

City of Fremont

DRAFT PEDESTRIAN MASTER PLAN

November 2016

alta
PLANNING + DESIGN

CITY OF
Fremont

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1 Introduction and Vision

1.1 Introduction

The purpose of the Pedestrian Master Plan Update is to:

1. Ensure compliance with the City of Fremont General Plan and other plans adopted since the 2007 Pedestrian Master Plan.
2. Update the background and analysis to include recent activity level, benefits, and other contextual information.
3. Update inventory data to reflect built projects.
4. Revise the proposed project lists based on city staff and public input.

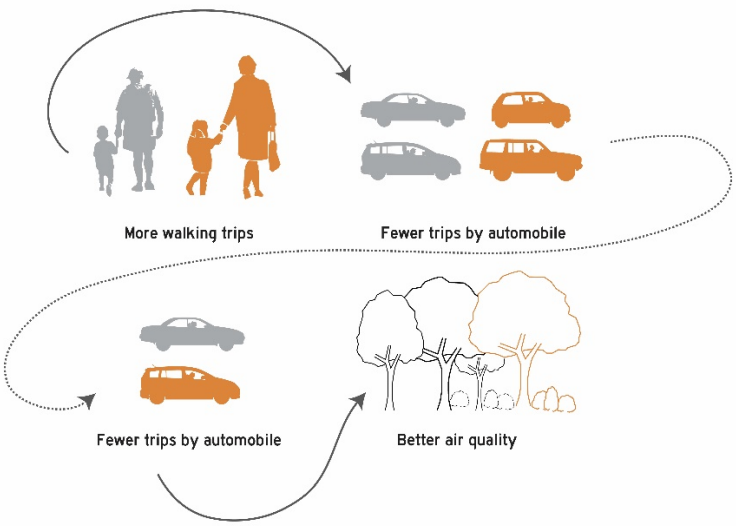
1.2 Benefits of Walking

Getting more residents walking can address several interrelated challenges including traffic, air quality, creating a sense of community, public health, and the local economy. By planning a city that is more walkable, Fremont can facilitate their goal of becoming "strategically urban," addressing these challenges and positively influencing existing and future quality of life.

Figure 1-1: Pedestrian friendly streets help improve the economy and quality of life (Bay Street, Fremont)

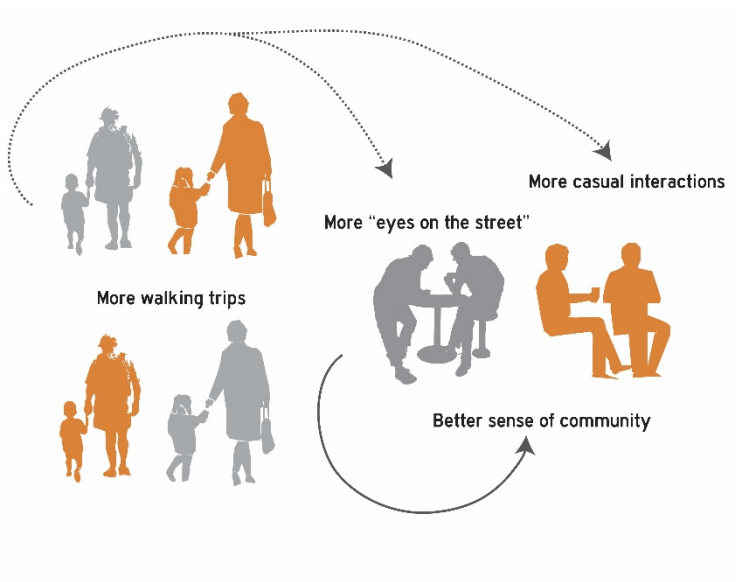
1.2.1 Traffic and Air Quality

As Fremont becomes more inviting to pedestrians, increasing numbers of work, school, shopping, and recreational trips can be made on foot. Each time residents in Fremont choose to walk instead of drive, vehicles are removed from the road. Cumulatively, this pattern may reduce traffic in some areas and improve air quality. It can also help facilitate greater density of jobs and housing.



1.2.2 Quality of Life

Fostering conditions in which walking is accepted and encouraged increases a community's livability. In areas where people walk, there are more opportunities for chance meetings and casual interactions with neighbors. Pedestrian activity also provides more "eyes on the street," or people looking out for one another. All of these quality of life benefits can enhance Fremont's sense of community.



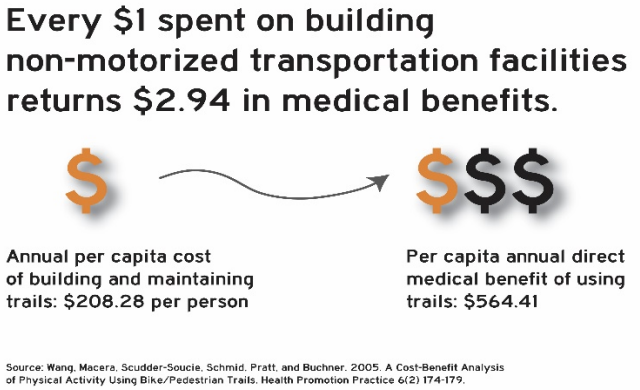
1.2.3 Public Health

In recent years, public health professionals and urban planners have become increasingly aware that the effects of vehicles on public health extend far beyond asthma and other respiratory conditions caused by air pollution or the pedestrian-vehicle collisions resulting in injury or fatality. Dependency on vehicles has also reduced levels of physical activity.

Physical inactivity is now widely understood to play a significant role in chronic diseases in the US, including coronary obesity, heart disease, stroke, and diabetes[1], as well as heart attacks. Improving non-motorized transportation facilities may help alleviate these disorders. An extra 2,000 steps per day can lead to a 10% reduction in the risk of a cardiovascular event.[2] In response to these trends, public health and transportation planners have advocated for walkable neighborhoods as an effective way to encourage active lifestyles. As Fremont and its neighborhoods become more walkable, the population will have more opportunities to exercise as part of their daily travel and activity, and potentially decrease related chronic disease.

Public health advocates and transportation planners have also joined forces in addressing childhood obesity. In Alameda County, 29 percent of 7th graders are overweight.[3] Programs like Safe Routes to School, which encourage school-age children to walk and bike to school, help address this public health issue.[4]

In addition to individual health benefits, physical activity provides fiscal rewards to the entire community by reducing health care costs and lost days of work. A report prepared for the Centers for Disease Control and Prevention found that the annual cost of building and maintaining trails was $209.28 per person, while the annual direct medical benefit of using the trail was $564.41 per person[5].



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[1] McKenna, M.T., Taylor, W.R., Marks, J.S., & Koplan, J.P., "Current issues and challenges in chronic disease and control" in Chronic Disease Epidemiology and Control, 2nd edition, American Public Health Association, 1988.

[2] Yates, T., et al, "Association between change in daily ambulatory activity and cardiovascular events in people with impaired glucose tolerance: a cohort analysis" in The Lancet, 2013.

[3] Alameda County Public Health Department, "Alameda County Maternal, Child, and Adolescent Health Indicators," 2012.

[4] http://www.alamedacountysr2s.org/

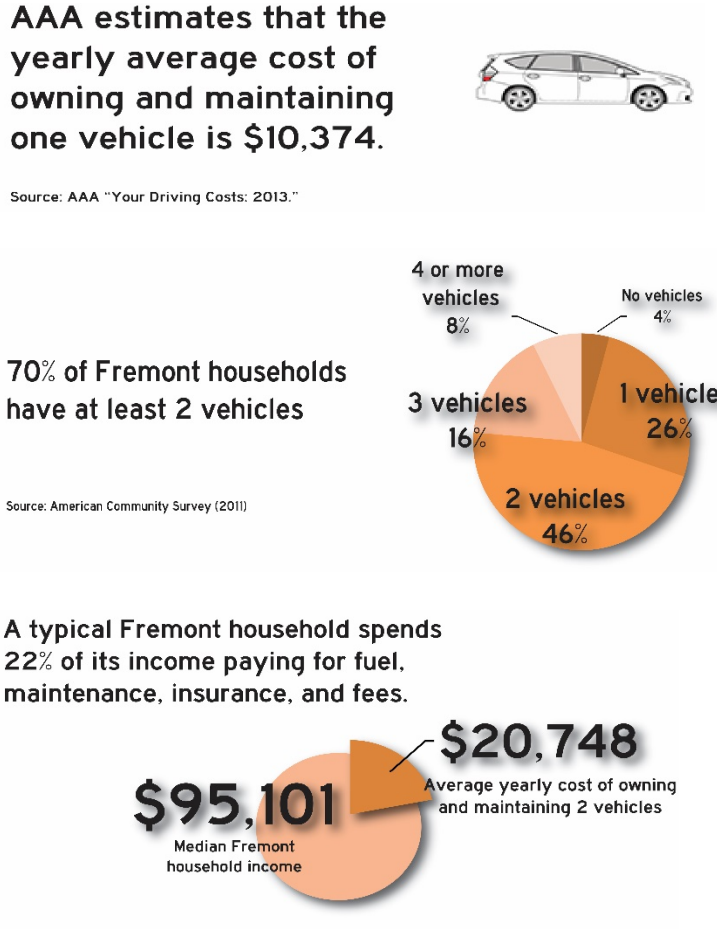
[5] Wang, Macera, Scudder-Soucie, Schmid, Pratt, and Buchner, "A Cost-Benefit Analysis of Physical Activity Using Bike/Pedestrian Trails," in Health Promotion Practices 6(2), pp174-179, 2005.

1.2.4 Economy

Walking can also be a more economically efficient mode of transportation than driving a vehicle. According to 2013 data from the American Automobile Association (AAA) and the US Census Bureau, yearly operation and ownership of one motor vehicle accounts for more than twelve percent of a typical Fremont household's income.[6,7]

For the 46 percent of Fremont workers who live in households with access to two vehicles, this adds up to 22 percent of household income.[8]

By walking more and driving less, residents could save money on gas, car maintenance and repairs, registration fees, insurance, parking costs, and bridge tolls.



Money saved by residents may likely be spent elsewhere in the local economy, or on a higher-valued home. A 1999 study of four new pedestrian-friendly communities determined that homebuyers were willing to pay a $20,000 premium for homes in walkable communities.[9]

Retail areas often subsidize vehicle parking on the assumption that customers need to drive to make large purchases. However, retail districts worldwide have realized commercial gains by increasing pedestrian space and reducing space dedicated to vehicles.[10]

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[6] *"Your Driving Costs," American Automobile Association, 2013*

[7] *American Community Survey, 2007*

[8] *Ibid.*

[9] *Eppli, M., & Tu, C., "Valuing the New Urbanism: The Impact of the New Urbanism on Prices of Single Family Homes," Urban Land Institute, 1999.*

[10] *http://www.transalt.org/files/newsroom/reports/soho_curbing_cars.pdf/*

Figure 1-2: Pedestrian-friendly shopping district (The Block, Fremont)

In addition, parking lots are becoming more pedestrian oriented to connect retail shopping with transit use and adjacent sidewalks. Wide sidewalks framed by landscaping, street furniture and lighting can provide a safer and more comfortable pedestrian route for employees and visitors who walk the entire trip, use transit, or drive to the parking lot.

Figure 1-3: Pedestrian route through a large parking lot (The Block, Fremont)

While motorists may indeed spend more money in a single visit to a local business, customers on foot or on bicycles make smaller, more frequent purchases that lead to higher spending over the course of a month.[11]

[11] *Clifton, K., Morrissey, S., & Ritter, C., "Business Cycles: Catering to the Bicycling Market," TR News, 2012.*

1.3 Progress Since 2007

The City has made substantial progress implementing the 2007 Pedestrian Master Plan. Thirteen recommended projects have been completed, five are in progress, and the remainder are planned to be studied (or on hold) while funds are sought (Table 1-1).

Table 1-1: Project Status Since 2007

Location	Improvement Type
Completed Projects	
Cedar St between Bryant St & Mission Blvd	Sidewalk
Civic Center Drive **not in the 2007 Plan*	Corridor
Clough Ave & Fremont Blvd	Intersection
Deep Creek Rd at Emilia Ln and Macbeth Ave	Intersection
E. Warren Ave between Navajo Rd & Yakima Dr	Sidewalk
Fremont Blvd (south terminus) to Dixon Landing Connector	Path/sidewalk/bike lanes/road
Fremont Blvd & Washington Blvd/Bay St & Union St	Intersection
Los Cerritos Community Park frontage on Alder Ave and Nicolet Ave	Sidewalk
Mission Blvd & Driscoll Rd	Intersection
Mission Blvd & Palm Ave	Intersection
Mission Blvd between Driscoll Rd & Mission San Jose High School	Sidewalk
Mission Blvd between Mill Creek Rd & Mission Creek	Sidewalk
Parkhurst St/Walnut Ave & Argonaut Way	Lane reduction & roundabout
Projects in Progress	
Bonde Way & Fremont Blvd	Intersection
Civic Center Dr & BART Way (temporary improvement installed)	Crossing
Grimmer Blvd & Blacow Rd	Intersection
Niles/Nursery & Nursery/Mission	Intersection & Corridor
Union Pacific Railroad Trail	Path
Projects Currently Unfunded	
Paseo Padre Parkway & Sailway Dr	Intersection
Fernald St & Mohave Dr & Crawford St	Intersection
Sullivan UNP/Nichols Ave & Mission Blvd	Sidewalk
Warm Springs/Fourier/Lippert	Intersection
Mission Blvd & Pine St (partially completed with audible ped signals)	Intersection
Paseo Padre Pkwy & Milton St	Intersection
I-680 & Scott Creek Rd	Interchange
Auto Mall Pkwy & I-680	Interchange
Fremont Blvd between Tamayo & Decoto	Sidewalk
Farwell Drive Path	Path
Hetch Hetchy Path	Path
Grimmer Blvd Greenway Path	Path
Mowry Avenue & Peralta Boulevard Intersection / Corridor Project	Intersection & Corridor

Since 2007 the City has also adopted a Complete Streets Policy, installed curb ramps with truncated domes citywide through the road maintenance program, and progressed plans for a pedestrian friendly City Center.

1.4 Vision

Fremont is a community that inspires people of all ages and abilities to walk for everyday transportation, recreation and health.

To achieve this, walking will become a safe, inviting and practical way to travel on a comprehensive system of sidewalks and pathways along green corridors. Vibrant central city and neighborhood centers will prioritize the pedestrian experience as a way to enhance quality of life and encourage more people to live, work and play in Fremont.

Figure 1-4: A pedestrian-friendly intersection on Fremont Boulevard: tight radius corners reduce traffic speeds; high visibility crosswalk markings highlight the pedestrian space

1.5 Pedestrian Master Plan Goals

By implementing City policies and the recommendations of this Plan, the City aims to achieve the following goals:

1. **Activity –** increase the percentage of all trips made on foot from 9% in 2007 to 15% by 2025.
    - *The 9% figure was derived from MTC calculations no longer available to the City. A model should be developed to measure progress for the next Pedestrian Plan update.*
    - *Current infill land development is expected to improve the walking mode share of all trips.*
    - *Fremont participates in the regional Spare the Air program to encourage active transportation.*
    - *This Plan recommends a Safe Routes to School Program that would encourage and educate the next generation about walking.*

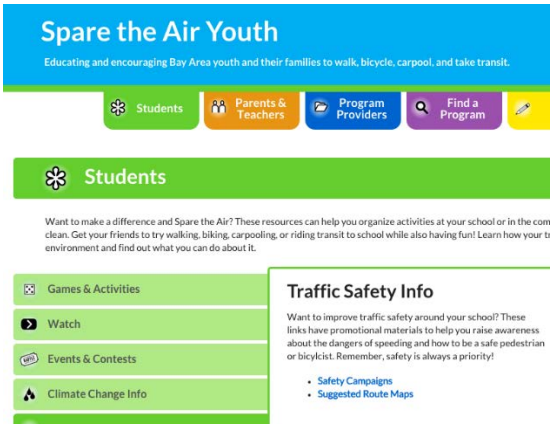

Figure 1-5: Fremont participates in the Alameda County Spare the Air program, which includes educational and encouragement tools

Figure 1-6: The Fremont Police Department maintains a school crossing guard program to help students walking to school

2. **Safety –** reduce annual reported pedestrian-motor vehicle collisions from 44.4 (5-year average 2003-2007) to 22 by 2025.
    - *In 2015, the 5-year average (2010-2015) was 50.6, so more work will be needed to achieve this goal.*
    - *A future metric could be a reduction in the percentage of roadways in Fremont that are posted for 40 mph.*
    - *The City has implemented a "Vision Zero Fremont" program with the aim of a significant reduction in road traffic fatalities and serious injuries*
    - *Safety is one of the criteria used in prioritizing the projects included in this Plan.*

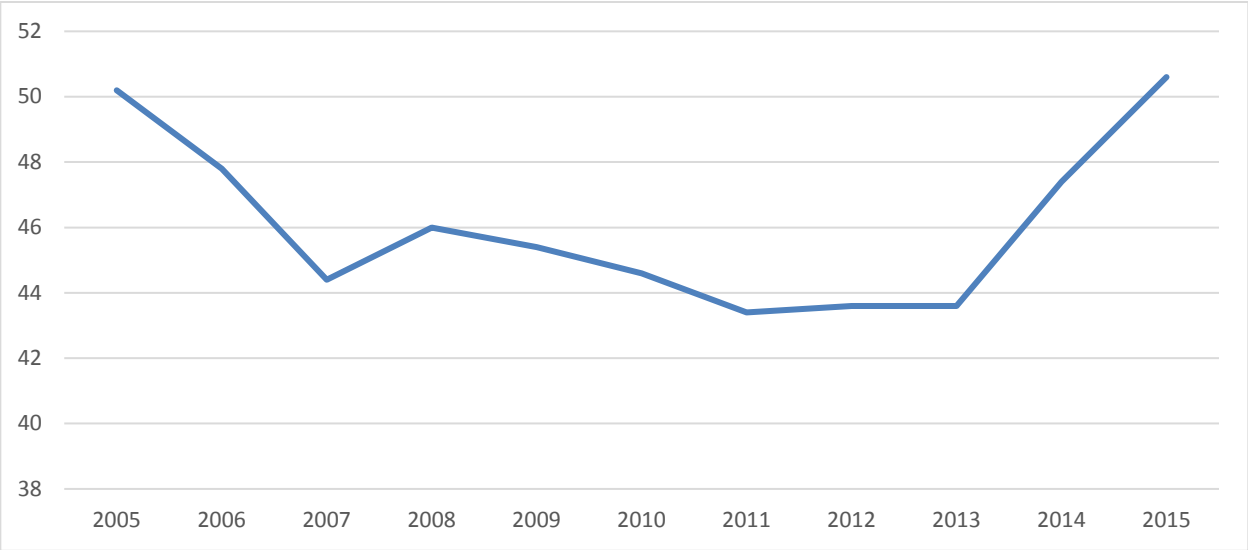

Figure 1-7: Five-year rolling annual average of reported pedestrian / motor vehicle collisions; there is a long way to go to halve the number of collisions by 2025

3. **Infrastructure and Design –** establish a world class pedestrian environment in Fremont's City Center / Downtown and in Town Center Districts and improve the pedestrian experience throughout Fremont with additional infrastructure, thoughtful design and integration, and routine maintenance.

    - *Progress has been made on many projects, as referenced in Table 1-1.*
    - *The updated Design Toolkit contained in this Plan features the latest solutions.*
    - *Walkability is included in community plans such as the Downtown Community Plan, City Center Community Plan, and the Warm Springs Community Plan (see Appendix A for more information).*

Figure 1-8: The Pedestrian Design Guide provides state-of-the-art design guidance

- *The City has applied for and received grants for projects such as the Downtown Capitol Avenue Extension, the Bike & Pedestrian facility improvements from Downtown District to Central BART, the Mission Boulevard Sidewalk, and the Sabercat Creek Public Access & Riparian Improvements.*
- *Although property owners are responsible for sidewalk maintenance, the City provides repair and replacement as long as funding and staffing is available.*

Figure 1-9: The City Maintenance Division does sidewalk grinding to eliminate trip hazard

4. **Connectivity and Accessibility –** ensure safe, continuous, and convenient pedestrian access to essential pedestrian destinations and districts throughout Fremont for all residents, workers, and visitors.

- *The City is continuing to develop projects for grant funding through the state Active Transportation Program and other grant sources.*
- *Since 2007, the focus has been on closing connectivity gaps near schools. For the next five-year period the focus will shift to the downtown and the Priority Development Areas (PDAs). Fremont's General Plan states that funding priorities should be based on greatest demand.*
- *This Plan recommends a Citywide Trails and Paths Study focused on railway and utility corridors to provide for an interconnected off-street trail network.*
- *The BART Way and Warm Springs projects will help integrate transit and walking.*

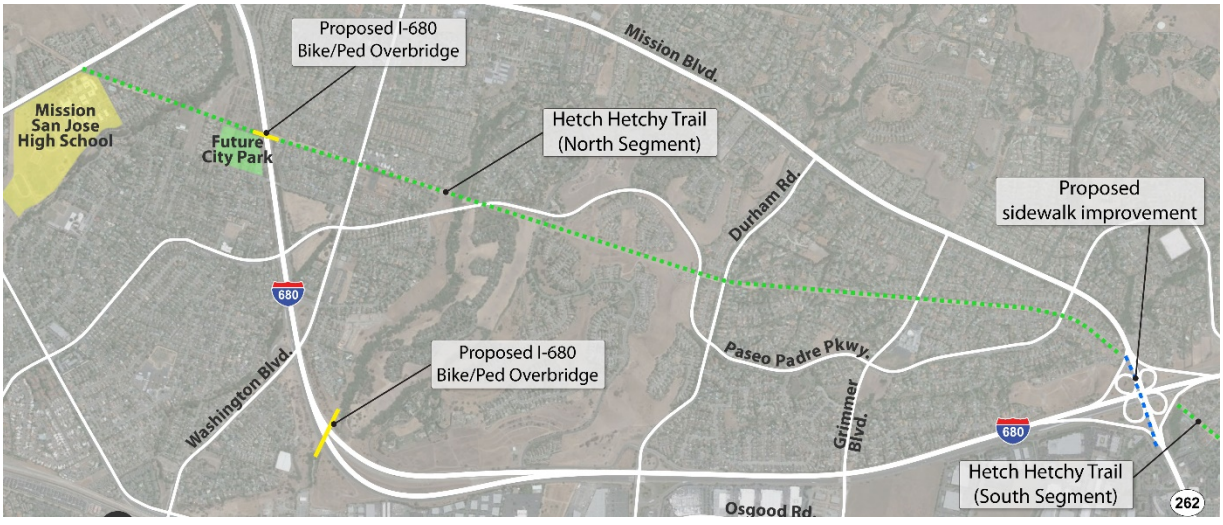

Figure 1-10: The development of this Plan update included connectivity gap analysis and project identification focused on creating an accessible and complete network

5. **Land Development –** plan, design, and construct new development to celebrate and invite walking, particularly in the City's Downtown District, City Center and Town Centers.
    - *Walkability is included in plans such as the General Plan, Downtown Community Plan, City Center Community Plan, and the Warm Springs Community Plan (see Appendix A for more information).*
    - *New developments must comply with city standards that facilitate walking.*

Figure 1-11: A new multi-family residential development on Walnut Avenue in Downtown Fremont features a pedestrian promenade through the site

1.6 General Plan Support for Walking

Appendix A presents a complete review of existing planning documents at the federal, state, regional and local levels. The most important of these plans is the Fremont General Plan, last updated in 2011. The General Plan recognizes the importance of pedestrian and bicycle travel - pollution-free modes that relieve pressure on roadways, improve the health of community members, and contribute to the vibrancy of neighborhoods and districts. In keeping with the "Strategically Urban" approach, Land Use Element goals include:

LAND USE	City Form and Structure (2-1): A city transformed from an auto-oriented suburb into a distinctive community known for its walkable neighborhoods, dynamic city center, transit-oriented development at focused locations, attractive shopping and entertainment areas, thriving work places, and harmonious blending of the natural and built environments.
	Complete Neighborhoods (2-3): Compact, walkable and diverse neighborhoods each with an array of housing types and shopping choices with parks, school and amenities that can be conveniently accessed by all residents.

Specific policies supporting walking have been established for selected portions of the city including Niles, the City Center, Mission San Jose, and Irvington. The General Plan Vision Book states: "…Fremont is poised to attract transit-oriented development to its downtown, which will help it achieve the objective of creating a vibrant, pedestrian oriented city center." [12] Mobility Element goals include:

MOBILITY	Complete Streets (3-1): City streets that serve multiple modes of transportation while enhancing Fremont's appearance and character.
	Reducing Vehicle Miles Traveled (3-2): Improve mobility in Fremont while reducing the growth of vehicle miles traveled.
	Accessibility, Efficiency, and Connectivity (3-3) – Maximize the efficiency of the transportation network, and its ability to connect the city, minimize travel distances, and increase mobility for all residents.
	Balancing Mobility and Neighborhood Quality (3-4): A transportation system that balances speed and convenience with the desire to have walkable neighborhoods and an enhanced sense of place.

In describing mobility as "not just about cars", the General Plan quotes Paul Bedford: "In a quality city, a person should be able to live their entire life without a car and not feel deprived". The Parks and Recreation Element policies include:

PARKS	Linear Parks (8-1.5): Acquire and develop linear trail parks that serve many functions including recreational opportunities, alternative transportation routes, aesthetic enhancements and the re-use of abandoned or underutilized transportation, utility, or other corridors.
	Recreational Offerings and Facilities From Other Agencies (8-3.1): Encourage other land and resource agencies to maintain and expand their offerings of recreational opportunities in Fremont. *Sub policies are focused on individual trails such as the Bay Trail, Alameda County Flood Control Trails, and more.*

[12] *Access the Vision Book here: http://www.fremont.gov/DocumentView.aspx?DID=3212*

2 Existing Conditions

2.1 Walking Activity in Fremont

The US Census collects information about the primary mode of transportation that residents use when commuting to work. While this provides important data about commute trips, these data only tell us about those residents over 16 years of age who are employed, and how they typically travel to work. The data do not capture the many other walking trips that Fremont residents take, including school, shopping, and recreational trips, nor do the data capture the walking trips that someone in Fremont might take after parking a vehicle or when walking to or from public transit. The Census also does not capture non-residents who walk in Fremont.

Compared to neighboring cities in Figure 2-1, Fremont has a slightly higher walk-to-work mode share. Compared to Alameda County overall, however, fewer people in Fremont walk and more drive alone for their journey to work. This may be a result of the more robust transit systems available in other parts of the County. Fremont's new General Plan emphasizes being "Strategically Urban" with priority focused development areas around the existing BART station near downtown. The Warm Springs Community Plan focuses on a balance of jobs and housing, car and bike sharing, and shuttle services to major employers. These developments will provide an alternative to the existing suburban environment.

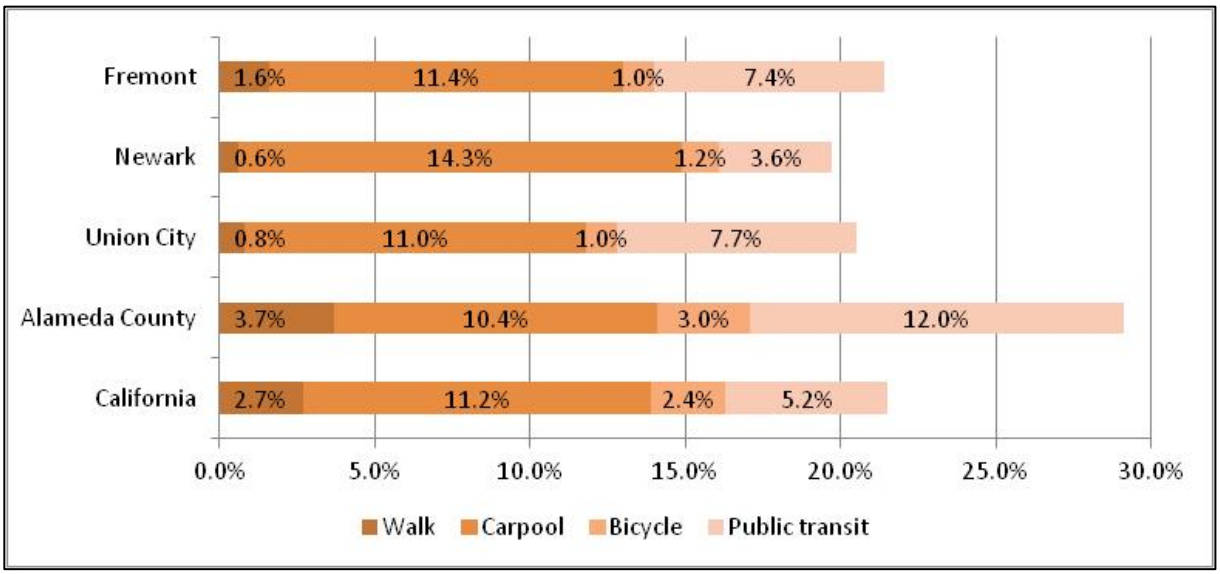

Figure 2-1: Journey to Work Mode Share for Fremont and Peer Cities

The dataset used to compile these statistics is the American Community Survey 5-year estimate (2008-2012), which is useful for recent data about smaller regions, such as cities and towns. The data often come with significant margins of error, however.

In addition to journey-to-work trip information, the 2007 Plan identified walking rates in Fremont for all trip purposes. This analysis used travel data from the Bay Area Travel

Survey (BATS), a survey conducted of 15,000 Bay Area households in 2000. A comparable National Household Travel Survey conducted in 2009 allows us to extrapolate walking rates for all trip purposes based on American Community Survey 5-year estimates (2008-2012), as shown in Table 2-1. In this table, utilitarian trips include things like running errands, accessing libraries or other public services, or parents walking children to school.

Note that in the 2007 Pedestrian Master Plan, MTC was reporting this data at the city level. MTC no longer produces data at the city level. The data analysis and modeling methods are not comparable, so it cannot be stated that the 2007 walking mode share of 9% and the 2012 walking mode share of 5.3% represents a decrease over time. For the next Master Plan update, several method of estimating walking mode share should be used.

Table 2-1: Estimated Walking Trips in Fremont

Trip Purpose	Walk Trips	All Modes	Walk Mode Share
Weekday Commute Trips	**18,337**		
Trips to Work	3,022	183,710	1.6%
Trips to Transit	3,137		
Trips to K-12	10,242		
Trips to College	1,936		
Daily Utilitarian Trips	**13,065**	**793,627**[13]	**1.6%**
Daily Social/Recreational Trips	**11,823**	**718,306**	**1.6%**
Total for All Trips	**43,225**	**811,397**[14]	**5.3%**

Another metric of walkability is Walk Score (www.walkscore.com) as shown in Table 2-2.

Table 2-2: Walk Score Ratings

Community	Walk Score	Walk Score Category
Fremont	44	Car Dependent
Irvington	67	Somewhat Walkable
Centerville	58	Somewhat Walkable
Sundale	57	Somewhat Walkable
Newark	45	Car Dependent
Union City	43	Car Dependent
San Francisco	84	Very Walkable

[13] *Calculated using the National Household Travel Survey ratios of Utilitarian and Social/Recreational trips to work trips.*

[14] *Based on the 2009 National Household Travel Survey, each person makes an average of 3.79 trips per day. This figure was multiplied by the total population of Fremont.*

2.2 Pedestrian Trip Generators and Attractors

Figure 2-2 shows locations in Fremont that are likely destinations or origins for pedestrian travel. Identifying nodes or corridors where these activity generators are clustered can help prioritize pedestrian infrastructure improvements where people are most likely to be walking.

Public amenities such as shopping centers, parks, schools, libraries, senior centers, hospitals, and civic buildings are common destinations for pedestrians, as are public transit stops and stations. Senior residence developments often generate pedestrian activity, as older adults lose the confidence or ability to drive and turn to walking or public transit for their trips.

Along with schools, major employers represent opportunities to increase the number of walking trips through education and encouragement programs targeted at students and employees. A list of the businesses and their employees is included in Table 2-3 and mapped in Figure 2-2.[15]

Table 2-3: Top Ten Employers

Name	Address	Employees
Tesla	45500 Fremont Boulevard	6,000
Fremont Unified School District*	4210 Technology Drive	3,000*
Washington Hospital	2000 Mowry Avenue	1,817
Lam Research Corporation	4650 Cushing Parkway	1,500
Western Digital	44100 Osgood Road	1,300
Boston Scientific/Target Therapeutics, Inc.	47201 Lakeview Boulevard	1,200
Seagate Magnetics	47010 Kato Road	1,050
AXT Incorporated	4281 Technology Drive	950
City of Fremont**	3300 Capitol Avenue	848**
Sysco Food Service	5900 Stewart Avenue	740

**Fremont Unified School District is not mapped as an activity generator because its employees are dispersed throughout the community. School sites are already mapped as generators.*

***City of Fremont is mapped as City Hall. Note that employees are dispersed to locations such as the Police Department, fire stations, maintenance yard, and the development center.*

[15] *As of 2012, based on the City of Fremont Comprehensive Financial Report: http://www.fremont.gov/DocumentCenter/View/19362*

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Figure 2-2 Pedestrian Activity Generators

Points of Interest
- Top 25 Employers
- Libraries
- Hospitals

Transit Location Information
- BART Station
- Centerville Train Depot
- Future BART Station
- Future ACE Station
- Existing Rail
- Future BART Extension

Bicycle and Pedestrian Facilities
- Class I - Multi-Use Paths (Existing)
- Proposed Class I - Multi-Use Paths
- Unpaved Paths

Other Features
- Quarter/Half Mile Pedestrian Service Area
- Water Bodies
- Priority Development Areas
- Schools
- Parks
- Fremont City Limits
- Unincorporated Areas

Source: City of Fremont
Map Created: Nov 2015

0 0.5 1 Miles

Hayward
Union City
Newark
Fremont
Sunol
East Palo Alto
San Jose
Milpitas
San Francisco Bay
Centerville Train Depot/ ACE/AMTRAK
ACE Transit Center
Warm Springs Station
Alameda Creek
Dry Creek
Patterson Creek
Crandall Creek
Plummer Creek
Lone Tree Creek
Coyote Creek
Sylvester Harvey Park
Lowry Park
Northgate Park
Deep Creek Park
Brookvale Park
Crandall Creek Park
Frank Fischer Park
Ardenwood
Nordvik Park
Coyote Hills
Quarry Lakes Regional Park
California Nursery
Niles Community Park
Vallejo Mill Historical Park
Vargas Plateau
Fremont Central Park
Country Park
Lake Elizabeth
Gomes Park
Buena Vista Park
Mission San Jose Community Park
Plaza Park
Azevada Park
Noll Park
Irvington Plaza
Marshall Park
Irvington Park
Rix Park
Blacow Park
Arroyo Agua Caliente Park
Old Mission Park
Mission Peak
Rancho Higuera Park
Warm Springs Park
Booster Park
Lone Tree Creek Park
Plomosa Park
Falcon Dr
Beard Rd
Darwin Dr
Warwick Rd
Ferry Ln
Lowry Rd
Decoto Rd
Cabrillo Trail
Nicolet Ave
Gibraltar Dr
Alder Ave
Thornton Ave
Hansen Ave
Central Ave
Post St
Hereford St
Peralta Blvd
Parkside Dr
Guerrero Dr
Cherry Ln
Gallaudet Dr
Shinn St
Almeria Ave
Fremont Blvd
Mattos Dr
Eggers Dr
Argonaut Way
Logan Dr
Glenview Dr
Sutter Dr
Farwell Dr
Blacow Rd
Mowry Ave
Capitol Ave
Walnut Ave
Liberty St
Leslie St
Bidwell Dr
Mission View Dr
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Bruce Dr
Olive Ave
Driscoll Rd
Chadbourne Dr
Luzon Dr
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Jerome Ave
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Hilo St
Omar St
Albrae St
Stewart Ave
Christy St
Boyce Rd
Boscell Rd
Auto Mall Pkwy
Curie St
Bunche Dr
Nobel Dr
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Cushing Rd
Technology Dr
Industrial Dr
Delaware Dr
Crestwood St
Doane St
Pine St
Durham Rd
Oregon Rd
Sabercat Rd
Hunter Ln
Boar Cir
Stanford Ave
Sundance Dr
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Brown Rd
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Reliance Way
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Bayside Pkwy
Warm Springs Blvd
Fernald St
Kato Rd
Milmont Dr
Scott Creek Rd
Green Valley Rd
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2.3 Pedestrian Suitability Analysis (PSI)

The PSI (Figure 2-) helps understand expected activity in the pedestrian environment by combining categories representative of where people **live, work, learn/play, and access public transit** into a composite sketch of demand. Scoring is a function of **distance** – features over ¼ mile away from other features result in lower scores; and **spatial density** – the effect of closely clustered features yields higher scores. Circles have been drawn around particular clusters of priority areas (Niles, Centerville, Central, Irvington). A more diffuse but also significant area is around the Warm Springs corridor, where increasing population density will soon warrant priority attention. The demand values behind this map have been used in the prioritization of projects.

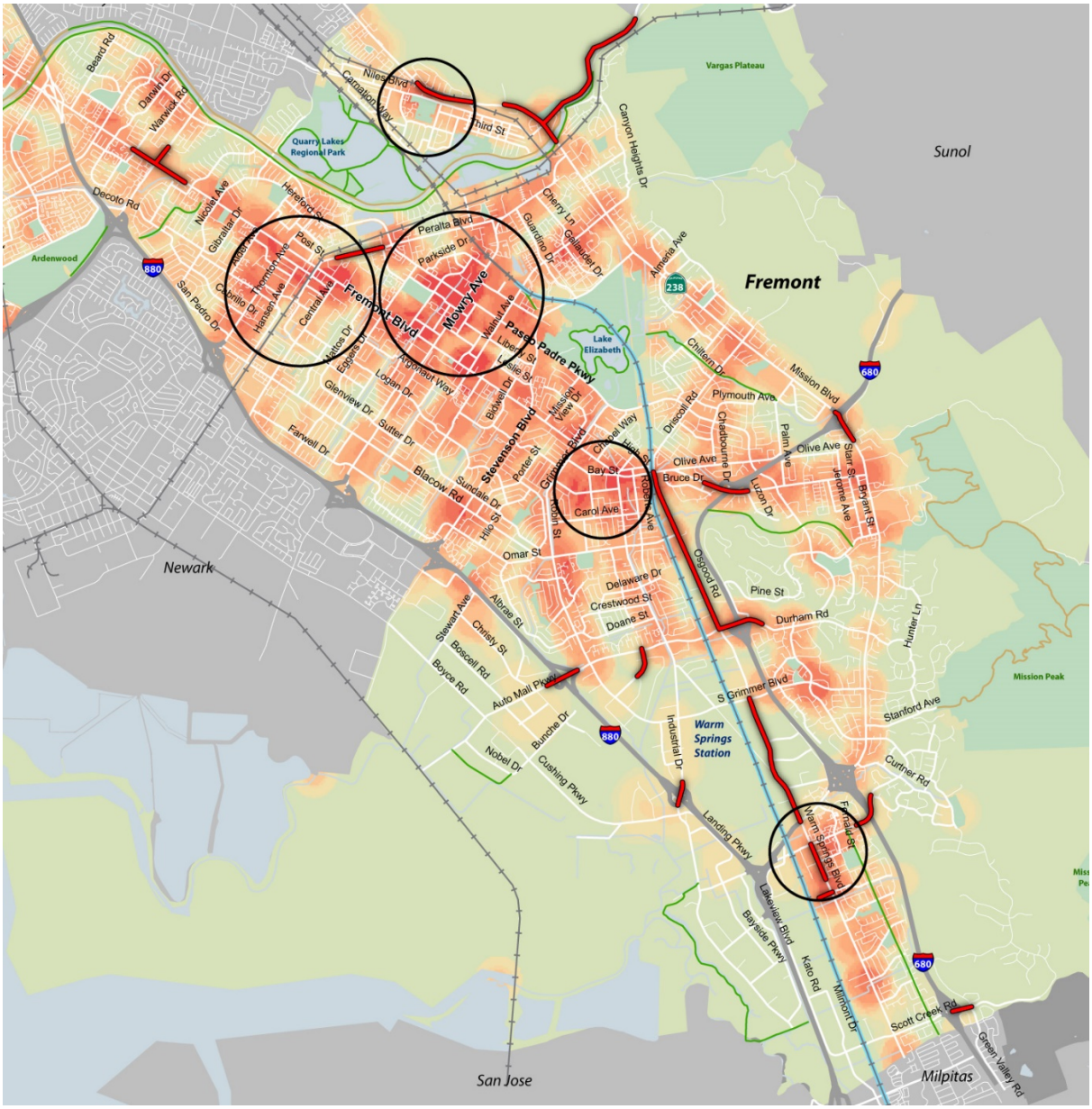

Figure 2-3: Pedestrian Suitability Analysis Map

2.4 Collision Analysis

Analysis of pedestrian-related collision data provides the City with a basis for infrastructure and programmatic recommendations that can improve safety. Collision data comes from the Statewide Integrated Traffic Report System (SWITRS). Because SWITRS is a repository for all police departments to submit traffic records, data is sometimes incomplete due to varying reporting methods. While some collisions are not reported, the data provides a general sense of the safety issues facing pedestrians in Fremont. This section primarily reviews collision data from the years 2001 to 2015 to identify where recent collisions occurred and how Fremont's most vulnerable pedestrians are affected. As of October 2016, the 2014 and 2015 data is provisional and may not be complete.

2.4.1 Annual Collision Totals

Figure 2-4 shows pedestrian collision totals in Fremont between 2001 and 2015.

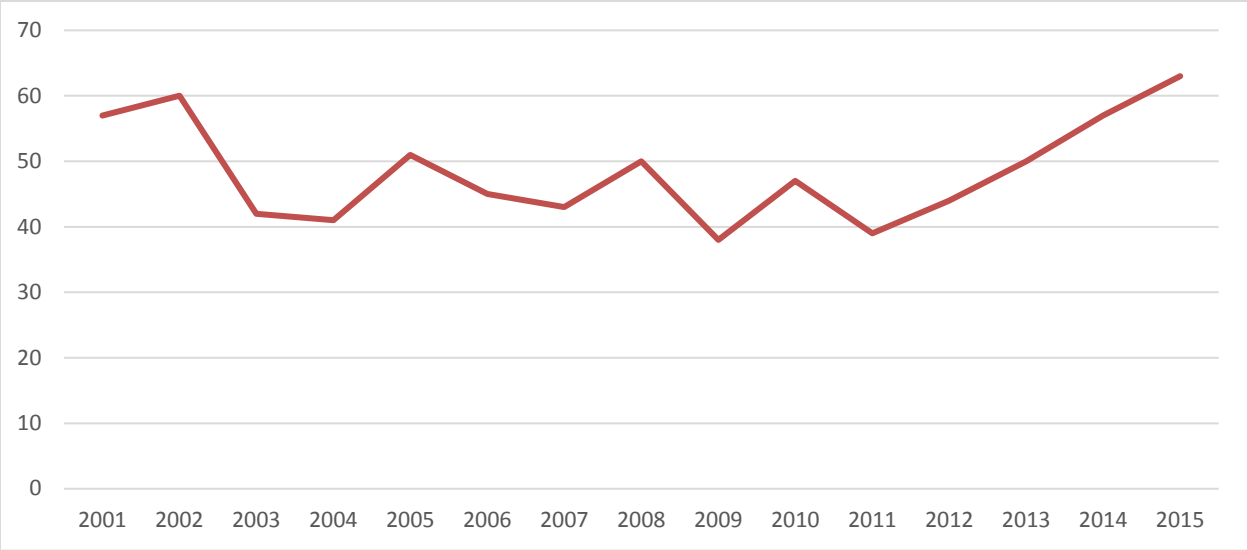

Figure 2-4: Pedestrian-Involved Collisions 2001-2015

There is no clear trend apparent in this data, although the recent uptick in reported collisions is a concern. Nationally, driver distraction due to smartphones is a mounting concern and could be a contributing factor to the increase in collisions.

Compared to other California cities with populations between 100,001 and 250,000, Fremont's 2011 pedestrian collisions ranked the city 48th out of 55 in total number of pedestrian collisions (#1 in the ranking is the highest or "worst," so Fremont at #48 ranks at the low end of the list).[16] While this comparison to other cities may indicate a low frequency of collisions in the community, when that one pedestrian collision is your child, friend, or family member, even one collision is too many. As noted in survey results (page 32), safety concerns are one of the top reasons people are discouraged from walking.

[16] *http://www.ots.ca.gov/media_and_research/Rankings/default.asp#what/*

Looking at rolling averages allows the evaluation of trends using periods of data, rather than single annual totals that can vary considerably from year to year. In this method, the annual total pedestrian collisions in Fremont for a five-year period are averaged. For example, the rolling average for 2005 is the average of the annual total collisions from 2001 to 2005. Figure 2-5 shows the trend in rolling averages and displays a similar trend in pedestrian collisions to the annual totals graph, with an apparent uptick between 2013 and 2015.

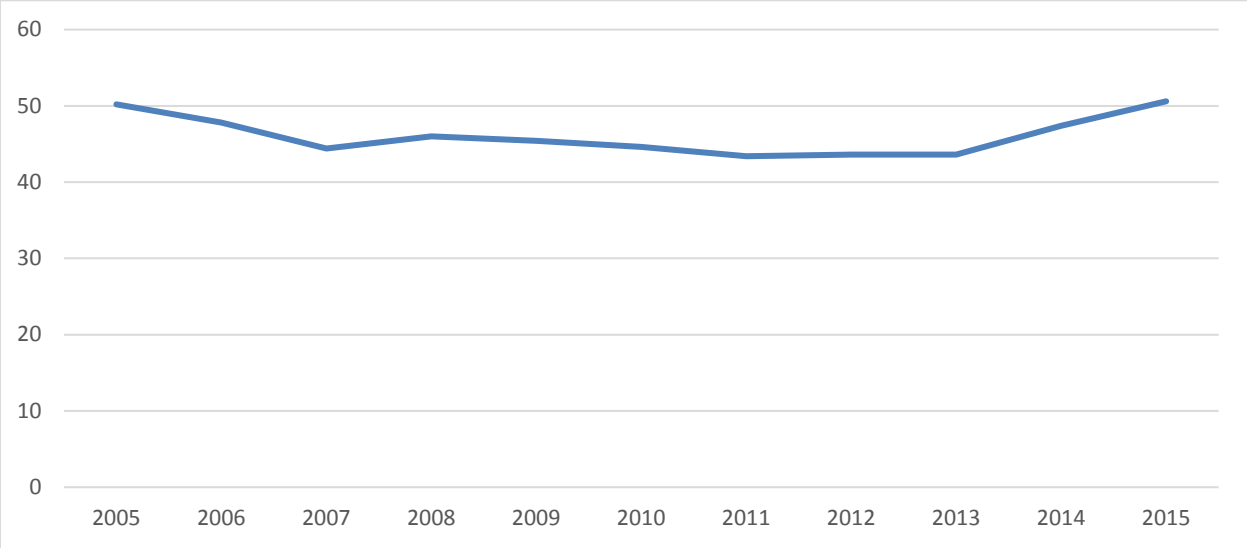

Figure 2-5 Rolling 5-Year Average of Reported Pedestrian Involved Collisions

2.4.2 Violation Codes of Collisions

The recorded violations codes for all collisions where there was a fatality or more than 5 injuries are presented in Table 2-4. Failure to yield right of way to the pedestrian is twice as frequent as the next most common violation, however pedestrian violations have been cited in the majority of pedestrian fatalities.

Table 2-4: Violation Codes of Reported Pedestrian Involved Collisions (2008-2015)

Violation Code	Fatality	Injury	Total
10 - Pedestrian Right of Way (the pedestrian's right of way was violated by another party)	2	203	205
11 - Pedestrian Violation (the pedestrian broke a traffic rule)	17	101	118
03 - Unsafe Speed (travelling at a speed that exceeds the reasonable and endangers safety of others)	2	19	21
21 - Unsafe Starting or Backing (started or backed a stopped, standing, or parked vehicle when unsafe to do so)	0	11	11
00 – Unknown	2	13	15

08 - Improper Turning (turn was not executed with reasonable safety or according to traffic rules)	1	7	8
09 - Automobile Right of Way (the vehicle driver's right of way was violated by another party)	1	8	9
18 - Other Than Driver (or Pedestrian)	1	1	2

2.4.3 Locations of Collisions

The locations where pedestrian collisions were reported between 2009-2015 are shown in Figure 2-6. A high density of crashes may indicate an area where pedestrian volumes are higher, but multiple crashes at a specific intersection may indicate the need to study whether pedestrian safety countermeasures are needed.

A consistently high number of collisions along roadways such as Fremont Boulevard may indicate that a corridor-scale safety countermeasure should be considered such as narrowing travel lanes, which correlates with a reduction in motorist speed and increased attention to roadway conditions. This in turn leads to improved safety.[17]

For data collected between 2009 and 2015, Table 2-5 and Table 2-6 highlight the intersections and corridors with the greatest number of collisions at isolated intersections. Fremont Boulevard contained the highest frequency of collisions among all roadways in Fremont, with 61 collisions—10 percent of all collisions—occurring along the corridor.

Table 2-5: Top Collision Intersections

Intersection	Collisions
Fremont Blvd. & Mowry Avenue	7
Fremont Blvd. & Chapel Way	7
Central Ave. & Dusterberry Way	6
Fremont Blvd. & Parish Way	4
Civic Center Dr. & Mowry Ave.	4

Table 2-6: Top Collision Corridors

Corridor	Collisions
Fremont Blvd.	61
Mowry Avenue	25
Paseo Padre Parkway	21
Central Avenue	16
Stevenson Blvd.	13

Engineering studies with detailed crash analysis should be performed at these locations to determine what street design treatments could help improve safety. Intersection, driveway and midblock location types are not frequently recorded in the Fremont data.

2.4.4 Vulnerable Road Users

'Vulnerable road users' describes those most at risk on a roadway. In other words, vulnerable road users are those who have a greater risk of injury in a collision with a vehicle—including pedestrians and bicyclists. Among pedestrians, elderly persons, children, and those with disabilities are considered the most vulnerable. Information on disabilities is not included in collision reports, but by comparing the age distribution of pedestrian collision victims to the distribution of all Fremont residents in Figure 2-, it is apparent that young adults between the ages of 15 and 29 and older adults over the age

[17] *For more information, visit http://www.nacto.org/docs/usdg/lane_widths_on_safety_and_capacity_petritsch.pdf*

of 65 are over-represented in the data. This could be attributable in part to higher rates of walking for individuals in these age groups.

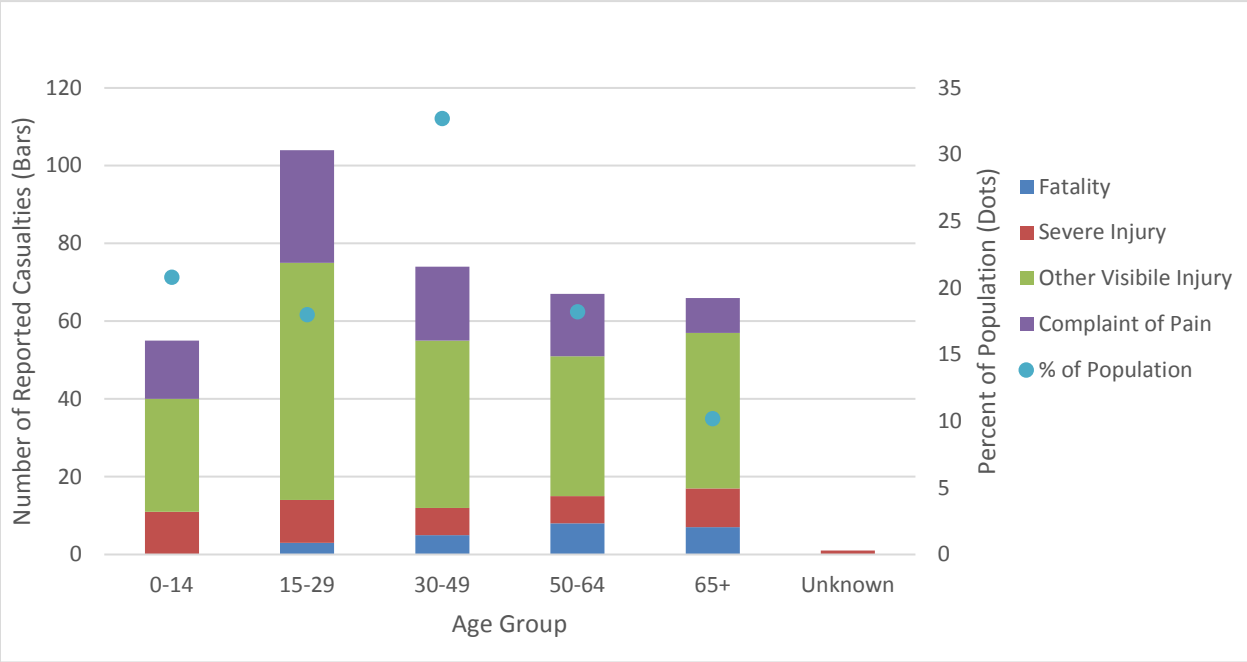

Figure 2-6: Pedestrian Collisions by Age Group and Severity (2009-2015)

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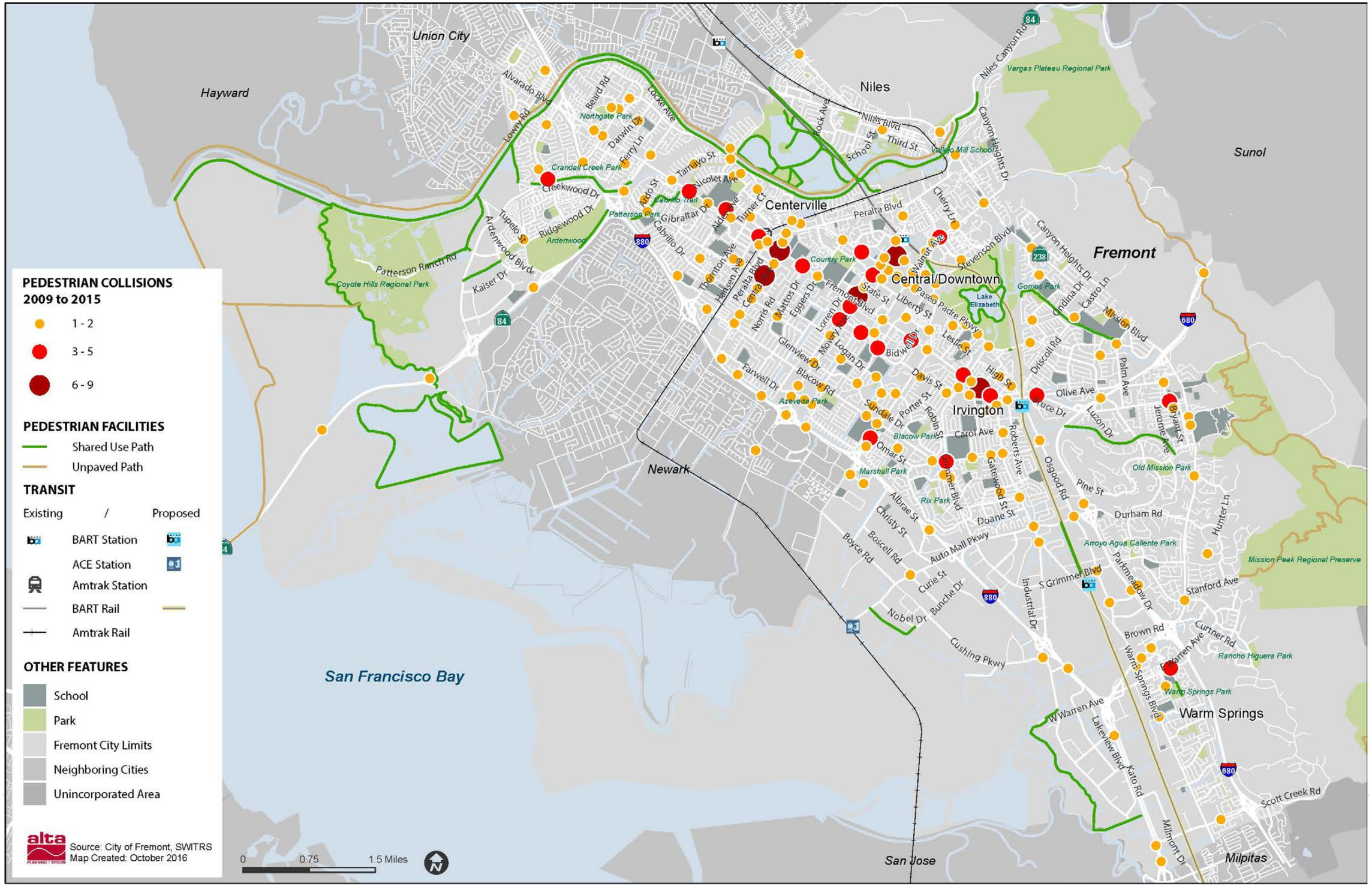
PEDESTRIAN COLLISIONS
2009 to 2015
1 - 2
3 - 5
6 - 9
PEDESTRIAN FACILITIES
Shared Use Path
Unpaved Path
TRANSIT
Existing / Proposed
BART Station
ACE Station
Amtrak Station
BART Rail
Amtrak Rail
OTHER FEATURES
School
Park
Fremont City Limits
Neighboring Cities
Unincorporated Area
Source: City of Fremont, SWITRS
Map Created: October 2016
0
0.75
1.5 Miles
Union City
Hayward
Niles
Sunol
Fremont
Centerville
Central/Downtown
Irvington
Warm Springs
Newark
San Jose
Milpitas
San Francisco Bay
Alvarado Blvd
Lowry Rd
Beard Rd
Northgate Park
Darwin Dr
Ferry Ln
Locke Ave
Crandall Creek Park
Creekwood Dr
Ridgewood Dr
Ardenwood
Ardenwood Blvd
Tupelo St
Patterson Park
Gabrillo Trail
Gibraltar Dr
Cabrillo Dr
Aldo St
Tamayo St
Nicolet Ave
Turner Ct
Thornton Ave
Patterson Ranch Rd
Coyote Hills Regional Park
Kaiser Dr
Niles Blvd
Third St
School St
Rock Ave
Niles Canyon Rd
Vargas Plateau Regional Park
Canyon Heights Dr
Vallejo Mill School
Peralta Blvd
Cherry Ln
Walnut Ave
Stevenson Blvd
Country Park
Central Ave
Hallsen Ave
Norris Rd
Mattos Dr
Eggers Dr
Fremont Blvd
Loren Dr
Mowry Ave
State St
Liberty St
Paseo Padre Pkwy
Lake Elizabeth
Gomes Park
Cindina Dr
Castro Ln
Mission Blvd
Driscoll Rd
Palm Ave
Leslie St
Bidwell Dr
Glenview Dr
Logan Dr
Farwell Dr
Blacow Rd
Azevada Park
Davis St
High St
Olive Ave
Bruce Dr
Luzon Dr
Jerome Ave
Bryant St
Sundale Dr
Porter St
Robin St
Blacow Park
Carol Ave
Roberts Ave
Omar St
Marshall Park
Gatewood St
Osgood Rd
Pine St
Durham Rd
Old Mission Park
Hunter Ln
Albrae St
Christy St
Rix Park
Timmer Blvd
Doane St
Boyce Rd
Boscell Rd
Auto Mall Pkwy
Arroyo Agua Caliente Park
Mission Peak Regional Preserve
Curie St
Bunche Dr
Nobel Dr
Cushing Pkwy
Industrial Dr
S Grimmer Blvd
Parkmeadow Dr
Stanford Ave
Brown Rd
Curtner Rd
Warren Ave
Rancho Higuera Park
Warm Springs Park
Warm Springs Blvd
W Warren Ave
Lakeview Blvd
Kato Rd
Scott Creek Rd
Milmont Dr
Old Warm Springs Blvd
880
84
680
238
1
4

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2.5 Programs

The City of Fremont has robust bicycle and pedestrian programs, demonstrating an ongoing commitment to improving accessibility throughout the community for non-motorized transportation users. In addition to the 2007 Pedestrian Master Plan and this subsequent update, the City developed a Bicycle Master Plan in 2012. The city also actively participates in the Southern Alameda County Spare the Air Resource Team, and annual May is Bike Month activities including Bike to Work Day. The City also has a robust sustainability program, with a sustainability coordinator on staff.

