Metro

Eastside Light Rail Bike Interface Plan

LACBC
Los Angeles County Bicycle Coalition
Building a Better, Bike-able LA County

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Eastside Light Rail Project

2006

Chapter 1

Introduction

INTRODUCTION

The Eastside Light Rail Bike Interface Plan (BIP) is a community transportation plan that integrates the bicycling needs of residents with the Los Angeles County Metropolitan Transportation Authority's Eastside Light Rail Transit (LRT) line. Previous light rail design plans focused on pedestrian access and are therefore limited to a one-quarter mile radius around each station. The BIP expands the scope of the project by studying access opportunities for residents outside the existing project area through the option of cycling. The plan identifies routes and bikeway design options that best fit the communities in the project area. It also identifies funding sources for project implementation. This report should serve as a guide for implementing the plan, and as a marketing tool for building and maintaining support for the project throughout the implementation process.

EASTSIDE TRANSPORTATION HISTORY

After World War II, the Boyle Heights and East Los Angeles communities were subjected to 30 years of freeway construction resulting in the current regional freeway network. Five freeways traverse these communities, negatively impacting air quality, neighborhood cohesiveness, pedestrian and traffic circulation, and creating visual and noise nuisances for residents. In addition, the area has been exposed to high volumes of automobile and truck traffic due to the density of freeway entrances and exits on local streets.

The Popular East Side Club, ca 1896 from: Los Angeles, An Illustrated History, pp 67-68

Approximately 2,900 housing units were removed and 10,000 persons were displaced as a result of freeway construction in the Boyle Heights community alone. Because the freeways were built prior to the enactment of NEPA and CEQA, no environmental impact documentation was prepared for any of these projects. Current provisions for relocation benefits to displaced persons were non-existent. These issues are of major concern to both current and former residents of the Boyle Heights and East Los Angeles communities, who bore the burden of the major transportation investments without receiving the benefits of increased mobility and enhanced regional connections.

CURRENT CONDITIONS

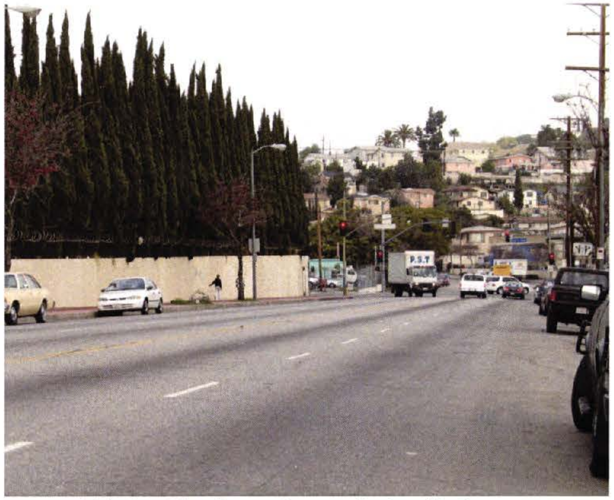
The negative impact of freeways on Boyle Heights/East Los Angeles residents is not limited to air and noise pollution. Freeways have broken up a previously functional street grid leaving a disconnected road network in much of the project area. Neighborhoods are isolated from one another. Local streets are often dead ends. Only arterials or major collector streets consistently cross the freeways and these streets are heavily congested, especially in Boyle Heights. Freeway ramps often draw traffic to local residential or collector streets causing an increase in neighborhood traffic, and making it difficult for bicyclists to encounter

Dead End: Michigan Avenue Stops at I-5

Eastside Freeway Volumes	Average Daily Traffic (ADT)
Interstate 5	**244,000**
Interstate 10	**242,000**
Interstate 710	**182,000**
State Route 60	**215,000**
U.S 101	**163,000**

Existing Bikeways

There are currently four designated bicycle facilities in the project area. All are 'Class III' facilities or 'bike routes' and are indicated as blue lines on the 'Existing, Planned and Proposed Bikeways' map on page six. The Beverly/1st Street bike route extends from Beverly and Hoover west of downtown to 1st and Main, four blocks from the future Little Tokyo Gold Line station. The Main/Spring Street route is a couplet allowing bicyclists to travel northbound on Main and southbound on Spring in Downtown Los Angeles. This route could serve cyclists on their way to Little Tokyo Station at 1st and Alameda. In Boyle Heights, Lorena and 8th Street are designated bike routes. The 8th Street route is an east-west route from Boyle to Olympic. The Lorena Street route is north-south between Cesar Chavez and Grande Vista, and is a potential connector between the Indiana Street station and neighborhoods to the south and west. A review of all Class III 'bike routes' in the City of Los Angeles was being conducted by LADOT concurrently with the Eastside Light Rail Bike Interface Plan



Existing Bike Route: Lorena Facing North toward Cesar Chavez

Previously Planned Bikeways

Local cities and the County of Los Angeles submitted existing bikeway plans to Metro as part of the Bicycle Transportation Strategic Plan (BTSP). The BIP and BTSP were developed simultaneously. The County of Los Angeles and the City of Monterey Park have planned bikeways on several routes. Access to future rail stations was not a primary consideration in the planning of these routes. In only one case (Monterey Pass Road) does a previously-planned route coincide with a route recommended in this plan. Since the BIP focuses primarily on north-south connections to future Gold Line stations, the routes planned by local agencies will provide important additions to the network. The proposed east-west routes (Olympic, 1st, Cesar Chavez/Riggin, and Brightwood) are of particular importance.

Challenges

Freeways in the project area create barriers to local non-motorized travel. Freeway ramps make intersections complicated and intimidating for bicyclists and pedestrians. They also bring outside traffic into residential areas, increasing traffic, noise pollution and air pollution. The existence of freeway ramps on local residential and collector streets also impacts the viability of some bike routes. Indiana Street is an example of a collector or secondary street heavily impacted by freeway traffic. It is also the only continuous roadway leading to the Indiana Street station. In most cases, the project team was able to select routes that avoided difficult intersections. At the intersection of Indiana and 4th Street (see photo below, right) we recommend adding a traffic signal or closing/relocating the freeway exit.

Atlantic, Telegraph, Ferguson, Goodrich and Triggs near I-5

Indiana and 4th Street with 60 Fwy Exit

Opportunities

In order to develop a cost-effective series of bike routes, the project team looked for opportunities to enhance existing infrastructure. Some neighborhood streets already serve as relatively comfortable routes for beginning to intermediate bicyclists. The primary problem on these routes is that cyclists are forced to cross major streets at unsignalized intersections. The addition of traffic signals or median refuges at major intersections will improve these routes for bicyclists. Existing pedestrian bridges and undercrossings could also be enhanced to better accomodate bicyclists.


Existing Ped Bridge over I-5 at Eastman Avenue

BIKE INTERFACE PLAN (BIP)

Route Selection

BIP Routes were selected based on the following criteria:

- Provide access to a future Eastside Gold Line Station
- Primary focus on access from the north and south (except at end of line stations)
- Avoid arterials or other busy streets
- Minimal impact on existing neighborhoods

By following these criteria we identified routes that comfortably provide rail station access for cyclists of all skill levels.

Recommended Routes

Station	Route
Union Station	Ramirez/Center/Santa Fe/Mateo
Little Tokyo	1st Street
	Central Ave
	Ramirez/Center/Santa Fe/Mateo
	Main/Spring[1]
Pico Aliso	No Route Identified[2]
Mariachi Plaza	Echandia/Boyle
	State Street
Soto	Breed Street
	Fickett/Mathews
Indiana	Indiana/Estudillo/Spence
	Rowan Ave or Rowan/Eastman
	Lorena[3]
Ford	Ford Blvd.
Civic Center	Monterey Pass/Mednik/Arizona
Pomona/Atlantic	Woods Ave
	Via Corona or Repetto St

1 The existing bike routes on Main St (northbound) and Spring St (southbound) was not evaluated as part of this project, but it does provide access to Little Tokyo Station. Bicyclists are currenlty permitted to use the peak hour bus lanes on these streets.

2 Most residences served by Pico Aliso Station are within walking distance (0.25 miles). Bicyclists using Pico Aliso Station would be best served by resurfacing of existing streets.

3 Lorena was not evaluated as part of this project, but it is a designated Class III 'bike route' providing access to Indiana Station from the south and west. The City of Los Angeles is currently evaluating this route to determine what improvements—if any—need to be made.

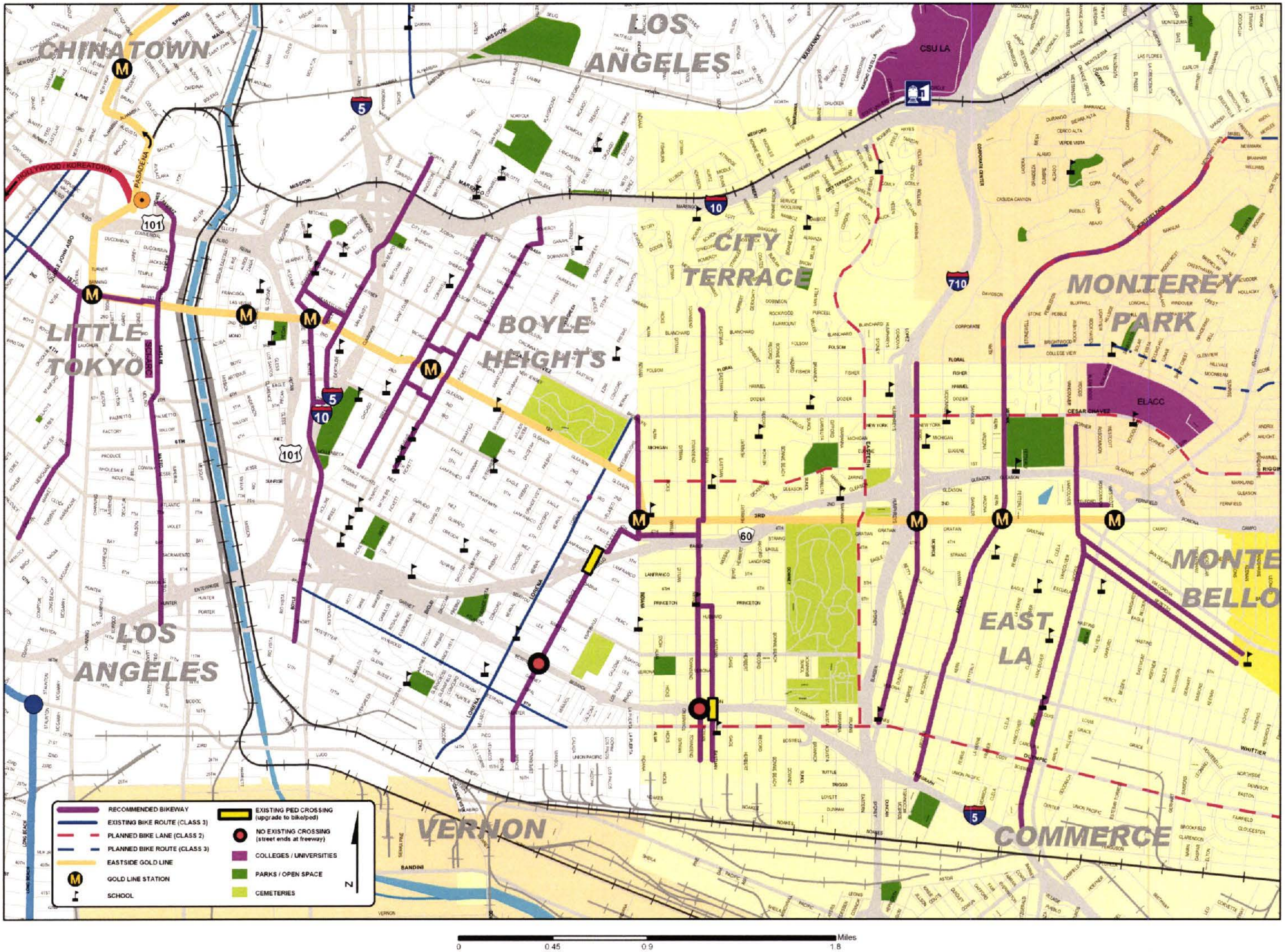
Recommended Improvements

Many of the routes selected would require only minor modifications. Recommended improvements fall into two categories: (1) Basic Improvements and (2) Additional Improvements.

Basic Improvements include signage, stencils, and intersection enhancements. Signage and stencils are intended to inform cyclists and motorists that they are on a bike route. Intersection improvements are recommended when necessary to assist cyclists when crossing major intersections. These include traffic signal actuators that will detect bicyclists at intersections, and the addition of traffic signals or median refuges where a route crosses a major street.

Additional Improvements are intended to further enhance the route for all local residents through traffic calming and new landscaping. These improvements have a greater impact on existing conditions and would have to suit the context and goals of each community. The

Recommended Routes



design concepts section of this report serves as a catalogue of potential improvements for consideration by community members and public agencies.

RECOMMENDATIONS

Some of the recommendations in this section are specific to the Eastside Gold Line extension, but others can be applied generally across Los Angeles County. The purpose of the Eastside Light Rail Bike Interface Plan (BIP) is to outline a series of projects and programs to be implemented, evaluated, improved upon, and expanded to other areas.

Infrastructure

Bike Routes to Transit

Local agencies should develop bikeways on the routes shown on the Recommended Routes map and in Chapter 5.

Initial implementation should include the basic improvements for each route. See conceptual designs in Chapter 4 and detailed lists of improvements in Chapter 5. Local agencies should work with Metro, LACBC and local stakeholders to identify appropriate locations for additional improvements such as bike-friendly traffic calming treatments.

Bike Parking

Bike parking should be installed at all Eastside Gold Line stations in accordance with Metro's Bicycle Parking Plan (2003), Bike-Transit Center Implementation Plan (2004) and the Bicycle Transportation Strategic Plan (2006). Bicycle parking should be located in (1) a highly visible location, (2) near station entrances, while (3) minimizing the potential for conflicts with pedestrians. Metro should work with LACBC to determine optimal locations for bike parking at each station.

Marketing and Education

Bike Maps

The development of bike maps specific to the Eastside LRT corridor will be important because Metro's countywide bike maps are scheduled for release in 2006 and will not include the routes suggested in this report. Bikeway maps should display bike routes to transit, bike parking information, and bike safety information. Detailed bicycle route maps should be displayed at each station. Each map should show the relevant route(s) with all intersecting streets and major destinations. Linear bike route maps similar to Metro's bus route maps should be developed and displayed in bike route signpost boxes. See Chapter 4.

Educational Print Materials

Work with local agencies and LACBC to develop a series of illustrated safety tips and promotional materials to be inserted in bike route signpost boxes and Metro Gold Line display cases. Materials should be relevant for bicyclists and motorists and include (but not be limited to) the following topics:

- Bicyclists' rights and responsibilities
- Proper lane positioning
- Sharing the road
- Passing bicyclists safely in a motor vehicle
- The 'door zone'
- How to get a green light
- Wrong way riding
- Helmet use
- Bike lights
- Hand signals
- How to safely lock your bicycle
- How to use bus bike racks
- How to take your bike on a Metro train
- Economic benefits of bicycling
- Health benefits of bicycling
- Environmental benefits of bicycling

Bike-Transit Workshops

Seminars promoting the safe integration of bicycles and public transit should be periodically conducted at Eastside Gold Line stations. Raffles and giveaways of bicycles, helmets, bike lights, and other bike accessories can be used as incentives for community members to attend and complete these workshops. The goal of workshops should be to promote safe bicycling behavior and the use of bicycles in conjunction with mass transit. Attendees should be encouraged to bring their bicycles and all lessons should be interactive. Groups should be divided by preferred language of instruction (English, Spanish and other languages as necessary). Topics should include (but not be limited to):

- Bike safety check
- Safe street riding skills
- How to lock your bike
- How to take your bike on the Gold Line
- How to use bike racks on buses
- Benefits of bicycling

Research

A portion of project funding should be used for before-and-after studies to evaluate the effectiveness of new bicycle facilities. Research should include before-and-after evaluations of: safe behavior of bicyclists, interaction between bicyclists and motorists, number of bicyclists on a route, and bicycle safety awareness in the project area.

Funding

Bikes Belong

The Bikes Belong Coalition provides funding that can be used to leverage other funding sources for projects that promote bicycling for transportation and recreation.

Eligible Projects: Education or Infrastructure

Available Funding: up to $10,000 per project (some projects over $10K will be considered)

Caltrans - Bicycle Transportation Account (BTA)

The recommended routes in this project are not currently listed in any Caltrans-approved Bicycle Transportation Plan (BTP). If the City or County includes these routes in a future Caltrans-approved BTP, the routes will be eligible for BTA funding.

Eligible Projects: Infrastructure. **Available Funding:** $4.5M per year for the State of California

Caltrans - Safe Routes to School (SR2S)

Ten of the 13 recommended routes provide access to elementary, middle or high schools, making them potential candidates for SR2S funding.

Eligible Projects: Infrastructure. Education may constitute up to 20% of total budget.

Available Funding: $20-30M per year for the State of California

Metro - Call for Projects

Metro has prioritized bicycle projects that provide access to transit, making all of the recommended routes competitive in their Call for Projects.

Eligible Projects: Infrastructure or Education

Available Funding: $10-20M every two years

for Los Angeles CountyMetro - Marketing

Education and marketing projects (bike maps, educational materials, etc) could be folded into ongoing Metro Marketing activities.

Metro - Area Teams & Service Sectors

Metro's Central Area Planning Team and Westside/Central and San Gabriel Valley Service Sectors should continue to work with local agencies and stakeholder groups in identifying projects that will improve bicycling conditions in areas served by the Eastside Gold Line Future projects could include additional bikeways, traffic calming, and ongoing safety and education programs.

Chapter 2

Outreach

COMMUNITY OUTREACH

Public input for this project was obtained through the following means:

- Field Survey Analysis of Local Bicyclists from the Enhanced Public Outreach Project (EPOP)
- Community Bike Rides
- Technical Advisory Committee (TAC)
- Rail Advisory Committee (RAC)

Enhanced Public Outreach Project

In 2003, the Los Angeles County Bicycle Coalition (LACBC) and the Los Angeles County Metropolitan Transportation Authority (Metro) conducted a countywide outreach effort focused on bicyclists in low-income communities. The effort included data collection on bicyclist needs, concerns and travel patterns. One survey was designed to create a demographic profile of bicyclists in low-income areas, and to compare that with the profile of bicyclists who belong to bike clubs and organizations such as the Los Angeles County Bicycle Coalition. Field surveys were used to collect data on bicyclists in low-income areas. Surveys were distributed to members of bicycling programs and organizations by mail and made available on the internet. The following table provides a profile of each group. Bicyclists surveyed in the field tended to be younger, lower-income, Hispanic males.

LACBC Staff interviews bicyclists before the Mariachi Festival in Boyle Heights

Demographic Comparison of Field Survey vs. Mail/On-Line

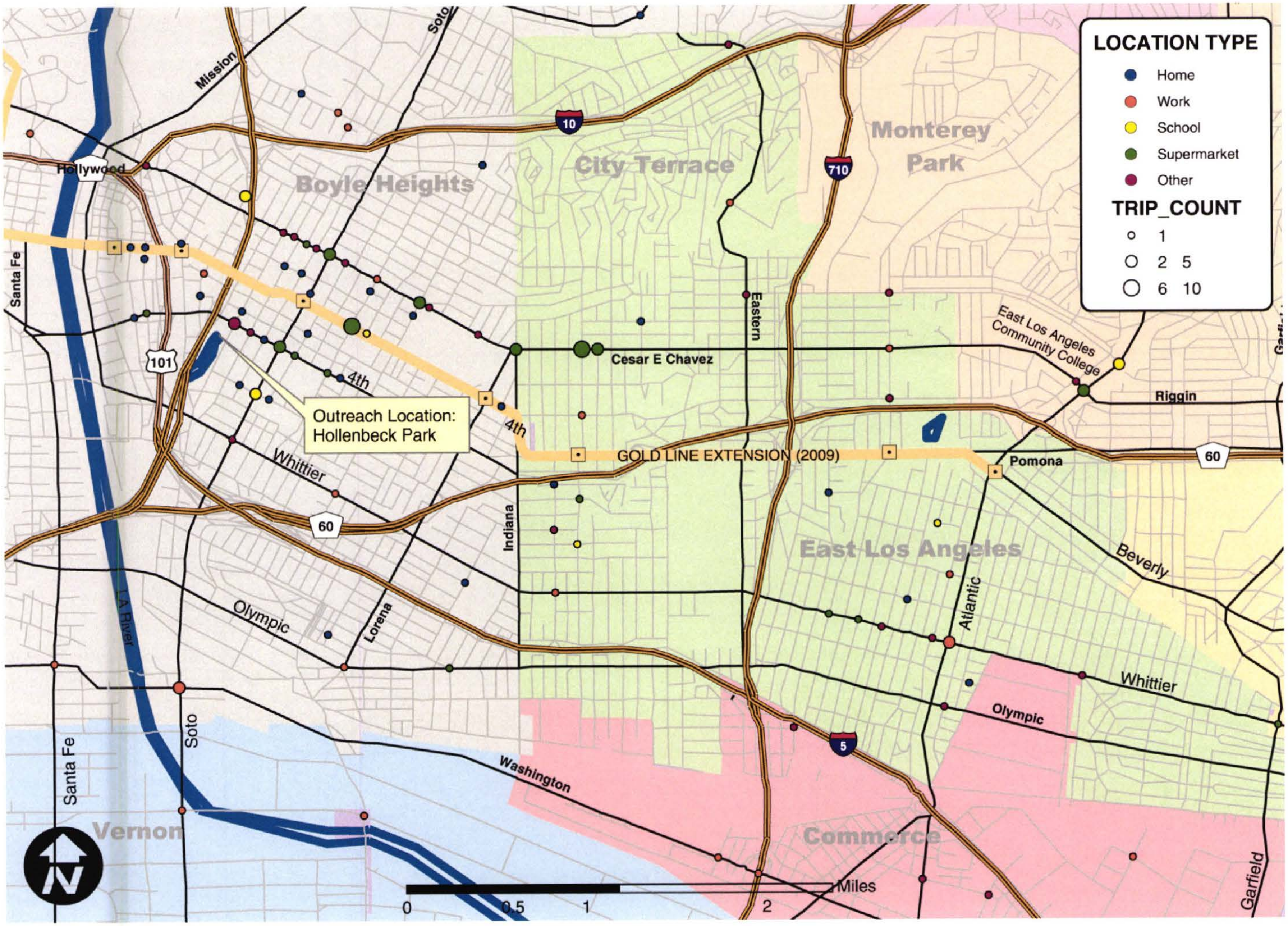
Field	Mail/On-Line
Non-White (79%)	**White (66%)**
Male (79%)	**Male (74%)**
37 years old	**46 years old**
Less than $35,000 Household	**More than $50,000 Household**
Income (64%)	**Income (64%)**
*Median Household income for Los Angeles County is $42,189	

Survey Respondents

As compared with the mail and on-line survey group, bicyclists in low-income areas tended to:

- Ride more often
- Make more utilitarian trips
- Make greater use of bikes with transit
- Use safety equipment less frequently
- Be more concerned about the safety of riding in traffic
- Be more sensitive to obstacles such as a lack of bicycle facilities and exposure to automobile pollution.
- Be uninformed about their rights and responsibilities as bicyclists
- Make most of their trips within three miles of their homes.

Boyle Heights-East LA



An Origin and Destination Survey was also conducted as part of the Enhanced Public Outreach Project. The map on the previous page provides a sample of destinations for bicyclists in the project area. The survey was conducted at Hollenbeck Park during the Festival de los Niños. Most of the destinations are concentrated along major arterials such as Cesar Chavez Avenue, 1st Street, 4th Street, Whittier Boulevard, Soto Street and Atlantic Boulevard. Since these arterials are heavily impacted by automobile traffic, local bicyclists generally wind their way through the broken grid of smaller residential streets in order to access these destinations.

Community Bike Rides

LACBC hosted two community bike rides as a way of engaging community members in the route selection process. The rides were also a way to demonstrate that bicycling is a viable means of transportation for exploring the communities of the greater eastside. Each ride followed a route linking a series of destinations including future transit stations, parks, restaurants, cemeteries, churches, and historical sites. Rides were publicized through:

- locally-targeted LACBC mail and email lists
- Latino Urban Forum e-newsletter
- Local Bike Shops
- Weingart YMCA
- East LA Public Library

Historic Boyle Heights Bike Tour

The Historic Boyle Heights Bike Tour was held on Sunday, March 13, 2005. At this point, the project was in its early stages and the ride provided an opportunity for the project team to obtain early input from interested bicyclists and community members. The tour started at Prospect Park. The first stop was Mariachi Plaza where we discussed the mobility impacts of the new light rail station and the historical elements of the plaza itself. We then explored Hollenbeck Park, the Breed Street Schul, and the Evergreen Cemetery and jogging path. The ride showed how all of these destinations can be accessed through a network of primarily residential streets with low traffic volumes. Riders discussed difficulties with using these streets and potential solutions such as adjusting stop signs and overcoming dead ends and difficult intersections.

Riders meet at Prospect Park in Boyle Heights

Historic Boyle Heights Bike Tour

Boyle Heights Historic Bike Tour

Sunday, March 13th, 2005
9:30 am – 12:30 pm
Ride Begins and Ends at Prospect Park
(near Bridge & Echandia streets, see map on reverse side)

Sunday, March 13th, 2005, 9:30 am

The L.A. Bike Coalition and Metro would like to invite you to participate in a bike ride that explores landmarks in historic Boyle Heights!

This bike ride will kick-off the Eastside Gold Line Bike/Rail Interface Plan and will be part of series of bike rides scheduled for East LA and the Little Tokyo/Arts District. The bike ride will increase residents' consciousness about multi-modal transportation activities and the bike/rail interface plan.

The bike ride will last three hours and highlight Prospect Park, Mariachi Plaza, Hollenbeck Park, Breed Street Schul, and Evergreen Cemetery.

To RSVP, call (213) 629-2142
or email matt@labikecoalition.org

LACBC Los Angeles County Bicycle Coalition
Improving The Bicycling Environment & The Quality of Life

Metro

FREE/GRATIS!! Hablamos español: (213) 629-2142

LACBC 634 Spring Street, Suite 821 Los Angeles, CA 90014 Fax: 213-629-2259 www.labikecoalition.org

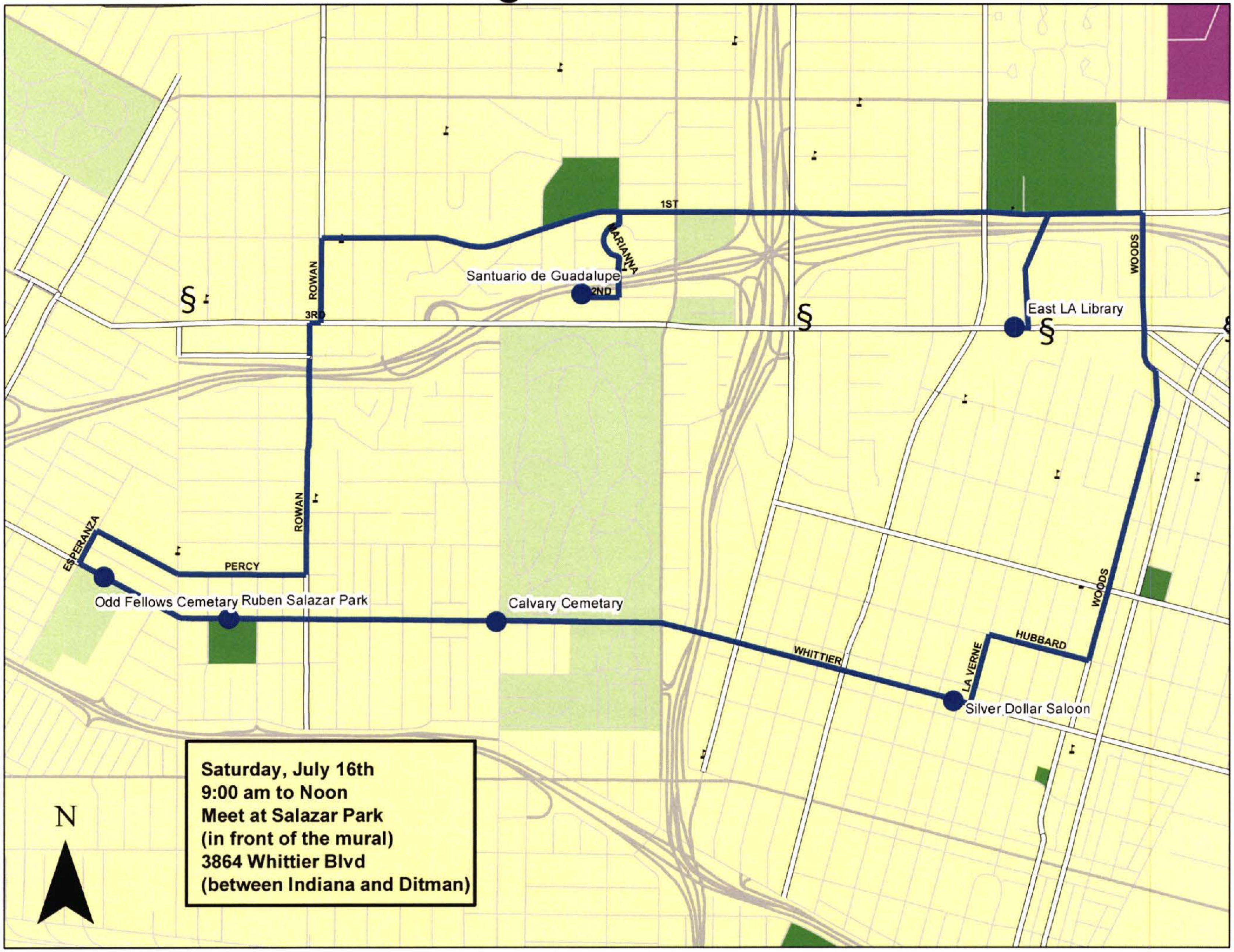
Golden Age of East LA Bike Tour

The Golden Age of East LA Bike Ride was held on Saturday, July 16, 2005. At this point, the project team had evaluated numerous roadways and wanted to get community input on the routes under consideration. The ride began at Salazar Park in East LA and followed the route of the 1970 Chicano Moratorium march from Salazar Park to the site of the historic Silver Dollar Saloon. Other destinations included Calvary Cemetery, the hilltop Santuario de Guadalupe, Odd Fellows Cemetery, and the new East LA Public Library. Riders also got to experience firsthand the existing conditions along two of the recommended bike routes: Rowan Avenue and Woods Avenue. Community members expressed the need to improve crossing conditions at some intersections and also suggested that non-structural factors such as gang activity be considered when selecting routes.

Calvary Cemetery

Riders Stopped for a Tour of East LA Public Library, near the future Civic Center Gold Line Station

Golden Age of East LA Bike Ride



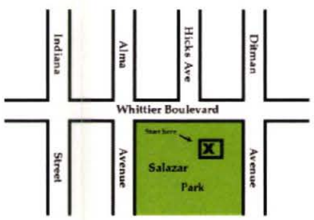
Saturday, July 16th
9:00 am to Noon
Meet at Salazar Park
(in front of the mural)
3864 Whittier Blvd
(between Indiana and Ditman)

Golden Age of East LA Bike Ride

Saturday, July 16th
9:00 am - Noon
Meet at Salazar Park (in front of the mural)
3864 Whittier Blvd (between Indiana and Ditman)

The popular East Los Angeles Bicycle Club, ca. 1896

Join the Bike Coalition and Metro for a bike ride through the history of East Los Angeles. Follow the route of 1970 Chicano Moratorium march from Salazar Park to the site of the historic Silver Dollar Saloon. Other destinations include the Calvary Cemetery, the hilltop Santuario de Guadalupe, Odd Fellows Cemetery, and the brand new East LA Public Library.



This ride is FREE! To RSVP contact Matt Benjamin @ (213) 629-2142 or matt@labikecoalition.org

Metro

Rubén Salazar Park-Paul Betello mural, "La pared que habla, canta y grita"
Native Angelino Paul Botello, assisted by Adalberto Ortiz, Gerardo Herrera, Gustavo Sanchez, composed this mural in 2001 with support from sponsors Fonovisa and los Tigres del Norte. The mural represents the struggles and strengths of everyday men and women. It is painted in acrylic and covers an area of approximately 25' x 50'

Calvary Cemetery
After the closure of the Old Calvary Cemetery, which was located near Our Lady Queen of Angels Perish and where Cathedral High School now stands, New Calvary Cemetery was founded in its present location in 1896. Calvary is the final resting place for two princes of the Roman Catholic Church, Los Angeles Archdiocese Cardinal James Francis McIntyre and Cardinal Timothy Manning, as well as a number of bishops including Bishop Amat. Some of the early Spanish and Mexican settlers, as well as other influential Catholic families of Los Angeles are also buried here including: Pico, Dominguez, Donehy, Hancock, Garvey, Brockman, Guasti, Connell, Wilcox, Higgins, Wolfskill, Forve, Schneider, Rowland, and Kanowsky. Former President Ronald Reagan's parents John E. and Nellie Reagan.

Silver Dollar Saloon (Little Mexico)
On August 29, 1970 Chicanos from all over the United States converged on Laguna Park (what is now called Rubén Salazar Park) to march in the national Chicano moratorium against the Vietnam War. After confrontations between police and protesters escalated into violence, the police occupied the park and attempted to disburse the crowd with tear gas. Later that afternoon, a controversial reporter who was covering the event for the *Los Angeles Times* and KMEX-TV was having a drink with colleagues in this bar. Soon after he arrived, police deputies came and surrounded the bar claiming to be searching for a man with a rifle and fired two 10-inch tear gas projectiles into the bar. One of the missiles fatally struck Rubén Salazar in the head.

East Los Angeles Library
The East Los Angeles Library was established in 1923 when a small collection of books was made available for borrowing in the corner of a local store. Since then the library moved five times to various locations within the community. The new East Los Angeles Library is part of the East Los Angeles Civic Center Renovation Project conceived and founded by Supervisor Gloria Molina. The design and vibrant colors of the new library and its exterior and interior murals reflect the history, culture and energy of the East Los Angeles community. Displayed in the murals on the East and West Walls are the representations of Oscar de la Hoya, Gloria Molina, Antonia Hernandez, Edward Roybal, Edward James Olmos, Esteban Torres, Dolores Huerta, Cesar Chavez, Ruban Salazar, David Siqueiros and Sister Karen Boccalero.

Santuario de Guadalupe
El Santuario de Nuestra Señora de Guadalupe is a replica of a famous church in Mexico City where an indigenous man named Juan Diego of the Chichimeca people is buried. Legend has it that the apparition of the Virgin of Guadalupe was revealed to Juan Diego at this site in Mexico on December 9, 1531. Juan Diego died in 1548 and was beatified on May 6, 1990 by Pope John Paul II. The miraculous image remains preserved at the original church.

Odd fellows Cemetery
Founded in 1850 on what was then the far eastern edge of Los Angeles, Odd Fellows Cemetery celebrates its 155th anniversary this year. Among the old graves stones located here, you can find the names of a few interesting characters including: Edward Schieffelin, a gold prospector whose brother gave the famous town of Tombstone its name; Chris-Pinn Martin, better known by his actor's alias, Leo Carrillo, who played "Pancho" in the original *Cisco Kid*, Medal of Honor recipient and Civil War veteran William W. Fraser (d. 1915); and actor Billy Gilbert who starred on a number of Laurel and Hardy shows. Interestingly, in 1986, the cemetery was also the site of a firestorm of protest when it donated three graves sites to 16,000 fetuses that were discovered on the property of a doctor from an abortion clinic who stored the aborted fetuses in cardboard boxes.

Technical Advisory Committee (TAC)

The primary function of the TAC was to obtain input from all local agencies with jurisdiction over the project area and to coordinate the Bike Interface Plan (BIP) with other projects in the area. TAC meetings were attended by the Project Team and representatives from Caltrans, Metro, the County of Los Angeles, the City of Los Angeles Department of Transportation (LADOT), the City of Monterey Park, the Los Angeles Community College District, and bicycle advocates. Smaller meetings were held as necessary with single agencies to discuss their specific issues in greater detail.

Project Team

Fernando Castro - Caltrans Project Manager

James Rojas - Metro Project Manager

Matt Benjamin - LACBC Project Manager

Kastle Lund - LACBC

Revel Sims - LACBC

Adrian Leung - LACBC

Advisory Committee

Dale Benson - Caltrans

Melanie Bradford - Caltrans

Diego Cardoso - Metro

Lynne Goldsmith - Metro

Ray Sosa - Metro

Henry Gonzales - Metro

Kent Strumpell - LACBC

Norma Garcia - LA County Board of Supervisors (District 1)

David Vela - LA County Board of Supervisors (District 1)

Eric Batman - LA County Department of Public Works

Michelle Mowery - LADOT

Robert Sanchez - LADOT

Amy Ho - City of Monterey Park

Diana Ho - Los Angeles Community College District

Rail Advisory Committee (RAC)

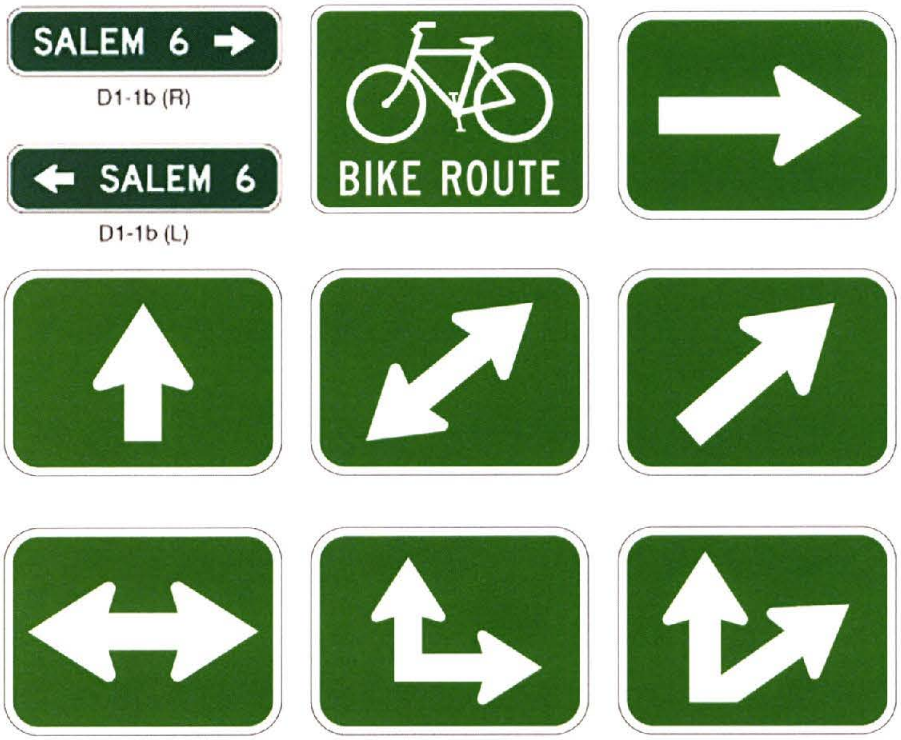
The RAC played an advisory role throughout the rail planning and construction process. Metro and LACBC staff have been present at RAC meetings to provide brief project updates when necessary and to stay informed of decisions that might impact bicycle access.

