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16. ABSTRACT

This report presents the results from a multiyear effort to develop and test performance measures for evaluating the impact of landscaping and roadside features on pedestrian and bicyclist safety and mobility and economic vitality for Caltrans' urban arterial network. The first phase of the study was a literature review, and the second phase focused on developing performance measures. The third phase focused on testing the proposed performance measures consisting of an infrastructure analysis, policy review, safety analysis and a pedestrian and bicyclist intercept survey on two urban corridors in California. The results of the fieldwork indicate that the majority of the proposed performance measures are valid and ready for adoption by Caltrans. The remaining measures require additional testing to produce conclusive results. The study also revealed that drivers, pedestrians, bicyclists, and transit users all request similar roadside design features to improve their perceptions of traffic safety, suggesting that transportation agencies may be able to target a few specific improvements for maximum benefit to all user groups. Finally, the study found that the cities with the most developed pedestrian and bicyclist policies and plans seemed to have commensurate pedestrian and bicycle infrastructure on the ground, suggesting that the policies and plans have a tangible impact on eventual development.

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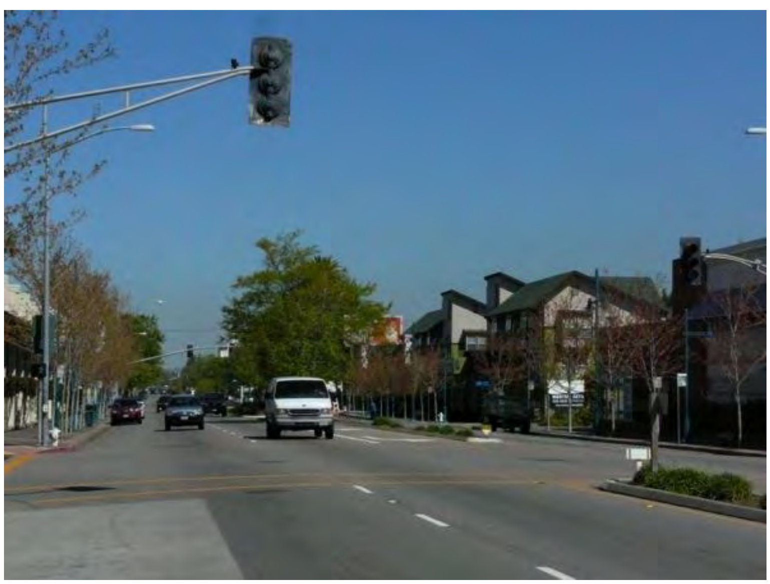
PREPARED BY THE

UC BERKELEY SAFE TRANSPORTATION RESEARCH AND EDUCATION CENTER

FOR THE CALIFORNIA DEPARTMENT OF TRANSPORTATION, DIVISION OF RESEARCH AND INNOVATION, OFFICE OF TECHNOLOGY APPLICATIONS AND DIVISION OF DESIGN, LANDSCAPE ARCHITECTURE PROGRAM



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DECEMBER 31, 2012

REBECCA SANDERS, MCP

ASHLEIGH GRIFFIN, MS, MCP

KARA E. MACLEOD, MPH, MA

JILL F. COOPER, MSW

DAVID RAGLAND, PHD, MPH

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Traffic counts were gathered by Quality Counts in the San Francisco Bay Area and by Quality Traffic Data, LLC in Los Angeles.

Intercept surveys were performed by Ewald & Wasserman Research Consultants at all locations.

Table of Contents

List of Figures

List of Tables

Executive Summary

Over the past decade, the California Department of Transportation (Caltrans) has committed to increased integration of Complete Streets elements such as enhanced pedestrian crossings, context-sensitive design features that can attract pedestrians, and bicycle racks and facilities, especially through Deputy Directive DD-64-R1. In 2007, Caltrans teamed with the University of California Transportation Center and the Safe Transportation Research and Education Center (SafeTREC) at Berkeley to investigate the effects of transportation corridors' features on safety, mobility and economic vitality. The specific goals of the investigation were to: 1) explore the relationship between landscape and roadside features and road user safety and behavior; 2) create a framework of performance measures for pedestrian and bicyclist safety and mobility, and environmental sustainability; 3) examine driver behavior and safety; and 4) understand how pedestrian and bicycle mobility can affect the economic vitality of an area. This research project has been conducted in three phases: a literature review, performance measure development, and field-testing of the performance measures.

For the literature review, the research team examined approximately 165 studies dealing with the effects of transportation corridor design features on user safety; walkability, bikability, and physical health; psychological well-being; community and economic vitality; and varying environmental concerns. The cumulative literature review research findings point to some key guidelines to make the design of urban arterials more accommodating to non-motorized travelers and environmental stewardship. The literature review was published in 2008 under the title *The Effects of Transportation Corridor Roadside Design Features on User Behavior and Safety, and Their Contributions to Health, Environmental Quality, and Community Economic Vitality: A Literature Review*.

After completion of the literature review, the research team turned its attention to the development of performance measures within a framework that is directed toward conventional highways. Research and observation suggests these are the highways on which the greatest conflicts between motorized and non-motorized traffic occur, and where local quality of life is most impacted by design of the highway facility. The proposed performance measure framework is based on the research findings from the literature review, and modeled after Caltrans' current performance measurement system. The document *Performance Measures for Complete Green Streets: a Proposal for Urban Arterials in California* was published in 2010.

The final phase of the research project focused on field testing the proposed performance measures for validity and reliability. This entailed gathering data on multiple aspects of two key urban arterial conventional highway corridors: San Pablo Avenue in the East San Francisco Bay Area, and Santa Monica Boulevard in the Los Angeles area. The analyses looked at street design features; rates of pedestrian, bicyclist, and driver injuries and fatalities; jurisdictional policies pertaining to non-motorized transportation; and user perceptions of safety and mobility. Finally, baseline data, including street design features and intercept surveys, were collected along a portion of Highway 82 in San Jose in the South San Francisco Bay Area. Complete Street improvements are anticipated on Route 82 over the next few years.

Among the conclusions of this research efforts are:

- Several of the proposed performance measures concerning pedestrian and bicycle safety showed potential appcability within Caltrans' current practices for driver safety. These new measures will require the collection of pedestrian and bicyclist volumes and the calculation of pedestrian and bicycle crash rates. This data is not currently collected as part of Caltrans standard practices. Caltrans should begin to use the capabilities of their existing data collection processes, such as SWITRS, to collect pedestrian and bicyclist data. The Department should also develop and deploy new data collection processes as necessary to implement these performance measures.
- Urban arterials that include design features such as street trees, landscaping, street lighting, bicycle lanes, trash receptacles, public art and other beautification measures attract all user groups (drivers, pedestrians, bicyclists, and transit users) to the area more often, contributing to improved economic vitality along the corridor. Clean, well-maintained roadways and sidewalks were also found to attract all user groups to visit urban arterial corridors more often and further improve economic vitality.
- Intercept surveys, which were completed by people who had stopped at some point along the corridor, revealed that increased mobility and perceived safety along urban arterial corridors can be attained for all user groups (pedestrians, drivers, bicyclists, and transit users) through the installation of bicycle lanes, improved pedestrian crossings (e.g., flashing lights, longer crossing time, and reduced wait time to cross), slower traffic and improved driver behavior, more traffic signals, and increased street lighting.
- Cities, counties, and local agencies that have aggressively pursued pedestrian and bicycle improvements in transportation plans have a corresponding greater number of pedestrian and bicycle facilities than those places that have not, indicating that policies and plans do positively affect the design of highway corridors. This suggests that Caltrans should review and update all of its highway planning and design guidance as necessary to address bicycle and pedestrian policies and improvements.
- While policies can lead to better facilities, and landscape design features make environments more comfortable and enjoyable, multimodal urban corridors face additional challenges of increased vulnerable roadway users and persistent motor vehicle traffic. As with any complex environment, care should be exercised to maximize safety and comfort for all roadway users, particularly for areas known to be problematic, such as within the sight triangle.

The mix of factors that affect safety on an urban corridor is complex. Studies suggest that there are roadside design features that can encourage pedestrians and bicyclists to visit an area, but the effects of these features may be completely nullified if the speed limit is beyond a certain level, or if automobile traffic volumes are so high that pedestrians and cyclists consistently feel at risk. Research in this area could be furthered by: 1) developing and validating various composite measures that account for the effects of multiple elements; 2) improving measurements of pedestrian and bicycle exposure; 3) understanding how the needs of through traffic, which does not stop, and traffic that does stop along the corridor overlap and/or differ in their desire for corridor roadside design; and 4) observing pedestrian, driver, and bicycle behavior in the context of various design, facility, and countermeasure features. This report will assist in furthering the implementation of transportation corridor design features that enhance the interrelated outcomes of mobility, perceived safety and traffic safety along urban arterials.

I. Introduction

Beginning in 2007, the California Department of Transportation (Caltrans) teamed with the University of California Transportation Center and the Safe Transportation Research and Education Center (SafeTREC) at Berkeley to explore the relationship between landscape and roadside features on road user safety and behavior and to create a framework of performance measures for pedestrian and bicyclist safety and mobility, and environmental sustainability. The project also examined driver behavior and safety, in particular how driver behavior can adversely affect pedestrian and bicyclist safety and mobility through speeding, turning without yielding, etc. In addition, the project examined how pedestrian and bicycle mobility can affect the economic vitality of an area.

As the project required field-testing the performance measures for validity and ease of application, the multijurisdictional corridor of San Pablo Avenue (SPA), traversing cities of Oakland, Emeryville, Berkeley, Albany, and El Cerrito in the eastern San Francisco Bay Area, was designated as the first test corridor. San Pablo Avenue was chosen because of the variety inherent in the street, in particular with regard to the presence of street trees and medians, the quality of the sidewalk and the land uses. In addition, several previous Caltrans research studies had examined the SPA Corridor for specific aspects of traveler safety not investigated in this project (e.g., pedestrian walking speed in relation to given crossing time at an intersection), and we felt the current research could build on that knowledge. The investigation included an analysis of the street design features along San Pablo Avenue; rates of pedestrian, bicyclist, and driver injuries and fatalities; local, regional, and state policies pertaining to non-motorized transportation; and pedestrian, driver, bicyclist, and transit user perceptions of safety and mobility.

The second test corridor selected was a portion of Santa Monica Boulevard (SMB) in West Hollywood and Los Angeles. Similarly to San Pablo Avenue, the analysis investigated street design features; rates of pedestrian, bicyclist, and driver injuries and fatalities; local, regional, and state policies pertaining to non-motorized transportation; and pedestrian, driver, bicyclist, and transit user perceptions of safety and mobility. Santa Monica Boulevard was selected as the second test corridor because of its abundance in street design features, the history of these street design features, and the variety of features throughout the corridor. A reconstruction project featuring many pedestrian and bicyclist design elements was completed in the West Hollywood portion of the corridor in 2001, providing the research team with ten years worth of collision history to analyze following the installation of the pedestrian and bicyclist elements. The corridor contains many elements that the San Pablo Avenue lacks, allowing the research team to further validate performance measures. The difference in design elements throughout the corridor provides the opportunity to conduct a cross-sectional analysis to evaluate how behavior, mobility, and safety vary in locations of the corridor with abundant features compare with locations in the corridor that lack these features. This chapter introduces the report and briefly describes the various phases, each contained within a single chapter.

Overview

California's transportation corridors must meet many needs. They serve multiple travel modes—motorized (cars, trucks, and transit vehicles) and non-motorized (pedestrians and bicyclists), and local, regional, and interregional traffic. They are a central feature in many urban and suburban neighborhoods and rural communities. Historically, transportation corridors have been designed primarily to maximize the throughput of motorized vehicle traffic. Recently, however, members of local communities and others have begun to question the wisdom of this approach, and have begun to push for transportation corridors that are designed to meet local needs as well as throughput needs, and that safely accommodate multiple travel modes. These efforts are supported by an increasing focus among city planners, designers, transportation engineers, and public health practitioners on enhancing the quality of life within communities. Local community quality of life is adversely affected by the presence of high volumes of motorized traffic moving much faster than pedestrians and bicyclists and thus diminishing roadway safety; increasing levels of obesity that may, in part, be related to community design characteristics that diminish walkability and bikability and hence contribute to reduced levels of physical activity; increases in air and water pollution levels due to automobile and truck traffic; and a growing population of aging adults who may lose their mobility if options other than driving alone are not provided.[1]

The design of transportation corridors communicates many things to its users, and the message it sends can affect the travel mode a user decides to take, the speed at which a motorist decides to drive, whether a pedestrian will walk along or across a street, and whether a resident will bicycle to local shops. Design elements give visual cues to the users of transportation corridors that let them know what needs have been prioritized and what behavior is expected. The vehicle lane widths, presence or absence of sidewalks and bicycle lanes, and presence or absence of buffering elements such as street trees and parked cars all influence a user's perceptions and resulting behavior responses. Is it safe and pleasant to walk here? Can I safely cross the street? Can I drive fast here, or should I slow down? For these reasons, the Complete Streets movement aims to encourage street design that clearly welcomes all users: pedestrians, bicyclists, drivers, and transit and truck traffic where applicable.

Across the United States, departments of transportation are increasing their use of performance measures to assess the operation of transportation systems. However, assessment is generally limited to monitoring whether departmental goals are being achieved cost effectively or are generating net benefits, and how those benefits are being distributed. The impacts of particular transportation corridor design features on the local quality of life cannot be evaluated under these performance measurement systems. Although corridor design elements that support livable and sustainable communities have been identified through numerous research studies, their individual and cumulative quality of life impacts have been particularly difficult to quantify and measure, resulting in these elements being difficult to justify and prioritize, especially in times of limited funding. However, as public

[1] For this reason, in 2009 AARP endorsed the national Complete Streets Act and published a platform that urges Congress to include the Complete Streets Act in the authorization of the next federal surface transportation program. Retrieved June 25, 2009 from: http://www.aarp.org/makeadifference/advocacy/GovernmentWatch/StrongCommunities/articles/aarp_one_minute_guide_complete_streets_act.1.html#

health and environmental needs, such as global climate change, obesity, and needed alternatives to fossil fuels, continue to motivate a new way of planning for mobility, Complete Streets principles become more widely utilized and mandated, and the numbers of people who walk and bicycle grow, the importance of quantifying the quality of life impacts of specific corridor design elements and developing measures to assess performance toward quality of life goals will only increase (Bernstein, Bosch et al., 2007; National Complete Streets Coalition, 2009).

Within the planning and transportation fields, some research has been conducted on the broadly conceived safety impacts of corridor design elements on all roadway users, including the effects of narrower vehicle lane widths, parked cars, street trees, bicycle lanes, and wider sidewalks. In addition, models of ideal "main streets" have been developed. However, few defensible performance measures exist for assessing the user safety, public health, economic vitality, multimodal mobility, and quality of life effects of various corridor design elements. Certainly, no comprehensive framework of such measures presently exists. Creating such a framework based on defensible research findings will assist transportation and planning professionals and policy makers in maximizing the potential public benefits associated with investments in highway right-of-way facilities and associated community networks, systems, and land use environments.

The adage justifying performance measures is "what gets measured gets done." In order to ensure the design and development of Complete Streets, transportation agencies need a more robust system of performance measures including new measures for non-motorized safety and mobility. Recognizing this need, Caltrans initiated this project with a research team from UC Berkeley Safe Transportation Research and Education Center (SafeTREC). The research team examined the effects of transportation corridor design features on user behavior and safety, the environment, public health, and community economic vitality, and the creation of defensible performance measures derived from the research that could be used by the Agency. The research effort was undertaken in three phases: a comprehensive literature review, the development of performance measures, and the field-testing of those measures. This report summarizes the literature review and performance measures development phases, and describes in detail the field-testing conducted for the proposed *Complete, Green Streets Performance Measure Framework for Urban Arterials*.

Focus of the Performance Measure Framework

As evidenced by its name, the performance measure framework has three key aspects:

- Applicability to Urban Arterials
- A focus on creating Complete Streets
- A focus on creating Green Streets

This emphasis derives from the findings of the Literature Review and also reflects and adopts the terminology of two important street design "movements" built in part on those findings.

Rationale for the Focus on Urban Arterials

The focus is on conventional highways, known hereafter in this report as "urban arterials," rather than all Caltrans highway types, because research and observation suggest these are the highways where most conflicts occur between motorized and non-motorized traffic, and where highway design has the biggest impact on local quality of life issues. As corridors that typically have a high concentration of commercial and retail attractions, often in addition to multi-family residential buildings, urban arterials act as a magnet to all types of traffic. However, this may create a situation wherein pedestrians and bicyclists feel and are less safe, due to high amounts of vehicular traffic. As a corollary effect, people may choose not to walk or bicycle in and through these areas, limiting mobility by these modes and thus reducing opportunities for physical activity. Vehicular traffic also negatively affects the immediate environmental quality, through releasing emissions during times of congestion and regular driving that pollute the air and exacerbate urban heat island effects caused by heat radiating from non-permeable surfaces.

Pedestrian and bicycle crashes also occur on rural highways; however, this report focuses on urban areas because of the greater population density and potential for walking and bicycling, and because performance measures for rural areas already exist in the Caltrans system.

The Complete Streets Concept

Adopting Complete Streets terminology throughout the performance measurement framework recognizes and incorporates recently approved state policies, enacted state legislation, and internal agency directives that either encourage or require Caltrans to move toward a highway system that reflects the Complete Streets concept. Although Caltrans currently focuses on meeting state and regional goals of moving motor vehicles at a high level of service (LOS), there is growing recognition that the existing roadway designs and standards often conflict with local, regional, and state needs and goals. Many of these goals are directed at encouraging pedestrian and bicycle travel and reducing air pollution from motor vehicles, and have come to be represented by the Complete Streets movement, which urges that transportation facilities be *"planned, designed, operated, and maintained to provide safe mobility for all users, including bicyclists, pedestrians, transit riders, and motorists appropriate to the function and context of the facility."*

In California, *Assembly Bill 1358: The Complete Streets Act* was passed by the legislature in 2008, representing statewide recognition of the need to provide for all users of the transportation system (Leno 2007). In addition, Caltrans issued *Deputy Directive 64-R1: Complete Streets – Integrating the Transportation System*, which mandates the provision of bicycling and walking facilities along Caltrans' roadways (except where prohibited, such as limited access expressways) (Caltrans 2008). DD-64-R1 demonstrates Caltrans' commitment to a multimodal transportation system, and AB 1358 builds on a national movement for Complete Streets, as well as on local policies already in place throughout California. The Complete Streets concept and these two specific initiatives, which will be discussed in more detail later in this report, provide the basis on which the performance measure framework presented in this report was developed.

Complete Streets principles should benefit Californians in multiple ways. First, they should result in safer and more convenient roadways for Californians who walk, bicycle, or use transit. Second, the enhanced safety may encourage more people to choose active transportation, possibly resulting in greater health benefits from travel, as well as further increasing safety due to the principle of "safety in numbers" (Jacobsen 2003). Third, increases in active travel may lead to reductions in traffic congestion, auto-related air pollution, and the production of climate-changing greenhouse gases. Although it is difficult to estimate how much environmental impact increased walking and bicycling could have, Assemblyman Mark Leno has anecdotally suggested that if every Californian substituted just one car trip per month with a bicycle trip, nearly 4,000 tons of carbon dioxide would be saved per year (Leno 2007).

An important final aspect of building Complete Streets is that it makes fiscal sense, particularly as world demand for resources grows and the future looks to be more constrained regarding energy, building materials, and other goods. When sidewalks, bicycle lanes, transit amenities, and safe crossings are integrated into the initial design of a project, costly retrofits are avoided. In addition, providing for multimodal transportation from the beginning will have immediate benefits to roadway infrastructure, by providing instant alternatives to driving within a community. In general, automobiles wear down roadways exponentially more quickly than bicyclists or pedestrians. Providing opportunities for travel via non-motorized modes may pay dividends in the form of reduced maintenance per user.

It should be noted that although Complete Streets terminology is used throughout the proposed performance measurement framework, transit related issues are not addressed. This is because the Literature Review did not cover these issues due to scope and budget limitations. It is hoped that in the future, additional research can be directed at filling this gap.

The Green Streets Concept

A second concept that is gaining momentum within transportation agencies across the United States is that of Green Streets. Incorporating Green Streets terminology into the performance measurement framework is an attempt to encourage Caltrans to take a leadership role in this important environmental movement. Green Streets (City of Portland 2007) are defined as streets that maximize permeable surfaces, tree canopy and landscaping elements in order to:

- Divert storm water from the sewer system and reduce basement flooding, sewer backups and combined sewer overflows
- Reduce polluted storm water entering rivers and streams
- Improve pedestrian and bicycle safety;
- Reduce impervious surface so storm water can infiltrate to recharge groundwater and surface water
- Increase urban green space
- Improve air quality and reduce air temperatures
- Reduce demand on sewer collection system and the cost of constructing expensive pipe systems
- Address requirements of federal and state regulations to protect public health and restore and protect watershed health

Although no states have adopted Green Streets policies, many agencies are conducting research to determine the feasibility of incorporating some Green Streets principles into their roadway design practices. At the federal level, staff at the Environmental Protection Agency

(EPA) are currently working to develop street design performance metrics that are inclusive of green infrastructure practices. At the regional level, Oregon's Metro Portland has adopted design guidelines for Green Streets, and the City of Portland is actively building city streets in accordance with them. During a recent EPA webinar on Green Streets, many DOTs stated that their agency was beginning to address Green Streets principles through roadway design (Wilson 2009).

It should be noted that although Green Streets terminology is used in the proposed performance measurement framework, the only Green Streets ideas that are addressed with new measures involve the provision of more street trees and the reduction of non-permeable surfaces along urban arterials. These areas have been well researched and provide a solid starting place for Caltrans to begin addressing environmental impacts of street design. It is hoped that future research efforts could lead to the creation of performance measures addressing other green streets elements, particularly elements other than tree canopies that can simultaneously provide benefits like storm water retention while beautifying pedestrian space, such as bioswales or rain gardens.

Caltrans' Current Use of Performance Measures

Caltrans describes performance measures as "a necessary part of the California transportation plan…that can be used to determine whether the California Department of Transportation…is successfully meeting the state's transportation goals…" (California DOT 2009). The agency currently uses performance measures to monitor the performance and progress of the transportation system throughout the State of California, and is working with local communities to encourage the use of performance measures in decision-making.

Caltrans' current performance measures framework is structured around a set of strategic agency goals. While Caltrans' stated mission is to "improve mobility across California," it has developed a set of five goals that encompass a broader range of concerns (California DOT 2007). The goals are:

1. *Safety*: Provide the safest transportation system in the nation for users and workers.
2. *Mobility*: Maximize transportation system performance and accessibility.
3. *Delivery*: Efficiently deliver quality transportation projects and services.
4. *Stewardship*: Preserve and enhance California's resources and assets.
5. *Service*: Promote quality service through and excellent workforce.

A series of objectives has been identified for each goal, and performance measures have been established that are intended to monitor the agency's progress toward each objective. The objectives set specific timeframes and numerical targets that are coordinated with the Strategic Plan that Caltrans adopts every five years. The current performance measure framework contains 26 objectives supported by 57 performance measures, the full list of which can be found in Appendix A. Caltrans publishes quarterly Performance Measure Reports that track key indicators and annual reports on all of the adopted objectives and measures. At the end of each fiscal year, performance is measured against the targets set in the Strategic Plan and compared with the results of previous years. This annual review allows Caltrans to gauge overall progress toward objectives, and may be used to modify objectives if progress is made at a much different rate than expected.

The hierarchical structure of Caltrans' performance measurement system is based upon the following conceptual diagram and set of definitions:

Goal: The broad, long-term outcome or result the agency will work to realize.

> ***Objective:*** A finite target the agency will aim to meet, with the year and quantity of change explicitly stated. May contain both short and long-term dates and quantities.
>
> > ***Performance Measure:*** The factor or trend that the agency will monitor, to track progress toward the objective and, ultimately, the goal.

Example (from Caltrans' existing Performance Measure Framework):

Goal: Provide the safest transportation system in the nation for users and workers.

> ***Objective:*** By 2008, reduce the fatality rate on the California state highway system to 1.00 per 100 million vehicle miles traveled and continuously reduce annually thereafter toward a goal of the lowest rate in the nation.
>
> > ***Performance Measure:*** Fatalities per 100 million VMT on the California state highway system.

Evaluation of Caltrans' Current Performance Measurement Approach

Although this report is focused on proposing new performance measures to enhance Caltrans' current system, it should be noted that few state transportation agencies in the United States have performance measurement frameworks that are more sophisticated or progressive. Like Caltrans, most DOTs have for decades concentrated primarily on driver mobility and safety, in keeping with the focus of the highway engineering profession. As that profession continues to expand to include a focus on pedestrians and bicyclists, however, and as the mitigation of harm to the environment continues to grow in priority, all of these agencies will need to measure additional aspects of the transportation system. It is the authors' hope that the new measures proposed in this report will allow California to emerge as a "best practice" state in the area of performance measurement.

Caltrans supported this research to develop standards that could measure the progress toward aspects of its strategic goals related to the Complete Streets directives and Green Streets movement; e.g. measures concerned with the *safety* and *mobility* of non-motorized travelers and *environmental quality*. For example, the measure "The number of fatalities per 1,000,000 VMT" refers to pedestrian and bicycle fatalities, as well as driver fatalities, even though drivers routinely travel thousands more miles per year. Including all three modes in the same measure obscures the actual safety of pedestrian and bicycle travel, which is more accurately measured in the hundreds or low thousands of miles traveled per year. Caltrans has attempted to address the lack of focus on non-motorized transportation through its work on the Strategic Highway Safety Plan (SHSP), although the proposed SHSP goals tend to be programmatic and are still in the development process.

Because of these shortcomings, this research effort sought to develop new performance measures that would allow Caltrans to work towards state and national goals related to multimodal transportation, community quality and environmental stewardship.

Performance Measures: A Means, Not an End
It is important to remember that performance measures are not the end in themselves, but rather a means to an end. The "end" in this case is a safer transportation system that improves mobility and traveler comfort while honoring the State of California through stewardship of environmental and fiscal resources, timely and quality delivery of projects, and service through its workforce.

Structure of the Report
This report is comprised of five chapters, each with a number of sub-sections. This is the first chapter. Chapter II summarizes the research findings from the Literature Review and discusses their relevance and implications for urban arterials. Chapter III discusses the theoretical underpinnings of performance measurement and various approaches in the literature. It also presents the proposed *Complete, Green Streets Performance Measure Framework*, and includes discussion and recommendations related to setting targets and data collection. Chapter IV is the longest, as it elaborates on the third phase of the project. It contains several sections, each devoted to a separate type of analysis and fieldwork. The sections include a traffic injury analysis, a policy and plan analysis for related jurisdictions, an interpretation of the pedestrian and bicyclist intercept survey results, and analysis of the proposed performance measures based on the accumulated data. The final chapter provides conclusions. There are also several appendices containing data related to Phase III.

This report provides Caltrans with tools to better serve an increasingly multimodal California. Although the research and proposals documented in this report are directed toward Caltrans, it is hoped that the information provided, particularly the rationale for the creation of the performance measures, will be useful for state highway departments across the United States and similar agencies elsewhere.

II. Phase I Literature Review

Background

The Literature Review conducted during the first phase of this research project forms the base of the proposed *Complete, Green Streets Performance Measure Framework* that is the focus of this research project. The literature review summarized the state of current knowledge regarding the effects of various corridor roadside design features on community quality of life issues. It addressed all transportation corridors under the jurisdiction of state highway departments, and was concerned with controlled-access freeways, expressways, arterials, and "main street" highways. The focus was primarily on corridor roadsides, rather than vehicle roadbeds, because these are the interface zones between roadways and communities or the rural landscape. Because of their potential contributions to quality of life issues, attention was also paid to non-roadside design elements that contribute to traffic calming, walkability, and bikability, such as travel lane widths, crosswalks, and bicycle lanes. Funding and time constraints, and directives from Caltrans, necessarily limited the scope of the literature review and therefore transit-related roadside design elements, such as bus shelters or transit lanes, or quality of life effects of neighboring land uses were not considered.

Rather than presuming to create a comprehensive review of every piece of applicable research, the researchers sought to include the most recent and relevant research. Approximately 165 studies, journal articles, and reports were reviewed for this phase and additional research published or deemed relevant to this project since the publication of the literature review has also been included in this section. In the summer of 2008, the literature review was circulated in draft form to a Technical Advisory Group composed of leading professionals and academics in the fields relevant to the literature. After incorporating their comments, the Review was published in late fall, 2008. It can be found on the University of California Transportation Center website at http://www.uctc.net/papers/878.pdf.

Findings from the Literature Review

The literature review was organized by broad category of subject matter related to user safety and behavior, health, community economic vitality, and the environment. Herein, only the findings applicable to *urban arterial streets* are presented because the focus of the performance measurement framework is on these streets, rather than all highways types, for the reasons explained in the Introduction to this report. In particular, findings from the literature review indicated that urban arterial streets were where most conflicts occur between motorized and non-motorized users because they typically offer direct movement routes and are usually lined with commercial establishments that attract pedestrians and bicyclists as well as drivers. Additionally, because of the higher number of pedestrians found there than on other highway types, the design of urban arterials has a greater cumulative effect on local quality of life than does that of other highway types.

The research findings are summarized in seven sections focused on the following subject matters: driver safety, pedestrian safety, bicyclist safety, physical health and active transportation, psychological well being, community economic vitality, and environmental effects.

Driver Safety
Studies regarding driver safety and roadside design elements that are applicable to urban arterials have focused mainly on the relationship between speed and driver safety, and whether the presence of roadside trees contributes to or reduces driver safety. Following is a summary of the key findings:

- On urban arterials of all configurations (two-lane undivided, three-lane with center turn, four-lane undivided, four-lane divided), wider lane widths (12-13 feet) are more likely to be associated with higher driver speeds than narrow lane widths (10 feet) (Fitzpatrick, Carlson et al. 2000; Potts, Harwood et al. 2007). Of interest related to this finding is that research indicates that wider travel lanes only marginally increase traffic capacity. Access management or signal synchronization can be employed to offset the minor reduction in capacity caused by designing 11- or 10-foot lanes (Bochner and Daisa 2006).
- Higher highway driving speeds are more associated with vehicle crashes and fatalities than are slower speeds (Richter, Berman et al. 2006).
- Urban arterials with roadside trees, landscaping and pedestrian amenities—in other words, where expectations of lower driver speed is communicated through design—are associated with fewer vehicle collisions than are streets without these design elements, particularly far fewer pedestrian and bicyclist injuries and fatalities (Mok, Landphair et al. 2003; Dumbaugh 2005; Dumbaugh 2006). The reduction in accidents has been shown to hold true for arterials up to six lanes wide and with speeds up to 43 mph.
- Roadside trees that are planted close to the roadway have a greater effect on slowing driver speeds on multilane highways than do trees planted further away. In the study from which these findings come, the closer trees were 6.6 feet from the roadway edge and the further trees were 14.76 feet away (Van der Horst and de Ridder 2007).
- On urban highways, wide traffic lanes and wide shoulders are positively associated with more run-off-roadway accidents whereas the presence of trees is negatively associated (Lee and Mannering 1999).
- A national study of crash data found that roadside trees are involved in less than 1% of urban accidents and less that 0.001% of fatal urban accidents (Wolf and Bratton 2006). In addition, a review of numerous research studies concluded that roadside trees posed no significant safety risk (Dixon and Wolf 2007).
- Simulator studies indicate that drivers perceive urban streets with trees to be safer than urban streets without trees (Naderi, Kweon et al. 2008).
- Simulator studies indicate that closely spaced street trees (25 feet apart) that come up to the intersection—if properly selected, adequately space, and pruned for high branching—do not create a strong visibility problem for drivers, but parked cars near intersections do (Macdonald 2006).

The findings regarding driver speed are extremely important because driver speed affects not only driver safety but also that of pedestrians and bicyclists. If a driver is going too fast in an urban area, where a bicyclist could swerve to miss a pile of debris or a pedestrian could unexpectedly step off a curb, the driver will likely not have enough time to slow down and safely avoid hitting the unprotected pedestrian or cyclist (Ivan, Garder et al. 2001). Tragically, pedestrians and cyclists can sustain serious injuries when hit by a car going just 25 mph, a slow speed along many urban arterials, and fatal injuries can occur at 35 mph, which is a common speed in many urban areas (Leaf and Preusser 1999).

Fast driver speeds are also associated with low perceptions of safety for pedestrians and cyclists, creating a hostile environment that tends to discourages walking and cycling (Parkin, Wardman et al. 2007). Therefore, the research suggests that as long as driver speeds on urban arterials remain high enough to endanger pedestrians and bicyclists, extra steps should be taken to both *protect* and *encourage* walking and bicycling. The findings regarding roadside trees and driver safety are important because of the multiple quality of life benefits trees provide, as will be discussed in a later section.

Pedestrian Safety

Concern for pedestrian safety on urban arterials is well-founded because research shows that most pedestrian fatalities (85%) occur on non-local streets (Anderson, McLean et al. 1997). Fortunately, the research also suggests that achieving greater pedestrian safety along urban arterials can be accomplished through design. The key findings from the literature review are as follows:

- Urban arterials that have "main street" characteristics (sidewalks, crosswalks, on-street parking, stop signs, mixed land use, posted speeds of 30 mph or less, large amounts of pedestrian traffic) were found to have much lower numbers of pedestrian injuries than those with a commercial strip character (no sidewalks, no traffic controls, wide curb cuts or no curbs at all, no on-street parking, posted speeds above 30 mph) (Ossenbruggen, Pendharkar et al. 2001).
- In 2002, nearly 23% of motor vehicle/pedestrian crashes in the U.S. occurred while pedestrians were in a crosswalk, over 96% of these accidents occurred at intersections, and approximately one-third resulted in severe or fatal injury (Ragland and Mitman 2007).
- Higher driver speeds are associated with less yielding to pedestrians at crosswalks (Ivan, Garder et al. 2001).
- Although marked crosswalks alone may be effective on low-volume (10,000 ADT or less) urban arterials, research clearly demonstrates that arterials with higher traffic volumes need additional safety features to consistently achieve driver yielding (Fitzpatrick, Turner et al. 2006).
- The presence of a marked crosswalk at an urban arterial intersection is associated with less mid-block jay-walking by pedestrians and slightly decreased driver speed approaching the intersection, particularly where there are multiple traffic calming treatments, such as overhead warning lights, pedestrian refuge island, pedestrian activated in-roadway lighting, and advance yield signage (Huang and Cynecki 2001; Knoblauch, Nitzburg et al. 2001; Dulaski 2006).
- Marked crosswalks at unsignalized locations along multi-lane arterials (intersections or mid-block) have been found to be dangerous for pedestrians because drivers in far lanes often fail to stop. However, such crosswalks become much safer when they supplemented with flashing lights or red beacons (95% motorist compliance rates were observed), especially on all multi-lane roadways and in areas with high volumes of fast-moving traffic (Zegeer, Stewart et al. 2005; Fitzpatrick, Turner et al. 2006; Ragland and Mitman 2007).
- At both signalized and unsignalized locations along urban arterials, crosswalks supplemented with in-pavement warning lights were found to be highly successful in encouraging driver yielding and somewhat successful at decreasing pedestrian jay-

walking, particularly in areas of moderate to intense pedestrian traffic (Whitlock and Weinberger Transportation 1998; Godfrey and Mazzella 2000; Hakkert, Gitelman et al. 2002; Rousseau, Miller Tucker et al. 2004; Abdelghany 2005).

- Along urban arterials, pedestrian countdown signals at intersections were found to be associated with safer crossing behavior by pedestrians (Eccles, Tao et al. 2004).
- In a study of New York City intersections where right turns on red were allowed, the installation of leading pedestrian intervals was associated with significantly reduced crash rates (King 2000).
- In a given area, the likelihood of a pedestrian being injured or killed by a collision with a motorist decreases as the number of people walking increases. The principle of "safety in numbers" suggests that to increase pedestrian safety overall, greater rates of walking should be encouraged, as this leads to increased driver awareness and subsequently safer driving around pedestrians (Jacobsen 2003).

Bicyclist Safety

Research related to the design of urban arterials and bicycling safety is not as yet very robust. Most research studies concerning the safety of particular design elements have focused on bicycle sidepaths, long eschewed from U.S. transportation engineering practices. However, because many research studies are currently in progress it is likely that the field will evolve quickly to provide a greater understanding of how various treatments, such as painted bicycle lanes, bicycle boxes, and separate bicycle signals, affect bicycle safety. Meanwhile, Jacobsen's study on "safety in numbers," cited above, applies equally to bicyclists, as can be seen in the statistics from Portland's years of bicycle counts and crash data from bridge crossings (Portland Office of Transportation 2008).

Considerable literature does exist on bicyclists' preferences regarding bicycle facilities, which are often linked to their perceptions of safety, as well as associations between the presence of bicycle facilities and increases in the number of bicycle trips. This literature is discussed below, in the Bikability section.

Physical Health and Active Transportation

Research suggests that good physical health leads to better quality of life and that community design that encourages active living can contribute to better physical health. A growing understanding of these cross effects combined with growing concerns about what seems to be an obesity epidemic in the United States, has led to increased linkages between the public health fields and the built environment fields. For instance, the American Academy of Pediatrics recently released a policy statement on the importance of designing communities that encourage children to use active transportation modes (Committee on Environmental Health - American Academy of Pediatrics 2009). The authors emphasize that children and others need more opportunities for "incidental physical activity," such as the ability to walk or bicycle to school or to the store for an unplanned trip. The importance of providing sidewalks and bicycling facilities for active travel and recreation is underscored. A recent report by Cycling England details all of the ways in which bicycling can help fight obesity and other chronic diseases (Cavill and Davis 2007), and numerous studies have found that walking and bicycling can significantly contribute to meeting nationally recommended goals for physical activity (Cooper, Page et al. 2003; Saelens, Sallis et al. 2003; Frank, Saelens et al. 2007; McDonald 2007).

The literature review focused on research related to walkability and bikability. Key findings are as follows:

Walkability

- Numerous research studies suggest that urban form influences whether or not a community is walkable. Elements found to be positively associated with walkability that have applicability to the design of urban arterials include the connectivity of a community's street system, the presence of sidewalks, and pedestrian pathways that are visually stimulating and scaled to pedestrians (Litman 2004; Handy 2005; Southworth 2005; Lee and Vernez Moudon 2006; Saelens and Handy 2008).
- People who live in walkable neighborhoods walk more than those who do not, even controlling for self-selection, and that they are generally less likely to be overweight or obese (Saelens, Sallis et al. 2003; Frank, Saelens et al. 2007).
- Related literature suggested that people are willing to walk farther than commonly assumed (one-half mile versus one-quarter mile) for utilitarian purposes (Schlossberg, Weinstein Agrawal et al. 2007).
- Research on pedestrian level of service (LOS) at signalized intersections indicates that conflicts with turning vehicles, as well as the volume and speed of perpendicular traffic, have the most negative effect on pedestrians' perceptions of comfort (Petritsch, Landis et al. 2004).
- Along arterial streets, perceived pedestrian LOS was found to decrease in correlation with the total width of driveway and intersection crossings, as well as the amount of traffic on the adjacent roadway (Petritsch, Landis et al. 2006).
- Pedestrian LOS for mid-block crossings was found to increase as the width of painted or raised medians increased, and when a crosswalk and/or pedestrian signals were present (Baltes and Chu 2002).
- Pedestrians were found to be more sensitive to delay than those driving or taking transit, perhaps due to climatic concerns (Rajamani, Bhat et al. 2002).
- The presence and number of street trees was found to positively influence the propensity to walk along a street (Lee and Vernez Moudon 2006; Lee and Vernez Moudon 2008).
- Streets with high volumes of traffic may act as barriers to pedestrians attempting to cross them, and thus may discourage walking (Schlossberg and Brown 2004; Litman 2008).

Bikability

Although not much research exists regarding bicyclists' preferences for new types of bicycle facilities, solid research on the use of and preference for bicycle lanes and paths has been conducted in the last few years. In particular, cities such as Portland, Oregon, and New York City continue to innovate and publish their findings regarding new bicycle facilities in the United States. The findings below represent the best of what is currently known and applicable to urban arterials.

- A national study found that in cities with populations over 250,000, each additional lane of Class II bicycle lanes per square mile was associated with an approximately one point increase in the percentage of bicycle commuters (Dill and Carr 2003).
- Likewise, a study at the neighborhood scale found a positive association between the

presence of bicycle lanes and paths in a neighborhood and the amount of bicycling in it (Lee and Vernez Moudon 2008).

- One survey found that perceptions of safety while cycling were associated with frequency of cycling, and that each additional mile of bicycle lane in a city was positively associated with a 5% increase in the likelihood of people to own a bicycle and to have ridden it in the week prior to the survey (Xing, Handy et al. 2008).
- An analysis of comprehensive investment in bicycling facilities in Portland, Oregon, found that a 215% increase in the bicycle network was matched by a doubling of the overall bicycle commute share, and a 210% increase in the number of bicycle trips in the surrounding areas (Birk and Geller 2005).
- A highly connected bicycle network leading to desirable destinations has been found to be positively associated with the number of bicyclists in a city (Birk and Geller 2005; Dill and Voros 2007; Douma and Cleaveland 2008).
- Bicyclists were found to be more sensitive to delay than those driving or taking transit, perhaps due to climatic concerns (Rajamani, Bhat et al. 2002).
- Streets with high volumes of traffic may act as barriers to bicyclists attempting to cross them, and thus may discourage bicycling (Schlossberg and Brown 2004; Litman 2008).
- A study using GPS data from Portland, Oregon, found that cyclists riding for utilitarian purposes rode mainly on facilities with bicycle infrastructure, and that nearly 30% of the travel occurred on streets with bicycle lanes. This study also found that bicyclists often go out of their way to use bicycle facilities, even when it lengthens trip time (Dill and Gliebe 2008).
- Several surveys have documented bicyclists' strongly desire for more bicycle lanes and trails (Gonzales, Hanumara et al. 2004; Vernez Moudon, Lee et al. 2005; Dill and Voros 2007; Wardman, Tight et al. 2007).
- Other studies have evaluated stated preferences using dynamic modeling to determine the balance between commute time and facility quality. The results revealed a clear willingness to travel several minutes longer to get to and ride in a bicycle lane in order to avoid riding in mixed traffic (Hunt and Abraham 2007; Tilahun, Levinson et al. 2007).
- An analysis of perceived cycling risk and route acceptability found that high amounts of auto traffic were associated with increased perceptions of cycling risk, which can be helped, but not completely alleviated, by the presence of bicycle lanes (Parkin, Wardman et al. 2007).
- Research on bicycle LOS found that the presence or absence of a bicycle lane was the most commonly cited reason for giving a roadway a high or low score (Petritsch, Landis et al. 2006).
- Where motorists and bicyclists share lanes, "sharrows" have been found to encourage safer driving and biking behavior (Alta Planning + Design 2004).

Other Aspects of Physical Health

Several studies have documented an increased risk of several health problems, including respiratory ailments, infant mortality, and cancers, in areas with high volumes of diesel truck and auto traffic (Wjst, Reitmeir et al. 1993; Pearson, Wachtel et al. 2000; Kim, Smorodinsky et al. 2004; Houston, Wu et al. 2006). In addition, the United States Global Change Research

Program recently released a report detailing the risks to health global climate change, which include increased risk of extreme weather events and deaths related to extreme heat (such as heat stroke), reduced air quality, and increases in contagious diseases and pollen production (Karl, Melillo et al. 2009). It is therefore increasingly important to mitigate air pollution and the overall effects of global climate change, including rising urban temperatures, as much as possible. The findings described in the Environmental Effects section below demonstrate that the design of urban arterials can help.

Psychological Well Being

Psychological well being is an important quality of life issue and evidence suggests that urban form can have a positive or negative impact. In particular, considerable literature links the presence of trees and greenery with psychological well being. Although few studies have dealt directly with the psychological effects of greenery along urban arterials, the findings from studies of other spaces can be extrapolated to arterials. The main findings are as follows:

- Time spent viewing greenspace or being outside in a calm environment enhanced positive feelings both directly and indirectly by taming stress and frustration, and was associated with improved performance on subject tests (Ulrich 1986; Parsons, Tassinary et al. 1993; Kaplan 1995; Pretty 2004; Maller, Townsend et al. 2005).
- The presence of roadside landscaping has been tied to reduced traffic stress for both drivers and those who live along heavily traveled corridors (Parsons, Tassinary et al. 1993; Cackowski and Nasar 2003).
- Other research found that people generally prefer to live near greenery and mature trees, and that in a lower income area, greenery and mature trees near apartment buildings were associated with greater community interaction (Kuo 2003).

Community Economic Vitality

Whether or not a community is economically vital has an important impact on local quality of life. Unfortunately, there is little research on the relationships between street design elements and community economic vitality. The research that has been conducted underscores that, as prime commercial areas, urban arterials should provide opportunities for pedestrian and bicycle access, as well as amenities such as street trees that enhance pedestrian comfort and therefore encourage foot traffic. The following are the key findings from the literature review:

- Several studies have found that pedestrians, transit users, and bicyclists routinely visit stores along commercial strips in urban areas more often and spend more money overall than do patrons who drive. In two of the studies, pedestrian intercept surveys found that patrons would prefer removing one lane of parking and installing bicycle lanes or widening the sidewalk by a ratio of 4:1 and nearly 5:1, respectively. Results from the third survey also suggested that widening the sidewalk could be very beneficial for the businesses in the area (Schaller Consulting 2006; San Francisco County Transportation Authority 2009; Sztabinski 2009).

Pedestrian improvements to a downtown business area were found to be associated with both increased pedestrian traffic and increased property values (Whitehead, Simmonds et al. 2006).

- Consumers were found to prefer business districts that have landscaping and trees, including those along main street arterials (Wolf 2004; Wolf 2004; Wolf 2005).

Environmental Effects

The theme throughout the environmental literature was that trees in urban areas tend to be overwhelmingly beneficial for communities. In particular, urban trees help mitigate air and water pollution, mitigate urban heat island effects, reduce emissions, retain storm water, and reduce energy consumption through shading adjacent buildings (Heisler 1974; Simpson 1998; Scott, Simpson et al. 1999; Akbari, Pomerantz et al. 2001; McPherson and Simpson 2003; Streiling and Matzarakis 2003). The cumulative benefits of a community's entire urban forest can be substantial. A study of Sacramento County's urban forest concluded that it contributes to approximately $20 million dollars in annual energy saving through shading and the reduction of wind speed and air temperature (Simpson 1998). Another study concluded that California's 177 million urban trees reduce energy used for cooling by 2.5%, for a total savings of almost 1.5 billion dollars annually (McPherson and Simpson 2003). Davis's public urban forest, consisting primarily of street trees, found an annual net benefit of $66 per tree in terms of energy savings, air quality improvements, CO_2 and storm water reductions, and aesthetic values for the city (Maco and McPherson 2003). A study of rainfall interception by trees in Santa Monica, California found that they intercepted 1.6% of total annual precipitation, annually saving the city over $110,000 in avoided storm water treatment and flood control costs associated with water runoff (Xiao and McPherson 2002). A model of urban forest effects on the urban heat island concluded that adding 5 million trees to the Los Angeles metropolitan area would result in an air temperature reduction of 5-7˚ F in the hottest areas (Akbari, Pomerantz et al. 2001).

How does all this relate to urban arterials? The environmental benefits of trees are incredibly important for urban arterials because the high amounts of traffic on these streets contribute to air and water pollution, while the high surface area of non-permeable asphalt contributes to the urban heat island and increased storm water run-off. In addition, urban arterials tend to be lined with numerous energy-consuming buildings. At the same time, they are places where people live, work, shop, and relax and so it is important to design urban arterials in ways that contribute to physical comfort. In addition, common sense suggests they should be designed to help mitigate the local harmful environmental effects they cause. Several complementary strategies can be employed to accomplish this. One strategy is to design urban arterials with facilities for pedestrians and bicyclists, in order to encourage people to drive less and thereby decrease both vehicle energy use and air pollution. A second strategy is to reduce the amount of heat absorbing surfaces on urban arterials, particularly dark asphalt, to address the urban heat island effect. A third strategy is to reduce the amount of non-permeable surfaces on urban arterials, to mitigate storm water run-off. A fourth strategy, which contributes to mitigating all the environmental problems, is to plant significant shade-giving trees along urban arterials.

Specific key findings about trees from the literature review that are applicable to urban arterials are as follows:

- Street trees in urban areas provide significant environmental benefits over their lifetimes that result in significant cost savings to communities. Large trees provide significantly greater heating and cooling energy savings, air pollution absorption, and storm water runoff reduction than smaller trees. Quantification efforts from a Washington and Oregon study suggest that a large street tree (46 feet tall; 41-foot spread) provides a benefit of $55/year; a medium tree (39 feet tall; 31-foot spread), approximately $25/year; and a small tree (28 feet tall; 25-foot spread), approximately $5/year (McPherson, Xiao et al. 2002).
- A study of a community tree-planting program in Iowa found that each newly tree planted annually sequestered 1.5 pounds of carbon per year and removed significant amounts of ozone and particulate matter (Thompson, Nowak et al. 2004).
- Trees with wider trunks remove significantly more pollution than those with small trunks. For example, a tree with a 2.5-foot diameter trunk removes 65% more than trees less than 3 inches in diameter (Thompson, Nowak et al. 2004).
- In the hot climate of Davis, California, shaded asphalt pavement was found to be 20 degrees cooler than unshaded pavement (Scott, Simpson et al. 1999).
- Asphalt parking areas with 50% tree coverage were found to be associated with 5% lower vehicle emissions than unshaded areas (Scott, Simpson et al. 1999).
- Depending on crown density, street trees allow only 2-40% of solar radiation to reach the ground surface (Heisler 1974).
- A study of the effects of tree shade on asphalt concrete pavement performance found that tree shading contributed to better pavement conditions and longer material life (McPherson and Muchnick 2005).

Implications for the Design of Urban Arterials

When viewed holistically, the cumulative research findings presented above seem to recommend some key guidelines for the design of urban arterials:

- Consider street designs that promote lower driver speeds, particularly narrower travel lanes, in order to contribute to driver, pedestrian, and bicyclist safety.
- Install sidewalks, crosswalks, and supportive pedestrian infrastructure in a systematic and correlated manner to give pedestrians the best chance of walking safely along any roadway and to increase their perceptions of safety. The more pedestrians there are on the road, the safer each pedestrian will be.
- At signalized intersections provide pedestrian countdown intervals and leading pedestrian intervals as well as crosswalks.
- Where pedestrian crosswalks occur at uncontrolled locations, particularly along multi-lane roadways, provide supplementary safety features such as in-pavement warning lights or overhead flashing beacons.
- Provide bicycle lanes, bicycle paths, or sharrows to build a network on which bicyclists feel comfortable and can interact safely with traffic. The more bicyclists there are on the road, the safer each bicyclist will be.
- Provide trees and greenery, particularly along stretches of highway where commercial uses attract people and where people live, in order to enhance psychological well-being and community economic vitality.

- Plant shade-giving sidewalk trees closely spaced together to create a continuous canopy along the street that will enhance the physical comfort of pedestrians and cyclists.
- Provide large shade-giving deciduous trees to mitigate local air pollution, storm water runoff, and the urban heat island effect, contribute to energy savings in surrounding buildings, and extend pavement life.

These guidelines should benefit pedestrian and bicycle traffic, including drivers and transit users when they choose to walk. They should also contribute to a more vibrant community by attracting people to walk and bicycle to local destinations. The guidelines form the basis for the performance measurement framework presented in the following section, and are in keeping with both Complete Streets and Green Streets principles, which will be discussed in Chapter III along with policies related to these concepts that effect Caltrans. First, however, we turn to a discussion of key issues concerning performance measures followed by examination of best practice examples of performance measures used by transportation agencies.

III. Phase II Performance Measures Development

The second phase of the research project focused on developing performance measures for pedestrian and bicyclist safety and mobility and environmental sustainability. The full report on performance measures was titled *Performance Measures for Complete Green Streets: a Proposal for Urban Arterials in California* and was published in 2010. While the content of the measures was based on the literature review conducted in Phase I, the format of the measures was based on a review of performance measures literature conducted as part of this phase. Fortunately, much literature exists regarding the formulation and use of performance measures in governmental agencies, business, and industry, including a host of literature directed at transportation agencies. In researching the foundational principles of performance measurement, several documents emerged as most useful because of their clear articulation of key concepts, important issues, and the variety of possible measurement approaches. These documents are summarized in the following sections, and include a national report on best practices in performance measurement, the proceedings from a major transportation conference focused on performance measures, a report on the development of multimodal performance-based planning from the National Cooperative Highway Research Project (NCHRP), and guidelines on creating performance measures for use within context sensitive solutions, among others.

Why Measure?

Performance measures are used to gauge progress for a simple reason: "what gets measured gets done" (United States Government 1997). More specifically, measuring performance provides an avenue for accountability for stakeholders and management, generally resulting in improved communication between the various groups; helps to gauge efficiency and effectiveness within an organization; provides clarity about the planning process and agency expenditures; and creates a direct feedback loop to foster improvement over time (Peyrebrune 2000). Peyrebrune quotes Osborne and Gaebler in *Reinventing Government*:

- If you don't measure results, you can't tell success from failure.
- If you can't see success, you can't reward it.
- If you can't see failure, you can't correct it.

Most performance measurement systems are based on the following hierarchy: broad goals, objectives that state the target year and desired change, and the performance measures that will be used to track progress toward objectives and goals.

It is critical that the objectives reflect the goals and are clear about the desired direction and magnitude of result. The performance measures must be identified in response to the objectives and goals to ensure that the desired results are obtained, rather than just what may be easier to gauge, and that the measures will in fact reflect progress toward the goals. A key part of performance measurement is its ability to provide accountability, which is generally achieved through monitoring and feedback to the process, in addition to communicating and reporting results to various stakeholders (Peyrebrune 2000).

Performance measures are often defined to give feedback about systems, and therefore influence the decision-making process. Although there was mention of concern about decision-makers "chasing" performance measures to achieve high marks, the literature was clear that although these measures can influence the process, they do not replace it (Cambridge Systematics 1999; Peyrebrune 2000). Project selection is often highly political and may depend on the presence of constrained funding. Performance measures should therefore be used to help make the best decisions possible under the circumstances and within the directive of over-arching policies. Ideally, performance measures will clarify the trade-offs that occur between design alternatives, thus providing transportation professionals with an accepted "neutral" guidance system.

With that said, however, there was also recognition in the literature of the need for transportation agencies to create goals, objectives, and measures that resonate with society and values for quality of life. Several speakers at the *Conference on Performance Measures to Improve Transportation Systems and Agency Operations* suggested that measures that are easy do not necessarily completely reflect society's greater goals, and that allowance must be made for struggling through incompatible measures such that quality of life is maximized (Peyrebrune 2000).

Creating Successful Performance Measures

In 1997, Vice President Al Gore commissioned the *National Performance Review* (NPR) to examine best practices in performance measurement in the United States. The authors defined performance measures as "quantitative or qualitative characterization(s) of performance" based on the progress made toward pre-determined goals after certain amounts of time (Cambridge Systematics 1999; Peyrebrune 2000). Although specific goals depend on the industry and context, it is common for goals to focus on efficiency, quality, outcomes, and effectiveness. The NPR lists several elements critical to the successful development of performance measures, including:

1. Leadership and alignment with a strategic direction
2. A conceptual framework that includes target setting and benchmarking
3. Effective communication about the process and the results both internally and externally
4. Results that provide intelligence rather than just gather information
5. Accountability for the results
6. A system of compensation and positive reinforcement

The performance measurement framework developed in this research project incorporates a number of these elements, specifically alignment with Caltrans' strategic directions, a conceptual framework for target setting and benchmarking, a means for both internal and external communication, and the gathering of real intelligence about the performance of urban arterials in relation to Complete Streets and Green Streets principles. Incorporation of the other critical elements would fall to Caltrans in their implementation process.

The NPR also provides guidance on how to develop individual performance measures. It suggests that performance information should be used to, among other things, inform resource allocation decisions, understand gaps between vision and reality, and influence reconsideration of current practice. Above all, performance measures should encourage taking appropriate action. The NPR recommends that in order to be successful, performance measures should be:

- Resonant with customer values
- Able to show both a snapshot and a trend of progress toward goals
- Simple
- Easily understandable
- Sensible
- Repeatable
- Timely
- Sensitive
- Economical with regard to data collection

These directives helped shape the proposed performance measures for urban arterials developed in this research project. In particular, efforts were made to develop measures that were based in policy and legislation reflective of customer values, influence a reconsideration of current practice, and capture both snapshots and trends. As well, recommendations for data collection focus on economical methods, drawing on existing data sources whenever possible. More is discussed about this below and in Chapter IV.

Many federal and state agencies have adopted performance measure frameworks to evaluate their operations. The Department of Health Services in Wisconsin (DHFS) is one such agency and its approach provides useful insight to how a performance measurement system is implemented (Strategic Planning Unit 2001). The DHFS suggests a five-stage approach to performance measurement:

1. Identify your desired accomplishments at the highest level reasonable
2. Identify the performance measure(s) you will use to determine if you are reaching your desired accomplishment
3. Obtain baseline or trend information on your performance measure(s)
4. Obtain comparison data and set a target or standard that you are trying to reach for each performance measure
5. Gather and report performance data

This systematic approach contributed a conceptual underpinning to the process used by the researchers when brainstorming possible performance measures.

Context Sensitive Performance Measures

In 2004, the National Cooperative Highway Research Project (NCHRP) published a report to guide state Departments of Transportation about how to be more context sensitive in their development and usage of performance measures (TransTech Management, Oldham Historic Properties et al. 2004). Depending on the context and specific needs of the organization, they encourage a balance of performance measures that gauge progress at both the project and the organization level, and that evaluate both planning and design processes and post-occupancy outcomes.

NCHRP recommends that process-oriented performance measures should reflect open, early, and continuous communication with all stakeholders, contain multi-disciplinary input, and be tailored to involve the public with consensus-building. Outcome-oriented measures should reflect community values, and be sensitive to scenic, aesthetic, historic, and natural resources.

In order to mesh with Caltrans' existing performance measurement system, the proposed performance measures for urban arterials developed in this report are outcome-level measures. However, Caltrans is currently moving in the direction of implementing context-sensitive design approaches recommended by NCHRP. As it does so, the agency can develop additional performance measures to address the process components of its corridor design undertakings.

What to Measure

Agencies can measure performance through examination of inputs, which examine the resources dedicated to a program (e.g., dollars per mile of sidewalk); outputs, which examine the products of the program (e.g., number of miles of sidewalk); or outcomes, which examine the impact of the products on the overall goals (e.g., improved sidewalk surface) (Peyrebrune 2000). Although it may be easier to measure inputs, the outcomes are what tell the transportation agencies how close they are to meeting their objectives, and what the stakeholders most often want to know. Therefore, agencies are encouraged to measure outcomes if possible, and to measure outputs when outcomes are too difficult to measure; inputs almost never provide the final desired information, although they help management understand how resources are being used.

It can be tempting to base performance measures on information that is readily available; however, this practice should be avoided, and measures should be defined to provide the information that is most helpful to the agency. In addition, although transportation agencies do not fully control all outcomes associated with implemented projects, particularly behavioral outcomes, (e.g., several factors other than the presence of a sidewalk go into the decision to walk to work), they should still be encouraged to use measures specific enough to provide concrete diagnostic information (Cambridge Systematics 1999).

Setting Targets and Determining Data Sources

The process of setting targets is a key part of creating a successful performance measurement system. The U.S. Department of Energy suggests that each target should be far enough off that the organization has to work to reach it, but close enough that there is a realistic chance of meeting it within a defined time period (Cambridge Systematics 1999). Cambridge Systematics recommends setting targets by defining the agency's current position in the various areas and then determining what a reasonable improvement would be. These should include evaluation criteria that can be measured in the near-term, but which are related to longer-term measures and goals. In this way, targets provide something to reach for while maintaining morale in the organization.

In addition, the literature recommends that targets should be set using currently available data whenever possible, as using existing data sources minimizes the time and resources needed to collect the data and evaluate progress (Peyrebrune 2000). In some cases, however, existing data cannot provide the information needed. While speaking at the aforementioned *Conference on Performance Measures,* Tarek Hatata, President of System Metrics Group, Inc., put it this way: *One of the guidelines, and one of my issues with performance measurement in general, is that even though relying on existing data makes it faster to implement, we are going through a revolution of information technology and information data sources…Maybe we need to change and put additional funds into it, as opposed to* *relying on the same data, just trying to manipulate it, and making it into something else. It may be why things haven't changed in 50 years—because there is a reluctance at every level, the regional, state, and federal levels, to think outside of the box and say, ''Let's collect new data, brand new data that may give us brand new answers.''*

In order to get these "new answers," new data sources will have to be created when there is no appropriate substitute and no other way to accurately gauge progress toward the desired goals.

The proposed *Complete, Green Streets Performance Measure Framework* was designed to make use of existing data sources whenever possible. The researchers recognize that the administrative cost of creating new data collection and analysis methods could serve as an obstacle to the adoption of these new measures. However, because incorporating non-motorized modes into all strategic goals is relatively new, it will not be possible to measure progress toward Green Streets without creating some new data collection/analysis processes. In some cases, an action already undertaken by the Agency will need to be expanded so that additional data can be collected (e.g., the annual pavement survey). For other proposed measures, entirely new data collection systems are required (e.g., counting bicycle and pedestrian trips).

When to Measure

When an organization using a performance measurement framework is involved in building projects and maintaining a built infrastructure, like Caltrans, the issue arises as to when the performance measures should be used: during the design phase or after projects are built (Weisbrod, Lynch et al. 2007).

Decision-making measures occur at the beginning of the decision-making process and can therefore influence the type of project implemented so that the organization's goals are more likely to be met in the near term. These measures are commonly directed toward internal audiences, such as management and staff within the organization.

Post-occupancy measures, on the other hand, occur after project completion, and serve to "grade" the project on how well it meets pre-determined goals. These measures are often used for external audiences, such as citizen stakeholder groups who are affected by the outcomes of the projects. Also, post-occupancy measures can be applied to individual projects, to all projects completed during a specified time-period, or to the entire system.

Decision-making and post-occupancy measures can be used discretely or together as part of a comprehensive system of performance measurement. The *Complete, Green Streets Performance Measure Framework* includes measures that can be used during the decision-making stage of Caltrans' work (e.g., when decisions are being made about which urban arterial projects to pursue, or which design elements to include in planned urban arterial projects), and for on-going monitoring of completed projects. Some proposed measures for completed projects evaluate only those projects completed during a specified time period (e.g., quarterly), while others measure the performance of Caltrans' entire urban arterial system.

Assigning Value
One complex aspect of performance measurement is the assignment of value to certain goals or strategies. Perhaps the most common way of doing this is through the process of monetization, which incorporates direct and indirect costs to assign a dollar value to alternative proposals. However, it is important to remember that not every impact can accurately be represented in monetary terms. Therefore, an alternative way is a scoring system to establish a hierarchy of goals and choosing a design or implementation strategy that best fits that hierarchy. These two methods are discussed below.

Monetization
When an organization strives to meet several diverse goals with limited resources, it can be difficult to prioritize certain goals over others. Many organizations choose to monetize the expected benefits and costs in order to develop a hierarchy. A broad study of monetary valuation with regard to the effects of the transportation system, sponsored by the NCHRP, concluded that both direct and indirect effects should be monetized in order to create a holistic picture of a system (Weisbrod, Lynch et al. 2007). Direct effects include, but are not limited to:

- Accessibility (including Americans with disability)
- Mobility
- Operations Efficiency (Average Travel Time and Distance)
- Customer satisfaction
- Safety

Indirect effects measure the impact on people and the environment, and can include:

- Economic development
- Environmental quality (air, water, land)
- Health
- Quality of life
- Security

The authors recommend that cost and benefit values may be determined by a variety of methods, including:

- *Damage costs*, which reflect the total estimated amount of economic losses produced by an impact
- *Control or prevention costs*, which are estimated based on what it would cost to prevent, control, or mitigate an incidence after it occurred
- *Hedonic methods*, which infer values for non-market goods from their effect on market prices, property values, and wages
- *Contingent valuation*, which infers costs by surveying a representative sample of individuals about how much they value a particular non-market good
- *Compensation rates*, which are legal judgments and other compensation rates for damages that can be used as a reference for assessing non-market costs
- *Shadow prices*, which reflect visitors' actual travel-related costs incurred (non-monetary expenses and time costs) as a way to measure the "consumer surplus" provided by making a trip—these prices may also be used to assign costs to emissions and resource loss

While monetization may be convenient, it routinely faces the challenges of establishing a hierarchy of values and quantification of qualitative impacts. The challenge of the hierarchy of values refers to the reality that for different stakeholders, different aspects of a transportation system may be prioritized. For some, throughput and efficiency (direct effects) may be the most important or valuable aspects, while for others environmental preservation and perceptions of comfort and safety (indirect effects) may be the most important. Although monetization may seem like a neutral way to value benefits and costs, this is often not the case due to the reality that many of the costs and benefits associated with transportation are not directly measured in dollars. This leads to the second challenge, which is that of quantification. Each stakeholder group may have a different opinion on the value of a life saved or the cost of treating or precluding air pollution. Because there are no universally-accepted values for many important impacts of transportation projects, subjectivity is almost always involved in the quantification of these impacts.

Even though the process is imperfect, however, it is important to quantify these effects as well as possible, to thwart the tendency of decision-makers to focus on "easy-to-measure impacts." Table 1 gives an example of some of NCHRP's suggested valuations for direct and indirect effects.

Table 1. Assessment of Monetization Potential of Categories

Impact Class	Comments on How These Impacts or Benefits are Monetized
Accessibility	The monetary value for accessibility can be some form of the economic value of the activity that is occurring on the land enabled by transportation investment. Or the value of the travel time associated with accessing a particular activity might be a surrogate for the monetary benefit associated with such a trip (for example, such an approach is used for valuing recreational trips to major parks).
Mobility	The value of mobility improvements is commonly measured as the value of time and cost savings resulting from traffic congestion reduction or transit service improvement. For freight, there can be an economic measure of improved productivity for the freight sector.
Safety	Monetary measures can be developed for safety performance, based on the societal cost of vehicular crashes (from NHTSA) and the cost of injuries and death (by FHWA and other agencies).
Customer Satisfaction	It is not clear how to monetize customer satisfaction, except via a survey of stated preferences.
Energy & Resource Conservation	The value of reduced consumption of non-renewable resources is measurable as the cost savings to society and consumers.
Environmental Quality	The traditional approach is to assign monetary values to the reduction in health risks associated with transportation improvements.

The United States Office of Management and Budget recommends considering performance measure monetization from multiple perspectives (Office of Management and Budget 2003). For example, the benefits of the presence of positive effects should be quantified, as should the benefits of the absence of negative effects. In addition, active impacts are more easily quantifiable than passive impacts (such as a public park that one can see and use versus air pollution that may or may not be visible), but not necessarily more important, so they should be considered commensurate with their ultimate value.

Because of the complexity that would be involved in monetizing the impacts of transportation corridor design features, due to the need to debate and come to agreement on a whole host of values related to both direct and indirect impacts, monetization has not been included in the proposed performance measure framework developed in this research project.

Scoring System

An alternative to monetization is creating a scoring system that organizations can use to rank projects. This system tends to work when the organization is clear about its hierarchy of values and how each direct and indirect effect fit into the hierarchy, therefore precluding the need for monetization.

One example of such a system is the Eastman Kodak Safety Performance Index (Training Resources and Data Exchange 1995). The company developed a performance matrix with the goals and range of performance (on a scale of 1-10) for several metrics. The components are ordered in terms of importance and then weighted against one another. Each metric has a baseline, a goal the company expects to meet, and a "stretch goal" that could be attained with excellent performance. Values are determined for each baseline, goal, and stretch goal per metric (such as number of unplanned shutdowns). Actual values are then filled in and multiplied against the weight to find the "score" of each matrix. In this way, the company can monitor its progress, but the origins of the goals are based on an established hierarchy, which can include, but is not automatically linked to, monetization.

The researchers considered incorporating a scoring system into the proposed performance measurement framework developed for urban arterials. However, this approach was discarded in favor of developing an approach more consistent with the current system of performance measurement used by Caltrans.

Using the Information Generated by Performance Measurement

Performance information can be used in multiple ways. In its *Best Practices in Performance Measurement* report (United States Government 1997), the federal government suggests using the information to:

- Guide resource allocation decisions
- Aid employee and management evaluations
- Define gaps between goals and reality
- Drive reengineering
- Aid benchmarking
- Improve organizational processes
- Adjust goals
- Improve measures

The researchers intend that Caltrans use the proposed *Complete, Green Streets Performance Measurement Framework* developed for this project in all these ways.

Best Performance Measurement Practices for Complete and Green Streets

In order to supplement Caltrans' current performance measures with measures that are both practical and progressive, the researchers reviewed various performance measurement frameworks used by other state DOTs. Of these, several performance measures stood out with regard to monitoring progress toward implementing Complete Streets principles. In particular, the states of Oregon, Vermont, Washington, and Florida were identified as having performance measures most aligned with Caltrans goals, and were therefore used as a model for the newly proposed performance measures. An expanded discussion of these agencies' performance measures can be found in the report *Performance Measures for Complete, Green Streets: A Proposal for Urban Arterials in California*.

In addition, current legislation, plans, and policies applicable to pedestrians and bicyclists in California were reviewed to ensure consistency with the proposed performance measures. These policies and plans are briefly described in Section B of Chapter III in this report.

Evaluation of Caltrans' Current Objectives and Performance Measures

Caltrans' traditional focus, as with all DOTs, has been on highway and motor vehicle engineering—which for a long time was the clear preference of most of the State. However, as people have grown more aware of the potential negatives of this singular focus, a different type of engineering and design—one that accounts for non-motorized travelers and the surrounding environment—has been, and is being demanded. This new preference is prompting the Department to strengthen performance measures addressing non-motorized users and stewardship of natural resources. The following section examines the goals and objectives of the Strategic Plan (California DOT 2007) and analyzes how the objectives and performance measures could be modified to better fit with Complete Streets and Green Streets principles.

Goal: Safety

Caltrans' goal related to safety is to "*provide the safest transportation system in the nation for users and workers.*" However, only one of the three related objectives in Caltrans' 2007-2012 Strategic Plan aims to measure safety of *users* of the transportation system (the other two measure Caltrans worker safety), and it measures *motorized* users:

> *Objective 1.1:* **By 2008, reduce the fatality rate on the California state highway system to 1.00/100mvmt and continuously reduce annually thereafter toward a goal of the lowest rate in the nation.**
>
> *PM 1.1A:* **Fatalities per 100 million vehicle miles traveled (mvmt) on the California state highway system**

Measuring fatalities per 100 million VMT obscures significant trends in pedestrian and bicyclist fatalities, as these modes travel only hundreds or in the low thousands of miles each year. Caltrans is attempting to address this lack of measurement through the Strategic Highway Safety Plan (SHSP). It is also important to remember that the term "state highway" refers both to limited access expressways and urban arterials. While the overall number of pedestrian and bicyclist deaths may be low on limited access highways due to low amounts of exposure, urban arterials remain important corridors for pedestrian and bicyclist movement and should be made measured separately to truly monitor and work toward safety.

