	(vacant)		W	L	Bike Lokr	2	2		12			
WBS	3270	West Bayshore	(vacant)		W	L	Bike Lokr	1	2	2				
WBS	3270	West Bayshore	(vacant)		SW	R	Rack-III	1	1	4				
WBS	3290	West Bayshore	Connetics / Respond		W	L	Bike Lokr	2	2		12			
WBS	3290	West Bayshore	Connetics / Respond		W	L	Bike Lokr	1	2		3			
WBS	3350	West Bayshore	Informatica		W	L	Cycle Safe	2	2		24			
WBS	3400	West Bayshore	Connetics		W	R	Comb-10	2	1	10				
WBS	3430	West Bayshore	Brio Technology		N	R	Inverted U	2	2	8				
WBS	3825	Fabian	Space Systems / Loral	2	W	R	Rack-III	1	1	4				
WBS	3850	Fabian	Space Systems / Loral		NE	L	Bike Lokr	2	2		40			
WBS	3850	Fabian	Space Systems / Loral		S	R	Comb-4's	2	2	6		0.4		Too close, not all usable
WBS	3900	Fabian	Space Systems / Loral		N	R	Wave-8	2	1	8				
WBS	3900	Fabian	Space Systems / Loral		S	R	Wave-6	2	1	6				
WBS	10??	East Meadow Circle	Space Systems / Loral	29	N	R	Inverted U	2	1	4				

Appendix J
BICYCLE EDUCATION

ABOUT BICYCLE EDUCATION

The California Vehicle Code gives bicycle operators the same rights and duties as motor vehicle operators; in California as in all states, bicyclists are drivers. *Riding* a bicycle, something most people can learn by themselves, involves knowing bicycle handling characteristics and one's own capabilities. *Driving* a bicycle competently on streets requires, in addition, knowing how all traffic operates and how to become part of the traffic stream based on your speed and destination. Unlike balancing and braking, these skills do not come automatically - they must be taught. The payoff is potentially large: many cycling educators believe that because safe and legal bicycle driving follows the same "rules of the road" as motor vehicle driving, teaching children how to drive bicycles will make them better motor vehicle drivers when they are older.

Unfortunately, too many bicyclists in the United States lack the basic skills or knowledge to safely drive a bicycle in traffic. Many people are simply afraid of bicycling on streets because they do not grasp that the underlying principles are the same as for driving a car, except that bicycles are thinner and generally slower.

Bicycle education programs are designed to improve cyclists' ability to operate with traffic. The challenges of helping people develop this skill and knowledge stems from the wide range of age groups that require this training and the need to tailor programs to each one. Other cycling-related education and promotion is designed to raise awareness among motorists, parents and child care providers, law enforcement personnel, and the community at large. More details on the many types of target audiences are described on page J-5.

DELIVERY FORMATS

We classify bicycle safety education programs as *informational*, such as posters, brochures, videos, and classroom presentations, or *hands-on*, such as off-street practice and escorted on-street training rides. Informational programs are intended to develop awareness and provide knowledge. Hands-on programs are designed to change behavior and/or develop skills. *Comprehensive* programs employ both presentation and practice. Finally, there are *Promotion* programs which are intended more for encouragement than education.

Informational Programs

Classroom Presentations - Although they must practice on a bicycle before becoming competent, children can learn the basic rules of the road in a classroom or assembly environment. In many cities this is the only "cycling education" offered, if any. Because school years are almost entirely pre-allocated and because few districts have in-house personnel trained as bicycle driving educators, a one-hour presentation once every year or two is all that many children receive. In Alameda County we found that these presentations are often delivered by

police officers, some of who are Police Cyclists (patrol officers trained in bicycle driving and law enforcement techniques).

Some "bike safety" presentations teach only helmet use, which is insufficient (helmets mitigate crashes, sound bicycle driver education prevents them.)

Youth "Diversion" Programs - City police departments often offer remedial classes for youths stopped for illegal cycling (typically wrong-way or stop sign/signal violations). These are often taught on a Saturday by police personnel, sometimes by a bicycle-mounted patrol officer.

Warning Stops - Police officers may stop cyclists who are behaving improperly or whose bicycle lacks required equipment such as lights. If an officer is properly prepared, these stops are opportunities for behavior-targeted education. Violation-specific handouts, ideally available in each language spoken in a jurisdiction, can help to reinforce each message. Bike shops sometimes work with law enforcement to add coupons to these handouts, good for discounts on helmets, lights, locks, and accessories.

"Good Driving" Stops and Rewards - Some police departments make "good bicycle driving" stops of youths, rewarding proper bicycle driver behavior with coupons for attractions and restaurants. Such programs are usually preannounced to the community and coupled with other educational outreach and promotion.

Videos - Hundreds of general-audience bicycling videos are available but most feature races, athletic training, off-road biking, or bicycle maintenance. Some, often produced by alternative-transportation programs, combine bicycle commuting information with a bit of education. Only a few bike videos teach bicycle driving, and not all do so competently.

Bike Maps - A bicycle route map is one of the items most frequently requested by commuter and recreational cyclists. The purpose of a bike map is to show cyclists routes they would otherwise have to discover by trial and error or by driving, with information as to facility type (e.g. bike lane, route, or path) and traffic level. Many city and county bicycle route maps include detailed bicycle driver information, typically on the back.

Several Alameda County cities publish bike route maps. The East Bay Bicycle Coalition publishes two maps, "West of the Hills" and "East of the Hills," which together cover the county. Krebs Cycle Touring, based in Santa Cruz, offers touring and trail maps which cover the entire county.

The Bay Trail Project produces nine printed maps showing the Bay Trail route. The maps are available for purchase from ABAG (510-464-7900) and on the Bay Trail website (http://baytrail.abag.ca.gov). The Bay Trail website also provides the maps for viewing and printing as well as a virtual tour of completed Bay Trail segments with photographs and text.

The San Francisco Bay Shoreline Guide produced by the State Coastal Conservancy provides a comprehensive guide to the entire San Francisco Bay shoreline. It includes Bay Trail route maps, information about recreational opportunities along the Bay, Bay Area history, and environmental education.

Some cities have gone beyond the traditional folding paper map. San Francisco and San Jose have both published their maps in the Pacific Bell telephone book. Sunnyvale and Santa Clara County's maps are available on the Internet. Cities such as Cupertino have defrayed the publishing costs of their bike maps by having them published by their Chamber of Commerce, which incorporates advertising for local businesses.

Hands-on Programs

Physical Education and After-school Events - The class-time-availability obstacle can be avoided if cycling is made part of the curriculum - often as part of physical education or sports. Programs offered this way often depend on the initiative of a particular teacher who is also a cyclist; this is the case in Berkeley. Children leaving campus for instructional purposes during school hours are typically required to be under the supervision of a certified teacher, which limits the use of volunteer cycling instructors. Liability concerns in some districts may prohibit off-campus travel even for instructional purposes.

Bike Rodeos - A bicycle rodeo is an outdoor, on-bike event, which may be offered during school or on a weekend day. Rodeos are usually set up in a parking lot and typically include helmet fitting, equipment safety checks, and several on-bike "skill stations" such as slaloms, spiral courses, and "slowest finisher wins" races. Most of these on-bike activities test handling skills but not driving skills; if any driving material is included it may be as a short video.

"Roadshow" Setups - Some school districts, counties, and states bring fully equipped youth cycling setups to their schools and cities. Trained instructors arrive with a trailer stocked with helmets and fully-maintained children's bicycles, which means that parents need not have purchased these items nor ensured that their child's bike is in working order. Such setups can of course be used as the basis for off-street-only or on-street education. One example is Hawaii "OBEEP" (Oahu Bicycle Education and Encouragement Program), which also has an excellent 10-minute promotional video for parents.

Off-school Class Rides - During the 1980's a Palo Alto middle school offered a multi-week 10-15 hour class which included supervised practice rides on neighborhood streets in the school's vicinity. Diana Lewiston, an Effective Cycling instructor.

Bike Club Rides and Classes - Most recreational bicycle clubs have scheduled rides. Adult and teen cyclists can gain on-street experience in a group setting on these rides, though there is no guarantee that the ride leader or participants understand the principles of safe and legal bicycle driving. Several ride leaders of local clubs have, however, taken Effective Cycling or other classes.

Some recreational bicycle clubs also offer touring-cyclist training classes. One is the Almaden Cycle Touring Club (ACTC), based in San Jose. ACTC Academy is a multi-week series that brings novice recreational cyclists up to touring-ready. ACTC coordinator Esther Snively has taken Effective Cycling.

Youth "Earn A Bike" and bike repair programs - Many organizations around the country have created programs which offer disadvantaged youths the opportunity to "earn a bike" by learning repair skills and using them to fix up donated or abandoned bicycles. These programs help give

kids an alternative to gang activity and petty crime, and an opportunity to learn useful work skills. They do not typically include bicycle driver education instruction, but are a potential channel for it. Related options include after-school and drop-in bike repair clinics. The Youth Bicycle Education Network (YBEN) is a national resource group for such operations. Examples of "Earn-a-Bike" programs in Alameda County include Oakland-based Cycles Of Change, and the Oakland Parks Department program managed by Jose Ortiz.

"Trips for Kids" Programs - Organized rides for children, usually of middle school age or above, can provide a teaching opportunity. Marin County-based Trips For Kids conducts such rides for inner-city youth.

Police Cyclist Training - Bicycle-mounted patrol forces now number in the hundreds across the country; Alameda, Albany, Berkeley, Dublin, Livermore, Palo Alto, and San Jose are but a few local cities which have them. Police Cyclist training is offered by two organizations; one is IPMBA, the International Police Mountain Bike Association. Such training may encompass an entire week, and is equivalent to an Effective Cycling course combined with high-performance maneuvering and police techniques such as pursuit, rapid dismounting, situation control, and disarming of offenders. Sergeant Joe Martin of the Hayward Police Department is a police cycling instructor and offers an informational video addressing police and legal issues for cities considering bicycle-mounted patrols.

Safe Moves "Safety Town" - Safe Moves, a company based in southern California with client cities throughout the state, takes the rodeo concept further with their "Safety Town." This is an elaborate set of props, which simulate a street intersection complete with lanes, sidewalks, driveways, signs, signals, and movable "car" shapes. Young children are taught pedestrian skills such as driveway awareness and use of pedestrian signals. Older kids use the "street" and "intersection" to practice stopping, looking, yielding, starting, and proper position for their intended destination.

"Safe Moves" contracts with cities and schools to provide bicycle education and rodeos
Executive Director: Pat Hines
15500 Erwin Street, Unit 1121
Van Nuys, CA 91411
818 908-5341 or fax 818 908-5337
Bay Area Phone 408 374-8991

Promotions

Helmet Giveaways - Many public health agencies and city police departments offer free or discounted helmets to children and parents, often at bicycle rodeos. Another strategy is to offer free helmets as an incentive to sit through a bicycle safety presentation. The City of Berkeley offers a monthly one-hour bike safety workshop for low-income families, and at the end the children receive a free fitted helmet.

National Bike Month / Bike To Work [School] Day - The month of May is National Bike Month, during which Americans are encouraged to ride a bike at least once. The third week is typically when cities and other jurisdictions hold Bike To Work Day promotions, often on Tuesday. In recent years this promotion has been expanded to Bike To School Day as well.

California's statewide Bike To Work Day promotion is coordinated by the California Bicycle Coalition (CBC), based in Sacramento (www.calbike.org). Bay Area Bike To Work Week events are coordinated by RIDES For Bay Area Commuters (RIDES, Inc.), based in Oakland (www.rides.org).

Walk Our Children To School Day - The growing movement to restore and improve pedestrian safety and "walkability" in neighborhoods and cities has spawned a worldwide event devoted to encouraging parents to walk with their children to school. International Walk To School Day will occur on October 4th this year. This is another opportunity to promote cycling to school, and October is just after the start of the school year, unlike May's Bike To School Day.

Street Fairs with Attended Bike Parking - Several bicycle transportation advocacy groups in the Bay Area work with event promoters to offer free guarded bicycle parking at street fairs and athletic events. These groups usually offer informational pamphlets about bicycle driving and safety at their tables.

"Charity" Rides - Many charity campaigns have organized walking and cycling events to raise funds through mileage-based pledges. These events are so far untapped as opportunities for street cycling education, but could provide an opportunity if pamphlets or other materials were supplied to the organizers.

TARGET AUDIENCES

Target audiences are divided into cyclists and non-cyclists, and subdivide cyclists by age level because of the diverse readiness levels involved.

Audiences: Cyclists

Children begin to bicycle by learning *handling skills*: balancing, steering, braking, turning, safe starting and stopping. Many kids quickly become competent bicycle *riders*, but until about third grade (age 9 or 10) they are not ready to become independent bicycle *drivers* on the street; they lack the attention span, peripheral vision, and understanding of consequences required to operate in traffic. They can, however, learn essential "pre-driving" skills such as checking over each shoulder while steering straight. They can also experience cycling on the street with parents in well-controlled situations.

