Berkeley Pedestrian Master Plan

Final Draft
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Prepared for:

City of Berkeley
Office of Transportation
1947 Center Street, 3rd Floor
Berkeley, CA 94704
510.981.7060
Contact: Matt Nichols

Prepared by:

Alta Planning + Design
2560 9th Street, Suite 212
Berkeley, CA 94710
(510) 540-5008

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CHAPTER 1

INTRODUCTION

This Pedestrian Master Plan guides the development and enhancement of the pedestrian environment within the City of Berkeley. The plan was developed with extensive input from Berkeley residents, and seeks to ensure that safe and pleasant walking facilities are available throughout the city. Throughout this Master Plan, the term "pedestrian" refers to a person moving from place to place, on foot and/or with the use of an assistive mobility device (when that person has a disability and/or medical condition). "Walking" or "to walk" are the terms used to describe this movement of a pedestrian.

Berkeley is already a tremendously walkable city, and ranks as the safest city of its size in California for walking.[1] For years the City has been at the forefront of providing improvements for disabled residents, and Berkeley was recently designated as the "Most Accessible City in the Nation" by a panel of disability advocates and experts. The City's street grid was developed in an era in which the streetcar was the main mode of transportation, and the short, regular blocks provided excellent pedestrian access. To this day, Berkeley's neighborhoods retain much of their distinctive character and walkability. With a busy downtown and a major university, well-defined neighborhoods and shopping districts, parks, schools, pathways, transit centers, and civic facilities, Berkeley has many vibrant areas of pedestrian activity.

The City of Berkeley is committed to an urban environment that encourages and facilitates walking, supports community health, vitality and safety. In 2004 the Berkeley City Council adopted a Pedestrian Charter that outlined the following principles:

- Accessibility
- Equity
- Health and Well-Being
- Environmental Sustainability
- Personal and Community Safety
- Community Cohesion and Vitality

Berkeley City residents, leaders, and staff are committed to ensuring that the City has a truly multi-modal transportation network, where pedestrian facilities are fully integrated and residents can walk comfortably and pleasurably between a variety of destinations. This pedestrian plan builds on Berkeley's past planning efforts, including the General Plan and Pedestrian Charter, to enhance the pedestrian environment. Providing enhanced walking opportunities will further decrease residents' use of the private automobile, and will help to preserve and promote Berkeley as a place where people want to live, work and visit.

What will Berkeley be like for pedestrians in the future? This Master Plan offers a vision of a future Berkeley where:

- People can conveniently walk to their destinations.
- People feel safe walking.
- Facilities are provided for people from all age groups.
- People with disabilities are more easily mobile.
- Visitors are attracted to the enhanced walking environment.
- Commercial streets are exciting places to visit.

[1] Relative walking risk of cities 60,000 or greater. Source: *Safety in numbers: more walkers and bicyclists, safer walking and bicycling,* Jacobsen, Injury Prevention 2003; 9: 205-209

Although many of these conditions are already in place in several areas of Berkeley, the goals, policies and strategies outlined in this Plan will enhance them and address shortcomings that are of concern. The plan includes recommendations for design guidelines that will raise the caliber of the existing pedestrian environment, enticing people to walk more for shorter trips, and enhancing the environment for people with disabilities and children walking to school, and leading to an overall increase in the number of pedestrian trips. It focuses on enhancing pedestrian safety in crosswalks and along streets, and provides an opportunity for improving residents' quality of life by creating a more sustainable environment through the reduction of traffic, noise and energy consumption.

1.1. PLAN CONTENTS

The Berkeley Pedestrian Master Plan is organized according to the following chapters:

Chapter 1. Introduction

Chapter 2. Goals & Policies
This chapter presents the vision for Berkeley's pedestrian network, based on the Pedestrian Charter and Goals, Policies and Actions of the Berkeley General Plan.

Chapter 3. Relationship to Other Planning and Policy Documents
This chapter presents the framework for pedestrian planning in Berkeley. It discusses the various local, regional and other planning and policy documents that relate to the implementation of pedestrian facilities in Berkeley.

Chapter 4. Existing Pedestrian Network
This chapter presents the state of overall pedestrian infrastructure in Berkeley. It discusses the results of an extensive pedestrian facilities inventory, and discusses other features of the roadway and public rights-of-way that affect pedestrian mobility.

Chapter 5. Pedestrian Travel, Demand and Safety
This chapter discusses current and future pedestrian travel and demand in Berkeley and provides an analysis of pedestrian safety based on collision and exposure data.

Chapter 6. Recommended Projects
This chapter presents capital projects to improve pedestrian accessibility and safety in Berkeley.

Chapter 7. Recommended Programs
This chapter presents non-infrastructure programs intended to educate, encourage and increase awareness of pedestrians in Berkeley.

Chapter 8. Accessibility Recommendations
This chapter outlines recommendations related to Berkeley's compliance with the Americans with Disabilities Act.

Chapter 9. Zoning Recommendations
This chapter provides an overview of Berkeley's existing Zoning Code and design review process as they relate to pedestrian facilities, and recommends potential changes to increase the pedestrian focus of new developments.

Chapter 10. Implementation and Funding
This chapter focuses on implementation and funding for the Pedestrian Master Plan and sets out an ambitious list of projects to be implemented over the next 20 years.

1.2. PUBLIC PARTICIPATION

This plan is a result of the Berkeley Pedestrian Charter, the Berkeley General Plan Transportation Element policies, and an extensive public participation process and vision. A broad public outreach effort played an invaluable role in understanding the needs and priorities of local residents and stakeholders. The public process included ongoing meetings of the Pedestrian Subcommittee (PSC) of the City Transportation Commission, open to members of the public, at which interim work products and progress reports were presented and made available for review. A city-wide community open house was held in March 2006 as a way of publicizing the Master Plan process, informing residents about pedestrian-related planning, design and engineering in Berkeley, and allowing them to speak out about pedestrian issues in a large forum setting. Participants discussed such issues as pedestrian crossing safety, sidewalks and other general and specific pedestrian issues in the City, and identified locations they felt had safety issues. The concerns and specific locations identified were studied in the planning process and incorporated into the needed improvements list. Detailed notes from the workshop are available through the City of Berkeley Transportation Division of the Public Works Department.

1.3. HOW CITIZENS CAN USE THIS PLAN

Community members and residents can use this Pedestrian Master Plan to ensure that pedestrian needs and conditions are adequately identified, and assist the City in keeping this Plan accurate over time as it is updated. Community members can also identify city priorities and proposals and how and when they may impact their own neighborhoods or walking routes. Perhaps most importantly, community members can use this Plan to identify the various tools and strategies that are available to improve conditions on their streets and work with the City to help fund and implement these improvements.

1.4. HOW THE CITY WILL USE THIS PLAN

This document will serve as a technical resource for the City to guide the implementation of the goals and policies outlined in Chapter 2. This document will help City staff with the following steps:

- Understand opportunities and constraints with respect to the existing pedestrian system
- Evaluate trends in pedestrian usage, demand and safety
- Identify a list of projects and programs to enhance the pedestrian environment
- Identify areas where further feasibility study is necessary to evaluate proposed improvements
- Prioritize recommended projects and develop a long-term strategy for implementation
- Identify likely funding sources for identified projects and programs
- Provide detailed guidelines, standards and policies to ensure that all projects undertaken in the City incorporate best practices for pedestrian design

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CHAPTER 2
GOALS AND POLICIES

Create a model bicycle- and pedestrian-friendly city where bicycling and walking are safe, attractive, easy, and convenient forms of transportation and recreation for people of all ages and abilities.

This statement, established as Objective Six of the Berkeley General Plan Transportation Element, sets forth the City's vision for the pedestrian[1] environment in Berkeley. This Pedestrian Master Plan is intended to support and implement that objective, as well as other objectives and policies of the General Plan that relate to pedestrians.

The Pedestrian Master Plan builds off the General Plan – the objectives, policies and actions of the General Plan serve as the foundation upon which specific projects, programs, and implementation measures are identified in this Plan. The most relevant Policies and Actions from the General Plan have been carried forward into this document, and new Goals and Implementation Measures have been identified to organize and carry out the City's efforts.

Goals set the overall agenda and direction of the plan, serving as the City's guiding principles with regard to greater pedestrian access. In support of and below the overarching Goals come the plan's **Policies**. All Policies listed here have been taken directly from the Berkeley General Plan. They are by definition more focused than the Goals and offer greater direction for the promotion of walking in Berkeley, but as policy statements, they remain essentially broad in their scope. Under Policies are the specific General Plan **Actions** to be carried out by the City in pursuit of the goals higher up. At the base of the four-tiered hierarchy come the Implementation Measures developed as part of the Pedestrian Master Plan process. The **Implementation Measures** are intended to provide further detail on how to carry out the Goals & Actions under which they are listed. Implementation Measures are not included in the General Plan, and have been developed for the Pedestrian Master Plan.

Taken as a whole, the Goals, Policies, Actions, and Implementation Measures of the Pedestrian Master Plan affect how decisions at all levels in Berkeley are made: how money is allocated, how public improvements are carried out, how programs are operated, how department priorities are determined, and how private development is approved. They lay out a vision of how to sustain and expand upon the numerous initiatives already underway intended to make Berkeley a place where walking, as the most fundamental and basic form of transportation, is welcomed and is given the high priority it deserves.

2.1. GENERAL PLAN POLICIES

The Berkeley General Plan includes eight "core" policies specific to pedestrian planning issues, policies T-48 through T-55. The purpose of the General Plan is to provide a comprehensive statement of policies for the development and preservation of the City of Berkeley, and to serve as a statement of community priorities and values to guide public decision-making. Given the importance of adopted General Plan policies as guiding principles for the community, and the extensive public outreach process

[1] The term "pedestrian" refers to a person moving from place to place, on foot and/or with the use of an assistive mobility device (when that person has a disability and/or medical condition). "Walking" or "to walk" are the terms used to describe this movement of a pedestrian.

that went into adopting the General Plan, the core set of pedestrian-related General Plan policies was carried over to form the basis for the Pedestrian Master Plan. In order to maintain consistency, these policies are included as written in the General Plan, and referenced with their General Plan policy number. It should be noted that policy T-48 – "Create a Pedestrian Plan for the purpose of developing additional strategies and policies to make Berkeley safer for pedestrians and to make Berkeley a more pedestrian-friendly city" – is not included as a Pedestrian Master Plan policy because creation of the plan fulfills that policy. Policy T-48 is, however, the basis for including the Implementation Measures in this Plan.

Two other policies within the Transportation Element, but not within the core set of pedestrian policies – T-12 and T-13 – were also carried over into the Pedestrian Master Plan, as they were directly related to the goal of education, encouragement and coordination.

The Transportation Element and other elements of the Berkeley General Plan contain a number of other policies that pertain to walking, but nevertheless fall outside of the core group of Pedestrian Master Plan Policies. These policies are listed in full, following the core Policies, in **Appendix C: General Plan Pedestrian Policies**.

2.2. PEDESTRIAN MASTER PLAN GOALS, POLICIES AND ACTIONS

The Goals developed for the Pedestrian Master Plan were designed to organize the General Plan Policies and Actions into three overarching categories. All of the Master Plan Policies and Actions listed below are taken directly from the City's General Plan for consistency. The order of the policies has been reorganized so that they better fit with relevant Pedestrian Master Plan Goals. Policies and their accompanying Actions are followed by specific Implementation Measures tailored to carry out the Goals, Policies, and Actions they follow. Although some Policies overlap multiple Goals, for ease of organization each Policy has been included under the one Goal where a majority of its implementing Actions fall.

GOAL 1

Plan, Build and Maintain Pedestrian Supportive Infrastructure

This Goal includes policies, actions and implementation measures related to design standards, engineering, maintenance, funding priorities, and development review

POLICY 1.1: SIDEWALKS

Maintain and improve sidewalks in residential and commercial pedestrian areas throughout Berkeley and in the vicinity of public transportation facilities so that they are safe, accessible, clean, attractive, and appropriately lighted. (GP T-50)

ACTIONS:

A. Prioritize pedestrian-serving public improvements, such as sidewalk repair and widening, bus shelters, street trees and lighting, public art, fountains, and directional signs. (GP T-50)

Implementation Measures:

1. Routinely accommodate pedestrians in all roadway construction projects to achieve "complete streets" that serve all users, as funding allows.

2. Work to increase funding for sidewalk repair and widening, bus shelters, street trees, pedestrian-scale lighting, seating, fountains, public bathrooms and directional signage.
3. Work with transit providers to develop high quality and pedestrian accessible transit stops.
4. Prioritize crosswalks for pothole and pavement cracking repair and maintenance.
5. Budget funds for concrete cutting of tree pits to facilitate the City's street tree program and prioritize the replacement of dead or missing trees at locations with tree pits.
6. Improve pedestrian wayfinding signage in Downtown Berkeley.

B. Establish safe, attractive pedestrian connections between residential areas, transit, shopping areas, and schools and other community facilities. (GP T-50)

Implementation Measures:

1. Identify the top priority corridor improvements.
2. Work with Caltrans to implement the projects identified in the Pedestrian Master Plan that enhance pedestrian safety and connectivity across the Interstate 80 corridor and Berkeley's State Highways, including Ashby Avenue & San Pablo Avenue.
3. Pursue Safe Routes to Transit Funding.

C. Ensure that sidewalks are kept in good repair and are level, with a suitable grade for pedestrians and pedestrians using wheelchairs. Discourage, and when possible prevent, new developments from creating uncomfortably steep grades. (GP T-50)

D. Ensure adequate unobstructed sidewalk passage by appropriate placement of street furniture and amenities and prevention of obstruction of travel ways by such items as advertisement signs, merchandise, and utility boxes. (GP T-50)

POLICY 1.2: PEDESTRIAN PRIORITY

When addressing competing demands for sidewalk space, the needs of the pedestrian shall be the highest priority. (GP T-51)

Implementation Measures:

1. Maintain an accessible path of travel for all pedestrians at all times.
2. Incorporate pedestrian projects into the City's Capital Improvement Program. (CIP)
    a. Refer to the Pedestrian Master Plan when selecting priority pedestrian projects.
    b. Monitor all pedestrian projects proposed in the Pedestrian Master Plan and update feasibility, cost, need, and other information at least every 5 years.
3. Incorporate the Pedestrian Master Plan into the discretionary permit process.
    a. Require use of the Pedestrian Design Guidelines of the Pedestrian Master Plan in reviewing and approving site plans for all proposed projects receiving discretionary review.
    b. Consider connections between streets and pedestrian pathways in land development review.

   c. Encourage and provide incentives for development patterns and site plans that promote walking, increase connectivity between buildings and sidewalks, and allow for short trips between multiple destinations.

4. Pursue revisions to the zoning ordinance that will help implement the Plan.
   a. Incorporate proposed design and zoning changes in the design guidelines section of this plan into updates of the zoning ordinance.
   b. Develop requirements and incentives for commercial property owners to provide pedestrian features into new projects.
5. Maximize the amount of financial resources available for pedestrian projects.
   a. Develop and update a 20-year Financial Plan.
   b. Apply for local, State, and Federal grants for pedestrian projects.
   c. Fund adequate staffing for planning, engineering (including Public Works engineering staff and consultants) and fundraising activities.
   d. Secure General Funds for pedestrian infrastructure.
   e. Consistent with Policy T-6 of the General Plan, institute a Transportation Services Fee for new development projects to mitigate traffic impacts and fund pedestrian improvements.
6. Explore and implement more effective mechanisms to enforce compliance with existing city ordinances dealing with sidewalk obstructions, including, but not limited to, vegetation incursion and parking on or across sidewalks.
7. Consider conversion of portions of the public right-of-way to pedestrian zones in locations with high pedestrian volumes and supporting uses. Feasibility of such conversions should include the impact on utilities, sanitary sewer, storm drains, and other infrastructure.

POLICY 1.3: PATHWAYS

Develop and improve the public pedestrian pathway system. (GP T-54)

ACTIONS:

A. Allocate resources to identify and improve pathways in disrepair. (GP T-54)

   Implementation Measures:

   1. Identify protective mechanisms and develop guidelines for optimal operational conditions including responsibility, control, access, and maintenance
   2. Develop a strategy to prevent the loss of existing pathways and identify opportunities to expand the pathways network
   3. Work with Federal, State and local agencies to identify current and future funding opportunities for pathway improvements

B. Maintain a complete and accurate inventory and database of Berkeley's Pathway Network, to include all known public paths, dedicated easements and rights-of-way. (GP T-54)

Implementation Measures:

1. Identify conditions of existing pathways that are at risk of being lost, are neglected or require enhanced connectivity, access or maintenance

C. Work with residents and interest groups adjacent to pathways to prepare a "Top Priority Improvement List" for pathway restoration. Give highest priority for public investment to paths that: 1) include neighbor support and a clear title, 2) provide an evacuation route, 3) continue existing paths, and 4) improve neighborhood circulation and provide access to community services and facilities. (GP T-54)

Implementation Measures:

1. Protect, maintain and expand residential connections including easements and historically used pedestrian short cuts that reduce walking distances and encourage walking
2. Identify appropriate mechanisms to require or encourage project applicants to provide pathways within commercial and residential development proposals
3. Continue the close coordination between the Public Works Engineering Division and interest groups such as the Berkeley Path Wanderers to prioritize and complete pathway improvements.

D. Continue to make repairs and safety improvements on public paths and restore unimproved paths. (GP T-54)

POLICY 1.4 NEIGHBORHOOD PROTECTION AND TRAFFIC CALMING

Take actions to prevent traffic and parking generated by residential, commercial, industrial or institutional activities from being detrimental to residential areas. (GP T-20)

Implementation Measure:

1. Ensure General Plan Policies and Actions regarding neighborhood protection and traffic calming are implemented. Neighborhood protection and traffic calming actions can include strategies and devices to slow traffic, support for neighborhood traffic watch associations, and education and enforcement strategies.
2. Develop a formalized Traffic Calming Request procedure to evaluate and prioritize resident requests, utilizing the traffic calming guidance in Policy T-20 of the General Plan. All traffic calming improvements should be justifiable countermeasures to a demonstrable problem or issue raised by a resident or identified by City Staff.

GOAL 2

Provide Universally Safe and Equal Access

This Goal includes policies, actions and implementation measures related to American Disabilities Association (ADA), safe crossings, access to destinations, and reducing conflicts and collisions

POLICY 2.1: DISABLED ACCESS

Improve pedestrian access for the entire disabled community. (GP T-49)

ACTIONS:

A. Fund sidewalk, crosswalk, curb, signalization and signage, and talking signal improvements. (GP T-49)

Implementation Measures:

1. Carry out the ADA transition plan as scheduled.
2. Insure that the ADA transition plan includes the Policy & Actions of GP T-49.
3. Explore and seek funding for motion detection technology for pedestrian actuated signals.

B. Use regulation and incentives to require or encourage accessibility upgrades for private businesses. (GP T-49)

C. Encourage businesses to exceed the minimum standards set by the ADA "readily achievable barrier removal" requirement. (GP T-49)

POLICY 2.2: PEDESTRIAN SAFETY AND ACCESSIBILITY

Provide safe and convenient pedestrian crossings throughout the city. (GP T-52)

ACTIONS:

A. Seek to ensure that the distance between signal-controlled intersections, "smart crosswalks," or stop signs is never more than one-quarter mile on major and collector streets. At intersections with severe or high pedestrian/automobile collision rates and at heavily used pedestrian crossings, consider all-way stop signals that allow the free flow of pedestrians through the intersection, “smart” signals to calm traffic and improve intersection safety, and pedestrian/bicycle-activated signals that allow bikes and pedestrians to cross busy streets without inviting traffic onto cross streets. (GP T-52)

Implementation Measure:

1. Identify locations where pedestrian signals need to be re-programmed to allow for longer pedestrian phases to accommodate slower walkers

B. Consider pedestrian crosswalk "runway" lights (in-pavement flashing crosswalk lights) in the pavement at intersections with severe or higher than average pedestrian collision rates. (GP T-52)

Implementation Measure:

1. Consider using flashing beacons in areas where in-pavement flashing crosswalk lights may be difficult to install or maintain.

C. Encourage and educate the public on the use of painted and unpainted crosswalks; enforce jaywalking regulations on main arterials. (GP T-52)

D. Encourage the creation of accessible pedestrian medians or islands in wide streets where people have to cross more than two lanes. (GP T-52)

E. Enforce pedestrian right-of-way laws. (GP T-52)

POLICY 2.3: INTERSECTIONS WITH SEVERE OR HIGH COLLISION RATES

Reduce pedestrian and bicycle collisions, injuries and fatalities. (GP T-53)

ACTION:

A. Undertake a review of intersections or street locations with a high number of collisions and/or a high percentage of fatal or permanently disabling collisions and develop programs with appropriate mix of education, enforcement and engineering changes to improve the safety of these intersections and locations. Consider:

1. Adding signage at intersections, warning the public that the intersection has been the site of several traffic collisions or fatalities. (GP T-53)
2. Moving bus stops to the far side of the intersection so that buses do not block visibility at the intersection when stopping to pick up passengers. (GP T-53)
3. Providing an all-red, pedestrian phase to especially congested intersections, giving pedestrians the ability to cross the intersection in any direction before vehicles are given a green light. (GP T-53)
4. Lighted crosswalks. (GP T-53)
5. Maintaining a minimum 50-foot red, no-parking zone adjacent to the intersection to increase visibility. (GP T-53)
6. Re-timing pedestrian crossing signals to allow more time for pedestrian crossing. (GP T-53)

Implementation Measures:

1. Review collision data from the Statewide Integrated Traffic Records System (SWITRS) annually
2. Using measures of pedestrian exposure (collisions per pedestrian; collisions per motor vehicle) in citywide collision analysis, develop a list of potential project locations for further study and prioritization

POLICY 2.4: STREET NETWORKS: INCREASING ACCESS AND MOBILITY

To ensure the effective and convenient movement of people and goods, ensure a successful integration of land use patterns and transportation systems, and encourage transitions to more environmentally sensitive modes of transportation, the Berkeley General Plan includes four network maps: the Vehicular Circulation Network map, the Transit Network map, the Bicycle Circulation Network map, and the Emergency Access and Evacuation Network map. The network maps identify the City's transportation infrastructure and establish priorities and standards for its use and improvement. These priorities and standards shall be used in conjunction with General Plan policies to determine priorities for use and determine network modifications to facilitate certain modes of travel. In all cases, the City shall recognize that the transportation network is a shared network that requires shared use and that to effectively achieve the transportation, land use, community safety, and economic development objectives of the General Plan will require careful consideration and balancing of competing objectives and needs. The network maps are intended to facilitate these future decisions. (GP T-55)

Additional Proposed Network Map:

During the development of this Pedestrian Master Plan, a GIS-based sidewalk centerline network model was developed. The model includes sidewalk centerlines, sidewalk widths, pathway and stair centerlines, the location of audible pedestrian signals, pedestrian actuated signals and pedestrian count-downs, and the location and types of crosswalks, traffic calming devices, curb ramps, and signage. Figures 4-1 through 4-4 in Chapter Four of this plan show the model in its most simple form: as a pedestrian network map that includes sidewalks, crosswalks and pathways. However, the network model's usefulness as a tool for organizing data on the attributes of these four basic pedestrian network features goes far beyond this map. The network model gives the City new methods of pedestrian planning, analysis and asset management. It is recommended that Berkeley amend the General Plan to officially adopt the pedestrian network model and Figures 4-1 through 4-4 as the City's sidewalk network map.

GOAL 3

Develop Pedestrian Supportive Encouragement and Enforcement Programs

This Goal includes policies, actions and implementation measures related to education, encouragement, enforcement, and coordination with other institutions.

POLICY 3.1: EDUCATION AND ENFORCEMENT

Support, and when possible require, education and enforcement programs to encourage carpooling and alternatives to single-occupant automobile use, reduce speeding and increase pedestrian, bicyclist and automobile safety. (GP T-12)

ACTIONS:

A. Consider developing a program that rewards households, block groups or neighborhood organizations that can document their reduction in automobile use. Consider discounts on electric bicycles to reward automobile use reduction. (GP T-12)

B. Encourage hotels, motels and other visitor destinations to provide visitors with information on public transportation and bicycle services and facilities. (GP T-12)

Implementation Measures:

1. Encourage people to walk through education and awareness efforts
    a. Conduct effective pedestrian awareness campaigns
    b. Educate city residents in such a way as to enable a cultural shift that embraces the many benefits of walking
    c. Promote and conduct walk to work and walk to school days
    d. Develop an outreach campaign to educate motorists regarding pedestrian right-of-way
    e. Coordinate with the health community, schools and other organizations interested in promoting improved pedestrian access
2. Enforce laws that protect pedestrians
    a. Emphasize pedestrian right-of-way, especially in high pedestrian use zones, through a combination of signage and increased enforcement

b. Conduct targeted enforcement of pedestrian right-of-way violations (crosswalk stings) especially on multilane roadways

c. Conduct and expand targeted education and enforcement campaigns aimed at school drop-off and pick-up or school zone locations

POLICY 3.2: MAJOR PUBLIC INSTITUTIONS

Work with other agencies and institutions, such as the University of California, the Berkeley Unified School District, Lawrence Berkeley Laboratory, Vista Community College, the Alameda County Court, and neighboring cities to promote Eco-Pass and to pursue other efforts to reduce automobile trips. (GP T-13)

ACTIONS:[2]

A. Encourage other agencies and institutions to match or exceed the City of Berkeley's trip reduction and emission reduction programs for their employees. (GP T-13)

C. Encourage the University of California: (GP T-13)

1. To maintain and improve its facilities and programs that support and encourage pedestrians, bicyclists and transit riders.

3. To locate non student-serving offices and additional staff and student housing at or near BART stations outside Berkeley.

Implementation Measures:

1. Encourage the University of California to develop and adopt a Pedestrian Safety Action Plan and to invest in the improvement of pedestrian safety at access points to the University campus

D. Encourage the Berkeley Unified School District to establish programs and facilities to reduce automobile use among staff, faculty and students, including (GP T-13):

Implementation Measures:

1. Identify and fund programs and improvements that will make it safer and more attractive for students to walk to school:
    a. Assist in the development of a Safe Routes to School program
    b. Provide coordination between local organizations, schools, the community, parents, neighborhoods, and City departments
    c. Apply for state Safe Routes to School funding and other grants to implement educational and encouragement programs in addition to capital improvements
2. Develop and maintain maps that identify the most appropriate routes for children to access school.
    a. Obtain input and buy-in by individual school principals for the walking route maps
    b. Provide maps to City schools for distribution
    c. Review maps every five years and update when appropriate

[2] This is not a complete listing of the Actions found under Policy T-13 in the General Plan. Only those actions most directly relevant to promoting walking have been included.

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CHAPTER 3

RELATIONSHIP TO OTHER PLANNING AND POLICY DOCUMENTS

Where the previous chapter established specific Goals, Policies, Actions, and Implementing Measures for the Pedestrian Master Plan, this chapter provides a summary of the relevant planning, policy and regulatory documents that comprise the broad framework for pedestrian* planning within the City of Berkeley. The City and other local and regional agencies are aware of the importance of enhancing the pedestrian environment, as shown in the numerous recommendations in these planning documents that relate to improving land uses, transit, sidewalks, intersections, and streetscapes to make them more pedestrian-friendly. City documents such as the General Plan, specific area plans and transportation plans, along with county and regional plans, and state and federal policies, are discussed as they relate to the planning and development of pedestrian facilities and programs in Berkeley.

3.1. BERKELEY PEDESTRIAN CHARTER

The City of Berkeley Pedestrian Charter was adopted by Council Resolution no. 62,452 on April 27, 2004. This document, although not legally binding, symbolically represents the desire of the City to support development of institutional changes that will encourage the future development of legally binding standards for providing pedestrian facilities.

The City of Berkeley:

1. Upholds the right of pedestrians of all ages and abilities to safe, convenient, direct and comfortable walking conditions;
2. Provides a walking environment within the public right-of-way and in public parks that encourages people to walk for travel, exercise, and recreation;
3. Supports and encourages the planning, design, and development of a walking environment in public and private spaces (both exterior and interior) that meets the travel needs of pedestrians;
4. Provides and maintains infrastructure that gives pedestrians safe and convenient passage while walking along and crossing streets;
5. Maximizes residents' access to basic community amenities and services by walking;
6. Sets policies that reduce the conflict between pedestrians and other users of the public right-of-way;
7. Creates walkable communities by giving high planning priority to compact, human-scale and mixed land use;

* The term "pedestrian" refers to a person moving from place to place, on foot and/or with the use of an assistive mobility device (when that person has a disability and/or medical condition). "Walking" or "to walk" are the terms used to describe this movement of a pedestrian.

8. Ensures that pedestrian amenities provide equal access by all persons with disabilities and medical conditions;
9. Encourages research and education on the social, economic, environmental, and health benefits of walking as a form of travel, exercise and recreation;
10. Promotes laws and regulations that respect pedestrians' particular needs;
11. Advocates for improving the governmental regulatory and funding frameworks that affect the City's ability to improve the pedestrian environment; and
12. Works with individual citizens, community groups and agencies, businesses, and other levels of government to achieve these goals.

3.2. BERKELEY GENERAL PLAN POLICIES T-48 THROUGH T-55

The Berkeley General Plan sets the framework for the physical development of the City. The General Plan identifies seven major goals, two of which relate directly to pedestrians and the pedestrian environment:

Goal #1: Preserve Berkeley's unique character and quality of life.

As one of the older East Bay cities that developed around the streetcar routes, Berkeley has several pedestrian-oriented commercial areas as well as walkways and stairways that provide access and connections. Reducing traffic and encouraging transit and alternative modes would preserve the quality of life and improve pedestrian and bicycle safety.

Goal #7: Maintain Berkeley's infrastructure, including streets, sidewalks, buildings, and facilities; storm drains and sanitary sewers; and open space, parks, pathways, and recreation facilities.

Maintenance of sidewalks and pathways would preserve the character and livability of the City.

The General Plan is divided into nine elements. Policies related to pedestrians are found throughout the various elements of the General Plan, although a "core" set of pedestrian policies are found in the Transportation Element in policies T-48 through T-55. These core policies, along with three additional Transportation Element policies related to education, encouragement and coordination, and engineering served as the foundation for the Pedestrian Master Plan Goals, Policies, Actions and Implementation Measures discussed in Chapter Two.

POLICY T-48 PEDESTRIAN PLAN

Create a Pedestrian Plan for the purpose of developing additional strategies and policies to make Berkeley safer for pedestrians and to make Berkeley a more pedestrian-friendly city.

POLICY T-49 DISABLED ACCESS

Improve pedestrian access for the entire disabled community.

POLICY T-50 SIDEWALKS

Maintain and improve sidewalks in residential and commercial pedestrian areas throughout Berkeley and near public transportation facilities so that they are safe, accessible, clean, attractive, and appropriately lighted.

POLICY T-51 PEDESTRIAN PRIORITY

When addressing competing demands for sidewalk space, the needs of the pedestrian shall be the highest priority.

POLICY T-52 PEDESTRIAN SAFETY AND ACCESSIBILITY

Provide safe and convenient pedestrian crossings throughout the city.

POLICY T-53 INTERSECTIONS WITH SEVERE OR HIGH COLLISION RATES

Reduce pedestrian and bicycle collisions, injuries, and fatalities.

POLICY T-54 PATHWAYS

Develop and improve the public pedestrian pathway system.

POLICY T-55 STREET NETWORKS: INCREASING ACCESS AND MOBILITY

To ensure the effective and convenient movement of people and goods, ensure a successful integration of land use patterns and transportation systems, and encourage transitions to more environmentally sensitive modes of transportation, the Berkeley General Plan includes four network maps: the Vehicular Circulation Network map, the Transit Network map, the Bicycle Circulation Network map, and the Emergency Access and Evacuation Network map. The network maps identify the City's transportation infrastructure and establish priorities and standards for its use and improvement. These priorities and standards shall be used in conjunction with General Plan policies to determine priorities for use and determine network modifications to facilitate certain modes of travel. In all cases, the City shall recognize that the transportation network is a shared network that requires shared use and that to achieve the transportation, land use, community safety, and economic development objectives of the General Plan will require careful consideration and balancing of competing objectives and needs. The network maps are intended to facilitate these future decisions.

POLICY T-12 EDUCATION AND ENFORCEMENT

Support, and when possible require, education and enforcement programs to encourage carpooling and alternatives to single-occupant automobile use, reduce speeding, and increase pedestrian, bicyclist and automobile safety.

POLICY T-13 MAJOR PUBLIC INSTITUTIONS

Work with other agencies and institutions, such as the University of California, the Berkeley Unified School District, Lawrence Berkeley Laboratory, Vista Community College, the Alameda County Court, and neighboring cities to promote Eco-Pass and to pursue other efforts to reduce automobile trips.

POLICY T-20 TRAFFIC CALMING

General Plan Polity T-20 is a neighborhood protection and traffic calming policy. The policy includes policy actions designed to encourage traffic calming strategies.

City staff has developed the following procedure to implement this policy. There are two ways Berkeley identifies traffic calming opportunities, when a street is reconstructed or repaved and upon an individual's request. At the time of reconstruction, City engineers evaluate the project to identify any needed signs and markings. Berkeley will act on traffic calming requests that come from individuals or via petition. Once a request is received, the city conducts a preliminary review of traffic speed and volumes, collision history and roadway geometry to see if the road is eligible for traffic calming. A street must meet the following requirements to be eligible for traffic calming measures:

i) It must be a residential street, AND

ii) the project must mitigate a documented bike/ped collision pattern AND/OR

iii) where 85th percentile speed profile is greater than 5 MPH over posted speed, AND

iv) where there is a documented problem of a significant or inappropriate number of "through" motor vehicles on the street or in the neighborhood; AND

v) in the case of "physical" traffic calming measures, where 50% +1 of households, within one block of the proposal, who have expressed their opinion in a City-sponsored poll, such as a questionnaire, support the proposal.

Once a street is deemed eligible, staff conducts a traffic study and makes recommendations for traffic calming solutions. The study uses a ranking system to evaluate the criteria below. Each criterion allots points to rank and prioritize projects.

- Traffic speeds
- Safety
- Crosswalks and sidewalks
- Proximity to traffic control devices
- Bus stops
- Bike facility
- Trail of less-restrictive, non-physical, traffic calming measures
- Driveways
- Traffic volume
- Proximity to destinations
- Proximity to physical traffic calming measures

In addition to the "core" Transportation Element pedestrian policies listed above, there are a number of other policies in the General Plan that make reference to pedestrian improvements or are otherwise relevant to the pedestrian environment. These additional policies are summarized in Appendix C.

3.3. BERKELEY AREA PLANS

Berkeley's General Plan works in concert with the City's more detailed Area Plans. The goals and policies of the General Plan and Area Plans are internally consistent and each must be considered when making decisions. Most of the City's previously adopted Area Plans were incorporated into the most recent General Plan, which was last updated in 2003. Since that time, three new Area Plans have been developed: the Draft Southside Area Plan, the Marina Master Plan and an updated Draft Downtown Area Plan. A list of Berkeley Area Plans and adoption dates is included below in **Table 3-1**. **Figure 3-1** shows the geographic areas covered by the City's area plans. The Area plans are organized in a format similar to the General Plan with sections on Transportation, Economic Development, Community Character, Land Use and Housing, Public Safety, and Design Guidelines. Most of these also include specific improvements that were used to inform recommended projects within this plan.

Table 3-1
Berkeley Area Plans

Area Plans	**Date**		
Southside Area Plan (Draft)	Jul	23	2003
Berkeley Marina Master Plan & Environmental Documents	Jul	8	2003
San Pablo Avenue Public Improvement Plan	Oct	15	2003
North Shattuck Urban Design & Circulation Report	Jun	15	2000
South Shattuck Strategic Plan	Jun	9	1998
University Avenue Strategic Plan	Nov	12	1996
West Berkeley Plan	Dec	14	1993
Berkeley Downtown Plan	Nov	27	1990
South Berkeley Area Plan	Jun		1990
Berkeley Waterfront Plan	Oct	7	1986

3.3.1. DRAFT SOUTHSIDE AREA PLAN, 2003

The Draft Southside Area Plan, published in July 2003, covers the area of Berkeley immediately south of the UC Berkeley campus, roughly bounded by Bancroft Way, Prospect Street, Dwight Way, and Fulton Street. Key pedestrian activity areas in this area include Telegraph Avenue, Bancroft Way, and College Avenue. Telegraph Avenue is a major retail and transit corridor lined with restaurants, shops, sidewalk vendors, and some housing. Bancroft Way, located along the southern boundary of UC Berkeley's campus, is also a key transit corridor lined with some retail and event halls on campus such as Zellerbach Hall, Haas Sports Pavilion and Pacific Film Archive. Most activity on Bancroft is located between Dana Street and College Avenue. A heavily utilized bus route and a significant concentration of student housing is found on and along College Avenue, which runs through the Elmwood district.

The Southside Plan includes the following elements: Transportation, Economic Development, Community Character, Land Use and Housing, Public Safety, and Design Guidelines. Policies from the Southside Plan include specific improvements or projects as well as area-wide improvement programs and design guidelines.

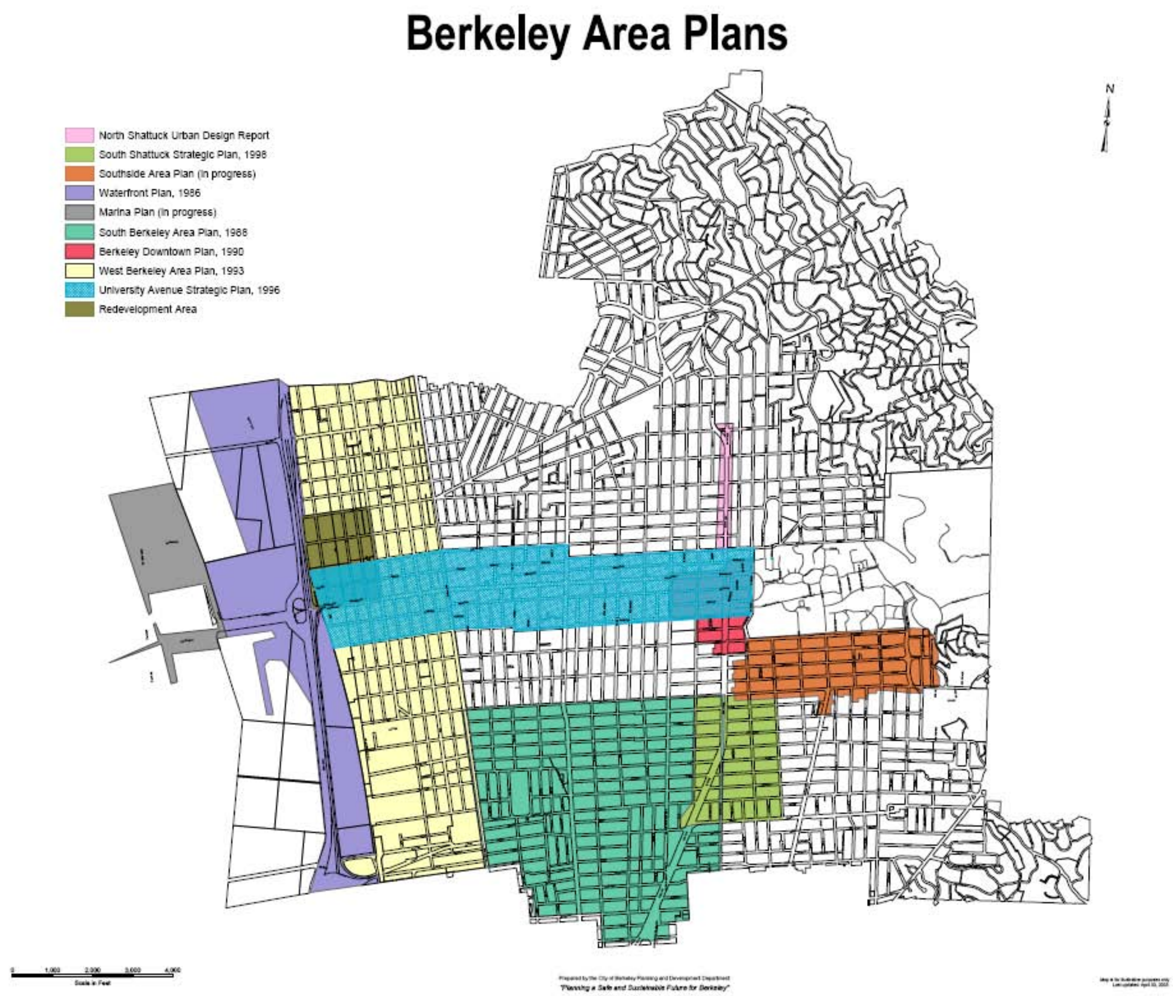


Figure 3-1: Berkeley Area Plans (as of April 30th, 2003)
Source: City of Berkeley Planning and Development Department

The specific improvements or projects in the Southside Plan are repairing damaged sidewalks on Telegraph Avenue, improving safety at the major pedestrian intersections of Dana/Bancroft, College/Bancroft and Ellsworth/Bancroft with traffic controls, and eliminating fast vehicle right-turns at Bancroft/Oxford. The other safety improvements in the Plan are redesigning and improving "High Hazard" intersections for pedestrian safety at Durant/Telegraph, Bancroft/Telegraph, Dwight/Telegraph, Bancroft/Bowditch, Bancroft/Dana, and Bancroft/College. The actions also include streetscape improvements as well as preservation of existing north-south mid-block passageways between Bancroft and Channing west of Telegraph.

Specific programs outlined in the Berkeley Southside Plan are enforcement of traffic laws, especially as they apply to pedestrians and illegal parking. Under Community Character, Policy E4, Action B calls for developing a pedestrian safety plan to identify which streets are most heavily used by pedestrians and should be prioritized for improvements to lighting, emergency telephones, signage, street tree maintenance, outreach for property owners about pruning, and preserving mid-block pedestrian pathways. Other polices and actions under Transportation and Community Character address streetscape design guidelines, such as street furniture, trees and plantings, zebra-striped crosswalks, bulbouts, pedestrian-level lighting, gateways, and signage.

3.3.2. BERKELEY MARINA MASTER PLAN, 2003

The Berkeley Marina Master Plan planning area is located west of Eastshore Park and includes the Berkeley Marina, Marina Drive, Spinnaker Way, and Seawall Drive. The Marina Plan provides a framework for facility improvements and enhancements in this area as well as maintaining the public's use of the Marina and neighboring parks.

The Plan suggests enhancing the Marina area's pedestrian accessibility by linking the Marina's existing pedestrian paths and sidewalks paths to the I-80 bike/pedestrian overcrossing. The Marina Master Plan also sets a policy to improve the area's pedestrian amenities with new signage, increasing landscaping, and enhancing public areas with public art. The Marina Master Plan recommends upgrading all pathways to meet ADA compliance as a capital improvement project.

3.3.3. DOWNTOWN AREA PLAN

As of 2008, The City of Berkeley is approximately two years into the planning process for creating a new Downtown Area Plan in partnership with the University of California. The City's existing plan was adopted in 1990, based on analysis conducted in the mid-1980s, which the City has determined is out of date with the current economic and development situation faced by the downtown area today. Goals from the previous Downtown Plan such as creating an Arts District have been accomplished and the City is now ready to embark on a new plan that will rely on coordinating closely with the University of California's Long Range Development Plan. A key measure of success for any attempt to create or maintain a dynamic and vibrant downtown is the level of pedestrian activity. Downtown is currently the hub of most pedestrian activity in Berkeley and this plan will address the needs of pedestrians in this high volume traffic area.

3.3.4. UNIVERSITY AVENUE STRATEGIC PLAN, 1996

The University Avenue Strategic Plan, adopted in 1996, covers University Avenue and is roughly bounded by I-80, Delaware Street, Hearst Avenue, the U.C. Berkeley Campus, and Allston Way. The University Avenue Strategic Plan provides a framework for safety improvements, pedestrian oriented development, and pedestrian access.

Action items in the Plan include improved design and transportation elements of the area. The University Avenue Strategic Plan sets to improve pedestrian amenities with new festival lighting, trees, and street furniture. The Plan also includes recommendations to reduce the number of mid-block curb cuts along University Avenue and implementing a signal system to reduce traffic speeds.

3.3.5. DRAFT NORTH SHATTUCK URBAN DESIGN & CIRCULATION REPORT

The Draft North Shattuck Urban Design & Circulation Report planning area is the Shattuck Avenue corridor from Hearst to Rose streets with emphasis on the block between Vine and Rose Streets. The Report is designed to provide guidance for aesthetic and pedestrian improvements. The report proposes several alternative concepts and designs. One suggested improvement includes a midblock crosswalk between Safeway and Longs Drugs to better serve pedestrians. Other proposed improvements include the creation of a plaza by narrowing the entrance to the service road parallel to Shattuck Avenue as well as widening the sidewalk on the service road.

3.4. OTHER CITY OF BERKELEY PLANS

3.4.1. AQUATIC PARK MASTER PLAN, 1990

The Aquatic Park Master Plan seeks to protect the park's natural resources while enhancing recreational use. Its goals are mitigating noise and negative visual impacts; improving circulation within the park, especially for pedestrians, bicyclists and wheelchair users; improving park habitat for wildlife; increasing the number of recreational uses and users while protecting habitat for wildlife; and improving park safety and security.

Aquatic Park has a ten-foot wide asphalt-paved walkway with adjoining gravel jogging path around the lagoon. The Aquatic Park Master Plan also recommends a pedestrian/bicycle bridge across the lagoon near Channing Way that would cut the path around the lagoon in half and provide more access to the west side of the Park.

3.4.2. BERKELEY BICYCLE PLAN

The Bicycle Plan is a policy document that was incorporated into the updated General Plan. The Bicycle Plan was first adopted in 2000 and updated in 2005. The policies and map of the bikeway network were included in the Transportation Element of the General Plan. The policies cover five main areas of importance to bicycle transportation: Planning, Network and Facilities, Education and Safety, Promotion, and Implementation.

The Bicycle Plan identifies several existing and proposed off-street pathways that provide for shared use by pedestrians and bicyclists. These include:

- Santa Fe Right of Way (West Street) path
- 9th Street bikeway extension
- Marina trails
- Bay Trail
- Ohlone Greenway
- Aquatic Park trails
- I-80 Bicycle-Pedestrian Overcrossing

While not pedestrian facilities themselves, on-street bike lanes provide a buffer between pedestrians on the sidewalk and automobiles in the traffic lanes. The Bicycle Plan also identifies a network of existing and proposed on-street bike lanes along Berkeley's street network.

The installation of signals, lighting, and other streetscape improvements also provide pedestrian amenities. The Bicycle Plan describes potential improvements such as these and can be found in **Appendix A**, Tables 17 and 18.

3.4.3. SAN PABLO AVENUE PUBLIC IMPROVEMENT PLAN, 2003

The San Pablo Avenue Public Improvements Plan was developed to create a framework for streetscape improvement projects that would complement the growing commercial investment and community uses in the areas adjacent to San Pablo Avenue. San Pablo Avenue is a major regional thoroughfare with multiple transit trunk lines including bus rapid transit. As the corridor develops over time it is important to delineate the character of Berkeley's segment of San Pablo Avenue to create a place that is both attractive to visitors as well as neighboring communities. The pedestrian related streetscape improvements called for in the plan will increase safety and accessibility for those living in the neighborhoods that flank San Pablo Avenue on either side. While San Pablo Avenue does not have the pedestrian volumes seen in downtown Berkeley, from the standpoint of equity it is important to consider how these surrounding neighborhoods gain safe access to commercial as well as public resources such as libraries, health clinics and schools.

3.5. OTHER LOCAL PLANS

3.5.1. UNIVERSITY OF CALIFORNIA LONG RANGE DEVELOPMENT PLAN, 2005

The University of California at Berkeley (UC Berkeley) 2020 Long Range Development Plan (LRDP), was approved by the University of California's Board of Regents in January 2005. The campus is bordered by Hearst Avenue, Gayley Road, Bancroft Way, and Oxford-Fulton Street, although UC Berkeley's buildings and properties extend well beyond these roadways into the City's neighborhoods. The campus is served by a comprehensive bicycle and pedestrian network that provides connections to the surrounding neighborhoods. The LRDP calls for significant increases of student housing in the Southside neighborhood and of parking and office space in the Downtown area. As pedestrian volumes increase due to these expansions, campus gateways and adjacent roadways will need modifications to accommodate them. Therefore, according to the LRDP Mitigation Measure TRA-12, "the University shall prepare a strategic pedestrian improvement plan that outlines the expected locations and types of pedestrian improvements that may be desirable to accommodate 2020 LRDP growth."

3.5.2. ED ROBERTS CAMPUS PLAN – ASHBY BART STATION

Ed Roberts Campus (ERC) is a proposed community-serving transit oriented development with planned facilities to serve as the future site of a disability rights service, advocacy, education, training, and policy center. The Ed Roberts Campus is a non-profit corporation that sponsored a series of public Community Design Workshops in 1998 and presentations to the City's various Commissions from 2000-2005. The ERC process involved major stakeholders including the City, BART and AC Transit in developing the ultimate site plan and urban design components. The campus will be located on the east side of the Ashby BART Station and will include an integrated mixed-use site with affordable housing, a community center, a health clinic, a playground, a transit center, and improved pedestrian and disabled access to and throughout the BART Station.

Overall, pedestrian related improvements identified in the ERC Plan include:

- **Pedestrian Concourse** connecting the BART station to the below-grade entrance to the ERC and to Adeline Street above via a new public elevator and staircase with bike channels;
- New **Ramp, Staircase, Pedestrian Pathway, Lighting, and Landscaping** through a reconstructed parking lot level with Adeline Street that replaces the existing terraced lot that is unsafe and difficult to patrol;
- New **Pedestrian Plaza, Paratransit Waiting Area and Transit Information Kiosk** at Adeline Street, improved with new pedestrian-scale lighting and street trees; and
- New **Crosswalks** and median improvements on Adeline Street and across a new driveway on Adeline that will move BART vehicular access off residential Woolsey Street and onto Adeline.

In addition, the City of Berkeley applied for a Transportation for Livable Communities funding cycle for a grant to install wayfinding and signage improvements within a quarter mile radius of the site and throughout the BART Station using BART's new bicycle/pedestrian sign design standards. This grant application also seeks funding to construct the pedestrian concourse between BART and the ERC.

3.6. REGIONAL PLANS

3.6.1. MTC REGIONAL BICYCLE PLAN, 2001

The Metropolitan Transportation Commission (MTC) sponsored the first bicycle plan for the entire nine-county San Francisco Bay Area. The regional bicycle network and lists of priority projects were derived through adopted county plans. The Regional Bicycle Plan identifies the Bay Trail as a shared-use pathway through Berkeley as well as the Ohlone Greenway. These paths are recommended for bicyclists and pedestrians. The Bay Trail outlined in the Regional Bicycle Plan is consistent with the Bay Trail Plan as described later in this section. The Ohlone Greenway is proposed in the Regional Bicycle Plan, and is mostly completed today.

3.6.2. SAN FRANCISCO BAY AREA OZONE ATTAINMENT PLAN FOR THE 1-HOUR NATIONAL OZONE STANDARD, 2001

Although the San Francisco Bay Area has made noteworthy progress towards reducing emissions, the area failed to meet the EPA criteria for one-hour ozone standards in 1999 and 2000. This 2001 plan amends the 1999 plan by revising elements that the EPA disapproves and adding control measures to increase the chances of meeting the one-hour ozone standard in the future. The Plan is part of the California State Implementation Plan.

This update includes five additional transportation control measures (TCMs). Among these is TCM B, the Bicycle/Pedestrian Program, which is the funding of high priority projects listed in countywide bicycle plans. This TCM was implemented with an MTC allocation of $15 million in TDA Article 3 funding starting in fiscal year 2004-2006.

3.6.3. EAST BAY REGIONAL PARKS DISTRICT MASTER PLAN, 1997

The East Bay Regional Parks District (EBRPD) includes Tilden Park, which is located directly east of the City in the East Bay hills and in Claremont Canyon in the southeast corner of the City. These parks include paved and unpaved multi-use trails. According to the EBRPD Master Plan, EBRPD will continue to plan for and expand the system of paved trails for connecting parklands and major population centers.

3.6.4. EASTSHORE STATE PARK GENERAL PLAN, 2002

The Eastshore State Park General Plan's purpose is to look at potential development opportunities and, most importantly, management of the park into the future. Eastshore State Park is eight miles long and covers the area along the San Francisco Bay from Emeryville to Albany, including the Berkeley Marina. In Berkeley, Gilman Street, University Avenue, Ashby Avenue, and a bike/pedestrian bridge over I-80 access the Park.

The Plan focuses on multimodal access to and around the park with several of the circulation elements suggesting paths to decrease vehicle access in and around the park. The Eastshore State Park General Plan also recommends better Berkeley beach access for pedestrians in the Park and a better connection to the Berkeley bike/pedestrian overcrossing.

3.6.5. BART STATION PLANNING

BART has prepared basic summaries of Planning, Development, Access Improvements, and Reinvestment plans for the three Berkeley BART stations located at Ashby, Berkeley (Downtown) and North Berkeley. The summaries list most recent developments and include the following pedestrian and disability access related components for each station:

Ashby BART – A Comprehensive Station Plan will be completed in the near future to encompass both the east and west sides of the BART station. To date the most complete planning efforts have been led by the Ed Roberts Campus Plan described above. The Station Improvements are described in detail by the ERC Plan. New energy efficient lighting was installed in 2005 throughout the station area.

Downtown Berkeley BART – The summary describes recent transit oriented development projects including the Gaia Building and Berkeley Repertory Theater and the partnership with BART to provide safe access to and from the BART station. In addition, the City of Berkeley completed an Urban Design Plan for the Downtown Berkeley BART Plaza and Transit Area.

3.6.6. AC TRANSIT EVALUATION OF RAPID BUS SERVICE IN THE SAN PABLO AVENUE CORRIDOR, 2005

This report evaluating Rapid Bus Service in the San Pablo Corridor focuses on an evaluation of the rapid system through Alameda and Contra Costa Counties. The report includes bus operations, rider perception of the rapid service and an overall evaluation of the system. One feature of the Rapid Service is branded shelters with unique logos and signs. This report suggests that new riders may have learned about the new service from these branding features.

3.6.7. THE BAY TRAIL PLAN, 1989

The Bay Trail Plan proposes the development of a paved regional hiking and bicycling trail around the perimeter of San Francisco and San Pablo Bays. Approximately 200 miles of the 400-mile trail have been constructed, either as hiking or bicycling paths or as on-street bicycle lanes or routes. The Bay Trail designates a "spine" for a continuous through-route around the Bay and "spurs" for shorter routes to Bay resources. The goals of the Plan include providing connections to existing park and recreation facilities, creating links to existing and proposed transportation facilities, and preserving the ecological integrity of the Bays and their wetlands. The pedestrian network in this plan will ensure connectivity to the Bay Trail.

Along the Bay in Berkeley, the Bay Trail includes a completed segment of the shared bicycle/pedestrian off-street path parallel to I-80. The multi-use path around Cesar Chavez Park, north of the Berkeley Marina, is a Bay Trail Spur, but is currently disconnected from the main Bay Trail. A connection along University Avenue is planned and will be constructed in the summer of 2007. Around the Marina and south around Horseshoe Park is an unimproved trail. This trail is also planned for improvement. Another planned Bay Trail improvement is a formal connection between Albany and Berkeley.

3.6.8. ALAMEDA COUNTYWIDE STRATEGIC PEDESTRIAN PLAN, 2006

The Alameda Countywide Strategic Pedestrian Plan identifies and prioritizes pedestrian related projects, programs and planning efforts which have countywide significance. The plan is used to plan and allocate countywide funding for pedestrian related projects. Areas of importance noted in the plan include San Pablo, Solano, Telegraph, and University Avenues. Transit centers and civic service facilities are also of importance. The plan focuses on access to transit, activity centers and inter-jurisdictional trails.

3.6.9. ALAMEDA COUNTYWIDE BICYCLE PLAN, 2006

The Alameda Countywide Bicycle Plan was adopted by the Alameda County Congestion Management Agency (ACCMA). The Plan was developed by ACCMA, the Alameda County Public Works Department, and an appointed Bicycle Task Force. The Countywide Bicycle Plan identifies shared-use pathways in Berkeley such as the Ohlone Greenway and the Bay Trail. Both are intended for cyclists and pedestrians and are high priority projects in the Countywide Bicycle Plan. High priority projects will be the focus of funding and implementation.

3.7. ROUTINE ACCOMMODATION POLICIES

3.7.1. US DOT'S ACCOMMODATING BICYCLE AND PEDESTRIAN TRAVEL

"Accommodating Bicycle and Pedestrian Travel: A Recommended Approach" is a policy statement that was adopted by the U.S. Department of Transportation (USDOT) in response to the Transportation Equity Act for the 21st Centrury (TEA-21). USDOT encourages public agencies, professional organizations, advocacy groups, and any other groups involved in transportation issues to adopt this policy to promote bicycling and walking as viable components of the transportation system. The four directives issued in this policy statement address measures to improve bicycle and pedestrian access, convenience and safety in transportation projects. The Policy Statement specifically states that:

Bicycle and pedestrian ways shall be established in all urbanized areas unless one or more of three conditions are met:

- *Bicyclists and pedestrians are prohibited by law from using the roadway. In this instance, a greater effort may be necessary to accommodate bicyclists and pedestrians elsewhere within the right of way or within the same transportation corridor.*

- *The cost of establishing bikeways or walkways would be excessively disproportionate to the need or probable use. Excessively disproportionate is defined as exceeding twenty percent of the cost of the larger transportation project.*

- *Where scarcity of population or other factors indicate an absence of need.*

The policy statement notes that, "the challenge for transportation planners, highway engineers and bicycle and pedestrian user groups, therefore, is to balance their competing interest in a limited amount of right-of-way, and to develop a transportation infrastructure that provides access for all, a real choice of modes, and safety in equal measure for each mode of travel."

3.7.2. ACCESSIBLE PUBLIC RIGHTS-OF-WAY PLANNING AND DESIGN ALTERATIONS

The Public Rights-Of-Way Access Advisory Committee (PROWAAC), working under the Americans with Disabilities Act, issued the "Accessible Public Rights-of-Way Planning and Design Alterations" report in July 2007. This report is meant to provide practitioners with a guide to improve pedestrian accessibility that recommends design alterations, processes to implement the alterations and design solutions to specific problems.

3.7.3. CALTRANS DEPUTY DIRECTIVE 64

In 2002, Caltrans adopted a policy directive—Deputy Directive 64 (DD-64)—related to non-motorized travel that reads:

> *"The Department fully considers the needs of non-motorized travelers (including pedestrians, bicyclists and persons with disabilities) in all programming, planning, maintenance, construction, operations and project development activities and products. This includes incorporation of the best available standards in all the Department's practices. The Department adopts the best practice concepts in the US DOT Policy Statement on Integrating Bicycling and Walking into Transportation Infrastructure."*

It is not clear what the effect of these policy directives have on the planning, design and funding of new transportation facilities. Although the USDOT policy encourages agencies and organizations to adopt this position, it does not state the possible repercussions if it is not embraced. Similarly, it is not certain how the Caltrans policy directive would apply to local jurisdictions or to streets that are not classified as "highways." Nonetheless, these policies reflect the growing concern that public agencies have shown to accommodate the needs of pedestrians and bicyclists in the design and operation of the transportation system.

3.7.4. ASSEMBLY CONCURRENT RESOLUTION 211 (ACR 211)

ACR 211 passed the California State Assembly on Bike-to-Work Day in August 2002. The Resolution calls for "Integrating walking and biking into transportation infrastructure," and further encourages all cities and counties in California to implement the policies of DD-64 and the USDOT design guidance document when building local transportation infrastructure.

3.7.5. ROUTINE ACCOMMODATION OF BICYCLISTS AND PEDESTRIANS IN THE BAY AREA, 2006

This report by MTC makes eleven recommendations for increasing the routine consideration of bicycle and pedestrian facilities in the future. Recommendations are divided into four categories: policy, project planning and design, funding and review, and training. The recommendations state that regionally funded projects must consider routine accommodations for bicyclists and pedestrians during design and planning stages.

MTC and the Bay Area's Congestion Management Agencies will help ensure that this occurs with the use of a routine accommodations checklist for new projects. The checklist asks agencies applying for grants to document how needs of bicyclists and pedestrians were considered in the planning and design of the project. Where sponsors do not consider non-motorized transportation, applicants must explain why they were excluded. Alameda County will provide the documented checklists to the Bicycle/Pedestrian Advisory Committee for review. Therefore, when Alameda County and Berkeley are making transportation improvements within Berkeley with regional funds, they must consider the pedestrian improvements outlined in the Berkeley Pedestrian Plan. To account for added pedestrian and bicycle facilities improvements, additional monies may need to be identified and the timelines for the street projects may need to be extended due to additional design requirements.

CHAPTER 4

EXISTING PEDESTRIAN NETWORK

Berkeley is already considered to be a very walkable city. Much of Berkeley's existing pedestrian network can be traced back to the City's historic urban development patterns. Berkeley's street grid was developed in an era in which the streetcar was the main mode of transportation, and the short, regular blocks provided excellent pedestrian[1] access to commuter rail corridors located along streets such as San Pablo Avenue, Shattuck Avenue, Sacramento Street, Adeline Street, University Avenue, and Telegraph Avenue. In the hills, where the street grid is curving and irregular, stairs and pathways provided access downhill to the streetcar lines. To this day, Berkeley's neighborhoods retain much of their distinctive character and walkability. With a busy downtown and a major university, well-defined neighborhoods and shopping districts, parks, schools, pathways, transit centers, and civic facilities, Berkeley has many vibrant areas of pedestrian activity.

4.1. PEDESTRIAN NETWORK INVENTORY

The most basic elements of the pedestrian network are sidewalks, pathways, crosswalks, and curb ramps. Sidewalks provide a space for pedestrian activity completely separated from motor vehicle traffic. Pathways also provide a separation from motor vehicle traffic, although pedestrians may have to share pathways with bicyclists and other non-motorized users. Crosswalks provide a legal extension of the sidewalk across a roadway, and curb ramps provide a transition between the raised sidewalk and the crosswalk for persons using mobility assistance devices. These elements should form a connected network to be functional, safe, and encourage people to walk. Four maps of the existing Berkeley Pedestrian Network are shown on Figures 4-1, 4-2, 4-3, and 4-4.

As part of this Pedestrian Master Plan, a citywide inventory of sidewalks, pathways, crosswalks, and curb ramps was conducted. The majority of inventory data were collected through a process of "feature extraction" from video imagery taken of the City's entire roadway network from which the presence/absence of sidewalks, crosswalks, and curb ramps could be determined and geographically referenced into a Geographic Information System (GIS) database. The video feature extraction was supplemented with review of city right-of-way record maps which provided additional information on sidewalk widths, buffers (planting strip widths), and setbacks from adjacent property lines which was added into the GIS database. Finally, field work was conducted to spot-check the feature extraction results for accuracy and to conduct detailed follow-up surveys of areas where sidewalks were lacking. This section summarizes the results of the inventory for the basic pedestrian network elements.

[1] The term "pedestrian" refers to a person moving from place to place, on foot and/or with the use of an assistive mobility device (when that person has a disability and/or medical condition). "Walking" or "to walk" are the terms used to describe this movement of a pedestrian.

Figure 4-1: Pedestrian Network Northeast Berkeley

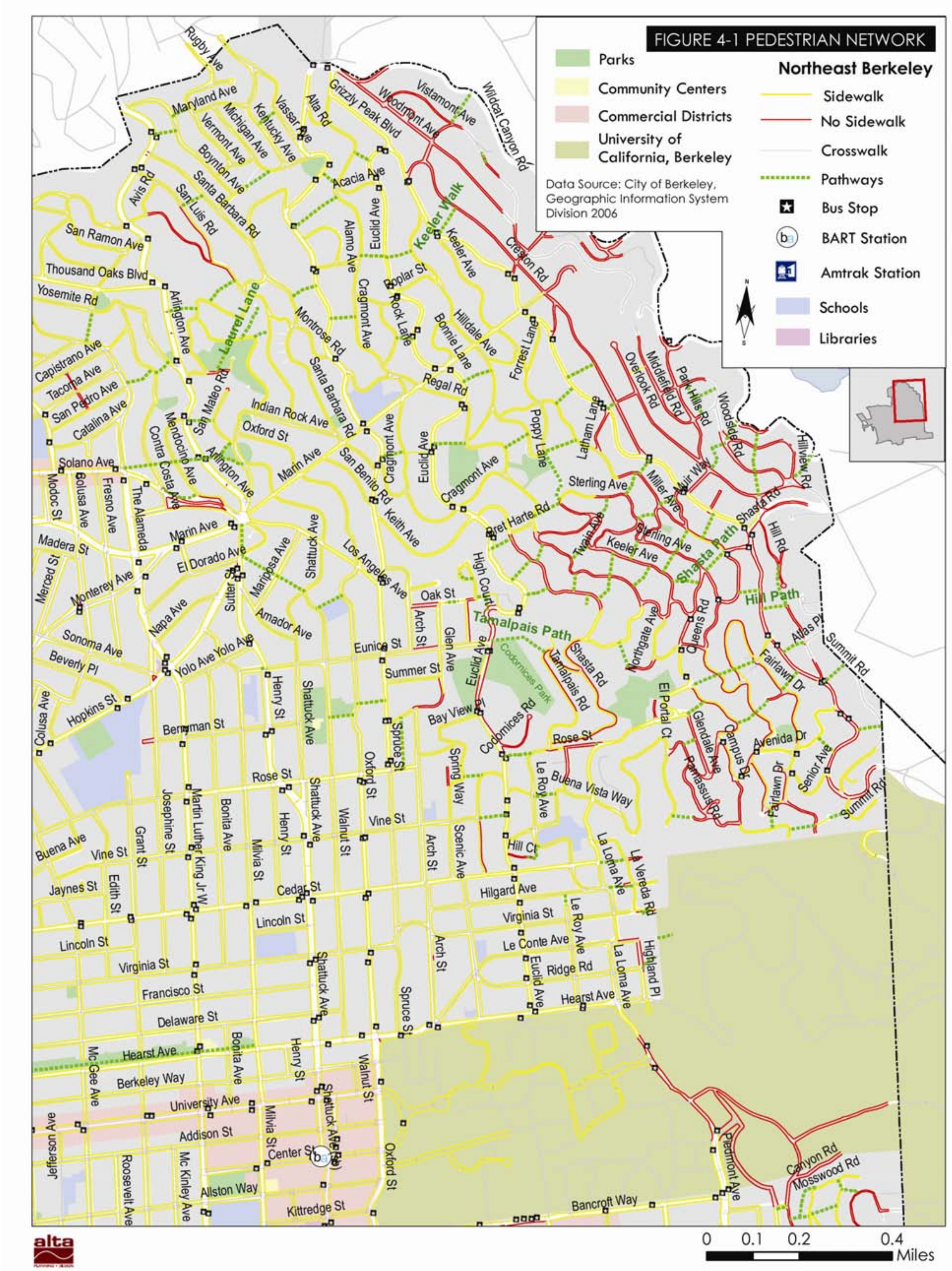


Figure 4-2: Pedestrian Network Southeast Berkeley

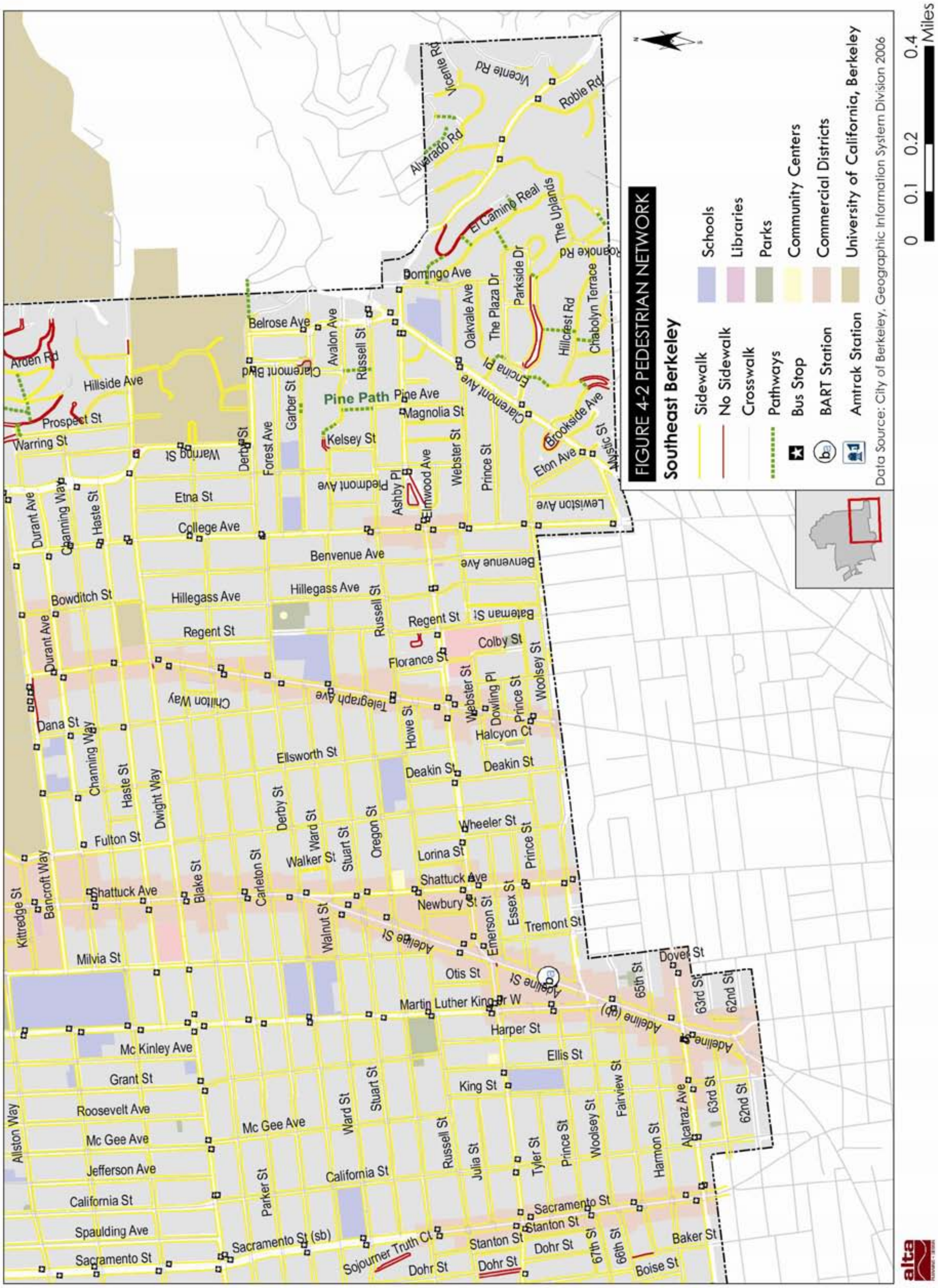


Figure 4-3: Pedestrian Network Southwest Berkeley

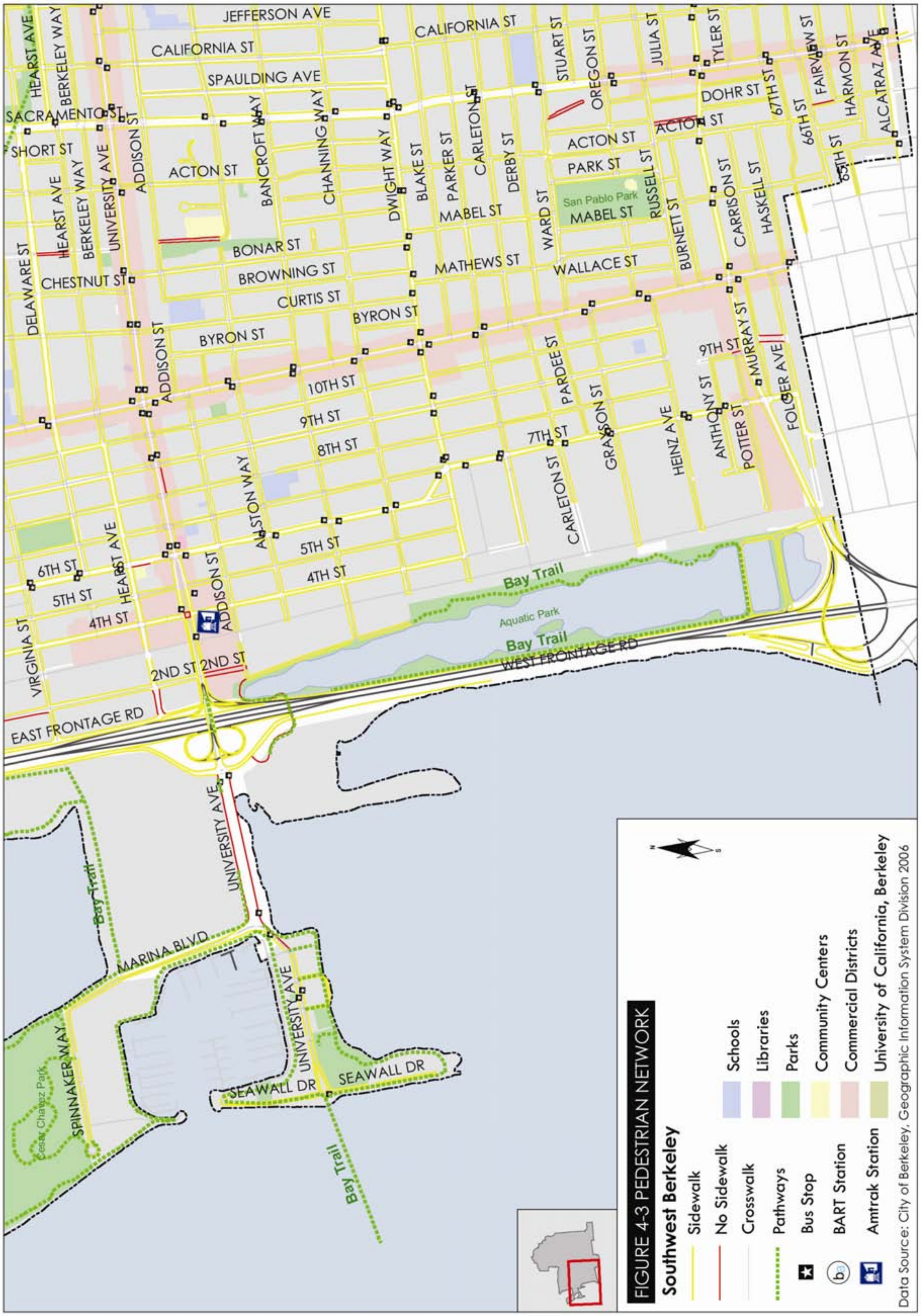


Figure 4-4: Pedestrian Network Northwest Berkeley

4.1.1. SIDEWALKS

4.1.1.1. PRESENCE OR ABSENCE

The City has approximately 400 miles of sidewalks, counting sidewalks on both sides of each street separately. According to GIS data confirmed by field checking, sidewalks are present in all but approximately 40 miles of the potential pedestrian network. (The potential pedestrian network is defined as both sides of any street within Berkeley excluding freeways). **Figures 4-1 through 4-4** show the presence and absence of sidewalks throughout the city. Almost the entire city has sidewalks except for two sections: the residential areas in the north Berkeley hills; and sections of northwest Berkeley's industrial area.

The residential areas within the Berkeley hills have the greatest concentration of streets lacking sidewalks. However, these areas are served by a network of 160 pathways creating a total of 5.2 miles of pathways. The lack of sidewalks in the hills results from limited developable land area. The topographic constraints of steep hills and slopes results in many narrow streets where it is often difficult for two cars to pass with vehicles parked on either side. Residents in these areas typically walk in the streets and feel safe enough to do so because vehicle traffic is greatly reduced and slowed by the curves and width of the roadway.

A section of northwest Berkeley bounded by San Pablo Avenue, Cedar Street, Sixth Street, and Gilman Street also has many missing sidewalk segments, a vestige of a previous era when this was primarily an industrial area. The gaps are typically within a block rather than entire blocks. Plans are currently being developed by the Public Works Department to install ADA compliant pedestrian facilities in this area. The discontinuous sidewalk network in West Berkeley is a result of changing land uses within the area. West Berkeley historically had a higher concentration of heavy industrial uses and is slowly transforming to light industrial and office uses. As industrial land is redeveloped, sidewalks adjacent to these properties are added or improved. This results in a discontinuous network as the remaining properties which have not upgraded also have not provided for sidewalks.

4.1.1.2. SIDEWALK WIDTHS

Over 95 percent of the City's sidewalks are six feet wide. This includes the majority of the City's neighborhood residential and collector streets. The downtown areas have the widest sidewalks at up to 10 feet along the major streets, with University Avenue and Shattuck Avenue the most notable examples. Other areas with wider sidewalks are Fourth Street, a major shopping district in West Berkeley, as well as the streets near the UC Berkeley campus. The other major streets throughout the city, including San Pablo Avenue, Telegraph Avenue, College Avenue, Sacramento Street, Cedar Street, and Gilman Street, have sidewalks between four and six feet wide.

Most of the City's sidewalks have planter strips (buffer strips) between the sidewalk and the curb. The average width of planter strips is four feet. This effectively creates a pedestrian zone of eight to ten feet wide. Although planter strips are not for through travel, they provide a crucial function of buffering pedestrians from vehicular traffic, provide an area for street trees which provide shade, and create visual interest at a pedestrian scale which can provide positive encouragement for walking.

4.1.1.3. CONDITION OF SIDEWALKS

The condition of sidewalks was documented in a street tree inventory collected five years ago. The tree inventory was primarily intended to survey street tree location, species and condition, but also included information on tree root uplifting, buckling, and other sidewalk damage associated with tree roots. Other than the tree inventory data, there is no other citywide database on the condition of sidewalks.

The tree inventory classifies sidewalk damage into three categories: Major Damage, Minor Damage and Patch. Because several inconsistent methods were used to observe the condition, summary statistics are not available.

4.1.2. CROSSWALKS

When discussing pedestrian safety, roadway crossings are locations of highest concern because they are where the pedestrian environment interfaces with the motor vehicular environment and thus where conflicts are most likely to occur. Pedestrian exposure to motor vehicle traffic at crossings directly affects safety, especially for older persons and children who may not be able to cross streets quickly or discern (or be seen by) on-coming motor vehicle traffic. Selecting appropriate marked crosswalk locations and providing visible markings and warning signage are important for increasing visibility of pedestrians.

The crosswalk inventory provides information on the following attributes of all marked crosswalks in Berkeley:

- Color: White, Yellow (school zones)
- Condition: New, Fair, Worn
- Marking type: Transverse (standard parallel lines), Ladder
- Width: Measurement in feet

There are a total of 2,099 marked crosswalks within Berkeley. Of these crosswalks, 74 percent are white crosswalks with standard double parallel line configuration and 12 percent are yellow with standard double parallel line configuration surrounding schools. The remaining 14 percent are ladder high visibility crosswalks: 12 percent of this configuration style is white and the remaining two percent is yellow in areas surrounding schools. Of the existing crosswalks, the condition of the crosswalks can be described as 853 (41 percent) in "new" condition, 674 (32 percent) in "fair" condition, and 574 (27 percent) in "worn" condition. New condition crosswalks are primarily located along major streets. Fair and worn crosswalks are dispersed throughout the city.

4.1.3. CURB RAMPS

Properly designed curb ramps are key accessibility features as they allow mobility impaired individuals to ramp down to the street level and back up with the least amount of effort and exposure to vehicle traffic. The curb ramp inventory provides information on the type and location of curb ramps. Berkeley has two types of curb ramps: apex (or diagonal, where a single diagonal ramp is provided at each corner) and perpendicular (two ramps are provided at each corner, each oriented directly toward the crosswalk). The angle of the curb ramp is determined by the direction of the ramp with respect to the nearest flow of traffic. Diagonal ramps require crosswalks to include a four foot buffer to allow a person using a wheelchair to turn the chair towards the path of travel after ramping down. These curb ramps are appropriate for areas where there is not enough room to provide perpendicular curb ramps. Perpendicular curb ramps situate a person using a wheelchair in the direction of the crosswalk so that there is no need to correct the direction of travel upon ramping down. Of the approximately 4,500 existing curb ramps in Berkeley, 79 percent are apex ramps, 17 percent are perpendicular ramps, and the remaining 4 percent are mid-block ramps, which are also considered to be perpendicular.

The curb ramp data also include the presence and absence of truncated domes. Truncated domes are tactile surfaces that indicate to visually impaired pedestrians that they are leaving the sidewalk and entering the roadway. Of the 4,500 existing curb ramps in Berkeley, only about seven percent have truncated domes. Ramps with truncated domes are located primarily on major streets such as San Pablo Avenue, University Avenue, Shattuck Avenue, Claremont Avenue, and Solano Avenue.

4.1.4. PATHWAYS

There are 160 individual pathways throughout the Berkeley Hills totaling approximately five miles. The pathways in this inventory include stairways and lanes. These pathways provide supplemental connectivity between the narrow, winding streets that parallel the contours of the hills. The pathways were designed to provide access to commuter trains which historically ran along Arlington Avenue and Shattuck Avenue to the top of Solano Avenue. They also connect to parks, schools and neighborhood commercial nodes providing a pleasant off-street alternative pedestrian network. Many of the streets in the hills lack sidewalks due to constrained roadway widths; however, absent major through-traffic, streets interspersed with pathways are adequate for walking. Most of the paths are concentrated in the north Berkeley Hills east of Colusa Avenue, The Alameda and Euclid Avenue. There are a few small clusters of pathways in the south Berkeley Hills in the area bounded by Claremont Avenue and Tunnel Road, two paths between Russell Street and Avalon Avenue, as well as a few paths providing east-west access between Panoramic Way and Arden Avenue. While pathways are an important component of the pedestrian environment in the Berkeley hills, the vast majority of them are not ADA compliant and are not providing full mobility for users in these areas.

4.1.4.1. OHLONE GREENWAY

The Ohlone Greenway, a multi-city, multi-use trail constructed over twenty years ago, extends from El Cerrito through Albany to Berkeley along the BART right-of-way. The Greenway is 8-10 feet wide in most sections and lacks the unpaved shoulders required of a formal multi-use pathway. The northern portions of the Greenway are situated beneath the elevated BART line. The 1.5 miles of the Greenway located within Berkeley are mostly above the underground portion of the BART line (BART descends underground just south of Gilman Street). The BART right-of-way between Gilman Street and Milvia Street is occupied by a string of parks, public art sculptures, community gardens, tennis and basketball courts, dog parks, and playing fields, with the North Berkeley BART station located at about the midpoint. The Greenway provides an off-street pedestrian/bicycle thoroughfare that links these facilities and provides access through the north and central parts of the city, ending in the south within blocks of the UC Berkeley campus and Downtown Berkeley. At the north end of Berkeley, it connects to the Westbrae neighborhood commercial district and continues on toward lower Solano Avenue in Albany.

4.1.4.2. SAN FRANCISCO BAY TRAIL

The San Francisco Bay Trail is a regional effort to provide a continuous multi-use path around San Francisco and San Pablo Bays. The goal of the trail network is to provide public access to the bay's shore, in addition to augmenting facilities for recreation and commuting. The 7.3-mile Bay Trail segment in Berkeley is located west of Interstate 80 along the West Frontage Road. The trail enters Berkeley from Emeryville and ends at Gilman Street. The Berkeley segment of the Bay Trail can be accessed via the I-80 pedestrian/bicycle bridge, which crosses the freeway just south of University Avenue. The City of Berkeley is currently designing a spur trail segment that would lead from the pedestrian/bike bridge out to the facilities of the Berkeley Marina. At the north end, a proposed two-mile segment is needed to close the gap between Gilman Street and the Albany Bulb, around Golden Gate Fields.

4.1.4.3. SANTA FE RIGHT-OF-WAY

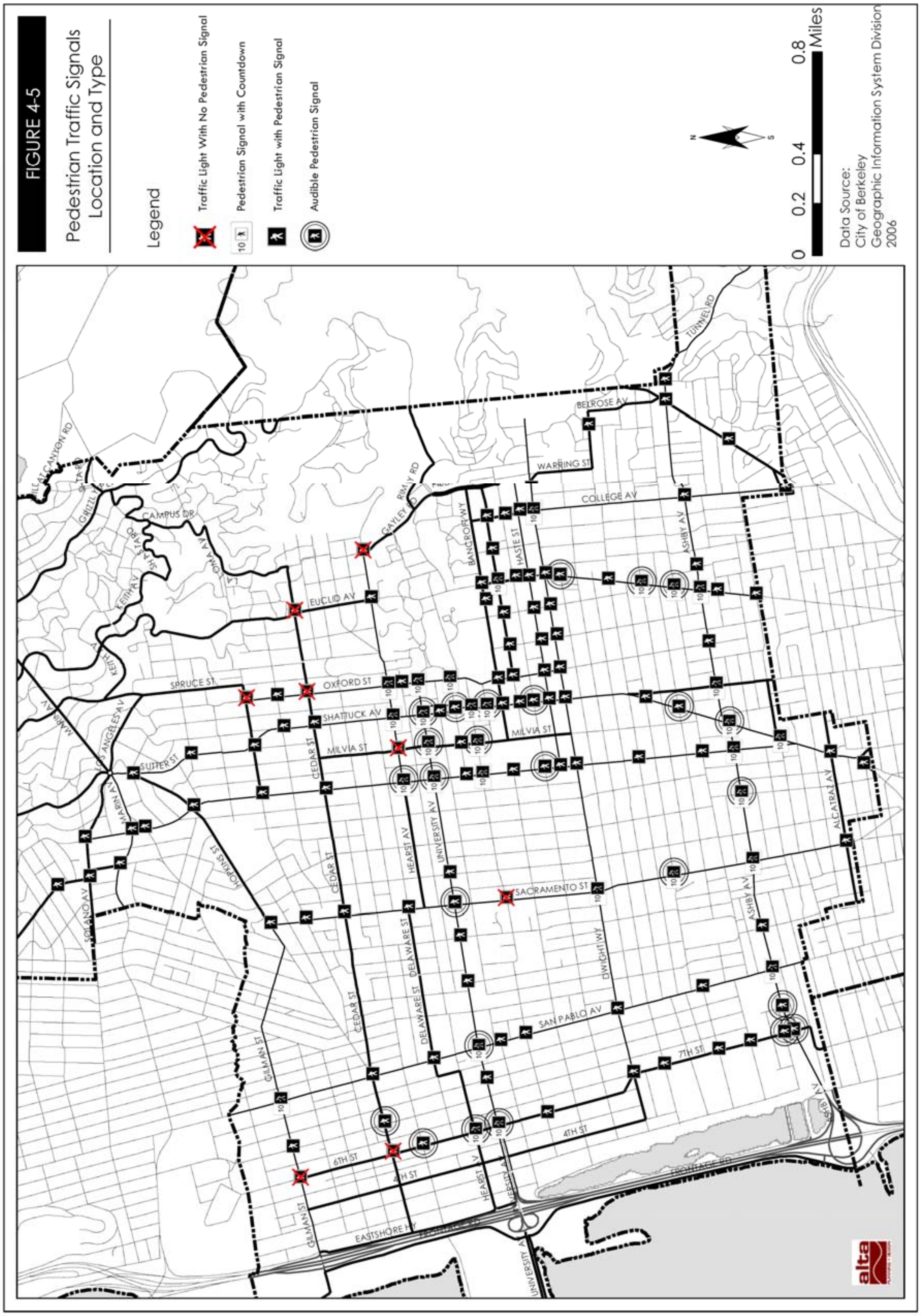
The Santa Fe right-of-way is a historic railroad corridor running north-south through Berkeley, located between San Pablo Avenue and Sacramento Street. The corridor generally extends from Cedar Street (at the Ohlone Greenway) south to Russell Street (where it meets Sacramento Street). Portions of the corridor have been developed over the years with parks (Strawberry Creek Park), a community garden, and other uses, but much of the right-of-way has been planned for a multi-use trail development. In 2006, a major segment of this multi-use trail was constructed between University Avenue and Virginia Street, including a mid-block pedestrian signalized crossing of University Avenue. This segment includes a 10-foot wide paved trail with two-foot decomposed granite shoulders on either side, pedestrian scale lighting and emergency call boxes. Planned extensions will connect this segment to Strawberry Creek Park on the south and to the Ohlone Greenway at Cedar Rose Park on the north.

4.2. TRAFFIC SIGNALS

Traffic signals are often described in the context of the motorized vehicle network, but they are a key piece of the pedestrian infrastructure as they direct pedestrian traffic to move in conjunction with vehicle traffic. Over time traffic signals have evolved to include pedestrian-oriented components such as pedestrian signal heads and actuator buttons, countdown displays and audible signals. **Figure 4-5, Pedestrian Traffic Signals and Type** shows the pedestrian signals in Berkeley. All but eight of the City's 145 signalized intersections have pedestrian heads, which show the WALK and DON'T WALK symbols to indicate when to cross. Traffic signals are located at all major/major street intersections and most major/collector street intersections.

The most common enhancements to pedestrian signal heads are a countdown portion of a signal or a signal that emits audible sounds. Thirty of the City's signalized intersections include a countdown portion, allowing pedestrians to assess the time available to complete the street crossing. The countdown signals are only located along the busiest vehicular intersections. There is also a subset of pedestrian signals that include audible "chirp" and "beep" sounds that alert visually impaired pedestrians to the pedestrian crossing phase of a signalized intersection. There are 25 intersections that include audible signals. These signals are particularly beneficial to the sight-impaired as the sounds generated by the signals are standardized so that across jurisdictional boundaries a chirping versus beeping pair of signals across an intersection will indicate the north-south or east-west direction of the crossing. About half of the audible signals are located at intersections that also include countdown features.

Figure 4-5
Pedestrian Traffic Signals and Type



4.3. TRAFFIC CALMING

While this is not a traffic calming plan, traffic calming is very closely related to pedestrian planning because the incidence and severity of vehicle-pedestrian collisions are highly correlated with vehicle speeds. Berkeley's General Plan Policy T-20 and Policy 1.4 of this Pedestrian Master Plan address traffic calming. The goal of traffic calming is to slow down vehicle speeds, and by doing so traffic calming serves to make the street environment safer and more pleasant for pedestrians. The following traffic calming measures are part of the motorized vehicle network, however the installation of these facilities directly benefit the pedestrian environment by reducing the volume and speed of vehicle traffic on residential streets. **Figure 4-6, Traffic Calming and Infrastructure** shows the improvements that slow vehicle traffic in Berkeley. Following is a description of Berkeley traffic calming measures and their distribution throughout the city.

4.3.1. SPEED HUMPS

There are 156 speed humps installed throughout the city. Speed humps are typically installed along concentrated street segments or neighborhoods. Speed humps typically are set at a maximum of 300 feet apart with two per block. The City of Berkeley has also been testing "speed cushions" which are modified speed humps that allow emergency and other wide vehicles' tires to pass through slots in the humps rather than over the hump itself. The City has collected and analyzed data on the effectiveness of the speed cushions and their suitability for use in Berkeley. A report to Council was presented in December of 2009. Appendix B: Pedestrian Design Guidelines has additional information on speed humps and other traffic calming devices.

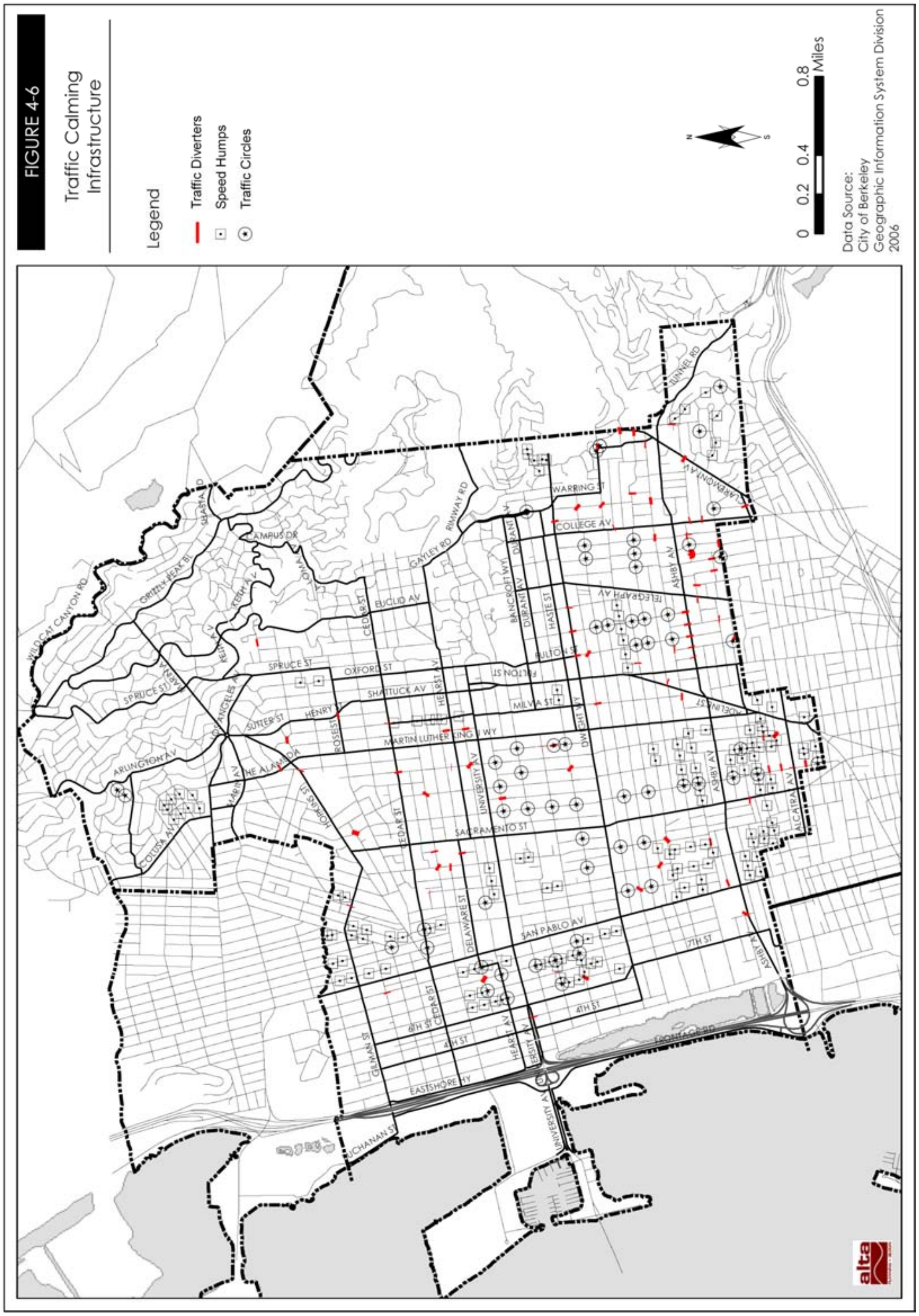
4.3.2. TRAFFIC CIRCLES

Traffic circles are located in intersections throughout the southern and western areas of the City. There were 62 traffic circles at the start of the plan process, with many additional traffic circles being constructed through the duration of the plan. Most of the traffic circles are along Blake, Carleton, Fulton, Ellsworth, Stuart, Parker, and Woolsey and California Streets. California Street has the most traffic circles of any street in the city. Traffic circles are accepted by the Berkeley Fire Department, provided the department has approval over the design.

4.3.3. TRAFFIC DIVERTERS

Traffic diverters, like traffic circles, are mostly located in the southern, central and western portions of the city. The diverters complement the use of traffic circles and speed humps. There are a total of 84 traffic diverters. The type of diverter varies from landscaped barriers to wide planter-type bollards. The diverters are completely permeable to pedestrians and bicycles but not to motor vehicles. There is a mixture of full diverters and semi-diverters which allow motor vehicle traffic through in one direction. A majority of diverters are located along streets surrounding the east-west portion of the Ohlone Greenway that parallels Ohlone Park and along streets feeding to Ashby Avenue.

Figure 4-6
Traffic Calming and Infrastructure



4.4. PUBLIC TRANSPORTATION

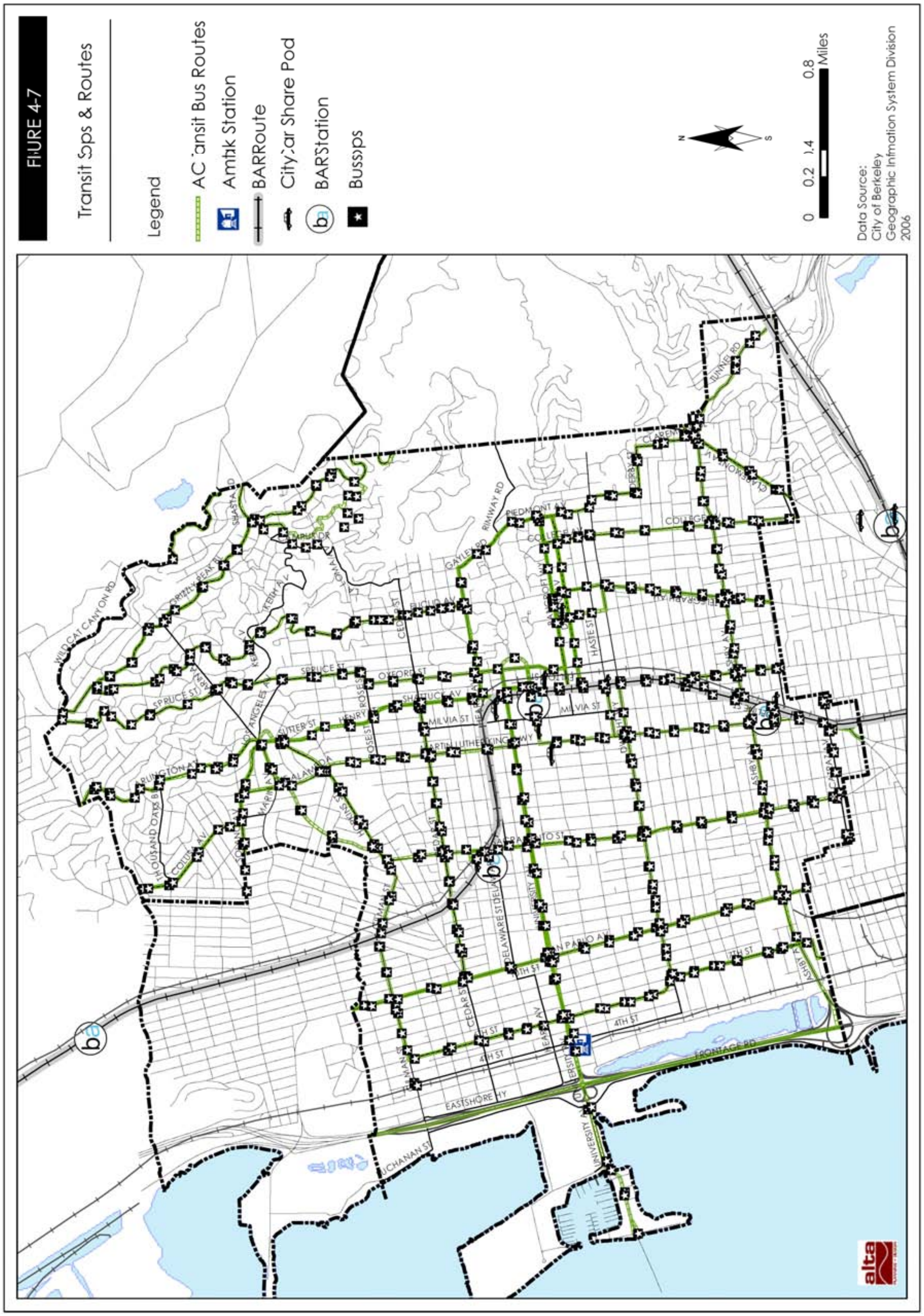
There are multiple public transportation providers in Berkeley. They include AC Transit, BART, Amtrak, and shuttles and paratransit service. The major routes and stops are shown in **Figure 4-7, Transit Stops & Routes** and described in the following sections.

4.4.1. AC TRANSIT

The City of Berkeley is served by 35 different AC Transit bus routes. The bus service corridors follow all major and collector streets in Berkeley, including major cross-town corridors such as San Pablo Avenue, Shattuck Avenue, Adeline Street, Martin Luther King Jr. Boulevard, Sacramento Avenue, Sixth/Seventh Streets, Hopkins Street, Arlington Avenue, Cedar Avenue, Dwight Way, Ashby Avenue, Telegraph Avenue, and College Avenue. According to the Berkeley General Plan, all Berkeley residents live within ¼ mile of a bus stop. Sample weekday counts conducted between 2004 and 2005, as provided by AC Transit, show that 21,000 daily bus riders board at bus stops in Berkeley, an estimated 16,000 of whom did not have automobile access and most likely walked to a stop.

Major corridors with trunk service, such as San Pablo, have key bus stops that provide transfer points to other corridor lines, such as those serving University Avenue. The City of Berkeley, in conjunction with AC transit, has a franchise agreement with Clear Channel Outdoor, Inc. to provide and maintain bus shelters throughout the city.

Figure 4-7
Transit Stops & Routes



4.4.2. BART

The Bay Area Rapid Transit (BART) system has three stations located in Berkeley. According to a 1999 BART Station Profile Study, just over 8,500 people in total walked to these three stations on a daily basis.