Goal: Mobility
Caltrans' goal related to mobility is to "*maximize transportation system performance and accessibility*." This goal is subdivided into four objectives, two of which could feasibly affect non-motorized transportation: reducing delay and reducing single occupancy vehicle trips. However, unlike the performance measures from Oregon cited in Chapter II, Caltrans' measure for delay looks at vehicle hours rather than person hours. This focus on vehicles suggests that pedestrian and bicycle delay is not measured.

> *Objective 2.1:* **By 2012, reduce daily vehicle hours or delay by 30,000 hours throughout the transportation system.**
>
> *PM 2.1A:* **Average daily hours of delay**

The second mobility objective aims to reduce single occupancy vehicle trips:

> *Objective 2.4:* **By 2012, reduce single occupancy vehicle commute trips by 5%.**
>
> *PM 2.4A:* **Percent of single-occupant vehicles compared with the total commute trips**

This measure is one step Caltrans has taken to promote a more diverse transportation system. However, the objective could be reached through increased carpooling or transit use, and does not directly measure changes in non-motorized facilities or trips. Caltrans mentions non-motorized travel as a strategy for meeting this objective, suggesting an "increase (in) support for non-motorized and promotion/incentives for use of other alternate means of transportation." This strategy is the only direct reference to non-motorized transportation in the entire mobility section. If bicycling and walking are to be encouraged in keeping with the policies and goals described earlier in this chapter, clearly additional objectives and measures dealing specifically with non-motorized transportation are needed.

Goal: Delivery
Caltrans goal for delivery is to "*efficiently deliver quality transportation projects and services.*" Because this goal applies to overall project efficiency and not to the delegation of resources, it does not favor one mode or user group over the other and has no direct relation to environmental quality. Therefore, within the proposed new framework presented in Chapter IV, no new objectives or performance measures are proposed for delivery.

Goal: Stewardship
The goal for stewardship is to "*preserve and enhance California's resources and assets*." Most of the objectives for this goal focus on Caltrans' resources, such as pavement, infrastructure, and funding, instead of the natural resources in California. However, objective 4.4 pertains to the natural environment:

Objective 4.4: **Each year, ensure environmental commitments are documented and implemented on 100% of projects**.

PM 4.4A: **Percent of projects that have updated environmental commitment records and a Certificate of Environmental Compliance at project closeout**
PM 4.4B: **Percentage of projects that have an Environmental Certification, including an updated Environmental Commitments Record, at the ready-to-list (RTL) milestone**

"Environmental commitments" are the actions Caltrans must take to ensure that the *California Environmental Quality Act* (CEQA) is observed during construction. However, CEQA only addresses mitigating possible harm caused by a new project, and does not push Caltrans to improve the existing environment of the transportation corridor, such as mitigating the amount of pollution already present due to travel along the corridor. While this has been the accepted practice for years, the urgency of global climate change and its effects on California's natural environment prompt a reconsideration of this practice to include more mitigating aspects.

One of the proposed performance measures in Chapter IV concerns increasing permeable surface area through landscaping to aid in storm water retention and reduce the urban heat island effect. Both of these effects should enhance the longevity of the infrastructure, in keeping with goal #6 of the California Transportation Plan, and the quality of the environment for users, in addition to the benefits they provide through water and energy savings. A second proposed measure concerns planting trees along the corridor to increase air pollution interception, provide shade for users and buildings, thereby decreasing energy usage and reducing the urban heat island effect, and provide additional storm water retention. Enhancing the quality of the corridor through these measures has the complementary benefit of creating a more pleasant environment for pedestrians and bicyclists, which may encourage more non-motorized trips and possibly lead to fewer motorized trips.

Goal: Service
The final goal for Caltrans pertains to service, and is to "*promote quality service through an excellent workforce.*" This goal is accompanied by several objectives, none of which deal specifically with training for any particular user group. Given the strong history of highway engineering in Caltrans, however, it seems appropriate and may be necessary to encourage training regarding other user groups in order to adequately plan and design Complete Streets. Two of the current objectives are related to this idea, and should provide momentum for complete streets training:

Objective 5.3: **By 2012, increase by 15% the number of Caltrans employees who agree or strongly agree that employees are encouraged to try new ideas and new ways of doing things to improve Caltrans**.

PM 5.3A: **Percent of Caltrans employees that agree or strongly agree that employees are encouraged to try new ideas and new ways of doing things to improve Caltrans**.

Objective 5.5: **By 2012, increase by 5% the number of Caltrans employees who agree or strongly agree that the training they have received at Caltrans has adequately prepared them for the work they do**.

PM 5.5A: **Percent of Caltrans employees who agree or strongly agree that the training they have received at Caltrans has adequately prepared them for the work they do**

Looking Forward
The numerous policy goals and mandates described in this chapter speak to a vision of a completely multi-modal transportation system, which is inherently more sustainable than the current system and its primary focus on motorized single-occupancy vehicles. However, as can be seen from the above analysis of the objectives and measures in current Caltrans' Strategic Plan, work is needed to create roadways that embrace all users and enhances community quality of life. The next chapter describes in detail the *Complete, Green Streets Performance Measures Framework for Urban Arterials* proposed to encourage progress toward this more sustainable vision. California has shown national leadership at several key times in its transportation-related history, such as requiring unleaded gasoline in the 1970s and higher fuel standards in the 2000s. The proposed new performance measures represent yet another pivotal opportunity for the State of California to take the lead in transportation policy and practice.

Proposed Performance Measures for Complete, Green Streets
The following proposed performance measurement framework will aid Caltrans in meeting its own internal Directive to improve mobility for non-motorized users and build a Complete Streets network. Recognizing the numerous community and environmental quality benefits that trees and permeable surfaces bring to transportation facilities and the communities they serve, the performance measure framework incorporates elements of the Green Streets concept. Recognizing as well that improvements to urban arterials will result in the greatest local quality of life benefits, the framework is directed toward them. Specifically, this *Complete, Green Streets Performance Measures Framework for Urban Arterials* it is designed to result in more:

- Bicycle and pedestrian facilities and safety features
- People who safely bicycle and walk
- Permeable surfaces
- Trees
- Caltrans staff trained in the design and maintenance of bicycle and pedestrian facilities

By combining the proposed measures with Caltrans' existing measures, the agency would take a major step toward creating a meaningful and comprehensive system to measure their progress toward a complete, multimodal and community-serving transportation system.

To enable Caltrans' incorporation of these new measures into their current performance measure document, the proposed framework is presented using Caltrans' existing format and structure. Each section begins with the Agency's adopted goals regarding Safety, Mobility, Delivery, Stewardship and Service. Following each goal are proposed objectives, labeled "CGS objectives" (for Complete, Green Streets), and performance measures, labeled using the abbreviation "PM." For reference, Caltrans' existing objectives and performance measures for each goal (already adopted and monitored by Caltrans) are included in the Appendix A of this document. The numbering of the new (proposed) objectives (i.e., 1.1, 1.2, etc.) and measures will need to be adjusted when they are incorporated with the existing framework.

The following paragraphs detail the proposed objectives and performance measures, including a discussion of how Caltrans can collect the data and set the targets for each measure. In several places, an "X" is used as a placeholder for a year or target where more work is needed before a finite target year (e.g., 2017) or target level (reduce injury rate to 1 per 1 million vehicle miles traveled) could be set. It is recommended that Caltrans apply the same target setting methodology for these new measures that it uses for its existing performance measures, incorporating stakeholder involvement when necessary.

SAFETY

Goal: Provide the safest transportation system in the nation for users and workers.

CGS Objective 1.1	**By 20XX, reduce the annual pedestrian and bicycle injury and fatality rates to the following levels, and continuously reduce annually thereafter with the goal of having the lowest rates in the nation.** **Pedestrian fatality rate target: X per X walking trips.** **Pedestrian injury rate target: X per X walking trips.** **Bicyclist fatality rate target: X per X bicycling trips.** **Bicyclist injury rate target: X per X bicycling trips.**
PM 1.1a	Number of pedestrian fatalities per x walking trips.
PM 1.1b	Number of pedestrian injuries per x walking trips.
PM 1.1c	Number of bicyclist fatalities per x bicycling trips.
PM 1.1d	Number of bicyclist injuries per x bicycling trips.

Discussion

In existing performance measures, Caltrans tracks the safety of drivers and workers, but not of non-motorized users. This omission is incompatible with the Agency's goal to provide a safe system for all users. In many communities, urban arterials serve as central corridors that provide essential mobility and accessibility for pedestrians and cyclists. While traveling on urban arterials, however, pedestrians' and bicyclists' exposure to injury and death is severe compared with that of automobile drivers. Because they are not surrounded by the metal buffer of a vehicle, non-motorized users can be severely injured or killed by even low-speed crashes. Furthermore, research indicates that the likelihood of a pedestrian surviving a crash with a vehicle decreases significantly between the vehicles speeds of 30 and 40 mph (Leaf and Preusser 1999). This fact is especially significant to this research effort, since vehicles on urban arterials tend to travel at speeds in this range.

Furthermore, there is a growing body of research that quantifies the economic costs to a community of traffic-related injuries and fatalities. According to the National Highway Traffic Safety Administration, the total cost in 2000 to the United States of all crashes, including vehicle, pedestrian and bicyclist crashes, was $230.6 billion (in 2000 dollars) (NHTSA 2007). Similarly, a review of national studies commissioned by the California Department of Motor Vehicles found that the cost of traffic accidents in California ranges annually from $13 to 49 billion (in 1994 dollars) (Peck and Healey 1996). These costs include losses to property damage and productivity, medical expenses, and other societal costs. As a state agency that is responsible for a major transportation system and community asset, Caltrans should work to reduce these costs to the greatest extent practicable.

Caltrans should adopt a broad, system-wide approach to improving pedestrian and bicyclist safety along urban arterials. Since only some of the transportation facilities in an urban area are state-owned and operated, this safety objective will require Caltrans' continuing coordination with other jurisdictions and stakeholders who are involved in planning, operating and using the local transportation system. A comprehensive approach that incorporates facility improvements, safety programs and educational campaigns may be recommended.

Data Collection

Summary: Existing data sources need to be expanded and new data needs to be collected.

For all four of these proposed performance measures, injury and fatality data will come from the existing Statewide Integrated Traffic Records System (SWITRS) data set. The agency will need to adjust its current data entry and reporting technique to isolate pedestrian and bicycle injuries and fatalities. Caltrans may also need to work with local police and the California Highway Patrol to ensure that local accident data for all urban arterials is captured.

For walking and bicycle trips, Caltrans should work toward conducting targeted counts of non-motorized trips on urban arterials. To collect this essential data, Caltrans could partner with university research centers and consulting agencies. This goal is also included as a part of a new objective, or "action" in the SHSP. Until this new data is collected, Caltrans could estimate pedestrian and bicycle trips using existing regional sources, like the Bay Area Transportation Survey (BATS), or from statewide census data, although these data sources are limited in scope and should not be considered long-term replacements for the more targeted exposure data.

Some challenges to measuring the rate of pedestrian and bicyclist injury and fatality should be noted. First, there is limited data on the number of pedestrian and bicyclist trips occurring on state urban arterials. While Caltrans works to generate better data on the number of non-motorized trips, statewide modeshare data from the Census can be used as a proxy for walking and biking trips on urban arterials. While this is a functional short-term solution, there are several issues that need to be addressed long-term. First, the Census counts commute trips, which only account for approximately 20% of present-day travel. In addition, it is taken in April, when it is still too cold to walk and bicycle in many parts of the country, thus incorrectly approximating the amount of non-motorized travel at other times of year. It also only counts the mode used for the longest part of the trip, so a trip that is part walking and part bus would be counted as bus if that segment were longer.

Second, this method of measuring the rate of injury and fatality does not specifically account for exposure on Caltrans urban arterials as opposed to other Caltrans facilities. Third, injury and fatality rates can be misleading in cases where there are no deaths or injuries because no one is walking or biking in a certain location. For this reason, overall trips (which are measured in proposed Mobility Objective 2.1) must also be measured and considered in relation to injury and fatality rates. A final challenge with this objective is that pedestrian and bicyclist injuries and fatality records often under-represent the actual number of incidents. Police records do not always accurately record the type of collision and anecdotal evidence suggests that many crashes go unreported. Furthermore, injury and death data from hospitals are rarely gathered and compiled with police report data. For these reasons, the rates calculated for this measure should be used primarily to monitor trends and Caltrans should work with partner agencies to improve the collection of injury and fatality data for pedestrians and bicyclists.

Setting Targets

The proposed target year 2014 was selected with input from Caltrans headquarters in order to provide enough time to feasibly begin to reach the goal. The rate targets (pedestrian injuries per walking trip, etc.) could be set using projections of the decreasing injury and fatality rate over the past several years.

CGS Objective 1.2	**By 20XX, establish a baseline of the percentage of Californians who feel safe using non-motorized modes on urban arterials. Annually increase this percentage, with the goal of having the highest reported percentage in the nation.**
PM 1.2	Percentage of Californians who feel safe using non-motorized modes on urban arterials.

Discussion

- Safety of non-motorized users must be measured in a variety of ways. Measuring safety by counting injuries and fatalities, however, is only one way to look at safety. The perception of safety plays an important role in the decision to walk or ride a bicycle. Monitoring user attitudes will help to gauge perceived safety amongst all system users, not just those who currently choose to walk or bicycle. This measure will help the Agency direct projects or programs to areas that might yield to the greatest improvements in perceived safety and use.
- Caltrans could begin measuring perceived safety through their annual External Customer Survey, which includes a user survey. Such a survey could be administered to all state residents by mail, as is done by the Oregon DOT. Caltrans could use this opportunity to ask other questions of its users to help measure improvement in other areas. According to the timeline proposed here, Caltrans should administer the first user survey in 2012 in order to set a baseline for the number of system users who feel safe walking and biking on Caltrans urban arterials. As long as Caltrans receives enough responses, the rate can be determined using number of positive responses over the number of survey respondents, which will serve as a statistically significant proxy for population.

Data Collection
Summary: An existing data source must be adapted for this measure.

Caltrans currently conducts an External Customer Survey. This measure would require the addition of one or two new questions to that survey.

Setting Targets

- The proposed target year of 2017 is the next time that Caltrans will update its Strategic Plan after 2012. By syncing target dates with Strategic Plan updates, Caltrans will have the opportunity to change Strategic Planning priorities to improve upon any areas where targets are not met. This is the approach Caltrans currently uses in setting existing performance measure targets. The 2017 target gives Caltrans ample time after the performance measures are adopted to gather the necessary data and be prepared to monitor it annually thereafter.

CGS Objective 1.3	**By 20XX, all Caltrans urban arterial projects (new expenditures) are designed to increase safety for non-motorized users in accordance with Complete Streets principles. Ensure that each new and retrofit urban arterial project incorporates Complete Streets principles annually thereafter, with the goal of thorough Complete Streets influence over time.**
PM 1.3a	Percent of signalized intersections along urban arterials with marked crosswalks and one or more of the following: countdown signals, leading pedestrian intervals, bulb-outs, or pedestrian refuge islands.
PM 1.3b	Percent of unsignalized 4-way (multilane) intersections along urban arterials with marked crosswalks and one or more of the following: HAWK signal, yield to pedestrian signage, user-activated overhead warning lights.
PM 1.3c	Percent of urban arterial intersections with one or more of the following improvements geared toward bicyclists: bicycle box, painted bicycle lane through the intersection*, bicycle signal, functioning bicycle loop detectors, bicycle left turn lane.
PM 1.3d	Percent of urban arterials that do not have a posted speed greater than 25 mph.

Discussion

- Incorporating pedestrian and bicycle safety treatments into urban arterial projects will be an important part of building Complete Streets. These performance measures are meant to complement the previous proposed safety measures (1.1 & 1.2) by measuring physical improvements geared toward pedestrian and bicyclist safety on Caltrans urban arterials. Urban arterials are located in central areas, which typically have a high vehicle throughput. For this reason, Caltrans must target these facilities with special safety features that have been shown to reduce pedestrian and bicyclist collisions and improve perceived safety.
- Performance measures 1.3 a, b, and c measure the percent of urban arterial intersections in the Caltrans system where a specified list of treatments (countdown signals, HAWK signals [which have not yet been approved for use in California,

although approval is expected in the future], bicycle boxes, etc.) are provided. These treatments were selected because there is substantial literature indicating their effectiveness at improving pedestrian or bicyclist safety. Measures 1.3a and b are designed to improve pedestrian safety at two of the most dangerous places along urban arterials: signalized and unsignalized intersections along multilane arterials. Performance measure 1.3c will help Caltrans build Complete Streets by measuring progress toward broadly incorporating bicycle safety into the design of urban arterials, particularly at intersections.

- It is important to note that these measures are not meant to prescribe design treatments for urban arterial intersections or to result in all treatments being used at all locations. Instead, Performance Measures 1.3 a, b, and c provide designers with a list of approved treatments that have a demonstrated effect on motorist, pedestrian or bicycle behavior and safety, with the goal of a system-wide increase in the application of these treatments. The list of safety treatments in Performance Measures 1.3a, b, and c will encourage Caltrans designers to use their professional judgment to design context-sensitive solutions that suit each intersection. As with all traffic facilities, careful design is essential. Especially for treatments that have not been widely applied in California, such as bicycle boxes and bicycle left turn lanes, close consultation with design guidelines (*like the AASHTO Greenbook or the AASHTO Design Manual*[2]) and/or with pedestrian and bicycle design professionals may be necessary.

While Performance Measures 1.3 a, b and c focus specifically on intersections, urban arterials must also be designed to promote safety of users traveling along a road section. Performance Measure 1.3d gauges the "percent of urban arterials that do not have a posted speed greater than 25 mph" and is intended to address design speed. While the mission of Caltrans is to improve mobility in California, historically in the transportation field, improving mobility has meant increasing driver speeds. Increasing vehicle speeds, however, can be highly detrimental to driver, pedestrian and bicyclist safety. In order to build Complete Streets, Caltrans must apply a balanced approach that provides multimodal mobility without sacrificing the safety of any users.

Research has shown that the relationship between risk of injury or death and vehicle speed is non-linear (Leaf and Preusser 1999). For example, a pedestrian hit by a car traveling 20 mph has an approximately 80% chance of surviving with a non-incapacitating injury, while that chance drops to less than 60% when hit by a car traveling at 30 mph. As speeds rise, the risk continues to increase non-linearly. Because of this reality, it is important to consider pedestrian and bicyclist safety when designing a corridor for a certain speed—particularly when drivers may exceed the speed limit and further increase the risk.

In the State of California, the de facto speed limit for business or residential districts is set by the Vehicle Code at 25 mph. However, localities can petition to have their speed changed if they demonstrate that 85% of drivers are driving a certain speed. In other words, the 85th

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[2] See also Zegeer, C. V., C. Seiderman, P. Lagerwey, M. Cynecki, M. Ronkin, and R. Schneider. 2002a. *Pedestrian facilities users' guide—Providing safety and mobility.* Report No. FHWA-RD-102-01. Washington, DC: Federal Highway Administration.

percentile rule adjusts the law (speed limit) to fit the behavior (actual speed). According to the Vehicle Code, "a reasonable speed limit is one that conforms to the actual behavior of the majority of motorists, and by measuring motorists' speeds, one will be able to select a speed limit that is both reasonable and effective." While this system may be appropriate on freeways and major highways, it is not suited to urban environments where roads are shared by a variety of users.

This measure approximates the 85th percentile speed by measuring the percentage of urban arterials on which the speed limit has been raised above the de facto 25 mph. By monitoring this quantity, Caltrans will be able to know which streets should perhaps be modified to encourage lower speeds in order to ensure maximum safety and comfort for all users. There is a range of design treatments that can help accomplish desired vehicle speeds and increase user safety while maintaining system throughput. In some circumstances, speed-calming measures such as center islands or raised intersection crosswalks may be appropriate. Lane narrowing may also be a desirable approach, especially on urban arterials and in places with limited right-of-way. Narrowing lane widths has been associated with slower driving speeds and accident rates that were either reduced or unchanged (Fitzpatrick, Carlson et al. 2000; Harwood 2000). According to the AASHTO *Green Book*, urban arterials lane widths may vary from 10 to 12 feet. The *Green Book* states that 12-foot lanes may be most appropriate on higher speed, free flowing, principal arterials. However, on signalized arterials operating at less than 45 mph (all urban arterials), "narrower lane widths are normally quite adequate and have some advantages." Furthermore, it has been demonstrated that vehicle capacity is minimally or not at all affected by a reduction of lane widths from 12 to 10 feet (Zegeer 2007).

Data Collection

Summary: A new process for collecting and analyzing data is required for these measures.

For all of these performance measures, data for measuring new projects/expenditures should be collected from the final design documents for individual projects. A new form may be needed to collect this data. For measuring system-wide facilities, data must be compiled from each of the Caltrans regional districts. A new database or GIS file could be created to ease in the evaluation of this measure.

Setting Targets

- Caltrans' Complete Streets Deputy Directive (DD-64-R1) was issued in October of 2008, but the proposed performance measures project did not conclude until 2011. Therefore, the Agency believes it is reasonable that it could be designing all new projects as Complete Streets by 2014 (after the next Strategic Plan update). The three-year interim gives the Agency time to adjust their design procedures and train staff as needed. Caltrans may choose to conduct a facility safety audit to determine the timeline and cost of meeting this target. The target for each of the first three performance measures, which work toward all facilities designed for safety according to Complete Streets principles, will be 100%.

CGS Objective 1.4	**By 20XX, annually reduce the number of pedestrian and bicycle hotspots (high concentration of collisions) on urban arterials.**
PM 1.4a	Overall number of pedestrian collision hotspots on urban arterials.
PM 1.4b	Overall number of bicycle collision hotspots on urban arterials.

Discussion
Even as Caltrans succeeds in reducing the overall system rate of pedestrian and bicyclist injury and fatality, the Agency must work to address its most unsafe locations. Caltrans already has a process for mapping and responding to vehicle collision hot spots, functionally defined in the Agency as any cluster of collisions. This performance measure simply extends that process to bicycle and pedestrian collision clusters as well. Since this performance measure applies only to urban arterials, hot spots should be analyzed for collisions occurring on similar road types, as is currently done for automobiles. Also, since pedestrian, bicyclist, and driver safety each depend on a different set of roadway characteristics, it is essential that each mode be analyzed individually.

Data Collection
Summary: Existing data sources will have to be altered for these measures.

For both of these measures, injuries and fatalities could be mapped using data from the California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS), though the Agency will need to change their data entry and reporting technique to isolate pedestrian and bicycle injuries and fatalities. A goal of the SHSP is to update TASAS with pedestrian and bicycle injuries. In analysis, however, it will be important to recognize that pedestrian and bicycle crashes are underreported. Therefore, data from state databases likely do not reflect the extent of pedestrian and bicycle traffic-related injuries.

Setting Targets
If Caltrans is continually working to address areas of concentrated injury and fatality, the Agency's goal should ultimately be to have zero hotspots. This performance measure must be addressed in coordination with an effort to reduce the overall rate of pedestrian and bicycle injury (as captured in proposed performance measure 1.1).

MOBILITY

Goal: Maximize transportation system performance and accessibility.

CGS Objective 2.1	**By 20XX, all Caltrans urban arterial projects (new expenditures) are designed to increase mobility for non-motorized users in accordance with Complete Streets principles, aiming to link up to a larger community bicycle and pedestrian network where possible. Ensure that each new and retrofit urban arterial project incorporates Complete Streets principles annually thereafter, with the goal of thorough Complete Streets influence over time.**
PM 2.1a	On urban arterials, ratio of sidewalk mileage to roadway mileage, bi-directionally.
PM 2.1b	On urban arterials, ratio of Class II bicycle facility mileage to roadway mileage, bi-directionally.
PM 2.1c	On urban arterials, percentage of intersections that are ADA compliant.
PM 2.1d	Percentage of urban arterial projects designed as Complete Streets.
PM 2.1e	Number of pedestrian trips on urban arterials.
PM 2.1f	Number of bicycle trips on urban arterials.

Discussion

To accomplish its Complete Streets directive, Caltrans must begin measuring the mobility provided to system *users*, not to automobiles. Mobility is the ability and efficiency, usually measured in time, with which one can move between places. Measuring mobility for pedestrians and bicyclists is very different than doing so for automobiles. For bicyclists and pedestrians, the first measure of mobility is whether a reasonable travelway exists for them to walk or bicycle on. For this reason, the Complete Streets mobility performance measures begin with 2.1a and b, which measure the system-wide presence of sidewalk and Class II bicycle facilities, respectively, in comparison to roadway miles. It is important to note that broader system connectivity will be important in providing pedestrian and bicyclist mobility. To accomplish this, Caltrans should work with local jurisdictions and consider how bicycle and pedestrian facilities on urban arterials connect to surrounding streets. Furthermore, Caltrans should incorporate local bicycle and pedestrian plans into the design of urban arterial facilities.

In addition to measuring the presence of a facility for non-motorized users, the Agency must continue to measure the accessibility of that facility to people with disabilities. The Americans with Disabilities Act (ADA) requires that governments provide accessibility for people with disabilities to all public services and facilities. With regard to new projects in the public realm, the ADA has led to a near-universal application of ramps and curb warning systems at intersections, wheelchair-accessible push buttons at crossing signals, and many other features. Since the ADA was passed in 1990, however, most jurisdictions have not been able to retrofit all of their pre-existing facilities to ADA compliance, due to financial limitations. Central to the Complete Streets concept, however, is the idea that the streets are public spaces that can be used by everyone. California's progress toward ADA compliance on all facilities is an important measure of their progress toward Complete Streets. For this reason, performance measure 2.1c measures the percentage of intersections that are ADA compliant. Intersections, rather than entire sections of roadway, are measured for reasons of feasibility—but Caltrans should work toward accessibility on all of its facilities.

Performance measure 2.1d directly tracks the Agency's progress toward designing transportation projects, specifically urban arterials, as Complete Streets. One might find this measure duplicative with other measures proposed here, but this is the measure that considers all modes and travelers simultaneously. If Caltrans is making improvements on each of the other new measures proposed here, this measure will also steadily improve. To determine whether a facility qualifies as a Complete Street, Caltrans should adopt a scorecard that can be used in the final design phase of project development.

While the existence and design of a facility is important, the decision to walk or bicycle depends on a wide range of factors. Performance measures 2.1e & f count the actual number of trips made by pedestrians and bicyclists on urban arterials. This measure incorporates the outcomes of the facility-oriented work addressed by the previous proposed measures and thus, allows the agency to measure multimodal mobility in a comprehensive way.

Data Collection

Summary: New data methods will need to be generated for these measures.

For measures 2.1 a, b, and c, Caltrans will need to compile facility data from each of the regional District offices. A unified database or GIS file might ease in reporting for this measure.

For measure 2.1d, Caltrans will need to develop or adopt a scorecard/checklist for determining whether a facility qualifies as a Complete Street.

For measures 2.1 e and f, Caltrans should work toward conducting targeted counts of non-motorized trips on urban arterials. This data is also required for proposed CGS Objective 1.1.

Setting Targets

2.1a: Along urban arterials, the target ratio of sidewalk mileage to roadway mileage should be 1 (all urban arterials have sidewalks on both sides).

2.1b: Recognizing that there are some streets where bicycle facilities are not possible or necessary due to space constraints, lower traffic volumes, lower vehicle speeds or other factors, the target for the ratio of Class II bicycle facility mileage to roadway mileage should steadily increase from year to year. A finite target may not be necessary.

2.1c: Since federal law requires that all public facilities are ADA accessible, the target for percent of intersections that are ADA compliant should be 100%.

2.1d: In 2014 and thereafter, the percent of urban arterial projects (new expenditures) designed as Complete Streets should be 100%.

2.1e, f: The target for the number of pedestrian and bicycle trips on urban arterials should be a steadily increasing number each year. If the Agency wants to set a finite target, it can measure trips for several years, determine an annual rate of change, and propose a steady increase to that rate of change.

DELIVERY

Goal: Effectively deliver quality transportation projects and services.

	(No proposed measures)

STEWARDSHIP

Goal: Preserve and enhance California's resources and assets.

CGS Objective 4.1	**By 2017, all new and retrofit Caltrans urban arterial projects (new expenditures) are designed to minimize negative environmental impacts in accordance with Green Streets principles. Ensure that each new and retrofit urban arterial project incorporates Green Streets principles annually thereafter, with the goal of thorough Green Streets influence on all urban arterials over time.**
PM 4.1a	Ratio of pervious to impervious surfaces on Caltrans urban arterial projects, including medians, buffer strips, and tree wells.
PM 4.1b	Percent of urban arterial lane mileage with tree canopy coverage.

Discussion

Existing Caltrans performance measures address stewardship primarily by measuring pavement and bridge conditions, equipment availability and the obligation of some types of funding. Maintaining facilities is important, but stewardship should be viewed more broadly as the agency's responsibility to the users and communities where Caltrans facilities are located. Proposed performance measures 4.1a and b will allow the Agency to work towards its Stewardship Goal to "Preserve and Enhance California's Resources and Assets" more holistically.

To become a successful steward of the state's resources, Caltrans should incorporate Green Streets principles into the design of urban arterials. Green streets are designed with the maximum canopy coverage and permeable surfaces practicable. These principles are incorporated into this proposed performance measure framework because of the role that greenery can play at improving the traveler experience on urban arterials. Trees in particular can improve the thermal equivalent index by creating shade and can attract people to travel through a business district. The shade can also help reduce the urban heat island effect, which is the increase in ambient air temperature created by the reflective properties of pavement. Beyond traveler experience, landscaping and trees can filter and reduce storm water runoff, sequester carbon, and mitigate other air pollution caused by vehicle traffic. Trees also bring about energy savings through building shading, and can promote social equity by improving air quality and providing an amenity to neighborhoods with high amounts of auto traffic.

Proposed performance measure 4.1a measures the ratio of pervious to impervious surfaces on Caltrans urban arterials. This ratio will improve with each newly planted median strip, buffer and tree that Caltrans incorporates into its projects. Performance measure 4.1b measures the urban arterial land mileage with tree canopy coverage. Canopy coverage is an important part of the pedestrian experience and is also a measure of the potential environmental benefits a tree-lined street provides.

Data Collection
Summary: New data sets will have to be created for these measures.

For performance measure 4.1a, an annual survey of a random sample set of urban arterial segments will be required. It is possible that this could be done in tandem with the annual pavement survey.

For performance measure 4.1b, Caltrans will first need to set a baseline, which could be done by estimating canopy coverage from aerial images. This baseline should be re-evaluated every five years. In the interim years, the Agency should estimate canopy coverage from the final design documents of new projects. Canopy measurements should estimate the expected size at maturity, and trees that are unhealthy or dying should not be included (see Appendix B for a demonstration of estimating pervious surfaces and canopy coverage).

Setting Targets
No additional target setting is required.

CGS Objective 4.2	**By 20XX, all Caltrans urban arterials meet a baseline for non-motorized facility quality.**
PM 4.2a	Percent of urban arterial sidewalk mileage in fair or better condition.
PM 4.2b	Percent of urban arterial bicycle lane mileage in fair or better condition.

Discussion
As part of their existing Performance Measure framework, Caltrans monitors distressed pavement through an annual pavement survey. The Agency also monitors the maintenance of road striping, guardrails and the overall roadway. There is no measure, however, specifically for the upkeep of bicycle and pedestrian facilities. Broadening the stewardship objectives to include maintenance of all facilities, including sidewalks and bicycle lanes would help to meet Complete Streets objectives.

For pedestrians, cracks or gaps in the sidewalk can be a tripping hazard and can create a barrier for people with disabilities and for other users. Poor sidewalk conditions also create an unappealing environment for walking and can discourage pedestrians from using a facility. For bicyclists, the condition of the pavement and maintenance of the facility can play an important role in the decision whether to ride. Failing pavement conditions in a bicycle lane can create uncomfortable and unsafe conditions. Litter and debris from the roadway often collect in bicycle lanes, further reducing the appeal and performance of a facility. Also, when pavement markings for bicycle lanes are not maintained, cyclists' safety may be threatened when drivers become unaware of the presence of the facility. As with all transportation facilities, maintenance and upkeep are essential to the function of bicycle and pedestrian travelways.

Data Collection
Summary: Existing data collection process will have to be adapted for this measure.

For both of these measures, data should be collected through an annual survey conducted in coordination with the existing pavement condition survey.

Setting Targets
Caltrans may need to develop a uniform method for grading sidewalk and bicycle facility conditions and should use a similar method to that used in the existing pavement survey.

SERVICE

Goal: Promote quality service through an excellent workforce.

CGS Objective 5.1	**Annually increase the number of Caltrans management, design, and maintenance personnel trained regarding Complete Streets principles and Green Streets principles.**
PM 5.1a	Number of personnel trained in Complete Streets principles.
PM 5.1b	Number of personnel trained in Green Streets principles.

Discussion
Since the design and maintenance of bicycle and pedestrian facilities has not always been central to the departments of transportation, many Agency employees will need special training in order to implement projects that work toward Complete Streets. As stated, the design and maintenance of a bicycle and pedestrian facility will play an important role in a users' choice of mode. Especially since the selection and design of the most appropriate bicycle or pedestrian treatment will vary from site to site, designers must have expansive and current knowledge of best practices in facility design and function. The same is true for maintenance of facilities and collection of data related to bicycle and pedestrian travel. For this reason, it is essential that Caltrans work to expand the capacity and knowledge of the design, maintenance and management staff on a variety of issues that relate to facilities for non-motorized users.

Some of the required trainings may be developed and offered by Caltrans. For example, Caltrans may want to establish a new training for design staff on how to determine whether a certain design qualifies as a Complete Street. Other training opportunities may be offered by outside providers such as the Institute of Transportation Engineers or by a bicycle and pedestrian design firm.

Caltrans staff will also need to be trained on designing, building and maintaining Green Streets. Specific elements related to the placement, species and spacing of trees, the size of buffers and tree wells, and the design of medians can determine extent of the safety and quality of life benefits these investments will bring to surrounding communities. Informed design and maintenance will ensure that this public investment in infrastructure and landscaping will yield meaningful and long-term results. The Green Streets movement is still evolving and may not offer a variety of specific training programs, but there are a range of landscape programs that would allow Agency staff to work towards meeting the new objectives that relate to tree canopy coverage and permeability.

Data Collection
Summary: New data will need to be generated for this measure.

For both of these measures, Caltrans can add a category to the Learning Management System that currently tracks all personnel training.

Setting Targets

No target setting required.

Next Steps

The next steps for the proposed performance measures include testing the measures for validity and reliability through fieldwork. This has been the focus of Phase III of the research project, and is described in detail in the following chapter.

IV. Phase III Analysis

The third phase of the research project focused on testing the proposed performance measures for validity and reliability. This entailed gathering data on multiple aspects of two key transportation corridors: San Pablo Avenue in the East San Francisco Bay Area, and Santa Monica Boulevard in the Los Angeles area. The data included aspects of the street design, such as sidewalk presence and width, the presence and amount of street trees and landscaping, the numbers of driveways and different types of businesses, the presence and width of center medians, and posted speed limit, among other things. Data on motorist, pedestrian, and bicyclist volumes and collisions was also gathered. This data was then analyzed for its relationship to pedestrian, bicyclist, and motorist safety, as described in Section A of this chapter. This was accompanied by a policy and plan analysis of the cities and counties through which San Pablo Avenue and Santa Monica Boulevard run, in order to provide a basis for understanding how policies and plans are translated into action. The policy analysis is described in Sections B and C of this chapter. A pedestrian and bicyclist intercept survey was then conducted to explore perceptions of safety and preferences for design features along the two corridors. This information is elaborated upon in Section D. Finally, Section E shows how the proposed performance measures rank in terms of their reliability and validity.

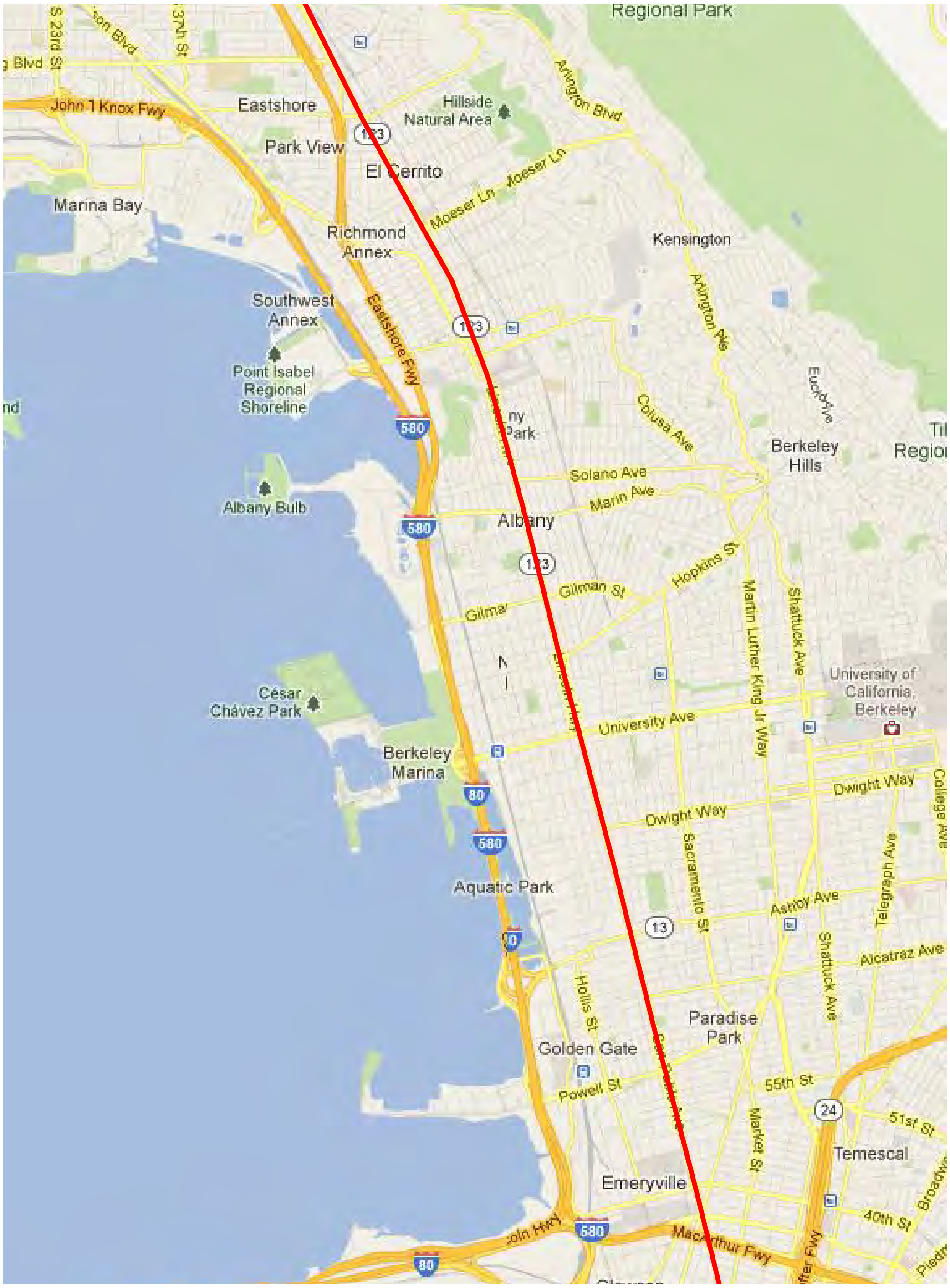
A. Pedestrian, Bicyclist, and Driver Safety Analysis

The third phase of the project focused on gathering data to field-test the proposed *Complete, Green Streets Performance Measures* for safety and mobility. This section describes the field study area and the data gathering process for the facility analysis, in addition to results for the pedestrian, bicyclist, and driver safety analysis.

Study Areas

The research team selected two test corridors for this project: San Pablo Avenue in the East San Francisco Bay area and Santa Monica Boulevard in the Los Angeles area. San Pablo Avenue (represented by the red line in Figure 1), a 9.5-mile, multi-jurisdictional corridor in the East San Francisco Bay of California, was selected as the first test corridor for the project. San Pablo Avenue is a historic State Route (123) that acts as an urban arterial, so while it is under the jurisdiction of Caltrans, its design is influenced by the cities through which it runs. This guaranteed that there would be some consistency in the street layout and operation, but also a variety of design conditions that may affect pedestrians and bicyclists, such as landscaping, decorative paving, public seating, etc.

Figure 1. San Pablo Avenue Study Area



As seen in Table 2, some aspects of the street had little to no variety and essentially acted as control variables within the analysis. Other variables showed quite a bit of variety. The signs in parentheses indicate the expected influence of each element on pedestrian safety and mobility. For example a (-) indicates an expected negative effect, while a (?) indicates that the literature is unclear on whether the effect should be positive or negative.

Table 2. Description of Street and Intersection Conditions along San Pablo Avenue

"Control" Variables (90-100% present)	• Speed limit of 30 mph (-) • 85th percentile speed of 34-38 mph (-) • At least four lanes of traffic (-) • Sidewalks ≥ 5 feet in width, in good condition, and ADA accessible (+) • Bidirectional traffic (+)
"Control" Variables (≤10% present)	• Decorative or textured paving for sidewalks or crosswalks (+) • Mid-block crossings (?) • Signs prohibiting right turns on red (+) • Traffic calming* other than a median (+)
Walkability (intersections):	• 75% of intersection corners were ADA accessible (+) • 24% of intersections had a marked crosswalk on each leg (+) • 22% of intersections had marked crosswalks and additional pedestrian features (e.g., user-activated lighting, pedestrian countdowns, refuge islands, or yield-to-pedestrian signage) (+)
Walkability (street segments):	• 85% of segments had no abandoned buildings (+) • 80% of segments had pedestrian (street) lighting (+) • 60% of segments had ≥ 1 trash receptacle on either side (+) • 60% of segments had no noticeable litter (+) • 25% of segments had public seating on at least one side (+) • 23% of street segments had ≥ 3 retail locations on either side (+) • 20% of segments had school zones (+) • 11% of the corridor had > 5 driveways on at least one side (-)
Landscaping	• 81% of segments had a raised median (+) • 69% of medians had landscaping (+) • 62% of segments had gardens or planters on at least one side (+) • 57% of medians were ≥ 10 feet wide (+) • 50% of segments had regularly spaced street trees on both sides (+) • 56% of landscaped medians had trees (?)
Traffic Operations	• 85% of segments had parallel parking (?) • 69% of intersections had a crossing speed of ≤ 3.5 feet/second (+) • 63% of intersections had at least one dedicated left turn lane (-) • 60% of segments had on-street parking at the intersection on at least one side (-) • 37% of intersections were signalized (?) • 12% of signalized intersections had pedestrian signals with countdowns (+)

*Traffic calming was defined as one of the following features: curb extensions or bulbouts, pavement treatments or lighting, speed tables, bicycle lane at intersection, mini-circles, semi-diverters, speed humps, partial closures, or roundabouts.

The second test corridor selected was a segment of Santa Monica Boulevard in the Los Angeles area. The segment is approximately five miles long, running from the western border of West Hollywood to its intersection with Highway 101 in Los Angeles, as shown in Figure 2. Santa Monica Boulevard is a State Route (2) that acts as an urban arterial in Los Angeles. The West Hollywood section is also an urban arterial. However, this section was relinquished from Caltrans to the City of West Hollywood in 1999 prior to the 2001 reconstruction project that included the design of many landscape, pedestrian, and bicyclist features. This allows for the test of innovative design features that have been implemented in West Hollywood and proposed in the Performance Measures based on recent studies but are still being tested for implementation within Caltrans. The Santa Monica Boulevard segment contains several features that were not present and able to be tested along the San Pablo Avenue corridor, including bicycle lanes, bicycle boxes, bulb-outs, and a greater variety in medians along the corridor. Table 3 shows the percentage of intersections and segments with various features along Santa Monica Boulevard.

Figure 2. Santa Monica Boulevard Study Area

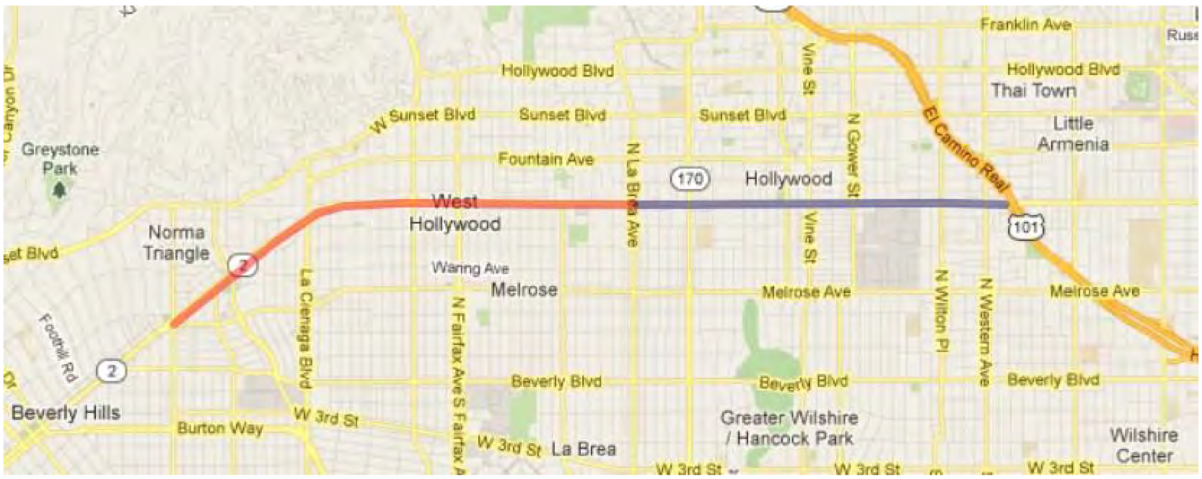


Table 3. Description of Street and Intersection Conditions along Santa Monica Boulevard

"Control" Variables (90-100% present)	• Speed limit of 30 or 35 mph (-) • 85th percentile speed of 31-35 mph (-) • At least four lanes of traffic (-) • Sidewalks ≥ 5 feet in width, in good condition, and ADA accessible (+) • Bidirectional traffic (+)
"Control" Variables (≤10% present)	• Decorative or textured paving for sidewalks or crosswalks (+) • Mid-block crossings (?) • Signs prohibiting right turns on red (+)
Walkability (intersections):	• 72% of intersection corners were ADA accessible (+) • 30% of intersections had a marked crosswalk on each leg (+) • 49% of intersections had marked crosswalks and additional pedestrian features (e.g., user-activated lighting, pedestrian countdowns, refuge islands, or yield-to-pedestrian signage) (+) • 50% Traffic calming* other than a median (+)
Walkability (street segments):	• 30% of segments had no abandoned buildings (+) • 74% of segments had pedestrian (street) lighting (+) • 80% of segments had ≥ 1 trash receptacle on either side (+) • 83% of segments had no noticeable litter (+) • 85% of segments had public seating on at least one side (+) • 71% of street segments had ≥ 3 retail locations on either side (+)
Landscaping	• 10% of segments had a raised median (+) • 25% of medians had landscaping (+) • 25% of segments had gardens or planters on at least one side (+) • 25% of medians were ≥ 10 feet wide (+) • 53% of segments had regularly spaced street trees on both sides (+)
Traffic Operations	• 92% of segments had parallel parking (?) • 64% of intersections had at least one dedicated left turn lane (-) • 40% of intersections were signalized (?) • 25% of signalized intersections had pedestrian signals with countdowns (+)

*Traffic calming was defined as one of the following features: curb extensions or bulbouts, pavement treatments or lighting, speed tables, bicycle lane at intersection, mini-circles, semi-diverters, speed humps, partial closures, or roundabouts.

Methodology

The research team compiled an inventory of landscape and design features along with other characteristics of the corridors including speed, demographic information, and vehicle, pedestrian, and bicycle volume. Crash history for the corridors was compiled for a ten-year period, and crash models were developed to test the relationship between the corridor features and crash rates of different locations throughout the corridors. Vehicle, pedestrian, and bicycle volume was used as a measure of exposure to account for varying volumes throughout the corridors. Models were built for San Pablo Avenue during Phase III of the study, and the procedure was modified slightly based on the experience with San Pablo Avenue to include several additional features in Phase III of the study which included modeling for Santa Monica Boulevard.

The research team developed a checklist to facilitate gathering the data needed to test the proposed performance measures. The checklist included elements needed to perform the National Cooperative Highway Research Program's Multimodal Level of Service Analysis for Urban Streets, which assesses how well various roadway users' needs are met on an urban street. This was done to double-check any conclusions the research team could draw about the framework with an accepted LOS method. The San Francisco Pedestrian Environmental Quality Index was also used for the facility analysis, as it measures some of the necessary information to test the proposed performance measures.

In addition, the research team reviewed the pedestrian and bicycle plans of each city and county with jurisdiction over San Pablo Avenue and Santa Monica Boulevard, and added the most common elements of the plans to the facility checklist as a way to evaluate the impact of policies on the design of the corridor. The checklist can be found in Appendix C. Finally, economic data from the 2010 US Census was used to predict pedestrian volumes for the corridors.

Data Collection: San Pablo Avenue

Data was gathered along San Pablo Avenue between October 2009 and June 2010, at various times in good weather. The lead author and two undergraduate researchers collected the data on paper forms, using standard engineering measuring wheels and stopwatches to enable measurement of distance and time. There are approximately 180 intersections along the test corridor, and the data was gathered for each intersection and its corresponding southern roadway section (both sides of the street segment were measured separately). In this way, data for each intersection and roadway section were attached to a unique ID in the analysis. The researchers spent about 15-20 minutes gathering the data for each intersection and roadway segment. After the data was gathered manually, it was input into a Microsoft Excel™ spreadsheet and checked for accuracy through a combination of Google Maps Street View™ and Google Earth™. When the data could not be corroborated through online tools, a second site trip was made.

The original data set contained 181 intersections along San Pablo Avenue as determined by each city's GIS files, and researchers at SafeTREC coded each intersection with the total number of pedestrian, bicyclist, and driver injuries and fatalities from the years 1997-2007. The crashes were determined from the California Highway Patrol Statewide Integrated Traffic Records System (SWITRS), and were coded to the nearest intersection along the corridor. It should be noted that underreporting of pedestrian and bicyclist crashes has been found in previous research, so it is possible that the crashes modeled in this research do not necessarily account for all pedestrian and bicyclist crashes during this time period. However, SWITRS data represents the best data available for analysis at this time. In addition, when gathering the physical data for analysis, a few of the intersections in the GIS files were unable to be located on the ground, suggesting that changes to the street pattern that may not have been recorded in the GIS database. This resulted in the deletion of 11 intersections from the data set; 170 intersections remained.

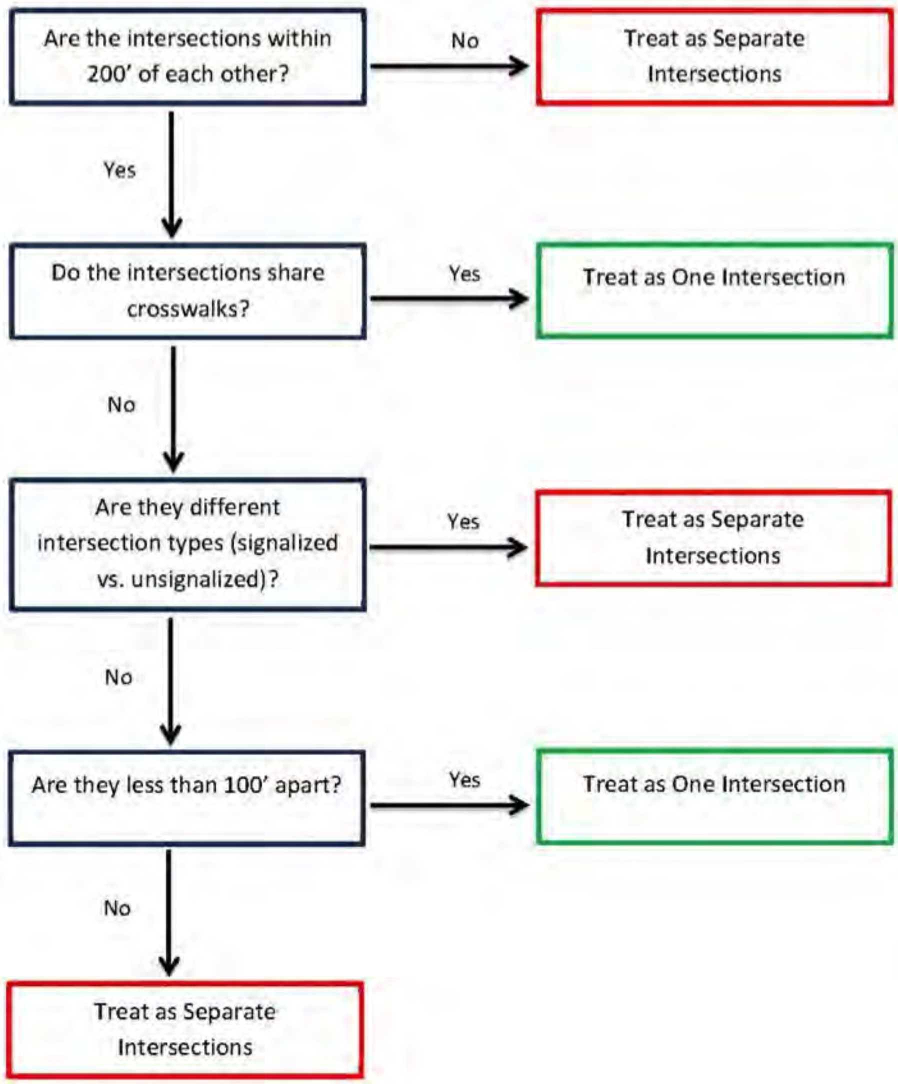
Data Collection: Santa Monica Boulevard

Data for Santa Monica Boulevard was first collected in a similar manner using a combination of Google Maps Street View and Google Earth to record design features and measurements on paper forms as well as to verify that features were present along the corridor for the entire ten year study period. Data was collected between October 2011 and March 2012. Not all measurements could be recorded using Google Earth due to lack of visibility. The measurements and observations were then field verified and completed during a site visit with good weather between Tuesday, March 27, 2012 and Thursday, March 29, 2012. Standard engineering measuring wheels and stopwatches were used to measure distance and time.

The research team developed a methodology for defining intersections in order to collect the data in a way to complete an informative analysis. There are 94 intersections along the corridor, but many of these intersections are close together or effectively act as one offset intersection as shown in Figure 3. This issue was not present to the same extent along San Pablo Avenue; and therefore, this methodology was not warranted or applied to the intersections on San Pablo Avenue. Intersections could not all be treated as separate intersections because the unit of analysis for the regression modeling was determined to be an intersection and its two surrounding blocks. Some block lengths were short enough that there would have been no recorded measurements of features for that block. Therefore, a methodology was developed to determine how intersections would be combined to condense intersections into units that were small enough to be accurate and informative for collision analysis but spaced far enough apart to provide informative collision analysis results. The methodology developed is shown in Figure 4.

Figure 3. Example of Offset Intersection

Figure 4. Methodology for Combining Intersections



After applying the methodology outlined in Figure 4, the original 94 intersections were condensed into 80 intersections. The resulting 80 intersections used for analysis are listed in Appendix I with their corresponding postmile. The intersections that were combined and treated as one intersection were categorized as "offset" in the database to indicate the difference in intersection design. Data was gathered for each of the 82 intersections and both sides of its corresponding western roadway section, so that data for each intersection and roadway section were attached to a unique ID in the analysis. After the data was gathered manually, it was input into a Microsoft Excel™ spreadsheet.

Data: Safety Analyses

Data were obtained from the California Statewide Integrated Traffic Record System (SWITRS). SWITRS is an electronic database of police-reported traffic collisions maintained by the California Highway Patrol (CHP). CHP and all local law enforcement agencies in the state are required by law to submit data on all police-reported collisions.

The SWITRS database is comprised of three data files: (1) collision; (2) party; and (3) victim. The collision table contains one record per collision, and each record is associated with one or more parties in the party table. A party is any participant involved in the collision and may be categorized as driver, pedestrian, parked vehicle, bicyclist, or other. The party table contains one record per party, and each record is associated with one or more victims in the victim table. The associated records are linked with numeric identifiers. Injury in the victim table is coded as "fatal," "severe," "other visible injury," "complaint of pain," or "none." Fatal includes a death within 30 days of the collision. Severe includes any injury which prevents one from performing normal activities that one was able to perform prior to the collision. Other visible includes an injury other than fatal or severe which is evident at the time of the collision scene. Complaint of pain includes injuries claimed but not evident (including limping). Collision characteristics were also used to determine what percentage of collisions at each intersection involved alcohol.

SWITRS data for the Santa Monica Boulevard corridor for a recent ten-year period (2001-2010) were geocoded. Collisions that caused some degree of injury and that occurred within 200 feet of the study intersection were included. Some studies have been more conservative with the distance criteria for pedestrian crashes, however, research using SWITRS indicates that a majority of pedestrian, bicycle, and motor vehicle crashes are captured within 200 feet (Zhang, Pande, & Grembek, 2012). Collisions within 200 feet of more than one intersection were assigned to the closer intersection. The following endpoints were used:

1. Number of pedestrian injuries (includes those in or operating a pedestrian conveyance such as baby carriage, skateboard, wheelchair)
2. Number of bicycle (including passengers on bicycle) injuries
3. Number of motor vehicle (driver and passenger in electric powered devices not on rails, including mopeds) injury collisions

Measures of Exposure

Developing a crash model requires data explaining the exposure of the corresponding mode. Locations with higher numbers of vehicles are inherently expected to experience higher numbers of vehicle crashes. The relationship between the increase in vehicle volume and the increase in number of vehicle crashes may not be linear. To build pedestrian, bicycle, and motor vehicle crash models, volumes were obtained for each of the three modes as explained below.

Vehicle Volume

Vehicle volume was calculated based on the sum of the average annual daily traffic (AADT) for a location over a ten-year period. For the San Pablo Avenue corridor, the AADT was obtained from the cities through which the corridor runs. For Santa Monica Boulevard, the AADT was obtained from the tube counts conducted in 2012.

Because consistent data for the vehicle volume of side streets along the corridors was not available, a proxy variable was use to indicate whether the side streets carried high or low vehicle volumes in comparison with the remainder of the corridor.

Bicycle Volume

Bicycle volume for both corridors was obtained from professional counting firms that conducted four-hour counts between 2 p.m. and 6 p.m. during weekdays in the summer of 2012. Because there is no 24-hour bicycle volume available for the corridors to show how volumes varied throughout the week and year, a full bicycle volume model could not be built as was done with the pedestrian volume. Therefore, bicycle volumes were extrapolated throughout the corridor based on the 4-hour counts in a similar fashion as was applied to the vehicle AADT. Rather than extrapolating the 4-hour bicycle counts to annual volumes, the exposure data for the bicycle crash model is based on the 4-hour counts in order to reflect relative differences in bicycle volume by location.

Pedestrian Volume – San Pablo Avenue

To account for exposure along San Pablo Avenue, pedestrian volumes were estimated according to a model based on the work of Schneider, Arnold, et al. (2009), which was derived using data from a variety of intersections in the Bay Area, including several along San Pablo Avenue.

Pedestrian Volume – Santa Monica Boulevard

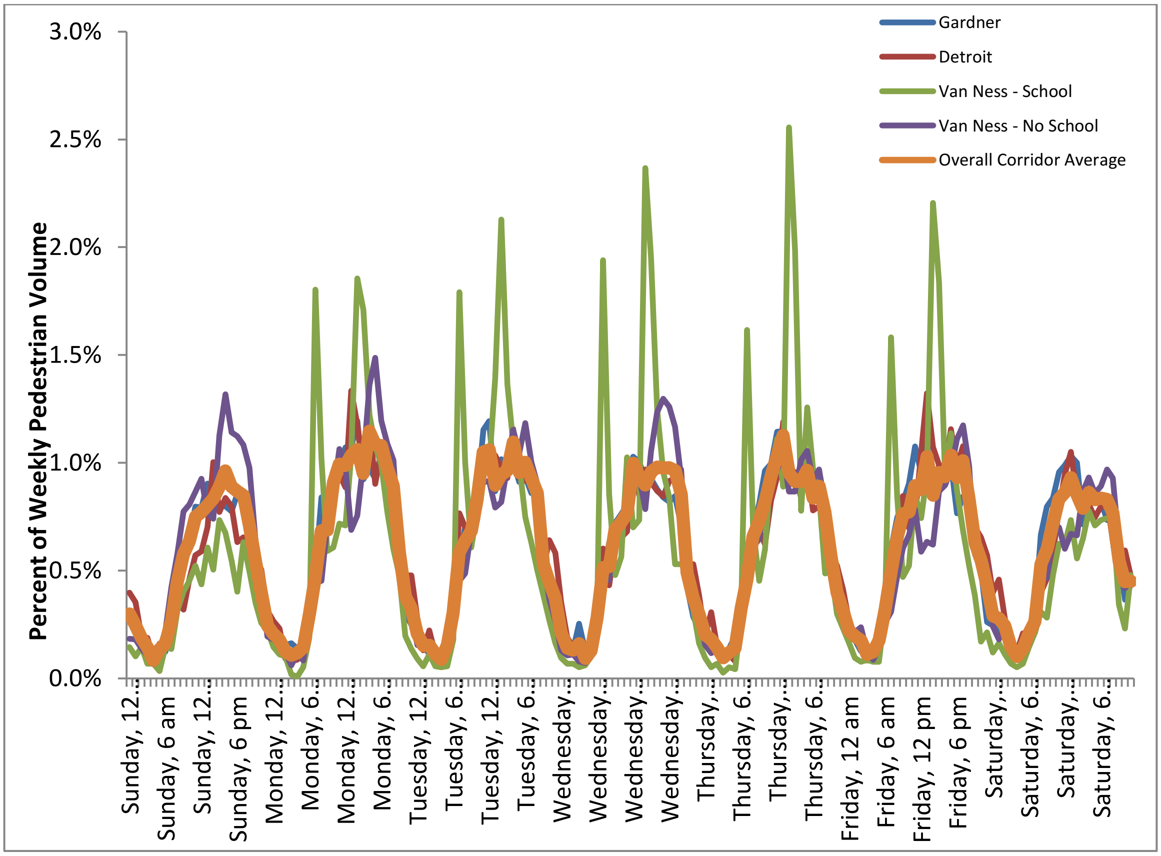
To account for exposure along Santa Monica Boulevard, a model was built to predict pedestrian volumes along the corridor. Rather than using the same pedestrian volume model utilized for the San Pablo Avenue corridor, researchers decided a separate model was necessary to account for the differences in behavior between two distinct regions: the San Francisco Bay and Los Angeles areas. A similar procedure was followed to develop the pedestrian volume model for Santa Monica Boulevard as was used in the development of the Bay Area pedestrian volume model.

A professional traffic counting firm collected pedestrian crossing counts at eleven different locations throughout the Santa Monica Boulevard corridor between the hours of 2 p.m. and 6 p.m. on a weekday between Tuesday and Thursday. Counts were conducted during the summer months of June and July 2012. Pedestrians were counted for each leg of the intersection they crossed to provide an accurate representation of exposure to potential crashes. Therefore, pedestrians who crossed multiple legs of the intersection were counted multiple times.

In addition, Eco-Counters were utilized to collect 24-hour counts for multiple weeks at three different locations throughout the corridor. These counts provided insight into pedestrian volume trends by time of day and day of week at various locations throughout the corridor. One site selected for the 24-hour counts was located next to a school to illustrate how pedestrian patterns vary when school is in and out of session.

The first step in creating a pedestrian volume model for the corridor involved extrapolating the 4-hour counts at eleven different locations to weekly volumes. In order to do this, an adjustment factor was created for each hour of each day based on the percentage that the hourly volume made up of the entire weekly pedestrian volume. Adjustment factors were created for each of the three Eco-Counter locations separately and then averaged together to create a corridor average. Figure 5 shows the percentage of weekly volume corresponding to each hour of the week based on the overall corridor average. The adjustment factors created for each hour between 2 and 6 p.m. were then applied to the corresponding counts to calculate a weekly volume for the eleven count locations. Because the adjustment factors produced four weekly volume estimates at each location, an average of the estimates was utilized for the final weekly volume. No adjustments were made to account for weather because there is no significant variation in weather throughout the corridor.

Figure 5. Percentage of Weekly Volume by Time of Day



When creating this adjustment factor, only the weekly volumes and trends corresponding to time periods when school was out of session were used at Van Ness Avenue. The volume trends when school is in session would not accurately reflect travel patterns throughout the corridor. During a later step in the modeling process, weekly volumes were extrapolated to annual volumes. At this point, the school volumes were utilized to create accurate volumes at the school locations only based on the number of weeks per year that school is in session.

Using the weekly volume projections at eleven locations, a pedestrian model was built to associate different land use and design feature elements with pedestrian volume in an effort to predict volume exposure. Following the methodology used in the Bay Area pedestrian model, a log linear model was used. Variables that were expected to have an association with pedestrian volume based on literature or researchers' hypotheses were tested. These variables included a mixture of demographic variables obtained from Census data, design and landscape features, and land use characteristics. The final pedestrian volume model configuration is shown in Table 4 below. The final model included variables indicating the total number of retail on both blocks surrounding an intersection, the presence of public art on both blocks, the presence of tree grates on both blocks, and the signalization of the intersection. The research team believed all of these associations to be reasonable because retail and high quality locations are likely to attract pedestrians. Pedestrian intersection crossing volumes are likely to be higher at locations with a signal providing pedestrians with a form of protection.

Table 4. Final Pedestrian Volume Model: (Adj. R2 = 0.91)

Variable	Coefficient	Std. Error	*P*-Value
Number of retail both sides of intersection	0.031	0.005	0.001
Indicates public art both sides (yes vs. no)	0.850	0.139	0.001
Number of tree grates on both blocks	0.284	0.108	0.038
Traffic signal (yes vs. no)	0.683	0.156	0.005
Constant	8.451	0.185	0.000

Using the model configuration presented above, weekly pedestrian volumes were calculated for each intersection within the corridor. The weekly volumes were then multiplied by 52 weeks per year and then again by 10 years to project exposure for the ten-year period during which crashes are evaluated. Variables selected for this final model were excluded from the crash models.

Although the model is the most accurate attempt to produce pedestrian exposure data for the Santa Monica Boulevard corridor, it should be noted that the model was developed based on counts from only eleven locations and 24-hour counts from only three locations. Additional counts would produce an even more reliable model. In addition, the counts were conducted in 2012 and are serving as a measure of exposure for crashes that occurred between 2001 and 2010. Therefore, the model relies on the assumption that pedestrian volumes have not significantly changed during the past twelve years.

Data Analysis

All data were entered into Excel 2007 (Microsoft, Redmond, WA). All analyses were conducted using STATA (Stata Corp, College Station, TX) and SAS 9.2 (SAS Institute, Cary, NC). Analysis was first completed for San Pablo Avenue in Phase III of the project. A separate analysis was completed for Santa Monica Boulevard.

Traffic fatalities are relatively infrequent events and, therefore, all levels of injuries were combined. For all endpoints or dependent variables (pedestrian injury, bicyclist injury, and vehicle occupant injury) bivariate and multivariable negative binomial regressions were conducted. Negative binomial is an appropriate approach for count outcomes and relaxes the variance assumption required for Poisson regression.

The safety analyses statistical models completed during Phase III of the study were developed in a stepwise fashion:

1. Relationship between potential independent variable and outcome were evaluated;
2. All variables that had a $p<0.20$ were considered; and
3. Variables with the least significance were removed one at a time.

Unweighted Complete Streets Index

During Phase III of the project, the research team hypothesized that sections of the San Pablo Avenue corridor with a greater number of "pedestrian-friendly" features (as identified in the literature review) would be safer for pedestrians after controlling for exposure. To examine this hypothesis, an index was created of the various features along the corridor with a reasonable expectation of either contributing to or detracting from pedestrian safety. Values were entered as averages of measurements from the street segments flanking the intersection to which the crash was assigned. Variables contributing to pedestrian safety (e.g., medians, marked crosswalks) were added, while those presumed to detract from pedestrian safety (e.g., driveways) were subtracted. The total number was the un-weighted CSI (complete streets index) score. The unweighted index was used solely for exploratory purposes. Results of the index and its relationship to pedestrian safety are discussed at the end of the next section.

Findings

The analyses reported in this section were created in part to test the validity of some of the proposed performance measures. Initial analyses were conducted in Phase III using data from San Pablo Avenue. The Santa Monica Boulevard corridor was added to the project in an attempt to test the treatments that did not occur frequently on San Pablo Avenue. This section elaborates on the findings for pedestrian, bicyclist, and vehicle occupant injury separately for the two corridors and then for the two corridors combined, describes the degree to which the safety in numbers pattern is found in this study, and then describes results for the unweighted complete streets index.

Regression Analysis for San Pablo Avenue

Appendix D describes the range and distribution of variables test in the injury. This section discusses the findings from the modeling using those variables. No final versions of the pedestrian and vehicle occupant injury models are presented for the San Pablo Avenue corridor, due to limitations in the dataset that suggest a need for continued testing using additional data. After obtaining bicycle volume for the San Pablo Avenue corridor in 2012, a bicycle crash model was developed. The final model is presented in this section, although the results should be interpreted with caution due to limitations in extrapolating bicycle volume.

Regression Analysis for Pedestrian Injury for San Pablo Avenue

The negative binomial regression model for pedestrian injury was created by testing a large number of variables and variable combinations for their relationship to pedestrian injuries and fatalities. Some variables previously found to be related to pedestrian injury were found to be significant in this model (e.g., pedestrian volume). In addition, street design features such as public seating and the percentage of ADA accessible corners at each intersection were related to pedestrian safety. However, a number of variables found to be related to pedestrian injury in previous studies were *not* significant in predicting injury rates. For example, among the features identified earlier in this report as contributing to or detracting from pedestrian safety, only vehicular traffic showed any significance in the final version of the model. The authors are cautious about interpreting the lack of association for such variables as marked crosswalks combined with ancillary traffic calming features, pedestrian countdown signals, medians, right-turn only lanes, and driveways. For example, several features were not frequent, reducing statistical power for detecting effects, and the model for extrapolating pedestrian volume based on limited observations may have produced skewed estimates of volume. These and other considerations will be discussion in the Limitations and Conclusions sections.

We also examined features that have been less explored in previous studies, for example, various types of landscaping and pedestrian amenities such as public seating, textured paving, trash receptacles, and public art were analyzed for their relationship to pedestrian injuries. Of these and similar variables, only the presence of public seating was found to be positively associated with the number of pedestrian injuries. In addition, while many of these variables were not significantly related to pedestrian injuries, the survey portion of this research project found that many of these elements are related to *perceptions* of safety and comfort.

In further, frankly exploratory analyses, combinations of variables were also examined. For example, the presence of three of a list of variables (street trees, the percent of the sidewalk with context sensitive paving, trash receptacles, lighting, context sensitive crosswalks, street landscaping, median landscaping, and public seating) was found to be significantly related to pedestrian injury. Other combinations were not found to be significant.