In addition to these city efforts, a countywide Safe Routes to School program seeks to encourage students to walk or bike to school. The Alameda County Safe Routes to School program launched in 2006, and has since expanded to include 103 schools in fourteen cities and unincorporated communities. The program includes a wide variety of events and resources for participating schools, including in-school assemblies and education, walking school buses, a 'Golden Sneaker' competition that rewards schools and classrooms with the highest walking and biking participation, and walk audits to identify potential improvements along school routes.

Fremont's Bicycle and Pedestrian Technical Advisory Committee meets regularly to advance the City's non-motorized transportation and recreation goals.

Figure 2-7: The Oliveira Elementary Golden Sneaker Award program rewards walking to school

2.6 Community Survey and Identified Needs

An online public survey tool gathered input from Fremont residents, employees, and visitors regarding walking conditions in the community, the types of walking trips they take, and where improvements for pedestrians are needed. The survey had 163 respondents, 59 percent female, 31 percent male, and ten percent declined to indicate their gender. As indicated in 8, the majority of respondents are between 30 and 60 years old, with fewer than 10 percent under 30 years old and 21 percent over 60 years old.

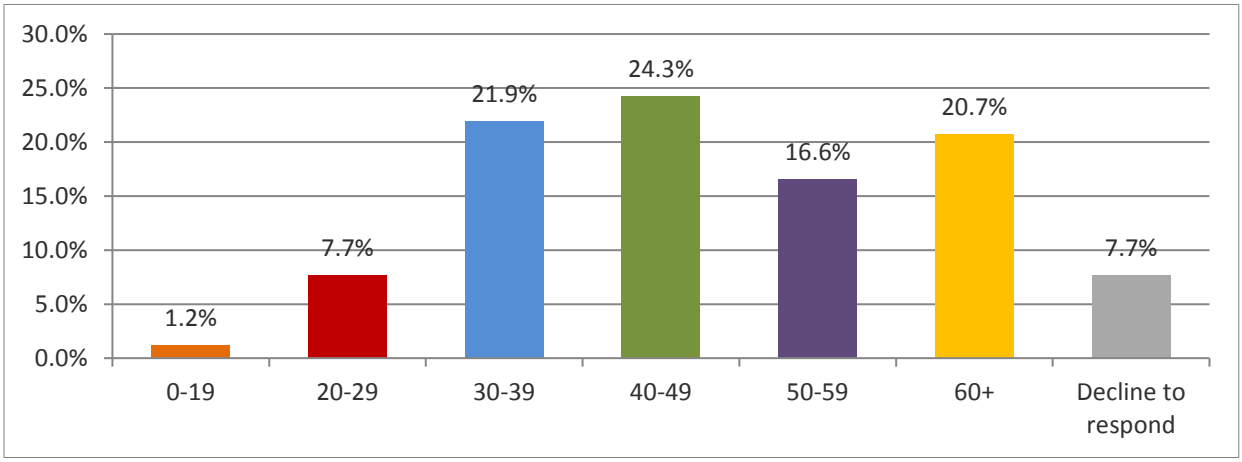

Figure 2-8: Age of Survey Respondents

As illustrated in 9, the five most common types of walking trips in Fremont are for exercise, to enjoy nature, for recreation, to access parks or greenways, and to go shopping or run errands. Over 100 respondents indicated they walk for each of these purposes. Respondents could choose more than one answer.

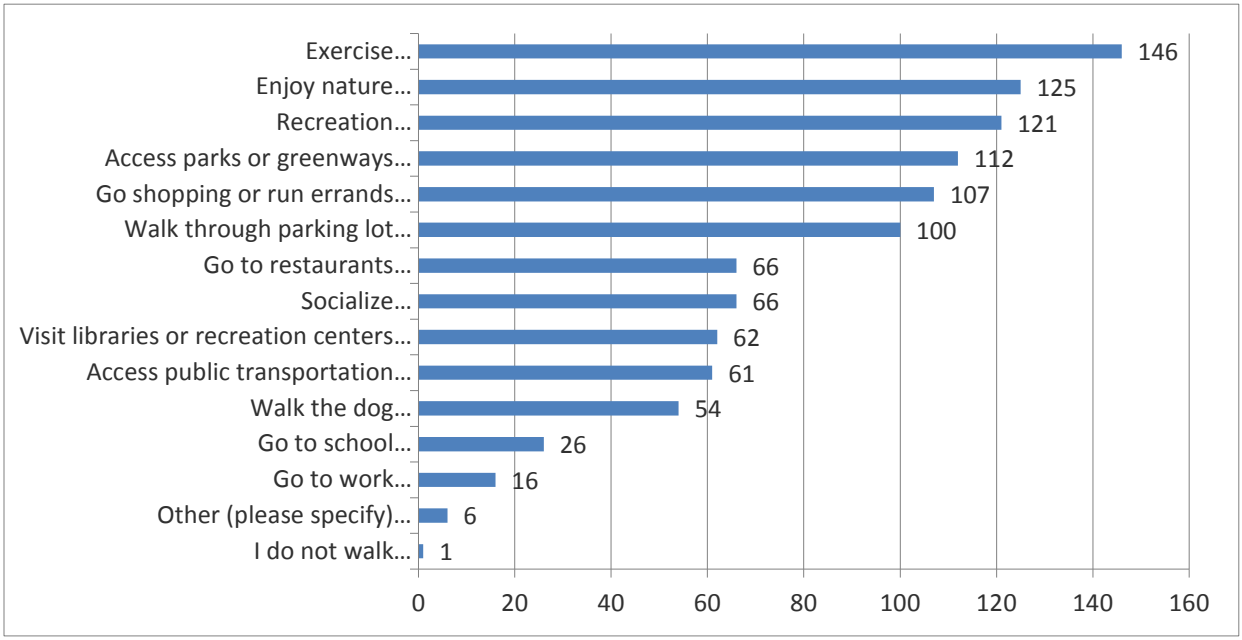

Figure 2-9: Where and Why Fremont Residents Walk

The length of walking trips in Fremont seems to vary based on the purpose of the trip, with two broad categories emerging. Trips that are taken for 'utilitarian' purposes including to school, work, shopping, restaurants, public transit, or libraries tend to be shorter than trips taken for non-utilitarian purposes—for recreation, exercise, to enjoy nature, walk the dog, access greenways, or socialize.

Among utilitarian walking trips, between 59 percent and 75 percent lasted fewer than 15 minutes. For non-utilitarian trips, between 66 and 92 percent of walking trips were fifteen minutes or longer. Figure 2-10 shows the reported lengths of walking trips for various purposes in the community, as well as an average for all trip purposes.

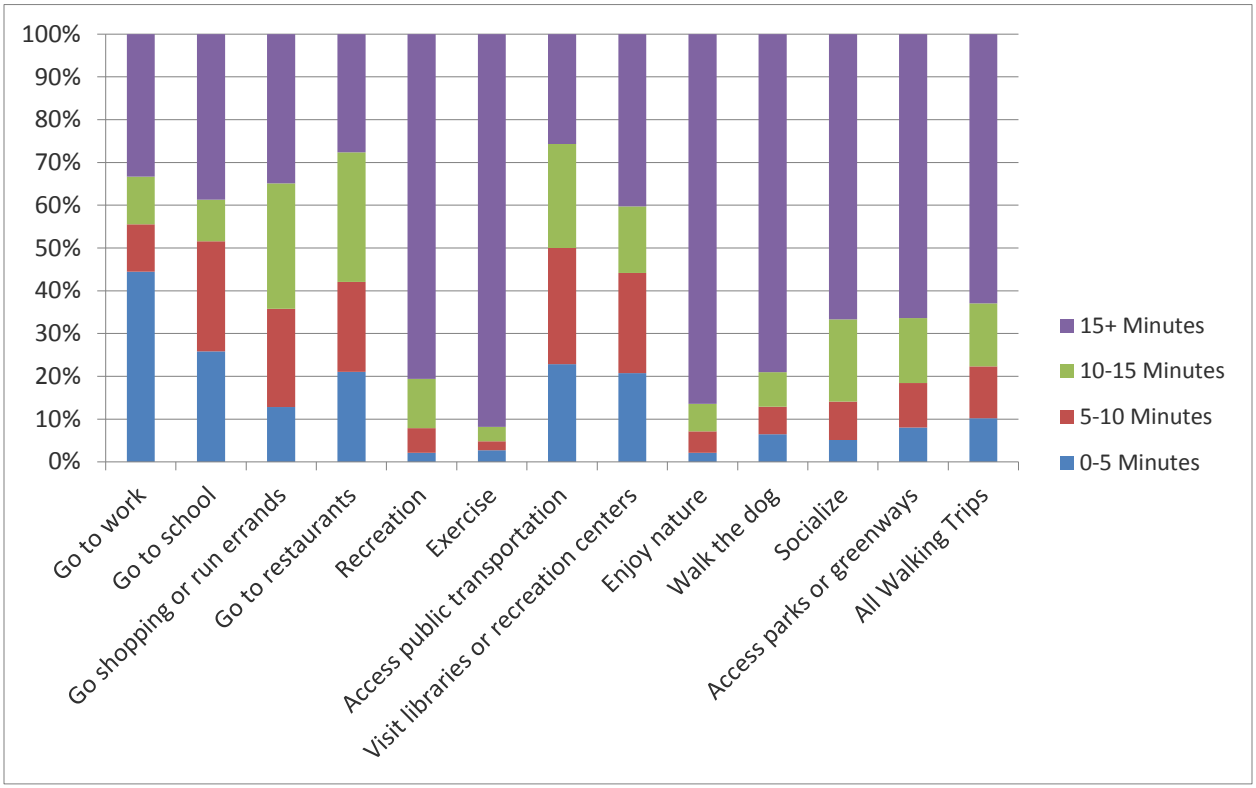

Figure 2-10: Length of Typical Walking Trips in Fremont

When asked to select the top five factors that discourage walking in Fremont, respondents were most concerned with the quality and presence of sidewalks, distance to their destinations, and safety at crossings (Figure 2-). Nearly 80 respondents selected each of the following answers: missing sidewalks, broken or uneven sidewalks, too far to walk between places, and feeling unsafe crossing the street on foot. Current City policy places most of the burden of sidewalk maintenance on property owners. Even if enforced, this approach can lead to piecemeal maintenance and an overall higher cost to the community. The City could consider a bond measure for sidewalks and landscaping to address this.

Other factors that received over 60 responses were too much traffic, personal safety concerns, and aggressive drivers. Fewer than ten respondents said they were uninterested

in walking, indicating a high level of demand for safe, comfortable, convenient pedestrian facilities in Fremont.

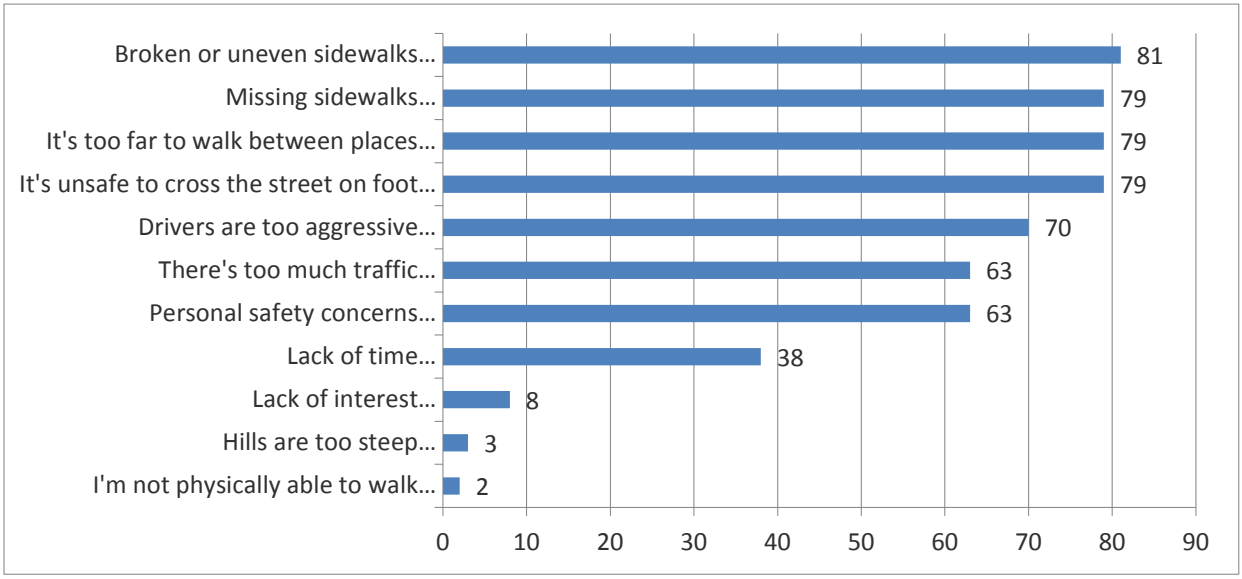

Figure 2-11: Factors That Discourage Walking in Fremont

Respondents were also asked which of the benefits of walking listed in Figure 2-12 would motivate them to walk more frequently. Four benefits received significant support: "walking is better for the environment", "walking provides relaxation and enjoyment", "walking offers a chance to spend time outdoors", and the most influential benefit was "walking is good exercise and good for health". This suggests that messaging aimed at the public related to the environmental, health, and recreational benefits of walking may be effective at increasing the number of walking trips in Fremont.

While messages related to economic benefits, parking hassles, and social aspects may be less effective in increasing walking if aimed at the public, these can be important for policy makers. For example, the current parking requirements encourage driving over walking as large, mostly under-utilized parking lots increase the separation between buildings. There is a need to align the "strategically urban" objectives in the General Plan with policies on parking.

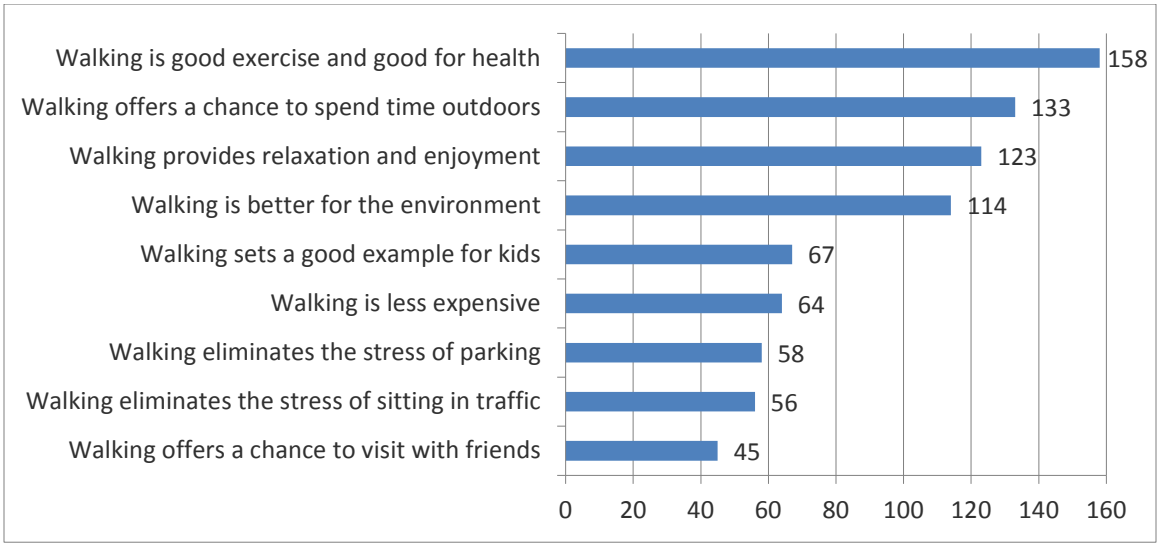

Figure 2-12: Benefits That Would Inspire Increased Walking

Fremont residents and visitors also identified locations where they felt pedestrian improvements would have the greatest impact on their community. The most commonly used words and phrases in these responses are depicted in a "word cloud" (Figure 2-13), with larger text indicating a higher frequency of occurrences.

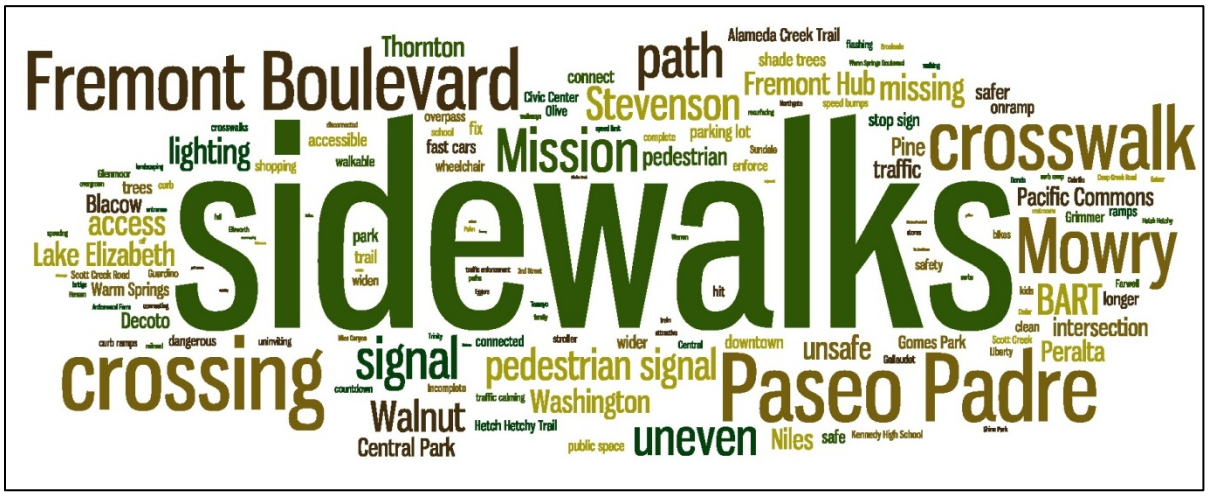

Figure 2-13: Community-Identified Pedestrian Improvements

Fremont Boulevard and Paseo Padre Parkway both emerge as critical corridors that respondents wish had better sidewalks and pedestrian crossings. These high-speed (40 to 45 mph) north-south corridors are four to six lanes wide and most intersections along them have crossings 100 to 140 feet wide. Addressing sidewalk conditions and challenging crossings were the two most commonly cited improvements that would improve the pedestrian experience in Fremont. Collision data further highlights these two corridors as priorities for pedestrian investments (see Table 2-6).

Survey respondents frequently described sidewalk maintenance issues. People with mobility impairments depend on smooth sidewalks. Trees lend shade and amenity to our environment, but also increase pavement maintenance requirements (Figure 2-14). The city has a limited proactive maintenance program to replace tree root damaged sidewalks, but limited funding challenges this effort.

Another commonly cited issue is the difficulty in crossing large roadways. Large multilane intersections minimize motorist delay, but increase pedestrian delay and take longer to cross (Figure 2-15). Higher speed traffic on such roads increases the probability of red light violations that increase risk to pedestrians. The city has a program to retrofit such intersections and make them more pedestrian-friendly, including eliminating free-right turn lanes and installation of curb extensions ("bulb-outs") that reduce crossing distances.

Figure 2-14: Pavement lift from a tree (now removed) on Eggers Drive

Figure 2-15: Large intersections can pose challenges (Stevenson Boulevard / Paseo Padre Parkway)

3 Network Recommendations

3.1 Introduction

This section discusses capital project recommendations for Fremont's pedestrian network.

General citywide improvements to address sidewalk gaps, intersections, and district streetscapes are presented first. As part of the project description, specific recommendations are made for prioritizing these improvements, so that the city can implement them in a logical manner based on the areas of greatest need first. Factors considered in the prioritization included areas with the greatest demand (e.g. main streets of City Center, Downtown District, Centerville, Niles, Irvington), areas with the greatest risk for pedestrian collisions (high traffic arterials), areas with identified public input, and areas that were identified as high need through the fieldwork and inventory process.

Following these general improvements, project sheets are presented with locality maps and cost estimates (where applicable). Cost estimates may include items such as curbs, gutters, and paving. These projects seek to improve specific intersections, corridors, or other locations that were identified through the existing conditions and public input process as needed improvement areas. On street projects are described first, followed by trails.

Following the network recommendations is a section that discusses programs and other non-infrastructure improvements that can enhance the walking experience in Fremont. Fremont can implement a variety of different programs through public awareness, education and enforcement that when combined with infrastructure improvements will help achieve the Vision and Goals set out in Section 1.

All pedestrian projects and programs must be implemented through Fremont's Capital Improvement Program process. This includes a public review process and project approval from the City Council. For implementation, projects and programs will also be evaluated for traffic impacts to the City's roadway network.

3.2 Sidewalk Gaps

Sidewalk gaps are areas in Fremont where there are no sidewalks, or the sidewalk ends abruptly, resulting in a discontinuous network. Areas without sidewalks may force pedestrians to walk along the edge of the roadway, or may cause pedestrians to cross at undesignated crossing locations. Providing a continuous pedestrian sidewalk along all of Fremont's roadways is recommended.

Although a complete citywide inventory of sidewalk gaps was not conducted as part of this plan, approximately 12 miles of sidewalk gaps have been identified through a review of aerial photography and field work, as listed in Table 3-1 and illustrated in Figure 3-1. Many of these gaps are due to unimproved properties, since new sidewalks are often funded through development activity. Other gaps are due to development occurring prior to complete streets policies took effect. Some of the higher priority gaps have been

featured in the project sheets, with the Niles neighborhood gaps aggregated into one proposed project.

Table 3-1: Major Existing Sidewalk Gaps

Street Name	From	To	Length (miles)
HIGHER PRIORITY (ARTERIAL STREETS and/or MAJOR DESTINATIONS)			
Auto Mall Parkway	East of Osgood Road	East of Sabercat Road	0.22
Auto Mall Parkway	Christy Street	Grimmer Boulevard	0.49
Auto Mall Parkway	Fremont Boulevard	Hugo Terrace	0.16
Auto Mall Parkway	West of Technology Drive	East of Technology Drive	0.25
Fremont Boulevard	North of Auto Mall Pkwy		0.07
Fremont Boulevard	North of Ice House Terrace	Auto Mall Parkway	0.05
Fremont Boulevard	West of Ferry Lane	East of Becerra Drive	0.45
Fremont Boulevard	Cushing Parkway	W. Warren Avenue	0.78
Mission Boulevard	Verde Way	Mill Creek Road	0.10
Mission Boulevard	Nichols Avenue & Sullivan	Peggy Wright Way	0.27
Mission Boulevard	Potel Terrace & Nursery Ave	Henderson Court	0.91
E. Warren Avenue	Fernald Street	James Leitch Elementary	0.05
Fernald Street	E. Warren Avenue	James Leitch Elementary	0.04
Decoto Road	Fremont Boulevard	East of Mount Palomar Court	0.09
Kato Road	Innovation Way	Warren Avenue	3.03
Innovation Way	Fremont Boulevard	Warm Springs BART station	0.50
Lopes Court	S. Grimmer Boulevard	Warm Springs BART station	0.57
Warm Springs Boulevard	Fourier / Lippert Ave	Scott Creek Boulevard	1.36
LOWER PRIORITY (LOCAL STREETS)			
D Street	2nd Street	North of Bodilly Ave	0.08
F Street	Niles Boulevard	3rd Street	0.13
G Street	2nd Street	3rd Street	0.13
H Street	Iron Horse Lane	3rd Street	0.07
I Street	2nd Street	South of 3rd Street	0.19
J Street	2nd Street	2nd Street	0.31
L Street	3rd Street	South of 3rd Street	0.08
DeVry Sidewalk	Ardenwood Blvd	DeVry Driveway	0.01
Ellsworth Street	Washington Boulevard	Mission Square Terrace	0.42
Fourier Avenue	Westinghouse Drive	Warm Springs Boulevard	0.07
Haven Avenue	Fremont Boulevard	Roberts Avenue	0.21
Hillview Drive	Niles Boulevard	South of 2nd Street	0.12
Lowry Road	UPRR overpass		0.03
Stanford Avenue	Weibel Dr	Mission Peak Park Entrance	0.42
Rowland Drive	Milton Street	Sylvester Street	0.28
Peralta Boulevard	Parish	Paseo Padre Parkway	0.44
		TOTAL MILES	**12.38**

Figure 3-1 Proposed Sidewalks and Crosswalk Improvements

PROJECT TYPE

- Challenging Crossings
- Proposed Sidewalks

PEDESTRIAN FACILITIES

- Shared Use Path
- Unpaved Path

TRANSIT

Existing / Proposed

- BART Station
- ACE Station
- Amtrak Station
- BART Rail
- Amtrak Rail

OTHER FEATURES

- School
- Park
- Fremont City Limits
- Neighboring Cities
- Unincorporated Area

Source: City of Fremont, SWITRS
Map Created: Nov 2015

0 0.75 1.5 Miles

Union City
Hayward
Newark
San Francisco Bay
San Jose
Sunol
Milpitas
Fremont
Niles
Centerville
Irvington
Central/Downtown
Warm Springs
Centerville Train Depot/ ACE/AMTRAK
Lake Elizabeth
Alvarado Blvd
Lowry Rd
Beard Rd
Northgate Park
Darwin Dr
Ferry Ln
Locke Ave
Crandall Creek Park
Tamayo St
Nicolet Ave
Creekwood Dr
Ridgewood Dr
Ardenwood
Ardo St
Camillo Trail
Patterson Park
Gibraltar Dr
Alder Ave
Turner Ct
Cabrillo Dr
Tupelo St
Ardenwood Blvd
Patterson Ranch Rd
Coyote Hills Regional Park
Kaiser Dr
Hansen Ave
Peralta Blvd
Central Ave
Norris Rd
Mattos Dr
Eggers Dr
Country Park
Fremont Blvd
Lerten Dr
State St
Liberty St
Paseo Padre Pkwy
Walnut Ave
Leslie St
Mowry Ave
Logan Dr
Glenview Dr
Farwell Dr
Blacow Rd
Azevada Park
Bidwell Dr
Davis St
High St
Porter St
Robin St
Sundale Dr
Blacow Park
Omar St
Marshall Park
Grimmer Blvd
Gatewood St
Roberts Ave
Osgood Rd
Pine St
Durham Rd
Old Mission Park
Hunter Ln
Arroyo Agua Caliente Park
Mission Peak Regional Preserve
Parkmeadow Dr
Stanford Ave
Albrae St
Christy St
Boscell Rd
Boyce Rd
Auto Mall Pkwy
Curie St
Bunche Dr
Nobel Dr
Cushing Pkwy
Industrial Dr
S Grimmer Blvd
Brown Rd
Curtner Rd
E Warren Ave
Rancho Higuera Park
Warm Springs Park
Warm Springs Blvd
W Warren Ave
Lakeview Blvd
Kato Rd
Scott Creek Rd
Milmont Dr
Rix Park
Niles Canyon Rd
Vargas Plateau Regional Park
Niles Blvd
Third St
School St
Mock Ave
Vallejo Mill School
Canyon Heights Dr
Cherry Ln
Peralta Blvd
Stevenson Blvd
Gomes Park
Cindina Dr
Castro Ln
Mission Blvd
Driscoll Rd
Palm Ave
Olive Ave
Bruce Dr
Luzon Dr
Jerome Ave
Bryant St
Hwy 84
Hwy 880
Hwy 680
Hwy 238

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3.3 Intersection Improvements

3.3.1 Reduction of Curb Radii

Past Fremont design standards called for wide curb radii at intersections. As a result, many of Fremont's intersections are considered large. This means that pedestrians have further to walk across the street than at intersections with small or medium turning radii and may result in pedestrians crossing at undesignated crossing locations. This design also allows vehicles to make right-turns at relatively high speeds compared to smaller intersections.

RECOMMENDATION: As a citywide policy, the City should consider reducing corner curb radii when determined by an engineering study. Fremont should also consider, where necessary, retrofitting curb radii at all arterial and collector signalized intersections in areas that are adjacent to commercial land uses.

3.3.2 Curb Ramps

In 2007, an inventory of curb ramps was conducted for the Pedestrian Plan in the city's five historical districts and the Central Business District. This data collection determined that nearly all of Fremont's intersection corners have curb ramps.

As part of the curb ramp inventory, data on the slope, side slope, landing dimensions, and other attributes of the curb ramp were measured in the field. An analysis of this data found that most of Fremont's curb ramps are not compliant with current ADA regulations for slope, particularly for slope of the flared sides, and presence of tactile warnings ("truncated domes"). Most of Fremont's ramps were installed prior to the current version of the ADA guidelines, and were compliant at the time of installation. Retrofitting the cities non-compliant curb ramps is generally something the city will accomplish as part of roadway re-paving projects (ADA requires that curb ramps be installed or brought up to compliance during street overlays).

Perpendicular curb ramps are designed so two ramps are included at intersection corners. Perpendicular ramps allow pedestrians and people in wheelchairs to access the sidewalk perpendicular to stopped traffic, and to enter into the crosswalk directly in their line of travel. Perpendicular ramps are not required by ADA or any other standard. However, perpendicular ramps are the preferred curb ramp style from a pedestrian standpoint since they provide the most direct access into the crosswalk. Perpendicular ramps do require more space to install than a single diagonal ramp, are costlier, and sometimes cannot be accommodated due to utilities or other obstructions at the corner. However, especially at major intersections in high pedestrian zones, it is recommended that they be installed where feasible.

In 2015, the City funded a study to develop an ADA Transition Plan through its Capital Improvement Program. The project will recommend and prioritize citywide improvements including curb ramps.

RECOMMENDATION: In addition to implementation of the ADA Transition Plan recommendations, the City should continue to install curb ramps and upgrade existing ramps to current standards through the street maintenance program.

3.3.3 Truncated Domes

Truncated domes provide a cue to visually-impaired pedestrians that they are entering a street or intersection.

Since 2002 when new guidelines were implemented, ADA Guidelines have called for truncated domes on curb ramps. Many of Fremont's streets lack truncated domes because they were constructed prior to 2002. Domes are especially important as Fremont is home to the regionally significant California School for the Blind.

Figure 3-2: A curb ramp with truncated domes

Although it is not required for Fremont to install truncated domes at existing curb ramps that were built prior to 2002, it is recommended that the city continue installing these devices at high priority pedestrian locations and when re-paving and upgrading existing curb ramps to meet ADA guidelines. Truncated domes are a very visible improvement, and they are relatively inexpensive to install.

RECOMMENDATION: Fremont should install truncated domes at all arterial/arterial and arterial/collector intersections that are adjacent to commercial land uses in pedestrian districts, and at those intersections located within 0.25 miles of the California School for the Blind, Fremont Senior Center, and Ohlone College. The City's ADA Transition Plan project will identify and prioritize all locations.

3.3.4 Signal Timing

Signal timing is the amount of time each phase of a signal is allotted for vehicles to pass through or pedestrians to cross the street. Per the MUTCD, standard traffic engineering design assumes that pedestrians travel at 3.5-feet per second, which is used to determine the amount of time to assign to the pedestrian clearance interval. For slower pedestrians, such as the elderly and children, this assumed walking speed may result in them not being able to fully cross the street before the light changes. By adjusting the signal timing to a slower walking rate, slower pedestrians will have more time to cross the street.

RECOMMENDATION: If supported by a traffic study, Fremont should consider adjusting signal timing at the 11 arterial/arterial and arterial/collector signals within 0.25 miles of elementary schools and senior centers to allow for a slower pedestrian pace. This slower walking speed is consistent with MUTCD recommendations for walking rates for slower pedestrians. Signal timing strategies, such as Leading Pedestrian Intervals, are described

in Appendix C. Consideration of signal operation and signal coordination by the Transportation Section is necessary for this recommendation.

3.3.5 Audible Signals

The City of Fremont has a project underway to assist visually impaired pedestrians to cross streets at signalized locations. For new installations and modification of existing signals, accessible pedestrian signal devices are installed at signalized intersections throughout the city. The new accessible pedestrian signal devices provide information in non-visual formats, including audible tones, verbal messages, and tactile (vibrating) push buttons. By emitting a locator tone, a visually impaired person can find the push button to activate the pedestrian crosswalk. The device will also emit a tone or audible voice indicating the "walk" interval, and can be programmed for the direction of the crossing. A vibrating tactile directional arrow surface will indicate that the "walk" interval is active. The City prioritizes the installation of audible signals near activity locations such as shopping areas, senior housing areas, transit facilities, medical facilities, government facilities, parks and school locations.

RECOMMENDATION: Fremont should continue installing audible signals at all new and existing updated signalized intersection, and as a beginning point all signalized intersections within at least 0.5 miles, and beyond where feasible, of the California School for the Blind, Fremont Senior Center, Ohlone College, transit facilities, medical facilities, government facilities, and shopping areas. The City should also consider installing audible signals at the five-corners intersection of Bay Street/Fremont Boulevard/Union Street/Washington Boulevard due to its complexity for pedestrians. Ambient sound for the audible signals can be gauged to a set volume.

3.3.6 High-Visibility Crosswalk Markings

There are a variety of different striping styles for crosswalks. The City of Fremont utilizes two different marking styles for pedestrian crosswalks: the standard "transverse" style, consisting of two parallel lines; and the "ladder" style consisting of the two parallel lines with perpendicular ladder bars striped across the width of the crosswalk. Ladder style crosswalks are used in locations where heightened pedestrian visibility is important, such as around school areas. However, the city does not currently have a consistent policy to guide the application of ladder crosswalks.

RECOMMENDATION: As a citywide policy, Fremont should install ladder crosswalk markings at all uncontrolled crosswalk locations on arterials and collectors where there are existing transverse style markings. The city should also continue its policy of installing high-visibility ladder crosswalk markings at uncontrolled crosswalks on local streets adjacent to schools, on a case-by-case basis.

3.3.7 Curb Extensions

Curb extensions, also called "bulbouts" to describe their shape, are engineering improvements intended to reduce pedestrian crossing distance and increase visibility. In addition to shortening the crosswalk distance, curb extensions serve to increase pedestrian

visibility by allowing pedestrians to safely step out to the edge of the parking lane where they can see into the street, also making them more visible to oncoming drivers. Despite their advantages, curb extensions can require major re-engineering of the street, can be extremely costly, and are not appropriate for all situations.

RECOMMENDATION: Fremont should consider installing curb extensions at crosswalk locations where appropriate.

The Pedestrian Design Toolkit (Appendix C) describes the pedestrian improvements mentioned in Section 3.3 and others in more detail, including design guidelines, materials and maintenance requirements, and additional resources. Specific treatments for intersections included in the Pedestrian Design Toolkit are marked crosswalks, decorative crosswalk paving, stop and yield lines, in street yield to pedestrians signs, raised crosswalks, median refuge island, minimizing curb radii, curb extensions, channelized turn lanes, ADA compliant curb ramps, and sidewalk at railroad grade crossing.

3.4 District Streetscapes

Streetscape improvements are described in Appendix C: Design Toolkit. Streetscape improvements are determined by six of the districts' existing planning documents. Table 3-2 shows a list of the districts and applicable plans.

Table 3-2: District Planning Documents

District	Planning Document	Sample Improvements
City Center / Downtown District	City Center & Downtown Community Plan	-Pedestrian Plaza on Capital Avenue between Fremont Boulevard and State Street (completed in 2015) -10-foot sidewalks on Fremont Boulevard between Mowry Avenue and Beacon
Irvington	Irvington Concept Plan	-Bay Street Streetscape & Parking Project -Bulb outs on Washington Avenue
Mission San Jose	Mission San Jose Design Guidelines and Regulations	- See Mission San Jose Design Guidelines and Regulations for Specific Improvements
Niles	Niles Concept Plan	-Pedestrian Refuge Island on Mission Boulevard at Mayhews Road
Warm Springs	Warm Springs Community Plan	-See Warm Springs Community Plan for Specific Improvements

RECOMMENDATION: Fremont should implement the pedestrian improvements included in the community and concept plans for the appropriate districts. These plans should be updated to reflect today's district projects and cost estimates.

3.5 Project Sheets (Note All Projects Are Conceptual and Subject to Change)

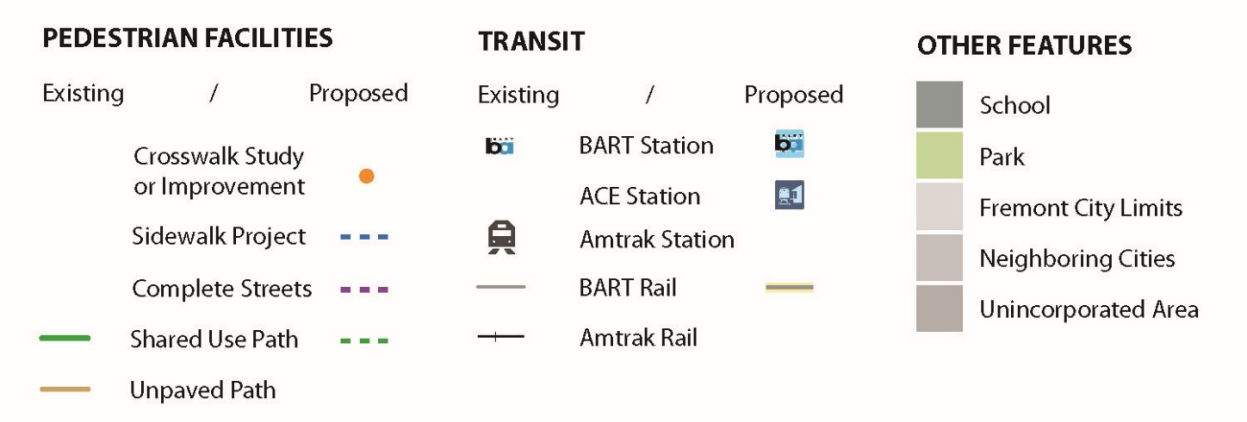
ROADWAY PROJECTS

1. *I-880 Bicycle and Pedestrian Overcrossing (North of Warren Avenue) 47*
2. *I-880 Bicycle and Pedestrian Overcrossing Study (South of Warren Avenue) 48*
3. *Ellsworth Street Sidewalk 49*
4. *Niles Neighborhood Sidewalks and Mission Boulevard Shared Use Path 50*
5. *Mission Boulevard Sidewalks (Walnut to Stevenson) 51*
6. *Fremont Boulevard and Decoto Road Sidewalks 52*
7. *Dusterberry Way Complete Street 53*
8. *Country Drive 54*
9. *Civic Center Drive Streetscape 55*
10. *Palm Avenue 56*
11. *Stevenson Boulevard Shared Use Path 57*
12. *Mission Boulevard at UPRR Trestle 58*
13. *Auto Mall Parkway Projects 59*
14. *Paseo Padre Parkway / Central Park Safety Access Study 60*
15. *Fremont Boulevard and Walnut Avenue Multi-Modal Complete Streets 61*
16. *Citywide Project: At-Grade Pedestrian Railroad Crossings 62*
17. *Citywide Project: Major Arterial Frontage Road Pathways 63*
18. *Citywide Project: Freeway Interchanges 64*
19. *Citywide Project: Uncontrolled Crosswalks on 4+ Lane Roadways 68*
20. *Citywide Project: Bus Stop Sidewalk Landing Pads 72*
21. *Citywide Project: School Traffic Safety Assessments 73*

TRAIL PROJECTS

1. *Citywide Project: Trails Development Study 76*
2. *Mission Creek Trail 79*
3. *Hetch Hetchy Trail North 80*
4. *Hetch Hetchy Trail South 81*
5. *East Bay Greenway Trail 82*
6. *Paseo Padre Parkway / UPRR Trail 88*
7. *Grimmer Boulevard Greenbelt 89*
8. *East-West Connector Trail 90*
9. *Bay Trail from Stevenson Boulevard to Dixon Landing Road 91*
10. *Bay Trail at Coyote Creek 92*
11. *Farwell Trail Upgrade 93*

In most plan views, the following legend is applicable:



1. I-880 Bicycle and Pedestrian Overcrossing (North of Warren Avenue)			
Route	**Start**	**End**	**Miles**
South Fremont	Auto Mall Parkway	Warren Avenue	N/A

Project Description

The Warm Springs Community plan shows two proposed bicycle and pedestrian bridge crossings shown below, a third bridge proposed is just south of Auto Mall Parkway.

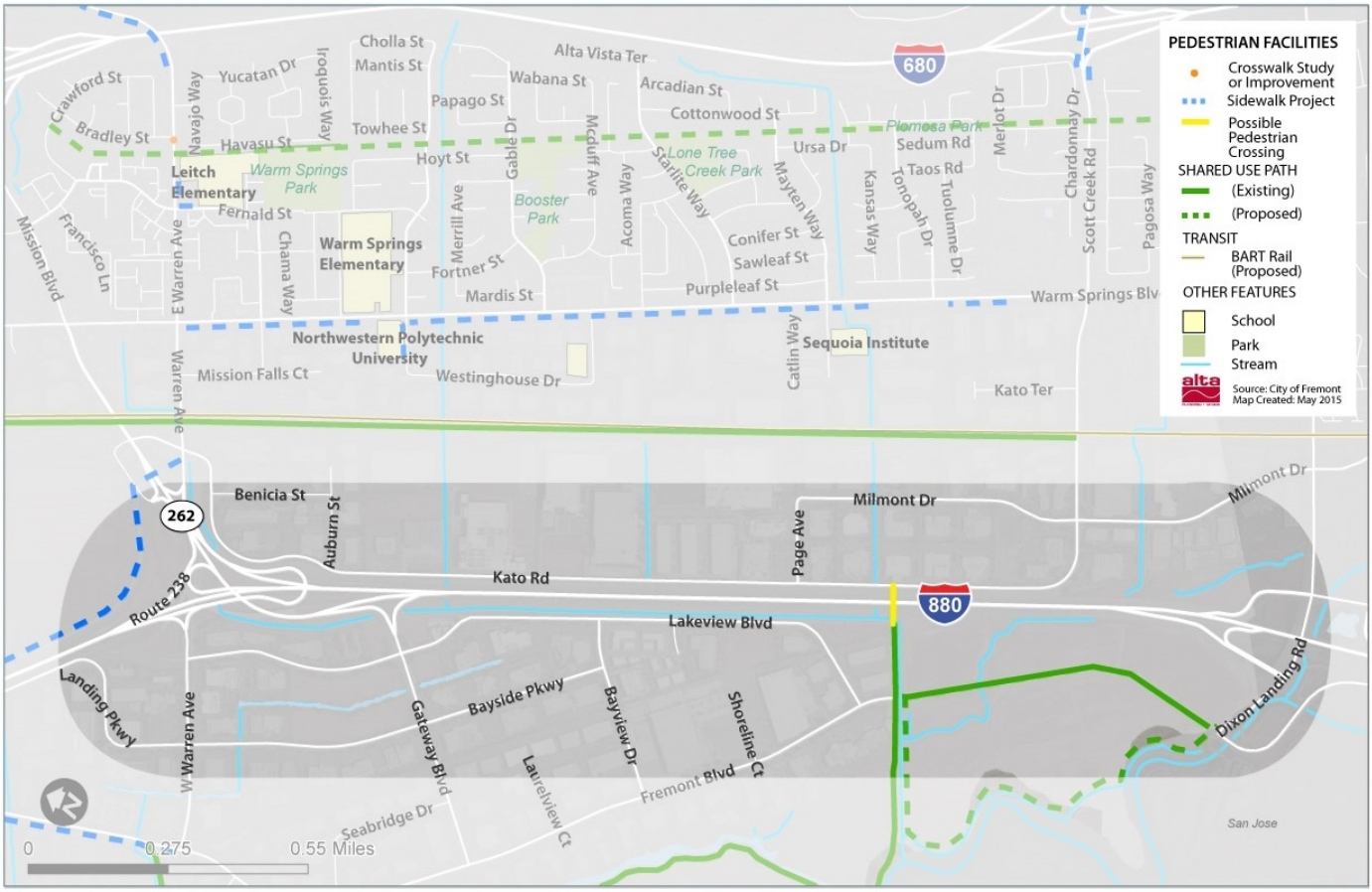
- At Innovation Way and the BART station (in design phase).
- Between the Fremont Boulevard interchange and the Warren Avenue interchange, an I-880 and Landing Parkway overbridge that would provide a link to the Bay Trail via Kato Road to Fremont Boulevard. It would involve paving of an existing service road parallel to a waterway.
- Located south of Auto Mall Parkway connecting Hannover Place to Bunche Drive.

Cost Estimate	Planning Area
$75,000,000	Baylands

2. I-880 Bicycle and Pedestrian Overcrossing Study (South of Warren Avenue)			
Route	**Start**	**End**	**Miles**
South Fremont	Warren Avenue	Dixon Landing Road	N/A

Project Description

The Warm Springs Community Plan and the BART station development processes have identified a possible crossing of I-880 north of Warren Avenue. However, no I-880 crossing opportunities exist between Warren Avenue and Dixon Landing Road, a distance of 1.7 miles. Many employers and residents live in the area and would benefit from increased connectivity and provide a potential connection to the Bay Trail at Coyote Creek. The proposed overbridge would link Kato Road to pathway along the waterway and on to Fremont Boulevard.



Cost Estimate	Planning Area
$50,000 (Study)	Baylands

3. Ellsworth Street Sidewalk

Route	Start	End	Miles
Ellsworth Street	Washington Boulevard	Pine Street	0.3

Project Description

On Ellsworth Street between Pine Street and Cedar Street (the southern segments in the plan shown below) are scheduled for construction in June 2016 and included in the Capital Improvement Program. This project is to include Cedar Street to Washington Boulevard only.

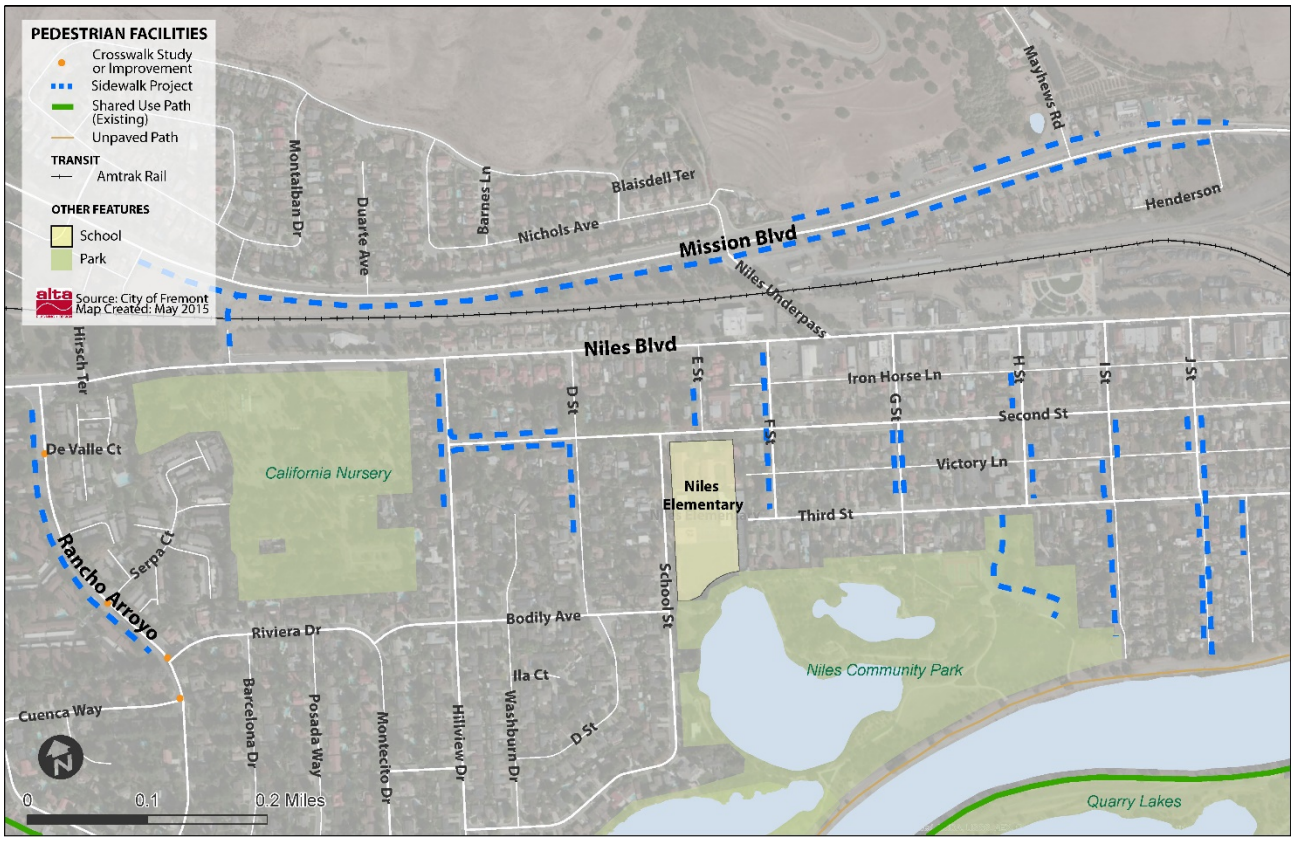
Cost Estimate	Planning Area
$1,120,000	Mission San Jose

4. Niles Neighborhood Sidewalks and Mission Boulevard Shared Use Path

Project Description

This older neighborhood has several gaps (shown as dashed blue lines in the figure below) in the pedestrian network. A program of work has already begun. Additional improvements such as Mission Boulevard pathways or short gap closures will require further study and public outreach to determine feasibility.

- Rancho Arroyo Parkway: (1250 LF, 0.24 mi)
- Nursery Avenue (in construction as of 2015)
- Mission Boulevard (south side 10' shared path, 4830 LF, 0.9 mi)
- Mission Boulevard (north side 6' sidewalk, 1417 LF, 0.27 mi)
- Hillview, 2nd and D streets (in design phase as of 2015)
- Niles Community Park sidewalk (694 LF, 0.13 mi)
- E, F, G, H, I, J, Riverside and L street gaps (various, 5218 LF, 1.0 mi)



Cost Estimate	Planning Area
$5,458,000	Niles

5. Mission Boulevard Sidewalks (Walnut to Stevenson)

Route	Start	End	Miles
Mission Boulevard	Viento Drive; Walnut Ave	Stevenson Boulevard	0.4

Project Description

This project will close the sidewalk gaps (indicated by the blue dashed line) on the south side of Mission Boulevard. There is a small sidewalk gap just south of Viento Drive and a large gap between Walnut Avenue and Stevenson Boulevard.

The UPRR Corridor Trail is illustrated for context only; separate project sheets are provided for that trail beginning on page 82.

Cost Estimate	Planning Area
$1,088,000	Central, Mission San Jose

6. Fremont Boulevard and Decoto Road Sidewalks			
Route	**Start**	**End**	**Miles**
Fremont Boulevard	Ferry Lane	Tamayo Street	0.5
Decoto Road	Fremont Boulevard	Mt Palomar Court	0.1

Project Description

This key arterial crossroad serves a number of pedestrian trip generators such as Warwick Elementary School, several churches, banks, pharmacies, and a community shopping center just to the east. Pedestrian connectivity is needed in advance of the development of the vacant sites where sidewalks do not exist. Missing sidewalks (dashed blue line) could also connect to the proposed Crandall Creek / East-West Connector Path along the future Route 84 extension (dashed green line).

Cost Estimate	Planning Area
$1,452,000	Centerville

7. Dusterberry Way Complete Street

Route	Start	End	Miles
Dusterberry Way	Thornton Ave	Central Ave	0.5

Project Description

The existing roadway has 2 motor vehicle lanes in each direction and is 60 feet wide. This project proposes to reconfigure the roadway from 4 lanes to 3 lanes and buffered Class II bike lanes would be added to both sides of the street. The intersection of Dusterberry and Peralta would be converted from a traffic signal to a 1 lane roundabout, with shorter crosswalks. The existing channelized right turn lane at Central Avenue would be removed, simplifying pedestrian crossing movements and reducing the number of potential conflict points with motor vehicles. New crosswalks would be installed at Thornton Avenue, better serving Thornton Middle-High School.

Project application submitted to Caltrans under the Active Transportation Program Round 3 and other grant opportunities are planned.

