CITY OF SOUTH PASADENA
STUDY SESSION

AGENDA

SPECIAL CITY COUNCIL MEETING
WEDNESDAY, AUGUST 19, 2026, AT 6:15 PM

AMEDEE O. "DICK" RICHARDS JR. COUNCIL CHAMBERS
1424 MISSION STREET, SOUTH PASADENA, CALIFORNIA 91030

NOTICE ON PUBLIC PARTICIPATION & ACCESSIBILITY

The South Pasadena City Council Meeting will be conducted in-person from the Amedee O. "Dick" Richards, Jr. Council Chambers, located at 1424 Mission Street, South Pasadena, CA 91030.

Public participation may be made as follows:

- In-Person – Council Chambers, 1424 Mission Street, South Pasadena, CA 91030
- Live Broadcast via the City website – http://www.spectrumstream.com/streaming/south_pasadena/live.cfm
- Via Zoom – Meeting ID: **825 9999 2830**
- Written Public Comment – written comment must be submitted by 12:00 p.m. the day of the meeting by emailing to ccpubliccomment@southpasadenaca.gov
- Via Phone–+1-669-900-6833 and entering the Zoom Meeting ID listed above.

Meeting may be viewed at:

1. Go to the Zoom website, https://zoom.us/join and enter the Zoom Meeting information; or
2. Click on the following unique Zoom meeting link: https://us06web.zoom.us/j/82599992830 or
3. By calling: +1-669-900-6833 and entering the Zoom Meeting ID listed above; and viewing the meeting via http://www.spectrumstream.com/streaming/south_pasadena/live.cfm

CALL TO ORDER:	Mayor	Sheila Rossi
ROLL CALL:	Mayor	Sheila Rossi
	Mayor Pro Tem	Omari Ferguson
	Councilmember	Michael A. Cacciotti
	Councilmember	Jon Primuth
	Councilmember	Janet Braun

ACTION/DISCUSSION

1. REVIEW, DISCUSS AND PROVIDE INPUT ON A DRAFT REQUEST FOR PROPOSALS FOR THE PREPARATION OF A CITY MOBILITY PLAN AND CITYWIDE SAFETY ACTION PLAN

Recommendation

It is recommended that the City Council review, discuss and provide feedback to Staff related to the draft Request for Proposals (RFP) (Attachment No. 1) for the preparation of the City's Mobility Plan and Citywide Safety Action Plan prior to issuance of the RFP.

CERTIFICATION OF POSTING

I declare under penalty of perjury that I posted this notice of agenda for the meeting to be held on August 19, 2026, on the bulletin board in the courtyard of City Hall located at 1414 Mission Street, South Pasadena, CA 91030, and on the City, website as required by law, on the date listed below.

08/13/2026 /S/

Date Nikima S. Newsome, Chief City Clerk

Study Session Agenda Report

ITEM NO. 1

DATE: August 19, 2026

FROM: Todd Hileman, City Manager

PREPARED BY: Julian Lee, Director of Public Works
Michael Vartanians, City Engineer
Bassam AL-Beitawi, Transportation Program Manager

SUBJECT: **REVIEW, DISCUSS AND PROVIDE INPUT ON A DRAFT REQUEST FOR PROPOSALS FOR THE PREPARATION OF A CITY MOBILITY PLAN AND CITYWIDE SAFETY ACTION PLAN**

Recommendation

It is recommended that the City Council review, discuss and provide feedback to Staff related to the draft Request for Proposals (RFP) (Attachment No. 1) for the preparation of the City's Mobility Plan and Citywide Safety Action Plan prior to issuance of the RFP.

Executive Summary

The City has prepared a draft Request for Proposals (RFP) to solicit qualified consulting firms to prepare a comprehensive Mobility Plan and Citywide Safety Action Plan. The project is intended to establish a long-term vision for walking, bicycling, transit access, and roadway safety while developing a prioritized implementation strategy that positions the City to compete for future grant funding. The draft RFP builds upon previous planning efforts, including the 2011 Bicycle Master Plan, the 2024 Fremont Avenue/Fair Oaks Avenue/Huntington Drive Study, and the 2020 Systemic Safety Analysis Report (SSARP), while expanding the scope to address multimodal transportation, systemic safety improvements, community engagement, and anticipated future growth associated with recent State housing legislation. Staff is seeking the Council's input on the scope of the draft RFP prior to releasing it for consultant proposals.

Background

The City does not currently have a comprehensive, citywide mobility plan that reflects current transportation planning practices, active transportation priorities, or recent changes in State and federal funding programs. While the City adopted a Bicycle Master Plan in 2011 and completed the Fremont Avenue, Fair Oaks Avenue, and Huntington Drive Study in 2024, those efforts focused on specific transportation modes or corridors and do not provide a comprehensive strategy for all roadway users throughout the City.

In 2017, the City was awarded Caltrans Systemic Safety Analysis Report Program (SSARP) grant funding to prepare a Systemic Safety Analysis Report (SSAR). The purpose of the SSARP was to identify systemic roadway safety improvements throughout the City and position South Pasadena to compete for future Highway Safety Improvement Program (HSIP) grant funding opportunities. In December 2018, the City Council approved a professional services agreement with KOA Corporation to prepare the SSAR using the awarded grant

funding.

Analysis

A Mobility Plan is a comprehensive strategic framework that outlines how a city will address transportation, access, and movement for residents, workers, and visitors across all modes, including public transit, pedestrian and bicycle infrastructure, vehicular traffic, and emerging transportation technologies. The plan's primary purpose is to integrate land use and transportation planning to create safe, equitable, and efficient mobility options that support economic development, environmental sustainability, public health, and quality of life. By establishing clear policies, infrastructure priorities, and implementation strategies, a Mobility Plan guides municipal investment decisions, coordinates across departments and agencies, and provides a roadmap for achieving the city's long-term vision for how people will move through and access the community.

As part of the Mobility Plan effort, staff recommends including a Citywide Safety Action Plan to evaluate existing safety conditions, update the recommendations contained in the 2020 SSARP, identify new systemic safety improvements, and prioritize projects that improve safety for all roadway users. The combined planning effort is also intended to position the City to compete for future state and federal transportation grant opportunities by providing a current, data-driven, and implementable transportation planning document.

Additionally, while reviewing the documentation related to the proposed development of a Mobility Plan, staff was unable to locate any official action indicating that the completed SSARP was formally accepted or adopted by the City Council. While the City possesses a version of the report dated 2020, staff believes it remains in draft form. As a result, staff recommends the scope of services for the RFP requests the selected consultant to review, validate, update, and incorporate the recommendations contained in the 2020 SSARP into the City's Mobility Plan and Citywide Safety Action Plan to ensure the recommendations reflect current roadway conditions, collision trends, and best practices.

Scope of Services for the RFP

The draft Request for Proposals has been prepared to identify a consultant team with expertise in multimodal transportation planning, traffic engineering, public outreach, and grant-ready project development. Prior to issuing the RFP, staff is seeking input from the City Council regarding the proposed project goals, scope of work, community engagement strategy, and anticipated deliverables to ensure it is in line with the City Council's expectations. Comments received from the Council will be incorporated, as appropriate, prior to advertising the RFP.

The draft Request for Proposals has been developed to procure a consultant team capable of preparing both a comprehensive Mobility Plan and a Citywide Safety Action Plan through a single coordinated planning effort. Rather than preparing two separate planning documents, the combined approach will allow the consultant to evaluate the City's multimodal transportation network, roadway safety needs, and implementation priorities in a unified manner, reducing duplication of effort while ensuring consistency between the two plans.

The proposed scope of work builds upon the City's previous planning efforts, including the 2011 Bicycle Master Plan, the 2024 Fremont Avenue, Fair Oaks Avenue, and Huntington Drive Study, and the 2020 Systemic Safety Analysis Report. The consultant will be expected to review these existing documents, validate previous recommendations, identify completed

projects, update recommendations based on current conditions, and integrate them into a single comprehensive transportation planning document.

The draft scope has also been tailored to address South Pasadena's unique transportation challenges. Because much of the City's street network consists of narrow, historic rights-of-way, the consultant will be expected to develop context-sensitive transportation solutions that improve mobility and safety while respecting existing neighborhood character, mature street trees, on-street parking needs, and other physical constraints. The RFP also emphasizes development of a design toolkit that can be used to guide future capital improvement projects and grant applications.

A significant component of the project will be public engagement. The consultant will be required to conduct multiple rounds of community outreach and work closely with residents, businesses, schools, community organizations, and other stakeholders throughout the planning process. The RFP also requires presentations to the Public Works Infrastructure Commission, Planning Commission, City Council, and other advisory bodies at key milestones to ensure the planning process remains transparent and reflects community priorities.

In addition to identifying infrastructure improvements, the consultant will develop a prioritized implementation strategy that includes planning-level cost estimates, potential funding sources, and phased project recommendations. The final plan will position the City to pursue future grant opportunities, including the Caltrans Active Transportation Program (ATP), Highway Safety Improvement Program (HSIP), Metro funding programs, and other federal, state and regional transportation grant opportunities.

Finally, the draft RFP requires the consultant to evaluate how anticipated future growth, including transit-oriented development and recent State housing legislation such as SB 79, may affect South Pasadena's transportation system. The consultant will identify infrastructure, operational, and policy improvements necessary to accommodate future growth while maintaining the City's historic character, improving safety, and expanding mobility options for all users.

Staff presented the draft RFP to the Public Works Infrastructure Commission (PWIC) at its August 12, 2026 meeting to receive input on the proposed project goals, scope of services, public engagement strategy, and anticipated deliverables. Staff is now requesting that the City Council review the draft RFP and provide additional comments and direction. Following the City Council’s discussion, staff will compile and incorporate feedback received from both the PWIC and City Council, as appropriate, prior to finalizing and issuing the Request for Proposals. The purpose of the study session is to obtain City Council input before finalizing and issuing the Request for Proposals.

Fiscal Impact

There is no fiscal impact associated with receiving and filing this presentation. The Fiscal Year 2026–2027 Capital Improvement Program includes an appropriation of $400,000 for the preparation of the Citywide Mobility Plan and Citywide Safety Action Plan. Funding for the project consists of $250,000 in Proposition C Local Return funds (207-9010-9423-8170-000), $75,000 in Measure R Local Return funds (233-9010-9423-8170-000), and $75,000 in Measure M Local Return funds (236-9010-9423-8170-000).

Key Performance Indicators and Strategic Plan
This item supports the City Council's 2026 Goals and Priorities, specifically Priority No. 2(k), "Exploration of Additional Traffic Mitigation Efforts and Safety Strategies to address traffic safety concerns, improve mobility, and enhance neighborhood quality of life." The proposed effort advances the City Council's infrastructure priorities by identifying strategies to improve transportation safety, mobility, and overall quality of life throughout the community.

Commission Review and Recommendation
The item was presented to the Public Works Infrastructure Commission on August 12, 2026 for review and feedback. A summary of the Commission's feedback will be provided as an Additional Document prior to the City Council meeting.

Public Notification
The public was made aware that this item was to be considered this evening by virtue of its inclusion on the publicly noticed agenda and posting of the same agenda and reports on the City's website.

Environmental Analysis
The City Council's review of the draft Request for Proposals and provision of comments and direction to staff does not constitute a project subject to the California Environmental Quality Act (CEQA), as defined by Section 15378 of the CEQA Guidelines, because the action will not result in a direct or reasonably foreseeable indirect physical change in the environment. Any environmental review required in connection with the future adoption of the Mobility Plan and Citywide Safety Action Plan, or implementation of specific improvements identified through the planning process, will be evaluated at the appropriate stage in accordance with CEQA.

Attachment:
Attachment No. 1 - Draft Request for Proposal Mobility Plan

Request for Proposals

City of South Pasadena
Request No. 005135
for
South Pasadena Mobility and Citywide Safety Action Plan

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Anticipated RFP Schedule

Request for Proposals (RFP) Issued	Month Day, 2026
Written Questions from Proposers Due	Month Day, 2026
Written Proposals Due	Month Day, 2026, by 4:00pm PT
Virtual Oral Interviews (only if necessary)	TBD
Contract Award	Council Meeting Approval Date TBD

* All dates and times are subject to change at City's sole discretion.

RFP Contact at City of South Pasadena

All communication and/or contact with City staff regarding this RFP prior to contract award shall be directed to:

Joan M. Powe, Procurement Contracts Administrator
1414 Mission Street
South Pasadena, CA 91030
626-403-7316
jpowe@southpasadenaca.gov

Commencing on the date of the issuance of this RFP and continuing until award of the contract or cancellation of this RFP, no Proposer, subconsultant, lobbyist or agent hired by the Proposer shall have any contact or communications regarding this RFP with any City staff or any contractor or Proposer involved with the procurement, other than the City staff named above, or unless expressly permitted by this RFP. Contact includes telephone, e-mail or formal written communication. Any proposer, subcontractor, lobbyist or agent hired by the proposer that engages in such prohibited communications may result in disqualification of the Proposer at the sole discretion of the City.

Section 1: Instructions to Proposers

Background

South Pasadena is a small, independent city located approximately six miles northeast of downtown Los Angeles, bordered by Pasadena, San Marino, Los Angeles, and Alhambra. Known for its high-quality public education, diverse communities, and active civic engagement, the City fosters a strong sense of local identity. South Pasadena operates under the City Council–City Manager form of government as a General Law City. It maintains a full-service municipal structure, providing police, fire, public works, library, and community development services.

South Pasadena has an active and organized mobility community, including weekly volunteer-led "bike bus" rides to local elementary schools and an engaged advocacy base through groups such as South Pas Active. The City intends for the Mobility Plan to build on this momentum, translate it into an actionable and fundable network and policy framework, and address the specific design challenges posed by South Pasadena's narrow, historic streets.

Because South Pasadena's street grid predates modern roadway standards, many corridors have narrow travel lanes, tight curb-to-curb widths, mature street trees, and limited right-of-way for conventional bikeway or sidewalk widening. Standard suburban design treatments are frequently not feasible. The City is seeking a consultant team that can bring creative, context-sensitive design solutions calibrated to these constraints, rather than a one-size-fits-all approach.

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Project Description

An Active, Engaged Mobility Community

South Pasadena benefits from a highly engaged base of residents who already organize around walking and biking:

- **Bike Buses.** Weekly, volunteer-organized "bike bus" rides carry groups of families and children to local elementary schools, building demand for safer, more comfortable routes to school.
- **South Pas Active.** A grassroots community organization that advocates for safer streets, organizes rides and events, and has been a consistent voice in past City planning processes.
- **A track record of turnout.** Past planning efforts — including the 2011 Bicycle Master Plan workshop and the 2024 arterial corridor charrette process — drew strong public participation and sustained community interest.

The City expects the selected consultant to work directly with these groups as partners in the planning process — not only as sources of feedback, but as channels for community-led education and encouragement.

The Mobility Plan should build on, reconcile, and update three prior planning efforts, all of which are provided as attachments to this RFP:

- **2011 Bicycle Master Plan Update (Attachment A).** The City's adopted bicycle plan established citywide goals, an existing and proposed bikeway network, priority corridor projects (including Fair Oaks Avenue, Huntington Drive, Fremont Avenue, Meridian Avenue, Mission Street/Pasadena Avenue, El Centro Street/Oxley Street, Oak Street, and Monterey Road), and bicycle facility design guidelines. The plan was written to meet the requirements of Caltrans' former Bicycle Transportation Account program and is now over a decade old. It addresses bicycling only, and does not reflect current Complete Streets, Vision Zero, or Caltrans Active Transportation Program (ATP) expectations.
- **2024 Fremont Avenue, Fair Oaks Avenue & Huntington Drive Study (Attachment B).** Prepared by Toole Design Group, this study used a values-based community charrette process to develop design direction for the City's three busiest arterial streets, grounded in a vehicle-miles-traveled (VMT) reduction framework, road diet and traffic calming toolkits, and detailed bulb out and cross-section concepts. The study is corridor-specific and does not extend to the rest of the citywide network, nor to policy, program, or funding recommendations.
- **2020 Systemic Safety Analysis Report (SSARP) (Attachment C) -** Prepared under the Caltrans Systemic Safety Analysis Report Program, the SSARP analyzed collision history, roadway characteristics, signage, pavement markings, traffic control devices, and systemic safety needs throughout the City. The report identified high-risk intersections and roadway segments, recommended safety countermeasures, developed conceptual safety projects, and prioritized improvements based on

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benefit-cost analysis to support future Highway Safety Improvement Program (HSIP) grant applications. The Mobility Plan shall review, validate, update, and incorporate the relevant recommendations of the SSARP into a comprehensive citywide mobility and safety strategy.

The Mobility Plan is intended to reconcile and carry forward the relevant recommendations of both documents into a single, current, citywide, multimodal framework — updating the bicycle network, extending the corridor study's design approach and lessons to other constrained streets citywide, and adding the pedestrian, transit-access, safety, policy, and funding components needed to make the Plan actionable and competitive for funding

Why a Mobility Plan, and Why Now

The City is intentionally scoping this effort as a multimodal Mobility Plan rather than a bicycle-only update. The City needs a single, current planning document that:

- Integrates walking, biking, safe routes to school, transit access, and emerging micromobility into one coherent network and policy framework;
- Is eligible for and competitive in current federal, state, and regional funding programs, including the Caltrans Active Transportation Program (ATP);
- Provides context-sensitive design solutions for South Pasadena's narrow, historic streets; and
- Channels the City's active grassroots mobility community — bike buses, South Pas Active, and engaged residents — into a durable, adopted plan with community buy-in.
- Recent changes to California housing and land use laws, including transit-oriented development legislation such as SB 79, have the potential to substantially increase residential density in areas surrounding high-quality transit, including the Metro A Line Station and surrounding neighborhoods. The Mobility Plan shall evaluate how anticipated growth may affect the City's transportation system and identify infrastructure, operational, and policy improvements necessary to safely accommodate additional residents while maintaining South Pasadena's character, enhancing mobility options, and improving safety for all users.

Project Goals

The Mobility Plan is expected to achieve the following goals:

- Develop a unified, citywide multimodal network plan that updates and builds upon the 2011 Bicycle Master Plan and extends the design approach of the 2024 arterial corridor study to the rest of the City.
- Identify creative, context-sensitive design solutions calibrated to South Pasadena's narrow, historic rights-of-way.
- Establish safe, comfortable connections to schools — building on and formalizing existing bike bus routes — as well as to the Metro A Line station, parks, and commercial districts.

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- Conduct a robust, inclusive community engagement and education process that reaches residents of all ages, abilities, and backgrounds, and that partners directly with South Pas Active and bike bus organizers.
- Prioritize projects and identify a realistic funding and implementation strategy, including near-term, low-cost quick-build opportunities.
- Ground recommendations in a data-driven, equity-focused analysis of collision history and safety needs.
- Provide policy and program recommendations — education, encouragement, enforcement, and evaluation — alongside infrastructure recommendations.
- Review, evaluate, and update the recommendations contained in the City's 2020 Systemic Safety Analysis Report (SSARP), identify completed projects, validate previously identified safety needs, recommend new systemic safety improvements based on current conditions and collision trends, and integrate the updated recommendations into the Mobility Plan and Citywide Safety Action Plan.
- Evaluate the transportation implications of anticipated future housing growth, including development encouraged by state legislation such as SB79, and identify multimodal infrastructure, street design, and poly improvements necessary to support increased population and transit-oriented development.

Scope of Services

The following tasks describe the City's anticipated scope of work. Proposers are encouraged to refine this scope based on their expertise and approach, provided the proposal clearly addresses each task area below.

Task 1: Project Initiation, Management, and Coordination

- Conduct a kickoff meeting with City staff to review prior plans, available data, roles, and refine the project schedule.
- Prepare a Project Management Plan, including a detailed schedule, communication protocol, and monthly progress reporting.
- Coordinate with relevant City departments (Public Works, Community Development, Police, Fire, Community Services) as well as external agencies as needed, including Metro, LA County, Caltrans District 7, and the South Pasadena Unified School District (SPUSD).
- Establish a Project Advisory or Steering Committee reflecting the City's geographic and stakeholder diversity, including representatives of South Pas Active, bike bus organizers, SPUSD/PTA, older adults, the disability community, and the business community.
- Evaluate existing and projected land use, housing, and employment growth, including anticipated transit-oriented development near the Metro A Line Station and other opportunity areas.
- Analyze the potential transportation impacts associated with implementation of recent State housing legislation, including SB 79 and other applicable laws affecting residential density and transit-oriented development.

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- Identify current deficiencies in the City's multimodal transportation network that may constrain future growth or reduce accessibility as population increases.

Task 2: Existing Conditions and Needs Assessment

- Inventory and map (GIS) existing bicycle, pedestrian, and transit facilities citywide, building on the network documented in the 2011 Bicycle Master Plan.
- Document right-of-way and street cross-section constraints on key corridors — including travel lane widths, on-street parking, and mature street trees — to establish design constraints early in the process.
- Analyze collision history to identify high-injury locations and safety patterns for people walking and biking.
- Review the City's 2020 SSARP; evaluate completed and outstanding recommendations; update collision analyses; conduct supplemental field reviews; reevaluate high-risk intersections and roadway segments using current systemic safety methodologies; identify emerging trends; prepare updated safety recommendations; and incorporate the updated recommendations into a Citywide Safety Action Plan.
- Evaluate existing traffic operations at key intersections and corridors, including level of service, delay, vehicle speeds, emergency response considerations, freight movement, and transit operations, where appropriate.
- Inventory and evaluate on-street parking utilization within commercial districts and neighborhoods where mobility improvements are proposed and identify strategies to balance parking needs with multimodal transportation objectives.
- Conduct an equity analysis to identify underserved neighborhoods and populations (e.g., using CalEnviroScreen or similar tools).
- Assess travel demand and gaps in the existing network relative to schools, the Metro A Line station, parks, and commercial districts.
- Review relevant plans and studies, including the General Plan, the 2011 Bicycle Master Plan Update, the 2024 Fremont/Fair Oaks/Huntington Drive Study, SPUSD safe routes to school efforts, and applicable County, Metro, SGVCOG, and adjacent-city plans.

Task 3: Community and Stakeholder Engagement

Community engagement is a central priority for this project. The City expects an engagement program substantially more robust than a minimum-compliance public process, and one that treats the Steering Committee as genuine partners rather than a single stakeholder group among many. At minimum, the consultant shall:

- Prepare a Community Engagement Plan at project outset, for City approval, defining target audiences, methods, materials, translation/interpretation needs, and success metrics.
- Conduct at least three rounds of public engagement aligned with key project milestones: (1) visioning and existing conditions, (2) draft network and design toolkit, and (3) draft plan review — each including both in-person and online components.

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Each round of public engagement should include a minimum of two meetings with the public, one meeting with appropriate commissions and one meeting with the City Council.
- Partner directly with South Pas Active and bike bus organizers as co-hosts and channels for outreach, feedback, and plan promotion.
- Engage families and schools directly, including pop-up engagement at bike bus rides and school pick-up/drop-off, and coordination with SPUSD and school PTAs.
- Host pop-up engagement at high-traffic community locations such as the Farmers Market, library, parks, and senior center.
- Maintain an online engagement hub and interactive mapping tool for crowdsourced input throughout the project.
- Conduct stakeholder interviews or focus groups with groups such as emergency responders, the disability community, older adults, and business owners.
- Provide materials in additional languages and formats as needed to reach the full community.
- Present at public workshops, and at Planning Commission, Public Safety Commission (as applicable), Public Works Infrastructure Commission and City Council meetings.
- Develop an education and encouragement component distinct from feedback collection — e.g., bike/pedestrian safety materials, a toolkit supporting new or expanding bike buses, and content to support Bike to School Day and similar events.
- Prepare an Engagement Summary Report documenting input received and how it shaped the Plan.

Task 4: Vision, Goals, and Performance Measures
- Facilitate a process with the Steering Committee and public to confirm the Plan's vision, goals, and objectives.
- Establish measurable performance targets (e.g., network completion, safety outcomes, mode share, school-trip mode share) to track progress after adoption.

Task 5: Citywide Multimodal Network Plan
- Update and expand the citywide bicycle network from the 2011 Bicycle Master Plan, classifying facility types appropriate to context (e.g., bike lanes, separated/protected bike lanes, bicycle boulevards/neighborhood greenways, shared streets, and multi-use paths, including connections to the Arroyo Seco).
- Develop a pedestrian network plan, including sidewalk gap analysis, crossing improvements, and a City ADA transition plan and curb ramp prioritization.
- Identify safe routes to school improvements that support and help formalize existing bike bus routes and other walking/biking routes to all SPUSD schools.
- Identify transit access and first-/last-mile improvements connecting to the Metro A Line station and local bus routes.
- Recommend traffic calming and neighborhood greenway treatments for local streets.
- Incorporate and reconcile the relevant recommendations of the 2024 Fremont Avenue, Fair Oaks Avenue, and Huntington Drive Study into the broader citywide

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network taking into the considerations the design alternatives approved for Fremont Avenue and Huntington Drive.
- Develop a wayfinding signage program.
- Develop a future mobility network that accommodates anticipated increases in residential density while maintaining safe, efficient, and accessible travel for pedestrians, bicyclists, transit riders, motorists, and persons with disabilities.
- Identify transportation improvements necessary to support higher-density mixed-use and transit-oriented neighborhoods, including enhanced pedestrian facilities, protected bicycle infrastructure, transit priority improvements, curb management strategies, micromobility facilities, and first-/last-mile connections.
- Evaluate roadway capacity through a multimodal lens, emphasizing person throughput, accessibility, and safety rather than vehicle capacity alone.

Task 6: Design Toolkit for Narrow, Historic Streets

Given South Pasadena's constrained rights-of-way, this task is central to the project's success.

- Develop a context-sensitive design toolkit of creative, low-right-of-way treatments suited to South Pasadena's streets — for example, parking-protected bike lanes, contraflow bike lanes, bicycle boulevards with traffic diversion, shared/slow streets, road diets, curb extensions/bulbouts, mini traffic circles, raised crossings, and low-cost or interim materials suitable for pilot/demonstration projects.
- Provide sample street cross-sections calibrated to typical South Pasadena rights-of-way, accounting for mature street trees, on-street parking demand, and emergency vehicle access.
- Prepare conceptual layouts and typical cross-sections for the City's highest-priority projects sufficient to support future grant applications and preliminary engineering.
- Build directly on the design concepts developed in the 2024 Fremont/Fair Oaks/Huntington Drive Study (including its bulbout and road diet approach).

Task 7: Prioritization, Implementation, and Funding Strategy

- Develop project prioritization criteria (e.g., safety, equity, connectivity, school access, feasibility, cost, and community support) and categorized on timely delivery such as Immediate (0-2 years), Near-Term (3-5 Years), Mid-Term (5-10 Years), and Long-Term (10+ Years).
- Prepare a prioritized, phased project list with planning-level cost estimates.
- Identify near-term, low-cost quick-build or demonstration project opportunities for early implementation.
- Identify applicable federal, state, regional, and local funding sources — including the Caltrans Active Transportation Program (ATP), Highway Safety Improvement Program (HSIP), SB 1 programs, Metro Measure M/R local return and active transportation programs, SGVCOG programs, and TDA Article 3 — and confirm the Plan meets current ATP eligibility and formatting requirements.
- Provide maintenance and asset management recommendations.

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- Prioritize projects that improve the City's readiness for anticipated transit-oriented growth and position South Pasadena to compete for state and federal funding supporting sustainable transportation and infill development.

Task 8: Policy and Program Recommendations

- Recommend policy updates for consistency with the General Plan and Municipal Code, including Complete Streets policy direction and bicycle parking requirements for new development.
- Recommend education, encouragement, and evaluation programs, including a framework for the City to formally support and help sustain bike buses and similar grassroots programs in partnership with South Pas Active and SPUSD.
- Evaluate the City's policies, standards, and design guidelines to ensure they are compatible with anticipated transit-oriented growth resulting from State housing legislation, including SB 79. Recommend updates to roadway design standards, complete streets policies, parking management, curb management, bicycle parking requirements, and other municipal policies necessary to support future development while maintaining a safe and efficient multimodal transportation system.
- Recommend a data collection and monitoring approach to track the Plan's performance measures after adoption.

Task 9: Draft and Final Mobility Plan/Citywide Safety Action Plan and Adoption

- Prepare an Administrative Draft, Public Draft, and Final Plan documents, with GIS-based maps, graphics, and a plain-language public summary.
- Prepare a technical memorandum evaluating how anticipated housing growth and transit-oriented development may affect travel demand, pedestrian activity, bicycle demand, transit access, curb utilization, parking, and roadway operations over the next 20 years. The memorandum shall identify infrastructure investments and policy actions needed to proactively prepare the City's transportation network for these changes and include conceptual improvement maps for areas surrounding the Metro A Line Station and other anticipated growth areas.
- Support any required environmental review documentation (e.g., CEQA exemption findings) in coordination with City staff.
- Prepare staff reports and present the Draft and Final Plan to the Planning Commission, Public Safety Commission (as applicable), and City Council for adoption.
- Deliver final GIS data and network files, editable source files, and a print-ready final Plan document.

Summary of Deliverables

At minimum, the consultant shall provide the following deliverables:

- Community Engagement Plan
- Existing Conditions / Needs Assessment Report

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- Engagement Summary Report(s), for each round of engagement
- Draft and Final Citywide Multimodal Network Maps (GIS)
- Design Toolkit for Narrow, Historic Streets, with sample cross-sections
- Prioritized Project List and Planning-Level Cost Estimates
- Funding and Implementation Strategy
- Policy and Program Recommendations
- Administrative Draft, Public Draft, and Final Mobility Plan and Citywide Safety Action Plan documents
- Accessible PDF and plain-language summary/brochure of the Final Plan
- All GIS and editable source files
- Agendas, minutes, and presentation materials for all public, committee, and Commission/Council meetings

Section 2: Anticipated Project Schedule

The City anticipates a project duration of approximately 12–18 months from Notice to Proceed. Proposers should provide a detailed schedule reflecting their proposed approach; the following milestones are illustrative:

Milestone	Estimated Timing
Notice to Proceed / Kickoff	Month 1
Existing Conditions & Needs Assessment	Months 1–3
Engagement Round 1: Visioning	Months 2–4
Draft Network & Design Toolkit	Months 4–8
Engagement Round 2: Draft Network Review	Months 7–9
Prioritization & Funding Strategy	Months 8–10
Administrative Draft Plan	Months 10–11
Engagement Round 3: Draft Plan Review & Commission Review	Months 12–15
Final Plan & City Council Adoption	Months 14–18

Section 3: Proposal Submission Requirements

Proposals shall be concise, well organized and demonstrate qualifications and applicable experience**.** Each proposal shall be no more than twenty-five (25) pages in length (excluding resumes, sample project pages, and proposal forms), using a minimum 12-point font.

Proposals shall include the following sections:

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- **Cover Letter** (Maximum of 2 pages, addressed to Joan M. Powe, Procurement Contracts Administrator)
    - Provide Firm profile; services, founding year, organization type, office locations, and staff size
    - Financial status: bankruptcy, litigation, claims over $25,000, office changes, mergers/acquisitions
    - Identify the authorized negotiator and signatory, including company legal name, address, phone, and contact info for negotiation and evaluation
    - Acknowledge all RFP addenda obligations
    - Confirm proposal is valid for at least 180 days from submission
    - Accept or note exceptions to the Sample Professional Services Agreement
    - Include signature of authorized representative and a statement certifying accuracy of all submitted information
- **Firm Qualifications and Relevant Experience** — include no more than three references and examples of similar projects, particularly those involving narrow or historic streets and/or partnership with grassroots advocacy groups.
- **Project Understanding and Approach** — demonstrate an understanding of South Pasadena's context, including its constrained infrastructure and active mobility community.
- **Scope of Work / Work Plan** — task-by-task approach, deliverables, and estimated hours.
- **Community Engagement Approach** — a dedicated narrative describing the firm's proposed approach to community engagement and education, including how it will partner with South Pas Active and bike bus organizers.
- **Project Team and Organization Chart** — including resumes, roles, sub-consultants, and percentage of time committed to the project.
- **Project Schedule** — identify milestones and anticipated timing
- **Fee Proposal** — submitted as a separate document; include hourly billing rates, a not-to-exceed total fee, and a cost breakdown by task.
- **Appendices (optional)** — work samples, and any additional supporting materials.

Section 4: Evaluation Criteria

Proposals will be evaluated based on the following:

Criteria	Weight
Firm Qualifications and Relevant Experience	20%
Project Understanding and Approach (including design solutions for narrow streets)	20%

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Criteria	Weight
Community Engagement and Education Approach	25%
Project Team Qualifications	15%
Schedule and Work Plan Feasibility	10%
Fee Proposal	10%
Total	**100%**

Section 5: General Provisions

Examination of Proposal Documents
By submitting a Proposal, the Proposer represents that they have thoroughly examined and become familiar with the work required under this Request For Proposals (RFP) and can perform quality work to achieve the City's objectives. The Proposer is prepared to comply with all local, state, and federal statutes and regulations applicable to the work performed.

Addenda
The City of South Pasadena reserves the right, at its sole discretion, to revise the RFP documents. Any changes to the requirements of this RFP will be made by written addendum. Any written addenda issued pertaining to this RFP shall be incorporated into the terms and conditions of any resulting Agreement. Addenda will be posted on the City's online bidding system, Planet Bids, and will be available to download. It is the responsibility of Proposers and other interested parties to check the online bidding system regularly during the solicitation period for updated information. The City will not be bound to any modifications to or deviations from the requirements set forth in this RFP as the result of oral instructions. Proposers shall acknowledge receipt of addenda in their proposals. Failure to acknowledge receipt of addenda may cause the proposal to be deemed non-responsive to this RFP and therefore be rejected.

Questions and Requests for Clarifications

- Examination of Documents
    - Proposers and other interested parties are encouraged to promptly notify the City of any apparent errors or inconsistencies in the RFP inclusive of all attachments, exhibits and appendices.
- Submitting Requests
    - All questions regarding this RFP must be submitted in writing via the City's online bidding system, Planet Bids, by the deadline listed. No other questions will be received after the deadline. Only written questions will be considered. All questions and answers will be published on Planet Bids.
    - Under no circumstances should prospective Proposers discuss with, or inquire of any City Proposers, employees (except for City contact as

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identified), city and county employees or elected officials on any matter relating to this solicitation.

Submission of Proposals
Proposer shall submit one proposal in PDF Format via the City's online bidding system, Planet Bids, by the deadline listed above.

Acceptance of Proposals
- The City reserves the right to accept or reject any and all proposals, or any item or part thereof, or to waive any informalities or irregularities in any proposals.
- The City reserves the right to amend, withdraw or cancel this RFP at any time without prior notice, and it makes no representations that any contract will be awarded to any Proposer responding to this RFP.
- The City reserves the right at its sole discretion to modify this RFP should the City deem that it is in the best interest to do so.
- Proposals received by the City are public information and will be made available to any person upon request, after the entire proposal evaluation process has been completed.
- Submitted proposals are not to be copyrighted.

Pre-Contractual Expenses
- The City shall not, under any circumstances, be liable for any pre-contractual expenses incurred by any Proposer in preparation of its proposals.
- Pre-contractual expenses are defined as expenses incurred by the Proposer in:
    - Preparing its proposal and related information in response to this RFP
    - Submitting that proposal to the City
    - Negotiating with the City any matter related to this proposal
    - Costs associated with interviews, meetings, travel or presentations
    - Any other expenses incurred by the Proposer prior to the date of award or contract execution

Conflict of Interest
Proposer agrees to avoid organizational conflicts of interest. An organizational conflict of interest means that due to other activities, relationships or contracts, the Proposer is unable, or potentially unable to render impartial assistance or advise the City; Proposer's objectivity in performing the work identified in the specifications is, or might be, otherwise impaired; or the Proposer has an unfair competitive advantage. Proposer is obligated to fully disclose to the City in writing any conflict-of-interest issues as soon as they are known to the Proposer. All disclosures must be disclosed at the time of Proposal submittal.

Period of Performance
Performance under a contract awarded pursuant to this RFP is estimated to commence in accordance with the anticipated RFP schedule.

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General Terms and Conditions

- The City reserves the right to reject any or all proposals, waive informalities, and select the proposal deemed in the best interest of the City.
- This RFP includes a sample of the anticipated professional services agreement, including the general terms and conditions of an agreement to provide services for this project.
- Proposers must review the insurance requirements as they are written in the anticipated professional services agreement provided with this RFP. Upon award, the City will request the appropriate insurance documents and certifications to ensure that the successful Proposer is compliant with the requirements as set forth in the professional services agreement.
- The City reserves the right to modify the professional services agreement to the extent that it deems necessary either before or during any negotiations with the selected Proposer.
- The Proposer is expected to review the general terms and conditions and acknowledge their acceptance in the Proposal Cover letter (or their objections to specific language) as a mechanism to expedite the contract negotiation process.
- To accommodate possible delays during contract negotiation, all parts of the Proposal shall be valid for one hundred eighty (180) days after submittal of the Proposal.
- Nondiscrimination: The City will not discriminate against any interested Proposers on the grounds of race, religious creed, color, national origin, ancestry, handicap, disability, marital status, pregnancy, sex, age, or sexual orientation.
- The City's Right to Modify RFP: The City reserves the right at its sole discretion to modify this RFP (including but not limited to the requirements and or the selection criteria) should the City deem that it is in the best interest to do so. Any changes to the proposal requirements will be made by written addendum. The failure of a Proposer to read any addenda shall have no effect on the validity of such modification.
- The City's Right to Cancel RFP: The City reserves the right at its sole discretion to cancel this RFP in part or its entirety should the City deem that it is in the City's best interest to do so.
- The City's Right to Extend RFP Deadlines: The City reserves the right to extend any of the deadlines listed in this RFP by written addenda should the City deem that it is in the best interest to do so.
- Liability for Proposal Errors: Proposers are liable for all inaccurate factual statements, errors and omissions contained in their proposals.
- Permits and Licenses: Proposers, at their sole expense and at the appropriate time, shall obtain and maintain all appropriate permits, certificates and licenses including, but not limited to, a City business license(s), which will be required in connection with their Proposal.

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Section 6: Attachments

- Attachment A — City of South Pasadena Bicycle Master Plan Update (Adopted August 17, 2011)
- Attachment B — Fremont Avenue, Fair Oaks Avenue & Huntington Drive Study, Toole Design Group (2024)
- Attachment C – 2020 Systemic Safety Analysis Report (SSARP)

****End****

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Attachment A — City of South Pasadena Bicycle Master Plan Update (Adopted August 17, 2011)

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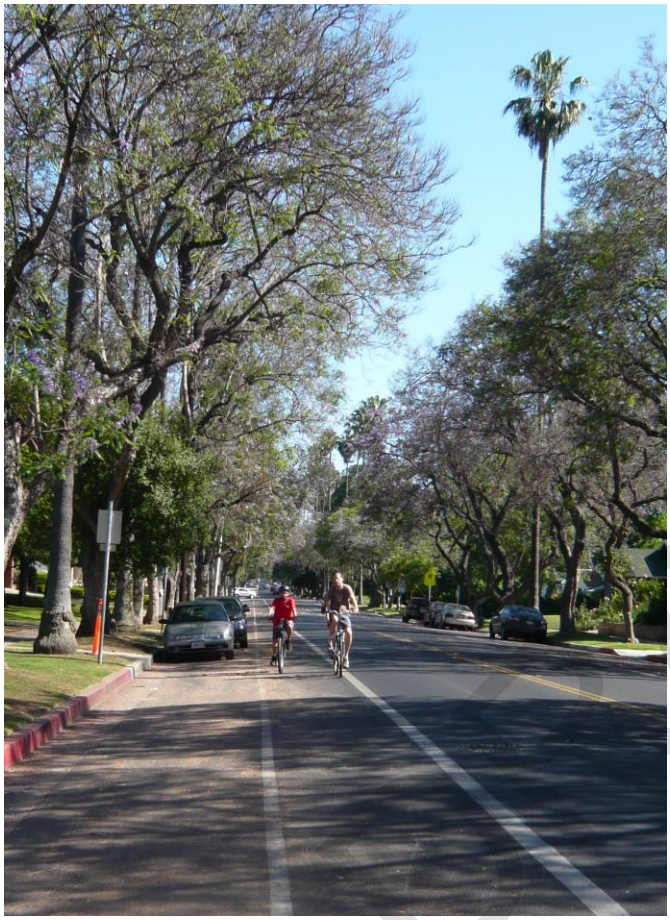
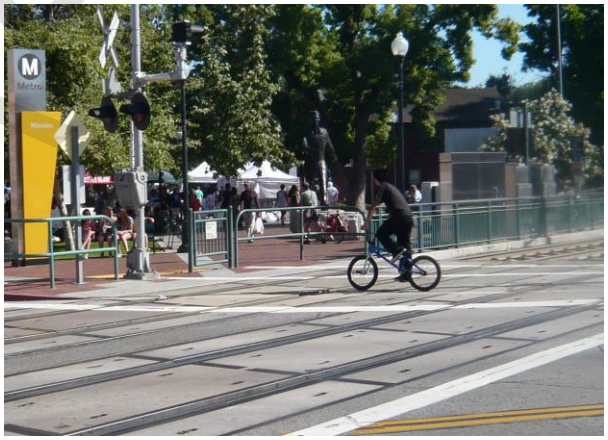
Cycle South Pasadena

Bicycle Master Plan Update

ADOPTED AUGUST 17, 2011







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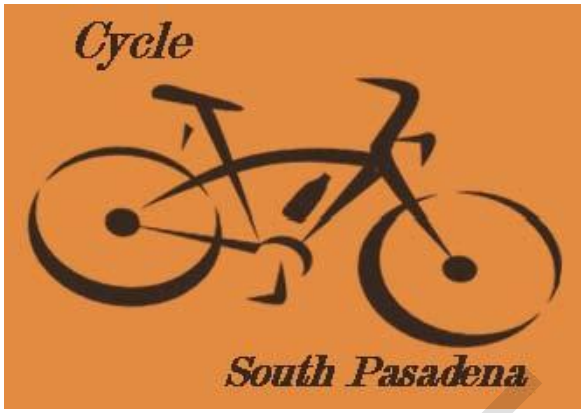
Leslie Scott Consulting

In Association With:
MJB Consulting

City of South Pasadena
Adopted Bicycle Master Plan Update



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Acknowledgements

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City of South Pasadena Bicycle Master Plan Update

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RESOLUTION NO. 7175

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SOUTH PASADENA, CALIFORNIA, ADOPTING A NEGATIVE DECLARATION, AND APPROVING AN UPDATE TO THE CITY'S BICYCLE MASTER PLAN

WHEREAS, on September 16, 2009, the City Council directed City staff to update the Bicycle Master Plan, which is consistent with the Policy 2.2 of the Circulation and Accessibility Element of the General Plan; and

WHEREAS, the Bicycle Master Plan ("BMP") Update is designed to meet the requirements of the Caltrans Bicycle Transportation Account as well as other State, Federal and Regional guidelines; and

WHEREAS, pursuant to the provisions of the California Environmental Quality Act (CEQA), an Initial Study was prepared for the proposed BMP update (the project), which found that the project would not have significant effects on the environment, and therefore, a Negative Declaration was prepared and circulated for public comment beginning July 20, 2011, and included the Draft BMP; and

WHEREAS, after notices issued pursuant to the requirements of South Pasadena Municipal Code and CEQA, the City Council held a duly noticed public hearing on August 17, 2011, at which all interested parties were given the opportunity to be heard and present evidence; and

WHEREAS, as a California Department of Transportation requirement for bicycle plans requires a public outreach, a public meeting was held on May 12, 2011, at the South Pasadena Public Library Community Room to inform the public about the update to the Bicycle Master Plan (BMP) and to solicit comments about bicycling in South Pasadena; and

WHEREAS, the public was provided with the opportunity to comment in person at the May 12, 2011, meeting as well as by email, comment card, letter and in person at the City Clerk's Office until May 27, 2011; and

WHEREAS, the residents on Grand Avenue were invited to attend a July 28, 2011, meeting to discuss and provide input on bicycle issues specific to Grand Avenue; and

WHEREAS, the updated BMP is intended to serve as a blueprint for the implementation of bicycle facilities and programs that upon build out will offer people an

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opportunity to bicycle to schools, parks, shops, offices, government facilities (Library, Senior Center, City Hall, post office), special events, as well as neighboring cities and the region when combined with transit such as the Metro Gold Line; and

WHEREAS, the update to the BMP reinforces South Pasadena's commitment to providing viable multi-modal transportation solutions; and

WHEREAS, upon implementation, the updated BMP can lead to a reduction in traffic congestion and related auto emissions, and provide healthy lifestyle choices and improved economic vitality.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF SOUTH PASADENA, CALIFORNIA, DOES RESOLVE, DECLARE, DETERMINE AND ORDER AS FOLLOWS:

SECTION 1. The City Council hereby adopts a Negative Declaration for the Bicycle Master Plan (BMP) Update. Upon completion of an initial study, the Negative Declaration states that there is no substantial evidence that the BMP Update will have a significant effect on the environment.

SECTION 2. The City Council hereby approves the Bicycle Master Plan (BMP) Update and directs staff to initiate implementation.

SECTION 3. The South Pasadena City Council reiterates its support for further development and implementation of the elements of the BMP, thereby providing multi-modal solutions that include but are not limited to, an integrated comprehensive network of bicycle systems, light-rail, heavy-rail, and bus throughout the region.

SECTION 4. This resolution shall become effective immediately upon its adoption.

SECTION 5. The City Clerk shall certify to the passage and adoption of this resolution and enter it into the book of original resolutions.

PASSED, APPROVED AND ADOPTED ON this 17th day of August, 2011.

Mike Ten, Mayor

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ATTEST:

Sally Kilby, City Clerk

APPROVED AS TO FORM:

Richard L. Adams II, City Attorney

I HEREBY CERTIFY the foregoing resolution was duly adopted by the City Council of the City of South Pasadena, California, at a regular meeting held on the 17th day August, 2011, by the following vote:

AYES: Cacciotti, Putnam, Schneider, Sifuentes and Mayor Ten

NOES: None

ABSENT: None

ABSTAINED: None

Sally Kilby, City Clerk

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Caltrans BTA Requirements Checklist

Approved	Caltrans Bicycle Transportation Account (BTA)	Page(s)
	a) Existing and future bicycle commuters	4.2-4.3
	Description	4.2-4.3
	Table	4.2
	b) Existing and proposed land use patterns description and map	2.2-2.4
	Description	2.2
	Maps	2.3, 2.4
	c) Existing and proposed bikeways description and map	4.5-4.12
	Description	4.5, 4.7, 4.8
	Maps	4.6, 4.7, 4.12
	Tables	4.9, 4.10, 4 .11
	d) Existing and proposed bicycle parking description and map	4.13-4.17, 7.37-7.39
	Description	4.13, 4.14, 4.15
	Maps	4.16,4.17
	Tables	4.14,4.18
	Priority Project Sheet	7.37-7.39
	e) Existing and proposed multimodal connections description and map	3.7, 4.6, 4.12-4.20
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	Maps	4.6, 4.12, 4.16, 4.17
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	f) Existing and proposed changing and storage facilities description and map	4.18-4.19
	Description	4.18, 4.19
	Table	4.18
	g) Bicycle safety and education programs with safety collision analysis	5.1-5.6
	Description	5.1-5.5
	Map	5.6

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Caltrans BTA Requirements Checklist

Approved	Caltrans Bicycle Transportation Account (BTA)	Page(s)
	h) Citizen and community involvement	1.4-1.5
	i) Consistency with transportation, air quality, and energy plans	2.2, 2.5-2.12
	Description	2.2, 2.5, 2 .8-2.12
	Map	2.7
	Tables	2.6, 2.8, 2.12
	j) Proposed projects and priority implementation	7.1-7.41
	Description	7.1-7.6, 7.9
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	k) Past expenditures for bicycle facilities and future financial needs	7.5-7.6

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CHAPTER 1
INTRODUCTION

1.0 REASON FOR THE BICYCLE MASTER PLAN

The South Pasadena Bicycle Master Plan update (The Plan) is a comprehensive Plan that upon implementation and build-out is intended to make bicycling a viable transportation option. It complements the small town atmosphere of South Pasadena and reinforces the City and region's commitment to multi-modal transportation solutions.

The Plan Update builds upon the existing Bicycle Master Plan (adopted in 2005) by incorporating current planning issues, community involvement, and the accessibility of existing resources, bicycle facility design, multi-modal integration, safety, education, and support facilities, as well as outlines implementation and maintenance recommendations.

The core of the Plan is the goals, objectives and policies upon which the chapters and recommendations within the Plan are based. Implementation of the Plan's recommendations will lead to a comprehensive citywide bicycle infrastructure consisting of bicycle paths, lanes and routes. When combined with recommended bicycle programs, support infrastructure, and amenities, the intended outcome will make bicycling a viable transportation option for riders of all skill levels and for local, regional, commuter, and recreational trips.

The General Plan, "embraces a policy direction to make South Pasadena a place where bicycling (and walking) are encouraged and fostered ... and facilities are provided as an ongoing part of transportation planning".

Combining bicycling with public transit extends the distance one could effectively travel without the use of a car. Additionally, implementation of the Plan is intended to offer opportunities to improve health through exercise, reduced traffic congestion, and improved air quality through a reduction in the number of vehicle miles traveled (VMT).

At the national and regional level, there has been increasing awareness of the need to reduce air pollutants produced from the burning of fossil fuels. The Federal and State governments have passed legislation, such as the Federal Clean Air Act, the California Complete Streets Act, California Senate Bill 375 (SB 375), and California Assembly Bill 32 (AB 32), all highlighting the need to find solutions to mobility, land use, and air quality challenges. Compliance with these laws and regulations can lead to an improvement in the quality of life of our cities and regions. Planning organizations are adopting and implementing Bicycle Master Plans as a mechanism to enhance non-motorized, sustainable transportation options and embrace a full-breadth multi-modal transportation network, where the bicycle is one of the essential transportation modes.

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1.1 USING THE BICYCLE MASTER PLAN

The South Pasadena Bicycle Master Plan includes eight (8) topic-related chapters and five (5) appendices for quick and easy reference. Each chapter begins with an overview identifying the purpose and need of the chapter. Much of the information in each chapter is required to fulfill California Department of Transportation (Caltrans) requirements, and the content of the Plan consists of recommendations for infrastructure and programs specific to South Pasadena. All of the chapters are interrelated and support each other.

Chapter 4 (Bicycle Network) and Chapter 7 (Implementation) identify projects upon which Chapter 6 (Funding Resources) can be utilized to match potential projects with available funding sources. Chapter 3 (Goals, Objectives and Policies) establishes the reasons for Chapters 4 (Bicycle Network), 5 (Bicycle Safety Programs), 6 (Funding Resources) and 7 (Implementation). To ensure execution of the Plan, Chapters 3, 4, 5, 6 and 7 identify specific City departments responsible for implementing the various aspects of the plan in a collaborative effort. The appendices provide background information.

1.2 BICYCLE MASTER PLAN VISION

The Bicycle Master Plan update is intended to serve as a blueprint for the implementation of citywide bicycle facilities and programs. Upon implementation, the bicycle network will allow people of varying bicycling abilities to reach their desired destinations throughout the community. These destinations include schools, local businesses, places of employment, parks, and government facilities such as City Hall, the public library, and the post office. To ensure that users can easily navigate to these destinations, a way finding signage network will be established. The Bicycle Master Plan incorporates multi-modal bicycle linkages to transit at the Metro Gold Line station and along Metro Bus routes, and this will assist users to reach destinations throughout the region.

This Bicycle Master Plan includes support facilities, called bicycle amenities, such as bicycle racks and bicycle lockers. These bicycle amenities allow the bicyclists to know that they can conveniently park their bicycle once they reach their destination.

This Plan has a component that establishes safety and education programs that will encourage adults and children to bicycle. These include but are not limited to events, informational campaigns, maps, and pamphlets.

The Bicycle Master Plan meets the requirements of Caltrans' Bicycle Transportation Account (BTA) as well as Federal, State, and regional guidelines and regulations, ensuring that the Plan will eligible for a full range of funding opportunities.

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1.3 BICYCLE MASTER PLAN BACKGROUND

The City of South Pasadena, in 1998, acknowledged the importance of bicycles as part of the transportation network with its first Bicycle Master Plan. The plan was received and filed by City Council as a long range planning document.

During the mid-2000s, another Bicycle Master Plan was drafted. The 2005 Bicycle Master Plan was seen as a work in progress that would increase bicycle facilities and improvements to meet the increasing demand for bicycling.

In 2009, City Council requested a complete Bicycle Master Plan Update, which follows policy direction from the General Plan.

1.4 COMMUNITY PROFILE

The City of South Pasadena prides itself on its small town character, as mentioned in numerous local pieces of literature and documents. Relatively small and independent with less than three and one-half square miles in area, South Pasadena has preserved its status as a distinct community. It is known for its tree lined streets, historic California Craftsman style homes, unique small businesses and outstanding public schools.

With a year 2010 population of 25,619 (Census 2010), South Pasadena is a low-to-medium density urban community located in the west San Gabriel Valley adjacent to the cities of Pasadena, Alhambra, San Marino, and Los Angeles.

The City's topography is generally flat in the central and eastern areas. The northern part of the City slopes up towards Pasadena, and there is a large hilly section in the southwest.



South Pasadena Parade

The City has an established network of arterial, collector, and local streets. Many streets in the central part of the City are aligned along a grid pattern.

A bicycle network will improve the transportation options for residents, businesses, and visitors by making bicycling more convenient and accessible.

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1.5 PUBLIC PROCESS

The Bicycle Master Plan Update included a public process, as required by the Caltrans Bicycle Transportation Account (BTA). As part of this process, the public was invited to attend a workshop to share their vision of a bicycle friendly future. The workshop was held on May 12, 2011 at the South Pasadena Public Library Community Room.

The workshop was announced by press release, flyer, website posting, and other relevant social media. A press release was sent to the local publications, including print newspaper and online news media. Seven (7) publications featured the South Pasadena Bicycle Master Plan in a print and online article.

Flyer notifications were sent to the South Pasadena City Council and City Commissions as well as distributed to the City's library, parks and recreation building, senior center, and golf course. Flyers were also available at the local bicycle shop.

Website posting included an article for the City's E-newsletter. Other social media, such as Facebook, were accessible through the City's website. Informal noticing also occurred through blogs, twitter, and social media. Posting about the workshop was seen on cobicycle.com and bicyclecritics.com. A podcast was hosted by robocaster.com.

The workshop kicked off with a bicycle tour. It looped around the library, towards the Farmers Market, around Orange Grove Park, along the Mission commercial district, past the Metro Gold Line, and back to the library. The purpose of the bicycle tour was to show the potential places people could travel by bicycle: community centers, parks, retail, and transit. Participants experienced the benefits of bicycling, such as less reliance on the automobile, connections to transit, economic vitality, and healthy living.



South Pasadena Bicycle Tour

The workshop included a presentation that provided an overview of the Bicycle Master Plan's vision, benefits, project examples, and a general schedule. After the presentation, attendees were asked to join in a mapping/project ranking exercise.

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Bicycle Master Plan Workshop

In addition, comments could be made by email at CycleSouthPasadena@gmail.com or comment cards. The City Clerk's office collected written comment cards and letters.

Prior to final adoption of the plan, the public was also given an opportunity to comment on the Draft Bicycle Master Plan through the environmental review process. Comments were submitted to City Council for consideration.

1.6 BICYCLE TRANSPORTATION ACCOUNT (BTA)

The Caltrans Bicycle Transportation Account is the primary source of funding for a Bicycle Master Plan's proposed projects and programs. Funds are allocated to cities and counties on a matching basis of 10% of the total project cost. The 2011 appropriation for BTA funds is $7.2 million for the annual year.

The City of South Pasadena must have a Bicycle Master Plan approved by Caltrans, with all of the BTA requirements for funding eligibility. These include the following:

- Estimation of existing and future bicycle commuters
- Description of existing and proposed land use patterns
- Land use planning
- Map of existing bikeways
- Maps of proposed bikeways
- Description of existing bikeways
- Description of proposed bikeways
- Maps of existing and proposed bicycle facilities
- Description of existing and proposed bicycle amenities
- Maps of existing and proposed multi-modal connections
- Description of existing and proposed multi-modal connections
- Maps of existing and proposed changing and storage facilities
- Description of existing and proposed changing and storage facilities
- Bicycle safety education and enforcement programs
- Citizen participation
- Consistency with transportation, air quality, and energy plans
- Project descriptions and priority ranking
- Past expenditures and future financial needs

The South Pasadena Bicycle Master Plan includes all required elements for the City to become eligible for BTA funding.

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CHAPTER 2
BICYCLE PLAN CONTEXT

2.0 BICYCLE PLAN CONTEXT OVERVIEW

The Bicycle Plan Context Chapter reviews the South Pasadena Bicycle Master Plan for consistency with Federal, State, regional, and local transportation and air quality-related plans, projects, policies, and regulations. The Bicycle Transportation Account (BTA) requires that a Bicycle Master Plan approved by Caltrans include a review of relevant City and regional planning documents. These documents are discussed here in sections 2.1, 2.2, and 2.3.

The City General Plan Circulation and Accessibility Element, the Fair Oaks Avenue Street Improvement Project, Fremont Avenue Traffic Calming Concept Plan, and Fair Oaks Avenue/SR-110 Interchange Improvement Project have been reviewed and the Bicycle Master Plan is consistent with these transportation plans and projects in the City.

The Bicycle Master Plan also considers its relationship to other regional plans and legislation related to transportation and air quality. The relevant transportation plans include the Southern California Association of Governments (SCAG) Regional Transportation Plan (RTP), South Coast Air Quality Management District (AQMD), Los Angeles Metro Bicycle Transportation Strategic Plan (BTSP), Los Angeles County Congestion Management Program (CMP) and California Complete Streets Act (CCSA). The air quality emissions legislation includes the AB 32 Global Warming Solutions Act and the SB 375 Reduce Vehicle Miles Traveled and Emissions.

In addition, the South Pasadena Bicycle Master Plan considered the elements of adjacent city plans. The City of Los Angeles and City of Pasadena bicycle plans were reviewed for connectivity and planning consistency.

The Bicycle Master Plan is consistent with regional plans and legislation by furthering their goals and intent.

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2.1 RELEVANT CITY PLANS

General Plan Land Use

The General Plan demonstrates the relationship between the Land Use Element and Circulation and Accessibility Element, as it promotes a, "safe, efficient and reliable movement of goods and people throughout South Pasadena," as described in the Plan.

In reference to land use, the City consists of a variety of residential, commercial, retail, and open space land uses, as illustrated in Map 2.1 and 2.2. Commercial land uses are primarily found along Fair Oaks Avenue, Mission Street, and Huntington Drive. Multi-family and higher-density housing is primarily located in the northeastern and north central areas as well as along Pasadena Avenue, West Monterey Road, South Fair Oaks Avenue, and Huntington Drive. Single-family housing makes up the largest proportion of residential land area but does not make up the majority of units of housing. Several small open space areas (parks, the golf course, utility corridors) are located in various areas of the City, and one large park (Arroyo Seco Park) and the golf course are located adjacent to the Arroyo Seco along the western boundary with Los Angeles.

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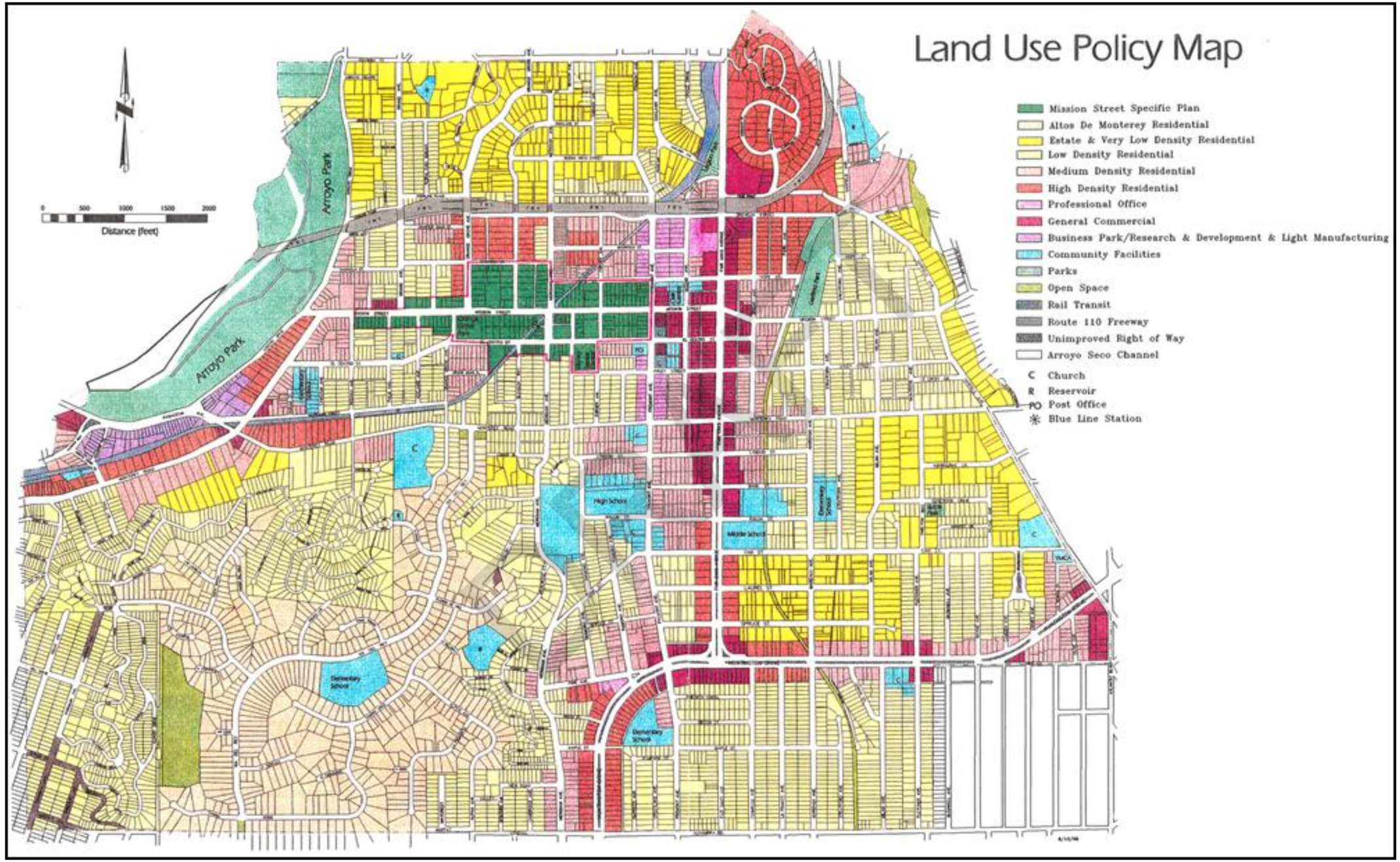
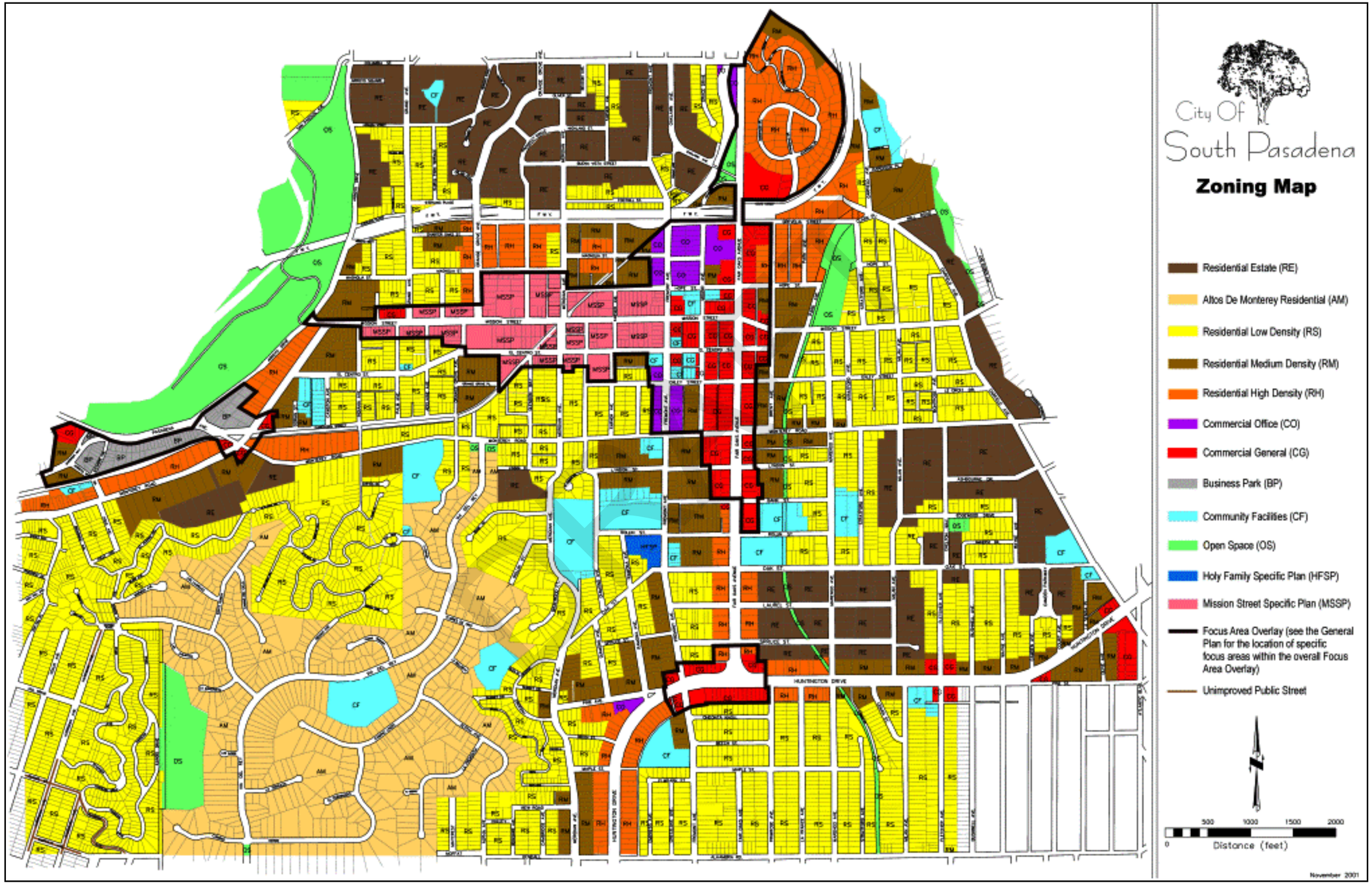
Map 2.1 General Plan Land Use



Map 2.2 General Plan Zoning



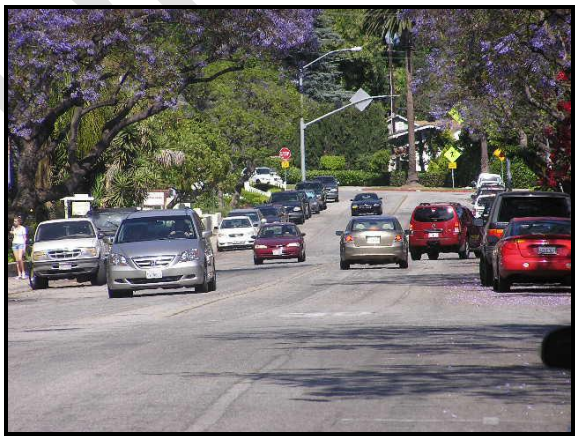
General Plan Circulation and Accessibility Element

Roadways

The roadway network consists of an organized hierarchy of major and minor arterials, collector and local streets, as presented in Table 2.1 and illustrated in Map 2.3. Fair Oaks Avenue and Mission Street serve as the commercial axes of the City. Huntington Drive and Fair Oaks Avenue are regional major arterials with Monterey Road/Pasadena Avenue and Fremont Avenue acting as regional minor arterials. The Arroyo Seco Parkway (SR-110 and previously known as the Pasadena Freeway) traverses the northern portion of the City in a general east-west alignment and connects the City with Downtown Los Angeles and Pasadena.



Monterey Road west of Via del Rey



Grevelia Street east of Fair Oaks Avenue

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Table 2.1 City Roadway Characteristics

Classification	Roadway	Limits (from, to)	Lanes (each direction)
Major Arterial	**Huntington Drive**	South city limit to Atlantic Boulevard	3
	Fair Oaks Avenue	North city limit to Monterey Road	2
		Monterey Road to Huntington Drive	3
	Atlantic Boulevard	Garfield Avenue to Pine Street	2
Minor Arterial	**Mission Street**	Pasadena Avenue to Fair Oaks Avenue	2
		Fair Oaks Avenue to east city limit	1
	Pasadena Avenue	West city limit to Mission Street	2
	Monterey Road	West city limit to Fair Oaks Avenue	2
		Fair Oaks Avenue to east city limit	1
	Orange Grove Avenue	North city limit to Grevelia Street (NB)	2
		North city limit to Grevelia Street (SB)	1
		Grevelia Street to Mission Street	1
	Fremont Avenue	North city limit to south city limit	1
	Garfield Avenue	Clark Street to Atlantic Boulevard	1
	Grevelia Street	Fair Oaks Avenue to Clark Street	1
Collector	**Clark Street**	Stratford Avenue to Garfield Avenue	1
	El Centro Street	Pasadena Avenue to Brent Avenue	1
	Oak Street	Meridian Avenue to Garfield Avenue	1
	Pine Street	Huntington Drive to Atlantic Boulevard	1
	Grand Avenue	North city limit to Mission Street	1
	Via Del Rey	Monterey Road to Camino Verde	1
	Oliver Street	Orange Grove Avenue to Meridian Avenue	1
	Meridian Avenue	Oliver Street to south city limit	1
	Marengo Avenue	Mission Street to south city limit	1
	Collis Avenue	West city limit to Hill Drive	1
	Fletcher Avenue	Alhambra Road to Huntington Drive	1
	Arroyo Drive	North city limit to Pasadena Avenue	1
	Camino Del Sol	Via Del Rey to St. Albans	1
	Hill Drive	St. Albans to west city limit	1
	Flores de Oro	Via Del Rey to Camino Lindo	1
	Camino Lindo	Flores de Oro to Alpha Avenue	1
	Alpha Avenue	Camino Lindo to south city limit	1
	Indiana Avenue	Monterey Road to Alta Vista	1
	Brunswick Avenue	Monterey Road to St. Albans	1
	St. Albans	Brunswick Avenue to Hanscom Drive	1
	Mission Street	Arroyo Drive to Pasadena Avenue	1
	San Pascual	West city limit to north city limit	1
	Orange Grove Avenue	Mission Street to Monterey Road	1
Local (Residential)	All roadways and roadway segments not listed above.		

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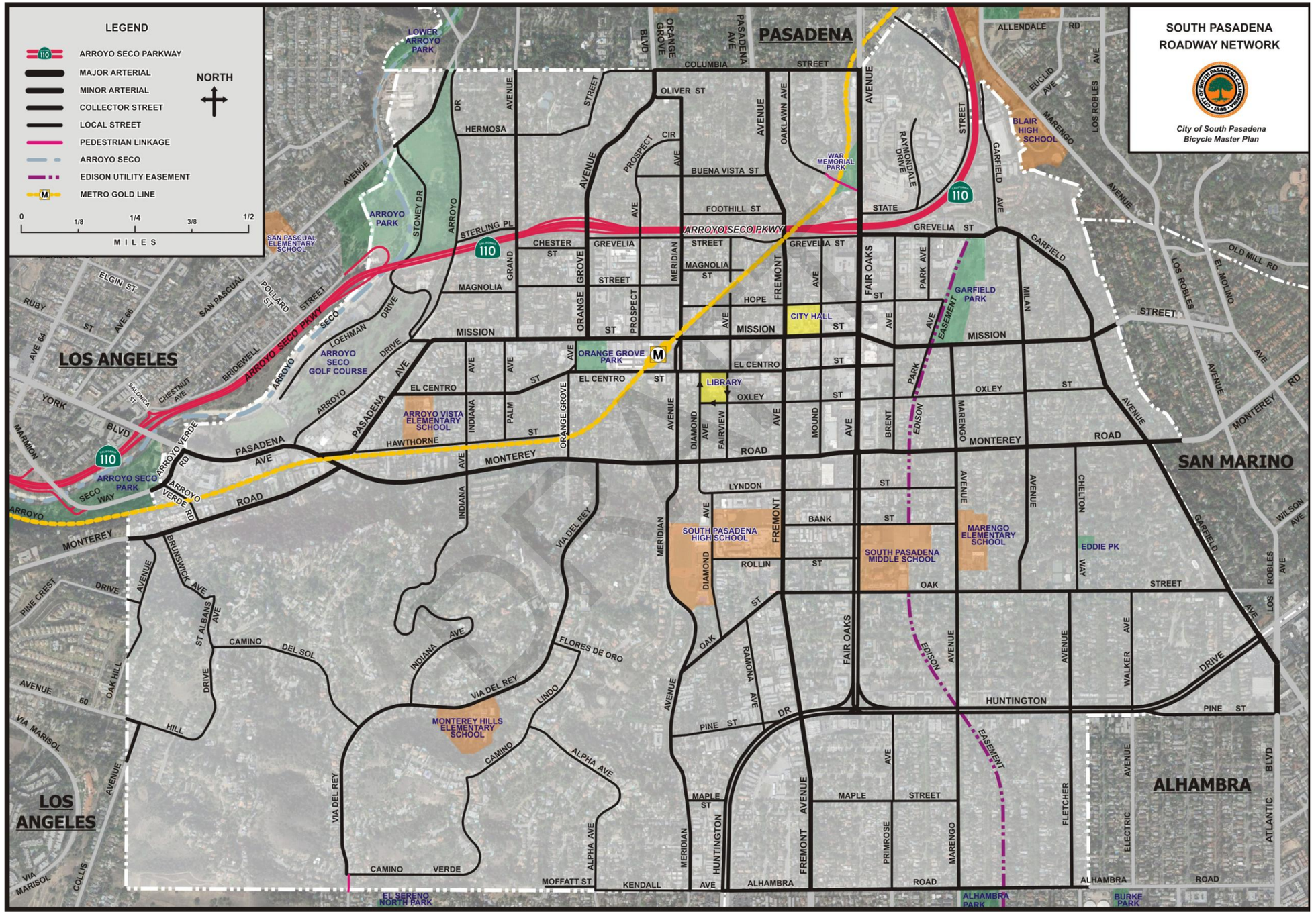
Map 2.3 South Pasadena Roadway Network



Transit

South Pasadena is served by the Los Angeles Metro Gold Line light rail system and Los Angeles County Metro buses.



Metro Gold Line, Mission Station

Several Metro bus lines traverse the City, including one Metro Rapid line, a Metro Express line, and other local service routes. South Pasadena's Metro-funded Dial-A-Ride service provides transportation to seniors and the disabled for local trips and medical appointments.

A summary of transit services provided within the City is presented in Table 2.2 and illustrated in Map 2.4.

Table 2.2 Transit Services in South Pasadena

Service Provider	Line	Service Type	Routing	Destinations
Metro	Gold Line	Light Rail	Metro-owned Rail Corridor	Pasadena, Downtown Los Angeles, East Los Angeles
Metro	762	Metro Rapid	Fair Oaks Ave, Huntington Dr, Atlantic Blvd	Pasadena, East Los Angeles
Metro	485	Metro Express	Huntington Dr, Fremont Ave	Altadena, Downtown Los Angeles
Metro	79	Metro Local	Huntington Dr	Downtown Los Angeles, Arcadia
Metro	176	Metro Local	Pasadena Ave, Mission St, Garfield Ave	Highland Park, El Monte
Metro	260	Metro Local	Fair Oaks Ave, Huntington Dr, Atlantic Blvd	Pasadena, East Los Angeles

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Park and Ride Locations

A Metro Park-and-Ride lot is available for patrons of the Metro Gold Line in the Mission-Meridian Village located at 805 Meridian Avenue, just north of Mission Street. It provides a multimodal connection for automobiles, bicycles and buses, and trains. A second Park-and-Ride is located at 435 North Fair Oaks Avenue adjacent to War Memorial Park.

Bicycle Facilities

The 1998 General Plan references the need for bicycle facilities and a recommendation to develop a Bicycle Master Plan (General Plan page III-13). It does not indicate specific bicycle lanes or routes.

Fair Oaks Avenue Street Improvement Project

The Fair Oaks Avenue Street Improvement Project is designed to improve movement along Fair Oaks Avenue, with an emphasis on pedestrian safety. Although these improvements are not planned for bicycle enhancements, the results will provide some additional roadway space for bicyclists between the rightmost travel lane and on-street parking. Although this extra space does not meet the Caltrans design guidelines for a Class II bike lane, it is intended as a Class III bike route and is reflected in this South Pasadena Bicycle Master Plan. A more detailed discussion of this issue is provided in Chapter 7 (Implementation).

Fremont Avenue Traffic Calming Concept Plan

Adopted in 2009, the Fremont Avenue Traffic Calming Concept Plan states that it is designed to "increase safety, better accommodate pedestrians and cyclists along the corridor, achieve driving behavior that is sensitive to the street's context and be cost conscious and implementable in stages" as described in the project literature. Traffic calming measures are used to reduce speed along Fremont Avenue. The reduced traffic speeds benefit bicycle riders. The Plan is being designed and implemented in phases as funding becomes available.

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Figure 2.1 Fremont Avenue Traffic Calming Concept Plan



2009 Rendering by Glatting Jackson Kercher Anglin, Inc.

Fair Oaks Avenue/SR-110 Interchange Improvement Project

The improvements planned for the interchange of SR-110 and Fair Oaks Avenue will reconfigure ramps and lanes at this location. The improvements will replace the existing southbound ramp at Fair Oaks Avenue, which will allow removal of the northbound double left-turn lanes on the overcrossing and increase usable roadway space. It will also expand the existing northbound off-ramp from two to four lanes, which will involve the closure of Grevelia Street just west of Fair Oaks Avenue. These improvements are intended to improve the intersection, which may in turn better manage traffic so bicyclists can travel on the major arterial more safely. As of the date of this Bicycle Master Plan, funding for this project has not yet been identified.

2.2 CONSISTENCY WITH REGIONAL PLANS

Southern California Association of Governments (SCAG) Regional Transportation Plan (RTP) and Non-Motorized Transportation Report (2008)

The 2008 Regional Transportation Plan (RTP) is a transportation plan that provides a framework for the region's transportation needs and challenges. The RTP supports non-motorized transportation, which includes bicycling, by promoting land use development that is less reliant up the use of automobiles. In relation to bicycling, the RTP emphasis is placed on increasing bicycling as a commute option. The South Pasadena Bicycle Master Plan's goals are consistent with the goals and policies of the RTP by furthering these goals and implementing projects that promote it.

Southern California Air Quality Management District (AQMD)

The Southern California Air Quality Management District (AQMD) delegates its transportation planning to the Southern California Association of Governments (SCAG) through the Regional Transportation Plan's (RTP) air quality conformance. The RTP is required to meet air quality standards set by Federal transportation planning and

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funding policy. As part of a Southern California air quality non-attainment area, the AQMD assists SCAG in the implementation of the RTP's clean air goals by funding utilitarian bicycling projects at the local and regional level. The South Pasadena Bicycle Master Plan proposes to implement a bicycle network that will contribute to efforts in reducing emissions harmful to the environment.

Los Angeles County Congestion Management Program (CMP)

The Los Angeles County Congestion Management Program allocates credits and debits in funding eligibility for various transportation improvements. For example, implementation of bicycle facilities would give the City CMP credits as a clean air improvement. These credits could be used to offset other transportation improvements that wouldn't qualify as "clean air" elsewhere in the City.

This South Pasadena Bicycle Master Plan is consistent with the CMP by establishing an implementation plan to establish "clean air" bicycle improvements throughout the City.

Metro Bicycle Transportation Strategic Plan (BTSP)

The Bicycle Transportation Strategic Plan (BTSP), developed by the Los Angeles County Metropolitan Transportation Authority (Metro), assists planning organizations in the identification of bikeways that could eventually provide continuity with bicycling. South Pasadena's Bicycle Master Plan considers regional connections to the greater County-wide network of bikeways as well as a multi-modal connections to the Gold Line and Metro buses.

2.3 CONSISTENCY WITH STATE LEGISLATION

Assembly Bill (AB) 1358: California Complete Streets Act (CCSA)

The California Complete Streets Act of 2008 requires that every jurisdiction promote a balanced and multi-modal transportation network by planning its roads to include all types of users, including bicyclists. South Pasadena's Bicycle Master Plan identifies specifically designated lanes and routes, but in no way does the Plan preclude the remaining street network from being used by bicyclists. The CCSA's goal of creating a balanced and multi-modal transportation network for all users is reflected in the South Pasadena Bicycle Master Plan through its goals (Chapter 3), network recommendations (Chapter 4), and proposed implementation plan (Chapter 7).

Assembly Bill (AB) 32: Global Warming Solutions Act of 2006

The Global Warming Solutions Act establishes a comprehensive program to reduce greenhouse gas emissions from all sources throughout the state. The Act requires the California Air Resources Board (CARB) to reduce California's greenhouse gas emissions to 1990 levels by 2020, representing a 25% reduction statewide, through the implementation of non-motorized transportation plans. The South Pasadena Bicycle Master Plan furthers the Act's goals of reducing greenhouse gas emissions through

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developing a more balanced transportation network.

Senate Bill (SB) 375 Reduce Vehicle Miles Traveled and Emissions

SB 375 enhances California's ability to reach its AB 32 goals by promoting good planning and more sustainable communities. SB 375 requires the California Air Resources Board (CARB) to develop regional greenhouse gas emission reduction targets for passenger vehicles.

For South Pasadena, the Southern California Association of Governments (SCAG) prepares a "sustainable communities strategy (SCS)" that demonstrates how the region will meet its greenhouse gas reduction target through integrated land use, housing and transportation planning, of which bicycle planning is a critical part. The South Pasadena Bicycle Master Plan furthers SB 375's goal of reducing vehicle miles traveled (VMT) and related emissions and increases the use of non-motorized transportation through the development of bicycle facilities that aim to increase utilitarian and commuter bicycling.

2.4 ADJACENT CITY PLANS

Caltrans requires that a City's Bicycle Master Plan provide connectivity with adjacent jurisdictions wherever possible. These connections further Caltrans' goal of being able to provide a seamless and continuous bikeway network across the region.

Pasadena and Los Angeles Bicycle Master Plans

The South Pasadena Bicycle Master Plan provides continuity with the bicycle planning efforts in the neighboring cities of Pasadena and Los Angeles. The Bicycle Master Plans of these two neighboring cities include local and regional connections to South Pasadena.

The following proposed bikeways designated as Class II or III are currently planned to connect with South Pasadena's bikeway network:

Table 2.3 Adjacent Jurisdiction Bikeway Continuity

Pasadena Bicycle Master Plan	Los Angeles Bicycle Master Plan
Arroyo Drive	San Pascual Avenue
Orange Grove Boulevard	York Boulevard
Pasadena Avenue	Monterey Road
	Avenue 60
	Collis Avenue
	Huntington Drive

The cities of San Marino and Alhambra do not have bicycle master plan documents, as of the date of this South Pasadena Bicycle Master Plan document.

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CHAPTER 3
GOALS, OBJECTIVES AND POLICIES

3.0 GOALS, OBJECTIVES AND POLICIES OVERVIEW

The goals, objectives and policies are the guiding principles for the South Pasadena Bicycle Master Plan. Goals are established to state the general purpose. Objectives provide more details about the purpose. Policies create action items to support them. Thus, the goals, objectives and policies support the vision of the Bicycle Master Plan, as outlined in Chapter 1 (Introduction).

Bicycle Master Plan Goals:

GOAL I:
Create a citywide bicycle network that includes facilities and amenities that will increase bicycle use commensurate with the average percentage of bicycle riders in the region.

GOAL II:
Encourage bicycling in the community by developing a comprehensive safety and promotion program that supports the bicycle network.

GOAL III:
Develop an implementation component that establishes a process, pursues funding opportunities and creates a maintenance plan.

GOAL IV:
Enhance the multi-modal network of transportation options by integrating bicycling with buses, trains, and park-and-ride lots.

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3.1 GOAL I: BICYCLE NETWORK

Objective 1: Bicycle Network

Develop a comprehensive bicycle network that includes facilities and innovative progressive elements.

Responsible Department: City Manager's Office, Public Works, Community Services, Police Department, Planning and Building

Policies:

a) Create a bicycle network of bicycle corridors, east/west and north/south, throughout the City.
b) Develop a variety bicycle routes, lanes, and paths to serve bicyclists of all levels of experience.
c) Connect the bicycle network to adjacent cities and the region.
d) Ensure that the bicycle network is linked to residential areas and activity centers such as schools, recreation centers, shopping centers, and businesses.
e) Integrate the bicycle network with other transportation systems to encourage multi-modal use.
f) Implement a way finding signage program for the bikeway network to guide bicyclists.
g) Include technologies, such as bicycle actuation at intersections, that improve the effectiveness of the bicycle network.
h) Implement innovative pavement markings and treatments, such as green lanes, sharrows and bicycle boxes, as part of the bicycle network.
i) Acquire or obtain land easements, such as utility and/or railroad rights-of-way, for bicycle facilities to expand the bicycle network.



Long Beach Green Lane

Objective 2: Bicycle Amenities

Provide bicycle amenities, such as bicycle parking and other support facilities.

Responsible Departments: Public Works, Community Services

Policies

a) Provide public bicycle parking (bike racks and bike lockers) and storage facilities (clothing lockers) at municipal buildings, schools, recreational centers, and public parking lots.
b) Install bicycle parking within the public right-of-way, especially in commercial areas.
c) Require that bicycle parking (bike racks and bike lockers) and storage facilities

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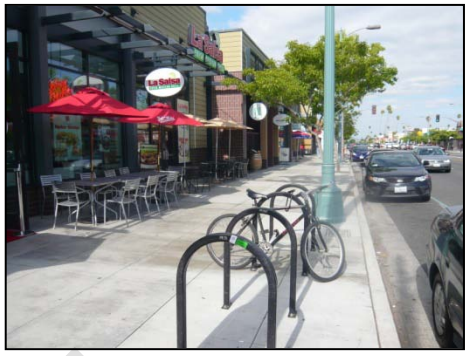
(clothing lockers) be provided in new development projects, including multi-family housing, retail, and commercial locations.

d) Provide attended parking services, such as a bicycle valet, at major City events, Farmer's Market, holiday festivals, and other community events.

e) Ensure that there is adequate bicycle parking at the Gold Line Station.

f) Install bicycle racks on buses.

g) Require other amenity facilities, such as showers, and equipment/clothing storage, for new land use development, changes in land use, building additions, and intensification of use.



Bicycle Parking on sidewalks in Pasadena

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3.2 GOAL II: BICYCLE SAFETY AND PROMOTION

Objective 1: Bicycle Safety Education

Promote bicycle safety through education, resource guides, events and law enforcement.

Responsible Departments: Police Department, Community Services

Policies

a) Promote bicycle safety education at schools, community events, the library, and recreation programs.
b) Publish a bicycle resource guide that would include a bikeway map, safety tips, rules of the road, and bicycling techniques.
c) Involve the Police Department's bicycle fleet to promote bicycle safety through programs such as helmet safety day and bicycle licensing.
d) Enforce the vehicle codes that pertain to bicycle safety.

Objective 2: Bicycle Promotion

Promote bicycling in the community through a public awareness campaign, media communications, and other incentives.

Responsible Departments: Public Works, Police Department, Community Services, Planning and Building

Policies

a) Develop a city-wide bicycle awareness program that promotes bicycling in schools, community events, and in recreational programs.
b) Involve civic clubs and organizations in the public awareness campaign by co-sponsoring events with the City.
c) Participate in local, regional, and State bicycle campaigns such as Bike to Work Week, Safe Routes to School, and Rideshare Week.
d) Encourage the Chamber of Commerce and the business community to promote bicycling in commercial areas to stimulate economic vitality.
e) Promote new projects such as bicycle lanes, way finding signage, through publications and events.
f) Feature bicycling updates on the City's website and other communications media.
g) Require new developments to implement an incentive program to encourage the use of bicycling.



Bicycle Fair (Claremont)

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3.3 GOAL III: BICYCLE IMPLEMENTATION

Objective 1: Process of Implementation

Establish a process that identifies responsibilities within each City department to implement the Bicycle Master Plan.

Department Responsibilities:

- Set a schedule based upon priorities – Public Works
- Secure funding – City Manager's Office, Public Works
- Public Outreach – City Manager's Office, Community Services, Police, Public Library, City Clerk
- Programs and events – Community Services, Police
- New development – Planning and Building
- Maintenance – Public Works
- Funding and purchase of bike racks and bike lockers – City Manager's Office, Public Works
- Installation of project elements (signage, striping, stencils, drainage grates) – Public Works

Policies

a) Designate that a coordinator within each City department be responsible for implementing the bicycle plan.
b) Establish a review process in the City, led by Public Works, to ensure that bicycle projects are properly implemented.
c) Update City ordinances and the zoning code for bicycle planning that includes bicycle facilities and ancillary accommodations, to be led by Planning and Building.
d) Adopt design guidelines for bicycle facilities and support elements.
e) Update the Bicycle Master Plan every 5 years to maintain compliance with Caltrans Bicycle Transportation Account (BTA) funding eligibility.

Objective 2: Bicycle Project Funding

Actively pursue funding opportunities for bicycle facilities and programs.

Responsible Departments: City Manager's Office, Public Works, Finance

Policies

a) Allocate City funds and other revenue sources specifically for bicycle projects.
b) Seek funding opportunities for grants in transportation, health, clean air, safe schools, and other resources.
c) Prioritize projects to maximize funding eligibility in grant applications.
d) Prepare projects in accordance with State and Federal guidelines to ensure funding eligibility.

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e) Plan the capital improvement program (CIP) budget to include bicycle facility projects and improvements wherever possible.
f) Consider an assessment for new developments to set aside funds for bicycle projects.
g) Coordinate with neighboring cities to jointly apply for grant funding for inter-jurisdictional projects where opportunities allow.
h) Collect bicycle counts on a regular basis to measure bicycle use, which can be included as part of funding grant applications.

Objective 3: Bikeway Maintenance

Develop a maintenance plan to ensure implementation of the bicycle projects.

Responsible Department: City Manager's Office, Public Works

Policies

a) Develop a review process where all capital improvement projects consider bicycle accommodations, such as road widening opportunities or restriping.
b) Implement a pavement surface management program to maintain street pavement in a condition suitable for bicycles.
c) Develop a maintenance program to maintain bicycle facility markings in good condition.
d) Ensure that bicycle and way finding signage is maintained and replaced when needed.

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3.4 GOAL IV: MULTI-MODAL INTEGRATION

Objective 1: Multi-Modal Connectivity

Improve opportunities for multi-modal trip-making linking bicycling with buses, trains and, park-and-ride lots.

Responsible Departments/Agencies: Public Works, Los Angeles County Metro

Policies

a) Ensure that the bicycle network is connected to the Gold Line through bicycle facilities such as lanes and routes.
b) Continue to maintain bicycle access at Gold Line entrances.
c) Improve bicycle parking (bike, racks) and/or bicycle storage (bike lockers) and consider the installation of a bike station at the Gold Line station.
d) Seek opportunities to make bicycle improvements on the City buses, such as installation of bicycle racks.
e) Improve bicycle parking (bike, racks) and/or bicycle storage (bike lockers) at public parking lots to encourage the bicycle connection with cars.
f) Promote the bicycle connections to the buses, trains and parking lots through the public awareness campaign.



Gold Line Multi-Modalism

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CHAPTER 4
BICYCLE NETWORK

4.0 BICYCLE NETWORK OVERVIEW

This Chapter evaluates the existing conditions and needs of bicyclists and makes specific recommendations for the planning and building of a comprehensive bicycle network.

The bicycle network connects people to places, such as City Hall, Metro Gold Line, shops, parks, and offices. It is intended to create a bicycle network for residents, businesses, and visitors of all skill levels.

The network is made up of bicycle facilities as well as support facilities such as bicycle parking (racks and lockers) and amenities, defined as clothing lockers, changing areas, and shower facilities. The Bicycle Master Plan Update recommends specific bicycle facilities, including routes, lanes, and paths. It also suggests amenities for parking and changing facilities.

In addition, there are suggestions for City ordinance changes to support the bicycle network.

4.1 TYPES OF BICYCLISTS

It is important to consider bicyclists of all skill levels and interests in creating a bicycle plan.

There are three general categories of bicycle skill types, according to the Federal Highway Administration (FHWA). These include advanced or experienced riders, basic or less confident riders, and children. Each of these types of bicycle riders possesses a different skill level.

The skill level often determines where a bicyclist is most comfortable riding. Some bicyclists with more experience prefer a direct route on an arterial roadway while a less experienced bicyclist may prefer a route on a local or residential street.

In addition to skill levels, there are different levels of interest in bicycling. The typical categories are for recreational and commuter bicyclists. There is a growing group of working bicyclists, such as law enforcement bicycle

"Most adult riders are less confident and prefer to use roadways with a more comfortable amount of operating space, perhaps with designated space for bicyclists"

AASHTO Guide 1999

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patrols and special event patrols.

Recreational bicycling is done for enjoyment. It may involve a family ride to a park, a bicycle club ride, or friends riding to meet for lunch. Typical bicycle destinations include parks, local retail, and community centers.

Commuter bicyclists use their bicycle as a means of transportation to get to work or school. Destinations for commuters are employment centers and schools. Multi-modal trip-making is often associated with commuter bicycling.

Working bicyclists are people who use a bicycle to conduct their business. There is a growing number of law enforcement agencies, including in South Pasadena, with officers on bicycle patrols. These bicyclists need access to all parts of the city, including neighborhoods and commercial areas.

4.2 CURRENT AND POTENTIAL COMMUTER BICYCLING

The Caltrans Bicycle Transportation Account (BTA) requires that the current number of bicycle commuters is determined and an estimated increase in that number would result from implementation of the Bicycle Master Plan.

The data used to determine such estimations were obtained from the U.S. Census American FactFinder's 2005-2009 databases.

According to the U.S. Census (2009), 79% of South Pasadena city workers drove to work alone in 2005-2009, 9% carpooled, 4% took public transportation, and 4% used other means, including bicycling.

The national average number of bicycle commuters has increased from 0.4% to 6%, according to the American Community Survey by the U.S. Census Bureau (2009). South Pasadena is within the range of bicycling commuters with approximately 0.4% of its working population commuting by bicycle.

Table 4.1 shows the results of the estimated number of commuters who could potentially be attracted to bicycling for shorter commutes if a bicycle program is fully implemented.

Table 4.1 Current and Potential Bicycling

City population	25,881	people
Working population	12,585	people
Workers currently bicycling	50	people
Workers currently driving alone	9,879	people
Census average commute time of all commuters	28.1	minutes
Bicycle commute distance for 28.1 minutes at 10mph	4.7	miles
Drive commute time of 4.7 miles at 25mph	11.2	minutes
Census drive-alone commute times less than 10 minutes	978	people
Potential number of new bicycle commuters	978	people

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The total number of bicycle commuters could conceivably be increased by 978, to a total of 1028 bicyclists. This is based on the fact that a commute which is less than 10 minutes and/or less than 5 miles is an ideal bicycle commute. So, a commuter under both of those conditions, miles and time, could potentially commute by bicycle. The South Pasadena Bicycle Master Plan, once fully implemented, is expected to increase the bicycle commute mode share from 0.4% to 8%.

4.3 BICYCLE FACILITIES

Bikeways are part of the roadway network. Official bicycle facility definitions are established by Caltrans. These include a Class I Bicycle Path, Class II Bicycle Lane, and Class III Bicycle Route.

Class I Bike Paths

A Class I Bikeway facility is designed specifically for bicycles and is a paved right-of-way separated from a street or highway providing a dedicated area for bicycle travel. It is often located along waterways (Arroyo Seco), utility corridors (Southern California Edison), or at the beach (Santa Monica). Paths are often shared with pedestrians unless specifically prohibited.



Bike Path along Ballona Creek

Class II Bike Lanes

A Class II Bikeway facility is a lane striped and stenciled on the pavement of a roadway that is for the preferential use of bicyclists. It is most often located to the right of through travel lanes on streets and roadways that are not limited-access (such as freeways). Bike lane striping and pavement markings are intended to promote an orderly flow of traffic by establishing specific lines of demarcation between roadway space reserved for bicycles and lanes to be occupied by motor vehicles.



Bike Lane on Marengo Avenue

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Class III Bicycle Routes

A Class III Bikeway facility is a shared facility, either with motor vehicles on the street or with pedestrians on sidewalks. They are established along preferred cycling routes not served by Class I or II bikeways. The term "preferred" is used here as a route that is of particular importance for bicycling where a Class I or II is not feasible. Class III Bike Routes often connect discontinuous segments of bikeway (typically bike lanes).



Bike Route in Pasadena

Special Roadway Markings

Special markings are often used with bicycle facilities. In particular, Class III Bicycle Routes may be enhanced with shared roadway markings (sharrows) or green lanes. More detailed information and references are provided in Chapter 8 (Design Guidelines).

Sharrows

Shared roadway markings, commonly known as sharrows, are intended to delineate where cars and bicycles share the travel lane. The sharrow marking indicates the proper position for cyclists to ride for ease of travel as well as to avoid obstructions such as unexpected car door openings. It also shows drivers where a bicycle can legally ride within the lane. A sharrow is often used along a Class III Bicycle Route that has been designated as part of a larger bicycle network.



Sharrow in Venice

Green Lanes

Green colored pavement may be used along a lane to enhance the conspicuity of a Class III bicycle route. These are often referred to as "green lanes" which highlight areas where bicycle and cars may share the road. The green lane is paired with a sharrow marking along bicycle routes where there is not enough width for a designated bicycle lane. The green lane treatment is also a way to raise awareness of bicycling on a particular street, such as along commercial streets.



Green Lane in Long Beach

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Bicycle Box

The bicycle box is an intersection design which creates a designated area for bicyclists to position themselves in front of cars at signalized intersections. It is intended to allow bicyclists to wait in a visible location for making a right or left turn. A bicycle box is a painted green box on the pavement accompanied by a white bicycle symbol.



Bike Box in Portland

Signal Detection for Bicycles

Similar to vehicle signal detection, bicycle detection can be placed at signalized intersections. Bicycle signal detection occurs either through the use of push-buttons or by automated means, most often in-pavement induction loops or video. Proper bicycle detection also has a pavement marking and sign, indicating where the bicyclist must be positioned and instructions to accurately detect bicyclists and provide clear guidance to bicyclists on how to call a green phase for their desired crossing.