By third grade most children are ready to learn to bicycle on two-lane residential streets on preselected routes to and from school. They should be taught the basic rules of the road in conjunction with hands-on (on-bike) instruction. By the end of fifth grade they are typically ready to learn the skills required for longer trips to middle school, involving distances up to two miles, four lane streets with moderate traffic, and busier intersections. The middle school transition provides a "teachable moment" for this knowledge. By seventh grade, most children can be taught to safely handle most streets and traffic flows.

Programs directed at children are best handled by schools or day care centers, but are often compromised by the time constraints of school curriculum and the unfamiliarity of instructors with sound bicycle driving principles. "Citation alternative" classes provide an "after the fact" way to reach youths who are using bicycles but not following the rules of the road.

Adult cyclists benefit most from a program designed to impart the responsibilities of bicycle operation, demonstrate how to safely share the road with motor vehicle traffic, and provide tips on the benefits and methods of bicycle commuting. However, programs aimed at adults typically only reach those that are interested in learning about bicycling. Motorist-oriented programs generally reach their intended audience at specific points, i.e. during driver's training courses, driver's licensing exams and traffic school courses for violators.

Audience	Relevant Bicycling Knowledge and Skills
Child cyclists, Grades K-2	Pedestrian skills: stopping, looking, crossing, waiting, alertness Helmet use and promotion (all ages) Basic bicycle control and handling (mounting, dismounting, balancing, starting, stopping, turning, braking) "Pre-driving" skills: Shoulder checks, driveway "rideout" hazard, eye contact
Child cyclists, Grades 3-5	*Opportunity: Start of 3rd grade, when most children can be taught to safely bike to elementary school along quiet neighborhood streets.* Rules of the Road: Riding on the right, yielding, stop signs and signals, shoulder checks, lateral position changes, safe turns at intersections. Conspicuity, hand signals. School commutes on prearranged routes
Child cyclists, Grades 6-8	*Opportunity: Summer transition between 5th and 6th grade, when most children are ready to learn the additional skills for commuting to middle school on routes that involve somewhat busier streets.* Intermediate Rules of the Road: Positioning at intersections by destination, where to ride on busier streets. Emergency braking and obstacle avoidance. Compliance with Vehicle Code regulations
Child cyclists, High school	Compliance with Vehicle Code regulations including equipment Encouragement of bicycle use as a practical transport mode for work and errand-running trips
Adult cyclists	Compliance with Vehicle Code regulations including equipment Knowledge of real and perceived safety hazards and how to reduce risk Human performance and practical and enjoyable cycling Where and how to ride on various types of streets and lane widths. Local route and bike/transit options

Audiences: Others

Audience	Relevant Bicycling Knowledge and Skills, or Messages
Parents and child-care providers	Helmet fitting and adjustment Basic bicycle fit and safety check Knowledge of common child cyclist errors, on and off streets Knowledge of children's' limitations in perception, attention, and ability to understand situations
Motorists	Recognition of cyclists' right to use the road as drivers Understanding, anticipation and avoidance of common cyclist mistakes Understanding and avoidance of common motorist mistakes
Law Enforcement personnel	Recognition of cyclists' right to use the road as drivers Knowledge of Vehicle Code sections regarding cyclists, including often-misinterpreted provisions such as "as far to the right as practicable", legality of occupying a traffic lane, and vehicular left turns Knowledge of common motorist errors and violations which obstruct and

	endanger cyclists, especially right-of-way violations Knowledge of non-moving-violation issues related to cyclist safety, such as improper car parking, and obstruction of bike lanes
Community	Promotion of cycling as healthy and clean transportation. Acknowledgement of cycling as a first-class transportation mode, and of cyclists as bona-fide users of the public streets.

BICYCLE EDUCATION VIDEOS

Effective Cycling (TRT 45 minutes, for adults and older teens)

This is the Effective Cycling Road I class video, a.k.a. "The Effective Cycling Movie." The running time of 45 minutes is divided into short segments suitable for a multi-session class or self-instruction program. These include getting ready to ride; basic handling and emergency maneuvers; the five traffic principles; bike lanes and bike paths; night riding; riding in the rain; hills, and group riding.

Getting There By Bike (TRT 20 minutes, for adults and older-teens)
Pedal Smarts (TRT 15 minutes, for middle-school age)
The Bicycle Zone (TRT 12 minutes, for elementary age)

Jeanne LePage, a professional videographer who was formerly the bicycle coordinator at the University of California, Santa Cruz, created these three videos. The videos each present bicycle driving principles and helmet use, with running times and themes tailored for their respective age groups. All three are notable for their multicultural casts and a "What if Cars Didn't Follow Any Rules" cartoon segment. "Getting There" features actors of diverse ages including an older woman motorist character who offers both cyclist and motorist perspectives.

Trucks and Bicycles: Sharing The Road (TRT 20 minutes, for adults, older teens, and professional drivers)

The American Trucking Association (ATA) created this excellent (but unfortunately out-of-print) video. Its narrator and main actor is a real-life bicycle racer and professional truck driver. The running time is split evenly into cyclist and trucker viewpoints; both segments offer technically sound driving, handling and passing tips.

EFFECTIVE CYCLING

John Forester's original Effective Cycling class covered all aspects of cycling from bicycle driving skills to handling, maintenance, nutrition and physiology. Knowledge of its bicycle driving material was tested on a multiple-choice written test, a parking-lot maneuvering test, and an on-street road examination. Because of its encyclopedic scope, a full EC class was a 33-hour multi-week production which understandably attracted only the most dedicated instructors and students due to the time commitment. EC in this format probably reached several thousand

cyclists; several hundred individuals took the time to not only pass the course but to become Effective Cycling Instructors (ECIs), certified by earlier ECIs back to ECI #1, Forester himself.

John Forester also developed and taught youth cycling classes; here is a fairly recent email posting of his on this topic:

Date: Wed, 18 Aug. 1999 20:45:17 –0700
From: John Forester forester@johnforester.com
Subject: Cycling training for children

Twenty years ago I worked out the sequence and method for teaching children their first lessons in traffic operation, as if they had no knowledge at the start. The method worked out taught children of grades 3, 5 and 7 to cycle appropriately on roads and in traffic appropriate for their ages. Grade 3 children qualified for 2-lane residential roads, grade 5 children qualified for 4-lane roads with medium-speed traffic, while grade 7 children qualified for almost any reasonable road and traffic condition. The proof was, in each case, passing the normal EC test on roads of the specified character. My class average scores were about 95%, on a test with 70% minimum passing, and on which the local populations of adult cyclists riding to work scored flunking scores of 55% to 60%. There's no mystery to this. See my web site http://www.johnforester.com and go to education.

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7585 Church St., Lemon Grove CA 91945-2306
619-644-5481 forester@johnforester.com

In the mid-1990s the League's Education Committee modularized Effective Cycling to attract more students and instructors, while endeavoring to preserve the essential bicycle driving material. A national-level instructor certification team was created to "train the trainers" at regional seminars, and several hundred more ECIs have been certified in the ensuing years (the author of this chapter is one). There are several active ECIs in Alameda County and the greater Bay Area; EC information and an instructor directory are available on the League's website: http://www.bikeleague.org (follow links to Education).

The new EC's core 10-hour "Road I" module teaches adults and older teens how to drive a bicycle safely and confidently on the public streets, and is typically offered in a two-day weekend or two-weeknight-plus-Saturday format. It includes five or more hours of off- and on-street practice, plus written, handling, and on-street examinations like the original course. Other EC modules include Road II and Road III, Commuting, Kids I (a short parent-orientation class), Kids II (elementary age, 7-10 hours), Kids III (middle school), and EC Motorist Education.

(In a dispute with LAB over content, John Forester recently revoked that organization's rights to use his trademarked program name. The League will continue its curriculum under a new name to be announced relatively soon; Forester plans to return Effective Cycling to its roots as a comprehensive seminar.)

CURRICULUM AND PROGRAMS TO BUY

The Basics Of Bicycling - The Bicycle Federation of America (BFA) created a curriculum called "The Basics of Bicycling," which includes in-class and on-bike/off-street practice. Many school districts base their efforts on this material, which includes a comprehensive instructor guide and lesson plans. Information is available at http://www.bfa.org.

Effective Cycling™ - Effective Cycling™ ("EC") is a standardized bicycle driver education curriculum for adults and children. It was created in the 1970s by John Forester, a cyclist, bicycle racer, transportation engineer, and past president of the League of American Bicyclists (LAB), the U.S. national cycling advocacy organization.

The new EC's core 10-hour "Road I" module teaches adults and older teens how to drive a bicycle safely and confidently on the public streets, and is typically offered in a two-day weekend or two-weeknight-plus-Saturday format. It includes five or more hours of off- and on-street practice, plus written, handling, and on-street examinations like the original course. Other EC modules include Road II and Road III, Commuting, Kids I (a short parent-orientation class), Kids II (elementary age, 7-10 hours), Kids III (middle school), and EC Motorist Education.

School districts and recreation programs seeking some sort of certification for potential instructors of youth cycling classes might consider requiring successful completion of an EC Road I class, whatever its new name may be.

Can-Bike (Canada) - The Canadian national cycling organization offers its own bicycle driver education curriculum called Can-Bike ("Can" for "Canada"), roughly comparable to Effective Cycling.

CONTACTS

- **International Bicycle Fund**
  web site at www.ibike.org
- **Bicycle Federation of America**
  1506 21st Street, NW, Suite 200
  Washington DC, 20036-1008
  bfa@igc.org or bikefed@aol.com or
  www.bikefed.org
- **"Developing Successful Bicycle/Pedestrian Commuter Programs"**
  Florida Institute for Marketing
  Alternative Transportation, February 1998
  Florida State University, Tallahassee,
  Florida 323-06-3037
  (904) 644-2509 fax (904) 644-6231
  e-mail "pmaurer@postoffice.cob.fsu.edu
- **Association for Commuter Transportation**
  1518 K Street, NW, Suite 503
  Washington DC, 20005
- **League of American Bicyclists (LAB)**
  1612 K Street, NW, Suite 401
  Washington DC, 20006
  bikeleague@aol.com or www.bikeleague.org
- **Web Sites**
  www.nwlink.com/~mcw/nowbike/31ways.html
  www.self-propelled-city.com
  www.cycling.com provides links to most of the good bicycle-related sites
  www.bikelane.com
  www.cascade.org
  www.rides.org to get info on bike information in the Bay Area

Appendix K
PRIORITY RATING OF RECOMMENDED PROJECTS

Project Number	Project Name	Prioritization Criteria									Score	Priority
		Remedies Obstacles	Route to School	Accident History	Narrow Lanes	Gap Closure	Bicycle Traffic Volume	Access to Adjacent Jurisdictions	Serves Bicycle Commuters	Special Significance		
1	El Camino Real	L	L	H	H	L	M	H	H		17	High
2	Park Blvd / Wilkie Way	L	M	L	L	L	H	H	H		15	High
3	Alma Street	H	L	H	H	H	L	H	H		20	High
4	Bryant / Redwood Cir / Carlson / Duncan / Creekside / Nelson / MacKay / San Antonio	M	H	M	L	H	H	H	H	H	23	High
5	Cowper Street	L	L	L	M	L	M	L	M		11	Low
6	Middlefield Road	H	H	H	H	M	M	H	H		22	High
7	Ross Road	L	H	L	L	L	L	L	L		10	Low
8	Newell Road	L	M	L	M	M	M	M	L		13	Medium
9	Greer Road	L	H	L	L	L	L	L	L		10	Low
10	West Bayshore Road / Fabian Way	M	L	L	L	L	L	L	L		9	Low
11	East Bayshore Road Bike Lanes	M	L	L	L	L	L	L	L		9	Low
12	Everett / Palo Alto Ave	M	M	L	L	H	M	M	H		16	High
13	University Avenue	M	H	H	H	M	M	H	H		21	High
14	Homer Avenue	M	H	L	L	L	H	H	H		17	High
15	Addison Avenue/Channing Avenue / St Francis	L	H	L	M	L	M	L	H		14	Medium
16	Chaucer / Boyce / Melville	L	H	L	L	L	M	H	H		15	High
17	Churchill Avenue / Coleridge Avenue	L	H	L	L	L	M	L	M		12	Medium

NOTE: Project 52, the El Camino multiuse path and Project 62, Homer/Caltrain undercrossing, are funded projects