Cost Estimate	Planning Area
$2,955,000	Centerville

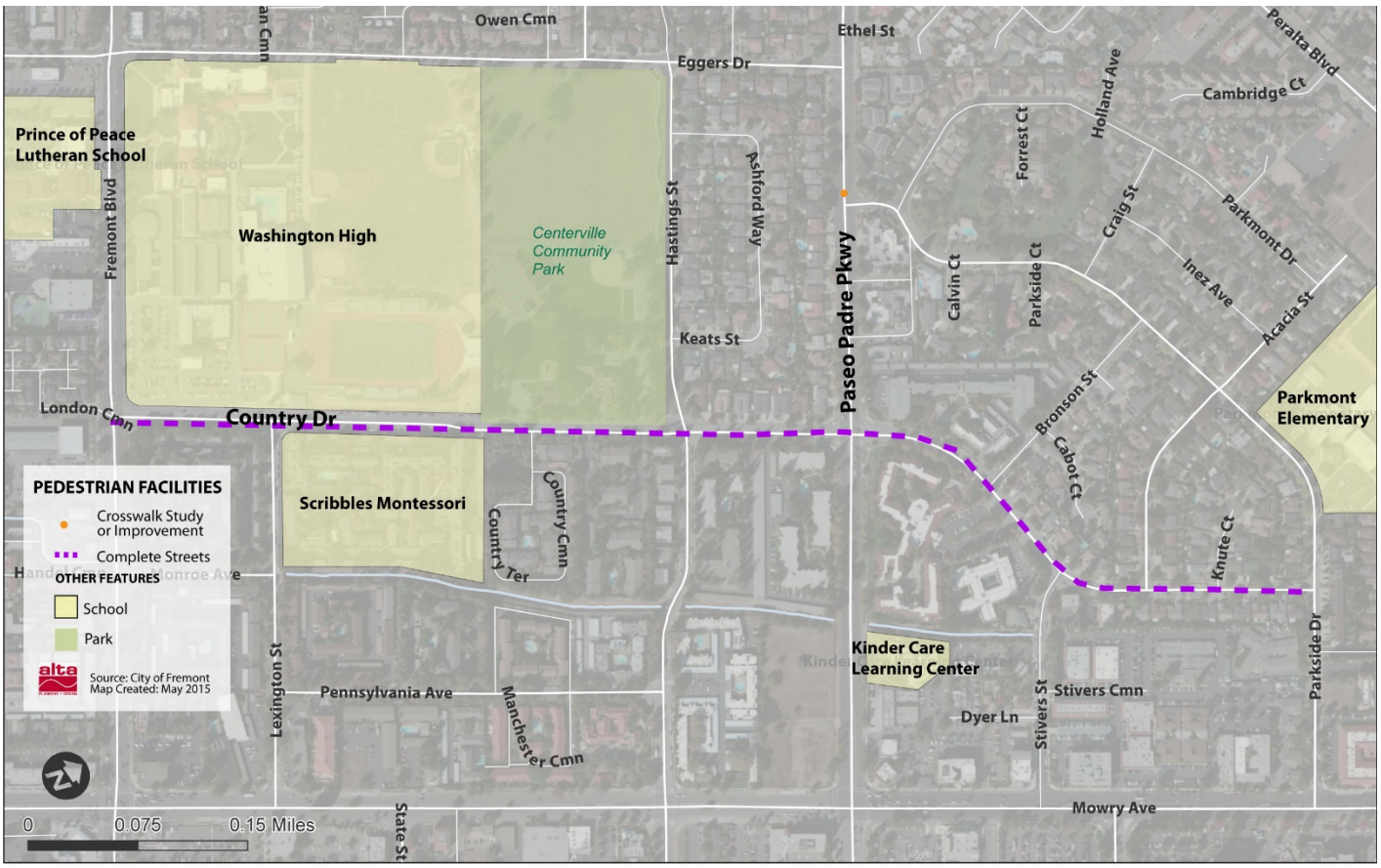
8. Country Drive

Route	Start	End	Miles
Country Drive	Fremont Blvd	Parkside Drive	0.9

Project Description

On Country Drive from Fremont Boulevard to Paseo Padre Parkway, vehicle lanes will be reconfigured to one lane in each direction with a two-way left turn lane in the middle. Parking on both sides of the street will be permitted, except at intersections, and a bikeway will be added. From Paseo Padre Parkway to Parkside Drive, the roadway will be classified as a Class III bike route. Existing speed bumps will be repainted to be more visible and will be reconstructed to become slotted speed bumps to allow for fire truck wheel cut-thru.

Design plans and a complete project description were developed for future streetscape grant project opportunities such as the Active Transportation Program.



Cost Estimate	Planning Area
$2,375,000	Centerville

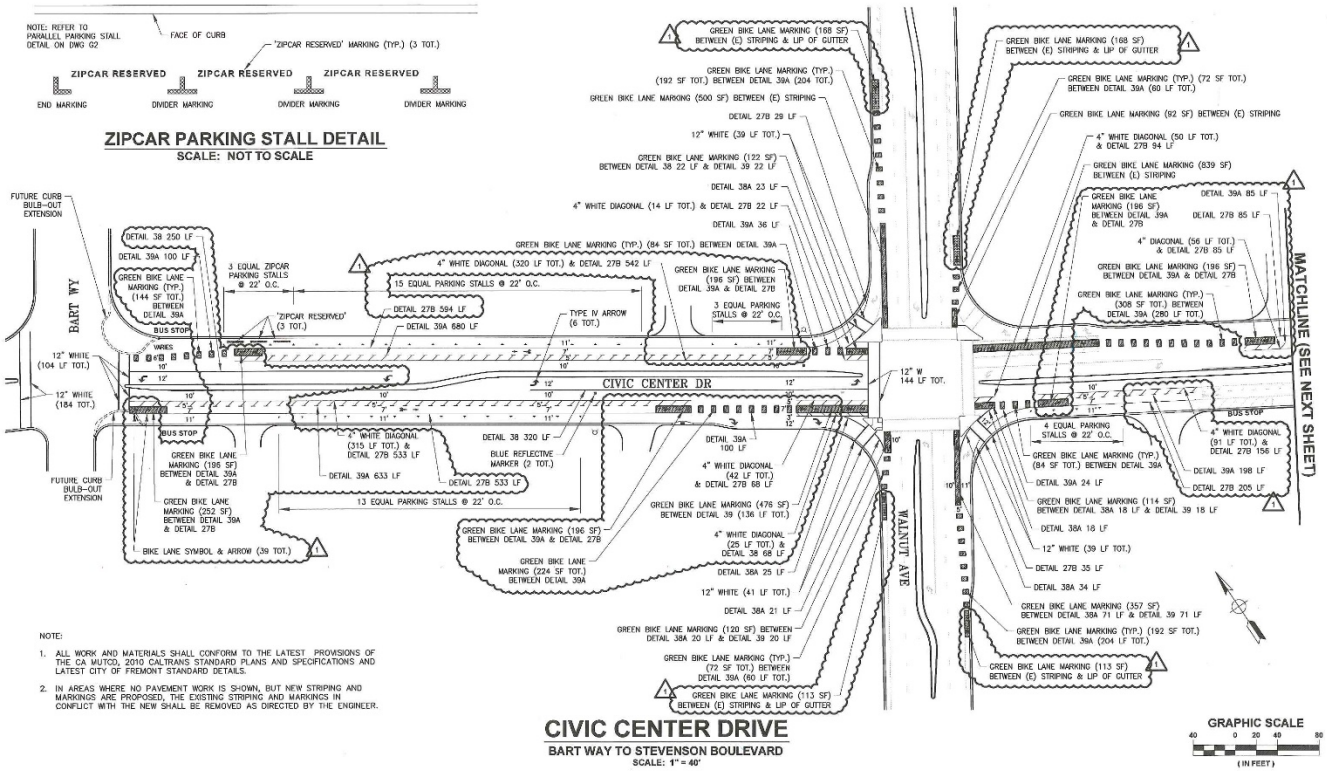
9. Civic Center Drive Streetscape

Route	Start	End	Miles
Civic Center Drive	BART Way	Stevenson Boulevard	0.4

Project Description

Civic Center Drive is frontage to a BART Transit station, two hospitals, a major shopping center, Archstone housing plus retail, and commercial offices. There are six bus lines that travel along Civic Center Drive with stops located at the intersections. With the lane reductions proposed on Civic Center Drive and the proposed new bicycle lanes, expanded sidewalks, improved intersection crossing and improved transit connections and higher density uses, Civic Center can be expected to generate an increase in pedestrian, bicycle and transit trips. Washington Hospital is in the process of expanding their hospital and installing a 600 plus garage parking structure. City Center plans call for "Creating a Park Once" environment. The vision is where a visitor can easily park once and walk to several destinations.

The project will involve lane reduction from 4 lanes to 2 lanes of travel; add green bike lanes; widen sidewalks; tighten curb radii to reduce motor vehicle turning speeds; and install bulb-out curb extensions to reduce pedestrian crossing distances. See typical striping and signing improvement plan below.



Cost Estimate	Planning Area
$2,133,000	Central

10. Palm Avenue			
Route	**Start**	**End**	**Miles**
Palm Avenue	Olive Avenue	San Marco Avenue	0.2

Project Description

There is no sidewalk on the east side of Palm Avenue, which is a route to the Mission San Jose High School. This project (indicated by the blue dashed line) would link to existing sidewalks on the I-680 overbridge and sidewalks along Olive Avenue at the south end, and existing sidewalks on the north end at Olive Avenue.

Cost Estimate	Planning Area
$600,000	Mission San Jose

11. Stevenson Boulevard Shared Use Path

Route	Start	End	Miles
Stevenson Boulevard	I-880	Sundale Drive	0.6

Project Description

With a posted speed limit of 40 mph, six traffic lanes and no bicycle lanes, most people bike on the narrow sidewalks. Streetlights, fire hydrants, and trees are located along these paths, impeding movement. Multiple driveways result in potential conflicts.

The project involves creating widened sidewalks (absolute minimum 8', desirable minimum 10' wide) designated as shared use paths, serving commercial destinations, JFK High School, and Blacow Elementary. Enhanced crosswalks would be provided at Blacow Road and Farwell Drive.

Cost Estimate	Planning Area
$1,647,000	Irvington

12. Mission Boulevard at UPRR Trestle			
Route	**Start**	**End**	**Miles**
Mission Boulevard	NA	NA	0.1

Project Description

This proposed project (highlighted in yellow in the plan below) is on the east side of Mission Blvd between the intersection of Stevenson Boulevard and Las Palmas Avenue. The project would improve pedestrian and bikeway connectivity by installing a tunnel on the east side similar to the one already provided on the west side. The City plans to acquire the UPRR corridor within 5 years which would include the existing UPRR trestle south of Stevenson Boulevard.

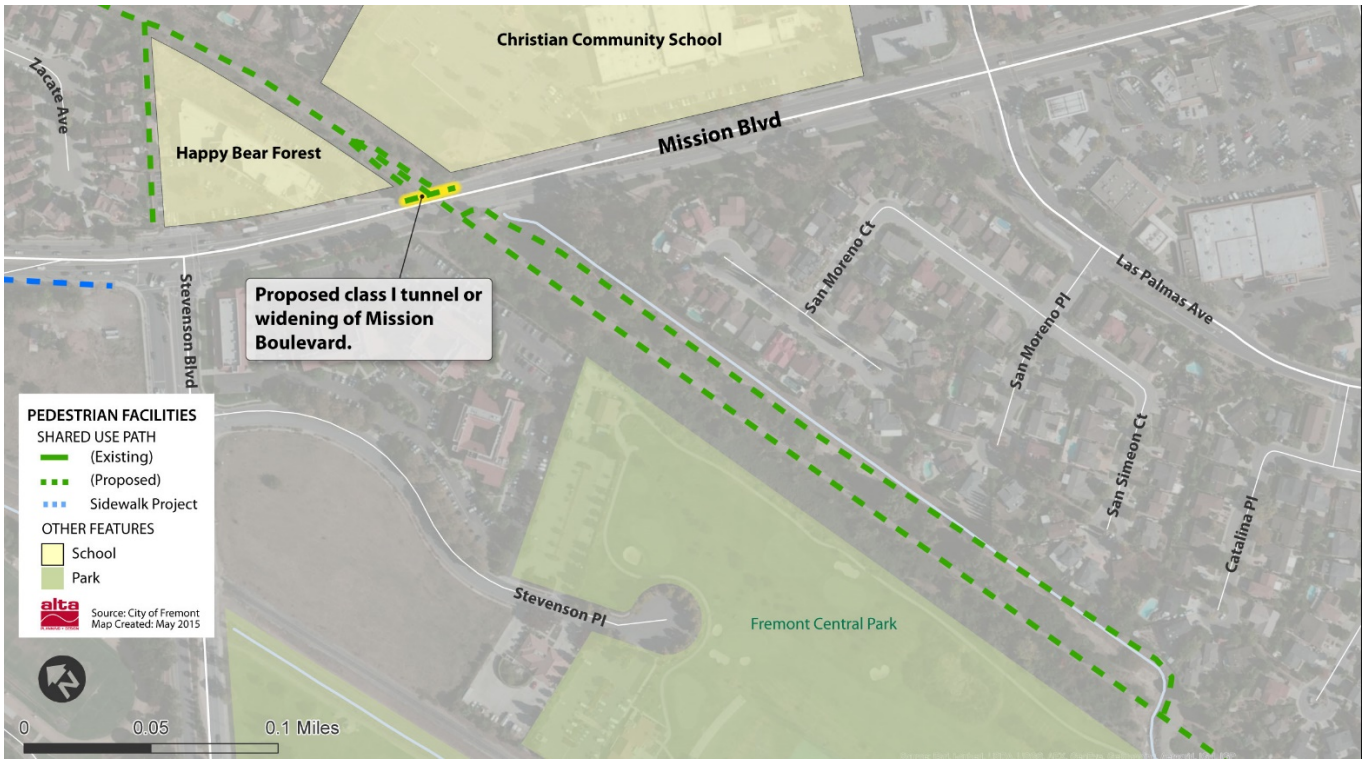


Figure 3-3: The project will duplicate the tunnel shown on the left side of the image

Cost Estimate	Planning Area
$1,900,000	Central, Mission San Jose

13. Auto Mall Parkway Projects

Route	Start	End	Miles
Auto Mall Parkway	I-880	I-680	2.0

Project Description

This project would combine previous Pedestrian Master Plan (2007) recommendations with a wider look at sidewalk and crossing improvements along the Auto Mall Parkway Corridor. Both the I-880 and I-680 interchanges have missing sidewalks and high-speed ramps (interchange improvements are described later in this document under a "citywide project" heading). The project should involve Caltrans as well as Warm Springs stakeholders and commercial property owners.

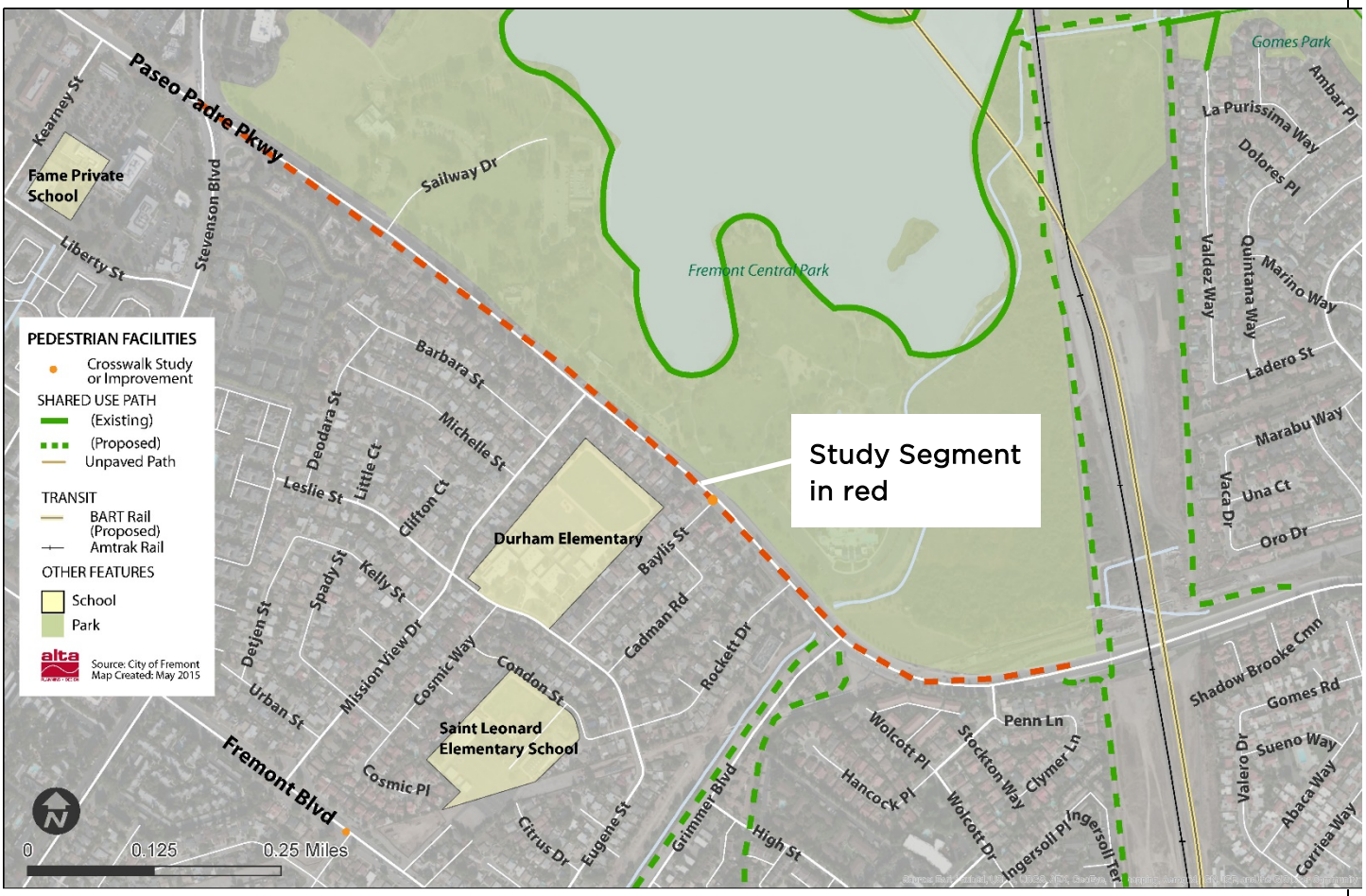
Dashed blue lines indicate sidewalk gaps along Auto Mall Parkway at I-880 though to I-680. One of the major gaps is along Technology Drive between Grimmer Boulevard and Auto Mall Parkway.

Cost Estimate	Planning Area
Not available	Irvington, South Fremont

14. Paseo Padre Parkway / Central Park Safety Access Study			
Route	**Start**	**End**	**Miles**
Paseo Padre Parkway	Stevenson Boulevard	UPRR Trail	2.0

Project Description

The south frontage of Central Park is along the busy Paseo Padre Parkway, a route that presents a barrier for walking and bicycling access (red dashed line on the plan below). The safety access study will consider "complete streets" elements such as traffic calming, pedestrian crossing treatments, buffered bicycle lanes or cycle tracks, and on-street parking. The study will also consider the needs of special events and weekend events held at Central Park. NOTE: this project does not include proposed trails (green dashed lines) which are illustrated only for contextual purposes.



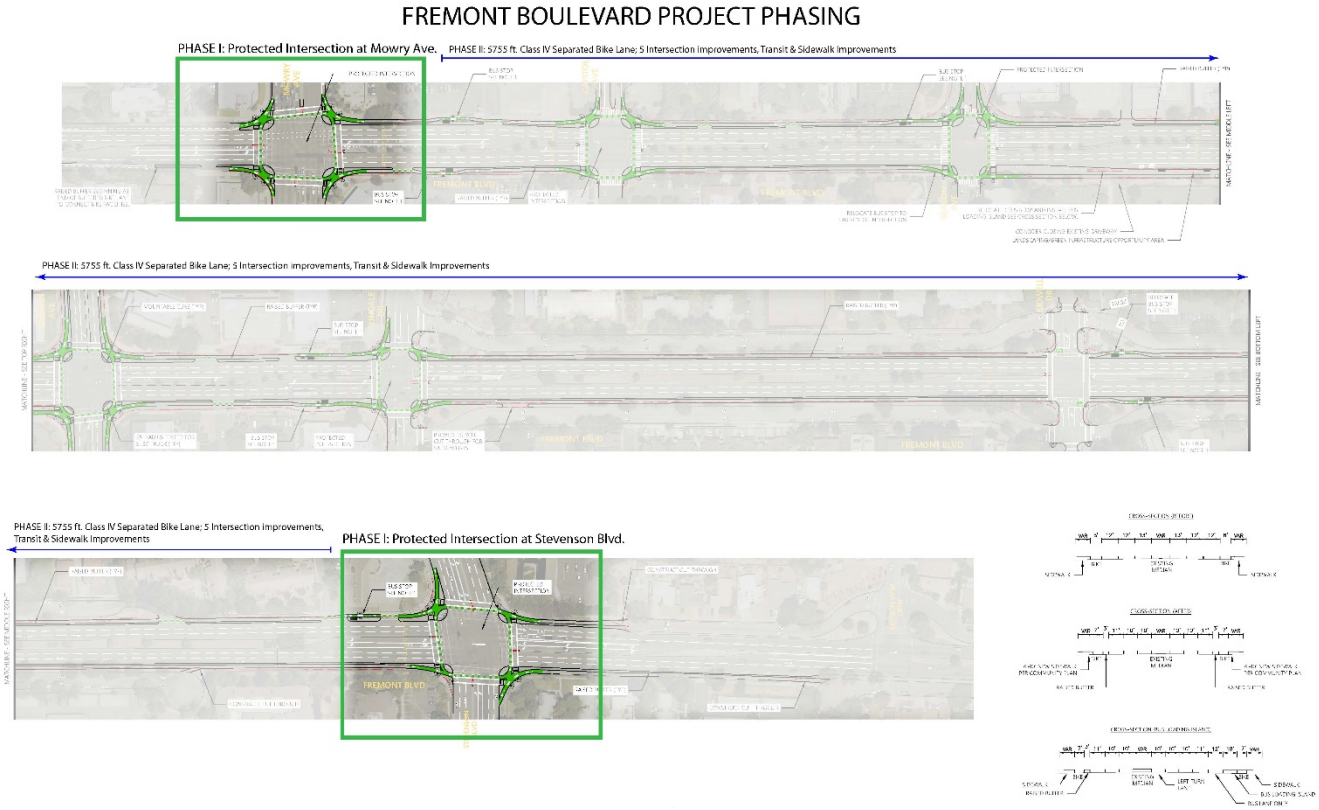
Cost Estimate	Planning Area
$75,000	Central

15. Fremont Boulevard and Walnut Avenue Multi-Modal Complete Streets

Route	Start	End	Miles
Fremont Boulevard	Stevenson Boulevard	Mowry Avenue	1.0
Walnut Avenue	Mission Boulevard	Argonaut Way	2.0

Project Description

Fremont Boulevard and Walnut Avenue are proposed for multi-modal Complete Streets projects. The projects would involve installation of buffered and separated bike lanes, protected intersections, and pedestrian crossing safety improvements.



Cost Estimate	Planning Area
Fremont Boulevard: $10.0 million Walnut Avenue: $8.5 million	Central

16. Citywide Project: At-Grade Pedestrian Railroad Crossings

Description

Over time, many of the at-grade railway crossings throughout the city have been either abandoned or grade separated. For example, the BART extension to Warm Springs has eliminated six such crossings. However, there are 10 remaining crossings where the pedestrian route could be improved. Depending on pedestrian volume, improvements may include gates, signals and barrier arms, enhanced signage, truncated domes, continuous sidewalks and/or smoother surfaces. At many of these locations, crossing infrastructure improvements will also enable the establishment of "quiet zones".

Figure 3-4: At Shinn Street, sidewalks are interrupted by the railway

Locations

- Clarke Drive
- Stevenson Boulevard
- Walnut Avenue
- Nursery Avenue
- Fremont Boulevard
- Blacow Road
- Maple Street
- Dusterberry Way
- Shinn Street
- Private road vicinity of Shinn Street

Cost Estimate

Costs to be determined by project location

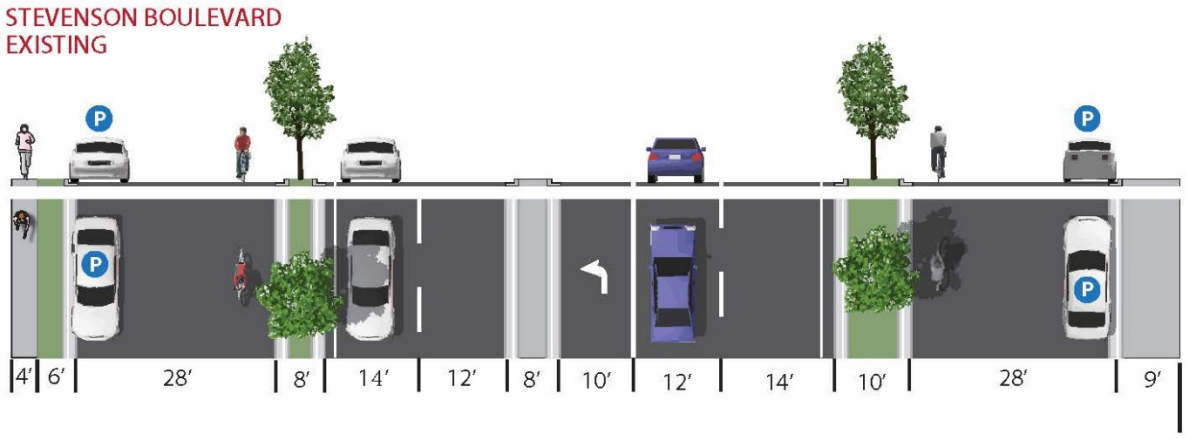
17. Citywide Project: Major Arterial Frontage Road Pathways

Description

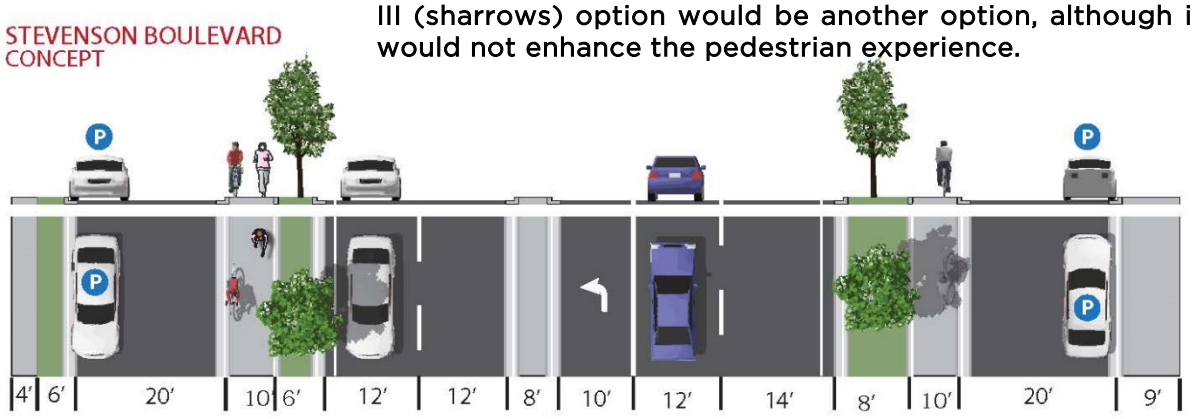
Some of Fremont's major boulevards have frontage streets to provide local access. Relatively narrow (5') sidewalks are provided between a parking lane and front yards, but these are frequently interrupted by driveways. As part of any future street renewal projects, the existing 26' wide frontage streets could be converted into one-way operation while retaining all parking. This would enable at least 8' of the frontage street pavement to be added to the width of the existing raised median and allocated to a more comfortable pedestrian route unencumbered by driveways. Length measurements provided below include each side of the road where such pathways could fit.

Locations

Route	Start	End	Miles
Stevenson Boulevard	Fremont Boulevard	Sundale Drive	1.4
Fremont Boulevard	Stevenson Boulevard	Sundale Drive	1.0
Mowry Avenue	Glendale Drive	Bell Street	1.4
Blacow Road	Central Avenue	Robin Street	2.7



NOTE: subject to agreement with Fire Department; a Class III (sharrows) option would be another option, although it would not enhance the pedestrian experience.



Cost Estimate	Planning Area
$500,000 per mile	Central, Irvington

18. Citywide Project: Freeway Interchanges

Description

Several highway interchanges in Fremont were designed in the decades before designing for all road users became national, state and local policy. Ramp geometries are optimized for high vehicular speeds and crosswalks are often missing. Consistent with federal and state policy, any major interchange renewal work would include improved provisions for walking and cycling. Some of the proposed improvements include fencing along overbridges, ramp crosswalks with high visibility ladder-style striping, warning signage, audible pedestrian signals, tighter corner radii, signal modifications, striping, and signing modifications. This project will develop planning concepts for all interchanges including interim and ultimate designs. Guidance documents include:

- The Caltrans Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians (Alta & Cambridge Systematics, 2010) provides detailed guidance: http://www.dot.ca.gov/hq/traffops/engineering/investigations/docs/intersection-guide-bicycles-pedestrians.pdf
- The ITE Proposed Recommended Practice (Draft for Public Comment) - Recommended Design Guidelines to Accommodate Pedestrians and Bicycles at Interchanges (ITE, 2015) http://www.pedbikeinfo.org/pdf/Webinar_PBIC_LC_062513.pdf

The principal locations for improvement are:

- I-880 / Stevenson Boulevard
- I-880 / Auto Mall Parkway
- I-880 / S. Fremont Boulevard
- I-880 / Mowry Avenue
- I-880 / Decoto Road
- I-880 / Alvarado Boulevard
- I-880 / Thornton Avenue
- I-880 / Warren Avenue
- I-880 / Mission Blvd (Rt. 262)
- I-680 / Scott Creek Road
- I-680 / Mission Boulevard
- I-680 / Auto Mall Parkway
- I-680 / Washington Blvd.
- I-680 / Mission Boulevard (Warm Springs and Mission San Jose locations)
- Route 84 / Thornton Avenue / Paseo Padre Parkway
- Route 84 / Ardenwood Boulevard

The I-680 interchanges are illustrated on the next pages, showing only the missing sidewalks. Other improvements such as listed above are not shown at the drawing scale used here.

Figure 3-5: A missing crosswalk at a 20mph freeway on-ramp, Decoto Road and I-880

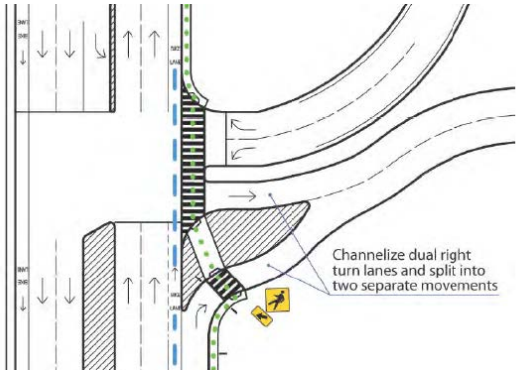
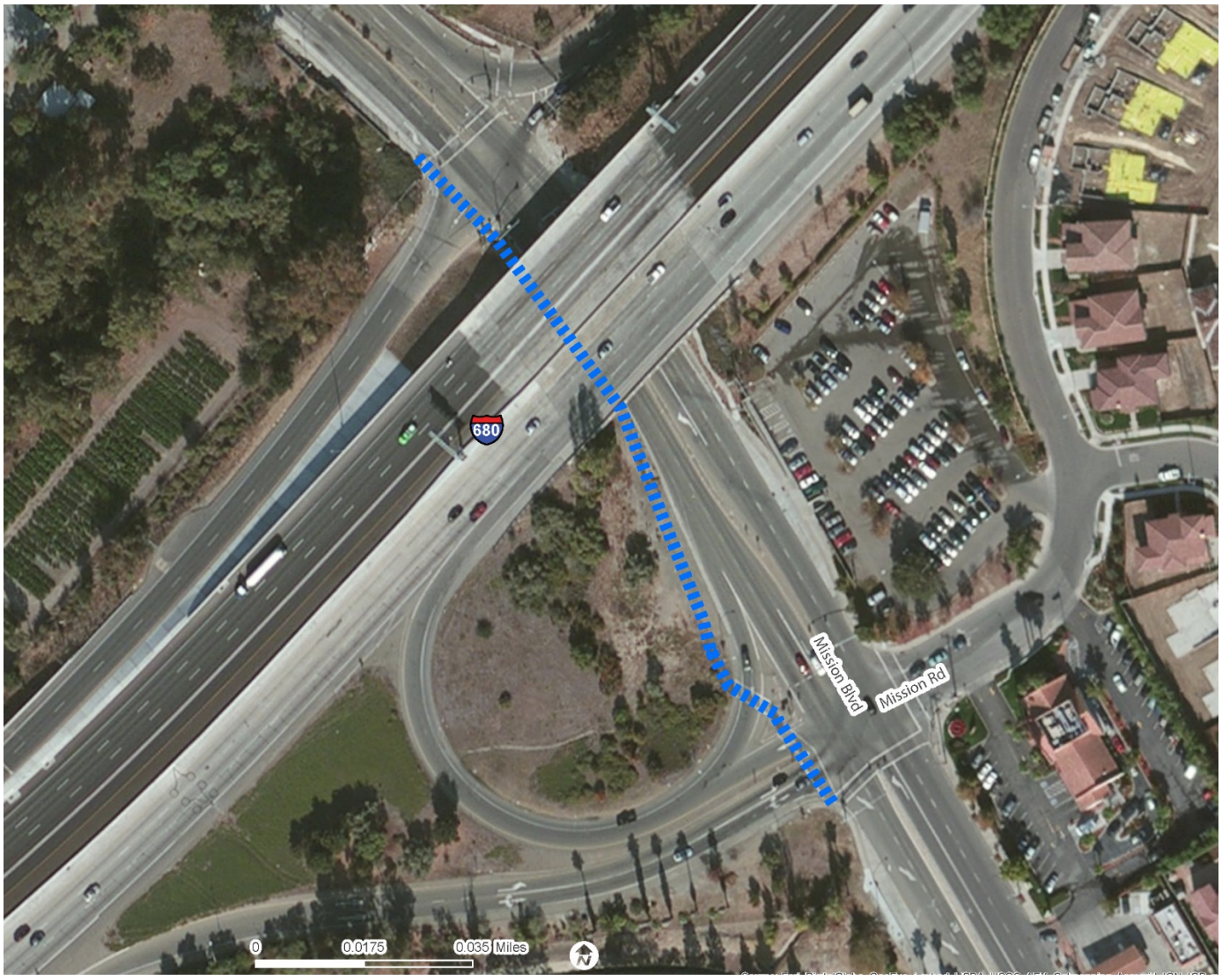


Figure 3-6: The Complete Intersections Guide includes ramp geometry, crosswalk and signage recommendations

Citywide Freeway Interchanges continued: Mission Boulevard Sidewalk at I-680 (Mission San Jose) Project Description			
Route	**Start**	**End**	**Miles**
Mission Boulevard	I-680 SB off-ramp	Mission Road	0.1

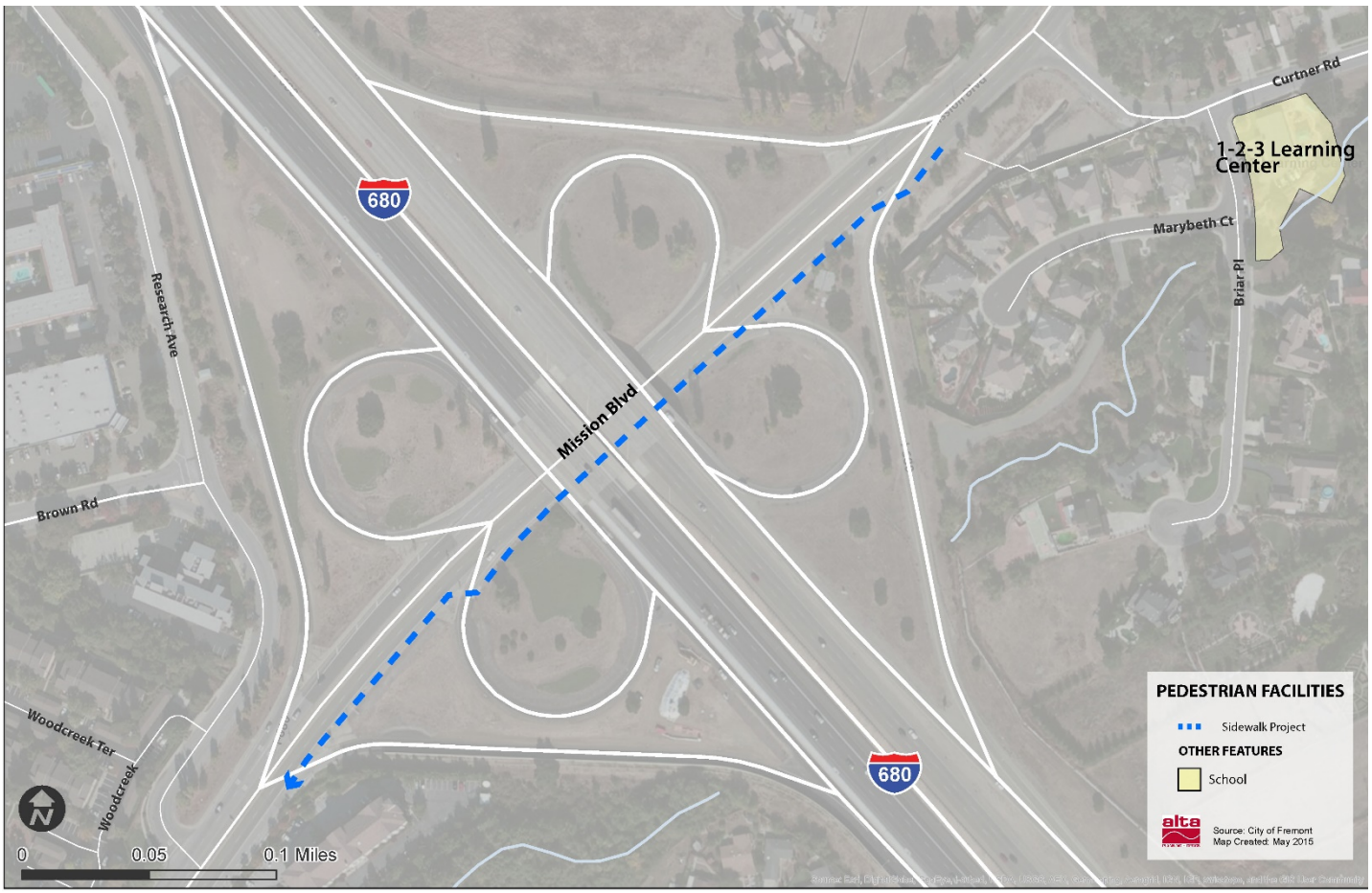
The undercrossing of I-680 bridge over Mission Boulevard has a sidewalk on the east side of the road, but no sidewalk is present on the west side. Mission San Jose High School and the Fremont Montessori School are both located on the west side, so completing this gap will improve access and increase safety and efficiency.



Cost Estimate	Planning Area
$342,000	Mission San Jose

Citywide Freeway Interchanges continued: Mission Boulevard Sidewalk at I-680 (Warm Springs) Project Description			
Route	**Start**	**End**	**Miles**
Mission Boulevard	I-680 SB on ramp	I-680 NB off ramp	0.3

This improvement project is in the Warm Springs district located at the Mission Boulevard / I-680 interchange. There are currently no sidewalks on the west side of Mission Boulevard to connect the residential land uses on either side of the freeway. This project is also part of a current (2015) Alameda County Transportation Commission (ACTC) study.



Cost Estimate	Planning Area
$700,000	Warm Springs

Citywide Freeway Interchanges continued: Washington Boulevard Sidewalk at I-680 (Warm Springs)Project Description			
Route	**Start**	**End**	**Miles**
Washington Boulevard	East of Meredith Drive	Luzon Drive	0.3

Sidewalks and crosswalks would be built at the I-680 interchange on the north side of Washington Boulevard (dashed blue line). This could also provide a connection to the proposed Trail Ridge Path (dashed green line) as identified in the UPRR Trail Study.

Cost Estimate	Planning Area
$495,000	Mission San Jose

19. Citywide Project: Uncontrolled Crosswalks on 4+ Lane Roadways or Difficult Crossing Locations

Fremont has over 36 marked crosswalks on four lane roadways or difficult crossing locations (a list follows on the next page, and they are also displayed as red dots in Figure 3-1 on page).

They can be challenging to cross for pedestrians while yielding motorists block the view of motorists in adjacent lanes (the "multiple threat" issue). Despite pedestrian crossing signage and pavement striping at many of these locations, motorists often do not expect to see a pedestrian and may not yield to a pedestrian in the crosswalk (Figure 3-7).

Figure 3-7: A pedestrian waits for motorists to yield (Central Avenue)

Potential design solutions such as flashing beacons, curb extensions, and median refuges are presented in the Toolkit (Appendix C). The Toolkit references NCHRP Report 562: Improving Pedestrian Safety at Unsignalized Crossings[18], a detailed guide for engineering practitioners. There are also spreadsheet tools available that employ the Highway Capacity Manual Chapter 19 pedestrian level of service calculations and enable modeling of the impact of various design solutions.

The following list has been prioritized based on traffic speed and volume. Within these tiers, the City will further prioritize based on intersections that are in PDA areas. In general, the higher the speed limit and traffic volume and the shorter the gaps in traffic are, the more extensive the design solutions must be. **This list is subject to change. Additional difficult crossing locations to be added as identified by the City.**

[18] http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_562.pdf

19. Citywide Project: Uncontrolled Crosswalks on 4+ Lane Roadways or Difficult Crossing Locations				
Road	**Nearest Intersection**	**Existing Condition**	**AADT**	**Posted Speed**
HIGHER PRIORITY (>35 MPH **and** >=20,000 AADT)				
Mowry Ave	Waterside Cir	White ladder	36,000	35
Paseo Padre Pkwy	Surry Pl	White transverse	31,000	45
Paseo Padre Pkwy	Commerce Dr	White transverse / all legs	10,000	45
Paseo Padre Pkwy	Kaiser Dr	White transverse / no sidewalk	10,000	45
Washington Blvd	Olive Ave	White ladder	22,000	40
Fremont Blvd	Michael Ave	White transverse	20,000	40
Fremont Blvd	Crestwood St	White transverse	20,000	40
Fremont Blvd	Doane St	White transverse	20,000	40
MEDIUM-HIGH PRIORITY (>35 MPH **or** >=20,000 AADT)				
Grimmer Blvd	Seneca Park Dr	White transverse	18,000	40
Blacow Rd	Gatewood St	Yellow transverse	16,000	40
Washington Blvd	Gallegos Ave	White ladder	13,200	40
Washington Blvd	Jerome Ave	White ladder	13,200	40
Walnut Ave	BART Driveway/ Trail Midblock Crossing	No crosswalk	13,000	35
Driscoll Rd	St Anthony Dr	White transverse	12,000	40
Driscoll Rd	Chiltern Dr	White transverse	12,000	40
Driscoll Rd	Durillo Dr	White transverse	12,000	40
Driscoll Rd	Joyce Ave	White transverse	11,000	40
Fremont Blvd	Margery Dr	Yellow transverse	33,000	30
Fremont Blvd	Clough Ave	White ladder / very bright	33,000	30
Fremont Blvd	Bonde Way	White ladder / worn markings	30,000	30
Fremont Blvd	Norris Rd	Yellow ladder	25,000	30
Fremont Blvd	Mattos Dr / Heritage Terr	White transverse	25,000	30
Mowry Ave	Vancouver Common	White ladder	21,000	35
Mowry Ave	Bonner Ave	White transverse	21,000	35
MEDIUM PRIORITY (>30 MPH **and** >=10,000 AADT)				
Civic Center Drive	Kaiser Hospital driveway	White ladder	12,000	30
Walnut Ave	Godfrey St	Yellow transverse	17,000	35
Central Ave	Joseph St	White transverse	15,000	35
Central Ave	Teakwood Dr	White transverse	15,000	35
Blacow Rd	Garden Wy	White transverse	15,000	35
Paseo Padre Pkwy	Covington Dr	White transverse	13,000	35
Paseo Padre Pkwy	Mento Dr	White transverse	13,000	35
Mission Boulevard	Cedar Street	White transverse	16,000	35
LOWER PRIORITY (ALL OTHERS)				
Warren Ave	Bradley St	Yellow ladder	5,000	35
Paseo Padre Pkwy	Onondaga Wy	Yellow transverse	4,000	35
Rancho Arroyo Pkwy	De Valle Court	White transverse / no curb ramps	3,000	30

19. Citywide Project: Uncontrolled Crosswalks on 4+ Lane Roadways or Difficult Crossing Locations				
Rancho Arroyo Pkwy	Serpa Court	White transverse / no curb ramps	3,000	30
Rancho Arroyo Pkwy	Riviera Drive	Unmarked / no curb ramps	3,000	30
Rancho Arroyo Pkwy	Cuenca Way	Unmarked / no curb ramps	3,000	30

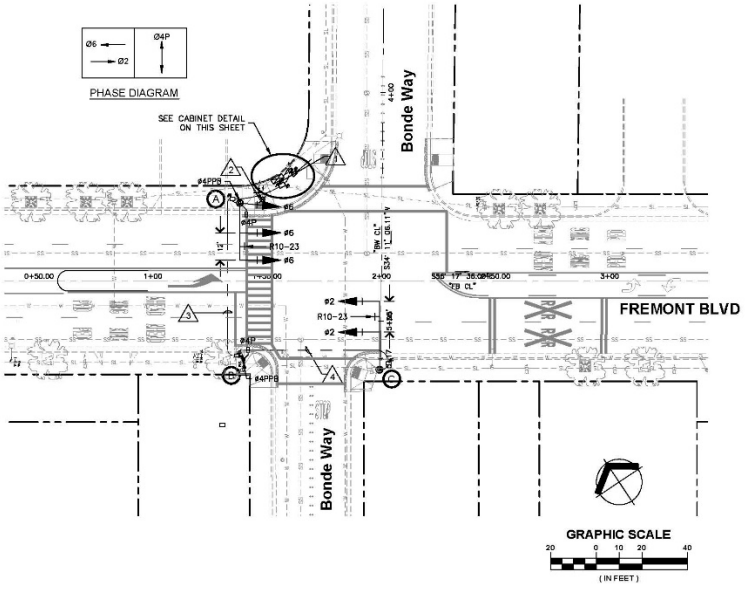
19. Citywide Project: Uncontrolled Crosswalks on 4+ Lane Roadways or Difficult Crossing Locations

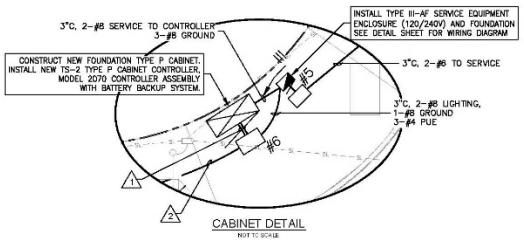
Sample Project: Fremont Boulevard / Bonde Way Uncontrolled Crossing Improvement

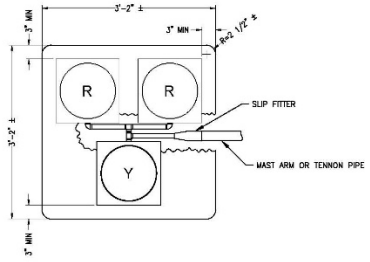
The Fremont Boulevard / Bonde Way crossing was reviewed as part of the Pedestrian Safety Assessment. Suggested improvements include:

- Renewal of crosswalk markings with high visibility "ladder" style markings
- Relocation of bus stop to avoid pedestrian visibility issues with motorists at the crosswalk
- Parking enforcement to address cars parked on the sidewalk at the auto repair business
- Pedestrian Hybrid Beacon
- Right turn only out of Taco Bell driveways

Conceptual striping and signage plan below, subject to change.







TRAFFIC SIGNAL NOTES:

1. TRAFFIC SIGNAL POLE STANDARDS AND EQUIPMENT TO BE REMOVED SHALL BE REMOVED AND DISPOSED OF AFTER NEW SIGNAL EQUIPMENT IS INSTALLED AND OPERATIONAL.
2. LOCATION OF POLES, PULL BOXES, EQUIPMENT, AND POSITIONING OF DETECTORS ARE SCHEMATIC UNLESS OTHERWISE NOTED. BEFORE BEGINNING ANY CONSTRUCTION OPERATION, THE CONTRACTOR SHALL CHECK FOR CONFLICTS WITH UNDERGROUND UTILITIES, OVERHEAD UTILITIES, OR OTHER OBSTACLES. IF EQUIPMENT OR POLES MUST BE RELOCATED, THE ENGINEER MUST APPROVE THE NEW LOCATION PRIOR TO INSTALLATION.
3. PULL BOXES SHALL NO. 5 UNLESS OTHERWISE NOTED.
4. NEW SIGNAL POLES SHALL BE LOCATED IN THE PRESENCE OF THE ENGINEER. LOCATION SHALL BE APPROVED BY THE ENGINEER PRIOR TO EXCAVATION.
5. POLES SHALL BE A MINIMUM OF 30" FROM THE FACE OF CURB AND A MINIMUM OF 36" SIDEWALK CLEARANCE SHALL BE PROVIDED FOR WHEELCHAIR ACCESS AND PEDESTRIAN TRAFFIC.
6. ALL PEDESTRIAN PUSH BUTTONS SHALL BE LOCATED 3' FROM GROUND LEVEL AND SHALL HAVE 2" DIAMETER ACTUATORS.
7. REFER TO SIGNING AND STRIPING PLANS FOR SIGNS ON TRAFFIC SIGNAL STANDARD POLES.

Cost Estimate	Planning Area
$190,000	Centerville

20.Citywide Project: Bus Stop Sidewalk Landing Pads

There are at least 87 bus stops in the city where the sidewalk pad is missing or deficient. Even where a landing (embarkation) pad is provided, some of them have narrow access paths connecting to the sidewalk or uneven surfaces. Some locations are not accessible for people with mobility impairments.

New sidewalk pads in a 5'x8' or 11'x8' size depending on landscaping strip width are planned. Alameda County Transit (AC Transit) is currently re-evaluating routes and schedules, which could impact the location of bus stops. At this time, a breakdown of the likely project locations is as follows:

- Fremont Boulevard route: 20 pads
- Washington Boulevard route: 9 pads
- Thornton Avenue route: 2 pads
- Mowry Avenue route: 9 pads
- Stevenson Boulevard route: 15 pads
- Paseo Padre Parkway route: 32 pads

Figure 3-8: Even when a pad is present, it may not offer an ADA accessible smooth surface

Cost Estimate

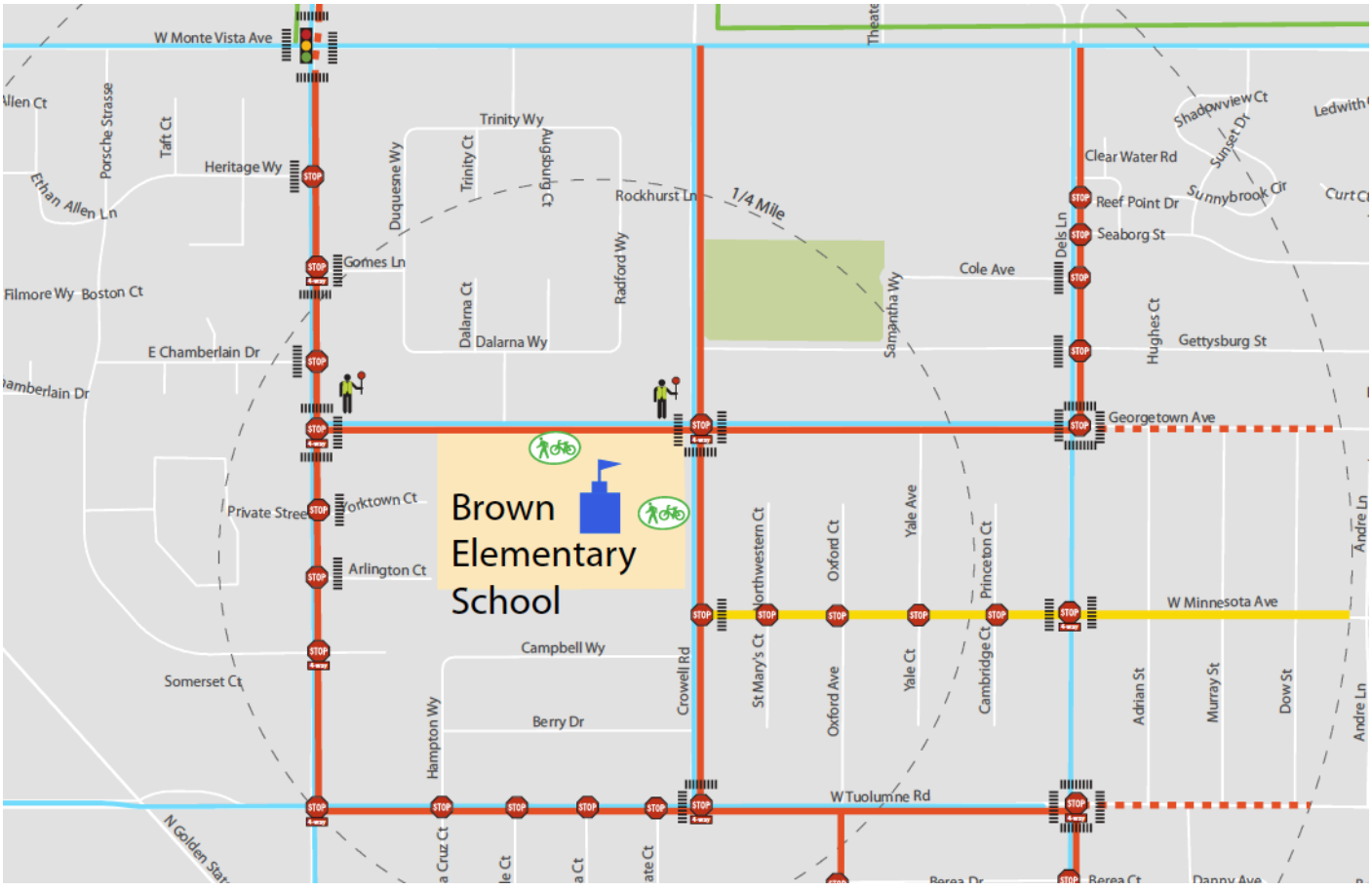
$280,000

21. Citywide Project: School Traffic Safety Assessments

Fremont has over 80 schools located throughout the city. Improvements at these locations benefit children walking to and from school and improve conditions for all pedestrians in the neighborhood. In the past, Fremont had an active residential traffic calming program that resulted in the installation of speed humps near many city schools. Since the Fremont City Council allocated $280,000 to a School Traffic Safety Program in 2006, infrastructure improvements have been completed at many elementary schools. A countywide safe routes to school project has led to audits at three Fremont schools. To build upon these programs, walk audits would be conducted with engineers, parents, school officials, and police officers. Each audit would include school frontage and surrounding roadways within 10-minute walk radius. The audits will yield:

- Identification of schools where speed limits can be lowered immediately
- Recommendations for installation of sidewalks, improved intersections, and crossings
- Recommendation of traffic calming elements required to implement lower speed limits
- Recommendation of safety and comfort improvements for active travel
- Identification of safe routes to school (higher cost option)

Sample School Route / Audit Map



Cost Estimate (per school)

$3,000 (basic audits with improvement plans) – $5,000 (adds route maps and stakeholder meetings)

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3.6 Pathway and Trail Projects

There are many pedestrian and bicyclist pathway projects that could increase pedestrian activity in Fremont. These paths help connect residents and visitors with various land uses and neighboring cities. Any new trail constructed shall have a dedicated maintenance and operations funding source. A citywide trails study is proposed on the next page, followed by descriptions of selected projects.

Figure 3-9: The Farwell Trail connects homes, schools and parks (recommended improvements are presented on page 93)

Figure 3-10: The recently completed Fremont Boulevard Trail; part of a multi-surface, multi-modal corridor

1. Citywide Project: Trails Development Study

Description

There are numerous flood control channels, utility corridors, and abandoned railway corridors throughout Fremont. These corridors present a unique opportunity to create a linked network of Class I shared use pathways for bicyclists and pedestrians, while enhancing maintenance vehicle access. The study should build upon, update and tie together previous planning work. The study would involve coordination with key stakeholders such as the City's Parks Department, East Bay Regional Park District (EBRPD) and other jurisdictions and utility agencies, such as the Alameda County Flood Control & Water Conservation District (ACFCWCD) to address key right of way and operational issues. Major existing and proposed trails that could be expanded and linked together include:

- Niles Canyon Trail
- East Bay Greenway
- California Trail
- Eagle Trail
- Hidden Valley Trail
- Isla Los Rancheros Trail
- Old Creek Trail
- Panorama Trail
- Patterson Ranch Road Trail
- Peak Trail
- Western Pacific Trail
- Wood Duck Trail
- Alameda Creek Trail
- Crandall Creek Path
- Nordvik Park Path
- Cabrillo Trail
- Ardenwood Pathway
- Albany Pathway
- Lake Elizabeth Trail
- Mission Creek Trail
- Bay Trail
- Hetch Hetchy Trail
- Farwell Trail

These trails are illustrated in the map on page 77.