4.4 EXISTING BIKEWAY NETWORK

South Pasadena currently has two existing bikeways, totaling 1.3 miles. The two existing bikeways in South Pasadena are illustrated in Map 4.2 and include Class II Bike Lanes on Raymondale Avenue and Marengo Avenue:

- **Raymondale Avenue**
  State Street to Amberwood Drive
  0.1 miles

- **Marengo Avenue**
  Mission Street to Alhambra Road
  1.2 miles



Raymondale Drive



Marengo Avenue

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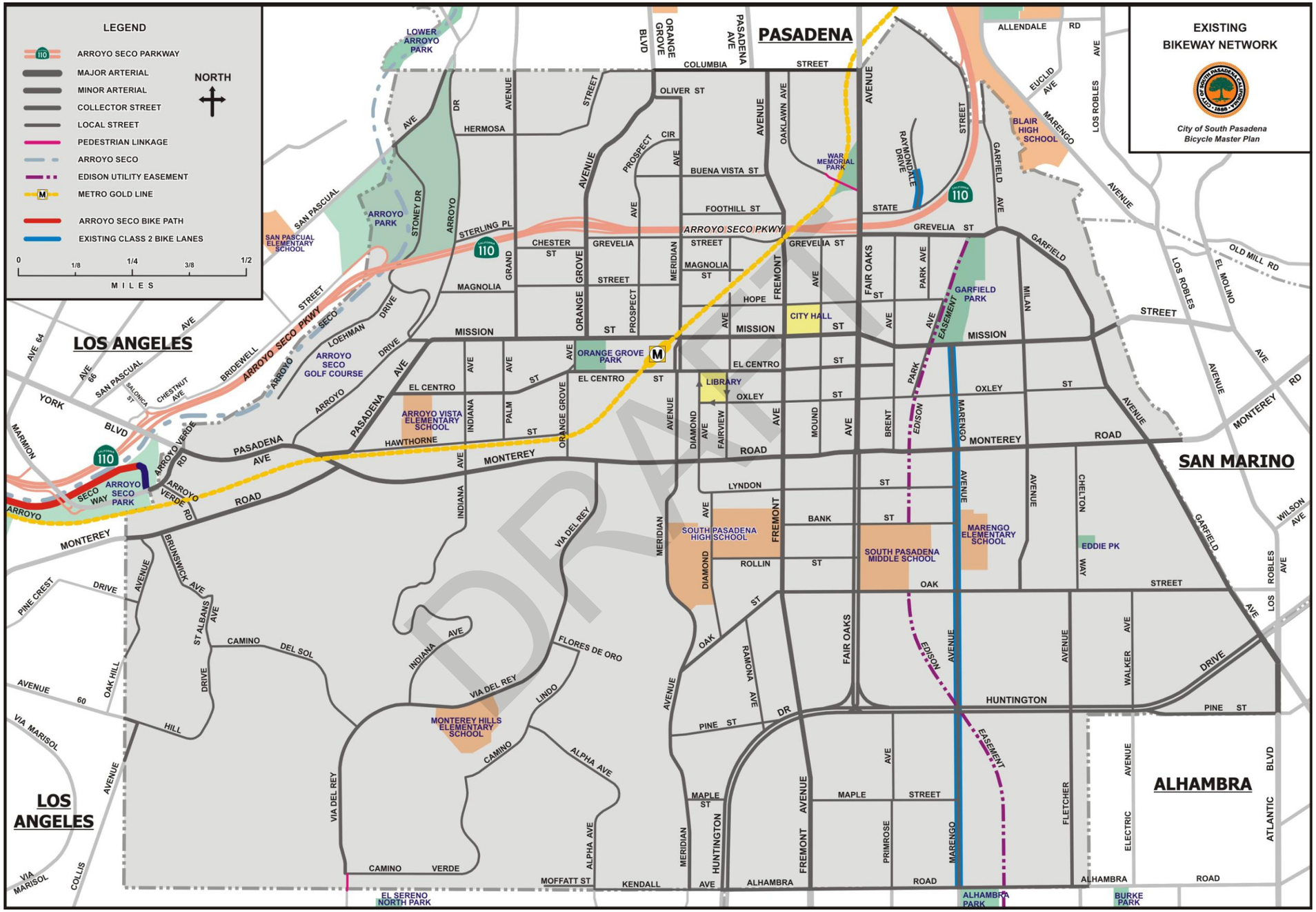
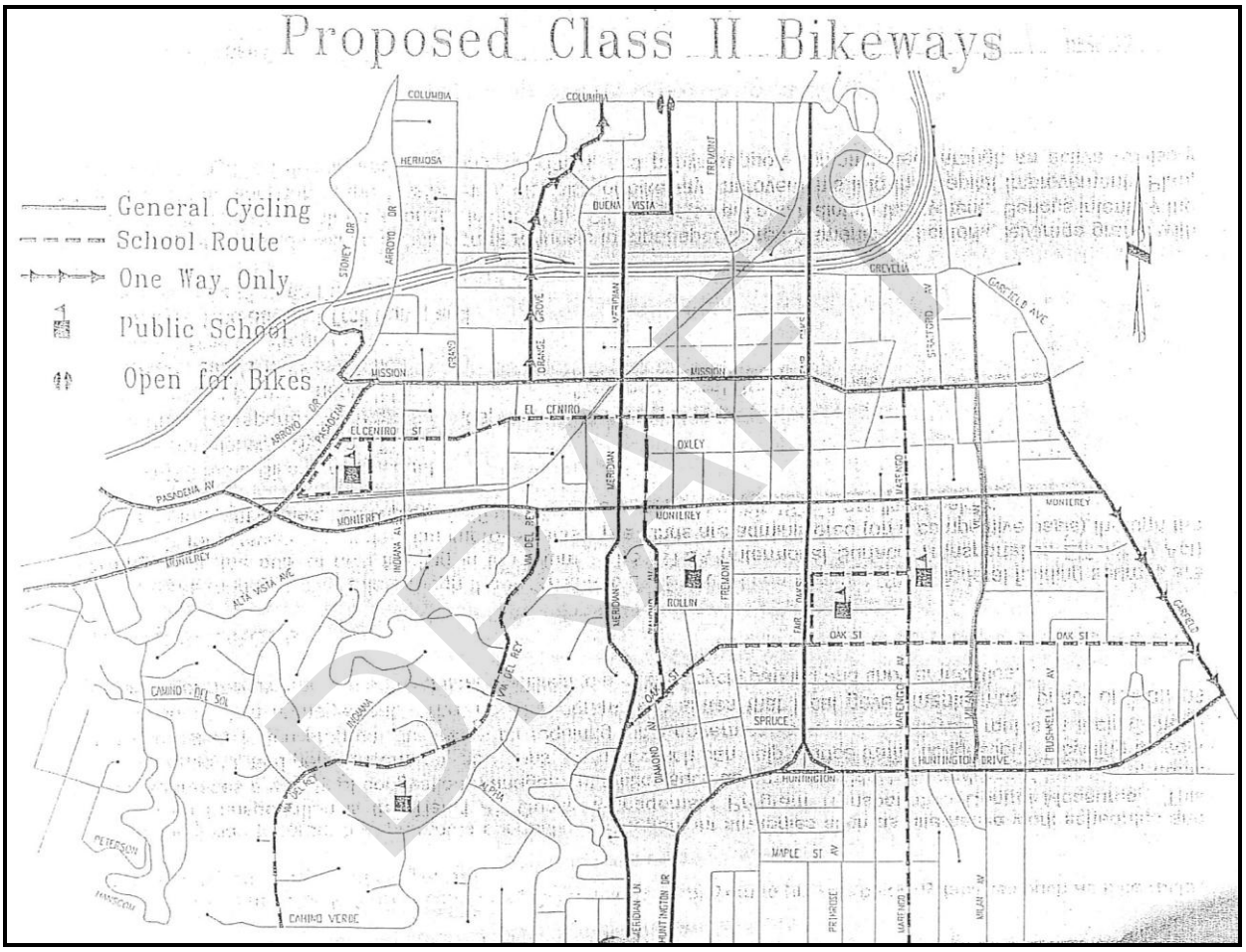
Map 4.1 Existing Bikeways



4.5 ADOPTED 2005 BICYCLE MASTER PLAN BIKEWAYS

The Bicycle Master Plan adopted in 2005 proposed several bikeways. At that time, no bikeways existed in the City. Map 4.2 illustrates the proposed bikeways as presented for adoption by the City Council on February 16, 2005. Of these, only the Class II Bike Lanes on Marengo Avenue have been implemented. This 2011 Update of the Plan includes the 2005 proposed bikeways plus many others to form a complete network.

Map 4.2 2005 Proposed Bikeways



This Chapter describes the Bicycle Plan's proposed bikeways, bicycle facilities, and programs as well as relevant changes to the municipal code.

4.6 2011 PROPOSED BIKEWAYS

This South Pasadena Bicycle Master Plan proposes a comprehensive network of bikeways that serves destinations within the City and provides for local and regional connectivity. A total of 22.8 miles of bicycle facilities are proposed.

The network includes a total of 21 bikeway projects that include 2 miles of Class I Bike Paths, 7.3 miles of Class II Bike Lanes, and 14 miles of Class III Bike Routes. Each project includes segments of roadway combined to produce a viable and continuous project.

The entire bikeway network of existing and proposed bikeways will total 24.1 miles of bike paths, bike lanes and bike routes

The proposed bicycle projects are organized in three tiers for implementation. The project tiers will be implemented in phases as funding becomes available. Tier I projects are intended for implementation in the short term and are presented in more detail in Chapter 7 (Implementation). Tier II projects are considered mid-term and will require further development and detail. And, Tier III projects include the remainder, including the Class I Bike Path projects that will be implemented later in the life of the Plan.

Tables 4.2, 4.3, and 4.4 present the list of individual projects, their component segments, destinations served, and length in miles. The color shading indicates the bikeway classification of each segment as defined below.

- **Red: Class I Bike Paths**
- **Blue: Class II Bike Lanes**
- **Green: Class III Bike Routes**

Map 4.4 illustrates the City's complete bikeway network including existing and proposed bikeways.

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Table 4.2 Proposed Tier I Bikeways (13.7 miles)

Project	Project Name	Destinations	Class	Project Segments			Segment Mileage	Project Mileage
				Street	From	To		
1	**Pasadena/Mission**	Arroyo Seco Stables, Arroyo Vista Elementary, Orange Grove Park, Gold Line Station, Farmers' Market, Mission Street Commercial District, Fair Oaks Commercial District, Garfield Park	**2**	**Marmion Way**	West City Limit	Arroyo Verde Rd	0.05	2.2
			2	**Arroyo Verde Rd**	Marmion Way	Pasadena Ave	0.05	
			2	**Pasadena Ave**	Arroyo Verde Rd	Monterey Rd	0.3	
			2	**Pasadena Ave**	Monterey Rd	Mission St	0.3	
			2	**Mission St**	Pasadena Ave	Grand Ave	0.2	
			Green Lane	**Mission St**	Grand Ave	Fair Oaks Ave	0.7	
			2	**Mission St**	Fair Oaks Ave	East City Limit	0.6	
2	**Fair Oaks**	Fair Oaks Commercial District	**2**	**Fair Oaks Ave**	Monterey Rd	Huntington Dr	0.5	1.3
			3	**Fair Oaks Ave**	North City Limit	Monterey Rd	0.8	
3	**El Centro/Oxley**	Arroyo Vista Elementary, Orange Grove Park, Gold Line Station, Farmers' Market, Public Library	**2**	**El Centro St**	Pasadena Ave	Orange Grove Ave	0.4	1.55
			3	**El Centro St**	Orange Grove Ave	Mound Ave	0.5	
			3	**Mound Ave**	El Centro St	Oxley St	0.05	
			3	**Oxley St**	Mound Ave	Garfield Ave	0.6	
4	**Meridian**	Gold Line Station, Farmers' Market, Mission Street Commercial District, South Pasadena High School	**3**	**Oliver St**	Orange Grove Ave	Meridian Ave	0.05	1.75
			3	**Meridian Ave**	Oliver St	South City Limit	1.7	
5	**Huntington**	Regional Bikeway (Los Angeles, San Marino)	**2**	**Huntington Dr**	South City Limit	East City Limit	1.5	1.5
6	**Fremont**	Post Office, Mission Street Commercial District, South Pasadena High School,	**3**	**Fremont Ave**	North City Limit	South City Limit	1.8	1.8
7	**Oak**	South Pasadena Middle School, YMCA	**3**	**Oak St**	Meridian Ave	Garfield Ave	1.2	1.2
8	**Monterey**	Arroyo Seco Stables, Regional Connection, Crosstown Bikeway, Fair Oaks Commercial Corridor	**2**	**Monterey Rd (west)**	West City Limit	Monterey Rd/Gold Line	0.5	2.4
			3	**Arroyo Verde Rd**	Marmion Wy	Monterey Rd	0.1	
			TBD	**Monterey Rd**	Monterey Rd/Gold Line	Fair Oaks Ave	1.1	
			3	**Monterey Rd**	Fair Oaks Ave	East City Limit	0.7	
9	**Bicycle Parking Program**		**See Page 7.34**					
10	**Bikeway Way Finding Program**		**See Page 7.35**					

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Table 4.3 Proposed Tier II Bikeways (7.0 miles)

Project	Project Name	Destinations	Class	Project Segments			Segment Mileage	Project Mileage
				Street	From	To		
11	**Garfield/Grevelia**	Garfield Park, YMCA	3	**Grevelia St**	Fair Oaks Ave	Clark Ave	0.3	1.35
			3	**Clark Pl**	Grevelia St	Garfield Ave	0.05	
			3	**Garfield Ave**	Clark Pl	Mission St	0.3	
			2	**Garfield Ave**	Mission St	Oak St	0.6	
			3	**Garfield Ave**	Oak St	Huntington Dr	0.1	
12	**Orange Grove**	Orange Grove Park	3	**Orange Grove Ave**	Columbia St	Grevelia St	0.5	0.7
			2	**Orange Grove Ave**	Grevelia St	Mission St	0.2	
13	**Monterey Hills**	Monterey Hills Elementary	3	**Via del Rey**	Monterey Rd	Camino Lindo	1.2	1.2
14	**Bank**	South Pasadena High School, South Pasadena Middle School, Marengo Elementary	3	**Bank St**	Fremont Ave	Marengo Ave	0.4	0.4
15	**Diamond**	Public Library, South Pasadena High School	3	**Fairview Ave (one-way SB)**	El Centro St	Oxley St	0.1	0.75
			3	**Oxley St (one-way WB)**	Diamond Ave	Fairview Ave	0.05	
			3	**Diamond Ave (one-way NB)**	El Centro St	Oxley St	0.1	
			3	**Diamond Ave**	Oxley St	Oak St	0.5	
16	**Stoney/San Pascual**	Arroyo Seco, Arroyo Park, Regional Connection	3	**San Pascual Ave**	West City Limit	North City Limit	0.3	0.9
			3	**Stoney Dr**	San Pascual Ave	Arroyo Dr	0.6	
17	**Arroyo Drive**	Arroyo Park	2	**Arroyo Dr**	Pasadena Ave	North City Limit	1.1	1.1

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Table 4.4 Proposed Tier III Bikeways (2.7 miles)

Project	Project Name	Destinations	Class	Project Segments			Segment Mileage	Project Mileage
				Street	From	To		
18	**Edison Bike Path**	Garfield Park, South Pasadena Middle School	**1**	**Edison Utility Easement**	Grevelia St	Bank St	0.7	1.4
				Edison Utility Easement	Oak St	Huntington Dr	0.3	
				Edison Utility Easement	Huntington Dr	Alhambra Rd	0.4	
19	**Arroyo Seco Trail**	Arroyo Seco, Arroyo Park, Golf Course	**1**	**Arroyo Seco Trail / Path**	Stoney Dr	West city limit	0.6	0.6
20	**State**	Local Bikeway	**3**	**State St**	Fair Oaks Ave	North City Limit	0.6	0.6
N/A	N/A	Los Angeles Connection	**3**	**Avenue 60**	West City Limit	Collis Ave/Hill Dr	0.05	0.05
N/A	N/A	Los Angeles Connection	**3**	**Collis Ave**	West City Limit	Avenue 60/Hill Dr	0.05	0.05

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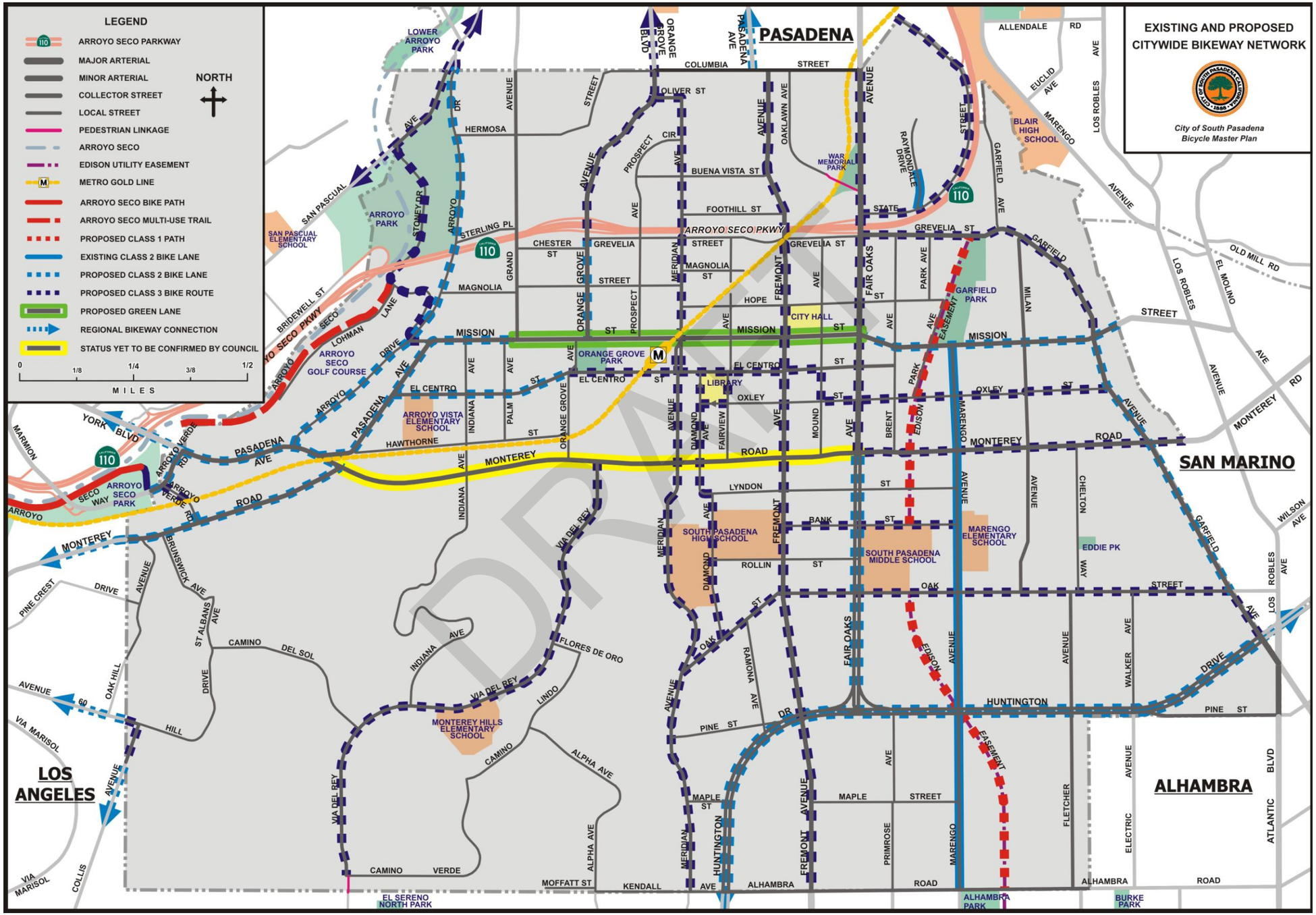
Map 4.3 Existing and Proposed Bikeways



4.7 BICYCLE PARKING

Bicycle parking is an essential component of the City's bicycle network. Just as vehicle users rely on a place to park their vehicles at their destination, bicyclists need to be provided a place to park their mode of transportation. More detailed information regarding bicycle parking is provided in Chapter 8 (Design Guidelines).

There are three types of bicycle parking: racks, lockers and valet.

Bicycle racks are used for short-term or temporary parking, perhaps for a few hours. The racks are placed at destinations, such as shops, parks, and municipal buildings. Details for bicycle rack design, placement, and installation are explained in detail in Chapter 8 (Design Guidelines).

Bicycle lockers are used for long-term parking for all day or overnight use. It is often used at employment centers or to assist in multi-modal connections, such as with the Gold Line.

Valet parking for bicycles is becoming an increasingly popular way to provide secure parking at local events. It operates the same way as a car valet, with a valet service storing the bicycles at a central location. Private valet parking companies as well as the Los Angeles County Bicycle Coalition (LACBC) provide bicycle valet services.

Existing Bicycle Parking

Existing bicycle parking availability is not prevalent, convenient, or reliable at most destinations within the City.

South Pasadena currently has bicycle parking racks at some activity centers, mainly public places. Specific locations include:

- Gold Line station
- Public library
- City Hall
- Local schools



Bicycle Rack at the Gold Line Station

Although the City has not identified existing locations of bicycle parking (bike racks or bike lockers) at places of employment, there may be some bicycle parking located at small business locations.

Bicycle lockers are not found in the City at this time, and there are no bicycle valet services at City events.

Proposed Bicycle Parking

One of the Plan's programs is a citywide bicycle parking program, as discussed in Chapter 5 (Bicycle Safety Programs) that includes bicycle racks, bicycle lockers, and valet services.

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Bicycle parking should be easily accessible, convenient, secure, and reliable. Thus, the program proposes bicycle parking at community destinations, retail areas, places of employment, and in public rights-of-way, such as on sidewalks.

The City may implement a bicycle parking program for municipal and public places. It would install bicycle parking at these locations through a grant project. The City may also apply for a grant to provide bicycle parking for retail areas and private establishments.

Recommended locations for bicycle parking in municipal, public, and some private locations are identified in Table 4.6.

Table 4.5 Proposed Bicycle Parking Locations

Destination	Racks	Lockers
City Hall	Additional Racks	New Lockers
Gold Line Station	Additional Racks	New Lockers
Public Library	Additional Racks	New Lockers
Farmers Market	Additional Racks	
Post Office	Additional Racks	
Parks	Additional and New Racks	
Golf Course (city-leased)	Additional and New Racks	New Lockers
Schools	Additional and New Racks	
Downtown Mission	New Racks	
Fair Oaks Retail	Additional Racks	
Local Businesses	Additional Racks	
YMCA	Additional Racks	
Places of Worship	Additional and New Racks	
San Pascual Stables (city-leased)	New Racks	

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Existing Bicycle Parking Codes

The City of South Pasadena Municipal Code specifies requirements for bicycle use and facilities. It describes where a bicycle may ride, bicycle licenses and bicycle parking. This plan provides recommendations for bicycle parking and amenities to help qualify for Caltrans funding.

The Municipal Code, Chapter 7 Bicycles, Section 7.13 Bicycle Parking Spaces and Racks, authorizes the City Manager to designate and establish bicycle parking spaces as necessary. This section also states that bicycles shall only be parked in "bicycle only" spaces when marked or signed.

Municipal Code, Chapter 19 Motor Vehicles and Traffic, Article VII, Trip Reduction and Travel Demands, discusses requirements for bicycle parking racks and lockers for non residential development based on square footage.

The Zoning Code Division 36.310.100 (Bicycle Parking) provides guidelines for bicycle parking in development for multi family and retail commercial uses based on percentages of vehicle parking required. It also provides specific rack equipment and placement of the equipment.

Proposed Bicycle Parking Codes

The existing municipal and zoning codes requires bicycle parking. However, there are some recommended modifications to these codes:

- Any new development of at least 15,000 square feet should be required to provide bicycle parking (bike racks).
- Bicycle lockers for longer-term parking should be provided at City Hall, the Gold Line Station, and new commercial and office developments of at least 50,000 square feet, or at the discretion of the City Planning and Building Department.
- The equipment and placement of bicycle racks and bicycle lockers is discussed in Chapter 8 (Design Guidelines).

Bicycle Parking signs should be included in the code with specific guidelines for type and placement, as illustrated in the Bicycle Master Plan Design Guidelines.

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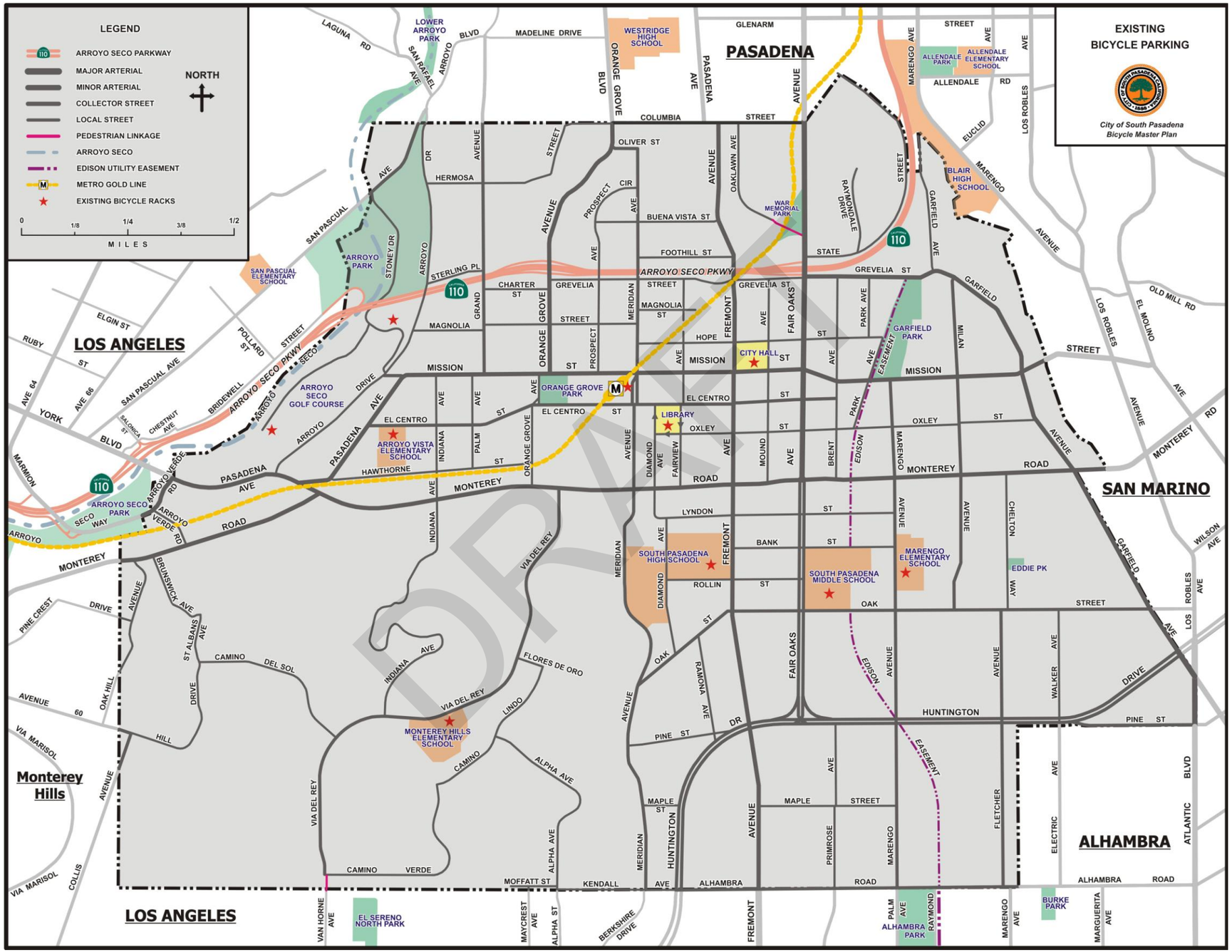
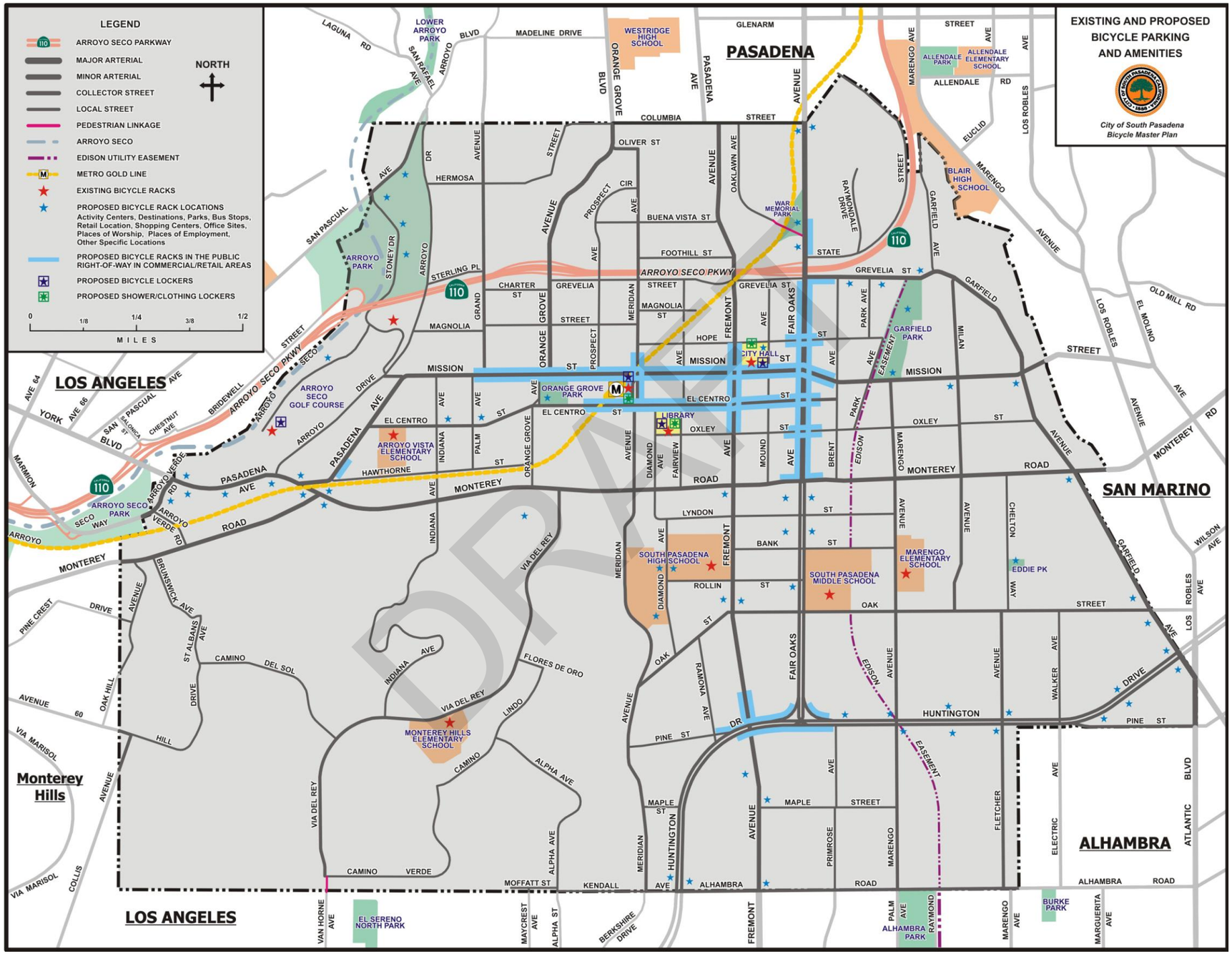
Map 4.4 Existing Bicycle Parking and Amenities



Map 4.5 Proposed Bicycle Parking and Amenities


LEGEND
ARROYO SECO PARKWAY
MAJOR ARTERIAL
MINOR ARTERIAL
COLLECTOR STREET
LOCAL STREET
PEDESTRIAN LINKAGE
ARROYO SECO
EDISON UTILITY EASEMENT
METRO GOLD LINE
EXISTING BICYCLE RACKS
PROPOSED BICYCLE RACK LOCATIONS
Activity Centers, Destinations, Parks, Bus Stops, Retail Location, Shopping Centers, Office Sites, Places of Worship, Places of Employment, Other Specific Locations
PROPOSED BICYCLE RACKS IN THE PUBLIC RIGHT-OF-WAY IN COMMERCIAL/RETAIL AREAS
PROPOSED BICYCLE LOCKERS
PROPOSED SHOWER/CLOTHING LOCKERS
NORTH
0 1/8 1/4 3/8 1/2
MILES
EXISTING AND PROPOSED BICYCLE PARKING AND AMENITIES
City of South Pasadena Bicycle Master Plan
PASADENA
LOS ANGELES
SAN MARINO
ALHAMBRA
Monterey Hills
LOS ANGELES
LOWER ARROYO PARK
WESTRIDGE HIGH SCHOOL
ALLENDALE PARK
ALLENDALE ELEMENTARY SCHOOL
BLAIR HIGH SCHOOL
WAR MEMORIAL PARK
ARROYO PARK
ARROYO SECO GOLF COURSE
ORANGE GROVE PARK
CITY HALL
LIBRARY
GARFIELD PARK
ARROYO VISTA ELEMENTARY SCHOOL
ARROYO SECO PARK
MONTEREY HILLS ELEMENTARY SCHOOL
SOUTH PASADENA HIGH SCHOOL
SOUTH PASADENA MIDDLE SCHOOL
MARENGO ELEMENTARY SCHOOL
EDDIE PK
EL SERENO NORTH PARK
ALHAMBRA PARK
BURKE PARK
ARROYO SECO PKWY
COLUMBIA STREET
MADELINE DRIVE
GLENARM STREET
ALLENDALE RD
OLIVER ST
HERMOSA AVE
BUENA VISTA ST
FOOTHILL ST
STATE ST
GREVELIA ST
STERLING PL
CHARTER ST
MAGNOLIA ST
HOPE ST
MISSION ST
EL CENTRO ST
OXLEY ST
HAWTHORNE ST
LYNDON ST
BANK ST
ROLLIN ST
OAK ST
PINE ST
MAPLE ST
MONTEREY ROAD
ALHAMBRA ROAD
MOFFATT ST
KENDALL AVE
CAMINO VERDE
VIA DEL REY
FLORES DE ORO
CAMINO DEL SOL
ST ALBANS AVE
BRUNSWICK AVE
PINE CREST DRIVE
OAK HILL DRIVE
VIA MARISOL
COLLIS AVE
ARROYO VERDE RD
SECO WAY
YORK BLVD
AVE 64
AVE 66
AVE 60
BRIDEWELL ST
CHESTNUT AVE
SAN PASCUAL AVE
SAN RAFAEL AVE
LAGUNA RD
EUCLID AVE
LOS ROBLES AVE
OLD MILL RD
EL MOLINO AVE
MONTEREY RD
WILSON AVE
ATLANTIC BLVD
MARENGO AVE
FAIR OAKS AVE
FREMONT AVE
MERIDIAN AVE
ORANGE GROVE BLVD
PASADENA AVE
RAYMONDALE DRIVE
OAKLAWN AVE
PROSPECT AVE
GRAND AVE
PARK AVE
MILAN AVE
FAIRVIEW AVE
DIAMOND AVE
MOUND AVE
BRENT AVE
PALM AVE
INDIANA AVE
RAMONA AVE
WALKER AVE
CHELTON WAY
PRIMROSE AVE
FLETCHER AVE
ELECTRIC AVE
MARQUERITA AVE
MAYCREST AVE
ALPHA ST
ALPHA AVE
VAN HORNE AVE
BERKSHIRE DRIVE
RAYMOND AVE
EDISON EASEMENT
HUNTINGTON DRIVE
LINDO AVE
STONEY DR
ARROYO DR
ARROYO
SAN PASCUAL
BALCONIA ST
MARMION WAY
ARROYO SECO PKWY
GARFIELD AVE
LOS ROBLES AVE
MARENGO AVE
ALLENDALE RD
EUCLID AVE
ORANGE GROVE BLVD
PASADENA AVE
FREMONT AVE
MERIDIAN AVE
HUNTINGTON DRIVE
ARROYO SECO PKWY
GARFIELD AVE
MARENGO AVE
LOS ROBLES AVE
OLD MILL RD
MONTEREY RD
WILSON AVE
ATLANTIC BLVD
ALHAMBRA ROAD
MONTEREY ROAD
MISSION ST
FAIR OAKS AVE
FREMONT AVE
MERIDIAN

4.8 BICYCLE AMENITIES

In order to encourage bicycle commuting, bicycle amenities, defined in this Bicycle Master Plan as showers, changing areas and clothing lockers, should be provided. These amenities are especially important to commuter bicyclists who may need to change clothing and store gear at their place of work.

Existing Bicycle Amenities

Currently, no shower and clothing locker facilities available to bicyclists have been identified at City Hall or other municipal locations. Municipal code currently does not require showers, changing areas, or clothing lockers in new development.

Existing Municipal Codes for Bicycle Amenities

There is no municipal or zoning code that reference bicycle amenities, such as showers, changing areas or clothing lockers.

Proposed Bicycle Amenities

Bicycle Amenities should include shower, clothing locker, and changing areas. Recommendations for the location of bicycle amenities include:

Table 4.7 Proposed Bicycle Amenities Locations

Destination	Amenities	Public/Private
Municipal Buildings	Showers, Lockers, Changing	Public
Gold Line Station	Showers, Lockers, Changing	Public
New Development	Showers, Lockers, Changing	Private

Proposed Municipal Codes for Bicycle Amenities

Recommendations for ensuring that bicycle amenities are installed for commuter bicyclists, the City should consider codes that require:

- One shower per gender should be required for commercial development of at least 25,000 square feet.
- One changing area per gender with storage lockers for clothing and gear should be required for commercial development of at least 25,000 square feet.
- A shared-use option for showers and changing areas with clothing lockers is an option. The shared-use may be with an adjacent commercial use or with a public or private establishment, such as the YMCA.

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Other Proposed Municipal Code Changes

The City currently has two sections of the municipal code that address the issue of riding bicycles on sidewalks. The first code is South Pasadena Municipal Code Section 7.12 Bicycles, which states:

> "It is unlawful to ride a bicycle upon any sidewalk in front of any church, school, place of business, or place of public assembly. The rider shall give the right of way to pedestrians in all other sidewalk areas."

It is recommended that the language be modified to be simpler as follows:

> "Bicyclists shall give the right of way to pedestrians when riding on sidewalks. Bicyclists shall walk their bicycle on sidewalks where there is limited space to share comfortably with pedestrians."

The second code is South Pasadena Municipal Code Section 20.42 Wheeled Toys, which states:

> "No person shall operate any bicycle or wheeled toy upon any sidewalk in a business district or adjacent to any place of public assembly. "wheeled toy" includes all wheeled objects regardless of motive power not classified as a bicycle in the vehicle code. Wheeled toy DOES NOT include an electric personal assistive mobility device (Segway)."

It is recommended that the language be modified to remove the words "bicycle or" in the first line as a bicycle is not a wheeled toy. The recommended changes to Section 7.12 above cover the issue that Section 20.42 wishes to address with regard to bicycles (riding on sidewalks).

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4.9 MULTI-MODAL INTEGRATION

Bicycling is an integral part of the City's multi-modal strategy and the Bicycle Master Plan supports the development of this mode and its connections to transit. The Plan ensures that bicycle facilities and amenities support the use of the Metro Gold Line and Metro buses.

There are 3 recommended bikeway projects that provide direct access to the Gold Line station. Access to the station is provided on the north (Mission/Meridian) and south (El Centro) ends of the station. These projects, outlined in Chapter 7 (Implementation) include the following.

- Pasadena/Mission
- El Centro/Oxley
- Meridian

Bicycle parking (bike racks and bike lockers) are recommended as support facilities that will further enhance the multi-modal connection. There will be long-term and short-term bicycle parking available at the station, as recommended in Chapter 7 (Implementation).

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CHAPTER 5
BICYCLE SAFETY PROGRAMS

5.0 BICYCLE SAFTETY PROGRAM OVERVIEW

Safety is a primary concern for those riding bicycles on the roadway network. A safety education component is an integral part of the Bicycle Master Plan and is required for Caltrans approval. This Chapter includes programs that provide bicycle safety education, events, and other campaigns. The programs outlined in this Chapter are examples of programs that can be implemented by the City of South Pasadena.

5.1 EXISTING BICYCLE SAFTETY PROGRAMS

The City of South Pasadena Police Department has a bicycle patrol unit. The City's bicycle patrol unit often leads community safety education events. The City's bicycle patrols have presented a Bike and Walk to School week open house event every October. Children are instructed in bicycle safety and appropriate riding behavior. Attendees can have their bicycles registered and are often provided a bicycle helmet. Due to decreased funding this past year, bicycle helmets were not made available as part of the event.

The Police Department conducts an "Arrive Alive" safety program that is required of teens who receive citations from South Pasadena police officers for violating the rules of the road while on foot, bike, scooter or skateboard. The program is designed to promote road and pedestrian safety among teens. The program was instituted four years ago after a series of accidents involving teen pedestrians on Fair Oaks Avenue near South Pasadena Middle School.

There are no other bicycle education programs, such as Bike to Work Week, currently organized by the City.



Bicycle Rodeo (Claremont)

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5.2 PROPOSED BICYCLE SAFTETY PROGRAMS

There are three primary components of the Bicycle Safety Program: general education, encouragement, and enforcement. These program components teach bicycling skills, encourage bicycling through events and campaigns, and enforce rules of the road. The following are potential programs and events the City of South Pasadena may implement.

Bicycle Safety Education

Department Responsibility – Community Services, Library, Police

There are a variety of activities and literature that can be used to teach bicycle safety to children, adults, and others who use the public right-of-way.

Bicycle Skills

Programs such as Bicycle Rodeos or "Traffic Skills 101" one-day courses use a training course to help people develop bicycle skills, such as proper stopping techniques, turning signals, and other rules of the road. In addition, safety tips and safety inspections are integrated into the course. This program is geared to both children and adults. The League of American Bicyclists and the Los Angeles County Bicycle Coalition (LACBC) offers curriculum and classes.

Bicycle Demonstrations

As part of a school assembly or community event, bicycle safety can be demonstrated by professional bicyclists who perform stunts to engage the audience. The bicyclists interact with the community, showing them bicycle safety tips. These appeal to children and adults. Bicycle Motocross teams can also be hired to perform at these.

Community Bicyclist Speakers

Professional cyclists can be invited to speak about bicycle safety. The speakers may combine a motivational safety speech with a community service component. This is often done for civic groups, girl and boy scouts, senior centers, and other community groups. The U.S. Cycling Federation as well as College Cycling Teams offers these services.

Motorist Education

Motorists can be educated about bicycle laws by explaining the rights of each user on the City's roadways. There should be an educational guide or brochure created with the

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laws as well as safety guidelines. It can be distributed to drivers through the high school, community centers, and local businesses.

Bicycle Signage

A bicycle signage program can be used to educate the community by providing greater visibility to and information about the City's bicycle network. There can be way finding signs that identify different routes or destinations. Other types of signage, such as "Share the Road" signs, can be used to teach motorists and bicyclist the proper use of a travel lane. There may also be literature developed, as part of a bicycle guide, to explain the signage program.

Encouragement

Department Responsibility – City Manager's Office, Community Services, Police

Encouraging people to ride their bicycle is an exciting way to create a safe environment for bicycling. The "Cycle South Pasadena" theme can be the cornerstone of bicycle encouragement. Encourage can consist of communication campaigns, health fairs, special events, and incentive programs.

Communication Campaign

Maintain a webpage, entitled "Cycle South Pasadena" that can be used to communicate the City's bicycle programs and implementation of facilities. It may announce the grand opening of a new bicycle lane, feature a story about a South Pasadena bicyclist, or highlight the latest trends in bicycle safety.

Business District Promotion

A local business promotion may reward bicyclists for riding their bicycle to the commercial district. The entire district, such as Mission Street, may create a themed campaign with posters, flyers, and/or events. Bicyclists may receive discounts or free products. It may be coordinated with the local Chamber of Commerce.



Community Bicycle Ride (Los Angeles)

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Community Rides or Ciclovias

Riding the streets of South Pasadena in a community ride or ciclovia is a positive way to encourage community members to see their City on a bicycle. The ideal bicycle route would traverse through the City, highlighting its parks, commercial areas and neighborhoods. It will also demonstrate the benefits of bicycling in South Pasadena.

Community Events

Bicycling should be integrated into existing community events, such as the Farmers Market, Home Tours, Garden Tours, and the City's Spring Egg Hunt and Health Fairs. Residents and visitors should be encouraged to attend bicycle events through advertisements at the weekly Farmers Market and at other community events. There should be information on these public announcements encouraging people to bicycle to the location. If possible, there could be a bicycle information booth or bicycle expert in attendance.

Regional Events

It is a good opportunity to join with other regional bicycle events. These events may include California Bicycle to Work Week, Countywide Bicycle Ride, and Bike to School. The City may sponsor a bicycling "pit stop", host a safety workshop, or sponsor a similar local event.

Multi-Modal Bicycle Guide

A bicycle and multi-modal guide may be produced. It would include a map of the South Pasadena bicycle network and its connections to other modes of transportation, including the Gold Line and connecting Metro bus lines. It will be important to explain to riders how to use their bicycles on the Gold Line and on racks on Metro buses. In addition, there can be safety tips, sign definitions, and bicycle amenities.

Enforcement

Department Responsibility – Police

Historically, police departments have been involved with educating through enforcement coupled with safety promotions.

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Bicycle Patrol Unit

South Pasadena has a bicycle patrol unit. These patrol officers should be trained in bicycle related laws, so they can enforce them. This may include rules of the road and other safety requirements such as sharing the road rules, bicycle lighting, and helmets for children. Safety campaigns related to these laws can be administered by the patrol unit; bicycle light, safety bell ringers and helmet give-aways.

Speed Limits

Speed enforcement for automobiles along bikeways could be implemented as a way of reducing bicycle accidents. Typically, the City's Police Department enforces the speed limits along bicycle facilities, either by speed trailer or other surveillance. It may be paired with another bicycle safety campaign, such as Bike to School week, to increase awareness of the dangers of speed.

Bicycle License

In accordance with the City's municipal code, bicycle licenses are required to be issued. However, bicycle licensure is rarely enforced and most bicycles go unlicensed. An annual community event for bicycle safety could be held in which bicycle licensing could be done. The process of licensing bicycles adds to the bicycling safety education process and assists the Police Department in recovering stolen bicycles.

5.3 BICYCLE COLLISION ANALYSIS

Bicycle safety is of primary importance for bicyclists. One measure of safety is bicycle collisions. Caltrans BTA requires an analysis of bicycle-related collision data for the most recent available three years. The analysis of bicycle collisions assists the Police Department in enforcing traffic laws in specific areas where bicycles are involved in collisions.

The California Highway Patrol (CHP) keeps collision statistics for jurisdictions throughout California as part of the State's Statewide Integrated Traffic Records System (SWITRS). In addition to SWITRS, the City of South Pasadena's Police Department keeps its own record of traffic collisions as well. The Department's records indicate that 24 collisions involving bicyclists occurred during the period 2007-2009. The vast majority occurred along the 3 busiest arterial roadways in the City: 6 along Fair Oaks Avenue, 6 along Huntington Drive, and 7 along the Pasadena Avenue/Monterey Road corridor.

Map 5.1 illustrates the locations of bicycle-related traffic collisions as reported by the South Pasadena Police Department.

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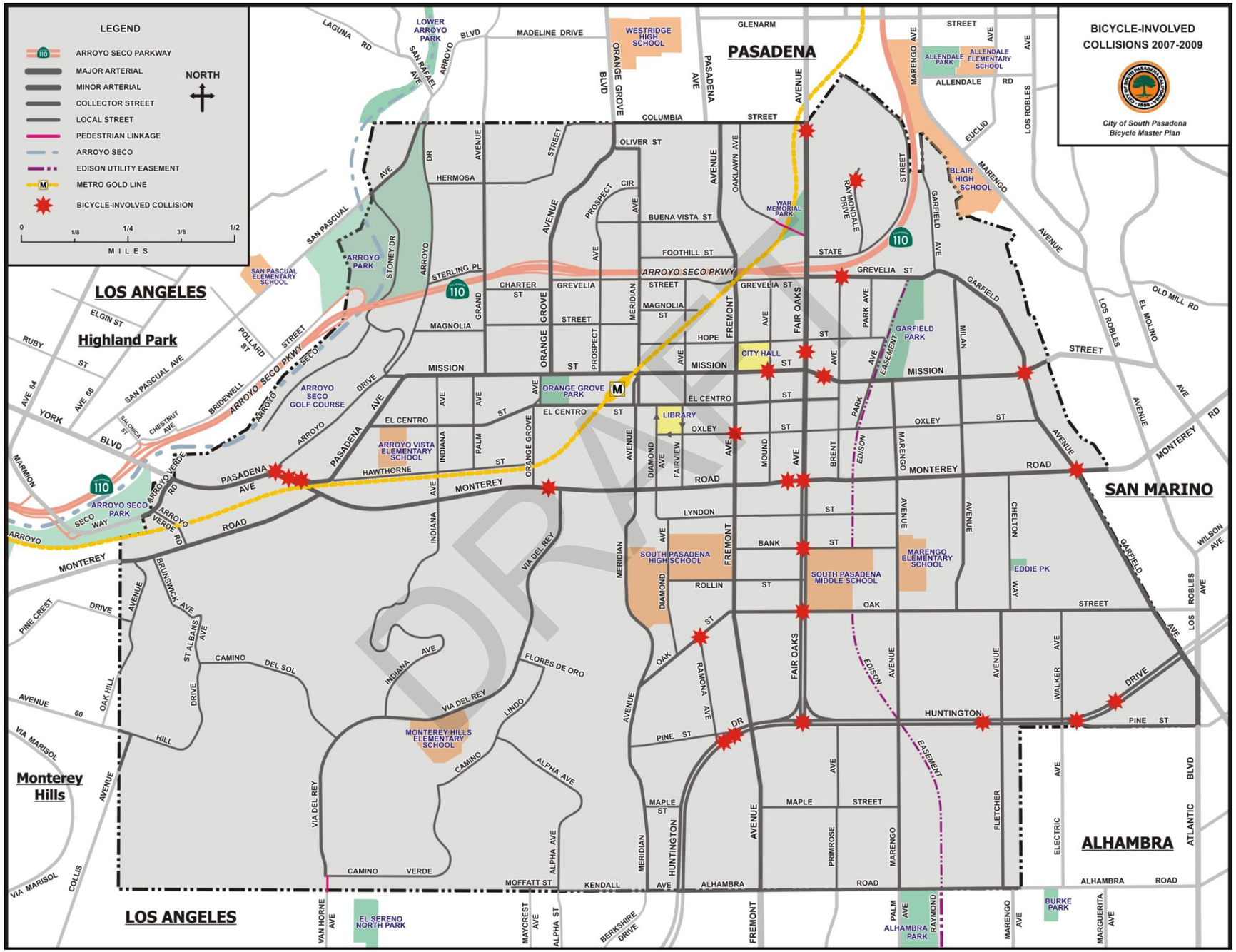
Map 5.1 Reported Police Department Bicycle-Involved Collisions



CHAPTER 6
FUNDING RESOURCES

6.0 FUNDING OVERVIEW

Bicycle Master Plan projects are funded through a variety of local, State, and Federal funding sources. There are few funds dedicated towards bicycle projects, although the majority of the funds are transportation or environmental resources where bicycling may be eligible. A summary of funding resources that are most applicable to South Pasadena is provided as a guide to help implement the Bicycle Master Plan.

In order to be eligible for many of the funding sources, especially Caltrans Bicycle Transportation Account (BTA) funds, the City must have a Bicycle Master Plan approved by Caltrans.

> To be eligible for Bicycle Transportation Account (BTA) funds, a city or county must prepare and adopt a Bicycle Transportation Plan
> *Caltrans*

6.1 FEDERAL FUNDING RESOURCES

Land & Water Conservation Fund (LWCF)

The LWCF program is intended to create and maintain a nationwide legacy of high quality recreational facilities. Specifically, the LWCF program provides matching grants for the acquisition and development of public outdoor recreation areas and facilities. It is administered through the State Department of Parks and Recreation. The LWCF could fund the development of river-adjacent bicycle facilities, for example along the Arroyo Seco.

Federal Safe Routes to School (SRTS) Program

The Federal Safe Routes to School (SRTS) Program was established by Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU) and is implemented by Caltrans. Federal SRTS grants are for bicycling and walking projects that create safe environments for children commuting to school. The funds are appropriated for engineering infrastructure and programming. South Pasadena's bicycle routes that are along school corridors could be eligible for funding under a Federal SRTS grant.

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Transportation Enhancements (TE)

The Federal Highways Administration's Transportation Enhancements (TE) activities are related to surface transportation enhancements, such as bicycle facilities and programs. The programs, "expand transportation choices and enhance the transportation experience," as stated in the TE guidelines. TE funds are distributed through Los Angeles Metro's Call for Projects. Typical projects include bicycle facilities and safety programs. South Pasadena may consider a funded project for the section of the Mission Street Green Lane (Chapter 7, Project 1), which connects the downtown historic retail area of South Pasadena with the Gold Line. Such elements as striping, bicycle parking, and bicycle signage are eligible activities for TE funds.

6.2 STATE FUNDING RESOURCES

Bicycle Transportation Account (BTA)

The State of California Bicycle Transportation Account (BTA) is the most relevant funding program for bicycle projects in California. It is administered through the Caltrans Bicycle Facilities Unit. The primary goal for the BTA is to improve bicycle commuting through local projects. These projects vary from bicycle planning to the installation of bicycle lanes to bicycle parking. The majority of the project is funded through the BTA, with a minimum 10% local match. South Pasadena's Class II bicycle lanes, Class III Bicycle Routes, and Green Lane bikeways are ideal BTA funded projects.

Office of Traffic Safety (OTS) Grant

The California Office of Traffic Safety Grants (OTS) is used to mitigate traffic safety program deficiencies. There is a category entitled, Pedestrian and Bicycle Safety (PS), which includes programs to increase safety and awareness and skills for bicyclists. Typical OTS grants include safety helmet distribution, bicycle rodeos, and safety educational events. South Pasadena could apply for grants to develop their bicycle safety education with eligible programming provided by OTS.

Recreational Trails Program (RTP)

The Recreational Trails Program (RTP), administered through the California Department of Parks and Recreation, provides funds for recreational trails and related projects. Bicycle related projects would fall under the non-motorized category. The Santa Ana Bicycle Trail Gap Closure in Orange County is an example of a project funded through this program . South Pasadena's Arroyo Seco Trail could be partly funded by it as well.

State Safe Routes to School (SR2S) Program

Much like the Federal Safe Routes to School (SRTS) Program, the State's Safe Routes to School (SR2S) program's goals are to, "increase the number of children walking and bicycling to school by making it safer." The difference in the programs is the funding

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source and program requirements, but both are administered by Caltrans. The majority of the State SR2S funds are for infrastructure, with only 10% for programming. South Pasadena may use these funds for intersection crossing improvements and bicycle markings in front of schools.

Transportation Development Act (TDA) Article 3 (SB 821)

Transportation Development Act (TDA) Article 3 funds are distributed by the State of California and administered by Los Angeles Metro for planning and construction of bicycle and pedestrian facilities. The TDA funds for bicycle improvements are available for most phases of a bicycle facility including design, construction, installation as well as signal controls, parking, and multimodal connections. South Pasadena may apply for funds for the design and implementation of the Class II bikeways as well as bicycle amenities such as bicycle parking.

6.3 LOCAL AND REGIONAL FUNDING RESOURCES

Metro Call for Projects (CFP)

As part of the Los Angeles Metro's Transportation Improvement Program (TIP), the Call for Projects (CFP) is a funding program that distributes transportation funds to regionally significant projects. There are eight transportation modal categories which includes Bikeway Improvements, Regional Surface Transportation Improvements (RSTI), Transportation Enhancements (TE) and Transportation Demand Management (TDM). Typical approved Metro Call for Projects include bicycle improvements that are part of a regional connection, have multimodal component, or have a historic significance. An ideal project for South Pasadena may be Mission Street (Chapter 7, Project 1), which has regional connections, multimodal Gold Line connections to rail and buses, and connections to the historic Arroyo Seco.

Assembly Bill (AB) 2766 Subvention Fund (Air Quality)

The South Coast Air Quality Management District (AQMD) allocates a percentage of Assembly Bill 2766 funds from automobile registration to projects that improve air quality. Approximately 40% of the funds are distributed to the cities as discretionary funds which can be used for bicycle projects that result in bicycle riding in lieu of driving alone. Such projects may include bike lane and bike routes. The other 60% is allocated through a competitive grant program for special projects to improve air quality. South Pasadena may utilize AB2766 funds for bicycle enhancements, such as expanding the Police Department's bicycle patrol unit or provide incentives for bicycling as part of a Transportation Demand Management (TDM) Plan.

Proposition C

Proposition C finances Transit Development Programs in Los Angeles County, which is administered through Los Angeles Metro. The funds are often used in a, "category for public transit projects such as street and road improvements that benefit transit, bikeways and congestion management activities", according to the funding guidelines.

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It is a discretionary program which also allocates monies to local jurisdictions. South Pasadena may enhance the multimodal connections between transit and bicycles through Proposition C funds.

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Table 6.1 Summary of Funding Resources for Bicycle Facilities Development

Category	Program	Disbursing Agency	Due Date	Required Match	Additional Information	Potentially Applicable to a South Pasadena Project Refer to Tables 4.2, 4.3, 4.4 and Map 4.3
Federal	**Land & Water Conservation Fund (LWCF)**	State Dept of Parks and Recreation	May	50%, including in-kind	Federal Funds: Projects that acquire and develop recreational trails and other outdoor facilities.	18, 19
	Safe Routes to School Federal (Federal SRTS)	Caltrans	April	--	Federal Funds: Infrastructure improvements for school safety within 2 miles of elementary or middle schools.	3, 4, 6, 7, 13, 14, 15
	Transportation Enhancements (TE)	Metro	January (Odd-numbered years)	20% to 35%	Federal Funds: Projects that expand the viability and effectiveness of bicycle travel.	All Projects and Programs would qualify.
State	**Bicycle Transportation Account (BTA)**	Caltrans	December	minimum 10% for construction	State Funds: Projects that improve the safety, effectiveness, and viability of bicycle commuting.	All Projects and Programs would qualify.
	Office of Traffic Safety (OTS)	Caltrans Office of Traffic Safety (OTS)	January	--	State Funds: Programs that promote bicyclist safety.	Safety programs defined in Chapter 5.
	Recreational Trails Program (RTP)	Metro	October	20%	State Funds: For recreational multi-use or single-use trails, including Class 1 bikeways.	18, 19
	Safe Routes to School (State SR2S)	Caltrans	May	11.5% minimum	State Funds: For the construction of projects that enhance the safety of pedestrians and bicyclists along primary school routes.	3, 4, 6, 7, 13, 14, 15
	Transportation Development Act (TDA) Article 3	Metro	January (Odd-numbered years)	--	State Funds: For the purchase and installation of bicycle parking and end-of-trip bicycle facilities. Also funds the retrofit of existing bicycle facilities for ADA compliance.	9, Safety programs defined in Chapter 5.
Local	**Metro Call for Projects**	Metro	January (Odd-numbered years)	20% to 35%	Federal, State, and Local Funds: Projects that serve regional connectivity or have a multi-modal component.	1, 2, 3, 4, 5, 8, 9, 12, 16
	AB 2766 Subvention Fund	AQMD	March	Varies	Local Funds: Projects that promote the effectiveness and viability of bicycle commuting in lieu of driving alone. Emphasis is on projects that can produce quantifiable results.	1, 3, 4, 9
	Proposition C	Metro Local Return	Ongoing	none	Local Funds: Projects and programs that benefit linkages to transit.	1, 3, 4

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CHAPTER 7
IMPLEMENTATION & PROJECT SHEETS

7.0 IMPLEMENTATION CHAPTER PURPOSE

The purpose of this Chapter is to outline steps that lead to implementation of the 2011 Bicycle Master Plan update. This Chapter provides guidance by:

- Assigning the responsibility of tasks to specific City departments
- Proposing an implementation timeline
- Presenting project rankings (based upon criteria)
- Outlining detailed project descriptions of the recommended Tier I projects proposed in the Plan

Implementation of the Plan is dependent upon the various City departments executing specific tasks as outlined in Table 7.1 below. Implementation of all tasks and aspects of the Plan will lead to:

- A comprehensive interconnected system of bicycle lanes, routes, and paths
- A comprehensive network of bicycle facilities and support amenities
- Citywide way finding signage
- Bicycle safety, education, and awareness programs
- Convenient connections to all areas of the City for local trips
- Convenient connections to buses and the Gold Line
- Bike valet options at special events
- Municipal code regulations requiring bicycle support facilities in new developments
- Clarify City policy regarding riding on the sidewalks

This Chapter has 7 sections. Section 7.1 proposes timelines and department responsibilities for the various tasks that must be completed for implementation of the Plan. For Caltrans purposes, this Plan is a five-year Plan. For the City of South Pasadena, this Plan is a 20-year organic blueprint for the future of bicycling in the City. It provides a solid foundation of infrastructure and programs that can be augmented with additional programs, such as bicycle sharing.

Sections 7.3 and 7.4 contain information necessary for the Plan to be approved by Caltrans.

Section 7.5 is also required by Caltrans and provides detailed project descriptions for Tier I recommended projects allowing the City to apply for funding. Tier I projects are selected as the result of a ranking process that included input from the public, the consultant team, City staff, and the City Council.

There are a total of three Tiers. Tier I projects are defined in Section 7.5 and contain

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project sheets outlining the details of each recommended Tier I project and are recommended for implementation within 1 to 5 years. Tiers II and III are identified in Chapter 4, Section 4.6, and are recommended for implementation in 6-20 years as identified in Section 7.1 below.

Tiers II and III projects do not need to be implemented upon completion of Tier I projects. Tier I, II, and III projects can be implemented independently, concurrently, or in a different order or ranking than is presented in this Chapter. The Tiers are recommendations that provide guidance to ensure that implementation proceeds. The timing of implementation can be adjusted as new information or resources become available. For example, the repaving of a roadway where a bikeway is proposed presents an ideal opportunity to implement the bikeway facility at the same time regardless of its specific ranking in the Plan.

Table 7.1 below presents the tasks required by City department to achieve implementation of the Plan's proposed projects (bikeways and programs). Each task is assigned to one or more departments with a direct reference to the relevant chapter where detailed information about that task can be found. As with the Tiers, individual tasks do not need to be implemented in any sequential order or one at a time.

It is incumbent upon each department to identify, fund, and implement each of its assigned tasks. Each department is also responsible to report to the City Manager or his/her designee on the progress of Plan implementation. This assignment of tasks is intended to ensure full implementation of this 2011 Bicycle Master Plan Update. The tasks in Table 7.1 are not necessarily presented in any order, but fulfillment of all tasks is necessary for the full implementation of the Plan.

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Table 7.1 City Department Responsibilities

Department	Responsibility	Reference
City Manager's Office	Secure Funding	Chapter 6
	Project Prioritization	Chapters 4 and 7
	Coordinate Bike Parking with Metro	Chapters 4, 7, and 8
	Project Status Reporting	
Planning and Building	Secure Funding	Chapter 6
	Municipal Code Implementation	Chapter 4
Public Works	Secure Funding	Chapter 6
	Project Prioritization	Chapters 4 and 7
	Bikeway Striping	Chapters 7 and 8
	Bikeway Signage	Chapters 7 and 8
	Bikeway Stencils	Chapters 7 and 8
	Bikeway Maintenance	Chapter 8
	Bicycle Racks on Sidewalks	Chapters 4, 7, and 8
	Proper Design of all Bicycle Facilities	Chapter 8
Community Services	Secure Funding	Chapter 6
	Bicycle Racks in Other Locations	Chapters 4, 7, and 8
	Bicycle Parking Valet Services	Chapter 5
	Bicycle Lockers	Chapters 4, 7, and 8
	Proper Design of Bicycle Parking	Chapter 8
Police	Secure Funding	Chapter 6
	Safety Programs	Chapter 5
	Modify Bicycle-Related City Ordinances	Chapter 4
	Enforce Bicycle-Related Ordinances	Chapters 4 and 7

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7.1 PLAN IMPLEMENTATION TIMELINE

The strategy for implementing the Bicycle Master Plan includes a recommended three-tier timeline of project development. Bicycle programs, such as Bicycle Parking, Way Finding Signage, and Safety Education, are intended to be ongoing parts of the Plan. Tier I projects are those described in more detail later in this chapter. Tiers II and III are projects that are listed and mapped in Chapter 4 (pages 4.10 to 4.12).

- Tier I: 1-5 years
- Tier II: 6-10 years
- Tier III: 11-20 years

The timeline and priority phasing of the projects is an element of the Plan that is required to be presented to Caltrans. However, the City Council and City Departments may use their discretion as to the ultimate order and ranking of projects within Tiers or across Tiers. Projects may also be combined with each other or implemented concurrently. The implementation of projects can be accelerated as funding becomes available.

Figure 7.1 illustrates the distribution of bikeway project mileage for each Tier as recommended in this Plan.

Figure 7.1 Project Phasing Plan in Bikeway Mileage



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7.2 BICYCLE PROJECT RANKING CRITERIA

Of the 21 proposed bikeways, 8 bicycle facilities and 2 programs have been identified as top priority in the first tier. The priority ranking is based upon the following criteria.

- Activity Centers – Providing linkages to locations of community activity, such as the Public Library, Farmers Market, parks, and the golf course.
- Connectivity – Creating linkages between different bikeways proposed in this Plan. Also, providing linkages to adjacent cities and planned bikeways in their Bicycle Master Plans.
- Safety – Establishing bikeways along roadways with a disproportionately higher incident of bicyclist collisions, and also taking into consideration areas near schools for children's safety.

- Destinations – Providing linkages to specific locations in the City, such as shopping centers, retail areas, City Hall, schools, the YMCA, the Gold Line station, and places of worship.

- Schools – Connecting with schools in the community.

- Transit Connections – Access to the Gold Line station as well as Metro buses promotes multi-modal connectivity and increases regional bicyclist mobility.

- Public Ranking – Members of the community have provided input on the Plan's top priorities. They have done so via attendance at the public workshop, comments delivered to City Hall on comment cards, via the City's website, and personal visits to City Hall.

- Agency Ranking – City of South Pasadena department staff have identified top priorities and their input has been considered in the ranking of projects.

The priority criteria are based upon industry standards, agency direction, and professional expertise. In addition, the local community provided input into the ranking criteria. Taking into account these criteria, Table 7.2 presents the top tier projects in their order of priority for implementation as part of the Bicycle Master Plan, and Map 7.1 illustrates them as well.

In addition to the eight Tier I bikeway projects, there are two programming projects recommended. This includes a bicycle parking program and a way finding signage program.

7.3 PAST EXPENDITURES FOR BICYCLE PROJECTS

The City of South Pasadena implemented one bicycle-related project in 2010. As part of the City's Capital Improvement Project (CIP) resurfacing of Marengo Avenue, the street was newly restriped with Class II Bike Lanes along its entire length in the City (Mission Street to Alhambra Road). The funds used were from the City's General Fund, and the bike lane portion of the project was not a separate effort within the resurfacing project. Total cost of the resurfacing project was $1,045,261, and the striping component was $38,700. The striping cost was for the entire roadway, and the bike lane striping is not broken out from the total project cost.

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7.4 FUTURE BICYCLE PLAN FINANCIAL NEEDS

The City's bikeway network would require a total implementation cost of approximately $5,777,600, with the top priority projects making up $323,600. These costs are based upon most recently available planning-level estimates as found in similar bicycle plans in the Los Angeles area and are presented in Table 7.2. These costs include the planning, design, and construction of all elements of the bikeway, including signage, striping, stencils, and any other components identified in each project.

Table 7.2 Planning-Level Project Cost Assumptions

Class I Bike Path	$2,640,000 / mile
Class II Bike Lane	$28,000 / mile
Class III Bike Route	$20,000 / mile

7.5 PRIORITY PROJECT SHEETS

This section describes each individual project in more detail and includes the following information:

- Map of the project
- Segment composition
- Destinations served
- Primary criteria for priority
- Segment and project length
- Planning-level cost estimate
- Diagram of bikeway treatment where appropriate
- Discussion of special circumstances, if required

The top priority projects are considered the primary bikeway network, while the remaining projects represent the secondary network.

Although the top tier priority projects are ranked in order, the City is under no obligation to follow this particular ranking in the development of individual bikeway projects.

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Table 7.2 Tier I Priority Projects (13.7 miles)

Project	Project Name	Destinations	Class	Project Segments			Segment Mileage	Project Mileage
				Street	From	To		
1	**Pasadena/Mission**	Arroyo Seco Stables, Arroyo Vista Elementary, Orange Grove Park, Gold Line Station, Farmers' Market, Mission Street Commercial District, Fair Oaks Commercial District, Garfield Park	2	**Marmion Way**	West City Limit	Arroyo Verde Rd	0.05	2.2
			2	**Arroyo Verde Rd**	Marmion Way	Pasadena Ave	0.05	
			2	**Pasadena Ave**	Arroyo Verde Rd	Monterey Rd	0.3	
			2	**Pasadena Ave**	Monterey Rd	Mission St	0.3	
			2	**Mission St**	Pasadena Ave	Grand Ave	0.2	
			Green Lane	**Mission St**	Grand Ave	Fair Oaks Ave	0.7	
			2	**Mission St**	Fair Oaks Ave	East City Limit	0.6	
2	**Fair Oaks**	Fair Oaks Commercial District	2	**Fair Oaks Ave**	Monterey Rd	Huntington Dr	0.5	1.3
			3	**Fair Oaks Ave**	North City Limit	Monterey Rd	0.8	
3	**El Centro/Oxley**	Arroyo Vista Elementary, Orange Grove Park, Gold Line Station, Farmers' Market, Public Library	2	**El Centro St**	Pasadena Ave	Orange Grove Ave	0.4	1.55
			3	**El Centro St**	Orange Grove Ave	Mound Ave	0.5	
			3	**Mound Ave**	El Centro St	Oxley St	0.05	
			3	**Oxley St**	Mound Ave	Garfield Ave	0.6	
4	**Meridian**	Gold Line Station, Farmers' Market, Mission Street Commercial District, South Pasadena High School	3	**Oliver St**	Orange Grove Ave	Meridian Ave	0.05	1.75
			3	**Meridian Ave**	Oliver St	South City Limit	1.7	
5	**Huntington**	Regional Bikeway (Los Angeles, San Marino)	2	**Huntington Dr**	South City Limit	East City Limit	1.5	1.5
6	**Fremont**	Post Office, Mission Street Commercial District, South Pasadena High School,	3	**Fremont Ave**	North City Limit	South City Limit	1.8	1.8
7	**Oak**	South Pasadena Middle School, YMCA	3	**Oak St**	Meridian Ave	Garfield Ave	1.2	1.2
8	**Monterey**	Arroyo Seco Stables, Regional Connection, Crosstown Bikeway, Fair Oaks Commercial Corridor	2	**Monterey Rd (west)**	West City Limit	Monterey Rd/Gold Line	0.5	2.4
			3	**Arroyo Verde Rd**	Marmion Wy	Monterey Rd	0.1	
			TBD	**Monterey Rd**	Monterey Rd/Gold Line	Fair Oaks Ave	1.1	
			3	**Monterey Rd**	Fair Oaks Ave	East City Limit	0.7	
9	**Bicycle Parking Program**		**See Chapter 5 and Page 7.34**					
10	**Bicycle Safety Program**		**See Chapter 5**					

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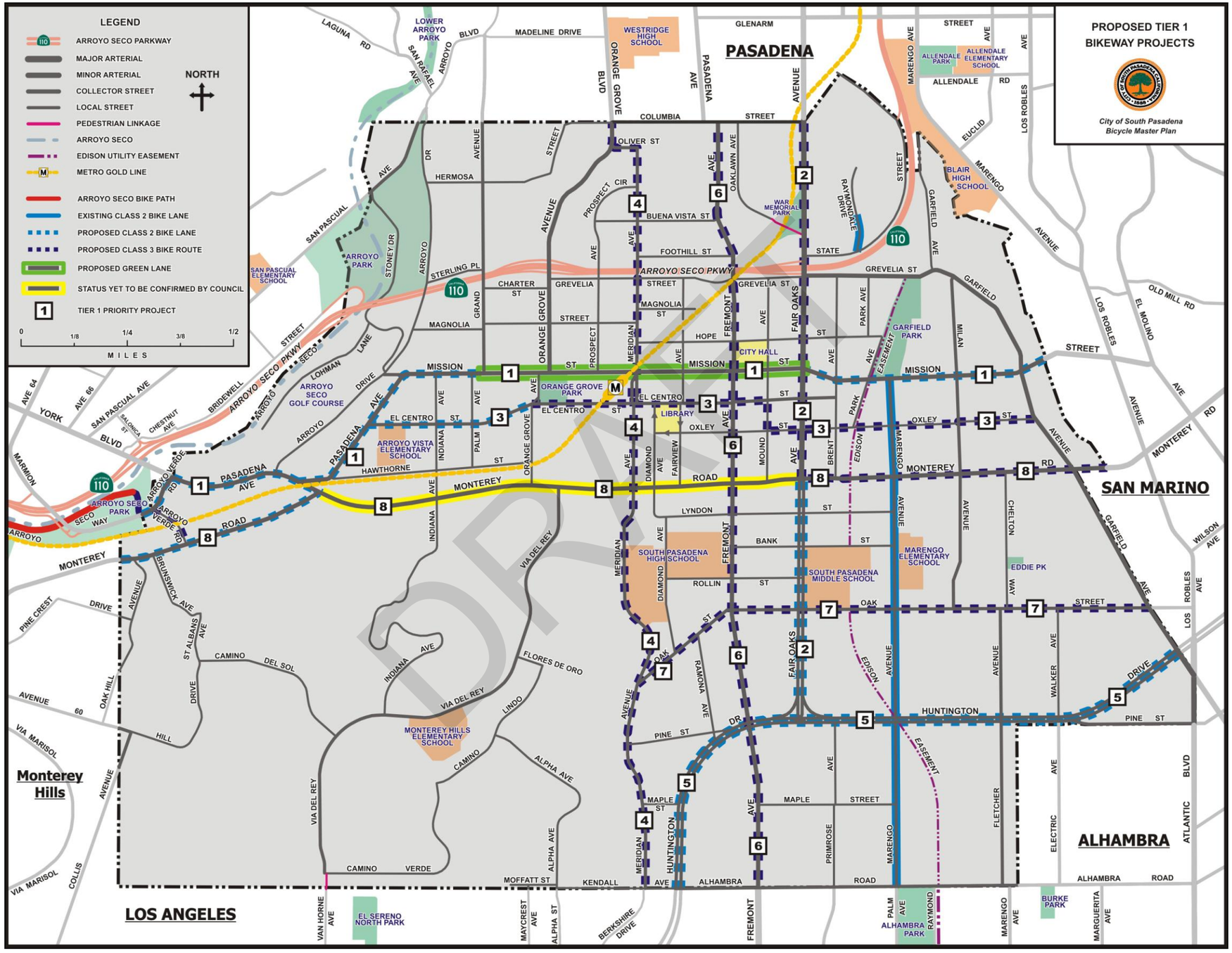
Map 7.1 Tier I Priority Projects



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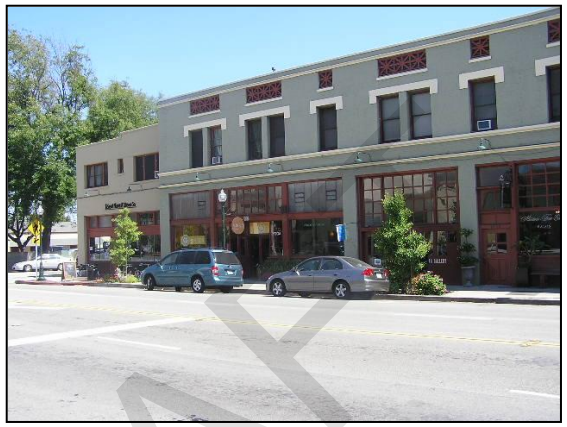
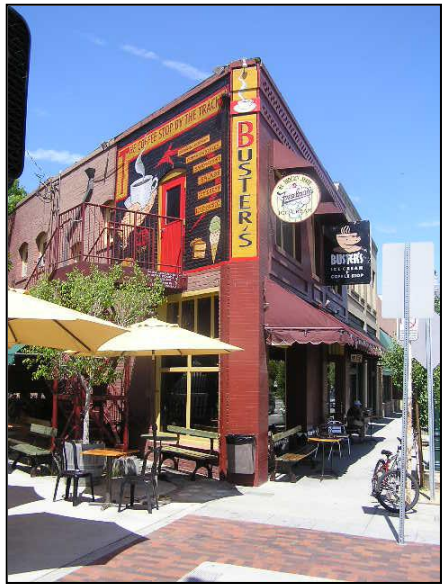
Project 1: Pasadena/Mission Bikeway

Project Description

This Pasadena/Mission Bikeway project spans the City in an east/west alignment from each end of the City limits. It includes Class II and III routes. The primary feature of the bikeway is a Green Lane, along the Class II roadway segment. The Green Lane through this area is intended to provide enhanced visibility for bicyclists in the high-activity Mission Street commercial district. Along the route, there is access to City Hall as a major destination. Orange Grove Park and Garfield Park are along the route for recreation. A multimodal connection can be made at the Gold Line. This corridor is a regional connector to the surrounding cities as well.

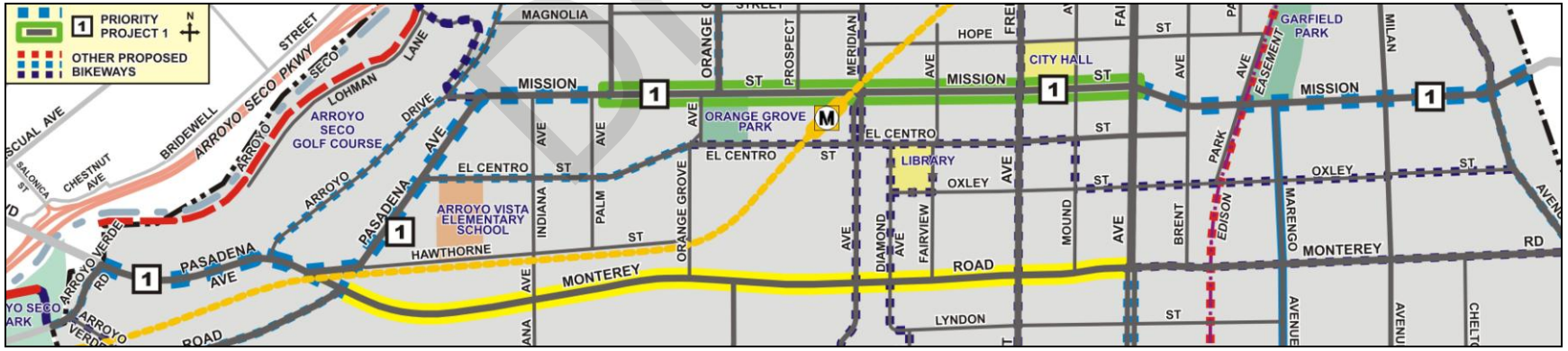


Mission at Diamond



Mission at Meridian

Map 7.2 Pasadena/Mission Project



Project Features

- City East/West Connection
- Regional Connection to Adjacent Cities
- Multimodal Connection to the Gold Line
- Destinations: Farmers Market, City Hall, Mission Retail Area
- Parks and Schools: Garfield Park and Orange Grove Park

Special Roadway Markings

- Green Lane: Mission Street
  Grand Avenue to Fair Oaks Avenue

- Sharrows: Mission Street
  Grand Avenue to Fair Oaks Avenue
  (to accompany the Green Lane)

- Intersections with Bicycle Boxes (12):
  Mission and Orange Grove (one each approach)
  Mission and Meridian (one each approach)
  Mission and Fremont (one each approach)

Street Modifications

- Parking Removal: Pasadena Avenue
  Arroyo Verde Road to Arroyo Drive
  North side of the street only

- Center Turn Lane Replaces 2 Travel Lanes: Pasadena Avenue
  Monterey Road to Grand Avenue

Responsible Departments

- Transportation, Public Works

Project Roadway Segments

Marmion Way
- ❖Class II: West City Limit to Arroyo Verde Road

Arroyo Verde Road
- ❖Class II: Marmion Way to Pasadena Avenue

Pasadena Avenue
- ❖Class II: Arroyo Verde Road to Mission Street

Mission Street
- ❖Class II: Pasadena Avenue to Grand Avenue
- ❖Class III Green Lane Treatment: Grand Avenue to Fair Oaks Avenue
- ❖Class II: Fair Oaks Avenue to East City Limit

Project Length: 2.2 miles
Project Cost $61,600

Primary Priority Criteria:
Activity centers
Connectivity, Destinations
Transit connections
Public and Agency ranking

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Signage

- Class II: Monterey to Huntington
- Class III Green Lane: Grand to Fair Oaks
- Way Finding/Destinations

Related Projects

- Capital Improvement Project (CIP) to resurface the roadway in FY 2011-2012
  Pasadena Avenue: Arroyo Verde Road to Mission Street

Concept Drawings

The following figures provide a conceptual illustration of the lane modifications. The first in each pair is existing and the second is proposed.

Figure 7.2 Pasadena Avenue and Mission Street Bike Lanes
Monterey Road to Grand Avenue

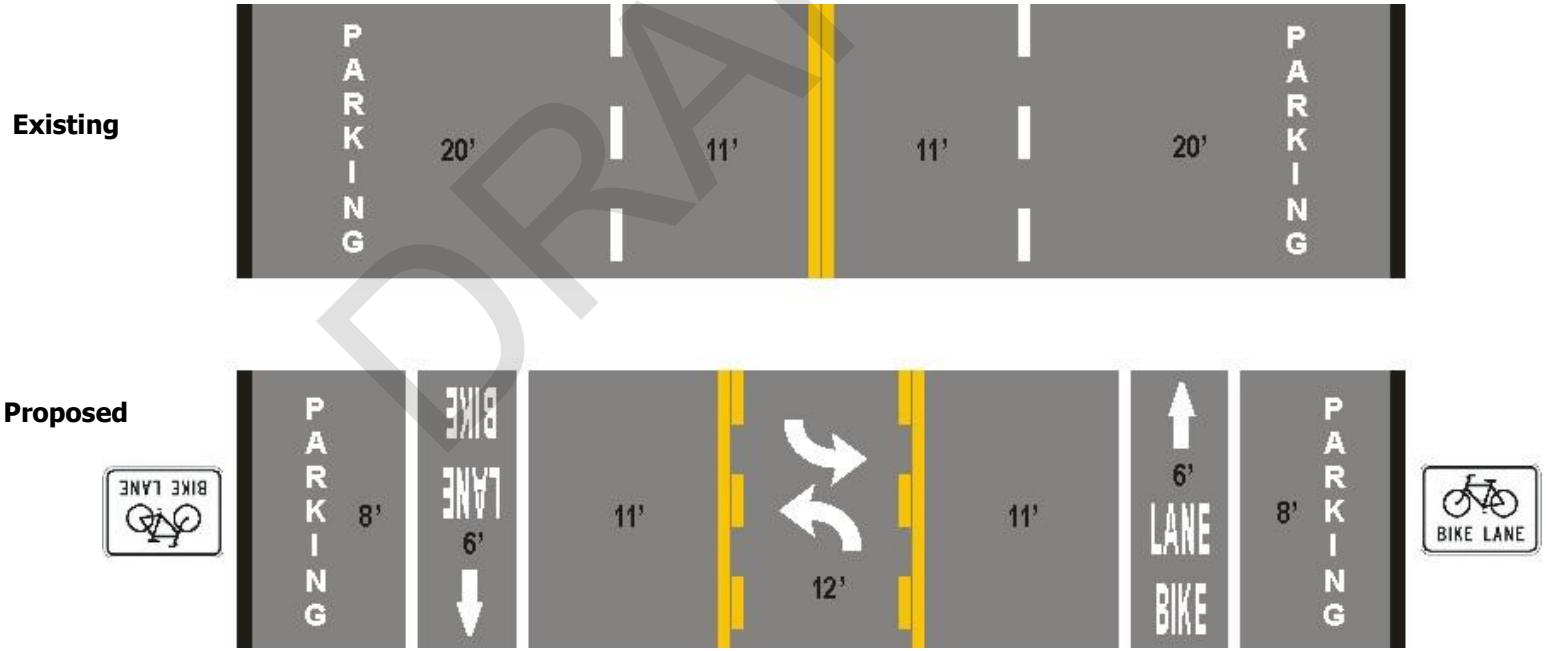

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Figure 7.3 Mission Street Green Lane
Grand Avenue to Fair Oaks Avenue

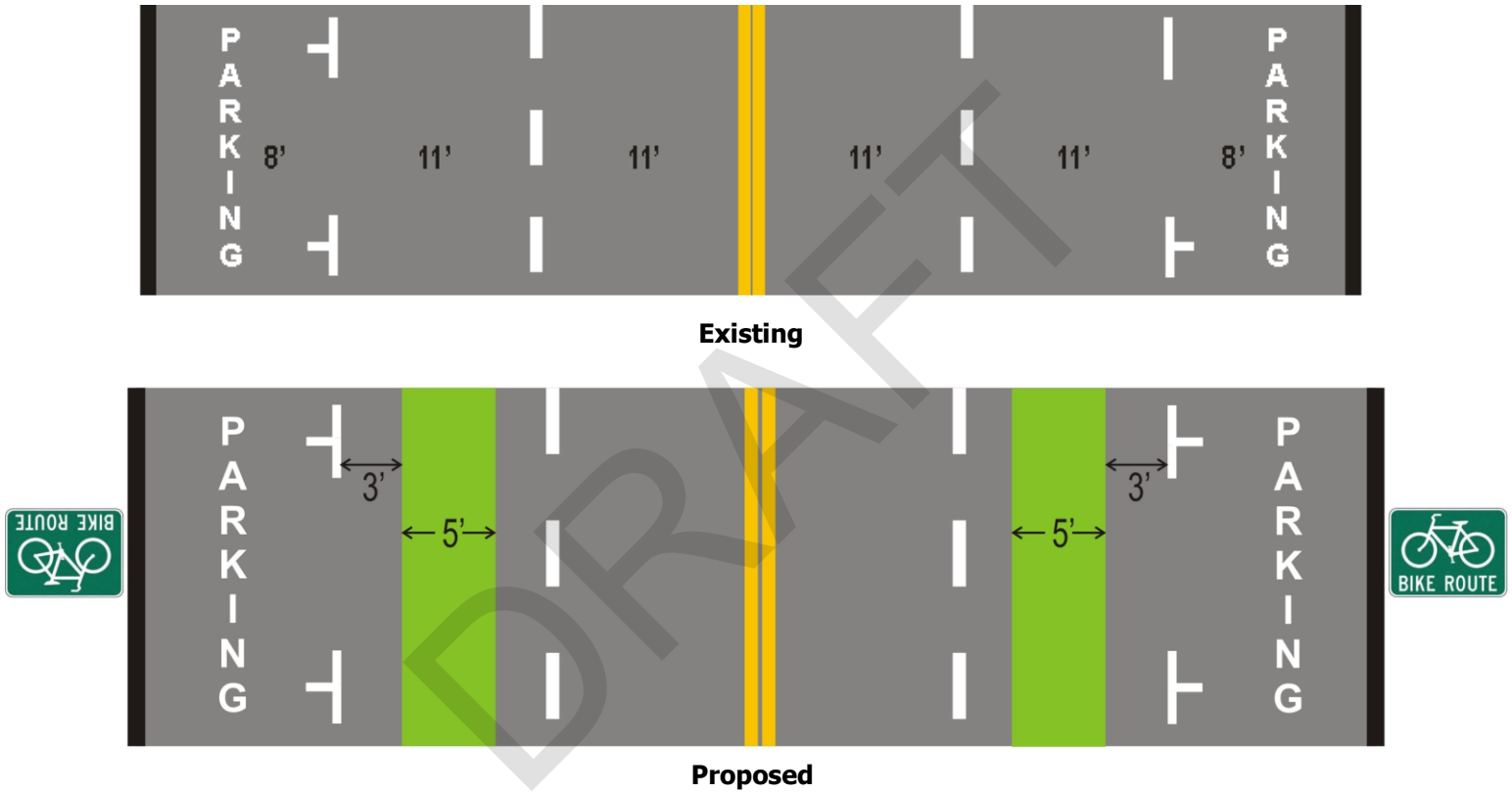

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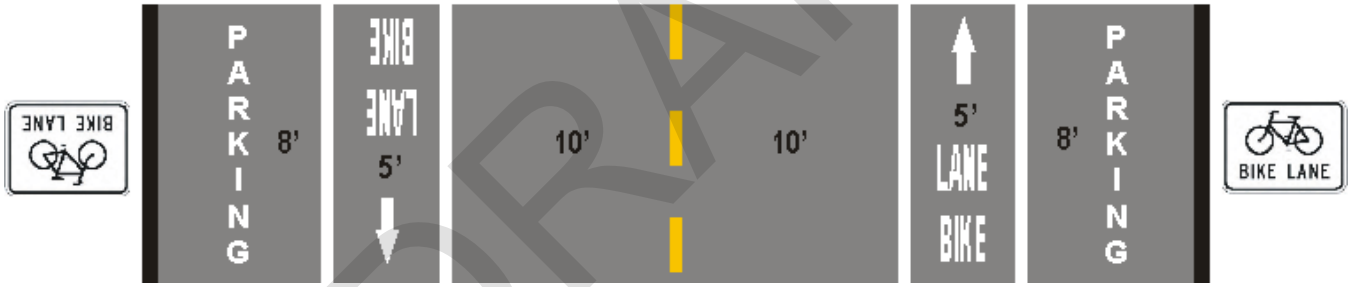
Figure 7.4 Mission Street Bike Lanes
Fair Oaks Avenue to East City Limit



Existing



Proposed

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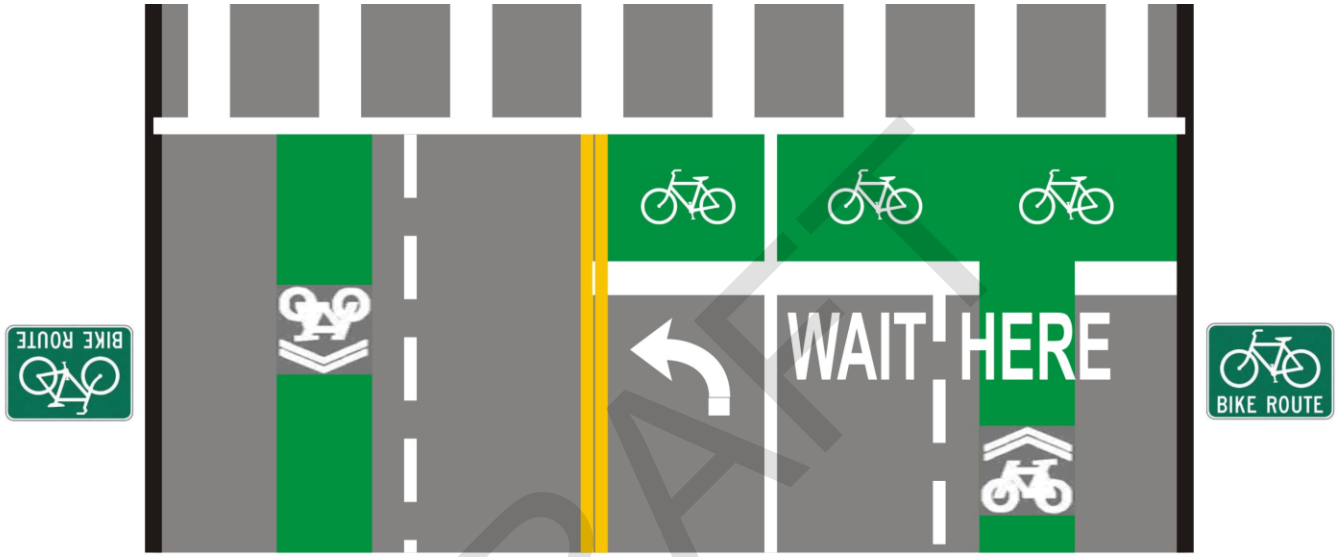
Figure 7.5 Mission Street Bike Boxes at Intersections
Grand Avenue to Fair Oaks Avenue



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Project 2: Fair Oaks Bikeway

Project Description

The Fair Oaks Bikeway project extends from the north city limit to Huntington Drive in a north/south alignment. It contains Class II Bike Lanes between Monterey Road and Huntington Drive, and a Class III Bike Route north of Monterey Road. It traverses a major commercial area. In addition, the South Pasadena Middle School can be accessed on this route. The northern section of the route is a connector to the neighboring City of Pasadena.



Fair Oaks at Mission



Middle School on Fair Oaks

Map 7.3
Fair Oaks Project



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Project Features

- City North/South Connection
- Regional Connection to an Adjacent City (Pasadena)
- Destinations: Retail Centers
- Parks and Schools: South Pasadena Middle School

Project Roadway Segments

Fair Oaks Avenue
- Class III: North City Limit to Monterey Road 0.8 miles

Fair Oaks Avenue
- Class II: Monterey Road to Huntington Drive 0.5 miles

Project Length: 1.3 miles
Project Cost $30,000

Primary Priority Criteria:
Destinations, Connectivity
Safety, Schools
Public and Agency ranking

Special Bicycle Pavement Markings

- Sharrows:
  North City Limit to Monterey Road

- Intersections with Bicycle Boxes (12):
  Fair Oaks and Grevelia (NB, WB approaches)
  Fair Oaks and Hope (NB, SB approaches)
  Fair Oaks and Mission (NB, SB approaches)
  Fair Oaks and El Centro (NB, SB approaches)
  Fair Oaks and Oxley (NB, SB approaches)
  Fair Oaks and Monterey (NB, SB approach)

Street Modification

- From Monterey Road to Huntington Drive:
  Reduce the width of each travel lane from 12 feet to 11 feet, stripe bike lanes

Signage

- Class II: Monterey to Huntington
- Class III: North City Limit to Monterey
- Way Finding/Destinations

Responsible Departments

- Public Works

Special Consideration: Concrete "Gutter" Area

The recently completed Fair Oaks Avenue Street Improvement Project (between the north city limit and Monterey Road) includes a 6-foot wide concrete area between the parking lane (along the curb) and the adjacent traffic lane. Gutters are typically built immediately adjacent to the curb. However, along Fair Oaks the gutter has been built within the 6-foot concrete area. The flow line is where run-off collects and flows downstream (the gutter flow line) is positioned off-center. The flow line is located 1 foot left of the concrete's right edge. The remaining area to the left of the flow line is 5 feet. Please see Figure 7.6.

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Gutter pans are typically 1.5 feet to 2 feet wide on either side of a gutter flow line, and the 6-foot gutter on Fair Oaks is unusual in its design. Three feet of the concrete area could be officially designated as gutter, thus leaving the remaining 3 feet available for travel. The adjacent traffic lane would then be 13 feet wide rather than 10. Although not enough space to provide a striped Class II Bike Lane, a Class III Bike Route with sharrows could be provided. The sharrow stencils would be placed within the 3-foot non-"gutter" concrete area.

Figure 7.6 illustrates the concrete area's dimensions. Figure 7.7 illustrates the adjusted dimensions if the "gutter" is officially defined as 3 feet and the remaining 3 feet is allocated to the adjacent traffic lane. Sharrows would be placed in the concrete area as shown.

Figure 7.6 Fair Oaks Avenue Concrete Area
North City Limit to Monterey Road

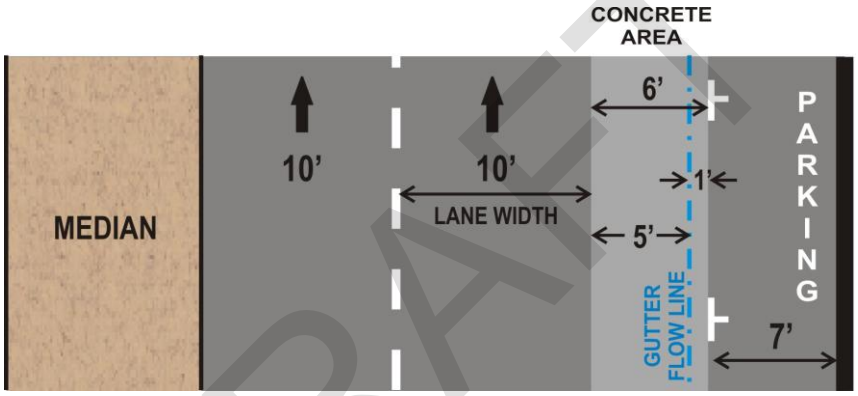
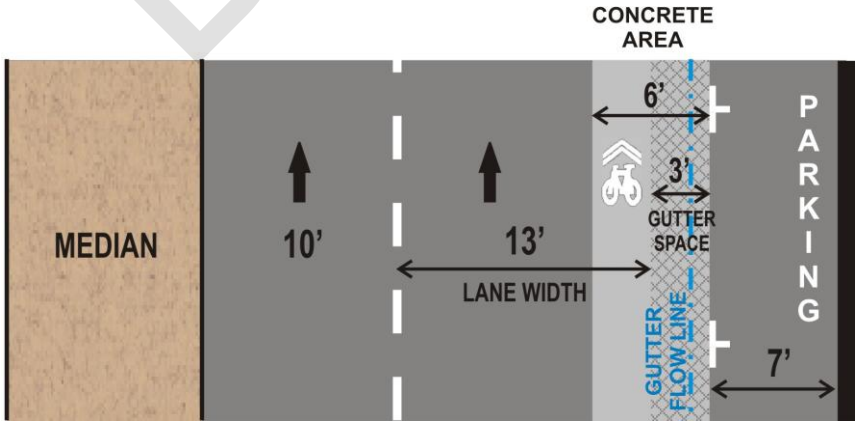


Figure 7.7 Fair Oaks Avenue Redefined Concrete "Gutter" Space
North City Limit to Monterey Road



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Concept Drawings

The figures below provides a conceptual illustration of the lane modifications for the Class II bike lane section of the project. The first is existing and the second is proposed.

Figure 7.8 Fair Oaks Avenue Bike Lanes
Monterey Road to Huntington Drive

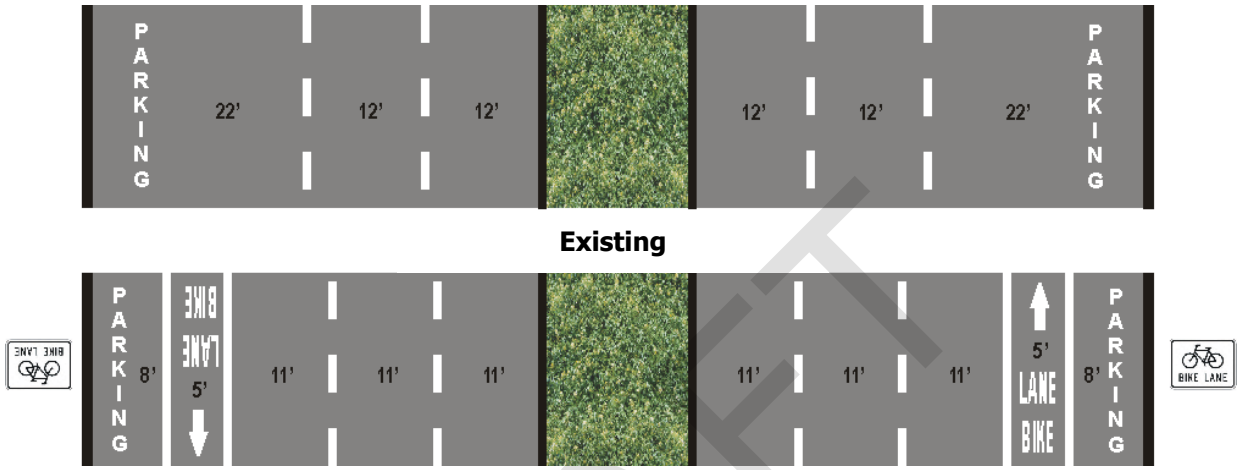
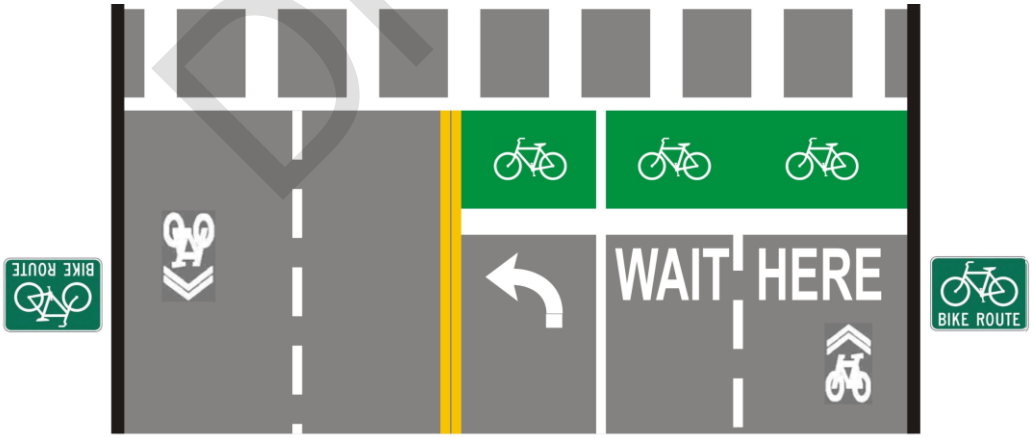


Figure 7.9 Fair Oaks Avenue Bike Boxes at Intersections
North City Limit to Monterey Road



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Project 3: El Centro/Oxley Bikeway

Project Description

The El Centro/Oxley Bikeway project spans the City in an east/west alignment from Pasadena Avenue to the east city limit. It consists of Class II Bike Lanes and a Class III Bike Route. There are linkages to the Public Library, the Gold Line Station, the Post Office, Orange Grove Park, and Arroyo Vista Elementary. It also provides connection with the adjacent retail destinations along Mission Street.



Shops on El Centro at Diamond



Public Library on El Centro

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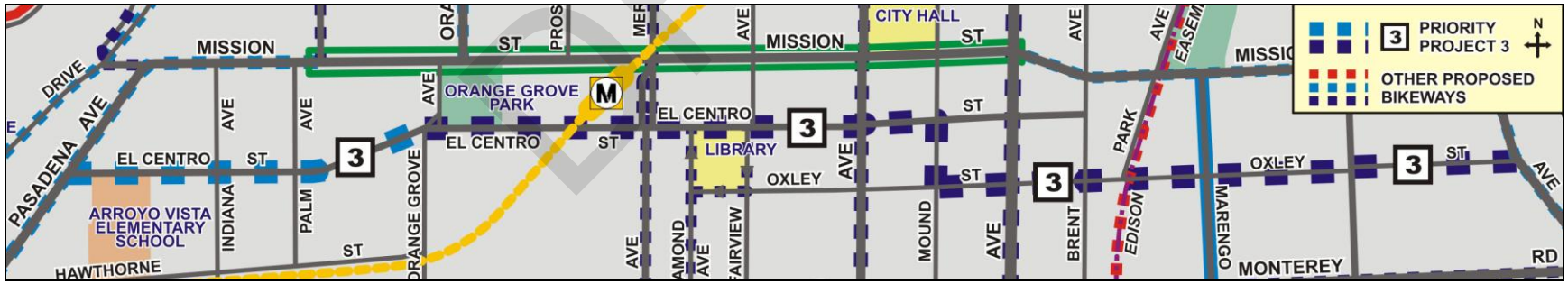
Map 7.4 El Centro/Oxley Project



Project Features

- City East/West Connection
- Multimodal Linkage to the Gold Line and Metro Buses
- Destinations: Public Library, Post Office, Commercial/Retail
- Schools and Parks: Arroyo Vista Elementary School, Orange Grove Park

Special Roadway Markings

- Sharrows
  El Centro Street: Orange Grove to Mound
  Mound Avenue: El Centro to Oxley
  Oxley Street: Mound to Marengo

Signage

- Class II: El Centro Street
  Pasadena Ave to Orange Grove Ave
- Class III: El Centro Street
  Orange Grove Ave to Mound Ave
- Class III: Mound Ave
  El Centro Street to Oxley Street
- Class III: Oxley Street
  Mound Ave to East City Limit
- Way Finding/Destinations

Project Roadway Segments

El Centro Street
- ❖Class II: Pasadena Avenue to Orange Grove Avenue
- ❖Class III: Orange Grove Avenue to Mound Avenue

Mound Avenue
- ❖Class III: El Centro Street to Oxley Street

Oxley Street
- ❖Class III: Mound Avenue to Garfield Avenue

Project Length: 1.55 miles
Project Cost $34,200

Primary Priority Criteria:
Multi-Modal Connection
Destinations, Safety, Schools
Public and Agency ranking

Responsible Departments

- Transportation, Public Works

Concept Drawings

The following figures provide a conceptual illustration of the lane modifications. The first in each pair is existing and the second is proposed.