The Downtown Berkeley BART Station is located in the heart of downtown Berkeley at Shattuck Avenue and Center Street. There are multiple entrances providing excellent pedestrian access along the sidewalks on Shattuck Avenue between Addison Street and Allston Way. The Downtown BART station, which also serves the nearby UC Berkeley campus, has four times more commuters walking to the station than either the North Berkeley or Ashby BART Stations.

The North Berkeley station is located on the west side of Sacramento Street on the block between Delaware, Virginia and Acton Streets. The station entrance is located directly in the center of the site, and surrounded by surface parking on all sides. Pedestrian access to the station is constrained by the parking areas and high traffic volumes along Sacramento Street. The intersection of Virginia Street and Acton Street has a diagonal traffic diverter preventing parking lot traffic from using the local streets. The station can also be accessed via the Ohlone Greenway route, which connects to the northwest and southeast corners of the site.

The Ashby BART station is situated on the block bounded by Ashby Street, Adeline Street and Martin Luther King Jr. Way, with an additional parking area located along Woolsey on the east side of Adeline. The station entrance itself is underneath Adeline Street, accessed via the parking lots on either side of Adeline. Direct access is provided via stairs and elevators on Adeline as well. The major street corridors adjacent to the station all have high traffic volumes and speeds. While the Ashby BART Station does not have as high of a walking access mode share as the downtown station, it is slightly greater than the North Berkeley BART Station.

4.4.3. AMTRAK CAPITOL CORRIDOR

The City of Berkeley has one train stop along the Amtrak Capitol Corridor route. The Capitol Corridor rail service extends from Auburn to San Jose, with stops including Sacramento, Davis, Richmond BART station, Oakland's Jack London Square, Fremont, and San Jose Diridon station. The City of Berkeley recently completed construction of major station improvements and amenities at the Berkeley Rail Stop, located at Third Street and University Avenue in West Berkeley, beneath the University Avenue overpass. The station improvements included a new station platform, addition of lighting, seating, sidewalks and curb ramps, and reconfiguration of bus stops and bus circulation. The Capitol Corridor provides a total of 16 trains every day in either direction. The schedule provides for about one train an hour from 6:00 a.m. to 10:00 p.m. on weekdays.

4.4.4. SHUTTLES

In addition to public transit, there are a variety of shuttle services which require the same pedestrian accessibility as AC Transit stops. Some of these systems include the West Berkeley Shuttle, which connects the Ashby BART station with employment areas along 7th Street in West Berkeley; BearTransit, the UC Berkeley shuttle system that has five daytime routes and a nighttime safety shuttle serving the campus area; and the Lawrence Berkeley Laboratory shuttles.

4.4.5. PARATRANSIT

City of Berkeley Paratransit Services provides transit services to persons with disabilities and those 70 years of age or older. Access to transportation is no less vital to senior citizens and those with disabilities, and some residents have difficulty using AC transit buses or BART trains and stations. Berkeley Paratransit Services provides four programs to enhance access to different transportation services.

Table 4-1
Berkeley Paratransit Services and Eligibility

Taxi Scrip Program: Provides a limited amount of free scrip (i.e., temporary paper money) to pay for rides in conventional taxicabs, wheelchair-accessible taxicabs, vans, and other selected vehicles.	***Eligibility: Those certified by East Bay Paratransit as disabled or 70 years of age or over AND whose incomes are not more than 30 percent of the Area Median Income.***
Wheelchair-Van Program: Provides a limited amount of free van vouchers and/or free taxi scrip exclusively to wheelchair users needing wheelchair-accessible van service for rides that are beyond the scope of services provided by East Bay Paratransit/ATC (also known as Intelitran).	***Eligibility: Those who travel by wheelchair and are certified by East Bay Paratransit as requiring "wheelchair-lift" service, irrespective of income level.***
East Bay Paratransit Tickets: Provides for a limited number of free East Bay Paratransit/ATC tickets to individuals certified by East Bay Paratransit.	***Eligibility: Limited to providing transportation services to people who meet criteria established in the Americans with Disabilities Act.***
Medical Return Transportation Improvement Program (MrTrip). Provides limited subsidies for taxicab or van rides to those returning from a health related appointment.	***Eligibility: Those participants in the Taxi Scrip Program or the Wheelchair-Van Program.***

CHAPTER 5

PEDESTRIAN TRAVEL, DEMAND AND SAFETY

We are all pedestrians[1] at some point during the day, whether or not we walk the entire way to a destination, walk to transit, or simply walk from our car into a building. One goal of this plan is to evaluate current and future pedestrian travel and demand patterns in Berkeley. Studying current travel patterns answers the question of where people are walking today: Who is walking? Where are their destinations? What is the purpose of their trip? Predicting future demand is a way of identifying areas of the city that could support high levels of pedestrian activity, even if those levels do not currently exist today. Related to travel and demand is the issue of pedestrian safety, looking at where and why pedestrian collisions are occurring in the city.

A variety of data sources are used in this analysis, including US Census data, pedestrian count data and collision records. This data, combined with information received from the public during the public outreach process, can help the City identify areas to focus on for making pedestrian improvements. Analyzing this information helps us to develop recommendations for pedestrian improvements, with the goals of improving safety, comfort and convenience for those who are currently walking, and making walking a more attractive choice for everyone.

5.1. PEDESTRIAN DEMOGRAPHICS

5.1.1. PEDESTRIAN COMMUTE DATA

Information on the number of pedestrian commuters in Berkeley comes from the 2000 US Census Journey to Work data. A central focus of presenting commute information is to identify the current "mode split" of people that live and work in Berkeley. Mode split refers to the choice of transportation a person selects to move to destinations, be it walking, public transit, bicycling, driving alone, or carpooling.

Table 5-1
Berkeley Journey to Work Mode Split in Percent

Mode	Berkeley	Alameda County	California	United States
Walked	16.0	3.3	3	3.0
Public Transit	19.9	11	5.3	4.9
Bicycle	6.0	1.3	0.9	0.4
Drove Alone	46.4	68.8	74.7	78.2
Carpool	10.3	14.3	15.1	12.6
Other	1.4	1.3	1.1	0.8

Source: U.S. Census 2000

[1] The term "pedestrian" refers to a person moving from place to place, on foot and/or with the use of an assistive mobility device (when that person has a disability and/or medical condition). "Walking" or "to walk" are the terms used to describe this movement of a pedestrian.

Berkeley has the highest walking rate of all cities in Alameda County: 16 percent of workers in Berkeley walk to work on a daily basis, compared to the national, state and county average of approximately 3 percent. Berkeley also has one of the highest proportions of workers commuting to work using public transit, 20 percent compared to national and state averages of around 5 percent and an Alameda County average of 11 percent. Berkeley also has the highest number of bicycle commuters in the County, with a total of 6.0 percent who bicycle to work every day, compared to the county and state average of around 1% and the national average of less than half percent.

In addition to mode of travel to work, the US Census provides information on the number of households in an area with no vehicle available. The number of car-free households is an important indicator of the number of people who are walking and using transit out of necessity. In Berkeley, 17 percent of households are car-free, compared to 10 percent at the national, state and county levels.

5.1.2. POPULATIONS OF PEDESTRIAN EMPHASIS

Certain populations are more likely to depend on pedestrian infrastructure. Children and teenagers getting to and from school have historically had a very high walking rate, although this has been declining in recent years as more parents drive their children to school. Students at UC Berkeley are another group that has high walking rates, since many students do not own vehicles. Those who are disabled may lack motorized transportation options and as a result are also more dependent on transit and pedestrian aspects of the transportation network. Senior citizens may also lack access to vehicles or the ability to drive and rely heavily on transit and pedestrian mobility options.

As illustrated in **Table 5-2**, the percent of Berkeley's population in the 16 and under age group is almost 10 percent less than the countywide percentage. Conversely, the percent of Berkeley's population in the 17 to 64 age group is 10 percent greater than the countywide percentage. Differences in these age groups' population in Berkeley and the County can partly be explained by the presence of 33,000 UC Berkeley graduate and undergraduate students, most fitting into the 17 to 64 age group.

The percent of residents in the 65 and older age group is similar in Berkeley (10.3 percent) and Alameda County (10.4 percent). Berkeley has a proportionally greater share of disabled residents than does the County.

Table 5-2
Berkeley Population Age Distribution and Disabled Population

Residents	Berkeley	Percentage of Total City Population	Countywide	Percentage of Total County Population
16 and under	13,593	13.2	622,927	23.1
17 to 64	78,616	76.5	1,792,264	66.5
65+	10,534	10.3	281,514	10.4
Total	**102,743**	100.0	**2,696,705**	100.0
Disabled	**8,884**	8.6	**130,307**	4.80

Source: U.S. Census 2000

5.2. PEDESTRIAN DEMAND MODEL

Space Syntax, a UK-based planning firm specializing in 'space-based' modeling, developed two pedestrian forecasting models for the Berkeley Pedestrian Plan. The first model is a tool to help determine areas in Berkeley where there is the greatest pedestrian activity and the primary factors influencing this activity. The second model is a collision exposure model, demonstrating how consideration of both pedestrian and vehicular traffic volumes affect pedestrian risk in Berkeley.

These models and their findings are explained in this section after a review of the qualitative baseline analysis, focusing on urban structure, land use and pedestrian movement. Data from the qualitative baseline analysis was used to create the two forecasting models.

A complete summary of the qualitative baseline analysis and the forecasting models are summarized in the Space Syntax report "Walkability, Movement and Safety for the City of Berkeley" that is included in **Appendix D**.

5.2.1. QUALITATIVE BASELINE ANALYSIS

The qualitative baseline analysis is divided into three categories: urban structure, land use and pedestrian movement. These three categories comprise an inventory of existing conditions in Berkeley that are input into the two models.

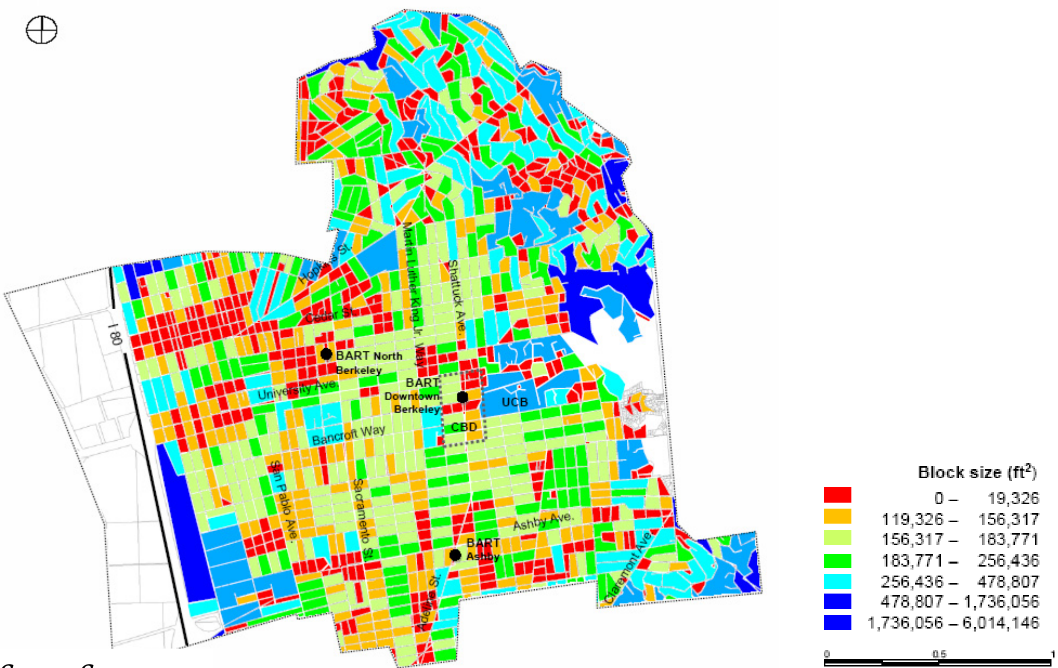
5.2.1.1. URBAN STRUCTURE

Urban structure is the framework of routes and public open spaces that connect locally to the wider context. There are five components to the urban structure category. They are: block size, directionality of street layout, street connectivity, accessibility to the street network, and the accessibility of the pedestrian system. **Figure 5-1, Block Size**, is a graphic example of one of the inputs under the urban structure category.

5.2.1.2. LAND USE

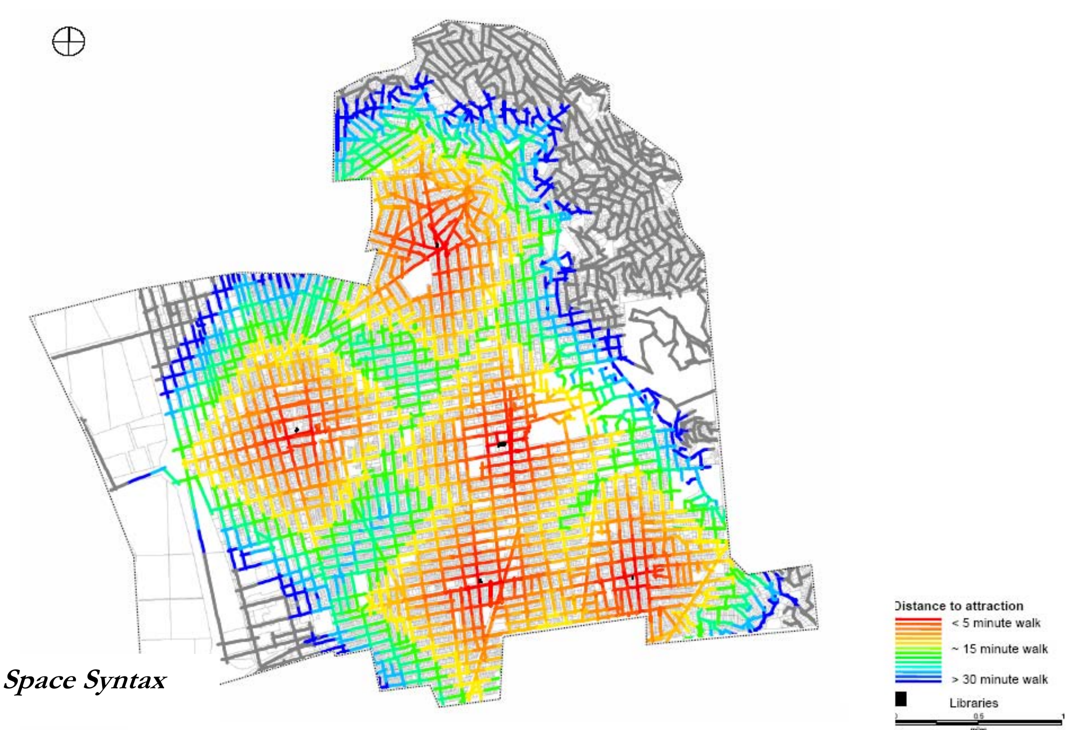
Land use is the location and distribution of various trip origins and destinations in Berkeley. The land uses included in the baseline analysis are: parks, schools, healthcare centers, libraries (as shown in **Figure 5-2, Walking Distance to Libraries**), community centers, major retail locations, neighborhood retail, office buildings, high density residential units, transit stops, and BART stations. These land uses were analyzed using their relative proximity to the surrounding areas in Berkeley.

Figure 5-1
Block Size



Source: Space Syntax

Figure 5-2
Walking Distance to Libraries



Source: Space Syntax

5.2.1.3. PEDESTRIAN MOVEMENT

The City of Berkeley conducts regular vehicular traffic counts as part of its transportation planning activities. In many cases, these vehicle counts include pedestrian counts. A summary of these data sheets was conducted as part of assessing baseline pedestrian activity in Berkeley. The existing pedestrian count data spans from 1997 to 2005. There are a total of 685 data sheets representing over 200 intersections in Berkeley. The data sheets report pedestrian volumes for each crosswalk within an intersection, and in some cases, they also report pedestrian direction of travel in crosswalks.

Pedestrian counts included in the data sheets were collected over a variety of days and times. Counts were collected across varying days of the week, both weekdays and weekends, and throughout the year. Times of day for counts vary among mornings, midday and evening peak hours. Count times are site specific, but generally, morning peak hours are from 7:00 to 9:00 A.M., midday peak hours are from 12:00 P.M. to 2:00 P.M., and evening peak hours are from 4:00 to 6:00 P.M.

Of the City's pedestrian counts, 64 of them were used for the final sample for the models. This was a random sample that includes counts at mid-day from a number of different months spanning over the nine year period. Mid-day counts often give a more accurate measure of general movement patterns in a city like Berkeley. Preliminary data analysis found that the mid-day peak movement provided the most informative picture of the largest area of the city. Morning and evening peaks can be higher in total volume but are often highly constrained around transit stops and parking locations, giving an inaccurate picture of overall movement patterns in a city. **Figure 5-3, Pedestrian Movement Count Locations** shows the count sites included in the analyses.

Figure 5-3
Pedestrian Movement Count Locations

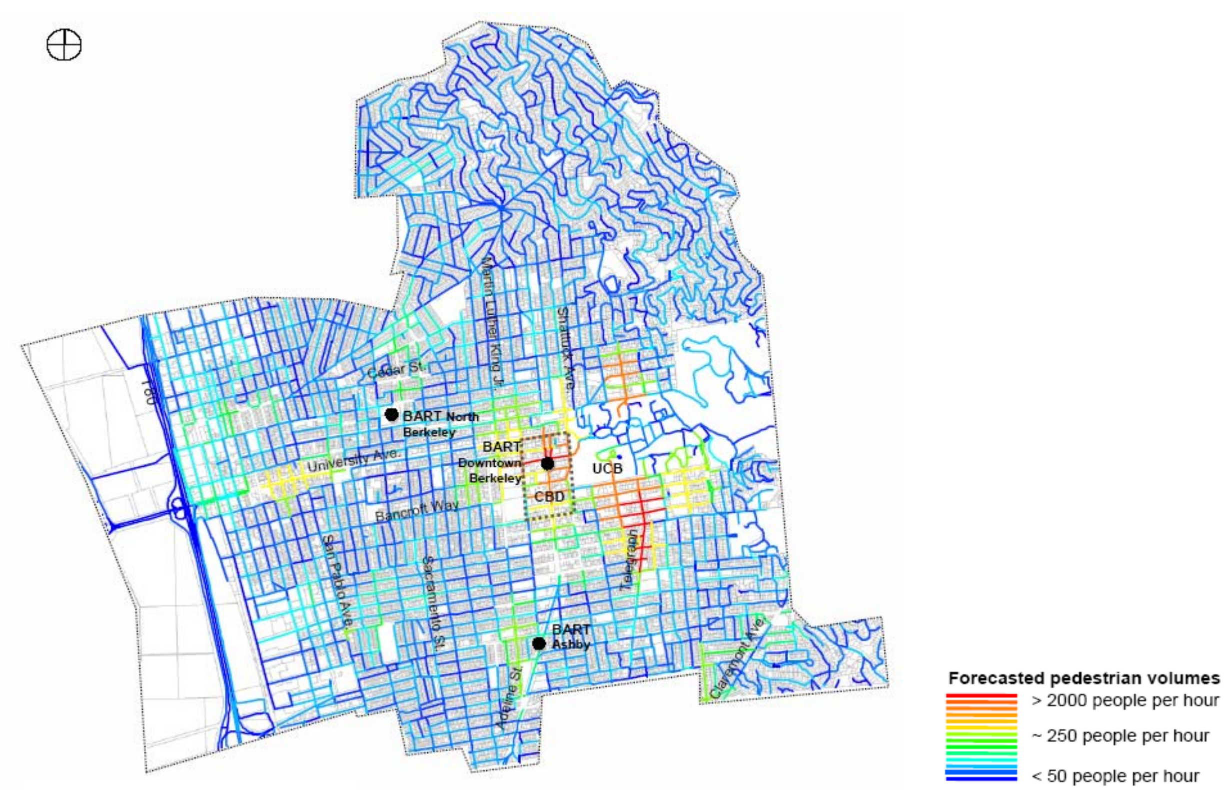
Source: Space Syntax

5.2.2. PEDESTRIAN VOLUME MODEL

Space Syntax used the qualitative baseline analysis and combined it with a hierarchy of Berkeley's walking routes. The results suggest that pedestrians avoid intersections with high vehicle volumes. In terms of origins/destinations, pedestrian movement was clustered around downtown Berkeley, specifically near the BART station, and near the entrances to UC Berkeley. As distance increases away from these centers, the model showed that land uses such as parks, libraries, and schools were not significant factors for increasing pedestrian movement during the mid-day peak hours. School schedules and resulting travel patterns create morning and afternoon pedestrian peaks around schools. Because this model uses mid-day pedestrian volumes it may not have adequately accounted for school area pedestrian activity.

Figure 5-4, Forecasted Mid-Day Peak Movement Levels, shows, as stated, the result of the spatial model that utilized a combination of urban structure, land use and pedestrian count data. The colors indicate the forecasted pedestrian volumes as predicted by the pedestrian volume model. Not surprisingly, the highest forecasted volumes are in Downtown Berkeley, on the south side of the UC Berkeley campus particularly along Telegraph, on the north side of campus particularly along Euclid, along University Avenue in the vicinity of San Pablo Avenue, and adjacent to the Ashby BART station. The highest forecasted peak volumes, shown in red, are in the Central Business District (CBD) and south side of the campus, where volumes in excess of 2,000 people per hour are forecast for the mid-day period. This is about 10 times greater than the volumes expected in locations such as Ashby BART or University/San Pablo Avenues, which are forecast to experience peak volumes of around 250 persons per hour. For most of the local streets in Berkeley that don't have commercial land uses, expected peak pedestrian volumes are around 50 persons per hour.

Figure 5-4
Forecasted Mid-Day Peak Movement Levels



Source: Space Syntax

5.2.3. PEDESTRIAN SAFETY AND EXPOSURE ANALYSES

The City of Berkeley maintains a geographic database of pedestrian collision locations with data provided by the Statewide Integrated Traffic Records System (SWITRS). Between January 1997 and December 2007, there were 1,253 pedestrian collisions, or an average of 114 per year. **Figure 5-5, Pedestrian/Vehicle Collisions between 1997 and 2007,** shows an overall decreasing number of collisions over the eleven-year period. The Space Syntax pedestrian safety and exposure analysis uses SWITRS data from a seven year period, between January 1997 and December 2004

Locations of these recorded collisions are throughout the City of Berkeley with concentrations near downtown Berkeley and at major intersections as **Figure 5-6, Collisions Per Junction** shows. Major streets in Berkeley were also found to have higher concentrations of pedestrian collisions, including University Avenue, Ashby Avenue, San Pablo Avenue, Martin Luther King Jr. Way, and Telegraph Avenue.

Figure 5-5
Pedestrian/Vehicle Collisions between 1997 and 2007

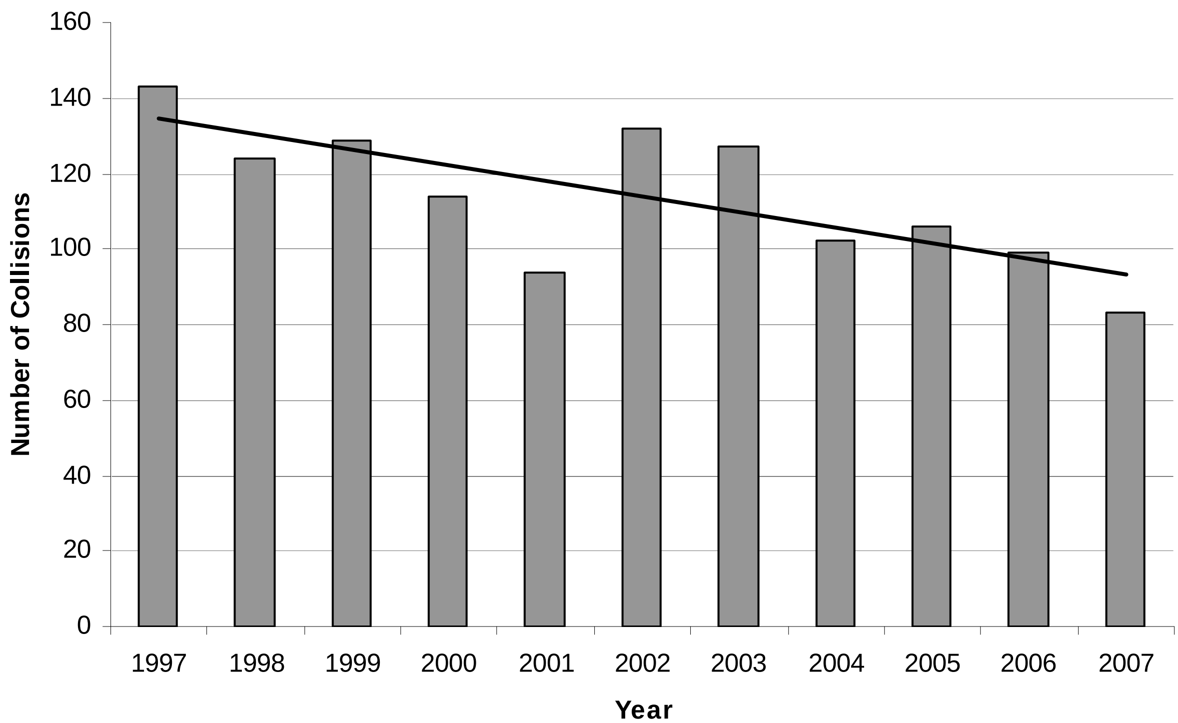
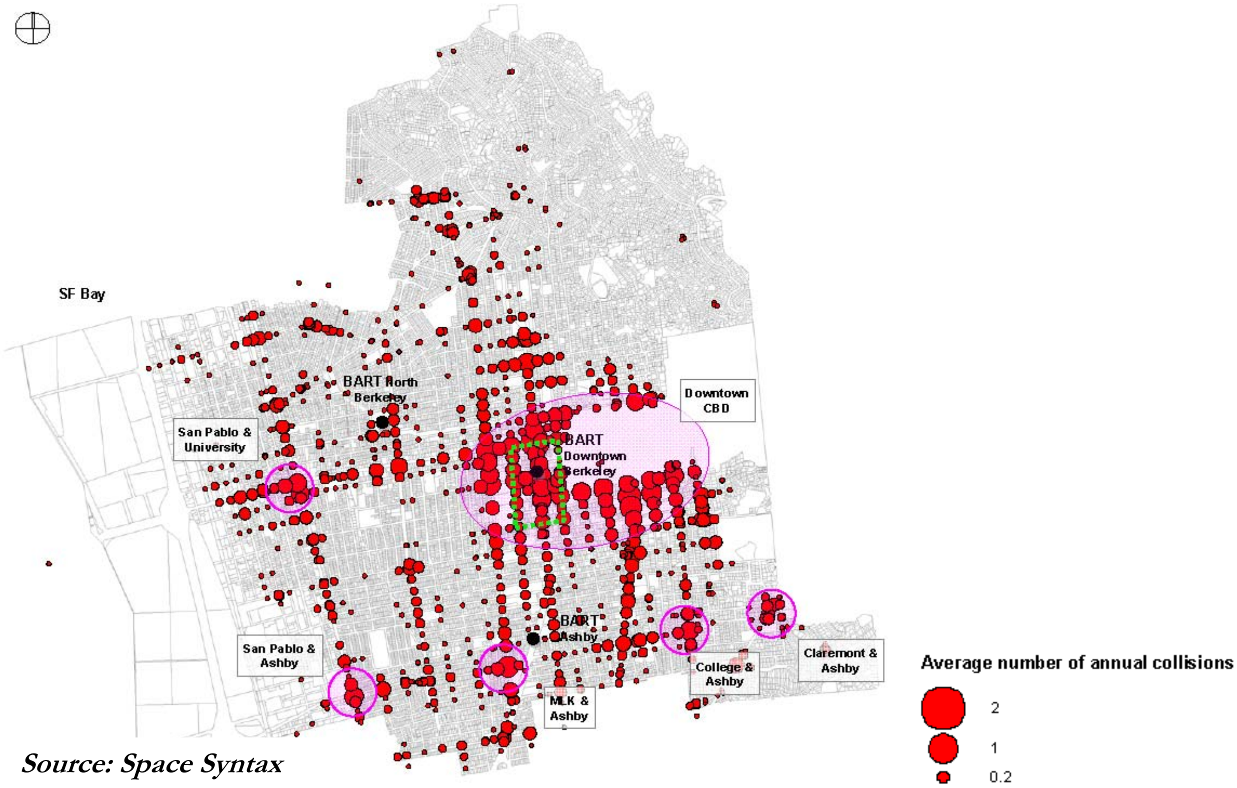


Figure 5-6
Collisions Per Junction



Source: Space Syntax

Based on the collision data available from the City of Berkeley at the time of analysis[2] and the pedestrian volume information presented in Figure 5-4, a pedestrian "exposure" analysis was performed. The term exposure originated in the public health field, and is defined as a person's rate of contact with a potentially harmful agent. Applied to transportation planning, pedestrian exposure is defined as a pedestrian's rate of contact with potentially harmful vehicular traffic. This exposure analysis was performed to show in more detail the locations and factors involved with these collision trends.

The concept of exposure is important for evaluating pedestrian risk, rather than relying strictly on the absolute number of collisions at specific locations. For example, Intersection A experiences 10 collisions per year, with an average annual pedestrian volume of 10,000 pedestrians per year. Intersection B experiences 20 collisions per year, but has an average annual pedestrian volume of 100,000 pedestrians per year. While intersection B has a higher *absolute* number of collisions (10 more collisions than Intersection A), dividing the annual number of collisions by the pedestrian volume (exposure) gives a measurement of relative risk between the two locations. This reveals that Intersection A experiences 0.001 annual collisions per pedestrian, while Intersection B experiences 0.0002 annual collisions per pedestrian. This approach demonstrates that Intersection A is actually a higher pedestrian risk by volume, experiencing five times the likelihood of a pedestrian collision than Intersection B. This type of analysis was performed in Berkeley and is described in the subsequent sections based on collisions per pedestrian volumes and collisions per traffic volumes.

[2] The collision data available at the time of analysis includes collisions from January 1997 through December 2004.

5.2.3.1. COLLISIONS COMPARED WITH PEDESTRIAN VOLUMES

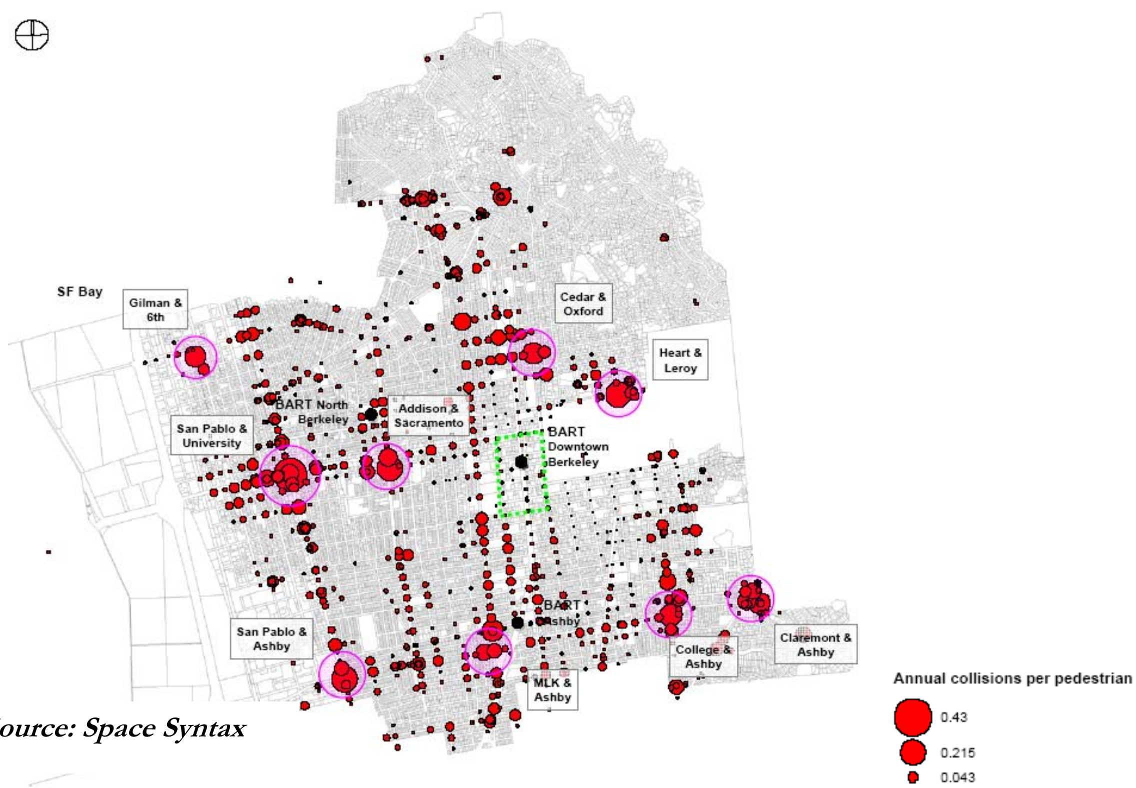
Figure 5-7, Collisions Compared with Pedestrian Volumes, effectively merges Figures 5-4 and 5-6, showing the average number of collisions per the number of pedestrians using that intersection. This reveals a different picture than mapping annual or total collisions alone – one which more accurately displays pedestrian risk in the City of Berkeley as a function of the use of each intersection.

It can be seen there is a higher incidence of risk at major street crossings, with a marked decrease at intersections within the residential portions of the city. All major concentrations of risk are found at major junctions outside of the city center. The areas around the downtown and to the south of the University, although bearing a significant number of collisions, were actually found to be less risky due to the large volumes of pedestrian traffic in these areas. Key areas of pedestrian risk, as measured by collisions per person, are highlighted in pink.

5.2.3.2. COLLISIONS COMPARED WITH TRAFFIC FLOW

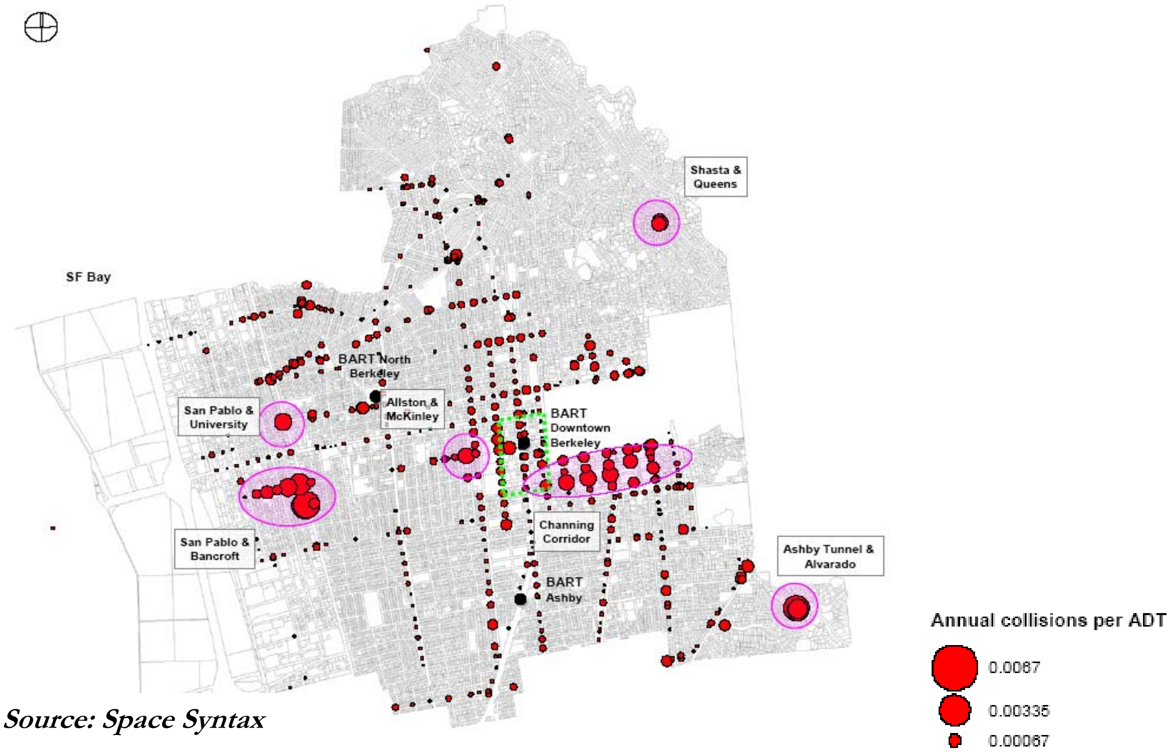
Another way of estimating pedestrian risk of collision is by dividing the number of annual collisions by average daily traffic. This approach, shown in **Figure 5-8, Collisions Compared with Traffic Flow,** shows that the highest values of collisions by traffic are primarily not at intersections with the most pedestrian collisions. Locations with the greatest risk are either in areas where there are low pedestrian volumes and low traffic volumes or where there are high pedestrian volumes and high traffic volumes. The larger circles represent the annual number of collisions per junction by average daily traffic.

Figure 5-7
Collisions Compared with Pedestrian Volumes



Source: Space Syntax

Figure 5-8
Collisions Compared With Traffic Flow



Source: Space Syntax

5.2.3.3. RESULTS AND FUTURE USES OF THE PEDESTRIAN EXPOSURE ANALYSIS

The pedestrian exposure analysis described was an important product of the Berkeley Pedestrian Master Plan process. Where in the past the City relied primarily on the absolute collision numbers available from SWITRS to evaluate pedestrian safety, City transportation planning and engineering staff now have a citywide summary of relative pedestrian risk based on pedestrian and vehicle volumes. This exposure data shows some unique patterns of pedestrian risk that are not apparent when looking simply at the SWITRS data. As an immediate step, the results of the exposure analysis were used as one of the factors in identifying and prioritizing pedestrian improvements as part of this Pedestrian Master Plan. In the future, the City will continue to revisit the pedestrian exposure analysis on a regular basis to ensure that they are tracking and addressing locations that have the highest pedestrian risk.

CHAPTER 6

RECOMMENDED PEDESTRIAN PROJECTS

This chapter discusses capital project recommendations for Berkeley's pedestrian[1] network. These infrastructure improvements are intended to enhance pedestrian access and circulation as well as help pedestrians feel more comfortable when walking in Berkeley. This chapter focuses on engineering and infrastructure. Chapter 7 discusses programs and other non-infrastructure improvements to enhance the walking environment in Berkeley.

6.1. PROJECT SELECTION AND PRIORITIZATION

Identification and development of the recommended infrastructure projects in this chapter was a multi-part process that involved extensive public input, technical review of numerous intersections and crosswalk locations by the project team, and development of a detailed analysis tool to prioritize and rank project locations. Beginning in March 2006 with the Pedestrian Master Plan Public Workshop, the project team began collecting information from Berkeley residents on locations they would like to see improved. The team continued collecting information over the course of the project through the project website and email links. At the same time public input was being received, the project team was conducting a citywide inventory of pedestrian facilities, including sidewalks, crosswalks, and curb ramps, adding to the existing database of pedestrian signal locations, signage and other pedestrian features. With this extensive data, both from the public input process and from the inventory, the team could then begin to look at the most likely locations for improvements. Over 300 individual locations were studied for potential improvements as part of the initial planning process.

In order to compare the relative importance of these locations for improvements, a ranking system was developed that used a variety of readily available data factors.

Community Access: Is the project located near key pedestrian generators or attractors?
Measurements: Civic buildings, neighborhood commercial centers, parks, senior centers, schools, density of surrounding land uses

Transit Connectivity: Is the project located near key transit access points?
Measurements: BART and Amtrak connections, AC Transit trunk lines, AC Transit local lines

Usage and Demand: How many people are walking in the project area?
Measurements: Census journey to work data, Space Syntax forecasted volumes

Safety: Will the project improve safety?
Measurements: Collisions, pedestrian exposure, traffic volumes and speeds

Support and Need: Is there an identified need for the project?
Measurement: Project is identified in an existing plan, public comment received

[1] The term "pedestrian" refers to a person moving from place to place, on foot and/or with the use of an assistive mobility device (when that person has a disability and/or medical condition). "Walking" or "to walk" are the terms used to describe this movement of a pedestrian.

A list of the top 100 ranked intersections is provided in **Appendix A**. This list provides the City with an overall guide of the relative priority of various project locations, based on the technical factors above. This approach to ranking was intended to eliminate the case-by-case approach that has often been taken with pedestrian projects in the past.

Because pedestrian improvements are so localized, it can be challenging to develop a cohesive citywide master plan that is more than simply a list of dozens of location-specific improvements. As such, a number of project categories were identified that grouped projects of similar type together to be implemented on a corridor or citywide scale. These project categories are:

- Infill of Sidewalk Gaps
- Installation of Truncated Domes
- Installation of Perpendicular Curb Ramps
- Priority Intersections for Signal Timing Adjustments
- Locations for Installing Countdown Signal Heads
- Safe Routes to School Priorities
- Multi-Use Path Projects
- Installation of Audible Signals Along Corridors
- High Visibility Crosswalk Installation
- Standard Crosswalk and Advance Warning Signage
- Parking Restrictions (Red Curbs) Adjacent to Intersections
- Speed Feedback Sign Installation
- Pathway and Stairway Improvements
- Improvements to Signalized Intersections with High Pedestrian Collision Rates

As part of the project description, specific recommendations are made for prioritizing these improvements, so that the City can implement them in a logical manner based on the areas of greatest need first.

In addition to the broader citywide projects, a number of stand-alone intersection, corridor and crossing projects were identified over the course of the project. These were projects that involved more specific improvements than could fit into the overall citywide project categories. These 34 projects are presented in detail at the end of this chapter.

All of these projects will have impacts in terms of funding and drainage and may impact street pavement. Specific projects may also affect specific street rehabilitation projects. Implementation of these projects will necessitate coordination with the various capital improvement programs.

Cost estimates and detailed project lists are shown in **Appendix A**.

6.2. CITYWIDE INFRASTRUCTURE PROJECTS

6.2.1. INFILL OF SIDEWALK GAPS

Sidewalk gaps are areas in Berkeley where there are no sidewalks, or the sidewalk ends abruptly, resulting in a discontinuous network. Areas without sidewalks may force pedestrians to walk along the edge of the roadway, or may cause pedestrians to cross at undesignated crossing locations. Providing a continuous pedestrian sidewalk along all of Berkeley's roadways is recommended. As discussed in Chapter 4, a complete citywide inventory of sidewalk segments and gaps was conducted as part of this plan. The locations of these major sidewalk gaps are shown in **Figures 4-1 through 4-4**.

With the exception of some parts of the Berkeley Hills, the sidewalk network of Berkeley is mostly complete. The largest area of missing sidewalks is located between Cedar and Gilman, west of San Pablo Avenue. Parts of this area have historically been more industrial in nature and as such some of the street network was not built with sidewalks. The major sidewalk gaps are listed in Appendix A.

The Berkeley Hills contain the largest area of missing sidewalks in the City. While sidewalks are present along the major streets such as Spruce, Euclid and Marin, much of the network of narrow and curving residential streets lacks sidewalks. Retrofitting all of these roadways with sidewalks is not likely to be feasible, given the topography and narrow streets constrained in many cases by private properties built up to the edge of or in some cases encroaching on the public right-of-way. Furthermore, the pathway/stairs network provides pedestrian access to many of the hills areas, and improving these pathways is considered a higher priority than extensive new sidewalk development in the hills.

RECOMMENDATION: As a first priority, Berkeley should fill sidewalk gaps located in the flat central and western part of the City, particularly those between Cedar and Gilman west of San Pablo Avenue. Note that infilling gaps will increase impervious area which is subject to National Pollutant Discharge Elimination System (NPDES) stormwater permit requirements. Drainage issues must be considered with new construction. As a second priority, Berkeley should continue to work with residents of the hills where new sidewalk segments are requested. Due to topographical constraints, it is likely that sidewalks may not be feasible in many areas of the hills. **Appendix A** shows a list of the key sidewalk gap segments outside of the hills areas, and the estimated costs for installing these sidewalk segments.

6.2.2. ADA IMPROVEMENTS

6.2.2.1. PERPENDICULAR CURB RAMP RETROFIT

Perpendicular curb ramps are designed so two ramps are included at intersection corners. Perpendicular ramps allow pedestrians and people in wheelchairs to enter into the crosswalk directly in their line of travel. Perpendicular ramps have been the preferred design for the City of Berkeley in the past and are required on all newly constructed streets. However, on many major streets diagonal ramps are present. Perpendicular ramps do require more space to install than a single diagonal ramp, are more costly, and sometimes cannot be accommodated due to utilities or other obstructions at the corner. Further, because of Berkeley's southwest drainage pattern, all southwest corner curb ramps must be reviewed for drainage. Accounting for these special considerations, it is recommended that perpendicular curb ramps be installed where feasible, especially at major intersections in high pedestrian activity zones.

RECOMMENDATION: As a first priority, Berkeley should identify opportunities to install perpendicular curb ramps at all arterial/arterial intersections and then establish a schedule for constructing them where feasible. See **Appendix A** for a list of these locations. Curb ramps at arterial/collector intersections should be evaluated on a case-by-case basis when the City is undertaking construction, maintenance or repair projects that affect the public right of way.

6.2.2.2. TRUNCATED DOMES

Truncated domes provide a cue to visually-impaired pedestrians that they are entering a street or intersection. Since 2002, Americans with Disabilities Act (ADA) Guidelines have called for truncated domes on curb ramps. Most of Berkeley's curb ramps lack truncated domes, because they were constructed prior to 2002. Should adequate funding be available, truncated domes should be installed on streets that have been constructed or re-paved since 2002. Otherwise, all future installations or reconstruction of curb ramps should include truncated domes as required by law.

Although it is not required for Berkeley to install truncated domes at existing curb ramps that were built prior to 2002, the City may wish to install these devices at high priority pedestrian locations. Truncated domes are a very visible improvement, and they are relatively inexpensive to install. The preferred option for retrofitting truncated domes requires saw-cutting out a 3x4 space in the ramp in order to embed the truncated dome panel flush with the surface. While more expensive than simply epoxying the retrofit panel to an existing ramp, the saw-cutting ensures that the domes will not become detached and pose a tripping hazard.

RECOMMENDATION: Berkeley should consider retrofitting truncated domes at all arterial/arterial intersections where they are currently lacking. In some cases, these would be considered temporary installations until the time that the roadway is resurfaced and the curb ramps are reconstructed to new ADA standards. See **Appendix A** for a list of these locations. As required by law, Berkeley will also continue to install truncated domes when re-paving streets and improving existing curb ramps.

6.3. SIGNALIZED INTERSECTION ENHANCEMENTS

6.3.1. SIGNAGE AND STRIPING

A controlled intersection provides the greatest level of traffic control for both motor vehicles and pedestrians. However, even with traffic controls, there may be conflicts between vehicles and pedestrians due to vehicles stopping partially in the crosswalk, failing to yield to pedestrians when turning, or making a right turn on red movement while pedestrians are crossing. Although these conflicts are primarily due to motorist behavior (generally failing to yield), making signage and striping improvements can help to increase motorist awareness of their vehicle placement at intersections and need to yield.

RECOMMENDATION: At intersections with a history of high vehicle/pedestrian conflicts (based on SWITRS data or the pedestrian exposure analysis), the City should consider: 1) installing Stop Lines five feet in advance of the crosswalks, to help position motorists back of the crosswalk when stopped; 2) install "Turning Traffic Must Yield to Pedestrians" (MUTCD R10-15) signage; and 3) if pedestrian conflicts appear to be related to right turn on red, consider prohibiting right turn on red at that location. The City's default advance stop bar setback is four feet unless conditions for a five foot setback have been met. A five foot stop bar setback should be used only where it does not exacerbate existing sightline issues caused by vegetation or buildings located close to the intersection. A list of the signalized intersections with the highest rate of pedestrian collisions is provided in **Appendix A.**

6.3.2. SIGNAL TIMING ADJUSTMENT

Signal timing controls the amount of time each phase of a signal is allotted for vehicles and bicycles to pass through or pedestrians to cross the street. Per the MUTCD, standard traffic engineering design assumes that pedestrians travel at 4.0 feet per second, which together with the width of the street is used to determine the amount of time to assign to the pedestrian clearance interval. For slower pedestrians, such as the elderly and children, this assumed walking speed may result in them not being able to fully cross the street before the light changes. By adjusting the signal timing to reflect a slower walking rate, slower pedestrians will have more time to cross the street.

RECOMMENDATION: As a first priority, Berkeley should consider adjusting signal timing at the 15 arterial/arterial signals adjacent to senior centers and 10 locations adjacent to elementary schools to allow for a pedestrian walking speed of 2.8 to 3.5 feet per second. This slower walking speed is consistent with MUTCD recommendations for walking rates for slower pedestrians. Consideration of signal operation and signal coordination by the Department of Public Works traffic engineers and signal technicians is necessary for this recommendation. As a next priority, consider implementing this signal timing walking speed for all high pedestrian demand locations in the City. **Appendix A** identifies the top priority signal locations.

6.3.3. COUNTDOWN SIGNALS

Countdown pedestrian signals provide information on the amount of time remaining in the pedestrian clearance interval, which can assist pedestrians in making safe crossing judgments. Guidance on the use of these devices is now included in the California MUTCD. The City of Berkeley has a program in place to install countdowns on all new signal installations, or when signals are upgraded.

RECOMMENDATION: Berkeley should continue to install countdowns on all new signal installations and when signals are upgraded. In addition, the City should plan to upgrade all signals to pedestrian countdown signals. A list of locations that need countdown signals is provided in **Appendix A**.

6.3.4. AUDIBLE SIGNALS

Audible signals emit sounds to guide visually-impaired pedestrians indicating when it is safe to cross. Different audible signals are usually used to also indicate crossing direction. Sounds are activated by the pedestrian push-button. The MUTCD states that installation of audible signals should be based on an engineering study that considers:

- Potential demand for accessible pedestrian signals
- A request for accessible pedestrian signals
- Traffic volumes during times when pedestrians might be present, including periods of low traffic volumes or high turn-on-red volumes
- The complexity of traffic signal phasing
- The complexity of intersection geometry

The City of Berkeley currently has audible pedestrian signals installed at 25 intersections, primarily concentrated along the Shattuck corridor downtown, along University, along Telegraph, and along 6th/7th streets in West Berkeley.

RECOMMENDATION: Berkeley should consider installing audible signals at all signalized intersections. Signalized intersections near the homes of people who are visually impaired, focusing on arterial/arterial installations, should be a first priority. Locations near senior centers should also be high priorities. The City has developed a list of prioritized intersection locations for audible pedestrian signal installation. This list is based on residences of people with visual impairments and land uses. **Appendix A** lists locations recommended for audible signal installation.

6.4. UNCONTROLLED CROSSWALK IMPROVEMENTS

Infrastructure improvements at uncontrolled crosswalk locations can help increase the visibility of pedestrians to motorists and improve pedestrians' walking experience. These improvements are for both unmarked and marked crosswalks at intersections. Improvements to uncontrolled crosswalks are discussed in **Appendix B – Pedestrian Design Guidelines.**

6.4.1. HIGH-VISIBILITY CROSSWALK MARKINGS

There are a variety of different striping styles for crosswalks. The City of Berkeley utilizes two different marking styles for pedestrian crosswalks: the standard "transverse" style, consisting of two parallel lines; and the "ladder" style consisting of the two parallel lines with perpendicular ladder bars striped across the width of the crosswalk. Ladder style crosswalks are used in locations where heightened pedestrian visibility is important.

RECOMMENDATION: The following roadways have been determined by the City to be high priority corridors that warrant the installation of ladder crosswalk markings at all uncontrolled marked crosswalk locations. **Appendix A** shows a detailed breakdown of the number of uncontrolled marked crosswalks along each of these corridors with a cost breakdown.

- San Pablo Ave.
- University Ave.
- Sacramento St.
- Ashby Ave.
- Adeline St.
- Martin Luther King Jr. Way
- Telegraph Ave.
- Gilman St.
- Shattuck Ave.
- Milvia St. between Blake St. & University Ave.
- Bancroft Way from Oxford St. to Piedmont Ave.
- Durant Ave. from Oxford St. to Piedmont Ave. (completed)
- Channing Way from Oxford St. to Piedmont Ave.
- Claremont Ave., south of Ashby Ave. (completed)
- College Ave.
- Cedar St. from Walnut St. to Martin Luther King, Jr. Way
- Hopkins St. from San Pablo Ave. to Peralta Ave.
- Solano Ave.

6.4.2. FLASHING BEACONS

Where the visibility of pedestrians in a crosswalk may be poor, or where warranted by other safety considerations, yellow flashing beacons can be installed to alert motorists to expect pedestrians in a crosswalk. The City has installed several pedestrian actuated flashing beacons. The installation of flashing beacons is preferred by Public Works over the actuated in-pavement crosswalk flashing lights due to maintenance issues. The City should continue to monitor existing in-pavement crosswalk lights, and replace them with flashing beacons if necessary. Flashing beacons should be installed on a case-by-case basis in accordance with the City's crosswalk hierarchy, discussed in the Design Guidelines. All push-button activated flashing beacon locations should have "Cross with Caution" signs (R62-E) at every push button location.

6.4.3. BULBOUTS

Bulbouts are engineering improvements intended to reduce pedestrian crossing distance and increase visibility. In addition to shortening the crosswalk distance, bulbouts serve to increase pedestrian visibility by allowing pedestrians to safely step out to the edge of the parking lane where they can see into the street, making them more visible to oncoming drivers. Despite their advantages, bulbouts can require major re-engineering of the street, can be very costly and are not appropriate for all situations.

Several items should be considered when planning bulbouts. Bulbouts should be designed so that they allow transit buses to complete turning movements and load and unload passengers safely. Bulbout geometry should allow mechanical street sweepers to clean the transitions from parking lane curb to extended curb. Bulbouts may impact drainage and require re-engineering that could entail expensive and extensive pavement re-grading and/or storm drain modifications. The cost of bulbouts should be compared to the safety benefit when determining where bulbouts should be installed.

RECOMMENDATION: Berkeley should consider the feasibility of installing bulbouts at uncontrolled crosswalk locations on a case-by-case basis where appropriate.

6.5. SIGNAGE IMPROVEMENTS

The City of Berkeley's current pedestrian-related signage consists of a mix of current (California MUTCD) and older (California Traffic Manual) signs, in both standard yellow and high-visibility fluorescent yellow-green. In accordance with the MUTCD sign update schedule, the City of Berkeley has developed a program to bring signs up to current MUTCD standards. As policy, when the City replaces signs near schools and senior centers, they upgrade to fluorescent yellow-green signs. The City is also converting to new MUTCD signage for pedestrian warning signs. Pedestrian warning signs are being replaced as part of regular on-going sign maintenance.

RECOMMENDATION: Continue to upgrade pedestrian warning signs and signs near schools and senior centers to fluorescent yellow-green signage. A summary of the total signs that need to be upgraded by corridor is presented in **Appendix A**.

6.6. PARKING RESTRICTIONS

Implementing parking restrictions adjacent to crosswalks is a low-cost method of maintaining pedestrian visibility. The California MUTCD recommends that at signalized intersections, parking be restricted for a minimum of two car-stall lengths on the near side and one car length on the far side. At all other intersections, the California MUTCD recommends that parking be restricted on all corners at least one stall length from the crosswalk or curb return. Minimum parking stall length is 20 feet, with 24 feet the preferred length. (Section 3B.18 Parking Space Markings) Design guidance regarding parking restrictions is provided in Appendix B.

RECOMMENDATION: Parking restrictions (red curb) should be installed one parking-stall length (20 to 24 feet) adjacent to both sides of all marked crosswalks. Disabled parking (blue curb) may also be suitable for such areas and should be considered where appropriate. **Appendix A** provides a list by corridor of the number of crosswalks and a cost for installing red paint at these locations.

6.7. CORRIDOR IMPROVEMENTS

6.7.1. SPEED FEEDBACK SIGNS

Speed feedback signs are permanent speed radar signs that display approaching vehicle speeds and speed limits on roadways. The unit is a fixed speed limit sign with a built-in radar display unit. The City already has speed feedback signs installed along several major roads and is working on criteria to select other locations for speed feedback signs.

RECOMMENDATION: The City should expand its program to install speed feedback signs on high priority corridors. **Appendix A** provides a list of locations and priorities for speed feedback sign installation.

6.7.2. BULBOUTS

Bulbouts are described in section 6.4.3.

RECOMMENDATION: As part of any major streetscape enhancement or overlay project, the City should conduct a feasibility study of installing bulbouts at selected locations along the corridor. The City should also look at enhancing existing bulbouts, such as those along Sacramento Avenue, to reduce the turn radius and provide parallel curb ramps that lead directly out into crosswalks. Installing bulbouts on a corridor basis would be similar to the project the City undertook along Dwight Way, in which a number of new bulbouts were installed. Bulbout designs should be standardized with input from the Fire Department and locations should be reviewed with the Fire Department to ensure bulbouts will not impact emergency vehicle access.

6.7.3. STREETSCAPE ENHANCEMENTS

The City of Berkeley has a number of existing detailed area plans that contain streetscape improvement recommendations. These plans are discussed in detail in Chapter 3. Table 6-1 identifies these improvements. This Pedestrian Master Plan defers to the specific streetscape and pedestrian improvement recommendations contained in those detailed area plans. Note that costs for these improvements are not included in the Pedestrian Master Plan.

Table 6-1
Corridor Streetscape Improvements

Street	From	To	Specific Improvement	Streetscape Plan
Bancroft	Bowditch		Redesign intersections for better safety	Draft Southside Area Plan
Bancroft	Dana		Redesign Intersections for better safety	Draft Southside Area Plan
Bancroft	College		Redesign Intersections for better safety	Draft Southside Area Plan
Hearst	California	Shattuck	Improve lighting	Bicycle Master Plan
Heinz	9th	San Pablo	Improve lighting	Bicycle Master Plan
Aquatic Park	Channing	Park	Bike/Ped bridge across lagoon	Aquatic Park Master Plan
Milvia	Allston	Dwight	Remove free right turn at Allston	Bicycle Master Plan
Russell	San Pablo	Claremont	Improve lighting	Bicycle Master Plan

Street	From	To	Specific Improvement	Streetscape Plan
San Pablo	Heinz	Russell	Improve lighting	Bicycle Master Plan
San Pablo	Haskell	Harrison	Accessible curb ramps	San Pablo Avenue Improvement Plan
San Pablo	Haskell	Harrison	Refuges at narrow and wide center medians	San Pablo Avenue Improvement Plan
San Pablo	Haskell	Harrison	Painted crosswalk markings at unsignalized intersections	San Pablo Avenue Improvement Plan
San Pablo	Haskell	Harrison	Standard crosswalk markings at signalized intersections	San Pablo Avenue Improvement Plan
San Pablo	Haskell	Harrison	Pedestrian-scale in-pavement light fixtures	San Pablo Avenue Improvement Plan
San Pablo	Dwight		Install colored concrete paver crosswalks	San Pablo Avenue Improvement Plan
San Pablo	University		Install colored concrete paver crosswalks	San Pablo Avenue Improvement Plan
San Pablo	Cedar		Install colored concrete paver crosswalks	San Pablo Avenue Improvement Plan
San Pablo	Gillman		Install colored concrete paver crosswalks	San Pablo Avenue Improvement Plan
Shattuck	Hearst	Rose	Street trees	Draft North Shattuck Urban Design and Circulation
Shattuck	Hearst	Rose	Bulbouts on NE and SW corners of major intersections	Draft North Shattuck Urban Design and Circulation
Shattuck	Hearst	Rose	Pedestrian-scaled street lights every 30 ft.	Draft North Shattuck Urban Design and Circulation
Shattuck	Hearst	Rose	Bike racks	Draft North Shattuck Urban Design and Circulation
Shattuck	Hearst	Rose	Bus shelters at: Hearst (2), Cedar (3), Vine (2), and Rose (2)	Draft North Shattuck Urban Design and Circulation
Shattuck	Hearst	Rose	Ped-mounted newsracks	Draft North Shattuck Urban Design and Circulation
Telegraph			Improve sidewalks	Draft Southside Area Plan
Telegraph	Durant		Redesign intersections for better safety	Draft Southside Area Plan
Telegraph	Bancroft		Redesign intersections for better safety	Draft Southside Area Plan
Telegraph	Dwight		Redesign intersections for better safety	Draft Southside Area Plan
University	I 80	Oxford	Festival lighting along median	University Ave Strategic Plan
University	I 80	Oxford	Plant trees in parking lanes	University Ave Strategic Plan
University	I 80	Oxford	Install street furniture and safety telephones	University Ave Strategic Plan
University	I 80	Oxford	Install median irrigation system	University Ave Strategic Plan

RECOMMENDATION: Where feasible, Berkeley should implement the specific streetscape enhancements developed as part of specific area plans. Consideration should be given to placement of structures such as news racks or bike racks that may obstruct fire hydrants or access to buildings from the street.

6.8. SAFE ROUTES TO SCHOOL

Proximity to schools was one of the primary factors in ranking and prioritizing the projects. Many of the corridor-wide improvements identified above would involve pedestrian enhancements near school areas. Improvements at these locations could benefit school-aged children walking to and from school, in addition to improving conditions for all pedestrians in the neighborhood. In addition, a Safe Routes to School project near Jefferson Elementary is identified in the stand-alone projects list below. Finally, a variety of Safe Routes to School related non-infrastructure programs are discussed in Chapter 7.

RECOMMENDATION: Berkeley should continue to implement Safe Routes to School projects as part of their effort to improve pedestrian safety in school areas. The City should actively pursue SR2S grants for any needed pedestrian improvements located near school zones. **Appendix A** shows a list of prioritized locations for Safe Routes to School improvements; these are located at intersections with at least three schools within 0.25 miles of the intersections and are in the top 100 ranked intersections.

6.9. PATHS AND STAIRS PROJECTS

6.9.1. HISTORIC BERKELEY HILLS PATHWAYS AND STAIRS

A unique network of over 130 historic pedestrian pathways and stairways exists in the Berkeley Hills. The pathways offer quiet resting places, panoramic viewpoints and critical pedestrian routes down from the hills neighborhoods, linking narrow and winding streets. The Department of Public Works has a detailed database of public pathways and publicly dedicated rights-of-way that was developed during the City of Berkeley's General Plan process.[2] The Berkeley Path Wanderers Association, a non-profit community group, has created a map of these pathways and works to improve them by installing simple wooden steps with volunteer labor. Some of the dedicated path alignments are currently unbuilt, impassable, steep, and not ADA-compliant. The City of Berkeley should seek to improve the remaining unbuilt pathways, and continue to cooperate with the Path Wanderers Association on this effort. Note that pathway improvements may impact existing drainage patterns and may require additional construction. The City should ensure that existing pathways are well maintained, kept clear of vegetation and well-signed so that residents can access them. In the event of an emergency, these pathways could serve as critical evacuation routes for large numbers of pedestrians in the hill area.

RECOMMENDATION: The City of Berkeley should work with the Berkeley Path Wanderers Association to improve the historic network of pathways and stairs in the hills. Priorities and cost estimates for pathway improvements are listed in **Appendix A**.

6.9.2. SHARED-USE BICYCLE/PEDESTRIAN PATH PROJECTS

A number of shared-use bicycle/pedestrian path projects are planned in Berkeley. These projects serve pedestrians as well as other non-motorized users such as bicyclists and roller bladers, and may be used by both recreational users and commuters. Most of these projects are shown on the 2005 Bicycle Master Plan Update map.

2 City of Berkeley General Plan, Transportation Element

RECOMMENDATION: The City of Berkeley should implement the proposed bicycle/pedestrian path segments shown on the 2005 Bicycle Master Plan Update. Those projects are carried forward into this Pedestrian Master Plan. **Appendix A** shows the key proposed bicycle and pedestrian shared-use path projects segments and costs for construction.

6.10. PEDESTRIAN PLAZA AND OPEN SPACE PROJECTS

The City of Berkeley has a number of adopted plans and conceptual projects which would construct public plazas as a pedestrian amenity. The goals of such projects vary. They include providing improved pedestrian access to transit, increasing open and green space in "urbanized" areas, and increasing social and commercial opportunities such as window shopping or café type outdoor seating. Following are three examples of such projects, although there are many more citywide. It is critical to note that these example projects exist at the conceptual level and require further study, design, environmental analysis, and public outreach before they can be implemented.

6.10.1. DOWNTOWN BERKELEY BART PLAZA

The City of Berkeley received an MTC Transportation for Livable Communities Planning Grant and, in partnership with BART and AC Transit, carried out a community-based urban design and transportation planning process to develop a concept plan for the larger downtown Berkeley BART plaza area, completed in late 2006. It defines both near-term and long-term improvements for the area with the near-term improvements allowing for a range of future long-term options. The near-term improvements defined in the plan include modifications to the BART entries to provide weather protection over stairs and escalators, as well as enhancements to the sidewalk along the plaza creating opportunities for café and restaurant seating to activate the area. A proposed custom bus canopy structure will provide shelter from the elements and create a centralized bus waiting area.

The City subsequently developed a Project Study Report Equivalent (PSRe) that contains a description of the proposed site design and near-term improvements, along with an analysis of alternatives, detailed project cost estimate, funding analysis, project schedule, and a Preliminary Environmental Analysis Report (PEAR). In 2010, the City will continue Design Development.

RECOMMENDATION: As the City of Berkeley continues Design Development of the Downtown Berkeley BART Plaza, the City should ensure that the project is consistent with the recommendations of this Plan as well as thoroughly coordinated with partner agencies such as transit providers BART and AC Transit.

6.10.2. CENTER STREET PLAZA

The City of Berkeley Planning Department is developing a Downtown Streets and Open Space Improvement Plan (SOSIP), funded by a MTC/ABAG Station Area Planning Program Cycle Two Grant. The plan focuses on major street and open space opportunity "subareas" in the Downtown Area. One such subarea is Center Street between Shattuck and Oxford, where a pedestrian plaza with limited vehicle access may be developed. The SOSIP will also propose area-wide improvements at a conceptual level for all subareas (including Center Street), and will make recommendations relating to new street trees and furnishings, lighting, wayfinding signage, public art, and use of public right-of-way by vendors, festivals and special events. The SOSIP will be accompanied by a "financing plan" to estimate the capacity of appropriate funding sources and prioritize projects so that project and maintenance costs fit within that capacity. Because interest in the Center Street Plaza project has been extremely high, public engagement and design development for the Center Street Plaza will likely go beyond the scope of the SOSIP.

RECOMMENDATION: As the City of Berkeley continues to develop the SOSIP and individual subarea projects, such as the Center Street Pedestrian Plaza, the City should ensure appropriate coordination among City departments and between partner agencies, as well as a thorough public outreach process when making critical decisions and before such projects are implemented.

6.10.3. NORTH SHATTUCK PEDESTRIAN PLAZA

The need for transit access and pedestrian improvements along North Shattuck was identified in the North Shattuck Urban Design and Circulation Report (2001)[3,4]. This report presents a conceptual plan for a North Shattuck Pedestrian Plaza which includes a transit hub that consolidates area bus stops, as well as new transit shelters, new public seating and bicycle parking.

RECOMMENDATION: As the City of Berkeley continues to develop improvements from the North Shattuck Report, the City should ensure appropriate coordination among City departments and outreach to partner agencies and the public before such projects are implemented. Because the project would involve a substantial redesign of the existing streetscape, a thorough public process is recommended.

6.11. PROJECT SHEETS

The remainder of this chapter provides specific project improvement sheets for stand-alone intersection, crosswalk or corridor projects throughout Berkeley. These projects involve unique improvements, or had more specific improvements than could fit into the overall citywide project categories described above. This subset of projects was selected from the overall citywide project ranking list based on a number of factors including: 1) the project's rank in the overall citywide list; 2) a unique location with improvements that could not be accomplished through one of the citywide infrastructure project categories; 3) providing for a range of different project types (intersection, corridor, crosswalk, transit access, school access); and 4) providing for geographic balance of project locations throughout Berkeley.

The projects are listed here in relative order of their ranking in the overall citywide project ranking list. This is not to imply that project implementation will occur in this exact order, consecutively from 1 to 34. Rather, project implementation is likely to be a flexible process that will be based on factors such as funding opportunities, schedules for street overlays and other larger street improvements, and development or redevelopment activities. This list provides the city with a guide for implementation, to be used in conjunction with the citywide infrastructure project lists described above. City staff and the Pedestrian Subcommittee should review these project lists at least on an annual basis to update them based on projects that have been implemented, re-adjust priorities as needed and to consider any opportunities for incorporating these projects into upcoming development or street improvement activities, as well as any upcoming grant funding cycles that could be targeted.

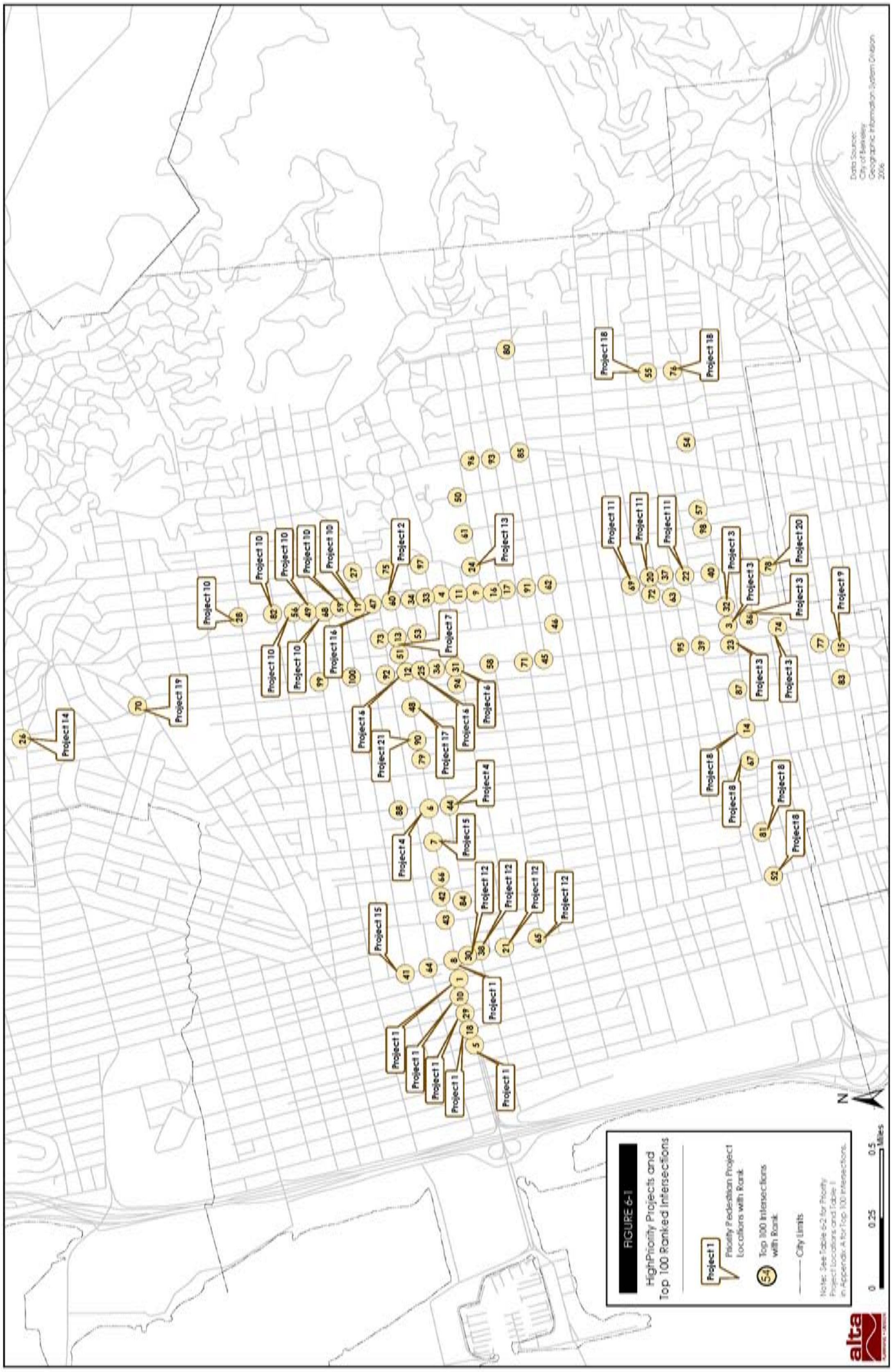
The list of project locations below is in order of highest to lowest priority based on the citywide ranking.

[3] Approved by Berkeley City Council on January 16, 2001; Resolution No. 60,911-N.S.
[4] "Resolution Declaring the City Council's Support for the North Shattuck Plaza Project" approved on May 16, 2006; Resolution No. 63,297-N.S.

Table 6-2
Pedestrian Project List

Project Number	Location
1	University from San Pablo to 6th Street
2	University and Shattuck
3	Ashby BART Station Improvements
4	Sacramento from University to Addison
5	Acton from Addison to University
6	Martin Luther King Jr. Way from Allston to University
7	University and Milvia
8	Ashby from California to San Pablo
9	Alcatraz and Adeline
10	Shattuck between Vine and Hearst
11	Shattuck from Russell to Ward
12	San Pablo from Addison to Bancroft
13	Bancroft at Oxford
14	Solano from Colusa to The Alameda
15	San Pablo and Delaware
16	Shattuck at Berkeley Way
17	University and Grant
18	College from Ashby to Russell
19	The Alameda/MLK and Hopkins
20	Shattuck and Woolsey
21	University and McGee
22	Dwight at Alta Bates
23	Alcatraz and California
24	North Berkeley BART Station
25	San Pablo and Cedar
26	Telegraph and Ashby
27	Telegraph and Parker
28	Rose and Sacramento
29	Gilman and Santa Fe
30	Addison and Jefferson
31	Sacramento and Oregon
32	Hearst Campus Sidewalk
33	Hearst and Gayley
34	Gilman Street and Curtis Street and the Ohlone Greenway

Figure 6-1: Map of High-Priority Projects and Top 100 Ranked Intersections



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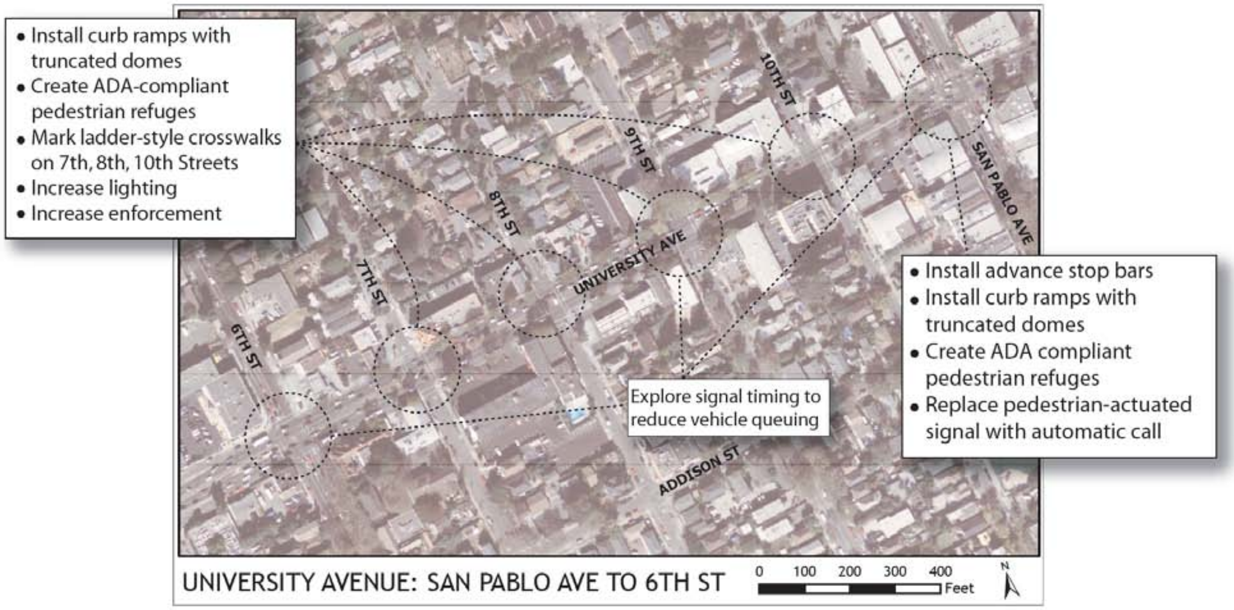
CORRIDOR IMPROVEMENT:
1. UNIVERSITY AVENUE FROM SAN PABLO AVENUE TO 6TH STREET

Study Area Description
University Avenue serves as the major route between downtown Berkeley, the University of California campus, and Interstate 80 through West Berkeley. The section between San Pablo Avenue and 10th Street is a "choke point" for vehicles traveling along University Avenue and an important node of pedestrian activities in West Berkeley. University Avenue is a major street that provides east-west connections between the Marina, the I-80 freeway, West Berkeley, Downtown, and the University of California campus. San Pablo Avenue and University Avenue have raised, landscaped medians, two travel lanes in each direction and exclusive single left turn lanes at most intersections. 6th, 7th, 8th, 9th and 10th Streets are local roadways providing north-south connections to the local neighborhoods in West Berkeley. University Avenue has a raised, landscaped median, two travel lanes in each direction and exclusive single left turn lanes at 8th eastbound and westbound, and 9th eastbound. The intersections of 7th, 8th, and 10th Street with University Avenue are stop-controlled on minor approaches. The intersection of University and 9th Street is signalized. All of these minor streets are residential in character, away from the University Avenue corridor and have one travel lane in each direction. A variety of commercial and retail establishments front University Avenue; there is metered parallel parking along University and metered parallel parking generally along the first half block of the side streets in each direction. Pedestrian crosswalks are provided at all legs of all intersections. The crosswalks of University at 7th, 8th, and 10th are uncontrolled; the crosswalks at 9th are signalized.

Issues
⅄ Vehicle queues on University Ave frequently extend along the San Pablo to 6th Street corridor; queues are particularly heavy between 9th and 10th eastbound (vehicles waiting at the San Pablo intersection); and between 7th and 8th westbound (vehicles waiting at the 6th Street intersection). "KEEP CLEAR" pavement markings are present across the side street intersections in both directions, but vehicles were frequently observed blocking the crosswalks at these intersections. ⅄ Long pedestrian crossing distances across all legs of San Pablo/University, and across the University legs of the other intersections. ⅄ Large volume of pedestrians crossing at San Pablo/University due to retail activities and bus route transfers. ⅄ Pedestrian crossings along corridor include children traveling to James Kenney Park north of University. ⅄ Vehicles on all legs often stop in the crosswalk on red. ⅄ No audible pedestrian signal actuation at University/San Pablo and University/9th. ⅄ Observed southbound truck turning right onto University Avenue having trouble making the turn without going into eastbound left turn lane. ⅄ Parked vehicles on University Avenue are too close to crosswalks and obscure presence of pedestrians. ⅄ No truncated domes on curb ramps. ⅄ This portion of University Avenue is scheduled for rehabilitation in summer 2008 as a Federal STP project. The grant funding is insufficient for the paving itself requiring that the street program make up the deficit.

Proposed Improvements



- San Pablo Avenue is a State of California right-of-way; therefore any work along the roadway requires State approval.
- At San Pablo/University install advance stop bars on all approaches and retain ladder style crosswalks on all legs. $3,600
- San Pablo Avenue Intersection:
  - Perpendicular curb ramps with truncated domes should be installed. $20,000
  - Drainage grates exist at the northeast and southeast corners.
  - Create pedestrian refuges on San Pablo Avenue at the medians by constructing median nose. $30,000
  - Install pedestrian-actuated audible signal on all legs. $4,000
- 7th, 8th, 9th, and 10th Street Intersections:
  - Directional curb ramps with truncated domes should be installed. $80,000
  - Drainage grates exist at several corners.
  - Create ADA compliant pedestrian median refuges on University Avenue. Median refuges may impact drainage and require re-engineering that could entail expensive and extensive re-grading and/or storm drain modifications. $240,000
  - Install ladder style crosswalks and warning signage at uncontrolled locations across University Avenue (all except 9th). $8,400
  - Increase lighting for pedestrians across University Avenue or install overhead pedestrian-activated flashing lights. Installation of increased lighting may require trenching for conduit that would impact street paving. $200,000 (2 locations only)
  - Increase enforcement of vehicles blocking intersections. (No capital cost)
- 6th and 9th Street Intersections:
  - Explore signal timing options at San Pablo Avenue, 6th Street and 9th Street to decrease vehicle queuing. (No capital cost)

Cost

- $552,000 ($116,000 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT PROJECT:
2. UNIVERSITY AVENUE AND SHATTUCK AVENUE

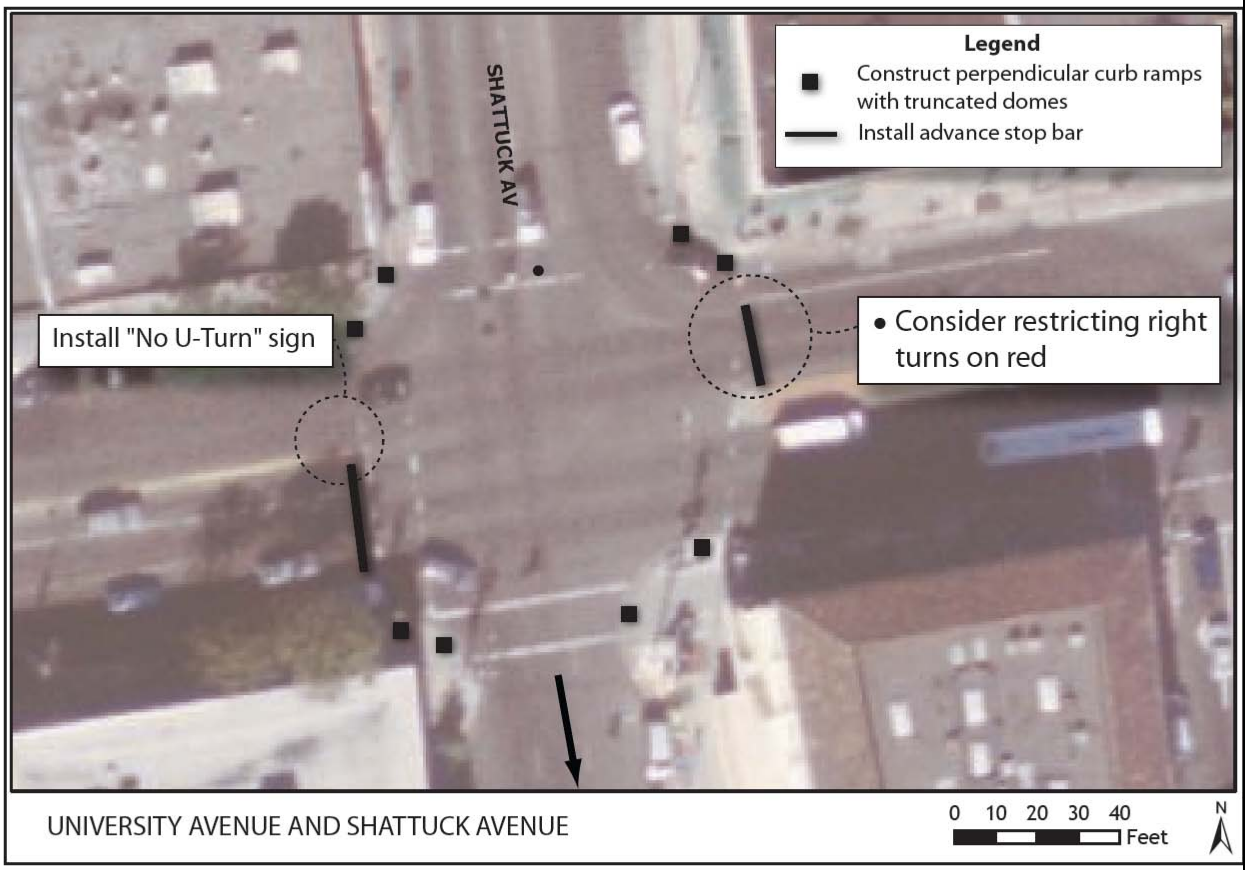
Study Area Description

The signalized intersection where northbound Shattuck splits from southbound Shattuck at University Avenue lies at the north end of the downtown district of Berkeley. University Avenue is the major east/west street and Shattuck Avenue is the major north/south street in Berkeley and their intersection is very complex, a result of the historic layout of the city as developed around the earlier streetcar system. Shattuck Avenue is split into a north/south couplet that is three lanes in either direction for several blocks between University Avenue and Center Street to the south. This intersection lies at the north end of the couplet, where it is resolved by the northbound Shattuck alignment being incorporated into University Avenue for a short block westward until it turns northward and reunites with southbound Shattuck to become bi-directional. This short block of University Avenue is three lanes wide with the far right lane being a right turn only lane, the middle lane allowing right turns and through movement, and the left lane allowing left turns and through movement. Shattuck Avenue southbound is three lanes in width. Eastbound University Avenue has two lanes for through movement, and both left and right hand pocket lanes, while southbound Shattuck, north of University Avenue, has two through lanes and a right-hand pocket lane.

Issues

- The Shattuck and University corridors are two of the most heavily congested corridors in Berkeley.
- This intersection is the site of the most auto/pedestrian collisions during a recent eight-year period.
- There are two right turn lanes proceeding northward from westbound University onto northbound Shattuck.
- Left turns are allowed from University onto Shattuck, although there is no dedicated lane from westbound University onto southbound University.

Proposed Improvements



- If sufficient right-of-way exists, install perpendicular curb ramps with truncated domes at all corners so that ramps face directly into crosswalk. $20,000
- Install advance stop bars on University to discourage encroachment of stopped vehicles into crosswalk and in right-turn-on-red situations. $1,800
- Consider utilization of a "leading pedestrian signal phase" to give pedestrians a "head start" to cross the street before motor vehicles start. (No capital cost)
- Repaint crosswalk striping at each crossing. $2,000
- Consider restricting right turn on red from westbound University traffic to northbound Shattuck in conjunction with improving intersection operations through signal timing modifications and/or signage. $200
- Install "No U-Turn" sign on west leg of intersection. $200

Cost

- $24,200 ($21,000 is accounted for in Citywide projects)

SAFE ROUTES TO TRANSIT PROJECT:
3. ASHBY BART STATION AREA IMPROVEMENTS

Study Area Description

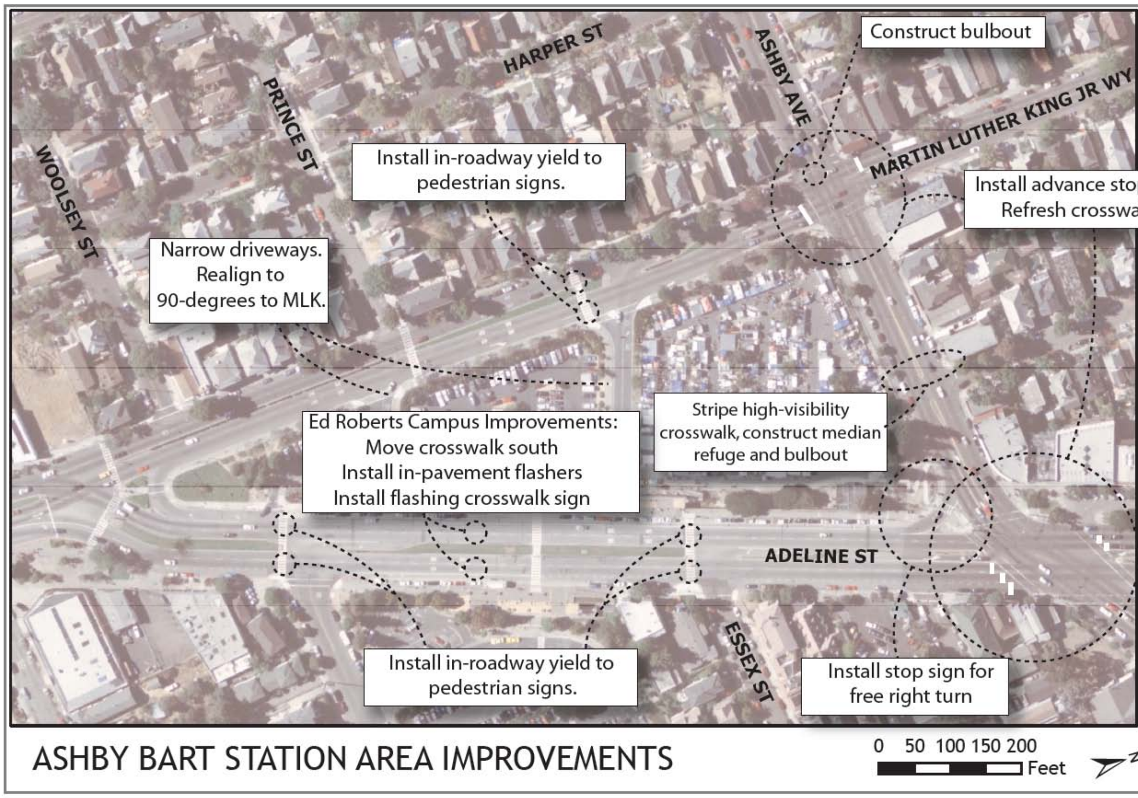
The Ashby BART station is situated on a triangular site, bordered by three major streets with heavy traffic volumes: Ashby Avenue on the north, Martin Luther King Jr. Drive on the west, and Adeline Street on the east. Uncontrolled crosswalks exist on both Adeline and Martin Luther King Jr streets in front of the BART station. These crosswalks experience high pedestrian volumes from people walking to the station from the surrounding residential areas. Pedestrians also cross Ashby at the unmarked crosswalk at Otis Street. In addition to the BART station, the parking lot of the station hosts a flea market on weekends that draws many local residents. In-pavement flashing lights have been installed across Martin Luther King Jr. Drive at Prince Street.

This area is undergoing changes as part of the Ed Roberts Campus Plan.

Issues

- High pedestrian volumes, combined with heavy traffic on surrounding streets, and many vehicles entering/exiting BART station parking lot.
- BART station driveways on MLK Jr. Drive.
- Free right turn lane at southwest corner of Ashby/Adeline promotes higher speed vehicle turns near a major entrance to the station.
- Pedestrian/Auto conflicts have been noted by local residents, specifically related to vehicles not stopping at the STOP sign on the northbound right turn movement out of the BART driveway on the west side of the station.
- Length of crossings on Adeline, particularly Adeline/Ashby.

Proposed Improvements



- Install in-roadway yield to pedestrian signs in medians at uncontrolled marked crosswalks along BART frontage as noted. $1,200
- Install advance stop line at intersections of Ashby/MLK and Ashby/Adeline to ensure vehicles stop far enough back from crosswalk, and refresh crosswalk paint. $6,400
- Consider tightening up “free” right turn radii at northwest corner of Ashby/Adeline using paint or vertical treatments. Take into account turning radii of trucks, buses, and other large vehicles. $100,000
- Work with BART to narrow widths of driveways from BART station onto MLK. In the long-term, these driveways should be realigned to 90-degrees to MLK. These driveways are on BART property and changes would need to be coordinated with BART. $51,200
- Consider constructing a bulbout on south side of Ashby between Harper and MLK, to provide a shorter crossing at the Ashby/MLK intersection. Ashby Avenue is State of California right-of-way and any work would need to be approved by the State. $80,000
- Change free right turn slip lane at southwest corner of Ashby and Adeline to stop controlled. $200
- Improve the crossing at Otis and Ashby by striping a high visibility crosswalk across the west leg of the intersection, constructing a median refuge, installing in-pavement flashers and constructing a bulbout on the south side of Ashby. Install “Cross with Caution” sign. $206,600
- Consider a study of pedestrian safety improvements along the Adeline Corridor. (No capital cost)
- Additional improvements include those planned as part of the Ed Roberts Campus Project. Improvements included in the project moving the existing middle of block crosswalk south and adding signage and in-pavement flashers. (No cost)

Cost

- $445,600 ($2,400 is accounted for in Citywide projects)

CORRIDOR IMPROVEMENT:
4. SACRAMENTO STREET BETWEEN ADDISON STREET AND UNIVERSITY AVENUE

Project Description

This improvement corridor extends along Sacramento between Addison Street and University Avenue. The intersection of Sacramento Street with University Avenue is signalized. Sacramento Street is a north-south major road with two travel lanes each direction, a raised landscaped median, and on-street parallel parking. University Avenue is an east-west major road with two travel lanes in each direction, a raised median, and on-street parallel parking. Addison Street is a local roadway providing east-west connections to the Andronico's Market parking lot and neighborhoods in West and Central Berkeley. Addison Street has one travel lane in each direction, with on-street parallel parking. This segment of Addison Street carries a large volume of vehicles and trucks for a neighborhood street due to Andronico's Market. The intersection skews to the west slightly on Sacramento Street, south of Addison Street. Vehicles on Addison Street are able to cross Sacramento Street in two stages, since the median is wide enough to store one car in each direction. Both intersections have marked crosswalks on all legs. Due to the width of the median on Sacramento, pedestrians are effectively crossing the roadway in two stages; when in the median area, pedestrians walk in a paved area along the edge of the median that is delineated with high-visibility ladder striping. (The remaining portions of the crosswalks are transverse striped).

Issues

Sacramento/University

- Long pedestrian crossing distances across all intersection legs.
- Large turning radii at corners and wide outer lane widths (about 20 feet) encourage right turning vehicles to speed through turning movement, especially at the northwest corner.
- A number of right-turning vehicles are not stopping on red if there is no opposing traffic, neglecting to look for pedestrians in crosswalk.
- Utility boxes and poles block or obscure pedestrians on sidewalk waiting to cross.
- Vehicles often stop in the crosswalk on red signal phase.
- No audible pedestrian signal actuation.
- No truncated domes on curb ramps.

Sacramento/Addison

- Long pedestrian crossing distances across Sacramento Street.
- Southbound vehicles tend to speed through this intersection.
- Parked vehicles on southwest side of Sacramento Street are too close to crosswalk and obscure presence of pedestrians.
- Raised median on southern leg of Sacramento Street sticks into crosswalk creating an obstacle for the disabled.
- No truncated domes on curb ramps.
- Numerous eastbound vehicles on Addison do not stop at crosswalk due to site distance problem created by intersection skewing and parked vehicles on Sacramento Street.
- Lowered curb instead of curb ramp on southwest corner.

Proposed Improvements

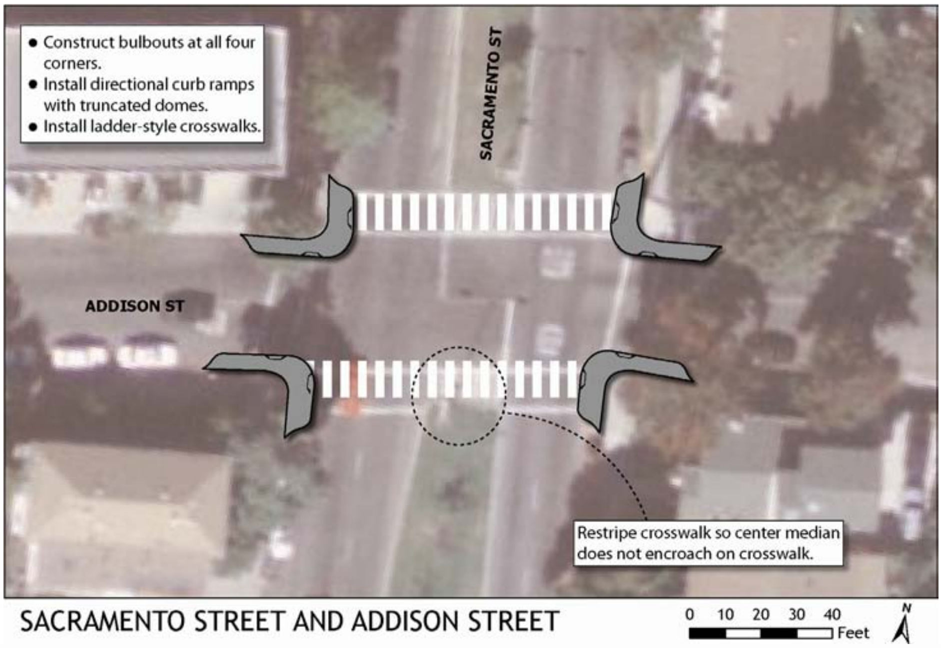
Sacramento/Addison

- Construct bulbouts at all corners to increase pedestrian visibility, restrict parking close to the intersection, reduce vehicle speeds, and decrease pedestrian crossing distances across Sacramento Street. Directional curb ramps with truncated domes should be installed. Bulbouts would require relocation of four catch basins and pipes (1 at northwest corner, 1 at southeast corner, 2 at northeast corner. $250,000
- Install ladder style crosswalks across Sacramento Street increase pedestrian visibility. Re-stripe crosswalk across southern leg of Sacramento so that the raised median does not intrude into the crosswalk. $3,000

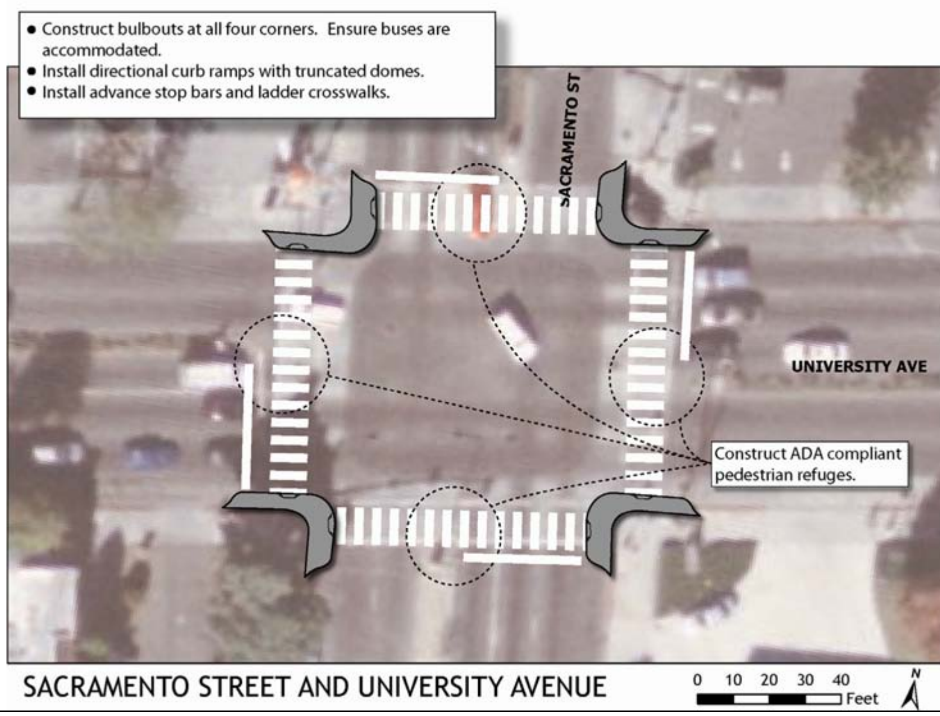
Sacramento/University

- Construct bulbouts at all corners of the intersection to reduce the width of the outermost lane to a maximum of 12 feet, increase pedestrian visibility, decrease the pedestrian crossing distances and tighten the turning radius for right turning vehicles. Directional curb ramps with truncated domes should be installed. Adequate lane width should be retained to serve as a bus pullout for the existing bus stops. Drainage grates exist at the northeast and southeast corners. Bulbouts would require relocation of four catch basins and pipes (1 at northwest corner, 1 at southeast corner, 2 at northeast corner.) $250,000

- Create ADA compliant pedestrian refuges at all medians. $120,000
- Install pedestrian-actuated audible signal on all legs. $4,000
- Improve visibility of crosswalks and pedestrians by installing advance stop bars on all approaches and ladder style crosswalks on all legs. $8,400



SACRAMENTO STREET AND ADDISON STREET



SACRAMENTO STREET AND UNIVERSITY AVENUE

Cost
▪ $634,800 (14,800 is accounted for in Citywide projects)

CORRIDOR IMPROVEMENT PROJECT:
5. ACTON STREET BETWEEN ADDISION AND UNIVERSITY

Project Description

This corridor includes Acton Street between Addison and University. Acton Street is a north-south local roadway with one lane in each direction, and with metered, parallel parking to the north, loading zone parking on the east side, and no parking on the west side. University Avenue is a major street with two travel lanes in each direction, a raised center median and on-street parallel parking. Addison Street is a local east-west roadway. The intersection of Acton/University is signalized and adjacent to residential and neighborhood retail establishments, including Andronico's Market on the southeast corner. Pedestrian signal actuation is on all corners and on the University Avenue medians. The intersection of Acton Street with Addison Street is four-way, stop-controlled. The northwest corner contains a 28-foot long bulbout that sticks about 6 feet into the Acton Street roadway and contains a tree. The intersection is adjacent Andronico's Market loading area on the northeast corner and residences on the other corners. Trucks generally approach Andronico's Market loading area using Addison Street. The Strawberry Creek Lodge Senior Housing is located on Addison Street west of this intersection. Addison Street between Acton and Sacramento carries a large volume of vehicles for a neighborhood street due to Andronico's Market.