Chapter 3

Design Toolbox

Signage

Bike Route Signage



Source: Manual on Uniform Traffic Control Devices (MUTCD);
Richard C. Moeur (www.trafficsign.us)

Guidance:

"In urban areas, signs should be placed every 500m (approx. 1/4 mile), at every turn, and at all signalized intersections." -AASHTO

"Bike route signs shall be placed at all points where the route changes direction and periodically as necessary." -Caltrans.

"If used, Bicycle Route Guide signs should be provided at decision points along designated bicycle routes, including signs to inform bicyclists of bicycle route direction changes and confirmations signs for route direction, distance, and destination.

If used, Bicycle Route Guide signs should be repeated at regular intervals so that bicyclists entering from side streets will have an opportunity to know that they are on a bicycle route. Similar guide signing should be used for shared roadways with intermediate signs placed for bicyclist guidance." -MUTCD

Other Standard Signage

Source:
MUTCD;
Richard C. Moeur
(www.trafficsign.us)

The message 'Share the Road' is somewhat ambiguous and subject to misinterpretation, making use of the signage problematic. Some alternative 'non-standard' signage has been developed to address specific safety issues and convey a more precise message to road users.

Non-Standard Signage

In some situations, non-standard signage is used because it conveys the desired message more clearly than standard signage.

Source: LACBC

Source: P. Gianfredo

Bicyclists are generally not allowed to use the freeway network. As a result, drivers on freeways only focus on other motor vehicles. When drivers exit a freeway onto local streets, they need to be reminded of other road users such as bicyclists. 'Watch for Bicyclists' signage should be placed at freeway exit ramps in the project area.

When a travel lane is 'substandard' or not wide enough for bicyclists and motorists to travel safely within the lane, bicyclists should ride close to the center of the lane and motorists must change lanes to pass. The above sign was developed to encourage proper lane positioning for bicyclists and proper passing behavior for motorists. The sign is currently being used in San Francisco. The sign refers to California Vehicle Code Section 21202, the section of the vehicle code listing substandard lane width as a situation where bicyclists do not have to ride 'as far right as practicable'.

Sharrows

A shared-use arrow or 'sharrow' is a pavement stencil that indicates where bicyclists should position themselves on the roadway. A variety of shared-use arrows have been used in cities around the world. A recent study conducted in San Francisco identified the most effective design and suggested that shared-use arrows produce the following benefits:

- Improved lane positioning of bicyclists, encouraging them to ride farther from parked cars
- Drivers give bicyclists more room when passing, reducing the chances of bicyclists being sideswiped
- Reduced wrong-way riding
- Reduced sidewalk riding
- Improved sense of safety of bicyclists

Sharrows can also be used to elevate the profile of bike routes. Typically, only signage is used to alert motorists that they are on a designated bike route. Having sharrow stencils painted on the street in addition to standard signage increases the visibility of the route as well as providing the safety benefits listed above. Other cities currently using sharrows include Denver (CO), Gainesville (FL), Cambridge (MA), Oakland (CA), Portland (OR), Brisbane (Australia), Buenos Aires (Argentina), Paris (France), and Zurich (Switzerland). Locally, the City of West Hollywood Bicycle and Pedestrian Plan calls for sharrow stencils and signage on all future Class III bike routes.

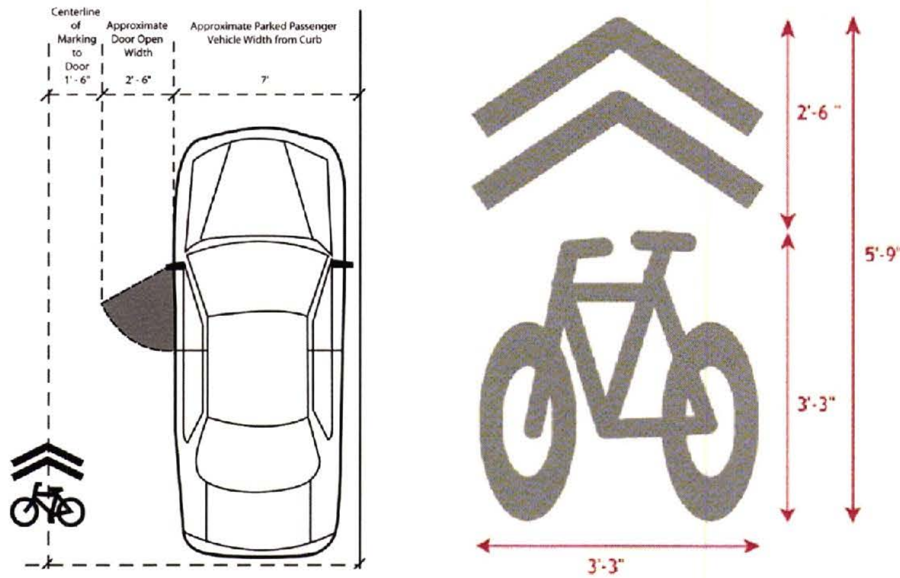
Boulder, Colorado

Source: City of Boulder

Placement of Sharrows

The most important element in the placement of sharrows is the distance from the curb, especially in areas with on-street parking. The California Supplement of the Manual on Uniform Traffic Control Devices (CA-MUTCD) recognizes the importance of sharrows in steering bicyclists away from opening car doors and suggests 11' as a minimum distance from the curb. This minimum is based on the dimensions of a medium-sized vehicle parked close to the curb within a 7-foot parking stall. This does not reflect the reality on the streets within the Eastside Light Rail project area, where larger vehicles use street parking and there are generally no parking stalls other than those in areas with metered parking. Given these conditions, the centerline of the sharrow stencil should be either (1) 13+ feet from the curb or (2) in the center of the travel lane (excluding the portion used for parking).

The following diagram illustrates how sharrows can be used to improve safety around on-street parking:



Source: San Francisco MTA, Alta Planning & Design

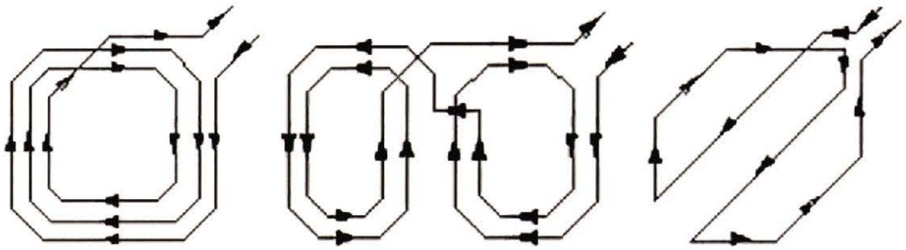
Because the greatest benefit of sharrows is to get bicyclists to ride outside of the door zone, measures need to be taken to keep cars parked a consistent distance from the curb. Parking stripes and/or painted stalls should be installed in order to distinguish the travel lane from the parking lane and encourage consistent parking behavior.

When sharrows are installed on top of existing pavement, the thickness of the paint or hot tape will create a series of bumps. Bicyclists are particularly sensitive to these surface inconsistencies, and-depending on the severity of vibrations caused by the rough surface-may tend to swerve around the pavement marking. Measures should be taken to ensure the smoothest possible surface. The City of Boulder, Colorado has addressed this issue by inlaying a pre-cut marking in hot asphalt or slurry seal. The result is a completely smooth surface and a longer-lasting stencil.

Sharrow Installation:

- Minimum 13' from curb to centerline of sharrow; or
- Center of travel lane (excluding parking area)
- Parking stripes and/or parking stalls to clearly define parking zone
- Inlayed in hot asphalt or slurry seal to create a smooth surface
- Two sharrows per block, per direction

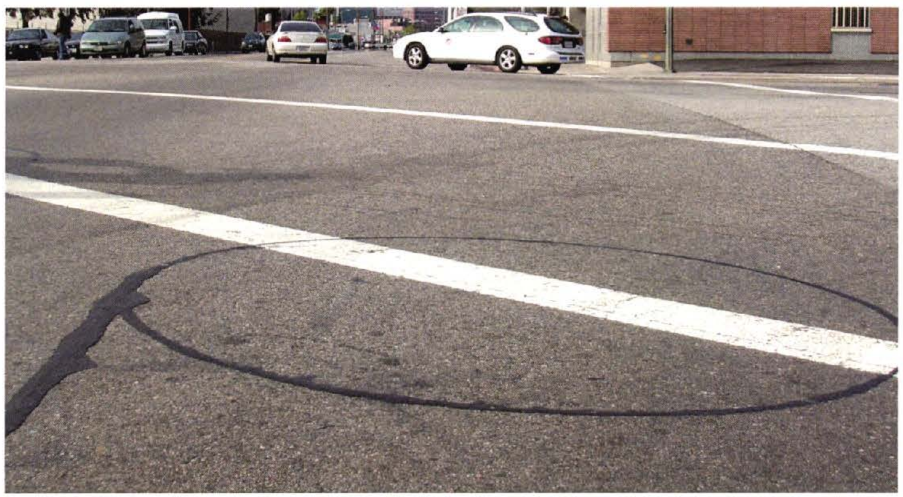
Traffic Signal Actuators



Rectangular Loop Quadrupole Loop Diagonal Quadrupole

Source: Federal Highway Administration

Bicyclists are expected to follow the rules of the road within a transportation system that often ignores cyclists by design. Traffic signals are an example. Bicyclists are expected to stop at all red lights and wait for a green, but at many intersections bicyclists will find that they wait and wait and the light does not change. The bicyclist could walk his or her bike over to the pedestrian button to request a walk signal, or wait for a car to come, or just turn right and alter his or her route. Would motorists ever be subjected to this sort of inconvenience? Many bicyclists have experienced the frustration of being ticketed or admonished for disobeying traffic signals designed only for cars. This is a problem that must be remedied not only on designated bikeways,

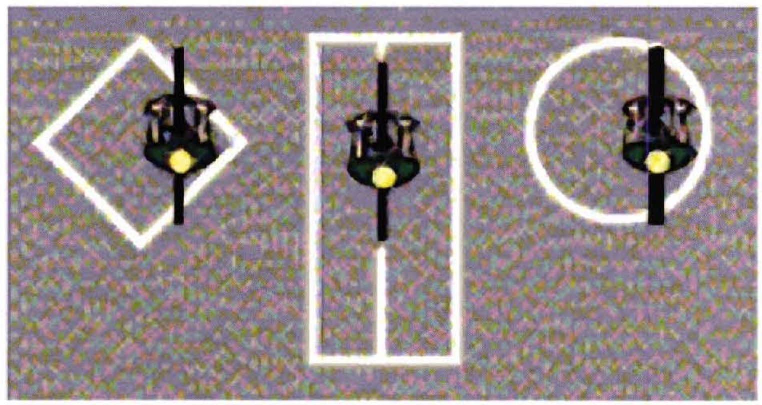


Typical circular traffic signal actuator, Los Angeles (6th & Central)
Source: LACBC

but at every stop line and left turn lane of every signalized intersection with the exception of freeway off-ramps and roadways where bicycles are not permitted.

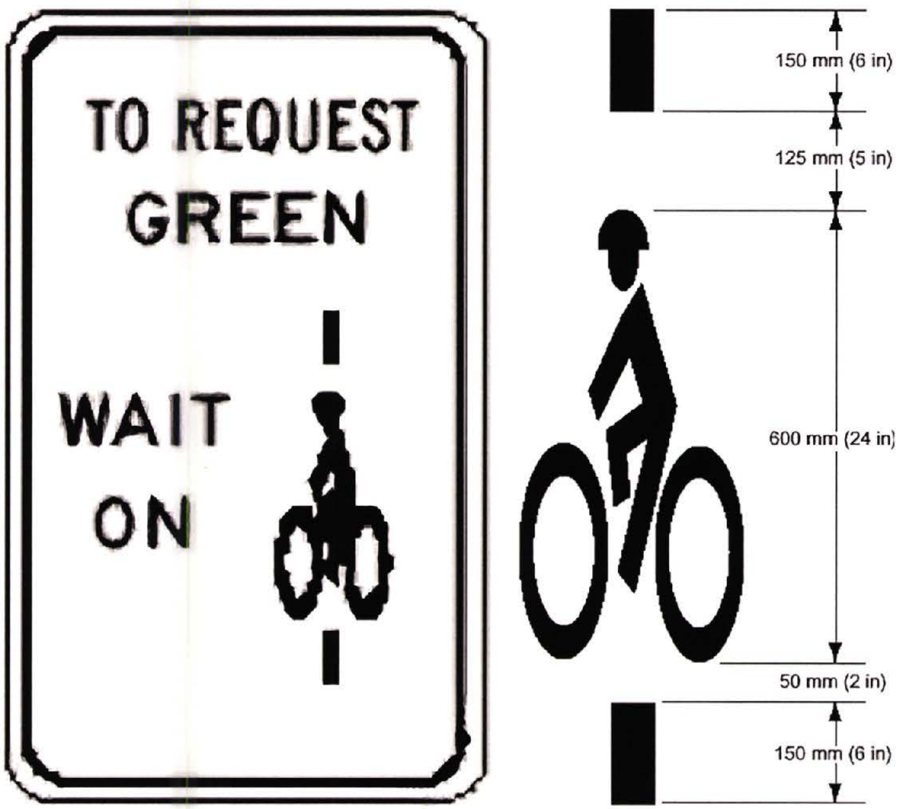
Some traffic signals are set to change based on timing systems. These serve all users since there is no need for detection. Other traffic signals change based on demand using devices known as traffic signal actuators. 'Demand-based signal actuation' is accomplished by a device that detects vehicles approaching the intersection. In the Los Angeles area, most vehicle detection is accomplished by traffic signal detectors embedded in the pavement at intersections near the stop line.

Loop detection systems vary in their sensitivities and should be selected based the conditions at a certain intersection. Quadrupole loops are most sensitive in the center and are best suited for bike lanes. Angular or diagonal quadrupole loops are sensitive over their entire width and are appropriate in lanes shared by bicyclists and motorists (i.e. in every outside lane and turn pocket of every roadway intersection excluding most freeway exits).



This diagram shows the bike-sensitive portion of different loop detectors
Source: Oregon Department of Transportation (ODOT)

Many types of traffic signal actuators can be adjusted to detect bicycles while minimizing false detections from passing cars in adjacent lanes. Existing actuators should be adjusted to detect bicycles where possible. The bike-sensitive portion of the actuator should be marked with the following stencil to indicate where bicyclists should stop to activate the green light cycle. If existing actuators cannot be adjusted to consistently detect bicycles while also minimizing false detections from passing cars, new bike-sensitive loop detectors and stencils should be installed or the signal should revert to a timing system.



Standard stencil and signage show cyclists how to get a green light
Source: MUTCD

For more information:

Alan Wachtel, "Re-Evaluating Signal Detector Loops", Bicycle Forum #50
http://www.bikeplan.com/aw-signals.pdf

Steven G. Goodridge, PhD, Detection of Bicycles by Quadrupole Loops at Demand-Actuated Traffic Signals
http://www.humantransport.org/bicycledriving/library/signals/detection.htm

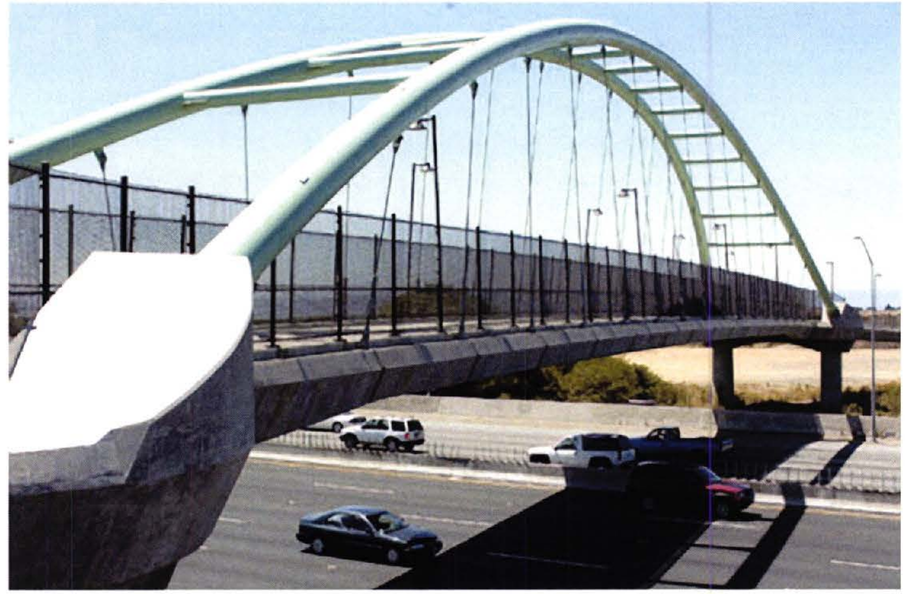
Linda Tracy and John Williams, "Traffic Signals"
http://www.bikeplan.com/signal.html

John Forester, Bicycle Transportation, Second Edition, MIT Press, 1994

John Allen, "Traffic Signal Actuators: Am I Paranoid?"
http://www.bikexprt.com/bicycle/actuator.htm

Freeway Over/Under Crossings

Most residential streets in the area are suitable for bicyclists of all skill levels, but few will allow you to get across the freeways. Streets that do cross the freeways generate more automobile traffic and are less attractive to beginning and intermediate cyclists. In order to make residential bike routes viable, freeway crossings for bicyclists and pedestrians should be developed. This can be accomplished with overcrossings or undercrossings. Several pedestrian overcrossings already exist in the project area. A pedestrian undercrossing at Michigan Avenue and I-5/I-10 has been closed. Overcrossings and undercrossings are the most expensive type of bike facility. Project costs depend on the length of the crossing, the amount of right-of-way that needs to be required, and the clearance height for going over or under a freeway. Key safety elements include visibility and the clear separation of pedestrian traffic from bicycle traffic. Adequate lighting and clear lines of sight will limit the risk of crime and collisions.



Berkeley Bicycle/Pedestrain Bridge over I-80: Berkeley, CA

I-80 Freeway Undercrossing: Davis, CA

Baum Bike Bridge over Los Feliz Blvd: Los Angeles, CA

Traffic Calming

Traffic calming is a popular way to increase safety and improve the quality of life in residential neighborhoods. It is intended to reduce non-local automobile traffic on local streets. This makes the local streets quieter and safer for residents and their children to walk, bicycle and play. The most effective traffic calming is designed in a way that reduces automobile traffic without restricting the flow of bicyclists and pedestrians. In the following pages you will see examples of traffic calming efforts from the perspective of bicyclists and pedestrians.

Some common traffic calming treatments include:

- Traffic Diverters
- Partial Street Closures
- Chokers
- Median Refuges / Crossing Islands
- Traffic Circles
- Speed Humps/Tables

All of these devices discourage non-local traffic on residential streets. This is achieved by restricting automobiles from entering a street at certain locations. A bicycle-friendly traffic diverter restricts motor vehicle traffic, but allows bicyclists to pass unimpeded.

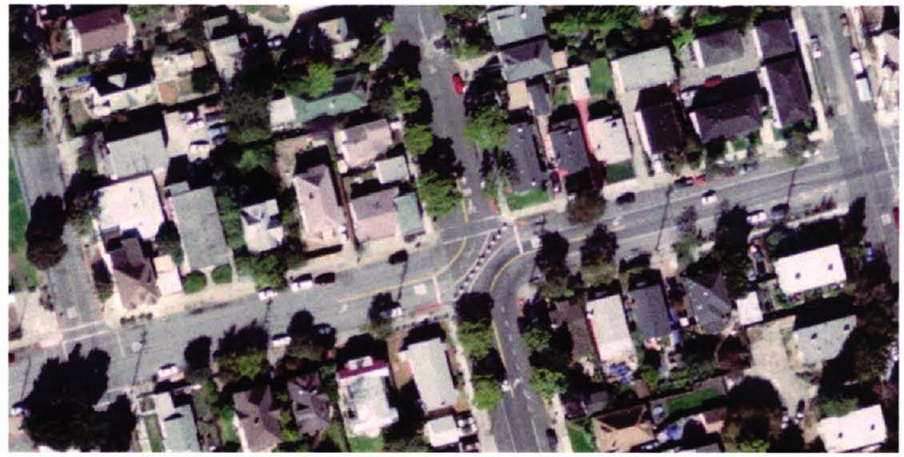
Benefits

- Reduced through traffic on residential streets
- Provides safer more comfortable environment for residents, pedestrians and bicyclists

Diagonal Traffic Diverters: Berkeley, CA

The bike-friendly diverters used in Berkeley extend diagonally through an intersection, from corner to corner, forcing motor vehicles to turn to the right or left while allowing bicyclists and pedestrians to continue in any direction.

Traffic Diverters (Berkeley, CA)



Sources: PBIC (top), USGS (bottom)

Diagonal Diverters (Berkeley, CA)			
	Straight	Left	Right
Local Street #1			
Bicyclists / Pedestrians	X	X	X
Motorists			X
Local Street #2			
Bicyclists / Pedestrians	X	X	X
Motorists		X	

Partial Street Closure: Pico Union, Los Angeles

Planters form a partial street closure to reduce traffic on a street in the Pico-Union neighborhood of Los Angeles. Spacing between planters allows bicyclists and pedestrians to move freely throughout the neighborhood.

Pico-Union neighborhood, Los Angeles

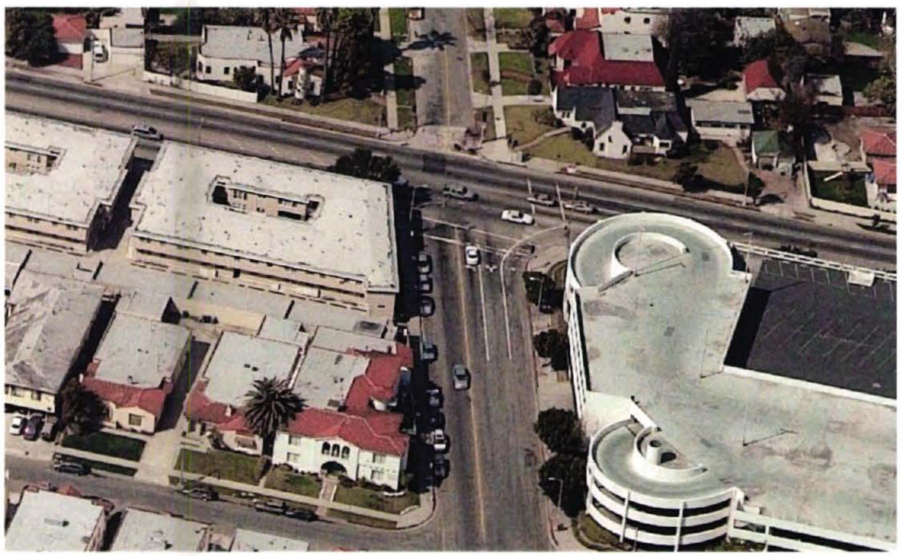
Sources: LACBC (top), USGS (bottom)

Partial Street Closure (Pico-Union, LA)			
	Straight	Left	Right
Local Street (Northbound)			
Bicyclists / Pedestrians	X	X	X
Motorists		X	X
Local Street (Southbound)			
Bicyclists / Pedestrians	X	X	X
Motorists			
Main Street (Eastbound)			
Bicyclists / Pedestrians	X	X	X
Motorists	X		X
Main Street (Westbound)			
Bicyclists / Pedestrians	X	X	X
Motorists	X	X	

Choker: Miracle Mile, Los Angeles

This choker in Los Angeles prevents motorists from entering a local residential street from the east. Residents of the local street can exit at this intersection, but must turn right. This particular choker was not designed to allow bicyclists to pass unrestricted, but could be modified with signage excepting bicyclists from the access restriction.

Miracle Mile (8th & Fairfax), Los Angeles
Source: LACBC



Source: USGS

Choker (Miracle Mile, LA)			
	Straight	Left	Right
Local Street (Eastbound)			
Bicyclists / Pedestrians*	X	X	X
Motorists			X
Local Street (Westbound)			
Bicyclists / Pedestrians*	X	X	X
Motorists		X	X
Main Street (Northbound)			
Bicyclists / Pedestrians*	X	X	X
Motorists		X	X
Main Street (Southbound)			
Bicyclists / Pedestrians*	X	X	X
Motorists	X	X	

*After bicyclist-friendly modifications

Median Refuge / Crossing Island: Location Unknown

At this intersection with a raised median, bicyclists can move in any direction while automobile movements are restricted. Bicyclists on the local street can to go straight or turn left onto the busier street, and the median refuge / crossing island makes this easier by providing the bicyclists with a refuge in the center of the busier street. Flowers, grasses, or other low vegetation can be planted in the median to make it more attractive.

Median Refuge / Crossing Island (location unknown)
Source: Pedestrian and Bicyclist Information Center (PBIC)

Median Refuge			
	Straight	Left	Right
Local Street			
Bicyclists / Pedestrians	X	X	X
Motorists			X
Busy Street			
Bicyclists / Pedestrians	X	X	X
Motorists	X		X

Adjusting Stop Signs

Adjusting stop signs is not really a traffic calming technique because-when done alone-it actually allows road users to maintain their cruising speed for longer distances. The purpose of adjusting or turning stop signs on a bike route is to minimize the number of stops for bicyclists who are more sensitive to the loss of momentum than automobiles. In order to avoid encouraging more and faster through traffic on residential streets, adjusting stops signs should be used in conjunction with other traffic calming efforts. The 'Bike Boulevard' image on the following page provides an example of how turning stops signs can work in conjunction with other traffic calming treatments.

Traffic Circles

Traffic circles do not restrict the movement of any vehicles in any direction. In many cases, traffic circles or 'roundabouts' improve traffic flow by eliminating stop signs on residential streets. Roundabouts are advantageous because they cause automobile traffic to slow down at intersections, without forcing bicyclists to stop and lose momentum. Traffic circles can be used instead of or in conjunction with turning stop signs in order to calm traffic and make a route more attractive for bicyclists.

Traffic Circle, West Holllywood
Source: LACBC

Speed Humps/Speed Tables

Speed humps or speed tables with gradual slopes can be used to slow faster automobile traffic without impacting bicyclists traveling at moderate speed.

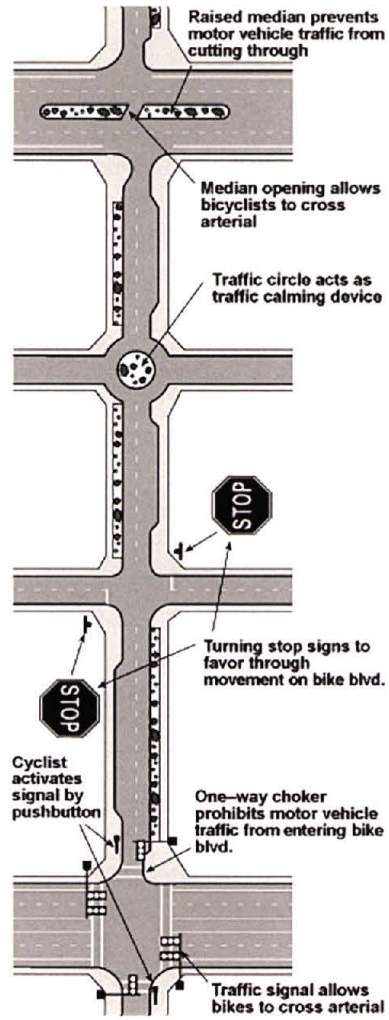
Typical speed hump, Los Angeles
Source: LACBC

Bicycle Boulevards

Bicycle Boulevards are developed by implementing a series of bicycle-friendly traffic calming treatments along a roadway. Bicycle boulevards are generally developed on local streets that parallel a major arterial or commercial corridor. Signage is used to direct bicyclists to important destinations. Severe congestion on arterials and commercial streets in the project area make bicycle boulevards on local streets an attractive way to improve bicycle access to Eastside Gold Line stations.

One of the great advantages of bicycle boulevards is that they allow the community to decide which types of traffic calming best serve their needs. Any variety of bike-friendly traffic calming treatments can be implemented on a given street. Bike boulevards also provide engineers with design flexibility and the opportunity to find creative solutions to residents' traffic concerns.

The following graphic provides just one example of how multiple traffic calming devices can create a bicycle boulevard:



Bike Boulevard Segment.
Source: Oregon Department of Transportation (ODOT)

Bike Lanes

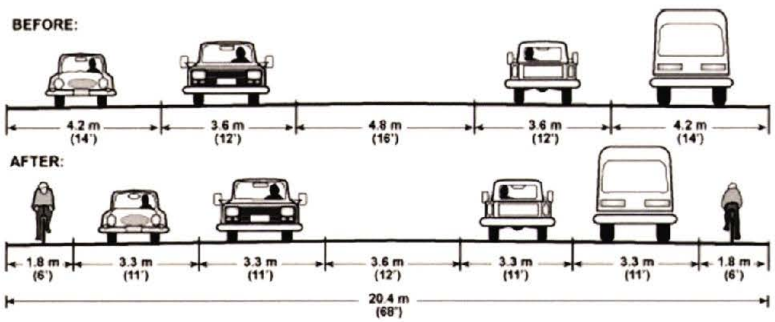
Bike Lanes can be accommodated in several ways:

- Narrowing Travel Lanes
- Road Diets
- Reducing or Relocating On-Street Parking
- Road Widening

Since road widening is costly and impractical in a built-out urban environment such as Los Angeles, it will not be discussed in this report. At the end of this section we will discuss the safety issues surrounding bike lanes and the 'door zone'.

Reducing the Width of Travel Lanes

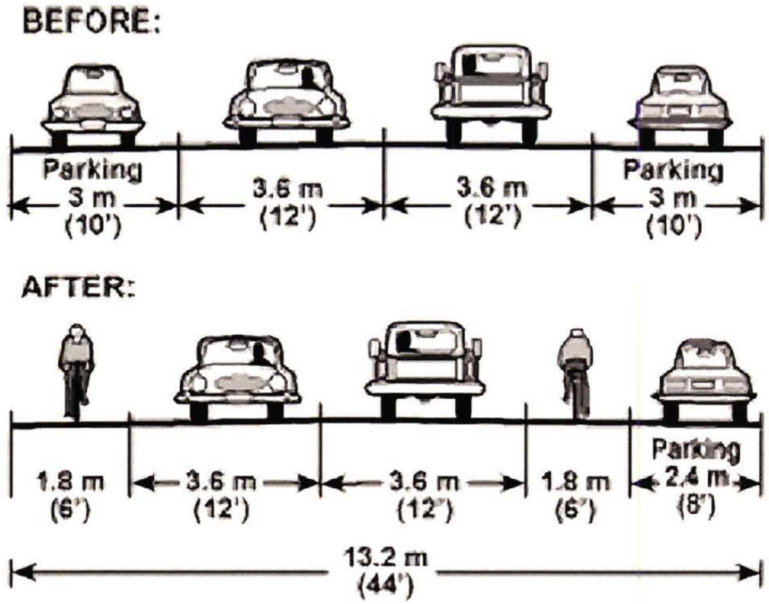
A relatively easy way to accommodate bike lanes is to re-stripe existing roadways with excess lane width. Under this scenario there is no need to make difficult decisions about lane removal or the use of roadways for public parking. Roadways with excess lane width are very limited in the project area, especially in Boyle Heights. However, there may be situations where a bike lane can be added primarily through lane width adjustments.



Source: ODOT

Reducing or Relocating On-Street Parking

In areas where parking utilization is low, parking can be removed on one or both sides of the street in order to accommodate bike lanes. If parking is well used, it can be relocated to a side-street or through the provision of municipal parking lots. City owned parking lots are common in some of the City's busiest business districts, and could be used to offset parking losses due to bike lane striping on commercial arterials.



Source: ODOT

Road Diets

A road diet consists of reducing the number of motor vehicle lanes on a street in order to calm traffic, accommodate other modes or simply beautify a roadway. For the purposes of this project, we will be considering implementing road diets in order to accommodate bike lanes. The images on the following page show one of the more common types of road diets where a street with four travel lanes (two in each direction) is reduced to three lanes (one in each direction with a center turn lane) in order to accommodate bike lanes on either side of the roadway. This is sometimes called a '4-3 Road Diet'.

According to the Federal Highway Administration (FHWA):

"Under most average daily traffic (ADT) conditions tested, road diets have minimal effects on vehicle capacity, because left-turning vehicles are moved into a common two-way left-turn lane. However, for road diets with ADTs above approximately 20,000 vehicles, there is a greater likelihood that traffic congestion will increase to the point of diverting traffic to alternate routes.

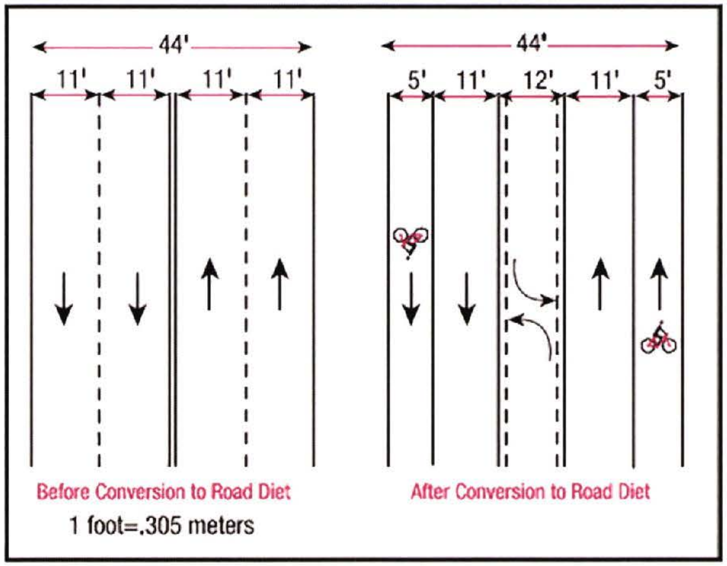
Road diets can offer potential benefits to both vehicles and pedestrians. On a four-lane street, drivers change lanes to pass slower vehicles (such as vehicles stopped in the left lane waiting to make a left turn). In contrast, drivers' speeds on two-lane streets are limited by the speed of the lead vehicle. Thus, road diets may reduce vehicle speeds and vehicle interactions during lane changes, which potentially could reduce the number and severity of vehicle-to-vehicle crashes. Pedestrians may benefit because they have fewer lanes of traffic to cross, and because motor vehicles are likely to be moving more slowly. The Federal Highway Administration (FHWA) report Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations found that pedestrian crash risk was reduced when pedestrians crossed two- and three-lane roads, compared to roads with four or more lanes."

More Information on Road Diets:

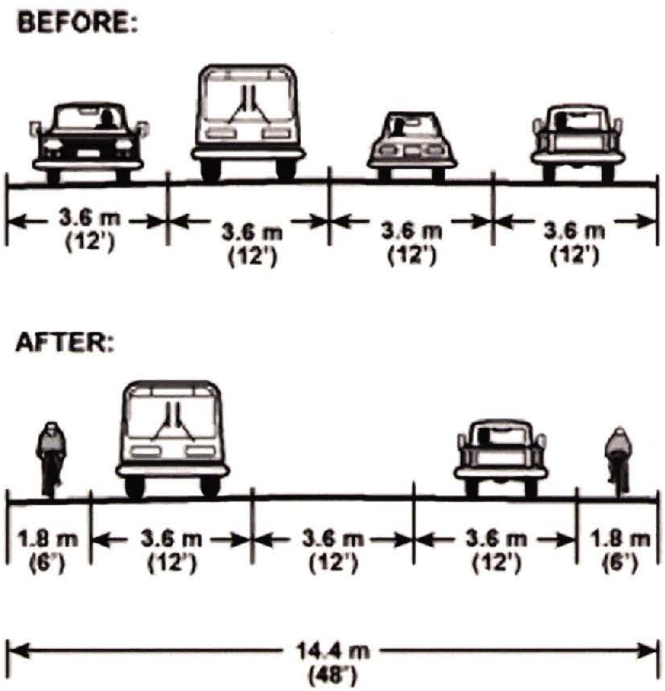
FHWA Summary Report: Evaluation of Lane Reduction "Road Diet" Measures and Their Effects on Crashes and Injuries
http://www.tfhrc.gov/safety/hsis/pubs/04082/index.htm#info

Burden, D. and P. Lagerwey. Road Diets: Fixing the Big Roads
http://www.walkable.org/download/rdiets.pdf.

Welch, T. "The Conversion of Four-Lane Undivided Urban Roadways to Three-Lane Facilities." Presented at the Transportation Research Board / Institute for Transportation Engineers Urban Street Symposium, Dallas, TX, June 28-30, 1999.



Source: FHWA



Source: ODOT

The Door Zone and Bike Lanes

The 'door zone' can be described as the portion of a roadway to the left of parked cars that can be blocked by an opened car door. Numerous cyclists have been killed or injured in door-zone-related crashes. This type of collision is especially common in urban business districts and other areas with high turnover of street parking. A recent study in Toronto, Canada found that this type of collision accounted for 12% of all motorist-cyclist collisions. Studies in Boston and Santa Barbara found opening car doors to be responsible for around 16% of motorist-cyclist collisions. Unfortunately, many urban bike lanes are either partially or entirely within the door zone. Measures should be taken to create separation between bike lanes and the 'door zone'. This can be achieved by widening bike lanes and leaving adequate space between the edge of the parking stall and the rightmost stripe of the bike lane. In order to maintain the maximum amount of road width for motor vehicle lanes, municipalities often implement the minimum width standards of Caltrans and/or AASHTO when installing bike lanes adjacent to on-street parking. These minimum standards do not ensure that bike lanes are clear of the door zone. The issue of the door zone and bike lanes is currently being studied by the Bicycle Technical Committee of the National Committee on Uniform Traffic Control Devices (NCUTCD). This could potentially lead to new standards for bike lanes adjacent to on-street parking. Check the NCUTCD website for updates (http://www.ncutcd.org). In the meantime, developing safe bike lanes adjacent to on-street parking requires that agencies exceed these standards in order to ensure that bike lanes are striped outside the door zone.