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Figure 7.9 El Centro Street Bike Lanes
Pasadena Avenue to Orange Grove Avenue

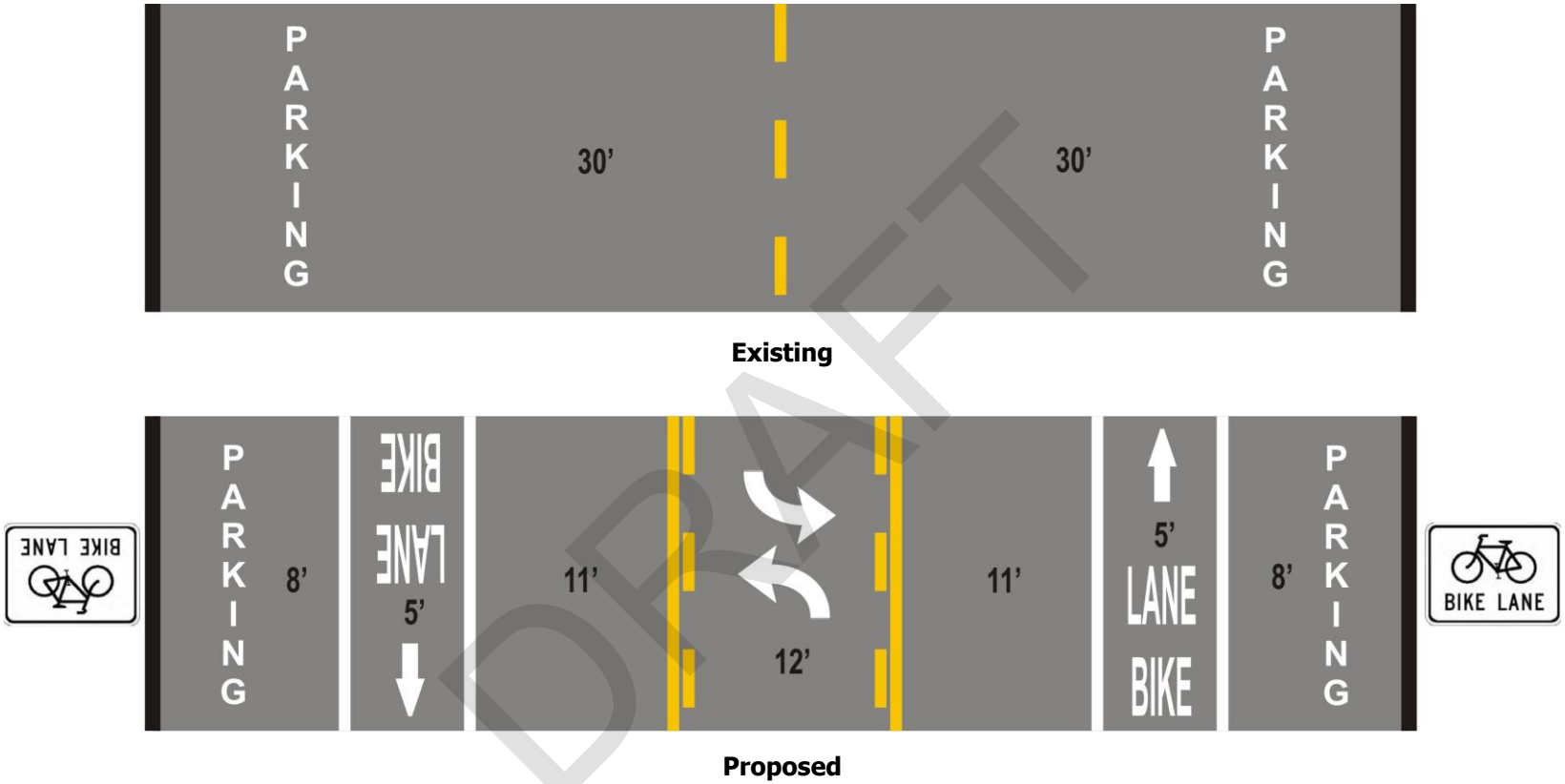

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Figure 7.10 Bike Route with Sharrows
Orange Grove Avenue to Garfield Avenue

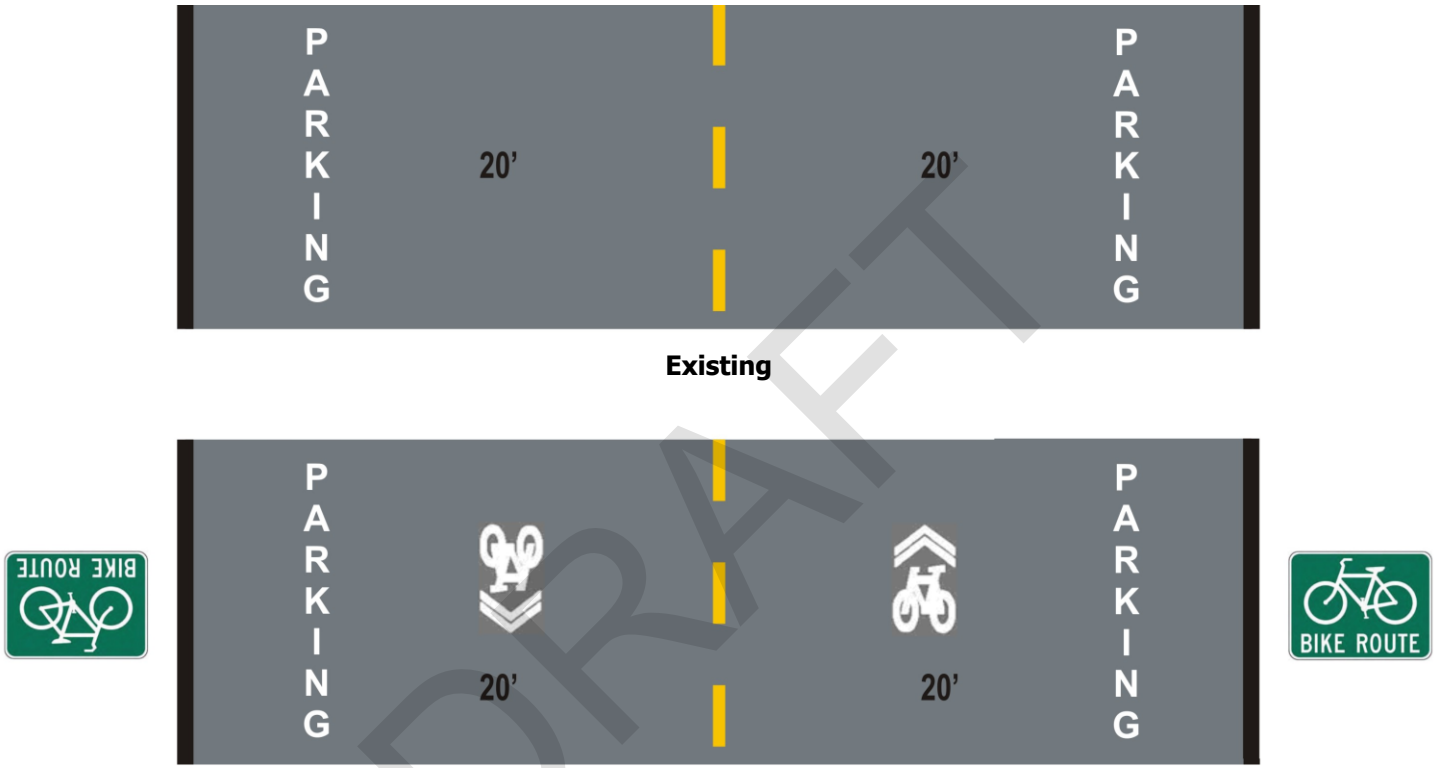

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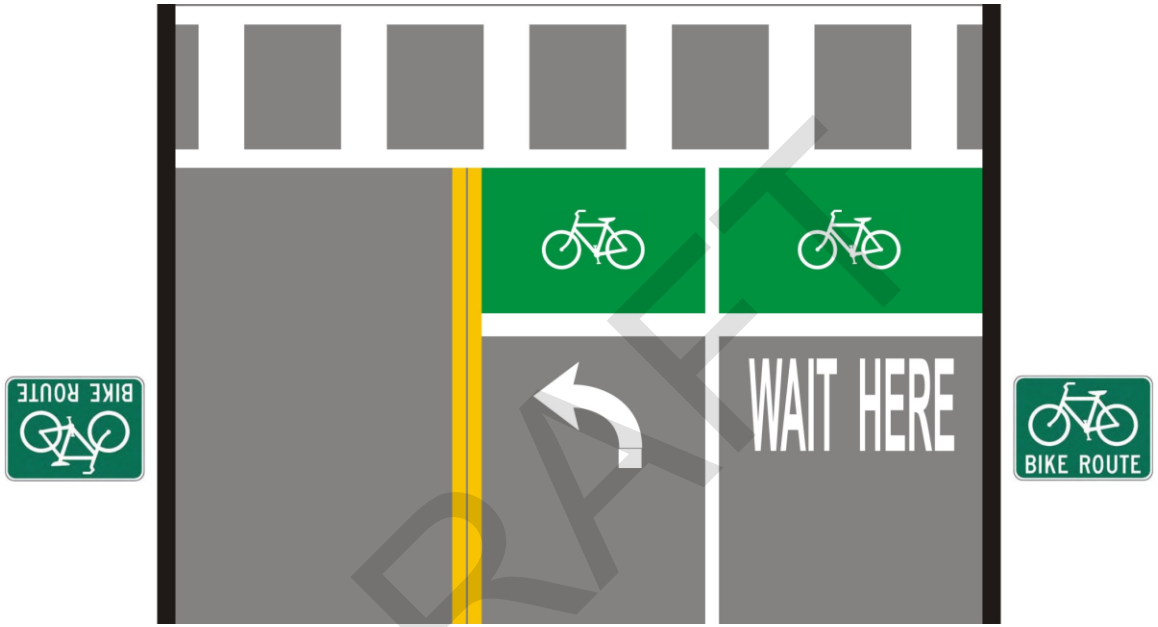
Figure 7.11 Bike Box
Oxley Street at Fair Oaks Avenue



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Project 4: Meridian Bikeway

Project Description

The Meridian Bikeway project extends in a north/south alignment from Orange Grove Avenue just south of the city limit to the south city limit in a north-south alignment. It consists of a Class III Bike Route, with "sharrows" along the segment from Mission Street to El Centro Street. Meridian Avenue serves the heart of the City with connections to Mission Street, Gold Line Station, and South Pasadena High School.



Gold Line Station at Meridian and Mission



Mission Street at Meridian

Map 7.5
Meridian Project



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Project Features

- City North/South Connection
- Regional Connection to Adjacent Cities (Pasadena, Alhambra)
- Multimodal Connection to Gold Line
- Destinations: Gold Line, Farmers Market, Mission Street
- Schools and Parks: South Pasadena High School

Special Bicycle Pavement Markings

- Sharrows:
  Meridian - Mission to El Centro

- Intersections with Bicycle Boxes (2):
  Meridian and Mission (NB, SB approaches)

Street Modifications

- None

Signage

- Class III
- Way Finding/Destinations

Responsible Departments

- Public Works

Project Roadway Segments

Oliver Street
- ❖Class III: Orange Grove Avenue to Meridian Avenue
  0.05 miles
  $1,000

Meridian Avenue
- ❖Class III: Oliver Street to South City Limit
  1.7 miles
  $34,000

Project Length: 1.75 miles
Project Cost $35,000

Primary Priority Criteria:

Gold Line Multi-Modal Connection
Destinations and Activity Centers
Regional and Local Connectivity
Schools, Safety
Public and Agency Ranking

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Concept Drawing

The figure below provides a conceptual illustration of the lane modifications for the Class II bike lane section of the project. The first is existing and the second is proposed.

Figure 7.12 Bike Route with Sharrows
Mission Street to El Centro Street



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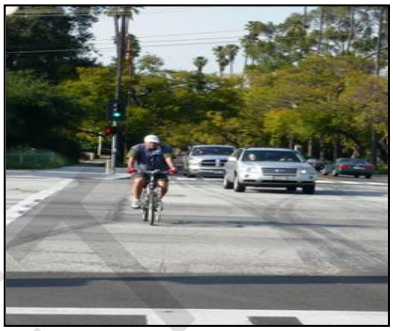
Project 5: Huntington Bikeway

Project Description

This Huntington Bikeway adds Class II Bike Lanes to Huntington Drive along its length within the City. There are retail areas along the route and is a major regional connector to San Marino and Los Angeles.

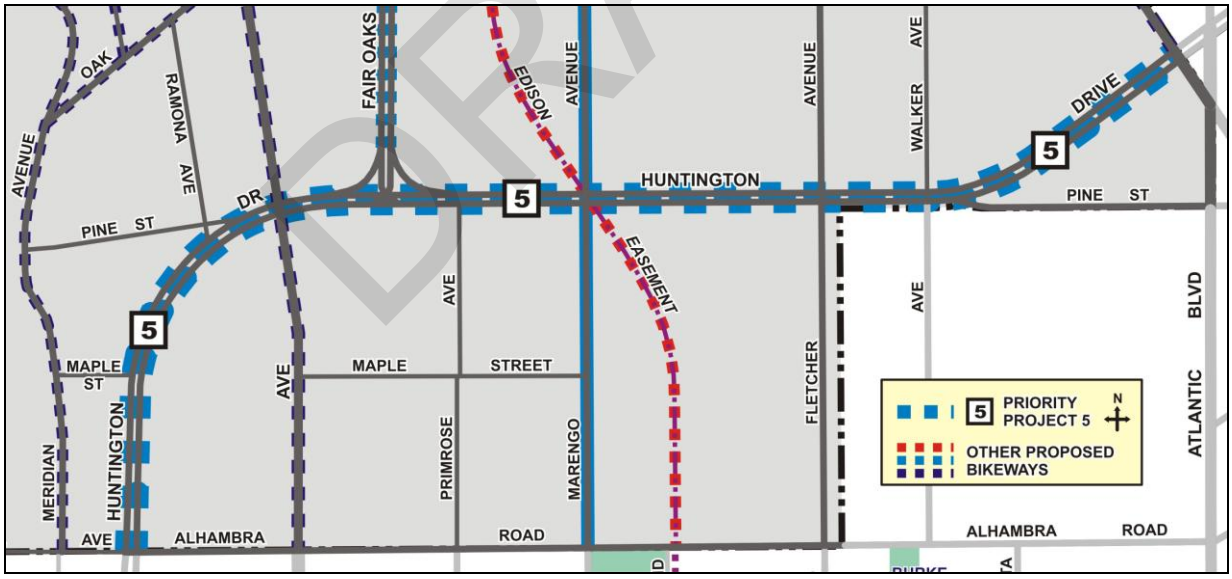


Huntington at Fletcher Avenue



Huntington Drive at Marengo Avenue

Map 7.6 Huntington Project



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Project Features

- City East/West Connection
- Regional Connection to Adjacent Cities (Los Angeles, San Marino)
- Destinations: Access to Fair Oaks retail

Special Bicycle Pavement Markings

- None

Street Modifications

- Reduce travel lanes width from 12 feet to 11 feet, stripe bike lanes

Signage

- Class II
- Way Finding/Destinations

Responsible Departments

- Public Works

Project Roadway Segments

Huntington Drive
- ❖Class II: South City Limit to East City Limit 1.5 miles

Project Length: 1.5 miles
Project Cost $42,000

Primary Priority Criteria:
Connectivity
Safety
Transit Connections
Public ranking
Agency ranking

Concept Drawings

The following figure provides a conceptual illustration of the Project. The first cross section is existing and the second is proposed. These are "before" and "after" illustrations.

Figure 7.13 Huntington Drive Bike Lanes



Existing



Proposed

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Project 6: Fremont Bikeway

Project Description

This Fremont Bikeway project extends from the Pasadena city limit in the north to the Alhambra city limit in the south. Some of the destinations served include the Post Office, City Hall, the Mission Street commercial area, and South Pasadena High School.

The Fremont Avenue Traffic Calming Plan proposes to install features designed to calm traffic. This Class III bikeway project would dovetail nicely with the Traffic Calming Plan.



Holy Family Catholic Church on Fremont



Post Office at El Centro

Map 7.7
Fremont Project



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Project Features

- City North/South Connection
- Connection to an Adjacent Cities (Pasadena, Alhambra)
- Destinations: Post Office, City Hall, Holy Family School
- Schools and Parks: South Pasadena High School

Special Bicycle Pavement Markings

- Sharrows
  North City Limit to South City Limit

- Intersections with Bicycle Boxes (8):
  Fremont and Mission (NB, SB approaches)
  Fremont and El Centro (NB, SB approaches)
  Fremont and Monterey (NB, SB approaches)
  Fremont and Huntington (NB, SB approaches)

Project Roadway Segments

Fremont Avenue
- ❖Class III: North City Limit to South City Limit 1.8 miles

Project Length: 1.8 miles
Project Cost $36,000

Primary Priority Criteria:
Connectivity
Destinations
Transit Connections
Public ranking

Street Modifications

- Sharrow stencils

Signage

- Class III
- Way Finding/Destinations

Responsible Departments

- Public Works

Concept Drawing

The following figure provides a conceptual illustration of the Bicycle Box elements of the Project.

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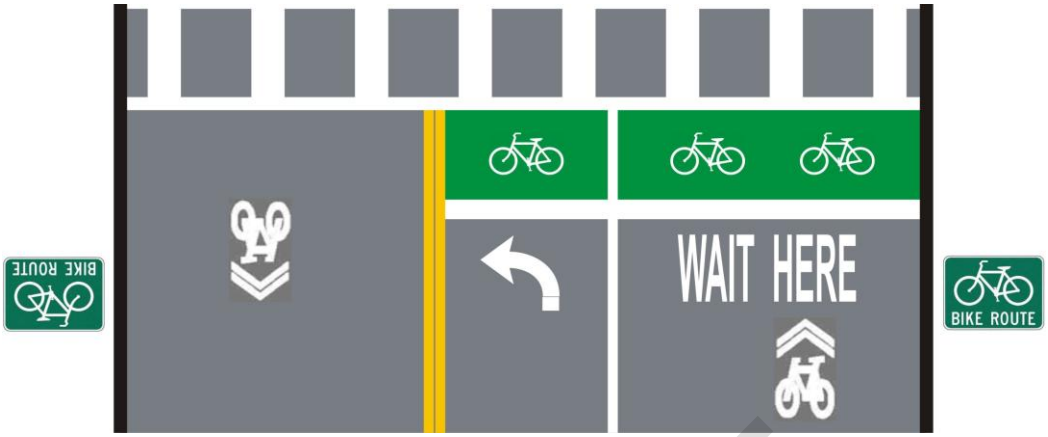
Figure 7.14 Bicycle Box Example



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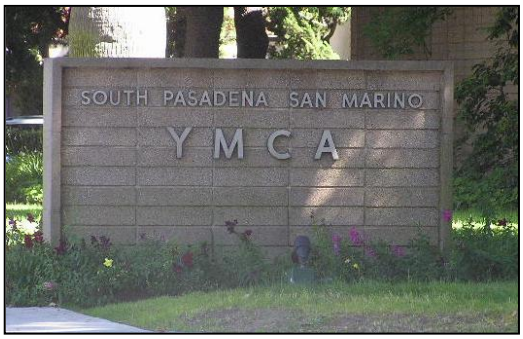
Project 7: Oak Street Bikeway

Project Description

The Oak Street Bikeway project provides east/west bikeway connectivity in the southern area of the City. It extends from Meridian Avenue to Garfield Avenue and serves the Middle School as well as close connections to South Pasadena High School and Marengo Elementary. The YMCA also is connected to the greater network.

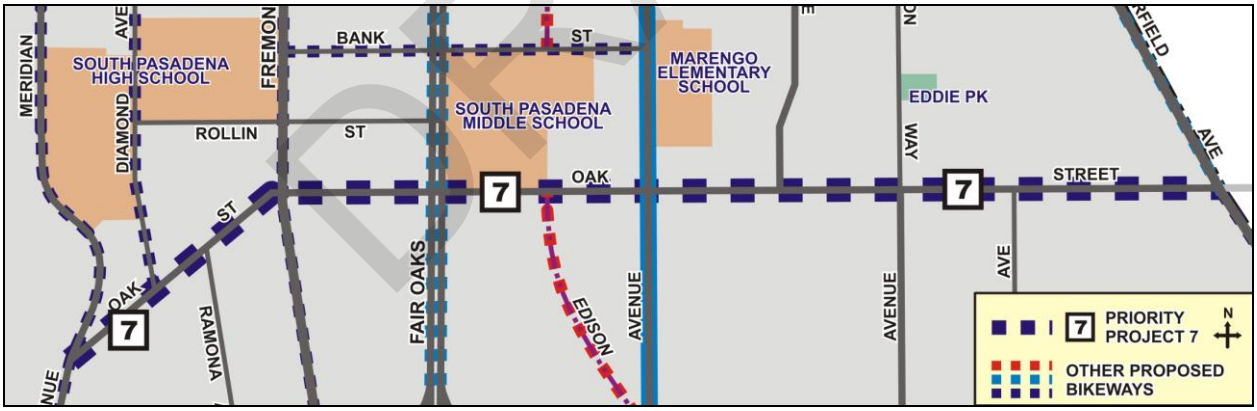


YMCA at Oak and Garfield



South Pasadena Middle School

Map 7.8 Oak Street Project



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Project Features

- City East/West Connection
- Connection to an Adjacent City (San Marino)
- Destinations: Fair Oaks Retail, YMCA
- Schools and Parks:
  South Pasadena Middle School
  South Pasadena High School
  Marengo Elementary

Special Bicycle Pavement Markings

- None

Street Modifications

- None

Signage

- Class III
- Destinations

Responsible Departments

- Public Works

Concept Drawings

- None

Project Roadway Segments

Oak Street
- ❖Class III: Meridian Avenue to to Garfield Avenue 1.2 miles

Project Length: 1.2 miles
Project Cost $24,000

Primary Priority Criteria:
Connectivity, Activity centers
Agency ranking

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Project 8: Monterey Bikeway

Project Description

The Monterey Bikeway project is an east/west connection that spans the City from Los Angeles to San Marino. This bikeway is primarily a crosstown regional route connecting with proposed bike lanes in Los Angeles and many other projects in South Pasadena.

The Monterey Bikeway provides access to the Fair Oaks Avenue business area. The Arroyo Verde Road portion of the project would simply provide a bikeway "spur" to Marmion Way and the terminus of the Arroyo Seco Class I Bike Path in Los Angeles.

The yellow-highlighted segment of Monterey Road between Pasadena Avenue and Fair Oaks Avenue is under study by the City to determine the bikeway classification. Page 7.36 provides a discussion of this segment.

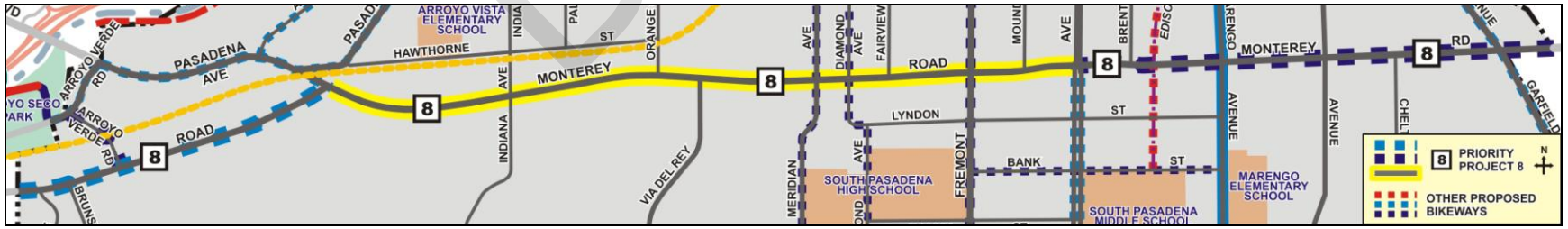


Monterey Road



Charlie's Coffee House

Map 7.9 Monterey Project



Project Features

- City East/West Regional Connection
- Connection to Adjacent Cities (Los Angeles, San Marino)
- Destinations: Fair Oaks Retail Corridor, Arroyo Seco Stables

Special Roadway Markings

- None

Street Modifications

- Yet to be determined

Signage

- Class II: Monterey Road
  West City Limit to Pasadena Ave
- Bikeway yet to be determined: Monterey Road
  Pasadena Ave to Fair Oaks Ave
- Class III: Monterey Road
  Fair Oaks Ave to East City Limit
- Class III: Arroyo Verde Road
  Marmion Way to Monterey Road
- Way Finding/Destinations

Responsible Departments

- Transportation, Public Works

Project Roadway Segments

Monterey Road

❖Class II: West City Limit to
Pasadena Avenue
0.5 miles
$14,000

❖Bikeway yet to be determined:
Pasadena Avenue to
Fair Oaks Avenue
1.1 miles
Cost yet to be determined

❖Class III: Fair Oaks Avenue to
East City Limit
0.7 miles
$14,000

Arroyo Verde Road

❖Class III: Marmion Way to
Monterey Road
0.1 miles
$2,000

Project Length: 2.4 miles
Project Cost Pending

Primary Priority Criteria:
Regional Connectivity
Destinations
Public ranking
Agency ranking

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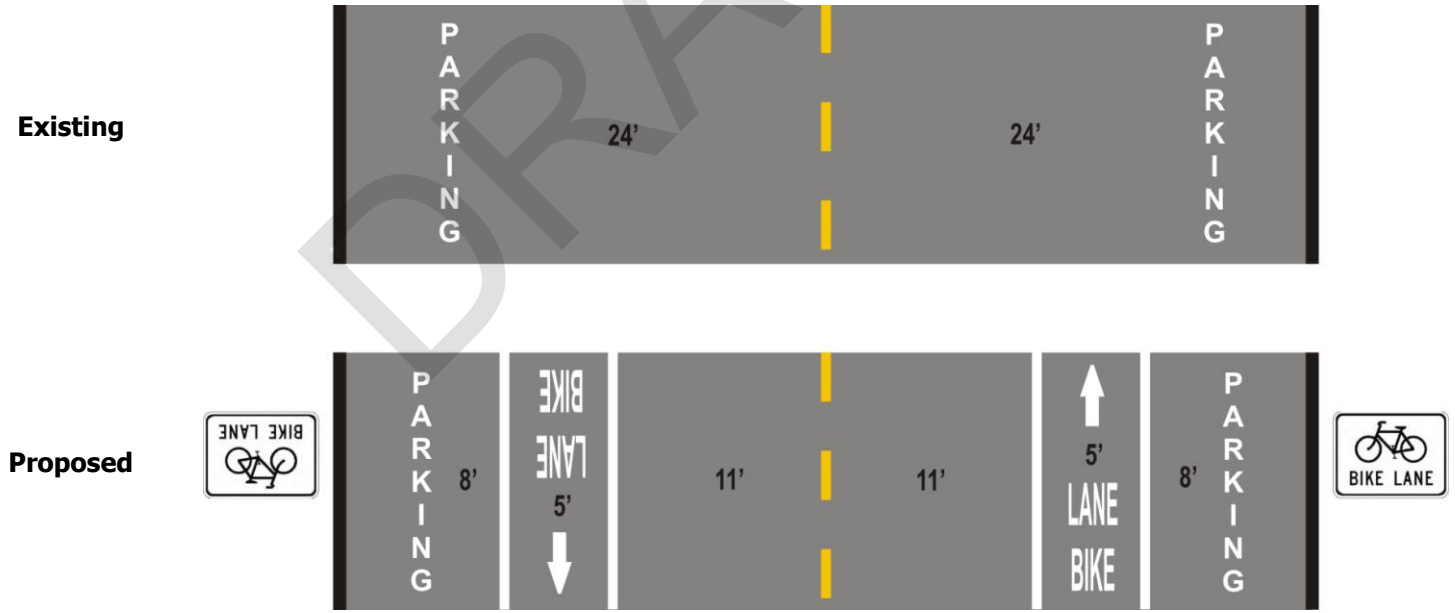
Related Projects

Monterey Road between Pasadena Avenue and Fair Oaks Avenue is part of the City's Capital Improvements Program (CIP) for the Fiscal Year 2011-12. The project includes a resurfacing of this segment of roadway and incorporating Americans with Disabilities Act (ADA) accessibility. The City Council is exploring several options regarding the type of bikeway that will be installed, including Class II Bike Lanes, a Class III Bike Route, protected bike lanes, and a Class I cycle track on one side of the roadway. The City Council will determine the class of bikeway following community outreach and additional engineering and design work. The City is committed to establishing a continuous and integrated bikeway facility along the entire Monterey Road corridor within the City.

Concept Drawing

The following figure shows a conceptual illustration of the lane modifications. The first is existing and the second proposed.

Figure 7.15 Monterey Road Bike Lanes
West City Limit to Gold Line Crossing/Pasadena Avenue



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Project 9: Bicycle Parking







Project Description

The purpose of this project is to provide guidance and support to City staff in a future grant application to Caltrans for bicycle parking. The details of a grant application will be determined at the time of submittal.

Project Features

- Bike Racks for short-term bicycle parking
- Bike Lockers for all-day and long-term bicycle parking
- Bike Racks in the public right-of-way in retail areas (sidewalks as determined by the Public Works Department)
- Valet parking at City events (primarily Farmers Market) as part of a public/private partnership

Improvements

- Replace existing bike racks with the recommended "U"-Rack design as outlined in Chapter 8 (Design Guidelines)
- Install bike racks at activity centers, destinations, places of employment, shopping centers, parks, bus stops, and additional racks at the Gold Line Station
- Install bike lockers at City Hall, the Public Library, and the Gold Line station
- A more specific set of bike rack and bike locker locations will be determined as part of the grant application process

Bicycle Parking

- Municipal and Public Buildings
- Retail Areas
  Mission Street
  Fair Oaks Avenue
- Shopping Centers
- Parks
  Orange Grove Park
  Garfield Park
  Arroyo Park
- City Events
  Farmers Market
- Multimodal Linkages
  Gold Line, Bus Stops

Project Cost:

- 6 Bike Lockers @ $3,000 each
  Gold Line Station (2)
  City Hall (2)
  Library (1)
  Golf Course (1)
  $18,000
- 20 Bike Racks @ $250 each
  $5,000
- **Total Project - $23,000**

Primary Priority Criteria:

Activity centers
Destinations
Public Input
Agency Input

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Programming

- City to provide racks and lockers through grant funding
- Coordinate with Metro for additional bike racks and bike lockers at the Gold Line station

Responsible Departments

- City Manager's Office, Public Works, Community Services, Los Angeles County Metro

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Project 10: Bikeway Way Finding







Project Description

The purpose of this project is to provide guidance and support to City staff in a future grant application to Caltrans for a bikeway way finding signage program. The details of a grant application will be determined by staff at the time of submittal.

Project Features

- Destinations Citywide
- Bikeway Network Navigation
- Green Lane Signage
- Green Lane Banners
- Regional Destinations
- Multimodal Connections

Improvements

- Affix destination signage to accompany existing Class II and III signage
- Install signage in accordance with MUTCD guidelines (see Chapter 8 – Design Guidelines)

Wayfinding Signage

- Bikeway Network Destinations
  Parks, Schools
  Municipal Buildings
  Retail Areas
- Green Lane Signage (Banner)
  Mission Street Green Lane
- Regional Connections
  Huntington Drive
  Fair Oaks Avenue
  Monterey Road
- Multimodal Connections
  Gold Line Station

Project Cost
$20,000

Primary Priority Criteria
Public Input
Agency Input

Programming

- Create a themed "Cycle South Pasadena" way finding signage logo
- Develop a consistent and seamless network of way finding signage throughout the City
- Develop a "Cycle South Pasadena" map and guide

Responsible Departments

- City Manager's Office, Public Works

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7.6 ADDITIONAL PROJECT IMPLEMENTATION

The implementation of the Bicycle Master Plan also includes other aspects of bicycle planning such as bicycle ordinances, safety programs and bicycle amenities.

Ordinances

The ordinances should be drafted and adopted by City Council in order to support the Bicycle Master Plan. Bicycle related ordinances are described in Chapter 4 (Bicycle Network). This should be complete within the first year of plan adoption.

Responsible Departments: City Manager's Office, Planning and Building, Police

Bicycle Safety Programs

Bicycle safety programs, as described in Chapter 5 (Bicycle Safety Programs), support the bicycle network. The City may decide which programs can be implemented, once funding is secured. Priority should be given to projects that support a particular bicycle facility, such as the Green Lane. For example, a safety education campaign may create a brochure with the new bicycle facility and explain the benefits of the Green Lane.

Responsible Departments: Public Works, Community Services, Police Department

Bicycle Amenities

An initial bicycle parking program is included as a top tier priority in the project sheets, and should be implemented within one to five years. However, bicycle parking should continue to be expanded throughout the City as needed.

Bicycle clothing locker storage, as explained in Chapter 4 (Bicycle Network), is typically part of a building development. The ordinance will specify the bicycle clothing storage requirements. It will be implemented when a building is complete.

Responsible Departments: Public Works, Community Services, Planning and Building

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CHAPTER 8
DESIGN GUIDELINES

8.0 DESIGN GUIDELINES OVERVIEW

Design guidelines provide direction for implementing bicycle facilities. It includes basic concepts with descriptions and samples of bicycle improvements.

The Caltrans Highway Design Manual (HDM) Chapter 1000, American Association of State Highway and Transportation Officials (AASHTO) and Manual Uniform Traffic Control Devices (MUTCD) contain more detailed standards which must be followed.

Projects may require specific plan and engineering studies. These studies will provide the technical detail required by the federal, state and local guidelines.

California Complete Streets Act

Assembly Bill (AB) 1358 mandates that cities plan for what is known as "complete streets". It states that a City's circulation element is required to plan for a balanced, multimodal transportation network that addresses the accommodations of all users of streets, roads and highways for safe and convenient travel. This includes bicycles.

This Chapter provides support and guidance for the implementation of the Bicycle Plan's projects, programs, and multimodal connections to transit that meet the goals of the California Complete Streets Act. It is important to provide design guidelines to ensure the development of a bicycle network system is safe, convenient, user-friendly, and efficient.

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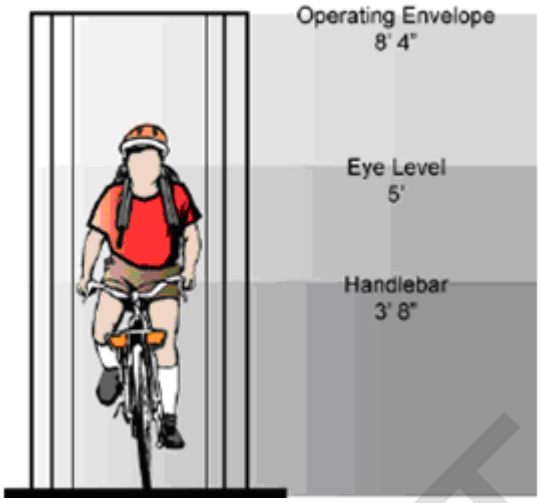
8.1 BICYCLE DEFINITION

There are a variety of bicycles which cyclists use. The typical types of bicycles, as determined by AASHTO, are considered in designing bicycle facilities. A bicyclist needs an operating width that is slight greater than the dimensions of the bicycle. The minimum width to safely ride a bicycle on a street is four feet, but it is preferred to provide at least five to allow a margin of safety.

Figure 8.1 Bicycle Traveling Space (AASHTO)



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8.2 BIKEWAY FACILITIES

A bicycle facility is a term used to denote a specific space or designation for bicycle travel, such as on a path, lane, or street. It is also used to describe such elements as bike racks and bike lockers. The term ancillary facility is used to denote items of bicycle support, such as showers, lockers, and changing rooms.

Class I Bicycle Path

A Bicycle Path is a facility designed for bicycles specifically and is paved right of way separated from the street or highway that provides a dedicated area for bicycle travel. It is often located along waterways (Arroyo Seco), utility corridors (Southern California Edison), or at the beach (Santa Monica and Venice). Paths are often shared with pedestrians unless specifically prohibited.

The minimum paved width for a two-way bike path is required to be 8 feet (2.4m). A typical path is 10 to 14 feet (3.0m to 4.3m). A minimum 2-foot- (0.6m-) wide graded area shall be provided adjacent to the pavement, according to the Reference Guides below.

The minimum paved width for a one-way bike path shall be 5 feet (1.5m) and have 2 feet (0.6m) of graded area adjacent to the pavement. The path center line is a painted dashed yellow stripe with solid white striping for shoulders.

Bicycle Path signage is required for a Class I bikeway is a white sign that indicates "BIKE PATH, NO MOTOR VEHICLES OR MOTORIZED BICYCLES".

Pavement markings for bicycle paths include a white lettered stencil: "BIKE PATH".

Multi-use trails and unpaved facilities that are for recreational purposes rather than for transportation commuting and are not designed Class I facilities unless they meet the required design criteria.

<u>Reference Guides</u>

- Caltrans HDM Chapter 1000
- MUTCD and California Supplement
- AASHTO

Figure 8.2 illustrates Bicycle Lane striping cross sections with and without on-street parallel parking. Figure 8.3 and 8.4 provide examples of Bike Paths.

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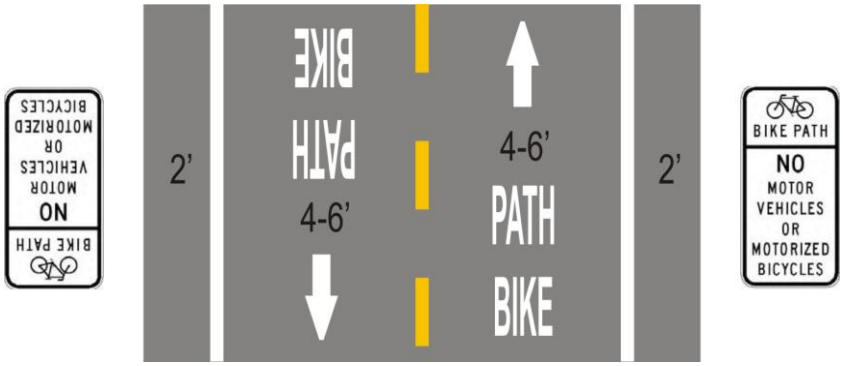
Figure 8.2 Class I Bike Path Cross Section Diagram



Figures 8.3, 8.4 Class I Bike Path Examples



Ballona Creek/South Bay Bike Path



Marina del Rey Bike Path

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Class II Bicycle Lane

A Bike Lane is a lane striped and stenciled on the pavement of a roadway that is for the preferential use of bicyclists. It is located to the right of through travel lanes on streets and roadways that are not limited-access (such as a freeway). Bike lane striping and pavement markings are intended to promote an orderly flow of traffic, by establishing specific lines of demarcation between roadway space reserved for bicycles and lanes to be occupied by motor vehicles. Examples include Marengo Avenue and Raymondale Avenue in South Pasadena.

The standard for a bicycle lane with adjacent on-street parallel parking is a minimum 5 feet (1.5m) as indicated by the Caltrans Highway Design Manual, Chapter 1000. On higher-speed roadways (above 40mph), 6 feet is recommended. Adjacent to a curb, the Bike Lane may be 4 feet wide if the gutter pan is a maximum width of 12 inches and is flush with the roadway pavement. The preferred width is 6 to 7 feet (1.8m) to (2.1m) where additional lane width is available. Solid white striping separating the vehicle lane from the bicycle lane is typically 4- to 6-inches wide. On the approach to an intersection, the solid white stripe becomes dashed where right-turning vehicles may enter to prepare for their right turn.

The required Bike Lane signage is white with black lettering that reads: "BIKE LANE" with a picture of a bicycle above it. The placement of these signs is required at intervals not to exceed ½-mile.

Pavement markings for bike lanes include a white lettered stencil with the words "BIKE LANE" and/or a stencil of a bicyclist and an arrow facing forwards. See Figures 8.5 and 8.6.

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Reference Guides

- Caltrans HDM Chapter 1000
- MUTCD and California Supplement
- AASHTO

Figures 8.5 and 8.6 illustrate Bicycle Lane striping cross sections with and without on-street parallel parking. Figures 8.7 and 8.8 provide examples of Bike Lanes.

Figure 8.5, 8.6 Class II Bike Lane Cross Sections

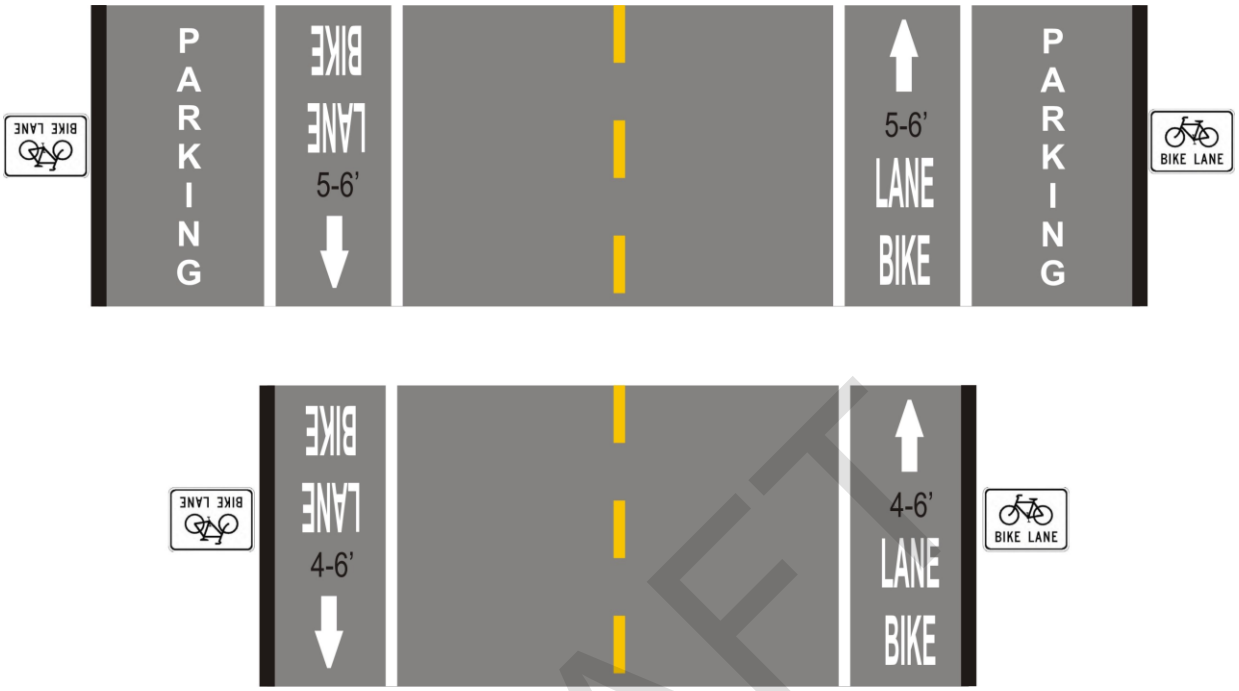
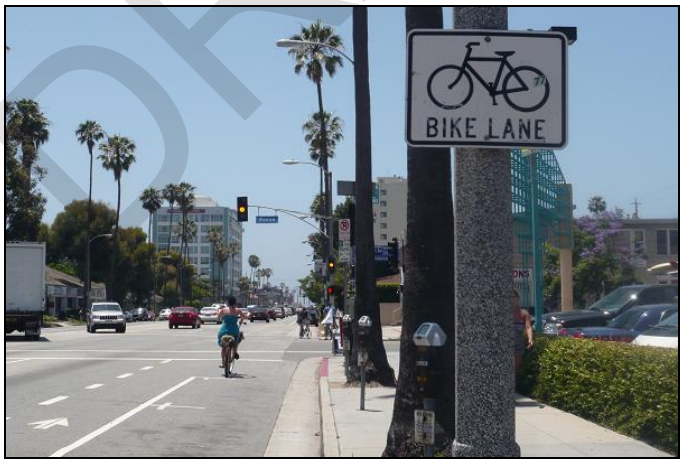


Figure 8.7 Class II Bike Lane Example



Washington Blvd in Venice

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Figure 8.8 Class II Bike Lane Example



Washington Blvd in Venice

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Class III Bicycle Route

Class III facilities are shared facilities, either with motor vehicles on the street, or with pedestrians on sidewalks. They are established along preferred cycling routes not served by Class I or II bikeways. The term "preferred" is used here as a route that is of particular importance for bicycling where a Class I or II is not feasible. Class III Bike Routes often connect discontinuous segments of bikeway (typically bike lanes). An example is Raymond Avenue in Pasadena.

There is no roadway striping or stencils associated with a Class III Bike Route.

The required Bike Route signage is green with white lettering that reads: "BIKE ROUTE" with a picture of a bicycle above it. Signage is required placed at intervals not to exceed ½-mile.

The following guides may be used when designing a Class III Bike Route facility:

- Caltrans HDM Chapter 1000
- MUTCD and California Supplement
- AASHTO

Figure 8.9 illustrates a roadway designated as a Bicycle Route. Figures 8.10 and 8.11 provide example of a Bike Route.

Figure 8.9 Class III Bike Route



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Figure 8.10, 8.11 Class III Bike Route Examples



Bike Route in Pasadena



Bike Route in Santa Monica

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8.3 BIKEWAY ENHANCEMENTS

An enhancement to a bikeway includes additional items that can be used to increase the safety, visibility, effectiveness, or accessibility of a bikeway. Enhancements are most often used along Class III Bike Routes. An enhancement may be a sign, a stencil, or another item either approved by Caltrans, AASHTO, or MUTCD or as an experimental treatment under review. A Bike Route bikeway with enhancements is called an Enhanced Class III Bike Route. This section presents several enhancements that are used in conjunction with bikeways.

Shared Lane Marking (Sharrow)

Shared lane markings, known as "sharrows", are intended to delineate where cars and bicycles share the lane. The sharrow marking indicates the position for cyclists to ride; for ease of travel as well as to avoid obstructions such as open car doors. It visually shows drivers where a bicycle can legally ride within the travel lane. Sharrows can only be used on Class III Bike Routes, but not all Class III Bike Routes require sharrows. It is an option that may be used on (but not limited to) roadways with high on-street parking demand or along Class III sections of bikeways without continuous Class II lanes.

The sharrow is placed a minimum of 11 feet (3.6m) from the curb. Included in this width is a required 3-foot buffer zone between parked cars and the sharrow stencil. This 3-foot space is known as the "door zone". The use of sharrows does not require any other pavement markings, but must include a standard Class III Bike Route sign at minimum ½-mile intervals.

Sharrows may also be accompanied by a "Share-the-Road" sign (as shown on page 8.23), but this is not required. "Share-the-Road" signs provide additional bicyclist visibility.

The pavement marking is a bicycle facing left with two upward facing chevrons above it, as shown in Figure 8.12. There is currently no requirement for the spacing of sharrows on the street, but it is recommended that they be placed at the beginning of each block and every 100 feet.

There is no specific paint required to be used for sharrow stencils.

Figure 8.13 illustrates the specific spacing requirements for the use of a sharrow.

<u>Reference Guides</u>

- Caltrans HDM Chapter 1000

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- MUTCD and California Supplement
- AASHTO

Figure 8.12 Sharrow Stencil Design (MUTCD)

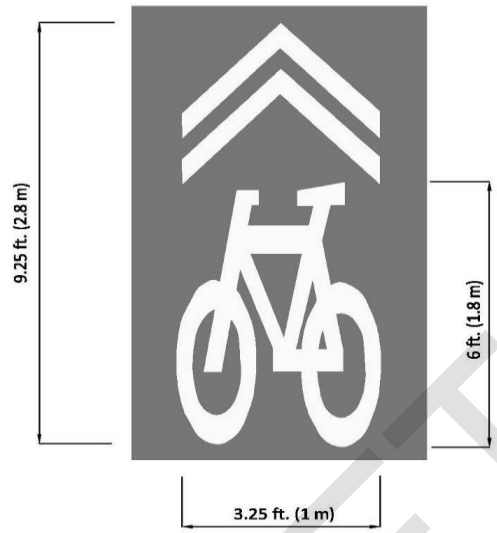

Figure 8.13 Sharrow Stencil Design (C.I.C.L.E.)

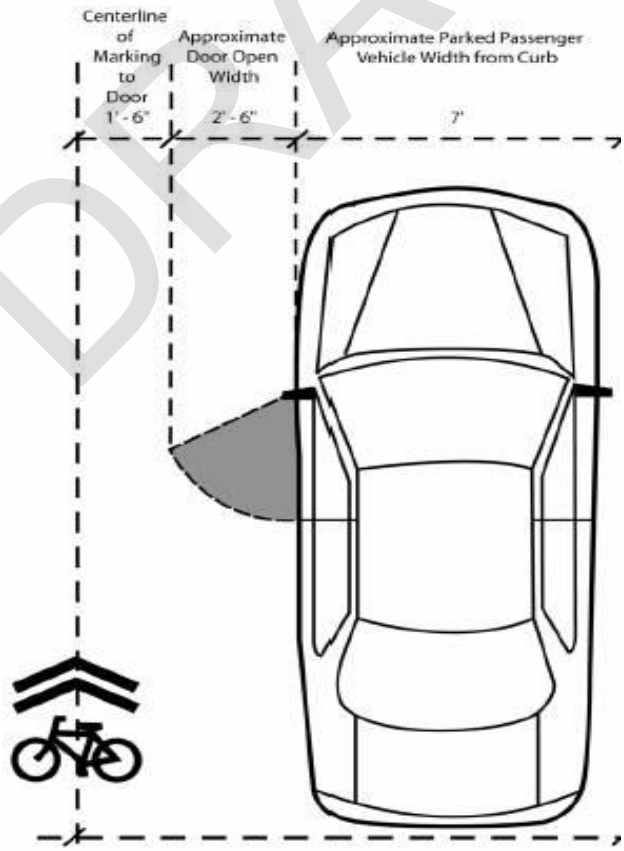

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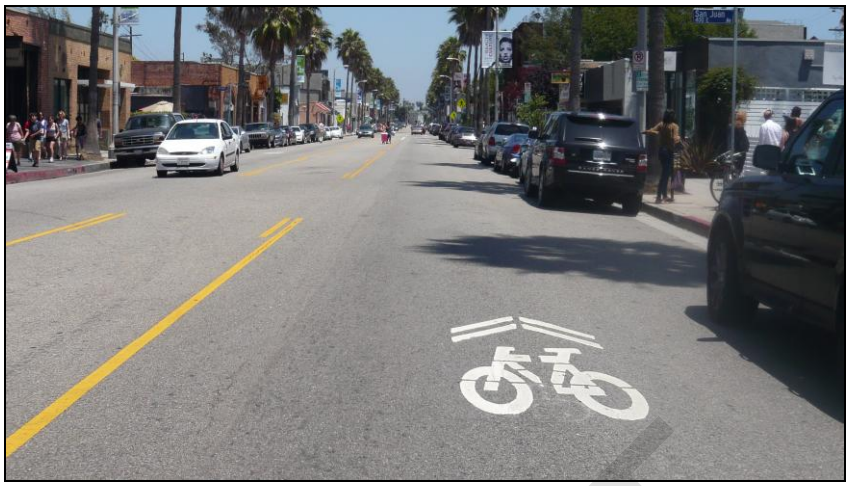
Figure 8.14 Sharrow Example



Abbott Kinney Blvd in Venice

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Green Lane

Green colored pavement may be used within a travel lane to enhance the visibility of bicyclists and of bicycle routes. These are often referred to as "Green Lanes", which highlight with a green pavement treatment the area within the travel lane where bicycle and cars share the road. It is a used in high-conflict areas, such as on roadways with high on-street parking demand or on slower-speed streets through commercial retail areas, as along 2nd Avenue in Long Beach. The Green Lane could be installed along bicycle routes where there is not enough width for a designated bicycle lane. The Green Lane treatment is also a way to raise awareness of bicycling on a particular street, such as in commercial areas.

The preferred width for a Green Lane is 5 feet (1.6m) with the right-most edge 3 feet (1m) to the outside of parked cars. The Green Lane has a green pavement with no white striping.

Signage for a Green Lane is the same as for a Bike Route and is an enhancement of a Class III facility.

Pavement markings for a Green Lane include a painted green area on the roadway within the outside travel lane. The use of a "Sharrow" stencil can be used in conjunction with the Green Lane. Although the Green Lane with a sharrow is not currently found in a design manual, it is an accepted practice as demonstrated by their use in Portland, Oregon.

The paint that is typically used for green lanes is thermoplastic. It is more durable than most other types of paint, contains tiny glass particles for reflectivity, is embedded with silica aggregate for skid resistance. However, other paint is acceptable.

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Reference Guides

- Caltrans HDM Chapter 1000
- MUTCD and California Supplement
- AASHTO

Figure 8.15 Green Lane Cross Section



Figure 8.16 Green Lane Example (RussRoca.com)



2nd Avenue in Long Beach

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Bicycle Box

A bicycle box is designed to prevent conflicts between bicyclists and motor vehicles at intersections. This treatment specifically addresses conflicts between bicyclists going straight through an intersection on green and right turning vehicles turning right. The correct positioning of both users is often confused at these locations, and a bicycle box clearly identifies where bicyclists may position themselves to reduce conflict through a visual enhancement.

The treatment is a green-painted pavement area in the shape of a rectangle with a white bicycle stencil inside it. The painted area is installed across travel lanes adjacent to and behind the crosswalk. The vehicle stop bar is then placed behind the bicycle box. This enhances the visibility of bicyclists while also recognizing their protection on the road. At a red light, cyclists are more visible to motorists by being in front of them.

Figure 8.17 Bicycle Box

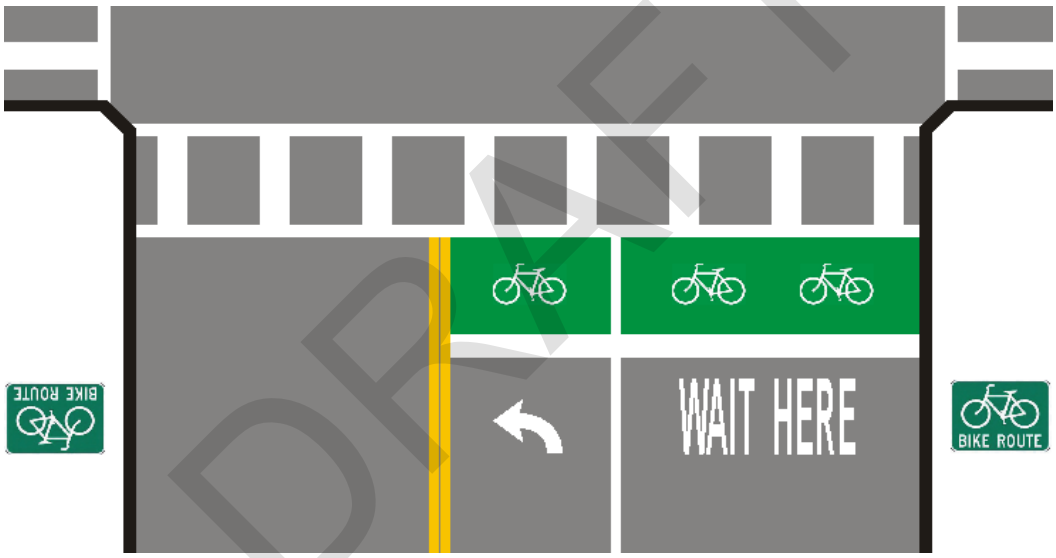

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Figure 8.18 Bicycle Box Example (Portland)



Uphill/Downhill Grade Class II/Class III Combination

For the purposes of this discussion, a roadway grade is the incline of a roadway where the downhill speeds of bicyclists could approach the speeds of motor vehicles on the same grade. The exact slope of the grade would depend on the length of the grade (in feet or miles) and therefore is not specifically defined here. Downhill bicyclist speeds of more than 20mph are relevant to this discussion.

If bicyclist speeds approach vehicle speeds in the downhill direction, an exclusive bicycle lane is not necessary because the function of the lane would be sufficient for bicycle travel as a shared Class III Bike Route. However, bicycle speeds in the uphill direction would be considerably slower than they typically would be on a flat surface. In the uphill direction, bicyclists would be better served by a Class II Bike Lane where slow-moving bicyclists would be appropriately provided space outside of the flow of vehicular traffic in a Class II where their slower speed wouldn't impede the flow of vehicle traffic. (see Figure 8.19)

In the uphill direction, the bicycle lane would require be the standard minimum width of 5 feet. It would also require striping and stencils per a Class II lane. A bicycle lane sign indicating "Bike Lane" would be required for the uphill section.

The downhill direction may be designated a Class III with sharrows to denote that bicyclists would be sharing the lane with traffic. The downhill direction must be signed with required "Bike Route" signage.

Reference Guides

- Caltrans HDM Chapter 1000
- MUTCD and California Supplement
- AASHTO

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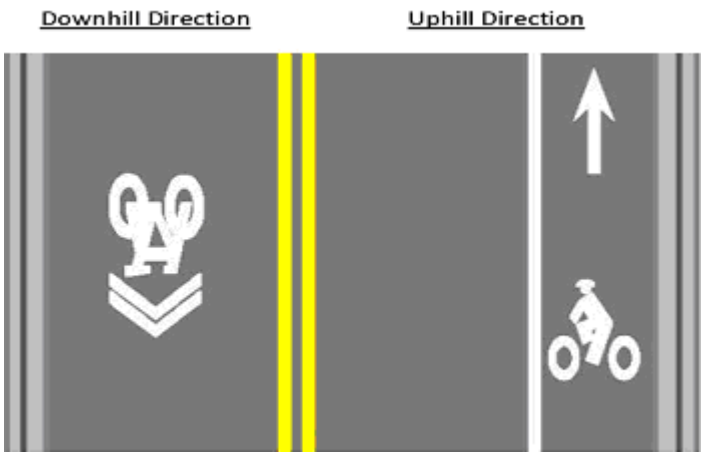
Figure 8.19 Uphill Bike Lane Design (AASHTO)



Signal Detection for Bicycles at Intersections

A traffic signal at an intersection can be designed as an "actuated" traffic signal. This involves installing detection devices to detect when a vehicle arrives at one of the approaches and indicates to the signal controller that a green phase is needed for that approach. The most common devices used are in-pavement loop detectors (magnetic induction) and video detection. Microwave and radar detection technologies are also being tried in some jurisdictions.

Signal detection is most often designed without bicyclists in mind, and therefore an additional effort must be made to actuate them for bicycles. For loop detection, a smaller loop design is created with a visual cue as to where to position the bicycle to induce the detector to call a green phase. The loop would be placed in the bike lane or adjacent to vehicle loop detectors on a Class III bike route.

Figure 8.20 shows the proper bicyclist signage for a loop-detected traffic signal. Figure 8.20 shows the pavement marking used to assist bicyclist in the proper position to call the green phase.

The stencil is placed before the stop bar of the intersection approach.

Reference Guides

- Caltrans HDM Chapter 1000
- MUTCD and California Supplement
- AASHTO

Figure 8.20 Bicycle Signal Detection Pavement Stencil (AASHTO)



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Figure 8.21, 8.22 Bicycle Loop Detector Signage and Stencil Examples



Washington Blvd in Venice



Washington Blvd in Venice

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Drainage Grates

Drainage grates are used on streets with curbs and gutters to drain water into the sewer system. They are placed at various intervals on a given street depending on a host of factors at the determination of the Public Works Department. Grates are usually designed with bars and slats that allow water through but not a vehicle tire. Since bicycle travel often occurs in the curb lane of a street near the gutter, it is important to ensure that the drainage grates be designed in such a way that bicycle tires do not get caught in them.

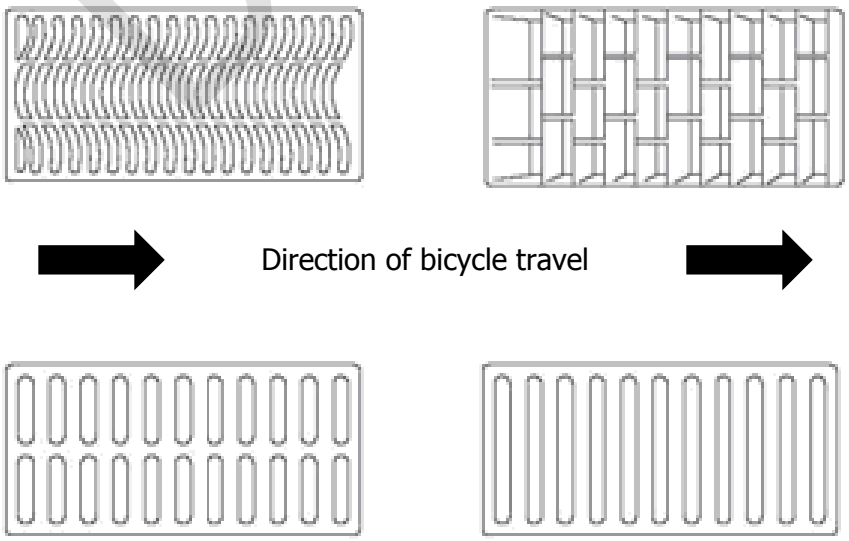
Drainage inlet grates on bikeways shall have openings narrow enough and short enough to assure bicycle tires will not drop into the grates. Where it is not immediately feasible to replace existing grates with standard grates designed for bicycles, 25mm x 6mm steel cross straps should be welded to the grates at a spacing of 150mm to 200mm to reduce the size of the openings adequately, according to the Caltrans Highway Design Manual, Chapter 1000.

Street drainage grates are maintained as part of routine street maintenance.

<u>Reference Guides</u>

- Caltrans HDM Chapter 1000
- MUTCD and California Supplement
- AASHTO

Figure 8.23 Examples of Proper Drainage Grates (AASHTO)



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8.4 BICYCLE PARKING

Parking is an essential part of bicycle transportation. Just as vehicle users rely on a place to park their vehicles at their destination, bicyclists too need to be provided a place to park their mode of transportation. Too often, bicycle parking is not provided and bicyclists are left to find unsecure locations to lock their bicycle, if any such location is even available.

Figure 8.24 Standard Bike Parking Signage (MUTCD)



Bicycle Rack

A bicycle rack is designed to safely secure a bicycle, typically for short-term parking. They typically have a metal design, sometimes with a special design or surface coating.

The most common and effective rack is a standard inverted "U" Bicycle Rack, typically 35 inches high and 30 inches in width, and there are many differing designs, manufacturers, and dimensions to them. Although "U"-Racks are preferred, others are acceptable as long as they allow for one bicycle wheel and the bicycle frame to be locked together.

Bike racks are typically placed on sidewalks, in public rights of way, or on private property. Of primary importance, the location of bike racks should be safe and convenient. They should be purchased from a manufacturer that installs them in a way that prevents the theft of bicycles or the racks when placed on sidewalks. Specific bolting techniques as well as the design of the racks themselves are important criteria in the selection of a bike rack manufacturer.

For bike racks that are installed on City sidewalks, the horizontal space required for the rack plus 2 bicycles parked to it is 4 feet. Racks should be installed parallel to the curb wherever possible to minimize the sidewalk space needed for them. The space required from the curb is 2 feet.

The MUTCD provides a standard accompanying parking sign that is to be used at the bicycle parking location.

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Reference Guides

- Caltrans HDM Chapter 1000
- MUTCD and California Supplement
- AASHTO

Figure 8.25 Proper "U" Bike Rack Usage (Boulder, Colorado)

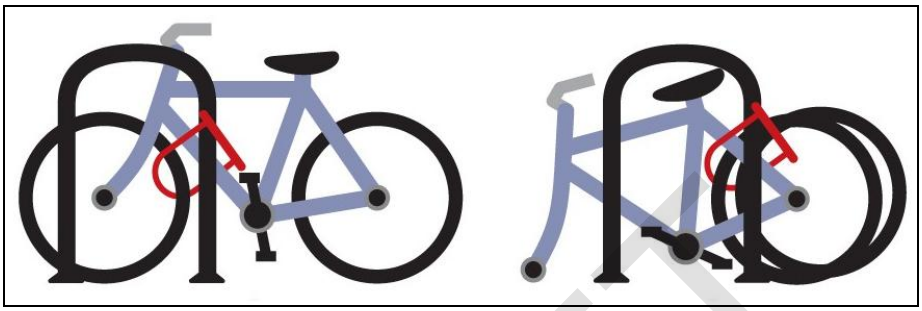
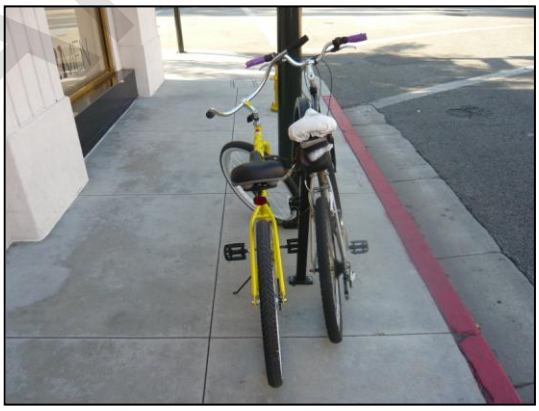


Figure 8.26 Examples of "U" Racks



"U"-Rack Pasadena



"U"-Rack Pasadena

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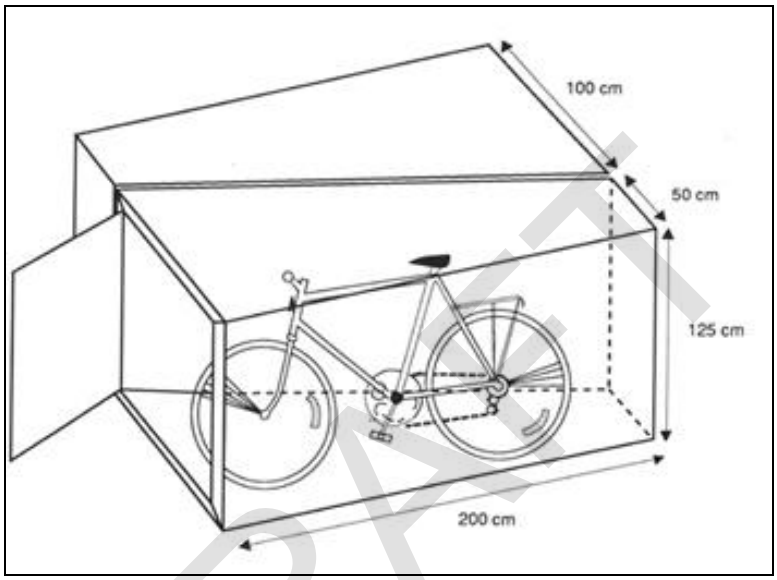
Bicycle Locker

A bicycle locker is an enclosed locker space designed to safely secure a bicycle, typically for all-day or long-term parking. Lockers can vary in size by manufacturer. Lockers are typically placed in parking garages, at transit stations, and/or on public or private property. The MUTCD provides the same standard accompanying parking sign as for bicycle racks. Many jurisdictions prefer perforated or "see-through" lockers to fully enclosed lockers. Greater visibility inside the locker prevents non-bicycle storage from occurring or, in some cases, people residing in them.

Reference Guides

- Caltrans HDM Chapter 1000
- MUTCD and California Supplement
- AASHTO

Figure 8.27 Typical Bike Locker Design (National Urban Institute)



Figures 8.28, 8.29 Bike Locker Examples



Bicycle Lockers in Marina del Rey



Bicycle Lockers at Oakland BART Station

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8.5 BIKEWAY SIGNAGE

Bikeway signage is roadway signage specifically designed for bicyclists. It is required by Caltrans, AASHTO, and the MUTCD to accompany Class I Bike Path, Class II Bike Lane, and Class III Bike Route bikeways. The reason for their usage is to identify bikeways for bicyclists and what type of bikeway it is. It is also useful to other users of the road (vehicles and pedestrians) that the road has been specifically designated for use by bicyclists, and that these users should expect to encounter bicyclists on that roadway.

Bikeway signs are required to be placed at intervals of ½-mile or less. Common practice in cities such as Portland, Oregon and San Francisco is to place a bikeway sign every ¼-mile. In addition to required bikeway signage, "Share the Road" signs may be added where deemed appropriate by the local jurisdiction as a way of providing additional bicyclist visibility and awareness. Share-the-Road signage is not required.

Reference Guides

- Caltrans HDM Chapter 1000
- MUTCD and California Supplement
- AASHTO

Figure 8.30 Standard Bicycle Facility Signage (MUTCD)



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Way Finding Signage

Way finding signage provides destination, distance, and routing information to users of a roadway. The system of way finding for streets and highways is well developed for motor vehicles. For bicyclists, it is not well-developed but such a network of way finding signage can be found in several cities, including Portland, Seattle, San Francisco, Oakland, and San Diego. Such signage provides destination- and corridor-specific guidance along a bikeway facility and/or among a network of bicycle facilities. Destination signs with names of activity centers. Mileage is an optional and often helpful feature. Way finding signage placed along a bicycle facility would not take the place of standard bikeway signage.

As shown in Figure 8.31, themed way finding signage is often designed in a way uniquely tailored to the City for whose bicycle way finding network is developed. For example, a South Pasadena way finding network of signage could display the City's official logo or Bicycle Master Plan logo entitled *Cycle South Pasadena.*

Reference Guides

- MUTCD and California Supplement

Figure 8.31 Way Finding Signage Examples (Oakland)



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Wayfinding Sign in Long Beach



Wayfinding Sign in Seattle

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APPENDIX A
BICYCLE TRANSPORTATION ACCOUNT CALTRANS REQUIREMENTS

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Bicycle Transportation Plan Checklist

BTP TITLE: _____

LOCAL AGENCY: _____ ADOPTED Y N DATE:

TRANSPORTATION PLANNING AGENCY: _____ APPROVED Y N DATE:

BFU REVIEW: APPROVED DISAPPROVED DATE:

Yes	No	Requirement	Pages	Comments
		(a) The estimated number of existing bicycle commuters in the plan area and the estimated increase in the number of bicycle commuters resulting from implementation of the plan.		
		(b) A map and description of existing and proposed land use and settlement patterns which shall include, but not be limited to, locations of residential neighborhoods, schools, shopping centers, public buildings, and major employment centers.		
		(c) A map and description of existing and proposed bikeways.		
		(d) A map and description of existing and proposed end-of-trip bicycle parking facilities. These shall include, but not be limited to, parking at schools, shopping centers, public buildings, and major employment centers.		
		(e) A map and description of existing and proposed bicycle transport and parking facilities for connections with and use of other transportation modes. These shall include, but not be limited to, parking facilities at transit stops, rail and transit terminals, ferry docks and landings, park and ride lots, and provisions for transporting bicyclists and bicycles on transit or rail vehicles or ferry vessels.		
		(f) A map and description of existing and proposed facilities for changing and storing clothes and equipment. These shall include, but not be limited to, locker, restroom, and shower facilities near bicycle parking facilities.		
		(g) A description of bicycle safety and education programs conducted in the area included within the plan, efforts by the law enforcement agency having primary traffic law enforcement responsibility in the area to enforce provisions of the Vehicle Code pertaining to bicycle operation, and the resulting effect on accidents involving bicyclists.		
		(h) A description of the extent of citizen and community involvement in development of the plan, including, but not limited to, letters of support.		
		(i) A description of how the bicycle transportation plan has been coordinated and is consistent with other local or regional transportation, air quality, or energy conservation plans, including, but not limited to, programs that provide incentives for bicycle commuting.		
		(j) A description of the projects proposed in the plan and a listing of their priorities for implementation.		
		(k) A description of past expenditures for bicycle facilities and future financial needs for projects that improve safety and convenience for bicycle commuters in the plan area.		

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APPENDIX B
PRIORITY RANKING AND PROPOSED ROADWAY MODIFICATIONS

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Table B.1 Recommended Project Ranking

Initial Ranking	Destinations	Class	Project Segments			Public Ranking	Agency Ranking 0-5	Activity Centers 0-3	Destinations 0-3	Connectivity 0-3	Schools 0-3	Transit 0-3	Safety 0-3	Cumulative Ranking	Priority Ranking
			Street	From	To										
3	Arroyo Seco Stables, Arroyo Vista Elementary, Orange Grove Park, Gold Line Station, Farmers' Market, Mission Street Commercial District, Fair Oaks Commercial District, Garfield Park	2	**Marmion Way**	West City Limit	Arroyo Verde Rd	3	5	3	3	3	1	3	2	**23**	**1**
		2	**Arroyo Verde Rd**	Marmion Way	Pasadena Ave										
		2	**Pasadena Ave**	Arroyo Verde Rd	Monterey Rd										
		2	**Pasadena Ave**	Monterey Rd	Mission St										
		2	**Mission St**	Pasadena Ave	Grand Ave										
		Green Lane	**Mission St**	**Grand Ave**	**Fair Oaks Ave**										
		2	**Mission St**	Fair Oaks Ave	East City Limit										
7	Fair Oaks Commercial District	2	**Fair Oaks Ave**	Monterey Rd	Huntington Dr	1	3	1	3	3	1	2	3	**17**	**2**
		3	**Fair Oaks Ave**	North City Limit	Monterey Rd										
1	Arroyo Vista Elementary, Orange Grove Park, Gold Line Station, Farmers' Market, Public Library	2	**El Centro St**	Pasadena Ave	Orange Grove Ave	2	4	3	3	3	1	3	0	**19**	**3**
		3	**El Centro St**	Orange Grove Ave	Mound Ave										
		3	**Mound Ave**	El Centro St	Oxley St										
		3	**Oxley St**	Mound Ave	Garfield Ave										
6	Farmers' Market, Public Library, South Pasadena High School, South Pasadena Middle School, Marengo Elementary, YMCA	3	**Oak St**	Meridian Ave	Garfield Ave	1	4	3	3	2	3	1	1	**18**	**4**
		3	**Bank St**	Fremont Ave	Marengo Ave										
		3	**Fairview Ave (one-way SB)**	El Centro St	Oxley St										
		3	**Oxley St (one-way WB)**	Diamond Ave	Fairview Ave										
		3	**Diamond Ave (one-way NB)**	El Centro St	Oxley St										
		3	**Diamond Ave**	Oxley St	Oak St										
2	Gold Line Station, Farmers' Market, South Pasadena High School	3	**Oliver St**	Orange Grove Ave	Meridian Ave	1	2	2	2	3	1	2	1	**14**	**5**
		3	**Meridian Ave**	Oliver St	South City Limit										
4	Regional Bikeway (Los Angeles, San Marino)	2	**Huntington Dr**	South City Limit	East City Limit	2	2	0	0	3	0	2	3	**12**	**6**
11	Post Office, Mission Street Commercial District, South Pasadena High School,	3	**Fremont Ave**	North City Limit	South City Limit	2	1	1	1	3	1	1	1	**11**	**7**
9	Arroyo Seco Stables, Regional Connection, Crosstown Bikeway, Fair Oaks Commercial Corridor	2	**Monterey Rd (west)**	West City Limit	Monterey Rd/Gold Line	2	1	0	1	3	0	1	3	**11**	**8**
		3	**Arroyo Verde Rd**	Marmion Wy/Arroyo Verde Rd	Monterey Rd										
		2	**Monterey Rd**	Monterey Rd/Gold Line	Fair Oaks Ave										
		3	**Monterey Rd**	Fair Oaks Ave	East City Limit										
8	Garfield Park, YMCA	3	**Grevelia St**	Fair Oaks Ave	Clark Ave	0	2	1	1	3	0	1	2	**10**	**9**
		3	**Clark Pl**	Grevelia St	Garfield Ave										
		3	**Garfield Ave**	Clark Pl	Mission St										
		2	**Garfield Ave**	Mission St	Huntington Dr										
	Orange Grove Park	3	**Orange Grove Ave**	Columbia St	Mission St	1	1	1	1	3	0	0	0	**7**	**10**
10	Monterey Hills Elementary	3	**Via del Rey**	Monterey Rd	Camino Lindo	1	1	0	0	1	1	1	0	**5**	**11**
13	Arroyo Seco,Arroyo Park, Golf Course	1	**Arroyo Seco Trail / Path**	Stoney Dr	West city limit	1	0	0	1	2	0	0	0	**4**	**12**

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Table B.1 Recommended Project Ranking (continued)

Initial Ranking	Destinations	Class	Project Segments			Public Ranking	Agency Ranking 0-5	Activity Centers 0-3	Destinations 0-3	Connectivity 0-3	Schools 0-3	Transit 0-3	Safety 0-3	Cumulative Ranking	Priority Ranking
			Street	From	To										
12	Garfield Park, South Pasadena Middle School	1	**Edison Utility Easement**	Grevelia St	Bank St	1	0	0	1	1	1	0	0	**4**	**13**
			Edison Utility Easement	Oak St	Huntington Dr										
			Edison Utility Easement	Huntington Dr	Alhambra Rd										
14	Arroyo Park	2	**Arroyo Dr**	Pasadena Ave	North City Limit	0	1	0	1	2	0	0	0	**4**	**14**
15	Arroyo Seco, Arroyo Park	3	**Stoney Dr**	San Pascual Ave	Arroyo Dr	0	0	0	1	2	0	0	0	**3**	**15**
17	Arroyo Park, Regional Connection	3	**San Pascual Ave**	West City Limit	North City Limit	0	0	0	1	2	0	0	0	**3**	**16**
18	Regional Connection	3	**Avenue 60**	West City Limit	Collis Ave	0	0	0	0	2	0	0	0	**2**	**17**
19	Regional Connection	3	**Collis Ave**	West City Limit	Avenue 60/Hill Dr	0	0	0	0	2	0	0	0	**2**	**18**
16		3	**State St**	Fair Oaks Ave	North City Limit	0	0	0	0	0	0	0	0	**0**	**19**

Table B.2 Summary of Proposed Roadway Modifications

Project	Project Name	Destinations	Class	Project Segments			Roadway Modifications
				Street	From	To	
1	**Pasadena/Mission**	Arroyo Seco Stables, Arroyo Vista Elementary, Orange Grove Park, Gold Line Station, Farmers' Market, Mission Street Commercial District, Fair Oaks Commercial District, Garfield Park	2	**Marmion Way**	West City Limit	Arroyo Verde Rd	
			2	**Arroyo Verde Rd**	Marmion Way	Pasadena Ave	
			2	**Pasadena Ave**	Arroyo Verde Rd	Monterey Rd	Parking removed on the north side of the street only
			2	**Pasadena Ave**	Monterey Rd	Mission St	One travel lane removed in each direction, a center left-turn lane added
			2	**Mission St**	Pasadena Ave	Grand Ave	One travel lane removed in each direction, a center left-turn lane added
			Green Lane	**Mission St**	Grand Ave	Fair Oaks Ave	
			2	**Mission St**	Fair Oaks Ave	East City Limit	
8	**Monterey**	Arroyo Seco Stables, Regional Connection, Crosstown Bikeway, Fair Oaks Commercial Corridor	2	**Monterey Rd (west)**	West City Limit	Monterey Rd/Gold Line	
			3	**Arroyo Verde Rd**	Marmion Wy/Arroyo Verde Rd	Monterey Rd	
			2	**Monterey Rd**	Monterey Rd/Gold Line	Fair Oaks Ave	Parking removed on one side of the street (side would be determined by the Public Works Department); Parking removed on both sides where there is a raised center median
			3	**Monterey Rd**	Fair Oaks Ave	East City Limit	
11	**Garfield/Grevelia**	Garfield Park, YMCA	3	**Grevelia St**	Fair Oaks Ave	Clark Ave	
			3	**Clark Pl**	Grevelia St	Garfield Ave	
			3	**Garfield Ave**	Clark Pl	Mission St	
			2	**Garfield Ave**	Mission St	Huntington Dr	Parking removed on one side of the street only (side would be determined by the Public Works Department)
18	**Arroyo Drive**	Arroyo Park	2	**Arroyo Dr**	Pasadena Ave	North City Limit	Parking removed on the west side of the street only

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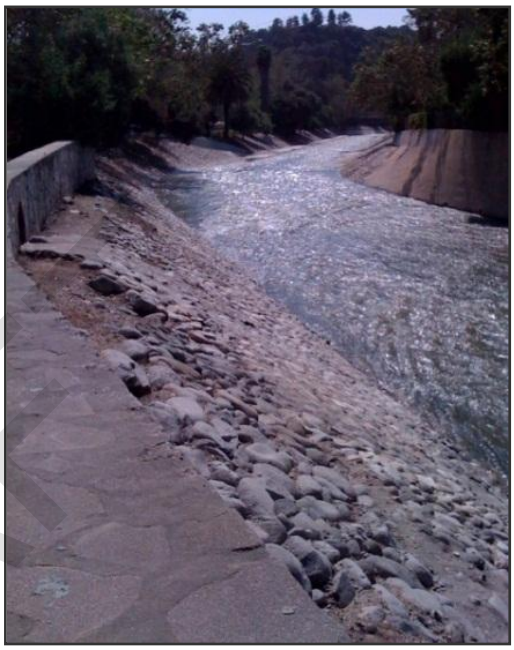
APPENDIX C
ARROYO SECO TRAIL PROJECT

A description of the Arroyo Seco Trail project is included in this appendix because there are special circumstances that need to be addressed.

The Arroyo Seco Trail is a multi-use trail project being undertaken by the City Community Services Department. It is currently in its planning and conceptual design stages. The Trail would be built on the south bank of the channel adjacent to the Arroyo Seco Golf Course along its southern half and along Lohman Lane along its northern half. The Arroyo Seco Trail is identified as Project 20 on page 4.9 of this Bicycle Master Plan.



Arroyo Seco near the Arroyo Seco Golf Course

Current planning efforts call for encroachment into the golf course driving range and into the golf course parking lot. Negotiations with the golf course are ongoing as to the extent of the proposed encroachments.

The planned design of the Trail would have varying widths at different locations, many of which are below the Caltrans-required width for a Class I Bike Path (12 feet). As shown in the figure below, the Trail would encroach into the clubhouse parking lot by 7 feet. An additional 5 feet would be needed to bring it up to the Caltrans required width of 12 feet.

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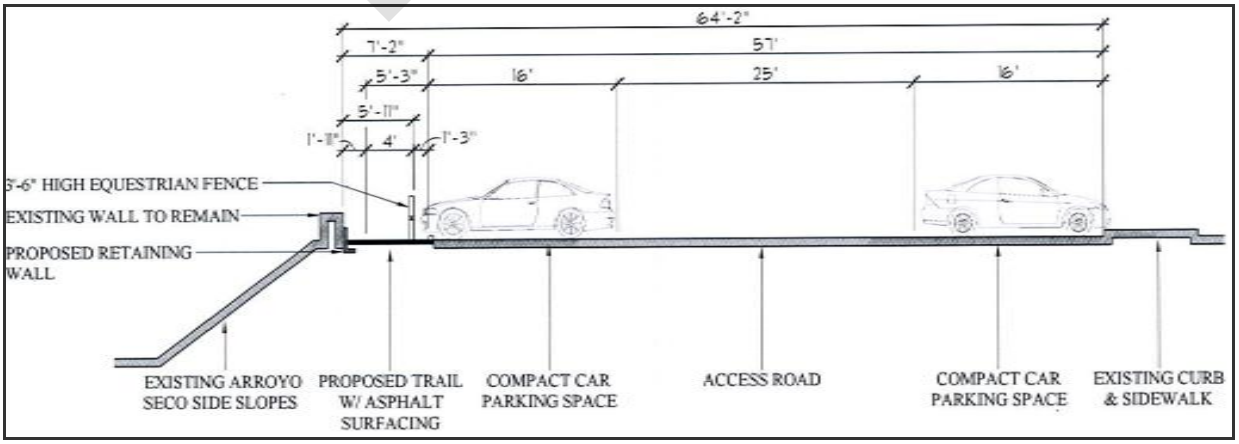
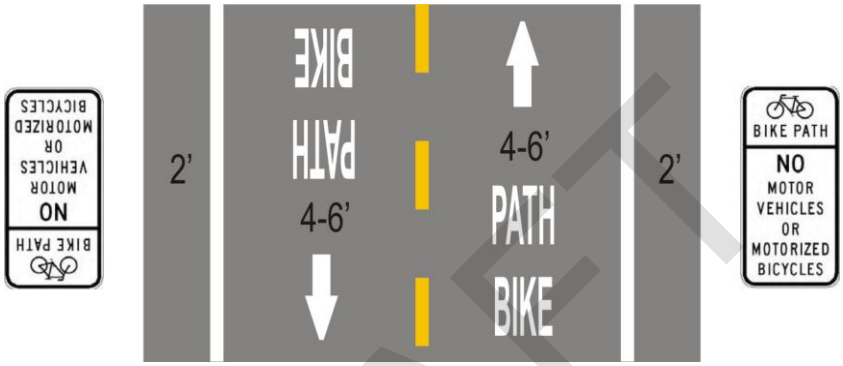
Figure C.1 Arroyo Seco Planned Trail at the Golf Course Parking Lot



An official Caltrans-standard Class I Bike Path needs to include a paved area of minimum 8 feet in width. An additional 2 feet on each side is required as "shoulders". The shoulders need not be paved, but they must be a graded ride-able surface. The entire area required for an official Class I Bike Path is 12 feet. Please see Figure C.2.

In order for the project to qualify for BTA funding and be officially classified as a Class I Bike Path, it would need to be designed to meet the minimum width requirement (as described above) along the project's entire length.

Figure C.2 Caltrans-Required Class I Bike Path Cross Section



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Class I Bike Path vs. Multi-Use Trail

If the Arroyo Seco Trail is not designed to meet the Caltrans requirement of 12 feet, it can still be constructed as a Multi-Use Trail. A Class I Bike Path must meet the minimum width, but a Multi-Use Trail for bicycle, pedestrian, or other non-motorized use has no width or pavement requirements.

For funding purposes, a Class I Bike Path is eligible for BTA and Metro grant funding as a transportation or commuting bicycle facility. Although a Multi-Use Trail less than 12 feet wide would not qualify for BTA or Metro funding, other funding resources are still applicable. Chapter 6 includes descriptions of funding resources available for bicycle facilities. Of these, the following two would be applicable to a Multi-Use Trail:

- Land & Water Conservation Fund (LWCF)
- Recreational Trails Program (RTP)

Additional recreational trail funding resources may also be available as part of other Federal, State, or Local programs.

Arroyo Seco Trail Connection to Los Angeles

The existing Arroyo Seco Class I Bike Path in the City of Los Angeles ends at the Arroyo Seco Stables with a short connection to Marmion Way. It does not end at the South Pasadena city limit. The planned Arroyo Seco Trail in South Pasadena extends to the city limit. Currently, there are no plans to fill the gap between the Path in Los Angeles and the planned Trail in South Pasadena.

A future planning study would be required to complete the gap and create a continuous bikeway facility. The planning study would likely require participation from the following departments and agencies outside South Pasadena:

- Caltrans District 7
- Metro
- State Senator Kevin Deleon's office
- City of Los Angeles Councilman Jose Huizar's office
- Los Angeles County Supervisor Michael Antonovich's office
- County of Los Angeles Dept of Public Works
  (Office managing the County Bicycle Master Plan)
- Arroyo Seco Foundation
- Council of Arroyo Seco Organizations
- Other stakeholders

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APPENDIX D
CATCH BASIN SURVEY

Purpose:

To update the locations and type of storm water collection basins as indicated on the proposed draft map (page D.2) on the streets identified as a part of the proposed bikeway projects in the 2005 South Pasadena City Bicycle Master Plan (adopted on 2/16/05)



Catch Basin type A



Catch Basin type B

The two grate types below are typically found in the city. Type A is usually a 4-6 foot long slot in the curb. But when the length of the catch basin is needed to be longer it is reinforced with steel rods to support the concrete above. Type B is very similar to Type A except that at every opening there are vertical and horizontal steel rods that help keep large debris from going into the storm water system.





Catch Basin type C

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This grate type is found in select areas around the city. These types of collection basins show up in area where the roads have a steeper grade than others. The drain has a slot in the curb as well as a grate in the gutter area. Alongside is a picture of the grate from above. For perspective a U.S. quarter-dollar coin is photographed on the grates.

Roadway Classifications:

Arroyo Verde Drive:
This is a local street.[i] The speed limit on this street is 25 mph, and on average this road handles up to 4,000 vehicles per day. [ii]

Meridian Avenue:
This is a collector street.[1] The speed limit on this street is 30 mph, and on average this road handles 4,000-20,000 vehicles per day. [2]

Oliver Street:
This is a collector street.[1] The speed limit on this street is 25 mph, and on average this road handles 4,000-20,000 vehicles per day. [2]

Orange Grove Avenue
This is a minor arterial street.[1] The speed limit on this street is 35 mph, and on average this road handles 4,000-20,000 vehicles per day. [2]

Via Del Rey:
This is a collector street.[1] The speed limit on this street is 25 mph, and on average this road handles 4,000-20,000 vehicles per day.[2]

Hermosa Street:
This is a local street.[1] The speed limit on this street is 25 mph, and on average this road handles up to 4,000 vehicles per day.[2]

Fair Oaks Avenue:
This is a Major Arterial street.[1] The speed limit on this street is 35 mph, and on average this road handles 20,000-40,000 vehicles per day.[2]

State Street:
This is a local street.[1] The speed limit on this street is 35 mph, and on average this road handles up to 4,000 vehicles per day.[2]

Raymondale Drive:
This is a local street.[1] The speed limit on this street is 25 mph, and on average this road handles up to 4,000 vehicles per day.[2]

Grevelia Street:
This is a collector street.[1] The speed limit on this street is 25 mph, and on average this road handles up to 4,000 vehicles per day. [2]

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Bank Street:
This is a local street. [1] The speed limit on this street is 25 mph, and on average this road handles up to 4,000 vehicles per day.[2]

Columbia Street:
This is a Minor Arterial street.[1] The speed limit on this street is 25 mph, and on average this road handles 4,000-20,000 vehicles per day.[2]

Clark Place:
This is a collector street.[1] The speed limit on this street is 30 mph, and on average this road handles 4,000-20,000 vehicles per day.[2]

Garfield Avenue:
This is a Minor Arterial street.[1] The speed limit on this street is 30 mph, and on average this road handles 4,000-20,000 vehicles per day.[2]

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Results:

		Catch Basin Types		
Main Street	Cross Streets	Type A	Type B	Type C
Meridian Ave	Kendall Ave- Maple St	0	0	0
	Maple St- Pine St	0	2	0
	Pine St-Oak St	0	0	0
	Oak St- Monterey Rd	5	0	0
	Monterey Rd- Oxley St	0	2	1
	Oxley St- El Centro St	0	0	0
	El Centro St-Mission St	3	0	0
	Mission St- Magnolia St	0	1	0
	Magnolia St- Grevelia St	0	0	0
	Grevelia St-Foothill St	0	0	5
	Foothill St- Prospect Cir	4	0	0
	Prospect Cir- Oliver St	1	0	0
Arroyo Verde Rd	City Limit- Arroyo Verde Rd	2	0	0
	Arroyo Verde Rd- Pasadena Ave	0	0	2
	Arroyo Verde Rd- Monterey Rd	0	2	0
Grevelia St	Meridian Ave- Fairview Ave	1	0	0
	Fairview Ave- Fremont Ave	2	0	0
	Fremont Ave-Mound Ave	1	0	0
	Mound Ave- Fair Oaks Ave	1	0	0
	Fair Oaks Ave- Brent Ave	0	0	0
	Brent Ave- Park Ave	0	0	0
	Park Ave-Stratford Ave	1	0	0
Columbia St	Orange Grove Ave- Pasadena Ave	0	1	0
	Pasadena Ave- Oaklawn Ave	0	0	0
	Oaklawn Ave- Fair Oaks Ave	2	0	0

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Type A



Type B



Type C



		Catch Basin Types		
Main Street	Cross Streets	Type A	Type B	Type C
Fair Oaks Ave	Huntington Dr- Spruce St	1	0	0
	Spruce St- Rollin St	0	3	0
	Rollin St- Bank St	0	0	0
	Bank St-Lyndon St	0	0	0
	Lyndon St- Monterey Rd	0	0	0
Via del Rey	Camino Verde-Camino del Sol	0	9	0
	Camino del Sol-Indiana Ave	0	3	0
	Indiana Ave- Flores del Oro	0	6	3
	Flores del Oro- Monterey Rd	0	0	6
Bank St	Fremont Ave- Fair Oaks Ave	0	0	0
	Fair Oaks Ave- Marengo Ave	0	2	0
State St	Fair Oaks Ave- Raymondale Dr	0	0	3
	Raymondale Dr- City Limit	0	0	0
Raymondale Dr	State St- Amberwood Dr	0	0	2
Hermosa St	Grand Ave- Columbia St	0	0	0
Oliver St	Meridian Ave- Orange Grove Ave	0	0	0
Orange Grove Ave	Oliver St- Columbia St	0	0	0
Clark Pl	Stratford Ave-Garfield Ave	1	0	0
Garfield Ave	Mission St- Montrose Ave	0	2	0
	Montrose Ave- Milan Ave	0	0	0
	Milan Ave- Garfield Ave	0	0	0

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Type A



Type B



Type C



References

[i] City of South Pasadena; (adopted, Oct. 1998) *South Pasadena General Plan*, Sections 3.2A-3.2B, pgs

[ii] Willdan, (March 2008), *Engineering and Traffic Survey for the City of South Pasadena*, pg 11-17

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APPENDIX E
SURVEY OF TRANSIT STOPS

Purpose:

The purpose of this report is to provide a reference guide and matrix categorizing and mapping the locations of public transit stops in the City of South Pasadena. These stops are served by Los Angeles County Metropolitan Transportation Authority (Metro) transit lines. The Metro stops located within the City serve several Metro Bus lines and one Metro Light Rail Station (Gold Line).

Organization:

This guide has three major components; stop typology (pages E.1-E.2), transit maps (pages E.3-E.6), and a matrix of transit stop amenities (pages E.7-E.10). The three are cross-referenced for easy identification of transit stop locations, amenities, and transit lines they serve.

Types of Transit Stops:

Metro Stops with Benches



Metro Bus stop at Garfield & Monterey



Metro Bus stop at Mission & Milan

Above are examples of a typical bus stop found in the City of South Pasadena. These bus stops serve the Metro Bus system. The stops consist of a concrete bench, a trash can, and a bus line identification sign. At some locations, transit maps are posted. None of the bus stops in the City has shelters.

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Metro Stops with Only a Sign



Metro Bus Stop at Mission & Meridian



Metro Bus Stop at Mission & Meridian

These stops are configured for the Metro Bus system. It is marked only by a bus line identification sign and usually has no other amenities.

Gold Line Light Rail Stop:



Gold Line Station at Mission & Meridian

This transit station is located at Mission Street and Meridian Avenue and is the only light rail station in the City of South Pasadena. It has real-time arrival and departure times, maps, shelters, benches, lighting, ticket machines, and bike racks.

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Metro and Local Bus Maps:

Map of Metro Bus Lines

This map depicts the routing of each bus line within the City of South Pasadena.

Map of Metro Bus Stops

This map depicts the location of bus stops within the City of South Pasadena.

Map of Metro Bus Stops for Amenities Matrix

This map, when used in conjunction with the Bus Stop Matrix on pages E.7-E.10, identifies amenities at specific stops.

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Map of Metro Bus Lines

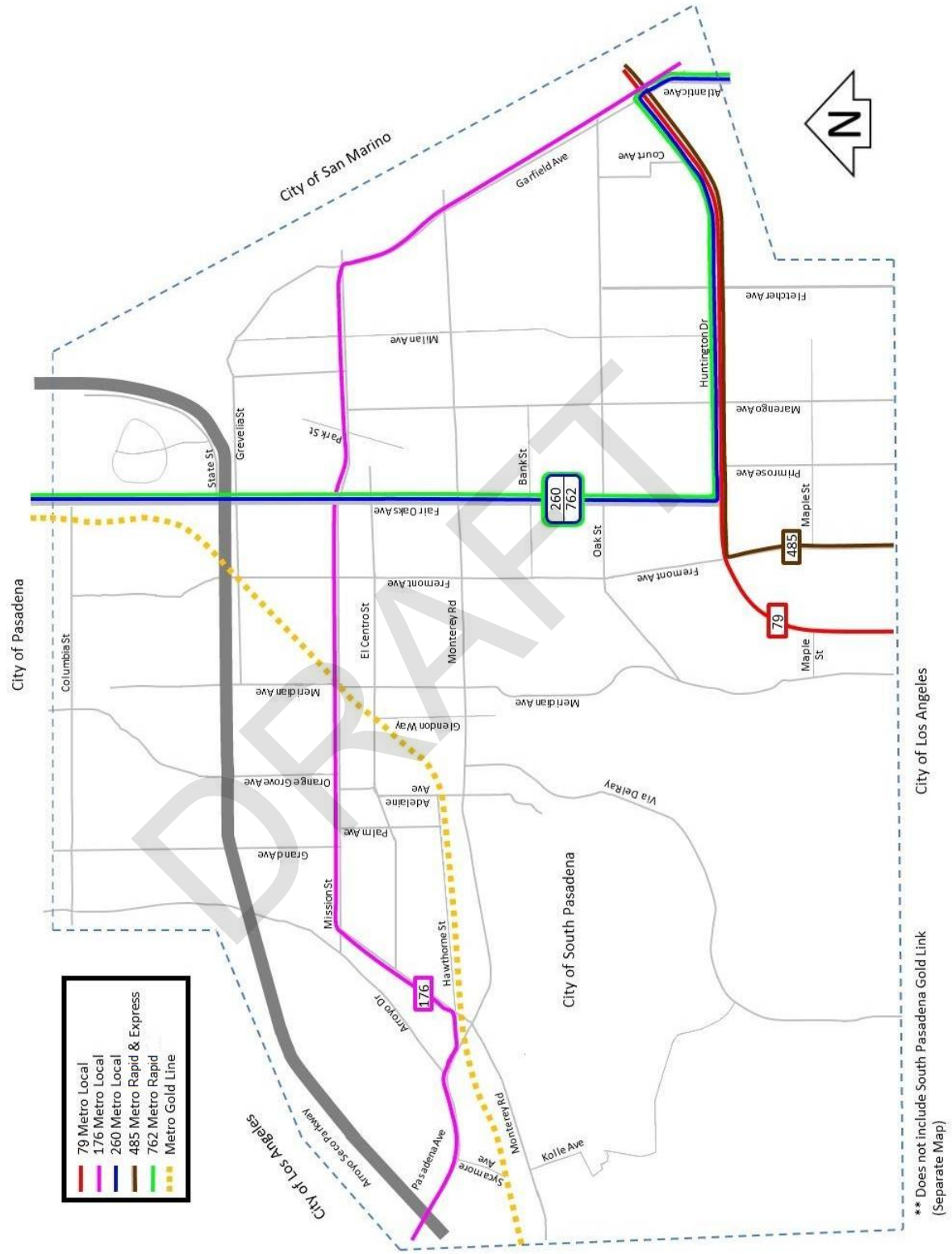

Figure 1: Map of Transit Lines

Map of Metro Bus Stops

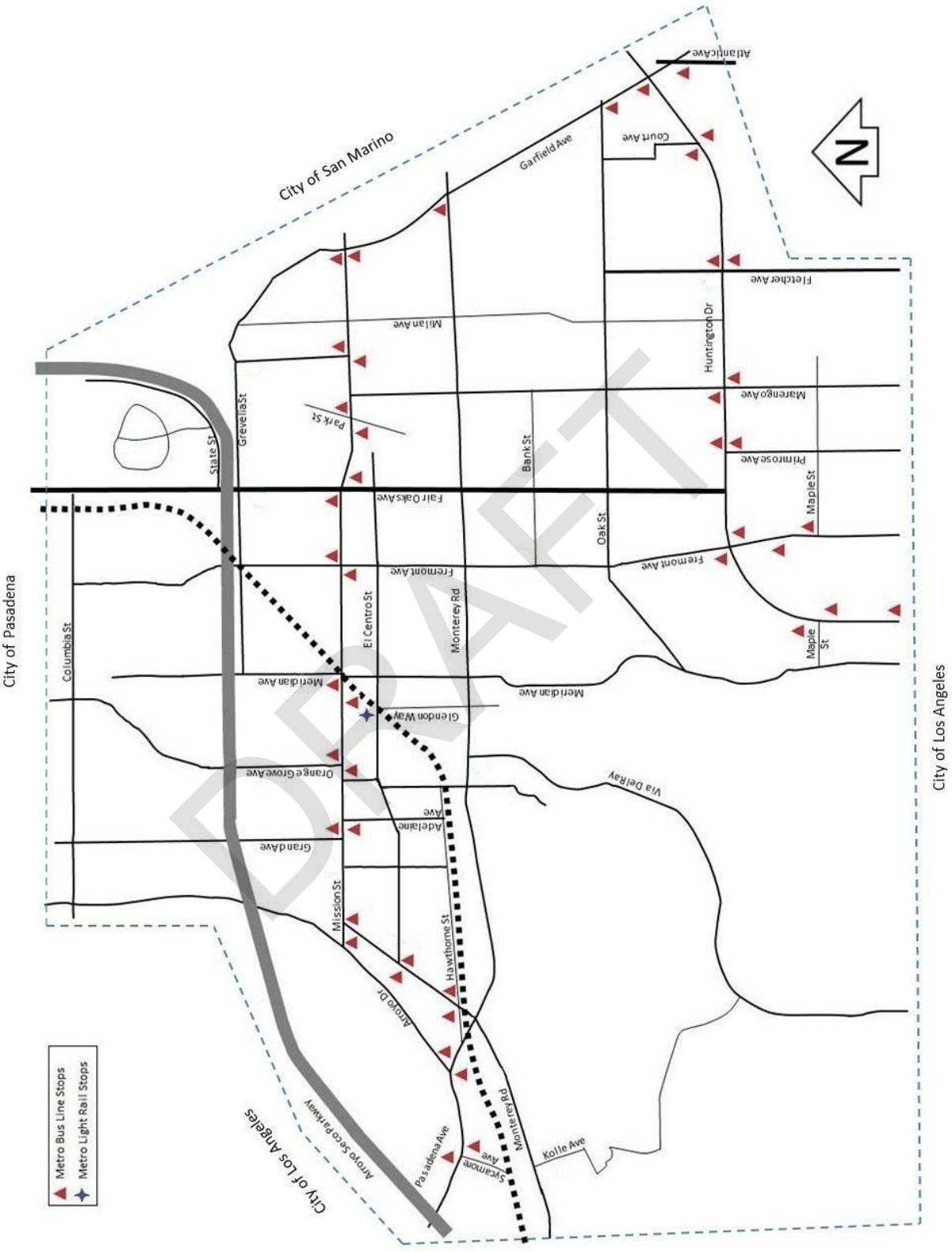

Figure 2: Map of Transit Stops

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Map of Metro Bus Stops for Amenities Matrix.