Appendix K
PRIORITY RATING OF RECOMMENDED PROJECTS

Project Number	Project Name	Prioritization Criteria									Score	Priority
		Remedies Obstacles	Route to School	Accident History	Narrow Lanes	Gap Closure	Bicycle Traffic Volume	Access to Adjacent Jurisdictions	Serves Bicycle Commuters	Special Significance		
18	Embarcadero Road	M	H	M	H	L	M	M	H		18	High
19	California Avenue	M	H	L	M	M	M	L	M		15	High
20	Oregon Expressway (County)	M	L	L	H	M	L	L	M		13	Medium
21	Colorado Avenue	L	M	M	M	M	M	L	M		14	Medium
22	Loma Verde Avenue	L	M	M	L	M	L	L	M		12	Medium
23	East Meadow Drive	L	M	L	L	M	H	L	H		14	Medium
24	Charleston Road. / Arastradero Road	M	H	M	H	H	H	M	H	H	24	High
25	San Antonio Road	M	L	L	H	L	L	M	H		14	Medium
26	Hansen Way/ Portage/ Ash/ Lambert Avenue	L	M	L	L	M	L	L	M		11	Low
27	Hanover Street / Porter Drive	M	M	M	L	H	M	L	H		16	High
28	Matadero / Margarita Avenues	M	H	L	M	M	M	L	H		16	High
29	Barron Avenue/ Laguna / La Donna	L	H	L	M	M	M	L	M		14	Medium
30	Los Robles Avenue	L	H	L	M	H	M	L	H		16	High
31	Maybell Avenue/ Donald / Georgia Avenue	M	H	L	M	M	M	L	H		16	High
32	Stanford Avenue	L	M	L	L	H	M	L	H		14	Medium
33	West Arastradero Road	L	M	L	M	M	M	H	M		15	High
34	Miranda Avenue	L	M	L	M	H	M	H	M		16	High
35	Old Page Mill Road	L	L	L	M	L	M	L	L		10	Low

NOTE: Project 52, the El Camino multiuse path and Project 62, Homer/Caltrain undercrossing, are funded projects

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Project Number	Project Name	Prioritization Criteria									Score	Priority
		Remedies Obstacles	Route to School	Accident History	Narrow Lanes	Gap Closure	Bicycle Traffic Volume	Access to Adjacent Jurisdictions	Serves Bicycle Commuters	Special Significance		
36	Deer Creek Road	L	L	L	M	M	M	L	H		13	Medium
50	Baylands Bike Path	L	L	L	L	M	H	L	L		11	Low
51	Bol Park Bike Path Spur	L	H	L	L	H	H	L	L		14	Medium
52	El Camino Multiuse Path	L	M	L	L	L	H	L	L		11	Low
53	Bay Trail Extension to East P.A.	L	L	L	L	H	M	H	M		14	Medium
54	Path extension from Faber Road	L	L	L	L	H	H	L	L		12	Medium
55	Geng Path	L	L	L	L	M	M	L	L		10	Low
56	Matadero Creek Bike Path	L	M	L	L	L	M	L	L		10	Low
57	Cubberley Pathway	L	H	L	L	L	M	L	M		12	Medium
58	Montrose Road Pathway	L	H	L	L	M	M	L	M		13	Medium
59	Miranda Road Extension Bike Path	L	M	L	L	H	L	H	H		15	High
60	California Avenue Caltrain Undercrossing	L	H	L	L	H	H	L	H		16	High
61	Everett Caltrain Undercrossing	M	M	L	L	H	H	H	H		18	High
62	Homer Avenue Caltrain Overcrossing	L	H	L	L	H	H	L	M	H	18	High
63	Miranda to Los Altos Bridge	L	M	L	L	H	L	H	M		14	Medium
64	Adobe Creek / 101 Undercrossing	L	L	L	L	H	M	M	H		14	Medium
65	Matadero Creek / 101 Undercrossing	L	L	L	L	H	M	L	M		12	Medium
66	Matadero Creek / Caltrain Overcrossing	H	M	L	L	H	H	L	M		16	High

NOTE: Project 52, the El Camino multiuse path and Project 62, Homer/Caltrain undercrossing, are funded projects

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PRIORITY RATING OF RECOMMENDED PROJECTS

Project Number	Project Name	Prioritization Criteria									Score	Priority
		Remedies Obstacles	Route to School	Accident History	Narrow Lanes	Gap Closure	Bicycle Traffic Volume	Access to Adjacent Jurisdictions	Serves Bicycle Commuters	Special Significance		
1	El Camino Real	L	L	H	H	L	M	H	H		17	High
2	Park Blvd / Wilkie Way	L	M	L	L	L	H	H	H		15	High
3	Alma Street	H	L	H	H	H	L	H	H		20	High
4	Bryant / Redwood Cir / Carlson / Duncan / Creekside / Nelson / MacKay / San Antonio	M	H	M	L	H	H	H	H	H	23	High
5	Cowper Street	L	L	L	M	L	M	L	M		11	Low
6	Middlefield Road	H	H	H	H	M	M	H	H		22	High
7	Ross Road	L	H	L	L	L	L	L	L		10	Low
8	Newell Road	L	M	L	M	M	M	M	L		13	Medium
9	Greer Road	L	H	L	L	L	L	L	L		10	Low
10	West Bayshore Road / Fabian Way	M	L	L	L	L	L	L	L		9	Low
11	East Bayshore Road Bike Lanes	M	L	L	L	L	L	L	L		9	Low
12	Everett / Palo Alto Ave	M	M	L	L	H	M	M	H		16	High
13	University Avenue	M	H	H	H	M	M	H	H		21	High
14	Homer Avenue	M	H	L	L	L	H	H	H		17	High
15	Addison Avenue/Channing Avenue / St Francis	L	H	L	M	L	M	L	H		14	Medium
16	Chaucer / Boyce / Melville	L	H	L	L	L	M	H	H		15	High
17	Churchill Avenue / Coleridge Avenue	L	H	L	L	L	M	L	M		12	Medium

NOTE: Project 52, the El Camino multiuse path and Project 62, Homer/Caltrain undercrossing, are funded projects

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19	California Avenue	M	H	L	M	M	M	L	M		15	High
20	Oregon Expressway (County)	M	L	L	H	M	L	L	M		13	Medium
21	Colorado Avenue	L	M	M	M	M	M	L	M		14	Medium
22	Loma Verde Avenue	L	M	M	L	M	L	L	M		12	Medium
23	East Meadow Drive	L	M	L	L	M	H	L	H		14	Medium
24	Charleston Road. / Arastradero Road	M	H	M	H	H	H	M	H	H	24	High
25	San Antonio Road	M	L	L	H	L	L	M	H		14	Medium
26	Hansen Way/ Portage/ Ash/ Lambert Avenue	L	M	L	L	M	L	L	M		11	Low
27	Hanover Street / Porter Drive	M	M	M	L	H	M	L	H		16	High
28	Matadero / Margarita Avenues	M	H	L	M	M	M	L	H		16	High
29	Barron Avenue/ Laguna / La Donna	L	H	L	M	M	M	L	M		14	Medium
30	Los Robles Avenue	L	H	L	M	H	M	L	H		16	High
31	Maybell Avenue/ Donald / Georgia Avenue	M	H	L	M	M	M	L	H		16	High
32	Stanford Avenue	L	M	L	L	H	M	L	H		14	Medium
33	West Arastradero Road	L	M	L	M	M	M	H	M		15	High
34	Miranda Avenue	L	M	L	M	H	M	H	M		16	High
35	Old Page Mill Road	L	L	L	M	L	M	L	L		10	Low

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PRIORITY RATING OF RECOMMENDED PROJECTS

Project Number	Project Name	Prioritization Criteria									Score	Priority
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50	Baylands Bike Path	L	L	L	L	M	H	L	L		11	Low
51	Bol Park Bike Path Spur	L	H	L	L	H	H	L	L		14	Medium
52	El Camino Multiuse Path	L	M	L	L	L	H	L	L		11	Low
53	Bay Trail Extension to East P.A.	L	L	L	L	H	M	H	M		14	Medium
54	Path extension from Faber Road	L	L	L	L	H	H	L	L		12	Medium
55	Geng Path	L	L	L	L	M	M	L	L		10	Low
56	Matadero Creek Bike Path	L	M	L	L	L	M	L	L		10	Low
57	Cubberley Pathway	L	H	L	L	L	M	L	M		12	Medium
58	Montrose Road Pathway	L	H	L	L	M	M	L	M		13	Medium
59	Miranda Road Extension Bike Path	L	M	L	L	H	L	H	H		15	High
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62	Homer Avenue Caltrain Overcrossing	L	H	L	L	H	H	L	M	H	18	High
63	Miranda to Los Altos Bridge	L	M	L	L	H	L	H	M		14	Medium
64	Adobe Creek / 101 Undercrossing	L	L	L	L	H	M	M	H		14	Medium
65	Matadero Creek / 101 Undercrossing	L	L	L	L	H	M	L	M		12	Medium
66	Matadero Creek / Caltrain Overcrossing	H	M	L	L	H	H	L	M		16	High

NOTE: Project 52, the El Camino multiuse path and Project 62, Homer/Caltrain undercrossing, are funded projects

Appendix L
PROPOSED CRITERIA FOR TIER ONE BICYCLE PROJECTS FOR THE CITY OF PALO ALTO

Maximum possible score = 40

(To be used to choose between projects in the High Priority tier if they are equivalent in terms of cost, eligible funding sources and project readiness)

Improves safety

1. 0-5 pts. Improves routes with high vehicle volumes or high speed.
   Rationale- *Routes with high motor vehicle volumes have greater potential safety conflicts and thus should have priority. (One point for each 1000 vpd per lane plus one point for speeds over 45 mph up to a maximum of 5 points.)*

2. 0-5 pts. Improves a safety problem or obstacle including railroad tracks, drainage grates, inconsistent shoulder width, street with limited sight distance, etc.
   Rationale - *Projects that eliminate an existing obstacle or hazard shall have priority*.

3. 0-5 pts. Improves routes or locations with high accident history.
   Rationale - *Locations that have had higher than normal bike accident rates (either bike-motor vehicle, single bike, bike-bike or bike-pedestrian) should have priority. One point for each reported accident along route within the last three years.*

4. 0-5 pts. Improves routes with narrow lanes or shoulders.
   Rationale- *Routes with the narrowest space for bicycles to ride have greater potential safety conflicts and thus should have priority.*

curb lane width or lane + shoulder	
No Parking	**With Parking**
<13 ft -5 pts	<21 - 5 pts
13 ft - 4 pts	21 - 4 pts
14 ft - 3 pts.	22 - 3 pts
15 ft - 2 pts	23 - 2 pts
16 ft - 1 pt	24 - 1 pt
17+ ft - 0 pts	25 - 0 pt

Improves connectivity

5. 0 or 5 pts. Closes gap between two route segments or otherwise reduces/eliminates circuitous travel.
   Rationale - *Routes that provide continuity and directness should be ranked higher.*

6. 0-5 pts. Improves routes with high existing or potential bicycle traffic.
   Rationale - *All other things being equal, the route that has or would have the most bicycle traffic should have priority.*

Facilitates commuter/utilitarian trips

7. 0 or 5 pts. Directly serves attractors/generators, including employment sites, schools, shopping centers and transit stations
   Rationale - *Routes which provide access to major activity centers facilitating the use of the bicycle for transportation should be ranked higher.*

Cost/Benefit Ratio and Local Support

8. 0 or 5 pts. Has special significant local support or is of particular interest to a community organization as measured by letters or citizens attendance at public meetings
   Rationale - *Routes that have special interest from the public interest, or private participation in funding, etc. have priority.*

Appendix M
FUNDING

FUNDING OPPORTUNITIES AND STRATEGIES

Traditional Funding Sources

This section outlines the most probable funding sources to implement the recommended bikeway projects. While some funding sources are dedicated to the City, many are competitive. Also, the City of Palo Alto receives funding for roadway projects which can be used to implement some bikeway projects in this Plan. The most likely funding opportunities for bicycle improvement projects in Palo Alto are:

- Transportation Development Act (TDA) Article 3 funds
- Bicycle Transportation Account (BTA)
- Bay Area Air Quality Management District funds - Transportation Fund for Clean Air (TFCA)
  40 percent Program Manager Monies/60 percent Regional
- Surface Transportation Program of the Transportation Equity Act of the 21st Century
  This is often used to fund projects with bicycle components. In fact, bicycle facilities enable the project to score higher.
- Office of Traffic Safety
  This funding source is often used for bicycle and pedestrian safety projects. It can be used for traffic calming programs as well.
- Transportation Enhancements and Transportation for Livable Communities
- Safe Routes to School

Table 6-5 summarizes these and other various local, regional, statewide, and federal funding sources which can be used for roadway, trail or traffic safety (including bicycle safety) projects.

Non-Traditional Funding Sources

In addition to the sources listed above and in Table M-1, there are several non-traditional funding sources that might be available for the long-term implementation of project and program recommendations. The following paragraphs briefly describe several of the unusual or innovative ways that communities have funded parts of their bicycle programs.

Grant and Foundation Opportunities - Private foundations provide excellent opportunities for funding specific capital projects or single event programs. To qualify for these types of funds, the BPAC, or an established non-profit group acting in its behalf, must exist. According to the 1994 "Foundation Directory," there are over 650 foundations within the State of California, many of them located in the Bay Area. The Directory only includes those organizations which held assets of $2 million or more, or gave $200,000 or more in grant awards in the previous year.