For more information on bike lane design standards:

AASHTO: Guide for the Development of Bicycle Facilities

Caltrans: Highway Design Manual, Chapter 1000: Bikeway Planning and Design

Manual on Uniform Traffic Control Devices (MUTCD), Chapter 9: Traffic Controls for Bicycle Facilities

MUTCD (California Supplement), Chapter 9: Traffic Controls for Bicycle Facilities

For critiques of existing design standards see:

John S. Allen: Bike Lane Guide Deception (www.truewheelers.org)

Wayne Pein: AASHTO and Door Zone Bike Lanes (2004) (www.humantransport.org/bicycledriving/library/AASHTO_DZBL.pdf)

A driver opens her door into a bike lane
Source: LACBC

Chapter 4

Design Concepts

DESIGN CONCEPTS

Educational Design Opportunities

Education is costly and most bicycle transportation funding is available for capital (infrastructure) projects. While there is no substitute for a strong, face-to-face educational curriculum, educational elements should be incorporated into bikeway design wherever possible. The following conceptual designs attempt to incorporate educational elements.

Signpost Boxes

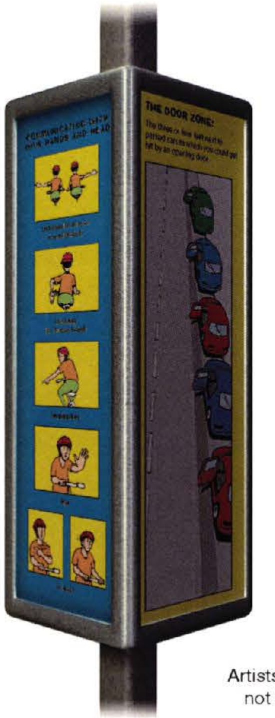
Signpost boxes can be used to disseminate bicycle safety information throughout the community. Signpost boxes are currently used on Metro bus stop signs to provide transit information.

Artists rendition: not to scale.

These same boxes could be used on bike route signage to disseminate bicycle safety and bike-transit information. Each signpost box contains four rectangular panels. A series of panels should be developed using color imagery and bilingual text explanations (if necessary) to convey a variety of messages related to bicycle transportation. Topics should include, but not be limited to:

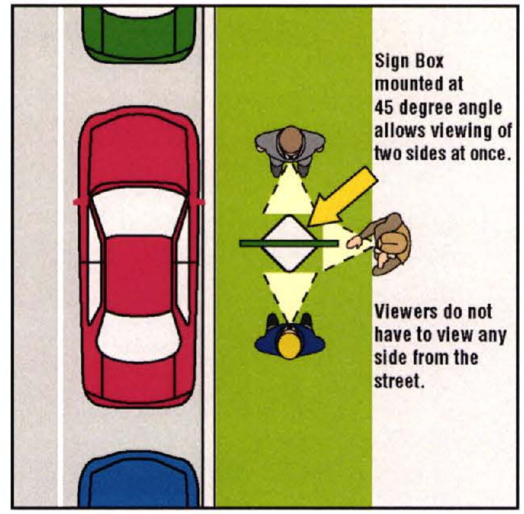
- Bicyclists' rights and responsibilities
- Proper lane positioning
- Sharing the road
- Passing bicyclists safely in a motor vehicle
- The 'door zone'
- How to get a green light
- Wrong way riding
- Helmet use
- Bike lights
- Hand signals
- How to safely lock your bicycle
- How to use bus bike racks

- How to take your bike on a Metro train
- Economic benefits of bicycling
- Health benefits of bicycling
- Environmental benefits of bicycling



Artists rendition:
not to scale.

The information in signpost boxes will be targeted at the general public. Bicyclists will not be able to read the messages as they ride down the street, but the information will be visible to pedestrians walking along or near bike routes. Pedestrians include everyone: motorists who have just parked their cars, people walking to or from home, children playing in the neighborhood, transit users waiting for or getting off of buses, and bicyclists who happen to be walking at the time. Signpost boxes will be between the sidewalk and the street and should be oriented to cross the plane of the bike route sign at a 45 degree angle. This will ensure that all four signpost panels are visible to pedestrians without entering the roadway.

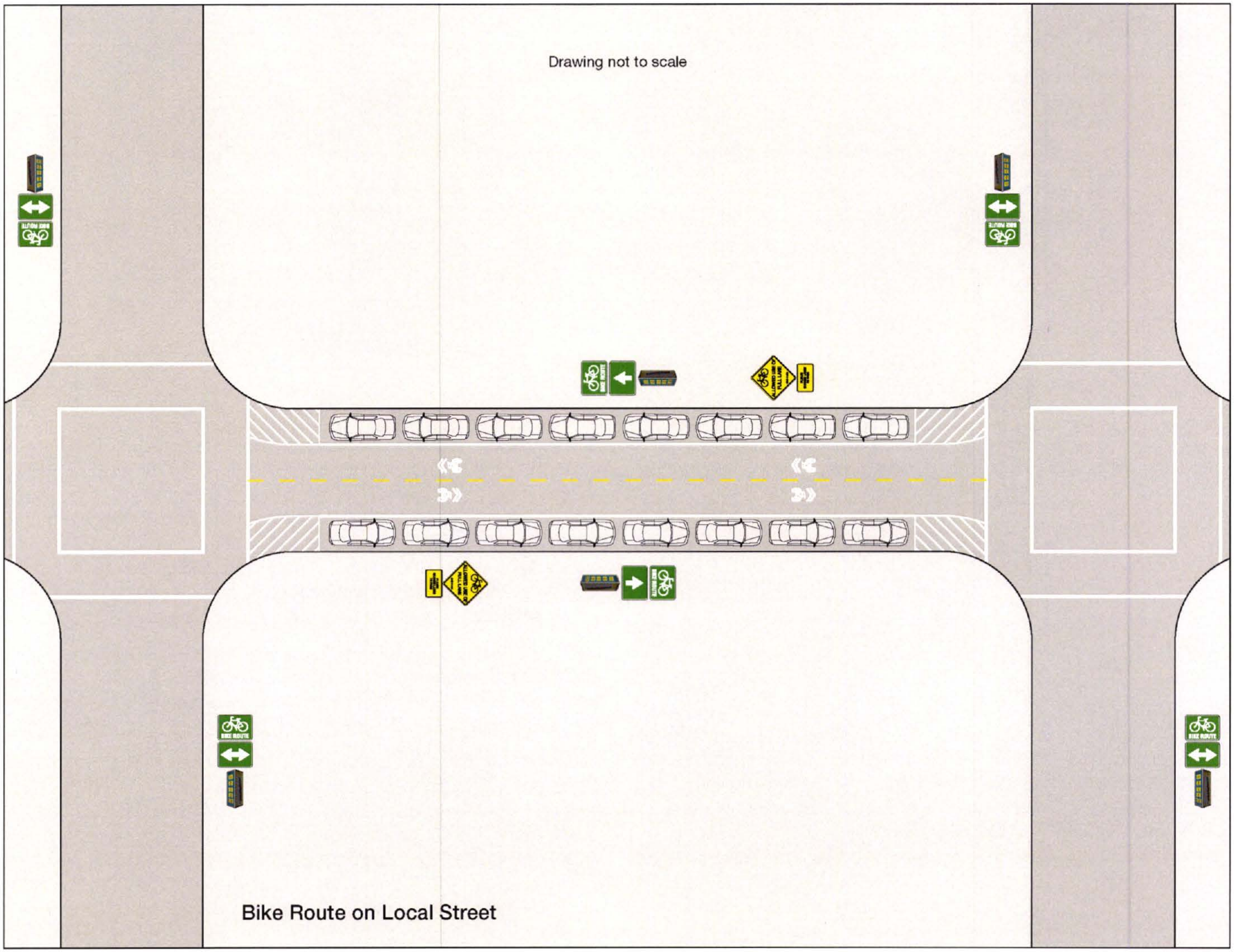


Bike Route Concepts

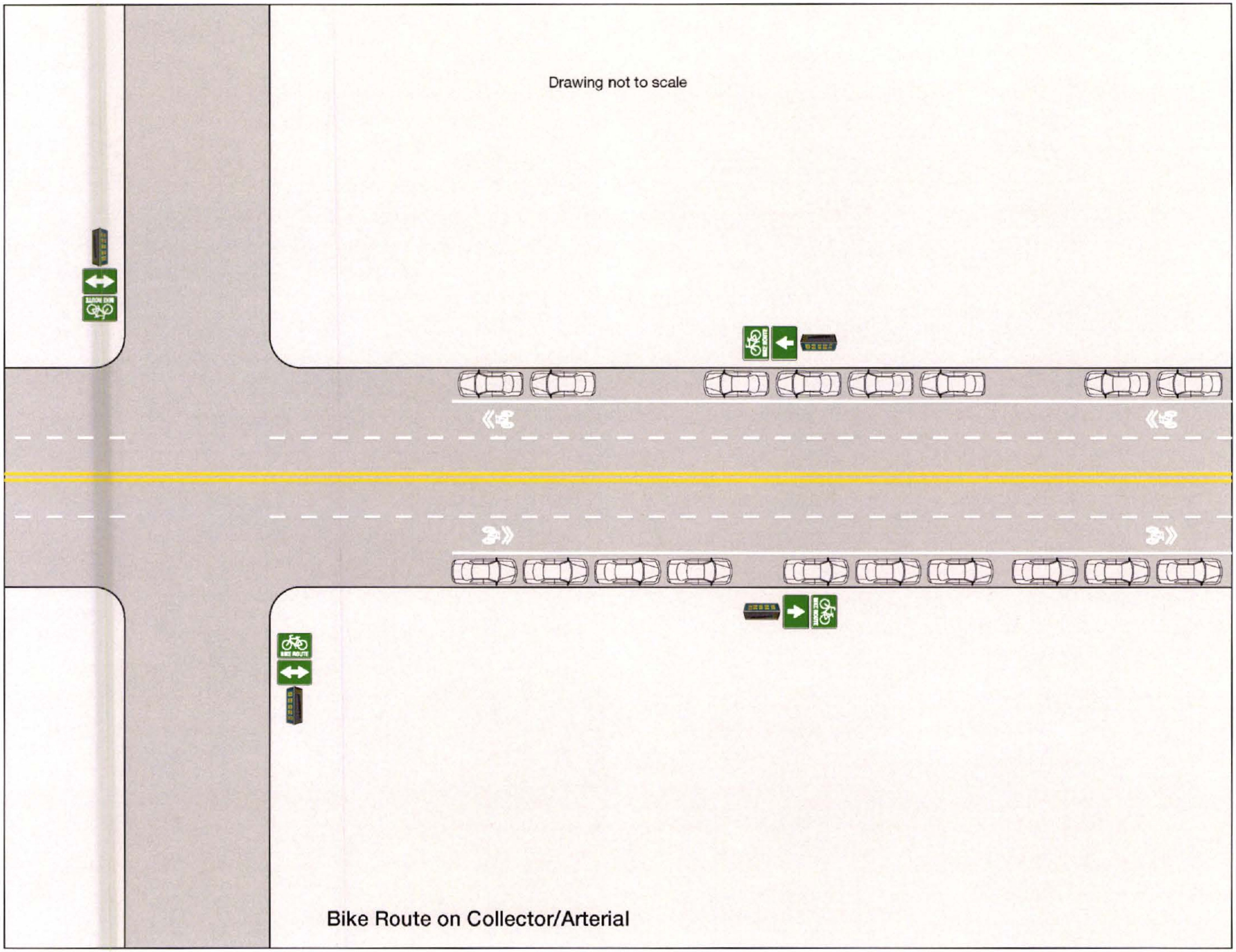
The following pages show conceptual designs for minimal bicycle transportation improvements along the selected routes. The drawings focus on signage, stenciling, striping and intersection improvements. Traditional guidance on the implementation of bike routes is limited and generally leads to no significant benefit to bicyclists. The designs shown here exceed the minimum bike route standards and are intended to improve bike route visibility, bicyclist lane positioning, motorist passing behavior, general bike safety awareness, and intersection functionality.

Additional improvements would include bicycle-friendly traffic calming treatments where appropriate in order to create 'bicycle boulevards' (see Design Toolbox, Chapter 3).

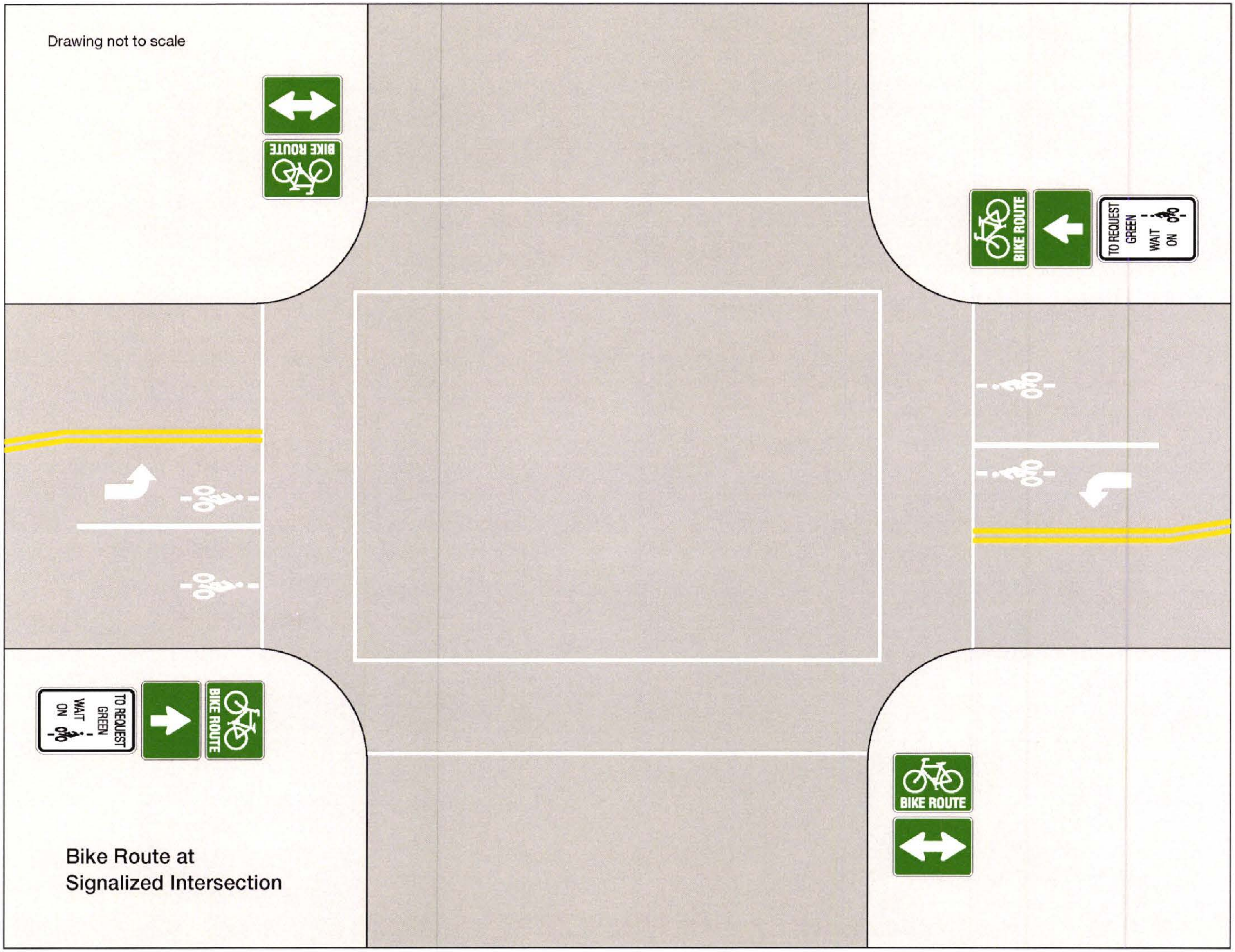
Design standards for bike lanes are described in more detail in Chapter 1000 of the California Department of Transportation Highway Design Manual. Here too, the minimum design standards can be problematic, particularly in areas with on-street parking and measures should be taken to ensure that bicyclists will not be directed to ride in the 'door zone' (see Chapter 3). The issue of the 'door zone' and bike lanes is currently being studied by the National Committee on Uniform Traffic Control Devices.

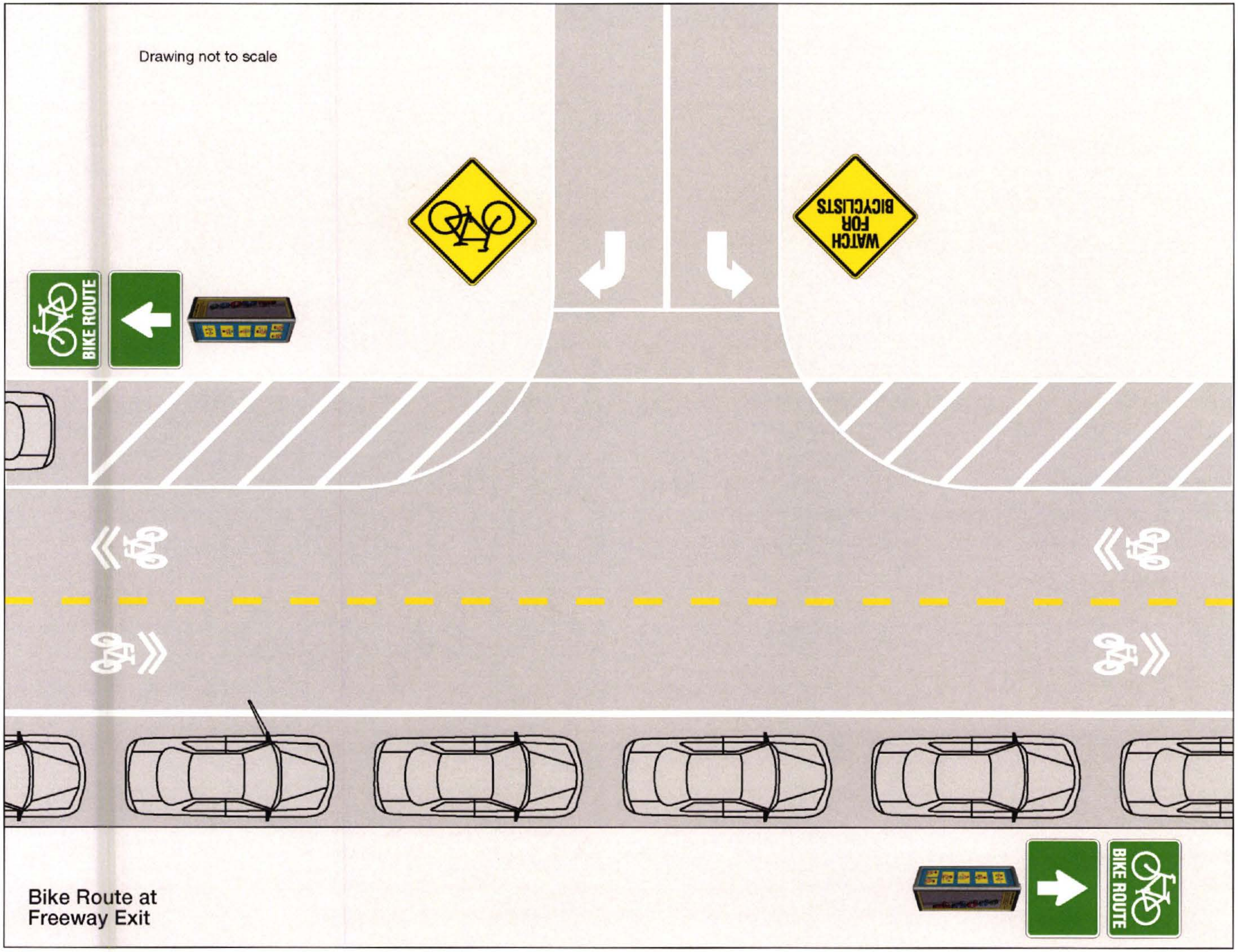


Bike Route on Local Street



Bike Route on Collector/Arterial


Drawing not to scale
BIKE ROUTE
BIKE ROUTE
TO REQUEST GREEN WAIT ON
TO REQUEST GREEN WAIT ON
BIKE ROUTE
BIKE ROUTE
Bike Route at Signalized Intersection



Bike Route at
Freeway Exit

Chapter 5

Implementation

Ramirez/Center/Santa Fe/Mateo

Route	Length
Ramirez/Center/Santa Fe/Mateo	**2.1 mi**
–Ramirez	0.1 mi
–Center	0.4 mi
–Santa Fe	0.5 mi
–Mateo	1.1 mi

Estimated Cost:

$18,000–$83,000 (excluding cost of resurfacing)
$114,000–$1,710,000 (including resurfacing)

for cost estimate methodology see Appendix A

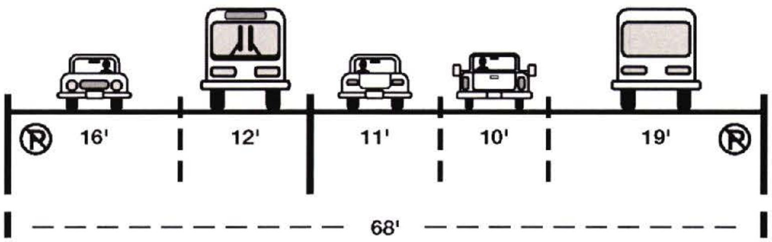
The route combination of Ramirez Street, Center Street, Santa Fe Avenue, and Mateo Street provides access to both Union Station and Little Tokyo Station from the south. Bike lanes may be feasible along the northern section (Ramirez, Center, and Santa Fe). The southern portion of the route (Mateo) is too narrow for bike lanes, and would be best suited for shared-use arrows, signage and road surface improvements. Bicyclists were consistently observed along this route.

Destinations along the route are primarily industrial, but also include housing, a major educational institution and some retail. Metro's Division 20 rail yard is one of the major employers along the route. According to Metro's human resources department 555 employees work at this site. Students and employees at the Southern California Institute of Architecture (Sci-Arc) would also be served by this route. Significant residential and commercial development is planned for this area.

Basic Improvements
Bike Route (or Bike Lanes) + Directional Signage
Shared-Use Arrows (or Bike Lanes)
Bike-Sensitive Loop Detectors at Signalized Intersections
Road Surface Improvements (especially on Mateo)
Additional Improvements
Adjusting Stop Signs at:
–Commercial Street
–Banning Street
–1st Street
–4th Street (Bridge Entrance)
Additional Street Trees/Landscaping

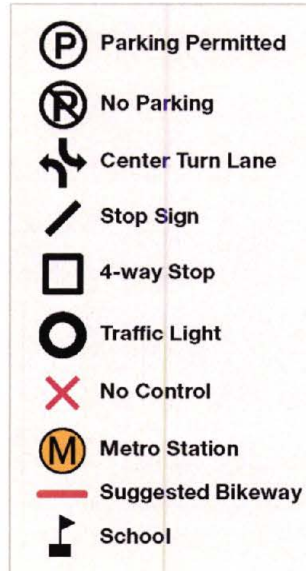
Southern California Institute of Architecture (Sci-Arc)

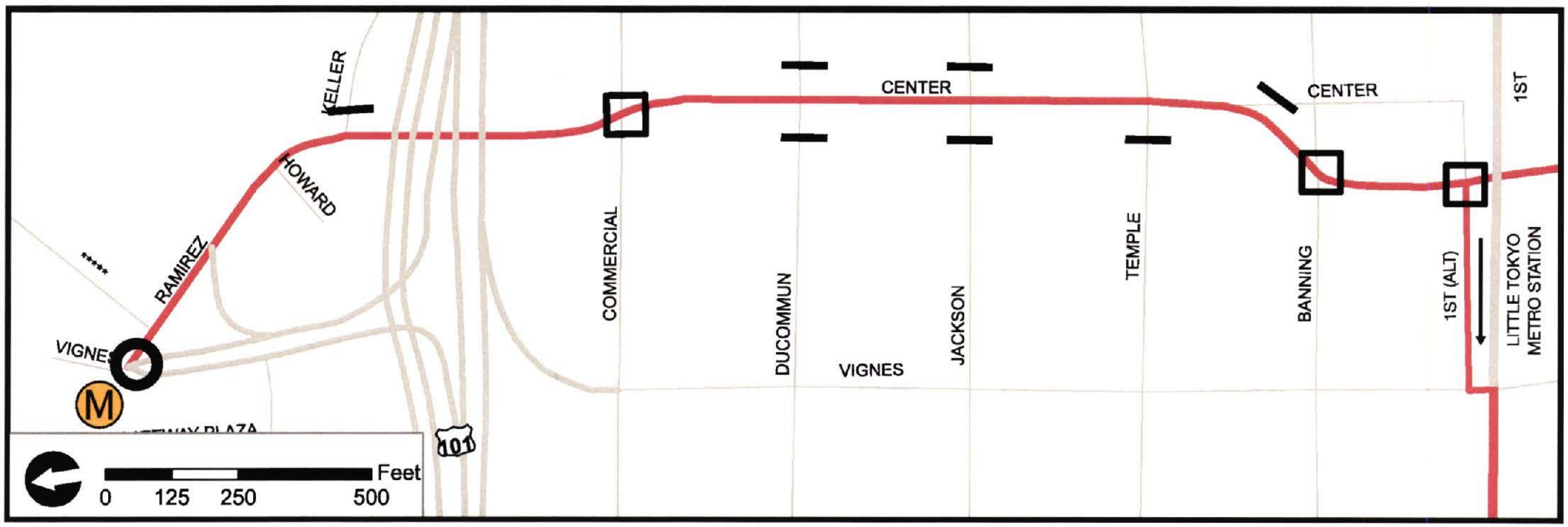
Ramirez-Center-Santa Fe-Mateo



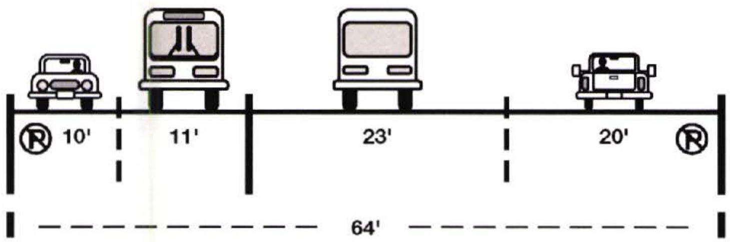
Ramirez South of Vignes

Center at 101 Fwy underpass (facing north)

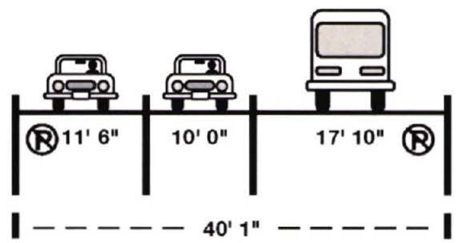




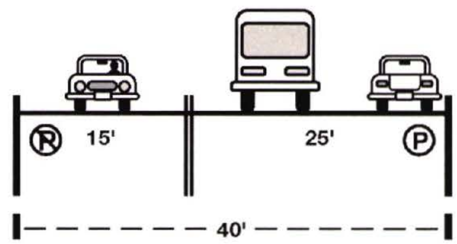
Ramirez-Center-Santa Fe-Mateo



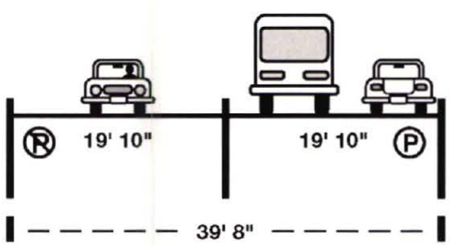
Ramirez and Center



Center between Commercial & Ducommun

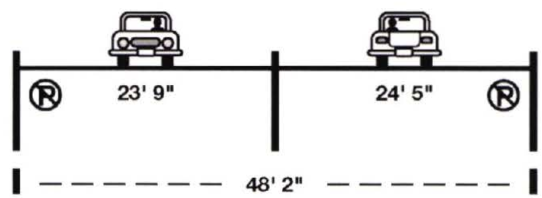


Center between Ducommun & Jackson



Center between Jackson & Temple

Center at Commercial (facing south)

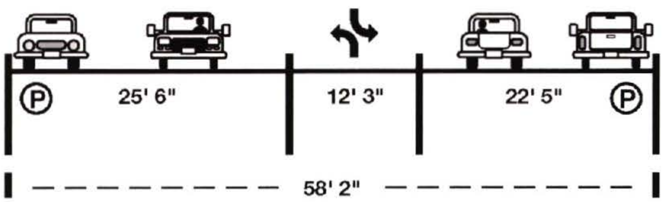


Center between Temple & Banning

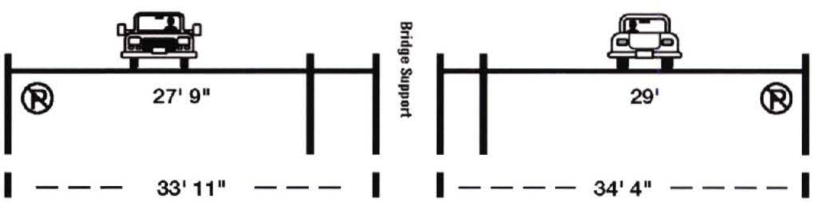
Ramirez-Center-Santa Fe-Mateo

Santa Fe north of 1st St Bridge (facing south)

Santa Fe south of 1st St Bridge (facing south)

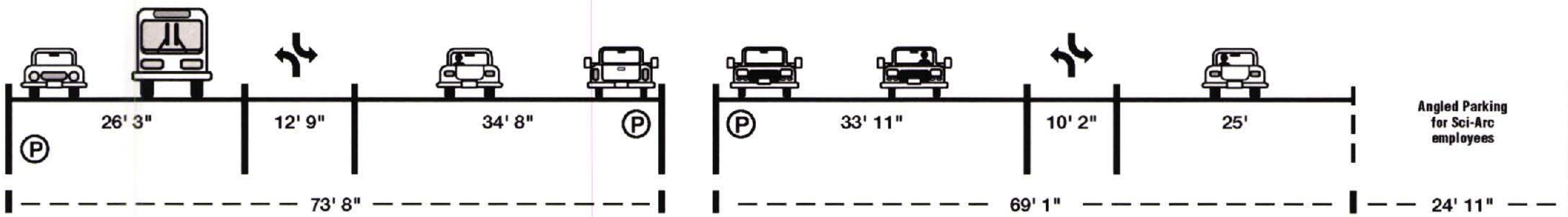


Santa Fe between Banning & 1st St. Bridge



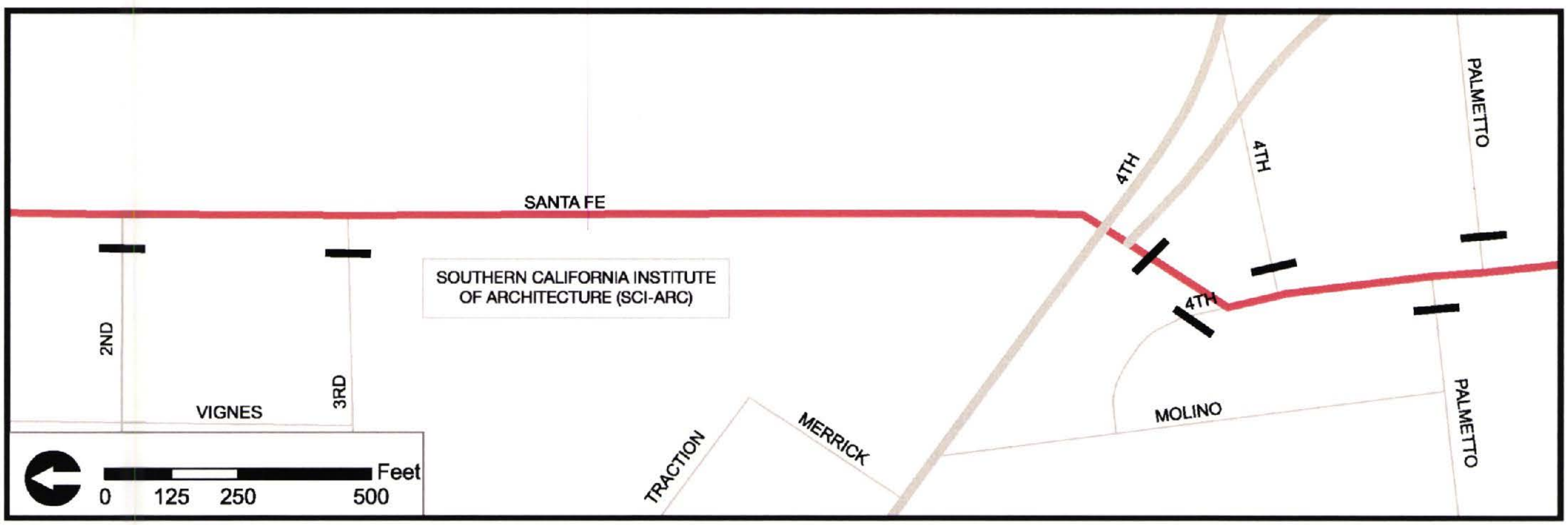
Santa Fe underneath 1st St. Bridge

Ramirez-Center-Santa Fe-Mateo

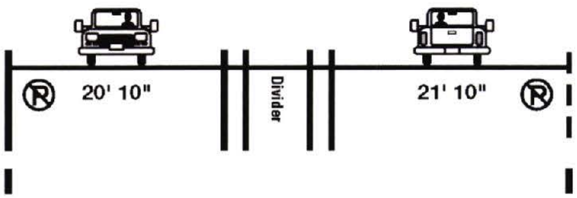


Santa Fe between 1st St. Bridge & 3rd St.

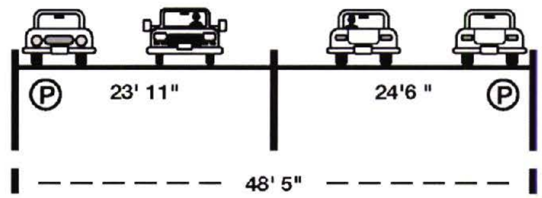
Santa Fe between 3rd St. & Sci-Arc



Ramirez-Center-Santa Fe-Mateo



Santa Fe under 4th Street Bridge



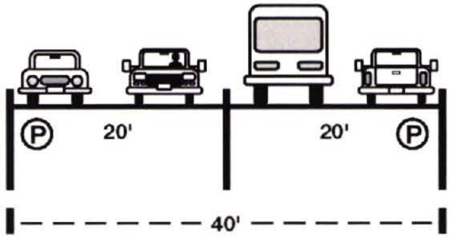
Mateo between Santa Fe & Palmetto

Santa Fe at 3rd St (facing north)

Santa Fe at 4th St Bridge (facing south)

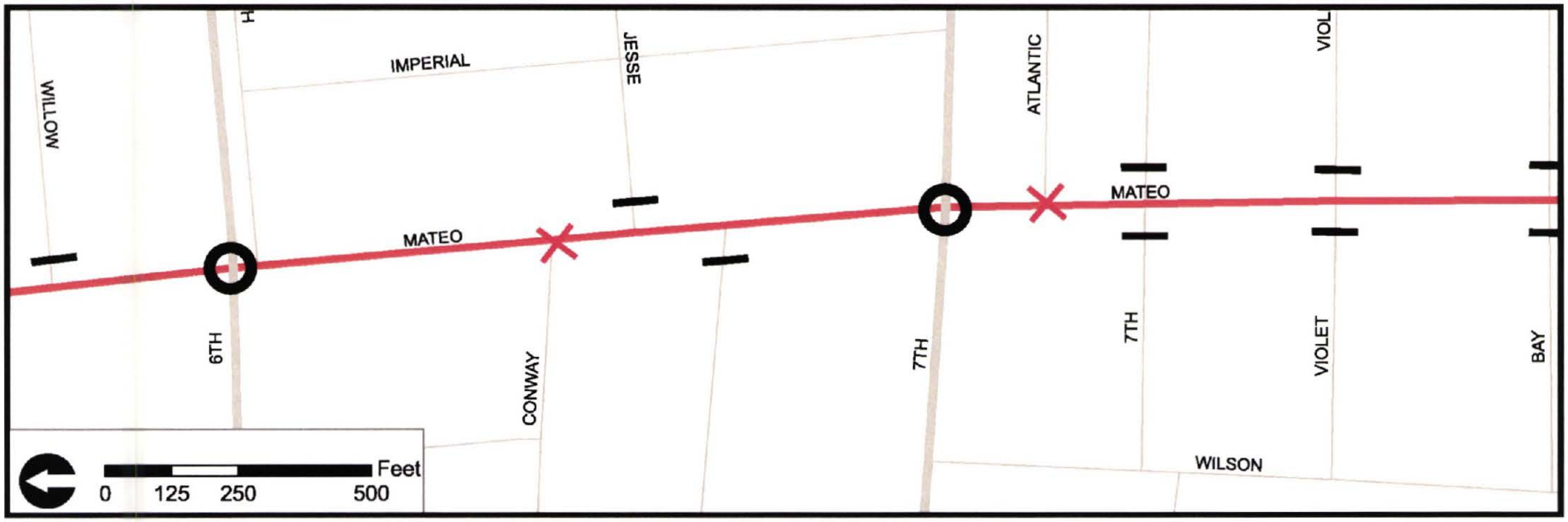
Mateo and Palmetto (facing south)

Ramirez-Center-Santa Fe-Mateo

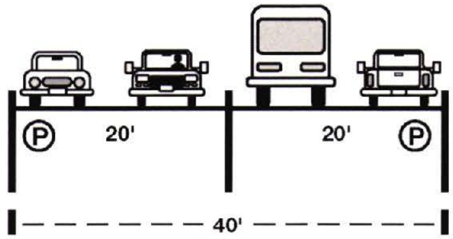


Mateo between Palmetto & Bay

Mateo and 6th St (facing south)

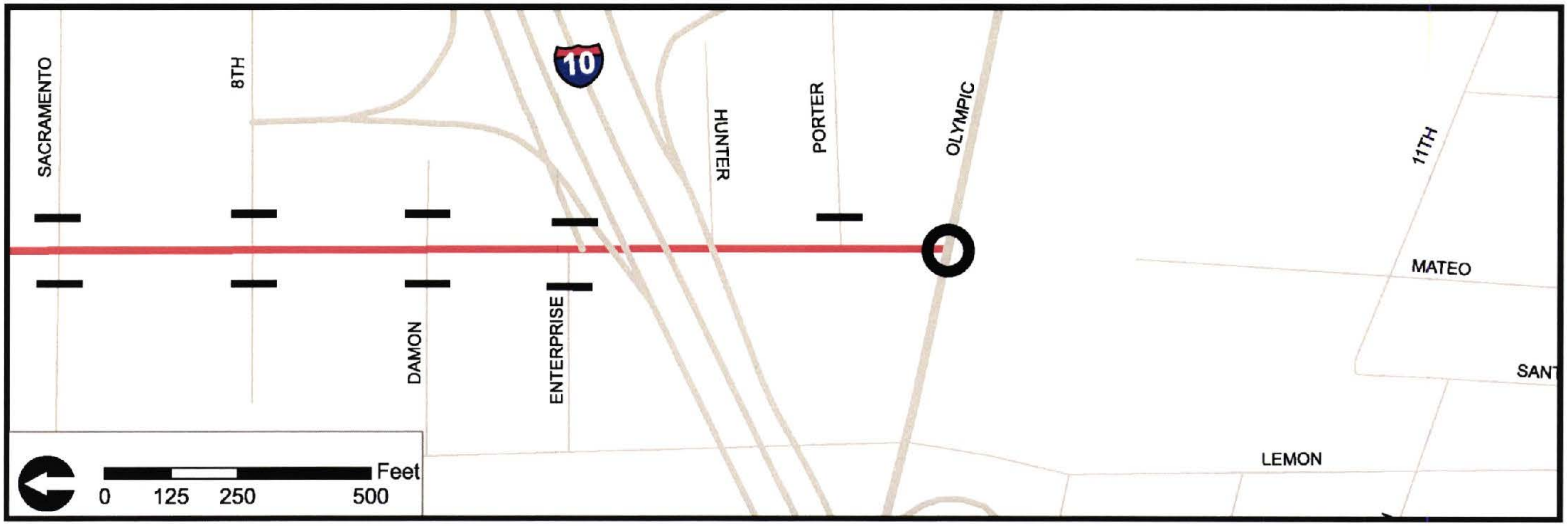


Ramirez-Center-Santa Fe-Mateo



Mateo between Bay & Olympic

Mateo and Damon (facing south)



1st Street

Route	Length
1st Street	**0.7 mi**

Estimated Cost:

$12,500–$33,000 (excluding cost of resurfacing)
$44,500–$575,000 (including resurfacing)

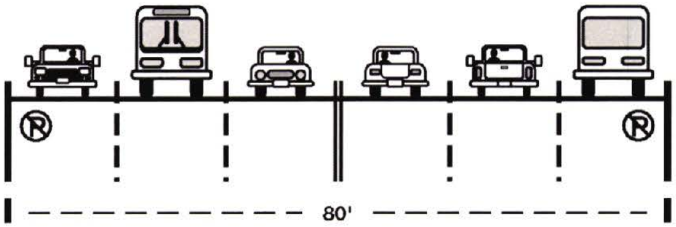
for cost estimate methodology see Appendix A

First Street provides a connection from the east and west to 1st and Alameda Station. Two of the recommended north-south routes feed into this section of 1st Street (Santa Fe & Central Avenue), as well as the existing one-way bike route couplet on Spring and Main. The recommended route segment extends from Main Street east to the 1st Street Bridge. First Street is already a designated bike route to the west of Main Street. In the future, the route could be continued to the east across 1st Street bridge. The recommended route also falls within the extent of Project Restore's '1st Street Now' plan which seeks to improve 1st Street from the Disney Concert Hall to Mariachi Plaza in Boyle Heights, and the bicycle transportation improvements recommended here are consistent with the overall vision of '1st Street Now'.