Issues

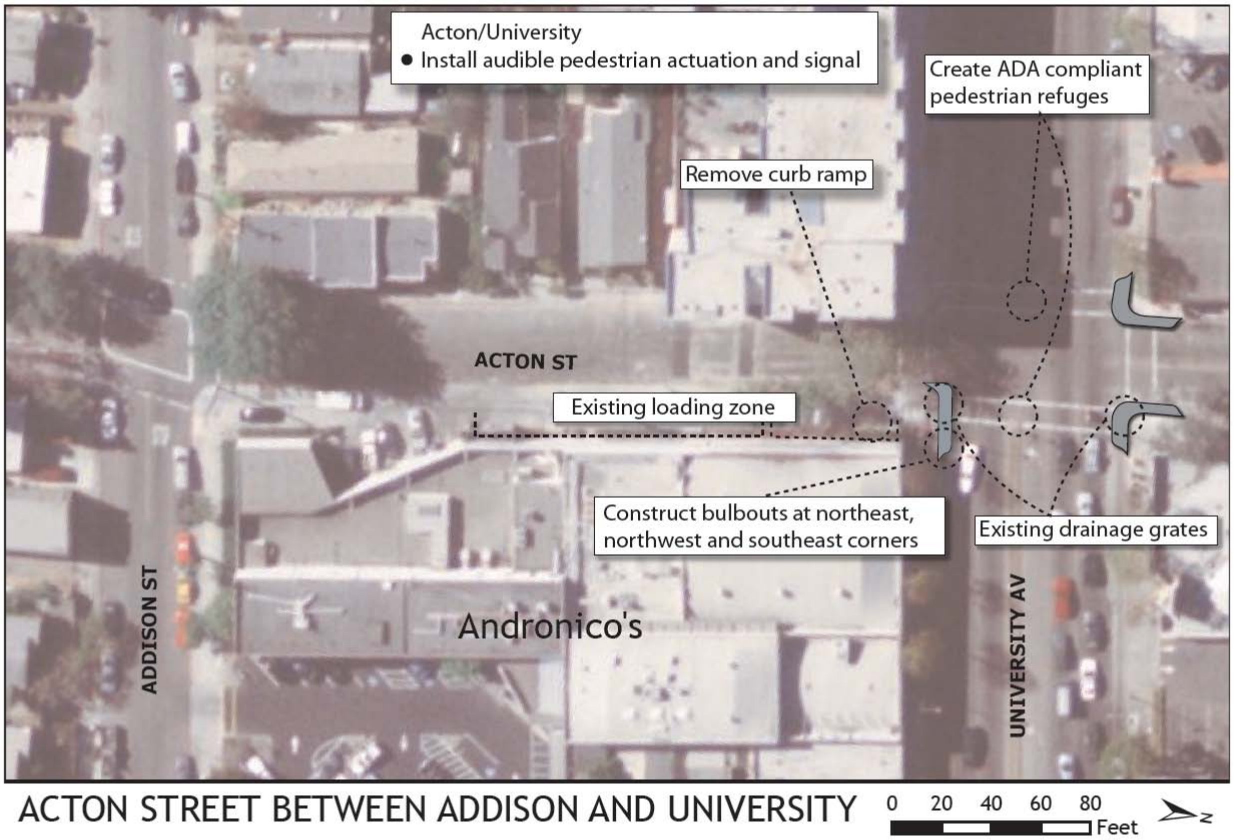
Acton/University

- Long pedestrian crossing distances across University Avenue.
- Metered parking space on northwestern side of University Avenue is too close to crosswalk.
- University Avenue vehicles often stop in the crosswalk.
- Raised median on eastern leg sticks 2.5 feet into crosswalk, creating an obstacle for the disabled.
- Raised medians do not serve as pedestrian refuges because they do not extend into the crosswalks or have curb ramps.
- No audible pedestrian signal or audible actuation.
- Truncated domes on southwest curb ramp only.
- Curb ramp on northeast corner facing western direction only.
- Curb ramp on the southeast side of Acton Street not facing crosswalk.

Acton/Addison

- Loading zone activity close to the intersection creates a vehicle bottleneck at the northern leg of Addison Street causes driver frustration and reckless turning movements.
- Trucks must sometimes double park on Addison Street to wait for space in loading dock or on Acton Street.
- Andronico's employees park in loading dock after morning deliveries, occasionally blocking the sidewalk and forcing delivery trucks to park on street.
- New senior living facility one block away. Many seniors walk through this intersection to access Andronico's and other retail and community services.

Proposed Improvements



Acton/University

- Construct bulbouts at northeast, northwest and southeast corners to reduce the width of the outermost lane to a maximum of 12 feet, increase pedestrian visibility, and decrease the pedestrian crossing distances across University Avenue. Directional curb ramps with truncated domes should be installed. Adequate lane width should be retained to serve as a bus pullout for the existing bus stops. Drainage grates exist at the northeast and southeast corners. $200,000
- Create pedestrian refuges at the medians on University Avenue that are ADA compliant. This may require drainage inlets. $60,000
- Install audible pedestrian actuation and audible signal on all legs. $4,000
- Remove curb ramp on southeast side of Acton Street that does not lead into crosswalk. (see image) $1,000

Acton/Addison

- Work with Andronico's to explore the options of relocating on-street loading zones. One option may be:
  - Removed loading zone on the southeast side of Acton Street closest to the intersection. (No capital cost)
  - Replace existing parallel parking with a loading zone on the northeast side of Addison Street closest to the intersection. (No capital cost)
- Partner with Andronico's to develop a traffic management plan, which would include employee trip reduction, employee parking provisions and expectations, and keeping the loading dock clear of parked vehicles until the cessation of all delivery activities. (No capital cost)
- Enforce parking violations. (No capital cost)

Cost

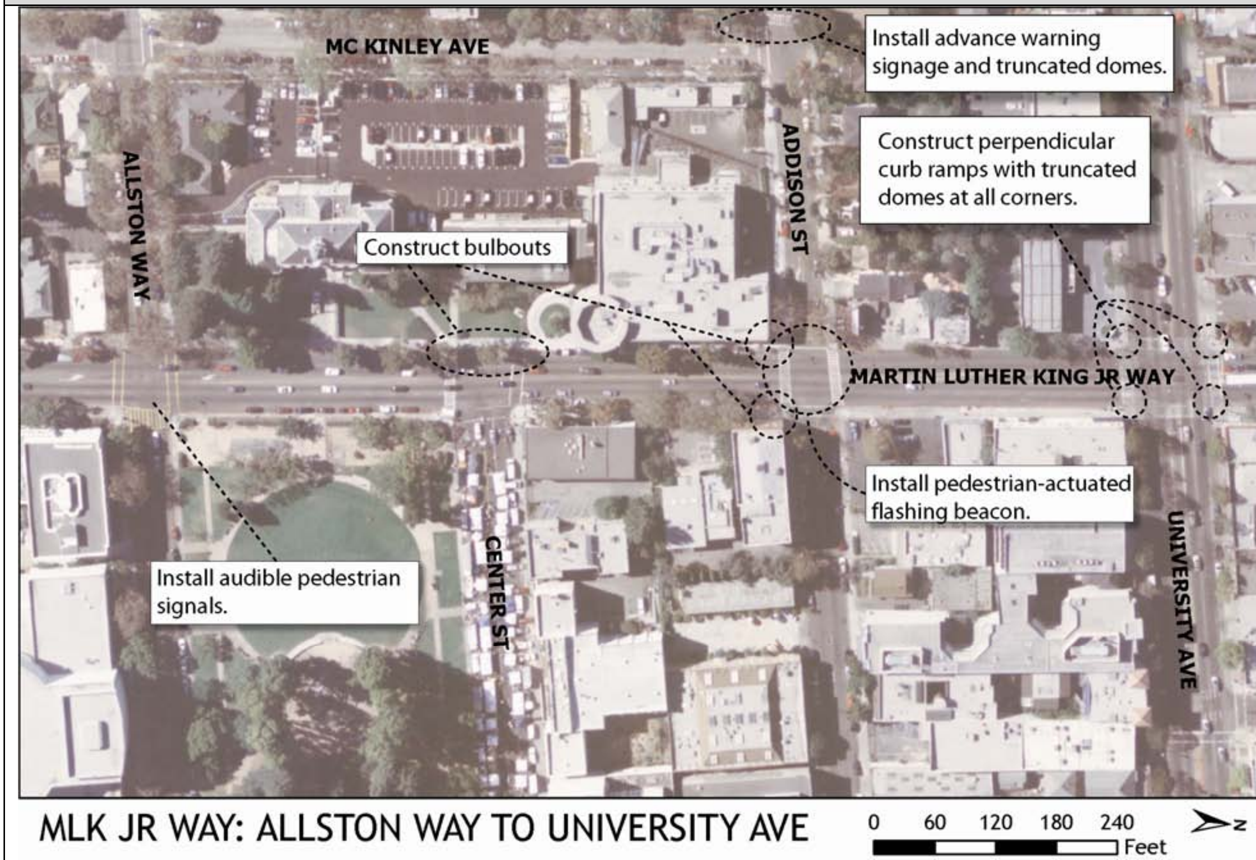
- $265,000 ($4,000 is accounted for in Citywide projects)

CORRIDOR IMPROVEMENT PROJECT:
6. MARTIN LUTHER KING, JR. WAY FROM ALLSTON WAY TO UNIVERSITY AVENUE

Study Area Description
This project encompasses a corridor along Martin Luther King Jr. Way including Allston Way, Center Street, Addison Street and University Avenue. This area is at the heart of the city's civic area, and is fronted by the Berkeley Unified School District Offices, the Berkeley Public Safety Building, the Berkley/Albany Municipal Court, and Martin Luther King Jr. Park and Plaza. Berkeley High School is located on the southeast corner of MLK/Allston Way. A farmer's market is held on Center Street on Saturdays. The MLK corridor marks the western edge of downtown Berkeley; to the east are civic, office and commercial uses of downtown, to the west are residential neighborhoods. Martin Luther King Jr. Way is a major north-south roadway, and carries two lanes of traffic in each direction plus on-street parking. Allston, Center, and Addison are effectively local roads with one travel lane in each direction plus parking, but carry very heavy volumes to the east of MLK due to the downtown land uses. University Avenue is a major east-west street with two travel lanes each direction plus on-street parking. Allston Way at MLK is signalized, Center Street is a signalized T-intersection that extends east off MLK, Addison Street is stop-controlled on the minor approaches, and University Avenue is signalized. Pedestrian volumes are primarily east-west across this corridor; marked crosswalks are present at all legs of all intersections, with those at Addison being uncontrolled and the remaining signal controlled. Audible pedestrian signals are installed at Center street and University Avenue intersections.

Issues
⅄ Heavy pedestrian volumes related to proximity of civic uses, MLK Jr Park, and Berkeley High School. ⅄ Heavy traffic volumes through corridor. ⅄ On-street parking along MLK not consistent; dropped at intersections to accommodate left turn lanes. ⅄ Uncontrolled crossing at Addison Street.

Proposed Improvements



- Consider installing bulbouts at west side of Center Street intersection, at south side of Addison Street intersection and at all corners of University Avenue intersection. Bulbouts at Center Street may require drainage considerations to Strawberry Creek Culvert. Other bulbouts may require drainage improvements. $500,000 (with University Avenue bulbouts) $250,000 (without University Avenue bulbouts)
- Install pedestrian actuated beacon for crossing at Addison Street. $100,000
- Install audible pedestrian signals at Allston Way intersection. $4,000
- If sufficient right-of-way exists, install perpendicular curb ramps with truncated domes at all corners of University/MLK. $20,000
- Install advance warning signage and truncated domes for uncontrolled crosswalk across Addison at McKinley. $2000

Cost

- $376,000 (without University Avenue bulbouts)
- 626,000 (with University Avenue bulbouts)

($26,000 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT:
7. UNIVERSITY AVENUE AND MILVIA STREET

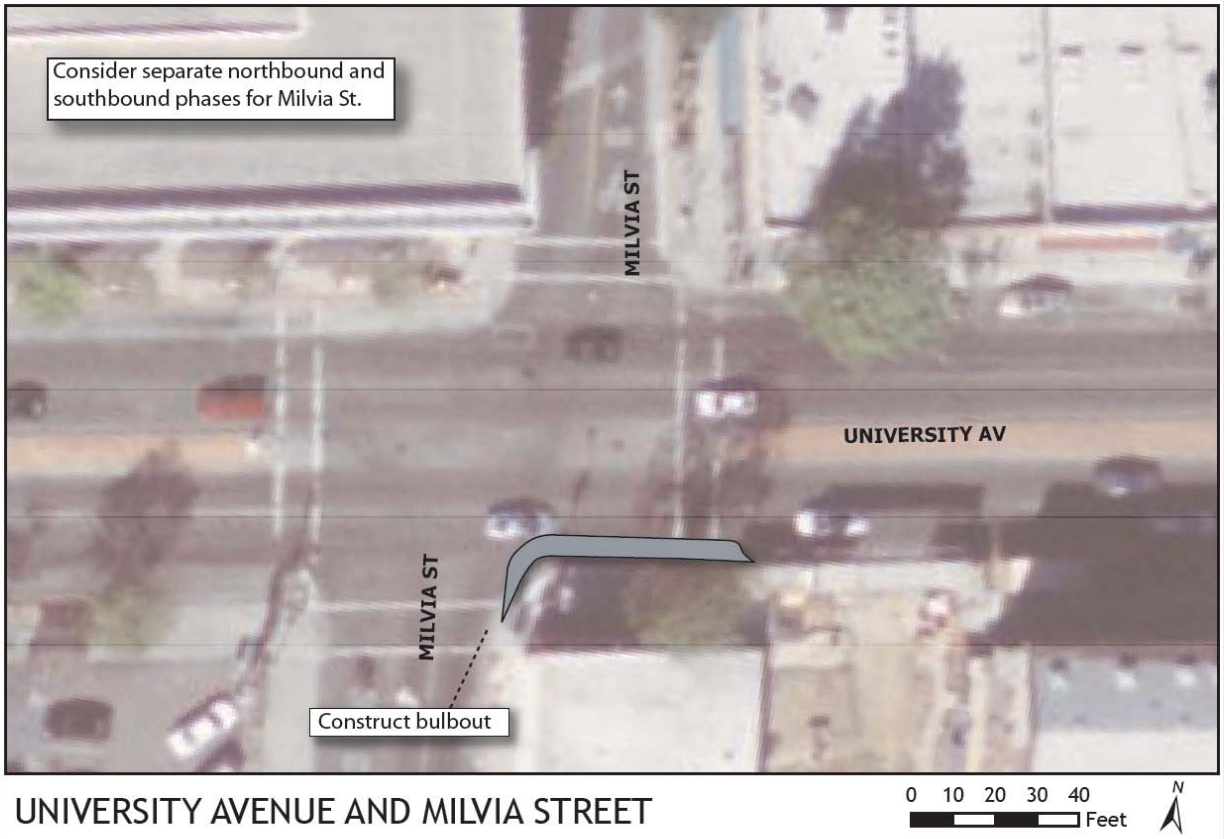
Study Area Description

The signalized intersection of Milvia and University is within the city's busy downtown area. Milvia is offset as it crosses University, so the intersection jogs to the east when heading northbound. The crosswalks however, are perpendicular; they are just set away from the corners on the southeast and northwest sides to provide a right angled crossing. Milvia is a north-south local road with one travel lane in each direction, plus on-street parallel parking; there is a left turn lane in the northbound direction on Milvia at University. University Avenue is an east-west major road with two lanes in each direction, with a raised center median and on-street parking. Commercial/retail uses front both sides of University in this area, and on the southwest corner is an auto service establishment with a parking lot that comprises much of the corner, including driveways on both University and Milvia.

Issues

- Crossing distances across University.
- Left turning vehicles may be focused on approaching traffic and fail to yield to pedestrians.

Proposed Improvements



UNIVERSITY AVENUE AND MILVIA STREET

- Consider bulbout on the southeast corner to provide additional visibility for pedestrians and shorten crossing distance. Bulbout may require regrading of the southeast quadrant of the intersection. $100,000
- Consider a separate northbound and southbound phases for Milvia Avenue, to eliminate left turn conflicts at the offset intersection. (No capital cost)

Cost

- $100,000 ($0 is accounted for in Citywide projects)

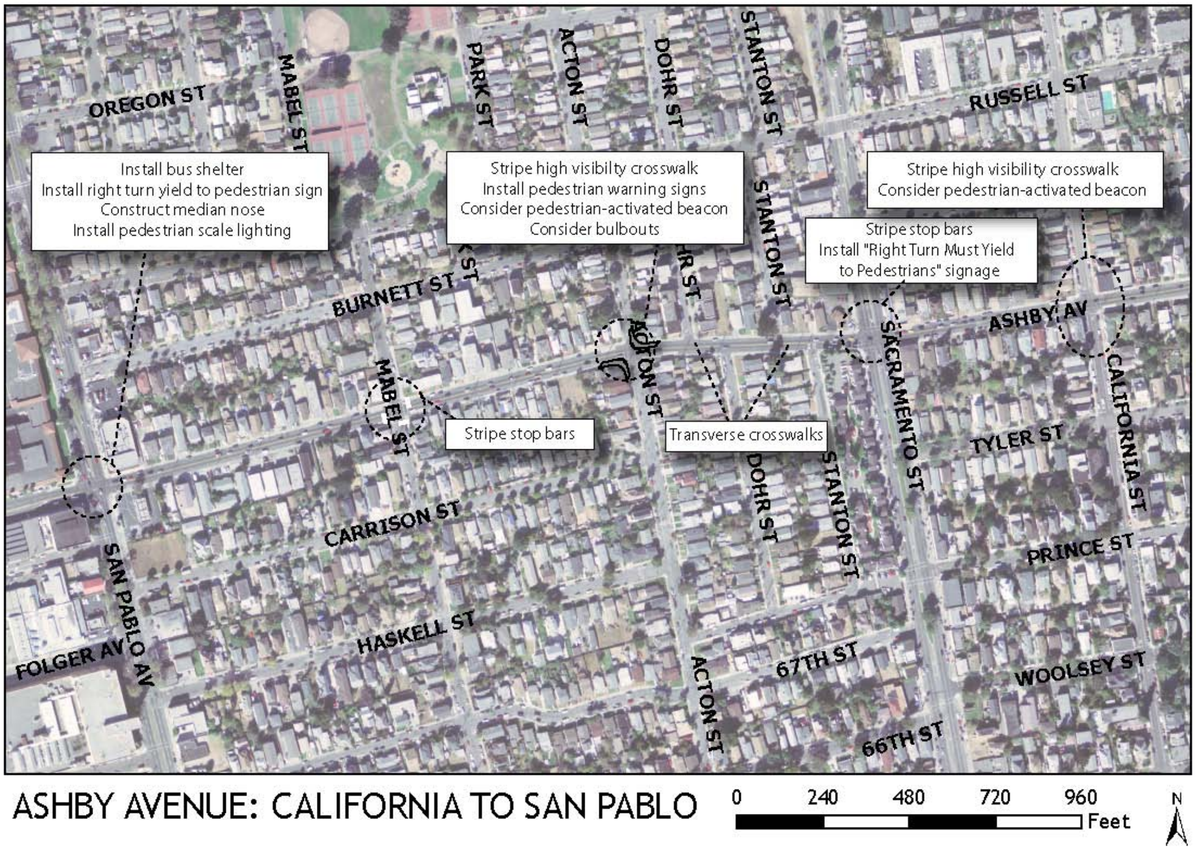
CORRIDOR IMPROVEMENT:
8. ASHBY AVENUE BETWEEN CALIFORNIA AVENUE AND SAN PABLO AVENUE

Study Area Description
This segment of Ashby Avenue is bordered by homes, with retail at Sacramento and San Pablo Corridors. It provides a major access route for motor vehicles to the I-80 freeway, and is heavily traveled. The road is four lanes, with the outside lanes used for parking during off-peak hours. The intersection of Ashby and San Pablo is a transfer point for AC Transit. The posted speed limit is 25 mph. Along the corridor, Sacramento Street, Mabel Street and San Pablo Avenue are signalized, while the remaining intersections are two-way stop-controlled. California Street is a bicycle boulevard. Between 2000 and 2007, pedestrian-vehicle collisions have occurred at California Street (3 collisions), Sacramento Avenue (1 collision), Mabel Street (1 collision), midway between Mabel and San Pablo Avenue (1 collision), and at San Pablo Avenue (6 collisions). Ashby Avenue and San Pablo Avenue are both California State Highways, and are under Caltrans jurisdiction. Improvements at San Pablo Avenue and Ashby Avenue are considered in the San Pablo Avenue Public Improvements Plan (SPPIP) and are included here.

Issues

- Heavy motor vehicle volumes.
- Speeding along corridor.
- Narrow sidewalks, lack of street trees and elimination of parking buffer during peak hours create an unpleasant walking environment.
- Limited easy crossing opportunities between Sacramento and Mabel.
- High rate of pedestrian-motor vehicle collisions at San Pablo/Ashby intersection.
- Bicycle Boulevard crossing at California Street does not have special treatments.
- Uncontrolled crossing at Acton does not have special treatments.
- Crosswalks are not striped on minor intersecting streets.

Proposed Improvements



California and Ashby
- Stripe high-visibility crosswalk across Ashby. $2,400
- Consider pedestrian-activated flashing beacon.$100,000

Sacramento and Ashby
- Stripe stop bars four feet back from crosswalk at all legs. $2,400
- Install right-turn must yield to pedestrians signage. $800

Stanton and Ashby and Dohr and Ashby Intersection
- Stripe transverse crosswalk across north and south legs of Stanton. $1,000
- Stripe transverse crosswalk across north and south legs of Dohr. $1,000

Acton and Ashby
- Stripe high-visibility crosswalk across Ashby. $1,200
- Install pedestrian warning signs. $400
- Consider pedestrian-activated flashing beacon. $100,000
- Consider bulbouts on northeast and southwest corners of Acton. Accommodate existing drainage. $150,000

Mabel and Ashby
- Stripe stop bars four feet back from crosswalk at all legs. $1,200

San Pablo and Ashby
- Install bus shelter on southwest corner on Ashby Avenue. $40,000
- Install right turn must yield to pedestrians sign and consider restricting right turns on red. $400
- Construct median nose with in-pavement luminares to provide pedestrian refuge. (Per SPPIP) $13,800
- Pave crosswalks with textured pavers that will withstand heavy vehicle volumes. (Per SPPIP)(Cost not included)
- Install pedestrian-scale lighting on existing cobra head street lights. (Per SPPIP) $6,100

Cost

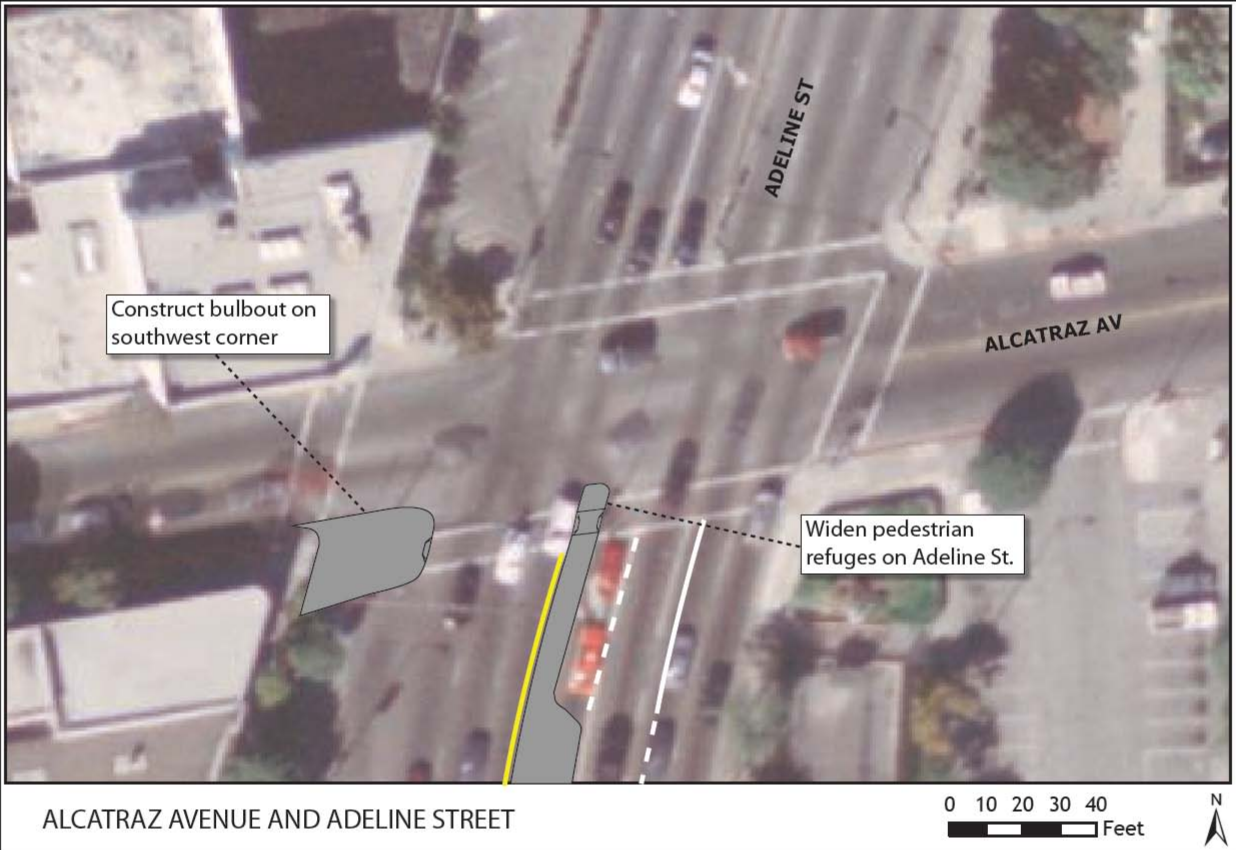
- $420,700 ($7,600 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT PROJECT:
9. ALCATRAZ AVENUE AND ADELINE STREET

Study Area Description
The intersection of Adeline Street with Alcatraz Avenue is in the Lorin District in South Berkeley near the border with Oakland. Adeline Street is a major street that runs diagonally from southwest to northeast connecting other major streets such as Shattuck Avenue, Martin Luther King Jr. Way and Stanford Avenue. Alcatraz Avenue is an important collector street that provides east-west connections between Claremont Avenue and the Elmwood district in the east to Adeline Street, Sacramento Avenue and San Pablo Avenue in the west. Alcatraz Avenue has one travel lane in each direction and has width to accommodate two vehicles side-by-side at the intersection approaches. Adeline Street has six travel lanes (three in each direction) plus a single exclusive left turn lane in each direction at intersections. The intersection is adjacent to neighborhood retail establishments on two corners, while the southeastern corner is the transition point for BART's underground tunnel section as it travels north through Berkeley on the Richmond line. On-street parking is prohibited on all approaches immediately adjacent to the intersection, leaving adequate lines-of-sight for drivers and pedestrians alike. Angled parking on Adeline Street is provided in parking bays located roughly 100 feet from the intersection on the east and west sides of Adeline Street north of the intersection and on the west side of Adeline Street south of the intersection. This intersection will be addressed when planning for the Ed Roberts Campus.

Issues:
⅄ Long crossing distances across Adeline Street. ⅄ Pedestrian islands on Adeline Street too narrow to serve as refuge. ⅄ Very wide southbound lane on far side of intersection (35' 9") increases speeds of eastbound right turning vehicles from Alcatraz Avenue to Adeline Street. ⅄ Due in part to the very wide southbound lane described above, there is a large turning radius for eastbound right turning vehicles from Alcatraz Avenue to Adeline Street.

Proposed Improvements



ALCATRAZ AVENUE AND ADELINE STREET

- Widen pedestrian refuge islands on Adeline Street to a minimum of 6 feet to shorten the pedestrian crossing distances across this major street. $62,000
- Construct a bulbout on the southwestern corner of the intersection to reduce the width of the outermost lane to a maximum of 12 feet and to decrease the pedestrian crossing distance across Adeline Avenue and "tighten" the turning radius for eastbound right turning vehicles from Alcatraz Avenue onto Adeline Street. Align crosswalk with bulbout. Design bulbout to serve as a bus pullout for the existing bus stop at this location. The bulbout should be designed with a turning radius that allows large vehicles to negotiate the corner. $80,000
- Widening of refuge islands and installation of raised medians will affect drainage, requiring re-engineering that could entail expensive and extensive pavement re-grading and/or storm drain modifications. The proposed bulbout at the southwest corner may not require drainage improvements. A detailed survey is required to make this determination.

Cost:

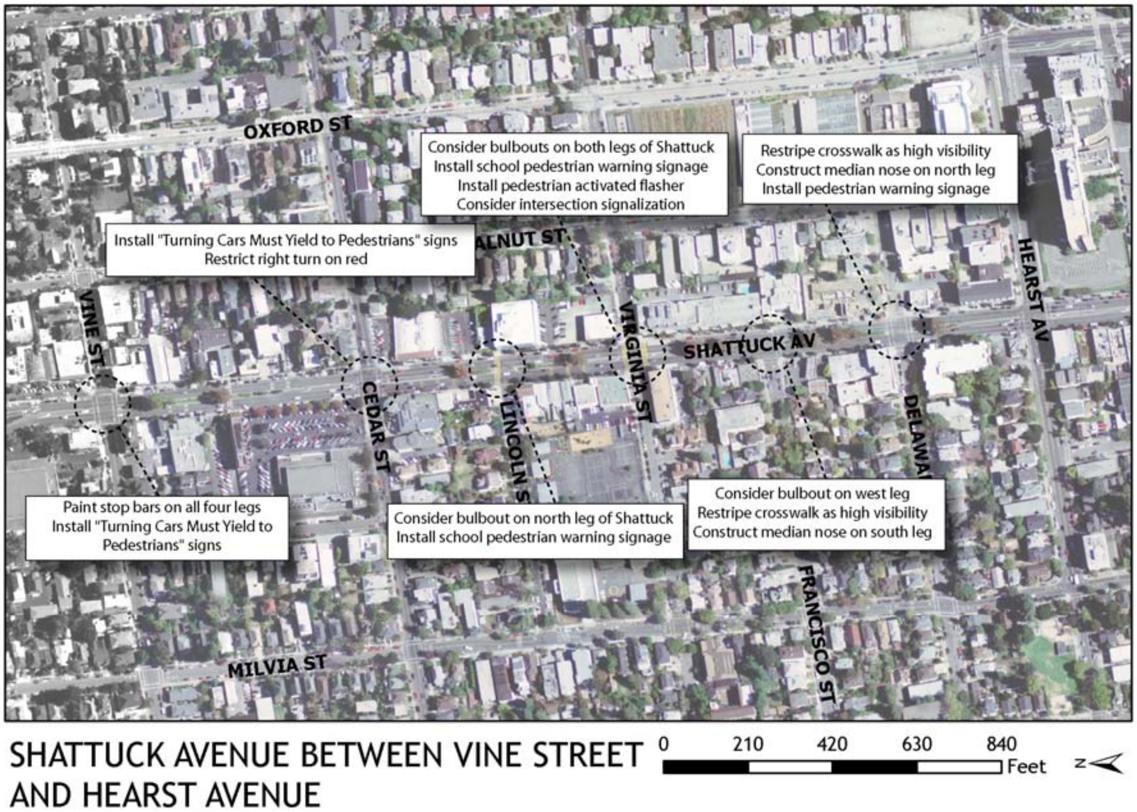
- $142,000 ($0 is accounted for in Citywide projects)

CORRIDOR IMPROVEMENT:
10. SHATTUCK AVENUE BETWEEN VINE STREET AND HEARST AVENUE

Study Area Description
This segment of Shattuck Avenue is located in the "Gourmet Ghetto," a commercial area with high pedestrian and motor vehicle volumes. Signalized intersections along the corridor include Vine and Cedar. All other intersections are stop-controlled on the streets perpendicular to Shattuck Avenue. Shattuck Avenue is four lanes with on-street parking, a median and turn lanes at most intersections. The posted speed limit is 25 mph. A school is located on Virginia Street, and crosswalks at Virginia and Lincoln are yellow. Virginia Avenue is also a bicycle boulevard. Between 2000 and 2007, there have been 18 pedestrian-motor-vehicle collisions along the corridor (4 at Vine, 5 at Cedar, 4 at Virginia, 2 at Delaware, and 3 at Hearst). In all cases except for one, the driver or bicyclist was at fault.

Issues
⅄ History of pedestrian collisions. ⅄ Heavy motor vehicle volumes. ⅄ Bicycle Boulevard on Virginia Street crosses at unsignalized intersection. ⅄ School adjacent to corridor. ⅄ School area signage on Shattuck is not up-to-date.

Proposed Improvements



Vine and Shattuck
- Paint stop bars four feet back from crosswalks on all four legs. $1,800
- Install "turning cars must yield to pedestrians" signs. $800

Cedar and Shattuck
- Install "turning cars must yield to pedestrians" signs. $800
- Restrict right turns on red for motor vehicles on Cedar Street. $400

Lincoln and Shattuck
- Consider bulbouts on north leg of Shattuck. $150,000
- Install MUTCD Assembly B School Pedestrian warning signage. $400

Virginia and Shattuck
- Consider bulbouts on north and south legs of Shattuck. Accommodate bus stops on south leg. $250,000
- Install MUTCD Assembly B School Pedestrian warning signage. $400
- Install pedestrian activated flasher that can be activated from all four corners. $100,000
- Consider intersection for signalization. (Per Berkeley Bicycle Plan)

Francisco and Shattuck
- Consider bulbout on west leg of crosswalk. $100,000
- Restripe existing transverse crosswalk across Shattuck as high-visibility crosswalk. $1,200
- Construct median nose on south leg of intersection. $3,000

Delaware and Shattuck
- Restripe existing transverse crosswalks across Shattuck as high-visibility crosswalks. $2,400
- Construct median nose on north leg of intersection. $3,000
- Install pedestrian warning signage. $400

Cost

- $640,400 ($32,400 is accounted for in Citywide projects)

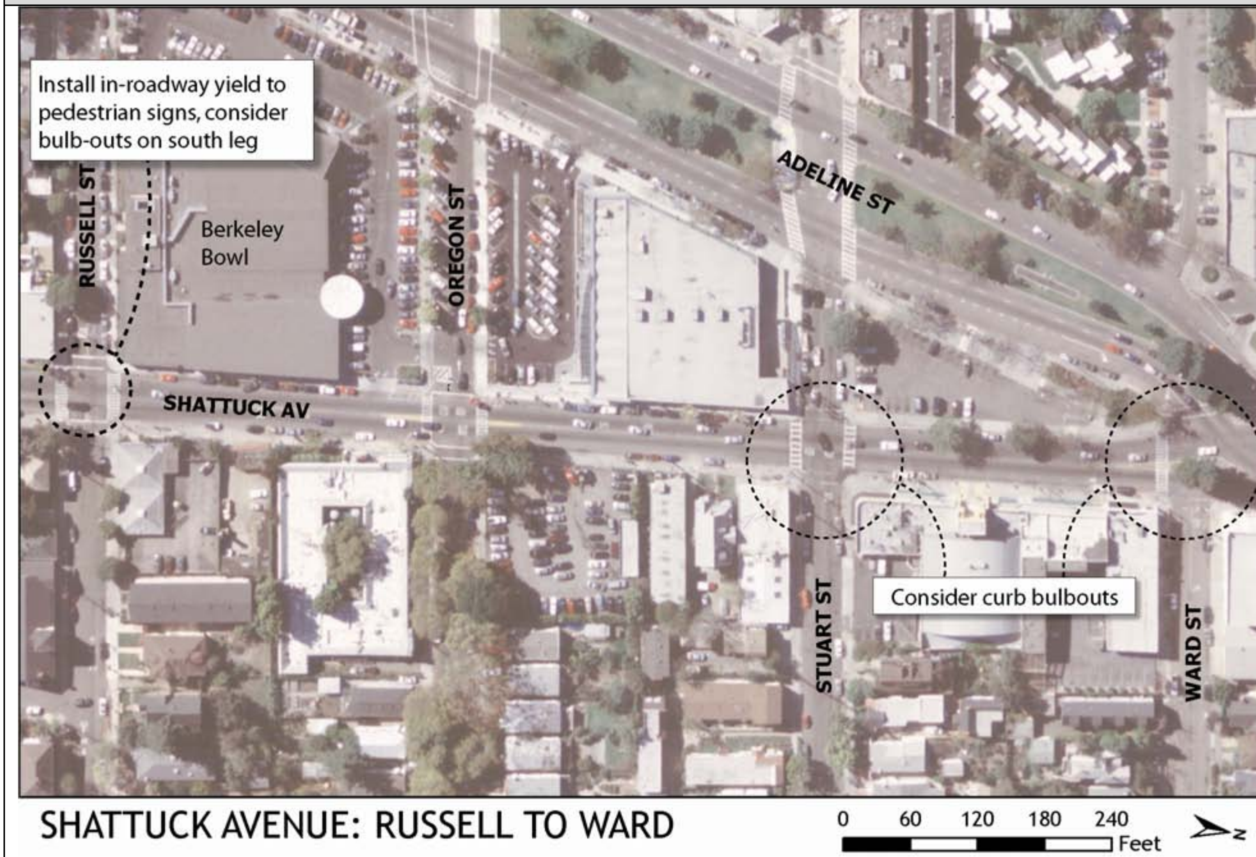
CORRIDOR IMPROVEMENT:
11. SHATTUCK AVENUE BETWEEN RUSSELL STREET AND WARD STREET

Study Area Description
This corridor extends along Shattuck Avenue between Russell Street and Ward Street. This corridor marks the area where Shattuck merges into Adeline, transitioning from one travel lane in each direction south of Ward to a wide major road with raised median north of Ward. This corridor is characterized by heavy volumes of vehicles, pedestrians, and bicyclists, and typically has heavy traffic congestion associated with the Berkeley Bowl market and other retail uses along the corridor. Russell Street is an east-west bicycle boulevard that intersects Shattuck and is stop-controlled on the minor approach. Shattuck/Ward/Adeline is a signalized intersection. Traffic along this corridor is also affected by nearby traffic signals at Ashby to the south. Heavy pedestrian crossings of Shattuck occur at this intersection and high-visibility ladder crosswalks are striped across Shattuck. The crosswalks at Oregon/Shattuck have actuated pole-mounted beacon for pedestrian crossings, as well as painted bulbouts at the corners.

Issues

- Heavy volumes of pedestrians, bicyclists, and motor vehicles along entire Shattuck corridor.
- Heavy pedestrian crossing volumes across Shattuck, particularly at Russell and Oregon.
- Berkeley Bowl marketplace vehicle traffic, with limited parking in parking lot many vehicles circle around Shattuck, Russell, and Adeline to find on-street parking.
- High on-street parallel parking turnover, resulting in many vehicles pulling in and out of spaces along a congested corridor.
- Left turning vehicles on Shattuck northbound at Oregon (to enter Berkeley Bowl driveway) have no dedicated left turn lane, and cause through traffic to veer to right hand side of road over painted bulbout at the crosswalk.
- Traffic queues on Shattuck southbound at Ashby back up toward the Russell Street intersection, creating visibility issues for pedestrians crossing.
- Southbound traffic on Shattuck merges from two lanes to one lane at Ward.

Proposed Improvements



- Consider installing bulbouts at Shattuck Avenue and Ward Street and Shattuck Avenue and Stuart Street. Bulbouts would impact drainage requiring re-engineering that could entail expensive and extensive pavement re-grading and/or storm drain modifications. Design must not inhibit access to bus stops at Stuart Street. Ward $150,000 Stuart $250,000
- Install pedestrian warning signage at Stuart Street. $400
- Install in-pavement yield to pedestrian signs at Russell Street and Shattuck Avenue. $400
- Consider bulbouts on south leg of Russell Street. $150,000
- Restrict parking 20 feet to either side of Russell Street on Shattuck Avenue. $80

Cost

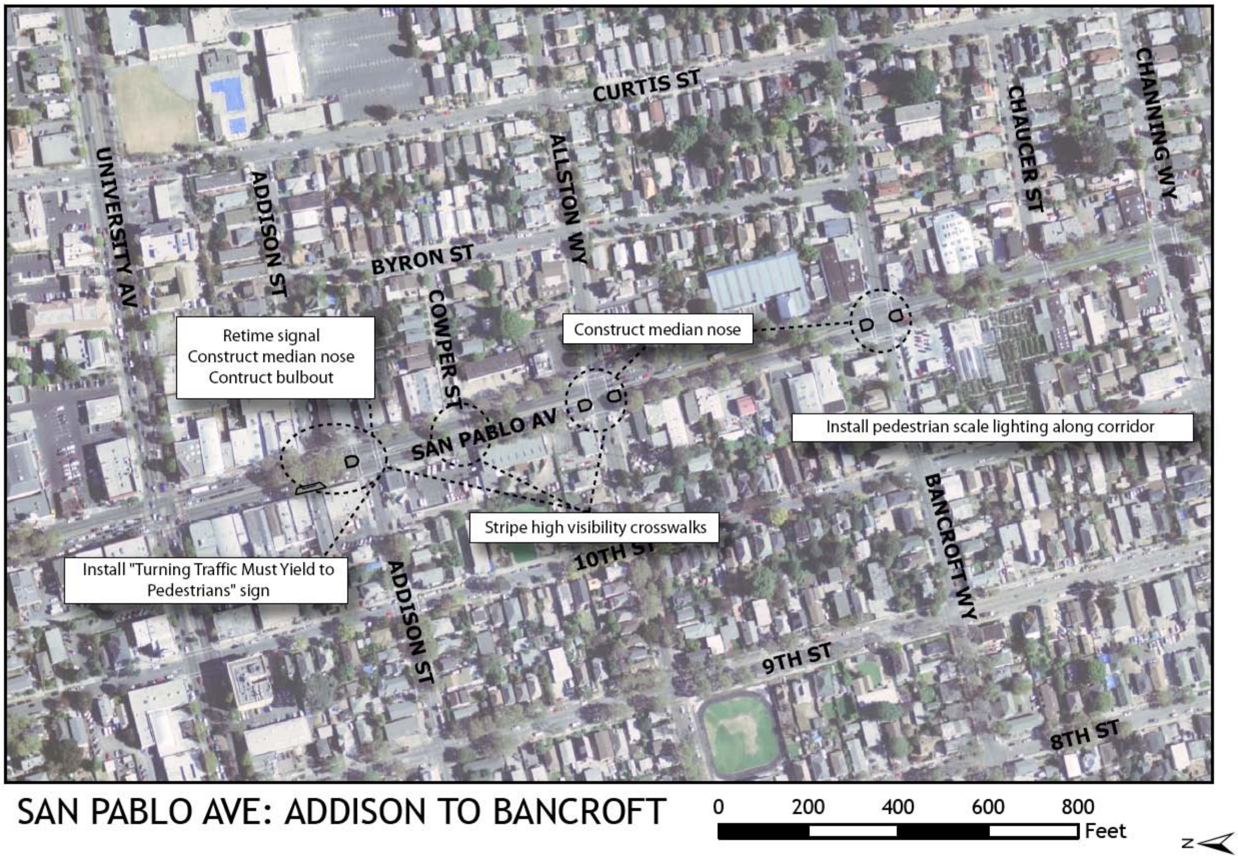
- $550,880 ($480 is accounted for in Citywide projects)

CORRIDOR IMPROVEMENT:
12. SAN PABLO AVENUE FROM ADDISON STREET TO BANCROFT WAY

Study Area Description
This section of San Pablo Avenue is bordered by many amenities, including a Post Office, several restaurants, convenience stores and other small stores. Businesses toward the south end of the corridor are more car-oriented than businesses to the north end. Addison Street and Allston Street are signalized, while Bancroft Way and Cowper Street are unsignalized. All intersections are striped with white transverse crosswalks. There is an uncontrolled mid-block crossing north of Addison Street. Addison Street crosses San Pablo Avenue in two segments, and has seen 7 pedestrian-motor vehicle collisions between 2000 and 2007. The driver was at fault in all collisions. During the same time frame, Allston saw 1 collision and Bancroft saw 2 collisions. San Pablo Avenue Public Improvements Plan recommends several improvements to this intersection, which have been included here. San Pablo Avenue is a California State Highway, and is under Caltrans jurisdiction.

Issues
⅄ Uncontrolled mid-block crossing north of Addison Street with standard transverse crosswalks. ⅄ High collision rate at Addison Street. ⅄ Potential for pedestrian-motor vehicle collisions at T-intersection at Addison Street. ⅄ Left turn lanes at most intersections reduce the size of available pedestrian refuges.

Proposed Improvements



Addison and San Pablo

- Install "Turning Traffic Must Yield to Pedestrians" signage for eastbound traffic on south leg of Addison Street. $200
- Retime signal at Addison to give pedestrians leading pedestrian interval. (No capital cots)
- Construct median nose to provide pedestrian refuge. (Per SPPIP) $3,000

Uncontrolled Crossing North of Addison

- Stripe high visibility crosswalk. (Per SPPIP) $1,200
- Construct bulbout on west leg of crosswalk. (Per SPPIP) $50,000

Allston and Cowper

- Stripe high-visibility crosswalks. (Per SPPIP) $2,400

Allston and Bancroft

- Construct median nose on both sides to provide pedestrian refuge. (Per SPPIP) $5,600
- Install pedestrian warning signage at south and north legs. $400
- Consider bulbouts into San Pablo at southwest and southeast corners. $150,000

Corridor-wide recommendations:

- Install pedestrian-scale lighting on existing cobra head street lights. (Per SPPIP) (Not included in cost)

Cost

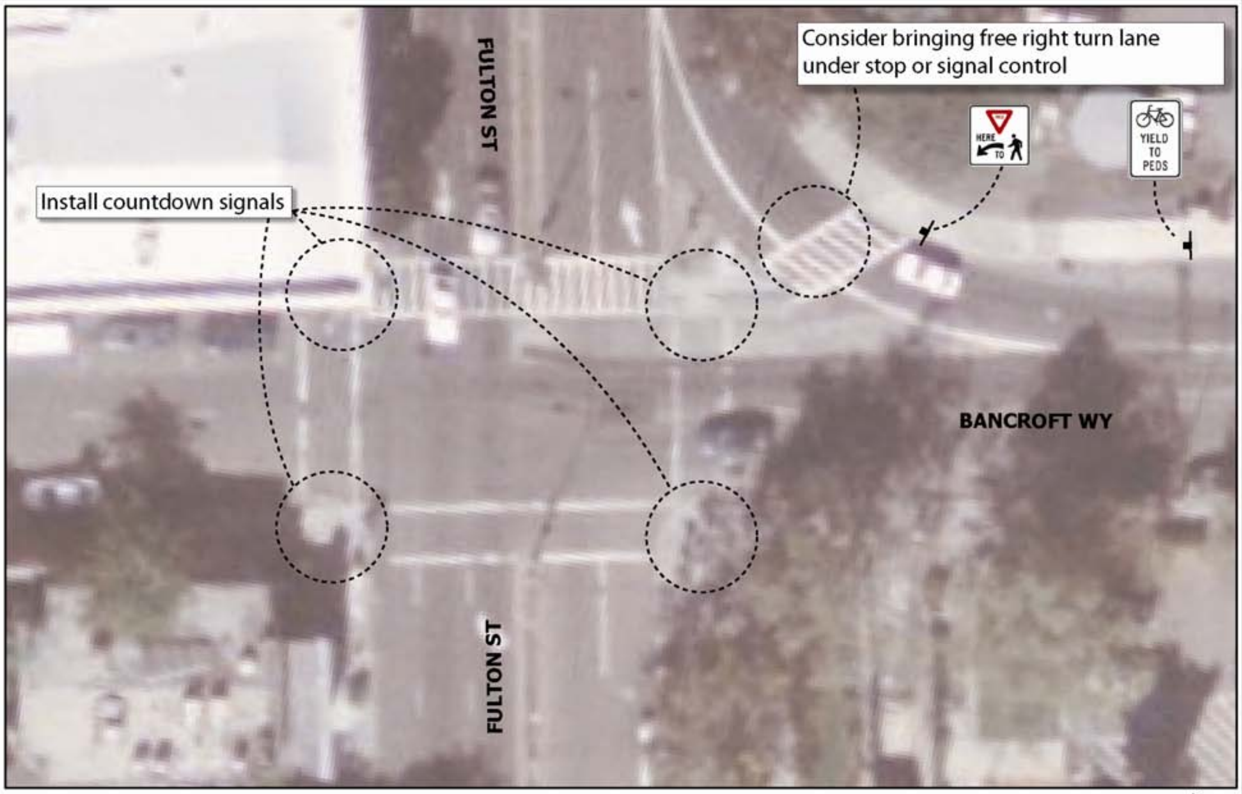
- $214,200 ($4,000 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT:
13. BANCROFT WAY AT OXFORD/FULTON STREETS

Study Area Description
The signalized intersection of Bancroft and Fulton is located at the southwest corner of the University of California campus. Bancroft is an east-west roadway that is situated along the southern boundary of the campus. Bancroft is one-way in the westbound direction, with three westbound travel lanes and parallel parking on both sides of the street. Fulton is a north-south roadway that is situated along the western boundary of campus. Fulton has two travel lanes in each direction, with on-street parallel parking and a bicycle lane on each side, and a raised center median. The Bancroft/Fulton intersection is configured with a free right turn lane in the westbound direction; approaching Fulton the rightmost lane becomes a dedicated right turn lane, which becomes a channelized slip lane at the intersection. This slip lane becomes the second travel lane on northbound Fulton. Heavy pedestrian volumes exist at this intersection as pedestrians walk between campus and downtown Berkeley. Crosswalks are striped at all legs of the intersection; the slip lane and the northern leg across Fulton are striped with high-visibility ladder markings.

Issues
▪ Heavy pedestrian volumes through intersection at campus boundary. ▪ Relatively high vehicle speeds coming westbound on one-way Bancroft. ▪ Free right turn slip lane on Bancroft becomes its own travel lane on Fulton; no slowing for merge necessary.

Proposed Improvements



BANCROFT WAY AT OXFORD/FULTON STREETS

- Install warning signage indicating that motorists and bicyclists should yield to pedestrians. $400
- Consider converting the existing free right turn lane to a stop or signal controlled lane, with a phase requiring all vehicles to stop for pedestrians. $200,000 (signal) $200 (stop sign)
- Install countdown signals for all crossing legs. $6,400

Design Details

- $206,800 (signal option)
- $7,000 (stop sign option)

($6,400 is accounted for in Citywide projects)

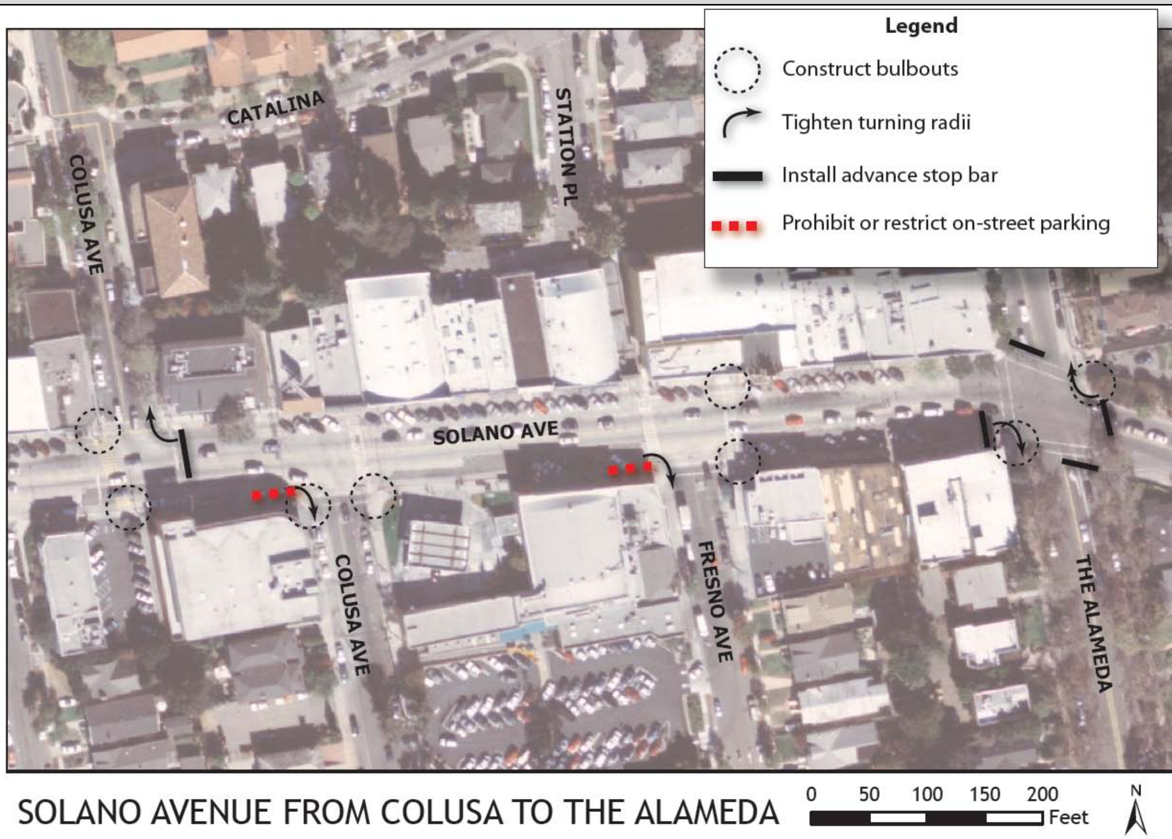
INTERSECTION IMPROVEMENT PROJECT:
14. SOLANO AVENUE FROM COLUSA TO THE ALAMEDA

Study Area Description
The Solano Avenue shopping district, which straddles the Berkeley-Albany border, is an important neighborhood and citywide shopping attraction. A large share of the district's pedestrian traffic is concentrated at the eastern end of Solano Avenue, within the boundaries of this project between Colusa Avenue and The Alameda. The Thousand Oaks Elementary School is on Colusa Avenue, one block north of Solano Avenue. The intersection of The Alameda & Solano Avenue serves as the eastern gateway to the Solano Avenue shopping district with each street serving as a conduit bringing traffic into and out of the area. Colusa Avenue provides access to Solano Avenue from the north to Kensington, Albany and El Cerrito, and from the south to central Berkeley. Colusa Avenue meets Solano Avenue at an "offset": its southern leg meets Solano Avenue roughly 125 feet to the east of its northern leg's intersection. The southern leg's intersection is stop controlled for vehicles northbound on Colusa Avenue and uncontrolled for the Solano Avenue approaches. The northern leg's intersection is signalized. This section of Solano Avenue also has several marked crosswalks that are uncontrolled for vehicles on Solano Avenue. While the visibility of these crosswalks has recently been increased with the installation of "ladder" crosswalk paint markers and pedestrian right-of-way signs installed on the centerline of Solano Avenue and a bulbout on the north side of the Colusa/Solano intersection, there are additional improvements that could further enhance safety.

Issues

- Colusa Avenue offset intersection serves a traffic calming purpose by discouraging drivers from using this path to reach points north, but at a cost to pedestrians and bicyclists since drivers are frequently distracted as they negotiate traffic.
- Pedestrian conflicts with northbound left-turning vehicles from Colusa Avenue onto Solano Avenue.
- Pedestrian visibility and crossing distances across Solano Avenue at Fresno Avenue and Colusa Avenue (both legs) intersections.
- Large turning radius for turn from westbound Solano Avenue onto northbound Colusa Avenue.
- Northbound vehicles encroaching on east-west crosswalk when turning onto Solano Avenue from Colusa Avenue.
- Poor visibility of oncoming traffic along Solano Avenue for vehicles turning onto Solano Avenue from Fresno Avenue and Colusa Avenue (S. leg).
- Large turning radius for eastbound right and westbound right turning vehicles at The Alameda & Solano Avenue.
- Long pedestrian crossing distances at The Alameda & Solano Avenue for north, south and east legs.
- Stopped vehicles encroach into crosswalks at intersections.

Proposed Improvements



SOLANO AVENUE FROM COLUSA TO THE ALAMEDA

- Bulbouts for the following crosswalk locations:
    - Colusa Avenue (N.) & Solano Avenue: north and south sides of west leg. North side has no apparent drainage issues, south side will require regrading to ensure flow around bulbout. $150,000
    - Colusa Avenue (S.) & Solano Avenue: north side of southeast corner; east side of southwest corner May require regrading intersection or relocating or installing new catch basins. $150,000
    - Fresno Avenue & Solano Avenue: North and south sides of east leg. $150,000
    - The Alameda & Solano Avenue: northeast and southwest corners. $150,000
- Install advanced stop bar at the following intersection approaches: $1,500
    - Westbound approach to Colusa Avenue (N.) from Solano Avenue.
    - All approaches to the intersection of The Alameda & Solano Avenue.
- Prohibit or restrict on-street parking to improve pedestrian visibility at the following locations: $400
    - S. leg of Colusa Avenue & Solano Avenue: increase pedestrian visibility for northbound vehicles turning on to Solano Avenue by removing one or two parallel parking spaces on the south side of the west leg of the intersection. This would also improve the visibility of pedestrians for eastbound right turning vehicles from Solano Avenue onto the S. leg of Colusa Avenue.
    - Fresno Avenue & Solano Avenue: increase pedestrian visibility for eastbound vehicles on Solano Avenue by removing one or two angled parking spaces on the south side of Solano Avenue just to the west of the crosswalk.
- Note: Any underground work at Solano and Colusa may be complicated by the presence of EBMUD's Wildcat Aqueduct (a 48-inch diameter potable water transmission line.) Additionally, bulbouts may impact existing drainage and could require additional construction and costs.
- Note: These improvements may be eligible for Safe Routes to School funding as they are located near Thousand Oaks Elementary School.

Cost

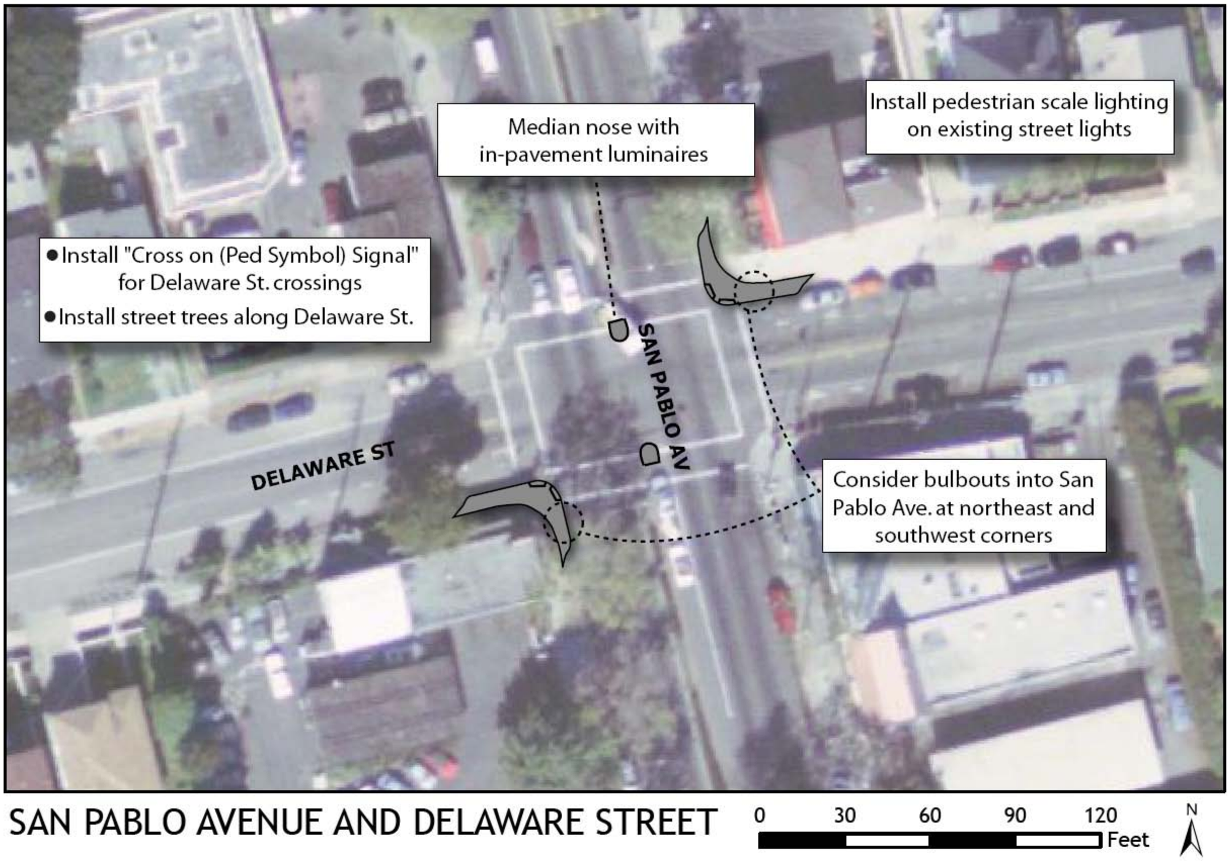
- $601,900 ($1,900 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT:
15. SAN PABLO AVENUE AND DELAWARE STREET

Study Area Description
The intersection of San Pablo Avenue and Delaware Street is signalized. Delaware Street is a two-lane roadway with bicycle lanes, San Pablo Avenue is a four-lane roadway with a median and left turn lanes. Left turns from San Pablo are protected. White transverse crosswalks are striped on all four legs of the intersection. Bus stops are located on both sides of San Pablo Avenue north of the intersection. Between 2000 and 2007, five pedestrian-motor vehicle collisions occurred here, injuring 4 pedestrians. The driver of the vehicle was at fault in 3 of the collisions, and all collisions occurred within a crosswalk. San Pablo Avenue Public Improvements Plan recommends several improvements to this intersection, which have been included here. San Pablo Avenue is a California State Highway, and is under Caltrans jurisdiction.

Issues
⅄ High collision rate. ⅄ Bus stops located on north leg of intersection. ⅄ Left turn lanes prevent pedestrians from using the median as a refuge if they cannot cross San Pablo in one light cycle. ⅄ Pedestrians may improperly cross during protected left turn phase. ⅄ Drainage at northeast corner.

Proposed Improvements



SAN PABLO AVENUE AND DELAWARE STREET

- Consider bulbouts into San Pablo Avenue at northeast and southwest corners. Existing drainage grate will need to be accommodated. Consider painting bulbouts at this location if constructing bulbouts is not feasible. $150,000
- Install R10-2a "Cross on (Ped Symbol) Signal" for pedestrians crossing Delaware Street. $200
- Consider shifting protected left turn phase to after through phase to allow pedestrians to complete crossing before left turn phase starts. (No capital cost)
- Construct the following items per the San Pablo Public Improvements Plan
    - Construct median noses to provide pedestrian refuge. $2,800
    - Install pedestrian-scale luminaries at both median noses. $4,100
    - Install pedestrian-scale lighting on existing cobra head street lights. $6,100
    - Plant street trees on west and east legs of Delaware Street. $3,200

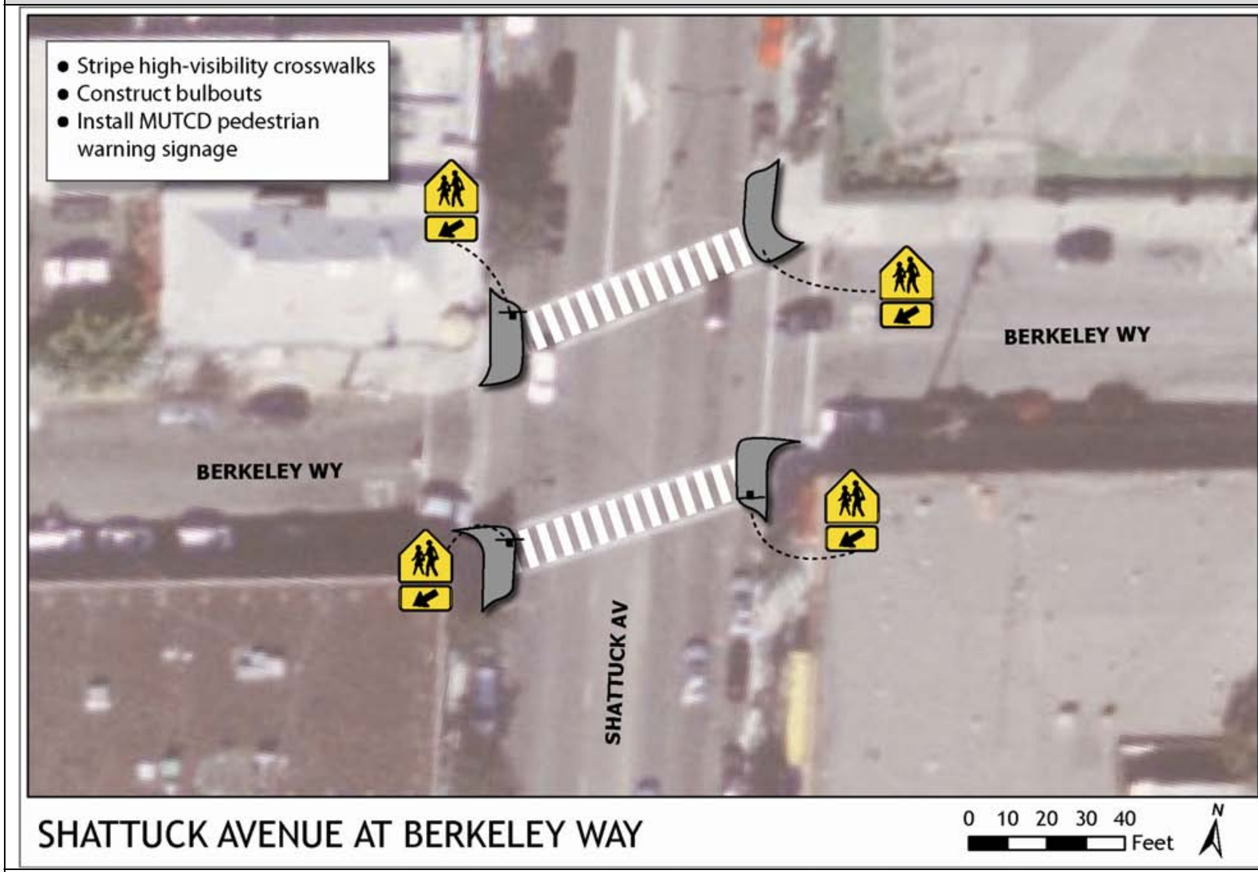
Cost

- $168,000 ($0 is accounted for in Citywide projects)

UNCONTROLLED CROSSING IMPROVEMENT:
16. SHATTUCK AVENUE AT BERKELEY WAY

Study Area Description
The intersection of Shattuck Avenue and Berkeley Way is stop-controlled on the minor approaches. Shattuck is a major north south roadway that has two travel lanes in each direction with on-street parallel parking on both sides. South of Berkeley Way Shattuck has three lanes in the southbound direction. Berkeley Way is a local east-west street with one travel lane each direction, and on-street parallel parking on both sides. The Shattuck corridor is fronted by a variety of retail and commercial uses, and there is very heavy pedestrian activity in this area, including the uncontrolled crossings of Shattuck. Standard transverse crosswalks are striped on all legs. Berkeley Way is slightly offset on the east and west sides of Shattuck, and so the crosswalks are skewed across Shattuck, resulting in a longer crossing distance.

Issues
⅄ Offset intersection creates long crossing distance for pedestrians at uncontrolled locations and challenges for persons who are visually impaired. ⅄ Heavy pedestrian volumes at uncontrolled location across major roadway.

Proposed Improvements

⅄ Stripe high-visibility ladder markings at both legs across Shattuck. $2,400 ⅄ Consider installing bulbouts at all corners to increase pedestrian visibility and shorten crossing distance. Bulbouts will require four inlets to be relocated, which may require additional costs. Bulbouts should not encroach on Berkeley Way, as this is a major response intersection for Fire Department Number 2. Design of project should be approved by Fire Department. $250,000 ⅄ Install current MUTCD pedestrian warning signage at crosswalk locations. $800

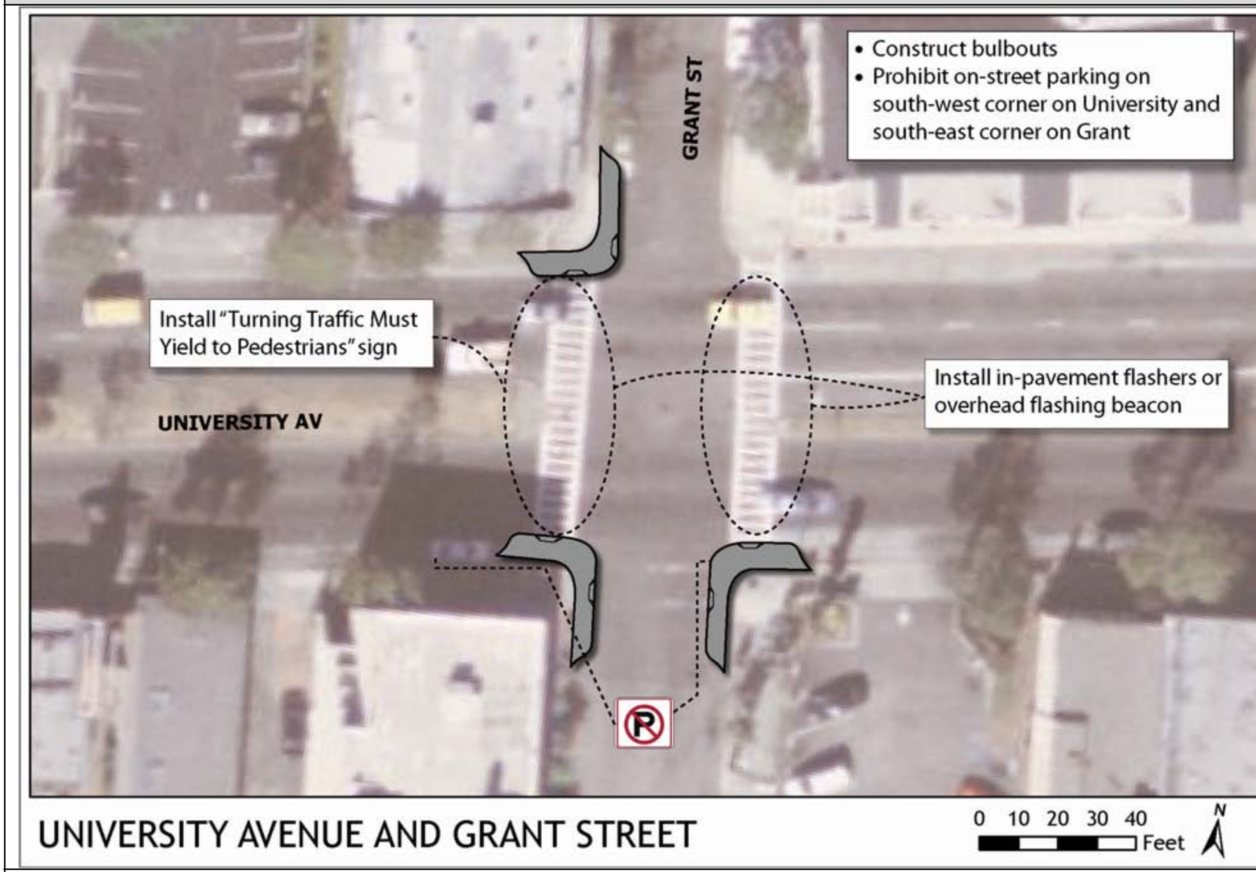
Cost
▪ $253,200 ($3,200 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT PROJECT:
17. UNIVERSITY AVENUE AND GRANT STREET

Study Area Description
University Avenue is an important east-west major road that runs from the western edge of the University of California campus to I-80 and the Berkeley Marina. As such, it carries large vehicular traffic volumes and bus riders during the peak periods for commuters and students accessing the University and downtown Berkeley. Grant Street is a local street that runs north-south through largely residential neighborhoods in central Berkeley. Located one block west of Martin Luther King (MLK) Jr. Way, an important north-south Berkeley major road, Grant Street carries some of the pedestrian and bicycle traffic from MLK. University Avenue also has specialty retail and restaurant uses along most of its length – uses that generate significant pedestrian activities at the Grant Street intersection as well. Grant Street has one lane in each direction. University Avenue has four travel lanes (two in each direction), plus a raised median island. The intersection of Grant Street with University Avenue is unsignalized, with stop controls on the Grant Street approaches and uncontrolled approaches on University Avenue. At Grant Street, University Avenue has a left-turn pocket for westbound vehicles but does not have one for eastbound vehicles.

Issues
⅄ Heavy traffic volumes, high speeds and no stop controls for vehicles along University Avenue combine to produce unsafe crossing conditions for pedestrians. ⅄ On-street parking at the southwestern corner on University Avenue and at the southeastern corner on Grant Street prevents motorists from seeing pedestrians as they start to cross the intersection.

Proposed Improvements



- Increase pedestrian visibility and decrease crossing distances by building bulbouts on the northwest, southeast and southwest corners. The Fire Department should approve bulbout designs at this location. Bulbouts may affect existing drainage and could require additional construction and costs. $200,000
- Prohibit or restrict on-street parking in spaces immediately adjacent to southwestern corner on University Avenue and the southeastern corner on Grant Street.
- Install in-pavement flashers or overhead beacons for crosswalks across University Avenue. $75,000 in-pavement or $100,000 overhead beacon.
- Install "Turning Traffic Must Yield to Pedestrians" for East bound traffic on University Avenue. $200

Cost

- $300,200 (with overhead beacon option)
- $275,200 (with in-pavement flasher option)

($0 is accounted for in Citywide projects)

CORRIDOR IMPROVEMENT PROJECT:
18. COLLEGE AVENUE BETWEEN RUSSELL STREET AND ASHBY AVENUE

Study Area Description

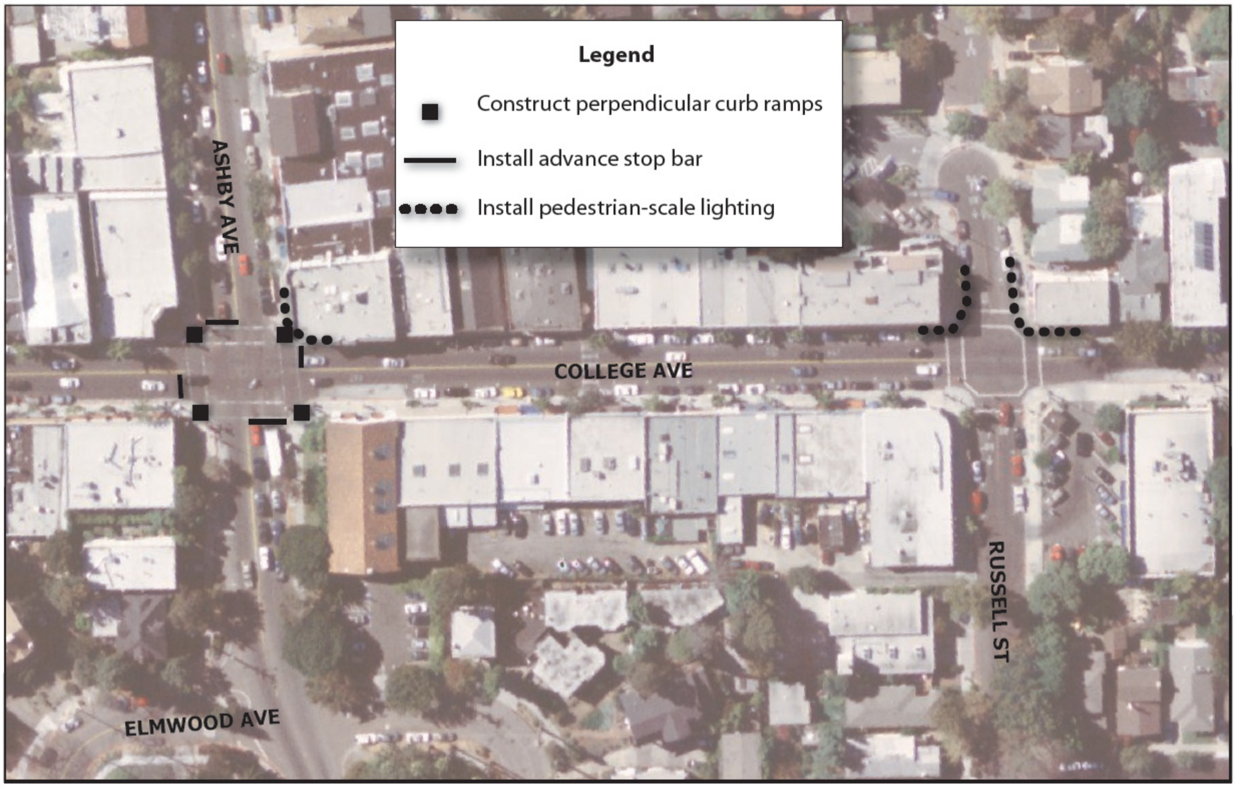
The intersection of College Avenue & Ashby Avenue is at the heart of the Elmwood shopping district and each of these streets serve as important major street connectors within Berkeley and to points beyond. College Avenue provides north-south access from Oakland to the University of California campus, and carries several heavily patronized AC Transit bus lines. Ashby Avenue (State Route 13) provides east-west regional connections for vehicles to I-80 to the west and S.R. 24 in the east. Both of these streets, College Avenue and Ashby Avenue, are frequently overburdened with vehicular traffic.

Russell Street crosses College Avenue one block north of Ashby Avenue. In this block, vehicles are restricted to one lane of travel in each direction and they are often slowed by vehicles engaging in parallel parking maneuvers and by pedestrians at the mid-block crossing half-way between Russell Street and Ashby Avenue. The intersection of College Avenue & Russell Street is stop-controlled on all four approaches. Russell Street is blocked by a traffic barrier approximately 100 feet west of the intersection and serves mainly as an access point to parking and service entries behind the shops that line College Avenue.

Issues

- Stopped vehicle encroachment into pedestrian crosswalks at College Avenue & Ashby Avenue.
- Protected left turn phase for southbound traffic at the Ashby and College signal only is confusing for pedestrians crossing Ashby Avenue on the east leg crosswalk. Pedestrians often start to cross when the protected phase begins (despite the “Don’t Walk” signal), anticipating a “walk” signal.
- No streetlights on northwest corner of College Avenue & Ashby Avenue and both west corners of College Avenue & Russell Street factors into 3 reported nighttime-conditions collisions.
- Of the six reported pedestrian collisions at College Avenue & Ashby Avenue (between 2000 and 2004), five involved a vehicle making a turning movement. This suggests that despite the left turn restrictions on Ashby Avenue during the peak hours, there are significant unresolved conflicts between vehicles and pedestrians.
- Due to the large traffic volumes and congested conditions on Ashby and College Avenues, there are few opportunities to increase pedestrian visibility or decrease pedestrian crossing times at this intersection without restricting right-turn-on-red movements and seriously degrading auto LOS.
- Presence of Berkeley Fire Department station just east of College Avenue on Russell Street means that the effects of any alterations to area intersections on emergency response times must be considered, particularly with any changes to east side of College Avenue at Russell Street.

Proposed Improvements



COLLEGE AVENUE BETWEEN RUSSELL AND ASHBY

- Install additional pedestrian-scale street lights to improve pedestrian visibility at the following locations. $90,000
  - The northwestern corner of College Avenue & Ashby Avenue.
  - The northwestern and southwestern corners of College Avenue & Russell Street.
- Install advanced stop bars all approaches at College Avenue & Ashby Avenue to reduce vehicle intrusion into crosswalks. 1,200
- Provided sufficient right-of-way exists, install new perpendicular pedestrian ramps on all four corners at College and Ashby Avenues. Any work on Ashby Avenue requires State approval as it is a State of California right-of-way. $20,000

Ashby/College

- Consider moving the protected left-turn phase for the south bound Ashby traffic after the through traffic phase. (No capital cost)

Cost

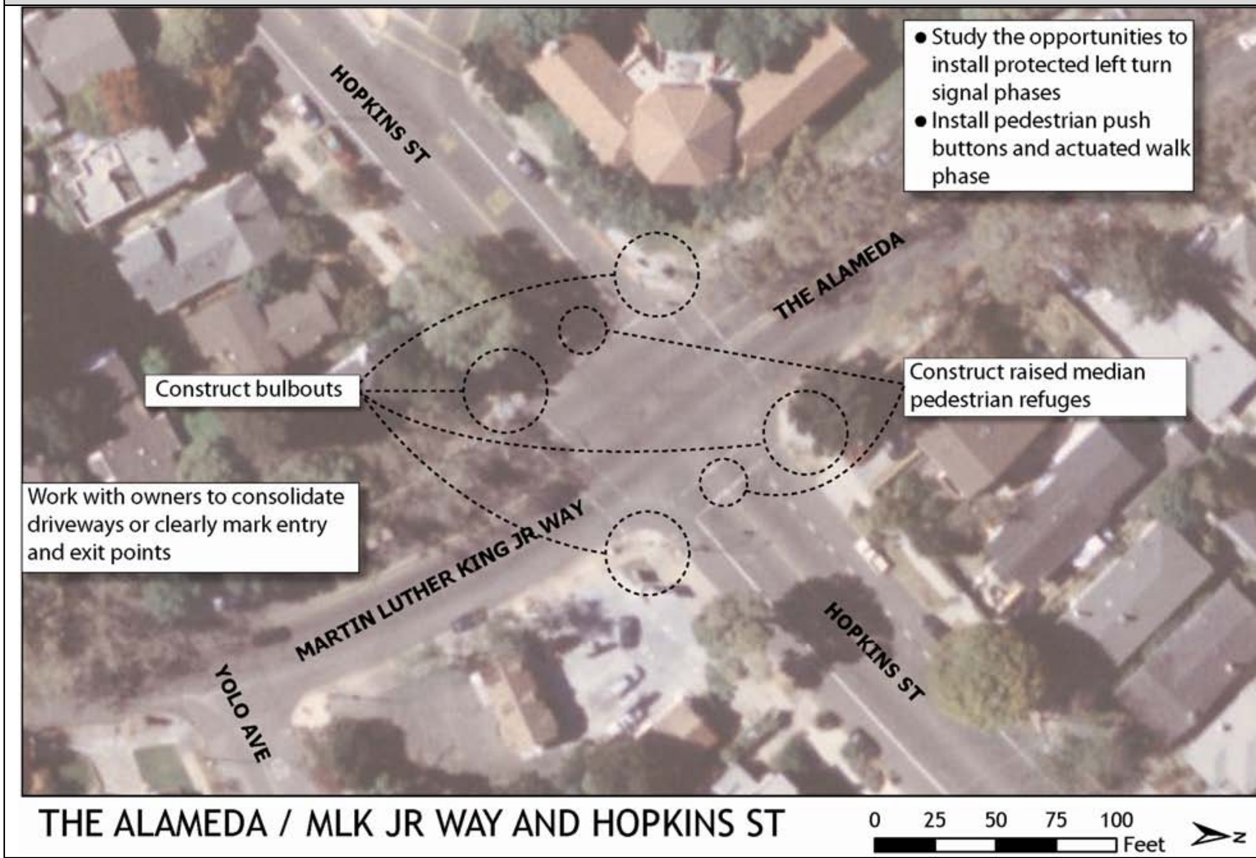
- $111,200 ($21,200 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT PROJECT:
19. THE ALAMEDA / MARTIN LUTHER KING JR. WAY AND HOPKINS STREET

Study Area Description
The signalized intersection of The Alameda/Martin Luther King (MLK) Jr. Way and Hopkins Street in North Berkeley is a large intersection with four lanes on The Alameda/MLK (two in each direction) and two very wide lanes on Hopkins Street (plus bicycle lanes). Hopkins Street is roughly 60 feet wide on both of its approaches to the intersection, leaving more than sixteen feet for each travel lane once parking and bicycle lanes are accounted for. Due to the lack of median "refuge" islands pedestrians must brave a very long crossing distance to traverse this intersection. Just south of this intersection, MLK Way narrows from a four-lane to a two-lane facility. The North Berkeley Branch of the Berkeley Public Library sits on the northwestern corner of this intersection. Since this facility sits on a relatively small triangle-shaped block without any designated parking area dedicated for its visitors, library visitors will occasionally park on nearby streets and cross the intersection. Other complications for pedestrians arise from the Chevron Station located on the southeastern corner, which has four driveway curb cuts. These numerous driveways at a close distance to the intersection bring many opportunities for auto/pedestrian conflicts.

Issues
⅄ Long pedestrian crossing distances across all intersection legs. ⅄ Large turning radii for all right turn movements. ⅄ Pedestrian/Auto conflicts for left-turning vehicles from The Alameda/MLK to Hopkins Street.

Proposed Improvements



- Build pedestrian refuge (i.e., raised) median islands on both Hopkins Street intersection approach legs to shorten pedestrian crossing distances. Islands should be a minimum of six feet in width. $60,000
- Construct bulbouts on The Alameda/MLK-facing sides of all corners to shorten pedestrian crossing distances, increase pedestrian visibility, and tighten turning radii for right-turning vehicles. The size of these bulbouts should be determined by further study of the intersection's operations to find out if removing the unmarked right turn pockets on these approaches will affect levels of service for autos or turning capability of large vehicles. Additionally, bulbouts and pedestrian refuge may require modifications to existing drainage and utilities. The EBMUD Wildcat Aqueduct, a 49-inch diameter potable transmission line runs under the intersection and may limit options for relocating underground drainage systems. $250,000
- Study the opportunities to install protected left turn lanes and signal phases for The Alameda/MLK left-turning traffic to reduce auto/pedestrian conflicts.
- Install pedestrian push-buttons with new actuated signal controller system. $20,000
- Work with Chevron station owners and managers to either consolidate driveways or clearly mark entry and exit points for refueling area. Entry driveways should be those closest to the intersection, while exit points should be those furthest from the intersection.

Cost

- $330,000 ($0 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT:
20. SHATTUCK AVENUE AND WOOLSEY STREET

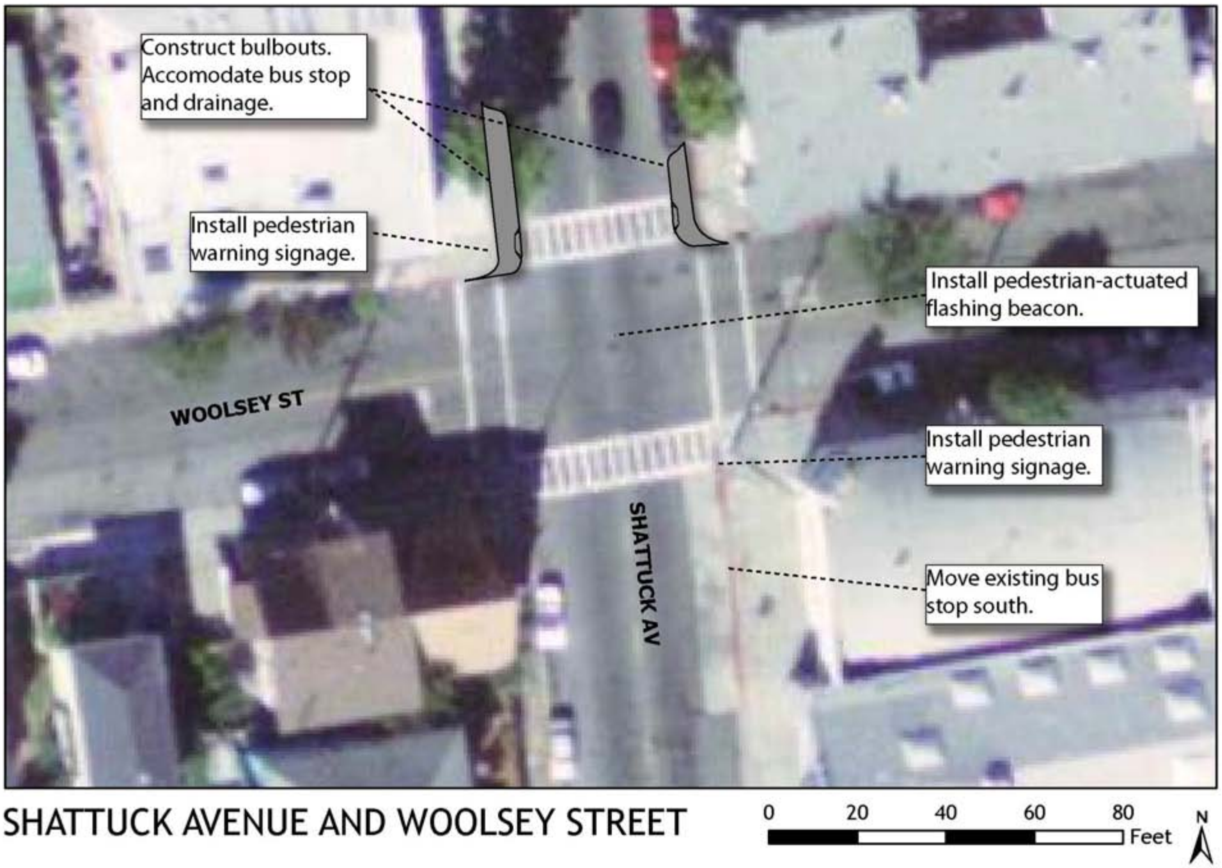
Study Area Description

Woolsey Street is stop-controlled at Shattuck Avenue. High-visibility ladder crosswalks are striped across Shattuck, and transverse crosswalks are striped across Woolsey. Bus stops are located at the southeast and northwest corners, and Woolsey provides access to the Ashby BART station from residential neighborhoods to the east of Shattuck. At this intersection, Shattuck Avenue is two lanes and has posted speed limit of 25 mph. Between 2000 and 2007, there were three pedestrian-motor vehicle collisions at this intersection in which five pedestrians were severely injured. In two of the collisions, the driver of the motor vehicle was at fault. The pedestrian was at fault in the remaining collision.

Issues

- High collision rate.
- Bus stops located on southeast and northwest corners.
- Drainage grates located on all corners except for northwest corner.

Proposed Improvements



SHATTUCK AVENUE AND WOOLSEY STREET

- Consider installing bulbouts at the northeast and northwest corners into Shattuck Avenue. Drainage grate and hydrant will need to be accommodated at northeast corner. $150,000
- Install pedestrian-actuated flashing beacon that can be actuated for north and south legs of intersection. Flashing beacon should include signage indicating to pedestrians that motor vehicles may not stop. $100,000
- Install pedestrian warning signage at crosswalk. $400
- Consider moving bus stop on southwest corner either back from intersection to provide better sight lines or to the far side of the intersection. (Cost not provided)

Cost

- $250,400 ($400 is accounted for in Citywide projects)

UNCONTROLLED CROSSWALK IMPROVEMENT:
21. UNIVERSITY AVENUE AND MCGEE AVENUE

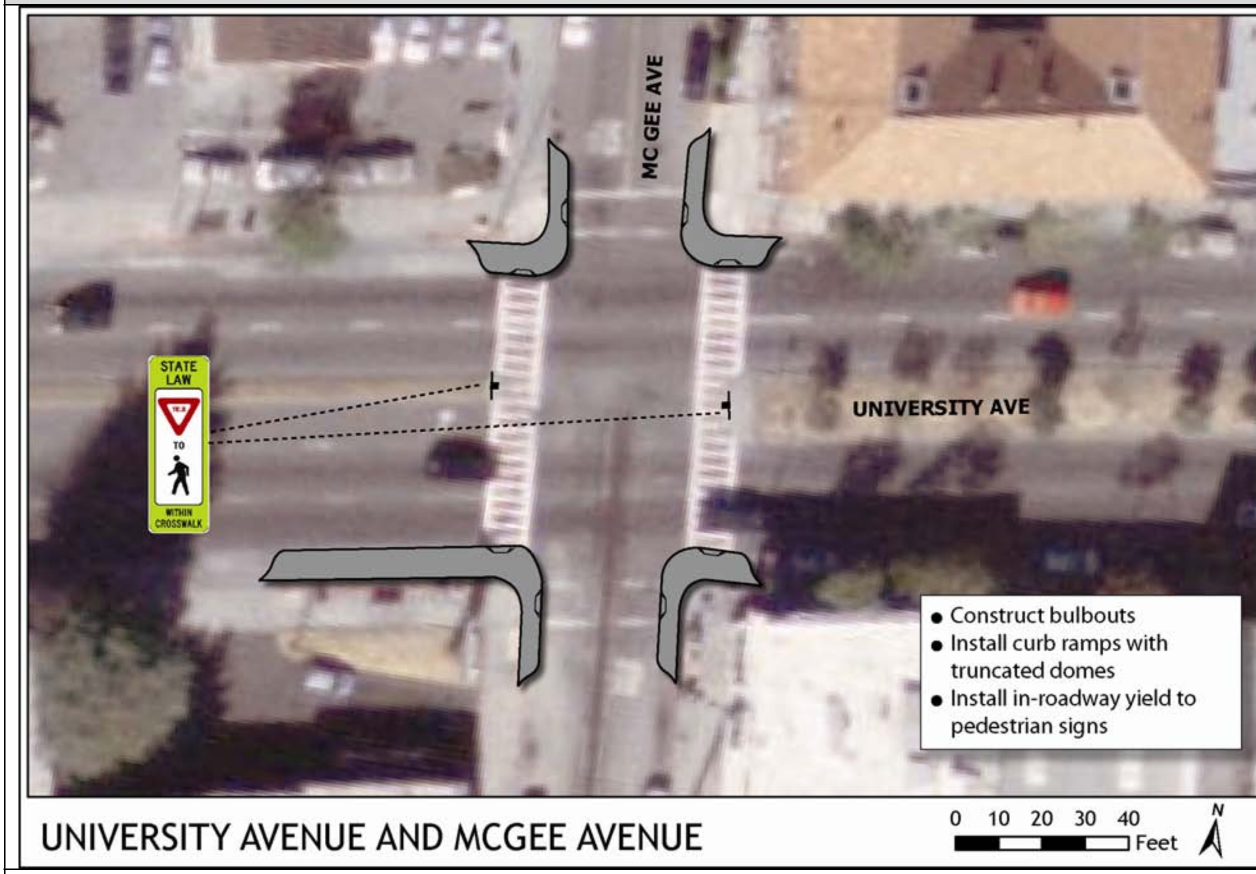
Study Area Description

The intersection of University Avenue and McGee Avenue in North Berkeley is stop-controlled on the McGee approaches. University Avenue is a major east-west road that has two travel lanes in each direction, a raised center median, and on-street parallel parking. A single left turn lane is present in the eastbound direction on University at this location. McGee Avenue is a local street, with one travel lane in each direction and on-street parallel parking. Land uses are commercial and retail along University Avenue, becoming residential along McGee away from the major street corridor. The Ohlone Greenway linear park is located two blocks north of University, and residents on the south side of University utilize the various crossings along this corridor including the uncontrolled crossing at McGee. Crosswalks are marked on all legs of the intersection, with the legs across University striped with a high-visibility ladder pattern.

Issues

- Uncontrolled crosswalks across University.
- Heavy traffic volumes along University Avenue.
- No truncated domes at corners.

Proposed Improvements



- Consider installing bulbouts at all four corners of intersection, to improve pedestrian visibility and shorten crossing distance. This would potentially require removing one parking space on both the northeastern and northwestern corners. Would also require consideration for bus stop location near southwestern corner. No storm drain currently exists at this intersection. Recommend extending the storm drain system from Addison and McGee north to serve University and McGee. (storm drain extension not included in cost) $250,000
- Install new curb ramps with truncated domes at all corners. (cost included in above estimate)
- Install in-pavement yield to pedestrian signs in median on both legs across University Avenue. $400

Cost

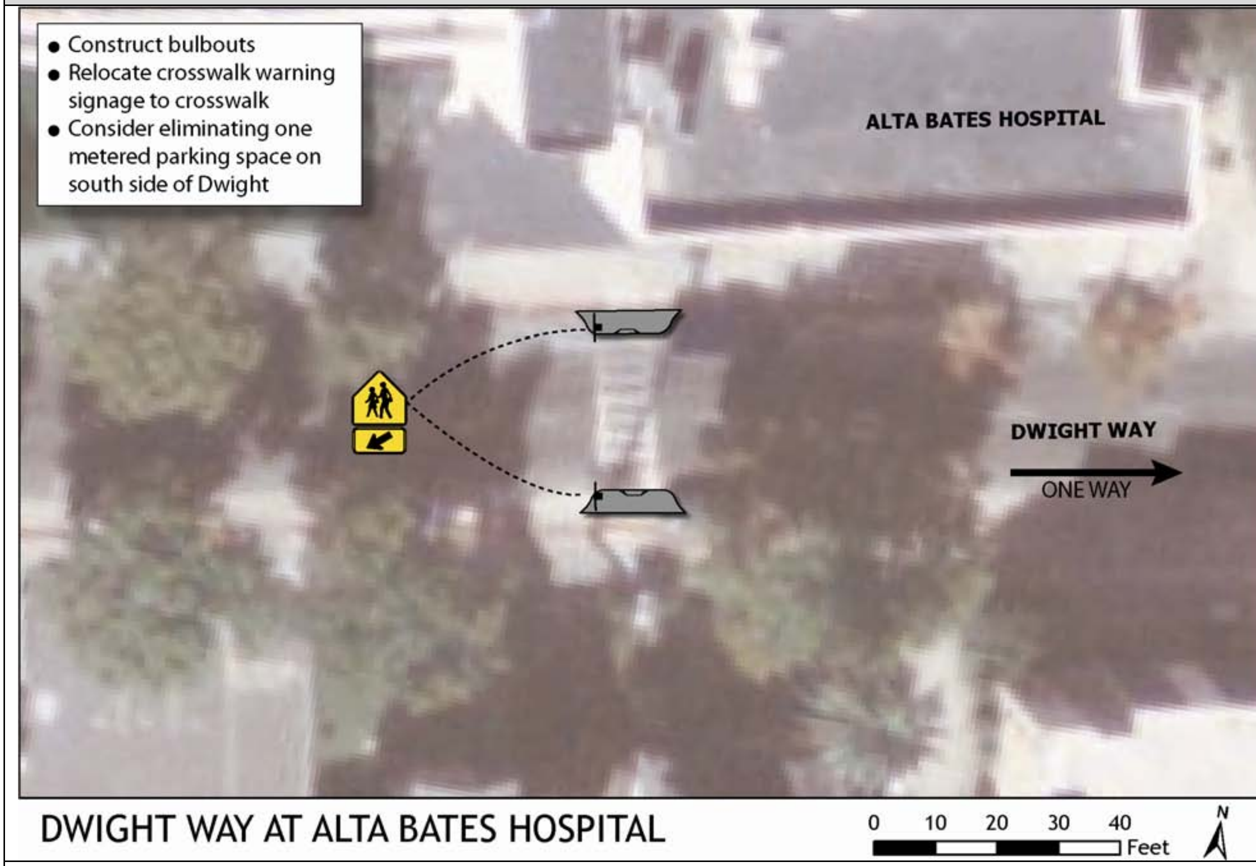
- $250,400 ($20,000 is accounted for in Citywide projects)

MID-BLOCK CROSSWALK IMPROVEMENT PROJECT:
22. DWIGHT WAY AT ALTA BATES HOSPITAL

Study Area Description
A mid-block crosswalk is located on Dwight Way between Milvia and Shattuck, in front of the Alta Bates hospital. This crosswalk feeds directly into the hospital entrance and provides a crossing for those who are parked on-street or in parking lots on the south side of Dwight Way. The crosswalk is striped with a high-visibility ladder pattern. This segment of Dwight is one-way in the eastbound direction, with two lanes of traffic and parallel parking on both sides. At the south crosswalk landing, a driveway is present to the west side of the crosswalk, and two metered parking spaces are present to the east side of the crosswalk. On the north landing, an area of red curb is striped to the west of the crosswalk, and metered parking is present to the east of the crosswalk.

Issues
⅄ Relatively high traffic volumes on Dwight, and one-way configuration may lead to higher vehicle speeds. ⅄ Visibility for crossing may be an issue if vehicles are encroaching into red curb zone on north side of roadway. ⅄ Crosswalk warning signage is not located at crosswalk.