In general, private foundations are initially established for specific purposes, e.g. children and youth needs, promotion of certain professional objectives, educational opportunities, the arts, and community development. There are four types of foundations located in the Bay Area:

- Independent Foundations
- Company-Sponsored Foundations
- Operating Foundations
- Community Foundations

A description of several foundations that favor environmentally-related projects is presented in the report "Guide to Bicycle Program Funding in California" published by the Planning and Conservation League Foundation, April, 1995. In general, private foundations prefer to fund programs that are special in nature such as conferences or children's education events, rather than programs viewed as city responsibilities such as constructing and maintaining roadways.

Adopt-A-Trail/Path Programs - Modeled upon the Southern California program of highway maintenance contributions, this program would post signs to indicate which individual or group has contributed to either the development, installation or maintenance of a particular bike facility.

Memorial Funds - These programs are advertised as potential donor projects to be funded via on-going charitable contributions or funds left to a particular project through a will. Most memorial projects include the location of a memorial plaque at a location specific to the improvement or at a scenic vista point.

Revenue-Producing Operations - As part of the development of a trail or bike path, plans can specifically include the location of a revenue-producing operation adjacent to the proposed improvement. For example, bicycle rental facilities, food and drink establishments, bike storage facilities and equipment centers, and/or equestrian centers would be appropriate uses. The on-going lease revenues from these operations could then be used for trail/path maintenance.

Funding Strategy

Some funding sources do not provide more than one or two hundred thousand dollars per year. To fund a million dollar or more project with these sources would commit this one funding source for about ten years or more. This would be to the neglect of many other smaller projects that may be as beneficial. It does not make sense to commit one source of funds for several years to only one project. Rather, smaller sources of funding such as TDA Article 3 and TFCA should be used for funding the less costly projects and larger pools of funding should be sought for the more expensive projects.

Table 6-5
Summary of Funding Sources for Bicycle Projects and Programs
Palo Alto Bicycle Plan

Funding Program	Source	Eligible Use of Funds	Restrictions, Including Local Matching Funds	Maximum Dollar Allocation (Annual unless stated otherwise)	Program Management/ Application/ Approval	Contact
Federal Sources						
TFCA/AB434-County Program Manager's Fund	Regional-Bay Area Air Quality Management District, (BAAQMD)	Bicycle projects that reduce air pollution quality under 3 of 8 categories: Improve bicycle access & facilities; improve arterials to encourage bicycling; and smart growth projects.	Bicycle projects must be in an adopted county-wide bicycle plan or congestion management plan.	. Palo Alto receives approximately $xxx,000 annually.	Apply through County VTA. BAAQMD approval required.	County CMA
TFCA/AB434 - Regional Fund	$4.00 surcharge on motor vehicle registration		Required 20% match for projects over $100,000.	$12 million (60% of total) in Bay Area. Maximum per project: $1 million. Minimum $10,000.	Apply directly to BAAQMD.	Dave Burch, BAAQMD
State Sources						
CA Bikeways Act – Bicycle Transportation Account (BTA)	State: State Highway Account. Funded by gasoline taxes.	Specifically for development of bicycle facilities, especially those that promote bicycle commuting.	Required 10% local match and an MTC and State approved bicycle plan not over 2 1/2 years old.	$1,500,000 statewide in FY 00/01 25% or $375,000 per project. $5 million statewide by FY 04/05.	Caltrans Bicycle Facilities Unit	Ken McGuire, Caltrans Bicycle Facilities Unit
Transportation Development Act Article 3 (TDA)	State 2% of the 1/4% of CA sales tax that is "returned to source."	Construction and maintenance of bicycle and pedestrian facilities, including parking; safety and education (up to 5% of TDA funds); and bicycle plans. Projects that serve activity centers are viewed favorably.	Cannot be used to fully fund the salary of any one person.	Approximately $xx,000 annually for Palo Alto.	Santa Clara VTA	Doug Kimsey, MTC
State Transportation Improvement Program (STIP)	State and federal funds combined	Capital projects only; includes pedestrian and bicycle facilities.	Federal funds require 11.5% match.	$350 million programmed for Santa Clara County in 1998 STIP (six-year period).	Project list created by VTA; must be approved by MTC and CTC	Lizzie Kemp, MTC

Table 6-5
Summary of Funding Sources for Bicycle Projects and Programs
Palo Alto Bicycle Plan

Funding Program	Source	Eligible Use of Funds	Restrictions, Including Local Matching Funds	Maximum Dollar Allocation (Annual unless stated otherwise)	Program Management/ Application/ Approval	Contact
TEA 21: Recreational Trails Program Title I, Section 1112	U.S. DOT (FHWA)	Development and maintenance of recreational trails to benefit bicycles, pedestrians and other non-motorized users.	Must be included in Statewide Comprehensive Outdoor Recreation Plan (SCORP). Requires 20% match, of which up to 15% may be other federal funds.	$3.2 million statewide, of which $2.2 million is designated for non-motorized trails and the remaining $1 million is for motorized trails.	CA Dept of Parks & Recreation	Project Officer, CA Dept. of Parks & Recreation, Local Services Section
Safe Routes to School (AB 1475)	U.S. DOT (1/3 of safety set-aside)	Same as above, but projects must be on route to a school. Traffic calming projects to assist bicyclists and pedestrians are also eligible.	Program effective only through January 1, 2002. 10% match for most projects; no match needed for traffic signalization, traffic signs, pavement markings.	$20 million throughout state. Maximum per project $500,000.	Caltrans	Randy Ronning, Caltrans
Federal Sources						
TEA 21: Congestion Mitigation and Air Quality Improvement (CMAQ) – Title I, Section 1110	U.S. DOT	Construction of bicycle and pedestrian facilities or bicycle safety programs, such as brochures, maps, public service announcements.	Must be mainly for transportation rather than recreation and included in TIP. Requires 20% local or state match.	)	Apply through County VTA; MTC approval required.	Vince Petrites, MTC
ISTEA: Surface Transportation Program (STP) Title I, Section 1108	U.S. DOT	Construction of bicycle and pedestrian facilities including wide shoulders or bike lanes as part of roadway reconstruction.	Must be mainly for transportation rather than recreation and included in TIP. Requires 20% local or state match.	.	Apply through County VTA. MTC approval required.	Vince Petrites, MTC, or Doug Kimsey, MTC re: bicycle project eligibility

Table 6-5
Summary of Funding Sources for Bicycle Projects and Programs
Palo Alto Bicycle Plan

Funding Program	Source	Eligible Use of Funds	Restrictions, Including Local Matching Funds	Maximum Dollar Allocation (Annual unless stated otherwise)	Program Management/ Application/ Approval	Contact
TEA 21: Surface Transportation Program (STP) Section 1108 - Transportation Enhancement Activity (TEA) Regional Funds	U.S.: Approximately 10% of the state's STP funds go to TEA programs; 75% distributed directly to counties	Bike projects are eligible in 3 of 12 categories: provision of facilities for bicyclists and peds., safety/education activities for bicyclists and peds; and preservation of abandoned railway corridors.	12% match required. Planning costs cannot be covered. Must be included in TIP.	Santa Clara County's annual share is approximately $1.6 million. Minimum project size of $100,000.	Apply through VTA; MTC and CTC approval required.	Vince Petrites, MTC
Transportation for Livable Communities (Capital Grants)	U.S. DOT: 5% of Bay Area's STP and CMAQ funds	Projects that support development and identity, including bicycle and pedestrian improvements.	Cannot be used for planning (TLC has separate Planning Grant program)	$9 million to Bay Area; project minimum $150,000, maximum $2 million.	Apply directly to MTC	Karen Frick, MTC
State and Community Safety Grants (23 USC 402)	U.S. DOT	Identification and alleviation of traffic safety problems. Includes accident studies to determine what improvements are needed. Bicycle projects include development and implementation of programs to increase awareness and safety skills.	Must eliminate current deficiencies or expand existing programs. Cannot replace existing programs or be used for construction, maintenance, research or rehabilitation.	None.	Apply directly CA Office of Traffic Safety (OTS)	Dana Lidster, OTS

Appendix N
BEST PRACTICES FOR BICYCLE ACCOMMODATION IN PALO ALTO

INTRODUCTION AND PURPOSE

This document presents design guidelines and best practices recommended for the City of Palo Alto to use for bikeway facilities. These guidelines describe the ideal conditions which cannot always be provided. The Caltrans Highway Design Manual (HDM), Chapter 1000, is the primary source for bikeway standards in California. The HDM identifies minimum acceptable dimensions for trails (Class 1 bikeways) and bike lanes (Class 2 bikeways). It also provides discussion on best practices as well as practices to avoid. These guidelines are intended to supplement the HDM by providing guidance on when and how to exceed the minimum standards. Also, since bicycles are allowed and may be present on all roadways, these guidelines provide guidance for ensuring that all roadways are safe for bicyclists.

The following recommendations are based on guidelines published by others, such as the HDM and the *Guide for the Development of Bicycle Facilities* by the American Association of State Highway and Transportation Officials (AASHTO), existing practices used by local agencies and on the consultant's knowledge of bicycle operations, traffic engineering and pedestrian safety.

These guidelines are divided into nine sections:

1. Bike Paths
2. Local Street Bike Routes
3. Arterial Street Bike Routes
4. Narrow Lane Bike Routes
5. Intersection Design Issues
6. Accommodating Bicycles at Traffic Signals
7. Maintenance
8. Other Recommended Best Practices
9. Bicycle Parking

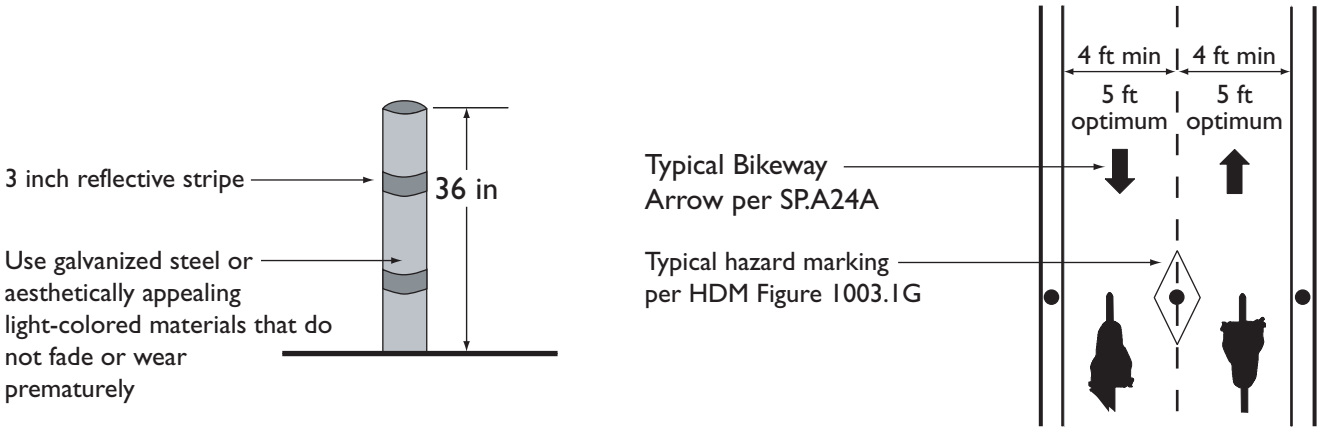
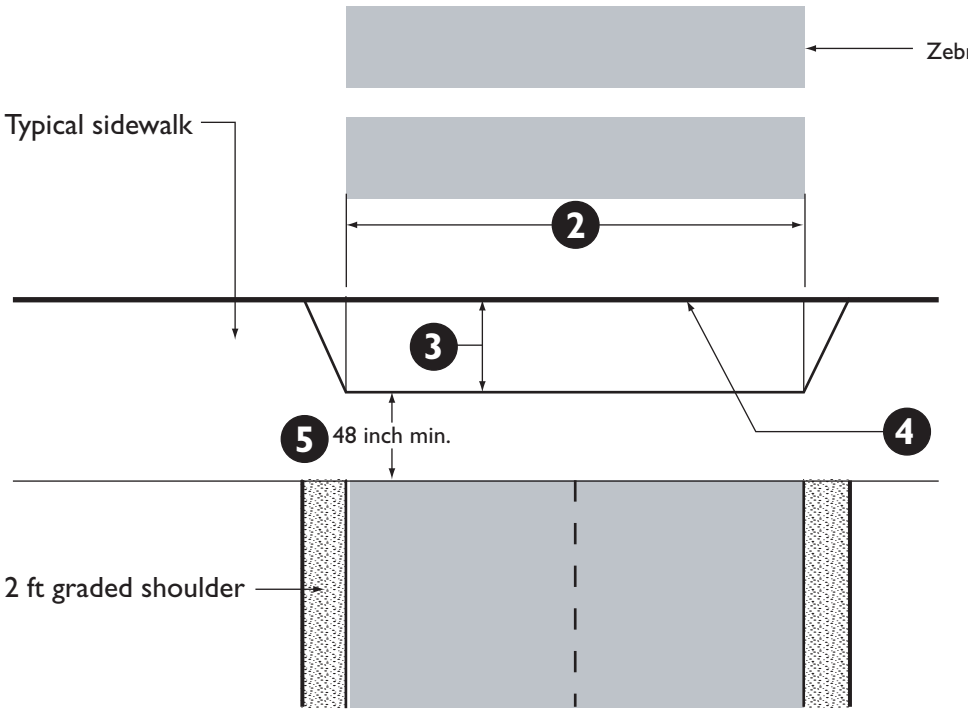


Figure 1A
BOLLARD DESIGN



1. Ramp should align with trail and crosswalk.
2. Ramp width should be same as trail width.
3. Ramp slope should be 5% maximum.
4. Ramp lip should be flush with pavement (vertical difference of 0.25 inch maximum).
5. All applicable ADA or Title 24 guidelines should be met such as maintaining 48 inch at the top of ramp zone in accordance with ADA guidelines.