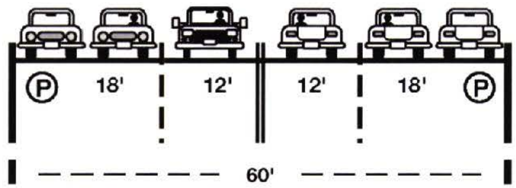
Basic Improvements
Bike Route + Directional Signage
Shared-Use Arrows
Bike-Sensitive Loop Detectors at Signalized Intersections
Road Surface Improvements (between Central and Vignes)
Additional Improvements
Additional Street Trees/Landscaping

1st Street at Central (facing east)

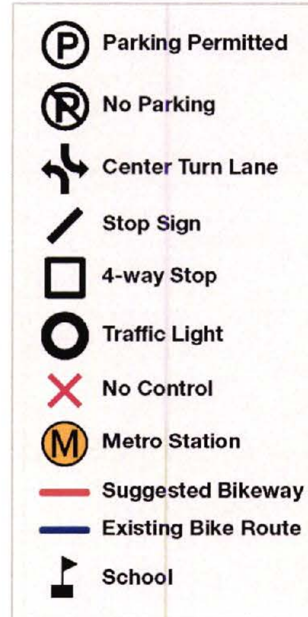
1st Street

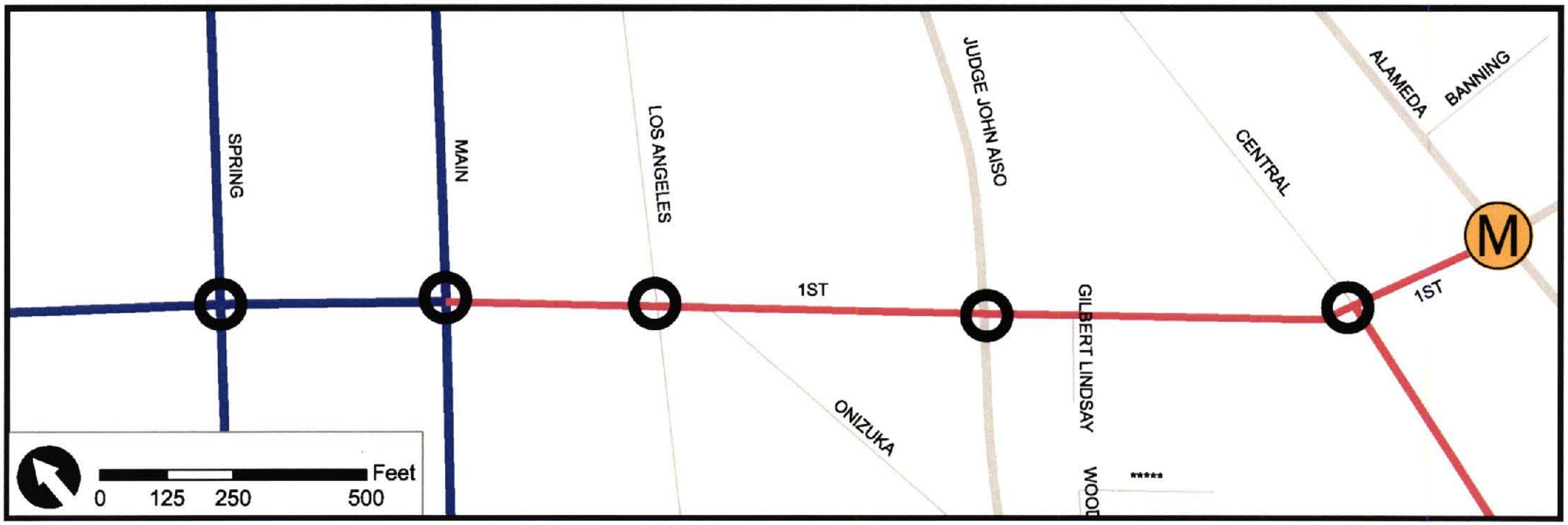


1st St. between Main & San Pedro

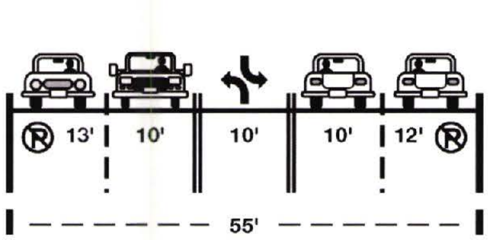


1st St. between San Pedro & Central

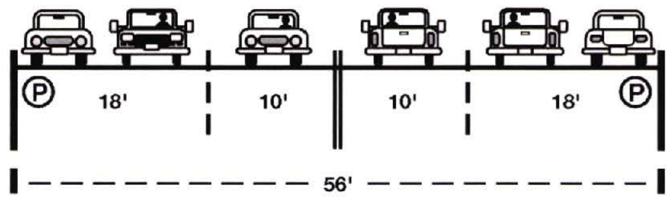




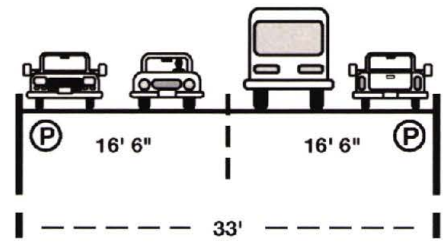
1st Street



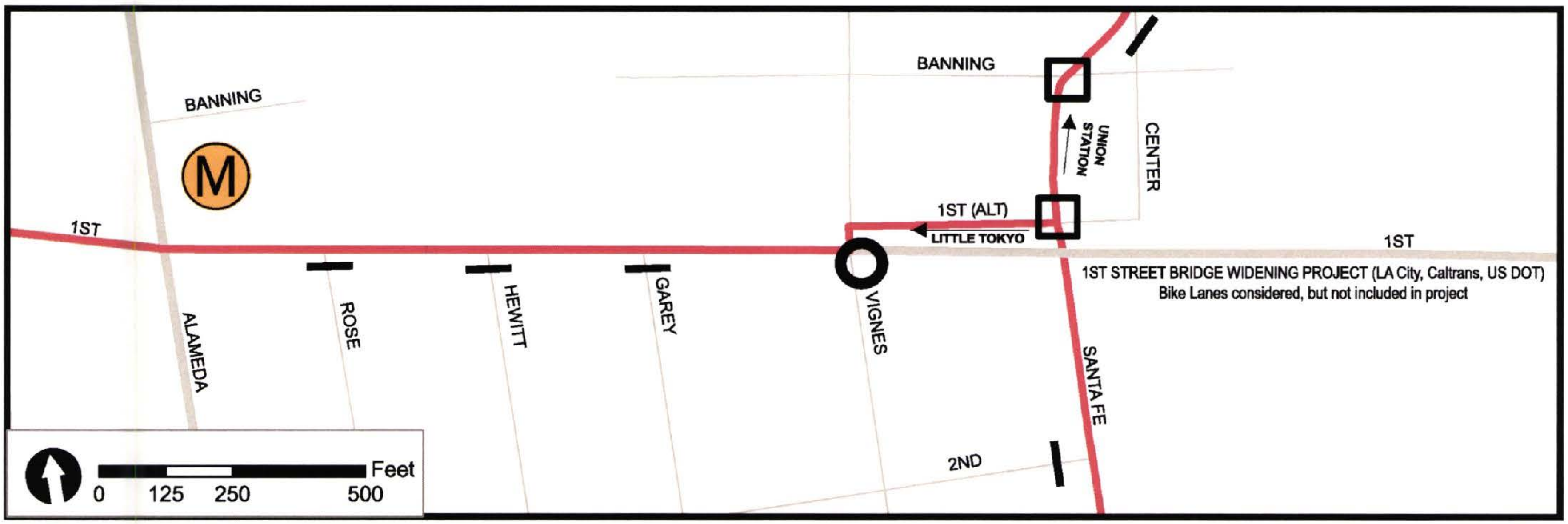
1st St. between Central & Alameda



1st St. between Alameda & Vignes



1st (ALT) between Vignes & Santa Fe



Central Avenue

Route	Length
Central	**1.3 mi**

Estimated Cost:

$15,500–$39,500 (excluding cost of resurfacing)
$79,500–$1,122,000 (including resurfacing)

for cost estimate methodology see Appendix A

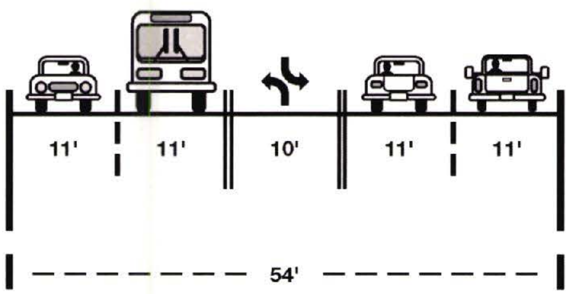
Central Avenue provides a connection from the south to 1st and Alameda Station. The route links the station to Central Avenue's new housing and commercial development as well as the older industrial employment centers along Central and Alameda Street. One major employer along this route-American Apparel-employs approximately 3,000 workers in their factory at 7th and Alameda. According to their human resources department around one half of their workforce lives in the Boyle Heights-East LA area. Central Avenue is a wide roadway with relatively low traffic volumes at the northern end of the recommended route.

The outside lanes are wide and the pavement surfaces are good along much of this route. No additional traffic signals or stop sign adjustments are needed. Large trucks regularly park along the route. If shared-use arrows are used the truck parking should be taken into account by placing them a greater distance from the curb (14+') in these areas.

Basic Improvements
Bike Route + Directional Signage
Shared-Use Arrows
Bike-Sensitive Loop Detectors at Signalized Intersections
Additional Improvements
Additional Street Trees/Landscaping

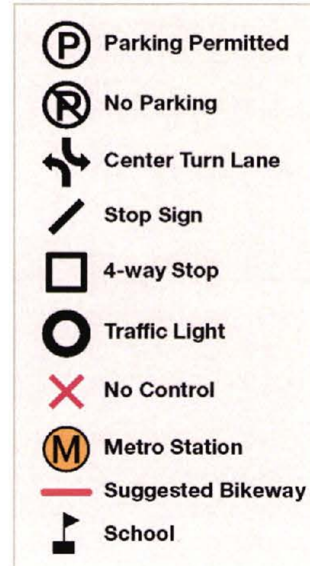
New Residential Development at Central Ave and 2nd St

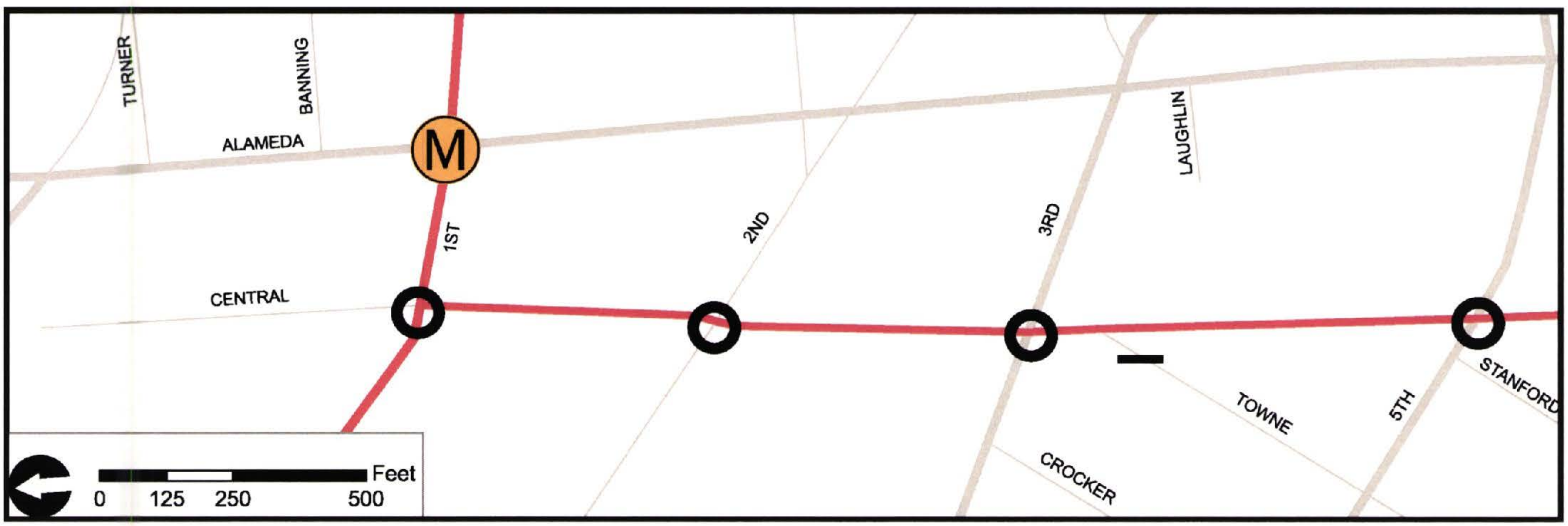
Central Avenue



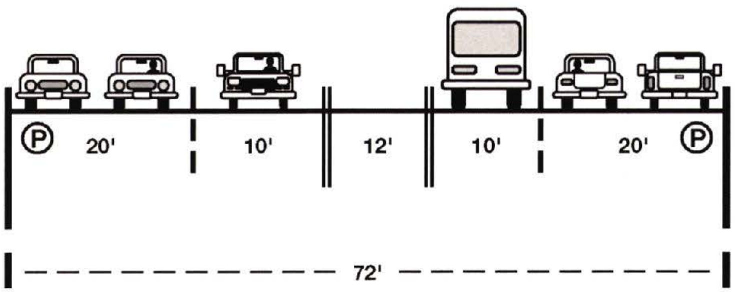
Central between 1st St. & 2nd St.

Central between 2nd St. & 3rd St.



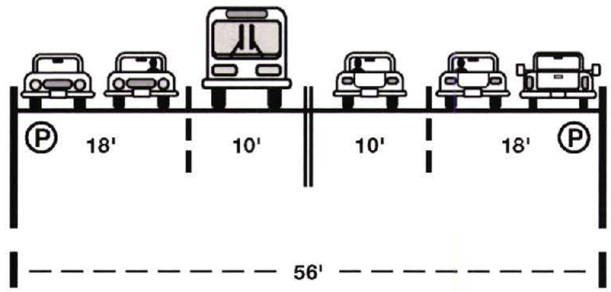


Central Avenue

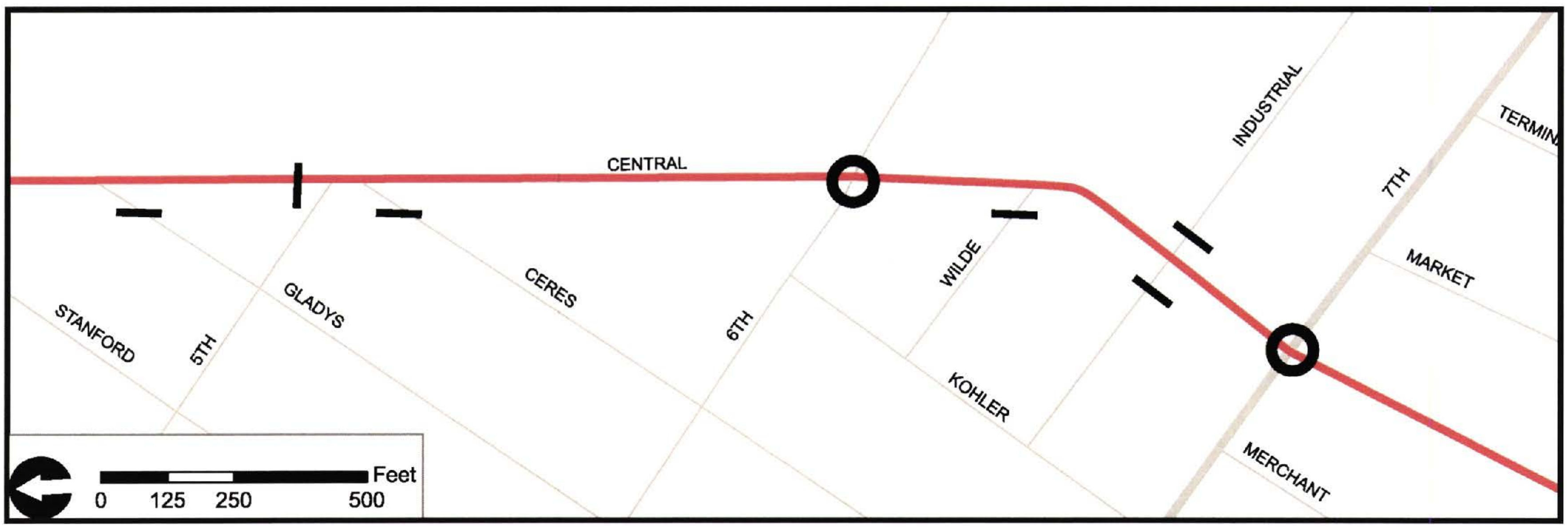


Central between 3rd St. & 6th St.

Central at 3rd (facing north)

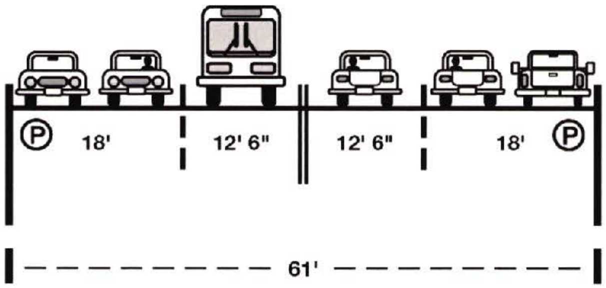


Central between 6th St. & 7th St.



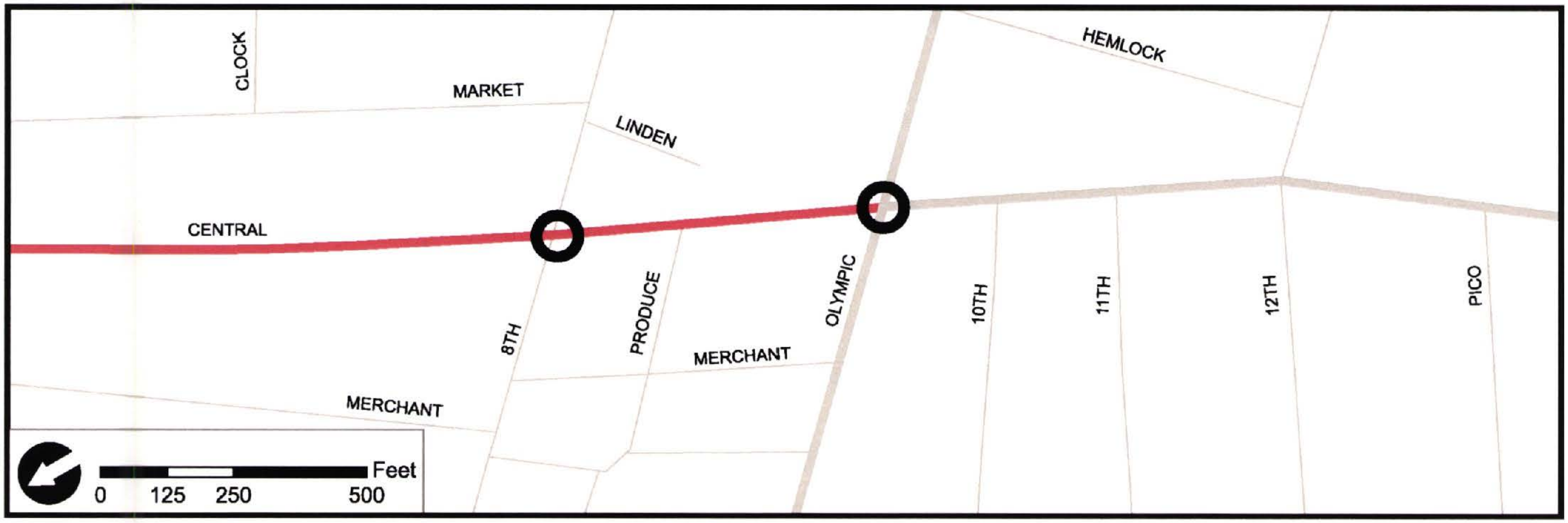
Central Avenue

Central at 6th (facing north)



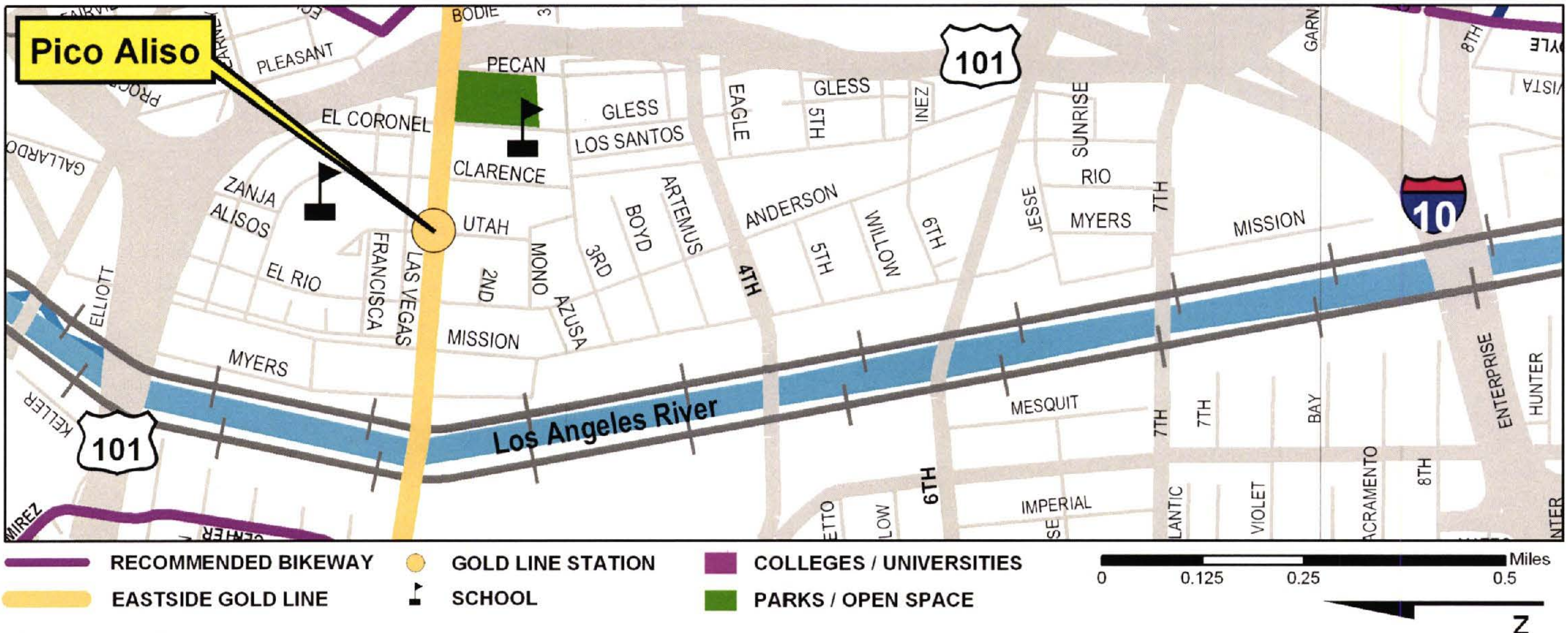
Central between 7th St. & Olympic

Central between 7th and 8th (facing north)



Streets Surrounding Pico Aliso Station

The area served by Pico Aliso Station is small and somewhat isolated. The neighborhood is separated from adjacent communities in Boyle Heights and the Arts District by the Los Angeles River, I-10, and U.S. 101. Most residences in the area are within comfortable walking distance of the station. Residents may still choose to ride their bicycles to the station because it is faster than walking or because they need their bicycle at the other end of their trip. The north-south streets serving the station (Utah, Anderson, Clarence, and Gless) have low traffic volumes and are suitable for bicyclists of varied skill levels. A key concern for bicyclists will be the crossings at the two major east west streets (1st and 4th). There are currently signalized crossings on 1st Street at Utah, Clarence and Gless streets; and on 4th Street at Anderson and Gless streets. Bike-sensitive traffic signal actuators should be installed at these five intersections and stencils should be used to highlight the sensitive portion of the detector. Streets with poor pavement conditions should be resurfaced. Street surface conditions are worst in the industrial area to the west of Utah and Clarence streets. Abandoned railroad spurs are a hazard on Anderson and Mission streets, and should be covered or removed.



Map not to scale

Anderson Street

Mission Street

Echandia/Boyle

Route	Length
Echandia/Boyle	**2.0 mi**
–Echandia	0.3 mi
–Pleasant (connector)	0.1 mi
–Boyle	1.6 m

Estimated Cost:

$20,500–$65,500 (excluding cost of resurfacing)
$102,000–$1,440,000 (including resurfacing)

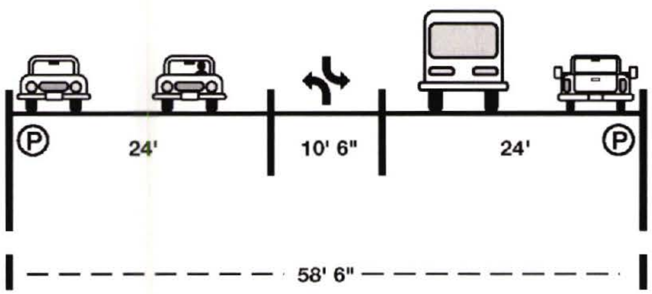
for cost estimate methodology see Appendix A

Echandia Street and Boyle Avenue provide a connection to Mariachi Plaza Station that extends from Prospect Park in northwestern Boyle Heights to the historic Sears building at Olympic Boulevard. The route provides access on the western side of the station via Pleasant Ave and on the eastern side via Pennsylvania Ave and Bailey Street. The route also serves Hollenbeck Park and crosses Interstate 5/10 and the 60 Freeway. Mature street trees provide shade along much of the route. On-street parking is allowed along most of the route, but is only sporadically used in some sections. Installation of bike lanes would require lane reduction and/or the removal of on-street parking. 'Watch for Bicyclists' signage should be installed at the I-5/I-10 freeway exit between Whittier Boulevard and 7th Street.

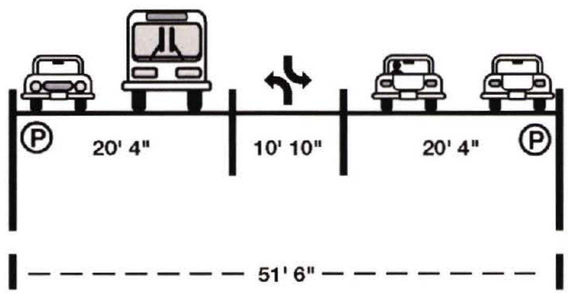
Basic Improvements
Bike Route (Bike Lane) + Directional Signage
'Watch for Bicyclists' Signs (at freeway exits)
Shared-Use Arrows
Bike-Sensitive Loop Detectors at Signalized Intersections
Additional Improvements
Additional Street Trees/Landscaping

Boyle south of 1st Street (facing south)

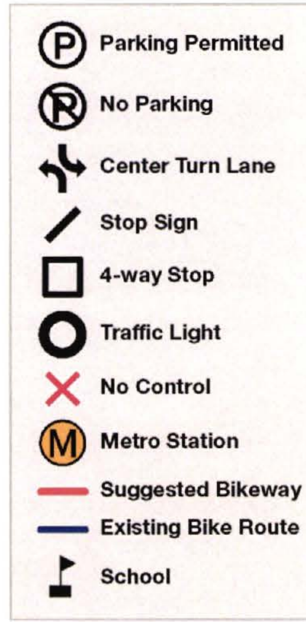
Echandia-Boyle

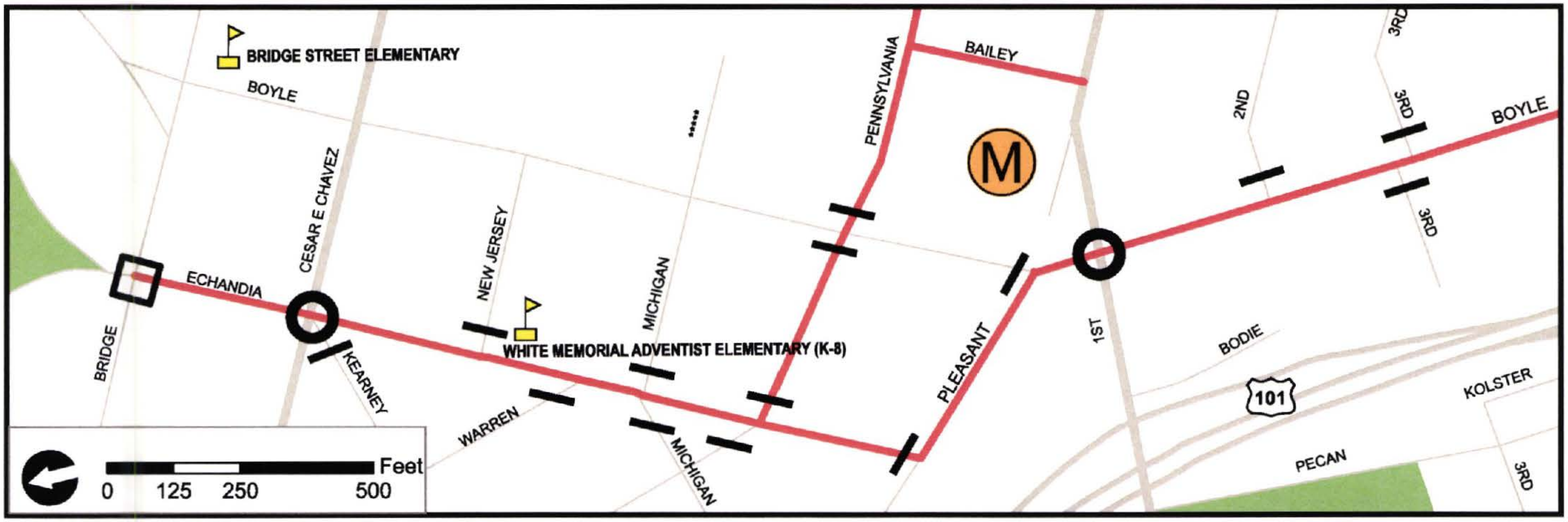


Echandia between Bridge & Pleasant

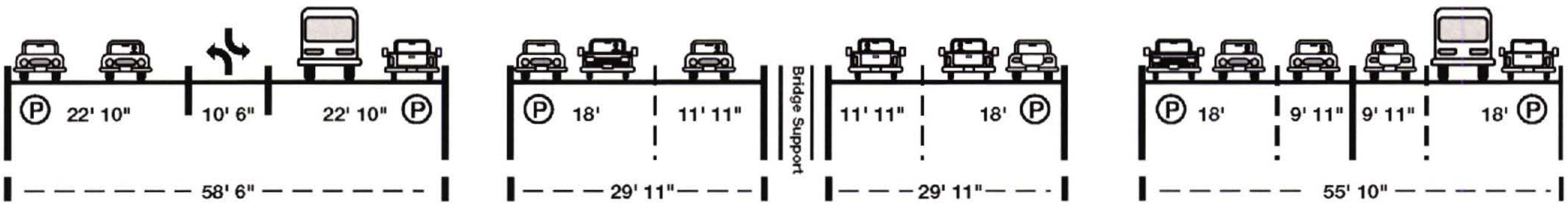


Boyle between 1st St. & 6st St.





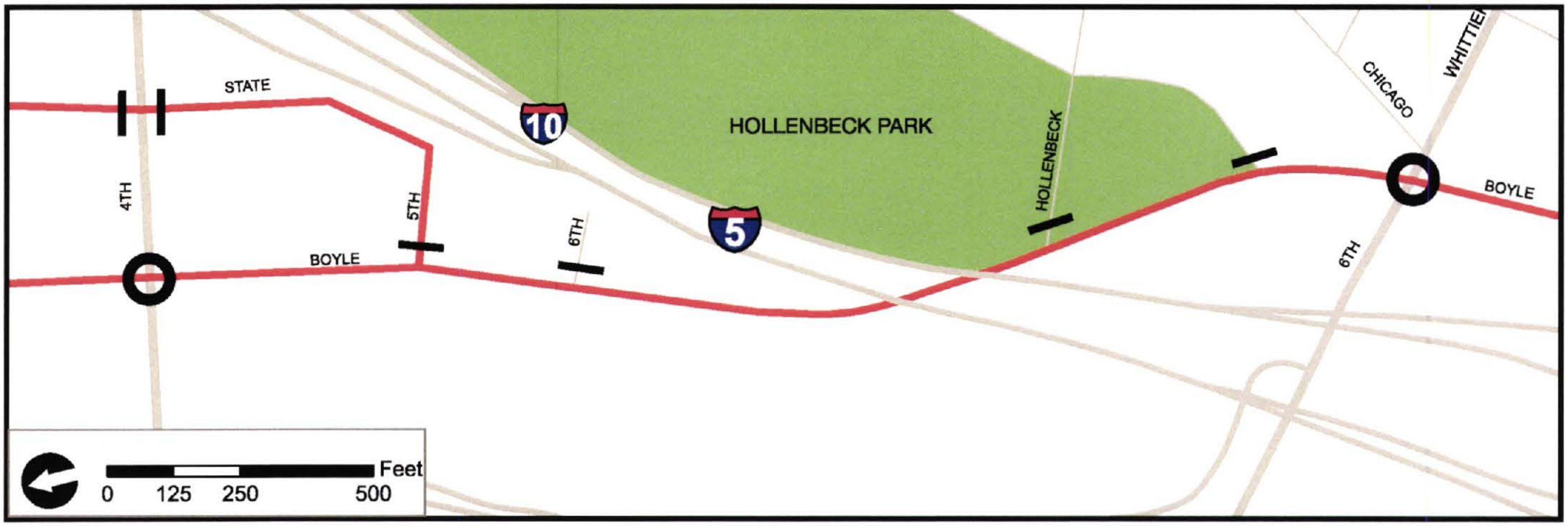
Echandia-Boyle



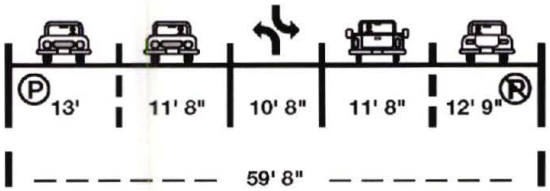
Boyle between 6th St. & 5/10 Freeway [bridge]

Boyle under 5/10 Freeway bridge

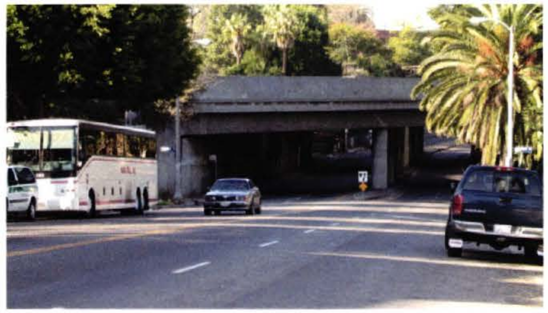
Boyle between 5 Freeway bridge & Whittier



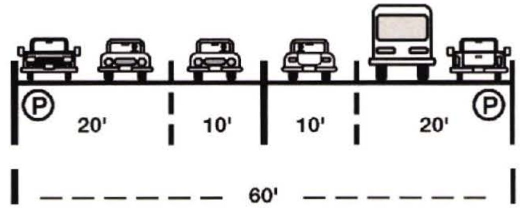
Echandia-Boyle



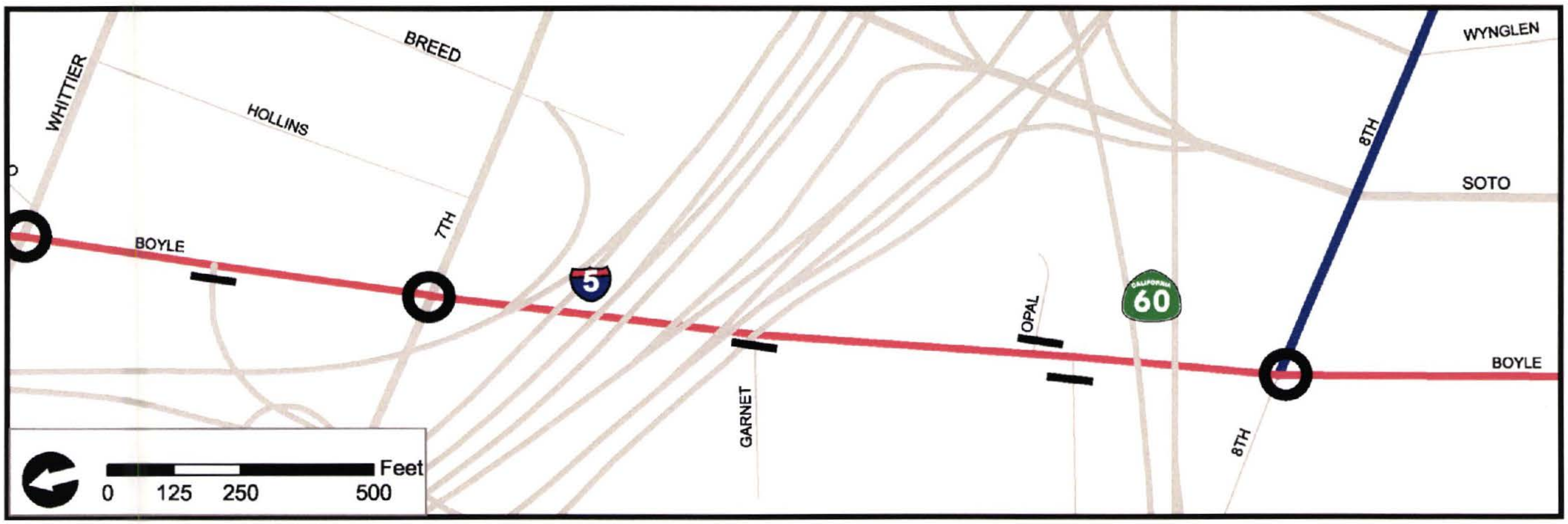
Boyle between Whittier & 7th St.



