5. Citywide Improvements

This chapter recommends physical upgrades to the walking and bicycling environment that can be made on a citywide basis. Recommendations include:

- Signalized intersection improvements for pedestrians
- Treatment guidelines for uncontrolled and mid-block crosswalks
- Parklets
- Pedestrian signage
- Bikeway signage
- Bike parking
- Bike maintenance stations
- Signal detection for bicyclists

5.1. Signalized Intersection Improvements

Signalized intersections provide key pedestrian crossing opportunities across Emeryville's major roadways: San Pablo Avenue, 40th Street, Hollis Street, Powell Street.

Recommendation

The City should upgrade all signals as they are replaced to include pedestrian countdown signal heads and audible pedestrian signals. Pedestrian countdown signals display the number of seconds remaining to cross a street until the end of the pedestrian phase, usually when the traffic signal turns yellow. Countdown signals have been shown to reduce the likelihood that a pedestrian will be caught in the crosswalk when the opposing traffic gets a green light, and can reduce the incidence of pedestrian injuries at an intersection.[20]

The City should adjust signal timing to provide a longer walking signal, to accommodate slower pedestrians, particularly at locations where seniors, children, and people with disabilities may be present. The California Manual of Uniform Traffic Control Devices permits using a walking speed of 2.8 feet per second in these circumstances.

The City should seek to reduce pedestrian wait time at signals. This can be achieved by either providing a walk light if the button is pushed within a few seconds after the light turns green, providing two walk lights per cycle, or providing the walk light whenever the light is green, eliminating the need for a pedestrian button.

5.2. Treatment Levels for Uncontrolled and Mid-Block Crossings

Uncontrolled intersections are locations without a stop sign or signal. Mid-block crossings are locations where there is a marked crosswalk in between intersections. Uncontrolled locations and mid-block crossings require unique treatments to ensure that pedestrians are visible within the roadway.

This section provides guidance about appropriate crossing treatments for uncontrolled and mid-block crossings. Recommendations are drawn from several major studies of pedestrian collision rates at marked and unmarked crosswalks. In 2002, the Federal Highway Administration (FHWA) published a comprehensive

[20] *http://www.popcenter.org/problems/pedestrian_injuries/PDFs/Markowitz_etal_2006.pdf*

report on the relative safety of marked and unmarked crossings.[21] In 2006, another study was completed that further assists engineers and planners in selecting the right treatment for marked crosswalks based on studies of treatment effectiveness.[22]

5.2.1 Recommended Guidelines for Marking and Enhancing Crosswalks

The California Vehicle Code requires vehicles to yield the right-of-way to pedestrians at any intersection where crossing is not prohibited, whether a crosswalk is painted on the roadway or not.[23] The primary purpose of painting a crosswalk is to channelize pedestrians. Well-marked pedestrian crossings prepare drivers for the likelihood of encountering a pedestrian, and reinforce the location and legitimacy of a crossing.

The City should consider uncontrolled and mid-block crossings as a candidate for marked (painted) crosswalks if there is a demonstrated need for a crosswalk including:

- Location near existing or proposed land uses or buildings with high pedestrian volumes (e.g. transit stops, schools)
- High existing pedestrian volumes
- High number or rate of pedestrian-vehicle collisions at this location (over several years)
- Nearest (adequately) marked or controlled crosswalk is far away
- Requests from the community (e.g. community surveys, direct requests, findings from walking audits, etc.)

The City should mark crosswalks at uncontrolled intersections and mid-block crossings where some of the following occur:

- Sufficient demonstrated need exists to justify the installation of a crosswalk (see above)
- The location has sufficient sight distance and/or sight distance will be improved with treatments
- Safety considerations do not preclude a crosswalk

5.2.2 Selecting Crosswalk Enhancements

When evaluating an uncontrolled or mid-block crossing for improvements, as a first step, the City should determine if the pedestrian volumes and vehicle volumes warrant installing a signal. If they do not, and the crossing is to be kept unsignalized, then the City should follow the treatment levels described below to select crosswalk enhancements.

Determining the appropriate treatment level relies on two pieces of information: the length of time a pedestrian (or bicyclist) must wait before they can cross a street (pedestrian delay), and the likelihood that motorists will yield to pedestrians or bicyclists who are crossing the street (motorist compliance). Locations with high pedestrian delay and low motorist compliance require higher level treatments, while locations with low pedestrian delay and high motorist compliance require lower level treatments.