Planning studies to be integrated include the city's General Plan, bicycle and pedestrian plans, community plans, and trail studies such as:

- Niles Canyon Trail Feasibility Study (EBRPD, 2015, can be downloaded at http://www.ebparks.org/about/planning). Fremont will work with the jurisdictions and stakeholders to coordinate access and connections to the trail at the Fremont City Limits.
- UPRR Trail Feasibility Study (Questa, 2009)
- Newark to Fremont Bay Trail Realignment Feasibility Study (Questa, 2013)
- Fremont Bay Trail Gap Feasibility Study (Questa, 2013)

Cost Estimate

$ 200,000

City of Fremont Existing and Proposed Trails and Class I Pathways

Proposed Pedestrian Facilities

- Proposed Shared Use Path
- Bay Trail Proposed Alignment
- Proposed Bay Trail On-Street / Interim

Existing Pedestrian Facilities

- Existing Shared Use Path
- Existing Trails
- Existing Bay Trail On-Street / Interim

Transit Location Information

- Fremont BART Station
- Centerville Train Depot
- Future BART Station
- Existing Rail
- Future BART Extension

Other Features

- Water Bodies
- Schools
- Parks
- Fremont City Limits
- Unincorporated Areas

Source: City of Fremont
Map Created: Nov 2015

0 0.5 1 Miles

alta PLANNING + DESIGN

Union City
Hayward
Sunol
Fremont
Newark
San Francisco Bay
East Palo Alto
San Jose
Milpitas
Alameda Creek
Dry Creek
Patterson Creek
Crandall Creek
Plummer Creek
Coyote Hills
Sylvester Harvey Park Lowry Park
Northgate Park
Deep Creek Park
Crandall Creek Park
Brookvale Park
Frank Fischer Park
Ardenwood
Nordvik Park
Quarry Lakes Regional Park
California Nursery
Niles Community Park
Vallejo Mill Historical Park
Vargas Plateau
Centerville Train Depot/ ACE/AMTRAK
Country Park
Fremont Central Park
Buena Vista Park
Lake Elizabeth
Gomes Park
Mission San Jose Community Park
Plaza Park
Azevada Park
Noll Park
Blacow Park
Irvington Plaza
Irvington Park
Marshall Park
Rix Park
Arroyo Agua Caliente Park
Mission Peak
Old Mission Park
Warm Springs Station
Warm Springs Park
Booster Park
Lone Tree Creek Park
Plomosa Park
Rancho Higuera Park
Linda Dr
Carnation Way
Niles Blvd
Third St
Canyon Heights Dr
Beard Rd
Darwin Dr
Warwick Rd
Ferry Ln
Lowry Rd
Lark Way
Creekwood Dr
Decoto Rd
Cabrillo Trail
Nicolet Ave
Gibraltar Dr
Alder Ave
Thornton Ave
Hansen Ave
Central Ave
Hereford St
Post St
Camden St
Peralta Blvd
Parkside Dr
Shinn St
Cherry Ln
Guardino Dr
Gallaudet Dr
Alberta Ave
Tupelo St
Patterson Ranch Rd
Kaiser Dr
Dumbarton Cir
San Pedro Dr
Cabrillo Dr
Fremont Blvd
Mowry Ave
Capitol Ave
Walnut Ave
Liberty St
Leslie St
Mattos Dr
Eggers Dr
Argonaut Way
Logan Dr
Glenview Dr
Sutter Dr
Blacow Rd
Farwell Dr
Bidwell Dr
Mission View Dr
Grimmer Blvd
Chapel Way
High St
Bay St
Olive Ave
Bruce Dr
Driscoll Rd
Chadbourne Dr
Luzon Dr
Palm Ave
Stars St
Jerome Ave
Bryant St
Castro Ln
Chiltern Dr
Mission Blvd
Plymouth Ave
Stevenson Blvd
Sundale Dr
Porter St
Hillo St
Carol Ave
Robin St
Roberts Ave
Omar St
Delaware Dr
Crestwood St
Doane St
Pine St
Durham Rd
Osgood Rd
Sabercat Rd
Hunter Ln
Boar Cir
Stanford Ave
Sundance Dr
Curtner Rd
E Warren Ave
Lippert Ave
Stewart Ave
Albrae St
Christy St
Boscell Rd
Boyce Rd
Auto Mall Pkwy
Curie St
Technology Dr
Buncbe Dr
Nobel Dr
Cushing Pkwy
Cushing Rd
Industrial Dr
S Grimmer Blvd
Warm Springs Blvd
Landing Pkwy
Lakeview Blvd
Bayside Pkwy
Kato Rd
Milmont Dr
Scott Creek Rd
Green Valley Rd
Coyote River
Lone Tree Creek
Alameda Creek
Dry Creek
Patterson Creek
Crandall Creek
Plummer Creek
Coyote Hills
Sylvester Harvey Park Lowry Park
Northgate Park
Deep Creek Park
Crandall Creek Park
Brookvale Park
Frank Fischer Park
Ardenwood
Nordvik Park
Quarry Lakes Regional Park
California Nursery
Niles Community Park
Vallejo Mill Historical Park
Vargas Plateau
Centerville Train Depot/ ACE/AMTRAK
Country Park
Fremont Central Park
Buena Vista Park
Lake Elizabeth
Gomes Park
Mission San Jose Community Park
Plaza Park
Azevada Park
Noll Park
Blacow Park
Irvington Plaza
Irvington Park
Marshall Park
Rix Park
Arroyo Agua Caliente Park
Mission Peak
Old Mission Park
Warm Springs Station
Warm Springs Park
Booster Park
Lone Tree Creek Park
Plomosa Park
Rancho Higuera Park

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2. Mission Creek Trail

Route	Start	End	Miles
Mission Creek	Palm Avenue	Mission Blvd	0.6

Project Description

Construction of a path along the Mission Creek between Palm Avenue and Mission Boulevard would enhance access to Central Park for eastern neighborhoods. It would complete the link between Central Park, Gomes Park, Mission San Jose Park and Mission San Jose High School.

The easternmost extent of the dashed green line (between Via San Luis Rey and Mission Boulevard) is scheduled to be completed as part of a residential development in 2016.

Cost Estimate	Planning Area
$2,023,000	Mission San Jose

3. Hetch Hetchy Trail North

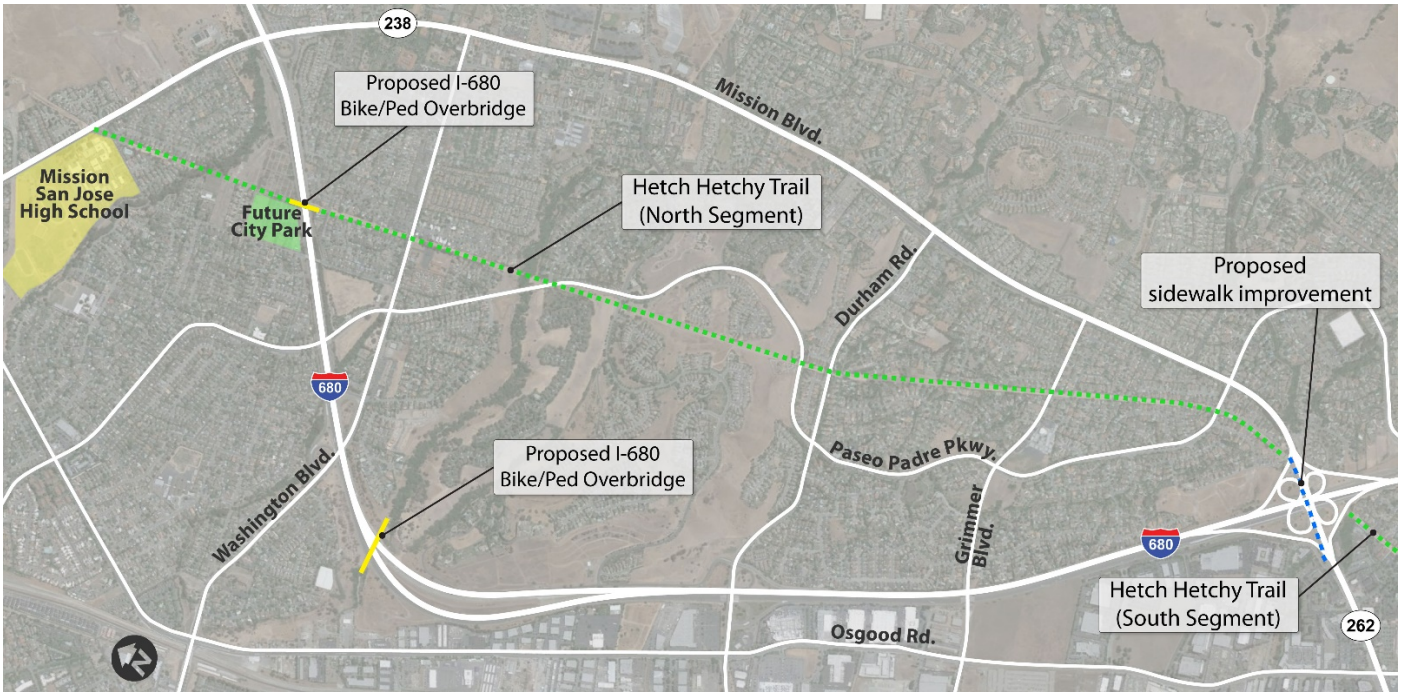
Route	Start	End	Miles
Hetch Hetchy Trail	Mission Boulevard	I-680	3.4

Project Description

This pathway would be along the Hetch Hetchy Aqueduct route. Crossings would be needed at:

- Palm Avenue – 2 lane collector
- Via San Miguel – 2 lane local
- I-680 – 6 lane freeway overbridge
- Olive Avenue – divided 2 lane collector
- Washington Boulevard – 4 lane arterial
- Hawthorne Drive – cul-de-sac head
- Glenhill Drive – 2 lane local
- Sabercat Creek Trail
- Paseo Padre Parkway @ Ocasa Camino
- Pine Street – 2 lane local
- Paseo Padre – 2 lane arterial
- Durham Road – 4 lane arterial
- Sioux Court – 2 lane local
- Washo Drive – 2 lane local
- S. Grimmer Boulevard – 2 lane collector
- Little Fout Drive – 2 lane local
- Concho Drive – 2 lane local
- Indian Hill Place – 2 lane local
- Cayuga Place – 2 lane local
- Paseo Padre Parkway – 4 lane arterial

The route would require an overbridge at I-680, which would connect neighborhoods to the south of I-680 with a proposed city park. Based on the land uses served, the north segment of this trail has independent utility even if there is no connection at the Mission Boulevard / I-680 interchange. However, pedestrian improvements are also proposed as part of citywide freeway interchange improvements. This project will require a feasibility study to assess opportunities, constraints, costs, and implementation phasing.



Cost Estimate	Planning Area
$150,000 (Feasibility Study)	Mission San Jose

4. Hetch Hetchy Trail South

Route	Start	End	Miles
Hetch Hetchy Trail	Crawford Street (at I-680)	Scott Creek Road (at Milpitas City Limit)	2.2

Project Description

The subterranean Hetch Hetchy Aqueduct passes through southern Fremont from the Fremont/Milpitas City Limit to Crawford Street. It would link to the existing Aqueduct Trail in Milpitas, which is comprised of pedestrian pathways of varied width along a linear corridor of open landscaped areas and developed park facilities. Extending and enhancing this trail would provide residents of southern Fremont with an additional north-south route.

This trail would provide access to Warm Springs Park, Booster Park, Lone Tree Creek Park, and Plomosa Park. Pedestrian hybrid beacons would likely be required at collector roadways such as Warren Avenue and Scott Creek Road. Crosswalks and curb ramps would be needed at:

- East Warren Avenue – 4 lane arterial
- Lippert Avenue – 2 lane local
- Flood channel bridge required
- Gable Drive – 2 lane local
- McDuff Avenue – 2 lane local
- Ulmeca Place – 2 lane local
- Starlight Way – 2 lane local
- Mayten Way – 2 lane local
- Flood channel bridge required
- Plomosa Way – 2 lane local
- Tonopah Drive – 2 lane local
- Wilaneta Ave – 2 lane local
- Merlot Drive – 2 lane local
- Chardonnay Drive – 2 lane local
- Scott Creek Road – 4 lane arterial
- Yampa Way – 2 lane local

Cost Estimate	Planning Area
$1,320,000	Warm Springs

5. East Bay Greenway Trail

Project Description

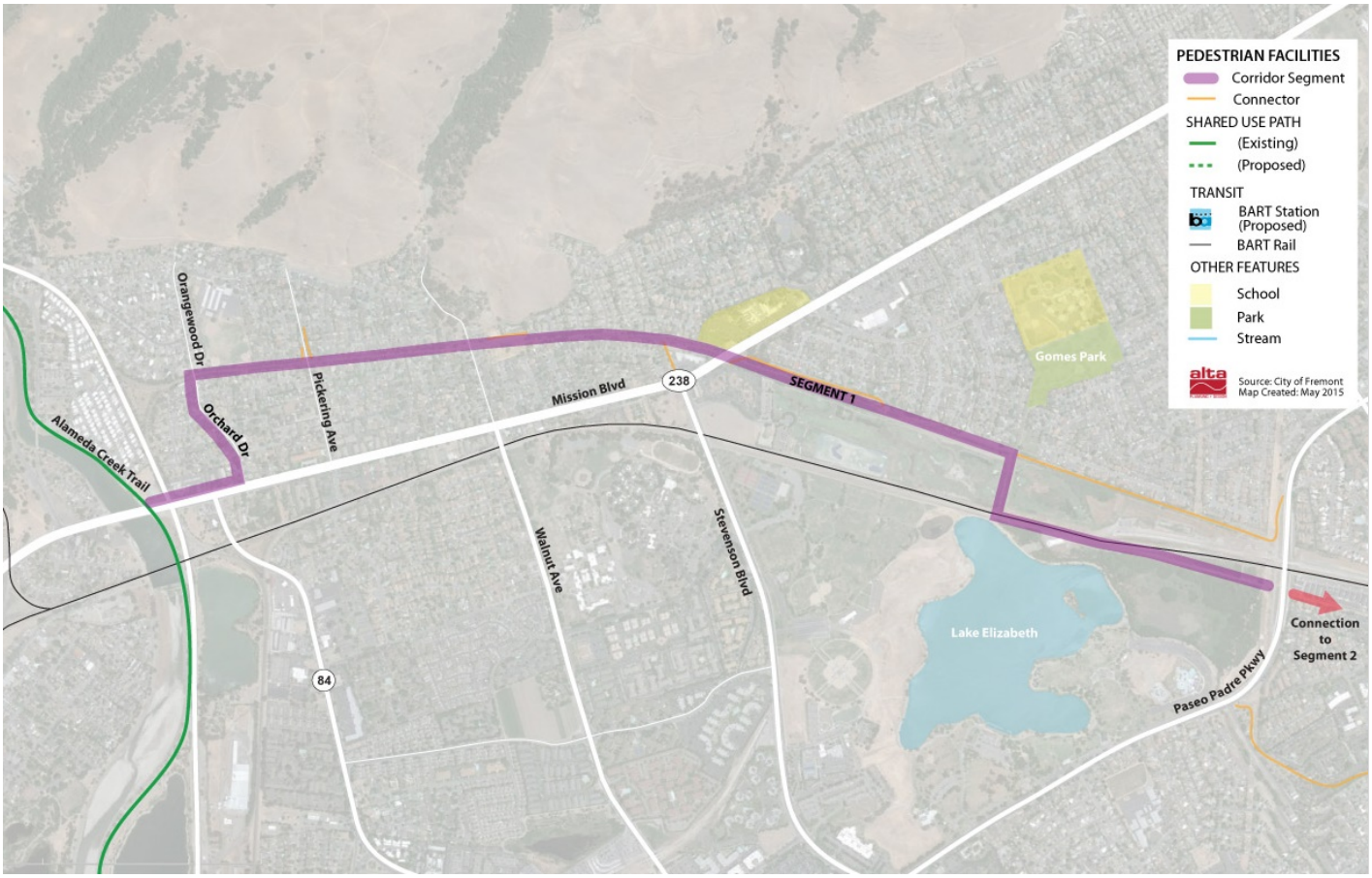
Building on the East Bay Greenway Trail Union Pacific Railroad (UPRR) Trail Study 2009 and subsequent developments, this project provides connections between several of Fremont's commuter and recreational destinations, including planned BART stations, Central Park, Centerville, and Warm Springs.

There are now five segments as indicated in the following overview graphic.

Except for Segment 1, the cost of each segment is to be determined as part of an update to the study. Each segment is shown in more detail on the following pages.

Route	Start	End	Miles
Segment 1 – East Bay Greenway Trail	Mission Blvd/Alameda Creek Trail	Paseo Padre Parkway	2.5

The northmost entrance to the proposed rail trail is at Mission Boulevard and Alameda Creek Trail. A sidewalk trail would be constructed on the east side of Mission Blvd roadway connecting Alameda Creek Trail and Orchard Drive. Wayfinding signs will be installed from Alameda Creek staging area to Orchard/Orangewood Drive. A Class I trail would be constructed from Orchard / Orangewood Drive to Paseo Padre Parkway. The cost of this segment has been estimated as $20.00 million, excluding right of way acquisition. Note: This segment alignment may be further refined due to ACTC scoping study underway in 2016.



Cost Estimate
$20,000,000

EAST BAY GREENWAY TRAIL CONTINUED	Start	End	Miles
Segment 2 (Railroad Ave)	Paseo Padre Parkway	Washington Boulevard	0.6

This segment of the trail has been constructed along the Railroad Avenue alignment adjacent to the residential development, as far as Main Street.

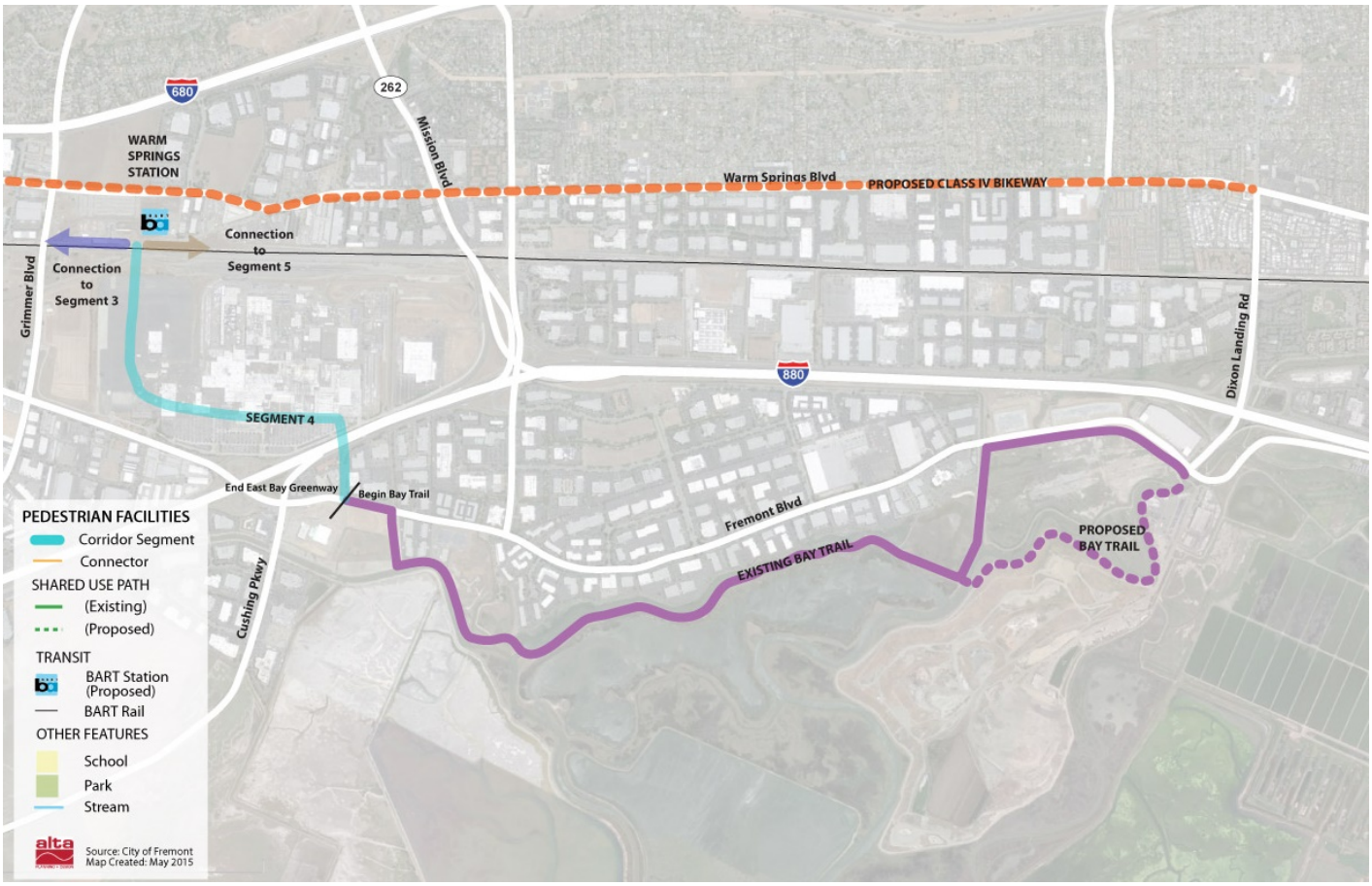
Route	Start	End	Miles
Segment 3 - East Bay Greenway Trail	Washington Boulevard	Warm Springs BART station	2.2 mi

This Class I and Class II segment would connect the future Irvington BART station and Transit Oriented Development (TOD) area with the soon to be completed Warm Springs BART station. BART is permitting the City of Fremont to construct a paved trail within BART right of way up to Auto Mall Parkway. The long-term conceptual East Bay Greenway trail alignment south of Auto Mall Parkway would continue along the non-active BART corridor, east of the tracks. In addition, bicyclists could travel south on Osgood Road / Warm Springs Boulevard via a proposed Class IV bikeway.

Cost Estimate

Not Available

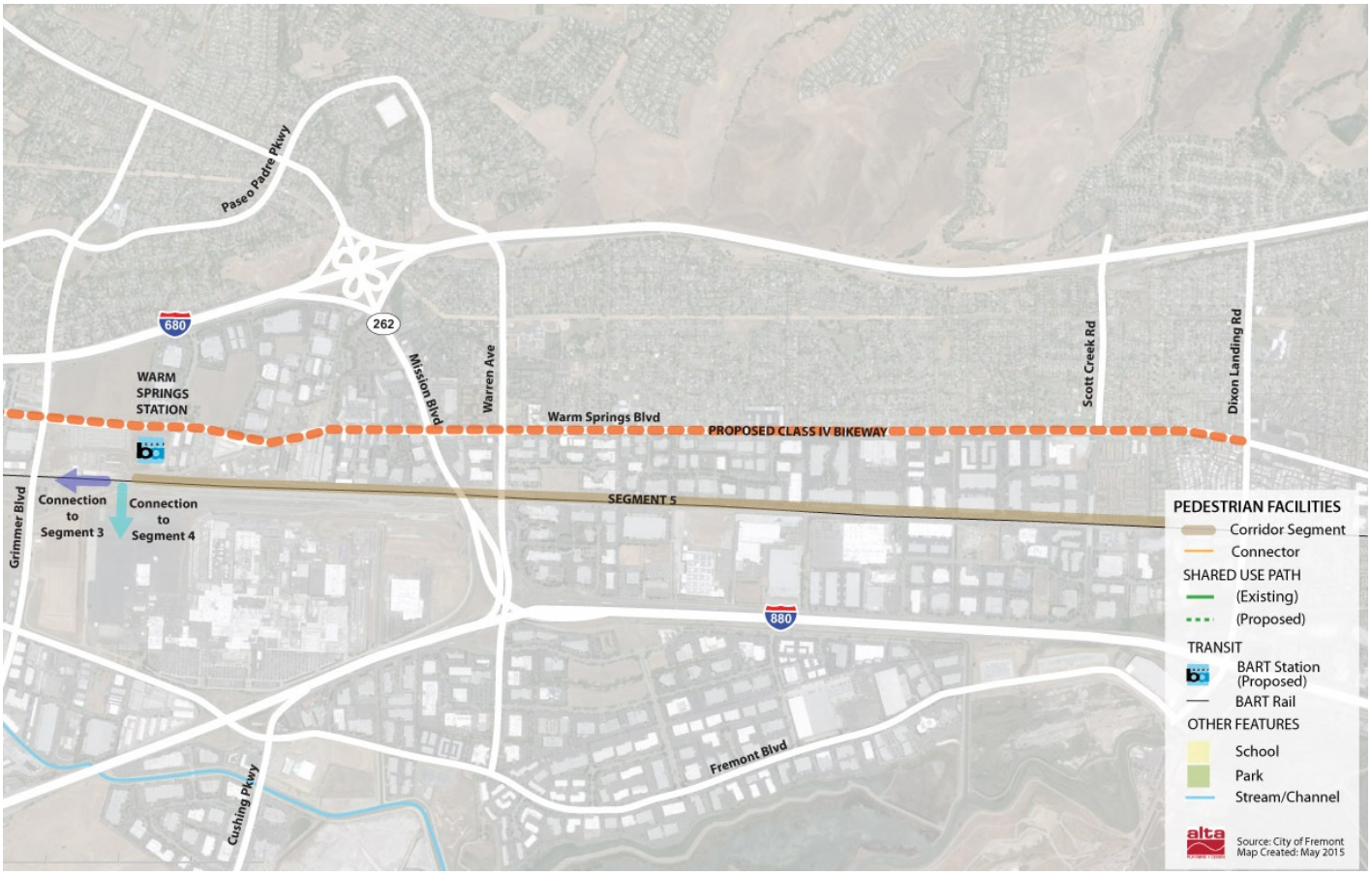
EAST BAY GREENWAY TRAIL CONTINUED	Start	End	Miles
Segment 4	Warm Springs BART station	South City limits at Dixon Landing Road.	4.5



Cost Estimate
Not Available

Route	Start	End	Miles
Segment 5 – East Bay Greenway Trail (Warm Springs Boulevard)	Auto Mall Parkway	south City limits	6.2

Due to right-of-way constraints along the BART corridor south of Auto Mall Parkway, Class II buffered bike lanes or Class IV cycle tracks are proposed along Warm Springs Boulevard. This would be a good alternative where there are opportunities on Warm Springs Boulevard.



Cost Estimate
Not Available

6. Paseo Padre Parkway / UPRR Trail

Route	Start	End	Length
Paseo Padre Parkway	Paseo Padre Parkway	UPRR Trail	220 LF (approx.)

Project Description

This connection would enable bicyclists and pedestrians travelling on the south side of Paseo Padre Parkway to access Segment 3 of the UPRR Trail. It would include an ADA accessible ramp to meet grade and be of shared use path standards, with at least 10' of concrete pavement width and 2' shoulders. A curb cut with a gentle (17 degree) angle would be provided to enable on-street bicyclists to smoothly access the ramp connection. The connection (dashed line) would enable Paseo Padre users to access the UPRR Trail (solid line) southbound.

Cost Estimate	Planning Area
$65,000	Irvington

7. Grimmer Boulevard Greenbelt

Route	Start	End	Miles
Grimmer Boulevard Greenbelt	Fremont Boulevard	Paseo Padre Parkway	0.4

Project Description

The Greenbelt Gateway is a proposed path/sidewalk along the PG&E/Alameda County Flood Control Channel right of way. It is in a residential area near the future Irvington BART station, Central Park, and two schools. The pathway would connect Fremont Boulevard to Central Park at Paseo Padre Parkway. The project would consider full street improvements (two vehicle lanes to four vehicles lanes, bike lanes, sidewalks, curb, gutter, striping & signage) along Grimmer Boulevard, construction of a Class I trail along the levee of the flood control channel, as well as intersection improvements at the intersection of Paseo Padre Parkway and Grimmer Boulevard.

The Grimmer Boulevard Greenbelt could intersect with a pathway along the utility corridor between Saint Leonard Elementary School and Central Park (not illustrated) as well as the UPRR Spur Trail proposed in the UPRR Trail Study. All these trail connections could be further planned as part of the separately recommended Citywide Trails Planning Study.

Cost Estimate	Planning Area
$10,500,000	Central / Irvington

8. East-West Connector Trail

Route	Start	End	Miles
Route 84 / East-West Connector	Decoto Road	Quarry Lakes Drive	2.0

Project Description

This off-street trail concept (highlighted in yellow in the graphic below) could connect Decoto Road to Quarry Lakes Drive, running alongside the Crandall Creek and the future Route 84 / East-West Connector roadway. The Route 84 trail provides easy access for residents from adjacent neighborhoods. Additionally, neighborhood access on the Brookvale side could provide residents access to the Brookvale trail and shopping areas. There are two segments:

- Segment 1: Decoto Road to Paseo Padre Parkway (1.0 mi) – this segment would require a crossing at Fremont Boulevard near Becerra Drive. A portion of Segment 1 between Fremont Blvd. to Paseo Padre Parkway has been purchased by Fremont Unified School District, so any pathway here would require coordination with the district.
- Segment 2: Paseo Padre Parkway to Quarry Lakes Drive (1.0 mi) – this segment includes a new crossing at Paseo Padre Parkway, then would briefly follow the Alameda Creek Trail. The creek would be crossed using a path on the future East-West Connector bridge. There are two spurs; 2A would continue to Niles Boulevard and into Union City to Mission Boulevard while 2B would go to Quarry Lakes. A future connection toward the Union City BART could be explored as part of this trail concept, in coordination with the City of Union City.

Cost Estimate	Planning Area
$2,968,000	Centerville

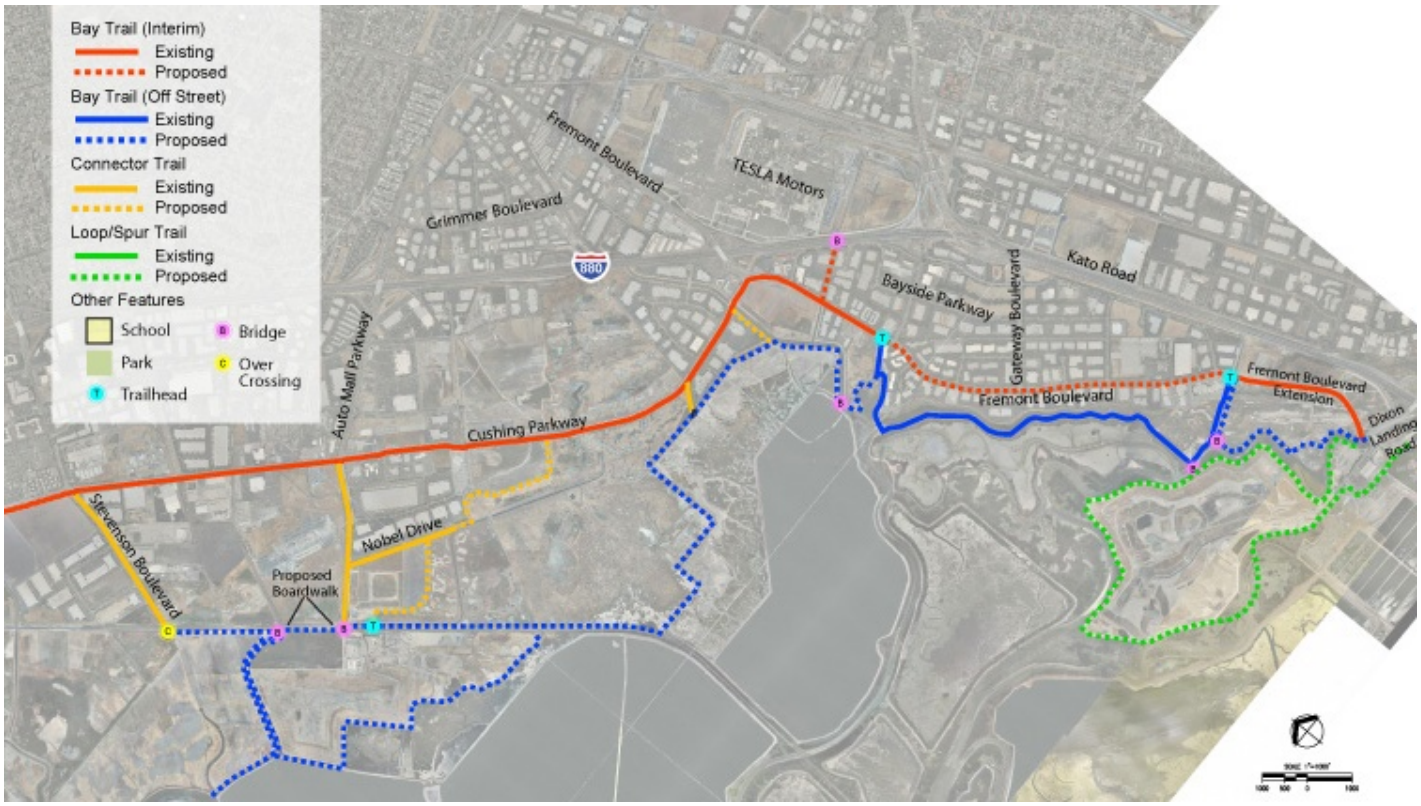
9. Bay Trail from Stevenson Boulevard to Dixon Landing Road

Route	Start	End	Miles
TBD	Stevenson Boulevard	Dixon Landing Road	7.0 miles

Project Description

The Newark-Fremont Bay Trail Feasibility Study (Questa, 2013) identifies a number of Bay Trail connection options in the vicinity of the newly constructed trail near Nobel Drive.

The Loop/Spur Trail (green dashed line) is also known as the Bay Trail at Coyote Creek and has been the focus of a separate feasibility study. It is summarized in another project sheet on page 92.



Cost Estimate	Planning Area
$1,559,000	Baylands

10. Bay Trail at Coyote Creek			
Route	**Start**	**End**	**Miles**
TBD	Line B flood channel	Dixon Landing Road	Approx. 2.0 mi

Project Description

Completing the gap in the Bay Trail at the Coyote Creek would connect the south end of the city at or near the Fremont Boulevard Extension to the City of Milpitas and points south along the Bay Trail. The Fremont Bay Trail Gap Feasibility Study (Fremont Boulevard to Dixon Landing Connector) Preliminary Engineering Study (Questa 2013) outlines three alignments.

Of these alignments, the Fremont Boulevard extension with sidewalks, bike lanes, and a parallel Class I trail was completed in July 2015. The Bay Trail route along Line B and Old Coyote Creek remains a possible project.

The I-880 bike/ped bridge and BART connection path are described in a separate project sheet on page 47.

Cost Estimate	Planning Area
$1,856,000 (does not include BART connections)	Baylands

11. Farwell Trail Upgrade

Route	Start	End	Miles
Farwell Trail	Farwell Drive	Lemke Place	0.5

Project Description

This project would renew and upgrade the Farwell Trail that runs through the greenbelt area parallel to Farwell Drive and behind Kennedy High School. The route could also be connected to Azevada Elementary and Park with wayfinding along low traffic neighborhood streets.

This project was included in previous bicycle and pedestrian master plans. The existing trail includes aging asphalt surface and a narrow pedestrian bridge over the Alameda County Flood Control channel near the school. The project should include curb ramps at every roadway intersection (including cul-de-sacs), lighting, wayfinding signage, and pavement renewal. A gate and pathway extension through school grounds would enhance the utility of the route but is under the school district's jurisdiction and is hence not included in the cost estimate. The right of way is identified as a "Ped Walkway" in tax assessment records.

Cost Estimate	Planning Area
$491,000	Irvington

3.7 Project Prioritization

A prioritization exercise was conducted for this plan update using the National Cooperative Highway Research Project (NCHRP) 717 Active Trans Priority Tool (APT). Criteria selected for the prioritization were based on input from the Fremont Bicycle and Pedestrian Technical Advisory Committee. Criteria included:

- Constraints as measured by available right of way (only for trails projects; 0 = difficult, 2 = easy acquisition), need for multi-agency or jurisdiction coordination, and cost estimate in dollars (for the Hetch Hetchy Trail North, the cost was extrapolated based on mileage from the cost estimate available for the south segment of the same corridor)
- Readiness to Proceed as measured by inclusion in the proposed Countywide Transportation Plan or a grant application (yes/no)
- Safety as measured by the number of reported fatalities and severe injuries recorded in the 5 year period from 2008-2012
- Demand as measured by the Live/Work/Play Index and the length of the segment in miles

More detail on the assumptions, criteria weights, and process can be found in the Excel workbook documentation supplied separately.

Most studies and citywide projects were excluded from the ranking, although if an order of magnitude cost could be estimated then the project was included in the ranking. Based on this analysis, the ranking of roadway projects is given in Table 3-3 and trail projects in Table 3-4.

Table 3-3: Roadway Projects Ranking

ID	Location	Score	Rank
8	Country Drive Complete Street	230	1
7	Dusterberry Way Complete Street	199	2
9	Civic Center Drive Streetscape	199	3
18	Citywide: Uncontrolled Crosswalks on 4+ Lane Roadways	198	4
4	Niles Neighborhood Sidewalks and Mission Boulevard Path	146	5
6	Fremont Boulevard and Decoto Road Sidewalks	139	6
17	Citywide Freeway Interchanges	137	7
11	Stevenson Boulevard Shared Use Path	130	8
16	Citywide Major Arterial Frontage Road Pathways	103	9
1	I-880 Bike/Ped Overcrossing N of Warren	88	10
3	Ellsworth Street Sidewalks	88	11
5	Mission Boulevard Sidewalks (Walnut to Stevenson)	79	12
10	Palm Avenue Sidewalks	53	13
19	Citywide: Bus Stop Sidewalk Landing Pads	28	14
12	Mission Boulevard Tunnel Under Trestle	26	14
16	Citywide At-Grade Railway Crossing Projects	22	15
15	Fremont Boulevard and Walnut Avenue Multi-Modal Complete Streets	-	16

Table 3-4: Trails Project Ranking

ID	Location	Score	Rank
7	Grimmer Boulevard Greenway	234	1
5	East Bay Greenway Trail (Segment 1 Orchard to Paseo Padre)	174	2
11	Farwell Trail Upgrade	171	3
8	East - West Connector Trail (Crandall Creek Path)	116	4
10	Bay Trail at Coyote Creek	108	5
3	Hetch Hetchy Trail North (estimated cost)	106	6
4	Hetch Hetchy / Plomosa Trail (South)	103	7
6	Paseo Padre Parkway / UPRR Trail	94	8
2	Mission Creek Trail	92	9
9	Bay Trail (Stevenson – Dixon Landing)	73	10

3.8 Countywide Transportation Plan Projects

The City has proposed the bicycle and pedestrian projects listed in Table 3-5 for inclusion in the 2016 Alameda Countywide Transportation Plan. Five of these are also detailed with Project Sheets in Section 3.8 of this Pedestrian Plan.

Table 3-5: Proposed Projects for Inclusion in the Countywide Transportation Plan Bicycle/Pedestrian Plan

ID	Proposed Projects	Notes
1	East Bay Greenway/Rails to Trails Project Segment 1 *(see Project Sheet #1)*	The project involves construction of new trail/linear park along UPRR abandoned corridor between Niles Canyon/Alameda Creek Trail - Staging Area to Central Park at the Paseo Padre Parkway grade separation. A total of 1.7 miles of Class I Trail will be constructed and 1.3 miles of bikeway way-finding signs will be installed.
2	Grimmer Boulevard Greenway Trail & Complete Streets *(see Project Sheet #3)*	The project involves construction of new meandering trail within a greenway, construction of new sidewalk and bike lanes on Grimmer Boulevard between Fremont Boulevard and Paseo Padre Parkway. The project will connect Central Park to Irvington District Area.
3	I-880 Bicycle/Pedestrian Bridge and Trail from Warm Springs BART Station to Bay Trail. *(see Project Sheet #7)*	The project consists of Class I trail beginning at the west entrance of the Warm Springs BART Station & will run west along the Lennar Development Industrial Road with a trail constructed within the sidewalk area and connect to Kato Road. From the Kato Road/Industrial Road intersection the trail travels south along the east side of Kato Road within the sidewalk area until it intersects with the Alameda County Flood Control Channel. At the flood control channel the trail heads west crossing over the I-880 freeway and connecting to the west side of I-880 via the same flood control channel. The trail continues west and crosses Fremont Boulevard continuing along the flood control channel & connecting to the Bay

ID	Proposed Projects	Notes
		Trail. The project consists of construction of Class 1 trail throughout, trail width varies from 10′ to 16′.
4	Bay Trail -South Fremont to Milpitas Connection *(see Project Sheet #6)*	The proposed Bay Trail project calls for a detailed planning/scoping of Class I and Class 2 Bay Trail bikeways in Fremont between Stevenson Boulevard to Dixon Landing Road. The City of Fremont in 2013 completed a joint Bay Trail Study with the City of Newark in cooperation with San Francisco Bay Trails to identify a preferred Bay Trail Alignment for the segment of the Bay Trail between Dumbarton Bridge Toll Plaza to the Milpitas/Dixon Landing. The Fremont segment of this Bay Trail portion primarily begins at Stevenson Boulevard and continues south to Dixon Landing Road at the Fremont/Milpitas border.
5	Blacow Road Ped/Bike Grade Separation at BART/Union Pacific Railroad (UPRR) tracks	The proposed bicycle and pedestrian grade separated crossing at the BART and Union Pacific Railroad lines will provide connection between terminus of Blacow Road to Osgood Road. This crossing is identified in Fremont's General Plan Mobility Primary Routes Plan, page 3-38, and is located in the Irvington PDA area. The project would provide a connection to Irvington residents residing south of Washington Boulevard and west of the UPRR and BART tracks. With the planned Fremont Irvington BART Station the proposed project will provide bicycle/pedestrian access to a portion of Irvington community separated by the BART/UPRR line access to activity centers on Osgood Road and the future Irvington BART Station.
6	Freeway Interchange Upgrades *(see Project Sheet #28)*	The City of Fremont has 15 freeway interchanges along I-880, I-680 and Route 84 which have minimal or limited pedestrian and bicycle facilities. This project will focus on providing access and improving safety for bicycle & pedestrian facilities. The City of Fremont's proposed project is to pursue scoping/planning funds for future improvements for these 15 interchanges. Caltrans Deputy Directive 64-R1 for complete streets in 2008, provides guidance for state Transportation Facilities. The City of Fremont's freeway interchanges along I-880, I-680 & Route 84 provides connection to major activity centers such as employment centers, shopping centers and residential areas.
7	Warm Springs BART West Access Bridge & Plaza Project	The bridge and plaza project will provide connection from the new BART Warm Springs Station to the new community west of the Warm Springs BART Station consisting of Tesla automotive factory, commercial/office development, residential development, school, park, and new Innovation Way street.
8	Irvington Trail Connector with New Bridge over I-680	The project involves planning and scoping for a proposed bicycle and pedestrian grade separated crossing at the I-680 freeway & proposed new trail from the Union Pacific Railroad Trail corridor next to Irvington BART Station to Sabercat Creek Trail, east of I-680 providing connection to the Ridge Trail via Pine Street and Mission Boulevard. This trail and crossing is identified in Fremont's General Plan Mobility Primary Routes Plan, page 3-38, and on the Irvington Community Plan/PDA and Mission San Jose Community Plan map, and Fremont Bicycle Master Plan.

ID	Proposed Projects	Notes
9	Niles to City Center Bikeway with New Alameda Creek Bridge	The proposed bicycle & pedestrian crossing bridge over Alameda Creek & proposed bikeway/pedestrian facility improvements on Shinn Street & Von Euw Common between Alameda Creek and Peralta Boulevard define the boundary limits of this project. Fremont's General Plan - Mobility Primary Routes Map, page 3-39, shows a bikeway connection from Alameda Creek to Peralta Boulevard via Shinn Street. Peralta Blvd. provides connection to the Central Community Planning & to other roadways that connect to the City Center and Downtown area. The project is partially located within the Central PDA. The project would provide connection between the Niles Community & Central Community Planning Area (Downtown & City Center) separated by the Alameda Creek & railroad lines.
10	Fremont State Route 84 - Mowry Widening & Complete Streets Project	The project is located on Mowry Avenue from Peralta Blvd to Mission Blvd. The project would widen Mowry Avenue from two lanes to four lanes and install bike lanes and sidewalks on both sides of the street to complete missing gaps. The project will reduce congestion and provide safety and accessibility for pedestrians and bicyclists and encourage other modes of transportation other than motor vehicles.
11	Fremont Boulevard Streetscape Project-Centerville	The project will construct streetscape/complete street features on Fremont Boulevard from Thornton Avenue to Central Avenue. The project will narrow existing vehicle lanes, install bulb-outs, improve intersection crossings, medians, landscaping, street furniture, street lighting, bike lanes. The project is located within the Centerville Priority Development Area (PDA) frontage to the Centerville Train Depot, AC Transit Bus stops and proposed new Artist Walk mixed use development of housing and commercial.
12	Fremont Boulevard Streetscape Project-Downtown District/City Center Area	The project will construct streetscape/complete street features on Fremont Boulevard from Country Drive to Sundale Drive. The project will construct wider sidewalks with planter areas, street furniture to provide a safe and comfortable place for pedestrians, narrow traffic lanes to slow traffic speeds, install high visibility stamped crosswalks, pedestrian countdown signals & bicycle lanes. The project is located within the Downtown PDA and conforms to the City Downtown & City Center Community Plan to build a network of complete streets and ensure safety for all modes and prioritizing pedestrians in the Downtown District.
13	Fremont Boulevard Streetscape Project- I 880 to Grimmer Boulevard in the Warm Springs/South Fremont Area	The project is located on Fremont Boulevard from Grimmer Blvd to I-880 interchange. The project would widen Fremont Boulevard from 4 lanes to 6 lanes, install bike lanes, install medians, install sidewalks on both sides of the street to complete missing gaps. The project will reduce congestion and provide safety and accessibility for pedestrians and bicyclists and encourage other modes of transportation other than motor vehicles. The project conforms to Warm Springs/South Fremont Community Plan which plans for new residential, commercial/office, retail, school, parks and Warm Springs BART station.

ID	Proposed Projects	Notes
14	Peralta Boulevard/State Route 84 Widening & Complete Streets Improvement	The project is located on Peralta Boulevard from Fremont Blvd to Mowry Avenue. The project would widen Peralta Boulevard from 2 lanes to 4 lanes, install continuous sidewalks, new bike lanes. The project will conform to City's General Plan, provide safety and accessibility for pedestrians and bicyclists, encourage other modes of transportation other than motor vehicles and will enhance connectivity to the nearby Centerville Train Station served by ACE, Amtrak and other rail lines.
15	State Route 84 Relinquishment & Complete Streets Upgrade	The project consists of streetscape improvements on Fremont Boulevard between Alder Avenue and Thornton Avenue, streetscape improvements on Fremont Boulevard between Central Avenue and Mattos Drive and on Thornton Avenue between Dusterberry Way and Fremont Boulevard. The improvements on these sections are necessary to bring these streets (Thornton Avenue, Fremont Boulevard, Peralta Boulevard, and Mowry Avenue) to Fremont Complete Streets standards in conjunction with the Route 84 relinquishment from Caltrans ownership to City ownership. The project includes narrowing traffic lanes to slow traffic speeds, new bike lanes and enhancement of existing bike lanes to bike buffer lane, widening sidewalks and improved lighting.
16	Fremont Downtown BART Station West Entrance Enhancements	In collaboration with BART, the proposed project will transform the west side of the Downtown Fremont BART Station to a pedestrian and bicycle friendly landscaped central square in conformance with the City Center Community Plan. The project will provide a safe and pleasant walking and bicycling experience between the BART Station entrance and BART Way.

4 Encouragement, Education, Enforcement and Evaluation

While much of this plan is focused on engineering recommendations to improve the pedestrian environment in Fremont, this section discusses the other "E's" – the non-infrastructure activities that support the capital infrastructure improvements. Non-infrastructure programs are not costed out individually due to their scalability, but we recommend 5% of the annual Measure B / BB budget, approximately $50,000 per year, be directed to programmatic activities such as those described below. The city can also take advantage of specific grant opportunities to fund non-infrastructure programs, as well as take advantage of existing free programming such as the Alameda Countywide Safe Routes to School program.

4.1 Education

4.1.1 Overview

Education can make pedestrians and motorists more aware of potentially hazardous environments and teach them the skills needed to make walking a more effective and enjoyable way to travel. There are a number of broad-based educational subjects that address particular issues, with individual programs that can be tailored around a specific theme or themes. Existing non-motorized user education classes have been hosted by Bike East Bay through a grant from Alameda County Transportation Commission. These are typically focused on bicycling skills, but could be expanded to cover issues like distracted walking and street crossing behavior.

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

4.1.2 Print Campaign

The print campaign could include guides with map inserts, bumper stickers, and posters. Bumper stickers could feature a promotional slogan, such as "Fremont Walks!". Brochures could include the following information:

- Maps highlighting routes and sites
- Health benefits of walking
- Rules of the road and sidewalk
- Information/hotline number

In addition to publication on the City's web site (www.fremont.gov), materials could be distributed at the following locations:

- Worksites
- Retail sites
- Chamber of Commerce
- Hotels and motels
- Gas stations
- Libraries and community centers
- Police stations
- DMV
- Churches
- Schools

City of Fremont staff or a consultant can produce and arrange the distribution of printed materials and identify sponsors and funding sources to offset the costs associated with the printed material. All activities can be done under the supervision of the Community Services Department or the Public Works Department.

4.1.3 Public Service Announcements

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

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

The City of Fremont can tag each of the television public service announcements with the following message "Fremont Walks! Call XXX-XXXX for more information!"

Distribution:

- Fremont Government TV Channel 27
- Movie theatre trailer promotions
- City of Fremont Bicycle and Pedestrian webpage: https://www.fremont.gov/534/Bicycle-and-Pedestrian-Program

4.1.4 City Staff or Elected Representative Spokesperson

Solicit the interest of local television and radio public service directors to interview a Fremont spokesperson to discuss the campaign and the importance of walking as an alternative mode of transportation in Fremont.

4.1.5 Safety Education Campaign

A variety of safety education campaigns could be undertaken by the city in order to educate motorists on the rights of pedestrians, and to educate pedestrians on safe behavior. The campaign could include messages related to speeding, yielding to pedestrians in crosswalks, stopping at stop signs, red light running, or jaywalking.

Sample messages might include:

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

The City of Fremont could partner with its neighbor to the south, San Jose, in its "Street Smarts" program. The program could become a regional program that helps teach traffic safety. For more information, visit the Street Smarts webpage at:

www.getstreetsmarts.org

Figure 4-1: Street Smart Webpage

4.1.6 Senior Citizen and Disabled Pedestrian Education

These programs could include instructors and guest speakers to provide information specific to the needs of the seniors and disabled. The themes should include:

- Personal Safety
- Traffic devices
- Recognition and avoidance of the causes of pedestrian collisions
- Promotion of proper attire (bright colors, proper shoes, glasses, walkers, canes etc.)
- Effects of certain medication on physical reactions, eyesight, hearing

Presentations would be conducted by an instructor, either City of Fremont staff or a consultant at community centers, churches, clubs, senior citizen centers, physician offices, and hospitals. The presentation could address the sensitive issues of physical limitations of many seniors and the crucial need for them to reach their destinations (e.g. medical appointments, food shopping, etc.). City of Fremont staff or a consultant can conduct the

presentations and identify sponsors and funding sources to offset the costs associated with the presentations. All activities can be performed under the supervision of the Public Works/Transportation Section.

4.1.7 Safe Routes to School Education for School Children

In conjunction with the recommended Safe Routes to School Infrastructure Audits (described in the Priority Projects section), the school district and City should continue to support safe routes to school education and encouragement programs. These include Fremont's bike and pedestrian safety education for Kindergarten through 6th grades, administered by the non-profit group Safe Moves, as well as the Alameda Countywide SR2S program which reaches elementary, middle and high schools within Fremont.

Figure 4-2: Walk to School activity at Leitch Elementary

Table 4-1: Schools Involved in the Safe Moves Program

A Child's Hideaway	Hopkins Jr High School
American High School	Hymn Pre-School
Ardenwood Elementary School	Irvington High School
Azevada Elementary School	John Horner Junio Hight School
Bethel Christian School	John Mattos Elementary School
Blacow Elementary School	Kindercare Pre-School
Brier Pre-School	Leitch Elementary School

Brookvale Elementary School	Millard Elementary School
Cabrillo Elementary School	Mirsch Elementary School
Chadbourne Elementary School	Mission San Jose Elementary School
Ducks for Bucks Community Rodeo	Mission San Jose High School
Durham Elementary School	Mission Valley Elementary School
Forest Park Elementary School	Oliveira Elementary School
Fremont Elementary School	Parkmont Elementary School
Fremont Festival of the Arts	Patterson Elementary School
Fremont YMCA	Thornton Junior High School
Glanker Elementary Pre-School	Walters Middle School
Glenmoor Elementary School	Warm Springs Elementary School
Gomes Elementary School	Warwick Elementary School
Grimmer Elementary School	Weibel Elementary School
Harvey Green Elementary School	YMCA Main Site
Hirsch Elementary School	

Figure 4-3: Golden Sneaker Award at Warwick Elementary, part of the Alameda County SR2S program

4.1.8 Operation Lifesaver – Rail Safety Education

Rail education is important for Fremont due to the proximity of schools to at-grade rail crossings. Operation Lifesaver is a non-profit organization that provides public education to end collisions, deaths, and injuries from locations where roads cross railroads. The organization was established in 1972 and is sponsored by governments and the railroad industry. Its education resources are available online at: http://www.oli.org/

The City of Fremont could work with the Fremont Unified School District on implementing these education programs. Operation Lifesaver provides lesson plans for all grades. The

Organization also has speakers and videos available as well as certificates for participating students. A City staff member could become an Operation Lifesaver presenter and visit schools near Fremont's train crossings, helping to educate younger walkers about train traffic.

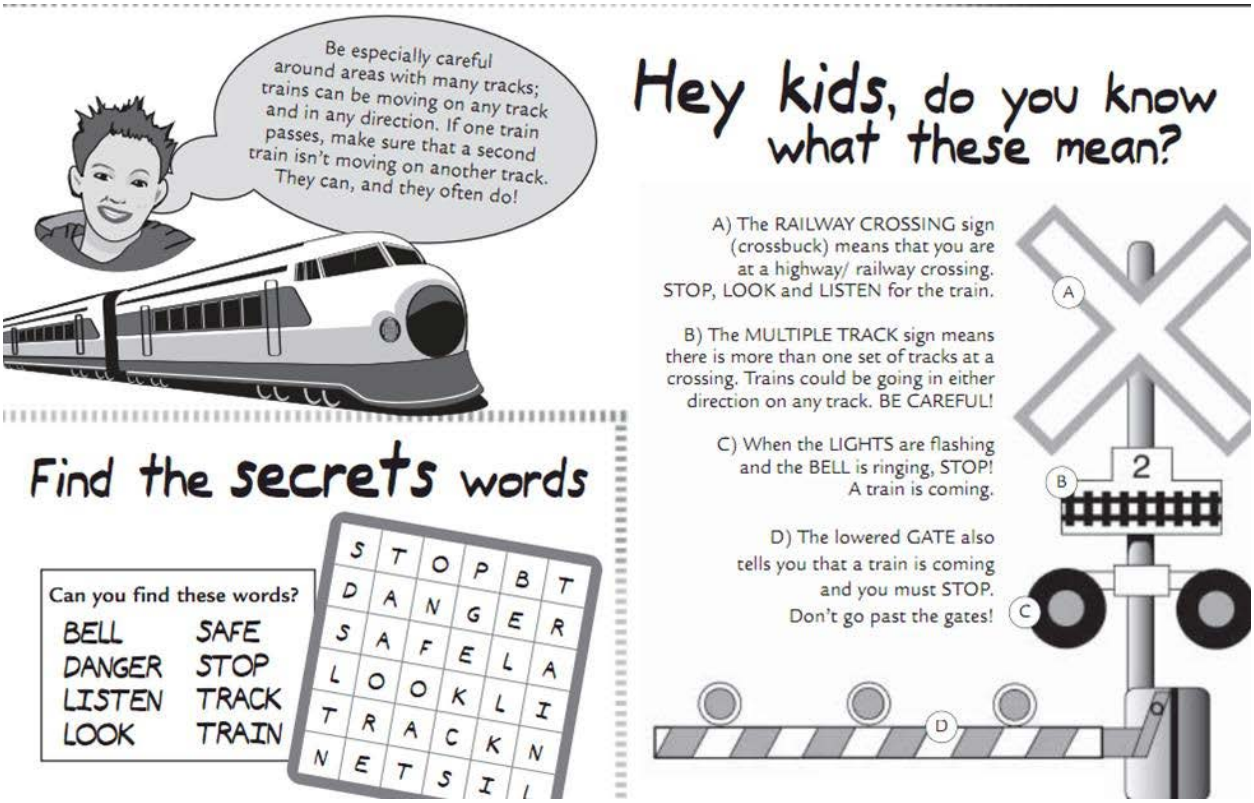


Figure 4-4: Operation Lifesaver has extensive resources targeted to all age groups

4.2 Encouragement

A campaign of promotions could be implemented to promote walking as an effective, fun and economical way to travel in Fremont.

4.2.1 Walk Score

Another metric of walkability is Walk Score (www.walkscore.com) as shown in Table 2-2 on page 18. The metric is already used in the real estate industry, but the City could use it to evaluate proposals and promote new walkable developments.

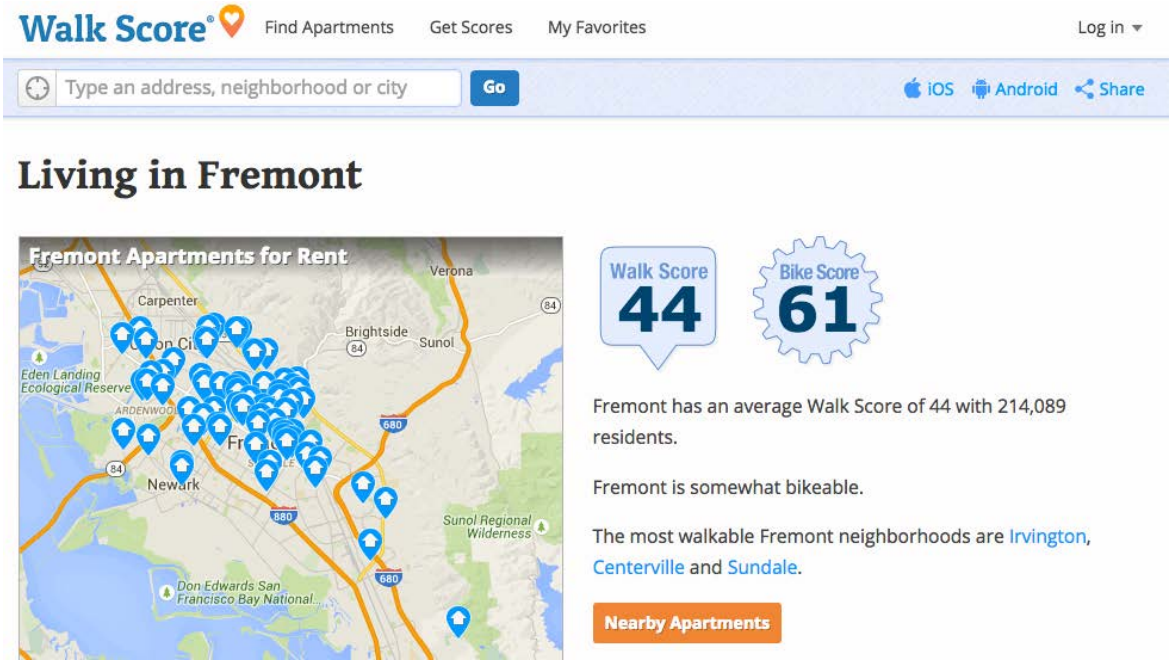


Figure 4-5: The Walk Score portal links walkability directly to neighborhoods

4.2.2 Commuter of the Month

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

Figure 4-6: Walk to Work Day promotions; a play on the iconic Beatles image encouraging walking to work

4.2.3 Murals and Box Art

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

Figure 4-7: An active transportation themed mural in San Francisco

Launched in 2014 by the City, the Box Art Program paints traffic signal cabinets located at signalized intersections. Themes for box art include sustainability, green energy, education, arts, technology, and more. Traffic safety could be added to the themes.