Boyle at 5/10 Fwy underpass (facing north)

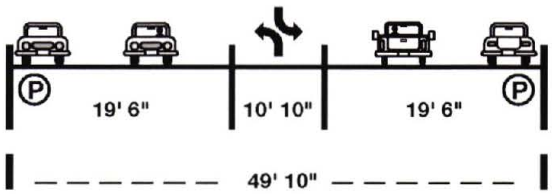


Boyle between 7th St. & 8th St.



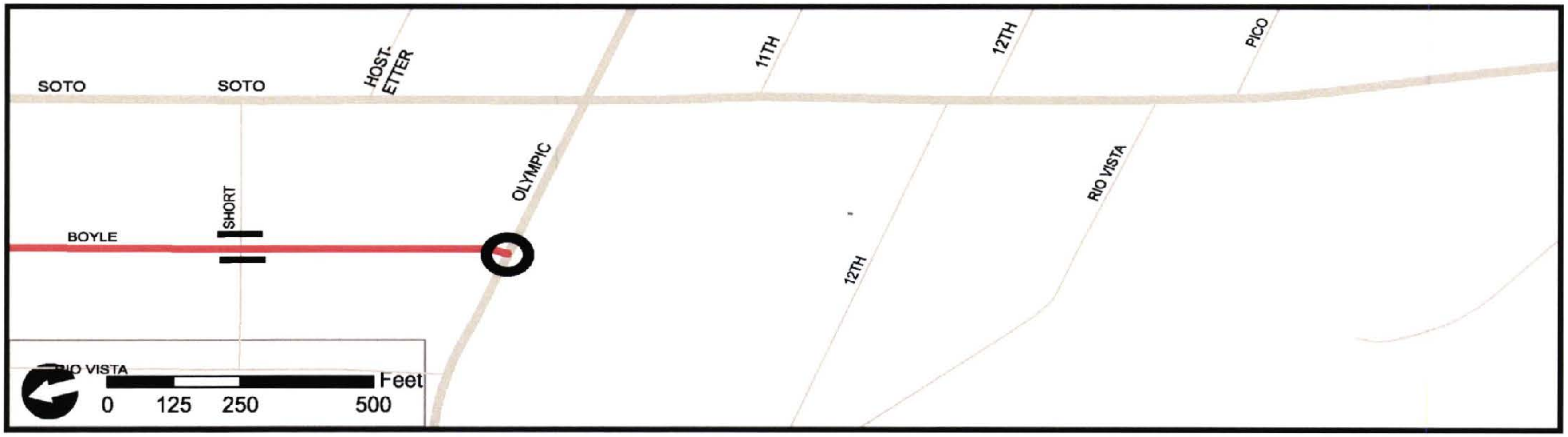
Echandia-Boyle


Boyle at 8th St (facing north)



Boyle between 8th St. & Olympic


Boyle at Olympic Blvd (facing south)



State Street

Route	Length
State	**1.7 mi**
–State	1.4 mi
–Pennsylvania (connector)	0.2 mi
–Bailey (connector)	0.1 mi

Estimated Cost:

$23,000–$54,000 (excluding cost of resurfacing)
$79,000–$1,012,000 (including resurfacing)

for cost estimate methodology see Appendix A

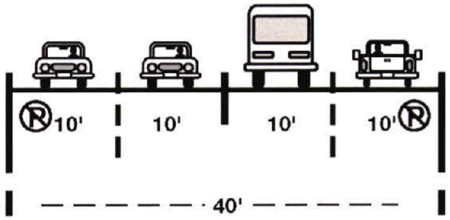
State Street provides access to Mariachi Plaza for residents to the east of the station. It also serves LA County-USC Medical Center, White Memorial Medical Center and Second Street Elementary School. The route ends at 5th Street where it connects with the longer route along Boyle Avenue.

The primary improvement along this route is the addition of a traffic signal at 4th Street. Road surface improvements are also needed. 'Watch for Bicyclists' signage could be used on along Boyle before the intersection at 5th Street to alert drivers to the presence of cyclists making the transition from State/5th to Boyle.

Basic Improvements
Bike Route + Directional Signage
'Watch for Bicyclists' Signs (on Boyle before 5th)
Shared-Use Arrows
Bike-Sensitive Loop Detectors at Signalized Intersections
Road Surface Improvements
Additional Improvements
Pedestrian/Bicycle Friendly Traffic Calming
Additional Street Trees/Landscaping

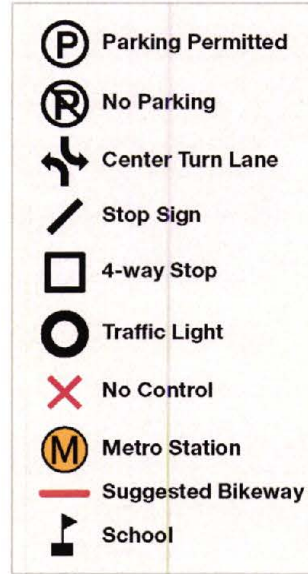
LA County–USC Medical Center (State & Marengo)

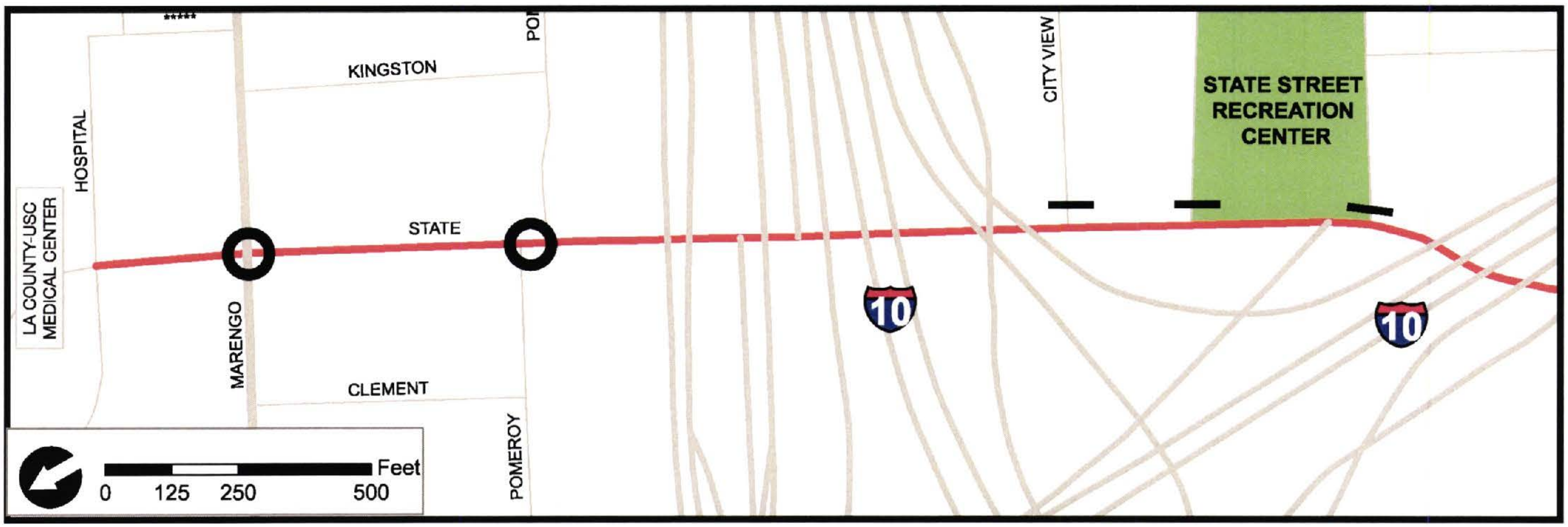
State Street



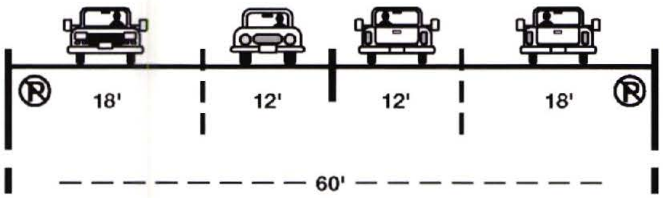
State between Marengo & Bailey

State at City View Ave facing north towards I-10 and Medical Center



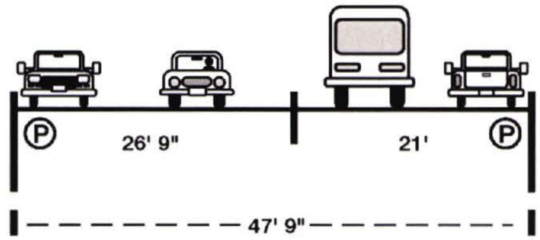


State Street

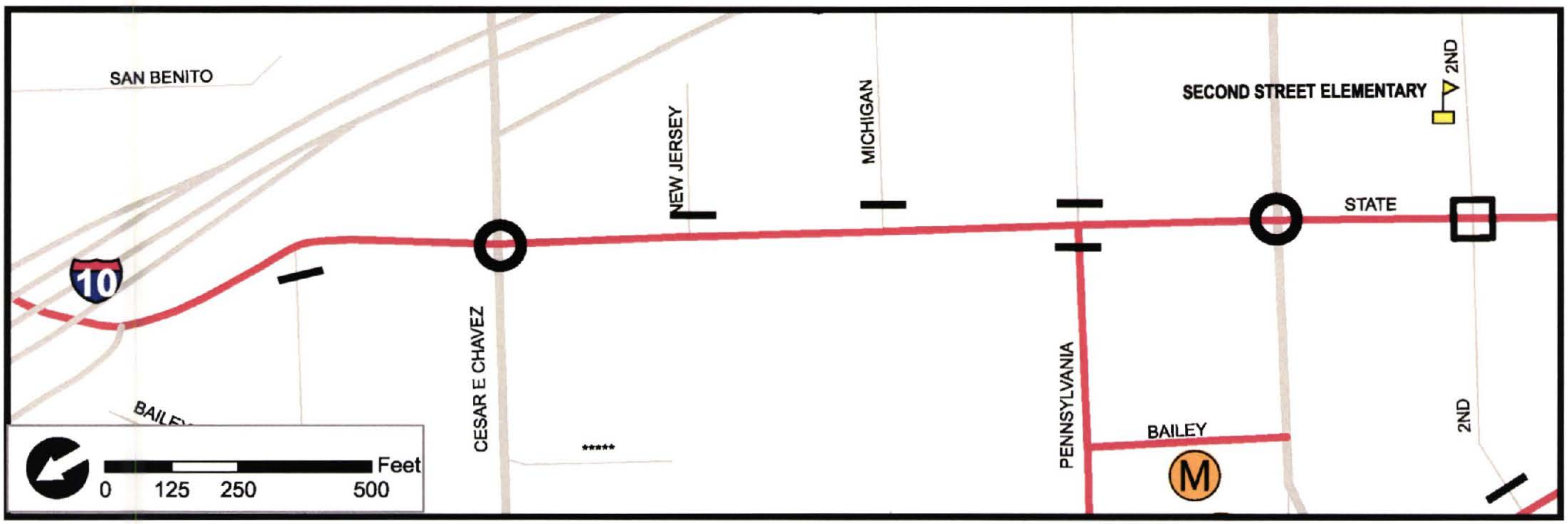


State between Bailey & Cesar Chavez

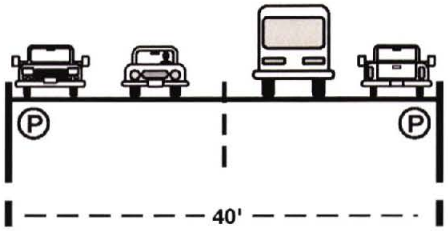
State at Second Street Elementary School (facing north)



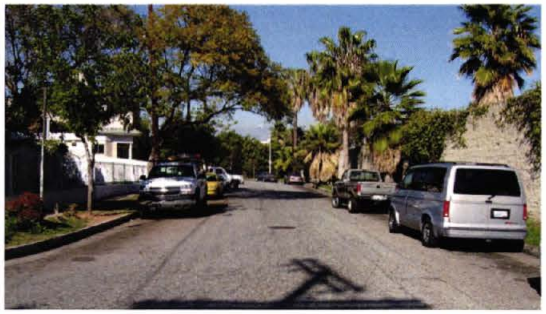
State between Cesar Chavez &1st.



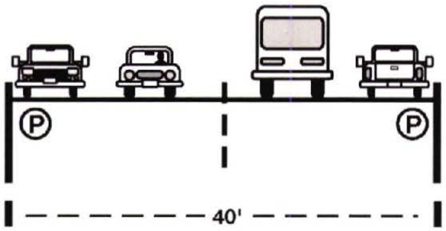
State Street



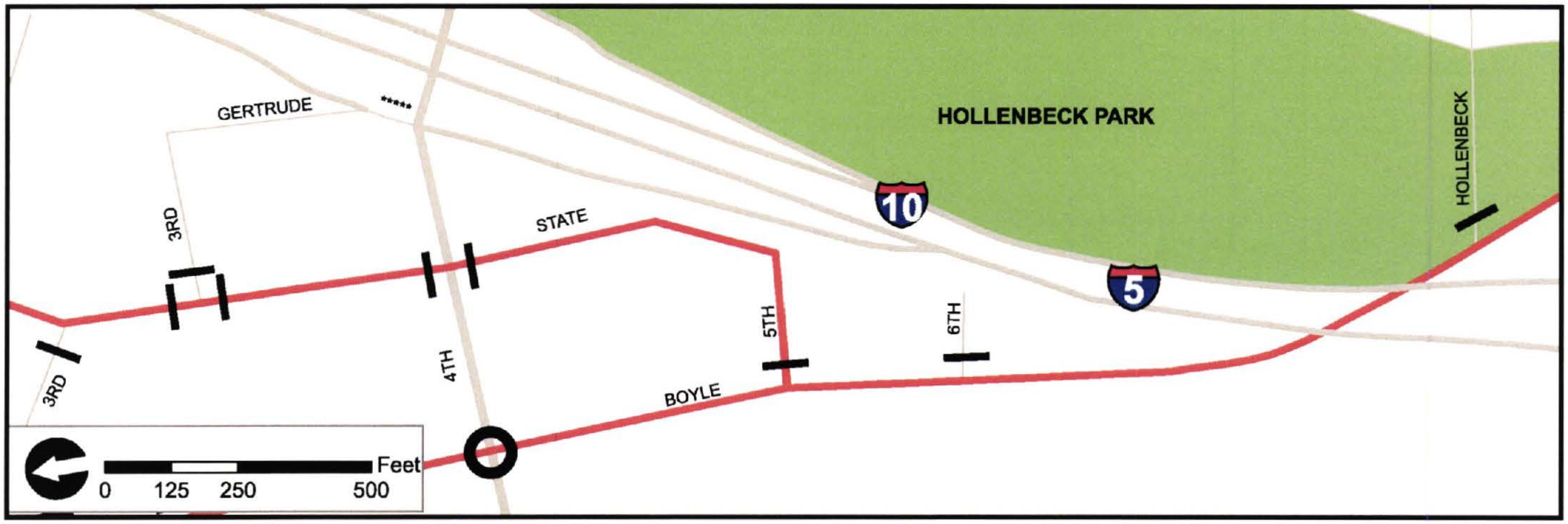
State between 1st. & 5th St.



State at 5th Street (facing north)



5th St. between State & Boyle



Breed Street

Route	Length
Breed	**1.3 mi**

Estimated Cost:

$16,000–$42,500 (excluding cost of resurfacing)
$56,000–$,708,000 (including resurfacing)

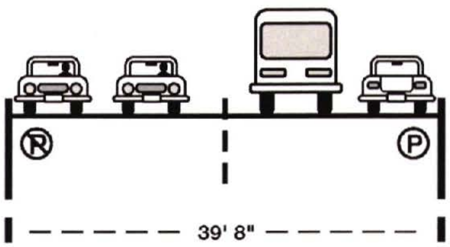
for cost estimate methodology see Appendix A

Breed Street provides easy north-south access to the Soto Station for residents and stakeholders to the west of Soto Street. The required improvements for developing this route are minimal. One problem area is at the north side of Breed and 1st Street where the Breed Street entrance to the Washington Mutual parking lot creates congestion in this station-adjacent area. Options to alleviate this congestion should be considered.

Basic Improvements
Bike Route + Directional Signage
Shared-Use Arrows
Bike-Sensitive Loop Detectors at Signalized Intersections
Additional Improvements
Pedestrian/Bicycle Friendly Traffic Calming
Adjusting Stop Signs at:
–City View Avenue
–Sheridan Street
–Folsom Street
–Michigan Avenue
–3rd Street
–6th Street
Additional Street Trees/Landscaping

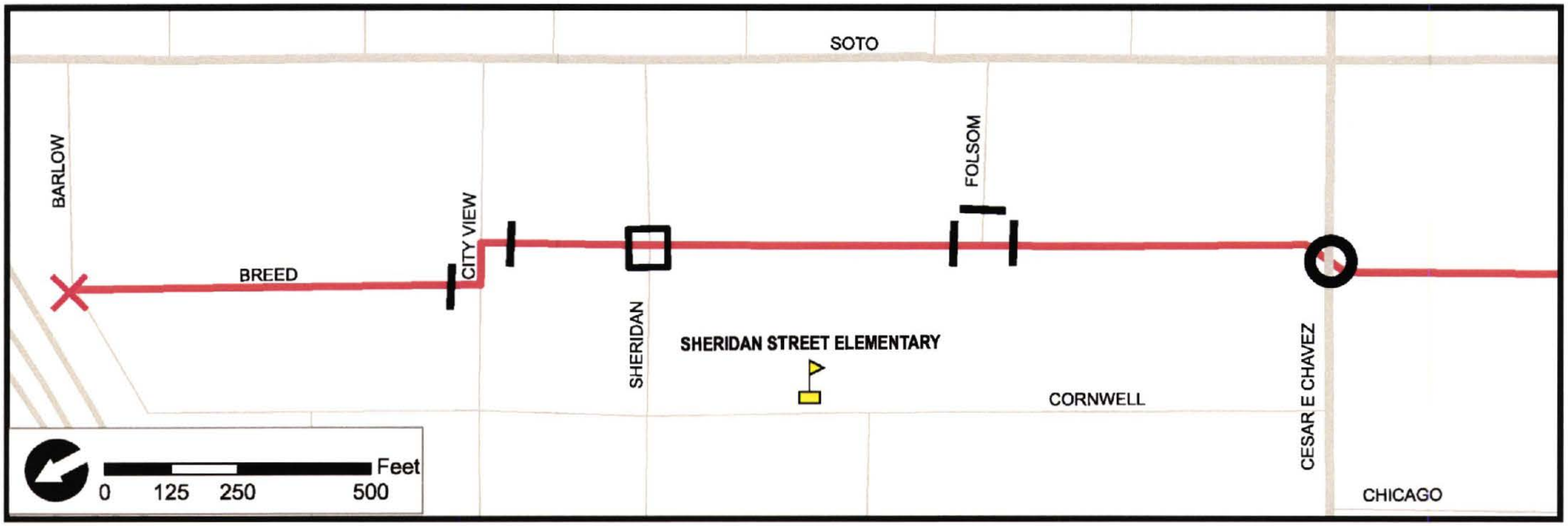
Breed and 1st Street (facing south)

Breed Street



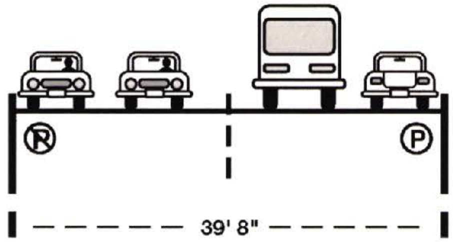
Breed between Barlow & 2nd St.

Breed at Chesar Chavez (facing north)



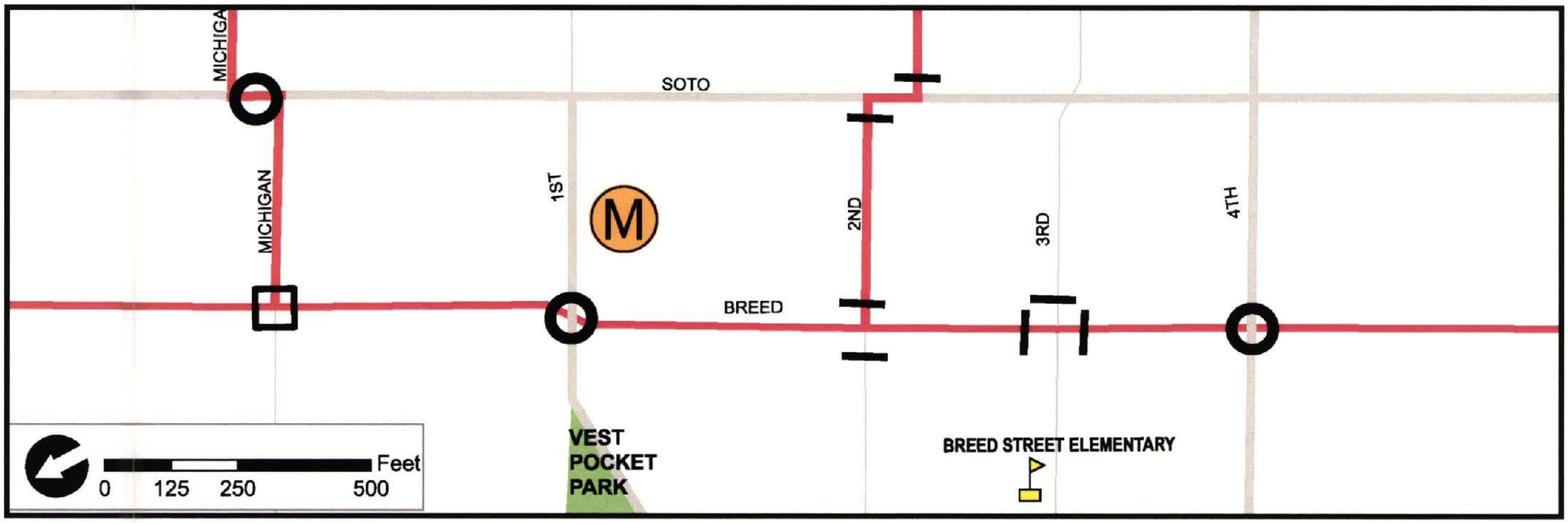
Breed Street

Breed at 2nd (facing north)

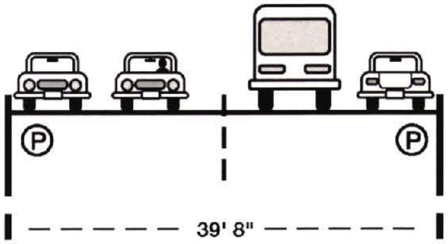


Breed between 2nd St. & 4th St.


Bakery Mural



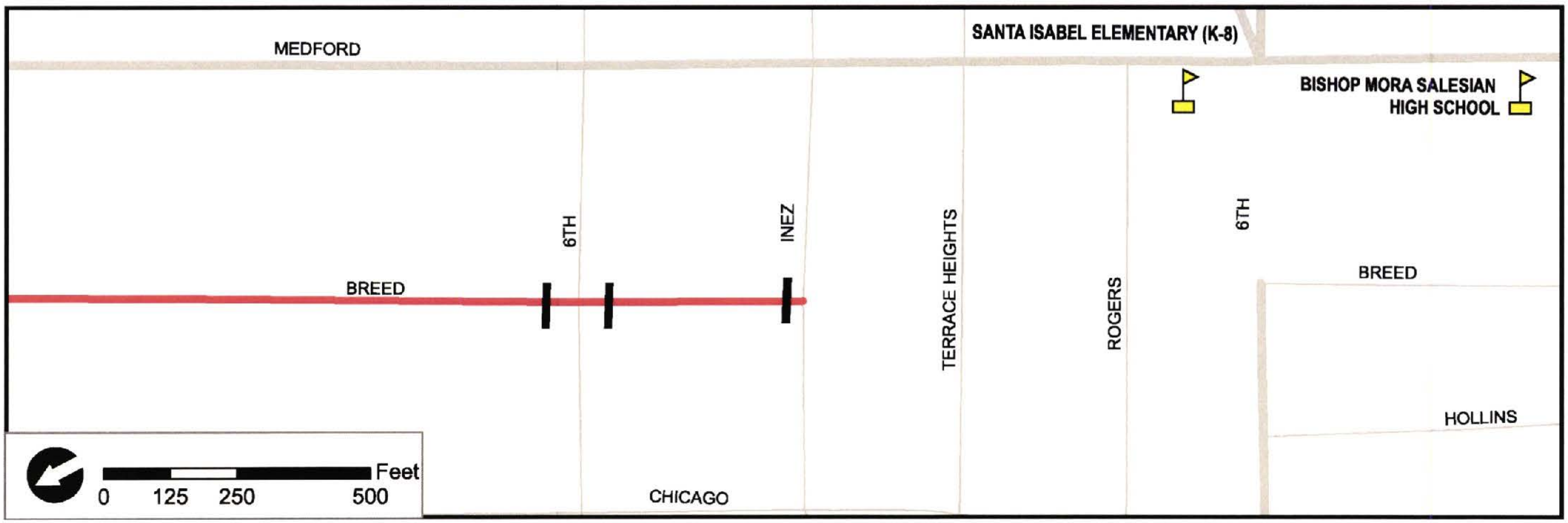
Breed Street



Breed between 4th St. & Inez

Breed at 4th (facing north)

Breed at 6th (facing north)



Fickett/Mathews

Route	Length
Fickett/Mathews	**1.2 mi**
–Fickett	.5 mi
–Mathews	.7 mi

Estimated Cost:

$214,000–$497,000 (excluding cost of resurfacing)
$249,500–$1,081,000 (including resurfacing)

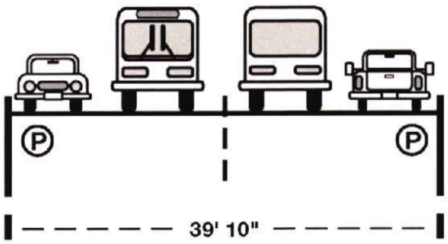
-for cost estimate methodology see Appendix A

The route combination of Fickett Street and Mathews Street provides north-south access to Soto Station for residents to the east of Soto Street as well as the students and employees of Roosevelt High School, Hollenbeck Middle School, and Boyle Heights Continuation High. The route also provides access to employment and shopping destinations along Soto Street. For access to Soto Station, bicyclists can be directed two blocks west to Breed Street via Michigan Ave or 2nd Street. A traffic signal is needed at 2nd and Soto, similar to the one at Michigan and Soto.

Intersection improvements would be required to assist cyclists in crossing at Cesar Chavez Avenue and 1st Street. The crossing at Cesar Chavez is the more complicated of the two, but would be necessary to assist in the transition from Fickett to Mathews street. A signal exists at Mathews and Cesar Chavez. The addition of a signal a Fickett could work in conjunction with the existing signal at Mathews. The existing signalization at Rowan Avenue and 3rd Street in East Los Angeles provides one potential model for the crossing at Cesar Chavez. An additional signal at 2nd and Soto would be needed for station-bound cyclists crossing to the west side of Soto Street. New traffic signals comprise most of the cost for this route.

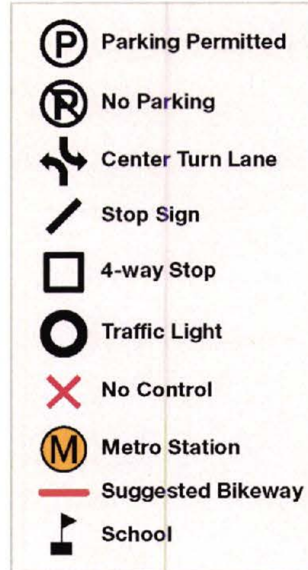
Basic Improvements
Shared-Use Arrows
Bike-Sensitive Loop Detectors at Signalized Intersections
New Traffic Signal or Median Refuge
–Cesar Chavez Avenue
–1st Street
–2nd Street (& Soto)
Additional Improvements
Pedestrian/Bicycle Friendly Traffic Calming
Adjusting Stop Signs at:
–Wabash Avenue
–Boulder Street
–Michigan Avenue
Additional Street Trees/Landscaping

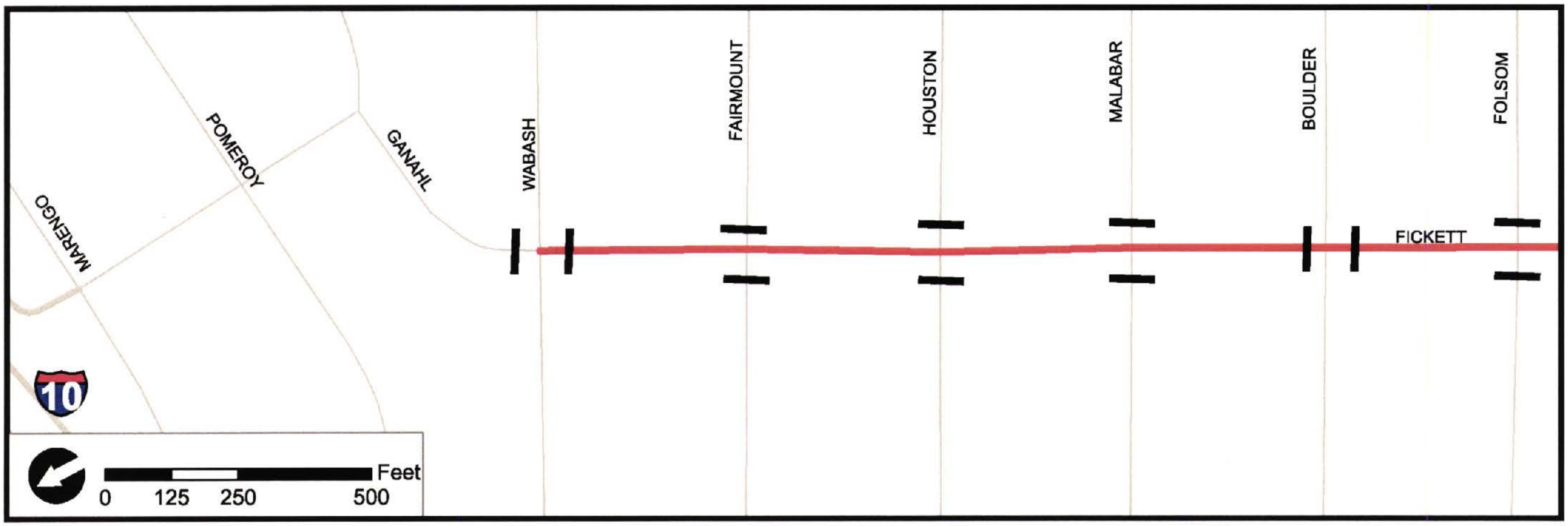
Fickett-Mathews



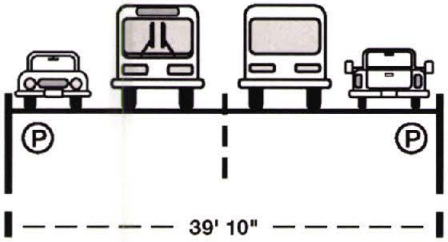
Fickett between Wabash & Cesar Chavez

Fickett at Boulder (facing north)



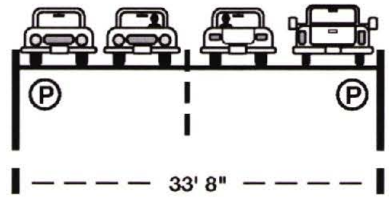


Fickett-Mathews

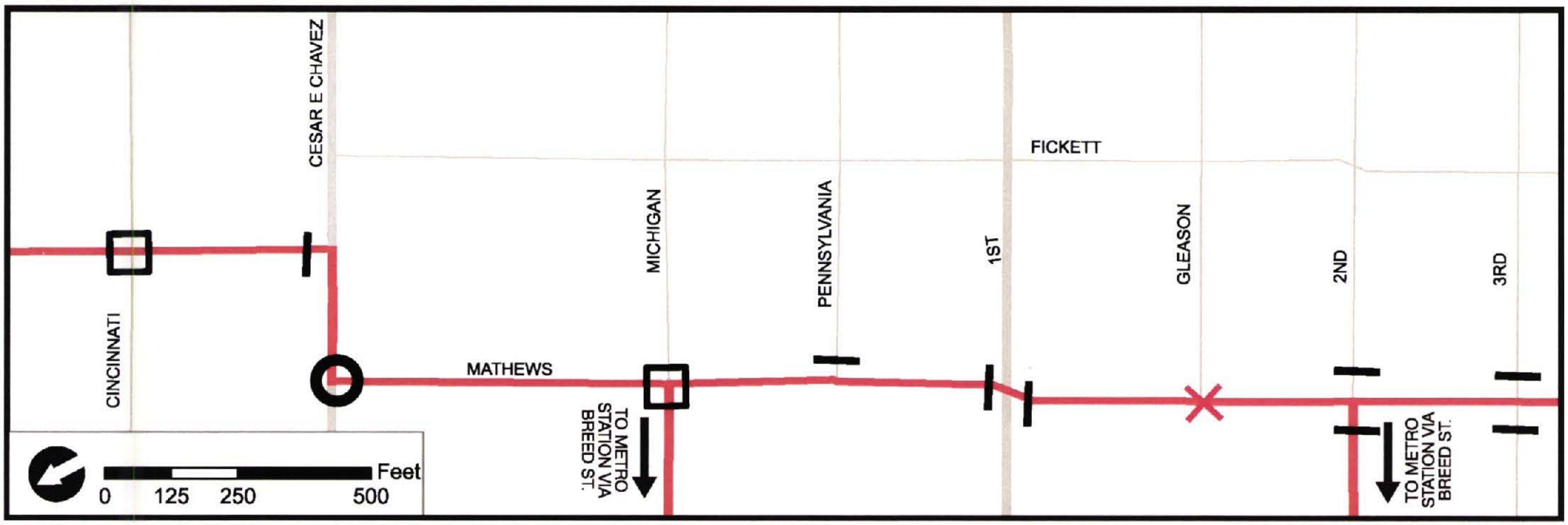


Mathews between Cesar Chavez & 1st St.

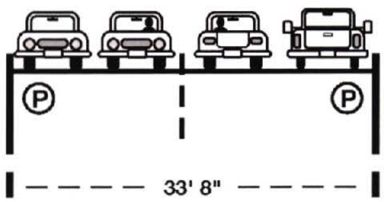
Fickett at Cesar Chavez (facing south)



Mathews between 1st St. & 4th St.



