City of Richmond Pedestrian Plan

February 2011

CITY OF Richmond CALIFORNIA

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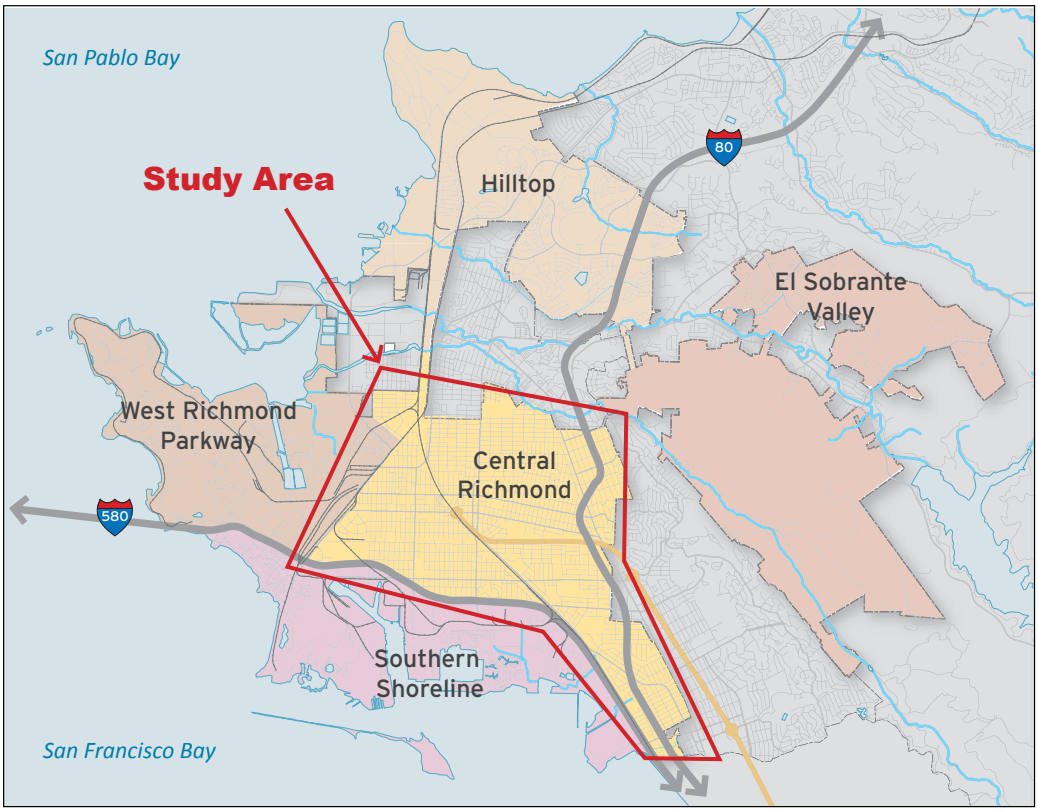


The map shows planning areas in Richmond as defined in the City's forthcoming new General Plan. Central Richmond, comprised of the Downtown, Civic Center, transit center and a number of historic mixed income and low income neighborhoods, is the focus of the plan.

Overview

This document describes the process and outcome of the pedestrian planning effort conducted in Richmond, CA during 2010 and early 2011. The resulting plan aims to improve the safety, convenience and appeal of walking throughout the city.

The California Department of Transportation provided an Environmental Justice: Context-Sensitive Design Planning Grant to the City of Richmond, in partnership with the Local Government Commission (LGC), to fund the process and develop the plan. LGC is a Sacramento-based nonprofit organization that works with local leaders and agencies to build livable communities. LGC assembled a multi-disciplinary consultant team to provide transportation and urban design expertise.

Caltrans Environmental Justice Grants stress the importance of involving low income and minority communities in planning to improve mobility, access and safety, while promoting economic opportunity, equity, environmental protection and affordable housing. An extensive community-based process consisting of a series of meetings and neighborhood workshops was conducted in Central Richmond, the location of the City's most disadvantaged neighborhoods, to study conditions and identify improvements that form the basis of the plan. Because conditions found in this area of Richmond are also common in other neighborhoods, most of the solutions can be applied citywide.

Photo Source: Richmond Public Library

Photo Source: Richmond Public Library

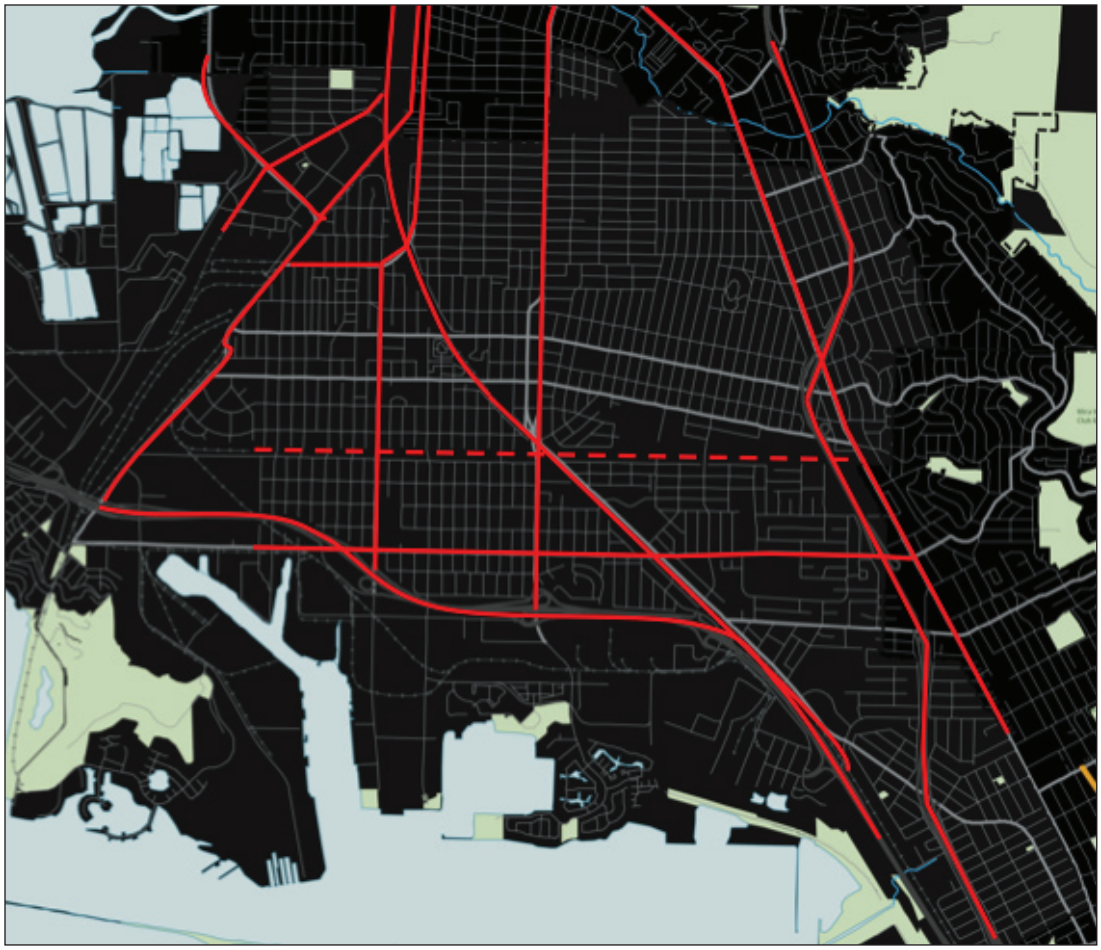
Top to Bottom: *Macdonald Avenue was a thriving main street during the 1940s. Middle: wartime workforce public housing. Above: Macdonald Avenue with recently installed pedestrian streetscape improvements.*

Background and Existing Conditions

Richmond is a city of approximately 104,000 residents in western Contra Costa County, located on a peninsula 16 miles northeast of San Francisco between San Francisco and San Pablo Bay. It is both a residential inner ring suburb and the site of heavy industry, with a commercial port, large refinery, railroad yards, and multiple manufacturing, assembly and warehousing businesses. The city has been transitioning to a more service and commercial-oriented economy since the 1970s, with a growing number of high technology and light industrial companies.

Richmond incorporated in 1905 as town sites emerged around the railroad and oil industries. Point Richmond was the western terminus of the Santa Fe Railroad and the original commercial hub of the city. The present downtown emerged northeast of Point Richmond on Macdonald Avenue as the city grew steadily in the decades that followed. Dramatic growth occurred in the 1940s when major shipyards and other wartime production facilities were quickly established on Richmond's southern waterfront. The influx of workers raised the population overnight from 24,000 to 100,000 people. Planned neighborhoods with dormitories, apartments and small lot houses were built on a walkable scale with access to the Shipyard Railway and contributed to the historic pattern of Richmond's central core neighborhoods.

Industry and population declined in the immediate postwar years. In time, some new industries located in the vacated shipyards. The City annexed lands to the northeast and northwest in the 1950s. Redevelopment activity in the 1970s converted industrial shoreline properties into the Marina Bay waterfront community. Development of the Hilltop Mall Shopping Center in the northern corner of the City along the I-80 Freeway brought a new commercial center to the region but accelerated downtown disinvestment as retailers relocated to Hilltop or closed business operations in Richmond. Major infrastructure projects in recent decades, including construction of the I-580 freeway and the Richmond Parkway, have accommodated higher volumes of traffic and brought new development opportunities, while shifting traffic and economic activity away from older corridors such as Cutting Boulevard.

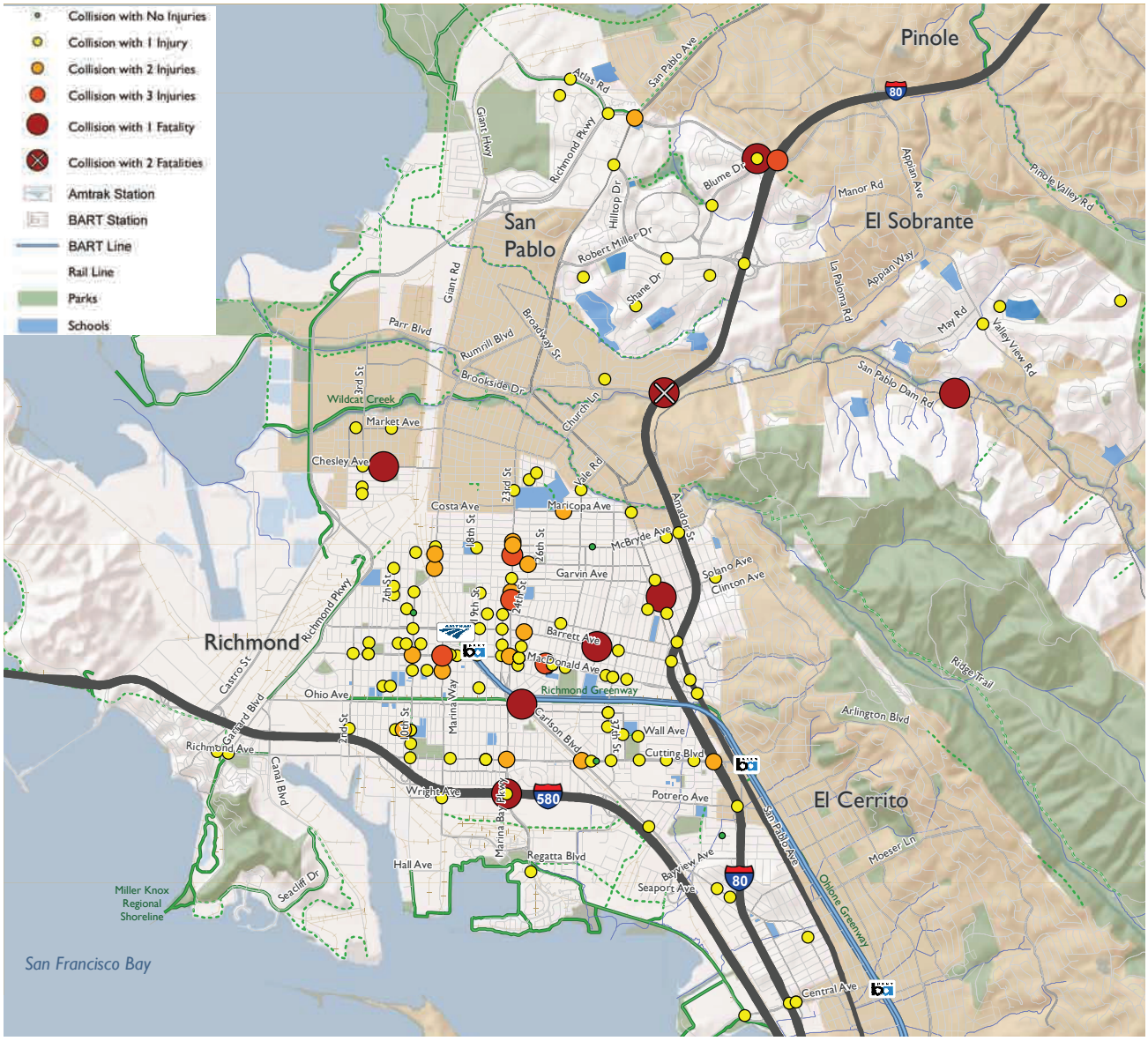


The x-ray image above shows Richmond's connected street network, enabling numerous routes between destinations. Red lines highlight some of the discontinuities and barriers associated with railroad tracks, freeways, wide arterials, and dead-end streets.

Connectivity and Barriers. Today, a grid-based network of streets remains in the central core area of the City providing an urban pattern conducive to walking and bicycling with multiple short, direct routes within and between neighborhoods. The surrounding freeway-expressway system provides bypass routes for motor traffic, reducing demand on the older arterial network. But wide arterials originally designed to serve heavy industry and other uses remain. These roadways, along with freeways, railroad tracks and street closures, create physical barriers between neighborhoods and challenges for walking and bicycling.

Pedestrian Safety. Pedestrians in Richmond face significant safety challenges. Participants in the pedestrian planning process identified hazards associated with high speed arterials and wide, complex intersections. Speeding and reckless driving was reported on local streets. Traffic collision data show the city has experienced a higher rate of pedestrian and bicycle injuries than other cities of comparable size. Richmond's Historic Triangle

Pedestrian Collisions: 2004 - 2008



neighborhood in particular has been subject to high rates of accidents involving pedestrians. Based on the California Office of Traffic Safety (OTS) statistics in 2008, the City ranked 37th out of 52 California cities in the same population group for the number of pedestrian collisions (with 1st position being the worst ranking). From 2003 to 2008, 175 pedestrian collisions occurred in the City, nine of which resulted in pedestrian fatalities.

Security and Infrastructure. Participants in the pedestrian planning process noted that personal security on Richmond's streets remains a primary concern for residents. Many sidewalks are broken, missing, too narrow or obstructed and lack curb ramps for young children, the elderly and people with personal mobility assistance devices. Many corridors lack landscaping and adequate lighting and are lined with stretches of poorly maintained or vacant properties and blighted buildings.

Examples of Existing Conditions

Above, Top to Bottom: *A Median and signal block the crosswalk. Railroad tracks and street closure impede street connectivity. Deteriorated infrastructure and fence create poor walkway.*

Right, Top to Bottom: *Tire marks indicate reckless driving in a residential neighborhood. Youth follow a makeshift trail next to the railroad tracks. Railroad tracks and inadequate sidewalks create difficult and hazardous crossing conditions.*

Walking to Work

Knowing how many people walk, and for what purposes, can help the City develop effective projects and programs to better serve existing walkers and encourage more people to walk. A common term used in describing types of travel demand is "mode split." Mode split refers to the form of transportation a person chooses to take, such as walking, bicycling, public transit, or driving. It is often used in evaluating commuter alternatives such as walking, where the objective is to increase the percentage of people selecting an alternative means of transportation to the single-occupant (or drive-alone) automobile. The table below presents U.S. Census data for the journey-to-work mode split for Richmond, compared to the United States, California, and Contra Costa County. While driving alone is the predominant means of commuting in Richmond, it constitutes a much lower share compared to national, state, and county levels. Richmond commuters are more likely to take transit and carpool, though the percentage of those who walk or bike to work is about the same when compared to the rest of the country, state and county.

EXISTING JOURNEY TO WORK

Mode	United States	California	Contra Costa County	City of Richmond
Drive Alone	76%	72%	70%	59%
Carpool	12%	15%	14%	20%
Transit	5%	5%	9%	15%
Bike	<1%	<1%	<1%	<1%
Walk	**3%**	**3%**	**2%**	**2%**
Other	4%	5%	5%	4%
Total	100%	100%	100%	100%

Source: US Census 2000, American Community Survey 2006-2008

Walking to work is not always an accurate indicator of overall pedestrian activity, since commute trips only represent a portion of all trips taken by residents. Residents also take walking trips when traveling between their home and transit, or between their vehicle and transit. Additionally, the journey-to-work data does not represent the trips Richmond residents take to go shopping, to school, or to social activities. Journey-to-work data should not be misinterpreted for several reasons:

- Journey-to-work data only represents commute trips, which tend to be longer than shopping, school, recreation, and other trips, and are therefore less compatible with walking.
- Journey-to-work data does not account for commuters with multiple modes of travel to and from work, such as commuters who walk to a bus stop before transferring to transit for the remainder of their journey to work.
- No separate accounting of shopping, school, or recreational trips is made in the Census; these trips make up more than half of the person trips on a typical weekday

and a significantly greater proportion on the weekend. These trips also tend to be short to medium in length and are therefore very well suited for walking.

- Journey-to-work data reports information for adult work trips, but does not request data on school trips, which are much more likely to be walking trips because school-aged individuals cannot drive until the latter half of their high school years.

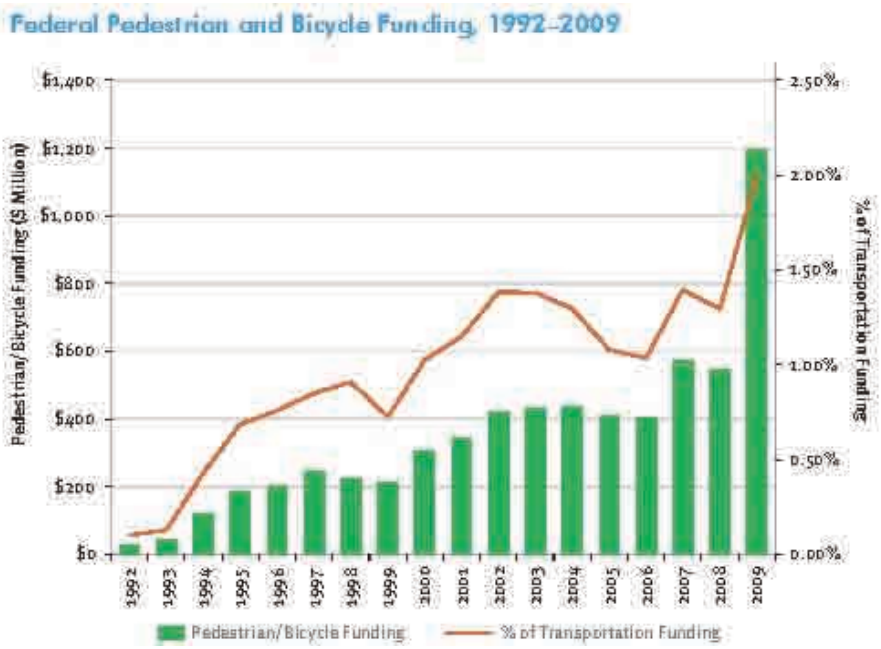
The table below summarizes estimates for commute and non-commute walking trips. According to the 2000 Census, 18,720 students were enrolled from Grade 1 to high school in Richmond. The MTC estimates that approximately five percent of students walk to school in the Bay Area; therefore, Richmond would have about 936 students walking to school. Approximately 7,578 of Richmond workers commute by transit. BART and AC Transit estimate that approximately two percent of transit riders throughout their service area walk to transit stops. Since Richmond has a higher than average number of people who take transit, it is safe to assume that more than 2 percent (or 151) residents walk to transit.

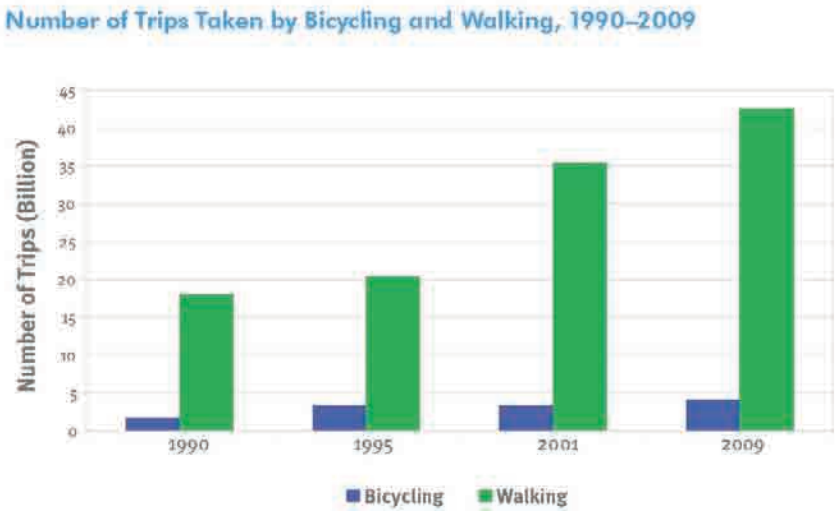
RICHMOND WALKERS BY TRIP GROUP

Trip Group	Daily Walk Commuters	Percentage of Walking Trips
Workers (Home-to-Work Trips)	960	47%
Students (Home-to-School Trips)	936	46%
Transit Riders (Home-to-Transit Trips)	151	7%
Total	2,047	100%

Source: Census 2000; Fehr & Peers, 2010

The Federal Highway Administration and U.S. Department of Transportation released the "National Bicycle & Walking Study: 15 Year Status Report" in May, 2010. The agencies found that between the initial report published in 1995, and household survey data collected in 2009, walk trips had increased in general, though not to the goal of doubling walking and biking trips that was set in 1995. Interestingly, though about 11 percent of respondents in the 2009 National Household Transportation Survey said that they made every day trips by foot, 63 percent said that they had walked for at least one trip in the past week. More generally, the 2010 National Bicycle & Walking Study: 15 Year Status Report found that between 1990 and 2008 funding for bike and pedestrian projects increased from less than 0.5 percent of federal transportation funding to about one percent. Over that same time, pedestrian and bicycle trips doubled.





Source: *National Bicycle & Walking Study: 15 Year Status Report* (2010)

With appropriate facilities in place, the walking and bicycle mode split could increase above its current rate. By promoting good facilities, Richmond could double the current walking and biking mode split (to 6% for journey to work trips and up to 8% for overall trips) by 2020. Assuming that 63 percent of Richmond residents walk for a trip at least once a week, we can estimate that nearly 18,000 daily trips [99,000 residents times 63% divided by 7 days times 2] will be made by foot on any given day in the City, not counting trips made by people walking to their cars or walking between destinations after they walk, transit or bike somewhere.

ESTIMATED TRAVEL MODE SHARES FOR RICHMOND EXISTING AND 2020

Mode	City of Richmond – Today	City of Richmond – 2020
Drive	79%	74%
Transit	15%	16%
Bike	<1%	2%
Walk	**2%**	4%
Other	4%	4%
Total	100%	100%

Source: Fehr & Peers, 2010

Recent Pedestrian Planning Activity in Richmond

The City has been focusing on projects to accommodate the existing needs of pedestrians and increase the safety, options and appeal of walking in everyday life. Recent examples are highlighted below.

Richmond General Plan Update. A comprehensive update of the General Plan is near completion, and the document will soon be adopted. The Circulation Element emphasizes a "place-based" transportation planning approach, under which "potential enhancements to the street system must [in general] consider all modes of travel and should be based on a particular street's intended function and design character." The element includes a section on "Walking and Bicycling Patterns and Facilities" and a map of existing and planned Class I, II and III bike routes. One of the key findings of the Circulation Element is that "[a]lthough a network of existing streets, sidewalks and trails provide linkages and connectivity between neighborhoods, improvements are needed to enhance safety and comfort for pedestrians and bicyclists." The five goals of the Circulation Element are to expand the multimodal circulation system, promote walkable neighborhoods and livable streets, create a safe and well-maintained circulation system, ensure an efficient movement of goods, and promote sustainable and green practices. Pedestrian-related policies include promoting an interconnected system of streets and safe and convenient walking and bicycling, developing a comprehensive network of multi-use trails, and allowing flexible level of service standards to create streets that balance all modes of travel, and ensuring development and adequate maintenance of transportation facilities, including streets, trails, sidewalks, bikeways and transit.

Pedestrian-related policies and actions are central components of other General Plan Elements. Goals, policies and actions in the Land Use and Urban Design Element aim to create land use patterns that place more residences and a diversity of uses within walking distance of one another, and that promote infill and transit-oriented development. The design of streets and other public spaces to support pedestrian access and appeal is also a core component. The Community Health and Wellness Element sets direction for improving the safety and convenience of walking and bicycling in Richmond.

Bicycle Master Plan. Richmond's first Bicycle Master Plan will soon be adopted. It provides a vision for the future of bicycling, shaped by the values of the community and supported by policies included in the General Plan and the Contra Costa Countywide Bicycle and Pedestrian Plan. The Plan focuses on the development of a complete on-street bicycle network, building safe and accessible connections to the Bay Trail and Richmond Greenway, and reducing barriers, such as freeway interchanges and railroad crossings. The network includes local routes on neighborhood streets, as well as important corridors such as Barrett Avenue. It also identifies opportunities for new, secure bicycle parking at key destinations, and provides guidance on programs that educate and encourage bicycling for recreation and everyday use.

Evolving Trail System. To date over 30 miles of the San Francisco Bay Trail has been built in Richmond on much of the shoreline and along inland roads such as the Richmond Parkway. This far exceeds Bay Trail completion in other cities, representing approximately 10% of the Bay Trail built in the entire nine-county Bay Area. The City has also developed the Richmond Greenway, a multiuse trail on a former railway corridor that runs parallel to Ohio Avenue. A continuous paved path has been constructed and, when completed, will connect the Ohlone Trail and the El Cerrito del Norte BART station east of Richmond to the Richmond Parkway to the west. The Hercules Bikeway connects the Ohlone Trail with Hercules, which runs along the neighborhoods of East Richmond and El Sobrante. Other segments of trail are under construction or complete along Wildcat Creek to connect the Bay Trail and Wildcat Marsh with Wildcat Canyon Regional Park.

Macdonald Avenue Revitalization. As Richmond's historic main street, Macdonald Avenue is the focus of a multi-phase and multi-faceted redevelopment effort to revive the entire corridor with streetscape improvements. Removal of a travel lane and enhanced sidewalks, crosswalks, street lighting, street furniture and landscaping have been implemented in the core commercial area adjacent and west of the Richmond Station. Sidewalk and crosswalk improvements, street tree planting and new and improved street lighting have also been implemented from San Pablo Avenue to 39th Street. Additional improvements are planned for the remaining portions of Macdonald Avenue.

Established Transit Oriented Development. The Metro Walk Transit Village was recently constructed, providing mixed housing and commercial development next to the Richmond BART and Amtrak Stations and AC Transit Hub, placing more residences and retail within walking distance of a major multimodal transit hub that connects users to local, regional and national destinations. This will add vitality to Downtown Richmond while reducing the need for cars.

Streetscape Improvement Projects on 23rd Street, Nevin Avenue and Barrett Avenue. All three corridors are in various stages of planning and design for pedestrian, bicycle and traffic improvements. Measures include sidewalk and intersection improvements, traffic calming, lighting and landscaping treatments, bicycle facilities, and reduction of travel lanes. In addition, the City has drafted a form-based zoning coded for the 23rd Street corridor that focuses on building types, frontage, site design and relationship to the sidewalk and street

to create an appealing environment for walking, social interaction, food and retail, and consistent neighborhood form and character.

ADA Transition Plan for Streets and Sidewalks. Richmond is currently working on a draft ADA Transition Plan that addresses areas of the public right-ofway, and has a staffed ADA Coordinator position. The Coordinator is in the process of collecting information about the amount of funds being expended for ADA compliance, such as curb cuts and ramps as part of the City's street pavement overlay program. A list of all curb ramps installed over the last several years in the City will be developed as part of this planning effort.

Traffic Safety Study. The City sent out a community-wide survey to identify top traffic safety problem area locations. Field visits are being conducted and data obtained by an engineering consultant. Recommendations for improvements will follow along with a traffic calming toolbox with a range of strategies to address the problems.

Outreach Activities

- Pedestrian Safety Assessment
- Advisory Group Meetings
- Focus Group Meetings
- Community Meetings
- Walking Audits
- Neighborhood Workshops
- Coordination with Bicycle Master Plan Outreach Efforts

Top to Bottom. *Focus meetings with City staff and regional Transportation Advisory Committee members. Community meeting participant votes on priorities.*

Study Process

City staff and the consultant team studied pedestrian conditions and explored potential improvements through an intensive public design process. This included a multi-day series of meetings, presentations and workshops that engaged residents, stakeholders and agencies in a variety of activities to elicit hopes and concerns, and draw out ideas about possible solutions.

In advance of the community meetings and workshops, a Pedestrian Safety Assessment (PSA) arranged through the U.C. Berkeley Institute of Transportation Studies Technology Transfer Program was conducted in January 2010. City staff, County Health staff, community representatives and members of the consultant team visited several sites representative of typical challenges in Richmond, observed conditions and brainstormed potential improvements.

In the weeks that followed, members of the consultant team convened several meetings of an advisory group that included City staff and community representatives, and met with the Richmond Bicycle and Pedestrian Advisory Committee (RBPAC) and Richmond Neighborhood Coordinating Council to learn more about key issues and how to engage residents. City staff met with several schools, school-based community organizations, and St. Mark's Catholic Church for further insight on how to engage residents, especially the Spanish-speaking community, in the upcoming public planning process.

The public design events took place May 12 – May 27, 2010. Nationally recognized pedestrian design expert Dan Burden of the Walkable and Livable Communities Institute facilitated the events.

Focus meetings were conducted on the first day with City department directors and staff, and with the West Contra Costa Transportation Advisory Committee to learn about plans, challenges and opportunities. In the evening, participants viewed a presentation highlighting principles of safe, walkable and prosperous communities, current

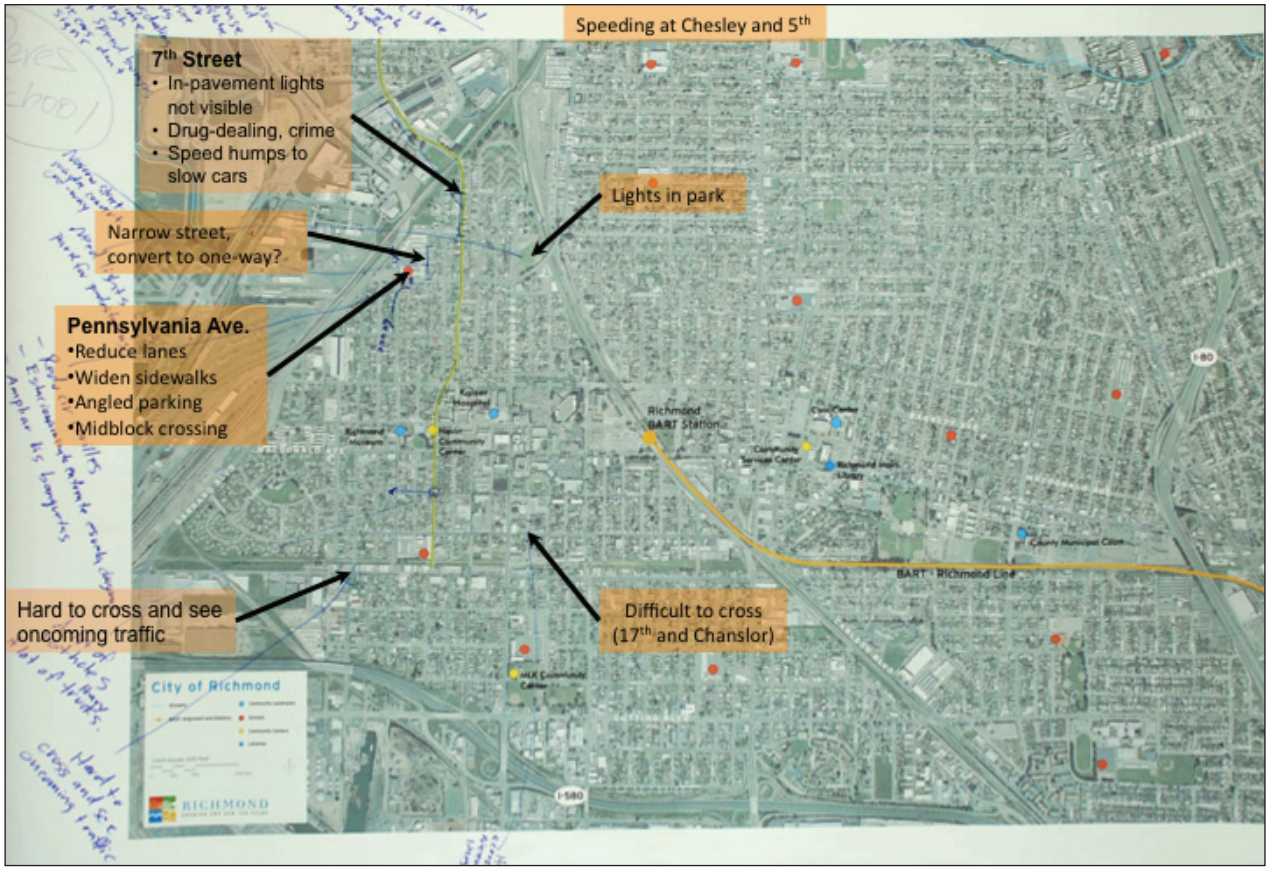
conditions in Richmond, and potential solutions used in other communities facing similar challenges. They then brainstormed priority issues for the pedestrian plan. Top priorities ordered according to vote included:

- Street trees – shading, beauty
- Lighting
- Yellow Brick Road/Youth Leadership Project
- Parking placement and design
- Traffic calming, especially primary streets
- Road diets/Lane reductions
- Civic and park space
- Roundabouts
- Green connections to greenway
- Connect residential to shopping
- Safety
- Street activities, cultural amenities
- Seating
- Crossing times for pedestrians

Saturday, May 15, members of the consultant team and many participants in the pedestrian planning effort took part in a bicycle planning community workshop to help develop Richmond's new Bicycle Master Plan. Participants rode in groups on designated routes throughout the city to observe bicycling conditions, identify problems and plan potential bikeways and facilities.

Community workshops were conducted the following week in four different locations from May 19 to May 22: Nevin Community Center, St. Mark's Church (conducted in Spanish), Peres Elementary School (conducted in Spanish) and Coronado Elementary School. At the start of each workshop, people walked the surrounding neighborhood with consultant team members. They observed traffic and pedestrian conditions in the field, discussed concerns, and considered ideas for resolving problems. Afterwards, participants viewed a presentation about strategies and tools to address input from the opening workshop, focus meetings and problems observed on the walk and by consultant field assessments. Participants then worked in groups at map stations, developed suggestions for improvements, and presented their ideas.

Top to Bottom. *"Walkability audit" at workshop in the Iron Triangle neighborhood. Participants put ideas down on table maps at neighborhood workshops.*



A table map from one of the neighborhood workshops with participant mark-ups and input.

Participants view preliminary concepts based on the neighborhood workshops.

Over the next several days the consultant team reviewed the input from the meetings, activities and field observations, and studied planning documents and resources. The team worked daily to translate the input into design concepts and recommendations. Thursday evening, May 27, team members presented the results for comments in a closing public meeting at the Richmond Community Center.

In the months following the workshops, the consultant team refined the concepts, completed drawings and prepared recommendations for near-term improvements and long-range, visionary changes. Recommendations were developed in concert with those being developed in the Bicycle Master Plan. The resulting plan is presented in the chapters that follow.

Overall Recommendations

Several consistent themes emerged from the public design process. Participants expressed challenges associated with the size of roadways, traffic speeds, lack of safe crossings, physical barriers to pedestrian and bicycle travel, and the importance of creating secure, active surroundings for walking, bicycling, gathering and interaction. In response, the following goals form the basis for the Pedestrian Plan recommendations and proposals.

Plan Goals

Increased Safety. Streets will be developed and retrofitted to accommodate all types of users. Designs and devices will produce speed moderation, visibility, awareness and communication for motorists and non-motorists alike.

Improved Security. Streets, trails and other public spaces will be designed and improved to create active places that are watched over, maintained and that project a sense of control and community ownership.

Improved Connectivity. A range of strategies and solutions will address physical barriers to walking, such as dead-end streets, railroad right of ways, wide roadways, and wide, complex intersections.

Increased Equity. Walking, the cheapest form of transportation, will be a safe, viable and convenient choice for those who cannot afford, are unable, or choose not to drive a car.

Improved Health. Walking and bicycling, the healthiest forms of transportation, will become desirable alternatives for trips to daily destinations.

Increased Sustainability. Walking and bicycling in the city will reduce the number of vehicle miles Richmond residents and visitors travel, and will reduce associated climate change, air and water quality impacts from vehicle emissions. Opportunities will be identified to convert excess paved rights of way to lower impact spaces with trees and landscaping.

Neighborhood and Downtown Revitalization. Improvements to the streets and pedestrian realm will beautify the public realm and set the stage for new investment in private property that can help fund improvements and attract development that supports walking, bicycling and the use of transit.

Opportunities for Walking and Bicycling in Richmond

The urban fabric of Richmond presents a distinct set of opportunities for furthering the Plan Goals. It also poses challenges with respect to being divided by freeways, railroads and large industrial sites, as well as high crime rates that affect people's sense of personal safety in public places. However, a host of opportunities suggest the potential for dramatic transformation as these obstacles are overcome.

Good walking and bicycling bones. The City was originally developed around pedestrian travel and the streetcar, and persists to this day as a transit rich, transit oriented community. Central Richmond has a uniform grid of small blocks and a good mix of land uses including diverse commercial streets well distributed throughout the City. The intermodal transit station in downtown Richmond provides convenient access to destinations throughout the Bay Area via AC Transit and BART, as well as destinations throughout the U.S. via Amtrak. The diversity and density of land uses, combined with excellent transit service provides the ideal environment for a thriving walkable and bicycle-friendly community.

Funding eligibility. From climate change initiatives to safe routes to school programs, there are multiple funding sources on both the regional and state level that are appropriate for Richmond. In addition, the City stands to benefit from the new Federal focus on healthy and sustainable communities. In order to capitalize on these and other future opportunities, the City will need to focus on increasing capacity for project development, management and delivery. A dedicated, full-time staff position to coordinate pedestrian and bicycle projects will be instrumental to the successful implementation of this plan and the forthcoming Bicycle Master Plan.

Under-used rights of way. Historically, an expansive arterial road network was developed to support Richmond's major employers at the shipyards. As the Bay Area developed, several major freeways including I-80, I-580 and the Richmond Parkway were built over the existing roadway network. As employment has shrunk considerably since that time, the City now has many overly wide and redundant connector streets such as Cutting Boulevard, Harbour Way, Marina Bay Parkway, Barrett Avenue, and Carlson Boulevard. This excessive right of way provides many immediate opportunities to enhance the pedestrian and bicycle realm by expanding sidewalks, installing bike lanes and creating inviting public spaces along community activity and connector streets.

Trails and Open space. It is important to note that Richmond has the longest and most scenic section of the Bay Trail and is blessed with more shoreline than any other city in the Bay Area. This makes the City a potential magnet for people seeking healthy lifestyles, particularly as the City's walking environment and bicycle network develop.

Design Principles: Complete Streets

A complete streets policy ensures that the entire right of way is planned, designed and operated to provide safe access for all users. It provides for pedestrians, bicyclists, transit, motorists, and travelers of all ages and abilities.

Complete streets policies and legislation have been adopted in recent years at the national, state and regional levels. The 2008 California Complete Streets Act (AB 1358) requires as of 2011 that any substantial revision of general plan circulation elements provide for "a balanced, multimodal transportation network that meets the needs of all users of the streets, roads, and highways for safe and convenient travel . . ." Users are defined as "bicyclists, children, persons with disabilities, motorists, movers of commercial goods, pedestrians, users of public transportation, and seniors."

The U.S. Department of Transportation Policy Statement on Bicycle and Pedestrian Transportation Accommodations Regulations and Recommendations supports "fully integrated active transportation networks," that include accommodations for bicyclists and pedestrians. The DOT encourages transportation agencies and local governments to adopt similar policies to ensure all users of streets, roads, and highways are taken into consideration when developing new or retrofitting existing transportation systems. The Policy Statement can be found at: http://www.fhwa.dot.gov/environment/bikeped/policy_accom.htm

The California Department of Transportation Deputy Directive 64-Revision #1: 'Complete Streets: Integrating the Transportation System' (DD-64-R1) was issued in 2008, directing the agency to support increased mobility and access for all users on Caltrans roads. Though the Directive is limited to Caltrans facilities, the goals provide important guidance for the design of city and county streets. Caltrans' Complete Streets Implementation Action Plan and other information on Caltrans' complete street policies can be found at: http://www.dot.ca.gov/hq/tpp/offices/ocp/complete_streets.html

The Metropolitan Transportation Commission (MTC), the transportation planning, coordinating and financing agency for the nine-county San Francisco Bay Area, adopted a complete streets/routine accommodation policy in 2006 that requires projects using regional funds to consider the accommodation of bicycle and pedestrian facilities, as described in Caltrans Deputy Directive 64" in the full project cost.

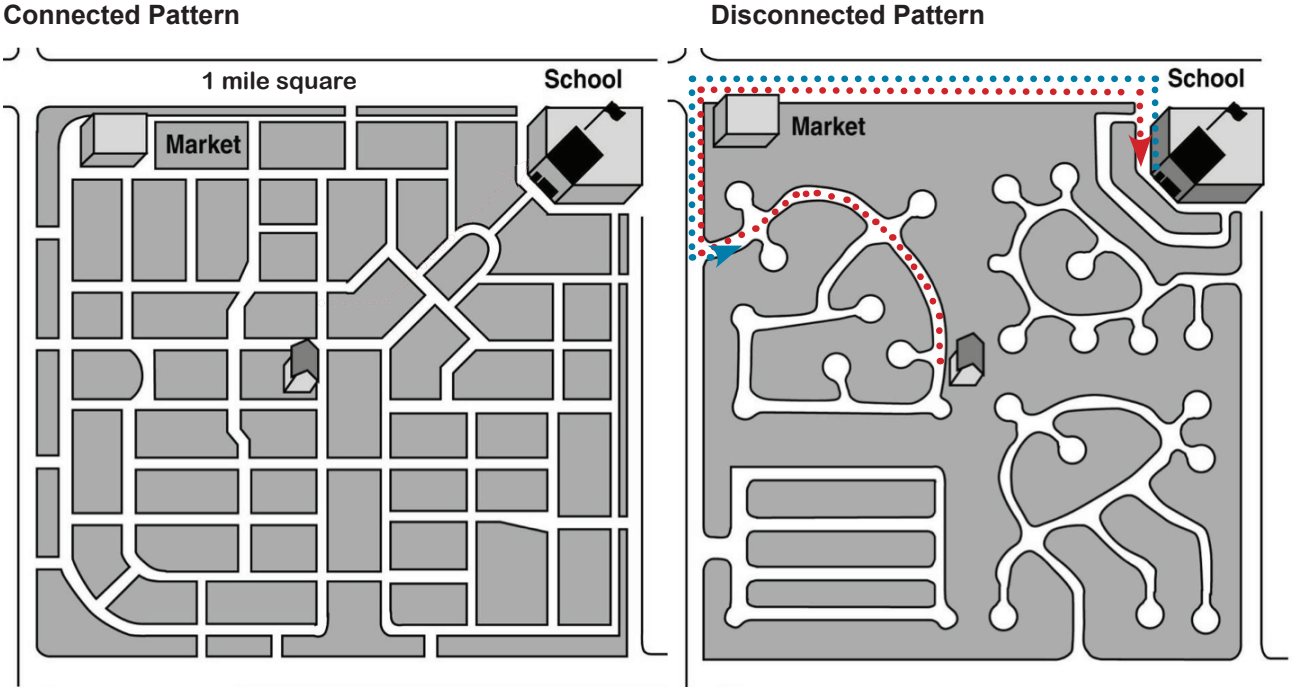
A complete streets policy is also called for in the Circulation, Land Use and Urban Design, and Health and Wellness Elements of Richmond's new General Plan that "promote[s] mixed-use urban streets that balance public transit, walking and bicycling with other modes of travel."