This map, when used in conjunction with the Bus Stop Matrix on pages E7-E10, identifies amenities at specific stops.

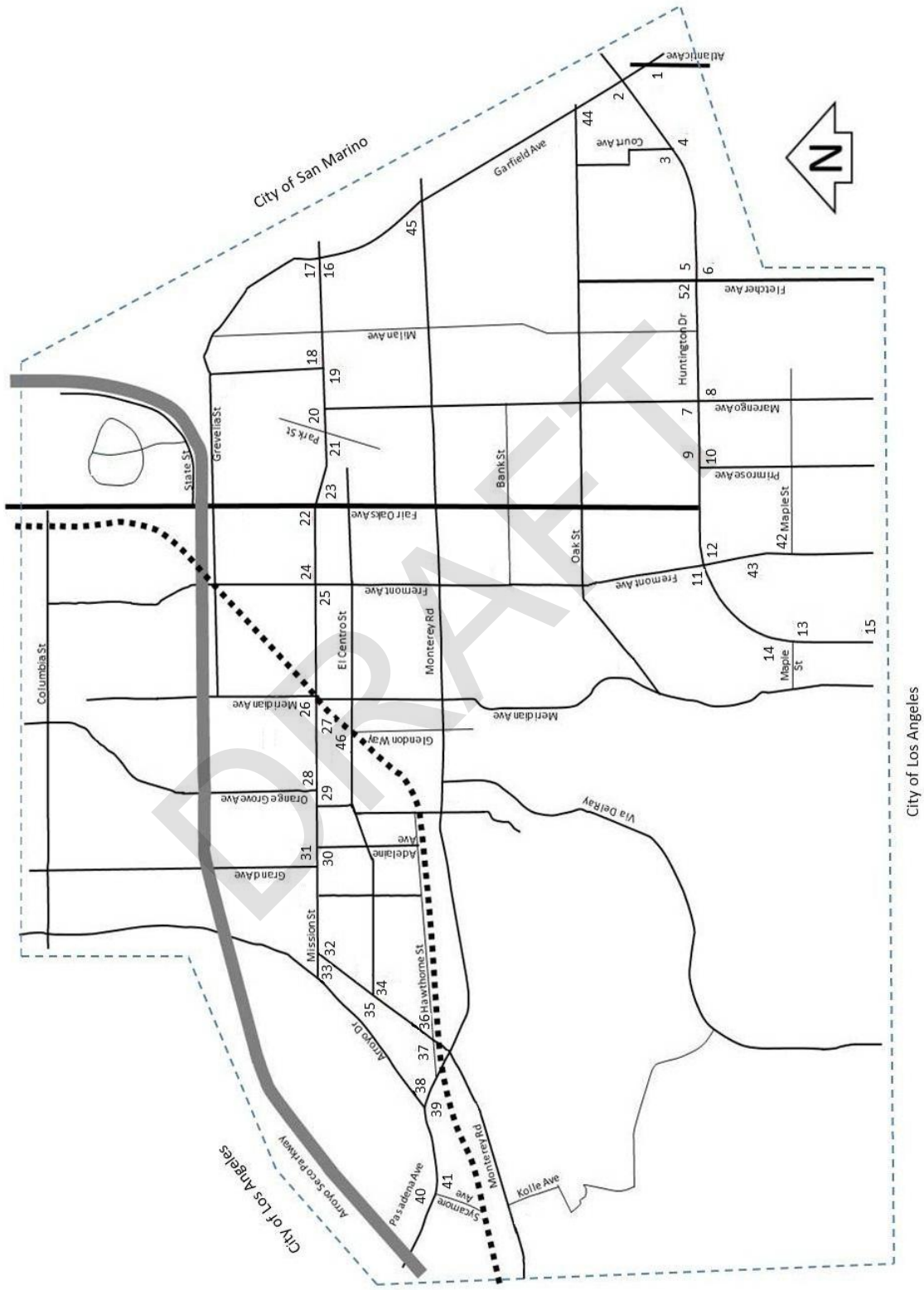

Figure 3: Map of Transit Stops for Amenities Matrix

Metro Bus Stop Amenities Matrix

	Stop ID	Side of Street	Lines	Transit Map	Benches	Shelter	Line ID Sign		Trash	NextTrip Sign*	Ped. Light	Street Light	Real Time Sign	Real Time Smart Phone App	Bike Racks	Operated by Metro	Operated by So. Pas	Posted Time Table	Bike Racks on Bus
Atlantic/Garfield																			
	1	West	260, 762	✓			✓							✓		✓			✓
Huntington/Garfield																			
	2	North	79, 260, 485, 762	✓	✓		✓		✓					✓		✓			✓
Huntington/Court																			
	3	North	79, 260, 485				✓		✓					✓		✓			✓
	4	South	79, 260, 485		✓		✓		✓			✓		✓		✓			✓
Huntington/Fletcher																			
	5	North	79, 260, 485		✓		✓		✓			✓		✓		✓			✓
	6	South	79, 260, 485		✓		✓		✓			✓		✓		✓			✓
Huntington/Marengo																			
	7	North	79, 260, 485, 762	✓	✓		✓		✓			✓		✓		✓			✓
	8	South	79, 260, 485, 762	✓	✓		✓		✓			✓		✓		✓			✓
Huntington/Primrose																			
	9	North	79, 485		✓		✓		✓			✓		✓		✓			✓
	10	South	79, 485		✓		✓		✓			✓		✓		✓			✓
Huntington/Fremont																			
	11	North	79, 260, 485		✓		✓		✓					✓		✓			✓
	12	South	79, 260, 485		✓		✓		✓			✓		✓		✓			✓
Huntington/Maple																			
	13	East	79		✓		✓		✓			✓		✓		✓			✓
	14	West	79		✓		✓		✓					✓		✓			✓
Huntington/Alhambra																			
	15	East	79		✓		✓		✓			✓		✓		✓			✓

*** See Page E.10**

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Metro Bus Stop Amenities Matrix (Continued)

	Stop ID	Side of Street	Lines	Transit Map	Benches	Shelter	Line ID Sign		Trash	NextTrip Sign **	Ped. Light	Street Light	Real Time Sign	Real Time Smart Phone App	Bike Racks	Operated by Metro	Operated by So. Pas	Posted Time Table	Bike Racks on Bus
Mission/Garfield																			
	16	North	176		✓		✓		✓			✓		✓		✓			✓
	17	South	176		✓		✓		✓					✓					✓
Mission/Milan																			
	18	North	176		✓		✓		✓			✓		✓		✓			✓
	19	South	176				✓					✓		✓		✓			✓
Mission/Park																			
	20	North	176		✓		✓		✓					✓		✓			✓
	21	South	176		✓		✓		✓					✓		✓			✓
Mission/Fair Oaks																			
	22	North	176		✓		✓		✓			✓		✓		✓			✓
	23	South	176		✓		✓		✓					✓		✓			✓
Mission/Fremont																			
	24	North	176		✓		✓		✓			✓		✓		✓			✓
	25	South	176		✓		✓		✓			✓		✓		✓			✓
Mission/Meridian																			
	26	North	176				✓							✓		✓			✓
	27	South	176		✓		✓		✓			✓		✓		✓			✓
Mission/Orange Grove																			
	28	North	176		✓		✓		✓					✓		✓			✓
	29	South	176		✓		✓		✓					✓		✓			✓
Mission/Adelaine																			
	30	South	176		✓		✓		✓			✓		✓		✓			✓
Mission/Grand																			
	31	North	176		✓		✓		✓			✓		✓		✓			✓
**** See Page 10**																			

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Metro Bus Stop Amenities Matrix (Continued)

	Stop ID	Side of Street	Lines	Transit Map	Benches	Shelter	Line ID Sign		Trash	NextTrip Sign**	Ped. Light	Street Light	Real Time Sign	Real Time Smart Phone App	Bike Racks	Operated by Metro	Operated by So. Pas	Posted Time Table	Bike Racks on Bus
Pasadena/Mission																			
	32	East	176		✓		✓		✓			✓		✓		✓			✓
	33	West	176		✓		✓		✓			✓		✓		✓			✓
Pasadena/El Centro																			
	34	East	176		✓		✓		✓			✓		✓		✓			✓
	35	West	176		✓		✓		✓			✓		✓		✓			✓
Pasadena/Hawthorne																			
	36	East	176		✓		✓		✓			✓		✓		✓			✓
	37	West	176		✓		✓		✓					✓		✓			✓
Pasadena/Arroyo																			
	38	North	176		✓		✓		✓					✓		✓			✓
	39	South	176		✓		✓		✓					✓		✓			✓
Pasadena/Sycamore																			
	40	North	176		✓		✓		✓					✓		✓			✓
	41	South	176		✓		✓		✓					✓		✓			✓
Fremont/Maple																			
	42	East	485		✓		✓		✓			✓		✓		✓			✓
Fremont/Huntington																			
	43	West	485		✓		✓		✓			✓		✓		✓			✓
Garfield/Oak																			
	44	East	176		✓		✓		✓					✓		✓			✓
Garfield/Monterey																			
	45	West	176		✓		✓		✓					✓		✓			✓

**** See Page 10**

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Metro Bus Stop Amenities Matrix (Continued)

	Stop ID	Side of Street	Lines	Transit Map	Benches	Shelter	Line ID Sign		Trash	NextTrip Sign**	Ped. Light	Street Light	Real Time Sign	Real Time Smart Phone App	Bike Racks	Operated by Metro	Operated by So. Pas	Posted Time Table	Bike Racks on Bus
Mission/Meridian																			
	46	South	Gold Line	✓	✓	✓	✓		✓		✓		✓	✓	✓	✓		✓	✓
**** See Page 10**																			

*****NexTrip Signs:***

NexTrip is a new program from Metro that will provide real-time bus departure times for Metro buses. These blue signs will soon be added to each stop to assist in planning riders' trips. Each stop has a unique stop number, and by entering any stop number in NexTrip, the predicted departure times for all routes serving that stop are displayed.



Example of NexTrip Sign

Each bus have an onboard GPS system that tracks its location. As a bus travels along its route, NexTrip tracks its location and provides an estimate of when the bus will arrive at a selected stop. Access to NexTrip is available by going to metro.net/nextrip, by texting Metro and the stop number to 41411 , by using m.metro.net on a mobile web-enabled phone, or by calling 511 or (323) GO-METRO and saying "NexTrip". So, simply choose your route, direction and stop location and NexTrip will inform you when the next buses will be leaving that stop. For more information about NexTrip please visit the Metro Website at www.metro.net/service/nextrip/

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Attachment B — Fremont Avenue, Fair Oaks Avenue & Huntington Drive Study, Toole Design Group (2024)

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TOOLE DESIGN

Fremont, Fairoaks & Huntington Drive

City Of South Pasadena



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ACKNOWLEDGEMENTS

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PREPARED BY

Toole Design Group

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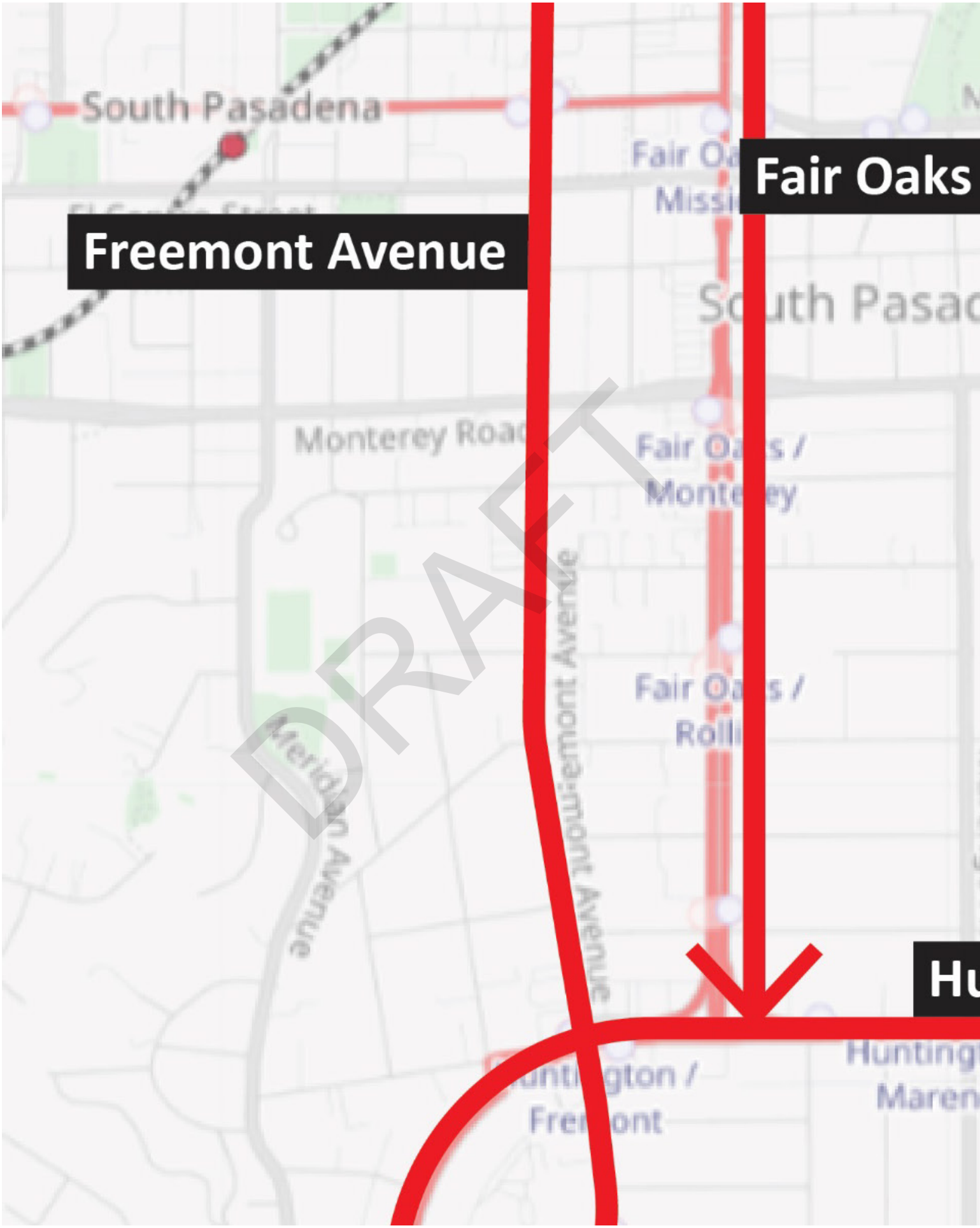
Freemont Avenue
Fair Oaks
South Pasadena
Monterey Road
Meridian Avenue
Fremont Avenue
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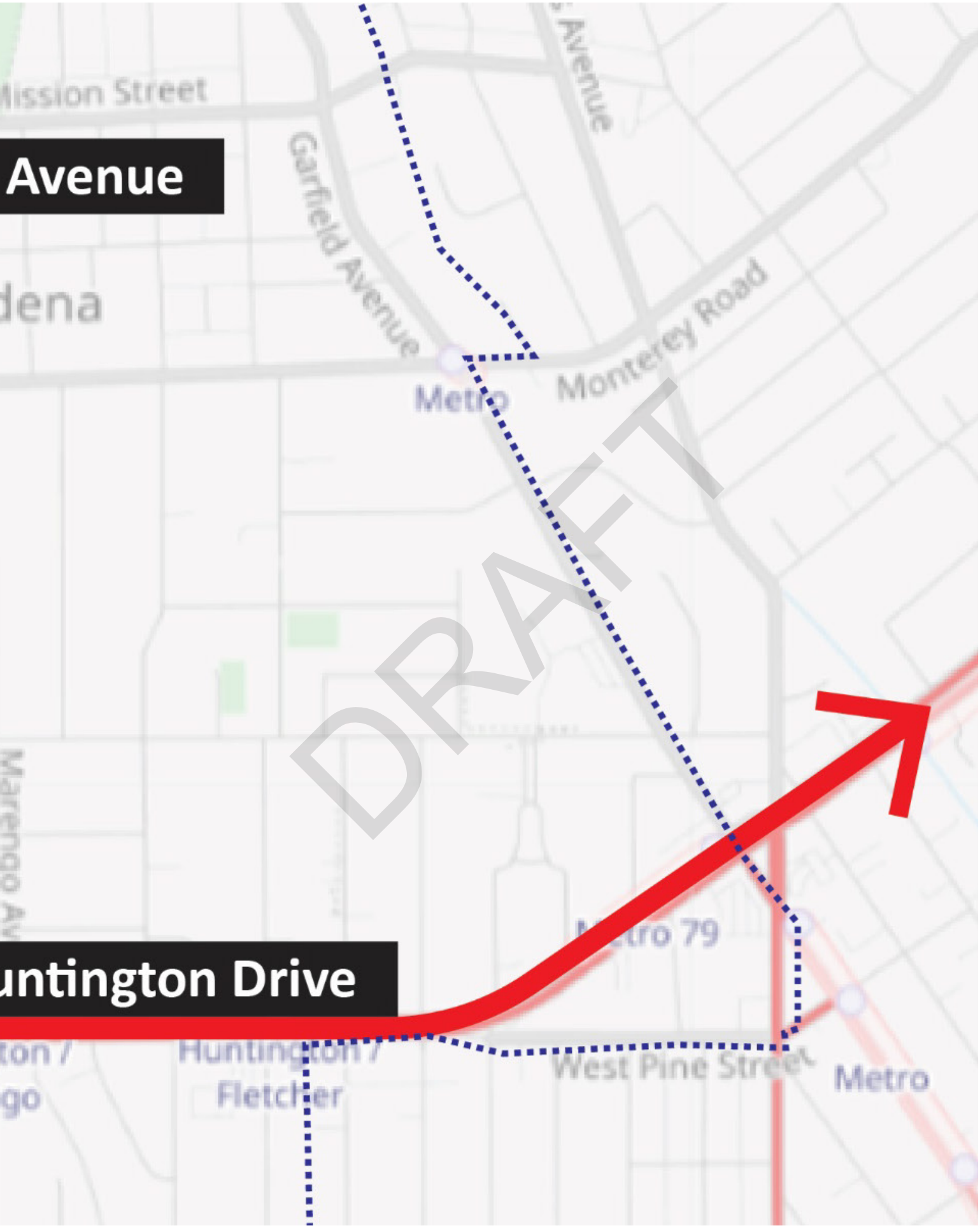
Avenue
Garfield Avenue
Monterey Road
Metro
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untington Drive
West Pine Street
Metro

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INTRODUCTION

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City of South Pasadena

The City of South Pasadena (population 26,000) retained Toole Design to provide design direction for the city's three busiest arterial streets: Fair Oaks Avenue, Huntington Drive, and Fremont Avenue. This report summarizes the evaluation, community input, design development, and recommendations associated with this project, emphasizing the rationale tradeoffs, and values-based approach the community requested.

While the process, values and overall approach section in these memoranda are similar, as these aspects were generally the same for each street, each memorandum focuses on only one street as the projects related to each street follow different timelines, funding mechanisms, etc. This memorandum focused on Huntington Drive.

Design direction and recommendations are grounded in:

1. the values, aspirations, and desired roles for the streets as provided by City staff
2. Inout from officials, stakeholders, and public during the study process;
3. the local context;
4. equity;
5. best practices;
6. the State of California's expressed goal to reduce vehicle-miles-traveled (VMT).

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Figure 1: Intersection at Fremont Avenue & Mission Avenue

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STUDY / CHARETTE PROCESS

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Charette Process

The City and Toole Design originally considered studying the three arterials sequentially in three separate studies. This would have resulted in duplicated public and stakeholder outreach efforts. To save time, reduce costs, and increase the overall effectiveness of the process, the three studies were combined into one. This combined process also reduced "meeting fatigue" for everyone involved.

An eight-person design team was formed to undertake the study. Six of the designers were divided into three, two-person teams, with one team dedicated to each street. The remaining two team members, the team's most senior designers, worked on all three streets. The work for the study was conducted at a temporary studio provided by the City at the South Pasadena Public Library on Oxley Street. All the needed maps, past studies, key City staff, and design team members were together in this shared space, allowing for maximum collaboration. The studio's location also allowed for easy field visits and convenient access for stakeholders and the public to participate in various meetings and open studio hours. Furthermore, there were a variety of pin-ups during which the project team and City staff members discussed the individual streets, the three streets together, and the general transportation issues facing the city and L.A. County.

A "two-phase charrette" design process was used. The first phase was the "discovery phase" that focused on:

- learning about the streets from reports, maps, stakeholders, City staff, and members of the public;
- site visits, and
- developing "starter ideas."

The second phase was the "design phase," during which the preliminary concepts were discussed, altered, and refined, and became final recommendations. The two phases were scheduled a few weeks apart. During those in-between weeks, additional stakeholder involvement occurred, and the starter ideas evolved into preliminary concepts.

A variety of means were used for stakeholder involvement, including public meetings, receiving emails, stakeholder meetings with groups and individuals, and open studios hours during which people could come in and informally discuss any topic and any street with the design team. The participatory nature of the process resulted in two-way communication and feedback loops between participants, which helped shape and reshape the designs until an informed consensus was achieved. The process creating a shared understanding of challenges and feasible changes that will help the city evolve the streets in accordance with the community's values and vision. The design concepts were completed in late 2023 and received public support. Concepts were advanced to provide as much detail as possible such that in subsequent processes they could be furthered in a manner that preserves the intent for the city and the specific direction of the streets.

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Figure 2: Charette Process including site walks, open house, workshops, and stakeholder interviews

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CONSENSUS FOR A HOLISTIC SOLUTION

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Consensus for a Holistic Solution

L.A. County's traffic problems have a national reputation. For seven decades, the County, the 88 cities that comprise it, CALTRANS, FHWA and other transportation organizations have spent billions of dollars on conventional transportation strategies, attempting to solve traffic congestion, increase motor vehicle speeds, and accommodate higher volumes of motor vehicles. Yet traffic problems worsened, quality of life dropped, kids could not safely walk to school, crashes increased, neighborhoods became divided and isolated, and businesses suffered.

The design team heard story after story about overly busy streets preventing residents from getting out of their own driveway, making it uncomfortable for children to walk to school, making it infeasible to cross the street and isolating whole neighborhoods. When asked if more conventional measures (e.g., adding lanes, reducing access, etc.) were needed to increase car-carrying capacity, the response was that the streets would fill up again, the problems would return, and the challenges would involve even more traffic. After 70 years of conventional strategies delivering poor outcomes, it was concluded that a different approach was needed.

There was general community consensus on the following issues:

1. too much traffic (mostly cut-through traffic with no origin or destination in the city);
2. excessive design speeds;
3. aggressive driving;
4. lack of comfortable pedestrian and cycling facilities, and
5. the past conventional solutions that had exacerbated problems.

Residents expressed a fear that changes to improve safety, livability, and multimodal mobility on Fremont, Huntington, and Fair Oaks would inadvertantly cause negative side effects on other streets.A holistic solution that addressed arterial streets city-wide was needed.

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> "We cannot solve out problems with the same thinking we used when we created them"
>
> - Albert Einstein



Figure 3: Existing Pedestrian Crossing at Huntington Drive

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THE HOLISTIC SOLUTION - TRAFFIC REDUCTION

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The Holistic Solution – Traffic Reduction

The process, discussions, ideas, feedback loop and considerations all coalesced around a consensus–a city-wide "traffic reduction" was needed. Traffic reduction is also known as a "vehicle-miles-traveled (VMT) reduction." This is achieved by making a combination of changes summarized in the "Universal Equation for Land Use and Transportation Planning," shown in Figure 1. For South Pasadena, these changes include integrated land use and transportation changes. In total, there were six city-wide recommendations that rose to the top as the right combination for South Pasadena:

1. reduce car-carrying capacity on all of the affected arterial and collector streets via road diets;
2. provide a consistent car-carrying capacity along the streets to avoid bottlenecks in the city;
3. use traffic calming/speed reduction measures to achieve maximum speeds of 25 mph;
4. use the reclaimed space in the rights-of-way for separated bike facilities, wide sidewalks, transit infrastructure, and street trees;
5. encourage land use mixes and densities such that people can find most of their daily and weekly needs nearby (i.e., in the neighborhood, in South Pasadena, or close by), to reduce average trip lengths; and
6. encourage walking and cycling for shorter trips, and transit for long trips.

While the focus of this effort was limited to South Pasadena, it was observed that similar benefits could be achieved across the region were other municipalities to adopt similar strategies.

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Figure 4: Intersection at Huntington Drive & Fremont Avenue

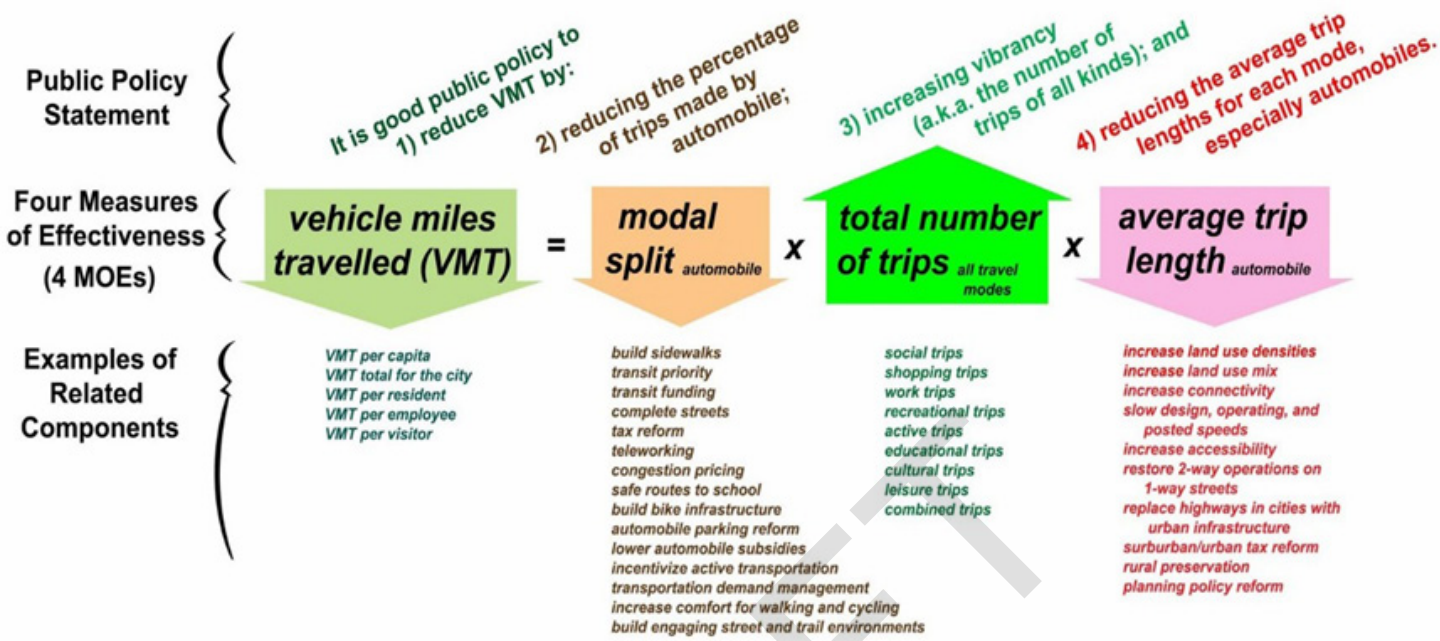

Figure 5: The Universal Equation for Reducing Vehicle Miles Traveled (VMT)

Reducing Vehicle Miles traveled, is how cities around the world successfully reduced their traffic volumes while increasing vibrancy (i.e., populations, social connectedness, and economy). Without exception, these cities first tried conventional strategies, starting after WWII, and, at some point, concluded:

1. that those strategies were harming their populations, community health, and economies; and
2. that holistic solutions were needed that reduced their traffic volumes city-wide.

Beginning in the 1970s, several cities pioneered strategies to reduce "vehicle miles traveled" by decreasing the modal split for motor vehicles and decreasing average trip lengths, while simultaneously increasing their vibrancy. Figure 5 shows several examples of changes involving land use, transportation, taxation, and policy changes, listed below the four variables.

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PROOF OF CONCEPT

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Figure 6: Before and After of a Street in Copenhagen



Figure 7: Before and After of a Plaza and Street in Copenhagen



Figure 8: Before and After of a Street in Copenhagen

Where does the traffic go?

People readily accept the idea that traffic volumes grow as car-carrying capacity is added because that is the pattern they have seen in L.A. County for 70 years. To many, it might seem odd that it is feasible for cities to reduce their traffic volumes. However, these same people readily acknowledge that lower traffic volumes would be desirable for many reasons. Fortunately, during the study process, South Pasadena residents were curious and open-minded. They wanted to see examples of traffic reduction and understand how it worked.

Traffic volumes in Cities are Adjustable

In the early 1970's, a few people in leadership positions in the City of Copenhagen, Denmark, noticed that the city had evolved to become car-dependent. Streets were dominated by motor vehicles, parking and congestion problems were the norm, and motor vehicle use had created unsafe and unhealthy places. Their car-centric transportation system was expensive, polluting, and killing too many people through collisions. At the time, the conventional transportation paradigm dominated public policy, cars were highly popular, and attitudes about the necessity of such car use were bullish. Seeking a different outcome, the city reprioritized their transportation funding, increased public awareness, changed public policy, and implemented a variety planning and design measures. Over about decade, the city emerged from car-dependency into a model city for multimodalism and sustainable planning.

Copenhagen could not afford to continue with car-dependency. Pedestrian, bike, and transit infrastructure, combined with good land use and transportation planning, was far less expensive than conventional practices. "Traditional" practices (i.e., pro vibrancy practices such as slower speeds, connected streets, transit, land use proximities, etc.) brought trip ends closer together. That, combined with multimodal transportation options, resulted in an increase in social and economic exchange, and smaller environmental footprints, as per the Universal Equation.

During this project's charrette, three sets of before and after pictures illustrating what occurred during this transformation, were featured.

Copenhagen was not alone in this paradigm shift and transformation. Many European cities, large and small, made similar changes and many more continue on more sustainable trajectories to this day. The City of Paris, for example, has undertaken many similar measures over the last few decades. In 2016, Paris removed the Pompidou Expressway along the Seine River and converted it into a pedestrian space. There was an initial uproar from motor vehicle advocates and warnings of terrible resulting congestion. The terrible congestion did not happen. The city got better, air quality improved, and the waterfront flourished.

These days, Paris has an upcoming park and trail plan that that will permanently replace the temporary changes shown in Figure 9.

Though Paris has a long-standing reputation as a world-class city, its leaders are not complacent. They are concerned that Paris' level of car-dependency and its effects on air pollution and climate change are still excessive. To advance their sustainability values further, the number of car lanes on the Champs de Elysée will be reduced from eight to four, 6,000 car parking spaces will be removed, and through-traffic will be banned in the downtown.

This is despite the facts that the eight lanes and 6,000 parking spaces are highly used by motorists, and many motorists drive through the downtown every day.

In Europe, transportation professionals are comfortable with the reality that traffic demand, traffic volumes, VMT and other surrogates for "car use" is flexible and it can be increased or decreased by altering variables such as public policy, infrastructure decisions, subsidies, street design, and parking policy. They have applied these reforms in a variety of contexts–from small towns to big cities, from flat places to hilly places, and from winter cities to Mediterranean cities. Motorists complain as their dominance is reduced through road diets, traffic calming and congestion pricing. However, every time populations adapt, cities get better, and people are generally happier, healthier, and better off. In North America, conventional traffic engineers mistakenly assume traffic volume is analogous to an incompressible fluid that must go somewhere. It is a "demand" that requires accommodation and for society to comply and adapt to it.

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Figure 9: Before and After Images of the Waterfront Along the Seine River in Paris

Traffic volumes are Adjustable in North American Cities Too

In 1988, the Embarcadero Freeway in San Francisco had an Annual Daily Traffic Volume (ADT) of more than 100,000. The Freeway was destroyed in the Loma Prieta Earthquake in 1989 and a lengthy debate about whether it should be rebuilt followed. CALTRANS' traffic model predicted terrible traffic congestion without the highway. According to the model, the freeway was needed to meet the predicted "demand." However, the bump in congestion that resulted after the highway was destroyed was short-lived, as people quickly adapted. Eventually, the debate over the highway reconstruction took long enough that it became clear that the city didn't need the highway and would likely be better off without it. And it was.

Where did the traffic go? Some motorists used other streets. Some people used BART. However, about half of the traffic volumes seemed to evaporate and could not be accounted for. Over the last 30 years or so, the enormous traffic volumes never came back. A boulevard was built with a streetcar line in the center, along with wide sidewalks and increased connectivity. New housing development and jobs were attracted to the formally car-dominated area. Trip-making increased but traffic volumes did not. The key was a reduction in long-distance car trips and an increase in walking, bike, and transit trips (as per the Universal Equation).

Social and economic exchange occurred more effectively and more efficiently without the highway. CALTRANS' model was wrong.

In the mid-1990s, the arterial streets in downtown West Palm Beach were congested despite decades of widening arterials, increasing design speeds, and synchronizing the traffic signals. The city suffered from rampant disinvestment.. About half of the buildings in the downtown had been torn down or were vacant. 80% of the buildings on the main shopping street, Clematis Street, were vacant. Elsewhere downtown, entire city blocks were vacant land. The City proposed conducting road diets on the arterial streets, beautifying the city, and infilling the vacant lots with five and ten story mixed-use buildings.

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Figure 10: Downtown San Fransico Before and After the Earthquake

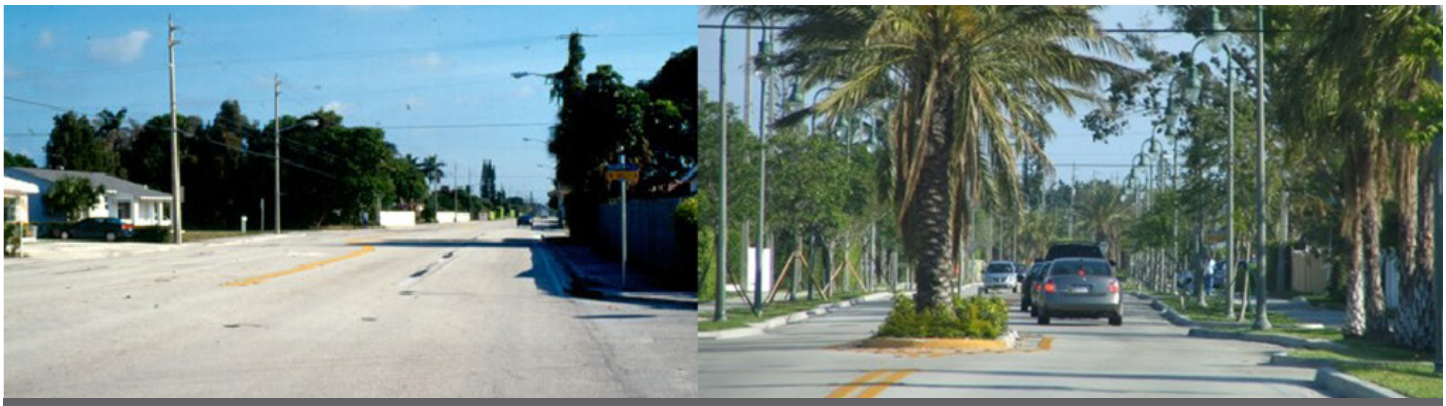

Figure 11: Before and After a Road Diet of a Five-Lane Arterial in West Palm Beach

Palm Beach County strongly objected to the proposed changes. They used the MPO's traffic model to "test" and evaluate the City's proposals. It predicted catastrophic congestion if the proposed buildings were built and catastrophic congestion if the proposed road diets were implemented. If both the additional buildings and the road diets were built and implemented, the model predicted the city would come to a standstill. The County felt that the arterial streets in the downtown needed widening to accommodate the increased traffic volumes from the proposed development.

Over the next few years, through good policy and strategic investment, the City turned itself around economically, attracted billions of dollars in private investment, built five to 10-story, mixed use, buildings on most of the vacant land, and implemented a series of road diets on the arterial streets in, and approaching, the downtown. Vacant buildings were restored and filled up with workers and residents. Congestion did not get worse–and the city became more prosperous.

The traffic model was wrong.

By the early 2010s, the City of South Bend had experienced decades of disinvestment in its downtown. Like West Palm Beach, South Bend had also widened, sped up, and one- wayed their downtown arterial streets. They had even begun building a ring highway around the downtown. The result was car-dependency, disinvestment, empty buildings, congestion, and surface parking lots. Then the City embarked on their Smart Streets Initiative. Through the initiative all the downtown's one-way streets were restored to two-way and arterial streets were dieted and turned into complete streets. Hundreds of millions of dollars of private investment flowed into the downtown. New housing was built, and employment opportunities increased

To this day, the City continues its trajectory of removing car-carrying capacity from arterial streets and redesigning them to be increasingly multimodal/complete streets. And the city continues to get better. Before the initiative began, a contingent of conventional transportation engineers predicted terrible congestion and "proved" with their traffic models that the two-way restorations and road diets would fail. They were wrong.



Figure 12: Before and After Trandformation of a Complete Street in South Bend

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The measures that were taken in San Francisco, West Palm Beach, and South Bend all align with the Universal Equation. The traffic models failed because their highest value is travel time for motor vehicles They are the wrong models to follow when envisioning a transformation away from car-dependency. These transformations require planning decisions. The correct method is to choose a model city, like Copenhagen, Paris, or any other city or cities that have already achieved that paradigm shift.

To achieve the community vision, South Pasadena needs to emulate these model cities in a manner that suits the local context. The common denominator for all these cities is that they followed some version of the Universal Equation. Consequently, it is recommended that South Pasadena use the Universal Equation as a litmus test for transportation and land use policies, planning, and decisions, and encourage neighboring cities to do the same.This is the change in thinking that will result in better outcomes.

How does Traffic Reduction work for Individuals?

Cities make changes, based on the Universal Equation, to position individuals to make rational decisions that serve their self-interest, but that are also good for the city, society, and the environment. Not every individual in the aforementioned six cities changed modes or shortened their trips lengths - personal circumstances dictate that there will be a range of behavior. However, enough people made different decisions in the six cities such that each of the cities got better. There are generally eight categories of change available to individuals, shown in Figure 13.

Drivers can change routes and shift travel schedules. They can chain previously separate trips togethe. Some drivers will change modes. By making South Pasadena's arterials into complete streets, there will be significant increases in active transportation. As land use changes (i.e., new businesses, infill housing, etc.) occur, many trips will shorten as people are increasingly able to access what they need on a daily and weekly basis at closer distances.

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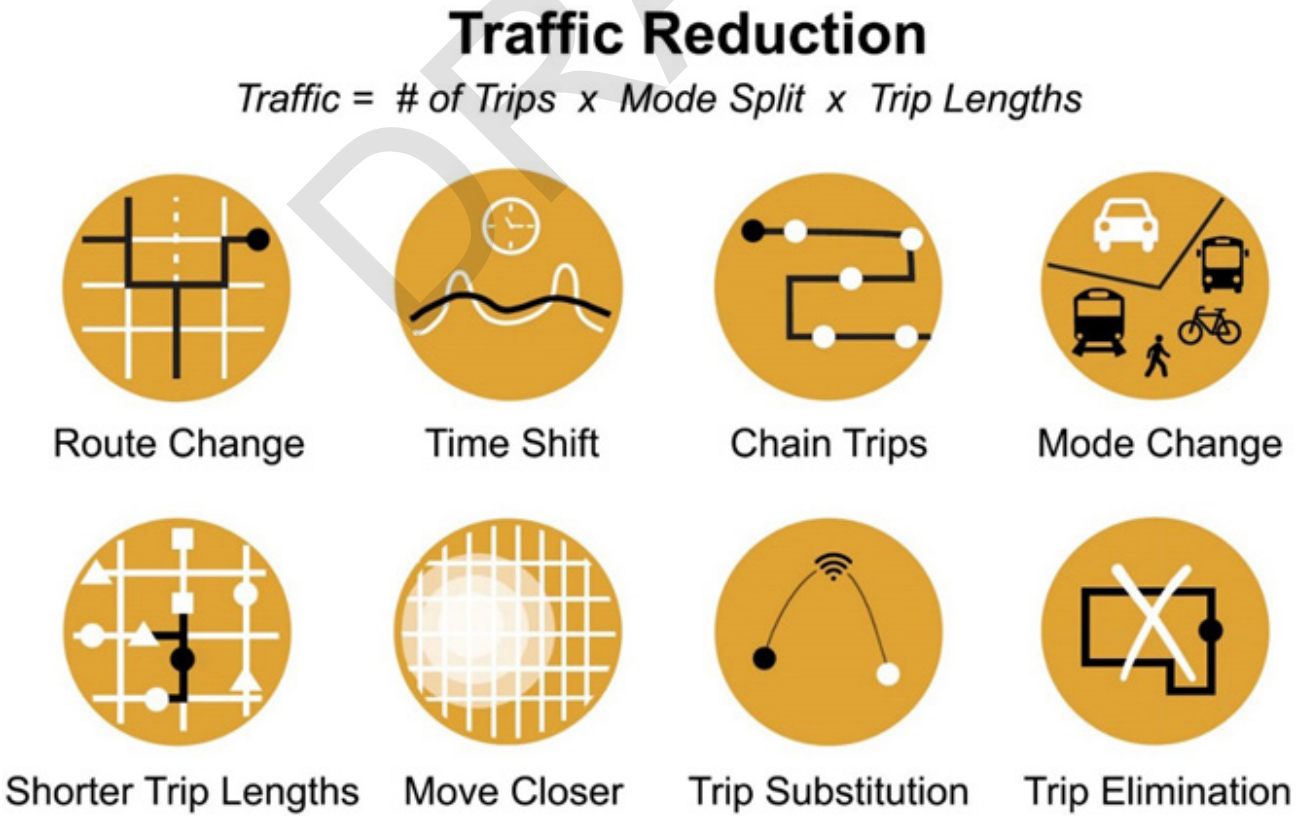

Figure 13: Categories of Changes Available to Individuals

With a change of priorities to more sustainable behaviors, "trip substitution" will grow. Instead of driving to some location to achieve a particular trip purpose, a substitute trip will occur. For example, rather than attending a meeting in person, a virtual meeting will occur using a smartphone or computer. These trip substitutions are already occurring and have increased in popularity since the pandemic. Finally, some trips will be eliminated. For example, instead of driving to a place to ride a bike or take a walk, people can begin their bike ride in their neighborhood, and enjoy walks that involve formerly hostile streets like Fair Oaks Avenue and Huntington Drive.

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GENERAL RECOMMENDATIONS

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General Recommendations

Some important best practices that had broad applicability in South Pasadena were recommended. Including:

1. Ensure that the "Purpose and Need" statements for projects align with the Universal Equation and avoid conventional (i.e., automobile-centric) language. Purpose and need statements set the trajectory for projects. If they do not align with the Universal Equation and community vision then the outcomes will be undesirable. Figure 14 shows some examples.

2. Avoid 4-lane cross sections where left turns are made form the left through lane. Use three-lane streets instead (i.e., one lane each way and a center turn lane). Three-lane streets are safer and more comfortable than four-lane streets, due to
   - less motor vehicle weaving;
   - better visibility (removes "double threat" problems);
   - more space for separated bike lanes, wider sidewalks, transit
   - infrastructure, and street trees;
   - more frequent pedestrian refuges, allowing easier and safer crossings; and
   - easier left turns into and out of driveways and perpendicular streets.

3. When full-time on-street parking is provided, place bulbouts at the ends of the parking rows and place a valley gutter between the parking row and the adjacent travel lane. For long blocks, use midblock bulbouts. Place a shade tree in every bulbout.

4. Develop a "framework street" map of the city, showing the primary fire routes. Ensure that fire equipment can turn from one framework street to another framework street without encroachment. Figure 15 shows a preliminary Framework Street Map.

	CONVENTIONAL WORDING	BETTER...
Problem Definition	Fight Congestion Increase Speed Move Traffic Improve Safety for *Vehicles*	Advance Community Priorities Make Places Increase Proximities Improve Safety for *Everyone*
Land Use Relationship	*[Missing]*	Integrated
Solution	Add lanes	Create multi-functional infrastrure Invest in Transit
Role and Capacity of Streets	To Move Traffic	Nurture Businesses Increase Exchange Function as Path *and* Place
Typical Outcomes	Lack of Identify Poor health Limited Options More Energy Use Car Dependency Less Vibrancy	Strong Identity Better health More Options + Transit Opportunities Less Energy Use and Emissions Economic Development More Vibrancy

Figure 14: Guidance on Purpose and Need Statements

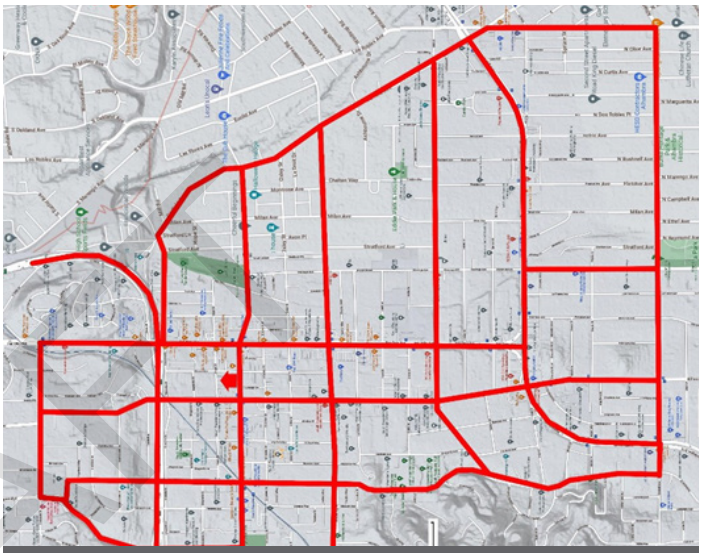

Figure 15: Framework Street/Fire Route Map

5. Use the Speed Management Matrix shown in Figure 16 to determine which traffic calming measures and which speed management measures are permissible on the framework streets and non-framework streets throughout the city. Use a combination of measures from the Traffic Calming and Speed Management Matrix to slow and self-enforce speeds to 25 mph on the framework streets and 25 mph or less on the non-framework streets.

Add no new/additional car-carrying capacity to any street in the street network. The idea is to commit no additional conventional harm and focus all resources on holistic solutions. For example, there was some discussion about adding car- capacity to part of Orange Grove Avenue. That is not recommended because it is the wrong type of thinking. Like similar changes over the last 70 years, these changes give the illusion of helping but end up harming the area and contributing to the existing city-wide problem of too much traffic. Instead, it is recommended to reduce traffic, as per the holistic solution.

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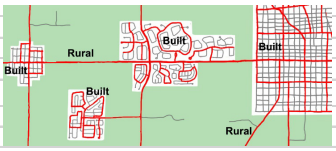
Self-Enforced Target Speeds & Speed Management Measures

(with due consideration for emergeny response)

Key for Column 1: Category of Speed
periodic traffic calming measure
cross-section traffic calming measure
highly accessible & slow facility types
traffic cotrol device

Key for Columns Below
generally not permissable
generally permissable



Framework Streets: cross-section traffic calming measures permitted

Non-Framework Streets: all traffic calming measures permitted

Category of Speed Management Measure	Speed Management Measures	Framework Streets (primary emergency routes)					Non-Framework Streets (not primary emergency route)	Notes
		R	Built Environments				Rural or Built	Rural/natural, Built Environment (suburban, urban, town, city...)
		≥40	40, 45	35	30	≤25	≤30 mph	Target Speed = Posted, Design, & Operating Speeds, at ≤ 45mph
	Transition Zone from/to higher speed environment[1]							
	Gateway Signs[1]							
	Entrance Features (architecture/landscaping)[1]							
	Coordinate traffic signals to discourage excessive speeds							
	Speed Limit Pavement Markings (usually in transition zones)[1]							
	Roundabouts[1]							can also be type of transition on its own
	Danish Roundabout							
	Roundel							
	Low-Speed Corner Radii							low speed corner raddi are generally R≤25'
	Lane Narrowing (a.k.a. part of "road dieting")[1]							
	Reduction in number of through lanes (a.k.a. part of "road dieting")[1]							
	remove right turn lanes[1]							
	remove left turn lanes[1]							
	Shoulder removal (a.k.a. part of "road dieting")[1]							
	Conventional Bike Lanes							FHWA: operating speed <= 20mph or ADT <= 2,000
	Buffered Bike lanes							FHWA: operating speed <= 30mph or ADT <= 6,000
	Shared Use Path, Trail							
	Seperated Bike Lanes							
	Horizontal Deflection, Splitter Island/ Lateral Shifts[1]							
	Introduce Curve[1]							
	Chicane[1]							
	Curb Extensions/Bulbouts							ends of parking rows, midblock, with chicanes & narrowings / pinch point , best with valley gutters & street trees
	Vertical Deflection / Speed Tables / Raised Crosswalks / Raised Intersections			*	*			* exceptions can be made for high pedestrian generators (e.g., schools, parks, community centers, etc.)
	Speed Feedback Sign[1]							
	Create Perception of Short Blocks, Mid-Block Crossings, Marked Crossing at Unsignalized Intersections[1]							
	RRFB/PHB							
	Median Islands at Crossings							
	Median Islands in Curve Sections							
	Long median / Continuous median							
	Street Trees, Continuous Wall Effect and Sense of Enclosure on Median Islands, Long Medians, and Medians in Curves[1]							with curb and gutter adjacent to travel or turn lane & tree diameter > 4" (measured 6" off the ground) place tree at minimum of 4' behind face of curb
	Flush Medians							
	Textured Surface/Paving							
	Terminated Vista							e.g., buildings, trees, art, natural views
	Buildings up to the Right-of-Way							
	Street Trees, Continuous Wall Effect, Sense of Enclosure on Edges[1]		*	**	**	**	**	with curb and gutter adjacent to travel lane & tree diameter > 4" (measured 6" off the ground) place tree: * 4' minimum behind face of curb, or 18" for reconstruction with existing plantings; ** 18" mimimum behind face of curb
	Curb and Gutter[1]							
	Curbless / Flush Streets							
	Shared Space							
	Two-Way Restoration							
	Pedestrian Scale Lighting[1]							
	On-Street Parking: Parrallel							
	On-Street Parking: Back-in Angled							
	On-Street Parking: Valley Gutters							used in conjunction with on-street parking and bulbouts
	On-Street Parking: Front-in Angled							
	On-Street Parking: Right Angle							operating speed < 20 mph
	Remove Lane Markings/Cues that Connote High-Speed (e.g., remove center lines on 2-lane streets)							usually with ADT <= 6,000
	Advisory Shoulders, Advisory Bike lanes							range from ADT <= 3000 (with lightly used shoulders) to ADT<= 1500 (with heavily-used shoulders)
	Yield Street							for ADT <= 1500
	Mini-Traffic Circles							
	Impeller							
	One-Lane Chicane (yield condition)							for ADT <= 3000
	Roundtop Speed Humps							
	Speed Cushions							
	Pinch Point							for ADT <= 3000

Notes:

1) Often used in transition zones (i.e., the space for to transitioning between high speed & low speed environments (e.g., between a Main Street in town & a rural highway out of town))

2) Exceptions can be made for measures, that are not currently permissable based on the colored square, if a good case can be made for the measures.

3) Measures may not be suitable in all situations as indicated as permissable, above. Consequently, good judgement is required.

4) Newly developed measures may not be in this matrix but the City/jurisdiction may experiment with them and, if suitable, be placed in this matrix.

5) A single measure is rarely effective; a combination is typically needed to achieve desired speeds, complete streets, better quality of life, & improved local economies.

6) An appropriate combination of measures requires collaboration, creativity, and judgement, and understanding of the context

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Figure 16: Traffic Calming and Speed Management Table

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SPECIFIC RECOMMENDATIONS

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Specific Recommendations

The streets shown in blue in Figure 17 were in the original study scope. When the idea of a city-wide holistic solution came up midway during the charrette the streets shown in black in Figure 17 were added to the traffic reduction strategy. However, additional designers, base maps, and time were not added to the charrette. Consequently, the design team could only develop preliminary design directions for these streets, with a focus on the most important ideas, and recommend more detailed studies as next steps. The less detailed direction for these streets should in no way imply a difference in importance, compared to the original three streets. There is a consensus that addressing all the arterial streets is necessary for the holistic solution to succeed.

Note that the streets, shown in black,are the streets that:

1. needed to be part of the holistic solution; and
2. the design team had time to consider.

There are likely other streets that should be part of the holistic solution that were not identified in this effort. Garfield Avenue is a likely example. Updating this map with such streets, as they become identified, is recommended as a next step.

The streets shown in red are not arterial streets, but ones that residents identified as being highly impacted by motorists using the streets to save travel time while traveling from one arterial street to another. No specific traffic calming plans were prepared for these streets. However, addressing the cut-through traffic problems was considered a needed part of the holistic solution. As next steps, traffic calming plans for these streets need to be developed. Using the matrix in Figure 16 would assist in this endeavor. Note that these streets are non-framework streets and do not have significant emergency services roles. Consequently, a broader range of traffic calming measures are available for consideration. These measures are often less expensive than the “cross-section measures” that are needed on framework streets. More detail is available in Figure 16. There may be other non-framework streets, besides those indicated in red, that are negatively affected by excessive speeds and cut-through traffic. Updating this map with such streets as they become identified, is recommended as a next step.

Prioritization

In keeping with the traffic reduction strategy and for quality of life and safety reasons, it is likely desirable to slow motorists on every street in South Pasadena and significantly reduce the traffic volumes on the arterial streets. Unfortunately, these changes cannot all be achieved at once. As a next step, it is recommended that the City staff prioritize city-wide changes. There are a lot of considerations that effect the priorities and the timeline. Some of them include:

1. funding;
2. need;
3. logical sequencing;
4. icoordination with other projects (i.e., resurfacing, maintenance, utility projects,development, etc.);
5. interjurisdictional coordination;
6. staff time;
7. time of year; and more.

Sometimes, it makes sense to move forward with projects that result in permanent changes to a street. In other times, it makes sense to design less expensive projects that are faster to implement and are as close to the permanent project as feasible. On one hand, due to all the serious issues on the streets of South Pasadena, many people want fast relief, even if it is done with temporary measures. The downsides are:

1. temporary solutions need staff time to design;
2. they still cost money;
3. they are usually unattractive and appear as obstacles which reduces public support for change;
4. they often need to be monitored and evaluated, which takes staff time;
5. they can harm the permanent solution if the temporary solution is unable to achieve the relief as intended;
6. the temporary solutions can delay the permanent solutions due to staff time and budget being used on the temporary solution, two sets of public meetings (one for the temporary project and the other for the permanent solution), and the permanent solution getting bumped to the lowest priority due to the

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temporary project being in place.

The upside is that the public on the street receives partial benefits faster.

When there is already identified funding involved and more available if applied for, the design team generally leans toward permanent solutions and away from temporary solutions. The idea is to focus the staff's time on permanent solutions. Exceptions may occur when separated bike lane connectivity is involved. Bike use is highly reliant on a good network. If key gaps can be completed quickly, then a temporary project might be a good idea.

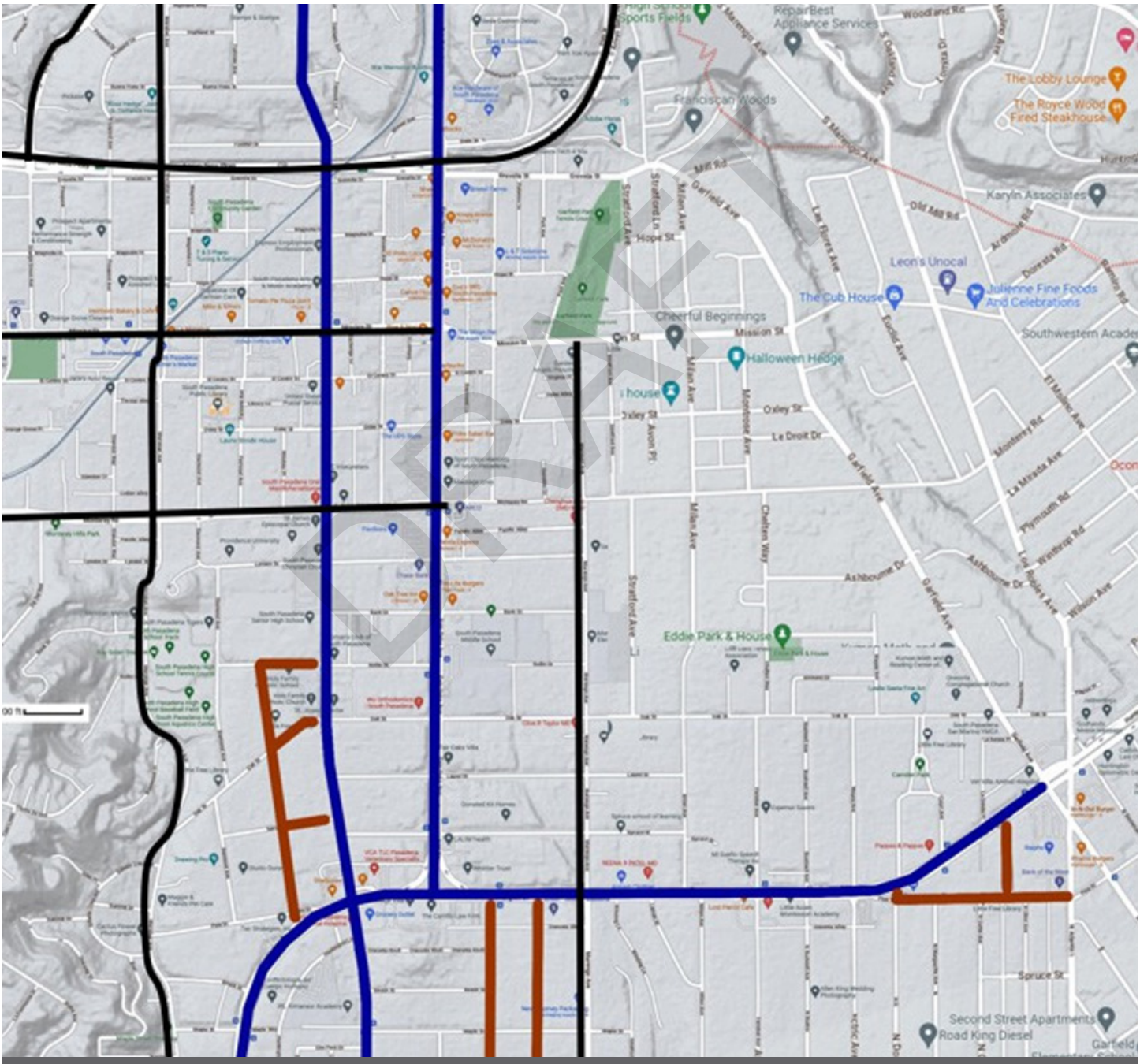

Figure 17: Map of Streets to Help with the Discussion of Recommendations

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RECOMMENDATIONS FOR ADJACENT STREETS

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Adjacent Streets

Meridian Avenue: is a long, two-lane, residential street that is has character, curves, and topography in some sections. It is on this list because there is too much through traffic and drivers drive too fast. The design team recommends removing the asphalt and repaving the street with rough bricks (not stamped asphalt or concrete). The texture is intended to be rough, so motorists slow down. The collateral benefit is the brick looks far better than asphalt. The team also recommends increasing the sense of enclosure by placing bulbouts strategically in the parking rows (i.e., to minimize any loss in on-street parking, and next to some driveways to improve sight lines for drivers leaving their driveways) and planting a shade tree in every bulbout.

Orangce Grove Avenue: is an overly wide and fast residential street. Its problems are exacerbated by the presence of the ramps onto Highway 110. The design team recommends narrowing Orange Grove from four lanes to three lanes. In the southern curvy area, align the three-lane street towards the east curb-line and use the space on the west side for a linear park with two-way separated bike lanes and wonderful pedestrian paths. In the middle lane, allow left turn access in and out of the driveways. In the middle lane, where driveway access in not needed, place medians. Use the medians to remove the "speed lines" from the curves. Plant shade trees in the medians, plant more shade trees on the sides, and over time the street will have a canopy over it. At logical locations, add pedestrian crossing to the linear park, using the median as a refuge. In that way, pedestrians could cross only one lane at a time.

Pasadena Avenue and Columbia Street: is a highly abused residential street due to the 710 stub, located to the north, that focuses unacceptable volumes of traffic through Pasadena Avenue towards South Pasadena. Though the Pasadena Avenue is in Pasadena, it significantly affects the City of South Pasadena. It is recommended that South Pasadena encourage Pasadena to:

1. narrow the street to three lanes up until the "wishbone;"
2. build a roundabout at the wishbone;
3. restore St John Avenue and Pasadena Avenue to two-way operations, between Bellefontaine Street and California Boulevard, with one lane northbound, one lane southbound, and the odd left tun lane; and
4. either eliminate the highway ramps to California Boulevard, or reduce the number of north-south through lanes across California Boulevard to/from the highway to one in each direction.

More detail about the interface between Pasadena Avenue, Columbia Street, and Fremont Avenue is in the recommendations for Fremont Avenue. The key recommended changes to the intersection of Columbia Street and Fremont Avenue are:

1. to remove the eastbound to southbound right turn lane from Columbia Street, and
2. combine the northbound left and right turn lanes into a one shared, left, right, turn lane.

The intent of these changes is to physically constrain the car-carrying capacity in the north- south direction, such that the north-south traffic volumes will be substantially lower. The idea is to build supportive, volume reduction measures between Fremont Avenue and California Boulevard, and additional supportive measures along Fremont Avenue in South Pasadena such that the lower car-carrying capacity through the intersections at Columbia Street will be consistent with the balance of the corridor. The collateral benefit of these changes is that they will help position the eventual removal of the highway stub for success.

Marengo Avenue: is a long two-lane, residential street, with conventional bike lanes, and on-street parking. Bike facilities make sense on this street, due to the street providing access to the South Pasadena Middle School and the Marengo Elementary School. However, conventional bike lanes are not suitable for elementary and middle school children. The design team recommends separated bike lanes, two narrow general-purpose lanes, on- street parking bulbouts with street trees on the corners of the intersections, and shortening crossing distances to 23 feet (curb to curb) on Marengo Avenue and the side streets. North of Huntington Drive, periodic measures could be

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added like raised crossings, raised intersections, and so forth. See Figure 19. However, Marengo Avenue, south of Huntington Drive, is a "framework street." So, the periodic measures would be limited to Marengo Avenue to the north of Huntington Drive.

Highway 110 or the Arroyo Seco Parkway: is a depressed, six-lane highway that passes through South Pasadena and ends a quarter of a mile north of South Pasadena, at Glenarm Street in Pasadena. In South Pasadena, it acts like another arterial for motorists to get to places nearby and for the Fire Department to access calls, many of them being on the highway. It was one of the first highways built in the US, at a time when there were fewer cars and little understanding of ramp design. The ramps have minimal acceleration or deceleration space making the highway dangerous. The bridges over the highway are uncomfortable for pedestrians and there are no bicycle facilities. The signalized intersection at Glenarm Street, has six though lanes, just like the highway. However, highway lanes can carry about double the volume of traffic compared to a through lane at a signalized intersection. Consequently, the highway doesn't need to have six lanes. Four highway lanes could still accept and deliver more traffic than can get through the signalized intersection at Glenarm Street. So, to increase safety at the interchanges and along the highway, the design team recommended using the inside four lanes for throughput, which would still provide more than enough car-carrying capacity, and use the outer two lanes for accelerating, weaving, and decelerating as is shown in Figure 18.

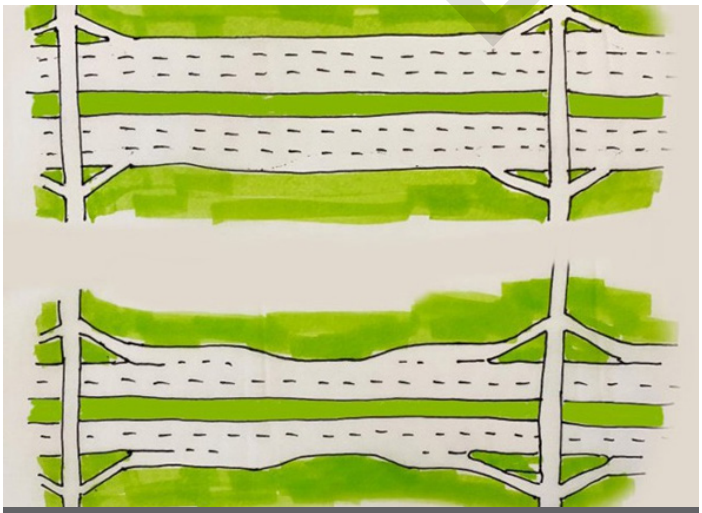

Figure 18: Existing (top) and Recommended (bottom) Configuration for Highway 110

Monterey Road : is primarily a residential street that is two lanes, east of Fair Oaks Avenue and either four or five lanes, west of Fair Oaks Avenue. The design team recommends that the street be dieted to three lanes west of Fair Oaks Avenue to the border of the city and tie in with the three-lane bridge that crosses Highway 110. The reclaimed right of way is recommended to be used for separated bike facilities, wide sidewalks, shade trees, and perhaps some on-street parking periodically. Within the third lane/center lane, access would be increased to homes and other land uses. Periodically, short medians with shade trees would be placed in the third lane, where access was not needed for beautification purposes and to create increased numbers of pedestrian crossings. Monterey Road would be one of the most beautiful streets in the city.

Mission Street: is South Pasadena's high street. However, its image, economic performance, and social significance has been stifled by being a four-lane truck route. The Gold Line Train Station, City Hall, the City Fire Station, a couple of parks, and a variety of shops are located along the street. The design team recommends removing the truck route designation and not replacing it anywhere else. Under normal circumstances, the team would recommend narrowing the street to two lanes with no left turn lanes because high streets are supposed to maximize social and economic exchange and be uncompromisingly pedestrian-oriented. However, the Fire Station is effectively located on the street and needs motorists to be able to pull to the sides of the street during emergencies. Consequently, the design team recommends a three-lane section. However, if the Fire Station could be moved to a more central location like, Monterey Road, then the team would recommend a two-lane street. East and west of the Train Station, the team recommends bulbouts, with shade trees, on all the corners, valley gutters, and parallel parking on both sides. East of the Train Station, the team also recommends brick paving in the travel way, and flush curbs (i.e., to create a barrier-free street for events).

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FAIROAKS AVENUE

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Fair Oaks Avenue

Fair Oaks Avenue, a crucial North-South connector linking City of Altadena, City of Pasadena, and City of South Pasadena. This avenue faces multiple challenges, including peak hour congestion, unsynchronized traffic signals, blocked intersections, speeding, and specific issues at the 110 and Huntington intersections. Additional complexities arise during school pick-up times, with notable concerns regarding biking at key locations, high traffic volumes, bulb outs affecting right turns, left turns onto Hope Street, and tactile bumps that impact pedestrian mobility.

At the Input & Visioning workshop, residents were encouraged to share their perspectives on the following key questions:

- What do you like and wish to see preserved?
- What do you dislike and wish to see changed?
- What is missing that you would like to see created?
- What are the key values that you feel should shape the streets?

In our conversations with Fair Oaks Avenue residents, a range of perspectives emerged from different user groups, shedding light on the varied concerns of the community. Pedestrians, particularly middle school students, expressed worries about crosswalk striping, trees in bulb outs, and the impact of local developments on pedestrian pathways, emphasizing factors like business access, lighting, and the effects of tactile bumps on pedestrian mobility devices. Bicyclist highlighted the absence of a dedicated North-South biking facility and concerns related to conflicts with turning vehicles at the 110 and Huntington intersections. Drivers, especially truck users, underscored challenges such as congestion during peak hours, unsynchronized traffic signals, blocked intersections, and speeding, with specific attention to issues at the 110 and Huntington intersections, school pick-up times, high traffic volumes, and bulb outs affecting right turns. Transit users identified shortcomings in amenities, including the lack of bus stop shelters, seats, and trash cans, and advocated for the expansion of local shuttle services. This diverse feedback calls for a comprehensive approach to address the multifaceted transportation issues on Fair Oaks Avenue.

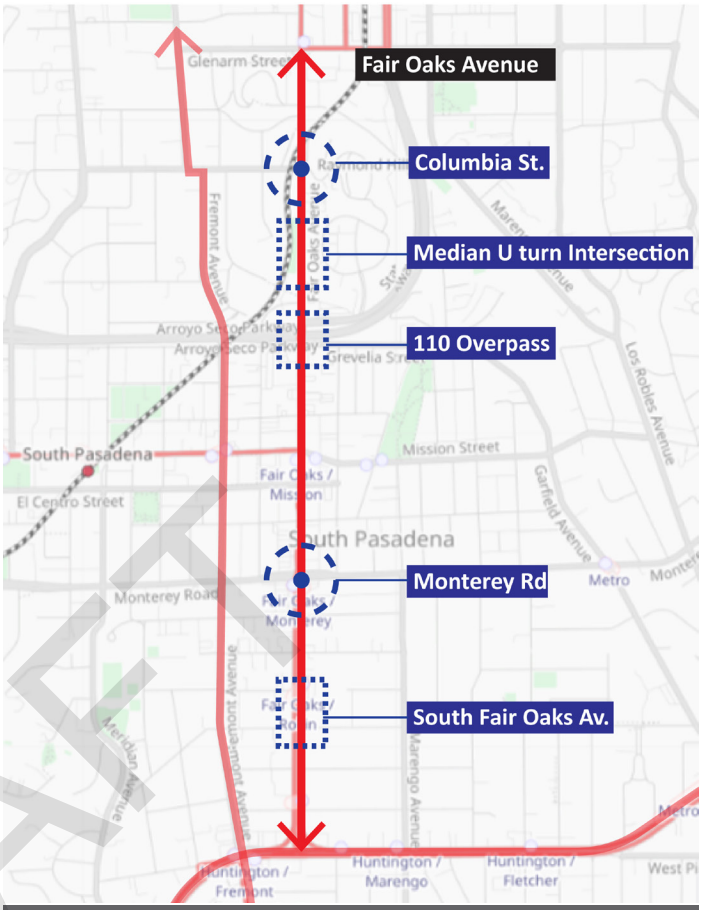

Figure 19: Key Intersection identified as key opportunities during the corridor study

Based on feedback from the residents & key stake holders, the following were identified as key intersections of opportunities (Reference Figure 19):

- Fair Oaks Avenue & Columbia Street
- Fair Oaks Avenue & Median U-turn Intersection
- Fair Oaks Avenue & 110 Overpass
- Fair Oaks Avenue & Monterey Road
- South Fair Oaks Avenue

The community expressed a collective desire to address several key priorities. These include the need to slow down speeds while ensuring the safe movement of all modes of transportation, the creation of safe crossings, facilitating easy access to businesses with secure parking options within a reasonable distance, establishing a comfortable environment for residents, and attracting more investment to the area.

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The initial starter ideas encompass making businesses easily accessible and positioning for new investment, by proposing a boulevard design with a feasible future phase that includes dedicated transit lanes, right-sizing for volume and speed, creating a complete street, establishing safe crossings, mitigating barriers for pedestrians and cyclists, and crafting distinctive north and south gateways for the community.



Figure 20: Proposed street section for Fair Oaks Avenue North of 110

The proposed street section for Fair Oaks Avenue north of the 110 suggests two lanes of traffic on each side, accompanied by separated bike lanes on both sides, utilizing on-street parking as a buffer. Additionally, the design incorporates ample lighting and shade for enhanced comfort and safety.

Fair Oaks Avenue & Columbia Street

The Fair Oaks and Columbia Street intersection currently has Excessive wide curbs which encourages speeding. Some of the existing pedestrian crossings are 65' feet wide making it extremely long and unsafe for pedestrians. These streets that are currently connecting to residential areas require safety measures. This intersection is also a gateway into South Pasadena with a welcoming sign that is easily missed by drivers because the design of the street makes excessive speeding easy.

The redesign of the intersection includes bike paths on Columbia street to connect with proposals for connecting bicycle facilities made at the Fremont Avenue and Columbia Street intersection. Proposed curb extensions/bulbouts will help respond to some of the safety concerns for pedestrians and bicyclists.



Figure 21: Proposed intersection plan of Fair Oaks Avenue & Columbia Street

Fair Oaks Avenue at Mid-Block U-turn Intersection

At the 110 overpass, westbound drivers face limited stacking capacity for left turns, mainly due to traffic from Fair Oaks & Grevilia St. The proposal aims to increase capacity for vehicles to line up for a U-turn, utilizing available width and freeing up two northbound lanes, which is aimed at reducing congestion at the bridge. This enhances northbound traffic flow, creating additional green space and placemaking opportunities.



Figure 22: Proposed intersection plan of Fair Oaks Avenue at Mid-block U-turn Intersection

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Fair Oaks Avenue at 110 Overpass

The redesign of the Grevelia Street intersection takes a tactical approach, considering its connection to the historic overpass. The proposal includes a protected bike lane with flex posts and curb extensions/bulbouts at Grevelia intersection for added safety. Additionally, a pocket park is proposed to maximize the public realm at the intersection.

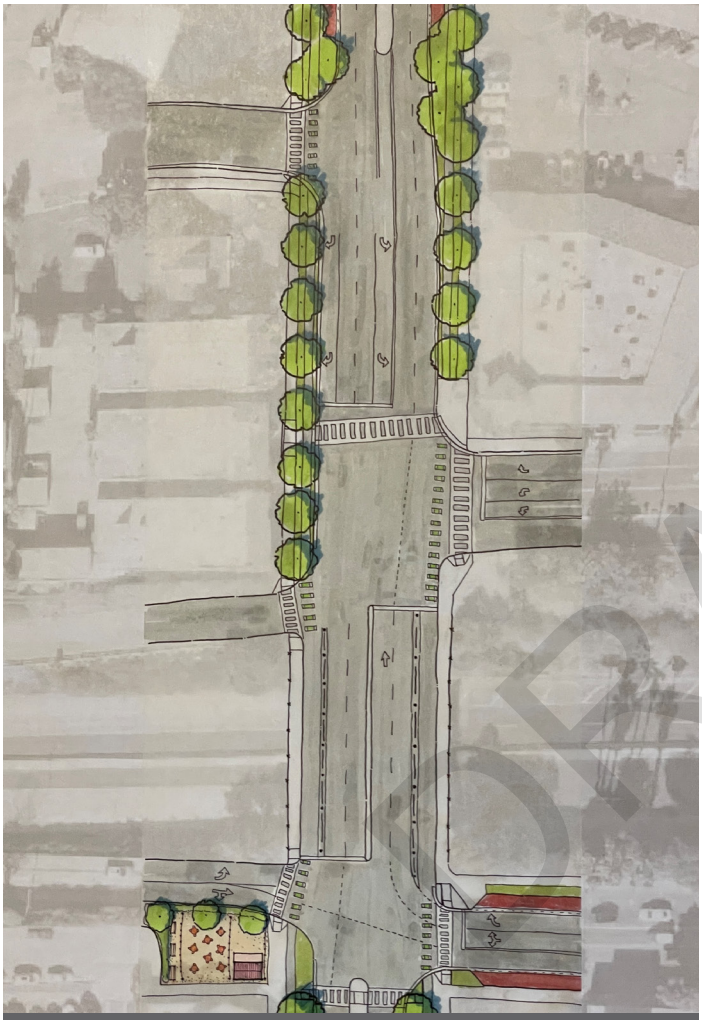

Figure 23: Proposed intersection plan of Fair Oaks Avenue at 110 Overpass



Figure 24: Proposed intersection plan of Fair Oaks Avenue and Monterey Road

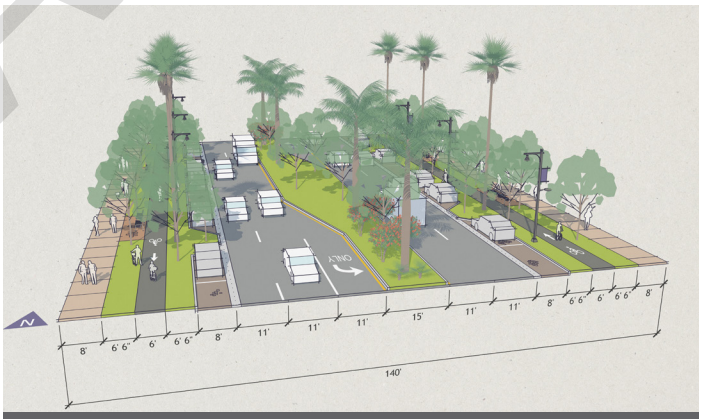

Figure 25: Proposed street section for Fair Oaks Avenue & Monterey Road

Fair Oaks Avenue & Monterey Road

The proposed section has includes modifications to introduce protected bike lanes, enhancing the overall safety for bycyclists. Additionally, dedicated sidewalk spaces have been allocated to support local businesses. Curb extensions are proposed to provide additional safety for pedestrian and cycling crossings. The inclusion of ample lighting and shading from trees will contribute to creating a more livable and secure community environment.

Fair Oaks Avenue & South of Monterey Road

Currently, Fair Oaks Avenue south of Monterey Road widens to a three-lane configuration, contributing to speeding issues leading up to the Huntington intersection. In response, a redesign concept proposes a road diet idea to reduce the lanes to two, allowing for the incorporation of additional street amenities. The envisioned redesign transforms Fair Oaks Avenue into a boulevard design,

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creating a green gateway to downtown. Specific features include two lanes for vehicular traffic with turn lanes at intersections, protected bike lanes, wide buffered sidewalks, on-street parking, two through travel lanes in each direction, and strategic lighting and shade elements. This holistic approach aims to enhance both safety and the overall urban experience on Fair Oaks Avenue. As an alternative vision (Figure 27), Fair Oaks Avenue south of Monterey Road is conceptualized with a dedicated transit lane designed to accommodate buses efficiently.

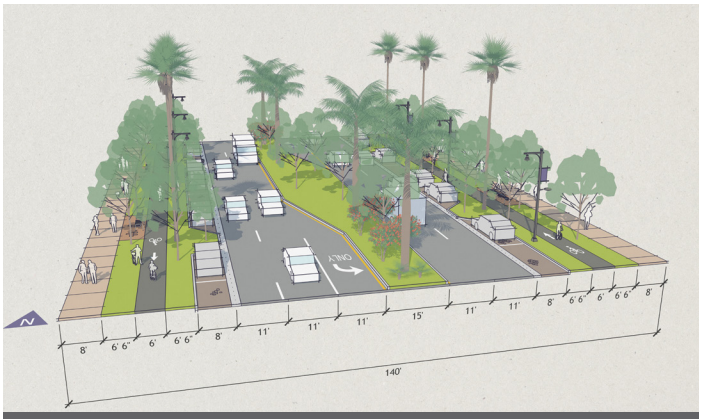

Figure 26: Proposed street section for Fair Oaks Avenue south of Monterey Road

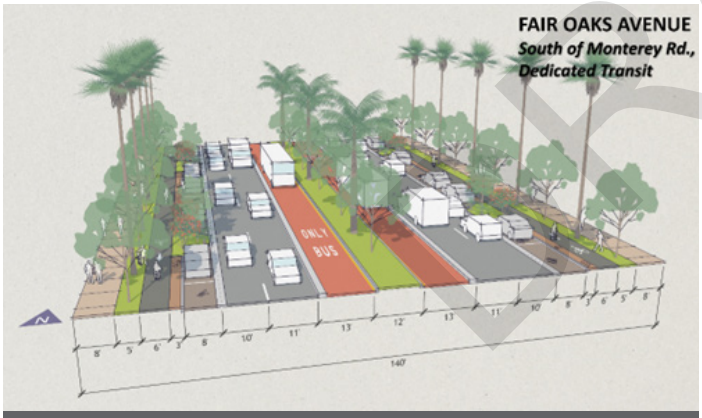

Figure 27: Proposed alternative street section for Fair Oaks Avenue south of Monterey Road

Fair Oaks Avenue – Middle School Crossing

Fair Oaks Avenue at the middle school crossing proposes additional measures to enhance pedestrian safety, specifically catering to all levels of abilities. The proposal includes a protected intersection with bulbouts and refuge islands at crossings. Furthermore, crosswalk distances are reduced at all key intersections.

In an alternative exploration, a transit intersection concept along Fair Oaks was considered, featuring three vehicle traffic lanes on each side. The proposed design allocates the lane adjacent to the central median specifically for buses and transit. This approach offers benefits such as center-running dedicated transit lanes, reducing conflicts with driveways, aligning with future Metro plans, and ultimately improving service to the A-Line.

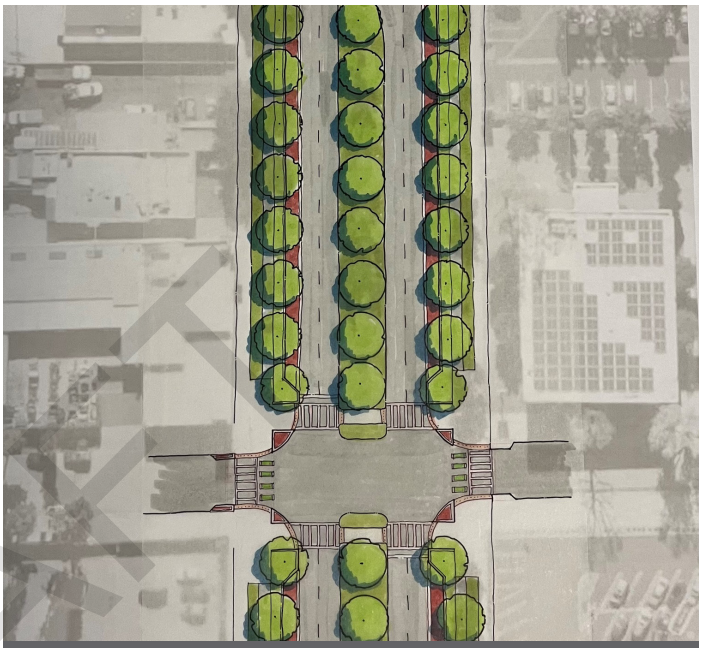

Figure 28: Proposed intersection plan for Fair oaks Avenue at the Middle school crossing



Figure 29: Proposed intersection plan for Fair Oaks considering a transit intersection approach

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FREMONT AVENUE

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Fremont Avenue

Fremont Avenue, a pivotal North-South connector in South Pasadena, confronts a range of challenges.Fremont currently has some challenges including significant cut through traffic, daytime congestion, high traffic volumes and speed, heavy truck usage, an uncomfortable bicycling facility and insuffient night lighting. The proximity to multiple schools and churches, the tree lined and shady nature of the avenue, and presence of historic homes are wonderful assets. At the Input & Visioning workshop, residents were encouraged to share their perspectives on the following key questions:

- What do you like and wish to see preserved?
- What do you dislike and wish to see changed?
- What is missing that you would like to see created?
- What are the key values that you feel should shape the streets?

Based on site visits and discussions with residents, our observations revealed distinct characteristics in different sections. Key locations in this area include Columbia, Buena Vista, and the Grevelia/Metro Rail crossing. Between Magnolia Street and Huntington Drive, there are multiple redevelopment opportunities and note heightened pedestrian activity near the high school and Holy Family. South of Huntington Drive, there is congestion at Huntington and Grocery Outlet, and with a challenging pedestrian environment at Huntington.

From the above mentioned feedback from residents & key stake holders, the following were identified as key intersections of opportunities (Figure 30):

- Fremont Avenue & Columbia Street
- Fremont Avenue & Buena Vista
- Fremont Avenue & Grevelia Street
- Fremont Avenue & Mission Street
- Fremont Avenue at the school zone
- South Fremont Avenue
- Fremont Avenue & Alhambra Road



Figure 30: Key Intersection identified as key opportunities during the corridor study

Fremont Avenue & Columbia Street

The current intersection design at Fremont Avenue & Columbia Street features disproportionately large curb radii, facilitating easy turns for large trucks but posing a danger with fast turns that threaten pedestrians.



Figure 31: Proposed Intersection plan of Fremont Avenue & Columbia Street

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Fremont Avenue South of Columbia Street

The narrowest right-of-way along Fremont Avenue, which is primarily residential, has raised concerns among neighborhoods because of fast traffic, challenging crossings, and limited ability to encourage neighborly interactions. To address these challenges, the proposed concept physically narrow the street, and features two travel lanes and a single parking lane. Additionally the design features shifted curbs to allow for additional space for trees, tree lawns and sidewalks which all will enhance the pedestrian experience. To accommodate both pedestrian and bike networks within the constrained right-of-way, the east side of Fremont's sidewalk is enlarged and marked as a shared-use path. The inclusion of shade trees on both sides adds to the visual appeal and environmental quality. Furthermore, bulbouts at midblock and corners serve multiple purposes by managing stormwater and providing space for trees, visually narrowing the street to reduce traffic speed, enhance pedestrian safety, and shortening crossing distances. These recommendations aim to transform Fremont Avenue into a safer, more inviting community space.



Figure 32: Proposed street section for Fremont Avenue, south of Columbia Avenue

Fremont Avenue & Buena Vista

The current intersection poses challenges as two local streets intersect at a steep grade, which may increase speeds and make crossings difficult and dangerous.The existing design, which includes a right turn only lane further promotes speeding while signage and vertical elements have limited impact on reducing speeds. The proposed concept aims to address these issues by significantly narrowing the intersection, incorporating bulbouts and an east-side vegetated swale, all of which are intended to calm traffic.



Figure 33: Proposed intersection plan at Fremont Avenue and Buena Vista

Travel lanes are reduced to 11.5 feet, and include pedestrian refuge islands. Removal of the right turn lane aims to discourage fast turns and prevent drivers from suing Buena Vista as a cut through street.Alternative concepts, such as a neighborhood traffic circle, were explored, but the steep grade change presents a challenge to design considerations.

Fremont Avenue & Mission Street

The existing intersection at Fremont and Mission features right turn lanes and emphasizes vehicle movements over pedestrians.Despite Mission being South Pasadena's "Main Street", the current configuration with four lanes, left turn pockets, parking, and sharrows falls short of creating a truly walkable, urban, and people-friendly environment commonly associated with a community's Main Street. The proposed design aims to remove right-turn only lanes and introduces a raised intersection, prioritizing pedestrians and bicyclists while making cars guests as they enter the city's main street district. Artistic paving materials contribute to the creation of an inviting gateway. The concept anticipates a future condition where Mission is narrowed and designed as a flush, shared space. Blocks east and west of Fremont could potentially become flush streets in this envisioned future. Additionally, the concept includes relocating bus stops to align with forthcoming changes in the bus network recommended in the LA Metro Nextgen Bus Plan.

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Figure 34: Proposed Intersection plan showing Mission Street as flush street and raised intersection.

Fremont Avenue in front of South Pasadena High School

The blocks encompassing South Pasadena High School, Holy Family Catholic School, and various civic organizations generate significant pedestrian and vehicle traffic. Recognizing the potential for increased active transportation, safety improvements are proposed at the intersections of Bank Street, Rollin Street, and Oak Street. The focus is on narrowing crossing distances, slowing vehicle speeds, and fostering a comfortable environment for walking and biking. Raised crossings are suggested at all intersections, particularly at Rollin Street and Bank Street. These raised crossings will help lower traffic speeds and provide better crossings for students, faculty, and visitors at key civic facilities. All-way stops complement raised crossings, which enhances traffic control, discourages speeding, and improves safety at crossings. Additionally, the design integrates a two-way bike facility through the intersections. To promote a cohesive identity aligned with the educational and civic nature of the area, pavement design for raised crossings could involve collaboration with the school, engaging students in a co-creative process.

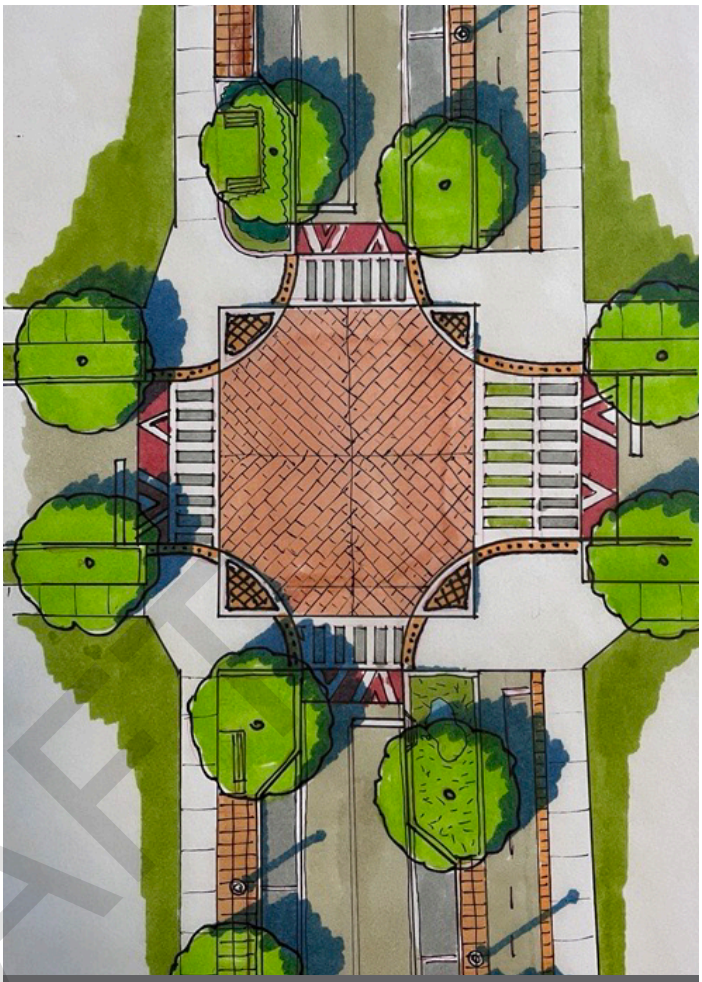

Figure 35: Proposed Intersection plan showing raised intersection at Fremont Avenue and Lyndon Street

Fremont Avenue South of Huntington Drive

Fremont Avenue south of Huntington Drive is predominantly residential in character and the proposed design is focused on narrowing the street as a way to slow traffic. Reallocation of a portion of the right-of-way is essential to incorporate is bus-only lanes and/or stops to enhance transit operations and promote bus usage. The concept emphasizes improved connectivity between bikeways and transit facilities to encourage multimodal tripsand features amenities like ample bike parking at bus stops along the corridor. The concept proposes narrowing the roadway to two lanes, eliminating center turn lanes, and integrating left turn pockets at intersections with high turn volumes. High visibility crosswalks, striped across all legs of intersections, enhances safety and pedestrian visibility within the neighborhood.

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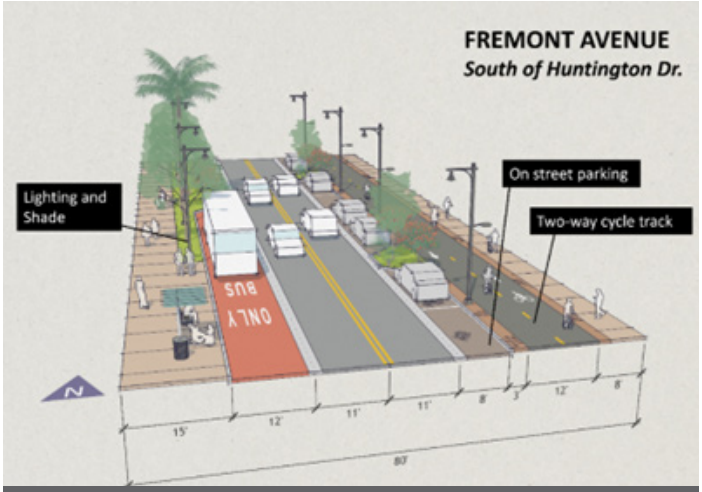

Figure 36: Proposed Intersection plan showing Mission Street as flush street and raised intersection.

Fremont Avenue and Alhambra Road

Similar the Columbia and Fremont intersection, Alhambra Road functions as a traffic "valve" for Fremont. To mitigate vehicle and truck traffic using Fremont as a high-speed arterial, the intersection is strategically narrowed. Turning radii are reduced to discourage fast turns, promoting safer traffic speeds. The introduction of a raised pedestrian crossing emphasizes a prioritization of pedestrian safety over vehicular speed. This feature not only signifies a street designed for people walking but also acts as a physical barrier to deter large vehicles from utilizing Fremont as a cut-through truck route. These measures collectively contribute to creating a safer and more pedestrian-friendly environment on Fremont Avenue.

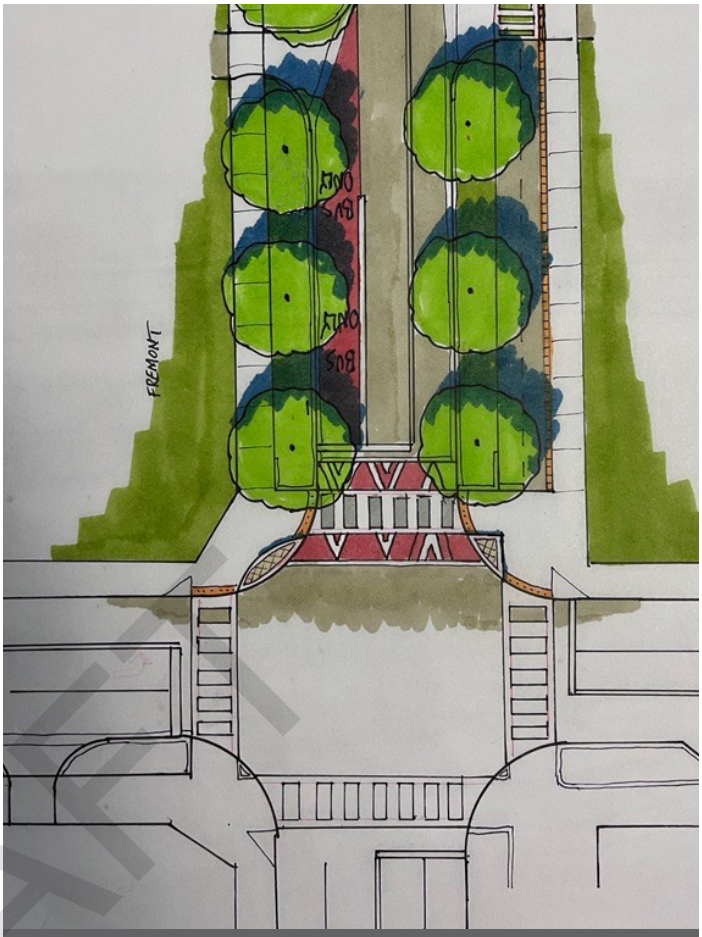

Figure 37: Proposed intersection plan for Fremont Avenue and Alhambra Road

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HUNTINGTON DRIVE

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Huntington Drive

Huntington Drive is key East-West connector linking City of South Pasadena to City of Los Angeles, City of Alhambra and City of San Marino. Today, Huntington Drive is a seven-lane street with on-street parking on both sides and excessive speeds, and traffic volumes. The right-of-way is 140 feet wide, as shown in Figure 38. High speeds are common along this street and there have been a number of severe crashes in the past.The street is a hostile and unsafe space for pedestrians and bicyclists. Crossing the street is uncomfortable in a car, on foot, or on a bicycle. Given it's current configuration we heard many parents do not allow their children to walk along or across the street. This is particularly unfortunate because schools are located north of Huntington Drive, while many families with school children live to the south.

During the public process, stakeholders and residents emphasized the importance of access to homes, businesses, and perpendicular streets along Huntington Drive. The Grocery Outlet, located on the southeast corner of Huntington Drive and Fremont Avenue, was mentioned most frequently as a desirable place to shop but a difficult place to access. There was a clear desire for a slow and safe street, traffic calming in the adjacent neighborhoods,and maintaining the on-street parking spaces along Huntington Drive. Pedestrians want street trees for shade and beauty, landscaped buffers between sidewalks and travel lanes, seating, and shorter pedestrian crossings that are safer, more comfortable, and more frequent. Transit users called for the same things as pedestrians, and also accessible transit stops and shelters, and comfortable seating. Car users focused on access, legibility, and reduced but consistent speeds in the area. There was consensus that driver behavior and overall aesthetics is poor, and that the southern arrival experience into South Pasadena is underwhelming.

Huntington Avenue is 1.5 miles long within the city, and it currently isolates the southernmost 13% of the city's land area. Four objectives of the study are to:

1. Reconnect the city across Huntington Drive;
2. Increase the quality of life of people living along or neat Huntington Drive;
3. Increase access to businesses along the Drive; and
4. Reduce the traffic volume along Huntington Drive.

Reducing traffic volume along Huntington Drive will also help reduce traffic volume on Fair Oaks. The traffic reduction strategies involve reducing the number of lanes on entering the city on the three major routes into the city (Huntington Drive at Alhambra Road, Huntington Drive at Garfield Avenue, and Fair Oaks Avenue at Alhambra Road) and via traffic calming measures on existing and potential cut-through routes (Meridian Avenue, Primrose Avenue, La France Avenue, Marengo Avenue, and perhaps others).

Based on feedback from residents and key stakeholders,

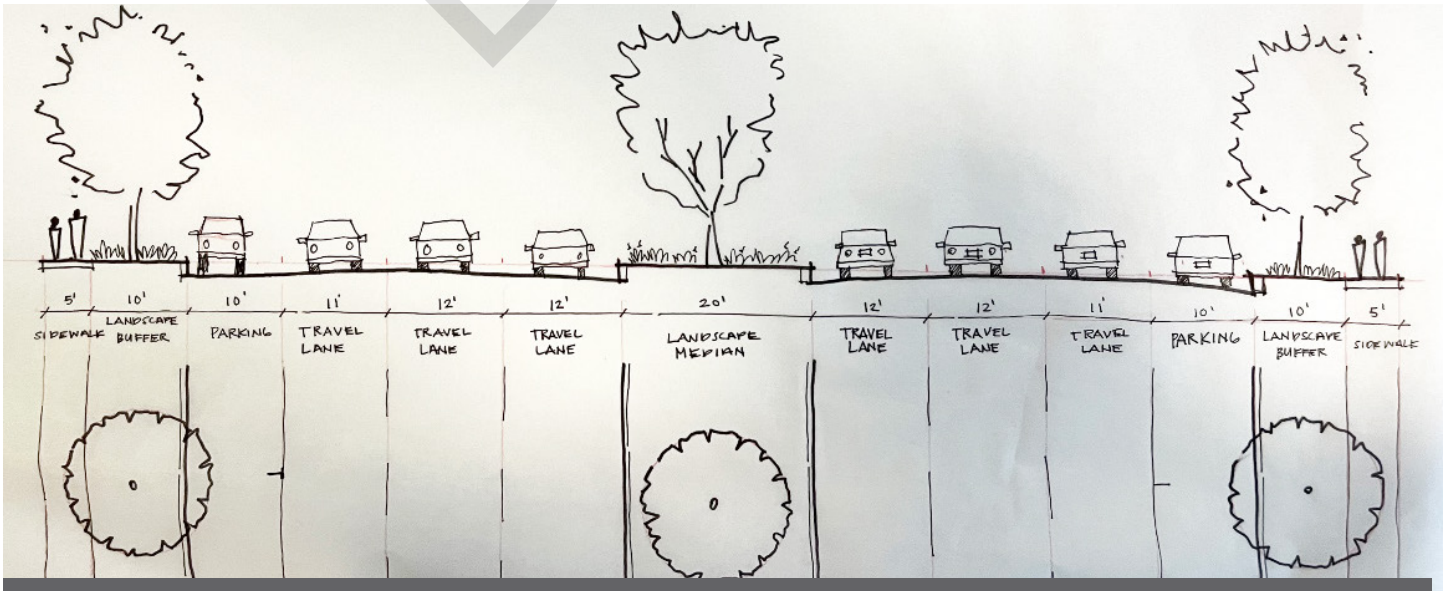

Figure 38: Existing 140-Foot Wide Right of Way

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Figure 39: Intersections with the Most Potential for Improvement

the following were identified as the worst intersections with the greatest potential for improvement (see Figure 39):

- Huntington Drive, Fair Oaks Avenue and Fremont Avenue
- Huntington Drive and Marengo Avenue
- Huntington Drive and Court Street
- Huntington drive and Pine Street
- Huntington Drive and Garfield Avenue
- Huntington Drive and Maple Street

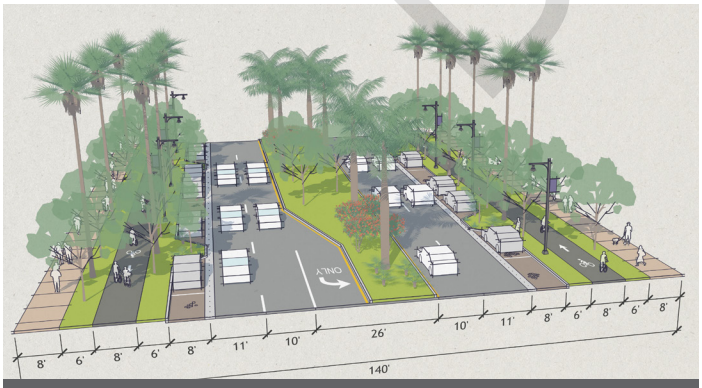

Figure 40:Proposed Typical Cross Section for Huntington Drive

Consistently, during the stakeholder interviews, open studios, and public meetings participant emphasized the unappealing appearance of Huntington Drive. The shear width of the street was a common complaint. The proposed cross section helps address the street's problems by incorporating a road diet from seven to five lanes and introducing, separated bike lanes, shade trees, accent palm trees, valley gutters, bulbouts with shade trees, on-street parking on both sides, wide and buffered sidewalks, as well as improved lighting.