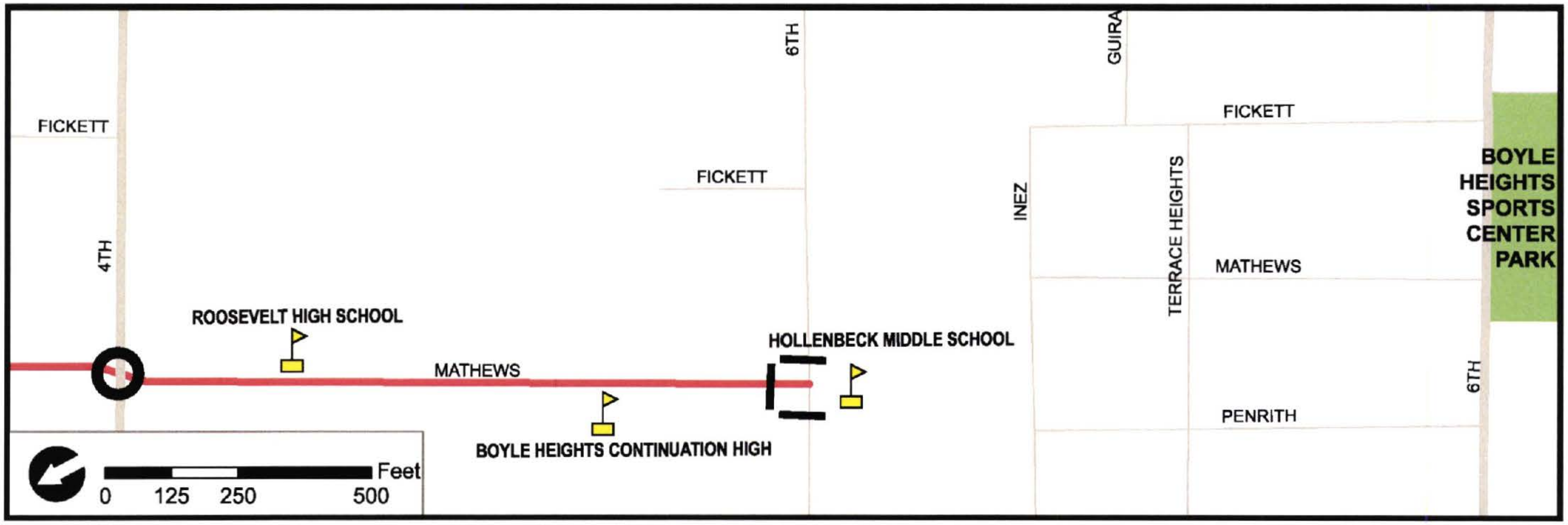
Fickett-Mathews



Mathews between 4th St. & 6th St.

Mathews at 4th St (facing north)

Mathews at Roosevelt High (facing north)



Indiana/Estudillo/Spence

Route	Length
Indiana/Estudillo/Spence	**2.3 mi**
–Indiana	0.6 mi
–4th (connector)	0.1 mi
–Estudillo*	0.3 mi
–6th (connector)	0.1 mi
--Spence**	1.2 mi
* Includes existing pedestrian bridge ** Includes future bike/ped bridge	

Estimated Cost:

$2,650,000–$5,100,000 (excluding cost of resurfacing)
$2,750,000–$6,300,000 (including resurfacing)

for cost estimate methodology see Appendix A

High costs include new bike-ped bridges over the 60 and I-5 Freeways. The low-cost estimate would maintain the existing ped-only bridge over the 60 Freeway.

Access to the Indiana Station from the west presented a challenge for several reasons. First, Indiana Street itself is a collector street with high traffic volumes and heavy truck traffic. Second, all of the streets to the west intersect Indiana Street at an angle. Third, jurisdictional issues arise since Indiana Street acts as the border between the City of Los Angeles and unincorporated L.A. County (East LA). Caltrans would also have to be involved in projects concerning freeway on/off ramps and bike/pedestrian overcrossings.

At the request of the advisory committee, the project team identified a potential route to Indiana Station that could serve as an alternative to the existing bike route on Lorena Street, which-along with other L.A. City Class 3 Bike Routes-is currently undergoing an internal safety evaluation. The combination of Indiana, Estudillo and Spence provides a comfortable low-traffic alternative to Lorena Street. The route takes advantage of an existing pedestrian overcrossing and connects the station to residential areas in the north and commercial/industrial areas at the southern end.

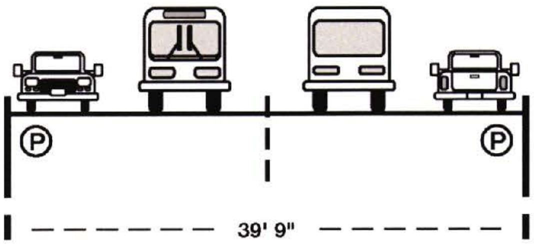
The left turn from 4th Street onto Indiana Street is complicated by the 60 Freeway off ramp and the lack of a traffic signal. This could be alleviated by adding a traffic signal or closing the off ramp. The increased traffic and pedestrian activity in this area that will come with the addition of light rail one block to the north may be further justification for off ramp closure. Road surface conditions at this intersection are very poor due to heavy truck traffic.

Changes to the existing pedestrian bridge over the 60 Freeway could range from complete replacement, to widening, to simply adding curb cuts at each end. A new bike/ped overcrossing would have to be constructed over Interstate 5.

Road surface conditions are poor in the southern sections of the route, especially south of Olympic Boulevard.

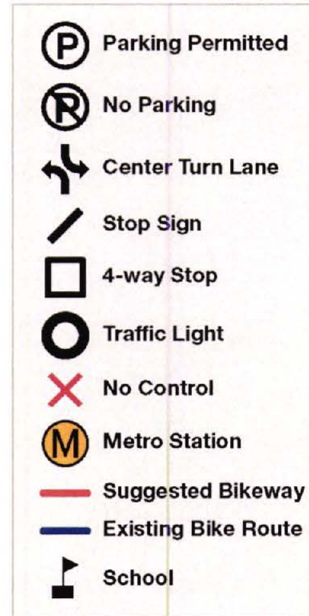
Five Points – Indiana/Lorena/Cesar Chavez

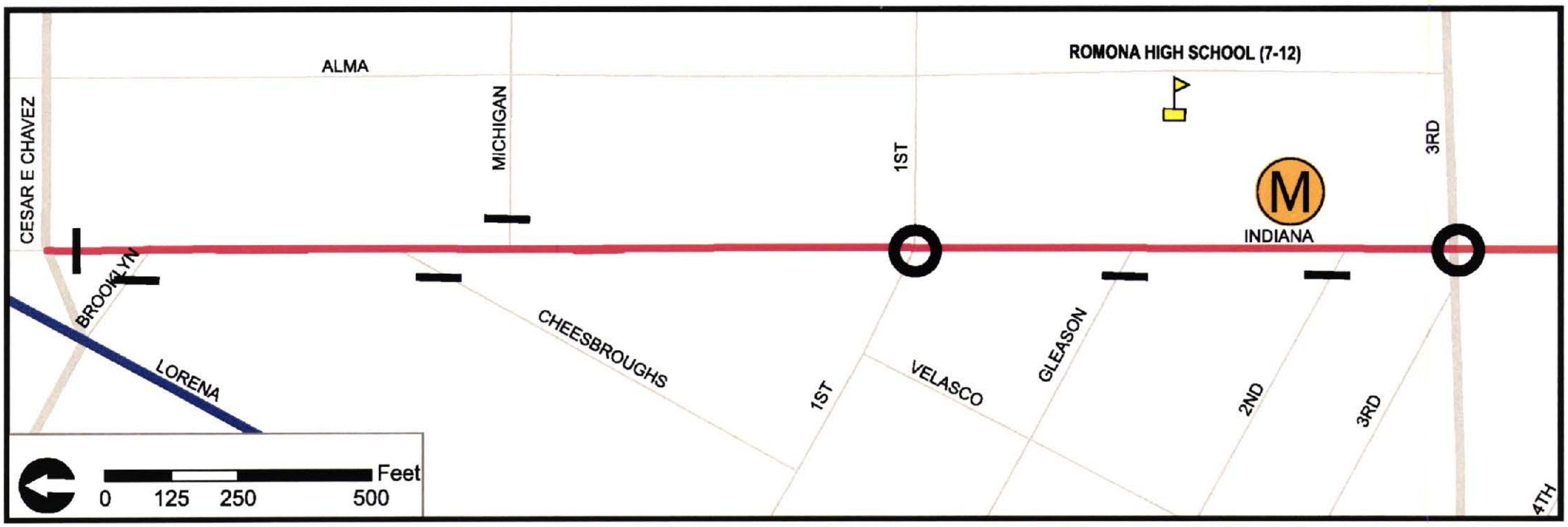
Indiana-4th-Estudillo-Spence



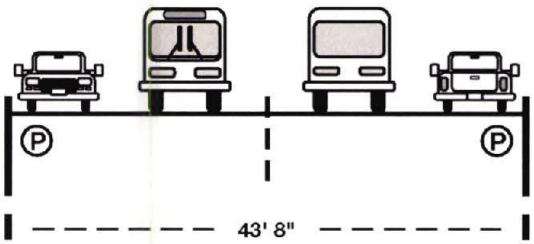
Indiana between Cesar Chavez & 1st St.

Indiana at Michigan (facing south)



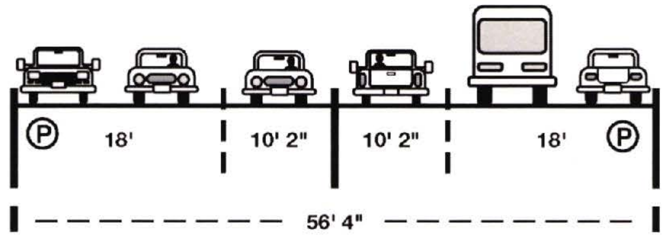


Indiana-4th-Estudillo-Spence

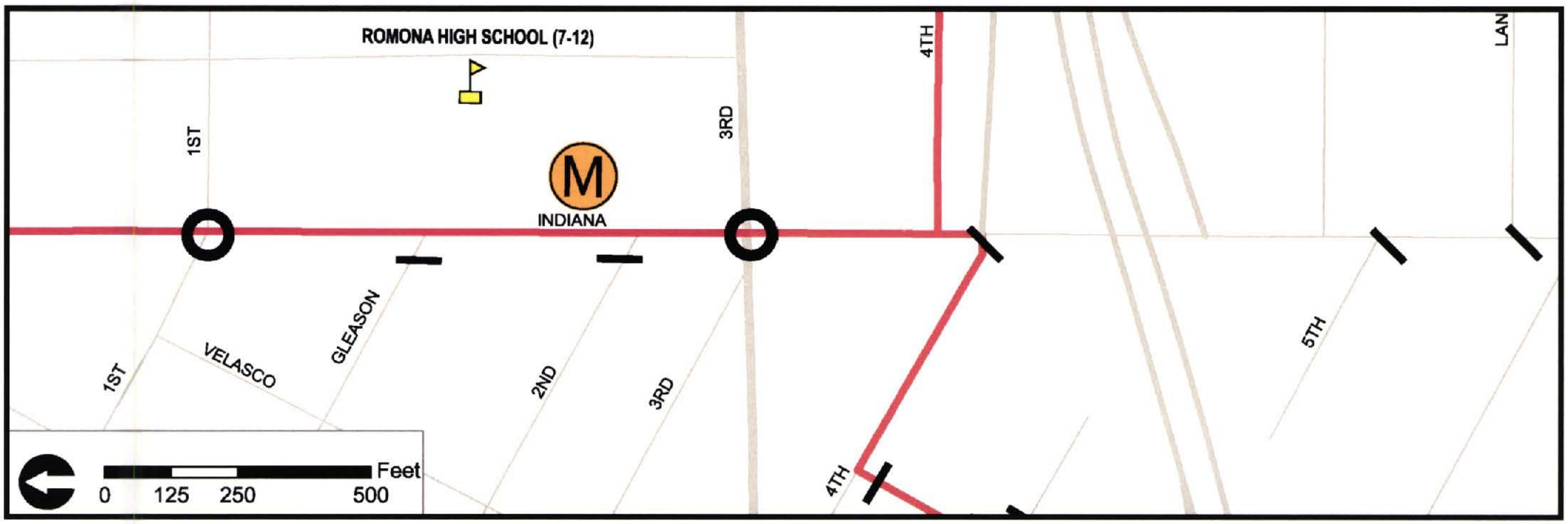


Indiana between 1st St. & 4th St.

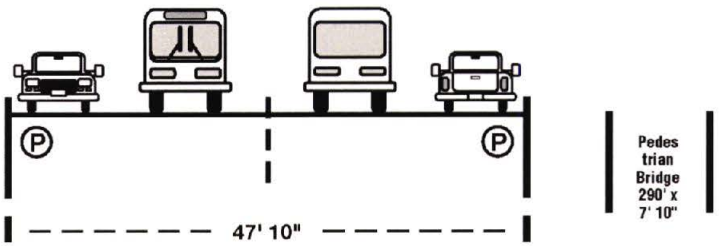
4th St facing east toward Indiana



4th St. between Indiana & Estudillo

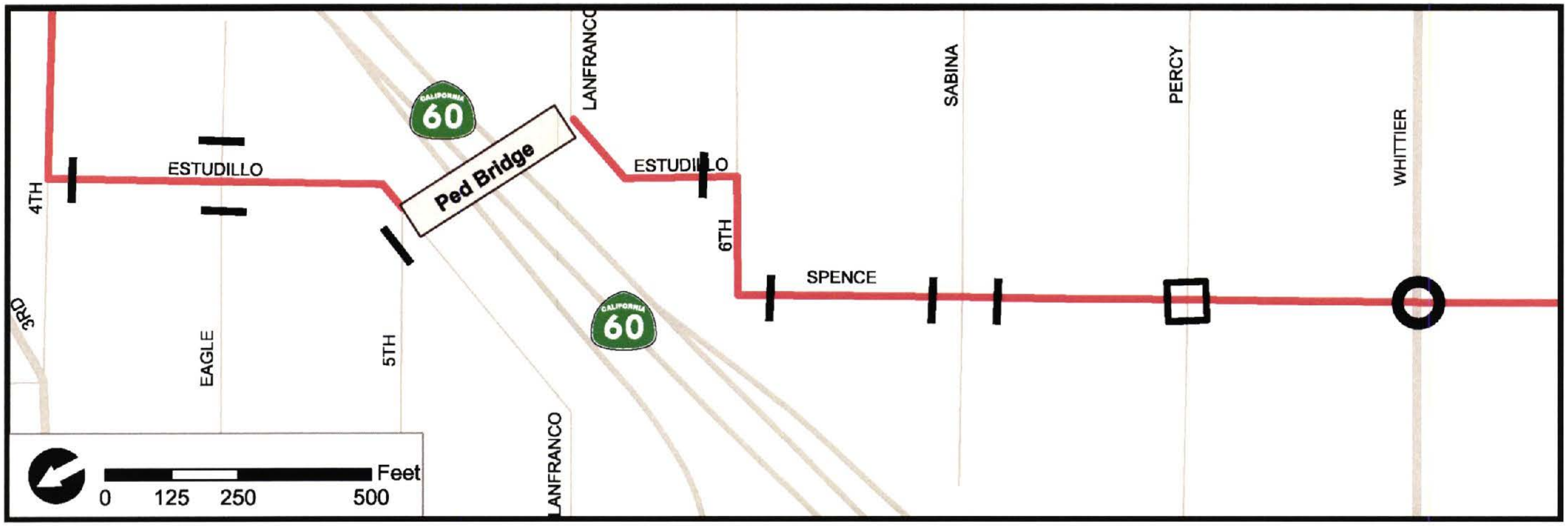


Indiana-4th-Estudillo-Spence

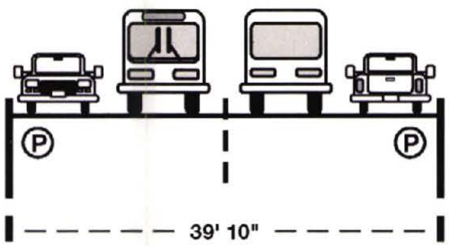


Estudillo between 4th St. & 6th St.

Estudillo at Ped Bridge (facing south)

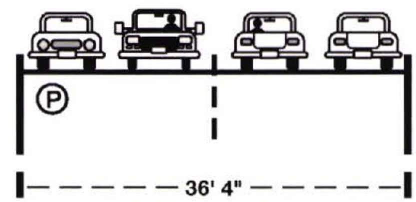


Indiana-4th-Estudillo-Spence

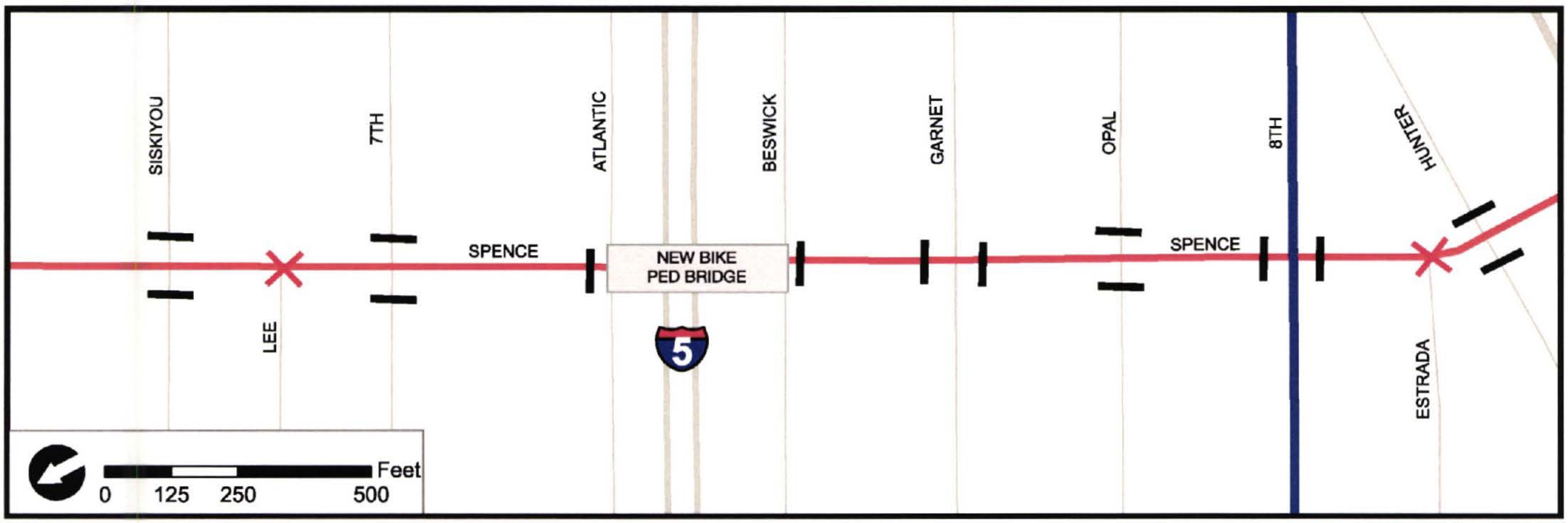


Spence between Whittier & 8th St.
(Spence stops between Atlantic & Beswick)

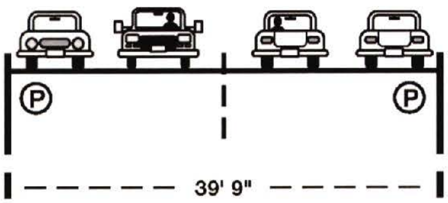
Spence at 7th St (facing north)



Spence between 8th St. & Olympic

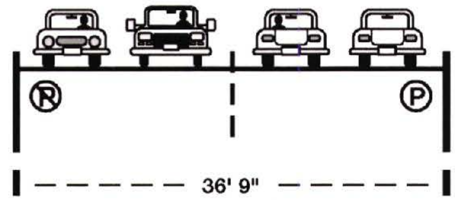


Indiana-4th-Estudillo-Spence

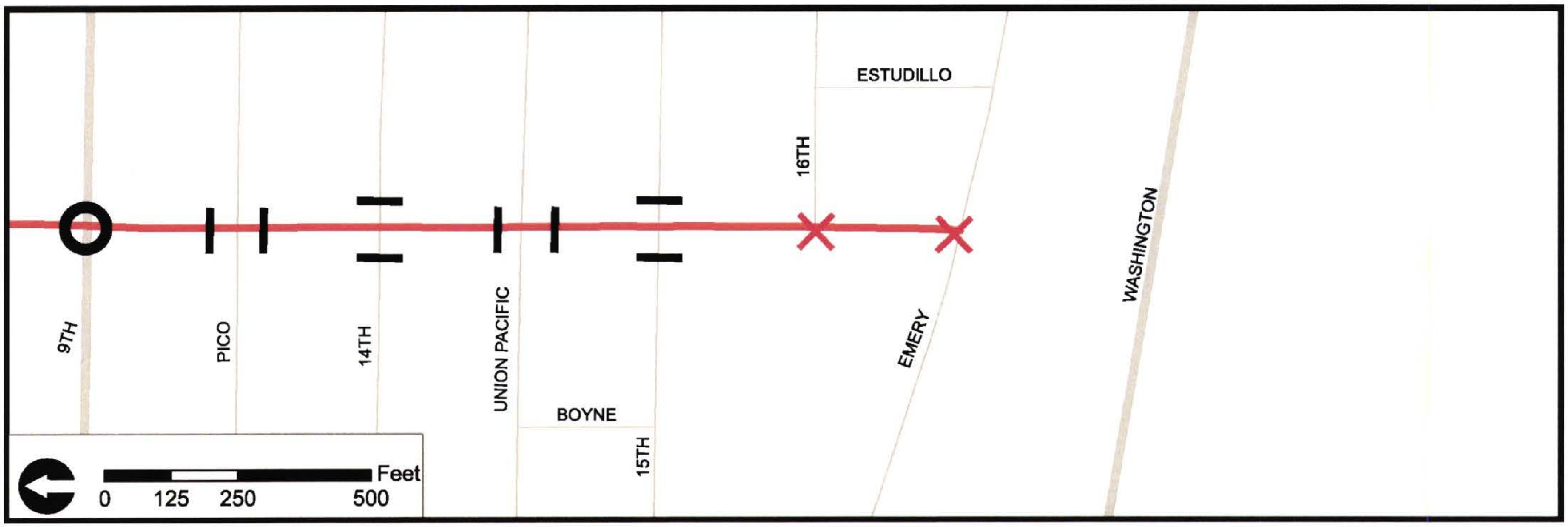


Spence between Olympic & 15th St.

Spence and Olympic (facing north)



Spence between 15th St. & Emry



Rowan or Rowan/Eastman

Route	Length
Rowan	**2.46 mi**
Rowan/Eastman	**2.5 mi**
–Rowan	1.46 mi
–Princeton (connector)	0.3 mi
–Eastman	1.0 mi

Estimated Cost:

$124,000–$3,200,000 (excluding cost of resurfacing)
$215,000–$4,760,000 (including resurfacing)

for cost estimate methodology see Appendix A

The high cost estimate includes a new bike-ped bridge over I-5 at Rowan or Eastman. The low estimate assumes that the existing ped-only bridge would be used by bicyclists to cross I-5.

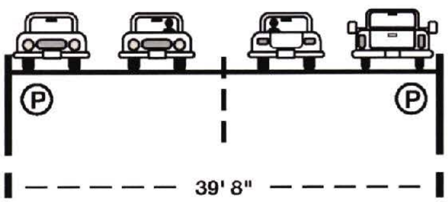
Rowan Avenue provides access to Indiana Station for residents to the east of Indiana Street. Rowan was chosen because it provided the most consistent north-south access. The first major barrier occurs about three quarters of a mile south of the station at Rowan and Whittier Boulevard where there is no traffic signal. The next major barrier is where Rowan stops at Interstate 5 a full mile south of Indiana Station. These first two barriers could be at least partially eliminated by having the route shift to Eastman Avenue south of Princeton Street. There is an existing traffic signal at Eastman and Whittier. There is also an existing pedestrian bridge at Eastman over Interstate 5. The bridge was not built to be used by bicycles but the use of ramps (rather than steps) and the moderate grade make it a comfortable crossing for bicyclists. Widening the bridge could make it safer for use by bicyclists and pedestrians. The Eastman alternative also allows bicyclists to avoid a very narrow segment of Rowan Ave south of Verona.

The only major barrier south of I-5 is the crossing at Eastman and Olympic Boulevard, where there is no traffic signal. A traffic signal currently exists at Rowan and Olympic.

Basic Improvements	Rowan	Rowan/ Eastman
Bike Route + Directional Signage	X	X
Shared-Use Arrows	X	X
Bike-Sensitive Loop Detectors at Signalized Intersections	X	X
New Traffic Signal or Median Refuge		
–Whittier Boulevard	X	
–Olympic Boulevard		X
Upgrade Pedestrian Bridge over Interstate 5		X
Add New Bike/Ped Bridge over Interstate 5	X	
Additional Improvements		
Pedestrian/Bicycle Friendly Traffic Calming	X	X
Adjusting Stop Signs at:		
–Michigan Avenue	X	X
–Verona Avenue	X	
Additional Street Trees/Landscaping	X	X

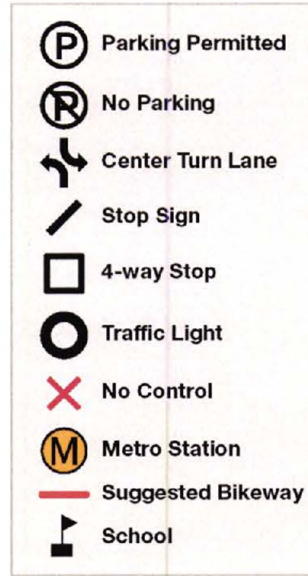
Rowan at Eagle/60 Fwy Bridge (facing north)

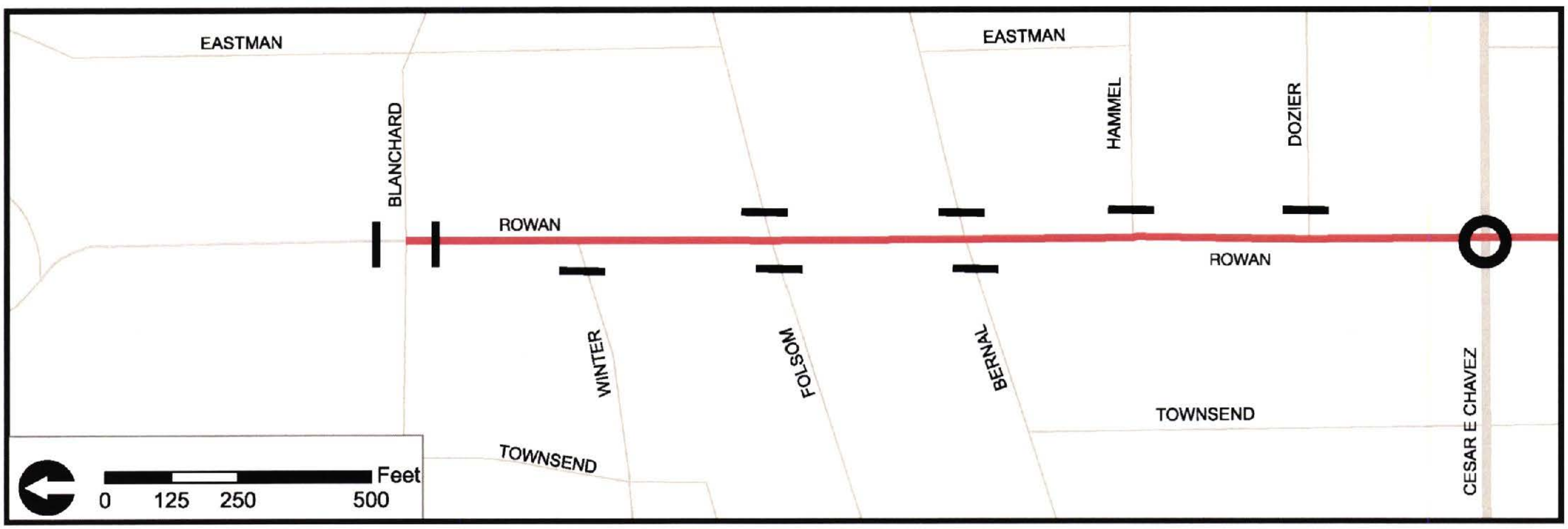
Rowan or Rowan-Eastman



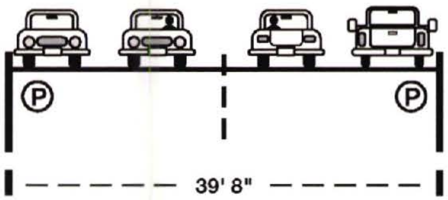
Rowan between Blanchard & Cesar Chavez

Rowan between Floral and Cesar Chavez (facing south)





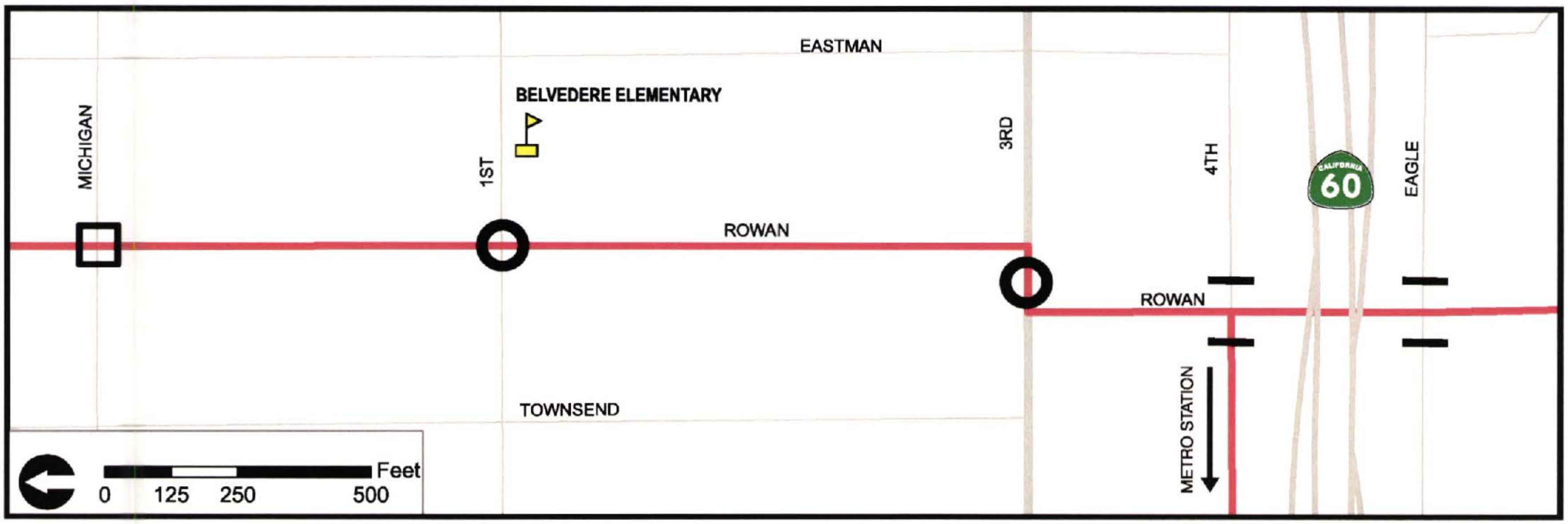
Rowan or Rowan-Eastman



Rowan between Cesar Chavez & Verona

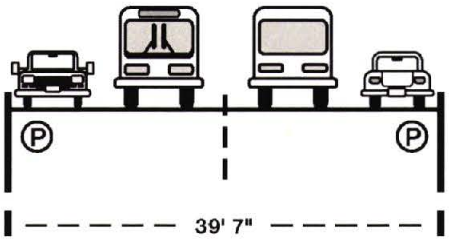
Rowan at Belvedere Elementary (facing north)

Rowan at 3rd (facing south)

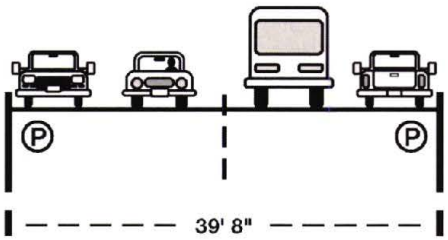


Rowan or Rowan-Eastman

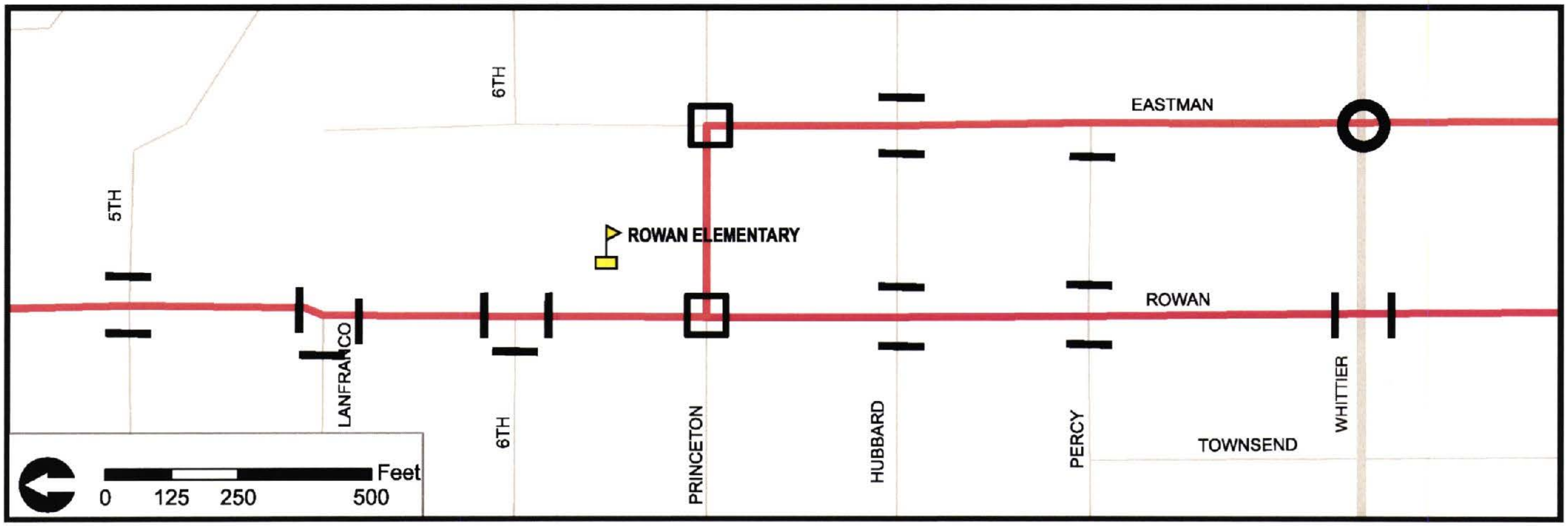
Eastman at Verona (facing south)



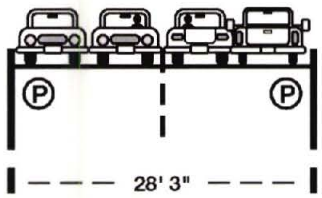
Princeton between Rowan & Eastman



Eastman between Princeton & Dennison/I-5

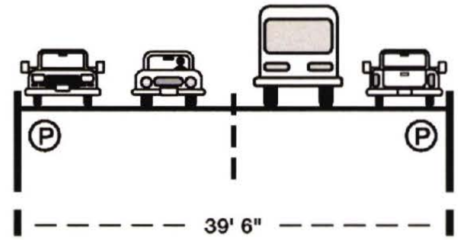


Rowan or Rowan-Eastman

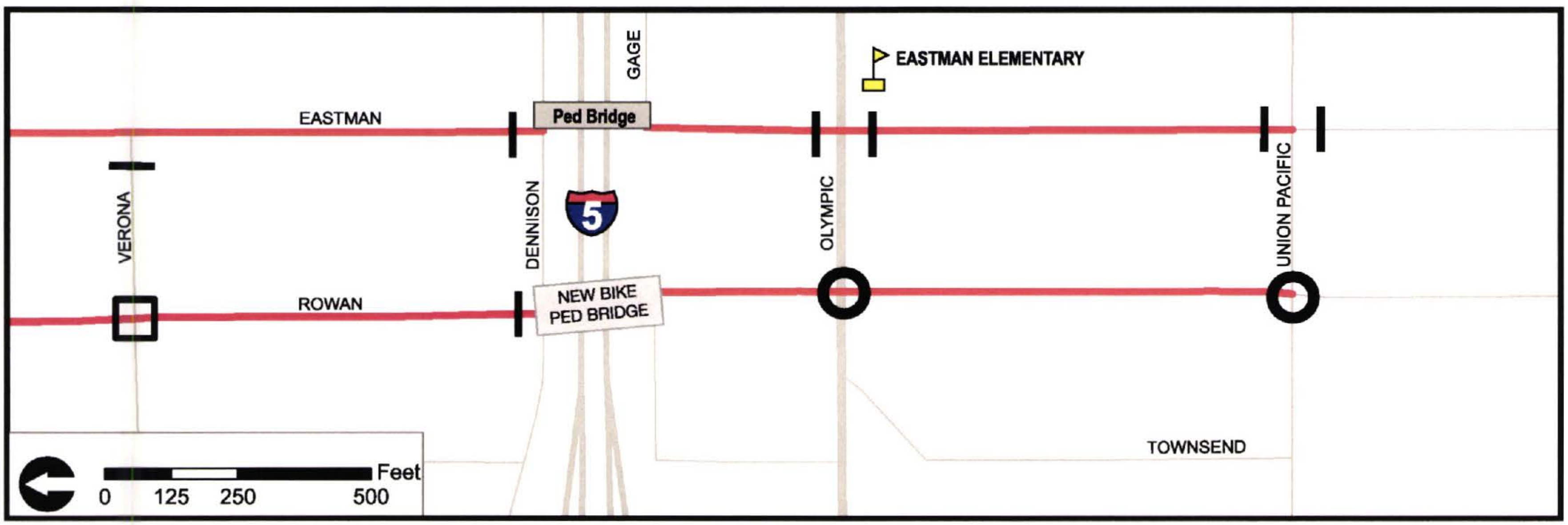


Rowan between Verona & Union Pacific

Pedestrian Bridge over I-5 Fwy (north end)



Eastman between I-5 & Union Pacific



Ford Boulevard

Route	Length
Ford	**1.8 mi**

Estimated Cost:

$28,000–$63,500 (excluding cost of resurfacing)
$93,000–$1,150,000 (including resurfacing)

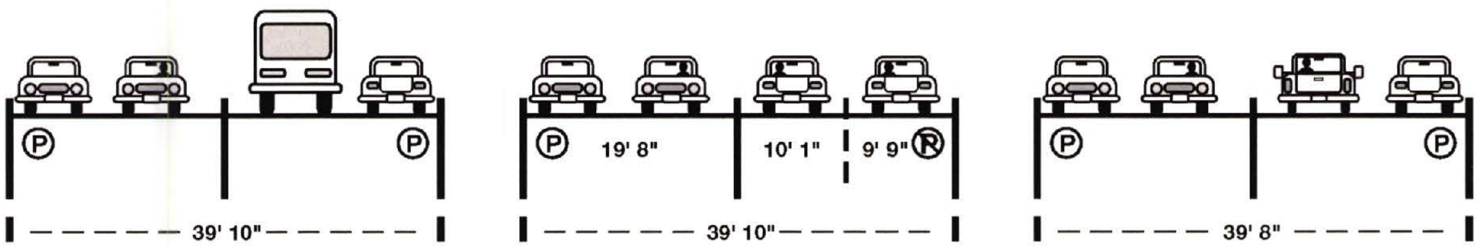
for cost estimate methodology see Appendix A

Ford Boulevard provides a continuous north-south route from Floral Drive at the northern end of unincorporated East LA to Olympic Blvd at the southern end. It parallels the 710 freeway and provides access to Maravilla Station at 3rd Street. A diversity of roadway widths and lane configurations exist along this route. Freeway on and off ramps exist at several locations along the route. 'Watch for Bicyclists' signage should be located at freeway exits so that cars exiting the freeway onto Ford are alerted to the fact that bicycles are present.