Complete streets educational information, model policy language and other resources are available at: <completestreets.org>. A list of jurisdictions with complete streets policies is included in the Appendix of this document.

The livability of Richmond will be enhanced by the adoption of complete street design standards that promote travel mode choice, provide a safe environment for all users, ensure pedestrian and bicycle accessibility, increase opportunity for social contact, establish a sense of place, and positively impact adjacent properties. Complete streets are designed as an integrated whole, considering the interrelationships among motorists, pedestrians and bicyclists, and adjoining land-use needs.

Fundamental principles for street design include:

- Strengthen Richmond's existing street network. An interconnected network of thoroughfares allows direct connections to local destinations, enables more walk and bicycle trips, reduces local traffic on regional streets, and increases regional street capacity for through traffic.
- Consider establishing maximum neighborhood and downtown block size limits based on the dimensions of Richmond's historic small urban block pattern.
- Establish right-sized roadways, including the number and width of travel lanes, that balance considerations of the available right-of-way, needs of pedestrians, bicyclists, traffic capacity and overall street function.
- Establish compact intersections with corner radii standards to encourage cautious motor vehicle turning movements and shorten pedestrian crossing distances.
- Provide curb extensions at intersections to reduce traffic speeds, increase pedestrian visibility and shorten crossing distances. Curb extensions can be provided on all streets with on-street parking.
- Consider the use of roundabouts and mini circles at intersections to reduce speed and conflicts between motor vehicles and between vehicles and pedestrians.
- Provide crosswalk treatments and tools at all intersections to heighten the prominence of pedestrian crossing locations and visibility to motorists.
- Consider mid-block crossings where intersections are spaced too far for easy access and in high pedestrian volume locations.
- Provide ADA-compliant curb ramps on each corner of all intersections.
- Maximize on-street parking to reduce the need for parking lots, provide a buffer between the street and sidewalk, and provide convenient parking in residential neighborhoods.
- Install bicycles lanes (and sharrows in constrained right-of-ways). In addition to providing space for bicyclists, these add buffering between motor travel lanes and sidewalks, and can have speed moderating effects that also benefit pedestrians.

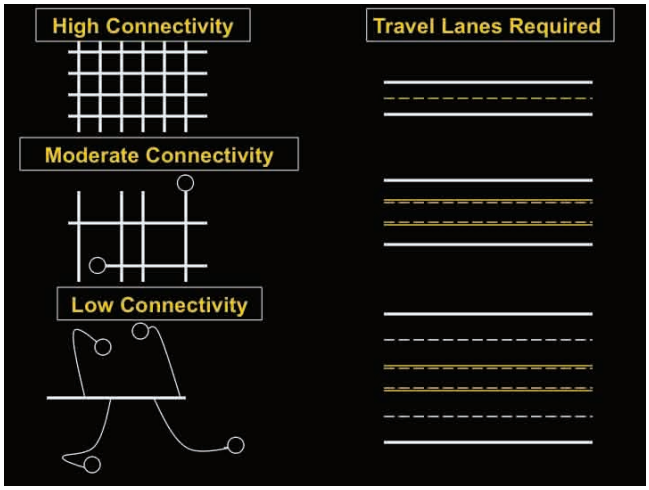


Connected Streets

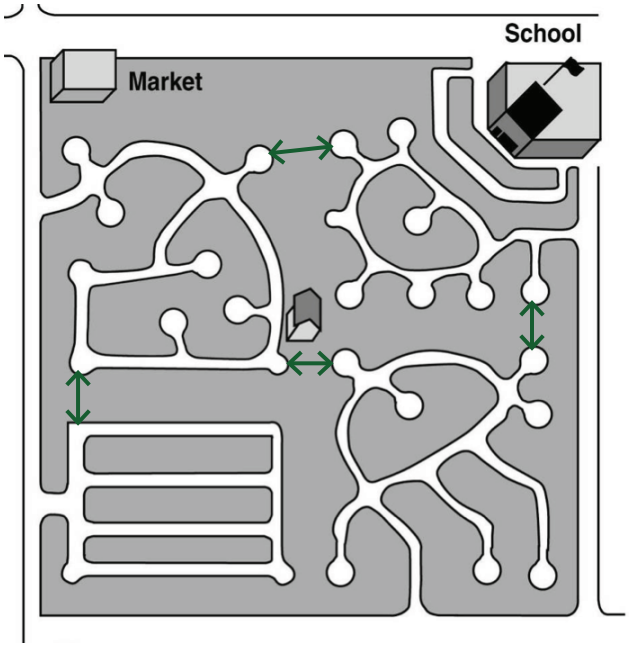
Street connectivity is, with land use, the most important indicator of whether people can walk conveniently and safely to destinations. Since World War II, American cities and neighborhoods have been designed for automobiles as the predominant mode of travel. Commercial activities have been concentrated in car-oriented shopping centers and corridors. Segregated land uses have isolated residential neighborhoods and dispersed routine destinations. Travel distances have benn lengthened, adding more cars and car trips to roadways and leading to systems of large arterials fed by smaller roadways with few or no connections to one another. As a result, fewer destinations can be reached on foot and walking has declined as a viable mode of transportation.

Since much of Richmond's street and block pattern was established prior to the 1950s, the city has a strong foundation to retain and advance a well-connected street network. The relatively short block lengths, or frequently spaced intersections, support walking by providing numerous direct and indirect routes throughout neighborhoods and between land uses. The connected street network can also help maintain capacity for vehicle traffic and reduce congestion by dispersing traffic flows and offering multiple route options.

Above Left and Right: *the diagram illustrates how in a traditional connected street system, it's possible to walk to school from the neighborhood. On the right, with disconnected streets, children would be typically driven to school. This means more traffic on the arterials. In addition, the trip home requires three left turns, which often creates the need for traffic signals or stop signs. This in turn causes more congestion and wider streets, as virtually all trips must be made on arterial streets. On the left, even if people drive, they are less reliant on the arterial system, as they have more access points. (Source: FHWA Designing for Pedestrian Safety Course).*



More connectivity means there is less of a need for wide streets. Conversely, low connectivity leads to wide streets as all trips rely on arterials. (Source: FHWA Designing for Pedestrian Safety Course).



The diagram illustrates how opening and connecting cul-de-sacs offers shorter distances and more route choices for walking. However, route choices are still limited for motorists, creating greater concentrations of motor traffic on arterial streets. (Source: FHWA Designing for Pedestrian Safety Course).

Block lengths in Central Richmond are generally short, ranging between 400 to 700 feet long by 200 to 250 feet wide (with the exception of a series of blocks in the North and East neighborhood between Roosevelt and Clinton Avenues that exceed 1,000 feet).

The City should consider adopting a policy and standards in the subdivision and zoning ordinances for maximum allowable block lengths and maximum street length requirements to connecting streets based on review and analysis of Richmond's historic grid pattern. As an example, the City of Sacramento's Street Standards require consideration of design standards to achieve "pedestrian-friendly streets" that include shortening street segments to 600 feet or less, increasing the number of local street connections to collector streets, and designing street patterns to avoid concentrating volumes on a small number of streets.

The objective is to reduce travel distance, shorten walking distances, and reduce over-reliance on a few roads to carry motorized traffic for all types of trips. This will reduce the need for wider, multilane roadways and increase mobility options for pedestrians. Wherever possible, street connections should be maintained. Where barriers and severances in the street network occur, strategies such as paths and grade-separated crossings should be developed for pedestrian access. Connecting severed streets re-establishes walking routes.

Right-sized Roadways

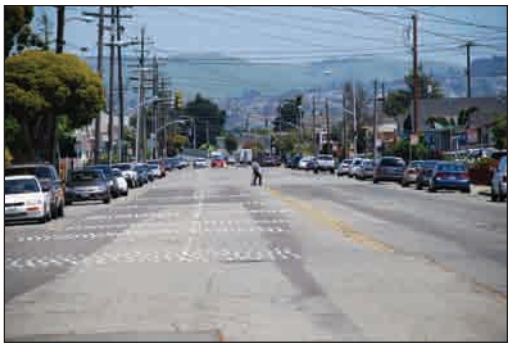
Roadway size is determined in large part by the width and number of vehicle travel lanes. Overly wide roads are hazardous for pedestrians to cross and often contribute to higher traffic speeds.

Narrower Lanes

Striped lane widths on many Richmond streets are 12 feet, the generally accepted standard for highways and freeways where traffic is free-flowing (no intersections and signals) and speeds are higher. But 12 feet is wider than necessary for Richmond's urban low speed

environment. Narrower lane widths should be used to manage or reduce speed and shorten crossing distances for pedestrians.

The American Association of State Highway and Transportation Efficiency (AASHTO) guidelines suggests that lane widths for "local" roads be between 9 and 12 feet wide, that "collectors" be between 10 and 12 feet wide, and that "arterials" be between 10 and 12 feet wide (between 11 and 12 feet in rural areas). A 2007 Transportation Research Board study found no general indication that lanes narrower than 12 feet on urban and suburban arterials increases crash frequencies, noting that lane width effects in the analyses were generally either not statistically significant or indicated that narrower lanes were associated with *lower* rather than higher crash frequencies.



This wide section of Pennsylvania Avenue far exceeds traffic demand.

A pedestrian contends with four lanes of traffic on South 23rd Street.

Road Diets

There are a number of four-lane arterials in Richmond that present significant challenges for pedestrians. Conversion of four-lane roads to two-lane roads with a center turn lane can provide numerous benefits for pedestrians and motorists alike. Reducing the number of lanes reduces traffic speeds and conflict points, and improves sight distance for turning and crossing traffic along the corridor. Pedestrian crossings are shortened and simplified, reducing exposure to traffic and motorist delay. Pedestrians need only cross one travel lane at a time. The center lane provides space for a median or crossing island where pedestrians can pause before crossing the second travel lane. Reduction of lanes often result in enough room to add bike lanes.

A four-lane road before a road diet.

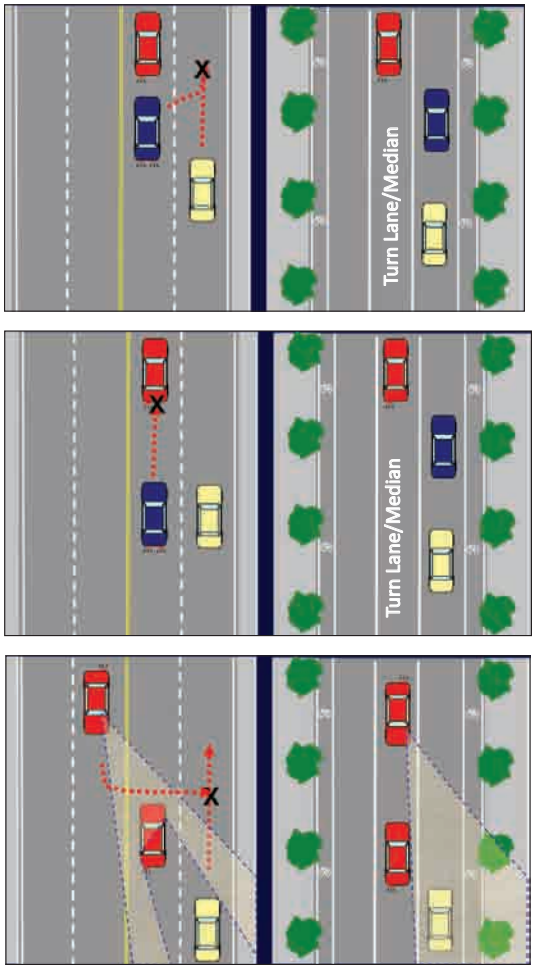
Known as "road diets," streets with average daily traffic volumes below 20,000 are prime candidates for these types of conversions. Traffic data suggest that the capacity of Richmond's arterials far exceeds current volumes. Traffic counts taken in 2007 indicate volumes below or well below 20,000 vehicles per day on 13th/ Pennsylvania from Sanford to Harbour Way, Harbour Way, 23rd Street, Marina Way Parkway, Barrett Avenue, Macdonald Avenue, Carlson Boulevard and Cutting Boulevard. Other candidates for road diets include McBryde Avenue east of San Pablo Avenue and 37th Street south of Barrett Avenue.

The same road is re-striped with two travel lanes, a center turn lane, and bicycle lanes.

While communities often worry that reducing the number of lanes will reduce vehicle capacity and increase congestion, experience with road diets across the U.S. shows that a 2-lane road can move as much traffic as a 4-lane road by utilizing a

Five lane street before a road diet.

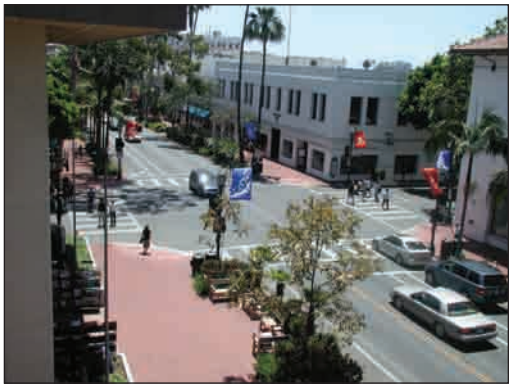
Two travels lanes are removed and replaced with bicycle lanes and angled parking on one side, increasing the number of on-street parking spaces.



The illustrations show how rear end, side-swipe and broadside crashes can be reduced by going from four lanes to three lanes.

center turn lane. The turning pocket shifts left turning vehicles out of the travel lane and allows the traffic to flow more smoothly, with fewer conflicts and better sight lines, though at lower speeds. Numerous conversions throughout the country have been implemented without losing capacity or experiencing unacceptable intersection levels of service.

A road diet creates space for a crossing island, where pedestrians can pause before crossing the next lane of traffic. Crossing islands encourage motorists to yield to pedestrians.



Top Left and Right: *The skewed intersection at Macdonald and Broadway makes it difficult to align crosswalks and stop bars; the photo to the right shows how the skewed angle of the intersection combined with wide corners produce a lengthy crossing and expose pedestrians to high speed right and left turning vehicles.* ***Middle Right:*** *A vehicle fails to yield for a pedestrian at a wide corner.* ***Above:*** *A compact, pedestrian-friendly intersection in Santa Barbara.*

Compact Intersections

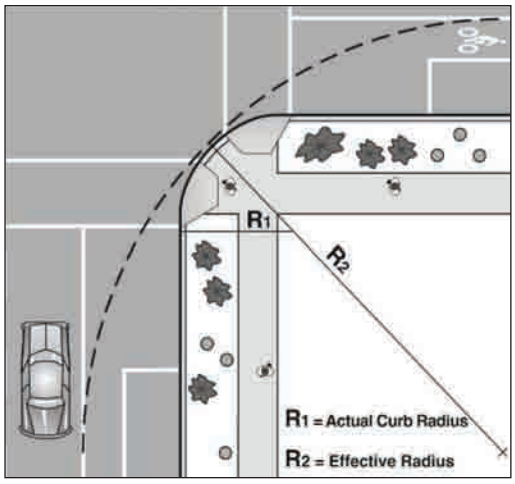
Most urban crashes occur at intersections and are associated with turning movements. Keeping intersections tight, simple and slow speed make them safer for motorists and non-motorists alike.

Many intersections in Richmond are wide, creating difficult crossing conditions for pedestrians and bicyclists. Some are skewed, which lengthens crossings and the ability for motorists to turn at high speeds. Skewed intersections force drivers turning right to look over their shoulders for approaching traffic and makes it difficult to detect pedestrians coming from the right and cyclists in the bicycle lane. Straightening skewed approaches better places pedestrians and cyclists into drivers' line-of-sight. Streets that intersect at right angles also decrease crosswalk lengths.

Curb Radii

Wide corner radii generally increase intersection size and lead to higher turning speeds. The larger the radius, the longer the pedestrian crossing distance and exposure to traffic, and the greater the chance the pedestrian will fall outside the line-of-sight of the driver. Richmond should adopt standards to minimize curb radii to the extent feasible to accommodate the specified design vehicle associated with specific locations. Smaller radii will help provide shorter crossings for pedestrians and require slower vehicle turning speeds, depending on the width of the street. Other likely benefits include:

- Better alignment of the crosswalk with the connecting sidewalks.



It is important to consider the effective radius appropriate for vehicles most likely to use an intersection. It will be larger than the actual built curb radius if the travel lane is offset from the curb with a parking and/or bike lane.

Above: *Curb extensions with furniture and greenery on Macdonald Avenue.*

- Easier installation of ADA-compliant directional curb ramps (instead of diagonal ramps).
- Improved visibility of pedestrians.
- Shorter pedestrian crossing clearance time, reducing motorist delay.

The choice of "design vehicle" determines how large a radius should be. The design vehicle is not the largest vehicle that may occasionally make a turn, but the vehicle that regularly makes a turn and whose movements should be accommodated. For example, a large moving van will occasionally have to make a turn into a local street. It can make it, though slowly and by taking the entire roadway. This may block traffic momentarily, but happens infrequently enough that it may be deemed acceptable. Other considerations that factor into the radius are the presence of bike lanes and on-street parking, which increase the effective radius of a curb.

The City of Oakland's Pedestrian Master Plan recommends a 10 foot turning radius for streets with curb-side parking and a 20 foot radius for streets without curb-side parking. Richmond should consider adopting a similar standard. The Oakland Plan notes that streets with significant volumes of truck traffic may require larger corner radii. Large radii may also be required on transit routes at corners with frequent bus turning movements. Buses can generally maneuver at intersections with 25 foot curb radii.

Curb Extensions

Curb extensions, sometime referred to as bulbouts, extend the curb line into the street, typically to the width of the parking lane, at intersections or midblock locations where cars would not be allowed to park. They shorten pedestrian crossing distances and calm traffic. They also reduce pedestrian clearance intervals for waiting motorists. Motorists are encouraged to travel more slowly at intersections with curb extensions because of physical and visual narrowing of the street. Extended curbs also slow turning movements and improve sight lines for pedestrians and motorists. Other benefits include:

- Space for street furniture and reduced sidewalk clutter.
- Improved driver yield rate to pedestrians (presence of a pedestrian in an extended curb area sends a clear signal of intention to cross).
- Enables traffic signs to be moved inward where they are

more visible.

- Can create inset areas for parking, or "parking pockets." The parking area can be paved with alternative material, maintaining a perceived narrow roadway even if no cars are parked.
- Space for bus shelters and efficient passenger loading and unloading.
- Space for greenery, stormwater drainage and filtration.

The City of Sacramento Street Standards include the general criteria that curb extensions should not extend further than 6 feet into the street adjacent to parallel parking, or 12 feet adjacent to diagonal parking. However, the sizing, design, cost and feasibility of bulbouts will depend upon parking lane widths, clearance for bicycle lanes, the need for drainage modifications, and large vehicle turning movements.

Mini-Circles and Roundabouts

Mini-circles and roundabouts can be used at intersections to reduce speed, reduce conflicts between motor vehicles and between vehicles and pedestrians, and for aesthetic enhancements.

Mini-circles are raised islands or large planters arranged in a circle, or other elements that cause vehicles to move slowly through intersections in a counter-clockwise direction. They are appropriate for use on local streets where speeds and volumes are low and are effective tools to moderate speeds and encourage motorists to yield to pedestrians and bicyclists crossing the street. Large vehicles such as fire trucks are allowed to make left turns in front of the circles. Berkeley has over 60 circles with stop controls and is considering removing controls and converting the intersections to all-way yields.

Roundabouts are an alternative to signalized or stop-controlled intersections. They use a raised circular island to allow large volumes of traffic to pass counterclockwise through an intersection at low speed without the use of stop signs or signals.

Though roundabouts are becoming more common in California, communities may raise concerns when they are first proposed. However, once built, residents often recognize that they are safer, quieter and more attractive than signalized intersections. Traffic engineers are recognizing that roundabouts are safer and can be

Top to Bottom: *Curb extension with diagonal parking on Macdonald Avenue. Extension with curb cut for stormwater drainage and infiltration. Mini-circles in a series slow traffic on a Seattle street. A landscaped traffic circle in Sacramento.*

Roundabout Essential Characteristics

more efficient than a typical stop-controlled or signalized intersection. The lower speeds and more predictable vehicular movement provide safety benefits for pedestrians and bicyclists:

- A typical 4-way intersection has 32 vehicle-to-vehicle conflicts and 24 vehicle to pedestrian conflicts. At a roundabout these conflicts are reduced to 8.
- Properly designed roundabouts will bring vehicle speeds down to 15-20 mph, speeds at which motorists are much more likely to yield to pedestrians and the frequency and severity of accidents are greatly diminished.
- Roundabouts are designed with a splitter island that provides a refuge for pedestrians as they cross the street and simplifies the crossing by letting them focus on vehicles traveling in only one direction.
- Bicyclists can take the travel lane since vehicles are circulating at a comfortable bicycle speed. Less confident bicyclists can be provided a ramp on the approach to the roundabout so they can exit and use the sidewalk to walk their bicycle to the crosswalk.

Roundabouts can be designed to accommodate the largest trucks with a mountable truck apron to allow space for wheels or equipment to pass over for turning movements.

Roundabouts can increase intersection capacity by up to 30 percent and reduce delay, reduce the need for storage lanes, and improve traffic flow at intersections with frequent left turns. They can be design with an additional lane on legs that might require greater capacity. Roundabouts save signal maintenance and energy costs and have a longer service life than signal equipment.

Crossings

Safe and frequent crossings are necessary for an effective pedestrian infrastructure. Crossings are a routine part of almost every walking trip. Richmond's grid network of frequently spaced intersections provides a strong foundation for an enhanced crossing system through a number of treatments.

California state law requires motorists to yield to pedestrians in both marked and unmarked crosswalks at intersections. Pedestrians can legally cross at midblock (except between adjacent intersections controlled by traffic signals or by police officers), but must yield to motor vehicles.

Controlled Intersections

Striped crosswalks are used to show pedestrians where to cross and to show drivers where to expect them. At signalized intersections, at a minimum, installation of marked crosswalks consisting of two standard parallel lines should be considered on all approaches with an advance limit line (stop bar) at least 4 feet before the crosswalk, unless marking a crosswalk at a specific location is determined by the City to be unsafe. Advance stop lines discourage vehicle encroachment into the crosswalk and failure to stop for pedestrians on right-turn-on-red. Intersections with increased pedestrian activity are candidates for high visibility crossing treatments (discussed below). At stop sign controlled intersections, installation of dual parallel lines should also be considered for all approaches.

Uncontrolled Intersections

Crosswalks at all uncontrolled intersections, midblock locations, and areas with high pedestrian and bicyclist volumes such as schools, parks, community centers, transit centers and commercial districts, should be high visibility crossings. At a minimum, this includes a pavement striping pattern with perpendicular markings. Richmond has used a "zebra" pattern at certain locations which is more visible to motorists than the standard two parallel lines. The City should consider adopting the "triple four" pattern used by the City of Sacramento or similar high visibility bars marked with thermoplastic rather than regular paint, to ensure that it has a high degree of reflectivity and will perform well over time.

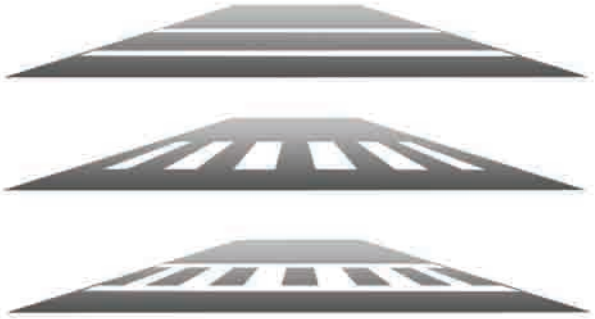
Marked crosswalks are one tool to get pedestrians safely across the street. When considering marked crosswalks at uncontrolled locations, the question should not simply be: "Should I provide a marked crosswalk or not?" Instead, the question should be: "Is this an appropriate tool for getting pedestrians across the street?" Regardless of whether marked crosswalks are used, there remains the fundamental obligation to get pedestrians safely across the street.

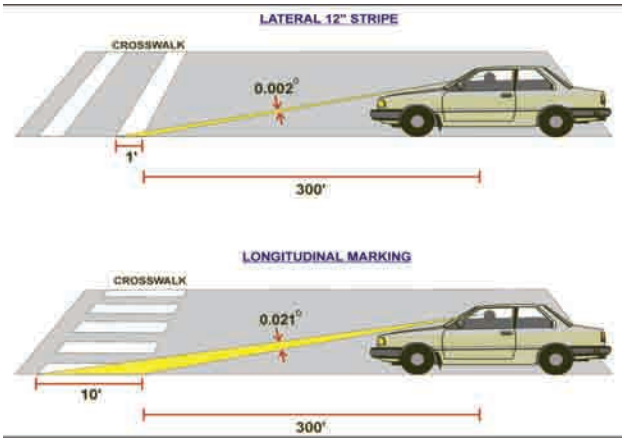
In most cases, marked crosswalks are best used in combination with other treatments (e.g., curb extensions, raised crossing islands, traffic signals, roadway narrowing, enhanced overhead lighting, traffic calming measures etc.). Think of marked crosswalks as one option in a progression of design treatments.

If one treatment does not adequately accomplish the task, then move on to the next one. Failure of one particular treatment is not a license to give up and do nothing. In all cases, the final design must accomplish the goal of getting pedestrians across the road safely.

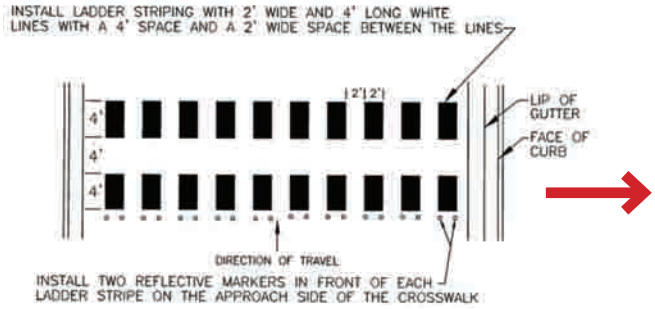
Source: Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations, Federal Highway Administration Zegeer, et al.

Crosswalk Visibility





Triple 4 High Visibility Pattern



Source: City of Sacramento Pedestrian Safety Guidelines

Above: *The City should continue to install new signs to alert motorists they are approaching locations where pedestrian crossing activity is unexpected or not readily apparent and update old signs per MUTCD standards. Pedestrian crossing signs at crosswalks require a downward arrow beneath the sign pointing to the marked crosswalk.*

Top Left and Right: *standard parallel and variations of perpendicular or longitudinal striping patterns. Longitudinal bars are more visible to approaching motorists.* ***Middle Left and Right:*** *Specifications for Sacramento's high visibility crosswalks. "Triple four" crosswalk in Sacramento. The gap between the bars provides a non-skid surface for pedestrians and a smooth surface for wheelchairs.* ***Above:*** *"Zebra" style pattern on Harbour Way in Richmond.*

High visibility markings should be used in conjunction with "SLOW PED XING" stenciled pavement markings and standard fluorescent yellow green pedestrian crossing signs in advance and adjacent to the crosswalk to alert drivers to the presence of pedestrians.

Advanced yield lines to set waiting vehicles back from crosswalks should be considered at midblock locations without stop controls. They are particularly important for multi-lane crossings (more than two lanes) to reduce the risk of a "multiple threat" crash when a vehicle stopped for a crossing pedestrian blocks the view of a vehicle approaching in the next lane. The federal Manual of Uniform Traffic Control Devices recommends a twenty to fifty-foot setback (1 to 2 car lengths) for the yield line.

A 2002 report published by the Federal Highway Administration on the safety effects of marked versus unmarked crosswalks at uncontrolled street crossings suggests marked crosswalks alone can be sufficient on low volume, low speed two-lane roads. But streets with higher volumes, more lanes and higher speeds require additional treatments for safe crossings.

A comprehensive policy for identifying candidate locations and treatments for marking crosswalks at uncontrolled crossings is included in the Appendix.

Lighting and Signals

Pedestrian crashes occur disproportionately at night. Proper illumination makes the pedestrian visible. Lighting at all crossing locations should be installed or retrofitted to direct illumination onto the crosswalk. The City of Oakland Pedestrian Master Plan provides lighting guidelines for crosswalk illumination (p. 64).

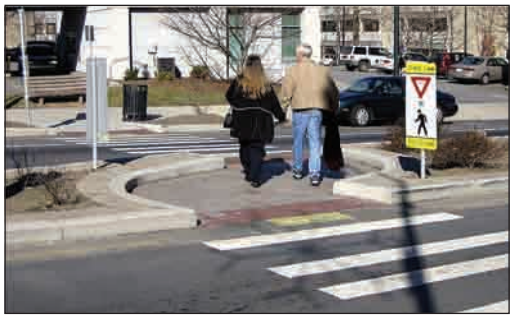
Early in 2010, a new Manual of Uniform Traffic Control Devices (MUTCD) was adopted at the federal level. The manual contains changes regarding signals at intersections that the City should consider. These include reduction of the walking speed used to set the walk phase of pedestrian signals from 4 feet per second to 3.5 feet per second and the installation of pedestrian signal countdown heads on all new and retrofit projects. The reduced walking speed provides pedestrians, including seniors and persons

Above: *Lighting is directed to illuminate crosswalks at night.*

Traffic control devices are governed by the procedures and policies set forth in the Manual of Uniform Traffic Control Devices (MUTCD) at the state and federal levels. Devices include traffic signals, traffic signs, and street markings. The MUTCD covers their design, placement, operation, and maintenance. The CA MUTCD emphasizes uniformity of traffic control devices to simplify the task of all users by aiding recognition and understanding, thereby reducing perception and reaction time. A uniform device conforms to regulations for design, use, and location.

Pedestrian countdown signal on Macdonald Avenue.

Car yields to pedestrian at crossing island in Sacramento.



Angled refuge area directs attention to oncoming traffic.

Staggered median crossing island.

with disabilities, with more time to complete crossings. The Berkeley Pedestrian Master Plan recommends considering walk phases set at 2.8 to 3.5 feet per second for all high pedestrian demand locations. If there are special land uses such as senior centers or schools within proximity of the intersection, Richmond should consider slower walking speeds.

Countdown signals let pedestrians know the amount of time remaining in the walk phase. These have been shown to improve pedestrian compliance with signals and reduce "dashes" into the crosswalk. Richmond has installed countdown signal heads on Cutting Boulevard and Macdonald Avenue at locations with high crossing demand and should continue to do so, especially at wide intersections with long crossing distances. Replacing traffic signal bulbs with LED bulbs is also recommended to increase visibility and improve efficiency. The California MUTCD will be updated in coming years and may reflect these changes.

Leading Pedestrian Intervals (LPI) provide pedestrians with a "head start" signal timing (usually 3 to 5 seconds) to establish their presence in the crosswalk before vehicles get a green light in the same direction. A 2000 study for the Insurance Institute for Highway Safety found that the LPI reduces conflicts between turning vehicles and pedestrians by enhancing the visibility of the pedestrian in the crosswalk. The LPI is especially effective at intersections with a high number of conflicts between left or right-turning vehicles and pedestrians. No LPIs are installed in Richmond. The City should consider installing LPIs in areas of high pedestrian activity, and consider a right-turn on red restriction as necessary per recent research findings.[7]

Crossing Islands

Raised medians and islands can reduce the likelihood of pedestrian accidents. They break long, complex crossings into two shortened, simplified legs. The pedestrian looks left, crosses to the median refuge, looks right, and crosses the second half of the roadway. This simplifies the task of finding a gap long enough to cross the entire roadway in one movement.

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7 Van Houten, R.; Retting, R.A.; Farmer, C.M.; and Van Houten, J. 2000. "Field Evaluation of a Leading Pedestrian Interval Signal Phase at Three Urban Intersections." Transportation Research Board Record 1734:86-92; Hubbard, S, Bullock, D and J. Thai, "Trial Implementation of a Leading Pedestrian Interval: Lessons Learned", ITE Journal, October 2008, pp. 32-41.

The photos above show recently built refuge islands in a continuous raised median in a four-lane roadway in West Sacramento. The photo on the top left shows a refuge island built though a median nose extended into a signalized intersection. The other three photos show a bicyclist and pedestrians using an angled median at a midblock location. Both types of median refuges use alternative paving treatments to clearly define the pedestrian travel way and bollards with lights to further distinguish and highlight the refuge areas. High visibility longitudinal crosswalk bars are used at the unsignalized midblock location.

As a general rule, refuge islands should extend through the crosswalk, with a curb cut for wheelchair accessibility. The cut through can be angled so that pedestrians face oncoming traffic. In order to improve wayfinding for pedestrians with visual impairments, the ends of the cuts must align with the crosswalk.

Crossing islands can also be designed with crosswalks staggered so that pedestrians cross half the street and walk toward traffic in the refuge to reach the second half of the crosswalk. This measure must be designed for accessibility by including curbs and truncated domes to direct sight-impaired pedestrians along the path of travel.

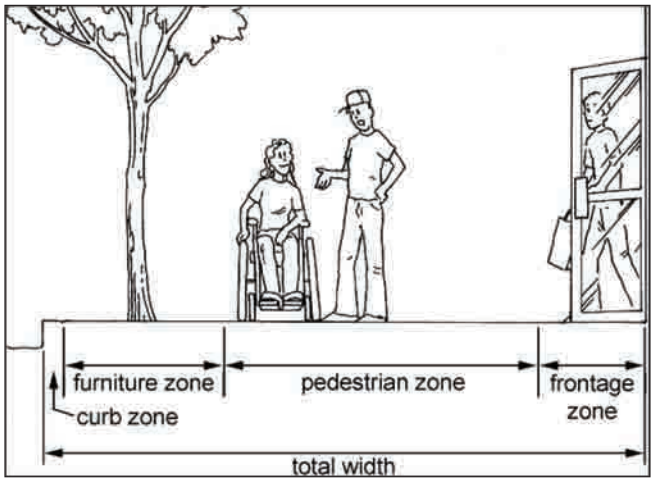
Islands should be at least 6 feet wide, the length of an average bicycle, and designed with contrasting materials and landscaping for increased visibility. They should be at least 12 feet long, or the width of the crosswalk (whichever is greater).

Sidewalk Zones

Sidewalks are needed on both sides of all urban streets in Richmond. The American Association of State Highway and Transportation Officials (AASHTO) policy on highway and street design states "sidewalks are integral parts of city streets." Research by the Federal Highway Administration shows that the presence of sidewalks on both sides of the street is related to significant reductions in "walking along roadway" pedestrian crashes compared to locations without sidewalks or walkways. Reductions of 50 to 90 percent of these types of pedestrian crashes have been found in the research.

Sidewalks line the roadways of central Richmond, serving as the principal facility of the city's pedestrian network. Sidewalk widths vary, but are generally 5 feet on residential streets, and 4 feet on some blocks. 5 feet is necessary for two people to walk comfortably side-by-side and allow ease of passage by people using canes, wheelchairs, or other mobility assistance devices. 6 feet is preferred. Sidewalk widths on existing commercial street segments tend between 8 and 15 feet. While 8 foot widths can accommodate more pedestrian activity, greater widths may be desirable in high pedestrian use areas, such as portions of Macdonald Avenue and 23rd Street.

The sidewalk should be considered a part of a pedestrian corridor that extends from the edge of the roadway to the edge of the public right-of-way (ROW), or from the curb line to the property line. The pedestrian corridor is separated into four distinct zones to accommodate a wide range of uses and prevent conflicts between the various functions of the sidewalk. The four zones include:



- Curb zone
- Furniture/Green Zone
- Pedestrian Through Zone
- Frontage Zone

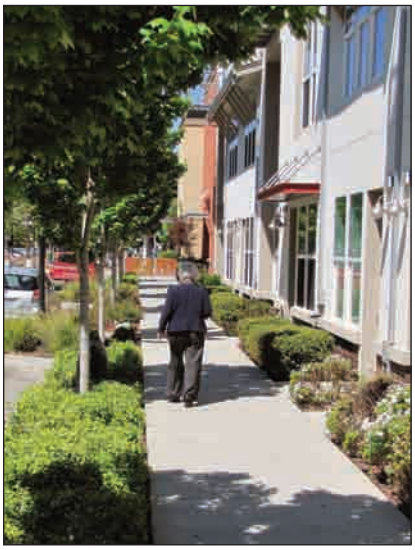
The curb zone defines the transition between the street and the sidewalk corridor. Curbs prevent water from overflowing on to sidewalks and properties and make it easier to sweep the streets. Flat-faced vertical curbs are best to define the edge of the vehicle boundary and to ensure parked cars don't encroach on the sidewalk.

Next to the curb is a landscape strip or furniture zone that buffers the pedestrian zone from the street. Trees, streetlights, benches, transit stops, bike racks, signs, utilities, and other objects are placed in this zone. The preferred minimum width for landscape strips is six feet to accommodate street trees, but may vary in sections with right-of-way constraints.

Next to the Furniture/Green Zone is the Pedestrian Zone, an accessible pathway clear of obstacles where people walk and talk. This area requires a smooth surface for safe and comfortable use by individuals of all ages and abilities. All sidewalks are sloped for drainage, but a slope that is too steep is challenging for people who use wheelchairs, walking aids, or who have difficulty walking but do not use aids. The cross-slope must not exceed 2 percent (1:50) as specified in ADA Accessibility Guidelines.

The Richmond Municipal Code addresses obstructions to the street and sidewalk and provides requirements for permissible encroachments. The City recently amended the Code to allow eating establishments to obtain permits for outdoor seating and services on public sidewalks, an important step to support economic development and streetside pedestrian activity. The City should continue to monitor and update standards to ensure that the pedestrian through zone is kept free and clear of obstructions.

The frontage zone is the space between the through zone and the adjacent property line. It separates sidewalks from buildings, fences, and walls. In most cases the frontage zone should be at least one foot. Sidewalk users generally avoid direct adjacency to structures and objects at the property line, such as doors, windows, walls and fences.



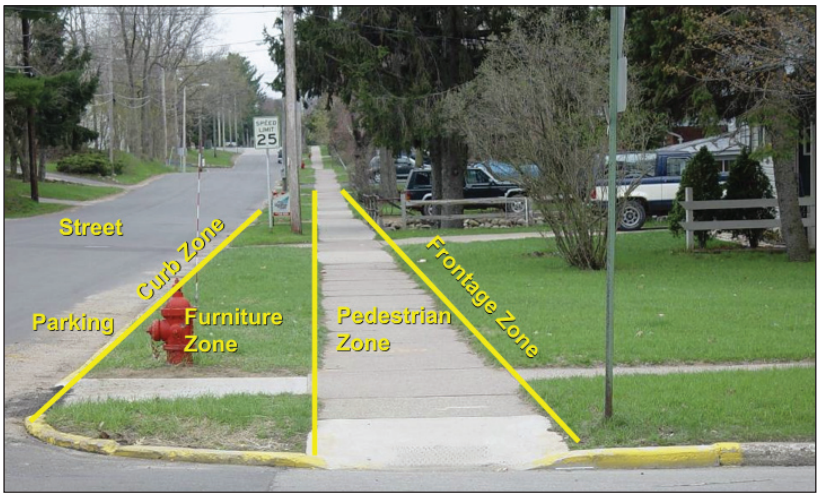
Landscaped buffer between the curb and sidewalk in Richmond mixed use transit village.

Comparison of Zone Widths

City	Street Type	Curb Zone	Furniture Zone	Through Zone	Frontage Zone	Corridor Width
Berkeley	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'
Oakland	Arterial	--	4'	8'	--	12'
	Collector	--	4'	6'	--	10'
	Local	--	4'	5'	--	9'
	Walkway	--	--	4'	--	--
	Trail	--	--	6'	--	--

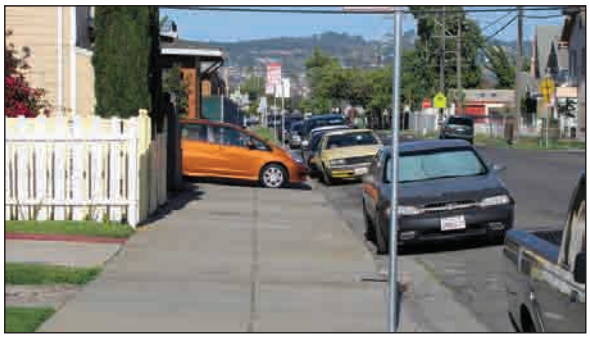
The table shows recommended zone widths in the Berkeley Pedestrian Master Plan and the Oakland Pedestrian Master Plan.

Pedestrian Corridor Zones: Residential



Pedestrian Corridor Zones: Commercial and Mixed Use

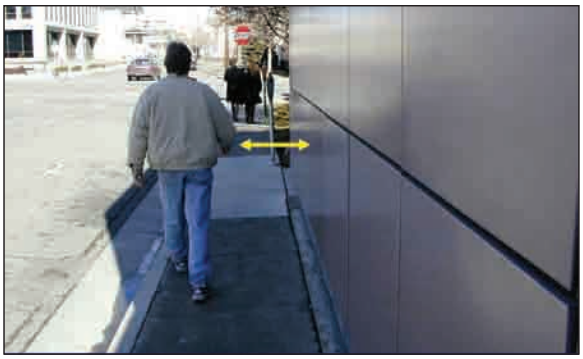
The upper and lower images show the arrangement of sidewalk corridor zones on residential and commercial and mixed use streets.



A car blocks the sidewalk on a residential street in Richmond.

Signs block the sidewalk on Cutting Boulevard.

The through zone is restricted by a trash container and landscaping on Macdonald Avenue.



People will shy away from a vertical space. More width is needed in the frontage zone in the photo above.

The type of fence material impacts pedestrian comfort: the sidewalk on the left is wider, but feels constrained because of a high chain link fence.

***Above:** This photo of a street in Point Richmond shows how an interesting façade can make a narrow sidewalk feel wider.*

***Left:** Outdoor seating areas such as this one in Point Richmond add space for activity. The City recently amended the Code to allow outdoor eating service on sidewalks adjacent to food establishments as long as encroachments do not obstruct the pedestrian travel lane.*

Driveways

Every driveway crossing is a potential conflict for pedestrians.. Unnecessarily wide driveways encourage higher turning speeds and expose drivers and pedestrians to increased risk. Driveway curb cuts that extend into the pedestrian through zone may pose a tripping hazard to people on foot, can compromise balance and stability for people in wheelchairs, and disrupt the pedestrian path with slopes and undulations.