Huntington Drive between Fair Oaks & Fremont

The current design of the intersection of Huntington Drive, Fair Oaks Avenue, and Fremont, has several challenges It is difficult to access businesses on the southern side of the street, and this encourages drivers to make illegal maneuvers to access. To address this, a frontage street along the south side of Huntington Drive is proposed to facilitate access in safe and logical manner. Refer to Figure 42 for a plan view of the area and Figure 41 for a cross section of Huntington Drive and the Frontage Street. Southbound motorists, from Fair Oaks Avenue, and westbound motorists, from Huntington Dive, can enter the frontage street at east end to access the businesses. Eastbound motorists, from Huntington Drive, and southbound motorists, from Fremont Avenue, can enter the frontage street at west end.

The frontage street is a two-way street, except for its western end, which is one-way eastbound. The one-way section extends from Fremont Avenue to the first driveway for the purpose of keeping the operations of the intersection of Huntington Drive and Fremont Avenue as simple as feasible. At the eastern end of the frontage street, the

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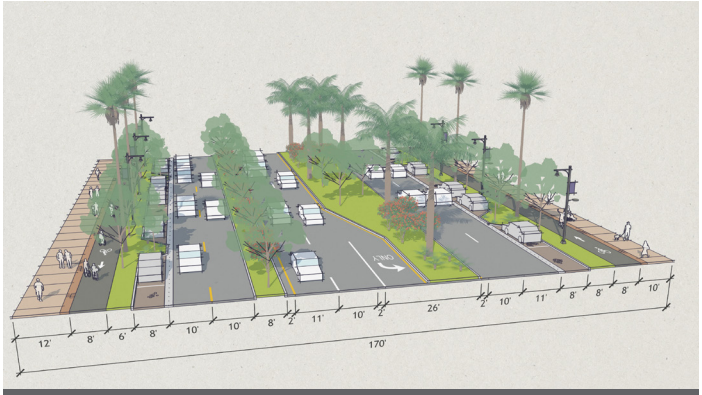
eastbound motorists are required to turn right (southbound) onto the driveway. The purpose of the right-turn-only is to prevent motorists from turning left across the driveway and blocking it. The frontage road primarily helps motorists who are driving to the businesses. Motorists who are departing from the businesses can depart as they do currently, except that they have additional options at the driveway that aligns with Fair Oaks Avenue. The motorist can turn left onto Huntington Drive or head straight onto Fair Oaks Avenue.



Proposed Cross Section of Huntington Drive and the Frontage Street

As shown on figure 42, at the intersection of Huntington Drive and Fair Oaks Avenue, the high-speed right turn channels were removed to reduce speeds, incoporate multimodal elements, and improve the aesthetics. The road diets on Huntingon Drive, Fremont Avenue and Fair Oaks Avenue reduces the size of the of the two intersections which shortens pedestrian crossings, provides space for the frontage street, increases legibility, reduces the impervious area, reduces the motor vehicle domination of the area, and help reduce traffic volumes.

The asterisks at the intersection of Huntington Drive and Fremont, shown in Figure 42, indicate places for significant gateway features. On the northern two corners, wonderful, small, public spaces are proposed.

The five-lane typical section of Huntington Drive is proposed to extend along the Huntington Drive to Alhambra Road. At the intersection of Huntington Drive and Alhambra Road, the length of the pedestrian crossing on the north approach of the intersection ought to be shortened from about 110 feet to about 75 feet (two southbound lanes, one left turn lane, a median refuge, and two northbound lanes). There would be bulbouts with shade trees at the ends of the parking rows. This presents another opportunity for a significant gateway feature into South Pasadena.

The goal of the road diets throughout the city, and in this location, is to constrain the car-carrying capacity of the street network to help reduce traffic volumes and increase active transportation options. Consequently, the transition from three northbound lanes to two northbound



Figure 42: Proposed Concept for Huntington Drive, Fremont Avenue and Fair Oaks Avenue

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lanes should happen south of the intersection. Only two northbound through lanes should be permitted through the intersection. One logical location for the transition in the northbound direction from three lanes to two lanes is south of Main Street, in Alhambra, and north of Alhambra's border with Los Angeles. At that location, the northbound right lane currently splits to add a double right turn channel onto Main Street. The idea would be to drop the right lane such that it simply becomes the double right turn channel onto Main Street. This transition could be achieved by modifying the pavement markings. There are likely other options for reducing the number of northbound through lanes that would need to be explored and, as necessary, discussed with Alhambra.

Huntington Drive & Marengo Avenue

There are excessive speeds and poor pedestrian accommodation at intersection of Marengo Avenue and Huntington Drive. Consequently, several traffic calming measures are proposed for Marengo Avenue, including protected bike lanes, narrow travel lanes, street trees, and bulbouts along the street. To prioritize pedestrian safety, raised crossings are proposed in the east-west direction at the intersection. The raised crossings will calm speeds, increase accessibility for pedestrians of all abilities to cross the street, send a message to motorist to expect people walking and bicycling.



Figure 19: Proposed Concepts for Huntington Drive and Marengo Avenue

All of Huntington Drive and Marengo Avenue, to the south of Huntington Drive, are framework streets. Normally, that would discourage the used of traffic calming measures that involve a vertical shift. However, an exception should be made for the raised crossing across the south approach to this intersection for public safety reasons. Emergency vehicles turning from Huntington Drive onto Marengo will be going adequately slowly that the vertical shift should pose little difficulties for them. However, the irresponsible motorist, speeding along Marengo Drive to "make the green light" will be affected.

Huntington Drive between Fair Oaks & Court Avenue

The unsignalized intersection of Huntington Drive and Court Avenue has a pedestrian crossing over Huntington Drive on the east approach. There are bus stops on both sides of Huntington Drive. The pedestrian crossing distance is 120 feet and there is no pedestrian refuge. Pedestrian safety is a concern with this configuration. A road diet along the length of Huntington Drive would help. Additionally, the design team has created two concepts for this intersection.

The first concept is to employ the typical section. Fewer lanes due to the road diet, bulbouts, and median refuges would greatly enhance pedestrian comfort and safety. In addition, the team recommends relocating bus stops to the far side of the pedestrian crossing. This way a stopped bus will not inadvertently block the view between eastbound drivers and pedestrians using the crosswalk. Note that the design team does not recommend building pull outs for buses, except at timed stops. The tapers have a negative effect on the supply of on-street parking. Pull outs near intersections can cause longer pedestrian crossing distances and consume a lot of street side space that should be used for wider sidewalks, street trees, and the bus stop itself. Most importantly, pull outs do not benefit transit users. They were invented to prioritize motorists such that they do not have to slow down or go around buses. Also, aggressive motorists often do not yield to buses when the bus driver wishes to reenter the travel way. Interestingly, if the motorist yield rates get too low, bus drivers learn to preemptively block the travel lane with the back of the bus so that they can get back in, or they stop in the travel lane and riders walk across the pull out.

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Figure 44: 2-Stage Left Turns and Crossings

Within this discussion of unsignalized intersections it is a good time to expand on the 26' median width on Huntington Drive. There are three reasons that the 26' dimension was used:

1. It increases the tree canopy. When a left turn lane is used, it consumes about 10' of the median. The remaining median, next to the left turn lane, is about 16' wide which is an ample width for street trees.

2. It facilitates easier left turns onto Huntington Drive from a perpendicular street. It does the same for through movements across Huntington Drive. The 26'- wide space is a refuge for the motorists, allowing a 2-stage left turn or a 2-stage through movement. In this way, the motorist only needs to find a gap in one direction at a time. Without a refuge, the motorist needs to find simultaneous gaps in both directions which can be rare on a busy street and hard to judge, which increases risk. See Figure 44.

3. Along a street like Huntington Drive, there are signalized and unsignalized intersections. Many motorists may have an unsignalized intersection with Huntington Drive at the end of their street, but choose to drive to a neighboring street with a signalized intersection because it is easier to turn left onto or cross Huntington Drive with the aid of a traffic signal. However, with the aid of 2-stage crossings, many of those motorists will opt to use the more convenient unsignalized intersection. This results in a more effective street network, a reduced barrier effect, more direct routing, and less traffic onto neighboring streets. With direct routing, motorists drive shorter distances, go through fewer intersections and pass fewer blocks--resulting in the same number of trips but reduced vehicle-miles traveled.

In sum, the 26' median helps to achieve many of the community's goals. While the minimum width for a refuge in which a 2-stage crossing is feasible is about 22', 26' provide more comfort.

The second concept incorporates an additional one-lane, one-way (west to east) frontage lane on the south side, from Camden Avenue to Olive Avenue, and narrower landscaped edges on both sides of the street. See Figure 45.



Figure 45: Concept for the Intersection of Huntington Drive and Court Avenue

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This provides a larger buffer for the neighborhood on the south side and a slightly increased on-street parking supply. Periodically, there would be an opening for motorists to access the frontage lane.

Finally, conduit should be placed under the intersection, during the construction, that allows pedestrian signals or traffic signals to be installed should they ever be desired in the future.

Huntington Drive & Pine Street

Pine Street, a residential street, functions as a high- speed short cut for eastbound motorists on Huntington Drive who wish to turn right (southbound), onto Garfield Avenue. By shortcutting, motorists avoid the queue at the signalized intersection of Huntington Drive and Garfield Avenue, and shorten their travel distance, because Pine Street forms the hypotenuse. Pine Street.

The geometry of the intersection of Pine Street and Huntington acts like a slip lane, allowing motorists to avoid slowing down. This condition has led to several crashes and abundant concerns about safety in the neighborhood. The concept involves converting the west end of Pine Street into a public green space/ pocket park, from Huntington Drive to Dos Robles Place. The west end of the remaining Pine Street would then tee into Dos Robles Place.

See Figures 46 and 47. If motorists continue to cut through Pine Street, then additional traffic calming measures should be added along Pine Street.

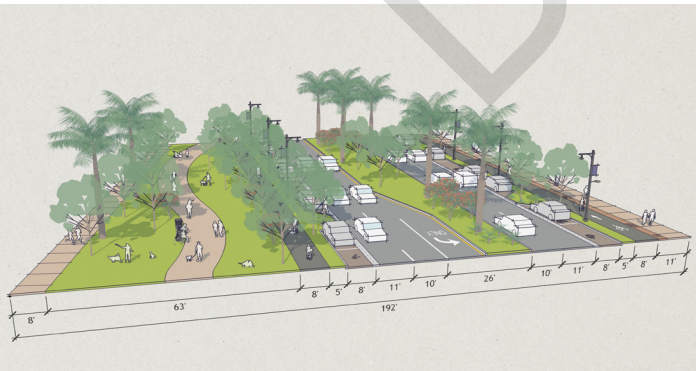

Figure 46: Proposed Section at Huntington Drive at Pine Street



Figure 47: Proposed Concept for the Intersection Huntington Drive & Pine Street

Huntington Drive & Garfield Street

In the vicinity of Huntington Drive, Garfield Avenue is the boundary between the Cites of South Pasadena and San Marino. However, north of Monterey Road, Garfield Avenue is completely within the City South Pasadena. The concept proposes bringing the typical five-lane cross section for Huntington Drive up to the intersection with Garfield, with one exception. The design team purposes that an eastbound to southbound right turn lanes would make sense due to:

1. The history of cut-through traffic on Pine Street; and
2. An exception to the no right turn lane practice can be made because it is in the outbound direction of the easternmost intersection within South Pasadena.

Along Garfield Avenue, the design team recommends a narrowing and slowing of the street, via separate bike facilities and bulbouts where on-street parking occurs. At the intersection, it is proposed that:

1. The northbound through movement to Garfield Avenue be limited to one lane; and
2. The westbound through movements to Huntington Drive be limited to two lanes.

Limiting the number of through lanes, entering the city, at the intersection with Garfield Avenue, to one lane to Garfield (northbound) and two lanes to Huntington Drive (westbound), will help reduce the traffic volume in the city.

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Figure 48: Proposed intersection plan of Huntington Drive & Garfield Street Intersection

Huntington Drive & Maple Street

Maple Street, the west of Huntington Drive, is a 1-block long approximately 46' wide, two-lane, residential street. Bulbouts with shade trees, are recommended at both ends of the block to narrow the crossing distances, create a sense of enclosure, and protect the ends of the on-street parking rows. See Figure 49.

As an option, the City and community should consider changing the parallel parking on the south side of Maple Street, to 60-degree, back-in-angled parking (due to the slope). This would help calm motor vehicle speeds, create a safer parking condition, and almost double the number of on-street parking spaces on the south side of the street. The pedestrian and bicycle crossings across the west approach are proposed to be raised. This will help the crossing be highly conspicuous and send the message to motorists that this is a residential neighborhood and to drive respectfully. A crosswalk was added to the intersection on the south approach to make the whole intersection more conspicuous and make pedestrian access to the bus stops more convenient.

Note that this is currently an unsignalized intersection and the median is 26' wide. Consequently, the barrier effect of Huntington Drive will be reduced due to two-stage crossings.Conduit should be installed under the intersection so that signalization can be easily installed in the future if desired.



Figure 49: Huntington Drive & Maple Street Intersection

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HOW WE ARRIVED AT RECOMMENDATIONS

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Role of Streets

Villages, towns, and cities were invented about 10,000 years ago to bring people close together to foster effective and efficient exchange. Streets were invented at the same time. In cities, people exchanged labor, capital, education, goods, entertainment, security, culture, services, ideas, innovations, and more. Prior to cities, people were scattered far and wide, making exchange ineffective and inefficient. Through trial and error, block sizes were developed and evolved such that the block perimeters were typically about a quarter of mile, which provided a good ratio of "access to buildable area." The streets were akin to linear public spaces that operated at low speeds (i.e., 3 to 8 mph) because that is how fast people, or their horses, walked. More recently, bicycles and trolleys contributed with street life (i.e., within the last 200 to 400 years, respectively). The streets were public spaces that hosted numerous community functions such as commerce, socializing, celebration, communication, recreation, multimodal travel, access, and deliveries. The streets' designs and building facades defined the community's identity and contributed to its sense of place.

Traditionally, cities employed a connected network of streets. These networks were planned, using various patterns, in accordance with what was important to the community and context. The radial pattern emphasized important places at the "hubs." Other communities employed rectilinear patterns which empathized development efficiency and simplicity. While other communities' network patterns were organic which responded to the landscape. In all cases, the street networks made the blocks accessible, created redundancies, fostered exchange, and provided a human scale.

Following the development of trolleys and rail, cities could expand into transit-oriented suburbs. The connected street network practices continued because people still needed to walk to the trolley lines. and the trolley routes and station areas became places of concentrated social and economic exchange. They were what we now call transit-oriented development. This is how South Pasadena was first developed. The whole city was a transit-oriented development.

Following WWII, government priorities, policies, and practices changed dramatically to support an untested but



Figure 50: Imman Square

exciting set of modernist transportation values, based on the automobile and its ability to travel at high speeds. For the first time in the 10,000-year history of cities, individuals, in automobiles, were capable of speeds that had never been feasible previously in cities with walking, horse and buggies, bicycles, and trolleys. Buggies were originally pulled by horses, and with the advent of the motor engine dawned the age of the "horseless carriage".Automobiles evolved dramatically but, size wise, they stayed about the width of two horses, side by side, and still typically can carry two to six people. Between 1920 and 1940, automobiles displaced horse and buggies and the streets were repurposed and redesigned to accommodate them and their speed capabilities.

The most impactful changes to our cities and streets were due to motor vehicle speeds. Accommodating these higher speeds was foundational to the new and untested modern metrics, performance measures, and hierarchy of roads. The support for higher speeds was provided at every level of government and enjoyed industry backing by car manufacturers, oil and rubber industries, concrete and asphalt industries, and tract home builders. The naïve assumption was that everything would more-or-less stay the same, but people could get places faster. Speed was equated with efficiency and freedom. The speeds and ever-increasing traffic volumes and travel distances required a different scale of accommodation.

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Between the 1950s and 1980s, the federal, state, county, and city levels of government collaborated to spend billions of dollars to accommodate the modern automobile-based ideas. In the Los Angeles area, this involved dismantling the trolley systems, constructing highways through traditional downtowns and neighborhoods, repurposing some streets into motor vehicle thoroughfares, all of which severed the communities' traditional street networks.

Unfortunately, all things did not stay the same. Markets changed. Development patterns changed. Proximity didn't matter anymore people long distances could theoretically be overcome by speed. Automobile-dependent, low density, suburban developments were enabled. New disconnected block patterns were invented like the loop-and-lollypop pattern, superblocks, and various types of development enclaves. The newly invented automobile suburbs externalized their traffic volumes on the old, sparce network of farm-to-market roads that led to the traditional cities. Those former rural roads were widened and evolved into the arterials and highways, at public expense. Theories about dendritic hierarchies of streets replaced the millennia-old practices of connected networks.

In terms of city-making, all of this happened in very quickly. In less than a century (i.e., less than 1% of the history of cities) city-making was transformed. The changes did not have the benefit of thousands of years of trial and error. And there was error. Numerous unintended, but very real, consequences occurred. First, the math of motordom did not work. No matter how much money was spent on widening the highways and arterials, the ability of motorists to consume the space was always greater. Congestion was a given. Second, the cumulative impacts of these changes were highly damaging at every scale, ranging from the quality of life in older traditional communities, to disadvantaging transit and the people who depended on transit, to loss of agricultural land and natural habitats, to the environmental health of the planet.

South Pasadena's traditional street pattern and communities were not spared. The historic roles of the arterials as multipurpose places, rich in social and economic exchange, walkable, and supported by public transit, became motor vehicle conduits. Most of the community functions of streets, previously listed, did not disappear entirely, but they were diminished. That diminishment was gradual in the lifetimes of residents but was not unnoticed. At the charrette, older residents shared stories of what the streets and place used to be like and contrasted that with what they had become. Newer residents resented that their children could do something as basic as walk to school. They could not ride their bikes comfortably, and they could not even drive their car out of their driveways. The streets had been conquered by high traffic volumes. Car-dependency and accommodation had gone too far, and the community wanted a restoration of the other purposes of their streets.

Interestingly, similar community feelings were expressed in the City of Delft in the Netherlands, in the late 1960s. However, the city ignored the concerns for years and the community revolted. They took over their streets and placed couches and other furniture in the streets, not to block motorists completely but to slow them down and regain the suppressed community roles of their streets. Contemporary traffic calming was invented. Soon thereafter, the methods were refined and became national policy. The practices spread across Europe and expanded in scope to include arterial calming, VMT-reduction, better land use and transportation planning, etc. Fortunately, the City of South Pasadena recognized the community's concerns and created a interactive design process, also known as a "charrette", to help address them. Peacefully, but passionately, people discussed the issues, learned and became informed, and collaborated with stakeholders and the City staff on a setting a direction forward for the roles and design of the streets in the city.

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Existing Roles and Designed Roles of the Three Arterial Streets

Fremont Avenue

Fremont Avenue is a two-lanes street. Some segments have turn lanes and other segments do not. It is the only street in South Pasadena, that extends for the whole length of the city north to south. Freemont Avenue's northern terminus is at Columbia Street, which is also South Pasadena's boundary with the City of Pasadena. Approximately 160 feet to the west along Columbia Street is the southern terminus of Pasadena Avenue, a north-south street in Pasadena. About 1.1 miles to the north, Pasadena Avenue becomes the Long Beach Freeway/ Highway 710. Consequently, Pasadena Avenue and Fremont Avenue are the north-south receiving route for the highway traffic. So, one of Fremont Avenue's current roles to carry high volumes of through traffic and truck traffic, even though this part of Fremont Avenue is not a legal truck route.

South of the border and north of the downtown, Fremont Avenue supports a typical-looking residential street. Within the downtown, Freemont Street's role is to be part of the connected street network to provide multimodal access the mix of land uses in the downtown. South of downtown, Freemont Avenue's role is to support multimodal access to local schools, medium density homes, and various businesses. However, the above roles are severely compromised by the volume and behaviors of motorists cutting through the city.

The segment of Freemont Avenue, south of Huntington Drive and north of Alhambra Road (the border with the City of Alhambra), is a three-lane street. It primarily serves a residential neighborhood with a frontage of commercial land uses, along Huntington Drive, including a popular grocery store on the southeast corner, Grocery Outlet. Consequently, the avenue serves the normal roles of any residential street, except this segment was designated as a truck route. Within the boundaries of South Pasadena, the truck route role does not make sense, considering there is a parallel truck route 300 yards to the west. The rationale for the truck route along a residential street in South Pasadena exists south of the border within the City of Alhambra.

Within Alhambra, Freemont Avenue is also a truck route that leads to West Main Street, an industrial area, and I-10, located 400 yards, one mile, and two miles south of the border, respectively. By designating the residential street as a truck route, the distance that trucks need to travel between I-10 and Fair Oaks Avenue and Huntington Drive to the east, is shortened by 600 yards. It is basically a shortcut for trucks. Finally, this segment of Freemont Avenue is also part of a transit route.

The current thoroughfare and truck route roles of Freemont Avenue are not compatible with the residential land uses and context of Fremont Avenue. The truck and car traffic, that results, cuts off and isolates the western part of neighborhood. Fortunately, the role of Freemont Avenue, between Huntington Drive and Alhambra Road, as a truck route is optional. These problems can be and should be reduced significantly, by removing the truck route designation.

To achieve the desired roles, along the entire length of Fremont Avenue the traffic volumes need to be lowered, the illegal use of the avenue as a truck route curtailed, the motor vehicle speeds calmed, the aesthetics of the avenue improved, and the infrastructure for walking, bicycling, and transit be provided where it is missing and improved where it already exists.

Fair Oaks Avenue

The current roles of Fair Oaks are numerous. It currently is a major thoroughfare for traffic between Huntington Drive, downtown, the Arroyo Seco Parkway/Highway 110, and the City of Pasadena. It is the address of many restaurants, financial institutions, schools, jobs, homes, medical buildings, and other land uses. It is travelled by motorists, transit services, pedestrians, and bicyclists. It is a major contributor to the identity of the city, though not in a positive way. It is how many people perceive South Pasadena as they pass through. The traffic functions have eclipsed the community functions and Fair Oaks Avenue is a barrier to community life. The avenue does not express the values

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of the community as a family-friendly, attractive, place that supports historic preservation, its business, and the environment. Its design and current role do the opposite.

The community recognizes that Fair Oaks Avenue will still have to accommodate a level of through traffic but not with same dominating volume, speeds, and design. The desired outcomes include creating:

1. a comfortable, slower, and multimodal avenue that provides comfortable access to the land uses along and across the avenue, the neighborhoods, and the downtown;
2. a seam that connects the community, as opposed to a barrier that divides it;
3. a place that businesses can thrive;
4. a contributor to the image of the city, highlighting the three main "character areas" of the avenue (i.e., the mixed-use area north of Highway 110, the commercial and downtown area between Highway 110 and Monterey Road, and the mixed use and institutional area between Monterey Road and Huntington Drive);
5. a comfortable connection for all modes across Highway 110; and
6. an entrance sequence, from the north, that expresses to people entering the City of the South Pasadena's community values and establishes driver expectations for slower speeds and the presence of people out walking and cycling.

Huntington Drive

The wide right-of-way and serpentine alignment of Huntington Drive is a remnant of its past roles. Prior to the construction of the Arroyo Seco Parkway, Huntington Avenue was the main transit route into Los Angeles. The median was used by the Monrovia-Glendora Line of the Pacific Electric Railway (owned by Henry Huntington). The transit service began in 1902, when cars were still experimental, to support real estate development of the valley. There were two-way streets on both sides of the tracks. When the train line ceased service in 1951, the area where the tracks were, became a median and the two-way streets on each side were made one-way. The right turn channels leading to Fair Oaks Avenue are large because they formerly were used for trains as well.

The current role of Huntington Drive in South Pasadena is an east-west arterial street in the south part of the city. It provides access to several neighborhoods, low and medium density housing, offices, restaurants, and other commercial land uses. It connects to other cities along its route, including Los Angeles, to the west, and San Marino, to the east. Currently, the main purpose is to facilitate fast, through traffic. The design attributes that reinforce this role include six through lanes, the 40mph posted speed limit, the lack of enclosure, lack of bicycle facilities, infrequent pedestrian crossings, and the median that denies left turn and through movements to 60% of the cross-streets. The latter causes circuitous routing for local trips while rewarding long trips. The median also results in the higher traffic volumes on the cross streets that do have full access, onto or across Huntington Drive, which reduces the quality of life on those cross streets. In other words, the median on Huntington Drive imposes an unwanted traffic on the streets with full access.

On the positive side, in many locations, the sidewalks are buffered by a landscaped strip and on-street parking. The on-street parking is a remnant of the era when: i) the rail service accommodated the longer trips; and ii) the two-way streets that paralleled the tracks served local access roles.

Overall, the Drive is barrier in the city. Its roles, design, and aesthetic do not reflect the values of the community. The desired roles for Huntington Drive are those that prioritize the community and place functions over the traffic functions. The community recognizes that Huntington Drive will have accommodate a level of through traffic but not with same domination in terms of volume, speeds, and design. The desired outcomes include creating:

1. a comfortable, slower, and multimodal street that provides comfortable access to the land uses along and across the Drive, and to the neighborhoods;
2. a seam that connects the community;
3. a place that businesses can thrive;
4. a contributor to the image of the city;
5. an entry sequence, from the east and west, that expresses the South Pasadena's community values and establishes driver expectations for slower speeds and the presence of people out walking and cycling; and
6. achieving greater utility of the open space that is located at the intersection with Fair Oaks Avenue.

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Evolution of Ideas Over Time

The design process in a charrette is an evolution. It is not like a protracted, conventional, process, during which three complete, discrete, options are designed and evaluated at the consultant's office. Then the options and the consultant's pros and cons are distributed to stakeholders, the city, and the community for input and comments. Then a preferred options is identified. First, there are usually not three discrete option that can equally fulfill the desired roles and achieve the desired outcomes of the community. Second, the design team already knows a lot of what is desired based on its discovery process with the community, stakeholders, and City staff. Third, in a collaborative process, like a charrette, it is more efficient and effective to evolve the preferred concept collaboratively, starting with design components and outcomes that are already givens, based on the discovery process at the start of the charrette, which captured people's values, aspirations, and concerns.

For example, the presence of street trees and comfortable sidewalks are givens. Complete streets and slower speeds are givens. The widths of the rights-of-way are givens. A fundamental choice that has to be made is the number of through lanes. So, the design team, compares, two-lane, three lane, four-lane, and five-lane options and makes a design choice. That choice is vetted with balance of the design team, the Client team, the public, and others during the various feedback loops during the balance of the charrette. During this vetting, several considerations are made about this one component. The main considerations are: i) does it advance the desired role of the street; and ii) does it fulfill the city-wide goals about VMT-reduction, economic prosperity, image, etc. Similar choices are made about left turn lanes, right turn lanes, raised intersection, on-street parking, the type of bike facilities, crossing, etc. Some decisions are straight froward, based on principle. For example, the choice about right-turn lanes in a slow-speed, urban environment, where rewarding speed is not desired, and where street trees, comfortable walking, and comfortable cycling are desired. Consequently, no right turn lanes were recommended anywhere in the city. So, one by one, the design is composed and adjusted.

During this process, "critique" occurs to help with the composition and adjustments. Critique occurs in four ways:

- The Desk Critique is the most informal and frequent type. It takes no organization or preparation. Usually, it involves one critic and an individual designer, in an ad hoc manner, at the designer's table. The desk critique can be initiated by the designer or the critic.
- The Round Table Critique is an internal critique in which a few people gather around one or more drawings on a table. The participants address one or more design challenges/issues facing the designer(s). Round Table Critiques do not need a lot of notice and often occur spontaneously.
- The Internal Pin-Up is more formal than a Round Table Critique. It requires a small amount of preparation to set up the maps, diagrams, design concepts, lists, etc., on a wall or series of tables, needed to tell the story. Typically, there are few critics, and someone acts as the facilitator to keep things moving.
- The External Pin-Up is the same as the Internal Pin-Up but there are critics who are not from the design team. They could include the City staff, a political figure, some stakeholders, etc. Often External Pin-Ups are used near charrette milestones, like prior to public meetings, so that the critics can help with the concepts and help frame the issues and messaging and help to achieve the best input and results.



Figure 51: Charette Process At the City of South Pasadena

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Critique is the quality assurance (QA) process for ensuring good quality design ideas. Critiques quickly get to heart of issues in real time as the design is evolving. Some of the questions that are explored are:

- How is this advancing the role of the street and the community values?
- Who are the users and what are their needs?
- How is this relieving a pain point or fulfilling an aspiration?
- Is this a best practice in this context? Is there a better way?
- What was your thought process that resulting in this?
- What and how is the context framing the design component and its composition?
- How is this responding the constraint(s)?
- How does this integrate with what is nearby and the whole street/neighborhood/district/city?

The above is not a checklist for critics. Experienced critics can usually zero in on the breadth of the design's strengths and weakness readily and help the designer evolve the design accordingly. Less experienced critics usually bring up ideas that they need clarification. This results in discussion and exploration of the applicable design principles which can add value to the design. In all its forms, critique is a constructive and ongoing activity during the design process that improves the quality of the design and saves time. It also helps create teaching moments for both the critics and the designers.

Big Ideas

At the beginning of the charrette, the design team's objectives were to find ways to:

- address the community's concerns, involving safety, to quality of life, placemaking, walkability, etc.;
- set a direction that would enhance the city in terms of equity, image, quality of life environmental stewardship, and economic development;
- avoid taking away things that some people likely value (i.e., to minimize tension and unnecessary controversy); and
- increase "mobility."

Community members told us they want to be able to comfortably ride their bikes, walk to places, and cross the street. They wanted their kids to be able to walk to school. "Mobility" in South Pasadena ought to include everyone who has mobility needs, such as the young, elderly, disabled, different genders, different income levels, walkers, pedestrians, cyclists, transit users, students, workers, truck drivers, delivery people, etc. It is a best practice to design the streets to be context-sensitive; consequently, increasing "mobility" needs to be done in context-sensitive manner as well. In and around South Pasadena, "mobility" is the populations' capabilities and strategies, to move in order to access and provide what people need to live and thrive.

Movement in South Pasadena is not done for the sake of movement. It is done for a purpose (i.e., to access something like work / work-related sites, customers/ suppliers, shopping, doctor/dentist, family/personal, church/school, social/recreational/entertainment, etc.) More movement is not good for the city. However, more trip-making is good because it is a measure economy activity and social activity. With good land use and transportation planning, South Pasadena can grow its populations and economy (i.e., grow its trip-making) and shrink its traffic (i.e., lower vehicle-miles-traveled /lower VMT) via reducing their city's modal split by automobile, and shortening the average trips lengths. The secret is to lower the automobile modal split and the average trip lengths at a greater rate than the increase in trip-making. By doing this, South Pasadena can grow its population, economic vibrancy, and social connectedness while lowering its traffic volumes. Over time, South Pasadena will evolve to join the ranks of the most sustainable and safest cities is the world. The key is to think of "mobility" in a city-friendly way. This aligned with the community values and helped inform the design direction for the three arterials.

Early in the charrette it, it became obvious that the common denominator/fundamental problem that contributed to the community's concerns and stifled their aspirations was excessive motor vehicle volumes (too much VMT) and poor driver behaviors (excessive speeds and aggressive driving), city-wide. Solving this fundamental problem is made challenging by conventional values, expectations, and practices that, for decades, have prioritized high levels of service (LOS) for motorists over most everything else.

Knowing how the problem was created helps with solving the problem. Following WWII, the automobile was new and

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exciting. The prevailing vision was pro-automobile and, in a word, was "motordom." Motordom made it normal and progressive to believe that everyone should be able to drive short or long distances, during peak hours, with high levels of service, to and from anywhere to anywhere else. The idea was the common denominator linking daily activities was the automobile. Computer models and speed-oriented performance metrics were developed to enable motordom. Streets were widened and sped up accordingly, particularly the arterial streets to enable long and fast trips by car. Highway were cut through the cities. However, it was never enough. Latent demand filled up arterial streets and highways after they were widened, and the outcomes worsened. Vehicle-miles travelled (VMT) increased. Spillover effects occurred on parallel non-arterial streets. To pursue motordom at higher and higher levels, the trade-offs inflicted on communities got worse, such as the diminishment of quality of life, placemaking, walkability, equity, safety, image, environmental stewardship, air quality, and economic development. The team realized that, in South Pasadena, the community had reached the point that the trade-offs, to advance motordom, had gone too far. They had enough and they required a course correction.

To address the concerns and advance the community' vision, there would be new trade-offs, but in the other direction. In South Pasadena, it was time to reprioritize and restore many of the street functions that the community valued but had lost or were diminished, even if it meant purposefully rolling back motordom.

Along the three arterials, Fair Oaks Avenue, Huntington Drive, and Fremont Avenue, the design team developed starter ideas that reallocated space within right-of-way, from motorists, to other street users and community purposes. Design speeds the car-carrying capacities were lowered. However, community members from other streets (e.g., Orange Grove, Mission Street, Monterey Road, etc.) throughout the city, pushed back due to: i) similar problems on their streets: and ii) concerns that their problems would get worse due to "transfer effects" from redesigning and altering the roles of the three original arterials. The only feasible remedy was to apply the pro-community solutions across the whole city in a holistic manner. That idea was equitable. It was defendable, there were precedents in foreign and domestic cities. It was the right thing to do. And it achieved a community consensus. The trajectory was set to develop the ideas for the original three arterials in the study as well as other key streets in the city. The bottom line was reducing traffic, city-wide was necessary to achieve the community's aspirations.

Evolution of the Ideas for Fremont Avenue

The thought process for designing Fremont Avenue was different than those for Huntington Drive and Fair Oaks Avenue for a few reasons:

Freemont Avenue is the only two-lane, non-truck route, in the original three arterials.

- Historically, it was not a transit corridor nor a major north-south route in South Pasadena or in Pasadena. The Freemont/Pasadena Avenue route had two off-set intersections. There was one at the intersection with Columbia Street, which still exists, and another at Bellefontaine Street, where the "wishbone" was built to remove the offset. Further north, at Walnut Street, Pasadena Avenue veered to the northwest and ended, in about two thirds of mile, at a bluff, where Blake Street is today. Consequently, the original roles of Fremont Avenue, in South Pasadena, and Pasadena Avenue, in Pasadena, did not include them being a north-south throughfare.
- Before the Highway 710 sub was built, it's role in South Pasadena was a regular residential street north of the downtown and a regular downtown street in downtown.
- Residents shared how the community function had suffered due to the traffic functions (e.g., feeling trapped in their homes, not being able to access their own driveways, unable to comfortably cross the street, an inability to socialize on the street, etc.) Two women who had lived across the avenue from each other for about a decade met for the first time at the charrette. Ironically, they were describing the barrier effect of the avenue at the time.

In 2022, Caltrans relinquished the right-of-way for the 710 Stub to the City of Pasadena. It was an early step to remove the Stub and correct its negative impacts on the community. One of those negative impacts was the creation of excessive volumes of impatient cut-through traffic along Pasadena Avenue a Freemont Avenue. Someone at the charrette referred to the problem as a "car cannon." Consequently,

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the design team aimed to begin the restorative process of reducing the traffic volumes and calming motorists' speeds on Freemont Avenue.

Part of the thinking was to reduce the car-carrying capacity of the intersection by removing lanes. This is consistent with the city-wide goal to reduce VMT. Consequently, the current traffic volumes simply won't be able to pass through the intersection. This would normally be considered a "bottleneck." However, the intent is to lower the car-carrying capacity along the remainder of Freemont Avenue so that excessive volumes of traffic can no longer arrive to the intersection of Columbia Street from the south. In other words, the intent is to create a consistent car-carrying capacity in the future that is less than the car-carrying capacity today. The result will be less traffic on Freemont Avenue

To reinforce driver courtesy, several traffic calming measures were combined in the design:

- A bulbout was placed on the west side of Freemont Avenue to shorten pedestrians crossing distances, provide a place for a street tree to reinforce the sense of enclosure/narrowness, and to protect the end of the on-street parking row on the west side of the street.
- A valley gutter is proposed between the parking row and the travel lane to optically narrow the avenue in the absence of parked cars and lower the camber of the crown of the avenue.
- The east-west raised crossing combined with tight corner radii helps to reinforce slow speeds for motorists and makes the pedestrian experience more comfortable.
- Street trees were planted in the furniture zones/ landscape zones to create a sense of enclosure for motorists and increase shade and comfort for pedestrians and cyclists.

From a complete street perspective, a shared use path was placed on the east side of the avenue. In-street bike lanes are not comfortable for most cyclists and separated bike lanes would require too much space. The east side of the street was chosen for the shared use path due to fewer conflicts with driveways and a safer crossing at Columbia Street by keeping pedestrians and cyclists from crossing within the "confluence: of the off-set interaction. Note that the term "confluence" means the segment of Columbia Street, between the two avenues, that is shared by both north-south traffic and east-west traffic. The bike lanes on Columbia Street were designed to connect the shared-use path with the bike facilities that the City of Pasadena is proposing for Pasadena Avenue.

The sum of the changes, at and near the intersection with Columbia Street, are intended to set driver expectations and provide an attractive entry sequence into the City of South Pasadena and the neighborhood.

The northern part of Freemont is sloped downward from north to south, resulting in faster southbound speeds. The current design of the intersection with Buena Vista Street looks like it was intended to encourage high speeds around the curve. It's wide open and the motorists turning right (i.e., southbound to westbound) are provided with a right turn lane. That allows drivers, turning right, to slow down for their turn without slowing down other drivers who are following them. The original intent was likely to reduce rear-end crashes between drivers turning right and through traffic, but the design remedy promotes faster speeds which contribute to a host of other problems. Currently, there is a single pedestrian crossing on the west approach.

The design intent of the team was to remove high speeds completely from this intersection, and on the avenue in general with the following changes:

- Tighten up the cross-section of the avenue in general.
- Create a sense of enclosure with street trees.
- Provide bulbouts on both sides Buena Vista Street at the intersection.
- Allow pedestrians to cross both streets.
- Control the intersection with all-way stops.
- Provide a bulbout on southwest corner of the intersection on Fremont Avenue.
- Note the best practice throughout this entire plan, is to place bulbouts, each with a street tree, at the ends of every dedicated on-street parking row. Also, place a valley gutter between every dedicated on-street parking row and the adjacent lane. Note that half of the valley gutter's width is included in the width of adjacent lane and the other half is

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considered part of the dimension of the parking row. The intent of the bulbouts and the valley gutter is to narrow the optical with of the street.

Note that the right of way is approximately 60 feet wide. Consequently, it is impossible to fit what is provided on the avenue today and everything else that that is needed to achieve the desired outcomes for the avenue. The least important component of the cross section was the on-street parking on the east side. It was removed to make space for the other, more important components. It was removed from the east side because fewer homes face Fremont on the east side, compared to the west side.

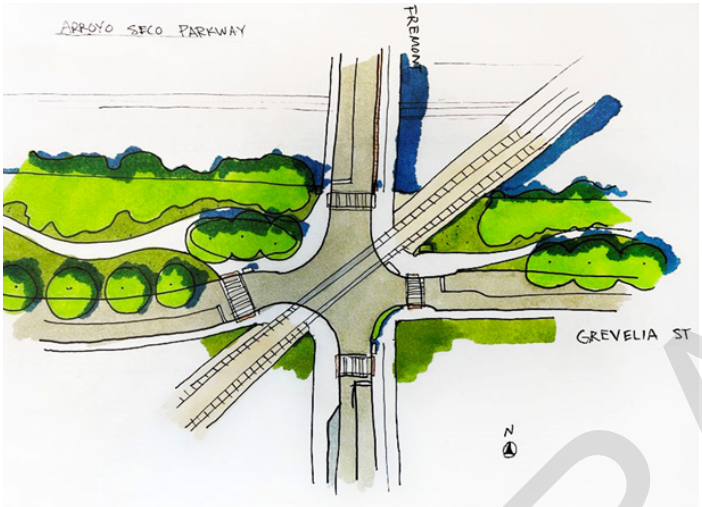

Figure 52: Proposed Intersection of Fremont Avenue and Grevelia Street

At Grevelia Street, the right-of-increases from 60 feet to 80 feet. Consequently, the cross section can include more components. The recommended cross section is two motor vehicle lanes, valley gutters, bulbouts, and a sidewalk and landscaped buffer on the west side. On the east side on there is a two-way separated bike facility, detectable strip (to help guide people, especially people with vision disabilities), and sidewalk. The reasons that the designers went from a shared use path to a sidewalk and separated bike lanes are: i) there will likely be more pedestrians and cyclists downtown, compared with further north; ii) multimodal comfort will be higher; and iii) there is enough space within the right-of-way. The two-way, separated bike lanes are proposed to extent all the way to Alhambra Road.

The signalized intersection with Grevelia Street is complicated by a set of train tracks that cross the intersection diagonally(see Figure 52). Presently, there is only two pedestrian crossings at the intersection. The intersection is located immediately south of a bridge over Highway 110. The eastern sidewalk over the bridge is closed. The sidewalk on the west side about 4.5 feet wide. There are no bike facilities over the bridge. The two motor vehicle lanes over the bridge are each 18 feet wide. Presently, the placements of rail-gates interfere with the sidewalks. Overall, the design of the bridge and intersection creates an obstacle to pedestrians and cyclists. For people who do walk or cycle through this space, it is an unpleasant and uncomfortable experience.

To address the problems, a roundabout was considered for the Grevelia Intersection. The team adjusted the shape of the roundabout several times but determined it was infeasible due to the constrained space. Consequently, the team focused on adjusting the shape of the signalized intersection, the width of the lanes on the bridge, and the other three approaches, until several objectives were reached and could be proposed:

- Bike and pedestrian facilities are proposed to cross the east side of the bridge;
- A wider sidewalk is proposed to cross the west side;
- Crosswalks are proposed on all four approaches of the intersection;
- Bicyclists can cross the tracks at about 90 degrees which is safer than at a shallow angle;
- Pedestrian and bike waiting spaces are available for when the trains pass, and the gate-arms come down;
- The gate-arm on the west approach is proposed to be altered such that it crossed the entire approach, the concrete channelization be removed, and the approach narrowed;
- The 0.5-acre, unused, open space, on the north side of west approach, should be made into an usable public space. It should be designed with consideration of what may occur on Grevelia Street to the east as part of the Fair Oaks recommendations. There is not a lot of public space in this area and a passive place to walk one's dog, sit down, or eat your take-out from a nearby restaurant would be welcome.

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At the Mission Street intersection, the idea is to have as compact an intersection as feasible. It is proposed to be a raised intersection to: i) slow motorists, ii) give pedestrian and cyclists priority; iii) make the crossings easier for people who use wheelchairs or have other disabilities; iv) highlight the location of Mission Street, especially if it were paved decoratively; and v) provide the flexibility to make segments of Mission Street a "flush street/barrier-free street." The design team located the bus stops on Mission Street, on the west side of the intersection because a new bus service is proposed, and its route involves Mission Street to the west of his intersection and Freemont Avenue to the south.

Bulbouts and valley gutter were proposed on Mission Street too. This results in the previously mentioned benefits. However, for Mission Street, valley gutters provide the additional benefit of making paving the street with clay bricks more affordable. That's because only the travel lanes need to be paved with brick and a change in material can be for the parking rows 9such as permeable concrete. Clay bricks create texture which is a traffic calming measure. Plus, clay brick pavers would help beautify the street.

All the right turn lanes are proposed to be removed from Fremont Avenue, for the previously mentioned reasons.

For the intersections, near the high school and Catholic school, they were designed similarly to that of Mission Street, and for the same reasons. The big difference is that there are no turn left-turn lanes at any of the intersections near the schools to minimize crossing distances.

Presently, of the curbside activities near the schools include pick-up and drop off areas for cars, and pick-up and drop-off areas for school busses. The intent is to provide the flexibility for these activities to continue. The concept drawings show parking rows on both sides of Freemont Avenue. However, these spaces should be considered as flexible zones for curbside activities. The space could be divvied up for pick-up drop-off by car, bus, or TNC, and/or street parking. Flexibility is the key so that the space best meets community needs. The space could even change over the course of a day or a week. For example, there could be pick-up and drop-off during school days, and on-street parking during non-school days and evenings.

However, the bulbouts are important when discussion curbside activities. The bulbouts are necessary because it is not a best safety practice for any of these curbside activities to occur too close to intersections. The bulbouts self-enforce what some people call "daylit intersections" which is key to reducing fatal and serious injury crashes.

The rational for the design of Freemont Avenue, south of Huntington Drive, was covered well in the section about truck routes. However, additional rationale includes the following.

- No turn lanes are recommended to capacity-constrain this segment of Freemont Avenue, to discourage through traffic and trucks, to and from I-10 and the industrial areas to the south.
- A northbound transit queue jump lanes was provided, south of Huntington Drive. A southbound transit queue jump lanes was provided north of Alhambra Road. The reason is that this segment will be busy, and the queue jump lanes will help with the transit vehicles with their headways.
- A raised crosswalk is proposed across the north approach to the intersection with Alhambra Road. Similar to the raised crossing at the city's northern border at Columbia Street, it helps to set driver expectations, as they enter South Pasadena, that pedestrians are present and to slow down.
- Presently, two northbound lanes cross Alhambra Road and merge on Freemont Avenue. Irresponsible drivers race to get ahead of other drivers prior to the merge. This behavior will be stopped by having only one receiving lane on the north approach to the intersection. This is also consistent with the city-wide goal of reducing VMT. The avenue is also proposed to be a s constrained as feasible to discourage truck drivers from short-cutting.

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Evolution of the Ideas for Fair Oaks Avenue

The population of South Pasadena is about 27,000 people with a land area of 3.44 square miles (2,200 acres). It has a transit-rich history and was developed on a traditional, connected, network of streets. If it were a stand-alone city, then an objective of the design team would be to plan and design the streets to be peaceful, walkable, bikeable, attractive, and two lanes. The team calls such cities, "two-lane towns," not counting transit lanes. If South Pasadena had a network of two-lane streets, they could easily handle the city's traffic volumes, provide modal options (as was the case historically), and result in great places. However, it is not a stand-alone city. South Pasadena a small part of the largest metropolitan region in the US (i.e., it's one of over 200 cities in the Greater Los Angeles Region with a population of 20,000,000 and an area of about 34,000 square miles). Consequently, motorists from South Pasadena routinely drive to other parts of the region and vice versa, while other motorists simply cut through South Pasadena. Thus, a two-lane town, is not feasible in the near term. However, driving from everywhere to everywhere else in the region, incurring high VMTs, is not sustainable and erodes quality of life, public safety, etc. The region is car-dependent and out-of-balance and, so is South Pasadena, which was a common thread of the charrette's public input. So, the design team recommendations are designed to put South Pasadena on a trajectory to achieve a better balance by reducing VMT and cut-through traffic, while positioning South Pasadena to better meet its own needs within its borders. Furthermore, the design team hopes that South Pasadena's example with inspire other cities in the region to do the same because then everybody will benefit. The bottom line for the design team was that, in South Pasadena, some streets and roads will need to have more than two through lanes. The design team recommends that those include Fair Oaks Avenue, Huntington Drive, and Highway 110.

Specifically, the design team recommends that Fair Oaks Avenue be a five-lane avenue (i.e., two lanes in each direction, with left turn lanes). The result is that Fair Oaks will carry traffic that has no origin or destination in South Pasadena. The cut-through drivers have a self-interest to drive quickly which is not in the interest of the community. The good news is that traffic volume and traffic speeds are separate ideas. So, the design team's recommended cross sections and intersection concepts incorporate several traffic calming measures.

From north to south the rationale for the design choices will be summarized.

The design team wanted to get the attention of travelers' attention, regardless of their mode of travel, as soon as they cross Columbia Street into South Pasadena with the cross section. As discussed previously, the recommendation cross section was five lanes. However, the narrowest feasible lanes widths, that is 10', were recommended to help reduce speeds, increase safety, and create space for other components of the cross section. Parking, to service the residences, businesses, and the museum, was recommended on both sides, with valley gutters and landscaped (with trees) bulbouts.

The team considered two-way separated bike lanes on one side and shared use paths, but one-way, separated bike lanes on both sides suited the context better. They make signal phasing and timing simpler. They align with drivers 'expectations better (i.e., cyclists ride in the same direction as motorists), which is important on Fair Oaks Avenue due to the mix of drivers including a higher percentage of people from out of town compared to a typical street in South Pasadena.

The bridge over Highway 110 is trying to serve the interchange ramps, State Street to the east, and Grevelia Street to the east and west, and north-south traffic. It is a complex place and cannot do all its functions well. It is barrier to walking and cycling. It has limited queueing space. The most problematic queue is for the northbound to westbound turns onto the highway. It backs into the through lanes. To address this, consideration is being given to a loop ramp in the northeast quadrant. However, there are space constraints, grade issues, and the highway is historic.

To address the difficult left turns at the interchange, the team developed an indirect-left-turn concept, which involves the motorists passing through the interchange and then, north of interchange, where there is plenty of queueing space, make a U-turn and then turn right onto the westbound ramps to highway. The rationale for the indirect left turn concept includes:

- it is a simple project compared to the loop ramp;
- a lot of money will be saved by not having to pay for an unnecessary environmental process;
- time and money will be saved by not have to

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develop loop ramp concepts;

- a large sum of money, that was contemplated to be used for implementing the ramp, would be saved and uses for other purposes;
- indirect left turns are a proven strategy and are common at problematic intersection;
- it would also save a lot of City staff time that could be better used on other efforts that more directly help the residents of South Pasadena;
- the left turn lanes and the related channelization can be removed, freeing up space for the bike and pedestrian infrastructure to continue over the bridge; and
- green time in the traffic signal cycle, previously used by the left turns would be available for the remaining approaches.

The U-turn intersection, associated with the indirect left turns, would involve acquiring some right-of-way from narrow, vacant strip of land, located between the War Memorial and the parking lot for the Dermatology Arts building. The design team assigned two traffic calming purposes to the U-turn intersection. It would be used a lateral shift for and a gateway treatment into South Pasadena. Combined with the proposed cross section, a strong message will be sent during the arrival experience regarding the community values of South Pasadena as a place of beauty, inclusivity, and multimodalism.

Evolution of the Ideas for Huntington Drive

Huntington Drive, a seven-lane thoroughfare with on-street parking, faces significant safety challenges due to excessive speeds and traffic volumes, resulting in severe crashes and hostile conditions for pedestrians and cyclists. Residents highlight the importance of improved access to homes, businesses, and perpendicular streets, with the Grocery Outlet being particularly difficult to reach. Stakeholders emphasize the need for a slower, safer street with traffic calming measures, maintained on-street parking, and amenities such as street trees, benches, and shorter pedestrian crossings for enhanced comfort and safety. Transit users echo these sentiments, calling for accessible transit stops and shelters, while motorists seek improved access, legibility, and consistent reduced speeds. Overall, there is a consensus that driver behavior and the street's aesthetics need improvement, particularly regarding the southern arrival experience into South Pasadena.

As a team during the discovery week of the charrette for Huntington Drive in South Pasadena, it's evident that the current configuration of the street presents significant challenges, including excessive speeds, safety concerns for pedestrians and cyclists, and poor access to businesses and amenities. Community input highlighted the desire for a safer, more inviting street that addresses these issues while enhancing overall aesthetics and functionality.

To address these concerns, some of out initial big Ideas included:

- Road Diet and Complete Streets: The proposed cross-section involves reducing Huntington Drive from seven to five lanes, creating separated bike lanes, and incorporating features such as shade trees, accent palm trees, valley gutters, and bulbouts with shade trees. This transformation aims to improve safety for all road users while enhancing the visual appeal of the street.
- Frontage Street: The intersection of Huntington Drive, Fair Oaks Avenue, and Fremont poses accessibility challenges, particularly for businesses on the southern side of the street. To alleviate this, a frontage street along the south side of Huntington Drive was proposed, facilitating clearer and more direct access to businesses. This two-way street provides improved access for motorists entering from Fair Oaks Avenue, Huntington Drive, and Fremont Avenue.
- Pine Street Transformation: Pine Street serves as a high-speed shortcut for motorists, leading to safety concerns and crashes. The proposal suggests converting the west end of Pine Street into a public green space or pocket park, discouraging cut-through traffic and enhancing safety. Additional traffic calming measures may be implemented if motorists continue to use Pine Street as a shortcut.

Permanent Projects and Temporary Projects

Design and building all the recommendations permanently and expeditiously would be best for the residents, businesses, city image, tax base, and the City. However,

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approvals, additional stakeholder and community involvement, design work, staging projects, staff time, contractor availability, and budgets make the perfect scenario infeasible. The reality is that it will take time. As an option, some of the challenges can be ameliorated somewhat by implementing projects or parts of projects temporarily. The idea is to approximate the permanent projects as much as feasible, using low-cost materials, such as paint, planters, portable barriers, art, flexible posts, etc. Then, when the budgets, designs, approvals, etc. are in place, then the temporary projects can be replaced with permanent projects.

The decision to build permanently or temporarily needs to be done on a case-by-case basis. Below are some factors to consider when making those decisions. Permanent projects deliver better outcomes than temporary projects. However, there can be several benefits to temporary projects, shown below in the regular font. There are also risks and disbenefits to temporary projects, shown below in italics.

i) If there is a desire to conduct a demonstration project to prove a concept to doubting stakeholders, then a temporary project can help. This is an option when case studies, testimonials, etc. aren't enough. However, sometimes the existing situation creates constraints that prevents a representative demonstration project. In other cases, the aesthetics of the demonstration project are so poor that they overshadow the positive outcomes and create opposition to a good otherwise good idea. In these cases, the demonstration project might backfire and result in more doubt or even opposition to the permanent project.

ii) Temporary projects can allow experimentation to occur for innovative designs that have uncertain outcomes. However, no recommendations, in this study, are experimental. Hypothetically, if the situation were to occur, in South Pasadena, then experimentation is a good idea. However, if the temporary project differs for the permanent project in a manner that would cause the temporary project to fall short of the expectations for the permanent project, then the remedy is to redesign the temporary project until it is close enough to the permanent solution to be a worthwhile experiment or do the permanent project with the assurance that it will be removed if it fails.

iii) Some positive change can be gained by implemented temporary projects when there is a highly pressing need that cannot wait for a permanent solution. Whether it is a safety need, connectivity need, or a political need, sometimes a temporary project is the only feasible means to address the need. Just be careful to explain to everyone involved the limitations of the temporary project to manage the expectations that the outcomes may not be same as those of a permanent project, and that the staff time and resources used to do the temporary project may delay the permanent project.

iv) Temporary projects are very helpful when there is one or more missing network connection that need to be in place to make other permanent projects perform better (e.g., closing one or more gaps in a bike lane project that is being implemented permanently in stages). Typically, there are few downsides for this kind of temporary project because the risks associated with having gaps are greater than the risks of doing the temporary projects.

v) There are insufficient funds to build the permanent project. Temporary projects cost money too. The designs of the temporary projects cost money. The monitoring and sometimes evaluating temporary projects cost money. The additional public involvement with doing two projects (i.e., a temporary project and a permanent project), instead of one, costs money. Though temporary projects are well meaning, the risk is that the combination of the costs of the temporary projects and the consumption of staff time, can slow down applying for grants and implementing permanent projects. If the lack of funds is a real problem, then consideration should be given to using some of the funds, that would have used on temporary projects, to apply for grants to pay for the permanent projects. This allows the staff and financial resources to focus on permanent projects.

vi) The biggest benefit of temporary projects is that portions of the desired outcomes of the permanent project can occur faster than they would otherwise. However, when City staff time is limited, using it for designing, implementing, and monitoring temporary project may delay greater benefits if that staff time were used to pursue funding and implement permanent projects.

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BULBOUT

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Anatomy of the Bulbout

Designing a street with bulbouts is a best practice when there is a parking row along the street. Note that the parking row is usually use for on-street parking, but it can be used for loading areas, TNC pick-up and drop-off purposes, school pick-up and drop off, etc. Think of the parking row as a flexible zone for curb-side functions. The benefits include:

- shortening the crossing distances for pedestrians and cyclists;
- self-enforcing the parking regulations (i.e., drivers cannot park too close to the intersection);
- creating better visibility between pedestrians and cyclists and motorists;
- creating room for a street-tree to be planted which produces shades and comfort for pedestrians and cyclists, and a sense of enclosure for traffic calming purposes; and
- it prevents aggressive drivers from overtaking in the vicinity of intersections when other motorists are turning.

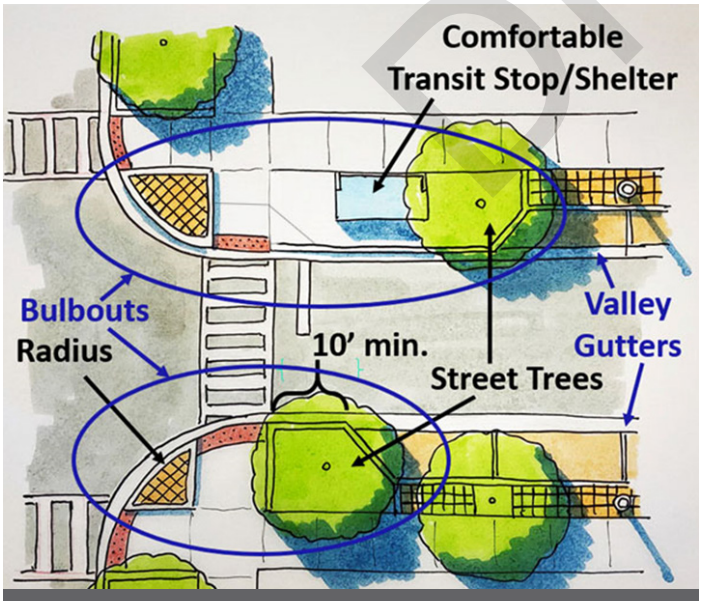

Figure 53: Typical Bulbout Design

Notice the corner detail in Figure 53 and the placement of the ADA ramps. The ramps align as close a feasible to 90 degrees to the street being crossed, and such that the crossing distance is minimized. Between the two ramps, there is a pie shaped corner island. It has orange pavers in the figure. It is surrounded by a curb. The curb has a 6" reveal along the side of the ramp for a minimum of 48", measured from the back of the warning surface. There is a similar curb on the opposite side of the ramp, next to the landscaped strip.

There are three purposes for these vertical curbs next to the ramps:

1. to provide a vertical surface to help guide people with vision disabilities to the crossings (this is aided by paving the pie-shaped triangle with pavers that contract with the ramps in color and shade);
2. to discourage motorists from driving over the corner, where pedestrians may be waiting;
3. avoid the need to use any bollards; and
4. maximize the landscaped space.

Note that in the example that there is a flare between the ramp and the bus stop. It is normal practice to place a flare next to a ramp in locations where a person might cross the ramp perpendicularly. Because someone might walk or roll between the ramp and the bus stop, there is a flare. On all the other sides of the ramps, there is either the pie-spaced triangle or a landscaped area. Consequently, nobody will be crossing the ramp perpendicularly in those locations. So, a vertical curb is used.

Note that, regular curb and gutters, along the edges of the travel lanes, are 24 inches wide (i.e., six inches for the top of the curb and 18 inches for the gutter). When a regular curb and gutter at a bulbout transitions to a valley gutter, it is best practice to align the valley gutter and the curb and gutter (i.e., align the back of the curb with the edge of the valley gutter closest to the parking row, and align the outer edge of the gutter with the edge of the valley gutter closest to the adjacent lane. See Figure 54.

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Also, shown on Figure 54 is the curb detail where the valley gutter and curb and gutter meet. It is difficult to compact the base for bricks in a 45-degree angled corner. So, the corner is filled in with an extension of the valley gutter.

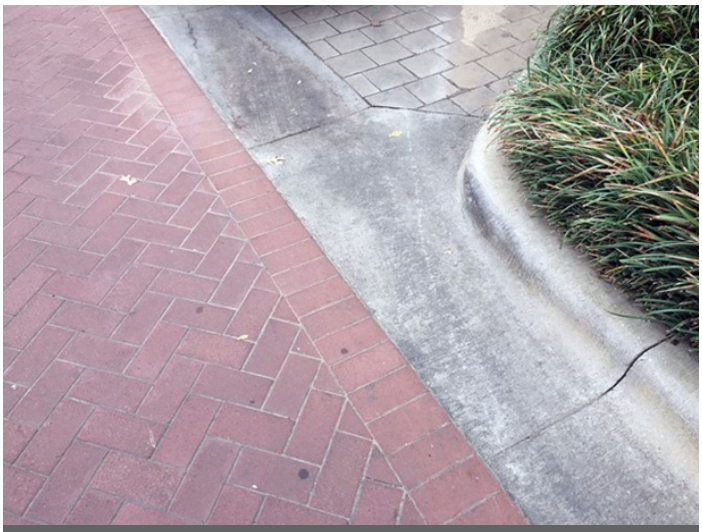

Figure 54: Detail for the Transition between a Valley Gutter and Curb and Gutter

Assume for a moment that the street in Figure 53 has 11' travel lanes and 8' parking rows. So, the curb-to-curb width of the street is 38 feet. The dimension between the centers of the valley gutters is 22 feet. At the intersection, where the curb and gutter is around the bulbouts, the vertical curbs are 6 inches farther from the travel lanes than the center of the valley gutter. So, at the bulbouts the curb-to-curb dimension is 23 feet wide. With this curb-to-curb dimension, an normal corner radius is 23 feet. This accommodates a WB40 design vehicle to turn the corner with full encroachment. This ensures that school busses and fire trucks can turn the corner. Note that, on fire routes, bus routes, and other locations where full encroachment is not desirable, then changes to the intersection design would be needed such as a larger turn radius, a greater throat width, etc.

At the end of the turn radii, a curb needs to be built along the tangent for a minimum length of ten feet parallel to the street. See Figure 53. After that, the curb can turn 45 degrees and form the end of the first parking stall. Obviously, the tangent can be longer that ten feet to accommodate an adequate area for a street tree, for bus stops, or for other reasons. The tangent section is necessary so that the bulbout is noticeable to drivers. If there is no tangent, then the bulbout will be too short, drivers will not notice it, and they will hit the bulbout.

Other advantages of valley gutters include:

- Midblock bulbouts can be placed in the parking row for a variety of reasons (i.e., to reinforce the sense of enclosure with street trees, to keep motorists from parking too close to a driveway, to create places for outdoor dining, etc.)
- Bulbouts can be lengthened to make space for a bus stop, without changing the location of the catch basins.
- Midblock bulbouts can typically be lengthened, shortened, or removed without affecting the drainage. Exceptions exist when the midblock bulbouts are used for a rain garden or catch basin.
- In narrow rights-of-way, choices must be made regarding the elements that can and cannot fit within the available space. Without bulbouts and valley gutters, sometimes a choice must be made between a row of on-street parking or a landscaped strip with street trees. However, with bulbouts and valley gutters, it is feasible to place street trees and on-street parking in the same row. See Figure 53, which shows a regular spacing of two parking spaces, then a street tree, the two more parking spaces, and so on. The pattern can be one tree then one parking space, or it can be variable.
- The valley gutter can lead the storm water to a flume which directs the water into a rain garden in a bulbout.
- Sand, grit, trash, etc. tends to migrate to the valley gutter where it can get swept up easily. With a conventionally crowed street, the sand, grit, and trash migrates to the back of the parking row where it is harder to maintain.
- For winter cities, the valley gutters require the catch basins to be placed next to a driving lane. Thus, after plowing snow, it is easier to keep the catch basins open, compared to conventionally crowned streets where the catch basins are at the back of the parking lanes.

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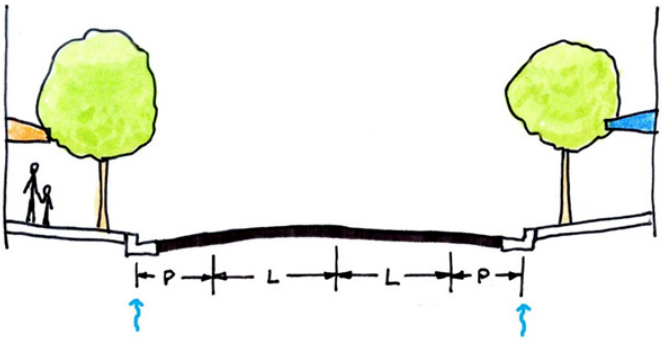

Figure 55: Conventional Curb and Gutter



Figure 56: Valley Gutters



Figure 57: Wide Optical Width

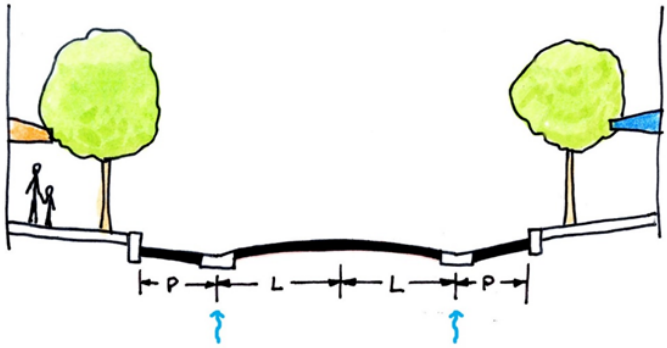

Figure 58: Narrow Optical Width

Valley Gutters

It is a best practice to use valley gutters in conjunction with bulbouts. One purpose of valley gutters is to move the lowest part of the cross section from the edges of the furniture zone to between the parking row and the adjacent lane. Stormwater runs from the parking row and the travel lanes to the valley gutter and then along the street to a catch basin, flume into a rain garden, a French drain, or other type of drain. See Figures 55 and 56.

Wide Valley Gutters

Valley gutters are usually 24 inches wide. 12 inches is considered part of the parking row and the other 12 inches is considered part of the adjacent lane. The valley gutters optically narrow the street which is a traffic calming measure. This effect exists with and without the presence of parked cars. See Figure 57 and 58.

Crown of Travel Lanes

Because the parking rows slope down towards the valley gutter, the crown of the travel lanes is lower than it would be with a conventional crown. See Figure 59 and 60. Note the arrow in both figures is at the same elevation. The change in profile with the valley gutter has several advantages over conventional profiles, including:

- In extreme rain events, a higher volume of stormwater can be held before the level of the water rises above the top of the curb.
- The sidewalks are higher than the crown which improves aesthetics.
- It is easier to design and build raised crossings and raised intersections.

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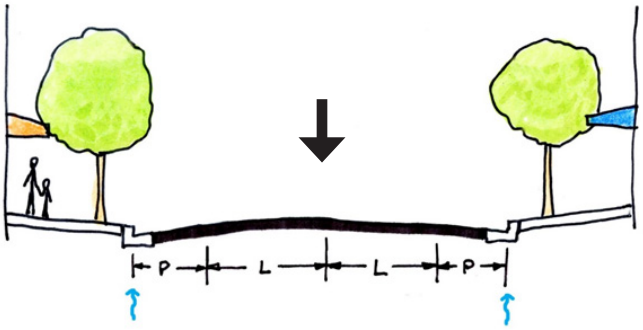

Figure 59: High Crown with Conventional Drainage

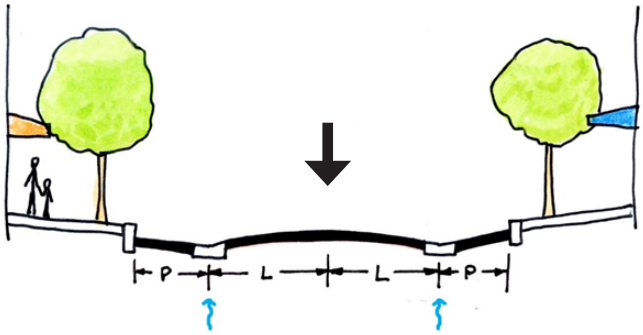

Figure 60: Lower Crown with Valley Gutters

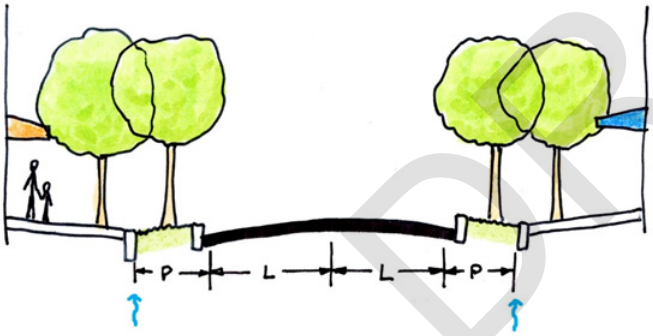

Figure 61: Bulbouts Slope Up with a Conventional Crown, Creates Ponding Problems

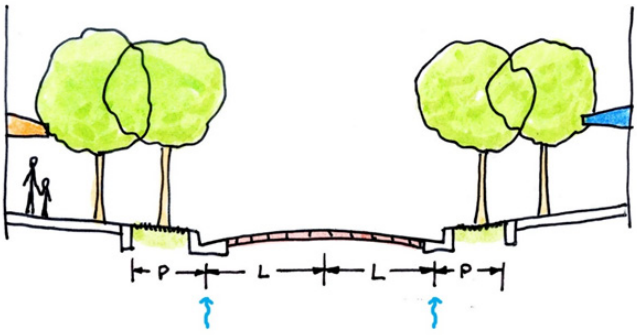

Figure 62: Bulbouts Slope Down with Valley Gutters, Resolves Drainage Problems

Valley Gutters

The valley gutters create the ability to use different paving material materials in the parking row and for the travel lanes. For example, brick pavers can be used for the travel lanes which creates texture (a traffic calming measure) and improve aesthetics. This contrast in materials enhances the optical narrowing of the street. Similarly, permeable bricks, bricks of a different color, concrete, permeable asphalt can be used in the parking row. There are plenty of other options for material changes. See Figure 61.

Bulbout at Intersections

It is best practice to place street trees in bulbout at intersections and at mid-block bulbouts, to reduce the optical width. With conventional drainage the bulbouts either: i) slope towards the sidewalks which creates drainage challenges like ponding; or ii) the reveal on the curb around the bulbout is made to small to be adequately visible and effective. See Figure 62. With valley gutters, the bulbouts slope towards the valley gutter and there is a full reveal on the curb.

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Flush Streets

Flush streets are barrier-free for people with mobility disabilities. This is beneficial during a normal day. However, during special events, when the street is closed to motorists, the street is effectively a plaza from face-of-building to face-of-building, where everyone can move around without curbs to block there way or to trip over. Furthermore. it allows for more flexibility for setting up events.

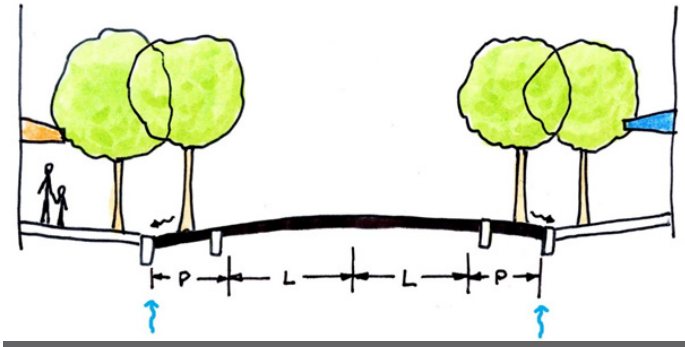

Figure 63: A Conventionally Crowned Street is not Conducive to being a Flush Street due to the Drainage Line being Next close to the Sidewalk

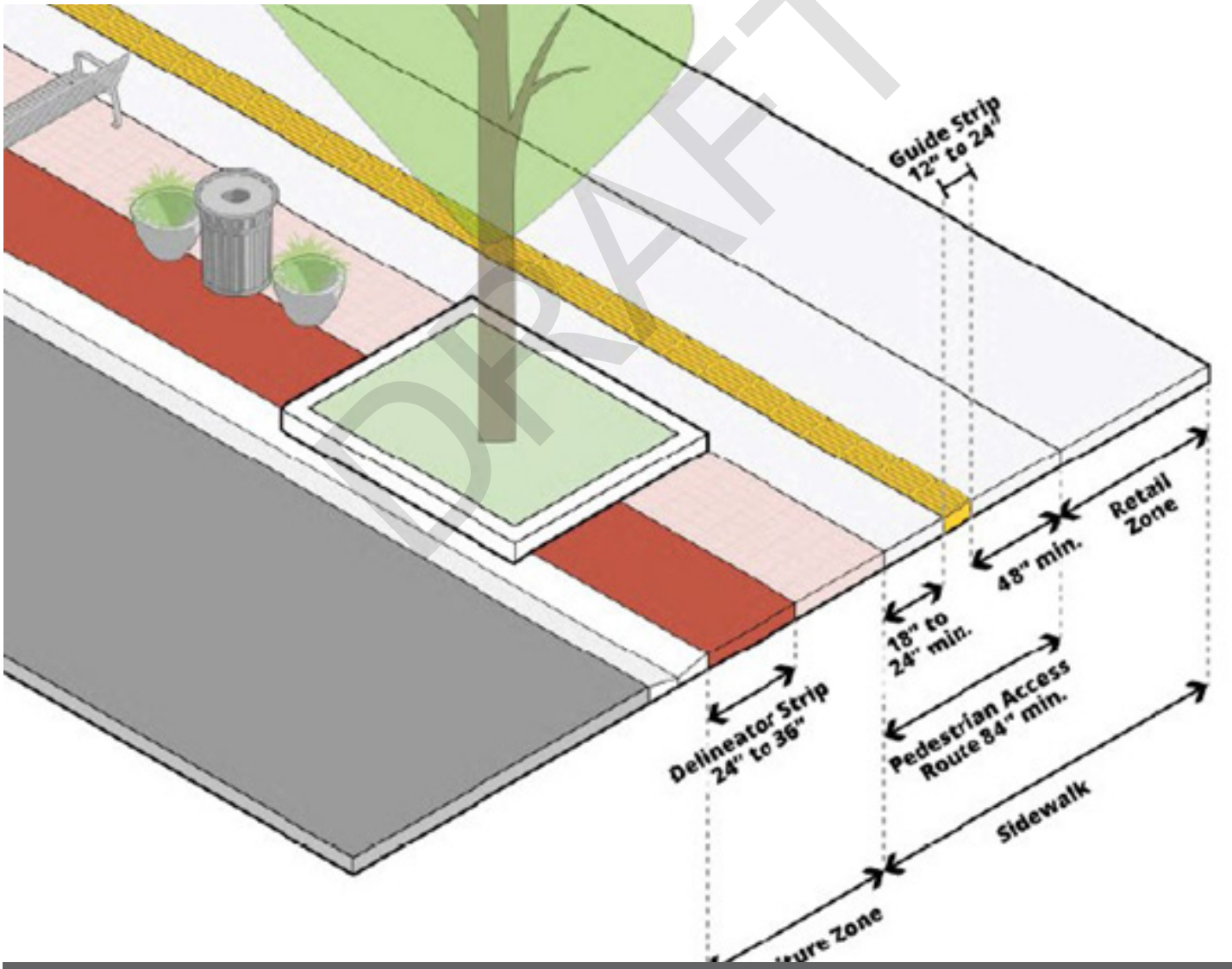

Figure 65: Typical Layout of Guide Strips and Delineator Strips on the Edge of a Flush Street.

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Flush streets lack curbs that people with vision impairments use for guidance. Following a curb line can be difficult too, due to signs, street trees, etc. However, there are tactile guide systems that can be added to sidewalks, plazas, and even large buildings, like train stations, that are more effective and more predictable than curbs for people with vision disabilities to follow. See Figure 64 for a typical layout of the edge of a flush street. Figure 65 shows an example of a guide strip. The example is from an international airport, where the guide strip leads people from the arrivals curb to the check-in counters, gates, and other important destinations at the airport. For passenger leaving the airport, the guide strips help guide people to the baggage claim areas and the transit platforms.

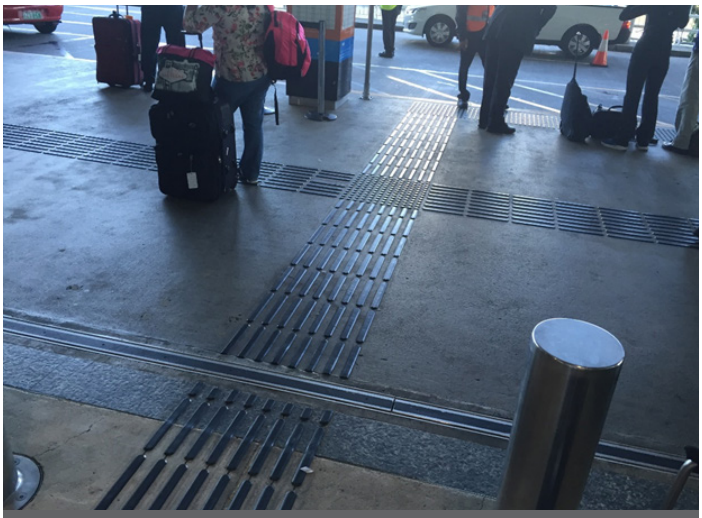

Figure 66: Example of Guide Strips

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NEXT STEPS

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Next Steps

Next steps should include:

- Review the list of other streets that need the similar attention as the three original arterials because there may be such streets that were not brought to the design team's attention during the charrette.
- Advance the concepts for the other streets, that did not receive the same design attention as the three original arterials.
- Conduct planning level cost estimates for the design and implement of the concepts for the three original arterials.
- Prepare traffic calming concepts for Marengo Avenue, Ramona Avenue, La France Avenue, and other streets that are used for shortcutting. Note that most of these streets are not primary fire routes and their problems can be successfully solved relatively inexpensively with "periodic traffic calming measures" such speed humps, mini-traffic circles, chicanes, etc.
- Mission Street is currently an important emergency services route. To fulfill that role, the design team recommended a three-lane section. If it were not an emergency route, then the recommendation would have been a typical cross section of two lanes. Mission Street would better serve it roles as the city's high street/main street if a substitute emergency services strategy or route could be identified that meets the needs of the emergency services departments of the City.
- Collaborate with the City of Pasadena on ways to reduce traffic volumes on Pasadena Avenue and Fremont Avenue. It is in both City's interests to reduce the north-south cut-through traffic along those avenues.
- Establish a position or hire a consultant to position the City for grants, and to apply for grants to help pay for the study's recommendations.

Considered but Rejected Options

As was explained in the section on evolving the concepts, there were no other discrete options developed. At the beginning of the project, the design team was open to all options but, as explained, the options were informed by the community values and aspirations and iteratively built up and evolved in a collaborative process. A range of options were considered for the components of each concept but were not typically drawn. So, for example, if a four-lane to three-lane road diet was recommended, then, options were considered that involved two-lane sections and five-lane sections and keeping the four-lane section.

Priorities

1. Stop any travel lane-related project that will increase car-carrying capacity in the city. Do not plan to add any through lanes, auxiliary lanes, or turn lanes anywhere in the city.

2. Remove the truck route designations from Mission Street and Fremont Avenue.

3. Close Pine Street, west of Dos Robles Place. Alter the north end of Dos Robles Place to allow eastbound to southbound right turns.

4. Collaborate with Pasadena on a permanently design to reduce the north-south car-carrying capacity of the intersection of Pasadena Avenue, Columbia Street, and Fremont Avenue

5. Build the U-turn facility on Fair Oaks Avenue to ameliorate the interchange problems at Highway 110. Design the projects as an early implementation step of the recommendations for Oaks Avenue. Restripe the interchange's bridge, temporarily, to connect the conventional bike lanes on the north and south sides of the bridge, until such time as the other Fair Oaks recommendations are implemented.

6. Collaborate with Pasadena on a permanently design to reduce the north-south car-carrying capacity of the intersection of Pasadena Avenue, Columbia Street, and Fremont Avenue.

7. Plan, design, and implement the traffic calming projects on the non-emergency routes. These position the three original arterials for change.

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8. Collaborate with emergence service departments on a study to remove the emergency services role from Mission Street between Fair Oaks Avenue and Meridian Avenue.

Thoughts on Truck Routes

Truck drivers are required to stay on truck routes unless their destination is not on a truck route. At those times, they must use the shortest reasonable route between the nearest truck route and the destination, respect areas that have truck restrictions, or use the route stipulated by the jurisdiction. The City of South Pasadena has the authority to determine the truck routes within its boundaries, provided they comply with State regulations. Two changes to the truck routes in South Pasadena are recommended.

i) Remove the truck route along Mission Street. This street's roles in the city should primarily be about maximizing social and economic exchange, place-making, pedestrian comfort, celebration, events, and civic identity. Its roles are diminished substantially by incompatible roles such as providing high levels of service for motorists and routinely accommodating freight and goods movement. Its role as an emergency services route also detracts from its high street/main street roles, but that role is necessary until an acceptable alternative is determined.

ii) Remove the truck route from the south portion of Fremont Avenue, between Huntington Drive and Alhambra Road. It is primarily a residential street within a traditional neighborhood. Shortening the truck drivers' route to and from I-10 by 600 yards is not sufficient justification to keep this truck route. The City of Alhambra ought to consider removing the truck route designation on the residential segment of Freemont Avenue between Alhambra Road and West Main Street. Truck routes should be on streets that have designs and land use compositions that are suitable for truck routes. Specifically, the westbound to southbound trucks should stay on Huntington Drive, and then use West Main Street to access Freemont Avenue, along which they would head south towards I-10. The same route would apply for the northbound to eastbound trucks, but in reverse order.

Lastly, informal/illegal truck routes should be discouraged through various means including design. Based on community input, City staff input, and field visits, Freemont Avenue is currently an informal/illegal and inappropriate truck route role. The avenue ought to be designed to accommodate South Pasadena's and Pasadena's fire trucks and school busses but not designed for routing use by large trucks such as tractor trailers. Those vehicles ought to be rare and should be considered a "control vehicle" such that, when turning, they are required to encroach into opposing lanes and onto reinforced curb returns when signal poles and signs, etc. are not present. The idea is to physically discourage drivers of such trucks from using Freemont Avenue. The smaller trucks are difficult to discourage through geometric design. However, slower speeds, outreach to local businesses that routinely use trucks, and periodic enforcement can help.

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Attachment C – 2020 Systemic Safety Analysis Report (SSARP)

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City of South Pasadena

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JANUARY 2020

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1.0 EXECUTIVE SUMMARY

The California Department of Transportation (Caltrans) established the Systemic Safety Analysis Report Program (SSARP) in 2016 to provide funding for local agencies to identify safety needs and recommend projects to address these needs. Systemic analysis is a proactive safety approach that focuses on evaluating an entire roadway network using a defined set of criteria. It looks at crash history on an aggregate basis to identify high-risk roadway characteristics, rather than looking at high-collision concentration locations through site analysis. Systemic analysis acknowledges that crash history alone is not always sufficient to prioritize countermeasures across a system.

Overview

A Systemic Safety Analysis Report (SSAR) analyzes collision data, assesses infrastructure deficiencies through an inventory of roadway system elements, and identifies roadway safety solutions on a city-wide basis. The SSARP was created to help local agencies develop safety projects that can be submitted to the federal Highway Safety Improvement Program (HSIP) for funding consideration. Agencies with an SSAR have a competitive edge to be awarded funding for their projects. The City of South Pasadena received funding allocated by the California Transportation Commission (CTC) in 2017 to implement the SSARP.

The general content of this report follows this outline:

- Crash data source and analysis techniques
- Crash data analysis results with highest occurring crash types and roadway characteristics contributing to these collisions
- Safety countermeasures for selected high risk corridors and intersections
- A citywide signage, pavement marking, and curb marking inventory, evaluation, and recommendations
- A list of safety improvement projects (countermeasures) , collision reduction benefits, and cost estimation
- Prioritization of projects based on benefit-cost ratio and effectiveness of safety improvement

This report was prepared in accordance with Caltrans' *Systemic Safety Analysis Report Program Guidelines,* dated February 2016 and *Caltrans Local Roadway Safety Manual (LRSM) version 1.4,* dated June 2018. Per the SSARP guidelines, the following language from Section 148 of Title 23, United States Code [23 U.S.C. §148(h) (4)] is included as part of this report:

> *REPORTS DISCOVERY AND ADMISSION INTO EVIDENCE OF CERTAIN REPORTS, SURVEYS, AND INFORMATION—Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for any purpose relating to this section, shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location identified or addressed in the reports, surveys, schedules, lists, or other data.*
>
> *By signing and stamping this Systemic Safety Analysis Report, the engineer (Walter Okitsu, KOA Corporation) is attesting to this report's technical information and engineering data upon which local agency's recommendation, conclusions, and decisions are made.*

[insert Walter's stamp]

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Citywide Pavement Markings Inventory

A total of 2,187 pavement marking features were inventoried, including 349 crosswalk markings and 322 arrow markings in the City, and 1,516 other features within the school zones. Approximately 90.5% of the features were assessed to be in good condition, while the rest were either damaged or faded, and may require repair or replacement. The total cost to repaint all the damaged and faded pavement markings is approximately $159,000. The pavement markings inventory is provided to the City in three formats: Excel spreadsheet, Google Earth KMZ, and ArcGIS Shape files.

Signage Inventory

A citywide signage inventory was compiled to help the City of South Pasadena understand the overall status of the signage, and allocate resources for repair and replacement. The signage inventory contains 4,484 signs and 2,572 sign posts. Most regulatory and warning signs within the study areas were surveyed for proper levels of retro-reflectivity to ensure the visibility and effectiveness of the signs at night.

A scoring system was established to quantitatively measure the conditions of the signs and posts. The Damage Score, which comprehensively describes the condition of the sign, takes into account a sign's readability, physical condition, and its importance to roadway safety. Signage upgrades were then prioritized based on the damage score. It would cost approximately $285,000 to update all signs needing replacement.

Prominent Collision Patterns

Five years of Statewide Integrated Traffic Records System (SWITRS) (July 2013 to June 2018) data were reviewed for the South Pasadena SSARP. The usage of five years of crash data adheres to the maximum threshold permitted by the HSIP for a safety infrastructure project application for federal funding. A total of 787 collisions occurred within South Pasadena in the five-year time period. Through the analysis by collision type, Primary Collision Factor (PCR), facility type, severity, involved parties, and lighting conditions by facility type (signalized intersection, non-signalized intersection, and mid-block), the following prominent collision patterns within the City have been identified:

- Rear-end collisions at all three facility types
- Unsafe speed at all three facility types
- Collisions due to improper turning at both intersections and mid-block locations
- Mid-block collisions that involved parked vehicles and other objects
- Mid-block collisions at nighttime
- Pedestrian- and bicyclist-involved collisions at signalized and non-signalized intersections

Safety Countermeasures and Safety Projects

The systemic analysis determines the potential candidate locations for safety countermeasures based on identifying high-risk collision locations. The intersections were ranked by Crash Frequency and Equivalent

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Property Damage Only (EPDO) score, and all the roadway segments were ranked by Crash Frequency, Crash Rate, and EPDO score. The process for identifying candidate locations is not exclusively determined by selecting locations that have had the greatest number of collisions, but also by finding locations with crash histories that suggest certain risk factors and determining other locations that may share similar risk factors but not have a similar crash history.

A field investigation of the intersections and roadway segments with high crash frequency and EPDO scores was conducted by planners and engineers. Safety countermeasures were proposed for nine intersections and four roadway segments. A list of 15 safety projects was developed with cost estimation and collision benefit reduction calculation. A Benefits-to-Cost (BCR) analysis was then conducted and projects were prioritized based on HSIP application consideration. See table 1.1 below for a list of these safety projects, which are discussed further in the report.

Table 1.1: Overall Benefits/Cost Ratio Analysis by Safety Project

#	Location	Location Type	No.	Cost ($)	Benefit/Cost Ratio
1	Fair Oaks Avenue & State Street, and Fair Oaks Avenue & Grevelia Street	Signalized intersection	CUSTOM	$29,229	4.84
			S3	$7,300	6.98
			Total	$38,135	5.05
2	Monterey Road & Fair Oaks Avenue	Signalized intersection	S3	$36,938	1.49
3	Monterey Road & Fremont Avenue	Signalized intersection	S2	$42,632	6.73
			S3	$7,300	14.54
			S19	$65,846	3.66
			S1	$7,446	59.82
			Total	$123,224	8.76
4	Mission Street & Orange Grove Avenue	Signalized intersection	S2	$62,926	1.55
			S19	$21,608	10.05
			S1	$3,212	54.10
			Total	$87,746	5.57
5	Fair Oaks Avenue & Huntington Avenue	Signalized intersection	CUSTOM	$1,117,128	1.77
6	Fremont Avenue & Huntington Avenue	Signalized intersection	CUSTOM	$190,421	4.11

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#	Location	Location Type	No.	Cost ($)	Benefit/Cost Ratio
			R36	$20,601	0.80
			S19	$20,148	0.59
			S1	$11,169	60.84
			Total	$242,339	6.15
7	Arroyo Drive & Pasadena Avenue	Non-signalized intersection	R36	$122,073	3.19
8	Mission Street & Pasadena Avenue, Arroyo Drive & Stoney Drive & Mission Avenue	Non-signalized intersection	CUSTOM	$96,550	4.25
9	Pasadena Avenue from Arroyo Drive to West City Limit	Roadway segment	R36	$127,337	0.67
10	Fair Oaks Avenue from Columbia Street to Monterey Road	Roadway Segment	R36	$1,165,080	7.94
			(none)	$27,623	0.00
			Total	$1,192,703	7.94
11	Fremont Avenue from Columbia Street to Monterey Road	Roadway Segment	R1	$247,835	6.24
			NS7	$58,546	8.93
			R28	$1,460	25.03
			Total	$307,841	6.84
12	Monterey Road from Fair Oaks Avenue to Pasadena Avenue	Roadway Segment	R32	$24,820	17.54
			(none)	$1,114	0.00
			Total	$25,934	16.79
13	Meridian Road from Monterey Road to Alhambra Road	Roadway Segment	R1	$121,472	2.36
			CMF	$197,100	0.00
			Total	$318,572	0.90
14	Huntington Drive from Leman Street to Maple Street	Roadway Segment	R36	$25,842	27.49
			R1	$175,492	15.75
			Total	$201,334	17.26

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#	Location	Location Type	No.	Cost ($)	Benefit/Cost Ratio
15	Fremont Avenue from Monterey Road to Alhambra Road	Roadway Segment	R1	$65,627	18.83

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2.0 SYSTEMATIC SAFETY ANALYSIS

Traditionally, agencies have selected safety projects based on historical crash records, focusing on sites with a concentration of recent severe collisions. By contrast, SSAR identifies the most common collision categories across a roadway network, so as to target projects that address the factors associated with those categories. By focusing on causal factors rather than collisions, SSAR allows agencies to assess risks before a collision occurs. Targeting a wider geography rather than the traditional site-based approach, systemic project selection favors broad implementation of cost-effective countermeasures.

2.1 SAFETY DATA UTILIZED

Crash data analysis for this SSAR was completed by using the Statewide Integrated Traffic Records System (SWITRS). SWITRS is a centralized crash database maintained by the California Highway Patrol (CHP). SWITRS includes a variety of information about each collision including the location, date, time of the day, crash type, crash severity, primary violation category, transportation mode of the involved parties, movement of the involved parties prior to the collision, and many others. SWITRS only includes crashes that are reported to the CHP. Per California state law, motor vehicle collisions must be reported when vehicle or property damage exceeds $1,000, or when any of the parties suffers an injury or fatality. Collisions with no injured parties or little property damage might not be reported and, therefore, excluded from the SWITRS database.

The SSARP guidelines require analyzing at least three years of the most recent crash data. Five years of SWITRS (July 2013 to June 2018) data was reviewed for the South Pasadena SSARP. The usage of five years of crash data adheres to the maximum threshold permitted by the HSIP for a safety infrastructure project application for federal funding.

2.2 DATA ANALYSIS TOOL AND TECHNIQUES

2.2.1 Collision Analysis Tools

Five years of SWITRS crash records were downloaded, cleaned (misspellings corrected and information from different datasets combined), and geocoded. The KOA project team created and utilized two tools to assist in collision analysis.

An Excel workbook powered by Visual Basic for Application (VBA) was developed to identify high-collision intersections and roadway segments by multiple ranking methods. The workbook was used to generate tables and charts for important SWITRS data fields such as severity level, crash type, and primary collision factor.

Dashboards for the top-ranked intersections and roadway segments have been developed to analyze collision data through the software Tableau; see Figure 2.1 for an example. Each dashboard contains a map surrounded by interactive charts, and information about each collision appears when a user clicks on a specific point.

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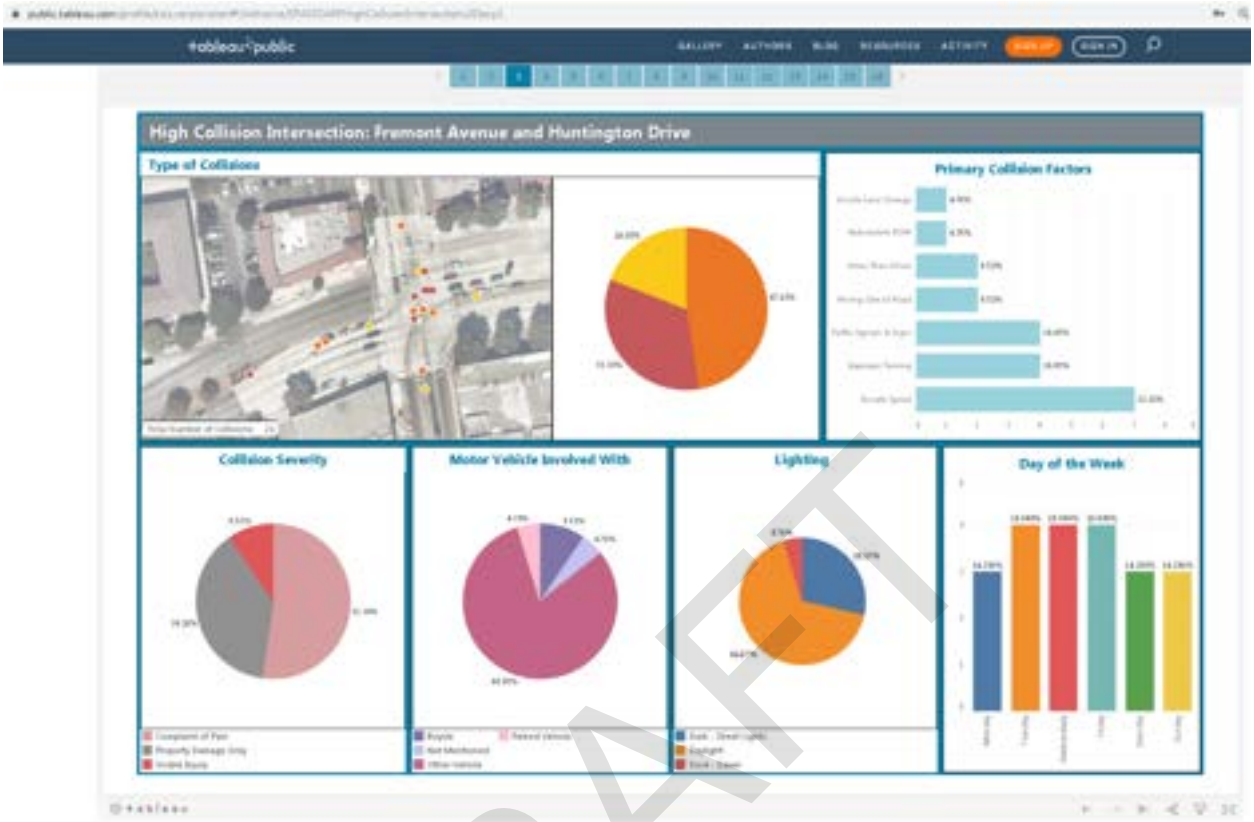
Figure 2.1: Dynamic Dashboard for Collision Analysis by Tableau



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2.2.2 Ranking Methods

Three ranking methods are utilized to identify the high-collision frequency intersections and roadway segments: Average Crash Frequency, Crash Rate, and Equivalent Property Damage Only (EPDO) scores. A brief introduction to each of the two methods is provided in the following sections.

Average Crash Frequency

Average Crash Frequency is the most basic method for assessing collision incidence. The analysis tallies the numbers of collisions at each location in the system, both in aggregation and by a category of interest (e.g., level of severity, and collision type). The analysis then ranks intersections or roadway segments based on the collisions' frequency. The method involves easy computation and little data collection. A crash database such as the SWITRS database usually suffices.

Crash Rate

The Crash Rate method goes a step beyond average crash frequency, normalizing facilities' crash frequency by the amount of vehicle traffic or travel. This method divides the number of collisions (or collisions in a particular category) by the quantity of Million Entering Vehicles (for intersections) or 100 Million Vehicle Miles Traveled (for roadway segments). While the Crash Rate method accounts for differences in facilities' length and traffic volume, it could unduly favor low-volume and low-collision roadways where countermeasures produce the lowest net benefit for travelers.

EPDO Scores

Equivalent Property Damage Only (EPDO) scores are calculated by assigning weighting factors to crashes by severity relative to property damage only (PDO) crashes. The weights generally reflect an order of magnitude difference between the societal costs of fatal and severe injury crashes versus non-severe injury crashes. Below are the weights by crash severity, based on the 2015 HSIP manual:

- Fatal - $5,579,400
- Severe Injury - $297,100
- Other Visible Injury - $108,600
- Complaint of Pain - $61,300
- Property Damage Only - $10,000

EPDO scores are useful for a benefit-cost analysis as collision costs can be translated into measurable benefits from installing improvements should the improvements prevent the collisions in question. However, they may place undue weight on the injury outcomes of previous collisions rather than overall trends suggested by collision patterns regardless of injury outcome. Furthermore, a location's EPDO score could be inflated by a fatal or severe collision caused by Driving Under the Influence (DUI). For example, the intersection of Fair Oaks Avenue and Banks Street ranked 1st by EPDO scores due to a DUI collision that resulted in severy injury. However, there is no feasible engineering solution alone to prevent this kind of collision.

The ranking of intersections and roadway segments in the City of South Pasadena using these three methods is further discussed in Section 3.

2.3 DATA ANALYSIS RESULTS

According to the SWITRS database, from July 2013 to June 2018, a total of 787 collisions occurred within the City of South Pasadena. In the following sections, the crash data are analyzed and discussed based on collision location types: signalized intersection, non-signalized intersection, and mid-block. Signalized intersection collisions occurred within 250 feet of a signalized intersection; non-signalized intersection collisions occurred within 150 feet of a non-signalized intersection; the remaining are treated as mid-block collisions.

2.3.1 Collision Severity

Table 2.1 shows the collision severity by facility type. Among all the collisions, 351 collisions resulted in Property Damage Only (PDO); 283 collisions resulted in complaint of pain; 19 collisions, or 2.5% of total collisions, resulted in persons killed or severely injured (KSI). Signalized intersections experienced the most KSI collisions (9), followed by non-signalized intersections (7). The mid-block locations had the lowest number of KSI collisions.

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Table 2.1: Collision Severity by Facility Type

Severity	Signalized Intersection		Non-signalized Intersection		Mid-block		Total	
	Collisions	%	Collisions	%	Collisions	%	Collisions	%
Fatal	1	0.3%	0	0.0%	1	0.8%	2	0.3%
Severe Injury	8	2.5%	7	2.0%	2	1.6%	17	2.2%
Visible Injury	59	18.6%	56	16.1%	19	15.6%	134	17.0%
Complaint of Pain	122	38.4%	123	35.4%	38	31.1%	283	36.0%
Property Damage Only	128	40.3%	161	46.4%	62	50.8%	351	44.6%
Total	318		347		122		787	

2.3.2 Collision Type

Table 2.2 lists the collisions by crash type. At all locations, rear-end was the most frequent collision type, with the usual primary collision factors being unsafe speed, improper turning, and driving or biking under the influence. Broadside was the second most frequent collision type for signalized and non-signalized intersections, typically caused by the violation of automobile right of way, failure to comply with traffic signals and signs, and improper turning. For mid-block locations, hit object was the second most frequent collision type.

Table 2.2: Collisions Type by Facility Type

Type of Collision	Mid-block		Signalized Intersection		Non-signalized Intersection		Total	
	Collisions	%	Collisions	%	Collisions	%	Collisions	%
Broadside	16	13.1%	98	30.8%	89	25.6%	203	25.8%
Head-On	6	4.9%	6	1.9%	23	6.6%	35	4.4%
Hit-Object	31	25.4%	32	10.1%	50	14.4%	113	14.4%
Not Stated	0	0.0%	2	0.6%	2	0.6%	4	0.5%
Other	3	2.5%	6	1.9%	6	1.7%	15	1.9%
Overturned	1	0.8%	3	0.9%	5	1.4%	9	1.1%
Rear-end	36	29.5%	105	33.0%	101	29.1%	242	30.7%
Sideswipe	26	21.3%	44	13.8%	48	13.8%	118	15.0%
Vehicle/Pedestrian	3	2.5%	22	6.9%	23	6.6%	48	6.1%
Total	122		318		347		787	

2.3.3 Lighting Condition

Table 2.3 summarizes the lighting conditions under which collisions occurred by facility type. The majority of collisions (67 percent) occurred under daylight conditions. Almost 30 percent of the collisions occurred during nighttime (dark conditions, with or without street lights). The remainder occurred during dusk or dawn conditions, or unstated conditions. Mid-block locations experienced the highest percentage of collisions that occurred at night.