Proposed Improvements



- Install bulbouts on both side of crosswalk to provide greater visibility for pedestrians and reduce crossing distance. Bulbouts may require additional drainage improvements. $150,000
- Relocate crosswalk warning signage to be at crosswalk. $400
- Consider eliminating one of the two metered parking spaces on the south side of the street, to provide a larger area for bulbouts to reduce potential for parked vehicles to encroach into crosswalk. $20

Cost

- $150,420 ($400 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT PROJECT:
23. ALCATRAZ AVENUE AND CALIFORNIA STREET

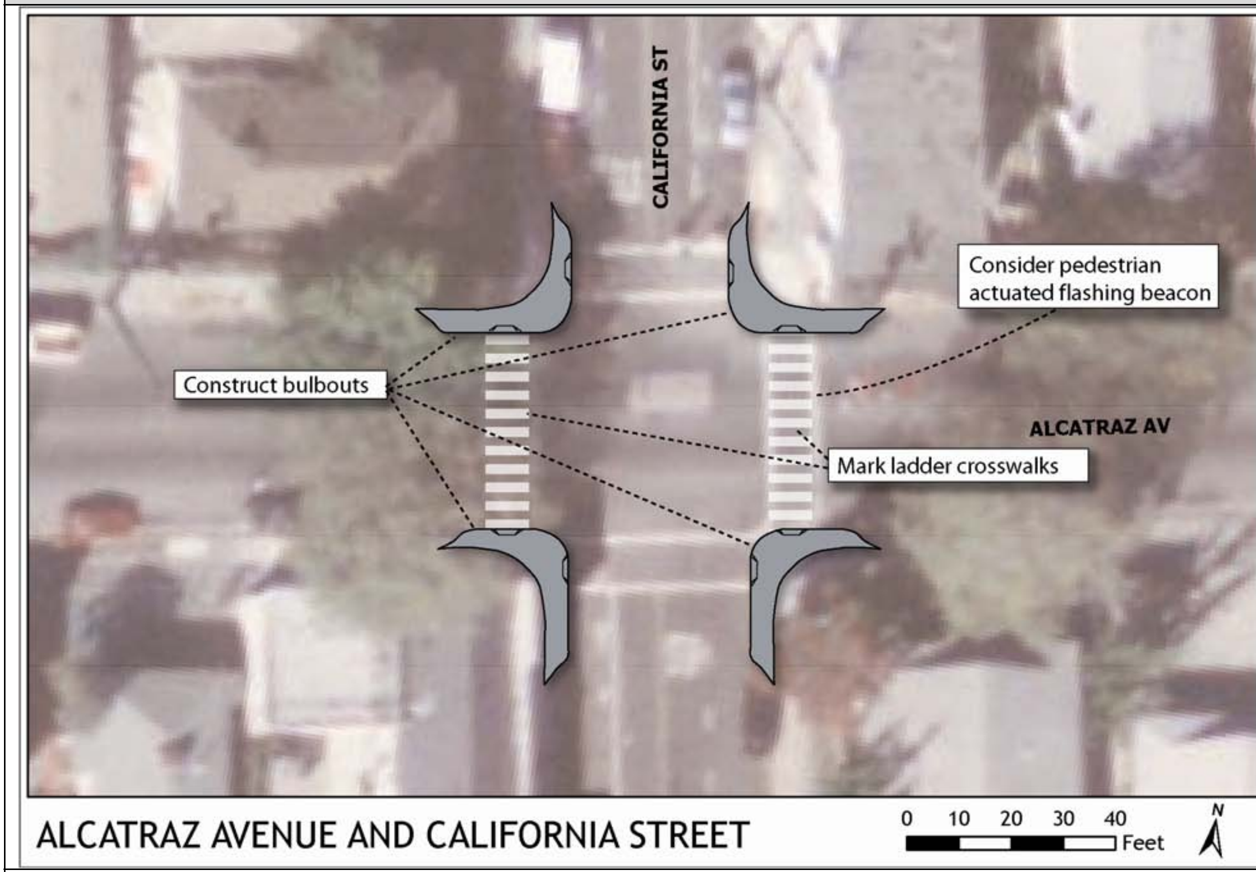
Study Area Description

The intersection of Alcatraz Avenue and California Street is stop-controlled on the California approaches. Alcatraz Avenue is a major east-west road with one travel lane in each direction and on-street parallel parking. Although it is a major road and carries heavy traffic volumes, Alcatraz is fronted by residential land uses. California Street is a local north-south road and a bicycle boulevard. A half-street traffic diverter is in place on the north side of California at Alcatraz -- northbound traffic cannot enter here, but southbound traffic can exit onto Alcatraz from California. A convenience store is located at the northeast corner, making this a heavily used crossing location for residents on the south side of Alcatraz. Standard transverse crosswalks are present on all legs of the intersection.

Issues

- Heavy traffic volumes on Alcatraz.
- High number of pedestrian crossings associated with convenience store on NE corner.
- Uncontrolled crosswalks across Alcatraz.

Proposed Improvements



- Stripe high-visibility ladder crosswalks on both legs across Alcatraz. $2,400
- Consider installing bulbouts on all corners. Bulbouts on northeast and southeast corners will require relocating inlets. Bulbouts on southwest corner will likely require regrading the southwest quadrant of the intersection to maintain drainage. The northwest corner does not appear to require work for storm drainage. Installation of curb ramps on east corners will need to account for bus stops in this location. $250,000
- Study installation of pedestrian actuated flashing beacons, particularly for the eastern leg which has the bus stop and convenience store. $100,000

Cost

- $354,400 ($2,400 is accounted for in Citywide projects)

SAFE ROUTES TO TRANSIT PROJECT:
24. NORTH BERKELEY BART STATION AREA

Study Area Description

The North Berkeley BART station and its surrounding park-and-ride lots are bounded by Sacramento Street on the east, Delaware Street on the south, Acton Street on the west and Virginia Street on the north. Due to its location in a largely residential neighborhood, the station attracts large numbers of pedestrians from all directions. Its location next to a major Berkeley north-south roadway, Sacramento Street, and its large park-and-ride lots ensures that it attracts large numbers of vehicle trips as well. Autos and AC Transit buses accessing the station generally approach along Sacramento Street, turning onto Virginia or Delaware Streets and then turning into the station lot driveways. As a result, the Virginia Street and Delaware Street intersections with Sacramento Street are critical points of conflict between autos and pedestrians.

The T-intersection of Sacramento Street with Delaware Street is at the southeastern corner of the station's parking lot. Delaware Street is a collector that provides east-west connections to the North Berkeley BART station parking lots, Ohlone Park, and residential neighborhoods. Sacramento Street has two travel lanes in each direction, an exclusive single left turn lane on the southern leg and an exclusive right turn lane on the northern leg at the intersection. Delaware Street terminates at Sacramento Street and has one exclusive left turn lane and one exclusive right turn lane. The intersection is signalized. Bicyclists traveling eastbound can continue straight to the Ohlone Greenway. On-street parking is prohibited on all approaches immediately adjacent to the intersection, leaving adequate lines-of-sight for drivers and pedestrians. Pedestrian signals are automatic.

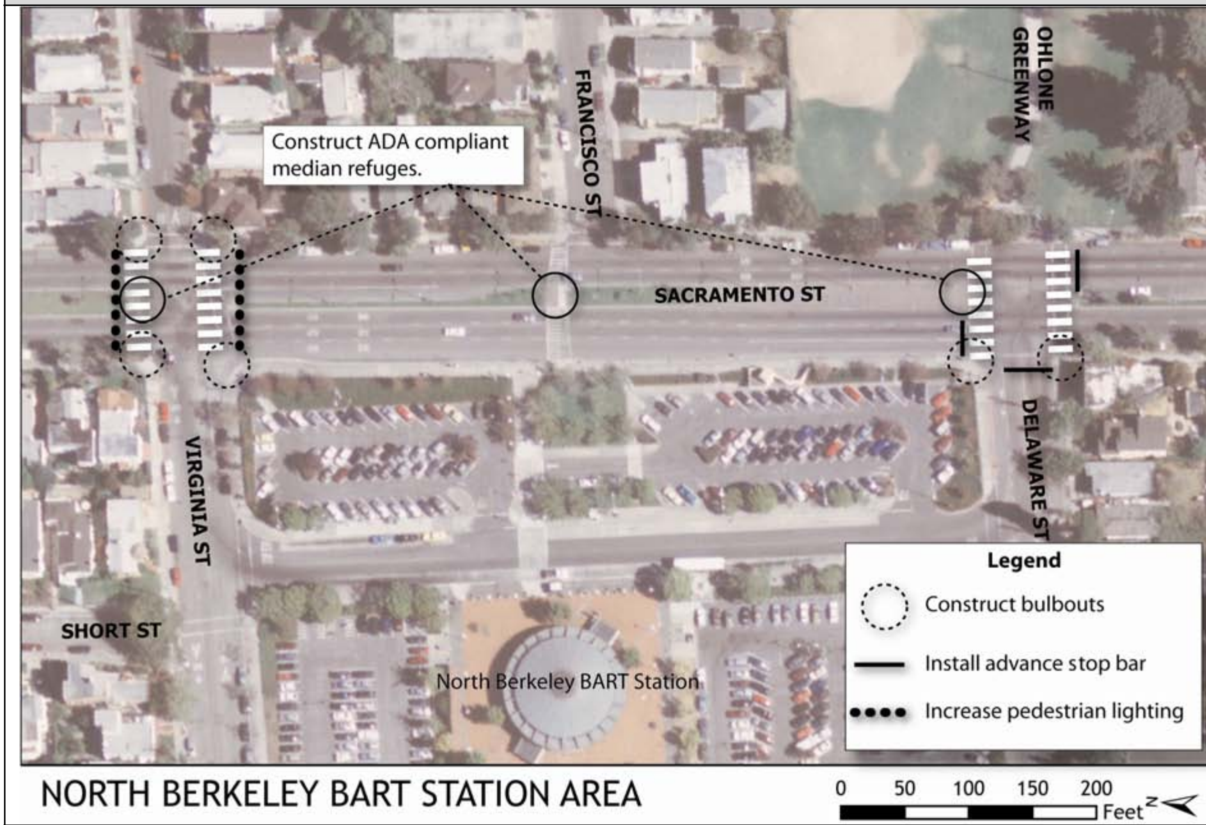
The intersection of Sacramento Street and Virginia Street is stop-controlled on Virginia Street. Virginia Street is a local roadway that is also a Bicycle Boulevard. At this intersection, Sacramento Street has a raised median on both legs, two travel lanes in each direction and an exclusive single left turn lane for northbound vehicles. Virginia Street has one travel lane in each direction and an exclusive right turn lane on the western leg of the intersection that doubles as a drop-off zone for the AM peak-hour. On-street parking is prohibited on all approaches immediately adjacent to the intersection but parallel parking on both roadways is allowed. The southwestern corner has a bulbout that protrudes out into Sacramento Street. Pedestrian crossing signs are located on Sacramento Street in the median approaching the intersection.

Issues

Significant pedestrian volumes crossing Sacramento Street at both key intersections as well as at the intersection of Francisco Street & Sacramento Street, half-way between Delaware Street and Virginia Street

- Raised medians on Sacramento Street do not serve as refuges for pedestrians because they do not extend into the crosswalks or have curb ramps.
- No truncated domes on curb ramps.
- Delaware Street Intersection:
  - Curb-delineated median on northern leg sticks 2 feet into crosswalk, creating an obstacle for the disabled crossing the intersection.
  - Large turning radius at northwest corner and exclusive right turn lane encourage southbound right turning vehicles to speed through movement.
  - Eastbound right-turning vehicles often stop in the crosswalk on red light phase.
  - No audible pedestrian signal.
- Virginia Street Intersection:
  - Lack of visibility of pedestrians waiting to cross Sacramento Street.
  - Left turning eastbound vehicles sometimes ignore pedestrians crossing the northern leg.
  - Long pedestrian crossing distance across Sacramento, especially southern leg.

Proposed Improvements



- Construct bulbouts to increase pedestrian visibility, decrease the pedestrian crossing distances and tighten the turning radius for right turning vehicles at corners of the following intersection locations:
  - Sacramento Street/Delaware Street Intersection:
    - Northwest and southwest corners. Directional curb ramps with truncated domes and actuation on all legs should be installed. $150,000
  - Sacramento Street/Virginia Street Intersection:
    - Construct bulbouts on northwest, northeast (drain grate on Virginia Street), and southeast corners of the intersection. Directional curb ramps with truncated domes should be installed and lane width should be retained to serve as a bus pullout for the existing bus stop. $200,000
    - Extend bulbout at southwest corner to increase pedestrian visibility at this skewed intersection and decrease pedestrian crossing distance to Sacramento Street median to 36 feet. Drainage modifications may be necessary and could contribute to construction costs. $100,000
- Create pedestrian refuges at the medians on Sacramento Street that are ADA compliant. Drainage modifications may be necessary and could contribute to construction costs. $90,000
- Install ladder style crosswalks at Virginia across Sacramento Street to improve pedestrian visibility. $2,400
- At the Virginia Street intersection, increase lighting for pedestrians across Sacramento Street or install flashing, pedestrian-activated lights. $75,000
- Install advance stop bars on all approaches to Delaware Street intersection. $900
- Conduct a study to evaluate the possibility to reduce the speed limit on Sacramento to 25 mph.

Cost

- $550,800 ($3,300 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT PROJECT:
25. SAN PABLO AVENUE AND CEDAR STREET

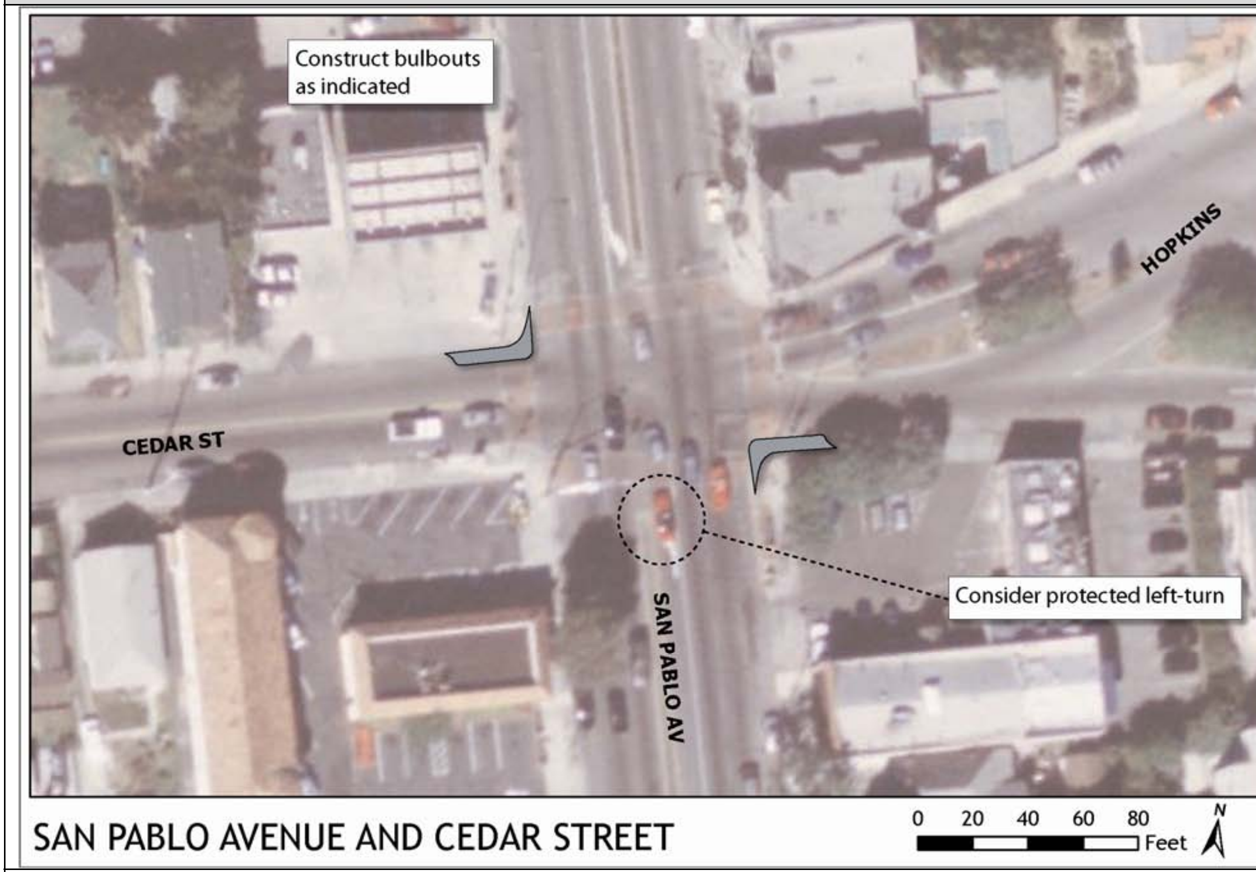
Study Area Description

The signalized intersection of San Pablo Avenue (State Route 123) and Cedar Street in northwest Berkeley has a number of popular attractions such as Café Fanny and Acme Bread Company that bring large numbers of pedestrians to cross both streets. The SP Gas Station and the parking lots for the Golden Bear Motel and Café Fanny and Acme Bread on the southwest and southeast corners ensure a steady flow of vehicles as well. San Pablo Avenue has four travel lanes (two in each direction) plus a raised median island that accommodates a left-turn pocket for cross-streets. Cedar Street has two travel lanes (one in each direction). Just east of the intersection, Hopkins Street and Cedar Street converge (at a "fork" in the road), with Hopkins Street approaching from the northeast. The San Pablo Plan recommends special paving at Cedar Street and constructing bulbouts along San Pablo side streets, but not within San Pablo right-of-way.

Issues

- Raised island on east leg of Cedar Street does not meet crosswalk. Painted median covers the last ~25 feet between raised median and the crosswalk, encouraging westbound vehicles to make u-turns prior to the intersection within the crosswalk zone.
- Large turning radius for westbound right turning vehicles onto San Pablo Avenue from Cedar Street.
- Stopped vehicles eastbound and westbound on Cedar Street intrude into crosswalks.
- Pedestrian-vehicle conflicts in crosswalks during permitted signal phases on San Pablo Avenue as southbound left and northbound left-turning vehicles traverse the east and west leg crosswalks.

Proposed Improvements



- Increase pedestrian visibility and decrease crossing distances by building bulbouts on the following corners: $150,000
  - Northwestern corner: south side.
  - Southeastern corner: north side.
- Bulbout design should take into consideration turning movements by buses, trucks, and other large vehicles.
- Study the feasibility of protected turn phasing for left-turning vehicles from San Pablo Avenue on to Cedar Street to reduce pedestrian/auto conflicts.
- As State of California right-of-way, any work on San Pablo would require the Caltrans approval.

Cost

- $150,000 ($0 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT PROJECT:
26. TELEGRAPH AVENUE AND ASHBY AVENUE

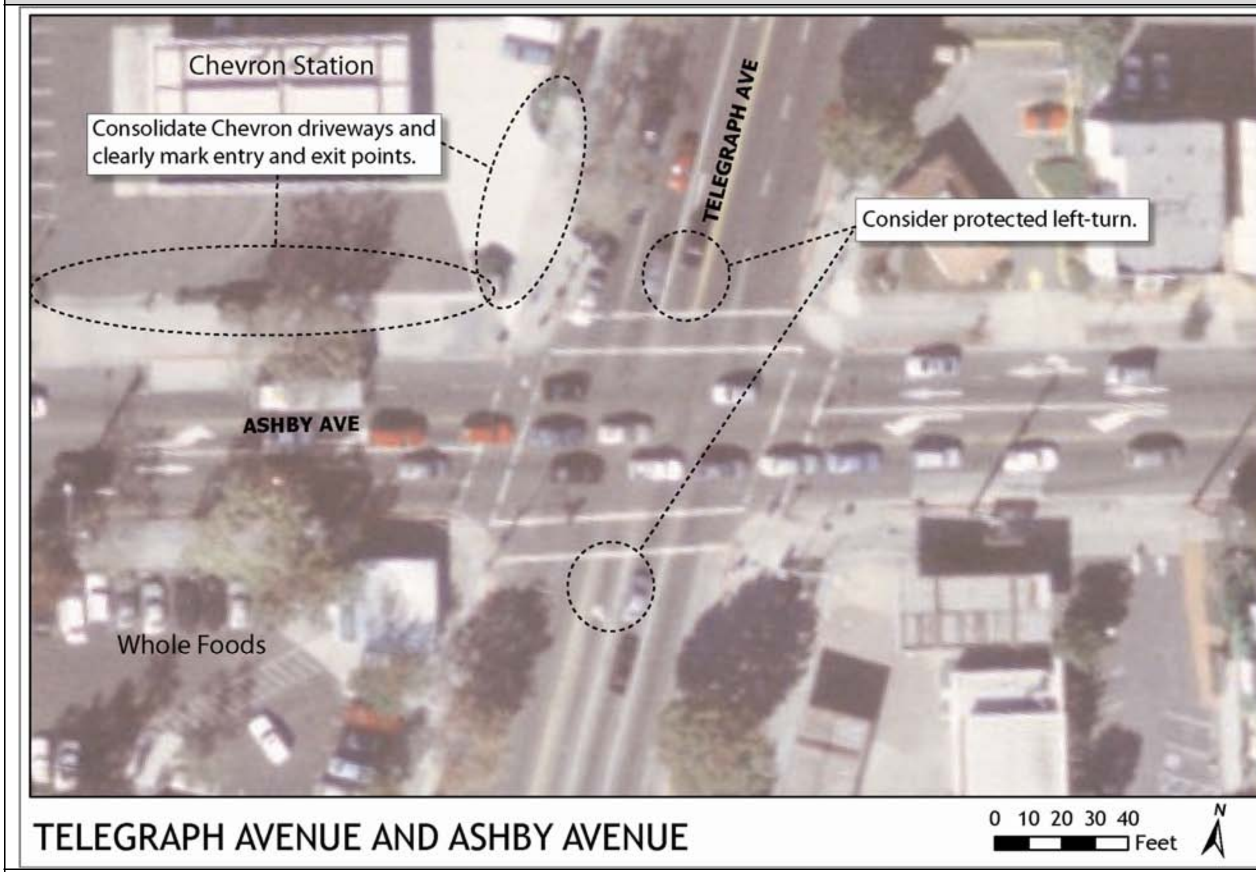
Study Area Description

The signalized intersection of Telegraph Avenue and Ashby Avenue (State Route 13) in south Berkeley has heavy vehicular traffic volumes. At this location Telegraph Avenue is a four-lane north-south major road with two lanes of travel in each direction with a center-left turn lane. Ashby Avenue has four lanes, with parking allowed in the outside lane except during peak hours. Signal phasing for this intersection allows permitted movements for each direction of travel and a protected phase for southbound movements. High vehicular traffic volumes at this intersection are matched by high levels of pedestrian activity caused by nearby trip generating land uses such as Whole Foods Market on the southwestern corner and the main campus of Alta Bates Hospital located one block east of the intersection on Ashby Avenue. Pedestrian-auto conflicts are increased by the Chevron gas station located on the northwestern corner, which has driveway curb cuts located directly adjacent to where the crosswalks meet the curb. While now vacant, the driveways for the Union 76 station on the southeastern corner have a similar design that would exacerbate pedestrian/auto conflicts should this lot be developed in the future and the current driveways retained.

Issues

- Long pedestrian crossing distances across Telegraph Avenue and Ashby Avenue.
- Driveway curb cuts close to intersection crosswalks on northwestern and southeastern corners create pedestrian/auto conflicts.

Proposed Improvements



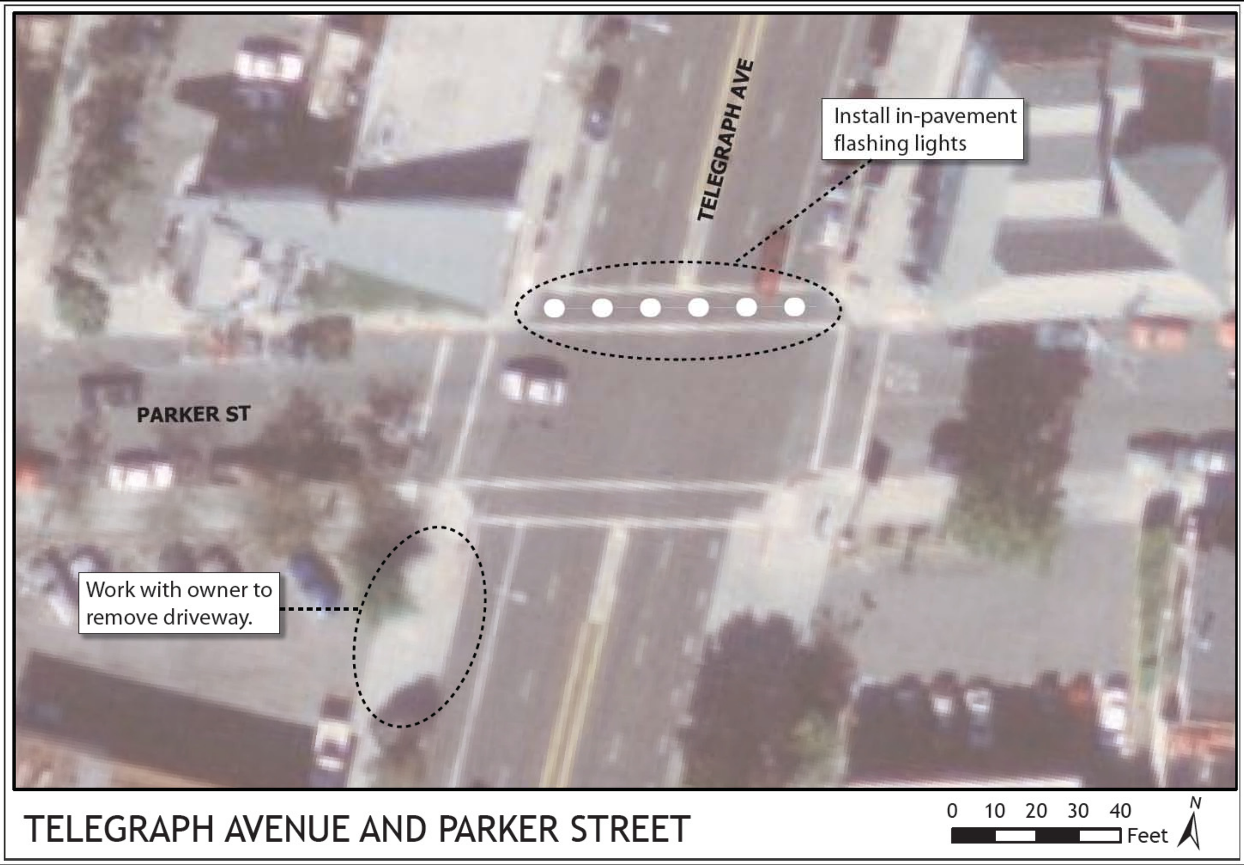
- Study the possibility of installing protected left turn phases for vehicles turning from Telegraph Avenue to Ashby Avenue and removing permitted left turns from the signal phasing for these movements. This would reduce the number of pedestrian/auto conflicts in crosswalks across Ashby Avenue.
- Work with Caltrans and Chevron station owners and managers to either consolidate driveways or clearly mark entry and exit points for refueling area. Entry driveways should be those closest to the intersection, while exit points should be those furthest from the intersection. Driveways on Ashby Avenue are within State of California right-of-way.
- Install count-down signal heads. $6,400

Cost
▪ $6,400 ($0 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT PROJECT:
27. TELEGRAPH AVENUE AND PARKER STREET

Study Area Description
Telegraph Avenue and Parker Street is an unsignalized intersection in South Berkeley. Telegraph Avenue is a five-lane north-south major roadway with two lanes of travel in each direction and a center-left turn lane. Parker Street is an east-west local street serving as access primarily to residential neighborhoods on the south side of the University of California Campus. Pedestrian volumes on Parker Street and at this intersection are generally high due to its proximity to the UC campus and the Telegraph Avenue shopping district. University students and faculty as well as Telegraph Avenue shopping patrons will often park in the surrounding residential neighborhoods and will use Parker Street to walk to Telegraph Avenue and points beyond. At the Telegraph Avenue intersection, both Parker Street approaches are stop-controlled. Telegraph Avenue is a major street that stretches from downtown Oakland to the south side of the University of California campus. Telegraph Avenue has two travel lanes in each direction at Parker Street and bicycle lanes in each direction as well. At the Parker Street intersection, the Telegraph Avenue approaches do not have stop controls. While the north and south legs of Telegraph Avenue at Parker Street have painted median islands, their widths (roughly 3 feet) and the fact that they do not have raised curbs make them inadequate to serve as pedestrian refuges. The recent installation of in-pavement, pedestrian-activated crosswalk flashers on the north leg of the intersection has improved pedestrian visibility and safety. Land uses adjacent to the intersection include restaurants, a convenience store with a small parking lot on the southeastern corner, an automobile repair business on the southwestern corner and specialty retail store fronts along Telegraph Avenue.

Issues
⅄ Long pedestrian crossing distances across Telegraph Avenue. ⅄ Driveway curb cuts close to intersection crosswalks on southwestern and southeastern corners create pedestrian/auto conflicts. ⅄ Collision records over 5-year period show 3 out of 5 pedestrian collisions occurred in or near the south leg crosswalk during dusk or dark lighting conditions. ⅄ Inadequate street lighting on northwestern and southeastern corners.

Proposed Improvements

▪ Remove driveway closest to south leg crosswalk on the southwestern corner of the intersection to reduce automobile/pedestrian conflicts. Pending negotiation with owner - $5,000 ▪ Install in-pavement pedestrian actuated flashing lights on north side of intersection. $20,000 (Note: completed)

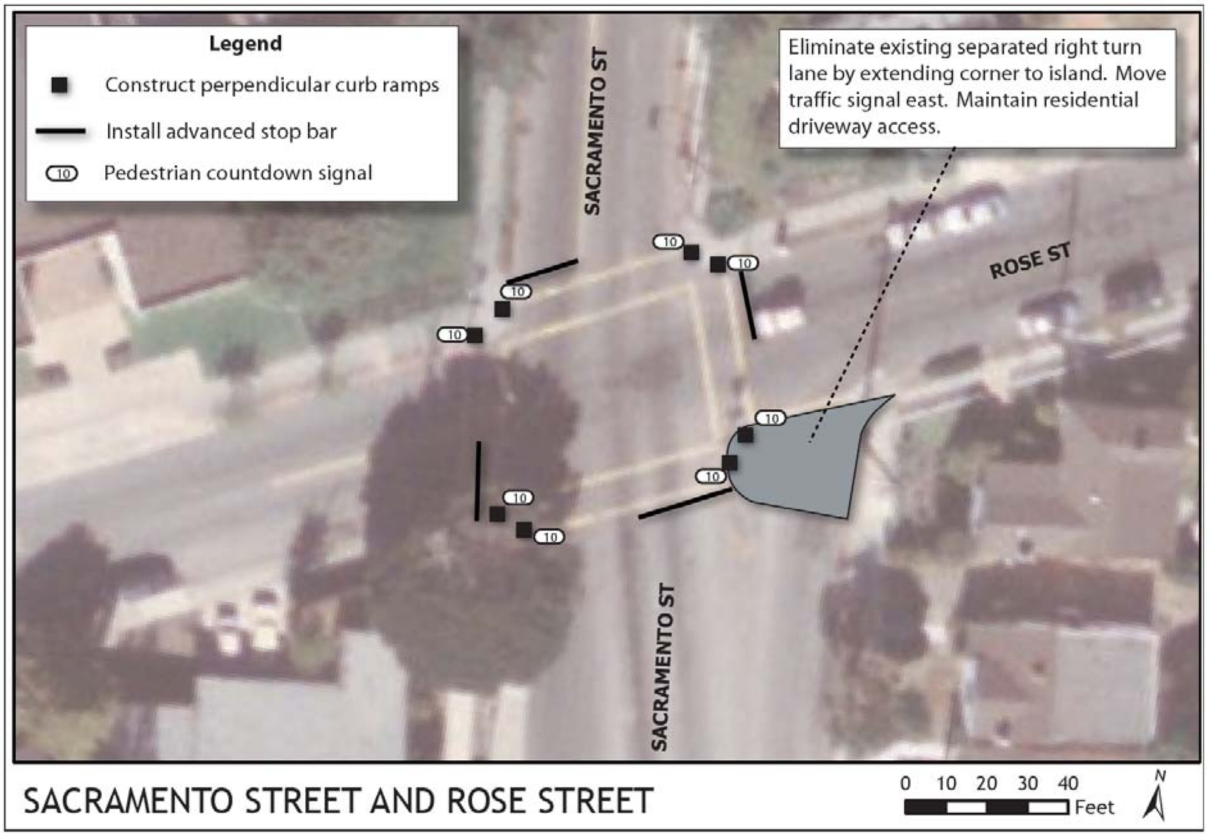
Cost
▪ $25,000 ($0 is accounted for in Citywide projects)

SAFE ROUTES TO SCHOOL PROJECT:
28. SACRAMENTO STREET AND ROSE STREET

Study Area Description
The signalized intersection of Rose and Sacramento in north Berkeley is the point at which the Sacramento Street right-of-way narrows significantly. North of Rose Street, Sacramento has two lanes northbound and one lane southbound. South of Rose, Sacramento widens to two lanes in each direction with a wide landscaped center median. At the northbound leg of Sacramento at Rose, this additional width is used for a separate right turn lane, separated from the two northbound through-lanes by a triangular island. The northbound traffic lanes are controlled by the traffic signal. The separated right turn lane is controlled by a STOP sign. In order to cross the southern leg of Sacramento, pedestrians must cross the STOP controlled right turn lane, then wait on the island for the traffic signal to cross the remaining through traffic lanes. A number of potential pedestrian conflicts and motorists failing to stop at the northbound right turn lane have been noted by local residents. This may be due in part to the unique design of the intersection, which may appear to motorists to be a "free right" turn lane (even though it is STOP controlled).

Issues
⅄ Separate right turn lane on northbound Sacramento is STOP controlled, while other northbound traffic lanes are Signal-controlled. ⅄ Right turn lane on northbound Sacramento is configured similar to many "free right" turn lanes, separated from through traffic by a small island. ⅄ Pedestrian/Auto conflicts have been noted by local residents, specifically related to vehicles not stopping at the STOP sign on the northbound right turn movement.

Proposed Improvements



- Eliminate existing separated right turn lane by extending the existing southeast corner out to connect with the island. In order to facilitate right turns from the reconfigured corner, the corner radius of the existing island would need to be widened, and the traffic signal moved to the east. No underground storm drainage system exists at this intersection; all drainage is provided by surface flow. The bulbout would require regrading the intersection. Access to two residential driveways that are currently within this separated right turn lane would need to be maintained. $190,000
- If sufficient right-of-way exists, install perpendicular curb ramps with truncated domes at all corners so that ramps face directly into crosswalk. $20,000
- Install countdown signals for all crossing legs. 1,000
- Install stop bars at all legs of the intersection to discourage encroachment of stopped vehicles into crosswalk and in right-turn-on-red situations. $1,200

Cost

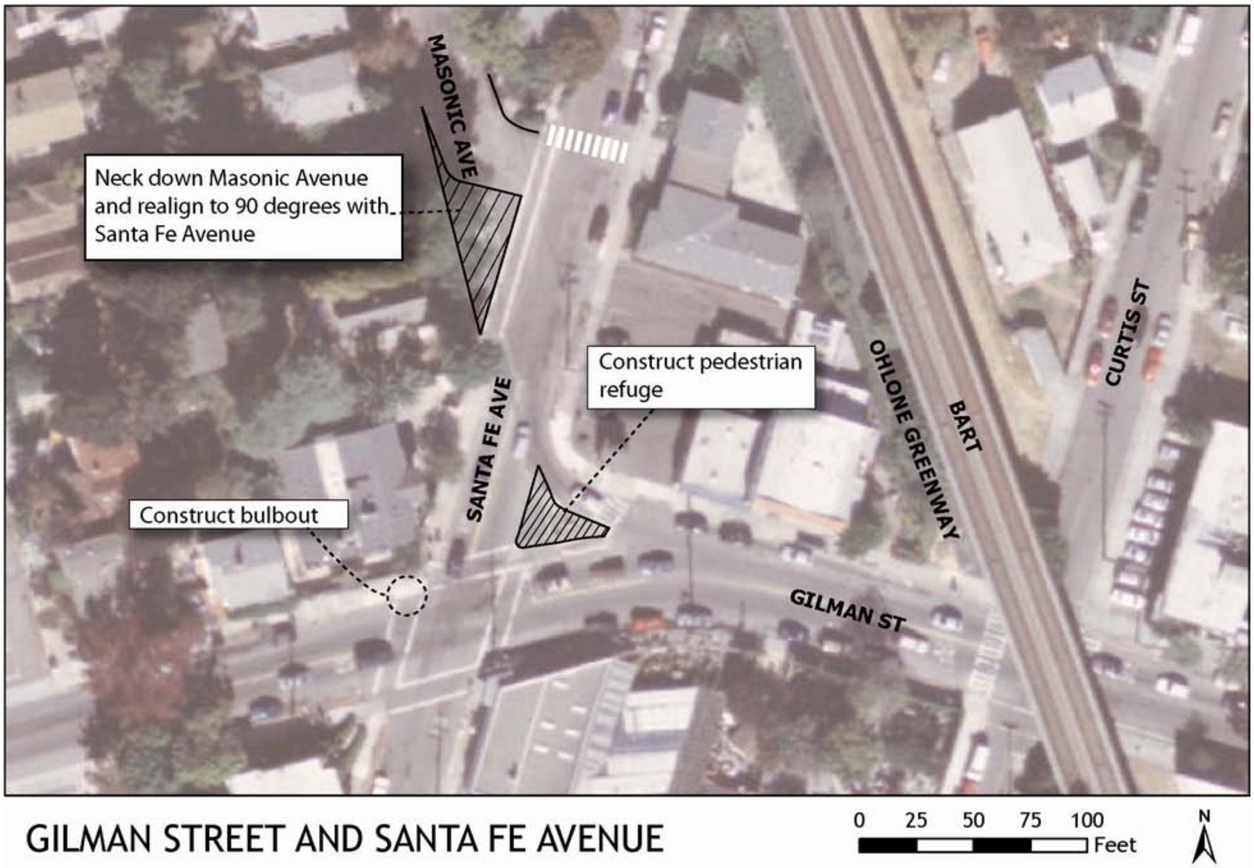
- $212,200 ($22,200 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT PROJECT:
29. GILMAN STREET AND SANTA FE AVENUE

Study Area Description
The intersection of Santa Fe Avenue/Masonic Avenue with Gilman Street is a focal point for vehicular and non-vehicular access to the Westbrae neighborhood shopping area in northwest Berkeley. The intersection is adjacent to well-known retail attractions such as Berkeley Bagels, Toot Sweets, and other specialty retail establishments along a two-block section of Gilman Street. Gilman Street is an important east-west link for vehicular traffic in Berkeley, and both Santa Fe and Masonic Avenues provide convenient access to Albany and El Cerrito for local traffic. The Ohlone Greenway trail passes through this neighborhood as well, one block east of the intersection in question, carrying substantial bicycle and pedestrian traffic through the neighborhood.

Issues
⅄ Pedestrian conflicts with westbound right turning vehicles from Gilman Street onto Santa Fe Avenue. ⅄ “Porkchop” island at Santa Fe Avenue & Gilman Street has confusing design for drivers and pedestrians. ⅄ Long crossing distance across Masonic Avenue at Santa Fe Avenue. ⅄ Pedestrian visibility for drivers eastbound on Masonic Avenue turning right onto Santa Fe Avenue and for left-turning vehicles from Santa Fe Avenue onto Masonic Avenue. ⅄ Oblique turning radius at southwestern corner of Santa Fe Avenue & Masonic Avenue. ⅄ Inadequate curb ramp at southeastern corner of Santa Fe Avenue & Gilman Street.

Proposed Improvements



- Construct "porkchop" island and stop-controlled right-turn slip lane at Gilman Street and Santa Fe Avenue. Drainage and utility issues must be considered. Existing Berkeley Survey monument is in existing island and must be preserved as per State law. $100,000
- Using striping or vertical improvements, "straighten" and "neck-down" intersection of Masonic Avenue with Santa Fe Avenue so that Masonic Avenue meets Santa Fe Avenue at a 90-degree angle. This will shorten crossing distance for pedestrians across Masonic Avenue and will increase visibility of pedestrians crossing the intersection for motorists. $5,000
- Install crosswalk for pedestrians crossing northern leg (across Santa Fe Avenue) of Santa Fe Avenue & Masonic Avenue Prohibit parking on north side of new crosswalk on west side of Santa Fe to improve pedestrian visibility to motorists. Consider installation of overhead pedestrian flashing lights for this new crosswalk. $1,200 (lights not included)
- Install bulbout on the northwest corner of Santa Fe Avenue & Gilman Street. Bulbouts would require regrading intersection and installation of valley gutter from northeast to northwest corners. $100,000

Cost

- $206,200 ($0 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT:
30. ADDISON STREET AND JEFFERSON AVENUE

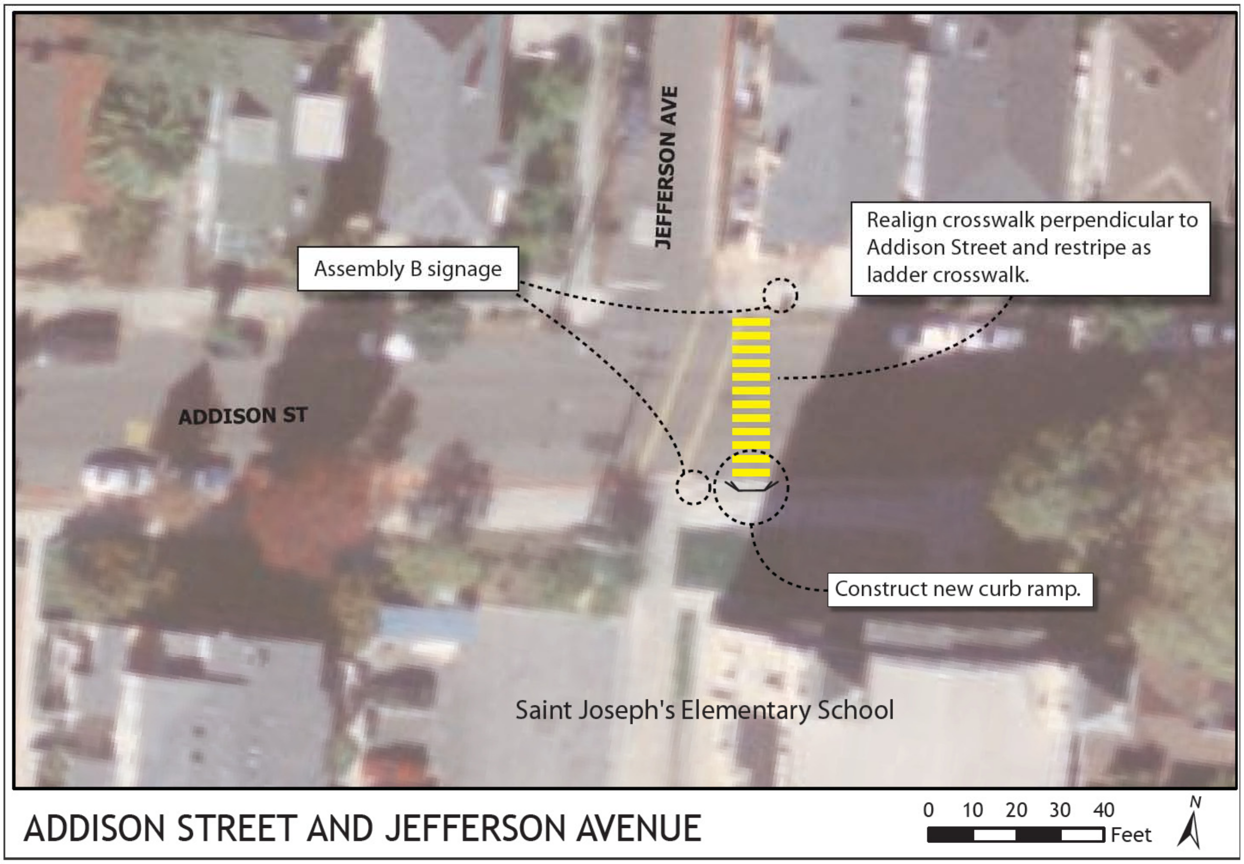
Study Area Description

The intersection of Addison and Jefferson in central Berkeley is an intersection of two local streets one block south of University Avenue. Addison is an east-west local street with one lane in each direction and on-street parallel parking. Jefferson has a narrow right-of-way with a sidewalk and on-street parking only on the west side of the roadway. Jefferson is discontinuous at Addison; although the roadway continues to the south, it is completely blocked from motor vehicle through traffic with a sidewalk/landscaping, making the intersection of Addison/Jefferson at T-intersection in the southbound direction, and a cul-de-sac in the northbound direction. The intersection is also offset at this point, with the southern segment shifted slightly west of the northern segment. Surrounding land uses are primarily residential, with St. Josephs Church and Elementary School the most dominant use, located on the southeast side of the intersection. The heaviest pedestrian and vehicle volumes at this intersection are related to church and school activities. A yellow transverse school crosswalk is striped from the northeast corner to the south side of the T-intersection; due to the offset nature of this intersection, the crosswalk is skewed to align with the sidewalk continuing to the south.

Issues and Proposed Improvements

- Lack of sidewalks along Jefferson north of Addison.
- Skewed pedestrian crosswalk across Addison.
- Crosswalk lands on NE corner of Jefferson; no sidewalk on this block to the north.
- Church/school loading area affects potential landing area for crosswalk.

Proposed Improvements



- Restripe crosswalk to west leg of intersection across Addison so that crosswalk is on same side as sidewalk. Align crosswalk perpendicular to roadway. Stripe high-visibility school ladder style. $1,200 for crosswalk and $2,000 for new ramp.
- Upgrade signage to install advance pedestrian warning signs and MUTCD Assembly B pedestrian signage at crosswalk. $800

Cost

- $4,000 ($4,000 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT:
31. SACRAMENTO STREET AND OREGON STREET

Study Area Description

The intersection of Sacramento Street and Oregon Street is stop-controlled on the Oregon approaches. Sacramento is a major north-south street with two travel lanes in each direction, a wide center landscaped median, and on-street parallel parking. Oregon is an east west local roadway that provides access to residential neighborhoods and has one travel lane in each direction with on-street parking. A community garden is located on the southwest corner of the intersection, and a convenience store is on the northwest corner. The convenience store and garden attract pedestrians from the neighborhood to the east of Sacramento, and the crossing experiences relatively high volumes. There are marked crosswalks on all legs of the intersection, and both legs across Sacramento are striped with a high-visibility ladder crosswalk. In addition, the northern leg has in-pavement flashing lights installed in the crosswalk, which are actuated via pole-mounted push-buttons on either side. Although Sacramento has a wide landscaped median that functions as a pedestrian refuge in many locations, at this intersection there is no median on the south leg due to a left turn lane, and the median on the north leg is tapered to a narrow point and does not function as a true refuge.

Issues

- Long crossing distances across Sacramento, without a full refuge at either crosswalk across Sacramento.
- Existing bulbouts on north side of intersection are rounded and provide a wide turning radius, and do not orient pedestrians 90-degrees to crosswalks.
- Pedestrian volumes related to convenience store.
- Senior and children pedestrians who are utilizing the community garden.
- In-pavement crosswalk lights may be difficult to see during daytime.

Proposed Improvements

▪ Widen the median at the north leg of the intersection to a full ADA-compliant refuge island. Because there is no left turn area in this location, the refuge area should be the full median width, and contain a median nose if feasible. Median widening could impact drainage requiring re-engineering that could entail expensive and extensive pavement re-grading and/or storm drain modifications. $30,000

Cost
▪ $30,000 ($0 is accounted for in Citywide projects)

SIDEWALK IMPROVEMENT PROJECT

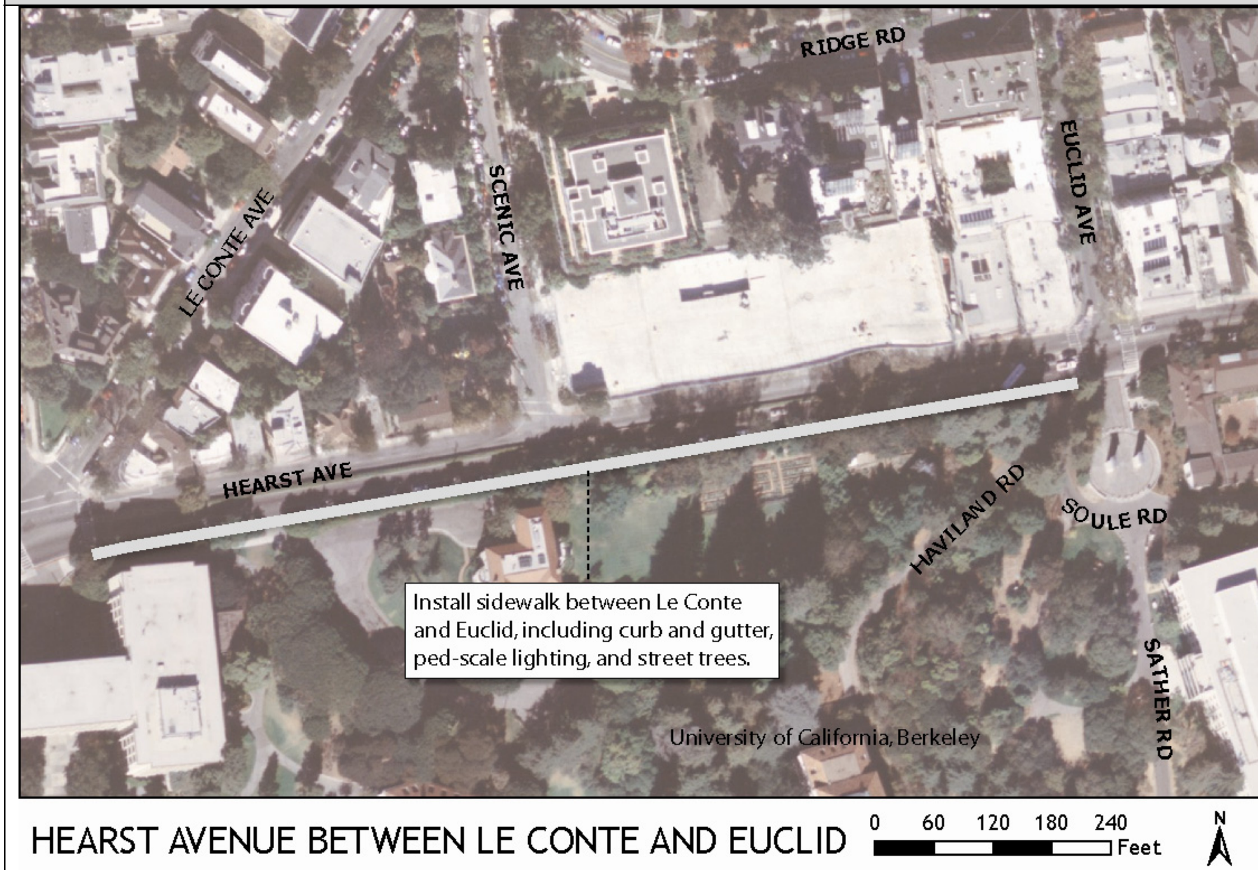
32. HEARST AVENUE BETWEEN LE CONTE AVENUE AND EUCLID AVENUE

Study Area Description
Hearst Avenue serves as the northern boundary of the UC Berkeley campus. A sidewalk is present along the entire north (non-campus) side of Hearst between Oxford and Euclid. On the south side, a sidewalk is present from Oxford to LeConte. At LeConte, pedestrians must utilize an uncontrolled crosswalk to the north side of the street, to continue east toward Euclid. The intersection of Hearst/Euclid is the North Gate to campus, the major campus pedestrian entryway on the north side. East of Oxford, Hearst has two lanes of traffic in each direction, and on-street parallel parking. Between LeConte and Euclid, the roadway is divided with a grade change between the eastbound and westbound traffic. The eastbound side of the road contains on-street metered parallel parking that is primarily used by students.

Issues

- Lack of sidewalk on south side of Hearst forces pedestrians to cross at uncontrolled crossing at LeConte, and then cross back to campus at Euclid.
- High vehicle speeds, especially in westbound direction coming downhill.
- Parking demand along campus boundary.
- Topography/grade issues of installing a sidewalk through the area between LeConte and Euclid; no additional right of way along south side of roadway.

Proposed Improvements



- Study installation of sidewalk on south side of Hearst between Le Conte and Euclid. This may require parking removals along this segment, given the constrained right of way. Work with University regarding parking demand along this segment. Provide smooth flowline transitions at both ends of sidewalk for drainage. New sidewalk. $54,000
- Install curb and gutter along proposed sidewalk. $36,225
- Install pedestrian-scale lighting along proposed sidewalk. $258,750
- Plant street trees along proposed sidewalk. $25,600
- Work with the City to evaluate impact of parking lane on eastbound travel flows, and ability to accommodate additional travel flows during peak hours.

Cost

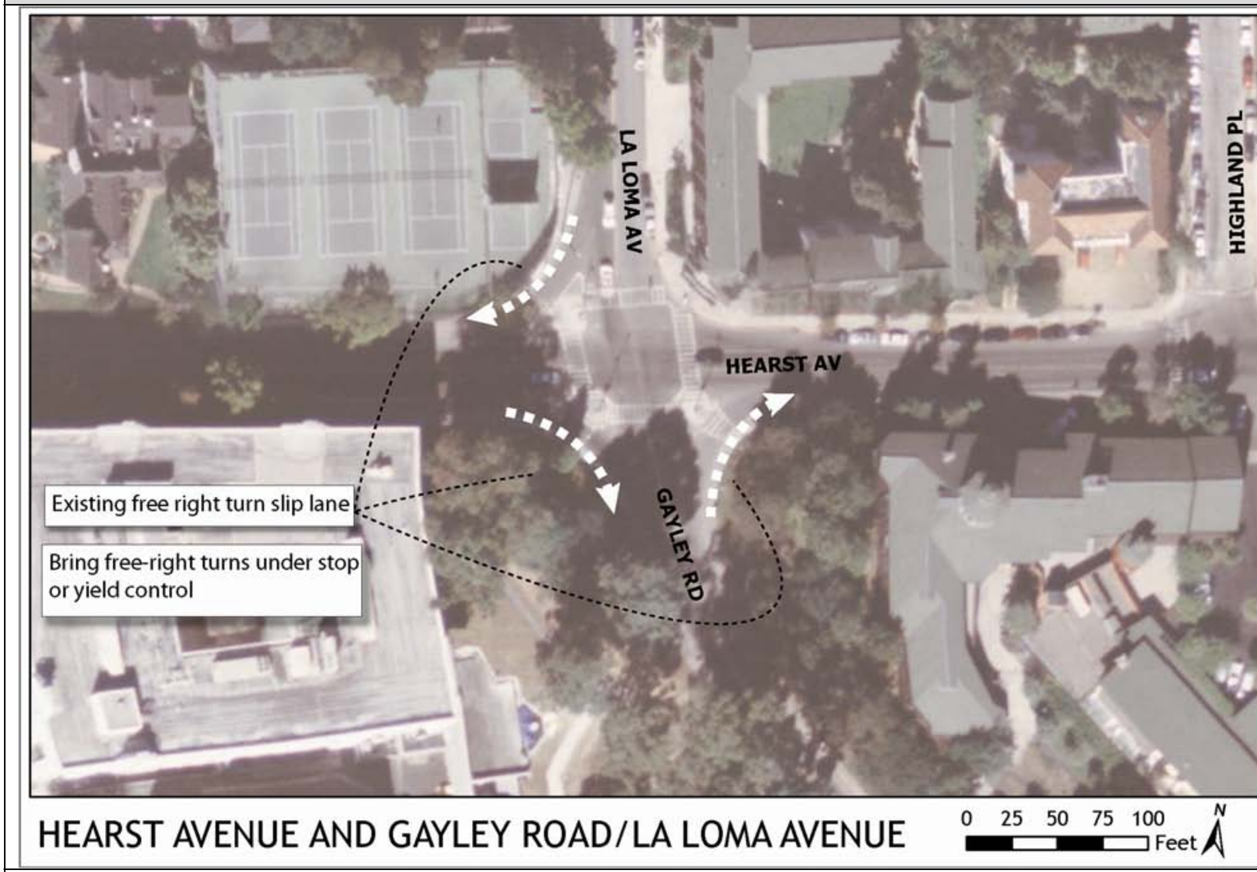
- $374,575 ($0 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT:
33. HEARST AVENUE AND GAYLEY ROAD / LA LOMA AVENUE

Study Area Description
The signalized intersection of Hearst Avenue and Gayley Road / La Loma Avenue forms the northeast corner of the main campus area. Hearst Avenue is an east-west major collector with one lane in each direction that forms the northern boundary of campus. Gayley Road is a north south local campus road that provides access to the eastern campus area, the athletic fields, the Greek Theater, and the Memorial Stadium. North of Hearst, Gayley becomes La Loma, a local residential street that extends up into the Berkeley hills. Land uses surrounding the intersection include campus housing on the northeast and southeast corners, a parking garage on the northwest corner, and campus buildings on the southwest corner. Three of the four corners (northwest, south west, and southeast) have free right turn slip lanes. The NE corner is configured with a relatively wide curb return. Heavy pedestrian crossings exist at this location. Marked crosswalks are present across all legs; all crosswalks are striped with a high-visibility ladder pattern

Issues
⅄ Heavy pedestrian volumes utilize intersection traveling between residential areas to north of Hearst and campus. ⅄ Free right turn slip lanes at NW, SW, and SE corners, allow vehicles to make turns at relatively high speeds. ⅄ Parking garage exit on La Loma near NW corner. ⅄ Intersection is identified as having significant impacts in the Environmental Impact Report for the Lawrence Berkeley National Laboratory's proposed expansion. Additional lanes on several approaches will likely be required to accommodate additional motor vehicle traffic.

Proposed Improvements



- Consider modifying east, west and south right slip turns to be yield or stop controlled. $600
- As intersection is modified to accommodate the Lawrence Berkeley National Laboratory's expansion and other UC Berkeley development plans, modify pedestrian crossing at right turn lanes to be signal-controlled. $300,000
- South side of Hearst Avenue and Gayley Avenue are UC Berkeley property and changes must be coordinated with University

Cost
▪ $300,600 ($0 is accounted for in Citywide projects)

INTERSECTION IMPROVEMENT:
34. GILMAN STREET AND CURTIS STREET AND THE OHLONE GREENWAY

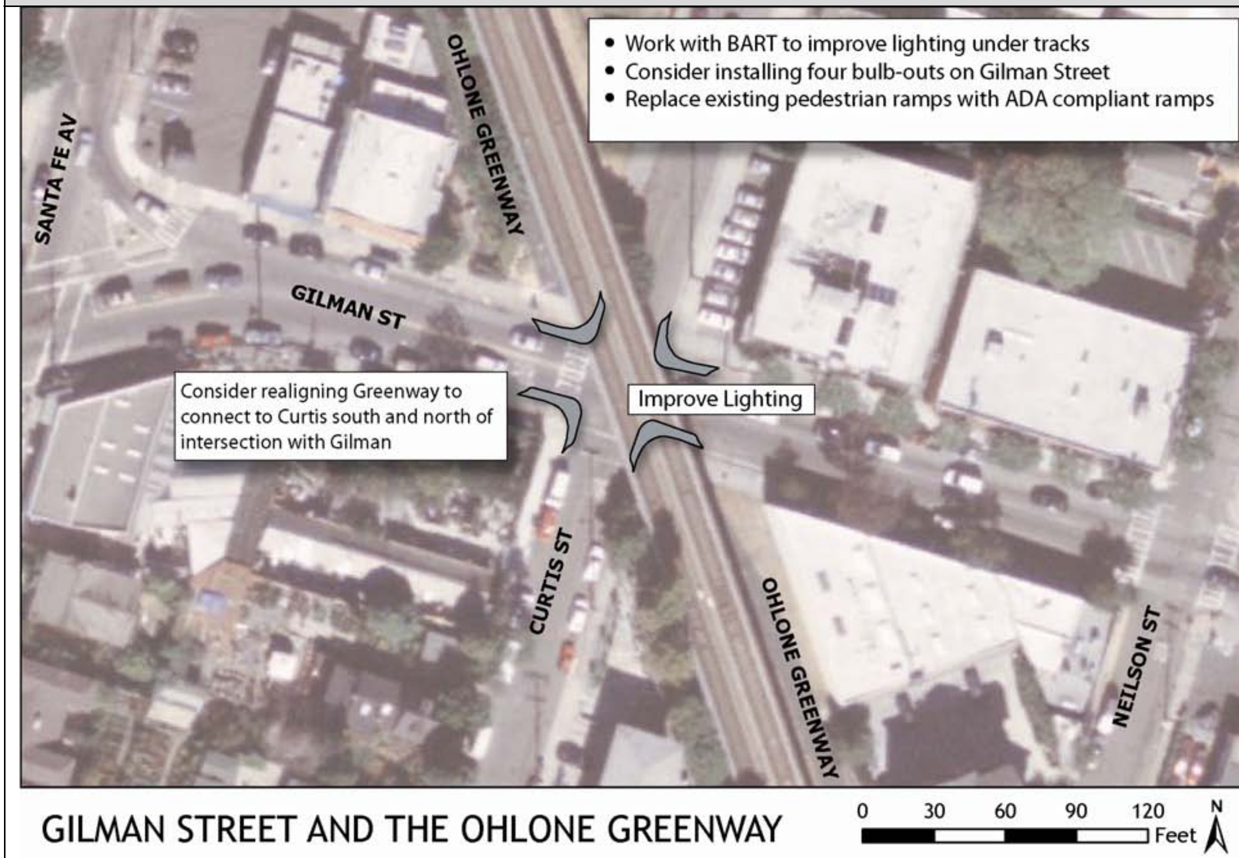
Study Area Description

This all-way STOP controlled intersection is located in a small retail district in northern Berkeley that is otherwise surrounded by primarily single family homes. Gilman Street, 40 feet curb-to-curb, is a north-south major collector street with one lane in each direction and Curtis Street, 30 feet curb-to-curb, is a minor, quiet east-west residential street. The BART system's aerial structure goes directly over the center of this intersection in a southwesterly to northeasterly direction. The Ohlone Greenway, a well used multi-use pathway established on the BART property under the aerial structure, enters the intersection in the same southwestern to northeastern corners. The streets are relatively narrow already with parking permitted on both sides. There are four marked crosswalks, one on each approach, and all are the high visibility "ladder" style.

Issues

- Relatively heavy neighborhood and Ohlone Greenway pedestrian and bicycle traffic may create potential conflicts with motor vehicles.
- Three of the pedestrian ramps are not ADA compliant.
- The sidewalk on the southwest corner of Curtis and Gilman Streets is a narrow.

Proposed Improvements



- Consider installing four bulbouts on Gilman Street – at all four corners to further shorten the crossing distance and encourage a more pedestrian-friendly environment. These improvements should be designed to maintain right turn movements. $250,000
- Consider realigning Greenway to connect with Curtis Street north and south of intersection with Gilman or as called for in City plans as part of BART construction project in area.
- Install signs directing bicyclists to cross Gilman on Curtis St. via potential realigned pathway. $400
- Work with BART to improve the lighting under the elevated rail tracks. $12,500

Cost

- $262,900 ($0 is accounted for in Citywide projects)

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CHAPTER 7

RECOMMENDED PEDESTRIAN PROGRAMS

Public awareness and education programs are important complements to the proposed pedestrian[1] improvements of this Plan. In addition to programs merely promoting walking, an educational effort should be made to cover pedestrian and motorist laws. For example, many people do not understand that motorists must yield to pedestrians crossing at intersections, regardless of whether there is a marked crosswalk in place or not. Others may be confused as to when crossing a street mid-block constitutes jaywalking. Of course, all of these elements promise to be most effective when accompanied by a robust campaign of enforcement of the existing laws that protect pedestrians.

7.1. PEDESTRIAN AWARENESS PROGRAMS

A public awareness campaign that promotes walking as a means of transportation and emphasizes safe behavior will contribute to helping people make healthier lifestyle choices. Berkeley's population covers a wide spectrum that can benefit from walking, including an active senior community, students, families, and employees. In a time of escalating obesity and diabetes rates, encouraging people to walk can provide the invitation necessary to start a lifestyle change.

7.1.1. "Everybody Walks in Berkeley" Campaign

Since 2003, the City of Berkeley, in partnership with Berkeley Unified School District, BEST, Walk & Roll Berkeley, and the Berkeley Residents, conducts an "Everybody Walks in Berkeley!" Campaign. This campaign promotes walking for physical activity by encouraging Berkeley residents to walk the first Wednesday of every month. It is recommended that the City should continue its "Everybody Walks in Berkeley!" campaign, and consider expanding it to serve as a broad pedestrian awareness/encouragement campaign, including promotional materials and other media. Bumper stickers, posters, window signs, and brochures would feature the slogan "Everybody Walks in Berkeley!" and, depending on the type of media, could include the following information:

- Easy ways to incorporate walking into daily activity
- Rules of the road for motorists and pedestrians
- Health benefits of walking
- Website/telephone number for more information

To offset the cost to the City of Berkeley of design and printing, sponsors could be secured. Sponsors' logos can be added at the bottom of the materials. The brochures, maps and bumper stickers could be distributed in and around Berkeley at civic buildings, libraries, schools, local businesses and merchants' associations, and community groups

The City could also expand the current "Everybody Walks in Berkeley!" website to include downloadable files, order forms for posters and signs, and expanded information on current walking events and activities in the city.

[1] The term "pedestrian" refers to a person moving from place to place, on foot and/or with the use of an assistive mobility device (when that person has a disability and/or medical condition). "Walking" or "to walk" are the terms used to describe this movement of a pedestrian.

City of Berkeley staff or a consultant can produce and arrange the distribution of printed materials and identify sponsors and funding sources to offset the costs associated with the printed material. All activities can be done under the supervision of the Transportation Division.

7.1.2. "Bear Crossing" University Focused Safety Campaign

The University environment creates special transportation needs due to the high levels of pedestrians in concentrated areas along the city/campus interface. At all roadways bordering the campus, and especially at the main campus entrance nodes of Bancroft/Telegraph, Oxford/Center and Hearst/Euclid, heavy volumes of pedestrians are crossing the local streets throughout most of the day. Along Telegraph, these heavy pedestrian volumes continue down the commercial corridor toward Dwight Way. This plan's pedestrian exposure analysis found that the area immediately south of campus had a relatively high rate of pedestrian collisions per vehicular volumes, which indicates increased pedestrian risk in this area. The City should work with UC Berkeley to develop a jointly sponsored safety campaign focused on pedestrian safety and awareness for UC students. The campaign should have a catchy title such as "Bear Crossing," and use a variety of media (signs, bumper stickers, news media spotlights) to promote more awareness by motorists of slowing down in areas around campus and yielding to pedestrians in crosswalks. The campaign should also educate students on crossing safety. An example of a successful university campaign is the University of North Carolina's "Yield to Heels" campaign sponsored by UNC and the City of Chapel Hill.

7.1.3. "Walk Bikes on Sidewalk, Ride Bikes on Street" Campaign

Although aimed at bicyclists, this existing pilot program promotes pedestrian safety by reminding cyclists in downtown Berkeley to dismount and walk their bikes when using the sidewalk areas. Particularly around the BART station, both pedestrian and bicycle volumes are extremely heavy, and bicyclists illegally riding on the sidewalk present a safety conflict to those walking. The program was developed by the Office of Transportation in conjunction with the Berkeley Police Department, the Bicycle and Pedestrian subcommittees of the Transportation Commission, and the Commission on Aging and Disability. The City of Berkeley should continue its Walk Bikes on Sidewalk campaign in the downtown area, and consider expanding to other high-pedestrian-use areas of the city such as on University Avenue between Sacramento and 6th Streets.

7.1.4. Public Service Announcements

A cost-effective way for the City of Berkeley to promote walking as an effective and enjoyable way to travel is to use existing television public service announcements (PSAs) made available through the National Highway Traffic Safety Administration (NHTSA), Safe Kids Coalition, and the California Office of Traffic Safety (OTS). These agencies provide existing award-winning television public service announcements on the following topics:

- Pedestrian education for seniors
- Pedestrian education for the general public
- Pedestrian education for children and their families
- Driver education on pedestrians
- Drivers running red lights

The City of Berkeley can tag each of the television public service announcements with the "Everybody Walks in Berkeley!" message, with the website and phone number for more information. Production of the tags could be accomplished by the City's cable station.

In addition to running the PSAs on local television, the City of Berkeley could provide local movie theatres with the public service announcements to be included as trailers on-screen. Several theatres use slides for community announcements.

Finally, to further utilize television and radio media to promote walking, the City could solicit the interest of local television and radio public service directors to interview a Berkeley spokesperson, such as the City's Bicycle and Pedestrian Planner, to discuss the campaign and the importance of walking as an alternative mode of transportation in Berkeley. The production, arrangement and distribution of public service announcements can be done by either City of Berkeley staff or consultants. In addition, costs associated with production and promotional activities can be offset by sponsors and other funding sources. All activities can be conducted under the supervision of the Transportation Division's Transportation Demand Modeling staff.

7.1.5. Walking Maps and Guides

One of the most effective ways of encouraging people to walk is through the use of maps and guides to show that the walking infrastructure exists, to demonstrate how easy it is to access different parts of the city on foot, and to highlight unique areas or routes such as the Berkeley hills pathways. Several excellent maps are already available that highlight different places to walk in Berkeley. These include:

- Berkeley! Biking and Walking Map -- This map shows the entire cities of Berkeley, Albany, Emeryville, and El Cerrito, as well as North Oakland and South Richmond. The map includes detailed information on many destinations including schools, parks, civic buildings, libraries, key grocery stores and markets, restaurants, and other popular places to walk. Street grades are color-coded so that pedestrians and bicyclists know how steep the streets are.
- Berkeley Pathways Map -- Produced by the Berkeley Path Wanderers Association, this map shows the locations and names of all Berkeley's pathways and stairways. It is an excellent guide for those wanting to explore this unique network of pedestrian facilities in the Berkeley hills.
- East Bay Regional Parks Maps -- the East Bay Regional Parks District produces a variety of maps on local trails within their park system, including maps for Tilden Regional Park.

Related to walking maps and guides are organized walks, which could be based around a specific theme or neighborhood. These types of activities would normally be led by a local non-profit group. For instance, the Berkeley Path Wanderers Group offers guided First Wednesday Walks and Saturday Walks that offer a chance for people to explore a different pathway or walkway of the city, and learn about history, art, etc. Walks can also be self-guided: a local public radio station KQED describes a self-guided walk through Berkeley on their website, the "Julia Morgan Walking Tour," which introduces participants to a variety of buildings designed by architect Julia Morgan. Uniquely themed "walk sheets" could be developed that illustrate sites and routes along specific Berkeley walking routes.

7.1.6. Other Promotions

A variety of other promotions or programs could be implemented to promote walking as an effective, fun and economical way to travel in Berkeley.

A. Commuter of the Month

   Implement a contest for residents and employers to nominate a person who walks and/or uses transit to get around Berkeley. Entry forms available at employer sites, retail sites, churches, and recreation and community centers could promote the contest. Monthly winners could receive prizes that may include gift certificates to dinner, retail stores and merchandise.

B. Murals

Murals have successfully been used to promote ideals and inform the community of important issues. The mural program could solicit help from local volunteers, artists, children, seniors, and other community members. Costs for the production of the murals could be generated by grants through public art foundations or as part of the Berkeley Public Art program.

C. Walk Exhibit

Berkeley could produce a traveling mobile exhibit promoting walking and bicycling. The exhibit could feature the following elements:

- Photo displays of new facilities
- Photos of residents and employees walking
- Walking Maps and Guides

This exhibit could be featured at all community events including the How Berkeley Can You Be? Festival, Juneteenth Festival, Earth Day, Bike to Work Week, and other events. The exhibit could be built to allow assembly and attendance to be done by one person.

D. Event Producers' Obligation

Berkeley could require all community events to promote walking (and bicycling) in all event literature, advertisements and other collateral materials as a mode of transportation to their event. The City could include this requirement as part of the permit process for events.

E. Monthly Events

First Wednesday Walks - The existing Everybody Walks in Berkeley campaign designates the first Wednesday of every month as Everybody Walks day.

Sidewalk Strolls - Organized walks could be implemented for seniors at local centers. The goal of these events could be to generate interest in recreational walking for health reasons with the ultimate goal of promoting walking as a form of transportation.

The production, coordination and implementation of all promotional activities can be done by either City of Berkeley staff or local volunteers. In addition, costs associated with the promotional activities can be offset by sponsors and other funding sources. All activities can be conducted under the supervision of the Transportation Division.

7.2. PEDESTRIAN EDUCATION PROGRAMS

Education can make pedestrians and motorists more aware of potentially hazardous environments and teach them the skills needed to make walking a more effective and enjoyable way to travel. A number of broad-based educational subjects address particular issues, with individual programs that can be tailored around a specific theme or themes.

7.2.1. Safety Education Campaign

A variety of safety education campaigns could be undertaken by the City in order to educate motorists on the rights of pedestrians, and to educate pedestrians on safe behavior. The campaign could include messages on street signage related to speeding, yielding to pedestrians in crosswalks, stopping at stop signs, red light running, or jaywalking. Particular emphasis should be given to the safety of children, seniors and people with disabilities.

Sample messages might include:

- "Save A Life – Your Own. Don't Jaywalk."
- "STOP! It could be someone you love in the crosswalk."
- "Use the other pedal and slow down."
- "Slow Down! It could be someone you love."
- "Want to meet cops? Don't stop for pedestrians in the crosswalk."

Elements of a successful pedestrian education program would include:

Media Coverage and Events, including statements of support from City officials, support of the Berkeley Police Department and development of a press kit outlining the program to get media coverage.

Print Campaign, incorporating the promotional themes in maps, posters, bumper stickers, guides, and television public service announcements.

Street Banners that display a safety message such as "SLOW DOWN" and "Everybody Walks in Berkeley!" Rotating the banner to different neighborhoods on a regular basis can keep the message fresh and reach new audiences.

7.2.2. Enforcement Education

The Office of Transportation should continue to cooperate with the Berkeley Police Department on ways to educate motorists during enforcement of pedestrian violations. This could include distributing materials to motorists on pedestrian rights, benefits of walking, and pedestrian-related traffic code commonly violated, such as coming to a complete stop before making a right turn. Bicycle patrol officers are in a particularly good position to educate pedestrians on safe and proper behavior as part of their routine activities. City staff and the Police Department should coordinate on ongoing programs to encourage pedestrian activity.

7.2.3. Senior Citizen and Disabled Pedestrian Education

This program could include instructors and guest speakers to provide information specific to the needs of the seniors and disabled. Presentations would be conducted by an instructor, either City of Berkeley staff or a consultant, at community centers, churches, clubs, senior citizen centers, physician offices, and hospitals. The presentation could address the sensitive issues of physical limitations of many seniors and the crucial need for them to reach their destinations (e.g. medical appointments, food shopping, etc.).

In addition, presentations can include guest speakers including officials from Berkeley, transit providers, retailers, physicians, and officers from the Police Department. City of Berkeley staff or a consultant can coordinate the participation of guest speakers and identify sponsors and funding sources to offset the costs associated with the presentations.

7.2.4. Teen & Adult Pedestrian Education Video

The program could produce a video and encourage teens and adults to walk for commuting, improved health, and fun. The City could coordinate with the school district to have the video produced as a school project by the Berkeley High School video production class. The video could be made available to employers, recreational centers, libraries, community groups, and Neighborhood Watch organizations. In addition, the video could be made accessible to the general public via the City's website. Existing technology could allow the production of this interactive video to be cost effective and a valuable source of on-going education.

7.2.5. State Parking Cash-Out Education

California State law requires certain employers who provide subsidized automobile parking for their employees to offer a cash allowance in lieu of a subsidized parking space. The purpose of this law is to encourage employees to get to work by alternative modes. However, many employees who use employer subsidized auto parking do not know about this "Cash-Out" program. All employees eligible for subsidized auto parking should be notified of this program. Brochures about this program could be included in employee new-hire packets and distributed at relevant events such as Earth Day or Bike to Work Day.

7.3. SAFE ROUTES TO SCHOOL PROGRAM

Safe Routes to School (SR2S) refers to a variety of multi-disciplinary programs aimed at promoting walking and bicycling to school, and improving traffic safety around school areas through education, incentives, increased law enforcement, and engineering measures. Safe Routes to School programs typically involve partnerships among municipalities, school districts, community and parent volunteers, and law enforcement agencies. SR2S efforts in Berkeley can serve as an important component of the Pedestrian Plan, as they help facilitate the implementation and funding for specific improvements that will help meet the Plan goals of making walking an integral mode of transportation in Berkeley.

Comprehensive Safe Routes to School programs are developed using four complementary strategies, referred to as the "Four Es":

Engineering – Design, implementation and maintenance of signing, striping and infrastructure improvements designed to improve the safety of pedestrians, bicyclists and motorists along school commute routes.

Enforcement – Strategies to deter the unsafe behavior of drivers, bicyclists and pedestrians and encourage all road users to obey traffic laws and share the road.

Encouragement – Special events, clubs, contests, and ongoing activities that encourage more walking, bicycling or carpooling through fun and incentives.

Education – Educational programs that teach students bicycle, pedestrian and traffic safety skills, and teach drivers how to share the road safely.

A fifth "E", Evaluation, is sometimes included in Safe Routes to School programs. Evaluating the success of a program helps to determine which programs are most effective and helps to identify ways to improve programs.

Although most children in the United States walked or biked to school pre-1980s, since then, the number of children walking or bicycling to school has sharply declined. This decline is due to a number of factors, including urban growth patterns, increased traffic, parental concerns about safety, and particularly in Berkeley, the fact that students can attend any school in the city. The situation is self-perpetuating: as more parents drive their children to school, there is increased traffic at the school site, resulting in more parents become concerned about traffic and driving their children to school.

According to a 2005 survey by the Center for Disease Control, parents whose children did not walk or bike to school cited the following barriers:[2]

- Distance to school: 61.5 percent
- Traffic-related danger: 30.4 percent
- Weather: 18.6 percent
- Crime danger: 11.7 percent
- Opposing school policy: 6.0 percent
- Other reasons (not identified): 15.0 percent

A comprehensive Safe Routes to School program addresses the reasons for reductions in biking and walking through a multi-pronged approach that uses education, encouragement, engineering and enforcement efforts to develop attitudes, behaviors and physical infrastructure that improve the walking and biking environment.

7.3.1. Benefits of a Safe Routes to School Program

Safe Routes to School programs directly benefit school children, parents and teachers by creating a safer travel environment near schools and by reducing motor vehicle congestion at school drop-off and pick-up zones. Students who choose to bike or walk to school are rewarded with the health benefits of a more active lifestyle and the responsibility and independence that comes from being in charge of the way they travel, and they learn at an early age that biking and walking can be safe, enjoyable and good for the environment. Safe Routes to School programs offer ancillary benefits to neighborhoods by helping to slow traffic and provide suitable facilities for walking by all age groups. Identifying and improving routes for children to safely walk and bicycle to school is also one of the most cost-effective means of reducing weekday morning traffic congestion and can help reduce auto-related pollution.

In addition to safety and traffic improvements, a SR2S program helps integrate physical activity into the everyday routine of school children. Health concerns related to sedentary lifestyles have become the focus of statewide and national efforts to reduce health risks associated with being overweight. Children

[2] U.S. Centers for Disease Control and Prevention. Barriers to Children Walking to or from School United States 2004, Morbidity and Mortality Weekly Report September 30, 2005. Available: www.cdc.gov/mmwr/preview/mmwrhtml/mm5438a2.htm. Accessed: December 28, 2005.

who bike or walk to school have an overall higher activity level than those who are driven to school, even though the journey to school makes only a small contribution to activity levels. [3]

Core strategies of a Safe Routes to School Program are its educational and encouragement programs. Educational programs serve to identify safe behaviors and encouragement programs can serve to encourage people to bike, walk and drive safely.

7.3.2. Educational Measures

Educational programs can teach pedestrians, bicyclists and drivers safe behaviors and can create awareness of the benefits and goals of a Safe Routes to School program. In developing an educational strategy, each school's stakeholder group should consider **who** the audience is, **when** the education should be delivered, **what** information should be shared, and **how** the message should be conveyed. A summary is provided in **Table 7-1, Safe Routes to School Education Strategies.**

Table 7-1
Safe Routes to School Education Strategies

Strategic Question	Recommendation
Who should receive the message?	Parents, students, teachers, neighbors. All key drivers near the school. Some groups may need special consideration, including families with English as a second language, and visually and hearing impaired people.
When should the education be delivered?	Timing depends on the specific issues noted at each school. Children should receive bicycle and pedestrian safety education before other types of education. If children are already walking or biking in unsafe places, immediate educational efforts may be needed to address the issues.
What message should be delivered? How should the message be conveyed?	The message that should be delivered and the way in which it should be conveyed differs for each group that is being educated. For children, a key message is safety, followed by the benefits of biking and walking to school. Children can be educated through school-based programs such as assemblies, in-classroom instruction and skills practice. Parental involvement is important in educating children. For parents, key messages include the fact that they are role models and teachers of safe behavior, and that they are drivers near the school. Parents can be reached through print materials, school website, media stories, enforcement strategies, and in some cases, training on how to teach bicycle safety to their children. For all drivers near the school and neighbors, key messages include

[3] Cooper A, Page A, Foster L, Qahwaji D. Commuting to school: are children who walk more physically active? American Journal of Preventive Medicine. 2003 November; 25(4):273-6.
Cooper A, Andersen L, Wederkopp N, Page A, Frosberg K. Physical activity levels of children who walk, cycle, or are driven to school. American Journal of Preventive Medicine, 2005 October; 29(3):179-184.

	watching for and yielding to bicyclists and pedestrians, obeying speed limits, stop signs and signals, keeping sidewalks clear and accessible. Neighbors can be reached through media stories, enforcement strategies and signage.

Source: Safe Routes to School Guide, National Highway Traffic Safety Administration, www.saferoutesinfo.org/guide/education/ Accessed February 25, 2006.

Curriculum programs implemented in schools can teach children the basics regarding pedestrian and bicycle safety. Classroom educational materials should be presented in a variety of formats (safety videos, printed materials and classroom activities) and should continually be updated to make use of the most recent educational tools available. Classroom education programs should also be expanded to promote the health and environmental benefits of bicycling and walking. Outside schools, educational materials should be developed for different audiences, including elected officials (describing the benefits of and need for a SR2S program), parents (proper school drop-off procedures, obeying speed limits near school, yielding to bicyclists and pedestrians, and safety for their children) and neighbors (keeping pedestrian ways clear, obeying speed limits, yielding to bicyclists and pedestrians). Educational programs should be linked with events and incentive programs when appropriate, and students should be included in task force activities, such as mapping locations for improvements. Instruction may include:

Pedestrian Safety Topics

- Crossing the street with an adult
- Crossing around school buses
- Driveways and cars backing up
- Understanding traffic signals
- Walking where no sidewalks exist
- Crossing at intersections and crosswalks
- Walking at night
- Using sidewalks
- Crossing around parked cars

Bicycle Safety Topics

- On-bike skills training
- Night riding (clothes, lights)
- Riding on sidewalks
- Riding defensively
- Importance of wearing helmets
- How to adjust and maintain a bicycle
- Rules of the road
- How to negotiate intersections
- Use of hand signals
- Common crash causes

The City may want to consider working with local pedestrian groups (e.g. School Traffic Safety Committees), as well as the school district, to develop a standard safety handbook and make it available to each school in a digital format for customization. Each school should develop a school area pick-up/drop-off circulation map of the campus and immediate environs to include in the handbooks, clearly showing the preferred pick-up, drop-off and parking patterns and explaining in text the reason behind the recommendations. This circulation map should also be a permanent feature in all school newsletters and can be based on maps already created by the city's Traffic Engineering division. More ideas for classroom activities and lessons, including lessons tailored to specific subject areas, can be found through the National Highway Traffic Safety Administration's (NHTSA) website.

7.3.3. Encouragement Measures and Incentives

Encouragement strategies are meant to be fun and are intended to generate excitement and enthusiasm about biking and walking. Encouragement activities can be quick and easy to start and relatively inexpensive. Programs include special events, such as International Walk and Bike to School Day, contests such as a mileage club, and ongoing activities such as a walking school bus. Several encouragement programs are described below. Additional programs can be found in the on-line Safe Routes to School Guide published by National Highway Traffic Safety Administration. (www.saferoutesinfo.org/guide/)

International Walk to School Day is held annually in October. The purpose is to promote health, safety, physical activity, and concern for the environment for students of all ages. The event began in 1997 in the United States and has seen increases in participation since. In 2006, six of Berkley's elementary schools participated in the program. This event can serve as a kick-off event to generate awareness and enthusiasm for the Safe Routes to School program. Schools may find additional information and register for the event at www.walktoschool.org. Schools may also designate additional days or weeks during the school year as special "Walk and Roll to School Days," or may piggyback on an existing day such as Earth Day or Bike to Work Week.

Mileage clubs and contests can be established to encourage children to increase their levels of activity in general, and to walk to school specifically. Children are asked to keep a record of the number of miles they bike or walk. Contests are generally established as an individual child monitoring their progress, as a classroom tracking their combined progress, or as schools competing against each other. Winners are rewarded with gift certificates or prizes. Some programs set up a "Walk Across America" program where children keep track of how far they walk, with the ultimate goal of walking enough distance to walk across America. Other contests and event ideas to encourage bicycling and walking to school include: competitions in which classrooms compete for the highest proportion of students walking or biking to school, themed or seasonal events, and keeping classroom logs of the number of miles biked and walked by children and plotting these distances on a map of California or the US.

Ongoing activities are used to promote biking and walking on a daily or weekly basis. They include programs such as a Walking School Bus, which involves parents taking turns walking (or bicycling in a "Bike Train") with groups of children to school. In areas where students cannot easily or safely walk or bike to school, programs such as "Park and Walk," which ask parents to park at a designated spot and walk their children the rest of the way to school, allow all students to participate. Park and Walk programs also can reduce traffic congestion at schools.

Events related to bicycling and walking should be incorporated into existing curricula when practical. Involving local celebrities or publishing the names of student participants in events can be an effective means of encouraging student involvement. Another key to successful events is promotion. Ensuring that parents are aware of events, whether classroom-specific or district-wide, is key to gaining maximum student participation.

7.4. ENFORCEMENT OF PEDESTRIAN LAWS AND TRAFFIC MOTOR VEHICLE CODE

Targeted enforcement of pedestrian laws should be focused in those areas with high pedestrian volumes or where pedestrians are especially vulnerable. Law enforcement efforts should be scheduled during periods and at locations where motorists and the general public can become aware of pedestrian laws and their penalties. It is recommended that such targeted enforcement occur at least four times per year and last one week. Focused enforcement should also take place at the start of the school year at selected schools near their primary access points for children walking. The Berkeley Police should also be surveyed for input on appropriate educational material, advisory and warning signs, and other tools to help them accomplish their mission. Furthermore, the Berkeley Police Department should continue to produce and distribute informational flyers regarding blocking sidewalks. It is also recommended that double fines be considered for failure to stop at red lights and stop signs. Finally, it is recommended that in the event of a pedestrian fatality or injury, the Police Department and eventually the District Attorney vigorously pursue legal action against the responsible motorist.

Pedestrians are protected in the public right-of-way by the California Vehicle Code, as enforced by the Berkeley Police Department.

7.4.1. Targeted Enforcement

Law enforcement agencies can increase the presence of police near schools, senior centers, social service agency sites, or high-conflict areas in order to curb unlawful behavior. People tend to slow down and improve their driving behavior if they expect law enforcement to be present. These targeted enforcement activities can be effective but are labor intensive in that they require dedication of police officer resources in a single location. In addition, once the targeted enforcement period has ended and motorists realize that the police presence is gone, they may revert to speeding or driving unsafely. Grant funding is available for these types of programs through the California Office of Traffic Safety (http://www.ots.ca.gov).

7.4.2. Crosswalk Enforcement Operation

In a crosswalk enforcement operation, the local police department targets motorists who fail to yield to pedestrians in school crosswalks. A plain-clothes "decoy" police officer ventures into a crosswalk or crossing guard-monitored location, and motorists who do not yield are given a citation by a second officer stationed nearby. Typically, a motorcycle officer issues the citations. The police department or school district may alert the media to the crosswalk enforcement operation to increase public awareness of the issue of crosswalk safety, and news cameras may accompany the police officers to report on the operation.

7.4.3. Radar Trailer

Speed Radar Trailers can be used to reduce speeds and enforce speed limit violations in known speeding problem areas. In areas with speeding problems, police set up an unmanned trailer that displays the speed of approaching motorists along with a speed limit sign. The trailer can be used as both an educational and enforcement tool. By itself, the unmanned trailer serves as effective education to motorists about their current speed in relation to the speed limit. As an alternative enforcement measure, the police department may choose to station an officer near the trailer to issue citations to motorists exceeding the speed limit. Because they can be easily moved, radar trailers are often brought to streets where local residents have complained about speeding problems. If frequently left in the same location without officer presence, motorists may learn that speeding in that location will not result in a citation and increase their speeds.

7.4.4. Neighborhood Speed Watch

In areas where potential speeding problems have been identified by residents, a Neighborhood Speed Watch can be used to warn motorists that they are exceeding the speed limit. A radar unit is loaned out to a designated neighborhood representative to record speed information about vehicles. The person operating the radar unit must record information, such as make, model and license number of offending vehicles. This information is sent to the local law enforcement agency having jurisdiction at the location of the violations, and the department then sends a letter to the registered vehicle owner, informing them that the vehicle was seen on a specific street exceeding the legal speed limit. Letters are typically sent out to those driving at least 5 mph over the speed limit. Although not a formal citation, the letter explains that local residents are concerned about safety for their families and encourages the motorist to drive within the speed limit.

CHAPTER 8

ACCESSIBILITY RECOMMENDATIONS

The City of Berkeley has always been at the forefront of working to improve access for persons with disabilities. Berkeley was the first city in the nation to provide curb ramps for wheelchairs, over 30 years ago. The City has a Commission on Disability, and a long-standing Disability Compliance Program within Public Works that is charged with the implementation of the necessary infrastructure to provide access to the disabled and ensure the City is in compliance with the mandates of the Americans with Disabilities Act (ADA). As a result of its ongoing efforts, the City of Berkeley was recently named the "Most Accessible City in the Nation" by a panel of disability advocates and experts.

Yet as standards have evolved over time, some of the earlier accessible facilities, including curb ramps, are in need of retrofitting or replacement. It is this replacement process and the process of ensuring that the remaining areas without facilities are addressed that is the focus of this chapter.

8.1. EXISTING PROGRAMS

8.1.1. CURB RAMP INSTALLATION AND RETROFIT

The City of Berkeley has dedicated approximately $250,000 annually to specifically address curb ramp installation and the retrofitting of ramps that are no longer compliant with ADA design standards. (Current ADA standards for curb ramps – including slopes, landing dimensions and tactile surface requirements – are discussed in Appendix B: Pedestrian Design Guidelines.) At current design and construction costs, this funding allows for the installation of approximately 100 curb ramps annually. Many of the City's newer existing ramps were installed when the requirement for the placement of truncated domes on ramp surfaces was temporarily suspended by the ADA Access Board, a suspension which expired in 2001. Consequently, while ramps are generally up to current code requirements for slopes and landing dimensions, required tactile domes are now being added as a component of overall right-of-way improvement projects.

In future years, the process for choosing which ramp locations are retrofitted to achieve current ADA standards is likely to shift away from a process of selecting stand-alone projects, and toward one which folds ramp retrofitting into larger scale public works projects focusing on maintenance and upgrades to street infrastructure and pedestrian facilities. While not driven solely by the need for improving access for the disabled, this process has the advantage of incrementally adding the curb ramp improvement into the cost of projects already being undertaken by the Berkeley Public Works Department and therefore being more cost effective than constructing stand-alone ramp improvements.

In fiscal year 1986-87, the City started a long range Spiral Sidewalk Replacement Program, which is designed to implement sidewalk repairs in a spiral pattern outward from the City Hall to the City limits. Repairs are performed annually within areas specified by the program. Outside of the areas scheduled under the Spiral Sidewalk program are many severely damaged sidewalks which cannot be effectively addressed by patching the sidewalk area with asphalt concrete. Starting in fiscal year 1989-90, additional funding was provided on an annual basis for such repair work under the Emergency Sidewalk Project.

The City of Berkeley has adopted a policy by which the City repairs (at the City's expense) sidewalks and driveways damaged by the growth of street-tree roots. Damages due to other causes remain the abutting property owner's responsibility to repair, in accordance with the California Streets and Highways Code.

8.1.2. TRANSIT ACCESSIBILITY

AC Transit maintains a bus fleet equipped with accessible features in accordance with ADA requirements. Persons with disabilities and seniors citizens in Berkeley also have access to four supplementary paratransit services for increased mobility opportunities:

- East Bay Paratransit/ATC Tickets are offered in limited numbers to residents certified by East Bay Paratransit as meeting ADA criteria
- The Wheelchair/Van program provides a limited number of free van vouchers and/or free taxi scrip to wheelchair users needing wheelchair-accessible van service for rides that are unavailable in the current range of services provided by East Bay Paratransit/ATC. These services are available to those needing wheelchair lift accommodations and certified by East Bay Paratransit.
- The Taxi Scrip Program offers a limited amount of free scrip to pay for rides on conventional taxicabs, wheelchair-accessible taxicabs, vans, and other selected vehicles. Service is limited to those who meet both the criteria of being 70 years of age *and* are living on an income that is 30 percent or less than Area Median Average
- Medical Return Transportation Improvement Program (Mr. Trip) provides limited subsidies for taxicab or van rides to those returning from a health related appointment and is available to participants of the Wheelchair/Van Program and the Taxi Scrip Program

8.1.3. BERKELEY DISABILITY COMPLIANCE PROGRAM

The Berkeley Disability Compliance Program (BDCP) was initially established in the 1980s to implement the federal accessibility requirements of Section 504 of the Rehabilitation Act of 1973, a predecessor to the ADA. The BDCP is administered through the City's Public Works Department. When issues pertaining to disability access are brought forward to council members or others working for the City of Berkeley, they can refer the concern directly to the BDCP to be addressed. Once an issue has been brought forth, it is entered into the City's internal tracking database. This system of reporting and tracking helps ensure that issues are followed through to their completion. Unfortunately, the database lacks the capability to identify problems by type and to afterwards programmatically track trends.

8.2. POLICIES

8.2.1. RIGHT OF WAY ENCROACHMENT

In addition to those policies that form the basis for establishment of the programs previously noted, the City of Berkeley Municipal Code Section 16.18, Right of Way Encroachments and Encroachment Permits, regulates public rights of way. This policy seeks to maintain pathways clear of encumbrances and mandates that those responsible for the placement of barriers in the public right of way remove them. This policy is applicable to both public and private entities, including utility agencies, which are one of the primary users of the public right of way both above ground and underground.

In many cases problems result simply from lack of care or maintenance by private residents – garbage bins blocking the sidewalk and overgrown landscaping are amongst the major pedestrian and ADA barriers generated by the private sector. Despite periodic notices sent out to Berkeley residents reminding them of proper placement of garbage and recycling containers, the overall enforcement of maintaining and increasing accessibility with this method generally does not happen due to lack of assigned resources. Given other enforcement priorities, the City is generally passive in its enforcement of this policy and is dependent upon an active citizenry to respond to and report infractions. Accordingly, easily remedied situations often go uncorrected until complaints are registered. Enforcement typically comes as a result of complaints filed with the BDCP directly or reported to the various City departments or City Council and then forwarded to BDCP. Infractions to the public right-of-way can be reported to the Office of Transportation at 510-981-7010.

8.2.2. PROJECT DEVELOPMENT OVERSIGHT

City of Berkeley policy requires major projects of all types to pass through the BDCP office as part of the overall project development review process. The BDCP office is empowered to approve the project as compliant with ADA mandates or to suggest project revisions. In many cases this is the only opportunity for BDCP staff to review a project prior to implementation, with the next opportunity for input generally occurring at the time of project walk-through or site inspection. This has sometimes resulted in the need to retrofit a nearly-complete project if originally suggested conformance revisions were not implemented or if changes made to the project after BDCP review result in non-compliance with ADA.

8.3. CONDITIONS

Not including the Berkeley Hills, ADA accessibility on Berkeley streets is over 90 percent compliant with only small pockets remaining to be brought up to ADA standards. These areas include: Bateman Street, Virginia Gardens and portions of the area bounded by San Pablo Avenue, Cedar Street, Sixth Street, and Gilman Avenue. The Berkeley Hills have a large area of non-compliance due to topography, discussed below.

8.3.1. NON-COMPLIANT AREAS

Virginia Gardens, near the North Berkeley BART Station, and Bateman Street, near Alta Bates Hospital, are both very narrow streets with three foot wide sidewalks. These sidewalks provide access to those living along the streets, but otherwise do not serve as connectors in the larger street network. Upgrading these small streets to ADA standards given the current street right of way is not likely without the residents providing an easement solely for that purpose, and at present there is no foreseen resolution to bringing these small, one-block segments into compliance. Several areas in the section bounded by San Pablo Avenue, Cedar Street, Sixth Street, and Gilman Avenue have no sidewalks whatsoever, a vestige of a previous era when this was primarily an industrial area. Plans are currently being developed by the Public Works Department to install ADA compliant pedestrian facilities in this area.

8.3.2. BERKELEY HILLS

The northeast Berkeley Hills, particularly the area east of Grizzly Peak and between Shasta and La Loma east of Euclid Street, is the largest geographic area in Berkeley that lacks pedestrian and ADA facilities. The steep topography and the narrow winding streets built before ADA requirements provide limited opportunity to construct standard curbs, gutters and sidewalks with curb ramps on many segments. The City has installed sidewalks and ADA curb ramps along most of the major roadways in the hills, including Spruce, Euclid and Marin. Many of the local roads adjacent to these streets have sidewalks, as well. However, for many of the minor side streets in the eastern parts of the hills, full sidewalk and curb ramp upgrades are not feasible.

One important note regarding the Berkeley Hills is the presence of the historic pathway and step network, which provides routes of direct pedestrian access down from the hills to the flatlands. These pathways serve as important pedestrian access facilities, and are acknowledged to be important emergency evacuation routes from the hills. However, most of these historic pathways are wood or concrete staircases that are not ADA compliant and it would be infeasible to make them ADA compliant. For persons with disabilities, it is important that other means of access to the hills are available, including transit/paratransit, and that large-scale Berkeley Hills emergency evacuation plans include provisions to provide transportation for those with disabilities or who are otherwise unable to use the pathway network.

8.4. RECOMMENDATIONS

8.4.1. THE BERKELEY PEDESTRIAN MASTER PLAN PROJECTS

This document, the Berkeley Pedestrian Master Plan, has a number of high-priority, site-specific projects designed to increase the safety of pedestrians traversing Berkeley City streets, discussed in Chapter 6. In addition to these specific projects, this Master Plan identifies accessibility and safety deficiencies at intersections on all the City's major streets as part of a comprehensive program to improve conditions along these thoroughfares. Specific, consistently applied elements of this program include:

- ADA compliant curb ramps
- Truncated tactile domes and advance stop bars at all regulated intersections
- Countdown pedestrian signals at signalized intersection
- High visibility crosswalks and warning signage at uncontrolled intersections
- Bulbouts to reduce crossing distances and serve as traffic calming measures
- Installation and standardization of Accessible Pedestrian Signals (APS)

The implementation of the High Priority Projects at these major pedestrian activity sites, comprising the vast majority of such sites within Berkeley, will result in an enhanced pedestrian environment for all Berkeley residents, including persons with disabilities.

8.4.2. BERKELEY PUBLIC WORKS AND PLANNING STAFF ADA TRAINING

As the department responsible for the implementation of all infrastructure, including accessibility measures, the Berkeley Public Works Department is a critical player in ensuring that the City of Berkeley is moving towards full compliance with ADA requirements. The Planning Department plays an equally important role in ADA compliance in terms of development review and municipal code compliance. In order to ensure that Public Works and Planning staff are fully versed in ADA compliance, it is recommended that all engineers and planners with duties that include public rights of way infrastructure, plan review and code compliance, undergo ADA facilities training. A training session to familiarize staff with key issues and concerns of access for the disabled community would go a long way towards proactively identifying barriers, and assist staff in the field with identifying these barriers. This would include but not be limited to, specific infractions of the City of Berkeley Municipal Code Section 16.18, Right of Way Encroachments and Encroachment Permits. The assessment portion of this program would be minimal in terms of time requirements after initial training, as it would only necessitate that staff be observant of barriers while in the field, recording and passing on that information to the Berkeley Disability Compliance Program for resolution.

8.4.3. TRACKING PROGRAM

An important tool that could help shape future programs and policies aimed at providing greater access for the disabled community within Berkeley would be a tracking system to monitor ongoing compliance efforts, issues resolution and other trends. Several options are possible for developing such a tracking system.

- An independent tracking system administered through the Berkeley Disability Compliance Program. This system would assist in a detailed programmatic approach to addressing issues such as installation of upgraded facilities, as well as items that are encroaching onto the sidewalk through-zone. Similarly, this program could monitor problematic infrastructure installation by utilities or City agencies to ensure that all new and replacement infrastructure is conducive to and enhances accessibility.
- Modification of the current internal city tracking system to enable type- and issue-specific categorization and searches.
- Adding to the functionality of the system to allow ongoing tracking of trends. The added benefit of this recommendation is that similar tracking opportunities would be available to other City of Berkeley departments and programs.
- A combination of the above options which would feed more robust data into a tracking system managed by the Berkeley Disability Compliance Program.

8.4.4. EXPANDED BDCP PROJECT OVERSIGHT

The project oversight function performed by the Berkeley Disability Compliance Program is critical to ensure that projects are compliant with ADA requirements. In order to improve this oversight, it is recommended that specific guidelines be developed for thresholds of project review triggered by specific type and size of projects. Furthermore, additional review of projects when revisions are recommended by the Berkeley Disability Compliance Program would ensure that revisions are followed appropriately, and allow re-review if changes are made to an originally approved project.

8.4.5. BERKELEY HILLS ACCESS PROGRAM

The Berkeley Hills would benefit from an expansion of the Berkeley Paratransit Services for Senior Citizens and Persons with Disabilities. Providing eligible residents of the Berkeley Hills area with a greater level of service would potentially offer mitigation to the current ADA deficits in the Berkeley Hills area and would, in all probability, be more cost effective and less contentious than building sidewalks along all roadways. Alternatively, a hybrid solution that would provide enhanced paratransit services while also upgrading several key corridors within the Berkeley Hills to ADA standards would provide greater mobility options for all Berkeley Hills residents.