Residential and commercial driveways in Richmond should be designed to enable the sidewalk to continue across the driveway at the same level and slope. As is characteristic of neighborhoods built before the 1960s, many sidewalks in Richmond's residential neighborhoods have, or once had, a planting strip between the curb and sidewalk. This makes them typically wide enough to place the driveway ramp in front of the sidewalk outside of the pedestrian travel way. The sidewalk area along Richmond's commercial arterials are also generally wide enough for placement of driveway ramps in the furniture zone and outside the pedestrian through zone. In addition to reducing obstructions to the pedestrian path, locating driveway aprons in front of the sidewalk will slow motorists and increase driver attention before they cross the sidewalk and interact with pedestrians.

The City should update its standards to ensure the ramp portion of driveways be located in the furniture/green zone. A maximum 2 percent cross slope through the sidewalk area is required by ADA Accessibility Guidelines, with a minimum passage space of 3 feet, which is expected to soon be increased to 4 feet.

Over time the City should work with property owners to minimize driveway widths and frequencies through consolidation into shared entries and exits. Access management can be improved through the use of right-in, right-out (or single direction) driveways, which is especially effective on multiple lane roadways. In addition to reducing the number of unnecessary vehicle turning opportunities and conflicts that make roads inefficient, managing access to fewer points lengthens the pedestrian's comfort zone and minimizes the possibilities for vehicle-pedestrian conflicts.

Vehicles parked in driveways that partially or completely block sidewalks is a persistent problem in many Richmond neighborhoods. This forces pedestrians into the driveway ramp or street to maneuver around parked cars.

A wide driveway on Cutting Boulevard lengthens pedestrian exposure to potential conflicts.

Example of a narrower driveway where the sidewalk area is clearly delineated from the driveway ramp.

Where sidewalks are narrower it is sometimes possible to wrap the sidewalk around the driveway apron.

Larger driveway openings can be divided into right turn in and right turn out sections to reduce conflicts between turning vehicles and between vehicles and pedestrians. Crossing treatments can be added to send a clear message to drivers that they are crossing a sidewalk.

Cars block sidewalk in Richmond.

Example of a notice placed on cars blocking sidewalks in Sacramento.

Directional curb ramps with truncated dome panels at the bottom of the ramp aid detection of transition into the street.

Single diagonal curb ramp.

California Vehicle Code sections 22500 (e) and (f) prohibit parking that blocks a portion or all of the sidewalk and may be subject to citation. Given the scope and persistence of the problem, this plan identifies the following actions:

1. Consider a range of traffic calming solutions that maximizes parking on the street and increases perceptions of safety and security. This will help provide additional alternate spaces for residents and guests to park vehicles. On-street parking is discussed in the next section.

2. Work with a community group, neighborhood action committee and/or neighborhood council to carry out a community-driven public information and notification effort to eliminate vehicle blockage of sidewalks. This could be initiated in a focused area (e.g., 3 - 5 blocks) that can serve as a model for other neighborhoods and the City. WALKSacramento, a nonprofit community organization that works to improve the walking environment in the Sacramento metropolitan region, developed a "warning" that neighbors could place on cars that was politely worded.

3. Consider striping parking lanes or "T" markings in pilot locations to reduce concerns about potential side swiping and increase comfort with parking on the street. As an example, on 19th Avenue in San Francisco, the Department of Parking and Traffic placed flyers on illegally parked vehicles with a warning that they were to park in the street between a new white line painted by Caltrans and the curb, or risk being ticketed and towed. The combination of markings and citations has contributed to less sidewalk blockage from cars.

Curb Ramps

State law and the Americans with Disability Act (ADA) Accessibility Guidelines require all streets with sidewalks and curbs to have curb ramps at intersections. Perpendicular corner curb ramps, a separate ramp installed in each direction, are preferable where feasible to single, diagonal corner ramps because they direct users into the crosswalk and maintain a straight path between sidewalks on both sides of the street. The ADA Public Rights of Way Access Guidelines, which will be adopted at the national level in the next few months, strongly support two directional ramps on each corner. The Standard Drawings for the City of Sacramento include best practices for directional curb ramp design (see

drawing T-77 at http://www.cityofsacramento.org/utilities/pubs/stdspecs/Transportation.pdf).

The City should include curb ramp installation at all street intersections as part of the street resurfacing, sidewalk improvement, utility, new construction, and alteration projects.

Pedestrian Scale Lighting

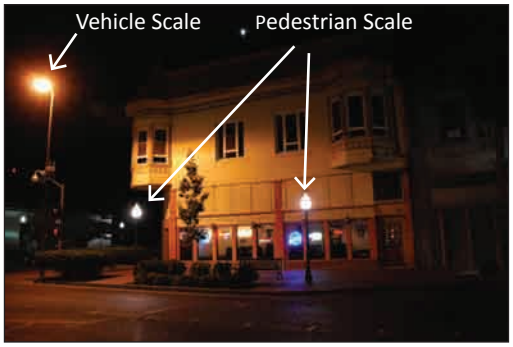
Motor-vehicle scale street lights focus light on travel lanes and intersections. Pedestrian-scale street lights direct light on to walkways. Lampposts are spaced more frequently at lower heights, providing a vertical buffer between the street and sidewalk. They help activate streets, paths and other public spaces by adding illumination at the pedestrian level. Safety, comfort and security are improved through increased visibility.

Pedestrian-scale street lights should be considered for installation in high pedestrian activity areas, especially in commercial districts where nighttime retail, restaurant and entertainment services are encouraged, in areas with a history of high crime rates, or around schools. Criteria for pedestrian lighting include:

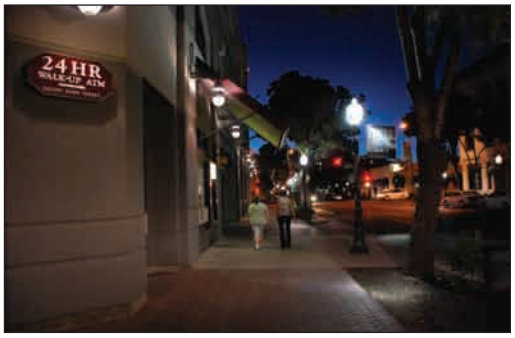
- Lampposts are a maximum 10 to 16 feet in height.
- Designs need to withstand vandalism.
- Designs and materials fit with neighborhood or district character.
- Light fixtures direct light where it is intended. Consider using partial or total cut-off fixtures (covers or hoods) to reduce glare, light trespass, and help preserve dark night sky.
- Choose appropriate lamp type for the location that balances illumination level, color rendering, energy efficiency, reliability and cost (see table on next page).

Proposed lighting guidelines in the Oakland Pedestrian Master Plan located lampposts at 50' intervals at a height of 14' on arterials, and 12' on collector and local streets. Illumination levels for pedestrian ways on the three types of streets are 0.9 foot candle, 0.6 foot candles and 0.2 foot candles, respectively. The Berkeley Pedestrian Master Plan recommends illumination of pedestrian ways between 0.5 to 1 foot candle.

Curb extension with broad curb ramp, framed by corner building, contributes to a walkable environment.



Pedestrian scale lighting compared to conventional streetlight.



Pedestrian scale lighting adds framing, comfort and security to the sidewalk.

Lamp Types: Pros and Cons

Lamp Type	Efficacy (lumens per watt)	Pros	Cons
Mercury Vapor	13-48	-Dimmable -Good initial color rendering; white/ blue light	-Inefficient, older technology -Use of hazardous material (mercury) -Medium life (~ 16,000 hours)
High Pressure Sodium	45-110	-Very energy efficient -Widely used, reliable	-Orange/yellow light -Aesthetic and safety concerns due to poor color rendering -Cannot restrike immediately
Low Pressure Sodium	80-180	-Most energy efficient option -Minimum glare -Able to restrike immediately	-Yellow light - Aesthetic and safety concerns due to poor color rendering -Expensive fixtures
Metal Halide	60-100	-Good color rendering; nice white light -More efficient than mercury vapor -Widely used	-Shorter life than HPS (up to 20,000 hours) -Less efficient than sodium lamps
Induction	61-76	-Long life (~ 100,000 hours) -Good color rendering; nice white light -Immediate ignition and restrike -No flickering	-High initial cost -Difficult to retrofit existing fixtures -Uses small amount of mercury -Not dimmable -Needs a high-frequency generator

Clockwise Starting From Left. *Hooded pedestrian lamps on Nevin Avenue in Richmond. Well-lit sidewalk in Merced, CA. Pedestrian lighting combined with low level bollards illuminate the sidewalk area in Mill Creek, WA.*

Street Trees

Trees planted in the furniture/green zone between the curb and sidewalk add a vertical buffer between moving vehicles and pedestrians. When located near the street edge, they provide visual interest and enclosure that heightens motorist recognition of speed and encourages caution. They also provide shade and cover for pedestrians, absorb air pollutants, capture rainfall and facilitate rainfall percolation into the ground, which reduces flooding and washing of contaminants into the bay. Studies have shown trees to have a positive impact on sales in business districts, crime reduction in low income neighborhoods, and residential property values.

Tree planted in traffic circle in Seattle.

Tree planted curb extension in Santa Cruz.

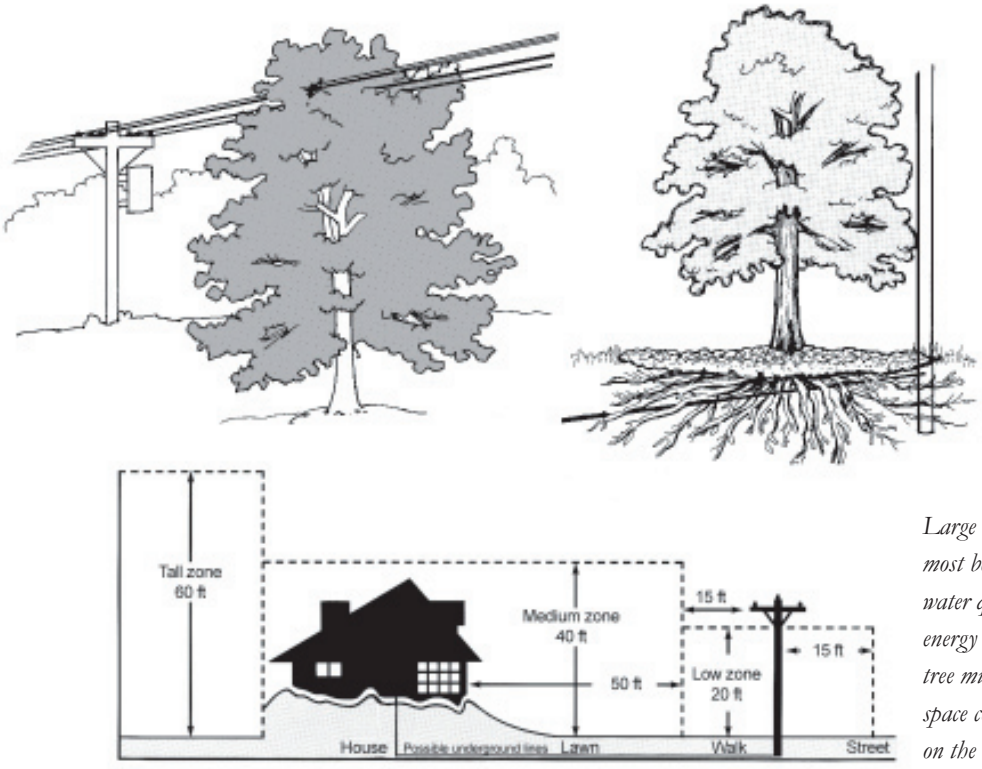
Most sidewalk corridors in Richmond are eight feet wide or more, with potential to accommodate properly sized, planted and maintained street trees. Many corridors are ten to twelve feet wide, with six-foot planting strips between the curb and sidewalk. Six feet is generally the minimum width required for a large canopied tree to minimize root conflict with the sidewalk and curb. Eight to ten feet is preferred for large trees. Trees can be located in planters, crushed granite in tree wells or grates in the furniture zone on sidewalks that do not include continuous planting strips.

Richmond's older arterials have under-used paved area that could be converted to wider landscaped space for roadside tree planting, and in some cases, offer room for development of medians that could accommodate trees. Road edges could be rebuilt with stormwater planters to receive, infiltrate and clean runoff from the roadway. As an example, a series of planters were recently installed on two block-long stretches of San Pablo Avenue in El Cerrito. Medians can also be designed to receive stormwater, but would require roadway regrading to direct flow toward the center of the street instead of the curb.

Trees can also be located in curb extensions and tree wells between on-street parking spaces where sidewalks are narrow on smaller residential streets to provide traffic calming and create well-canopied neighborhoods. Curb extensions can be designed with curb cuts to absorb stormwater runoff. They can be relatively inexpensive to build, but may require the removal of some on-street parking spaces.

Right. *Trees in recently constructed stormwater planters on San Pablo Avenue in El Cerrito. Source: San Francisco Estuary Partnership (photo by Lisa Owens Viani).*

Tree Planting in Constrained Locations



Large healthy trees produce the most benefits for air quality, water quality, shading and energy savings. But the right tree must be selected based on space constraints below ground, on the surface and above.

In order for street trees to be successful, appropriate species need to be matched with the available space. Smaller trees must be selected for location under overhead power lines. Trees must not be planted directly over underground utilities and should be set back twenty to thirty feet at intersections to avoid blocking sight lines. Shallow-rooting species should be avoided and trees should be located a minimum of three feet from sidewalks, curbs and paving. Matching tree species to the site's available soil volume will also help reduce the likelihood of sidewalk and curb conflict. The use of structural soils can facilitate tree health and reduce pavement uplifting. Structural compounds use coarse materials that can be compacted to bear heavier loads but still allow root penetration for healthy growth.

Richmond has actively pursued funding to identify planting opportunities throughout the city, set tree canopy goals, develop design standards and pursue maintenance districts to manage the urban forest. As part of this effort, the City should develop a street tree plan for appropriate tree types, spacing, tree well sizes, maintenance standards, tree preservation, and to prevent conflicts with utilities and street lights. The *Northern California Coast Community Tree Guide* published by the USDA Forest Service Pacific Southwest Research Station is a good resource for the selection, planting and maintenance of trees for both public and private spaces. The *San Mateo County Green Streets and Parking Lots Design Guidebook* is a useful resource that combines traffic calming and pedestrian-oriented goals with green infrastructure design strategies, techniques and standards.

Placing utilities underground reduces conflicts between trees and poles and overhead wires. Electrical wires and other utilities are run through conduits in streets, lanes and easements. Service wires to homes and businesses are also placed underground. This removes visual clutter and can make more space on sidewalks available for pedestrians, trees and other uses. As more utilities are undergrounded, safety and service reliability improve because of reduced exposure to damage or collapse from storms, wind and earthquakes.

Typical sources of funding for conversion of overhead utilities to underground include utility ratepayer funds regulated by the California Public Utilities Commission, property assessment districts, and developer fees. The City should consider development of a utility undergrounding program to identify and target funds, and explore the feasibility of conversion in targeted locations.

Bikeway Facilities

Planning and design for bicyclists and pedestrians in Richmond are mutually supportive. Both focus on connectivity and direct links between destinations and roadways that safely accommodate motorists and non-motorists alike.

The 2011 Richmond Bicycle Master Plan delineates a comprehensive bikeway network that includes Class I, II and III facilities as defined by Caltrans, all of which contribute to improvement of the pedestrian environment. Class I bikeways are separated paths for exclusive bicycle and pedestrian use, with motor vehicle cross-flow minimized. Class II bikeways are striped lanes on streets and highways designated for bicycles. Class III bikeways are routes designated by signs or pavement markings for shared use with pedestrians or motor vehicle traffic. Not all shared streets are designated as bikeways, and much bicycling occurs on streets that are not designated facilities. The designation is generally reserved for facilities which provide continuity to other bicycle facilities or for preferred routes through high demand corridors.

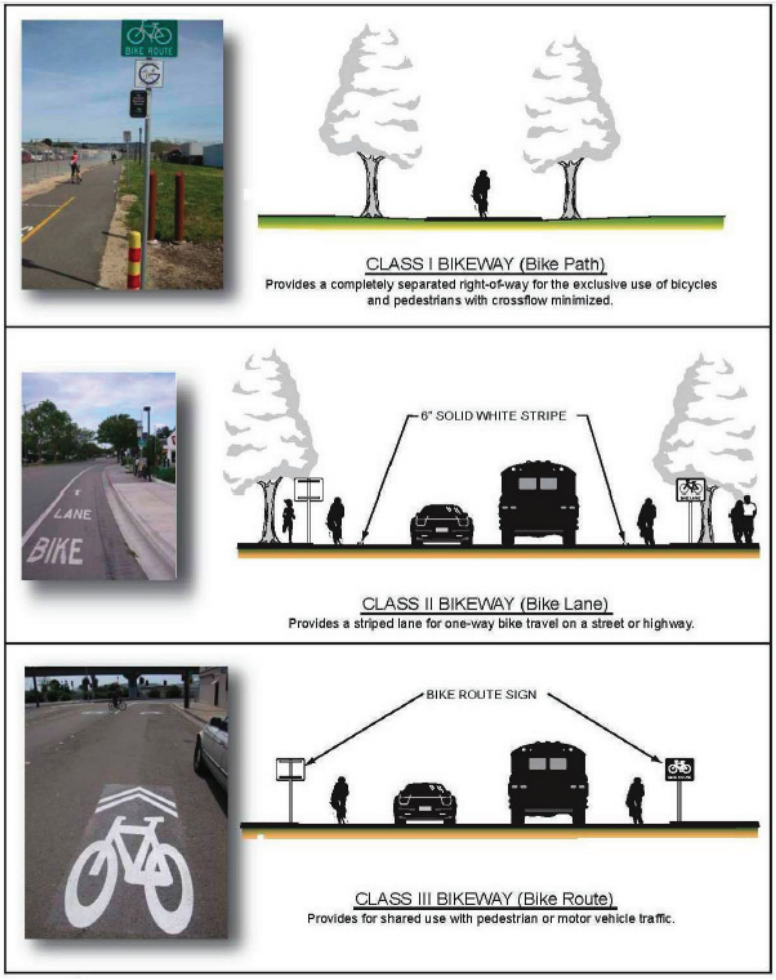
Shared use paths benefit pedestrians and bicyclists by providing opportunities for off-street connections to multiple destinations, recreation and exercise, with little or no exposure to conflict with motor traffic. Striped on-street bike lanes provide space for bicycling, but can also have a traffic calming

Tree-lined street in Santa Cruz, Ca.

Dense canopy on 36th Street in Richmond.

Recently planted trees in West Sacramento, Ca.

Planters with inlets to receive runoff in West Sacramento.



effect by adding definition and friction to the road edge, and by visually narrowing the roadway. In addition, the preferred width for bicycle lanes proposed in the Bicycle Master Plan is six feet, which provides a buffer space between traffic and the sidewalk.

The Bicycle Master Plan also suggests enhanced Class III routes known as Bike Boulevards. These are designated routes that are integral to a bikeway system, but may be too narrow for a bicycle lane or have low enough vehicle volumes that a bicycle lane is less necessary. Ideally, motor vehicle traffic is slowed to approximately the same speed as the bicycle speeds. The development of a bicycle boulevard may include the alteration of intersection controls and the installation of signs and stencils. Stop signs and traffic signals on the bicycle boulevard are limited, except where they aid bicyclists in crossing busy streets. Typically, these and other modifications to enhance bicycle safety and convenience will also calm traffic and improve pedestrian safety. The City of Berkeley has implemented a number of bicycle boulevards. More information can be found at: http://www.ci.berkeley.ca.us/ContentDisplay.aspx?id=6690

On-Street Parking

Parked cars on the street can have traffic calming effects by adding "friction" on the travel edges that promotes driver attention and awareness of speed. Parked cars provide a buffer between the street and sidewalk and convenient access to businesses and residences. Maximizing on-street parking is also a shared parking strategy that reduces the amount of land that needs to be developed and devoted to duplicative parking spaces, site by site, use by use, and the associated costs and aesthetic impacts of large parking lots.

Parallel parking is generally allowed throughout Central Richmond's residential neighborhoods, and along commercial and arterial streets. While a common width for marked parking stalls is 8 feet, the City should consider 7 foot widths, especially when

adjacent to bicycle lanes, to encourage motorists to park close to the curb and minimize conflict with bicyclists.

Parking should be restricted adjacent to crosswalks to maintain pedestrian visibility. The California MUTCD recommends that at signalized intersections, parking be restricted for a minimum of two car-stall lengths (40 feet to 48 feet) on the near side and one car length (20 feet to 24 feet) 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. As noted previously, curb extensions can be used to restrict and make illegal parking virtually impossible at intersections, while providing inset parking.

On-street angled parking yields more spaces than parallel parking but requires more road width. Many of Richmond's streets are wide and portions intended for slower speeds and that have lower traffic volumes present opportunities for angled parking. Angled parking provides the twin benefits of more spaces in areas with periods of higher demand and development intensity (e.g., schools, parks, community centers, and shopping locations) and reduced roadway widths to encourage slow speeds and ease pedestrian crossings. A recent example includes the reduction of lanes on Macdonald Avenue between 16th Street and Harbour Way from four to three lanes and the addition of angled parking on one side to facilitate a slower speed, pedestrian-friendly environment.

Bicycle lanes are generally not appropriate adjacent to front-in angled parking, unless sufficient room exists to enable vehicles to back out of the space without intruding on the bicycle lane. Marking the inside bike lane will increase motorist awareness of where the parking stall ends and when encroachment into the bike lane occurs.

Back-in angled parking has emerged as an alternative to head-in angled parking. There benefits of back-in angled parking include:

- Motorists face instead of back out toward moving traffic as they depart from spaces.
- Since motorist are facing traffic when pulling out, visibility and sight distance between motorists and between motorists and bicyclists are improved compared to parallel parking or front-in angled parking.

Top and Above: *7-foot marked parking encourages the car in the bottom photo to park close to the curb.*

Recently marked front-in diagonal parking on Macdonald Avenue.

Back-in angled parking in Salt Lake City, with vehicles facing the bike lane.

- With back-in angled parking, children and other occupants unload toward the sidewalk instead of the street. Trunks, rear doors, hatches and truck beds are accessible away from moving traffic.
- The back-in maneuver is simpler than a parallel parking maneuver, requiring two instead of three movements. Signs are installed to show motorists the steps required.

A number of places have installed this type of parking, including, but not limited to, Washington D.C., Seattle (over 200 blocks for more than 30 years), Salt Lake City, New York City, Wilmington, Delaware, Pottstown, Pennsylvania, and Sacramento, San Francisco, Ventura, Chico, Solana Beach, and Esparto (State Route 16, Yolo County) in California.

Installation and conversion to back-in angled parking requires careful site planning to ensure that the car stops before encroaching into the pedestrian space. As a general rule, back-in angled parking should be installed on side streets first. It may also be considered on non-arterial streets where speeding is a problem and increased parking is a need.

View from sidewalk in Salt Lake City.

Instructional sign in Sacramento.

Back-in angled parking provides safe unloading for child and stroller at park in Chico, Ca.

Back-in angled parking in Seattle.

Back-in angled parking on a mixed commercial and residential street in Sacramento.

Site Applications

The previous chapter identified tools and strategies that can be used citywide. This chapter looks at applications of these tools and strategies in Central Richmond. It begins with an overview of the nexus between the Pedestrian Plan and the Bicycle Master Plan. The pages that follow show proposed improvements at sample locations based on the community input process from the pedestrian plan workshops (and bicycle plan community workshop) conducted in May, and consultant field observations and analysis. Many of these site-specific examples may serve as models for other locations in the city.

Walking and Bicycling in Richmond

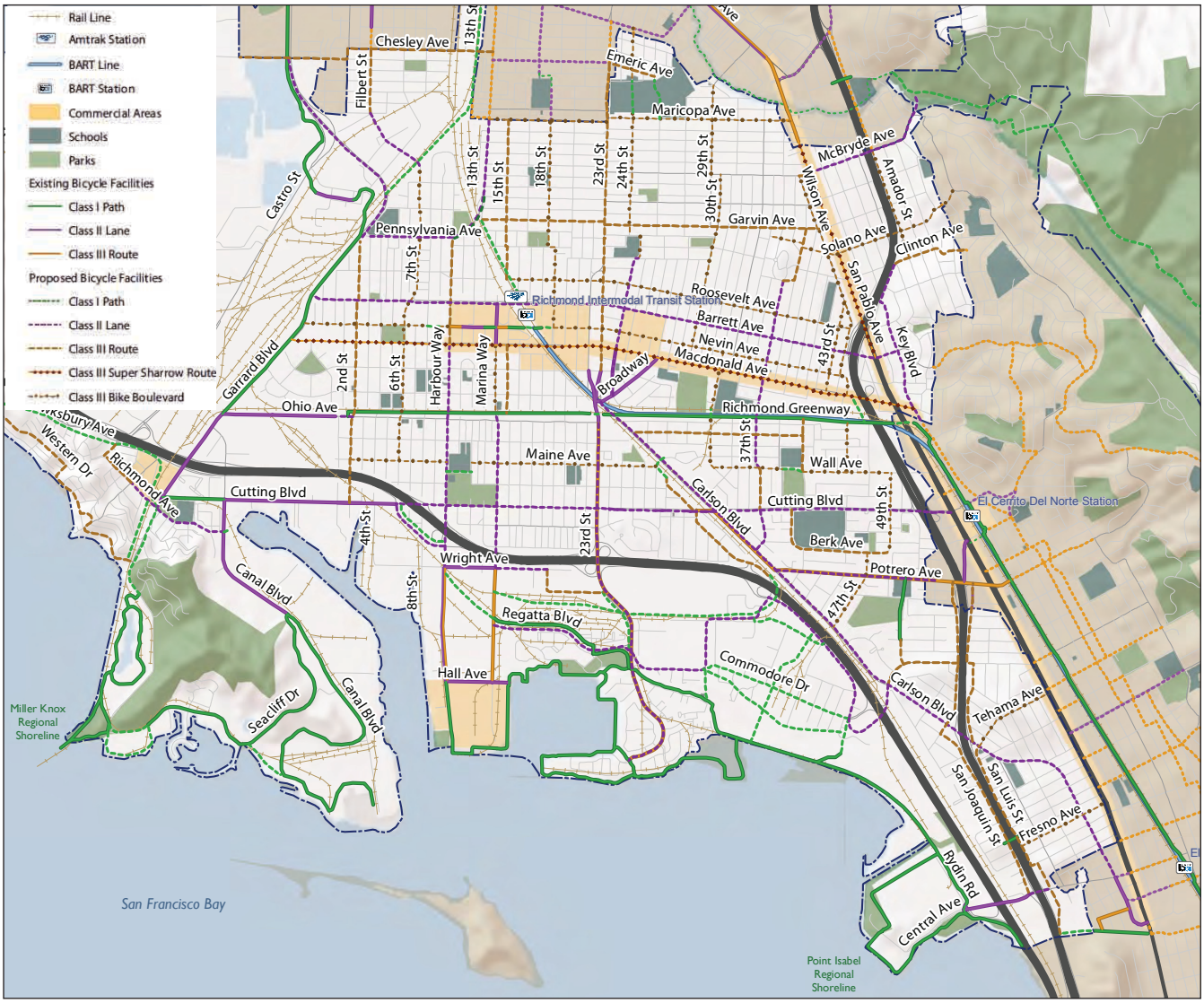
As noted previously, planning and design for pedestrian and bicycle safety and mobility go hand in hand. Both are mutually reinforcing.

- Separated paths benefit both pedestrians and bicyclists with transportation and recreation alternatives generally free of interaction with motorized traffic.
- On-street bike lanes produce greater pedestrian separation from traffic, especially in the absence of on-street parking or a planter strip, increasing pedestrian comfort and safety.
- Bike lanes support the opportunity to use tighter corner radii, which reduces intersection crossing distance and tends to slow turning vehicles, a benefit to both pedestrians and bicyclists.
- On-street bicycle facilities also support greater effective turning radius at corners and driveways, allowing large vehicles to turn into side streets without off-tracking onto the curb.
- For emergency vehicles, on-street bicycle facilities can add bonus space to maneuver around stopped traffic, decreasing response time.
- Enhanced crossing treatments at intersections, mid-block, freeway on- and off-ramps, and railroad tracks benefit people traveling by foot or bicycle.
- Traffic calming and streetscape improvements benefit all non-motorized users by increasing safety for everyone, including motorists (though some delay and congestion may be a required trade-off in certain settings).

The map on the following page shows the existing and proposed bikeway network for Central Richmond in the Bicycle Master Plan. Criteria used to develop the network that directly benefit pedestrians include:

- "The system should provide equitable access from all areas of the city to both commute and recreation routes, with design for all bicycle ability levels."
- "On-street facilities should be continuous and direct, and off-street facilities should have a minimal number of arterial crossings and uncontrolled intersections."
- "The intermodal transit village, Downtown Richmond, Hilltop Mall area, Ford Point and other major retail and employment centers should be accessible from all neighborhoods by a reasonably direct system."
- "Schools and community facilities . . . should be accessible by bike [and foot]."
- "Richmond's waterfront, parks and open spaces should be accessible so that residents are able to bike [or walk] from home to both local and regional recreation."

Existing and Proposed Bicycle Facilities: Central Richmond



Improvements to the bicycle network shown above are also seen as opportunities to improve walking conditions. Class I Paths provide trails for pedestrians separated from roadways, while other facilities encourage slower speeds and buffer sidewalks from traffic. Graphic Source: Bicycle Master Plan and Fehr and Peers.

A series of site-specific concepts to make Richmond more walkable were prepared during and following the community-based study process. They include short- to long-term improvements, and should be considered as a resource for best practices in pedestrian and bikeway design for other areas in the city. In addition, these plans can be used to pursue project-specific grant funding. Concepts and recommendations are organized into the following categories:

1. Key Corridors.
2. Local Streets.
3. Trail Connectivity.
4. Freeway and Interchange Safety and Connectivity.

Key Corridors

The draft Richmond General Plan and draft Bicycle Master Plan both identify key corridors in Central Richmond that are integral to pedestrian and bicycle mobility. The General Plan Land Use and Circulation Element defines key corridors as mixed-use "change areas," that is, areas that present strong opportunities for future revitalization and infill development. General Plan Key Corridors include:

- San Pablo Avenue
- 23rd Street
- Cutting Boulevard
- Harbour Way
- Marina Way
- Carlson Boulevard
- Ohio Avenue

The General Plan envisions transformation of these corridors into places "characterized by high-quality pedestrian amenities, higher-density and mixed-use development, high levels of transit service, bicycle amenities and public gathering spaces."

In addition to identifying key corridors in Central Richmond as ready for change, the General Plan also underscores the centrality of Macdonald Avenue as a pedestrian-oriented street and location of some of the City's most vital assets, including the Civic Center, BART/Amtrak Station, historic downtown buildings and many public and cultural facilities.

The Richmond Bicycle Master Plan refers to Key Bicycle Corridors, noting that many residential and regional collector streets provide the most direct and continuous connections between destinations, but also have heavier and fast-moving vehicle traffic. Bike lanes are recommended wherever possible for the majority of these streets, and other design and traffic calming treatments should be considered to enhance the comfort and safety along specific routes for bicyclists. Examples of key bicycle corridors located in Central Richmond include:

- Barrett Avenue
- San Pablo Avenue*
- 23rd Street*/Marina Bay Parkway
- Cutting Boulevard*
- Harbour Way*
- Carlson Boulevard*
- 37th Street

**Also designated a change area in the General Plan*

Improvement Options for Key Corridors

All of the corridors noted above share some common attributes that present both challenges and opportunities for pedestrian improvements, such as:

- Direct links between neighborhoods and community destinations
- Wide roadways
- Fast-moving traffic
- Underutilized right-of-way and adjacent property

Many of these streets are excellent candidates for narrower lane widths, reduced number of lanes, or a combination of both to create enhanced space for pedestrians and bicyclists. Reducing the size of the roadway slows vehicles and reduces pedestrian and bicycle crossing distances. Lane reductions can decrease the number of vehicle conflicts, and conflicts between vehicles and pedestrians. Roadway width reduction generates space that can be converted to other uses, such as a center median that can be used for left turning movements, bicycle and parking lanes, wider sidewalks, landscaping, or conversion of parallel parking to angled or perpendicular parking for additional spaces. Roadways with surplus capacity (typically multi-lane roadways with less than 20,000 vehicles per day) and high pedestrian and bicycle use, and roadways in need of traffic calming measures are most appropriate for lane reductions.

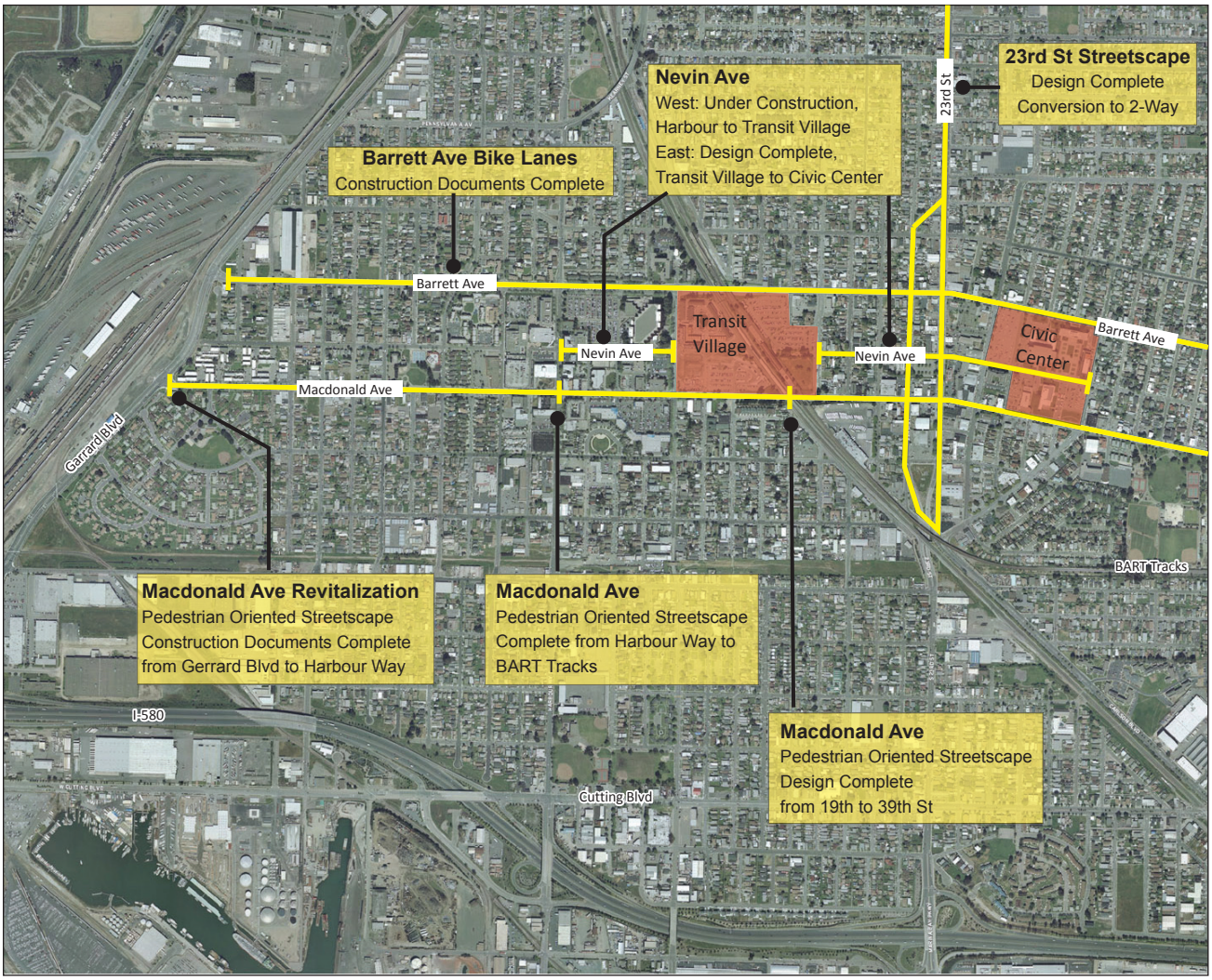
The City has already taken steps to re-size and rebalance several of these roadways in Central Richmond to improve pedestrian conditions. As described below and in the map on the following page, recent and current projects that are in various stages of planning and design include:

Macdonald Avenue Pedestrian-Oriented Streetscape Improvements
- Sidewalk & Intersection Improvements
- Lighting & Landscaping
- Public Art
- Lane Reduction
- Angled Parking

Nevin Avenue Streetscape Improvements
- Sidewalk & Intersection Improvements
- Traffic Calming
- Lighting & Landscaping
- Class III Bike Facility

23rd Street Streetscape Improvements
- Two-way Conversion & Lane Reduction
- Sidewalk & Intersection Improvements
- Lighting & Landscaping
- Coordination with 22nd Street Improvements

Recent and Planned Central Richmond Pedestrian and Bicycle Improvements



The map above highlights the progress of recent and planned major improvement projects in Central Richmond, that include transformation of Macdonald Avenue and 23rd Street into highly walkable, active retailing streets, transformation of Nevin Avenue into a shared pedestrian and bicycle corridor linking federal offices, Kaiser facilities, the Transit Village and Civic Center, and conversion of Barrett Avenue to a prominent east-west on-street bicycle route.

Barrett Avenue Bike Lanes and Road Diet

- Lane Reduction
- Bike Lanes

The pages that follow provide illustrative examples of proposed improvement options for other Key Corridors, including Harbour Way, Marina Way, South 23rd Street, Carlson Boulevard, Cutting Boulevard, 37th Street and San Pablo Avenue.

Harbour Way

The Harbour Way Corridor extends from Interstate 580 to Downtown and provides a connection between Downtown and the Ford Peninsula area. The corridor carries four lanes of fast-moving traffic that presents a barrier to connectivity between the neighborhoods on either side.

Traffic counts taken in 2007 indicate Harbour Way carries an average of 15,000 vehicles per day from Macdonald Avenue to Cutting Boulevard. The four-lane roadway has a carrying capacity of 38,200 vehicles per day. This excess capacity makes the roadway a strong candidate for a road diet to moderate speed and noise, reduce conflict, and facilitate safer crossings. Reducing the number of lanes will provide space for bicycle lanes and more space for parking.

Summary of Issues

- 4 lanes, excess capacity.
- Difficult crossings for pedestrians and bicyclists.
- Identified as key corridor and change area in the General Plan.
- Harbor Way Streetscape Improvements identified as a High priority Capital Improvement Project in the General Plan.
- Connects Historic Iron Triangle, Coronado and Santa Fe Neighborhoods.
- Connects Downtown and Ford Pennisula.
- Important AC Transit route.

Proposed Improvements

Short Term:

- Re-stripe Harbour Way to 3 lanes, and add bike lanes between Bissell and Macdonald Avenues.
- Re-stripe Harbour Way to 2 lanes, and add bike lanes between Bissell and Ohio Avenues.
- Add pedestrian-scale lighting.

Medium Term:

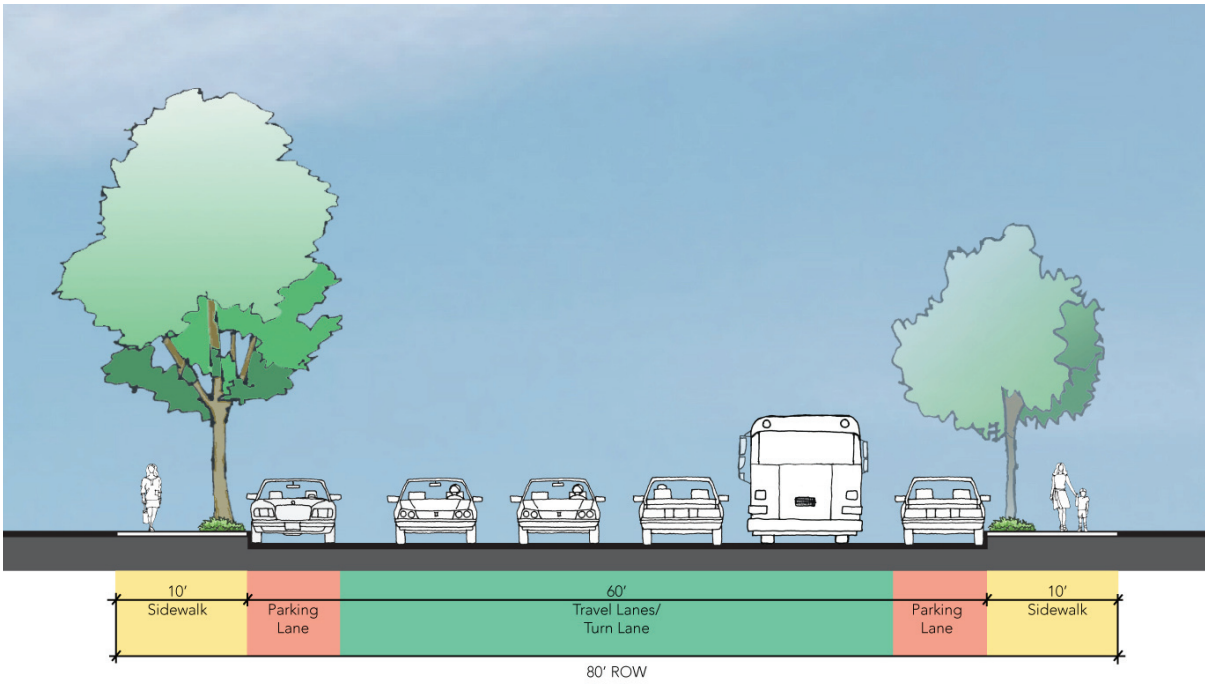
- Build raised median with downtown gateway treatment between Bissell and Macdonald.
- Install mid-block crosswalk and crossing island between Bissell and Chanslor.
- Install curb extensions at Bissell Avenue.
- Reduce lane widths and paint sharrows for Class III bike facility south of Ohio Avenue.
- Develop options for road diet south of Ohio Avenue (coordinate access to residential driveways).
- South of Ohio, plant medium to large trees in planting strips.
- Add pedestrian-scale lighting from Bissell to Cutting.

