Appendix F-1
BICYCLE DESIGN GUIDELINES AND PRACTICES USED IN ALAMEDA COUNTY

Jurisdiction	Design Guidelines
County - Western unincorporated areas	Class IIIB and IIIC are used to describe bike routes with wide curb lanes (14 to 16 ft with no on-street parking) and for bike routes with wide shoulders (4 ft), respectively. Class IIIB are on multi-lane arterials and collector roadways with high traffic volumes with a curb lane width of 14 ft to 16 ft, which allows a vehicle to pass bicyclists with 2+ feet of clearance without changing lanes. Where appropriate, other travel lanes will be narrowed to 11-ft to allow the 14-16 ft width in the curb lane with no parking and 22-24 ft with on-street parking.
County - entire county	Have Bicycle Design Guidelines Document that addresses bike paths, bike lanes, bike routes, traffic calming, bicycle parking and new and innovative signage. The design guidelines also include recommendations for all roadways on issues such as maintenance, traffic signal timing and detection, right-turn conflicts, miscellaneous obstructions and conflicts (including drainage grates, roadway resurfacing edge hazards, railroad tracks, rumble strips) striping materials and typical roadway sections for new developments and redevelopment areas.
Alameda	Bicycle boulevard on street parallel to major commercial corridor (based on Palo Alto's bicycle boulevards); bicycle loop detectors installed on all arterial/arterial and arterial/collector signalized intersections on bikeway systems. When pedestrian and bicycle traffic exceeds 200 persons per hour, when possible use a minimum width of 12 feet for bike lanes and sidewalks.
Albany	Bicycle plan provides specific types of guidelines according to both the class of bike lane and existing conditions. For example, some Class I alignments where possible will run parallel to creeks, while one will run along the Bay front. For Class II, shared left turn lanes will be added. Class II will be on certain streets; 6-foot wide bike lanes on both sides of the street, while a 7-foot parking lane is maintained. Class III lanes where possible will be bike boulevards. At specified intersections, bicycle-actuated signals will be added. Class II has a 6-inch painted line separating the path from traffic; Class III has a 4-inch painted line.

Jurisdiction	Design Guidelines
Berkeley	In addition to the regular three classes of bikeways, Berkeley has two more: bicycle boulevards and Class 2.5. Boulevard design is contingent on existing conditions and community input. Class 2.5 includes removal of unsafe drainage grates, signal retiming, restriping for wider curb lanes, and "Share the Road" signs. Bike sensors are installed at all intersections with traffic-actuated signals.
Dublin	Caltrans; Iron Horse Trail EBRPD
Emeryville	Provide 5-foot bike lane where possible, frequent sweeping of bike lanes, make pavement level with gutters and grates. Bicycle racks on the Emery-Go-Around BART shuttle buses.
Fremont	TBD
Hayward	Add directional and distance signs; bike lanes where possible should be straight lines with good visibility; physically separate automobile traffic and pedestrian traffic from bicycle lane where possible. Where possible, drop bike lane stripe where right lane becomes Right-Turn-Only lane. Supplemental directional sign added to bicycle lane signs. Bike signs will be placed at all points where the route changes direction, and where possible, special optional destination signing.
Livermore	Caltrans. Warning signs to motorists; curb travel lanes at least 14 feet wide (or 21 feet with parking).
Newark	Caltrans
Oakland	Caltrans
Piedmont	TBD
Pleasanton	Class A Trails are 8-12 feet wide for multi-use path; 10 feet for multi-use along Single Track Light Rail; 8-12 feet multi-use along abandoned railroad right-of-way. Class II bike lane has lane striping; Class III has only a sign indicating bike route.
San Leandro	Primarily just Caltrans. Where possible 12 feet for 2-way Class I paths with 2% cross slope in the center line. Class II bike lanes where possible 5 ft. For Class II with vertical curb, bike lane is 12 feet for 7 feet parking and 5-foot lane (8 feet for parking if turnover of parked cars is high). For rolled curb, lane is 4 feet. Bike lane signs placed at the beginning of all bike lanes, far side of arterial intersections, at major changes in direction, and at a maximum of one-half mile intervals. Wrong-way signs on back of bike lane signs.
Union City	Caltrans
EBRPD	Publishes internal design and maintenance guidelines
Caltrans	Highway Design Manual Chapter 1000