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[21] *Zegeer, C.V., J.R. Stewart, H.H. Huang and R.A. Lagerwey. "Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations: Executive Summary and Recommended Guidelines." Report No. FHWA-RD-01-075. Washington, DC, USA: Federal Highway Administration, March 2002. http://www.walkinginfo.org/pdf/r&d/crosswalk_021302.pdf.*

[22] *Fitzpatrick, Kay, et al. Improving Pedestrian Safety at Uncontrolled Crossings. TCRP Report 112/NCHRP Report 562. 2006. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_562.pdf.*

[23] *More information on the California Vehicle Code sections related to pedestrian right-of-way is available at http://www.walksf.org/vehicleCodes.html.*

Pedestrian delay is measured using Pedestrian Level of Service (PLOS) methodology.[24] PLOS is the average delay experienced by pedestrians as they are waiting to cross the street. For crossings at bicycle boulevards and multi-use paths, the City should count bicyclists as well as pedestrians when calculating pedestrian delay.

Motorist compliance is based on field observations and engineering judgment. If drivers are likely to stop for a pedestrian, the compliance is rated "high." If drivers rarely stop for pedestrians, compliance is "low." A default compliance rate of low is suggested for all locations where the speed limit is 35 mph or greater.

Treatment levels range from Level 1, which consist of minor improvements, to Level 4, which include more intense treatments. **Table 5-1** presents a matrix that can be used to identify which treatment level is appropriate for a particular location. The treatment levels provide a list of possible treatments; the exact treatments installed at a crossing need to be based on site feasibility and engineering judgment.

Descriptions and images of treatments are included in Appendix A.

Level 1 Treatments:

- High visibility crosswalk markings, advance yield limit lines, advance signage

Level 2 Treatments:

- Curb extensions, bus bulbs, reduced curb radii, staggered pedestrian refuges, pedestrian refuge island

Level 3 Treatments:

- In-pavement flashing lights, overhead flashing beacons (on two-lane roads)
- Rectangular rapid flashing beacons (RRFB) (on multi-lane roads)

Level 4 Treatments:

- Pedestrian Hybrid Beacons,[25] also known as High Intensity Actuated Crosswalks (HAWKs; see Appendix A for a picture and more information), RRFB, new signal, or direct pedestrians to the nearest safe crossing

[24] *Note: The pedestrian level of service calculation is set forth in the Highway Capacity Manual (HCM), published by the Transportation Research Board.*

[25] *Pedestrian Hybrid Beacons are now included in the CA MUTCD*

Table 5-1. Treatment Identification Matrix for Uncontrolled and Mid-Block Crossings

Pedestrian Level of Service	Expected Motorist Compliance		
	High	Moderate	Low (or Speed ≥ 35 MPH)
LOS A-D (average delay up to 30 seconds)	**LEVEL 1** High Visibility Crosswalk Markings, Advance Yield Lines, High Visibility Signage	**LEVEL 2** Curb Extensions, Bus Bulb, Reduced Curb Radii, Staggered Pedestrian Refuge (or Pedestrian Refuge Island) **Plus LEVEL 1**	**LEVEL 3** Two-lane street: In-pavement flashers, overhead flashing beacons Multi-lane street: RRFB **Plus LEVEL 1 AND 2**
LOS E-F (average delay greater than 30 seconds)	**LEVEL 2** Curb Extensions, Reduced Curb Radii, Staggered Pedestrian Refuge (or Pedestrian Refuge Island) **Plus LEVEL 1**	**LEVEL 3** Two-lane road: In-pavement flashers, overhead flashing beacons Multi-lane road: RRFB **Plus LEVEL 1 AND 2**	**LEVEL 4** HAWK, RRFB, New Signal, or Direct Pedestrians to Nearest Safe Crossing **PLUS LEVEL 1 AND 2**

Notes:

For candidate crosswalk locations on either a multi-lane street (three or more lanes), or on two-lane streets with average daily traffic volumes greater than 12,000 or with posted speed limit of 35 miles per hour or more, enhanced treatments beyond Level 1 striping and signing may be needed. Failing to provide an enhanced crosswalk and/or removing a crosswalk because it cannot be enhanced should be an option of last resort.

A pedestrian refuge island is recommended for consideration in all scenarios where at least six feet of right-of-way is available.

A road diet is recommended for consideration in all scenarios with four or more lanes of traffic and a daily traffic volume of less than 15,000 vehicles. With a road diet, the number of travel lanes is reduced and replaced with one or more of the following: a two-way left turn lane, wider sidewalks, new bicycle or parking lanes, conversion of parallel parking to angled or perpendicular parking. A daily traffic volume of 15,000 or less is a general guideline for identifying eligible multi-lane roadways where lanes could be removed and vehicle level of service would remain the same or improve.