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CHAPTER 9

ZONING AND DESIGN REVIEW RECOMMENDATIONS

The amount of walking in any city is related primarily to its mix and density of land uses, along with urban design features within the public right-of-way. In Berkeley, as in other cities, land use and urban design is guided by the General Plan and related documents such as the Zoning Ordinance. A community's land use and development code can be structured to ensure the creation of an excellent pedestrian[1] environment. An efficient policy and code system can help reduce reliance on the automobile, encourage alternative modes of transportation, improve the pedestrian environment and increase safety. Ensuring a pedestrian friendly, compact, walkable community requires a dense mix of land uses, ample access to services and good transit opportunities.

This chapter provides an overview of Berkeley's existing Zoning Code and Design Review Guidelines and recommends potential amendments to these documents that would increase the pedestrian-focus of new developments and existing developments that are being modified. As the City of Berkeley continues to build and enhance its pedestrian environment, specific zoning solutions to enhance the pedestrian environment should be included in updates and revisions to the land use element, circulation element, zoning code, engineering standards, and design guidelines and applied at the site design review level to new development, redevelopment and capital improvements.

9.1. REVIEW OF EXISTING ZONING

Berkeley's zoning code has many of the elements needed to produce a pedestrian-friendly environment. Title 23 contains the Zoning Ordinance within the Municipal Code and includes several requirements affecting new development and the pedestrian environment:

- Zoning Code 23E.08.010 Establishes a design review for all non-residential uses to "Encourage excellence in design and to ensure that new construction and alterations to existing buildings are compatible with the best elements of the existing character of the area, in order to provide a pleasing urban environment for Berkeley residents, pedestrians and building occupants"
- The Zoning Code contains designations for several Zoning Districts that support pedestrian use, including a mix of uses, multi-family residential, and commercial zoning districts for Shattuck Avenue, Telegraph Avenue, Solano Avenue, West Berkeley, and Central Berkeley. Certain non-residential neighborhood amenities are allowed in residential areas (e.g. parks, libraries, schools, community centers) with increased uses allowed in higher residential zones.
- Zoning Code 23E.28.140 allows reductions in off-street parking requirements for commercial and manufacturing uses located near transit or a public parking lot, for neighborhood-serving commercial and for locations where there is sufficient on-street parking.

[1] The term "pedestrian" refers to a person moving from place to place, on foot and/or with the use of an assistive mobility device (when that person has a disability and/or medical condition). "Walking" or "to walk" are the terms used to describe this movement of a pedestrian.

- Zoning Code 23E.24 outlines requirements for issuance of an Authorized Use Permit for Sidewalk Café Seating. Sidewalk Café Seating is not permitted unless an AUP is issued. Sidewalk seating should allow a 6-foot minimum horizontal clear space.
- Zoning Code 23E.26 outlines requirements for placement of sidewalk benches and planters, including the requirement to maintain a 6-foot minimum horizontal clear space.

9.2. DESIGN REVIEW

All projects in non-residential districts in the City of Berkeley and commercial and mixed-use projects within the R-4 District are required to undergo Design Review before permits can be issued. Design review for projects that affect historic landmarks is conducted by the Landmarks Preservation Committee and design review for other projects is conducted by the Design Review Committee. The intention of Design Review is to encourage design excellence, ensure that new development and alterations are in character with an area, and to provide a pleasing environment for residents, pedestrians, and building occupants. The Design Review process does not focus on land use issues, but rather design issues.

Design Review Guidelines include requirements for building and parking siting, street facades, landscaping and open space, and circulation. Pedestrian-related elements of the Design Review Guidelines are listed in **Table 9-1, Pedestrian-Related Design Review Guidelines**.

Table 9-1
Pedestrian-Related Design Review Guidelines

Guideline	Number	Text
A. Building and Parking Siting	A.1.b.	For usual lot shapes and locations, the building footprint should allow for corners and spaces that can be used by pedestrians.
	A.1.c.	Whenever possible parking should be behind buildings, underground, or in a central court.
	A.3.	Conflict with pedestrian circulation should be prevented by the proper location and design of auto entrances.
B. Street Facades	B.2.	Street facades in general and the ground floor level in particular should include elements of pedestrian scale and three-dimensional interest.
	4.b.	Secondary building accessories such as garbage receptacles, utility meters and mechanical and electrical equipment should be screened from the view of pedestrians.
	B.7.	Large, unarticulated expanses of any particular wall material that deaden the pedestrian environment should be avoided. The use of clear windows for ground floor retail project is encouraged. Walls designed to allow sitting areas for pedestrians or space for landscaping and artwork are encouraged, especially in areas of heavy pedestrian use. Landscaping and/or artwork should be maximized if large expanses of wall must be left devoid of openings.
C. Landscaping and Open Space	C.2.	The provision of planters, trees, ground covers, and shrubs with automatic watering systems is encouraged where they do not impede pedestrian movement and where the building owner and/or tenant will provide continuing

Guideline	Number	Text
		maintenance.
	C.3.	Sidewalk areas should include landscaping that is coordinated with the neighborhood design. The consistent use of one species of tree along a street or block is encouraged. Paving materials may be varied but must create a pattern that is sensible in terms of cues for people who have visual impairments.
	C.4.	If parking is not placed underground, behind buildings, or in interior courts, it should incorporate adequate landscaping or artwork for visual screening. Screening should not interfere with pedestrian safety. When adjacent to public sidewalks, parking areas should include walls, beaming, artwork, or shrubbery that is at least three feet, but no more than four feet, in height between the sidewalk and the first row of parked cars. Parking areas should include setbacks for landscaping and/or artwork to minimize visibility of parked cars, especially from the street.
	C.5.	The inclusion of public open spaces is encouraged as a means of providing places for people to come together for community interaction and enlivening the pedestrian environment. These spaces should be wheelchair accessible and the entrances should be visible from the street. Such amenities as artwork, patios with benches, fountains with nearby sitting areas, and interior courtyards are encouraged. These open space areas should be located to take advantage of winter and afternoon sunlight, and to protect from prevailing winds. Roof plazas and gardens are encouraged.
D. Circulation	D.1.	Shared parking facilities are encouraged whenever possible to minimize the number of curb cuts. Driveways should be designed to have minimum interference with pedestrian traffic flow.
	D.2.	Pedestrian paths and arcades interior to the block that join different parts of buildings as well as different streets are encouraged. These paths should be lighted, should not contain blind corners, and should be marked for a clear understanding of direction and destination points. Entry points to the pathways and arcades should be defined by architectural elements such as gateways, change in paving materials, signage, and artwork.
	D.3.	Entrance points should be clearly defined and easily identifiable by pedestrians via appropriate locations and elements such as awnings, signage, artwork, or changes in paving material to define the entry point. Buildings on corner lots are encouraged to incorporate a cut away entrance to improve visibility and pedestrian circulation.
	D.4.	Where appropriate, remodeling of adjacent transit loading points may be desirable. Transit loading points should be designed to provide protection for transit users in inclement weather. Adequate room should be provided for transit loading so that pedestrian traffic is not interrupted.
	D. 5	All pedestrian drop-off zones should have curb ramps in association with the zone to allow a person using a wheelchair access to the sidewalk from the street as required by code.

9.3. COMPARISON WITH OTHER CITIES

Land use patterns in Berkeley are the result of a combination of history, geography, and past planning efforts. Berkeley's pedestrian-oriented structure developed during the streetcar era, and the preservation of its pedestrian-friendly structure is largely the result of specific planning and urban design efforts by the City to preserve and enhance the pedestrian environment. Berkeley's zoning code compares favorably with other pedestrian-oriented codes, such as Portland, Oregon, and San Diego. Portland completed one of the first and most comprehensive pedestrian plans in the late 1990s. San Diego completed a pedestrian guideline plan in 2001.

Portland suggests limiting the provision of parking to support alternative transportation and efficient use of land, while San Diego offers reductions in parking requirements if bicycle parking is provided. Portland allows for a reduction in parking for transit-proximate land uses. Berkeley includes parking reductions for projects located near transit, residential projects for seniors, and for certain neighborhood-serving retail uses.

Portland provides incentives for and regulations of sidewalk activities such as cafes and vendors. Berkeley allows sidewalk activities such as sidewalk sales and café seating. Berkeley's zoning code requires that café seating be authorized by an Administrative Use Permit (AUP) that it would not interfere with pedestrian traffic or with public employee access to street hardware. An AUP may be denied if sidewalk seating would not leave a minimum horizontal clearance of six feet. Berkeley should provide incentives for sidewalk seating, or expedited review for certain zoning districts.

Portland has regulations that allow for special setbacks to increase visibility and safety of pedestrians and motorists, improve the appearance of the corridor and reduce visual clutter. Berkeley's setbacks are specific to each Zoning District and range between 10 to 20 feet. Berkeley should include exceptions to these setbacks as Portland has done.

9.4. REQUIREMENTS AND INCENTIVES

As part of the General Plan update process, the city should include new incentives and requirements to help ensure that new development or redevelopment projects include pedestrian features and design elements identified in the Pedestrian Master Plan. For example, the City may allow reduced parking requirements for specific development types or in areas in exchange for contributions to pedestrian improvements both on and adjacent to the development site. The City should continue to review potential impacts to pedestrians as part of the development review and CEQA process, and ensure that adequate provisions and mitigations are provided that are consistent with the city's goals and policies.

9.5. POTENTIAL ZONING ENHANCEMENTS

The above excerpts from Berkeley's Zoning Code and Design Guidelines highlight some of the ways pedestrian amenities are currently provided. Table 9-3, **Potential Zoning and Design Guideline Enhancements**, provides recommendations for improving Berkeley's Zoning Code and Design Guidelines. The following concepts are drawn from a variety of published sources and represent elements that help make a new development project pedestrian-friendly. The recommendations are intended to supplement, not replace, Berkeley's existing Zoning Ordinance and Design Guidelines.

Table 9-2 Comparison of Pedestrian Zoning Elements provides a comparison between pedestrian-related zoning elements in Berkeley, Portland and San Diego.

Table 9-2
Comparison of Pedestrian Zoning Elements

Pedestrian Zoning Elements	City		
	Berkeley	Portland	San Diego
Blocks	Block size is not addressed by the zoning code.	Requirements regulate the amount and location of open areas and walkways on large commercial sites where streets have been vacated. The intent is to promote a pleasant and convenient walkway and open area system on the superblock that links to the adjacent buildings, to the public circulation system and to any available public transit. The requirements also promote the maintenance of light, air and access that could be lost due to development on the vacated street.	Requirements regulate block length and frequency for pedestrian connections in both pedestrian-supportive areas and areas outside the central pedestrian-supportive core.
Streets	Street design is not addressed by the zoning code.	Code contains design suggestions that aim to promote vehicle areas that are safe and attractive for motorists and pedestrians.	Requirements address street design for pedestrian-friendly environments by regulating speed limits, auto lane widths, bike lane widths, pedestrian walkway widths, curb radii, ped crossing design along with signage, refuge islands and curb cuts. Code contains general requirements for street tree planting.
Parking	In residential areas, a 75 percent off-street parking reduction is permitted for senior group housing. Parking reductions are permitted for commercial and manufacturing uses that are proximate to transit stops, near a publicly owned parking lot, for neighborhood-serving commercial, or if sufficient on-street parking is available during business hours. Additionally, the parking reduction must either support alternative transportation or	Code suggests limiting the number of parking spaces allowed to promote efficient use of land, enhance urban form and encourage use of alternative modes of transportation, which provides for better pedestrian movement, and protects air and water quality. Code offers incentives for reduced parking in exchange for pedestrian and transit supportive amenities or increased bicycle parking. Code also addresses shared parking requirements,	Requirements include allowing bicycle parking in lieu of automobile spaces and requiring businesses to provide shower facilities for employees who choose to commute via bicycle. Code also addresses extended no-parking zones for pedestrian visibility and strict requirements for parking lot pedestrian paths, landscaping and screening.

Pedestrian Zoning Elements	City		
	Berkeley	**Portland**	**San Diego**
	be complemented by a transportation demand management strategy. Parking reductions require the issuance of an AUP. Payment of an in-lieu parking fee is permitted for areas with a public parking fund.	short and long-term bicycle parking facility design, construction, and security.	
Transit	In commercial and manufacturing districts, minimum off-street parking requirements can be reduced for uses located within 1/3 mile of a transit stop.	Requirements waive minimum off-street parking requirements for areas proximate to transit to promote pedestrian activity. Requirements address designated transit lanes.	Code suggests basic radii between transit stations.
Sidewalks	Includes regulations for allowing sidewalk café seating and sidewalk sales. A 6-foot minimum horizontal clearance is required. Sidewalk design is not addressed by the zoning code.	Includes regulations for allowing sidewalk cafes and sidewalk vendors (kiosks).	Requirements regulate basic widths of pedestrian walkways and include details for ADA compliant sidewalks.
Building Site Design	Minimum building setbacks, minimum lot sizes, and required yard frontages are designated by District. Accessory dwelling units are permitted by right, and must be authorized by a use permit. The zoning code restricts fencing height and type, (varies between 4'-6; depending on district). Height restrictions vary by district from 2 stories in single-family residential to 6 stories in the downtown area. Most height restrictions are 3 stories. Higher stories are required to have a larger setback from the street. Berkeley's zoning code has a provision for design review to ensure that new construction and alterations to existing buildings "provide a pleasing urban environment for Berkeley pedestrians"	Regulations allow for special street setbacks that aim to increase visibility and safety for pedestrians and drivers, provide a pleasant pedestrian environment and human scale, improve the appearance of the corridor and reduce visual clutter, maintain adequate space for the growth of large street trees, and maintain adequate light and air.	Requirements regulate maximum setbacks and minimum street frontages for all zoning designations.

Table 9-3
Potential Zoning and Design Guideline Enhancements

Zoning and Site Design
– Requirements: The impact assessment of any new project should include an assessment of pedestrian trip generation, an assessment of proportional financial responsibility for pedestrian improvements identified in the Pedestrian Master Plan both within and adjacent to the community, and linkages to transit. – Zero Lot Lines: New buildings should be located directly on sidewalks (zero front lot line) in the downtown and higher density commercial zones. – Building Entrances: Main entries should be located on the major abutting street rather than a parking area. – Landscaping: Proposed landscaping should be designed so as not to uproot sidewalks or obscure visibility especially at driveways and intersections. Trees of heights and patterns complimentary to pedestrians—including providing shade and adequate vertical clearance—should be used. – Sight Lines: Ensure unimpeded pedestrian and motorist sight lines by enforcing the maintenance and appropriate placement of shrubbery and other visual obstacles. – Amenities: Larger projects with pedestrian areas should provide benches, seating areas, access to restrooms, strategically located garbage receptacles, and fully screened garbage bins. – Vertical Expansion: Encourage vertical expansion to increase floor area and provide opportunities for large retailers. – Pedestrian Lighting: For new developments, pedestrian-scale lighting should be provided adjacent to the project and within the parking area. – Special Pedestrian Zones: In pedestrian activity zones including Downtown but also transit nodes and other locations, provide special paving to alert and guide people, enhanced protection at busy crossing locations, expanded drop-off and transit zones, special signing to guide and inform visitors, street names engraved into the sidewalk, and the use of special events and street closures.
Circulation and Parking
– Continuous Walkways: All new development projects should provide continuous passages for pedestrians wherever possible and needed. – Public Buildings: All new and rehabilitated public buildings in Berkeley, including schools, should include adequate pedestrian access and internal circulation, and proportional contribution to pedestrian improvements on immediate access routes. – Parking Lots and Pedestrian Access: Pedestrian access should be provided through parking lots on delineated walkways, providing a direct connection to public streets and transit stops. Orient parking aisles towards the main building entrance so pedestrians do not need to cross multiple aisles. Provide raised crosswalks in larger parking lots to help slow traffic and alert motorists. Provide adequate lighting and drainage. – Barriers: Ensure there are no physical barriers to pedestrian circulation or access. – Site Access and Driveways: Driveways should be located away from existing intersections to provide sufficient visibility for and of pedestrians. Plan reviews should include traffic calming at commercial driveways. – Parking Queues: Ensure that parking lots and garages provide sufficient queuing area and an adequate operating system to minimize vehicles stopping on sidewalks, and adequate sight distance for vehicles leaving these facilities. – Parking Location: Parking should be located on the side or behind new buildings, not in front of them. Structured parking should be located below grade if possible, or provide ground floor retail or other uses. – Loading Docks: Freight access to a building should be located away from pedestrian walkways. – Drop-off Zones: Provide adequate pedestrian drop-off (No Parking) zones directly in front of a building's main entrance, including curb ramps that allow wheelchair access to the sidewalk as required by City code.

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CHAPTER 10

IMPLEMENTATION AND FUNDING

This chapter focuses on implementation and funding for the Pedestrian Master Plan[1]. This plan sets out an ambitious list of projects to be implemented over the next 20 years.

10.1. ROLE OF PEDESTRIAN MASTER PLAN

The Pedestrian Master Plan and future updates should serve as the primary guide in the allocation of capital, maintenance, administrative, and matching funds. The Plan is also designed to provide staff and the public with flexibility as opportunities and needs arise.

The Pedestrian Master Plan will be updated every five years as needed to reflect changes in needs and conditions. As part of this update, information on cost, feasibility, need, and other items should be included in the analysis of priorities and identification of projects.

10.2. CAPITAL IMPROVEMENT PROGRAM

Pedestrian projects and enhancements identified in this Pedestrian Master Plan and in future revisions should be included in the City's Capital Improvement Program. This may be accomplished by a combination of funding capital and maintenance efforts, providing matching monies for competitive grants, and/or integrating pedestrian features into larger public projects. The City's Bicycle and Pedestrian Planner should continue to evaluate pedestrian complaints and make recommendations for improvements.

The City will actively seek competitive grant sources and allocate adequate matching monies to implement pedestrian projects. In particular, funding sources outside of the Street Rehabilitation Program should be secured.

10.2.1. COST ELEMENTS

A summary of projected cost estimates is presented in the following tables. Each of the major programs is presented in a separate table, along with an estimate of the capital or annual cost. All cost estimates are capital costs at a planning level and the amounts are subject to further refinement once feasibility and engineering work has been completed, or as budget conditions change within the City.

Pedestrian unit costs are presented in Table 10-1. These costs are the basis for the planning-level cost estimates used in the following tables. Cost estimates are in 2007 dollars.

[1] The term "pedestrian" refers to a person moving from place to place, on foot and/or with the use of an assistive mobility device (when that person has a disability and/or medical condition). "Walking" or "to walk" are the terms used to describe this movement of a pedestrian.

Table 10-1
Pedestrian Improvement Basic Unit Costs

Item	Unit	Unit Cost
Add Striping	LF	$2
Bench	EA	$2,000
Bulbout - Additional installments at intersection	EA	$50,000
Bulbout - First installment at intersection	EA	$100,000
Bus Stop (Shelter, Bench, Curb Cut, Bus Pad)	EA	$40,000
Class I Path Construction	LF	$100
Concrete Planter Bollards	EA	$200
Concrete Sidewalk/Island	SF	$9
Countdown Signal Heads	EA	$800
Crosswalk - High Visibility	EA	$1,200
Crosswalk – In-Pavement Flashing Lights	EA	$75,000
Crosswalk - Transverse	EA	$500
Curb & Gutter	LF	$35
Curb Ramp Retrofit (diagonal, per corner)	EA	$2,000
Curb Ramp Retrofit (perpendicular, per corner)	EA	$5,000
Lighting, In-pavement luminaires (includes electric service)	EA	$2,050
Lighting, Pedestrian-scale lighting mounted on existing cobra head (includes electric service)	EA	$1,528
Median Nose Addition	EA	$1,400
Median Nose Reduction	EA	$2,000
Mid-block crossing barrier	LF	$30
Move Traffic Signal	EA	$200,000
Parking Restrictions -- Red Curb	EA	$20
Ped Push Button	EA	$800
Ped Signal, Audible	PER CORNER	$1,000
Pedestrian Median Refuge Island	EA	$30,000
Pedestrian Scramble	EA	$50,000
Pedestrian-scale Lighting	LF	$250
Reduce Curb Radii – Additional installments	EA	$30,000
Reduce Curb Radii – First installment	EA	$80,000
Remove Curb	LF	$4
Remove Striping	LF	$1
Resurface Sidewalk - 5' Wide	LF	$40
Sidewalk - 10' Wide	LF	$90
Sidewalk - 5' Wide	LF	$45
Sidewalk Widening	LF	$46
Signs, In-Pavement Yield to Pedestrian Signs	EA	$200
Signs, Overhead Beacon	EA	$50,000
Signs, Speed Feedback	EA	$10,000

Item	Unit	Unit Cost
Signs, Warning	EA	$200
Stop Limit Bars/ Yield Teeth (per lane)	EA	$300
Trash Receptacle	EA	$1,200
Trees	EA	$800
Truncated Domes (retrofit plastic)	EA	$800

10.2.2. CITYWIDE PROJECT COSTS

Costs for the citywide projects are shown in Table 10-2. Costs are shown for the total improvements recommended in the plan, and then an average cost over 20 years is shown. Some of the lower cost improvements such as signage and crosswalk restriping would likely be done in a phased corridor approach in less than 20 years. The total cost for the citywide projects is estimated at approximately $5.6 million, with the high costs attributed to the Perpendicular Curb Ramp projects, Truncated Dome Retrofit projects, Class I Multi-Use Trail projects, and Sidewalk Infill projects.

Table 10-2
Citywide Project Costs

Project Category Name	Total Cost	Average Annual Cost over 20 Years
Sidewalk Gap Infill	$1,660,968	$83,048
Perpendicular Curb Ramp Retrofit	$895,000	$45,000
ADA Truncated Domes Retrofit	$639,200	$32,000
Crosswalk and Warning Signage Improvements	$39,000	$1,950
Signal Timing Adjustments	No Capital Cost	N/A
Countdown Signal Installation	$97,600	$4,880
Audible Signal Installations	$63,000	$3,100
High Visibility Crosswalk Markings	$199,200	$9,960
Parking Restrictions (Red Curbs)	$109,440	$5,472
Speed Feedback Signs	$70,000	$3,500
Historic Pathway Projects	$232,000	$11,600
Class I Multi-Use Path Projects	$1,575,000	$78,800
Stop Bars at Signalized Intersections	$104,400	$5,220
TOTAL COST CITYWIDE PROJECTS	**$5,684,808**	**$284,530**

10.2.3. PRIORITY INTERSECTION, CROSSWALK AND CORRIDOR PROJECT COSTS

Costs for the intersection, corridor and standalone projects are presented in Table 10-3. The total cost for these improvements is estimated at $9 million. The costs for these major projects may vary considerably depending on a variety of conditions and assumptions. Further feasibility and design work are required to refine these estimates.

Table 10-3
Priority Intersection and Corridor Project Costs

Project Number	Location	Project Type	Project Cost
1	University from San Pablo to 6th Street	Corridor Improvement	$552,000
2	University and Shattuck	Intersection Improvement	$24,200
3	Ashby BART Station Improvements	Safe Routes to Transit	$445,600
4	Sacramento from University to Addison	Corridor Improvement	$634,800
5	Acton from Addison to University	Corridor Improvement	$265,000
6	Martin Luther King Jr. Way from Allston to University	Corridor Improvement	$626,000
7	University and Milvia	Intersection Improvement	$100,000
8	Ashby from California to San Pablo	Corridor Improvement	$420,700
9	Alcatraz and Adeline	Intersection Improvement	$142,000
10	Shattuck between Vine and Hearst	Corridor Improvement	$640,400
11	Shattuck from Russell to Ward	Corridor Improvement	$550,880
12	San Pablo from Addison to Bancroft	Corridor Improvement	$214,200
13	Bancroft at Oxford	Intersection Improvement	$16,400
14	Solano from Colusa to The Alameda	Corridor Improvement	$601,900
15	San Pablo and Delaware	Intersection Improvement	$168,000
16	Shattuck at Berkeley Way	Intersection Improvement	$253,200
17	University and Grant	Intersection Improvement	$300,200
18	College from Ashby to Russell	Corridor Improvement	$111,200
19	The Alameda/MLK and Hopkins	Intersection Improvement	$330,000
20	Shattuck and Woolsey	Intersection Improvement	$250,400
21	University and McGee	Intersection Improvement	$120,000
22	Dwight at Alta Bates	Mid-Block Crosswalk Improvement	$150,420
23	Alcatraz and California	Intersection Improvement	$352,400
24	North Berkeley BART Station	Safe Routes to Transit	$550,800
25	San Pablo and Cedar	Intersection Improvement	$150,000
26	Telegraph and Ashby	Intersection Improvement	$6,400
27	Telegraph and Parker	Intersection Improvement	$25,000
28	Rose and Sacramento	Safe Routes to School	$212,200
29	Gilman and Santa Fe	Intersection Improvement	$206,200
30	Addison and Jefferson	Intersection Improvement	$4,000
31	Sacramento and Oregon	Intersection Improvement	$30,000
32	Hearst Campus Sidewalk	Sidewalk Improvement	$374,575
33	Hearst and Gayley	Intersection Improvement	$300,600

Project Number	Location	Project Type	Project Cost
34	Gilman Street and Curtis Street and the Ohlone Greenway	Intersection Improvement	$262,900
	TOTAL COST		**$9,392,575**
	Note: $276,880 of this total cost is already accounted for in Citywide Projects identified in Chapter 6 and Appendix A.		

10.2.4. PROGRAM COSTS

Recommended ongoing and program costs are shown in Table 10-4. Since a significant amount of curb ramp and sidewalk improvements are included in the intersection, corridor projects, and neighborhood partnership program, these program budgets are expected to be reduced somewhat from current levels. Also, the costs for promotion, enforcement, maintenance, and landscaping may already be covered fully or in part by existing City budgets in various departments. Some City policies shift maintenance responsibility to the public. For example, traffic calming devices installed as part of the Traffic Calming Program are landscaped and maintained by neighbors, not by the City. The budgets for recommended programs, while annualized in the table, are likely to vary considerably from year to year and are subject to grant awards and budget conditions. This table does not include the costs of existing programs, such as the Spiral Sidewalk and ADA Curb Ramp programs.

Table 10-4
Costs of Programs Recommended in the Plan

Program Name	Annual Cost	Average Annual Cost over 20 Years
Maintenance (See note.)	$100,000	$2,000,000
Promotional Efforts		
Printed material (posters, brochures, maps)	$20,000	$400,000
Public Service Announcements	$2,000	$40,000
Website	$2,000	$40,000
Annual Events	$50,000	$1,000,000
Presentations	$5,000	$100,000
Enforcement	$10,000	$200,000
TOTAL COST PROGRAMS	**$189,000**	**$3,780,000**

Note: Maintenance for new facilities recommended in plan. This estimate does not include costs to alleviate the spiral sidewalk repair backlog or emergency repairs.

10.3. FINANCIAL PLAN

The total pedestrian capital and program costs and expected revenue for the next twenty years are presented in Table 10-5. The long-term costs are based on very broad assumptions about needs in the City, and will be refined as the Pedestrian Master Plan is updated.

The total 20-year cost of the pedestrian improvements and programs in Berkeley is estimated to be $31 million, or $1.5 million per year.

The City currently provides $375,000 annually for existing Sidewalk Repair and ADA Curb Ramp programs, which would total $7.5 million over 20 years. In addition, the City anticipates receiving $155,000 annually, or $3.1 million over the next 20 years, from Berkeley's allocation of ACTIA Measure B Bicycle/Pedestrian and Transportation Development Act Article 3 funds.

This leaves a shortfall of $20 million over 20 years, or $1 million annually. The draft Pedestrian Plan estimates that 70% of the total capital project costs could come from competitive grants. This would result in $10.3 million in grants over 20 years, and would leave just a $10 million shortfall, or approximately $500,000 per year.

Table 10-5 City of Berkeley Pedestrian Plan 20-Year Costs

		20-year
High Priority Projects Recommended in Plan		$ 9,115,495
Total cost minus $276,880 accounted for in Citywide Projects, below.		
Citywide Projects Recommended in Plan		
Major Sidewalk Gaps		$ 1,660,968
Curb Ramps		$ 895,000
Truncated Domes		$ 639,200
Crosswalk and Warning Signage Improvements		$ 39,000
Signal Timing Adjustments		$ -
Countdown Signal Heads		$ 97,600
Audible Signals		$ 63,000
High Visibility Crosswalks		$ 199,200
Parking Restrictions (Red Curbs)		$ 109,440
Speed Feedback Signs		$ 70,000
Historic Pathway Projects		$ 232,000
Class I Multi-Use Path Projects		$ 1,575,000
Stop Bars at Signalized Intersection		$ 104,400
Subtotal		**$ 5,684,808**
Programs Recommended in Plan	**Annual**	**20 yr**
Maintenance (of new facilities)	$ 100,000	$ 2,000,000
Promotion	$ 79,000	$ 1,580,000
Enforcement	$ 10,000	$ 200,000
Subtotal	**$ 189,000**	**$ 3,780,000**
Soft Costs (incl. Personnel)	$ 242,000	**$ 4,840,000**
Summary of Costs	**Annual**	**20 yr**
High Priority Projects	$ 455,775	$ 9,115,495
Citywide Projects	$ 284,240	$ 5,684,808
Program Costs	$ 189,000	$ 3,780,000
Soft Costs (Personnel)	$ 242,000	$ 4,840,000
Existing Programs (Spiral Sidewalks & ADA Curb Ramp)	$ 375,000	$ 7,500,000
Total Costs	**$ 1,546,015**	**$ 30,920,303**
Revenue		
Measure B Ped (est. $125K annual)		$ 2,500,000
TDA3 (est. $30K annual)		$ 600,000
Spiral Sidewalk ($200K) & ADA Curb Ramp Program ($175K)		$ 7,500,000
		$ 10,600,000
20 -year Funding Gap		**$ 20,320,303**
Estimated Competitive Grant Revenue (70% of Capital)		**$ 10,360,212**
Estimated Total 20-Year Shortfall		**$ 9,960,091**
Annual Total Shortfall		**$ 498,005**

10.4. FUNDING

This chapter covers federal, state, regional, and local sources of pedestrian funding, as well as some non-traditional funding sources that have been used by local agencies to fund pedestrian infrastructure and programs. A matrix summarizing funding sources is provided at the end of the chapter.

10.4.1. FEDERAL FUNDING SOURCES

The primary federal source of surface transportation funding—including pedestrian facilities—is SAFETEA-LU, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users. SAFETEA-LU is the fourth in a series of Federal transportation funding bills. The $286.5 billion SAFETEA-LU bill, passed in 2005, authorizes federal surface transportation programs for the five-year period between 2005 and 2009.

SAFETEA-LU funding is administered through the State (Caltrans and Resources Agency) and regional planning agencies. Most, but not all, of these funding programs are oriented toward transportation rather than recreation, with an emphasis on reducing auto trips and providing inter-modal connections. Specific funding programs under SAFETEA-LU include:

Congestion Mitigation and Air Quality (CMAQ) — Funds projects that are likely to contribute to the attainment of national ambient air quality standards. Funds are available for projects and programs in areas that have been designated in non-attainment or maintenance for ozone, carbon monoxide or particulate matter. Since the Bay Area is in attainment of national air quality standards for all pollutants except ozone, future Bay Area eligibility for CMAQ allocations is currently being determined.

Recreational Trails Program — $370 million nationally through 2009 for non-motorized trail projects.

Safe Routes to School Program — A new program with $612 million nationally through 2009.

Transportation, Community and System Preservation Program — $270 million nationally over five years (2006-2011) reserved for transit oriented development, traffic calming and other projects that improve the efficiency of the transportation system, reduce the impact on the environment, and provide efficient access to jobs, services and trade centers.

Federal Lands Highway Funds — Federal Lands Highway funds may be used to build pedestrian facilities in conjunction with roads and parkways at the discretion of the department charged with administration of the funds. The projects must be transportation-related and tied to a plan adopted by the State and MPO. Approximately $1 billion is available nationally for Federal Lands Highway Projects through 2009.

SAFETEA-LU www.fhwa.dot.gov/safetealu/index.htm

Walkinginfo.org - A listing of project types and corresponding potential funding sources is available from the Pedestrian and Bicycle Information Center. The listing includes 35 different types of pedestrian and bicycle projects and identifies the federal funds that are most appropriate for each type of project.

Walkinfo.org Federal Funding Matrix
http://www.walkinginfo.org/pp/funding/gov/popups/matrix.htm

10.4.2. STATEWIDE FUNDING SOURCES

The State of California uses both federal sources (such as the Recreational Trails Program) and its own budget to fund pedestrian projects and programs. In some cases, such as Safe Routes to School, Office of Traffic Safety, and Environmental Justice grants, project sponsors apply directly to the State for funding. In others, such as Bay Trail grants, sponsors apply to a regional agency.

10.4.2.1. RECREATIONAL TRAILS PROGRAM (RTP)

In California, RTP funds are administered by the California State Parks Department. Recreational Trails Program funds may be used for the following:

- Maintenance and restoration of existing trails;
- Purchase and lease of trail construction and maintenance equipment;
- Construction of new trails;
- Acquisition of easements or property for trails; and
- Operation of educational programs to promote safety and environmental protection related to trails (limited to five percent of a State's funds).

$3.3 million statewide was available in fiscal year 2006.

Federal Highway Administration, RTP Program
www.fhwa.dot.gov/environment/rectrails/index.htm

California State Parks, RTP Guide
http://www.parks.ca.gov/pages/1008/files/rtpguide.pdf

10.4.2.2. LAND AND WATER CONSERVATION FUND

The Land and Water Conservation Fund is a federal program that provides grants for planning and acquiring outdoor recreation areas and facilities, including trails. The Fund is administered by the California State Parks Department and has been reauthorized until 2015.

Cities, counties and districts authorized to acquire, develop, operate, and maintain park and recreation facilities are eligible to apply. Applicants must fund the entire project, and will be reimbursed for 50 percent of costs. Property acquired or developed under the program must be retained in perpetuity for public recreational use. The grant process for local agencies is competitive, and forty percent of grants are reserved for Northern California.

In 2006, approximately $480,000 was available for projects in Northern California.

California State Parks Department, Land and Water Conservation Fund Guide
www.parks.ca.gov/?page_id=21360

10.4.2.3. FEDERAL SAFE ROUTES TO SCHOOL (SRTS) AND CALIFORNIA SAFE ROUTES TO SCHOOL (SR2S)

Caltrans administers funding for Safe Routes to School projects through two separate and distinct programs: the state-legislated Program (SR2S) and the federally-legislated Program (SRTS). Both programs competitively award reimbursement grants with the goal of increasing the number of children who walk or bicycle to school. The programs differ in some important respects.

The California Safe Routes to School Program expires January 1, 2013, requires a 10% local match, is eligible to cities and counties, and targets children in grades K-12. The fund is primarily for construction, but up to 10% of the program funds can be used for education, encouragement, enforcement, and evaluation activities. Fifty-two million dollars were available for Cycle 7 (FY 06/07 and 07/08).

The Federal Safe Routes to School Program expires September 30, 2009; reimburses 100%; is eligible for cities, counties, school districts, non-profits, and tribal organizations; and targets children in grades K-8. Program funds can be used for construction or for education, encouragement, enforcement and evaluation activities. Construction must be within 2 miles of a grade school or middle school. Forty-six million dollars is available for Cycle 2 (FY 08/09 and 09/10).

Caltrans, SR2S and SRTS Programs

http://www.dot.ca.gov/hq/LocalPrograms/saferoutes/saferoutes.htm

10.4.2.4. ENVIRONMENTAL JUSTICE: CONTEXT SENSITIVE PLANNING GRANTS

The Caltrans-administered Environmental Justice: Context Sensitive Planning Grants Program funds planning activities that assist low-income, minority and Native American communities in becoming active participants in transportation planning and project development. Grants are available to transit districts, cities, counties, and tribal governments. This grant is funded by the State Highway Account at $1.5 million annually statewide. Grants are capped at $250,000.

Caltrans, Environmental Justice Program

www.dot.ca.gov/hq/tpp/offices/opar/titleVIand%20EJ.htm

10.4.2.5. OFFICE OF TRAFFIC SAFETY (OTS) GRANTS

The California Office of Traffic Safety distributes federal funding apportioned to California under the National Highway Safety Act and SAFETEA-LU. Grants are used to establish new traffic safety programs and to expand ongoing programs to address deficiencies in current programs. Pedestrian safety is included in the list of traffic safety priority areas. Eligible grantees include governmental agencies, state colleges and state universities, local city and county government agencies, school districts, fire departments, and public emergency services providers. Grant funding cannot replace existing program expenditures, nor can traffic safety funds be used for program maintenance, research, rehabilitation, or construction. Grants are awarded on a competitive basis, and priority is given to agencies with the greatest need. Evaluation criteria to assess need include potential traffic safety impact, collision statistics and rankings, seriousness of problems, and performance on previous OTS grants. OTS had $56 million in funding available statewide for FY 2006/07.

California Office of Traffic Safety, Grants Program

www.ots.ca.gov/grants/default.asp

10.4.2.6. CALIFORNIA CENTER FOR PHYSICAL ACTIVITY GRANT PROGRAM

The California Center for Physical Activity runs several programs related to walking and offers small grants to public health departments. Grants are in the amount of $4,999 dollars or less and are offered intermittently.

California Center for Physical Activity

www.caphysicalactivity.org/our_projects.html

10.4.3. REGIONAL FUNDING SOURCES

Regional pedestrian grant programs come from a variety of sources, including SAFETEA-LU, the State budget, vehicle registration fees, and bridge tolls. Although most regional funds are allocated by regional agencies such as the Metropolitan Transportation Commission (MTC), the Bay Area Air Quality Management District (BAAQMD) and the Association of Bay Area Governments (ABAG), some (such as a portion of the regional Bicycle and Pedestrian Program) flow to county congestion management agencies, such as the Alameda County Congestion Management Agency (ACCMA), which allocate funds to project sponsors.

10.4.3.1. SAFE ROUTES TO TRANSIT (SR2T)

Regional Measure 2 (RM2), approved in March 2004, raised the toll on seven state-owned Bay Area bridges by one dollar for 20 years. This fee increase funds various operational improvements and capital projects that reduce congestion or improve travel in the toll bridge corridors.

Twenty million dollars of RM2 funding is allocated to the Safe Routes to Transit Program, which provides competitive grant funding for capital and planning projects that improve bicycle and pedestrian access to transit facilities. Eligible projects must be shown to reduce congestion on one or more of the Bay Area's toll bridges. The competitive grant process is administered by the Transportation and Land Use Coalition and the East Bay Bicycle Coalition. Competitive funding is awarded in five $4 million grant cycles. The first round of funding was awarded in December 2005. Future funding cycles will be in 2007, 2009, 2011 and 2013.

Transportation and Land Use Coalition, SR2T Program
www.transcoalition.org/c/bikeped/bikeped_saferoutes.html

10.4.3.2. TRANSPORTATION FUND FOR CLEAN AIR PROGRAM (TFCA)

TFCA funds are generated by a four-dollar surcharge on automobile registration fees in the nine-county Bay Area. Approximately $20 million is collected annually, which funds two programs; 60 percent of the TFCA monies go to the Regional Fund and 40 percent go to the County Program Manager Fund. In Alameda County, 70 percent of the Program Manager Funds are distributed to cities based on population. The remaining 30 percent are competitive funds available to transit agencies.

The Regional Fund is administered by the Bay Area Air Quality Management District (BAAQMD). In Alameda County, the Program Manager Fund is administered by the ACCMA. Pedestrian infrastructure improvements are eligible for TFCA funds through the Smart Growth funding category.

BAAQMD, TFCA Program
www.baaqmd.gov/pln/grants_and_incentives/tfca/

10.4.3.3. REGIONAL BICYCLE AND PEDESTRIAN PROGRAM (RBPP)

The RBPP was created in 2003 as part of the long range Transportation 2030 Plan developed by the Bay Area Metropolitan Transportation Commission. The program—currently funded with Congestion Mitigation and Air Quality funds—funds regionally significant bicycle and pedestrian projects, and bicycle and pedestrian projects serving schools or transit. $200 million is committed to this program over the 25-year period. Seventy-five percent of the total funds are allocated to the county congestion management agencies based on population. The remaining 25 percent of funds is regionally competitive, with the county congestion management agencies recommending the projects to be submitted to MTC for funding consideration.

Metropolitan Transportation Commission, RBPP Program
www.mtc.ca.gov/planning/bicyclespedestrians/regional.htm#bikepedprog

10.4.3.4. TRANSPORTATION FOR LIVABLE COMMUNITIES (TLC)

MTC offers two kinds of assistance through the TLC program: capital and planning. TLC funds small-scale transportation improvements that are designed to make a big difference in a community's vitality. Eligible projects include streetscape improvements, and transit/pedestrian-oriented developments. Successful projects bring new vibrancy to downtown areas, commercial cores, and neighborhoods, making them places where people want to live, work and visit. Within the TLC funds is the Housing Incentive Program (HIP), these funds are allocated to capital transportation projects that support increasing the housing supply in the Bay Area where there is existing infrastructure, locating new housing near non-automotive transportation options, and establishing residential density near public transportation to support the service.

$27 million is the annual allocation to the TLC Program.

Metropolitan Transportation Commission, TLC Grant Program
www.mtc.ca.gov/planning/smart_growth/tlc_grants.htm

10.4.3.5. THE BAY TRAIL PROJECT

The Bay Trail Grant program offers competitive grants to local governments, special districts and qualified nonprofit groups to build or design new Bay Trail segments. The program is structured to speed Bay Trail construction by targeting high-priority, ready to build sections and closing critical gaps; leveraging state dollars with significant matching funds and in-kind contributions; fostering partnership by encouraging cooperative partnerships and creative design solutions; and employing the California Conservation Corps for construction, landscaping and maintenance where possible. The amount of available funding varies, depending on State bonds and grants to the Bay Trail Project.

Bay Trail Project Grant Program
http://baytrail.abag.ca.gov/grants_2003.htm

10.4.4. LOCAL FUNDING SOURCES

10.4.4.1. TDA ARTICLE 3

Transportation Development Act (TDA) Article 3 funds are available for transit, bicycle and pedestrian projects in California. According to the Act, pedestrian and bicycle projects are allocated two percent of the revenue from a ¼ cent of the general state sales tax, which is dedicated to local transportation. These funds are collected by the State, returned to each county based on sales tax revenues, and typically apportioned to areas within the county based on population. Eligible pedestrian projects include construction and engineering for capital projects and development of comprehensive pedestrian facilities plans. A city or county is allowed to apply for funding for pedestrian plans not more than once every five years. These funds may be used to meet local match requirements for federal funding sources.

$1.4 million of TDA Article 3 funds were allocated in Alameda County in 2006/07.

Metropolitan Transportation Commission, TDA Funding Program
www.mtc.ca.gov/funding/STA-TDA/index.htm

10.4.4.2. ACTIA BICYCLE AND PEDESTRIAN MEASURE B FUNDING

Measure B is a sales tax measure reauthorized by Alameda County voters in 2000. It allows the collection of a ½-cent sales tax devoted to transportation projects and programs, to be collected from 2002 through 2022. The portion of Measure B funding devoted to bicycle and pedestrian improvements totals approximately $100 million, or five percent of all Measure B funding. Of this amount, 75 percent is "pass-through" funding distributed to the cities and the County according to population, and may be used for locally prioritized bicycle or pedestrian projects, programs and plans. The remaining 25 percent is available for capital projects, programs and plans of countywide significance, most of which are distributed based on a competitive grant process. In fiscal year 2007/08, Berkeley received about $277,000 in Measure B bicycle and pedestrian pass-through funds and the City is expected to receive a total of $4.1 million dollars through 2022.

ACTIA Measure B Bicycle and Pedestrian Program
http://www.acta2002.com/bikeped.html

10.4.4.3. LOCAL TRAFFIC CALMING FUND

The Berkeley City Council has made an annual allocation from the General Fund of $50,000 which is utilized by the Department of Public Works to respond to residents' traffic calming requests. Periodically, the Council has made special one-time allocations of funding to supplement this program; for example, in 2008 an additional $200,000 was programmed for traffic calming requests. These funds have been applied toward traffic circles, curb bulbouts and speed feedback signs. It is likely that this fund will be continued at a minimum level of $50,000 and may be increased.

10.4.5. NON-TRADITIONAL FUNDING SOURCES

10.4.5.1. INTEGRATION INTO LARGER PROJECTS

The State of California's "routine accommodation" policy requires Caltrans to design, construct, operate, and maintain transportation facilities using best practices for pedestrians. Local jurisdictions can begin to expect that some portion of pedestrian project costs, when they are built as part of larger transportation projects, will be covered in project construction budgets. This applies to Caltrans and other transportation facilities, such as new BART stations and Bus Rapid Transit stops.

10.4.5.2. COMMUNITY DEVELOPMENT BLOCK GRANTS

The Community Development Block Grants program (CDBG) provides money for streetscape revitalization, which may be largely comprised of pedestrian improvements. Federal Community Development Block Grant Grantees may use CDBG funds for activities that include (but are not limited to) acquiring real property; building public facilities and improvements, such as streets, sidewalks and recreational facilities; and planning and administrative expenses, such as costs related to developing a consolidated Plan and managing CDBG funds. In Oakland, CDBG funds have also been used to find crossing guards, called "Safe Walk to School Monitors."

$526 million in CDBG funds were distributed statewide in 2004/05.

CDBG program
www.hud.gov/offices/cpd/communitydevelopment/programs/index.cfm

10.4.5.3. *REQUIREMENTS FOR NEW DEVELOPMENT*

With the increasing support for "routine accommodation" and "complete streets," requirements for new development, road widening, and new commercial development provide opportunities to efficiently construct pedestrian facilities.

10.4.5.4. *IMPACT FEES*

One potential local source of funding is developer impact fees, typically tied to trip generation rates and traffic impacts produced by a proposed project. A developer may attempt to reduce the number of trips (and hence impacts and cost) by paying for on- and off-site pedestrian improvements designed to encourage residents, employees and visitors to the new development to walk rather than drive. Establishing a clear nexus or connection between the impact fee and the project's impacts is critical for avoiding a potential lawsuit.

10.4.5.5. *MELLO-ROOS COMMUNITY FACILITIES ACT*

The Mello-Roos Community Facilities Act was passed by the Legislature in 1982 in response to reduced funding opportunities brought about by the passage of Proposition 13. The Mello-Roos Act allows any county, city, special district, school district, or joint powers of authority to establish a Community Facility Districts (CFD) for the purpose of selling tax-exempt bonds to fund public improvements within that district. CFDs must be approved by a two-thirds margin of qualified voters in the district. Property owners within the district are responsible for paying back the bonds. Pedestrian facilities are eligible for funding under CFD bonds.

Mello-Roos Fact Sheet
http://mello-roos.com/pdf/mrpdf.pdf

10.4.6. MATRIX OF FUNDING SOURCES

The matrix on the next page provides detailed information for the funding sources listed in the preceding section. Beside each source is the corresponding application deadline, the allocating agency, the amount available, matching requirements, eligible applicants, eligible projects, and comments, including agency contact information.

Table 10-6
Funding Sources

Acronyms:	Jurisdictions for City of Berkeley, California:
AQMD - Air Quality Management District Caltrans - California Department of Transportation CMAQ - Congestion Management and Air Quality CTC - California Transportation Commission FHWA - Federal Highway Administration RTPA - Regional Transportation Planning Agency State DPR - California Department of Parks and Recreation (under the State Resources Agency) SAFETEA-LU - Safe, Accountable, Flexible, Efficient Transportation Equity Act	Caltrans - Caltrans District 4 ABAG—Association of Bay Area Governments ACTIA—Alameda County Transportation Improvement Authority MTC—Metropolitan Transportation Commission

Grant Source	Application Deadline	Agency	Program Funds Available	Matching Requirement	Eligible Applicants	Commute	Recreation	Safety/ Education	Comments/Contact Information
Federal Funding									
Congestion Mitigation and Air Quality (CMAQ)		FHWA	$8.6 billion nationwide under SAFETEA-LU (2005-2009)	20% local match	State DOTs, MPOs, transit agencies	X	X		MTC requires that the project sponsor adopt and submit a resolution of local support through its respective congestion management agency. MTC Contact: Craig Goldblatt, 510.817.5837, cgoldblatt@mtc.ca.gov Federal Information: http://www.fhwa.dot.gov/environment/cmaqpgs/
Federal Lands Highway Funds		FHWA	$1 billion total nationwide through 2009	None	State	X	X	X	Project must appear in STIP. Contact California Division, FHWA http://www.fhwa.dot.gov/cadiv/directory.htm

Grant Source	Application Deadline	Agency	Program Funds Available	Matching Requirement	Eligible Applicants	Commute	Recreation	Safety/ Education	Comments/Contact Information
Recreational Trails Program (RTP)	October 1	FHWA	($5.5 to California)	At least 12%	State, local, regional agencies, and nonprofit organizations		X		Administered by California State Parks: Jean Lacher, Manager, Office of Grants and Local Services 1416 Ninth St, Room 918 Sacramento CA 94814 Mail: PO Box 942896 Sacramento CA 94296-0001 916-653-6160; Fax 916-653-6511
Transportation and Community and System Preservation Program (TCSP)	Varies	FHWA	$61.25 million annually nationwide through 2008/09	20% local match	state, local, MPOs	--	--	--	Projects that improve system efficiency, reduce environmental impacts of transportation, etc. Contact Kenneth Petty TCSP Program Officer, Office of Planning phone: (202) 366-6654 http://www.fhwa.dot.gov/tcsp/pi_tcsp.html
State Funding									
California Center for Physical Activity Grant Program	Ongoing	Department of Health Services	Up to $4,999 per grantee	None	Public Health Departments			X	For pedestrian encouragement programs Contact: Lisa Cirill, Acting Chief lcirill@dhs.ca.gov 916.552-9943
Coastal Conservancy Non-Profit Grants Program	Ongoing	Coastal Conservancy	Grants range from $10,000 to several million	Not required but favored	California non-profit 501 (c) 3 organizations		X		Funds for trail planning and construction and restoration of coastal urban waterfronts. Contact Janet Diehl jdiehl@scc.ca.gov

Grant Source	Application Deadline	Agency	Program Funds Available	Matching Requirement	Eligible Applicants	Commute	Recreation	Safety/ Education	Comments/Contact Information
Environmental Enhancement and Mitigation Program (EEMP)	Currently suspended (as of mid-2006)	State Resources Agency, Caltrans	$10 million statewide	Not required but favored	local, state and federal government non-profit agencies	X	X	X	Projects that mitigate environmental impacts of planned transportation projects; can include acquisition or development of roadside recreational facilities. Contact Carolyn Dudley, State Resources Agency, (916) 653-5656
Environmental Justice Grants: Context Sensitive Planning	October 14	Caltrans	$1.5 million statewide	10% local	MPA, RPTA, city, county, tribal govmts, transit districts	X	X	X	Funds activities that include low-income and minority communities in transportation planning and project development. Contact Norman Dong at norman_dong@dot.ca.gov or (916) 651-6889.
Land & Water Conservation Fund (LCWF)	May 1	California DPR	$480,000 in Northern California (2006)	50% match	Cities, counties, park districts		X		Recreational trails are eligible for funding. Applicants must fund the entire project, and will be reimbursed for 50% of costs.
Office of Traffic Safety Grants	Jan. 31	Office of Traffic Safety	$56 million statewide (FY 2006/07)	None	Governmental agencies, state colleges, and universities, local city and county government agencies, school districts, fire depts, and public emergency services providers			X	Grants are used to mitigate traffic safety program deficiencies, expand ongoing activity, or develop a new program. Grant funding cannot replace existing program expenditures, nor can traffic safety funds be used for program maintenance, research, rehabilitation, or construction. Contact OTS Regional Coordinator Lisa Dixon at, (916) 262-0978 or ldixon@ots.ca.gov

Grant Source	Application Deadline	Agency	Program Funds Available	Matching Requirement	Eligible Applicants	Commute	Recreation	Safety/ Education	Comments/Contact Information
Recreational Trails Program (RTP)	Oct. 1	State DPR	$3.3 million statewide (FY 2006)	20% match	Jurisdictions special districts, non profits with management responsibilities over land		X		For recreational trails to benefit bicyclists, pedestrians, and other users; contact State Dept. of Parks & Rec, Statewide Trails Coordinator, (916) 653-8803
Federal Safe Routes to Schools Program (SRTS)	February	Caltrans	$46 million in Cycle 2 (FY09/10)	None	State, local, regional agencies; cities and counties; non-profit organizations; school districts; & federally-recognized Native American Tribes	X	X	X	http://www.dot.ca.gov/hq/LocalPrograms/saferoutes/saferoutes.htm
California Safe Routes to School (SR2S)	May 31	Caltrans	$52 million in Cycle 7 (FY 06/07 and 07/08)	10%	City, county	X	X	X	http://www.dot.ca.gov/hq/LocalPrograms/saferoutes/saferoutes.htm
Regional Funding									
The San Francisco Bay Trail Project	Varies	The San Francisco Bay Trail Project/ ABAG	Total available varies from year to year		Public Agencies, Land Trusts, Non-profits	X	X		Funds trail planning and construction projects to complete gaps in the Bay Trail. Contact Lee Huo leeh@abag.ca.gov

Grant Source	Application Deadline	Agency	Program Funds Available	Matching Requirement	Eligible Applicants	Commute	Recreation	Safety/ Education	Comments/Contact Information
Regional Bicycle and Pedestrian Program (RBPP) – Local Pass-Through	Varies	ACCMA, MTC	$6 million annually region-wide	11.5%	Cities, school districts, transit districts	X		X	Constructing regionally significant pedestrian projects and bicycle/pedestrian projects serving schools or transit.
Regional Bicycle and Pedestrian Program (RBPP)	Varies	ACCMA, MTC	$2 million annually region-wide	11.5%	Cities, school districts, transit districts	X		X	Constructing regionally significant pedestrian projects and bicycle/pedestrian projects serving schools or transit.
Safe Routes to Transit	Varies	MTC, Administered by TALC	$4 million annually region-wide	None required, but scoring preference given to projects with outside match	Public agencies in all 9 Bay Area counties. Non-profits must partner with a public agency	X			Applications must demonstrate bridge congestion reduction on at least one state-owned Bay Area bridge. Contact the Transportation and Land Use Coalition or Dave Campbell (East Bay Bicycle Coalition) sr2t@transcoalition.org dcampbel@lmi.net
Transportation Fund for Clean Air (TFCA), Program Manager Fund	January in Alameda County, varies in other counties	ACCMA, BAAQMD	Approx. $8 million annually region-wide	None	Cities, counties, school districts, transit districts	X			Smart growth projects: Physical improvements that support development projects and/or calm traffic, resulting in the achievement of motor vehicle emission reductions.

Grant Source	Application Deadline	Agency	Program Funds Available	Matching Requirement	Eligible Applicants	Commute	Recreation	Safety/ Education	Comments/Contact Information
Transportation Fund for Clean Air (TFCA), Regional Fund	May 1st	BAAQMD, ACCMA	Approx. $10 million annually region-wide	10% for requests greater than $150,000	Cities, counties, schools, and transit districts	X			Smart growth projects: Physical improvements that support development projects and/or calm traffic, resulting in the achievement of motor vehicle emission reductions. www.baaqmd.gov/pln/grants_and_incentives/tfca/regional_fund.htm
Transportation for Livable Communities Program	June	MTC	$27 million annually region-wide	Local match of 11.5% is required	Public Agencies. Non-profits and other CBOs may partner with public agencies	x		x	Funds for transportation projects that revitalize downtown areas, commercial cores, neighborhoods, and transit corridors. www.mtc.ca.gov/planning/smart_growth/tlc_grants.htm
Local Funding									
ACTIA Bicycle and Pedestrian Measure B Funding	Varies	ACTIA	$4 million county-wide (FY 08/09)	No match is required; however projects with a match will score better.	Any public agency that operates in Alameda County.	X	X	X	All projects must demonstrate countywide significance. Contact Rochelle Wheeler rwheeler@actia2022.com
Transportation Development Act (TDA) Article 3	January	MTC/ Alameda County PWA	$1.4 million in Alameda County (2006/07)	--	Alameda County	X		X	Contact Ruben Izon rubeni@acpwa.org

Grant Source	Application Deadline	Agency	Program Funds Available	Matching Requirement	Eligible Applicants	Commute	Recreation	Safety/ Education	Comments/Contact Information
Nontraditional Sources									
Community Development Block Grants	Varies	HUD	$526 million statewide (2004/05)	None, but may be used as evaluation criteria	Public entities and 501(c)(3) non-profits and tax-exempt faith-based religious orgs				Primarily for community revitalization, but may be used to fund streetscape improvements, to eliminate slum and blight in low- and moderate-income areas.
Mello-Roos Community Facilities Act	None	Various Public Agencies	Varies	None		X	X	X	Primarily used to fund public services such as libraries and fire depts., but may fund pedestrian infrastructure.

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APPENDIX A
DETAILED PROJECT LISTS AND COSTS

Table 1: 100 High Priority Intersections

The following table lists the top 100 highest priority intersections for pedestrian amenities in the City of Berkeley. This list was developed based on five categories: community access, transit connectivity, usage and demand, safety, and support and need. In general, an intersection ranks higher on the list if it is close to community amenities and transit stops, if it has high numbers of pedestrians, if it has a high number of pedestrian collisions, and if it was identified by the public or in adopted city plans as a location in need of pedestrian improvements. Only intersections along arterial streets were included in the analysis.

Details on how the five categories were measured are provided after the table of top 100 intersections. Please contact the City of Berkeley Transportation Division for the full version of the intersection prioritization matrix, which includes raw data and computed scores for all ranked intersections.

The recommended improvements column lists improvements recommended in this plan for each intersection. In some cases, there are few additional improvements that can be made to an intersection to improve the pedestrian environment.

Score	Rank	Street 1	Street 2	Improvements
57.0	1	University	10th	Project 1
55.4	2	University	Shattuck(W)	Project 2
54.3	3	Ashby	Otis	Project 3
53.1	4	Shattuck	Allston	Truncated domes, stop bars
52.9	5	University	6th	Project 1
52.6	6	Sacramento	University	Project 4
52.2	7	University	Acton	Project 5
51.7	8	San Pablo	University	Project 1
51.6	9	Shattuck	Bancroft	Truncated domes, stop bars
51.3	10	University	9th	Project 1
51.1	11	Shattuck	Kittredge	Truncated domes, stop bars
49.7	12	University	Martin Luther King	Project 6
49.4	13	University	Milvia	Project 7
48.9	14	Ashby	California	Project 8
48.7	15	Adeline	Alcatraz	Project 9
48.0	16	Shattuck	Durant	Truncated domes, perpendicular curb ramps, stop bars
47.5	17	Shattuck	Channing	Longer pedestrian signal, truncated domes, stop bars
47.3	18	University	7th	Project 1
47.2	19	Shattuck	Hearst	Project 10
47.1	20	Shattuck	Stuart	Project 11
47.1	21	San Pablo	Allston	Project 12
47.1	22	Shattuck	Russell	Project 11

Score	Rank	Street 1	Street 2	Improvements
47.1	23	Ashby	Martin Luther King	Project 3
46.9	24	Bancroft	Oxford/Fulton	Project 13
46.8	25	Martin Luther King	Addison	Project 6
46.7	26	The Alameda	Solano	Project 14
46.6	27	Oxford	Hearst	None
46.1	28	Shattuck	Vine	Project 10
46.0	29	University	8th	Project 1
45.5	30	San Pablo	Addison(N)	Project 12
45.5	31	Martin Luther King	Allston	Project 6
45.3	32	Ashby	Adeline	Project 3
45.1	33	Shattuck	Center	Truncated domes, stop bars
45.1	34	Shattuck	Addison(E)	Truncated domes, stop bars
45.1	35	Shattuck	Addison(W)	Truncated domes, stop bars
45.1	36	Martin Luther King	Center	Audible pedestrian signals, truncated domes, red curbs, stop bars
45.0	37	Shattuck	Oregon	Truncated domes
44.8	38	San Pablo	Addison(S)	Project 12
44.5	39	Martin Luther King	Russell	Speed feedback sign, audible pedestrian signals, truncated domes, red curbs, stop bars
44.4	40	Ashby	Shattuck	Truncated domes, perpendicular curb ramps, red curbs
44.2	41	San Pablo	Delaware	Project 15
44.1	42	University	Chestnut	High visibility crosswalks, truncated domes, crosswalk warning signage, red curbs
44.1	43	University	Curtis	High visibility crosswalks, truncated domes, crosswalk warning signage, red curbs
44.0	44	Sacramento	Addison	Project 4
43.9	45	Martin Luther King	Haste	Audible pedestrian signals, countdown signal, truncated domes, red curbs, stop bars
43.8	46	Dwight	Milvia	Truncated domes, red curbs
43.8	47	Shattuck	Berkeley Wy	Project 16
43.5	48	University	Grant	Project 17

Score	Rank	Street 1	Street 2	Improvements
43.5	49	Shattuck	Virginia	Project 10
43.3	50	Bancroft	Dana	Sidewalk gap fill, truncated domes, crosswalk warning signage, red curbs
43.2	51	University	Bonita	Truncated domes, crosswalk warning signage, red curbs
43.2	52	San Pablo	Ashby	Project 8
43.1	53	Addison	Milvia	Red curbs
43.0	54	Ashby	Colby	Truncated domes, stop bars
42.6	55	College	Russell	Project 18
42.4	56	Shattuck	Lincoln	Project 10
42.1	57	Ashby	Deakin	High visibility crosswalks, truncated domes, crosswalk warning signage, red curbs
42.0	58	Martin Luther King	Bancroft	Longer pedestrian signal, countdown signal, audible pedestrian signals, truncated domes, red curbs, stop bars
42.0	59	Shattuck	Delaware	Project 10
41.5	60	University	Shattuck(E)	High visibility crosswalks, truncated domes, red curbs
41.4	61	Bancroft	Ellsworth	High visibility crosswalks, truncated domes, crosswalk warning signage, red curbs
41.4	62	Dwight	Shattuck	Audible pedestrian signals, countdown signal, stop bars
41.3	63	Adeline	Oregon	Longer pedestrian signal, red curbs
41.0	64	San Pablo	Hearst	High visibility crosswalks, crosswalk warning signage, red curbs
40.9	65	San Pablo	Bancroft	Project 12
40.8	66	University	Bonar	Audible pedestrian signal, red curbs
40.8	67	Ashby	Sacramento	Project 8

Score	Rank	Street 1	Street 2	Improvements
40.8	68	Shattuck	Francisco	Project 10
40.7	69	Shattuck	Ward	Project 11
40.6	70	Martin Luther King	Hopkins	Project 19
40.4	71	Martin Luther King	Channing	Longer pedestrian signal, truncated domes, red curbs, stop bars
40.3	72	Adeline	Stuart	Truncated domes, red curbs
40.1	73	Milvia	Berkeley	None
40.0	74	Adeline	Woolsey	Project 3
40.0	75	University	Oxford	Audible pedestrian signals, red curbs, stop bars
39.8	76	College	Ashby	Project 18
39.7	77	Adeline	Harmon	Truncated domes, crosswalk warning signage, red curbs
39.6	78	Shattuck	Woolsey	Project 20
39.6	79	University	Jefferson	High visibility crosswalks, truncated domes, crosswalk warning signage, red curbs
39.6	80	Dwight	Piedmont	Perpendicular curb ramps, stop bars
39.3	81	Ashby	Mabel	Project 8
39.2	82	Shattuck	Cedar	Project 10
39.2	83	Alcatraz	King	Truncated domes, longer pedestrian signal
39.1	84	Addison	Browning	None
38.9	85	Dwight	Telegraph	Audible pedestrian signals, perpendicular curb ramps, truncated domes, red curbs
38.5	86	Adeline	Essex	Project 3
38.4	87	Ashby	King	Longer pedestrian signals, countdown signal, audible pedestrian signals, truncated domes, perpendicular curb ramps, red curbs
38.2	88	Sacramento	Hearst(N)	High visibility crosswalks, truncated domes, crosswalk warning signage, red curbs

Score	Rank	Street 1	Street 2	Improvements
38.2	89	Sacramento	Hearst(S)	High visibility crosswalks, truncated domes, crosswalk warning signage, red curbs
38.2	90	University	McGee	Project 21
38.0	91	Shattuck	Haste	Audible pedestrian signals, truncated domes, longer pedestrian signal
38.0	92	Martin Luther King	Berkeley Wy	Truncated domes, crosswalk warning signage, red curbs
37.8	93	Telegraph	Channing	Audible pedestrian signals, truncated domes, red curbs, stop bars
37.8	94	Allston	McKinley	Truncated domes
37.8	95	Martin Luther King	Oregon	High visibility crosswalks, truncated domes, red curbs
37.7	96	Telegraph	Durant	Audible pedestrian signals, truncated domes, red curbs, stop bars
37.6	97	Center	Oxford	none
37.5	98	Ashby	Fulton	Audible pedestrian signals, countdown signal, truncated domes, red curbs
37.2	99	Martin Luther King	Virginia	High visibility crosswalks, truncated domes, red curbs
37.0	100	Martin Luther King	Delaware	Red curbs

The following table summarizes the methodology that was used to rank intersections in Berkeley for the Pedestrian Master Plan. Each category uses several factors. Measurements for each factor were first normalized, and then were weighted based on a weighting system identified by the Berkeley Pedestrian Subcommittee. Weighted values were added up for each intersection to get a final score. Intersections with higher scores are considered to have higher priority. Please contact the City of Berkeley Transportation Division for the full version of the intersection prioritization matrix, which includes raw data and computed scores for all sixteen ranking factors for all ranked intersections.

Table 2: Methodology Used to Rank Intersections

Category	Factor	Measurement	Source	Weight
Community Access	Public Activity Areas (e.g. post office, city hall)	Is intersection within ¼ mile? Yes=1 No=0	City of Berkeley GIS data 2005.	3
	Neighborhood Commercial Centers	Is intersection within ¼ mile? Yes=1 No=0	City of Berkeley GIS data 2005.	2

Category	Factor	Measurement	Source	Weight
	Parks	Is intersection within ¼ mile? Yes=1 No-0	City of Berkeley GIS data 2005.	3
	Senior Centers and Disabled Community Resources	Is intersection within ¼ mile? Yes=1 No-0	City of Berkeley GIS data 2005.	6
	Schools	Number of schools within ¼ mile.	City of Berkeley GIS data 2005.	6
Transit Connectivity	Multi-Modal BART/ Amtrak Stations	Number of stations within ½ mile.	City of Berkeley GIS data 2005.	9
	Multi-Modal AC Transit Trunk Stops	Number of stops within ¼ mile.	City of Berkeley GIS data 2005.	6
	Multi-Modal AC Transit Local Stops	Number of stops within 1/8 mile.	City of Berkeley GIS data 2005.	4
Usage and Demand	Journey to Work	Percent of people living within 1/8 mile who walk to work.	Census 2000	3
	Estimated Pedestrian Flows	Estimated number of pedestrians per hour during weekday mid-day.	Space Syntax Model (See Appendix D)	6
	Population Density	Number of people living within 1/8 mile.	Census 2000	6
Safety	Number of Collisions	Number of police-reported collisions within 400 feet of intersection.	Statewide Integrated Traffic Records System 2000-2005 collision data.	12
	Ped Exposure/ Ped Flows	Number of collisions divided by the estimated pedestrian volumes.	Statewide Integrated Traffic Records System, Space Syntax	15
	Traffic Volumes	Estimated average peak hour traffic volumes on one leg of intersection.	City of Berkeley Pavement Management System Traffic Counts (1983-2003)	6
Support and Need	Existing Plan	Is the intersection identified as part of an existing plan adopted by the City of Berkeley? Yes = 1 No=2	Review of plans	7

Category	Factor	Measurement	Source	Weight
	Public Comment	Was the intersection identified by the public as one that should be considered for pedestrian improvements? 1 point for every mention	Public comments received during plan development (2005-2008)	6

Table 3: Major Sidewalk Gaps

5’ Sidewalk	$45
Total Cost	$1,660,968

Street	Cross Street 1	Cross Street 2	Length (FT)	Cost
2ND	CAMELIA	CAMELIA	64.7	$2,912
2ND	CAMELIA	GILMAN	602.7	$27,123
2ND	CAMELIA	GILMAN	576.5	$25,941
2ND	CAMELIA	PAGE	401.4	$18,062
2ND	CEDAR	JONES	387.9	$17,456
2ND	CEDAR	VIRGINIA	628.6	$28,289
2ND	HARISSON	HARRISON	60.6	$2,725
2ND	HEARST	VIRGINIA	1090.0	$49,051
2ND	JONES	PAGE	410.9	$18,488
2ND	PAGE	JONES	391.5	$17,616
2ND	UNIVERSITY	ADDISON	433.8	$19,521
2ND	UNIVERSITY	ADDISON	426.5	$19,194
2ND	VIRGINIA	CEDAR	622.2	$27,997
2ND	VIRGINIA	HEARST	1083.5	$48,755
8TH	CAMELIA	GILMAN	170.0	$7,649
8TH	GILMAN	CAMELIA	204.4	$9,196
8TH	GILMAN	CAMELIA	233.2	$10,495
8TH	HARRISON	CITY OF ALBANY	135.0	$6,077
8TH	HARRISON	CITY OF ALBANY	37.3	$1,676
9TH	FOLGER	MURRAY	258.9	$11,649
9TH	FOLGER	MURRAY	245.6	$11,053
9TH	POTTER	ASHBY	94.1	$4,236
ADELINE	62ND	62ND	21.4	$962
ADELINE	ASHBY	EMERSON	23.2	$1,043
ARLINGTON	INDIAN ROCK	MENDOCINO	16.3	$732
ARLINGTON	INDIAN ROCK	MENDOCINO	16.3	$734
ARLINGTON	SAN LUIS	SANTA BARBARA	10.3	$464
ARLINGTON	SANTA BARBARA	BOYNTON	17.7	$796
ARLINGTON	SANTA BARBARA	SANTA BARBARA	17.3	$779
ASHBY	ELMWOOD	ASHBY	332.7	$14,972
BAKER	FAIRVIEW	66TH	226.1	$10,174
BATEMAN	WOOLSEY	PRINCE	197.0	$8,863
BAY	AHSBY	POTTER	445.5	$20,049
BAY	I 80 OFF RAMP	COEMERYVILLE	41.1	$1,851
BROOKSIDE	CLAREMONT	CLAREMONT	196.6	$8,849
BROOKSIDE	CLAREMONT	CLAREMONT	215.7	$9,708
BURNETT	MABEL	PARK	220.0	$9,901
CEDAR	EASTSHORE	2ND	293.7	$13,215
CEDARWOOD	HARRISON	PARK	297.5	$13,387
CEDARWOOD	HARRISON	PARK	330.8	$14,888
COLUSA	MONTEREY	LOS ANGELES	43.3	$1,950
CONTRA COSTA	LOS ANGELES	SOLANO	120.3	$5,415
CURTIS	ROSE	HOPKINS	21.9	$985

Street	Cross Street 1	Cross Street 2	Length (FT)	Cost
EAST APPROACH TO I 80 BIKE PED BRIDGE	I 80	BOLIVAR	457.0	$20,563
EASTSHORE	CEDAR	JONES	57.0	$2,564
EASTSHORE	CEDAR	JONES	387.4	$17,431
EASTSHORE	GILMAN	HARRISON	143.8	$6,469
EASTSHORE	GILMAN	HARRISON	447.3	$20,126
EASTSHORE	GILMAN	PAGE	197.3	$8,877
EASTSHORE	GILMAN	PAGE	846.7	$38,101
EASTSHORE	HARRISON	CITY OF ALBANY	617.5	$27,789
EASTSHORE	HARRISON	CITY OF ALBANY	629.8	$28,340
EASTSHORE	HARRISON	HARRISON	53.8	$2,423
EASTSHORE	JONES	JONES	39.2	$1,766
EASTSHORE	JONES	PAGE	394.9	$17,770
EASTSHORE	PAGE	PAGE	54.1	$2,433
EASTSHORE	VIRGINIA	CEDAR	617.4	$27,783
EASTSHORE	VIRGINIA	VIRGINIA	59.7	$2,687
HARRISON	6TH	7TH	252.8	$11,378
HARRISON	6TH	7TH	308.8	$13,896
HARRISON	7TH	7TH	56.6	$2,548
HARRISON	7TH	8TH	293.3	$13,200
HARRISON	CEDARWOOD	3RD	129.4	$5,822
HOPKINS	CURTIS	ROSE	34.5	$1,551
HOPKINS	HOPKINS	CURTIS	23.9	$1,077
I 80 BIKE PED BRIDGE	I 80	I 80	229.5	$10,325
I80 EAST (OFF RAMP) UNIVERSITY	HEARST	VIRGINIA	1055.6	$47,504
I80 WEST (OFF RAMP) UNIVERSITY	FRONTAGE	INTERSTATE 80	192.9	$8,680
JONES	4TH	3RD	277.3	$12,479
JONES	4TH	3RD	272.4	$12,256
LAUREL	SAN PEDRO	TACOMA	240.5	$10,824
LAUREL	SAN PEDRO	TACOMA	227.1	$10,218
LAUREL	TACOMA	CAPISTRANO	227.1	$10,220
LAUREL	TACOMA	CAPISTRANO	212.6	$9,565
MARTIN LUTHER KING JR	62ND	63RD	275.6	$12,402
MENDOCINO	SOLANO	ARLINGTON	340.7	$15,333
OFF REGENTS	ASHBY	RUSSELL	443.7	$19,965
PAGE	2ND	EASTSHORE	263.6	$11,861
PAGE	3RD	2ND	304.3	$13,692
PALM	STUART	KELSEY	40.5	$1,822
PALM	STUART	KELSEY	114.9	$5,169
PALM	STUART	KELSEY	150.2	$6,757
PARK	4TH	CEDARWOOD	188.1	$8,464
PARK	4TH	CEDARWOOD	246.2	$11,078
PERALTA	SOLANO	CAPISTRANO	79.6	$3,584
PERALTA	THOUSAND OAKS	COLUSA	107.8	$4,850
POTTER	BAY	ON RAMP	731.7	$32,928
POTTER	BAY	ON RAMP	745.4	$33,545
ROSE	CURTIS	HOPKINS	17.5	$787
SACRAMENTO	HEARST N	HEARST S	16.6	$747
SAN ANTONIO	ARLINGTON	AVIS	206.8	$9,304

Street	Cross Street 1	Cross Street 2	Length (FT)	Cost
SAN FERNANDO	THOSUAND OAKS	CONTRA COSTA	200.7	$9,031
SAN LUIS	ARLINGTON	AVIS	213.4	$9,602
SAN LUIS	AVIS	SAN ANTONIO	396.1	$17,826
SAN LUIS	SAN ANTONIO	AVIS	731.3	$32,910
SAN MATEO	INDIAN ROCK	SAN MATEO END	57.0	$2,567
SOJOURNER TRUTH	WARD	SJ TRUTH END	412.8	$18,577
SOJOURNER TRUTH	WARD	SJ TRUTH END	437.8	$19,701
SOLANO	PERALTA	PERALTA	8.9	$402
SOLANO	PERALTA	TACOMA	127.4	$5,732
SOLANO	TULARE	ALBANY	1.5	$68
SOMERSET	SOUTHAMPTON	DEVON	98.7	$4,439
SOMERSET	SOUTHAMPTON	DEVON	153.7	$6,918
SOUTHERN PACIFIC	GRAYSON	GRAYSON	191.8	$8,631
STANNAGE	CITY OF ALBANY	HARRISON	40.1	$1,803
STANNAGE	CITY OF ALBANY	HARRISON	7.6	$342
TEVLIN	GILMAN	TEVLIN END	132.9	$5,979
TEVLIN	GILMAN	TEVLIN END	129.8	$5,839
TEVLIN	GILMAN	WATKINS	241.0	$10,847
THE ALAMEDA	YOSEMTIE	YOSEMITE	44.2	$1,990
THOUSAND OAKS	PERALTA	COLUSA	38.3	$1,721
UNIVERSITY	2ND	3RD	613.0	$27,585
UNIVERSITY	2ND	3RD	633.5	$28,506
UNIVERSITY	8TH	9TH	278.4	$12,529
UNIVERSITY	FRONTAGE	BERKELEY MARINA	1308.4	$58,878
UNIVERSITY	FRONTAGE	BERKELEY MARINA	1212.0	$54,539
UNIVERSITY	INTERSTATE 80	EASTSHORE	26.5	$1,194
UNIVERSITY	INTERSTATE 80	EASTSHORE	99.4	$4,474
UNIVERSITY	INTERSTATE 80	FRONTAGE ROAD	89.7	$4,035
UNIVERSITY	INTERSTATE 80		177.5	$7,989
UNIVERSITY	INTERSTATE 80		84.1	$3,785
UNIVERSITY	MARINA	MARINA	178.7	$8,042
UNIVERSITY	MARINA	MARINA	102.6	$4,616
UNIVERSITY	MARINA	MARINA	252.1	$11,344
UNIVERSITY	MARINA	MARINA	58.8	$2,647
UNIVERSITY	MARINA	MARINA	246.0	$11,069
VIRGINIA	2ND	3RD	276.2	$12,427
VIRGINIA	2ND	3RD	276.3	$12,435
VIRGINIA	EASTSHORE	2ND	246.0	$11,072
WEST	ADDISON	ALLSTON	637.8	$28,700
WEST	DELAWARE	HEARST	330.6	$14,879
WEST APPROACH TO I 80 BIKE PED BRIDGE	FRONTAGE	I 80	754.8	$33,966
YOSEMITE	SAN FERNANDO	CONTRA COSTA	388.9	$17,502
		Total	**36,910**	**$1,660,968**

Table 4: Installation of Truncated Domes

INSTALLATION OF TRUNCATED DOMES (PAGE 1 OF 3)

Main Street	Side Street	Domes Needed
Adeline	Woolsey	2
	Fairview	2
	BART mid-block	2
	Essex	2
	Oregon	4
	Stuart	4
	Russell	6
	Alcatraz	8
	Harmon	8
	Cost	*$30,400*
Alcatraz	Ellis	2
	Dover	2
	Baker	2
	California	4
	King	4
	Cost	*$11,200*
Allston	McKinley	1
	Cost	*$800*
Ashby	King	3
	Colby	3
	Deakin	4
	Mabel	4
	California	4
	Benvenue	4
	Fulton	4
	Hillegass	4
	Regent	4
	Domingo	4
	Claremont	8
	Adeline	12
	Cost	*$46,400*
Bancroft	Mid-Block	2
	Ellsworth	2
	Barrows	2
	Dana	4
	Bowditch	4
	Piedmont	6
	Oxford/Fulton	7
	Cost	*$21,600*

Main Street	Side Street	Domes Needed
Cedar	Kains	3
	Cornell	4
	Sacramento	4
	Stannage	4
	Bonita	4
	Spruce	4
	Walnut	4
	Milvia	4
	Oxford	4
	Chestnut	4
	Belvedere	4
	4th	4
	Curtis	4
	McGee	4
	Grant	4
	California	4
	5th	4
	Acton	4
	10th	4
	Martin Luther King	4
	Arch	4
	9th	4
	Ohlone Crossing (mid-block)	4
	Cost	*$72,800*
Claremont	Claremont Crest	2
	Brookside	2
	Eton	2
	Hillcrest	2
	Prince	2
	The Uplands	4
	Cost	*$11,200*
College	Garber	2
	Webster (N)	2
	Webster (S)	2
	Prince	2
	Stuart (N)	2
	Mid-Block bwtn Ashby/Russell	2
	Derby (S)	3
	Derby (N)	3
	Parker (N)	3
	Haste	4
	Alcatraz	4
	Dwight	4
	Channing	4
	Durant	4
	Woolsey	4
	Cost	*$36,000*

INSTALLATION OF TRUNCATED DOMES (PAGE 2 OF 3)

Main Street	Side Street	Domes Needed
Dwight	Curtis	1
	Waring	2
	Bowditch	2
	Hillegass	2
	Benvenue	2
	8th	2
	Valley	2
	Acton	2
	Browning	2
	Grant	3
	Fulton	3
	Dana	3
	7th	3
	Martin Luther King	4
	Sacramento	4
	Milvia	4
	Ellsworth	4
	College	4
	9th	4
	McGee	4
	6th	4
	4th	4
	Mid- Block (Alta Bates)	2
	Cost	*$53,600*
Gilman	Stannage	1
	Cornell	1
	Hopkins	2
	Acton	2
	Ordway	2
	Northside	2
	Kains	2
	Talbot	2
	Evelyn	2
	Peralta	4
	Neilson	4
	10th	4
	Cost	*$22,400*
Henry	Eunice	3
	Berryman	4
	Cost	*$5,600*

Main Street	Side Street	Domes Needed
Martin Luther King Jr	BART entry mid-block	2
	Russell	2
	Prince	2
	Stuart	2
	Ward	2
	Blake	2
	Carleton	2
	Center	3
	Haste	3
	Bancroft	3
	Berkeley Wy	3
	University	4
	Ashby	4
	Hearst	4
	Dwight	4
	Rose	4
	Cedar	4
	Allston	4
	Channing	4
	Oregon	4
	Delaware	4
	Virginia	4
	Francisco	4
	Derby	4
	Parker	4
	Berryman	4
	Vine	4
	Adeline	5
	Cost	*$76,000*
Rose	Edith	3
	California	3
	Grant	4
	Cost	*$8,000*
Sacramento	Prince	1
	Blake	1
	Tyler	2
	Woolsey	2
	Fairview	2
	Berkeley Wy	2
	Carleton	2
	Parker	2
	Russell	4
	Hearst (N)	4
	Hearst (S)	4
	Cedar	4
	Channing	4
	Bancroft	4
	Ward	4
	Hopkins	5
	Cost	*$37,600*

INSTALLATION OF TRUNCATED DOMES (PAGE 3 OF 3)

Main Street	Side Street	Domes Needed
Shattuck	Channing	1
	Carleton	1
	Derby	1
	Parker	1
	Emerson	2
	Delaware	2
	Lincoln	2
	Essex	2
	Prince	2
	French Hotel Mid-Block	2
	Safeway Mid-Block	2
	Francisco	3
	Hearst	4
	Ashby	4
	Cedar	4
	Berkeley Wy	4
	Oregon	4
	Russell	4
	Virginia	4
	Vine	4
	Woolsey	4
	Durant	8
	Allston	8
	Kittredge	8
	Bancroft	8
	Addison (E)	8
	Addison (W)	8
	Center	8
	Haste	8
	Cost	*$96,800*
Shattuck Place	Rose	8
	Cost	*$6,400*
Solano	Modoc	1
	Ensenada	4
	Cost	*$4,000*
Sutter	Yolo	2
	Cost	*$1,600*

Main Street	Side Street	Domes Needed
Telegraph	Prince (S)	2
	Ward	3
	Channing	4
	Durant	4
	Haste	4
	Stuart	4
	Oregon	4
	Blake	4
	Bancroft	4
	Howe	4
	Dowling	4
	Russell	4
	Carleton	4
	Webster	4
	Derby	4
	Woolsey	4
	Dwight	6
	Cost	*$53,600*
The Alameda	Monterey	4
	Marin	5
	Cost	*$7,200*
University	Jefferson	2
	Curtis	2
	Chestnut	2
	Shattuck(E)	3
	10th	4
	6th	4
	9th	4
	Milvia	4
	7th	4
	Bonita	4
	8th	4
	Oxford	4
	Cost	$32,800
Virginia	California	4
	Cost	$3,200

Total Domes	799
Cost per dome	$800
Total Cost	$639,200

Table 5: Installation of Perpendicular Curb Ramps

Main Street	Side Street	Ramps Needed
Addison	Jefferson	1
	Cost	*$5,000*
Ashby	Piedmont	2
	Pine	2
	Martin Luther King	4
	Shattuck	4
	Sacramento	4
	Cost	*$80,000*
Bancroft	Piedmont	1
	Cost	*$5,000*
Cedar	6th	4
	Cost	*$20,000*
College	Haste	4
	Ashby	4
	Alcatraz	4
	Cost	*$60,000*
Dwight	Piedmont	1
	Warring	2
	Martin Luther King	4
	Sacramento	4
	Cost	*$55,000*
Gilman	Santa Fe	2
	8th	4
	6th	4
	Cost	*$50,000*
Henry	Eunice	1
	Cost	*$5,000*
Martin Luther King Jr	University	4
	Ashby	4
	Hearst	4
	Dwight	4
	Hopkins	4
	Rose	4
	Cedar	4
	Cost	*$140,000*
Sacramento	Tyler	1
	Woolsey	1
	Fairview	2
	Rose	2
	Prince	3
	University	4
	Allston	4
	Harmon	4
	Ashby	4
	Russell	4
	Dwight	4
	Alcatraz	4
	Cost	*$185,000*
San Pablo	University	4
	Addison (S)	4
	Cedar	4
	Allston	4
	Delaware	4
	Dwight	4
	Ashby	4
	Gilman	4
	Cost	*$160,000*
Shattuck	Durant	2
	Hearst	4
	Ashby	4
	Cedar	4
	Cost	*$70,000*
Telegraph	Dwight	4
	Cost	*$20,000*
University	Shattuck(W)	4
	Martin Luther King	4
	Cost	*$40,000*

Total Ramps	**179**
Cost per corner	$5,000
Total Cost	**$895,000**

Table 6: Priority Intersections for Signal Timing

Intersections Adjacent to Senior Centers

Street 1	Street 2
Martin Luther King, Jr.	Hearst
6th	Hearst
Adeline	Oregon
Shattuck	Channing
Sacramento	Ashby
Shattuck	Hearst
Sacramento	Dwight
Sacramento	Alcatraz
9th	University
Acton	University
Shattuck	Haste
Martin Luther King, Jr.	Dwight
Claremont	Derby
Adeline	Ward

Intersections Adjacent to Elementary Schools

Street 1	Street 2
King	Ashby
6th	University
Martin Luther King, Jr.	Channing
Claremont	Ashby
Domingo	Ashby
Martin Luther King, Jr.	Bancroft
Colusa	Solano
Colusa	Tacoma
Sacramento	Rose
Eunice	Henry/Sutter

Table 7: Countdown Signal Heads

COUNTDOWN SIGNAL HEADS

Signal Heads Cost $800

Ranking	Main Street	Cross Street	Number of Heads	Cost
1	University	6th	8	$6,400
2	University	9th	8	$6,400
3	Shattuck	Ward	2	$1,600
4	Martin Luther King Jr	Haste	4	$3,200
5	Martin Luther King Jr	Bancroft	8	$6,400
6	Dwight	Shattuck	8	$6,400
7	Dwight	Fulton	4	$3,200
8	Shattuck	Vine	8	$6,400
9	Dwight	Ellsworth	6	$4,800
10	Martin Luther King Jr	Derby	8	$6,400
11	Ashby	Fulton	6	$4,800
12	Dwight	San Pablo	8	$6,400
13	Telegraph	Blake	8	$6,400
14	Dwight	Dana	4	$3,200
15	Martin Luther King Jr	Adeline	6	$4,800
16	College	Channing	8	$6,400
17	Telegraph	Webster	8	$6,400
18	College	Durant	8	$6,400
19	Ashby	Domingo	8	$6,400
20	Ashby	7th	6	$4,800
21	Claremont	The Uplands	6	$4,800

Total Cost **$112,000**

Table 8: Installation of Audible Signals Along Corridors

Corridor	Intersections
Adeline	Martin Luther King, Jr
Ashby	Domingo, Fulton, Mabel
Claremont	Uplands, Ashby
College	Ashby, Dwight, Haste, Channing, Durant
Dwight	Fulton, Ellsworth, Dana
Martin Luther King, Jr	Hopkins, Rose, Cedar, Center, Allston, Bancroft, Haste, Dwight, Derby, Russell, Ashby
Sacramento	Hopkins, Rose, Cedar, Delaware, Dwight, Ashby, Alcatraz
San Pablo	Gilman, Cedar, Delaware, Addison, Allston, Dwight, Grayson, Ashby
Shattuck	Rose, Vine, Cedar, Hearst, Haste, Dwight, Ward
Solano	Colusa
Telegraph	Woolsey, Ashby, Derby, Dwight, Haste, Channing, Durant, Bancroft
The Alameda	Solano, Marin
University	9th, Bonar, Acton, California, Oxford

Audible Signal Cost/Corner	**$1,000**
Total Corners	**63**
Total Cost	**$63,000**

Table 9: High Visibility Crosswalk Installation at Uncontrolled Locations

HIGH VISIBILITY CROSSWALK INSTALLATION AT UNCONTROLLED LOCATIONS
(locations of existing standard crosswalks not controlled by a stop sign or traffic signal)

High Visibility Crosswalk Cost $1,200

Ranking	Corridor	From	To	Number of Crosswalks	Cost
1	MLK	All	All	20	$24,000
2	Ashby	All	All	6	$7,200
3	University	All	All	12	$14,400
4	Shattuck	Oakland	Shattuck Place	16	$19,200
5	Milvia	Blake	University	4	$4,800
6	San Pablo	All	All	33	$39,600
7	Adeline	at 62nd	-	2	$2,400
8	Sacramento	All	All	20	$24,000
9	Telegraph	All	All	12	$14,400
10	Bancroft	at Barrows & at Ellsworth	-	2	$2,400
11	Cedar	at Bonita	-	2	$2,400
12	Channing	at Piedmont	-	2	$2,400
13	College	All	All	5	$6,000
14	Hopkins	San Pablo	Peralta	7	$8,400
15	Gilman	All	All	12	$14,400
16	Solano	All	All	11	$13,200

Total $199,200

Table 10: Standard Crosswalk and Advance Warning

STANDARD CROSSWALK AND ADVANCE WARNING SIGNAGE IMPROVEMENTS ON CORRIDORS

Rank	Arterial Corridor	From	To	Corridor Intersections needing signage	Corridor Sign Costs at $200 X 2 per Intersection
1	Martin Luther King, Jr	All	All	8	$3,200
2	Ashby	All	All	5	$2,000
3	University	All	All	12	$4,800
4	Shattuck	Oakland	Shattuck Place	11	$4,400
5	Milvia	Blake	University	5	$2,000
6	San Pablo	All	All	10	$3800
7	Adeline	All	All	5	$2,000
8	Sacramento	All	All	8	$3,200
9	Telegraph	All	All	1	$400
10	Bancroft	Oxford	Piedmont	5	$2,000
11	Cedar	Walnut	Martin Luther King, Jr	2	$800
12	Channing	Oxford	Piedmont	4	$1,600
13	College	All	All	4	$1,600
14	Durant	Oxford	Piedmont	4	$1,600
15	Hopkins	San Pablo	Peralta	3	$1,200
16	Claremont	Ashby	Oakland limits	2	$800
17	Gilman	All	All	6	$2,400
18	Solano	All	All	3	$1,200
			Total	107	$39,000

Table 11: Painted Red Curb Installation at Crosswalks on Arterials

PAINTED RED CURB INSTALLATION AT CROSSWALKS ON ARTERIALS

Red Stripe Cost $2

Ranking	Arterial Corridor	From	To	Total Crosswalks	Cost
1	Martin Luther King, Jr	All	All	57	$9,120
2	Ashby	All	All	82	$13,120
3	University	All	All	68	$10,880
4	Shattuck	Oakland limits	Shattuck Place	68	$10,880
5	Milvia	Blake	University	20	$3,200
6	San Pablo	All	All	71	$11,360
7	Adeline	All	All	17	$2,720
8	Sacramento	All	All	66	$10,560
9	Telegraph	All	All	37	$5,920
10	Bancroft	Oxford	Piedmont	16	$2,560
11	Cedar	Walnut	Martin Luther King, Jr	11	$1,760
12	Channing	Oxford	Piedmont	15	$2,400
13	College	All	All	39	$6,240
14	Durant	Oxford	Piedmont	13	$2,080
15	Hopkins	San Pablo	Peralta	13	$2,080
16	Claremont	Ashby	Oakland limits	24	$3,840
17	Gilman	All	All	52	$8,320
18	Solano	All	All	15	$2,400

Total **$109,440**

Table 12: Speed Feedback Sign Installation

Sacramento (northbound) south of Harmon	cost per sign	$10,000
Arlington (southbound) north of Mendocino	total signs	7
Dwight Way (eastbound) west of California	**total cost**	**$70,000**
Telegraph (northbound) south of Stuart		
Alcatraz (eastbound) west of California		
MLK (northbound) south of Russell		
Claremont (northbound) south of Hazel		

source: City of Berkeley Transportation Department. Pending Council Approval Feb 2008.

Additional Locations to Consider

Adeline Corridor
Ashby Corridor
Cedar Street
MLK south of Dwight
Sacramento Corridor
University Corridor
Virginia and Shattuck
Virginia and Oxford
Henry and Berryman

Table 13: Safe Routes to School Priorities

The following table lists the Safe Routes to School Priorities in the City of Berkeley. This list was developed based on the 100 highest priority intersections listed in Table 1 of this Appendix. Intersections listed in the 100 highest priorities which are within 500 feet of a school are listed below as candidates for Safe Routes to School Priorities.

SAFE ROUTES TO SCHOOL PRIORITIES

	Street 1	Street 2	Improvements	Note
1	University	6th	Signal timing	Project 1
2	University	7th	Truncated domes, curb ramps, pedestrian refuges, ladder crosswalks, lighting	Project 1
3	University	8th	Truncated domes, curb ramps, pedestrian refuges, ladder crosswalks, lighting	Project 1
4	Martin Luther King	Allston	Audible pedestrian signals	Project 6
5	Shattuck	Virginia	Bulbouts, MUTCD Assembly B signage, pedestrian activated flashers	Project 10
6	Shattuck	Lincoln	Bulbouts, MUTCD Assembly B signage	Project 10
7	Shattuck	Francisco	Restripe crosswalk, median nose, consider bulbout	Project 10
8	Shattuck	Cedar	Yield signage, restrict right turns on red	Project 10
9	Shattuck	Ward	Bulbouts	Project 11
10	San Pablo	Delaware	Bulbouts, Cross on (Pedestrian Symbol) Signal signage, median noses, pedestrian scaled luminaries, pedestrian scaled lighting, street trees	Project 15
11	Martin Luther King	Hopkins	Pedestrian refuge, bulbouts, pedestrian push buttons and actuated walk phase	Project 19
12	University	McGee	Bulbouts, perpendicular curb ramps, truncated domes, in-roadway yield to pedestrian signs	Project 21
13	Martin Luther King	Center	Audible pedestrian signals, truncated domes, red curbs, stop bars	
14	University	Chestnut	High visibility crosswalks, truncated domes, crosswalk warning signage, red curbs	
15	University	Curtis	High visibility crosswalks, truncated domes, crosswalk warning signage, red curbs	
16	Martin Luther King	Haste	Audible pedestrian signals, countdown signal, truncated domes, red curbs, stop bars	

SAFE ROUTES TO SCHOOL PRIORITIES

	Street 1	Street 2	Improvements	Note
17	Bancroft	Dana	Sidewalk gap fill, truncated domes, crosswalk warning signage, red curbs	
18	Ashby	Deakin	High visibility crosswalks, truncated domes, crosswalk warning signage, red curbs	
19	Martin Luther King	Bancroft	Longer pedestrian signal, countdown signal, audible pedestrian signals, truncated domes, red curbs, stop bars	
20	Bancroft	Ellsworth	High visibility crosswalks, truncated domes, crosswalk warning signage, red curbs	
21	University	Bonar	Audible pedestrian signal, red curbs	
22	Martin Luther King	Channing	Longer pedestrian signal, truncated domes, red curbs, stop bars	
23	Adeline	Stuart	Truncated domes, red curbs	
24	University	Jefferson	High visibility crosswalks, truncated domes, crosswalk warning signage, red curbs	
25	Ashby	King	Longer pedestrian signals, countdown signal, audible pedestrian signals, truncated domes, perpendicular curb ramps, red curbs	
27	Allston	McKinley	Truncated domes	

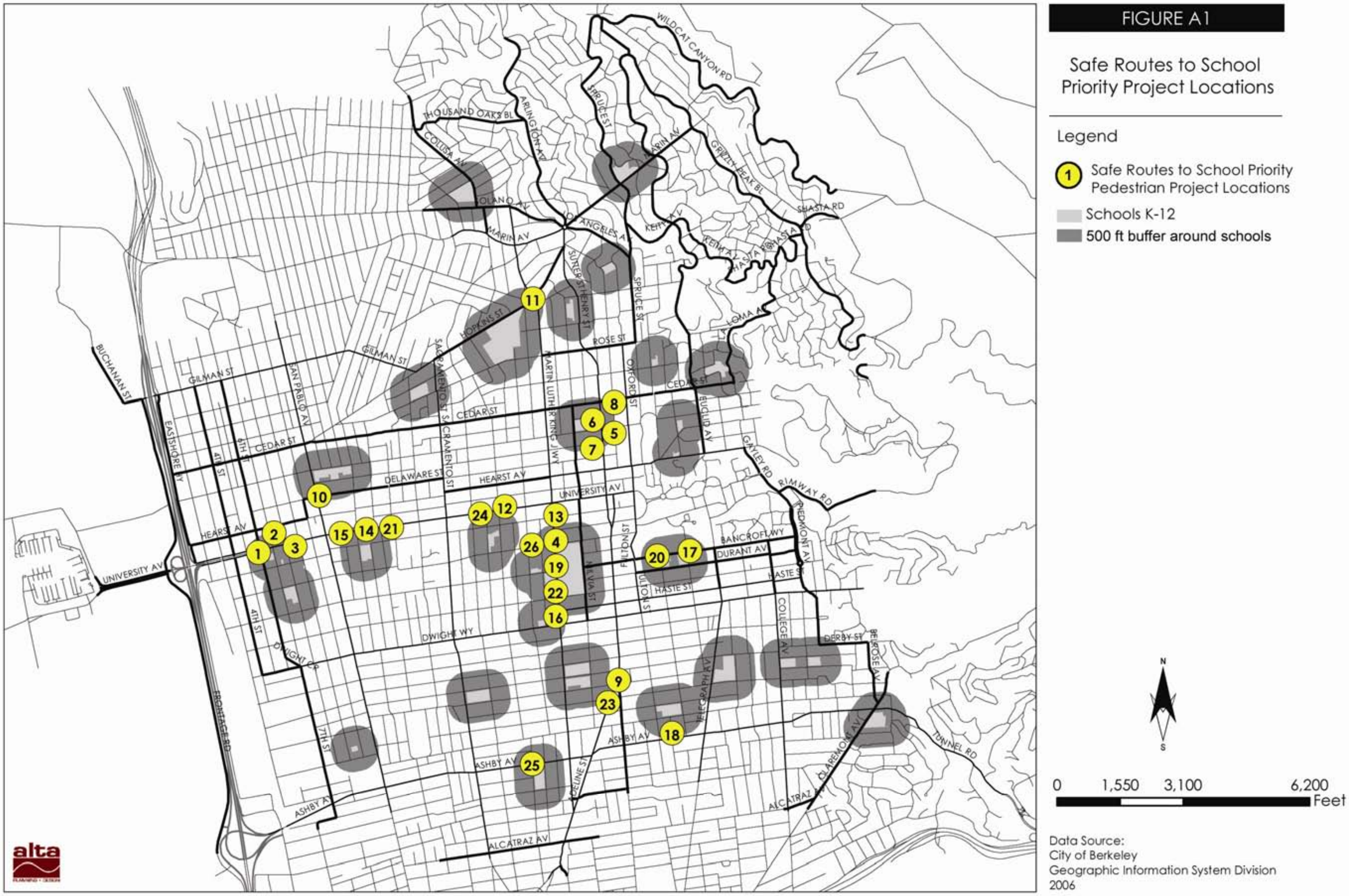
FIGURE A1
Safe Routes to School Priority Project Locations
Legend
Safe Routes to School Priority Pedestrian Project Locations
Schools K-12
500 ft buffer around schools
0 1,550 3,100 6,200 Feet
Data Source:
City of Berkeley
Geographic Information System Division
2006

Table 14: Pathway and Stairway Improvements

Name	From	To	Status	Priority	Est. Cost
Halkin Walk	Cragmont	Euclid	Unbuilt	High	30,000
Halkin Walk	Euclid	Hilldale	Unbuilt	High	30,000
Keeler Walk	Grizzly Peak	Creston	Unbuilt	High	5,000
Shasta Walk	Keeler	Shasta	Unbuilt	High	1,000
Tilden Path	Shasta	Grizzly Peak	Unbuilt	High	1,000
Parnassus Path	Buena Vista	Parnassus Ct.	Unbuilt	High	10,000
Columbia Path	Queens	Columbia Circle	Unbuilt	High	10,000
Columbia Path	Campus	Queens	Unbuilt	High	10,000
Harding Path	Campus	Harding Circle	Unbuilt	High	1,000
Wilson Path	Campus	Olympus	Unbuilt	High	5,000
Northgate Path	Shasta	Quail	Unbuilt	High	20,000
Devon Lane	San Diego	Southampton	Unbuilt	Medium	1,000
Miller Path West	Miller	Grizzly Peak	Unbuilt	Medium	10,000
Miller Path East	Grizzly Peak	Creston	Unbuilt	Medium	10,000
Cragmont Path	Cragmont	Keeler	Unbuilt	Medium	1,000
Hill Path	Grizzly Peak	Hill	Unbuilt	Medium	5,000
Twain Path	Sterling/Twain	Whitaker	Unbuilt	Medium	1,000
Path 71	Sterling	Miller	Unbuilt	Medium	30,000
Path 80	Hillview	Wildcat Canyon	Unbuilt	Medium	1,000
Delmar Path	Delmar	Glendale	Unbuilt	Medium	1,000
Grizzly Path	Grizzly Peak	Summit	Unbuilt	Medium	1,000
Summit Path	Grizzly Peak	Summit	Unbuilt	Medium	1,000
Avenida Path	Avenida	Grizzly Peak	Unbuilt	Medium	5,000
Hilgard Path	End of Hilgard	La Vereda	Unbuilt	Medium	10,000
Twain Way	Cragmont	Keeler	Unbuilt	Lower	30,000
Path 74	Woodside	Wildcat Canyon	Unbuilt	Lower	1,000
Rose Glen Alley	Rose	Glen	Part-built	Lower	1,000

Total **$232,000**

Table 15: Multi-Use Path Projects

MULTI-USE PATH PROJECTS

Name	From	To	Cost
9th Street Connector Path	Heinz	Ashby	$550,000
Santa Fe Right of Way Path	Virginia	Ohlone Greenway	$875,000
Bay Trail	Gilman	N. City Limit	$150,000
		Total	$1,575,000

Table 16: Signalized Intersections with the Highest Pedestrian Collision Rate

Section 6.3.1 Signage and Striping recommends the following improvements to these intersections:
Stop Bars 5 feet back from crosswalk: 87 intersections x 4 bars per intersection x $300 per bar = $104,400

SIGNALIZED INTERSECTIONS WITH THE HIGHEST PEDESTRIAN COLLISON RATE
Pedestrian collision rate is calculated by number of pedestrian-related collisions 1999-2004 divided by estimated pedestrian flow.