Long Term:

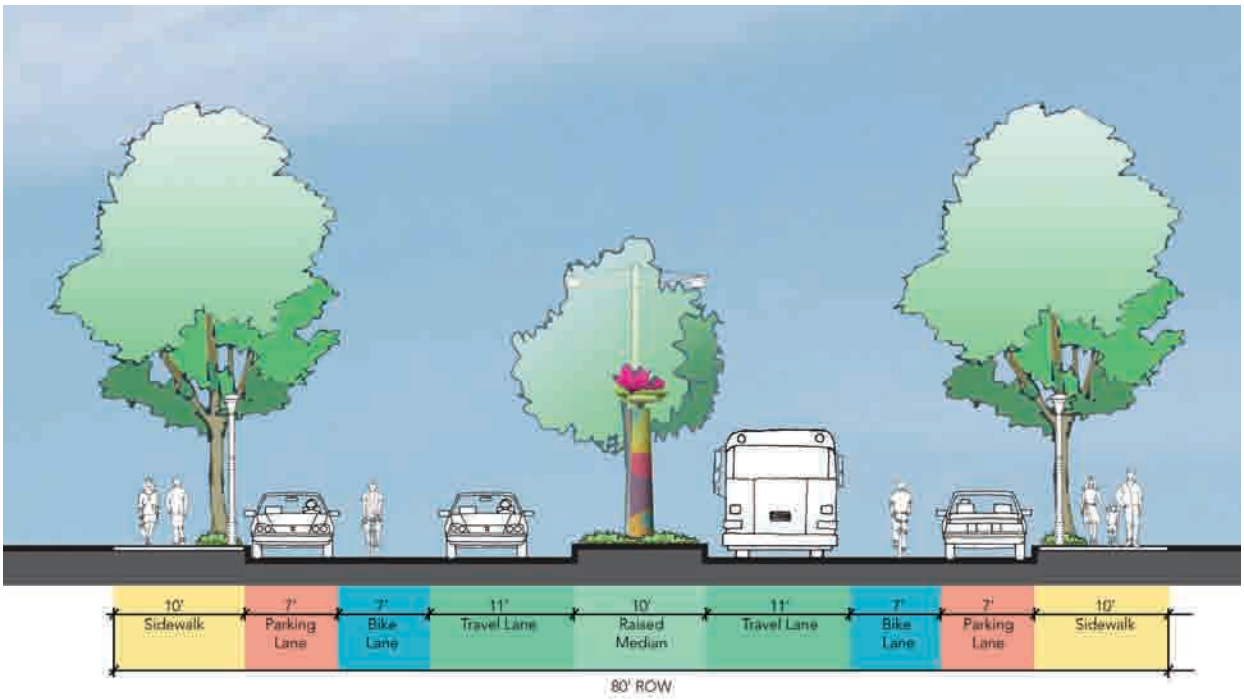
- Implement road diet from Ohio Avenue to Hoffman Boulevard.

Diagram illustrates conversion of Harbour Way between Macdoanld and Bissell Avenues from 4 lanes to 2 lanes with a center turn lane and bicycle lanes. The center lane can eventually be converted to a raised landscaped median with a turn pocket to provide access to the parking lots on the west side of the street.

Harbour Way (between Macdonald and Bissell Avenues) — Existing

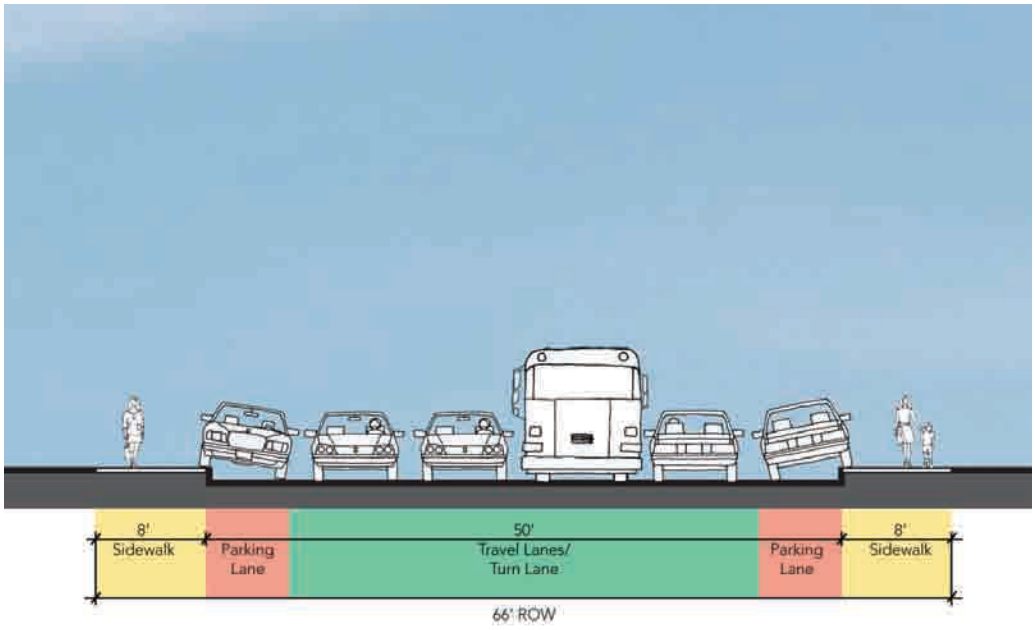


Harbour Way — Proposed

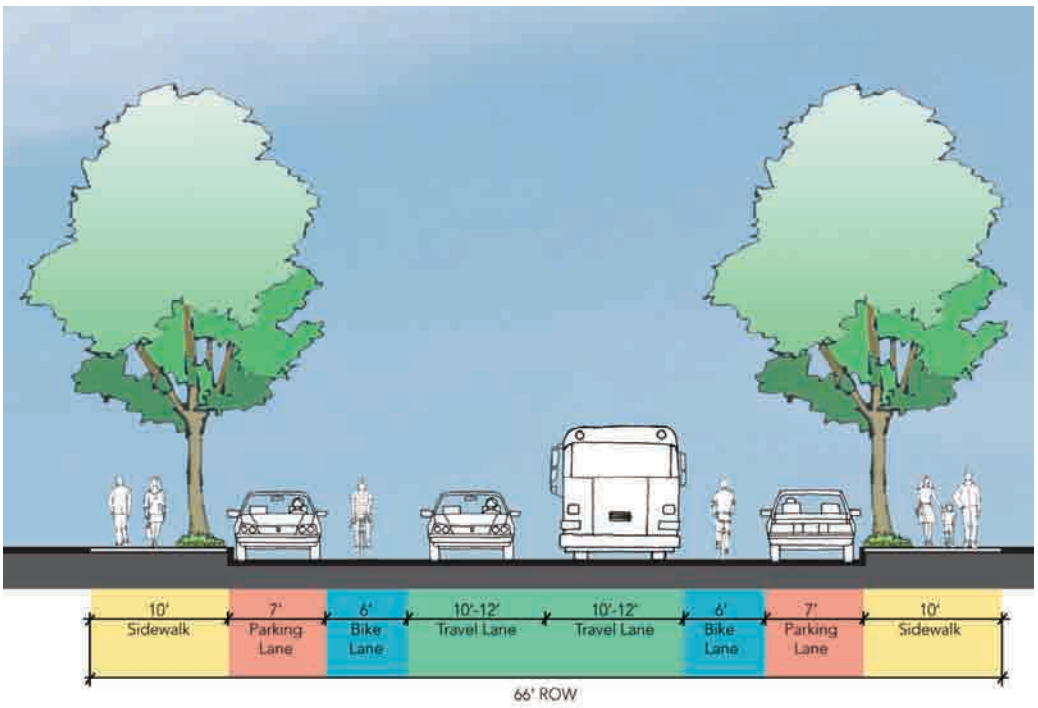


The lower diagram illustrates the proposed concept for Harbour Way between Bissell Avenue and Macdonald Avenue. A compressed roadway, with a median, lighting and landscaping announces arrival into Downtown Richmond and a pedestrian district. 7-foot parking lanes encourage vehicles to park close to the curb. 11-foot travel lanes provide adequate space for buses. 7-foot bicycle lanes provide comfortable space for bicyclists and "bonus" room for emergency vehicle maneuvering.

Harbour Way (between Bissell Avenue to Chanslor Avenue) — Existing

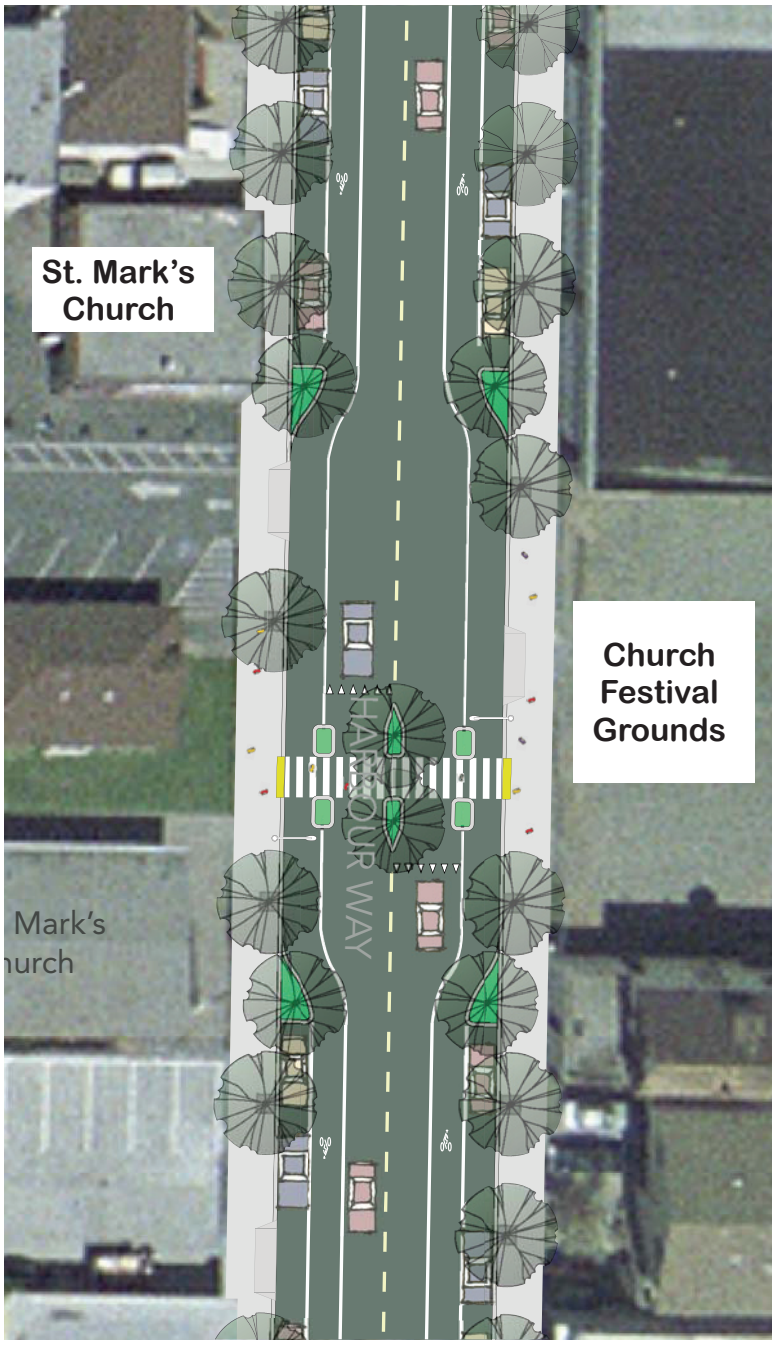


Harbour Way — Proposed



The lower diagram illustrates the proposed concept for Harbour Way between Bissell Avenue and Chanslor Avenue. This is the narrowest point of the roadway between Bissell and Cutting Boulevard. Parking would need to be restricted at corners to allow a left turn pocket at intersections. Travel lanes would need to be narrowed to 10 feet for one block, between Bissell and Chanslor, or bike lanes reduced by 1 foot to allow 11-feet travel lanes. South of Ohio Avenue, the curb to curb width increases approximately 2 to 4 feet, enabling wider travel lanes to better accommodate buses.

Harbour Way — Example of Mid-Block Crosswalk between Bissell and Chanslor Avenues



Participants at the May workshops pointed out the need for a safe crossing between St. Mark's Church and a lot across the street that is owned by the Church and used for an annual event and other activities. The diagram above illustrates a high visibility midblock crosswalk with a median refuge island that connects the church and the property on the east side of the street.

Before

Harbour Way looking north as it exists today with St. Mark's Church located on the west side of the street.

After

The two photo simulations above visualize Harbour Way with a crossing island linking the Church to grounds on the east side of the roadway where Church events are held. Note that either design should include advance yield lines (not shown) set back from the crosswalk for waiting motorists and crossing signage in line with California MUTCD standards. Refer to the earlier section of this document on Crossings beginning on Page 27 for further details.

Marina Way

The Marina Way Corridor extends from Interstate 580 into Downtown and is one of the key north-south streets connecting Downtown and the southern shoreline. Marina Way has lower traffic volume than Harbour Way, but is very wide, ranging from 50 feet to 56 feet from curb to curb between Ohio Avenue and Hoffman Boulevard, which contributes to fast-moving traffic. The road is two lanes from Bissell Avenue to Cutting Boulevard, and becomes four lanes north of Macdonald and South of Cutting.

The extra width of the roadway and low traffic volume provide an opportunity to reallocate space for bike lanes and a continuous tree-planted median, or series of median islands, to slow traffic and beautify the street. A median between Cutting Boulevard and Wright Avenue could link to the series of existing medians that follow the corridor to the Marina and Bay Trail, creating a continuous thematic connection from the Coronado neighborhood to Richmond's south shore. A median north of Cutting, combined with space at Martin Luther King Park would provide an opportunity to compress the street with a dense tree canopy, signaling to motorists the change in context to a residential setting. From Cutting to Ohio, curbside planting strips are 6 feet wide, which could accommodate medium to large trees to further green the street and provide a buffer between traffic and the sidewalk.

Summary of Issues

- Key corridor and change area in the General Plan from Bissell Avenue to Wright Avenue.
- Connects Historic Iron Triangle, City Center, Coronado, and Marina Bay Neighborhoods, and Ford Peninsula, Marina and Bay Trail.
- Fast-moving, moderate to low volume traffic.
- Potential redevelopment opportunities at the intersections with Cutting Boulevard and Potrero Avenue.

Proposed Improvements

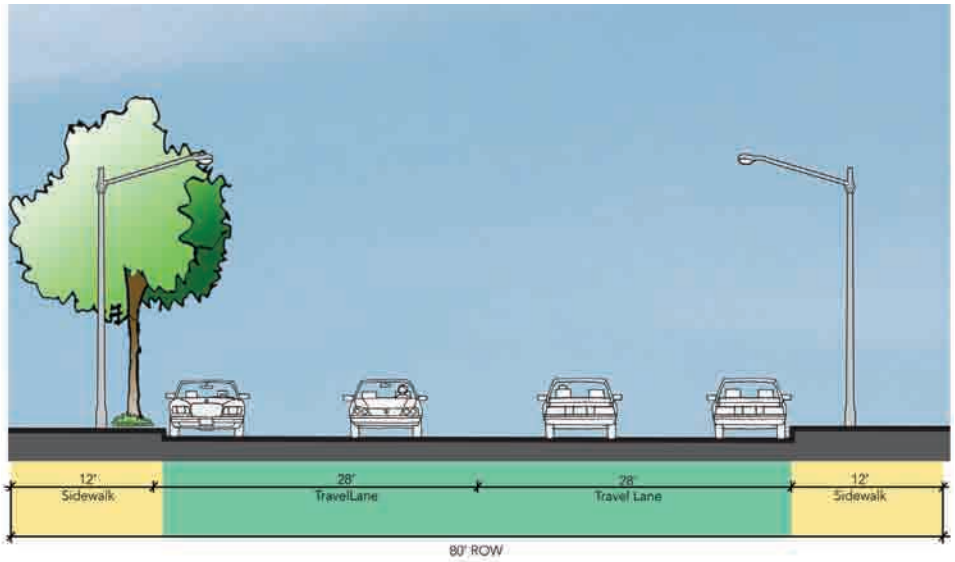
Short Term:

- Stripe 6 foot bike lanes and 7 foot parallel parking lane.
- Stripe 8 to 10 foot center median and 10 to 11 foot travel lanes based on available space in varying segments.
- Plant medium to large canopy trees in planting strips south of Ohio Avenue.

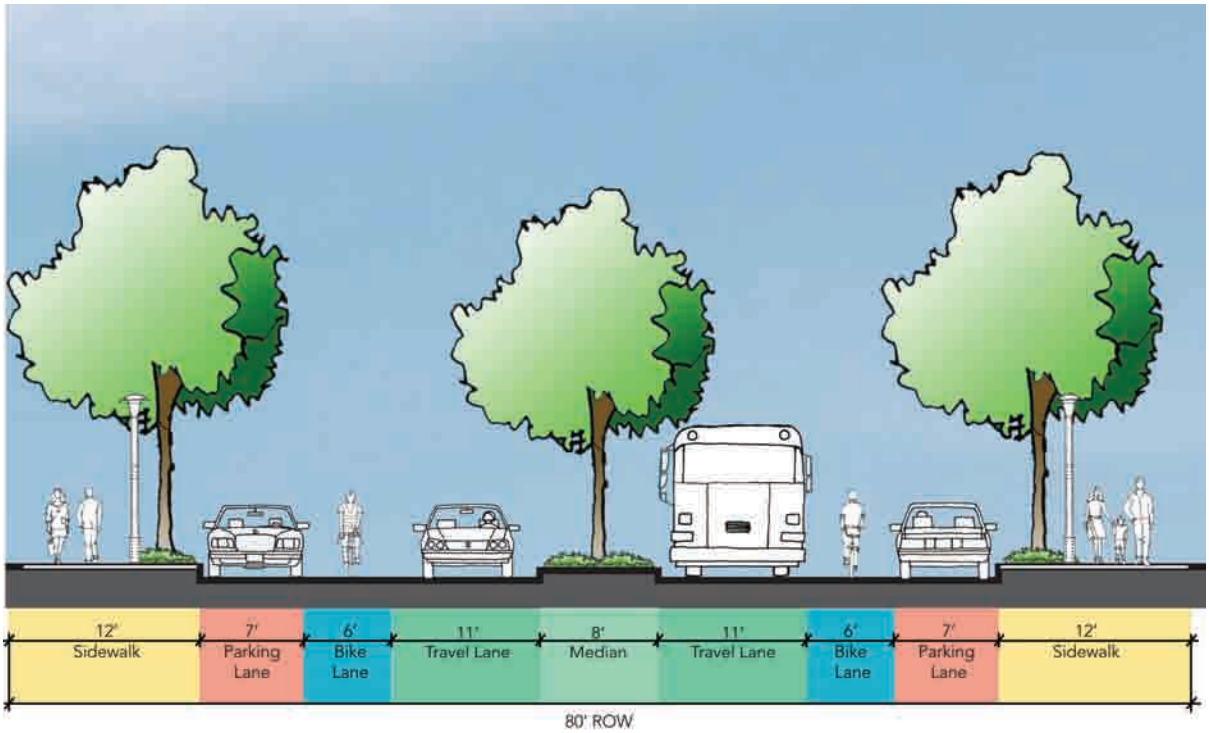
Medium Term:

- Build 8 to 10 food raised tree-planted center median between Virginia and Ohio Avenue, and between Cutting and Wright Avenue.
- Add pedestrian-scale lighting from Ohio Avenue to Macdonald Avenue, and Martin Luther King Park to Hoffman Boulevard.

Marina Way — Existing



Marina Way — Proposed

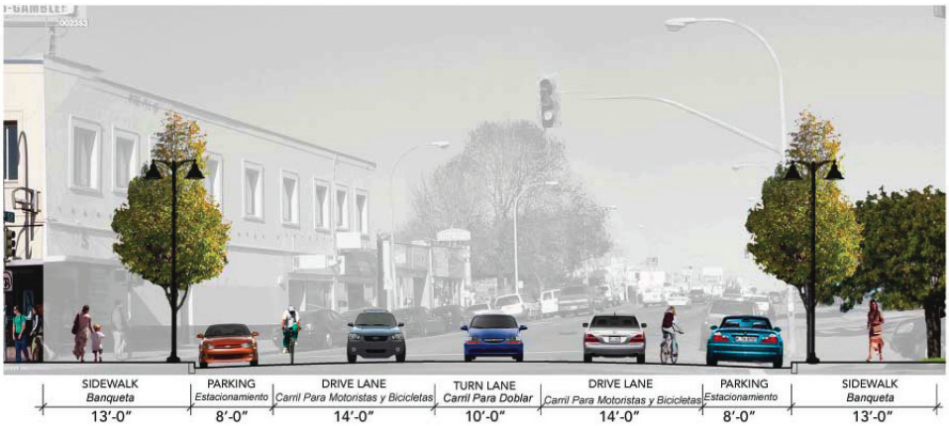


The diagram above illustrates a proposed concept for Marian Way. The roadway is generally wide enough to accommodate an 8 to 10-foot wide median to improve safety, calm traffic, and provide space for treatments to announce changes in context and for added beauty.

23rd Street Corridor

The 23rd Street corridor in Richmond extends from Interstate 580 north to the border with the City of San Pablo.. As noted before, a plan has been developed for 23rd Street, from Bissell Avenue through the downtown area to Rheem Avenue. The plan includes conversion of the roadway from one-way to two-way traffic, reduction of the number of travel lanes from three to two, and streetscape enhancements to improve pedestrian safety, access and appeal. The plan also addresses the safety of pedestrian crossings at intersections through curb extensions, and relocation of crosswalks and use of median refuge islands at strategic locations that include "hot spots" identified by participants at the Pedestrian Plan workshops.

23rd Street Streetscape Improvement Project — Proposed



The diagram shows the proposed cross section for 23rd Street looking north from Macdonald Avenue. Streetscape concept by Callander Associates Landscape Architecture, Inc.

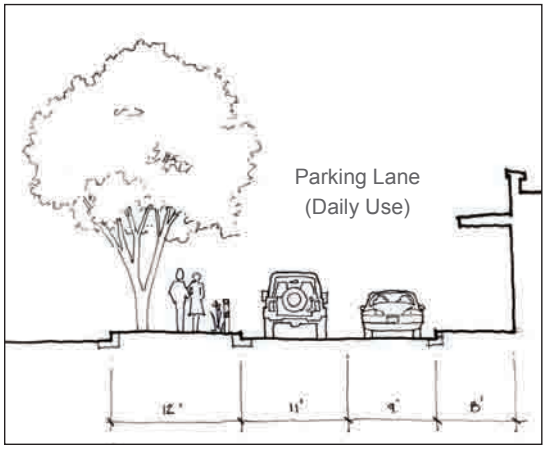
A draft form-based development code has also been produced for the same segment of 23rd Street to facilitate its transformation from an auto-oriented corridor to walkable, mixed-use neighborhoods. Standards are designed to facilitate high quality infill projects and regulate building and site design to ensure new development is compatible with existing and future development on neighboring properties and contributes to a pedestrian-oriented environment.

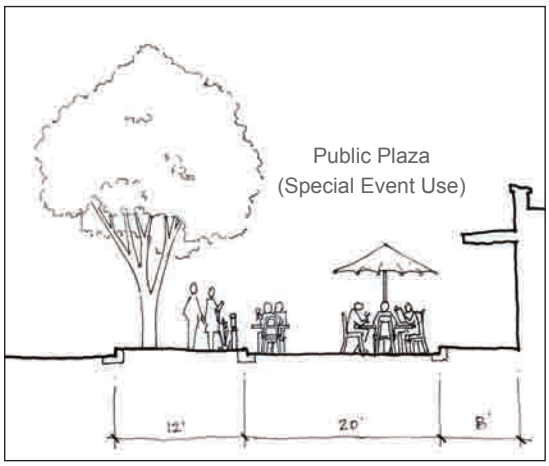
23rd Street Corridor Form-Based Code — Proposed

The image on the right is a portion of the Illustrative Plan around the intersection of Macdonald Avenue and 23rd Street from the draft 23rd Street Form-Based Code. Concept by Opticos Design, Inc.

Macdonald Avenue and 23rd Street — Before

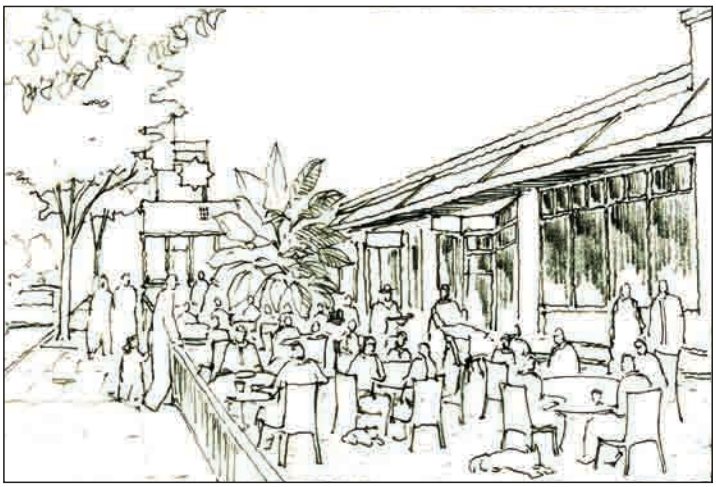
The parking lot on the southeast corner of Macdonald Avenue and 23rd Street lacks a clearly defined sidewalk with an adequate cross-slope. The continuous driveway creates further hazards for pedestrians.





The diagrams above show options for a new sidewalk and flexible adjacent space for additional uses. Illustrations prepared by Opticos Design, Inc.

Macdonald Avenue and 23rd Street — After



In the illustration above, the parking lot is transformed into a space for outdoor dining next to a wide, landscaped sidewalk. The illustration and draft Form-Based Code was prepared by Opticos Design, Inc.

A key theme in the vision for the proposed 23rd Street Form-Based Code is reinforcement of the prominence of the intersection with Macdonald Avenue as a primary crossroad in the heart of downtown. The illustrations on this page show the transformation of a parking lot lacking a clearly separated sidewalk on one corner of the intersection to include an enhanced sidewalk and active flexible space for additional uses. This improves pedestrian safety while adding value to the property.

The sidewalk adjacent space could be built as a permanent corner plaza, or be designed to quickly transform from a parking court into a plaza space. Small steps like this will begin to reinforce this corner as an important location within the City and hint at the potential of both the 23rd Street and Macdonald Avenue corridors to be vibrant retail destinations.

South 23rd Street

South 23rd Street extends from Interstate 580 north to Ohio Avenue. South of Bissell Avenue, where 22nd Street merges with 23rd Street, the corridor continues with four lanes of fast-moving traffic that separates the neighborhoods on either side, detracts from fronting residences and businesses, and creates difficult crossing conditions for pedestrians and cars. Traffic counts taken in 2007 indicate South 23rd Street carries an average of 17,400 vehicles per day between Bissell Avenue and Cutting Boulevard. The four-lane roadway has a carrying capacity of 38,200 vehicles per day. This excess capacity makes the roadway a strong candidate for strategies to reduce road width to moderate speed and noise, reduce conflict, facilitate safer crossings, and improve the context for pedestrian activity and new investment in fronting properties.

Summary of Issues

- Key corridor and change area in the General Plan.
- Wide street with excess capacity.
- Fast-moving traffic with moderate volume.
- Difficult crossings.
- Road diet planned from Bissell to Rheem.
- Connects neighborhoods and downtown to Marina Bay Parkway, Marina Bay and Bay Trail.
- AC transit route.

Proposed Improvements

Short Term:

- Stripe 7 foot parallel parking from Cutting Boulevard to Ohio Avenue.
- Consider installation of pedestrian refuge island at intersection with Virginia Avenue.

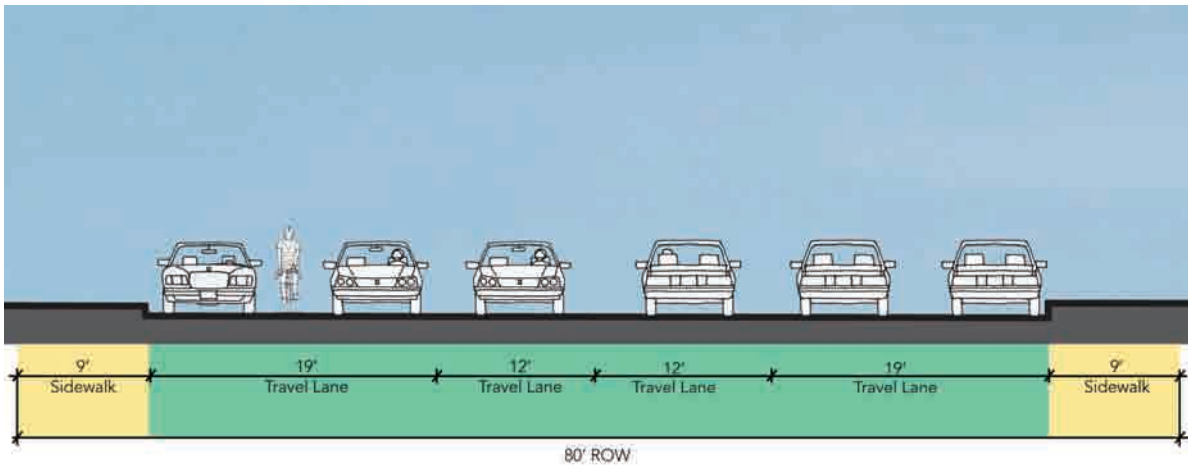
Medium Term:

- Re-stripe from Cutting to Ohio with two 11 foot travel lanes and a ten-foot center median/turn lane.
- Replace sharrow with 6 foot bike lanes.
- Add pedestrian-scale lighting.

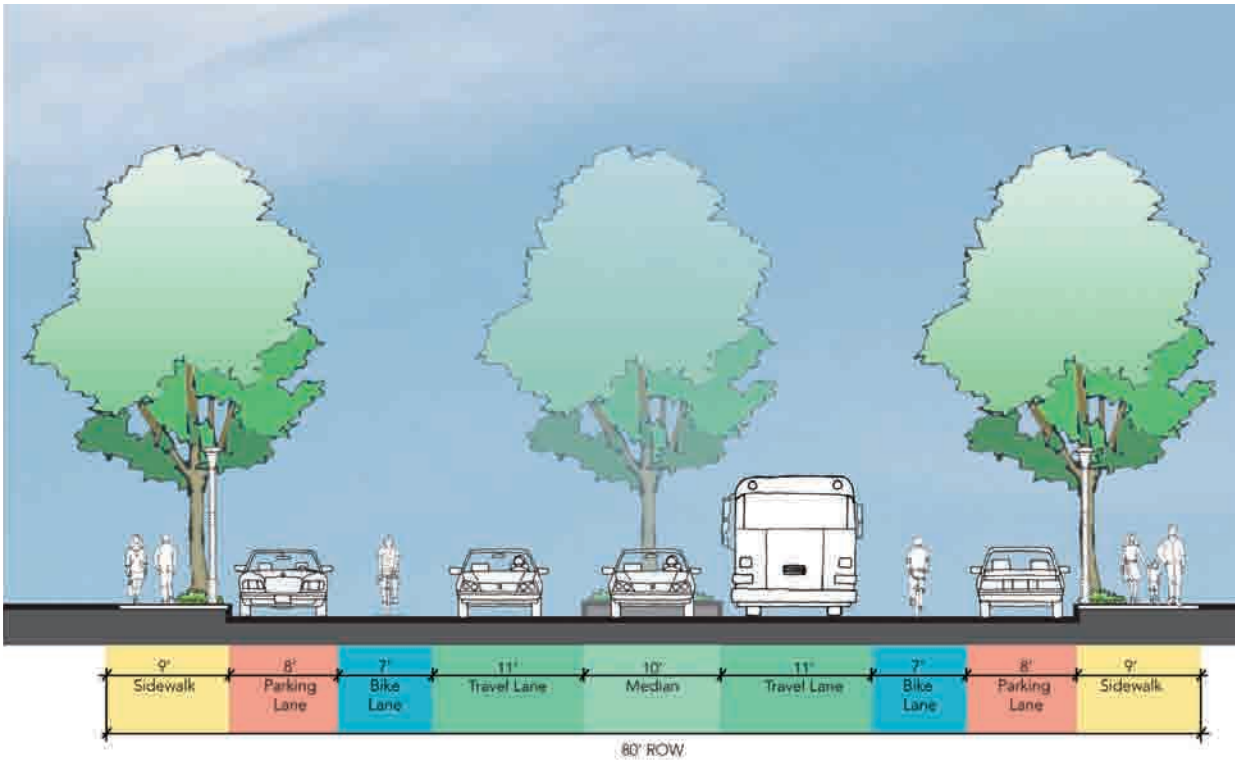
Long Term:

- Consider median islands at selected locations for additional pedestrian crossings.

South 23rd Street — Existing



South 23rd Street — Proposed



The diagram above illustrates a proposed concept for South 23rd Street. The roadway is wide enough to accommodate a 10-foot wide striped median and center turn lane. Segments could include raised, landscaped median islands for added greening, pedestrian crossings, and to manage access to adjacent properties by consolidating turning areas into fewer locations.

Carlson Boulevard

Carlson Boulevard is a four-lane arterial that carries traffic within the City of Richmond and into the City of El Cerrito, and provides a primary connection between the Richmond Annex Neighborhood and Downtown Richmond. The corridor runs parallel and adjacent to the Union Pacific railroad right of way, which limits development to the west. A raised median that varies in width from approximately ten to fourteen feet runs through the center of much of the corridor.

Traffic counts taken in 2007 indicate Carlson Boulevard carries an average of 9,100 vehicles per day between 23rd Street and Cutting Boulevard, and an average of 7,900 from Cutting to Interstate 80. The four-lane roadway has a carrying capacity of 38,200 vehicles per day. This excess capacity and the absence of development and intersections on the railroad-adjacent side makes the street a strong candidate for road width reduction to moderate speed and reallocate space for landscaping, pedestrian and bicycle improvements. The median could be enlarged and developed with significant landscaping to help produce a context that supports investment in adjacent infill sites.

Summary of Issues

- Key corridor and change area in the General Plan.
- Multiple lanes with considerable excess capacity.
- Fast moving traffic.
- Wide Greenway gap when combined with adjacent railroad corridor and 23rd Street multilane crossing.
- Constrained on southwest side by railroad tracks.
- Connects numerous southeast neighborhoods to central Richmond.
- Wide, skewed intersection at Cutting Boulevard (dangerous pedestrian crossing en route to Kennedy High School).
- AC Transit Route.

Proposed Improvements

Short Term:

- Reduce lane widths, stripe bike lanes and paint sharrows.

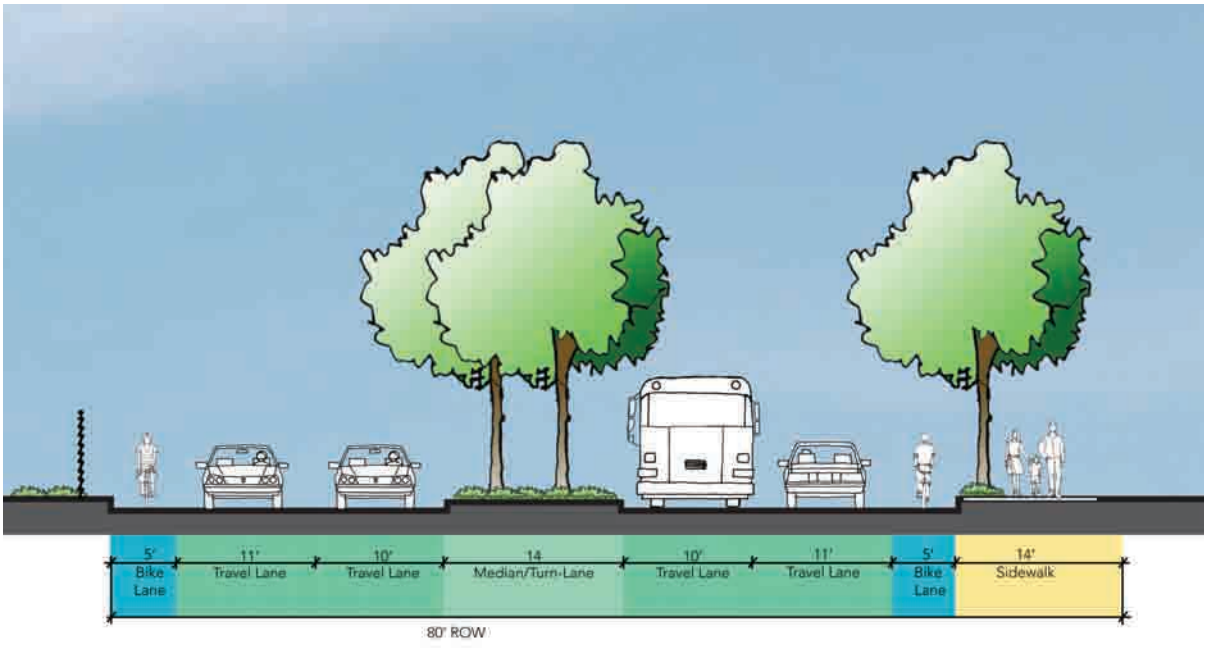
Medium Term:

- Re-stripe to 2 travel lanes (road diet).
- Widen bike lanes and add buffers.
- Study and install roundabout at intersection with Cutting Boulevard if feasible.

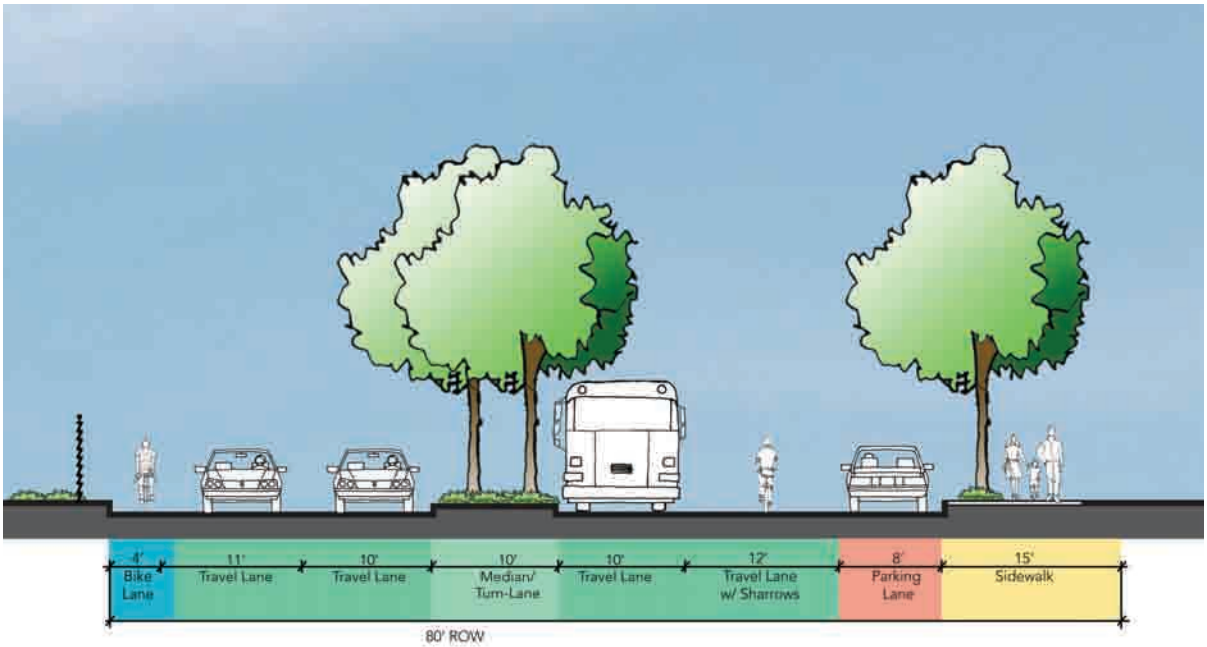
Long Term:

- Widen medians (consider elements to create usable public space) or relocate curb further from railroad tracks for additional space between the bikeway and trains.

Carlson Boulevard: Ohio Ave — Cutting Blvd
Option A: Proposed Lane Width Reduction

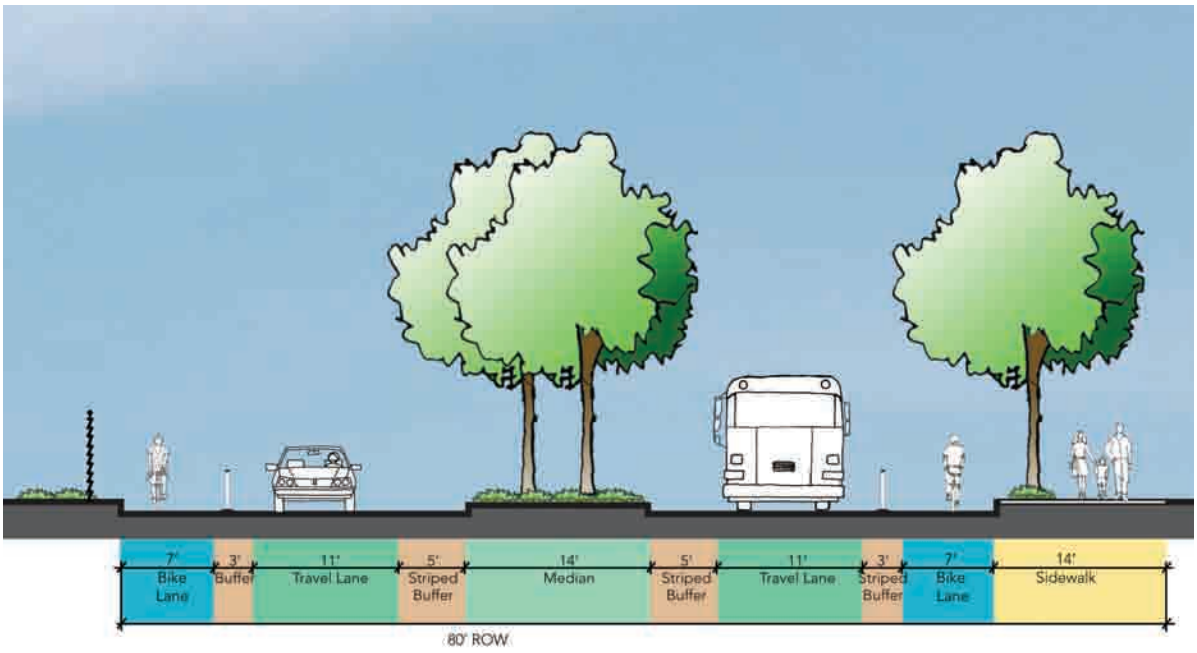


Carlson Boulevard: Cutting Blvd — 45 St
Option A: Proposed Lane Width Reduction

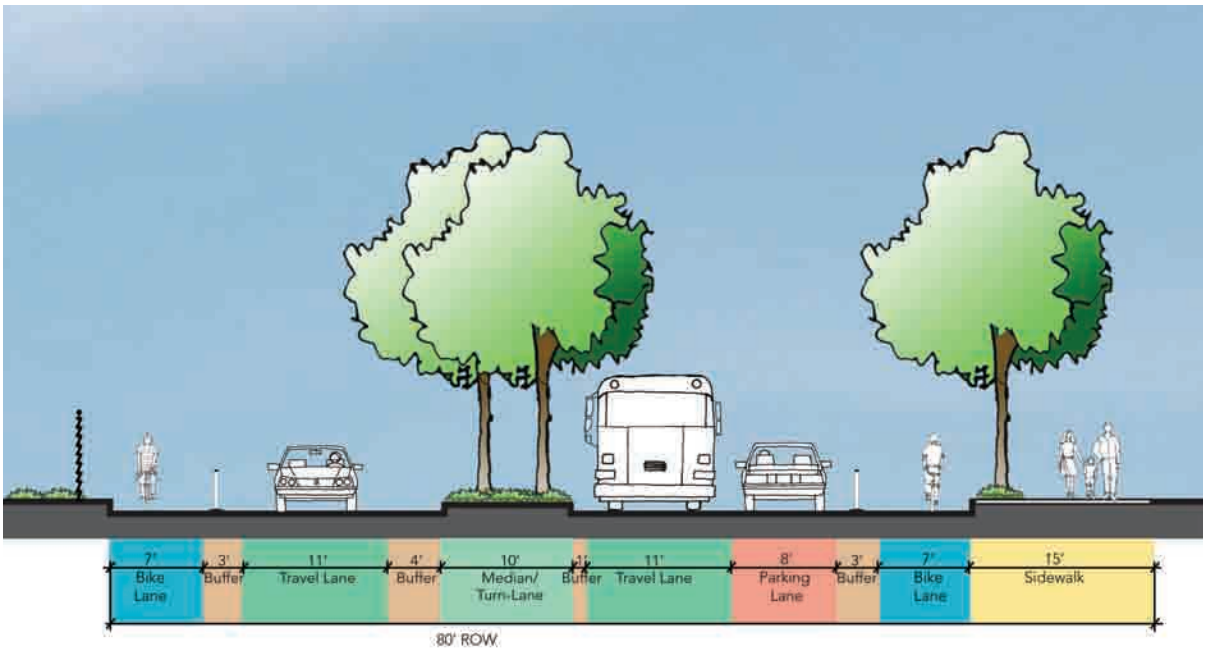


The illustrations above show short term lane width reductions that would contribute to more cautious speeds and allow replacement of sharrow lanes with bike lanes, except where there is on-street parallel parking.