Finally, a series of economic and demographic variables was also entered into the pedestrian injury model. Data measuring the presence of retail stores near the intersection and Census data accounting for age, gender, income, and poverty status of the population of the Census Tract in which the intersection is located were entered into the model. However, none of those variables showed a significant relation to pedestrian injuries.

Regression Analysis for Bicyclist Injury for San Pablo Avenue

Bicyclist volumes for San Pablo Avenue were obtained during Phase III of the project and extrapolated throughout the corridor. These volumes enabled the development of a bicyclist injury model, based on the number of bicyclist injuries at each intersection. The results of the bivariate analysis are shown in Appendix L. The significant variables from the bivariate analysis were then checked for correlation and compiled into a model to begin the step-wise approach. The configuration of the final model is shown in Table 5.

Although the association was not statistically significant, bicyclist volume was positively associated with bicyclist injury. Vehicle speed was significant associated with higher bicyclist injuries.

The presence of bus stops, ladder crosswalks, and percentage of intersection corners that are ADA compliant were positively associated with bicyclist injuries. Such effects may be due to higher numbers of pedestrians and/or vehicles, which increase potential conflicts for bicyclists and can cause increased distractions for all modes. The presence of graffiti revealed a negative association with bicyclist injuries. Such relationships could be idiosyncratic given the large number of variables tested, or be correlated with other variables inversely associated with bicyclist injury.

Table 5. Multivariate Negative Binomial Regression of Bicyclist Injuries and Fatalities*, SWITRS SPA 1997-2007

Variable	Coefficient	Standard Error	95% Confidence Interval		*P*-Value
Log bike volume	0.199	0.167	-0.129	0.527	0.235
Speed 85th percentile	0.192	0.086	0.025	0.361	0.025
Number of bus stops	0.327	0.107	0.118	0.536	0.002
Percent of corners that are ADA	0.021	0.005	0.011	0.031	0.000
Number of ladder crosswalks	0.273	0.077	0.123	0.422	0.000
Graffiti (yes vs. no)	-0.479	0.241	-0.951	-0.007	0.047

Regression Analysis for Vehicle Occupant Injury Crashes for San Pablo Avenue
As expected, vehicle volume was positively, although not significantly, related to vehicle injury crashes and street lighting was protective. Some variables not previously related to vehicle crashes were found to be significant in the model, such as the percentage of ADA accessible corners and the number of trash receptacles on each block. Since there is no clear mechanism for such relationships, it may be that some findings are in fact false positives arising from the many variables examined in the dataset.

As with the pedestrian injury model, variables combining multiple street treatments were also tested for their relationship to driver crashes. One such variable significantly related to occupant injury crashes combined the presence of a traffic signal, marked crosswalks, a median, and pedestrian countdown signals. The authors urge caution in interpreting this finding until it can be further corroborated using additional data from separate corridors.

While variables testing “corridor effects” and economic and demographic characteristics of the surrounding area were tested, none of these variables were significant in the current driver crash model. Further exploration is necessary to understand these findings.

Regression Analysis for Santa Monica Boulevard
Similarly to the methodology used for San Pablo Avenue, negative binomial regression was used for the regression analysis for all three Santa Monica Boulevard crash models. When building the Santa Monica Boulevard crash models, a step-wise approach was applied. The first step in the modeling process involved testing the bivariate relationship between the number of crashes and each of the numerous independent variables. Based on bivariate analyses, variables with p-values less than 0.2 were kept and then checked for correlation with one another. When two variables were correlated, the least significant variable was removed. The remaining variables were then used to build the crash model in a backward step-wise method, removing the least significant variable after each iteration until every variable was significant at the 90% confidence level. This confidence level was more appropriate for this sample size and in some cases relationships with a lower significance level that were close were kept in the model. The dependent variable is the number of crashes

or injuries with exposure as an independent variable. The exposure variable was never removed in the modeling process even if it was the least significant variable.

Additional data was collected for the Santa Monica Boulevard corridor based on the experience with the San Pablo Avenue models, and the models for Santa Monica Boulevard should reflect this added information. However, the research team cautions that these models still reflect limitations, and further studies are needed to validate any findings presented here.

Regression Analysis for Pedestrian Injury for Santa Monica Boulevard
In the bivariate model, pedestrian volume was positively associated with pedestrian injury. This is possibly because the other variables together were associated with pedestrian volume. Traffic volume on the cross streets was associated with an increase in pedestrian injury. The positive association of 'intersection pedestrian features' with pedestrian injury appears paradoxical, since each of these features has been shown to reduce pedestrian injury in individual studies where the focus is on a single treatment. There are several possible reasons for this finding. One is that these features combined reflect (or contribute to) a true increase in pedestrian volume that was not detected by our pedestrian volume model. Another is that these features combined create a strong sense of safety among pedestrians that reduces vigilance. These possibilities will be discussed further in the Limitations and Conclusions sections.

Other variables positively associated with pedestrian injuries included newspaper racks, trash receptacles, and bicycle parking. These features are often found in areas with higher pedestrian and bicyclist volumes, and may therefore be acting as a proxy for volume in the model. Another possibility is that they may have been placed in the sight triangle[3] at the intersection in such a way that visibility was reduced. Sight distance was not evaluated in this study; and future research should differentiate between design features inside and outside of the sight triangle.

Finally, a positive relationship was observed for alcohol involvement and there is research to suggest that pedestrian injury rates tend to be positively associated with proximity to alcohol sales establishments (Schneider, Diogenes, Arnold, Attaset, Griswold, and Ragland, 2010).

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[3]As defined in the AASHTO Green Book, the sight triangle is an area of the intersection corner that should be kept clear to maximize visibility for roadway users, if possible. AASHTO recommends that designers exercise care in placement of any design features in the sight triangle, including trees, bus shelters, power poles, and control cabinets. If possible, these should be placed well in advance of the intersection approach or around the corner, on the egress. In addition, as the eye of the driver typically sits 3.5 feet above the pavement [2] any objects around this height should be outside of the sight triangle if possible, including curbside parked cars, trash cans, low shrubs, newsracks, and transit benches. References: *A Policy on Geometric Design of Highways and Streets* 2011 6th Edition; AASHTO; http://www.ctre.iastate.edu/pubs/traffichandbook/4SightDistance.pdf *Handbook of Simplified Practice for Traffic Studies, Chapter 4 - Sight Distance*, Center for Transportation Research and Education, Iowa State University, 2002

Table 6. Multivariate Negative Binomial Regression of Pedestrian Injuries*, SWITRS SMB 2001-2010

Variable	Coefficient	Standard Error	95% Confidence Interval		P-Value
Log pedestrian crossing volume	-0.001	0.154	-0.302	0.300	0.99
Traffic volume: cross street volume classification	0.445	0.218	0.019	0.872	<0.05
Intersection pedestrian features**	0.702	0.184	0.342	1.062	<0.001
Newspaper racks: Number of 4 surrounding blocks that have at least 1	0.224	0.128	-0.026	0.475	0.08
Trash receptacles: Average number of trash receptacles per segment for the 4 surrounding blocks	0.381	0.129	0.128	0.633	<0.01
Bike parking: Number of bike parking spaces on the 4 surrounding blocks	0.036	0.022	-0.006	0.079	0.09
Alcohol: Percent of intersection crashes that involved alcohol	0.023	0.009	0.005	0.040	<0.01

*Number of pedestrian injuries and fatalities within 200 feet of study intersection.
**Is a signalized intersection with marked crosswalks and one or more of the following: pedestrian countdown signal, leading pedestrian intervals, bulb-outs, or pedestrian refuge island; or an unsignalized intersection with marked crosswalks and one or more of the following: yield to pedestrian signage, user-activated overhead or in-ground warning lights.

Regression Analysis for Bicyclist Injury for Santa Monica Boulevard

The final configuration of the bicyclist injury model, using the methodology outlined above, is shown in Table 7. Although not statistically significant, bicyclist volume was inversely related to bicyclist injuries. The reason for this association is not directly clear because the number of crashes typically increases with the number of bicyclists on the road. Vehicle speed (85th percentile) was positively associated with bicyclist injury.

The positive coefficient for the number of industrial enterprises within two blocks indicates that the number of bicyclist injuries increases with the presence of industrial use buildings. The industrial category was applied to buildings on the corridor that were used for purposes such as storage, warehouses, studios, and transportation operation companies. The presence of these facilities likely indicates locations in which automobile use and speed is higher and places in which bicycle use is lower. Qualitative exploration of the data reveals that the industrial uses are mostly located within the Los Angeles section of the corridor. There are no bicycle facilities on the road at these locations.

The next significant variable in the model is the number of bicycle parking spaces in the two blocks surrounding the study intersection. The positive coefficient indicates that as the number of bicycle parking spaces increases, the number of bicycle injuries also increases. Bicycle parking spaces are likely more common in locations with higher numbers of bicyclists. Therefore, it is possible that the association revealed here is due to the relationship between bicycle parking and bicycle volume.

A higher percentage of curb ramps was associated with an increase in the number of bicyclist injuries at an intersection. This relationship cannot be clarified without further research. The percentage of corners with ramps may be an indication of higher pedestrian volumes, creating the potential for more conflicts between bicyclists and pedestrians. Further research is needed to determine whether this relationship holds true in larger corridors with a greater variety in the percentage of corners with curb ramps.

The presence of pedestrian countdown was associated with a higher number of bicyclist injuries. The relationship could also be attributed to potential higher volumes of pedestrians at locations with pedestrian countdown signals, and the higher pedestrian volume could be associated with more bicycle injuries because of the bicycle-pedestrian conflicts as well as the increased distraction that pedestrians may cause bicyclists. However, it also may reflect a difference in bicycle injury rates between West Hollywood and Los Angeles, since the majority of the pedestrian countdown signals were located in Los Angeles.

The final significant variable in the model other than the exposure data is 85th percentile speed. 85th percentile speed was obtained by measuring speeds during free flow traffic conditions. Therefore, this speed does not account for the times that the corridor is congested. The positive coefficient on the 85th percentile speed variable indicates that bicycle crashes are more common in locations with higher speeds. This relationship aligns with expectations that bicyclists are at higher risk of injury or fatality when vehicles are traveling at higher speeds. The relationship between speed and bicycle injuries raises the question of whether the landscape and design features are related to the corridor travel speed.

Table 7. Multivariate Negative Binomial Regression of Bicyclist Injuries, SWITRS SMB 2001-2010

Variable	Coefficient	Standard Error	95% Confidence Interval		*P*-value
Log bike volume	-0.707	0.578	-1.839	0.426	0.221
Speed 85th percentile	0.157	0.065	0.029	0.284	0.016
Number of industries	0.199	0.059	0.083	0.315	0.001
Number of bike parking spots	0.049	0.017	0.015	0.083	0.005
Percentage of corners that are ADA-compliant	0.007	0.004	-0.001	0.014	0.076
Pedestrian countdown signal	0.552	0.197	0.165	0.940	0.005
Graffiti (yes vs. no)	-0.468	0.201	-0.863	0.020	0.020
Number of newspaper racks	0.163	0.085	-0.004	0.056	0.056

Regression Analysis for Vehicle Occupant Injury for Santa Monica Boulevard
In the multivariate model, traffic volume on Santa Monica Boulevard was negatively associated with motor vehicle injury crashes. Since some studies suggest high levels of congestion result in less severe collisions (and therefore fewer injury collisions), a pattern of high congestion might explain an inverse relationship between high traffic volume and injury crashes. However, cross street volume was positively associated with motor vehicle injury crashes. Offset intersections were associated with fewer crashes, which is consistent with previous research. Landscaped bulbouts, installed particularly to protect pedestrians, had a protective effect for vehicle occupant injury crashes, possibly due to decreased vehicle speed forced on turning vehicles. Bicycle parking (number of bicycle parking spaces on the two blocks surrounding the study intersection) and percentage of the intersection with curb ramps

and/or truncated domes were positively associated with vehicle crashes. Finally, land use patterns (number of industries) was positively associated with vehicle crashes.

Table 8. Multivariate Negative Binomial Regression of Motor Vehicle Occupant Injury Crashes*, SWITRS SMB 2001-2010

Variable	Coefficient	Standard Error	95% Confidence Interval		*P*-Value
Log 10 year AADT	-1.760	0.748	-3.23	-0.294	<0.05
Cross street classification	0.854	0.214	0.435	1.273	<0.0001
Offset intersection	-0.328	0.218	-0.755	0.099	0.13
Landscaped bulb-outs	-0.887	0.552	-1.967	0.194	0.11
Number of industries	0.117	0.071	-0.022	0.255	0.10
Percent of corners that are ADA	0.017	0.003	0.011	0.023	<0.0001
Number of bike parking spots	0.045	0.019	0.007	0.082	<0.05

*Number of motor vehicle occupant injury crashes within 200 feet of study intersection.

Combined Corridors Regression Analysis

Combined regression models were developed using a dataset combining data from both San Pablo Avenue and Santa Monica Boulevard corridors. By combining the datasets from the two corridors, the sample size used for regression modeling increases to 249 intersections, which can provide for more reliable model results. However, it is important to remember that the two corridors are quite different in a number of ways.

Regression Analysis for Pedestrian Injury for Both Corridors

The final model configuration for the pedestrian injury model for both corridors combined is shown in Table 9. Pedestrian volume was not significantly related to pedestrian injuries; however, it was kept in the model in order to assure control for pedestrian exposure. The number of intersection pedestrian features and pedestrian scale lighting were both related to higher pedestrian injuries. Again, possible reasons for this paradoxical finding are discussed below.

Number of legs at the intersection was also significant and positively correlated with pedestrian injuries at intersections. This finding supports the expectation that pedestrians are at higher risk at locations with a greater number of locations at which pedestrians, vehicles, and bicycles may all conflict, such as intersections with four legs rather than three. Intersections with four legs are also more likely to have higher speed cross traffic.

Finally, the average number of trash receptacles per block and the presence of newspaper racks were both associated with a higher number of increased crashes. These features might be related to pedestrian volume. Above we speculated that these may interfere with the line of sight; further research should differentiate features with respect to sight triangle.

Table 9. Multivariate Negative Binomial Regression of Pedestrian Injuries SWITRS: SMB 2001-2010 & SPA 1997-2007

Variable	Coefficient	Standard Error	95% Confidence Interval		*P*-Value
Log pedestrian crossing volume	0.009	0.128	-0.243	0.261	0.944
Pedestrian features (yes vs. no)	0.580	0.153	0.279	0.880	0.000
Pedestrian scale lighting	0.585	0.095	0.399	0.771	0.000
Number of intersection legs	0.660	0.140	0.385	0.936	0.000
Number of newspaper racks	0.322	0.093	0.139	0.505	0.001
Average number of trash receptacles per block	0.182	0.109	-0.032	0.396	0.096

Regression Analysis for Bicyclist Injury for Both Corridors Combined

The combined bicycle model showed a significant and positive relationship between bicycle volume and bicycle crashes. The percentage of the street that is a Complete Street was also positively associated with higher numbers of bicycle crashes. This again may be due to an increase in bicyclist volume that is not reflected in the bicycle volume extrapolation.

Pedestrian volume was negatively correlated with bicycle crashes, indicating that bicycle crashes may be less common in locations with high numbers of pedestrians. However, other variables that may indicate locations with high numbers of pedestrians (retail locations, pedestrian countdown signals, and newspaper racks) were associated with higher numbers of bicycle crashes.

A higher number of driveways and higher number of legs at an intersection were both associated with a higher number of bicyclist injuries. Both of these are related to increased chance of conflict with vehicles.

Graffiti and street trees were negatively associated with number of bicyclist injuries. The association with graffiti could be due to a lower number of bicyclists in locations that may be deemed unsafe or undesirable to ride a bicycle. The relationship with street trees should be further explored to determine whether street trees provide a safety benefit to bicyclists.

Table 10. Multivariate Negative Binomial Regression of Bicyclist Injuries and Fatalities SWITRS: SMB 2001-2010 & SPA 1997-2007

Variable	Coefficient	Standard Error	95% Confidence Interval		*P*-value
Log bike volume	0.300	0.151	0.004	0.047	0.047
Log pedestrian volume	-0.231	0.131	-0.488	0.077	0.077
Pedestrian countdown signal	0.610	0.162	0.293	0.000	0.000
Number of intersection legs	0.633	0.137	0.366	0.000	0.000
Number of driveways	0.031	0.011	0.009	0.005	0.005
Percent of the block that is a complete street	0.009	0.002	0.005	0.000	0.000
Blocks with at least 6 retail locations	0.460	0.146	0.175	0.002	0.002
Number of newspaper racks r	0.163	0.085	-0.004	0.056	0.056
Does the block have regularly spaced trees on both sides	-0.458	0.148	-0.747	0.002	0.002
Graffiti (yes vs. no)	-0.468	0.201	-0.863	0.020	0.020

Regression Analysis for Vehicle Occupant Injury for Both Corridors

The final model configuration for the motor vehicle crash model is shown in Table 11. Vehicle volume was not significant but was kept in the model to assure control for vehicle exposure data. The cross street classification was significant and positively associated with an increase in vehicle crashes; higher vehicle volumes on cross streets present an increased risk for vehicle collision. Similarly, the number of driveways is positively associated with number of vehicle crashes, likely due to the increase in potential conflicts.

Some features that may indicate areas with higher pedestrian and bicyclist volumes (percent of corners that are ADA, pedestrian scale lighting, number of newspaper racks, pedestrian features, high numbers of retail locations, and bicycle volume) are associated with higher vehicle crash rates. This may be due to the increase in vehicle-pedestrian and vehicle-bicycle conflicts as well as in distractions for drivers.

Additional pedestrian signs and ladder crosswalks are significantly and negatively associated with motor vehicle crashes, indicating that these facilities may be beneficial to users other than pedestrians. These pedestrian warning features may cause drivers to be more alert to their surroundings or to reduce vehicle speeds.

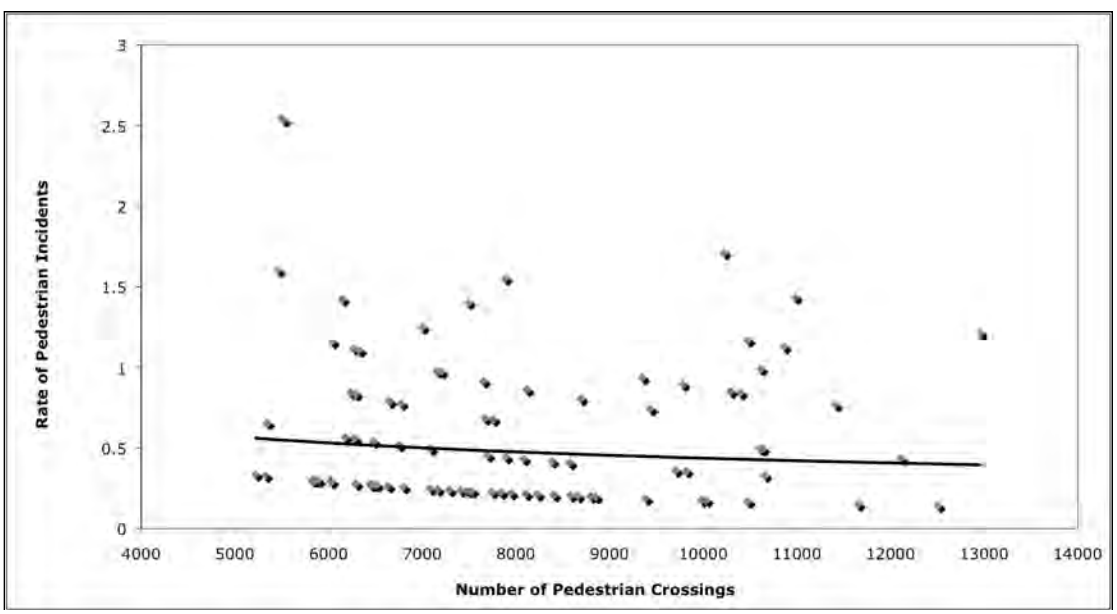
Table 11. Multivariate Negative Binomial Regression of Motor Vehicle Occupant Injury Crashes SWITRS: SMB 2001-2010 & SPA 1997-2007

Variable	Coefficient	Standard Error	95% Confidence Interval		*P*-Value
Log 10 year AADT	-0.412	0.573	-1.534	0.710	0.472
Cross street classification	0.562	0.133	0.301	0.823	0.000
Number of driveways	0.025	0.010	0.006	0.044	0.011
Percent of corners that are ADA	0.016	0.003	0.011	0.022	0.000
Number of ladder crosswalks	-0.096	0.056	-0.207	0.014	0.087
Additional signs for pedestrians	-0.311	0.141	-0.586	-0.035	0.027
Does the block have an average sidewalk width greater than 8'	0.344	0.130	0.089	0.598	0.008
Pedestrian scale lighting	0.382	0.079	0.228	0.536	0.000
Number of newspaper racks	0.349	0.072	0.207	0.490	0.000
Pedestrian features (yes vs. no)	0.242	0.141	-0.034	0.518	0.086
Blocks with at least 6 retail locations	0.239	0.124	-0.004	0.482	0.054
Log bike volume	0.212	0.096	0.024	0.401	0.027

Safety in Numbers

Although many past research studies have found a "safety in numbers" effect for pedestrians and bicyclists (Jacobsen 2003; Raford and Ragland 2005), Figure 6 shows that this effect was quite small for the data in this study (outliers removed), although the range of pedestrian volumes is relatively narrow.

Figure 6. The Relationship Between Rate of Pedestrian Incidents and the Estimated Number of Pedestrian Crossings



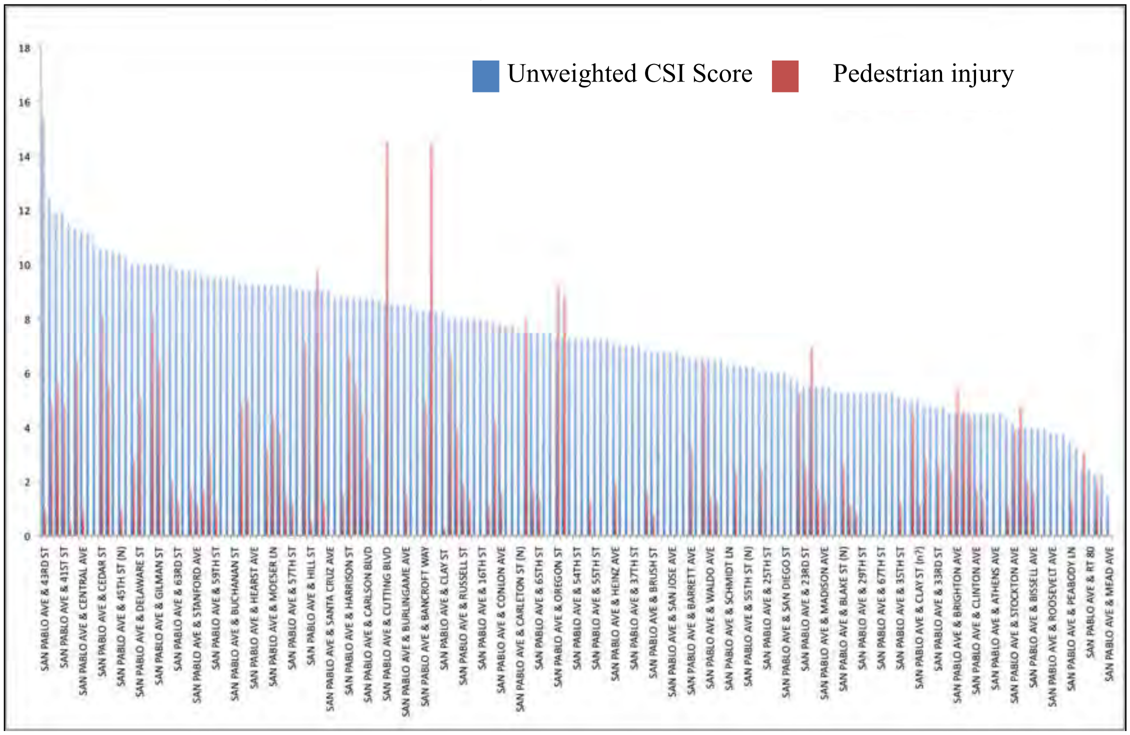
Unweighted Complete Streets Index
The scores for the unweighted Complete Streets Index (CSI) that was developed for San Pablo Avenue ranged from 1.5 to 15 for the various intersections, with a mean value of 7 and a standard deviation of 2.34. Figure 7 and Figure 8 show photos of the intersections at the high and low ends of the scale, respectively.

Figure 7. Cross Section Photo of 43rd Street—a High CSI Score

Figure 8. Cross Section Photo of Mead Avenue—a Low CSI Score

Although the segments look different, there was no association of CSI with pedestrian injury. If the CSI had any relation to pedestrian injury, one would expect to see the crash rate either positively or negatively associated with the CSI score. However, as Figure 9 depicts, there was little or no relationship between the two, and the CSI score was highly insignificant in the regression model.

Figure 9. Pedestrian Injury Rates per Unweighted Complete Streets Index Scores



Limitations
There are several limitations to the research presented in this section. First, as this research was conducted on only two corridors on which several variables were present with little variation (e.g., posted speed limit, number of vehicle lanes), care should be used in extending conclusions reached in this paper to other situations. Second, although the two study corridors combined have almost 300 intersections and a variety of features, intersections cannot be assumed to be entirely independent due to spatial proximity. Third, we utilized a modeling approach to extrapolate pedestrian and bicycle volume estimates, with potential biases related to corridor features being tested. Finally, it is possible that unreported pedestrian injuries are related to different elements than reported pedestrian injuries; this paper analyzed only reported pedestrian, bicycle, and vehicle crash data.

Conclusions and Next Steps
This section presented the findings from the pedestrian, bicyclist, and driver crash models created to help test safety components of the *Complete, Green Streets Performance Measures Framewo*rk. This is one of the first attempts to test the separate and combined effect of multiple variables that comprise a complete streets concept.

One aim of this study was test whether features associated with Complete Streets are associated with reduced pedestrian injuries. We found, by and large, that this was not the case for the two corridors either separately or combined. Instead we found a pattern of positive associations between Complete Streets features and pedestrian-related collisions in the two corridors separately as well as the two corridors combined. We have considered three possible explanations for this unexpected pattern of results.

The first is that our pedestrian volume estimates were not valid. An underestimate of volume in areas with a high number of Complete Streets features and/or an overestimate in other areas would produce the results we noted. However, we examined our model carefully and see no reason that such a pattern of biased volume estimates would have been produced. The second is that our study results could be affected by a cross-sectional bias. Pedestrian injury issues (e.g., high number of injuries) might have helped trigger the installation of these features in the first place. Such features might have reduced pedestrian collisions but the number of such collisions may still have been higher than in non-treated areas. A before-after study with both treated and untreated sites would address this potential bias, although measures should be taken to reduce a possible regression to the mean effect if locations are treated based on high collision numbers. The third is that the multiple features associated with Complete Streets cause pedestrians to be less alert due to an increase in perceptions of safety. In fact, the survey portion of this research project found that many of these elements are related to *perceptions* of safety and comfort. An adverse impact on safety might be produced if perceptions of safety were enhanced but vehicle speed and/or volume were not substantially reduced. Further research is needed to determine whether these, or other, explanations apply to the reported results.

In the combined corridor model the number of bicyclist injuries was associated with the number of intersection legs and the number of driveways, suggesting increased conflict associated with these features. In the separate models, the percentage of corners that are ADA compliant were related to high numbers of bicyclist injury. It is worth noting that the percentage of corners that are ADA compliant was highly correlated with the number of crosswalks at an intersection. The increase bicycle injuries at intersections with curb ramps, which may serve as a proxy for number of crosswalks or number of legs of the intersection, indicates that bicyclists are at higher risk when there are higher pedestrian volumes or potential conflicts with vehicles turning. Each model separately indicates that bicyclists are at higher risk when vehicles are traveling at higher speeds.

In the combined corridor model, the number of vehicle occupant injury crashes was associated with cross street vehicle volume and the number of driveways, suggesting the potential for increased conflicts. The positive association between ADA compliant intersection corners and bicycle parking with driver safety might be attributed to the increased pedestrian and bicyclist volumes associated with these features. Higher numbers of injury vehicle crashes are associated with pedestrian features, high numbers of retail locations, and pedestrian scale lighting. These areas might be associated with higher pedestrian and bicyclist volume leading to increasing conflicts and possible distractions for drivers.

This is one of a few studies attempting to assess the impact on safety of multiple roadway/ environmental features in a complex urban environment. All in all, the results do not present a clear and consistent picture and we urge caution in the interpretation of these results. In particular, further work is need to (i) improve volume estimates for all three modes so that we have confidence in estimates of the volume-injury association; (ii) understand how corridor treatments individually or combined may influence perception of safety and therefore behavior; (iii) understand the statistical correlation among the multiple roadway features studied and how that might affect analyses; and, finally (iv) plan and conduct before-after studies of corridors undergoing transition to a complete streets model.

The potential for conducting a before-after study exists for the Highway 82 improvements being made. A counting firm utilized video technology to record the pedestrian and bicyclist counts along this corridor. Video footage from these counts, which will be provided to the research team, could be reviewed after the improvements to complete a longitudinal study study, (i.e., comparisons over time rather than space).

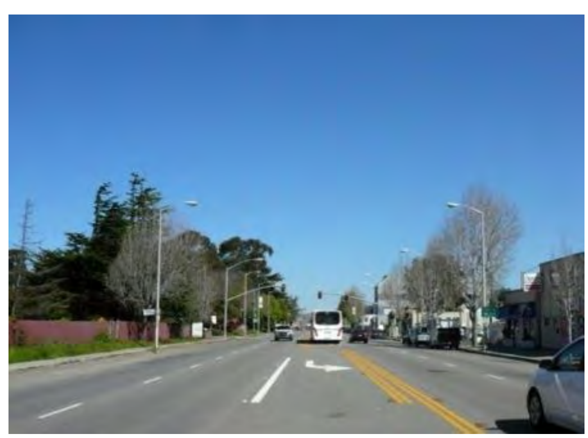
The following sections elaborate on other key findings from the project. Section C presents the results of the pedestrian and bicyclist intercept survey, while Section D presents an analysis of each performance measure's validity and ease of application. Issues that have been identified are being addressed so that the performance measures can be fully recommended for use by Caltrans. In doing so, the researchers plan to deliver a valid and relatively easy to implement set of measures for Caltrans' *Complete, Green Streets Performance Measures Framework for Urban Arterials.* It will then be Caltrans's role to begin to set targets and gather the data necessary to measure the performance of its network with regard to pedestrian and bicyclist safety and mobility. The result of implementing the proposed *Complete, Green Streets Performance Measures Framework for Urban Arterials* should be a Caltrans roadway system that better accommodates pedestrians and bicyclists and contributes to environmental sustainability and community vitality through increased multimodal mobility, and ultimately, more holistic street design.

B. San Pablo Avenue Pedestrian and Bicycle Policy and Plan Analysis

Introduction & Background

San Pablo Avenue (SPA) is a historic state route that acts as an urban arterial on the eastern side of the San Francisco Bay. As a state route, the roadway is under the jurisdiction of Caltrans, but influenced by the six cities and two counties through which it runs. This variety in governance has naturally resulted in a variety of local priorities—many of which were written into the design of the street itself. This can be seen, for example, at the transition of two cities. Whereas one city built medians into the street and planted them with trees that would create a large canopy, another banned medians to facilitate access to businesses. As can be seen in Figure 10 and Figure 11 below, these two design decisions have resulted in dramatically different streetscapes.

Figure 10 & Figure 11. San Pablo Avenue, City of Berkeley (left) and City of Albany (right) Cross-sections at Shared Border



While these decisions may have made the most sense at the time, priorities have begun to change with regard to the many purposes roadways serve. A decline in physical activity, along with alarming growth in the rate of obesity and diabetes in the United States, has spurred the CDC to recommend building bicycle and pedestrian facilities as a key strategy to increase public health (CDC 2009). Evidence of global climate change has also convinced the United States government to target reducing vehicle miles traveled (VMT) as an important objective (EPA 2010).

In addition, roadway funding is in short supply: the Highway Trust Fund, which has traditionally paid for the maintenance of highways in the United States, is functionally bankrupt (AASHTO 2010), and communities across California continue to struggle to keep up with maintenance needs. Thus, fiscally it is not clear that continuing to focus on the most expensive and least efficient form of transportation—the private automobile—is in the State's best interest. Caltrans' current Strategic Plan acknowledges these challenges, in addition to the burden of a rapidly growing population on the aging transportation system (California DOT 2007).

Many of the jurisdictions with authority over San Pablo Avenue have recognized the importance of prioritizing alternative transportation in their policies. While several of these policies are new, and have therefore not had time to affect design, they still serve as important harbingers of the future of walking and bicycling along San Pablo Avenue. *In addition, in the places where policies have been in place for several years, clear results can be seen in the built form, offering encouraging evidence of the importance of policy and political will with regard to defining priorities.* Specific examples of this can be seen in the following sections of this chapter. This section examines the city and county policies that affect pedestrian and bicycle safety and mobility along San Pablo Avenue, and compares the current policies and their potential to create a more walkable, bikable San Pablo Avenue.

Overview

This section briefly describes each agency's roles and responsibilities regarding transportation planning, and details the policies applicable to pedestrian and bicyclist safety and mobility, and community vitality along San Pablo Avenue. Policies from the following agencies/jurisdictions are included in the analysis:

- California Department of Transportation (Caltrans)
- Alameda County
- Contra Costa County
- Metropolitan Transportation Commission (MTC)
- City of Albany
- City of Berkeley
- City of El Cerrito
- City of Emeryville
- City of Oakland
- City of Richmond

We looked at 43 different strategies and physical elements that could encourage pedestrian and bicyclist safety, and compared them with one another using a checklist developed from the summary review of all plans. The aim of this effort is to understand how design and policies interact in each jurisdiction to produce the observed outcomes.

Format

Each plan that influences the design of San Pablo Avenue was examined, along with its specific goals and objectives for increasing walking and bicycling along San Pablo Avenue. The exact text from the plans discussed here can be found in Appendix F. In the concluding section, a checklist will summarize and compare the aspects of pedestrian and bicyclist safety and mobility covered by a combination of the plans of each city or county. A summary comparison of the contents of all policies reviewed herein is located in Appendix E.

Local Agency Roles and Policies for San Pablo Avenue

The various plans from each city through which San Pablo Avenue runs as State Route 123 are detailed in this section. Only plans that specifically mention San Pablo Avenue are discussed. For each city, any plan that is specifically geared toward San Pablo Avenue is discussed first, followed by the general plan of the city, and then by pedestrian and bicycle plans. Other policies that are not specific to any plan, but that would be generally applicable to San Pablo Avenue (e.g., a street tree ordinance), are mentioned at the end of each city's section. The California Streets and Highways Code requires that sidewalks be maintained by the adjoining private property owner (*Section 5610*) in all cities, so sidewalks are not mentioned except where cities have added an addendum to this section.

CITY OF ALBANY

History and authority: The City of Albany was incorporated in 1908 (City of Albany 2008). The city partially maintains the route for the State. The most recent maintenance deal was signed in 1981 (Caltrans 1981).

Roles and responsibilities: In agreement with Caltrans, the City of Albany is responsible for maintaining the roadside (including sidewalks), street tree and median maintenance and care, litter cleanup, and operational aspects such as signal timing and speed limits. Due to possible impacts on air quality and traffic congestion, decisions about operations are influenced by regional authorities such as the congestion management agency (CMA) and the Metropolitan Transportation Commission. Decisions about modifying the route, such as by adding a signal or a crosswalk, must be approved by the State.

San Pablo Avenue Streetscape Master Plan (2001)

This is Albany's only San Pablo Avenue-specific plan. The plan aims to create a consistent streetscape for San Pablo Avenue in Albany. It focuses on amenities, such as street lights, benches, trash receptacles, and street trees. There is little attention given to pedestrians or bicyclists, other than design features such as pedestrian-scaled lighting and bicycle rack placement (pp. 2-3). However, it can be assumed that the amenities would benefit both pedestrians and bicyclists by creating a more pleasant place to walk and bicycle. There are no stated goals or policies in this document.

Albany General Plan (1994)

Albany's current General Plan focuses on pedestrian improvements along pathways, rather than on the sidewalks of major streets. While the plan mentions the various types of bikeways that could be developed, as well as a need to develop a network, it also states that it has not developed a network. It should be noted that the current General Plan was approved over ten years before the current Albany Bicycle Plan. The plan has only one goal specific to pedestrians and bicyclists, and four supporting policies, which are summarized below.

Goal: Support alternative modes of transportation to the private automobile.

Policies:
1. Create incentives for walking and bicycling.
2. Connect pathways to major uses and amenities to encourage walking.
3. Increase compliance with the ADA to enable disabled pedestrian access.
4. Assure that pedestrian pathways (including sidewalks) are safe and accessible.

Albany Bicycle Plan (~2005)
The Albany Bicycle Plan defines several goals and supporting policies to increase bicycling in the city. Many of the goals and policies are operational and involve programming, so are difficult to measure with a physical analysis. The goals that are physical in nature can be measured, but are not targeted for implementation along San Pablo Avenue. In general, the plan acknowledges that bicycling may take place along San Pablo Avenue, and so argues for increased bicycle parking, but does not recommend facilities along the street. The goals that are applicable to San Pablo Avenue are summarized below.

Goals:
1. Develop a comprehensive bicycle transportation system that links neighborhoods to regional destinations.
2. Attempt to fund bicycle transportation system with state and federal monies.
3. Aim to accommodate both recreational and commuter bicyclists.
4. Provide connections to transit.
5. Improve safety for bicyclists.
6. Encourage bicycling through city events and efforts (e.g., a bicycle map).

City of Albany Traffic Management Plan (2000)
Vision: *The Traffic Management Plan is presented as a set of defined goals, objectives, and implementation actions designed to enhance the City's quality of life by creating more livable streets, which promote safer automotive travel, and safer and more convenient facilities and programs that increase and encourage bicycle, pedestrian, and transit travel* (adapted, p. 1).

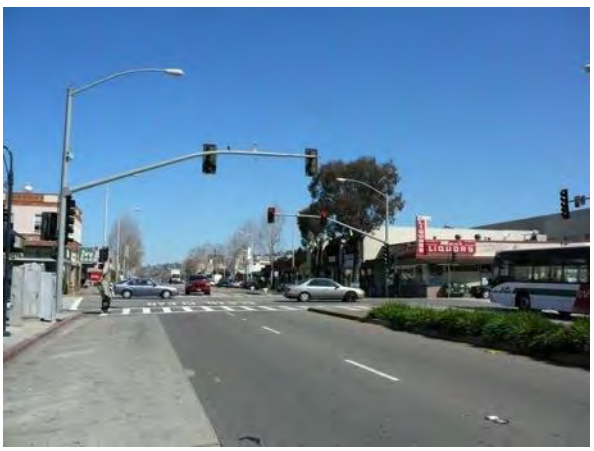
This plan identifies the goals and strategies for managing traffic in Albany. Several of the overall goals relate to improving pedestrian and bicycle access in Albany. These include the following:
1. Provide equal rights of access for non-automobile modes.
2. Reduce automobile trips in the City by encouraging use of non-automobile modes.
3. Create conditions throughout the City for safer and more convenient walking and bicycling, especially for children going to and from school.

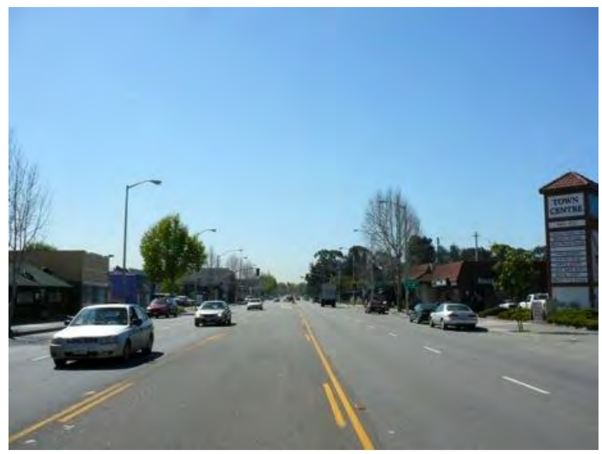
The traffic plan focuses on travel safety and traffic calming on key streets (including San Pablo Avenue). It recommends that a future Pedestrian Preferential Plan be developed to more fully deal with pedestrian issues.

How Does Albany Compare?

The plans mentioned here reflect efforts to increase pedestrian and bicycle safety and access in Albany. Table 12 in the concluding section shows that Albany's plans cover 12 of the 43 topics, many fewer than the other cities profiled in this report. In addition, even though there are specific safety and landscape design projects mentioned in the plans, some of these improvements have yet to be implemented. Figure 12 and Figure 13 show major intersections in Albany as currently designed.

Figure 12 & Figure 13. San Pablo Avenue in Albany: Cross Section With and Without a Median





CITY OF BERKELEY

History and authority: The City of Berkeley was incorporated in 1878 (City of Berkeley 1878). The city maintains the route for the State. The most recent maintenance contract with Caltrans was signed in 1988 (California DOT 1988).

Roles and responsibilities: In agreement with Caltrans, the City of Berkeley has assumed responsibility for the maintenance of San Pablo Avenue, and is thus responsible for ensuring the quality of the roadway and sidewalks (where not private). This includes roadway and sidewalk paving and construction, where needed; street tree and median maintenance and care; litter cleanup; providing and refurbishing pavement markings and signs; and operational aspects such as signal timing and speed limits. Due to possible impacts on air quality and traffic congestion, decisions about operations are influenced by regional authorities such as the congestion management agency (CMA) and the Metropolitan Transportation Commission. Decisions about modifying the route, such as by adding a signal or a crosswalk, must be approved by the State.

City of Berkeley San Pablo Avenue Public Improvements Plan (2003)

Vision: *The City of Berkeley is committed to improving the San Pablo Avenue streetscape to balance the needs of pedestrians, bicyclists, local and regional drivers, public transit users, business owners, and local residents* (p. 2).

Through this plan, the city aims to create a more walkable and accessible San Pablo Avenue that is economically vibrant and connected to the local Berkeley neighborhoods. The plan identified the following actions to accomplish this vision:

- Upgrade existing crosswalks and install pedestrian-scaled light fixtures.
- Upgrade curb ramps to current ADA standards.
- Designate key intersections through special features or markings.
- Further define Berkeley's character through maintenance and enhancement of street and median trees.
- Use landscaping and bulb-outs to enhance sidewalk connections from residential and commercial areas to San Pablo Avenue.
- Consider adding differential gateway features to mark north and south entries.

The plan also looks at medians, special paving, special pedestrian signals, crosswalks, trash receptacles, benches, news racks, public art, bicycle parking, and new traffic signals where San Pablo Avenue intersects with bicycle boulevards.

Berkeley General Plan (2001)

The Berkeley General Plan contains several policies to address various aspects of walking and bicycling. These policies are summarized below.

Policies:

1. Consider separate traffic signals to increase pedestrian and bicycle access.
2. Coordinate with other departments to improve bicycle and pedestrian access when possible.
3. Provide a comfortable bicycling network for all types of bicyclists.
4. Emphasize education and enforcement to encourage safe driving and bicycling.
5. Promote benefits of bicycling to the public.
6. Improve pedestrian access for the disabled community.
7. Maintain sidewalks to facilitate pedestrian access.
8. Prioritize pedestrians when there is competition for sidewalk space.
9. Increase pedestrian safety at crossings.
10. Address intersections with high pedestrian and bicycle collision rates.
11. Ensure that bicyclists and pedestrians are provided for in neighborhoods.
12. Create pedestrian-friendly commercial areas.

Berkeley Pedestrian Master Plan (2008)

The Berkeley PMP is modeled from and consistent with the City's General Plan. Many of the goals are linked to the policies in the Berkeley General Plan.

Goals:

1. Plan, Build and Maintain Pedestrian Supportive Infrastructure
   This Goal includes policies, actions and implementation measures related to design standards, engineering, maintenance, funding priorities, and development review.
2. Provide Universally Safe and Equal Access
   This Goal includes policies, actions and implementation measures related to the ADA, safe crossings, access to destinations, and reducing conflicts and collisions. As part of the PMP, the City developed a GIS-based sidewalk centerline network model that includes sidewalk centerlines, sidewalk widths, pathway and stair centerlines, the location of audible pedestrian signals, pedestrian actuated signals and pedestrian count-downs, and the location and types of crosswalks, traffic calming devices, curb ramps, and signage. This data enables the city to keep track of how well they are meeting plan goals.
3. Develop Pedestrian Supportive Encouragement and Enforcement Programs
   This Goal includes policies, actions and implementation measures related to education, encouragement, enforcement, and coordination with other institutions. The plan is quite thorough, and also includes detailed information about pedestrian safety and risk.

Berkeley Bicycle Plan (1998; updated in 2005)

Mission: To create a model bicycle-friendly city where bicycling is a safe, attractive, easy, and convenient form of transportation and recreation for people of all ages and bicycling abilities. Following are the goals of the plan that directly affect the San Pablo area.

Goals:

1. Planning
   Integrate the consideration of bicycle travel into City planning activities and capital improvement projects, and coordinate with other agencies to improve bicycle facilities and access within and connecting to Berkeley.
2. Network and Facilities
   Develop a safe, convenient, and continuous network of bikeways that serves the needs of all types of bicyclists, and provide bicycle parking facilities to promote cycling.
3. Education/Safety
   Improve the safety of bicyclists through education and enforcement.
4. Promotion
   Increase bicycle mode share by increasing public awareness of the benefits of bicycling and of the available bike facilities and programs.
5. Implementation
   Secure sufficient resources from all available sources to fund ongoing bike improvements and education.

Additional Policies: Street Tree Planting

Street trees positively affect pedestrians by providing shade, serving as a buffer between the sidewalk and the roadway, visually enclosing a space, and providing a sense of street continuity. Over 800 new and replacement street trees are planted in the parkway strip (area between the sidewalk and curb) each year by the Parks Recreation & Waterfront Department (City of Berkeley 2010).

How Does Berkeley Compare?
The particulars of Berkeley's plans show more detailed planning for pedestrian and bicycle issues in comparison with other communities. Table 12 in the concluding section shows that Berkeley's plans cover 31 of the 43 topics. In addition, many of the specific actions in Berkeley's San Pablo Avenue Improvement Plans have been implemented, such as street trees, public seating or amenities, high visibility crosswalks, audible pedestrian signals, and pedestrian-scaled lighting. Figure 14 and Figure 15 show the effect of street trees and medians. However, there is still work to be done to meet the remainder of the various plans' goals.

Figure 14 & Figure 15. San Pablo Avenue in Berkeley: London Plane and Mixed Trees

CITY OF EL CERRITO
History and authority: The City of El Cerrito was formally established in 1917 (City of El Cerrito 2010). The city partially maintains the route for the State. The most recent maintenance contract with Caltrans was signed in 1992 (California DOT 1992).

Roles and responsibilities: In agreement with Caltrans, the City of El Cerrito is responsible for the landscaping, drainage, litter cleanup and electrical maintenance of lights along San Pablo Avenue. However, in contrast to Berkeley, El Cerrito is not responsible for the physical quality or operations of the roadway. El Cerrito is responsible for the quality of the public sidewalks; however, private sidewalks are required by state law to be the responsibility of the abutting property owner.

Cities of El Cerrito and Richmond Draft San Pablo Avenue Specific Plan (2009)
Vision: *The heart of El Cerrito and an important artery for Richmond, San Pablo Avenue is a vibrant, cohesive and community-strengthening corridor that serves existing and new residents, businesses, commuters and visitors. Its new residential, commercial and civic uses and activities are linked by easy and safe cross-avenue connections, increasing the corridor's activity, vitality and prosperity. The character of this East Bay "gem" is cohesive while allowing for variations and unique elements* (p. 37).

(The vision continues that the street) ... *is oriented to provide an improved environment that encourages walking, biking, and transit use. San Pablo is a safe, attractive street, with wide sidewalks, trees, lighting and other amenities supporting a healthy pedestrian environment. Sustainable street design elements are incorporated into the infrastructure, supporting the environmental and ecological commitment of the community. While San Pablo Avenue is a bustling, pedestrian-oriented place, the Ohlone Greenway runs parallel to the street, providing a safe and more natural environment for bicyclists and pedestrians. Key east-west connections are designed to better balance the demands of autos, bicyclists and pedestrians. Intersection improvements improve cross-avenue connectivity, and new streets, pedestrian connections, and alleys break up large blocks, enhancing walkability of the plan area* (p. 37).

The following key principles and goals affect pedestrian and bicyclist safety and mobility:

Circulation Principles:

1. Balanced transportation modes provide options for mobility.
2. Improvements to circulation routes increase safety for pedestrians and bicyclists.
3. Universal accessibility ensures a safe and efficient circulation experience for everyone.

Transportation Goals:

- T-1—Make the plan area a walkable and bikeable corridor at the seam of the El Cerrito and Richmond communities.
- T-3—Strengthen multi-modal connections in and around the plan area.

This plan is a special case of city partnership, as the City of Richmond maintains the west side of the roadway, and the City of El Cerrito maintains the east side. Differences in quality between the two sides are noticeable in some places currently; however, the plan clearly creates a unified vision for the quality of the street. The plan aims for a high-quality streetscape, and thoroughly identifies areas of improvement along the corridor. It is not possible to measure the effects of this plan on the built environment at this time, as it was just recently released as a draft. However, it has the potential to significantly improve San Pablo Avenue in El Cerrito and Richmond.

For its part, the City of El Cerrito intends that San Pablo Avenue become an environment that supports walking, bicycling, and transit use. The City sponsored the San Pablo Avenue Streetscape Improvement Project from 2007-2010, fitting with the development of the larger San Pablo Avenues Specific Plan. El Cerrito desires San Pablo Avenue to be a safe roadway, complete with sidewalks, trees, and lighting and other amenities that encourage walkability. It should also become a sustainable streetscape that supports the "ecological commitment of the community." The Ohlone Greenway will be the more natural parallel to SPA, while important east-west routes will help balance multimodal travel demands. The city also aims to improve intersections and break up large blocks to increase walkability.

El Cerrito General Plan (1999)

El Cerrito aims to create an atmosphere of pedestrian friendliness and economic vitality. The General Plan envisions El Cerrito as a "pedestrian friendly place" with a pedestrian-friendly network of streets, pathways, and open spaces that conveys safety and mobility for city residents. The city aims to emphasize pedestrians, cyclists, and public transit users through slowing automobile traffic and creating an attractive place to be. The city also aims to accommodate pedestrians through land use patterns that can support alternative transportation.

San Pablo Avenue is specifically targeted to be more transit and pedestrian friendly. The city's policies promote greater mixed uses along SPA that can connect various parts of the avenue, as well as connect the avenue to the Ohlone Greenway. Businesses are to have adequate pedestrian and bicycle facilities, such as curb ramps and bicycle parking, and connections to transit where possible. San Pablo Avenue should have a coherent identity reinforced through landscaping and street improvements.

El Cerrito Circulation Plan for Bicyclists and Pedestrians (2007)
The Circulation Plan is consistent with the General Plan. With the development and implementation of this Circulation Plan, the City of El Cerrito hopes to attain the following goals:

Goals

1. Create a comprehensive citywide network of bicycle and ADA accessible pedestrian routes that connect travelers to both local and regional destinations.
2. Promote bicycling and walking as alternative modes of transportation through design, designation, programs, policies, and education.
3. Foster a sustainable community by addressing the social, economic, and environmental impacts of transportation infrastructure and services.
4. Provide safe and accessible routes to schools, transit stops and stations, and City facilities.
5. Create bicycle and pedestrian facilities that fulfill the needs of both utilitarian and recreational users.
6. Accommodate bicycle and pedestrian access in the design and development of new buildings and facilities.

…

8. Work with City departments, neighboring jurisdictions, and regional organizations to coordinate efforts during the planning and implementation phases of bicycle and pedestrian improvement projects.
9. Establish priorities and identify funding sources for implementing bicycle and pedestrian improvements.

The Circulation Plan has designated San Pablo as a proposed pedestrian route in the city, and has identified seven intersections along San Pablo for improvement. It also urges consideration of allowing previously prohibited pedestrian crossings, installing pedestrian countdown signals, reconfiguring lanes, lowering the speed limit to 30 mph (which is consistent with the speed limit in Berkeley and Albany)[4], and prohibiting vehicular right turn on red movements at select

[4] It should be noted that research shows that a pedestrian hit by a driver traveling 30 mph has only a 40% chance of survival:
Leaf, W. A., & Preusser, D. F. (1999). *Literature Review on Vehicle Travel Speeds and Pedestrian Injuries*. Washington, D.C.: National Highway Traffic Safety Administration, United States Department of Transportation.

intersections. The plan suggests developing streetscape improvements in coordination with redevelopment along the San Pablo Avenue corridor, and exploring potential for Caltrans' relinquishment of control of sidewalks to the City of El Cerrito.

How does El Cerrito compare?
The plans mentioned here reflect efforts to increase pedestrian and bicycle safety and access in El Cerrito. Table 12 in the concluding section shows that El Cerrito plans cover 33 of the 43 topics, the most of any city profiled in this report. Anecdotal evidence from the facility analysis suggests that El Cerrito has followed through with some of its plans to improve the streetscape and plant trees for pedestrians, as demonstrated by Figure 16.

Figure 16 & Figure 17. San Pablo Avenue in El Cerrito: Regular (left) and Sporadic (right) Street Trees

However, these plans have not yet been universally implemented, as demonstrated in Figure 17. In addition, other actions, such as the intention to increase bicycle parking, have not been as evidently accomplished. The recently released San Pablo Avenue Specific Plan contains specific recommendations which, when implemented, should greatly improve the walkability of the corridor. None of the plans advocate for bicycle facilities along San Pablo Avenue, though, which brings into question how bikable the corridor will eventually become (this is the case for all cities evaluated in this document, not just El Cerrito). It will take a few years before the newest recommendations come to fruition. Evaluation of the plans' effectiveness will be more appropriate at that time.

CITY OF EMERYVILLE
History and authority: The City of Emeryville was incorporated in 1896 (City of Emeryville 2010). The City partially maintains the route for the State. The most recent maintenance contract with Caltrans was signed in 1989 (California DOT 1989).

Roles and responsibilities: In agreement with Caltrans, the City of Emeryville is responsible for the landscaping, drainage, litter cleanup and electrical maintenance of lights along San Pablo Avenue. Similar to the City of El Cerrito, Emeryville is not responsible for the physical quality or operations of the roadway.

Emeryville Draft General Plan (2009)
The fourth Guiding Principle of Emeryville's GP states that the City is "a walkable, fine-grained city, emphasizing pedestrians."
The General Plan establishes that all of Emeryville will be easily traversed on foot. A fine-grained pattern of blocks and streets is a fundamental prerequisite of a walkable and accessible city; the General Plan promotes walkability through encouragement of active uses, creation of smaller parcels/blocks and inter-connections as large sites are redeveloped, and improved sidewalks, pathways, and streetscapes. Where larger buildings may be appropriate, these shall be constructed with smaller footprints to preserve views and ensure pedestrian access. Where appropriate, in people-intensive places—such as retail, office, and residential districts—pedestrians will have priority over automobiles, and buildings shall be articulated and designed to visually engage and offer comfort to pedestrians (p. I-3).

San Pablo Avenue is classified as a "transit street" in Emeryville, which accommodates pedestrians through large sidewalks. Part of SPA is also designated a "Pedestrian Priority Zone"—an area designed to accommodate and encourage high volumes of pedestrian traffic along the sidewalk. The designation includes:

- Building wide sidewalks with plentiful pedestrian amenities;
- Encouraging interesting building frontages;
- Giving high priority to pedestrian crossings at intersections; and
- Providing well-protected mid-block crosswalks where appropriate.

The City also plans to replace its Level of Service analyses (LOS) with a Quality of Service analysis that will give more weight to pedestrian and bicyclist concerns than traditional LOS.

Emeryville Bicycle and Pedestrian Plan
This plan does not deal with San Pablo Avenue specifically, except in its claim that a majority of residents are able to walk around Emeryville via its sidewalks.

How Does Emeryville Compare?
The plans mentioned here signify progress toward increasing pedestrian and bicycle safety and access in Emeryville. Table 12 in the concluding section shows that Emeryville's plans cover 20 of the 43 topics. Figure 18 and Figure 19 show that some of the policies have already been implemented. For example, San Pablo Avenue is fairly consistently lined with street trees and many medians have landscaping.

Figure 18 & Figure 19. San Pablo Avenue in Emeryville: Medians with Plants and Trees

CITY OF OAKLAND
History and authority: The City of Oakland was incorporated in 1852 (Oakland convention & visitors bureau 2008). The most recent maintenance contract with Caltrans was signed in 1991 (California DOT 1991).

Roles and responsibilities: In agreement with Caltrans, the City of Oakland has assumed responsibility for the maintenance of San Pablo Avenue, and is thus responsible for ensuring the quality of the roadway and bridges (where applicable). This includes roadway and sidewalk paving and construction, where needed; street tree and median maintenance and care; litter cleanup; providing and refurbishing pavement markings and signs; and operational aspects such as signal timing and speed limits. Due to possible impacts on air quality and traffic congestion, decisions about operations are influenced by regional authorities such as the congestion management agency (CMA) and the Metropolitan Transportation Commission. Decisions about modifying the route, such as by adding a signal or a crosswalk, must be approved by the State.

Oakland General Plan (1998)
The General Plan has a few transportation goals broadly related to pedestrian and bicycle transportation. These are:

- T2—Provide mixed use, transit-oriented development that encourages public transit use and increases pedestrian and bicycle trips at major transportation nodes.
- T4—Increase use of alternative modes of transportation.
- T6—Make streets safe, pedestrian accessible, and attractive.

These goals form the basis for many of the goals, policies, and actions developed for the Oakland Pedestrian and Bicycle Master Plans. There are not many specific actions in the General Plan; however, this may be appropriate given the scope of the plan. For example, San Pablo Avenue is designated in the plan as a regional transit street and an arterial, typically having speeds between 30-45 mph. However, there are no other specifics about San Pablo -- the plan mentions only a desire to generally "improve" the arterial. The plan references the Oakland Bicycle and Pedestrian Master Plan for more information.

Oakland Pedestrian Master Plan (2002)
The vision of the Oakland Pedestrian Master Plan is to:
...promote a pedestrian-friendly environment; where public spaces, including streets and off-street paths, will offer a level of convenience, safety and attractiveness to the pedestrian that will encourage and reward the choice to walk (p. 6).

To foster pedestrian safety, the City established a Pedestrian Route Network that connects every public school, park, recreational center, and library in the City of Oakland. The network was integrated with existing school safety programs that have targeted sidewalk and crossing improvements. It also identifies key routes that serve AC Transit bus lines and BART stations. These routes include the "transit streets" designated by the Land Use and Transportation Element (of which San Pablo Avenue is one).The plan has the following goals for enhancing pedestrian safety.

Goals:

1. Pedestrian Safety. Create a street environment that strives to ensure pedestrian safety.
2. Pedestrian Access. Develop an environment throughout the City—prioritizing routes to school and transit—that enables pedestrians to travel safely and freely.
3. Streetscaping and Land Use. Provide pedestrian amenities and promote land uses that enhance public spaces and neighborhood commercial districts.
4. Education. Educate citizens, community groups, business associations, and developers on the safety, health, and civic benefits of walkable communities.
5. Implementation. Integrate pedestrian considerations based on federal guidelines into projects, policies, and the City's planning process.

Oakland Bicycle Master Plan (2007)

Vision Statement: *Oakland will be a city where bicycling is fully integrated into daily life, providing transportation and recreation that are both safe and convenient* (p. 15).

Goals:

1. Infrastructure: Develop the physical accommodations, including a network of bikeways and support facilities, to provide for safe and convenient access by bicycle.
2. Education: Improve the safety of bicyclists and promote bicycling skills through education, encouragement, and community outreach.
3. Coordination: Provide a policy framework and implementation plan for the routine accommodation of bicyclists in Oakland's projects and programs.

The Bicycle Master Plan aims to help the City achieve "Bicycle Friendly Community" status, as awarded by the League of American Bicyclists, by the year 2012.

How Does Oakland Compare?

The plans mentioned here demonstrated concerted effort toward increasing pedestrian and bicycle safety and access in Oakland. Table 12 in the concluding section shows that Oakland's plans and policies cover 21 of the 43 topics. Many of these topics have been addressed along parts of San Pablo Avenue. Figure 20 represents an area of San Pablo Avenue in Oakland with great attention to landscaping, full sidewalks, and pedestrian-scaled lighting. In contrast, Figure 21 depicts a part of the avenue where the policies do not seem to have had much effect.

Figure 20 & Figure 21. San Pablo Avenue in Oakland: Planted and Concrete Medians

CITY OF RICHMOND
History and authority: The City of Richmond was chartered in 1909 (City of Richmond 1909). The most recent maintenance contract with Caltrans was signed in 1973 (California DOT 1973).

Roles and responsibilities: Caltrans still has responsibility for most of the maintenance of San Pablo Avenue, including the restoration and repair of the surface and base within the roadbed area; cleaning of the culverts, ditches, natural water channels and gutter; restoring side slopes, removal of drifted material, drift prevention, erosion control, and maintenance of walls, cribs or bank protection, sidewalks and curbs, and other roadside facilities. The state also controls the vegetation and performs routine tree maintenance for safety only. The City is responsible for street sweeping and cleaning, roadway marking maintenance, and maintenance of select curb paint. The state pays for all signs used for warning or regulating traffic and for lighting at intersections, when required for the safety of persons crossing the streets.

Richmond General Plan (2009)
As part of its General Plan, Richmond developed a vision of what the community will look like in 2030. This vision describes Richmond as a place that "ensures mobility and access for all residents, workers and visitors through a safe, interconnected, multimodal transportation system." The vision continues with a specific focus on non-motorized transportation:
Richmond's grid-based network of streets balances modes of travel, supports pedestrian and bicycle connectivity, transit accessibility and a smooth flow of vehicular traffic. The City is easily navigable with clear directional signage and barrier-free links connecting all neighborhoods. Many residents rely on walking, bicycling and transit. These modes of travel are well supported by attractive streetscapes, pedestrian amenities, connected hubs and reliable bus service that provides connections to local destinations. Crosswalks, sidewalks, traffic calming features, multimodal trails and designated bike routes further provide safe and comfortable conditions for pedestrians and cyclists (p. 2, Circulation Element).

The pedestrian and bicycle goals relevant to San Pablo Avenue in Richmond's General Plan include:

Circulation:
- CR1—Expand the Multimodal Circulation System
- CR2—Promote Walkable Neighborhoods and Livable Streets
- CR3—Create a Safe and Well-Maintained Circulation System

Land Use:
- LU6—Promote High-Quality and Sustainable Development

Richmond has also focused on San Pablo Avenue as a "community connector street," a transit street, and a "key corridor." In this way, it serves as a link to neighborhoods in other parts of the City, with a particular emphasis on accommodating public transit and being multimodal.

How Does Richmond Compare?
Richmond's General Plan and the Richmond/El Cerrito San Pablo Avenue Specific Plan demonstrate concerted effort toward increasing pedestrian and bicycle safety and access in Richmond. In addition, the City is currently in the process to develop a pedestrian plan. Table 12 in the concluding section shows that Richmond's plans and policies cover 23 of the 43 topics.

Figure 22 and Figure 23 depict typical street and landscaping conditions in Richmond. The policies show effort to improve the environment for pedestrians and cyclists in ways that may dramatically alter the current streetscape.

Figure 22 & Figure 23. San Pablo Avenue in Richmond: Street Trees and a Typical Cross Section

Regional Agency Roles and Policies for San Pablo Avenue
Regional agencies produce broad plans that aim to work with the local plans and policies addressing San Pablo Avenue and the region. The counties of Alameda and Contra Costa have both produced pedestrian and bicycle plans, and the Bay Area's Metropolitan Transportation Commission has produced its own regional bicycle plan. These plans are discussed briefly below.

ALAMEDA COUNTY
In 1986, voters in Alameda County elected to pay a ½ cent sales tax in order to support discretionary transportation funding. The Alameda County Transportation Improvement Authority (ACTIA) was formed to manage this money, known as "Measure B" funds, on behalf of county residents. When the measure went to the ballot again in 2002, voters again supported it – this time with a guarantee of 5% of the funding (estimated to be about $150 million) going to pedestrian and bicycle projects (Alameda County Transportation Improvement Authority 2010). The county's pedestrian and bicycle plans were developed in part to guide the allocation of Measure B funds.

Alameda Countywide Strategic Pedestrian Plan (2006)
According to the Pedestrian Plan, its main purpose is to improve the status of pedestrians in Alameda County. The plan will be used to guide funding decisions in a strategic fashion to encourage walking in Alameda County.

Vision*: Alameda County will be a community that inspires people to walk for everyday trips, recreation and health where development patterns, connections to transit, and interconnected pedestrian networks offer safe, attractive, and widely accessible walking routes and districts* (p. iv).

The goals of the plan target a range of areas, from connectivity to safety. The following goals are complimented by actions over which Caltrans may have some influence:

1. *Number and Percentage of Walk Trips:* Increase the number and percentage of walking trips with the intention of reducing motor vehicle use.
2. *Safety:* Improve actual and perceived pedestrian safety and security.
3. *Infrastructure and Design:* Improve Alameda County's pedestrian environment through additional infrastructure, better design and maintenance.
4. *Connectivity:* Ensure that essential pedestrian destinations throughout Alameda County—particularly public transit—have direct, safe and convenient pedestrian access
6. *Staffing and Training:* Ensure that public agency staff and elected and appointed officials are well-informed and well-trained in the pedestrian realm.

Alameda Countywide Bicycle Plan (2006)

Similar to the pedestrian plan, the Countywide Bicycle Plan aims to encourage bicycling throughout the county, and to provide guidance on priority projects to help accomplish this overall goal.

Vision: *To establish and maintain bicycling as a viable mode of transportation and integrate it with other modes of transportation; to assure that bicycling is safe for bicyclists of all abilities; and to encourage multi-jurisdictional coordination to plan, fund, design and construct bicycle projects* (p. ES-2).

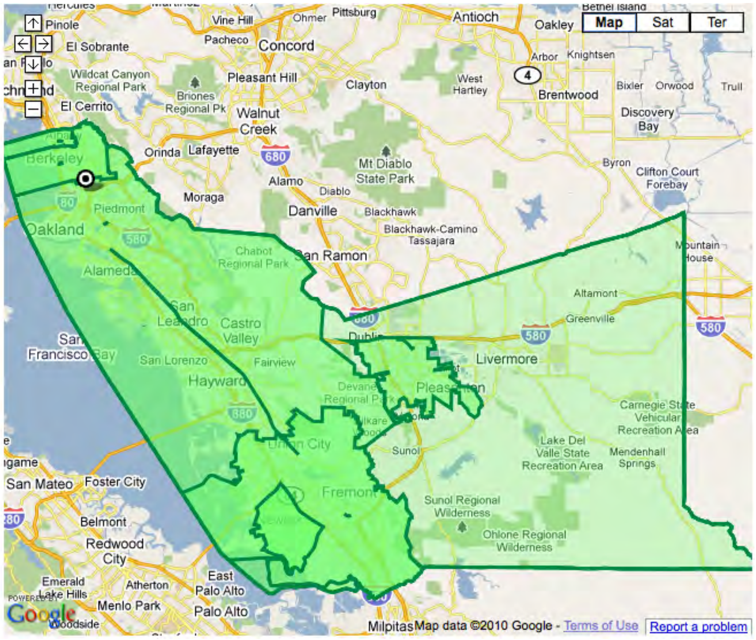
The goals of the bicycle plan include:

- Create and maintain an inter-county and intra-county bicycle network that is safe, convenient and continuous.
- Integrate bicycle travel in transportation planning activities and in transportation improvement projects.
- Encourage policies and actions that foster bicycling as a mode of travel.
- Improve bicycle safety through facilities, education and enforcement.
- Maximize the use of public and private resources in establishing the bikeway network.

How Does Alameda County Compare?

The plans mentioned here demonstrate concerted effort toward increasing pedestrian and bicycle safety and access in Alameda County. Figure 24 shows the ACTIA project area; the lines and blocks of color represent nearly 20 programs and projects.

Figure 24. ACTIA Bicycle and Pedestrian Project Area



Source: Alameda County Transportation Authority

However, because Alameda County includes several cities that each have their own bicycle and pedestrian plans (at least the cities covered in this report), it may be difficult to differentiate the effects of the county plans from the effects of the city plans. In addition, because much of the County's efforts go into programs to encourage bicycling or walking, rather than actual expenditure on infrastructure, it is difficult to know how much effect they have on San Pablo Avenue. The low number of 'x' marks in Table 13, which compares the regional and state plans, reflects this reality. Alameda County's plans cover 9 of the 43 of the topics on the list.

CONTRA COSTA COUNTY

In 2004, voters in Contra Costa County overwhelmingly supported Measure J, which continued a ½ cent sales tax (previously passed as Measure C in 1988) to provide funds for transportation projects. The Measure is estimated to provide about $30 million for pedestrian and bicycle projects over a 30-year period. The funds are managed by the Contra Costa County Transportation Authority (CCCTA) (Contra Costa Transportation Authority 2010). The county's pedestrian and bicycle plans were developed in part to guide the allocation of Measure J funds.

Draft Contra Costa County Bicycle and Pedestrian Plan (2009)

The County Bicycle and Pedestrian Plan aims to encourage walking and bicycling through supporting cities in their efforts to accommodate pedestrians and bicyclists, guiding regional allocation of funds designated for bicycle and pedestrian projects, and influencing other regional funding to routinely consider pedestrians and cyclists.

Vision: *More people who live, work, shop and go to school in Contra Costa will walk and bicycle, thereby improving health, reducing emissions of greenhouse gases and making our transportation system more sustainable. To support walking and bicycling, Contra Costa will have an integrated system of safe, convenient and comfortable pedestrian and bicycle* *facilities that provide access to schools, jobs, shopping, neighborhoods, community facilities, parks and regional trails. Agencies within Contra Costa will collaborate on creating interjurisdictional facilities and accommodate the needs of pedestrians and bicyclists when planning, designing and approving all development and transportation projects* (p. 29).

The goals of the Bicycle and Pedestrian Plan applicable to San Pablo Avenue include:

1. Expand, Improve and Maintain Facilities for Walking and Bicycling
2. Improve Safety for Pedestrians and Bicyclists
3. Encourage More People to Walk and Bicycle
5. Consider and Plan for the Needs of Pedestrians and Bicyclists

Contra Costa Countywide Transportation Plan (2009)

Vision: *Strive to preserve and enhance the quality of life of local communities by promoting a healthy environment and a strong economy to benefit the people and areas of Contra Costa, sustained by 1) a balanced, safe and efficient transportation network; 2) cooperative planning; and 3) growth management. The transportation network should integrate all modes of transportation to meet the diverse needs of Contra Costa.* (p. v)

To direct the actions of the CTP, the Authority established the following goals:

1. Enhance the movement of people and goods on highways and arterial roads,
2. Manage the impacts of growth to sustain Contra Costa's economy and preserve its environment,
3. Provide and expand safe, convenient and affordable alternatives to the single-occupant vehicle, and
4. Maintain the transportation system.