Basic Improvements
Bike Route + Directional Signage
'Watch for Bicyclists' Signs (at all freeway exits)
Shared-Use Arrows
Bike-Sensitive Loop Detectors at Signalized Intersections
Additional Improvements
Pedestrian/Bicycle Friendly Traffic Calming
Adjusting Stop Signs at:
-Hammel St
-Betty Ave/5th St
Additional Street Trees/Landscaping

Ford and Eagle (facing south)

Ford Boulevard

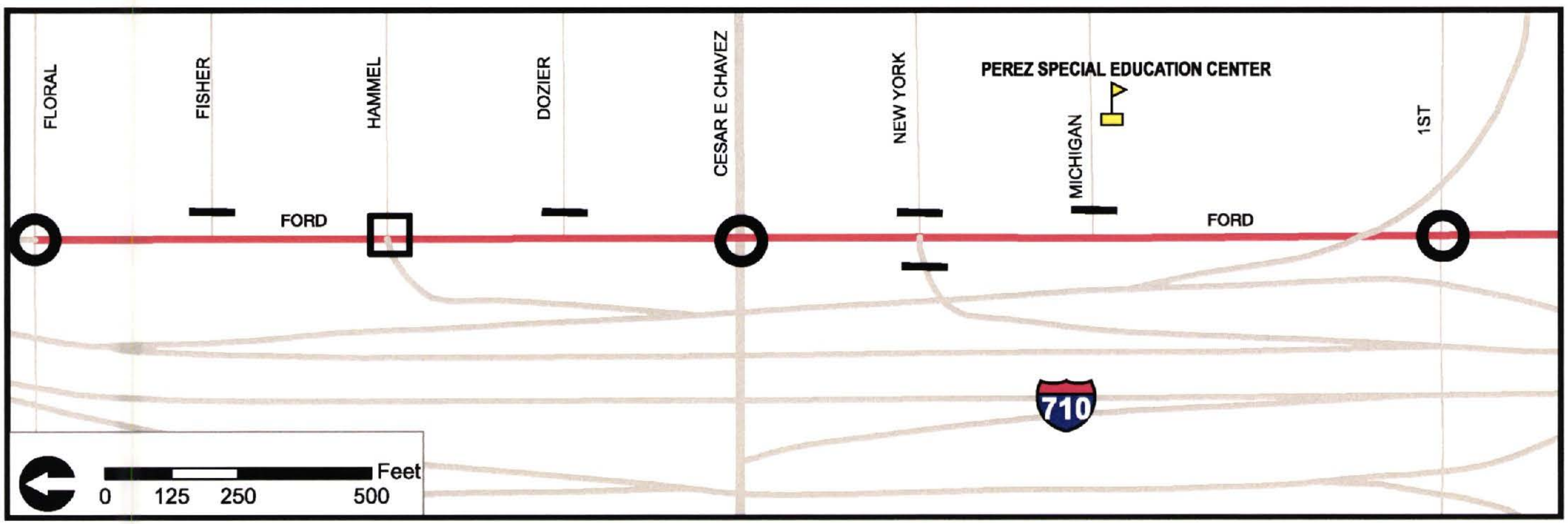


Ford between Floral & Cesar Chavez

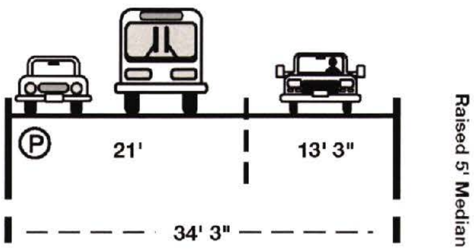
Ford between Cesar Chavez & New York

Ford between New York & I-710 overpass (North of 1st St.)

- Parking Permitted
- No Parking
- Center Turn Lane
- Stop Sign
- 4-way Stop
- Traffic Light
- No Control
- Metro Station
- Suggested Bikeway
- School

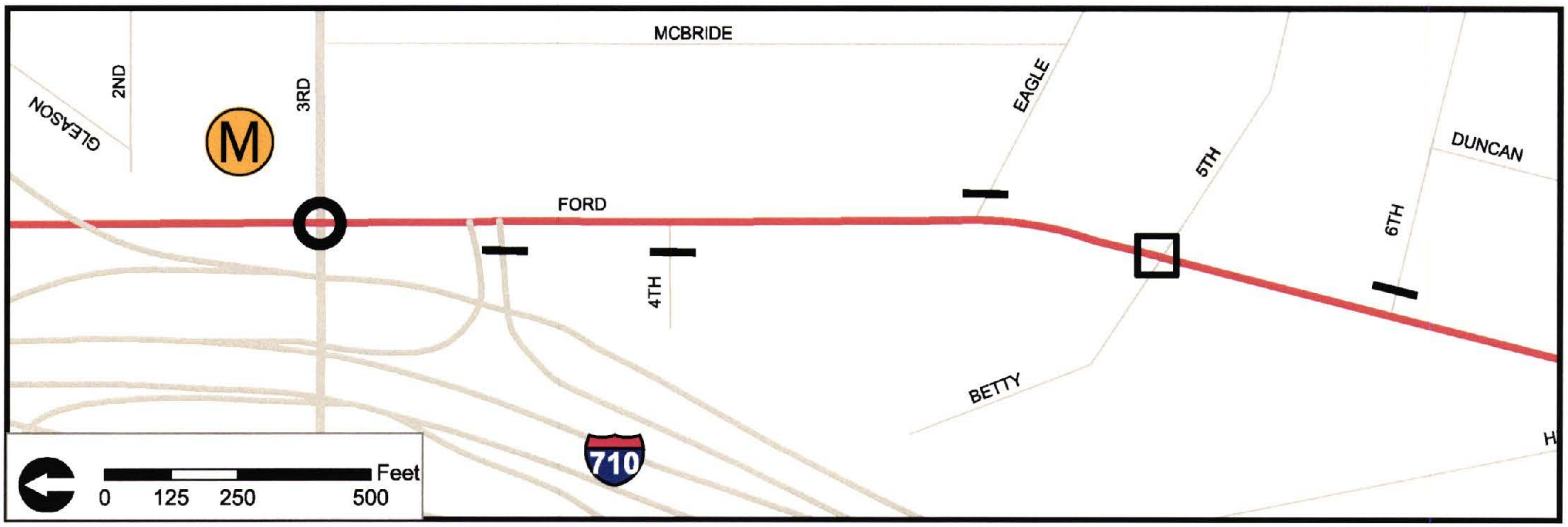


Ford Boulevard

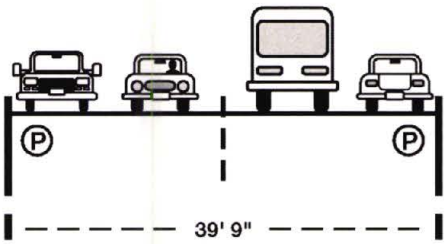


Ford between 1st & 3rd

Ford at 60/710 interchange (facing south)

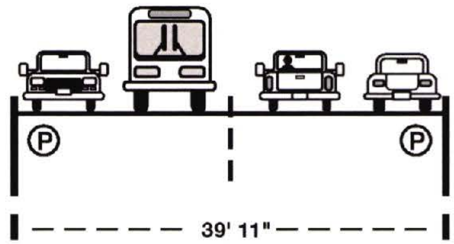


Ford Boulevard

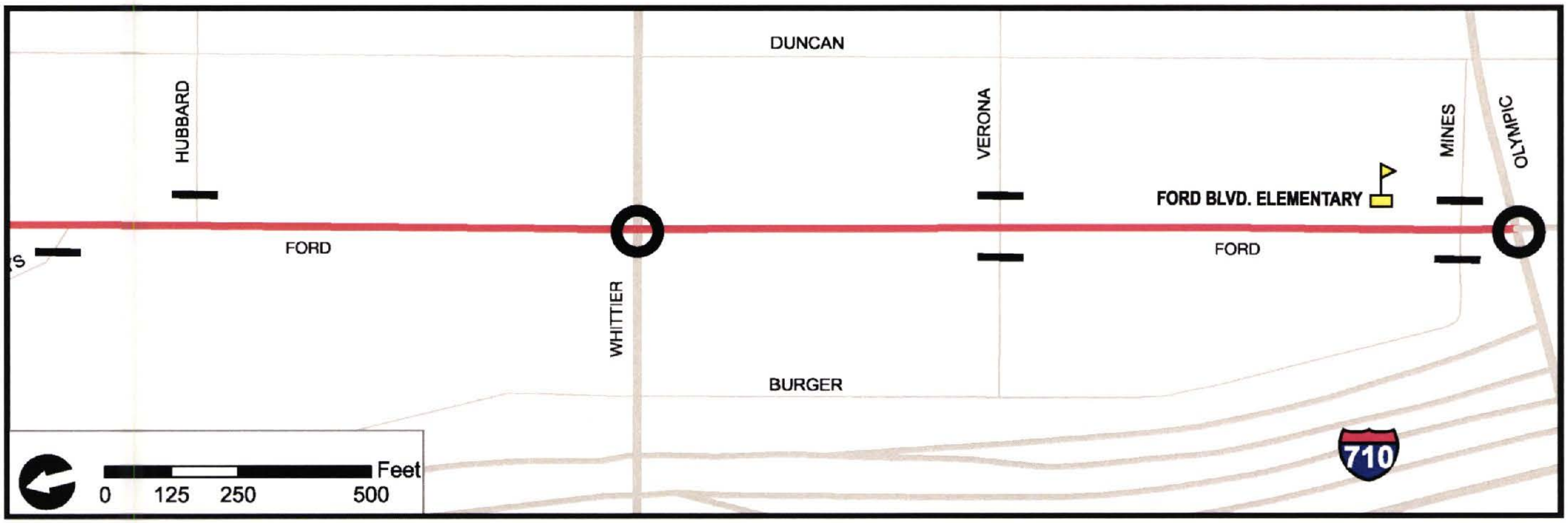


Ford between 3rd and Whittier

Ford at Whittier Blvd (facing north)



Ford between Whittier and Olympic



Monterey Pass/Mednik/Arizona

Route	Length
Monterey Pass/Mednik/Arizona	**3.7 mi**
Monterey Pass	1.6 mi
Mednik	0.8 mi
Arizona	1.3 mi

Estimated Cost:

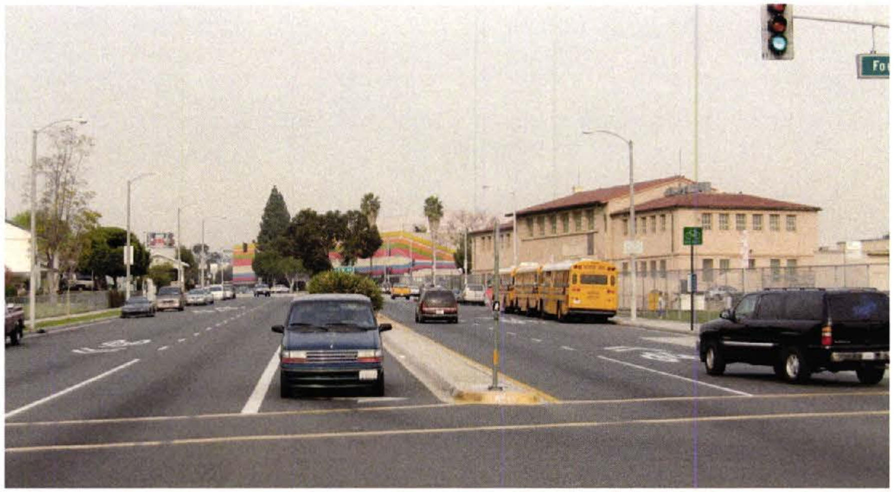
$54,000–$94,000 (excluding cost of resurfacing)
$246,000–$3,340,000 (including resurfacing)

for cost estimate methodology see Appendix A

The route comprised of Monterey Pass Road, Mednik Avenue, and Arizona Avenue provides direct access to the Civic Center Station. This corridor is largely commercial, so traffic volumes are higher than on some of the other residential routes. No continuous parallel routes exist. The outside lanes are wide and the pavement surfaces are good along this route. No additional traffic signals or stop sign adjustments are needed.

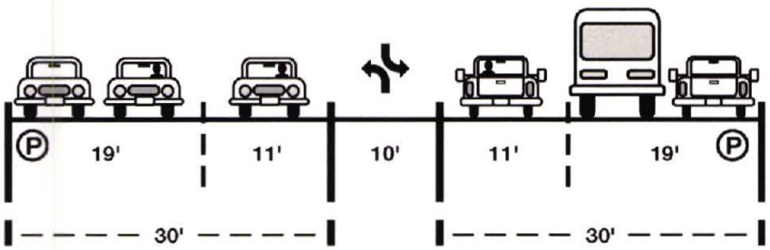
Bike lanes might be feasible, but would likely require some on-street parking removal and/or narrowing of center turn lanes. Bike lanes are not recommended unless enough room is provided for cyclists to safely clear the 'door zone' while riding in the bike lane (see design concepts section). If shared-use arrows are used, they should be painted a minimum of 14' from the curb, especially in the downhill sections of Monterey Pass and areas where large trucks park along the route.

Basic Improvements
Bike Route (or Bike Lane) + Directional Signage
'Watch for Bicyclists' Signs (at all freeway exits)
Shared-Use Arrows (or Bike Lanes)
Bike-Sensitive Loop Detectors at Signalized Intersections
Additional Improvements
Additional Street Trees/Landscaping



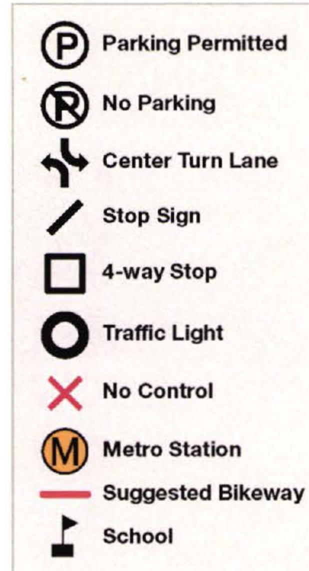
Arizona at 4th (looking north)

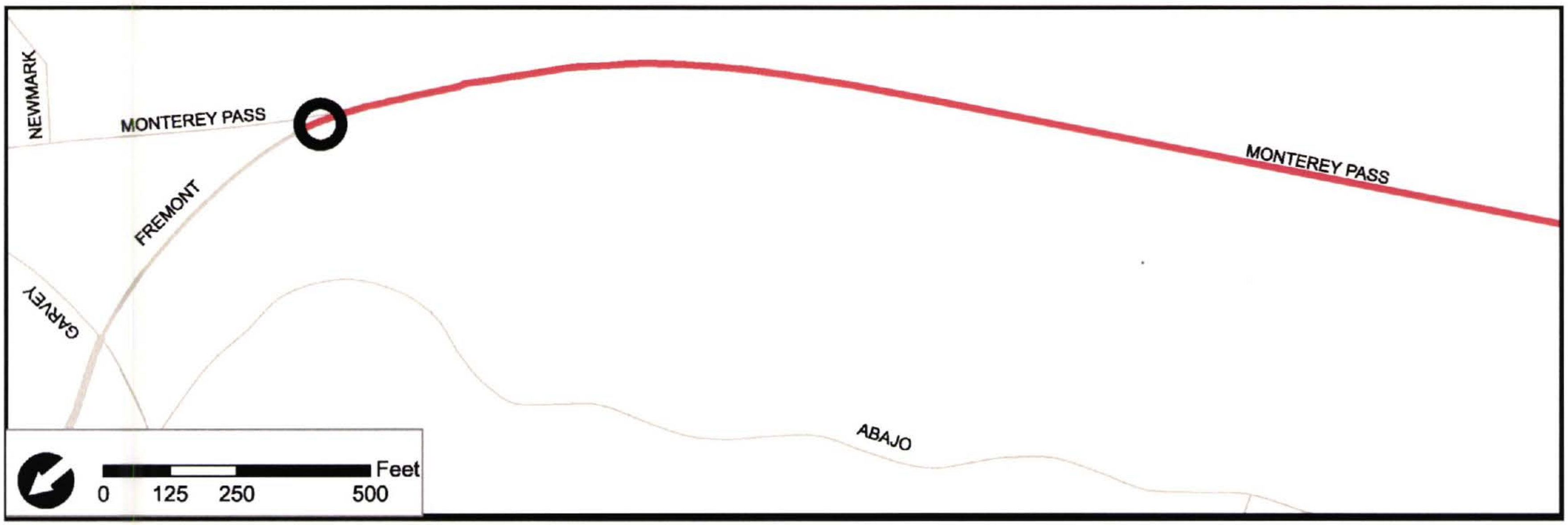
Monterey Pass-Mednik-Arizona



Monterey Pass between Fremont & Vagabond

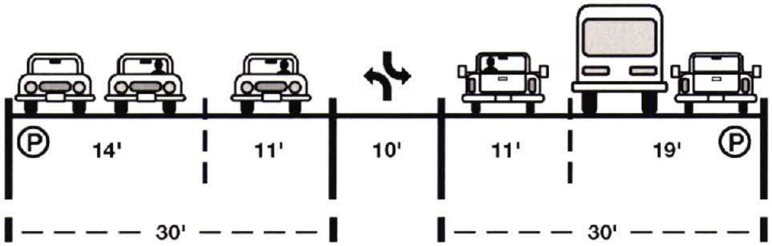
Monterey Pass at Fremont (facing north)



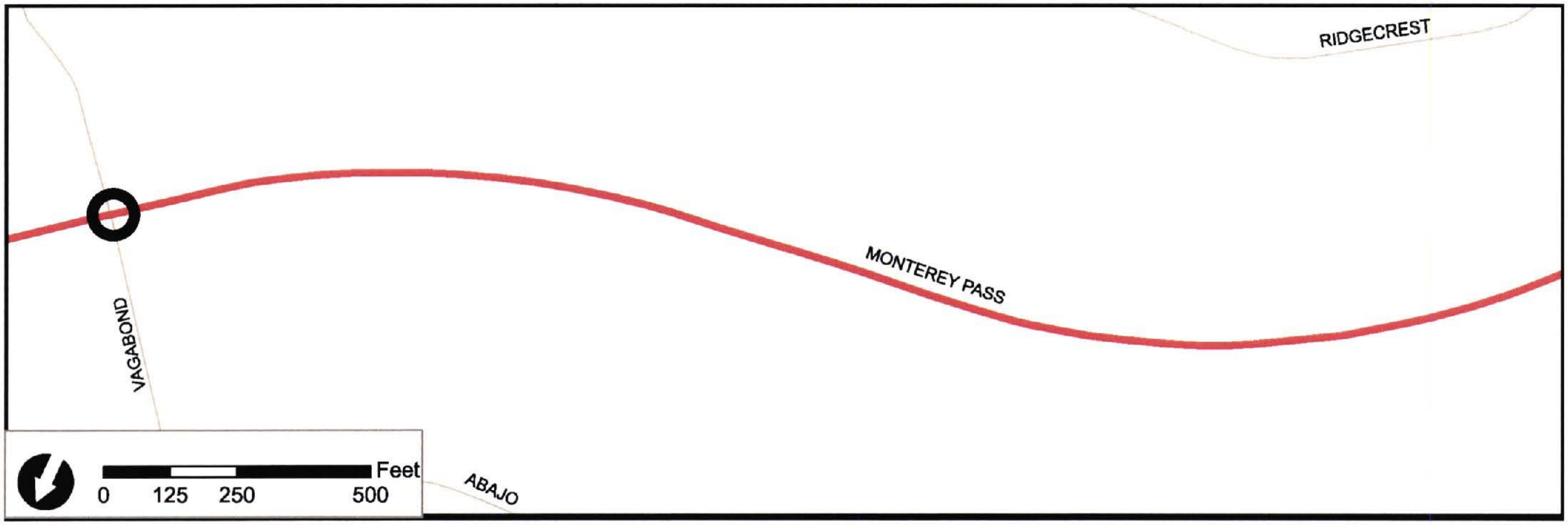


Monterey Pass-Mednik-Arizona

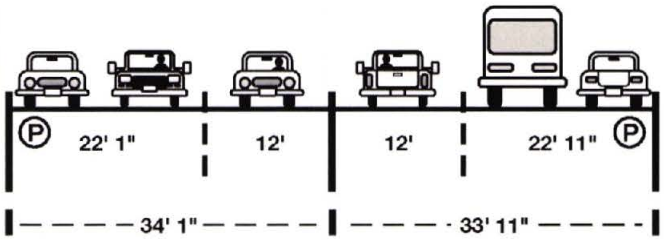
Monterey Pass south of Vagabond (facing south)



Monterey Pass between Vagabond & Floral

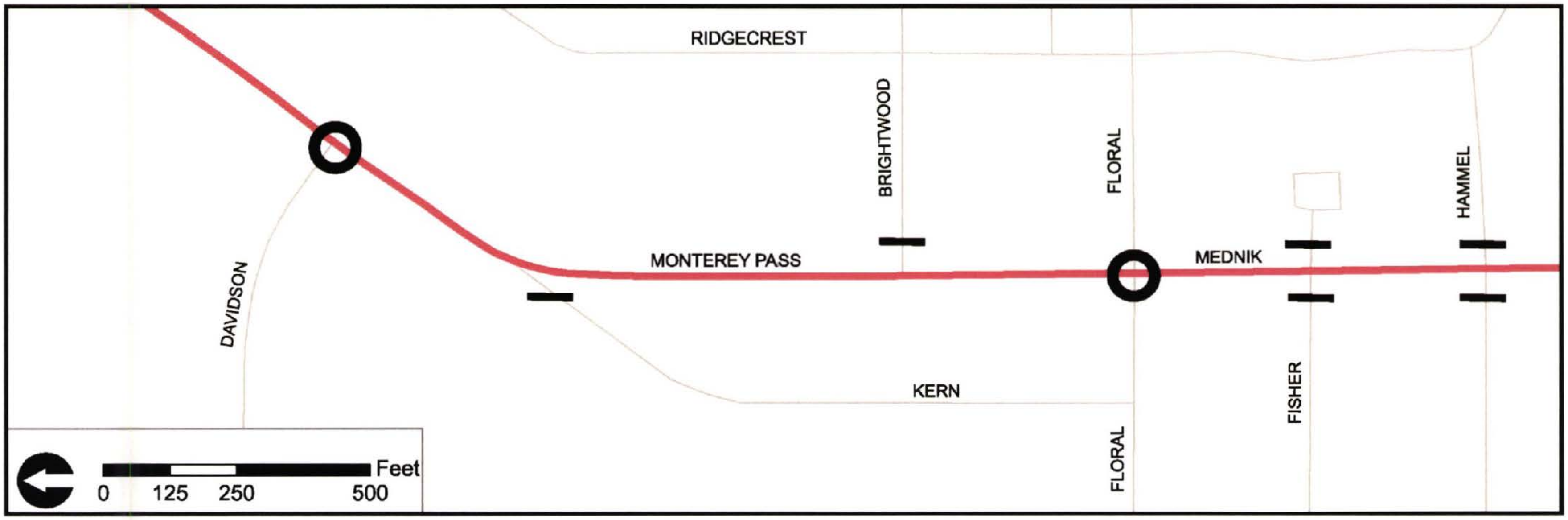


Monterey Pass-Mednik-Arizona

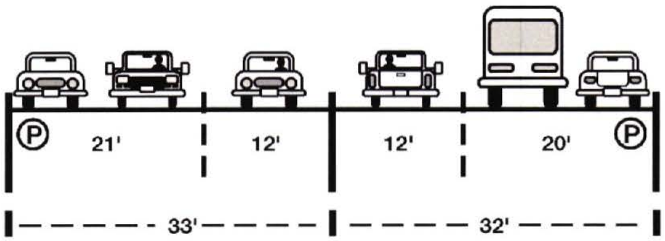


Mednik between Floral & Cesar Chavez

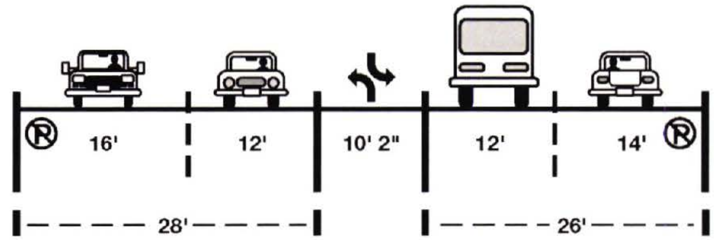
Belvedere County Park



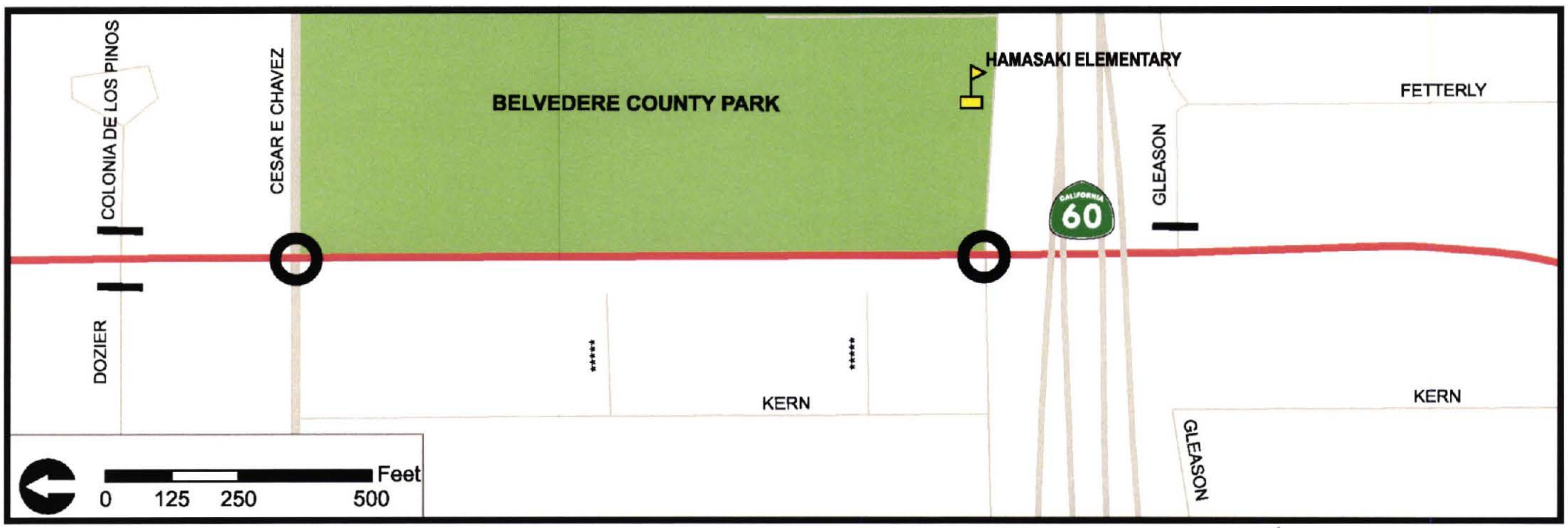
Monterey Pass-Mednik-Arizona



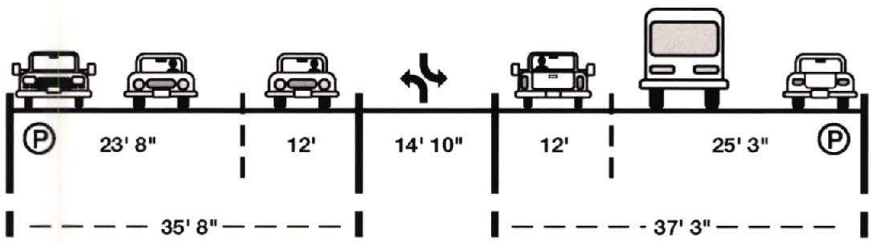
Mednik between Cesar Chavez & 1st



Mednik at bridge over 60 Freeway

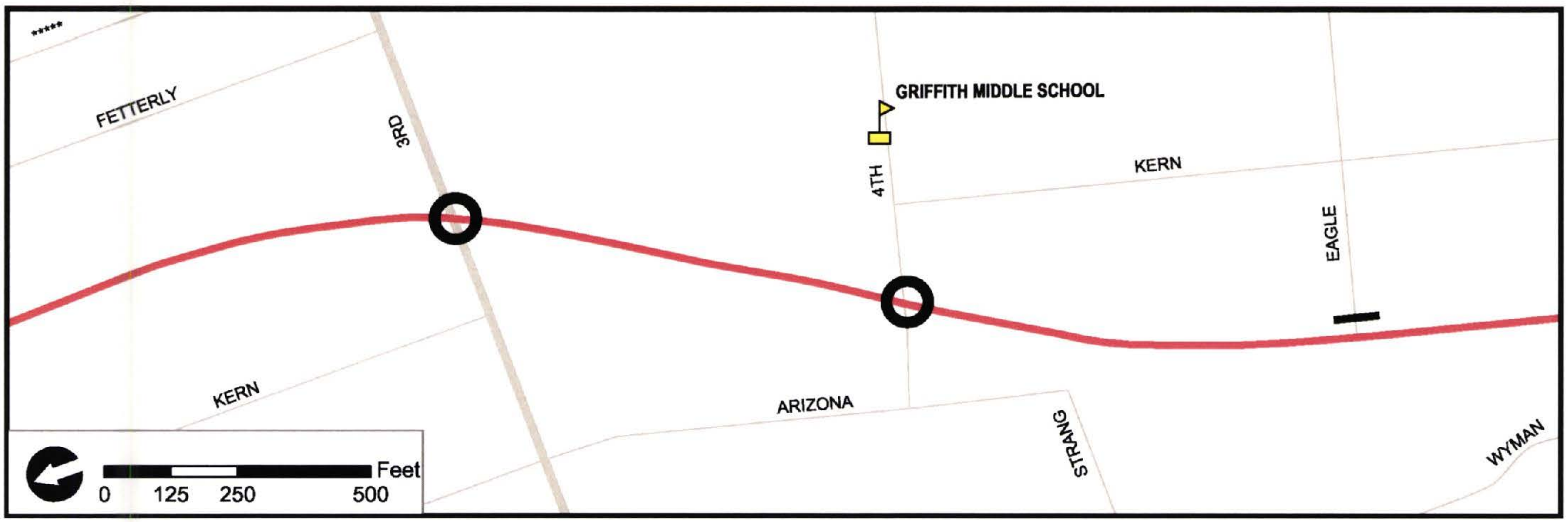


Monterey Pass-Mednik-Arizona

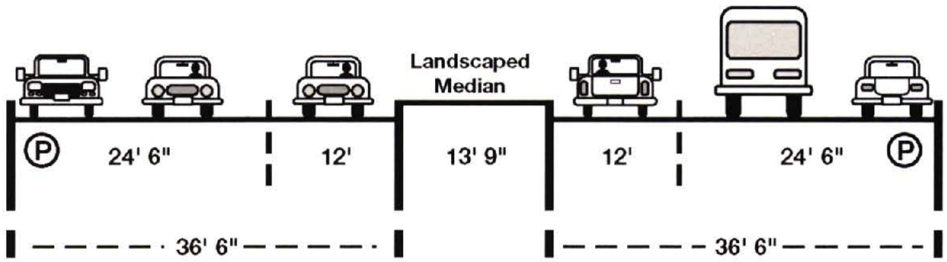


Mednik between 60 Fwy & 3rd Street

Arizona at 4th (facing north)



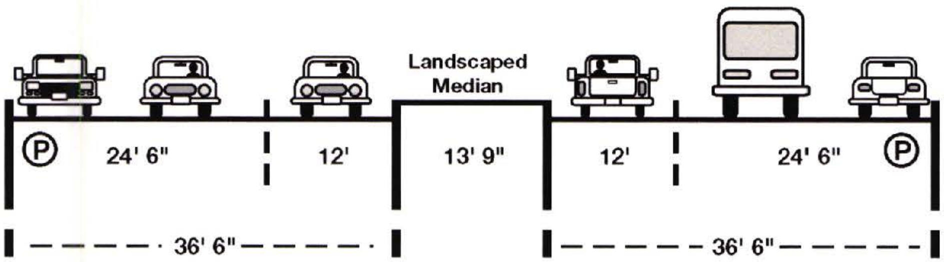
Monterey Pass-Mednik-Arizona



Mednik/Arizona between 3rd Street & Whittier

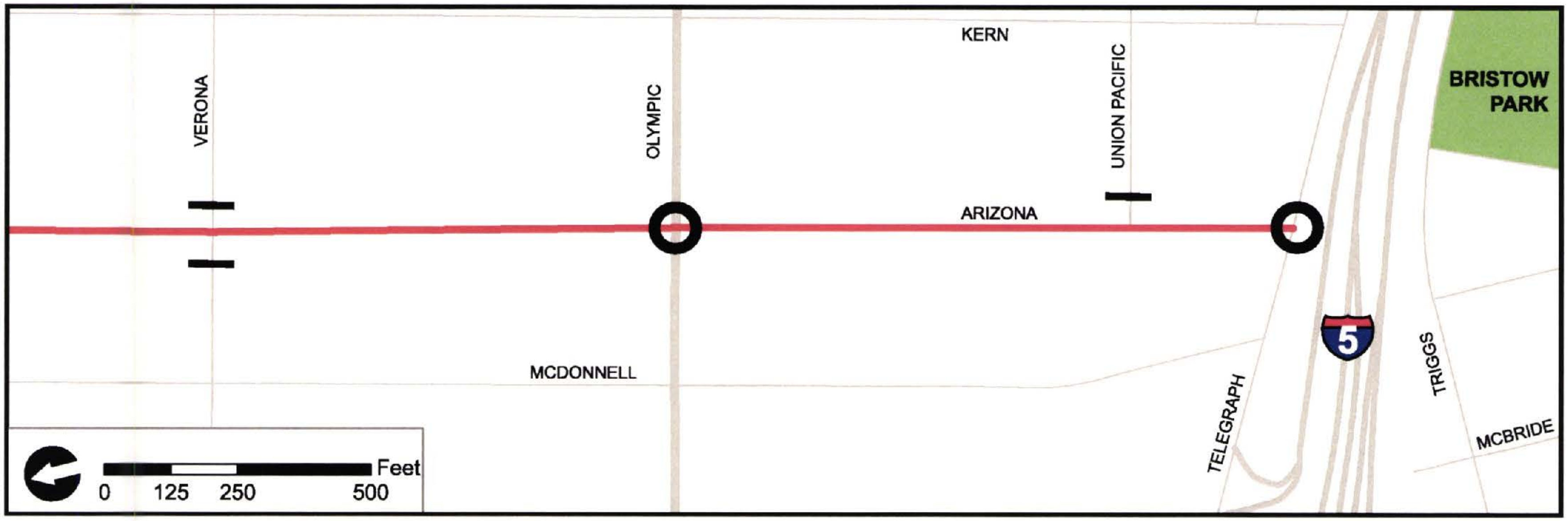
Arizona at Hubbard (facing south)

Monterey Pass-Mednik-Arizona



Arizona between Whittier & Telegraph

Arizona between Olympic & Verona (facing north)



Woods

Route	Length
Woods	**2.1 mi**

Estimated Cost:

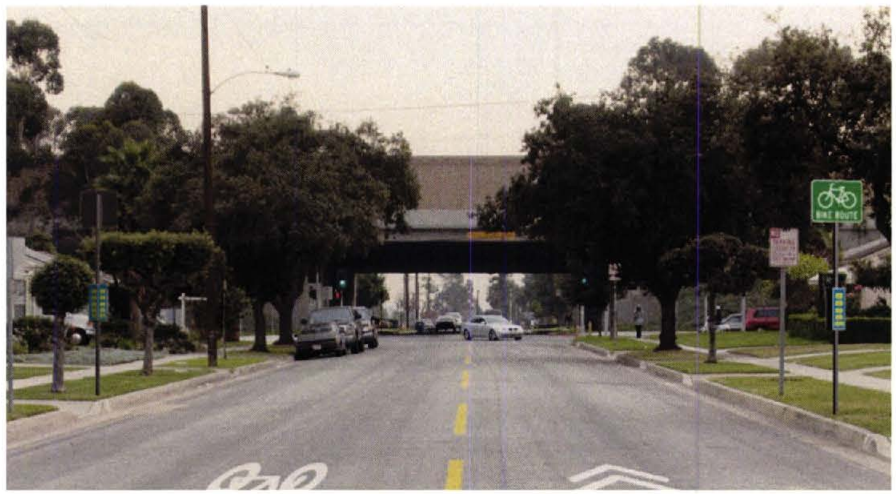
$219,000 - $357,000 (excluding cost of resurfacing)
$279,000 - $1,378,000 (including resurfacing)

-for cost estimate methodology see Appendix A

Woods Avenue is well suited to provide north-south access to the Pomona-Atlantic Station for residents and stakeholders to the west of Atlantic Boulevard. It parallels the commercial and employment destinations along Atlantic and provides access to two high schools (Garfield and Del La Hoya Animo) and East Los Angeles Community College (ELACC). At the northern end, a more direct connection to ELACC could be created as part of the transportation planning study being conducted by the Community College District. Access to the station and park and ride lot should be provided by directing cyclists down Telford Street. The park and ride entrance along Telford should be designed to accommodate bicyclists and pedestrians only. This will protect bicyclists, pedestrians and residents by ensuring that traffic volumes on Telford remain low. Much of the route, especially the southern portion is attractively landscaped.

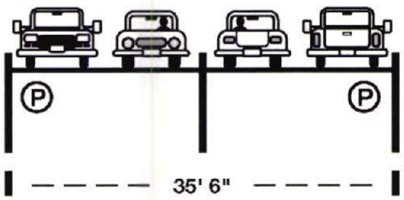
Two major improvements include the installation of bike activated traffic signals or refuge islands at the intersections of Whittier Blvd and Olympic Blvd.