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Table 2.3: Collision Lighting Condition by Facility Type

Lighting	Mid-block		Signalized Intersection		Non-signalized Intersection		Total	
	Collisions	%	Collisions	%	Collisions	%	Collisions	%
Dark - No Street Lights	6	4.9%	0	0.0%	4	1.2%	10	1.3%
Dark - Street Lights	49	40.2%	85	26.7%	89	25.6%	223	28.3%
Dark - Street Lights Not Functioning	0	0.0%	0	0.0%	2	0.6%	2	0.3%
Daylight	60	49.2%	222	69.8%	243	70.0%	525	66.7%
Dusk - Dawn	7	5.7%	10	3.1%	7	2.0%	24	3.0%
Not Stated	0	0.0%	1	0.3%	2	0.6%	3	0.4%
Total	122		318		347		787	

2.3.4 Involved Parties

Table 2.4 breaks down the number of collisions by involved parties. Motor vehicle collisions involving other vehicles accounted for the highest percentage of collisions, comprising approximately 62 percent of collisions at signalized intersections, 54 percent at non-signalized intersections and 34 percent at mid-block locations.

Signalized intersections had the highest number of collisions involving pedestrians and bicyclists, with 20 pedestrian-related collisions and 35 bicycle-related collisions.

Besides, mid-block locations also experienced high shares of moving vehicles colliding with parked vehicles and fixed objects.

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Table 2.4: Collision Involved Party by Facility Type

Motor Vehicle Involved With	Mid-block		Signalized Intersection		Non-signalized Intersection		Total	
	Collisions	%	Collisions	%	Collisions	%	Collisions	%
Bicycle	6	4.9%	35	11.0%	15	4.3%	56	7.1%
Fixed Object	34	27.9%	33	10.4%	61	17.6%	128	16.3%
Motor Vehicle on Other Roadway	0	0.0%	7	2.2%	2	0.6%	9	1.1%
Non-Collision	1	0.8%	2	0.6%	5	1.4%	8	1.0%
Not Stated	0	0.0%	2	0.6%	3	0.9%	5	0.6%
Other Motor Vehicle	42	34.4%	197	61.9%	188	54.2%	427	54.3%
Other Object	1	0.8%	3	0.9%	5	1.4%	9	1.1%
Parked Motor Vehicle	36	29.5%	19	6.0%	44	12.7%	99	12.6%
Pedestrian	2	1.6%	20	6.3%	24	6.9%	46	5.8%
Total	122		318		347		787	

2.3.5 Primary Collision Factor

Table 2.5 lists the number of collisions by Primary Collision Factor (PCF). Unsafe speed was the prevailing primary collision factor among all three facility types, accounting for 29% of collisions at signalized intersections, 33% at non-signalized intersections, and 32% at mid-block locations.

For signalized intersections, other leading primary collision factors were improper turning (16%) and failure to comply with traffic signals and signs (14%). For non-signalized intersections, automobile right of way (18%) and improper turning (15%) were significant. Improper turning (22%) and driving or biking under the influence (15%) contributed to mid-block collisions.

Table 2.5: Primary Collision Factor by Facility Type

PCF	Mid-block		Signalized Intersection		Non-signalized Intersection		Total	
	Collisions	%	Collisions	%	Collisions	%	Collisions	%
-	3	2.5%	2	0.6%	3	0.9%	8	1.0%
Automobile Right of Way	8	6.6%	37	11.6%	64	18.4%	109	13.9%
Driving or Bicycling Under the Influence of Alcohol or Drug	18	14.8%	17	5.3%	23	6.6%	58	7.4%
Following Too Closely	0	0.0%	11	3.5%	5	1.4%	16	2.0%
Improper Passing	4	3.3%	3	0.9%	5	1.4%	12	1.5%
Improper Turning	27	22.1%	51	16.0%	52	15.0%	130	16.5%
Other Hazardous Violation	3	2.5%	2	0.6%	3	0.9%	8	1.0%
Other Improper Driving	1	0.8%	1	0.3%	3	0.9%	5	0.6%
Other Than Driver (or Pedestrian)	0	0.0%	3	0.9%	9	2.6%	12	1.5%
Pedestrian Right of Way	0	0.0%	9	2.8%	14	4.0%	23	2.9%
Pedestrian Violation	1	0.8%	5	1.6%	7	2.0%	13	1.7%
Traffic Signals and Signs	0	0.0%	43	13.5%	12	3.5%	55	7.0%
Unknown	5	4.1%	20	6.3%	7	2.0%	32	4.1%
Unsafe Lane Change	2	1.6%	6	1.9%	4	1.2%	12	1.5%
Unsafe Speed	39	32.0%	93	29.2%	113	32.6%	245	31.1%
Unsafe Starting or Backing	8	6.6%	6	1.9%	20	5.8%	34	4.3%
Wrong Side of Road	3	2.5%	9	2.8%	3	0.9%	15	1.9%
Total	122		318		347		787	

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It should be noted that the list of Primary Collision Factors does not include distracted driving, which could include inattentiveness due to use of mobile phones. The occurrence of distracted driving is not included in SWITRS reports.

Based on the collision analysis, the prominent collision patterns within the City of South Pasadena in the past five years include:

- Rear-end collisions at all three facility types
- Unsafe speed at all three facility types
- Collisions due to improper turning at both intersections and mid-block locations
- Mid-block collisions that involved parked vehicles and other objects
- Mid-block collisions at nighttime
- Pedestrian- and bicyclist-involved collisions at signalized and non-signalized intersections

In the following section, the high-collision frequency intersections and roadway segments will be selected for detailed safety issue analysis. The locations will be chosen to reflect the dominant collision patterns within the City.

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3.0 HIGH-RISK INTERSECTIONS AND CORRIDORS

This chapter summarizes the proposed safety countermeasures for selected high-collision risk intersections and roadway segments in the City of South Pasadena, with focus of addressing the highest-occurring crash types by location type.

3.1 GENERAL METHODOLOGY

The systemic analysis determines the potential candidate locations for safety countermeasures based on identifying high-risk collision locations, which were ranked based on the Crash Frequency and Equivalent Property Damage Only (EPDO) score.

The process for identifying candidate locations is not solely determined by ranking locations based on collision history, but also by comparing locations that show a correlation of risk factors that is supported by a crash history and finding other locations that share similar risk factors but may not have similar crash history. A candidate intersection or roadway segment does not need to demonstrate a history of high or severe collisions to be considered for further evaluation. This type of process is considered to be proactive since studying locations without a crash history, but with existing risk factors that are associated with increasing the potential for certain types of crashes, reduces the likelihood of future crashes to occur if the appropriate countermeasures are implemented.

The recommended countermeasures for the identified candidate location are based on the following factors:

- Collision severity
- Time of day
- Collision involved parties (motor vehicles, pedestrians, bicyclists, etc.)
- Type of collision
- Primary collision factor

Caltrans developed the SSARP guideline in consultation with the California Local HSIP Advisory Committee. As such, it is logical to utilize the tools for identifying potential countermeasures for candidate locations that are also used in the development of an HSIP application. The *Local Roadway Safety Manual* (LRSM) was developed by Caltrans to support the HSIP call-for-projects and provides lists of potential countermeasures that are deemed acceptable for implementation with federal-aid funding awarded through the HSIP. Countermeasures in the LRSM are categorized by facility type, including signalized intersection, non-signalized intersection, and roadways. The majority of, if not all, proposed countermeasures will be selected from the lists in the LRSM.

This general process is followed for identifying candidate locations and potential countermeasures with small differences in execution for intersections and roadway segments. The following sections will elaborate further on the processes for analyzing the focus facilities and selecting potential countermeasures. Safety countermeasures are not proposed on all the top ranked locations. Professional judgment was applied by KOA planners and engineers to determine whether appropriate countermeasures could be proposed to reduce the high risk situations.

3.2 INTERSECTION ANALYSIS METHOD

All the intersections of City-owned public streets were reviewed based on the Crash Frequency method

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and the Equivalent Property Damage Only (EPDO) method. The following summarizes the procedure taken for recommending potential countermeasures at the selected intersections.

- Geocode the collisions on a GIS mapping tool through software Tableau: https://public.tableau.com/profile/koa.corporation#!/vizhome/SPASSSARPHighCollisionIntersections/Story1
- Review crash details (party involved, collision data, victims) for various crashes shown on a collision visualization tool in software Tableau and crash diagrams, with additional attention to fatal and severe crashes as well as high crash concentration areas. Detailed collision reports were obtained from the City of South Pasadena for a few fatal or severe injury collisions.
- Evaluate various primary collision factor violations that contributed to crashes at the intersection.
- Assess the nature of prevalent crash types with respect to the intersection's control type, geometrical features, and signal phasing/timing.
- Review field conditions through physical site visits in the City. Photos were taken to document various features of the intersections including geometry and striping, access control, crosswalk, signage, pavement markings, and traffic signal controls.
- Evaluate and screen countermeasures from LRSM or Crash Modification Factor (CMF) Clearinghouse (http://www.cmfclearinghouse.org/), a searchable database that can be easily queried to identify CMFs and Crash Reduction Factors (CRFs), which can be derived from the CMFs.
- Identify intersections that do not have a demonstrated crash history but resemble other intersections with documented crash history and risk factors.

The top ten intersections using both collision frequency and EPDO scores were analyzed for potential countermeasures. Of this set of intersections, nine were chosen for potential countermeasure implementation.

1. Fair Oaks Avenue & State Street and Fair Oaks & Grevelia Street (signalized)
2. Fair Oaks Avenue & Hope Street (signalized)
3. Fremont Avenue & Huntington Drive and Fair Oaks & Huntington Drive (signalized)
4. Monterey Road & Fair Oaks Avenue (signalized)
5. Monterey Road & Fremont Avenue (signalized)
6. Mission Street & Orange Grove Avenue south leg (non-signalized)
7. Arroyo Drive & Pasadena Avenue (non-signalized)
8. Mission Street & Pasadena Avenue (non-signalized)
9. Arroyo Drive & Stoney Drive & Mission Street (non-signalized)

The location of the nine intersections is shown in the following figure.

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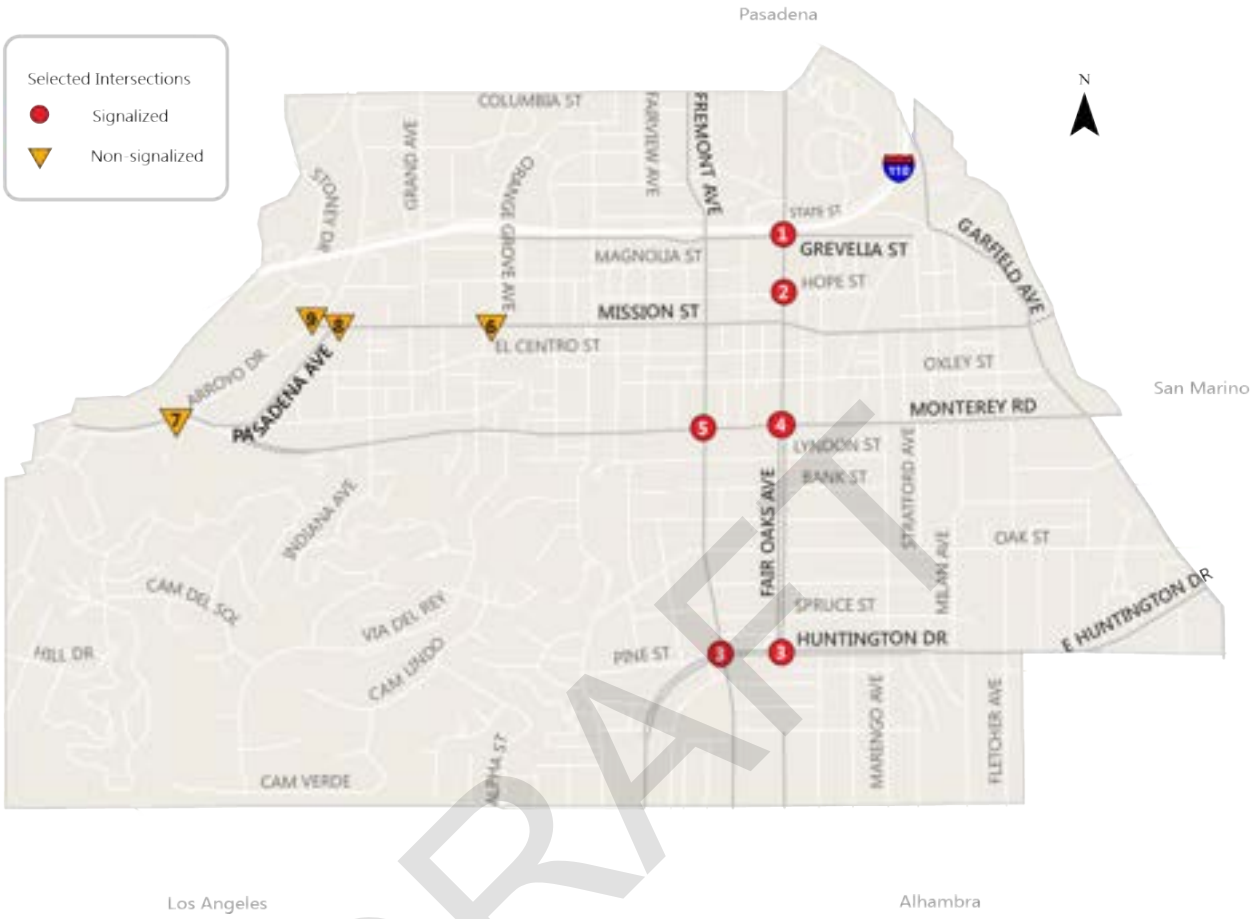
Figure 3.1: Intersections with Proposed Safety Countermeasures



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The intersection rankings by Crash Frequency and EPDO scores are provided in Appendix A. Traffic counts collected for the selected intersections are provided in Appendix B. The collision summary infographic sheets for the intersections are provided in Appendix C.

3.2.1 Signalized Intersections

1. Fair Oaks Avenue & State Street and Fair Oaks Avenue & Grevelia Street

As shown in Figures 3.2, these two intersections are located adjacent to on and off ramps of State Route 110 at Fair Oaks Avenue, and operates in conjunction. Fair Oaks Avenue has two lanes in each direction, with a speed limit of 35 miles per hour (mph); State Street has one travel lane on each direction; Grevelia Street has a speed limit of 30 mph with two lanes in each direction on the east (westbound) approach.

Figure 3.2: An Aerial View of the On and Off Ramps for State Route 110 at Fair Oaks Avenue



Source: Google Map

As shown in Figure 3.3, the intersection of Fair Oaks Avenue and Grevelia Street has two eastbound approaches, one from the off-ramp of the northbound 110 freeway, and the other from Grevelia Street. The freeway off-ramp is signalized but the Grevelia Street approach is controlled by a stop sign (see Figure 3.4). The intersection has standard crosswalks on the south, east, and west sides but not the north side.

Figure 3.3: An Aerial View of the Intersection of Fair Oaks Avenue and Grevelia Street



Source: Google Map

Figure 3.4: The Westbound Approach at the Intersection of Grevelia Street and Fair Oaks Avenue



A total of 24 collisions occurred at the intersection of Fair Oaks Avenue and State Street from July 2013 to June 2018. The intersection ranks 1st by total collision frequency and 8th by the EPDO score method. A total of 18 collisions occurred at the intersection of Fair Oaks Avenue and Grevelia Street during the five-

year time period. The intersection ranks 4th by total collision frequency and 22nd by the EPDO method. Collision types entirely consisted of rear ends, sideswipes, and hit-object. The most common primary collision factor was improper turning, but multiple collisions were also reported as caused by unsafe speed and unsafe lane changes.

As shown in Figure 3.5, the northbound approach on Fair Oaks Avenue has three lanes which immediately transitions to four lanes after the intersection. However, the added fourth lane that serves as a second left-turn lane onto southbound 110 Freeway has no lane feeding it. The middle lane among the three northbound lanes on the near side of the intersection has a left-and-through arrow pavement marking, suggesting that motorists in that lane could make either movement. However, a V-shaped splitter marking aligns vehicles in the middle lane to a lane that serves only northbound through traffic. The second left turn lane, in turn, serves two upstream lanes with no clear guidance who receives priority. The existing pavement markings might be increasing the risk of sideswipe collisions.

Figure 3.5: The Northbound Approach at the Intersection of Grevelia Street and Fair Oaks Avenue



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The following improvements are recommended:

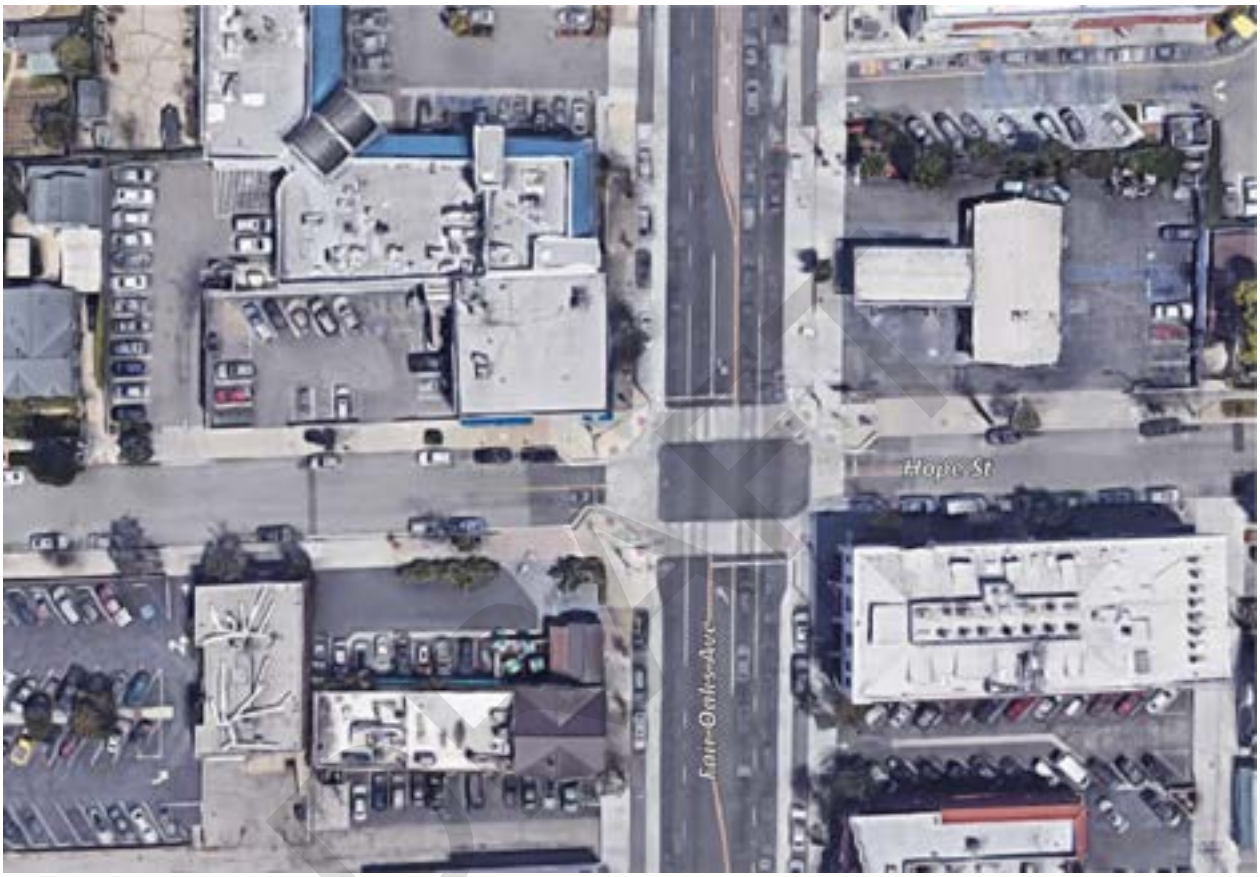
- Eliminate the v-shaped divider between the two left-most lanes on the northbound approach to the intersection of Fair Oaks & Grevelia Street.
- Add cat-tracks (lane line extension) across the intersection heading northbound to better guide motorists.
- Install guide signage clarifying the lane assignments for the northbound approach.
- Eliminate the eastbound approach on Grevelia Street that serves low demand but raises the risk of collisions with right-turning traffic from the freeway offramp.
- Realign the south leg crosswalk if westbound Grevelia Street is closed, with the west end of the crosswalk at the southwest corner of the SR 110 off-ramp so that westbound offramp motorists could see pedestrians in the crosswalk.

2. Fair Oaks Avenue & Hope Street

As shown in Figure 3.6, Fair Oaks Avenue has two lanes in each direction with left-turn lanes at the

intersection, while Hope Street has one lane in each direction from which all movements are permissible. There are curb extensions at all four corners and standard crosswalks. Fair Oaks Avenue has a speed limit of 30 mph and Hope Street has a speed limit of 25 mph. The surrounding area is characterized by commercial uses, with associated congestion and frequently utilized street parking spots.
Figure 3.6: An Aerial View of the Intersection of Fair Oaks Avenue and Hope Street.

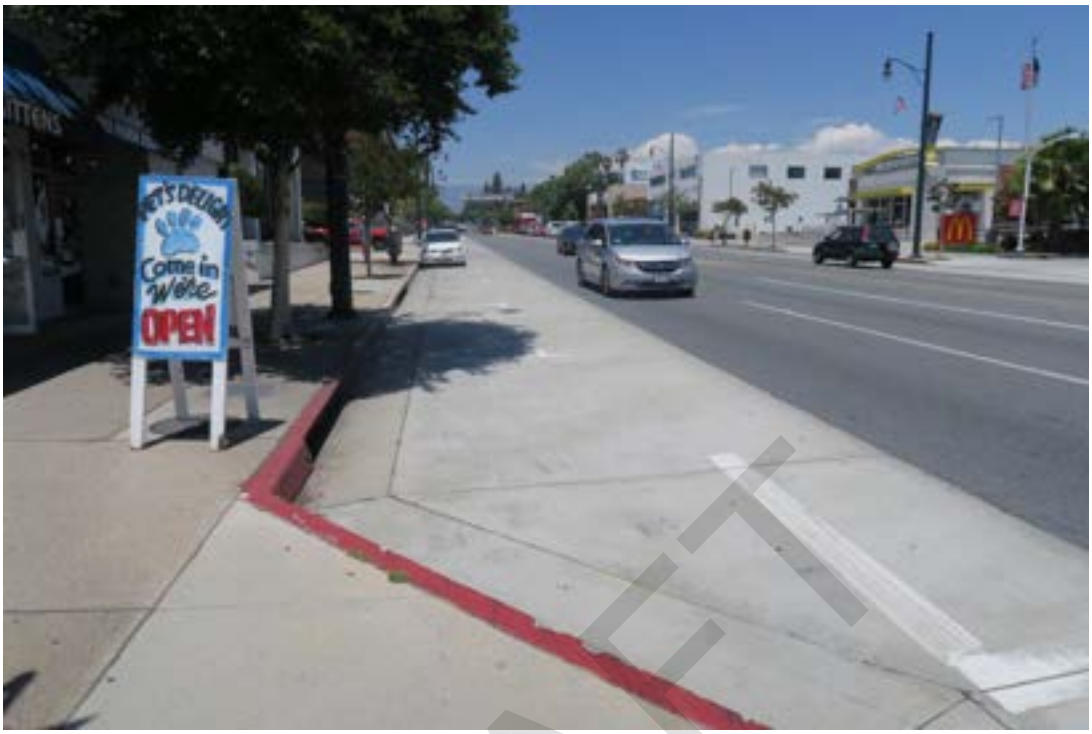
Figure 3.6: An Aerial View of the Intersection of Fair Oaks Avenue and Hope Street



Source: Google Map

A total of 16 collisions occurred at the intersection of Fair Oaks Avenue and Hope Street from July 2013 to June 2018. The intersection ranks 6th by total collision frequency and 4th by the EPDO method. Almost half of all collisions (seven out of 16) were bicycle collisions. Three of these collisions were between southbound motor vehicles turning right and southbound bicyclists headed straight (also known as right hook collisions). The northwest corner of the intersection features a large curb extension for walkers (no pedestrian collisions were reported at this intersection), as shown in Figure 3.7. Fair Oaks Avenue features a 6-foot wide concrete gutter offset seven feet from the curb face on each side of the street. Bicyclists commonly use the gutter as a de facto unmarked bike lane, and in the southbound direction, may tend to travel at high speeds. The large number of southbound collisions may be due to the downhill gradient north of the intersection. There were also four rear-end collisions, which are fairly common at signalized intersections of this type. One head-on vehicle collision was also reported.

Figure 3.7: The Southbound Approach at the Intersection of Fair Oaks Avenue and Hope Street



Several improvements are recommended to improve the safety of bicyclists at this intersection:

- Install a 5-foot bike lane along the concrete gutter of Fair Oaks Avenue, both northbound and southbound, stretching from the northern city limit at Columbia Street down to Monterey Road. Curbside parking may be retained. Install dashed bike lane striping highlighted with green pavement markings on intersection approaches and across intersections.

The exhibit of the recommended improvements is provided in Appendix D.

3. Fremont Avenue & Huntington Drive and Fair Oaks Avenue & Huntington Drive

The intersections of Fremont Avenue & Huntington Drive, and Fair Oaks Avenue & Huntington Drive are shown in Figure 3.8. These two intersections are both signalized and are only 600 feet from each other. Huntington Avenue (3 lanes) has a speed limit of 40 mph; Fremont Avenue (1 lane northbound and southbound with right and left-turn lanes) has a speed limit of 30 mph. The westbound right turn at Fremont Avenue is channelized. Zebra crosswalks are present on all four crossings at Fremont Avenue & Huntington Drive. Fair Oaks Avenue has a school zone speed limit of 25 mph. The westbound right turn and southbound right turn are both channelized at the intersection of Fair Oaks Avenue & Huntington Drive.

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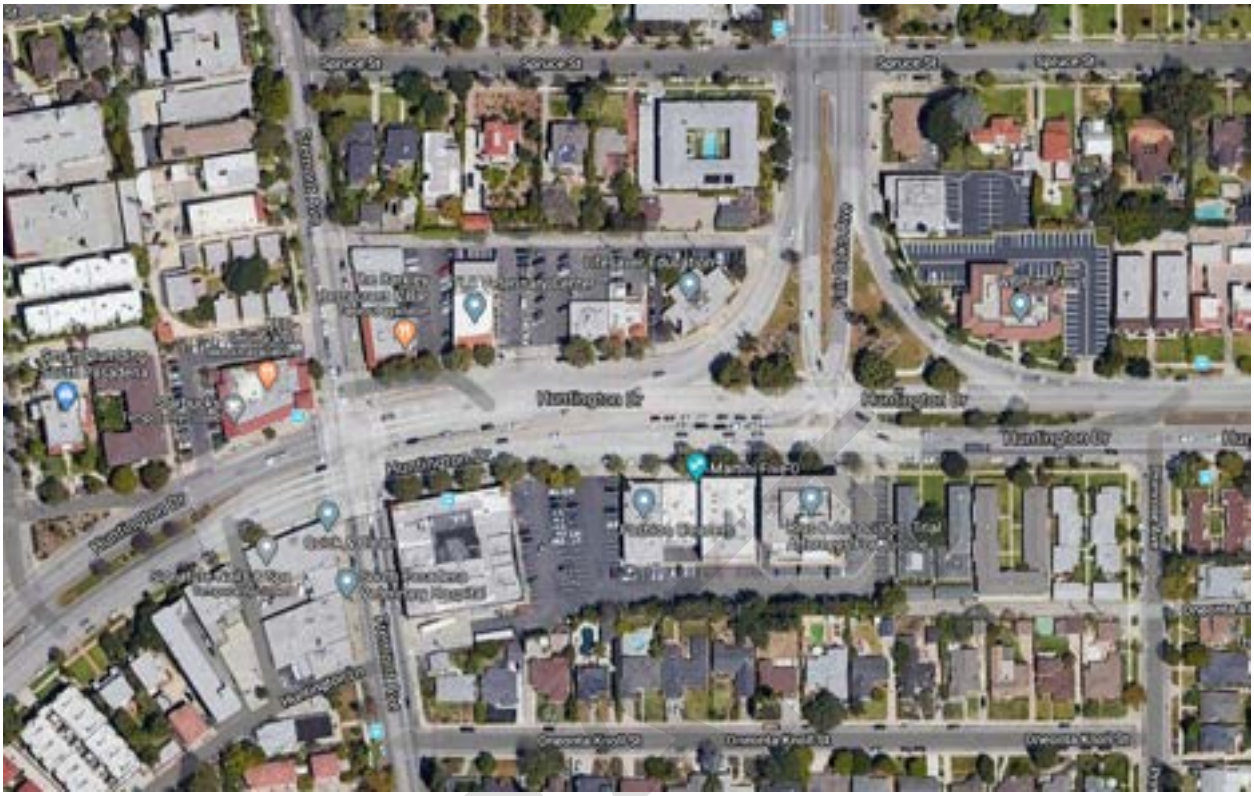
Figure 3.8: An Aerial View of the Intersection of Fremont Avenue & Huntington Drive and Fair Oaks Avenue & Huntington Drive



Source: Google Map

A total of 20 collisions occurred at the intersection of Fremont Avenue & Huntington Drive from July 2013 to June 2018. The intersection ranks 2nd by total collision frequency and 5th by the EPDO method. The collisions with the most significant injuries were broadsides. The top three collision factors were unsafe speed, improper turning, and traffic signals and signs. Two bicycle-related collisions were reported. The primary collision factor for both bicycle collisions was "wrong side of the road." A total of 14 collisions occurred at the intersection of Fair Oaks Avenue & Huntington Drive in the five-year time period. The intersection ranks 8th by total collisions frequency and 6th by EPDO score. The PCF "unsafe speed" accounted for more than half the collisions at this intersection. As shown in Figure 3.9, the westbound Huntington Drive approach is very wide between these two intersections.

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Figure 3.9: The Westbound Approach at the Intersection of Fremont Avenue and Huntington Avenue



The following modifications are recommended for westbound Huntington Drive between Fremont Avenue and Fair Oaks Avenue:

- Remove the existing right-turn lane on the westbound approach; remove the island that separates the right-turn lane and the through lanes; create a curb extension at the northeast corner of the intersection.
- Create a new frontage road on the north side of Huntington Drive.
- Add a bike lane on Huntington Drive in both directions.
- Extend the westbound left-turn pocket.

4. Monterey Road & Fair Oaks Avenue

This signalized intersection of Monterey Road and Fair Oaks Avenue is located on the south end of South Pasadena's main business district, at an intersection that provides access to two grocery stores, a gas station, and many other businesses and restaurants. As shown in Figure 3.10, the north and east legs have two through lanes and a left-turn lane, and have a speed limit of 30 mph. The south leg also has two through lanes but both a left and a right turn lane and a speed limit of 35 miles per hour. The west leg has just one through lane, with a left and a right turn lane and a speed limit of 35 mph.

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Figure 3.10: An Aerial View of the Intersection of Monterey Road and Fair Oaks Avenue

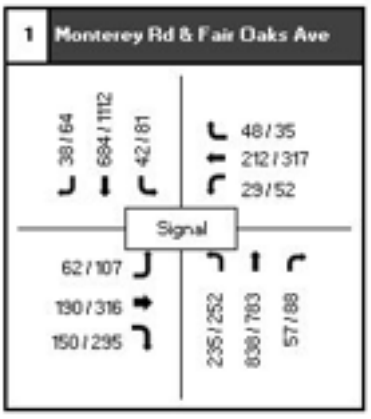


Source: Google Map

A total of 16 collisions occurred at the intersection from July 2013 to June 2018. The intersection ranks 6th by total collisions and 15th by EPDO score. The most common collision type was broadside (eight collisions); including three collisions caused by a northbound left-turning car (one into a bicycle), two caused by a westbound left-turning car, and one caused by a westbound right-turning car (the final two were related to entering the roadway from nearby driveways). There were also four rear ends (three of four while heading southbound), two hit object collisions, one sideswipe, and one considered "other."

Traffic counts were conducted for this intersection on Thursday, June 13, 2019. Figure 3.11 shows the AM peak hour (8am-9am) and PM peak hour (5pm-6pm) vehicle turning movement volumes at the intersection. The number of vehicles making northbound left-turns was significantly higher than the number of vehicles making southbound left-turns, in both the AM and PM peak hours.

Figure 3.11: AM/PM Peak Hour Vehicle Turning Movement Volumes



The signal phasing for this intersection is currently protected-permissive; lead/lag phasing cannot be done as this would risk a yellow trap, or where cars looking to turn have the possibility of getting caught in the intersection on a red light. KOA thus recommends the following improvement for this intersection:

- Install Flashing Yellow Arrows (FYAs) to allow for leading /lagging at this intersection, giving the northbound-lefts more time to pass through the intersection than the southbound-left movement.

5. *Monterey Road & Fremont Avenue*

This signalized intersection of Monterey Road and Fremont Avenue is located in a primarily residential neighborhood, with two churches located on the southwest corner. The intersection ranks 3rd by both total collisions and EPDO score Figure 3.12 shows that the major street (Monterey Road) has two through lanes in each direction with a left turn lane, while the minor street (Fremont Avenue) has one through lane in each direction with both an exclusive left-turn lane and right-turn lane. Signal phasing allows permissive turning movements only. Signals are on mast arms with lighting, and standard crosswalks are striped on all four legs. Monterey Road has a speed limit of 35 mph while Fremont Avenue has a speed limit of 30 mph.

Figure 3.12: An Aerial View of the Intersection of Monterey Road and Fremont Avenue



Source: Google Map

A total of 19 collisions occurred at the intersection. Almost half of the collisions, nine of 19 were rear-end collisions, of which six were in the northbound direction. The remainder of collisions included three

broadsides, three sideswipes, two hit-object collisions, one vehicle/pedestrian collision, and one head-on collision. There were two bicycle collisions; one from a right hook collision from a westbound driver and bicyclist, the other a broadside from a northbound turning car to a westbound bicyclist on the wrong side of the road.

Signal upgrades at this intersection and other comparable intersections can help to improve signal visibility and thus reduce the number of rear-end collisions. KOA recommends the following signal-related improvements:

- Replace the 8" signal heads on poles (two per approach, eight in total) with a 12" signal head.
- Update existing pedestrian signal heads to show countdown sequence in all directions.
- Replace existing push buttons with ADA compliant push buttons at all four corners.
- Replace HPS light fixtures with LED light fixtures for safety lighting at all four corners.
- Adjust yellow interval to 4.1 seconds to meet recommended MUTCD interval (will help reduce rear-end collisions).

3.2.2 Non-Signalized Intersections

6. Mission Street & Orange Grove Avenue

This refers to not one but two nearby T-intersections: the intersection with the north leg of Orange Grove Avenue that is currently signalized, and the intersection with the south leg of Orange Grove Avenue that is not currently signalized. Treatments are proposed for the latter of these intersections, as shown in Figure 3.13.

The speed limit on Orange Grove Avenue is 30 mph. One lane is present on the minor street but splits into three turn lanes for southbound travelers at the signalized intersection. Mission Street is two lanes in the same direction, with a speed limit of 30 mph. The streetlights are located on the traffic light pole. There is a ladder crosswalk on the east side and standard crosswalk on the north side of the signalized intersection; there are no marked crosswalks for the non-signalized intersection. For motorists traveling through Orange Grove Avenue heading south there is only a small left turn pocket at the non-signalized intersection to do so. Field observations found that this turn pocket was frequently full; sometimes vehicles spilled over into the through travel lanes.

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Figure 3.13: An Aerial View of the Intersection of Mission Street and Orange Grove Avenue (Circled in Red)



Source: Google Map

A total of ten collisions occurred at the intersection of Fair Oaks Avenue and Hope Street from July 2013 to June 2018. The intersection ranks 14th by total collision frequency and 7th by the EPDO method. Seven out of ten (70%) collisions were bicycle collisions. These included a bike (eastbound) heading through red to hit a left-turning car, an eastbound left-turn car into bicycle heading straight and southbound right into bicycle proceeding straight. Non-bicycle collisions that occurred are probably not preventable in the future. Field visit found that the left-turn pocket at Mission Street & Orange Grove Avenue can be crowded, as shown in Figure 3.14.

KOA conducted a signal warrant for the intersection with the south leg of Orange Grove Avenue as a traffic control signal may reduce the risk that left-turning cars at the south leg of Orange Grove collide with bicycles. However, based on traffic counts taken on Thursday, June 13, 2019, the intersection did not meet a warrant for a new signal.

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Figure 3.14: Queuing at the Westbound Left-turn Pocket at Mission Street and Orange Grove Avenue



While a new signal is not justified, KOA recommends additional signal upgrades at Mission Street and Orange Grove Avenue's north leg, including:

- Install video detection (including bike detection) at all approaches.
- Replace 8" signal heads on poles (five in total, two westbound, two eastbound, one southbound) with a 12" signal head.
- Update all four pedestrian signal heads to show countdown sequence.
- Replace the three existing push buttons with ADA compliant push buttons.
- Replace the back plate and visor for the three signals heads in the eastbound direction.
- Replace HPS light fixtures with LED light fixtures for safety lighting at the northwest corner and the southeast corner of the intersection.

7. Arroyo Drive & Pasadena Avenue

The intersection of Arroyo Drive and Pasadena Avenue features unusual geometry. As shown in Figure 3.15, it is a stop-controlled T-intersection with three legs, the major street is Pasadena Avenue and the minor street is Arroyo Drive. Directly east of the intersection, Pasadena Avenue splits into two streets, Pasadena Avenue and Monterey Road, the latter of which carries a higher volume of traffic. Both approaches on Pasadena Avenue have two through lanes in each direction while Arroyo Drive transitions from one lane into a right and left-turn lane at the intersection. Both right turns (southbound from Arroyo to Pasadena and westbound from Pasadena to Arroyo) are channelized. There is only one crosswalk present, and the crosswalk is considered a "school" crosswalk with applicable signage and pavement markings present. The crosswalk includes a median refuge. There is a school crosswalk present because Arroyo Vista Elementary School is located about 2,000 feet from the intersection; it is not immediately clear what routes to the school would use this crosswalk. The speed limit is 35 mph on the major street (Pasadena Avenue) and also 35 mph on the minor street (Arroyo Drive). There are bike lanes in both directions on the west side of the street but each one terminates at this intersection. Some street lights are present.

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Figure 3.15: An Aerial View of the Intersection of Pasadena Avenue and Arroyo Drive



Source: Google Map

A total of 14 collisions occurred at the intersection of Arroyo Drive and Pasadena Avenue from July 2013 to June 2018. The intersection ranks 8th by total collision frequency and 2nd by the EPDO method. Half of all collisions (seven out of 14) at the intersection were a result of unsafe speed. Most of these occurred eastbound toward the Metro Gold Line light rail grade crossing, which is active and has frequent train headways. There was a severe collision with the pedestrian in a crosswalk, a driver heading east into pedestrian heading north, at 6:54pm in winter. Other severe injuries included a head-on vehicle collision and a westbound sideswipe with a parked vehicle. There was another pedestrian collision in the dark resulting in a visible injury. There was also a visible injury with a bicyclist by a left-turning vehicle. There was a sideswipe with a vehicle driver resulting in complaint of pain, east of the intersection where there is no bike lane. A car also overturned west of the intersection for unknown reasons. Field visit found that the approach to Arroyo Drive and Pasadena Avenue on the east side of the road can be difficult to follow for bicyclists, as shown in Figure 3.16.

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Figure 3.16: The Westbound Approach at the Intersection of Arroyo Drive and Pasadena Avenue



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KOA recommends the following improvements:

- Install a guide sign facing eastbound traffic prior to the intersection to better guide motorists, informing them that the left lane will be used to continue onto Pasadena Avenue after turning while through lanes will go towards Monterey Road.
- Add a 5′ eastbound bike lane on Monterey Road west of Pasadena Avenue; narrow the remaining eastbound lanes to be 11′, 11′, and 12′ wide, maintain an 8′ parking lane next to the bicycle lane at the curb.
- Add westbound bicycle lane (5′ east of Arroyo Drive and 7′ west of Arroyo Drive) and narrow the remaining two westbound lanes to be 11′ and 11′ wide; maintain an 8′ parking lane; create an 8′ buffered bike lane immediately on both sides of the intersection in lieu of parking.
- Add shark teeth and cat tracks to yield on right turn from Pasadena Avenue onto Monterey Road on the westbound approaches.
- Add cat tracks from the 7′ bicycle lane and 8′ buffer to guide bicyclists to the existing 8′ bicycle lane west of newly striped bicycle lane.
- Extend the bicycle lane towards the West City Limit; restripe the stretch of Pasadena Avenue between Arroyo Drive and Arroyo Verde Road to be 11′, 11′ wide with a 5′ wide bicycle lane on each direction; restripe the stretch between Arroyo Verde Road and West City Limit to be 10′, 10′ and 5′ on westbound direction, and 11′, 5′ on the eastbound direction.

8&9. Mission Street & Pasadena Avenue, Arroyo Drive & Stoney Drive & Mission Avenue

As shown in Figure 3.17, Mission Street and Pasadena Avenue is a non-signalized three-leg T-intersection. Stop control is provided on the west (eastbound) leg of Mission Street, while the east (westbound) leg of Mission Street and Pasadena Avenue are both uncontrolled. The east (westbound) leg of Mission Street has two lanes, one through lane and one left-turn lane. The west (eastbound) leg of Mission Street has one lane for all movements. Pasadena Avenue has two lanes for "through" movements (right-turns onto

Mission Street) and a two-way left-turn lane. Pedestrian crossings are available at the south and west legs. The speed limit on Mission Street is 30 mph; however, on a westbound approach, a warning sign (yellow) and pavement markings designate that motorists should slow to 20 mph immediately prior to the intersection. No speed limit is designated on the west (eastbound) approach. Pasadena Avenue has a speed limit of 25 mph. Pasadena Avenue has Class II bicycle lanes, and Mission Street is a class III bike route.

Less than 150 feet west of the Mission Street & Pasadena Avenue intersection is the intersection between Arroyo Drive, Mission Street (east leg), and Stoney Drive (west leg). This intersection is controlled by an all-way stop, with crosswalks available on all legs. Only one lane is present on each leg. Mission Street and Stoney Drive are slightly offset, requiring motorists who wish to travel "through" on these streets to make an S-curve motion. Arroyo Drive has a speed limit of 35 mph, Stoney Drive has a speed limit of 15 mph, and no speed limit is listed for Mission Street.

Figure 3.17: An Aerial View of the Intersection of Pasadena Avenue and Mission Street, and the Intersection of Stoney Drive, Arroyo Drive and Mission Street



Source: Google Map

From July 2013 to June 2018, a total of seven collisions occurred at these two intersections. Only one collision occurred directly at the intersection of Mission Street and Pasadena Avenue, a collision between a left-turning vehicle and a pedestrian that resulted in a visible injury. A hit object collision resulting in property damage occurred on Mission Street between the two intersections. At the Arroyo Drive, Stoney Drive and Mission Street intersection, there were two collisions with bicycles, one a sideswipe resulting in a visible injury, and the other a broadside resulting in a complaint of pain. The remaining three collisions were either hit object collisions or cause unknown.

KOA recommends re-designing these two intersections to improve visibility and calm traffic. Specifically,

at the intersection of Mission Street and Pasadena Avenue, KOA recommends:

- Create a curb extension on the northeast side (westbound approach of Mission Street) to make the motorist first curve left prior to making a right turn motion onto Mission Street.
- Extend limit line connecting Mission Street east and Pasadena Avenue at a bend rightward, indicating the Mission Street – Pasadena Avenue is the major traffic approach.

KOA has created two alternative concepts (provided in Appendix E) for this intersection; they each deal similarly with Mission Street and Pasadena Avenue as described above, but are different in their treatment of the intersection of Arroyo Drive, Mission Street and Stoney Drive. In Alternative 1, a barrier is placed on the east leg of the intersection, creating a channelize right-turn for the westbound vehicles on Mission Street. The Stoney Drive leg and the Mission Street leg are aligned better at this intersection compared with the existing geometry. In Alternative 2, Mission Street is realigned between Stoney Drive and Pasadena Avenue. The intersection of Arroyo Drive, Mission Street and Stoney Drive is split into an offset intersection. The vehicles on Mission Street would avoid the S-curve movement while making left turns.

3.3 ROADWAY SEGMENT ANALYSIS

All the streets within the City were classified into four categories in the Circulation Element of the City's General Plan: major arterials, secondary arterials, collectors, and local streets. KOA defined a total of 39 roadway segments that include all the major arterials, secondary arterials, and collectors in the City. Local streets are excluded due to their low traffic volumes and collision frequency. The definition of the roadway segments was primarily based on major barriers such as freeways and rail tracks, major cross streets, roadway configuration, and land use. The roadway segment map is provided in Figure 3.18.

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Figure 3.18: City of South Pasadena Roadway Segment Map

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Non-intersection related collisions by severity level for each corridor segments are summarized in the table provided in the Appendix F. Three types of ranking are provided:

- Collision frequency
- Collision rate
- Equivalent Property Damage Only (EPDO)

The 24-hour traffic counts conducted by the City in 2014 was utilized for calculating crash rates. The counts are provided in Appendix G.

Ranking is a quantitative method used to navigate a particular corridor segment and compare with various other segments. It is ultimately just a tool to streamline the crash analysis and selection process for candidate locations. High ranking segments shown at the top of the list are not necessarily ideal candidates for potential improvements and selecting locations to further review requires discernment.

After ranking the roadway segments, the next step is to view the various collision data that is included for each roadway segment. This process requires that all high collision segments in the City are reviewed to determine patterns or trends in crashes and searching for segments with unusual crash rates and characteristics. Several steps are taken when a roadway segment is selected for review, as shown below:

- Geocode the collisions on a GIS mapping tool developed by KOA through software Tableau: https://public.tableau.com/profile/koa.corporation#!/vizhome/SPASSSARPRoadwaySegments/Story1
- Review crash details (party involved, collision data, victims, etc.) for various crashes shown on the GIS mapping tool and crash diagrams, with additional attention to fatal and severe crashes as well as high crash concentration areas.
- Evaluate the various primary collision factor violations that contributed to crashes on the studied roadway.
- Assess the nature of prevalent crash types with respect to the roadway's geometrical features and traffic conditions
- Review field conditions through physical site visits in the City. Photos were taken to document various features of the roadway segments including geometry and striping, medians, curbs, sidewalks, driveways, signage, pavement markings, etc.
- Review via Google Map Street View whenever necessary to check whether any geometry, striping or signage has been made in the past few years.
- Identify candidate roadway segments that do not have a demonstrated crash history but resemble other segments with documented crash history and risk factors. Once identified, the roadway segment is subjected to analysis through the aforementioned steps.

After the crash analysis and identification of candidate locations the next step is the evaluation and screening of countermeasures listed in the LRSM. Important considerations for screening countermeasures include safety effectiveness at reducing crashes, consistency with an agency's policies, and implementation and maintenance costs. The LRSM provides helpful descriptions and justifications for each published countermeasure to provide insight on its application and potential for reducing crashes.

Roadway Segment Locations

The potential countermeasures for roadway segments were selected by the highest ranking of collisions and EDPO score. Four of the segments were selected for analysis and provided recommendations on the roadway improvements.

- Fair Oaks Avenue – Columbia Street to Monterey Road
- Fremont Avenue – Columbia Street to Monterey Road

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- Monterey Road – Pasadena Avenue to Fair Oaks Avenue
- Meridian Road – Monterey Road to Alhambra Road

The location of the four roadway segments are shown in Figure 3.19.

Figure 3.19: Roadway Segments with Proposed Safety Countermeasures



The collision summary infographic sheets for the roadway segments are provided in Appendix H.

1. *Fair Oaks Avenue from Columbia Street to Monterey Road*

This segment on Fair Oaks Avenue is approximately one mile long from Columbia Street to Monterey Road. The roadway width ranges from 62 to 76 feet with a posted speed limit of 35 mph. On-street parking is generally permitted on both sides of the roadway. Fair Oaks Avenue is a four-lane north-south major arterial with a two-way left-turn lane or flush median with raised median islands in between. As shown in Figure 3.20, a gutter is provided between the travel lane and on-street parking area, as part of a recent roadway expansion project. The gutter is utilized as a bike lane by the bicyclists. The daily traffic volume was approximately 31,500 in 2014. This segment includes a total of eight signalized intersections.

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Figure 3.20 Fair Oaks Avenue, North of Monterey Road



A total of 105 collisions occurred on this segment from July 2013 to June 2018. The majority of the collisions occurred during the daytime. Rear-end, broadside, and sideswipes were the most common collision types. A total of 26 (67%) out of the 39 rear-end collisions were due to unsafe speed. Ten left-turn collisions involved with other vehicles due to automobile right of way violation; three right-turn collisions involved with bicyclists due to improper turning. Along the corridor, there was a high concentration of rear-end collisions north of the I-210 freeway ramps.

As shown in Figure 3.21, some of the crosswalks are faded, which needs to be repainted for better visibility.

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Figure 3.21: Faded Crosswalks on Fair Oaks Avenue Corridor



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KOA recommends the following improvements:

- Install advance warning signs that bicyclists may be on the road – W11-1 and W16-1P.
- Install "No Turn on Red" regulatory sign [R13A (CA)] at intersections to increase bicycle safety and decrease crashes with right-turning vehicles.
- Repaint faded crosswalks.

2. *Fremont Avenue from Columbia Street (north City Limit) to Monterey Road*

This corridor on Fremont Avenue is approximately 0.83 mile long from Columbia Street (northern city limit) to Monterey Road. The roadway is classified as minor arterial under the City's General Plan, and the roadway width ranges from 46 to 49 feet with a posted speed limit of 30 mph. Fremont Avenue provides one lane in each direction, with a double yellow centerline from Columbia Street to Magnolia Street, and a two-way left-turn lane from Magnolia Street to Monterey Road. On-street parking is generally permitted on both sides of the roadway. The daily traffic volume was approximately 23,100 in 2014. The Fremont corridor was being proposed for a Class II bike lane under the City's Bicycle Master Plan.

A total of 78 collisions occurred on this segment from July 2013 to June 2018. The majority of the collisions occurred during the daytime. Rear-end, broadside, and sideswipes were the most common collision types. A total of 20 (77%) out of the 26 rear-end collisions were due to unsafe speed or following too closely. There were a total of 21 broadside collisions, with eight left-turn collisions involved with other vehicle due to automobile right of way or not obeying traffic signals and signs. In addition, 11 of the 21 broadside collisions were related to motorists running the red traffic light. Several collisions occurred at nighttime involved with parked vehicles, bicyclists, and pedestrians.

As shown in Figure 3.22, street lighting was not provided for this segment. Throughout the segment, the centerline striping was faded and needed repainting. The warning light flashers were not operating properly at the crosswalk on Fremont Avenue and Oxley Street.

Figure 3.22: Lack of Street Lighting and Faded Striping along the Fremont Avenue Corridor



KOA recommends the following improvements:

- Install street lights along the corridor for better nighttime visibility and improves non-motorists visibility.
- Install warning sign for the street curvature roadway north of Foothill Street, heading northbound – W1-2.
- Install Rectangular Rapid Flashing Beacon (RRFB) at Fremont Avenue and Oxley Street

Similar Location: Fremont Avenue, Monterey Road to Alhambra Road (install street lighting)

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3. Monterey Road from Fair Oaks Avenue to Pasadena Avenue

This corridor of Monterey Road is approximately 1.12 mile long from Columbia Street (northern city limit) to Monterey Road. The roadway is classified as minor arterial under the City's General Plan, and the roadway width ranges from 64 to 85 feet with a posted speed limit of 35 mph. Monterey Road provides two travel lanes in each direction. On-street parking is generally permitted on both sides of the roadway. Daily traffic volume was approximately 17,400 in 2014. The Monterey corridor was being proposed for a green lane from Grand/Palm Avenue to Fair Oaks Avenue under the City's Bicycle Master Plan.

A total of 85 collisions occurred on this segment from July 2013 to June 2018. The majority of the collisions occurred during the daytime. Broadside, rear end, and sideswipes were the most common collision types. A total of 22 out of the 31 (71%) broadside collisions were due to motorists making left-turns at the intersections. There were a total of 22 rear-end collisions involved with unsafe speed or following too closely.

KOA recommends the following improvements:

- Install edge line striping along the Monterey Road corridor.
- Repainting the existing striping to a conventional striping for the eastbound roadway from Fairview Avenue that leads to the right-turn lane on Fair Oaks Avenue.

4. Meridian Road from Monterey Road to Alhambra Road (south City Limit)

The Meridian corridor is approximately 0.96 mile long from Monterey Road to Alhambra Road. The roadway is classified as a collector street under the City's General Plan, and the roadway width is approximately 36 feet with a posted speed limit of 25 mph. Meridian Road is a two-lane north-south collector with a striped centerline, and on-street parking is generally permitted on both sides of the roadway. As shown in Figure 3.23, a gutter is located at the center of the roadway from Oak Street to north of Beech Street, which serves as a centerline of the roadway. Daily traffic volume was approximately 6,900 in 2014. The Meridian corridor was being proposed for a Class III bike route under the City's Bicycle Master Plan.

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Figure 3.23: Gutter on Meridian Avenue Corridor



A total of 20 collisions occurred on this roadway segment from July 2013 to June 2018, of which 55 percent occurred during nighttime. Meridian Road lacks sufficient lighting, which creates a dark neighborhood. Some of the street lights are blocked by tall trees. Approximately 25 percent of the collisions were due to unsafe speed.

KOA recommends the following improvements:

- Extend the existing street light arms where blocked by trees and increase the wattage to improve nighttime visibility.
- Install speed humps along Meridian Road to reduce speeding.

5. Huntington Drive from Leman Street to Maple Street

This corridor on Huntington Drive is approximately 0.67 mile long from Leman Street to Maple Street. The roadway is classified as major arterials under the City's General Plan, and the roadway width ranges from 100 to 108 feet with a posted speed limit of 40 mph. Huntington Drive provides three lanes in each direction, with a raised median of approximately 17 feet wide. On-street parking is generally permitted on both sides of the roadway. The daily traffic volume was approximately 30,800 in 2014. The Huntington corridor was being proposed for a Class II bike lane under the City's Bicycle Master Plan.

A total of 60 collisions occurred on this roadway segment from July 2013 to June 2018. Rear-end, broadside, sideswipes, and hit object were the most common collision types occurred along the segment. There were a total of 19 rear-end collisions, 15 broadside collisions, nine sideswipes collisions, and eight hit objects. A total of 25 (42%) out of the total 60 collisions occurred due to unsafe speed. At this corridor, approximately 67 percent of the collisions were related to motorists running the red traffic light. There were three pedestrian-related collisions that occurred under dark with street lighting conditions and one of the collisions was severely injured. In addition, there were five bicycle-related collisions due to improper passing, unsafe speed, or bicyclists on the wrong side of the road.

Unsafe speeding was a common issue along the corridor, which could be related to multiple wide travel lanes with a high speed limit of 40 mph. KOA recommends the following improvements:

- Install a Class II bike lane in both directions on Huntington Drive.

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- Extend the existing street light arms and upgrade all the light bulbs to LED lights, which could improve nighttime visibility for pedestrians and motorists.

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4.0 CITY-WIDE TRAFFIC CONTROL DEVICES INVENTORY

KOA conducted a citywide inventory of existing signage, pavement markings, curb markings, and miscellaneous traffic devices. The citywide inventory work enabled the KOA Team and City staff to determine if existing traffic signs, pavement markings, and curb markings meet intended design specifications; to catalog information regarding physical conditions of the traffic control devices; to identify locations where maintenance or repairs are needed; to quantify the extent of work required for the proposed improvements; and to maintain records of repair, maintenance, and installation of improvements.

4.1 GENERAL METHODOLOGY

The City of South Pasadena is 3.41 square miles with 77.27 centerline miles of roadway. Before conducting the field survey for signage, curb, and pavement marking inventory, the City reviewed and approved the list of key attributes (Data Dictionary) that would be used to measure the status of the objects. Pilot studies in a small area of South Pasadena were conducted and submitted to the city for review. KOA then proceeded to full-scale data collection after integrating comments from the pilot studies.

The inventory data collected from the field was then compiled into a GIS database in both KMZ and shapefile formats, for easy access in Google Earth Pro and ESRI ArcGIS software, respectively. The database was designed with the ability to receive inventory updates, maintain historical information, search features by location and category, and track property maintenance and replacement activities.

The GIS database also allowed KOA to conduct further visualization and analysis on the overall status of signage, curb, and pavement markings at the city level. Detailed inventory reports and summary infographics were generated for City's review and future uses. For easier navigation and progress tracking, the city was divided into four quadrants, as shown in Figure 4.1. The inventory database was organized by quadrant.

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Figure 4.1: South Pasadena Quadrants and School Zones



4.2 PAVEMENT MARKINGS INVENTORY

Pavement markings, as captured in this task, are transverse markings that are generally placed perpendicular and across the flow of traffic such as a word, a symbol, arrow markings, stop lines, crosswalk lines, speed measurement markings, and parking space markings (MUTCD Chapter 1A Part 1, 2014).

4.2.1 Database Design and Data Collection

The three phases of compiling the pavement markings inventory are summarized in Table 4.1. During the initial phase of defining the database template, the City worked with the KOA Team to ensure that all desired information about the pavement markings would be collected and used effectively. The Data Dictionary for a detailed list of attributes and their definitions is provided in Appendix I.

High resolution satellite imagery from 2018 and panorama street view images from 2017 were used as primary sources during the first phase of the inventory work. In Google Earth Pro, pavement markings were marked as points or lines overlaid with an aerial image basemap. Essential attributes were also collected at this stage, including pavement marking type, description, street name, quadrant, damage, and dimensions.

Phase II of the pavement marking inventory process was to validate the digital inventory through a field survey. The following metrics were checked to ensure the quality of the data:

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- Completeness: whether the digital inventory was missing pavement markings as a result of using satellite imagery. The field survey identified manual errors and pavement markings under tree canopies that were not visible in aerial images. KOA staff also photographed markings with damages to provide additional visual reference of the state of pavement markings.
- Accuracy: whether the location and attributes of pavement markings were correctly recorded. Field survey was helpful to identify the precise locations of some markings and clarify information that was unclear from aerial images.
- Timeliness: whether pavement markings have been updated since the aerial image was captured in March 2018. Field survey found that new STOP markings, limit lines, and crosswalks have been painted.

The digital inventory was transferred from the desktop software, Google Earth Pro, to the mobile application, Esri Collector for ArcGIS, to allow easy data access and modification in the field. A local or online multimedia file path can be added as an attribute to link photo attachments captured in the field to a record in the database. The updated pavement marking inventory data was then synced and integrated back to the desktop copy as final deliverables.

Table 4.1: Pavement Marking Data Collection Process

Phase I	Using Google Earth Pro, digitizing citywide arrows and crosswalks, and other pavement markings within school zone buffers
Phase II	Validating the completeness, accuracy, and timeliness of the digital inventory by field survey
Phase III	Completing the city-wide inventory. Exporting data to ArcGIS Pro for data consistency, tabulation and analysis

The completed set of pavement marking data is available in KMZ, shapefile, and Excel format, allowing analysis and visualization in Google Earth Pro, ArcGIS Pro and Excel. A hierarchical folder system has been developed for the KMZ database so that users can navigate through the database and locate desired records with ease. The pavement marking inventory database is divided first by quadrants, followed by feature types, contents, or functions. Records in the subfolders are organized alphabetically based on the name of the street the pavement marking is located on.

For the shapefile, the map symbology was carefully developed to reflect the geographic locations and classifications of the records. The pavement marking symbols distinguish feature type (point/ line) and marking contents by symbol shape and color.

4.2.2 Inventory Summary

The pavement markings inventory by type is summarized in Table 4.2. A total of 2,187 pavement marking features were inventoried, including 349 crosswalk markings and 322 arrow markings in the city, and 1,516 other features within the school zones.

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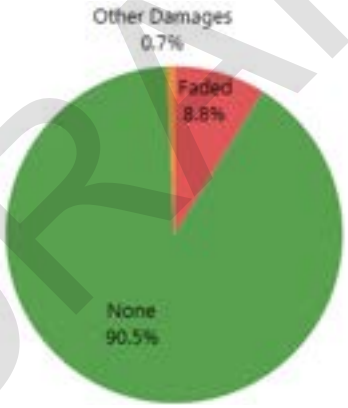
Table 4.2: Pavement Marking Inventory Summary

Pavement Marking Category	Pavement Marking Type	Number of Features
Words	Word	576
	Speed	145
Lines	Limit Line	454
	Yield Line	10
	Crosswalk	349
Symbols	Arrow	322
	Parking	174
	Bike	120
	Rail	29
Special	In-roadway Lighting	8
Total		2,187

As shown in Figure 4.2, approximately 90.5% of the features were assessed to be in good condition, while the rest are either damaged or faded, and may require repair or replacement.

Figure 4.1: Pavement Marking Condition Summary



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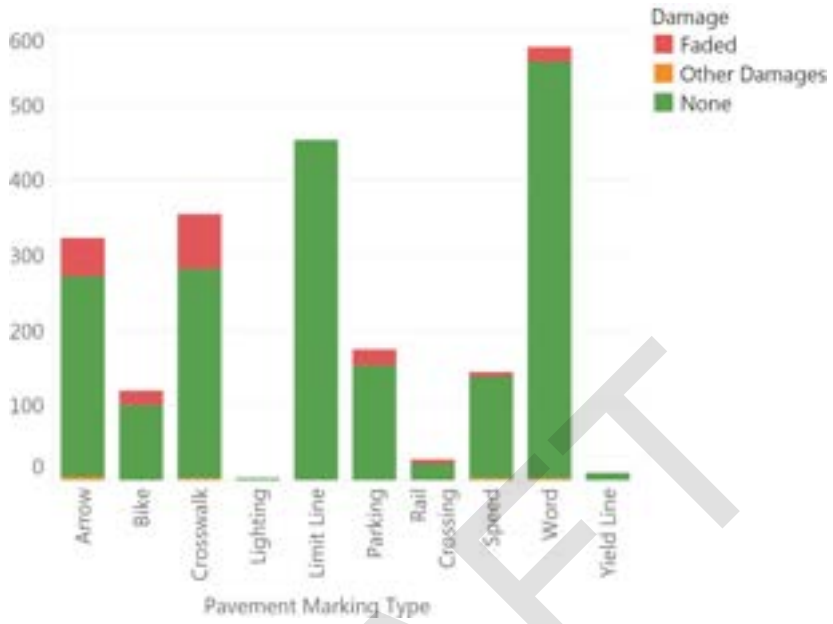
As shown in Figure 4.3, the crosswalks and arrows have the highest percentage of wear and tear. Specifically, arrow markings in Quadrant 2 and crosswalk markings in Quadrant 1 and 2 are damaged the most.

Figure 4.2: Pavement Marking Condition by Type



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4.2.3 Cost Estimation for Repainting

KOA calculated the cost of repainting the damaged and faded pavement markings so that all markings would be up to standard. Based on the inventory assessment, 209 pavement markings are in bad conditions and require repainting. The area of each pavement marking type was measured in square feet using Caltrans Standard Plans, and the average unit price for painting one square foot of thermoplastic pavement marking was taken from Caltrans Contract Cost Data portal as $8/sqft. Table 4.3 summarizes the estimated cost for repainting pavement markings by type. The total cost to repaint all the damaged and faded pavement markings is approximately $159,000.

Table 4.3: Cost Estimate for Pavement Marking Upgrade

Pavement Marking Type	Total Square Footage	Total Cost
Arrow	946	$7,568
Bike	146.5	$1,172
Crosswalk	17,025	$136,200
Parking	276	$2,208
Rail Crossing	420	$3,360
Speed	162	$1,296
Word	887	$7,096
Grand Total	19,862.5	$158,900

4.3 SIGNAGE INVENTORY

A traffic sign is a traffic control device used to communicate regulatory, warning, or informational messages to road users through a word, symbol, and/or arrow legend. Proper installation and maintenance of the signs can ensure highway safety for drivers, pedestrians, bicyclists, and other road users.

For these reasons, a signage inventory can help the city of South Pasadena understand the overall status of the signage, and allocate resources for repair and replacement. The precise spatial data collected for a signage inventory can also inform city traffic engineers of sign locations, and help identify sites for new sign installation to improve roadway travel safety and efficiency.

4.3.1 Database Design and Data Collection

Upon City's approval, the KOA Team collected data on traffic signs identified by current or past versions of the MUTCD, city-specific signs that target motorists or other road users, and posts such signs are attached to. Hand-held GPS devices (see Figure 4.4) were used to record accurate sign and post locations, along with field photos and key attributes. The following attributes were collected for 4,484 signs in the city:

- Quadrant number
- Street Name and nearest address
- X, Y Coordinates
- Sign ID
- CA MUTCD Sign Code (ex. R1-1, W11-2, etc.)
- Sign Type (ex. Regulatory, Warning, Guide, etc.)
- Sign Advisory [message] (ex. Right Lane Must Turn Right, Speed Limit 40 mph, etc.)
- Sign Dimensions and Installation Height
- Sign Location (ex. Curbside, overhead, median, etc.)
- Sign Conditions (Faded, Bent, Cracked)
- Sign Needs Cleaning (Yes or No)
- Sign Obscured / vegetation around sign needs trimming (Yes or No)
- Date, Time of Collection (automated by GPS device)
- Notes

Figure 4.3: Trimble Geo7X



For the 2,572 sign posts in the city, the following attributes were collected from the field:

- Quadrant number
- Street Name and nearest address
- X, Y Coordinates
- Pole ID (unique ID)
- Pole Type (Round Tubular Pole, Perforated Square Pole, U-Channel Pole, Wooden Pole, Street Light Pole, Utility Pole, Traffic Signal Pole, Mast Arm, etc.)
- Number of Poles
- Number of Signs on Post
- Pole Condition (ex. rusted, bent, etc.)
- Notes

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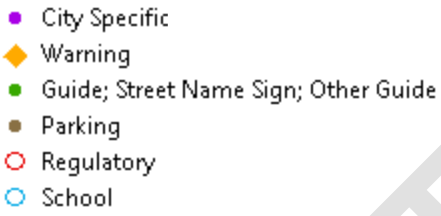
With ample information collected from the field, the database can be arranged by a wide variety of metrics, including city quadrant, sign type, and sign condition. In terms of visualizing signage locations on a map, there are two options for the signage shapefile in ArcMap: symbolizing sign locations by sign type, and by MUTCD code. The sign type symbols are defined as shown in Figure 4.5, while the MUTCD symbology recreates the actual look of the sign based on California MUTCD 2014 Sign Charts. The KMZ file for Google Earth Pro is only available in the MUTCD symbology setting.

Figure 4.4: Signage Shapefile Symbology



The Data Dictionary for a detailed list of attributes and their definitions is provided in Appendix J.

4.3.2 Retro-reflectivity Assessment

Retro-reflectivity refers to a special property of traffic signs in which light shining on the reflective material of the sign is redirected back towards the light source. This is the attribute which causes the traffic signs to appear brighter as light bounces off of them, thus making the sign more visible to a driver at night. The retroreflective quality of signs tend to degrade gradually over time, and other environmental conditions such as sun exposure, dirt, moisture, and pollutants can accelerate the degradation process, causing a further drop in retroreflective performance. If left unchecked, the retroreflective deficiency of these signs can reach the point where the sign messages cannot be interpreted by the driver early enough to react properly, rendering the sign ineffective during nighttime hours.

The signage inventory database enables easy assessment of the retro-reflectivity levels of signs in the city. The most recent version of the MUTCD states that all traffic-related signs within a jurisdiction are required to maintain a minimum level of retro-reflectivity (defined in MUTCD Table 2A.3). For this reason, most regulatory and warning signs within the study areas were surveyed for proper levels of retro-reflectivity to ensure the visibility and effectiveness of the signs at night. City-specific signs, guide signs, parking regulation signs, and pedestrian push button signs were excluded from field assessment.

Per requirements set by the Federal Highway Administration (FHWA), the nighttime retro-reflectivity assessment was conducted by a KOA transportation engineer over 60 years old who drove a pick-up truck between 9pm to midnight. As the senior driver drove through the study street segments shining headlights onto the roadway signs, the two supporting staff in the same car helped navigate through the study area with a GPS-enabled mobile device (shown in Figure 4.6) and marked signs identified by the driver as having failed the retro-reflectivity assessment. Since some roadway signs were facing different directions or were obscured by utility poles, trees, etc., where the light from the vehicles headlights would not reach the signs, the supporting staff used a handheld spot light to shine the light directly onto the

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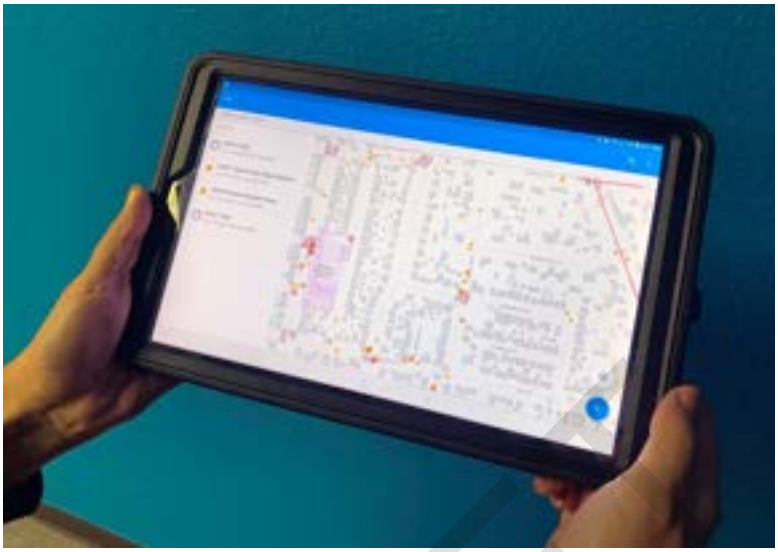
sign to verify the retro-reflectivity performance.

Figure 4.5: The GPS-enabled Mobile Device Used in Nighttime Retro-reflectivity Assessment



The field notes were then transferred to the Excel signage table as an important metric for the sign replacement prioritization analysis and sign upgrade cost estimate calculation.

4.3.3 Sign Replacement Prioritization Analysis

KOA established a scoring system to quantitatively measure the conditions of the signs and posts. The Damage Score, which comprehensively describes the condition of the sign, takes into account a sign's readability, physical condition, and its importance to roadway safety; it also gives weight to signs that failed the nighttime retro-reflectivity assessment, and those not in compliance with the most recent CA MUTCD in terms of design and dimensions. The signs that require immediate retirement due to MUTCD incompliance are listed in Table 4.4.

Table 4.4: Signs for Immediate Retirement and Their Replacements

Retired	R10 (CA)	R10-11a	R34A (CA)	R41 (CA)	R96A	W53	W54
							
New	R6-1	R13a	R3-4	R3-5R	R9-3	W14-1	W11-2 & W16-7p
							

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As shown in Table 4.5, Readability and Physical Condition were manually evaluated on a scale of zero (no issues detected) to three (severe damage observed) based on field images; Sign Importance was categorized on the same scale based on sign type and MUTCD sign code.

Table 4.5: Sign Condition Assessment Rubric

	Readability *Level of difficulty in reading sign content when the sign is covered by graffiti or stickers, or demonstrates overall fading of colors*	**Physical Condition** *The physical condition of the sign, rated by severity of bending, cracking, and chipping*	**Sign Importance** *How important the sign is to roadway safety*
0	No readability issues	No outstanding physical conditions	Sign type is a City Specific, Guide, or Street Name Sign.
1	Sign background is covered by small graffiti or stickers; sign has minor fading	Sign has a minor bend or cracks	Sign type is Object Marker or Parking.
2	Sign legend is partially covered by graffiti or stickers; sign has some fading	Sign is chipped off, has some bending or cracks	Sign type is Uncategorized Regulatory and Warning.
3	Sign content is incomprehensible	Cracks appear all over the sign, is severely bent, or is missing a significant portion	Sign type is Categorized Regulatory and Warning.

The damage score takes the average of the readability and physical condition ratings. For signs with an importance rating of one to three, the damage score is increased by 10%-30% to give priority to signs with higher importance to traffic safety. For signs that need to be retired in the future or have improper dimensions, the damage score receives an additional 10% increase to prioritize such signs over those compliant with MUTCD. The multiplier factors for sign importance, future retirement, and improper dimensions are cumulative. If a sign fails the retro-reflectivity assessment or requires immediate replacement, it automatically receives a damage score of three regardless of sign conditions. The resulting damage score may range anywhere between zero (for signs in good condition) to 4.72 (for signs receiving maximum average ratings and all multiplier factors).

Based on the calculated Damage Score, signs are scheduled to be upgraded immediately (within one year), in the short term (within one to two years), or in the long term (in two to five years). Generally, the higher the Damage Score is, the sooner the sign needs to be upgraded. Figure 4.7 shows how Damage Score reflects the condition of the sign and how they are prioritized for replacement accordingly.

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Figure 4.6: Examples of Signs Requiring Immediate, Short-term, and Long-term Replacement



Because it is common to find multiple signs on one sign post, post condition is evaluated separately on a scale of zero to three based on the rubric shown in Table 4.6.

Table 4.6: Post Condition Assessment Rubric

Post Condition	Assessment Criteria	Post Replacement (all signs on the post also need to be replaced)
0	Post in good condition	No actions required
1	Post has minor lean or is partially rusted	Long-term unless signs on post require immediate or short-term upgrade
2	Post is over 90% rusted or obviously bending	Short-term unless signs on post require an immediate upgrade
3	Post bends significantly and/or post is thoroughly rusted	Immediate

If the post is severely damaged and requires immediate replacement, the sign(s) on the post will also have to be replaced immediately. A post with minor or moderate damages may be replaced along with the signs, if signs on the post require immediate or short-term replacement. For example, the sign and post on the left in Figure 4.8 require immediate replacement even though the post only has spotted rust, because the One-way sign is not compliant with the latest MUTCD and requires immediate replacement. The sign and post on the right in Figure 4.8 require immediate replacement despite the sign being in good condition, because the post is thoroughly rusted and tilted to the sidewalk. If a post hanging multiple signs needs to be replaced, only one sign is counted as "Sign & Pole Replacement", while the remaining signs are counted as "Sign Replacement" needed.

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Figure 4.7: Comparison of Sign and Post Conditions



4.3.4 Sign Upgrade Cost Estimate Calculation

The outcome of the field assessments and prioritization analysis includes two parts: actions to be taken to upgrade the sign, and the urgency of such actions. Using these analysis results, KOA came up with a sign upgrade plan and the recommended a completion timeline. As shown in Table 4.7, a total of 4,484 traffic signs were inventoried in the city, of which 1,178 were identified as having an upgrade needed in the next five years, including 956 signs needed to be replaced, 44 signs needed to be removed, and 178 signs needed to be replaced with the pole. Among the 956 traffic signs that require replacement, 30 percent are regulatory signs and 28 percent are warning signs. Among the 178 sign posts that need to be replaced, 85 percent are pipe posts.

Table 4.7**:** Sign Upgrade Action Summary

Action	Definition	Number of Eligible Signs
Sign Replacement	Sign that needs to be replaced with a new one due to deteriorating condition, or sign is no longer MUTCD-compliant	956
Sign Removal	Non-MUTCD compliant sign that needs to be removed, where new sign is already installed at the same location	44
Sign & Pole Replacement	The sign post and all signs on the post need to be replaced due to critical post condition or overall deterioration of signs and the post	178
Total		1178

As shown in Table 4.8, among the 357 signs that need to be upgraded immediately, 46 percent are due to the immediate retirement requirement by MUTCD, 42 percent are due to a failed nighttime retro-reflectivity assessment, and 12 percent are due to severe sign and post conditions. Among the 224 signs scheduled for upgrade in the short term, 33 percent are regulatory signs and 20 percent are warning signs. For signs scheduled for long-term upgrades, 24 percent are regulatory signs and 22 percent are

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warning signs.

Table 4.8: Sign Upgrade Priority Summary

Priority	Upgrade to be Complete within	Number of Eligible Signs
Immediate	1 year	357
Short-term	1-2 years	224
Long-term	2-5 years	597
Total		1178

The sign upgrade cost estimation was calculated using the following unit prices, including material and labor costs:

- Sign and Pole Replacement - $500
- Sign Replacement - $200
- Sign Removal - $100

Table 4.9 shows the estimated cost for upgrading the traffic signs in the city, based on priority and type of action needed. The City may seek funding accordingly to complete the upgrade process by phase. It costs approximately $285,000 to update all the signs.

Table 4.9: Cost to Update All Signs by Phase

Action	Sign & Pole Replacement	Sign Removal	Sign Replacement	Grand Total
Immediate	$19,000	$2,900	$58,000	$79,900
Short-term	$25,000	$700	$33,400	$59,100
Long-term	$45,000	$800	$99,800	$145,600
Grand Total	$89,000	$4,400	$191,200	$284,600

KOA identified about 30 percent of the inventoried traffic signs in the City as signs key to traffic safety. A detailed list of all such key signs is provided in Appendix K. The cost estimate to upgrade key traffic signs is summarized below.

Table 4.10: Cost to Update Key Signs by Phase

Action	Sign & Pole Replacement	Sign Removal	Sign Replacement	Grand Total
Immediate	$5,000	$2,200	$22,800	$30,000
Short-term	$9,000	$700	$14,600	$24,300
Long-term	$18,000	$800	$33,000	$51,800
Grand Total	$32,000	$3,700	$70,400	$106,100

The following map set (Figure 4.9) shows the spatial distribution of signs that need to be replaced immediately, in the short-term, and in the long-term. The sign locations, shown as points on the map, are color-coded by whether they were categorized as key to traffic safety.

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Figure 4.8: Sign Upgrade Priority Maps

Immediate



Key Signs Other Signs

Short-term



Key Signs Other Signs

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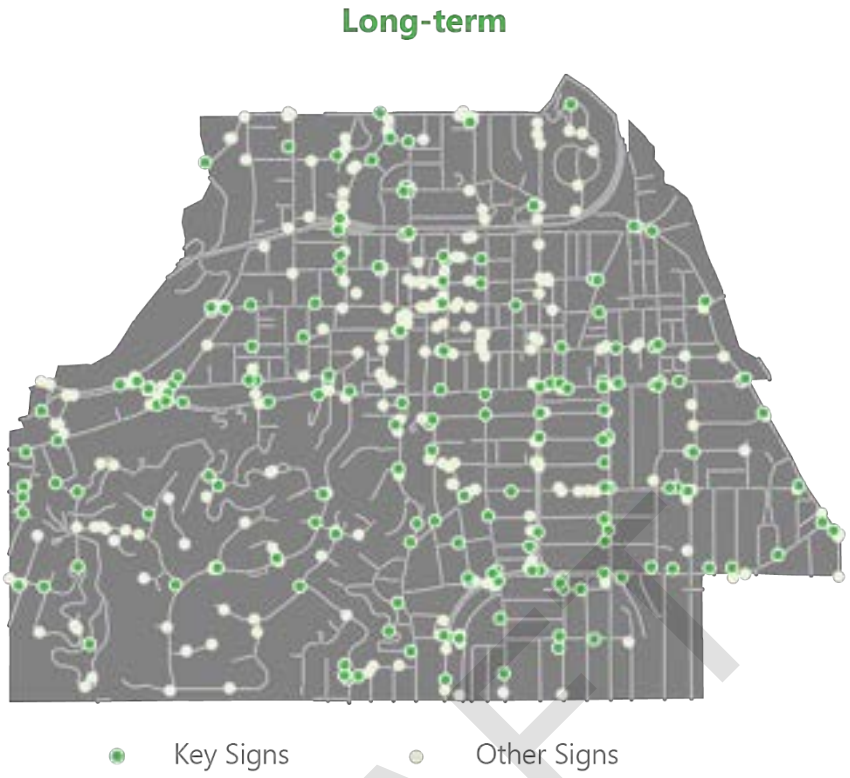

Apart from sign upgrade, some signs still within service life can be maintained with low-cost procedures including sign cleaning and vegetation trimming around the sign to clear any visual obstructions. The quantities of signs requiring such actions are summarized in Table 4.11. Signs requiring immediate or short-term upgrade were not included in this summary.

Table 4.11: Sign Maintenance Need Summary

	Vegetation Trimming Needed	Sign Cleaning Needed
Key Signs	62	18
Other Signs	181	50
Total	243	68

The following map set (Figure 4.10) shows the spatial distribution of signs that need to be maintained. The sign locations, shown as points on the map, are color-coded by whether they were categorized as key to traffic safety.

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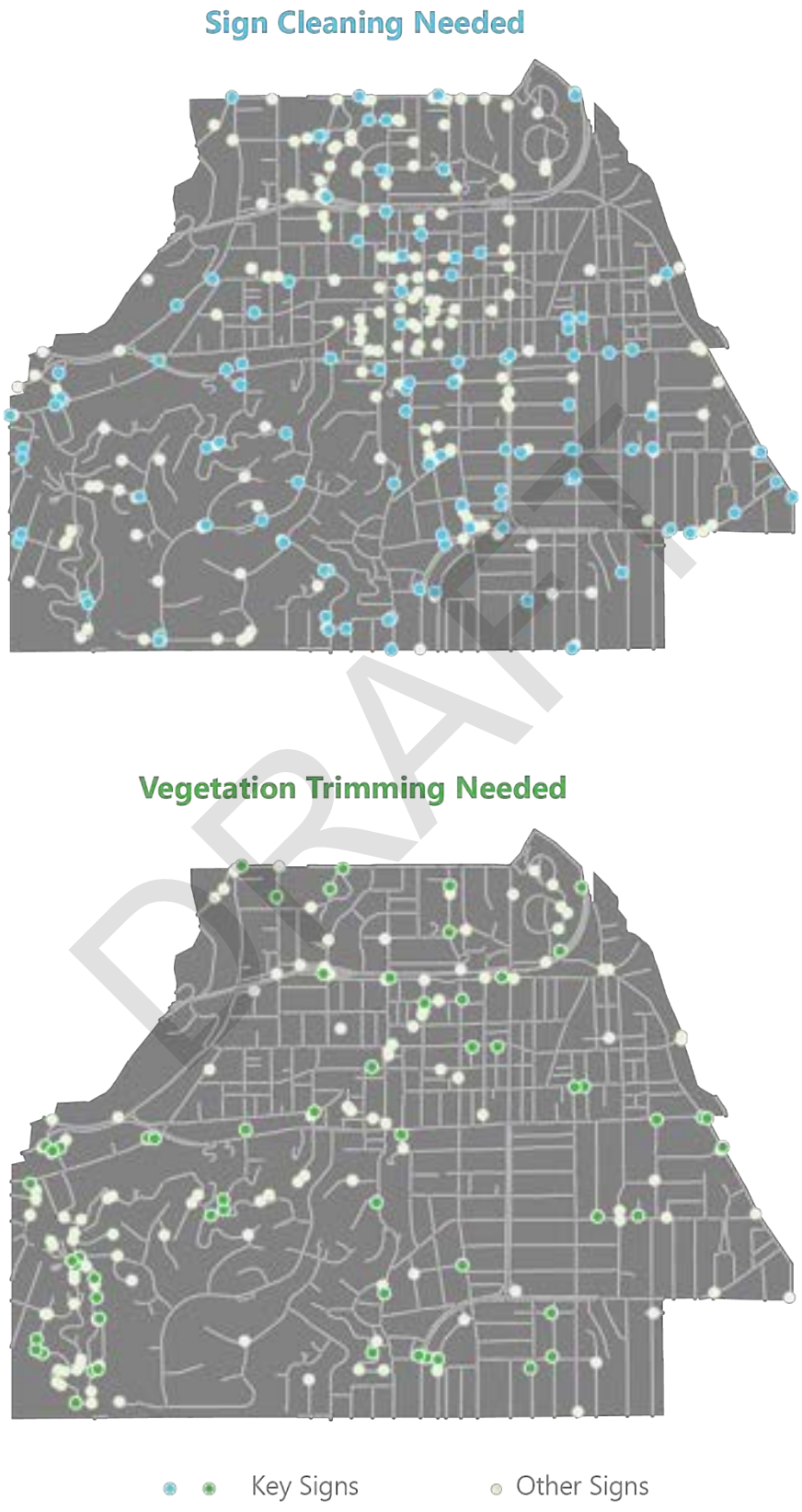
Figure 4.9: Sign Maintenance Needs Map



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4.4 CURB MARKING INVENTORY

Curb markings are colors painted at the curb to indicate roadside parking regulations. They clarify curb use rules to drivers and other road users in residential, commercial, school, and other areas. The following colors were observed at curbs in South Pasadena, and their regulatory meanings are described as below, per CA MUTCD:

- *Red indicates no stopping, standing, or parking, whether the vehicle is attended or unattended, except that a bus may stop in a red zone marked or sign posted as a bus loading zone.*
- *Yellow indicates stopping only for the purpose of loading or unloading passengers or freight for the time as may be specified by local ordinance.*
- *White indicates stopping for either a) loading or unloading of passengers for the time as may be specified by local ordinance, or b) depositing mail in an adjacent mailbox.*
- *Green indicates time limit parking specified by local ordinance.*
- *Blue indicates parking limited exclusively to the vehicles of disabled persons and disabled veterans.*

It should be noted that unpainted curb space where parking is generally allowed is not included in this inventory.

4.4.1 Database Design and Data Collection

Similar to the field data collection process of traffic signs, curb markings were collected using hand-held GPS devices. To record the shape of the curb marking, the field crew starts recording their GPS location at one end of the curb, walks along the curb, and ends GPS recording when reaching the other end of the curb marking. Field photos were taken, and key attributes and marking conditions were recorded.
The curb marking inventory database is available in three formats: ArcGIS shapefile, Google Earth Pro KMZ file, and Excel file. Attributes including curb length, unique ID, and quadrant were calculated with geoprocessing tools in ArcMap, while field photos are attached to each curb feature in Excel for convenient access. Curb symbology is defined by color of the curb marking in ArcMap, and exported to KMZ file for viewing in Google Earth Pro.

The Data Dictionary for a detailed list of attributes and their definitions is provided in Appendix L.

4.4.2 Inventory Analysis

A total of 2,222 curb markings were inventoried in the city. The majority (93.5%) of the curb markings are red curb, while the remaining are made up of white (regular parking, 2.5%), green (limited-time parking, 2.4%), yellow (loading, 0.6%), and blue. Among the 65,854 feet of curb markings evaluated, about 9,878 feet of curb markings may require maintenance. Their conditions are summarized in Table 4.12.

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Table 4.12: Curb Marking Condition Summary

	Damaged	Faded	Faded & Chipped	Good	Grand Total
Blue	0.00%	0.00%	0.00%	0.16%	0.16%
Green	0.10%	0.17%	0.00%	2.35%	2.62%
Red	2.72%	11.36%	0.03%	79.42%	93.53%
White	0.31%	0.14%	0.00%	2.54%	2.99%
Yellow	0.01%	0.13%	0.00%	0.56%	0.70%
Grand Total	3.14%	11.81%	0.03%	85.02%	100.00%

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5.0 SAFETY PROJECTS

Safety projects are proposed at eight intersections and five roadway segments, based on the safety countermeasures proposed in section 3. For each location, this section provides the project scope, collision reduction benefits calculation, cost estimation and Benefit to Cost Ratio (BCR) analysis. This section also discusses and summarizes the project prioritization for HSIP application.

5.1 PROJECT SCOPES AND BENEFITS CALCULATION

The development of project scopes involves identifying one or more specific countermeasures at potential locations for safety improvement. For each location, a general scope of the project(s) is described. The exhibits of the project concepts are provided in Appendix M for all the safety projects.

Expected benefits for the proposed countermeasures are derived by applying a Crash Reduction Factor (CRFs) to each measure and then monetizing the expected reduction in crashes. This involves:

- Identifying the current number of crashes without treatment
- Applying CRFs by type and severity
- Applying a benefit value by crash severity
- Calculating the annual collision reduction benefits and multiplying by the number of years in the project life

An engineer determining the benefits of newly installed infrastructure first determines the number of collisions with potential to be prevented by the improvement. The engineer then applies the CRF which gives the rough percentage of crashes that would be prevented. The Local Roadway Safety Manual (LRSM) and Crash Modification Factor Clearinghouse are two major sources for CRFs.

The next step in estimating the overall benefit of a proposed improvement project is to multiply the expected reduction in crashes by a generally accepted value for the "cost" of crashes. The expected "benefit" value for a project is the expected "reduction in costs" value from reducing future crashes. The source for the costs by collision severity level was taken from the 2015 HSIP Manual:

- Fatal - $5,579,400
- Severe Injury - $297,100
- Other Visible Injury - $108,600
- Complaint of Pain - $61,300
- Property Damage Only - $10,000

The final step in calculating the total safety project benefits is to divide the benefits by the number of years the collision data was collected (five years for this project), and to then multiply this quotient by the number of years in the project life. The project scopes are listed as follows, including the applicable countermeasure category for each improvement and monetary benefit calculated according to the method just described.

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5.1.1 Safety Projects for Intersections

Project 1: Fair Oaks Avenue & State Street and Fair Oaks Avenue & Grevelia Street (Signalized Intersection)

No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit
CUSTOM		Add cat-tracks (edge line extension through intersection) across the intersection heading northbound to better guide motorists. Eliminate the v-shaped divider between the two left turn lanes on the northbound approach to the intersection of Fair Oaks & Grevelia. Apply new layer of paint to existing pavement markings demonstrating faded appearance (intersection-wide). Install freeway approach guidance signage on northbound approach prior to the intersection. Eliminate the southwest approach on Grevelia Street that is currently not compliant with the most recent MUTCD guidelines.	Sideswipes	100%	20	3	$35,400	$141,600
S3	Improve signal timing	Adjust yellow interval to 4.1 seconds for the signals at the North-South Direction (Fair Oaks Avenue)	Rear end collisions (NS Direction)	15%	10	6	$169,800	$50,940
						Total	$205,200	$192,540

Project 2: Monterey Road & Fair Oaks Avenue (Signalized Intersection)

No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit
S3	Improve signal timing	Install flashing yellow arrow on northbound and southbound approach to allow for leading/lagging at this intersection.	Left-turn angle collisions (NS direction)	15%	10	3	$183,900	$55,170

Project 3: Monterey Road & Fremont Avenue (Signalized Intersection)

No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit
S2	Improve signal hardware	Replace 8" signal heads with 12" signal head (2 per approach, 8 total)	All collisions	15%	10	19	$955,700	$286,710
S3	Improve signal timing	Adjust yellow interval to 4.1 seconds (all directions)	Rear end collis	15%	10	9	$353,700	$106,110
S19	Install ped countdown signals	Update pedestrian signal heads to show countdown sequence, replace existing push buttons with ADA compliant push buttons	Pedestrian & b	25%	20	4	$240,800	$240,800
S1	Add lighting	Replace HPS light fixtures with LED light fixtures for safety lighting	Night collisions	40%	20	7	$278,400	$445,440
						Total	$1,828,600	$1,079,060

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Project 4: Mission Street & Orange Grove Avenue (Signalized Intersection)

No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit
S2	Improve signal hardware	Replace 8" signal heads with 12" signal head (two westbound, two eastbound, one southbound), install video detection (including bike detection), replace back plate and visor for signal head for three signals in eastbound direction.	All collisions	15%	10	3	$325,800	$97,740
S19	Install ped countdown signals	Update pedestrian signal heads to show countdown sequence, replace existing push buttons with ADA compliant push buttons.	Pedestrian & b	25%	20	2	$217,200	$217,200
S1	Add lighting	Replace HPS light fixtures with LED light fixtures for safety lighting at the northwest corner and southeast corner of the intersection.	Night collisions	40%	20	1	$108,600	$173,760
						Total	$651,600	$488,700

Project 5: Fair Oaks Avenue & Huntington Avenue (Signalized Intersection)

No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit
CUSTOM		Reduce turn radius of the curve to discourage speeding; add bicycle lanes on each direction	Sideswipes, bicycle collisions, unsafe speed collisions	100%	20	9	$495,600	$1,982,400

Project 6: Fremont Avenue & Huntington Avenue (Signalized Intersection)

No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit
CUSTOM		Remove existing right-turn lane on westbound approach and remove island that separateds right-lane from through lanes, create curb extension on northeast corner of the intersection, create new frontage road on north side of Huntington Drive; Extend westbound left-turn pocket.	Sideswipes, rear ends, bicycle collisions, unsafe speed collisions	100%	20	4	$195,700	$782,800
R36	Add bike lanes	Add bike lane (both directions)	Bike collisions	35%	20	1	$11,800	$16,520
S19	Install ped countdown signals	Replace existing push button with ADA compliant push button at all four corners	Pedestrian & bike	25%	20	1	$11,800	$11,800
S1	Add lighting	Replace HPS ligth fixtures with LED light fixtures at all four corners	Night collisions	40%	20	7	$424,700	$679,520
						Total	$644,000	$1,490,640

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Project 7: Arroyo Drive & Pasadena Avenue (Non-signalized Intersection)

No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit
R36	Add bike lanes	Add bike lane (east approach, both directions), add shark teeth for SBR movement, add guidance signage.	Bike collisions	35%	20	3	$278,500	$389,900

Project 8: Mission Street & Pasadena Avenue, Arroyo Drive & Stoney Drive & Mission Avenue (Non-signalized Intersection)

No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit
CUSTOM	Change alignment	Create a curb extension on northeast side (westbound approach of Mission Street), extend limit line connecting Mission Street east and Pasadena Avenue.	CUSTOM	50%	20	5	$205,300	$410,600

5.1.2 Safety Projects for Roadway Segments

Project 9: Pasadena Avenue between Arroyo Drive and West City Limit

No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit
R36	Add bike lanes	Add bike lanes from Arroyo Drive to west City limit	Bike collisions	35%	20	1	$61,300	$85,820

Project 10: Fair Oaks Avenue from Columbia Street to Monterey Road (Roadway Segment)

No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit
R36	Install bike lanes	Paint a 5-foot bike lane along the concrete gutter of Fair Oaks Avenue, both northbound and southbound, stretching from northern city limit at Columbia Street down to Monterey Road (no parking will be impacted). Dash bike lane striping on approaches to intersections and across intersections. Highlight approaches with dashed green markings and intersection crossings with solid green markings. Install advance warning signs that bicyclists may be on the road- W 11-1 and W16-1P. Install "No Turn on Red" regulatory sign at intersections to increase bicycle safety and decrease crashes with right-turning vehicles.	Bike collisions	35%	20	14	$6,610,600	$9,254,840
(none)		Repaint faded crosswalks	(none)			0	$0	$0
						Total	$6,610,600	$9,254,840

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Project 11: Fremont Avenue from Columbia Street to Monterey Road (Roadway Segment)

No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit
R1	Add lighting	Install street lights along corridor	Night collisions	35%	20	27	$1,104,000	$1,545,600
NS7	Install flashing beacons at Stop-Controlled Intersection	Install Rectangular Rapid Flashing Beacon (RRFB) at Fremont Avenue and Oxley Street	Pedestrian & bike	30%	10	12	$870,900	$522,540
R28	Install curve advance warning signs	Install warning sign for the street curvature roadway north of Foothill Street, heading northbound- W 1-2	Vicinity of warning sign (rear end)	25%	10	2	$73,100	$36,550
						Total	$2,048,000	$2,104,690

Project 12: Monterey Road from Fair Oaks Avenue to Pasadena Avenue (Roadway Segment)

No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit
R32	Install edge-lines and centerlines	Install edge line striping along the Monterey Road corridor from Fair Oaks Avenue to Pasadena Avenue	Vicinity of edgeline	25%	10	20	$870,700	$435,350
(none)		Repaint existing striping to a conventional striping for the eastbound roadway from Fairview Avenue that lead to the right-turn lane on Fair Oaks Avenue.	(none)			0	$0	$0
						Total	$870,700	$435,350

Project 13: Meridian Road from Monterey Road to Alhambra Road (Roadway Segment)

No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit
R1	Add lighting	Extend the existing street light arms where blocked by trees and increase the wattage to improve nighttime visibility.	Night collisions	35%	20	9	$205,200	$287,280
CMF		Install speed humps	All collisions	40%		20	$776,100	$0
						Total	$981,300	$287,280

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Project 14: Huntington Drive from Leman Street to Maple Street (Roadway Segment)

No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit
R36	Install bike lanes	Install Class II bike lane in both directions	Bike collisions	35%	20	6	$507,500	$710,500
R1	Add lighting	Extend the existing street light arms and upgrade all the light bulbs to LED lights, which could improve nighttime visibility for pedestrians and motorists.	Night collisions	35%	20	28	$1,974,600	$2,764,440
						Total	$2,482,100	$3,474,940

The detailed collision reduction benefit calculation tables are provided in Appendix N.

Project 15: Fremont Avenue from Monterey Road to Alhambra Road (Roadway Segment)

No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit
R1	Add lighting	Extend the existing street light arms and upgrade all the light bulbs to LED lights, which could improve nighttime visibility for	Night collisions	35%	20	21	$882,500	$1,235,500

5.2 COST ESTIMATE

Planning-level cost estimates were developed for each countermeasure and project costs were estimated based on the countermeasures applied to the safety project locations. KOA applied market construction costs for the proposed improvements to the quantities measured. Cost estimates were derived from a combination of available sources including Caltrans published data and recent bid prices from other local projects. The grand total also includes a 30 percent contingency, a 10 percent design fee, and an additional 6 percent fee for construction engineering. Table 5.1 summarizes the project cost for all 13 safety projects.

Table 5.1: Safety Project Cost Estimation

#	Location	Location Type	No.	Countermeasure	Cost ($)
1	Fair Oaks Avenue & State Street and Fair Oaks Avenue & Grevelia Street	Signalized intersection	CUSTOM		$30,835
			S3	Improve signal timing	$7,300
				Total	$38,135
2	Monterey Road & Fair Oaks Avenue	Signalized intersection	S3	Improve signal timing	$36,938

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#	Location	Location Type	No.	Countermeasure	Cost ($)
3	Monterey Road & Fremont Avenue	Signalized intersection	S2	Improve signal hardware	$42,632
			S3	Improve signal timing	$7,300
			S19	Install pedestrian countdown signals	$65,846
			S1	Add lighting	$7,446
				Total	$123,224
4	Mission Street & Orange Grove Avenue	Signalized intersection	S2	Improve signal hardware	$62,926
			S19	Install pedestrian countdown signals	$21,608
			S1	Add lighting	$3,212
				Total	$87,746
5	Fair Oaks Avenue & Huntington Avenue	Signalized intersection	CUSTOM		$1,117,128
6	Fremont Avenue & Huntington Avenue	Signalized intersection	CUSTOM		$190,421
			R36	Add bike lanes	$20,601
			S19	Install pedestrian countdown signals	$20,148
			S1	Add lighting	$11,169
				Total	$242,339
7	Arroyo Drive & Pasadena Avenue	Non-signalized intersection	R36	Add bike lanes	$122,073
8	Mission Street & Pasadena Avenue, Arroyo Drive & Stoney Drive & Mission Avenue	Non-signalized intersection	CUSTOM	Change alignment	$96,550
9	Pasadena Avenue from Arroyo Drive to West City Limit	Roadway Segment	R36	Add bike lanes	$127,337

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#	Location	Location Type	No.	Countermeasure	Cost ($)
10	Fair Oaks Avenue from Columbia Street to Monterey Road	Roadway Segment	R36	Install bike lanes	$1,165,080
			(none)		$27,623
				Total	$1,192,703
11	Fremont Avenue from Columbia Street to Monterey Road	Roadway Segment	R1	Add lighting	$247,835
			NS7	Install flashing beacons at Stop-Controlled Intersection	$58,546
			R28	Install curve advance warning signs	$1,460
				Total	$307,841
12	Monterey Road from Fair Oaks Avenue to Pasadena Avenue	Roadway Segment	R32	Install edge-lines and centerlines	$24,820
			(none)		$1,114
				Total	$25,934
13	Meridian Road from Monterey Road to Alhambra Road	Roadway Segment	R1	Add lighting	$121,472
			CMF		$197,100
				Total	$318,572
14	Huntington Drive from Leman Street to Maple Street	Roadway Segment	R36	Install bike lanes	$25,842
			R1	Add lighting	$175,492
				Total	$201,334
15	Fremont Avenue from Monterey Road to Alhambra Road	Roadway Segment	R1	Add lighting	$65,627

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The detailed cost estimation worksheets are included in the Appendix O.

5.3 B/C RATIO

A Benefit-to-Cost Ratio (BCR) is the ratio of the benefits of a project relative to its costs, both expressed in monetary terms. The BCR is calculated by taking a project's overall benefit and dividing it by the overall project cost. For projects with a BCR greater than 1, the value of project benefits exceeds the value of project costs: Hence, they have positive net benefits. The higher the BCR, the greater the value of benefits

the project has relative to the costs, and the lower the BCR, the lower the value of benefits relative to the costs.

The BCR calculation of the proposed safety projects for the City of South Pasadena is shown in Table 5.2. For each safety project, both the overall BCR and BCR by countermeasures are provided.