In general, the plan focuses on moving traffic, but does state a few multimodal transportation service objectives, including:

- Improving bicycle and pedestrian access to transit to make it more competitive with driving.
- Increase bicycle and pedestrian mode splits in West Contra Costa County to 3 percent for commute trips by 2012.

The plan also identifies specific actions for San Pablo Avenue and other key routes. However, most of the bicycle and pedestrian projects are not intended for San Pablo Avenue.

How Does Contra Costa County Compare?

The plans mentioned here demonstrate intention to encourage pedestrian and bicycle safety and access in Contra Costa County. In comparison with Alameda County, Contra Costa has allocated less money to pedestrian and bicycle projects, and may be disadvantaged because of development patterns (Contra Costa County lacks dense areas like downtown Berkeley or Oakland which naturally encourage non-motorized modes). However, anecdotal evidence indicates that strong policies and plans to encourage bicycling and walking can influence rates of walking and bicycling, and the plans profiled here are a good start. Table 13 shows that the County's plans cover 6 of the 43 topics among the plans affecting San Pablo Avenue.

SAN FRANCISCO BAY AREA

The main influence on San Pablo Avenue at the regional level, other than county agencies, is the Metropolitan Transportation Commission (MTC), which is the conduit through which most federal money flows for bicycle and pedestrian projects in the Bay Area. The MTC has a vested interest in regional transportation flows, and has been active in trying to encourage more sustainable transportation in the Bay Area. In this vein, MTC produced a regional bicycle plan to encourage inter-regional bicycling as a way to potentially reduce congestion and air pollution, and increase physical activity.

MTC Regional Bicycle Plan (2009)

Overall goal: *To ensure that bicycling is a safe, convenient, and practical means of transportation and healthy recreation throughout the Bay Area, including in Priority Development Areas (PDAs); to reduce traffic congestion and risk of climate change; and to increase opportunities for physical activity to improve public health* (p. 5).

The Regional Bicycle Plan states the following goals for encouraging bicycling in the Bay Area:

1. Routine accommodation—Guarantee that accommodations for bicyclists and pedestrians are routinely considered in the planning and design of all roadway, transit and other transportation facilities funded by MTC.
2. The Regional Bikeway Network (RBN)—Define a comprehensive RBN that connects every Bay Area community; provides connections to regional transit, major activity centers and central business districts; and includes the San Francisco Bay Trail.
3. Bicycle safety—Encourage local and statewide policies that improve bicycle safety.
4. Bicycle education and promotion—Develop training sessions and educational materials that emphasize bicycle safety and the positive benefits of cycling.
5. Multimodal integration—Work toward developing seamless transfers between bicycling and public transportation.
6. Comprehensive support facilities & mechanisms—Encourage the development of facilities and institutions that contribute to a bicycle-friendly environment.
8. Planning—Continue to support ongoing regional bicycle planning.

What Does the MTC Contribute?

We used the same table that we've used throughout this paper to profile the efforts covered in the MTC plan. However, we asked a different question, because there is no appropriate entity with which we could compare MTC's efforts in the Bay Area. Thus, the focus is on the additional aspects of bicycle and pedestrian safety and mobility that MTC contributes. Table 13 shows that MTC's plan covers 6 of 43 topics on the list. Figure 25 and Figure 26 show the proposed regional bicycle network links in Alameda and Contra Costa County, respectively.

Figure 25. Regional Bicycle Network Links in Alameda County

Figure 26. Regional Bicycle Network Links in Contra Costa County

State Agency Roles and Policies Affecting San Pablo Avenue

State influences come mainly from Caltrans, which is the roadway authority in the State. However, additional influences may come from legislation passed by the State. Policies and plans that may have an effect on pedestrian and bicyclist safety and mobility on San Pablo Avenue are covered in this section.

California Department of Transportation

Although Caltrans is most often associated with the major interstate highways, its policies and plans affect local roadways most directly when state highways run through cities as local arterial roadways. In many of its statements and policies, Caltrans presents a holistic vision. Its five high-level goals cover a broad range of topics (*safety, mobility, stewardship, delivery,* and *service*) important to Californians. Following are Caltrans' plans and policies that most directly affect pedestrians and bicyclists on San Pablo Avenue.

California Blueprint for Cycling and Walking (2002)

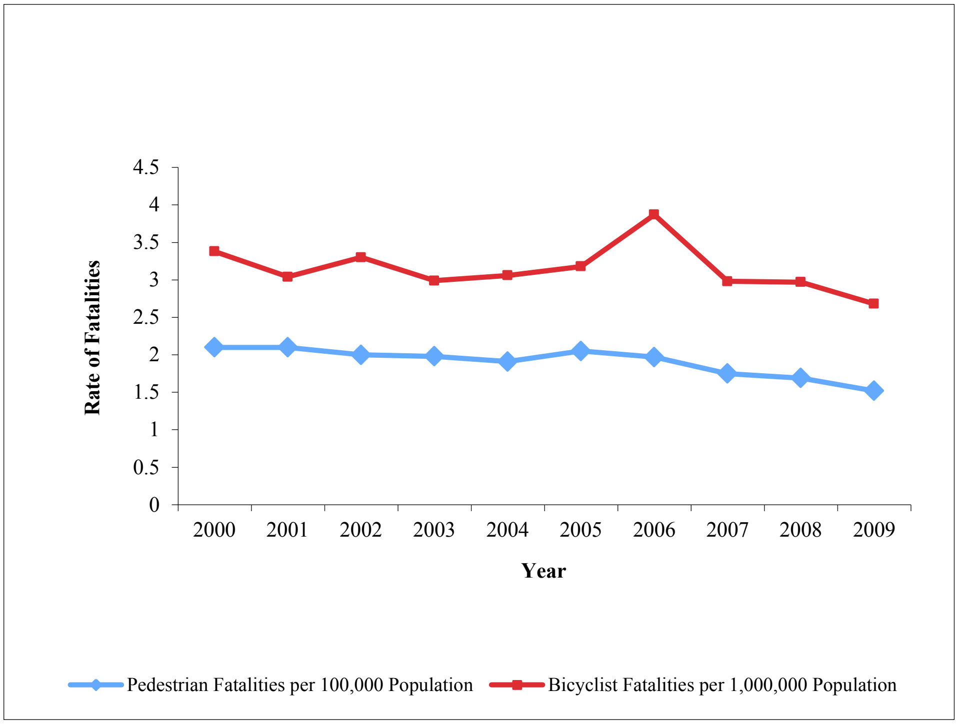
The Blueprint was Caltrans' response to the Budget Act's requirement to address "measurable goals for increasing bicycling and walking within the state, funding of facilities, and a reduction in pedestrian and bicycling injuries and fatalities" (Davis, Contreras-Sweet et al. 2002). The report stated ambitious goals:

- A *50 percent increase in the number of bicycling and walking trips by the year 2010* (compared with base year 2000 levels as measured by the US Census)
- A *50 percent decrease in the bicycle and pedestrian fatality rates by the year 2010* (compared with base year 2000 levels as measured by the NHTSA)
- Increased funding for bicycle and pedestrian programs as necessary to meet these goals

As the California-specific data from the 2010 Census had not yet been released by the time of this report, how close California has come to doubling the number of number of trips from the baseline of 0.83% bicycle and 2.85% pedestrian commute trips cannot be exactly determined (U.S. Census Bureau 2000). However, data from the American Community Survey from 2009, also administered by the U.S. Census Bureau, may be used as a proxy. The ACS data indicates that California's rate of bicycle commuting as of 2009 had increased to 0.89%, and walking to work had decreased slightly, to 2.75% (U.S. Census Bureau 2011). Although the slight uptick in bicycle commuting is encouraging, the lack of major movement in non-motorized commute trends in California suggests that the trip goals of the Blueprint will be almost impossible to meet.

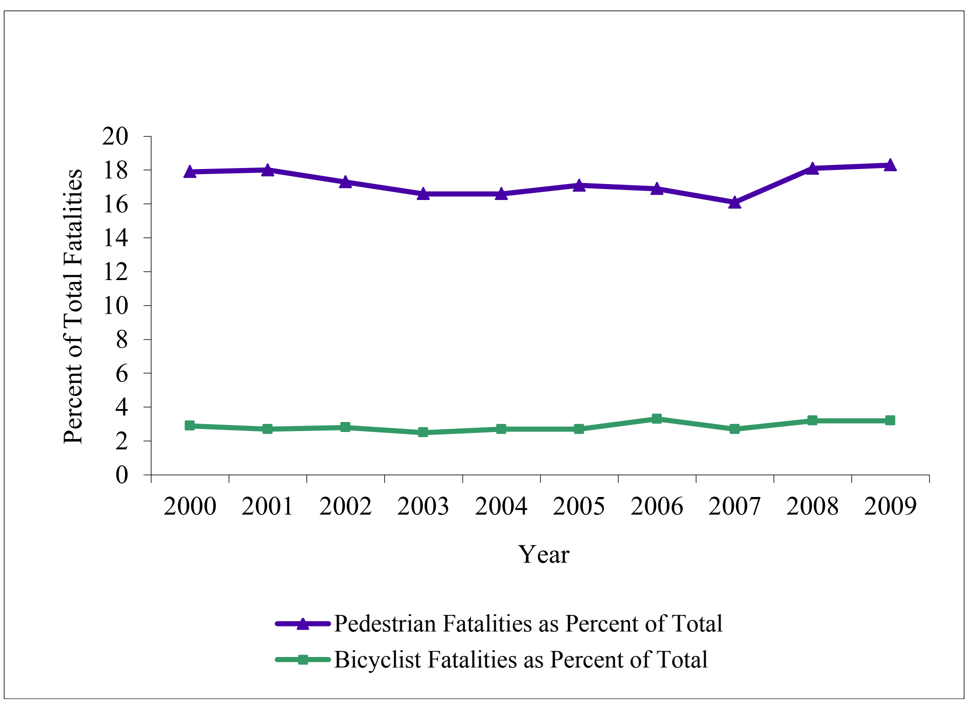
Data for safety is measured more frequently, and trends are therefore more easily determined. Figure 27 and Figure 28 illustrate the slightly negative overall trend in traffic fatalities in California from 2000 to 2009—clearly not yet to the goal of halving the rates of fatalities (National Highway Traffic Safety Administration 2000-2009). These trends suggest that the goal for safety, like the goal for increasing trips, will go unmet. However, it is difficult to tell from this data the true picture of bicycle and pedestrian safety, as the available data does not control for exposure (i.e., if bicycle trips are increasing, a commensurate increase in bicycle crashes could be expected). Thus, it is possible that the presence of these goals has had a positive effect on pedestrian and bicycle activity in California.

Figure 27. Rate of Pedestrian and Bicyclist Fatalities in California per 100,000 Population (2000-2009)



Data Source: National Highway Traffic Safety Administration

Figure 28. Pedestrian and Bicyclist Fatalities as Percent of Total California Traffic Fatalities (2000-2009)



Data Source: National Highway Traffic Safety Administration

California Transportation Plans 2025 (2006) and 2030 (2007)
The California Transportation Plan 2030 (CTP) is an update to California's long-range transportation plan, CTP 2025. Both were developed in conjunction with Caltrans by the Office of State Planning, and seek to "influence transportation decisions and investments to create a world-class transportation system" (Smith, Korte et al. 2006). As the basis for Governor Schwarzenegger's *GoCalifornia* plan, which aims to spur a reduction in congestion and improvements in mobility, the CTP documents outline a broad-level approach to the future of transportation in California, summed in its sweeping vision:
California has a safe, sustainable, world-class transportation system that provides for the mobility and accessibility of people, goods, services, and information through an integrated, multimodal network that is developed through collaboration and achieves a Prosperous Economy, a Quality Environment, and Social Equity (cover page).

The CTP speaks candidly about the need to improve non-motorized mobility and preserve the natural environment in order to achieve a more sustainable transportation system:
*Mobility is not mode-specific; rather it encompasses **all modes**. We need to choose transportation investments that will **provide the greatest mobility and efficient use of the entire system**. ... A sustainable transportation system is one that **meets people's needs equitably**, fosters a **healthy environment**, provides a broad, balanced system in which the private vehicle, **public transportation, bicycling, and walking are all viable options** and can be maintained and operated efficiently and effectively over time.*

*In recent years, the number of non-work trips has overtaken the number of commute trips…the increase…can be partially attributed to the need to drive to most destinations, due to changes in urban and street design, and **lack of safe, convenient travel choices**.*

*A major focus of SAFETEA-LU and of the CTP 2030 Addendum is the **linking of transportation planning with natural resource and environmental planning** to promote early consultation. ... **The goal of this early consultation is transportation plans, and ultimately projects, that preserve and enhance California's valuable natural and environmental resources** (emphasis added).*

These statements seem to indicate a need to increase investment in pedestrian and bicycling facilities and public transportation. The CTP developed several goals and strategies for achieving a sustainable transportation system. The goals applicable to pedestrian and bicyclist safety and mobility follow below.

Goals:
1. Improve Mobility and Accessibility
4. Enhance Public Safety and Security
5. Reflect Community Values

Caltrans Strategic Plan (2007)
Caltrans' Strategic Plan, which is updated every five years, is the key governing document for the agency, and the agency's performance measurement system is linked to it. The current Strategic Plan states that it *"…focuses on strategies which are seen as key for organizational process improvement over the next five years…(and) addresses the key external and internal driving forces that are affecting or have the potential to affect Caltrans mandates"* (p. 5). The Strategic Plan elaborates upon how the agency plans to work toward its goals during the years 2007-2012.

The overall goals of the Strategic Plan reflect Caltrans' organizational goals. The two that are most applicable to pedestrian and bicyclist safety and mobility on San Pablo are:

1. Safety: Provide the safest transportation system in the nation for users and workers.
2. Mobility: Maximize transportation system performance and accessibility

Regarding the goal of *safety*, the Strategic Plan describes two efforts pertaining to non-motorized users: the Safe Routes to Schools program and the Strategic Highway Safety Plan (covered below). The goal of *mobility* is described as, among other things, "improving multi-modal connectivity, (and) addressing bicyclist and pedestrian needs…" (p. 26).

Strategic Highway Safety Plan (2006)
The Strategic Highway Safety Plan (SHSP) aims to improve traffic safety in California in 12 specific areas, based on analysis of California's crash trends and demographics. Through a statewide process involving over 200 agencies to develop strategic goal for the SHSP, three "Challenge Areas" were developed that are particularly applicable for pedestrian and bicyclist safety and mobility along San Pablo Avenue.

Challenge Areas:
7: Improve Intersection and Interchange Safety for Roadway Users
8: Make Walking and Street Crossing Safer
13: Improve Bicycling Safety

Deputy Directive 64-R1: Complete Streets – Integrating the Transportation System (2008)
The internal Caltrans mandate known as DD-64-R1 is a key policy for pedestrian and bicyclist safety and mobility within Caltrans. It mandates a new Complete Streets attitude for the agency. Key parts of the directive are as follows (Caltrans 2008):
The California Department of Transportation (Department) provides for the needs of travelers of all ages and abilities in all planning, programming, design, construction, operations, and maintenance activities and products on the State highway system. ***The Department views all transportation improvements as opportunities to improve safety, access, and mobility for all travelers in California and recognizes bicycle, pedestrian, and transit modes as integral elements of the transportation system.***

The Department develops integrated multimodal projects in balance with community goals, plans, and values. Addressing the safety and mobility needs of bicyclists, pedestrians, and transit users in all projects, regardless of funding, is implicit in these objectives. ***Bicycle, pedestrian, and transit travel is facilitated by creating "complete streets" beginning early in system planning and continuing through project delivery and maintenance and***

operations. *Developing a network of "complete streets" requires collaboration among all Department functional units and stakeholders to establish effective partnerships.*

Although there are no fixed goals associated with this directive, it is important to mention because of its potential to influence how the Department works to achieve all of the other goals mentioned in this section.

State Legislation

The State Legislature has passed several pieces of legislation pertaining to various aspects of transportation in California. Each of these bills mandates or encourages provision for non-motorized users on California's streets, and should positively affect pedestrian and bicyclist safety and mobility along San Pablo Avenue.

AB 1358 Complete Streets (2008)

The Complete Streets Act of California was signed into law in September of 2008, following the lead of several other states with established Complete Streets policies (California Bicycle Coalition 2008). The Act went into effect on January 1, 2009, and

…requires the legislative body of a city or county, upon revision of the circulation element of their general plan, to ***identify how the jurisdiction will provide for the routine accommodation of all users of the roadway*** *including motorists, pedestrians, bicyclists, individuals with disabilities, seniors, and users of public transportation* (Leno 2007).

AB 32: The Global Warming Solutions Act (2006)

Assembly Bill 32 is known as the "Global Warming Solutions Act" because it aims to curb the amount of greenhouse gases emitted into the atmosphere in California. The bill set an ambitious target for reducing the amount of greenhouse gases: by 2020, the emissions should be at 1990 levels. The long-term goal is an 80% reduction of 1990 levels by 2050. According to the California Air Resources Board, which is the lead agency for implementing the legislation, this amounts to an approximately 15% reduction from current levels of emissions, or about 4 fewer tons of carbon dioxide emitted per person in the state (approximately 147,000,000 tons of CO_2) (California Air Resources Board 2008). Understandably, broad actions are focused on making the state's heavy and light duty vehicles and power plants cleaner. However, making non-motorized transportation a viable option for short trips throughout the state's urbanized areas can help achieve these goals in two important ways. First, because automobiles release the majority of their emissions while the engine is warming up (a "cold start"), short automobile trips disproportionately pollute the air in comparison with longer trips (Ludykar, Westerholm et al. 1999); second, short trips in urban areas contribute to the urban heat island effect, necessitating greater energy usage by power plants to keep buildings cool. Substituting transit, bicycling, or walking for short trips in urban areas can therefore actually make a considerable contribution to reducing emissions.

SB 375 Regional Planning for Greenhouse Gas Reduction (2008)

Passed in 2008, Senate Bill 375 is meant to complement AB 32 by seeking to reduce the amount of vehicle miles traveled through a combination of land use and planning incentives (California Bicycle Coalition 2009). The bill requires regional transportation planning agencies to develop more sophisticated transportation planning models for the purpose of creating "sustainable community strategies (SCS)" that limit greenhouse gas emissions in their regional plans. The bill also provides incentives for local governments to incorporate these SCSs into the transportation elements of their general land use plans. Ultimately, it is likely that the SCSs will promote moderate to dense urban development, which tend to provide more opportunities to walk and bicycle and will therefore require adequate pedestrian and bicycle facilities to support the travel.

AB 57 Safe Routes to School (2007)
Begun in 1999, the Safe Routes to School (SR2S) legislation in California requires federal safety funds to be allocated equally between state highways, local roads, and the SR2S construction program (Safe Routes to School National Partnership 2007). The funding for SR2S supports bicycle and pedestrian safety, infrastructure, and traffic calming projects such as sidewalks, bicycle lanes, trails, and intersection improvements. AB 57 served to make the previous funding allocation permanent and created a state framework for federally funded safe routes program which was in effect from 2005 to 2009.

What Does the State Contribute?

We used the same table that we've used throughout this paper to profile the efforts covered in Caltrans' various plans and State legislation. However, we asked a different question, because there is no appropriate entity with which we could compare State efforts in the Bay Area. Thus, the focus is on the additional aspects of bicycle and pedestrian safety and mobility to which the State plans and legislation contribute. **Error! Reference source not found.** shows that the State plans and legislation either directly or indirectly cover 21 of 43 topics.

Conclusions

This policy review included local, regional, and state-level plans and policies that could affect pedestrian and bicyclist safety and mobility along San Pablo Avenue, in the East San Francisco Bay Area of California. The plans were examined for strategies and physical elements that could encourage pedestrian and bicyclist safety, and compared with one another using a checklist developed from the summative review of all plans. Table 12 shows how the cities and counties rank in comparison to one another on the content of their plans, while Table 13 compares regional and state policies. It should be noted that the size and purview of the organization that developed the plan affects how many of the elements the plan covers. For example, it is understandable that a county plan may be much less specific than a city plan.

Table 12. Comparison of Local Plans with Regard to Elements and Strategies to Encourage Non-Motorized Safety and Mobility

Characteristics	Albany	Berkeley	El Cerrito	Emeryville	Oakland	Richmond
ADA accessible sidewalks		X	X	X	X	X
Street trees	X	X	X	X	X	X
Public seating or amenities	X	X	X	X	X	X
Pedestrian-scaled lighting	X	X	X	X	X	X
Minimum sidewalk passage of 10 ft.		X	X	X	X	X
Curb ramps	X	X	X	X	X	X
Continuous sidewalks			X		X	X
Pedestrian signals (countdowns/leading pedestrian intervals/separate signals altogether)		X	X	X		X
Median refuges	X	X	X	X		X
Signals timed at 3.5 ft/sec or lower		X	X		X	X
Marketing campaigns to promote walking or cycling		X	X	X	X	
Marked crosswalks		X	X	X		X
Fair or better pavement quality		X	X	X		
Wayfinding signage	X	X	X	X	X	X
High visibility crosswalks		X	X			X
Unobstructed sidewalks	X	X	X	X		X
Audible pedestrian signals		X	X	X	X	
Bulb-outs			X	X		X
Public art	X	X			X	X
Crosswalk lighting			X			X
Prohibited parking near intersection		X				X
Complete Streets aims		X	X	X		X
Pedestrian safety signage		X	X	X		
On-street parking as buffer					X	X
Short distance between crossings		X				
Pedestrian pushbuttons			X	X		
Mid-block crosswalks		X				
Truncated domes at curb ramps			X			X
Blocked visibility at intersection			X		X	
Police enforcement with regard to pedestrians or bicyclists	X	X	X		X	
Speed limit			X		X	
Bus stops on far side of intersection		X				
Bicycle lanes well-maintained, clean		X	X		X	
Bicycle facilities	X	X	X	X	X	X
Bicycle parking or storage	X	X	X	X	X	X
Bicycle signals or detectors	X	X			X	
Pedestrian/bicycle over/underpasses			X		X	
Physical deterrents to bicycling		X				
Recessed stop line			X			
Prohibited right turn on red			X			
Pedestrian crossings prohibited			X			
Accessible Transit stops		X				
New signal warrant		X				
TOTAL	**12**	**31**	**33**	**20**	**21**	**23**

Table 13. Comparison of Regional and State-Level Plans with Regard to Elements and Strategies to Encourage Non-Motorized Safety and Mobility

Characteristics	Alameda County	Contra Costa County	MTC	State
ADA accessible sidewalks	X			X
Street trees				
Public seating or amenities				
Pedestrian-scaled lighting				
Minimum sidewalk passage of 10 ft.				
Curb ramps				X
Continuous sidewalks	X	X		X
Pedestrian signals (countdowns/leading pedestrian intervals/separate signals altogether)				
Median refuges				
Signals timed at 3.5 ft/sec or lower				
Marketing campaigns to promote walking or cycling	X	X	X	X
Marked crosswalks				X
Fair or better pavement quality				
Wayfinding signage		X	X	
High visibility crosswalks				X
Unobstructed sidewalks				X
Audible pedestrian signals				X
Bulb-outs				
Public art				
Crosswalk lighting				
Prohibited parking near intersection				
Complete Streets aims		X		X
Pedestrian safety signage				X
On-street parking as buffer				
Short distance between crossings				X
Pedestrian pushbuttons				X
Mid-block crosswalks				X
Truncated domes at curb ramps				X
Blocked visibility at intersection				
Police enforcement with regard to pedestrians or bicyclists	X	X	X	X
Speed limit				
Bus stops on far side of intersection				
Bicycle lanes well-maintained, clean	X			X
Bicycle facilities	X	X	X	X
Bicycle parking or storage	X		X	
Bicycle signals or detectors	X		X	X
Pedestrian/bicycle over/underpasses				X
Physical deterrents to bicycling	X			X
Recessed stop line				
Prohibited right turn on red				
Pedestrian crossings prohibited				
Accessible Transit stops				X
New signal warrant				
TOTAL	**9**	**6**	**6**	**21**

Comparison of Jurisdictions along San Pablo Avenue
This policy review included local, regional, and state-level plans and policies that could affect pedestrian and bicyclist safety and mobility along San Pablo Avenue. Pedestrian and bicyclist safety and mobility along San Pablo Avenue is clearly addressed through multiple plans and policies at various levels of government. Out of 43 topics we identified which represent a range of pedestrian and bicycle safety and mobility improvements, the City of Albany has implemented 12, the City of Berkeley has implemented 31, the City of El Cerrito has implemented 33, the City of Emeryville has implemented 20, the City of Oakland has implemented 21 and the City of Richmond has implemented 23. However, the checklists do not tell a complete story, given that many of the elements and strategies are present in new plans that have only recently been adopted. The impact of these plans will likely become clearer in the future, and anecdotal evidence suggests that the cities that have had policies for several years demonstrate noticeable results in the built form. The following sections explore the extent to which there is empirical evidence that policies are related to features of the built environment. The data analysis explores how these policies are related to actual and perceived safety and mobility of the San Pablo Avenue corridor.

C. Santa Monica Boulevard Pedestrian and Bicycle Policy and Plan Analysis

Introduction & Background

Santa Monica Boulevard, California, also known as State Route 2, is a historic route ("FAQ - SMB Reconstruction Project," 2012) that serves as an urban arterial running from the city of Santa Monica in the west through Beverly Hills, West Hollywood, and into Los Angeles. This study will focus on the five-mile segment of Santa Monica Boulevard that begins at the intersection with North Doheny Drive, at the west entrance to West Hollywood, and ends at the intersection with Highway 101, in the City of Los Angeles. The route is under two different jurisdictions along this five-mile corridor. Santa Monica Boulevard falls under the City of West Hollywood's jurisdiction throughout the West Hollywood segment, due to a relinquishment of the road from the California Department of Transportation (Caltrans) in 1999 ("FAQ - SMB Reconstruction Project," 2012). The route transfers to the jurisdiction of Caltrans between La Brea Avenue and Highway 101 in Los Angeles.

The difference in priorities across the two jurisdictions is evident in the street's design, as shown in Figure 29 and Figure 30. Figure 29 shows a typical pedestrian crossing along Santa Monica Boulevard in West Hollywood, while Figure 30 shows a typical crossing in Los Angeles. West Hollywood prides itself on being a multimodal city that encourages walking and bicycling as forms of transportation. The City completed a major redevelopment of Santa Monica Boulevard in 2001 that added landscaped medians, street trees, bulb-outs, high visibility crosswalks, bus-bulbs, and bicycle lanes in some locations ("FAQ - SMB Reconstruction Project," 2012). In contrast, the City of Los Angeles has adopted plans and policies prioritizing non-motorized modes of transportation more recently, and, thus, the full implementation of these policies has yet to be observed. This document describes the city and county policies that affect pedestrian and bicycle safety and mobility along this five-mile segment of Santa Monica Boulevard and explores their potential to create a more walkable, bikeable Santa Monica Boulevard.

Figure 29. Ped. Crossing in West Hollywood

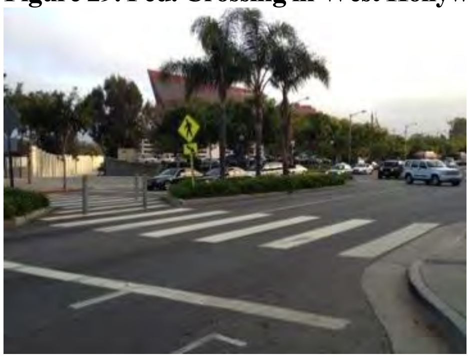


Figure 30. Ped. Crossing in L.A.

Overview
This section briefly describes each agency's roles and responsibilities regarding transportation planning, and details the policies applicable to pedestrian and bicyclist safety and mobility, and community vitality along Santa Monica Boulevard. Policies from the following jurisdictions are included in the analysis:

- City of West Hollywood
- City of Los Angeles
- Los Angeles County
- California Department of Transportation (Caltrans)

Each plan with legal influence over Santa Monica Boulevard was examined, along with its specific goals and objectives for increasing walking and bicycling along Santa Monica Boulevard. The exact text from plans discussed in the body of the report can be found in the Appendix. At the end of each section, a checklist will summarize the aspects of pedestrian and bicyclist safety and mobility covered by a combination of the city's or county's plans.

Local Agency Roles and Policies for Santa Monica Boulevard

The various plans for West Hollywood and Los Angeles are discussed in this chapter. Only plans that are directly applicable to Santa Monica Boulevard are included. For each city, the general plan is reviewed first and then followed by bicycle and pedestrian plans. The California Streets and Highways Code requires that sidewalks be maintained by the adjoining property owner (Section 5610) in all cities, so sidewalks are not included in this section.

CITY OF WEST HOLLYWOOD
History and authority: The City of West Hollywood was incorporated in 1984 ("City of West Hollywood General Plan 2035," 2011). Santa Monica Boulevard, State Route 2, was relinquished by Caltrans to the City of West Hollywood in 1999. The City now owns and maintains Santa Monica Boulevard, allowing the City to implement designs that make Santa Monica Boulevard West Hollywood's "Main Street" ("FAQ - SMB Reconstruction Project," 2012).

Roles and responsibilities: As a result of the 1999 relinquishment of Santa Monica Boulevard in West Hollywood, the City now assumes all liability and maintenance responsibilities for that portion of the corridor ("Relinquishment of State Highways by Legislative Enactment," 2005).

West Hollywood General Plan 2035 (2011)
West Hollywood's General Plan focuses on creating an efficient multi-modal transportation system throughout the city to alleviate the traffic it experiences due to its central location. The Mobility Section of the General Plan expresses the City's desire to maintain and improve its pedestrian friendly environment. Although the General Plan lists specific improvements that should be considered for various facility types, including pedestrian, bicycle, and automobile facilities, it refers to the 2003 Bicycle and Pedestrian Mobility Plan for location-specific improvements to the bicycle and pedestrian network and suggests that the Bicycle and Pedestrian Mobility Plan be implemented. The Mobility section of the General Plan specifies the nine goals listed below, all of which have the potential to improve non-motorized transportation within the City, and two of which focus specifically on such improvement.

- M-1: Develop a world-class transit system in West Hollywood
- M-2: Collaborate on regional transportation solutions that improve mobility, quality of life, and environmental outcomes.
- M-3: Maintain and enhance a pedestrian-oriented City.
- M-4: Create a comprehensive bicycle network throughout the City.
- M-5: Create an environmentally and financially sustainable transportation network that provides for the mobility and livability needs of West Hollywood residents, businesses, and visitors.
- M-6: Utilize Transportation Demand Management strategies to reduce auto travel.
- M-7: Protect and preserve residential neighborhoods from intrusion of non-residential traffic.
- M-8: Manage parking supply to serve residents, businesses and visitors.
- M-9: Facilitate sustainable, effective, and safe movement of goods and commercial vehicles.

West Hollywood Bicycle and Pedestrian Mobility Plan (2003)
The West Hollywood Bicycle and Pedestrian Mobility Plan explicitly recommends locations where pedestrian and bicycle facilities should be improved. The Plan states that walking and bicycling already occur heavily within the City due to its dynamic nature. Santa Monica Boulevard is designated as a Retail-Commercial Street, which should have the "widest sidewalks, the widest crosswalks, the brightest street lighting, the most furnishings, and other features that will enhance the pedestrian environment." The Plan also emphasizes the risks of allowing bicycling on sidewalks, which is permitted in locations without bicycle facilities in West Hollywood, and expresses the need to extend the existing bicycle lanes on Santa Monica Boulevard further to remove bicycles from the sidewalks. The physical characteristics suggested by the Plan are recorded in Table 14. Due to Santa Monica Boulevard's significant presence in the small City of West Hollywood, all of the six goals outlined in the City's Bicycle and Pedestrian Mobility Plan, listed below, are applicable to Santa Monica Boulevard.

Goals:

1. Promote Bicycle Transportation
2. Develop an Enhanced Bikeway Network
3. Enhance Bicycle Transportation Safety
4. Enhance Pedestrian Mobility
5. Enhance Pedestrian Safety
6. Encourage More People to Walk

West Hollywood Vision 2020 Strategic Plan (2003)

Mission Statement: *As a premiere city, West Hollywood is proactive in responding to the unique needs of its diverse community, creative in finding solutions to managing its urban environment, and dedicated to preserving and enhancing its well being. West Hollywood strives for quality in all its actions, setting the highest goals and standards.* (Adapted for context.)

The West Hollywood Vision 2020 Strategic Plan, finalized in 2003, identifies the City's Core Values as follows:

- Respect and Support for People
- Responsiveness to the Public
- Idealism, Creativity and Innovation
- Quality of Residential Life
- Promote Economic Development
- Public Safety
- Responsibility for the Environment

In addition, the Strategic Plan presents the City's Five Primary Goals, based on the most important issues facing the City, as identified through meetings with the community. The first Primary Goal reflects the City's desire to promote pedestrian and bicycle mobility: *Maintain the City's Unique Urban Balance with Emphasis on Residential Neighborhood Livability*.

A list of Ongoing Strategic Programs, programs previously established as important for maintaining the nature of the community, is also identified. The Strategic Programs that pertain to pedestrian and bicyclist mobility within the City are listed below.

- Promote Economic Development while Maintaining Business Vitality & Diversity
- Transportation System Improvement
- Enhance Technology and Access for the City and its Citizens
- Enhance and Expand Disability Access throughout the City

The full text of the Mission Statement is located in Appendix F.

How Does West Hollywood Compare?

The plans in this section reflect the City of West Hollywood's efforts to create and maintain streets welcoming to pedestrians and bicyclists. Table 14 contains a checklist of the elements affecting Santa Monica Boulevard. An 'X' represents elements covered in West Hollywood's plans and policies. West Hollywood's plans cover 30 of the 48 topics.

Table 14. Elements Covered in West Hollywood's Plans

Elements	West Hollywood	Elements	West Hollywood
ADA accessible sidewalks	X	On-street parking as buffer	
Street trees	X	Short distance between crossings	
Public seating or amenities	X	Pedestrian pushbuttons	X
Pedestrian-scaled lighting	X	Mid-block crosswalks	
Minimum sidewalk passage of 10 ft.	X	Blocked visibility at intersections & driveways	X
Curb ramps	X	Vehicle speed	X
Continuous sidewalks	X	Bus stops on far side of intersection	
Pedestrian signals	X	Signals timed at 3.5 ft/sec or lower	X
Median refuges	X	Bicycle lanes well-maintained, clean	X
Truncated domes at curb ramps	X	Bicycle facilities	X
Marketing campaigns to promote walking or cycling	X	Reflective striping alternatives to reduce slippery conditions for wet bike lanes	
Marked crosswalks	X	Bicycle parking or storage	X
Bicycle scale/path street lighting		Bicycle signals or detectors	X
Pedestrian wayfinding signage	X	Pedestrian/bicycle over/underpasses	
High visibility crosswalks	X	Physical deterrents to bicycling	
Unobstructed sidewalks	X	Recessed stop line	
Audible pedestrian signals	X	Prohibited right turn on red	
Bulb-outs	X	Accessible Transit stops	
Public art	X	New signal warrant	X
Crosswalk lighting		Bicycle facilities at transit stops	X
Prohibited parking near intersection		Fair or better pavement quality	
Complete Streets aims	X	Bicycle safety signage	
Pedestrian safety signage		Bicycle wayfinding signage	X
Police enforcement with regard to pedestrians or bicyclists		Removal of on-street parking to accommodate bike lanes	
Total Elements Covered			**30**

CITY OF LOS ANGELES

History and authority: Los Angeles was incorporated as a city on April 4, 1850 ("Headline History, Los Angeles County 1848 to 1865," 2012). The City partially maintains Santa Monica Boulevard between La Brea Avenue and Route 101. The most recent maintenance agreement between Caltrans and the City of Los Angeles was signed in 2005 ("Agreement for Maintenance of State Highways in the City of Los Angeles," 2005).

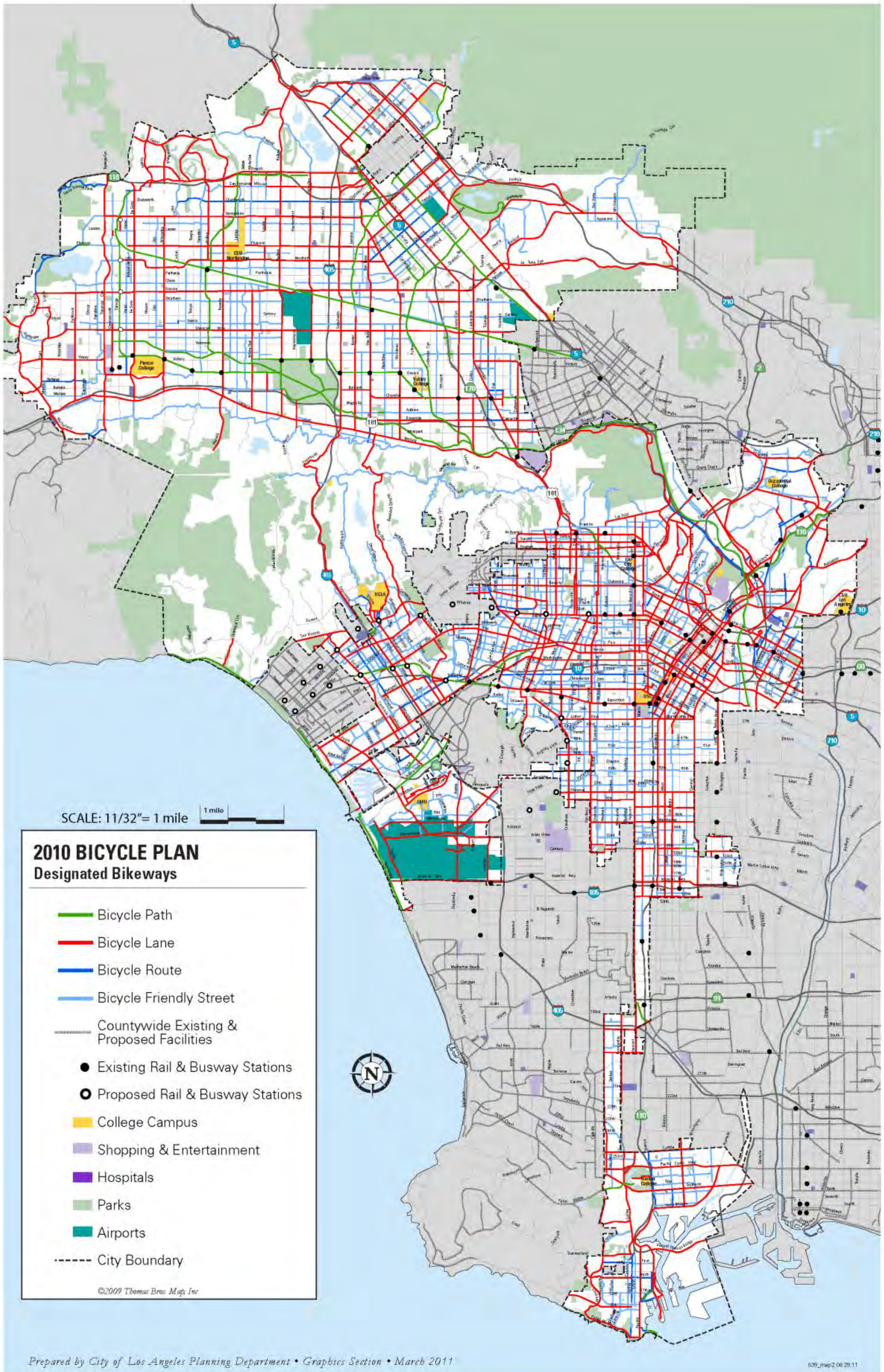
Roles and responsibilities: In agreement with Caltrans, the City of Los Angeles has assumed responsibility for the maintenance of Santa Monica Boulevard and is thus responsible for ensuring the quality of the roadway and sidewalks (where not private). This includes roadway and sidewalk paving and construction, where needed; all maintenance and care of landscaped areas on the Boulevard, within the freeway interchange and landscaped traffic medians; and the maintenance of all state highway related signing located outside of State Right-of-Way. From the city limits 0.04 mile east of La Brea Avenue to the off-Ramp southbound Hollywood Freeway, Route 101 the city assumes the following responsibilities: cleaning, maintaining, and repairing culverts, ditches, and drains related to sidewalk drainage on an emergency basis; providing for the removal of litter and debris from the roadway and roadside; and maintaining electrical facilities including traffic signals, traffic signal systems, safety lighting and sign lighting.

Los Angeles City General Plan: Transportation Element (Adopted 1999)
The Purpose of the Transportation Element of the City of Los Angeles' General Plan is to guide the development of a citywide transportation system to efficiently move people and goods. The Transportation Element states three overarching Goals, which are supported by specific Objectives and Policies. Of these three Goals shown below, one directly calls for a pedestrian and bicycle network. Although the supporting policies do provide several design requirements for pedestrian and bicycle facilities, the policies within Goal C call for implementation of the Bicycle Plan, which provides more specific guidelines for facility design requirements.

- Goal A: Adequate accessibility to work opportunities and essential services, and acceptable levels of mobility for all those who live, work, travel, or move goods in Los Angeles.
- Goal B: A street system maintained in a good to excellent condition adequate to facilitate the movement of those reliant on the system.
- Goal C: An integrated system of pedestrian priority street segments, bikeways, and scenic highways which strengthens the City's image while also providing access to employment opportunities, essential services, and open space.

City of Los Angeles 2010 Bicycle Plan (Adopted 2011)
In its attempt to make Los Angeles a more bicycle-friendly city, the 2010 Los Angeles City Bicycle Plan presents three new bikeway networks for the City: the Backbone, the Neighborhood Network, and the Green Network. The 2010 Plan calls for a bikeway network of 1,684 miles, significantly larger than the existing network of 334 miles in 2010. The network, shown in Figure 31 shows planned Class II bicycle lanes on Santa Monica Boulevard extending east from the intersection with La Brea Avenue past the end of the study segment, U.S. 101. Although Santa Monica Boulevard is not classified as such, the Plan also introduces the concept of Bicycle Friendly Streets, which are neighborhood streets that will be designed to be more "inviting" to bicyclists and pedestrians through design features such as signage, pavement markings, bulb-outs, and traffic diversions, among others. A toolbox for potential design elements for these types of streets is located in Section Four of the Technical Design Handbook, substituting for a relative lack of physical design elements within the Objectives, Goals, and Policies of the Bicycle Plan. The Technical Design Handbook compiles standards and current best practices from agencies and municipalities throughout the United States. The relevant design elements that are covered in the Technical Design Handbook are listed in Appendix F.

Figure 31. Map of Los Angeles City Bicycle Plan



How Does Los Angeles Compare?

The plans in this section reflect the City of Los Angeles' efforts to create and maintain streets welcoming to pedestrians and bicyclists. Table 15 contains a checklist of the elements; an 'X' represents elements covered in Los Angeles' plans and policies. Only 15 topics are covered.

Table 15. Elements Covered in Los Angeles' Plans

Elements	**Los Angeles**	**Elements**	**Los Angeles**
ADA accessible sidewalks		On-street parking as buffer	
Street trees	X	Short distance between crossings	
Public seating or amenities		Pedestrian pushbuttons	
Pedestrian-scaled lighting		Mid-block crosswalks	
Minimum sidewalk passage of 10 ft.	X	Blocked visibility at intersections & driveways	
Curb ramps		Vehicle speed	X
Continuous sidewalks		Bus stops on far side of intersection	
Pedestrian signals		Signals timed at 3.5 ft/sec or lower	
Median refuges		Bicycle lanes well-maintained, clean	X
Truncated domes at curb ramps		Bicycle facilities	X
Marketing campaigns to promote walking or cycling	X	Reflective striping alternatives to reduce slippery conditions for wet bike lanes	
Marked crosswalks		Bicycle parking or storage	X
Bicycle scale/path street lighting	X	Bicycle signals or detectors	X
Pedestrian wayfinding signage		Pedestrian/bicycle over/underpasses	
High visibility crosswalks		Physical deterrents to bicycling	
Unobstructed sidewalks		Recessed stop line	
Audible pedestrian signals		Prohibited right turn on red	
Bulb-outs		Accessible Transit stops	
Public art		New signal warrant	
Crosswalk lighting		Bicycle facilities at transit stops	X
Prohibited parking near intersection		Fair or better pavement quality	
Complete Streets aims	X	Bicycle safety signage	X
Pedestrian safety signage		Bicycle wayfinding signage	X
Police enforcement with regard to pedestrians or bicyclists	X	Removal of on-street parking to accommodate bike lanes	X
Total Elements Covered			**15**

Comparison of West Hollywood and Los Angeles

The City of West Hollywood's General Plan, Pedestrian and Bicycle Plan, and Strategic Plan together cover 30 of the 48 topics related to pedestrian and bicyclist safety and mobility, most of which have been implemented along Santa Monica Boulevard in the City and make the corridor rich with pedestrian and bicyclist amenities. Figure 32 shows an example of a segment of Santa Monica Boulevard in West Hollywood. In addition to stating goals of having a pedestrian and bicyclist friendly city, West Hollywood has successfully included policies to further guide the design of such streets.

In contrast, the City of Los Angeles' General Plan and Bicycle Plan only cover a total of 15 of the 48 topics related to pedestrian and bicyclist safety and mobility. This lack of topics is likely due to the age of the City's current Transportation Element of the General Plan, which was adopted 13 years ago. The recent Bicycle Plan also lacks specific policies pertaining to physical design because it defers those issues to a Technical Design Handbook. Of the 15 topics that were covered in the plans, very few were observed on Santa Monica Boulevard during a field visit. The City has begun placing additional bicycle parking, but the remainder of the topics covered in the new bicycle plan have yet to be built along the corridor. Figure 33 shows an example of a typical segment of Santa Monica Boulevard in Los Angeles and the noticeable difference in features between West Hollywood.

Figure 32. SMB in West Hollywood

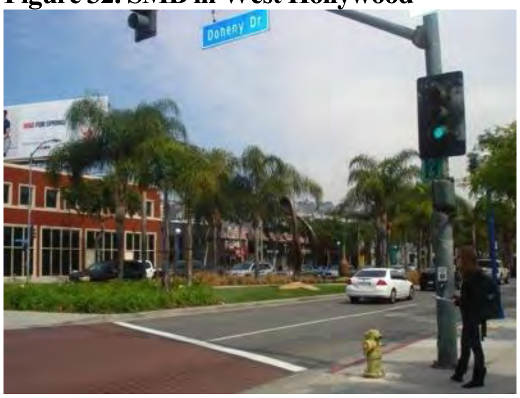


Figure 33. SMB in Los Angeles

Regional Agency Roles and Policies Affecting Santa Monica Boulevard

Regional agencies produce broad plans that aim to work with the local plans and policies to address region-wide transportation issues and circulation. These plans include county-wide plans as well as regional plans extending across numerous counties. This section will focus on the Los Angeles County Bicycle Master Plan. The Southern California Association of Governments (SCAG) is in the process of developing a Regional Bicycle and Pedestrian Plan. Because this Plan is not currently complete, it is not discussed in this section ("Non-Motorized," n.d.).

LOS ANGELES COUNTY

Santa Monica Boulevard, between North Doheny Drive and Highway 101, is located entirely within Los Angeles County. In addition to the cities' bicycle and pedestrian plans previously discussed, the County of Los Angeles also recently created a regional bicycle plan that is discussed briefly below.

County of Los Angeles Bicycle Master Plan (2012)

The County of Los Angeles Bicycle Master Plan incorporates bicycle networks proposed by local cities and creates a region-wide network by facilitating connections of routes between different cities. The County's plan has several goals which are supported by specific policies.

- Goal 1: Expanded, improved, and interconnected system of county bikeways and bikeway support facilities to provide a viable transportation alternative for all levels of bicycling abilities, particularly for trips of less than five miles.

- Goal 2: Increased safety of roadways for all users.
- Goal 3: Develop education programs that promote safe bicycling.
- Goal 4: County residents that are encouraged to walk or ride a bike for transportation and recreation.
- Goal 5: Community supported bicycle network.
- Goal 6: Funded Bikeway Plan.
-

The plan shows bicycle facilities connecting to the cities' proposed bicycle lanes on Santa Monica Boulevard, creating a region-wide network for bicyclists.

Evaluation of Los Angeles County Plans

The County's Bicycle Master Plan only directly covers five of the pedestrian and bicyclist topics as shown in Table 16. This lack of specific policies and guidelines may be due to the fact that the County's plan is meant to serve in conjunction with local plans and policies. The County plan is meant to guide bicycle infrastructure development in unincorporated locations which have differing needs from urban environments.

Table 16. Topics Covered in Los Angeles County's Plans

Elements	**LA County**	**Elements**	**LA County**
ADA accessible sidewalks		On-street parking as buffer	
Street trees		Short distance between crossings	
Public seating or amenities		Pedestrian pushbuttons	
Pedestrian-scaled lighting		Mid-block crosswalks	
Minimum sidewalk passage of 10 ft.		Blocked visibility at intersections & driveways	
Curb ramps		Vehicle speed	
Continuous sidewalks		Bus stops on far side of intersection	
Pedestrian signals		Signals timed at 3.5 ft/sec or lower	
Median refuges		Bicycle lanes well-maintained, clean	
Truncated domes at curb ramps		Bicycle facilities	X
Marketing campaigns to promote walking or cycling	X	Reflective striping alternatives to reduce slippery conditions for wet bike lanes	X
Marked crosswalks		Bicycle parking or storage	X
Bicycle scale/path street lighting		Bicycle signals or detectors	
Pedestrian wayfinding signage		Pedestrian/bicycle over/underpasses	
High visibility crosswalks		Physical deterrents to bicycling	
Unobstructed sidewalks		Recessed stop line	
Audible pedestrian signals		Prohibited right turn on red	
Bulb-outs		Accessible Transit stops	
Public art		New signal warrant	
Crosswalk lighting		Bicycle facilities at transit stops	
Prohibited parking near intersection		Fair or better pavement quality	
Complete Streets aims		Bicycle safety signage	
Pedestrian safety signage		Bicycle wayfinding signage	
Police enforcement with regard to pedestrians or bicyclists	X	Removal of on-street parking to accommodate bike lanes	
Total Elements Covered			**5**

Conclusions from the San Pablo Avenue and Santa Monica Boulevard Avenue Policy Analyses

These analyses assisted in informing whether policies were associated with the presence of pedestrian and bicycle safety and mobility features. Policies—from general plans to pedestrian or bicycle plans— help guide jurisdictional expenditure in safety and mobility improvements. An improvement must generally be included in some plan before it is funded and scheduled. Cities for the San Pablo Avenue study site had 12-33 of the 43 policies examined. West Hollywood had 30 and Los Angeles had 15 of the 48 pedestrian and bicyclist safety and mobility policies examined included in their plans. West Hollywood had a majority of the features of interest while Los Angeles had much fewer.

The specific performance measures evaluated were:

- Percentage of signalized intersections along urban arterials with marked crosswalks and one or more of the following: countdown signals, leading pedestrian intervals, bulb-outs, or pedestrian refuge islands; and percent of unsignalized 4-way (multilane) intersections along urban arterials with marked crosswalks and one or more of the following: HAWK signal, yield to pedestrian signage, user-activated overhead warning lights;
- Percentage of urban arterial intersections with one or more of the following improvements geared toward bicyclists: bicycle box, painted bicycle lane through the intersection, bicycle signal, functioning bicycle loop detectors, bicycle left turn lane; and
- Percentage of urban arterials that do not have a posted speed greater than 25 mph.

A greater proportion of intersections had features from #1 on Santa Monica Boulevard in West Hollywood compared with Los Angeles and the Bay Area. Features for #2 were present in West Hollywood. Neither study corridor had feature #3. In general, cities that have aggressively pursued including pedestrian and bicycle improvements in plans had greater levels of implemented improvements.

D. Pedestrian and Bicyclist Intercept Survey

Introduction

This section explains the results of the San Pablo Avenue and Santa Monica Boulevard pedestrian and bicyclist intercept surveys. The purpose of the surveys was to understand: 1) general attractions to or detractors from San Pablo Avenue and Santa Monica Boulevard—for example shopping attracts people and crime may deter visitors, 2) perceptions of traffic safety in the area for pedestrians, bicyclists, and motor vehicle drivers and passengers, and 3) how landscaping and street design features currently or could potentially affect perceived traffic safety risk, economic vitality, and general satisfaction with the area. Respondents' perceptions and preferences will be revealed through this survey. These perceptions will be used to evaluate the proposed performance measures that can only be evaluated by asking roadway users about their preferences. Further discussion of performance measure evaluation is presented in Section E of this report.

Many of the questions in the survey focus on user's perceptions of safety and the landscape or design elements that would encourage users to visit the area more often or increase perceptions of safety. These questions are asked to determine how landscape and design elements can potentially increase economic vitality and quality of life of the corridor. When people perceive an area as safe and attractive to visit, they are more likely to visit the area for many purposes including recreation, shopping, and residential purposes.

Methodology

Survey Development & Site Choice

The survey was developed in conjunction with a professional survey firm in order to ensure the highest possible validity and reliability of the questions. The survey included questions about trip purpose, frequency of visits to the area, perceived traffic risk under various conditions, preferences for various design amenities, and likelihood of walking or bicycling more under certain conditions. The San Pablo Avenue survey was conducted in 2010, allowing time for analysis and review of the results before the Santa Monica Boulevard survey in 2012. The research team took advantage of this opportunity to slightly alter the survey by replacing two of the original questions to learn different things about the Santa Monica Boulevard respondents. Where possible, this chapter compares the results from the two surveys.

The research team chose eight survey locations along San Pablo Avenue and nine survey locations along Santa Monica Boulevard, attempting to include a variety of street design amenities and land uses in the analysis. Surveys were generally conducted within a two-block area including both of the blocks surrounding the intersection. A map displaying these survey locations is presented in Appendix M. These locations with differing features were selected to show how preferences varied in locations with different features to determine if the features do indeed influence user perceptions. Respondents were intercepted on foot and bicycle, regardless of how they arrived to the site. Table 17 and Table 18 display the traffic and collision information for each of the survey areas.

Table 17. Pedestrian, Driver, and Bicyclist *Injury, Volume, and Speed Information for San Pablo Avenue Survey Areas

	Fresno	Brighton	Solano	Cedar	Haskell	57th	45th	Alcatraz
Study area length	0.08 mi	0.29 mi	0.28 mi	0.38 mi	0.12 mi	0.35 mi	0.26 mi	0.08 mi
Total Ped Injuries[1] (Low-high number of injuries at intersections)	3 (0-3)	7 (0-5)	16 (0-10)	12 (0-5)	13 (0-8)	2 (0-1)	18 (0-6)	3 (0-1)
Total Ped Fatalities[1] (Low-High)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0-1)	0 (0)	0 (0)
Total Bike Injuries[1] (Low-High)	1 (0-1)	2 (0-2)	7 (0-3)	19 (1-10)	10 (0-4)	3 (0-1)	7 (0-3)	1 (0-1)
Total Motor Vehicle Injuries[1] (Low-High)	7 (0-5)	44 (0-26)	56 (0-33)	136 (13-46)	119 (0-89)	37 (1-11)	90 (4-25)	24 (0-10)
Total MV Fatalities[1] (Low-High)	0 (0)	0 (0)	1 (0-1)	0 (0)	2 (0-2)	2 (0-1)	0 (0)	0 (0)
Modeled pedestrian crossings[2] (Low/High)	7,483/ 7,756	8,527/ 10,710	9,385/ 11,413	5,889/ 6,393	5,524/ 6,291	8,342/ 8,658	10,033/ 10,613	7,289/ 7,839
AADT[3] (Low/High)	28,733/ 28,795	26,917/ 29,000	28,250/ 29,000	27,398/ 28,452	26,218/ 27,250	21,333/ 28,924	29,908/ 30,973	24,183/ 24,753
**Speed: Range mph	17-39	15-41	16-36	20-41	20-40	16-39	15-40	17-36
**Speed: 85th % mph	33	32	31	34	32	32	29	36

* Injuries and fatalities from 1997-2007; there were no bicycle fatalities along San Pablo Avenue during these years.
**The posted speed limit is 25 mph along the corridor
[1]California Statewide Integrated Traffic Records System (SWITRS), 1997-2007
[2] Modeled pedestrian data (using Schneider, et al., 2009 model)
[3]Caltrans Traffic Accident Surveillance and Analysis (TASAS) data

Table 18. Pedestrian, Driver, and Bicyclist *Injury, Volume, and Speed Information for Santa Monica Boulevard Survey Areas

	Cole	Fairfax	Gardner	Gower	Harper	La Brea	San Vicente	Western	Van Ness
Number of intersections in study area	5	5	5	6	5	5	5	5	5
Total Ped Injuries1 (Low-high number of intersection injuries)	29 (2-10)	51 (2-15)	7 (0-3)	19 (0-6)	15 (0-9)	29 (2-13)	50 (3-22)	55 (0-20)	25 (2-7)
Total Ped Fatalities1 (Low-High)	0	1 (0-1)	0	1 (0-1)	0	0	0	0	1 (0-1)
Total Bike Injuries[1] (Low-High)	14 (1-5)	8 (0-3)	4 (0-2)	21 (1-7)	14 (0-10)	13 (0-5)	10 (1-4)	22 (2-7)	15 (0-7)
Total Motor Vehicle Injuries1 (Low-High)	171 (7-90)	119 (3-84)	47 (2-19)	178 (11-70)	59 (2-25)	145 (9-55)	91 (7-28)	334 (22-118)	151 (9-62)
Total MV Fatalities1 (Low-High)	0	1 (0-1)	0	0	0	0	0	0	0
Modeled pedestrian crossings[2] (Low/ High)	5,291/ 11,485	7,187/ 44,969	8,124/ 30,375	5,456/ 20,533	17,787/ 56,533	12,007/ 44,248	10,066/ 51,126	11,035/ 56,470	5,456/ 20,553
AADT[3] (Low/ High)	31,789/ 31,976	32,007/ 32,805	31,977/ 32,200	25,260/ 28,618	33,326/ 34,059	31,487/ 31,583	35,786/ 36,069	25,260/ 25,654	25,260/ 28,618
**Speed: 85th % mph	33	31	31	34	32	34	34	35	35

* Injuries and fatalities from 2001-2010; there were no bicycle fatalities along Santa Monica Boulevard during these years.
**The posted speed limit is 30 and 35 mph along the corridor
[1]California Statewide Integrated Traffic Records System (SWITRS), 2001-2010
[2] Weekly modeled pedestrian data
[3]Based on tube counts

Weather and Conditions

For the San Pablo Avenue surveys, the survey team visited the sites from 9 a.m. – 6 p.m. over five weekdays and three weekend days in September 2010. There was no rain during the survey period, and temperatures were slightly above average for the Bay Area, but not unpleasant.

For Santa Monica Boulevard, the survey team visited the area from 8 a.m. – 8 p.m. over 13 weekdays and 6 weekend days in June 2012. Again, there was no rain during the survey period, and temperatures were close to average temperatures for West Hollywood during the time period.

Data Modifications Post-Survey

For San Pablo Avenue, the survey results from two different sites were combined and analyzed together. This occurred because one of the sites proved too dangerous from a personal security standpoint for the survey team, so a site similar in design was found and used as a substitute. The results from the two sites were then combined and analyzed as one.

No changes were made to the Santa Monica Boulevard data after the survey closed.

Responses

The surveys along San Pablo Avenue were conducted only in English. Twenty-four percent of those approached refused to take the survey, for a total of 537 respondents. The surveys along Santa Monica Boulevard were conducted in English and Spanish. Thirty-eight percent of those approached refused to take the survey, for a total of 567 respondents. All survey respondents had to be at least 18 years old to take the survey.

The results were entered into a Microsoft Excel spreadsheet, and then analyzed using the statistical software package STATA. The results presented in this chapter represent both descriptive statistics and statistically significant relationships between variables in the analysis. Statistical analysis was determined through Analysis of Variance and Chi-square tests. Only statistically significant relationships where the p value was ≤ 0.10 (indicating significance at the 90% level) are presented here.

Results

Survey Population Characteristics

This section describes the respondent population. It is important to understand the characteristics of the population being surveyed in order to be sure the survey is representative of the larger population.

San Pablo Avenue

The age range for the San Pablo Avenue respondents was broad and fairly well distributed. Table 19 shows that 23% of respondents were aged 25-34, while 22% were aged 55-70. Census data from the survey areas suggest that the respondent population was slightly younger than the surrounding areas. The gender split for the survey was 57% male to 43% female, underrepresenting females for the areas. The racial composition of the sample, at 51% white, 29% African American, and less than 10% each of Asian, Hispanic, or "other" races, suggests that it overrepresents African American and underrepresents Asian and Hispanic respondents. The survey population was also slightly more educated than the survey area might suggest.

Table 19. San Pablo Ave Survey Area Characteristics at the Census-Tract Level

	Survey Sample Population (N=537)	**Survey Area Population** (N=17,546)*	**Survey Region Population** (N=1,903,577)*
Age[1]	**%**	**%**	**%**
18-24	14	10	12
25-34	23	24	18
35-44	17	18	20
45-54	17	18	20
55-70	22	19	19
70+	5	10	11
Sex[2]			
Male	57	49	49
Female	43	51	51
Race/Ethnicity[2]			
Caucasian or White	51	49	53
**Hispanic	6	13	23
African American or Black	29	21	11
Asian	9	22	21
Native American or Alaska Native	0	0	0
Other	5	3	10
Education[3]			
Less than high school	3	10	13
High school graduate	16	17	21
Some college	24	25	30
College degree or higher	55	49	36
Commute Mode[4]			
Car, truck, or van	-	63	79
Public transportation	-	20	10
Bicycle	-	4	1
Walked	-	6	3
Motorcycle, taxi, other	-	1	1
Arrival Mode to Survey Area			
Car, truck, or van	39	-	-
Public transportation	16	-	-
Bicycle	9	-	-
Walked	35	-	-
Motorcycle, taxi, other	0	-	-

1 American Community Survey 2006-2010 5-year Estimates, S0101 Age and Sex
2 ACS 2006-2010 5-year Estimates, DP05 ACS Demographic and Housing
3 ACS 2006-2010 5-year Estimates, S1501 Educational Attainment
4 ACS 2006-2010 5-year Estimates, B08006 Sex of Workers by Means of Transportation to Work
* Population aged 18 and over
**Hispanic counted separately from other races in Census, so totals add up to more than 100%.

Age was significantly related to how the respondent arrived to the area, but not to the likelihood of walking more than 1 block, whether or not additional design improvements were installed. The respondent's sex was significantly related to likelihood of walking or bicycling more if there were more sidewalk lights ($p \leq 0.10$) and street medians ($p \leq 0.05$) but not to general likelihood to walk or bicycle more than one block, visit frequency, or arrival mode. Race was significantly related to arrival mode ($p \leq 0.000$) in the case of white and black respondents, and to visit frequency ($p \leq 0.10$) in the case of Asian and black respondents. The likelihood of walking or bicycling more if there were more street improvements was significantly related to some races and not others for each element.

Santa Monica Boulevard
The data describing the demographics of the respondent population for Santa Monica Boulevard are shown in Table 20.

Table 20. Santa Monica Blvd Survey Area Characteristics at the Census-Tract Level

	Survey Sample Population (N=567)	**Survey Area Population** (N=60,593)	**Survey Region Population** (N=9,758,256)
Age[1]	%	%	%
18-24	16	12	14
25-34	27	26	21
35-44	21	19	20
45-54	19	14	18
55-70	10	15	17
70+	4	13	10
Sex[2]			
Male	62	53	49
Female	38	47	51
Race/Ethnicity[2]			
Caucasian or White	51	50	35
*Hispanic	25	24	32
African American or Black	14	3	6
Asian	6	5	9
Native American or Alaska Native	0	0	0
Other	5	18	18
Education[3]			
Less than high school	6	17	24
High school graduate	17	16	22
Some college	25	26	28
College degree or higher	44	41	26
Commute Mode[4]			
Car, truck, or van	-	76	87
Public transportation	-	14	7
Bicycle	-	2	1
Walked	-	7	3
Motorcycle, taxi, other	-	1	3
Arrival Mode to Survey Area			
Car, truck, or van	28	-	-
Public transportation	34	-	-
Bicycle	3	-	-
Walked	35	-	-
Motorcycle, taxi, other	1	-	-
Usual Mode around City			
Car, truck, or van	37	-	-
Public transportation	48	-	-
Bicycle	4	-	-
Walked	10	-	-
Motorcycle, taxi, other	2	-	-

1 American Community Survey 2006-2010 5-year Estimates, S0101 Age and Sex
2 ACS 2006-2010 5-year Estimates, DP05 ACS Demographic and Housing
3 ACS 2006-2010 5-year Estimates, S1501 Educational Attainment
4 ACS 2006-2010 5-year Estimates, B08006 Sex of Workers by Means of Transportation to Work
*Hispanic counted separately from other races in Census, so totals add up to more than 100%.

For Santa Monica Boulevard, age was significantly related ($p \leq 0.10$) to how respondents over age 45 arrived to the area, as well as to their usual travel mode. Age was not significantly correlated with visit frequency, nor with the likelihood of walking or bicycling more than 1 block, regardless of additional design improvements. The respondent's sex was significantly related to arrival mode ($p \leq 0.01$), but not to usual travel mode, visit frequency, or general likelihood of walking or bicycling more than one block. Sex was related to the likelihood of walking or bicycling more if there were more shade trees ($p \leq 0.01$), bicycle parking ($p \leq 0.10$), and public art or decorative trash receptacles ($p \leq 0.05$). Race was significantly related to arrival mode in the case of white and Hispanic respondents ($p \leq 0.001$), and in the case of black respondents ($p \leq 0.01$). Race was also significantly related ($p \leq 0.001$) to usual travel mode for these groups, as well as for "other" races ($p \leq 0.05$). Race was not significantly related to visit frequency or general likelihood of walking or bicycling more than one block, except in the case of "other" races ($p \leq 0.05$). The likelihood of walking or bicycling more if there were more street improvements was significantly related to some races and not others for each element.

Table 21 compares the respondent demographics from San Pablo Avenue and Santa Monica Boulevard. The survey population for San Pablo Avenue is slightly older, more gender-balanced, more highly educated, less Hispanic, and more African American than the population from Santa Monica Boulevard. In addition, there were more drivers and bicyclists, but fewer public transit users among the San Pablo Avenue group.

Table 21. Comparison of San Pablo Avenue and Santa Monica Boulevard Respondent Demographics

	San Pablo Avenue Survey Sample Population (N=537)	**Santa Monica Boulevard Survey Sample Population** (N=567)
Age	%	%
18-24	14	16
25-34	23	27
35-44	17	21
45-54	17	19
55-70	22	10
70+	5	4
Sex		
Male	57	62
Female	43	38
Race/Ethnicity		
Caucasian or White	51	51
*Hispanic	6	25
African American or Black	29	14
Asian	9	6
Native American or Alaska Native	0	0
Other	5	5
Education		
Less than high school	3	6
High school graduate	16	17
Some college	24	25
College degree or higher	55	44
Arrival Mode to Survey Area		
Car, truck, or van	39	28
Public transportation	16	34
Bicycle	9	3
Walked	35	35
Motorcycle, taxi, other	0	1

Trip Characteristics
This section describes the characteristics of trips made to San Pablo Avenue and Santa Monica Boulevard. Understanding the trip characteristics is important for understanding the impact of these users on the corridor's vitality. For example, if the majority of pedestrian trips are made by people who are shopping, dining, or working in the area, this would imply that improving the pedestrian travel experience on the corridor would be economically beneficial.

Trip Purpose
The main reasons people visited San Pablo Avenue on the survey day can be categorized into eight categories.[5] Shopping was the most popular reason, with just over one-quarter of respondents citing that as their main purpose for their visit. Living in the area was the second most-cited reason, at 18%. How the respondent arrived to San Pablo Avenue was significantly related ($p \leq 0.0001$) to the main purpose of the trip. Figure 34 depicts how the categories compare for the survey date.

[5] Santa Monica Boulevard respondents were not asked this question.

Figure 34. Main Purpose of San Pablo Ave Trip by Mode of Arrival (N=537)

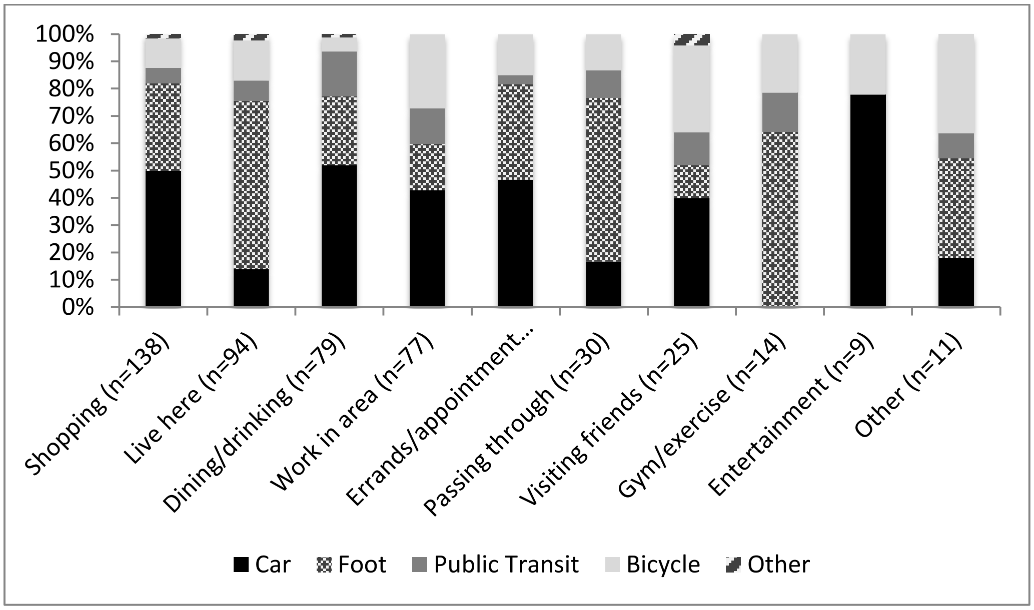
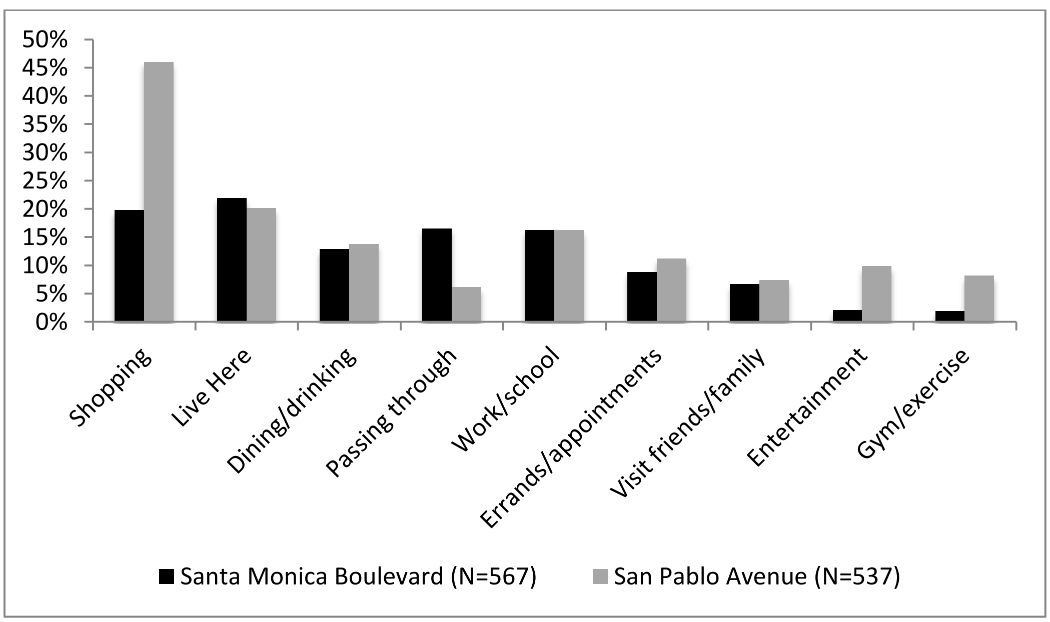


Figure 35 compares the "typical" activities of survey respondents along San Pablo Avenue to those along Santa Monica Boulevard. Note that while shopping is a popular activity for both corridors, a much higher percentage of San Pablo Avenue respondents (46% vs. 20%) reported it as a typical activity.