4.2.4 Retail Involvement

Partnerships with local retailers could be established to promote walking. These partnerships could involve the campaign theme being promoted on bag stuffers and pre-printed bags. The costs of the bag stuffers and pre-printed bags could be borne by retailers and could act as a donation by them. The City of Fremont could provide suggested artwork for the printed material. Retailers could, if possible, agree to provide counter space for guides and window space for promotional posters.

4.2.5 Walk Exhibit

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

- Photo displays of new facilities
- Photos of residents and employees walking
- Walk Guides
- Interactive video encouraging participants to take the "Fremont Walks! Challenge"

This exhibit could be featured at all community events including Earth Day, Clean Air Week, Bike to Work Week, and other events. The exhibit could be built to allow assembly and attendance to be done by one person.

4.2.6 Event Producers Obligation

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

4.2.7 Community Event

Fremont could produce an annual "Fremont Walks!" expo to promote the use of alternative modes of transportation, including shuttle services, buses, electric cars, bicycling, and carpooling. Other aspects of walking could also be showcased, including health benefits, the active lifestyle of those who walk, the equipment, the financial benefits, and the environmental benefits.

4.2.8 Monthly Events

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

City Walk Tours - Organized walks could be organized for the general public in order to (1) showcase the destinations reachable by walking, (2) educate participants on walking as a mode of transportation and (3) promote walking as a healthy activity.

The production, coordination, and implementation of all promotional activities can be done by either City of Fremont staff or consultants. In addition, costs associated with the promotional activities can be offset by sponsors and other funding sources.

4.3 Enforcement

4.3.1 Public Education and Enforcement Program

An enforcement program could work to improve communication between the public and the Fremont Police Department, as well as work to prioritize enforcement of laws relevant to pedestrians. The Fremont Police Department has regular meetings with City staff to exchange ideas about existing problems facing pedestrians and motorists. During these meetings, the Fremont Police Department is briefed on new facilities that affect walking in the City of Fremont.

The Fremont Police Department's ongoing mission is to promote a safe pedestrian environment through public education and enforcement. The Fremont Police Department will collect and analyze information from many sources, including collision data, complaints from the community and input from City staff to develop an enforcement plan that promotes pedestrian safety and positively influences driving behavior.

The Fremont Police Department will continue to partner with the Fremont Unified School District to identify and respond to areas around schools that experience poor driving behavior and high traffic congestion. The Fremont Police Department will continue to patrol these areas to encourage safe driving around school zones.

The Fremont Police Department will continue to engage the community to provide information related to pedestrian safety by utilizing social media, traffic safety events, and other social gatherings. The education component of this action plan will be used to provide the public with information regarding safe driving behavior through literature and conversations with members of the Fremont Police Department.

4.3.2 Relevant Legislation

Pedestrians are protected in the public right-of-way by the California Vehicle Code, as enforced by the Fremont Police Department. Some of the key provisions of the California Vehicle Code as it relates to pedestrians are shown below.

21950 Right of Way at Crosswalks

- The driver of a vehicle shall yield the right-of-way to a pedestrian crossing the roadway within any marked crosswalk or within any unmarked crosswalk at an intersection, except as otherwise provided in this section.
- This section does not relieve a pedestrian from the duty of using due care for his or her safety. No pedestrian may suddenly leave a curb or other place of safety and walk or run into the path of a vehicle that is so close as to constitute an immediate hazard. No pedestrian may unnecessarily stop or delay traffic while in a marked or unmarked crosswalk.
- The driver of a vehicle approaching a pedestrian within any marked or unmarked crosswalk shall exercise all due care and shall reduce the speed of the vehicle or take any other action relating to the operation of the vehicle as necessary to safeguard the safety of the pedestrian.

- Subdivision (b) does not relieve a driver of a vehicle from the duty of exercising due care for the safety of any pedestrian within any marked crosswalk or within any unmarked crosswalk at an intersection.

21950.5 Crosswalk Removal

A. An existing marked crosswalk may not be removed unless notice and opportunity to be heard is provided to the public not less than 30 days prior to the scheduled date of removal. In addition to any other public notice requirements, the notice of proposed removal shall be posted at the crosswalk identified for removal.
B. The notice required by subdivision (a) shall include, but is not limited to, notification to the public of both of the following:
    a. That the public may provide input relating to the scheduled removal.
    b. The form and method of providing the input authorized by paragraph (1).

21951. Failure to Stop for a Pedestrian (fine for violation is $480)

Whenever any vehicle has stopped at a marked crosswalk or at any unmarked crosswalk at an intersection to permit a pedestrian to cross the roadway the driver of any other vehicle approaching from the rear shall not overtake and pass the stopped vehicle.

21954. Pedestrians Outside Crosswalks Must Yield / Drivers Must Exercise Due Care

a) Every pedestrian upon a roadway at any point other than within a marked crosswalk or within an unmarked crosswalk at an intersection shall yield the right-of-way to all vehicles upon the roadway so near as to constitute an immediate hazard.
b) The provisions of this section shall not relieve the driver of a vehicle from the duty to exercise due care for the safety of any pedestrian upon a roadway.

21955. Jaywalking Between Adjacent Traffic Signals

Between adjacent intersections controlled by traffic control signal devices or by police officers, pedestrians shall not cross the roadway at any place except in a crosswalk.

21956. Walking in the Roadway

(a) No pedestrian may walk upon any roadway outside of a business or residence district otherwise than close to his or her left-hand edge of the roadway.
(b) A pedestrian may walk close to his or her right-hand edge of the roadway if a crosswalk or other means of safely crossing the roadway is not available or if existing traffic or other conditions could compromise the safety of a pedestrian attempting to cross the road.

4.4 Evaluation

Evaluation programs help the City measure progress towards the goals of this Pedestrian Plan and other active transportation initiatives. It is also a useful way to communicate success with elected officials as well as local residents.

4.4.1 Pedestrian Count and Survey Program

Pedestrian counts and community surveys act as methods to evaluate not only the impacts of specific pedestrian improvement projects but can also function as way to measure progress towards City goals such as increased pedestrian travel for trips one mile or less.

The city should conduct a regular pedestrian community survey and pedestrian count program. With this information, along with bicycle and trail counts, produce a report or 'report card' on active transportation every 2-3 years. Reports developed from count and survey efforts can help the City measure its success toward the goals of this Plan as well rate the overall quality or effectiveness of the ongoing efforts to increase walking in the City.

Appendix A Pedestrian Planning Context

Numerous plans and policies at the Federal, State, Bay Area and County level guide pedestrian planning. These various frameworks establish priorities that can directly influence and show support for non-motorized investments within the City of Fremont. The most relevant policies and projects are included in this appendix.

Figure A-1: Walkability is a central tenet of many plans and policies in Fremont and the region

City of Fremont General Plan 2011

The 2011 General Plan identifies a central challenge: the City must grow 'up' rather than 'out.' Low-density land use patterns and auto-oriented transportation investments cannot provide for the growth that the city expects or wants to accommodate when it comes to homes and jobs. As stated in the General Plan, the city projects 14,880 new households between 2010 and 2035, needing 15,624 new housing units. Jobs in the community are expected to grow by 50 percent, topping 75,000 in the next 20 to 25 years. Maintaining the current average density of development, that influx of residents would require 3,000 acres—land that the City does not have.

Instead, the General Plan lays out a vision for sustainable infill growth occurring on former commercial sites. In other words, Fremont is committed to becoming "strategically urban." This growth will take advantage of existing transit facilities, focusing in the areas where transit stations are planned, and bolster existing commercial nodes. A large share of this growth is envisioned as mixed-use projects that reduce the necessity of driving. According to the General Plan, "Higher development intensity can also help create a more sustainable city, and provide the pedestrian-oriented, urban workplaces and shopping experiences that are missing in the City today" (Land Use 2-13).

Toward a walkable Fremont, the General Plan identifies recommendations for both land use and transportation strategies, highlighting strategies for better investment in transit, biking, and walking as well as design guidelines and intensified land uses that will support these investments. This vision supports a growth model in which 2/3 of household growth and 1/3 of employment growth between 2010 and 2035 will occur within one half-mile of existing or future Bay Area Rapid Transit (BART) and Altamont Corridor Express (ACE) train stations. Today, many people in Fremont regularly walk, ride a bike, or take buses or shuttles to access transit stations. The addition of a Warm Springs BART station and a BART connection to San Jose will better connect Fremont within the Silicon Valley and the South Bay Area.

The following sections identify specific guidance from the various elements in the General Plan that are relevant to this Plan. Relevant language includes both policies that support and affirm this Plan, and implementation strategies that should be considered as candidates for project recommendations.

Land Use Element

The Land Use Element of Fremont's General Plan identifies several key goals for encouraging pedestrian-oriented development. Acknowledging that walkable environments are the product of smart land use, design, and parking management decisions, Table A-1 lists relevant land use policies from the General Plan that will help transform Fremont into a more walkable city.

Table A-1: Land Use Element Policy Implementation Guidance

Policy	Implementation	Language
City Form and Structure (2-1): A city transformed from an auto-oriented suburb into a distinctive community known for its walkable neighborhoods, dynamic city center, transit-oriented development at focused locations, attractive shopping and entertainment areas, thriving work places, and harmonious blending of the natural and built environments.		
Neighborhoods (2-1.4)		Sustain and enhance Fremont's neighborhoods as the basic "building blocks" of the community. Fremont's neighborhoods should accommodate a high quality of life by providing diverse housing choices, safe and walkable streets, and convenient access to services, schools, and parks.
Fremont City Center (2-1.5)		Plan for the transformation of Fremont's Central Business District into a pedestrian-oriented urban district known as "City Center." City Center should contain a mix of office, retail, health care, government, high density residential, cultural, and entertainment land uses, designed to create an active, lively street environment and strong sense of place.
	City Center as a Priority Development Area (2-1.5.B)	Recognize City Center as Fremont's highest priority for multi-family development and pedestrian-oriented shopping, cultural, civic and entertainment land uses.
Town Centers (2-1.6)		Recognize Fremont's five original towns—Centerville, Irvington, Mission San Jose, Niles, and Warm Springs—as important and unique places that contribute to Fremont's identity. Plans for these districts should address the preservation of historic resources; appropriate areas for new

Policy	Implementation	Language
		commercial, residential, and mixed-use infill development; parking and transportation strategies which foster a pedestrian-oriented shopping environment; and provisions to ensure that future development helps enhance and define each area's character.
Becoming a More Transit-Oriented City (2-1.7)		Plan for Fremont's transition to a community that includes a mix of established lower-density neighborhoods and new higher-density mixed-use neighborhoods with access to high-quality transit. Transit-oriented development (TOD)—or the placement of higher density uses around transit facilities—should be recognized as the key strategy for accommodating Fremont's growth in the next 20-25 years.
	Reducing the Predominance of Parking (2-1.7B)	Encourage future development in the vicinity of transit stations to utilize vertical development formats rather than the suburban model of one- or two-story buildings surrounded by surface parking. This should be accomplished through such tools as parking maximums in the zoning ordinance, the development of parking structures, unbundling parking for mixed use and shared parking areas serving multiple parcels.
Pedestrian Scale (2-1.10)		Create a more pedestrian-oriented environment in Fremont's City Center, its five Town Centers, and the other Transit-Oriented Development areas shown on the General Plan Land Use Map. These areas should be characterized by convenient and continuous sidewalks, crosswalks, and walkways; easy access to transit; comfortable outdoor spaces for pedestrian use; and parking that is located in structures or in shared lots to the rear of buildings rather than between buildings and the streets they face.
	Pedestrian-Oriented Zoning Standards (2-1.10.A)	Develop zoning standards and incentives to achieve pedestrian-oriented development.
	Parking Reductions and Alternative Mode Improvements (2-1.10.B)	Ensure that parking standards and other changes that incentivize density are paired with improvements that provide viable alternatives to driving, including more frequent and convenient transit service, and new bicycle and pedestrian facilities.
Complete Neighborhoods (2-3): Compact, walkable and diverse neighborhoods each with an array of housing types and shopping choices with parks, school and amenities that can be conveniently accessed by all residents.		
Balance of Services, Amenities, and Uses (2-3.5)		Promote design and land use decisions which improve the walkability of neighborhoods, enhance the ability to travel by bicycle or public transportation, and minimize the distance a resident must travel to reach basic services, shopping, parks, and schools.
Connectivity (2-3.6)		Improve ability to travel through neighbors and between neighborhoods on foot, bicycle, or automobile. Street layouts should facilities pedestrian travel and connect homes with nearby services to the greatest extent feasible. Cul-de-sacs and dead-ends should be avoided it hey require circuitous routes for pedestrians.

Policy	Implementation	Language
	Neighborhood Connectivity(2-3.6.A)	Undertake improvements that make Fremont's neighborhood streets safer and more convenient for walking and bicycling. This is both a sustainability objective and a public health objective. The pedestrian and bicycle networks in Fremont's neighborhoods should reflect universal design principles that make the City more accessible for seniors and others with mobility limitations.
	Traffic Calming (2-3.6B)	Implement measures to slow down or "calm" traffic on local streets, thereby improving traffic safety and enhancing the quality of life in Fremont neighborhoods.

Mobility Element

The Mobility Element (Chapter 3) identifies priorities and strategies for moving people and goods more efficiently and safely in Fremont. Central Mobility Element policy goals include expanding transportation choices, reducing dependence on single-passenger automobile trips, and making it easier for Fremont residents and visitors to walk, bicycle, and use public transportation. In particular, the Mobility Element identifies the following issues to be addressed:

- Transforming Fremont's corridors into "complete streets" that are designed for multiple modes of travel
- Reducing the number of vehicle miles traveled by Fremont residents and workers by providing more non-automobile travel options and more compact land use patterns
- Balancing the need for convenience and speed with the need to create safe, pedestrian-friendly streets

Chief among the goals of the Mobility Element is the application of Complete Streets principles. As noted in the General Plan, the initial push for Complete Streets retrofits should focus on streets within Priority Development Areas such as Downtown, where significant infill development is planned. Corridors with wide rights-of-way such as Fremont Boulevard and Mowry Avenue are also potential candidates. This is the first Pedestrian Master Plan update since the General Plan was adopted. Table A-2 identifies guidance from the Mobility Element relating to walkability.

Table A-2: Mobility Element Policy Implementation Guidance

Policy	Implementation	Language
Complete Streets (3-1): City streets that serve multiple modes of transportation while enhancing Fremont's appearance and character.		
Complete Streets (3-1.1)		Design major streets to balance the needs of automobiles with the needs of pedestrians, bicyclists, and transit users. Over time, all Fremont's corridors should evolve into multi-modal streets that offer safe and attractive choices among different travel modes.

Policy	Implementation	Language
	Complete Streets Design Standards (3-1.1.A)	Periodically review Fremont's street standards to continue implementation of Complete Streets concepts. Standards should accommodate multiple transportation modes within rights-of-way and achieve mutually supportive land use, transportation, and urban design objectives.
	Multi-modal Rights of Way (3-1.1.B)	When major resurfacing projects occur, or where traffic volumes are well below a road's design capacity, consider converting auto lanes on major streets for multiple purposes, such as bus and bicycle travel and carpools.
	Use of Traffic Impact Fees for Non-Auto Projects (3-1.1.C)	Explore changes to Fremont's traffic impact fees that enable the use of these fees to improve transit, bicycle, and pedestrian facilities, and to undertake traffic calming projects.
Transit-Friendly Street Design (3-1.3)		As appropriate, apply street design and development standards that require transit-supportive facilities such as bus stop curb extensions, bus shelters, benches, lighting, sidewalks, and convenient access to bus stops.
	Bus Stop Locations (3-1.3.A)	Work with transit providers to ensure that bus stops and shelters are sited in appropriate locations and are designed to maximize rider comfort and safety.
Walking, Bicycling, and Public Health (3-1.4)		Recognize the importance of a walkable, bicycle- and pedestrian-friendly city to overall public health and wellness.
	Wellness Education (3-1.4.A)	Educate local residents and employers on the health benefits of walking and bicycling through sponsorship of events such as "Bike to Work" day, and other programs which increase public awareness of the link between exercise and health, and the ways in which community design can address obesity and improve physical well-being.
Improving Pedestrian and Bicycle Circulation (3-1.5)		Incorporate provisions for pedestrians and bicycles on city streets to facilitate and encourage safe walking and cycling throughout the city.
	Pedestrian and Bicycle Accommodations on Roadways (3-1.5A)	Require that road improvements incorporate facilities for pedestrians and bicycles in locations identified in the City's Pedestrian and Bicycle Master Plans.
	Relationship of Road Improvements to Bike and Pedestrian Plans (3-1.5C)	Ensure that roadway improvements do not cause a reduction in existing or planned capacity for Class I or II bike facilities as identified in the Fremont Bicycle Plan, or a reduction in sidewalk widths that result in an uncomfortable pedestrian environment.
Pedestrian and Bicycle Safety (3-1.6)		Improve the safety of pedestrians and bicyclists throughout Fremont through design, signage, capital projects, pavement maintenance, street sweeping and public education.

Policy	Implementation	Language
	Safe Routes to School (3-1.6A)	Pursue grant funding opportunities to implement a Safe Routes to School program aimed at protecting the safety of students walking to and from school and that addresses physical improvements, including gaps in the sidewalk network.
	Pedestrian Crosswalks at Signalized Intersections (3-1.6C)	Provide enhanced pedestrian crossing times at locations with high pedestrian volumes and with large numbers of special needs and/or elderly residents. Install "countdown crosswalks" to improve the safety of pedestrian crossings. Also, consider the use of diagonal crosswalks at appropriate locations which require motorists in all directions to periodically stop for pedestrian crossings from all four corners of an intersection.
	Public Education on Traffic Safety (3-1.6.D)	Expand public education on laws relating to parking, circulation, speed limits, pedestrian crossings, right-of-way, and other "rules of the road." Special efforts should be made to ensure the safety of children and youth.
Sidewalks (3-1.7)		Require the provision of sidewalks in all new development, including infill development and redevelopment, in order to eventually complete the City's sidewalk network. Sidewalks shall be required on both sides of all public streets, except in hillside areas where a single sidewalk may be adequate. Sidewalks and direct pedestrian connections between uses should also be provided in parking lots.
	Sidewalk Installation (3-1.7.A)	Continue to require developers to finance and install sidewalks, pedestrian walkways, and other pedestrian-oriented features in new development.
Reducing Vehicle Miles Traveled (3-2): Improve mobility in Fremont while reducing the growth of vehicle miles traveled.		
Pedestrian Networks (3-2.3)		Integrate continuous pedestrian walkways in Fremont's City Center, Town Centers, residential neighborhoods, shopping centers, and school campuses. Place a priority on improving areas that are not connected by the City's pedestrian network, with the objective of making walking safer, more enjoyable, and more convenient.
	Planning for Pedestrians (3-2.3A)	Include plans for integrated pedestrian circulation systems as part of any future area plan, neighborhood plan, specific plan, or development plan. Such plans shall include provisions for landscaping, street furniture, and other pedestrian amenities.
	Walkways to BART (3-2.3.B)	Strengthen pedestrian connections to all BART stations. Enhanced pedestrian access shall be considered an important element of station design.
	Pedestrian Connectivity (3-2.3.C)	Use the development review process to require pedestrian connectivity within proposed development and between development and destinations (public facilities, transit, neighborhood commercial uses, parks, etc.) within a one-half mile radius. Require trail or sidewalk right-of-way dedication for development or improvement projects.
	Mid-Block Paths (3-2-3.D)	Strategically locate and develop highly visible mid-block pedestrian walkways and/or pedestrian-only streets in Fremont's City Center and other areas near transit or concentrated and higher density development.

Policy	Implementation	Language
	Improving Pedestrian Mobility (3-2.3.E)	Improve crossings for pedestrians at key intersections through pavement changes, curb redesign, landscaping, countdown crosswalks, and other measures which improve safety and ease of travel.
	Connecting the Trail System (3-2.4.B)	Connect recreational trails in City and regional parks, access trails along creeks and flood control channels, and sidewalks and bike lanes on local streets to fill the gaps and improve the continuity of the city's bike and pedestrian trail system. Require right-of-way dedication from development projects to complete the system.
Pedestrian and Bicycle Master Plans (3-2.5)		Maintain and implement City master plans for pedestrian and bicycle travel, and use these plans as the basis for network development.
	Bicycle and Pedestrian Capital Projects (3-2.5.A)	Develop and periodically update a priority list for planned pedestrian and bicycle improvements, consistent with the route networks in the Pedestrian and Bicycle Master Plans.
	Narrower Streets (3-3.1.B)	Where aesthetic, safety, and emergency access considerations can be addressed, design streets only as wide as required to provide all necessary functions
	Bicycle and Pedestrian Accident Data (3-3.7.B)	Monitor bicycle and pedestrian accidents and recommend safety improvements where needed.
Transportation for Persons with Special Needs (3-3.10)		Improve mobility for people of all physical capabilities, including residents who are elderly, disabled, use walkers or wheelchairs, or have other special needs.
	Visual and Audio Signals (3-3.10.C)	Install visual and audio signals at pedestrian crossings as appropriate to improve safety for hearing-impaired and sight-impaired travelers.
Balancing Mobility and Neighborhood Quality (3-4): A transportation system that balances speed and convenience with the desire to have walkable neighborhoods and an enhanced sense of place.		
Relating Vehicle Speed to Reflect Land Use and Community Character (3-4.1)		Manage traffic on arterials and collectors to reduce unnecessary travel delays and maintain efficient vehicle flow. However, auto speed and convenience may be diminished in some locations in order to achieve a more livable, walkable, and attractive community. In general, lower vehicle speeds will be encouraged in pedestrian-oriented areas such as the Town Centers and City Center.

Policy	Implementation	Language
Variable Level of Service Standards (3-4.2)		Adopt variable standards for traffic speed and travel delay that recognize the character of adjacent land uses, the functions of different streets, the different modes of transportation on a street or corridor, and other community development goals. For locations within the City Center, Town Centers, and Irvington and Warm Springs / South Fremont BART Station areas, and within PDA boundaries, peak hour LOS "E" or "F" may be acceptable. In these locations, the efficiency and convenience of vehicular operations must be balanced with the goal of increasing transit use, bicycling, and walking.
	Redefining Level of Service (LOS) (3-4.2.A)	Develop new ways of calculating LOS which are based on people rather than vehicles. Such measures could take into account the relative volumes of transit users, pedestrians, carpoolers, and bicyclists passing through an intersection or along a road segment during a given time period and not solely the number of cars. Until new standards are developed, the City will continue to use its current standards and methods for calculating LOS.
Traffic Calming (3-4.5)		Incorporate measures to slow down or "calm" traffic on local streets, or in some special circumstances, collector streets, that experience cut-through traffic, hazardous conditions for bicycles or pedestrians, or a high incidence of vehicles traveling at excessive speeds.
	Traffic Calming in Future Plans (3-4.5.A)	Incorporate traffic calming measures into major urban design projects, streetscape plans, specific plans, and concept plans for small areas within the city.
Transportation and the Environment (3-4.7)		Ensure that investments in transportation infrastructure, including roads, BART, rail lines, bus-only lanes, bike lanes, and pedestrian bridges are sited and designed in a way that complements the natural and built environments.
Regional Trail Development (3-5.2)		Promote and coordinate the planning of pedestrian and bicycle trail systems with Alameda County, Newark, Milpitas, Union City, Santa Clara County, ABAG, BCDC, EBRPD, SFPUC, ACFC, and other jurisdictions and organizations.
	Bay Trail and Ridge Trail (3-5.2.A)	Support completion of the Bay Trail and the Ridge Trail through Fremont and establish trail connections across the city between these two regional networks.
	Rails to Trails (3-5.2.B)	Support the conversion of abandoned or vacated railroad rights of way to linear parks containing bicycle trails and walking paths. A priority should be placed on the surplus Union Pacific corridor between Niles and Milpitas.
	Trail Dedication (3-5.2.C)	Require new development to dedicate and improve right-of-way for trails indicated on General Plan Diagrams.

Parks and Recreation Element

Among the recommendations within the Parks and Recreation Element, those most relevant for this Plan include the goals of creating a wide range of parks and recreational facilities (Goal 8-1) and interagency collaboration (8-3).

Specific policies and implementation strategies relevant to this Plan include the following:

- Acquiring and developing linear trail parks using abandoned or underutilized land corridors (Policy 8-1.5, Implementation 8-1.5.A)
- Encouraging trail recreational offerings and facilities from other Agencies, right-of-way dedication for trail access from property owners, and right-of-way improvements for the Bay Trail in Fremont (Policy 8-3.1, Implementation 8-3.1.A, Implementation 8-3.1.E, Implementation 8-3.1.F)

Community Plans Element

The Community Plan Element identifies existing area plans, and other focused planning efforts and incorporates relevant sections into the General Plan. This ensures subarea plans are consistent with the General Plan, and provide a sense of local priorities within the citywide General Plan. Recommendations which are relevant to this Plan are outlined as follows.

Centerville Town Center

The Community Plan for Centerville identifies potential development intensification surrounding the Centerville Train Depot in the Centerville Town Center. The Depot is currently served by Altamont Commuter Express and Amtrak Capitol Corridor. This area is identified as a Priority Development Area in PlanBayArea, the regional transportation and land use plan. The community plan reflects this vision, supporting transit-oriented development around the train depot and the transformation of Fremont Boulevard into a "safe, walkable thoroughfare lined with ground floor shops and restaurants, upper floor residential and office uses, and parks and plazas."

The 2010 Centerville Framework Plan considered four options for redesigning Fremont Boulevard to make the street safer and more accommodating for pedestrians and bicycles. These included:

- Two lanes each way with no median, shared bicycle lanes, and about 90 new parallel on-street parking spaces
- Two lanes each way with a median, shared bicycle lanes, and about 70 new parallel on-street parking spaces
- Two lanes northbound, one lane southbound, a wide median with turn lanes at intersections, dedicated bicycle lanes, and about 75 new parallel on-street parking spaces
- Two narrower lanes each way with dedicated bicycle lanes and about 60 new on-street parking spaces, with and without medians

Corridor improvements recommended for Fremont Boulevard include narrowing travel lanes, adding a continuous bike lane, and constructing a landscaped median (Implementation 11-3.1.A). Recommended intersection improvements include raised crosswalks, median, curb extensions, reduced speed limits, and landscaping (Implementation 11-3.1.B). Additionally, one strategy specifically suggested eliminating the free right turn lane at the Thornton Avenue and Fremont Boulevard intersection, an intersection feature found at nearly all arterial intersections in Fremont (Implementation 11-3.1.E).

Other project recommendations may be drawn from implementation strategies related to street connectivity in the specific plan area. These include providing a pedestrian link through the cemetery to the "Centerville Unified" site and developing additional mid-block pedestrian paths between Maple and Fremont Boulevard (Implementation 11-3.7.A).

Central Fremont

One of the chief goals of the Community Plan for Central Fremont is to make City Center into a pedestrian-oriented area. Capitol Avenue is envisioned as a pedestrian-friendly shopping street with urban retail, civic and arts uses, and high density housing. The Community Plan for Central Fremont also calls for enhanced bicycle and pedestrian circulation along Fremont Boulevard as it passes through City Center (Implementation 11-4.2.E), including narrowing of travel lanes, wider sidewalks, improved crosswalks, fewer curb cuts, and a continuous bicycle route.

The Central Plan recommends implementing the roadway, bicycle, and pedestrian improvements identified in the City Center Concept Plan and the Downtown District Plan (Implementation 11-4.2.A).

Other priorities relevant to this Plan include developing new pedestrian walkways—including mid-block passages to break up superblocks—and improving pedestrian connections to Fremont BART station and the Hub Shopping Center (Implementation 11-4.11.A)

Warm Springs South Fremont Community Plan 2014

Key pedestrian recommendations of this plan include:

- Complete the BART access bridge over the UPPR tracks into the west side of the new BART station
- Consider providing a new bike and pedestrian crossing over I-880
- Provide pedestrian improvements on key pedestrian corridors
- Provide consistent sidewalks and crosswalks on all roadways and intersections
- Improve pedestrian signal timings as street network develops

The plan also recommends completion of three freeway interchange improvement projects in the South Fremont area:

- I-680 / Mission Boulevard
- I-680 / Auto Mall Parkway
- I-880 / Fremont Boulevard

The plan suggests installation of sidewalks along:

- A grid of new local streets
- The new Innovation Way (from Fremont Boulevard to the Warm Springs BART station)
- Lopes Court and Old Warm Springs Boulevard
- Kato Road

The projects recommended by the Plan are now in progress.

City of Fremont Complete Streets Policy 2013

Fremont adopted a Complete Streets policy in 2013 to advance their vision for a community where major streets balance the needs of automobiles with the needs of pedestrians, bicyclists, and transit users. It identifies five principles to guide future designs: a commitment to serve all modes of transportation, to build infrastructure that supports complete streets, to employ context-sensitive designs, to make complete streets a routine best practice across all relevant city departments, and to consider complete streets improvements in all phases of all projects. The policy lays out guidance to achieve greater transparency in the implementation process and ensure that bicycle, pedestrian, and transit user considerations are included in every project.

City of Fremont Union Pacific Railroad Corridor Trail Feasibility Study 2009

This Feasibility Study examines the feasibility of a nine-mile Class I shared use trail along the existing Union Pacific Railroad Corridor. First recommended in the 1991 General Plan, this trail would require negotiations with the railroad as well as many public agencies, including Alameda County Flood Control and Water Conservation District, Bay Area Rapid Transit, and Valley Transportation Authority. The trail was also recommended in the Fremont Pedestrian Master Plan (2008), as a high priority in the Fremont Bicycle Master Plan (2005 & 2012), and within the Irvington Concept Plan (2005).

The Warm Springs BART Extension overlaps with the Union Pacific Railroad ROW, and due to constraints south of Auto Mall Expressway, the plan is now to develop walking and cycling facilities on Warm Springs Boulevard instead. The City has submitted one of the segments for inclusion in the Countywide Transportation Plan, and other segments have been constructed. Please refer to the project sheets beginning on page 82 for more up-to-date information.

City of Fremont Vision Zero 2020

The goal of Fremont Vision Zero 2020 is to significantly reduce fatalities and severe injures by 2020. The Vision Zero Action Plan is organized around the themes of **Safer Streets, Safer People, and Safer Vehicles**. The Vision Zero approach recognizes that human errors are inevitable and unpredictable, and accordingly, the transportation system should be designed to anticipate error so the consequence is not severe injury or death. To make progress toward the Fremont Vision Zero goal of improving street safety and eliminating traffic fatalities, a series of near-term actions are proposed. These traffic safety countermeasures are designed to address specific issues identified from a rigorous review of Fremont's crash data and solve problems with a comprehensive approach towards safer streets, safer people and safer

vehicles. The Fremont Vision Zero action plan takes two approaches toward improving safety. The first approach involves addressing opportunities associated with each crash incident and location. The second approach incorporates the concept of "predictive analytics", which extracts information from crash data and uses it to predict trends and the probability of future traffic crashes where similar conditions may exist.

City of Fremont Traffic Calming Policy 2002

The Traffic Calming Program was authorized for funding in 2016 by the City Council. The program had not been funded since 2003. The objectives of the City of Fremont's Traffic Calming Policy (established in 2002) are to reduce speeding and discourage through traffic on neighborhood streets. The Policy lays out a framework for residents to propose traffic calming measures in their neighborhoods.

Installation of traffic calming devices requires strong community support and will be considered only on two-lane residential streets with posted speed limit of 25 miles per hour. According to the policy, "reasonable" automobile, pedestrian, and bicycle access should be maintained where traffic calming devices are installed. Likewise, traffic calming devices must not significantly impact transit, waste disposal, and other service vehicles.

The policy also indicates that removal of some on-street parking spaces may be necessary to install certain types of devices. Traffic calming devices permitted in Fremont include the following:

- Speed Lumps (humps)
- Modified T-Intersections
- Modern roundabouts
- Chicanes
- Neckdowns
- Center Islands
- Speed Tables/Raised Crosswalks

Figure A-2: Roundabouts reduce pedestrian crossing distances and motorist speeds (Argonaut Way)

City of Fremont Bicycle Master Plan 2012

In 2012, Fremont adopted the City's Bicycle Master Plan, which lays out a vision and implementation plan for creating a comprehensive, safe, and logical bicycle network in the City. The Master Plan identifies approximately 66 miles of bikeways for construction. Nearly 33 miles of these are planned "Class I" bikeways – shared use paved pathways shared by bicyclists and pedestrians. While many communities differentiate paved shared use paths from unpaved trails, in many parts of California including Fremont the term "Trail" is generally a catch all term.

Bikeways identified as high priority projects, intended to be implemented within the next five years, include two Class I bikeways. These are listed in Table A-3, separated by prioritized tier.

Since adoption of the Bicycle Master Plan, the City has determined that any new Class I trails shall have a dedicated maintenance and operations funding source.

Table A-3: Bicycle Plan Recommended Class I Trails

Tier	Location	From	To	Miles
1	UPRR Rail Trail	Clarke Drive	Main Street	3.55
1	Central Park Trail	Stevenson Boulevard	Lake Elizabeth	0.46
2	Sabercat Creek Trail	Irvington BART	I-680	0.53
2	Mission Creek Trail	Palm Avenue	Mission Boulevard	0.60
2	UPRR Rail Trail	Washington Boulevard	Milpitas City Limits	5.54
2	Grimmer Boulevard Greenbelt	Paseo Padre Parkway	Fremont Boulevard	0.44
2	Hetch Hetchy/Plomosa Trail	Crawford Street	Milpitas City Limits	2.19
3	Alameda Creek Spur	Alameda Creek Trail	Shinn Street	0.34
3	Bay Trail	Agua Caliente Stream	ACE Transit Center	3.81
3	Niles-BART Connector	Von Euw Common	Fremont BART	0.77
3	Patterson Ranch/Bay Trail	Alameda Creek	Patterson Ranch Road	0.74
3	Bay Trail Access Spur	Cushing Parkway	Bay Trail	0.16
3	Fremont Boulevard Extension	Fremont Boulevard	Dixon Landing Road	0.69
3	Bay Trail	Auto Mall Parkway	Newark City Limits	1.17
3	Bay Trail Connector	Cushing Parkway	Nobel Drive	0.62
3	Coyote Creek Levee	Dixon Landing Road	Bay Trail	0.75
3	Farwell Trail	Farwell Drive	Kennedy High School	0.62
3	Auto Mall Parkway Path	Nobel Drive	Planned Transit Center	0.44
3	Bay Trail Loop	Tri-Cities Landfill	Coyote Creek	4.95

City of Fremont Pedestrian Master Plan 2007

The following table presents the full list of goals and objectives from the 2007 Plan, along with progress achieved since then. This Plan update has simplified the goals and refers to policies in the General Plan instead of establishing another policy layer.

Table A-4: Pedestrian Master Plan 2007 Goals, Objectives, Indicators and Progress

Goal	Objective	Indicator and Progress
1. Number of Pedestrians Increase the number and percentage of trips made on foot to reduce traffic congestion, preserve air quality, and improve public health.	Strive to increase the percentage of walking trips for all trip purposes, from nine percent to 13.5 percent by 2025.	2007: 9% MTC no longer issues updates to this measure. A model to estimate this may be included in the next Pedestrian Master Plan update.
	Develop educational programs for the public about the environmental and health benefits of walking.	Fremont participates in regional Spare the Air work to encourage active transportation.
	Encourage incorporating walking into everyday activities to improve health.	This Plan recommends a Safe Routes to School Program that would encourage and educate the next generation about walking.
2. Safety & Security Create a pedestrian network that is designed to be safe and is also perceived to be secure.	Strive to improve driver awareness of pedestrian rights.	No progress has been made on this objective.
	Provide educational programs for pedestrians to encourage walking safely, particularly school children and senior citizens.	Ongoing Alameda County Safe Routes to School efforts include education on pedestrian safety.
	Continue collection and analysis of collision data.	Data is collected through SWITRS and analyzed with each update of this Plan.
	Strive to reduce annual pedestrian collisions by 50 percent by 2025.	2007: 44.4 (5-year average 2003-2007) 2012: 43.6 (5-year average 2008-2012) While this reduction in annual crashes should be acknowledged, a decrease at this rate will not achieve a 50 percent reduction (to an average 22.2 annual collisions) by 2025.
3. Infrastructure & Design Establish a world class pedestrian environment in Fremont's Central Business District and Community Commercial Centers and improve the pedestrian	Prioritize and implement improvements to the pedestrian environment, according to the recommendations of the Pedestrian Master Plan.	Progress has been made on many projects, as referenced in Table 1-1.
	Improve and standardize the state of the practice of pedestrian infrastructure design by developing and following citywide pedestrian design guidelines.	This Plan update project has included an update of the City's Pedestrian Design Guidelines.
	Include pedestrian facilities in all City transportation projects where feasible and appropriate.	Supported by adoption of Complete Streets policy.

Goal	Objective	Indicator and Progress
experience throughout Fremont with additional infrastructure, thoughtful design and integration, and routine maintenance.	Prioritize pedestrian circulation along local and collector streets in Fremont's Central Business district and Community Commercial Centers, through the use of pedestrian improvement measures.	The City is advancing plans for a pedestrian friendly City Center
	Provide appropriate pedestrian roadway crossings throughout Fremont, to facilitate and invite safe and secure pedestrian travel.	This Plan update includes a project to improve uncontrolled crossings city-wide.
	Routinely ensure that public access complies with the Americans with Disabilities Act.	New developments must comply with California Building Code; public projects require ADA compliance.
	Create both public and private open spaces and activities that invite pedestrian use.	Existing and proposed open space is defined in the General Plan. The General Plan Exhibit 8-2 identifies open space trails.
	Design and construct pedestrian facilities to conform to the guidelines and standards of the City of Fremont, Alameda County, Metropolitan Transportation Commission, and state and federal agencies.	Pedestrian Master Plan projects implemented through the Capital Improvement Program (CIP) every two years.
	Dedicate adequate resources in the Capital Improvement Program for maintaining existing and future pedestrian facilities.	The City's sidewalk and concrete improvement program constructs new or re-constructs damaged sidewalk as funds are available.
	Optimize the experience of walking with amenities such as landscaping, public art, seating, and drinking fountains where appropriate.	Included in specific plans such as Downtown Community Plan, City Center Community Plan, and Warm Springs Community Plan
	Identify and apply for public funding sources to finance pedestrian facilities, education, and safety programs.	The City has applied for and received grants including: • HSIP Roundabout Project • Downtown Capital Avenue Extension (OBAG) • Measure B Bike & Pedestrian Grant • Safes Routes to School Mission Boulevard Sidewalk • Livable Communities • Sabercat Creek Trail
4. Connectivity & Accessibility Ensure safe, continuous, and convenient	Work towards providing safe, continuous, and convenient walking routes from neighborhoods to all schools, transit hubs, commercial districts, parks and other recreational	The City is continuing to develop projects for grant funding through the state Active Transportation Program and other grant

Goal	Objective	Indicator and Progress
pedestrian access to essential pedestrian destinations and districts throughout Fremont for all residents, workers, and visitors.	destinations, and between employment centers and nearby shops and restaurants.	sources. New developments must comply with city standards that provide for walking.
	Promote planning and design for safe, accessible, and convenient pedestrian circulation design from the public street right-of-way to entrances of shopping centers and new developments.	While focused on the public right of way, the Design Toolkit in this Plan may also be applied to development projects.
	Work towards completing Fremont's pedestrian network by closing existing gaps.	Since 2007, the focus has been on closing gaps near schools. For the next five-year period the focus will shift to the downtown and the PDAs.
	Create a comprehensive system of trails that links major destinations throughout Fremont and is accessible to a large number of people.	This Plan recommends a Citywide Trails and Paths Study focused on railway and utility corridors.
	Promote accessibility and mobility for special needs people such as elderly and disabled people.	City staff met with senior citizens during the update of this Plan and will continue to seek input from special needs residents.
	Promote increasing the pedestrian access share to BART from eight percent to 8.5 percent.	The BART Way and Warm Springs BART projects are anticipated to help achieve this goal.
5. Land Development Plan, design, and construct new development to celebrate and invite walking, particularly in the city's Central Business District and Community Commercial Centers.	Plan, design, and construct new development sufficiently compact and dense to support an active pedestrian environment at a human scale.	The City's land use policies are oriented towards active pedestrian environments. New, walkable developments have been built throughout the city.
	Orient new construction around public plazas and esplanades, pedestrian pathways, and other open spaces.	
	Encourage a mix of land uses and activities in development and redevelopment projects that will maximize pedestrian travel.	
	Encourage retail at the ground level of new development in the Central Business District and Community Commercial Centers.	

City of Fremont Climate Action Plan 2012

The goals of the 2012 Climate Action Plan (CAP) are to identify specific and achievable actions for reducing greenhouse gas emissions in Fremont, and to serve as a resource for continued engagement, education, motivation, and inspiration for the community and City.

The CAP recommended implementing the Pedestrian Master Plan (L-A2) and requiring that new sidewalk construction meet the five-foot width minimum (L-R3). Other

recommended regulatory policies would further help implement the goals of this Plan, including one policy that would require applicants for private schools to submit plans for managing vehicular movement and parking (L-R4). The CAP also recommended "prohibiting redesignation and rezoning of land for lower intensity land uses in transit-oriented development areas, areas within walking distance of basic services, and other areas served by transit systems," ensuring that plans for transit-oriented development have the regulatory teeth needed for implementation (L-R5).

Alameda County Pedestrian Plan 2012

The Alameda County Pedestrian Plan aims to increase walking in the county through 2040 by identifying and prioritizing pedestrian projects, programs, and planning efforts. It organizes these goals into five thematic areas, with strategies and policies grouped under each:

- Infrastructure and design: Create and maintain a safe, convenient, well-designed and inter-connected pedestrian system, with an emphasis on routes that serve transit and other major activity centers and destinations.
- Safety, education and enforcement: Improve pedestrian safety and security through engineering, education and enforcement, with the aim of reducing the number of pedestrian injuries and fatalities, even as the number of people walking increases.
- Encouragement and promotion: Support programs that encourage people to walk for everyday transportation and health, including as a way to replace car trips, with the aim of raising the number and percentage of trips made by walking.
- Planning: Integrate pedestrian needs into transportation planning activities, and support local planning efforts to encourage and increase walking.
- Funding and implementation: Maximize the capacity for implementation of pedestrian projects, programs, and plans.
- The Alameda County Pedestrian Plan prioritizes connections to transit stations and commercial centers, as well as regional connections that will link Fremont to other communities. One proposed trail, the East Bay Greenway, is envisioned to follow the existing rail lines from Albany to Fremont. Another, the Bay Trail, is partially complete and now requires investments to close gaps in the loop.

Alameda Countywide Transportation Plan 2012

The Alameda Countywide Transportation Plan (CWTP) guides transportation funding decisions for Alameda County over a 25-year horizon. It lays out a strategy for all modes of transportation within the county, including facilities and programs that support walking and bicycling. To fulfill new requirements laid out by SB 375, the most recent update includes transit-oriented development (TOD) and priority development areas, as well as transit connectivity.

A number of Priority Development Areas and Growth Opportunity Areas are identified in Fremont, including Centerville, City Center, Irvington, Ardenwood Business Park, Fremont

Boulevard & Warm Springs Boulevard Corridor, Fremont Boulevard Decoto Road Crossing, and Warm Springs.

The CWTP includes an extensive consideration of walking in Alameda County, and a number of bicycle and pedestrian projects are included. These are:

- Widen Fremont Blvd from I-880 to Grimmer Boulevard – $5 million
- Irvington BART station – $127 million
- Greenbelt Gateway on Grimmer Blvd – $9 million
- Sullivan Road overcrossing, pedestrian and bicycle safety improvements – $2 million
- Construct Bicycle/Pedestrian grade separation on Blacow Road at Union Pacific railroad tracks, and future BART line in Irvington Area PDA – $6 million
- Rails to Trails: Fremont UPRR/BART Corridor Trail – $44 million
- Altamont Commuter Express/Capitol Corridor Station at Auto Mall Parkway – $11 million
- Vargas Road Safety Improvement Project – $5 million

Alameda County Transportation Commission Transportation Expenditure Plan 2014

Alameda CTC's Transportation Expenditure Plan is a 30-year plan for transportation investment in Alameda County, totaling nearly $8 billion. The TEP was approved by Alameda CTC and the member agencies and approved by voters in November 2014. Of the $8 billion, $651 million is planned for bicycle and pedestrian paths, safety projects, and educational programs. Additionally, 15 percent of $2.3 million designated for city and county streets will be spent on project elements that directly support bicycle and pedestrian paths and safety improvements. A portion of funds will also be directed to community investments that improve transit connections to jobs and schools.

Population-based direct allocations to cities and the County for bicycle and pedestrian projects are estimated at $232 million. While jurisdictions may use this funding for planning, construction, or maintenance as they see fit, the focus will be on completing the high-priority projects described in their Bicycle and Pedestrian Master Plans. An additional estimated $154 million will be administered through a countywide grant program to fund implementation and maintenance of regional active transportation facilities.

Eligible projects in Fremont that may be funded under the 2014 Transportation Expenditure Plan include:

- Fremont Boulevard Streetscape
- Thornton Ave Streetscape
- Mowry Ave widening at Mission Boulevard
- Route 84 in Fremont
- Irvington BART Warm Springs Westside Access improvements
- Priority projects in local and countywide bicycle and pedestrian plans

All investments will conform to Complete Streets requirements and Alameda County guidelines to ensure that all transportation types and users are considered in the expenditure of funds.

MTC Sustainable Communities Strategy 2013

In 2008, California adopted Senate Bill 375, which requires every region in California to develop a Sustainable Communities Strategy. This strategy must demonstrate how the region will reduce greenhouse gas emissions through long-range planning. The Metropolitan Transportation Commission (MTC) Sustainable Communities Strategy lays out a comprehensive, cooperative solution. By integrating transportation, land use, and housing plans, the Bay Area aims to reduce the number and length of trips taken in automobiles each day and create communities that are supportive of walking, bicycling, and transit for everyday transportation needs.

MTC Regional Transportation Plan 2009

MTC's Regional Transportation Plan (RTP) outlines a framework for the expansion and development of the Bay Area's network of local roads, freeways, transit facilities, and more. It devotes an entire chapter to bicycle and pedestrian concerns, emphasizing that there is still much to be done to make walking and bicycling safer and more comfortable.

The RTP doubles the amount of funding available for the Transportation for Livable Communities program, which finances projects that improve pedestrian access to transit and housing. It also provides funding to expand existing Safe Routes to School efforts in Contra Costa, Alameda, and Marin counties, and create new programs in other counties.

Bay Area Rapid Transit Strategic Plan 2008

The Bay Area Rapid Transit (BART) long-range planning effort acknowledges the need for improved station access by modes other than single-occupancy vehicles. This includes establishing model stations with non-motorized access that can be replicated elsewhere in the system, implementing a comprehensive wayfinding program to help passengers navigate stations and make connections with other modes of transportation, and collaborating with cities to make connections to local destinations.

The Strategic Plan also identifies Transit-Oriented Development (TOD) as an important strategy to enhance livability around BART stations and meet regional goals. The transit agency will work with local communities to conduct planning efforts around stations and prioritize access improvements.

- Ensure that disadvantaged communities fully share in the benefits of the program, and
- Provide a broad spectrum of projects to benefit many types of active transportation users.

Legislation

Senate Bill 99: Active Transportation Program 2014

California's Active Transportation Program (ATP) was created through Senate Bill 99 and Assembly Bill 101. The ATP consolidates existing federal and state transportation programs, including the Transportation Alternatives Program (TAP), Bicycle Transportation Account (BTA), and State Safe Routes to School (SR2S), into a single program. The purpose of the ATP is to encourage increased use of active modes of transportation by achieving the following goals:

- Increase the proportion of trips accomplished by biking and walking,
- Increase safety and mobility for non-motorized users,
- Advance the active transportation efforts of regional agencies to achieve greenhouse gas reduction goals,
- Enhance public health,

Assembly Bill 32: Global Warming Solutions Act 2006

The 2006 Global Warming Solutions Act sets discrete actions for California to reduce greenhouse gas (GHG) emissions to 1990 levels by 2020, which represents a 25 percent reduction statewide. These actions focus on increasing motor vehicle and other sector efficiencies, and include identification of bicycling as one of several strategies to reduce California's emissions that contribute to global warming.

Senate Bill 375: Sustainable Communities 2008

Put simply, SB 375 directly links land use planning with greenhouse gas emissions. The law requires the California Air Resources Board to set emissions reduction goals for metropolitan planning organizations. The GHG reduction targets for the Bay Area (adopted in September 2010) are a 7 percent reduction in per capita emissions by 2020 and 15 percent by 2035. Significant reductions in vehicle miles traveled (VMT) is also one of the targets of SB375, which is necessary to meet the state's emission reduction goals.

Assembly Bill 1358: Complete Streets 2008

AB 1358 requires the legislative body of any city or county, upon revision of a general plan or circulation element, to ensure that streets accommodate all user types, e.g. pedestrians, bicyclists, transit riders, motorists, children, persons with disabilities, and elderly persons. This requirement took effect as of January 1, 2011.

Caltrans Deputy Directive 64-R1: Complete Streets 2008

Similar to AB 1358, the California Department of Transportation (Caltrans) Complete Streets Directive provides guidance for transportation facilities under state jurisdiction. The Directive codified the Department's intention to integrate motorized, transit, pedestrian and bicycle travel by creating complete streets that provide safe travel for all road users, beginning early in system planning and continuing through project delivery and maintenance and operations.

California Manual on Uniform Traffic Control Devices 2014

Published by Caltrans, the California Manual on Uniform Traffic Control Devices (CA-MUTCD) is issued to adopt uniform standards and specifications for all official traffic control devices in California, in accordance with Section 21400 of the California Vehicle

Code. The CA-MUTCD incorporates the Federal Highway Administration (FHWA) MUTCD in its entirety and explicitly shows which portions thereof are applicable or not applicable in California.

Caltrans Highway Design Manual 6th Edition

The Highway Design Manual (HDM) was most recently updated in 2015. The document provides detailed guidance related to planning and design of roadways, including bicycle and pedestrian facilities, but for pedestrian facilities it is only applicable to state highways and the local streets that interface with them.

Because the HDM is primarily concerned with state highways—which are primarily used by motorists—its standards are not universally suited to local streets and roads, especially those where walking is encouraged. The document is available online: (www.dot.ca.gov/hq/oppd/hdm/hdmtoc.htm).

California Vehicle Code, Streets and Highways Code

The California Vehicle Code (CVC) regulates many aspects of transportation within the state, particularly vehicle use and registration, and enumerates the powers and duties of the Department of Transportation (Caltrans). Division 11 of the code also provides the legal framework, or "rules of the road," for motor vehicles, bicycles, and pedestrians operating on public roadways in California.

CVC Section 21949-21971 deals with pedestrian rights and responsibilities. It declares "safe and convenient pedestrian travel and access, whether by foot, wheelchair, walker, or stroller" a right of all state residents and establishes priority right-of-way for pedestrians crossing within "any marked crosswalk or within any unmarked crosswalk at an intersection" with few exceptions.

The Streets and Highways Code enumerates additional provisions for the definition, use, administration, and financing of the state's highway and public transportation rights-of-way. Chapter 8 is concerned with non-motorized transportation.

Caltrans Main Streets Guidelines, California 2013

This third edition offers guidance on main street investments that support all modes of transportation with the goal of creating more sustainable California communities. It includes a discussion of how streets can function as public spaces, supporting strong communities and vibrant economies, as well as a thorough discussion of how various design elements can contribute to or detract from a street's walkability. It includes citations and references to other Caltrans policies and manuals for all topics, functioning as a synthesis of existing policies most supportive of walking.

US DOT Policy Statement on Bicycle and Pedestrian Accommodation 2010

The United States Department of Transportation (USDOT) issued this Policy Statement to support and encourage transportation agencies at all levels to establish well-connected walking and bicycling networks. The USDOT policy is to incorporate safe and convenient

walking and bicycling facilities into transportation projects. The Statement stipulates that every transportation agency, including DOT, has the responsibility to improve conditions and opportunities for walking and bicycling and to integrate walking and bicycling into their transportation systems. Because of the numerous individual and community benefits that walking and bicycling provide – including health, safety, environmental, transportation, and quality of life – transportation agencies are encouraged to go beyond minimum standards to provide safe and convenient facilities for these modes.

USDOT encourages States, local governments, professional associations, community organizations, public transportation agencies, and other government agencies, to adopt similar policy statements on bicycle and pedestrian accommodation as an indication of their commitment to accommodating bicyclists and pedestrians as an integral element of the transportation system. In support of this commitment, transportation agencies and local communities are encouraged by USDOT to go beyond minimum design standards and requirements to create safe, attractive, sustainable, accessible, and convenient bicycling and walking networks. Recommended actions include:

a. Consider walking and bicycling as equals with other transportation modes. Walking and bicycling should not be an afterthought in roadway design.
b. Ensure that there are transportation choices for people of all ages and abilities, especially children. People who cannot or prefer not to drive should have safe and efficient transportation choices.
c. Go beyond minimum design standards. Planning projects for the long-term should anticipate likely future demand for bicycling and walking facilities and not preclude the provision of future improvements.
d. Integrate bicycle and pedestrian accommodation on new, rehabilitated, and limited-access bridges.
e. Collect data on walking and biking trips. Communities that routinely collect walking and bicycling data are able to track trends and prioritize investments to ensure the success of new facilities.
f. Set mode share targets for walking and bicycling, and track them over time.
g. Improve non-motorized facilities during maintenance projects.

Appendix B Potential Funding Sources

The total cost of projects and programs identified in this plan is over $80 million dollars, and includes a number of relatively high-cost overcrossing, trail, and roadway reconfiguration projects. The I-880 overcrossing project alone is estimated at $42 million. For some projects like roadway reconfigurations the pedestrian elements may be a small percentage of the total project cost. The plan identifies a number of future planning studies that will be used to determine feasibility of some of the recommended projects and develop more accurate cost estimates.

The City anticipates receiving $1.2 million annually from Alameda County Measure B & BB bicycle and pedestrian funds, as well as $190,000 annually from TDA Article 3 bicycle and pedestrian funds. The City will pursue additional grants to leverage local / county funds.

This section describes various sources of funding available to plan and construct bicycle and pedestrian facilities, including those related to school access and area improvement, as well as sources to provide education or encouragement programs.

Projects such as those described in this Plan can be funded through multiple sources, and not all sources apply to all projects. Many sources require a local funding match and most are competitive based on project merit and adherence to grant criteria. This section covers federal, state, regional, and local sources of funding, as well as some non-traditional funding sources that have been used by local agencies to fund bicycle and pedestrian infrastructure and programs.

Funding for ongoing maintenance is typically not funded by the sources noted below, and is a critical need to ensure the ongoing safe and functional operations of facilities after construction. All off-street trails constructed should have a dedicated maintenance and operations funding source identified as part of their management planning.

Federal Sources

The Fixing America's Surface Transportation Act (FAST Act)

The FAST Act, which replaced Moving Ahead for Progress in the 21st Century Act (MAP-21) in 2015, provides long-term funding certainty for surface transportation projects, meaning States and local governments can move forward with critical transportation projects with the confidence that they will have a Federal partner over the long term (at least five years).

The law makes changes and reforms to many Federal transportation programs, including streamlining the approval processes for new transportation projects and providing new safety tools. It also allows local entities that are direct recipients of Federal dollars to use a design publication that is different than one used by their State DOT, such as the *Urban Bikeway Design Guide by the* National Association of City Transportation Officials.

More information: https://www.transportation.gov/fastact

Surface Transportation Block Grant Program (STBGP)

The Surface Transportation Block Grant Program (STBGP) provides states with flexible funds which may be used for a variety of highway, road, bridge, and transit projects. A wide variety of bicycle and pedestrian improvements are eligible, including trails, sidewalks, bike lanes, crosswalks, pedestrian signals, and other ancillary facilities. Modification of sidewalks to comply with the requirements of the Americans with Disabilities Act (ADA) is also an eligible activity. Unlike most highway projects, STBGP-funded pedestrian facilities may be located on local and collector roads which are not part of the Federal-aid Highway System.