				Pedestrian-Related Collisions 1999-2004				
Rank	STREET 1	STREET 2	ESTIMATED PED FLOW	# Fatalities	# Injuries	# Property Damage Only	Sum Collisions	Collisions/ Flow
1	MLK	Allston	38	0	10	0	10	0.263
2	College	Ashby	42	0	7	0	7	0.167
3	Shattuck	Cedar	59	0	7	0	7	0.119
4	San Pablo	Ashby	34	0	4	0	4	0.118
5	Telegraph	Ashby	39	0	4	0	4	0.103
6	Fulton	Cedar	20	0	2	0	2	0.100
7	San Pablo	University	20	0	2	0	2	0.100
9	Sacramento	University	52	0	4	0	4	0.077
11	College	Alcatraz	27	0	1	1	2	0.074
12	7th	Dwight	46	0	3	0	3	0.065
13	Shattuck	University	92	0	6	0	6	0.065
14	San Pablo	Allston	48	0	2	1	3	0.063
15	Fulton	Bancroft	34	0	2	0	2	0.059
16	San Pablo	Delaware	38	0	2	0	2	0.053
17	MLK	Rose	42	0	2	0	2	0.048
18	Milvia	University	88	0	3	1	4	0.045
20	6th	University	96	0	4	0	4	0.042
21	MLK	Ashby	120	0	5	0	5	0.042
22	MLK	Hopkins	72	0	3	0	3	0.042
23	MLK	Russell	103	0	4	0	4	0.039
24	Shattuck	Allston	155	0	6	0	6	0.039
25	MLK	Channing	26	0	0	1	1	0.038
26	MLK	University	104	0	4	0	4	0.038
28	San Pablo	Cedar	107	0	4	0	4	0.037
29	San Pablo	Gilman	55	0	1	1	2	0.036

SIGNALIZED INTERSECTIONS WITH THE HIGHEST PEDESTRIAN COLLISON RATE
Pedestrian collision rate is calculated by number of pedestrian-related collisions 1999-2004 divided by estimated pedestrian flow.

				Pedestrian-Related Collisions 1999-2004				
Rank	STREET 1	STREET 2	ESTIMATED PED FLOW	# Fatalities	# Injuries	# Property Damage Only	Sum Collisions	Collisions/ Flow
30	Telegraph	Channing	171	0	4	2	6	0.035
31	Oxford	University	91	0	3	0	3	0.033
33	Sacramento	Rose	94	0	3	0	3	0.032
34	Action	University	96	0	3	0	3	0.031
36	MLK	Derby	64	0	2	0	2	0.031
37	Bowditch	Durant	171	0	5	0	5	0.029
38	Adeline	Alcatraz	111	0	3	0	3	0.027
39	Colusa	Solano	80	1	1	0	2	0.025
40	Oxford	Hearst	121	0	3	0	3	0.025
42	Milvia	Center	87	0	1	1	2	0.023
43	The Alameda	Marin	87	0	2	0	2	0.023
44	MLK	Cedar	46	0	1	0	1	0.022
45	Piedmont	Dwight	136	0	3	0	3	0.022
46	Telegraph	Durant	189	0	4	0	4	0.021
47	Colby	Ashby	98	0	2	0	2	0.020
48	MLK	Dwight	100	0	2	0	2	0.020
49	San Pablo	Dwight	102	0	2	0	2	0.020
50	Sacramento	Delaware	108	0	2	0	2	0.019
51	Shattuck	Kittredge	103	1	1	0	2	0.019
52	Telegraph	Stuart	160	0	3	0	3	0.019
53	Dana	Dwight	113	0	2	0	2	0.018
54	Henry	Rose	56	0	1	0	1	0.018
55	Milvia	Allston	168	0	3	0	3	0.018
56	Sacramento	Ward	112	0	2	0	2	0.018
57	Shattuck	Channing	167	0	3	0	3	0.018
58	Shattuck	Vine	167	0	3	0	3	0.018
59	La Loma	Hearst	175	0	3	0	3	0.017
60	MLK	Bancroft	116	0	2	0	2	0.017
61	Adeline	Ward	129	0	2	0	2	0.016

SIGNALIZED INTERSECTIONS WITH THE HIGHEST PEDESTRIAN COLLISON RATE
Pedestrian collision rate is calculated by number of pedestrian-related collisions 1999-2004 divided by estimated pedestrian flow.

				Pedestrian-Related Collisions 1999-2004				
Rank	STREET 1	STREET 2	ESTIMATED PED FLOW	# Fatalities	# Injuries	# Property Damage Only	Sum Collisions	Collisions/ Flow
62	Sacramento	Dwight	127	0	2	0	2	0.016
63	Telegraph	Haste	124	0	2	0	2	0.016
64	College	Dwight	131	0	2	0	2	0.015
65	Shattuck	Hearst	136	1	1	0	2	0.015
66	Telegraph	Derby	67	0	1	0	1	0.015
67	Ellsworth	Durant	70	0	1	0	1	0.014
68	Shattuck	Bancroft	70	0	1	0	1	0.014
70	Domingo	Ashby	76	0	1	0	1	0.013
71	Sacramento	Ashby	155	0	2	0	2	0.013
72	Telegraph	Russell	76	0	1	0	1	0.013
73	Shattuck	Center	163	0	2	0	2	0.012
74	Telegraph	Dwight	170	0	2	0	2	0.012
75	Telegraph	Blake	87	0	1	0	1	0.011
76	MLK	Haste	99	0	1	0	1	0.010
77	Sacramento	Alcatraz	101	0	1	0	1	0.010
78	Shattuck	Addison	97	0	1	0	1	0.010
79	Telegraph	Webster	111	0	1	0	1	0.009
80	Claremont	Ashby	126	0	1	0	1	0.008
81	Fulton	Haste	122	0	1	0	1	0.008
82	Adeline	Woolsey	145	0	1	0	1	0.007
83	College	Channing	136	0	1	0	1	0.007
84	Mabel	Ashby	139	0	1	0	1	0.007
85	Shattuck	Durant	152	0	1	0	1	0.007
86	Center	MLK	163	0	1	0	1	0.006
87	Shattuck	Dwight	160	0	1	0	1	0.006

Need for and type of additional signals and traffic controls is subject to further planning evaluation and traffic engineering review.

Table 17: Potential Signals Proposed in Berkeley Bicycle Master Plan Appendix F

Route	Street	From	To	Proposal
7a	Virginia	Fifth	La Loma	Need stop signals at major intersections
13b	Bancroft	at Dana		Stop sign or signals
14b	Channing	9th	MLK	Need signals at major intersections
15a	Parker	9th	Warring	Need signals at major intersections
17c	Russell	San Pablo	Claremont	5 signals at major streets
58b	California	Dwight		Signal
58c	King	Alcatraz		Signal
67a	Oxford	Hearst	Kittredge	Signal or caution sign at Allston. Remove free right turn at Hearst.
69a	Dana	Bancroft		Signal or stop sign
71b	Hillegass	Ashby		Signal or stop sign
71b	Hillegass	Alcatraz		Signal or stop sign

Table 18: Related Improvements Proposed in Berkeley Bicycle Master Plan Appendix F

Route	Street	From	To	Proposal
6a	Rose	Ohlone Greenway		Stop sign
8c	Hearst	California	Shattuck	Improve lighting
12a	Addison	Aquatic Park	Fourth	Distinctive signage to bicycle/pedestrian bridge
17a	Heinz	9th	San Pablo	Improve lighting
17b	San Pablo	Heinz	Russell	Improve lighting
17c	Russell	San Pablo	Claremont	Improve lighting
21c	Seawall Drive	North	South	Class1 Path
23a	Ashby Overcrossing	Bay Street	Bay Trail	Reconfigured freeway interchange
24a	Virginia Street Extension	Bay Trail	Marina Boulevard	Class 1 Path - note since constructed (verify)
50a	Bay Trail	Albany	Gilman	Class1 Path - note, since constructed
50c	Bay Trail	City of Emeryville	University	Class1 Path - note, since constructed
52b	5th Street	Virginia	Hearst	Distinctive signage to bicycle/pedestrian bridge
52c	Hearst	Fifth	Fourth	Distinctive signage to bicycle/pedestrian bridge
52d	Fourth	Hearst	Channing	Distinctive signage to bicycle/pedestrian bridge
53e	9th Street	Heinz	City of Emeryville	Long-term route. Abandoned RR right of way, no through traffic.
56a	Ohlone Greenway	City of Albany	California	Widen to 8-10 ft; pave north of Gilman; straighten near Cedar-Rose Park; stop signs on Cedar, Rose, Hopkins/Peralta, Gilman, Santa Fe; raised intersections at street crossings; cross-street signing for path users
62b	Milvia	Allston	Dwight	Remove free right turn at Allston

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APPENDIX B

PEDESTRIAN DESIGN GUIDELINES

TABLE OF CONTENTS

1. INTRODUCTION

Good street design can make the City of Berkeley's streets more vibrant and active, encouraging people to walk by providing an experience that is safe, comfortable and attractive. The City of Berkeley's strong commitment to pedestrian safety and access is reflected in its existing design standards, policies and specific plans. The purpose of the Pedestrian Design Guidelines is to integrate existing resources and innovative best practice ideas into one coherent set of guidelines aimed at further improving the pedestrian experience in Berkeley. These guidelines can be used by policy makers, planners and the public to guide decisions related to new construction as well as retrofitting existing infrastructure.

The guidelines are built upon the City of Berkeley's existing pedestrian-related planning, zoning and engineering policies. In the cases where the City did not have an adopted policy, recommendations were made based on widely recognized best-practice guidelines and state and federal regulations. Because they are largely based on the City's adopted policies and plans, this document can serve as a comprehensive resource for pedestrian improvements throughout the City. However, in all cases, engineering judgment is required in implementing specific projects.

This document is divided into several sections. The first two sections provide an overview of the guidelines, plans and principles that informed the development of the Pedestrian Design Guidelines. Next, the document provides guidelines for three major components of the pedestrian realm: sidewalks, street corners and crossings. These three elements are important building blocks to a street system where pedestrians feel comfortable, safe and encouraged to walk. Next, the document describes recommendations related to traffic calming, which has been widely used in the City of Berkeley, and access to transit, which is an important issue for the City's many bus and BART riders.

Creating a truly pedestrian-oriented streetscape also requires that development along street corridors support pedestrian movement and create an active street environment. Therefore, these guidelines conclude by describing considerations for private development that support pedestrian activity and comfort.

Many sections in the Pedestrian Design Guidelines address accessibility needs for pedestrians with limited mobility or assistance devices. A set of separate accessibility recommendations are also presented in Section 12 of this Appendix, which can be used as a stand-alone document.

2. EXISTING GUIDELINES AND PLANS

The design of many pedestrian elements is regulated by state and federal law. Traffic control devices must follow the standards set forth in the California Manual of Uniform Traffic Control Devices (MUTCD), while elements such as sidewalks and curb cuts must comply with guidelines implementing the Americans with Disabilities Act (ADA). The City of Berkeley also has a variety of adopted planning documents that contain specific pedestrian and streetscape design guidance.

2.1. CALIFORNIA MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES

When installing traffic control devices, the City of Berkeley follows the procedures and policies set out in the California Manual of Uniform Traffic Control Devices (MUTCD), which provides uniform standards and specifications for the placement, construction, and maintenance of all traffic control devices including traffic signals, traffic signs and street markings. The California MUTCD emphasizes uniformity of traffic control devices to protect the clarity of their message and provide a sense of what to expect for both drivers and pedestrians. "Uniformity" means devices that conform to regulations for dimensions, color, wording, and graphics and means treating similar situations in the same way. Sections of the California MUTCD that are most applicable to pedestrian planning include Part 2: Signs (which covers devices such as pedestrian warning signs), Part 3: Markings (which covers pavement markings including crosswalks), and Part 7: Traffic Controls for School Areas (which covers a variety of specific signs and markings for use in school zones). These Berkeley Pedestrian Design Guidelines refer frequently to the California MUTCD standards for signage and markings.

The California MUTCD is available at the following website:
http://www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/ca_mutcd.htm

2.2. AMERICANS WITH DISABILITIES ACT

Title II of the Americans with Disabilities Act (ADA), signed into law in 1990, is a civil rights act that prohibits public entities from discrimination on the basis of disability. Newly constructed public facilities must be free of architectural barriers that restrict access or use by individuals with disabilities. Cities in California use two technical standards for accessible design: the Americans with Disabilities Act Accessibility Guidelines (ADAAG), adopted by the Department of Justice for places of public accommodation and commercial facilities covered by Title 3 of the ADA, and the State Architectural Regulations for Accommodation of the Physically Handicapped in Public Facilities, found in Title 24 of the California Code of Regulations, also known as the California Standards Building Code. More detailed information on specific ADA standards for pedestrian facilities is discussed in Section 12, Accessibility Recommendations.

The ADAAG accessibility guidelines can be accessed at the following website:
http://www.access-board.gov/adaag/html/adaag.htm

2.3. LOCAL GUIDELINES AND PLANS

The City of Berkeley Municipal Code includes regulations that apply to sidewalk engineering and use. These design guidelines incorporate existing municipal code standards, which are available on the City of Berkeley's website: www.ci.berkeley.ca.us/bmc/.

The City of Berkeley Municipal Code includes regulations that apply to designated landmarks. Projects that affect historic landmarks must have a design review conducted by the Landmarks Preservation Committee.

The City of Berkeley *Standard Details* provide detailed specifications for the design and construction of street elements such as sidewalks, curb ramps, driveways, and curbs and gutters. Any project involving construction or reconstruction of these street elements within the public right-of-way must conform to the standard detail drawings. Standard details for pedestrian-related elements have been referenced and diagramed where applicable throughout this design guidelines document.

The Transportation Element of the General Plan includes recommendations for some specific design interventions, which are included in the recommendations below. The General Plan is available on the

City of Berkeley's website: www.ci.berkeley.ca.us/planning/landuse/plans/generalPlan/Intro.html. Key policies of the General Plan are discussed in Chapter 2 and Chapter 3 of the Pedestrian Master Plan.

The City of Berkeley has nine *Area Plans* as well as a number of other guidelines and reports that affect the pedestrian realm. When applicable, recommendations from Area Plan documents are referenced in the following guidelines. These Area Plans are summarized in Chapter 3 of the Pedestrian Master Plan. Copies of many of these plans are available on the City's Planning Department website at: http://www.ci.berkeley.ca.us/planning/landuse/adopted.html

The City of Berkeley's *Americans with Disabilities Act Transition Plan* contains a plan to remove barriers to accessibility across the city. The plan is currently being updated. Information on the status of the Transition Plan and other information about the City's ADA compliance efforts can be obtained via the City's disability compliance website at: http://www.ci.berkeley.ca.us/pw/disability/disabilitycp.htm

3. PRINCIPLES OF GOOD PEDESTRIAN DESIGN

The following design principles represent a set of ideals which should be incorporated, to some degree, into every pedestrian improvement. They are ordered roughly in terms of relative importance.

1. **The pedestrian environment should be safe.**

   Sidewalks, walkways and crossings should be designed and built to be free of hazards, offer a sense of security and minimize conflicts with external factors such as noise, vehicular traffic and protruding architectural elements.

2. **The pedestrian network should be accessible to all.**

   Sidewalks, walkways and crosswalks should ensure the mobility of all users by accommodating the needs of people regardless of age or ability.

3. **The pedestrian network should connect to places people want to go.**

   The pedestrian network should provide continuous direct routes and convenient connections between destinations, including homes, schools, shopping areas, public services, recreational opportunities, and transit.

4. **The pedestrian environment should be easy to use.**

   Sidewalks, walkways and crossings should be designed so people can easily find a direct route to a destination and will experience minimal delay.

5. **The pedestrian environment should provide a sense of place**.

   Good design should enhance the look and feel of the pedestrian environment. The pedestrian environment includes open spaces such as plazas, courtyards, and squares, as well as the building facades that give shape to the space of the street. Amenities such as seating, street furniture, banners, art, trees, plantings, shading, and special paving, along with historical elements and cultural references, should promote a sense of place.

6. **The pedestrian environment should be used for many things.**

   The pedestrian environment should be a place where public activities are encouraged. Commercial activities such as dining, vending and advertising may be permitted when they do not interfere with safety and accessibility.

7. **Pedestrian improvements should preserve or enhance the historical qualities of a place and the city.**

   Berkeley's history must be preserved in the public space. Where applicable, pedestrian improvements should restore and accentuate historical elements of the public right-of-way. Good design will allow pedestrians to experience a sense of Berkeley's history.

8. **Pedestrian improvements should be economical.**

   Pedestrian improvements should be designed to achieve the maximum benefit for their cost, including initial cost and maintenance cost as well as reduced reliance on more expensive modes of transportation. Where possible, improvements in the right-of-way should stimulate, reinforce and connect with adjacent private improvements.

4. SIDEWALK CORRIDOR GUIDELINES

Sidewalks are the most fundamental element of Berkeley's pedestrian network. The sidewalk corridor provides an environment for walking that is separated from vehicle movement. Successful sidewalks not only provide safe passage for pedestrians, but are integral in providing public gathering space, supporting vibrant commercial corridors and providing the means for an active and healthy community. Because most trips start and end on foot, sidewalks also provide critical connections between other modes of transport.

The City of Berkeley Municipal Code defines "sidewalk" as the portion of a street between the curb line and the adjacent property line intended for the use of pedestrians.[1] The term "pedestrian" includes persons using wheelchairs.[2] There are approximately 340 miles of concrete sidewalks in Berkeley.[3]

4.1. SIDEWALK WIDTHS

The sidewalk corridor is typically located within the public right-of-way between the curb or roadway edge and the property line. Sidewalks should have adequate width for the level of anticipated user, but at a minimum should permit two users to walk comfortably side-by-side and allow ease of passage by people using canes, wheelchairs, or other mobility assistance devices. The City of Berkeley requires a minimum of 6 feet of pedestrian clear space on all sidewalks.[4] This is interpreted to mean that for new construction, the minimum allowable through passage zone width is 6 feet. In many parts of the city, sidewalks are 5 feet or less and do not meet this clearance width requirement. For sidewalks wider than 6 feet, the minimum clearance requirement mandates that there be no encroachment into the sidewalk (e.g., of tables or chairs at a sidewalk café) unless the minimum 6-foot clearance is maintained. In high-pedestrian use areas such as downtown, sidewalks wider than 6 feet are recommended due to the high pedestrian volumes. Specific guidelines for sidewalk widths, building frontage setbacks and streetscape elements for many high-pedestrian use areas of Berkeley are provided in the appropriate area plans for those locations.

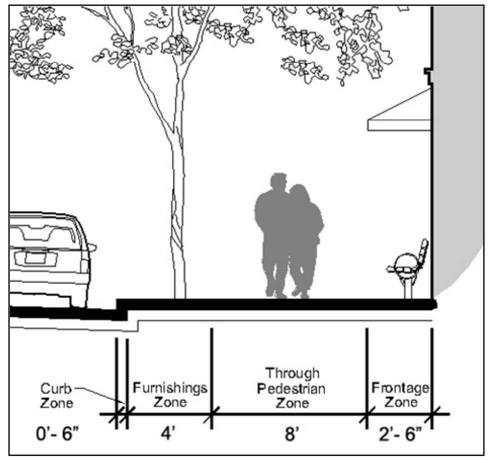
For design purposes, the sidewalk corridor is broken up into four distinct zones: the ***Curb Zone***, the ***Furnishings Zone***, the ***Through Passage Zone***, and the ***Frontage Zone***. Descriptions of each zone

[1] Berkeley Municipal Code, Section 1.04.101
[2] Berkeley Municipal Code, Section 16.40.020
[3] Berkeley Pedestrian Master Plan GIS centerline file for sidewalk network.
[4] Berkeley Municipal Code, Section 16.18.080: "No major or minor encroachment into a sidewalk may be granted unless a minimum clear space of six feet remains open for public use in the sidewalk area."

are included in this section, with recommendations for minimum widths shown in Table 1. Design guidelines for each of the zones are presented in the following section.

4.2. CURB ZONE

Figure 1
Sidewalk Zones



Curbs prevent water in the street gutters from entering the pedestrian space, discourage vehicles from driving over the pedestrian area, and make it easy to sweep the streets. The curb helps to define the pedestrian environment of a streetscape. At the corner, the curb is an important tactile element for pedestrians who are finding their way with the use of a cane.

4.3. FURNISHINGS ZONE

The furnishings zone is the area between the curb zone and the through passage zone, where pedestrians pass. The furnishings zone creates an important buffer between pedestrians and vehicle travel lanes by providing horizontal separation. On sidewalks of ten feet or greater, the furnishings zone width should be a minimum of four feet. A wider zone should be provided in areas with large planters and/or seating areas, like those on Shattuck Avenue in downtown Berkeley.

4.4. THROUGH PASSAGE ZONE

The through passage zone is the area dedicated for pedestrian travel and can also serve as public gathering space. In order for two people to walk comfortably side-by-side, a six-foot minimum through passage zone is recommended. Areas with higher pedestrian volumes warrant a wider through passage zone.

4.5. FRONTAGE ZONE

The frontage zone is the space between the through zone and the adjacent property line. Pedestrians tend to avoid walking close to barriers at the property line, such as buildings, storefronts, walls or fences, in the same way that they tend to avoid walking close to the roadway. In most cases the frontage zone should be at least 12 inches.

Table 1
Recommended Minimum Zone Widths By Street Type

Street Type	Curb Zone	Furnishings Zone	Through Passage Zone	Frontage Zone	Total Sidewalk Width
Major Street, Pedestrian District	0’ - 6”	4’	8’	6” - 2’	15’
Collector Street	0’ - 6”	4’	6’	6” - 1’	12’
Local Street	0’ - 6”	4’	6’	0’ - 6”	11’

4.6. DESIGN OF THE FURNISHINGS ZONE

Sidewalk furnishings are located in the furnishings zone to buffer pedestrians from the adjacent roadway and to keep the through passage zone clear for passage. Sidewalk furnishings provide an important buffer and should be designed to pedestrian scale. The furnishings zone is also the area where people alight from parked cars.

Elements in the furnishings zone include:

- Bus shelters
- Benches
- Trees, planters & landscaping
- Trash & recycling receptacles
- Bicycle racks
- Public art
- Consolidated news racks
- Telephone poles
- Banners & flags
- Information kiosks
- Fountains
- Wayfinding/signage
- Street lights
- Fire hydrants
- Utility boxes

Figure 2
Furnishing Zone

The Furnishings Zone buffers pedestrians from the roadway and is the place for elements such as street trees, poles, parking meters, and street furniture.

Separating pedestrians from vehicular travel lanes greatly increases their comfort as they use the sidewalk corridor. This buffer function of the furnishings zone is especially important on streets where traffic is heavy. Where possible, additional width should be given to this zone on streets with posted traffic speeds over 30 mph.

4.6.1. Street Trees and Plantings

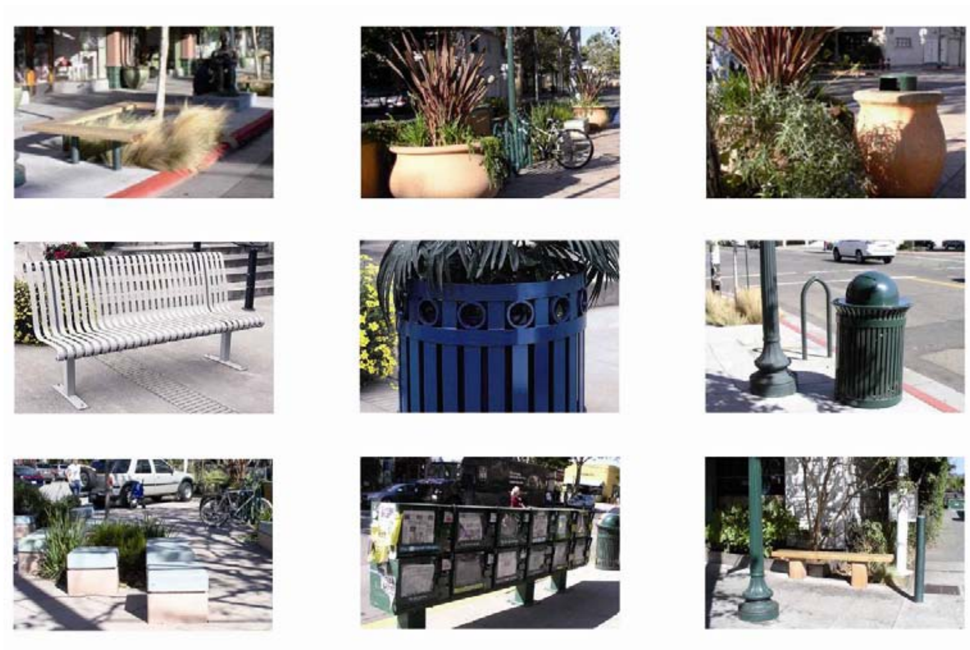
Street trees are a vital element of Berkeley’s pedestrian landscape, providing visual interest, shade and a feeling of protection to pedestrians. Wherever the sidewalk is wide enough, the furnishings zone should include street trees. In commercial areas, this zone may be paved, with tree wells and planting pockets for trees, flowers, and shrubs. In other areas, this zone generally is not paved except for access walkways, but is landscaped with some combination of street trees, shrubs, ground cover, lawn, or other landscaping treatments.

In order to maintain line of sight to stop signs or other traffic control devices at intersections, when planning for new trees, care should be taken not to plant street trees within 25 feet of corners of any intersection. Care should be taken to choose street trees that are appropriate. Trees should be easy to maintain and require little water after established. Trees with a shrubby habit, trees with thorns or sharp seed pods, and those with lots of fruit drop should be avoided.

4.6.2. Street Furniture and Amenities

Street furniture and amenities, such as benches, artwork and information boards, humanizes the scale of a street and encourages pedestrian activity. Street furniture should be placed in the furnishings zone to maintain through passage zones for pedestrians and to provide a buffer between the sidewalk and the street.

Figure 3
Examples of Street Furniture in Berkeley



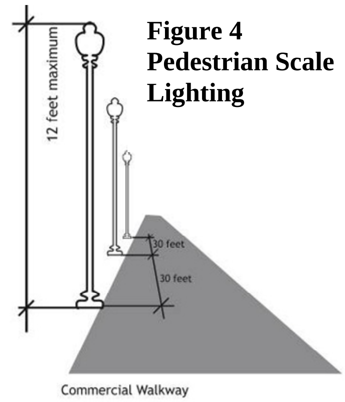
4.6.3. Newsracks

Although newsracks provide a pedestrian amenity, their proliferation has led to specific regulations that control their placement. The Berkeley Municipal Code prohibits placement of newsracks, as well as sandwich boards, in any location that would reduce the clear path for a pedestrian to less than eight feet. Newsracks are also prohibited within specific distances from bus stops, curbs, corners, tree wells and planters, wheelchair ramps, and bike racks.[5] Design standards for newsracks are contained in the Berkeley Municipal Code.[6]

[5] Berkeley Municipal Code, Section 16.40.080
[6] Berkeley Municipal Code, Section 16.44.070

4.6.4. Lighting

Figure 4
Pedestrian Scale Lighting



Pedestrian scale lighting improves visibility and can provide a vertical buffer between the sidewalk and the street, defining pedestrian areas. Pedestrian scale lighting should be used in areas of high pedestrian activity and where feasible based on available right of way, utilities and cost. A guideline for a pedestrian way is illumination of between 0.5 foot-candle to 1 foot-candle. Pedestrian scale lighting is a significant capital improvement and should be provided only where it will have a maximum benefit, such as public safety. When installing pedestrian scaled lighting, the following details should also be considered:

- Need for strong structures to withstand vandalism
- Materials should fit with City standards and areas' character
- Glare to adjacent residents
- Color of light
    - o High pressure sodium lamps have the longest life and lowest maintenance cost with a yellow light quality.
    - o Metal halide lights produce a white light quality but have shorter lamp life.

Figure 5
Public Art Installation in Downtown Berkeley

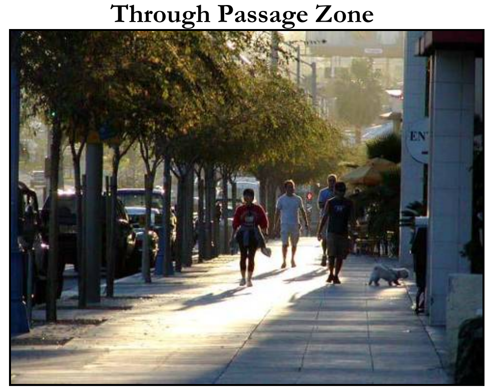
4.6.5. Public Art

Public art adds visual interest to enhance the pedestrian environment of sidewalks, plazas or other pedestrian spaces. Art can act as a gateway or focal point, signaling arrival to a special place. Or, it can be used to define a "district" by creating a unified sense of design. Art can take the form of stand-alone pieces, or can be incorporated into functional features such as bicycle racks, benches or planters. As with all pedestrian amenities, public art should not infringe on the through passage zone. The City of Berkeley has an extensive Public Art program, which includes "gateway" art at main access points into the city, a set of downtown public art installations, and a series of sidewalk art pieces along Addison Street. More information on Berkeley's Public Art Program can be found on the City's website: http://www.ci.berkeley.ca.us/civicarts/publicart.htm

4.7. DESIGN OF THE THROUGH PASSAGE ZONE

The through passage zone is the area intended for pedestrian travel. This zone should be entirely free of permanent and temporary objects. As noted earlier, the City of Berkley requires a 6-foot minimum clearance for through passage travel on the sidewalk. Eight feet of clearance is required in front of newspaper racks.

Figure 6
Through Passage Zone



The Through Passage Zone is the area of the Sidewalk Corridor intended for pedestrian travel.

4.7.1. Surfaces

Sidewalks should be firm and stable, and resistant to slipping. Sidewalks are normally constructed out of Portland cement concrete. According to the Berkeley Municipal Code, "sidewalks should be constructed using wood-float-finished concrete, heavy-broom-finished concrete or paving bricks embedded in concrete. Other materials must be approved by the Director of Public Works."[7] The municipal code also allows concrete sidewalk to be colored where a specific aesthetic is desired. Where stamped concrete patterns are used, care should be taken to provide a surface that does not reduce mobility for wheelchair users or create vibrations.

Berkeley has recently implemented several sections of experimental rubber sidewalk, which provide a softer walking surface and help to prevent cracked or uplifted sidewalks where tree roots are present. The rubber sidewalks are installed using interlocking rubber pavers that allow for easy maintenance and replacement and allow water to pass through, so tree roots are less likely to surface in search of water. Several other cities in the U.S. have installed sections of rubber sidewalk including Santa Monica, Seattle, and Washington, DC, and are reporting good results in terms of reduced uplifting.

Although multi-use pathways may be constructed out of asphalt, asphalt is not suitable for sidewalk construction due to its shorter lifespan and higher maintenance costs.

Table 2 presents a summary of sidewalk materials and considerations for their use.

Table 2: Sidewalk Material Comparison

Concrete	
Where to Use	Preferred material for use on standard city sidewalks.
Maintenance Life	75 years plus (with no tree root damage)
Comparative Cost (2007)	$29.25/sq yd
20 Year Cost	$7.80/sq yd
Concrete Pavers	
Where to Use	Acceptable material for use where aesthetic treatment is desired, at the discretion of the Director of Public Works. May be best suited for the Furnishings Zone as streetscape accent where pedestrian through travel is not expected. Not allowed to be used on sidewalk through-zone.
Maintenance Life	20 years plus (with no tree root damage)
Comparative Cost (2007)	$50.00/sq yd
20 Year Cost	$50.00/sq yd
Rubber Sidewalk	
Where to Use	Experimental sidewalk material being applied in select locations in Berkeley where cracking and tree root uplifting are problems.
Maintenance Life	15-20 years (must reset after 7-10 years)
Comparative Cost (2007)	$80.00/sq yd
20 Year Cost	$80.00/sq yd
Asphalt	
Where to Use	Preferred material for use on any widened shoulder alternative pathway. Acceptable but not preferred as a material for separated alternative pathways or connector paths. Unacceptable for use for city standard sidewalk.
Maintenance Life	40 years plus (with no tree root damage)
Comparative Cost (2007)	$25.00/sq yd
20 Year Cost	$12.50/sq yd

[7] Berkeley Municipal Code, Section 16.040.070

4.8. DESIGN OF THE FRONTAGE ZONE

The frontage zone is the area between the through passage zone and the property line. This zone allows pedestrians a comfortable shy distance from the building fronts in areas where buildings are at the lot line or from elements such as fences and hedges on private property. In commercial areas, the frontage zone becomes an important public amenity. Pedestrians use the space for window shopping, or to gather with friends. The frontage zone can also be used for café seating or for selling merchandise as long as these activities do not encroach on the through passage zone.


Temporary uses such as sidewalk cafes may occupy the Frontage Zone, providing the Through Passage Zone remains clear.

Where no furnishings zone exists, elements that would normally be sited in that zone, such as transit shelters and benches, telephone kiosks, signal and street lighting poles and controller boxes, traffic and parking signs, and utility poles, may occupy the frontage zone. In some cases, easements from private property owners or additional right-of-way may be required to allow for these items. These elements should not be sited in front of residential and mixed-use buildings built to the right-of-way line as they could block access to an existing or future building.

4.8.1. Encroachments

Elements in the frontage zone, including seating and signage, may not encroach into the through passage zone. Berkeley requires any encroachment to maintain a minimum 6 feet of clearance on the sidewalk for a pedestrian through zone. Any encroachment of more than two feet requires a permit from the Department of Public Works.[8] Encroachments into the sidewalk are not permitted at all in locations where the existing sidewalk corridor is less than the recommended 6-foot width.

Elements such as standpipe systems for fire safety may project into the frontage zone, but not more than 4 inches if they project in the area between 2 ft 3 inches and 6 ft 8 inches above the sidewalk, per the ADA.


Elements such as standpipe systems may project into the Frontage Zone. Care must be taken to assure compliance with the ADA.

4.9. BICYCLE PARKING

Creating convenient linkages between walking and bicycling in Berkeley will help the City encourage non-motorized trips. Placing bicycle parking adjacent to store fronts, shopping centers or municipal buildings will make it more convenient for people to bicycle to their destination.

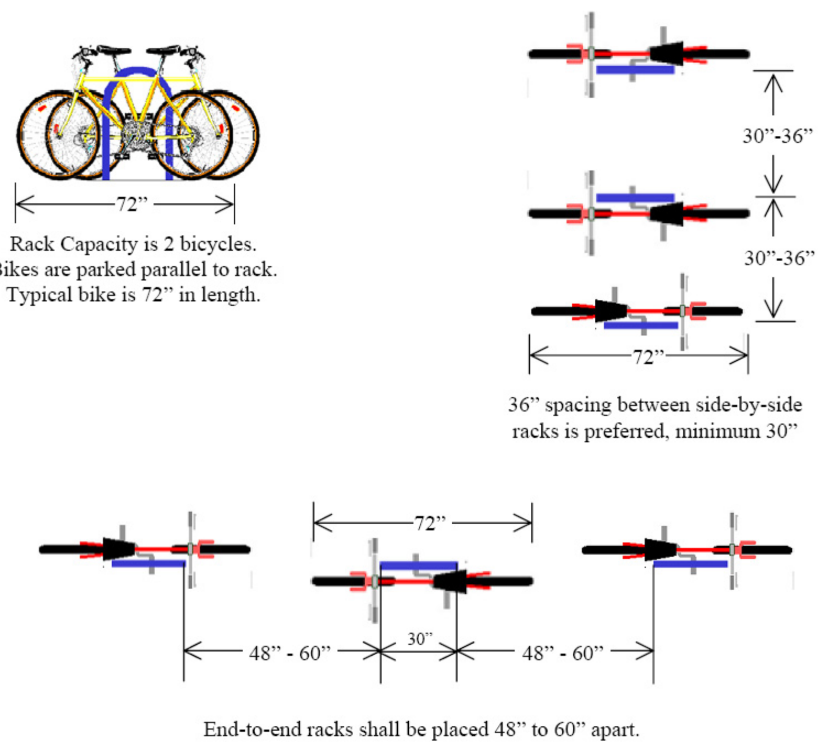
The City has specific standards for the dimensions and installation of bike racks within city right-of-way. Racks should be an inverted U style, with a capacity of two bicycles locked parallel to the rack. Additional standards include the following:

[8] Berkeley Municipal Code, Section 16.18.020

- Generally, racks should be installed parallel to the curb so as to minimize needlessly taking up sidewalk space.
- Racks must be oriented such that they do not interfere with pedestrian path of travel on the sidewalk, yet are not so close to the curb that the rack can be inadvertently hit by the overhang of a car as it parks.
- There should be a minimum of 5½' clear for pedestrian right-of-way outside the footprint; 7' in areas of heavy pedestrian traffic.

- Rack should be located a minimum of:
    - 24" from: the curb
    - 3' from: newspaper racks, US mailbox, light pole, sign pole, bus shelter, driveway, surface hardware (PG&E, cable grates, etc.), street furniture, standpipes, bus benches, trash cans, other sidewalk obstructions
    - 4' from: AC transit red zone, loading zone, blue zone (disabled parking), curb/curb ramps, crosswalk, BART entrance

Figure 7
Berkeley Bike Parking Standards



4.10. DRIVEWAYS

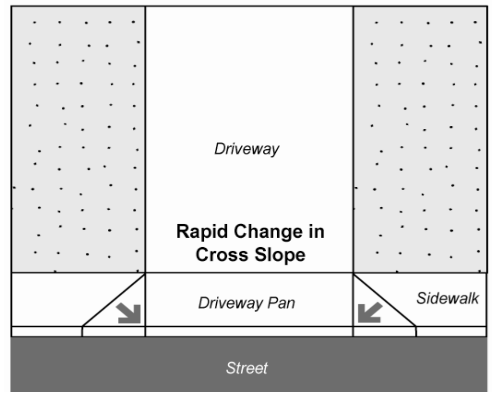
Driveway crossings permit cars to cross the sidewalk and enter the street. Driveway crossings can be both dangerous and inconvenient for pedestrians. Driveway curb cuts that extend into the through passage zone may pose a tripping hazard to people on foot or obstruct wheelchairs.

As a general guideline, minimizing the number of driveways improves pedestrian safety. As development allows, a goal should be reducing driveway widths and frequencies to the minimum required by the City of Berkeley's standards.

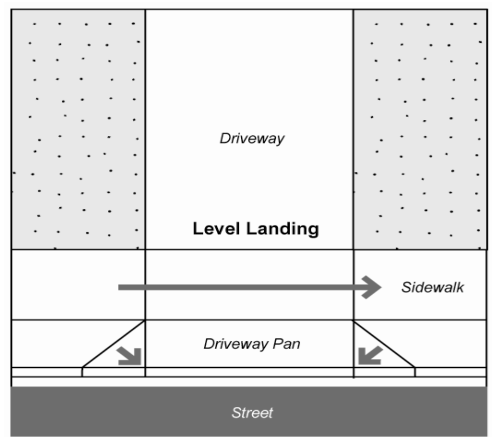
Driveway designs without level landings that force sidewalk users to travel over the sidewalk flare are not allowed under ADA guidelines (maximum allowable cross slope is 2 percent). Such a design creates a rapid change in cross slope, which compromises balance and stability for people in wheelchairs and can also present a trip hazard for pedestrians.

The City of Berkeley Standard Driveway Approach Detail requires the ramp portion of driveways to be located in the furnishing zone, with a maximum 2 percent cross slope through the sidewalk area. The Standard Detail for driveways in commercial areas without a furnishing zone places the driveway ramp within the sidewalk area, but requires a minimum 48-inch clear area with a cross slope of no greater than 2 percent be maintained, as shown in Figure 9.

Figure 8
Driveway Design



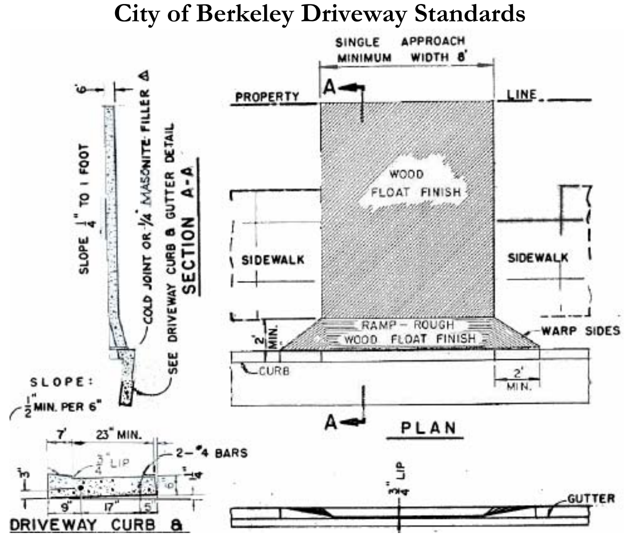
Unacceptable Driveway Design



Recommended Driveway Design

Devices such as humps and signs can improve commercial driveway crossings. These devices are considered appropriate at crossings where there is heavy pedestrian and traffic volume.

Figure 9
City of Berkeley Driveway Standards



4.11. CORNERS

Street corners are hubs of pedestrian activity. These are the places where sidewalks converge, where pedestrians wait for crossing opportunities, and where people may to stop and converse with one another. Street corners provide the transition between raised sidewalks and the crosswalk at street grade. The design of corners affects the speed of turning traffic and determines how visible pedestrians are to drivers. Street corners are also the logical location for providing information to pedestrians, including street signs and other wayfinding tools.

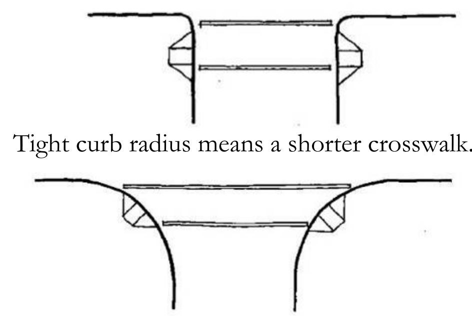
4.11.1. Adequate Space at Street Corners

Street corners should be large enough to serve their multiple public functions. The greater the pedestrian volume, the greater the area needed at each corner. Corners in pedestrian-oriented commercial corridors and corners with transit stops require the greatest area. Ideally, a corner should provide at least five square feet for each pedestrian expected to wait in a given period.[9] One particular element to be considered is the proper placement of street furnishings within this area to allow for unobstructed viewing of pedestrians at corners as they are preparing to enter the crosswalk. Bulbouts, discussed later in this document, are one way to provide additional area at a street corner.

4.11.2. Curb Radius

The curb radius of a street corner affects traffic speed and crosswalk length. In general, a smaller (narrow) curb radius is better for pedestrians. A larger (wide) curb radius creates a greater crosswalk length and allows vehicles to move faster around the turn. Reducing the curb radius, especially across busy multi-lane arterials, can increase pedestrian safety by slowing vehicles and minimizing pedestrian crossing distances.

Figure 10
Curb Radius Comparison



Tight curb radius means a shorter crosswalk.

Wide curb radius means a longer crosswalk.

The Berkeley Municipal Code Section 21.40.150 stipulates corner radii of residential blocks be no less than 15 feet, and in commercial districts or on major streets no less than 20 feet. For standard curb heights of 6 inches, a 14' curb radius is needed for a single curb ramp, and a minimum of 32' is needed for two ramps using the standard crosswalk width and placement.

4.12. CURB RAMPS

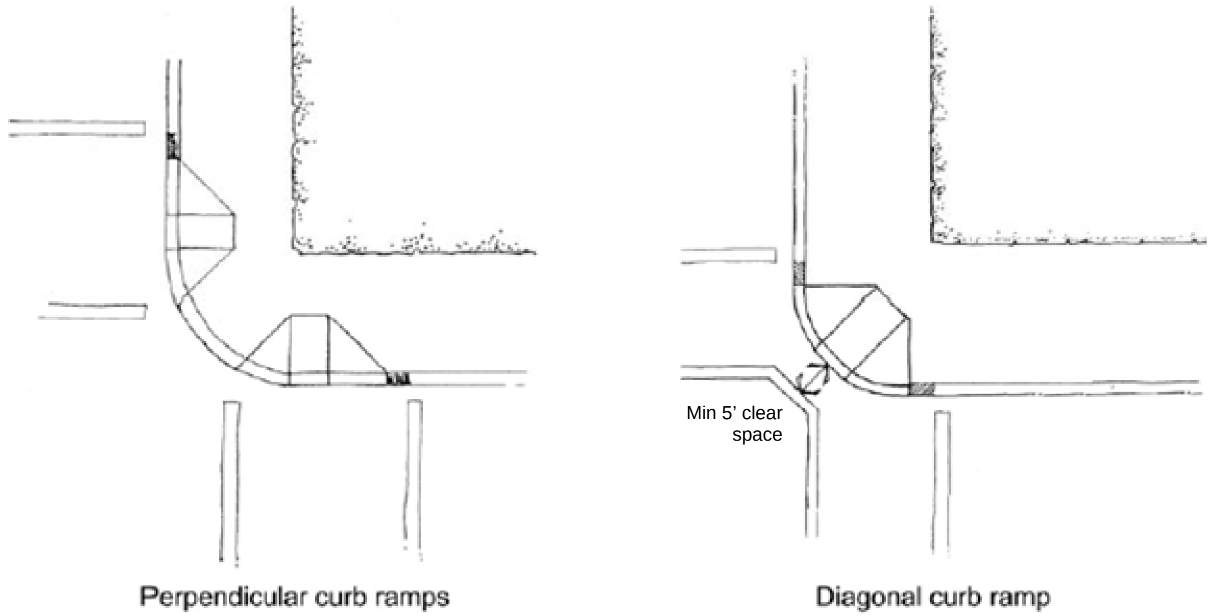
Curb ramps create a transition between the raised sidewalk and the crosswalk at street grade. Curb ramps are necessary for people who use wheelchairs or scooters, as well as people with strollers and rolling carts, but they benefit all pedestrians.

Two common curb ramp types for corners – diagonal and perpendicular curb ramps – are shown in Figure 11 below. The City of Berkeley's Street Design Standards require the use of two perpendicular curb ramps on all new streets, and where feasible elsewhere.[10] Perpendicular curb ramps are preferred for pedestrian safety because they align directly with the crosswalk. Perpendicular ramps take up more space, and in some cases due to site conditions, drainage or utilities, installing two perpendicular ramps may not be feasible at a corner. In those cases a single diagonal curb ramp at the apex of the corner may be the only option. Diagonal ramps are less expensive to install, because they require one ramp per corner compared with two perpendicular ramps. However, diagonal ramps are not aligned directly with the crosswalk path of travel, and force wheelchair users and other pedestrians to travel a more circuitous

[9] Methodology outlined in the Highway Capacity Manual, Chapter 13, Pedestrians.
[10] City of Berkeley Department of Public Works Standard Detail, Wheelchair Ramp

route into the crosswalk. The Berkeley Standard Detail for diagonal wheelchair ramps requires a minimum 5-foot wide clear space be provided within the marked crosswalk at the bottom of any diagonal ramp.

Figure 11
Common Curb Ramp Types in Use in Berkeley



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

5. CROSSWALKS

5.1. DEFINITION

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

(a) That portion of a roadway included within the prolongation or connection of the boundary lines of sidewalks at intersections where the intersecting roadways meet at approximately right angles, except the prolongation of such lines from an alley across a street.
(b) Any portion of a roadway distinctly indicated for pedestrian crossing by lines or other markings on the surface.

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

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

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

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

5.2. CROSSWALK MARKINGS

Marked crosswalks serve to alert road users to expect crossing pedestrians and to direct pedestrians to desirable crossing locations. The City of Berkeley utilizes two different marking styles for pedestrian crosswalks: the standard "transverse" style, consisting of two parallel lines; and the "ladder" style consisting of the two parallel lines with perpendicular ladder bars striped across the width of the crosswalk.

In addition to the standard and ladder pedestrian crosswalk styles, the City of Berkeley also utilizes a third crosswalk marking style for multi-use trail intersections. These markings are currently only striped along the West Street path corridor in Berkeley, between University Avenue and Delaware Street. This additional multi-use trail marking was developed in order to provide a separation between the pedestrian crosswalk areas and the bicycle crossing areas of the crosswalk. The West Street style is considered a special multi-use path crossing and discussed later in this document under trail crossings.

Table 3
Crosswalk Markings Used in Berkeley

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

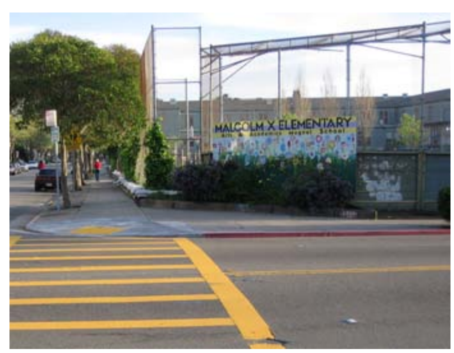
Style	Sample
West Street Style. Only for use on multi-use shared bicycle/pedestrian path crossings, where a separation between the pedestrian crosswalk areas, and the bicycle crossing areas is desired. Bicyclists use the center portion of the crossing, and pedestrians use the ladder-striped crosswalk lanes on the outside. Currently installed along West Street path between University Avenue and Delaware Street.	

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

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

5.3. CROSSWALK MARKINGS IN SCHOOL ZONES

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



School Crosswalk across Ashby Avenue

5.4. CROSSWALK WARNING SIGNAGE AND PAVEMENT MARKINGS

The California MUTCD provides guidance on the installation of warning signage and pavement stencils at and in advance of uncontrolled crosswalks. These signs are only for use at uncontrolled locations, because at STOP, YIELD, or signalized locations the presence of the traffic control serves to regulate the crosswalk at those intersections. Signage and pavement markings to supplement crosswalks are not required, and in fact the California MUTCD notes that such signs should be installed in locations where crossing activity is unexpected or not readily apparent. On some major street corridors in Berkeley that have marked uncontrolled crosswalks nearly every block, installing signage at each crosswalk would create signage clutter on the corridor and would reduce the effectiveness of the signs.

MUTCD Crosswalk Warning Signage

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

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

5.5. HIGH VISIBILITY SIGNAGE

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


Fluorescent Yellow-Green School Sign

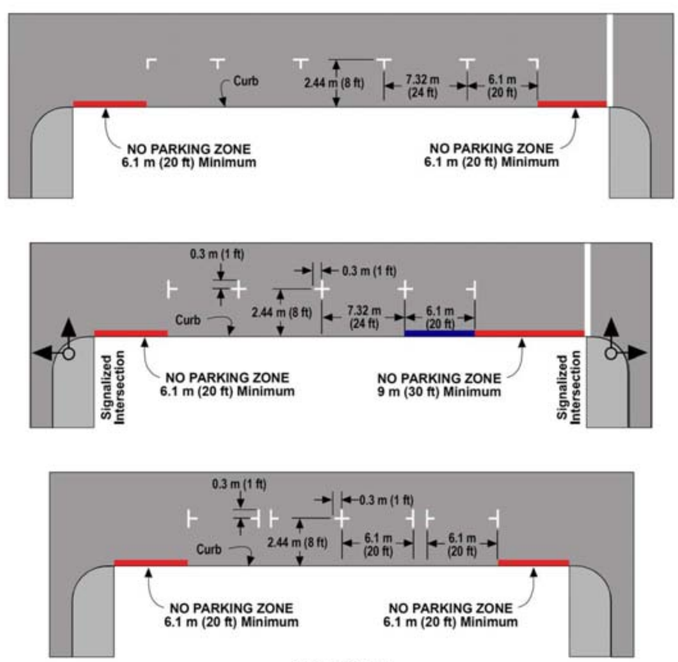
5.6. PARKING RESTRICTIONS

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

As a standard, the City should apply red curb of at least 20’ (approximately 1 parking stall length) adjacent to both sides of all marked crosswalks, citywide. This standard is provided in the MUTCD Section 3-18 in reference to establishment of parking meter stalls and the application of clearance at intersections:

> “The desirable dimensions of parking meter stalls are 2.4 m (8 ft) by 7.3 m (24 ft) with a minimum length of 6.1 m (20 ft).
>
> Guidance:
> At all intersections, one stall length on each side measured from the crosswalk or end of curb return should have parking prohibited. A clearance of 1.8 m (6 ft) measured from the curb return should be provided at alleys and driveways.
>
> At signalized intersections parking should be prohibited for a minimum of two stall lengths on the near side and one stall length on the far side. See Figure 3B-18(CA).”

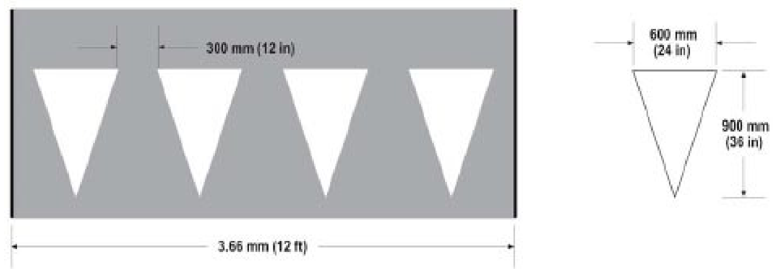
Figure 12
Parking Restriction Specifications (MUTCD Figure 3B-18)



NOT TO SCALE

5.7. STOP AND YIELD LINES

Figure 13
Yield Line Specifications



The use of stop lines (commonly referred to as limit lines or stop bars) and yield lines is guided by California MUTCD Sec. 3B.16. Stop lines are solid white lines 12 inches to 24 inches wide that indicate where traffic must stop at STOP-controlled or signalized locations. Stop lines are only required at controlled locations where no marked crosswalk exists; where a crosswalk is present, the crosswalk itself can function as the stop line. Jurisdictions are permitted by the MUTCD to install a stop line in advance of a marked crosswalk if they desire. Installing stop lines in advance of crosswalks can help to discourage vehicle encroachment into the marked crosswalk, particularly in right-turn-on-red situations where vehicles often creep forward to get better visibility. One solution to this problem is to stripe a stop line on the left lanes farther back than the right lanes, allowing better visibility to the left for right-turning vehicles. This also allows more clearance for vehicles turning from perpendicular streets. A supplement to Stop Lines is “STOP HERE ON RED” signage with a down arrow indicating the stop line as the proper location for vehicles to stop in advance of the intersection.

Yield lines (also called yield teeth or shark’s teeth) indicate the point at which traffic should yield at uncontrolled locations, and are composed of white triangles 3 feet long by 2 feet wide, spaced 1 foot apart, as shown in Figure 13. In California, vehicles are required to “YIELD” to pedestrians in uncontrolled crosswalks, and yield lines can be used to indicate the appropriate location for vehicles to stop in advance of an uncontrolled crossing location. These markings are most effective in mid-block locations, where there is no intersection to give a motorist cues on the location to wait for a crossing pedestrian. The California MUTCD notes that yield line placement should be 20 to 50 feet back of uncontrolled mid-block intersections. On multi-lane roadways, yield lines can be used to counter the “multiple-threat” collision, which refers to the situation where a car in one lane stops and screens the pedestrian from the view of the adjacent lane. Installing yield lines 40-50 feet back (two car lengths) gives both pedestrians and motorists a better view of each other during the crossing. “YIELD HERE FOR PEDESTRIANS” signs with a down arrow can be used at the yield lines to indicate the proper location for vehicles to yield in advance of the crosswalk.

The City of Berkeley currently does not install stop lines or yield lines at locations that have a marked crosswalk. It is recommended that the City evaluate signalized intersections on a case-by-case basis, and consider installing stop lines at least 4 feet back from the crosswalk at locations that have a history of vehicle encroachment into the crosswalk or vehicles failing to stop for pedestrians on right-turn-on-red. At signalized mid-block pedestrian crosswalks, the City should install stop lines at least 40 feet in advance of the signal indication. At uncontrolled mid-block crosswalk locations the City should install yield lines at least 40 feet in advance of the crosswalk.

5.8. PEDESTRIAN WARNING SIGNAGE FOR SIGNALIZED INTERSECTIONS

As noted under the discussion of crosswalk signs and markings, crosswalk warning signs are not permitted at crosswalks controlled by a traffic signal, as the traffic control itself serves to regulate vehicles at the intersection. At signalized intersections, particularly where right turn on red is permitted, installing stop lines as described above may be one way of reducing encroachment of vehicles into the pedestrian crosswalk. Another solution to remind drivers who are making turns to yield to pedestrians is installation of a "TURNING TRAFFIC MUST YIELD TO PEDESTRIANS" (R10-15) sign.

5.9. IN-STREET YIELD TO PEDESTRIAN SIGNS

In-street yield to pedestrian sign in Berkeley

In-street yield to Pedestrian Signs are flexible plastic signs installed in the center line or median to enhance a crosswalk at uncontrolled crossing locations. These signs communicate variations of the basic message 'State Law: Yield to Pedestrians'. The signs can be supplemented with a "SCHOOL" plate at the top for use at school crosswalks. If used near schools, these signs are sometimes installed on a portable base and brought out in the morning and back in at the end of each day by school staff, which may reduce the chance that the sign will become less noticeable to motorists by being left out all the time. For permanently installed signs, maintenance can be an issue as the signs may be run over by vehicles and need to be replaced occasionally. Installing the signs in a raised median can help extend their lifetime. Candidate locations for this treatment need to be carefully reviewed by traffic engineers. Possible issues to be avoided include narrow right of way and constricted turning movements, both of which can create the potential for vehicle-on-vehicle conflicts. The City of Berkeley collects the following information before implementing in-street yield signs and then determines if they are appropriate.

- Pedestrian collision history
- Crossings at wide uncontrolled approaches (more than one lane per direction)
- Adequate lane width in order to minimize potential for knock-over
- Sufficient geometry to minimize potential for knock-over by turning vehicles
- Presence of distractions (sight distance issue)
- Vertical curves, Y configurations
- Crossings in series (e.g. in one block)
- Consideration for schools
- Documented speeding
- Local knowledge
- Not intended as stand alone bike crossing enhancement

5.10. FLASHING BEACONS

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

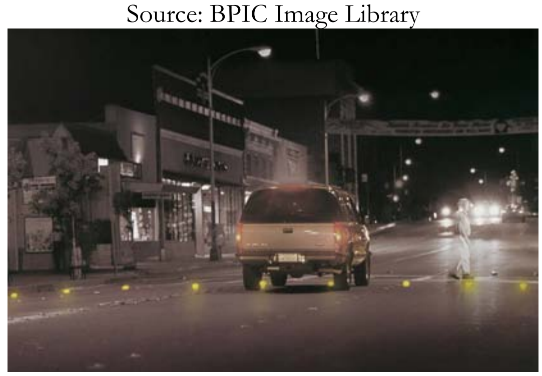
When used to make motorists aware of school zones, flashing beacons should be timed to flash only during the morning and afternoon school commute hours when children are present.

5.11. SPECIAL CROSSWALK PAVEMENT TREATMENTS

For aesthetic reasons, crosswalks are sometimes constructed with distinctive paving materials such as colored pavement or special decorative pavers meant to look like brick. Brick should never be used in crosswalks, as it tends to wear down quickly, becoming uneven and slippery and causing difficulties for pedestrians, especially persons with disabilities. Crosswalks with unique materials or colored pavement should use concrete pavers or asphalt, and textures should maintain a smooth travel surface and good traction. It is important to note that these decorative pavement treatments do not enhance the visibility of the crosswalk location, in many cases they make the crossing more difficult for persons with disabilities to navigate, and can make the crosswalk less visible to motorists at night. For these reasons decorative crosswalk treatments are not recommended. Regardless of any colored or unique pavement treatment used, marked crosswalk locations should always be marked with parallel transverse lines.

5.12. IN-ROADWAY WARNING LIGHTS

Figure 14
In-Roadway Warning Lights
Source: BPIC Image Library



The California MUTCD has approved the use of in-roadway warning lights at uncontrolled marked crosswalks. Also known as in-pavement flashing crosswalks, illuminated crosswalks, or "Santa Rosa lights," these lights are embedded just above the roadway surface and flash when activated (either by a pushbutton or by passive detection) by a crossing pedestrian, as shown in Figure 14. The California MUTCD Sec. 4L.02 provides guidance on evaluating the need for in-roadway warning lights and offers standards for their placement. There are seven crosswalk locations in Berkeley where in-roadway warning lights have been installed: 1) Alcatraz and King, 2) Sacramento and Oregon, 3) Telegraph and Parker, 4) Bancroft and Ellsworth, 5) Piedmont and Ashby, 6) MLK and Prince, and 7) Claremont and Brookside. The City is still evaluating the effectiveness of these devices, and the decision on whether to pursue the installation of additional in-roadway light has not been made. At this time the city traffic engineer is favoring installing activated pole-mounted flashing beacons in lieu of in-roadway lights to provide enhanced warning at crosswalks, as they appear to be more cost effective with less maintenance.

Pedestrian Signal

5.13. PEDESTRIAN SIGNALS

Traffic control signals minimize conflicts between motorists and pedestrians by giving clear direction about the proper use of the right-of-way. Section 4E of the California MUTCD outlines the standards for the use and design of pedestrian signals, including the warrants for locations where pedestrian signals may be provided. All new pedestrian signal installations shall consist of pedestrian signal heads with international symbols, rather than textual "walk" and "don't walk" messages. Engineering judgment should be used in determining the specifics of pedestrian signal design at different crossing locations. Currently there is a combined bicycle/pedestrian signal with both pedestrian and bicycle signal heads at University Avenue/West Street path.

5.14. PEDESTRIAN CROSSWALK ENHANCEMENT HIERARCHY

The City of Berkeley applies crosswalk markings and other enhancements described above according to the following hierarchy of improvements:

1. Provide standard transverse painted pedestrian markings
2. Add ladder stripes
3. Add pedestrian warning sign (W11-2) with down arrow at crosswalk
4. Add advance pedestrian warning signs on approaches to crosswalk (W11-2)
5. Add advance pavement legend (or alternate marking)
6. Add standard white stanchions <u>OR</u> pedestrian stanchions (R1-6a)
7. Add flashing beacon <u>OR</u> in-pavement flashing crosswalk
8. Install pedestrian signal

These enhancements are done on a case-by-case basis. If one level of enhancement does not appear to be adequate for a particular crosswalk location, the City will move to apply the next level of enhancement. By incrementally making crosswalk improvements, the City can evaluate each treatment independently for its ability to improve pedestrian safety at that location.

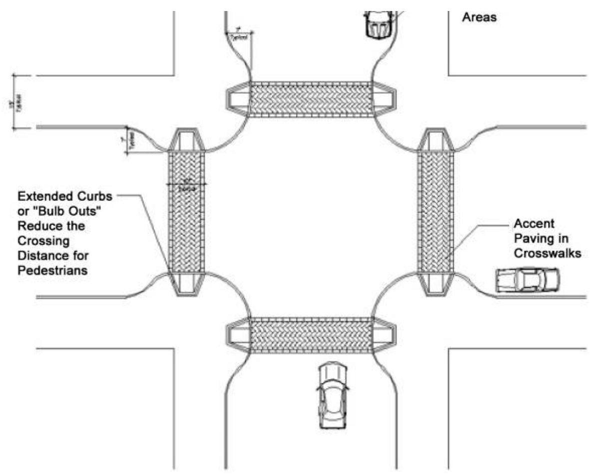
5.15. HIGH-PRIORITY LADDER CROSSWALK MARKING CORRIDORS

The following roadways have been determined by the City to be high priority corridors that warrant the installation of ladder crosswalk markings at all uncontrolled marked crosswalk locations:

- San Pablo
- University
- Sacramento
- Ashby
- Adeline
- MLK
- Telegraph
- Gilman
- Shattuck
- Milvia between Blake & University
- Bancroft from Oxford to Piedmont
- Durant from Oxford to Piedmont
- Channing from Oxford to Piedmont
- Claremont, south of Ashby
- College
- Cedar from Walnut to Martin Luther King, Jr. Way
- Hopkins from San Pablo to Peralta
- Solano

6. OTHER ENGINEERING TREATMENTS FOR CROSSINGS

6.1. BULBOUTS



Bulbouts, also called curb extensions, are engineering improvements intended to reduce pedestrian crossing distance and increase visibility. Bulbouts can either be placed at corners or at mid-block crosswalk locations, and extend out to about 8 feet to align with the edge of the parking lane, as shown in Figure 15. In addition to shortening the crosswalk distance, bulb-outs serve to increase pedestrian visibility by allowing pedestrians to safely step out to the edge of the parking lane where they can see into the street, also making them more visible to oncoming drivers. At corners, bulb-outs serve to reduce the turning radius, and provide space for perpendicularly-aligned curb ramps. Where bus stops are located, bulb-outs can provide additional space for passenger queuing and loading.

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

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

6.2. MEDIAN REFUGE ISLANDS

On wide, multi-lane roadways, pedestrians can benefit from median refuge islands, which offer a place to wait after crossing only half of the street. Berkeley has several major roadways with median refuge islands, including San Pablo, Sacramento, Shattuck, and University. Refuge islands increase the visibility of pedestrian crossings, and decrease pedestrian collisions by reducing pedestrian/vehicle conflicts, motor vehicle speeds, and exposure time for pedestrians.[11] They also allow pedestrians to consider cross traffic from one direction at time, making it easier to find a gap and simplifying crossing. In Berkeley, accessible pedestrian medians or islands are encouraged on wide two-way streets where pedestrians have to cross more than two lanes.[12]

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

The FHWA document "Pedestrian Accommodations at Intersections" advises that a refuge island should be a minimum of 4 feet wide and 12 feet long (or the width of the crosswalk, whichever is greater).[13] The Metropolitan Transportation Commission's Pedestrian Toolkit states that refuge islands should be a minimum of 4 feet wide and 8 feet long.[14]

The recently revised ADA Access Board Guidelines on Accessible Public Rights of Way has a section on median islands.[15] The following guidelines are applicable:

- Medians and pedestrian refuge islands in crosswalks shall contain a pedestrian access route, including passing space connecting to each crosswalk.
- Regarding a minimum width for refuge islands, the guidelines state that medians and pedestrian refuge islands shall be 1.8 m (6.0 ft) minimum in length in the direction of pedestrian travel.
- The guidelines permit both ramped up and cut-through design of refuge island, and advise that there are many factors to consider when deciding whether to ramp or cut-through a median or island. Those factors may include slope and cross slope of road, drainage, and width of median or island. They note that "curb ramps in medians and islands can add difficulty to the crossing for some users."
- Medians and refuge islands are also required to have detectable warnings, with detectable warnings at cut-through islands separated by a 2-foot minimum length of walkway without detectable warnings.

The City of Berkeley should implement accessible median refuges whenever feasible.

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

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[11] FHWA 2002b, p. 72
[12] City of Berkeley General Plan, Transportation Element, p. T-28
[13] Pedestrian Accommodation and Intersections, FHWA, http://safety.fhwa.dot.gov/ped_bike/univcourse/swless15.htm
[14] MTC Safety Toolbox http://www.mtc.ca.gov/planning/bicyclespedestrians/tools/pedRefugeIsland/index.htm
[15] http://www.access-board.gov/PROWAC/draft.htm#305

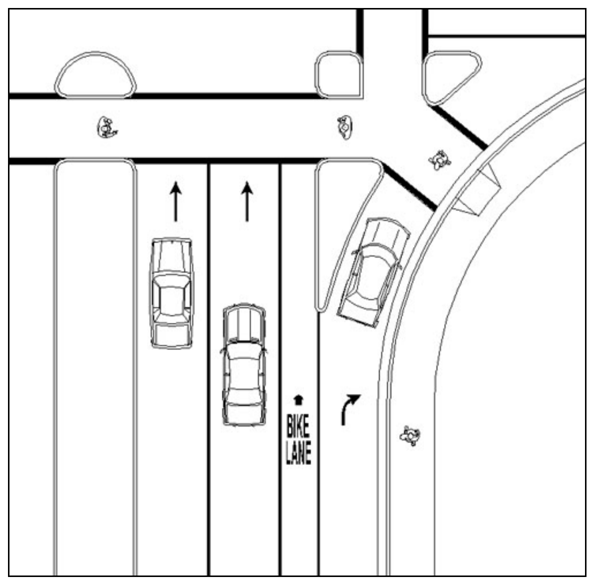
6.3. CHANNELIZED RIGHT-TURN SLIP LANES

A right-turn slip lane, often delineated by paint or a concrete island, separates the right-turn movement from through and left-turning vehicles, as shown in Figure 16.

Slip turn lanes can be dangerous to pedestrians because drivers tend to concentrate on merging with oncoming traffic and may not see pedestrians entering the crosswalk. In high-traffic areas, inadequate gaps in right-turning traffic may exist, making crossing a slip turn lane difficult for pedestrians. The non-standard corner geometry introduced by slip lanes is extremely difficult for the blind to negotiate. Uncontrolled slip turn lanes should be discouraged where conflicts with pedestrians are anticipated. Reclaimed space from slip lane removal can be made into an attractive area for pedestrians through the use of street furniture, benches and small-scale plantings.

Where slip lanes cannot be removed due to traffic capacity considerations, several options exist for enhancing pedestrian safety. Signalizing the right-turn movement creates gaps for pedestrians and may be the safest alternative. Passive crossing treatments, such as warning signage, or a raised crosswalk connecting the sidewalk with a refuge island, may also improve conditions for pedestrians.

Figure 16
Slip Turn Crossing Treatment



Source: Improving Pedestrian Access to Transit: An Advocacy Handbook

Slip lanes that turn into a dedicated traffic lane can be safely provided if the turning movement is controlled by a signal or a stop sign.

6.4. ROUNDABOUTS

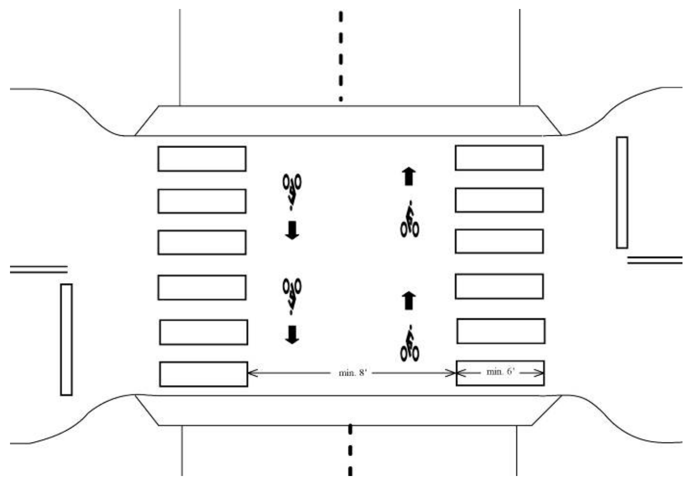
Roundabouts are circular intersections used to slow traffic and control the flow of traffic entering the intersection. In North America, roundabouts are typically larger than the more common neighborhood traffic calming circle. The Marin Circle and Channing Circle (at the intersection of Piedmont Avenue and Channing Way) are two roundabouts in Berkeley. Traffic outside the intersection must yield before entering. Roundabouts slow traffic by requiring vehicles to travel in a counter-clockwise circle rather than following a straight path through the intersection. Twin roundabouts are planned for the intersection of Gilman Avenue & I-80.

Although roundabouts slow traffic and in general, reduce the number and severity of motor vehicle collision, special consideration should be given to pedestrians in their design. Of particular concern is the ability of visually impaired pedestrians to cross the street safely at roundabouts. The visually-impaired need to be properly oriented to the crosswalk and able to use audible cues from traffic movements to judge when it is safe to cross. Design treatments that can be applied in these situations are: limiting the number of lanes that flow into the roundabouts to help with audible identification of vehicles and inclusion of tactile domes and highly visible crosswalks to indicate to motorists and pedestrians the correct pedestrian crossing location. In general, single-lane roundabouts are safer and more convenient for pedestrians than multi-lane roundabouts.

6.5. SAFETY BARRELS AND BOLLARDS

Safety barrels and bollards can be effective in preventing vehicles from entering the pedestrian right-of-way. They are also an inexpensive way to test more permanent intersection improvements such as curb bulbs. The placement of these vertical elements must ensure that they do not block the travel path of pedestrians, particularly those who are sight or mobility impaired. The creative use of bollards to create combination curb bulbs/bicycle parking areas can be effective in improving pedestrian safety while enhancing the aesthetic quality of an intersection and providing bicycle parking.

Figure 17
City of Berkeley Standard Multi-Use Path Crossing Marking



6.6. MULTI-USE PATH INTERSECTIONS

Multi-use paths provide pedestrian and bicycle travel ways that are separated from automobile traffic. Path crossings must be safe for pedestrians and bicyclists alike, and should also provide convenient connections to the City's street network. In general, path crossings should be treated just like other intersection types, oriented at 90 degree angles whenever possible ensuring safety for all path and road users. In addition to typical intersection lighting, signage, and traffic control features, path crossings should include design features that warn both path and roadway users of the crossing. Restricting parking near path crossings, as at typical intersections, enhances sight distance. As noted earlier, the City of Berkeley has developed a unique multi-use path crosswalk marking, currently used at crossings along the West Street Trail between University Avenue and Delaware Street, as shown in Figure 17.

6.7. RAIL CROSSINGS

Rail crossings can be hazardous for pedestrians, particularly for those who rely on who rely on wheeled devices for mobility. One way to improve safety is design rail crossings to have the pedestrian path at a 90 degree angle to the tracks. This minimizes potential for wheelchair and stroller wheels to catch in the track gap. The crossing surface should be a smooth transition from the sidewalk and over the rails. Other design elements include the use of detectable warnings such as truncated domes, flashing light signals, signs, and audible sounds.

7. TRAFFIC SIGNAL ENHANCEMENTS

This section discusses specific pedestrian enhancements for use at signalized intersection locations.

7.1. COUNTDOWN PEDESTRIAN SIGNALS

Countdown pedestrian signals provide information on the amount of time remaining in the pedestrian change interval, which can assist pedestrians in making safe crossing judgments. Guidance on the use of these devices is now included in the California MUTCD. It is recommended that the City of Berkeley install these devices on all new pedestrian signal installations, and continue their program of retrofitting them at existing signals. Recommendations for audible pedestrian signals and other signal head accessibility considerations are included in the Accessibility Recommendations below.

Pedestrian Countdown Signal

7.2. SIGNAL TIMING

Traffic signal timing can have an effect on the ability of slower-moving pedestrians to safely cross the street. The length of the pedestrian clearance phase is determined by calculating a clearance interval, which is the length of time it takes a person to walk from the curb on one side to the center of the farthest travel lane on the other using a standard walking speed and distance. The standard walking speed used to calculate pedestrian clearance intervals recommended by the California MUTCD and used in Berkeley, is 4 feet per second. However, where there are populations of pedestrians who walk more slowly, a lower walking speed should be considered in determining the pedestrian clearance time. Particularly where there are seniors or persons with disabilities, the MUTCD recommends a walking speed of 2.8 ft/sec. This recommendation may also be applied to locations near elementary schools, because young children commonly walk more slowly. Where signalized crossings are in close proximity to locations such as senior centers, senior housing, elementary schools, or centers generating significant volume of pedestrians with disabilities, the City of Berkeley should utilize a walking speed of 2.8 ft/sec to allow for longer crossing times.

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

- Leading Pedestrian Interval (LPI) – At intersections where there are conflicts between turning vehicles and pedestrians, pedestrians are given a “walk” designation a few seconds before the associated green phase for the intersection begins.
- Pedestrian Scramble Phase – In areas with very heavy pedestrian traffic, an all-pedestrian signal phase gives pedestrians free passage in the intersection while no vehicle traffic is allowed. The intersection of Telegraph/Bancroft has a pedestrian scramble phase. Pedestrian scramble phases are only recommend where pedestrian volumes are very high and should be used sparingly, given that the additional phase increases wait times for all modes.

7.3. SIGNAL ACTIVATION

Traffic signals in Berkeley operate in one of three ways:

Fixed-time signals have a regular cycle of phases with a fixed amount of green time for each movement. There is a regular WALK phase in each direction for each cycle, and pedestrians are not required to push a button to actuate the WALK phase.

Fully-actuated signals are highly responsive to local traffic variations because they detect vehicles and pedestrians as they arrive in the intersection on any approach. On fully-actuated signals, pedestrians are required to push the button to actuate the WALK phase in any direction.

Semi-actuated signals employ vehicle and pedestrian detection only on the side or local street. A green light and WALK phase is on for the major street unless the presence of a pedestrian or car is detected on the local street. Pedestrians must push a button to actuate the side street signal.

7.4. PEDESTRIAN PUSHBUTTON

Pedestrian pushbuttons allow for actuation of pedestrian signals, and should be located at all intersection corners where pedestrian actuation is used. As required by the California MUTCD, pedestrian pushbuttons must be accompanied by signs explaining their use. Pedestrian pushbuttons should be easily accessible for those in wheelchairs and for the sight-impaired. This can be accomplished by locating them located approximately 3.5 ft. off the ground and provide a level surface to the push button. Pedestrian pushbuttons should not be used in locations where the pedestrian phase is set on a fixed cycle and cannot be actuated. One exception to this is the use of pushbuttons to activate audible pedestrian signals at non-actuated locations. More details on push button requirements are discussed in Section 12 on Accessibility.

8. TRAFFIC CALMING

Traffic calming interventions slow traffic by modifying the physical environment of a street. The City of Berkeley has employed a variety of traffic calming measures, including speed humps, chokers, traffic circles and both full and partial street closures.

Research into the efficacy of traffic calming devices to improve pedestrian safety has shown that traffic calming can reduce the number of automobile collisions. A Vancouver study published in 1997 showed an average collision reduction of 40 percent in four neighborhoods that used a combination of the traffic calming types described below.[16]

Currently the city of Berkeley is developing a formalized Traffic Calming Request procedure to evaluate and prioritize resident requests, utilizing the traffic calming requirements detailed in Policy T-20 of the General Plan. All traffic calming improvements will be based on demonstrable problems or issues raised by a resident or identified by City staff. City engineering staff will determine the appropriate countermeasures for the safety issues which residents have identified.

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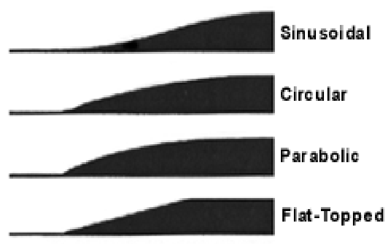
[16] Zein, S. R.; Geddes, E.; Hemsing, S.; Johnson, M., "Safety Benefits of Traffic Calming," Transportation Research Record Vol: #1578 pp. 3-10.

Table 4
Traffic Calming Descriptions and Considerations for Use

Traffic Calming Measure	Description	Considerations for Use
Street Trees		
	In addition to their aesthetic value, street trees can slow traffic and improve safety for pedestrians. Trees add visual interest to streets and narrow the street's visual corridor, which may cause drivers to slow down.	- If the sidewalk corridor is not wide enough to accommodate street trees, adding tree plantings in the parking lane is possible. These trees will have shortened life spans. - The placement of plantings should consider potential for conflict with street sweeping and drainage.
Raised Crosswalks		
	Raised crosswalks are similar to speed humps, but are installed at intersections to elevate crosswalks. Raised sidewalks eliminate grade changes from the pedestrian path and give pedestrians greater prominence as they cross the street.	- Use detectable warnings at the curb edges to alert vision-impaired pedestrians that they are entering the roadway. - May be designed so they do not have a slowing effect (for example, on emergency response routes).

Traffic Calming Measure	Description	Considerations for Use
Speed Humps		
 	Speed humps are elevated, sloped sections of pavement that require drivers to slow down as they pass over. Berkeley has 156 speed humps on 99 streets.[17] Speed humps are generally 12-22 feet long and 3-4 inches high. There are four speed hump shapes – sinusoidal, circular, parabolic and flat-topped – which differ in the shape of their slope. The sinusoidal shaped are much smoother to drive over at the intended speed, and are also friendlier to bicyclists. (Many of the older speed humps installed in Berkeley were of the parabolic shape, which provides a more pronounced bump when driving over them.)	- Not for use on emergency response routes or transit corridors. - In July 1995, the Berkeley City Council approved a one-year moratorium on construction of any new speed humps until completion of an evaluation of the City's speed hump program. In 1997, a draft evaluation was prepared by the Advance Planning Division. The evaluation, which included a recommendation to lift the speed hump moratorium, was not reviewed by City Council and no new speed humps have been installed since 1995.
Chicanes		
	Chicanes are a series of bulb-outs or narrowings that create an S-shaped route, causing traffic to slow down. An example of chicanes can be found on Milvia Street in North Berkeley, pictured at left.	With no major pedestrian issues, chicanes can provide additional landscaping and street buffer area. Care should be taken to ensure that chicanes do not affect bicycle mobility.

[17] City of Berkeley, Office of Transportation, http://www.ci.berkeley.ca.us/transportation/TrafficCalming/TCinBerkeley.html#SpeedHumps

Traffic Calming Measure	Description	Considerations for Use
Traffic Calming Circles		
	Traffic calming circles are circular islands in the middle of an intersection. At the end of 2006, Berkeley had 62 traffic circles on its residential streets, and at least 4 more were added in 2007. Traffic circles slow traffic by altering the route of vehicles and by reducing the distance a driver can see down the street, which also causes traffic to slow. The City is currently maintaining existing STOP controls at traffic circle intersections. In the future the City may remove the STOP signs and convert the intersections to all-way yields.	- Unlike full roundabouts, traffic circles maintain the crosswalks at the intersection corners. - However, in some cases it is necessary to move the crosswalks back to accommodate the turning radius of larger vehicles around the circle. In these cases the crosswalks are no longer aligned directly perpendicular with the corner, which could cause difficulty for persons with visual impairments Care should be taken to ensure that any landscaping in the circles uses low-growing shrubs that maintain visibility for pedestrians, particularly those in wheelchairs. The City maintains a list of acceptable plant species for traffic calming circle plantings. - Traffic circles are accepted by the Berkeley Fire Department, provided the department has approval over the design.
Street Closures/Diverters		
	Berkeley has employed street closures to minimize the amount of through-traffic on residential streets. There are three types of street closures, all of which have been used in Berkeley. *Diverters* force traffic to turn right or left. *Half roadway closures* are constructed at intersections to allow only one-way traffic to continue through an intersection on one side of the street. *Full roadway closures* completely close a street segment to motor vehicle traffic from an intersection.	All three types of street closures benefit pedestrians and residents by diverting traffic away from residential streets. However, diverted traffic flows may cause problems on other streets. On streets with closures, emergency vehicle access may be limited. Berkeley's General Plan now discourages the use of diverters because traffic can be diverted onto neighboring streets, which is a disbenefit to those people impacted.

9. ACCESS TO TRANSIT STOPS

Enhancing connections between walking and transit service is an important opportunity for Berkeley to support both modes of transport. Improved pedestrian access to AC Transit bus stops, BART stations, and the Berkeley Amtrak station will better serve passengers who walk to their transit connections. Making walking to transit safer and more accessible may also attract new transit passengers and reduce the number of people who currently drive to transit stations.

Figure 18
North Berkeley BART Access

In the City of Berkeley, every residence lies within one-quarter mile of a transit line. In 1993, based on the transit service measure of "seat miles per capita" Berkeley had nearly double the transit service of the average metropolitan area in the United States, placing it in the top 10 metropolitan areas nationwide.[18]

Although a large number of Berkeley residents walk to the City's three BART stations, a large portion of people accessing Ashby & North Berkeley BART drive (see **Table 5** below). Across the East Bay, a large majority (75 percent) of AC Transit riders access their bus stop by walking.[19]

Table 5
Method of BART Station Access by Customers Traveling from Home, 1998

	Walk Only	Car	Bus/Transit	Bicycle
Ashby	46%	42%	5%	7%
Downtown Berkeley	57%	14%	23%	6%
North Berkeley	30%	62%	3%	5%

Source: BART Station Profile Survey, 1998 (Section IV, pages 6, 15, and 28)

9.1. ACCESS TO BUS SERVICE

AC Transit's "Designing with Transit" Manual provides the following recommendations for making bus transit more accessible to pedestrians of all abilities:

- Sidewalk widths are at least 6 feet on all streets leading to bus stops
- Where bus shelters are installed, sidewalks should be wide enough to accommodate bus shelter while maintaining a minimum of 6 feet for through passage traffic;
- Provide direct access from activity centers to bus stops;
- Site stops in the best operational locations, usually on the far side of an intersection;
- Site stops where passengers are less likely to become victims of crime;
- Install bus bulbs where they facilitate bus operation and pedestrian capacity
- Provide adequate lighting and clear sight lines on all sidewalks and pathways;

[18] City of Berkeley General Plan, Transportation Element, page T-5
[19] Designing with Transit, page 2-11

- Make sidewalks and paths visually interesting and active;
- Provide ADA compliant bus boarding and alighting areas of at least eight feet by five feet; measured from the bus outwards;
- Provide pedestrians with safe crossings of major streets, installing traffic signals where necessary for pedestrian safety;
- Minimize roadway crossing distances without compromising bus operations;
- Limit vehicle turning movements across active sidewalks and walkways; and
- Locate parking to minimize interference with people walking to building entrances.

For bus shelters on crowded sidewalks, bus bulb-outs are recommended for providing additional space. Bus shelters should also have clearly displayed bus schedules and city maps for way-finding.

9.2. ACCESS TO BART STATIONS

In 2003, BART published a set of guidelines for transit-oriented development. These guidelines include a number of recommendations related to enhancing pedestrian access to BART Stations. BART's Access Guidelines prioritize pedestrian access over all other modes, including transit and shuttles, bicycle, carpools and cabs, and single occupancy vehicles (shown in Figure 19).[20]

In order to prioritize pedestrian access at BART stations, the Access Guidelines recommend eight ways to improve pedestrian safety and comfort:[21]

- Sidewalks connecting the station fare gates to key intersections and destinations in the station area should be as short, direct and visually unobstructed as possible.
- Sidewalks linking the fare gates to the surrounding community should be wide and smooth enough for wheelchairs and strollers, and lined with trees, lights and wayfinding signs to improve orientation and safety.
- The size and layout of blocks near the station should anticipate the need for direct pedestrian paths.
- Pedestrians should be encouraged to cross major streets and intersections at street level.
- Buildings along the sidewalks serving the fare gates should open directly on the path, with transparent ground floors and good views of the path from the upper floors.
- Continuous building frontages along sidewalks should be maintained by avoiding front and side setback, blank walls and surface parking lots that face the sidewalk.

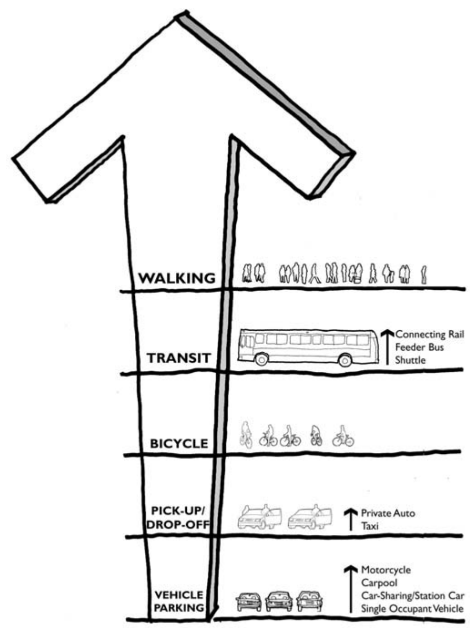


Figure 19
BART Station Access Priorities by Mode

[20] BART Transit-Oriented Development Guidelines, June 2003, available at www.bart.gov
[21] BART Transit-Oriented Development Guidelines, June 2003, available at www.bart.gov

10. GUIDELINES FOR PRIVATE DEVELOPMENT

The provision of pedestrian infrastructure alone may not be sufficient to increase non-motorized transportation mode share. Land use and urban design patterns that encourage walking as a safe, attractive and convenient choice are also important. People are motivated to walk and bicycle for transportation when their destinations are close by, routes of travel are interesting, safe and comfortable, and a mix of uses allows for the combination of trips for maximum convenience.

Berkeley has a mix of development patterns; some that encourage walking and some that are more supportive of automobile traffic. Berkeley faces a particular challenge on some of its major corridors, including University Avenue, Shattuck Avenue and San Pablo Avenue. These wide thoroughfares, originally built for streetcar lines, traditionally supported a variety of transportation modes, including walking. In the 1950s, however, many streets in Berkeley were re-oriented to better accommodate automobiles. Sidewalks were narrowed to make room for more cars. Lighting, signage and other amenities were provided at a scale that supports automobile, rather than pedestrian, travel.

In recent years, Berkeley has developed area plans that focus on restoring pedestrian infrastructure to these corridors. The City is encouraging land use types that support pedestrian activity, such as mixed-use development, commercial nodes and transit-oriented development. In addition to these policies, good building and streetscape design is crucial to improving conditions for pedestrians. A number of Berkeley's existing area plans include design guidelines that encourage or require pedestrian-supportive urban design for new developments. The following sections define the types of urban design elements included in Berkeley's existing area plans, for use in future projects and planning efforts.

The general design elements contained in the specific area plans are meant to guide design decisions in the early phases of a project, in order to provide design direction and expedite the development review process. Approval of specific design plans for a given project is done through the Planning Department's site plan review process, which may involve a hearing before the City's Design Review Committee depending on the scope of the project. As part of a project approval, specific conditions of approval may be attached to a project to ensure that it complies with design requirements.

10.1. PEDESTRIAN-SCALE DESIGN

To create streetscapes that are attractive to pedestrians, it is important that buildings, pedestrian amenities and street furniture reflect a pedestrian scale. For vertical elements such as street lighting, the appropriate height is 8-12 feet above the sidewalk level. Vertical elements should not exceed 20 feet. For design elements, such as awnings on building façades, the appropriate scale is 12-20 feet above ground level. Including streetscape elements at this scale creates a sense that the environment is properly suited for pedestrian use.

10.2. BUILDING ORIENTATION

Buildings on corridors where pedestrian travel is encouraged should address the street and reinforce the pedestrian experience. Buildings in commercial and high-density residential areas should not be set back from the property line but should be flush with the public right-of-way. In order to prevent building frontages from presenting as a monolithic wall, setbacks can be infrequently used to provide variety.

10.3. BUILDING HEIGHTS

On wide corridors, appropriately scaled building heights create a sense of enclosure for pedestrians. Buildings that are as tall as the width of the street are appropriate for creating this sense of enclosure. Although many areas of Berkeley traditionally have buildings that are much lower than the width of the adjacent street, Downtown Berkeley has several buildings that are 65-85 feet tall, in some instances taller than the width of the streets they line.

On pedestrian-oriented corridors, building heights that are too low can discourage pedestrian travel, creating a more auto-oriented street atmosphere. For this reason, one and two-story buildings should be discouraged on wide commercial corridors.

10.4. BUILDING FACADES

The design of building façades, particularly on the ground level, can encourage pedestrian activity by providing visual interest and a sense of safety. In commercial and mixed-use areas, retail or other activity should be encouraged in the ground floor. In areas where ground floor retail is not economically viable, flexible space on the ground floor is an appropriate option. Flexible space can be used for office, residential or retail uses. Flexible ground-floor space is particularly appropriate for areas where new mixed-use development is encouraged. In these developments, requiring ground-floor retail in all new developments can lead to significant portions of the space being vacant. Flexible space, in contrast, can transition to commercial uses as the market for local businesses grows.

In commercial areas, transparent ground-floor design helps to activate the street corridor for pedestrians. Transparent windows at the ground floor should be encouraged, while long stretches of blank walls should be avoided. In all new developments, building façades should be articulated with elements that add visual variety and interest. Windows, awnings, front porches, and other design elements achieve this purpose. Specific area plans recommend façade improvements that reflect the existing character of buildings in Berkeley's diverse neighborhoods.

10.5. BUILDING ENTRANCES

In commercial areas, building entrances should be placed every 15-30 feet. In residential areas, building entrances can be farther apart. To create the same sense of articulation, porches or balconies should be located where they complement building entrances.

10.6. PARKING FACILITIES

Surface parking lots create a disruption in the pedestrian experience because they are wide, open areas oriented toward automobiles. When passing open parking lots, pedestrians lose a sense of enclosure offered by buildings with flush frontages, and lose the sense of interest provided by active ground-floor uses. In pedestrian-oriented corridors, surface parking lots abutting the public right-of-way should be discouraged. Existing surface parking lots can be retrofitted with trellises or other pedestrian-scale design elements to minimize the impact of an open lot.

Structured parking facilities can negatively impact the pedestrian experience by creating large, blank walls. As a result, some cities have required that structured parking facilities be set back from the street frontage, behind an active ground-floor use, such as retail. In other cities, structured parking lots are situated above an active ground-floor use, to maintain pedestrian orientation at the street level.

Table 6
Example Pedestrian-Related Design Guidelines from Berkeley Area Plans

	Downtown Berkeley Design Guidelines[22]	University Avenue Strategic Plan[23]	West Berkeley Plan[24]
Pedestrian-Scale Design	Many of the features desirable for a pedestrian-oriented Downtown … which include inviting entranceways, continuous display windows, obvious locations for signs, and sensitively scaled proportions, should be incorporated into new as well as remodeled storefronts.	Large-scale projects should employ variations in floor level, roof shapes and materials, architectural details, and finishes. Elements of human scale should be incorporated into the building's design.	Design street facades and ground level doors and windows to include elements of pedestrian scale and three-dimensional interest.
Building Orientation and Frontage	- Buildings should frame and define the street as an active public space. - All buildings should maintain a continuous zero setback.	Buildings should address and reinforce streets, pedestrian paths, parks and plazas by locating the building along the street property line, unless usable street amenity space is created.	Ensure that new construction along the corridors maintains and strengthens the urban character of the street by locating new buildings at the front property line to reinforce the streetwall.
Building Heights	- New development should be scaled down to the periphery of Downtown and adjacent neighborhoods. - Along Shattuck Avenue, maintain the historic 3-5 story streetwall at the property line.	Building height and massing guidelines are presented for four node types.	Develop incentives to encourage new construction to be 2-4 stories in height (and to incorporate residential and office uses above the ground floor) along these corridors, especially at nodes.
Building Entrances	Storefronts should continue the rhythm of 15-30 foot enframed storefront openings at ground level, in order to reinforce visual continuity and pedestrian scale.	- Mixed use, multi-family residential buildings and office buildings: entries every 50-60 feet and bays, balconies and upper façade projections every 25-30 feet. - Single-family homes, town homes and ground floor retail uses should provide entries every 25-30 feet.	
Parking Facilities	- Downtown is first and foremost a place for pedestrians and every effort should be taken to ensure their comfort, safety and continued patronage. - Parking for new projects in the Downtown Area should be provided in the buffer area, as recommended in the Downtown Plan. - Locate parking behind buildings, underground or behind ground floor storefronts.	Parking garages and parking lots must not dominate the frontage of a street or inhibit pedestrian movement. In most cases, parking should be placed behind, below, or to the side of buildings.	Locate parking at the side or rear of the lot.

[22] Downtown Berkeley Design Guidelines are available at: http://www.ci.berkeley.ca.us/Planning/landuse/plans/dt_design.htm. Note: May be amended by the new Downtown Area Plan

[23] University Avenue Strategic Plan is available at: http://www.ci.berkeley.ca.us/planning/landuse/plans/uagoals.htm

[24] West Berkeley Plan: http://www.ci.berkeley.ca.us/planning/landuse/plans/westberkeley/wbtoc.htm

11. PEDESTRIAN PATHWAYS AND STAIRS


Stairs in the Berkeley Hills

A unique network of over 130 historic pedestrian pathways and stairways exists in the Berkeley Hills. The pathways offer quiet resting places, panoramic viewpoints and critical pedestrian routes down from the hill neighborhoods linking between the narrow and winding streets. The Department of Public Works maintains a detailed database of public pathways and publicly dedicated rights-of-way.[25] Some of the dedicated path alignments are currently unbuilt and impassable. An organization called the Berkeley Path Wanderers Association works to improve these pathways by installing simple wooden steps.

These pathways and stairs are steep and not ADA-compliant. The City of Berkeley should seek to improve the remaining unbuilt pathways, and continue to cooperate with the Path Wanderers Association on this effort. The City should ensure that existing pathways are well maintained, kept clear of vegetation overgrowth, and well-signed so that residents can access them. In the event of an emergency, these pathways could serve as critical evacuation routes for getting large numbers of pedestrians out of the hill area.

12. ACCESSIBILITY RECOMMENDATIONS

The City of Berkeley has a history of pioneering in the area of pedestrian accessibility, and is committed to providing access for all pedestrians, including those who have disabilities. The purpose of this section is to summarize street design standards that will make Berkeley more accessible to all pedestrians, paying special attention to accommodate special mobility needs.

The Federal Americans with Disabilities Act of 1990 (ADA) created civil rights protections for people with disabilities. Legally enforceable standards for sidewalks, curb ramps, crosswalks, and bus stops are included in the Americans with Disabilities Act Accessibility Guidelines (ADAAG). The U.S. Access Board creates and modifies these guidelines, which are applied by the U.S. Department of Transportation and enforced by the U.S. Department of Justice.

The State of California also has required accessibility standards, included in Title 24 of the California Code of Regulations, also known as the California Building Standards Code. The Division of State Architecture develops these standards, which generally follow ADAAG standards but include higher standards for some facilities. The U.S. Access Board has also developed guidelines for communities to voluntarily improve accessibility beyond the mandatory requirements of ADAAG.

12.1. BERKELEY ADA TRANSITION PLAN

The City of Berkeley has taken many successful steps to improve accessibility on its street network, even before the passage of Federal and State regulations. Since the early 1970's, the City of Berkeley has installed more than 2,700 curb ramps, nearly 300 blue zones for disabled parking and numerous audible

[25] City of Berkeley General Plan, Transportation Element

pedestrian signals. The City adopted its first nondiscrimination policy about disability in 1985.[26] Since 1986, the City's Commission on Disability has advised the City Council and staff on accessibility issues.

In 1996, the City adopted the "ADA Initial Transition Plan" which guided the City's efforts to improve facility access in accordance with ADA Accessibility Guidelines. The City is currently updating its Transition Plan which will include a year-by-year schedule of capital improvements to make Berkeley more accessible for all pedestrians.

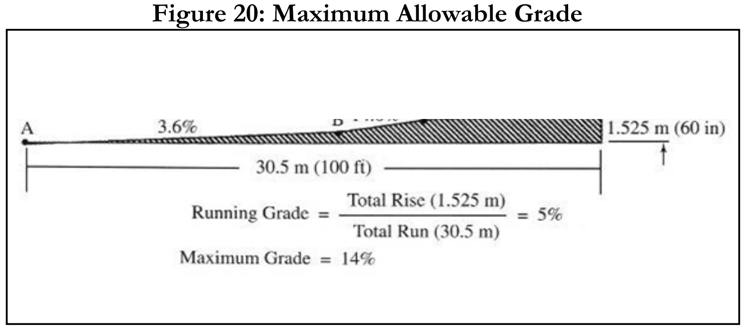
12.2. GUIDELINES FOR ACCESSIBLE SIDEWALKS AND PATHWAYS

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

12.3. GRADE

The grade of a sidewalk affects the issues of control, stability and endurance. Gentle grades are preferred to steep grades, allowing more people to go uphill, providing more control on the downhill and minimizing loss of footing. The maximum grade of a sidewalk should be no more than 14 percent in any 2-foot section, while the running grade for a sidewalk should not exceed 5 percent, as shown in Figure 20.

Figure 20: Maximum Allowable Grade



The following terms apply to standards for grades:

- Grade is the slope parallel to the direction of travel.

- Running grade is the average grade along an entire continuous path.

- Maximum grade covers a section of the sidewalk that is larger than the running grade. It is measured over a two-foot section.

- Rate of change is the change of the grade over a distance of two feet.

- Counter slope is the grade running opposite to the running grade.

12.4. CROSS-SLOPE

Cross-slope describes the angle of the sidewalk from the building line to the street, perpendicular to the direction of travel. All sidewalks require some cross-slope for drainage, but a cross-slope that is too great will present problems for people who use wheelchairs, walking aids, or who have difficulty walking

[26] City of Berkeley Administrative Regulation 1.90

but do not use aids. The maximum cross-slope should be no more than 2 percent (1:50) for compliance with ADAGG, as shown in Figure 21.[27]

If a greater slope is anticipated because of unusual topographic or existing conditions, the designer should maintain the preferred slope of 1:50 within the entire through passage zone, if possible. This can be accomplished either by raising the curb so that the cross-slope of the entire sidewalk can be 1:50, or by placing the more steeply angled slope within the Furnishings Zone and/or the Frontage Zone, as shown in Figure 21.