Figure 35. Typical Activities* on San Pablo Avenue and Santa Monica Boulevard



*Respondents could name more than one activity; "other" and "don't know" excluded from figure.

Figure 36 shows the breakdown of arrival mode for each of the typical activities along San Pablo Avenue. Note that while drivers make a large portion of the trips, they make less than half of almost every category.

Figure 36. Typical Activities along San Pablo Avenue, by Arrival Mode (N=537)

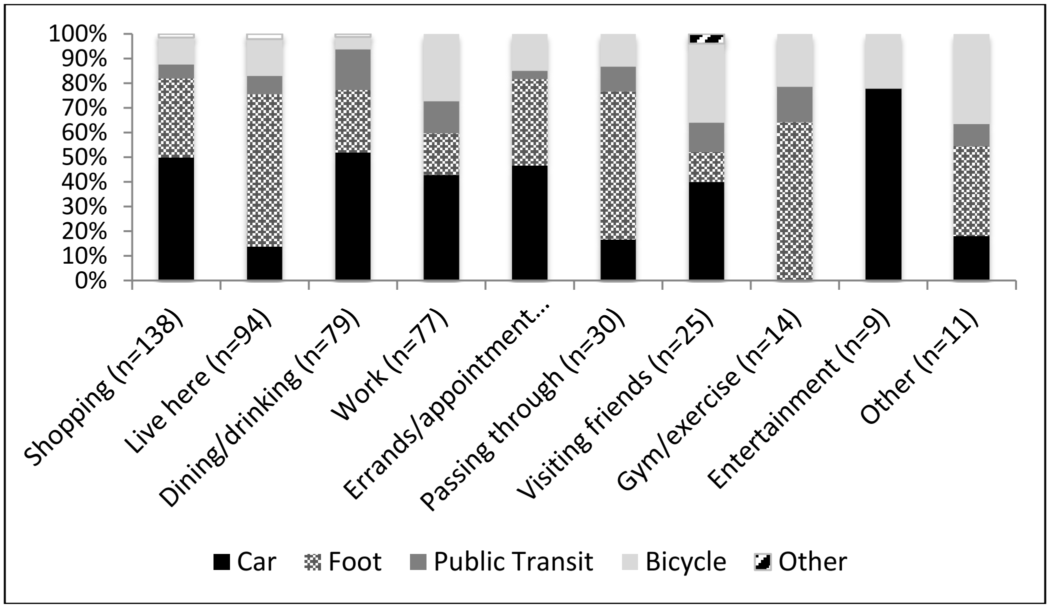
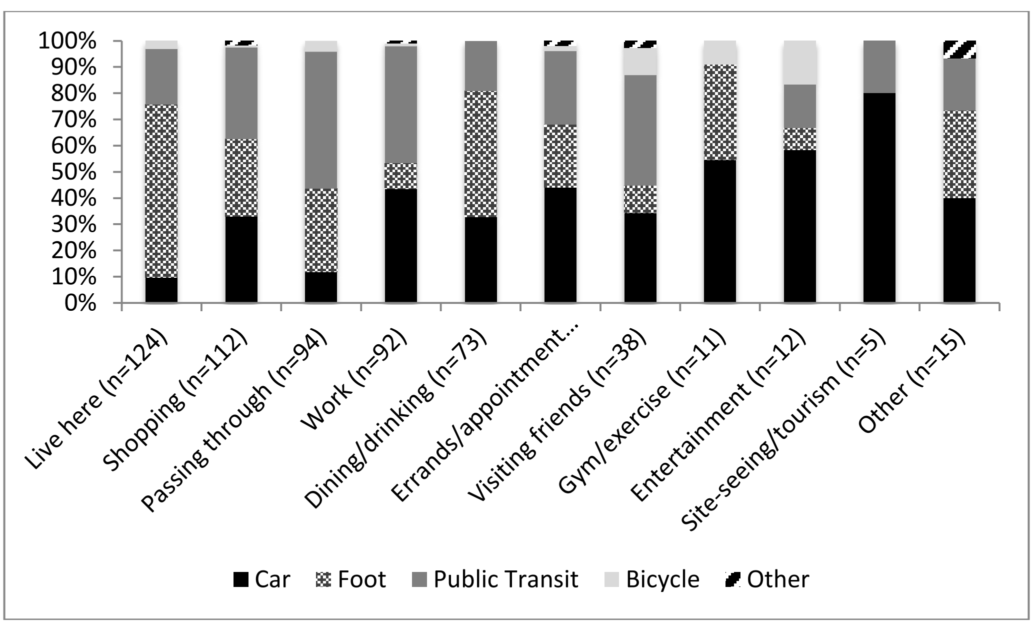


Figure 37 shows the same breakdown for Santa Monica Boulevard. Note that the percentage of public transit users is much greater for each activity than it was on San Pablo Avenue. Similar to the San Pablo Avenue results, drivers made up less than half of almost every category.

Figure 37. Typical Activities along Santa Monica Blvd, by Arrival Mode (N=567)

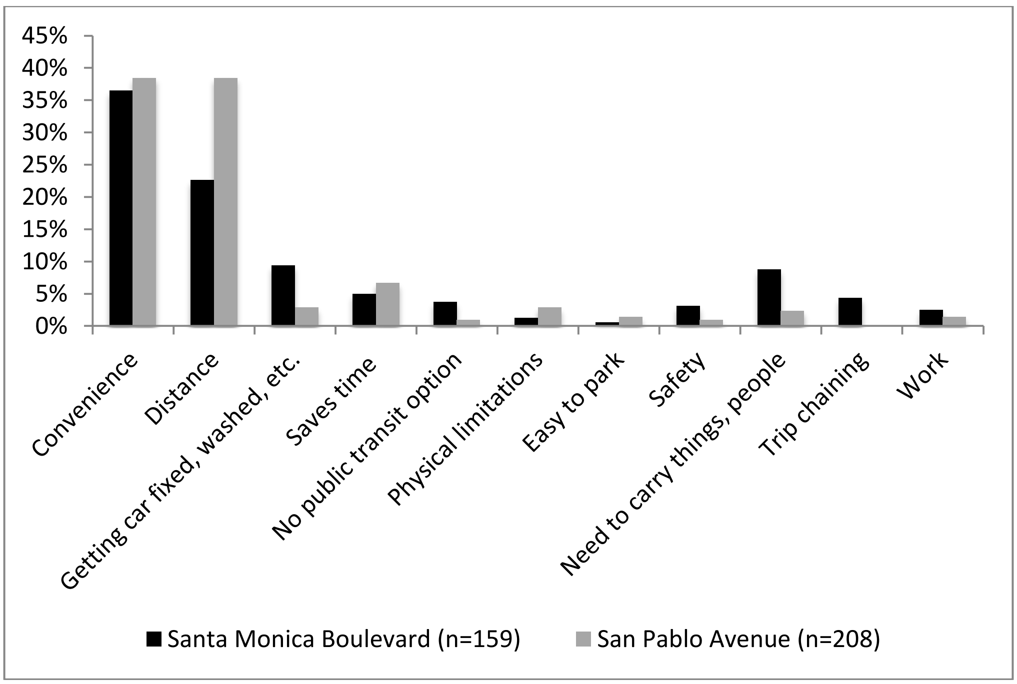


Travel Mode

Understanding the travel mode of respondents is important to understand how survey responses vary among different users. It would be expected that pedestrians prefer pedestrian improvements, bicyclists request bicycle improvements, and vehicles request vehicle improvements. Finding convergence among respondents' preferences reveals methods and improvements with which Caltrans can focus its resources to have the greatest affect among all users.

Thirty-five percent of respondents for both surveys arrived to the survey area by foot. Another 39% arrived to San Pablo Avenue by car, whereas only 24% arrived to Santa Monica Boulevard by car. Figure 38 compares the reasons for driving to San Pablo Avenue versus to Santa Monica Boulevard. "Convenience" was the most commonly-cited reason for driving for both groups. Another 38% of San Pablo Avenue respondents also cited distance as a main reason for driving (compared with 23% of Santa Monica Boulevard respondents).

Figure 38. Reasons for Driving to San Pablo Ave versus Santa Monica Boulevard



Frequency of Visits

The frequency of visits to the area is important to understand how improvements can increase frequency of visits to the area. More visits to the area would lead to higher economic vitality of the area.

Table 22 and Table 23 show the frequency with which the survey respondents typically visit the San Pablo and Santa Monica Boulevard areas, respectively. Fifty-six percent of respondents visit San Pablo Avenue "all the time," while another 18% visit "fairly often." For Santa Monica Boulevard, 46% visit "all the time," while 26% visit "fairly often". These numbers suggest that the survey responses have a high validity due to familiarity with the area.

There was a significant correlation ($p \leq 0.0001$) between how the respondent arrived and how often they typically visit the survey areas. Seventy-two percent of San Pablo Avenue pedestrians and 63% of Santa Monica Boulevard pedestrians—the most of all mode groups—reported that they visit "all the time."

Table 22. Frequency of Visits to San Pablo Avenue, by Arrival Mode

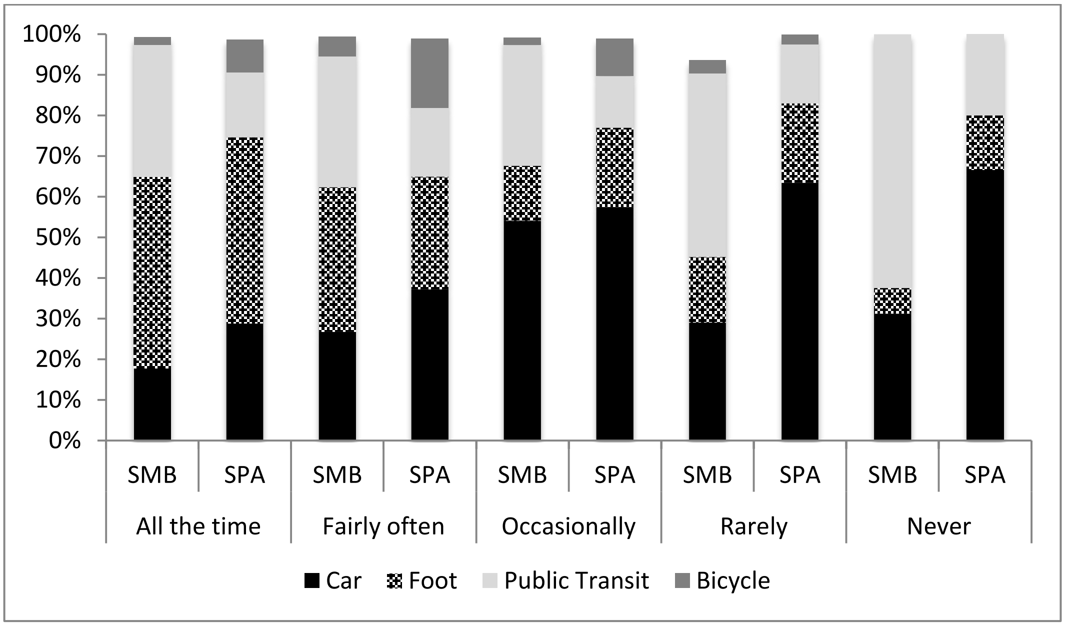
	Everyone (N=537) %	**Drivers** (n=208) %	**Pedestrians** (n=190) %	**Transit Users** (n=84) %	**Bicyclists** (n-49) %	**Other** (n=6) %
All the time	56	42	72	57	49	67
Fairly often	18	17	14	19	33	17
Occasionally	16	24	9	13	16	17
Rarely	8	13	4	7	2	0
First time today	3	5	1	4	0	0

Table 23. Frequency of Visits to Santa Monica Boulevard, by Arrival Mode

	Everyone (N=567) %	**Drivers** (n=154) %	**Pedestrians** (n=195) %	**Transit Users** (n=270) %	**Bicyclists** (n=15) %	**Other** (n=6) %
All the time	46	29	63	45	33	33
Fairly often	26	25	27	25	47	17
Occasionally	20	38	8	18	13	17
Rarely	6	6	3	7	7	33
First time today	3	3	1	5	0	0

Figure 39 depicts the information presented in the above tables. Note that, for both corridors, more pedestrians visit "all the time" than any other user group. In addition, San Pablo Avenue has a higher general percentage of drivers and bicyclists and a lower general percentage of public transit users than Santa Monica Boulevard.

Figure 39. Visit Frequency to San Pablo Ave (N=537) and Santa Monica Blvd (N=567), by Arrival Mode



Likelihoods of Walking or Bicycling

Likelihood of Walking or Bicycling More Given Various Improvements
Information revealing how various improvements could improve the likelihood of walking or bicycling reveals specific features that Caltrans should consider focusing its resources to achieve higher percentages of people walking or bicycling.

The analysis found that there is no significant difference between areas regarding the general likelihood to walk more than one block along San Pablo Avenue. Overall, nearly 65% of people are "very" or "somewhat" likely to walk more than one block. However, there is a significant connection ($p \leq 0.0001$) between how often respondents visit the area and their likelihood of walking or bicycling more than one block. For example, those who visit "all the time" are much more likely to walk or bicycle more than one block than those who visit occasionally or rarely. There is also a significant relationship ($p \leq 0.0001$) between how someone arrived to the area and the likelihood of walking or bicycling more than one block. Those who arrived on foot or by public transportation are much more likely to walk more than one block than those who drove or even those who bicycled. Figures representing these associations can be found in Appendix G.

For Santa Monica Boulevard, 73% of people are "very likely" or "likely" to walk or bicycle more than one block while visiting. As was the case for San Pablo Avenue, the likelihood of walking or bicycling more than one block along Santa Monica Boulevard is significantly positively correlated ($p \leq 0.0001$) with how often the respondent visits the area. For example, those who visit "all the time" are much more likely to walk more than one block than those who visit occasionally or rarely. There is also a significant relationship ($p \leq 0.0001$) between how someone arrived to the area and the likelihood of walking or bicycling more than one block. Those who arrived on foot, by bicycle, or by public transportation are much more likely to walk or bicycle more than one block than those who drove. Figures representing these associations can be found in Appendix H.

The survey also asked about the likelihood of walking or bicycling more given certain street improvements. Table 24 shows that around 50-60% of San Pablo Avenue respondents said that they would be at least "somewhat likely" to walk or bicycle more given an increase in most of the proposed street improvements. The lowest-scoring elements were medians, curb extensions, and decorative pavement, all of which had an approximately 40% likelihood. Note that the "unlikelihood" number does not indicate that people do not want these treatments, just that they are unlikely to walk or bicycle more if these treatments are installed.

Table 24. Likelihood of Walking or Bicycling More along San Pablo Avenue if More Design Amenities (N=537)

	Likely %	Neutral %	Unlikely %	N/A %	Total
Outdoor seating areas	65	8	23	-	100
Sidewalk lighting	63	7	25	2	100
Landscaping	55	9	35	-	100
Bicycle lanes	53	4	17	25	100
Shade Trees	50	8	38	1	100
Bicycle parking	48	6	19	26	100
Public art/decorative trash receptacles	47	11	40	1	100
Curb extensions	43	8	40	1	100
Medians	37	9	44	4	100
Decorative pavement	36	10	49	1	100

Table 25 shows the results to these same questions for the Santa Monica Boulevard respondents. The results indicate that the Santa Monica Boulevard respondents were uniformly more likely to walk or bicycle more given these improvements than the San Pablo Avenue respondents. The "likelihood" order of the improvements was nearly the same between the two groups, with outdoor seating areas and sidewalk lighting being the two categories with the most positive responses for both groups. One key difference for Santa Monica Boulevard was the greater positive response toward street trees, which may reflect several things, including respondents' comments about needing more shade on hot days and the fact that many parts of San Pablo Avenue already have a lot of shade trees. These types of explanations will be discussed further in the case study section at the end of the chapter.

Table 25. Likelihood of Walking or Bicycling More along Santa Monica Boulevard if More Design Amenities (N=567)

	Likely %	Neutral %	Unlikely %	N/A %	Total
Outdoor seating areas	77	13	7	3	100
Sidewalk lighting	70	17	9	4	100
Shade Trees	69	20	8	2	100
Landscaping	60	23	16	2	100
Bicycle lanes	60	16	13	11	100
Bicycle parking	57	17	15	10	100
Curb extensions	56	25	15	4	100
Decorative pavement	50	21	26	3	100
Landscaped medians	49	25	18	8	100
Public art/decorative trash receptacles	48	22	27	3	100

Each "likelihood" question was further examined for its connection to arrival mode and visit frequency, as shown in Table 26. Figures representing significant associations are located in Appendix G for San Pablo Avenue and Appendix H for Santa Monica Boulevard.

Table 26. Significant Correlations between Likelihood of Walking or Bicycling More Given Certain Design Features and Travel Mode and Visit Frequency

	San Pablo Avenue		Santa Monica Boulevard		
	Arrival mode	Visit frequency	Arrival mode	Usual mode	Visit frequency
Outdoor seating areas	*	*			**
Sidewalk lighting				#	*
Shade Trees	**	*		**	#
Landscaping[6]	*			*	#
Bicycle lanes			***	***	
Bicycle parking			***	***	
Curb extensions	#			**	
Decorative pavement	*		#	**	
Landscaped medians[7]	#				
Public art/decorative trash receptacles			***	***	

Significant correlations at the following levels: # $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

There was a significant difference between groups for likelihood of walking or bicycling more given more of certain improvements. In the section below, the significant correlations are explained for each improvement.

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[6] The San Pablo Avenue survey asked about "landscaping or other plants"; the Santa Monica Boulevard survey asked about "plants on the sidewalk."

[7] The San Pablo Avenue survey asked about "medians in the middle of the street"; the Santa Monica Boulevard survey asked about "landscaped medians."

Shade Trees
Overall, just over 50% of San Pablo Avenue respondents and nearly 70% of Santa Monica Boulevard respondents would be at least "somewhat likely" to walk or bicycle more if there were more shade trees. The significant correlation to arrival mode for San Pablo Avenue respondents reflects that more pedestrians and bicyclists than drivers were more likely to walk or bicycle more than one block if more shade trees were present. The significant correlation to usual mode for Santa Monica Boulevard respondents reflects that more public transit users than any of the other modes were more likely to walk or bicycle more than one block if more shade trees were present. The significant correlation to visit frequency for both areas reflects that those who visit the most frequently are also more likely to walk or bicycle more than one block if more shade trees are planted. This likelihood was significantly related to the survey area along San Pablo Avenue and Santa Monica Boulevard. This may reflect the difference between survey locations in terms of the presence of shade trees.

Landscaping
Overall, 55% of San Pablo Avenue respondents and 60% of Santa Monica Boulevard respondents said they would be more likely to walk or bicycle more if there was additional landscaping. As with shade trees, significant correlations to arrival mode for San Pablo Avenue respondents and usual mode for Santa Monica Boulevard respondents reflects that more pedestrians and bicyclists (in the case of San Pablo Avenue) and more transit users (in the case of Santa Monica Boulevard) than the other groups were more likely to walk or bicycle more than one block if more landscaping were present. The slightly significant correlation to visit frequency for Santa Monica Boulevard reflects that those who visit more frequently are also more likely to walk or bicycle more than one block if additional landscaping is present. This likelihood was significantly related to the survey area along San Pablo Avenue and Santa Monica Boulevard, again perhaps reflecting the difference in landscaping between survey areas.

Street/Landscaped Medians
Thirty-seven percent of San Pablo Avenue respondents and 49% of Santa Monica Boulevard respondents stated that they would be at least "somewhat likely" to walk or bicycle more if there were more street/landscaped medians. This likelihood was not significantly correlated to visit frequency for either area, and was only slightly significantly correlated to arrival mode along San Pablo Avenue. This slight correlation reflects pedestrian, transit user, and bicyclist willingness to walk or bicycle more than drivers if medians are present. This likelihood was not significantly related to the survey areas for either corridor.

Sidewalk Lighting
Approximately 63% of San Pablo Avenue respondents and 70% of Santa Monica Boulevard respondents would be at least "somewhat likely" to walk or bicycle more if there were more sidewalk lighting along their respective corridors. This likelihood was not significantly correlated to visit frequency or arrival mode for San Pablo Avenue, suggesting that neither of those attributes made any certain user group more or less likely to walk or bicycle more if there were more sidewalk lighting. Santa Monica Boulevard respondents who visited less often were significantly less likely to walk or bicycle more if more sidewalk lighting were installed. Public transit users and bicyclists were more likely than drivers or pedestrians to

walk or bicycle more given more sidewalk lighting. This likelihood was significantly related to the survey area along Santa Monica Boulevard, but not San Pablo Avenue.

Curb Extensions
Just over 43% of San Pablo Avenue respondents and 56% of Santa Monica Boulevard respondents reported being more likely to walk or bicycle more if there were more curb extensions. This likelihood was not significantly related to survey area for San Pablo Avenue, but was for Santa Monica Boulevard. This may reflect the general lack of curb extensions along San Pablo Avenue and the fact that Santa Monica Boulevard has them in some places but not others. There is a significant association between this likelihood and arrival mode for San Pablo Avenue, as well as with usual travel mode for Santa Monica Boulevard, reflecting a greater preference among non-drivers for this feature. This likelihood was not associated with visit frequency for either corridor.

Colored or Decorative Paving
Overall, just over 36% of San Pablo Avenue respondents and 50% of Santa Monica Boulevard respondents were at least "somewhat likely" to walk or bicycle more if there were more colored or decorative pavement. This was significantly related to area for San Pablo Avenue, though in an unexpected direction. For example, nearly 50% of respondents from the Castro/Solano area, which already has a large amount of context-sensitive and pedestrian-friendly features, would likely walk more given these conditions. In contrast, only 26% of respondents from the Kains/Castro area, with few context-sensitive and pedestrian-friendly features, would likely do so. This likelihood was not significantly related to area along Santa Monica Boulevard.

There was also a significant association between this likelihood and arrival mode for all respondents, as well as with usual travel mode among Santa Monica Boulevard respondents. This is likely explained by the responses of those who took public transit, as they seem to be the most likely to walk (or bicycle) more given more colored/ decorative paving. While pedestrians along Santa Monica Boulevard seemed likely to walk more given this treatment, this was less clear along San Pablo Avenue. Finally, there was no significant correlation between this likelihood and visit frequency.

Bicycle Parking
Approximately 48% of San Pablo Avenue respondents and 57% of Santa Monica Boulevard respondents were at least "somewhat likely" to (walk or) bicycle more if there were more bicycle parking. Approximately 26% of San Pablo Avenue respondents and 11% of Santa Monica Boulevard respondents answered "not applicable" to this question. This was not significantly related to area for San Pablo Avenue, although it was for Santa Monica Boulevard. It was not related to visit frequency for either area. There was a significant relation to arrival mode and usual travel mode among Santa Monica Boulevard respondents, mostly explained by bicyclists' preferences.

Bicycle Lanes
Approximately 53% of San Pablo Avenue respondents and 60% of Santa Monica Boulevard respondents reported being at least "somewhat likely" to walk or bicycle more if there were

more bicycle lanes, with 25% of San Pablo Avenue respondents and 10% of Santa Monica Boulevard respondents again answering “not applicable.” This was not significantly related to area for either corridor, perhaps because there are no bicycle lanes along San Pablo Avenue and they exist only on a short section of Santa Monica Boulevard. This was significantly related to arrival mode and usual mode for Santa Monica Boulevard respondents, again likely due to bicyclists’ preferences. It was not related to visit frequency for either corridor.

Public Art or Decorative Trash Receptacles
Nearly 47% of San Pablo Avenue respondents and 48% of Santa Monica Boulevard respondents are “likely” or “somewhat likely” to walk or bicycle more if there were more public art or decorative trash receptacles. This likelihood was not significantly related to area or visit frequency for either corridor. There was a significant association between the likelihood and arrival mode and usual mode for Santa Monica Boulevard respondents, likely due to a higher preference among transit users, pedestrians, and bicyclists, in comparison to drivers.

Outdoor Seating
Just over 65% of San Pablo Avenue respondents and 77% of Santa Monica Boulevard respondents are “likely” or “somewhat likely” to walk or bicycle more if there were more outdoor seating areas. This was significantly related to area for both corridors. A significant connection to how San Pablo Avenue survey respondents arrived is likely explained by a high preference among public transit users for more outdoor seating. Visit frequency for both corridors is significantly related to this likelihood, perhaps reflecting that those who visit more often were more likely to walk or bicycle more if more outdoor seating were available.

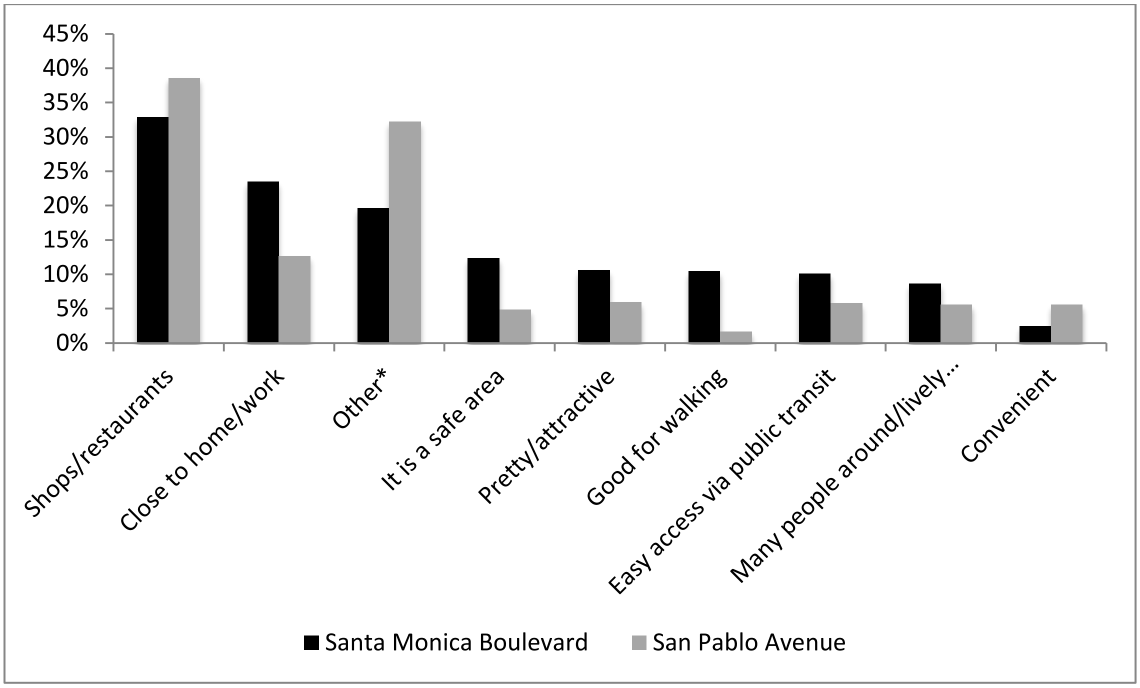
Activities and Attributes of San Pablo Avenue and Santa Monica Boulevard
This section reveals the characteristics the users like most about San Pablo Avenue and Santa Monica Boulevard. Understanding these preferences can help reveal how improvements can increase trips to the area. It is important to understand what users feel is the primary characteristic of the corridor that attracts them to understand whether it is the landscape and design elements, land use, or another attribute that draws people to the area.

The data showed that the survey respondents tended to enjoy similar things about the areas. Dining and shopping were far and away the most popular activities for each survey area, although some areas seemed to have more diverse offerings than others. The attributes people liked most and least about San Pablo Avenue and Santa Monica Boulevard also seemed fairly similar between user groups. These findings are elaborated upon below.

Attributes Respondents Liked Best about San Pablo Avenue and Santa Monica Boulevard
The survey asked respondents to name the attributes of San Pablo Avenue and Santa Monica Boulevard they liked most and least. Because these were open-response questions, respondents could answer more than one answer. The data indicated that the attributes and characteristics that respondents liked best about San Pablo Avenue and Santa Monica Boulevard were related to their typical activities. Figure 40 shows a comparison of the two corridors in terms of what respondents liked best. Both corridors were considered to have

"good shopping/restaurants" and had a high percentage of respondents who liked that they were close to home and/or work.

Figure 40. Attributes Respondents Liked Best about San Pablo Avenue (N=537) and Santa Monica Boulevard (N=567)



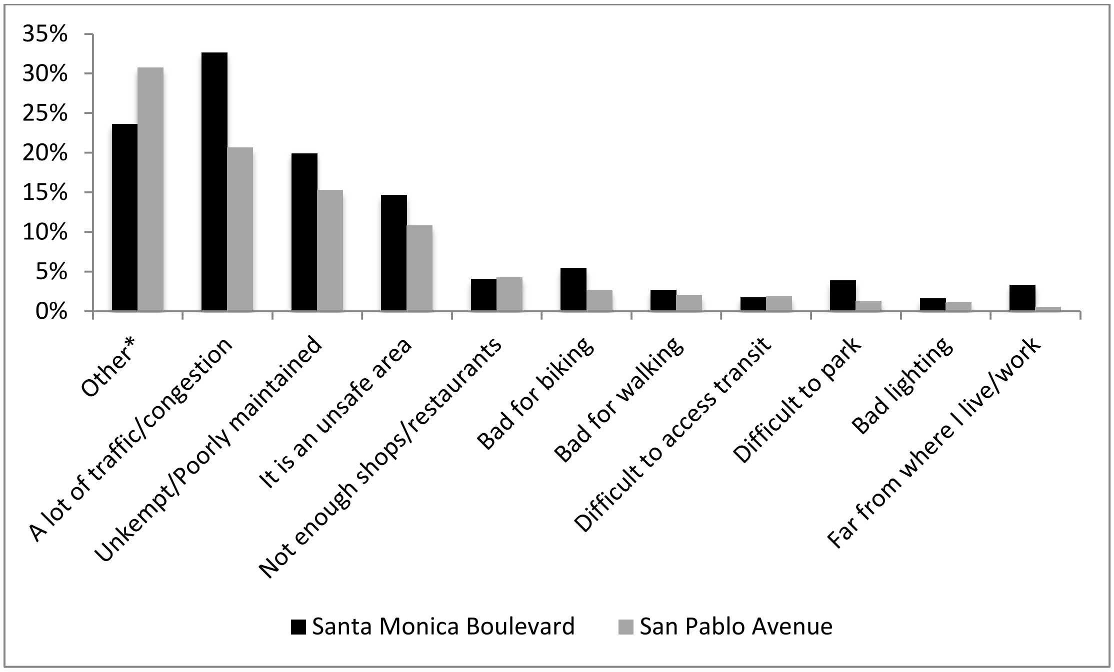
*Other includes answers chosen by less than 2% of respondents.

Note that a higher percentage of Santa Monica Boulevard respondents like every attribute than do San Pablo Avenue respondents. This could be due to a difference in survey populations or overall survey area, but it may also reflect the extensive upgrades Santa Monica Boulevard has undergone in the past ten years.

Note that many of these attributes—such as shopping/restaurants and proximity to work or home—are not directly related to street design. However, other attributes, such as attractiveness and access to public transit, have the potential to be affected by street design. For San Pablo Avenue respondents, these preferences were slightly significantly related to frequency of visit, but not to the respondents' arrival mode. For Santa Monica Boulevard, preferences were significantly related to arrival mode and visit frequency.

Attributes Respondents Liked Least about San Pablo Avenue and Santa Monica Boulevard
Figure 41 compares San Pablo Avenue and Santa Monica Boulevard in terms of aspects that respondents liked least overall. In contrast to the things that people liked best about the two corridors, those that they liked least were not significantly related to arrival mode or visit frequency. Note that the complaints are similar for both corridors—particularly, traffic congestion, appearance, and safety. However, in every single category a higher percentage of Santa Monica Boulevard than San Pablo Avenue respondents named these as issues.

Figure 41. Attributes Respondents Liked Least about San Pablo Avenue (N=537) and Santa Monica Boulevard (N=567)



*Other includes answers chosen by less than 3% of respondents.

Clearly there are some aspects that are beyond the control of street design, such as a lack of shops. However, many of these aspects could be improved by additional elements to calm traffic and provide pedestrian and bicyclist amenities.

Street Improvements that Would Encourage More Visits

Respondents were asked to name the various types of street improvements that could encourage them to visit the area more often. Identifying these improvements can help Caltrans determine where to focus its resources. The breadth of responses for each corridor is shown in Figure 42 and Figure 43. Note that these figures do not contain responses suggested by less than 2% of the survey populations; there were dozens of answers to this question. In spite of this, some responses were clearly preferred by more people, as seen in Table 27 and Table 28.

These improvements were significantly related to arrival mode but not to survey area or frequency of visit. The figures in this section include responses that are not street improvements under Caltrans' purview, such as increasing shops and restaurants and reducing vagrancy. These responses were left in to allow comparability between users' overall priorities, and to show the complexity of creating attractive environments.

Figure 42. Suggestions to Encourage More San Pablo Avenue Visits (N=537)

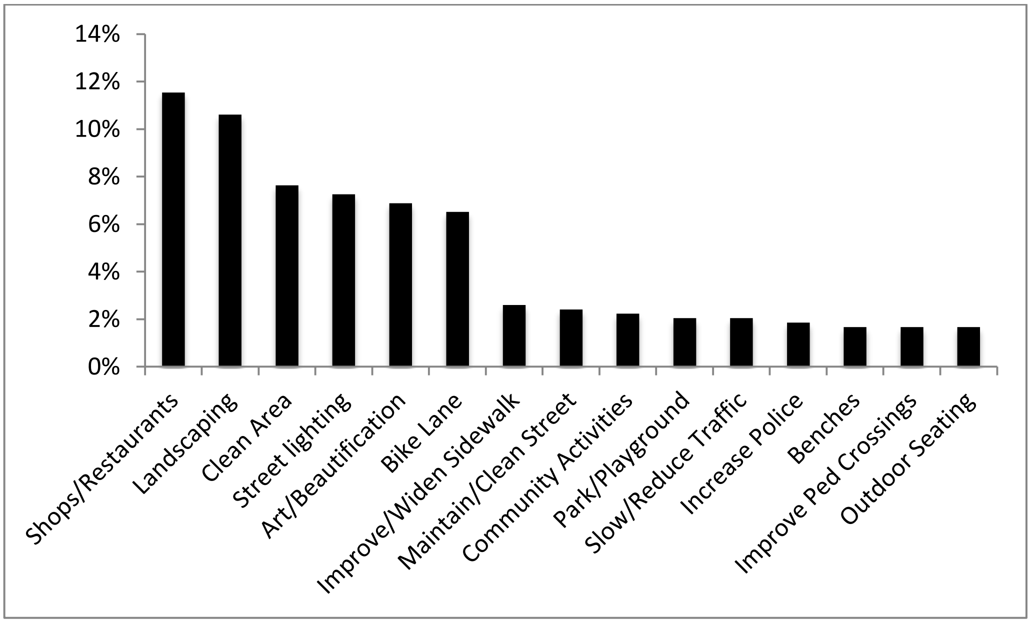


Figure 43. Suggestions to Encourage More Santa Monica Boulevard Visits (N=567)

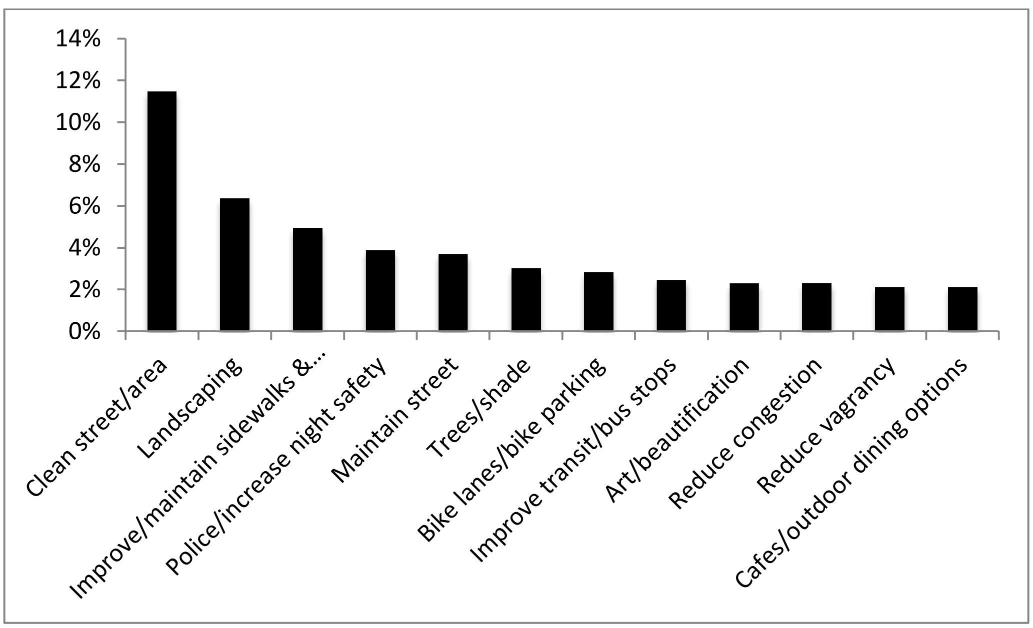


Table 27 and Table 28 show the most commonly suggested street improvements to encourage visits to San Pablo Avenue and Santa Monica Boulevard, respectively. These tables illustrate an alignment in preferences among the various respondent groups.

Note the high number of "nothing" responses for both groups, suggesting that these people will not visit the corridor more, regardless of added features. For Santa Monica Boulevard, this percentage (including "missing" responses) is fairly even across groups. For San Pablo

Avenue, however, a majority of transit users, bicyclists, and drivers have suggestions for improvements that could encourage more visits.

Table 27. San Pablo Avenue Respondents' Top Five Street Improvements to Encourage More Frequent Visits, by Arrival Mode

	All Users (N=531)	**Driver (n=208)**	**Pedestrian (n=190)**	**Transit User (n=84)**	**Bicyclist (n=49)**
Improvement	% of Responses	%	%	%	%
1. Trees & landscaping	15	11	22	11	12
2. Retail, food, entertainment	13	11	15	8	20
3. Clean area/more trash cans	8	6	8	14	8
4. Street lighting	8	6	11	8	4
5. Bike lane*	7	8	4	2	20
5. Art/beautification*	7	6	8	4	10
- Nothing	43	37	61	27	24

*Tied for fifth most-requested improvement.

Table 28. Santa Monica Boulevard Respondents' Top Five Street Improvements to Encourage More Frequent Visits, by Arrival Mode

	All Users (N=567)	**Driver (n=159)**	**Pedestrian (n=195)**	**Transit User (n=192)**	**Bicyclist (n=15)**
Improvement	% of Responses	%	%	%	%
1. Clean streets/sidewalk/area	12	12	14	11	13
2.Road/sidewalk maintenance/repair	7	8	5	6	13
3.More plants/ landscaping/parks	6	5	8	6	-
4.Bicycle lanes/parking	4	3	3	4	27
4.More entertainment options	4	4	5	2	-
4.Police/security/cameras	4	4	6	3	-
- Nothing/missing	51	48	48	59	47

*Tied for fourth most-requested improvement.

Perceived Traffic Safety on San Pablo Avenue and Santa Monica Boulevard

This section describes how safe users felt along San Pablo Avenue and Santa Monica Boulevard. People are unlikely to travel through a corridor if they feel unsafe doing so. The survey participants were questioned about how safe they feel from traffic while doing certain things on San Pablo Avenue. It is clear from the responses shown in Table 29 that people in general feel much safer walking along San Pablo Avenue than they do bicycling. In addition, over 50% of respondents answered "not applicable" to questions about bicycling safety. While this half likely includes many respondents with no desire to ride a bicycle, it may also include people who would like to bicycle but do not consider it because of perceived danger. Perceived safety while walking or bicycling was not significantly related to survey area, arrival mode, or frequency of visit (other than in one instance explained below).

Table 29. Perceptions of Traffic Safety while Walking and Bicycling on San Pablo Avenue (N=537)

	Very safe	Somewhat safe	Neutral	Somewhat unsafe	Very unsafe	N/A or Don't know
When walking on the sidewalk	57%	25%	10%	4%	2%	2%
When walking across the street	28%	20%	25%	15%	10%	2%
When bicycling across the street	7%	8%	12%	10%	8%	**52%**
When bicycling on the roadway	4%	5%	9%	12%	15%	**53%**

Table 30 shows how safety the Santa Monica Boulevard respondents feel when walking and bicycling along and across the corridor. The percentages are actually quite similar to those for San Pablo Avenue, except that a higher percentage of San Pablo Avenue respondents feel "very safe" walking along and across the street.

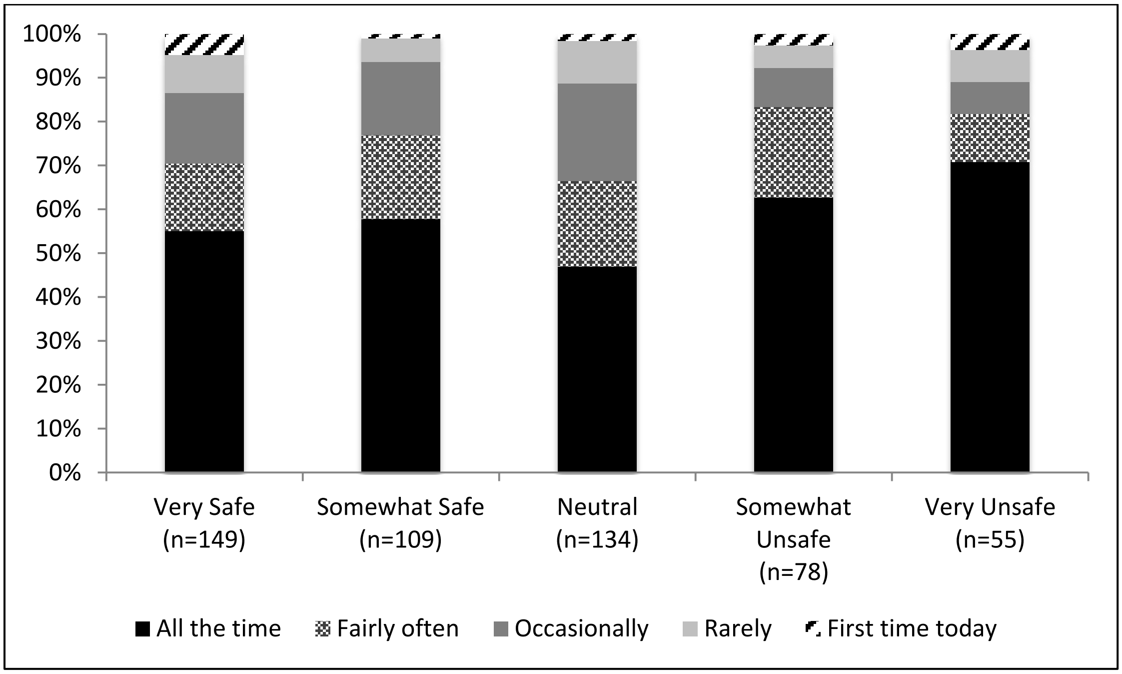
Table 30. Perceptions of Traffic Safety while Walking and Bicycling on Santa Monica Boulevard (N=567)

	Very safe	Somewhat safe	Neutral	Somewhat unsafe	Very unsafe	N/A or Don't know
When walking on the sidewalk	46%	37%	11%	2%	1%	3%
When walking across the street	21%	29%	27%	14%	6%	3%
When bicycling across the street	7%	7%	22%	16%	10%	**38%**
When bicycling on the roadway	4%	5%	16%	19%	17%	**39%**

Perceived Safety from Traffic When Walking

The questions about perceived safety while walking revealed a fairly safe experience. Only 25% and 6% of respondents reported feeling unsafe while walking across and along San Pablo Avenue, respectively. The difference between perceived traffic safety when crossing the street and the frequency of one's visits to San Pablo Avenue reached marginal significance (Figure 44), although it may be in an unexpected direction. It seems that the more someone visits, the less safe they feel, which may reflect a familiarity with certain dangers, or just the fact that more visits means more exposure to whatever dangers exist.

Figure 44. Perceived Traffic Safety When Walking Across San Pablo Ave, by Visit Frequency (N=525)



For Santa Monica Boulevard, only 20% and 3% of respondents reported feeling unsafe walking across and along the corridor, respectively. There was no significant association between perceived traffic safety and visit frequency.

Perceived Safety from Traffic When Bicycling

The questions about bicycling safety revealed a much greater disparity in perceived safety. While only 18% and 27% of respondents reported feeling unsafe while bicycling across or along San Pablo Avenue, respectively, over 50% of respondents for both questions responded "not applicable." This not applicable suggests that these respondents do not bicycle at all, which previous research has linked to fear of bicycling risk (Dill and Voros, 2007).

For Santa Monica Boulevard, 26% and 36% of respondents reported feeling unsafe bicycling across and along the street, respectively. In this case, an additional nearly 40% of respondents chose "not applicable" as their response. There was a significant association ($p \leq 0.01$) between visit frequency and perceived traffic safety bicycling across the street, as well as bicycling along the street ($p \leq 0.10$). As shown in Figure 45, there is a general trend indicating that the more someone visits, the less safe they report feeling bicycling. This may reflect dangers on Santa Monica Boulevard, but that causation cannot be established without further study. This trend is somewhat less apparent, although still present, in Figure 46.

Figure 45. Perceived Traffic Safety When Bicycling Across Santa Monica Boulevard

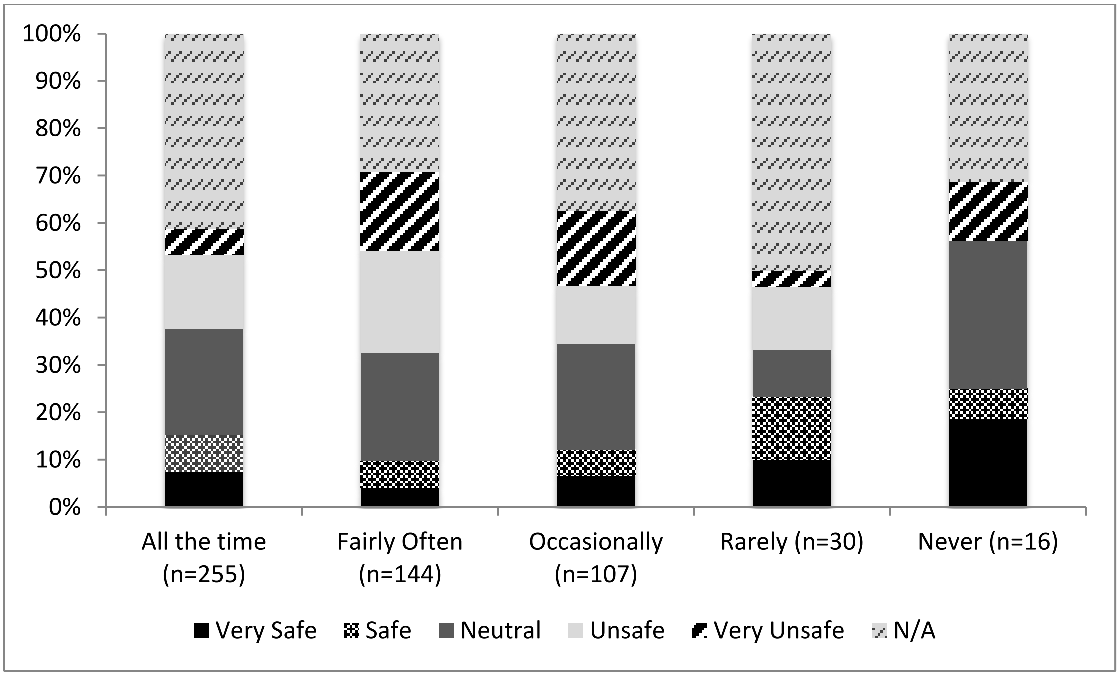
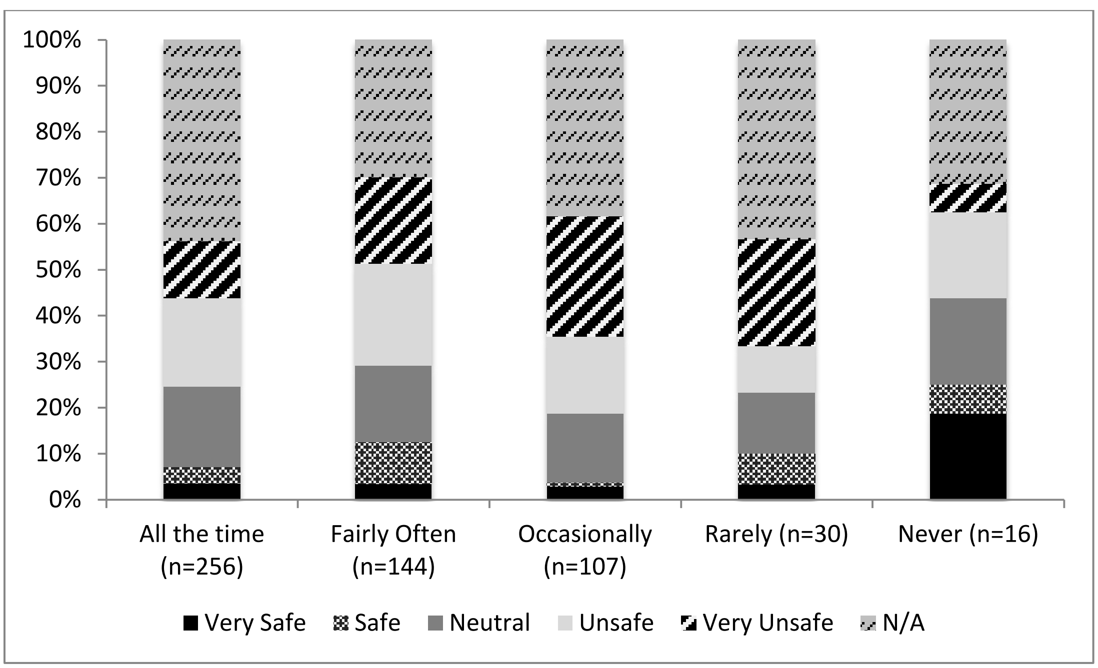


Figure 46. Perceived Traffic Safety When Bicycling Along Santa Monica Boulevard



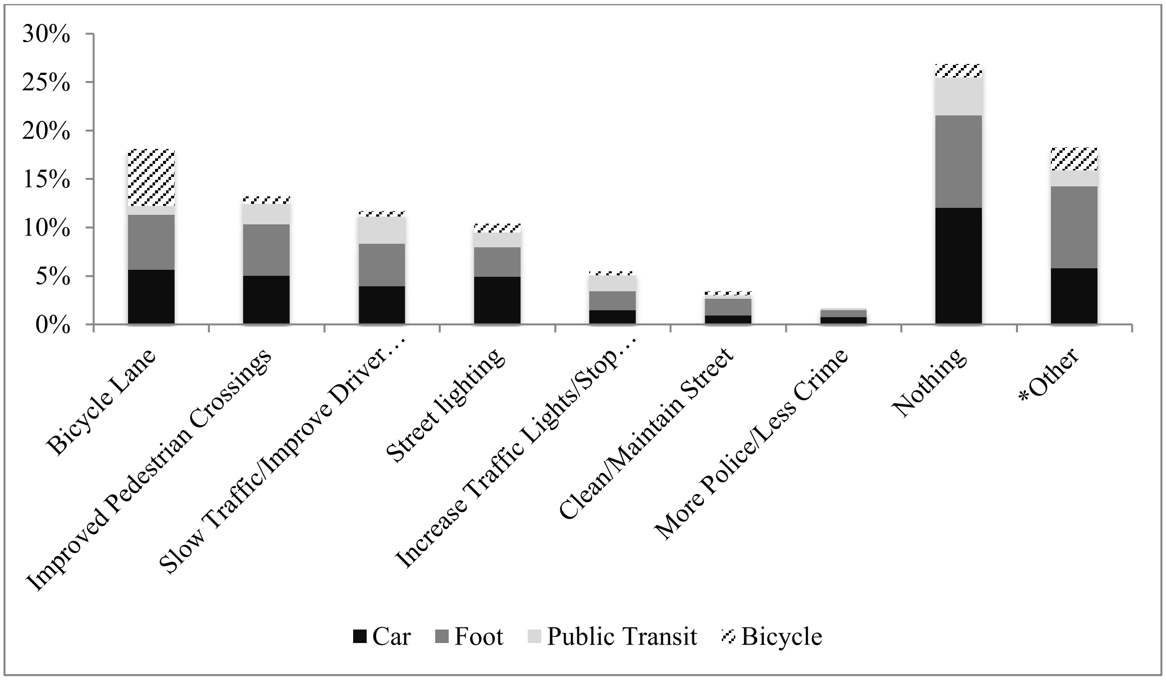
Encounters with Cars
The survey also asked about respondents' encounters with cars. The following percentages give a picture of the traffic risk survey respondents have encountered walking and bicycling along San Pablo Avenue and Santa Monica Boulevard.

- Percentage of respondents who have almost been hit by a vehicle while walking or biking in their area:
- Nearly 38% of San Pablo Avenue respondents
- Approximately 31% of Santa Monica Boulevard respondents
- Percentage of respondents who have had a motor vehicle come too close to them while walking or bicycling along the corridor:
- Over 50% of San Pablo Avenue respondents
- Nearly 44% of Santa Monica Boulevard respondents
- Percentage of respondents who have almost been hit by a car door while walking or biking along the corridor:
- Nearly 17% of San Pablo Avenue respondents
- 15% of those hit were injured
- Over 13% of Santa Monica Boulevard
- 34% of those hit were injured

Street Improvements that Would Increase Perceived Traffic Safety
Respondents were asked to name the various types of street improvements they thought would improve safety from traffic. Respondents could name as many things as they wanted, and many named more than one street improvement. Response trends are discussed in this section.

San Pablo Avenue
As seen in Figure 47 and Table 31, a bicycle lane was the most requested traffic safety improvement along San Pablo Avenue, both overall and among each user group except for public transit users (who ranked it fifth). The second most-requested addition was improved pedestrian crossings, such as adding lighted crosswalks and increasing crossing times. This category was requested second-most by each group except bicyclists (who ranked it third).

Figure 47. Requested Street Improvements to Increase Perceived Traffic Safety along San Pablo Ave, by Arrival Mode (N=533)



* "Other" includes 14 requested improvements, each of which was requested by less than 2% of the sample.

Table 31. Respondents' Top Five Street Improvements to Increase Perceived Traffic Safety along San Pablo Avenue, by Mode

	All Users (N=531)	**Driver (n=208)**	**Pedestrian (n=190)**	**Transit User (n=84)**	**Bicyclist (n=49)**
Improvement	% of respondents	%	%	%	%
1. Bicycle lane	18	14	16	6	63
2. Improved crosswalks	14	13	15	13	8
3. Slow traffic/ Improve driver behavior	11	10	12	18	6
4. Street lighting	9	13	5	10	10
5. More traffic lights and stop signs	5	4	8	11	4
- Nothing	28	31	27	25	14

There are several interesting trends found in this table. The first is that all users requested the same top 5 street improvements, although in different order. This may reflect the fact that many users are multimodal—that is, drivers, transit users, and bicyclists are all pedestrians at some point in their trip, while pedestrians likely use other modes at different times. The same could be said for the permeability of other modes.

The second trend to notice is that pedestrians, drivers, and bicyclists all ranked a bicycle lane as the top request to improve perceived traffic safety, even though bicyclists requested it the most. This may reflect the point raised above, that some pedestrians and drivers may bicycle at other times, but it may also reflect benefits derived by pedestrians and drivers from the existence of a bicycle lane for bicycle traffic. For example, this may increase predictability for drivers in terms of bicyclists' actions, and it may encourage more bicyclists to ride on the roadway instead of the sidewalk, thus improving pedestrian comfort and safety on the sidewalk.

A high percentage of respondents (28%) responded that "nothing" could improve traffic safety along San Pablo Avenue. Because of the response, it is difficult to know whether that indicates respondents' opinion that the situation is already quite safe, or because the respondents feel that it is so unsafe that "nothing" could improve it. A look at respondents' perceptions of safety from elsewhere in the survey may offer some clarity: 59% of respondents who answered "nothing" also reported feeling "very safe" walking along and across San Pablo Avenue. This correlation provides some evidence that the "nothing" from these respondents could be viewed positively. On the other side of the scale, no one who answered "nothing" also reported feeling "very unsafe" walking, but 13% reported feeling "very unsafe" bicycling (including 8% who feel "very safe" walking). This may be evidence that those responses should be viewed as a negative. It is unclear how the remaining 36% of "nothing" responses should be interpreted. However, it is clear that 72% of respondents overall—including 86% of bicyclists—believed that there was room for improvement. Table 32 shows that the most-requested traffic safety improvements were ranked by visit frequency. Those who visit frequently were more likely to request traffic safety improvements.

Table 32. Respondents' Most Requested Traffic Safety Improvements along San Pablo Avenue, by Frequency of Visit (N=536)

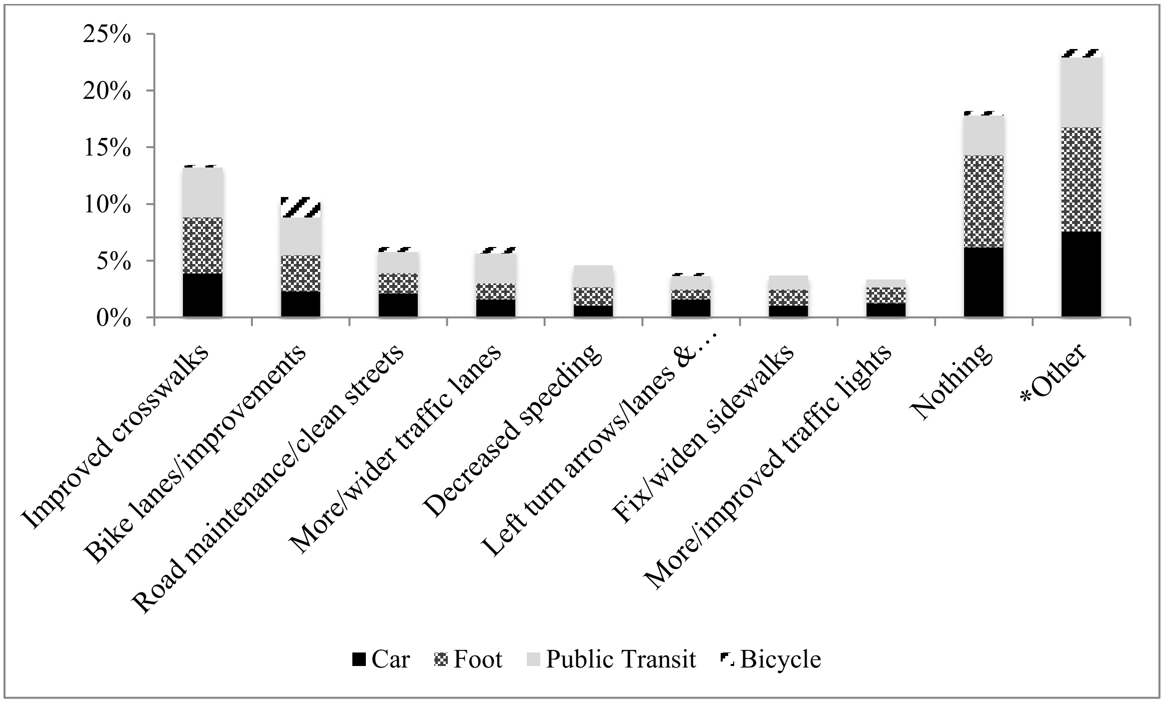
	All the Time (n=299)	**Frequently (n=94)**	**Occasionally (n=87)**	**Rarely (n=41)**	**First Time (n=15)**
Improvement	% of Responses	%	%	%	%
Bike Lane	18	22	20	13	13
Improved pedestrian crossings	14	14	7	17	33
Slow traffic/Improve driver behavior	12	12	9	5	-
Street lighting	10	9	7	5	7
Nothing	34	36	46	49	40

Traffic safety improvements were also significantly related to survey area, which will be discussed in a later section.

Santa Monica Boulevard

Figure 48 presents the results from the open-ended traffic safety improvement question along Santa Monica Boulevard. Similar to the responses from San Pablo Avenue, there was alignment among user groups about traffic safety elements, with improved crosswalks and bicycle lanes/improvements as the two most-requested categories.

Figure 48. Requested Street Improvements to Increase Perceived Traffic Safety along Santa Monica Boulevard, by Arrival Mode (N=567)



* "Other" includes over 20 requested improvements, each requested by no more than 2% of the sample.

This alignment between user preferences continued through the five most-requested traffic safety improvements, as presented in Table 33. One exception to this alignment is that the fifth most-requested improvement—reduced driver speed—was not requested by any bicyclists.

Table 33. Respondents' Top Five Street Improvements to Increase Perceived Traffic Safety along Santa Monica Boulevard, by Arrival Mode

	All Users (N=567)	Driver (n=159)	Pedestrian (n=195)	Transit User (n=192)	Bicyclist (n=15)
Improvement	% of responses	%	%	%	%
1. Improved crosswalks	13	14	14	13	7
2. Bicycle lanes/improvements	11	8	9	10	67
3. Road maintenance/clean streets	6	8	5	6	13
4. More/wider traffic lanes	7	6	4	8	20
5. Decreased speeding	5	4	5	6	-
- Nothing	19	22	24	10	13
- Skipped question	26	19	19	39	7

There are several things to note from this table. As in the case of San Pablo Avenue, all user groups prioritized traffic safety improvements traditionally thought to benefit just one group. Improved pedestrian crossings were not only the most-requested addition overall, they were also the most-requested among those who drove, walked, and took transit to the site (ranked fifth by bicyclists). Bicycle lanes or improvements were ranked second overall and second by all groups except bicyclists, who ranked them first. While these preferences may reflect the multimodality of these respondents, they also potentially reflect benefits to other modes. For example, when requesting a bicycle lane, one respondent said, "…walking feels dangerous with bicycles on the sidewalks."

In addition, a fairly high percentage of people either mentioned "nothing" to improve traffic safety (19%), or skipped the question (26%). As with the data from San Pablo Avenue, it is difficult to decipher whether this is a positive or negative non-response. Further analysis shows that 41% of those respondents already feel "very safe" walking or bicycling along Santa Monica Boulevard, so a good portion of the responses do seem to be positive. However, the remaining 59% of responses cannot be categorized one way or the other. Regardless of the meaning of the non-response, it is clear that a majority of corridor users (55%) would like to see traffic safety improvements, including 80% of bicyclists and nearly 60% of drivers and pedestrians.

Table 34 shows how the most-requested traffic safety improvements were ranked by frequency of visit. Note that the enthusiasm for pedestrian and bicycle improvements remains fairly consistent regardless of visit frequency.

Table 34. Respondents' Most Requested Traffic Safety Improvements along Santa Monica Boulevard, by Frequency of Visit (N=563)

	All the Time (n=259)	Fairly Often (n=146)	Occasionally (n=111)	Rarely (n=31)	First Time (n=16)
Improvement	% of Responses	%	%	%	%
1. Improved crosswalks	13	18	11	3	13
2. Bicycle lanes/ improvements	20	15	15	29	25
3. Road maintenance /clean streets	5	8	7	10	-
4. More/wider traffic lanes	3	8	10	3	6
5. Decreased speeding	5	2	10	-	-
- Nothing	20	15	15	29	25

Limitations

For all of the findings about preferences, a few important limitations apply. First, all survey respondents were intercepted on foot or bicycle, regardless of their mode of arrival to the corridor. Thus, it is possible that their answers reflected their preferences as a pedestrian more than their preferences as a driver or transit user. Likewise, pedestrians may have different preferences for street design when traveling via other modes. There is no way to fully measure those possible differences from this data, although it is worth noting that the answers of the other roadway user groups do not exactly mirror (and in some cases diverge from) those of the pedestrian group, suggesting that they did not think solely as pedestrians when answering the questions.

One way the research team attempted to address this limitation was by asking respondents along Santa Monica how they "usually" traveled around the city. These answers were then compared with requested traffic safety improvements to detect any influence of the arrival mode on one's choices. Figure 49 and Table 35 display these results. Note that it does appear that respondents' arrival mode influenced their answers to the question. For example, a smaller percentage of people who usually walk requested pedestrian crossings than the percentage of those who walked to the site that day. However, the percentages were relatively close for all modes, particularly for drivers and public transit users, suggesting that the answers based on arrival mode are reliable.

Figure 49. Requested Street Improvements to Increase Perceived Traffic Safety Along Santa Monica Boulevard, by Usual Mode (N=567)

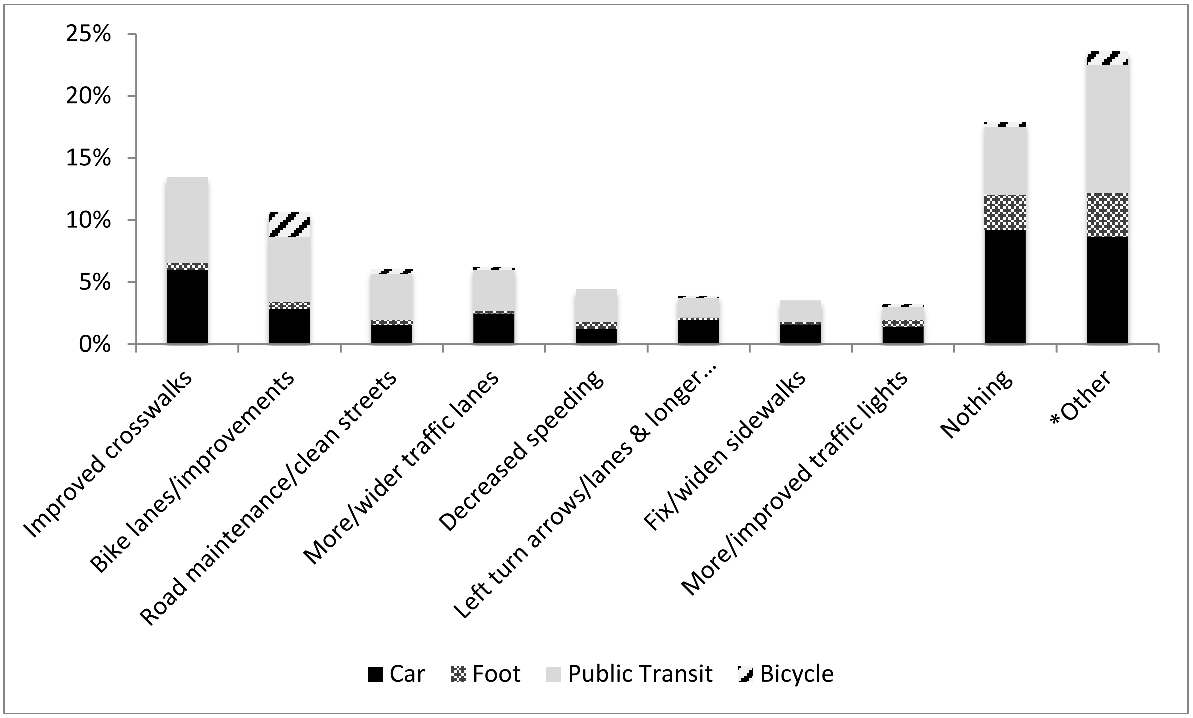


Table 35. Respondents' Top Five Street Improvements to Increase Perceived Traffic Safety Along Santa Monica Boulevard, by Usual Travel Mode

	All Users (N=565)	Driver (n=208)	Pedestrian (n=54)	Transit User (n=270)	Bicyclist (n=23)
Improvement	% of responses	%	%	%	%
1. Improved crosswalks	13	16	6	14	0
2. Bicycle lanes/improvements	11	8	6	11	48
3. Road maintenance/clean streets	7	4	4	8	9
4. More/wider traffic lanes	6	7	2	7	4
5. Decreased speeding	5	3	6	6	-
- Nothing	19	25	30	11	9

A second, but related, limitation is that this survey explores roadway design preferences of traffic that has stopped at some point along this corridor. Thus, it cannot be said to represent the preferences of traffic that uses this corridor solely for traveling through these locations. However, this concern is somewhat less relevant, as data about walking and bicycling trip characteristics indicate that it is highly unlikely that very many, if any, pedestrians and bicyclists would traverse the lengths of these two corridors without stopping.

Finally, open-response questions such as the one about traffic safety improvements did not give users a choice set from which to select responses. While this has the benefit of not leading the respondent to a certain answer, it has two main disadvantages. First, all users may not have the same knowledge or ideas about what street improvements are possible. Second, without a choice set, respondents may not know what is possible beyond their general familiarity. For example, in cities such as Copenhagen or Paris, roadways with high amounts of fast-moving traffic like San Pablo Avenue and Santa Monica Boulevard would likely be designed with physically-separated bicycle lanes (i.e., cycle-tracks). However, these treatments are rarely used in the United States and likely unfamiliar to most of the respondents to this survey.

Case Study Approach

Another way to examine the data from the San Pablo Avenue and Santa Monica Boulevard surveys is using a case study approach. This section explores and compares the survey findings from each area to try to understand how various outcomes are influenced by design features.

San Pablo Avenue

Table 36 and Table 37 display information about the San Pablo Avenue survey areas (which are shown on a map in Appendix M), which are the blocks surrounding the identified intersection. A few things are clear from the percentages and preferences listed in these two tables. First, areas where a higher percentage of respondents arrived by bicycle ranked a bicycle lane as the most-requested traffic safety improvement. However, all areas except the area around the intersection of Solano Avenue and San Pablo Avenue rank a bicycle lane either first or second, suggesting that it is seen as a need throughout the corridor. This high ranking is due to the fact that drivers, pedestrians, and transit users also requested a bicycle lane, as was shown in Table 31, Table 36 and Table 37 also show that the areas with a higher percentage of respondents arriving by bicycle are not necessarily considered safer in terms of bicycling. While there is a significant correlation ($p \leq 0.05$) between perceptions of safety while bicycling and whether a traffic safety improvement is requested in the area, there is no significant correlation between perceptions of safety while bicycling and requesting a bicycle lane.