Carlson Boulevard: Ohio Ave — Cutting Blvd
Option B: Proposed Lane Reduction

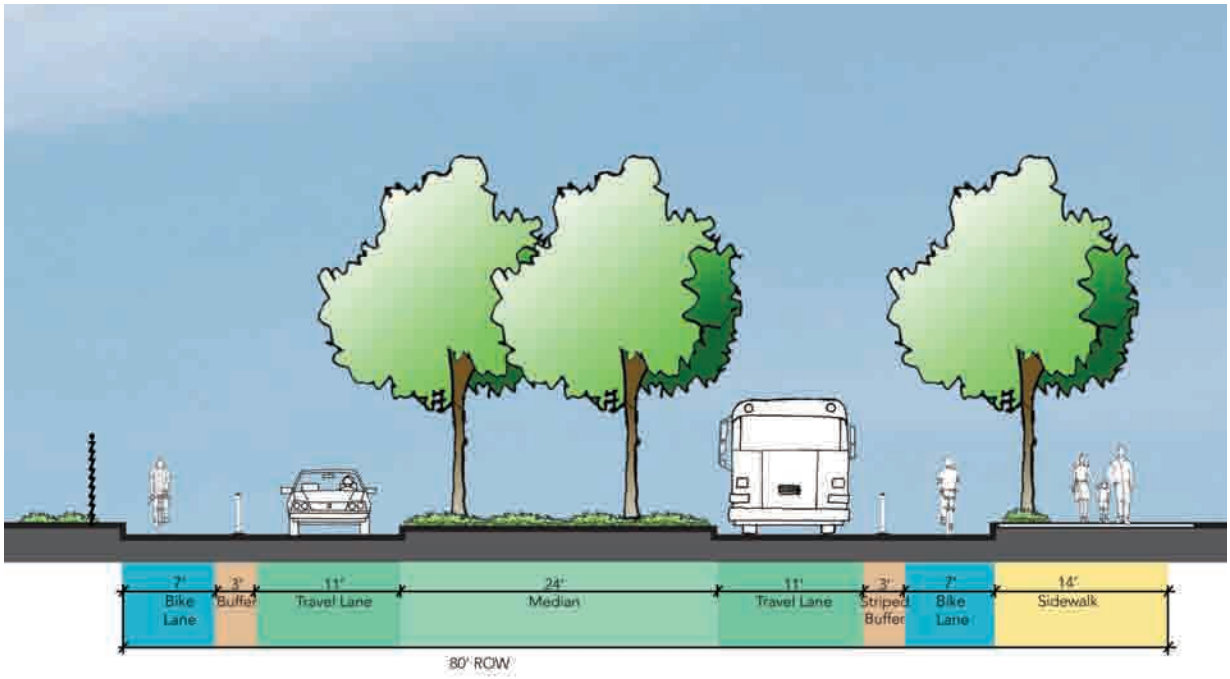


Carlson Boulevard: Cutting Blvd — 45 St
Option B: Proposed Lane Reduction

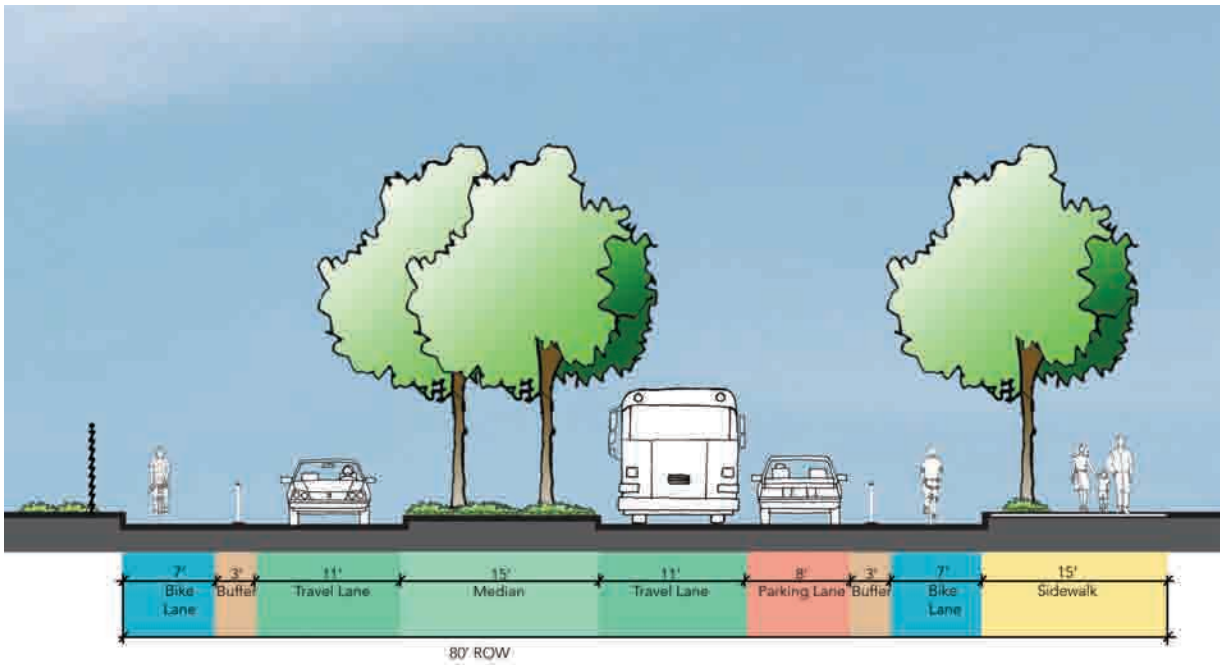


The drawings above show a reduction in the number of lanes, with additional space allocated to separated bicycle lanes and further separating moving traffic from the sidewalk and adjacent properties. Soft hit posts and/or other high visibility and decorative treatments buffer bicyclists from vehicles.

Carlson Boulevard: Ohio Ave — Cutting Blvd
Option C: Proposed Lane Reduction



Carlson Boulevard: Cutting Blvd — 45 St
Option C: Proposed Lane Reduction



In the long term, additional space made available through a road diet could be dedicated to an enhanced, widened median. Segments could be designed to receive stormater runoff, while wider sections could incorporate linear park elements such as shaded benches, walkways or community garden spaces.

Cutting Boulevard

The Cutting Boulevard Corridor spans nearly four miles from San Pablo Avenue to Point Richmond. The wide right-of-way was originally designed for high volumes of fast-moving traffic prior to construction of Interstate 580 immediately to the south, which replaced Cutting Blvd as the primary thoroughfare between I-80 and the San Rafael Bridge. Community facilities along the corridor include Kennedy High School and open spaces such as Martin Luther King Jr. Memorial Park and John F. Kennedy Park. East of Carlson, the corridor is a residential boulevard with separated frontage roads. It transitions to a mix of residential and small businesses west of Carlson, and finally to primarily maritime industry after crossing Harbour Way and I-580.

This corridor is an area of Richmond where substantial change is possible. The roadway capacity far exceeds what is needed. 2007 traffic counts indicate an average daily traffic volume of 15,900 vehicles per day between Carlson and 23rd Street, tapering down to 11,500 vehicles per day between 23rd Street and Harbour Way, and finally dwindling to 5,800 vehicles west of Harbour Way. The City could elect to reduce the number of lanes and still maintain acceptable levels of service. Land uses and building form remain oriented towards its former function and character as a higher speed auto-oriented major arterial. A considerable amount of land is available (both private land that is vacant or under-utilized, and a considerable amount of public ROW), presenting tremendous opportunities to dramatically transform the character, function and performance of the corridor.

Given the excess capacity, the City should consider reducing the number of lanes along Cutting Boulevard to provide safety benefits to pedestrians and vehicles. As there is ample right-of way and several candidate opportunity sites for redevelopment, the City should consider the long-term possibility of transformation of the roadway to establish bus rapid transit, or support installation of light rail transit or a streetcar line.[7] This would link the BART El Cerrito Del Norte station on the eastside to Point Richmond on the west. This could be part of a larger economic development strategy and environmental justice effort to bring affordable, effective and convenient transit within easy access of numerous mixed income and low income neighborhoods.

Summary of Issues

- Key corridor and change area in the General Plan.
- Provides east-west link from El Cerrito Del Norte BART station to Point Richmond.
- Very wide ROW with excess capacity.
- Fast moving traffic.
- Significant opportunity sites for redevelopment.
- Well established median and boulevard with frontage roads east of Carlson Boulevard.
- Wide intersections with difficult multi-lane crossings.
- At grade railroad crossing.

[7]Macdonald Avenue, which is Downtown Richmond's principal main street, could also be a candidate for a streetcar system, but would require a shared vehicle and transit travel lane west of 19th Street and the railroad tracks underpass where the roadway has been reduced to a single travel lane in each direction.

Proposed Improvements

Short Term:

- Intersection with Harbour Way: install curb extensions, directional ramps and high visibility striping, and median crossing islands.
- Consider similar treatments at intersections with Marina Way and 23rd Street.
- Stripe bicycle lanes and parking.
- Repair planting strips west of 23rd Street and plant large canopied trees. Incorporate designs for stormwater infiltration and treatment.
- Study options for roundabout at intersection with Carlson.

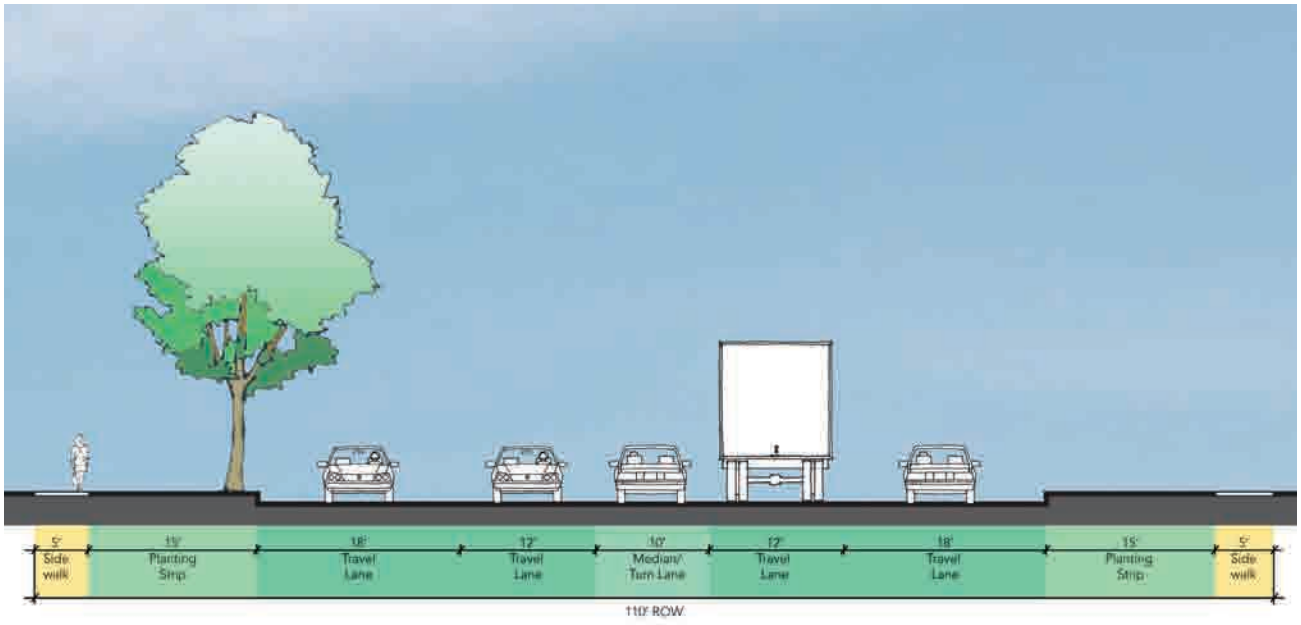
Medium Term:

- Study options for converting excess capacity/space to bus rapid transit or rail transit with dedicated or shared priority transit lanes.
- Install roundabout at intersection with Carlson.

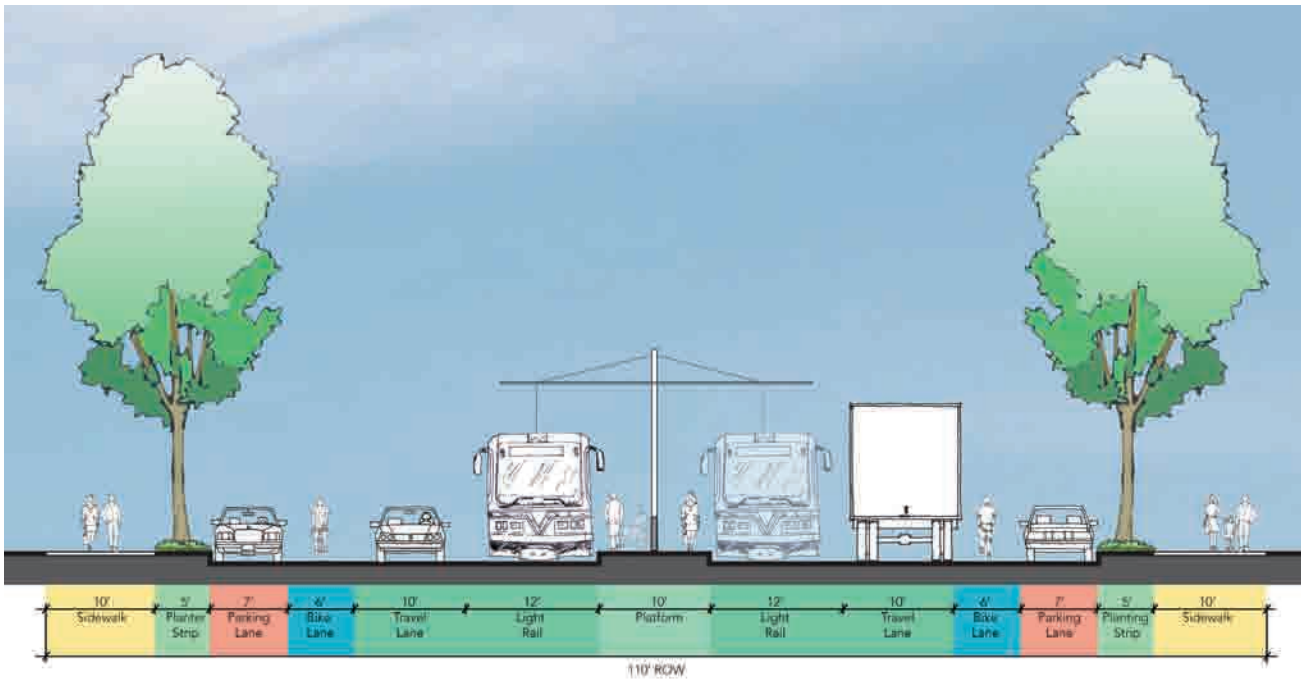
Long Term:

- Implement priority transit option or option without dedicated transit with a road diet and widened median.

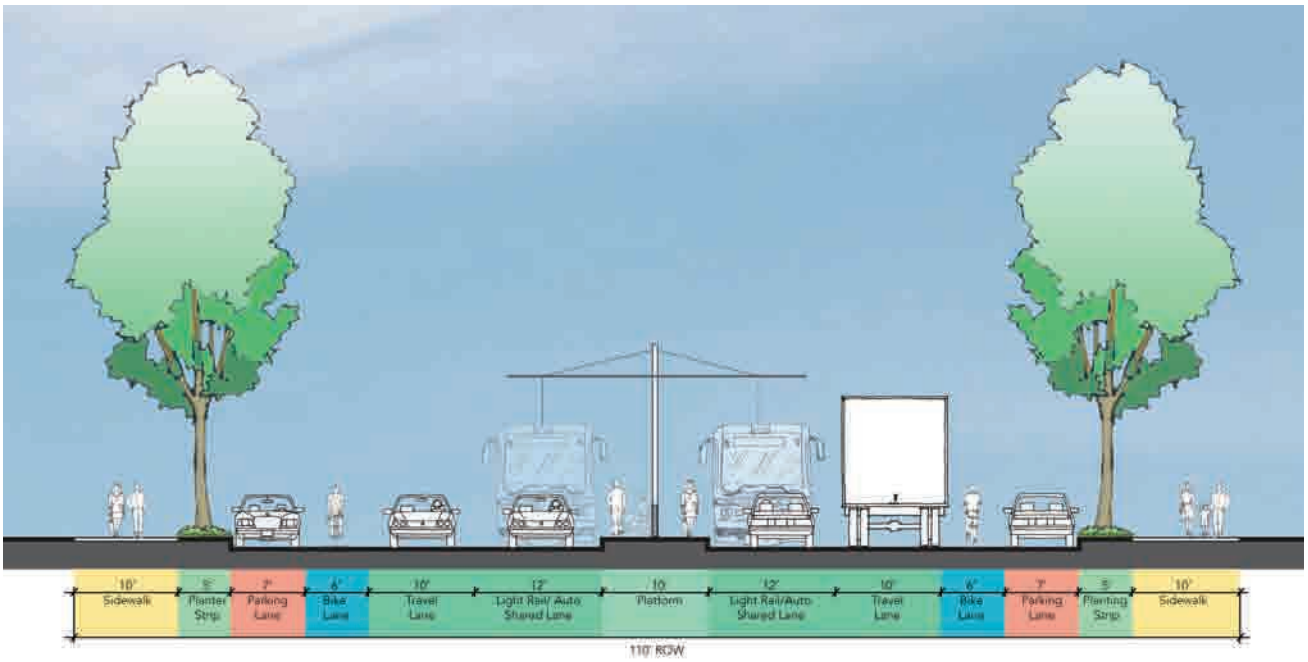
Cutting Boulevard — Existing



Cutting Boulevard — Option A: Road Diet with Dedicated Transit

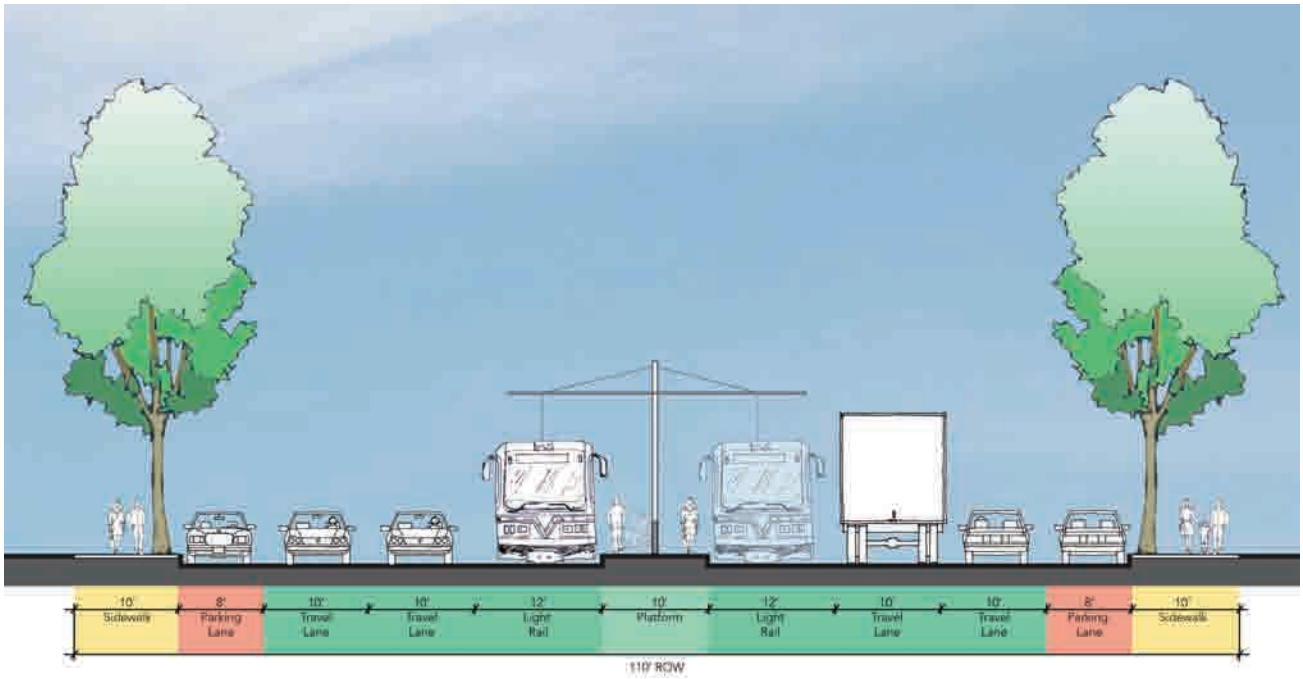


Cutting Boulevard — Option B: Road Diet with Bicycle Lanes and Shared Auto/Transit

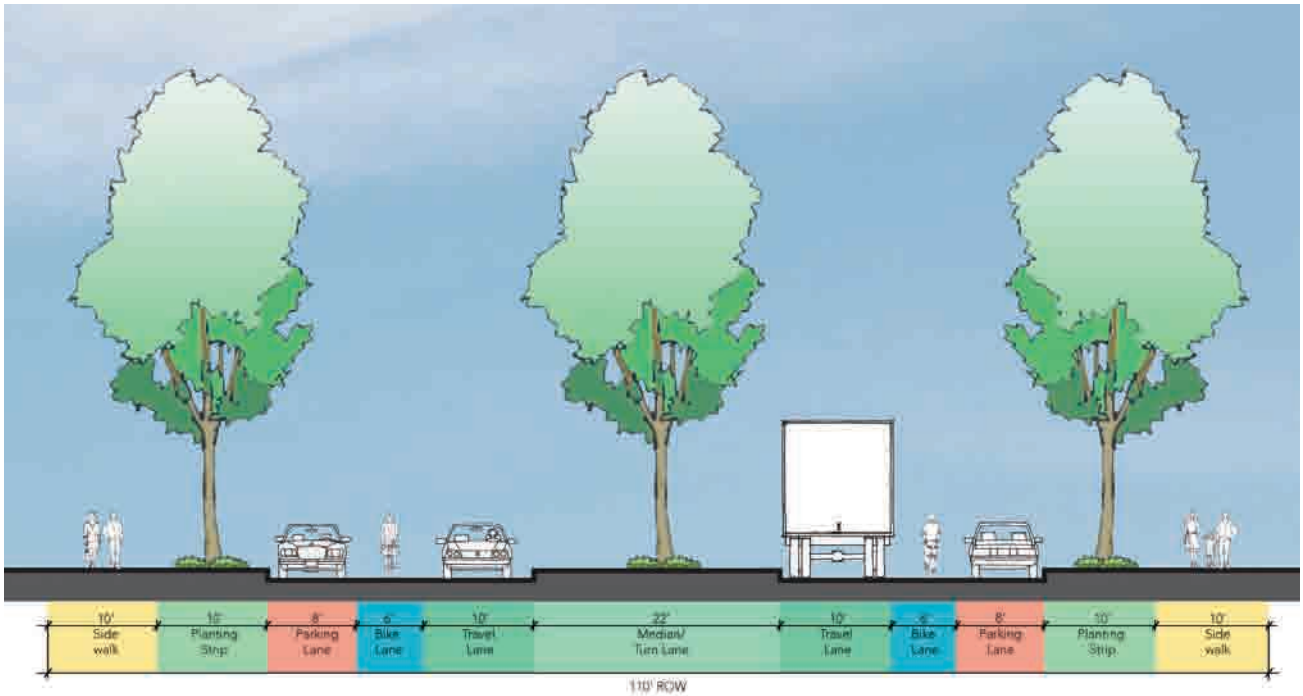


The drawing at the top of the page shows the roadway redesigned with bicycle lanes and light rail or bus rapid transit with rider loading from a center platform. The drawing below depicts a scenario where cars and buses share the inside lane, increasing roadway capacity for non-transit vehicles.

Cutting Boulevard — Option C: No Road Diet, with Dedicated Transit



Cutting Boulevard — Option D: Road Diet, Bicycle Lanes and Wide Median



The drawing at the top of the page depicts on option where the existing number of lanes is maintained in conjunction with center-loaded transit. The option below shows a simple road diet with space reallocated to bicycle lanes and a widened center median. The median could be designed to receive stormater runoff and incorporate linear park elements such as shaded benches or community garden spaces.

Cutting and Carlson Boulevards intersect at a 45 degree angle, creating a skewed intersection adjacent to active rail lines on the west. This creates a formidable obstacle and safety hazard for pedestrians. The diagram below illustrates how construction of a roundabout at this location, combined with road diets on both streets, would vastly reduce chaos and the number of conflicts at the intersection, while simplifying pedestrian crossings and reducing pedestrian exposure to traffic.

A preliminary traffic operations analysis showed that the addition of a second eastbound lane at the roundabout would ensure that the intersection would perform acceptably during afternoon peak hour traffic. Right turn slip lanes are provided at the 45 degree approaches to provide for truck turns. Mountable curbs could be added at locations for larger vehicles.

Cutting and Carlson Boulevard Intersection

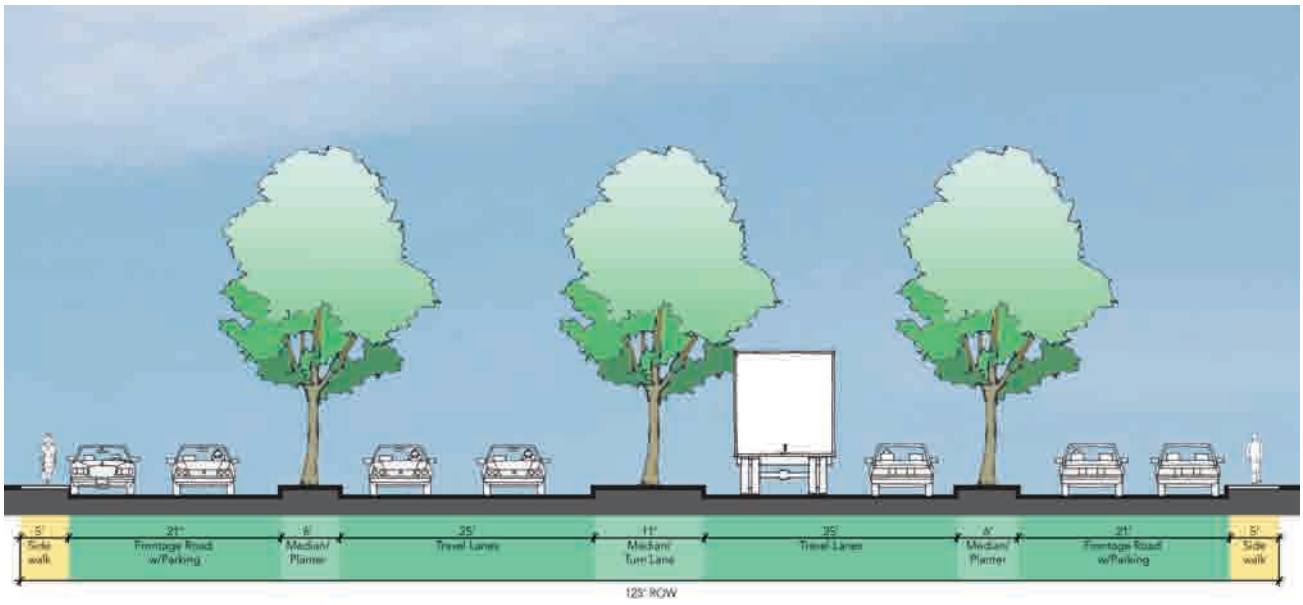
A crosswalk is not included on the west leg of the intersection because it would place pedestrians too close to the railroad tracks on the south side of the roadway, which could present safety concerns.

Vehicles may queue into the roundabout when a train is present. Based on this, the need for gates on all approaches will need to be studied. Gates to northbound and southbound approaches on Carlson may not be required, which would allow these movements to continue when a train is present. The southbound right hand turns and northbound lefts have volumes under 100 at peak hour, so queuing would be far less than with the westbound movement on Macdonald. More research and queueing analysis will be required to determine the need and placement of gates.

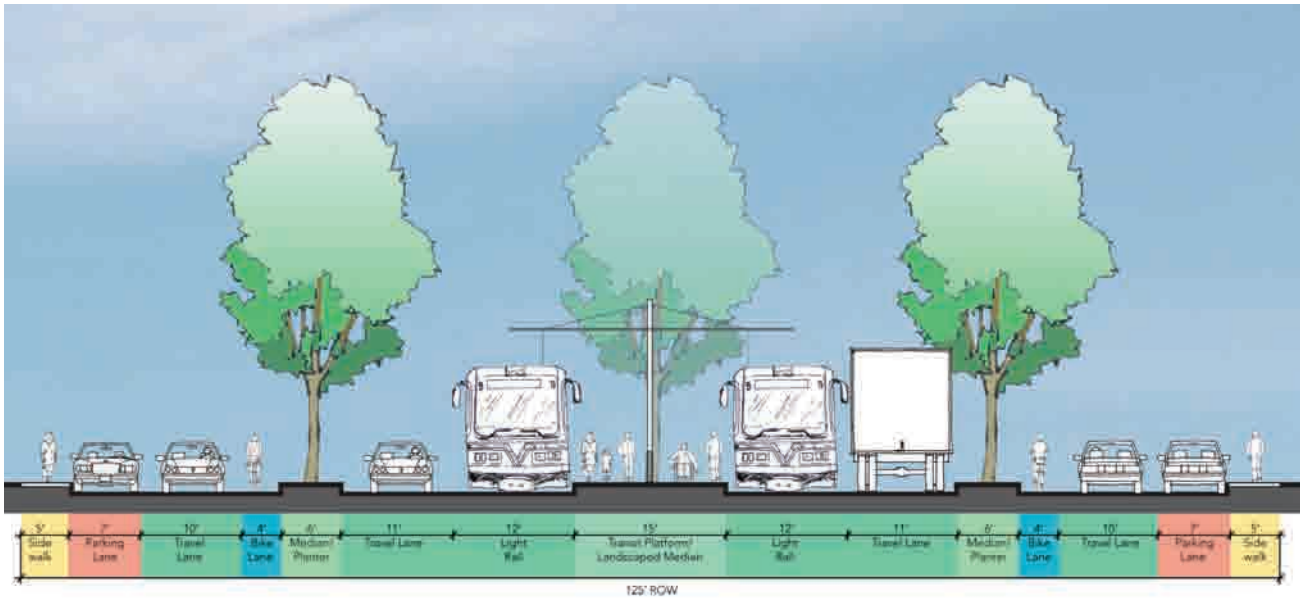
Additional details regarding design considerations and operations for the roundabout are included in the Appendix.

Cutting and Carlson Boulevard Intersection Improvements

East Cutting Boulevard — Existing



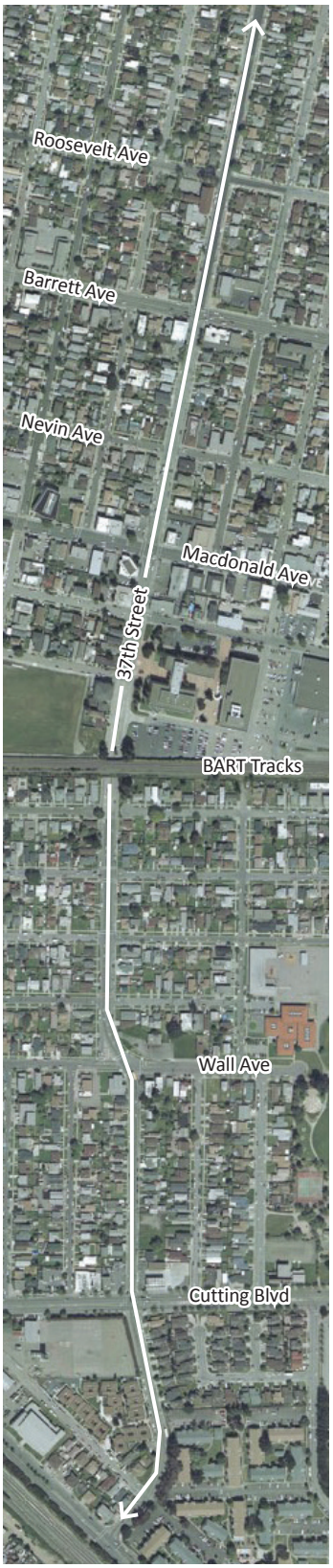
East Cutting Boulevard — Proposed Road Diet with Dedicated Transit



The drawing above illustrates the incorporation of a dedicated transit lane east of 41st Street where adjacent one-way frontage roads provide access to residences. The frontage roads are wide enough to accommodate striped bicycle lanes that are separated from traffic on Cutting Boulevard.

37th Street

Approximately one mile long, 37th Street traverses several residential neighborhoods, providing a north-south connection from Carlson Boulevard to Roosevelt Avenue. It is the only roadway between Carlson Boulevard/23rd Street on the west and Interstate 80 on the east that provides north-south access across the BART tracks (via an underpass). It is 56 feet wide for most of its length, from Wall Avenue to its terminus at Cerrito Avenue, and is four lanes until Barrett Avenue, after which it transitions to two lanes.



37th Street is very wide for a mostly residential connector street with light traffic. Excess space can be reallocated for pedestrian and bicycle safety and improved north-south access across the BART tracks. The City should consider lane reductions and pilot areas to stripe angled parking to maximize on-street parking and create a buffer between traffic and the sidewalk. Back-in angled parking could be considered because it works well with bicycle lanes, as motorists face the lane and can see bicyclists when pulling out. See page 42 for more information on this type of parking.

Summary of Issues

- Only vehicular connection through BART tracks between Carlson and I-80.
- Only ADA accessible and bikable connection through BART tracks between Carlson Boulevard/23rd Street and I-80 (pedestrian overpass at 33rd Street is steep and stairs only).
- Wide roadway with excess capacity north of Wall Avenue.
- Frequent speeding south of Macdonald Avenue to Cutting.
- Pedestrian route for King Elementary School, Lavonnya De Jean Middle School, and Kennedy High School.
- Numerous vehicle crashes at 37th and Center Avenue.

Proposed Improvements

Short Term:

- Build curb extensions and install high visibility crosswalks at Roosevelt Avenue; consider similar treatments at intersections from Barrett south to Florida Avenue.
- Test stripe pilot back-in parking by church.
- Stripe bike lanes from Cerrito Ave to Wall.

Medium Term:

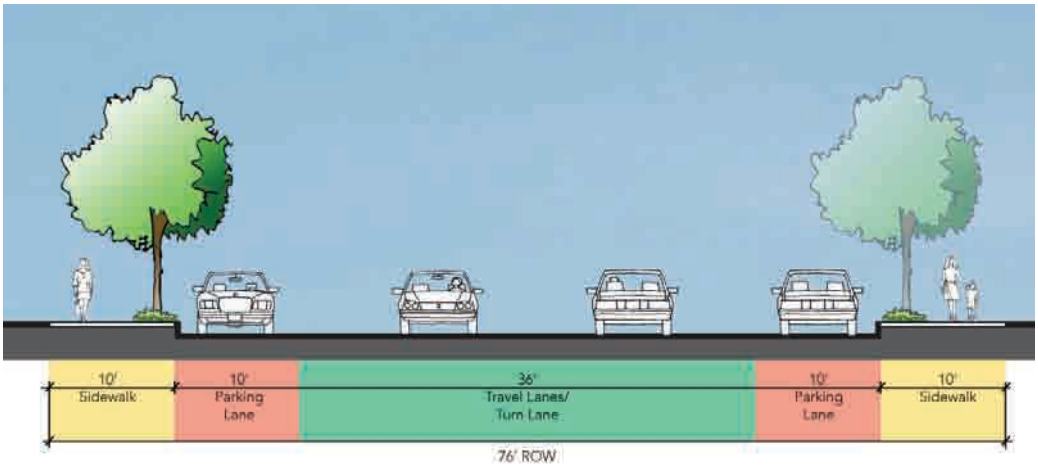
- Re-stripe the roadway from 4 to 3 lanes, from Barrett to Wall Avenue.
- Consider mini-circle or roundabout at Roosevelt Avenue and at Center Avenue.

37 Street and Roosevelt — Sample Roadway and Intersection Improvements

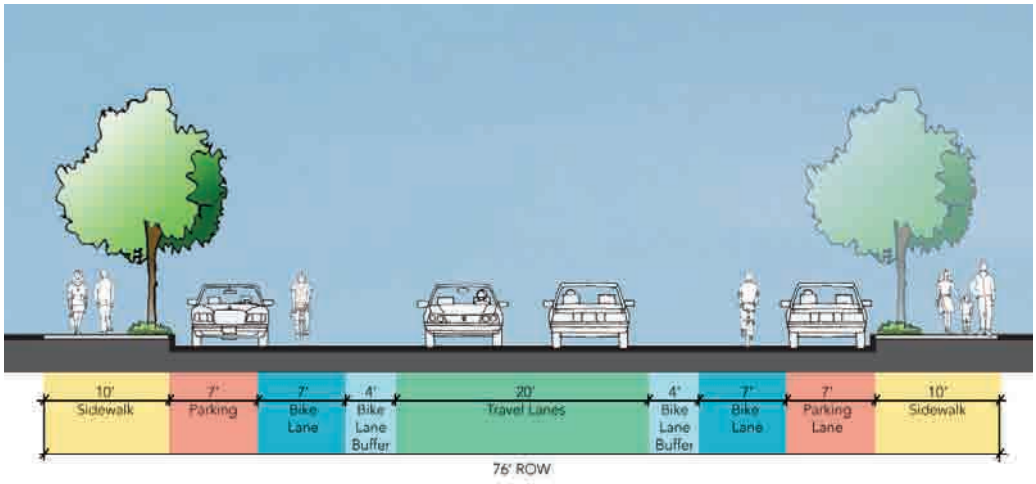
The plan view of 37th Street in the North and East neighborhood shows a road diet and typical intersection improvements. The road diet is shown with two types of treatment options: one with parallel parking and bicycle lanes buffered from traffic, and the other with angled parking. The use of angled parking on broad sections of roadway provides the twin benefits of narrowing unnecessarily wide streets and maximizing on-street parking for adjacent residences and other uses. Back-in angled parking is ideal when adjacent to a bicycle lane because motorists face the lane when exiting the space. Striped bicycle lanes adjacent to head in diagonal parking is generally not recommended.

The intersection of 37th Street and Roosevelt Avenue with a small roundabout.

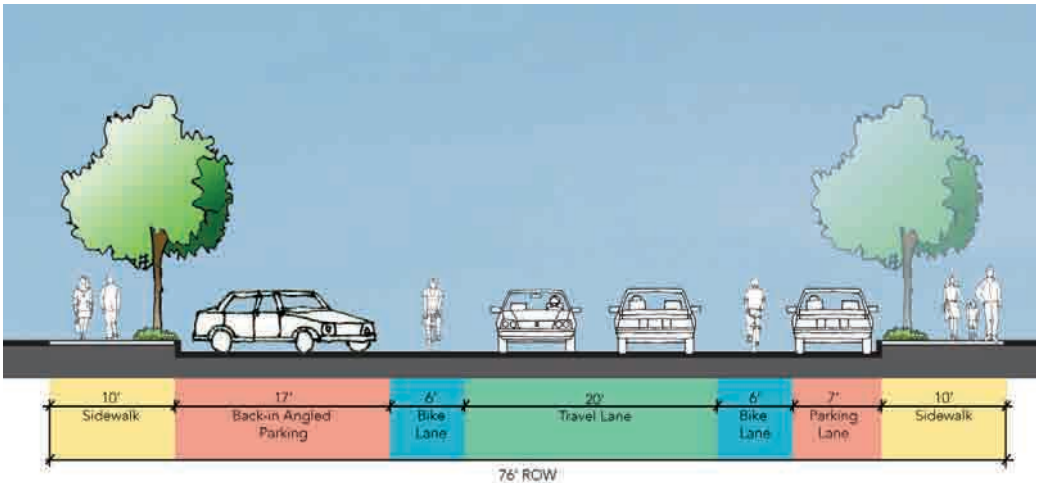
37 Street — Existing



37 Street — Proposed, Bicycle Lane with Buffer



37 Street — Proposed, Bicycle Lane with Back-in Angle Parking



San Pablo Avenue at the intersection with McBryde Avenue.

San Pablo Avenue

San Pablo Avenue extends approximately 1.25 miles within Richmond city limits. It is a busy five-lane corridor that connects cities across Contra Costa and Alameda counties and provides access to the El Cerrito Del Norte BART station at Cutting Boulevard. It runs along the eastern edge of Richmond and forms large, complex, skewed and offset intersections with cross streets such as MacBryde, Barrett, and Macdonald Avenues (and Cutting Boulevard, where it is just outside Richmond City limits and located in the City of El Cerrito). In the shorter term, improvements can be implemented to moderate speed and better accommodate pedestrians and bicyclists. Over time, intersections can be re-designed to shorten and simplify pedestrian crossings, improve traffic flow and reduce motor vehicle conflicts.

Summary of Issues

- Medium to high volumes of fast moving traffic.
- Wide, complex intersections.
- Poor pedestrian and bicycle access to eating establishments, markets, stores and services.

Proposed Improvements

Short Term:

- Install Class III facility with sharrows.
- Install pilot 5-foot wide colored lane in the center of the shared lane.

Medium Term:

- Consider narrowing inside travel lanes to 11 feet.
- Consider installation of median islands or installation of Class II bicycle lanes.
- Install pedestrian scale lighting.
- Install curb extensions and ramps.

Long Term:

- Rebuild major intersections with extended curbs and sidewalks so that streets intersect at right angles.

San Pablo Avenue and McBryde Avenue — Intersection Improvements

The plan view shows the formation of a more compact intersection with more direct routes for crossings at San Pablo Avenue and McBryde Avenue. One lane is removed in each direction on McBryde east of San Pablo, improving the alignment with McBryde west of San Pablo. Curbs and sidewalks are extended, reducing crossing distances and providing additional space that can be used for outdoor seating, landscaping or gateway elements announcing to travelers arrival in Richmond.

Local Streets

Participants at the May workshops reported unsafe speed, careless driving, and failure to yield to pedestrians are common occurrences on local residential streets. The pages that follow show proposed improvements at sample locations developed with community input from the pedestrian plan workshops. The recommendations coincide with suggested treatments for "Neighborhood Routes" as defined in the Bicycle Master Plan, which proposes a system of Neighborhood Routes along residential streets with lighter, slower moving traffic and access to local destinations such as schools and parks. These routes are relatively narrow and generally lack the space for continuous bicycle lanes. But they are appropriate for shared use of the travel way given the low volumes of traffic, as long as drivers maintain appropriate speeds.