Table 5.2: Overall Benefits/Cost Ratio Analysis by Safety Project

#	Location	Location Type	No.	Cost ($)	Benefit/Cost Ratio
1	Fair Oaks Avenue & State Street, and Fair Oaks Avenue & Grevelia Street	Signalized intersection	CUSTOM	$30,835	4.59
			S3	$7,300	6.98
			Total	$38,135	5.05
2	Monterey Road & Fair Oaks Avenue	Signalized intersection	S3	$36,938	1.49
3	Monterey Road & Fremont Avenue	Signalized intersection	S2	$42,632	6.73
			S3	$7,300	14.54
			S19	$65,846	3.66
			S1	$7,446	59.82
			Total	$123,224	8.76
4	Mission Street & Orange Grove Avenue	Signalized intersection	S2	$62,926	1.55
			S19	$21,608	10.05
			S1	$3,212	54.10
			Total	$87,746	5.57
5	Fair Oaks Avenue & Huntington Avenue	Signalized intersection	CUSTOM	$1,117,128	1.77
6	Fremont Avenue & Huntington Avenue	Signalized intersection	CUSTOM	$190,421	4.11
			R36	$20,601	0.80
			S19	$20,148	0.59
			S1	$11,169	60.84
			Total	$242,339	6.15

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#	Location	Location Type	No.	Cost ($)	Benefit/Cost Ratio
7	Arroyo Drive & Pasadena Avenue	Non-signalized intersection	R36	$122,073	3.19
9	Mission Street & Pasadena Avenue, Arroyo Drive & Stoney Drive & Mission Avenue	Non-signalized intersection	CUSTOM	$96,550	4.25
9	Pasadena Avenue from Arroyo Drive to West City Limit	Roadway Segment	R36	$127,337	0.67
10	Fair Oaks Avenue from Columbia Street to Monterey Road	Roadway Segment	R36	$1,165,080	7.94
			(none)	$27,623	0.00
			Total	$1,192,703	7.94
11	Fremont Avenue from Columbia Street to Monterey Road	Roadway Segment	R1	$247,835	6.24
			NS7	$58,546	8.93
			R28	$1,460	25.03
			Total	$307,841	6.84
12	Monterey Road from Fair Oaks Avenue to Pasadena Avenue	Roadway Segment	R32	$24,820	17.54
			(none)	$1,114	0.00
			Total	$25,934	16.79
13	Meridian Road from Monterey Road to Alhambra Road	Roadway Segment	R1	$121,472	2.36
			CMF	$197,100	0.00
			Total	$318,572	0.90
14	Huntington Drive from Leman Street to Maple Street	Roadway Segment	R36	$25,842	27.49
			R1	$175,492	15.75
			Total	$201,334	17.26
15	Fremont Avenue from Monterey Road to Alhambra Road	Roadway Segment	R1	$65,627	18.83

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As shown in Table 5.2, the project with the highest overall BCR is project #13, to install a Class II bike lane in both directions on Huntington Drive from Leman Street to Maple Street, and improve the street lighting. The calculated BCR for each project summarizes the overall cost effectiveness of the 13 proposed safety projects, without considering how the projects would be funded.

5.4 PROJECT PRIORITIZATION AND HSIP APPLICATION

To develop a prioritized list of safety projects for the HSIP application and to maximize the City's chance of receiving funding, KOA further refined the BCR calculation by using the same process shown in the HSIP Analyzer. The BCRs were used to identify the projects with high cost effectiveness that have the greatest chance of receiving federal funding in a Caltrans call-for-projects. The modification of the BCR analysis for the 13 safety projects includes:

- Countermeasures with low federal reimbursement rates were not combined with countermeasures with high reimbursement rates. HSIP Cycle 9 guidelines state that a project will receive the lowest reimbursement rate of the applied countermeasures. Therefore, countermeasures that are not listed in the LRSM, or not eligible for federal funding are excluded.

- Only a maximum of three (3) individual countermeasures can be utilized in the B/C ratio for a project. For locations with more than three countermeasures, only the three most cost-effective countermeasures are included.

Table 5.3 summarizes the BCR analysis for all the safety projects, taking the HSIP application into consideration. The detailed BCR analysis table is provided in Appendix P.

Table 5.3: Safety Projects Sorted by BCR – HSIP Application Consideration

#	Location	CM No.	Benefit	Cost ($)	Benefit/Cost Ratio	HSIP Max Share	HSIP Amount	Local Amount
1	Fair Oaks Avenue & State Street, and Fair Oaks Avenue & Grevelia Street	S3	$50,940	$7,300	6.98	50%	$3,650	$3,650
2	Monterey Road & Fair Oaks Avenue	S3	$55,170	$36,938	1.49	50%	$18,469	$18,469
3	Monterey Road & Fremont Avenue	S2	$286,710	$42,632	6.73	100%	$42,632	$0
		S3	$106,110	$7,300	14.54	50%	$3,650	$3,650
		S1	$445,440	$7,446	59.82	100%	$7,446	$0
		Total	$838,260	$57,378	14.61		$53,728	$3,650
4	Mission Street & Orange Grove Avenue	S2	$97,740	$62,926	1.55	100%	$62,926	$0

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#	Location	CM No.	Benefit	Cost ($)	Benefit/Cost Ratio	HSIP Max Share	HSIP Amount	Local Amount
		S19	$217,200	$21,608	10.05	100%	$21,608	$0
		S1	$173,760	$3,212	54.10	100%	$3,212	$0
		Total	$488,700	$87,746	5.57		$87,746	$0
6	Fremont Avenue & Huntington Avenue	R36	$16,520	$20,601	0.80	90%	$18,541	$2,060
		S19	$11,800	$20,148	0.59	100%	$20,148	$0
		S1	$679,520	$11,169	60.84	100%	$11,169	$0
		Total	$707,840	$51,918	13.63		$49,858	$2,060
7	Arroyo Drive & Pasadena Avenue	R36	$389,900	$122,073	3.19	90%	$109,866	$12,207
9	Pasadena Avenue from Arroyo Drive to West City Limit	R36	$85,820	$127,337	0.67	90%	$114,603	$12,734
10	Fair Oaks Avenue from Columbia Street to Monterey Road	R36	$9,254,840	$1,165,080	7.94	90%	$1,048,572	$116,508
11	Fremont Avenue from Columbia Street to Monterey Road	R1	$1,545,600	$247,835	6.24	100%	$247,835	$0
		NS7	$522,540	$58,546	8.93	100%	$58,546	$0
		R28	$36,550	$1,460	25.03	100%	$1,460	$0
		Total	$2,104,690	$307,841	6.84		$307,841	$0

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#	Location	CM No.	Benefit	Cost ($)	Benefit/Cost Ratio	HSIP Max Share	HSIP Amount	Local Amount
12	Monterey Road from Fair Oaks Avenue to Pasadena Avenue	R32	$435,350	$24,820	17.54	100%	$24,820	$0
13	Meridian Road from Monterey Road to Alhambra Road	R1	$287,280	$121,472	2.36	100%	$121,472	$0
14	Huntington Drive from Leman Street to Maple Street	R36	$710,500	$25,842	27.49	90%	$23,258	$2,584
		R1	$2,764,440	$175,492	15.75	100%	$175,492	$0
		Total	$3,474,940	$201,334	17.26		$198,750	$2,584
15	Fremont Avenue from Monterey Road to Alhambra Road	R1	$1,235,500	$65,627	18.83	100%	$65,627	$0

The minimum project cost and B/C ratio requirement, which was $200,000 and 3.5, respectively, for HSIP Cycle 9. The average BCR of the approved projects in the past HSIP cycles is 12.3. The three projects in Table 5.4 meet the minimum requirements for HSIP Cycle 9 application. The City can consider these projects for HSIP Cycle 10 application, if its requirements are similar to those of Cycle 9.

Table 5.4: Prioritized Safety Projects for HSIP Application

#	Location	CM No.	Benefit	Cost ($)	Benefit/Cost Ratio	HSIP Max Share	HSIP Amount	Local Amount
14	Huntington Drive from Leman Street to Maple Street	R36	$710,500	$25,842	27.49	90%	$23,258	$2,584
		R1	$2,764,440	$175,492	15.75	100%	$175,492	$0
		Total	$3,474,940	$201,334	17.26		$198,750	$2,584
10	Fair Oaks Avenue from Columbia Street to Monterey Road	R36	$9,254,840	$1,165,080	7.94	90%	$1,048,572	$116,508

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11	Fremont Avenue from Columbia Street to Monterey Road	R1	$1,545,600	$247,835	6.24	100%	$247,835	$0
		NS7	$522,540	$58,546	8.93	100%	$58,546	$0
		R28	$36,550	$1,460	25.03	100%	$1,460	$0
		Total	$2,104,690	$307,841	6.84		$307,841	$0

Depending on the minimum reimbursement amount and BCR of HSIP Cycle 10, the City can either select the eligible individual projects, or group together projects as systemic improvements for the HSIP funding application. The City may also determine which projects should be prioritized based on other considerations such as alternative available funding sources, public support, and environmental impacts and other factors.

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APPENDIX A
INTERSECTION RANKING BY COLLISION FREQUENCY AND EPDO SCORES

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South Pasadena SSARP

Intersections with high frequency of collisions

Data Source: SWITRS July 2013 - June 2018

Collisions that occurred within 250 feet of signalized intersections and within 150 feet of non-signalized intersections are included.

Intersection Name	Total Number of Collisions	Rank by Total Collisions	Number of Collisions					EPDO Score	Rank by EPDO Score	Pedestrain-Involved		Bicyclist-Involved		Signalized
			Fatal	Severe Injuries	Visible Injuries	Complaint of Pain	Property Damage Only			Total	Severe Injuries	Total	Severe Injuries	
FAIR OAKS AV & STATE ST*	24	1	0	0	3	6	15	15.1	8	0	0	1	1	YES
FREMONT AV & HUNTINGTON DR*	20	2	0	0	2	10	8	16.3	5	0	0	2	1	YES
MONTEREY RD & FREMONT AV*	19	3	0	0	5	5	9	16.8	3	1	0	3	3	YES
FAIR OAKS AV & GREVELIA ST*	18	4	0	0	1	3	14	7.8	22	0	0	1	1	YES
MISSION ST & FAIR OAKS AV	18	4	0	0	2	8	8	14.1	10	1	0	2	2	YES
FAIR OAKS AV & HOPE ST*	16	6	0	0	2	11	3	16.5	4	0	0	7	7	YES
MONTEREY RD & FAIR OAKS AV	16	6	0	0	0	10	6	12.1	15	0	0	3	2	YES
ARROYO DR & PASADENA AV*	14	8	0	3	4	2	5	26.9	2	2	2	3	3	NO
HUNTINGTON DR & FAIR OAKS AV*	14	8	0	1	3	3	7	15.7	6	0	0	1	1	YES
FREMONT AV & MISSION ST*	13	10	0	1	2	3	7	13.8	11	1	1	3	2	YES
FREMONT AV & BANK ST*	12	11	1	0	0	4	7	105.6	1	2	1	1	0	YES
EL CENTRO ST & FREMONT AV*	11	12	0	0	2	4	5	9.2	19	1	1	2	2	YES
MONTEREY RD & PASADENA AV	11	12	0	0	2	3	6	8.3	20	0	0	0	0	YES
MISSION ST & ORANGE GROVE AV*	10	14	0	0	6	3	1	15.2	7	0	0	7	7	YES
MARENGO AV & HUNTINGTON DR*	10	14	0	0	4	4	2	12.5	14	2	2	1	1	YES
HUNTINGTON DR & FLETCHER AV	10	14	0	1	3	3	3	15.0	9	0	0	0	0	YES
FREMONT AV & OAK ST	10	14	0	0	2	3	5	8.1	21	0	0	0	0	YES
FAIR OAKS AV & MOUND AV*	10	14	0	0	3	3	4	9.9	18	0	0	0	0	NO
MONTEREY RD & MERIDIAN AV	10	14	0	0	1	3	6	6.3	25	0	0	0	0	YES
FAIR OAKS AV & OAKLAWN AV	9	20	0	0	2	2	5	7.0	23	0	0	0	0	NO
MONTEREY RD & ORANGE GROVE AV	9	20	0	0	2	6	1	10.7	16	1	1	0	0	NO
HUNTINGTON DR & GARFIELD AV*	8	22	0	1	3	1	3	12.8	13	1	1	2	3	YES
MONTEREY RD & VIA DEL REY/LOMA VISTA CT	8	22	0	0	3	4	1	10.4	17	0	0	0	0	YES
FAIR OAKS AV & BANK ST	8	22	0	1	1	5	1	12.9	12	0	0	0	0	YES
FAIR OAKS AV & LYNDON ST	8	22	0	0	1	2	5	5.0	26	0	0	0	0	NO
MONTEREY RD & MARENGO AV*	8	22	0	0	1	4	3	6.9	24	0	0	0	0	NO
FREMONT AV & FREMONT LN	7	27	0	0	1	1	5	3.9	27	0	0	0	0	NO
FREMONT AV & COLUMBIA ST	7	27	0	0	0	0	7	1.3	28	0	0	0	0	YES

*** Collision dashboard available**

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APPENDIX B
TRAFFIC COUNTS FOR SELECTED INTERSECTIONS

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Survey Count **Project#: P20190013** *tact: (949)-543-5*

For **CITY OF SOUTH PASADENA**
Location **Monterey Rd & Fair Oaks Ave**
Task **Intersection Counts** AM **6/13/2019 Thursday**

Main/Minor Streets:		Fair Oaks Ave						Monterey Rd						
		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:		1	2	1	1	1	1	1	1	1	1	1	1	13
7:00 AM		34	203	10	9	110	3	8	31	24	8	38	10	488
7:15 AM		55	236	4	11	134	10	18	34	19	5	34	5	565
7:30 AM		46	236	19	6	148	11	10	37	20	5	44	11	593
7:45 AM		53	167	14	10	146	11	21	35	38	11	54	9	569
8:00 AM		42	205	20	6	165	10	10	28	26	6	48	17	583
8:15 AM		60	193	9	5	171	11	15	52	38	6	46	11	617
8:30 AM		55	223	15	7	157	12	24	58	41	9	43	11	655
8:45 AM		78	217	13	24	191	5	13	52	45	8	75	9	730
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES		423	1680	104	78	1222	73	119	327	251	58	382	83	4800

AM Peak Hr Begins at: 800 AM

PEAK HR START		800	AM											TOTAL
PEAK HR VOL		235	838	57	42	684	38	62	190	150	29	212	48	2585
PEAK HR FACTOR		0.917			0.868			0.817			0.785			0.885

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Survey Count **Project#: P20190013** *Contact: (949)-543-5767*

For **CITY OF SOUTH PASADENA**
Location **MontereyRd&FairOaksAve**
Task **Intersection Counts** PM **6/13/2019 Thursday**

Main/Minor Streets:	Fair Oaks Ave						Monterey Rd						
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	1	1	1	1	1	1	1	1	1	1	13
4:00 PM	45	161	13	22	243	17	27	65	53	13	65	12	736
4:15 PM	41	201	11	19	288	21	24	58	71	13	62	12	821
4:30 PM	66	208	21	25	268	10	17	63	48	8	74	12	820
4:45 PM	50	184	19	23	254	19	31	72	68	11	75	19	825
5:00 PM	67	195	18	10	290	13	30	73	58	16	83	8	861
5:15 PM	56	182	18	21	294	17	19	85	76	16	76	9	869
5:30 PM	63	214	21	25	256	16	31	78	93	13	85	10	905
5:45 PM	66	192	31	25	272	18	27	80	68	7	73	8	867
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES	454	1537	152	170	2165	131	206	574	535	97	593	90	6704

PM Peak Hr Begins at: 500 PM

PEAK HR START	500	PM											TOTAL
PEAK HR VOL	252	783	88	81	1112	64	107	316	295	52	317	35	3502
PEAK HR FACTOR	0.942			0.947			0.889			0.935			0.967

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Survey Count **Project#: P20190013** *Contact: (949)-543-5767*

For CITY OF SOUTH PASADENA
Location Monterey Rd & Fair Oak
Task Intersection Counts AM/PM 6/13/2019 Thursday

	PEDS AM				
	North Leg	South Leg	East Leg	West Leg	Total
7:00 AM	5	2	3	4	14
7:15 AM	1	2	1	1	5
7:30 AM	2	0	0	3	5
7:45 AM	1	1	4	1	7
8:00 AM	0	0	0	4	4
8:15 AM	0	0	0	2	2
8:30 AM	3	2	3	2	10
8:45 AM	1	4	5	5	15
Total:	13	11	16	22	62

	BICYCLE AM				
	North Leg	South Leg	East Leg	West Leg	Totoal
7:00 AM	0	0	1	0	1
7:15 AM	0	0	0	0	0
7:30 AM	1	0	0	0	1
7:45 AM	0	0	0	0	0
8:00 AM	0	0	0	0	0
8:15 AM	1	0	0	0	1
8:30 AM	0	0	1	0	1
8:45 AM	0	0	0	0	0
Total:	2	0	2	0	4

	PEDS PM				
	North Leg	South Leg	East Leg	West Leg	Totoal
4:00 PM	4	3	4	9	20
4:15 PM	9	6	7	6	28
4:30 PM	3	3	1	6	13
4:45 PM	1	0	7	2	10
5:00 PM	3	2	2	3	10
5:15 PM	2	1	6	3	12
5:30 PM	3	1	4	4	12
5:45 PM	2	1	10	7	20
Total:	27	17	41	40	125

	BICYCLE PM				
	North Leg	South Leg	East Leg	West Leg	Totoal
4:00 PM	0	0	1	1	2
4:15 PM	0	0	1	2	3
4:30 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0
5:15 PM	1	0	0	0	1
5:30 PM	0	0	2	0	2
5:45 PM	0	0	0	0	0
Total:	1	0	4	3	8

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Survey Count *P20190013* *Contact:* 9495435767

For **CITY OF SOUTH PASADENA**
Location **Mission St & Orange Grove Ave**
Task **ADT** **6/13/2019 Thursday**

Date	Hour	South Leg (Minor)			West Leg (Major)		
		NB IN	NB OUT	NB TOTAL	EB IN	EB OUT	EB TOTAL
6/13/2019	00:00-00:59	3	6	9	11	19	30
6/13/2019	01:00-01:59	3	5	8	14	10	24
6/13/2019	02:00-02:59	3	1	4	10	8	18
6/13/2019	03:00-03:59	1	3	4	5	7	12
6/13/2019	04:00-04:59	4	1	5	17	13	30
6/13/2019	05:00-05:59	19	17	36	42	25	67
6/13/2019	06:00-06:59	52	42	94	114	80	194
6/13/2019	07:00-07:59	144	98	242	242	222	464
6/13/2019	08:00-08:59	176	116	292	403	313	716
6/13/2019	09:00-09:59	125	87	212	328	285	613
6/13/2019	10:00-10:59	84	74	158	304	301	605
6/13/2019	11:00-11:59	95	86	181	356	321	677
6/13/2019	12:00-12:59	94	115	209	395	336	731
6/13/2019	13:00-13:59	95	104	199	336	341	677
6/13/2019	14:00-14:59	123	116	239	360	392	752
6/13/2019	15:00-15:59	152	167	319	392	408	800
6/13/2019	16:00-16:59	202	164	366	451	419	870
6/13/2019	17:00-17:59	191	201	392	501	439	940
6/13/2019	18:00-18:59	114	136	250	434	431	865
6/13/2019	19:00-19:59	95	109	204	353	377	730
6/13/2019	20:00-20:59	92	86	178	259	287	546
6/13/2019	21:00-21:59	54	82	136	176	191	367
6/13/2019	22:00-22:59	32	31	63	58	89	147
6/13/2019	23:00-23:59	18	16	34	44	48	92
Total		1971	1863	3834	5605	5362	10967

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Survey Count **Project#: P20190013** *Contact: (949)-543-5767*

For **CITY OF SOUTH PASADENA**

Location **Mission St & Orange Grove Ave**

Task **Intersection Counts** AM **6/13/2019** Thursday

Main/Minor Streets:	Orange Grove Ave						Mission St						
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	2	0	1	2	0	7
7:00 AM	2	2	26	3	0	1	2	41	6	8	26	0	117
7:15 AM	0	0	30	3	0	0	3	37	10	11	45	4	143
7:30 AM	3	1	31	1	0	1	2	46	18	18	66	1	188
7:45 AM	6	1	42	2	0	4	0	65	12	15	68	0	215
8:00 AM	3	1	32	2	0	2	3	85	4	17	57	1	207
8:15 AM	2	1	52	4	0	0	5	79	6	21	69	0	239
8:30 AM	7	1	32	3	0	8	4	94	13	17	77	5	261
8:45 AM	3	0	42	3	1	5	7	86	17	20	80	2	266
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES	26	7	287	21	1	21	26	533	86	127	488	13	1636

AM Peak Hr Begins at: 800 AM

PEAK HR START	800	AM											TOTAL
PEAK HR VOL	15	3	158	12	1	15	19	344	40	75	283	8	973
PEAK HR FACTOR	0.800			0.636			0.908			0.897			0.914

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Survey Count **Project#: P20190013** *Contact: (949)-543-5767*

For **CITY OF SOUTH PASADENA**
Location **Mission St & Orange Grove Ave**
Task **Intersection Counts** PM **/13/2019** **Thursday**

Main/Minor Streets:	Orange Grove Ave						Mission St						
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	1	0	0	2	0	1	2	0	7
4:00 PM	4	0	28	1	1	1	3	95	10	28	89	1	261
4:15 PM	5	1	31	1	1	3	4	93	9	30	100	1	279
4:30 PM	2	0	59	6	2	4	7	101	8	28	105	3	325
4:45 PM	3	0	69	0	1	10	6	101	14	32	93	2	331
5:00 PM	2	0	42	4	0	6	3	113	20	30	99	1	320
5:15 PM	9	0	40	3	3	7	2	97	18	37	95	1	312
5:30 PM	4	1	46	4	0	5	3	117	13	38	96	2	329
5:45 PM	4	1	44	0	0	7	1	105	9	33	105	1	310
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES	33	3	359	19	8	43	29	822	101	256	782	12	2467

PM Peak Hr Begins at: 445 PM

PEAK HR START	445	PM											TOTAL
PEAK HR VOL	18	1	197	11	4	28	14	428	65	137	383	6	1292
PEAK HR FACTOR	0.750			0.827			0.932			0.967			0.976

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Survey Count **Project#: P20190013** *Contact: (949)-543-5767*

For **CITY OF SOUTH PASADENA**
Location **Mission St & Orange Grove Ave**
Task **Intersection Counts** AM/PM 6/13/2019 Thursday

PEDS AM

	North Leg	South Leg	East Leg	West Leg	Total
7:00 AM	2	0	0	0	2
7:15 AM	9	2	0	0	11
7:30 AM	3	0	0	0	3
7:45 AM	4	4	0	0	8
8:00 AM	7	3	0	0	10
8:15 AM	7	1	0	0	8
8:30 AM	12	2	0	0	14
8:45 AM	0	1	0	0	1
Total:	44	13	0	0	57

BICYCLE AM

	North Leg	South Leg	East Leg	West Leg	Totoal
7:00 AM	2	1	0	0	3
7:15 AM	2	0	0	0	2
7:30 AM	4	0	0	0	4
7:45 AM	0	1	0	0	1
8:00 AM	0	0	0	0	0
8:15 AM	1	1	0	0	2
8:30 AM	2	0	0	0	2
8:45 AM	1	0	0	0	1
Total:	12	3	0	0	15

PEDS PM

	North Leg	South Leg	East Leg	West Leg	Totoal
4:00 PM	5	5	0	0	10
4:15 PM	6	2	0	0	8
4:30 PM	5	0	0	0	5
4:45 PM	5	3	0	0	8
5:00 PM	6	2	0	0	8
5:15 PM	8	2	0	0	10
5:30 PM	11	1	0	0	12
5:45 PM	19	3	0	0	22
Total:	65	18	0	0	83

BICYCLE PM

	North Leg	South Leg	East Leg	West Leg	Totoal
4:00 PM	0	2	0	0	2
4:15 PM	4	0	0	0	4
4:30 PM	0	0	0	0	0
4:45 PM	1	0	0	0	1
5:00 PM	2	1	0	0	3
5:15 PM	0	0	0	0	0
5:30 PM	3	1	0	0	4
5:45 PM	1	0	0	0	1
Total:	11	4	0	0	15

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APPENDIX C
INFOGRAPHIC SUMMARY SHEETS FOR SELECTED INTERSECTIONS

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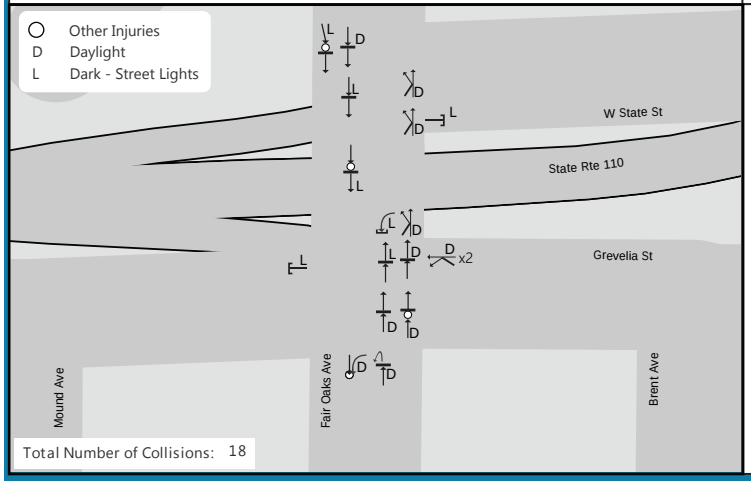
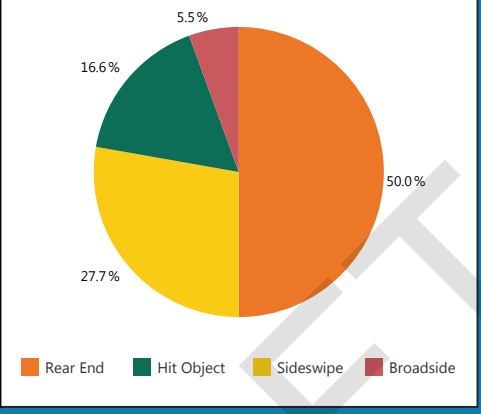
High Collision Intersection: Fair Oaks Ave & Grevelia St and Fair Oaks Ave & State St

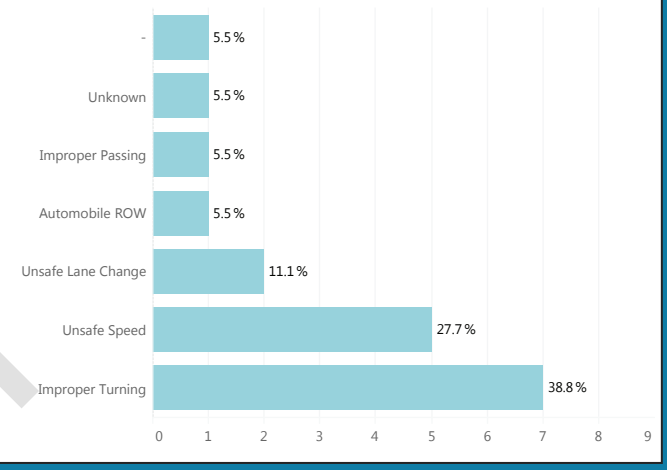
Collision Diagram



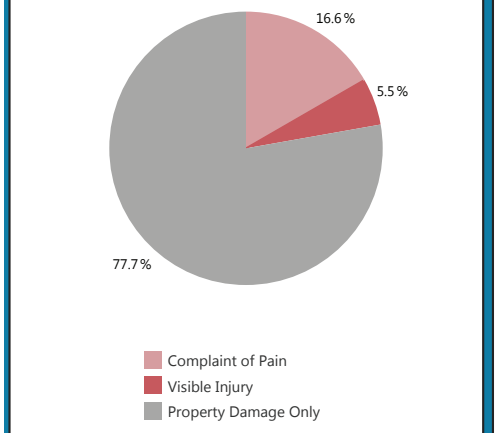
Type of Collisions



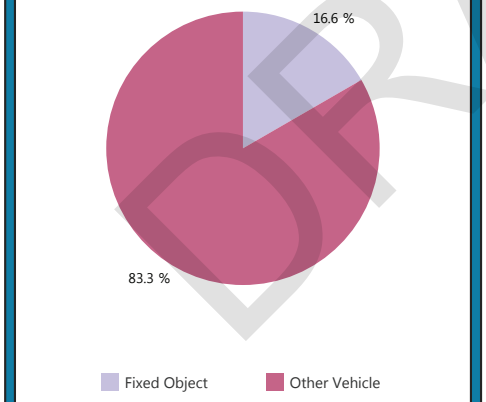
Primary Collision Factors



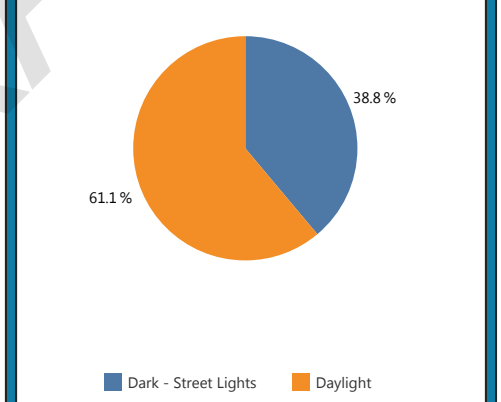
Collision Severity



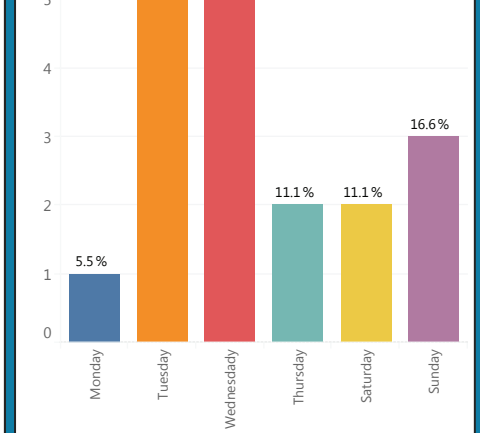
Motor Vehicle Involved With



Lighting



Day of the Week



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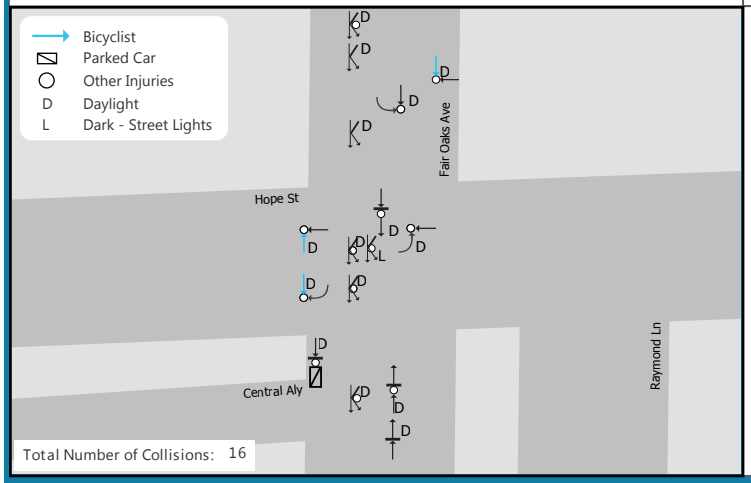
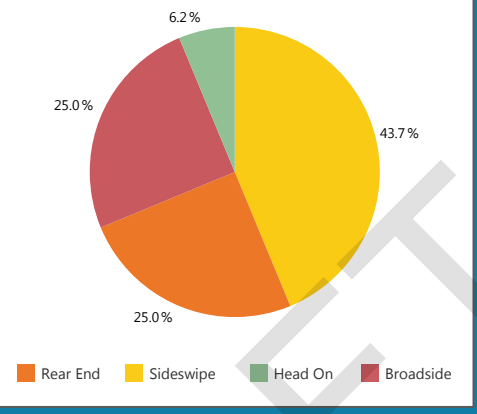
High Collision Intersection: Fair Oaks Avenue and Hope Street

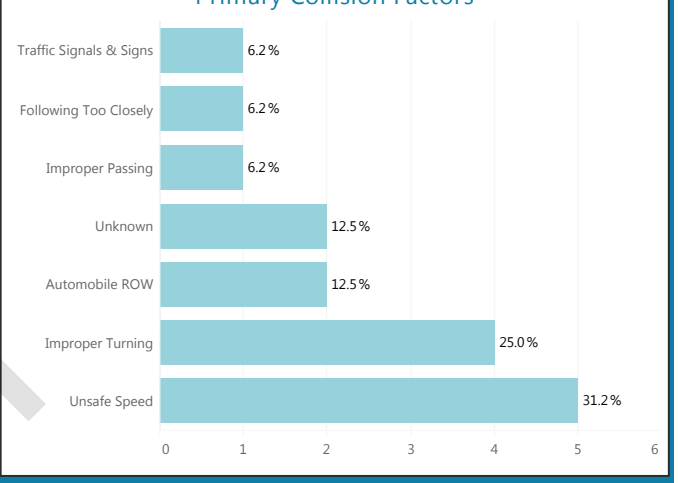
Collision Diagram



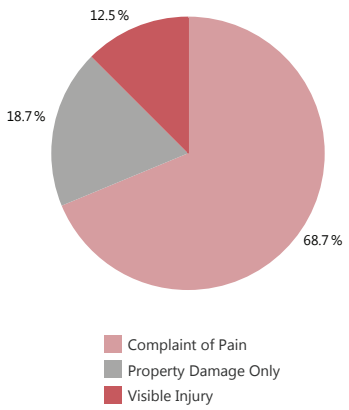
Type of Collisions



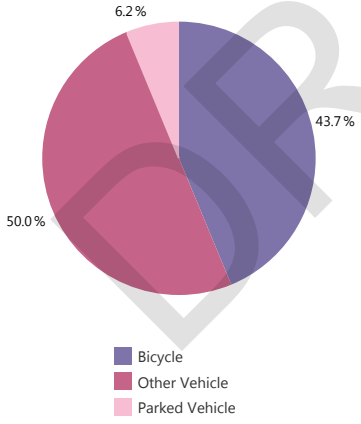
Primary Collision Factors



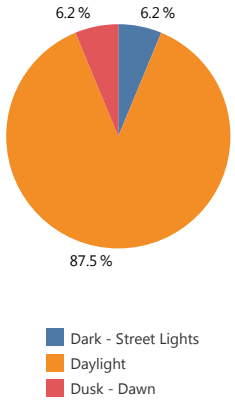
Collision Severity



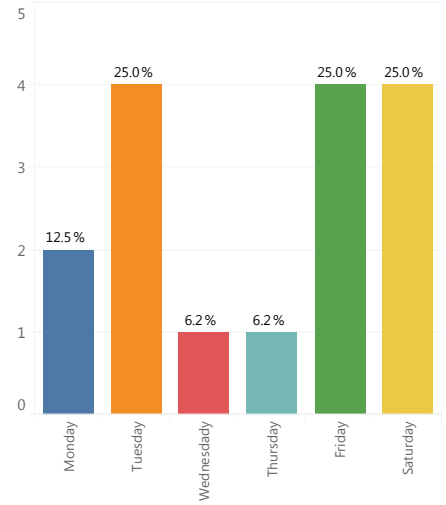
Motor Vehicle Involved With



Lighting



Day of the Week



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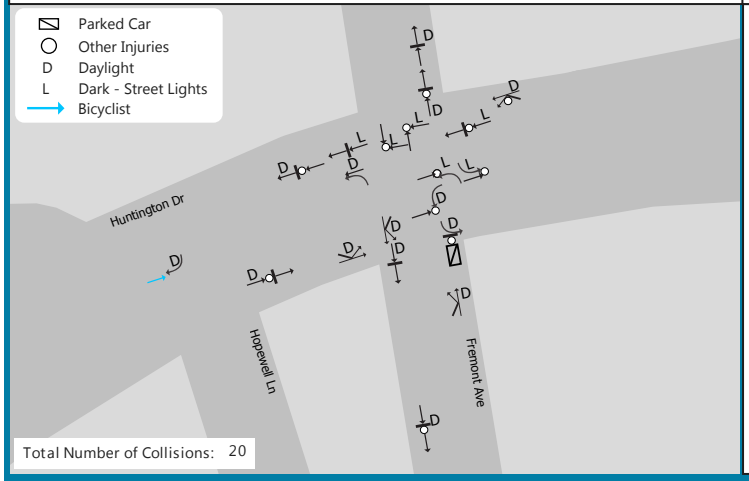
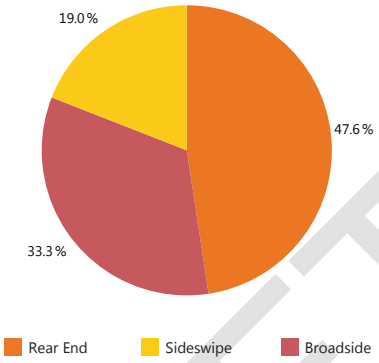
High Collision Intersection: Fremont Avenue and Huntington Drive

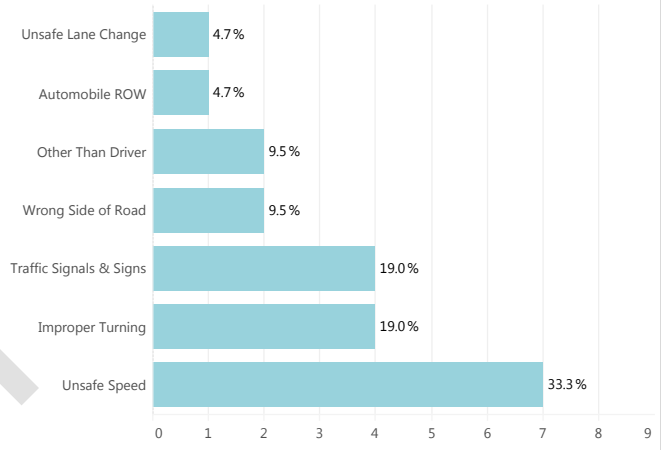
Collision Diagram



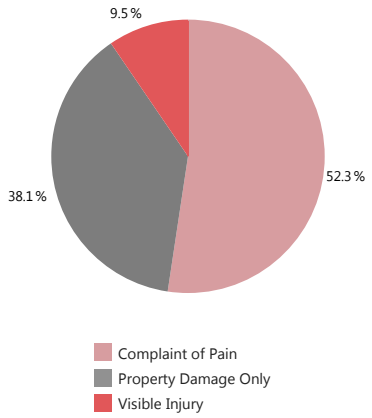
Type of Collisions



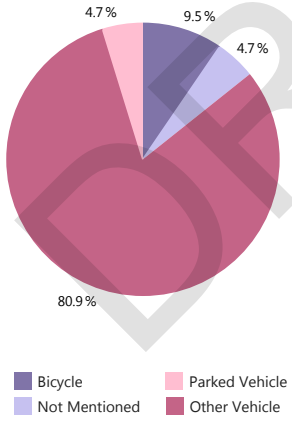
Primary Collision Factors



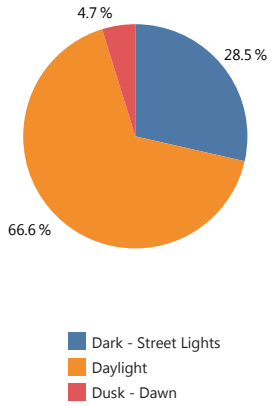
Collision Severity



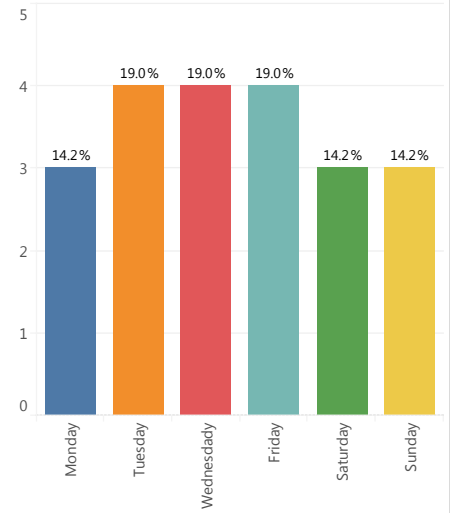
Motor Vehicle Involved With



Lighting



Day of the Week



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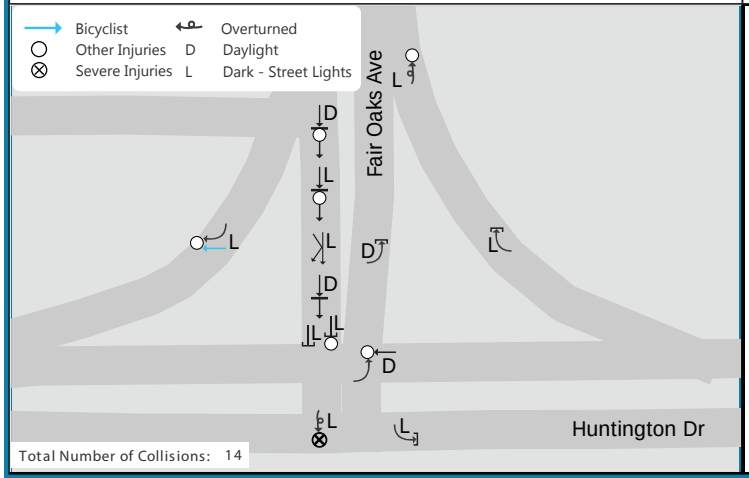
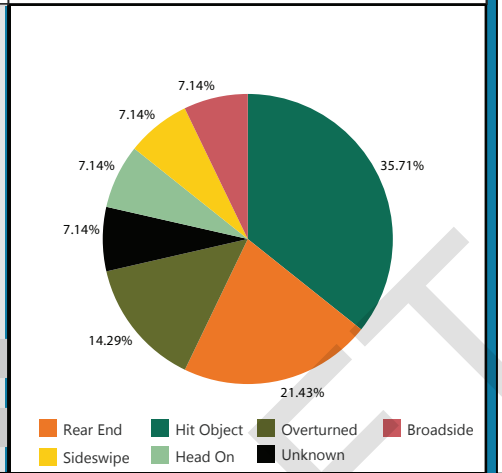
High Collision Intersection: Fair Oaks Avenue & Huntington Drive

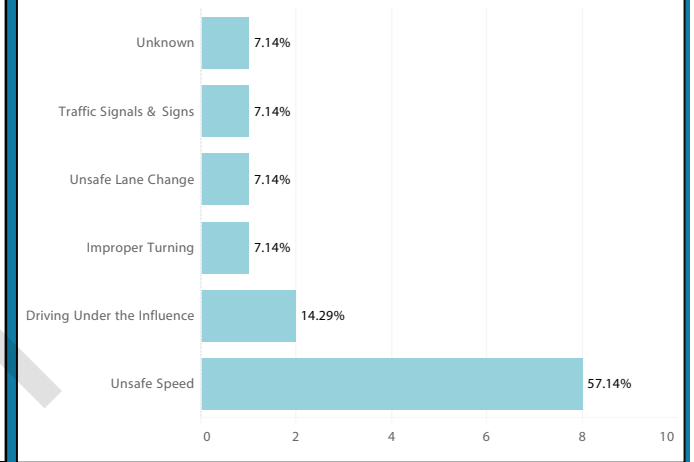
Collision Diagram



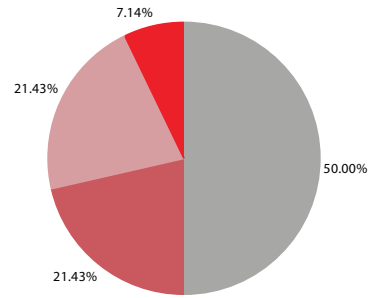
Type of Collisions



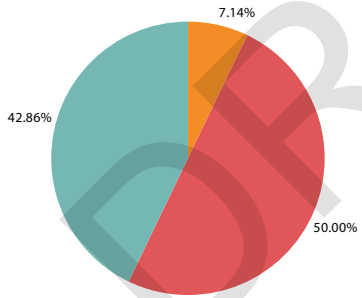
Primary Collision Factors



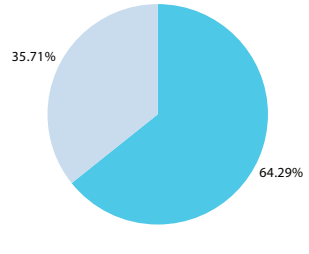
Collision Severity



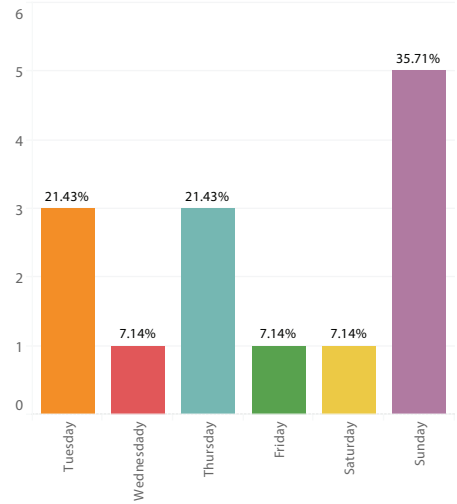
Motor Vehicle Involved With



Lighting



Day of the Week



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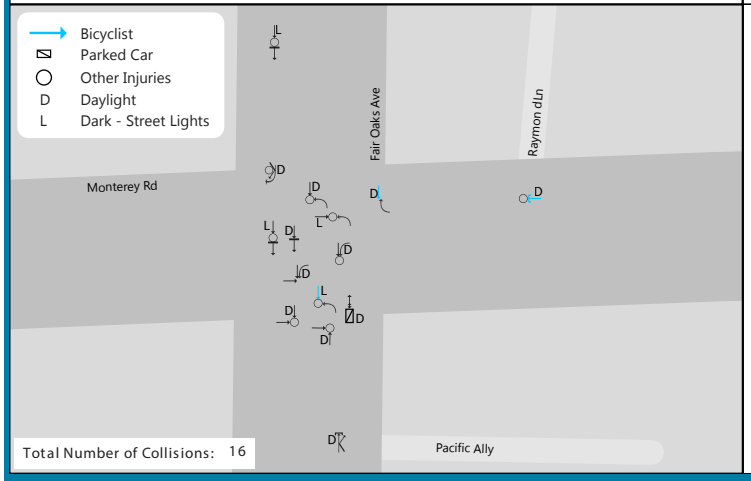
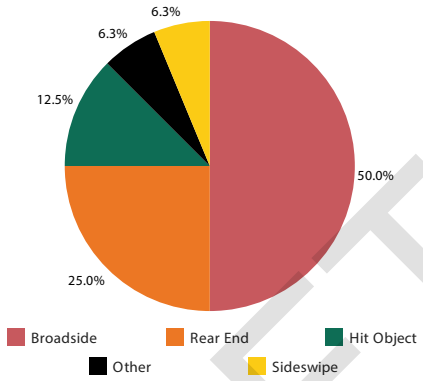
High Collision Intersection: Fair Oaks Avenue and Monterey Road

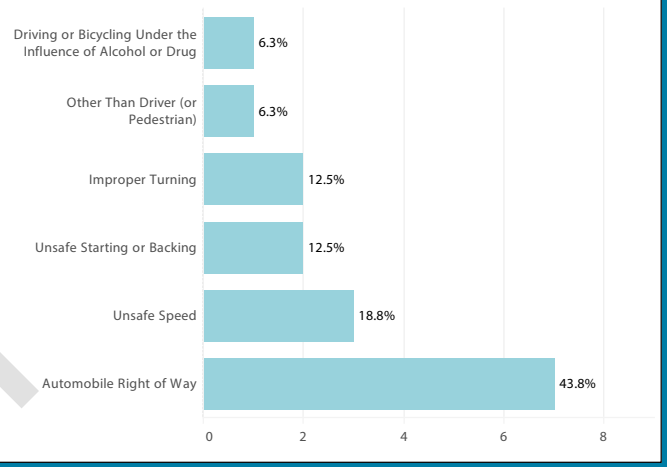
Collision Diagram



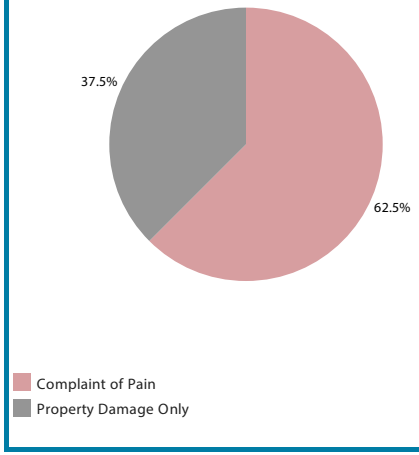
Type of Collisions



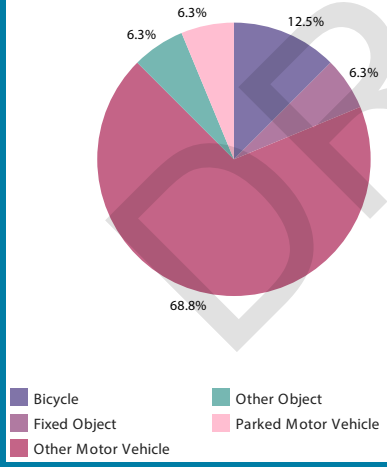
Primary Collision Factors



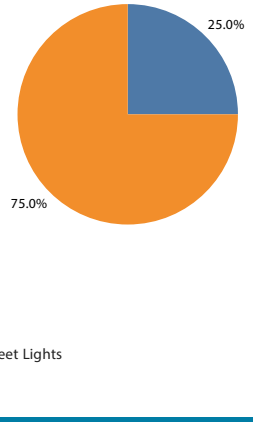
Collision Severity



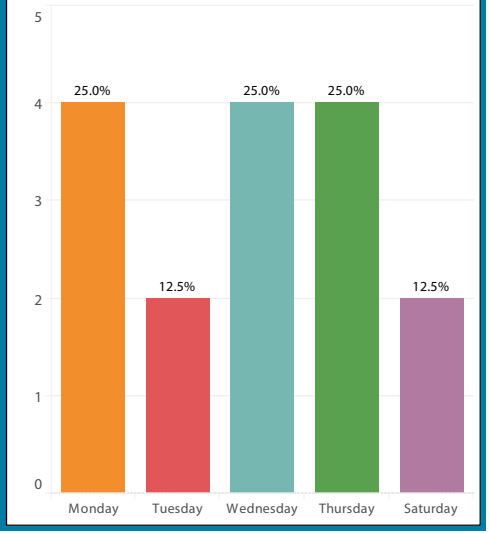
Motor Vehicle Involved With



Lighting



Day of the Week



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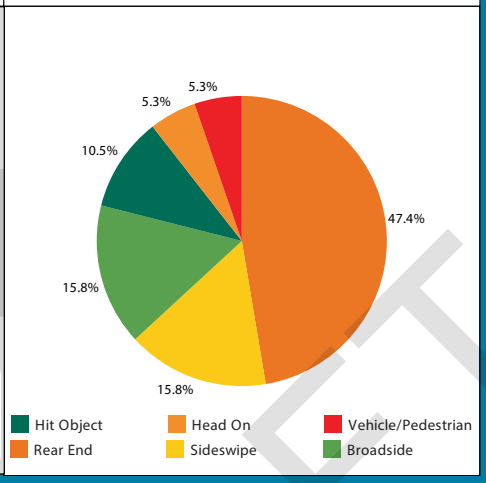
High Collision Intersection: Monterey Road and Fremont Avenue

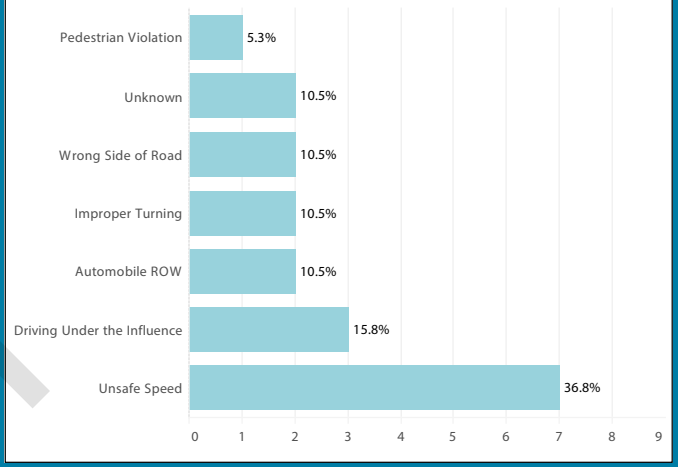
Collision Diagram



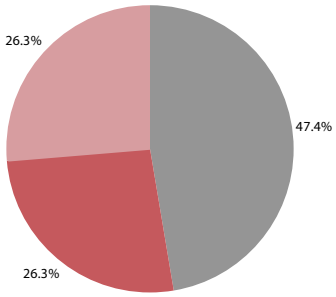
Type of Collisions



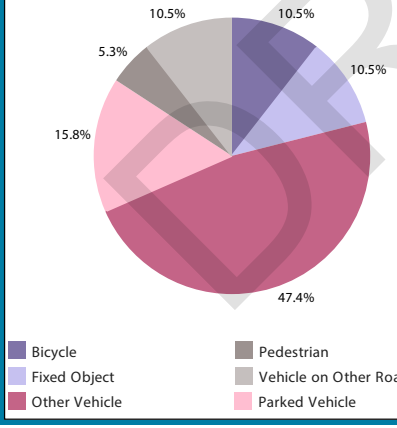
Primary Collision Factors



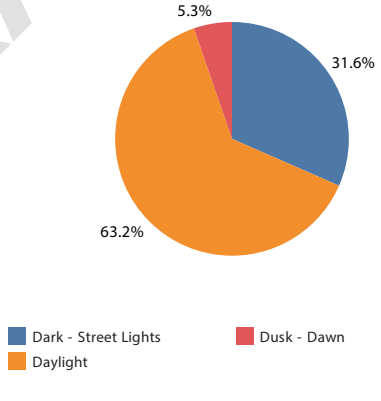
Collision Severity



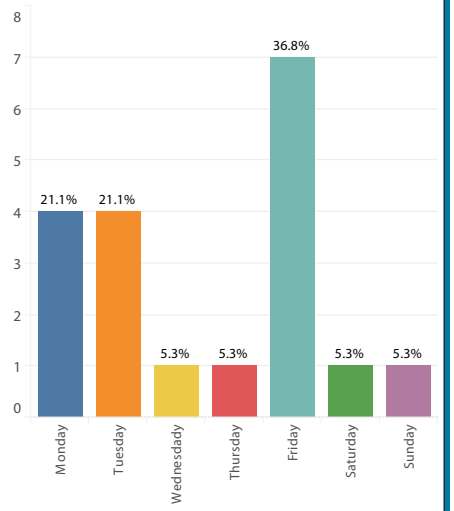
Motor Vehicle Involved With



Time of Day



Day of the Week



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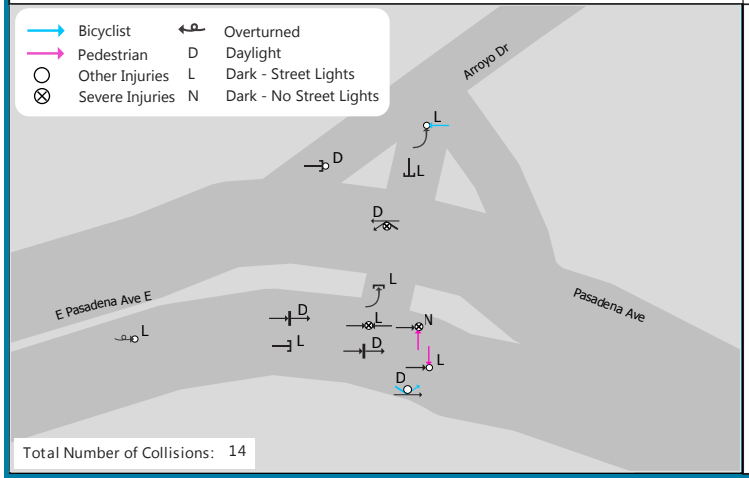
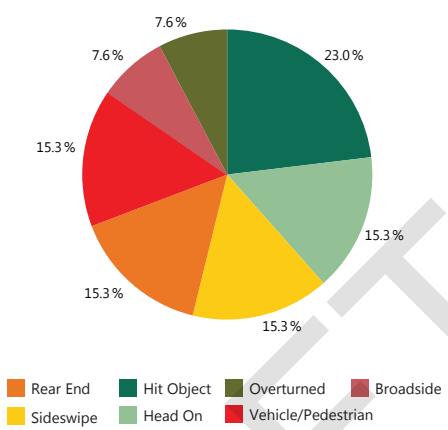
High Collision Intersection: Arroyo Drive and Pasadena Avenue

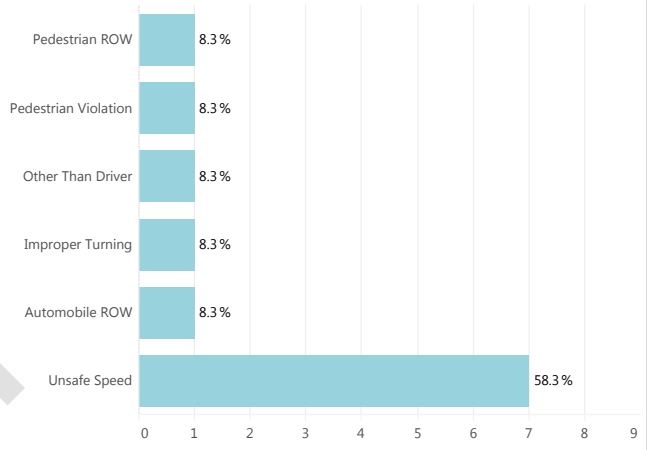
Collision Diagram



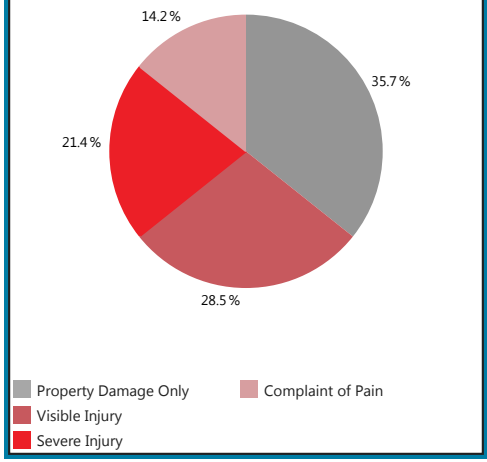
Type of Collisions



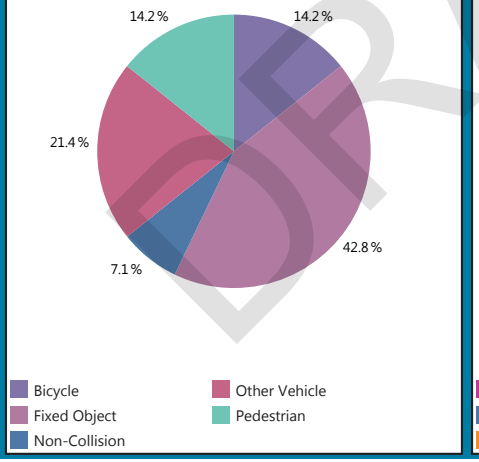
Primary Collision Factors



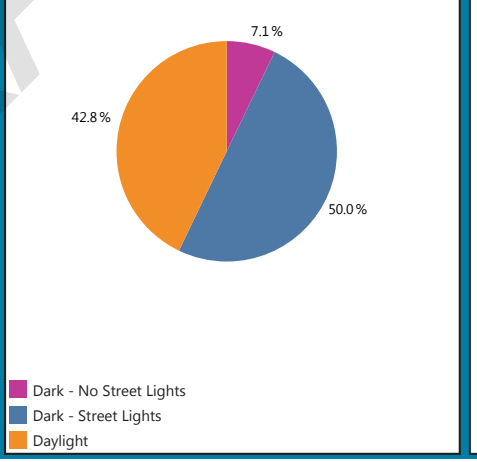
Collision Severity



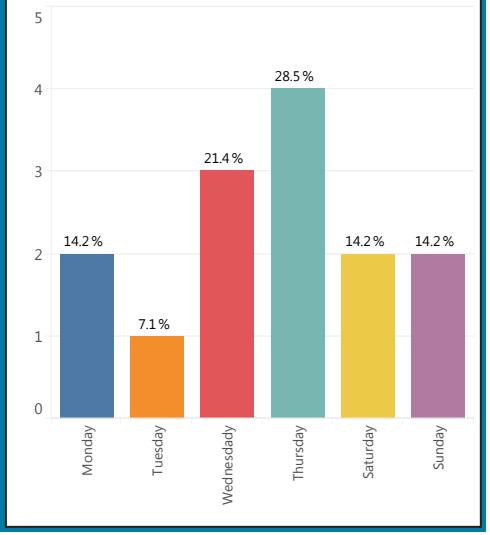
Motor Vehicle Involved With



Lighting



Day of the Week



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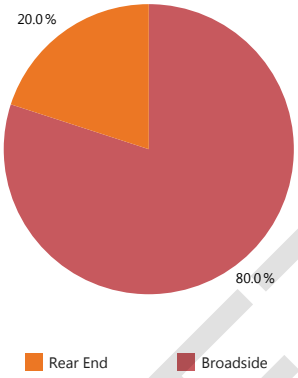
High Collision Intersection: Mission Street and Orange Grove Avenue

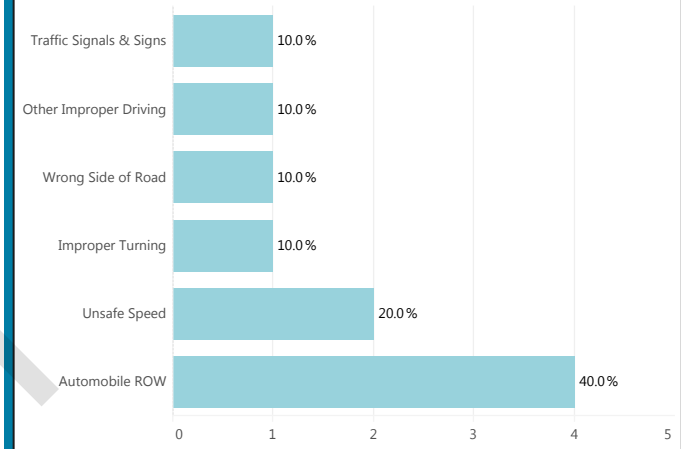
Collision Diagram



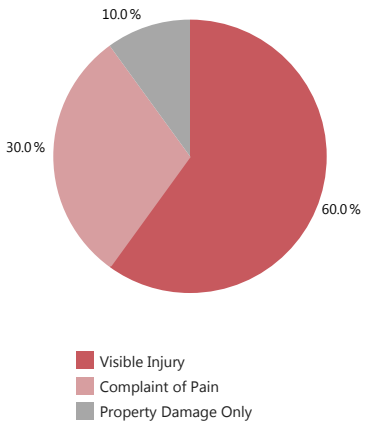
Type of Collisions



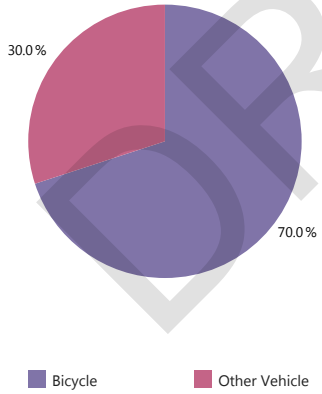
Primary Collision Factors



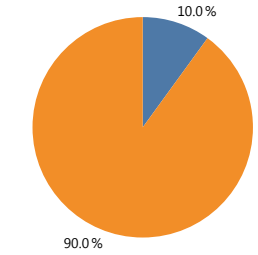
Collision Severity



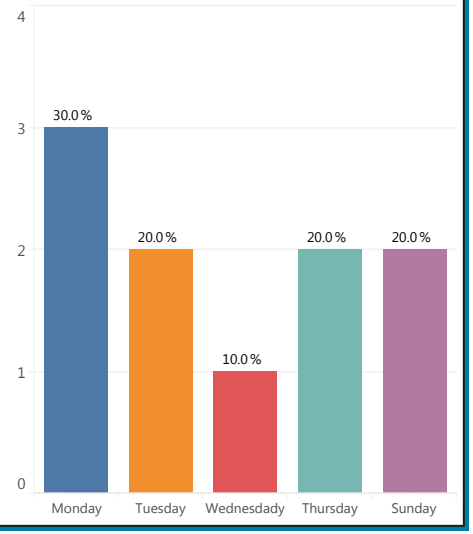
Motor Vehicle Involved With



Lighting



Day of the Week



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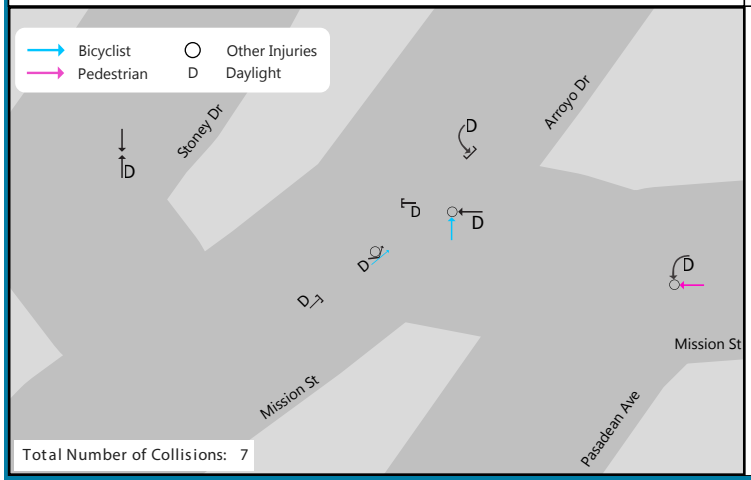
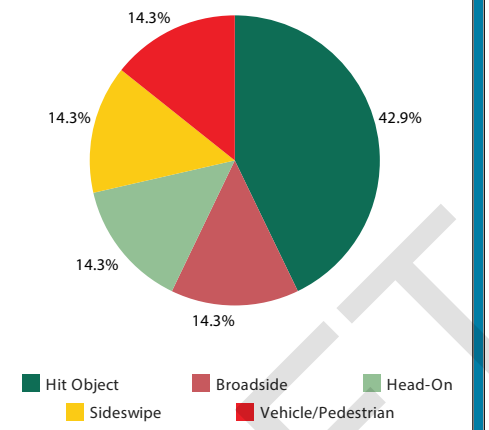
High Collision Intersection: Stoney Drive & Arooyo Drive and Mission Street & Pasadena Avenue

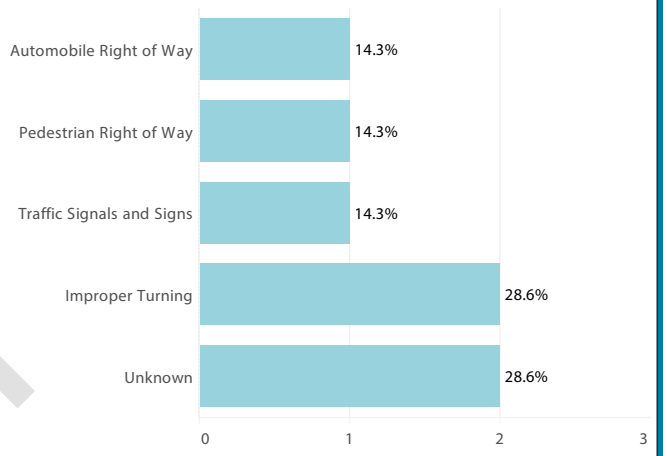
Collision Diagram



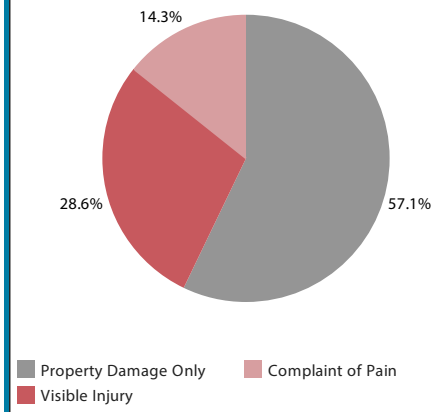
Type of Collisions



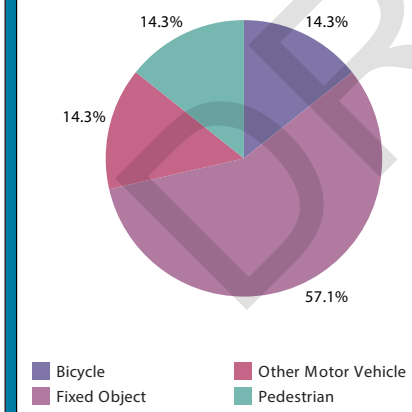
Primary Collision Factors



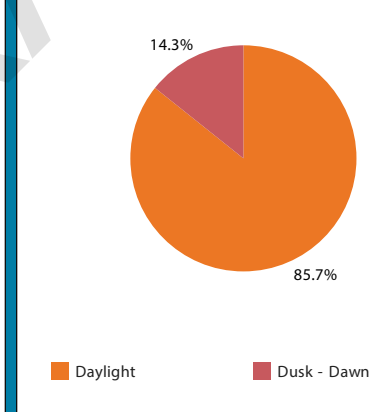
Collision Severity



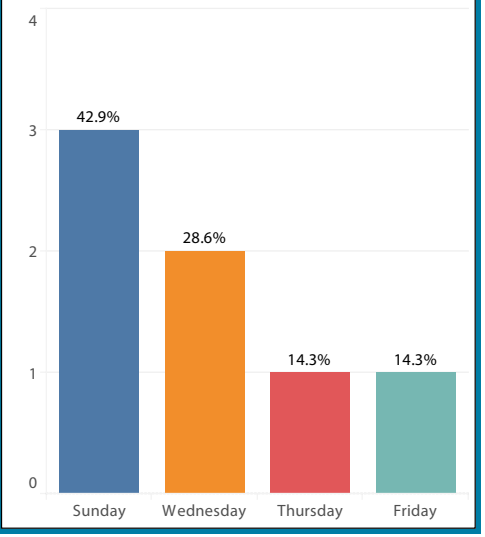
Motor Vehicle Involved With



Lighting



Day of the Week



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APPENDIX D
SAFETY IMPROVEMENTS CONCEPT DESIGN AT FAIR OAKS AVENUE & HOPE STREET

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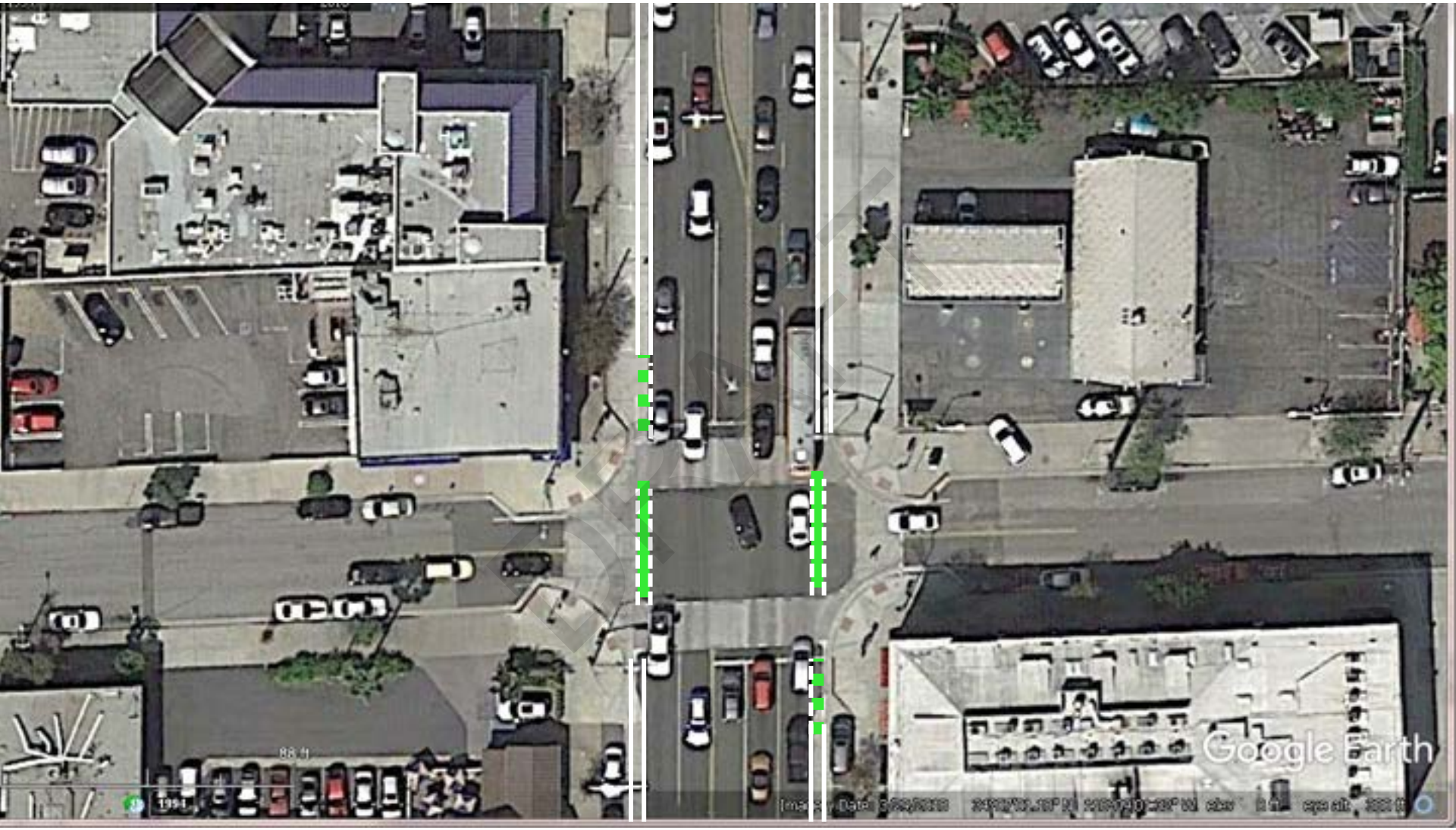
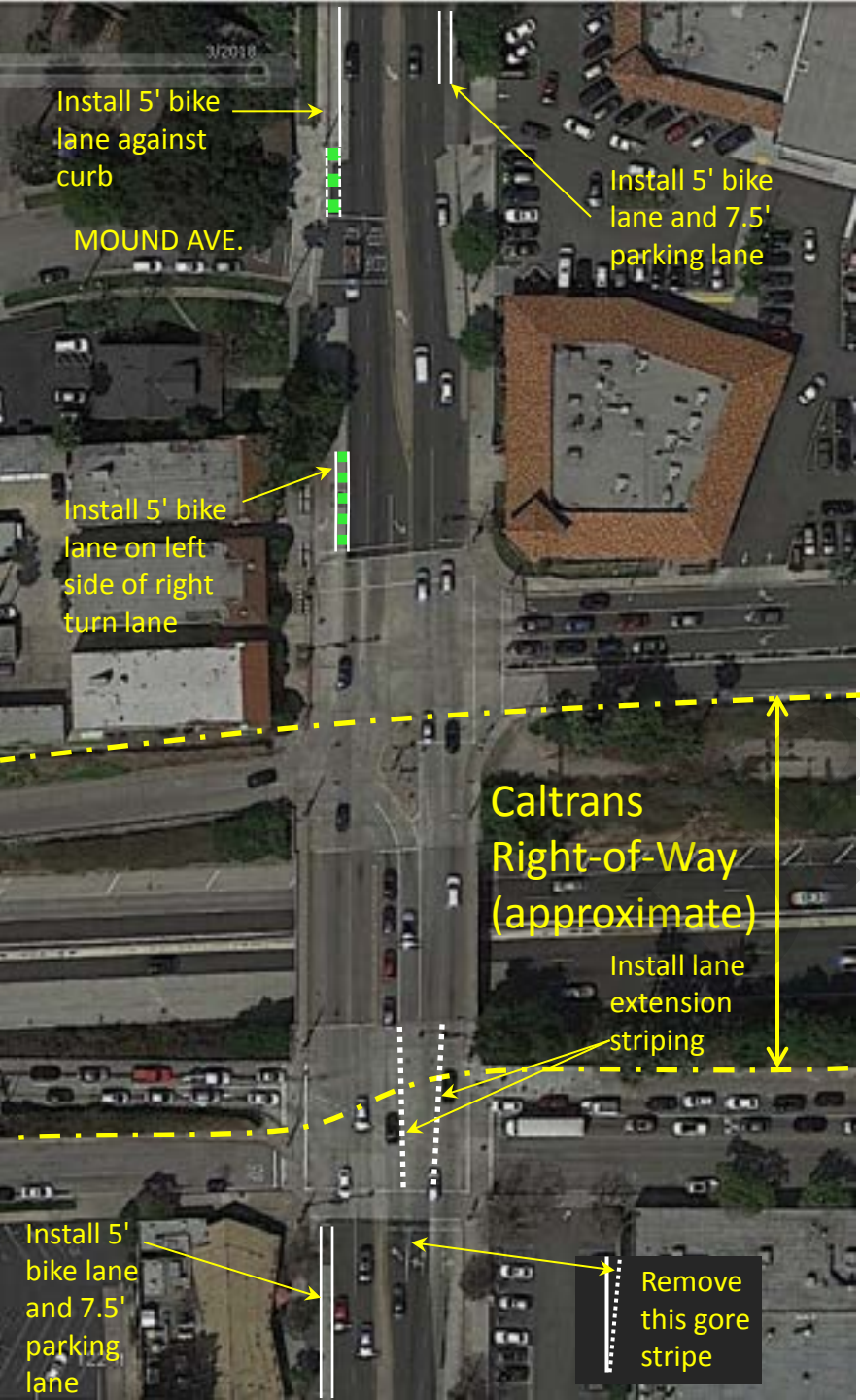
Fair Oaks Avenue and Hope Street



Recommend the striping shown above, similar to Marengo Avenue between Cordova St. and Glenarm St. in neighboring City of Pasadena: 5' bike lanes with solid lines between intersections, dashed lines with dashed green on intersection approaches, and dashed white with SOLID green across intersections.

Fair Oaks Avenue between Columbia St. and Glenarm St.





Fair Oaks Avenue at SR-110 Freeway Interchange

The southbound bike lane approaching the interchange would be installed on the left side of the right turn lane leading onto SR-110 southbound on-ramp. Across Mound Avenue, in accordance with California MUTCD Section 9C.04 Paragraph 09a, *"A dashed line across the right-turn-only lane should not be used on extremely long lanes, or where there are double right-turn-only lanes. For these types of intersections, all striping should be dropped to permit judgment by the bicyclists to prevail."*

The northbound bike lane would drop south of the interchange where lateral roadway width is not sufficient to accommodate it, and resume north of the interchange.

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APPENDIX E

SAFETY IMPROVEMENTS CONCEPT DESIGN AT MISSION STREET & PASADENA AVENUE, AND ARROYO DRIVE & STONEY DRIVE & MISSION AVENUE

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Mission Street & Pasadena Avenue (Alternative 1)

City of South Pasadena Systemic Safety Analysis Report Program - Safety Project Concepts



Mission Street & Pasadena Avenue (Alternative 2)

City of South Pasadena Systemic Safety Analysis Report Program - Safety Project Concepts

APPENDIX F

ROADWAY SEGMENT RANKING BY COLLISION FREQUENCY, CRASH RATE, AND EPDO SCORES

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South Pasadena SSARP
Roadway Segment with high frequency of collisions
Excluding Intersection Collisions
Data Source: SWITRS, July 2013-June 2018

Segment Name	From	To	Number of Non-intersection Collisions	Rank by Number of Collisions	Fatal Collisions	Severe Injury Collisions	Visible Injury Collisions	Complaint of Pain Collisions	Property Damage Only Collisions	EPDO Score	Rank by EPDO Score	Length (mile)	Traffic Count (24 hours)	Crash Rate	Rank by Crash Rate	Number of Pedestrain-involved Collisions	Number of Pedestrains Injured	Number of Bicyclist-involved Collisions	Number of Bicyclists Killed	Number of Bicyclists Injured
FAIR OAKS AVE 1	Northern City Limit	MONTEREY RD	70	**1**	1	0	10	30	29	157.6	**1**	0.81	31567	149.9	**16**	3	2	9	1	9
FREMONT AVE 2	MONTEREY RD	Southern City Limit	64	**2**	0	0	8	29	27	52.3	**2**	0.93	23154	162.4	**14**	2	0	3	0	3
FREMONT AVE 1	Northern City Limit	MONTEREY RD	52	**3**	0	0	5	20	27	36.5	**4**	0.83	14270	239.7	**9**	2	1	4	0	3
MONTEREY RD 2	PASADENA AVE	FAIR OAKS AVE	46	**4**	0	0	11	12	23	38.7	**3**	1.12	17370	129.8	**19**	3	2	2	0	2
N HUNTINGTON DR 2	LEMAN ST	MAPLE ST	39	**5**	0	1	7	12	19	35.5	**5**	0.67	30829	102.8	**25**	1	1	6	0	5
FAIR OAKS AVE 2	MONTEREY RD	HUNTINGTON DR	34	**6**	0	1	4	9	20	26.6	**7**	0.55	30393	111.5	**23**	0	0	3	0	3
MISSION ST 2	FREMONT AVE	Eastern City Limit	30	**7**	0	0	0	12	18	16.4	**14**	0.72	9256	246.4	**8**	3	2	1	0	0
ORANGE GROVE AVE 1	Northern City Limit	MISSION ST	28	**8**	0	3	2	4	19	27.7	**6**	0.62	21339	115.8	**21**	1	1	1	0	1
MISSION ST 1	PASADENA AVE	FREMONT AVE	24	**9**	0	1	6	6	11	25.6	**8**	0.80	8435	195.7	**12**	1	1	9	0	8
MARENGO AVE 1	MISSION ST	Southern City Limit	23	**10**	0	0	4	10	9	20.4	**11**	1.16	2625	412.7	**3**	1	1	2	0	2
EL CENTRO ST 1	PASADENA AVE	BRENT AVE	18	**11**	0	1	2	5	10	16.5	**13**	1.08	4266	215.1	**11**	2	2	3	0	3
PASADENA AVE 1	YORK BLVD	MISSION ST	17	**12**	0	2	5	3	7	24.9	**9**	0.66	18214	77.0	**30**	3	3	3	0	3
MERIDIAN AVE 2	MONTEREY RD	Southern City Limit	16	**13**	0	0	0	6	10	8.4	**21**	0.96	6935	131.8	**18**	1	1	0	0	0
GARFIELD AVE 1	Northern City Limit	ATLANTIC BLVD	15	**14**	0	2	1	7	5	21.2	**10**	1.44	9930	57.6	**33**	3	3	1	0	1
GREVELIA ST 1	ORANGE GROVE AVE	STRATFORD AVE	15	**14**	0	0	1	5	9	9.1	**19**	0.85	9344	103.3	**24**	0	0	0	0	0
INDIANA AVE 1	MONTEREY RD	VIA DEL REY	15	**14**	0	0	6	1	8	14.2	**16**	1.16	N/A	N/A	N/A	2	2	1	0	1
MERIDIAN AVE 1	OLIVER ST	MONTEREY RD	15	**14**	0	0	1	4	10	8.1	**22**	0.76	3481	311.0	**6**	0	0	0	0	0
MONTEREY RD 3	FAIR OAKS AVE	Eastern City Limit	14	**18**	0	1	2	8	3	18.5	**12**	0.69	7732	143.5	**17**	1	1	2	0	2
E HUNTINGTON DR 1	GARFIELD AVE	WAYNE AVE	10	**19**	0	1	2	3	4	13.2	**17**	0.30	28336	63.9	**31**	1	1	1	0	1
HUNTINGTON DR 1	WAYNE AVE	LEMAN ST	10	**19**	0	0	2	4	4	9.0	**20**	0.37	29352	50.7	**34**	0	0	1	0	1
OAK ST 1	MERIDIAN AVE	MARENGO AVE	10	**19**	0	0	3	1	6	8.0	**23**	0.65	2859	296.3	**7**	0	0	1	0	1
MONTEREY RD 1	Western City Limit	PASADENA AVE	9	**22**	0	1	3	3	2	14.8	**15**	0.50	8739	113.0	**22**	0	0	1	0	1
OAK ST 2	MARENGO AVE	GARFIELD AVE	9	**22**	0	0	1	2	6	5.2	**25**	0.59	3514	239.3	**10**	0	0	1	0	1
ORANGE GROVE AVE 2	MISSION ST	ORANGE GROVE AV	8	**24**	0	0	3	3	2	9.5	**18**	0.44	1774	563.6	**2**	1	1	3	0	3
FLETCHER AVE 1	OAK ST	Southern City Limit	6	**25**	0	0	1	2	3	4.7	**26**	0.63	N/A	N/A	N/A	0	0	1	0	1
OLIVER ST 1	ORANGE GROVE AVE	BEACON AVE	5	**26**	0	0	0	1	4	1.8	**33**	0.10	2174	1236.6	**1**	0	0	0	0	0
VIA DEL REY 1	MONTEREY RD	CAM VERDE	5	**26**	0	0	1	2	2	4.5	**27**	1.22	3805	58.8	**32**	0	0	0	0	0
HILL DR 1	Western City Limit	CAM DEL SOL	4	**28**	0	0	2	0	2	4.3	**28**	0.41	1433	368.6	**4**	0	0	0	0	0
ARROYO DR 1	Northern City Limit	PASADENA AVE	3	**29**	0	0	0	0	3	0.5	**36**	0.95	2055	84.4	**28**	0	0	0	0	0
CAM LINDO 1	FLORES DE ORO	CAMINO LINDO	3	**29**	0	0	1	0	2	2.3	**30**	0.51	1936	166.1	**13**	0	0	0	0	0
COLLIS AVE 1	Western City Limit	HILL DR	3	**29**	0	0	1	0	2	2.3	**30**	0.28	4973	116.2	**20**	0	0	0	0	0
FLORES DE ORO 1	Western End	Eastern End	3	**29**	0	0	1	1	1	3.2	**29**	0.24	2057	333.8	**5**	0	0	1	0	1
GRAND AVE 1	Northern City Limit	MISSION ST	3	**29**	0	0	1	0	2	2.3	**30**	0.57	3135	91.4	**27**	0	0	0	0	0
PINE ST 1	MERIDIAN AVE	HUNTINGTON DR	3	**29**	0	0	0	0	3	0.5	**36**	0.24	N/A	N/A	N/A	0	0	1	0	0
ALPHA ST 1	Southern City Limit	CAMINO LINDO	2	**35**	0	0	0	1	1	1.3	**34**	0.47	2860	82.1	**29**	1	1	0	0	0
N HUNTINGTON DR 3	MAPLE ST	Southern City Limit	2	**35**	0	0	0	1	1	1.3	**34**	0.17	19944	33.2	**35**	0	0	0	0	0
BRUNSWICK AVE 1	MONTEREY RD	ST ALBANS AVE	1	**37**	0	1	0	0	0	5.3	**24**	0.20	N/A	N/A	N/A	0	0	1	0	1
CAM DEL SOL 1	ST ALBANS AVE	VIA DEL REY	1	**37**	0	0	0	0	1	0.2	**38**	0.39	1468	95.0	**26**	0	0	0	0	0
SAN PASCUAL AVE 1	Northern City Limit	Western City Limit	1	**37**	0	0	0	0	1	0.2	**38**	0.19	1800	161.4	**15**	0	0	0	0	0

A Non- intersection collision is defined as a collision occurred more than 100 feet away from an intersection, or is labeled as "Not" an intersection collision in SWITRS
Where:
R = Crash rate for the road segment expressed as crashes per 100 million vehicle-miles of travel per day
C = Total number of crashes in the study period
V = Traffic volumes using Average Annual Daily Traffic (AADT) volumes
N = Number of years of data
L = Length of the roadway segment in miles
Source: Local Roadway Safety Manual, Caltrans (June 2018)
24 hour traffic counts were conducted in 2014 and provided by the City

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South Pasadena SSARP
Roadway Segment with high frequency of collisions
Including Intersection Collisions
Data Source: SWITRS, July 2013-June 2018

Segment Name	Road Type	From	To	Number of Collisions	Rank by Number of Collisions	Fatal Collisions	Severe Injury Collisions	Visible Injury Collisions	Complaint of Pain Collisions	Property Damage Only Collisions	EPDO Score	Rank by EPDO Score	Length (mile)	Traffic Count (24 hours)	Crash Rate	Rank by Crash Rate	Number of Pedestrain Collisions	Number of Pedestrains Injured	Number of Bicyclist Collisions	Number of Bicyclists Injured
FAIR OAKS AVE 1	Major	Northern City Limit	MONTEREY RD	105	**1**	1	0	14	47	43	186.60	**1**	0.81	31567	224.85	**18**	3	2	16	15
FREMONT AVE 2	Minor	MONTEREY RD	Southern City Limit	89	**2**	0	0	13	41	35	76.62	**2**	0.93	23154	225.78	**17**	4	2	6	5
MONTEREY RD 2	Minor	PASADENA AVE	FAIR OAKS AVE	85	**3**	0	0	18	32	35	76.47	**3**	1.12	17370	239.84	**16**	3	2	6	5
FREMONT AVE 1	Minor	Northern City Limit	MONTEREY RD	78	**4**	0	0	12	27	39	60.01	**5**	0.83	14270	359.61	**10**	4	2	8	7
N HUNTINGTON DR 2	Major	LEMAN ST	MAPLE ST	60	**5**	0	2	13	20	25	62.41	**4**	0.67	30829	158.22	**25**	3	3	6	5
FAIR OAKS AVE 2	Major	MONTEREY RD	HUNTINGTON DR	59	**6**	0	2	8	19	30	52.47	**6**	0.55	30393	193.40	**21**	0	0	4	3
MISSION ST 2	Minor	FREMONT AVE	Eastern City Limit	50	**7**	0	0	6	19	25	37.03	**9**	0.72	9256	410.60	**8**	4	3	3	2
MISSION ST 1	Minor	PASADENA AVE	FREMONT AVE	42	**8**	0	1	13	11	17	45.76	**7**	0.80	8435	342.45	**11**	3	3	14	13
MARENGO AVE 1	Collector	MISSION ST	Southern City Limit	34	**9**	0	0	6	14	14	29.57	**13**	1.16	2625	610.12	**3**	2	2	2	2
ORANGE GROVE AVE 1	Minor	Northern City Limit	MISSION ST	33	**10**	0	3	5	4	21	33.87	**11**	0.62	21339	136.53	**26**	1	1	2	2
GARFIELD AVE 1	Minor	Northern City Limit	ATLANTIC BLVD	31	**11**	0	2	6	15	8	40.24	**8**	1.44	9930	119.13	**28**	4	4	3	4
MONTEREY RD 3	Minor	FAIR OAKS AVE	Eastern City Limit	30	**12**	0	1	3	17	9	31.45	**12**	0.69	7732	307.52	**14**	1	1	4	3
EL CENTRO ST 1	Collector	PASADENA AVE	BRENT AVE	27	**13**	0	1	5	9	12	27.10	**14**	1.08	4266	322.59	**13**	5	5	4	4
GREVELIA ST 1	Minor	ORANGE GROVE AVE	STRATFORD AVE	24	**14**	0	0	1	7	16	12.50	**26**	0.85	9344	165.30	**22**	1	1	0	0
PASADENA AVE 1	Minor	YORK BLVD	MISSION ST	24	**14**	0	3	6	5	10	34.94	**10**	0.66	18214	108.68	**31**	4	4	4	4
INDIANA AVE 1	Collector	MONTEREY RD	VIA DEL REY	23	**16**	0	0	7	5	11	21.09	**16**	1.16	N/A	N/A	N/A	2	2	2	2
MERIDIAN AVE 1	Collector	OLIVER ST	MONTEREY RD	22	**17**	0	1	2	6	13	18.14	**20**	0.76	3481	456.13	**5**	1	1	0	0
MERIDIAN AVE 2	Collector	MONTEREY RD	Southern City Limit	20	**18**	0	0	2	7	11	13.56	**24**	0.96	6935	164.71	**23**	1	1	0	0
OAK ST 2	Collector	MARENGO AVE	GARFIELD AVE	17	**20**	0	0	4	7	6	16.55	**22**	0.59	3514	452.06	**6**	1	1	1	1
ORANGE GROVE AVE 2	Collector	MISSION ST	ORANGE GROVE AV	17	**20**	0	0	5	10	2	21.08	**17**	0.44	1774	1197.72	**2**	1	1	5	5
MONTEREY RD 1	Minor	Western City Limit	PASADENA AVE	16	**22**	0	1	3	5	7	17.91	**21**	0.50	8739	200.92	**20**	0	0	1	1
E HUNTINGTON DR 1	Major	GARFIELD AVE	WAYNE AVE	15	**23**	0	1	4	5	5	19.50	**18**	0.30	28336	95.82	**32**	1	1	2	3
HUNTINGTON DR 1	Major	WAYNE AVE	LEMAN ST	15	**23**	0	1	4	5	5	19.50	**18**	0.37	29352	76.05	**34**	0	0	1	1
OAK ST 1	Collector	MERIDIAN AVE	MARENGO AVE	15	**23**	0	0	4	3	8	12.52	**25**	0.65	2859	444.45	**7**	0	0	1	1
FLETCHER AVE 1	Collector	OAK ST	Southern City Limit	10	**26**	0	1	3	3	3	15.00	**23**	0.63	N/A	N/A	N/A	0	0	1	1
VIA DEL REY 1	Collector	MONTEREY RD	CAM VERDE	10	**26**	0	0	3	5	2	11.69	**27**	1.22	3805	117.66	**29**	0	0	0	0
GRAND AVE 1	Collector	Northern City Limit	MISSION ST	7	**28**	0	1	2	1	3	10.85	**28**	0.57	3135	213.26	**19**	1	1	1	1
ARROYO DR 1	Collector	Northern City Limit	PASADENA AVE	18	**19**	0	2	5	2	9	24.19	**15**	0.95	2055	506.26	**4**	0	0	2	2
OLIVER ST 1	Collector	ORANGE GROVE AVE	BEACON AVE	5	**29**	0	0	0	1	4	1.82	**35**	0.10	2174	1236.63	**1**	0	0	0	0
CAM LINDO 1	Collector	FLORES DE ORO	CAMINO LINDO	5	**29**	0	0	1	1	3	3.58	**31**	0.51	1936	276.90	**15**	1	2	0	0
HILL DR 1	Collector	Western City Limit	CAM DEL SOL	4	**31**	0	0	2	0	2	4.25	**30**	0.41	1433	368.58	**9**	0	0	0	0
PINE ST 1	Collector	MERIDIAN AVE	HUNTINGTON DR	4	**31**	0	0	0	1	3	1.64	**36**	0.24	N/A	N/A	N/A	0	0	1	0
ALPHA ST 1	Collector	Southern City Limit	CAMINO LINDO	3	**33**	0	0	0	2	1	2.38	**33**	0.47	2860	123.15	**27**	2	3	0	0
COLLIS AVE 1	Collector	Western City Limit	HILL DR	3	**33**	0	0	1	0	2	2.30	**34**	0.28	4973	116.18	**30**	0	0	0	0
FLORES DE ORO 1	Collector	Western End	Eastern End	3	**33**	0	0	1	1	1	3.22	**32**	0.24	2057	333.80	**12**	0	0	1	1
BRUNSWICK AVE 1	Collector	MONTEREY RD	ST ALBANS AVE	2	**36**	0	1	0	0	1	5.50	**29**	0.20	N/A	N/A	N/A	0	0	1	1
N HUNTINGTON DR 3	Major	MAPLE ST	Southern City Limit	2	**36**	0	0	0	1	1	1.28	**37**	0.17	19944	33.25	**35**	0	0	0	0
CAM DEL SOL 1	Collector	ST ALBANS AVE	VIA DEL REY	1	**38**	0	0	0	0	1	0.18	**38**	0.39	1468	95.02	**33**	0	0	0	0
SAN PASCUAL AVE 1	Collector	Northern City Limit	Western City Limit	1	**38**	0	0	0	0	1	0.18	**38**	0.19	1800	161.39	**24**	0	0	0	0

Where:
R = Crash rate for the road segment expressed as crashes per 100 million vehicle-miles of travel per day
C = Total number of crashes in the study period
V = Traffic volumes using Average Annual Daily Traffic (AADT) volumes
N = Number of years of data
L = Length of the roadway segment in miles
Source: Local Roadway Safety Manual, Caltrans (June 2018)
24 hour traffic counts were conducted in 2014 and provided by the City

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APPENDIX G
CITYWIDE 24-HOUR TRAFFIC COUNTS IN 2014

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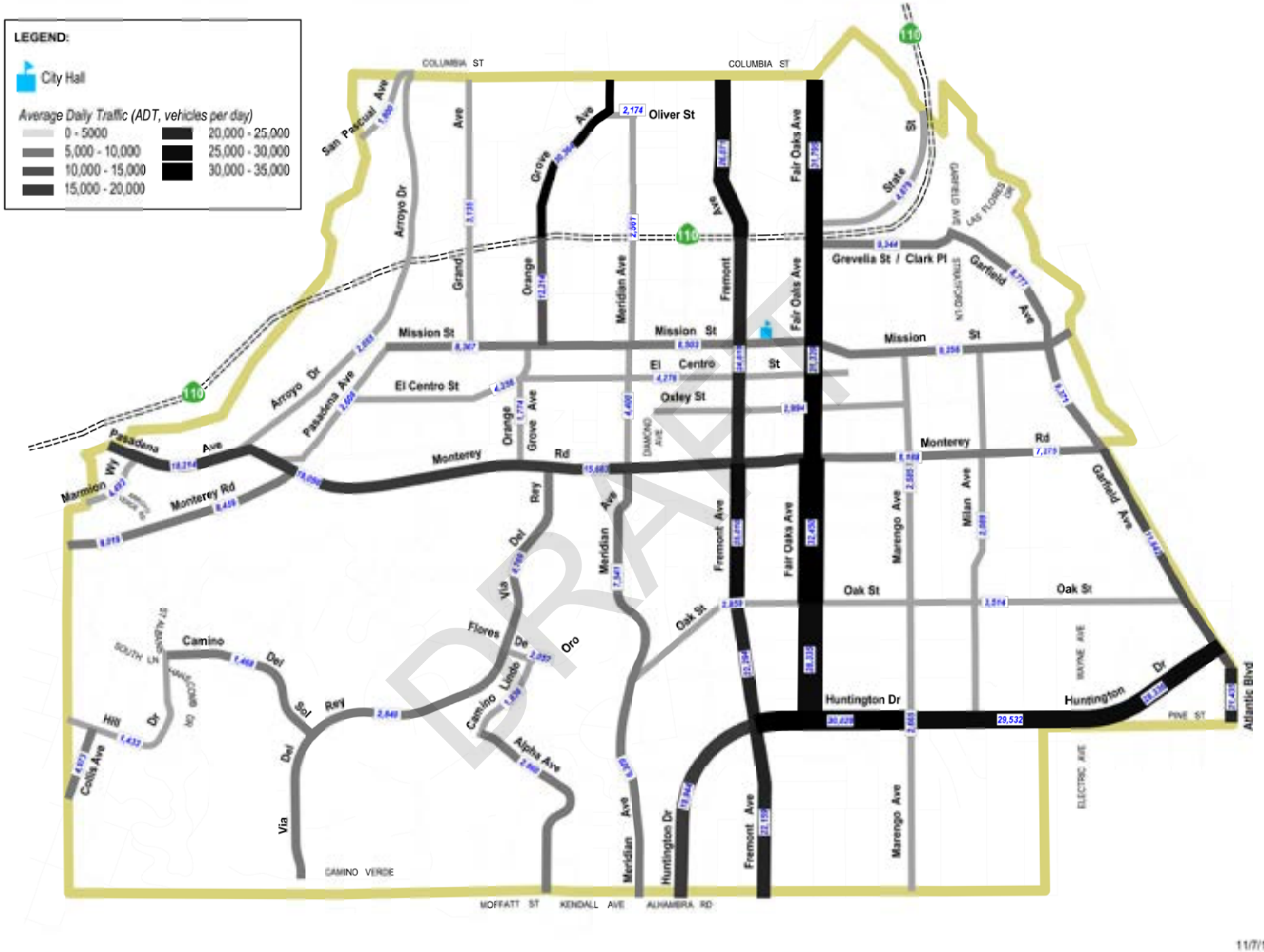

Figure 2. Average Daily Traffic Flow, September 2014

City of South Pasadena 2014-15 Citywide Engineering & Traffic Survey (E&TS)

MINAGAR & ASSOCIATES, INC.