These same trends are less clear for pedestrians. There is no correlation between the percentage of people arriving by foot and whether improved pedestrian crossings were requested. Although there is a significant correlation ($p \leq 0.0001$) between perceptions of safety while walking and whether a traffic safety improvement is requested, it seems that those who report feeling safer are actually more likely to request an improvement than those who feel less safe. In addition, there is no significant correlation between perceptions of safety while walking and requesting improved pedestrian crossings. Overall, there is no significant difference between areas for whether people feel safe walking or bicycling along or across the street, or whether they requested design elements to improve traffic safety.

There is also no significant difference between areas regarding the likelihood of walking or bicycling more when one visits. However, there were significant differences between the areas when respondents were queried about their likelihoods of walking or bicycling more given more of certain design elements. The following elements were significantly related to area, suggesting that some areas might see a greater effect from the addition of these elements:

- Shade trees
- Sidewalk lighting
- Bicycle parking
- Bicycle lanes
- Outdoor seating areas

The findings about design improvements that could encourage more visits are somewhat less clear-cut. There is no significant correlation between requesting a design improvement to encourage more visits and how often someone visits. There is a marginally significant correlation ($p \leq 0.10$) between requesting design improvements to encourage more visits and arrival mode, in that drivers were the least likely and transit users and bicyclists were the most likely to request an improvement. There was also a marginally significant correlation ($p \leq 0.10$) between areas for whether a design improvement was requested.

Table 36. Traffic Safety & Visit Frequency Comparison - San Pablo Avenue Areas 1-4

	Fresno n=76	Brighton n=61	Solano n=63	Cedar n=66
Arrival Mode				
% Arrive on foot	33	39	37	26
% Arrive by bicycle	7	3	3	6
% Arrive by transit	5	18	22	14
Traffic Safety Components				
% somewhat or very safe walking across street	44	37	27	27
% somewhat or very safe biking across street	9	11	3	12
% somewhat or very safe walking along street	65	51	51	52
% somewhat or very safe biking along street	2	3	2	6
Top-ranked traffic safety improvement	Bicycle lane	Slow drivers/ improve behavior	Improve ped crossings	Bicycle lane
Second-ranked traffic safety improvement	Improve ped crossings	Bicycle lane	Slow drivers/ improve behavior	Sidewalk lighting
% not requesting traffic safety improvement	42	46	41	35
Average ped injuries	1	1	3	2
Average bike injuries	0	0	1	4
Visit Frequency Components				
% Visit usually or all the time	75	66	75	61
Top-ranked visit more improvement	Trees & plants	Ped amenities	Trees & plants	Trees & plants
Second-ranked visit more improvement	Better ped design	(tie) Cleaner area; Trees & plants	(tie) Shopping/dining options; beautification/ art; sidewalk lighting; cleaner area	Bike lane
% not requesting visit more improvement	48	57	52	36
Street tree coverage	Sporadic	Regular	Regular	Regular
Bike lane present	No	No	No	No
Average number of crosswalks/ intersections	2	2	3	4
Average median presence	All blocks	No blocks	No blocks	All blocks
Comparison with Policy Analysis				
Total number of elements covered by City's plans	23	12	12	31

Table 37. Traffic Safety & Visit Frequency Comparison - San Pablo Avenue Areas 5-8

	Haskell n=91	**57th n=45**	**45th n=58**	**Alcatraz n=64**
Arrival Mode				
% Arrive on foot	33	53	26	44
% Arrive by bike	8	13	19	19
% Arrive by transit	25	11	14	11
Traffic Safety Components				
% somewhat or very safe walking across street	42	21	26	34
% somewhat or very safe biking across street	15	4	15	13
% somewhat or very safe walking along street	70	41	49	60
% somewhat or very safe biking along street	8	4	11	15
Top-ranked traffic safety improvement	Bicycle lane	Improve ped crossings	Bicycle lane	Bicycle lane
Second-ranked traffic safety improvement	Slow drivers/ improve behavior	Bicycle lane	Improve ped crossings	Improve ped crossings
% not requesting traffic safety improvement	33	28	38	42
Average ped injuries	3	0	3	1
Average bike injuries	2	0	1	0
Visit Frequency Components				
% Visit usually or all the time	74	89	78	78
Top-ranked visit more improvement	More ped amenities	Shopping/ dining options	More ped amenities	Shopping/ dining options
Second-ranked visit more improvement	More sidewalk lighting	Art/ beautification	Shopping /dining	More trees & plants
% not requesting visit more improvement	38	29	33	41
Street tree coverage	Regular	Regular	Regular	Regular
Bike lane present	No	No	No	No
Average number of crosswalks/intersection	3	3	3	3
Average median presence	Half the blocks	All blocks	All blocks	All blocks
Comparison with Policy Analysis				
Total number of elements covered by City's plans	31	20	21	20

Santa Monica Boulevard
Table 38 and Table 9 display information about the Santa Monica Boulevard survey areas. There was a significant difference ($p \leq 0.01$) between areas regarding requesting improved pedestrian crossings for traffic safety. Seven of the nine survey areas ranked improved pedestrian crossings as one of the top two requested traffic safety improvements. This is likely related to the significant difference ($p \leq 0.01$) between areas in terms of safety walking along and across the street, as whether respondents requested improved pedestrian crossings was significantly related ($p \leq 0.05$) to how safe they felt walking along and across the street.. Requesting improved pedestrian crossings was not related to arrival mode, but was slightly significantly related ($p \leq 0.10$) to usual travel mode.

A bicycle lane to improve traffic safety was one of the top two requests for six of the nine survey areas. In this case, however, there was no significant difference between areas—even though perceptions of safety while bicycling did significantly differ ($p \leq 0.01$) between survey areas. Requests for bicycle lanes were significantly related ($p \leq 0.0001$) to arrival mode, usual mode, and perceptions of safety while bicycling along and across Santa Monica Boulevard.

For Santa Monica Boulevard, there was a significant difference ($p \leq 0.05$) between areas regarding the likelihood of walking or bicycling more when one visits. There were also significant differences between the areas when respondents were queried about their likelihoods of walking or bicycling more given more of certain design elements. The following elements were significantly related to area, suggesting that some areas might see a greater effect from the addition of these elements:

- Shade trees
- Sidewalk lighting
- Sidewalk landscaping
- Widened curb extensions
- Bicycle parking
- Outdoor seating areas

Regarding design improvements that could encourage more visits, there is a significant correlation ($p \leq 0.01$) to how often someone visits, which represents the fact that those who visit occasionally or fairly often have the most suggestions for increasing visit frequency. There is a slight significant correlation ($p \leq 0.05$) between requesting design improvements to encourage more visits and arrival mode, which seems to reflect that a greater percentage of public transit users requested an improvement than those of other groups.

Table 38. Traffic Safety & Visit Frequency Comparison – Santa Monica Boulevard Areas 1-4

	Cole n=72	**Fairfax n=43**	**Gardner n=63**	**Gower n=63**
Arrival Mode				
% Arrive on foot	35	16	32	35
% Arrive by bike	4	-	5	2
% Arrive by transit	22	72	29	24
Traffic Safety Components				
% somewhat or very safe walking across street	59	40	76	29
% somewhat or very safe biking across street	9	9	15	16
% somewhat or very safe walking along street	86	93	94	71
% somewhat or very safe biking along street	3	7	7	14
Top-ranked traffic safety improvement	(tie) Improve ped crossings	(tie) Improve ped crossings	Improve ped crossings	Road maintenance
Second-ranked traffic safety improvement	(tie) Slow drivers	(tie) Bike lane	Bike lane	Bike lane
% not requesting traffic safety improvement	46	42	33	49
Average ped injuries	8	14	1	1
Average bike injuries	4	1	0	3
Visit Frequency Components				
% Visit usually or all the time	68	81	68	71
Top-ranked visit more improvement	(tie) Bike lane	Cleaner street/area	Cleaner street/area	Road/ sidewalk maintenance
Second-ranked visit more improvement	(tie) Landscaping & parks	(tie) Increase/ improve parking; landscaping & parks	Landscaping & parks	Cleaner street/area
% not requesting visit more improvement	38	29	33	41
Street tree coverage	Sporadic	Regular	Regular	Sporadic
Bike lane present	No	No	No	No
Average number of crosswalks/intersection	4	3	2	1
Average median presence	No blocks	All blocks	Half the blocks	Half the blocks
Comparison with Policy Analysis				
Total number of elements covered by City's plans	15	30	30	15

Table 39. Traffic Safety & Visit Frequency Comparison – Santa Monica Boulevard Areas 5-9

	Harper n=89	**La Brea n=74**	**San Vicente n=63**	**Van Ness n=55**	**Western n=45**
Arrival Mode					
% Arrive on foot	58	26	29	35	29
% Arrive by bike	1	3	6	2	-
% Arrive by transit	11	31	40	55	53
Traffic Safety Components					
% somewhat or very safe walking across street	40	38	71	40	56
% somewhat or very safe biking across street	16	13	13	19	16
% somewhat or very safe walking along street	81	82	98	69	80
% somewhat or very safe biking along street	9	8	8	11	9
Top-ranked traffic safety improvement	Improve ped crossings	(tie) Bike lane	Bike lane	Improve ped crossings	Police/ security
Second-ranked traffic safety improvement	Bike lane	(tie) More/ wider lanes	Improve ped crossings	Road maintenance	(tie) Improve ped crossings; road maint.
% not requesting traffic safety improvement	37	38	57	46	56
Average ped injuries	2	6	7	5	12
Average bike injuries	1	2	2	3	4
Visit Frequency Components					
% Visit usually or all the time	80	58	74	80	81
Top-ranked visit more improvement	Landscaping & parks	Cleaner street/area	(tie) Bike lanes/ parking	Cleaner street/area	Cleaner street/area
Second-ranked visit more improvement	Entertainment options	More/ better sidewalk lighting	(tie) Landscaping & parks	Public art/beautification/advertising	Police/ security
% not requesting visit more improvement	51	43	79	42	49
Street tree coverage	Regular	Regular	Regular	Sporadic	Sporadic
Bike lane present	No	No	Yes	No	No
Average number of crosswalks/intersection	2	2	2	2	2
Average median presence	No blocks	No blocks	All blocks	Half the blocks	No blocks
Comparison with Policy Analysis					
Total # of elements covered by City's plans	30	30	30	15	15

Limitations

Some limitations of the survey methodology should be noted. First, drivers and transit users were intercepted on foot instead of in their mode of arrival. This means that they may have been reflecting their preferences as a pedestrian more than their preferences as a driver or transit user. Likewise, pedestrians and bicyclists may have different preferences as drivers and transit users than were reflected in their answers. There is no way to measure those possible differences from this data. In addition, respondents were all users who had stopped along the corridor for one reason or another. Transit users and drivers passing through the corridor without stopping were not intercepted and may have different preferences from those intercepted.

A second limitation to the survey is that the open-response questions did not give users a choice set from which to select responses. While this has the benefit of not leading the respondent to a certain answer, the disadvantage is that all users may not have the same knowledge or ideas about what street improvements are possible. A third limitation is that some items that could have been named to improve perceived traffic safety or encourage more visits, such as landscaping, may not have been named in other locations because they already existed along the area of San Pablo Avenue or Santa Monica Boulevard where the survey response was captured; in a different circumstance, different answers may have been given. A comparison of the number of pedestrian and bicyclist elements covered by the City's plans and the percentage of percentage of respondents who felt safe or somewhat safe walking along the corridors appears to be positively related, indicating that policies pertaining to pedestrian and bicyclist facilities did influence the corridor design and thus the users responses.

Finally, several questions resulted in a percentage of respondents answering "nothing"—for example, that "nothing" could improve perceived traffic safety. This "nothing" is difficult to interpret, as it could mean that nothing could make it better because it is already great—or that nothing could possibly help such a terrible situation. Regardless of the possible interpretation, however, it is notable that only 14% of bicyclists along San Pablo Avenue and 20% of bicyclists along Santa Monica Boulevard did not request any improvements for traffic safety, suggesting that there is a lot that could improve perceived bicycling traffic safety along the roadway. In fact, only one-third of all San Pablo Avenue respondents and 45% of Santa Monica Boulevard respondents had no suggestions for improving traffic safety, suggesting that this is an important subject area to be addressed in the future.

Discussion

The original intent of the survey was to provide a basis for testing the pedestrian and bicyclist mobility performance measures proposed in Chapter III of this report. The findings accomplish this goal, as explained in Section E. However, the survey has also informed the research about how the potential impacts of various design features varies by how one travels to and how often one visits the area by revealing how preferences vary among users of different modes.

The various analyses also revealed notable findings about strategies for corridor design. The most salient findings from the survey analysis included an alignment between all user groups—pedestrians, drivers, bicyclists, and transit users—about what would increase their perceptions of traffic safety along San Pablo Avenue and Santa Monica Boulevard. For San Pablo Avenue, all user groups listed the same top five suggestions, which included the installation of a bicycle lane (#1 for all groups except transit users), improved pedestrian crossings (e.g., flashing lights, longer crossing time, and reduced wait time to cross), slowed traffic and improved driver behavior, more traffic lights, and increased street lighting. There was also alignment for the Santa Monica Boulevard respondents, with pedestrians, drivers, and public transit users all requesting improved pedestrian crossings and bicycle lanes or improvements as the top two responses. Santa Monica Boulevard bicyclists requested bicycle lanes or improvements first, and improved pedestrian crossings sixth.

The alignment of these preferences suggests that all user groups may benefit from treatments traditionally considered mode-specific, such as bicycle lanes and improved pedestrian crossings. These design elements not only benefit drivers and transit users if and when they choose to bicycle and walk, but may also provide increased predictability while driving. While slowing traffic is often seen as detrimental to vehicular throughput, if the speed is kept constant so that drivers experience less stopping and starting at lights, the throughput may not be adversely affected. In addition, slowed traffic clearly benefits all users by improving perceived and actual traffic safety when they walk—even if just to cross the street after parking one's car or getting off a bus. These findings indicate that Caltrans may have the opportunity to focus its investment in a few key areas and potentially reap large dividends in terms of increased mobility and perceived safety for all users.

There was also alignment among all users regarding the types of design elements that would encourage them to visit the area more often. All San Pablo Avenue user groups ranked trees and landscaping in their top five choices, and three of the four user groups requested more street lighting, public art/beautification, and a cleaner area/more trash receptacles in their top five. For Santa Monica Boulevard, there was similar alignment, with all groups requesting a cleaner and better-maintained roadway and sidewalk. Three of the four groups also requested more landscaping and park areas along the corridor. While this category had a bit more diversity among group preferences for both corridors, for example, bicyclists specifically requested a bicycle lane and transit users specifically requested increased seating, the alignment of many of the preferences present yet another opportunity to create a more desirable street setting by focusing efforts on a few design elements.

The survey analysis also suggested that economic vitality is created by the complex interaction of many elements. It was clear from the survey responses that shopping and dining were the activities that respondents did the most and liked best about San Pablo Avenue and Santa Monica Boulevard. Conversely, perceptions of crime, dirtiness, and high amounts of auto traffic were the things that respondents liked least about the two areas. Thus, the role of street design in encouraging vitality is nuanced: street design seems to be the mortar that can hold crucial elements of economic vitality together, rather than the building blocks of economic vitality. For example, design elements such as landscaping and street trees can encourage users to visit an area more often, but without the shops and restaurants to attract the users, these street design elements will be limited in their attraction. Similarly, street and sidewalk lighting can increase perceptions of personal security, but without thriving businesses to produce “eyes on the street” and accessible police services, street and sidewalk lights will be limited in their efficacy.

Future research could survey people who could use the corridor but do not (e.g. residents in the surrounding neighborhoods) to identify the leading improvements that could be made to encourage visits to the corridor.

Conclusions & Recommendations

The goal of developing and testing performance measure 1.2 (the percentage of Californians who feel safe using non-motorized modes on urban arterials) was accomplished by assessing perceptions of safety by: (1) demonstrating there is variation in perceptions of safety by intercept location; and (2) providing a baseline measure that can be used for a benchmark with the deterioration or improvement of features. The findings also indicate that at these study sites many pedestrians do not feel safe crossing the street and of those who bicycle, many do not feel safe crossing the street. The research also confirmed that visitors to these corridors want features and facilities supportive of active transportation. This finding was consistent in both study areas. Specifically, all users requested:

- Bicycle lanes
- Improved pedestrian crossings
- Improved driver behavior
- Street lighting

In addition, elements associated with pleasure and comfort can encourage more frequent visits to the corridor. Specific requests included:

- Trees
- Landscaping
- Street lighting
- Public art and beautification
- Cleanliness

Caltrans may focus its efforts on improving design elements that benefit all users by increasing perceptions of traffic safety on the corridor and encouraging users to visit the corridor more often, thus improving economic vitality. The results presented can serve as a baseline for continued monitoring of efforts focused on traffic safety, mobility, and economic vitality. Future research should also consider objective measures of economic vitality and the perceptions and preferences of those who live in the neighborhoods surrounding the corridor and roadway users who travel through but do not visit the corridor.

E. Performance Measures Analysis

This section describes the analysis and corresponding results of testing the proposed performance measures for validity and ease of application. Validity was determined differently for the various performance measures. For measures that examine relationships between design elements and safety (e.g., measures 1.3a-d), validity was assessed by whether or not the measurement proved significantly related to pedestrian or driver safety in the crash models. For measures that examine quantities of incidents (e.g., measures 1.1a-b and 1.4a-b) and concepts, validity was determined by whether or not that quantity made sense as the selected measurement of the subject area. Statistically significant results from the pedestrian and bicyclist intercept survey were also used to validate some of the proposed measures. Ease of application was determined after evaluating the amount of time and effort the task took the research team to complete.

It should be noted that the validity of various measures cannot be compared without the context of the data that needs to be measured. For example, multivariate regression models tend to look at the impact of various independent, or predictor, variables on a dependent variable. This type of data testing works well when there is enough information (usually, a sample of at least 100 observations) about all of the independent variables available to test their effects on the dependent variable without a high risk of bias. In this case, a regression model was used to test pedestrian, bicyclist and driver safety, as there was a great deal of information about the independent variables and there were several hundred observations of pedestrian, bicyclist, and driver crashes assigned to the 250 intersections of the two corridors.

A regression model could not be constructed to test relationships between some of the other variables, such as that between perceived safety and roadside design features, because surveys were conducted in only eight locations along the San Pablo Avenue corridor and nine locations along the Santa Monica Boulevard corridor. This small sample size (17 locations) means that there is not enough variability in the roadside design features to ensure that the results would not be biased in some serious way. In this case, statistical significance was examined through a test known as the Kruskal-Wallis test, which compares how various groups (e.g., bicyclists, pedestrians, drivers, transit users) ranked or chose different variables. If there was a notable difference in the way these groups chose or ranked the variables, the test was deemed significant; otherwise, it was not.

Findings

This section elaborates on the findings regarding the validity and ease of application of the pedestrian safety-related performance measures proposed in Phase II of the project.

CGS Performance Measures 1.1a - 1.1d: Rates of Injury and Fatality

The guiding objective for performance measures 1.1a and 1.1b was modeled after Caltrans' objective for vehicular safety:

By 20XX, reduce the annual pedestrian and bicycle injury and fatality *rates to the following levels, and continuously reduce annually thereafter with the goal of having the lowest rates in the nation.

- Pedestrian fatality rate target: X per X walking trips.
- Pedestrian injury rate target: X per X walking trips.
- Bicyclist fatality rate target: X per X bicycling trips.
- Bicyclist injury rate target: X per X bicycling trips.

*Rates not set due to the need to establish a baseline number.

It is well-established that accounting for exposure is the most accurate way to assess pedestrian risk (Jacobsen 2003; Raford and Ragland 2005). Measuring the number of crashes without accounting for exposure could give the impression that a reduction in crashes is due to safer behavior on the roadway, when in reality, the number of pedestrians could be declining. Similarly, measuring only overall numbers may give the impression that an intersection with zero crashes is very safe, when in reality it could be so unsafe that no one dare cross it. Both of these scenarios reinforce the need to measure incidence rate, rather than a cumulative incident number, to accurately gauge pedestrian risk. However, gathering pedestrian volumes is a task that has not been historically performed by State transportation agencies, so pedestrian safety may or may not be measured through other ways. For example, Caltrans currently measures combined traveler safety: pedestrian and bicycle fatalities are combined with vehicle fatalities, and then divided by 100 million VMT in order to gauge the rate of collisions on state highways (including those that run through cities as urban arterials) (California DOT 2007). Whether there were 10 or 1,000 pedestrian fatalities, the actual picture of pedestrian safety would be unclear due to having been combined with other modes.

Proposed CGS performance measures 1.1a (*number of pedestrian fatalities per x walking trips*) and 1.1b *(number of pedestrian injuries per x walking trips*) have the potential to provide a much more specific and accurate picture of the risk pedestrians face on the roadway. To "test" these measures, the overall number of pedestrian injuries and fatalities were compared with the rate of injuries and fatalities per intersection crossings (a proxy for pedestrian trips). As shown in Figure 50 and Figure 51, intersections with the same number of pedestrian incidents can have dramatically different crash rates. In this case, a pedestrian crossing the intersection with the highest rate has almost five times as much risk of being hit as a pedestrian crossing the intersection with the lowest rate. This demonstrates that a reliance on total numbers could wrongly suggest that certain intersections are safer or more dangerous than they actually are. For this dataset, fatalities and injuries were combined due to a low number of fatalities. Likewise, if Caltrans were to measure individual corridors in the future, performance measure 1.1a may be modified to measure both fatalities and injuries. However, in the case of a system-wide evaluation, it is recommended that separate performance measures be evaluated for pedestrian injuries and fatalities to fully understand the level of each type of risk to pedestrians.

Figure 50. Rate of Pedestrian Fatalities & Injuries (per weekly pedestrian crossing) at San Pablo Avenue Intersections With Identical Fatality and Injury Counts, 1997-2007

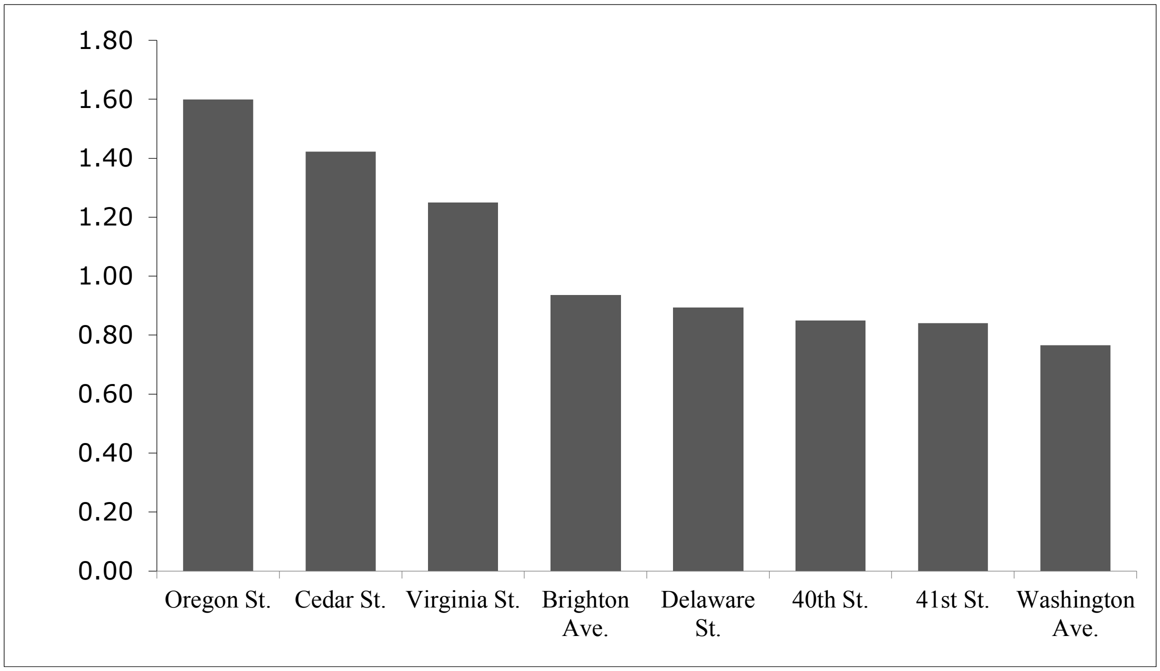
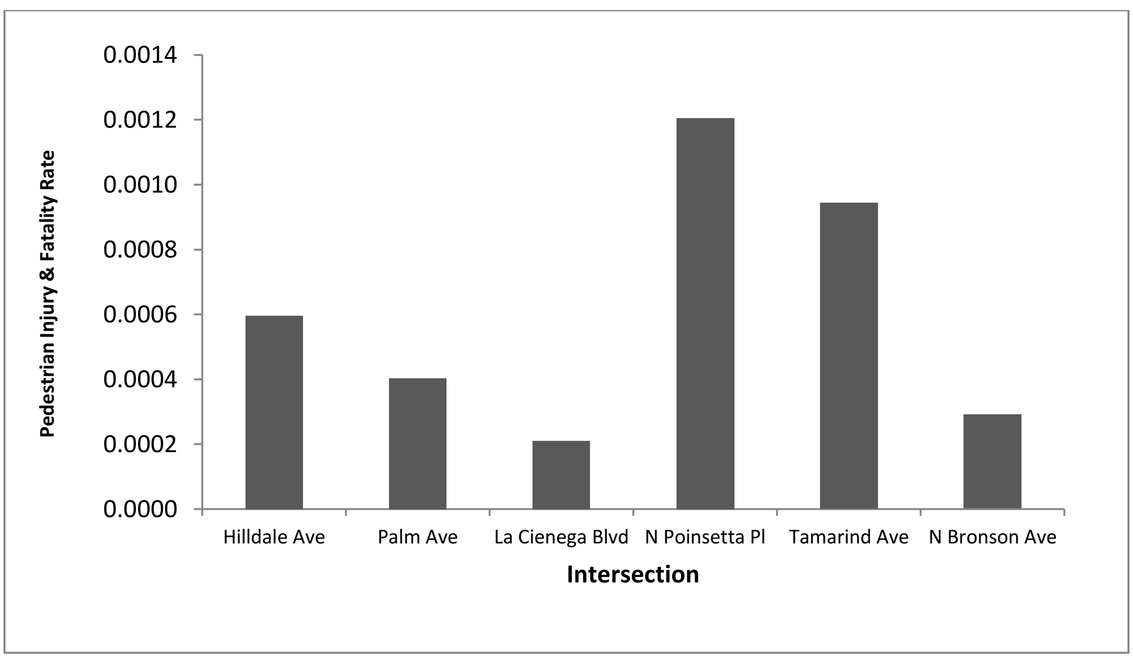
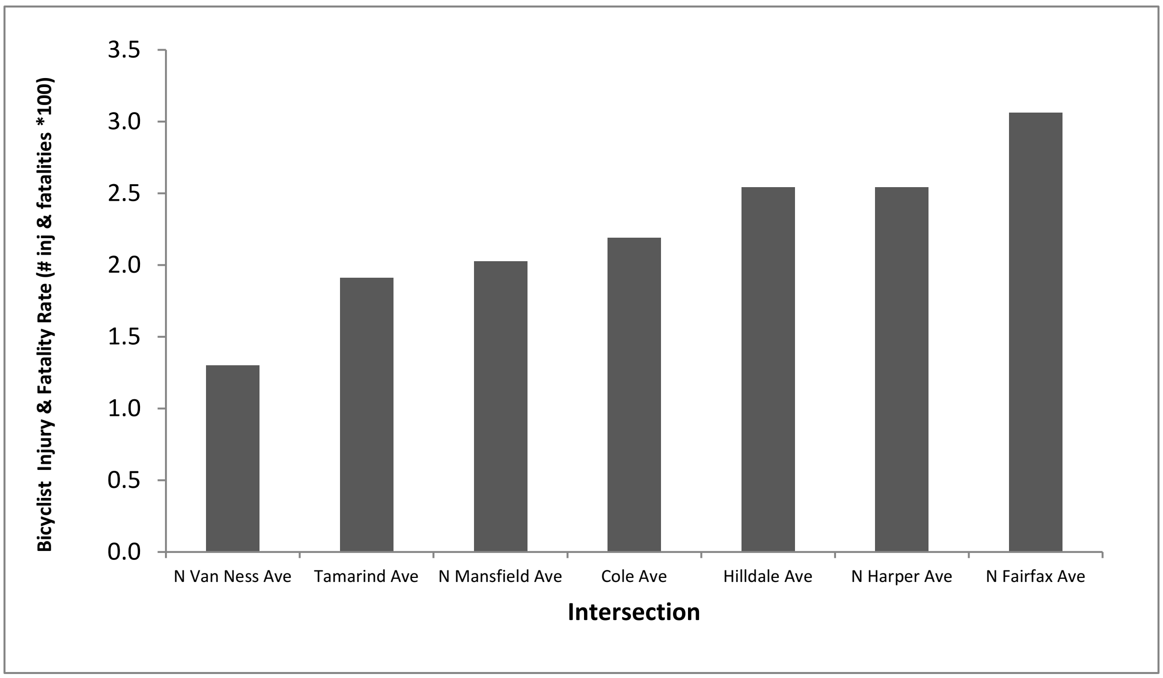


Figure 51. Rate of Pedestrian Fatalities & Injuries (per weekly crossings) at Santa Monica Boulevard Intersections with Identical Fatality and Injury Counts, 2001- 2010



Proposed CGS performance measures 1.1c (*number of bicyclist fatalities per x bicycling trips)* and 1.1d *(number of bicyclist injuries per x bicycle trips*) have the potential to provide a much more specific and accurate picture of the risk bicyclists face on the roadway. Similar to the pedestrian injury and fatality rates, to “test” these measures, the overall number of bicyclist injuries and fatalities were compared with the rate of injuries and fatalities per number of bicycle intersection crossings (a proxy for bicycle trips). **Error! Reference source not found.** shows the bicyclist injury and fatality rate per bicycle intersection crossing for several intersections with the same fatality and injury counts for bicyclists along Santa Monica Boulevard. As Figure 52 shows, intersections with the same number of bicyclist injuries and fatalities can have different rates. The intersection with the highest rate of bicyclist injuries and fatalities per bicyclist volume had a rate almost two times that of the lowest rate for intersections with a total of three bicyclist injuries or fatalities during the ten-year period.

Figure 52. Rate of Bicyclist Injuries & Fatalities at Santa Monica Boulevard Intersections with Identical Fatality and Injury Counts, 2001- 2010



<u>*PM 1.1a, 1.1b, 1.1c, & 1.1d Conclusions*</u>

Validity: The proposed performance measures evaluate the intended quantity, and are the most accurate measures for the subject area.

Ease of Application: The research team concluded that the ease of application for this performance measure is reasonably high. The data needed for these performance measures includes: 1) the number of incidents in the system, and 2) the corresponding number of pedestrian trips (or a proxy, such as the number of pedestrian crossings per intersection). The challenges to obtaining this data are explained below.

1. The number of incidents on Caltrans’ roadways can be obtained through the CHP SWITRS database. The data must be filtered for pedestrian crashes and road type, and then separated by year and injury type before it can be summed; however, all of these functions can be conducted using readily available desktop software.

2. Pedestrian and bicyclist exposure data is difficult and expensive to gather, and is not currently routinely gathered by the State. However, Caltrans may work with local jurisdictions to use their counts (and influence future count locations). Additional efforts by other organizations may also help Caltrans gather this data. For example, UC Berkeley SafeTREC (Schneider) has developed a method to collect pedestrian and bicycle counts in a standardized way across the state. Also, ITE and Alta Planning + Design have been working since 2007 on a joint effort to encourage consistent, annual pedestrian and bicycle counts throughout California, which may be usable for these measures. Finally, the SHSP has identified a new objective to "develop a plan to collect pedestrian infrastructure and pedestrian volume data to be incorporated in the future into the Caltrans Traffic Surveillance and Analysis System – Transportation Systems Network (TASAS-TSN)."
3. Pedestrian and bicyclist volume data can be generated from models. This project is currently testing the validity of using pedestrian count models in the place of on-the-ground pedestrian counts. Count models use geographic information and data from the U.S. Census to give estimates of pedestrian volumes that can be used as a proxy for actual exposure, facilitating the application of this performance measure. Additional bicycle counts are needed to validate a bicyclist model.

CGS Performance Measure 1.2: Perceptions of Safety

The guiding objective for performance measure 1.2 is:
By 20XX, establish a baseline of the percentage of Californians who feel safe using non-motorized modes on urban arterials. Annually increase this percentage with the goal of having the highest reported percentage in the nation.

The associated performance measure gauges the *Percentage of Californians who feel safe using non-motorized modes on urban arterials.* Table 40 and Table 41 use data from this project to demonstrate the value of this measure. There is a marked difference between the percentage of people who report feeling safe walking and those who feel safe bicycling on San Pablo Avenue and Santa Monica Boulevard. Without measuring these percentages, Caltrans will have no way of knowing whether these perceptions of safety are increasing or decreasing, and will not be able to fully estimate the benefits of its investments in pedestrian and bicycle infrastructure.

Table 40. Survey Respondents' Perceptions of Safety Walking and Bicycling along San Pablo Avenue

	Very safe	**Somewhat safe**	**Neutral**	**Somewhat unsafe**	**Very unsafe**	**N/A or Don't know**
When walking on the sidewalk	57%	25%	10%	4%	2%	2%
When walking across the street	28%	20%	25%	15%	10%	2%
When bicycling on the roadway	4%	5%	9%	12%	15%	**53%**
When bicycling across the street	7%	8%	12%	10%	8%	**52%**

Table 41. Survey Respondents' Perceptions of Safety Walking and Bicycling along Santa Monica Boulevard

	Very safe	**Somewh at safe**	**Neutral**	**Somewhat unsafe**	**Very unsafe**	**N/A or Don't know**
When walking on the sidewalk	46%	37%	11%	2%	1%	3%
When walking across the street	21%	29%	27%	14%	6%	3%
When bicycling on the roadway	4%	5%	16%	19%	17%	**39%**
When bicycling across the street	7%	7%	22%	16%	10%	**38%**

<u>*PM 1.2 Conclusions*</u>
Validity: The proposed performance measure evaluates the intended quantity, and is the most accurate measure for the subject area.
Ease of Application: The research team concluded that the ease of application for this performance measure is reasonably high. Although this subject area is not something Caltrans has monitored in the past, it is something that can be asked on the annual External Customer Survey without adding substantial analysis or data gathering burden.

CGS Performance Measures 1.3a - 1.3d: Complete Streets
The guiding objective for performance measures 1.3a – 1.3d is:
By 20XX, all Caltrans urban arterial projects (new expenditures) are designed to increase safety for non-motorized users in accordance with Complete Streets principles. Ensure that each new and retrofit urban arterial project incorporates Complete Streets principles annually thereafter, with the goal of thorough Complete Streets influence over time.

The core of this objective, "accordance with Complete Streets principles," refers to the Complete Streets goal of providing "safe mobility for all users" (Caltrans 2008). While "safe mobility" may be simple enough to imagine, developing a succinct, practical performance measure for the concept has proven more difficult. Based on research showing the effect of vehicle speed and various street design treatments on pedestrian safety, the research team developed four performance measures to capture the essence of the objective (Godfrey and Mazzella 2000; King 2000; Huang and Cynecki 2001; Knoblauch, Nitzburg et al. 2001; Eccles, Tao et al. 2004; Rousseau, Miller Tucker et al. 2004; Abdelghany 2005; Dumbaugh 2005; Zegeer, Stewart et al. 2005; Fitzpatrick, Turner et al. 2006; Ragland and Mitman 2007).

Measures, 1.3a and b, pertains to the *percent of signalized intersections along urban arterials with marked crosswalks and one or more of the following: countdown signals, leading pedestrian intervals, bulb-outs, or pedestrian refuge islands; and percent of unsignalized 4-way (multilane) intersections along urban arterials with marked crosswalks and one or more of the following: HAWK signal, yield to pedestrian signage, user-activated overhead warning lights.*

A High-intensity Activated crosswalk signal (HAWK signal) allows pedestrians to trigger a modified signal head to change the traffic signal from no light, to yellow, to red in order to get drivers to legally stop. HAWK signals are not currently permitted in California, so the effectiveness of this part of the measure could not be tested. In addition, there are no user-activated overhead warning lights or leading pedestrian intervals along either of the study corridors. San Pablo Avenue did not have any bulb-outs, however, Santa Monica Boulevard had several. Only 10% of San Pablo Avenue intersections have a pedestrian countdown signal or yield to pedestrian signage. Forty-nine percent of Santa Monica Boulevard intersections have one or more pedestrian feature—15% of all intersections are unsignalized with pedestrian features and 34% of all intersections are signalized with pedestrian features. Counter to expectation, this measure demonstrated a positive association with pedestrian injury and fatality when tested on Santa Monica Boulevard. It is possible that these countermeasures are installed where there is a crash history or particularly high volumes that remain problematic. Perhaps at these locations with additional pedestrian features, roadway users behave differently (e.g., more violations due to increased sense of safety or additional restrictions).

PM 1.3a and b Conclusions
Validity: This performance measure needs further validation before it can be recommended.
Ease of Application: Given that the measure may be modified significantly from its current state, a formal evaluation of the ease of application is not possible at this time. It is likely that the measure will require a large amount of data collection to isolate the effect of specific pedestrian features, which will then be able to be maintained with minimal effort. However, given the high resolution and widespread availability of aerial images from sources like Google Street view™, the data collection will not necessarily be too taxing to obtain.

The third measure for this objective pertains to *the percentage of urban arterial intersections with one or more of the following improvements geared toward bicyclists: bicycle box, painted bicycle lane through the intersection, bicycle signal, functioning bicycle loop detectors, bicycle left turn lane*. Because San Pablo Avenue had none of these features, the performance measure was unable to be tested on San Pablo Avenue. The performance measure was tested on Santa Monica Boulevard but was not found to have a significant association with the bicyclist injury and fatality rate in either the bivariate analysis or the final model. However, bicycle features were only present on a small portion of the Santa Monica Boulevard corridor. The performance measure should be further tested on a corridor with more abundant features.

PM 1.3c Conclusions
Validity: This performance measure needs further testing before it can be recommended for implementation.
Ease of Application: Given that the measure may be modified significantly from its current state, a formal evaluation of the ease of application is not possible at this time. It is likely that the measure will require a large amount of data collection in the beginning, which will then be able to be maintained with minimal effort. However, given the high resolution and widespread availability of aerial images from sources like Google Street view™, the data collection will not necessarily be too taxing to obtain.

The fourth measure, *percentage of urban arterials that do not have a posted speed greater than 25 mph*, is based on research showing the non-linear relationship between risk of injury or death and vehicle speed (Leaf and Preusser 1999). This research indicates that pedestrians have a less than 60% chance of surviving with a non-incapacitating injury when hit by a car traveling at 30 mph, and the risk increases non-linearly as speeds rise. Unfortunately for both the research and pedestrians along San Pablo Avenue and Santa Monica Boulevard, no sections of the corridor were applicable for this performance measure, so it could not be tested. This is due to a posted speed limit of between 30 and 35 mph throughout the corridor, which influenced the average speed and the 85th percentile speed on both corridors. While it may seem that a measure seeking speeds around 25 mph does not fit a corridor with a 30 mph speed limit, it is precisely the danger to pedestrians from the average and 85th percentile speeds that necessitates some kind of acknowledgement of the risk inherent in the corridor's design speed.

PM 1.3d Conclusions
Validity: This performance measure must be evaluated on a separate corridor before it can be recommended.
Ease of Application: The data needed for this performance measure is available through engineering documents justifying changes to Caltrans corridors, thus enabling implementation of the measure.

CGS Performance Measures 1.4a - b: Hotspots
The final performance measure for pedestrian and bicyclist safety is guided by the objective:

By 20XX, annually reduce the number of pedestrian and bicycle hotspots (high collision concentrations) on urban arterials.

PM 1.4a gauges the *overall number of pedestrian collision hotspots on urban arterials* as a way to ensure that high collision locations are specifically examined even when the location may have a lower rate of pedestrian collisions due to exposure. The same is true for PM 1.4b and bicyclists. This mirrors Caltrans' practice with motorized vehicles. This concept was "tested" for pedestrians through evaluation of incidence rate versus overall number of incidents, similar to PM 1.1a and 1.1b. In the San Pablo Avenue dataset, for example, the intersection with the 9th highest rate had the 3rd highest number of collisions. While the rate suggests that it should be a lower priority, it still merits attention given the total number of crashes.

PM 1.4a & 1.4 b Conclusions
Validity: The proposed performance measure evaluates the intended quantity and is the most appropriate measure for the subject area.
Ease of Application: The data needed for this performance measure is the SWITRS crash data—the same data needed for proposed performance measures 1.1a-b. The research team thus concludes that the ease of application for this performance measure is reasonably high.

CGS Performance Measures 2.1a - 2.1f: Pedestrian and Bicyclist Mobility
The guiding objective for these performance measures is:
By 20XX, all Caltrans urban arterial projects (new expenditures) are designed to increase mobility for non-motorized users in accordance with Complete Streets principles, aiming to link up to a larger community bicycle and pedestrian network where possible. Ensure that each new and retrofit urban arterial project incorporates Complete Streets principles annually thereafter, with the goal of thorough Complete Streets influence over time.

The first measure under this objective is PM 2.1a, *on urban arterials, ratio of sidewalk mileage to roadway mileage, bi-directionally*. Data from the pedestrian and bicyclist intercept surveys (Table 40 and Table 41) show that over 90% of respondents felt at least "neutral" or "somewhat safe" while walking on the sidewalk along San Pablo Avenue and Santa Monica Boulevard. These findings suggest that this measure is on the right track for gauging the mobility of pedestrians along a corridor. However, since San Pablo Avenue and Santa Monica Boulevard have nearly 100% sidewalk coverage, this measure would be strengthened through further evaluation on a corridor that is lacking sidewalk coverage in places. Ideally, this comparison would come through a prospective design where data can be gathered before and after before sidewalks are installed.

PM 2.1a Conclusions
Validity: This performance measure seems valid, but should be further tested on a comparison corridor before it can be fully recommended.
Ease of Application: Given the strong research on which this measure was based, it is unlikely that it will change significantly from its current state. Therefore, a tentative evaluation of the ease of application may be appropriate. The data needed for this performance measure will have to be manually gathered through audits of the facilities themselves or the latest pertinent design plans. We estimate that this measure will be data-intensive in the beginning, as a database is set up to catalogue the presence of sidewalks on appropriate state facilities. However, ease of maintenance should be relatively high once the database has been set up, and analysis should follow easily from that point.

The second measure under this objective is PM 2.1b, *on urban arterials, ratio of Class II bicycle facility mileage to roadway mileage, bi-directionally*. This performance measure was tested on the Santa Monica Boulevard portion of the corridor that had bicycle lanes. As stated in the modeling section, the presence of a bicycle facility was not significant in the crash model, although this should be interpreted with caution since the bicycle lane along Santa Monica Boulevard was only a few blocks long, and therefore could not affect the majority of the corridor Only one survey location (San Vicente) was located in an area with a bicycle lane, but the responses at this location were not significantly different from other locations: respondents all along the corridor requested bicycle lanes.

Data from the pedestrian and bicyclist intercept survey shows that people feel unsafe bicycling along San Pablo Avenue and Santa Monica Boulevard under current conditions (Table 40 and Table 41). In addition, 63% of San Pablo Avenue survey respondents and 67% of Santa Monica Boulevard respondents who bicycled on the day of the survey named a bicycle lane as their top suggested traffic safety improvement, as shown in Table 42 and Table 43. Thus, while this measure could be strengthened through a comparative evaluation with more data from a corridor with bicycle lanes, the available data suggest that this measure is valid.

Table 42. San Pablo Avenue Bicyclists' Top Suggested Traffic Safety Improvements

Improvement	Rank (#)	% of Responses
Bicycle Lane	1	63%
Street lights	2	10%
Improve Pedestrian Crossings	3	8%
Slow traffic/Improve Driver Behavior	4	6%
Traffic signals	5	4%
Landscaping	5	4%
Nothing		14%

Table 43. Santa Monica Boulevard Bicyclists' Top Suggested Traffic Safety Improvements

Improvement	Rank (#)	% of Responses
Bicycle lane/improvements	1	67%
More/wider lanes	2	20%
Maintain/clean streets	3	13%
Public transit improvements	3	13%
Nothing		13%

PM 2.1b Conclusions

Validity: This performance measure seems valid, but would be strengthened through further testing on a comparison corridor before being fully recommended.

Ease of Application: Given the strong research on which this measure was based, it is unlikely that it will change significantly from its current state. Therefore, a tentative evaluation of the ease of application may be appropriate. The data needed for this performance measure will have to be manually gathered through audits of the facilities themselves or the latest pertinent design plans. We estimate that this measure will be data-intensive in the beginning, as a database is set up to catalogue the presence of Class II bicycle lanes on appropriate state facilities. However, ease of maintenance should be relatively high once the database has been set up, and analysis should follow easily from that point.

The third measure under this objective is PM 2.1c, *on urban arterials, percentage of intersections that are ADA compliant*. Caltrans is required by the Americans with Disabilities Act to retrofit its roadways to be ADA-compliant, so the appropriateness of this measure is not in question. In addition, we were able to measure this through the facility analysis, in which we found that the amount of compliance was relatively high overall, but much higher in some places along the corridor than others.

PM 2.1c Conclusions
Validity: This performance measure is valid and appropriate for the subject area.
Ease of Application: The data needed for this performance measure will have to be manually gathered through audits of the facilities themselves or the latest pertinent design plans. We estimate that this will be data-intensive at first, as a database is set up to catalogue the presence of various ADA-compliant intersection treatments on appropriate state facilities. However, ease of maintenance should be relatively high once the database has been set up, and analysis should follow easily from that point.

The fourth measure under this objective is PM 2.1d, *percentage of urban arterial projects designed as Complete Streets*. This measure exists to ensure accountability for the continued design of relevant California roadways as complete streets. There was no aspect of this measure that could be tested for validity in the traditional sense, although the validity of creating a policy and enacting measures of accountability for the policy has long been recognized as a way to ensure that the policy is actually followed. Thus, we deem this measure to be valid and appropriate for the intended purpose.

PM 2.1d Conclusions
Validity: This performance measure is valid and appropriate for the subject area at this time.
Ease of Application: The data needed for this performance measure will have to be manually gathered through audits of new design plans. We estimate that this will create some extra work in the beginning, as an initial database is established, but that, given the overall number of applicable plans, it is not likely to be too data-intensive. The ease of maintenance should be high once the database has been set up, and analysis should follow easily from that point.

The fifth and sixth measures under this objective are PM 2.1e, *number of pedestrian trips on urban arterials,* and 2.1f*, number of bicycle trips on urban arterials*. The aim of these measures is to compliment PM 1.2, perceptions of safety, to ensure that perceptions of safety are not increasing along State arterials simply because fewer people are walking and bicycling (creating a potentially biased sample).

PM 2.1e & 2.1f Conclusions
Validity: The proposed performance measures evaluate the intended quantity, and are the most accurate measure for the subject area.
Ease of Application: The research team concluded that the ease of application for this performance measure is medium, as it requires the same data needed for performance measures 1.1 a-d. The same challenges and opportunities explained in PM 1.1a-d exist for these measures.

CGS Performance Measures 4.1a - 4.1b: Environmental Stewardship
The guiding objective for these performance measures is:
By 20XX, all new and retrofit Caltrans urban arterial projects (new expenditures) are designed to minimize negative environmental impacts in accordance with Green Streets principles. Ensure that each new and retrofit urban arterial project incorporates Green Streets principles annually thereafter, with the goal of thorough Green Streets influence on all urban arterials over time.

This objective aims to expand Caltrans' current definition of environmental stewardship to be more inclusive of the environmental impacts of road design and vehicular travel. Thus, the measures under this objective focus on "green street" principles of storm water infiltration and air pollution interception as ways to reduce the negative impacts of roadway design and travel.

The first measure under this objective is PM 4.1a, *ratio of pervious to impervious surfaces on Caltrans urban arterials, including medians, buffer strips, and tree wells*. This measure aims to understand the water infiltration potential of State roadways, and to encourage design with greater infiltration potential over time. The second measure under this objective is PM 4.1b, *percent of urban arterial lane mileage with tree canopy coverage*. While street trees have numerous walkability benefits, this measure aims to understand the air pollution interception potential of State roadways, and to encourage design with greater air pollution interception potential in the future.

PM 4.1a & 4.1b Conclusions
Validity: These performance measures are valid and appropriate for the subject area, although more research should be conducted to set the appropriate target.
Ease of Application: The data needed for this performance measure will have to be manually gathered through audits of the facilities themselves or the latest pertinent design plans. It is possible that this process could be eased through choosing a random sample of street segments to represent the system. We estimate that this measure will be data-intensive in the beginning, as a database is set up to catalogue the ratio of pervious to impervious surfaces and the presence of street trees on appropriate state facilities (although this would be significantly eased if the sample method is used). Ease of maintenance should be medium high once the database has been set up, although updating of street trees may need a bit more effort. Analysis should follow easily once the database has been populated.

CGS Performance Measures 4.2a – 4.2b: Non-Motorized Facility Quality
The guiding objective for these performance measures is:
By 20XX, all Caltrans urban arterials meet a baseline for non-motorized facility quality.

This objective also aims to expand the definition of environmental stewardship, this time to ensure that non-motorized modes have equal opportunity to travel along State arterials with motorized vehicles. The measures under this objective are PM 4.2a, *percent of urban arterial sidewalk mileage in fair or better condition*, and PM 4.2b, *percent of urban arterial bicycle lane mileage in fair or better condition*. There were no specific tests for these measures, as they simply measure the presence of facilities (and corresponding opportunities for non-motorized travel).

PM 4.2a & 4.2b Conclusions
Validity: These performance measures are valid and appropriate for the subject area.
Ease of Application: The data needed for this performance measure will have to be manually gathered through audits of the facilities themselves or the latest pertinent design plans. We estimate that this measure will be data-intensive in the beginning, as a database is set up to catalogue the ratio of sidewalks and bicycle lanes in "fair or better condition" to roadway mileage. One of the more difficult parts will be judging "fair or better condition", although the guidelines given by the Oregon DOT (outlined in the Phase II Performance Measures report) seem to work fairly well, and require a simple formula (easily set up in a spreadsheet) to work. Ease of maintenance should be medium high once the database has been set up, although updating the conditions of sidewalks and bicycle lanes may need a bit more effort. One way to ease the data burden is to select sample segments to represent the street population as a whole. Analysis should follow easily once the database has been populated.

CGS Performance Measures 5.1a - 5.1b: Advanced Training for Personnel
The guiding objective for these performance measures is:
Annually increase the number of Caltrans management, design, and maintenance personnel trained regarding Complete Streets principles and Green Streets principles.

Both of the performance measures for this objective pertain to employee training opportunities. The first is PM 5.1a, *number of personnel trained in Complete Streets principles*, and the second is PM 5.1b, *number of personnel trained in Green Streets principles*. These measures will not be able to be tested until they are implemented, but seem intuitively valid. Providing employees the opportunities to learn more about the various types of design they will be expected to create seems a natural way to simultaneously increase employees' skill sets and reinforce the other measures described in this chapter.

PM 5.1a & 5.1b Conclusions
Validity: These performance measures seem valid and appropriate for the subject area.
Ease of Application: The data needed for this performance measure will have to be manually gathered through employee reviews or an employee survey. This may be somewhat data intensive in the beginning, as a database cataloguing training is set up, but the data should be relatively easy to maintain and analyze once the initial work has been done.

Conclusions
This chapter elaborated on the findings from the field-tests for the *Complete, Green Streets Performance Measures Framewo*rk proposed to provide Caltrans with the measures needed to monitor pedestrian and bicyclist safety and the environmental health of its urban arterials. The findings of the Phase III field tests, summarized in Table 44, suggest that several of the performance measures developed after Phase I and II of the project adequately measure the intended qualities, and should be retained for future use. However, there are a few measures that should be further tested and potentially revised before being recommended for use by Caltrans.

Table 44. Relative Validity and Ease of Application of Proposed Performance Measures

		Ease of Application		
		Low (Requires adjustment before Caltrans can implement)	**Moderate** (Moderately easy for Caltrans to implement. Potentially data intensive)	**High** (Relatively easy for Caltrans to implement)
Validity	**High** (Determined to be valid based on field testing)		• PM 1.1a-b: Rate of pedestrian injuries & fatalities • PM 1.1c-d: Rate of bicyclist injuries & fatalities • PM 2.1a-b: Ratio of sidewalk and bicycle lane mileage to arterial centerline mileage • PM 2.1c: Percent of ADA-compliant intersections • PM 2.1e-f: Number of pedestrian & bicycle trips • PM 4.2a-b: Percent of sidewalk and bicycle lane mileage in fair or better condition • PM 5.1a-b: Employee training for Complete & Green Streets	• PM 1.2: Perceptions of safety • PM 1.4a-b: Pedestrian & bicyclist hotspots • PM 2.1d: Percent of complete street projects
	Low (Requires adjustment to validate)		• PM 4.1a: Pervious to impervious surface ratio • PM 4.1b: Percent of tree canopy coverage	
	Unknown (Based on field test, cannot		• PM 1.3a-b: Intersection design for pedestrians • PM 1.3c: Intersection design for bicyclists	• PM 1.3d: Complete Streets (posted speed limit)

As Table 44 shows, only a few of the proposed performance measures fall into the optimal 'High Validity' & 'High Ease of Application' category. None of the measures are designated 'Low Validity' at this time, but several do require additional testing before they can be recommended for use by Caltrans. This finding exemplifies the difficulty of developing performance measures based on cutting-edge research and best practices—in this case, some of the recommended treatments were not present in high enough quantities on the test corridor to adequately evaluate their impact. These findings also emphasize the value of conducting even small-scale field-testing of proposed performance measures, through providing the opportunity for critical feedback on the validity and implementation potential of the measures.

Some of the proposed performance measures may also benefit from modifications aimed at improving their ease of implementation. As noted in the measures' descriptions, there are ways to ease the implementation of some of the proposed performance measures as they currently exist. Caltrans can continue to fund research that develops tools to facilitate data gathering for all types of analysis. This could include, for example, improved pedestrian count models and databases of critical street design information (e.g., width of sidewalks, presence of crosswalks, etc.). Such work could be carried out through existing partnerships with university transportation centers. In addition, Caltrans can make use of community volunteers and advocacy groups who may be willing to gather the information needed to evaluate aspects of safety and mobility. For example, volunteers were used to gather the data necessary to develop the pedestrian count model used in this paper (Schneider, Arnold et al. 2009). While the research team has an opinion about the "relative ease of application" of the proposed performance measures, the final judgment belongs to the Caltrans employees who will be performing the analysis in the future.

Field-testing the proposed performance measures has been a critical step in the development of Caltrans' *Complete, Green Streets Performance Measures Framework for Urban Arterials.* Field tests revealed that performance measures based on the latest research vary in their ease of implementation and potentially in their validity. While this is not a shocking finding, some organizations may wish to develop performance measures without expending the time or costs associated with field tests. It is possible, as was the case with this project, that it may prove difficult to field-test some of the metrics, or that parts of the metrics may need adjustment. While this may be discovered early, particularly with issues related to ease of implementation, it may also be some time before issues are identified and performance measures are revised or discarded. This phase of the project demonstrates that relatively small-scale field tests can contribute significantly to the development of performance measures that are valid and easy to apply in practice.

V. Conclusions and Next Steps

This chapter summarizes the results of the three study phases and describes future research and next steps for Caltrans.

Conclusions

The research findings presented in this report reflect a multiyear effort to develop and test performance measures for evaluating the impacts of transportation corridor design features, such as landscaping and pedestrian and bicyclist facilities, on the safety, mobility and economic vitality of Caltrans' urban arterial network. This is one of the first studies to explore the impact of these features on non-motorized modes of transportation and on community economic vitality.

The research project began with a comprehensive literature review of studies regarding the effects of roadside design features on pedestrian, bicyclist, and driver behavior and safety; pedestrian and bicyclist mobility; environmental quality; and community economic vitality. These findings formed the basic platform upon which the performance measures were built. The performance measures were developed after a comprehensive literature review of related research and best practices in performance measurement, as well as a thorough examination of Caltrans' current performance measurement system, to ensure that the proposed measures would fit well with the Caltrans culture and way of business. However, as the Performance Measures Evaluation in Chapter IV showed, performance measures must be field-tested in order to assess their validity. Working with extensive facility and survey data from the test corridors San Pablo Avenue in the eastern San Francisco Bay Area and Santa Monica Boulevard in the Los Angeles area, the research team had the opportunity to field-test the proposed performance measures, with good results. Of the 23 proposed measures, 19 were deemed valid and 4 were determined to need further testing due to lack of presence and variety in the study corridors. This suggests that Caltrans can confidently move forward and begin setting targets for the majority of the proposed performance measures, strengthening its commitment to multimodal mobility, safety, and Complete Streets.

The various analyses also revealed notable findings about strategies for corridor design. The most salient findings from the survey analysis included an alignment between all user groups (pedestrians, drivers, bicyclists, and transit users) about what would increase their perceptions of traffic safety along San Pablo Avenue and Santa Monica Boulevard. All user groups showed a general agreement on the desire for more bicycle lanes and improved pedestrian crossings. There was also general agreement on the desire for more landscaping, beautification, cleanliness, and maintenance. Based on these findings, Caltrans has the opportunity to benefit all users and communities by focusing its resources in a few select areas such as bicycle lanes, improved pedestrian crossings, and landscaping.

The survey analysis also suggested that a community's economic vitality is created by the complex interaction of many highway corridor elements. Urban arterials that include design features such as street trees, landscaping, street lighting, bicycle lanes, trash receptacles, public art, and other beautification measures attract all user groups (drivers, pedestrians, bicyclists, and transit users) to the area, contributing to improved economic vitality along the corridor. Clean well-maintained roadways and sidewalks were also found to attract all user groups to visit urban arterial corridors and further improve economic vitality.

Users of these corridors all expressed a desire for pedestrian and bicycle facility improvements. However, a better understanding of perceptions is required for users of the corridor who use this as a travel arterial rather than making stops along the corridor.

Findings from the policy analysis suggested that policies and plans such as general plans and transportation plans do affect the design of the roadway corridor to the benefit or detriment of users. Although many of the plans reviewed were fairly new and have not necessarily had time to affect change, it was clear that the longer term plans that addressed walkability and bikability had led to more walkable and bikable city environments. To affect the design of the built environment, Caltrans policies and guidance must address requirements for bicycle and pedestrian improvements.

Finally, the safety analyses suggest that user safety is also a complicated concept to measure in certain environments. The mix of factors that affect roadway safety on an urban arterial is complex and it is difficult to isolate the effects of specific corridor features. Some features may create a false sense of safety and change behavior for some users. This may be mitigated by careful placement of features so that critical views of intersections are preserved. Increases in pedestrian, bicyclist, and vehicle volume can affect safety as well. Although the survey analysis revealed that features do attract users to the corridors and improved perceptions of safety, Caltrans must continue striving to make the corridors truly safer in addition to attracting users.

As expected, pedestrian safety was found to be associated with some variables such as pedestrian and motor vehicle traffic volume on San Pablo Avenue and on Santa Monica Boulevard. This also indicates that better measures of volume are needed because the volumes reflected in the crash models may not have captured all true fluctuations throughout the corridors. Safety was not found to be associated with some of the pedestrian countermeasure land use variables such as ADA curb ramps and enhanced crosswalks established in previous research identified in the literature review. This may be due to a different study approach or manner of measurement, a lack of variability and presence of important features along the corridor, or additional unknown factors.

Similarly, the driver safety analysis followed some expectations based on findings from previous studies, but also revealed that there may be additional, previously unstudied roadway design features that could affect driver safety and behavior. For example, on both study corridors the percentage of ADA-accessible corners at each intersection is associated with an increase in driver crashes. It may be that these features are associated with pedestrian volume and land use. These relationships should be interpreted with caution.

Next Steps

The findings of this study point to several actions that may be implemented to improve the safety, mobility, and economic vitality of highway corridors. Although additional research and data collection is needed in some areas, the study findings support Caltrans Deputy Directive DD-64-R1 Complete Streets to improve safety, access, and mobility for all travelers in California while recognizing bicycle, pedestrian, and transit modes as integral elements of the transportation system. Caltrans' implementation of Complete Streets is intended to result in more options for people to go from one place to another, produce less traffic congestion and greenhouse gas emissions, and provide more walkable communities (with healthier, more active people) that have fewer barriers for older adults, children, and people with disabilities. To reach these intended results, Complete Streets implementation efforts should include installing bicycle lanes, improving pedestrian crossings, installing traffic calming measures, adding more traffic lights, and additional street lighting.

The economic vitality of portions of San Pablo Avenue and Santa Monica Boulevard was shown to be associated with a vibrant transportation corridor that includes design features such as street trees, landscaping, street lighting, trash receptacles, outdoor seating, public art and other beautification measures. Implementing these types of corridor features in improvement projects along other conventional highways should likewise attract users and improve community economic vitality along the corridor.

Several of the proposed performance measures concerning pedestrian and bicycle safety requires the collection of pedestrian and bicyclist volumes, accident rates, and exposure data. The collection of this data is currently not part of Caltrans standard practices. Caltrans should begin to use the capabilities of their existing data collection processes, such as SWITRS, to collect pedestrian and bicyclist data and also develop and implement new data collection processes as necessary to implement these performance measures.

Further Research

This research provides Caltrans with some of the tools needed to improve multi-modality on State right-of-ways. In addition, although the research and proposals documented in this report were created for Caltrans, the information provided, particularly the performance measures and their rationale, will be useful for state highway departments across the United States and similar agencies elsewhere.

This research revealed the complexity in evaluating complete streets and landscape design elements of a highway corridor. To further encourage Complete Streets projects, Caltrans should develop an evaluation protocol to be used to measure the effectiveness of Complete Streets on mobility and safety for all modes. By creating a standardized system for measuring how Complete Streets impact attractiveness and safety of a corridor, effectiveness of the elements can be better tracked.

Research in this area could be furthered by: (1) developing and validating various composite measures; (2) improving measurements of pedestrian and bicycle exposure; and (3) observing pedestrian, driver, and bicyclist behavior in the context of various design, facility, and countermeasure features. This information will assist in describing how roadway users respond in places: (1) with higher volumes; (2) with additional accommodations for mobility of all roadway users; (3) that potentially have an increased sense of safety; and (4) that impose additional constraints for reducing conflict.

In addition, it is important to understand the impact, if any, Complete Streets has on the surrounding neighborhoods and community. For example, changes in an urban corridor could have positive impacts in air quality in a community. Or changes in an urban corridor could disperse traffic-related problems.

Further Research: Highway 82 Longitudinal Study, San Jose

This report provides the findings of two cross-sectional studies, which show how variations in-corridor features throughout the length of the corridor affect pedestrian, bicyclist, and driver mobility and safety. Conducting a longitudinal study, also known as a before–and-after study, will provide an opportunity to evaluate newly implemented changes on a corridor in terms of perceived and observed safety and mobility.

To support such a study in the future, "before" data were collected for a 1.5-mile long section of Highway 82, known as The Alameda, in San Jose. The segment runs from the intersection of I-880 and Highway 82 south and east to Diridon station. The City of San Jose has successfully relinquished this portion of Highway 82 from Caltrans in preparation for a project to implement various landscape, pedestrian, and bicyclist design elements along the corridor. These elements planned for construction include, among other features, landscaped medians and bicycle lanes.

Data were collected for this corridor using the same methodology implemented for the Santa Monica Boulevard study corridor. Design and landscape elements were recorded using the same instrument as that of Santa Monica Boulevard (Appendix C). Data were collected using Google Earth and verified during a site visit in August 2012. Intercept surveys were conducted during October 2012. Pedestrian and bicycle counts were conducted between 2 p.m. and 6 p.m. during weekdays in November 2012.

A summary of the data collected for the Highway 82 corridor is presented in Appendix N. The data files will be provided to Caltrans for use in the event that Caltrans decides to conduct a longitudinal study on the corridor after the improvements are complete.

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Appendix A. Caltrans' Current Performance Measures

Existing Caltrans Goals, Objectives and Performance Measures	
SAFETY GOAL: Provide the safest transportation system in the nation for users and workers.	
Objective 1.1	By 2008, reduce the fatality rate on the California state highway system (SHS) to 1.00 per 100 million vehicle miles traveled and continuously reduce annually thereafter toward a goal of the lowest rate in the nation.
PM 1.1	Traveler Safety – Fatalities per 100 MVMT on the California state highway system.
Objective 1.2	Each year, ensure zero work-related fatalities.
PM 1.2	Worker Safety – Number of work-related fatalities.
Objective 1.3	By 2012, reduce the work-related injury and illness incident rate for transportation workers by 25%.
PM 1.3	Worker Incident Rate – Work-related injuries and illnesses in previous 12 months per 200,000 employee hours.
MOBILITY GOAL: Maximize transportation system performance and accessibility.	
Objective 2.1	By 2012, reduce daily vehicle hours of delay by 30,000 hours throughout the transportation system.
PM 2.1a	Statewide daily vehicle hours of delay (DVHD).
PM 2.1b	Percent of good (operating) detectors (CMIA corridors).
PM 2.1c	Percent of good (operating) detectors (overall).
PM 2.1d	Percent of detection coverage (CMIA corridors).
PM 2.1e	Percent of detection coverage (overall).
Objective 2.2	By 2012, increase reliability by 10% throughout the transportation system.
PM 2.2a	Percent variation from predicted travel time (with reliable real-time detection).
PM 2.2b	Percent of major incidents cleared in less than 90 minutes.
Objective 2.3	By 2012, increase intercity rail ridership on the State-supported routes by 28%.
PM 2.3a	Intercity rail ridership by route (Pacific Surfliner, San Joaquin, and Capital Corridor), and total ridership for the three routes.
PM 2.3b	Farebox ratio for intercity rail (Pacific Surfliner, San Joaquin, and Capital Corridor).
Objective 2.4	By 2012, reduce single occupancy commute trips by 5%.
PM 2.4a	Single occupancy vehicle as a percentage of total trips.
PM 2.4b	Percent of available funds used for Mass Transportation projects that pass through Caltrans to local recipients.
DELIVERY GOAL: Effectively deliver quality transportation projects and services.	

Objective 3.1	By 2012, impact the overall cost to deliver capital projects by: a. Reducing the support to capital ratio to 32% or lower; b. Reducing the overhead cost to 13%.
PM 3.1a	Capital outlay support cost to capital cost ratio (as Construction Contract Acceptance [CCA] milestone).
PM 3.1b	Percent overhead cost.
Objective 3.2	Each fiscal year, meet 100% of project delivery milestones.
PM 3.2a	Percent delivery of Project Approval/Environmental Document (PA/ED) milestones.
PM 3.2b	Percent delivery of planned Right of Way (R/W) Certification milestones.
PM 3.2c	Percent delivery of planned Ready to List (RTL) milestones.
PM 3.2d	Percent delivery of planned Construction Contract Acceptance (CCA) milestones.
PM 3.2e	Number and percent of cooperative agreements executed within 60 days of signing authorizing document.
Objective 3.3	By 2012, ensure 100% of projects meet their approved purpose and need at project completion.
PM 3.3	Percent of projects that meet their approved purpose and need at project completion.
Objective 3.4	Each year, ensure that the total construction costs of projects do not exceed 100% of their total original allotment.
PM 3.4	Total construction cost of projects at Proposed Final Estimate (PFE) as a percentage of total original contract allotment.
Objective 3.5	Each year, keep the total of all low bids within +/- 5% of the total of all engineers' estimates.
PM 3.5a	Percent difference between total low bids and total engineer's estimates.
PM 3.5b	Percent of projects with low bid within +/- 10% of engineer's estimate; and Percent of projects with low bid greater than 110% of engineer's estimate.

STEWARDSHIP GOAL: Preserve and Enhance California's resources and assets.	
Objective 4.1	By 2012, ensure that distressed pavement does not exceed 30% of the system's lane miles.
PM 4.1a	Pavement Condition – Percent of distressed lane miles.
Objective 4.2	Each year, ensure that 100% of Caltrans' financial resources are available when and where needed.
PM 4.2a	Percent of federal subvention formula funds obligated for local projects (on/off State highway system).
PM 4.2b	Timely use of funds – Percent of unexpended obligational authority (OA) balance that is deemed inactive and subject to quarterly review.
PM 4.2c	Percent of invoices issued to individuals or entities that own the Department money prepared within 30 calendar days of receipt of documentation.
PM 4.2d	Percent of total payments made to vendors and other government agencies within the time limits imposed by the Prompt Payment Act or as specified in the contract.
PM 4.2e	Percent of employees payments processed within 10 working days of receipt of Travel Expense Claim (TEC) by Accounting.
Objective 4.3	By 2012, increase maintenance level of service (LOS) scores to: • 80 in Litter and Debris • 95 in Striping • 95 in Guardrail • 87 for overall roadway level of service.
PM 4.3a	Maintenance LOS in Litter and Debris.
PM 4.3b	Maintenance LOS in Striping.
PM 4.3c	Maintenance LOS in Guardrail.
PM 4.3d	Maintenance LOS in overall roadway.
Objective 4.4	Each year, ensure environmental commitments are documented and implemented on 100% of projects.
PM 4.4a	Percentage of projects that have an updated Environmental Commitments Records and a Certificate of Environmental Compliance at project close.
Objective 4.5	Each year, dispose of 100% of the parcels identified as excess in the annual Real Property Retention Review.
PM 4.5	Percent of parcels identified in the Excess Land Disposal Plan and disposed of.
Objective 4.6	Identify all critical infrastructure deficiencies for facilities by 2010 and remediate 25% of the deficiencies by 2012.
PM 4.6	Percent of facilities with critical infrastructure deficiencies remediated.

Objective 4.7	Manage Caltrans' assets (human resource, information, facilities, and equipment) efficiently and effectively to ensure that 100% of its authorized resources are protected and available when and where needed.
PM 4.7a	Percentage of equipment that is available to the user (fleet uptime).
PM 4.7b	Percent approval rating of the Legal Division from an annual performance survey of senior Department managers.
PM 4.7c	Percent of the tort, eminent domain and contract cases in which Legal Division obtains favorable results.
PM 4.7d	Percent of external audits identified in the annual service plan that are completed.
PM 4.7e	Percent of mandated audits that are completed.
Objective 4.8	By 2012, reduce the number of distressed bridges to 5% of all bridges.
PM 4.8a	Bridge Condition – Number and percent of distressed bridges.
PM 4.8b	Bridge Condition – Network bridge health index (BHI) number.
PM 4.8c	Bridge Condition – Percent of State-owned bridges classified as structurally deficient or functionally obsolete (SD/FO).
SERVICE GOAL: Promote quality service through an excellent workforce.	
Objective 5.1	Each year, ensure that the attrition rate at Caltrans does not exceed 4%.
PM 5.1	Employee Attrition Rate – Percent.
Objective 5.2	Each year, ensure 100% compliance with response times and scheduled milestones for Local Assistance, oversight, and permits, as negotiated with out local partners and other submitting entities.
PM 5.2a	Percent of "Request for Authorization to Proceed" packages submitted by local agencies that are reviewed and processed by Caltrans and are ready for submittal to FHWA within 30 days of receiving the complete and accurate request.
PM 5.2b	Percent of encroachment permits approved within the statutory 60-day limit.
Objective 5.3	By 2012, increase by 15% the percentage of Caltrans employees who agree or strongly agree that employees are encouraged to try new ideas and new ways of doing things to improve Caltrans.
PM 5.3	Percent of Caltrans employees who agree or strongly agree that employees are encouraged to try new ideas and new ways of doing things to improve Caltrans.
Objective 5.4	By 2012, increase by 15% the percentage of external stakeholders who are satisfied with Caltrans services.
PM 5.4a	Percent of survey respondents who said Caltrans was doing a good or excellent job.
PM 5.4b	Percent of survey respondents who said Caltrans was doing a good or excellent job in fulfilling its mission of improving mobility across California.