Treatments to consider on local streets to increase pedestrian comfort and safety include:

- Traffic calming to produce uniform consistent vehicle speeds and reduce the need for stop signs at intersections. Requiring vehicles to stop frequently has the side effect of increasing exhaust emissions and noise. A vehicle traveling at a uniform speed produces less noise and air pollution than one which must brake to a stop and then accelerate to its original speed**.**
- On residential neighborhood streets where volumes are low, conversion of stop-controlled intersections to yield intersections through installation of traffic calming circles in the middle of the intersection. This technique has been used in other cities and has been shown to lower speeds and reduce crashes on residential streets. Where mini-circles are not possible (e.g., due to traffic volumes or emergency responder access needs), develop a planned pattern of alternating two-way stop signs, so that motorists travel two blocks between stops and each intersection has two stop signs..
- Roundabouts.
- Curb extensions.
- Traffic control at intersections with busy cross streets.
- High-visibility crosswalks.
- Landscaping.
- Signage and Wayfinding.

Many of these treatments are described in the previous chapter on overall recommendations. Refer also to the Design Guidelines chapter of the Bicycle Master Plan for additional bicycle-specific design details.

Pennsylvania Avenue - Peres Elementary School

Located in the northern end of the Historic Triangle neighborhood, Pennsylvania Avenue, from Harbour Way to Richmond Parkway (where it dead ends) is an example of a former arterial street that now functions as a local neighborhood street. It is very wide and has ample space that can be rededicated to create safe pedestrian and bicycle access to Peres Elementary School and the surrounding neighborhood.

Summary of Issues

- Peres Elementary School.
- Road is 4 lanes, promotes unsafe speed, enables reckless driving, and creates hazardous crossings.
- The road no longer provides through traffic to Garrard Boulevard/Richmond Parkway.
- Provides a connection to trail spurs that link to the Bay Trail system along the Richmond Parkway and North Richmond.

Proposed Improvements

Short Term:

- Re-stripe to two lanes with bike lanes, parallel parking, and angled parking in front of Peres School. Consider pilot area back-in angled parking for use in conjunction with bike lanes.
- Widen sidewalk and create formal pickup and dropoff area in front of school.

Mid Term:

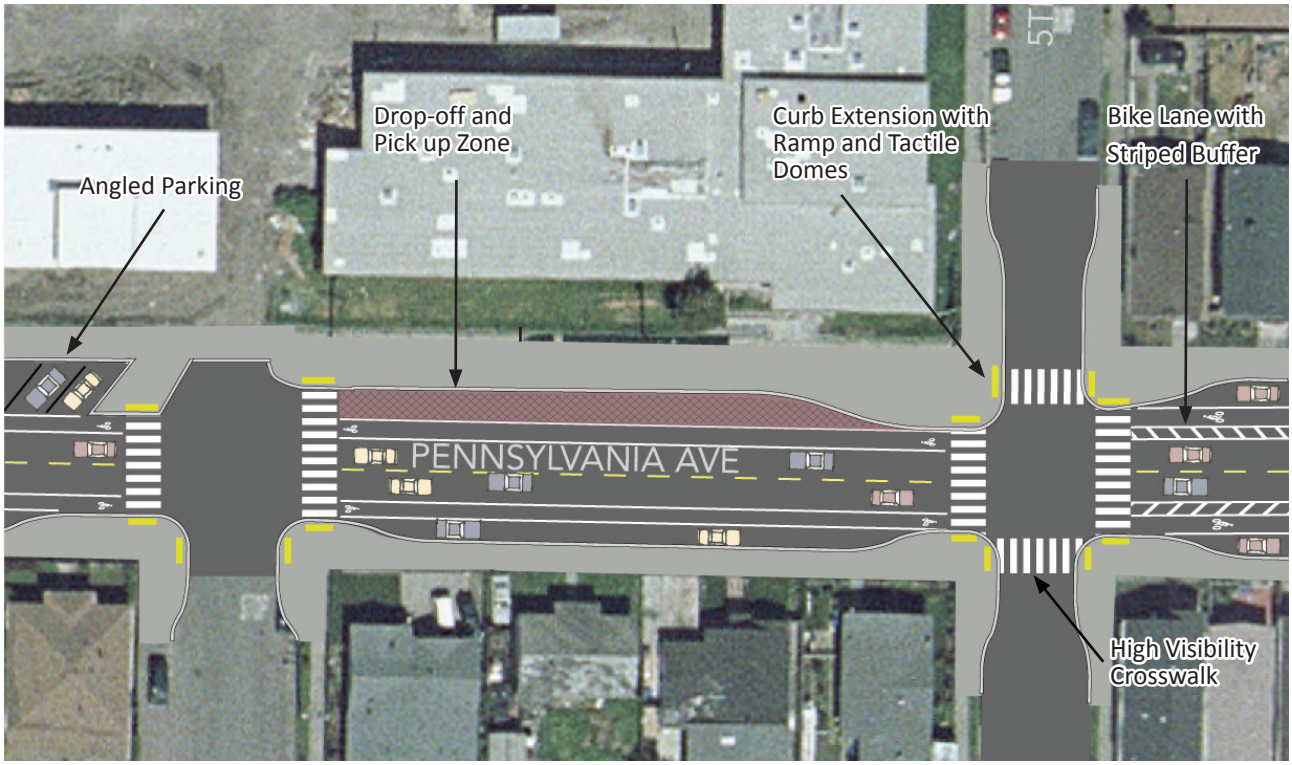
- East of 5th to 13th Street Bridge, stripe 7 foot parallel parking lanes, 7 foot bike lanes with 6 foot buffers, and 10 foot travel lanes.

Long Term:

- Consider conversion of portions east of 5th Street to angled parking on one side with a wider sidewalk to support higher intensity mixed-use infill development.

Pennsylvania Avenue Improvements - Peres School

Aerial view of Pennsylvania Avenue near Peres School as it exists today. The curb to curb road width is 62 feet.



Reducing Pennsylvania Avenue from four lanes to two lanes provides space for a wider sidewalk in front of the school, bicycle lanes that can connect to the Bay Trail system where the street terminates at the Richmond Parkway to the west, a safe drop off and pick up area in front of the school, and curb extensions for traffic calming and safer crossings.

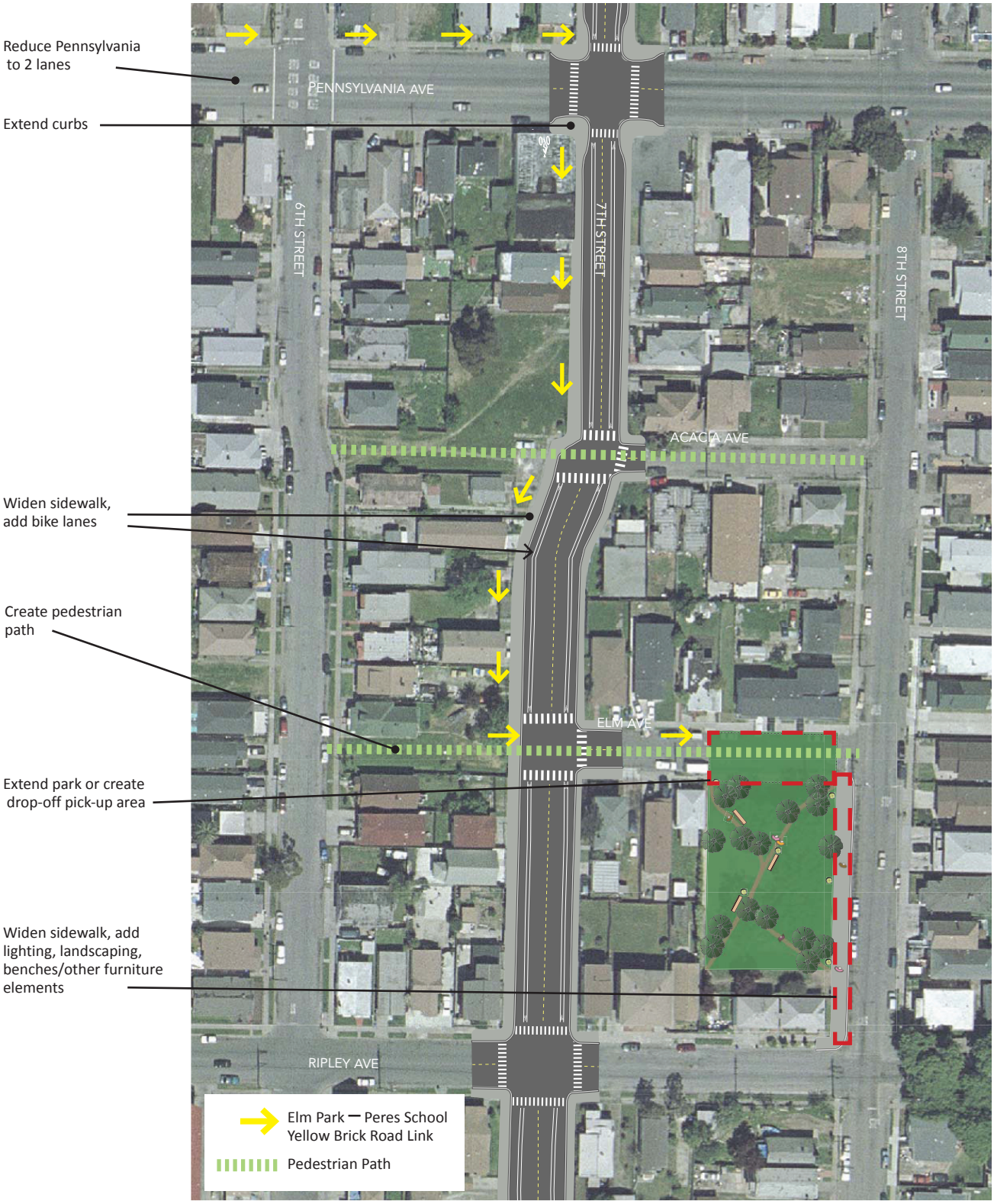
Pennsylvania Avenue and Turpin Street — Before

Crossing Improvements — After

The photo simulation shows the addition of curb extensions at the intersection of Pennsylvania Avenue and Turpin Street in front of Peres Elementary School, narrowing the travelway to encourage cautious motor speeds, shortening the crossing for school children, and adding space for street lamps and benches where pedestrians can rest and add surveillance to neighborhood surroundings.

Connecting Assets in the Historic Triangle: The Yellow Brick Road and Elm Park. With the assistance of the nonprofit organization, Opportunity West, a youth group from the Iron Triangle neighborhood conceived the idea of a "Yellow Brick Road" that would deploy thematic symbols on roads and sidewalks to designate safe walking routes and connect key community assets. An additional grass roots effort spearheaded by the local nonprofit organization Pogo Park has generated ambitious plans to transform Elm Playlot, located two blocks south of Pennsylvania Avenue, into a safe and vital public space that can serve as a model for other city parks in under-served Richmond neighborhoods. The concept on the following page illustrates improvements that build upon and reinforce these efforts.

7th Street and Elm Park Improvements



The intersection of Pennsylvania and Harbour Way produces fast -turning traffic and risky crossing conditions for pedestrians. The bridge carries four lanes of traffic that must be distributed onto two-lane roadways in the southbound and northbound direction. Channelized islands can be added to simplify crossings and reduce pedestrian exposure to traffic.

Pennsylvania Avenue and Harbour Way/13th Street Overpass

Several blocks east of Peres Elementary School, Pennsylvania Avenue terminates at the junction of Harbour Way, 10th Street and 13th Street overpass over the Union Pacific railroad, forming a wide intersection with numerous barriers for pedestrians and bicyclists. Both the intersection and the bridge can be improved to create a positive gateway into the Historic Triangle neighborhood and link to neighborhoods northeast of the railroad tracks.

Summary of Issues

- Bridge is a principal connection across railroad tracks and direct link between Belding Woods and Iron Triangle neighborhoods.
- Bridge is 4 lanes and steep with narrow shared sidewalk on only one side.
- Intersection with Harbour Way is wide, with poor site lines, especially at the southeast corner.
- Median on west side blocks the crosswalk.

Proposed Improvements

Short Term:

- Improved crosswalks, median, channelized islands and advance stop bars at Pennsylvania and Harbour Way.
- Crosswalk and ramps on southbound entry on north end of the bridge.

Mid to Long Term:

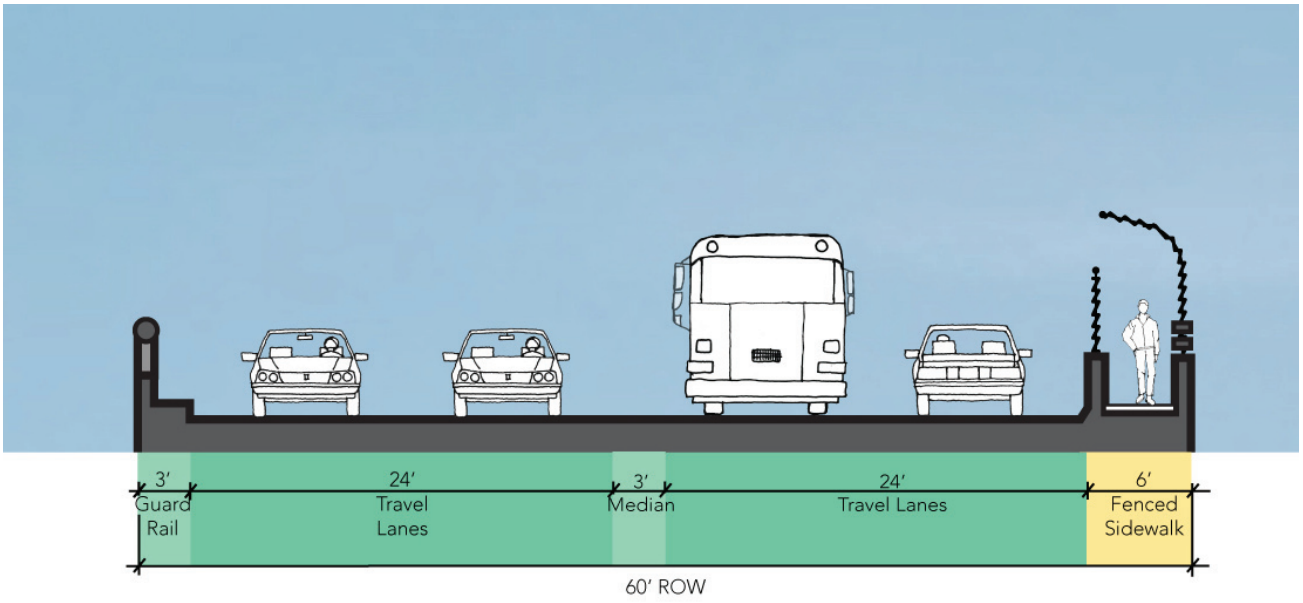
- Close right-hand turn lane on 10th Street and extend curb on northwest corner.

Long Term:

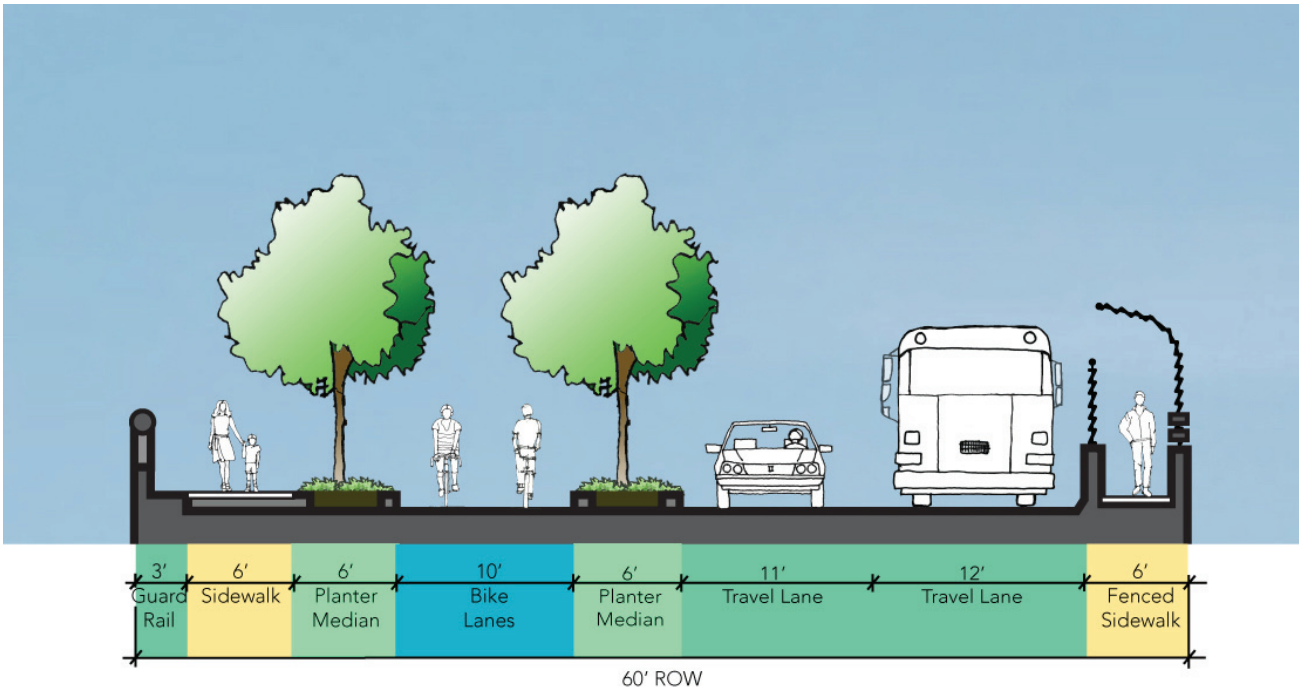
- Reduce number of lanes on bridge from 4 to 2, provide median-separated two-way bike path on northwest side of the bridge, and a median-separated 6' sidewalk on the northwest side of the bridge.
- Consider roundabout at intersection with Harbour Way/Pennsylvania.

Pennsylvania Avenue and Harbour Way/13th Street Overpass Improvements

13th Street Overpass — Existing



13th Street Overpass — Proposed



The 13th overpass provides an important route and one of the only alternatives for pedestrians and bicyclists to cross the railroad and BART service tracks. Users currently must share one path that is steep and too narrow for users to easily pass one another. The diagram above shows a concept that reduces the number of vehicle travel lanes and provides separated walkways on both sides of the overpass, and a separated bikeway. Medians can include landscaping, lighting or other decorative elements to beautify the route and strengthen the sense of security and connectivity between the neighborhoods on both sides of the overpass.

20th Street — Coronado Elementary School

20th Street in front of Coronado Elementary School is a two lane local residential street with an exceptionally wide curb to curb width of 52 feet. A diagonal diverter is installed at the intersection of 20th Street and Virginia Avenue, but traffic in front of the school remains chaotic during peak hours. The street width can be reduced through the installation of diagonal parking in front of the school, providing additional spaces for faculty and visitors during school hours. Traffic calming treatments at the intersections with Virginia Avenue and Maine Avenue can improve traffic flow and safety for school children.

Summary of Issues

- Elementary school and YMCA location.
- Very wide road.
- Opportunity for increased parking for school and residents.
- Partial road closure through angled diverter.

Proposed Improvements

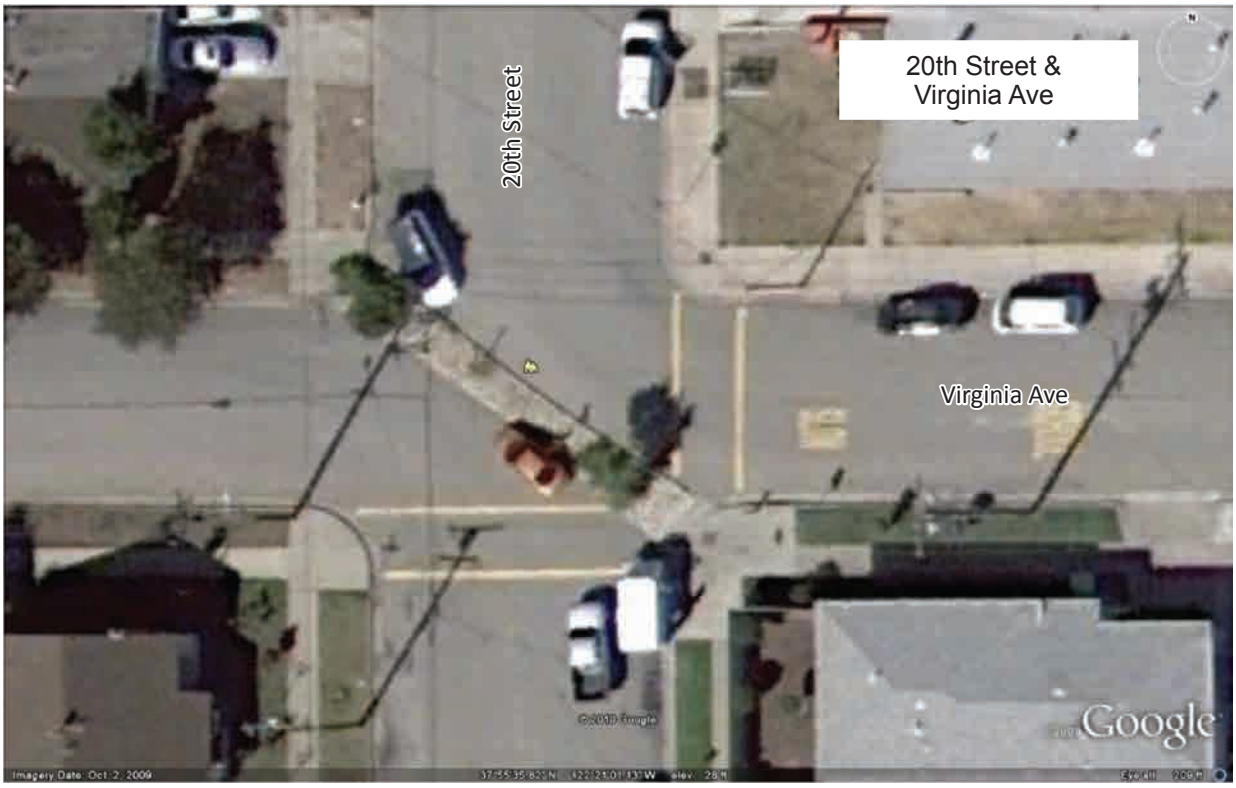
Short Term:

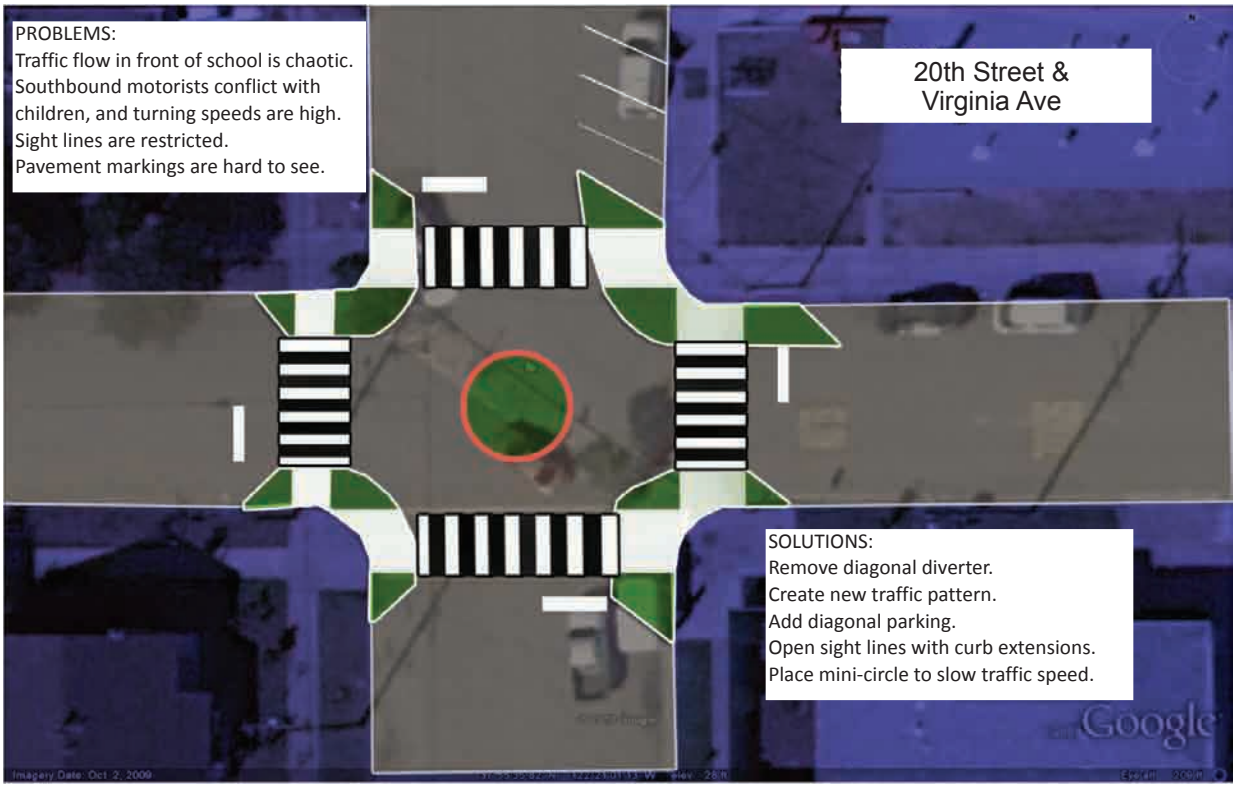
- Stripe diagonal parking in front of school. Consider back-in angled parking.
- Install high visibility crosswalk markings. Consider raised crosswalk and pavement treatments for traffic calming and heightened visibility.

Medium Term:

- Remove diverter and replace with traffic circle.
- Install corner curb extensions.

20th Street and Virginia Avenue Improvements





20th Street Improvements

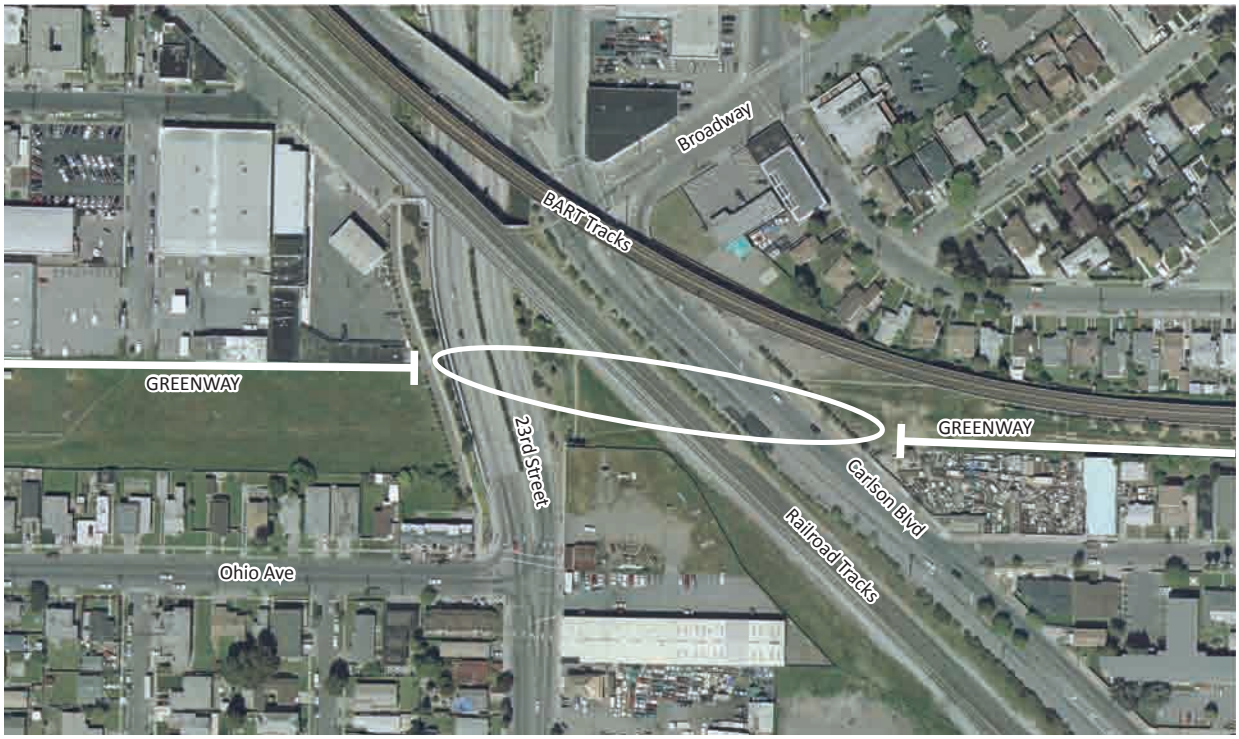
20th Street Crossing Treatments

In this photo simulation looking south on 20th Street at the intersection with Virginia Avenue, the angled diverter has been removed.

In this photo simulation looking south on 20th Street at the intersection with Virginia Avenue, a mini-circle with curb extensions and crosswalk pavement treatment are added.

Example of a raised crosswalk at a school in El Cerrito. The raised crosswalk heightens the prominence of the crossing and provides a speed table that slows motorists. A similar type of treatment could be used near schools and other locations in Richmond with high crossing demand.

View of the crosswalk from a pedestrian perspective. Note that the curb extensions were constructed separated from the existing curb to preserve existing drainage.



Trail Connectivity

The Richmond Greenway provides a consistent off-street pedestrian and bicycle route that spans the entire east-west length of Central Richmond. Planning and design is in progress for connecting the Greenway across San Pablo Avenue to the Ohlone Greenway, that follows the BART tracks south all the way to Berkeley. There is enormous opportunity for the Richmond Greenway to evolve into a highly used commute and recreational trail for walking, jogging and bicycling, to serve as a focal point for community mixing, and to stimulate new development organized around high quality open space.

The intersections of Carlson Boulevard/Broadway, the railroad tracks, and 23rd Street/Ohio Avenue comprise one of the most significant barriers to east-west pedestrian and bicycle connectivity in Central Richmond. Located just south of the Richmond BART Station and Civic Center area, this site is defined by a series of railroad and BART tracks that restrict bicycle and pedestrian access to key destinations, including the Richmond Greenway, Bay Trail, BART Station and Downtown.

The area's current configuration provides poor pedestrian and bicycle access. Both 23rd Street and Carlson Boulevard have fast-moving vehicle traffic and poor sightlines. At the Carlson Boulevard/ Broadway intersection, overhead BART tracks are supported by columns that reduce visibility around the intersection, and at-grade railroad tracks are a significant barrier to east-west connections. Additionally, 23rd Street runs below grade in this location, further limiting east-west access.

As the roadway and railroad track configuration is confusing, pedestrians and bicyclist would benefit from signage and wayfinding directing users to surrounding destinations.

The western portion of the Richmond Greenway ends at Ohio Avenue and 23rd Street, where there is little accommodation for pedestrians or bicyclists. To connect the eastern portion of the Richmond Greenway, users are supposed to travel under the railroad tracks on 23rd Street, and then loop back to the Greenway on Carlson Boulevard. This route is neither direct nor intuitive, and as a result path users often use an unmarked trail across private property and cross the railroad tracks to Carlson Boulevard. Once at Carlson Boulevard, there is no marked crosswalk or signal in this location for bicyclists and pedestrians to safely cross.

The eastern portion of the Richmond Greenway ends at Carlson Boulevard, where there is no comfortable access to and from the north. The Greenway entrance lacks a curb cut, so northbound bicyclists ride on the sidewalk, and southbound bicyclists entering the Greenway must cut across several lanes of fast moving traffic. There is also an opportunity to provide a Class I connection along the east side of Carlson Boulevard adjacent to the sidewalk, which may require right-of-way acquisition.

Proposed Improvements

Short Term:

- Improve crosswalks at the Carlson Boulevard/ Broadway intersection.
- Install Class II physically separated bike lanes on Carlson Boulevard as shown in the previous section of Key Corridors.
- Install a bike box on 23rd Street at Bissell Avenue to transition bicyclists east. Consider a two-way side path on the 23rd Street frontage road to provide a direct connection between 23rd Street bike lanes and the eastern span of the Richmond Greenway.
- Potential lane narrowing or lane reduction on Carlson Boulevard as shown in the previous section on Key Corridors.
- Install wayfinding and signage.
- Improve the Ohio Avenue crossing for pedestrians and bicyclists.

Medium Term:

- At-grade pedestrian and bicycle railroad crossing, and associated crosswalk improvements across Carlson Boulevard and 23rd Street to connect the east and west portions of the Richmond Greenway. Right-of-way acquisition may be necessary to provide a pathway connection from 23rd Street to the railroad tracks. Permission from the Public Utilities Commission to construct a new at-grade railroad crossing at this location may be difficult. This improvement should likely be considered in combination with safety enhancements of other nearby railroad crossings at Carlson Boulevard/Maine Avenue and Carlson/Cutting Boulevard.
- Install a staggered crosswalk with median refuge across Carlson Boulevard to connect to the railroad crossing.
- Construct a Class I spur path along the east side of Carlson Boulevard from the Richmond Greenway to Broadway. Right-of-way acquisition may be necessary.

Long Term:

- Grade-separated bicycle and pedestrian crossing over 23rd Street to connect the east and west portions of the Richmond Greenway.

Richmond Greenway Connection Concept

Intersection Improvements

Richmond Greenway Access: First Street to 11th Street

The diagram above and on the pages that follow depict an overall strategy to activate the area around the greenway and create more entry and exit opportunities for access, convenience, ownership, security and integration into the fabric of the surrounding neighborhoods.

Ohio Avenue, west of 23rd Street, is envisioned as a change area in the General Plan, with the potential to evolve into a revitalized corridor with a mix of uses and housing types and densities. A series of public spaces and private areas between the street and trail oriented to the Greenway will strengthen the Corridor's distinctive

Richmond Greenway Access: 11th Street to 23rd Street

character and provide a desirable context for new development.

Primary bicycle access connections to the Greenway and cross connections from the Greenway are shown, as well as important routes for pedestrian enhancements from the surrounding neighborhoods, potential pathways linking streets or walkways across the Greenway, and current or potential future direct pedestrian access points onto and off the trail.

Richmond Greenway Access: 24th to 35th Street

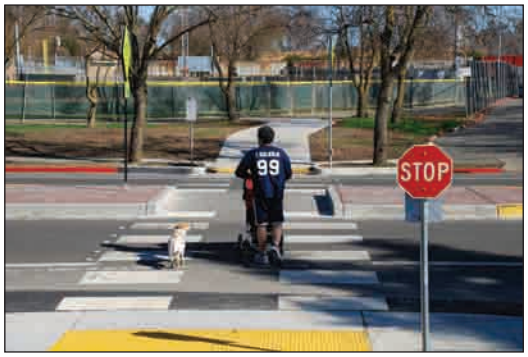
Considerations to Improve Greenway Connectivity in Central Richmond

- Maximize lateral pedestrian connections and access points to the trail.
- Improve intersection crossings.
  - Consider yield to pedestrian and bicycle controls at key crossings.
- Encourage adjacent development that spurs activity and provides oversight of the greenway.
- Establish a series of thematic and functional elements that include planting, art, seating and signs that draw people toward the greenway and extend its visibility and linkage to surrounding neighborhoods.

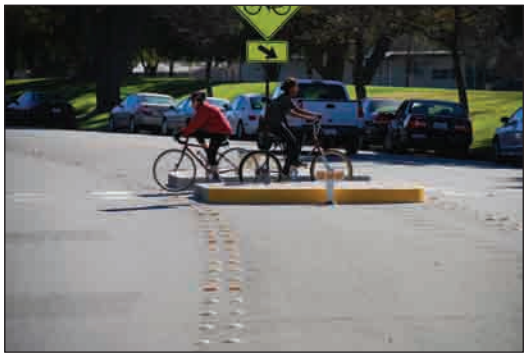
Richmond Greenway Access: 37th to 47th Street

- Complete connection of the trail from 2nd Street to the Bay Trail on Garrard Boulevard.
- Complete connection of the Greenway under I-80 and across San Pablo Avenue to the Ohlone Greenway.

This trail crossing includes low maintenance curb extensions and crossing island.



The crosswalk and island channel are wide enough for bicyclists and pedestrians to share the crossing.



The crossing width is sufficient for two bicyclists to pass one another.

Greenway Crossing at Harbour Way

Wide Greenway Trail crossing at Harbour Way.

The photo simulation shows the impact of the addition of a small median with a wider refuge area and crossing signage. The crossing island includes lean bars for bicyclists.

The photo simulation shows the crossing with the replacement of a travel lane in each direction with wider sidewalks buffered by green strips, which greatly improves the visibility to motorists of people on foot or bicycle preparing to cross. The narrowed travel way will encourage driver caution and likeliness to yield. The road diet also enables a median wide enough to accommodate landscaping.

Greenway: Ohio Avenue and 16th Street

The diagrams illustrate how an adjacent property on Ohio Avenue could be developed with space dedicated for a pedestrian path linking both ends of 16th Street across the Greenway.

The Richmond Greenway as it appears today.

Photo simulation of the Greenway with connection to perpendicular street and multi-story development fronting and overlooking the trail. Physical and visual connections between private property and public spaces will create a sense of ownership, and provide watchfulness and security.

Bay Trail Network

The San Francisco Bay Trail network in Richmond provides residents access to nature and recreation, and connects neighborhoods to valuable local and regional historical destinations and other attractions. The map on the following page shows completed and planned alignments of the Bay Trail in Richmond (see also the Existing and Proposed Bicycle Facilities Map on Page 46 of this document). Most of the existing and planned trail is off-street, while some route segments are limited to sidewalks, on-street bikeway facilities, directional and information signage and other elements.

At the time of this writing, the Trails for Richmond Action Committee (TRAC) and Association of Bay Area Governments (ABAG) trail planning staff identified several important issues and opportunities to address to enhance the system. These include:

- Address the gap between the west end of the Greenway and the Bay Trail along the Richmond Parkway. A .5 mile section of BN&SF owned railroad right of way is located between the west terminus of the Greenway at 2nd Street and the Bay Trail on Garrard Boulevard. Bike lanes on Ohio Avenue help link the gap, but the City should continue to work with BN&SF for an easement to complete the off-road Greenway alignment from Garrard to 2nd Street.

- Improve weak links between Sheridan Observation Point and Ferry Point Loop. Industrial port operations force the San Francisco Bay Trail away from the shoreline onto barren city streets between Sheridan Observation Point and the Ferry Point Loop, including Harbour Way South and Hoffman, Cutting and Canal Boulevards. There may be sufficient right-of-way on portions of these corridors to enable segments of the trailway to be constructed as a Class I separated multiuse path.

- Improve the crossings of Railroad Avenue at Richmond Avenue in Point Richmond and crossings at the intersection of Central Avenue with Rydin Road in the Southwest Richmond and Richmond Annex areas. All three crossings are wide, and the Railroad Avenue crossing also has an extraordinarily large curb radius. Railroad Avenue has heavy pedestrian use since it links Point Richmond Historic District businesses and residences with The Plunge, Washington Elementary School, the only local bank, a ball field, and Miller-Knox Regional Shoreline. The Central Avenue and Rydin Road crossings are on the busy spine of the Bay Trail linking Berkeley and Emeryville with Point Isabel Regional Shoreline and Marina Bay, thus having especially heavy commute and recreational bicycle usage in addition to pedestrians.


SAN FRANCISCO
BAY TRAIL PROJECT
Richmond
Bay Trail
Complete
Incomplete
Connector trails
Complete
Incomplete
Parks/Open Space
Water Bodies
Point Wilson
Point Pinole Regional Shoreline
UP rail corridor
Atlas Road
San Pablo Avenue
Richmond Parkway
Point San Pablo
Point San Pablo Yacht Harbor
West County Landfill
Parr
San Pablo Creek
SAN PABLO
Wildcat Creek Trail
Davis Park
Wildcat Creek Viewpoint
Gertrude
Hensley St
23rd Street
San Pablo Avenue
Point Molate
Western Drive
Pennsylvania
Castro Point
Richmond-San Rafael Bridge
Castro Street
Garrard Blvd
West Macdonald
Richmond BART Station
RICHMOND
Ohio Ave
Richmond Greenway
El Cerrito del Norte BART Station
Ohlone Greenway Trail
Chevron Long Wharf
Cutting Blvd
Hoffman
Canal
580
Marina Bay Pkwy
Keller Beach
Regatta
Marina Bay Park
Miller-Knox Regional Shoreline
Domain Dr
Seacliff Dr
Brickyard Cove
Marina Wy
Harbour Wy South
Hall
Marina Bay
Meeker Tidal Creek
80
Ferry Point
Point Potrero
Lucretia Edwards Park
Vincent Park
Shimada Park
Eastshore State Park
Central
Point Isabel Regional Shoreline
Brooks Island Regional Preserve
N
0 0.25 0.5 0.75 1
Miles
October 12, 2010

Freeway and Interchange Safety and Connectivity

Freeways and interchange areas in Richmond pose substantial obstacles for pedestrian mobility and safety. The best interchange configurations for pedestrians and bicyclists are where ramps intersect with streets at or close to a 90 degree angle and where the intersection is controlled by a stop or signal. This increases motorist awareness of speed and context when making the transition to or from a high speed environment. Tighter, sharper intersections also force drivers to slow down before turning and improve their sightlines for cross traffic of all kinds, motorist and nonmotorist alike, increasing the likelihood that they will see and yield to pedestrians and bicyclists. If an impact occurs, severity is lessened by slower speeds.

I-80 On-Ramp: Cutting Boulevard

The 2 lane on-ramp, broad, sweeping corner and crosswalk placement forces pedestrians to follow indirect route across 2 lanes of accelerating traffic.

I-80 On-Ramp: Cutting Boulevard – Proposed

The diagram illustrates changes to Cutting Boulevard and the I-80 northbound on-ramp enabling pedestrians to cross one vehicle lane prior to vehicle acceleration. Space on Cutting is also reallocated for a bike lane with reduced area of conflict between bicyclists and vehicles merging to the on-ramp.

Barrett Avenue/ Wilson Avenue/ San Pablo Avenue/I-80 Interchange

This area serves as a major interchange for vehicle traffic traveling between San Pablo Avenue (SR 123) and I-80, as well as traveling to Downtown Richmond along Barrett Avenue. There are high volumes of high-speed traffic, which present significant challenges to creating an area that is safe and comfortable for pedestrians. Regardless, many pedestrians and bicyclists use these streets, demonstrating the need for improvements. Enhancements will also create a positive and welcoming gateway into Central Richmond.