Appendix F2
PEDESTRIAN DESIGN RECOMMENDATIONS

Sidewalks:

Good sidewalks are characterized by:

- **Accessibility**: People of all levels of ability should be able to walk easily on sidewalks. Sidewalks should meet Americans with Disabilities Act (ADA) requirements.
- **Adequate width**: Two people walking side by side should be able to pass a third person comfortably. Areas with higher pedestrian traffic should be wider, although mature development areas with existing, narrower sidewalks may not be able to accommodate ideal widths. While conditions may vary, and sidewalks may also include spaces for planting and street furnishings, the following widths are suggested:
    - Pedestrian districts: 15 feet wide including space for curb, street furnishings, through pedestrian zone and building frontage
    - City walkways: 12 feet
    - Local service walkways in pedestrian districts and on streets wider than 60 feet: 11 feet
    - Local service sidewalk/walkways in low-density residential neighborhoods: 5 feet
- **Curbs and Landscape Strips:** Physical separation between pedestrians and automobile traffic fosters a sense of safety.
- **Street Trees:** Trees along the curb line can create a canopy over the road and humanize the streets. Trees shade the sidewalk and make streets beautiful and pleasant.
- **Pedestrian Amenities:** Benches, waste containers, drinking fountains, flower and shrub containers, lampposts, kiosks, trees and pocket parks.
- **Street Lighting:** Well-lit streets feel safer and are more inviting. Lights should be centered on furnishing zone.
- **Social Space:** Places for sitting, standing, children playing and people generally interacting.

Corners:

Places where streets converge are particularly important because they tend to attract more people than areas mid-block and they allow changes in pedestrians' routes. They should be spacious, unobstructed and well-defined. Specific design guidelines for good corners include:

- **Small curb radii:** The curb radius determines in part the crossing distance for pedestrians at an intersection; the larger the curb radius, the greater the distance between opposite sides of the street. The curb radius should be as small as possible: up to 3 feet without turning movements, or 15 feet with adequate street width, parking and bike lanes. Truck routes and arterials may need wider curb radii depending on street width, number of lanes and on-street parking.

- **Curb ramps:** should direct pedestrians on to the crosswalks. In general, corners need two ramps, one in each crossing direction.

Crosswalks:

Pedestrian interaction with traffic should be clearly marked and safe. Signal and crossing designs that promote this include:

- **Clearly marked crossings**: Should be obvious to both drivers and pedestrians; see the traffic calming section for some designs.
- **Frequent crossing opportunities:** Pedestrians should have a crosswalk wherever they are likely to cross. This include both sides of intersections, areas around transit stops, and mid-block on long blocks.

Street Pattern and Design:

On a more macro-scale, street patterns can facilitate walking. Pedestrian-oriented street design elements include:

- **Logical, Grid Street Patterns**: Predictable street patterns facilitate walking because pedestrians are less likely to get lost and have to walk unexpectedly long distances. Grid street patterns offer the additional benefit of providing multiple route options to drivers, thus reducing congestion.
- **Punctuated Streetscapes**: Providing regular terminating vistas and prominent features at street ends or curve apexes make pedestrian travel more interesting.
- **Narrow Streets**: When streets are as narrow as 26 feet with tight angled corners, walkers feel safe and crossing distances are reduced. In addition, pedestrians are safer because cars must drive more slowly.
- **Short Blocks**: When blocks are short (approximately 200 feet), pedestrians have a greater variety of route options, frequent milestones, and in some cases shorter distances. Short blocks also imply more intersections, which create route choices and informal meeting places.

Traffic Calming Measures:

Traffic calming measures range from enforcing traffic laws to full roadway closure. Some traffic calming design features include:

- **Highlighted pedestrian crossings**: These crossings are created by texturing the concrete, raising the crosswalk above roadway grade, or adding pavement markings. While these measures can increase the visibility of a crosswalk to drivers, they can give pedestrians a false sense of security.
- **Rumble strips:** These consist of patterned ceramic pavement markers that transmit sound and vibration to a vehicle driving over. They call the motorist's attention to regulatory devices and road conditions that may not otherwise be apparent. However, the noise may disturb people nearby, and they may be dangerous for bicycles and motorcycles.