Not To Scale

Figure 1B
RAMP DESIGN

1. BIKE PATHS

Pavement Management and Trail Maintenance

Program T-29 of the Comprehensive Plan is to "Provide regular maintenance of off-road bicycle and pedestrian paths, including sweeping, weed abatement, and pavement maintenance." Yet off-road paths are not currently surveyed by the pavement management program or reached by street sweepers.

- A special schedule of inspection and maintenance should be established for routine maintenance such a sweeping and trimming/landscape maintenance.
- Pavement of trails should be included in the pavement rehabilitation and resurfacing program along with roadways since they are transportation facilities on which many Palo Altans depend.
- See also Section 7 on Page 12 for more maintenance guidelines.

Bollard Design

The recommended practice for bollard design at bridges and on bike paths is as follows:

- Bollards should only be used where there is a documented problem of abuse by motor vehicles.
- One bollard in the center is usually sufficient to discourage motor vehicles. It must be acknowledged that any design that is effective at preventing motorcycles also prevents bicycles with trailers and panniers from entering.
- If bollards are used, the recommended guidelines for their design are presented in Figure 1A. The intent is that standard bollards available from suppliers be used to reduce costs and simplify procurement.

Ramps

The recommended practice for ramp design to minimize the negative impacts on bicycle travel includes the following elements, (these are also illustrated in Figure 1B):

- Width- should be as wide as the approaching pathway
- Slope - should not exceed five percent
- Smoothness at joint - should have lip height less than or equal to one-quarter inch

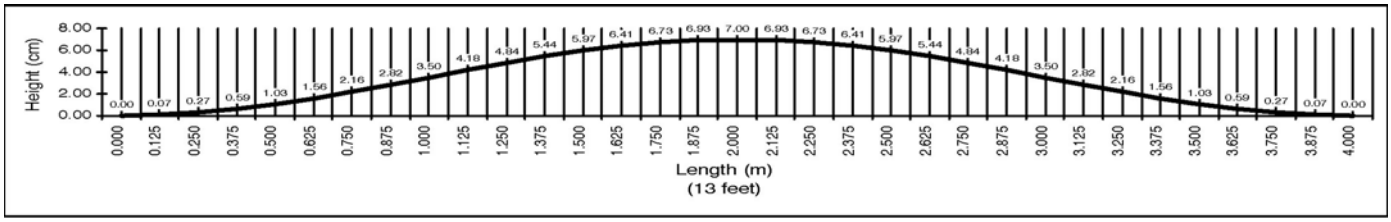
Lighting

Offroad trails are often not located adjacent to roadways or other sources of nighttime lighting. Trails should be lit at night to maximize their potential to serve as transportation corridors. Lights such as the Lumec DMS30 used on the Alma Street Bridge should be selected which cast their light downward onto the trail which minimizes adverse impacts on adjacent land uses and maximizes lighting for trail users.

2. LOCAL STREET BIKE ROUTES

Local streets can make excellent bike routes especially when they have low traffic volumes. Bike Lanes are not necessary when traffic volumes are below 4000 vpd. If local streets are designated bike routes, they should meet as many of the conditions below as possible:

- ADT < 2,000
- Limited use of stop signs
  - STOP signs positioned to give right-of-way to travel on the bike route
  - Two-way STOPS rather than four-way stops on local streets; one-way STOPS at T intersections
- Median refuges or traffic signals to cross arterials
- Traffic calming if used should be compatible with bicycles:
  - Speed humps should have a sinusoidal profile as depicted below
  - Not a truck route
  - Directional signing
  - Standard street lights



Sinusoidal Speed Humps - Profile

3. ARTERIAL BIKE ROUTES

Comprehensive Plan Policy T-14 is to improve pedestrian and bicycle access to and between local destinations. Policy T-25 is to plan for the usage of roadway space by all users including motor vehicles, transit vehicles, bicycles and pedestrians. Several programs under these policies directly or indirectly impact arterial roadways.

Width of Outer Lane/Shoulder

Program T-24 under Policy T-14 is to *Provide adequate outside through-lane widths for shared use by motorists and bicyclists when constructing or modifying roadways, if feasible*.

- Where possible, provide bike lanes or four foot shoulder; Bike lane widths, striping, and legends shall conform to the mandatory standards cited in the Caltrans Highway Design Manual, and whenever possible, to the permissive standards in the manual.
- Where not possible to provide bike lanes, provide a 15 curb (through) lane. See *Options To Improve Width Of Narrow Lanes* below. If the outer lane is less than 15 feet, see *Section 4 - Narrow Lanes* on Page 6.

- Evaluate all streets during the pavement resurfacing to determine if bike lanes or wider curb lanes can be provided when the striping is reapplied.

❖ Options to improve width of narrow lane roads:

To obtain the recommended width within a limited right of way, consider the following options:

- Remove parking from one side of the street, or restrict it to nighttime hours.
- Convert diagonal parking to parallel parking.

The following are options for roadways with four or more lanes:

- Consider restriping roadway from four narrow travel lanes to two travel lanes plus a two-way left-turn lane.
- Consider the use of modern roundabouts in place of traffic signals. (Roundabouts reduce the storage room needed at intersections, enabling fewer lanes to carry the same volume of traffic.)
- Consider narrowing inner lanes to ten feet to provide more width in the outer lane.

Edge and Roadway Obstacles

- Install driveways/curb ramps to be flush or with maximum lip height 0.5 inch..
- In hill areas, pave gravel driveways for 15 feet from edge of roadway, pave two foot minimum shoulders.
- In the outside traffic lane, the gutter pan lines, construction joints and grates that adversely affect bicycle steering will be designed to minimize or eliminate bicycle handling hazards.

  Gutters: The most beneficial road surface is curb-to-curb asphalt, and no gutter. Where it is necessary to install gutters, Use gutters with a maximum width of 12 inches on all new or renovated construction projects.

  Grates: The grate design should be bike-safe, with no linear openings parallel to the travel lane. Grates with waffle patterns or slots running perpendicular to the traffic lanes are acceptable. Acceptable bicycle-proof grates are specified in Caltrans Standard Plans D 77B.

  Joints: Joints between the gutter and asphalt shall be flush when constructed and resurfaced. When resurfacing over an existing cement road which has joints perpendicular to curb, joints shall be cut down prior to resurfacing.

Roadway Surface Quality

- Surface of utility covers or plates should have minimum co-efficient of friction = 0.35 to reduce their slickness when wet and should be flush with the pavement.
- Potholes should be repaired promptly. See *Section 7- Maintenance*.
- Trench repair should conform to the City's guidelines for backfilling. See *Section 7-Maintenance.*
- Institute spot improvement program – See *Section 7-Maintenance*.
- Chip sealing should not be used.

4. NARROW LANE BIKE ROUTES

Sometimes it is impossible to provide wide outside lanes of more than 14 feet. This is true particularly in-built up areas and for both two lane and multi lane roads. On those streets that are nevertheless significant for bicycles, the following is recommended:

Share the Road Sign

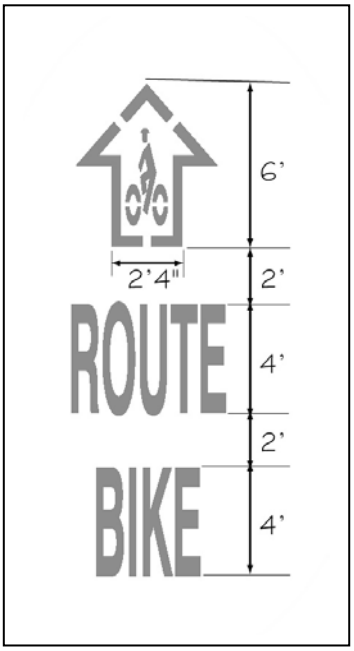
Install *Share The Road* signs to officially acknowledge the presence of bicyclists on the roadway.
Share the Road signs should be installed after every arterial intersection and at maximum one-half mile intervals.

Bicycle Route Stencil

Bicycle pavement stencils are used to inform both motorists and bicycles the safe positioning of the bicycle on narrow lane roadways.

- **Appropriate Roadways for the Stencil:**
  They are recommended where the following conditions exist:
  - Is a designated bike route
  - ADT> 5,000 – two lane road
  - ADT > 12,000 – four lane road
  - Outer lane < 14 feet with no parking and 22 feet with parking

- **Placement of the Stencil on the Roadway**
  - Lateral placement: centerline of symbol should be five feet from edge of curb (or 13 feet with parking).
  - Longitudinal placement: twice per block or every 200 feet.



5. INTERSECTION DESIGN ISSUES

Traffic Lanes

1. On a street with bike lanes leading to the intersection and where the outside lane is right-turn-only, there shall be a straight across bicycle lane between the right-turn-only lane and the adjacent motor vehicle lane. (See Caltrans Highway Design Manual.)

2. On a street without bike lanes leading to the intersection, and where there is to be a right-turn-only lane, the width of the outside through traffic lanes should be wide enough (minimum 12') for bicycles and motor vehicles to share. Lanes may need to be wider as design speed increases.

3. If the outside lane is dual-destination and right-of-way exists, the outside lane should be wider than the adjacent through lane. Outside lanes of 13' are acceptable, 14' are preferable.

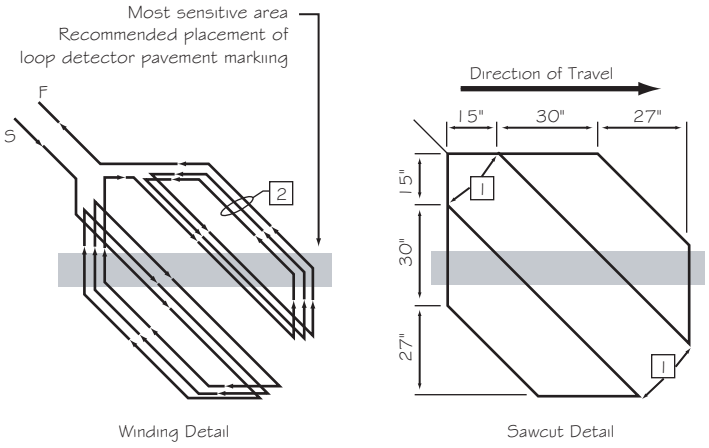
4. If the roadway is striped with bicycle lanes, the bike lane lines shall be dropped 100' prior to the intersection as measured from the curb return. If there is a through bike lane at the intersection, this lane should not be less than 50' long and the transition (gap) from the midblock curbside bike lane should be 100'.

Intersections - Right-Turn Treatment

1. Extremely long right turn lanes make it difficult for bicyclists to be positioned correctly at the intersection. Avoid right-turn lanes over 200 feet long.
2. Large radius right turns, oblique right-turns and channelized right-turns enable motor vehicles to turn at high speeds. Design right-turn lanes such that motor vehicles must slow to a safe appropriate speed prior to making the turn.
3. Double right-turn lanes make it more difficult for through bicyclists to continue straight through the intersection thus discouraging all but the most experienced cyclists from bicycling. Avoid double right-turn lanes whenever possible.

Street Furniture

1. Street furniture shall be sited so as not to block sight lines for any category of roadway user.

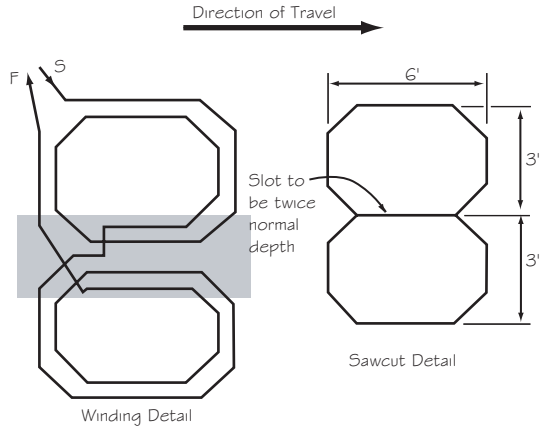


Type D Loop Detector Configuration

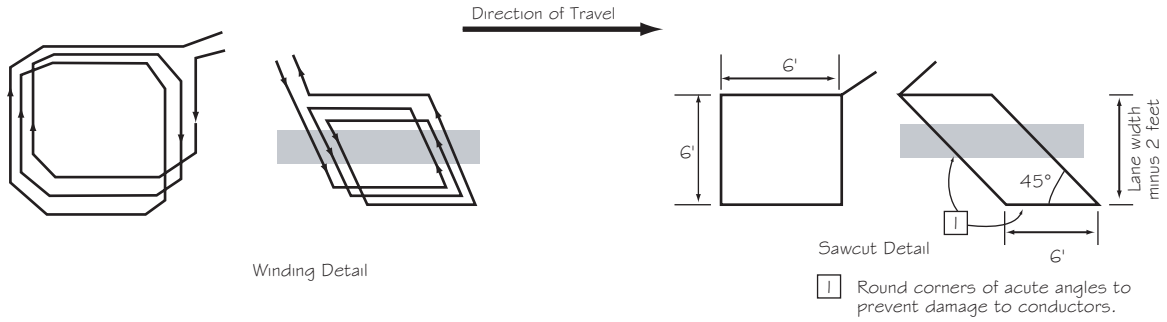
1 Round corners of acute angle sawcuts to prevent damage to conductors.