Proposed Improvements

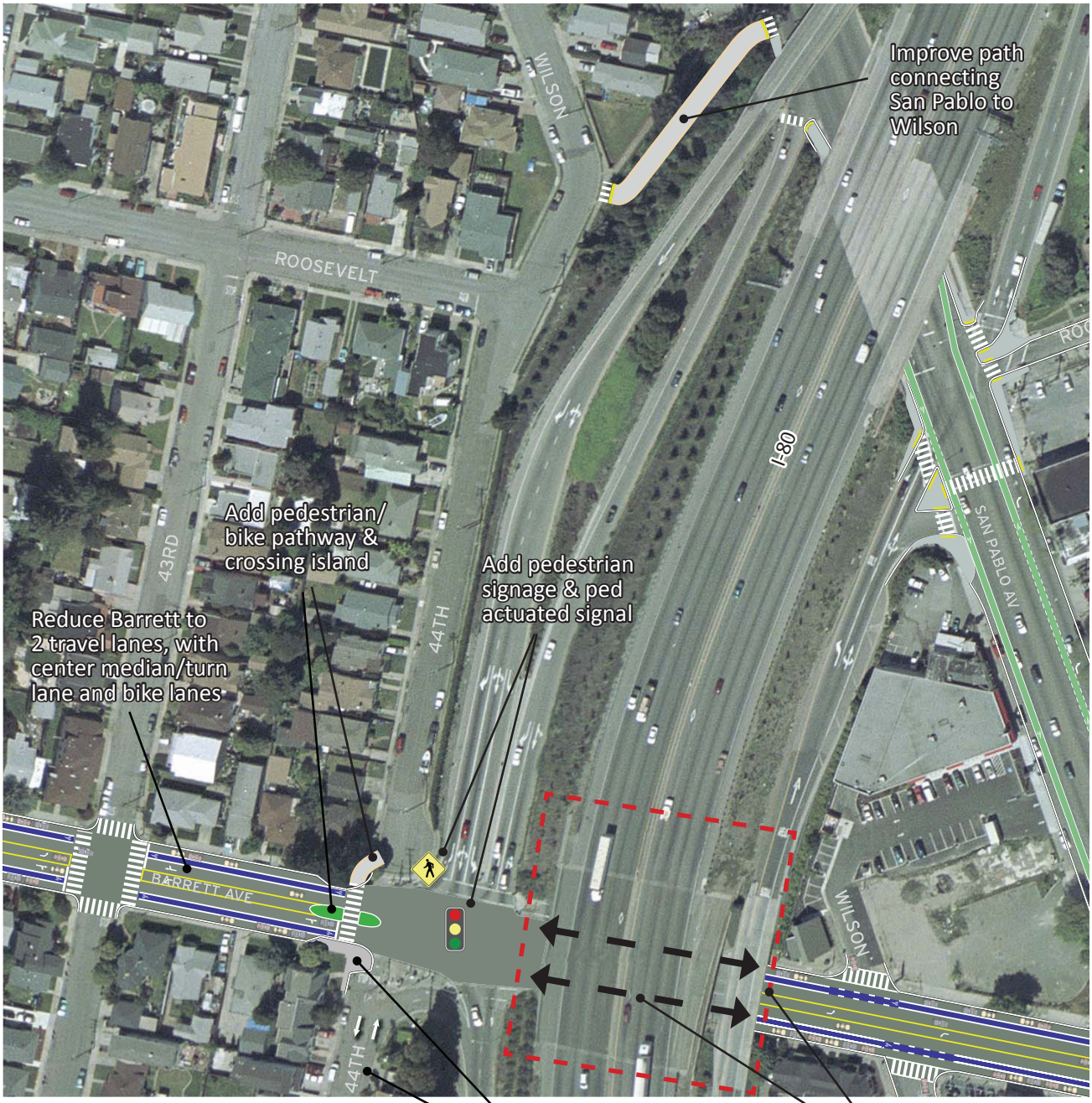
Short Term:

- Improve the pathway between Wilson Avenue and San Pablo Avenue at Roosevelt Avenue:
  - Realign the path to improve visibility and sightlines.
  - Remove debris and improve landscaping.
  - Widen the path to 10'-12'. Install ADA-accessible curb ramps.
- Install advanced pedestrian crossing signage at the southbound I-80 off-ramp onto Barrett Avenue.

Medium to Long Term:

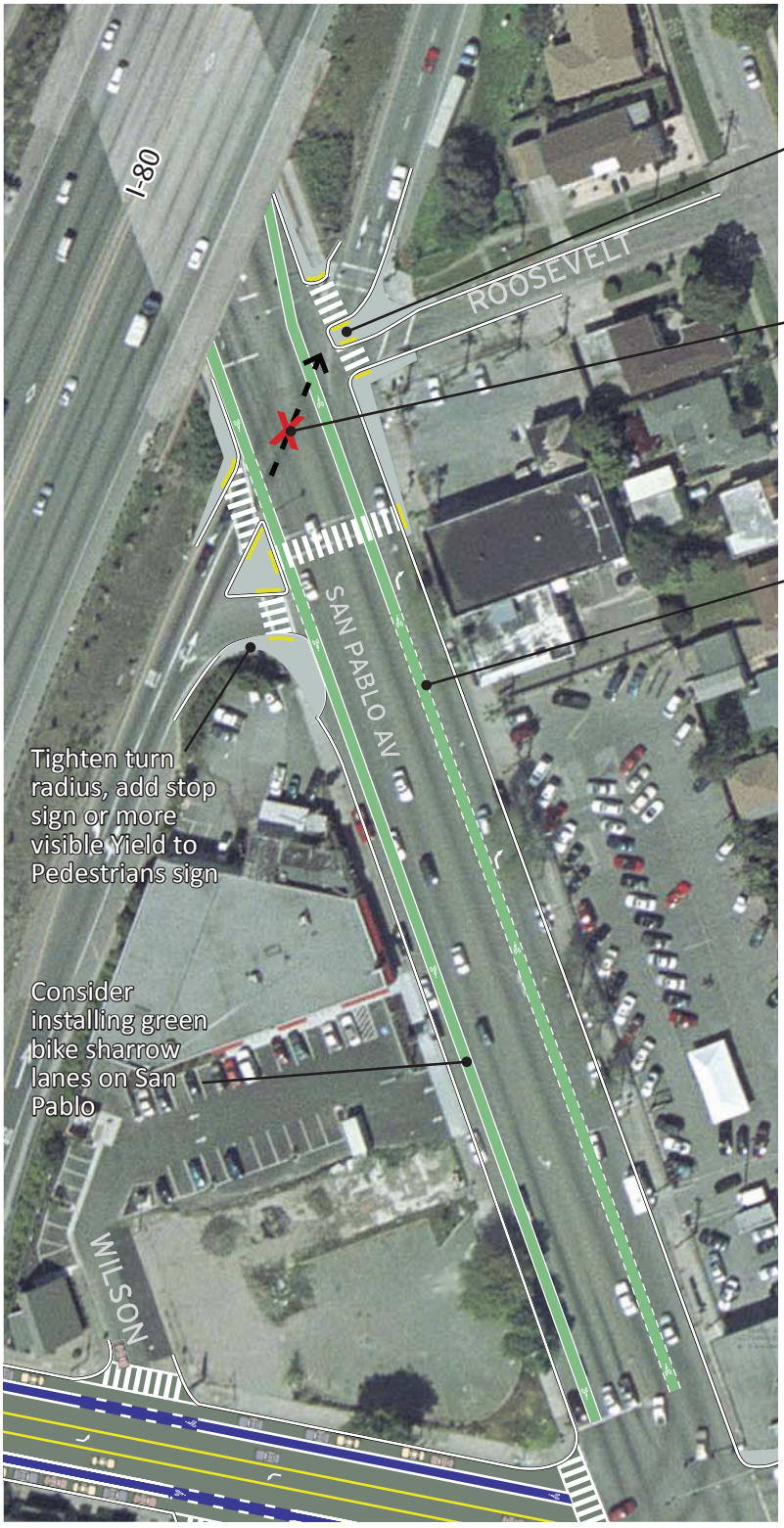
- Reduce travel lanes on Barrett Avenue and bike lanes.
- Improve pedestrian and bicycle access at the Barrett Avenue/44th Street intersection.
  - Provide pedestrian and bicycle access southbound on 44th Street across Barrett Avenue.
  - Install a crosswalk and island on the west side of Barrett Avenue.
  - Move the eastbound vehicle queue back to stop at the new crosswalk.
  - Provide a pedestrian/bicycle actuated signal with a dedicated phase.
  - Extend southwest corner of 44th and Barrett to allow right-hand turns only off of 44th Street.
- Improvements at the I-80/San Pablo Avenue/Roosevelt Avenue intersection:
  - Consider bike lanes on both sides of San Pablo Avenue. Ensure designs facilitate safe vehicle merging across bike lanes as they enter and exit I-80 from San Pablo Avenue (SR 123).
  - Consider removing the through lane from NB I-80 off-ramp to NB on-ramp and installing a median to protect pedestrians and cyclists heading north on San Pablo Avenue. Preclude the straight-across movement to the on-ramp for all except possibly emergency vehicles (aided by lights and sirens) to make this occasional movement safely.
  - Consider squaring up on-ramp configuration to slow traffic and lower pedestrian and bicycle exposure during crossings.
  - On the approach to the northbound I-80 on-ramp from San Pablo Avenue, consider eliminating the double right turn, and create room for a through bike lane, to the left of the right-turn lane.

Barrett Avenue/ Wilson Avenue/ San Pablo Avenue/I-80 Interchange
Proposed short and long term improvements



(note: the color blue is used to denote striped bike lanes for graphic legibility and not intended to stipulate installation of blue colorized lanes)

San Pablo Avenue/I-80 Interchange
Proposed improvements



6-foot painted green sharrows centered in the right travel lane on 2nd Street in Long Beach, Ca.

Marina Bay Parkway/I-580 Interchange and Harbour Way/I-580 Interchange

I-580 is a lineal barrier that severely limits pedestrian and bicycle access between downtown Richmond and residential neighborhoods and the waterfront. South 23rd Street, which becomes Marina Bay Parkway as it crosses I-580, and Harbour Way provide two of the three connections across the freeway (Marina Way providing the third). The freeway interchanges on both routes present challenges to pedestrian and bicycle safety and comfort that may deter non-motor travel to and from important amenities and destinations to the south, including the new Officer Moody Class I path, the existing Bay Trail system, Ford Peninsula and other commercial and residential areas.

Marina Bay Parkway/I-580 Interchange

Proposed Improvements

Short Term:

- Stripe and sign bike lanes along Marina Bay Parkway. Connect bike lanes to the Officer Moody Class I path at Meeker Avenue/Marina Bay Parkway intersection.
- Consider narrowing or removing travel lanes on South 23rd Street to provide a stronger bicycle and pedestrian connection to downtown Richmond.
- Stripe crosswalks at freeway ramps for pedestrian and bicycle travel across ramps. Locate crosswalks for optimal sightlines and convenience to pedestrians and bicyclists.

Medium to Long Term:

- Square the freeway off-ramps to slow speeds and improve sightlines between drivers, pedestrians and bicyclists.
- Consider installing a roundabout at Meeker Avenue.

Harbour Way/I-580 Interchange

Proposed Improvements

Short Term:

- Install high visibility crosswalks and crossing islands at intersection with Cutting Boulevard.
- Add Bicycle lanes on Harbour Way and Hoffman Boulevard.
- Install bicycle detection loops at Harbor/Hoffman intersection.

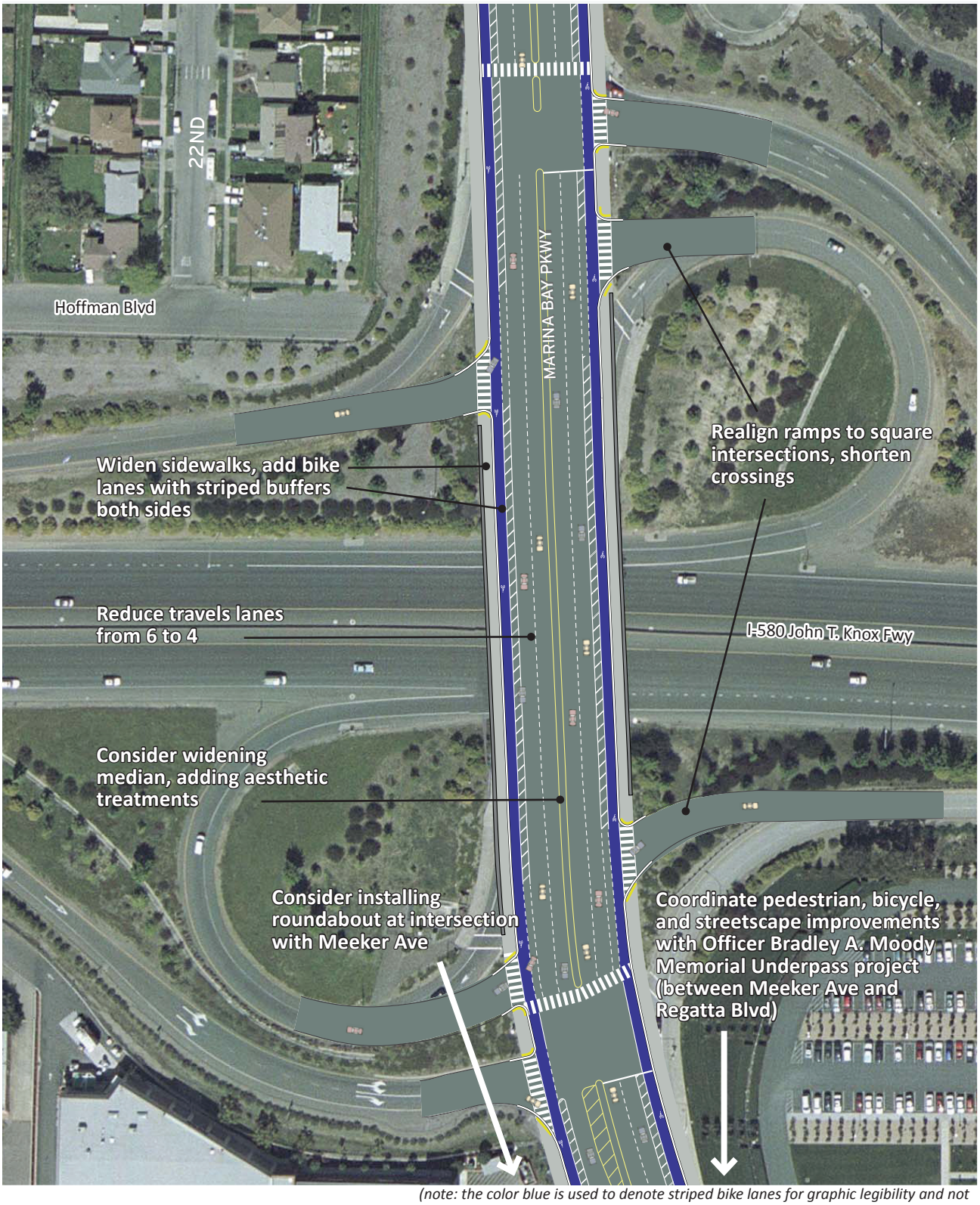
Medium Term:

- Install curb extensions and directional ramps at intersection with Cutting Boulevard.
- Widen sidewalks on Cutting Boulevard.
- Reduce the number of lanes on Cutting Boulevard.
- Tighten corners and add crosswalks at on-ramps and off-ramps.

Long Term:

- Realign ramps toward 90 degree angle to slow vehicles and improve sightlines.

Marina Parkway - I580 Interchange



(note: the color blue is used to denote striped bike lanes for graphic legibility and not intended to stipulate installation of blue colorized lanes)

Harbour Way - I580 Interchange

(note: the color blue is used to denote striped bike lanes for graphic legibility and not intended to stipulate installation of blue colorized lanes)

Proposed Overpass Improvements

Richmond residents, community leaders and participants at the Pedestrian Plan workshop have noted many challenges associated with passages under freeways, including narrow sidewalks with inadequate separation from vehicle traffic, poor illumination, and visual blight associated with overpass structures, supports and surroundings. To help address these challenges, the City Planning Division has developed a list of existing overpass conditions with proposed improvements. The list is included below and the pages that follow.

Draft Overpass Improvement Program
City of Richmond, California

Overpass:	Lighting:	Hand Railings:	Sidewalks:	Walls/Abutments:	Plantings:	Bridge Facings:
 San Pablo Avenue North of Barrett	24/7 Illumination should be installed above sidewalks.	Install pedestrian railings on both sides of the street.	Sidewalks should be widened by narrowing width of San Pablo Ave.	East side has mural by J. Wurle. West side must have similar mural.	Abutments are currently planted.	"Richmond" is painted on each facing (should be maintained).
 Barrett Avenue	24/7 Illumination should be installed above sidewalks on both sides of the street.	Install pedestrian railings on both sides of the street.	Sidewalks should be widened by installing pavers in existing area intended for planting.	Overpass rests on dirt embankments that should be covered with decorative pavers.	Areas exposed to sunlight have been planted with 'rock roses' and other plants. Palms or Redwoods should be added to create 'gateways'.	Street name should be painted on facings.
 Macdonald Avenue	Lighting was recently installed on south wall. Must also be installed on the north wall.	Bollards were installed on the south wall. Bollards or railings should be installed along the sidewalk on the south side of the street.	Sidewalk on north side of the street must be widened. Street embedded lights should be installed in the cross walk where northbound traffic exits I-80.	The south wall has an intact mural by John Wurhlie. A similar mural should be painted on the north wall.	A Coastal Redwood grove should be planted in the center of the exit circle. Redwoods should be planted on the east side of the overpass.	Street name should be painted on Facings. A second option would be to encourage vines to grow across the face of the overpass.

Draft Overpass Improvement Program
City of Richmond, California

Overpass:	Lighting:	Hand Railings:	Sidewalks:	Walls/Abutments:	Plantings:	Bridge Facings:
 **Cutting Boulevard**	24/7 Illumination needed above sidewalks.	Install pedestrian railings on both sides of the street. Add safety devices because of commute lane exit.	Sidewalks should be widened. Additional pedestrian safety devices should be installed because of commute lane exit.	The overpass rests on dirt embankments that should be covered with decorative pavers.	Some planting is already in place.	Street name or district should be painted on the bridge facings.
 **Potrero Avenue**	24/7 Illumination should be installed above sidewalks.	railings should be installed on each sidewalk to separate pedestrian and motor vehicles.	Sidewalks should be widened using decorative pavers.	The overpass rests on dirt embankments that should be covered with decorative pavers.	Some planting is already in place. Redwoods or Palms should be planted to create gateway.	Street name or district should be painted on the bridge facings.
 **Carlson Boulevard**	24/7 Illumination should be installed above sidewalks.	Install pedestrian railings on both sides of the street.	Widen sidewalks by narrowing street by 18" to 24" on each side.	Install ceramic tile murals on each concrete abutment.	Some planting is already in place. Redwoods or Palms should be planted to create gateway.	"Richmond Annex" has been painted on the facings of the bridge. This should be maintained.
 **Central Avenue**	24/7 Illumination should be installed above sidewalks.	Pedestrian railing have been installed.	Fill any available area with decorative pavers.	The overpass rests on dirt embankments that should be covered with decorative pavers.	Upgrade current planted areas.	Street name or district should be painted on the bridge facings.
 **2nd Street @ I-580**	24/7 Illumination should be installed above sidewalks	Install pedestrian railings on both sides of the street	Fill any available area with decorative pavers	The overpass rests on dirt embankments that should be covered with decorative pavers	Areas should be planted with Redwoods	Street name or district should be painted on the bridge facings
 **I-580@ Canal**	24/7 Illumination should be installed above sidewalks.	Install pedestrian railings on both sides of the street.	Fill any available area with decorative pavers.	Install ceramic tile murals on each concrete abutment.	Upgrade current planted areas.	Encourage continued growth of vines that are beginning to cover facings.

Appendix

Pedestrian Projects Prioritization

Prioritization of Capital Projects and Citywide Maintenance and Upgrades to Pedestrian Facilities

The proposed pedestrian projects, when fully implemented, will dramatically enhance the public realm in Richmond by improving safety and access for all pedestrians. However, due to limited resources, the proposed improvements need to be prioritized for implementation over the next XX years. The prioritization provided in this chapter is meant to serve as a guide to implementation. The City should pursue opportunities to implement projects through routine resurfacing or development projects as they arise, regardless of a project's place in the prioritization.

The methodology to prioritize capital projects, as well as ongoing citywide maintenance and upgrades to pedestrian facilities was developed specifically for the City of Richmond, but is similar to that used by other Bay Area agencies in their pedestrian plans. There are a total of 16 possible points based on four elements:

- Pedestrian Improvement Districts & Amenities
- Community Connectivity
- Safety
- Relative Ease of Implementation

The methodology used to score projects within each element is described below:.

Pedestrian Improvement Districts & Amenities (five points):
The Richmond General Plan identifies three Pedestrian Improvement Districts: Downtown Richmond, the Ford Peninsula in Marina Bay and the Hilltop Mall area. These are the areas where the City anticipates its highest pedestrian volumes and demand over the course of its General Plan build-out. Pedestrian demand is also relatively higher in areas located within walking distance of "amenities" including but not limited to banks, places of worship, grocery stores, retailers, cleaners, beauty salons, laundromats, libraries, offices, parks, restaurants, schools, theaters, and community centers.

- 5 points: Projects within a ¼ mile of a Pedestrian Improvement District identified in the Circulation Element of the Richmond General Plan.
- 3 points: Projects beyond a ¼ radius of a Pedestrian Improvement District identified in the Circulation Element of the General Plan, but with five or more amenities located within a ¼ mile.
- 2 points: Projects beyond a ¼ radius of a Pedestrian Improvement District, but with between two and five amenities located within a ¼ mile.
- 1 point: Projects beyond a ¼ radius of a Pedestrian Improvement District with fewer than two amenities within a ¼ mile.

Community Connectivity (three points):
This criterion evaluates the ability of a pedestrian project to provide access across major streets, to provide safe connections between activity centers, and to link neighborhoods and/or overcome physical barriers between them. A more detailed description of how each proposed project is evaluated is shown below.

- A proposed pedestrian project receives a point for each of the following conditions it meets:
  - improves access on a major arterial
  - improves access across a freeway interchange or railroad tracks
  - improves access along a bus route

Safety (three points):
The proposed methodology for assessing the safety of pedestrian projects is based on the number of pedestrian collisions on the roadway over the past five years:

- 3 points: Projects that provide pedestrian improvements on a roadway with more than four collisions per mile over the past five years.
- 2 points: Projects that provide pedestrian improvements on a roadway with two to three collisions per mile over the past five years.
- 1 point: Projects that provide pedestrian improvements on a roadway with less than one collision per mile over the past five years.

Relative Ease of Implementation (five points):
The relative ease of project implementation may be determined through a review of existing plans, field review of the study area, and level of construction required for implementation. The proposed methodology for assessing ability to implement each project is as follows:

- 5 points: High implementation ability – projects that require minimal modification of existing street layout, do not require ROW acquisition, and/or converge with the City's overall planning priorities.
- 3 points: Moderate implementation ability – projects that require moderate modifications to the existing layout.
- 1 point: Low implementation ability – projects that require major construction, ROW acquisition, or inter-jurisdictional coordination.

Capital Improvement Projects

Each of the 37 capital projects included in this Plan has short-, medium- and long-term/ opportunistic projects identified within them. Short-term improvements include basic upgrades such as crosswalk enhancements and narrowing travel lanes, and should be included in ongoing repaving projects and street improvements. Medium-term projects include more substantial changes to the existing street, such as a travel lane reduction, median construction and realigning the geometry of an intersection. Grants and redevelopment opportunities should be pursued to help fund this level of improvements. Long-term and opportunistic projects are ones that may require significant infrastructure or major funding, such as the Richmond Greenway connection at 23rd Street across the railroad tracks, or freeway ramp realignments. These projects are well suited for unique grant opportunities, as part of a seismic retrofit project, or as part of major redevelopment of an area.

The set of capital projects are then parceled into three tiers, defined by their prioritization score using the methodology described above. This list of prioritized projects is intended to be a starting point for the City to improve the pedestrian environment in central Richmond, and should be a flexible tool for the planning of new facilities. It is anticipated that as new opportunities emerge and community values shift, certain projects will become a higher priority.

Ongoing Citywide Improvements

The Pedestrian Master Plan also identifies a series of ongoing maintenance and upgrade projects for the citywide pedestrian system, such as sidewalk gap closures and repair, crosswalk installation and upgrades to pedestrian traffic control devices. To assist the City in funding and implementing a citywide program, each street in the city was evaluated and assigned a score based on the prioritization criteria described in the section above. The following graphic illustrates the first, second and third tier locations identified for pedestrian upgrades. The City may use this as a guide to allocate CIP funds or other funding for projects on an annual basis.

PRIORITIZATION OF CAPITAL IMPROVEMENTS: TIER ONE PROJECTS

	Name	From	To	Ped Districts/ Amenities	Connectivity	Safety	Relative Ease of Implementation	Prioritization Score
1	**Marina Way**	MacDonald Ave	Richmond Greenway	5	2	2	5	**14**
2	**Nevin Avenue**	13th St	9th St	5	1	2	5	**13**
3	**Richmond Greenway**	San Pablo Ave	Ohlone Greenway	4	2	2	5	**13**
4	**South 23rd Street**	Ohio Ave	Meeker Ave	4	2	1	5	**13**
5	**Barrett Avenue**	Key Blvd	Richmond Pkwy	4	2	1	5	**13**
6	**6th Street**	Maine Ave	Barrett Ave	5	1	1	5	**12**
7	**Ohio Avenue**	2nd St	1st St	5	1	1	5	**12**
8	**Harbor Way**	Macdonald Ave	Bissell	5	2	2	3	**12**
9	**Harbor Way**	Pennsylvania	Macdonald Ave	5	2	2	3	**12**
10	**Nevin Avenue**	8th St	Richmond Pkwy	4	1	1	5	**12**
11	**Harbor Way South**	Cutting Ave	Wright Ave	5	2	1	3	**11**
12	**Harbor Way South**	Bissell Ave	Cutting Ave	4	2	2	3	**11**

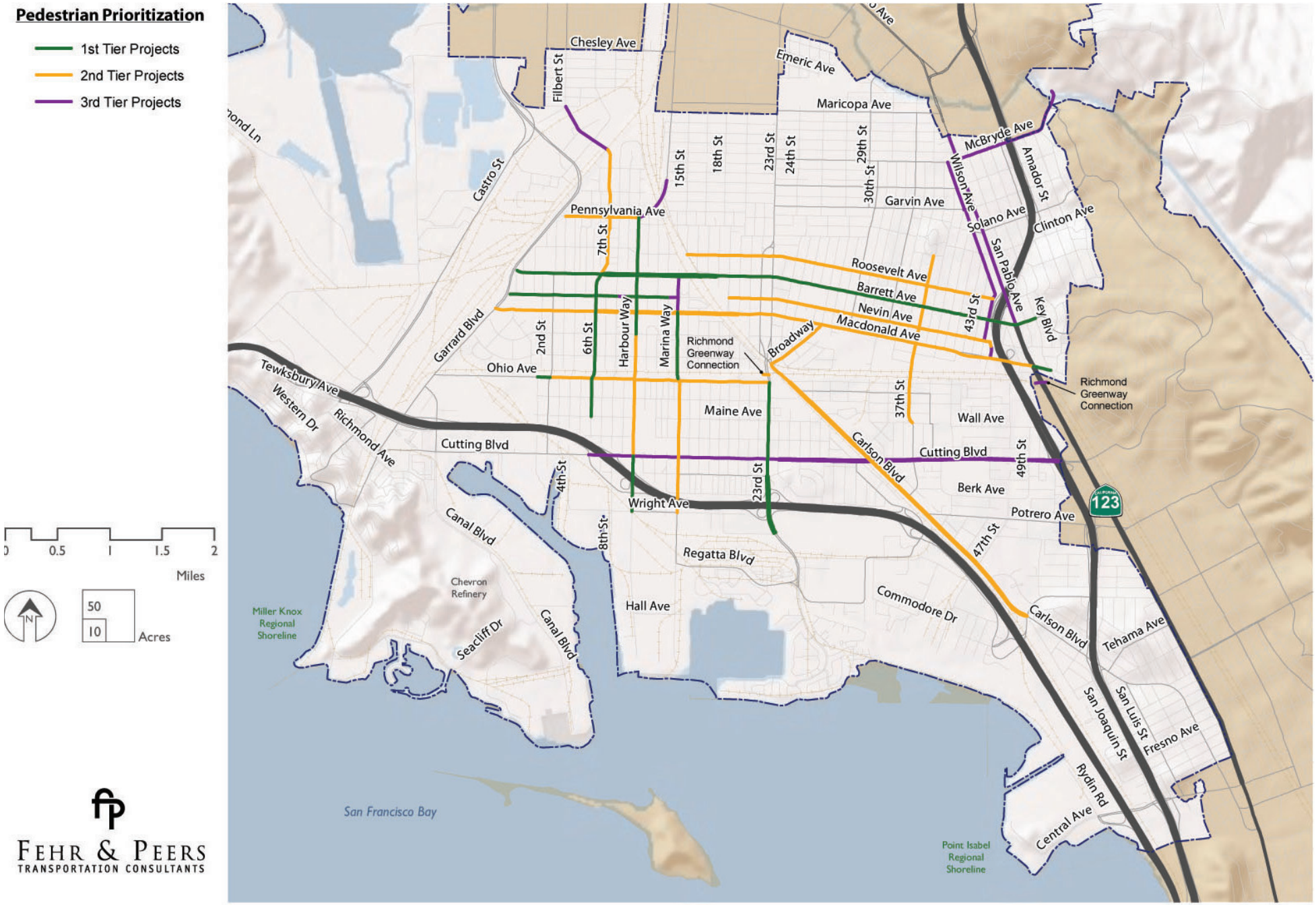
**PRIORITIZATION OF CAPITAL IMPROVEMENTS:
TIER TWO PROJECTS**

	Name	From	To	Ped Districts/ Amenities	Connectivity	Safety	Relative Ease of Implementation	Prioritization Score
13	**Nevin Avenue**	45th St	19th St	4	1	1	5	**11**
14	**Macdonald Avenue**	Richmond Pkwy	Key Blvd	4	2	2	3	**11**
15	**Marina Way**	Richmond Greenway	Wright Ave	5	2	1	3	**11**
16	**Ohio Avenue**	2nd St	23rd St	5	2	1	3	**11**
17	**Pennsylvania Avenue**	3rd St	13th St	3	2	1	5	**10**
18	**Broadway Street**	Carlson Blvd	Macdonald Ave	5	1	1	3	**10**
19	**7th Street**	Acacia Ave	Barrett Ave	5	1	1	3	**10**
20	**Richmond Greenway Access**	San Pablo Ave	1st St	5	1	1	3	**10**
21	**37th Street**	Cerrito Ave	Wall Ave	3	2	2	3	**10**
22	**7th Street**	RR track	Acacia Ave	4	1	2	3	**10**
23	**Roosevelt Avenue**	Wilson Ave	Portola Ave	4	1	1	3	**9**
24	**Carlson Blvd**	Broadway Street	Bayview Ave	3	2	1	3	**9**

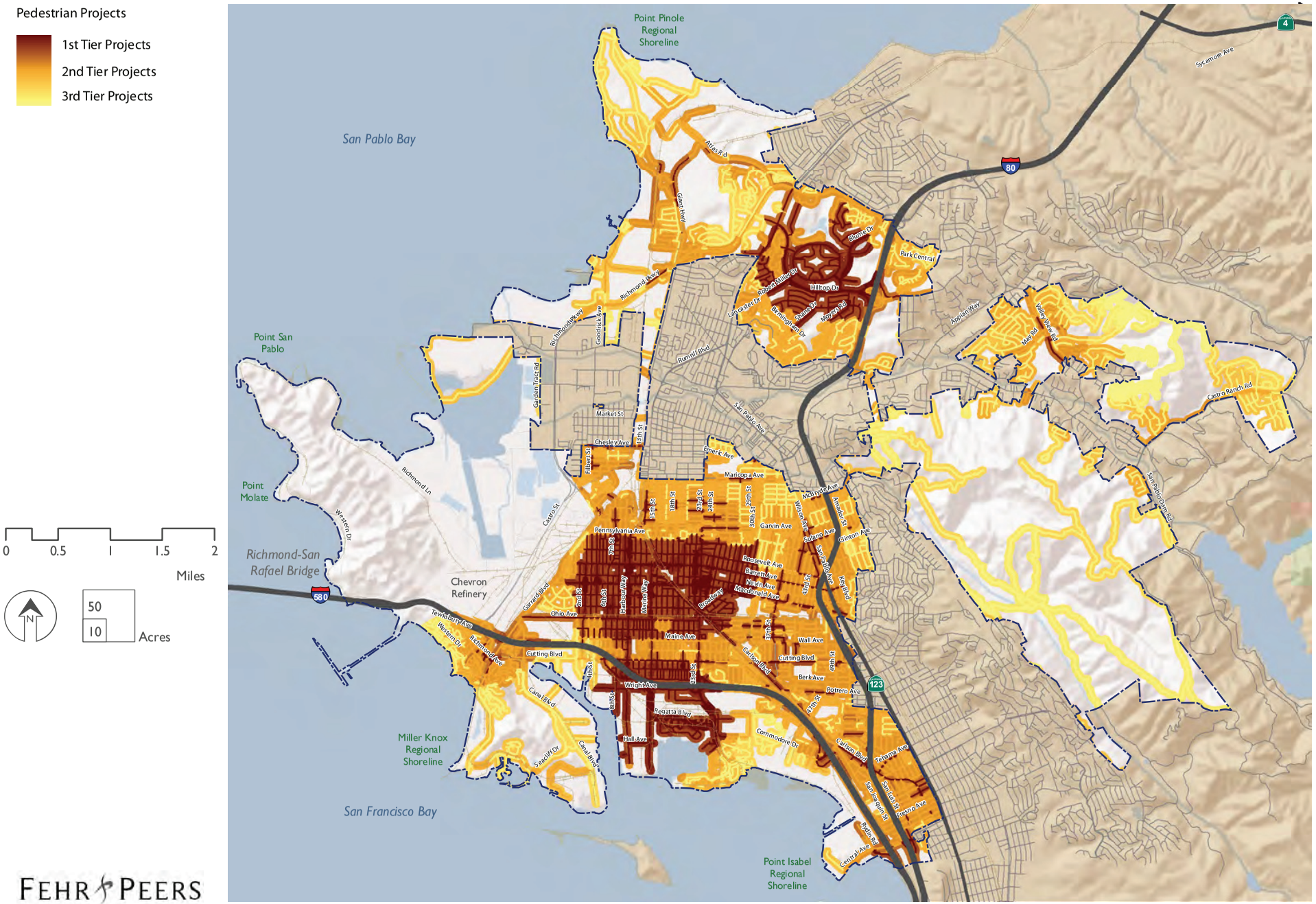
**PRIORITIZATION OF CAPITAL IMPROVEMENTS:
TIER THREE PROJECTS**

	Name	From	To	Ped Districts/ Amenities	Connectivity	Safety	Relative Ease of Implementation	Prioritization Score
27	**Marina Way**	Barrett Ave	MacDonald Ave	5	2	1		**8**
28	**Richmond Greenway**	23rd St	Carlson Blvd	3	3	1	1	**8**
29	**Cutting Blvd**	Marina Bay Pkwy	Hoffman Blvd	3	2	2	1	**7**
30	**7th Street**	Vernon Ave	RR track	2	1	1	3	**7**
31	**Cutting Blvd**	San Pablo Ave	Carlson Blvd	3	2	2	1	**7**
32	**13th Street bridge**	Pennsylvania Ave	Esmond Ave	3	2	1	1	**7**
33	**Cutting Blvd**	Carlson Blvd	Marina Bay Pkwy	2	2	1	1	**7**
34	**McBryde Avenue**	Alvarado Park	San Pablo Ave	2	2	1	1	**6**
35	**44th Street**	Wilson Ave	Nevin Ave	2	1	1	1	**5**
36	**Nevin Avenue**	Marina Way	13th St	0	0	0	3	**3**
37	**Nevin Avenue**	9th St	8th St	0	0	0	3	**3**

Central Richmond Prioritized Capital Improvement Projects



Prioritization for Ongoing Citywide Pedestrian Improvements



FEHR PEERS

Proposed Crosswalk Policy

This crosswalk policy includes a toolbox of elements to improve crosswalk visibility and safety. In addition to standard tools, the toolbox includes very promising devices, such as the HAWK Beacon and Rectangular Rapid Flashing Beacon (RRFB)[7]

This policy provides guidance about the type of treatments appropriate on various streets and under various conditions. The toolbox uses simple inputs from a field survey, such as number of lanes, posted speed, and average daily traffic, to provide a candidate crosswalk treatment at mid-block and uncontrolled locations. While these treatments represent best practice, engineering judgment should be exercised in all cases.

The main function of a crosswalk is to channelize pedestrians. Well-marked pedestrian crossings accomplish dual goals. They prepare drivers for the likelihood of encountering a pedestrian, and they create an atmosphere of walkability and accessibility for pedestrians. Marked crossings reinforce the location and legitimacy of a crossing. However, the California Vehicle Code requires vehicles to yield the right-of-way to pedestrians at any intersection where crossing is not prohibited (regardless of markings).[8] Crossing between adjacent, signalized intersections or anywhere crossing is prohibited is considered jaywalking.

While pedestrians and drivers have a responsibility to behave in accordance with the vehicle code, municipalities also have a responsibility to provide for safe crossings. This policy focuses on crosswalk treatments that will improve pedestrian safety and, in doing so, enhance pedestrian accessibility and mobility for all users.

Background

The first step in identifying candidate crosswalk locations is to identify where the "pedestrian desire lines" are located. Pedestrian desire lines are affected by local land uses (homes, schools, parks, commercial establishments, etc.) and the location of transit stops. The identification of pedestrian desire lines serves as a basis for identifying pedestrian crossing improvement areas and prioritizing such improvements, thereby creating a convenient, connected, and continuous walking environment.

The second step is identifying the locations safest for people to cross. Of all road users, pedestrians have the highest risk because they are the least protected. National statistics indicate that pedestrians represent 14 percent of all traffic incident fatalities while walking accounts for only three percent of total trips. Pedestrian collisions occur most often when a pedestrian is attempting to cross the street at an intersection or mid-block location.[9]

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7 As of November 2010, the HAWK Beacon was not yet included in the California Manual of Uniform Traffic Control Devices (CMUTCD) but was approved for use at the national level. Use of the RRFB requires permission to experiment from the FHWA and is not yet included in the California Manual of Uniform Traffic Control Devices (CMUTCD).

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

9 Pedestrian Crash Types, A 1990's Information Guide, FHWA; This paper analyzed 5,076 pedestrian crashes that occurred during the early 1990's. Crashes were evenly selected from small, medium, and large communities within six states: California, Florida, Maryland, Minnesota, North Carolina, and Utah. http://drusilla.hsrc.unc.edu/cms/downloads/PedCrashTypes1997.pdf

Several major studies of pedestrian collision rates at marked and unmarked crosswalks have been conducted. In 2002, the Federal Highway Administration (FHWA) published a comprehensive report on the relative safety of marked and unmarked crossings.[7] In 2006, another study was completed that further assists engineers and planners in selecting the right treatment for marked crosswalks based on studies of treatment effectiveness.[8] With these studies as a backdrop, this policy presents a variety of treatment options to mitigate safety, visibility, or operational concerns at specific locations.

Crosswalks at Uncontrolled Locations

Marked Crosswalks

Charts 1 and 2 on the following pages describe the recommended selection process and feasibility analysis that should be followed when considering a marked crosswalk at uncontrolled and mid-block locations. In addition to providing marked crosswalks where desire lines exist, the charts illustrate that consideration must be given to ensure adequate sight distance is provided additional enhancements are installed where safety considerations require.

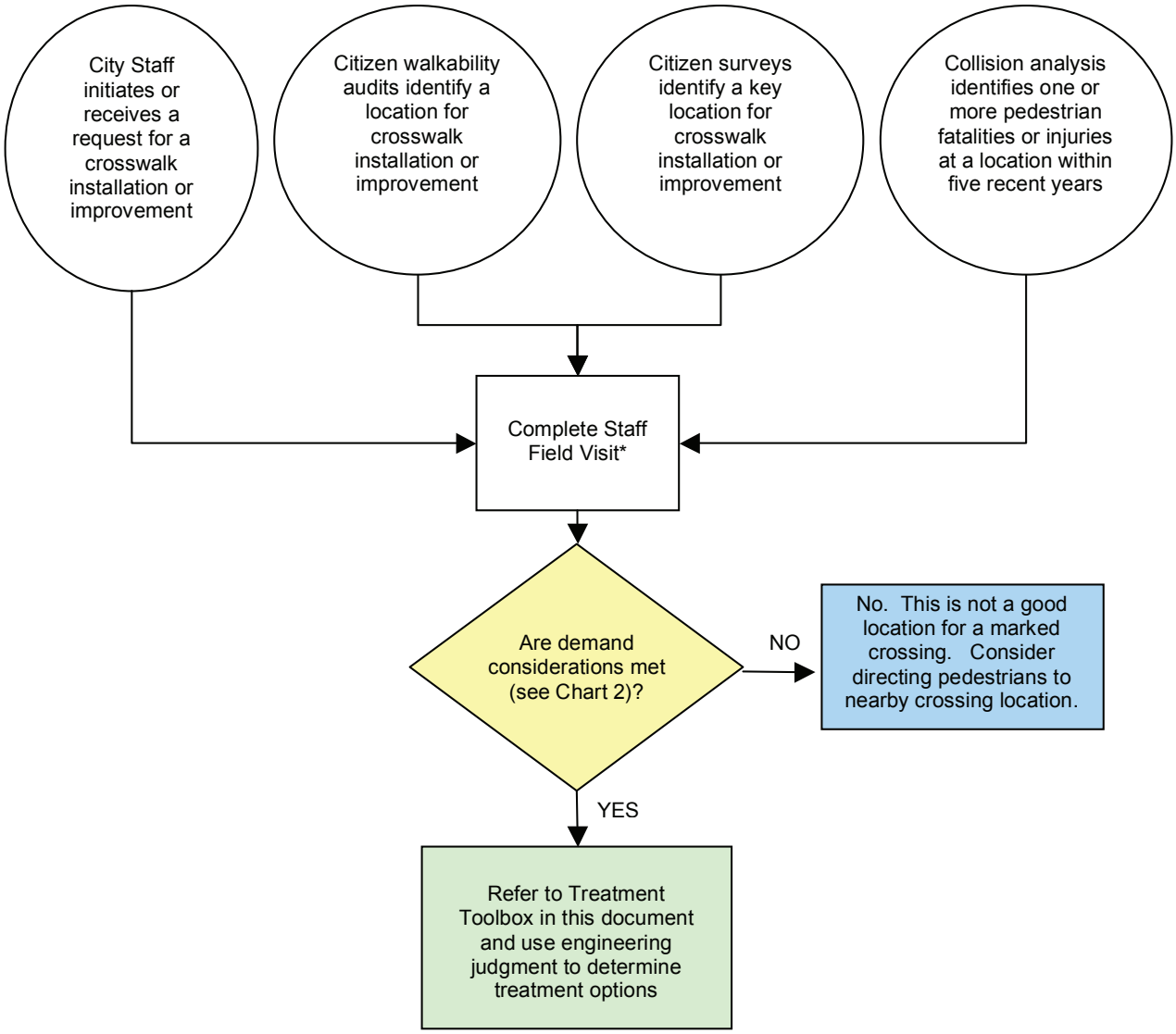
Considerations for Multi-Lane, High Volume, and/or High Speed Locations

For candidate crosswalk locations on either a multi-lane street of three or more lanes, or on two-lane streets with daily traffic volumes (ADT) greater than 12,000 or with posted speed limit exceeding 30 miles per hour, enhanced treatments beyond striping and signing may be needed. Additional funding sources should be identified as needed for these enhancements. Failing to provide an enhanced crosswalk and/or removing a crosswalk because it cannot be enhanced should be an option of last resort.