21 Years of Excellence

APPENDIX H
INFOGRAPHIC SUMMARY SHEETS FOR SELECTED ROADWAY SEGMENTS

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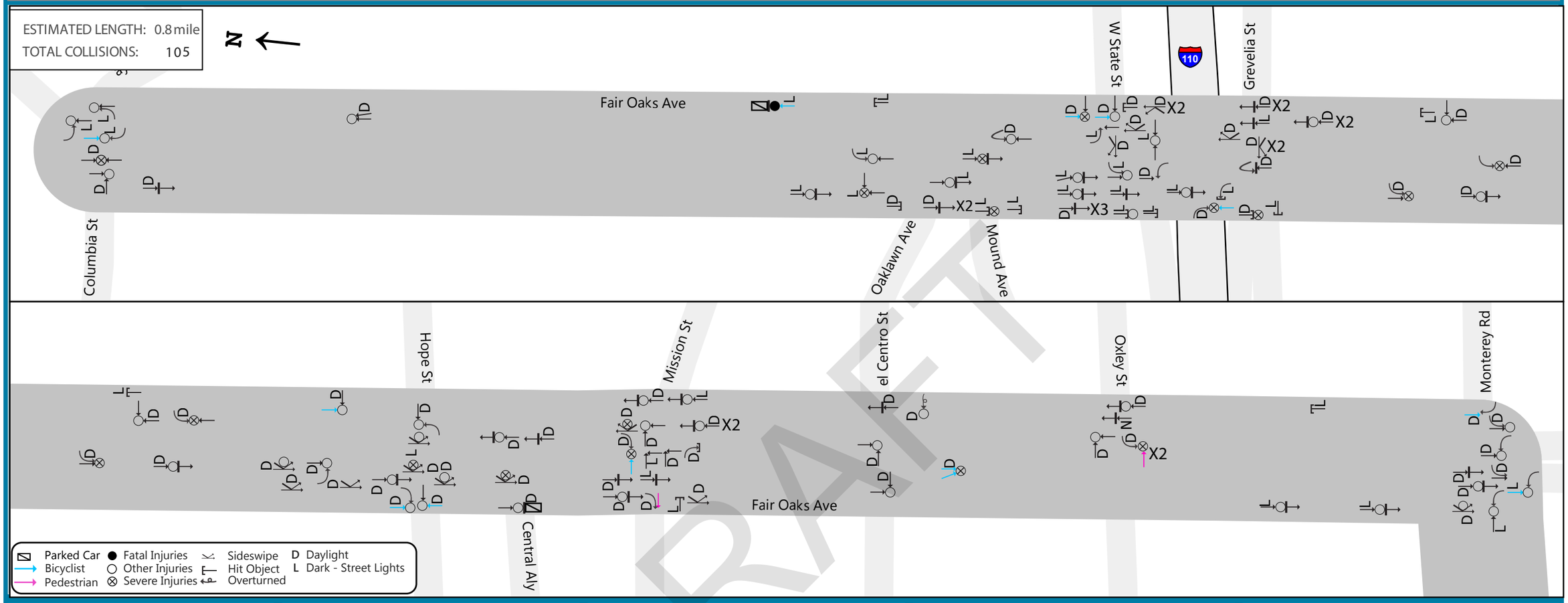
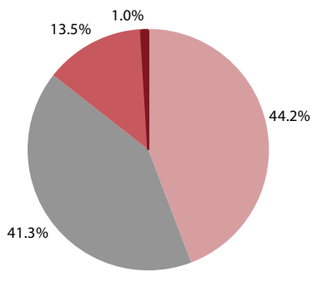
High Collision Roadway Segment: Fair Oaks Avenue from Columbia Street to Monterey Road

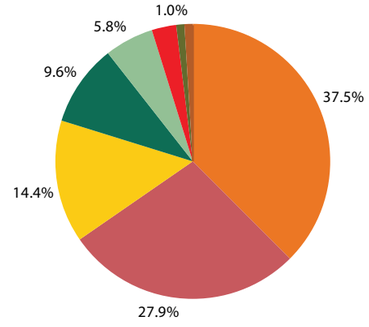
ESTIMATED LENGTH: 0.8 mile
TOTAL COLLISIONS: 105



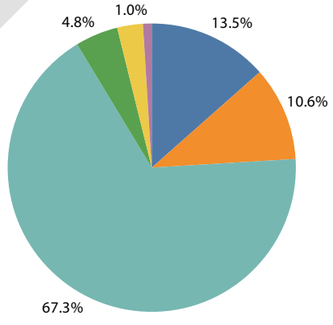
Collision Severity



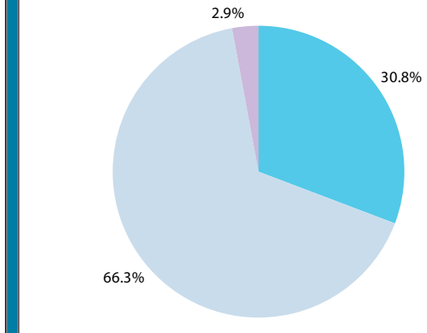
Type of Collision



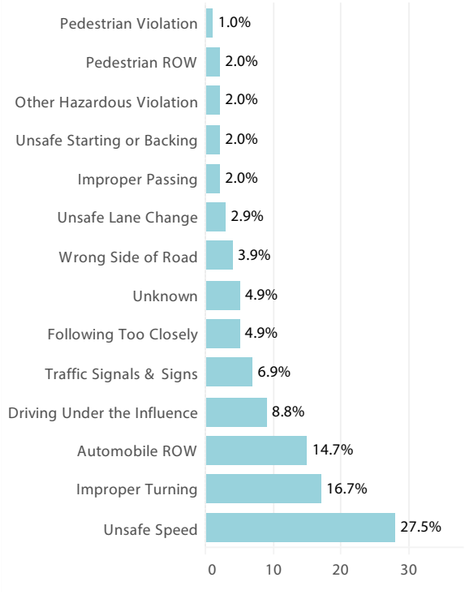
Motor Vehicle Involved With



Lighting Condition



Primary Collision Factors



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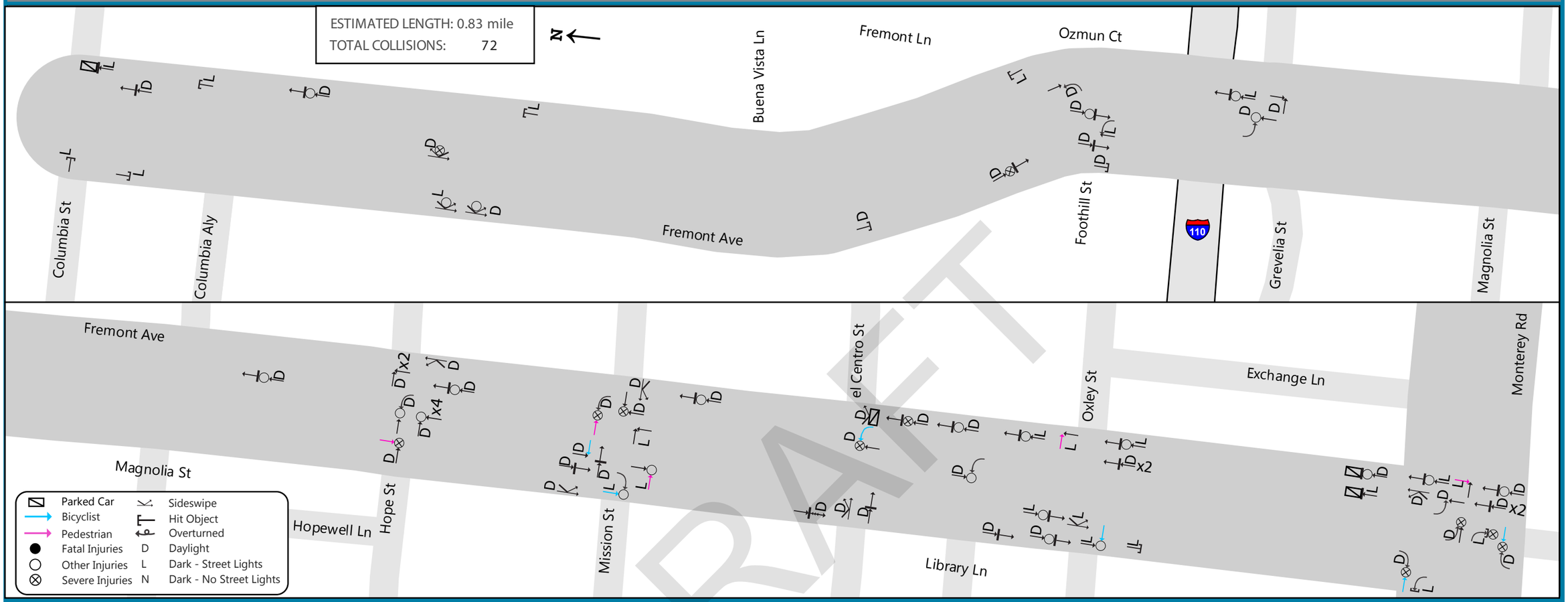
High Collision Roadway Segment: Fremont Avenue from Columbia Street to Monterey Road



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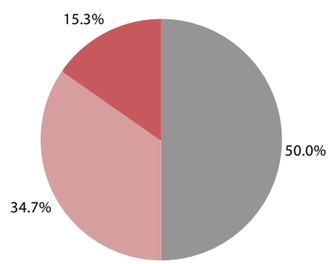
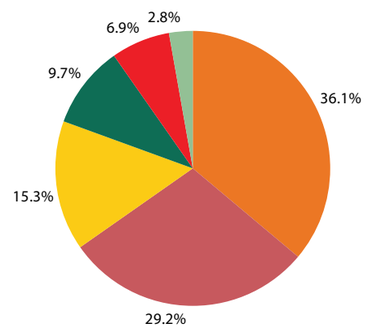
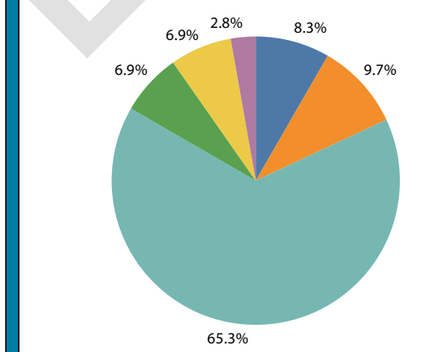
Collision Severity



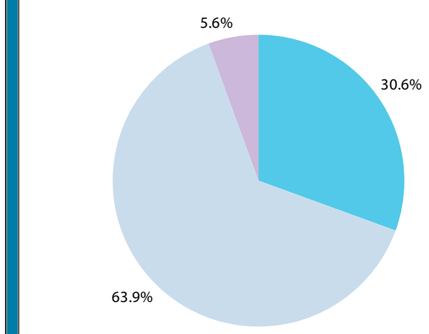
Type of Collision



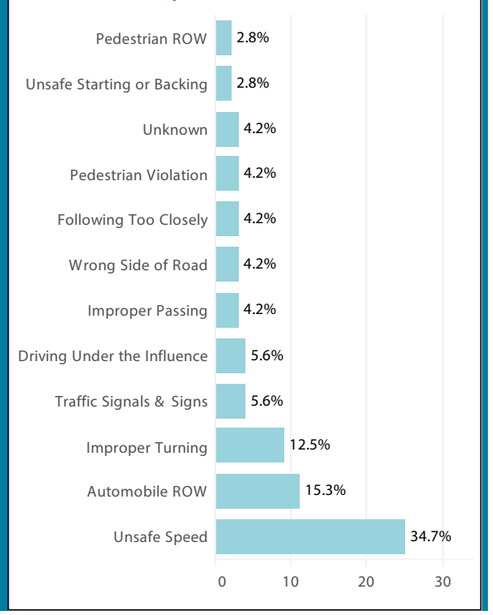
Motor Vehicle Involved With



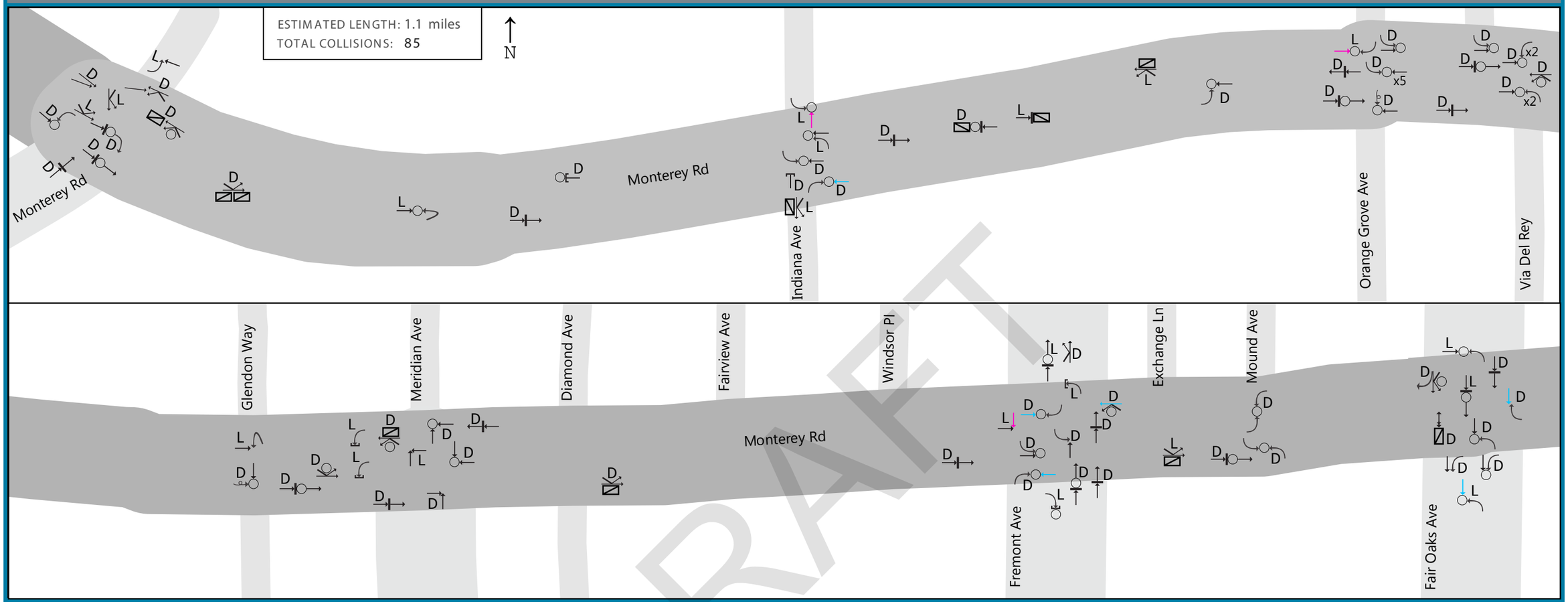
Lighting Condition



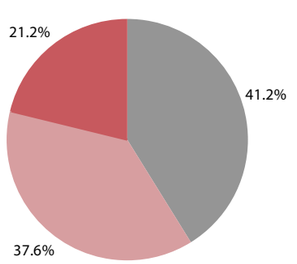
Primary Collision Factors



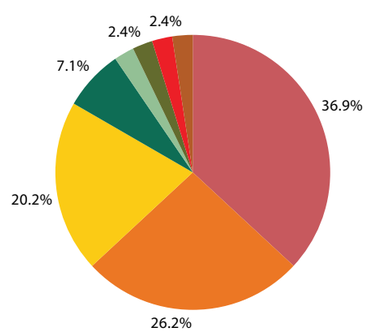
High Collision Roadway Segment: Monterey Road from Pasadena Avenue to Fair Oaks Avenue



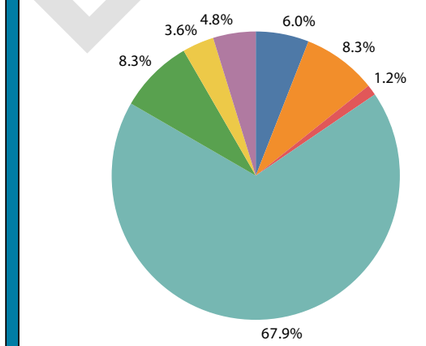
Collision Severity



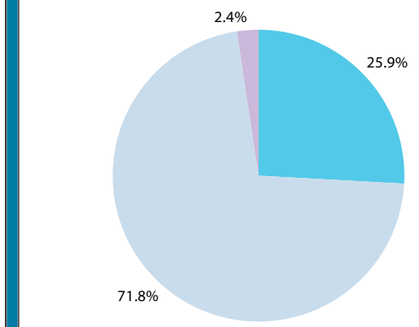
Type of Collision



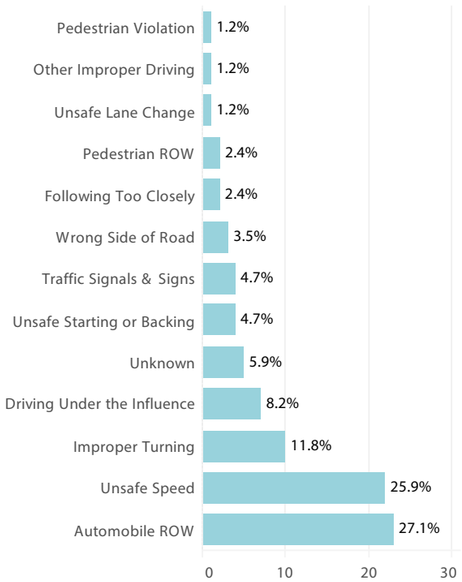
Motor Vehicle Involved With



Lighting Condition



Primary Collision Factors



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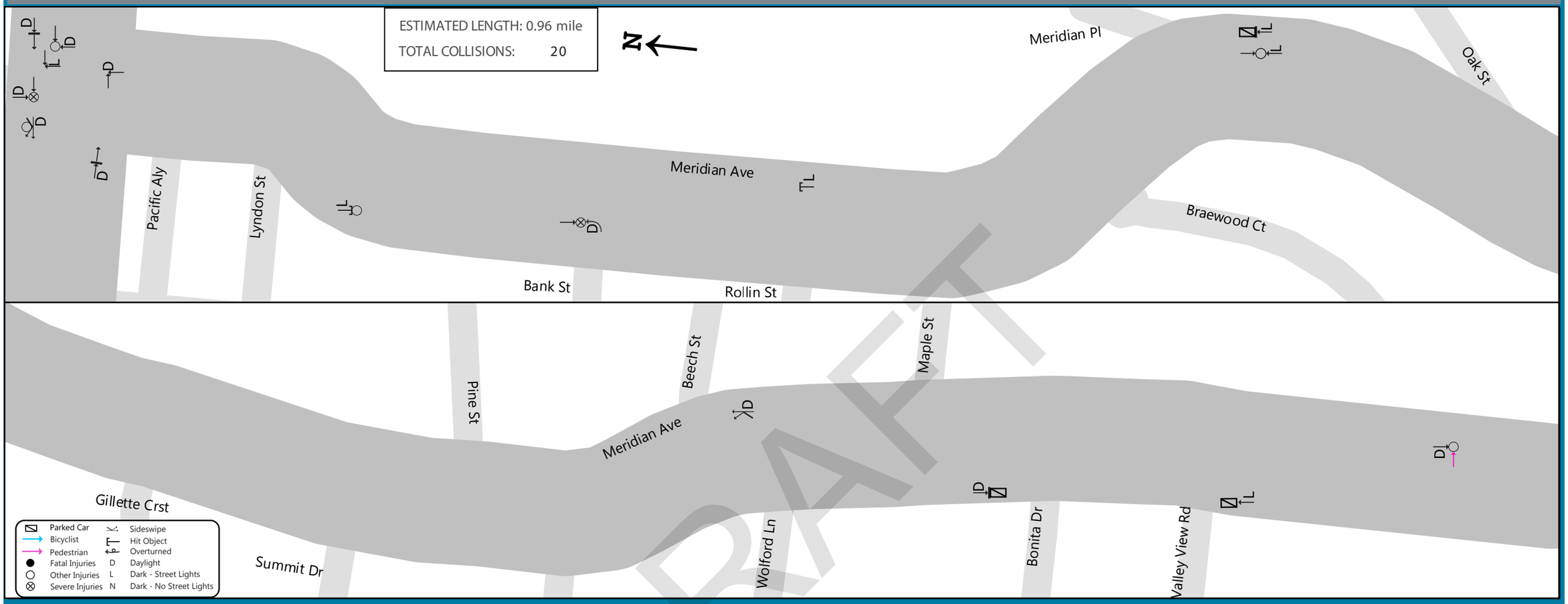
High Collision Roadway Segment: Meridian Avenue from Monterey Road to Kendall Avenue



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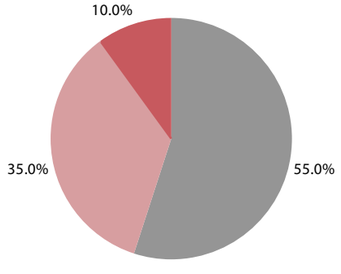
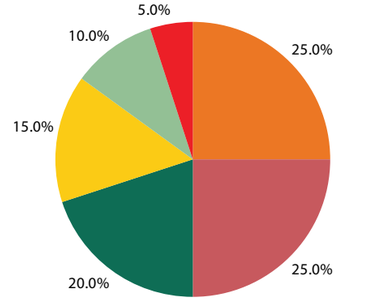
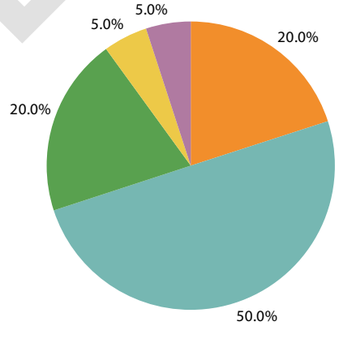
Collision Severity



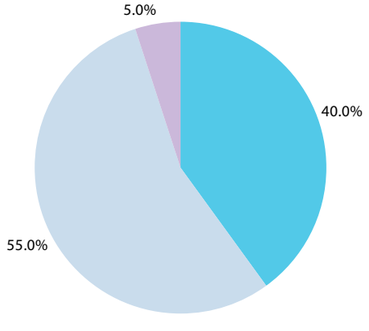
Type of Collision



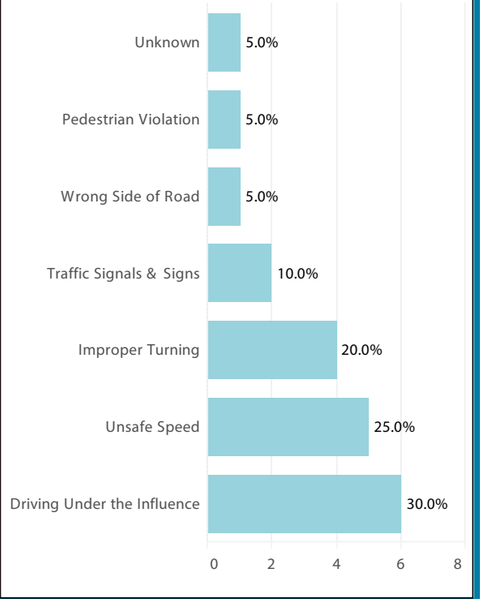
Motor Vehicle Involved With



Lighting Condition



Primary Collision Factors



APPENDIX I
PAVEMENT MARKINGS INVENTORY DICTIONARY

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PAVEMENT MARKING INVENTORY DATA DICTIONARY

Attribute Name	Description	Data Type / Format	Default Value	Possible Values
Index	Unique record identifier for each pavement marking feature	Numeric		
POINT_X (Longitude)	The longitude of feature center point, in decimal degrees. (GCS WGS 1984, WKID 4326)	Numeric, 9 Decimal Places		
POINT_Y (Latitude)	The latitude of feature center point, in decimal degrees. (GCS WGS 1984, WKID 4326)	Numeric, 9 Decimal Places		
Quadrant	The Quadrant the pavement marking is located in	Numeric		1,2,3,4
Photo Tag Number		Numeric		
Description	Further description of the pavement marking feature on its content and meaning	Text		
Street Name	Name of the street that the pavement marking feature is located on	Text		
Damage	The level of wear and tear of the pavement marking feature	Text	None	Chipped, Duplicated, Faded
Width	The width of the pavement marking feature, measured in feet	Numeric, 2 Decimal Places		
Height	The height of the pavement marking feature, measured in feet	Numeric, 2 Decimal Places		
Pavement Marking Type	Category of the pavement marking feature, based on its function and geometric shape	Text		Arrow, Bike, Crosswalk, Lighting, Limit Line, Parking, Rail Crossing, Speed, Word, Yield Line

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APPENDIX J
SIGNAGE INVENTORY DICTIONARY

DRAFT

SIGN INVENTORY DATA DICTIONAY

Attribute Name	Description	Data Type / Format	Default Value	Possible Values
Unique ID	Unique record identifier for each sign feature	Text		
RealX	X coordinates of the sign point in NAD_1983_2011_StatePlane_California_V_FIPS_0405_Ft_US Projected Coordinate System	Numeric		
RealY	Y coordinates of the sign point in NAD_1983_2011_StatePlane_California_V_FIPS_0405_Ft_US Projected Coordinate System	Numeric		
Photo_ID	The unique ID(s) of field photo(s) associated with the sign feature	Text		
Quadrant	The quadrant in which the sign is located in	Text		1,2,3,4
Sign Type	Sign category based on function	Menu		Stop Signs, Speed Limit Signs, Curve Warning, Other Warning, School, Parking, Street Name Signs, Other Guide, City Specific, Other Regulatory
CAMUTCD_CODE	California Manual on Uniform Traffic Control Devices 2014 Revision 2 Sign Charts	Text		
Sign Retirement	Whether the sign is still in the latest MUTCD sign sheet; if not, the sign needs to be retired	Text		Immediate, Future
SIGN_DETAIL	Text on the sign or meaning of the symbol on the sign	Text		
Road Name	Name of the street where the sign is installed	Text		
Nearest Address	The nearest street number of which the sign feature is located to	Numeric		
Height of Sign	Distance from the bottom of the sign to the surface that the post is installed on	Numeric, 2 Decimal Places		
DIM_HT	The height of the sign	Numeric, 2 Decimal Places		
DIM_WD	The width of the sign	Numeric, 2 Decimal Places		
Improper Dimensions	Whether the dimension of the sign is compliant with the MUTCD	Text	0 (compliant)	1 (dimension not in compliance)
Sign Direction	The direction the sign is facing	Menu		North, South, East, West, All Way
Position of Sign	The position of the sign, based on where the post is located relative to the roadway.	Menu	Roadside	Overhead, Median, Others
Condition	Condition of the sign assessed by field surveyor	Menu		Damaged, Faded, Good, Other, Vandalized
Material Grade	The type of material used for the sign	Menu		Engineering Grade, Prismatic, Others
Post ID	Unique record identifier for sign post	Text		

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SIGN INVENTORY DATA DICTIONAY				
Attribute Name	**Description**	**Data Type / Format**	**Default Value**	**Possible Values**
Post Type	The type of post used to hold the sign, based on material and shape	Menu		Unistrut, Pipe Post, Wooden 4x4, Wooden, Signal Standard, Light Standard, U-Post, Fence/Wall, Others
NO_OF_SIGN	The number of signs on the same post	Menu	1	2,3,4,5,6,7
NO_OF_POST	The number of posts used to hold the sign	Menu	1	2,3
Post Condition	Numeric measure of the sign post condition, including rust or lean	Menu	0	1 (minor issues), 2, 3 (major issues)
Legend Color	Color of the sign text or symbol	Menu		Black, White, Green, Red, Multiple, Others
Background Color	Color of the sign background	Menu		White, Yellow, Red, Green, Blue, Brown, Black, Others
Sign Obstruction	Whether the sign is visually obstructed	Menu	No	Yes, Others
Obstruction Detail	Detailed notes describing how the sign is obstructed	Text		
VegetationTrimmingNeeded	Whether vegetation trimming is needed to enhance sign visibility from distance	Text	0	1 (needs trimming)
Improper Height	Whether the sign installation height is compliant to MUTCD	Text	0	1 (height not in compliance)
Sign_Cleaning_Needed	Whether the sign needs cleaning to improve its readability	Text	0	1 (cleaning needed)
Readability	Numeric measure of how much of the sign information is covered by graffiti, stickers, or overall fading of colors	Numeric (Integer)	0	1 (minor), 2 , 3 (worst)
Physical_Condition	Measure of the level the sign is broken, cracked, or bent	Numeric (Integer)	0	1 (minor), 2 , 3 (worst)
Retroreflectivty	Testing results of sign nighttime retroreflectivity	Text		Fail

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APPENDIX K
A LIST OF KEY SIGNS FOR TRAFFIC SAFETY

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List of MUTCD Sign Codes of Signs Key to Traffic Safety

1	R1-1
2	R1-2
3	R1-3P
4	R1-5
5	R1-5a
6	R2-1
7	R2-4 (CA)
8	SR4-1 (CA)
9	R3-1
10	R3-18
11	R3-1P
12	R3-2
13	R3-4
14	R3-5
15	R3-6 MOD
16	R3-7
17	R3-8b
18	R3-26a MOD
19	R5-1
20	R5-1a
21	R6-1

22	R6-2
23	R10-11
24	R10-12
25	R13
26	R13A (CA)
27	R16B
28	R17B
29	R33A (CA)
30	R34A
31	R41
32	R61-5 (CA)
33	R61-7 (CA)
34	R61-11 (CA)
35	R61-19 (CA) MOD
36	R61-26 (CA)
37	R61-36 (CA) MOD
38	R73-2 (CA)
39	R73-3 (CA)
40	R73-5 (CA) MOD
41	R73-6 (CA)
42	S1-1

43	S2-1
44	SW24-1 (CA)
45	SW24-2 (CA)
46	SW24-3 (CA)
47	W10-1
48	W11-2
49	W11-2P
50	W3-1
51	W3-2
52	W3-3
53	W41A
54	W66
55	W66A

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APPENDIX L
CURB MARKINGS INVENTORY DICTIONARY

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CURB MARKING INVENTORY DATA DICTIONARY

Attribute Name	Description	Data Type / Format	Default Value	Possible Values
Unique ID	Unique record identifier for each curb marking	Text		
Road Name	Name of the street where the curb marking feature is located	Text		
COLOR_CURB	Color of the curb marking	Menu		Blue, Green, Red, White, Yellow
Curb_Detail	Text on the curb marking	Text		
Condition	Condition of the curb marking assessed by field surveyor	Menu		Damaged, Faded, Good, Faded & Chipped
NOTES	Additional description of curb marking conditions	Text		
Length_Ft	Length of the colored curb, measured in feet	Numeric, 2 Decimal Places		
PHOTO_ID	The unique ID(s) of field photo(s) associated with the curb marking, derived from the hyperlink to	Text		
Quadrant	The quadrant where the curb marking is located	Text		1,2,3,4

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APPENDIX M
SAFETY PROJECTS CONCEPT DESIGN EXHIBITS

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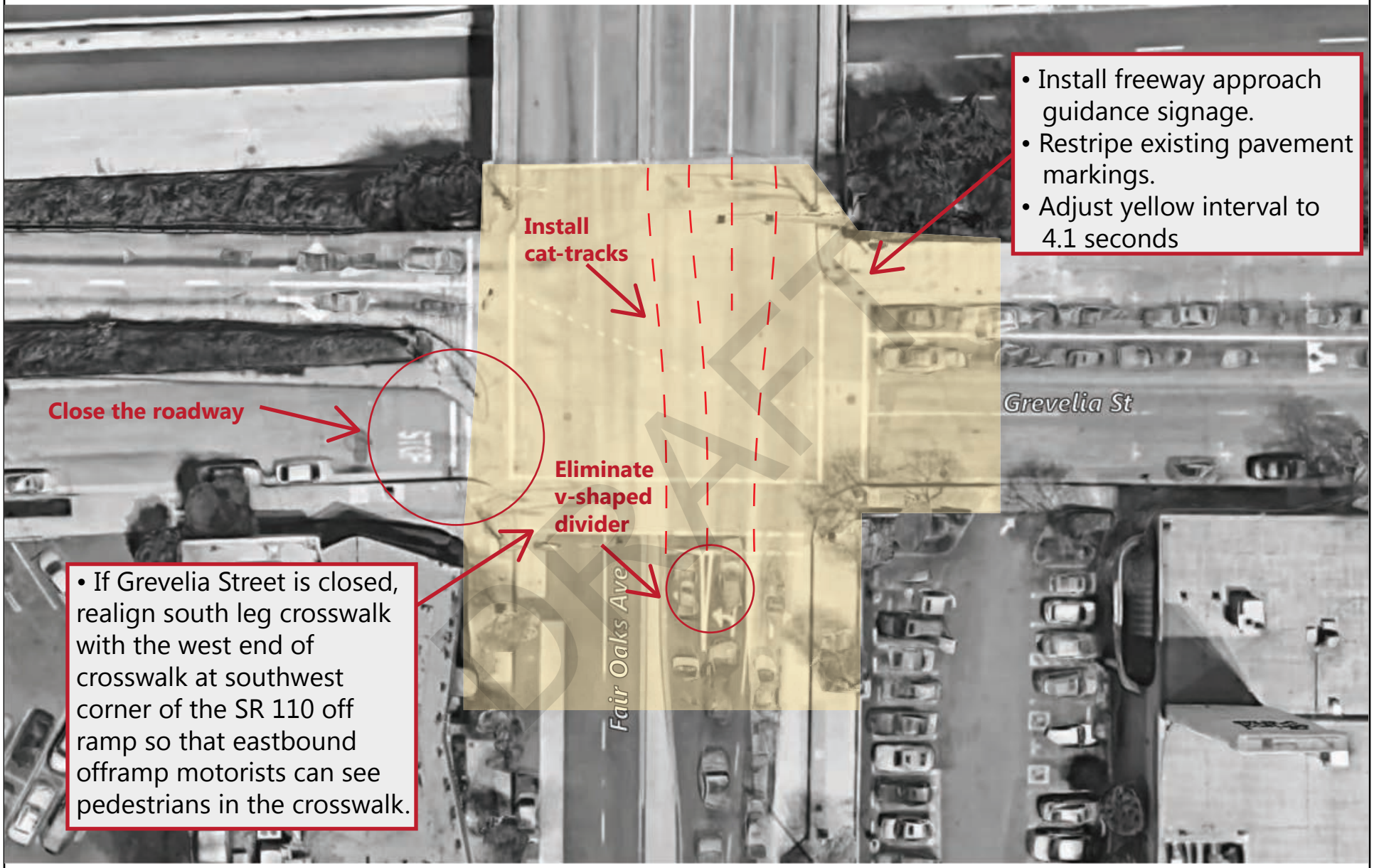
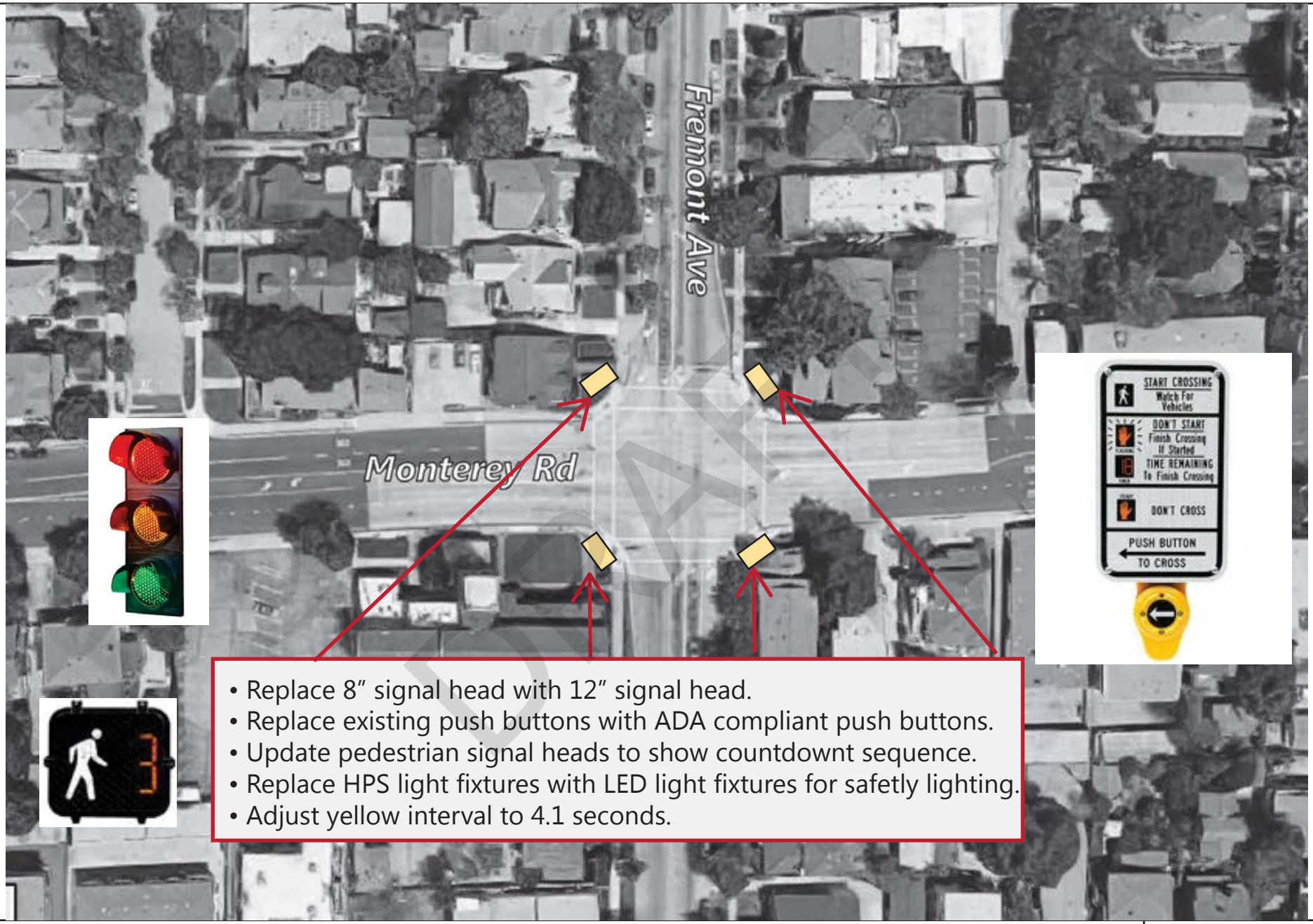


Fair Oaks Avenue & Grevelia Street

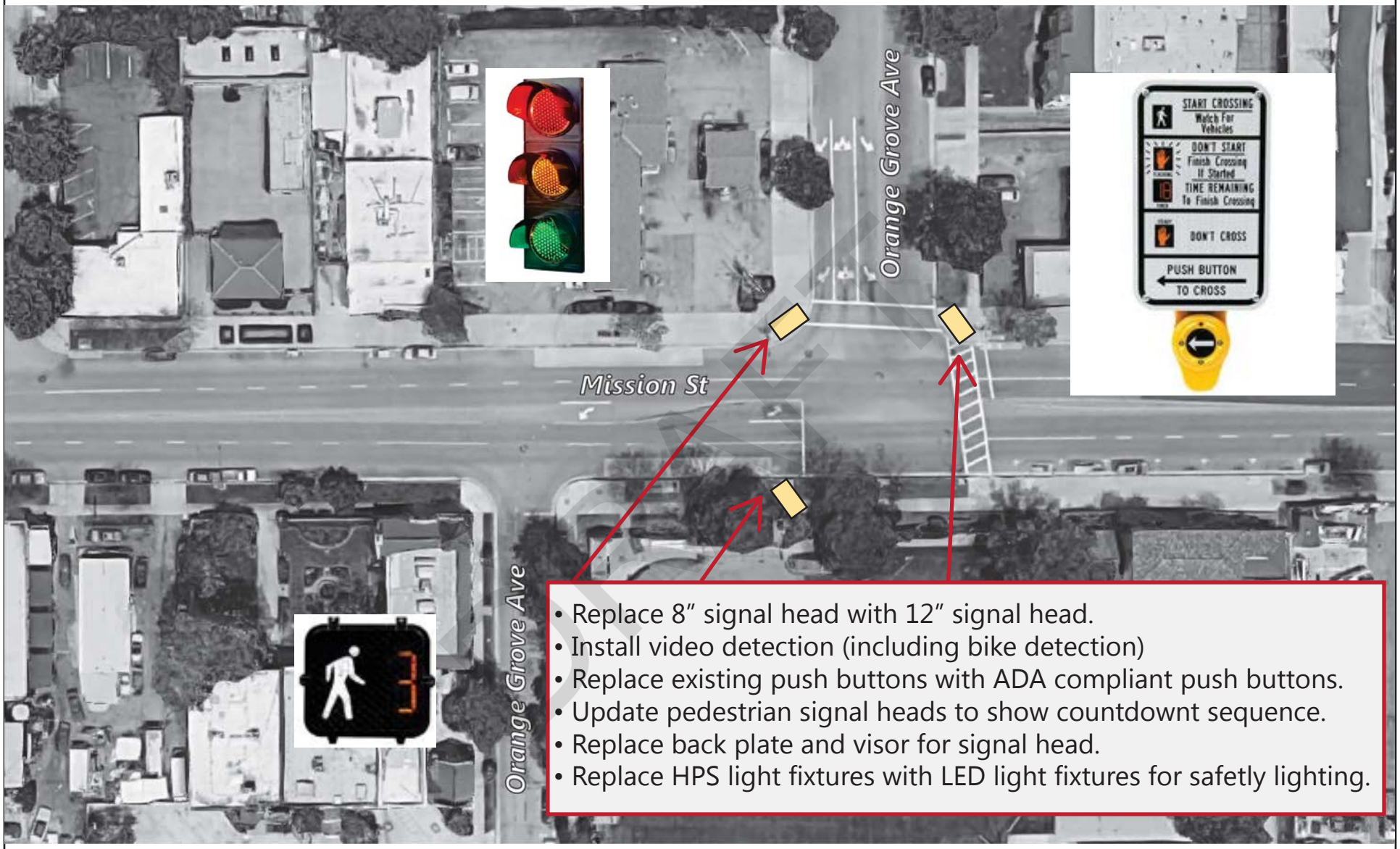


Monterey Road & Fair Oaks Avenue

City of South Pasadena Systemic Safety Analysis Report Program - Safety Project Concepts

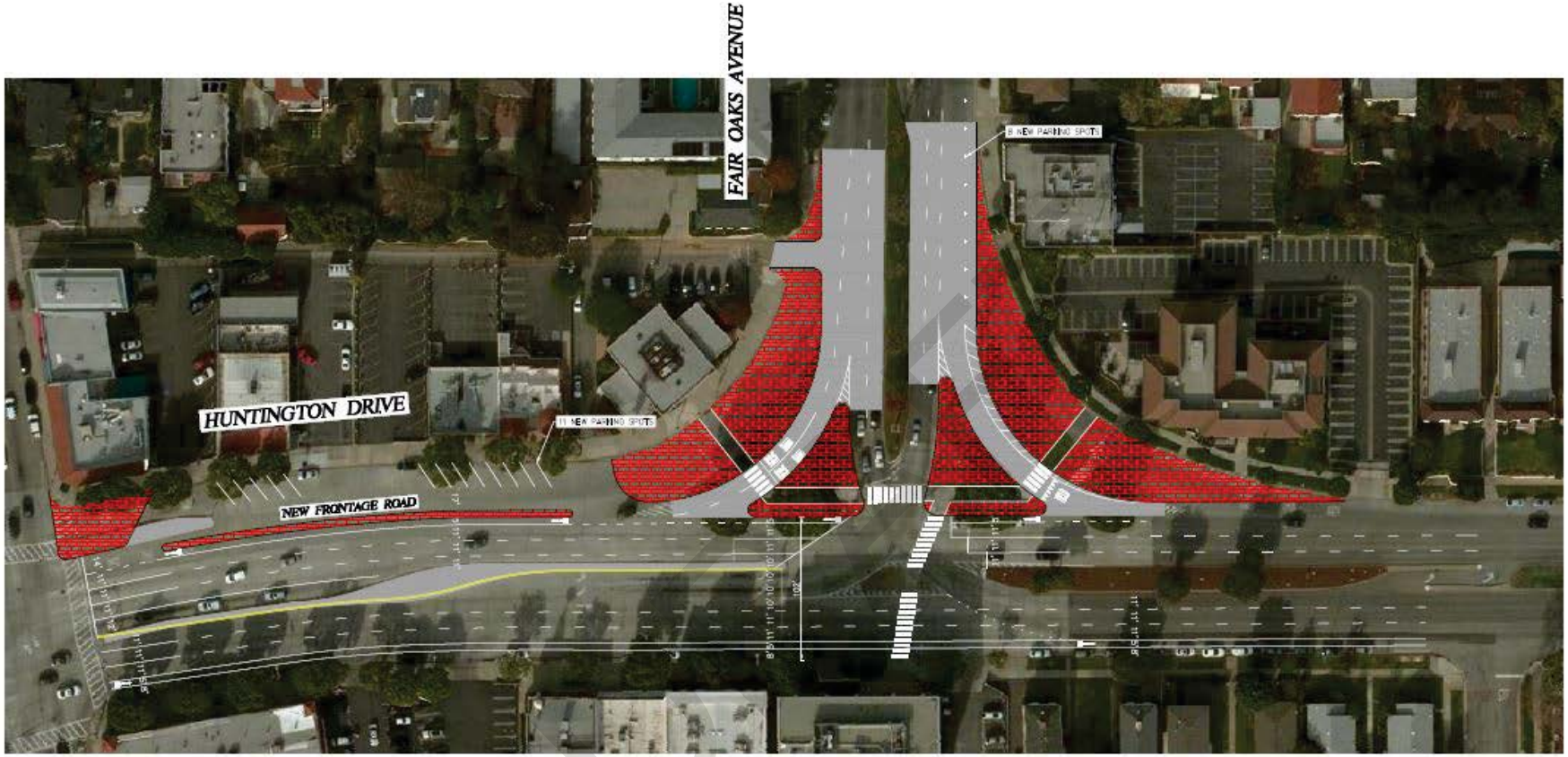


Monterey Rd & Fremont Ave



Mission Street & Orange Grove Avenue

City of South Pasadena Systemic Safety Analysis Report Program - Safety Project Concepts



Huntington Drive & Fair Oaks Avenue

City of South Pasadena Systemic Safety Analysis Report Program - Safety Project Concepts



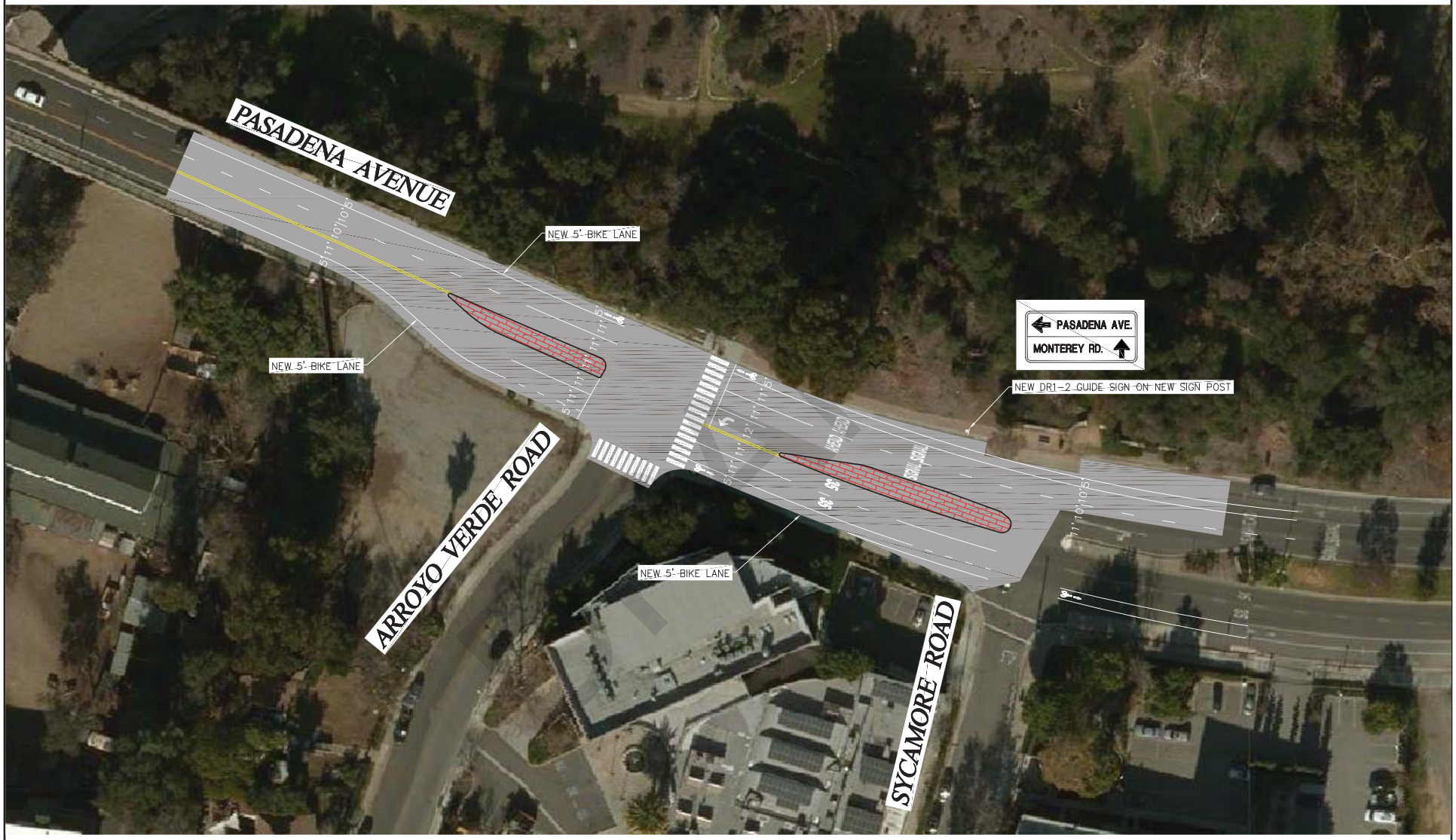
Pasadena Avenue & Monterey Road

City of South Pasadena Systemic Safety Analysis Report Program - Safety Project Concepts



Mission Street & Pasadena Avenue (Alternative 1)

City of South Pasadena Systemic Safety Analysis Report Program - Safety Project Concepts

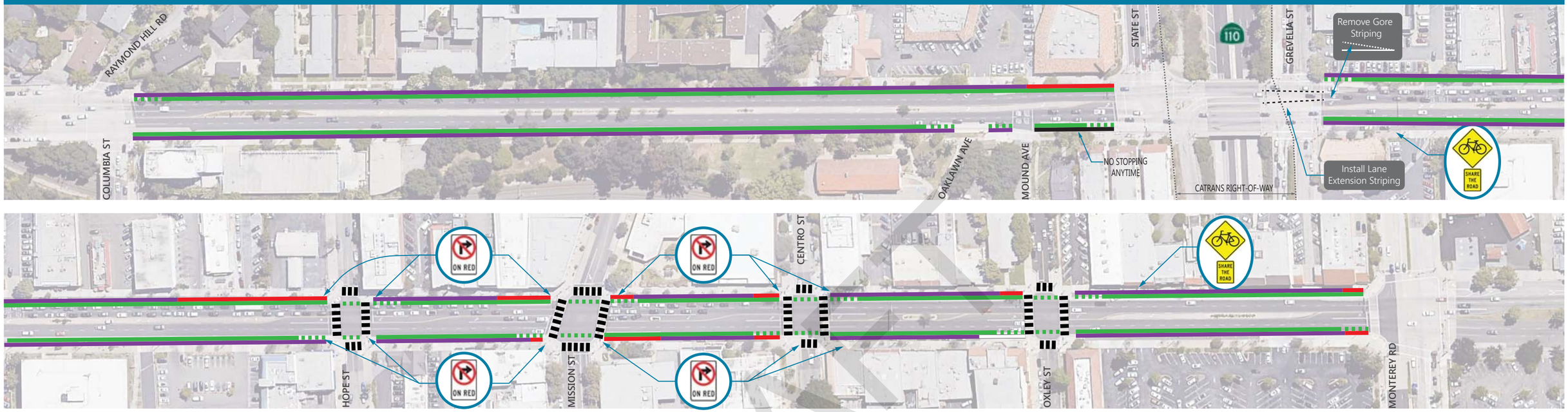


Pasadena Avenue & Monterey Road

City of South Pasadena Systemic Safety Analysis Report Program - Safety Project Concepts

SOUTH PASADENA SSARP

FAIR OAKS AVENUE - COLUMBIA STREET TO MONTEREY ROAD



EXISTING

- Street Parking
- Red Curb
- White Curb

PROPOSED

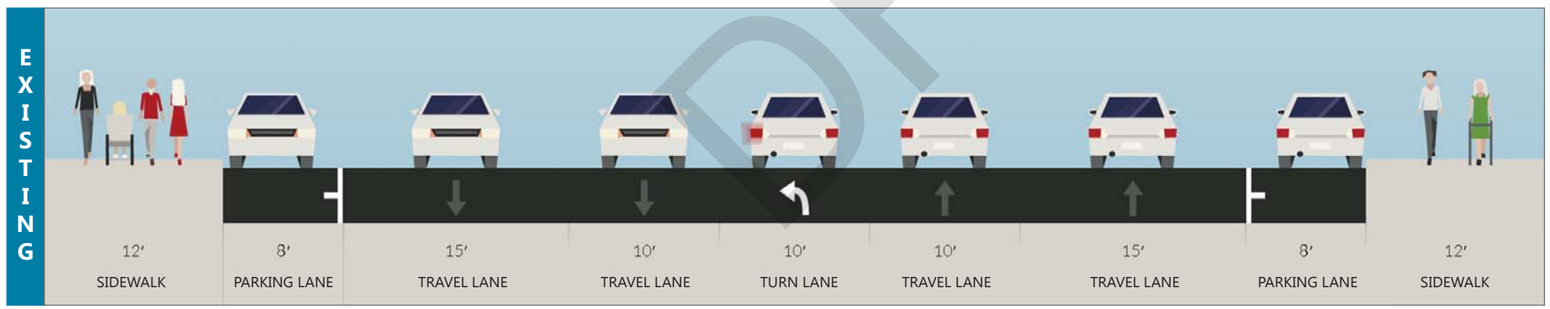
- Bike Lane
- Repaint Crosswalk

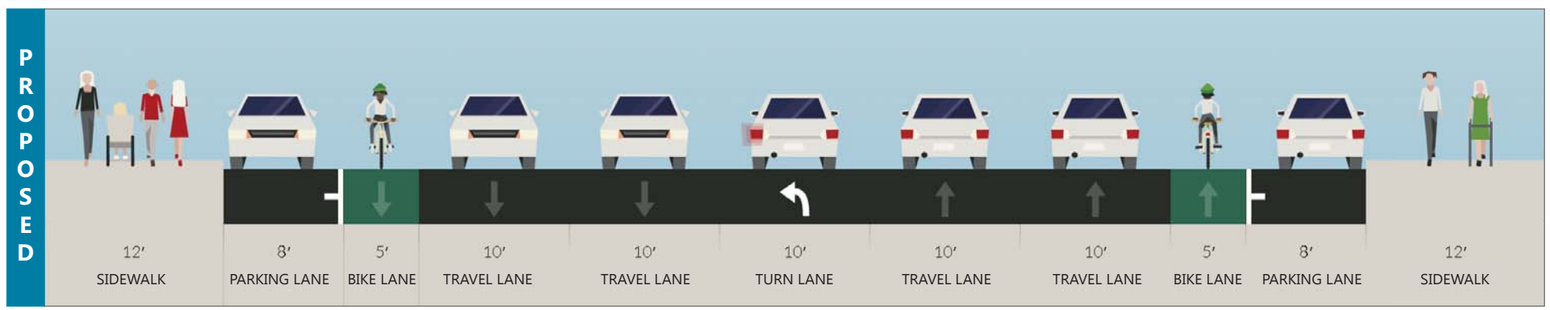


No Right Turn on Red



Advance Bicycle Warnign Sign





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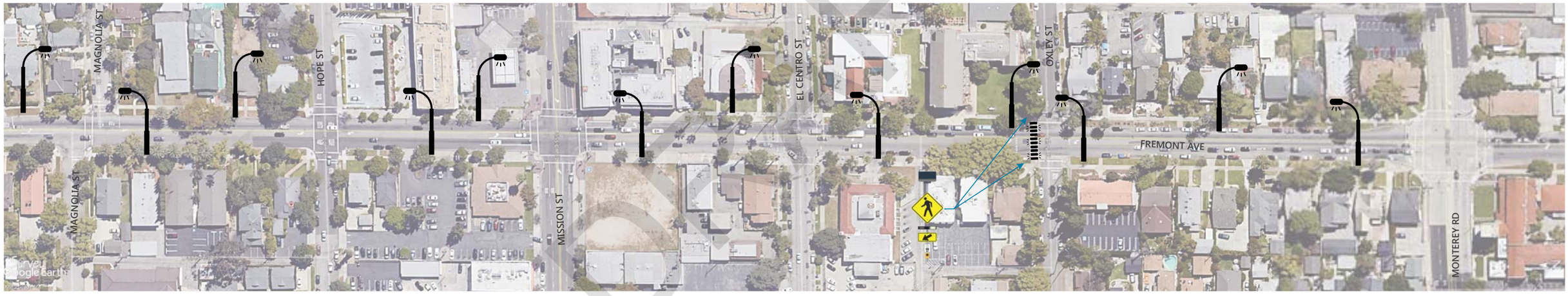
FREMONT AVENUE - COLUMBIA STREET TO MONTEREY ROAD

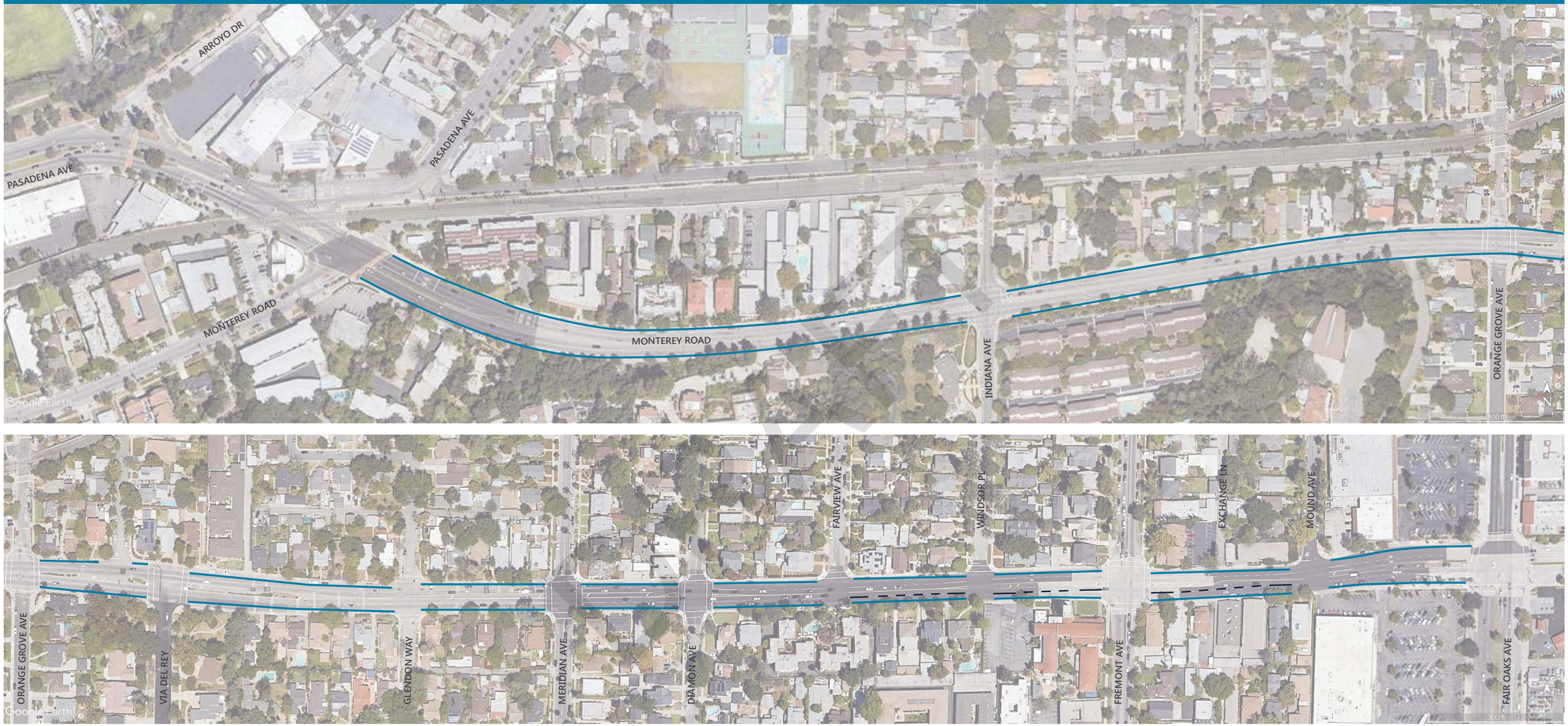




Install Street Lighting

Upgrade Crosswalk to RRFB

MONTEREY ROAD - PASADENA AVENUE TO FAIR OAKS AVENUE



Install Edge Line Striping

Install Conventional Striping

SOUTH PASADENA SSARP

MERIDIAN ROAD - MONTEREY ROAD TO ALHAMBRA ROAD



Extend Luminare Arm Length

Install Speed Hump

APPENDIX N
SAFETY PROJECT COLLISION REDUCTION BENEFITS CALCULATIONS

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South Pasadena SSARP - Safety Project Collision Reduction Analysis

#	Location	#CM	Relevant Crash Types	Number of Crashes (CM1)					
				Total	*Fatality*	*Severe*	*Visible*	*Complaint of Pain*	*PDO*
		CUSTOM	Sideswipes	***3***					3
1	Fair Oaks Avenue & Grevelia Street	S3	Rear end collisions (NS Direction)	***6***				2	4
2	Monterey Road & Fair Oaks Avenue	S3	Left-turn angle collisions (NS dire	***3***				3	
		S2	All collisions	***19***			5	5	9
		S3	Rear end collisions	***9***				5	4
		S19	Pedestrian & bike	***4***			2		2
3	Monterey Road & Fremont Avenue	S1	Night collisions	***7***			1	2	4
		S2	All collisions	***3***			3		
		S19	Pedestrian & bike	***2***			2		
4	Mission Street & Orange Grove Avenue	S1	Night collisions	***1***			1		
5	Fair Oaks Avenue & Huntington Avenue	CUSTOM	Sideswipes, bicycle collisions, uns	***9***			3	2	4
		CUSTOM	Sideswipes, rear ends, bicycle coll	***4***				3	1
		R36	Bike collisions	***1***					1
		(none)	#REF!	***0***					
		S19	Pedestrian & bike	***1***					1
6	Fremont Avenue & Huntington Avenue	S1	Night collisions	***7***			2	3	2
7	Arroyo Drive & Pasadena Avenue	R36	Bike collisions	***3***			2	1	
8	Mission Street & Pasadena Avenue, Arroy	CUSTOM	CUSTOM	***5***			1	1	3
	Fair Oaks Avenue from Columbia Street	R36	Bike collisions	***14***	1		6	6	1
9	to Monterey Road	(none)	(none)	***0***					
		R1	Night collisions	***27***			3	10	14
	Fremont Avenue from Columbia Street	NS7	Pedestrian & bike	***12***			6	3	3
10	to Monterey Road	R28	Vicinity of warning sign (rear end)	***2***				1	1
	Monterey Road from Fair Oaks Avenue	R32	Vicinity of edgeline	***20***			4	5	11
11	to Pasadena Avenue	(none)	(none)	***0***					
	Meridian Road from Monterey Road to	R1	Night collisions	***9***				2	7
12	Alhambra Road	CMF	All collisions	***20***			2	7	11
	Huntington Drive from Leman Street to	R36	Bike collisions	***6***			4	1	1
13	Maple Street	R1	Night collisions	***28***		2	7	8	11

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APPENDIX O
SAFETY PROJECT COST ESTIMATES

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Preliminary Engineers Cost Estimate

City: South Pasadena

Project: South Pasadena SSARP

Location: #1 Fair Oaks Avenue and Grevelia Street

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
CUSTOM	***GENERAL***				
	Mobilization	1	LS	$2,100	$2,100
	Traffic control	1	LS	$1,000	$1,000
	Construction survey and monumentation	1	LS	$1,000	$1,000
	Storm Water Pollution Prevention Plan	1	LS	$1,000	$1,000
				GENERAL SUBTOTAL	**$5,100**
	STREET				
	Demo/Unclassified excavation	7	CY	$70	$490
	PCC curb and gutter	20	LF	$50	$1,000
	PCC curb ramp	1	EA	$3,500	$3,500
	PCC Sidewalk	160	SF	$8	$1,280
				STREET SUBTOTAL	**$6,270**
	SIGNING & STRIPING				
	Remove striping	1	LS	$1,000	$1,000
	Detail 38	50	LF	$1	$50
	Detail 40	300	LF	$1	$300
	Repaint x-walk	400	LF	$2	$800
	Pavement marking	11	EA	$500	$5,500
	Freeway approach guidance signage	1	EA	$1,000	$1,000
				SIGNING & STRIPING SUBTOTAL	**$8,650**
				TOTAL	**$20,020**
				30% CONTINGENCY	**$6,006**
				10% DESIGN	**$2,002**
				6% CONSTRUCTION ENGINEERING	**$1,201**
				GRAND TOTAL	**$29,229**
S3	***TRAFFIC SIGNAL***				
	Signal Timing Improvements	1	LS	$5,000	$5,000
				TRAFFIC SIGNAL SUBTOTAL	**$5,000**
				TOTAL	**$5,000**
				30% CONTINGENCY	**$1,500**
				10% DESIGN	**$500**
				6% CONSTRUCTION ENGINEERING	**$300**
				GRAND TOTAL	**$7,300**

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Preliminary Engineers Cost Estimate

City: South Pasadena

Project: South Pasadena SSARP

Location: #2 Monterey Road and Fair Oaks Avenue

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
	GENERAL				
	Mobilization	1	LS	$3,000	$3,000
	Traffic control	1	LS	$1,500	$1,500
				GENERAL SUBTOTAL	**$4,500**
	TRAFFIC SIGNAL				
	Remove existing vehicle head and mounting	4	EA	$300	$1,200
S3	Install 4-12" vehicle head and mounting (LED)	4	EA	$2,400	$9,600
	Controller cabinet modifications	1	LS	$10,000	$10,000
				TRAFFIC SIGNAL SUBTOTAL	**$20,800**
				TOTAL	**$25,300**
				30% CONTINGENCY	**$7,590**
				10% DESIGN	**$2,530**
				6% CONSTRUCTION ENGINEERING	**$1,518**
				GRAND TOTAL	**$36,938**

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Preliminary Engineers Cost Estimate

City: South Pasadena

Project: South Pasadena SSARP

Location: #3 Monterey Road and Fremont Avenue

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
S1	***GENERAL***				
	Mobilization	1	LS	$600	$600
	Traffic control	1	LS	$300	$300
				GENERAL SUBTOTAL	**$900**
	LIGHTING				
	Remove HSP luminaire	4	EA	$100	$400
	Install LED luminaire	4	EA	$950	$3,800
				LIGHTING SUBTOTAL	**$4,200**
				TOTAL	**$5,100**
				30% CONTINGENCY	**$1,530**
				10% DESIGN	**$510**
				6% CONSTRUCTION ENGINEERING	**$306**
				GRAND TOTAL	**$7,446**
S2	***GENERAL***				
	Mobilization	1	LS	$3,500	$3,500
	Traffic control	1	LS	$1,700	$1,700
				GENERAL SUBTOTAL	**$5,200**
	TRAFFIC SIGNAL				
	Remove 8" vehicle head and mounting	12	EA	$300	$3,600
	Install 3-12" vehicle head and mounting (LED)	12	EA	$1,700	$20,400
				TRAFFIC SIGNAL SUBTOTAL	**$24,000**
				TOTAL	**$29,200**
				30% CONTINGENCY	**$8,760**
				10% DESIGN	**$2,920**
				6% CONSTRUCTION ENGINEERING	**$1,752**
				GRAND TOTAL	**$42,632**
S3	***TRAFFIC SIGNAL***				
	Signal timing improvements	1	LS	$5,000	$5,000
				TRAFFIC SIGNAL SUBTOTAL	**$5,000**
				TOTAL	**$5,000**
				30% CONTINGENCY	**$1,500**
				10% DESIGN	**$500**
				6% CONSTRUCTION ENGINEERING	**$300**
				GRAND TOTAL	**$7,300**

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City: South Pasadena

Project: South Pasadena SSARP

Location: #3 Monterey Road and Fremont Avenue

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
S19	***GENERAL***				
	Mobilization	1	LS	$5,000	$5,000
	Traffic control	1	LS	$2,500	$2,500
				GENERAL SUBTOTAL	**$7,500**
	TRAFFIC SIGNAL				
	Remove pedestrian head and mounting	8	EA	$300	$2,400
	Remove existing pedestrian push button	8	EA	$150	$1,200
S19	Install countdown pedestrian head with mounting (LED)	8	EA	$2,400	$19,200
	Install pedestrian push buttons	8	EA	$1,850	$14,800
				TRAFFIC SIGNAL SUBTOTAL	**$37,600**
				TOTAL	**$45,100**
				30% CONTINGENCY	**$13,530**
				10% DESIGN	**$4,510**
				6% CONSTRUCTION ENGINEERING	**$2,706**
				GRAND TOTAL	**$65,846**

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Preliminary Engineers Cost Estimate

City: South Pasadena

Project: South Pasadena SSARP

Location: #4 Mission St and Orange Grove Avenue

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
S1	***GENERAL***				
	Mobilization	1	LS	$200	$200
	Traffic control	1	LS	$100	$100
				GENERAL SUBTOTAL	**$300**
	LIGHTING				
	Remove HSP luminaire	2	EA	$100	$200
	Install LED luminaire	2	EA	$950	$1,900
				LIGHTING SUBTOTAL	**$1,900**
				TOTAL	**$2,200**
				30% CONTINGENCY	**$660**
				10% DESIGN	**$220**
				6% CONSTRUCTION ENGINEERING	**$132**
				GRAND TOTAL	**$3,212**
S2	***GENERAL***				
	Mobilization	1	LS	$5,000	$5,000
	Traffic control	1	LS	$2,500	$2,500
				GENERAL SUBTOTAL	**$7,500**
	TRAFFIC SIGNAL				
	Remove 8" vehicle head and mounting	5	EA	$300	$1,500
	Replace visor and back plate for 3-12" vehicle head	3	EA	$200	$600
	Install 3-12" vehicle head and mounting (LED)	5	EA	$1,700	$8,500
	Install gridsmart video detection complete (2 cameras)	1	LS	$25,000	$25,000
				TRAFFIC SIGNAL SUBTOTAL	**$35,600**
				TOTAL	**$43,100**
				30% CONTINGENCY	**$12,930**
				10% DESIGN	**$4,310**
				6% CONSTRUCTION ENGINEERING	**$2,586**
				GRAND TOTAL	**$62,926**

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City: South Pasadena

Project: South Pasadena SSARP

Location: #4 Mission St and Orange Grove Avenue

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
	GENERAL				
	Mobilization	1	LS	$1,800	$1,800
	Traffic control	1	LS	$900	$900
S19				**GENERAL SUBTOTAL**	**$2,700**
	TRAFFIC SIGNAL				
	Remove pedestrian head and mounting	3	EA	$300	$900
	Remove existing pedestrian push button	2	EA	$150	$300
	Install countdown pedestrian head with mounting (LED)	3	EA	$2,400	$7,200
	Install pedestrian push buttons	2	EA	$1,850	$3,700
				TRAFFIC SIGNAL SUBTOTAL	**$12,100**
S19					
				TOTAL	**$14,800**
				30% CONTINGENCY	**$4,440**
				10% DESIGN	**$1,480**
				6% CONSTRUCTION ENGINEERING	**$888**
				GRAND TOTAL	**$21,608**

DRAFT

Preliminary Engineers Cost Estimate

City: South Pasadena

Project: South Pasadena SSARP

Location: #5 Fair Oaks Avenue and Huntington Avenue

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
	GENERAL				
	Mobilization	1	LS	$80,000	$80,000
	Traffic control	1	LS	$40,000	$40,000
	Construction survey and monumentation	1	LS	$40,000	$40,000
	Storm Water Pollution Prevention Plan	1	LS	$40,000	$40,000
				GENERAL SUBTOTAL	**$200,000**
	STREET				
	Curb Extension				
	Demo/Unclassified Excavation	800	CY	$70	$56,000
	PCC Sidewalk	20500	SF	$8	$164,000
	PCC curb and gutter	900	LF	$50	$45,000
	PCC curb ramp	2	EA	$3,500	$7,000
	Landscape Median				
	Demo/Unclassified Excavation	300	CY	$70	$21,000
	Landscape	5600	SF	$10	$56,000
	PCC Sidewalk	1700	SF	$8	$13,600
	PCC curb and gutter	600	LF	$50	$30,000
	PCC curb ramp	5	EA	$3,500	$17,500
	Asphalt Concrete Pavement				
	Demo/Unclassified Excavation	890	CY	$70	$62,300
	Asphalt Concrete Pavement	70	TON	$125	$8,750
				STREET SUBTOTAL	**$481,150**
CUSTOM	***TRAFFIC SIGNAL***				
	Traffic Signal modifications	1	LS	$50,000	$50,000
				TRAFFIC SIGNAL SUBTOTAL	**$50,000**

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City: South Pasadena

Project: South Pasadena SSARP

Location: #5 Fair Oaks Avenue and Huntington Avenue

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
	SIGNING AND STRIPING				
	Remove striping/marking	1	LS	$4,000	$4,000
	Remove signage	1	LS	$1,000	$1,000
	Install pavement legend	5	EA	$600	$3,000
	Install pavement marking	6	EA	$500	$3,000
	Install yield line marking	18	LF	$2	$36
	Install continental x-walk	1300	SF	$2	$2,600
	Install 4" white line	300	LF	$1	$300
	Install 12" white line	260	LF	$2	$520
	Install 8" white line	525	LF	$2	$1,050
	Detail 10	4500	LF	$2	$9,000
	Detail 23	500	LF	$2	$1,000
	Detail 38C	300	LF	$2	$600
	Detail 39	2300	LF	$2	$4,600
	Detail 39A	300	LF	$2	$600
	Detail 40A	100	LF	$2	$200
	Install signage	1	LS	$2,500	$2,500
				SIGNING AND STRIPING SUBTOTAL	**$34,006**
				TOTAL	**$765,156**
				30% CONTINGENCY	**$229,547**
				10% DESIGN	**$76,516**
				6% CONSTRUCTION ENGINEERING	**$45,909**
				GRAND TOTAL	**$1,117,128**

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Preliminary Engineers Cost Estimate

City: South Pasadena

Project: South Pasadena SSARP

Location: #6 Fremont Avenue and Huntington Avenue

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
CUSTOM	***GENERAL***				
	Mobilization	1	LS	$14,000	$14,000
	Traffic control	1	LS	$7,000	$7,000
	Construction survey and monumentation	1	LS	$7,000	$7,000
	Storm Water Pollution Prevention Plan	1	LS	$7,000	$7,000
				GENERAL SUBTOTAL	**$35,000**
	STREET				
	Asphalt Concrete Pavement				
	Demo/Unclassified Excavation	150	CY	$70	$10,500
	Asphalt Concrete Pavement	11	TON	$125	$1,375
	Curb Extension				
	Demo/Unclassified Excavation	80	CY	$70	$5,600
	PCC Sidewalk	2200	SF	$8	$17,600
	PCC curb ramp	2	EA	$3,500	$7,000
	PCC curb and gutter	150	LF	$50	$7,500
	Median Island				
	Demo/Unclassified Excavation	55	CY	$70	$3,850
	PCC Sidewalk	1500	SF	$8	$12,000
	PCC curb and gutter	600	LF	$50	$30,000
				STREET SUBTOTAL	**$95,425**
				TOTAL	**$130,425**
				30% CONTINGENCY	**$39,128**
				10 % DESIGN	**$13,043**
				6% CONSTRUCTION ENGINEERING	**$7,826**
				GRAND TOTAL	**$190,421**
S1	***GENERAL***				
	Mobilization	1	LS	$900	$900
	Traffic control	1	LS	$450	$450
				GENERAL SUBTOTAL	**$1,350**
	LIGHTING				
	Remove HPS luminaire	6	EA	$100	$600
	Install LED luminaire	6	EA	$950	$5,700
				LIGHTING SUBTOTAL	**$6,300**
				TOTAL	**$7,650**
				30% CONTINGENCY	**$2,295**
				10 % DESIGN	**$765**
				6% CONSTRUCTION ENGINEERING	**$459**
				GRAND TOTAL	**$11,169**

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City: South Pasadena

Project: South Pasadena SSARP

Location: #6 Fremont Avenue and Huntington Avenue

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
	GENERAL				
	Mobilization	1	LS	$1,200	$1,200
	Traffic control	1	LS	$600	$600
				GENERAL SUBTOTAL	**$1,800**
	TRAFFIC SIGNAL				
	Remove existing pedestrian push button	6	EA	$150	$900
S19	Install pedestrian push buttons	6	EA	$1,850	$11,100
				TRAFFIC SIGNAL SUBTOTAL	**$12,000**
				TOTAL	**$13,800**
				30% CONTINGENCY	**$4,140**
				10 % DESIGN	**$1,380**
				6% CONSTRUCTION ENGINEERING	**$828**
				GRAND TOTAL	**$20,148**
	GENERAL				
	Mobilization	1	LS	$1,500	$1,500
	Traffic control	1	LS	$750	$750
				GENERAL SUBTOTAL	**$2,250**
	SIGNING AND STRIPING				
	Remove striping/marking	1	LS	$2,500	$2,500
	Remove signage	1	LS	$1,000	$1,000
	Install pavement marking	6	EA	$500	$3,000
R36	Detail 38C	205	LF	$2	$410
	Detail 39	4550	LF	$1	$4,550
	Detail 39A	400	LF	$1	$400
	Install signage	1	LS	$2,500	$2,500
				SIGNING AND STRIPING SUBTOTAL	**$11,860**
				TOTAL	**$14,110**
				30% CONTINGENCY	**$4,233**
				10 % DESIGN	**$1,411**
				6% CONSTRUCTION ENGINEERING	**$847**
				GRAND TOTAL	**$20,601**

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Preliminary Engineers Cost Estimate

City: South Pasadena

Project: South Pasadena SSARP

Location: #7 Arroyo Drive & Pasadena Avenue & Monterey Road

Date: 1/8/2020

COUNTER MEASURE	ITEM NO.	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
	GENERAL				
	Mobilization	1	LS	$9,000	$9,000
	Traffic control	1	LS	$4,500	$4,500
	Construction survey and monumentation	1	LS	$4,500	$4,500
	Storm Water Pollution Prevention Plan	1	LS	$4,500	$4,500
				GENERAL SUBTOTAL	**$22,500**
	STREET				
	Asphalt concrete pavement				
	Demo/Unclassified Excavation	40	CY	$70	$2,800
	Asphalt concrete pavement	3	TON	$125	$375
	Median Island				
	Demo/Unclassified Excavation	90	CY	$70	$6,300
	Landscape	2400	SF	$10	$24,000
	PCC curb and gutter	300	LF	$50	$15,000
				STREET SUBTOTAL	**$48,475**
	SIGNING AND STRIPING				
R36	Remove striping/marking	1	LS	$2,000	$2,000
	Install pavement marking	11	EA	$500	$5,500
	Install yield line marking	15	LF	$2	$30
	Install continental x-walk	1120	SF	$2	$2,240
	Install 8" white line	300	LF	$2	$600
	Detail 9	840	LF	$1	$840
	Detail 22	230	LF	$1	$230
	Detail 38	200	LF	$1	$200
	Detail 39	1270	LF	$1	$1,270
	Detail 39A	120	LF	$1	$120
	Detail 40	690	LF	$1	$690
	Install signage	1	LS	$2,500	$2,500
				SIGNING AND STRIPING SUBTOTAL	**$16,220**
				TOTAL	**$87,195**
				30% CONTINGENCY	**$26,159**
				10% DESIGN	**$8,720**
				6% CONSTRUCTION ENGINEERING	**$5,232**
				GRAND TOTAL	**$122,073**

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Preliminary Engineers Cost Estimate

City: South Pasadena

Project: South Pasadena SSARP

Location: #8 Mission Street and Pasadena Avenue

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
	GENERAL				
	Mobilization	1	LS	$7,000	$7,000
	Traffic control	1	LS	$3,500	$3,500
	Construction survey and monumentation	1	LS	$3,500	$3,500
	Storm Water Pollution Prevention Plan	1	LS	$3,500	$3,500
				GENERAL SUBTOTAL	**$17,500**
	STREET				
	Curb Extension				
	Demo/Unclassified excavation	50	CY	$70	$3,500
	PCC sidewalk	1300	SF	$8	$10,400
	PCC curb and gutter	160	LF	$50	$8,000
	Median Island				
	Demo/Unclassified excavation	20	CY	$70	$1,400
	PCC sidewalk	500	SF	$8	$4,000
	PCC curb and gutter	110	LF	$50	$5,500
	PCC curb ramp	2	EA	$3,500	$7,000
				STREET SUBTOTAL	**$39,800**
CUSTOM					
	SIGNING AND STRIPING				
	Remove striping/marking	1	LS	$1,000	$1,000
	Remove signage	1	LS	$1,000	$1,000
	Install pavement marking	2	EA	$500	$1,000
	Install pavement legend	4	EA	$600	$2,400
	Install basic x-walk	290	LF	$2	$580
	Detail 9	85	LF	$1	$85
	Detail 22	130	LF	$1	$130
	Detail 29	65	LF	$1	$65
	Detail 38	70	LF	$1	$70
	Install signage	1	LS	$2,500	$2,500
				SIGNING AND STRIPING SUBTOTAL	**$8,830**
				TOTAL	**$66,130**
				30% CONTINGENCY	**$19,839**
				10% CONTINGENCY	**$6,613**
				6% CONSTRUCTION ENGINEERING	**$3,968**
				GRAND TOTAL	**$96,550**

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Preliminary Engineers Cost Estimate

City: South Pasadena

Project: South Pasadena SSARP

Location: #9 Pasadena Avenue from Arroyo Drive to West City Limit

Date: 1/8/2020

COUNTER MEASURE	ITEM NO.	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
	GENERAL				
	Mobilization	1	LS	$9,400	$9,400
	Traffic control	1	LS	$4,700	$4,700
	Construction survey and monumentation	1	LS	$4,700	$4,700
	Storm Water Pollution Prevention Plan	1	LS	$4,700	$4,700
				GENERAL SUBTOTAL	**$23,500**
	STREET				
	Asphalt concrete pavement				
	Demo/Unclassified Excavation	60	CY	$70	$4,200
	Asphalt concrete pavement	5	TON	$125	$625
	Median Island				
	Demo/Unclassified Excavation	90	CY	$70	$6,300
	PCC Sidewalk	2400	SF	$8	$19,200
	PCC curb and gutter	500	LF	$50	$25,000
				STREET SUBTOTAL	**$55,325**
R36	***SIGNING AND STRIPING***				
	Remove striping/marking	1	LS	$1,000	$1,000
	Install pavement marking	5	EA	$500	$2,500
	Install pavement legend	6	EA	$600	$3,600
	Install continental x-walk	600	SF	$2	$1,200
	Install 12" white line	70	LF	$2	$140
	Detail 9	800	LF	$1	$800
	Detail 22	220	LF	$1	$220
	Detail 39	1570	LF	$1	$1,570
	Detail 39A	100	LF	$1	$100
	Install signage	1	LS	$1,000	$1,000
				SIGNING AND STRIPING SUBTOTAL	**$12,130**
				TOTAL	**$90,955**
				30% CONTINGENCY	**$27,287**
				10% DESIGN	**$9,096**
				6% CONSTRUCTION ENGINEERING	**$5,457**
				GRAND TOTAL	**$127,337**

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Preliminary Engineers Cost Estimate

City: South Pasadena

Project: South Pasadena SSARP

Location: #10 Fair Oaks Avenue from Colombia Street to Monterey Road

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
NONE	***SIGNING AND STRIPING***				
	Install continental x-walk	9460	SF	$2	$18,920
				SIGNING AND STRIPING SUBTOTAL	**$18,920**
				TOTAL	**$18,920**
				30% CONTINGENCY	**$5,676**
				10% DESIGN	**$1,892**
				6% CONSTRUCTION ENGINEERING	**$1,135**
				GRAND TOTAL	**$27,623**
R36	***GENERAL***				
	Mobilization	1	LS	$70,000	$70,000
	Traffic control	1	LS	$35,000	$35,000
				GENERAL SUBTOTAL	**$105,000**
	SIGNING AND STRIPING				
	Remove striping/marking	1	LS	$6,000	$6,000
	Install pavement marking	13	EA	$500	$6,500
	Detail 39	12810	LF	$1	$12,810
	5' wide green bike lane	32000	SF	$20	$640,000
	3'wide green striping at 12' o.c.	1500	SF	$15	$22,500
	Detail 40	190	LF	$1	$190
	Install signage	1	LS	$5,000	$5,000
				SIGNING AND STRIPING SUBTOTAL	**$693,000**
				TOTAL	**$798,000**
				30% CONTINGENCY	**$239,400**
				10% DESIGN	**$79,800**
				6% CONSTRUCTION ENGINEERING	**$47,880**
				GRAND TOTAL	**$1,165,080**

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Preliminary Engineers Cost Estimate

City: South Pasadena

Project: South Pasadena SSARP

Location: #11 Fremont Avenue from Columbia Street to Monterey Rd

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
NS7	***GENERAL***				
	Mobilization	1	LS	$4,800	$4,800
	Traffic control	1	LS	$2,400	$2,400
				GENERAL SUBTOTAL	**$7,200**
	RRFB				
	Remove striping/marking	1	LS	$1,000	$1,000
	Remove sign/post	1	LS	$1,000	$1,000
	Install continental x-walk	450	SF	$2	$900
	Install RRFB System	1	LS	$30,000	$30,000
				RRFB SUBTOTAL	**$32,900**
				TOTAL	**$40,100**
				30% CONTINGENCY	**$12,030**
				10% DESIGN	**$4,010**
				6% CONSTRUCTION ENGINEERING	**$2,406**
				GRAND TOTAL	**$58,546**
R28	***SIGNING AND STRIPING***				
	Install advance warning sign and post	2	EA	$500	$1,000
				SIGNING AND STRIPING SUBTOTAL	**$1,000**
				TOTAL	**$1,000**
				30% CONTINGENCY	**$300**
				10% DESIGN	**$100**
				6% CONSTRUCTION ENGINEERING	**$60**
				GRAND TOTAL	**$1,460**
R1	***GENERAL***				
	Mobilization	1	LS	$20,000	$20,000
	Traffic control	1	LS	$10,000	$10,000
				GENERAL SUBTOTAL	**$30,000**
	LIGHTING				
	Furnish and install luminaire complete	13	EA	$10,750	$139,750
				LIGHTING SUBTOTAL	**$139,750**
				TOTAL	**$169,750**
				30% CONTINGENCY	**$50,925**
				10% DESIGN	**$16,975**
				6% CONSTRUCTION ENGINEERING	**$10,185**
				GRAND TOTAL	**$247,835**

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Preliminary Engineers Cost Estimate

City: South Pasadena

Project: South Pasadena SSARP

Location: #12 Monterey Road from Fair Oaks Avenue to Pasadena Ave

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
	GENERAL				
	Mobilization	1	LS	$2,000	$2,000
	Traffic control	1	LS	$1,000	$1,000
				GENERAL SUBTOTAL	**$3,000**
	SIGNING AND STRIPING				
R32	Install edgeline stripe	7000	LF	$2	$14,000
				SIGNING AND STRIPING SUBTOTAL	**$14,000**
				TOTAL	**$17,000**
				30% CONTINGENCY	**$5,100**
				10% DESIGN	**$1,700**
				6% CONSTRUCTION ENGINEERING	**$1,020**
				GRAND TOTAL	**$24,820**
	SIGNING AND STRIPING				
	Detail 9	850	LF	$1	$850
				SIGNING AND STRIPING SUBTOTAL	**$850**
NONE				**TOTAL**	**$850**
				30% CONTINGENCY	**$128**
				10% DESIGN	**$85**
				6% CONSTRUCTION ENGINEERING	**$51**
				GRAND TOTAL	**$1,114**

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Preliminary Engineers Cost Estimate

City: South Pasadena

Project: South Pasadena SSARP

Location: #13 Meridian Road from Monterey Road to Alhambra Road

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
R1	***GENERAL***				
	Mobilization	1	LS	$10,000	$10,000
	Traffic control	1	LS	$5,000	$5,000
				GENERAL SUBTOTAL	**$15,000**
	LIGHTING				
	Remove existing luminaire and mast arm	22	EA	$850	$18,700
	Install new luminaire and mast arm	22	EA	$2,250	$49,500
				LIGHTING SUBTOTAL	**$68,200**
				TOTAL	**$83,200**
				30% CONTINGENCY	**$24,960**
				10% DESIGN	**$8,320**
				6% CONSTRUCTION ENGINEERING	**$4,992**
				GRAND TOTAL	**$121,472**
CMF	***GENERAL***				
	Mobilization	1	LS	$14,000	$14,000
	Traffic control	1	LS	$7,000	$7,000
	Construction survey and monumentation	1	LS	$7,000	$7,000
	Storm Water Pollution Prevention Plan	1	LS	$7,000	$7,000
				GENERAL SUBTOTAL	**$35,000**
	STREET				
	Install speed humps	10	EA	$10,000	$100,000
				STREET SUBTOTAL	**$100,000**
				TOTAL	**$135,000**
				30% CONTINGENCY	**$40,500**
				10% DESIGN	**$13,500**
				6% CONSTRUCTION ENGINEERING	**$8,100**
				GRAND TOTAL	**$197,100**

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Preliminary Engineers Cost Estimate

City: South Pasadena

Project: South Pasadena SSARP

Location: #14 Huntington Drive from Leman Street to Maple Street

Date: 1/8/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
R1	***GENERAL***				
	Mobilization	1	LS	$14,000	$14,000
	Traffic control	1	LS	$7,000	$7,000
				GENERAL SUBTOTAL	**$21,000**
	LIGHTING				
	Remove existing luminaire and mast arm	32	EA	$850	$27,200
	Install new LED luminaire and mast arm	32	EA	$2,250	$72,000
				LIGHTING SUBTOTAL	**$99,200**
				TOTAL	**$120,200**
				30% CONTINGENCY	**$36,060**
				10% DESIGN	**$12,020**
				6% CONSTRUCTION ENGINEERING	**$7,212**
				GRAND TOTAL	**$175,492**
R36	***GENERAL***				
	Mobilization	1	LS	$2,000	$2,000
	Traffic control	1	LS	$1,000	$1,000
				GENERAL SUBTOTAL	**$3,000**
	SIGNING AND STRIPING				
	Install pavement marking	4	EA	$500	$2,000
	Detail 39	9200	LF	$1	$9,200
	Detail 39A	1000	LF	$1	$1,000
	Install signage	1	LS	$2,500	$2,500
				SIGNING AND STRIPING SUBTOTAL	**$14,700**
				TOTAL	**$17,700**
				30% CONTINGENCY	**$5,310**
				10% DESIGN	**$1,770**
				6% CONSTRUCTION ENGINEERING	**$1,062**
				GRAND TOTAL	**$25,842**

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Preliminary Engineers Cost Estimate

City: South Pasadena

Project: South Pasadena SSARP

Location: #15 Fremont Avenue from Monterey Road to Alhambra Road

Date: 1/23/2020

COUNTER MEASURE	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	ITEM TOTAL
	GENERAL				
	Mobilization	1	LS	$5,500	$5,500
	Traffic control	1	LS	$2,250	$2,250
				GENERAL SUBTOTAL	**$7,750**
	LIGHTING				
R1	Remove existing luminaire and mast arm	12	EA	$850	$10,200
	Install new LED luminaire and mast arm	12	EA	$2,250	$27,000
				LIGHTING SUBTOTAL	**$37,200**
				TOTAL	**$44,950**
				30% CONTINGENCY	**$13,485**
				10% DESIGN	**$4,495**
				6% CONSTRUCTION ENGINEERING	**$2,697**
				GRAND TOTAL	**$65,627**

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APPENDIX P

SAFETY PROJECT BENEFIT TO COST RATIO ANALYSIS – HSIP APPLICATION CONSIDERATIONS

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South Pasadena SSARP

List of Safety Projects - Detailed B/C Ratio Analysis

#	Location	Location Type	No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit	Cost ($)	Benefit/ Cost Ratio	HSIP Max Share	HSIP Amount	Local Amount
1	Fair Oaks Avenue & State Street and Fair Oaks Avenue & Grevelia Street	Signalized intersection	CUSTOM		Add cat-tracks (edge line extension through intersection) across the intersection heading northbound to better guide motorists. Eliminate the v-shaped divider between the two left turn lanes on the northbound approach to the intersection of Fair Oaks & Grevelia. Apply new layer of paint to existing pavement markings demonstrating faded appearance (intersection-wide). Install freeway approach guidance signage on northbound approach prior to the intersection. Eliminate the southwest approach on Grevelia Street that is currently not compliant with the most recent MUTCD guidelines.	Sideswipes	100%	20	3	$35,400	$141,600	$29,229	4.84	0%	$0	$29,229
			S3	Improve signal timing	Adjust yellow interval to 4.1 seconds for the signals at the North-South Direction (Fair Oaks Avenue)	Rear end collisions (NS Direction)	15%	10	6	$169,800	$50,940	$7,300	6.98	50%	$3,650	$3,650
									Total	$205,200	$192,540	$36,529	5.27		$3,650	$32,879
2	Monterey Road & Fair Oaks Ave	Signalized intersection	S3	Improve signal timing	Install flashing yellow arrow on northbound and southbound approach to allow for leading/lagging at this intersection.	Left-turn angle collisions (NS direction)	15%	10	3	$183,900	$55,170	$36,938	1.49	50%	$18,469	$18,469
3	Monterey Road & Fremont Avenue	Signalized intersection	S2	Improve signal hardware	Replace 8" signal heads with 12" signal head (2 per approach, 8 total)	All collisions	15%	10	19	$955,700	$286,710	$42,632	6.73	100%	$42,632	$0
			S3	Improve signal timing	Adjust yellow interval to 4.1 seconds (all directions)	Rear end collisions	15%	10	9	$353,700	$106,110	$7,300	14.54	50%	$3,650	$3,650
			S19	Install ped countdown signals	Update pedestrian signal heads to show countdown sequence, replace existing push buttons with ADA compliant push buttons	Pedestrian & bike	25%	20	4	$240,800	$240,800	$65,846	3.66	100%	$65,846	$0
			S1	Add lighting	Replace HPS light fixtures with LED light fixtures for safety lighting	Night collisions	40%	20	7	$278,400	$445,440	$7,446	59.82	100%	$7,446	$0
									Total	$1,828,600	$1,079,060	$123,224	8.76		$119,574	$3,650
4	Mission Street & Orange Grove Avenue	Signalized intersection	S2	Improve signal hardware	Replace 8" signal heads with 12" signal head (two westbound, two eastbound, one southbound), install video detection (including bike detection), replace back plate and visor for signal head for three signals in eastbound direction.	All collisions	15%	10	3	$325,800	$97,740	$62,926	1.55	100%	$62,926	$0
			S19	Install ped countdown signals	Update pedestrian signal heads to show countdown sequence, replace existing push buttons with ADA compliant push buttons.	Pedestrian & bike	25%	20	2	$217,200	$217,200	$21,608	10.05	100%	$21,608	$0
			S1	Add lighting	Replace HPS light fixtures with LED light fixtures for safety lighting at the northwest corner and southeast corner of the intersection.	Night collisions	40%	20	1	$108,600	$173,760	$3,212	54.10	100%	$3,212	$0
									Total	$651,600	$488,700	$87,746	5.57		$87,746	$0
5	Fair Oaks Avenue & Huntington Avenue	Signalized intersection	CUSTOM		Reduce turn radius of the curve to discourage speeding; add bicycle lanes on each direction	Sideswipes, bicycle collisions, unsafe speed collisions	100%	20	9	$495,600	$1,982,400	$1,117,128	1.77	0%	$0	$1,117,128

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#	Location	Location Type	No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit	Cost ($)	Benefit/ Cost Ratio	HSIP Max Share	HSIP Amount	Local Amount
6	Fremont Avenue & Huntington Avenue	Signalized intersection	CUSTOM		Remove existing right-turn lane on westbound approach and remove island that separateds right-lane from through lanes, create curb extension on northeast corner of the intersection, create new frontage road on north side of Huntington Drive; Extend westbound left-turn pocket.	Sideswipes, rear ends, bicycle collisions, unsafe speed collisions	100%	20	4	$195,700	$782,800	$190,421	4.11	0%	$0	$190,421
			R36	Add bike lanes	Add bike lane (both directions)	Bike collisions	35%	20	1	$11,800	$16,520	$20,601	0.80	90%	$18,541	$2,060
			S19	Install ped countdown signals	Replace existing push button with ADA compliant push button at all four corners	Pedestrian & bike	25%	20	1	$11,800	$11,800	$20,148	0.59	100%	$20,148	$0
			S1	Add lighting	Replace HPS ligth fixtures with LED light fixtures at all four corners	Night collisions	40%	20	7	$424,700	$679,520	$11,169	60.84	100%	$11,169	$0
									Total	$644,000	$1,490,640	$242,339	6.15		$49,858	$192,481
7	Arroyo Drive & Pasadena Avenue	Non-signalized intersection	R36	Add bike lanes	Add bike lane (east approach, both directions), add shark teeth for SBR movement, add guidance signage.	Bike collisions	35%	20	3	$278,500	$389,900	$122,073	3.19	90%	$109,866	$12,207
8	Mission Street & Pasadena Avenue, Arroyo Drive & Stoney Drive & Mission Avenue	Non-signalized intersection	CUSTOM	Change alignment	Create a curb extension on northeast side (westbound approach of Mission Street), extend limit line connecting Mission Street east and Pasadena Avenue.	CUSTOM	50%	20	5	$205,300	$410,600	$96,550	4.25	0%	$0	$96,550
9	Pasadena Avenue between Arroyo Drive and West City Limit	Roadway Segment	R36	Add bike lanes	Add bike lanes from Arroyo Drive to west City limit	Bike collisions	35%	20	1	$61,300	$85,820	$127,337	0.67	90%	$114,603	$12,734
10	Fair Oaks Avenue from Columbia Street to Monterey Road	Roadway Segment	R36	Install bike lanes	Paint a 5-foot bike lane along the concrete gutter of Fair Oaks Avenue, both northbound and southbound, stretching from northern city limit at Columbia Street down to Monterey Road (no parking will be impacted). Dash bike lane striping on approaches to intersections and across intersections. Highlight approaches with dashed green markings and intersection crossings with solid green markings. Install advance warning signs that bicyclists may be on the road- W 11-1 and W16-1P. Install "No Turn on Red" regulatory sign at intersections to increase bicycle safety and decrease crashes with right-turning vehicles	Bike collisions	35%	20	14	$6,610,600	$9,254,840	$1,165,080	7.94	90%	$1,048,572	$116,508
			(none)		Repaint faded crosswalks	(none)			0	$0	$0	$27,623	0.00	0%	$0	$27,623
									Total	$6,610,600	$9,254,840	$1,192,703	7.94		$1,048,572	$144,131

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#	Location	Location Type	No.	Countermeasure	Work Description	Collision Type	CRF	Project Life (years)	Number of Preventable Collisions	Total Collision Costs	Benefit	Cost ($)	Benefit/ Cost Ratio	HSIP Max Share	HSIP Amount	Local Amount
11	Fremont Avenue from Columbia Street to Monterey Road	Roadway Segment	R1	Add lighting	Install street lights along corridor	Night collisions	35%	20	26	$995,400	$1,393,560	$247,835	5.62	100%	$247,835	$0
			NS7	Install flashing beacons at Stop-Controlled Intersection	Install Rectangular Rapid Flashing Beacon (RRFB) at Fremont Avenue and Oxley Street	Pedestrian & bike	30%	10	12	$870,900	$522,540	$58,546	8.93	100%	$58,546	$0
			R28	Install curve advance warning signs	Install warning sign for the street curvature roadway north of Foothill Street, heading northbound- W 1-2	Vicinity of warning sign (rear end)	25%	10	2	$73,100	$36,550	$1,460	25.03	100%	$1,460	$0
									Total	$1,939,400	$1,952,650	$307,841	6.34		$307,841	$0
12	Monterey Road from Fair Oaks Avenue to Pasadena Avenue	Roadway Segment	R32	Install edge-lines and centerlines	Install edge line striping along the Monterey Road corridor from Fair Oaks Avenue to Pasadena Avenue	Vicinity of edgeline	25%	10	20	$870,700	$435,350	$24,820	17.54	100%	$24,820	$0
			(none)		Repaint existing striping to a conventional striping for the eastbound roadway from Fairview Avenue that lead to the right-turn lane on Fair Oaks Avenue.	(none)			0	$0	$0	$1,114	0.00	0%	$0	$1,114
									Total	$870,700	$435,350	$25,934	16.79		$24,820	$1,114
13	Meridian Road from Monterey Road to Alhambra Road	Roadway Segment	R1	Add lighting	Extend the existing street light arms where blocked by trees and increase the wattage to improve nighttime visibility.	Night collisions	35%	20	9	$205,200	$287,280	$121,472	2.36	100%	$121,472	$0
			CMF		Install speed humps	All collisions	40%		20	$776,100	$0	$197,100	0.00	0%	$0	$197,100
									Total	$981,300	$287,280	$318,572	0.90		$121,472	$197,100
14	Huntington Drive from Leman Street to Maple Street	Roadway Segment	R36	Install bike lanes	Install Class II bike lane in both directions	Bike collisions	35%	20	6	$507,500	$710,500	$25,842	27.49	90%	$23,258	$2,584
			R1	Add lighting	Extend the existing street light arms and upgrade all the light bulbs to LED lights, which could improve nighttime visibility for pedestrians and motorists.	Night collisions	35%	20	28	$1,974,600	$2,764,440	$175,492	15.75	100%	$175,492	$0
									Total	$2,482,100	$3,474,940	$201,334	17.26		$198,750	$2,584
15	Fremont Avenue from Monterey Road to Alhambra Road	Roadway Segment	R1	Add lighting	Extend the existing street light arms and upgrade all the light bulbs to LED lights, which could improve nighttime visibility for pedestrians	Night collisions	35%	20	21	$882,500	$1,235,500	$65,627	18.83	100%	$65,627	$0

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