2 Install 3 turns when only one Type D loop is on a sensor unit channel.

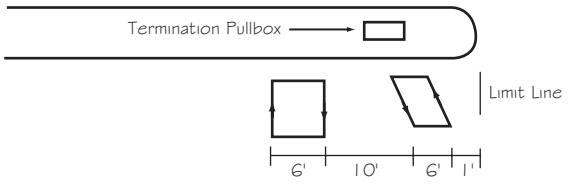
Install 5 turns when one Type D loop is connected in series with 3 additional 6' X 6' loops on a sensor unit channel.



Type Q Loop Detector Configuration



Type SA Loop Detector Configuration



Type SA Loop Installation

Not To Scale

Figure 2
LOOP DETECTOR DETAILS

6. ACCOMMODATING BICYCLES AT TRAFFIC SIGNALS

Traffic Signal Detection

Traffic signals should allow cyclists to activate a green light from the correct position for their direction of travel. The most common type of detection are loop detectors. Other detection technologies are proving effective.

Loop Detectors

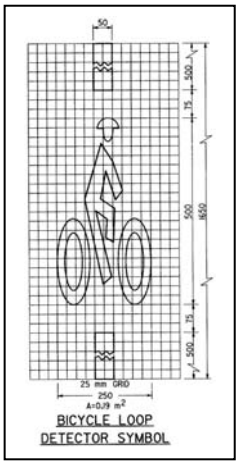
- For standard loop detectors to detect bicyclists, the sensitivity must be adjusted accurately so that bicyclists are detected and the loops must be placed in the appropriate locations in the lanes for cyclists' movements.[1] The following type of loop detectors are recommended. These are illustrated in Figure 2.

    a) Through lanes shared with bikes: Type D - modified quadruple loops.

    b) Left-turn lanes/minor side streets: State Type 5DA loop.

    c) Advance detectors that are not expected to be shared by bicycles can be Type A.

    d) Bike lanes: Type Q - quadruple loops.



BICYCLE LOOP DETECTOR SYMBOL

- Identify sensitive points with standard marking specified in Standard Plans A 24C.

Other detection technologies

- Consider other detection technologies such as microwave or video detection that do not depend on the presence of ferrous metals so that all bicycles can be detected. These new detection methods are also advantageous in that they usually have a much broader area in which the bicyclist may wait in order to be detected, compared to inductive loop detectors where bicyclists must wait in exactly one spot.
- To indicate to bicyclists where to wait in order to be detected, a sign may need to be erected informing bicyclists that they are being detected. The loop detector pavement marking specified in Standard Plans A 24C in not recommended since it is too site-specific.

[1] Loops for cyclists are needed in:
-wide dual destination curb lanes
-single lanes serving all three movements at intersections
-single leg of "T" intersections
-marked through bike lanes at intersections

Traffic Signal Timing

Minimum green times should account for the time needed for bicyclists to safely clear the intersection. The minimum green times depend on the width of the road, slope and type of bicyclists. Generally eight seconds is sufficient. The minimum green time can be found by using the formula below.

$$g + y + r_{clear} \geq t_{cross} + t_{lost}$$

The value of t_{cross} can be determined by estimating full-speed crossing times $(w + l)/v$ where w = intersection width, l = length of the bicycle, (typically 6 feet) and v = bicyclist speed. A startup time of 6 sec should be added for time lost (t_{lost}) reacting to the green light and accelerating to full speed.

Green time extensions-Cyclists should have the have the capability to extend the green phase from the loop closest to the crosswalk as well as the precursor loops. Cyclists should have the same ability to trigger the green signal as motorist when:

- they are still on the loop after the initial green time, or
- when they must travel a distance to reach the loop after another cyclist has already triggered the light.[2]

The clearance interval (yellow plus red time) must be sufficient such that a bicyclist who has entered on a green light can clear the intersection. Under normal circumstances, yellow intervals calculated for motorists are sufficient for bicyclists. Longer yellow intervals do not help to prevent clearance-time accidents, because some bicyclists will always enter (lawfully) on the last of the yellow. A better solution is to provide an all-red clearance interval, during which the intersection can clear safely before cross traffic is allowed to enter. Very long red clearance intervals are not commonly used, because they reduce the efficiency of the intersection, and may encourage motorists to enter on red. The California Traffic Manual, for instance, generally limits red clearance intervals to 2.0 seconds. A red clearance interval of two seconds is therefore recommended to minimize the risk for bicyclists who are caught in the intersection in the following instances:

- Bicycle clearance-time accidents have already occurred.
- Physical characteristics (such as width) and bicyclist volume make these accidents likely.
- A street with bike lanes or a signed bicycle route crosses an exceptionally wide major street (greater than 80 feet).

Programmed visibility lights Left turn programmed visibility lights must be adjusted to accommodate the normal position in the left turn lane, i.e., on the right side of the loop lane.

[2] Example of this type of situation: Bike lane eastbound on Churchill Avenue at Alma where a cyclists on the loop at the intersection is separated from cyclists on the west side of the tracks.

Bicycle Signal Heads

Bicycle Signal Heads can eliminate confusion at intersections with certain geometries where it is desirable to facilitate a bicycle movement that is not permitted for a motor vehicle. The State Standards for Bicycle Signals are presented below in Exhibit A.

Exhibit A
Bicycle Signal Standards
Adopted by CTCDC 11/19/99

A bicycle signal is an electrically powered traffic control device. It may be used only in combination with a traffic signal. It directs a bicyclist to take specific actions and may be used to improve an identified safety or operational problem involving bicycles.

Since a separate signal phase for bicycle movement will reduce the green time available for other phases, alternate means of handling conflicts between bicycles and motor vehicles should be considered first. The most likely alternatives are:

1. Striping to direct a bicyclist to a lane adjacent to a traffic lane such as a bike lane to the left of a right-turn only lane

2. Redesigning the intersection to direct a bicyclist from an off-street path to a bicycle lane at a point removed from the signalized intersection

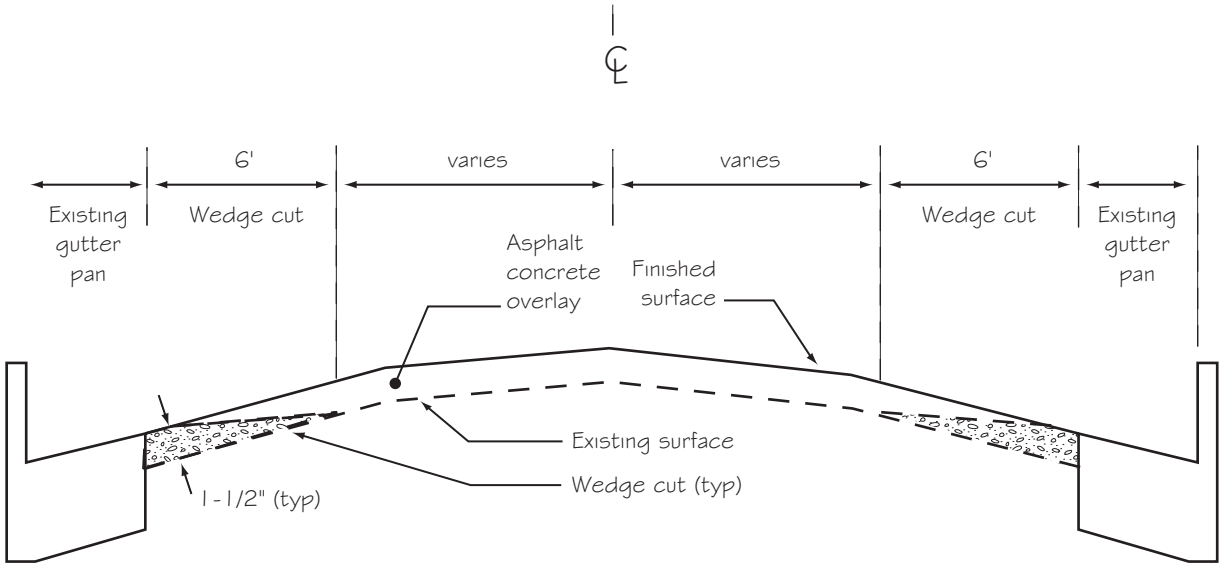
A bicycle signal phase should be considered only after these and other less restrictive remedies have an adequate trial with enforcement and with the result that the collision frequency has not been reduced.

WARRANTS – A bicycle signal may be considered for use only when the volume and collision or volume and geometric warrants have been met:

1. **VOLUME –** When $W = B * V$ and $W \geq 50{,}000$ and $B \geq 50$; where:
   W is the volume warrant
   B is the number of bicycles at the peak hour entering the intersection
   V is the number of vehicles at the peak hour entering the intersection
   Band V shall use the same peak hour.

2. **COLLISION** – When two or more bicycle/vehicle collisions have occurred in a 12-month period and the responsible public works official determines that a bicycle signal will reduce the number of collisions

3. **GEOMETRIC –** (a) Where a separate bicycle/multi-use path intersects a roadway (b) At other locations to facilitate a bicycle movement that is not permitted for a motor vehicle



- Depth of wedge cut should equal depth of AC overlay, typically 2" on arterial streets, 1-1/2" on local streets.
- Finished surface should match level of gutter to within 1/4".

Not To Scale

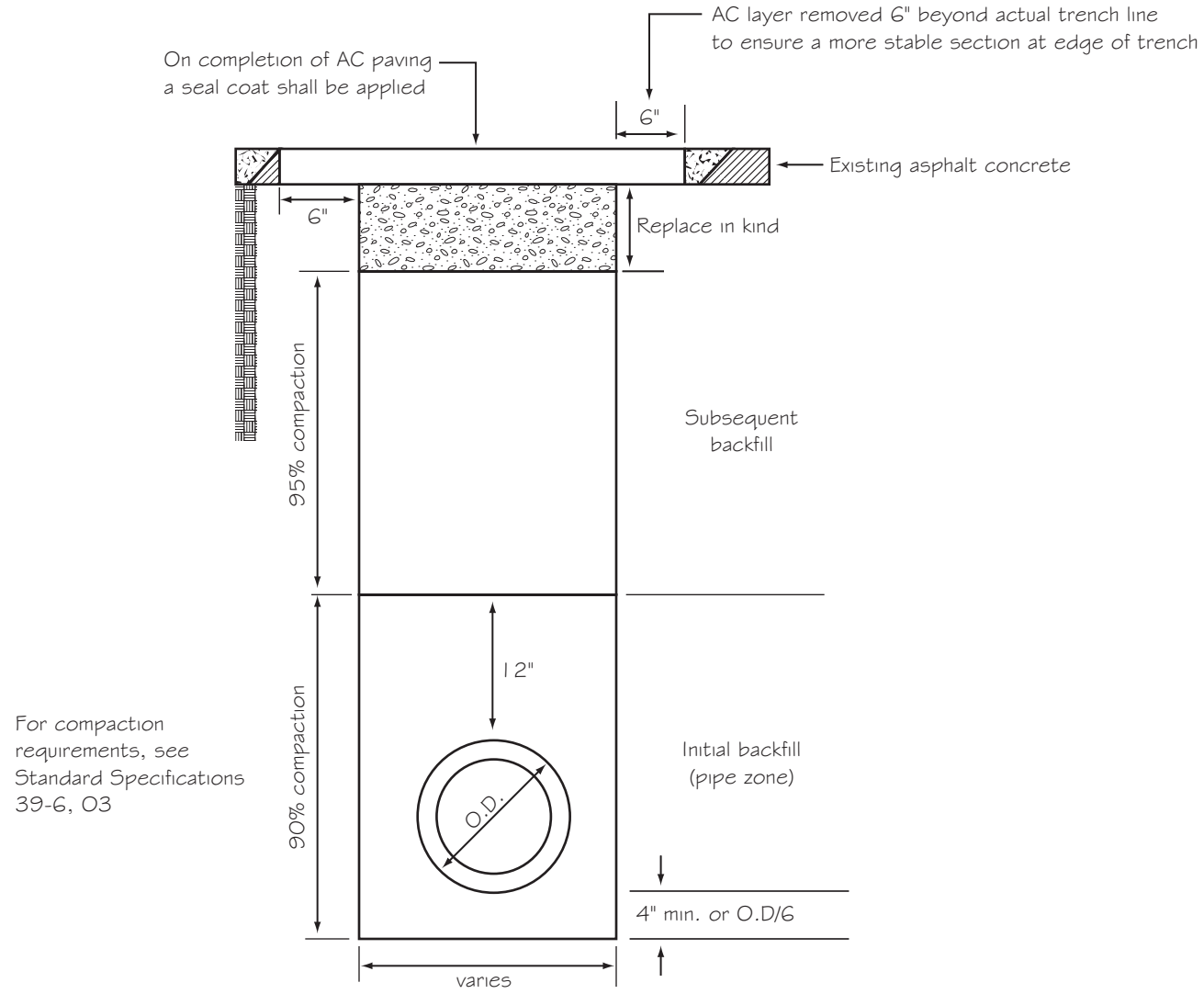
Figure 3
WEDGE CUT / ROADWAY RESURFACING