PM 5.4c	Percent of survey respondents who said: “Over the last two years, Caltrans’ performance has improved, gotten worse, stayed about the same, or don’t know.”
Objective 5.5	By 2012, increase by 5% the percentage of Caltrans employees who agree or strongly agree that the training they have received at Caltrans has adequately prepared them for the work they do.
PM 5.5	Percent of Caltrans employees who agree or strongly agree that the training they have received at Caltrans has adequately prepared them for the work they do.
Objective 5.6	Increase the percentage of Caltrans employees who rate Caltrans management as good or very good at being open and honest in communications with employees, by (from baseline) 15% in 2008, 30% in 2010, and 50% in 2012.
PM 5.6	Percent of Caltrans employees who rate Caltrans management as good or very good at being open and honest in communications with employees.
Objective 5.7	By 2012, increase by 15% the percentage of Caltrans employees who agree of strongly agree that they are satisfied with the availability of the tools necessary to do their job.
PM 5.7	Percent of Caltrans employees who agree of strongly agree that they are satisfied with the availability of the tools necessary to do their job.
Objective 5.8	By 2012, increase by 20% the percentage of first-choice candidates that accept the Department’s entry-level job offers.
PM 5.8	Percent of first-choice candidates that accept the Department’s entry-level job offers.

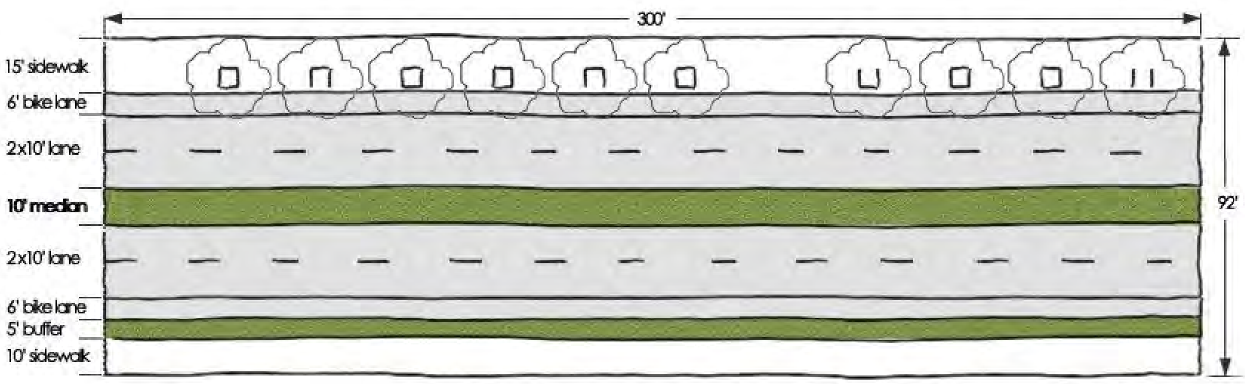
Appendix B. Estimating Tree Canopy and Pervious Surface Coverage

Estimating the ratio of pervious to impervious surfaces for proposed PM 4.1a:
Note: Caltrans should generate a random selection of urban arterials to sample for this measure and determine a uniform segment length that will be feasible and appropriate

Pervious Surface Area Calculation: (# of tree wells * area of tree wells) + (area of planted median) + (area of planted buffer) + (area of other pervious surface)

Impervious Surface Area Calculation: (Total area of urban arterial segment) – (Pervious surface area, as calculated above)

Example: (Uses a 300' segment length)



Pervious Surface Area Calculation: (10 * 25 sq. ft.) + (3,000 sq. ft.) + (1,500 sq. ft.)
= 4,750 sq. ft. pervious
Impervious Surface Area Calculation: (300 ft. * 92 ft.) – (4,750 sq. ft.)
= 22,850 sq. ft. impervious
Ratio Pervious to Impervious: (4,750/22,850) = *.2079*

Estimating the Percentage of Urban Arterial Lane Mileage With Tree Canopy Coverage for Proposed PM 4.1b:

Step 1: Set a baseline for canopy coverage on all (or a representative sample) Caltrans urban arterials. Update baseline periodically (possibly every five years).
Total urban arterial lane mileage = (length of urban arterials) * (number of lanes)
Percent Canopy Coverage (baseline) =
(Total length [diameter] of existing canopy, including median trees) ÷ (Total urban arterial lane mileage)

Step 2: Annually update baseline using final design drawings for new projects.
Percent Canopy Coverage (annual update) =
(Total length of existing canopy from baseline) + (Total length [diameter] of canopy coverage from new projects) ÷ (Total urban arterial lane mileage, including new projects)

Appendix C. Checklist for Corridor Design Features

*Intersection: ____ Date: _____________
All information on roadway segment should refer to the southern section. Time: _____________

Bike Facilities

	NB	SB
Bike lane presence (y/n)		
On-street parking on main street approach to intersection (y/n)		
The intersection has one or more of the following: bike box, bike lane through intersection, bike signal, bicycle detectors, bike left turn lane (y/n)		
Ave. pavement surface condition rating in bike lane area (3 = good: smooth, 2 = fair: passable, 1 = poor: dangerous/not passable)		
Percent of bicycle lane mileage in fair or better condition (at least 2 in pavement rating)		
Ratio of Class II (striped) bicycle facility mileage to centerline roadway mileage, bidirectionally (approximate)		
Percent of SPA designed as a complete street (including bicycle facilities, sidewalks, and motor vehicle travel lanes)		
Bike parking (total # spaces; 1 U rack = 2 spaces)		
Bike lockers (#)		
Marketing campaigns to encourage cycling (y/n)		
Bicycle wayfinding signage (y/n)		
Effects of Transit (conflicts evident - y/n)		

Pedestrian Facilities

Ratio of sidewalk mileage to centerline roadway mileage, bidirectionally		
Percent of sidewalk mileage in fair or better condition (at least 3 on scale of 5=excellent, 1=poor)		
Percentage of sidewalk that is ADA accessible (min. 5' width, slope, cross-slope)		
Percentage of sidewalk constructed with context sensitive materials, colors, or patterns		
Number of intersection legs/crosswalks constructed with context sensitive materials, colors, or patterns		
Is a **signalized intersection** with **marked crosswalks** and one or more of the following: pedestrian countdown signals, leading pedestrian intervals, bulb-outs, or pedestrian refuge islands (y/n, mark ped element)		
Is an **unsignalized 4-lane (multilane) intersection** with **marked crosswalks** and one or more of the following: yield to pedestrian signage, user-activated overhead or in-ground warning lights (y/n, mark ped element)		
Percent of the intersection with curb ramps, truncated domes, or both (mark where)		
Raised median refuge (y/n, width)		
Left turn lanes at intersection (y/n)		
Median has landscaping (y/n)		
Median landscaping type (grass, shrub, trees)		
Frequency of median landscaping frequency (regular, sporadic, none)		
Median passable (y/n)		
Mid-block crossing (y/n)		
Mid-block signage or traffic calming (y/n)		
Trash receptacles present (#)		

Appendix D. Frequency of Various Street Treatments & Events

San Pablo Avenue

Description	Mean	Range / SD
Combined pedestrian incidents	1.52	Range: 0 to 10 SD: 2.14
On-street parking up to intersection – east (west)	0.59 (0.62)	Range: 0 to 1 [0 = no on-street parking; 1 = on-street parking]
Percent sidewalk "fair or better" – east (west)	95.36 (93.50)	Range: 30 to 100 (10 to 100) SD: 11.11 (13.79)
Percent sidewalk ADA compliant – east (west)	96.14 (95.65)	Range: 0 to 100 (40 to 100) SD: 11.17 (10.74)
Context sensitive crosswalk legs		Range: 0 to 4
Trashcans – east (west)	0.50 (0.62)	Range: 0 to 4 (0 to 5) SD: 0.72 (0.94)
Pedestrian trips	9361.48	Range: 4987 to 55,436 SD: 6292.89
Driveways – east (west)	2.05 (1.81)	Range: 0 to 12 (0 to 10) SD: 2.14 (2.07)
Street tree presence and spacing – east (west)		Range: 0 to 2 [0 = none; 1 = sporadic; 2 = regular]
Gardens/planters – east (west)		Range: 0 to 1 [0 = none; 1 = gardens/planters]
Public seating – east (west)		Range: 0 to 1 [0 = none; 1 = public seating]
Sidewalk buffer – east (west)		Range: 0 to 3 [0 = no buffer; 1 = bicycle lane; 2 = unrestricted parallel parking; 3 = time-restricted parallel parking]
Storefronts – east (west)		Range: 0 to 2 [0 = none; 1 = 1-2 storefronts; 2 = 3+ storefronts]
Public art or historical site – east (west)		Range: 0 to 1 [0 = none; 1 = public art or historical sites]
Graffiti – east (west)		Range: 0 to 1 [0 = little to none; 1 = graffiti]
Litter – east (west)		Range: 0 to 1 [0 = little to none; 1 = litter]
Pedestrian-scaled lighting – east (west)		Range: 0 to 3 [0 = none; 1 = private lighting; 2 = public lighting; 3 = private & public lighting]
Construction – east (west)		Range: 0 to 1 [0 = none; 1 = construction]
Abandoned buildings – east (west)		Range: 0 to 1 [0 = none; 1 = abandoned buildings]
Left turns at intersection	0.91	Range: 0 to 2 SD: 0.80
Raised median		Range: 0 to 1 [0 = no median; 1 = median]

Regular median width	9.44	Range: 4 to 18 SD: 5.93
Median width when left turn lane is present	2.53	Range: 0 to 9 SD: 2.16
Landscaping on median		Range: 0 to 1 [0 = none; 1 = landscaping]
Median landscaping type		Range: 0 to 7 [0 = none; 1 = grass; 2 = shrubs; 3 = trees; 4 = grass, shrubs; 5 = grass, trees; 6 = shrubs, trees; 7 = all]
Passability of median		Range: 0 to 1 [0 = not passable; 1 = passable]
Mid-block crossing		Range: 0 to 1 [0 = no mid-block crossing; 1 = mid-block crossing]
Mid-block crossing sign		Range: 0 to 1 [0 = none; 1 = signage]
Standard crosswalks	2.69	Range: 0 to 5 SD: 1.04
Ladder crosswalks	0.17	Range: 0 to 4 SD: 0.73
Crosswalks (either type)	2.77	Range: 0 to 5 SD: 0.99
Pedestrian signals with countdowns	0.39	Range: 0 to 5 SD: 1.15
Pedestrian signals without countdowns	0.79	Range: 0 to 5 SD: 1.39
Pedestrian signals (either type)		Range: 0 to 1 [0 = no pedestrian signal; 1 = pedestrian signal(s)]
Intersection legs > 4		Range: 0 to 1 [0 = four or fewer legs; 1 = more than four legs]
Crosswalk length – north	81.38	Range: 71 to 152 SD: 11.38
Crosswalk length – south	79.54	Range: 24 to 156 SD: 9.56
Crosswalk length – east	44.49	Range: 21 to 113 SD: 17.48
Crosswalk length – west	48.05	Range: 21 to 135 SD: 21.93
Crossing speed over 3.5 feet/second		Range: 0 to 1 [0 = 3.5 ft/sec or less; 1 = Greater than 3.5 ft/sec]
Average crosswalk length – north/south	80.46	Range: 62.5 to 138 SD: 9.0
Average crosswalk length – east/west	46.47	Range: 21 to 117.5 SD: 18.47
Right turns on red prohibited		Range: 0 to 2
Intersection traffic-calmed		Range: 0 to 1 [0 = none; 1 = traffic calming]
Pedestrian signs at intersection		Range: 0 to 1 [0 = none; 1 = pedestrian signs]

Vehicle speed posted		Range: 0 to 1 [0 = no speed limit sign; 1 = speed limit sign]
School zone		Range: 0 to 1 [0 = no school zone; 1 = school zone]
Sidewalk width – east (west)		Range: 0 to 3 [0 = less than 5’; 1 = 5-7’11”; 2 = 8-12’; 3 = 12’+]
Sidewalk impediments – east (west)		Range: 0 to 3 [0 = no sidewalk; 1 = none; 2 = few; 3 = significant]
Sidewalk obstructions – east (west)		Range: 1 to 3 [1 = none; 2 = temporary; 3 = permanent]

Santa Monica Boulevard

Description	Mean	Std Dev	Min.	Max.
Speed 85th percentile extrapolated (Source: speed surveys)	33.30625	1.42423	31	35
Cross street classification (1= minor, 2= major)	1.2625	0.61095	1	3
Percent of intersection injuries or crashes that involved alcohol (Source: SWITRS)	11.28112	10.65708	0	50
Number of bike parking spots on both blocks	2.325	4.04961	0	18
Average percent of sidewalks in fair or better condition both blocks	99.25	2.82395	87.5	100
Average percent of sidewalks that are ADA both blocks	99	4.84899	65	100
Number of intersection legs/crosswalks with context sensitive materials	0.0875	0.28435	0	1
Percent of corners with ADA features	71.6125	27.79195	33	100
Indicates 1 or more left turn lane at the intersection (yes vs. no)	0.625	0.48718	0	1
Median landscaped (yes vs. no)	0.3	0.46115	0	1
Regular median landscaping present on either block	0.35	0.47998	0	1
Number of regularly marked crosswalks	1.075	1.66707	0	4
Number of ladder crosswalks	0.975	1.2219	0	4
Number of marked crosswalks	2.05	1.46607	0	4
At least 3 or 4 crosswalks at the intersection (yes vs. no)	0.35	0.47998	0	1
Indicates pedestrian countdown signal at any intersection leg (yes vs. no)	0.2375	0.42824	0	1
Intersection is signalized (yes vs. no)	0.4	0.49299	0	1
Number of intersection traffic calming features	0.625	0.70036	0	2
Number of vehicle lanes	4.4625	0.61508	4	6
Vehicle speed is posted on either block (yes vs. no)	0.45	0.50063	0	1
Indicates 1 or more abandoned buildings on both blocks	0.175	0.38236	0	1
Indicates any construction on either block	0.1375	0.34655	0	1
Ped scale lighting on both blocks (0= none, 1= 1 block, 2= 2 blocks)	1.725	0.47667	0	2
Any litter on either block	0.175	0.38236	0	1
Indicates any graffiti either block	0.025	0.15711	0	1

Number of intersection legs	3.4875	0.503	3	4
Indicates intersection is offset (yes vs. no)	0.1625	0.37124	0	1
Motor vehicle speed extrapolated from speed tubes at survey locations (miles per hour)	32.57625	1.30612	27.8	34.8
Percent of traffic that are trucks extrapolated (Source: tube counts)	0.09865	0.02033	0.0746	0.1505
Number of trees on both blocks	24.225	21.78315	0	106
Number of trees that provide shade coverage on both blocks	23.825	21.68461	0	104
Number of bus stops on both blocks	1.375	0.9192	0	4
Number of tree grates on both blocks	0.45	0.87004	0	4
Number of bollards on both blocks	0.375	0.75263	0	4
Number of industrial enterprises on both blocks	0.4	1.09775	0	5
Number of commercial driveways on both blocks	5.8	4.39332	0	18
Number of residential driveways on both blocks	0.025	0.15711	0	1
Indicates presence of 1 or more advanced yield lines at the intersection (yes vs. no)	0.5375	0.50174	0	1
Landscaped bulb-outs on either block (yes vs. no)	0.025	0.15711	0	1
Indicates intersection has 1 or more ped features	0.4875	0.503	0	1
Average length peds have to cross to cross SMB (based on intersection)	64.96042	14.69917	51	147
Average length peds have to cross to cross side street (feet)	47.01875	16.43812	20	111

Appendix E. Comparison of Plans and Policies for Selected Pedestrian and Bicycle Accommodations

Entity	Document	ADA Accessible Sidewalks	Street Trees	Benches or Amenities	Ped-Scaled Lighting	Minimum Passage 10 feet	Curb Ramps	Continuous sidewalks	Ped Signals (Countdowns, LPI's, separate)	Median refuges	Signals at Realistic Walking Speed	Ped Wayfinding Signage	Marked Xwalks	Fair or Better Pavement Quality	Pedestrian Campaigns	High Visibility Xwalk	Unobstructed Sidewalks	Audible Ped Signals	Bulb-outs	Police Enforcement wrt Pedestrians	Xwalk Lighting	Public Art	Complete Streets aims	Ped Safety Signage	On-Street Parking as Buffer	Short Distance Between Crossings	Pushbuttons	Mid-block Xwalks	Prohibited Parking near Intersection	Truncated Domes	Blocked Visibility at Intersection	Speed Limit	Bus Stops Far Side Intersection	Ped/Bike Over/Under Passes	Bicycle Facilities	Bicycle Parking/Storage	Marketing Campaigns to Promote Cycling	Bicycle Signals/detectors	Police Enforcement wrt cyclists	Bicycle Wayfinding Signage	Bicycle Lanes Well-maintained, Clean	Physical Deterrants to Bicycling	Recessed Stop Line	Prohibited RTOR	Ped Crossings Prohibited	Accessible Transit Stops	New signal warrant
City of Albany	General Plan						x			x							x																														
	Bicycle Plan																																		x	x	x	x	x								
	San Pablo Master Plan		x	x	x																	x																									
City of Berkeley	General Plan	x	x	x	x		x		x	x	x			x			x	x		x	x			x		x			x				x		x	x	x	x	x		x						
	Pedestrian Master Plan	x	x	x	x	x				x	x	x	x	x	x	x	x			x	x	x	x			x			x				x													x	
	Bicycle Plan																																		x	x	x		x		x	x					
	San Pablo Avenue Public Improve-ments Plan	x	x	x		x	x		x	x			x															x								x		x									x
City of El Cerrito	Circulation Plan for Bicyclists and Pedestrians	x	x	x		x	x		x	x	x			x		x	x	x	x		x			x			x			x	x	x		x	x	x							x	x	x		
	General Plan	x	x	x	x	x					x	x	x	x	x	x				x	x		x												x	x	x		x	x	x						

City of Emery-ville	Bicycle and Pedestrian Plan	x										x							x																x	x		x		x							
	General Plan	x	x	x	x	x	x		x	x			x	x	x		x	x	x				x	x			x	x							x	x	x			x							
City of Oakland	Pedestrian Master Plan	x	x	x	x		x	x			x	x										x			x						x																
	Bicycle Master Plan																																	x	x	x	x	x	x	x	x						
	General Plan	x	x	x	x	x		x			x	x			x			x				x										x			x	x	x	x									
City of Richmond	General Plan	x	x	x	x	x	x		x	x			x			x			x																												
Alameda County	Countywide Strategic Pedestrian Plan	x						x							x					x																											
	Countywide Bicycle Plan																																		x	x	x	x	x	x	x	x					
Contra Costa County	Bicycle and Pedestrian Plan							x				x			x					x			x												x		x		x	x							
	Countywide Transpor-tation Plan																																														
MTC	Regional Bicycle Plan																																		x	x	x	x	x	x							
	Pedestrian Plan																																														
Caltrans	Complete Streets Law							x															x												x												
	DD-64-R1							x															x												x												
San Pablo Avenue	San Pablo Avenue Specific Plan	x	x	x	x	x	x	x	x	x		x	x			x	x		x		x	x	x		x				x	x					x	x				x							
		12	11	11	9	8	8	7	6	8	6	7	6	5	6	5	6	4	5	5	5	5	7	3	2	2	2	2	3	2	2	2	2	2	15	13	10	8	8	8	5	2	1	1	1	1	1

Appendix F: Specific Goals, Policies, and Actions of Plans

Specific Goals, Policies, and Actions of Albany Plans

Albany General Plan Goals and Policies Applicable to Pedestrians and Bicyclists

Goal	Policy
Circulation Goal # 4: Support public transit, and other means to reduce reliance on the automobile as the primary means of transportation.	CIRC 4.3. Continue to work with the City's Trip Reduction Ordinance and continue to develop programs and incentives for the use of carpools, staggered work hours, bicycling, walking and the increased use of public transit for residents and employees in the community.
	CIRC 4.5. Increase pedestrian travel throughout the City by connecting major pathway systems such as the BART linear park to other City, regional, and State Parks, and other community facilities.
	CIRC 4.6. Increase disabled access throughout the City by installing curb cuts wherever feasible as part of new construction, repair or improvements to streets, sidewalks, pathways and trails.
	CIRC 4.7. Assure that sidewalks, pathways and trails used by pedestrians are safe and provide unhindered access for all.

Selected Albany Bicycle Plan Goals and Policies Pertaining to San Pablo Avenue

Goal	Policy
1. Support bicycling and the development of a comprehensive bicycle transportation system as a viable alternative to the automobile.	1.2 Continue to ensure that the Plan is consistent with all existing regional, state, and federal policy documents.
2. Use available state and federal funding for bicycle improvements in Albany.	2.1 Identify current regional, state, and federal funding programs, along with specific funding requirements and deadlines.
	2.2 Pursue multi-jurisdictional funding applications with neighboring cities.
3. Improve upon existing bikeway facilities and programs in Albany.	3.3 Maintain and improve existing bicycle education programs in Albany.
4. Develop a bicycle system that meets the needs of commuter and recreation users, helps reduce vehicle trips, and links residential neighborhoods with regional destinations.	4.1 Develop a commuter route system connecting residential neighborhoods and regional employment areas, multi-modal terminals, schools, and shopping areas.
	4.3 Develop incentives that will encourage people to bicycle to work.
	4.4 Balance the needs for user convenience and user safety in bikeway design. Where needed, develop a dual system, which serves both the experienced and inexperienced bicyclist and separates pedestrians, roller bladers, and bicyclists.
	4.5 Emphasize Class I (bike paths) and Class II (bike lanes) over Class III (bike routes) wherever feasible.
	4.6 Continue to work to address barriers to bicycling, such as lack

	of secure bicycle parking and signals that do not detect bicycles.
4. Develop a bicycle system that meets the needs of commuter and recreation users, helps reduce vehicle trips, and links residential neighborhoods with regional destinations.	4.7 Encourage development concepts and standards such as mixed-use and neighborhood-serving retail and employment opportunities.
5. Maximize multi-modal connections to the bicycle system.	5.1 Develop bikeways that are consistent with and complement Albany's Transit First Policy.
6. Improve bicycle safety in Albany.	6.1 Monitor bicycle and pedestrian-related accident levels annually, and target a ten percent reduction over the next 20 years.
	6.2 Develop a comprehensive bicycle education program that is taught to all school children in Albany.
	6.5 Maintain a schedule for maintenance and cleaning (street sweeping) of bicycle facilities.
9. Develop a coordinated strategy to encourage bicycling in Albany.	9.1 Develop and update a user-friendly bikeway map for public distribution that shows existing bicycle facilities.
	9.2 Sponsor annual bicycle events such as Bike-to-Work Day and adult safety courses in conjunction with other regional efforts.
	9.3 Provide information about the advantages and opportunities afforded by the Bicycle Transportation System to promotion groups that may help publicize the system.
	9.4 Coordinate efforts with the Chamber of Commerce, Solano Avenue Association, neighborhood associations, and local media.

Albany Traffic Plan Goals and Policies Pertaining to Pedestrians and Bicyclists

Objectives	Actions
2. Address crosswalk/pedestrian visibility issues	Phase I: Implement crosswalk policies to be determined by the Traffic and Safety Commission. Maintain existing crosswalks were appropriate. Phase II: Consider funding/implementation of demonstration projects for new pedestrian crossing treatments on key corridors (including San Pablo Avenue) to enhance pedestrian safety.
3. Address street lighting issues especially in southeast part of the City.	Phase I: Maintain existing streetlights Phase II: City staff assess lighting needs throughout the City and routinely implement new/replacement lighting as part of its five-year Capital Improvement Program.
9. Identify means for reducing automobile dependency	Phase II: Implement Bicycle Master Plan. - Prepare and implement a Pedestrian Enhancement Plan. - Prepare and implement a Transit Improvement Plan.

Specific Goals, Policies, and Actions of Berkeley Plans

San Pablo Avenue Improvements Plan Pertaining to Pedestrians and Bicyclists

Goals
Create a safe and attractive streetscape for pedestrians, transit users, residents, and employees, which contributes to the City's revitalization efforts in the area.
Increase pedestrian and bicycle safety.
Action Items
Significantly improve pedestrian safety and neighborhood connectivity by upgrading existing crosswalks, introducing new crosswalks in several locations, and installing of pedestrian-scaled light fixtures.
Improve the accessibility of uses and transit by upgrading curb ramps at crosswalks to current ADA standards throughout the corridor.
Distinguish key intersections within designated nodes as focal points of pedestrian activity through the use of special features or materials.
Maintain and enhance the rows of trees in sidewalks and medians, which define the street's overall character and image within Berkeley.
Enhance the visual quality of sidewalk connections from adjacent residential areas and employment centers to San Pablo Avenue with additional landscaping and curb bulb-outs in appropriate locations.
Explore the idea of introducing distinct entry/gateway features at the northern and southern city borders.

Berkeley General Plan Policies and Recommended Actions Applicable to Pedestrians and Bicyclists

<table>
<tr><th>Policy</th><th>Action</th></tr>
<tr><td rowspan="4">T-30 Traffic Signals. Continue to pursue better signal devices and systems to facilitate movement on Berkeley's limited road network.</td><td>1. Consider signals that provide separate phases for through (straight) traffic, pedestrians and cyclists, and turning traffic.</td></tr>
<tr><td>3. Consider all-way stop signals that allow the free flow of pedestrians through the intersection.</td></tr>
<tr><td>4. Consider "smart" signals to calm traffic and improve intersection safety.</td></tr>
<tr><td>6. Consider pedestrian /bicycle-activated signals that allow bikes and pedestrians to cross busy streets.</td></tr>
<tr><td colspan="2">T-42 Bicycle Planning. Integrate the consideration of bicycle travel into City planning activities and capital improvement projects, and coordinate with other agencies to improve bicycle facilities and access within and connecting to Berkeley.</td></tr>
<tr><td rowspan="2">T-43 Bicycle Network. Develop a safe, convenient, and continuous network of bikeways that serves the needs of all types of bicyclists, and provide bicycle-parking facilities to promote cycling.</td><td>A. Expand the supply of highly secure bicycle parking near transit hubs and commercial areas.</td></tr>
<tr><td>B. Encourage business owners to provide bicycle parking, showers, and lockers for employees and bicycle parking for customers.</td></tr>
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<tr><td colspan="2">T-44 Bicycle Safety. Improve bicycle safety for riders, pedestrians, and drivers through continuing education of motorists and bicyclists as well as rigorous enforcement of laws for both bicyclists and automobile drivers.</td></tr>
<tr><td colspan="2">T-45 Bicycle Promotions. Promote bicycle use by increasing public awareness of the benefits of bicycling and of the available bike facilities and programs.</td></tr>
<tr><td rowspan="3">T-49 Disabled Access. Improve pedestrian access for the entire disabled community.</td><td>A. Fund sidewalk, crosswalk, curb, signalization and signage, and talking signal improvements.</td></tr>
<tr><td>B. Use regulation and incentives to require or encourage accessibility upgrades for private businesses.</td></tr>
<tr><td>C. Encourage businesses to exceed the minimum standards set by the ADA “readily achievable barrier removal” requirement.</td></tr>
<tr><td rowspan="4">T-50 Sidewalks. Maintain and improve sidewalks in residential and commercial pedestrian areas throughout Berkeley and in the vicinity of public transportation facilities so that they are safe, accessible, clean, attractive, and appropriately lighted.</td><td>A. Prioritize pedestrian-serving public improvements, such as sidewalk repair and widening, bus shelters, street trees and lighting, public art, fountains, and directional signs.</td></tr>
<tr><td>B. Establish safe, attractive pedestrian connections between residential areas, transit, shopping areas, and schools and other community facilities.</td></tr>
<tr><td>C. Ensure that sidewalks are kept in good repair and are level, with a suitable grade for pedestrians and wheelchairs. Discourage, and when possible prevent, new developments from creating uncomfortably steep grades.</td></tr>
<tr><td>D. Ensure adequate unobstructed sidewalk passage by appropriate placement of street furniture and amenities and prevention of obstruction of travel ways by such items as advertisement signs, merchandise, and utility boxes.</td></tr>
<tr><td colspan="2">T-51 Pedestrian Priority. When addressing competing demands for sidewalk space, the needs of the pedestrian shall be the highest priority.</td></tr>
<tr><td rowspan="2">T-52 Pedestrian Safety and Accessibility.
Provide safe and convenient pedestrian crossings throughout the city.</td><td>A. Seek to ensure that the distance between signal-controlled intersections, “smart crosswalks,” or stop signs is never more than one-quarter mile on major and collector streets. At intersections with severe or high pedestrian/automobile collision rates and at heavily used pedestrian crossings, consider all-way stop signals that allow the free flow of pedestrians through the intersection, “smart” signals to calm traffic and improve intersection safety, and pedestrian/ bicycle-activated signals that allow bikes and pedestrians to cross busy streets without inviting traffic onto cross streets.</td></tr>
<tr><td>B. Consider pedestrian crosswalk “runway” lights in the pavement at intersections with severe or higher than average pedestrian collision rates.</td></tr>
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<tr><td rowspan="3">T-52 Pedestrian Safety and Accessibility. Provide safe and convenient pedestrian crossings throughout the city.</td><td colspan="2">C. Encourage and educate the public on the use of painted and unpainted crosswalks; enforce jaywalking regulations on main arterials.</td></tr>
<tr><td colspan="2">D. Encourage the creation of accessible pedestrian medians or islands in wide streets where people have to cross more than two lanes.</td></tr>
<tr><td colspan="2">E. Enforce pedestrian right-of-way laws.</td></tr>
<tr><td rowspan="6">T-53 Intersections with Severe or High Collision Rates. Reduce pedestrian and bicycle collisions, injuries, and fatalities.</td><td rowspan="6">A. Undertake a review of intersections or street locations with a high number of collisions and/or a high percentage of fatal or permanently disabling collisions and develop programs with appropriate mix of education, enforcement, and engineering changes to improve the safety of these intersections and locations.</td><td>1. Consider adding signage at intersections, warning the public that the intersection has been the site of several traffic collisions or fatalities.</td></tr>
<tr><td>2. Consider moving bus stops to the far side of the intersection so that buses do not block visibility at the intersection when stopping to pick up passengers.</td></tr>
<tr><td>3. Consider providing an all-red, pedestrian phase to especially congested intersections, giving pedestrians the ability to cross the intersection in any direction before vehicles are given a green light.</td></tr>
<tr><td>4. Consider lighted crosswalks.</td></tr>
<tr><td>5. Consider maintaining a minimum 50-foot red, no-parking zone adjacent to the intersection to increase visibility.</td></tr>
<tr><td>6. Consider re-timing pedestrian crossing signals to allow more time for pedestrian crossing.</td></tr>
<tr><td colspan="3">LU-11 Pedestrian- and Bicycle-Friendly Neighborhoods. Ensure that neighborhoods are pedestrian- and bicycle-friendly with well-maintained streets, street trees, sidewalks, and pathways.</td></tr>
<tr><td rowspan="3">LU-27 Avenue Commercial Areas. Maintain and improve Avenue Commercial areas, such as University, San Pablo, Telegraph, and South Shattuck, as pedestrian-friendly, visually attractive areas of pedestrian scale and ensure that Avenue areas fully serve neighborhood needs as well as a broader spectrum of needs.</td><td colspan="2">B. Ensure safe, well-lighted, wide walkways that are appropriately shaded for compatibility with upper-story residential units and adequate traffic signals for pedestrian street-crossings in commercial areas.</td></tr>
<tr><td colspan="2">C. Provide street trees, bus shelters, and benches for pedestrians in commercial areas.</td></tr>
<tr><td colspan="2">D. Provide bicycle facilities and ample and secure bicycle parking wherever appropriate and feasible.</td></tr>
</table>

Berkeley Bicycle Plan Goals and Policies Applicable to San Pablo Avenue

Goal	Policy
1. Planning *Integrate the consideration of bicycle travel into City planning activities and capital improvement projects, and coordinate with other agencies to improve bicycle facilities and access within and connecting to Berkeley.*	1.5 Integrate bicycle network and facility needs into all City planning documents and capital improvement projects.
	1.6 Work with transit providers to increase accessibility on board transit vehicles to bicycle users, especially during peak commute hours, and to provide secure bike parking at stations.
2. Network and Facilities *Develop a safe, convenient, and continuous network of bikeways that serves the needs of all types of bicyclists, and provide bicycle parking facilities to promote cycling.*	2.1 Develop a citywide system of designated bikeways that serves both experienced and casual bicyclists. The network should serve all bicyclists' needs, especially for travel to employment centers, schools, commercial districts, transit stations, institutions, and recreational destinations.
	2.2 Ensure that all city streets open to bicycles are safe for bicycling, while focusing bikeways primarily on streets with lower volumes of auto traffic.
	2.3 Provide bikeway facilities that are appropriate to the street classification, traffic volume, and speed including the development of a new bikeway classification - the bicycle boulevard - such that the entire city is served by the bikeway network.
	2.4 Design the street system to provide a safe network for bicyclists, pedestrians, the disabled community, and emergency response.
	2.5 Adopt and adhere to citywide design standards for bikeways and bike rack placement. Ensure that standards for roadway maintenance meet bicyclists' needs for smooth, deterrent-free roads.
	2.6 Maintain all streets, roadways, and designated bike routes to be free of deterrents to bicycling (such as pot holes, debris, and overgrown landscaping) to the greatest extent possible.
	2.7 Incorporate bicyclists' needs into the City's guidelines and timetables for maintenance activities, including re-paving, and ensure proper funding levels for routine bicycle-related maintenance activities.
	2.8 Ensure that roadway and pedestrian corridor designs do not include any actions that would compromise bicycle safety, such as the extreme narrowing of a curb lane.
	2.9 Monitor bicycle parking supply within the City right-of-way and installed by private developers under the city ordinance to ensure that adequate bike parking is available.
3. Education/Safety *Improve the safety of bicyclists through education and enforcement.*	3.1 Support and expand safety education programs for adult bicyclists, child bicyclists, and motorists which increase knowledge and encourage individual behavior change.

3. Education/Safety *Improve the safety of bicyclists through education and enforcement.*	3.3 Enforce motorist and bicyclist violations that are most likely to cause injury such as running red lights, speeding, wrong-way riding and riding on sidewalks where illegal.
4. Promotion *Increase bicycle mode share by increasing public awareness of the benefits of bicycling and of the available bike facilities and programs.*	4.1 Provide current and easily accessible information about the bicycle network, bicycle programs and bicycle parking.
5. Implementation *Secure sufficient resources from all available sources to fund ongoing bike improvements and education.*	5.1 Establish priorities for the allocation of public funds, balancing the needs of the diverse population of bicyclists.
	5.7 Promote public/private partnerships in development, implementation, operation, and maintenance of bike facilities.

Specific Goals, Policies, and Actions of El Cerrito Plans

El Cerrito and Richmond Draft San Pablo Avenue Specific Plan – Design Guidelines Applicable to Pedestrians and Bicyclists

Goal	Focus Area	Policy
1. Site Design and Planning of the Private Realm	1H Parking	*1H-iii* Create visual connections for pedestrians and vehicles between rear parking areas and San Pablo Avenue.
		1H-iv Encourage higher intensity mixed use, residential, or office development to utilize podium parking that is “wrapped” with active uses along the primary façade and the surrounding parking structure.
		1H-v Where ground floor uses are not possible, screen façades of parking structures to reduce adverse effects on the pedestrian environment with green-screens, landscaping, public art, lighting, and semi-opaque windows.
		1H-vii Ensure pedestrian-friendly façades at the ground floor of parking structures.
		1H-ix Articulate parking structures to prevent the presence of blank walls and large vehicular entries. Prohibit blank walls on parking structures or podium parking buildings. Unless infeasible, mitigate any required blank walls with murals, architectural articulation, faux façades, etc.
		1H-x Locate stairwells and elevators of parking structures at building corners visible from the street to increase transparency between the structure and public realm.
		1H-xii Provide ample lighting in and around parking structures to ensure safety.
		1H-xx Consider areas for bike parking
	1I Bicycle and Pedestrian Facilities	*1I-i* Create pedestrian and bicycle connections through new development between the Ohlone Greenway and San Pablo Avenue.
		1I-ii Include bicycle parking and facilities as part of new development.
		1I-iii Provide a delineated and clear path of travel for pedestrians and bicyclists through new development, and particularly through parking lots and open spaces.

2. Site Design and Planning of the Public Realm	**2A Overarching Guidelines:** 2Ai Roadways	*2Ai-v* Install bulb-outs in parking lanes between parking spaces and at corners to reduce the crossing distance for pedestrians. Provide landscaping and street trees to create an extended sidewalk experience and lend character to the roadway.
	2Aii Sidewalks and Landscaping	*2Aii-i* Provide 10- to 20-foot wide sidewalks along San Pablo Avenue where possible and as part of new private development.
		2Aii-ii Ensure that all streets have continuous ADA accessible pathways with a minimum width of six feet.
		2Aii-iii Visually and functionally extend the width of the sidewalk by designing building setbacks to contribute to the pedestrian environment.
		2Aii-iv Locate street trees and planter strips between sidewalks and roadway to provide a safety buffer for pedestrians from traffic. Allow tree wells to be used instead of planter strips in cases where parking or bicycle lanes are located next to sidewalks.
		2Aii-vi Landscape planter strips with shade-providing trees and shrubs.
		2Aii-xi Ensure at least a 12-foot tree canopy clearance from finished sidewalk elevation to provide clear emergency and service access, not block light from pedestrian-scale street lights, and allow for a visual connection between buildings, areas of key building signage, the sidewalk and the roadway. Place location of trees to minimize blockage.
	2Aiii Crosswalks and Bulbouts	*2Aiii-i* Provide clearly marked minimum 10 foot wide crosswalks at all controlled intersections and at intersections of key streets.
		2Aiii-ii Ensure all crosswalks have ramps and warning strips for ADA access.
		2Aiii-iii Explore the use of in-pavement flashers and crosswalk signage that flashes to alert drivers of a crossing, especially at critical intersections.
		2Aiii-iv Explore using special paving materials, colors, and/or patterns for crosswalks to heighten visibility and lend identity to the area while creating an attractive pedestrian environment.
		2Aiii-v Provide bulbouts at San Pablo Avenue intersections and mid-block crossings to minimize crossing distance and increase pedestrian visibility.
		2Aiii-vi Encourage the design of bulbouts at corners to function as pocket plazas with pedestrian amenities such as seating, trash cans, and bicycle racks.
	2Aiv Public-Private Interface	*2Aiv-i* Utilize building setbacks in the private realm along San Pablo Avenue to create an extended sidewalk and allow activity to spill onto the sidewalk without disrupting or obstructing pedestrian flow.
		2Aiv-ii Where possible, encourage the planting of trees three to five feet from the edge of the sidewalk within private lots to provide shade for pedestrians and privacy for building users.
		2Aiv-iii Discourage the use of fences along San Pablo Avenue. If fences must be used, ensure they are no higher than three feet so not to serve as a barrier between the public and private realms.
	2Av Street Furniture, Lighting, and Public Art	*2Av-i* Provide pedestrian-oriented and automobile-oriented street lighting along major pedestrian corridors and arterials, including San Pablo Avenue and major east-west streets.

2. Site Design and Planning of the Public Realm	2Av Street Furniture, Lighting, and Public Art	*2Av-ii* Encourage the use of pedestrian-scaled street lights to be at a lower height (approximately 12 feet high), closer spaced, and to use full spectrum bulbs.
		2Av-iii Provide pedestrian-oriented street lights on all local streets and pedestrian paths, such as the Ohlone Greenway, the two BART stations, retail shopping areas, and residential streets, to improve safety and comfort.
		2Av-iv Provide pedestrian-friendly streetscape amenities, including seating, trash cans and public art, at key nodes along San Pablo Avenue and the Ohlone Greenway.
		2Av-v Provide bicycle racks and/or lockers (at key locations) throughout San Pablo Avenue.
		2Av-vi Explore opportunities for artistic design of bicycle racks, trash cans, seating, lighting posts, and utility boxes.
	2Avi Signage and Traffic Calming	*2Avi-i* Highlight bicycle and pedestrian routes and connections with the Ohlone Greenway with signage.
		2Avi-ii Employ public signage for vehicular, pedestrian and bicyclist wayfinding to the two BART Stations, the Ohlone Greenway, major bus stops, and key community amenities such as the Community Center and Theater.
		2Avi-iv Place signs at a height visible for both pedestrians and drivers. Scale signage to be visible both from the roadway and the sidewalk.
	2C Open Spaces: 2Ci Pocket Parks	*2Ci-i* Explore creating connections between the Avenue and the Ohlone Greenway that can be expanded into pocket parks.
		2Ci-ii Ensure that pocket parks are no less than 35 feet wide to provide adequate space for users.
		2Ci-iii Include a variety of programs and facilities to serve a wide range of users, including play equipment areas, gathering space, multi-use play areas, and community gardens.
		2Ci-iv Ensure the provision of a five-foot wide minimum pathway for ADA access.
		2Ci-v Provide adequate lighting and signage within pocket parks.
		2Ci-vi Ensure that park entrances are highly visible to enhance safety and wayfinding. Maximize vistas into the park and encourage "eyes on the park". Avoid locating tall foliage, walls, or large signage towards the entrance of the park, which may act as visual barriers.

El Cerrito and Richmond Draft San Pablo Avenue Specific Plan – Transportation Goals and Policies Applicable to Pedestrians and Bicyclists

Trans-portation	**T-1** Make the plan area a walkable and bikeable corridor at the seam of the El Cerrito and Richmond communities.	**T-1.1** Encourage transit use, walking, bicycling and other non-motorized personal modes of transportation by providing clearly defined and safe routes for transit users, pedestrians and cyclists.
		T-1.2 Discourage local automobile traffic from performing short trips; instead promote transit use, walking and bicycling as a means for residents and employees to move between destinations located within the plan area.
		T-1.3 Install additional crosswalks at key intersections to minimize San Pablo Avenue as a barrier.
		T-1.4 Provide and enhance pedestrian and bicycle-only routes that allow alternative means of access to key destinations and penetrate long blocks.
		T-1.5 Install dedicated mid-block mews and greenway connections through long blocks to improve pedestrian and bicycle connectivity between San Pablo Avenue and the Ohlone Greenway.
		T-1.6 Design the public realm and rights-of-way for universal design and Americans with Disabilities Act (ADA) compliance to meet or exceed guidelines set by the Division of the State Architect.
		T-1.7 Include universally accessible design improvements, such as appropriately placed curb cuts, audible pedestrian-crossing signals, minimum pathway grades, generous walkway width and areas for rest.
		T-1.8 Encourage the use of traffic-calming techniques, such as street narrowing, bulb outs, roundabouts, traffic diverters and other strategies on streets in the neighborhoods just off of the Avenue.
	T-2 Improve ridership of transit options along the corridor, including BART, the Rapid Bus, and regional and local buses.	**T-2.1** Identify opportunities for parking pricing strategies and minimizing the number of parking spaces provided while ensuring parking needs are met.
		T-2.2 Explore the creation of public parking structures in strategic locations that may be shared by transit riders, residents and businesses.
		T-2.3 Streamline bus circulation patterns to improve transit provision and minimize impacts on the pedestrian and bicycle environment.
		T-2.4 Improve the overall environment around transit centers.
		T-2.5 Explore improvements to seating and weather protection at transit stops along San Pablo Avenue.
Trans-portation	**T-3** Strengthen multi-modal connections in and around the plan area.	**T-3.1** Provide safe and efficient automobile circulation.
		T-3.2 Reconfigure bus routes through the Del Norte BART Station area to streamline bus operations and reduce the impact of bus traffic in the area.

*Special policies exist for distinguished “character areas” along the Avenue.

El Cerrito General Plan Goals and Policies Applicable to Pedestrians and Bicyclists

Goal	Policy
LU2: A land use pattern and mix of uses that contribute to the financial health and stability of the community.	LU2.1 San Pablo Avenue. Promote retail, office, and mixed uses along San Pablo Avenue to provide more tax revenues to the city.
LU4: A safe, attractive, and interesting community	
LU5: A land use pattern and types of development that support alternatives for the movement of people, goods, and ideas.	LU5.2 Mixed-Use Centers. Encourage mixed-use centers along San Pablo Avenue – including development along Fairmount Avenue, Stockton Avenue and Moeser Lane, between San Pablo Avenue and the Ohlone Greeway – that provide the opportunity for people to walk among businesses, employment, and residences.
	LU5.5 Pedestrians, Bicycles, and Access. Ensure that business areas have adequate pedestrian and bicycle facilities and accessibility for persons with disabilities, and that easy connections to transit are available wherever possible.
LU6: Development patterns that promote energy efficiency, conservation of natural resources, and use of renewable rather than nonrenewable resources.	LU6.2 Circulation Alternatives. To the extent possible, encourage alternatives to the use of private automobiles. Encourage a full range of transportation options – driving, transit, walking and biking – without allowing any one to preclude the others.
	CD1.9 Building Design. A variety of attractive images will be achieved by encouraging a variety of building styles and designs, within a unifying context of consistent "pedestrian" scale along streets and compatibility among neighboring land uses.
CD2: A city with attractive, safe, and functional streets, parking areas, and pedestrian walkways.	CD2.2 San Pablo Avenue. Develop a design concept for San Pablo Avenue that includes street landscaping and improvements, and design guidelines that create an overall coordinated image and character of the street from north to south. Establish physical design standards for development in cooperation with Caltrans and, where required, subject to acceptance by Caltrans.
	CD2.3 Streetscape Improvements. Maintain an active program of street tree planting and improved roadway landscaping through both public and private means. Design guidelines shall describe appropriate types of trees for commercial areas – to enhance the shopping experience rather than detract from it.
	CD2.4 Multi-Modal Transportation Network. Ensure that streets, paths, and bikeways contribute to the system of a fully connected transportation network to all major destinations in the City. The design of these streets and pathways should encourage pedestrian and bicycle uses by being spatially defined by buildings, trees, lighting, and street furniture. Pedestrian and bicycle pathways and auto routes should be compatible.

	CD2.5 Signs. Scale and orient signs to both pedestrians and drivers along the street frontage. Building signs should be designed to fit within the scale and character of buildings.
	CD2.7 Accessible Design. Site and building design must meet basic accessibility needs of the community and not be exclusively oriented to those who arrive by car.
CD2: A city with attractive, safe, and functional streets, parking areas, and pedestrian walkways.	CD2.8 City Sidewalk and Pedestrian Walkways. City streets and pedestrian walkways should be designed to be safe, accessible, convenient, comfortable, and functionally adequate at all times, including the design of pedestrian crossings, intersection design, sidewalk widths, street tree planting, street furniture, and signal timing.
	CD3.11 Streetscape Design. Streetscape design (street trees, lighting, and pedestrian furniture) should be used to lend character and continuity with commercial districts and residential neighborhoods.
T1: A transportation system that allows safe and efficient travel by a variety of modes and promotes the use of alternatives to the single-occupant vehicle.	T1.1 Balanced Transportation System. Create and maintain a balanced transportation system with choice of transit, bicycle, pedestrian, and private automobile modes.
	T1.3 Bicycle Circulation. Create a complete, interconnected bicycle circulation system. Provide a bicycle system that serves commuter as well as recreational travel. Improve bicycle routes and access to and between major destinations
T1: A transportation system that allows safe and efficient travel by a variety of modes and promotes the use of alternatives to the single-occupant vehicle.	T1.4 Pedestrian Circulation. Provide a safe, convenient, continuous and interconnected pedestrian circulation system throughout the City. Ensure safe pedestrian access to local schools.
T3: A transportation system that maintains and improves the livability of the City.	T3.5 Street Maintenance. Provide high-quality, regular maintenance for existing and future transportation facilities, including streets and dedicated bicycle paths.
T3: A transportation system that maintains and improves the livability of the City.	T4.2 Improve Circulation. Improve circulation in locations with high levels of congestion, but avoid major increases in street capacities unless necessary to remedy severe traffic congestion, and not at the expense of pedestrian circulation.
PS1: An adequate, comprehensive, coordinated law enforcement system consistent with the needs of the community.	PS1.7 Traffic Enforcement. Ensure safe streets for all vehicles, bicycles, and pedestrians through adequate traffic enforcement.

Specific Goals, Policies, and Actions of Emeryville Plans

Emeryville General Plan Policies and Recommended Actions Applicable to Pedestrians and Bicyclists

Goal	Policy
Overall Circulation System	
T-G-1 A comprehensive transportation system—A transportation system that is efficient, safe, removes barriers (e.g. accessibility near freeways and rail lines), and optimizes travel by all modes.	
T-G-2 Universally accessible—A transportation system that meets the needs of all segments of the population, including youth, seniors, persons with disabilities, and low-income households.	T-P-2 The design, construction, operation, and maintenance of city streets shall be based on a "complete streets" concept that enables safe, comfortable, and attractive access and travel for pedestrians, bicyclists, motorists, and transit users of all ages and abilities.
T-G-3 Multi-modal—A transportation system that eliminates the necessity of owning and/or driving personal vehicles because of the availability of convenient and accessible alternative modes of transportation.	T-P-3 A "Quality of Service" standard that seeks to optimize travel by all transportation modes shall be developed and used to measure transportation performance. The City does not recognize "Level of Service" (LOS) as a valid measure of overall transportation operations, and sets no maximum or minimum acceptable LOS levels, with the exception of streets that are part of the regional Congestion Management Agency network. (These streets may change, but as of 2008 include San Pablo Avenue, Frontage Road, and Powell and Adeline streets). LOS shall not be used to measure transportation performance in environmental review documents or for any other purpose unless it is mandated by another agency over which the City has no jurisdiction (such as Caltrans, Berkeley, Oakland, and the Congestion Management Agency), and then it shall only be used for the purposes mandated by that agency.
Walking	
T-G-4 A walkable city—A universally accessible, safe, pleasant, convenient, and integrated pedestrian system that provides links within the city and to surrounding communities, and reduces vehicular conflicts.	T-P-9 Sidewalks shall be provided on both sides of all streets; pedestrian connections between new and existing development is required.
	T-P-10 The city will plan, upgrade, and maintain pedestrian crossings at intersections and mid-block locations by providing safe, well-marked crosswalks with audio/visual warnings, bulb-outs, and median refuges that reduce crossing widths.
T-G-4 A walkable city—A universally accessible, safe, pleasant, convenient, and integrated pedestrian system that provides links within the city and to surrounding communities, and reduces vehicular conflicts.	T-P-11 Pedestrian routes will be provided across large blocks, pursuing creative options if necessary such as purchasing private alleys, designating pathways through buildings, and acquiring public access easements.
T-G-4 A walkable city—A universally accessible, safe, pleasant, convenient, and integrated pedestrian system that provides links within the city and to	T-P-12 Establish Pedestrian Priority Zones in Neighborhood Centers, around schools, and in other locations as indicated in Figure 3-2, where wider sidewalks, street lighting, crosswalks, and other pedestrian amenities are emphasized. Link these

surrounding communities, and reduces vehicular conflicts.	zones to adjacent land uses to ensure that building frontages respect pedestrians and truck loading takes place on adjacent streets wherever possible.
	T-P-13 Walking will be encouraged through building design and ensure that automobile parking facilities are designed to facilitate convenient pedestrian access within the parking area and between nearby buildings and adjacent sidewalks. Primary pedestrian entries to nonresidential buildings should be from the sidewalk, not from parking facilities.
Bicycling	
T-G-5 A safe, comprehensive, and integrated bicycle system—A system and support facilities throughout the city that encourage accessible bicycling for all community members.	T-P-19 The City will develop the bicycle circulation system set forth in Figure 3-4 and based on the typologies described in this chapter.
	T-P-21 On-street bike routes in the City's Bicycle and Pedestrian Plan shall be designated as either Class II (bike lanes) or Class III (signed routes without lanes), as appropriate. These designations are not part of the General Plan and may be changed as circumstances dictate.
	T-P-22 Safe, secure, and convenient short- and long-term bicycle parking shall be provided near destinations for all users, including commuters, residents, shoppers, students, and other bicycle travelers. Retail businesses in regional retail areas are encouraged to provide valet bicycle parking.
	T-P-23 A numbered bike route system with destination signs, consistent with the regional bike route numbering system shall be developed and implemented with clear signage to bicycle boulevards.
	T-P-24 Bicycling will be promoted through public education, including the publication of literature concerning bicycle safety and the travel, health and environmental benefits of bicycling.
City Structure	
UD-G-3 A walkable and pedestrian-scaled environment—A network of streets and connections that expands circulation opportunities for pedestrians and bicyclists.	
UD-G-7 Expanded street grid—A pedestrian and bicycle path system with extensions that improve connectivity throughout the city.	
UD-G-8 A safe, attractive, and connected pedestrian environment—Throughout the city, but particularly in areas with high volumes of pedestrian activity.	
Interface	
UD-G-13 Streets that support multiple functions—Streets designed for all types of users, including pedestrians, bicyclists, public transit, and automobiles.	UD-P-18 The San Pablo Avenue Urban Design Plan will continue to be used to improve landscaping, and streetscape design and guide development in the San Pablo Corridor district.

Streetscapes and Building-to-Street Interface
UD-P-40 Minimize pavement widths (curb to curb) to the minimum necessary to ensure traffic flow and safety, to discourage speeding through neighborhood centers and residential areas, and to prioritize pedestrian and bicycle movement.
UD-P-41 Sidewalks shall be safe, comfortable, and accessible for pedestrians.
UD-P-43 Curb cuts shall be minimized to emphasize continuous, unbroken curb lengths.
UD-P-44 Long blocks shall be minimized to allow for ease of pedestrian connectivity.
UD-P-45 Street trees shall be planted in a row along the curb, between the vehicle roadway and sidewalk, unless this is physically impossible due to constraints such as underground water or sewer lines.
UD-P-66 An open relationship between buildings and street edge should be maintained. Fencing and significant landscape barriers should be avoided, except to enclose individual yards.

Specific Goals, Policies, and Actions of Oakland Plans

Oakland General Plan Policies and Recommended Actions Applicable to Pedestrians and Bicyclists on San Pablo Avenue

Objective	Policy
T2 – Provide mixed use, transit-oriented development that encourages public transit use and increases pedestrian and bicycle trips at major transportation nodes.	T2.2, Guiding Transit-Oriented Development -Transit-oriented developments should be pedestrian oriented, encourage night and day time use, provide the neighborhood with needed goods and services, contain a mix of land uses, and be designed to be compatible with the character of surrounding neighborhoods.
	T3.4 Emerging New Technologies – The City should encourage the use of new technologies in traffic control devices to maximize efficiency of car, bicycle, and pedestrian traffic.
	T3.5 Including Bikeways and Pedestrian Walks – The City should include bikeways and pedestrian walks in the planning of new, reconstructed, or realized streets, wherever possible.
T4 – Increase use of alternative modes of transportation.	T4.1 Incorporating Design Features for Alternative Travel – The City will require new development, rebuilding, or retrofit to incorporate design features in their projects that encourage use of alternative modes of transportation such as transit, bicycling, and walking.
	T4.2 Through cooperation with other agencies, the City should create incentives to encourage travelers to use alternative transportation options.
	T4.5 Preparing a Bicycle and Pedestrian Master plan – The City should prepare, adopt, and implement a Bicycle and Pedestrian Master Plan as a part of the Transportation Element of this General Plan.
	T4.6 Making Transportation Accessible for Everyone – Alternative modes of transportation should be accessible for all of Oakland's population, including the elderly, disabled, and disadvantaged.
T6 – Make streets safe, pedestrian accessible, and attractive.	T6.1 Posting Maximum Speeds – Collector streets shall be posted at the lowest possible speed (usually a maximum speed of 25 miles per hour), except where a lower speed is dictated by safety and allowable by law.
	T6.2 Improving Streetscapes – The city should make major efforts to improve the visual quality of streetscapes. Design of the streetscape, particularly in neighborhoods and commercial centers, should be pedestrian-oriented and include lighting, directional signs, trees, benches, and other support facilities.

Oakland Pedestrian Master Plan Goals, Policies and Applicable to San Pablo Avenue

Goal	Policy	Action
1. Pedestrian Safety: Create a street environment that strives to ensure pedestrian safety.	1.1. Crossing Safety: Improve pedestrian crossings in areas of high pedestrian activity where safety is an issue.	1.1.1. Consider the full range of design elements – including bulbouts and refuge islands – to improve pedestrian safety.
		1.1.2. Update crossing treatment policy guidelines for all types of crossings based on current federal research (FHWA 2002a, FHWA 2002b).
		1.1.3. Conduct a test of the FHWA-based crosswalk policy (FHWA 2002a) in the Fruitvale District.
		1.1.4. Use pedestrian safety, bicyclist safety, and residential and business densities to establish lower speed limits in areas with a high level of pedestrian activity or a history of pedestrian/motor vehicle collisions (California Vehicle Code Section 627).
		1.1.5. Evaluate whether to update the City's current lighting policy to ensure that crosswalks are properly lit at night.
		1.1.6. Analyze pedestrian/motor vehicle collisions to reduce the incidences of pedestrian/motor vehicle conflict.
	1.2. Traffic Signals: Use traffic signals and their associated features to improve pedestrian safety at dangerous intersections.	*1.2.1*. Review the guidelines for signal need prioritization to ensure that pedestrian considerations are given due consideration.
		1.2.2. Create guidelines, priorities and a schedule for the installation of pedestrian signal heads at locations with significant pedestrian crossing volumes.
		1.2.3. Seek additional funds to pay for the retrofitting of traffic signals with pedestrian signal heads and the maintenance costs that such additions may incur.
		1.2.4. Review the signal-timing program to ensure that it incorporates the needs of pedestrians by providing adequate crossing times.
		1.2.5. Seek funds to address the backlog of traffic signals with special attention to signals in front of schools, senior centers, and other high-pedestrian activity centers.
		1.2.6. Continue the City's programs to install audible pedestrian signals at all new and retrofitted traffic signals. Continue the on-demand program to install such signals at additional locations based on requests from persons with visual impairments.
		1.2.7. Consider using crossing enhancement technologies like countdown pedestrian signals (a device not yet approved by State or Federal agencies) at the highest pedestrian volume locations.

1. Pedestrian Safety: Create a street environment that strives to ensure pedestrian safety.	1.3. Sidewalk Safety: Strive to maintain a complete sidewalk network free of broken or missing sidewalks or curb ramps.	*1.3.1.* Conduct a survey of areas lacking sidewalks and estimate the cost and feasibility of filling sidewalk gaps in areas with pedestrian traffic.
		1.3.2. Assign responsibility for sidewalk additions to ensure that sidewalk gaps are filled.
		1.3.3. Create a program to enforce the responsibility of adjacent property owners for the addition of sidewalks to close gaps and accompany new development.
		1.3.4. Aid in the finance of sidewalk improvements through the creation of assessment districts.
		1.3.5. Budget funds for additional sidewalks to fill in gaps in the sidewalk network in areas identified as high priority for safety reasons.
		1.3.6. Implement pedestrian scale lighting at regular intervals in areas of high pedestrian activity to promote pedestrian safety and discourage criminal activity.
		1.3.7. Conduct a survey of all street intersections to identify corners with missing, damaged, or non-compliant curb ramps and create a plan for completing their installation.
		1.3.8. Continue the City's in-fill and on-call curb ramp programs to fulfill the federal mandate for curb ramps at every pedestrian crossing.
		1.3.9. Continue and expand the City's program of on-demand sidewalk repairs.
2. Pedestrian Access: Develop an environment throughout the City – prioritizing routes to school and transit – that enables pedestrians to travel safely and freely.	2.1. Route Network: Create and maintain a pedestrian route network that provides direct connections between activity centers.	2.1.1. Improve existing connections across/under freeways to activity centers using lighting, acoustics, and other design features.
		2.1.2. Develop a system of signage for pedestrian facilities including walkways and trails.
		2.1.3. Create trails, identified in the Open Space, Conservation, and Recreation (OSCAR) Element that follow creeks and help promote the restoration of those creeks.
		2.1.4. Avoid the use of pedestrian overpasses and underpasses for pedestrian crossings on surface streets (FHWA 2002b, p. 49).
		2.1.5. Install signage to discourage drivers from using local streets as through routes.
		2.1.6. Conduct a study to identify streets with underused travel lanes for potential traffic calming projects including restriping, lane reduction, and sidewalk widening.
		2.1.7. Strive to maintain the existing walkways to ensure that they are safe and free of debris and vegetation.
		2.1.8. To the maximum extent possible, make walkways accessible to people with physical disabilities.

2. Pedestrian Access: Develop an environment throughout the City – prioritizing routes to school and transit – that enables pedestrians to travel safely and freely.	2.2. Safe Routes to School: Develop projects and programs to improve pedestrian safety around schools.	2.2.1. Using the Pedestrian Route Network as a base, work with schools having the highest walking rates to designate, improve, and publicize safe routes to school.
		2.2.2. Implement a seamless school safety program that coordinates adult crossing guards, student safety patrols, and parent volunteers to ensure that all schools have adequate traffic safety programs.
		2.2.3. Prioritize crossing and sidewalk improvements around schools with the greatest number of child pedestrian/vehicle collisions.
		2.2.4. Work with schools having inadequate pick-up and drop-off facilities to develop compensatory programs.
		2.2.5. All new schools in Oakland should consider vehicle pick-up and drop-off areas to accommodate child pedestrian safety.
	2.3. Safe Routes to Transit: Implement pedestrian improvements along major AC Transit lines and at BART stations to strengthen connections to transit.	2.3.1. Develop and implement street designs (like bus bulbouts) that improve pedestrian/bus connections.
		2.3.2. Prioritize pedestrian improvements at transit locations with the highest pedestrian volumes and the most pedestrian/vehicle collisions.
		2.3.3. Prioritize the implementation of street furniture (including bus shelters) at the most heavily used transit stops.
		2.3.4. Improve pedestrian wayfinding by providing local area maps and directional signage at major AC Transit stops and BART stations.
3. Streetscaping and Land Use. Provide pedestrian amenities and promote land uses that enhance public spaces and neighborhood commercial districts.	3.1. Streetscaping: Encourage the inclusion of street furniture, landscaping, and art in pedestrian improvement projects.	3.1.1. Identify pedestrian routes in neighborhood commercial districts and in the downtown to prioritize streetscaping improvements.
		3.1.2. Budget funds for the concrete cutting of tree pits to facilitate the City's street tree program.
		3.1.3. Prioritize the replacement of dead or missing trees at locations with existing tree pits.
		3.1.4. Include pedestrian-scale lighting in streetscaping projects.
		3.1.5. Use part of the City's 1.5% Public Art Ordinance and seek additional funding sources to incorporate public art into the Pedestrian Route Network.
		3.1.6. Work with community groups to install signs, artwork, and landscaping that highlight historical and community landmarks.

3. Streetscaping and Land Use. Provide pedestrian amenities and promote land uses that enhance public spaces and neighborhood commercial districts.	3.2. Land Use: Promote land uses and site designs that make walking convenient and enjoyable.	3.2.1. Use building and zoning codes to encourage a mix of uses, connect entrances and exits to sidewalks, and eliminate “blank walls” to promote street level activity.
		3.2.2. Promote parking and development policies that encourage multiple destinations within an area to be connected by pedestrian trips.
		3.2.3. Consider implementing “pedestrian only” areas in locations with the largest pedestrian volumes.
		3.2.4. Require contractors to provide safe, convenient, and accessible pedestrian rights-of-way along construction sites that require sidewalk closure.
		3.2.5. Continue the programs to clean up trash and blighted buildings at the street level and expand the use of business associations in this regard.
		3.2.6. Encourage the inclusion of public walkways or trails in large, private developments.
		3.2.7. Encourage the development of pocket parks and plazas that are along the Pedestrian Route Network.
		3.2.8. Discourage motor vehicle parking facilities that create blank walls, unscreened edges along sidewalks, and/or gaps between sidewalks and building entrances.
4. Education. Educate citizens, community groups, business associations, and developers on the safety, health, and civic benefits of walkable communities.	4.1. Education. Promote safe and courteous walking and driving and the benefits of walking through targeted outreach programs.	4.1.1. Sponsor Walk to School Day as an annual, citywide event that encourages people to walk and promotes both pedestrian and driver safety around schools.
		4.1.2. Sponsor Pedestrian Safety Week as an annual, citywide educational event to promote pedestrian and driver safety.
		4.1.3. Continue the use of Safe Moves Town in public schools as an educational tool for pedestrian safety.
		4.1.4. Publicize the Pedestrian Route Network through the internet and other means.
		4.1.5. Publicize the network of walkways in brochures that explain their history and describe suggested walking tours.
		4.1.6. Work with residents and community groups to expand the network of walkways on existing City rights-of-way.
		4.1.7. Publicize the City’s audible pedestrian signal network and provide wayfinding orientation for persons with visual impairments through the Mayor’s Commission on Persons with Disabilities and local organizations.
	4.2. Enforcement: Prioritize the enforcement of traffic laws that protect the lives of pedestrians.	4.2.1. Develop a fine structure that discourages walking and driving behaviors that threaten the safety or access of pedestrians.
		4.2.2. Continue the program of radar trailer deployment in high-speed areas.

4. Education. Educate citizens, community groups, business associations, and developers on the safety, health, and civic benefits of walkable communities.	4.2. Enforcement: Prioritize the enforcement of traffic laws that protect the lives of pedestrians.	4.2.3. Continue the program of targeted enforcement of the pedestrian's right-of-way at unsignalized crosswalks.
		4.2.4. Continue the "Stop" program that takes unqualified drivers off the road.
		4.2.5. As part of the city budget process, consider if an adequate number of officers are assigned to traffic enforcement and if additional officers could be funded through additional citation revenue.
5. Implementation. Integrate pedestrian considerations based on federal guidelines into projects, policies, and the City's planning process.	5.1. Dedicate the necessary staff support to implement the Pedestrian Master Plan.	
	5.2. Conduct public outreach to residents, merchants, and property owners affected by major pedestrian improvements scheduled for implementation.	
	5.3. Coordinate pedestrian improvement projects with scheduled projects for street re-paving, streetscaping, and utility undergrounding.	
	5.4. Revise existing design standards where necessary using federal guidelines for arterial, collector, and local streets to ensure pedestrian safety and access.	
	5.5. Work with existing and future plans to ensure that they promote the safety, convenience, and enjoyability of walking, while meeting approved design guidelines.	

Oakland Bicycle Master Plan Goals, Policies and Applicable to San Pablo Avenue

Goal	Policy	Action
1. Infrastructure: Develop the physical accommodations, including a network of bikeways and support facilities, to provide for safe and convenient access by bicycle.	1A – Bikeway Network: Develop and improve Oakland's bikeway network.	*1A.1 – Bicycle Lanes (Class 2)*: Install bicycle lanes where feasible as the preferred bikeway type for all streets on the proposed bikeway network (except for the bicycle boulevards proposed for local streets with low traffic volumes and speeds).
		1A.2 – Arterial Bicycle Routes (Class 3A): Install arterial bicycle routes on collector and arterial streets only when bicycle lanes are infeasible. These shared lane facilities shall include best practices for lane widths, signage, and striping.
		1A.4 – Route Signage: Develop an informative and visible signage system for the bikeway network, building on existing bikeway signage, that includes directional and distance information to major destinations.
		1A.6 – Dedicated Right Turn Lanes and "Slip Turns" : Where feasible, avoid the use of dedicated right turn lanes on streets included in the bikeway network. Where infeasible, consider a bicycle through lane to the left of the turn lane or a combined bicycle lane/right turn lane.
		1A.7 – Diagonal Parking: Discourage the installation of "head-in/back-out" diagonal parking on streets included on the bikeway network. Where feasible, relocate existing diagonal parking on the bikeway network to other streets.

1. Infrastructure: Develop the physical accommodations, including a network of bikeways and support facilities, to provide for safe and convenient access by bicycle.	1A – Bikeway Network: Develop and improve Oakland's bikeway network.	*1A.10 – Maintenance*: Continue and improve the PWA Customer Call Center as the system for reporting and responding to maintenance issues on bikeways.
		1A.11 – Street Cleaning: Strive to keep bikeways free of debris through regularly scheduled street sweeping. In industrial areas, work with businesses to ensure their compliance with related use permits for keeping adjacent roadways and bikeways clear of sand, gravel, and other debris.
		1A.12 – Regional and Inter-regional Bikeways: Work with partner agencies to support the development of regional and inter-regional bikeways.
		1A.13 – Striping Materials: Where feasible, specify thermoplastic or tape for bikeway pavement markings for increased longevity and reduced maintenance.
	1B – Routine Accommodation: Address bicycle safety and access in the design and maintenance of all streets.	*1B.1 – Roadway Improvements*: Include bicycle safety and access improvements in roadway resurfacing, realignment, and reconstruction projects.
		1B.2 – Traffic Signals: Include bicycle-sensitive detectors, bicycle detector pavement markings, and adequate yellow time for cyclists with all new traffic signals and in the modernization of all existing signals.
		1B.3 – Freeway Ramps: Work with Caltrans to reduce conflicts created by ramps, dedicated turn lanes, and high-speed merges at freeway interchanges.
		1B.4 – Bridges: Include two-way bicycle access in projects that would rebuild or create new bridges over the Oakland Estuary, Lake Merritt Channel, railroad tracks, or freeways.
		1B.5 – Railroad Crossings: Strive to enhance bicyclist safety at railroad crossings by improving pavement quality, reducing the flangeway gap, removing abandoned tracks, and installing warning signs to indicate rough surfaces or skewed tracks where needed.
		1B.6 – Medians: Discourage the installation of medians where those medians would preclude a proposed bikeway or otherwise compromise bicyclist safety and access.
		1B.7 – Automobile Diagonal Parking: Consider the negative impacts on cyclists in proposals to convert parallel parking to diagonal parking.
		1B.8 – Pavement Quality and Drainage Grates: Strive to ensure smooth paving surfaces and bicycle-safe drainage grates on city streets and paths.