Fifty percent of each state's STBGP funds are sub-allocated geographically by population. These funds are funneled through Caltrans to the MPOs in the state. The remaining 50 percent may be spent in any area of the state.

STBGP Set-Aside: Transportation Alternatives Program

Transportation Alternatives Program (TAP) has been folded into the Surface Transportation Block Grant program (STBG) as a set-aside funded at $835 million for 2016 and 2017, and $850 million for 2018, 2019, and 2020. Up to 50 percent of the set-aside is able to be transferred for broader STBGP eligibility.

Improvements eligible for this set-aside fall under three categories: Transportation Enhancements (TE), Safe Routes to School (SR2S), and the Recreational Trails Program (RTP). These funds may be used for a variety of pedestrian and streetscape projects including sidewalks, multi-use paths, and rail-trails. TAP funds may also be used for selected education and encouragement programming such as Safe Routes to School.

Non-profit organizations (NGOs) are now eligible to apply for funding for transportation safety projects and programs, including Safe Routes to School programs and bike share.

Complete eligibilities for TAP include:

1. Transportation Alternatives. This category includes the construction, planning, and design of a range of pedestrian infrastructure including "on–road and off–road trail facilities for pedestrians, bicyclists, and other active forms of transportation, including sidewalks, bicycle infrastructure, pedestrian and bicycle signals, traffic calming techniques, lighting and other safety–related infrastructure, and transportation projects to achieve compliance with the Americans with Disabilities Act of 1990." Infrastructure projects and systems that provide "Safe Routes for Non-Drivers" is still an eligible activity.

2. Recreational Trails. TAP funds may be used to develop and maintain recreational trails and trail-related facilities for both active and motorized recreational trail uses. Examples of trail uses include hiking, in-line skating, equestrian use, and other active and motorized uses. These funds are available for both paved and unpaved trails, but may not be used to improve roads for general passenger vehicle use or to provide shoulders or sidewalks along roads.

   Recreational Trails Program funds may be used for:

   - Maintenance and restoration of existing trails
   - Purchase and lease of trail construction and maintenance equipment
   - Construction of new trails, including unpaved trails

- Acquisition or easements of property for trails
- State administrative costs related to this program (limited to seven percent of a state's funds)
- Operation of educational programs to promote safety and environmental protection related to trails (limited to five percent of a state's funds)

3. **Safe Routes to School.** There are two separate Safe Routes to School Programs administered by Caltrans. There is the Federal program referred to as SRTS, and the state-legislated program referred to as SR2S. Both programs are intended to achieve the same basic goal of increasing the number of children walking and bicycling to school by making it safer for them to do so. All projects must be within two miles of primary or middle schools (K-8).

   The Safe Routes to School Program funds non-motorized facilities in conjunction with improving access to schools through the Caltrans Safe Routes to School Coordinator.

   Eligible projects may include:

   - Engineering improvements. These physical improvements are designed to reduce potential bicycle and pedestrian conflicts with motor vehicles. Physical improvements may also reduce motor vehicle traffic volumes around schools, establish safer and more accessible crossings, or construct walkways or trails. Eligible improvements include sidewalk improvements, traffic calming/speed reduction, and pedestrian crossing improvements.
   - Education and Encouragement Efforts. These programs are designed to teach children safe walking skills while educating them about the health benefits and environmental impacts. Projects and programs may include creation, distribution and implementation of educational materials; safety based field trips; interactive pedestrian safety video games; and promotional events and activities (e.g., assemblies, walking school buses).
   - Enforcement Efforts. These programs aim to ensure that traffic laws near schools are obeyed. Law enforcement activities apply to cyclists, pedestrians and motor vehicles alike. Projects may include development of a crossing guard program, enforcement equipment, photo enforcement, and pedestrian sting operations.

4. **Planning, designing, or constructing roadways within the right-of-way of former Interstate routes or divided highways.** At the time of writing, detailed guidance from the Federal Highway Administration on this new eligible activity was not available.

<u>405 National Priority Safety Program</u>

Approximately $14 million annually (5 percent of the $280 million allocated to the program overall) will be awarded to States to decrease bike and pedestrian crashes with motor vehicles. States where bike and pedestrian fatalities exceed 15 percent of their overall traffic fatalities will be eligible for grants that can be used for:

- Training law enforcement officials on bike/pedestrian related traffic laws
- Enforcement campaigns related to bike/pedestrian safety
- Education and awareness programs related to relevant bike/pedestrian traffic laws

Highway Safety Improvement Program (HSIP)

The Highway Safety Improvement Program (HSIP) provides $2.4 billion nationally for projects that help communities achieve significant reductions in traffic fatalities and serious injuries on all public roads, bikeways, and walkways. Non-infrastructure projects are no longer eligible. Eligible projects are no longer required to collect data on all public roads. Pedestrian safety improvements, enforcement activities, traffic calming projects, and crossing treatments for active transportation users in school zones are examples of eligible projects. All HSIP projects must be consistent with the state's Strategic Highway Safety Plan.

The 2015 California SHSP is located here:

http://www.dot.ca.gov/trafficops/shsp/

Congestion Mitigation and Air Quality Improvement Program (CMAQ)

The Congestion Mitigation and Air Quality Improvement Program (CMAQ) provides funding for projects and programs in air quality nonattainment and maintenance areas for ozone, carbon monoxide, and particulate matter which reduce transportation related emissions. These federal dollars can be used to build pedestrian and bicycle facilities that reduce travel by automobile. Purely recreational facilities generally are not eligible.

To be funded under this program, projects and programs must come from a transportation plan (or State (STIP) or Regional (RTIP) Transportation Improvement Program) that conforms to the SIP and must be consistent with the conformity provisions of Section 176 of the Clean Air Act. States are now given flexibility on whether to undertake CMAQ or STBGP-eligible projects with CMAQ funds to help prevent areas within the state from going into nonattainment.

In the Bay Area, CMAQ funding is administered through the Metropolitan Transportation Commission (MTC) on the local level. These funds are eligible for transportation projects that contribute to the attainment or maintenance of National Ambient Air Quality Standards in non-attainment or air-quality maintenance areas. Examples of eligible projects include enhancements to existing transit services, rideshare and vanpool programs, projects that encourage pedestrian transportation options, traffic light synchronization projects that improve air quality, grade separation projects, and construction of high-occupancy vehicle (HOV) lanes. Projects that are proven to reduce direct PM2.5 emissions are to be given priority.

Partnership for Sustainable Communities

Founded in 2009, the Partnership for Sustainable Communities is a joint project of the Environmental Protection Agency (EPA), the U.S. Department of Housing and Urban Development (HUD), and the U.S. Department of Transportation (USDOT). The partnership aims to "improve access to affordable housing, more transportation options, and lower transportation costs while protecting the environment in communities nationwide." The Partnership is based on five Livability Principles, one of which explicitly addresses the need for pedestrian infrastructure ("Provide more transportation choices: Develop safe, reliable, and economical transportation choices to decrease household transportation costs,

reduce our nation's dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health").

The Partnership is not a formal agency with a regular annual grant program. Nevertheless, it is an important effort that has already led to some new grant opportunities (including the TIGER grants).

More information: https://www.sustainablecommunities.gov/

State Sources

Active Transportation Program (ATP)

In 2013, Governor Brown signed legislation creating the Active Transportation Program (ATP). This program is a consolidation of the Federal Transportation Alternatives Program (TAP), California's Bicycle Transportation Account (BTA), and Federal and California Safe Routes to School (SRTS) programs.

The ATP program is administered by Caltrans Division of Local Assistance, Office of Active Transportation and Special Programs.

The ATP program goals include:

- Increase the proportion of trips accomplished by biking and walking,
- Increase safety and mobility for non-motorized users,
- Advance the active transportation efforts of regional agencies to achieve greenhouse gas reduction goals,
- Enhance public health,
- Ensure that disadvantaged communities fully share in the benefits of the program, and
- Provide a broad spectrum of projects to benefit many types of active transportation users.

The California Transportation Commission ATP Guidelines are available here: http://www.catc.ca.gov/meetings/agenda/2014Agenda/2014_03/03_4.12.pdf

Eligible bicycle and Safe Routes to School projects include:

- Infrastructure Projects: Capital improvements that will further program goals. This category typically includes planning, design, and construction.
- Non-Infrastructure Projects: Education, encouragement, enforcement, and planning activities that further program goals. The focus of this category is on pilot and start-up projects that can demonstrate funding for ongoing efforts.
- Infrastructure projects with non-infrastructure components

The minimum request for non-SRTS projects is $250,000. There is no minimum for SRTS projects.

More information: http://www.dot.ca.gov/hq/LocalPrograms/atp/

State Highway Account

Section 157.4 of the Streets and Highways Code requires Caltrans to set aside $360,000 for the construction of non-motorized facilities that will be used in conjunction with the

State highway system. The Office of Bicycle Facilities also administers the State Highway Account fund. Funding is divided into different project categories. Minor B projects (less than $42,000) are funded by a lump sum allocation by the CTC and are used at the discretion of each Caltrans District office. Minor A projects (estimated to cost between $42,000 and $300,000) must be approved by the CTC. Major projects (more than $300,000) must be included in the State Transportation Improvement Program and approved by the CTC. Funded projects have included fencing and bicycle warning signs related to rail corridors.

Office of Traffic Safety (OTS) Grants

Office of Traffic Safety Grants are supported by Federal funding under the National Highway Safety Act and SAFETEA-LU. In California, the grants are administered by the Office of Traffic Safety.

Grants are used to establish new traffic safety programs, expand ongoing programs or address deficiencies in current programs. Eligible grantees are governmental agencies, state colleges, state universities, local city and county government agencies, school districts, fire departments, and public emergency services providers. Grant funding cannot replace existing program expenditures, nor can traffic safety funds be used for program maintenance, research, rehabilitation, or construction. Grants are awarded on a competitive basis, and priority is given to agencies with the greatest need. Evaluation criteria to assess need include potential traffic safety impact, collision statistics and rankings, seriousness of problems, and performance on previous OTS grants.

The California application deadline is January of each year. There is no maximum cap to the amount requested, but all items in the proposal must be justified to meet the objectives of the proposal.

More information: http://www.ots.ca.gov/

Highway Safety Improvement Program (HSIP, Caltrans)

Caltrans-administered grant program for infrastructure projects that reduce traffic fatalities and serious injuries, including those that enhance safety for bicyclists and pedestrians.

http://dot.ca.gov/hq/LocalPrograms/hsip.html

Regional Sources

Metropolitan Transportation Commission OneBayArea Grant (OBAG)

The Bay Area Metropolitan Transportation Commission (MTC) OBAG program is a funding approach that aligns the Commission's investments with support for focused growth. Established in 2012, OBAG taps federal funds to maintain MTC's commitments to regional transportation priorities while also advancing the Bay Area's land-use and housing goals.

OBAG includes both a regional program and a county program that targets project investments in Priority Development Areas and rewards cities and counties that approve

new housing construction and accept allocations through the Regional Housing Need Allocation (RHNA) process. Cities and counties can use these OBAG funds to invest in:

- Local street and road maintenance
- Streetscape enhancements
- Bicycle and pedestrian improvements
- Transportation planning
- Safe Routes to School projects
- Priority Conservation Areas

In late 2015, MTC adopted a funding and policy framework for the second round of OBAG grants. Known as OBAG 2 for short, the second round of OBAG funding is projected to total about $800 million to fund projects from 2017-18 through 2021-22.

More information: http://www.mtc.ca.gov/our-work/fund-invest/federal-funding/obag-2

Transportation Fund for Clean Air (TFCA)

The TFCA is a grant program of the Bay Area Air Quality Management District that funds projects to reduce air pollution from motor vehicles. It consists of two sub-programs: the Regional Fund and the County Program Manager Fund. The Regional Fund receives about 60% of TFCA revenues and is administered directly by the Air District. The remaining 40% is returned through the County Program Manager Fund to the CMAs for allocation. The TFCA funds a wide range of bicycle facilities, including bicycle paths, lanes and routes, bicycle parking lockers and racks, and bicycle racks on transit vehicles.

Lifeline Transportation Program

Alameda CTC administered program, using MTC funding, for transportation projects and programs—including for walking and bicycling—that address the mobility and access needs of low-income communities throughout the Bay Area.

Regional Active Transportation Program

A portion of the statewide ATP program is distributed to local CMAs and MPOs for distribution locally. The Regional ATP targets projects that increase walking, improve safety, and benefit disadvantaged communities. In the Bay Area, regional ATP funding is distributed through MTC.

Regional ATP applications are generally the same as the application for the statewide program, with a few additional questions. Applications not funded in the statewide program are no longer automatically considered for the regional program. Applicants must complete the additional questions and apply separately.

More information: http://mtc.ca.gov/our-work/invest-protect/investment-strategies-commitments/protect-our-climate/active-transportation

The Bay Trail Project (ABAG)

The San Francisco Bay Trail Project has provided grant funds to help complete undeveloped segments of the 500-mile Bay Trail. The Bay Trail is a planned 500-mile,

multiple-use trail administered by the Association of Bay Area Governments. When complete, the trail will encircle San Francisco Bay, linking the shorelines of 47 cities and nine counties. Currently, 345 miles of Bay Trail are complete.

Check the Bay Trail Website for information about grant programs

http://www.baytrail.org/

Local Funding Sources

TDA Article 3

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

$1.36 million of TDA Article 3 funds were allocated in Alameda County in 2014/15

Metropolitan Transportation Commission, TDA Funding Program

http://mtc.ca.gov/our-work/invest-protect/investment-strategies-commitments/transit-21st-century/transit-operating-0

ACTC Bicycle and Pedestrian Measure B and Measure BB Funding

Measure B is a sales tax measure authorized by Alameda County voters in 2000. It allows the collection of a ½-cent sales tax devoted to transportation projects and programs, to be collected from 2002 through 2022. In 2014, Alameda County voters approved Measure BB, authorizing an extension and augmentation of the Measure B sales tax. Five percent of Measure B net revenues are for bicycle and pedestrian safety and eight percent of Measure BB net revenues are for bicycle and pedestrian improvements. Under Measure BB 30% of net revenues are for local streets and road, and fifteen percent of the local streets and roads must support bicycle and pedestrian components (Complete Streets). Measure BB funds the 2014 Transportation Expenditure Plan.

Alameda CTC Bicycle and Pedestrian Program information:

http://www.alamedactc.org/app_pages/view/9641

Non-Traditional Funding Sources

Public-Private Partnerships

Fremont boasts a significant employment base, including anchor companies such as Tesla Motors, Lam Research, ThermoFisher Scientific, and many others. The City will seek to

leverage the potential for public-private partnerships on projects, as opportunities arise.

Integration into Larger Projects

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

Community Development Block Grants

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

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

CDBG program

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

Roadway Construction, Repair and Upgrade

Future road widening and construction projects are one means of providing improved pedestrian and bicycle facilities. To ensure that roadway construction projects provide these facilities where needed, it is important that the review process includes input pertaining to consistency with the proposed system. In addition, California's 2008 Complete Streets Act and Caltrans Deputy Directive 64 require that the needs of all roadway users be considered during "all phases of state highway projects, from planning to construction to maintenance and repair."

More information: *http://www.dot.ca.gov/hq/tpp/offices/ocp/complete_streets.html*

Utility Projects

By monitoring the capital improvement plans of local utility companies, it may be possible to coordinate upcoming utility projects with the installation of bicycle and pedestrian infrastructure within the same area or corridor. Often times, the utility companies will mobilize the same type of forces required to construct bikeways and sidewalks, resulting in the potential for a significant cost savings. These types of joint projects require a great deal of coordination, a careful delineation of scope items and some type of agreement or memorandum of understanding, which may need to be approved by multiple governing bodies.

Cable Installation Projects

Cable television and telephone companies sometimes need new cable routes within public right-of-way. Recently, this has most commonly occurred during expansion of fiber optic networks. Since these projects require a significant amount of advance planning and disruption of curb lanes, it may be possible to request reimbursement for affected bicycle facilities to mitigate construction impacts. In cases where cable routes cross undeveloped areas, it may be possible to provide for new bikeway facilities following completion of the cable trenching, such as sharing the use of maintenance roads.

Requirements for New Development

New Construction or developments must comply with the Fremont City Street Improvement Ordinance in the construction of streets. With the increasing support for "routine accommodation" and "complete streets," requirements for new development, road widening, and new commercial development provide opportunities to efficiently construct pedestrian facilities. The City Street Improvement Ordinance currently requires construction of new curb and gutter and sidewalk.

Impact Fees

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

Mello-Roos Community Facilities Act

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

Mello-Roos Fact Sheet

http://www.californiataxdata.com/pdf/Mello-Roos2.pdf

A listing of project types and corresponding potential funding sources is available from the Pedestrian and Bicycle Information Center. Pedestrian and Bicycle Information Center Funding Pages:

http://www.pedbikeinfo.org/planning/funding.cfm

Pedestrian and Bicycle Information Center

Advocacy Advance maintains a list of funding sources and guidance documents for walking and bicycling projects and programs:

http://www.advocacyadvance.org/site_images/content/Advocacy_Advance_Federal_Funding_Resource_List.pdf

Advocacy Advance | Resources | Training | Grants

The Federal Highway Administration maintains a funding opportunities database.

http://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/funding_opportunities.cfm

U.S. Department of Transportation
Federal Highway Administration

The Safe Routes to School National Partnership offers a webpage dedicated to funding sources at all levels of government, along with resources tailored to securing funding.

http://saferoutespartnership.org/resources

Safe Routes to School National Partnership

Appendix C Design Toolkit

The following pages present a toolkit of design options resource that City staff, consultants and developers may use to improve the pedestrian environment. In all cases, engineering standards and judgment shall be used. No design solution presented here is applicable to all situations; every location is unique. Practitioners should also consult the bikeway oriented design toolkit provided along with the Fremont Bicycle Master Plan, as well as all applicable federal, state, regional and local standards and guidelines at all stages of design development.

Appendix C:

Pedestrian Design Toolkit

for the City of Fremont Pedestrian Master Plan

August 2016

PREPARED BY:
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Introduction

This technical handbook is intended to assist the City of Fremont in the selection and design of pedestrian facilities. The document is an interim measure, designed to bridge the transition between the current Bicycle Plan Design Guide, California Manual of Traffic Control Devices and CalTrans Highway Design Manual and the likely future changes arising from the 2014 State Smart Transportation Initiative report.

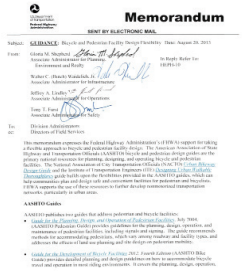
This document provides a general summary of pedestrian facility design tools to lead planners, designers and engineers in the right direction when designing and implementing projects. Existing standards are referenced throughout and should be the first source of information when seeking to implement any of the treatments featured here.

Guiding Principles

The following are guiding principles for this design manual:

- **The walking environment should be safe.** All walking routes should be physically safe and perceived as safe by all users. Safe means minimal conflicts with external factors, such as noise, vehicular traffic and protruding architectural elements. Safe also means routes are clear and well marked with appropriate pavement markings and directional signage.
- **The pedestrian network should be accessible.** Sidewalks, shared use paths and crosswalks should permit the mobility of residents of all ages and abilities. The pedestrian network should employ principles of universal design.
- **Pedestrian network improvements should be economical.** Pedestrian improvements should achieve the maximum benefit for their cost, including initial cost and maintenance cost, as well as a reduced reliance on more expensive modes of transportation. Where possible, improvements in the right-of-way should stimulate, reinforce and connect with adjacent private improvements.
- **The pedestrian network should connect to places people want to go.** The pedestrian network should provide continuous direct routes and convenient connections between destinations such as homes, schools, shopping areas, public services, recreational opportunities and transit.
- **The walking environment should be clear and easy to use.** Sidewalks, shared use paths and crossings should allow all people to easily find a direct route to a destination with minimal delays, regardless of whether these persons have mobility, sensory, or cognitive disability impairments. All streets are legal for the use of pedestrians. This means that streets should serve all users and should be designed, marked and maintained accordingly.
- **The walking environment should be attractive and enhance community livability.** Good design should integrate with and support the development of complementary uses and should encourage preservation and construction of art, landscaping and other items that add value to communities. These components might include open spaces such as plazas, courtyards and squares, and amenities like street furniture, banners, art, plantings and special paving. These along with historical elements and cultural references, should promote a sense of place. Public activities should be encouraged and the municipal code should permit commercial activities such as dining, vending and advertising when they do not interfere with safety and accessibility.
- **Design guidelines in this toolkit are flexible and should be applied using professional judgment.** This document references specific national guidelines for pedestrian facility design. Statutory and regulatory guidance may change. For this reason, the guidance and recommendations in this document function to complement other resources considered during a design process, and in all cases sound engineering judgment should be used.

National Standards


Memorandum

SENT BY ELECTRONIC MAIL

FHWA Guidance on Bicycle and Pedestrian Facility Design Flexibility (2013)

This memorandum expresses the Federal Highway Administration's (FHWA) support for taking a flexible approach to bicycle and pedestrian facility design. FHWA supports the use of resources, such as the Institute of Transportation Engineers (ITE) Designing Urban Walkable Thoroughfares guide and the National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide to further develop nonmotorized transportation networks, particularly in urban areas.


United States Department of Transportation Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations

Signed on March 11, 2010 and announced March 15, 2010

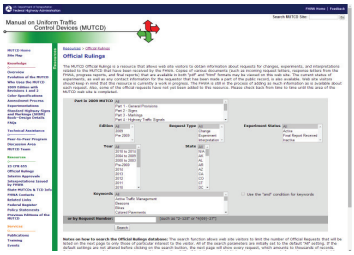
Purpose

Policy Statement

Authority

USDOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations (2010)

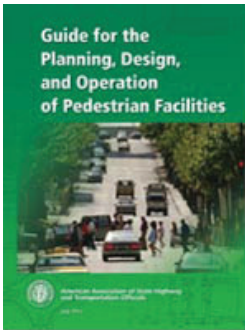
This policy statement stresses to local jurisdictions that the DOT policy is to incorporate safe and convenient walking and bicycling facilities into transportation projects. As a part of this statement, the DOT encourages States, local governments, professional associations, community organizations, public transportation agencies, and other government agencies, to adopt similar policy statements on bicycle and pedestrian accommodation as an indication of their commitment to accommodating bicyclists and pedestrians as an integral element of the transportation system.


Manual on Uniform Traffic Control Devices (MUTCD)

Official Rulings

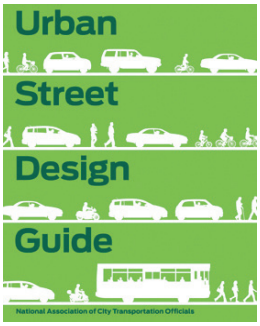
MUTCD Official Rulings

Traffic control devices and other treatments not explicitly covered by the MUTCD are often subject to experiments, interpretations and official rulings by the FHWA. The MUTCD Official Rulings is a resource that allows website visitors to obtain information about these supplementary materials. Copies of various documents (such as incoming request letters, response letters from the FHWA, progress reports, and final reports) are available on this website.1



American Association of State Highway and Transportation Officials (AASHTO) Guide for the Planning, Design and Operation of Pedestrian Facilities (2004)

Last updated in 2004 provides guidance on dimensions, use, and layout of specific pedestrian facilities. The standards and guidelines presented by AASHTO provide basic information, such as minimum sidewalk widths, driveway construction, crosswalk striping requirements and other recommended signage and pavement markings.



National Association of City Transportation Officials' (NACTO) Urban Street Design Guide (2013)

The Urban Streets Design Guide is the newest publication of nationally recognized street design guidelines, covering street designs and elements focused on creating walkable, bikeable, transit-friendly places.

Some of the treatments featured in the NACTO guides are not directly referenced in the current versions of the AASHTO Guide or the MUTCD, although many of the elements of these treatments are found within these documents. In all cases, engineering judgment is recommended to ensure that the application makes sense for the context of each treatment, given the many complexities of urban streets.

1 *MUTCD Official Rulings. FHWA. http://mutcd.fhwa.dot.gov/orsearch.asp*

State Standards & Policies

California Manual on Uniform Traffic Control Devices (MUTCD) (2014)

The California MUTCD 2012 an amended version of the FHWA MUTCD 2009 edition modified for use in California. While standards presented in the CA MUTCD substantially conform to the FHWA MUTCD, the state of California follows local practices, laws and requirements with regards to signing, striping and other traffic control devices.

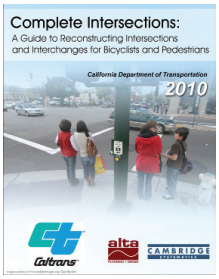
Application of traffic control devices that are not included in the CA MUTCD must go through a request to experiment process with the California Traffic Control Devices Committee (CTCDC). Described in section 1A.10 of the CA MUTCD, a request to experiment must clarify the nature of the problem the request aims to solve, specific guidelines for the experiment itself including a work plan, time period and reporting schedule, and commits the applicant to terminate the experiment at the end of the approved period.

California Highway Design Manual (HDM) (2012)

This manual establishes uniform policies and procedures to carry out highway design functions for the California Department of Transportation. The 2012 edition incorporated Complete Streets focused revisions to address the Department Directive 64 R-1.

California Consstruction Contract Standards (2015)

The California Department of Transportation (Caltrans) develops and revises construction contract standards that include the Standard Specifications, Standard Plans, Standard Special provisions (SSPs), Standard Item Codes, Bid Book, and the Notice to Bidders. These were most recently revised in 2015 can be found at http://www.dot.ca.gov/des/oe/construction-contract-standards.html.

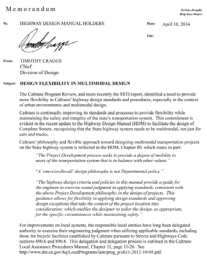


Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians (2010)

This California Department of Transportation reference guide presents information and concepts related to improving conditions for bicyclists and pedestrians at major intersections and interchanges. The guide can be used to inform minor signage and striping changes to intersections, as well as major changes and designs for new intersections.

Main Street, California: A Guide for Improving Community and Transportation Vitality (2013)

This Caltrans informational guide reflects California's current manuals and policies that improve multimodal access, livability and sustainability within the transportation system. The guide recognizes the overlapping and sometimes competing needs of main streets.



Caltrans Memo: Design Flexibility in Multimodal Design (April 2014)

This April 2014 memorandum encourages flexibility in highway design. The memo stated that "Publications such as the National Association of City Transportation Officials (NACTO) "Urban Street Design Guide" "... [is a resource] that Caltrans and local entities can reference when making planning and design decisions on the State highway system and local streets and roads."

City of Fremont Standards, Guidelines & Policies

City of Fremont Standard Details (regularly updated)

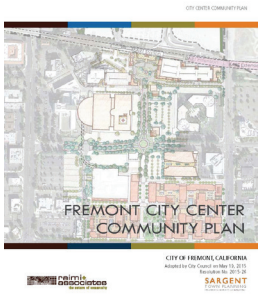
The City of Fremont Standard Details illustrate standard designs for improvements in the public right of way, including streets, sidewalks and curb and gutter, driveways, tree wells and curb ramps.

City of Fremont Standard Specifications (2008)

The guide for developers of public works in the City of Fremont. The specifications cover the construction and manufacture of signs, asphalt, concrete and street lighting. Specifications here are to be used in conjunction with the City of Fremont Standard Details and may be modified by special provisions on approved improvement plans.

City of Fremont Downtown Community Plan and Design Guidelines (2012)

Covering 110 acres of the City Center, the Downtown Community Plan and Design Guidelines describe how the Community Plan and Design Guidelines describe how the downtown district area will be transformed into an urban, pedestrian-friendly district embodying sustainability and transit-oriented development principles.

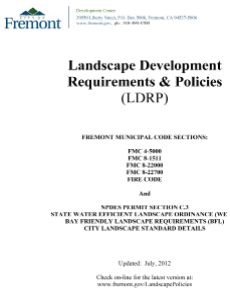


Fremont City Center Community Plan (2015)

This plan, covering 330 acres of the City Center not in the Downtown Plan, provides policy guidance, illustrative concepts, and implementation actions for transforming the area near central Fremont, BART, and Downtown from an auto-oriented suburban area into a truly walkable, urban, transit-oriented City Center. The plan envisions a walkable, bikeable, transit-oriented City Center with pedestrian-scaled blocks, pedestrian-oriented buildings, and a strong sense of place. The plan includes land use concepts, street elements and design guidelines to achieve this vision.

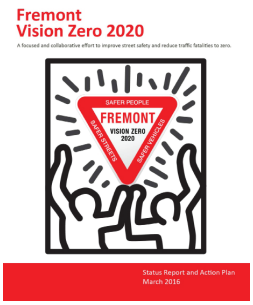
Warm Springs/South Fremont Community Plan (2014)

This plan covers 879 acres generally bounded by I-880 on the west, I-680 on the east, Auto Mall Parkway on the north, and Mission Boulevard on the south. The Plan sets the framework for a transformation of the area into an Innovation District and employment center accommodating a mix of compatible uses focused around the synergy of the new BART station and adjacent undeveloped land



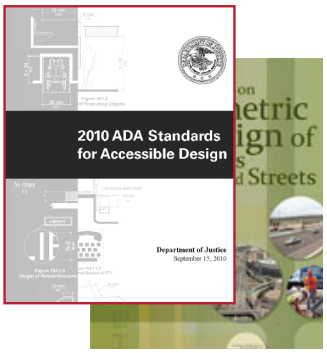
City of Fremont Landscape Development Requirements & Policies (2012)

The Landscape Development Requirements & Policies is a compilation of municipal codes intended for the landscape architect preparing construction documents in the form of Building Permit or Improvement Plans, or in preparing preliminary design documents in the form of a Site Plan and Architectural Review for review by the City of Fremont. Some items will require coordination with other disciplines such as civil engineer, planner, arborist or others.



City of Fremont Vision Zero Status Report and Action Plan (2012)

In September 2015, the Fremont City Council approved Vision Zero as its traffic safety policy. Among US cities, Fremont is an early adopter of Vision Zero and is now the sixth city to have a specific Vision Zero action plan, following New York City, San Francisco, Seattle, San Jose, and Washington DC. Fremont's Vision Zero 2020 status report and action plan includes a detailed assessment of traffic crashes in Fremont and presents a comprehensive set of actions to improve traffic safety over the next few years with a goal to significantly reduce fatalities and severe injuries by 2020. Getting to zero fatalities by 2020 is the ideal vision; continuous improvement is the minimum expectation. The Fremont Vision Zero 2020 action plan is organized around the themes of safer streets, people and vehicles.



Additional US Federal Guidelines

Meeting the requirements of the Americans with Disabilities Act (ADA) is an important part of any bicycle and pedestrian facility project. The United States Access Board's proposed Public Rights-of-Way Accessibility Guidelines[2] (PROWAG) and the 2010 ADA Standards for Accessible Design[3] (2010 Standards) contain standards and guidance for the construction of accessible facilities. This includes requirements for sidewalk curb ramps, slope requirements, and pedestrian railings along stairs.

The 2011 AASHTO: A Policy on Geometric Design of Highways and Streets commonly referred to as the "Green Book," contains the current design research and practices for highway and street geometric design.

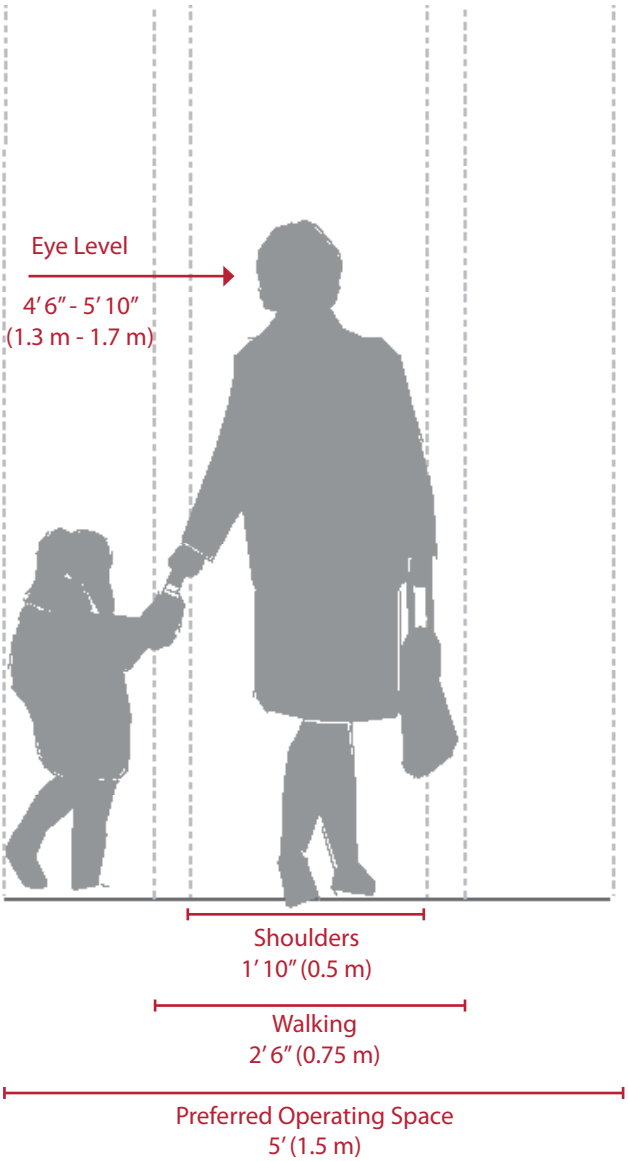
2 http://www.access-board.gov/prowac/
3 http://www.ada.gov/2010ADAstandards_index.htm

Design Needs of Pedestrians

Types of Pedestrians

Pedestrians have a variety of characteristics and the transportation network should accommodate a variety of needs, abilities, and possible impairments. Age is one major factor that affects pedestrians' physical characteristics, walking speed, and environmental perception. Children have low eye height and walk at slower speeds than adults. They also perceive the environment differently at various stages of their cognitive development. Older adults walk more slowly and may require assistive devices for walking stability, sight, and hearing. The table below summarizes common pedestrian characteristics for various age groups.

The MUTCD recommends a normal walking speed of 3.5 feet per second when calculating the pedestrian clearance interval at traffic signals. The walking speed can drop to 3 feet per second for areas with older populations and persons with mobility impairments. While the type and degree of mobility impairment varies greatly across the population, the transportation system should accommodate these users to the greatest reasonable extent.



Pedestrian Characteristics by Age

Age	Characteristics
0-4	Learning to walk
	Requires constant adult supervision
	Developing peripheral vision and depth perception
5-8	Increasing independence, but still requires supervision
	Poor depth perception
9-13	Susceptible to "darting out" in roadways
	Insufficient judgment
	Sense of invulnerability
14-18	Improved awareness of traffic environment
	Insufficient judgment
19-40	Active, aware of traffic environment
41-65	Slowing of reflexes
65+	Difficulty crossing street
	Vision loss
	Difficulty hearing vehicles approaching from behind

Source: Adapted from the AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*. 2004.

The table below summarizes common physical and cognitive impairments, how they affect personal mobility, and recommendations for improved pedestrian-friendly design.

Disabled Pedestrian Design Considerations

Impairment	Effect on Mobility	Design Solution
Wheelchair and Scooter Users	Difficulty propelling over uneven or soft surfaces.	Firm, stable surfaces and structures, including ramps or beveled edges.
	Cross-slopes cause wheelchairs to veer downhill.	Cross-slopes of less than two percent.
	Require wider path of travel.	Sufficient width and maneuvering space.
Walking Aid Users	Difficulty negotiating steep grades and cross slopes; decreased stability.	Smooth, non-slipperly travel surface.
	Slower walking speed and reduced endurance; reduced ability to react.	Longer pedestrian signal cycles, shorter crossing distances, median refuges, and street furniture.
Hearing Impairment	Less able to detect oncoming hazards at locations with limited sight lines (e.g. driveways, angled intersections, channelized right turn lanes) and complex intersections.	Longer pedestrian signal cycles, clear sight distances, highly visible pedestrian signals and markings.
Vision Impairment	Limited perception of path ahead and obstacles; reliance on memory; reliance on non-visual indicators (e.g. sound and texture).	Accessible text (larger print and raised text), accessible pedestrian signals (APS), guide strips and detectable warning surfaces, safety barriers, and lighting.
Cognitive Impairment	Varies greatly. Can affect ability to perceive, recognize, understand, interpret, and respond to information.	Signs with pictures, universal symbols, and colors, rather than text.

Design Needs of Wheelchair Users

As the American population ages, the number of people using mobility assistive devices (such as manual wheelchairs, powered wheelchairs) increases.

Manual wheelchairs are self-propelled devices. Users propel themselves using push rims attached to the rear wheels. Braking is done through resisting wheel movement with the hands or arm. Alternatively, a second individual can control the wheelchair using handles attached to the back of the chair.

Power wheelchairs user battery power to move the wheelchair. The size and weight of power wheelchairs limit their ability to negotiate obstacles without a ramp. Various control units are available that enable users to control the wheelchair movement, based on their ability (e.g., joystick control, breath controlled, etc).

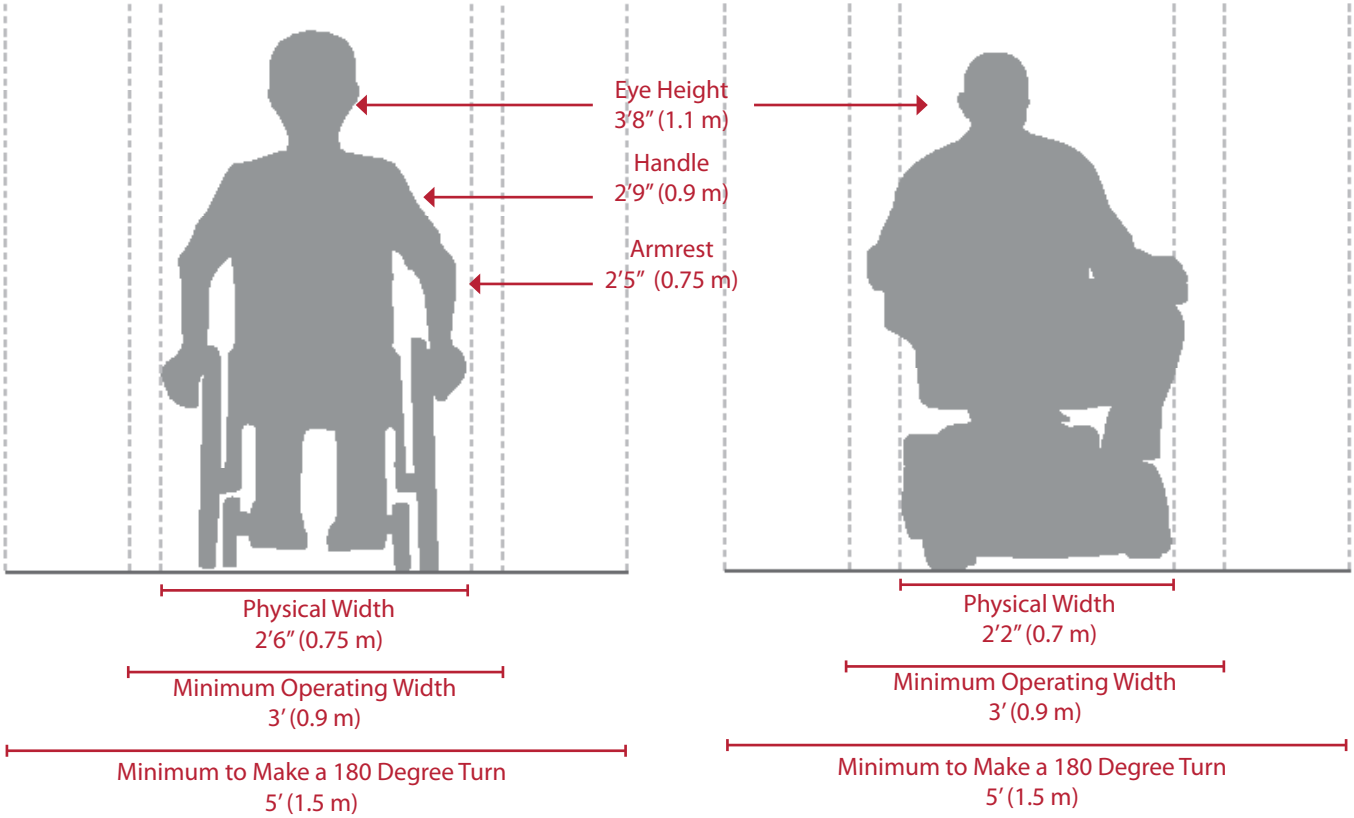
Maneuvering around a turn requires additional space for wheelchair devices. Providing adequate space for 180 degree turns at appropriate locations is an important element for accessible design.

Wheelchair User Typical Speed

User	Typical Speed
Manual Wheelchair	3.6 mph
Power Wheelchair	6.8 mph

Wheelchair User Design Considerations

Effect on Mobility	Design Solution
Difficulty propelling over uneven or soft surfaces.	Firm, stable surfaces and structures, including ramps or beveled edges.
Cross-slopes cause wheelchairs to veer downhill.	Cross-slopes of less than two percent.
Require wider path of travel.	Sufficient width and maneuvering space.



Source: FHWA. *Characteristics of Emerging Road and Trail Users and Their Safety.* 2004.
USDOJ. *2010 ADA Standards for Accessible Design.* 2010.

Pedestrian Crossing Location and Facility Selection

Midblock Crossings

Midblock crossings are an important street design element for pedestrians. They can provide a legal crossing at locations where pedestrians want to travel, and can be safer than crossings at intersections because traffic is only moving in two directions. Locations where midblock crossings should be considered include:

- long blocks (longer than 600 ft) with destinations on both sides of the street.
- locations with heavy pedestrian traffic, such as schools, shopping centers.
- at midblock transit stops, where transit riders must cross the street on one leg of their journey.

Crossing Treatment Selection

The specific type of treatment at a crossing may range from a simple marked crosswalk to full traffic signals or grade separated crossings. Crosswalk lines should not be used indiscriminately, and appropriate selection of crossing treatments should be evaluated in an engineering study should be performed before a marked crosswalk is installed. The engineering study should consider the number of lanes, the presence of a median, the distance from adjacent signalized intersections, the pedestrian volumes and delays, the average daily traffic (ADT), the posted or statutory speed limit or 85th-percentile speed, the geometry of the location, the possible consolidation of multiple crossing points, the availability of street lighting,and other appropriate factors.

The chart below is based off of guidance from the 2005 FHWA report, *Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations,* national guidelines and professional best practice.

PEDESTRIAN CROSSING CONTEXTUAL GUIDANCE At unsignalized locations		Local Streets 15-25 mph		Collector Streets 25-30 mph			Arterial Streets 30-45 mph							
	FACILITY TYPE	2 lane	3 lane	2 lane	2 lane with median refuge	3 lane	2 lane	2 lane with median refuge	3 lane	4 lane	4 lane with median refuge	5 lane	6 lane	6 lane with median refuge
1	Crosswalk Only (high visibility)	✓	✓	EJ	EJ	X	EJ	EJ	X	X	X	X	X	X
2	Crosswalk with warning signage and yield lines	EJ	✓	✓	✓	✓	EJ	EJ	EJ	X	X	X	X	X
3	Active Warning Beacon (RRFB)	X	EJ	✓	✓	✓	✓	✓	✓	X	✓	X	X	X
4	Hybrid Beacon	X	X	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓	✓	✓
5	Full Traffic Signal	X	X	EJ	EJ	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓
6	Grade separation	X	X	EJ	EJ	EJ	X	EJ	EJ	EJ	EJ	EJ	✓	✓

LEGEND	
Most Desirable	✓
Engineering Judgement	EJ
Not Recommended	X


1 Marked Crosswalks


2 Crosswalk with Warning Signage


3 Active Warning Beacon (RRFB)

4 Pedestrian Hybrid Beacon


5 Full Traffic Signal

6 Grade Separation

Sidewalks

Sidewalks are the most fundamental element of the walking network, as they provide an area for pedestrian travel that is separated from vehicle traffic. Sidewalks are typically constructed out of concrete and are separated from the roadway by a curb or gutter and sometimes a landscaped planting strip area. Sidewalks are a common application in both urban and suburban environments.

Attributes of well-designed sidewalks include the following:

Accessibility: A network of sidewalks should be accessible to all users.

Adequate width: Two people should be able to walk side-by-side and pass a third comfortably. Different walking speeds should be possible. In areas of intense pedestrian use, sidewalks should accommodate the high volume of walkers.

Safety: Design features of the sidewalk should allow pedestrians to have a sense of security and predictability. Sidewalk users should not feel they are at risk due to the presence of adjacent traffic.

Continuity: Walking routes should be obvious and should not require pedestrians to travel out of their way unnecessarily.

Landscaping: Plantings and street trees should contribute to the overall psychological and visual comfort of sidewalk users, and be designed in a manner that contributes to the safety of people.

Drainage: Sidewalks should be well graded to minimize standing water.

Social space: There should be places for standing, visiting, and sitting. The sidewalk area should be a place where adults and children can safely participate in public life.

Quality of place: Sidewalks should contribute to the character of neighborhoods and business districts.


Zones in the Sidewalk Corridor


Sidewalk Widths


Sidewalk Obstructions and Driveway Ramps


Pedestrian Amenities

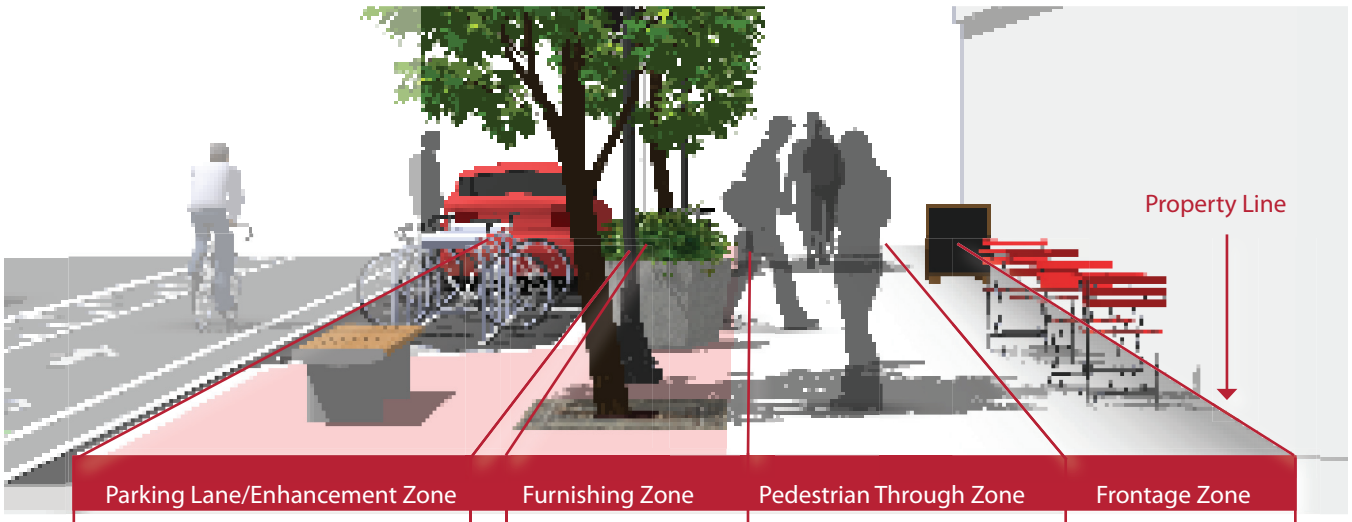

Pedestrian Scale Lighting


Pedestrian Access Through Construction Areas

Zones in the Sidewalk Corridor

Description

Sidewalks are the most fundamental element of the walking network, as they provide an area for pedestrian travel separated from vehicle traffic. A variety of considerations are important in sidewalk design. Providing adequate and accessible facilities can lead to increased numbers of people walking, improved safety, and the creation of social space.



Parking Lane/Enhancement Zone

The parking lane can act as a flexible space to further buffer the sidewalk from moving traffic. Curb extensions and bike corrals may occupy this space where appropriate.

In the edge zone there should be a 6 inch wide curb.

Furnishing Zone

The furnishing zone buffers pedestrians from the adjacent roadway, and is also the area where elements such as street trees, signal poles, signs, and other street furniture are properly located.

Pedestrian Through Zone

The through zone is the area intended for pedestrian travel. This zone should be entirely free of permanent and temporary objects.

Wide through zones are needed in downtown areas or where pedestrian flows are high.

Frontage Zone

The Frontage Zone allows pedestrians a comfortable "shy" distance from the building fronts. It provides opportunities for window shopping, to place signs, planters, or chairs.

Not applicable if adjacent to a landscaped space.

Discussion

Sidewalks should be more than areas to travel; they should provide places for people to interact. There should be places for standing, visiting, and sitting. Sidewalks should contribute to the character of neighborhoods and business districts, strengthen their identity, and be an area where adults and children can safely participate in public life.

Additional References and Guidelines

United States Access Board. *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public-Right-of-Way (PROWAG)*. 2011.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.
NACTO. *Urban Street Design Guide.* 2013.
Caltrans. *Main Street, California.* 2013.
City of Fremont. *Standard Specifications.* 1995.

Materials and Maintenance

Sidewalks are typically constructed out of concrete and are separated from the roadway by a curb or gutter and sometimes a landscaped space. Colored, patterned, or stamped concrete can add distinctive visual appeal.

Sidewalk Widths

Description

The width and design of sidewalks will vary depending on street context, functional classification, and pedestrian demand. Below are preferred widths of each sidewalk zone according to general street type. Standardizing sidewalk guidelines for different areas of the city, dependent on the above listed factors, ensures a minimum level of quality for all sidewalks.

Guidance

The table below describes generally acceptable dimensions for sidewalks across the City of Fremont.

Sidewalks in the Downtown District area should follow the specifications presented in the 2012 *City of Fremont Downtown Community Plan and Design Guidelines*.

Street Classification	Parking Lane/ Enhancement Zone	Furnishing Zone	Pedestrian Through Zone	Frontage Zone	Total
Local Streets	Varies	2 - 5 feet	4 - 6 feet	N/A	6 - 11 feet
Commercial Areas	Varies	4 - 6 feet	6 - 12 feet	2.5 - 10 feet	11 - 28 feet
Arterials and Collectors	Varies	2 - 6 feet	4 - 8 feet	2.5 - 5 feet	8 -19 feet

Areas that have significant accumulations of snow during the winter may prefer a wider furnishing zone for snow storage.

Six feet enables two pedestrians (including wheelchair users) to walk side-by-side, or to pass each other comfortably

Discussion

It is important to provide adequate width along a sidewalk corridor. Two people should be able to walk side-by-side and pass a third comfortably. In areas of high demand, sidewalks should contain adequate width to accommodate the high volumes and different walking speeds of pedestrians. The Americans with Disabilities Act requires a 4 foot clear width in the pedestrian zone plus 5 foot passing areas every 200 feet.

Additional References and Guidelines

United States Access Board. *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public-Right-of-Way (PROWAG).* 2011.
City of Fremont. *Downtown Community Plan and Design Guidelines.* 2012.
NACTO. *Urban Street Design Guide.* 2013.
Caltrans. *Main Street, California.* 2013.
City of Fremont. *Standard Specifications.* 1995.

Materials and Maintenance

Sidewalks are typically constructed out of concrete and are separated from the roadway by a curb or gutter and sometimes a landscaped boulevard. Surfaces must be firm, stable, and slip resistant. Colored, patterned, or stamped concrete can add distinctive visual appeal.

Sidewalk Obstructions and Driveway Ramps

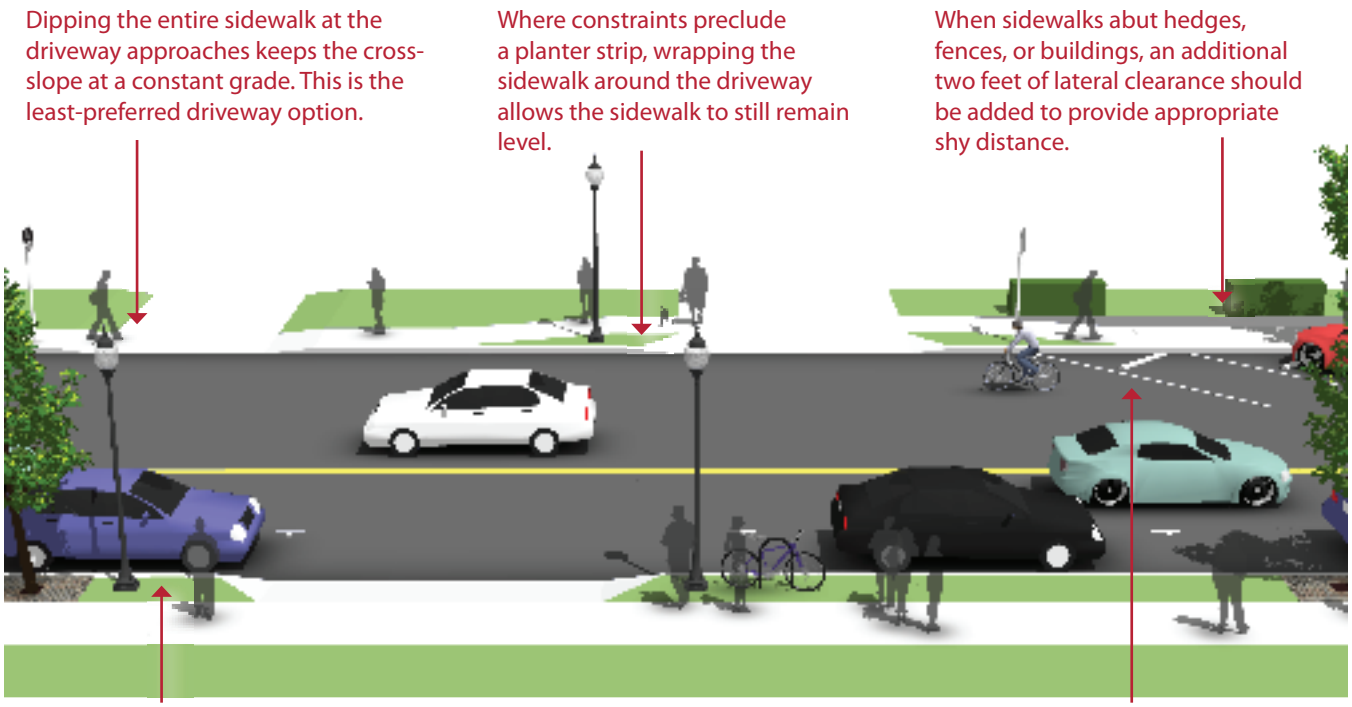
Description

Obstructions to pedestrian travel in the sidewalk corridor typically include driveway ramps, curb ramps, sign posts, utility and signal poles, mailboxes, fire hydrants and street furniture.

Guidance

Reducing the number of accesses reduces the need for special provisions. This strategy should be pursued first.

Obstructions should be placed between the sidewalk and the roadway to create a buffer for increased pedestrian comfort.



Discussion

Driveways are a common sidewalk obstruction, especially for wheelchair users. When constraints only allow curb-tight sidewalks, dipping the entire sidewalk at the driveway approaches keeps the cross-slope at a constant grade. However, this may be uncomfortable for pedestrians and could create drainage problems behind the sidewalk.

31%
Crash Reduction
For reducing driveways from 26-48 to 10-24 per mile.

Additional References and Guidelines

USDOJ. *ADA Standards for Accessible Design*. 2010.
United States Access Board. *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public-Right-of-Way (PROWAG)*. 2011.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*. 2004.
CRF: Elvik, R. and Vaa, T. *Handbook of Road Safety Measures*. 2004.

Materials and Maintenance

Sidewalks are typically constructed out of concrete and are separated from the roadway by a curb or gutter and sometimes a landscaped space. Surfaces must be firm, stable, and slip resistant.

Pedestrian Amenities

Description

A variety of streetscape elements can define the pedestrian realm, offer protection from moving vehicles, and enhance the walking experience. Key features are presented below.

Street Trees

In addition to their aesthetic and environmental value, street trees can slow traffic and improve safety for pedestrians. Trees add visual interest to streets and narrow the street's visual corridor, which may cause drivers to slow down. It is important that trees do not block light or the vision triangle.

Street Furniture

Providing benches at key rest areas and viewpoints encourages people of all ages to use the walkways by ensuring that they have a place to rest along the way. Benches should be 20" tall to accommodate elderly pedestrians comfortably. Benches can be simple (e.g., wood slats) or more ornate (e.g., stone, wrought iron, concrete). If alongside a parking zone, street furniture should be placed to minimize interference with passenger loading.