If the above measures are not sufficient and additional slope is required to match grades, the cross slope within the Through Passage Zone may be as much as 1:25, provided that a 3-ft wide portion within the Through Passage Zone remains at 1:50 cross slope, as shown in Figure 21.

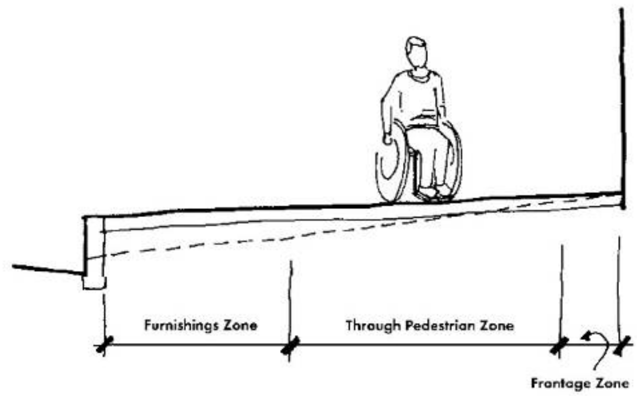
12.5. WIDTH

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

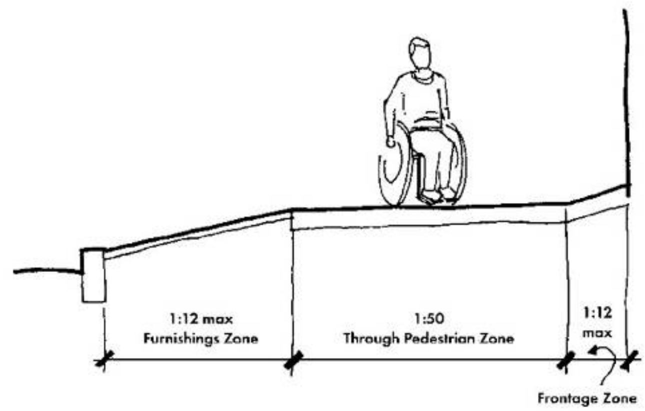
12.6. VERTICAL CLEARANCE

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

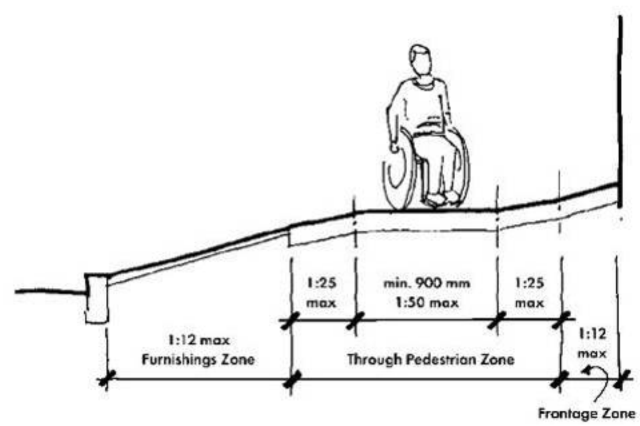
Figure 21
Cross Slope



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



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



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

[27] ADA Accessibility Guidelines, 4.3.7

12.7. CHANGES IN LEVEL

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

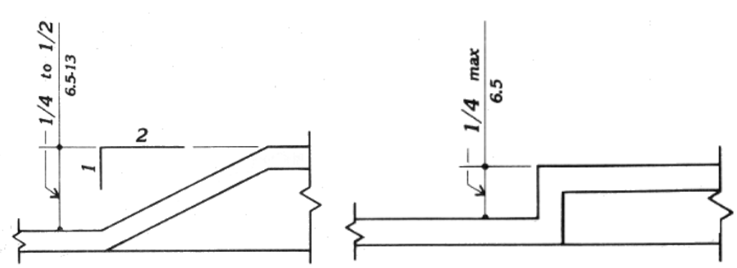
- Sidewalk cracks
- Curbs without ramps
- Drainage gates
- Buckled bricks
- Grooves in the surface
- Heaving due to tree roots
- Lips at the edges of curb ramps & driveways
- Railroad tracks
- Steps
- Tree grates
- Transitions between streets, gutters and ramps

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

12.8. GRATES AND HATCH COVERS

Grates and hatch covers should be located in the furnishings zone of a sidewalk, outside of the through passage zone (see sidewalk zones, above). Grates are frameworks of latticed or parallel bars, such as tree wells or drainage inlets, that permit water and small debris to fall through. Grates can cause people to trip, and can catch wheelchair casters, crutches and canes.

Figure 22
Changes in Level

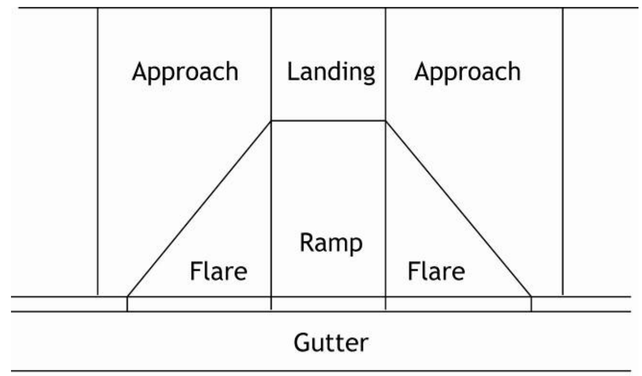


All grates within the sidewalk should be flush with the level of the surrounding sidewalk surface, and should be located outside the through passage zone. Ventilation grates and tree well grates should have openings no greater than 1/2 inch in width. If gratings have elongated openings, they should be placed so that the long dimension is perpendicular to the dominant direction of travel.[28]

[28] ADA Accessibility Guidelines, 4.5.4

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

Figure 23
Curb Ramp Components



12.9. DRIVEWAY CROSSINGS

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

12.10. CURB RAMPS

ADA-compliant curb ramps are required at all newly constructed intersections, and must be retrofitted when streets are repaved. Curb ramps are required to be at least 48 inches wide, excluding flared sides. Ramps should have a detectible warning system (truncated domes), which extend the full width of the curb ramp and 3' depth. The smallest possible slope should be used for ramps, and the transition from ramps to streets should be flush and free of abrupt changes.

Curb ramps consist of the following basic components, described in Table 7 and depicted in Figure 23.

Table 7
Curb Ramp Components

Landing	The level area at the top of a curb ramp facing the ramp path. Landings allow people using wheelchairs to enter and exit a curb ramp, as well as travel along with sidewalk without tipping or tilting.
Approach	The portion of the sidewalk on either side of the landing. Approaches provide space for people using wheelchairs to prepare to enter landings.
Flare	The sloped transition between the curb and sidewalk. Flares help to prevent pedestrians from tripping over an abrupt change in level.
Ramp	The sloped transition between the sidewalk and street where the grade is constant and cross slope at a minimum. Ramps are the main pathway between the sidewalk and street.
Gutter	The trough that runs between the curb or curb ramp and the street, designed to serve as a conduit for storm water flow or other drainage.

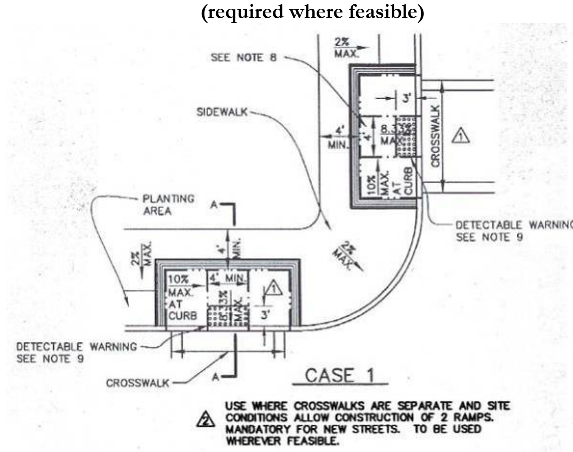
12.10.1. Recommended City Curb Ramp Guidelines

The three most common curb ramp designs, perpendicular, parallel, and diagonal, and the situations in which each should be used, are described below. Other curb ramp types, including built-up ramps and depressed corners, are also addressed.

12.10.2. Perpendicular Curb Ramps

Perpendicular curb ramps allow for a convenient, direct path of travel with a 90-degree angle to the curb. Perpendicular curb ramps are oriented so that users enter the street traveling perpendicular to vehicular traffic. Perpendicular curb ramps maximize access for pedestrians at intersections. They reduce the overall distance required to cross the street when compared with diagonal ramps. However, perpendicular curb ramps require more space than single diagonal ramps.

Figure 24
Berkeley Standard Perpendicular Curb Ramp Design
(required where feasible)



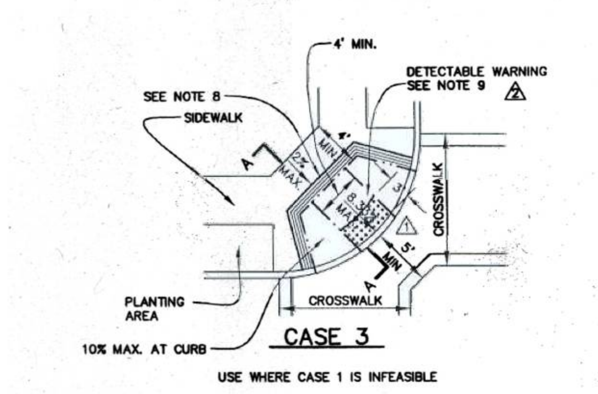
Perpendicular curb ramps without level landings are difficult for wheelchairs to negotiate, and should not be installed. Where sidewalks are narrow, there may not be space for two perpendicular curb ramps and their landings. Adding bulb-outs can create additional space to accommodate two perpendicular ramps and landing areas. Using vertical curb returns instead of flares is a space-saving option that can make room for two ramps.

The City of Berkeley requires that all newly constructed sidewalks include two perpendicular ramps at each corner, unless precluded by either extreme cost or operational issues. Retrofitted ramps in multi-family neighborhoods and commercial areas should include perpendicular ramps, except where space is inadequate.

12.10.3. Diagonal Curb Ramps

Diagonal curb ramps are usually similar in design to perpendicular curb ramps, but are placed at the apex of the corner and oriented such that users enter the street traveling diagonally to the path of vehicle travel. Diagonal curb ramps require less space than dual perpendicular curb ramps, but also require users to take a longer, circuitous travel path to cross the street. The diagonal orientation causes a user to travel towards the center of the intersection before maneuvering left or right to cross the street. This is undesirable, particularly at locations with tight turning radii and no on-street parking, because users are exposed to turning vehicles at the base of the ramp. Being in the intersection longer exposes the user to greater risk of being hit by vehicles. In Berkeley, diagonal curb ramps are only used if extreme cost or operational conditions preclude the use of perpendicular ramps.

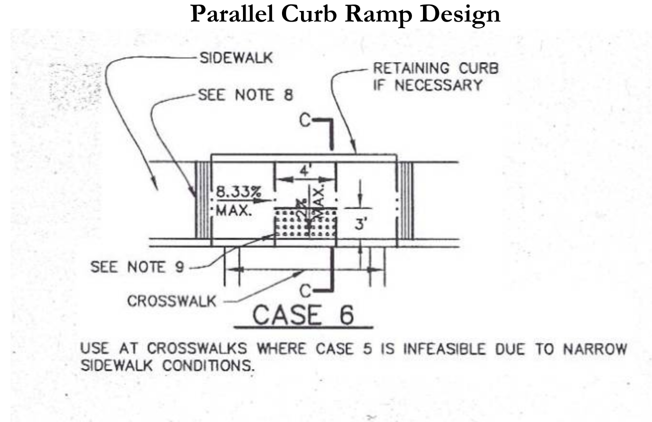
Figure 25
Berkeley Standard Diagonal Curb Ramp Design
(allowed where perpendicular ramps infeasible)



12.10.4. Parallel Curb Ramps

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

Figure 26
Parallel Curb Ramp Design



12.11. GUIDELINES FOR ACCESSIBLE STREET CROSSWALKS

The design guidelines for accessibility at crosswalks are much the same as for crosswalks in general. Crosswalks, whether marked or unmarked, exist at all roadway intersections except where pedestrian crossing is specifically prohibited. Mid-block crosswalks must be marked. For detailed design guidance on crosswalk markings and other enhancements, see Section 5 above.

12.12. CROSSING TIMES

As discussed earlier, the City of Berkeley follows the California MUTCD in using a 4 feet per second normal walking speed in order to calculate the pedestrian clearance time needed at signalized intersections. For intersections used by seniors or persons with disabilities, it is recommended that the City re-time the pedestrian clearance interval using a slower walking rate of 2.8 feet per second, consistent with MUTCD recommendations.

12.13. PEDESTRIAN-ACTIVATED TRAFFIC CONTROL SIGNALS

Pedestrian-activated traffic control signals require pedestrians to push a button to activate a walk signal. Pedestrian-activated signals are appropriate at mid-block crosswalks and at intersections with low pedestrian volumes. In areas of high pedestrian volumes, automatic (timed) actuation of pedestrian walk signals is preferred.

Pushbuttons for pedestrian-activated traffic control signals should be located as close as possible to curb ramps without reducing the width of the path. Recommended locations for accessible pedestrian pushbuttons are presented in Figure 27.

The buttons should be at a level that is easily reached by people in wheelchairs. The California MUTCD and the US Access Board recommend a height of 42 inches for pedestrian control signals.[29] The City of Berkeley uses a pressure-activated push button called "the BullDog" as standard. The button is non-moving, and when pressed provides both a two tone audible beep and visible momentary or latched LED light to notify the user the switch was activated. It only takes 1-3 lbs. of force to activate so small children, seniors, persons with disabilities, and all pedestrians can easily activate it.

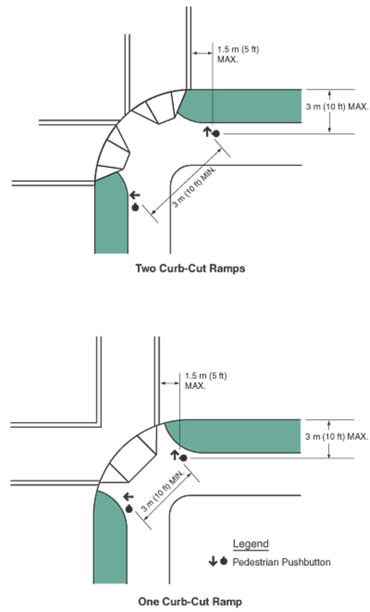
The US Access Board recommends a 30" x 48" level ground surface centered on each control. This ensures that wheelchair users can access the buttons on a level surface.[30] The US Access Board recommends the buttons be raised above or flush with their housing, and large enough for people with visual impairments to see, a minimum of 2 inches.

[29] MUCTD, Section 4E.08; "Accessible Rights-of-Way, A Design Guide," US Access Board, 3.5.4
[30] "Accessible Rights-of-Way, A Design Guide," US Access Board, 3.5.4

12.14. AUDIBLE AND VIBROTACTILE PEDESTRIAN SIGNALS

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

Figure 27
Recommended location for accessible pedestrian push-button signals



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

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


Pedestrian Push Button

Following are Berkeley's Guidelines to assess intersections for the installation of APS:

The City of Berkeley will consider the installation of audible pedestrian traffic signals to provide crossing assistance at signalized intersections, when warranted. To be considered for audible signals, the location must first meet the following basic criteria:

- The intersection must already be signalized.
- The location must be suitable to the installation of audible signals, in terms of safety, noise levels and related environmental considerations.
- There must be a demonstrated need for an audible signal device. An individual or an organization demonstrates the need through a request.
- The location should not have unique characteristics (i.e.: a complex intersection configuration).

In Berkeley, existing APS signals use the bird "chirp" to signal "WALK" and "cuckoo" to signal "DON'T WALK."

The use of audible pedestrian traffic signals needs to be carefully considered in each location for possible adverse noise impacts, particularly on adjacent residential neighborhoods.

12.15. ACCOMMODATING PEOPLE WITH VISUAL IMPAIRMENTS

People with visual impairments must gather information about their traveling environment in different ways from fully sighted people. People with vision impairments must use cues, such as the sound of traffic and its direction, changes in slope such as curb ramps, textures, and color contrast. Good design provides these cues. Predictability and consistency in the walking environment makes navigation easier for people with visual impairments. Intersections that are at 90-degree angles with simple crossing patterns are more easily discerned than complex or irregularly shaped intersections. If devices are used to help the visually impaired, such as audible pedestrian signals or truncated domes, the same devices should be used in a consistent manner at similar locations.

12.15.1. Raised Tactile Devices Used as Detectible Warnings (Truncated Domes)

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

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

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

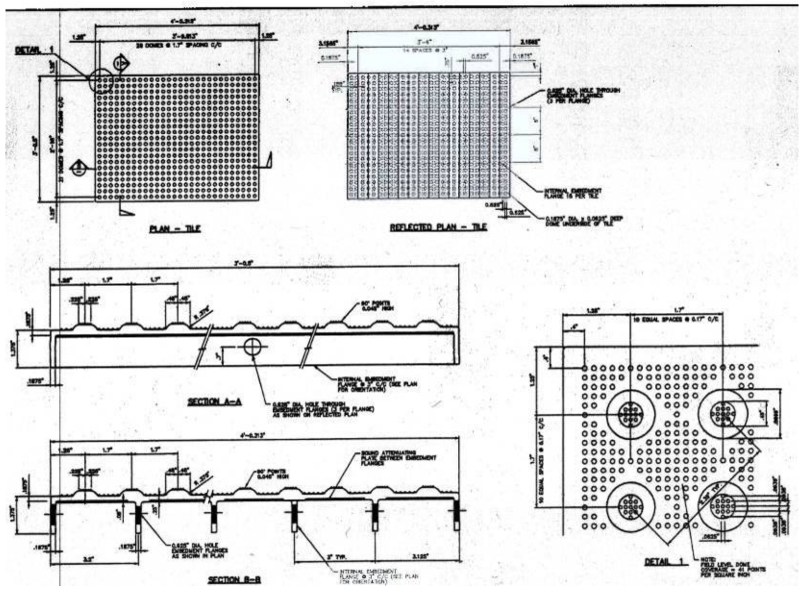
The ADAAG standards for detectable warnings are:

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

The US Access Board recommends:

- Visual contrast of at least 70 percent
- Width: 610 mm (24 in)
- Location: 152 mm to 200 mm (6 in to 8 in) from the bottom of the ramp

Figure 28
Berkeley Standard Design Detail for Truncated Domes



12.15.2. Grooves

Grooves are indentations at the top of curb ramps that can be detected by canes in contact with the sidewalk. Curbs along Caltrans facilities in California are required to include 12-inch grooves to form a border at the level surface of the sidewalk.

12.15.3. Raised Tactile Devices Used for Wayfinding

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

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

APPENDIX C
GENERAL PLAN PEDESTRIAN POLICIES

This Appendix contains a summary of all pedestrian-related policies found in the Berkeley General Plan. For the most up-to-date policies, please refer to the General Plan.

1. TRANSPORTATION ELEMENT: "CORE" PEDESTRIAN POLICIES

POLICY T-48 PEDESTRIAN PLAN

Create a Pedestrian Plan for the purpose of developing additional strategies and policies to make Berkeley safer for pedestrians and to make Berkeley a more pedestrian-friendly city.

Actions

Create a Pedestrian Plan for the purpose of developing additional strategies and policies to make Berkeley safer for pedestrians and to make Berkeley a more pedestrian-friendly city.

POLICY T-49 DISABLED ACCESS

Improve pedestrian access for the entire disabled community.

Actions

A. Fund sidewalk, crosswalk, curb, signalization and signage, and talking signal improvements.

B. Use regulation and incentives to require or encourage accessibility upgrades for private businesses.

C. Encourage businesses to exceed the minimum standards set by the ADA "readily achievable barrier removal" requirement.

POLICY T-50 SIDEWALKS

Maintain and improve sidewalks in residential and commercial pedestrian areas throughout Berkeley and in the vicinity of public transportation facilities so that they are safe, accessible, clean, attractive, and appropriately lighted.

Actions

A. Prioritize pedestrian-serving public improvements, such as sidewalk repair and widening, bus shelters, street trees and lighting, public art, fountains, and directional signs.

B. Establish safe, attractive pedestrian connections between residential areas, transit, shopping areas, and schools and other community facilities.

C. Ensure that sidewalks are kept in good repair and are level, with a suitable grade for pedestrians and wheelchairs. Discourage, and when possible prevent, new developments from creating uncomfortably steep grades.

D. Ensure adequate unobstructed sidewalk passage by appropriate placement of street furniture and amenities and prevention of obstruction of travel ways by such items as advertisement signs, merchandise, and utility boxes.

POLICY T-51 PEDESTRIAN PRIORITY

When addressing competing demands for sidewalk space, the needs of the pedestrian shall be the highest priority.

POLICY T-52 PEDESTRIAN SAFETY AND ACCESSIBILITY

Provide safe and convenient pedestrian crossings throughout the city.

Actions:

A. Seek to ensure that the distance between signal-controlled intersections, "smart crosswalks," or stop signs is never more than one-quarter mile on major and collector streets. At intersections with severe or high pedestrian/automobile collision rates and at heavily used pedestrian crossings, consider all-way stop signals that allow the free flow of pedestrians through the intersection, "smart" signals to calm traffic and improve intersection safety, and pedestrian/bicycle-activated signals that allow bikes and pedestrians to cross busy streets without inviting traffic onto cross streets.

B. Consider pedestrian crosswalk "runway" lights in the pavement at intersections with severe or higher than average pedestrian collision rates.

C. Encourage and educate the public on the use of painted and unpainted crosswalks; enforce jaywalking regulations on main arterials.

D. Encourage the creation of accessible pedestrian medians or islands in wide streets where people have to cross more than two lanes.

E. Enforce pedestrian right-of-way laws.

POLICY T-53 INTERSECTIONS WITH SEVERE OR HIGH COLLISION RATES

Reduce pedestrian and bicycle collisions, injuries, and fatalities.

Action:

A. Undertake a review of intersections or street locations with a high number of collisions and/or a high percentage of fatal or permanently disabling collisions and develop programs with appropriate mix of education, enforcement, and engineering changes to improve the safety of these intersections and locations. Consider:

   1. Adding signage at intersections, warning the public that the intersection has been the site of several traffic collisions or fatalities.
   2. Moving bus stops to the far side of the intersection so that buses do not block visibility at the intersection when stopping to pick up passengers.
   3. Providing an all-red, pedestrian phase to especially congested intersections, giving pedestrians the ability to cross the intersection in any direction before vehicles are given a green light.
   4. Lighted crosswalks.
   5. Maintaining a minimum 50-foot red, no-parking zone adjacent to the intersection to increase visibility.
   6. Re-timing pedestrian crossing signals to allow more time for pedestrian crossing.
   7. Other actions recommended by the Bicycle and Pedestrian Safety Report.

POLICY T-54 PATHWAYS

Develop and improve the public pedestrian pathway system.

Action:

A. Allocate resources to identify and improve unimproved pathways.

B. Maintain a complete and accurate inventory and database of Berkeley's Pathway Network, to include all known public paths, dedicated easements, and rights-of-way.

C. Work with residents and interest groups adjacent to pathways to prepare a "Top Priority Improvement List" for pathway restoration. Give highest priority for public investment to paths that: 1) include neighbor support and a clear title, 2) provide an evacuation route, 3) continue existing paths, and 4) improve neighborhood circulation and provide access to community services and facilities.

D. Continue to make repairs and safety improvements on public paths and restore unimproved paths.

2. GENERAL PLAN TRANSPORTATION ELEMENT: OTHER PEDESTRIAN RELATED POLICIES

POLICY T-12 EDUCATION AND ENFORCEMENT

Support, and when possible require, education and enforcement programs to encourage carpooling and alternatives to single-occupant automobile use, reduce speeding, and increase pedestrian, bicyclist, and automobile safety.

Actions:

A. Consider developing a program that rewards households, block groups, or neighborhood organizations that can document their reduction in automobile use. Consider discounts on electric bicycles to reward automobile use reduction.

B. Encourage hotels, motels, and other visitor destinations to provide visitors with information on public transportation and bicycle services and facilities.

POLICY T-13 MAJOR PUBLIC INSTITUTIONS

Work with other agencies and institutions, such as the University of California, the Berkeley Unified School District, Lawrence Berkeley Laboratory, Vista Community College, the Alameda County Court, and neighboring cities to promote Eco-Pass and to pursue other efforts to reduce automobile trips. (Also see Land Use Policy LU-39.)

Actions:

A. Encourage other agencies and institutions to match or exceed the City of Berkeley's trip reduction and emission reduction programs for their employees.

B. Encourage other agencies, institutions, and cities to use market-pricing mechanisms to reduce automotive use and discourage all-day parking.

C. Encourage the University of California:

1. To maintain and improve its facilities and programs that support and encourage pedestrians, bicyclists, and transit riders.
2. To provide bicycle facilities, "all hour" bicycle paths, and timely pavement maintenance.
3. To locate non-student-serving offices and additional staff and student housing at or near BART stations outside Berkeley.

D. Encourage the Berkeley Unified School District to establish programs and facilities to reduce automobile use among staff, faculty, and students, including:

1. Training in safe and competent bicycle use.
2. Providing safe and convenient bicycle facilities.
3. Working with parents to establish carpools, "bicycle to school groups," and "bus to school groups."
4. Create programs that offer incentives to use public transportation such as Eco-Pass.

E. Obtain "Safe Routes to School" grants and other funds for programs to make it safer for students to travel to school.

F. Continue limiting the number of residential parking permits given to BUSD faculty and staff.

G. Assist the University of California and the Berkeley Unified School District in developing satellite parking lots with shuttle service for students and staff.

H. Encourage the University of California, the Berkeley Unified School District, and other major institutions to cap parking at current levels while seeking to reduce automobile use.

I. Encourage institutions to create incentives for their employees and students to live locally.

J. Encourage all public and private institutions, including schools, health clubs, recreation centers and other community destinations to organize carpools and shuttles.

POLICY T-16 ACCESS BY PROXIMITY

Improve access by increasing proximity of residents to services, goods, and employment centers. (Also see Land Use Policies LU-13 and LU-23, Housing Policy H-16, and Environmental Management Policy EM-41 Action B.)

Actions:

A. Locate essential commercial and other services in transit-oriented locations to reduce the need for cars and enable people living near transit and services to reduce auto trips.

B. Encourage higher density housing and commercial infill development that is consistent with General Plan and zoning standards in areas adjacent to existing public transportation services.

C. Encourage the University of California to provide additional housing within walking distance of campus to reduce University-related traffic.

D. Encourage siting of child-care facilities and other services in large residential or commercial facilities to reduce traffic impacts associated with child-care drop-off and pick-up.

E. In locations served by transit, consider reduction or elimination of parking requirements for residential development.

POLICY T-18 LEVEL OF SERVICE

When considering transportation impacts under the California Environmental Quality Act, the City shall consider how a plan or project affects all modes of transportation, including transit riders, bicyclists, pedestrians, and motorists, to determine the transportation impacts of a plan or project. Significant beneficial pedestrian, bicycle, or transit impacts, or significant beneficial impacts on air quality, noise, visual quality, or safety in residential areas, may offset or mitigate a significant adverse impact on vehicle Level of Service (LOS) to a level of insignificance. The number of transit riders, pedestrians, and bicyclists potentially affected will be considered when evaluating a degradation of LOS for motorists.

Action:

A. Establish new multi-modal levels of service (LOS) City standards that consider all modes of transportation, including transit, bicycles, and pedestrians in addition to automobiles.

POLICY T-20 NEIGHBORHOOD PROTECTION AND TRAFFIC CALMING

Take actions to prevent traffic and parking generated by residential, commercial, industrial or institutional activities from being detrimental to residential areas. (Also see Land Use Policies LU-9, LU-10, and LU-11.)

Actions:

A. Continue to support and actively move forward neighborhood strategies to slow and "calm" traffic.

B. Endorse strategies to reduce shortcutting and speeding and minimize the use of neighborhood streets by through traffic.

C. Endorse traffic calming strategies that primarily slow traffic.

D. Discourage strategies that divert traffic from one residential street to another residential street.

E. Require that strategies provide for the movement of emergency vehicles to and through the neighborhoods and recognize the needs of the disabled, pedestrians, transit riders, and bicyclists.

F. Make use of street modifications, including sidewalk bulb-outs, and appropriate traffic calming measures to slow traffic on neighborhood streets to 15 or 20 miles per hour and limit 24-hour volumes to less than 1500 cars per day.

G. Support and encourage neighborhood traffic watch associations to work with local enforcement to report and prosecute traffic violations in neighborhood areas.

H. Establish a Residential Traffic Calming Program that includes objective criteria for evaluating neighborhood traffic problems such as traffic volume, pedestrian and bicycle accident rates, and vehicle speeds, especially in areas where children and seniors are concentrated. Include processes to ensure neighborhood participation in the development and evaluation of potential traffic calming solutions.

I. Implement strategies that slow and calm traffic on residential streets including both local streets and residential segments of collector and major streets.

J. Develop engineering, education, and enforcement strategies to discourage speeding on local, collector and major streets. Prioritize speed limit enforcement on local streets and on residential segments of collector and major streets.

K. Evaluate effectiveness of enforcement efforts to prevent speeding and consider increasing the number of traffic enforcement officers if necessary to reduce and control speeding.

L. Establish levels of service standards for residential areas on collector and major streets.

M. In residential areas, restrict the use of large buses to Primary and Secondary Routes shown on the Transit Network map, whenever feasible.

POLICY T-24 ASHBY AVENUE

Take actions necessary to reduce congestion, improve pedestrian and bicycle crossings, and improve the quality of life for residents on Ashby Avenue.

Action:

A. Ensure safe pedestrian crossing of Ashby Avenue along its entire route, but particularly to City facilities such as schools, senior citizen centers, and libraries.

POLICY T-25 STREET MAINTENANCE

Maintain streets, sidewalks, and other public infrastructure to reduce long-term replacement costs.

Actions:

A. Coordinate pedestrian and transit public improvements with street repairs and repaving.

B. Ensure that street repairs and repaving are completed without negatively affecting the disabled or bicyclists (e.g., ensure that all repaving and patching provides a smooth surface for bicyclists and wheelchairs).

C. Coordinate the work of agencies such as EBMUD and others to minimize the digging up of City streets.

POLICY T-28 EMERGENCY ACCESS

Provide for emergency access to all parts of the city and safe evacuation routes. (Also see Disaster Preparedness and Safety Policy S-22.)

Actions:

A. Do not install new full diverters or speed humps on streets identified on the Emergency Access and Evacuation Network map unless it is determined by the Fire and Police Departments that the installation will not significantly reduce emergency access or evacuation speeds. The Fire Department should be able to access all Berkeley locations within four minutes (see Disaster Preparedness and Safety Element). All other proposed traffic calming devices or obstructions to the free flow of traffic on these streets should be reviewed by the Fire and Police Departments to ensure that the proposed change will not significantly increase emergency response times or hinder effective evacuation of adjacent neighborhoods.

B. Maintain and improve pedestrian pathways throughout the city that are dedicated for public use and provide an alternative to the streets in case of an emergency evacuation.

C. Maintain and make available to the public up-to-date maps of all emergency access and evacuation routes.

D. Where necessary, consider parking restrictions to ensure adequate access for emergency vehicle access and evacuation in hill area neighborhoods with narrow streets.

E. Prioritize evacuation routes for under grounding of overhead utilities.

POLICY T-30 TRAFFIC SIGNALS

Continue to pursue better signal devices and systems to facilitate movement on Berkeley's limited road network. Consider:

1. Signals that provide separate phases for through (straight) traffic, pedestrians and cyclists, and turning traffic.
2. Bus-activated signals.
3. All-way stop signals that allow the free flow of pedestrians through the intersection.
4. "Smart" signals to calm traffic and improve intersection safety.
5. Timed traffic signals to give priority to and speed movement of transit and emergency vehicles.
6. Pedestrian /bicycle-activated signals that allow bikes and pedestrians to cross busy streets.

POLICY T-33 DISABLED PARKING AND PASSENGER ZONES

Ensure adequate disabled parking and passenger drop-off zones.

Actions:

A. Require access to adequate disabled parking and passenger drop-off zones in all new commercial and residential developments.

B. Improve enforcement of disabled "blue zone" parking.

POLICY T-38 INTER-JURISDICTIONAL COORDINATION

Establish partnerships with adjacent jurisdictions and agencies, such as the University of California and the Berkeley Unified School District, to reduce parking demand and encourage alternative modes of transportation.

Actions:

A. Promote bicycle and pedestrian travel through training, education, incentive programs, and physical improvements such as path improvements and signage, bicycle lockers, and shower facilities.

POLICY T-40 PARKING IMPACTS

When considering parking impacts under the California Environmental Quality Act for residential projects with more than two units located in the Avenue Commercial, Downtown, or High Density Residential land use classifications, any significant parking impacts identified that result from the project should be mitigated by improving alternatives to automobile travel and thereby reducing the need for parking. Examples include improvements to public transportation, pedestrian access, car sharing programs, and bicycle facility improvements. Parking impacts for these projects should not be mitigated through the provision of additional parking on the site. The City finds that:

A. Parking supply and demand may easily be adjusted by changing local pricing policies and by changing how the supply is managed.

B. As the parking supply increases or parking costs decrease, automobile use becomes a more attractive transportation alternative and demand for parking increases. As parking supply decreases and its price increases, demand decreases.

C. Increasing the parking supply increases automobile use, which causes a measurably negative impact on the environment.

POLICY T-41 STRUCTURED PARKING

Encourage consolidation of surface parking lots into structured parking facilities and redevelopment of surface lots with residential or commercial development where allowed by zoning.

Actions:

A. Whenever feasible, orient automobile access to parking lots and garages away from designated bicycle ways and boulevards and avoid blank walls along pedestrian ways.

3. GENERAL PLAN URBAN DESIGN ELEMENT: PEDESTRIAN RELATED POLICIES

POLICY UD-8 PUBLIC WORKS PROJECTS

In public works projects, seek to preserve desirable historic elements such as ornamental sidewalk features, lampposts, and benches.

Actions:

A. Carefully review planned utility undergrounding, sidewalk repair, and other public works projects to avoid unnecessary removal of light fixtures, planting, and other features with historic or aesthetic value.

B. Establish procedures for the review of work by PG&E, EBMUD, and other agencies responsible for work in the public right-of-way.

C. Provide for review by the Landmarks Preservation Commission of public works projects involving potential change to desirable historic elements.

POLICY UD-26 PEDESTRIAN-FRIENDLY DESIGN

Architecture and site design should give special emphasis to enjoyment by, and convenience and safety for, pedestrians.

Actions:

A. Use regulatory review to promote pedestrian-friendly design.

B. Ensure proper placement of elements such as doors and windows, in relation to the sidewalk and streetscape, to ensure pedestrian-friendly design and increase public safety.

POLICY UD-27 RELATION TO SIDEWALK

Projects generally should be designed to orient the main entrance toward the public sidewalk, not a parking lot, and avoid confronting the sidewalk with a large windowless wall or tall solid fence.

POLICY UD-28 COMMERCIAL FRONTAGE

Commercial buildings on streets with public transit generally should have no appreciable setback from that street's sidewalk, except in the case of occasional plazas or sitting areas that enhance the area's pedestrian environment.

POLICY UD-35 PUBLIC IMPROVEMENTS

Undertake, and/or participate in, major improvement projects aimed at making the streetscape more enjoyable, clarifying and strengthening the urban pattern, and generally enhancing Berkeley's physical character. Public works projects should be designed to make it easier for people to orient themselves within Berkeley and understand and appreciate the city's various districts and neighborhoods, as well as to generally enhance the urban environment

Actions:

A. Continue to use interdepartmental review to help achieve suitable design of City improvement projects.

B. Remove existing features that detract from the cityscape, such as unsightly signs and overhead utilities.

C. Emphasize the special characteristics of each district and neighborhood through distinctive public landscaping, street lighting, and pedestrian amenities.

D. Recognize and identify district centers, boundaries, and gateways with distinctive landscaping and physical design improvements.

E. Use pedestrian-scale lighting, wide sidewalks, street trees, gateway features, and other public improvements to reinforce and enhance residential and commercial area character and identity, and improve conditions for pedestrians, bicyclists, and transit riders.

4. GENERAL PLAN ECONOMIC DEVELOPMENT AND EMPLOYMENT ELEMENT: PEDESTRIAN RELATED POLICIES

POLICY ED-4 NEIGHBORHOOD AND AVENUE COMMERCIAL DISTRICTS

Provide programs and services to assist neighborhood and avenue commercial districts.

Actions:

A. City efforts in neighborhood and avenue commercial zones should:

    1. Assist with the retention and development of existing businesses or attract new businesses that serve local neighborhood needs.
    2. Implement capital improvements and expand façade grants to restore original and historic facades.
    3. Maintain adequate levels of police presence.
    4. Maintain adequate street and sidewalk cleaning for all commercial districts.
    5. Enhance the pedestrian orientation of all shopping districts.

B. Maintain a diverse mix of commercial goods and services in the shopping districts. Use needs assessments to determine what basic goods and services are lacking, and establish criteria of appropriateness for neighborhood businesses that address the following issues:

   1. Availability of basic goods and services that are affordable to local residents.
   2. Local ownership.
   3. Employment for local residents at living wages.
   4. Environmental impact on adjacent neighborhoods and businesses, for example, traffic, noise, and air pollution.
   5. Impact on the viability of other business districts and quality of life in other neighborhoods in the city.

5. GENERAL PLAN LAND USE ELEMENT: PEDESTRIAN RELATED POLICIES

POLICY LU-11 PEDESTRIAN- AND BICYCLE-FRIENDLY NEIGHBORHOODS

Ensure that neighborhoods are pedestrian- and bicycle-friendly with well-maintained streets, street trees, sidewalks, and pathways.

Action:

Ensure that any City-owned pathways or dedicated easements adjacent to, abutting, or through private property are preserved when reviewing new development proposals.

POLICY LU-16 DOWNTOWN PLAN

Implement the Downtown Plan and take actions to achieve the three goals of the Plan:

1. Express and enhance Berkeley's unique social and cultural character in the Downtown.
2. Create an appealing and safe Downtown environment, with a comfortable pedestrian orientation.
3. Diversify, revitalize, and promote the Downtown economy.

POLICY LU-20 DOWNTOWN PEDESTRIAN AND TRANSIT ORIENTATION

Reinforce the pedestrian orientation of the Downtown.

Actions:

A. Continue to explore options for the partial or complete closure of Center Street, Addison Street, or Allston Way to automobiles to promote the pedestrian and commercial vitality and enhance Civic Center Park use and appearance. When exploring options, carefully consider the experiences of other cities where closures have proven to be successful and where closures have proven to be unsuccessful or detrimental.

B. Implement capital improvement projects that reinforce the pedestrian, transit, commercial, arts, and entertainment orientation of the Downtown and improve the quality of life for visitors and residents of the area.

C. Reconstruct the Downtown BART Station and Plaza to be more pedestrian-friendly and visually attractive.

D. Encourage development of public spaces, plazas, and restoration of natural areas in the Downtown and other areas of the city where appropriate to enhance the pedestrian environment.

POLICY LU-26 NEIGHBORHOOD COMMERCIAL AREAS

Maintain and improve Neighborhood Commercial areas, such as Elmwood, Solano, and North Shattuck, as pedestrian-friendly, visually attractive areas and ensure that Neighborhood Commercial areas fully serve neighborhood needs.

Actions:

A. Require ground-floor commercial uses to be oriented to the street and sidewalks to encourage a vital and appealing pedestrian experience.

B. Ensure safe, well-lighted, wide walkways that are appropriately shaded for compatibility with upper-story residential units and adequate traffic signals for pedestrian street-crossings in commercial areas.

C. Provide street trees, bus shelters, and benches for pedestrians in commercial areas.

D. Maintain and encourage a wide range of community and commercial services, including basic goods and services.

E. Use design review and careful land use decisions to preserve the historic character of Neighborhood Commercial areas.

POLICY LU-27 AVENUE COMMERCIAL AREAS

Maintain and improve Avenue Commercial areas, such as University, San Pablo, Telegraph, and South Shattuck, as pedestrian-friendly, visually attractive areas of pedestrian scale and ensure that Avenue areas fully serve neighborhood needs as well as a broader spectrum of needs.

Actions:

A. Require ground-floor commercial uses to be oriented to the street and sidewalks to encourage a vital and appealing pedestrian experience.

B. Ensure safe, well-lighted, wide walkways that are appropriately shaded for compatibility with upper-story residential units and adequate traffic signals for pedestrian street-crossings in commercial areas.

C. Provide street trees, bus shelters, and benches for pedestrians in commercial areas.

D. Maintain and encourage a wide range of community and commercial services, including basic goods and services.

E. Encourage sensitive infill development of vacant or underutilized property that is compatible with existing development patterns.

F. Maintain and improve the historic character of Avenue Commercial areas with design review and careful land use decisions.

6. GENERAL PLAN OPEN SPACE ELEMENT: PEDESTRIAN RELATED POLICIES

POLICY OS-2 MAINTENANCE, REPAIR, AND ENHANCEMENTS

Within the context of open space resource allocations, give highest priority to maintaining and improving the City's existing network of open space and recreation facilities.

The City's extensive open space network requires ongoing maintenance. Due to funding constraints, required maintenance has often been deferred, which results in higher maintenance and replacement costs. Maintenance of existing resources consists of; ongoing maintenance (upkeep), restoration of resources (repair), and improvements to maximize or improve utilization of existing facilities (improvements).

Actions:

A. Restore the network of public paths and historic street features, such as gateways, lighting, and stairways.

B. Improve access for the disabled to park and open space facilities.

POLICY OS-6 NEW OPEN SPACE AND RECREATIONAL RESOURCES

Create new open space and recreational resources throughout Berkeley.

Actions:

A. Convene a community planning process to determine the final use of the remaining 14 blocks of City-owned land on the Santa Fe Right-of-Way. The community planning process shall consider public open space use (i.e., neighborhood parks, community gardens, and/or bicycle and pedestrian paths) as the highest priority use for the remaining vacant land and new affordable housing development as the next highest priority use.

B. Develop joint-use agreements with other agencies such as the University of California, the Berkeley Unified School District, the Bay Area Rapid Transit District, and regional open space agencies to increase public access to public lands.

POLICY OS-9 AQUATIC PARK

Make Aquatic Park more accessible and usable as a neighborhood park.

Actions:

A. Install an effective and attractive noise and visual freeway barrier with landscaping for Aquatic Park.

B. Provide new safe pedestrian and bicycle railroad crossings, particularly at the southern end of the site, for improved access and circulation from nearby neighborhoods to Aquatic Park.

C. Improve the bicycle path around the park.

POLICY OS-10 ACCESS IMPROVEMENTS

Improve transit, bicycle, disabled, and pedestrian access to and between open space and recreation facilities, including regional facilities such as the Berkeley Marina, University of California open space, East Bay Regional Park District lands, the Eastshore State Park, and recreational facilities in other cities.

Actions:

A. Develop and maintain a citywide pedestrian and bicycle network that links open space and recreation facilities with bicycle and walking paths along tree-lined streets, publicly owned pathways, creeks, and other greenways.

B. Maintain opportunities to eventually complete a Cordornices Creek Greenway from the Bay to the hills.

C. Increase shuttle and weekend transit service and weekend street closures to improve access to recreational and open space.

D. Continue to improve pedestrian and bicycle access to the waterfront and Berkeley Marina.

POLICY OS-11 PUBLIC SPACES

Encourage innovative use of public plazas, sidewalks, and temporary street closures as open space or for recreational or cultural events.

Action:

A. Design and improve public streets, parking lots, and plazas to provide public spaces for street fairs, festivals and other gatherings.

7. GENERAL PLAN ENVIRONMENTAL MANAGEMENT ELEMENT: PEDESTRIAN RELATED POLICIES

POLICY EM-33 CITIZEN EFFORTS

Encourage citizen efforts to restore ecological resources and open space areas, such as pathways and stairways.

Action:

Work with citizens and businesses to maintain clean streets, sidewalks, and building exteriors.

8. GENERAL PLAN HOUSING ELEMENT: PEDESTRIAN RELATED POLICIES

POLICY H-24 THE ELDERLY AND THE DISABLED

Support housing program activities that increase the ability of elderly and disabled households to remain in their homes or neighborhoods, and if necessary, to locate other suitable affordable housing to rent or purchase.

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APPENDIX D

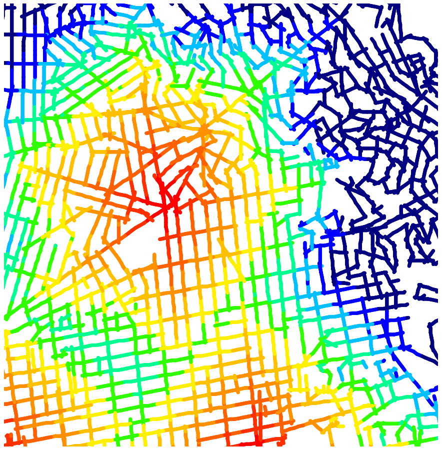
WALKABILITY, MOVEMENT AND SAFETY FOR THE CITY OF BERKELEY

Space Syntax, a UK-based planning firm specializing in "space-based" modeling, developed two pedestrian forecasting models for the Berkeley Pedestrian Plan. These models and their findings are summarized in Section 5.2 Pedestrian Demand Model, of the Berkeley Pedestrian Master Plan.

The complete summary of Space Syntax's qualitative baseline analysis and the forecasting models are summarized in the Space Syntax report, "Walkability, Movement and Safety for the City of Berkeley" provided in this appendix.

Berkeley Pedestrian Master Plan

Walkability, movement, and safety for the City of Berkeley



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Space Syntax

Space Syntax

11 Riverside Studios
28 Park Street
London
SE1 9EQ
United Kingdom

T +44 (0) 20 7940 0000
F +44 (0) 20 7940 0005

london@spacesyntax.com
www.spacesyntax.com

Contacts for further information

Noah Raford or **Alain Chiaradia**

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1 Introduction

Background & scope

This document has been produced to assist the Alta team during the creation of the Berkeley Pedestrian Master Plan. It uses a series of scientific analyses to provide a quantitative, predictive perspective for the City of Berkeley, combining Space Syntax's unique methodology with years of experience in complex pedestrian planning projects around the world.

For this project Space Syntax has been contracted to perform the following elements of work:

> *Task 3:* Creation of a basic pedestrian movement model and SWITRS safety analysis
>
> *Task 7:* Using the above model produce a list and map of key parcels and intersections of strategic interest and opportunity
>
> *Task 8:* Assist in evaluating, ranking, and prioritizing baseline pedestrian activity

The current report presents preliminary results from Task 3, model creation, with implications for Task 8.

General approach

In working alongside the Alta team in the development of the pedestrian master plan for Berkley, we have taken an "evidence-based" approach to the measurement of factors which influence walking and walkability in the City of Berkeley.

The term "evidence-based" denotes the use of a peer reviewed scientific methodology. This means that it has been tested and verified through an extensive review process, giving added confidence to the accuracy of its results. In the case of Space Syntax's consulting work, our methods have also been tested in the laboratory of the "real world", having been applied to hundreds of successful projects around the world.

Because each place is different and is the result of its own unique conditions and histories, an evidence-based approach can also provide quantitative backup for what planners already know "in their gut". This means that long held "rules of thumb" or "truisms" about a place can be tested and verified, using the hard evidence produced by scientific analysis.

But this approach can also produce surprises and unexpected results, especially for complex or uncertain problems. This has been the case in Berkeley, where quantitative modelling of pedestrian volumes has produced a surprising figure of pedestrian risk which looks different than the picture of collisions alone.

This combination of affirmation and surprise is what gives Space Syntax's approach its merit.

Key questions

The key questions which this piece of work aims to answer are:

1) Where are pedestrians currently located in the City of Berkeley?

2) What are the major factors that influence people's decision to walk?

3) Can these factors be combined to create a predictive model of movement in locations where pedestrian counts do not exist?

4) What is the relationship between pedestrian volume (exposure) and pedestrian risk (collisions)?

Each of these questions will be addressed in detail in the following report, drawing upon a scientific analysis of the walkable factors in the City of Berkeley

1 Introduction Understanding pedestrian behavior in the public domain

The spatial logic of pedestrian experience

The life on an urban dweller is made up of series upon series of everyday pedestrian journeys.

The public realm is the setting in which these journeys unfold and, occasionally, in which they pause. People use the public domain to move between private origins and destinations (from a house to an office, for example), between public origins and destinations (from the train station to the shopping mall), or between a mixture of the two. And sometimes people stop – perhaps to rest, ask directions, browse in a market or take refreshment.

The purposes people have for moving and stopping may be necessary or practical (to buy food or re-energise themselves), or they may be optional or recreational (walking for exercise or people-watching). In fact, the presence of the latter – leisure activities – is often taken as a sign of a successful urban area.

The public domain offers opportunities for socialising with others, and high rates of socialising are another traditional sign of success. But of course, the city can also be a place for solitude.

In the end, the true success for a city or town lies in the creation and maintenance of a network of spaces that support a variety of uses and users. Knowing about the relative levels of usage for streets, squares, walkways, bridges, and other spaces helps agencies responsible for creating and maintaining the public domain to better target limited resources.

Pedestrian behaviour baseline assessments can assist in this process. These studies are concerned with the routes and public spaces individuals choose to use – either while going about their necessary daily tasks, or while spending their leisure time – and, in the patterns such decisions form, in aggregate.

Methods for understanding pedestrian movement

In undertaking pedestrian baseline assessments, it is crucial to employ methods for capturing individual pedestrian choices, and aggregate patterns, in an efficient, yet accurate manner. This section reviews what is known on the topic.

There are two methods for gathering information about the choices pedestrians make in moving about an area. On the one hand, individuals can be questioned and their answers recorded in 'stated preference' surveys. This type of observation is typically undertaken as part of the UK planning consultation requirements for development plan production processes.

On the other hand, individuals' actual movements can be observed, and then mapped. This often takes the form of cordon counts. People are counted as they pass through a series of virtual 'screen lines', located throughout a study area.

Although this sort of data is frequently used as an indicator of activity, it can also be viewed as a consultation which presents the 'revealed preferences' of an area's users – the manner in which they are consulted is by a 'vote with their feet'.

Perhaps surprisingly, the results of these data collection activities often differ. This is because it is rarely possible to achieve a sample for stated preference surveys of the same size, or geographic density, as with observations of actual movements. The two methods are complementary, with the former providing a useful qualitative understanding of the quantitative data generated by the latter.

There are limitations to most methods of observing actual movement. With current technology, even in small areas, it is not possible to monitor all spaces and capture all of pedestrian movement. In any area, only a selection of spaces within it can ever be observed. Even observing a small sample of spaces can be expensive and time-consuming and, therefore, difficult to undertake with any frequency.

In addition, these observation methods can only answer questions about how a specific change to the environment affects pedestrian behaviour *after* that change has been made. They do not offer any help to decision-makers evaluating change proposals.

Fortunately, the results of extensive observational research show that pedestrian movement patterns tend to follow certain rules. Individuals appear to use specific intentional, environmental and (most importantly of all) *spatial* criteria when they choose a route between an origin and destination.

These rules can be used to generate criteria for qualitatively evaluating the pedestrian infrastructure of an urban area.

Taken together, these methods can be very useful to those responsible for planning, designing, maintaining, and monitoring urban infrastructure.

Influences on pedestrian movement

People construct mental maps of an area by using both perceptual information (what they can see, hear, etc.), and inferences about things they cannot directly perceive. These mental maps then inform route choice plans across an area. They also change in response to new information, and are thus part of a 'way-constructing' and 'way-finding' process.

Beyond mental maps, research has shown that the influences on pedestrian route choice preferences include income level, gender, age, perception of one's own strength and stamina, familiarity with an area, and the time and place of their journey's origin.

Pedestrians also tend to exhibit a number of spatially-related tendencies that affect route choice decisions. Most of the time most people will:

• use spaces that lie on the shortest path towards their seen or unseen destination

• select the longest direct leg earlier in a journey, when faced with alternatives

• minimize directional changes along a journey and avoiding back-tracking

• select spaces that offering natural surveillance/deterrence, such as those with active frontages, and clear indications of use and ownership

• select routes which allow them to link into 'chain' destinations, and so facilitate multi-purpose journeys

Proceeding from and 'multiplying' all these other factors, the presence or absence of other people along routes or in spaces will also affect on individuals' route choice preferences.

Influences on public space use

Extensive research has found that there are six main influences on pedestrian stopping and public space use:

1 Proximity to high levels of pedestrian movement – good public spaces are located close to the routes with high levels of pedestrian movement

2 Good accessibility from the surrounding area – successful squares are located at strategic points in the pedestrian movement network (such as at the intersections of important pedestrian movement routes)

3 Movement routes pass through the body of the space – to achieve good levels of use, it is important that the routes bring movement from several directions through the heart of the space, and do not just 'skirt' around the edges

4 Multi-directional views into the surrounding urban area – people are more likely to use squares where they can see where they are going, and feel safe. Similarly, people prefer to stay where they have good visibility from within a space into the surrounding areas

5 Proximity of 'live-uses' – land uses such as retail and catering attract activity over and above the effects of spatial layout, and contribute to the natural surveillance of the space by providing presence in the space

6 Adequate seating and street furniture – good seating, lighting, and high-quality landscaping all encourage informal / stationary activity within public spaces.

Influences on visitors' spending in downtowns

The result of these factors is pedestrian movement and public space activity. This can have profound impact on the economic and social success of cities.

New research from the United Kingdom has found that the mode of transportation used to get to urban areas has a strong relationship to the average spend of visitors.

It found that those who walk to the downtown areas of cities spend more then those who use any other mode of transportation. This is followed by people who travel by car or bus.

Although the demographic profile of transit ridership is different in America, the same pattern is likely to apply for pedestrians. The more people walk in the downtown area, the more money they are likely to spend. The more money pedestrians spend, the greater the demand for retail and commercial space. The greater this demand, the higher the capital investment in a city becomes. The more capital, the more jobs and, finally, the more jobs, the more residents. Taken as a whole, increased pedestrian activity can be vital for the success or failure of America's downtowns.

2 Quantitative baseline assessment Methodology

Space Syntax analysis methods

A wide variety of factors have been found to influence pedestrian movement in modern cities. These include important attraction factors such as land uses, transit stops, and proximity to major trip generators such as universities and downtown areas.

They also include urban form factors such as block size and grain, permeability, street connectivity, route directness, and spatial accessibility. Sidewalk conditions and pedestrian amenities play a lesser but still important role.

Personal preference and demographic considerations have also been found to contribute to levels of walking. These include age, income, race, knowledge of an area, physical fitness and feelings of safety.

The combination of these three factors determines the level of walking in an urban environment. Space Syntax modeling begins by diagnosing the existing conditions of many of these factors, then analyzing their statistical relationships to determine which are the most important factors on walking in a given area. Once these factors have been mathematically defined, walking rates can be extrapolated into the future or over larger areas.

Three general types of analysis were used for this report. These include:

- Quantitative baseline analysis
    - Urban structure
    - Land use
    - Pedestrian movement
- Pedestrian volume forecasting
- SWITRS collision data for exposure and risk measurement.

This chapter presents the results from the quantitative baseline analysis, beginning with a brief discussion about the methodology used in this section.

Urban structure analysis

We see "urban structure" as the framework of routes and public open spaces that connect locally and to their wider context. This structure (often called "public space", "urban realm", or the "space between buildings") provides the basic plan from which all other aspects of form and use arise.

Different kinds of urban structure can result in different kinds of "character", the distinctive culture of place and its activities. Slight changes in the physical structure can also introduce differentiation, distinction and interest which define this character.

In order to assess this differentiation and to analyze the influence urban structure has on urban activity it is necessary to use a representation that allows comparison of different factors.

Space Syntax does this by representing all publicly accessible open space as a map, formed by the fewest set of longest, straight lines that cover all streets and spaces within a city. This map is known as an "axial map".

This map can be understood in two ways; first, as a representation of the longest lines of direct sight, and second, as a map of possible lines of movement that can be quantitatively analyzed. Both interpretations are useful for analysis, and represent all possible ways of perception and movement in the city.

Measuring urban structure

The axial map was used to analyze urban structure in five primary ways:

1. Block size
2. Directionality
3. Connectivity
4. Local accessibility
5. Legibility and citywide accessibility

1. *Block size*

Urban blocks are defined by their surrounding street configuration. Their size and shape can have an influence on pedestrian activity around them, above and beyond the land uses which they contain. Large, long blocks create blockages in the urban environment that are hard to navigate around. Smaller, more compact blocks create a variety of route choice options and can foster more pedestrian friendly land uses. A measurement of block sizes provides the foundation for quantifying the factors which influence walkability, upon which other factors rest.

2. *Directionality*

Next, measuring the geometry of the urban layouts helps to establish the "character" of a place in terms of its directional characteristics, distribution, and trends. Long, straight streets that occur in regular repetition create a certain kind of character, while short streets of varying directions create a very different one. Also, people prefer to take the most direct routes to and from their destination, so a measure of directionality can help identify these streets and routes through different neighborhoods.

2 Quantitative baseline assessment Methodology

Aside for the feel of a place, street geometry also has other far reaching consequences. Not only on movement activity, but also on the orientation and solar access of dwelling. This can in turn affect energy use for climate regulation purposes and natural lighting.

3. Connectivity

An analysis of how streets come together and form junctions can provide information about the interface between different areas and neighborhoods. This is expressed through the measure of connectivity, which depends on the number of streets intersecting each other. In general, more connected streets result from smaller block sizes, resulting in a compound influence on walkability.

4. Local accessibility

The result of block sizes, directness and connectivity is a measure of "nearness", or "local accessibility". The layout of a city's streets and blocks has a fundamental influence on the nearness of different destinations which is often different from the obvious "as the crow flies" distance.

Measuring the amount of street available within a given walking distances from every street provides a measure of the movement potential of the street network itself, before even considering the actual location of different origins and destinations. Well placed destinations will take advantage of the natural nearness potentials of a street, providing more access to a greater numbers of origins then those which are placed in more difficult to get to neighborhoods.

5. Legibility and citywide accessibility

The cumulative effect of all of these factors is "accessibility" , which can be defined as the ability and degree of ease that people have when moving around in their environment. Research has found that neighborhoods with shorter blocks and more direct, connected streets produce more accessible streets at both the local and citywide scales, facilitating easier and more direct movement of all modes. In pedestrian terms, streets with higher accessibility provide more direct access to a greater number of destinations and are thus more likely to be used when taking short trips. A similar logic applies to cyclist and vehicles, although a variety of other concerns affect these modes such as one-way streets, congestion, and the presence of safe bicycle routes.

Taken together, these five measures produce a baseline picture of spatial accessibility. This framework can be thought of as the "skeleton" of a city, upon which all land uses and activity hang.

Land use

The location and distributions of land uses is what adds the "muscle" to the skeleton of urban space. It is the lifeblood of the city, providing the key origins and destinations to which people must move.

Well structured cities often have the right kind of land uses in the right place, taking advantage of the natural benefit which urban accessibility provides. Movement sensitive uses such as retail and commercial centers, for example, are best suited to an environment which is easy to get to and high pedestrian and vehicular movement potential. Residential and other more private land uses require additional seclusion and often seek more isolated parts of the city.

To account for the effect of land use distribution in the City of Berkeley, Space Syntax mapped the location and distribution of key land uses, including:

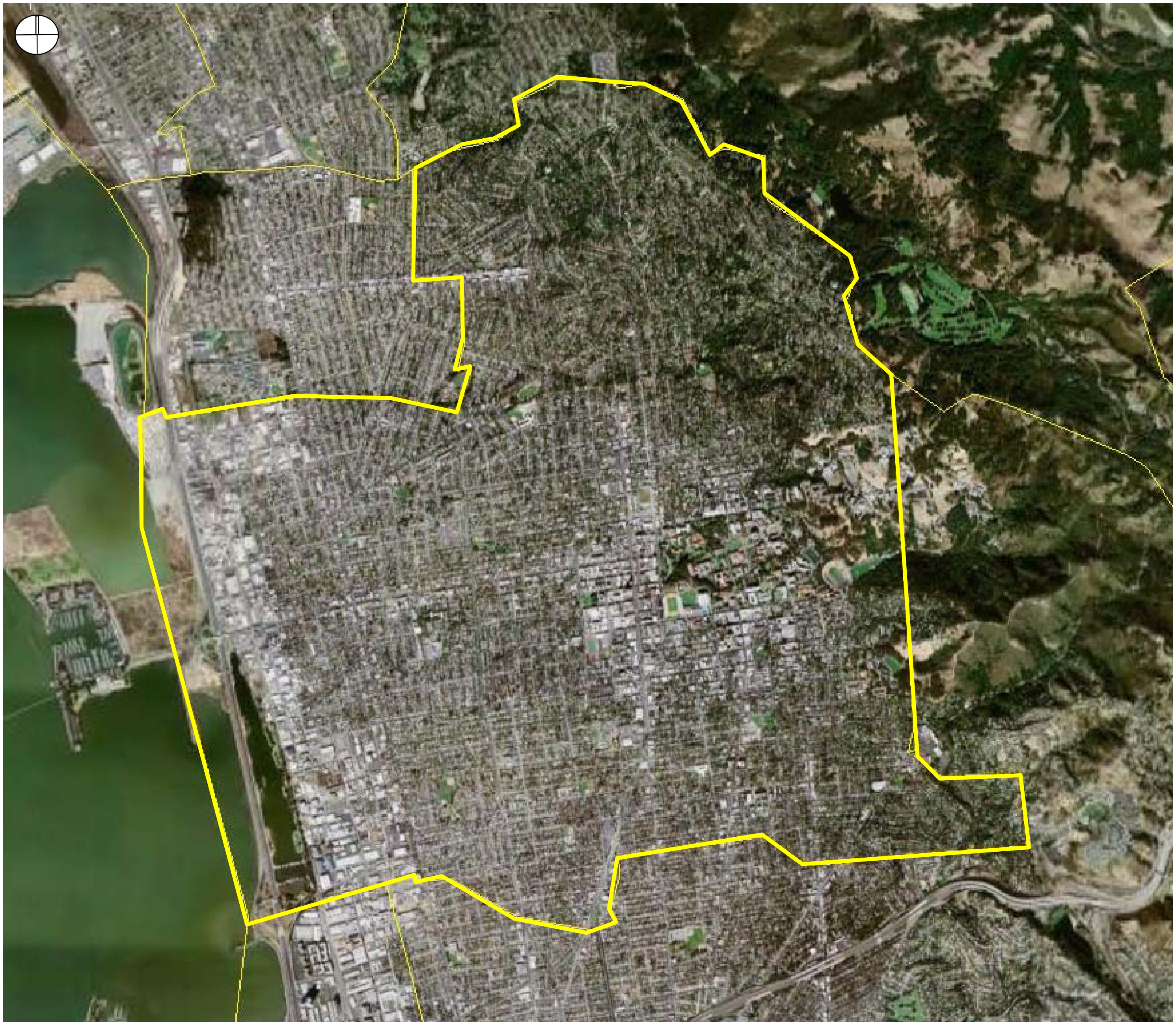
- Parks
- Schools
- Healthcare centers
- Libraries
- Community centers
- Major retail locations
- Neighborhood retail
- Office buildings
- High density residential
- University buildings
- Transit stops
- BART stations

The location of each of these facilities was analyzed using a real-world measurement of walking distances from them to surrounding areas. This measurement takes into account the specific street layout in the City of Berkeley and avoids the oversimplification that can result from simple "as the crow flies" walking buffers.

Pedestrian movement

The last step in the quantitative baseline analysis for the City of Berkeley was a mapping exercise of existing pedestrian volume counts. This was done using a random sample of locations within the city, based upon mid-day peak movement rates. The location and volume of flows within the city was then analyzed and assessed against the urban structure factors outline above, providing the baseline for further analysis in the following chapters.

2.1 Study area City of Berkley



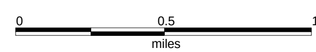
The City of Berkeley is located in the San Francisco Bay Area, between the cities of Oakland and Albany and El Cerrito.

The city has a total area of 10.5 square miles of land, with an additional 7.2 square miles of area encompassing the water of the San Francisco Bay.

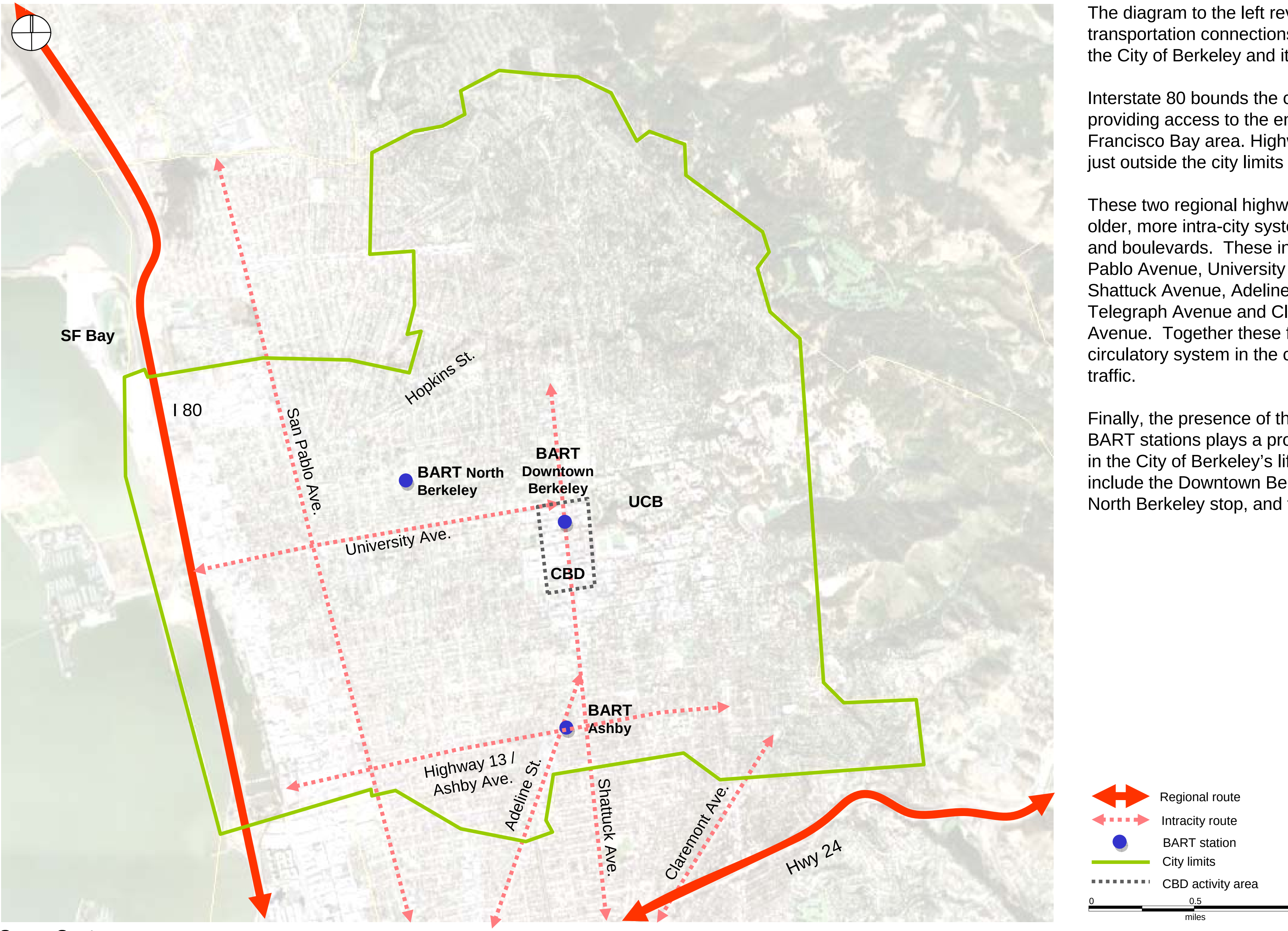
Berkeley had approximately 102,000 residents at the time of the 2000 Census, with a population density of nearly 9,800 people per square mile. With a total of over 46,000 housing units, a highly diverse, mixed race population, and a median income of $44,485 per household, the City of Berkeley is among the more liveable, mixed communities in the Bay Area.

The campus of UC Berkeley at the eastern edge of the city comprises the densest areas of population and activity, with medium rise commercial buildings fronting the major north – south commercial corridor of Shattuck Avenue. This area is well served by AC Transit bus service and is provided with three major regional commuter rail stations (Downtown Berkeley, North Berkeley, and Ashby BART stations). The city is also connected to the regional highway network by a two mile segment of I-80 / I 580 which runs along the coast to the west.

Berkeley is also reported to have one of the highest rates of bicycle and pedestrian commuting in the nation.



2.1 Study area Regional transportation context



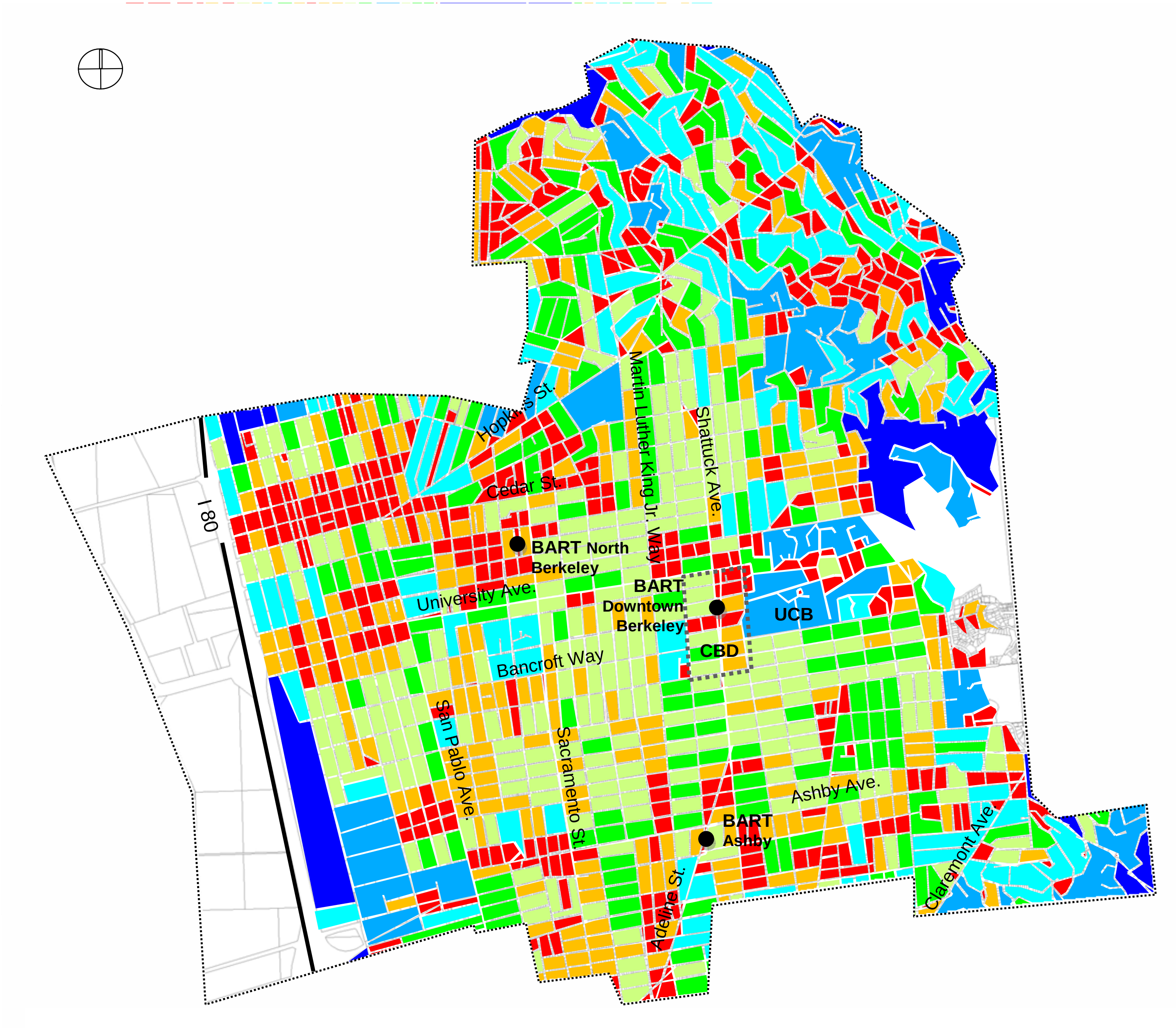
The diagram to the left reveals the major transportation connections and routes in the City of Berkeley and its region.

Interstate 80 bounds the city to the west, providing access to the entire San Francisco Bay area. Highway 24 skirts just outside the city limits to the south.

These two regional highways support an older, more intra-city system of avenues and boulevards. These include San Pablo Avenue, University Avenue, Shattuck Avenue, Adeline Street, Telegraph Avenue and Claremont Avenue. Together these form the major circulatory system in the city for through traffic.

Finally, the presence of three major BART stations plays a profound influence in the City of Berkeley's life. These include the Downtown Berkeley stop, the North Berkeley stop, and the Ashby stop.

2.2 Urban structure Block size



The map to the left illustrates a block size analysis of the City and its surroundings. Smaller block sizes facilitate easier walking trips and produce more compact, functional neighborhoods. In retail terms, they also maximize display frontage and reduce trip length between attractors, resulting in more valuable retail environments when clustered appropriately.

The City of Berkeley was found to have a mixture of block sizes in the different areas regardless of their function.

The CBD and the roads where 'live center' functions (such as retail and catering) are predominant, University Avenue and Shattuck Avenue, comprise a mix of relatively fine (red and orange) and medium (green and light blue) blocks.

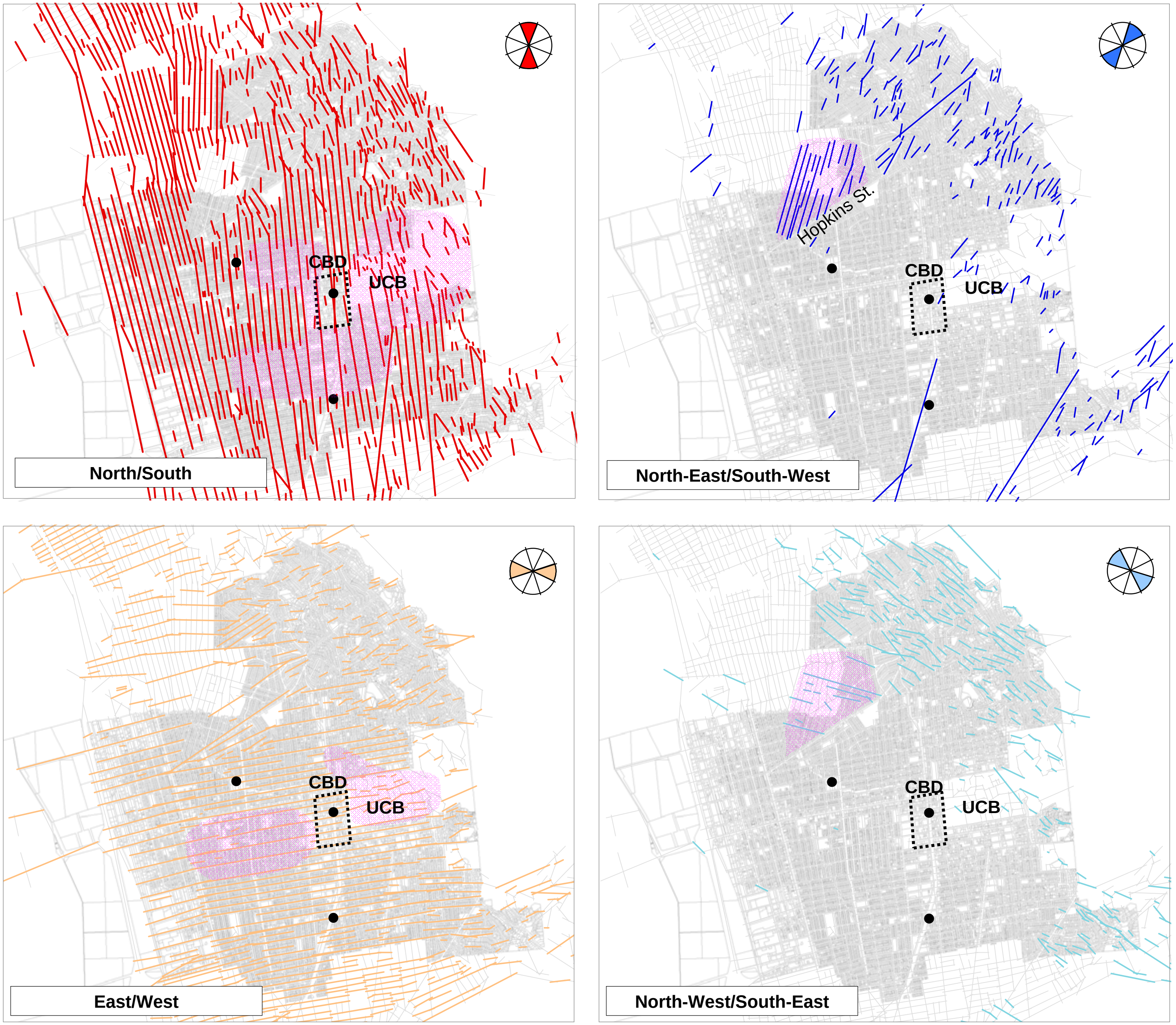
However, the area immediately around the CBD on three directions (north, south and west) has a predominance of medium (light green blocks)
while further west and south the grain becomes finer. The University Campus on the east side has a coarse grain next to the CBD.

Block size (ft^2)

0 – 19,326
119,326 – 156,317
156,317 – 183,771
183,771 – 256,436
256,436 – 478,807
478,807 – 1,736,056
1,736,056 – 6,014,146

0 0.5 1
miles

2.2 Urban structure Street directionality



The diagrams to the left show the extent of directionality in the study area.

The City of Berkeley's dominant street directions are north-south and east-west.

There is discontinuity between the CBD and its surroundings in both north-south and east-west directions. To the west, lines are interrupted by big school and green area blocks; to the east, by the University. The latter, however, behaves as a strong attractor, generating its own levels of activity irrespective of grid conditions.

The area to the north-west of Hopkins Street appears defined by an offset grid, mainly in north-east and south-west direction.

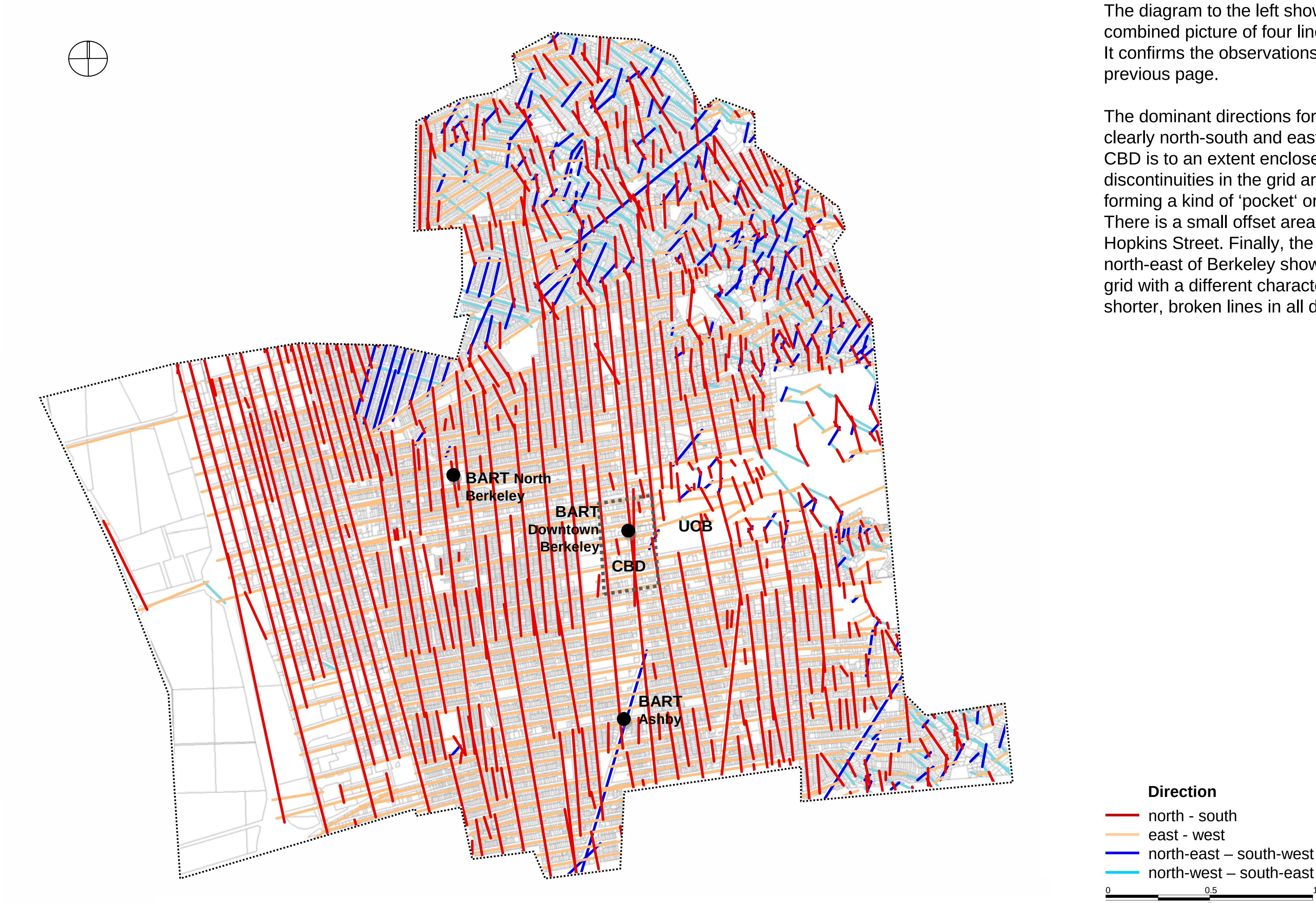
The north-east area shows a different and fragmented grid with lines going in all four directions.

Direction

- north - south
- east - west
- north-east – south-west
- north-west – south-east

0 0.5 1
miles

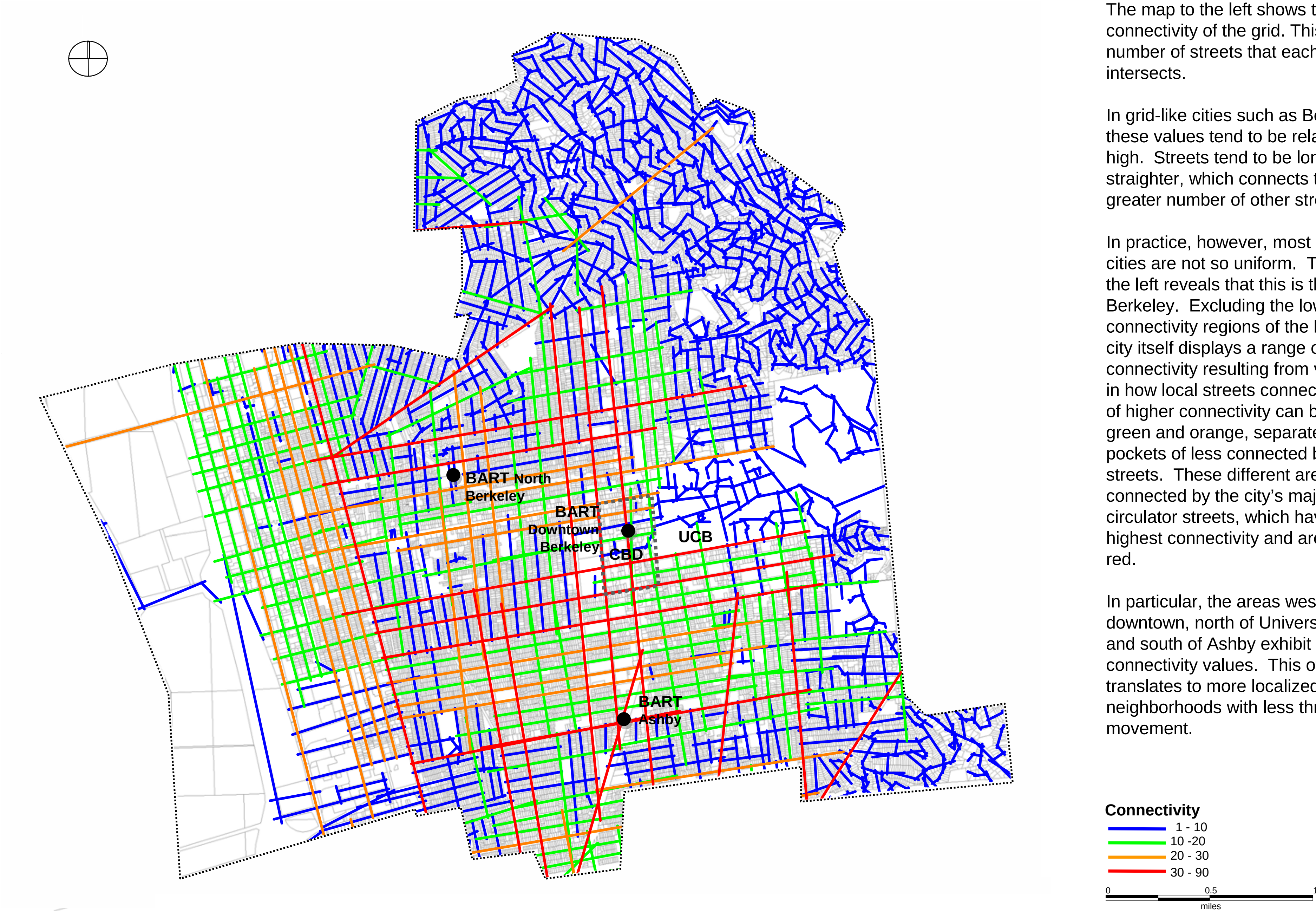
2.2 Urban structure Street directionality



The diagram to the left shows a combined picture of four line directions. It confirms the observations in the previous page.

The dominant directions for Berkeley are clearly north-south and east-west. The CBD is to an extent enclosed, with discontinuities in the grid around it, forming a kind of ‘pocket‘ or ‘island‘. There is a small offset area north-west Hopkins Street. Finally, the area to the north-east of Berkeley shows its own grid with a different character made of shorter, broken lines in all directions.

2.2 Urban structure Street connectivity



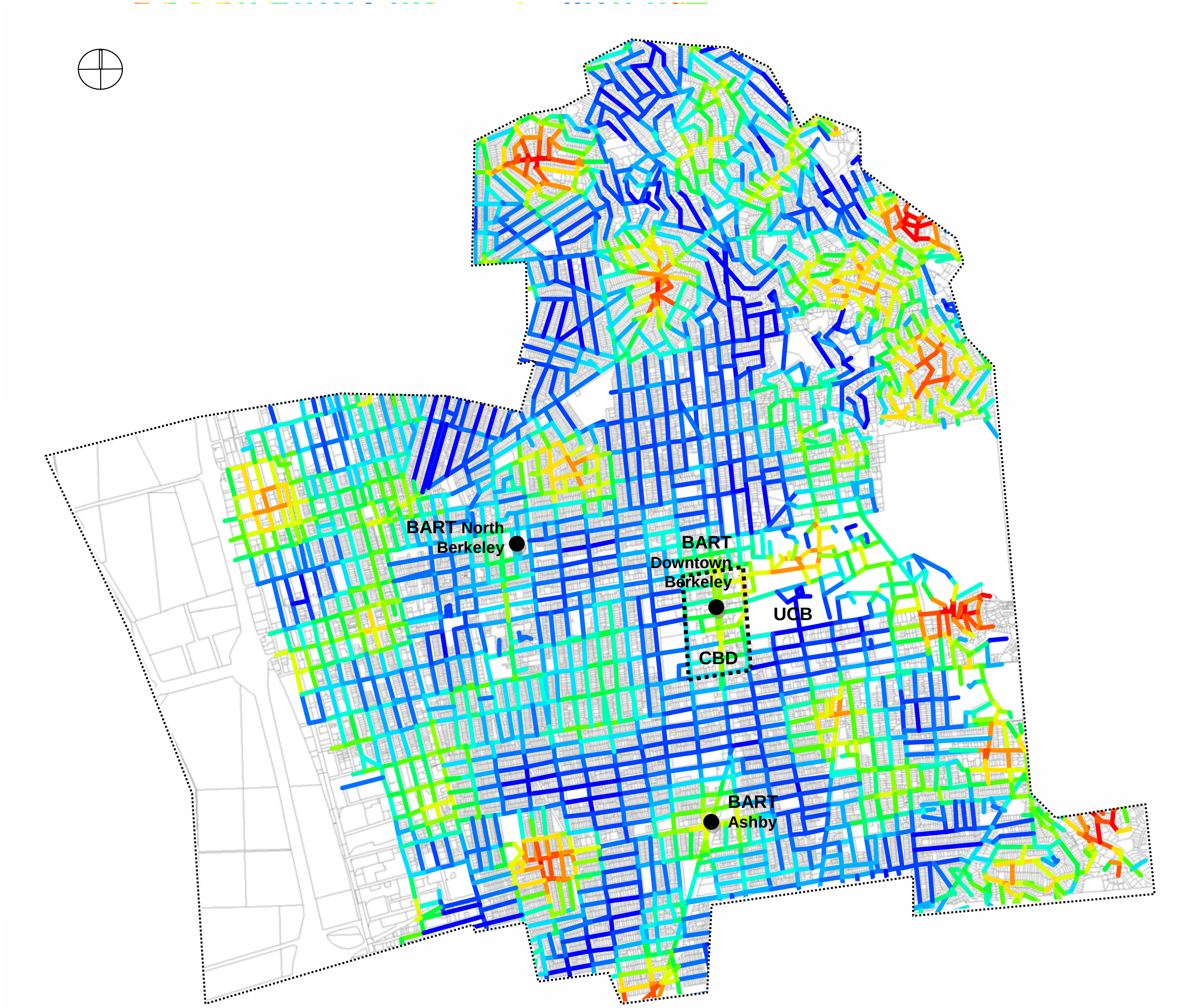
The map to the left shows the connectivity of the grid. This is the number of streets that each street intersects.

In grid-like cities such as Berkeley, these values tend to be relatively high. Streets tend to be longer and straighter, which connects to a greater number of other streets.

In practice, however, most grid-like cities are not so uniform. The map to the left reveals that this is the case for Berkeley. Excluding the low connectivity regions of the hills, the city itself displays a range of connectivity resulting from variations in how local streets connect. Patches of higher connectivity can be seen in green and orange, separate by other pockets of less connected blue streets. These different areas are connected by the city's major circulator streets, which have the highest connectivity and are shown in red.

In particular, the areas west of downtown, north of University Avenue and south of Ashby exhibit lower connectivity values. This often translates to more localized neighborhoods with less through-movement.

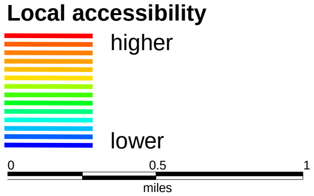
2.2 Urban structure Local accessibility



This map illustrates areas of increased walkability, as measured by the proximity of street surface within a 10 minute walk.

Clusters of red, yellow, and green illustrate areas that offer more surface area within a shorter walk due to the arrangement of streets and blocks in this area. If the surrounding land uses support walking trips, these areas are likely to generate more pedestrian activity than those with similar land uses but less conducive urban layouts.

Despite the fairly regular grid of Berkeley's urban morphology, the city displays a strong variation in local walking catchments. Of note, the downtown and UCB campus areas are highlighted as part of a close knit walkable system. The downtown is also surrounded by areas of lower walkability (seen in blue), indicating that there is less street area available within a walkable distance once one is outside of the CBD. This does not mean that there are less destinations in this area per se, but rather that the layout of streets creates longer walking trips and can therefore act as an inhibitor to walking as a mode choice. The presence of many destinations in this area can overcome this to some degree and is explored further in subsequent analysis.



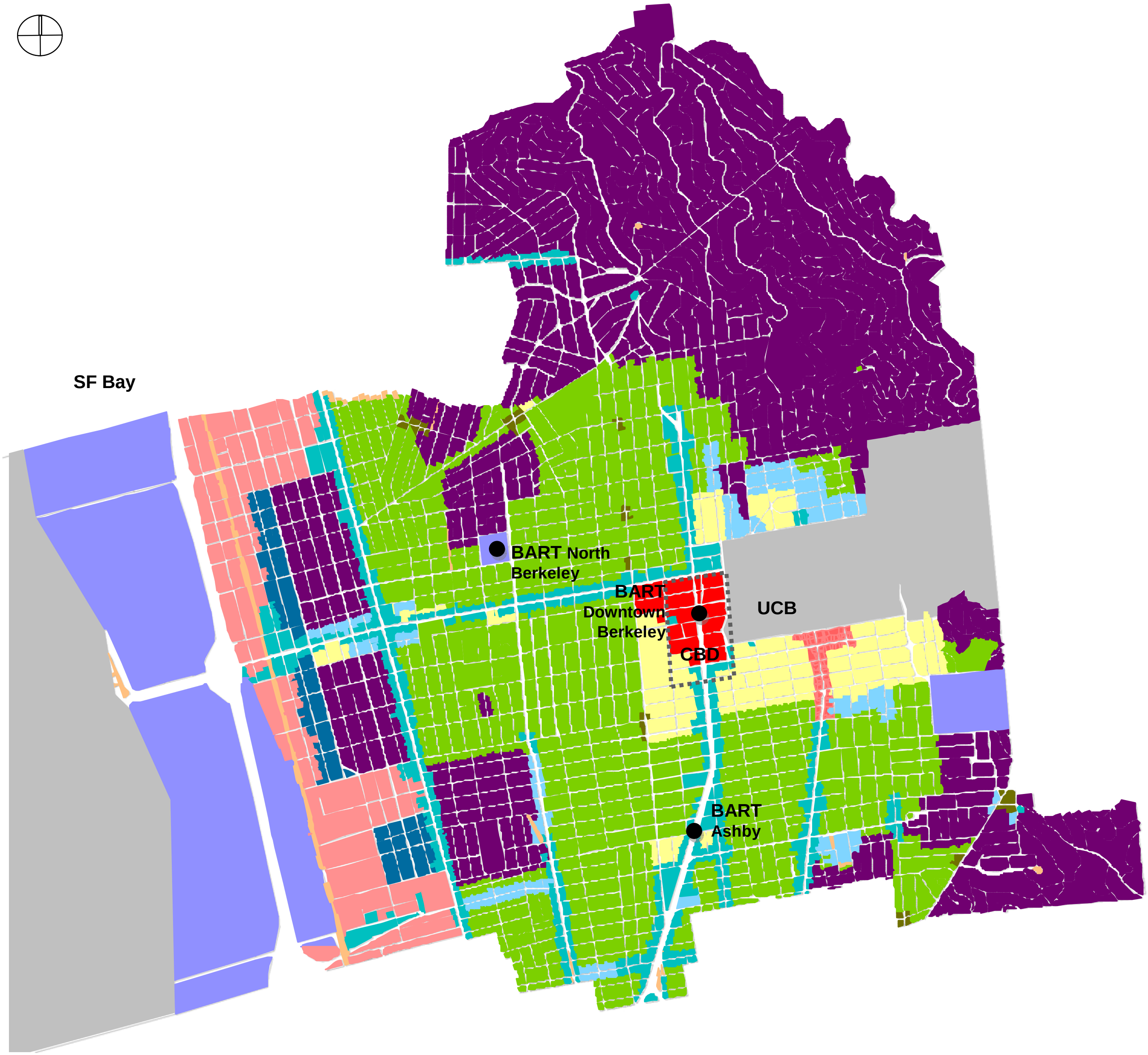
2.2 Urban structure Legibility and citywide accessibility

The map to the left displays the "movement potential" of streets in Berkeley when viewed at the city-wide scale. Streets in red are those which are more directly connect to and from different parts of the city and, all other factors being equal, are those which are most likely to carry longer distance movement through the study area.

This type of model considers Berkeley at the strategic level and therefore does not include details about individual sidewalks, crossing locations, street directions, etc. Studies have shown that this level of analysis corresponds well to people's mental understanding or "cognitive map" of a city. This in turn reflects on how they navigate and wayfind in the area, preferring the shortest, most direct routes whenever possible.

It can be seen that San Pablo, Sacramento, Martin Luther King Jr. Way and Shattuck are the main north – south routes in Berkeley. Other important east – west roads are Hopkins Street to the north, Cedar Street, Bancroft Way and Ashby Avenue.

2.3 Land use Zoning

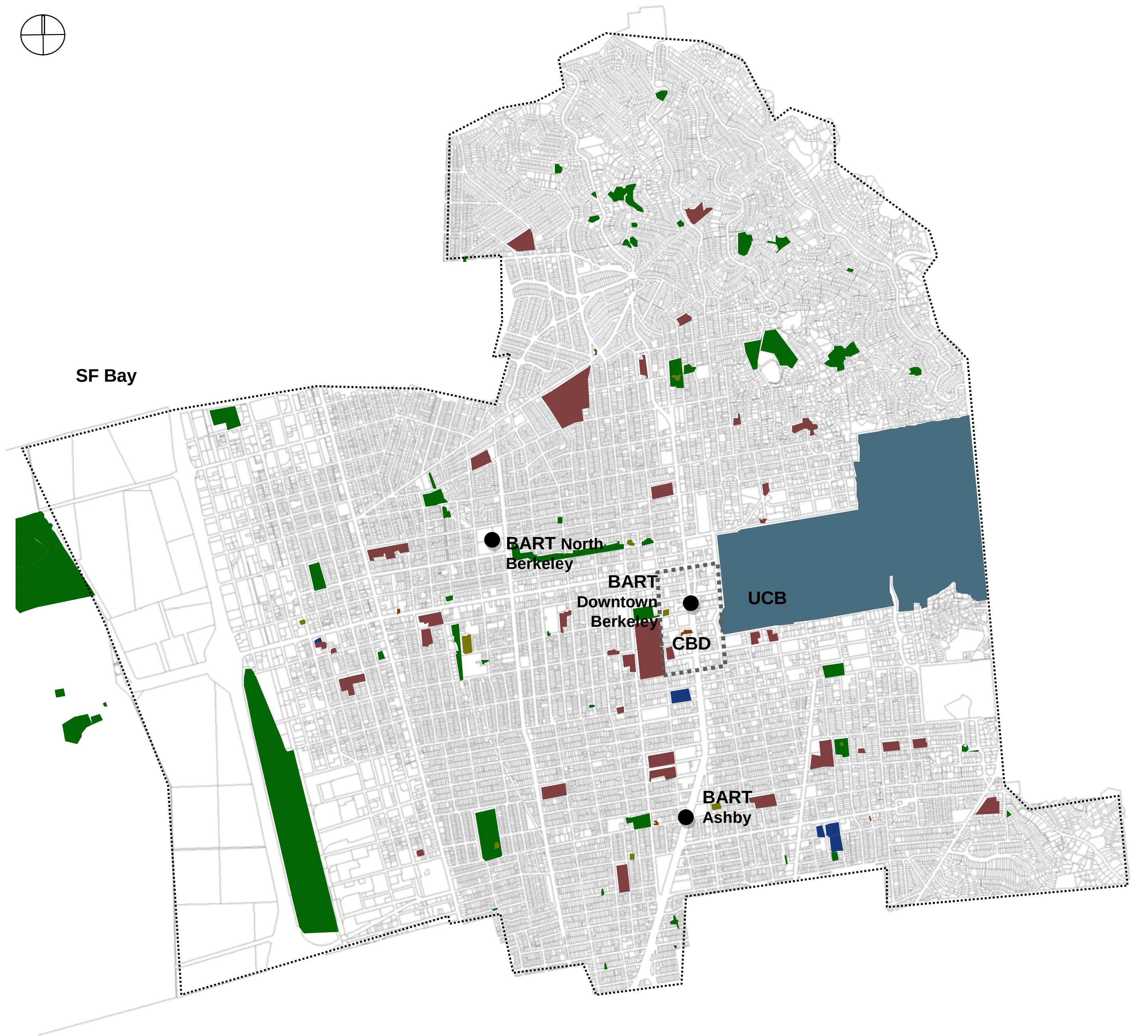


The map to the left includes a general graphic of land use through-out the City of Berkeley.

It can be seen that the majority of the City is comprised of low and medium density residential uses, with strips of retail and commercial activity along major corridors. A moderate amount of high rise commercial office buildings can be found downtown, just to the west of the University campus. Some mixed use and light industrial buildings can be found west of San Pablo, creating a distinctly different character for this area.

This kind of land use distribution, clusters of pedestrian friendly land uses interspersed in a backdrop of lower density residential neighborhoods, often results in pockets of intense activity separated by much lower levels of activity in between.