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

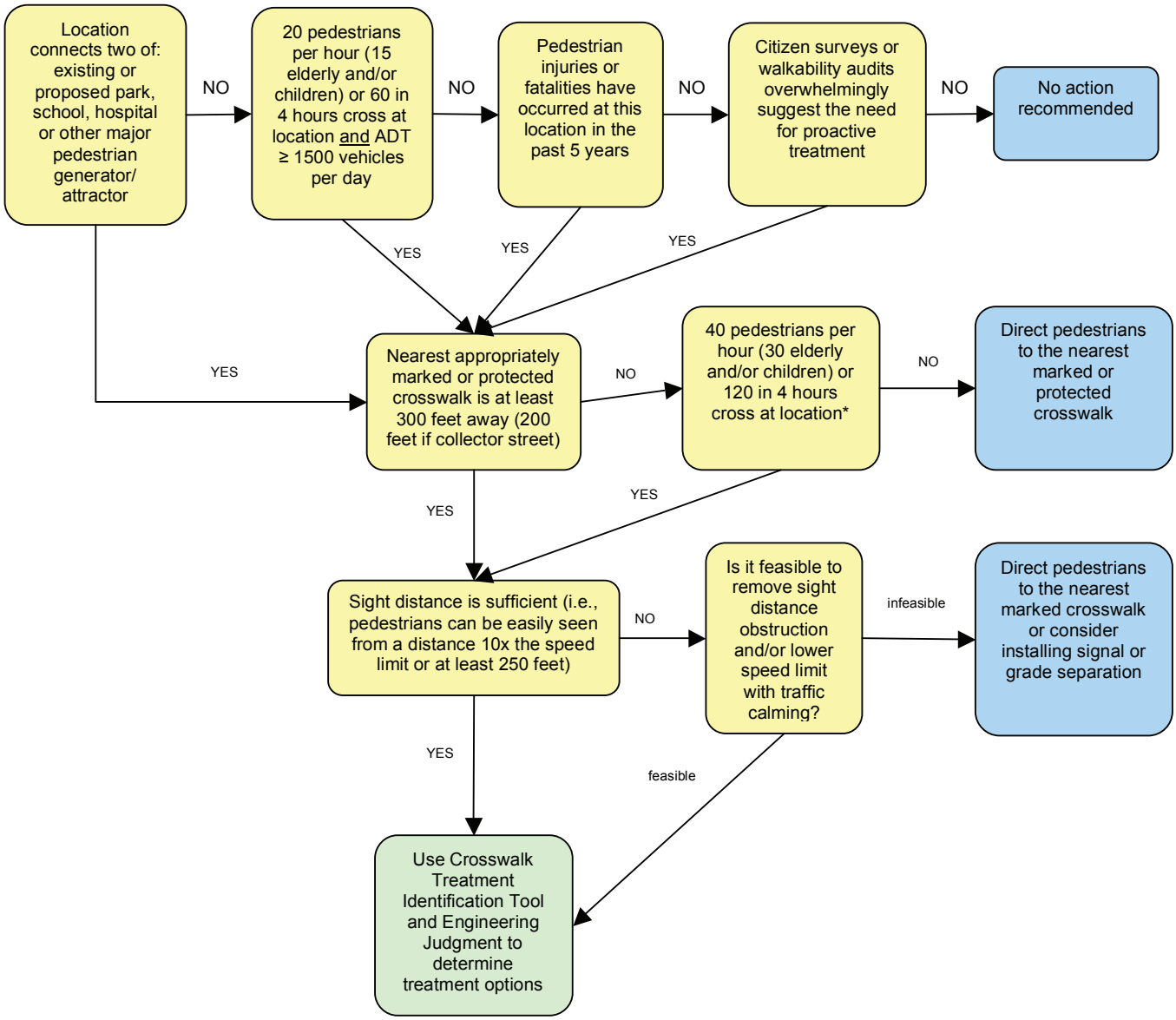
8 Fitzpatrick, Kay, et al... Improving Pedestrian Safety at Uncontrolled Crossings. TCRP Report 112/NCHRP Report 562. 2006. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_562.pdf.

Chart 1. Recommended Selection Process for Uncontrolled and Mid-Block Crosswalk Crosswalk Locations



* A field visit checklist is provided in Appendix A

Chart 2. Feasibility Analysis for Treatments at Uncontrolled Locations



* Consider lowering the volume requirements in rural locations or to meet local ranges for pedestrian volumes

Note: Where no engineering action is recommended in Chart 2, consider applicable education and enforcement efforts.

Treatment Toolbox

Based on the results of Charts 1 and 2, the procedure in this section may be used at a candidate crosswalk location to identify an appropriate crosswalk treatment. The treatment identification procedure follows a two-step process to determine a "match" for the study location characteristics. The first step is to determine if the pedestrian and vehicle volumes meet the signal warrant requirements to install a pedestrian signal. If this warrant is met, then a signal is recommended. If the warrant is not met, one or more less "intense" treatments is recommended, as described below.

A calculation of Pedestrian Level of Service (PLOS) forms the basis for treatment identification.[7] PLOS is the average delay experienced by pedestrians as they are waiting to cross the street. The average crossing speed is based on curb-to-curb width and gaps in traffic.

Expected motorist compliance is another key variable for treatment identification. Compliance is based on field observations and engineering judgment. It is meant to reflect typical motorist responses to pedestrians attempting to cross the street. If drivers are likely to stop for a pedestrian, the compliance is rated "high." If drivers rarely stop for pedestrians, compliance is rated "low." A default compliance rate of low is suggested for all locations where the speed limit is greater than 30 MPH.

A treatment matrix assigns treatment by level of enhancement needed (with the most significant enhancement required with the worst PLOS and compliance rates).

<u>Level 1 Treatments:</u>
- High Visibility Crosswalk Markings, Advance Yield Limit Lines, Advance Signage

<u>Level 2 Treatments:</u>
- Curb Extensions, Bus Bulbs, Reduced Curb Radii, Staggered Pedestrian Refuges

<u>Level 3 Treatments:</u>
- In-pavement Flashers, Overhead Flashing Beacons (two-lane roads)
- Rectangular Rapid Flashing Beacons (RRFB)* (multi-lane roads)

<u>Level 4 Treatments:</u>
- HAWK, RRFB, or Direct Pedestrians to Nearest Safe Crossing[8]

<u>Level 5 Treatments:</u>
- Signal (when warrants are met)
- Grade Separation (freeways and high speed, high volume arterials)

Descriptions for each treatment are presented in the next section. For higher levels of treatments, combinations of treatments across levels (such as a HAWK beacon with curb extensions) may be appropriate. These combinations should be determined based on site feasibility and engineering judgment.

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7 Note: This calculation requires data inputs from the Field View Checklist (see Appendix A). The pedestrian level of service calculation is set forth in the Highway Capacity Manual (HCM), published by the Transportation Research Board.

8 Not included in the current CMUTCD (however, the HAWK is included in the federal MUTCD and the RRFB has provisional approval at the federal level).

Treatment Identification Matrix for Uncontrolled Locations

PEDESTRIAN LEVEL OF SERVICE *	EXPECTED MOTORIST COMPLIANCE		
	HIGH	MODERATE	LOW (or Speed > 30 MPH)
LOS A-D (average delay up to 30 seconds)	LEVEL 1 High Visibility Crosswalk Markings, Advance Yield Lines, Advance signage	LEVEL 2 Curb Extensions, Bus Bulb, Reduced Curb Radii, Staggered Pedestrian Refuge Plus LEVEL 1	LEVEL 3 2 lane road: In-pavement flashers, overhead flashing beacons Multi-lane road: RRFB Plus LEVELS 1 AND 2
LOS E-F (average delay greater than 30 seconds)	LEVEL 2 Curb Extensions, Reduced Curb Radii, Staggered Pedestrian Refuge Plus LEVEL 1	LEVEL 3 2 lane road: In-pavement flashers, overhead flashing beacons Multi-lane road: RRFB Plus LEVELS 1 AND 2	LEVEL 4 HAWK, RRFB, or Direct Pedestrians to Nearest Safe Crossing PLUS LEVELS 1 AND 2

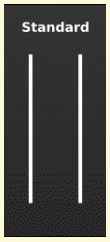
* Based on the pedestrian level of service criteria as defined in the 2000 Highway Capacity Manual, Table 18-13 (LOS Criteria for Pedestrians at Unsignalized Intersections) for average delay/pedestrian, where delay is calculated as a function of vehicle flow rates and critical gaps (which are a function of walking speed, crosswalk length, and startup and end clearance times).

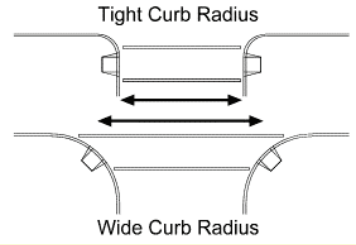
Notes:

- A Pedestrian Refuge Island is recommended for consideration in all scenarios where at least six feet of right-of-way is available.
- A Road Diet is recommended for consideration in all scenarios with four or more lanes of traffic and a daily traffic volume of less than 16,000 vehicles (ADT). Streets with ADT between 16,000 and 20,000 are also candidates for road diets, but require additional study.

Candidate Treatment Options

The following table provides a summary of the treatments toolbox. Additional fact sheets and case studies for many of these treatments are included in the NHCRP 562 Report at http://trb.org/publications/nchrp/nchrp _rpt_562.pdf or the Pedestrian Bicycle Information Center at http://www.walkinginfo.org/.

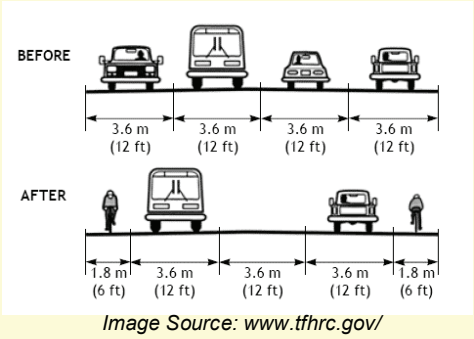
CROSSWALK TREATMENTS			
Measure	**Description**	**Benefits**	**Application**
Level 1			
Marked Crosswalk  *Image source: www.walkinginfo.org/pedsafe/*	Marked crosswalks should be installed to provide designated pedestrian crossings at major pedestrian generators, crossings with significant pedestrian volumes (at least 15 per hour), crossings with high vehicle-pedestrian collisions, and other areas based on engineering judgment	Marked crosswalks provide a designated crossing, which may improve walkability by signaling a clear "channel" for pedestrian pathways to both pedestrians and vehicles.	Marked crosswalks alone should not be installed on multi-lane roads with more than about 10,000 vehicles/ day. Enhanced crosswalk treatments (as presented in this table) should supplement the marked crosswalk.
High-Visibility Signs and Markings  *Image source: exodusinnovations.com*	High-visibility markings include a family of crosswalk striping styles such as the "ladder" and the "continental." High-visibility fluorescent yellow green signs are made of the approved fluorescent yellow-green color and posted at crossings to increase the visibility of a pedestrian crossing.	Increases the visibility of a pedestrian crossing. Beneficial in areas with high pedestrian activity, as near schools, and in areas where travel speeds are high and/or motorist visibility is low.	High visibility crosswalk striping (ladder or triple four style) should be used for all uncontrolled marked crosswalks. Yellow paint must be used for all crosswalks within 200 feet of a school. High visibility signs should be used in areas with frequent pedestrian activity.
Advanced Yield or Stop Lines  *Image source: www.saferoutesinfo.org*	Standard white stop or yield limit lines are placed in advance of marked, uncontrolled crosswalks. Stop or yield lines are determined based on state vehicle codes (requiring the driver to either stop or yield to the pedestrian).	This measure increases the pedestrian's visibility to motorists, reduces the number of vehicles encroaching on the crosswalk, and improves general pedestrian conditions on multi-lane roadways. It is also an affordable option.	Useful in areas where pedestrian visibility is low and in areas with aggressive drivers, as advance limit lines will help prevent drivers from encroaching on the crosswalk. Addresses the multiple-threat collision on multi-lane roads.

CROSSWALK TREATMENTS			
Measure	**Description**	**Benefits**	**Application**
In-Street Pedestrian Crossing Signs  *Image source: www.seton.com*	This measure involves posting regulatory pedestrian signage on lane edge lines and road centerlines. The In-Street Pedestrian Crossing sign may be used to remind road users of laws regarding right of way at an unsignalized pedestrian crossing. The legend STATE LAW may be shown at the top of the sign if applicable. The legends STOP FOR or YIELD TO may be used in conjunction with the appropriate symbol.	This measure is highly visible to motorists and has a positive impact on pedestrian safety at crosswalks.	Mid-block crosswalks, unsignalized intersections, low-speed areas, and two-lane roadways are ideal for this pedestrian treatment. The STOP FOR legend shall only be used in states where the state law specifically requires that a driver must stop for a pedestrian in a crosswalk.
Level 2			
Curb Extension/ Bulb Outs  *Image source: Dan Burden*	Also known as a pedestrian bulb-out, this traffic-calming measure is meant to slow traffic and increase driver awareness. It consists of an extension of the curb into the street, making the pedestrian space (sidewalk) wider.	Curb extensions narrow the distance that a pedestrian has to cross and increases the sidewalk space on the corners. They also improve emergency vehicle access and make it difficult for drivers to turn illegally.	Due to the high cost of installation, this tool would only be suitable on streets with high pedestrian activity, on-street parking, and infrequent (or no) curb-edge transit service. It is often used in combination with crosswalks or other markings.
Reduced Curb Radii  *Image Source: www.ci.austin.tx.us*	The radius of a curb can be reduced to require motorists to make a tighter turn.	Shorter radii narrow the distance that pedestrians have to cross; they also reduce traffic speeds and increase driver awareness (like curb extensions), but are less difficult and expensive to implement.	This measure would be beneficial on streets with high pedestrian activity, on-street parking, and no curb-edge transit service. It is more suitable for wider roadways and roadways with low volumes of heavy truck traffic.

CROSSWALK TREATMENTS			
Measure	**Description**	**Benefits**	**Application**
Staggered Median Pedestrian Island  *Image Source: www.tfhrc.gov/*	This measure is similar to traditional median refuge islands; the only difference is that the crosswalks in the roadway are staggered such that a pedestrian crosses half the street and then must walk towards traffic to reach the second half of the crosswalk. This measure must be designed for accessibility by including rails and truncated domes to direct sight-impaired pedestrians along the path of travel.	Benefits of this tool include an increase in the concentration of pedestrians at a crossing and the provision of better traffic views for pedestrians. Additionally, motorists are better able to see pedestrians as they walk through the staggered refuge.	Best used on multi-lane roads with obstructed pedestrian visibility or with off-set intersections
Level 3			
In-Roadway Warning Lights  *Image Source: www.tfhrc.gov/*	Both sides of a crosswalk are lined with pavement markers, often containing an amber LED strobe light. The lights may be push-button activated or activated with pedestrian detection.	This measure provides a dynamic visual cue, and is increasingly effective in bad weather	Best in locations with low bicycle ridership, as the raised markers present a hazard to bicyclists. May not be appropriate in areas with heavy winter weather due to high maintenance costs. May not be appropriate for locations with bright sunlight. The lights may cause confusion when pedestrians fail to activate them and/or when they falsely activate.
Overhead Flashing Beacons  *Image source: tti.tamu.edu*	Flashing amber lights are installed on overhead signs, in advance of the crosswalk or at the entrance to the crosswalk.	The blinking lights during pedestrian crossing times increase the number of drivers yielding for pedestrians and reduce pedestrian-vehicle conflicts. This measure can also improve conditions on multi-lane roadways.	Best used in places where motorists cannot see a traditional sign due to topography or other barriers.

CROSSWALK TREATMENTS			
Measure	**Description**	**Benefits**	**Application**
Stutter Flash*  *Image source: mutcd.fhwa.dot.gov*	The Overhead Flashing Beacon is enhanced by replacing the traditional slow flashing incandescent lamps with rapid flashing LED lamps. The beacons may be push-button activated or activated with pedestrian detection.	Initial studies suggest the stutter flash is very effective as measured by increased driver yielding behavior. Solar panels reduce energy costs associated with the device.	Appropriate for multi-lane roadways.
Level 4			
Hawk Beacon Signal*  *Image Source: www.tfhrc.gov/*	HAWK (High Intensity Activated Crosswalks) are pedestrian-actuated signals that are a combination of a beacon flasher and a traffic control signal. When actuated, HAWK displays a yellow (warning) indication followed by a solid red light. During pedestrian clearance, the driver sees a flashing red "wig-wag" pattern until the clearance interval has ended and the signal goes dark.	Reduces pedestrian-vehicle conflicts and slows traffic speeds	Useful in areas where it is difficult for pedestrians to find gaps in automobile traffic to cross safely, but where normal signal warrants are not satisfied. Appropriate for multi-lane roadways.
Level 5			
Traffic Signal  *Image source: www.livablestreets.com*	Conventional traffic control devices with warrants for use based on the Manual on Uniform Control Devices (MUTCD)	Reduces pedestrian-vehicle conflicts and slows traffic speeds	Must meet warrants based on traffic and pedestrian volumes; however, exceptions are possible based on demonstrated pedestrian safety concerns (collision history)

* Treatment not included in the current version of the CMUTCD

CROSSWALK TREATMENTS			
Measure	**Description**	**Benefits**	**Application**
Pedestrian Overpass/ Underpass  *Image source: omahamidcenturymodern.blogsome.com*	This measure consists of a pedestrian-only overpass or underpass over a roadway. It provides complete separation of pedestrians from motor vehicle traffic, normally where no other pedestrian facility is available, and connects off-road trails and paths across major barriers.	Pedestrian overpasses and underpasses allow for the uninterrupted flow of pedestrian movement separate from the vehicle traffic. However, for underpasses, security is known to be a major issue.	This measure is most appropriate in extreme cases where pedestrians must cross roadways such as freeways and high-speed, high-volume arterials. Use of either type of facility falls off rapidly when the additional time required for use amounts to 20% or more of the time required to cross at grade. This measure should be considered only with further study.
Consider for All Multi-Lane Roads			
Road Diet (aka Lane Reduction)  *Image Source: www.tfhrc.gov/*	The number of lanes of travel is reduced by widening sidewalks, adding bicycle and parking lanes, and converting parallel parking to angled or perpendicular parking.	This is a good traffic calming and pedestrian safety tool, particularly in areas that would benefit from curb extensions but have infrastructure in the way. This measure also improves pedestrian conditions on multi-lane roadways.	Roadways with surplus roadway capacity (typically multi-lane roadways with less than 20,000 ADT) and high bicycle volumes, and roadways that would benefit from traffic calming measures.
Consider for All Scenarios			
Median Pedestrian Island  *Image source: http://thegoodcity.wordpress.com/category/transportation/*	Raised islands are placed in the center of a roadway, separating opposing lanes of traffic with cutouts for accessibility along the pedestrian path.	The refuge allows pedestrians to focus on each direction of traffic separately, and provides them with a better view of oncoming traffic as well as allowing drivers to see them more easily. It can also split up a multi-lane road and supplement other pedestrian tools.	Recommended for multi-lane roads wide enough to accommodate an ADA-accessible median

Pedestrian Plan Action Steps

Task Type	Task	Lead City Agency/ Partner	Timeline	Relative Cost*	Relative Priority	Plan Chapter
Proposed Site Improvements						
Near-term Projects	Identify priority projects for implementation and pursue funding for design and construction.	Planning Engineering Redevelopment	1-5 years	$-$$$$	Tier 1: High Tier 2: Medium Tier 3: Low	Chapter 3: 50–106 Appx: A-2–A-7
Medium-Term Projects	Ensure that medium-term projects are considered as new funding sources, redevelopment or other opportunities arise.	Planning, Engineering, Redevelopment	6-10 years	$-$$$$	Tier 1: High Tier 2: Medium Tier 3: Low	Chapter 3: 50–106 Appx: A-2–A-7
Long-term/ Opportunistic Projects	Ensure that long-term projects are considered as new funding sources, redevelopment or other opportunities arise.	Planning Engineering Redevelopment	Ongoing-Long-term	$-$$$$	Tier 1: High Tier 2: Medium Tier 3: Low	Chapter 3: 50–106 Appx: A-2–A-7
Project Prioritization	Reevaluate the prioritization of projects as facilities are constructed, new opportunities arise, and priorities shift over time.	Planning RBPAC	Annual	$	Moderate	Appx: A-2–A-7
Repaving	Coordinate repaving projects with proposed on-street, curb ramp, and crosswalk improvements; prioritize repaving on streets with existing and proposed facilities with poor pavement conditions.	Planning Engineering	Ongoing	$	High	Chapter 2, Chapter 3: 50–106 Appx: A-2–A-7, A-8–A-18
Richmond Greenway Maintenance and Operations	Collaborate with Rails to Trails to seek grant funding for a focused study on construction practices and materials, and maintenance and operations to help the City deter crime and vandalism.	Planning Rails to Trails Conservancy Groundwork Richmond	Short-term	$	Medium	Chapter 3: 88–97
Bay Trail Gaps	Support and coordinate with TRAC and ABAG to address gaps and improvements to the Bay Trail.	Planning Redevelopment ABAG TRAC	Ongoing	$	Medium	Chapter 3: 88–99
Regional Coordination	Coordinate with CCTA, WCCTAC, and neighboring jurisdictions to ensure a continuous and connected on-street and off-street pedestrian and bicycle network throughout West County.	Planning WCCTAC	Ongoing	$	Medium	N/A
Collisions						
SWITRS Reports	Obtain and make available to the public standardized SWITRS reports for collisions in Richmond involving pedestrians and bicyclists for the latest available calendar year.	Police	Annual	$	High	N/A
Trends	Analyze collision trends from SWITRS reports and include the information in an annual traffic safety report.	Engineering	Annual	$	Medium	N/A
Hot Spots	Create and analyze maps of collision locations, and seek solutions to any newly identified collision hotspots.	Engineering	Annual	$	High	Chapter 1: 4
Support Programs						
Educational Campaign	Develop and deliver bilingual educational campaigns with motorist, pedestrian and bicycling safety and share-the-road messages.	Engineering Dept, Police Dept	Annual	$	High	N/A

Task Type	Task	Lead City Agency/ Partner	Timeline	Relative Cost*	Relative Priority	Plan Chapter
Neighborhood Walk Audits and Clean-ups	Conduct neighborhood walk audits and clean-up campaigns with residents to assess walking conditions, identify safety and infrastructure problems, and encourage property owners and tenants to keep parked vehicles, plants, weeds, and other debris from blocking walkways	Police Code Enforcement Unit Engineering Community Organizations Neighborhood Councils	Annual	$	Medium	Chapter 2: 32–36
Encouragement Programs and Events	Partner with the school district and community groups on Safe Routes to School, guided walks, runs or rides, and other efforts to promote walking and bicycling among students, young adults, families and seniors of all abilities.	Planning Engineering Contra Costa County Health Services Community Organizations School District	Ongoing	$	Medium	N/A
Code Enforcement	Give warnings and cite vehicles illegally parked on sidewalks in driveways and other areas.	Police Code Enforcement Unit	Ongoing	$	High	Chapter 2: 32–36
Bicycle Patrol Unit	Provide adequate funding for a bicycle patrol unit.	Police	Annual	$$	Low	N/A
Policy						
Complete Streets	Adopt a complete streets policy to ensure roadway design and operation with all users in mind.	Planning Engineering	Short to mid-term	$$	Medium	Chapter 2: 17–18
Development Code Update	Update standards in the subdivision and zoning codes to implement citywide recommendations in coordination with the required code update following adoption of the new General Plan.	Planning	Short to mid-term	$[1]	Medium	Chapter 2
Engineering Standards	Review, update and develop relevant engineering standard plans and specifications to implement citywide recommendations.	Engineering	Short-term/ Ongoing	$$	Medium	Chapter 2 Chapter 3
Crosswalk Policy	Adopt criteria, procedures and consistent standards for pedestrian crossing treatments.	Engineering	Short-term	$	High	Appx: A-8–A-18
Street Trees and Landscaping Guidelines and Standards	Develop citywide guidelines and standards for trees and green stormwater drainage and treatment strategies in streets, parking lots and sidewalk areas.	Planning Engineering Parks and Public Landscaping	Short-term	$$[2]	Medium	Chapter 2: 39–41
General Plan Policies	Conduct a detailed review of relevant policies and actions in the General Plan, and develop implementation mechanisms for any not addressed in the Pedestrian Plan or through other City plans and processes.	Planning	Short- to medium-term	$	Medium	Circulation, Land Use and Urban Design, Health and Wellness, Community Facilities and Infrastructure Elements

[1] Cost is folded into the cost of the required comprehensive zoning code update to ensure zoning code consistency with new General Plan. In addition, the City is approved for funding from a Proposition 84 Sustainable Communities Grant that can aid this effort; however, funding at the time of this writing is contingent upon sell of State bonds for the grant program.

[2] The City is approved for funding from a Proposition 84 Urban Greening Grant that can aid this effort; however, funding at the time of this writing is contingent upon sell of State bonds for the grant program.

Task Type	Task	Lead City Agency/ Partner	Timeline	Relative Cost*	Relative Priority	Plan Chapter
Bicycle Master Plan	Coordinate Pedestrian Plan recommendations with Bicycle Master Plan implementation to ensure that walking and bicycle improvements complement one another.	Citywide	Ongoing	$	High	Richmond Bicycle Master Plan
RBPAC	Examine RBPAC membership and expand to ensure representative community cross-section of pedestrian mobility needs and concerns.	Planning	Short-term	$	High	N/A
Staff Coordinator	Seek funds to hire a part- to full-time pedestrian and bicycle coordinator to oversee and pursue funding for projects set forth in the Pedestrian and Bicycle Plans, and support interdepartmental and interagency coordination on walking and biking issues and infrastructure.	TBD	Ongoing	$$	High	N/A
Public Input	Develop gradations of public notification and outreach corresponding to the scope and level of street improvement projects.[3]	Engineering	Short-term	$	Low	N/A

*Estimated Order of Magnitude Cost: $ = <$50K, $$ = $50K-$200K, $$$ = $200K-$500K, $$$$ = >$500K

[3] The Community Participation Chapter of the Draft Richmond Parks Master Plan includes recommendations and a matrix of types of public input targeted for different types of projects that could be used for guidance for repaving, striping, and more intensive roadway and streetscape projects.

FEHR & PEERS
TRANSPORTATION CONSULTANTS

MEMORANDUM

Date: July 22, 2010

To: Josh Meyer, Local Government Commission

From: Brooke DuBose and Ryan McClain, Fehr & Peers

Subject: ***Cutting Boulevard/Carlson Boulevard Roundabout Concept***

WC07-2478

Fehr & Peers performed a conceptual level feasibility assessment of replacing the signalized Cutting Boulevard/Carlson Boulevard intersection with a roundabout. This assessment included a basic intersection operations analysis and conceptual layout. This memorandum summarizes our results.

Background

Cutting Boulevard and Carlson Boulevard are currently four-lane roads, with left-turn pockets at the intersection. The roads intersect at a 45 degree angle, creating a skewed intersection. Potential road diets would reduce both of these roadways to two lanes. For the purposes of the roundabout analysis, it was assumed that the road diets would be in place.

Union Pacific rail lines run parallel to Carlson Boulevard in the project area. Cutting Boulevard crosses the tracks approximately 75 feet west of the study intersection. Additionally, there is frequent truck traffic through the intersection serving industrial and commercial uses.

Existing pedestrian facilities include a sidewalk on the east side of Carlson Boulevard, and on the north and south sides of Cutting Boulevard. Crosswalks are provided across the south, east, and north legs of the intersection.

Traffic Operations

For operational analysis, existing peak hour traffic volumes were obtained from the 2006 Richmond *General Plan* project documents. The SimTraffic microsimulation software and NCHRP 572 methodology were both used for this analysis, which we have found provide a conservative assessment. The impacts of the railroad crossing were not included in this operational analysis. Initial analysis of a single lane roundabout resulted in the following:

- Acceptable operations during the AM peak hour
- The eastbound approach fails during the PM peak hour with queues extending over a half mile and delay of 10 minutes per vehicle

With the resulting failure of the eastbound approach, a second eastbound lane was added. This provides a second entry lane, a second circulating lane, and a second exit lane for eastbound through traffic. With the additional lane, the roundabout performed acceptably in both the AM and PM peak hours. We estimate that the extents of the second eastbound travel lane would be from

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S. 31st Street to Stege Avenue/S. 34th Street. Additional analysis would be needed to refine the projected capacity needed for the eastbound direction.

Conceptual Roundabout Design

A conceptual roundabout layout incorporating the second eastbound lane is shown in Figure 1. This design provides an inscribed diameter of 100 feet for the single lane section and 130 feet for the two lane section. Right turn slip lanes are provided at the 45 degree approaches to provide for truck turns. This design accommodates a WB-40 (45.5 foot-long) semitrailer. Mountable curbs at several locations would be required for larger vehicles since a larger diameter roundabout is not feasible at this location.

Typically, a roundabout would have two lanes in both directions (e.g. the eastbound and westbound directions.) However, in this case the buildings in the northeast quadrant limit the available space for a second lane in the westbound direction, and the operations analysis does not indicate a need for a second lane.

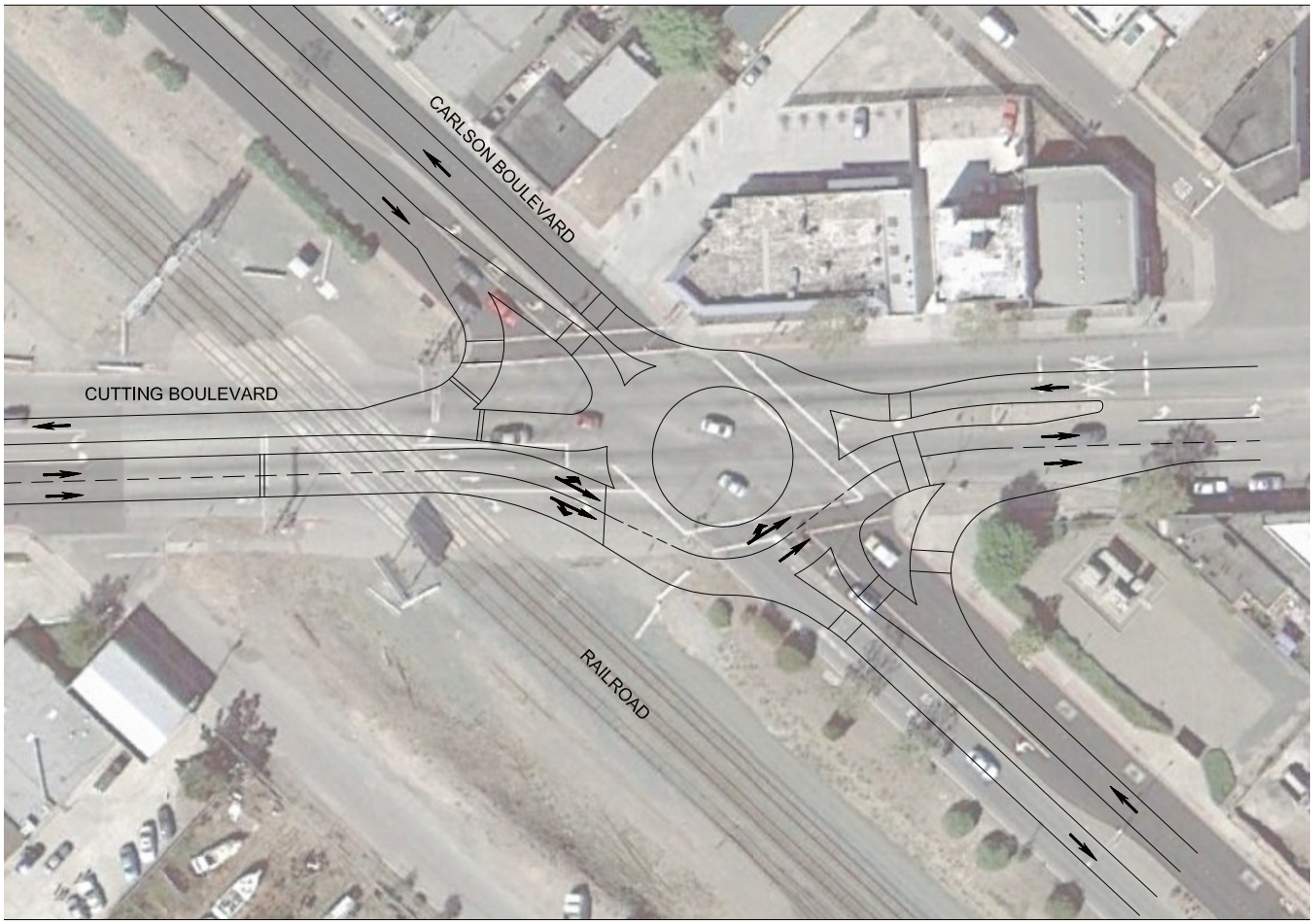
Similar to existing conditions, a crosswalk is not proposed for the west leg of the intersection. A crosswalk at this location would place pedestrians very close to the railroad tracks on the south side of the roadway, which may present safety concerns. With limited pedestrian destinations on the west side of the intersection, the crosswalks on the remaining three legs and at S. 31st Street should sufficiently accommodate pedestrian access.

The eastbound railroad crossing arm could remain in the existing location with this proposed design. We recommend moving the westbound crossing arm to the east, away from the railroad, and providing crossing arms for both the slip lane and the roundabout exit lane. Right-of-way from the railroad would be needed in the southwest quadrant of the intersection as shown in Figure 1.

Next Steps

Following are our recommended next steps. The feasibility and acceptability of a roundabout at this location can be reevaluated at the end of each step.

- Refine conceptual geometric design, including fastest path analysis, sidewalks, and right-of-way impacts. A topographic survey showing existing curb lines, railroad, and right-of-way is recommended.
- Approach Public Utilities Commission (PUC) with concept design and our approach to operational analysis with the railroad crossing.
- Based on feedback from PUC, perform detailed simulation with railroad crossing.
- Receive approval from PUC.
- Complete construction document package, including plans, specifications, and cost estimate.



FEHR & PEERS
TRANSPORTATION CONSULTANTS

CUTTING BOULEVARD/CARLSON BOULEVARD INTERSECTION
CONCEPTUAL ROUNDABOUT

Jurisdictions with Complete Streets Policies

updated: 02/03/10

Source: Completestreets.org

Policies Collected	State	County	Regional/MPO	City
Legislation / Ordinance	California Colorado Connecticut Florida Illinois Hawaii Massachusetts Maryland Michigan Minnesota Oregon Puerto Rico Rhode Island Vermont Wisconsin	Montgomery County, MD Salt Lake County, UT		Airway Heights, WA Albert Lea, MN Buffalo, NY Charlotte, NC Columbia, MO Columbus, MS Crystal City, MO DeSoto, MO Dexter, MI Ferguson, MO Ferndale, MI Hernando, MS Honlulu, HI Houghton, MI Issaquah, WA Kirkland, WA Lansing, MI North Myrtle Beach, SC Redmond, WA Renton, WA Roanoke, VA Saline, MI Salt Lake City, UT San Francisco, CA* San Francisco, CA* Seattle, WA Sedro-Woolley, WA St. Louis, MO Taylor, MI Tupelo, MS University Place, WA
Tax Ordinance		Sacramento County, CA San Diego County, CA		Seattle, WA
Internal Policy	California Colorado Louisiana Mississippi New Jersey North Carolina Pennsylvania Tennessee Virginia	Cobb County, GA Cook County, IL Hennepin County, MN Johnson County, IA Marin County, CA	Anderson, IN MPO (MCCOG) Bloomington, IN MPO (BMCMPO) Boise, ID MPO (COMPASS) Cleveland, OH MPO (NOACA) Columbus, OH MPO (MORPC) Dayton, OH MPO (MVPC) Fargo-Moorhead ND, MN (Metro COG) Portage, IN (NIRPC) Quad Cities, IA/IL MPO (Bi-State RPC) Wilmington, DE (WILMAPCO)	Coeur d'Alene, ID Chicago, IL Las Cruces, NM Midland, MI Rochester, MN Rockville, MD Washington, DC
Executive Orders	Delaware			Nashville, TN Philadelphia, PA Salt Lake City, UT
Plans		Arlington County, VA Washtenaw County, MI	Austin, TX MPO (CAMPO) Birmingham, AL MPO (PCGB) Cheyenne, WY MPO	Bloomington, MN Boulder, CO Champain, IL

Complete Streets - Current Policies **updated: 02/03/10**

For more information, visit www.completestreets.org

Plans, cont.			Kansas City, MO (MARC) Pensacola, FL TPO (FATPO) Madison, WI MPO (MATPB) St. Joseph, MO MPO (SJATS) St. Louis, MO MPO (EWGCOG) Savannah, GA MPO (CORE)	Colorado Springs, CO Columbus, IN Decatur, GA Fort Collins, CO Hendersonville, TN Lee's Summit, MO Louisville, KY New York City, NY Northamton, MA Salamanca, NY Santa Barbara, CA West Palm Beach, FL Scottsdale, AZ Tacoma, WA
Design Guidance	Massachusetts		Knoxville Regional TPO	Basalt, CO Charlotte, NC Louisville, KY New Haven, CT New York City, NY Sacramento, CA San Diego, CA Tacoma, WA
Resolution	North Carolina South Carolina	Ada County, ID Doña Ana County, NM DuPage County, IL Erie County, NY Hennepin County, MN Jackson County, MI Kauai County, HI La Plata County, CO Lee County, FL Monmouth County, NJ Pierce County, WA Richland County, SC Spartanburg County, SC Ulster County, NY	Bay Area, CA MPO (MTC) Jackson, MI MPO Las Cruces, NM MPO San Antonio-Bexar County, TX MPO	Allegan, MI Anderson, SC Babylon, NY Baltimore, MD Berkley, MI Big Lake, MN Binghamton, NY Bozeman, MT Brookhaven, NY Byron, MN Cascade, IA Charlottesville, VA Chickasaw, AL Columbia, SC Columbus, OH Concord, NH Cuba, NY Daphne, AL Dayton, OH Des Moines, IA Duluth, MN Edmond, OK Elizabethtown, NY Emerson, NJ Everett, WA Fairfax, CA Fairhope, AL Festus, MO Flint, MI Franklin, PA

Complete Streets - Current Policies **updated: 02/03/10**

For more information, visit www.completestreets.org

Resolutions, cont.				Golden, CO Gowanda, NY Greenville, SC Hamtramck, MI Helena, MT Hoboken, NJ Independence, MN Iowa City, IA Islip, NY Jackson, MI Kauai, HI Kingston, NY Knoxville, TN Lawrence, NJ Lee's Summit, MO Linden, MI Mackinaw City, MI Madison, WI Manistique, MI Mesilla, NM Miami, FL Middletown, RI Missoula, MT Montclair, NJ Morgantown, WV Netcong, NJ New Haven, CT New Hope, MN Newport, OR Newport, RI North Little Rock, AR Novato, CA Novi, MI Orange Beach, AL Pascagoula, MS Prattville, AL Red Bank, NJ Red Wing, MN Ross, CA Roswell, GA Saint Paul, MN San Anselmo, CA Sandpoint, ID Sault Ste. Marie, MI Spartanburg, SC Spokane, WA Stewartville, MN Topeka, KS West Windsor, NJ

Complete Streets - Current Policies **updated: 02/03/10**

For more information, visit www.completestreets.org

Policies Collected	State	County	Regional/MPO	City	Total Policies
Legislation / Ordinance	15	2	0	31	48
Resolution	2	14	4	79	99
Tax Ordinance	0	2	0	1	3
Internal Policy	9	5	10	7	31
Executive Orders	1	0	0	3	4
Plans	0	2	9	17	28
Manuals/Standards	1	0	1	8	10
Total Policies	*28*	*25*	*24*	*146*	**223**
Total Jurisdictions	*24*	*24*	*24*	*136*	**208**

**San Francisco has two ordinances that direct a Complete Streets approach.*

Examples of Complete Streets Policies and Guides

visit www.completestreets.org for updates and more information

Agency	Policy	Level	Year	Link
State of Connecticut	Public Act 09-154	State	2009	http://www.completestreets.org/webdocs/policy/cs-ct-legislation.pdf
State of Minnesota	Sec. 52 Minnesota Statutes 2008, section 174.75	State	2010	http://www.completestreets.org/webdocs/policy/cs-mn-legislation.pdf
State of California DOT	Deputy Directive 64-R1	State	2008	http://www.completestreets.org/webdocs/policy/cs-ca-dotpolicy.pdf
State of New Jersey DOT	Complete Streets Policy	State	2009	http://www.completestreets.org/webdocs/policy/cs-nj-dotpolicy.pdf
State of North Carolina DOT	Complete Streets Policy	State	2009	http://www.completestreets.org/webdocs/policy/cs-nc-dotpolicy.pdf
State of Massachusetts DOT	Project Development and Design Guidelines	State	2006	http://www.mhd.state.ma.us/default.asp?pgid=content/designGuide&sid=about
Mid-America Regional Council (Kansas City, MO area)	Transportation Outlook 2040	MPO	2010	http://www.marc.org/2040/Plan/index.aspx
Madison County Council of Governments (Anderson, IN area)	Complete Streets Policy	MPO	2010	http://www.completestreets.org/webdocs/policy/cs-in-madisoncountycog-policy.pdf
Mid-Ohio Regional Planning Commission (Columbus, OH area)	Complete Streets Policy	MPO	2010	http://www.completestreets.org/webdocs/policy/cs-oh-morpc-policy.pdf
Fargo-Moorhead Metropolitan Council	Complete Streets Policy	MPO	2010	http://www.completestreets.org/webdocs/policy/cs-nd-fargomoorhead-policy.pdf
Salt Lake County, UT	Ordinance No. 1672	County	2010	http://www.completestreets.org/webdocs/policy/cs-ut-saltlakecounty-ordinance.pdf
Dona Ana County, NM	Resolution 09-114	County	2009	http://www.completestreets.org/webdocs/policy/cs-nm-donaanacounty-resolution.pdf
Ada County, ID Highway District	Resolution No. 895	County	2009	http://www.completestreets.org/webdocs/policy/cs-id-adacounty-policy.pdf
Crystal City, MO	Ordinance	City	2010	http://www.completestreets.org/webdocs/policy/cs-mo-crystalcity-ordinance.pdf
Seattle, WA	Ordinance No. 122386	City	2010	http://www.completestreets.org/webdocs/policy/cs-wa-seattle-ordinance.pdf
Byron, MN	Resolution	City	2010	http://www.completestreets.org/webdocs/policy/cs-mn-byron-resolution.pdf
Festus, MO	Resolution No. 3924 ½	City	2010	http://www.completestreets.org/webdocs/policy/cs-mo-festus-resolution.pdf
Missoula, MT	Resolution No. 7473	City	2009	http://www.completestreets.org/webdocs/policy/cs-mt-missoula-resolution.pdf

Examples of Complete Streets Policies and Guides

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Agency	Policy	Level	Year	Link
Las Cruces, NM	Resolution 09-301	City	2009	http://www.completestreets.org/webdocs/policy/cs-nm-lascruces-resolution.pdf
Rochester, MN	Complete Streets Policy	City	2009	http://www.completestreets.org/webdocs/policy/cs-mn-rochester-policy.pdf
Decatur, GA	Community Transportation Plan	City	2008	http://www.decaturga.com/cgs_citysvcs_dev_transportationplan.aspx
New Haven, CT	Complete Streets Design Manual	City	2010	http://www.completestreets.org/webdocs/policy/cs-ct-newhaven-manual.pdf
New York City, NY	Street Design Manual	City	2009	http://nyc.gov/html/dot/html/about/streetdesignmanual.shtml
Charlotte, NC	Urban Streets Design Guidelines	City	2007	http://charmeck.org/city/charlotte/Transportation/PlansProjects/Pages/Urban%20Street%20Design%20Guidelines.aspx