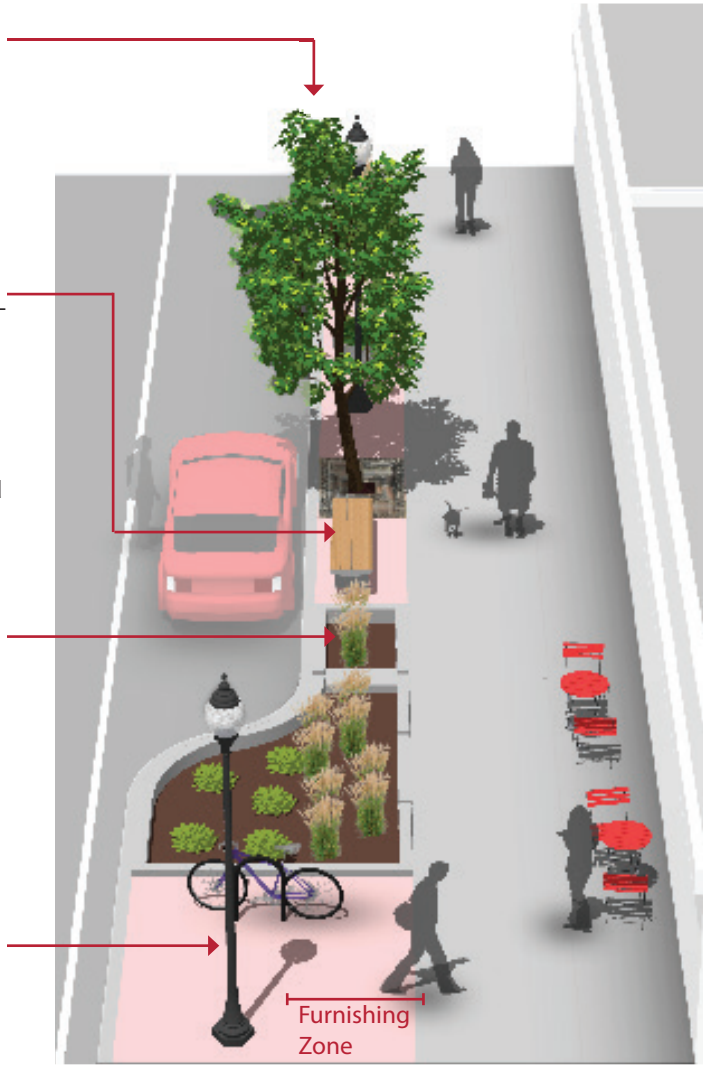
Green Features

Green stormwater strategies may include bioretention swales, rain gardens, tree box filters, and pervious pavements (pervious concrete, asphalt and pavers).

Bioswales are natural landscape elements that manage water runoff from a paved surface. Plants in the swale trap pollutants and silt from entering a river system.

Lighting

Pedestrian scale lighting improves visibility for both pedestrians and motorists - particularly at intersections. Pedestrian scale lighting can provide a vertical buffer between the sidewalk and the street, defining pedestrian areas. Pedestrian scale lighting should be used in areas of high pedestrian activity.



Discussion

Additional pedestrian amenities such as banners, public art, special paving, along with historical elements and cultural references, promote a sense of place. Public activities should be encouraged and commercial activities such as dining, vending and advertising may be permitted when they do not interfere with safety and accessibility.

Pedestrian amenities should be placed in the furnishing zone on a sidewalk corridor. Signs, meters, tree wells should go between parking spaces.

Additional References and Guidelines

United States Access Board. *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public-Right-of-Way (PROWAG)*. 2011.
NACTO. *Urban Street Design Guide*. 2013.
Caltrans. *Main Street, California.* 2013.
City of Fremont. *Landscape Development Requirements & Policies . 2012.*

Materials and Maintenance

Establishing and caring for your young street trees is essential to their health. Green features may require routine maintenance, including sediment and trash removal, and clearing curb openings and overflow drains.

Pedestrian Scale Lighting

Description

Pedestrian scale lighting improves visibility for both pedestrians and motorists - particularly at intersections and in areas where personal safety is a concern.

Pedestrian scale lighting is characterized by short light poles (around 15 feet high), close spacing, low levels of illumination (except at crossings), and the use of LED lamps to produce good color rendition, long service life and high energy efficiency. Lighting should be oriented downward to illuminate the pedestrian environment.

Guidance

Pedestrian scale lighting should be located in the furnishing/utility zone so as not to impede pedestrian traffic in the through area.

Lamp fixtures should be at height of about 12-14 feet, and poles should be spaced approximately 25-50 feet apart depending on the intensity of lights.

Lamp fixtures should be shaded so as to project light downward and provide sufficient illumination of the sidewalk while limiting excess light pollution.

Illumination should be warm and moderate, rather than dim or glaring, and provide a balanced coverage of the corridor and surrounding area for comfort and security.

Discussion

Both street and pedestrian lighting levels should be considered for the same street corridor, especially in areas with tree canopy. "Dark Sky" lighting should be pursued to reduce light pollution. Pedestrian scale lighting should be used in areas of high pedestrian activity and along pedestrian corridors connecting destinations, including transit hubs and access points, and multi-family neighborhoods.

59%
Crash Reduction
For providing intersection illumination

Additional References and Guidelines

Illuminating Engineering Society of North America. *American National Standard Practice for Roadway Lighting. 2005.*
FHWA. Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations. 2005.

CRF: Elvik, R. and Vaa, T. *Handbook of Road Safety Measures.* 2004.

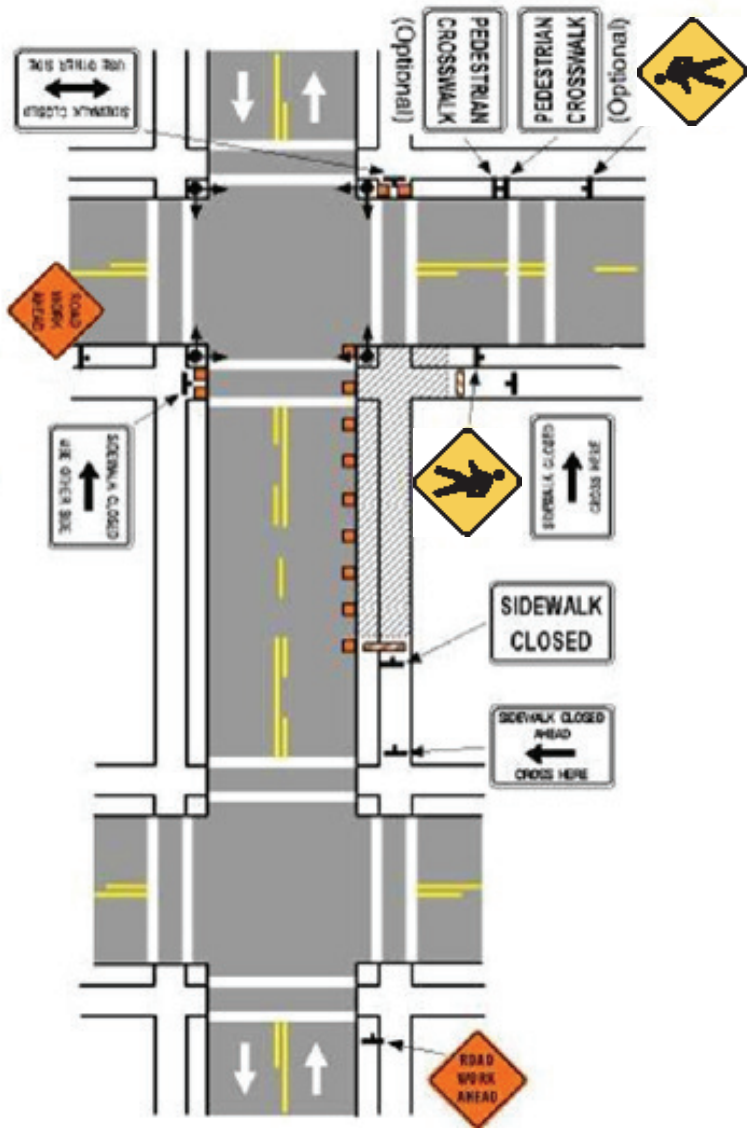
Materials and Maintenance

Street trees should be regularly maintained so as not to obstruct light fixtures and light projection. Low-cost light emitting diodes (LED) offer a wide range of light levels and can reduce long term utility costs.

Pedestrian Access Through Construction Areas

Description

Measures should be taken to provide for the continuity of a pedestrian's trip through a construction closure. Only in rare cases should pedestrians be detoured to another street when travel lanes remain open.



Guidance

- The California MUTCD section 6G.05 states:

  Pedestrian detours should be avoided since pedestrians rarely observe them and the cost of providing accessibility and detectability might outweigh the cost of maintaining a continuous route. Whenever possible, work should be done in a manner that does not create a need to detour pedestrians from existing routes or crossings.

- Pedestrians should be provided with a safe, accessible, convenient path that replicates as nearly as practical the most desirable characteristics of the existing sidewalks. The alternate circulation path should be parallel to the disrupted pedestrian access route, be located on the same side of the street, and accommodate the disabled.
- The alternate route should have a width of 5 feet minimum, and an additional foot of width for each vertical element along the route.
- Signage related to construction activities shall be placed in a location that does not obstruct the path of bicycles or pedestrians, including bicycle lanes, wide curb lanes, or sidewalks.
- In rare cases where access is not available on the same side of the street, the alternate pedestrian route may be located on the opposite side of the street for short distances. A 300 ft maximum detour length recommended.

Discussion

The removal of a pedestrian access route, curb ramp, or pedestrian street crossing, even for a short time, may severely limit or totally preclude pedestrians, especially those with a disability, from navigating in the public right-of-way. It might also preclude access to buildings, facilities, or sites on adjacent properties.

Additional References and Guidelines

Caltrans. *California Manual on Uniform Traffic Control Devices. 2012.*
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.

Materials and Maintenance

The alternate route should include sidewalks and pedestrian access routes, curb ramps, pedestrian crossings, lighting, and all other elements included in these standards.

Multimodal Enhancements

Bicycle Parking

Bicyclists expect a safe, convenient place to secure their bicycle when they reach their destination. This may be short-term parking of 2 hours or less, or long-term parking for employees, students, residents, and commuters.

Access to Transit

Safe and easy access to bicycle parking facilities is necessary to encourage commuters to access transit via bicycle and on foot. Providing safe access to transit and space for bicycles on buses and rail vehicles can increase the feasibility of transit in lower-density areas. People are often willing to walk only a quarter- to half-mile to a bus stop, while they might bike as much as two or more miles to reach a transit station.

Bicycle Racks

Access to Transit

Bicycle Racks

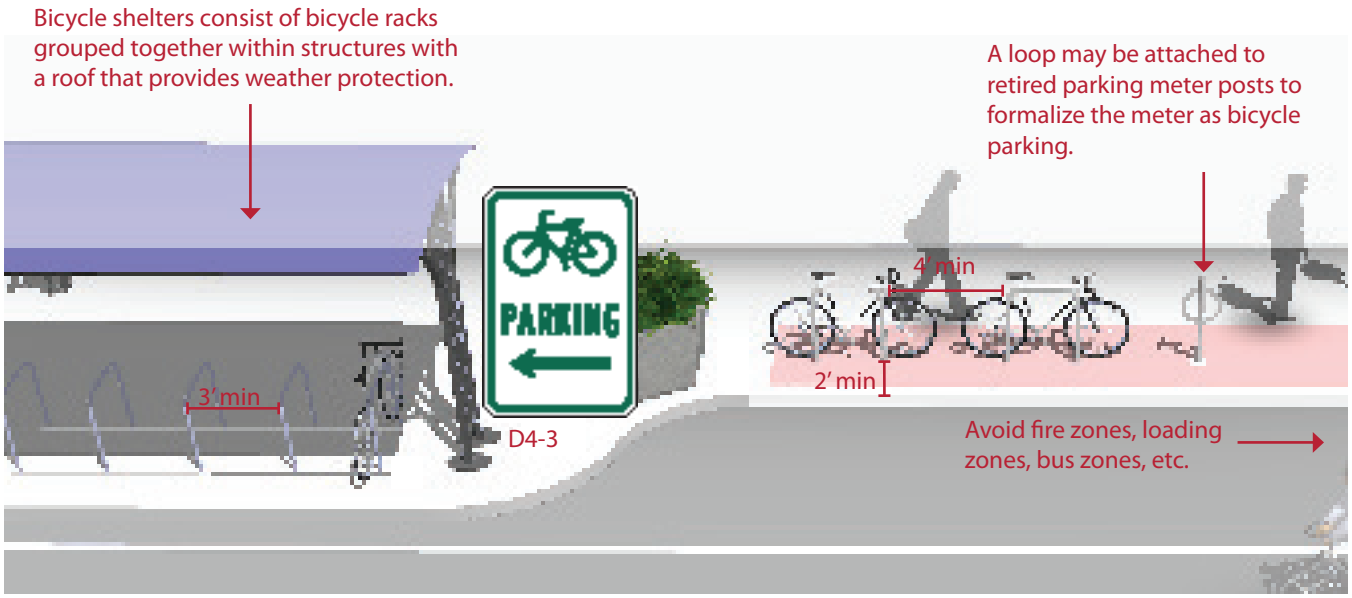
Description

Short-term bicycle parking is meant to accommodate visitors, customers, and others expected to depart within two hours. It should have an approved standard rack, appropriate location and placement, and weather protection. The Association for Pedestrian and Bicycle Professionals (APBP) recommends selecting a bicycle rack that:

- Supports the bicycle in at least two places, preventing it from falling over.
- Allows locking of the frame and one or both wheels with a U-lock.
- Is securely anchored to ground.
- Resists cutting, rusting and bending or deformation.

Guidance

- 2' minimum from the curb face to avoid 'dooring.'
- Close to destinations; 50' maximum distance from main building entrance.
- Minimum clear distance of 6' should be provided between the bicycle rack and the property line.
- Should be highly visible from adjacent bicycle routes and pedestrian traffic.
- Locate racks in areas that cyclists are most likely to travel.



Discussion

Where the placement of racks on sidewalks is not possible (due to narrow sidewalk width, sidewalk obstructions, street trees, etc.), bicycle parking can be provided in the street where on-street vehicle parking is allowed in the form of on-street bicycle corrals.

Some types of bicycle racks may meet design criteria, but are discouraged except in limited situations. This includes undulating "wave" racks, schoolyard "wheel bender" racks, and spiral racks.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
APBP. *Bicycle Parking Guide 2nd Edition.* 2010.

Materials and Maintenance

Use of proper anchors will prevent vandalism and theft. Racks and anchors should be regularly inspected for damage. Educate snow removal crews to avoid burying racks during winter months.

Transit Stops

Description

At transit stops, a variety of streetscape elements can define the pedestrian realm, offer protection from moving vehicles, and enhance the walking experience.

Guidance

Lighting is important for safety and security. A brightly lit bus stop makes it easier for the bus driver to observe waiting passengers and allows motorists to see pedestrians around the bus stop.

Shelters provide protection from the elements and seating while for patrons waiting for rides. An attractive, well designed shelter can also be a positive addition to a streetscape that contributes to a sense of place. It also provides an excellent opportunity to improve the visibility of the transit service and to provide maps and other information.

Public Info Kiosks and Signage at bus stops are an important element of good transit service. Signs serve as a source of information to patrons and operators regarding the location of the bus stop and are excellent marketing tools to promote transit use. This should be provided at all stops with 49 or less average daily boardings (ADB). Real-time signage provides up-to-the-minute updates on bus arrival times for stops with 100-999 ADB.

Seating provides comfort and convenience at bus stops and are usually installed on the basis of existing or projected ridership figures. Seats may be installed by themselves or as part of a shelter. Seating and shelters should be provided at all stops with 50-99 ADB.

Waste receptacles provided at higher use transit stops reduce unwanted items from being brought on the vehicle, and results in a cleaner stop area.

Marked Crossings should help pedestrians safely navigate to bus stops and the surrounding destinations.

Discussion

Bus stops located on the far side of intersections result in pedestrians crossing the street behind the bus, which makes them more visible to motorists. It also generally increases the overall efficiency of transit operations by reducing delay at traffic signals.

82%
Crash Reduction
In vehicle/bicycle crashes in the presence of bus stops

Additional References and Guidelines

FHWA. *Federal Highway Administration University Course on Bicycle and Pedestrian Transportation.* 2006.
NACTO. *Urban Street Design Guide.* 2013.
CRF: Oh et al. *Assessing Critical Factors Associated with Bicycle Collisions at Urban Signalized Intersections.* 2008.

Materials and Maintenance

Features should be maintained to ensure proper lighting, comfort and security.

Pedestrians at Intersections

Attributes of pedestrian-friendly intersection design include:

- Clear Space at corners
- Visibility of pedestrians
- Legibility of symbols and markings
- Accessibility
- Separation from traffic
- Lighting


Raised Crosswalks


Median Refuge Island


Marked Crosswalks


Minimize Curb Radii


Decorative Crosswalk


Curb Extensions


Stop and Yield Lines


ADA Compliant Curb Ramps


In Street Yield to Pedestrian Signs


Sidewalks at Railroad Grade Crossings

Marked Crosswalks

Description

A marked crosswalk signals to motorists that they must stop for pedestrians and encourages pedestrians to cross at designated locations. Installing crosswalks alone will not necessarily make crossings safer especially on multi-lane roadways.

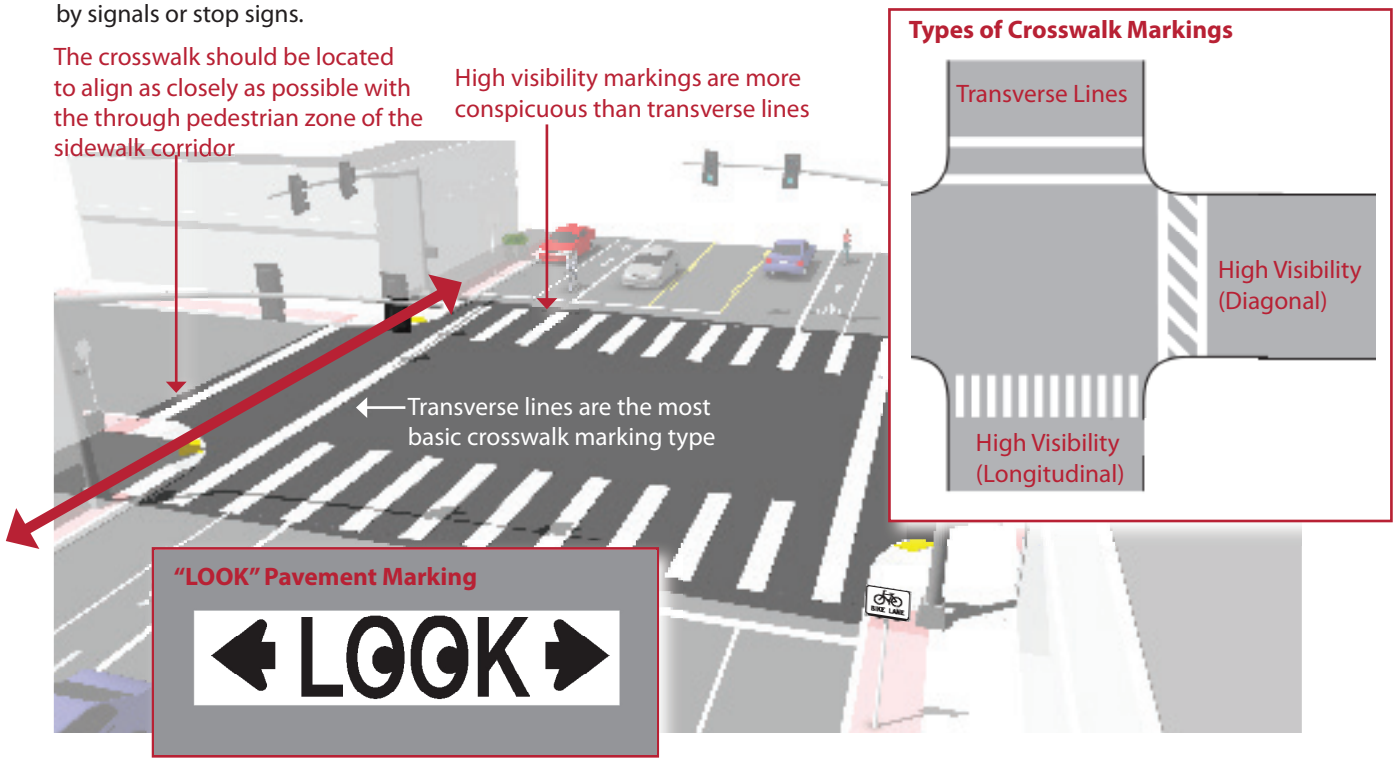
At mid-block locations, crosswalks can be marked where there is a demand for crossing and there are no nearby marked crosswalks.

High visibility crosswalk markings should be used at crossings with high pedestrian use or where vulnerable pedestrians are expected, including: school crossings, across arterial streets for pedestrian-only signals, at mid-block crosswalks, and at intersections not controlled by signals or stop signs.

Guidance

At signalized intersections, all crosswalks should be marked. At unsignalized intersections, crosswalks may be marked under the following conditions:

- At a complex intersection, to orient pedestrians in finding their way across.
- At an offset intersection, to show pedestrians the shortest route across traffic with the least exposure to vehicular traffic and traffic conflicts.
- At an intersection with visibility constraints, to position pedestrians where they can best be seen by oncoming traffic.
- At an intersection within a school zone on a walking route.



Discussion

LOOK pavement stencils (shown above) are pavement markings designed to remind pedestrians to look for vehicles before crossing. These markings were tested in San Francisco as an inexpensive alternative to incorporating animated eyes in the countdown pedestrian signal. The results of this test and the effectiveness of this treatment was inconclusive.

Additional References and Guidelines

Caltrans. *California Manual on Uniform Traffic Control Devices. 2012.*
AASHTO. Guide for the Planning, Design, and Operation of Pedestrian Facilities. 2004.
FHWA. *Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations.* 2005.
FHWA. *Crosswalk Marking Field Visibility Study.* 2010.
NACTO. *Urban Street Design Guide.* 2013.

Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority. Thermoplastic markings offer increased durability than conventional paint.

Decorative Crosswalk Paving

Description

Standard marked crosswalks may be enhanced with decorative painting and designs, assuming such designs do not compromise the effectiveness of the crosswalk.

Decorative crosswalks are most appropriate in tourist areas, historic districts, or other special community areas where a unique visual identity is desired.

Guidance

- Decorative paint material must not be retroreflective.
- The color of the pavement surface within the crosswalk area should not degrade the contrast of the white crosswalk lines.
- The decoration should not potentially mistaken by road users as a traffic control application (i.e., to guide or regulate traffic.)
- The colors Yellow, Blue, and Green should not be used as decoration to minimize any confusion as a traffic control device.

Discussion

The decision to provide a marked crosswalk at a given location is based on engineering studies and judgment.

Additional References and Guidelines

FHWA. *Manual on Uniform Traffic Control Devices*. 2009.
FHWA *Interpretation Letter 3-152(I) and 3-169(I)*

Materials and Maintenance

Paint will wear quickly in areas with high volumes of traffic. Frequent reapplication may be necessary.

Stop and Yield Lines

Description

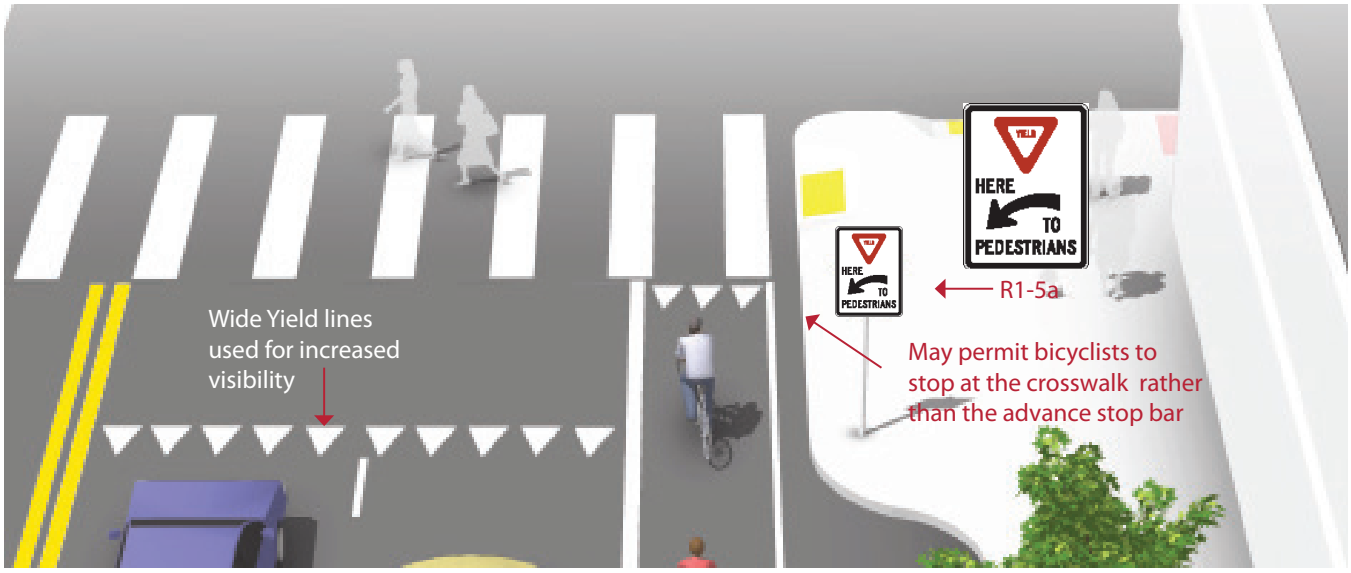
Advance stop bars increase pedestrian comfort and safety by stopping motor vehicles well in advance of marked crosswalks, allowing vehicle operators a better line of sight of pedestrians and giving inner lane motor vehicle traffic time to stop for pedestrians.

California State law requires drivers to yield to pedestrians in marked crosswalks. At marked crossings, an advance stop line should only be used in conjunction with a stop sign (R1-1) or other traffic control device requiring a stop. An advance yield line marking must only be used in conjunction with yield signage (R1-2, R1-5, or R1-5a).

Guidance

- On streets with at least two travel lanes in each direction.
- Prior to a marked crosswalk
- In one or both directions of motor vehicle travel
- Recommended 15-50 feet or more in advance of the crosswalk
- A "Yield/Stop Here for Pedestrians" sign should accompany the advance stop bar

On multi-lane approaches, stop lines and yield lines can be staggered lane-by lane to increase visibility of pedestrians, and reduce the likelihood of the "Multiple Threat."



Discussion

If a bicycle lane is present, mark the advance yield/stop bar to permit bicyclists to stop at the crosswalk ahead of the yield/stop bar for motor vehicles.

Additional References and Guidelines

Caltrans. *California Manual on Uniform Traffic Control Devices*. 2012.
NACTO. *Urban Street Design Guide*. 2013.

Materials and Maintenance

Because the effectiveness of markings depends entirely on their visibility, maintaining markings should be a high priority.

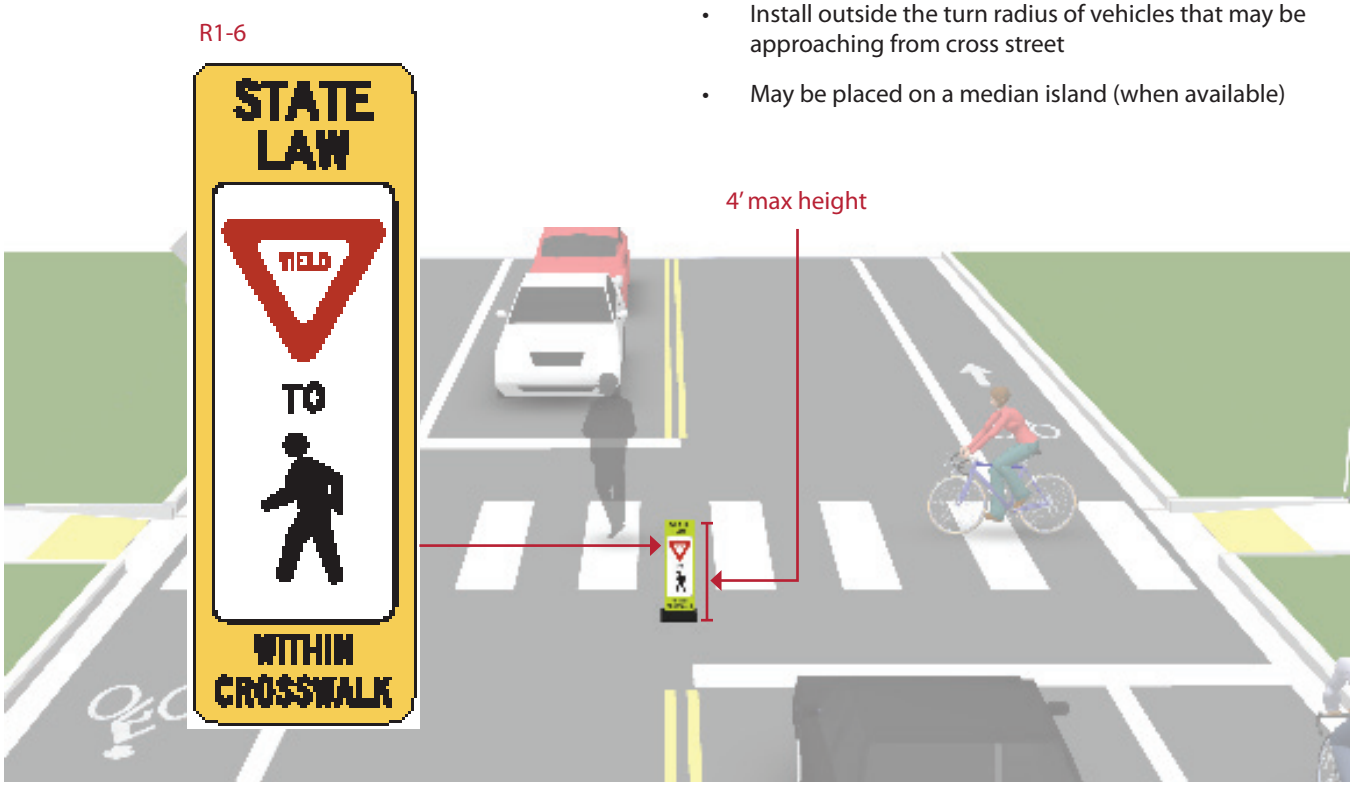
In Street Yield to Pedestrians Signs

Description

In-street pedestrian crossing signs are attached to a flexible plastic bollard on the centerline of the roadway. They are used to reinforce the presence of crosswalks and remind motorists of their legal obligation to yield for pedestrians in marked or unmarked crosswalks. This signage is often placed at high-volume pedestrian crossings that are not signalized.

Guidance

- The in-street pedestrian crossing sign shall be placed in the roadway at the crosswalk location on the center line, on a lane line, or on a median island.
- The top of an In-Street Pedestrian Crossing sign shall be a maximum of 4 feet above the pavement or median island surface.
- The signs perform better on narrow roadways, where the visibility of the signs is maximized
- Install in a manner that does not impede pedestrian flow.
- Install outside the turn radius of vehicles that may be approaching from cross street
- May be placed on a median island (when available)



Discussion

These flexible signs must be extremely durable to withstand potential impacts with motor vehicles . Semi-permanent installations are also possible when the sign is combined with a moveable base. This allows for day-time only applications.

On multi-lane roadways, consider active warning beacons for improved yielding compliance.

Additional References and Guidelines

Caltrans. *California Manual on Uniform Traffic Control Devices.* 2012.
Redmon, Tamara. *Evaluating Pedestrian Safety Countermeasures. Public Road.* 2011.
Hua, Jenna. *San Francisco PedSafe II Project Outcomes and Lessons Learned.* TRB Annual Meeting. 2009.

Materials and Maintenance

Unless the In-Street Pedestrian Crossing sign is placed on a physical island, the sign support shall be designed to bend over and then bounce back to its normal vertical position when struck by a vehicle.

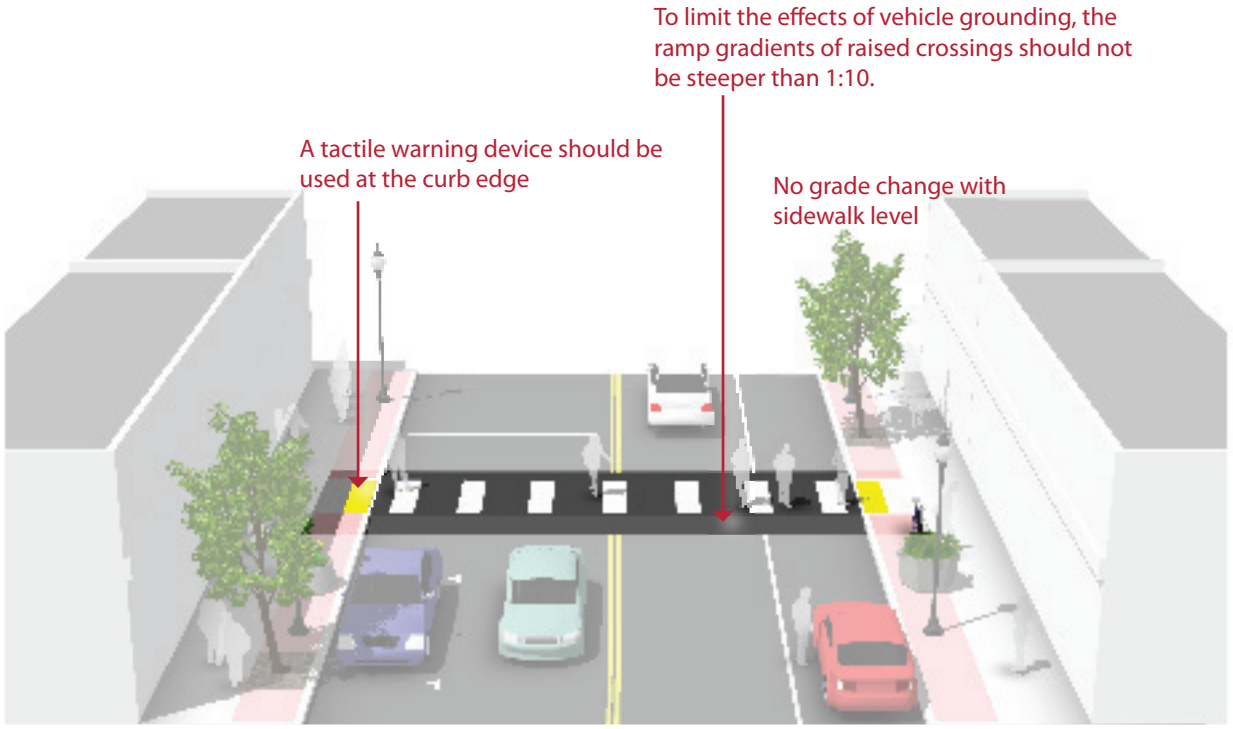
Raised Crosswalks

Description

A raised crosswalk or intersection can eliminate grade changes from the pedestrian path and give pedestrians greater prominence as they cross the street. Raised crosswalks should be used only in very limited cases where a special emphasis on pedestrians is desired; review on case-by-case basis.

Guidance

- Use detectable warnings at the curb edges to alert vision-impaired pedestrians that they are entering the roadway.
- Approaches to the raised crosswalk may be designed to be similar to speed humps.
- Raised crosswalks can also be used as a traffic calming treatment.



Discussion

Like a speed hump, raised crosswalks have a traffic slowing effect which may be unsuitable on emergency response routes.

46%
Crash Reduction
In vehicle/pedestrian crashes for raised pedestrian crossings.

Additional References and Guidelines

FHWA. *Manual on Uniform Traffic Control Devices. (3B.18)*. 2009.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.
USDOJ. *ADA Standards for Accessible Design*. 2010.
NACTO. *Urban Street Design Guide*. 2013.
CRF: Elvik, R. and Vaa, T. *Handbook of Road Safety Measures.* 2004.

Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority.

Median Refuge Island

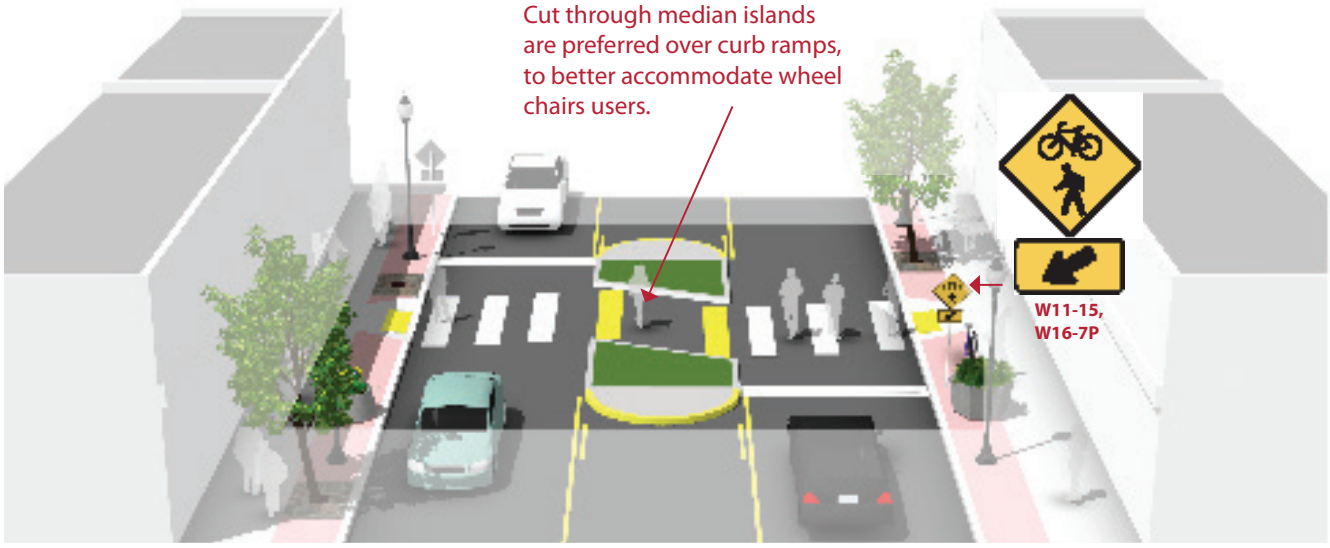
Description

Median refuge islands are located at the mid-point of a marked crossing and help improve pedestrian safety by increasing pedestrian visibility and allowing pedestrians to cross one direction of traffic at a time.

Refuge islands minimize pedestrian exposure by shortening the crossing distance and increasing the number of available gaps for crossing.

Guidance

- Can be applied on any roadway with a left turn center lane or median that is at least 6' wide.
- Appropriate at signalized or unsignalized crosswalks
- The refuge island must be accessible, preferably with an at-grade passage through the island rather than ramps and landings.
- The island should be at least 6' wide between travel lanes (to accommodate bikes with trailers and wheelchair users) and at least 20' long (40' minimum preferred).
- On streets with speeds higher than 25 mph there should also be double centerline marking, reflectors, and "KEEP RIGHT" signage.
- If a refuge island is landscaped, the landscaping should not compromise the visibility of pedestrians crossing in the crosswalk. Shrubs and ground plantings should be no higher than 1 ft 6 in.



Typical Application

Median refuge islands can be installed on roadways with existing medians or on multi-lane roadways where adequate space exists (see Lane Reconfiguration and Road Diets). Median Refuge Islands should always be paired with crosswalks and advance pedestrian warning signage.
On multi-lane roadways, consider configuration with active warning beacons for improved yielding compliance.

46%
Crash Reduction
In vehicle/pedestrian crashes for raised medians with marked crosswalks.

Additional References and Guidelines

AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.
NACTO. *Urban Street Design Guide.* 2013.
CRF: Zeeger et al. *Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations.* 2002.

Materials and Maintenance

Refuge islands may collect road debris and may require somewhat frequent maintenance.

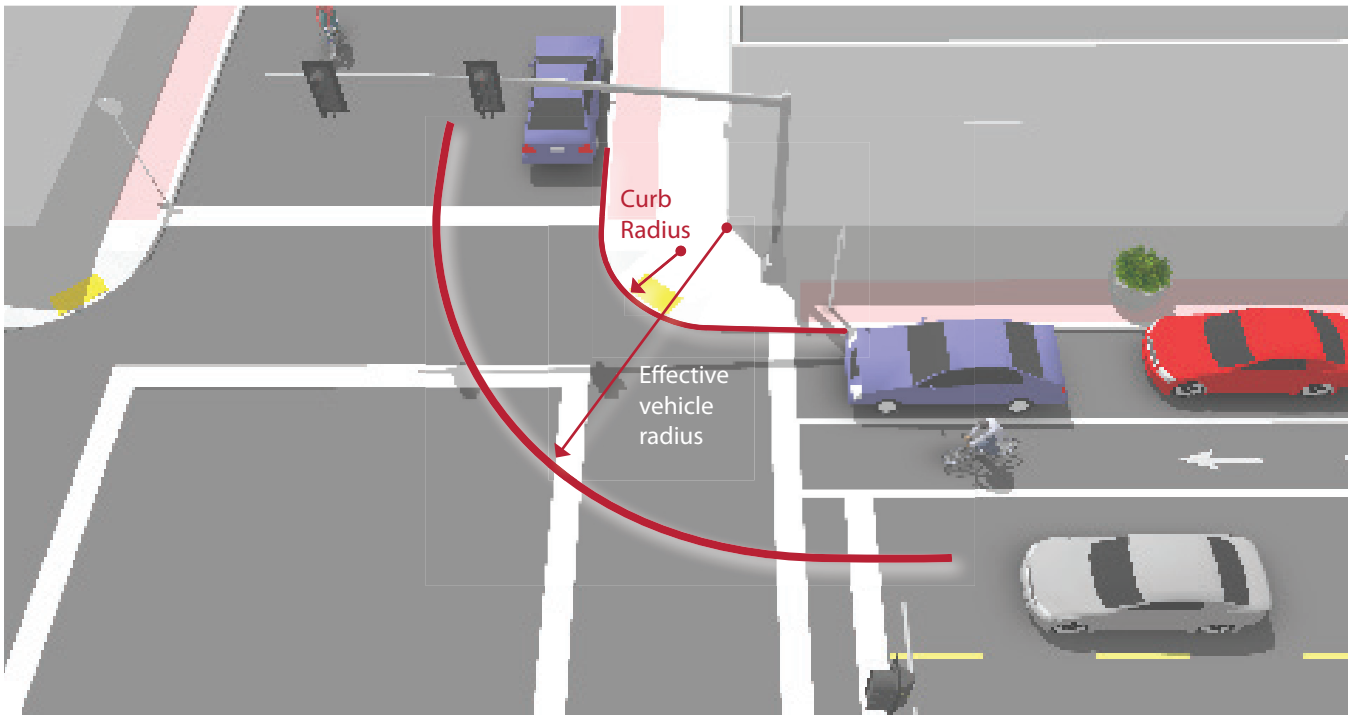
Minimizing Curb Radii

Description

The size of a curb's radius can have a significant impact on pedestrian comfort and safety. A smaller curb radius provides more pedestrian area at the corner, allows more flexibility in the placement of curb ramps, results in a shorter crossing distance and requires vehicles to slow more on the intersection approach. During the design phase, the chosen radius should be the smallest possible for the circumstances.

Guidance

The radius may be as small as 3 ft where there are no turning movements, or 5 ft where there are turning movements, adequate street width, and a larger effective curb radius created by parking or bike lanes.



Discussion

Several factors govern the choice of curb radius in any given location. These include the desired pedestrian area of the corner, traffic turning movements, street classifications, design vehicle turning radius, intersection geometry, and whether there is parking or a bike lane (or both) between the travel lane and the curb.

Additional References and Guidelines

AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.
Caltrans. *Complete Intersections.* 2010.
NACTO. *Urban Street Design Guide.* 2013.

Materials and Maintenance

Improperly designed curb radii at corners may be subject to damage by large trucks.

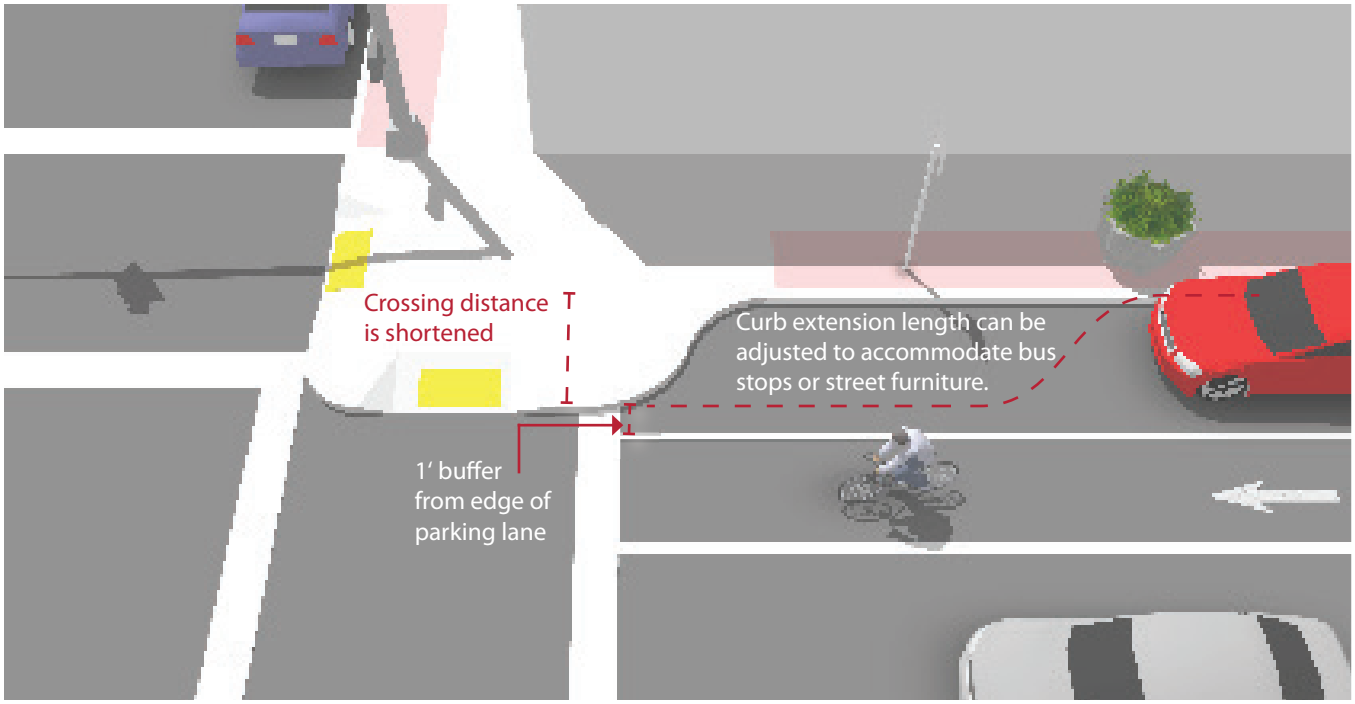
Curb Extensions

Description

Curb extensions minimize pedestrian exposure during crossing by shortening crossing distance and giving pedestrians a better chance to see and be seen before committing to crossing. They are appropriate for any crosswalk where it is desirable to shorten the crossing distance and there is a parking lane adjacent to the curb.

Guidance

- In most cases, the curb extensions should be designed to transition between the extended curb and the running curb in the shortest practicable distance.
- For purposes of efficient street sweeping, the minimum radius for the reverse curves of the transition is 10 ft and the two radii should be balanced to be nearly equal.
- Curb extensions should terminate one foot short of the parking lane to maximize bicyclist safety.



Discussion

If there is no parking lane, adding curb extensions may be a problem for bicycle travel and truck or bus turning movements.

Additional References and Guidelines

AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.
Caltrans. *Complete Intersections.* 2010.
NACTO. *Urban Street Design Guide.* 2013.

Materials and Maintenance

Planted curb extensions may be designed as a bioswale, a vegetated system for stormwater management.

Channelized Turn Lanes

Description

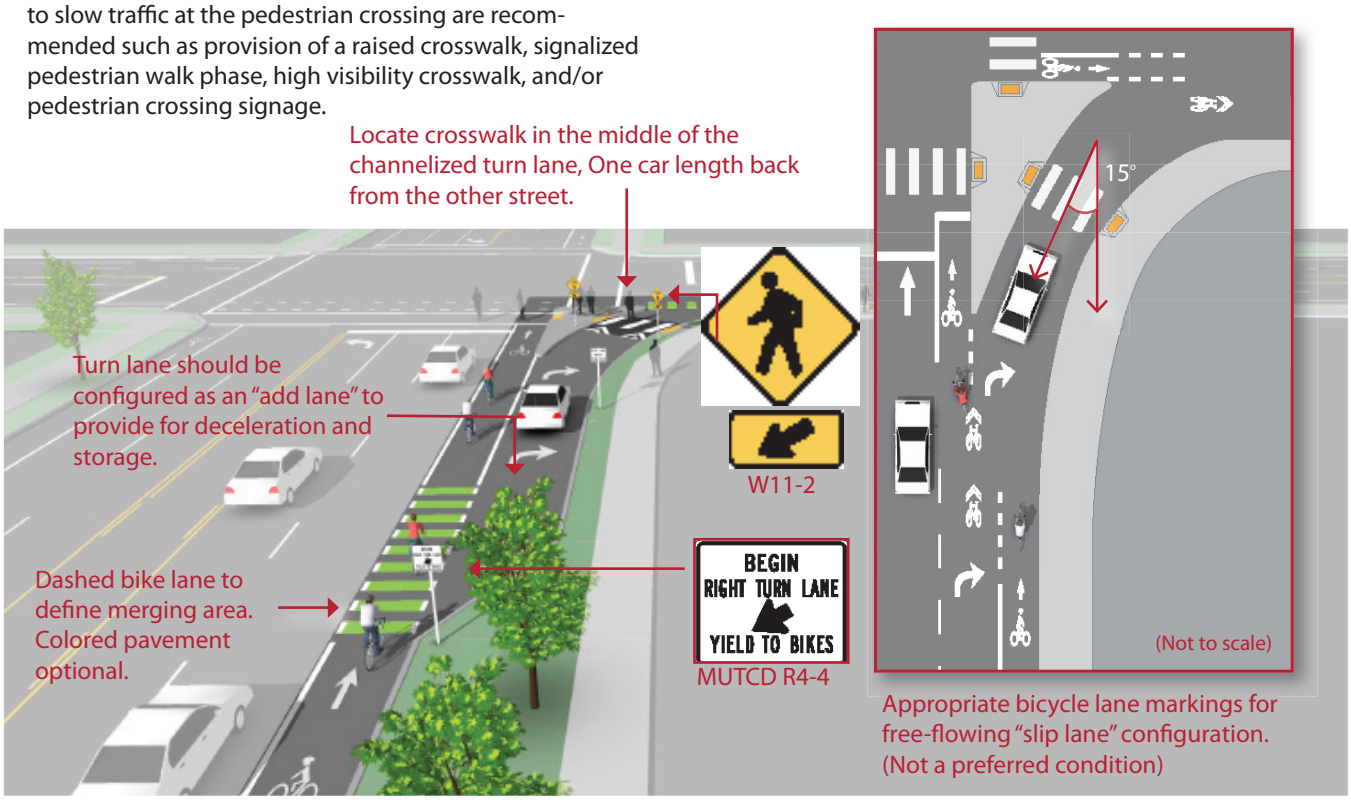
In some intersections of arterials streets, design vehicle requirements or intersection angles may result in wide turning radii at corners. Configuring the intersection as a channelized (or free-right) turn lane with a raised refuge island can improve conditions for pedestrians trying to cross the street.

Similar to a median refuge island, the raised refuge island can reduce crossing distances, allow staged crossing of the roadway, and improve visibility of pedestrians crossing the roadway.

To improve safety and comfort for pedestrians, measures to slow traffic at the pedestrian crossing are recommended such as provision of a raised crosswalk, signalized pedestrian walk phase, high visibility crosswalk, and/or pedestrian crossing signage.

Guidelines

- The preferred angle of intersection between the channelized turn lane and the roadway being joined is no more than 15 degrees to allow for simultaneous visibility of pedestrians and potential roadway gaps.
- Design with a maximum 30-35 foot turning radius.
- Signing: Pedestrian crossing sign assembly (W11-2) or Yield (R1-2) to encourage yielding. Yield to Bikes (R4-4) or similar if bike lanes are present.
- Raised crossings in the channelized turn lane may slow driver speed through the turning area.



Discussion

This design requires trucks to turn into multiple receiving lanes, and may not be appropriate on the approach to streets with one through lane.

Channelized turn lanes can be very challenging for blind pedestrians. NCHRP 674 identified the use of sound strips (a full lane rumble strip-like device) in conjunction with flashing beacons to increase yielding compliance.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
TRB. *NCHRP 674 Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities.* 2011.
ITE. *Designing Walkable Urban Thoroughfares.* 2010.

Materials and Maintenance

Signage and striping require routine maintenance.

ADA Compliant Curb Ramps

Description

Curb ramps are the design elements that allow all users to make the transition from the street to the sidewalk. There are a number of factors to be considered in the design and placement of curb ramps at corners. Properly designed curb ramps ensure that the sidewalk is accessible from the roadway. A sidewalk without a curb ramp can be useless to someone in a wheelchair, forcing them back to a driveway and out into the street for access.

Although diagonal curb ramps might save money, they create potential safety and mobility problems for pedestrians,including reduced maneuverability and increased interaction with turning vehicles, particularly in areas with high traffic volumes. Diagonal curb ramp configurations are the least preferred of all options.

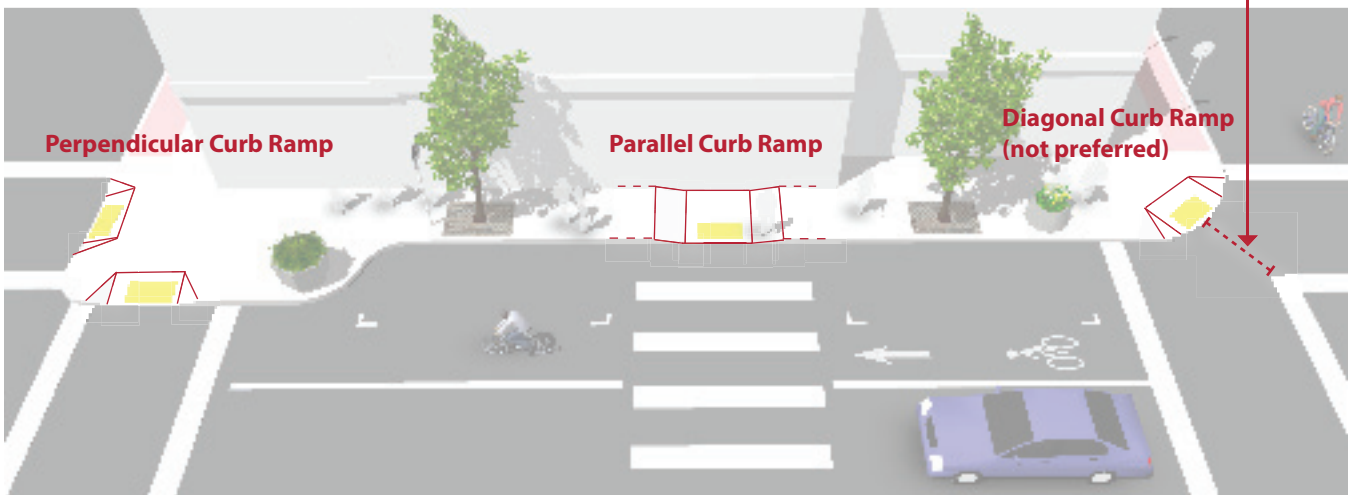
Guidance

ADA compliance is required for both public space (Title II) and private businesses that are generally open to the public (as describe in Title III).

- The landing at the top of a ramp shall be at least 4 feet long and at least the same width as the ramp itself.
- The ramp shall slope no more than 1:12 , with a maximum cross slope of 2.0%.
- If the ramp runs directly into a crosswalk, the landing at the bottom will be in the roadway.
- If the ramp lands on a dropped landing within the sidewalk or corner area where someone in a wheel-chair may have to change direction, the landing must be a minimum of 5'-0" long and at least as wide as the ramp, although a width of 5'-0" is preferred.

Curb ramps shall be located so that they do not project into vehicular traffic lanes, parking spaces, or parking access aisles. Three configurations are illustrated below.

Diagonal ramps shall include a clear space of at least 48" within the crosswalk for user maneuverability



Crosswalk spacing not to scale. For illustration purposes only.

Discussion

The edge of an ADA compliant curb ramp should be marked with a tactile warning device (truncated domes) to alert people with visual impairments to changes in the pedestrian environment. Contrast between the raised tactile device and the surrounding infrastructure is important so that the change is readily evident, this can be either light-on-dark or dark-on-light.

Additional References and Guidelines

United States Access Board. *Accessibility Guidelines for Buildings and Facilities.* 2002.
United States Access Board. *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public-Right-of-Way (PROWAG).* 2011.
USDOJ. *ADA Standards for Accessible Design.* 2010.

Materials and Maintenance

It is critical that the interface between a curb ramp and the street be maintained adequately. Asphalt street sections can develop potholes at the foot of the ramp, which can catch the front wheels of a wheelchair.