- **Bulb-outs**: Intersection bulb-outs widen of the corner at the intersection, resulting in a narrower roadway entrance that reduces pedestrian exposure to the intersection. They can be applied to areas mid-block as well. They shorten crossing distance for pedestrians, highlight the intersection for approaching motorists, and create areas for landscaping and pedestrian amenities.
- **Traffic circles:** Traffic circles are circular island in the middle of an intersection. Traffic goes around the circle in a counter-clockwise direction and standard controls apply (i.e., stop signs, etc.). They are effective at reducing vehicle speeds and some kinds of accidents and provide a venue for attractive landscaping. However, drivers unfamiliar with their operations may not use them correctly, and if poorly designed they may create confusing crosswalks for pedestrians.
- **Chicanes:** These consist of two or three half-circle islands several inches from the curb that jut into the street. They force vehicles to change sides at mid-block locations by narrowing the road and forcing on-coming traffic to yield. They slow traffic and provides a space for landscaping. However, inattentive motorists may hit a chicane or fail to yield to oncoming traffic.
- **Speed humps:** These are undulations in the pavement, typically 3 inches in height and 12 feet in length. They reduce vehicle speed and discourage cut-through traffic. They also have a number of disadvantages: they may cause inattentive motorists to lose control; they cause excess noise from vehicles decelerating and accelerating; when there are no curbs, they may encourage vehicles to drive on the pedestrian pathways or landscaped areas to avoid them; they may divert traffic to nearby roads; and some consider them unattractive.
- **Raised intersection:** At raised intersections, the roadway rises to a plateau that spans the intersection. These are typically constructed of textured concrete. This approach combines the effectiveness of a speed hump with highlighting an intersection. It causes vehicles to slow in a critical area and reduces the risk of conflict. On the other hand, it makes turns more difficult and can be expensive to install due to drainage concerns.
- **Diagonal diverter/forced turn channelization:** These are constructed diagonally across an intersection to force traffic to turn right or left. They reduce cut-through traffic and conflicts, increase pedestrian safety, and provide space for landscaping.
- **Half (one-way) road closures:** Half road closures restrict traffic at an intersection to travel only one-way onto one or more streets. It effectively reduces cut-through traffic in one direction, partially reduces it in the other direction, and provides space for landscaping. However it also reduces access for residents' and emergency vehicles and can divert traffic from one neighborhood to another.
- **Full road closures:** Closing the entire road, either at an intersection or mid-block, eliminates cut-through traffic, reduces vehicle speeds and improves safety for residents. Disadvantages include reducing access for residents' and emergency vehicles and potentially increasing traffic on nearby streets.

REFERENCES: CHAPTER 2 PEDESTRIAN RECOMMENDATIONS

Documents

Americans with Disabilities Accessibility Guidelines for Buildings and Facilities, Architectural and Transportation Barriers Compliance Board, as amended through January 1998.

Alameda County Traffic Calming Program, October 1996.

Mean Streets 2000: Pedestrian Safety, Health, and Federal Transportation Spending, Surface Transportation Policy Project, June 2000.

Pedestrian Master Plan, City of Portland, March 1998.

*Pedestrian Design Guid*e, City of Portland, December 1997.

San Francisco Bicycle Plan, San Francisco Department of Parking and Traffic, March 10, 1997.

Statewide Integrated Traffic Records System, California Highway Patrol, 1996-1998 data.

On-Line Resources

Feet First	(http://www.scn.org/civic/feetfirst/rights.html)
PEDS	(http://www.peds.org)
BayPeds	(http://www.baypeds.org/)
Pedestrian and Bicycle Information Center	(http://www.walkinginfo.org/)
Sierra Club	(http://www.sierraclub.org/)

All referenced sites accessed week of March 28, 2000.

Persons Contacted

Zac Wald, Executive Director of BayPeds. Telephone interview March 28, 2000.

Fran Gage, Coordinator of the Oakland Pedestrian Safety Project. Telephone interview July 27, 2000