7. MAINTENANCE

Comprehensive Plan Policy T-20 is to *Improve maintenance of bicycle and pedestrian infrastructure.*

Program T-28 under this policy is to "Adjust the street evaluation criteria of the City's Pavement Management Program to ensure that areas of the road used by bicyclists are maintained at the same standards as, or at standards higher than, areas used by motor vehicles." The following action steps are recommended:

- Sweep streets regularly, with priority given to those with higher bicycle traffic.
- Special attention should be paid to the right-hand portion of the roadway, where bicyclists normally ride.
- Establish routine annual inspection of all onstreet and offstreet bikeways for:
  - Visibility of striping and legends
  - Condition and placement of signs
  - Potholes / pavement condition
  - Overhanging shrubs and other hazards encroaching on the bikeway
- Consider bicycle volumes on streets when prioritizing roadways for overlays and reconstruction.
- Gutter joints: During resurfacing, ensure smooth longitudinal gutter joints by grinding and/or wedge cutting prior to applying the overlay. This will maintain a smooth transition between the asphalt surface of the roadway and gutter pan thereby providing a safe riding surface for bicyclists. See Figure 3.
- Roadway patching and utility trenching repair: During repair of potholes and trenches, adhere to compaction standards to ensure that the pavement surface remains intact and smooth. Palo Alto's compaction standards are attached as Figure 4.
- Establish standards for new and replacement pavement quality. Inspect work done by
- contractors, and have it replaced if defective.
- Ensure that any other vertical interruptions in the roadway surface adhere to the maximum tolerances set forth in the HDM (see Table 1 below). These are for both grooves (indentations) or steps (ridges). These tolerances should be maintained on all roadways at such locations as utility covers, driveway lips, where two pavements intersect, and other such joints in the area where bicyclists can be expected to ride.
- Provide a postcard, voicemail and/or e-mail program for the public to report hazards and suggest low cost small scale spot improvements such as pavement maintenance, hazard removal or bike rack installation.



AC & AGGREGATE BASE

- Trenches>20 square feet have compaction testing.
- Testing to be performed by professional testing service.
- When trench backfill passes the compaction test, final surface course of asphalt concrete may be placed.
- Restored surface of trench must match existing surface within 1/4 inch.

Not To Scale

Figure 4
TRENCHING AND COMPACTING PROCEDURES

Table 1 Bikeway Surface Tolerances		
Direction of travel	**Grooves**	**Steps**
Parallel to travel	0.5 inch (12 mm) wide maximum	0.375 inch (10 mm) high maximum
Perpendicular to travel	---	0.75 inch (20 mm) maximum
Source: Table 1003.6, Highway Design Manual		

8. OTHER RECOMMENDED BEST PRACTICES

Bike Surveys

Supplement census journey-to-work data on bicycle mode share by obtaining data regarding:

- Number of middle and high school students who bike to school
- Number of Caltrain riders who arrive at the station by bicycle
- Number of residents who use the bicycle for non-commute transportation trips

Bicycle Traffic Counts

Annual counts of bicycle traffic should be conducted at key locations in the City. These locations should include major arterials, routes to schools, and bicycle bridges. These counts should be conducted during the same time of year during a non-rainy month when school is still in session such as May or early October.

Before and After Counts

Prior to making a bicycle improvement or constructing a new on-road facility, traffic counts should be conducted so that before and after comparison in the level of bicycling can be made.

Traffic Impact Studies

In all traffic impact studies, consider the impact of the project and project alternatives on the following issues:

- Impact on the existing bikeway network;
- Consistency with General Plan and Bicycle Plan policies;
- Degree to which bicycle travel patterns are altered or restricted due to the project;
- Safety of future bicycle operations (based on project conformity to accepted design guidelines and standards); and
- Impact of mitigation measures on all of the above.

9. BICYCLE PARKING

Bicycle Parking Definitions

The Palo Alto City Code defines bicycle parking types as follows:

Class I Facilities. *Intended for long-term parking; protects against theft of entire bicycle and of its components and accessories. The facility must also protect the bicycle from inclement weather, including wind-driven rain. Three design alternatives for Class I facilities are as follows:*

> ***(A)Bicycle Locker.*** *A fully enclosed space accessible only by the owner or operator of the bicycle. Bicycle lockers may be premanufactured or designed for individual sites. All bicycle lockers must be fitted with key locking mechanisms.*
>
> *In multiple-family developments, the Class I bicycle parking and required storage area for each dwelling unit may be combined into one locked multi-use storage facility provided that the total space requirement shall be the sum of the requirements for each use computed separately.*
>
> *The preferred Class I facility is a bicycle locker. Restricted access facilities and enclosed cages may be considered as alternatives to bicycle lockers as indicated below. Class I facilities other than lockers, restricted access rooms, or enclosed cages, but providing the same level of security, may be approved by the director of planning and community environment.*
>
> ***(B)Restricted Access.*** *Class III bicycle parking facilities located within a locked room or locked enclosure accessible only to the owners or operators of the bicycles parked within. The maximum capacity of each restricted room or enclosure shall be ten bicycles. An additional locked room or enclosure is required for each maximum increment of ten additional bicycles. The doors of such restricted access enclosures must be fitted with key locking mechanisms.*
>
> *In multiple-family residential developments, a common locked garage area with Class II bicycle parking facilities shall be deemed restricted access provided the garage is accessible only to the residents of the units for whom the garage is provided.*
>
> ***(C)Enclosed Cages.*** *A fully enclosed chain link enclosure for individual bicycles, where contents are visible from the outside, and which can be locked by a user-provided lock. The locking mechanism must accept a three-eighths inch diameter padlock. This type of facility is only to be used for retail and service uses and multiple family developments.*

(2)Class II Facilities. *Intended for short-term parking. A stationary object to which the user can lock the frame and both wheels with only a lock furnished by the user. The facility shall be designed so that the lock is protected from physical assault. A Class II rack must accept padlocks and high security U-shaped locks.*

> *(A)Class II facilities must be within constant visual range of persons within the adjacent building or located in well-traveled pedestrian areas.*
>
> *(B)Class II facilities must be located at street floor level.*
>
> *(C)Class II facilities should be protected from the weather whenever possible.*

(3)Class III Facilities. *Intended for short-term parking. A stationary object to which the user can lock the frame and both wheels with a user-provided cable or chain (six foot) and lock.*

Bicycle Parking Supply Requirements

Palo Alto Zoning Ordinance 18.83 contains specific requirements for bike parking for new developments depending on the land use. These are too numerous to be repeated here, but they are available on the city's web site. There is a requirement for both Class 1 and Class 2 bike parking.

Bicycle Parking Rack Design

The City has not set standards for acceptable bike racks other than the definition in the city code. The Class 2 bike rack is often defined by other agencies as being a rack to which the frame and one wheel can be locked with a user provided U-lock. Few standard bike racks on the market actually protect the lock from physical assault as contained in Palo Alto's Class 2 definition. This section of the code was written when the Rack III brand of rack was popular which met these specifications for a Class 2 rack. However this rack has become out of favor with most cyclists who now prefer an inverted U rack used with a U-lock. Also the Palo Alto specification that the rack be designed to lock both wheels is often interpreted as a rack that provides two points of contact with the bicycle. For example, the inverted U rack and the horse rail rack as depicted in Figure 5 both meet this requirement, whereas the ribbon or wave rack does not. The City should consider rewriting the definition of Class 2 and Class 3 bike parking so that the racks below would meet the Class 2 definition.

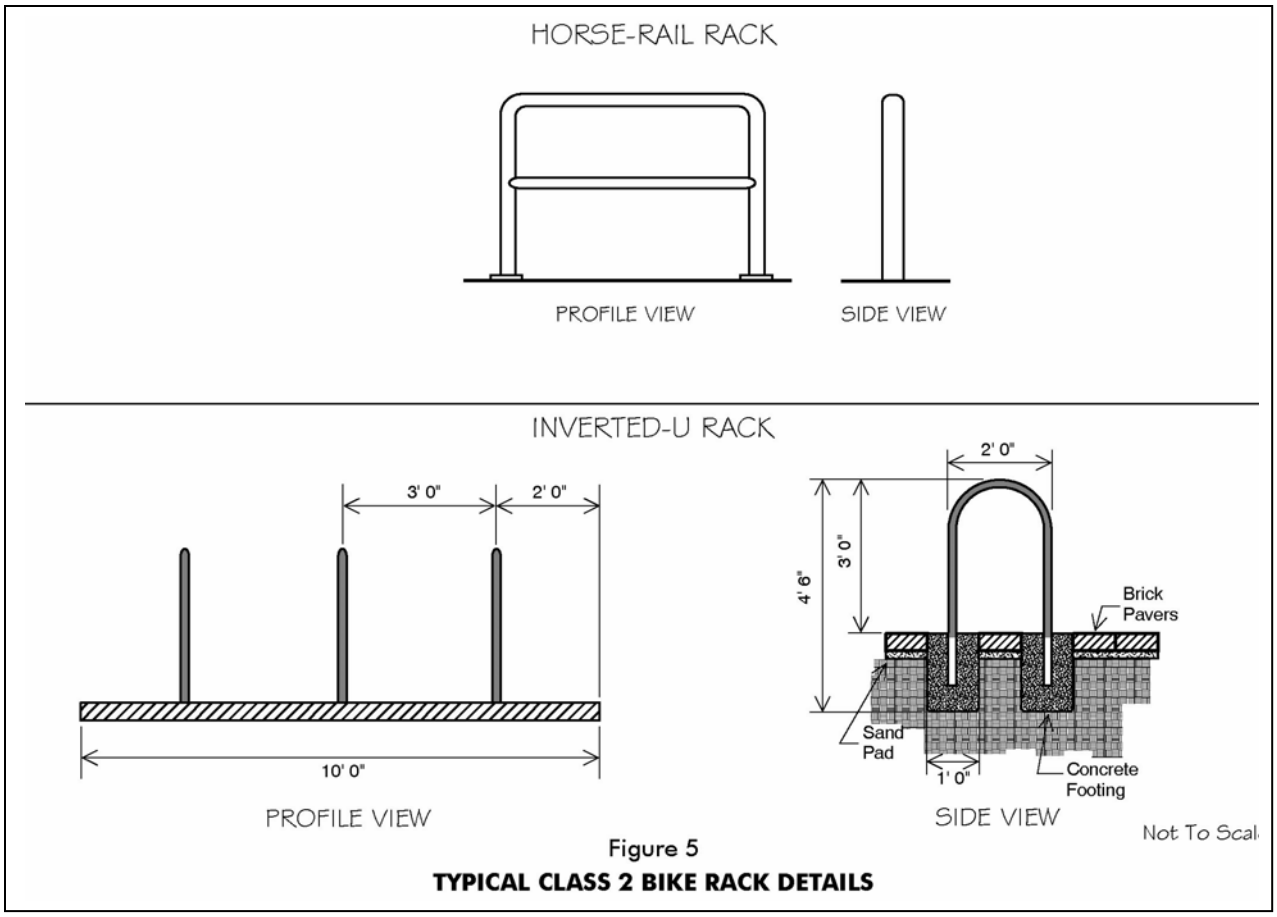


Figure 5
TYPICAL CLASS 2 BIKE RACK DETAILS

Bicycle Parking Placement

Correct placement of bike racks is essential both for security reasons and so that they can be used to their maximum capacity. The Palo Alto Municipal Code contains the following regarding the placement of bike racks.

3(A)All Class III facilities must be located at street floor level.
(B)The following general design standards shall be observed:

(1)Class II and Class III facilities shall provide at least a twenty-four-inch clearance from the centerline of each adjacent bicycle, and at least eighteen inches from walls or other obstructions.

(2)An aisle or other space shall be provided to bicycles to enter and leave the facility. This aisle shall have a width of at least five feet (1.5 meters) to the front or the rear of a standard six-foot (1.8 meters) bicycle parked in the facility.

(3)Parking facilities shall support bicycles in a stable position without damage to wheels, frame, or components. Facilities designed for hanging or vertical storage of bicycles shall not satisfy the requirements of this chapter.