Sidewalk at Railroad Grade Crossing

Description

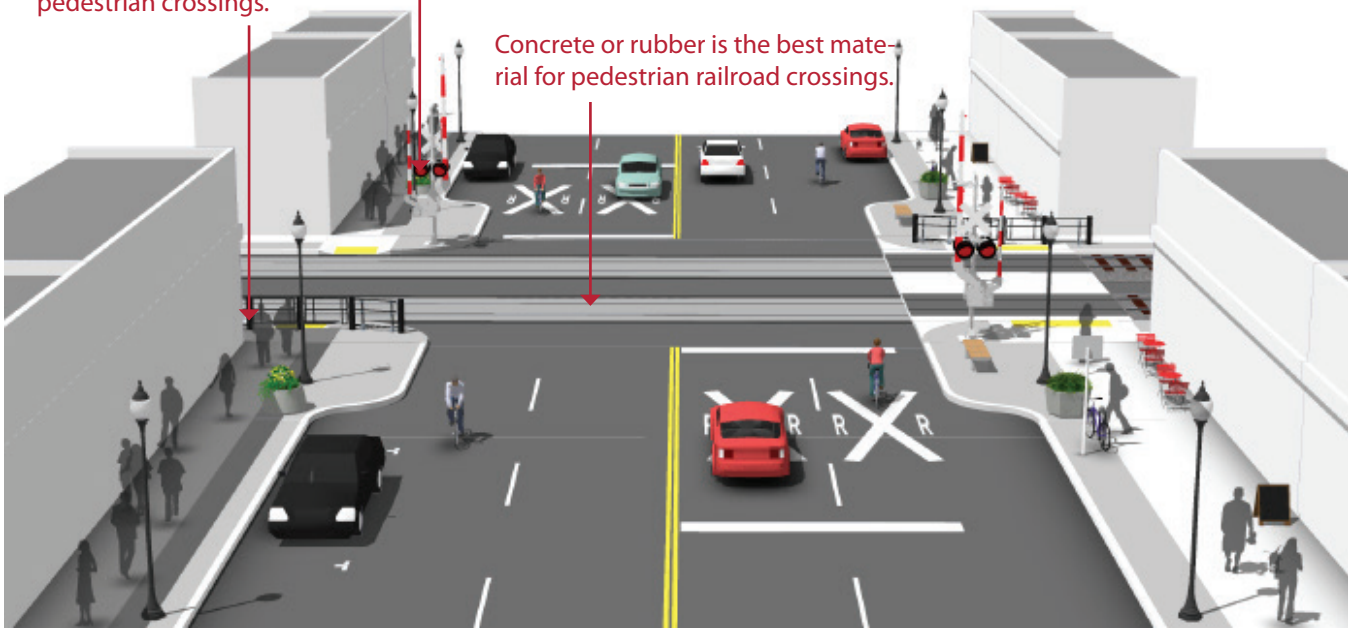
Locations where sidewalks must cross railroad tracks are problematic for pedestrians, particularly for those with mobility or vision impairments.

Wheelchair and scooter casters can easily get caught in the flangeway gap, and slippery surfaces, degraded rough materials, or elevated track height can cause tripping hazards for all pedestrians.

Angled track crossings also limit sight triangles, impacting the ability to see oncoming trains.

Guidance

- Bells or other audible warning devices may be included in the flashing-light signal assembly to provide additional warning for pedestrians and bicyclists.
- Pedestrians need clear communication and warning to know that they may encounter a train and when a train is coming. Provide clear definition of where the safest place to cross is.
- The crossing should be as close as practical to perpendicular with tracks. Ensure clear lines of sign and good visibility so that pedestrians can see approaching trains
- The crossing must be level and flush with the top of the rail at the outer edge and between the rails.
- Flangeway gaps should not exceed 2.5 in (3.0 in for tracks that carry freight.)



Discussion

Crossing design and implementation is a collaboration between the railroad company and highway agency. The railroad company is responsible for the crossbucks, flashing lights and gate mechanisms, and the highway agency is responsible for advance warning markings and signs. Warning devices should be recommended for each specific situation by a qualified engineer based on various factors including train frequency and speed, path and trail usage and sight distances.

Additional References and Guidelines

AASHTO. *Planning, Design, and Operation of Ped. Facilities.* 2004.
Caltrans. *California Manual on Uniform Traffic Control Devices. 2012.*
FHWA. *Railroad-Highway Grade Crossing Handbook.* 2007.
TRB. *TCRP 17: Integration of Light Rail Transit into City Streets.* 1996.
Rails-to-Trails Conservancy. *Rails-with-Trails: A Preliminary Assessment of Safety and Grade Crossings.* 2005.

Materials and Maintenance

Surfaces must be firm, stable, and slip resistant. Concrete or rubber are the preferred materials for use at railroad crossings. Rubber may become slippery when wet and degrade over time. (AASHTO 2012)

Traffic Signal Enhancements

Crossing beacons and signals facilitate crossings of roadways for pedestrians. Pedestrian-friendly signal timing and phasing can make crossing intersections safer by clarifying when to enter an intersection and by alerting motorists to the presence of pedestrians.

Pedestrians at Signalized Crossings

Description

Pedestrian Signal Head

Pedestrian signal indicators demonstrate to pedestrians when to cross at a signalized crosswalk. All traffic signals should be equipped with pedestrian signal indications except where pedestrian crossing is prohibited by signage.

Countdown pedestrian signals are particularly valuable for pedestrians, as they indicate whether a pedestrian has time to cross the street before the signal phase ends. Countdown signals should be used at all signalized intersections.

Signal Timing

Providing adequate pedestrian crossing time is a critical element of the walking environment at signalized intersections. The MUTCD recommends traffic signal timing to assume a pedestrian walking speed of 3.5' per second, meaning that the length of a signal phase with parallel pedestrian movements should provide sufficient time for a pedestrian to safely cross the adjacent street.

At crossings where older pedestrians or pedestrians with disabilities are expected, crossing speeds as low as 3' per second may be assumed. Special pedestrian phases can be used to provide greater visibility or more crossing time for pedestrians at certain intersections.

In busy pedestrian areas such as downtowns, the pedestrian signal indication should be built into each signal phase, eliminating the requirement for a pedestrian to actuate the signal by pushing a button.

Audible pedestrian traffic signals provide crossing assistance to pedestrians with vision impairment at signalized intersections

Consider the use of a Leading Pedestrian Indication (LPI) to provide additional traffic protected crossing time to pedestrians

Discussion

When push buttons are used, they should be located so that someone in a wheelchair can reach the button from a level area of the sidewalk without deviating significantly from the natural line of travel into the crosswalk, and marked (for example, with arrows) so that it is clear which signal is affected.

In areas with very heavy pedestrian traffic, consider an all-pedestrian signal phase to give pedestrians free passage in the intersection when all motor vehicle traffic movements are stopped.

Additional References and Guidelines

United States Access Board. *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public-Right-of-Way (PROWAG).* 2011.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.
NACTO. *Urban Street Design Guide.* 2013.

Materials and Maintenance

It is important to repair or replace traffic control equipment before it fails. Consider semi-annual inspections of controller and signal equipment, intersection hardware, and loop detectors.

Signal Timing

Description

Signal timing can have a significant effect on the comfort, safety and functionality of an intersection for pedestrians. The sections below identify key signal timing attributes that should be evaluated.

Split Phasing

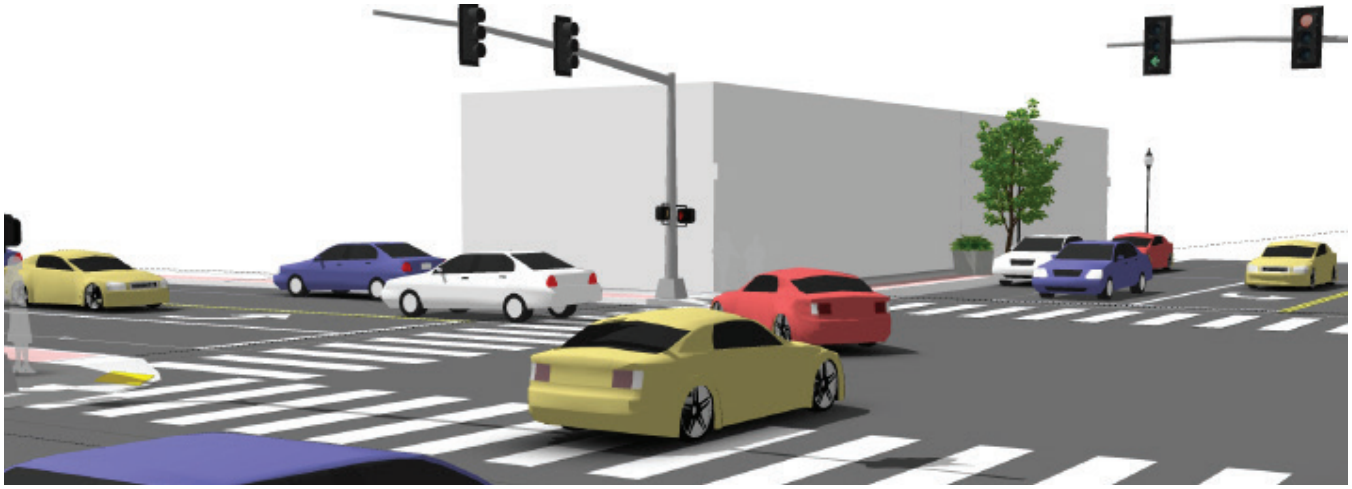
Split phasing separates traffic movements on opposite approaches and can reduce pedestrian conflicts at intersections with protected left turns. This is generally safer because it separates pedestrian crossings from vehicle left-turn and through movements. Split phasing can simplify otherwise complex intersection operations and make vehicle and pedestrian movements more predictable, but it also increases cycle lengths.

Split phasing is generally reserved for locations with atypical geometric constraints, such as a shared through/left turn lane, and/or variation in opposing approach volumes. As such, use of split phasing should be preceded by a detailed analysis of traffic volumes and intersection movements.

Protected-Permissive Left Turn

With Protected-Permissive Left Turn (PPLT) phasing, motorists have left turn right of way with the protected green arrow, and can also make a left turn on a circular green display (yielding to traffic in the opposing direction and concurrent pedestrian movements). This mode can offer the safety benefits of protected left turns and the efficiency benefits of permissive left turns.

Pedestrians are most vulnerable on the permissive left turn interval, where motorists trying to make a left turn are focused on the traffic signal head and potential gaps in on-coming traffic. They may not see pedestrians before they accelerate to clear the intersection, and may collide with pedestrians entering the crosswalk.



Fixed vs Actuated

There are two basic categories of traffic signalization operations: Fixed and Actuated. Fixed traffic signals operate on a fixed schedule for all phases in the cycle. Every traffic phase is cycled through regardless of actual demand. This makes operations more predictable for drivers and pedestrians, and more efficient from a pedestrian delay perspective. Fixed signal timing may vary by time of day.

Actuated signals employ detection equipment and can be further distinguished as fully- or semi-actuated. Semi-actuated operations allow the major street to rest in green (fixed), until traffic is detected on cross streets.

Actuated signals can operate in coordinated or free modes. When signals are coordinated, the signal controller is "coordinating" with other signals to prioritize vehicle throughput downstream. This progression tends to increases delay for pedestrians at crossings.

By contrast signals operating in "free" mode operate independently of other signals, and can significantly reduce pedestrian delay and noncompliance.

To further reduce pedestrian delay consider minimizing the green interval for vehicles, increasing the permissive period (call window) for pedestrians, and/or programming a pedestrian recall.

Signal Actuation

Description

Manual activation of pedestrian signals is performed with a pedestrian push button. This requires the pedestrian to locate and press the pushbutton to actuate the pedestrian signal phase. For this reason, pushbuttons should be easy to identify and access, and ideally, be user-responsive.

A favorable alternative to manual actuation is passive detection possible with a variety of automated detection equipment, including microwave and infrared detectors. Because detection is automatic, it saves the pedestrian the trouble of having to locate the pushbutton. Passive detection can also contribute to the efficiency of signal operations by allowing for walk time extensions, and/or not dedicating walk time in the absence of pedestrians.

Guidance

The minimum walk interval time is 7 seconds.

The walk and pedestrian clearance times can be adjusted to account for the elderly, wheelchair users, and visually-disabled people who typically need more time to cross. The walk time can be calculated based on a slower walking speed, 2.8 fps - 3.0 fps, and/or a longer crossing distance from pushbutton-to-far curbside, instead of curb-to-curb.

Pushbuttons should be accompanied by adjacent all-weather surfaces for wheelchair users, and informational signage.

A pushbutton outfitted with a pilot or indicator light and/or audible/vibrotactile feedback acknowledges that the pedestrian call has been placed, reassuring the pedestrian that they have been detected.

Typical Application

Manual pushbuttons are installed at intersections operating on actuated signal timing and fixed timing. They can be utilized in semi-actuated or fully-actuated operations, and in coordinated or free modes.

The decision to install pushbuttons, should take into account pedestrian accessibility needs and pedestrian volumes.

Additional References and Guidelines

Caltrans. *California Highway Design Manual.* 2012
FHWA. *Signalized Intersections: Informational Guide.* 2nd Edition. 2013.

Materials and Maintenance

Pushbuttons require routine maintenance to ensure satisfactory actuation and pedestrian compliance.

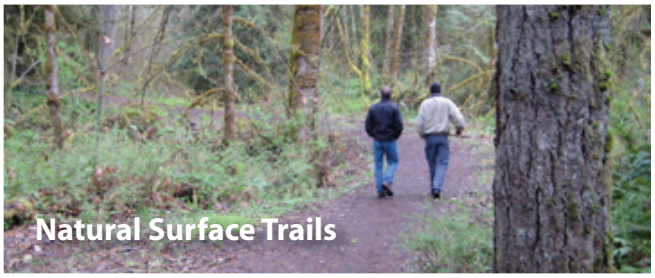
Shared Use Paths and Off-Street Facilities

A shared use path allows for two-way use by pedestrians, skaters, wheelchair users, bicyclists, joggers and other non-motorized users. These facilities are frequently found in parks, along rivers, beaches, and in greenbelts or utility corridors where there are few conflicts with motorized vehicles. Path facilities can also include amenities such as lighting, signage, and fencing (where appropriate).

Key features of shared use paths include:

- Frequent access points from the local road network.
- Directional signs to direct users to and from the path.
- A limited number of at-grade crossings with streets or driveways.
- Terminating the path where it is easily accessible to and from the street system.
- Separate treads for pedestrians and bicyclists when heavy use is expected.

The geometric design of shared use paths should be designed to support the speed and volume of expected user types. Bicyclist speeds can vary significantly depending on path grade. The table below lists typical bicyclists speeds.



Bicycle Design Speed Expectations

Bicycle Type	Feature	Typical Speed
Upright Adult Bicyclist	Paved level surfacing	8-15 mph
	Downhill	20-30+ mph
	Uphill	5 -12 mph
Recumbent Bicyclist	Paved level surfacing	11-18 mph

Source: AASHTO *Guide for the Development of Bicycle Facilities*, 4th Edition

General Design Practices

Description

Shared use paths can provide a desirable facility, particularly for recreation, and users of all skill levels preferring separation from traffic. Shared use paths should generally provide directional travel opportunities not provided by existing roadways.

Guidance

Width

- 8 feet is the minimum allowed for a two-way shared use path and is only recommended for low traffic situations.
- 10 feet is recommended in most situations and will be adequate for moderate to heavy use.
- 12 feet is recommended for heavy use situations with high concentrations of multiple users. A separate track (5' minimum) can be provided for pedestrian use.

Lateral Clearance

- A 2 foot or greater shoulder on both sides of the path should be provided. An additional foot of lateral clearance (total of 3') is required by the MUTCD for the installation of signage or other furnishings.
- If bollards are used at intersections and access points, they should be colored brightly and/or supplemented with reflective materials to be visible at night.

Overhead Clearance

- Clearance to overhead obstructions should be 8 feet minimum, with 10 feet recommended.

Striping

- When striping is required, use a 4 inch dashed yellow centerline stripe with 4 inch solid white edge lines.
- Solid centerlines can be provided on tight or blind corners, and on the approaches to roadway crossings.

Discussion

Terminate the path where it is easily accessible to and from the street system, preferably at a controlled intersection or at the beginning of a dead-end street.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
Caltrans *California Manual on Uniform Traffic Control Devices.* 2012.
Flink, C. *Greenways: A Guide To Planning Design And Development.* 1993.
Caltrans. *California HDM.* 2012.

Materials and Maintenance

Asphalt is the most common surface for shared use paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Local Neighborhood Accessways

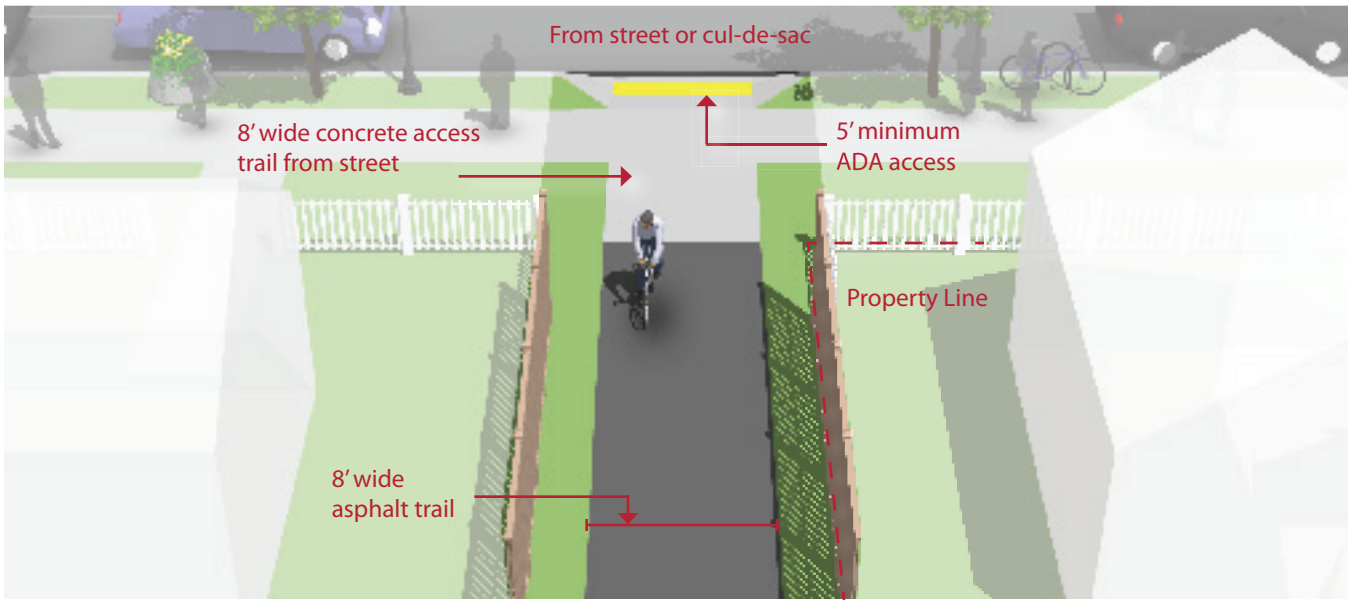
Description

Neighborhood accessways provide residential areas with direct bicycle and pedestrian access to parks, trails, green spaces, and other recreational areas. They most often serve as small trail connections to and from the larger trail network, typically having their own rights-of-way and easements.

Additionally, these smaller trails can be used to provide bicycle and pedestrian connections between dead-end streets, cul-de-sac, and access to nearby destinations not provided by the street network.

Guidance

- Neighborhood accessways should remain open to the public.
- Trail pavement shall be at least 8' wide to accommodate emergency and maintenance vehicles, meet ADA requirements and be considered suitable for multi-use.
- Trail widths should be designed to be less than 8' wide only when necessary to protect large mature native trees over 18" in caliper, wetlands or other ecologically sensitive areas.
- Access trails should slightly meander whenever possible.



Discussion

Neighborhood accessways should be designed into new subdivisions at every opportunity and should be required by City/County subdivision regulations.

For existing subdivisions, Neighborhood and homeowner association groups are encouraged to identify locations where such connects would be desirable. Nearby residents and adjacent property owners should be invited to provide landscape design input.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
Caltrans. *California Manual on Uniform Traffic Control Devices. 2012.*
FHWA. *Federal Highway Administration University Course on Bicycle and Pedestrian Transportation. Lesson 19: Greenways and Shared Use Paths.* 2006.
NACTO. *Urban Street Design Guide.* 2013.

Materials and Maintenance

Asphalt is the most common surface for shared use paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Natural Surface Trails

Description

Sometimes referred to as footpaths or hiking trails, the natural surface trail is used along corridors that are environmentally-sensitive but can support bare earth, wood chip, or boardwalk trails. Natural surface trails are a low-impact solution and found in areas with limited development or where a more primitive experience is desired.

Guidance presented in this section does not include considerations for bicycles. Natural surface trails designed for bicycles are typically known as single track trails.

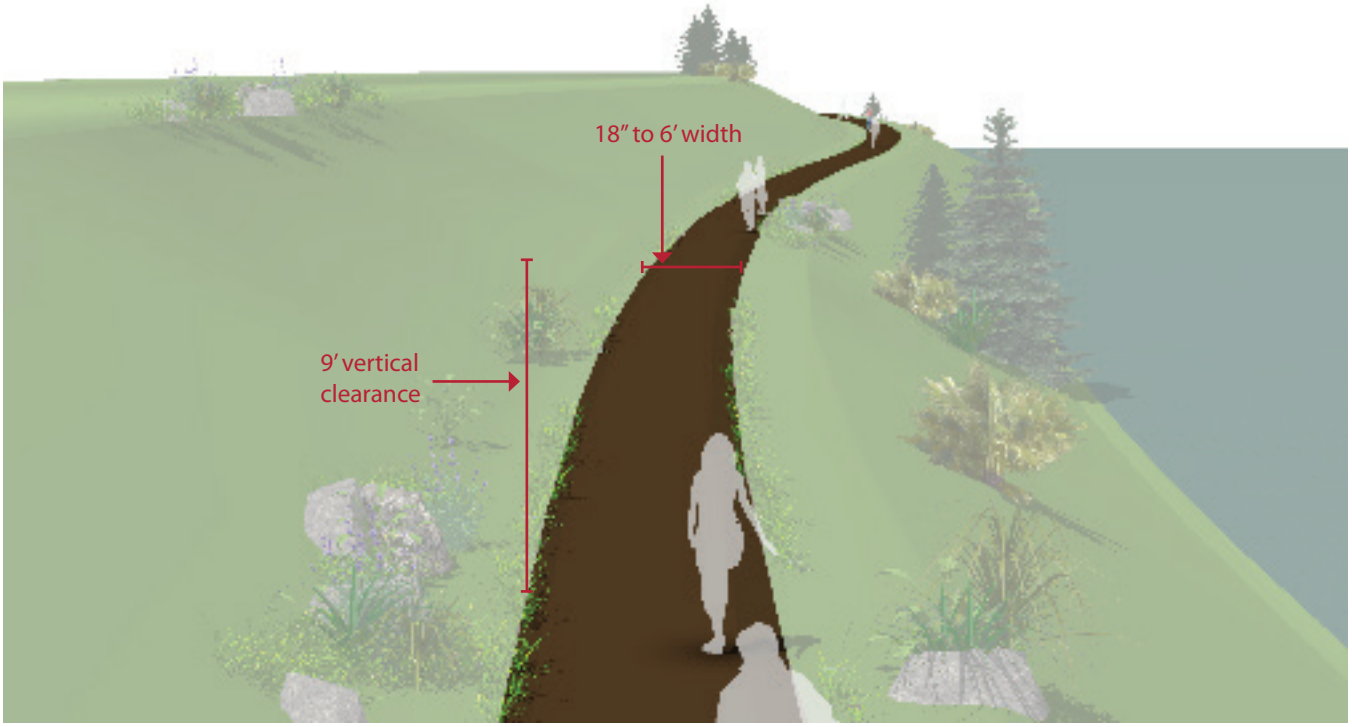
Guidance

Trails can vary in width from 18 inches to 6 feet or greater; vertical clearance should be maintained at nine-feet above grade.

Base preparation varies from machine-worked surfaces to those worn only by usage.

Trail surface can be made of dirt, rock, soil, forest litter, or other native materials. Some trails use crushed stone (a.k.a. "crush and run") that contains about 4% fines by weight, and compacts with use.

Provide positive drainage for trail tread without extensive removal of existing vegetation; maximum slope is five percent (typical).



Discussion

Trail erosion control measures include edging along the low side of the trail, steps and terraces to contain surface material, and water bars to direct surface water off the trail; use bedrock surface where possible to reduce erosion.

Additional References and Guidelines

Flink, C. *Greenways: A Guide To Planning Design And Development.* 1993.

Materials and Maintenance

Consider implications for accessibility when weighing options for surface treatments.

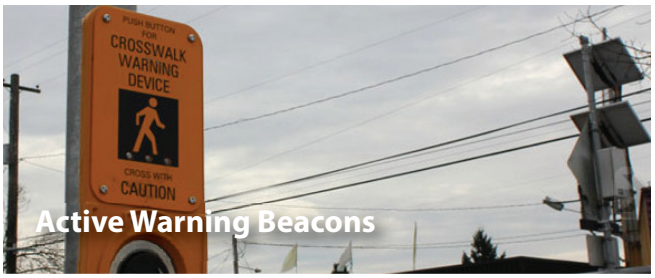
Path/Roadway Crossings

At-grade roadway crossings can create potential conflicts between path users and motorists, however, well-designed crossings can mitigate many operational issues and provide a higher degree of safety and comfort for path users. This is evidenced by the thousands of successful facilities around the United States with at-grade crossings. In most cases, at-grade path crossings can be properly designed to provide a reasonable degree of safety and can meet existing traffic and safety standards. Path facilities that cater to bicyclists can require additional considerations due to the higher travel speed of bicyclists versus pedestrians.

Consideration must be given to adequate warning distance based on vehicle speeds and line of sight, with the visibility of any signs absolutely critical. Directing the active attention of motorists to roadway signs may require additional alerting devices such as a flashing beacon, roadway striping or changes in pavement texture. Signing for path users may include a standard "STOP" or "YIELD" sign and pavement markings. Care must be taken not to place too many signs at crossings lest they begin to lose their visual impact.

A number of striping patterns have emerged over the years to delineate path crossings. A median stripe on the path approach will help to organize and warn path users. Crosswalk striping is typically a matter of local and State preference, and may be accompanied by pavement treatments to help warn and slow motorists. In areas where motorists do not typically yield to crosswalk users, additional measures may be required to increase compliance.


Marked/Unsignalized Crossings



Active Warning Beacons


Pedestrian Hybrid Beacon Crossing


Full Traffic Control Signal Crossing

Undercrossing


Route Users to Existing Signals


Overcrossing

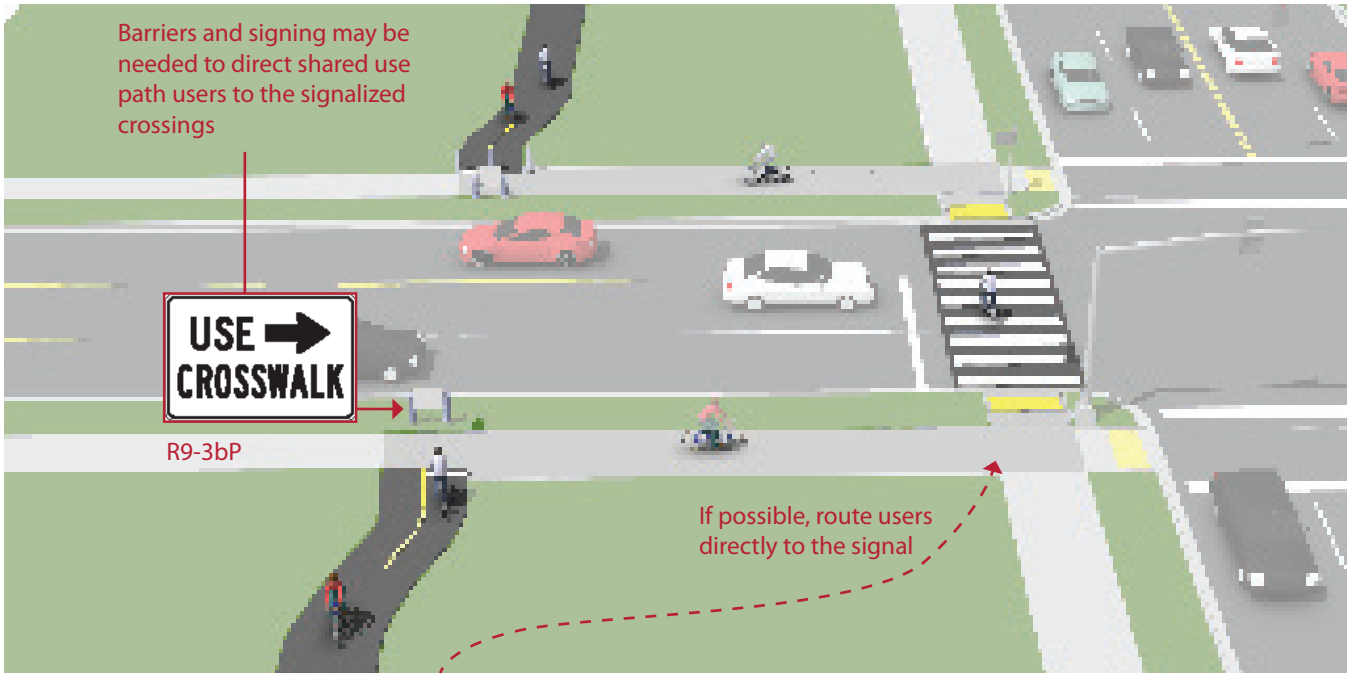
Route Users to Signalized Crossings

Description

Path crossings within approximately 400 feet of an existing signalized intersection with pedestrian crosswalks are typically diverted to the signalized intersection to avoid traffic operation problems when located so close to an existing signal. For this restriction to be effective, barriers and signing may be needed to direct path users to the signalized crossing. If no pedestrian crossing exists at the signal, modifications should be made.

Guidance

Path crossings should not be provided within approximately 400 feet of an existing signalized intersection. If possible, route path directly to the signal.



Discussion

In the US, the minimum distance a marked crossing can be from an existing signalized intersection varies from approximately 250 to 660 feet. Engineering judgement and the context of the location should be taken into account when choosing the appropriate allowable setback. Pedestrians are particularly sensitive to out of direction travel and jaywalking may become prevalent if the distance is too great.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.

Materials and Maintenance

If a sidewalk is used for crossing access, it should be kept clear of snow and debris and the surface should be level for wheeled users.

Marked/Unsignalized Crossings

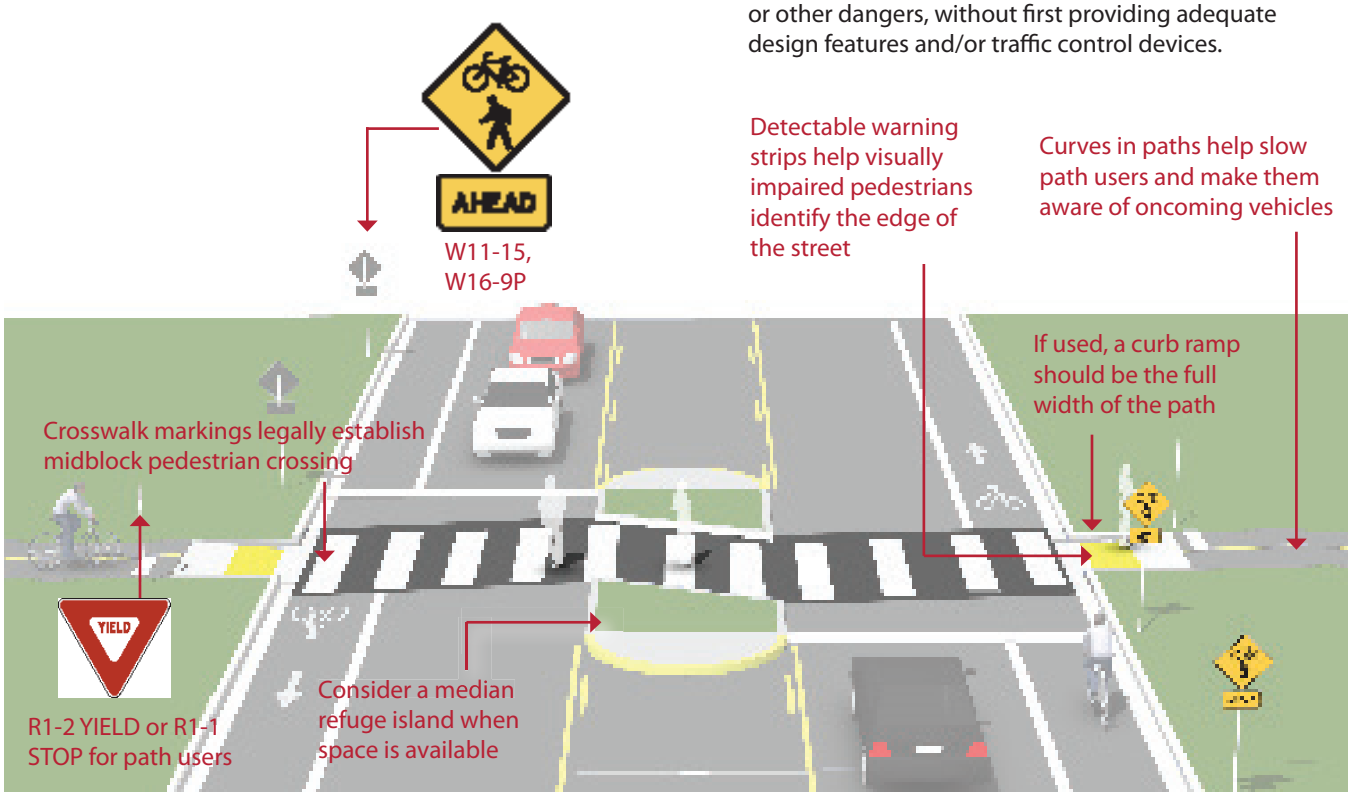
Description

A marked/unsignalized crossing typically consists of a marked crossing area, signage and other markings to slow or stop traffic. The approach to designing crossings at mid-block locations depends on an evaluation of vehicular traffic, line of sight, pathway traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions.

When space is available, using a median refuge island can improve user safety by providing pedestrians and bicyclists space to perform the safe crossing of one side of the street at a time.

Guidance

- Refer to the FHWA report, "Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations" for specific volume and speed ranges where a marked crosswalk alone may be sufficient.
- Where the speed limit exceeds 40 miles per hour, marked crosswalks alone should not be used at unsignalized locations.
- Crosswalks should not be installed at locations that could present an increased risk to pedestrians, such as where there is poor sight distance, complex or confusing designs, a substantial volume of heavy trucks, or other dangers, without first providing adequate design features and/or traffic control devices.



Discussion

The assignment of right of way at path crossings requires a detailed understanding of user volumes, travel speeds, and approach sight distance. Installing unwarranted controls on path approaches can lead to a loss of respect for traffic control at more critical locations. Good engineering judgment should be used for deciding which treatment to use.

In conventional intersection design, right of way is assigned to the higher volume or higher speed approach. In many cases, path volumes will exceed that of minor crossed streets, and right of way may be assigned to the path traffic. In crossings with appropriate sight distances, "YIELD" control of the path or road can be an effective solution for users as it encourages caution without being overly restrictive. For further discussion see chapter 5 in the AASHTO *Guide for the Development of Bicycle Facilities.*

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012. Ch 5.
Caltrans. *California Manual on Uniform Traffic Control Devices. 2012.*
Caltrans. *California HDM.* 2012.

Materials and Maintenance

Locate markings out of wheel tread when possible to minimize wear and maintenance costs.

Active Warning Beacons

Description

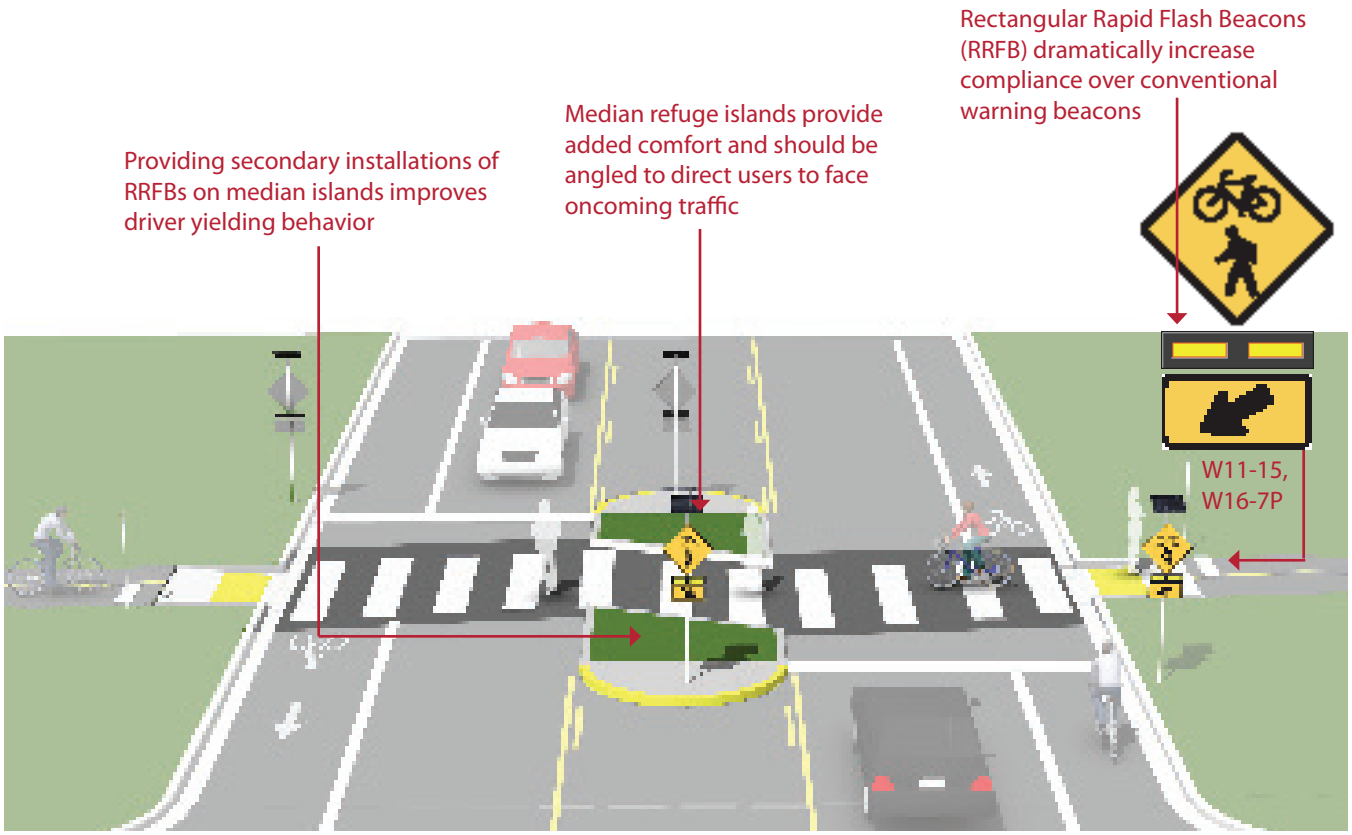
Enhanced marked crossings are unsignalized crossings with additional treatments designed to increase motor vehicle yielding compliance on multi-lane or high volume roadways.

These enhancements include pathway user or sensor actuated warning beacons, Rectangular Rapid Flash Beacons (RRFB) shown below, or in-roadway warning lights.

Guidance

Guidance for marked/unsignalized crossings applies.

- Warning beacons shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic control signals.
- Warning beacons shall initiate operation based on user actuation and shall cease operation at a predetermined time after the user actuation or, with passive detection, after the user clears the crosswalk.



Discussion

Rectangular rapid flash beacons show the most increased compliance of all the warning beacon enhancement options.

A study of the effectiveness of going from a no-beacon arrangement to a two-beacon RRFB installation increased yielding from 18 percent to 81 percent. A four-beacon arrangement raised compliance to 88%. Additional studies of long term installations show little to no decrease in yielding behavior over time. (Sherbutt, J., R. Van Houten, and S. Turner. *An Analysis of the Effects of Stutter Flash LED Beacons to Increase Yielding to Pedestrians Using Multilane Crosswalks.* 2008.)

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide*. 2012.
Caltrans. *California Manual on Uniform Traffic Control Devices. 2012.*
FHWA. *MUTCD - Interim Approval for Optional Use of Rectangular Rapid Flashing Beacons (IA-11)*. 2008.

Materials and Maintenance

Locate markings out of wheel tread when possible to minimize wear and maintenance costs. Signing and striping need to be maintained to help users understand any unfamiliar traffic control.

Pedestrian Hybrid Beacon Crossings

Description

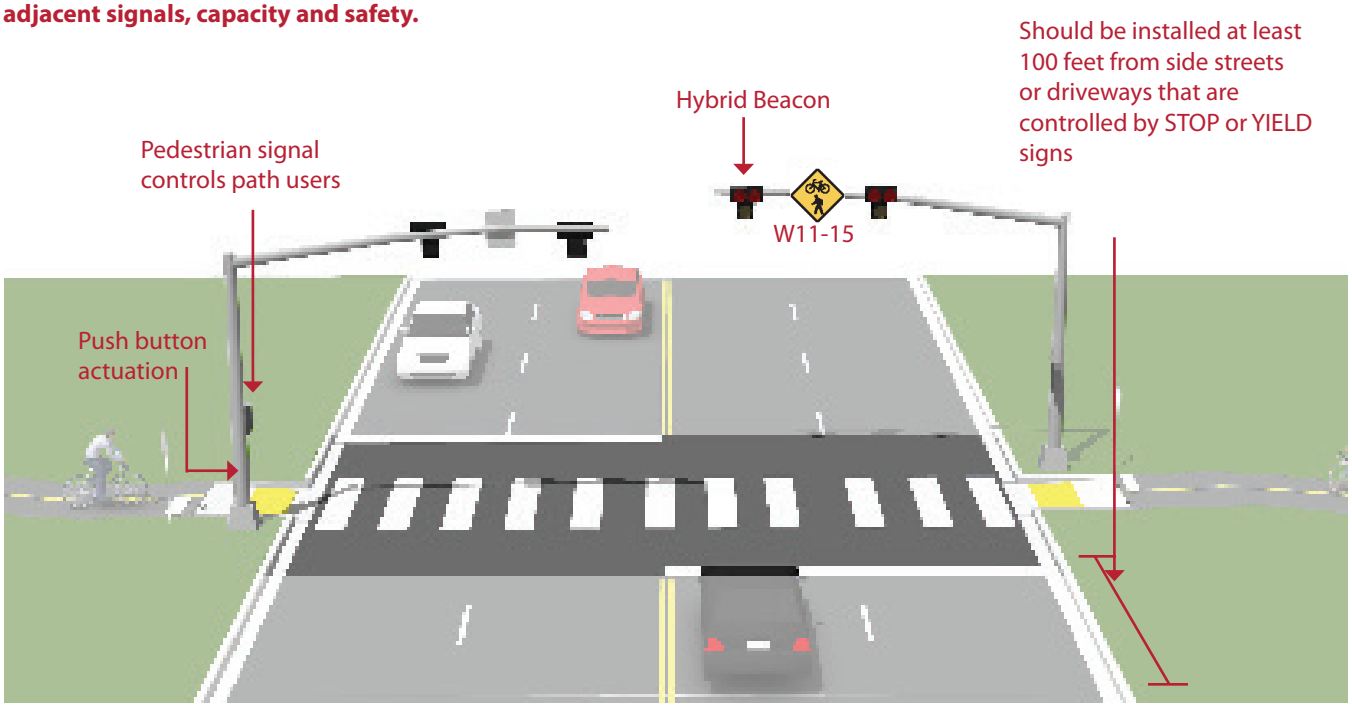
Pedestrian hybrid beacons (PHBs) provide a high level of comfort for crossing users through the use of a red-signal indication to stop conflicting motor vehicle traffic.

Hybrid beacon installation faces only cross motor vehicle traffic, stays dark when inactive, and uses a unique 'wig-wag' signal phase to indicate activation. Vehicles have the option to proceed after stopping during the final flashing red phase, which can reduce motor vehicle delay when compared to a full signal installation.

Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity and safety.

Guidance

- Hybrid beacons may be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable path crossings.
- To maximize safety when used for shared use path crossings, the flashing 'wig-wag' phase should be very short and occur after the pedestrian signal head has changed to a solid "DON'T WALK" indication as bicyclists can enter an intersection quickly.
- Shared use path signals are normally activated by push buttons but may also be triggered by embedded loop, infrared, microwave or video detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street.



Discussion

PHBs have been shown to significantly reduce pedestrian crashes. A FHWA study published in 2010 found that pedestrian hybrid beacons can reduce pedestrian crashes by 69 percent and total crashes by 29 percent. (K. Fitzpatrick, E. S. Park. *Safety Effectiveness of the HAWK Pedestrian Crossing Treatment.* 2010.)Motorist compliance with the requirement to yield has been shown to exceed 90 percent at PHBs. (R. P. Godavarthy. *Effectiveness of a Pedestrian Hybrid Beacon at Mid-block Crossings in Decreasing Unnecessary Delay to Drivers and Comparison to Other Systems.* 2007.)

Additional References and Guidelines

FHWA. *Pedestrian Hybrid Beacon Guide.* 2014.
NACTO. *Urban Bikeway Design Guide.* 2012.
Caltrans. *California Manual on Uniform Traffic Control Devices. 2012.*

Materials and Maintenance

Hybrid beacons are subject to the same maintenance needs and requirements as standard traffic signals. Signing and striping need to be maintained to help users understand any unfamiliar traffic control.

Full Traffic Signal Crossings

Description

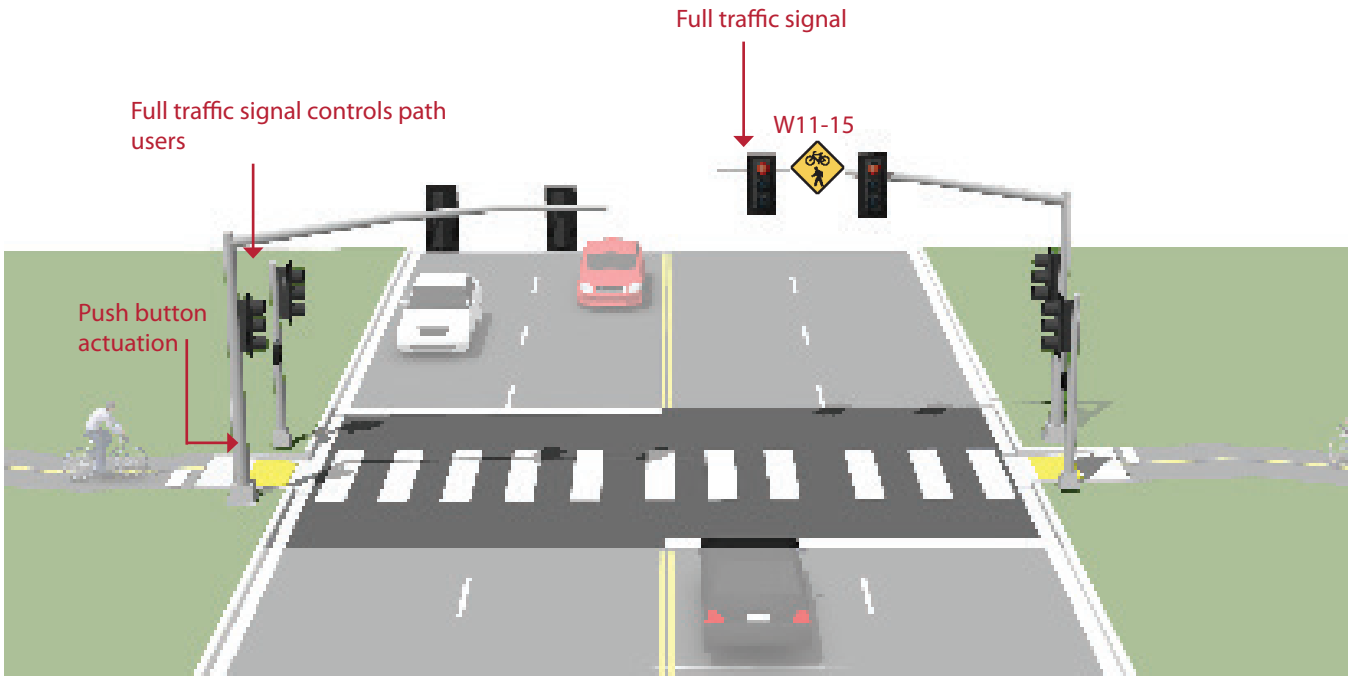
Signalized crossings provide the most protection for crossing path users through the use of a red-signal indication to stop conflicting motor vehicle traffic.

A full traffic signal installation treats the path crossing as a conventional 4-way intersection and provides standard red-yellow-green traffic signal heads for all legs of the intersection.

Guidance

Full traffic signal installations must meet MUTCD pedestrian, school or modified warrants. Additional guidance for signalized crossings:

- Located more than 300 feet from an existing signalized intersection
- Roadway travel speeds of 40 MPH and above
- Roadway ADT exceeds 15,000 vehicles



Discussion

Shared use path signals are normally activated by push buttons but may also be triggered by embedded loop, infrared, microwave or video detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street.

Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity and safety.

Additional References and Guidelines

Caltrans. *California Manual on Uniform Traffic Control Devices. 2012.*
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Traffic signals require routine maintenance. Signing and striping need to be maintained to help users understand any unfamiliar traffic control.

Undercrossings

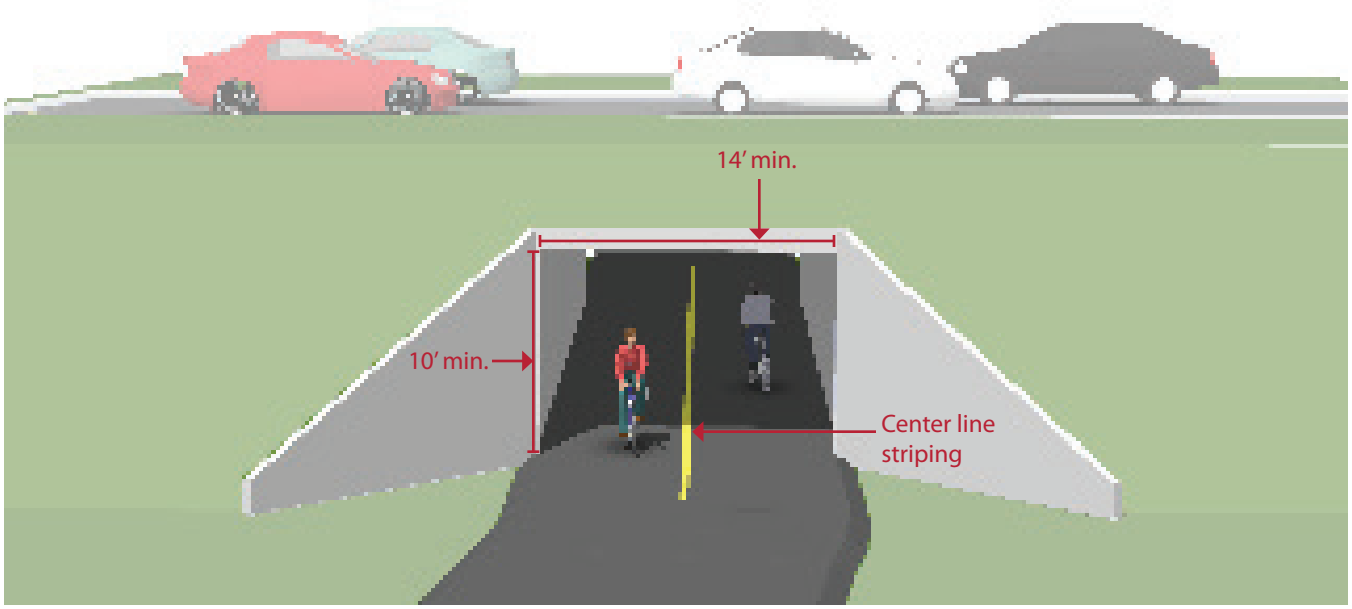
Description

Bicycle/pedestrian undercrossings provide critical non-motorized system links by joining areas separated by barriers such as railroads and highway corridors. In most cases, these structures are built in response to user demand for safe crossings where they previously did not exist.

There are no minimum roadway characteristics for considering grade separation. Depending on the type of facility or the desired user group grade separation may be considered in many types of projects.

Guidance

- 14 foot minimum width, greater widths preferred for lengths over 60 feet.
- 10 foot minimum height.
- The undercrossing should have a centerline stripe even if the rest of the path does not have one.
- Lighting should be considered during the design process for any undercrossing with high anticipated use or in culverts and tunnels.



Discussion

Safety is a major concern with undercrossings. Shared use path users may be temporarily out of sight from public view and may experience poor visibility themselves. To mitigate safety concerns, an undercrossing should be designed to be spacious, well-lit, equipped with emergency cell phones at each end and completely visible for its entire length from end to end.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.

Materials and Maintenance

14 foot width allows for maintenance vehicle access.

Potential problems include conflicts with utilities, drainage, flood control and vandalism.

Overcrossings

Description

Bicycle/pedestrian overcrossings provide critical non-motorized system links by joining areas separated by barriers such as deep canyons, waterways or major transportation corridors. In most cases, these structures are built in response to user demand for safe crossings where they previously did not exist.

There are no minimum roadway characteristics for considering grade separation. Depending on the type of facility or the desired user group grade separation may be considered in many types of projects.

Overcrossings require a minimum of 17 feet of vertical clearance to the roadway below versus a minimum elevation differential of around 12 feet for an undercrossing. This results in potentially greater elevation differences and much longer ramps for bicycles and pedestrians to negotiate.

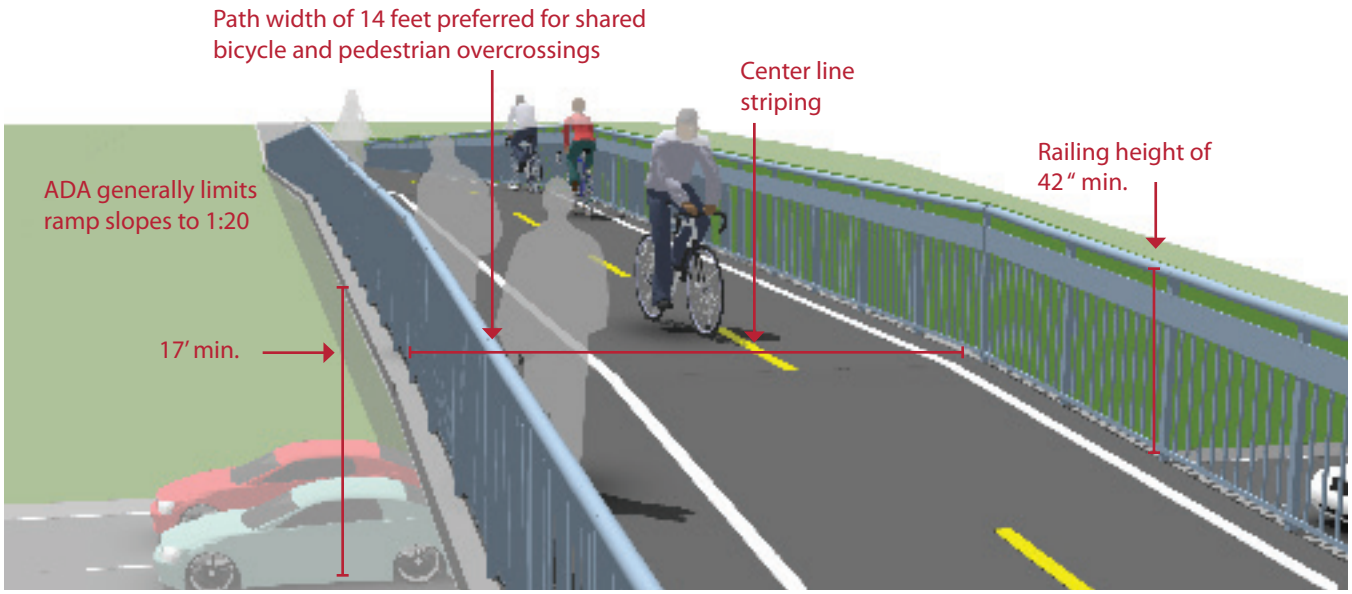
Guidance

8 foot minimum width, 14 feet preferred. If overcrossing has any scenic vistas additional width should be provided to allow for stopping. A separate 5 foot pedestrian area may be provided for facilities with high bicycle and pedestrian use.

10 foot headroom on overcrossing; clearance below will vary depending on feature being crossed.

Roadway:	17 feet
Freeway:	18.5 feet
Heavy Rail Line:	23 feet

The overcrossing should have a centerline stripe even if the rest of the path does not have one.



Discussion

Overcrossings for bicycles and pedestrians typically fall under the Americans with Disabilities Act (ADA), which strictly limits ramp slopes to 5% (1:20) with landings at 400 foot intervals, or 8.33% (1:12) with landings every 30 feet.

Overcrossings pose potential concerns about visual impact and functional appeal, as well as space requirements necessary to meet ADA guidelines for slope.

Additional References and Guidelines

Caltrans. *California Highway Design Manual.* 2012
AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.

Materials and Maintenance

Potential issues with vandalism.

Overcrossings can be more difficult to clear of snow than undercrossings.