5.3. Parklets

Parklets are the temporary repurposing and transformation of underused street parking spaces to extend the sidewalk and create more space for pedestrian amenities or outdoor seating for adjacent restaurants and cafes. The spaces are often in the public right-of-way between the curb and travel lanes in commercial and retail areas. They occupy on-street parking spaces and excess roadway area. Parklets are intended to increase public space, enhance the pedestrian environment, and improve corridor aesthetics.

San Francisco parklet
Source: http://sfpavementtoparks.sfplanning.org/

Parklets have been implemented successfully in New York City and San Francisco. The City of Oakland developed a pilot parklet program in late 2011, and expects implementation by 2012.

San Francisco's Pavement to Parks program recommends parklets only in areas that have limited public space, narrow sidewalks, or no parks. The areas should have existing conditions that will attract people to the space, such as retail and high pedestrian activity. Parklets are generally sponsored and implemented by community benefit districts, storefront business owners, non-profit institutions, and community organizations.

Recommendation

The City should establish a parklet program, based on lessons learned from San Francisco's and Oakland's parklets program. Prior to establishing a formal citywide program the City may wish to work with local businesses to permit individual parklets on an ad-hoc basis.

In addition to areas that lack public space and have the potential for open space demand, the following characteristics are recommended for parklet locations:

- Streets with speed limits of 25 mph or less
- Streets with parking lanes
- Site is not in front of a fire hydrant or would restrict access to utility covers and valves
- Site should be a minimum of two parking spaces in length or equivalent

5.4. Pedestrian Directional Signage

Pedestrian directional signage and maps enable people to navigate through public and private space and can enhance the walking experience to help make trips safe and easy. Most cities lack sufficient signage and map information for pedestrians. Pedestrian-oriented signage can help conceptualize a space, area or city as a whole. Maps and signage can help orient both residents and visitors and enable them to calculate the time to reach a destination.

Recommendation

The City should consider a pedestrian signage program within its Pedestrian Priority Zones that provides information on direct and safe routes between key origins and destinations, and where it is possible to cross streets and railroad tracks, access buildings, connect to public transit, and find community facilities such as public bathrooms.

The City should install walking maps, starting with the Amtrak Station and the transit hub at 40th Street and San Pablo Avenue. Pedestrian-oriented directional signs, similar to those used in Oakland, are also recommended.

5.5. Bikeway Destination Signage

Given the unintuitive nature of Emeryville's street and path network, destination signage for bicyclists can significantly improve navigation around the city. Destination signs may display directional or mileage information.

Recommendation

The City should consider installing destination signs on all bikeways. Along bicycle boulevards, the City should continue to install the purple bicycle boulevard directional signs. Signage programs should be coordinated with adjoining jurisdictions. See **Appendix B** for additional recommendations and guidelines for the use of bikeway signage

Directional Signs
Directional signs should be installed before intersections at decision points such as the junction of two or more bikeways. They include destinations and associated directional arrows.

Confirmation signs
Confirmation signs display mileage to destinations and should be installed regularly along the network, including where a bikeway turns. They are located midblock or on the far side of intersections and include destinations and distances.

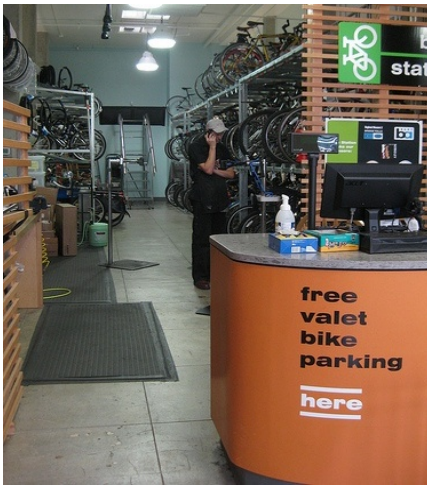
5.6. Bike Parking

Bicyclists need convenient, secure places to store their bicycles at the end of their trips; 22 percent of respondents to the *Emeryville Pedestrian and Bicycle Survey* reported that insufficient bike parking prevented them from making more bicycle trips. The City has a bicycle parking ordinance for private development.

Recommendation

The City should continue to enforce its bicycle parking ordinance and expand bicycle parking in public spaces. Additional bike parking should be provided at major transit hubs and car share locations, as well as locations identified in fieldwork and community outreach.

- Locations identified for bike parking include:
    - 40th Street at San Pablo Avenue
    - The Bay Street area
    - 40th Street at Emery Street
    - Emeryville Public Market
    - 65th Street at Hollis Street
    - 53rd Street and Hollis Street
    - Shellmound Way at Shellmound Street
    - Emeryville Amtrak station
    - 59th Street at Doyle Street
    - 45th Street at Spur Alley
    - Triangle Neighborhood
    - East BayBridge Shopping Center
    - Powell Street Plaza
    - Christie Avenue at 64th Street



The Berkeley Bike Station provides parking and other services.