Basic Improvements
Bike Route + Directional Signage
Shared-Use Arrows
Bike-Sensitive Loop Detectors at Signalized Intersections
New Traffic Signal or Median Refuge
–Whittier Boulevard
–Olympic Boulevard
Additional Improvements
Pedestrian/Bicycle Friendly Traffic Calming
Adjusting Stop Signs at:
–4th Street
–Eagle Street
–6th Street
–Verona Street
Union Pacific AvenueAdditional Street Trees/Landscaping



Woods looking north from Telford

Woods Avenue

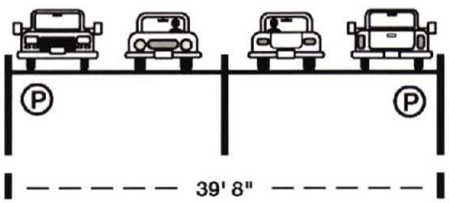


Woods between Dorner & 3rd st

Woods at 1st St & 60 Fwy underpass (facing south)

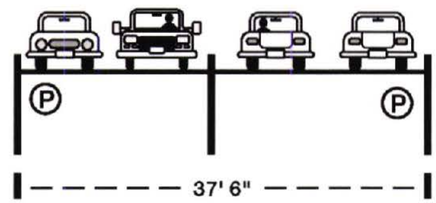
- Parking Permitted
- No Parking
- Center Turn Lane
- Stop Sign
- 4-way Stop
- Traffic Light
- No Control
- Metro Station
- Suggested Bikeway
- School

Woods Avenue

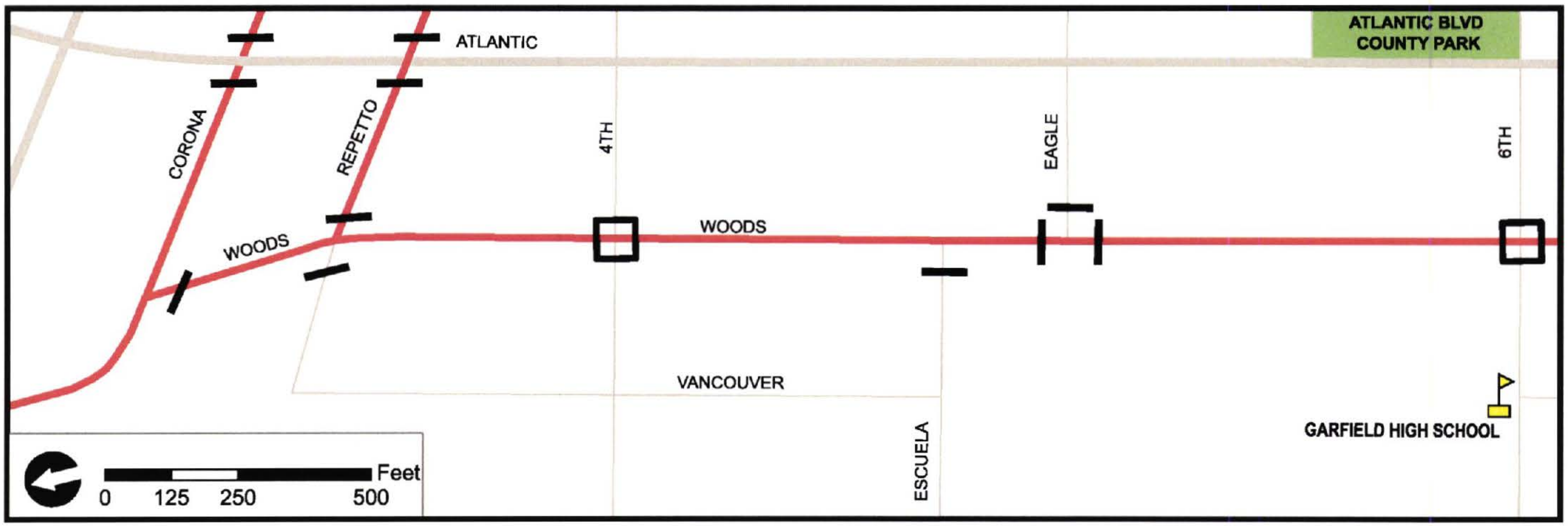


Woods between 3rd St./Pomona/Beverly intersection & Via Corona

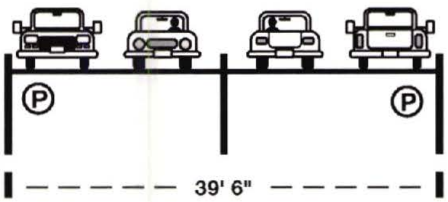
Woods at 4th (facing north)



Woods between Via Corona & Whittier

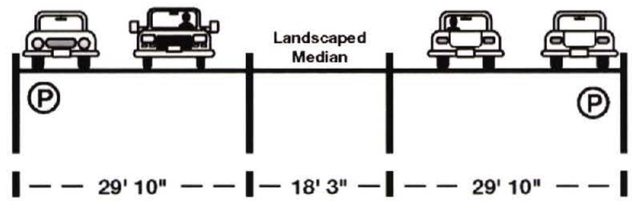


Woods Avenue

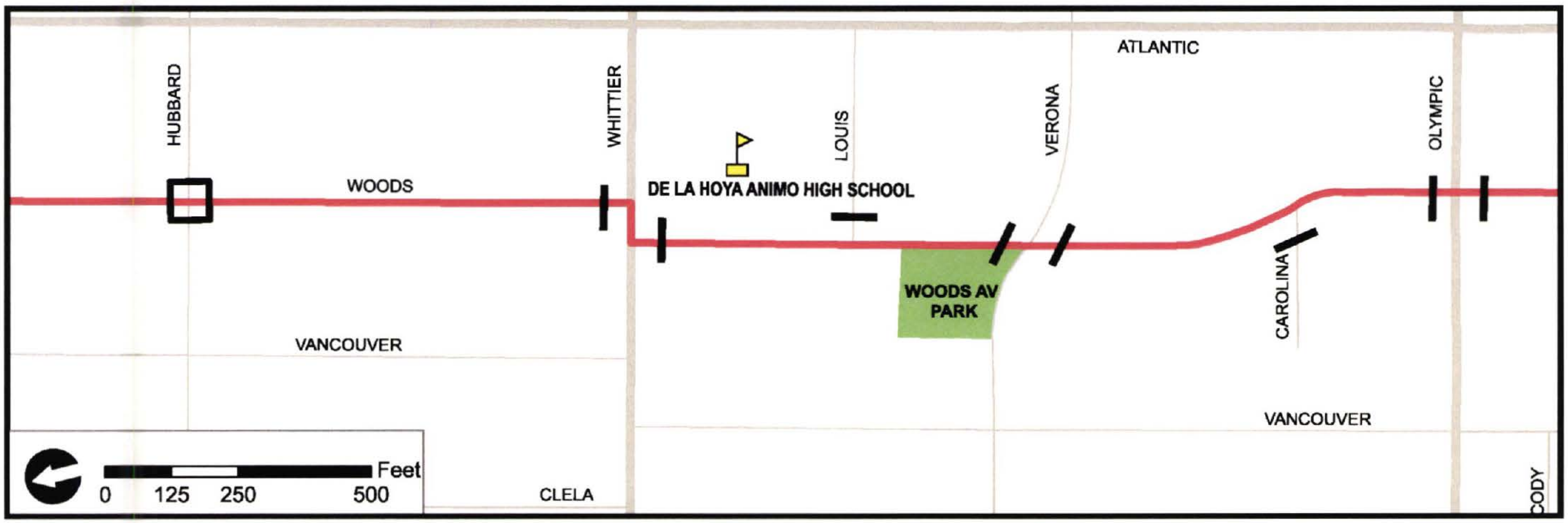


Woods between Whittier & Louis

Woods at Whittier (facing northeast)



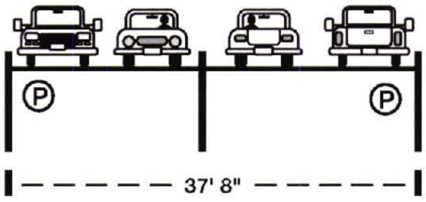
Woods between Louis & Carolina Place



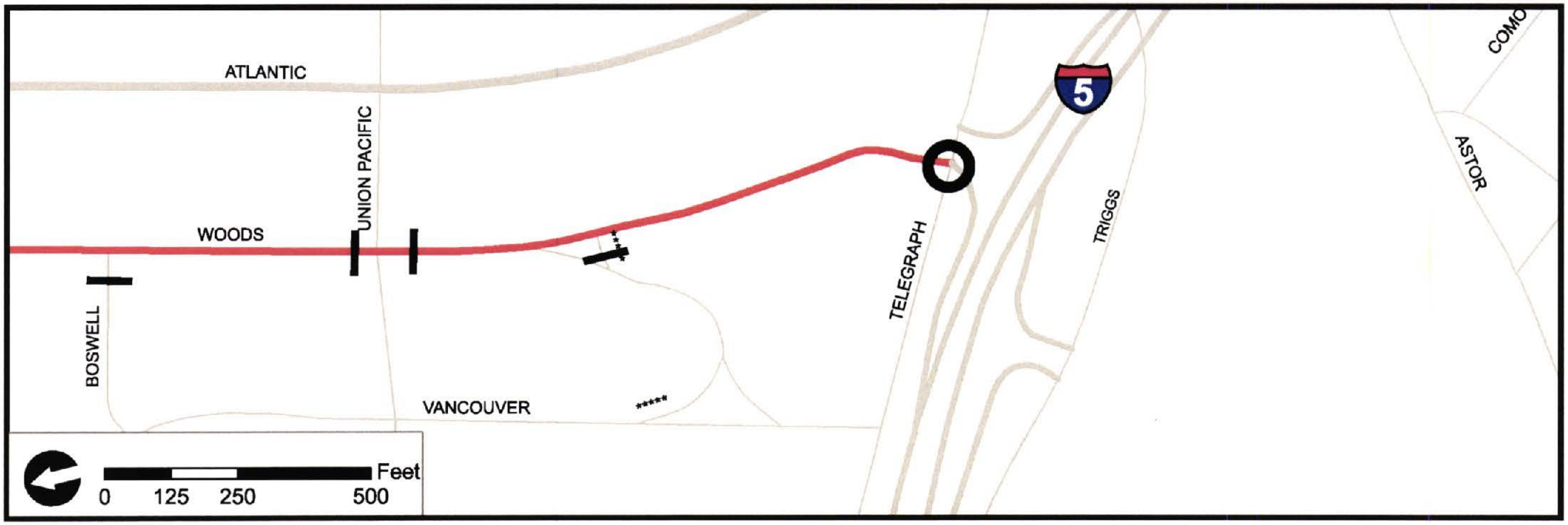
Woods Avenue

Woods between Whittier and Verona (facing south)

Woods and Union Pacific (facing north)



Woods between Carolina Pl. & Telegraph



Via Corona or Repetto Street

Route	Length
Via Corona	**.94 mi**
Repetto Street	**.91 mi**

Estimated Cost:

$103,000 - $185,000 (excluding cost of resurfacing)
$129,000 - $605,000 (including resurfacing)

-for cost estimate methodology see Appendix A

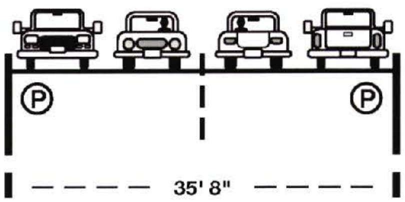
Access to Pomona-Atlantic Station from the east could be established by developing a bike route on either Via Corona or Repetto Street. Both routes provide a connection to Eastmont Intermediate School in Montebello and feed nicely into Woods Avenue, which will provide access to the Pomona-Atlantic Station from the north and south. The last block at the east end of each route is in the City of Montebello.

Via Corona is lined with mature trees providing shade that makes it an attractive route for cyclists. Via Corona also has one less stop than Repetto and is only one block south of the commercial destinations and employment along Beverly Boulevard. Repetto would provide less shade for bicyclists, but would provide better access for residents to the south. Fourteen residential streets feed into Repetto east of Atlantic Boulevard. Via Corona intersects only five streets. The key improvement for either route is to provide a way for cyclists to cross Atlantic Boulevard. Adding a traffic signal will probably be necessary. In this case, the fact that Repetto is two blocks from the existing signal at Atlantic and Beverly might be an advantage.

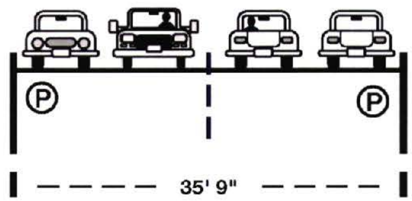
Basic Improvements	Corona	Repetto
Bike Route + Directional Signage	X	X
Shared-Use Arrows	X	X
Bike-Sensitive Loop Detectors at Signalized Intersections	X	X
New Traffic Signal or Median Refuge		
Atlantic Boulevard	X	X
Additional Improvements		
Pedestrian/Bicycle Friendly Traffic Calming	X	X
Adjusting Stop Signs at:		
Hillview Avenue	X	X
Margaret Avenue		X
Sadler Avenue	X	X
Gerhardt Avenue	X	X
Additional Street Trees/Landscaping		X

Repetto looking East toward Atlantic

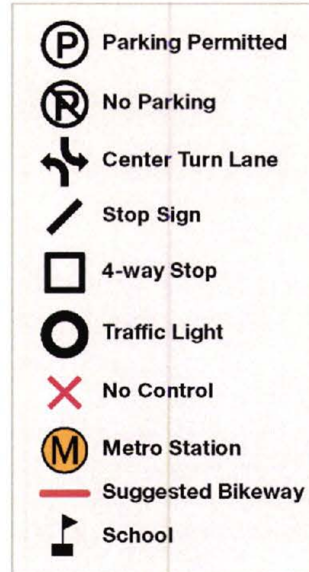
Via Corona or Repetto Street

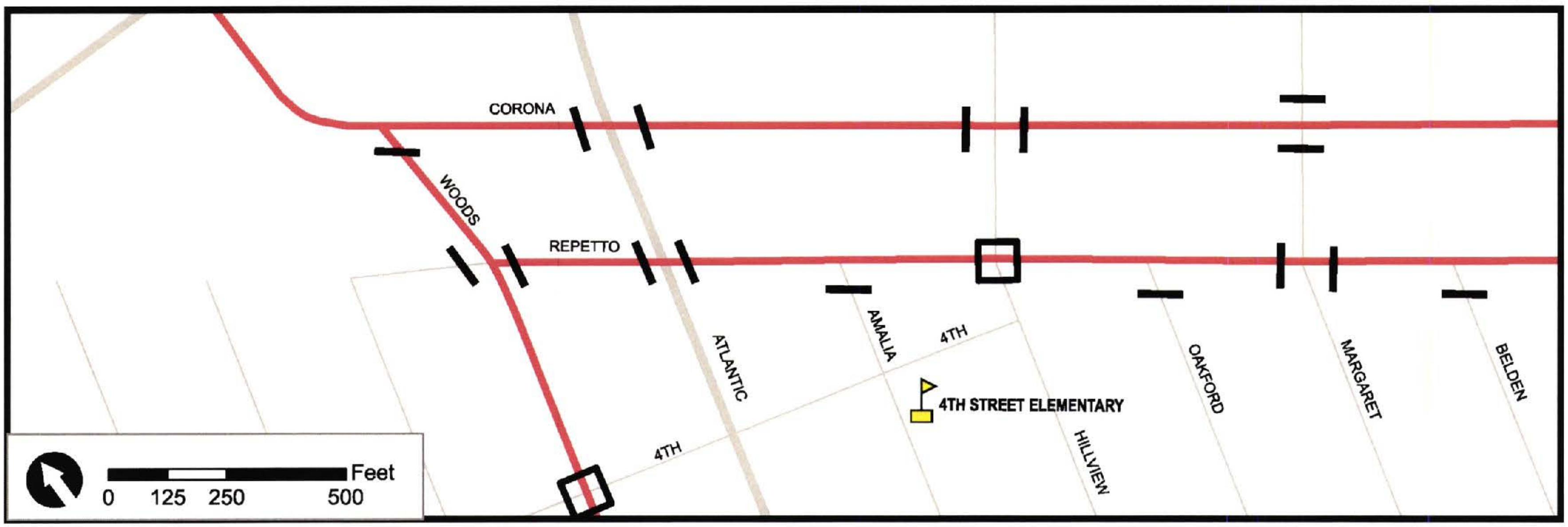


Via Corona between Woods & Bradshawe



Repetto between Woods & Bradshawe



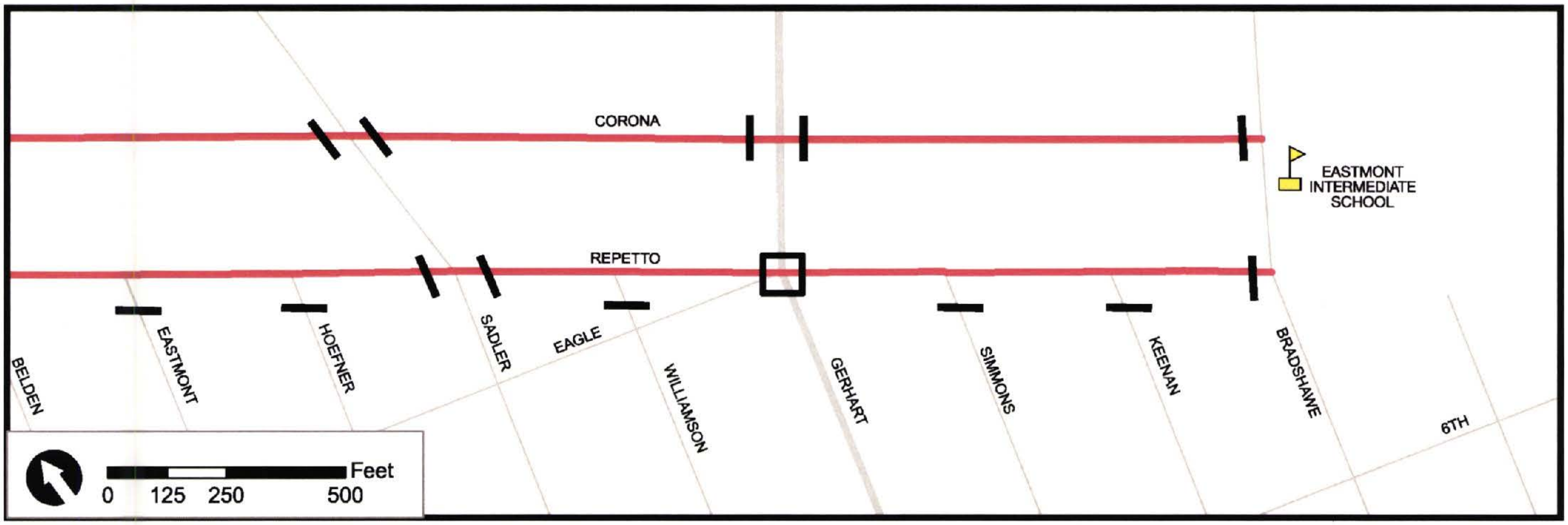


Via Corona or Repetto Street


Corona at Atlantic (facing east)


Repetto at Amalia (facing east)


Eastmont Intermediate School



Cost Estimate Sources

Cost estimates are for planning and budgeting purposes only. The responsible agency should develop new cost estimates after project design is complete.

Basic Improvements	cost hi	cost low	source	notes
Bike Route + Directional Signage	$ 200	$ 200	bicyclinginfo.org	sign with post
Signpost Boxes (Information Cubes)	$ 160	$ 160	Laird Plastics (732) 593-2770 x17	Does not include installation.
Shared-Use Arrows	$ 380	$ 125	City of San Francisco; City of Boulder; UCLA	Boulder method of inlaying 3M pre-cut sharrow stencil in hot asphalt is most expensive, but preferred for the resulting smooth riding surface.
Bike-Sensitive Loop Detectors at Signalized Intersections	$ 400	$ 500	LADOT	If existing loop detectors can be adjusted to detect bicycles, only the stencil (below would be necessary.
Loop Detector Stencil	$ 125	$ 125	bicyclinginfo.org	Estimate based on painted sharrow stencil.
New Traffic Signal	$ 150,000	$ 100,000	Washington State DOT	$100,000 to $150,000 to purchase and install a traffic signal
Median Refuge	$ 30,000	$ 4,000	walkinginfo.org	The cost for an asphalt island or one without landscaping is less than the cost of installing a raised concrete pedestrian island with landscaping.
'Watch for Bicyclists' Signs	$ 200	$ 200	bicyclinginfo.org	sign with post
Additional Improvements	**cost hi**	**cost low**	**source**	**notes**
Traffic Circle	$ 12,000	$ 6,000	walkinginfo.org	The cost is approximately $6,000 for a landscaped traffic mini-circle on an asphalt street and about $8,000 to $12,000 for a landscaped mini-circle on a concrete street.
Choker	$ 20,000	$ 5,000	walkinginfo.org	depending on site conditions and landscaping. Drainage may represent a significant cost.
Diverters	$ 130	$ 130	bicyclinginfo.org	The City and County of Denver, Colorado prepared a report of bid cost data of road construction projects for 1999 identifying a unit cost for bollards of $130 each.
Street Surfacing			City of Loveland, Colorado	http://www.ci.loveland.co.us/PublicWorks/PWEngTrans/FrequentlyAskedQuestions.htm
Chip Sealing	$ 1.30	$ 1.30	per square yard	
Overlay	$ 5.00	$ 3.50	per square yard	
Reconstruction	$ 22.00	$ 12.00	per square yard	

Cost Estimate Assumptions

Cost estimates assume that bike route elements would be implemented under the following conditions.

Improvement	Conditions	both directions
	every 0.25 miles	X
	every turn in route	X
	at all signalized intersections	X
Bike Route + Directional Signage	turn toward stations	X
Signpost Boxes	1 per sign	
Shared-Use Arrows	1-2 per block	X
Bike-Sensitive Loop Detectors at Signalized Intersections	at all signalized intersections	X
Loop Detector Stencil	at all signalized intersections	X
New Traffic Signal	at unsignalized arterial or high-volume collector crossings	
Median Refuge	at unsignalized arterial or high-volume collector crossings	
'Watch for Bicyclists' Signs	at all freeway exits	
Road Surface Improvements	on all routes as necessary to provide a smooth riding surface	
Traffic Circle	to be determined by community and responsible agency	
Choker	to be determined by community and responsible agency	
Diverters	to be determined by community and responsible agency	

Ramirez-Center-Santa Fe-Mateo (Vignes to Olympic)

Basic Improvements	low units	high units	cost hi	cost low
Bike Route + Directional Signage	19	136	48,960	6,768
Shared-Use Arrows	66	132	50,160	8,250
Bike-Sensitive Loop Detectors at Signalized	8	8	3,200	4,000
Loop Detector Stencil	8	8	1,000	1,000
Intersection Improvements (median refuge/traffic signal)	0	0	0	0
'Watch for Bicyclists' Signs (at all freeway exits)	6	6	1,200	1,200
Road Surface Improvements	square yards	73,920		
Chip Sealing			96,096	96,096
Overlay			369,600	258,720
Reconstruction			1,626,240	887,040
Traffic Circle			0	0
Crossing Island/Raised Median			0	0
Choker			0	0
Diverters			0	0
TOTAL (excluding resurfacing costs)			104,520	21,218
TOTAL			1,730,760	117,314

Variables		
	length	2.1
	width	60
	turns in route	0
	turn toward station	1
	blocks	33
	signalized intersections	4
	intersection improvements (median/signal)	0
	freeway exits	3

1st Street (Main to Santa Fe)

Basic Improvements	low units	high units	cost hi	cost low
Bike Route + Directional Signage	14	56	20,160	4,896
Shared-Use Arrows	20	40	15,200	2,500
Bike-Sensitive Loop Detectors at Signalized	12	12	4,800	6,000
Loop Detector Stencil	12	12	1,500	1,500
Intersection Improvements (median refuge/traffic signal)	0	0	0	0
'Watch for Bicyclists' Signs (at all freeway exits)	0	0	0	0
Road Surface Improvements	square yards	24,640		
Chip Sealing			32,032	32,032
Overlay			123,200	86,240
Reconstruction			542,080	295,680
Traffic Circle			0	0
Crossing Island/Raised Median			0	0
Choker			0	0
Diverters			0	0
TOTAL (excluding resurfacing)			41,660	14,896
TOTAL			583,740	46,928

Variables	length	0.7
	width	60
	turns in route	2
	turn toward station	2
	blocks	10
	signalized intersections	6
	intersection improvements (median/signal)	0
	freeway exits	0

Central (1st to Olympic)

Basic Improvements	low units	high units	cost hi	cost low
Bike Route + Directional Signage	12	56	20,160	4,464
Shared-Use Arrows	26	52	19,760	3,250
Bike-Sensitive Loop Detectors at Signalized	16	16	6,400	8,000
Loop Detector Stencil	16	16	2,000	2,000
Intersection Improvements (median refuge/traffic signal)	0	0	0	0
'Watch for Bicyclists' Signs (at all freeway exits)	0	0	0	0
Road Surface Improvements	square yards	49,192		
Chip Sealing			63,950	63,950
Overlay			245,960	172,172
Reconstruction			1,082,224	590,304
Traffic Circle			0	0
Crossing Island/Raised Median			0	0
Choker			0	0
Diverters			0	0
TOTAL (excluding resurfacing)			48,320	17,714
TOTAL			1,130,544	81,664

Variables		
	length	1.3
	width	64.5
	turns in route	0
	turn toward station	1
	blocks	13
	signalized intersections	8
	intersection improvement (median/signal)	0
	freeway exits	0

Echandia-Boyle (Bridge to Olympic)

Basic Improvements	low units	high units	cost hi	cost low
Bike Route + Directional Signage	24	108	38,880	8,640
Shared-Use Arrows	46	92	34,960	5,750
Bike-Sensitive Loop Detectors at Signalized	16	16	6,400	8,000
Loop Detector Stencil	16	16	2,000	2,000
Intersection Improvements (median refuge/traffic signal)	0	0	0	0
'Watch for Bicyclists' Signs (at all freeway exits)	2	2	400	400
Road Surface Improvements	square yards	62,480		
Chip Sealing			81,224	81,224
Overlay			312,400	218,680
Reconstruction			1,374,560	749,760
Traffic Circle			0	0
Crossing Island/Raised Median			0	0
Choker			0	0
Diverters			0	0
TOTAL (excluding resurfacing)			82,640	24,790
TOTAL			1,457,200	106,014

Variables		
	length	2
	width	53.25
	turns in route	2
	turn toward station	2
	blocks	23
	signalized intersections	8
	intersection improvement (median/signal)	0
	freeway exits	1

State (Hospital to 5th)

Basic Improvements	low units	high units	cost hi	cost low
Bike Route + Directional Signage	20	76	27,360	7,056
Shared-Use Arrows	32	64	24,320	4,000
Bike-Sensitive Loop Detectors at Signalized	8	8	3,200	4,000
Loop Detector Stencil	8	8	1,000	1,000
Intersection Improvements (median refuge/traffic signal)	0	0	0	0
'Watch for Bicyclists' Signs (at all freeway exits)	8	8	1,600	1,600
Road Surface Improvements	square yards	43,544		
Chip Sealing			56,607	56,607
Overlay			217,718	152,403
Reconstruction			957,959	522,523
Traffic Circle			0	0
Crossing Island/Raised Median			0	0
Choker			0	0
Diverters			0	0
TOTAL (excluding resurfacing)			57,480	17,656
TOTAL			1,015,439	74,263

Variables		
	length	1.7
	width	43.66
	turns in route	1
	turn toward station	2
	blocks	16
	signalized intersections	4
	intersection improvement (median/signal)	0
	freeway exits	4

Breed (Barlow to Inez)

Basic Improvements	low units	high units	cost hi	cost low
Bike Route + Directional Signage	16	64	23,040	5,904
Shared-Use Arrows	26	52	19,760	3,250
Bike-Sensitive Loop Detectors at Signalized	6	6	2,400	3,000
Loop Detector Stencil	6	6	750	750
Intersection Improvements (median refuge/traffic signal)	0	0	0	0
'Watch for Bicyclists' Signs (at all freeway exits)	0	0	0	0
Road Surface Improvements	square yards	30,247		
Chip Sealing			39,322	39,322
Overlay			151,237	105,866
Reconstruction			665,442	362,968
Traffic Circle			0	0
Crossing Island/Raised Median			0	0
Choker			0	0
Diverters			0	0
TOTAL (excluding resurfacing)			45,950	12,904
TOTAL			711,392	52,226

Variables		
	length	1.3
	width	39.66
	turns in route	2
	turn toward station	1
	blocks	13
	signalized intersections	3
	intersection improvement (median/signal)	0
	freeway exits	0

Fickett-Mathews (Wabash to 6th)

Basic Improvements	low units	high units	cost hi	cost low
Bike Route + Directional Signage	18	80	28,800	6,336
Shared-Use Arrows	32	64	24,320	4,000
Bike-Sensitive Loop Detectors at Signalized	4	4	1,600	2,000
Loop Detector Stencil	4	4	500	500
Intersection Improvements (traffic signal only)	2	3	450,000	200,000
'Watch for Bicyclists' Signs (at all freeway exits)	0	0	0	0
Road Surface Improvements	square yards	26,576		
Chip Sealing			34,549	34,549
Overlay			132,880	93,016
Reconstruction			584,672	318,912
Traffic Circle			0	0
Crossing Island/Raised Median			0	0
Choker			0	0
Diverters			0	0
TOTAL (excluding resurfacing)			505,220	212,836
TOTAL			1,089,892	247,385

Variables		
	length	1.2
	width	37.75
	turns in route	2
	turn toward station	2
	blocks	16
	signalized intersections	2
	intersection improvement (median/signal)	3
	freeway exits	0

Indiana-Estudillo-Spence (Cesar Chavez to Emery)

Basic Improvements	low units	high units	cost hi	cost low
Bike Route + Directional Signage	32	160	57,600	11,664
Shared-Use Arrows	66	132	50,160	8,250
Bike-Sensitive Loop Detectors at Signalized Intersections	8	8	3,200	4,000
Loop Detector Stencil	8	8	1,000	1,000
Intersection Improvements (median refuge/traffic signal)	1	1	150,000	4,000
Bike-Ped Bridge over I-5 (350' x 30' = 10500 sq ft)	1	1	2,625,000	2,625,000
Bike-Ped Bridge over 60 Fwy (290' x 30' =8700sq ft)	1	1	2,175,000	
'Watch for Bicyclists' Signs (at all freeway exits)	0	0	0	0
Road Surface Improvements	square yards	55,862		
Chip Sealing			72,621	72,621
Overlay			279,312	195,518
Reconstruction			1,228,973	670,349
Traffic Circle			0	0
Crossing Island/Raised Median			0	0
Choker			0	0
Diverters			0	0
TOTAL (excluding resurfacing)			5,061,960	2,653,914
TOTAL			6,290,933	2,726,535

Variables		
	length	2.3
	width	41.4
	turns in route	6
	turn toward station	1
	blocks	33
	signalized intersections	4
	intersection improvement (median/signal)	1
	freeway exits	0

Rowan (Blanchard to Union Pacific)

Basic Improvements	low units	high units	cost hi	cost low
Bike Route + Directional Signage	22	96	34,560	7,805
Shared-Use Arrows	46	92	34,960	5,750
Bike-Sensitive Loop Detectors at Signalized	10	10	4,000	5,000
Loop Detector Stencil	10	10	1,250	1,250
Intersection Improvements (median refuge/traffic signal)	1	1	150,000	4,000
'Watch for Bicyclists' Signs (at all freeway exits)	0	0	0	0
Road Surface Improvements	square yards	68,783		
Chip Sealing			89,418	89,418
Overlay			343,915	240,740
Reconstruction			1,513,224	825,395
Traffic Circle			0	0
Crossing Island/Raised Median			0	0
Choker			0	0
Diverters			0	0
TOTAL (excluding resurfacing)			224,770	23,805
TOTAL			1,737,994	113,223
Variables	length			2.46
	width			47.66
	turns in route			0
	turn toward station			1
	blocks			23
	signalized intersections			5
	intersection improvement (median/signal)			1
	freeway exits			0

Rowan-Eastman (Blanchard to Union Pacific)

Basic Improvements	low units	high units	cost hi	cost low
Bike Route + Directional Signage	26	108	38,880	9,360
Shared-Use Arrows	48	96	36,480	6,000
Bike-Sensitive Loop Detectors at Signalized	8	8	3,200	4,000
Loop Detector Stencil	8	8	1,000	1,000
Intersection Improvements (traffic signal)	1	1	150,000	100,000
Bike-Ped Bridge over I-5 at Rowan (400' x 30' = 12,000		1	3,000,000	
'Watch for Bicyclists' Signs (at all freeway exits)	0	0	0	0
Road Surface Improvements	square yards	69,901		
Chip Sealing			90,872	90,872
Overlay			349,507	244,655
Reconstruction			1,537,829	838,816
Traffic Circle			0	0
Crossing Island/Raised Median			0	0
Choker			0	0
Diverters			0	0
TOTAL (excluding resurfacing)			3,229,560	120,360
TOTAL			4,767,389	211,232

Variables	length	2.5
	width	47.66
	turns in route	2
	turn toward station	1
	blocks	24
	signalized intersections	4
	intersection improvement (median/signal)	1
	freeway exits	0

Ford (Floral to Olympic)

Basic Improvements	low units	high units	cost hi	cost low
Bike Route + Directional Signage	16	76	27,360	5,904
Shared-Use Arrows	36	72	27,360	4,500
Bike-Sensitive Loop Detectors at Signalized	12	12	4,800	6,000
Loop Detector Stencil	12	12	1,500	1,500
Intersection Improvements (median refuge/traffic signal)	0	0	0	0
'Watch for Bicyclists' Signs (at all freeway exits)	6	6	1,200	1,200
Road Surface Improvements	square yards	49,368		
Chip Sealing			64,178	64,178
Overlay			246,840	172,788
Reconstruction			1,086,096	592,416
Traffic Circle			0	0
Crossing Island/Raised Median			0	0
Choker			0	0
Diverters			0	0
TOTAL (excluding resurfacing)			62,220	19,104
TOTAL			1,148,316	83,282

Variables		
	length	1.8
	width	46.75
	turns in route	0
	turn toward station	1
	blocks	18
	signalized intersections	6
	intersection improvements (median/signal)	0
	freeway exits	3

Monterey Pass-Mednik-Arizona (Fremont to Telegraph)

Basic Improvements	low units	high units	cost hi	cost low
Bike Route + Directional Signage	32	92	33,120	11,376
Shared-Use Arrows	44	88	33,440	5,500
Bike-Sensitive Loop Detectors at Signalized	26	26	10,400	13,000
Loop Detector Stencil	26	26	3,250	3,250
Intersection Improvements (median refuge/traffic signal)	0	0	0	0
'Watch for Bicyclists' Signs (at all freeway exits)	0	0	0	0
Road Surface Improvements	square yards	147,605		
Chip Sealing			191,887	191,887
Overlay			738,027	516,619
Reconstruction			3,247,317	1,771,264
Traffic Circle			0	0
Crossing Island/Raised Median			0	0
Choker			0	0
Diverters			0	0
TOTAL (excluding resurfacing)			80,210	33,126
TOTAL			3,327,527	225,013

Variables		
	length	3.7
	width	68
	turns in route	1
	turn toward station	0
	blocks	22
	signalized intersections	13
	intersection improvementm (median/signal)	0
	freeway exits	0

Woods (Dorner to Telegraph)

Basic Improvements	low units	high units	cost hi	cost low
Bike Route + Directional Signage	19	84	30,240	6,768
Shared-Use Arrows	40	80	30,400	5,000
Bike-Sensitive Loop Detectors at Signalized	6	6	2,400	3,000
Loop Detector Stencil	6	6	750	750
Intersection Improvements (median refuge/traffic signal)	2	2	300,000	200,000
'Watch for Bicyclists' Signs (at all freeway exits)	0	0	0	0
Road Surface Improvements	square yards	46,397		
Chip Sealing			60,316	60,316
Overlay			231,986	162,390
Reconstruction			1,020,737	556,765
Traffic Circle			0	0
Crossing Island/Raised Median			0	0
Choker			0	0
Diverters			0	0
TOTAL (excluding resurfacing)			363,790	215,518
TOTAL			1,384,527	275,834

Variables		
	length	2.1
	width	37.66
	turns in route	1
	turn toward station	0
	blocks	20
	signalized intersections	3
	intersection improvement (median/signal)	2
	freeway exits	0

Via Corona (Woods to Bradshawe)

Basic Improvements	low units	high units	cost hi	cost low
Bike Route + Directional Signage	8	24	8,640	2,707
Shared-Use Arrows	12	24	9,120	1,500
Bike-Sensitive Loop Detectors at Signalized	0	0	0	0
Loop Detector Stencil	0	0	0	0
Intersection Improvements (traffic signal)	1	1	150,000	100,000
'Watch for Bicyclists' Signs (at all freeway exits)	0	0	0	0
Road Surface Improvements	square yards	19,665		
Chip Sealing			25,565	25,565
Overlay			98,327	68,829
Reconstruction			432,637	235,984
Traffic Circle			0	0
Crossing Island/Raised Median			0	0
Choker			0	0
Diverters			0	0
TOTAL (excluding resurfacing)			167,760	104,207
TOTAL			600,397	129,772

Variables		
	length	0.94
	width	35.66
	turns in route	0
	turn toward station	0
	blocks	6
	signalized intersections	0
	Intersection improvement (median of signal)	1
	freeway exits	0

Repetto (Woods to Bradshawe)

Basic Improvements	low units	high units	cost hi	cost low
Bike Route + Directional Signage	7	60	21,600	2,621
Shared-Use Arrows	30	60	22,800	3,750
Bike-Sensitive Loop Detectors at Signalized	0	0	0	0
Loop Detector Stencil	0	0	0	0
Intersection Improvements (median refuge/traffic signal)	1	1	150,000	100,000
'Watch for Bicyclists' Signs (at all freeway exits)	0	0	0	0
Road Surface Improvements	square yards	19,086		
Chip Sealing			24,811	24,811
Overlay			95,429	66,800
Reconstruction			419,886	229,029
Traffic Circle			0	0
Crossing Island/Raised Median			0	0
Choker			0	0
Diverters			0	0
TOTAL (excluding resurfacing)			194,400	106,371
TOTAL			614,286	131,182

Variables		
	length	0.91
	width	35.75
	turns in route	0
	turn toward station	0
	blocks	15
	signalized intersections	0
	intersection improvement (median/signal)	1
	freeway exits	0