2.3 Land use Location of key facilities



Special land use categories are picked out in the map to the left. These include:

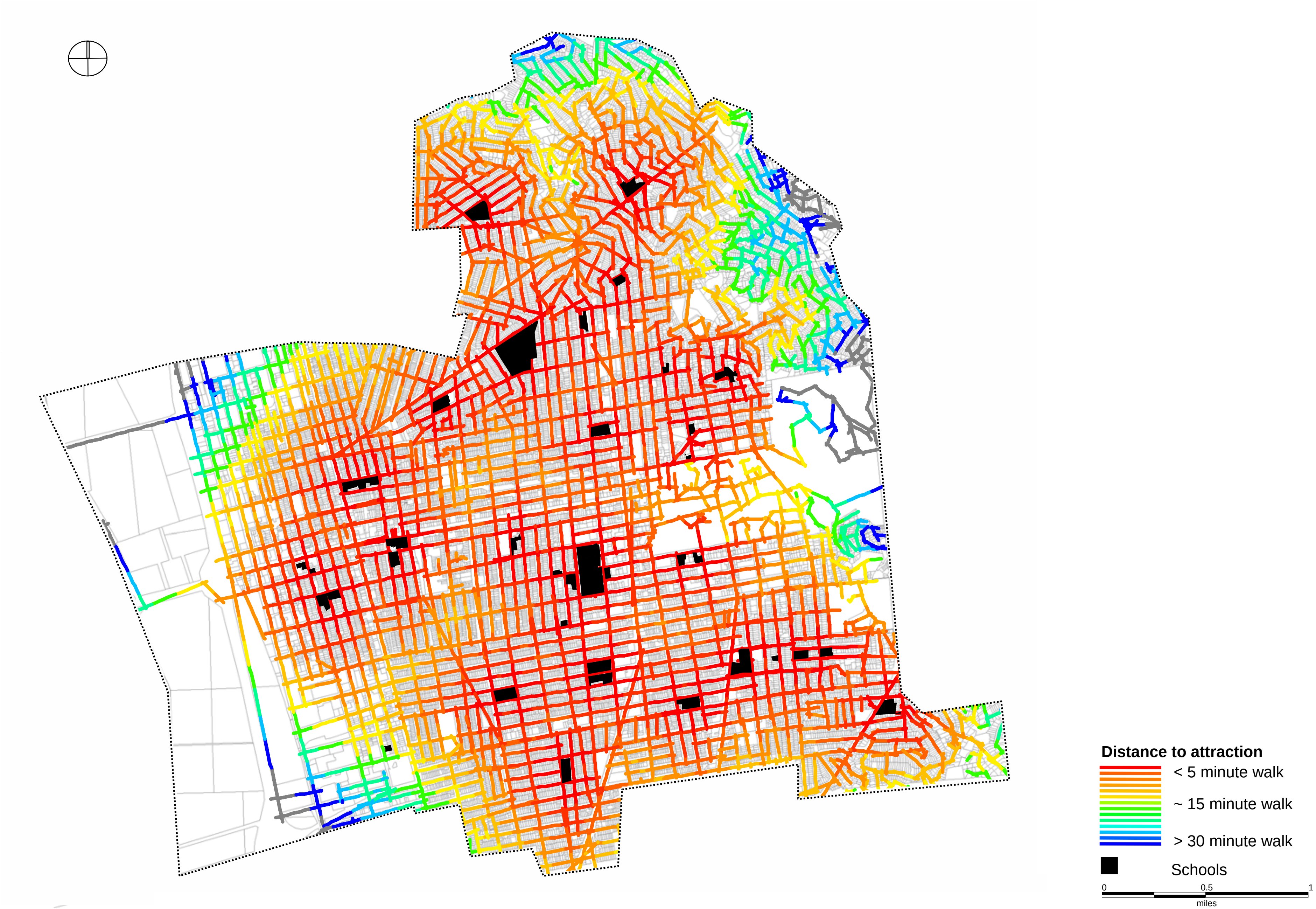
- Parks
- University
- Health Care Centers
- Libraries
- Schools
- Community Centers

The accessibility to each of these special uses was analyzed using an adaptation of the traditional 5 minute walking buffer technique.

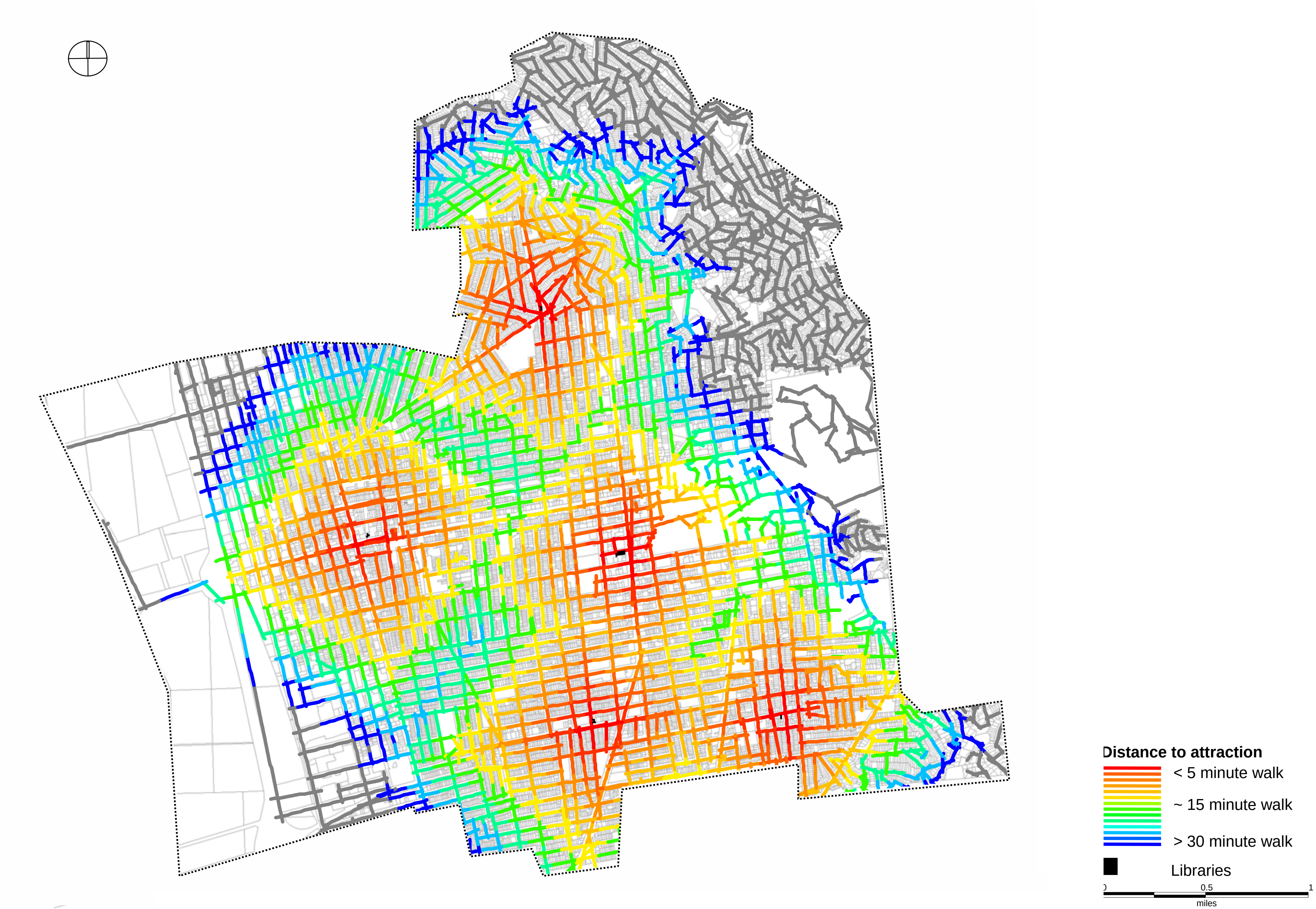
This technique, known as "Manhattan Distance" measurement, traces out the actual distance from each destination to its surrounding area. This takes into account the variations in trip length caused by different urban design factors and can be more accurate than simply drawing circles around key facilities based on "as the crow flies" distance.

The following pages present the result of this analysis for each key land use type.

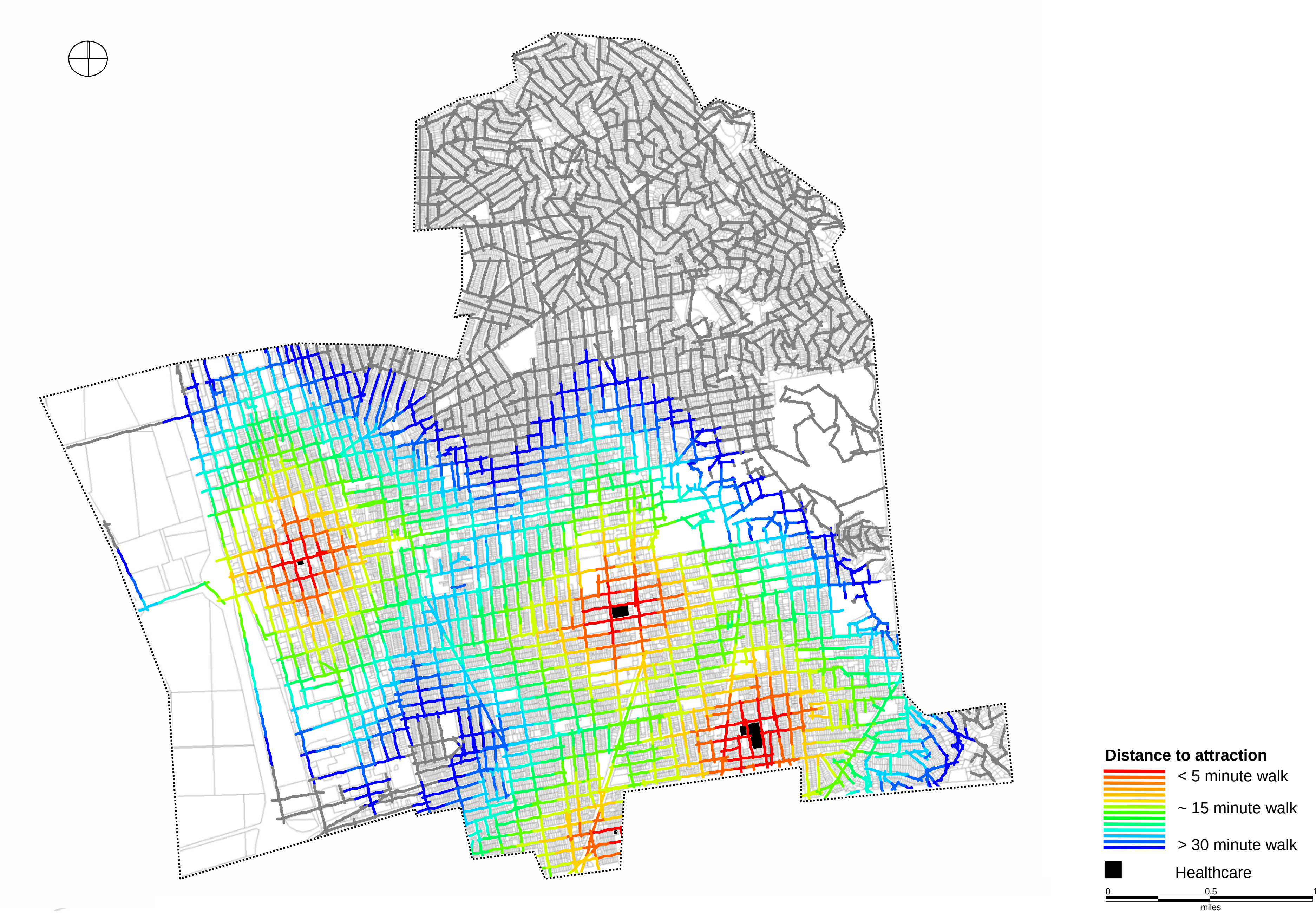
2.3 Land use Walking distance to school facilities



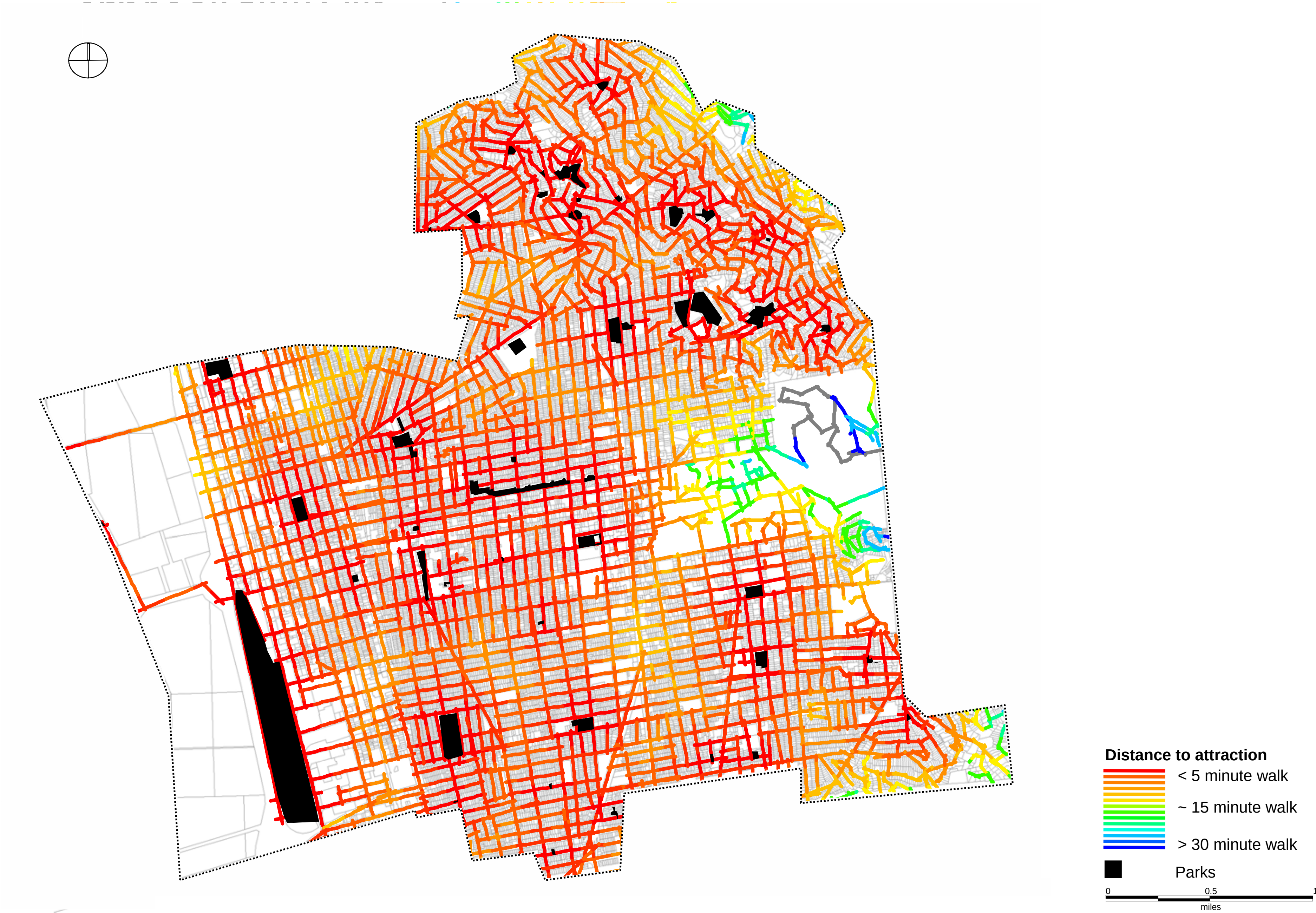
2.3 Land use Walking distance to libraries



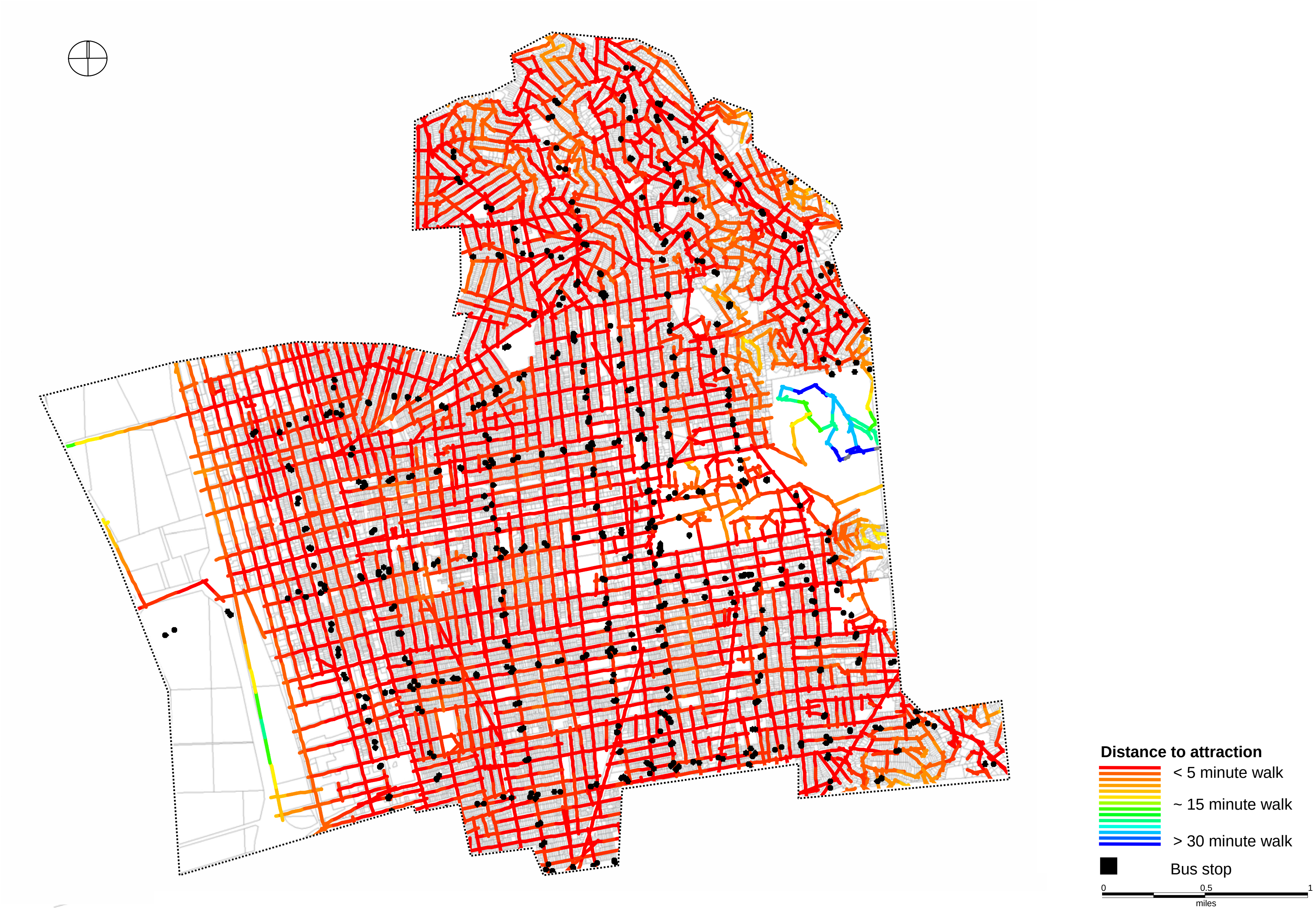
2.3 Land use Walking distance to healthcare facilities



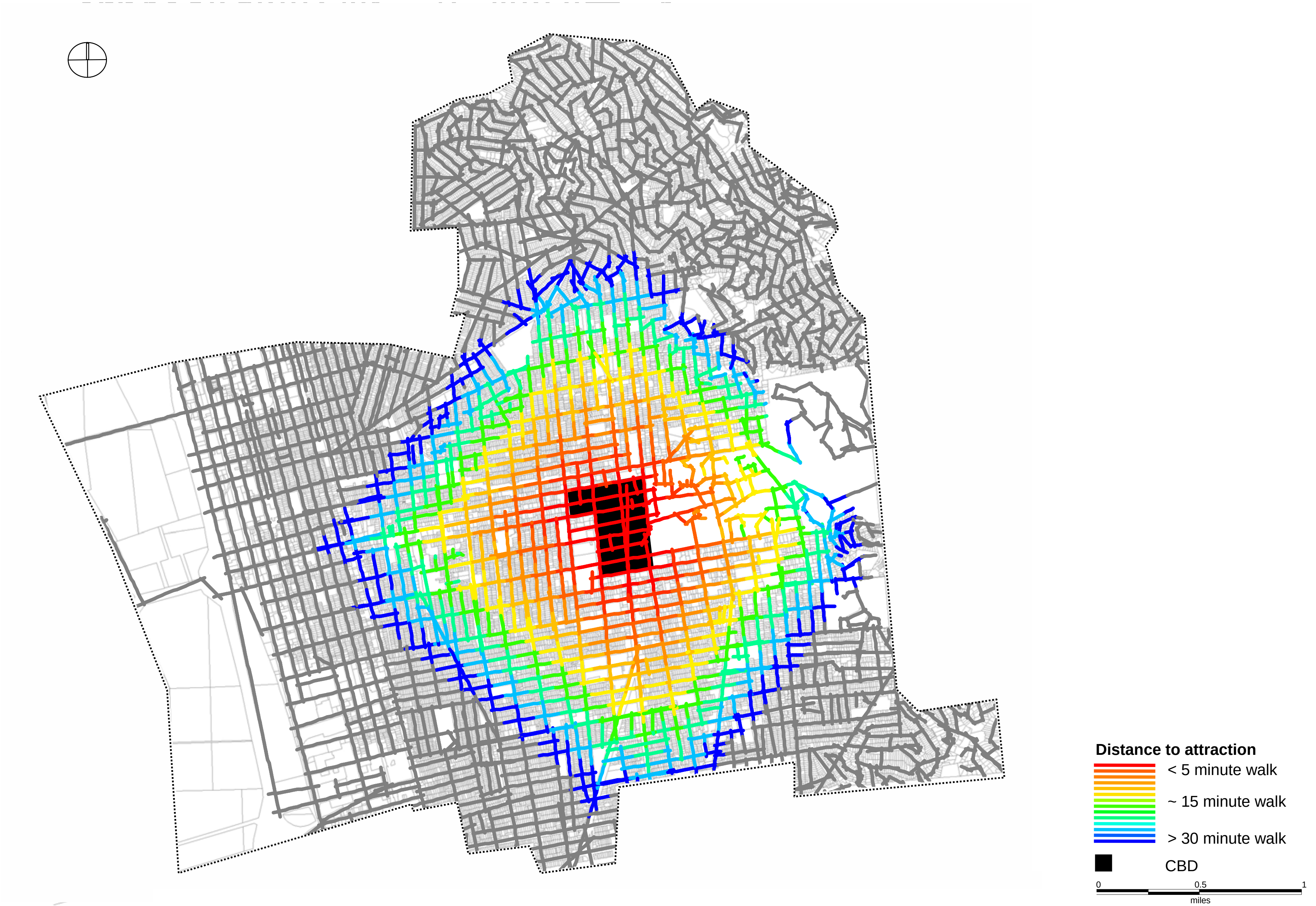
2.3 Land use Walking distance to parks and open spaces



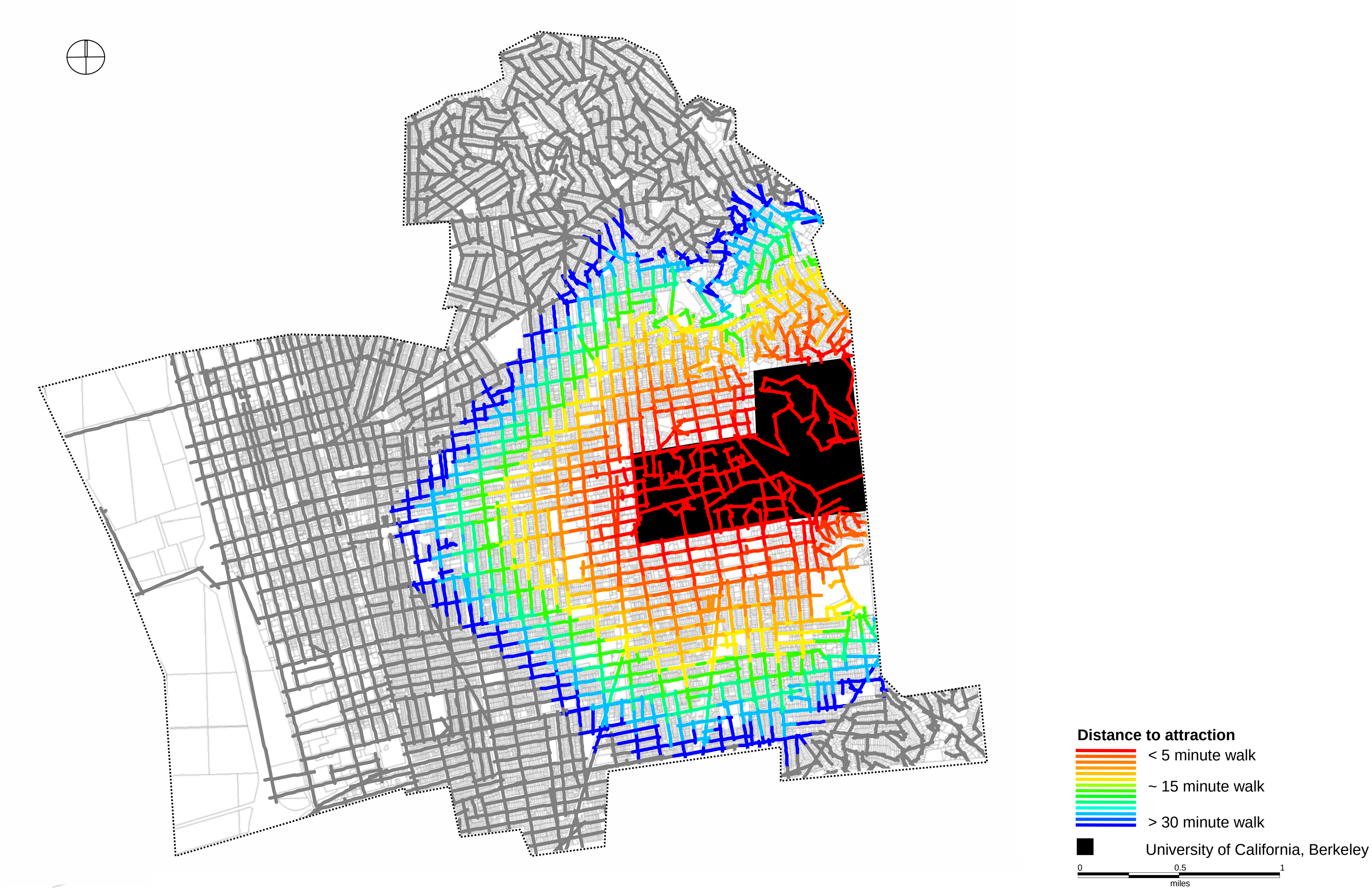
2.3 Land use Walking distance to transit services



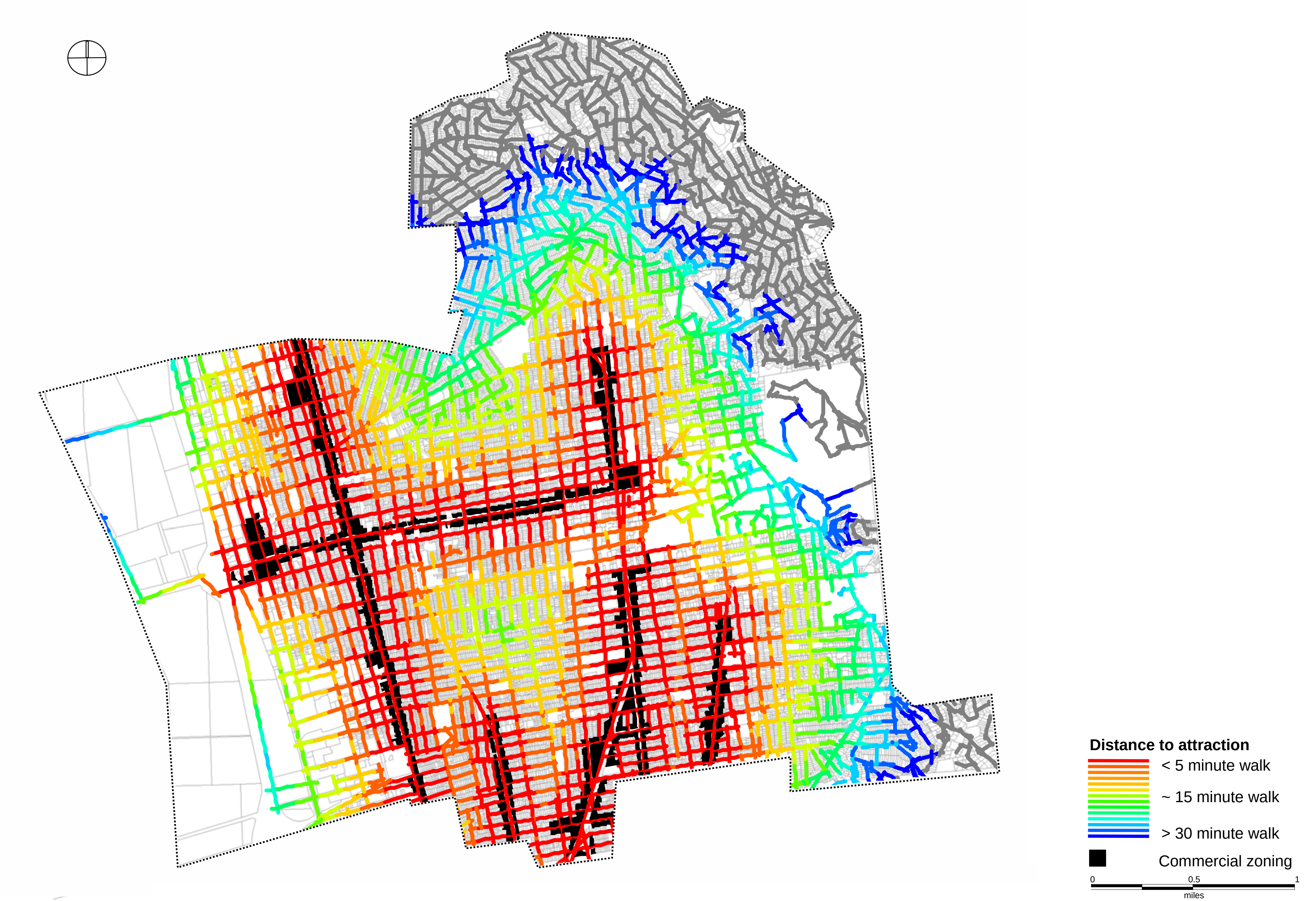
2.3 Land use Walking distance to the Central Business District



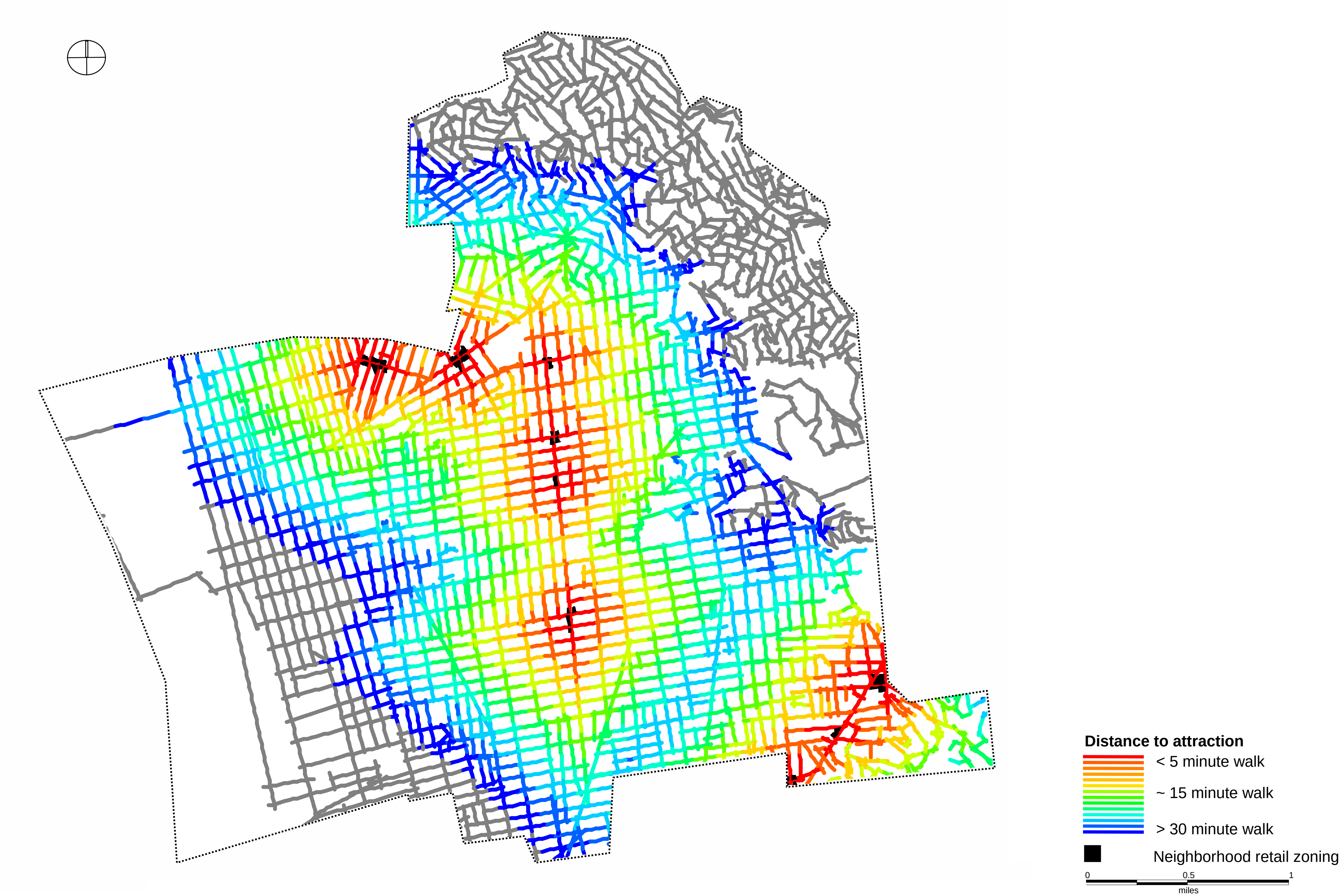
2.3 Land use Walking distance to the University



2.3 Land use Walking distance to major retail areas



2.3 Land use Walking distance to neighborhood retail



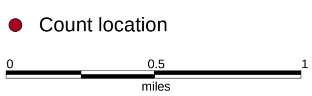
2.4 Pedestrian movement Count locations

The map to the left displays the sample locations of the pedestrian movement observations that were analyzed in this study.

This data set was selected from a larger data set of pedestrian movement counts provided by the City of Berkeley. Because these counts were in paper form, from different suppliers and in different formats, only a limited number of counts were able to be included for this study.

A random sampling technique was used to ensure accuracy and eliminate bias in selecting a sub-set of count locations. After initial analysis it was found that additional counts were necessary, resulting in a supplementary round of sampling to improve the geographic coverage of the data set. A third set of supplementary counts were then added to address specific questions relating to the area south of the University campus.

The final sample included average hourly movement rates during the weekday lunchtime peak hour (11:30 to 13:30) and estimated mid-day peak counts for the area south of UCB where only afternoon peak counts were available. A total of 64 counts were used for the model, covering a number of different months and collected over a nine year period between 1997 and 2005.



2.4 Pedestrian movement Observed volumes

The map to the left displays the intensity of pedestrian flows at the observed locations in the City of Berkley. Circles are sized according to the number of pedestrians per hour passing through that junction. Larger circles indicate locations with higher hourly average movement rates.

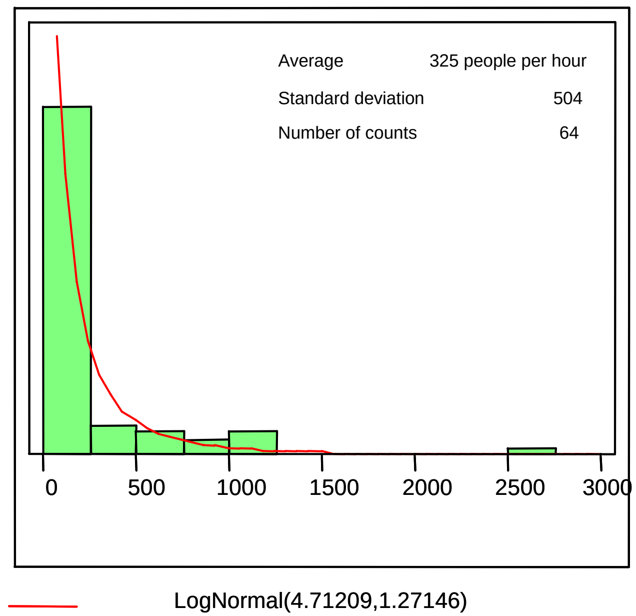
A total of 64 locations were used, spread through-out the city. The minimum hourly average was 8 people per hour whereas the maximum was 2628 people per hour appeared around the BART Downtown Berkley.

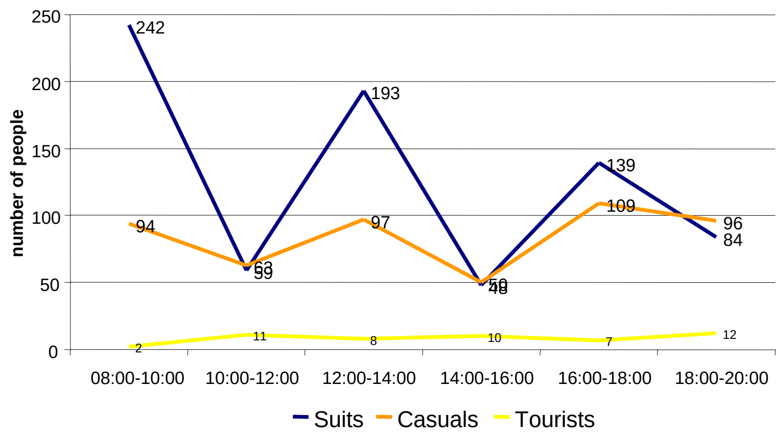
It can be seen that there is a marked concentration of higher pedestrian movement activities in the areas around the downtown. There is also heavy pedestrian activity around the UCB campus, particularly to the south along Telegraph Avenue.

Movement then falls off sharply to the west and in the remaining areas of the city, indicating that the UCB campus and the downtown activity zone exerts a powerful, but geographically constrained influence on pedestrian movement. It is suggested that the combination of the Downtown Berkeley BART station, the high level of offices and ground floor commercial activity, and the proximity to the UCB campus account for these peaks in movement.

NOTE: The other two BART stations in Berkeley did not exhibit similar levels of pedestrian movement levels in their vicinity as did the Downtown Berkeley stop. Statistics provided by the 1999 BART Station Profile Study reveal that the total daily number of commuters walking to Downtown Berkeley BART Station was almost three times higher than that of Ashby Bart Station and almost six times higher than North Berkley Station. Although it is likely that the station areas experience higher movement in the morning and evening rush hour peaks, the BART study suggests that pedestrian activity around the other two stations in more localized and / or that a greater number of people drive or are picked up from these stations.

2.4 Pedestrian movement Distribution analysis





The graph to the left displays the distribution of pedestrian movement values from the sample data set.

The shape of the graph indicates that the vast majority of areas in Berkeley have very low pedestrian movement rates. Only a few locations exhibit higher rates, a trend which is common in many world cities.

The average mid-day peak pedestrian flow was 325 people per hour. There is a high degree of variance in this data, however, resulting from the presence of a very small number of high volume locations located in the CBD and on Telegraph Avenue.

If these busy locations are removed from the sample, the average movement rate for the rest of the City of Berkeley is approximately 100 pedestrians per hour, with a much lower variance. This indicates that outside of the CBD / UCB area there is a low level but consistent rate of mid-day peak movement which hovers around the 100 pedestrian per hour rate.

Although data for variation in time was not available from the sample data, it is likely that the city displays a typical “W-shaped” pattern of pedestrian movement. The second graph to the left displays an example of this W-shaped pattern. Pedestrian movement peaks in morning as people go to work, in the lunchtime as they leave their place of work for lunch and evening as they go home. Data was not available on the demographic characteristics of different pedestrian types in the City of Berkeley.

3 Pedestrian volume model Methodology

Introduction

Although it is often easy to determine accessibility from a single given location to any other (we often do this in our head when giving directions), it becomes extremely difficult to determine accessibility from tens of thousands of different origins and destinations, as is the case in real urban environments.

Past research has found that despite the wide range of origins and destinations within a city, there is often a relatively stable movement pattern in time and space. This suggests that the pattern of journeys used by most people, most of the time, is relatively tractable and predictable. When viewed from this perspective, it becomes clear that what is most important is not the specific origins and destinations pairs, but the character and pattern of the journey flows themselves. This distribution is exactly what spatial accessibility analysis measures.

Space Syntax journey simulation

Space Syntax performs "journey simulation" and route choice analysis which takes into account the route choice strategy and preference of most pedestrians and cyclists.

These analytical techniques are a proven, robust way of assessing the spatial accessibility of the urban structure and grain and, in so doing, indexing the ease of movement for most people in an area most of the time. This index is often referred to as "spatial accessibility".

An understanding of spatial accessibility can then be used to establish a robust hierarchy of routes, within the public domain movement network.

The balance between spatial accessibility and other factors is critical to the success of well functioning urban spaces. Where the coupling between urban form, accessibility, land use, and transport is out of balance, the fit between accessibility and movement levels can be out of balance. This often results in the potential for socio-economic disorder. When this is the case, space syntax analysis incorporates multiple variables such as frontage quality, land use, ownership status, exposure, and social data such as crime rates and aesthetic preference.

Spatial accessibility analysis in Berkeley was performed using the public open space line map (axial map) as its base.

The "integration" measure was used to establish a hierarchy of routes. This was then colored using a scheme to represent most likely used routes within this hierarchy. Streets which comprised the most direct journeys were colored in red, orange, and yellow. Streets which carried less journeys were colored greenish-blue and blue.

Where observations of existing movement levels are available, the relationship between simulated and observed movement levels can be statistically compared to determine the exact degree of "fit" between them. Empirical studies have shown that these simulations conform to real movement, with up to 80% accuracy in many cases – especially in well structured urban environments where accessibility, land use, and transportation nodes are in synergy with ease of movement.

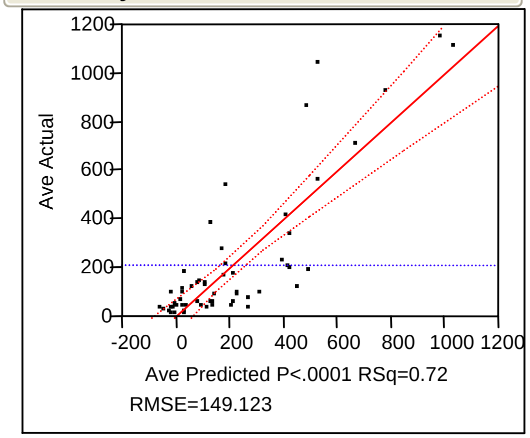
In cases where movement data is not available simulated journeys alone can be used to identify approximate movement levels and route hierarchies based on their robust history of use and comparative cases.

All of the urban form, land use, and pedestrian observations were then processed in a customized statistical model. This model, using standard multi-variate regression techniques, was then used to explore the influence of various urban design and land use factors on observed movement.

Where a statistically significant connection was found, these relationships were used to extrapolate values with a reasonable degree of confidence across the geographic area of Berkeley.

3 Pedestrian volume model Statistical results

Actual by Predicted Plot



Summary of Fit

RSquare	0.723602
RSquare Adj	0.689453
Root Mean Square Error	149.1298
Mean of Response	272.3423
Observations (or Sum Wgts)	64

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	3373508.6	1491398	42.4233
Error	64	1325384.1	25231	Prob > F
C. Total	64	4742421.3		<.0001

Scaled Estimates

Continuous factors centered by mean, scaled by range/2

Term	Scaled Estimate	Std Error	t Ratio	Prob>|t|
Intercept	215.24	24.1626	10.24	<.0001
Log_PD_BART	-513.28	58.2727	-9.34	<.0001
R6	110.86	48.7279	2.02	0.0455
Avg_ADT	-109.56	41.4843	-2.46	0.0231

The graph to the left illustrates the significance and validity of the model that was used for the Berkeley area. It can be seen that forecasts around this area approach 70% accuracy, when compared to existing observations.

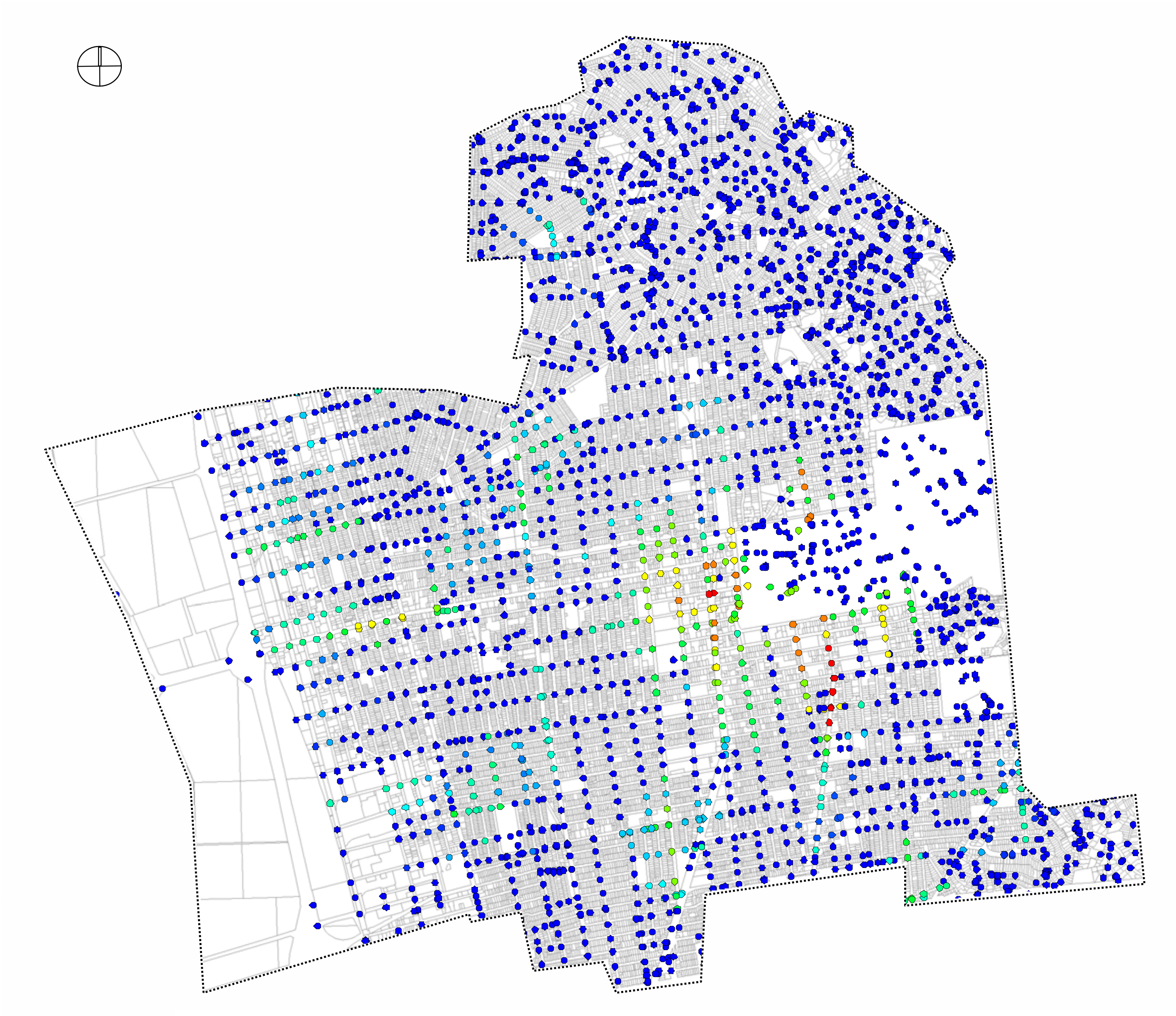
As distance from the downtown area increases (falling inversely with the distance, i.e., decaying rapidly), two other secondary factors were found to come into play. The first was the average daily traffic at each junction (ADT). A negative correlation was found with increase ADT, suggesting that pedestrian actually *avoid* junctions with high vehicular volumes if possible. This factor, combined with the distance from the CBD and the relative accessibility of a junction (Radius 6 spatial integration), were found to account for the majority of movement in the City of Berkeley.

Analysis of the movement model revealed two distinct movement systems in Berkeley. The first was clustered around UCB and the downtown CBD. This system is powerfully influenced by a simple inverse gravity relationship from the major attractors in the area, most notably the Downtown Berkeley BART station and the two north and south entrances to the UCB campus.

As distance increased even farther from downtown, however, these effects reduced significantly. A "second movement system" was found to extend through-out the remaining areas of town outside of the sphere of influence of the downtown. Average movement rates in these areas were less than 100 people per hour, which past studies have shown to be nearly insignificant in statistical terms at the citywide level. Because of this fact, a logarithmic decay model was used from observed data points to extrapolate values for these areas.

Of note, the proximity to parks, libraries, schools, and transit stops were found to be insignificant factors on mid-day pedestrian movement in these areas. This suggests that movement in the more residential areas of Berkeley is more heavily car and cycle based and that, even where local retail or community facilities are present, they are accessed by other modes of transit which were not recorded in the data set provided. Crosswalks, signalization, and other more detailed urban amenities were also found to exert no influence on pedestrian trip rates. Although these may have an impact on other key factors of this study (such as safety), their presence did not significantly influence movement rates in the City of Berkeley.

3 Pedestrian volume model Forecasted mid-day peak movement levels



This statistical model was then used to extrapolate pedestrian volumes for all of the remaining junctions in the City of Berkeley. The map to the left demonstrates the output of this model, with the color representing the average mid-day peak movement rates for each junction.

NOTE: Movement rates were not forecasted inside the UCB campus and the colors shown to the left are representative only. Pedestrian movement patterns in a complex environment such a university campus requires more detailed analysis in a separate study. Student movement rates are subject to a variety of other more complex factors than a traditional city street and campuses are more complex spatial entities. Class times, open space layout and provision, dormitory locations and other factors have all been shown to play a large role in the nature and pattern of campus life. Such variables were beyond the remit of this study but have been dealt with comprehensively in other university master planning scenarios.

Forecasted pedestrian volumes

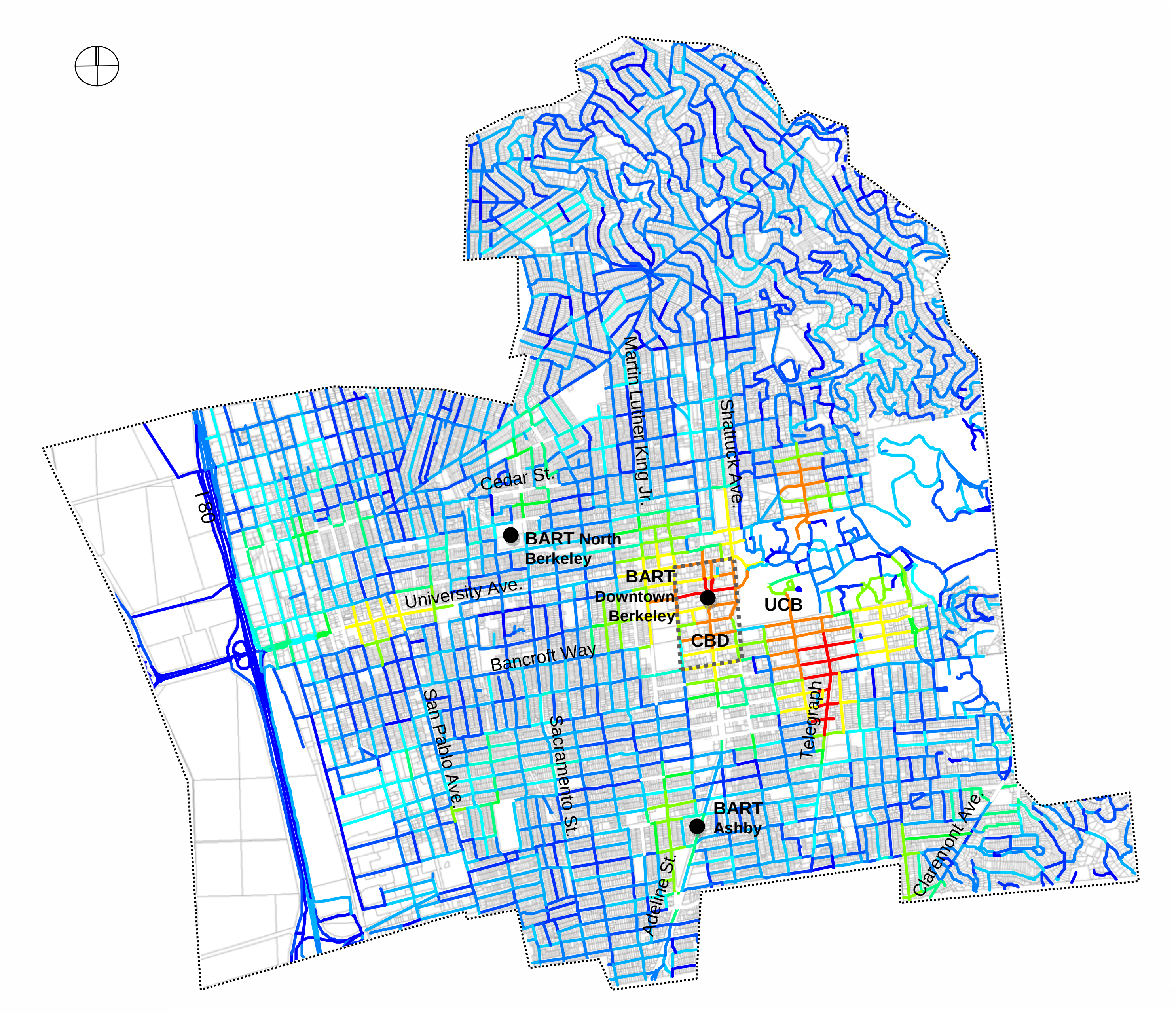
> 2000 people per hour

~ 250 people per hour

< 50 people per hour

0 0.5 1
miles

3 Pedestrian volume model Forecasted mid-day peak movement levels



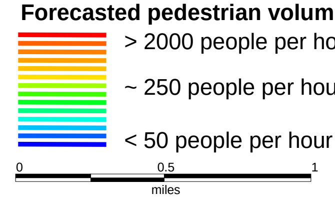
Estimates for junctions were then assigned to individual street segments at the request of the client. It can be seen that the vast majority of pedestrian movement is highly clustered around the Downtown Berkeley BART station, as well as the southern and northern entrances of the UC Berkeley campus.

Movement rates are shown to fall off sharply from the downtown CBD area. The statistical model highlights the importance of the Downtown Berkeley BART station, although clearly the University plays a major role in generating movement around its entrances. This effect can be seen particularly to the south, where many retail and pedestrian oriented business support and take advantage of this movement.

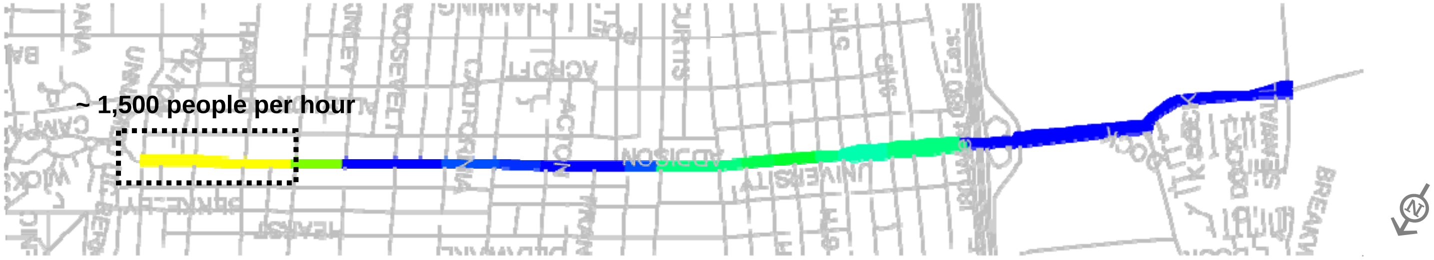
As in the observed counts, variations through-out the rest of the city are relatively minor, with slightly increased movement rates (between 200 – 500 people per hour) between San Pablo Avenue and I-80, north of University Avenue.

Although the presence of local neighborhood retail is found to exert an important influence, it was not found to be statistically significant when compared to the influence of the CBD and University campus.

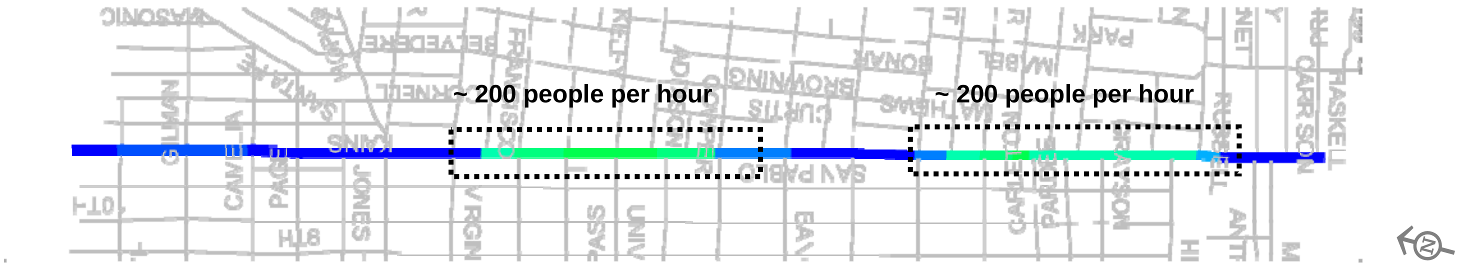
Forecasted pedestrian volumes



3 Pedestrian volume model Corridor analysis



University Avenue



San Pablo Avenue

Shattuck Avenue

The graphics to the left display forecasted pedestrian movement along key corridors in the City of Berkeley.

These visuals, which are rotated for comparability, provide graphic examples of the variation in pedestrian movement along some of the most important streets in Berkeley. The same color scale is also used for all examples, such that the same color represents the same value in forecasted pedestrian movement.

Key areas of activity are circled with black dotted lines and the maximum movement on this street annotated.

This can be used to help prioritize improvement options to target opportunities where streets are being used the most.

Forecasted pedestrian volumes

> 2000 people per hour

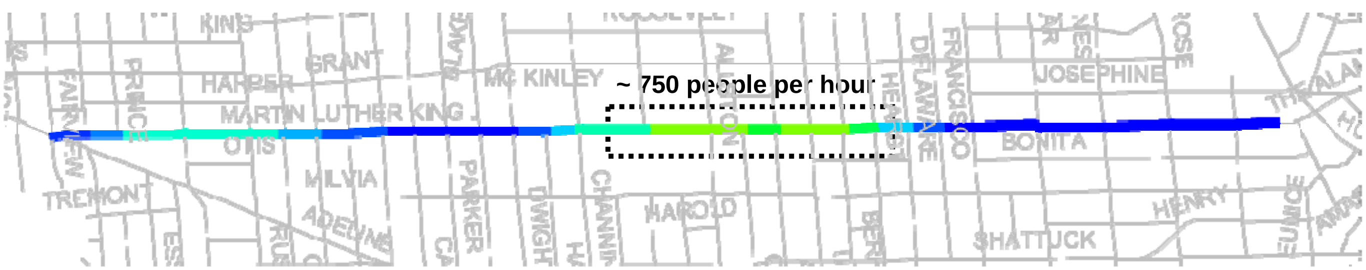
~ 250 people per hour

< 50 people per hour

3 Pedestrian volume model Corridor analysis

Telegraph Avenue

College Avenue



Martin Luther King Jr. Way

Forecasted pedestrian volumes

- > 2000 people per hour
- ~ 250 people per hour
- < 50 people per hour

4 SWITRS exposure analysis Methodology

The need for pedestrian exposure

The Federal Highway Administration (FHWA) and the National Highway Traffic Safety Administration (NHTSA) recently identified four major areas of need in pedestrian planning. Among these, accurate pedestrian exposure data was identified as the least understood and most important area of research for pedestrian planners and decision-makers.

The term "exposure" originates from the field of epidemiology and is defined as the rate of contact with a potentially harmful agent or event. Applied to the world of transportation planning, pedestrian exposure is defined as a pedestrian's rate of contact with potentially harmful vehicular traffic.

Pedestrian exposure is therefore measured by pedestrian volume, as expressed in units of pedestrians per hour.

Many US cities have access to pedestrian crash data through police reports, which give planners a detailed picture of the amount and location of pedestrian – vehicle collisions occurring each year. But without pedestrian volume counts to determine walking rates, this information paints an incomplete picture of actual pedestrian risk.

High volume intersections may experience a large number of collisions per year, but they may be relatively safer than intersections that experience less annual collisions but also less usage. This mismatch often results in funding pedestrian planning projects based on the "squeaky wheel" principle instead of on objective data analysis (i.e., intersections with the highest rates of collision are given attention instead of those that experience the greatest risk).

Measuring exposure

An example can help illustrate this point. The figure to the right demonstrates the concept of exposure as it relates to pedestrian risk. Intersection A experiences
10 collisions per year, with an average annual pedestrian volume of 10,000 pedestrians per year. Intersection B experiences 20 collisions per year, but has an average annual pedestrian volume of 100,000 pedestrians per year.

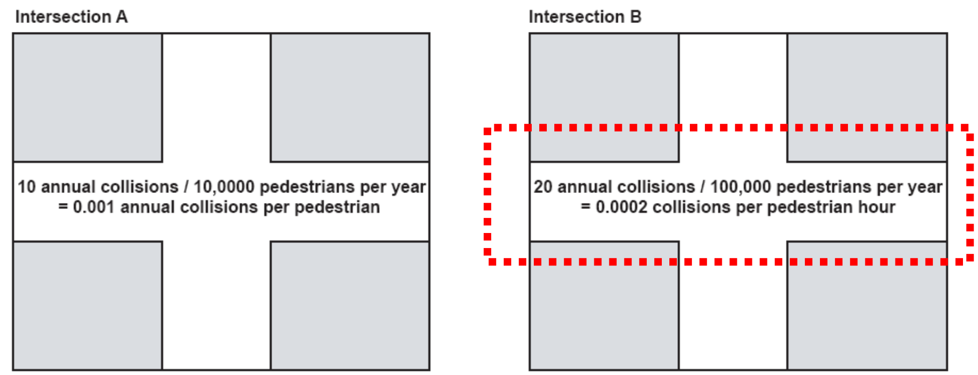
Which intersection is the most dangerous? At first glance, it would appear that Intersection B is the most dangerous, with 20 collisions per year.

This would be accurate, based on the absolute number of collisions alone. But dividing the annual number of collisions by the pedestrian volume rate (exposure) gives a measurement of relative risk and reveals that Intersection A experiences 0.001 annual collisions per pedestrian, while Intersection B experiences 0.0002 annual collisions per pedestrian. This approach reveals that Intersection A is actually the more dangerous intersection by volume, experiencing five times the likelihood of collision than Intersection B.

It can be seen that absolute collision data alone can provide an inaccurate or misleading picture of pedestrian risk when considered in isolation.

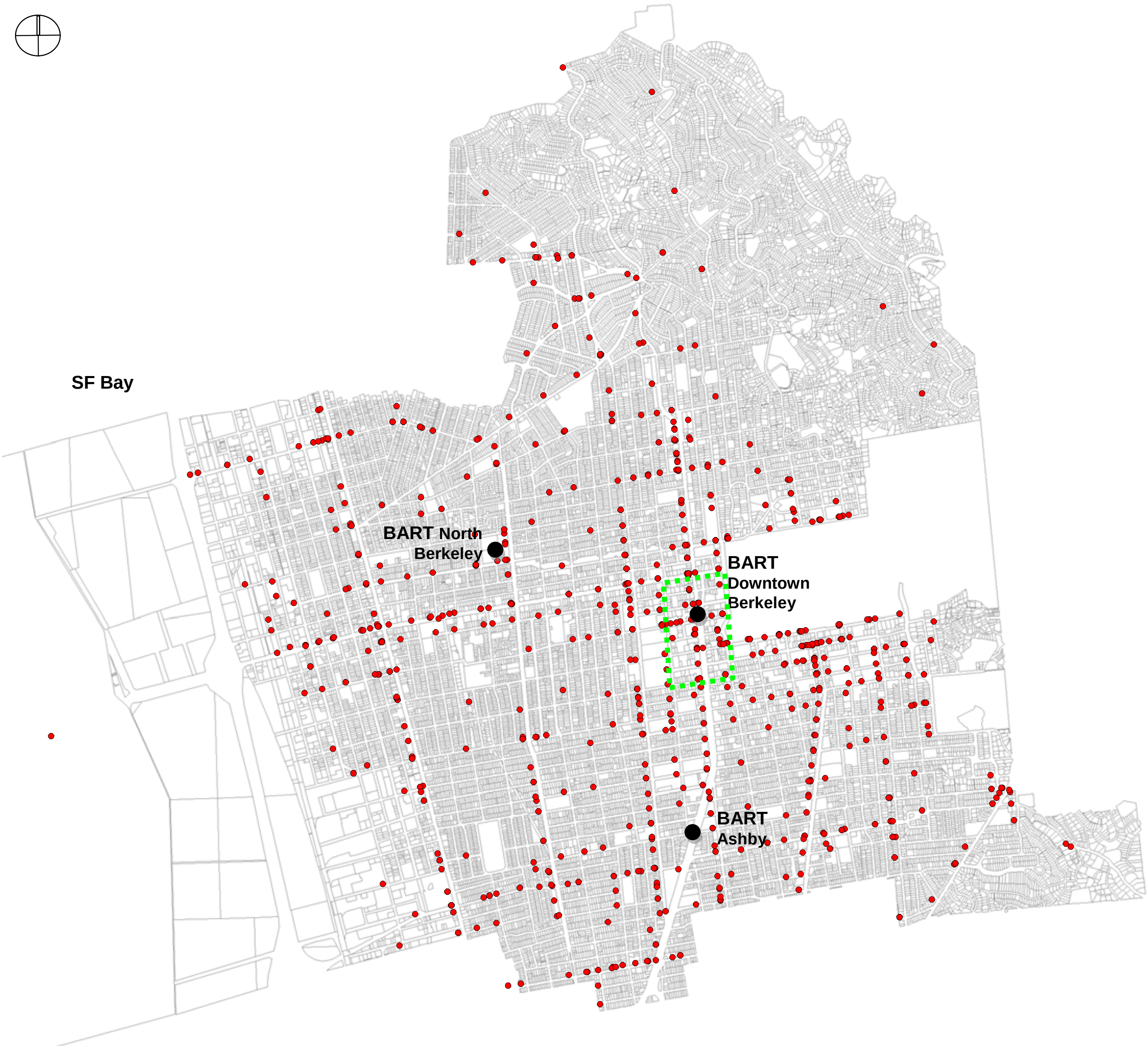
This technique was pioneered for the City of Oakland, CA during the preparation of their first pedestrian master plan in 2003 and has been extensively peer reviewed since then. The City of Berkeley is the second city in the country to apply this advanced technique, placing them among the vanguard in pedestrian safety planning in the nation and in the world.

Demonstrating the concept of exposure



Intersection B is more dangerous than Intersection A because even though it has twice the number of annual collisions, it carries 10 times the number of pedestrians (Source: Raford and Ragland, 2003)

4 SWITRS exposure analysis Collision locations



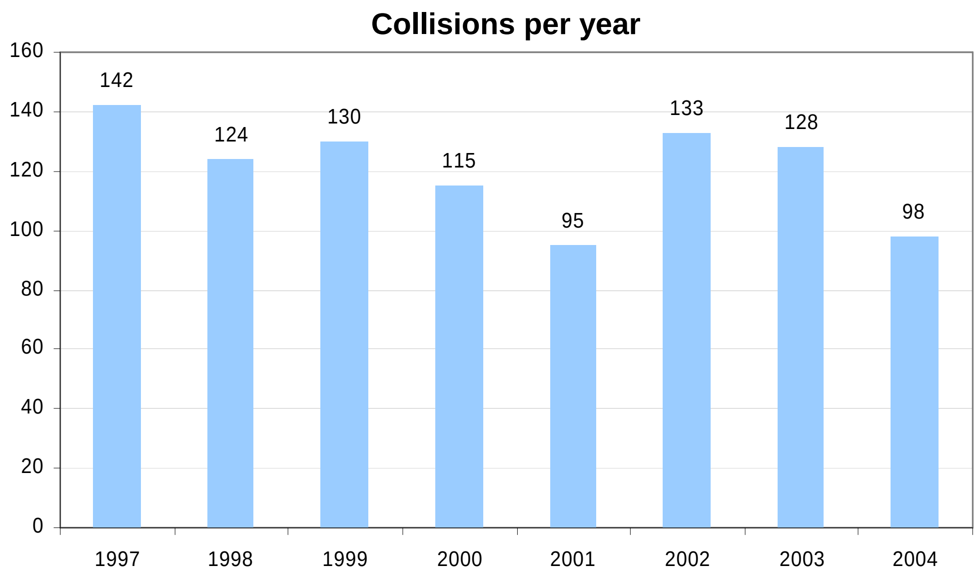
After forecasting the pedestrian volumes at all intersections in the City of Berkeley, a detailed pedestrian risk analysis was conducted using SWITRS vehicle – pedestrian crash data provided by the California Highway Patrol.

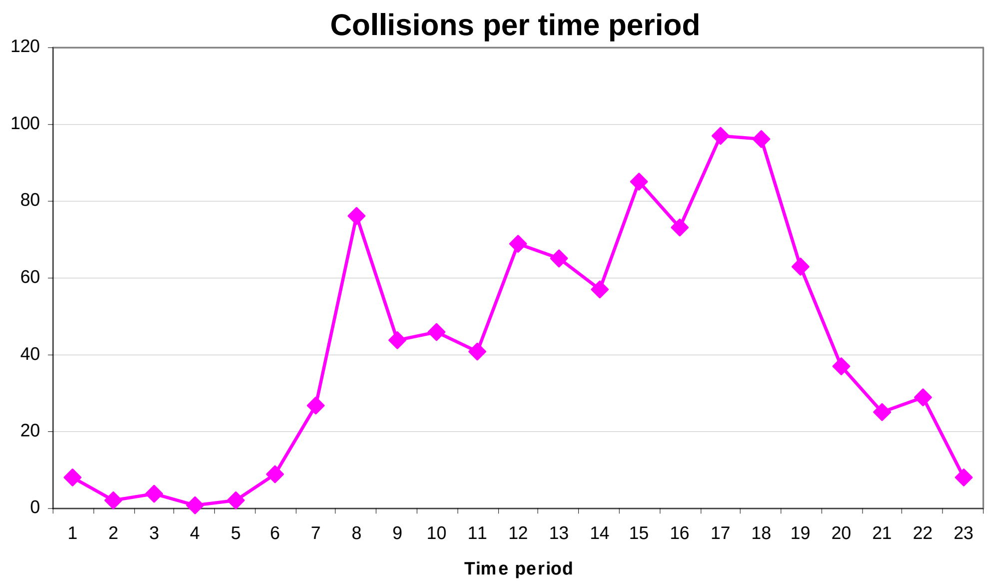
A total of 965 pedestrian collisions were recorded in Berkeley between the years of 1997 and 2004.

For analytical purposes the exact locations of these collisions were aggregated to the intersection level, as this was the level of output provided by the pedestrian movement model.

The map to the left displays the locations of with associated collision data that were available for this study. It can be seen that pedestrian collisions extend through-out the City of Berkeley, with the majority occurring along the lengths of the major streets such as San Pablo, Telegraph, and Shattuck Avenues. Other concentrations include a higher number of collisions in the downtown area, as well as to the south of the UCB campus.

4 SWITRS exposure analysis Summary statistics





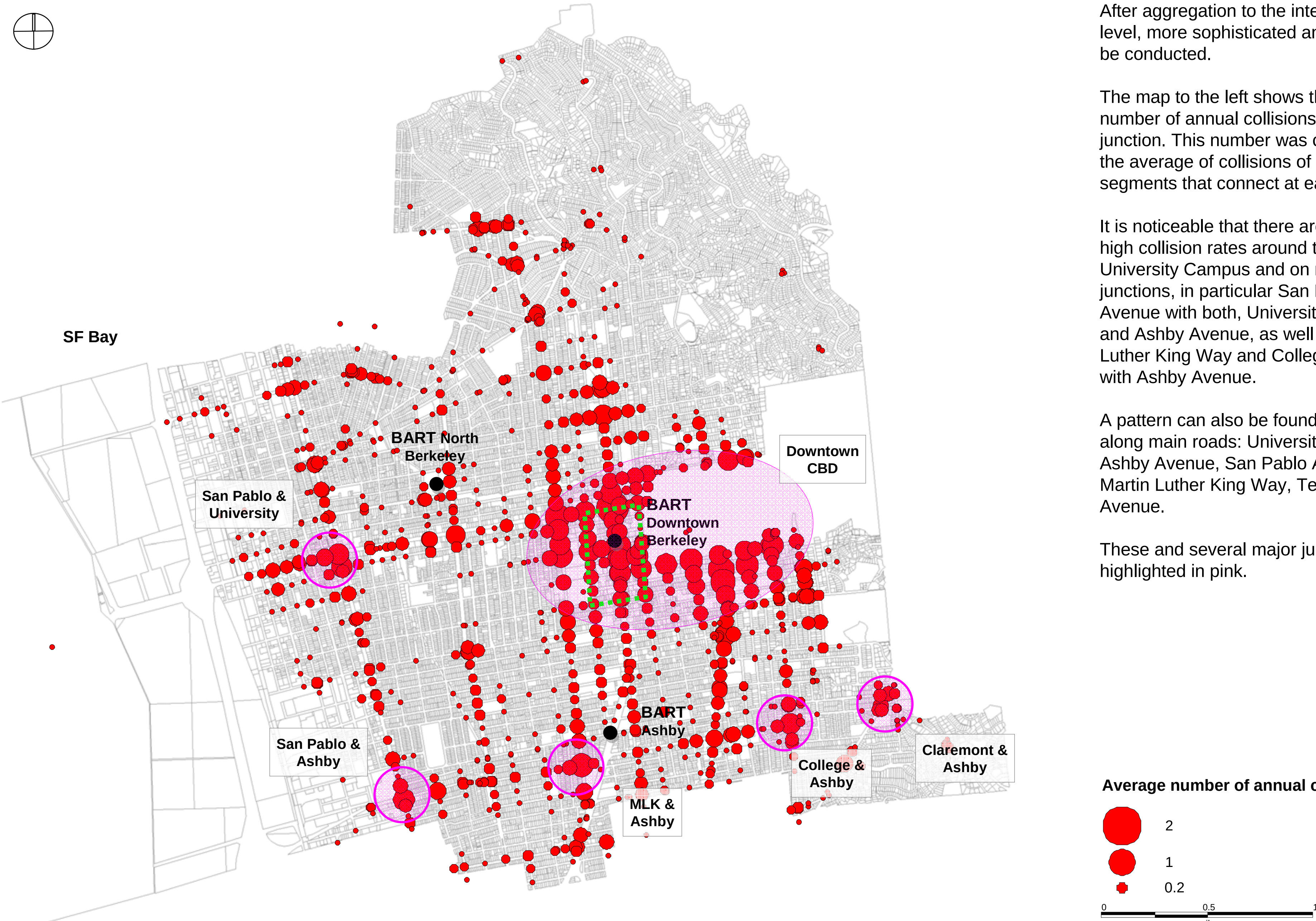
The charts to the left illustrate some statistical trends in the collision data.

The bar chart shows the number of collisions per year from 1997 to 2004. The average across this years is 120 collisions. The years of 2001 and 2004 have the lowest number of incidents with 95 and 98 respectively, while 1997 appears to have the highest rate with 142.

The line chart at the bottom of the page highlights the pattern of collisions throughout different hours of the day. The highest counts of collisions are during peak hours. The period between 5pm and 7pm has a maximum number of incidents per hour slot of 97. There is also a high rate of 76 from 8am to 9am. The average number of collisions across different times is 42.

As it is expected, the period with the least absolute number of collisions is late night/early morning, from 11pm to 6am with an average of only 5 collisions per year during this time period.

4 SWITRS exposure analysis Collisions per junction



After aggregation to the intersection level, more sophisticated analysis could be conducted.

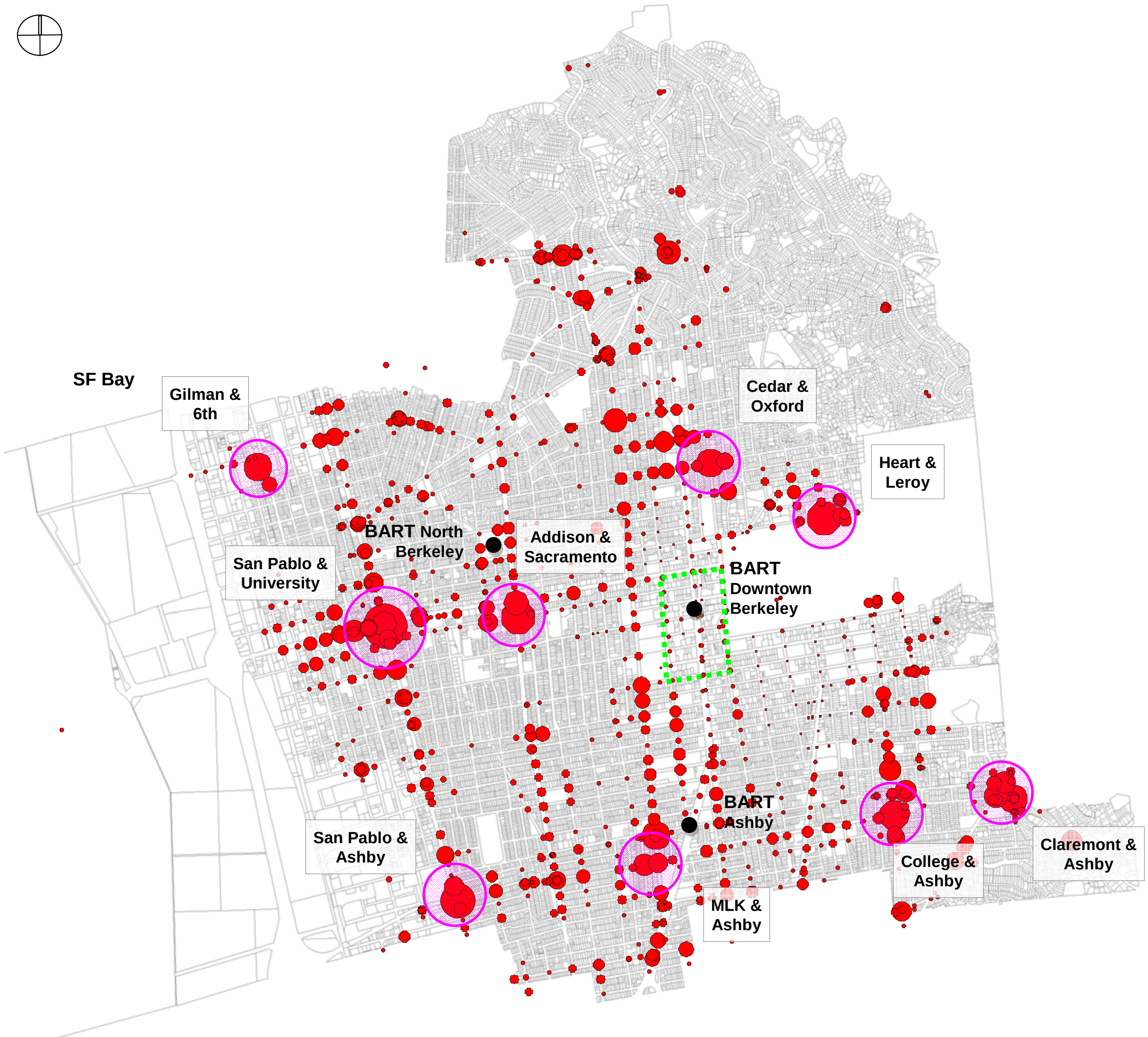
The map to the left shows the average number of annual collisions per street junction. This number was calculated as the average of collisions of all street segments that connect at each junction.

It is noticeable that there are clusters of high collision rates around the CBD-University Campus and on main road junctions, in particular San Pablo Avenue with both, University Avenue and Ashby Avenue, as well as Martin Luther King Way and College Avenue with Ashby Avenue.

A pattern can also be found primarily along main roads: University Avenue, Ashby Avenue, San Pablo Avenue, Martin Luther King Way, Telegraph Avenue.

These and several major junctions are highlighted in pink.

4 SWITRS exposure analysis Collisions and pedestrian movement model



Past studies have found that a better measure of actual pedestrian risk is the average number of collisions per pedestrians using that intersection.

The map shows this figure, with larger circles indicating the annual number of collisions per street junction by pedestrian movement model forecast.

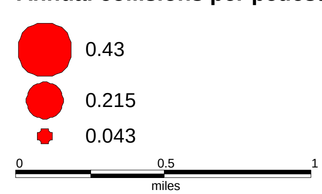
It can be seen that this reveals a different picture than simply mapping annual or total collisions alone – one which more accurately displays pedestrian risk in the City of Berkeley as a function of the use each intersection actually receives.

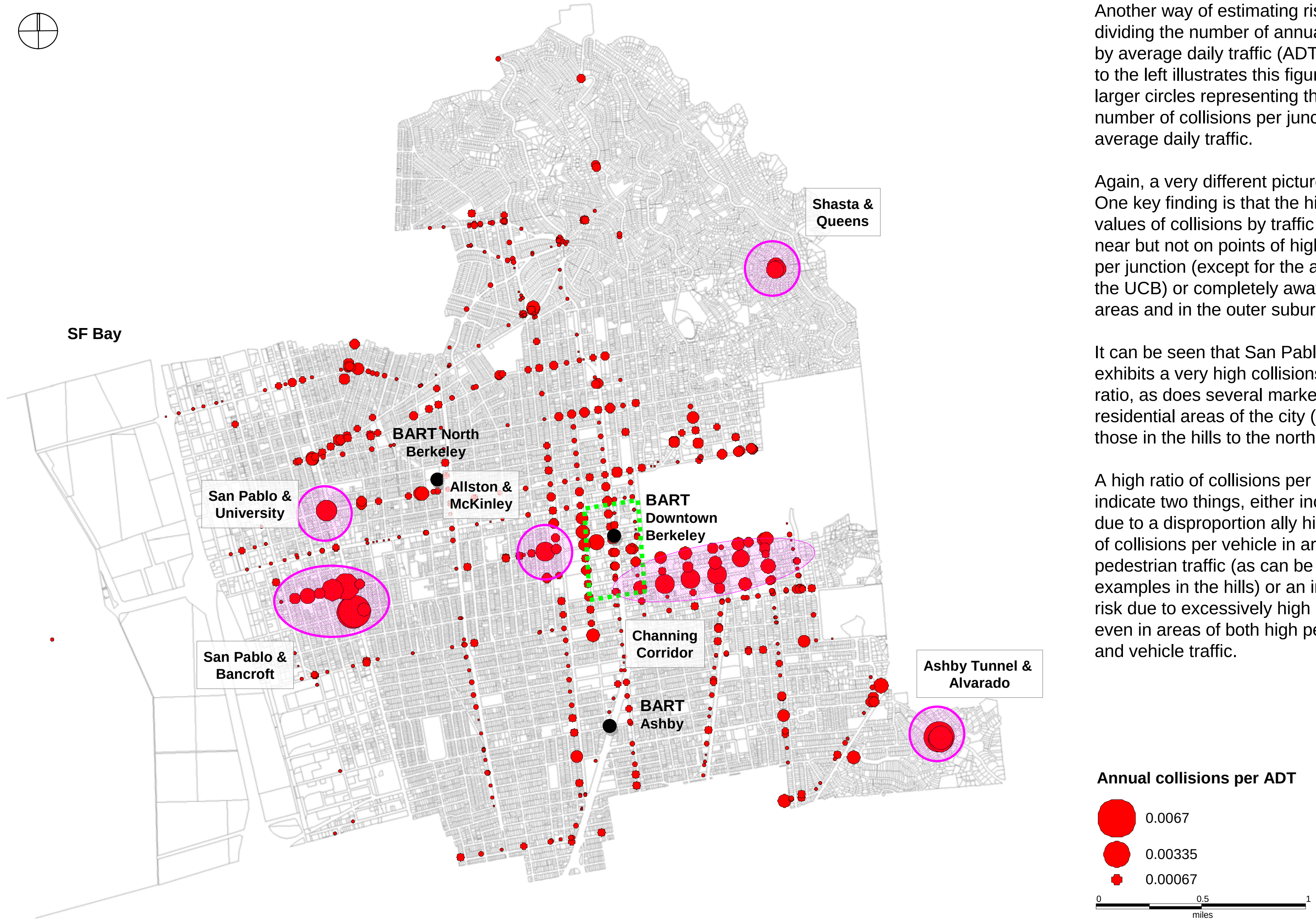
It can be seen that is a higher incidence of risk at the crossing of major streets, with a marked decrease at intersections within the residential portions of the city.

All major concentrations of risk are found at major junctions outside of the city center. The areas around the CBD and to the south of the University, although bearing a significant number of accidents, were actually found to be less risky due to the large volumes of pedestrian traffic these areas receive.

Key areas of pedestrian risk, as measured by collisions per person, are highlighted in pink.

Annual collisions per pedestrian





Another way of estimating risk is by dividing the number of annual collisions by average daily traffic (ADT). The map to the left illustrates this figure, with larger circles representing the annual number of collisions per junction by average daily traffic.

Again, a very different picture emerges. One key finding is that the highest values of collisions by traffic are, either near but not on points of high collisions per junction (except for the area south the UCB) or completely away from these areas and in the outer suburban edge.

It can be seen that San Pablo Avenue exhibits a very high collisions per vehicle ratio, as does several markedly residential areas of the city (such as those in the hills to the north and south).

A high ratio of collisions per car can indicate two things, either increased risk due to a disproportion ally high number of collisions per vehicle in areas of low pedestrian traffic (as can be seen in the examples in the hills) or an increased risk due to excessively high collisions even in areas of both high pedestrian and vehicle traffic.

4 SWITRS exposure analysis Summary table

	Top 12 Annual Collisions	Total	Average Annual
1	Shattuck & University	20	2.5
2	Telegraph & Durant	14	1.75
3	University & Martin Luther King	13	1.625
4	Telegraph & Channing	13	1.625
5	Allston & Martin Luther King	12	1.5
6	Ashby & Martin Luther King	12	1.5
7	Shattuck & Allston	11	1.375
8	Bancroft & Dana	11	1.375
9	Durrant & Bowditch	11	1.375
10	Bancroft & Ellsworth	10	1.25
11	Ashby & San Pablo	10	1.25
12	University & San Pablo	10	1.25

	Top 12 Annual Collisions / Pedestrian	Total	Average Annual
1	University & San Pablo	0.428	0.0535
2	Parker & Regent	0.384	0.048
3	Haste & Bowditch	0.384	0.048
4	Ashby & San Pablo	0.285	0.035625
5	Bancroft & College	0.281	0.035125
6	Addison & Sacramento	0.272	0.034
7	Hearst & Leroy	0.272	0.034
8	Ashby & Colleage	0.209	0.026125
9	Gilman & 6th	0.2	0.025
10	Ashby & Domingo	0.2	0.025
11	Russell & Martin Luther King	0.2	0.025
12	Acton & Oxford	0.19	0.02375

	Top 12 Annual Collisions / Vehicle	Total	Average Annual
1	Addison & Sacramento	0.272	0.034
2	San Pablo & Bancroft	0.0066	0.000825
3	San Pablo & Allston	0.0045	0.000563
4	Ashby Tunnel & Alvarado	0.0038	0.000475
5	Allston & 10th	0.0032	0.0004
6	San Pablo & Delaware	0.003	0.000375
7	Allston & McKinley	0.0028	0.00035
8	Channing & Ellsworth	0.0028	0.00035
9	Channing & Dana	0.0028	0.00035
10	Channing & Telegraph	0.0028	0.00035
11	Durant & Bowdith	0.0023	0.000288
12	Shasta & Queens	0.0021	0.000263

The tables to the left summarize the top 12 most dangerous intersections by the following categories:

- Total annual collisions
- Collisions per pedestrian
- Collisions per vehicle

It can be seen that these lists vary significantly. Past studies have indicated that collisions per pedestrian is often the most important indicator of risk, and it is suggested that the City of Berkeley begin to use this index for its prioritization of pedestrian safety improvements.

The most dangerous intersections per pedestrian are generally split between two areas – the San Pablo corridor and the area south of UCB's campus. These areas should be given greater attention in the following phases of this study.

Areas which have high numbers of total collisions but are relatively safer per pedestrian include most of the intersections in downtown Berkeley. This finding suggests that despite their high number of collisions, the amount of people using these intersections is so great that the relative risk per person is actually quite safe.

The following graphics display pedestrian risk as a function of pedestrian volume and collisions along key corridors as presented previously.

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8	Ashby & Domingo	0.2	0.025
9	Oxford & Cedar	0.19	0.02375
10	University & Sacramento	0.15	0.01875
11	Ashby & Claremont	0.14	0.01775
12	Oxford & Marin	0.14	0.01775

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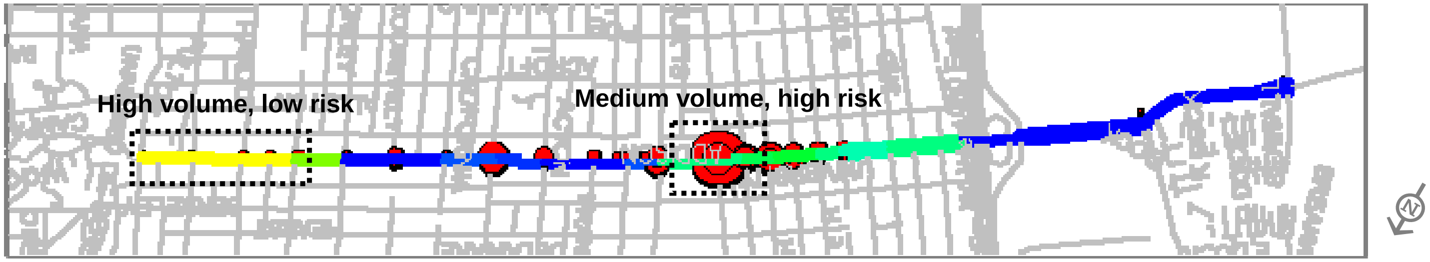
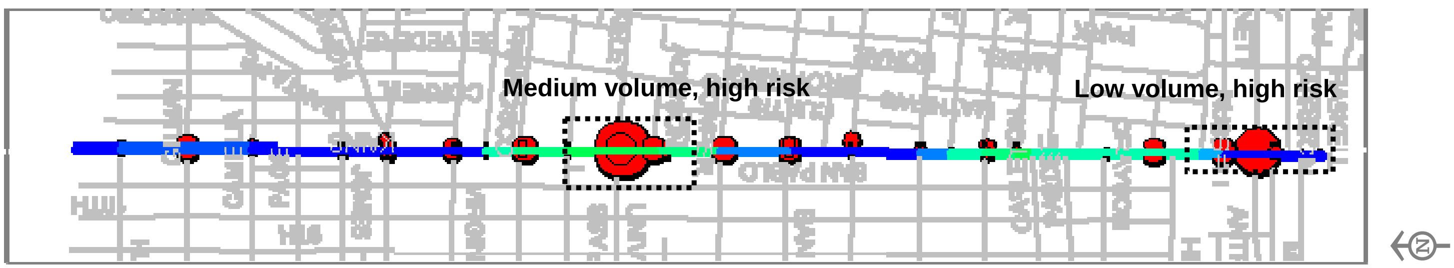
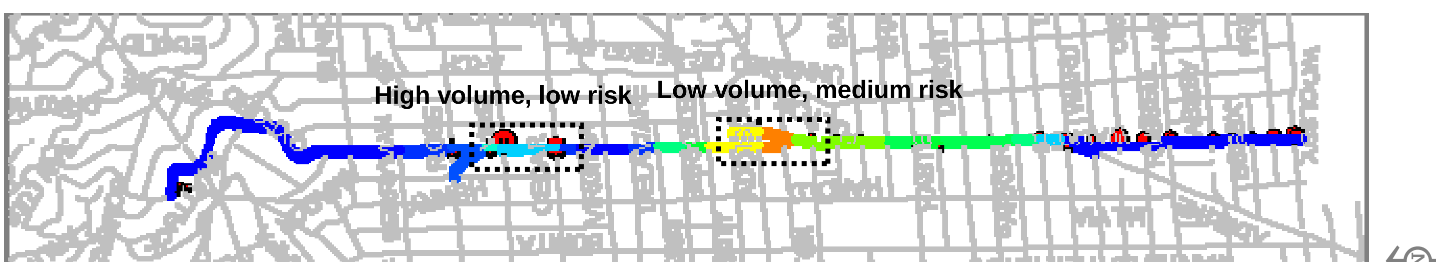
4 SWITRS exposure analysis Corridor analysis



University Avenue



San Pablo Avenue



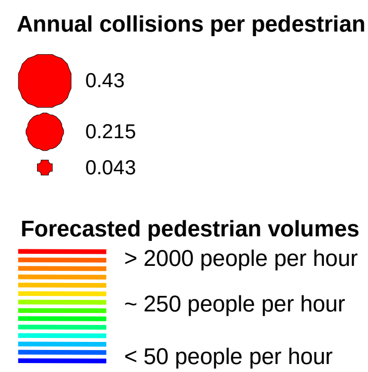
Shattuck Avenue

The graphics to the left compare the collisions rate per pedestrians with the pedestrian volumes presented previously for key corridors in Berkeley.

It can be seen that there is a general relationship between higher pedestrian volumes and lower risk, with several notable exceptions. These exceptions should be examined in more detail because the represent areas of elevated risk relative to the use they receive.

Conversely several areas of low volume and high risk are picked out. These two should be addressed because they have a disproportionate number of collisions per year relative to the use they receive. This means that they are more dangerous for those who use them and therefore require further attention and investigation.

As in the previous graphics, the pedestrian risk bubbles are drawn to the same scale for accurate comparison between corridors.



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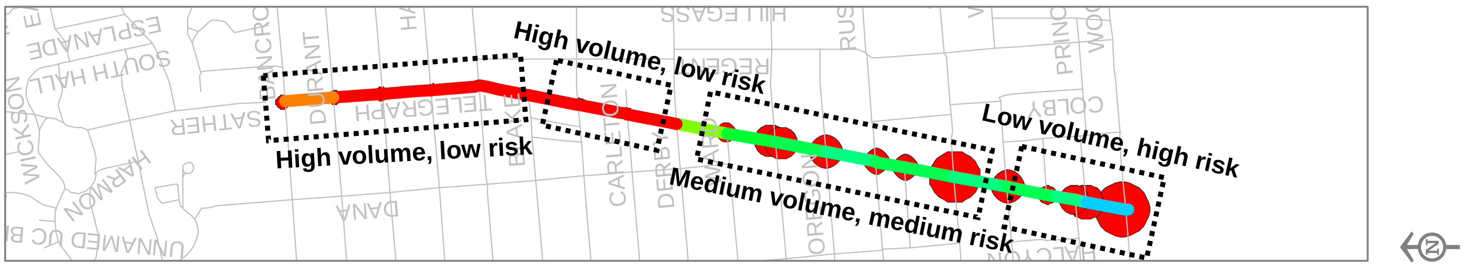
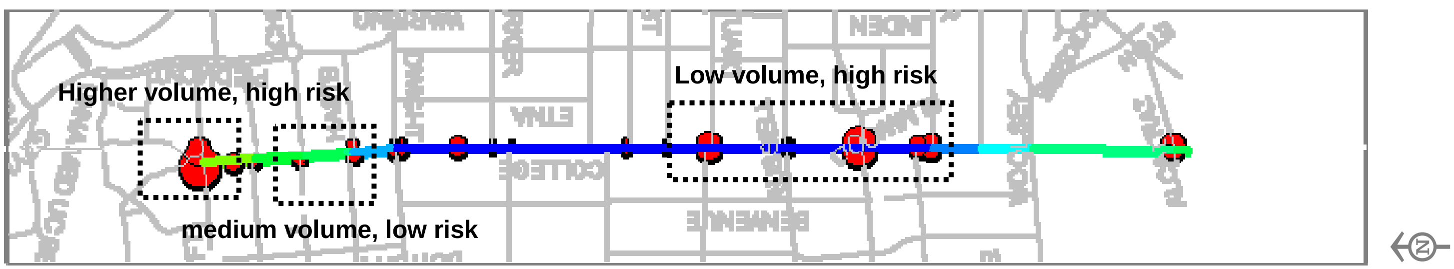
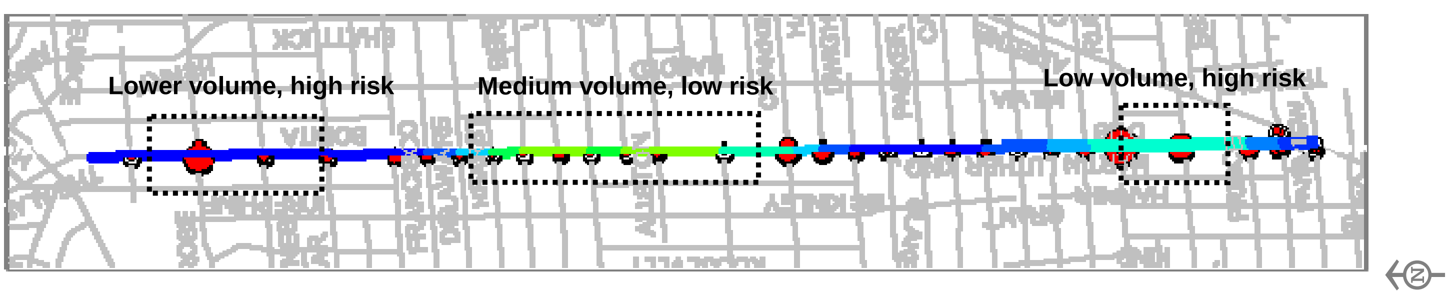


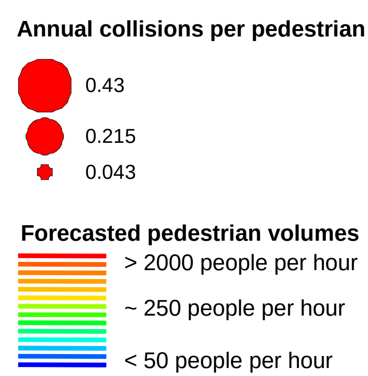
Telegraph Avenue



College Avenue



Martin Luther King Jr. Way



5 Conclusions

Safer streets for the City of Berkeley

The report analyzed many of the important factors which influence pedestrian movement in the City of Berkeley.

It found that the majority of pedestrian activity occurs within a small radius of the Downtown Berkeley BART station. Several smaller pockets of activity exist, notably at the main southern and northern gates of the University of California Berkeley campus. Outside of these areas, very little mid-day pedestrian activity was measured.

A statistically significant mathematical model was then created which analyzed the relationship between observed movement and key urban design and land use patterns. This model found that approximately 70% of pedestrian activity could be accurately described based on distance from the downtown, avoidance of heavy car traffic, and the straightness and connectedness of the street. These factors were then combined to estimate pedestrian volumes for the remaining streets in the city.

Once citywide pedestrian volume estimates had been forecasted, these could be compared to annual vehicle-pedestrian collision rates to determine the pedestrian exposure of every street and intersection in Berkeley.

It was found that many of the intersections which experienced the most number of collisions also carried a very high proportion of the city's pedestrian traffic. Conversely, several lower volume intersections experienced many times more collisions than they should. This analysis revealed a new, more accurate picture of pedestrian safety in the City of Berkeley which can now be used to help prioritize and improve upon these dangerous intersections.

This finding should also help guide the City of Berkeley's pedestrian and traffic planning policies, such that extra attention is given to low volume pedestrian intersections that experience high volumes of vehicular traffic. This combination may (although not always) increase the risk of death and injury to pedestrians and drivers alike if proper engineering solutions are not provided for.

A general note on risk versus collision

It has been debated amongst traffic engineers and pedestrian planners that providing additional facilities to increase the walking rates of pedestrians in busy urban environments will necessarily result in increased collisions, injuries, and even deaths.

This has been used as evidence by some that increased provision of pedestrian priority facilities should not be pursued.

This report builds upon a growing body of research that provides evidence counter to this claim. While increased walking rates can result in an increased total number of collisions (also called "absolute collisions") the rate of this increase is much smaller when compared to the rate of decreasing risk per pedestrian when more people are walking in the streets.

Indeed, the more pedestrians are on the street, the safer the street becomes – with sharply increasing benefit. The number of total collisions does rise, but only slowly and in a way which gradually plateaus at a certain point.

This suggests that by addressing the areas identified in this report will serve to increase the amount of walking in the City of Berkeley and by doing so, create a safer, healthier, more active public realm.