- Consider establishing a bike station (an attended or restricted-access facility that offers secure bicycle parking and other amenities) at a centrally located site near transit and casual carpool locations, at the MacArthur Bart Station, and at large entertainment venues such as theaters.
- Consider bike stations (or Bike Link lockers or equivalent secure bicycle storage) to be a requirement for large developments.
- Potential locations for bike corrals (bicycle racks grouped within a parking space) include Bay Street, 59th Street between Hollis and Doyle Streets, and 65th Street between Hollis Street and Overland Avenue.
- See **Appendix B** for a detailed discussion of bike corrals, bike stations, and general design.

5.7. Bicycle Maintenance Stations

The installation of bicycle maintenance systems would support and make it easier for Emeryville residents and visitors to bicycle. These stations generally provide tire wrenches and pumps, Allen wrenches, and a few other tools allow minor adjustments. They can be installed for approximately $1,000 each and have been used successfully in Cambridge, MA. Bicycle maintenance stations are recommended at the Emeryville Public Market, along Doyle Street near Doyle-Hollis Park, and on the Bay Trail.


A bicycle repair station in Cambridge.

5.8. Signal Detection for Bicyclists

Bicycle detection at actuated traffic signals permits bicyclists to trigger a green light, even when no motor vehicle is present. California Assembly Bill 1581 requires all new and replacement actuated traffic signals[26] to detect bicyclists and to provide sufficient time for a bicyclist to clear an intersection from a standing start (see Appendix B for details). Caltrans Policy Directive 09-06 clarifies the requirements and permits any type of detection technology. The most common technologies are in-pavement loop detectors and video detection, both of which are used by the City. More recently, microwave detection has been used to detect and differentiate between bicyclists and motor vehicles.

Recommendation

The City should implement Policy 3.9 of this Plan, which states that "all signals should have functioning bicycle detection and signal timing shall be long enough to allow bicyclists to clear the intersection." Where bicyclists are required to wait over a loop detector to request a green light, a bicycle stencil should be painted on the roadway to indicate proper positioning. Bicycle detection with stencils is needed in through lanes and turning lanes. Consider installing signage to instruct bicyclists on positioning their bicycles to activate detection.

Fieldwork indicates that the following intersections do not detect bicyclists or have other issues that interfere with bicycle detection. The City should evaluate bicycle detection at these locations and improve detection if it is faulty:

- 40th Street (Some loop detectors are in poor condition and subject to stress from high traffic volumes)
- 45th Street at San Pablo Avenue (EB)
- 47th Street at San Pablo Avenue (EB and WB)
- 65th Street at Overland Street (WB)
- 65th Street at Shellmound Street (EB and WB) *
- 65th at Hollis Street (EB and WB) *
- Christie Avenue at Powell Street (SB)
- Bay Street at Shellmound Street (WB)
- Park Avenue at Hollis Street (EB and WB)
- Hollis Street at 40th Street (SB)
- Park Avenue at San Pablo Avenue (EB)
- 59th Street at Hollis Street (EB and WB)
- 53rd Street at Hollis Street (EB)
- 53rd Street at San Pablo Avenue (EB)
- Stanford Avenue at Hollis Street (EB and WB)**

Advance Signal Detection

In addition to ensuring bicyclists can trigger signals and have sufficient time to cross the street, the City should consider bicycle advance signal detection. This emerging technology detects a bicycle before the intersection, and extends the green phase to allow the bicyclist adequate time to clear the intersection. Technologies can also be programmed to collect bicycle volumes. Recent applications include City of Portland, and City of Pleasant Hill.

For more information, see http://bikeportland.org/2010/11/16/pbot-project-would-improve-signals-and-reduce-delay-for-bike-traffic-42822

** At this intersection, the stencil is not positioned over the loop detector. The existing stencil should be removed and repainted to communicate to bicyclists how to request a green light.*

[26] *Actuated traffic signals stay red until the signal detects a car or bicyclist that is waiting for the light to turn green.*

***At this intersection, bicyclists are not detected in the bike lane, but are detected in the motor vehicle lane.*

The City should replace loop detectors with video detection, microwave detection, or other effective technology. The City should also pursue an education campaign to teach bicyclists how to position their bicycles to activate loop detectors. This may include signage indicating stencils and positioning for loop detectors or video with messaging such as "Wait here for green."

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