(4)Bicycle parking *should be situated at least as conveniently as the most convenient vehicle parking area. Bicycle and vehicle parking areas shall be separated by a physical barrier or sufficient distance to protect parked bicycles from damage by vehicles.*

(A)Class I facilities at employment sites shall be located near the building entrances used by employees.

(B)Class II or Class III facilities intended for customers or visitors shall be located near the main building entrances used by the public.

(5)Paving of bicycle parking areas is required.

(6)Convenient access to bicycle parking facilities shall be provided. *Where access is via a sidewalk or pathway, curb ramps shall be installed where appropriate.*

Figures 6 through 8 reprinted from the VA Bicycle Technical guidelines, illustrate the recommended placement of racks for three types of settings:

- Sidewalks adjacent to the curd
- Plaza areas or near buildings
- Onstreet (e.g. in lieu of vehicle parking space)

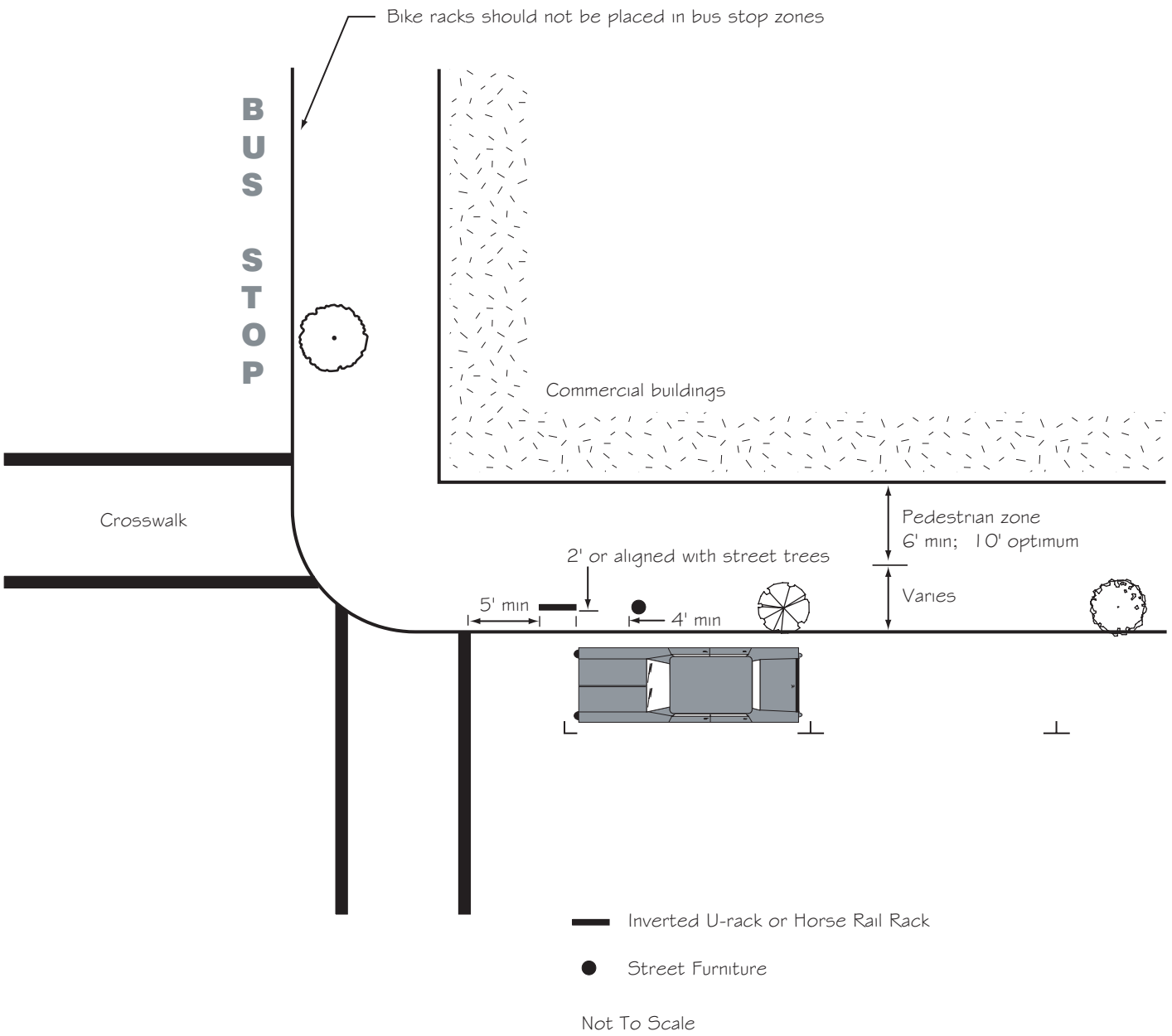
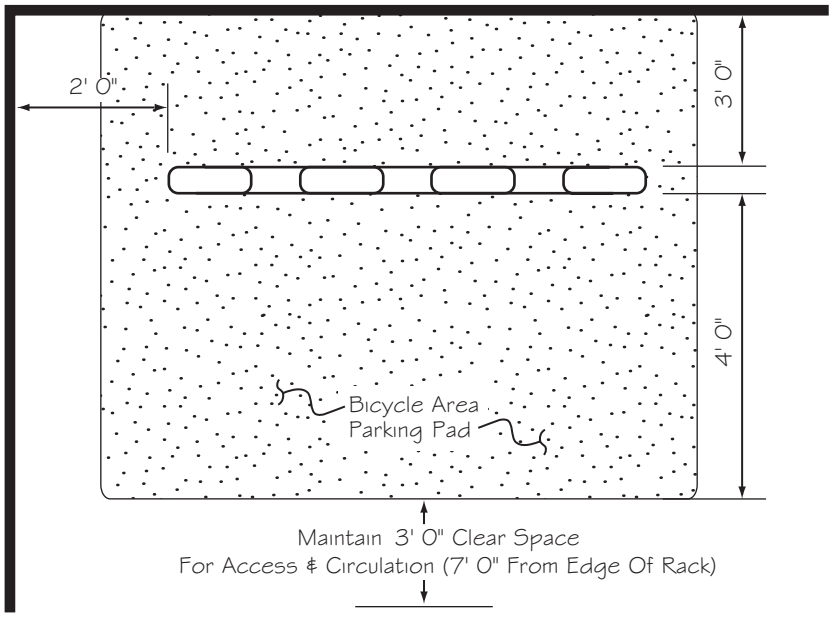
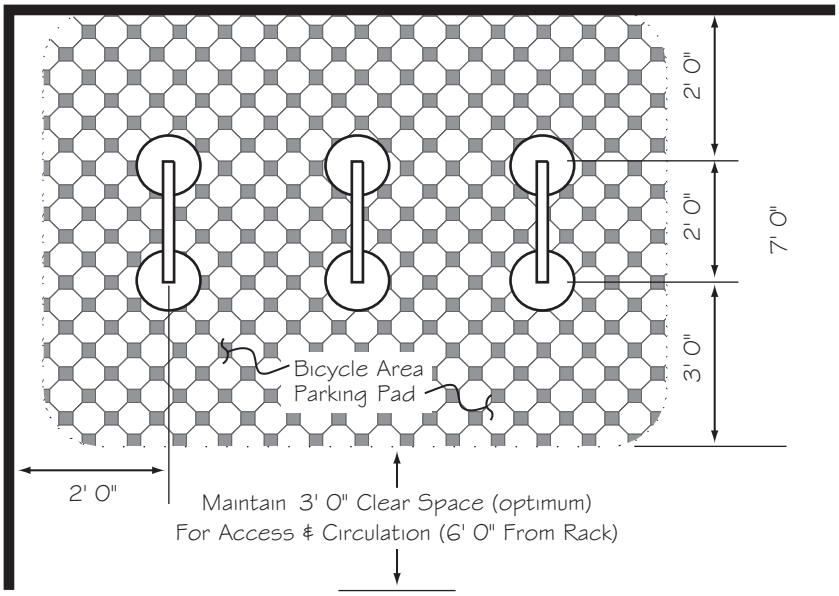


Figure 6
BIKE RACK PLACEMENT CRITERIA ADJACENT TO CURB

Wave Rack
Plan View



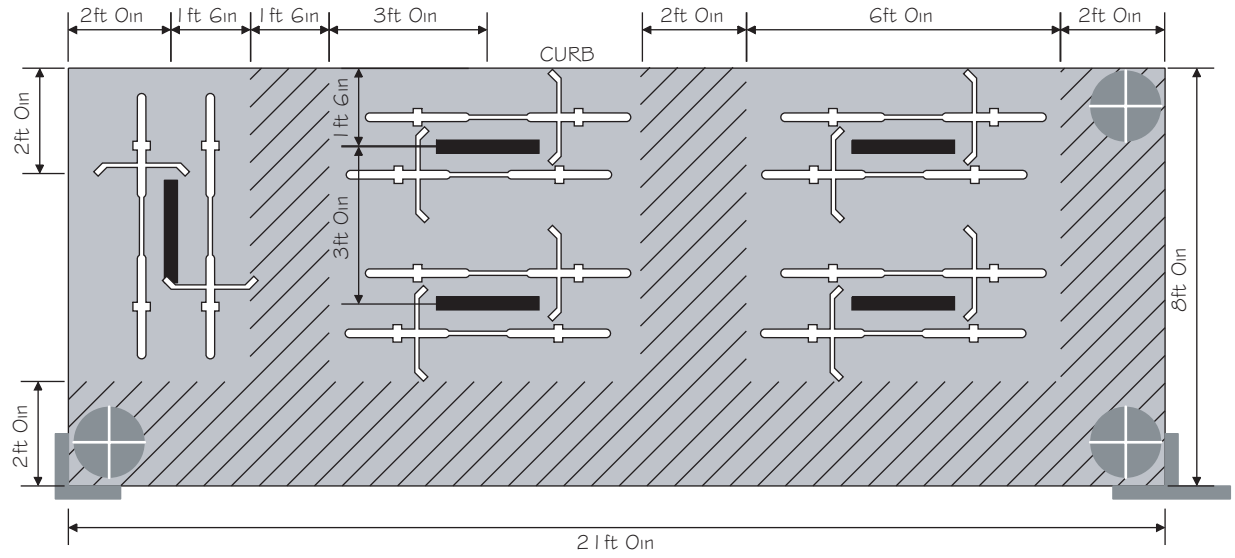
Inverted U-Racks
Plan View



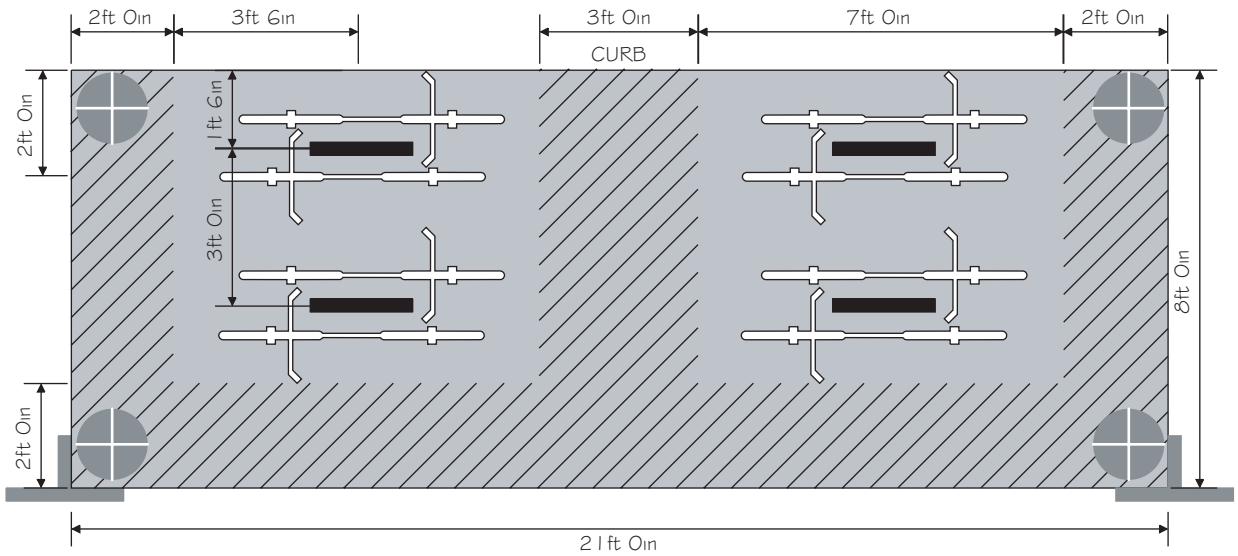
Not To Scale

Figure 7
BIKE RACK PLACEMENT DETAILS IN PLAZAS OR NEAR BUILDINGS

Bicycle parking layout for end parking space



Bicycle parking layout for internal parking space



Buffer zone between parked/moving cars and bicycle parking

Not To Scale

Figure 8

BIKE RACK PLACEMENT DETAILS