1. Infrastructure: Develop the physical accommodations, including a network of bikeways and support facilities, to provide for safe and convenient access by bicycle.	1B – Routine Accommodation: Address bicycle safety and access in the design and maintenance of all streets.	*1B.9 – Bicycle Performance Measure*: Work to identify and integrate a quantitative performance measure for bicycles into the City's process for environmental review and transportation impact analysis.
	1C – Safe Routes to Transit: Improve bicycle access to transit, bicycle parking at transit facilities, and bicycle access on transit vehicles.	*1C.1 – Bikeways to Transit Stations*: Prioritize bicycle access to major transit facilities from four directions, integrating bicycle access into the station design and connecting the station to the surrounding neighborhoods.
		1C.2 – Bicycle Parking at Transportation Hubs: Work with partner agencies to provide secure bicycle parking at transportation hubs that accommodates demand with bicycle racks, bicycle lockers, bicycle cages, and/or bicycle stations.
	1D – Parking and Support Facilities: Promote secure and conveniently located bicycle parking at destinations throughout Oakland.	*1D.1 – CityRacks Program*: Continue Oakland's program of installing bicycle racks in the public right-of-way based on requests by residents and merchants.
		1D.6 – Bicycle Parking Ordinance: Adopt an ordinance as part of the City's Planning Code that would require new development to include short and long-term bicycle parking.
2. Education: Improve the safety of bicyclists and promote bicycling skills through education, encouragement, and community outreach.	2A – Education: Work with public agencies and the private sector to improve bicycle education, enforcement, and promotional programs.	*2A.1 – Child Education*: Work with the Oakland Unified School District and community- based organizations to develop education programs and parking facilities that promote youth cycling.
		2A.2 – Adult Education: Work with bicycling organizations and partner agencies to provide street skills bicycle safety courses for adult cyclists.
		2A.3 – Driver Education: Work with stakeholder organizations and the media to educate drivers on the rights and responsibilities of cyclists and drivers through brochures and public service announcements.
		2A.6 – Public Awareness: Publicize the benefits of bicycling, existing facilities, and available programs through Bike to Work Day, the City of Oakland's web site, and other outreach opportunities.
	2B – Enforcement: Prioritize the enforcement of traffic laws that protect bicyclists.	*2B.2 – Officer Training*: Educate police officers on the importance of and methods for citing bicycle offenders.
		2B.4 – Oakland Municipal Code: Review and update the sections of the Oakland Municipal Code that relate to bicycles.

3. Coordination: Provide a policy framework and implementation plan for the routine accommodation of bicyclists in Oakland's projects and programs.	3A – Resources: Seek the necessary staff and funding to implement the *Bicycle Master Plan*.	*3A.3 – Routine Accommodation*: Integrate bicycle facilities and their associated costs into the implementation of streetscape and resurfacing projects.

Specific Goals, Policies, and Actions of Richmond Plans

Richmond General Plan Policies and Recommended Actions Applicable to Pedestrians and Bicyclists on San Pablo Avenue

Goal	Policy
CR1 Expand the Multimodal Circulation System Richmond seeks to make conditions safer and more attractive for all modes of mobility including travel by foot and bicycle, public transit and automobiles. By relying on a place-based approach to circulation planning, the City can evaluate streets and potential enhancements based on surrounding land use, street function and desired character. Potential improvement measures should range from physical design treatment of the street environment to social and programmatic responses appropriate to the particular street context.	**CR1.1 Balanced Modes of Travel** *Encourage multiple modes of travel in the City to enhance mobility for all.* Streets and corridors should support a variety of travel modes including transit, pedestrians, bicycles and goods movement as well as automobiles.
	CR1.2 Access for All *Provide circulation options that are accessible to all members of the community.* Providing an affordable circulation system that meets the needs of low-income populations, seniors, youth and persons with disabilities will ensure access for all.
	CR1.3 An Interconnected Street System *Provide an interconnected system of streets that adequately serves current and future travel needs.* By promoting a grid system for streets along with pedestrian, bicycle and transit facilities, the City can support streets that are compatible with surrounding land uses, street function and community character.
	CR1.6 Safe and Convenient Walking and Bicycling *Promote walking and bicycling as a safe and convenient mode of transportation.* The City should improve pedestrian and bicycle amenities to serve the recreation and travel needs of residents and visitors in all parts of Richmond. Where feasible, the City should: connect major destinations such as parks, open spaces, civic facilities, employment centers and retail and recreation areas with pedestrian and bicycle infrastructure; promote shared roadways in residential streets; require new development and redevelopment projects to provide pedestrian and bicycle amenities, streetscape improvements and linkages to planned and completed City and regional multi-use trails; and develop safe routes to schools and out-of-school programs that allow access by bicycle and pedestrian paths or reliable and safe transit. The City should provide enhanced bicycle and pedestrian facilities, explore innovative solutions such as bicycle-sharing programs, and encouraging businesses, schools and residential developments to provide secure bicycle parking to ensure that these ecologically-friendly, low-impact transportation modes are available to all community members, thereby reducing emissions from vehicles within the City, improving environmental quality and enhancing mobility and connectivity.
	CR1.9 Place-Based Circulation Approach *Promote the place-based planning approach and classification system outlined in this General Plan.* This integrated approach linking functional accessway requirements with surrounding land uses and urban design promotes community character, active use of streets and improved quality of life.

CR2 Promote Walkable Neighborhoods and Livable Streets Richmond strives to activate the public right-of-way and improve the experience of moving people between key destinations at the pedestrian level. In order to make walking and bicycling a more attractive option, the City should enhance connectivity between neighborhoods, schools, the workplace, and daily goods and services so that reaching key destinations is safer and more convenient. Promoting mixed-use streets, high-quality pedestrian environments, context-based street design and efficient public transit will also contribute to walkability and livability.	**CR2.2 Complete Streets** *Promote mixed-use urban streets that balance public transit, walking and bicycling with other modes of travel.* Developing a grid-based network of streets with landscaping and amenities for transit, bicycles and pedestrians will support pedestrian and bicycle connectivity, as well as transit accessibility. Long block lengths, cul-de-sacs and gated streets should be discouraged. Furthermore, the City should provide mid-block crosswalks where cul-de-sacs or long blocks impede pedestrians.
	CR2.3 Integrated Bicycle and Pedestrian System *Create and maintain a safe, comprehensive and integrated bicycle and pedestrian system.* Walking and bicycling to work, to schools and for recreation can be encouraged by providing amenities and facilities for pedestrians and bicycles, enhancing pedestrian and bicycle connectivity within neighborhoods, promoting multimodal trails and pathways accessible to all and addressing major barriers in the community such as freeways, railroads and steep terrain. Pedestrian improvements at parks, community centers, open space areas, schools, transit stops and commercial nodes will further enhance the bicycle and pedestrian system. *Action CR2.D Street Design Guidelines* Update the street design guidelines that support public transit, bicycles and walking on all streets. Develop standards that are consistent with and tailored to street or trail function and adjacent land use type. Pedestrian-friendly designs should address maximum lane widths, maximum curb radii, sidewalk width, curb ramps and Americans with Disabilities Act (ADA) requirements. Bicycle-friendly design should address lane widths, street and intersection crossings and parking areas. Include guidelines for transit access.
CR3 Create a Safe and Well-Maintained Circulation System An emphasis on ongoing street maintenance and safety improvements that consider all modes of transportation including walking, bicycling and public transit are needed to create a safe and efficient circulation system. As new development occurs in Richmond, new facilities and infrastructure must meet the needs of all users while enhancing mobility and connectivity.	**CR3.1 Safety and Accessibility** *Enhance safety and accessibility for pedestrians, bicyclists and public transit riders.* The City can promote walking, bicycling and transit use by improving: key intersections and streets to reduce pedestrian and bicycle collisions; transit stations and stops to reduce crime and vandalism; at grade railroad crossings to minimize traffic conflicts and increase connectivity; and streetscape design to reduce traffic speeds and pollution.
	CR3.2 Adequate Maintenance *Ensure adequate maintenance of transportation facilities such as streets, trails, sidewalks and bicycle paths.* Maintenance priorities should emphasize safety considerations, impacts on non-automobile modes of travel and overall impacts on long-term resource needs.
	EC4.2 Walkable Neighborhoods and Livable Streets *Promote safe and walkable neighborhoods and inter-connected streets through the design of streetscapes, public gathering places and physical development.* Provide pedestrian amenities such as sidewalks and street trees, transit and bike improvements, lighting

	and landscaping and appropriate traffic calming measures to ensure a safe pedestrian environment for all. Support uses and public space improvements that generate street-level activity, create eyes-on-the-street, provide opportunities for community interaction and encourage a sense of collective ownership of common areas. Encourage mixed-use development that attracts people and facilitates activity throughout the day. Strongly discourage isolated or gated communities in order to improve physical connectivity throughout the City, and create incentives to remove barriers in existing gated areas. The City should maintain the streets to ensure that neighborhoods and streets are safe and well used. Walkable communities with neighborhood nodes and local amenities and services provide opportunities for residents and workers to comfortably travel to and from school, work, shopping and other destinations by foot, bicycle and public transit rather than relying solely on vehicles.
	LU1.3 A Range of High-Quality Community Facilities and Infrastructure *Provide a wide range of high-quality facilities and infrastructure to serve diverse community needs.* Upgrade, maintain and expand infrastructure to meet current and future needs and provide an effective and consistent level of services and utilities to all neighborhoods. Provide facility and infrastructure improvements that support enhanced vitality and a better quality of life for residents and businesses in core urban areas of the City. Retain existing public facilities and uses in the Downtown and actively work to attract new public facilities, especially within walking distance of the Richmond BART/Amtrak station. Facilities and infrastructure may include community and recreation centers, parks and playgrounds, libraries and senior centers, schools, safe streets, multiuse trails, pedestrian-scale lighting, and police and fire stations.
LU6 Promote High-Quality and Sustainable Development Richmond will set a high standard of quality and ecological sustainability for the design, planning and construction of new and renovated public and private facilities, infrastructure and services. The City should adhere to a comprehensive planning approach that supports a sustainable and healthy community and reduces impacts on the natural environment. Richmond encourages new development near transit and in areas with existing transportation infrastructure. By promoting the location of housing, jobs and	**LU6.1 Pedestrian-Friendly and Transit-Oriented Urban Environment** *Promote walkability and public transit by encouraging mixed-use, higher-density development close to community amenities.* Promote multifamily and mixed-use infill and brownfield redevelopment close to the Richmond BART/Amtrak Station, Hilltop Area and the Ford Peninsula, the site of the planned ferry terminal. Encourage new development to comply with transit-oriented development principles and prioritize projects that will reduce automobile use. Support increased residential density, commercial intensity and reduced parking requirements in areas well served by transit while protecting and increasing land dedicated to parks and open space. Locate regional uses, including region-serving recreation, commercial and institutional uses, close to transit stations to energize these areas, create strong activity centers and community nodes and reduce reliance on automobile trips.

recreation uses close to transit lines, bicycle routes and pedestrian improvements, Richmond can activate the public realm and reduce the need for residents and employees to travel by automobile to access daily needs. In support of a walkable and vibrant community, the City further strives to develop complete mixed-use streets that are safe for pedestrians, bicyclists and all modes of travel.	Support complete and balanced streets and an expanded multimodal circulation system. Locate medium and high-density housing and mixed-use development along corridors where improvements to multimodal systems are planned. Require new development and improvements to include amenities for pedestrians, bicyclists and transit users. Encourage public agencies and institutions to locate new public facilities proximate to primary user groups and existing public transit infrastructure. Encourage new residential uses near existing schools and community facilities.

Specific Goals, Policies, and Actions of Countywide and Regional Plans for San Pablo Avenue

Alameda Countywide Strategic Pedestrian Plan Goals and Policies Applicable to San Pablo Avenue

Goal	Policy
1. Number and Percentage of Walk Trips: Increase the number and percentage of walking trips with the intention of reducing motor vehicle use.	a. Increase the percentage of walking trips for all trip purposes, from 12 percent to 14 percent by 20101 and to 18 percent by 2020, by replacing vehicle trips whenever possible.
	b. Focus countywide funding on pedestrian improvements in high density transit-dependent areas.
	c. Encourage incorporating walking into everyday activities to increase physical fitness.
	d. Enhance public awareness about the health benefits of walking, particularly for obese individuals and those at risk for diabetes, heart disease and stroke.
2. Safety: Improve actual and perceived pedestrian safety and security.	a. Significantly improve methods of collecting and analyzing data on collisions and collision rates, using geographic information systems (GIS) and other analysis tools to ensure funding is focused on projects of greatest need.
	b. Implement pedestrian safety and security improvements in locations with the highest collision rates and security issues.
	c. Improve pedestrian safety, especially for the young, elderly, and disabled.
	d. Reduce annual pedestrian collision rate by 50 percent by 2030.
	e. Improve driver awareness of pedestrian rights.

3. Infrastructure and Design: Improve Alameda County's pedestrian environment through additional infrastructure, better design and maintenance.	a. Improve the state of the practice of pedestrian infrastructure design so that all transportation facilities are well-designed and standardized, where appropriate.
	b. Support efforts to ensure that pedestrians are fully considered in all transportation projects, to the extent feasible, including by supporting the Routine Accommodation policies of regional, State and federal agencies.
	c. Encourage local agencies to develop and follow pedestrian design guidelines and amend local ordinances as appropriate to reflect them.
	d. Support local agency compliance with provisions of the Americans with Disabilities Act related to public access.
	e. Support maintenance of the existing pedestrian infrastructure with countywide funds when no other maintenance funds are available.
	f. Support efforts to plan, design and fund transportation facilities that minimize conflicts between pedestrians and other travel modes (i.e., bicycles, transit, autos).
	g. Support a mix of land uses and activities in development and redevelopment projects that will maximize pedestrian travel.
4. Connectivity: Ensure that essential pedestrian destinations throughout Alameda County—particularly public transit—have direct, safe and convenient pedestrian access.	a. Encourage the prioritization of pedestrian projects that provide access to essential destinations such as commercial districts, schools, healthcare facilities, senior centers, grocery stores, and parks and trail systems, particularly in high density, transit-dependent areas.
	b. Support investment in the creation of convenient, safe pedestrian routes to transit, including to bus stops, ferry terminals and rail stations.
	c. Increase countywide pedestrian access share to BART by 6.5 percent, from 22 percent in 1998 to 23.5 percent in 2010.
	d. Encourage development that is designed to optimize access by public transit and on foot.
6. Staffing and Training: Ensure that public agency staff and elected and appointed officials are well-informed and well-trained in the pedestrian realm.	d. Work with law enforcement agencies on pedestrian safety, enforcement of traffic laws, and the collection of collision data.

Alameda Countywide Bicycle Plan Goals and Objectives Applicable to San Pablo Avenue

Goal	Objective
1. Create and maintain an inter-county and intra-county bicycle network that is safe, convenient and continuous.	Increase the potential for bicycle transportation by closing gaps in existing bikeways.
	Designate appropriate bicycle facilities to serve routes which link major activity centers, including transit stations, schools, parks and employment and shopping centers, as well as routes which sere major corridors.
	Designate appropriate bicycle facilities on routes linking schools, after-school child care facilities, libraries, parks, and recreational sties to facilitate the mobility of school-aged children.
	Consider the needs of bicyclists for smooth and level pavement in all roadway maintenance practices.
	Include bike/pedestrian facilities in all transportation projects where feasible and appropriate.
2. Integrate bicycle travel in transportation planning activities and in transportation improvement projects.	Include a bicycle and pedestrian element in all transportation studies.
	Encourage and facilitate multimodal interface by including bike parking at multimodal transfer points and by supporting bikes-on-board transit vehicles.
	Coordinate with other local, regional, state, and federal agencies to plan, design, fund and construct bicycle projects.
	Utilize transportation models based on person-trips and estimate future bike trips and walking trips.
	Develop a checklist of guidelines that address bicycle and pedestrian access to be used in the planning and programming of al CMA-funded transportation projects.
3. Encourage policies and actions that foster bicycling as a mode of travel.	Encourage land use plans to include bicycle/pedestrian connections.
	Promote pavement management programs that encourage bicycle/pedestrian travel.
	Encourage bike parking facilities at employment sites, schools, and shopping areas.
	Encourage bicycling as a means to reduce traffic congestion, particularly in local TDM plans.
	Address impacts of development or transportation projects on bicycle/pedestrian access, circulation and safety.
	Establish guidelines that encourage: • Bicycle parking ordinances • Bicycle parking facilities • City bicycle fleets • Bicycle/car-pooling/transit programs (e.g. through the implementation of financial incentive programs) • Encourage the establishment of citation diversion programs for bicyclists. • Promote bicycle planning and engineering training programs for city and county staff.

4. Improve bicycle safety through facilities, education and enforcement.	Identify primary bicycle accident types, locations and ages of individuals involved in the bicycle accidents by periodically reviewing the Statewide Integrated Traffic Record System (SWITRS) and determine measures to mitigate these collisions.
	Develop a proactive program to identify and eliminate obstacles, including deferred maintenance.
	Encourage bicycle safety education programs targeted at the following audiences in order to reduce bicycle accident rates, improve public awareness of bicycling and increase bicycle mode share: • adult cyclists • elementary school students • middle and high school students • motorists • general public
	Encourage enforcement efforts on the most common motorist and bicyclist violations.
5. Maximize the use of public and private resources in establishing the bikeway network.	Maintain designated bikeways as well as all roadways as part of a regularly scheduled maintenance program.
	Consider bicycle volumes and bicycle routing in the prioritizing of roadways in the pavement management system.
	Incorporate bicycle/pedestrian access in non-freeway roadway projects to provide such facilities most cost-effectively.
	Develop a prioritized list of bicycle projects to be able to maximize funding opportunities.
	Encourage public/private, inter-jurisdictional and intra-jurisdictional partnerships in designing, funding and constructing new projects.

Contra Costa County Draft Bicycle and Pedestrian Plan Goals and Policies Applicable to San Pablo Avenue

Goal	Objective	Policy
1. Expand, Improve and Maintain Facilities for Walking and Bicycling	*Double the number of bikeway miles and create three new pedestrian-priority districts in the county by 2020.*	1.1. Describe a countywide system of non-motorized transportation facilities and key destinations and other attractors of pedestrians and bicyclists.
		1.2. Identify significant gaps and barriers to walking and bicycling and define funding priorities for removing these obstacles and implementing other needed pedestrian and bicycle projects and programs.
		1.3. Provide funding for the construction of priority bicycle and pedestrian facilities to connect and provide access to commercial and job centers, transit stations, schools, parks and other key activity centers throughout Contra Costa.
		1.4. Include the costs of maintenance of pedestrian and bicycle facilities when estimating the maintenance needs of streets and roads and encourage local jurisdictions to do the same.
2. Improve Safety for Pedestrians and Bicyclists	*Reduce the rate of pedestrian and bicycle fatalities and injuries per capita by half by 2020.*	2.1. Give relative funding priority to projects that address safety deficiencies for pedestrians and bicyclists, especially conflicts with motor vehicles.
		2.2. Provide funding for traffic calming, intersection improvements and other projects if they improve safety for pedestrians and bicyclists.
		2.3. Analyze data on traffic collisions involving pedestrians and bicyclists and share this information with local agencies to assist them in identifying and remedying problem locations.
		2.4. Support programs that educate drivers, bicyclists, and pedestrians of their rights and responsibilities, as well as pedestrian and bicycle education and safety programs for adults and youth.
		2.5. Support the development of “bike trains,” “walking school buses” and “safe routes to school” programs at schools throughout Contra Costa to encourage more students of various ages to walk or bicycle to school.
		2.6. Support enforcement by local police departments of laws that aim to protect pedestrians and bicyclists from collisions with motor vehicles.
3. Encourage More People to Walk and Bicycle	*Double the share of trips made by walking and bicycling in Contra Costa by 2020.*	3.1. Work with local and regional agencies to develop encouragement and promotion programs for walking and bicycling aimed at a broad range of audiences and potential users.
		3.2. Incorporate bicycle- and walking-related services into broader transportation demand management and commute alternatives programs and support events such as “bike to work” days, “walk to school” days and “National Walk at Lunch Day.”

3. Encourage More People to Walk and Bicycle	*Double the share of trips made by walking and bicycling in Contra Costa by 2020.*	3.3. Support wayfinding programs for pedestrians and bicyclists, such as free maps, trip-planning services and the regional 511 BikeMapperSM program, and work with local agencies to develop a countywide signage scheme, including directional and destination signs for bikeways and trails and location maps in pedestrian districts.
		3.4. Support bicycling-skills classes and other programs that help bicyclists learn how to ride safely.
5. Consider and Plan for the Needs of Pedestrians and Bicyclists	*Help every local jurisdiction in Contra Costa to adopt and begin implementing effective policies and standards for pedestrian- and bicycle-friendly developments by 2012.*	5.1. Encourage local jurisdictions to consider the impacts of their development decisions on walking and bicycling and, consistent with the Authority's Growth Management Pro-gram, require the jurisdictions to adopt policies and standards that support pedestrian, bicycle and transit access in new developments.
		5.2. Monitor capital improvement projects to ensure that the needs of pedestrians and bicyclists (including children, seniors and persons with disabilities) are considered in programming, planning, design, construction, operation and maintenance activities and products; encourage local agencies to do the same.
		5.3. Comply with the "routine accommodation" requirements of the Metropolitan Transportation Commission concerning the evaluation of needs for pedestrian and bicycle facilities, and assist local implementing agencies in meeting their responsibilities.
		Policy 5.4. Insist that roadway projects funded by the Authority incorporate "complete streets" principles as appropriate to each project so that they provide safe and convenient access to all users, including bicyclists and pedestrians.
		Policy 5.5. For transportation projects funded by the Authority that result in the removal or degradation of pedestrian or bicycle facilities, provide at least equally safe and convenient alternatives.
		Policy 5.6. For transportation projects funded by the Authority, provide temporary accommodations for pedestrians and bi-cyclists during construction activities.

Contra Costa Countywide Transportation Plan Goals and Strategies Applicable to San Pablo Avenue

Goal	Strategy
3. Provide and expand safe, convenient and affordable alternatives to the single-occupant automobile	3.1 Help fund the expansion of existing transit services, and maintenance of existing operations, including BART, bus transit, school buses, and paratransit
	3.2 Link transit investments to increased coordination and integration of public transit services, and improved connections between travel modes
	3.3 Require local jurisdictions to incorporate policies and standards that support transit, bicycle and pedestrian access in new developments
	3.4 Support transit-oriented and pedestrian-friendly developments
	3.5 Invest in trails, walkways, and pedestrian-oriented improvements
	3.6 Promote formation of more carpools and vanpools, and greater use of transit, bicycling, and walking
	3.7 Support the expansion of a coordinated system of transit and paratransit service to address the mobility needs of low-income, elderly, young and disabled travelers
	3.8 Encourage local jurisdictions and other agencies to develop a connected and coordinated system of bicycle facilities through financial assistance, technical support and other aid and encouragement

MTC Regional Bicycle Plan Goals and Policies Applicable to San Pablo Avenue

Goal	Policy
1. Routine accommodation - Guarantee that accommodations for bicyclists and pedestrians are routinely considered in the planning and design of all roadway, transit and other transportation facilities funded by MTC.	1.1 Ensure that all transportation projects funded by MTC consider enhancement of bicycle transportation, consistent with MTC Resolution 3765, Caltrans Deputy Directive 64 R1, Assembly Concurrent Resolution 211 and the Complete Streets Act of 2008.
	1.2 Encourage bicycle-friendly design of all roadways, public transit systems and other transportation facilities, through new technologies, “best practices,” mandatory standards, optional guidelines and innovative treatments.
2. The Regional Bikeway Network (RBN) - Define a comprehensive RBN that connects every Bay Area community; provides connections to regional transit, major activity centers and central business districts; and includes the San Francisco Bay Trail.	2.1 Develop a cohesive system of regional bikeways that provide access to and among major activity centers, public transportation and recreation facilities.
	2.2 Ensure that the RBN serves bicyclists with diverse ability levels who are bicycling for a range of transportation and recreational purposes.
	2.3 Ensure that closing gaps in the RBN — particularly those that occur over jurisdictional boundaries — are given high funding priority.
	2.4 Ensure ongoing maintenance and monitoring efforts that support the implementation and operation of the RBN.
	2.5 Encourage coordination of cross-jurisdictional bicycle way-finding signage.

3. Bicycle safety - Encourage local and statewide policies that improve bicycle safety.	3.1 Ensure investment choices that help achieve the *Transportation 2035* goal of reducing bicycle fatalities and injuries by 25 percent each from 2000 levels by 2035.
	3.2 Support local government efforts to improve bicyclist safety by encouraging enforcement of the California Vehicle Code for motorists and cyclists alike. Examples include diversion training programs and reduced fines for errant cyclists so police officers will be more willing to cite them. (Diversion training allows motorists and cyclists who break traffic laws to avoid having citations documented in exchange for attending traffic safety classes.)
4. Bicycle education and promotion - Develop training sessions and educational materials that emphasize bicycle safety and the positive benefits of cycling.	4.1 Encourage and support the creation or expansion of comprehensive safety awareness, driver education, cyclist education, and diversion training programs for cyclists and motorists.
	4.2 Develop a comprehensive promotion and outreach effort — including, but not limited to, Bike-to-Work Day — that advocates for bicycling as part of a larger effort to provide healthy and environmentally friendly transportation choices.
5. Multimodal integration - Work toward developing seamless transfers between bicycling and public transportation.	5.1 Encourage transit agencies to provide, maintain and promote convenient and secure bicycle parking at transit stops, stations and terminals, including racks, bike lockers, in-station bike storage and staffed and automated bicycle parking facilities.
	5.3 Foster collaboration between local jurisdictions and regional transit agencies to improve bicycle access to transit stations in the last mile surrounding each station. Improvements to ease, speed, convenience and safety of bicycle access, including by means of signage and bikeways, should be considered.
6. Comprehensive support facilities & mechanisms - Encourage the development of facilities and institutions that contribute to a bicycle-friendly environment.	6.1 Encourage development of facilities at transit stations that provide long-term bicycle storage, bicycle repair and bicycle rental.
	6.2 Encourage local jurisdictions to adopt ordinances requiring bicycle parking and storage and to offer incentives to employers that provide enclosed, sheltered bicycle parking for their employees and, when feasible, their customers.
8. Planning - Continue to support ongoing regional bicycle planning.	8.3 Encourage development of bicycle facilities and amenities when planning Priority Development Areas (PDAs).

Specific Goals, Policies, and Actions of West Hollywood Plans

West Hollywood General Plan: Mobility Section Goals and Policies Applicable to Pedestrians and Bicyclists

<table>
<tr><th>Goal</th><th>Policy</th></tr>
<tr><td>M-1: Develop a world-class transit system in West Hollywood</td><td>M-1.2: Work with transit providers to improve the quality of transit stations, transit stops, and transfer points by enhancing the following passenger amenities, among others, as appropriate:
• Way-finding and clear signage
• Bus shelters and shade structures
• Clean and comfortable waiting areas
• Attractive landscaping, art, and paving materials
• User-friendly system and route maps
• Updated and current schedules
• Real-time arrival times via GPS updates (i.e., “NextBus”)
• Adequate seating areas based on passenger volumes and typical wait times
• Adequate pedestrian walkways
• Convenient pay stations
• Bicycle storage
• Public restrooms</td></tr>
<tr><td rowspan="7">M-3: Maintain and enhance a pedestrian-oriented City.</td><td>M-3.1: Encourage and provide incentives and programs for people to walk more and drive less.</td></tr>
<tr><td>M-3.2: Seek to prioritize space for pedestrians and bicycles in the design and improvement of public rights of way.</td></tr>
<tr><td>M-3.3: Implement improvements identified in the adopted Bicycle and Pedestrian Mobility Plan as funding becomes available.</td></tr>
<tr><td>M-3.4: Where feasible, provide the following pedestrian amenities throughout the street network, consistent with the desired urban form and land use in this General Plan:
• Wider sidewalks
• Street trees and landscaping
• Bulb-outs
• Seating areas
• Pedestrian-oriented lighting</td></tr>
<tr><td>M-3.5: Utilize the City’s planning processes, such as streetscape improvements or area plans, to identify areas where pedestrian improvements can be made, such as new pedestrian connections, increased sidewalk widths, improved crosswalks, pedestrian countdown signals, improved lighting, and new street furniture.</td></tr>
<tr><td>M-3.7: Limit the quantity and width of new curb cuts for vehicle access in order to improve the pedestrian network.</td></tr>
<tr><td>M-3.8: Seek to minimize the negative impacts of parking for the pedestrian realm and accommodate bicycles, carpool and carshare vehicles, and other modes of transit wherever possible in the design of public parking.</td></tr>
</table>

	M-3.9: Require new commercial development to provide for the construction of pedestrian rights of way to allow convenient and unimpeded circulation to, through, and within the property being developed.
	M-3.10: Require design measures as appropriate to accommodate access by pedestrians, bicycles, and transit within new development and to provide connects to adjacent development.
	M-3.11: When possible, enhance pedestrian accessibility by providing bulb-outs where appropriate in order to minimize pedestrian crossing distances and improve visibility.
M-4: Create a comprehensive bicycle network throughout the City.	M-4.1: Implement improvements identified in the adopted Bicycle and Pedestrian Mobility Plan (2003) as funding becomes available.
	M-4.2: As feasible, ensure that new development of commercial and multi-family residential uses enhance the City's bicycle network and facilities.
	M-4.3: Where feasible, install bicycle amenities including parking, storage, dedicated bicycle lanes, and bicycle way-finding/signage along planned bicycle routes, throughout commercial areas, and at public facilities.
	M-4.4: Explore the development of bicycle stations throughout the City and at major transit stops. The bicycle stations should consider amenities such: • Lockers • Showers • Bicycle Repair • Bicycle sharing facilities
	M-4.5: Utilize the City's planning processes, such as street improvements or area plans, to identify areas where better bicycle route connections can be implemented and increased bicycle parking can be provided.
	M-4.7: Utilize outreach and public education activities to increase bicycling or recreation, commuting, and shopping. This may include City-sponsored bike festivals, maintenance classes, and route maps, among others.
M-5: Create an environmentall y and financially sustainable transportation network that provides for the mobility and livability needs of West Hollywood residents, businesses, and visitors.	M-5.1: Maintain a Streetscape Master Plan that balances the needs of pedestrians, bikes, public transit, passenger vehicles, and commercial vehicles.
	M-5.6: Where appropriate, allow alleys to be improved with public art, green space, or other amenities, where improvements do not conflict with access.
	M-5.8: Allow for the collection of fees from developers to undertake the following infrastructure projects to support new development: • Sidewalk improvements • Landscaping • Bicycle infrastructure • Traffic calming devices • Traffic signals • Other improvements that promote/maintain the pedestrian-oriented character of the community (i.e., traffic calming devices and TDM programs).
	M-5.12: Control vehicle speeds through traffic controls, speed limits, and design features with the intended purpose of minimizing vehicle accidents, creating a pedestrian and bicycle environment, and discouraging pass-through traffic.

Selected West Hollywood Bicycle and Pedestrian Master Plan Goals and Policies Pertaining to Santa Monica Boulevard

Bicycle Transportation Goals	
Goal 1: Promote Bicycle Transportation Make bicycle travel an integral part of daily life in West Hollywood by implementing and maintaining a bikeway network, providing end-of-trip facilities, improving the multi-modal bicycle/transit connection, encouraging bicycle use, and making bicycling safer.	
Goal 2: Develop an Enhanced Bikeway Network Implement a bicycle plan that serves the needs of different types of bicyclists (including those with lower skill levels, children, and experienced commuters), and defines a system of bicycle lanes, routes, and support facilities to serve local and regional commuting and recreational bicyclists.	
Goal 3: Enhance Bicycle Transportation Safety Enhance bicycle safety in the City of West Hollywood by striving to reduce the number of bicycle-motor vehicle crashes while simultaneously increasing bicycle usage.	
Bicycle Transportation Objectives	
Objective	***Policy Actions***
B: Identify and Implement a comprehensive bikeway network that serves bicyclists' needs, especially for travel to employment centers, schools, parks, commercial retail areas, transit transfer points, and public institutions.	1. Ensure through project implementation that the bikeway network is continuous, closes gaps in the existing system, serves important destinations, and serves a wide range of potential and existing bicyclists.
	2. Develop a bikeway network that provides regional bikeway connections to Los Angeles and Beverly Hills.
	3. Provide a destination-based signage for the bikeway network to guide bicyclists along designated routes.
	4. Prioritize bicycle facility improvements that address bikeway gaps, enhance safety, serve commuting needs, connect existing routes, and enjoy public support, ad identified in Chapter 7.
	5. Carry out routine maintenance of roadways, eliminate hazards to cyclists, and upgrade actuated traffic signal detection systems to detect bicycles where feasible.
C: Provide short- and long-term bicycle parking and other bicycle amenities in employment and commercial areas, in multifamily housing, at schools, and at transit transfer points.	1. Expand the number of bicycle parking and storage facilities in new development projects and at existing employment centers, schools, major transit transfer points, shopping centers, multi-family housing, and public and semi-public recreational areas, as specified in the Municipal Code Section 19.28.150.
	2. Install short- and long-term bicycle parking in the public right-of-way.
	4. Encourage and support attended bicycle parking facilities at major entertainment and community events.

D: Enhance the opportunities for bicycle-transit multi-modal trips.	2. Provide and promote secure bicycle parking at transit transfer points.
E: Develop and implement education and encouragement programs aimed at youth and adult cyclists. Increase public awareness of the benefits of bicycling and of available resources and facilities for City planning design, and transportation staff.	1. Develop and execute a focused public education campaign on bicycle and pedestrian mobility to increase public awareness of traffic laws on bicycling including the rights and responsibilities of bicyclists and motorists.
	2. Promote the health and environmental benefits of bicycling.
	3. Promote bicycling as the preferred mode of travel for short trips.
	4. Continue Transportation Demand Management programs at worksites that encourage commuters to bicycle to work.
	5. Develop a local bikeway map that includes City of West Hollywood bikeways and those in adjoining areas.
	6. Develop a bikeway map signage program that provides information about bicycle facilities at their point of use.
	7. Provide education regarding bicycle planning, design, and enforcement to City staff and law enforcement officials involved in planning decisions.
Pedestrian Environment Goals	
Goal 1: Enhance Pedestrian Mobility Provide a safe and friendly pedestrian environment for all residents with special attention given to those who are more vulnerable, including seniors, children, and persons with disabilities.	
Goal 2: Enhance Pedestrian Safety Enhance conditions for pedestrians that will foster a pedestrian environment that includes adequate accommodations for sidewalks, safe crossings, facilities for the disabled, and other amenities.	
Goal 3: Encourage More People to Walk Encourage more people to walk for more of their daily trips. Promote walking as a transportation mode of choice for short trips.	
Pedestrian Environment Objectives	
Objective	***Policy Actions***
A: Implement the Bicycle and Pedestrian Mobility Plan	1. Provide education regarding pedestrian planning, design, and enforcement to City staff and law enforcement officials.
B: Implement pedestrian designs that encourage walking and	1. Approve recommended design standards as a guide for attractive landscaping and streetscape amenities, such as street lighting, bus shelters, street furniture, and refuse receptacles. These design elements should be aesthetically pleasing, consistent, and compatible with surrounding designs and uses.

contribute to a positive walking environment.	2. Ensure the adequate application of design guidelines for pedestrian facilities.
	3. Ensure compliance with the Americans with Disabilities Act (ADA).
	4. Ensure the modification and improvement of design guidelines for pedestrian facilities.
	5. Provide and maintain good pedestrian access to transit by ensuring adequate space for transit stops, safe and convenient intersection crossings near transit stops and completion of pedestrian facilities that serve transit stops.

Selected Elements from Chapter Four of the West Hollywood Bicycle and Pedestrian Master Plan: Design Guidelines[8]

Section	Element
4.1	Class II bikeway facility: signage; striping; intersection treatments (pockets, signal loop detectors, bike boxes, colored lanes)
4.2	Class III bike route facility: signage; striping
4.3	Riding on sidewalks
4.4	Signage
4.5	Bicycle parking
4.7	Bicycle amenities ordinance: bicycle parking; showers; bicycle lockers
4.8	Bikeway maintenance: sign replacement; pavement marking; tree, shrub and grass trimming; pavement sealing; pavement sweeping; trash disposal; lighting replacement; graffiti removal
5.1	Street classification: retail-commercial streets; other commercial streets; medium- and high-density residential streets; low-density residential streets
5.2	Sidewalk design guidelines: frontage zone; through pedestrian zone; furnishings zone; curb zone; other sidewalk guidelines
5.3	Pedestrian crossings: signage; push buttons; ADA designs; median refuge island; bulb-out design; transit stops
5.5	Elements of interest to the pedestrian realm: bus shelters; trees and landscaping; benches and other street furniture; textured or colored sidewalk paving; attractive street lights; attractive, standard trash and recycling receptacles; attractive, consolidated news racks; clocks; public art; banners and flags; information kiosks; fountains; district-wide logo/signage program
6.1	Bicycle and pedestrian awareness campaign: print campaign

[8] Elements listed here are included in design guidelines (Chapter 4) of the West Hollywood Bicycle and Pedestrian Master Plan

West Hollywood Strategic Plan Mission Statement and Core Values

Mission Statement:
As a premiere city, we are proactive in responding to the unique needs of our diverse community, creative in finding solutions to managing our urban environment, and dedicated to preserving and enhancing its wellbeing. We strive for quality in all our actions, setting the highest goals and standards.
Core Values:
Respect and Support for People
We recognize and celebrate the diversity of our community by treating all individuals with respect for their personal dignity and providing a wide array of specialized services. We promote mutual respect, courtesy, and thoughtfulness in all interactions.
Responsiveness to the Public
We hold ourselves accountable to the members of our community and are committed to actively seeking public participation. We promote a public process whereby we can respond to the community's needs while balancing competing interests and diverse opinions.
Idealism, Creativity, and Innovation
We value our artistic richness and support idealism and creativity. We are dedicated to consistently finding innovative and better solutions to provide the best public service possible.
Quality of Residential Life
We maintain a balanced sense of community by protecting quality of life, conserving our historic neighborhoods, safeguarding housing affordability, and proactively governing growth with care and thought.
Promote Economic Development
We recognize that economic development is essential to maintaining quality of life for the total community. We support an environment where our diverse and eclectic businesses can flourish, and seek mutually beneficial relations with the business community.
Public Safety
We protect the personal safety of our constituents and safeguard the community from the threats of natural technological and other man-made hazards. Through preparation and planning, we minimize the effects of these disasters.
Responsibility for the Environment
We make it our responsibility to protect and improve our natural and built environments, pursuing opportunities to preserve and create open and green space in our urban setting. We initiate partnerships with other cities and agencies to address regional and global environmental challenges.

Specific Goals, Policies, and Actions of Los Angeles Plans

Los Angeles General Plan: Transportation Element. Selected Goals and Policies Applicable to Pedestrians and Bicyclists

Goal A: Adequate accessibility to work opportunities and essential services, and acceptable levels of mobility for all those who live, work, travel, or move goods in Los Angeles.	
Objective	**Policy**
2: Mitigate the impacts of traffic growth, reduce congestion, and improve air quality by implementing a comprehensive program of multimodal strategies that encompass physical and operational improvements as well as demand management.	2.3: Promote the development of transportation facilities and services that encourage transit ridership, increase vehicle occupancy, and improve pedestrian and bicycle access such as: a. Locally-based Transportation Management Organizations (TMOs); b. Enhanced transit services and improved transit safety; c. Merchant incentives; d. Preferential parking; e. Bicycle access and parking facilities; f. Adequate and appropriate lighting for pedestrian, vehicular, bicycle, and transit uses.
	2.10: Secure funding and rights-of-way for implementation of the Citywide Bicycle Plan Bikeway System.
	2.11: Continue and expand requirements for new development to include bicycle storage and parking facilities, where appropriate.
4: Preserve the existing character of lower density residential areas and maintain pedestrian-oriented environments where appropriate.	4.2: Incorporate traffic management measures to control traffic speeds and volumes on local and collector streets within low density residential neighborhoods to assure safe and orderly traffic flow. Traffic management measures for such local streets may include partial closures and/or traffic diverters.
	4.4: Identify pedestrian priority street segments (through amendments to the Community Plans) in which pedestrian circulation takes precedence over vehicle circulation, and implement guidelines to develop, protect, and foster the pedestrian-oriented nature of these areas.
	4.6: Consider the cultural aspects as well as the safety functions of existing street lighting when determining whether to refurbish or replace existing street lighting equipment.

Goal B: A street system maintained in a good to excellent condition adequate to facilitate the movement of those reliant on the system.	
Objective	**Policy**
8: Operate a pavement management system designed to provide, on a continuing basis, the status of the maintenance needs of the City's street and bikeway systems.	8.1: Identify streets requiring remedial repair and determine the maintenance techniques required to return those streets to a good to excellent condition and to prolong their useful life.
Goal C: An integrated system of pedestrian priority street segments, bikeways, and scenic highways which strengthens the City's image while also providing access to employment opportunities, essential services, and open space.	
Objective	**Policy**
10: Make the street system accessible, safe, and convenient for bicycle, pedestrian, and school child travel.	10.1: Implement the updated and revised 1996 City Bicycle Plan (Chapter IX of this Element).
	10.4: Expedite the implementation of the streetscape guidelines and standards set forth in this Transportation Element for pedestrian priority and transit priority streets as funding allows.
	10.5: Ensure that sidewalks along all designated major and secondary highways are maintained at a minimum ten (10)-foot width pending full dedication and improvement of these streets to the standards set forth in this Element.

Selected Objectives, Policies, and Programs from the City of Los Angeles Bicycle Plan Pertaining to Santa Monica Boulevard

Goal 1: Increase the number and types of bicyclists who bicycle in the City.		
Objective	**Policy**	**Program**
1.1: Develop a comprehensive transportation and recreation bikeway system for the City of Los Angeles.	1.1.1: Establish bicycling as an officially designated mode of transportation for the City of Los Angeles.	A. Traffic Definition: Lobby the State of California to update the legal definition of "traffic" in the California Vehicle Code to include bicycles.
		B. Neighborhood Network: Establish a Neighborhood Network at an approximately one-mile grid to provide local and regional access to community and citywide amenities on "bicycle friendly" local and collector streets.
		C. Five Year Implementation Strategy: In collaboration with the community and Council Districts develop a comprehensive implementation strategy to identify funds and construct at least 200 miles of bicycle facilities on the Backbone and Neighborhood Networks every five years until complete. Bikeways that fill geographic gaps in either of the Networks and/or are in neighborhoods with low-income populations will be prioritized.

1.1: Develop a comprehensive transportation and recreation bikeway system for the City of Los Angeles.	1.1.4: Establish Bicycle Friendly Streets to encourage bicycling on streets with low traffic volumes and slow speeds.	A. Bicycle Friendly Streets: Use a combination of at least two traffic calming and intersection treatments, in addition to shared pavement markings and signage to discourage non-local motor vehicle traffic and to make it easier and safer for bicyclists and pedestrians to travel on local and collector streets and to cross intersections.
	1.1.5: Upgrade Bicycle Routes	A. Enhanced Bicycle Routes: Upgrade existing routes with shared lane markings and signage to increase motorist awareness of bicycle presence.
	1.1.6: Increase the number of bicycle lanes and/or improve the quality of the street right-of-way for bicyclists.	A. Major Highway Class II Street Designation Review: In collaboration with bicyclists, community stakeholders, and City departments update the Major Highway Class II roadways, included in the Backbone Network, to include modified street standards that include the addition of bicycle lanes, bicycle-bus-only lanes and/or other engineering treatments.
		B. Secondary Road Mobility: In collaboration with bicyclists, community stakeholders, and City departments, update Secondary streets included in either the Backbone and/or Neighborhood Bikeway Network, to incorporate modified street standards that include the addition of bicycle lanes and/or other engineering treatments.
		C. Local and Collector Street Mobility: In collaboration with bicyclists, community stakeholders, and City departments update Local and Collector streets included in either the Backbone and/or Neighborhood Networks, to incorporate modified street standards that could include reduced street lane width, the addition of bicycle lanes, Bicycle Friendly Street features or wide curb lanes.
		D. Modified Cross-Sections: Using the modified Cross-Sections included in the Technical Design Handbook and Street Classification Study, develop and adopt new street cross-sections that accommodate a range of bikeway facilities as Standard Cross-Sections in the City's Standard Plans.
		E. Appropriate Speed Limits for Complete Streets: Develop and advocate for state legislation to support reducing posted traffic speeds. Revised methodology should account for all roadway users (including pedestrians and bicyclists), adjacent land uses, and street user demand.

1.1: Develop a comprehensive transportation and recreation bikeway system for the City of Los Angeles.	1.1.7: Increase the number of bicycle lanes.	A. Transit/Bikeway Priority Streets: Establish Major Class II Streets within the Backbone Network that have Rapid Bus Service as Transit/Bicycle Priority Streets. Review the need for a peak hour travel lane on Transit/Bicycle Priority Streets. Install transit/bicycle only lanes where feasible.
		B. Protected Bicycle Lanes: Develop a pilot project to test the use of a protected bicycle lane on Major Class II or secondary roadways. (See Technical Design Handbook)
		C. Street Parking Removal: Identify favorable opportunities to remove parking to accommodate bicycle lanes.
	1.1.8: Require a public hearing for the proposed removal of an existing or designated bicycle lane or path.	A. Public Hearing Process for Bicycle Facility Removal: Require a public hearing with the City Council's Transportation Committee for any proposed bicycle lane, path removal or street improvement that would preclude an existing or designated bicycle lane or path.
1.2: Encourage the use of bicycles for everyday transportation by ensuring the provision of convenient and secure bicycle parking and support facilities citywide.	1.2.1: Develop and implement citywide bicycle rack and location standards.	A. Bicycle Parking Equipment Standards: Develop and adopt bicycle parking equipment standards for bicycle parking equipment installed within the public right-of-way or private developments. Post an educational information guide on the City website.
	1.2.2: Increase the supply of quality bicycle parking in public rights-of-way.	A. Sidewalk Bicycle Parking Program: Continue to install and maintain City-standard bicycle racks on sidewalks. Identify areas with demand for bicycle racks and implement an installation schedule. Prioritize the installation of racks on streets where businesses request the racks as well as within either the Backbone and/or Neighborhood Networks.
		B. On-Street Bicycle Parking Corrals: Develop bicycle parking corrals in on-street parking spaces as a public-private partnership. Implement a pilot installation and evaluate the feasibility and criteria for widespread use. Prioritize Network streets as potential locations for corrals as well as locations where businesses request a corral.
	1.2.3: Increase supply of quality bicycle parking in City facilities.	A. Bicycle Parking Standards in City Facilities: Amend LAMC 12.21-A 16(a) to modify the bicycle parking requirement at all City owned and operated facilities to provide bicycle parking space for 5% of employees and estimated daily visitors with a minimum of five (5) bicycle parking spaces.
		B. City Owned, Operated and Leased Facility Bicycle Parking Review: Review all City-owned, operated, and leased facilities for compliance with the city's bicycle parking standards.

<table>
<tr><td rowspan="9">1.2: Encourage the use of bicycles for everyday transportation by ensuring the provision of convenient and secure bicycle parking and support facilities citywide.</td><td></td><td>Increase bicycle parking to meet LAMC requirements where deficiencies are identified.</td></tr>
<tr><td rowspan="2">1.2.4: Ensure the maintenance of safe, secure bicycle parking facilities.</td><td>A. Bicycle Parking Handbook: Provide information to developers, property managers and building inspectors about bicycle parking and support facilities to comply with LAMC bicycle parking requirements.</td></tr>
<tr><td>B. Bicycle Parking Training: Develop a Bicycle Parking Requirement Training Presentation and post on the Bicycle website. Provide training sessions to the Department of Building and Safety and other City staff on the LAMC bicycle parking requirements.</td></tr>
<tr><td rowspan="3">1.2.5: Encourage the installation of bicycle parking at public schools, colleges, and universities.</td><td>A. Public School Bicycle Parking: Encourage the Los Angeles Unified School District (LAUSD) to install quality bicycle parking at public schools within the City of Los Angeles. Work with LAUSD to identify bicycle parking needs and solutions.</td></tr>
<tr><td>B. Community College Bicycle Parking: Encourage the Los Angeles Community College District (LACCD) to install quality bicycle parking on school property, in front of the school entrance or other visible high traffic locations, at all community colleges within the City of Los Angeles. Work with LACCD to identify bicycle parking needs and solutions.</td></tr>
<tr><td>C. University Bicycle Parking: Encourage four-year universities to install quality bicycle parking on school property, in front of the school entrance or other visible high traffic locations, on all campus locations within the City of Los Angeles. Conduct outreach to identify bicycle parking needs and solutions.</td></tr>
<tr><td rowspan="3">1.2.6: Encourage the installation of bicycle parking at a visible, high traffic location, at all Federal, State and County facilities located within the City of Los Angeles.</td><td>A. Federal Facility Parking: Coordinate with Federal officials to encourage the installation of quality bicycle parking at all Federal facilities within the City of Los Angeles, to meet or exceed City bicycle parking standards. Conduct outreach to identify bicycle parking needs and solutions.</td></tr>
<tr><td>B. State Facility Parking: Coordinate with State officials to encourage the installation of quality bicycle parking at all State facilities within the City of Los Angeles to meet or exceed City bicycle parking standards. Conduct outreach to identify bicycle parking needs and solutions.</td></tr>
<tr><td>C. County Parking: Coordinate with County officials to encourage the installation of good quality parking at all County facilities within the City of Los Angeles to meet or exceed City bicycle parking standards. Conduct outreach to identify bicycle parking needs and solutions.</td></tr>
</table>

1.2: Encourage the use of bicycles for everyday transportation by ensuring the provision of convenient and secure bicycle parking and support facilities citywide.	1.2.7: Develop and implement citywide bicycle parking standards.	A. Private Property Bicycle Parking Standards for Commercial and Industrial projects: Amend LAMC Section 12.21 A.16 to increase the City's requirements for bicycle racks, lockers, and shower amenities in commercial and industrial projects. Require design and placement to comply with City standards.
		B. Private Property Bicycle Parking Standard for Residential Projects: Amend LAMC Section 12.21 A1b to augment the City's bicycle parking requirements to include bicycle racks and lockers in multi-family residential projects.
		C. Parking at Existing Major Destinations: Work with special event facilities' managers to provide convenient, secure, good quality and well-lit bicycle parking facilities at special event venues such as Dodger Stadium, the Staples Center/LA Convention Center, and the LA Memorial Coliseum/Sports Arena.
		D. Transit-Oriented District Plans: Review and update all existing Transit Oriented District Plans (TODs) to include bicycle access and amenities.
	1.2.8: Encourage creative solutions to increase the availability of bicycle parking.	A. Artist Designed Bicycle Parking Solutions: Support and develop creative bicycle parking solutions in the public rights-of-way.
		B. Parking Meter Posts: As existing parking meters are eliminated citywide maintain a minimum of 25% of existing parking meter posts and retrofit for bicycle parking.
		C. Street Furniture Definition: Include bicycle racks in the definition of street furniture to utilize streetscape funding opportunities.
1.3: Expand bicyclists' range and mobility options through the integration of bicycling into the region's transit system.	1.3.1: Incorporate bikeways into transit projects that include an exclusive right-of-way.	A. Bikeways along Exclusive Transit Rights-of-Way: Continue to include Class I bicycle paths adjacent to new exclusive surface transit rights-of-way. Identify all major transit projects under development and work with Metro and other appropriate agencies to incorporate bikeways in new transit projects.
		B. Bicycle-Transit-Only Lanes: Allow bicycle use on surface street bus-only lanes as permitted by California Vehicle Code (CVC) 21202. Work with Metro to develop bus/bike-only lane standards to accommodate bicycle lanes and install appropriate signage and on-street markings. Identify corridors on the Backbone Network that are potential candidates for the inclusion of bus-only lanes.
	1.3.2: Maximize Bicycle Amenities at Transit Stops and Stations	A. Clean Mobility Hubs (Bicycle Commuter Center): Work with transit agencies and adjacent property owners to include attendant operated bicycle storage, lockers, restrooms and showers, and bicycle rental and repair facilities, and WiFi at all transit stations identified as Clean Mobility Hubs on the Bicycle Plan Maps. Coordinate and support Metro efforts as necessary. Leverage the role of the Mayor and the Mayor's appointees as

1.3: Expand bicyclists' range and mobility options through the integration of bicycling into the region's transit system.		members of the Metro board and/or the Metro Technical Advisory Committee to increase support for the development of bicycle amenities at transit locations. Prioritize the development of Hubs that are located on the Backbone Network.
		B. Multi-Mobility Hubs: Work with transit agencies and adjacent property owners to include short term and long term secure bicycle storage, bicycle rental facilities, lockers, bicycle maps and WiFi at transit stations identified as Multi-Mobility Hubs on the Bicycle Plan Maps. (See Backbone and Neighborhood Network Maps) Coordinate and support Metro efforts as necessary.
		C. Transit Station Bicycle Parking: Work with Metro, other transit agencies and adjacent property owners to include bicycle parking racks and lockers at all existing and new transit stations identified as Bicycle Transit Hubs in the Metro Bicycle Transportation Strategic Plan (BTSP).
		D. Bus Stop Bicycle Parking: Work with Metro, local transit agencies and adjacent property owners to include bicycle parking racks within 50' of all existing and new transit stops. Prioritize bus stops that are located on either the Backbone or Neighborhood Networks.
1.4: Encourage and facilitate bicycle riding as an important mode of personal transportation as well as a pleasant source of outdoor exercise.	1.4.1: Promote bicycling through City-sponsored events and through non-profit entities.	A. Monthly Car-Free Days: Coordinate a Car-Free Day on a regular basis each month. Provide information and incentives for drivers to leave the car behind for a day. Post materials at BicycleLA.org website and work with Metro and City Council offices to provide incentives and disseminate materials to event participants.
		E. Ciclovias (Car free Weekend/Holiday Roadways): Provide support to local organizations to organize Ciclovias (a series of local and citywide road closure events) on weekends and holidays to provide bicyclists, walkers, skaters and others a recreational opportunity by creating public space for non-vehicular activities within the roadway area. Encourage the selection of these streets on the Backbone and Neighborhood Networks.
	1.4.2: Provide widespread and user-friendly information on the location and quality of bicycle facilities.	A. Citywide Bikeways Map: Provide and distribute physical and electronic copies of the Citywide Bikeway Map that includes information about the Green, Backbone and Neighborhood Networks and locations of the Clean Mobility Hubs, Multi-Mobility Hubs and bus stops with bicycle amenities.
		B. Neighborhood Network Maps: Work with local Business Improvement Districts, Neighborhood Councils, and Chambers of Commerce to develop, fund, and distribute physical and electronic maps of localized portions of the Citywide Bikeways Map.

1.4: Encourage and facilitate bicycle riding as an important mode of personal transportation as well as a pleasant source of outdoor exercise.	1.4.2: Provide widespread and user-friendly information on the location and quality of bicycle facilities.	C. Public Bicycle Parking Facility Map and Database: Develop and provide a map that includes the public facilities. Maintain a database of the facilities that includes the number of bicycle parking spaces, ownership of the facility, and other amenities.
		D. City's Bikeway Plan Website: Continue to maintain the BicycleLA.org website to provide bicyclists with current information about safety, future improvements, events, network maps, route information and suggestions, maintenance and other relevant information. Provide enhanced tools for hazard reporting, mapping of reported hazards and tracking of repairs.
		E. Poster Campaigns: Promote awareness of the Green, Backbone, and Neighborhood Networks through the installation of posters and/or banners. Installation could be either temporary or permanent and could be used to inform the community about the Networks as well as focus on a variety of topics including safe driving practices and/or bicycling encouragement.
		G. Wayfinding: Develop and install wayfinding signage along the Green, Backbone, and Neighborhood Networks to inform bicyclists of key destinations along, or adjacent to, their route.
Goal 2: Make every street a safe place to ride a bicycle.		
2.1: Disseminate information and provide comprehensive education programs for motorists, bicyclists, and the general public to improve bicycle safety and encourage increased bicycle use.	2.1.5: Educate law enforcement, heavy duty bus and truck operators, taxis, motorists, all city employees and bicyclists on bicyclist rights and safe monitoring behavior around bicyclists.	B. Bicyclists and the Law: Develop and distribute Bicyclists and the Law education material.
2.2: Reduce the number of annual bicycle collisions (bicycle to pedestrian, bicycle to bicycle, bicycle to automobile) to zero.	2.2.1: Enforce traffic laws to enhance bicyclists' safety by consistently citing both motor vehicle operators and bicyclists and ensuring speed enforcement in school zones.	A. LAPD Bicycle Peace Officer Standards and Training Program: Train officers on bicyclists' rights and responsibilities and bicycle/vehicle collision evaluation.
		B. Sting Operations: Target unsafe bicycle riding and motorist driving behavior especially on the Backbone and Neighborhood Networks and in school zones as resources permit. Publicize the stings to improve bicycle and motorist interaction.
	2.2.2: Reduce impediments to bicycle lane mobility and safety.	A. Bicycle Lane Enforcement Program: Train LAPD Traffic Officers and Bureau of Sanitation drivers to identify bicycle lane parking violations and obstructions and issue citations.

2.3 Design and maintain all streets so that they incorporate Complete Street standards.	2.3.1: Upgrade bridges, intersections, freeway ramps, tunnels, and grade separations that impede safe and convenient bicycle passage.	A. Signalization Program: Upgrade, repair, or adjust intersection signalization to accommodate bicyclists in accordance with CA MUTCD. Focus initial efforts on the Backbone and Neighborhood Networks.
		B. Bridge Design Program: Consider bicycle facilities for new or retrofitted bridges. Any modifications to an existing bridge determined to be eligible as a Historic Resource should avoid adversely impacting character-defining features. Particular attention should be made to bridge underpasses that cross existing or future bicycle paths to ensure that the paths are integrated into the design and construction of the facility.
		D. Signal Timing: Identify opportunities to re-time street signals to reduce speeds and create smoother traffic throughput. Prioritize re-timing efforts on streets within the Backbone Network. Identify opportunities to re-time street signals to allow longer crossing times for cyclists/pedestrians where the Neighborhood Network streets cross large intersections.
	2.3.3: Provide and maintain bicycle sensitive signal detectors, information signage, and lighting, along City bikeways.	A. Bicycle-Sensitive Detectors: Continue to install bicycle sensitive signal detectors at all actuated signal controlled intersections. Include pavement markings for bicyclists.
		B. Bicycle Network Wayfinding Program: Develop and install wayfinding signage program to indicate route turns, the presence of intersecting bikeways, streets and distances to nearby local and major destinations along the Backbone and Neighborhood Networks.
		C. Bicycle Street Lighting: Prioritize the installation of bicycle-scale lighting on the Backbone and Neighborhood Network streets.
	2.3.4: Maintain and facilitate the best bikeway design practices.	A. Facility Design Standards: Develop and maintain City of Los Angeles Bikeway Design Standards for inclusion in DOT Manual of Policies and Procedures (MPP).
		D. Innovative Bicycle Priorities and Procedures Review Program: Develop new and innovative bikeway designs and treatments through the California Traffic Control Devices Committee (CTCDC) and the Federal Highway Administration (FHWA) approved experiment process.

2.3 Design and maintain all streets so that they incorporate Complete Street standards.	2.3.5: Maintain safe bikeways through regular inspection and maintenance.	B. Bikeways Maintenance Program: Establish and implement a routine maintenance program which responds to the visual inspection reports for repair/removal of potential hazards, including but not limited to potholes, railroad crossings, inappropriate/unsafe storm drain grates, and gutter cracks. Prioritize the maintenance of streets on the Backbone and Neighborhood Networks.
		D. Routine Bikeways Maintenance Program: Establish a routine maintenance (sweeping, litter removal, repainting of striping and signage) schedule for all roads with bikeways. Prioritize streets on the Backbone and Neighborhood Networks. Publish a schedule on-line and make it easily accessible from the DPW and RAP (and other agency) websites.
		F. Street Lighting of Bikeways: Regularly monitor and maintain adequate street lighting along bikeways. Review lighting conditions and repair lighting as necessary. Prioritize maintenance of lighting on streets along the Backbone and Neighborhood Networks. Provide a way for the public to inform DPW's Bureau of Street Lighting through an existing on-line service request form and 311 when lighting is out.
Goal 3: Make the City of Los Angeles a bicycle-friendly community.		
3.1: Assure that the City has adequate staff to qualify for, receive, and administer its fair share of regional, state and federal funding for bikeway construction, support amenities, bikeway maintenance and bicycle education with high quality projects.	3.1.4: Establish the Bicycle Funding Priority Grading System to prioritize funding applications and City budget allocations to existing and new bikeway facilities including but not limited to bicycle lanes, bicycle parking and showers, signage, intersection improvements, grade separations, street repaving and staffing requirements to support these activities.	D. Street Tree Prioritization: Utilize the Bicycle Funding Priority Grading System to prioritize streets for the planting and maintenance of shade trees.
		E. Street Lighting Prioritization: Utilize the Bicycle Funding Priority Grading System to prioritize streets for the installation and maintenance of street lights.

Selected Elements from the Technical Design Handbook of the City of Los Angeles Bicycle Plan, Applicable to Santa Monica Boulevard[9]

Section	Topics
3. Design of Bicycle Lanes	3.1: Bicycle lane next to on-street parallel parking
4. Design of Bicycle Routes (Class III)	4.4: Bicycle friendly streets
	4.5: Bicycle route signing & pavement marking
	4.8: Bicycle route at local intersections – curb bulbouts and high-visibility crosswalks
	4.9: Bicycle route at local intersections – diagonal diverter
	4.10: Bicycle route at local/major signalized intersection (bicycle detection)
	4.11: Crossing islands

Specific Goals, Policies, and Actions of Regional Plans for Santa Monica Boulevard

Los Angeles County Bicycle Master Plan: Goals, Policies, and Implementation Actions Applicable to Santa Monica Boulevard

Goal 1—Bikeway System *Expanded, improved, and interconnected system of county bikeways and bikeway support facilities to provide a viable transportation alternative for all levels of bicycling abilities, particularly for trips of less than five miles.*	
Policy	**Implementation Action**
1.1: Construct the bikeways proposed in 2012 County of Los Angeles Bicycle Master Plan over the next 20 years.	1.1.1: Propose and prioritize bikeways that connect to transit stations, commercial centers, schools, libraries, cultural centers, parks and other important activity centers within each unincorporated area and promote bicycling to these destinations.
	1.1.2: Coordinate with the adjacent jurisdictions and LACMTA to implement bicycle facilities that promote connectivity.
	1.1.3: Implement bikeways proposed in this Plan when reconstructing or widening existing streets.
	1.1.4: Implement bikeways proposed in this Plan when completing road rehabilitation and preservation projects.
1.3: Coordinate with developers to provide bicycle facilities that encourage biking and link to key destinations.	1.3.1: Require the implementation of bike lanes and bicycle support facilities along key corridors.
	1.3.2: Require bicycle parking at key locations, such as employment centers, parks, transit, schools, and shopping centers.

[9] Elements listed here are included in Technical Design Handbook of the Los Angeles Bicycle Plan

1.4: Support the development of bicycle facilities that encourage new rides.	1.4.1: Support efforts to develop a Complete Streets policy that accounts for the needs of bicyclists, pedestrians, disabled persons, and public transit users.
	1.4.2: Provide landscaping along bikeways where appropriate.
	1.4.3: Ensure the provision of convenient and secure end of trip facilities at key destinations.
	1.4.4: Allow the use of and promote new and/or innovative bicycle facility designs and standards on County bicycle facilities.
1.5: Complete regular updates of the Bicycle Master Plan to be current with policies and requirements for grant funding and to improve the network.	1.5.1: Measure the effectiveness of the Bikeway Plan implementation.
1.6: Develop a bicycle parking policy.	1.6.1: Identify where bicycle parking facilities are needed and identify the appropriate type (e.g., inverted U style racks at grocery stores, bike lockers near transit stations).
	1.6.2: Establish bicycle parking design standards and requirements for all bicycle parking on County property and for private development.
Goal 2 – Safety *Increased safety of roadways for all users.*	
2.1: Implement projects that improve the safety of bicyclists at key locations.	2.1.1: Review bicyclist-related automobile crashes to identify potential problem areas.
	2.1.2: Implement “sharrow” markings on all existing and proposed Class III facilities, as deemed appropriate and in accordance with the most current edition of the Manual on Uniform Traffic Control Devices.
	2.1.3: Coordinate with the California Public Utilities Commission to consider impacts and safety mitigation measures when proposed bicycle facilities are adjacent to, near or over any railroad or rail transit right-of-way.
2.2: Encourage alternative street standards that improve safety such as lane reconfigurations and traffic calming.	2.2.1: Identify opportunities to remove travel lanes from roads where there is excess capacity in order to provide bicycle facilities.
	2.2.2: Implement the bicycle boulevards proposed by this Plan.
	2.2.3: Investigate the use of reflective striping alternatives on Class I bike paths that would address concerns with slippery conditions that generally result from the traditional reflective striping.
2.3: Support traffic enforcement activities that increase bicyclists’ safety.	2.3.1: Encourage enforcement of traffic laws including citing bicyclists, pedestrians and motor vehicle operators consistently for violations to enhance bicyclist and pedestrian safety.

	2.3.2: Encourage targeted enforcement activities in areas with high bicycle and pedestrian volumes.
	2.3.3: Encourage enforcement agencies to conduct traffic enforcement on Class I bikeways.
2.4: Evaluate impacts on bicyclists when designing new or reconfiguring streets.	2.4.1: Encourage the development and approval of traffic study criteria that better accounts for bicyclists and pedestrians.
	2.4.2: Conduct biennial counts of bicyclists on key bikeways to gauge the effectiveness of the County's bicycle facilities in increasing bicycle activity.
	2.4.3: Use alternative Level of Service (LOS) standards that account for bicycles and pedestrians.
2.5: Improve and enhance the County's Suggested Routes to School programs.	2.5.1: Implement improvements that encourage safe bicycle travel to and from school.
	2.5.2: Develop incentive programs for students who participate in the Suggested Routes to School Program.
Goal 3 -- Education *Develop education programs that promote safe bicycling.*	
3.1: Provide bicycle education for all road users, children and adults.	3.1.1: Offer bicycle skills, bicycle safety classes, and bicycle repair workshops.
	3.1.2: Develop communication materials aimed to improve safety for bicyclists and motorists.
3.3: Train county staff working on street design, construction, and maintenance projects to consider the safety of bicyclists in their work.	3.3.1: Educate all key personnel on the needs of bicyclists.
	3.3.2: Educate maintenance personnel on the importance of bicycling related maintenance.
	3.3.3: Explore development of an education program to educate County employees who use a County vehicle on how to safely share the road with bicycles.
3.4: Support training for the California Highway Patrol (CHP).	3.4.1: Work with the CHP to provide training regarding bicyclists' rights and responsibilities pursuant to the California Vehicle Code and the County Code.
Goal 4 – Encouragement Programs *County residents that are encouraged to walk or ride a bike for transportation and recreation.*	
4.2: Encourage non-automobile commuting.	4.2.1: Promote Bike to Work Day/Bike to Work Month among County employees.
	4.2.2: Investigate options for incentivizing County employees to use bicycles and other non-auto modes of transportation to commute to work.
	4.2.3: Expand the County fleet to include alternate modes of transportation, e.g. bicycles.
	4.2.4: Participate in a working group with LACMTA, the Southern California Association of Governments (SCAG), local agencies and advocacy groups, and private industry/entrepreneurs to develop a regionally consistent bicycle sharing program in L.A. County.

Goal 5 – Community Support *Community supported bicycle network.*	
5.1: Support Community Involvement.	5.1.1: Establish a community stakeholder group to assist with the implementation of the Bicycle Master Plan.
	5.1.2: Encourage citizen participation and stakeholder input in the planning and implementation of bikeways and other bicycle related improvements by holding public meetings and workshops to solicit community input.
5.2: Create an online presence to improve visibility of bicycling issues in unincorporated Los Angeles County.	5.2.1: Provide updates to the community about planned projects.
	5.2.2: Provide closure updates to the community about County-maintained regional bikeways.
	5.2.3: Provide information on bicycle safety and wayfinding resources.
5.3: Maintain efforts to gauge community interest and needs on bicycle-related issues.	5.3.1: Conduct periodic online surveys to gauge interest in bicycling and related issues throughout the county.
Goal 6 – Funding *Funded Bikeway Plan.*	
6.1: Identify and secure funding to implement this Bicycle Master Plan.	6.1.1: Support innovative funding mechanisms to implement this Bicycle Master Plan.
	6.1.2: Support new funding opportunities for bicycle facilities that are proposed at the Federal, State, and Local level that impact the county.
	6.1.3: Identify and apply for grant funding that support the development of bicycle facilities and programs.
	6.1.4: Establish the construction of bikeways as a potential mitigation measure for project-related vehicle trips.

Specific Goals and Actions of State Plans and Policies

California Transportation Plan 2025/2030 Goals and Strategies Applicable to Pedestrians and Bicyclists on San Pablo Avenue

Goal	Policy	Strategy
1. Improve Mobility and Accessibility	*Manage and operate an efficient intermodal transportation system*	Enhance connectivity between transportation modes. • Enhance system connectivity and convenience between motorized and nonmotorized transportation modes. • Include infrastructure to support non-motorized modes during the planning and design phases of project development.
		Support systems for comprehensive multimodal planning and system performance analysis that incorporate all transportation modes. • Accelerate deployment of data collection technologies and communications. • Improve analytical methods for assessing performance data.
	Provide viable transportation choices	Establish methods for evaluating levels of service for all modes in support of an integrated, multimodal transportation system.
		Support the goals and further the efforts initiated by the *California Blueprint for Cycling and Walking* • Integrate bicycling into mainstream transportation models and modeling, including cost benefit analysis of bicycle facilities. • Remove barriers to walking and bicycling. • Educate California's youth on the health and air quality benefits of making trips by bicycle or foot.
	Support research to advance safe and environmentally responsible mobility and accessibility	Continue to enhance the understanding of road ecology, a field of study that seeks to explain the relationship between roads and the natural environment.
4. Enhance Public Safety and Security	*Improve system and user safety*	Increase education and outreach programs that address safe transportation behavior, including drivers training, awareness of pedestrian and bicyclists, safe biking practices, and truck driver training.
		Include safe pedestrian and bicycle facilities in the design of new or upgraded roadways.
		Increase patrols to enforce speed restrictions, minimize aggressive driver behavior, and driving under the influence of

		alcohol…
		Improve transportation system safety for older Californians. • Establish roadway infrastructure and land use practices that promote safety.
5. Reflect Community Values	*Manage growth*	Provide incentives to promote sustainable land use decisions that integrate land use, housing, and transportation through General Plans, regional transportation plans, and interregional cooperation. • Increase densities and designs strategically to facilitate effective transit service, including encouraging transit-oriented development within major transit corridors and providing the ability to conveniently walk to destinations. • Promote street and urban design to encourage walking and bicycling to destinations. Incorporate community values and support context sensitive solutions for all transportation facilities and infrastructure.

Caltrans Strategic Plan 2012 Goals, Objectives, and Strategies Applicable to Pedestrians and Bicyclists on San Pablo Avenue

Goal	Objective	Strategy
1. Safety: Provide the safest transportation system in the nation for users and workers.	1.1: By 2008, reduce the fatality rate on the California state highway system to 1.00/100mvmt and continuously reduce annually thereafter toward a goal of the lowest rate in the nation.	1.1.1: Conduct public awareness campaigns in coordination with partners to improve driver behavior.
2. Mobility: Maximize transportation system performance and accessibility	2.4: By 2012, reduce single occupancy vehicle commute trips by 5%.	2.4.8. Increase support for non-motorized and promotion/incentives for use of other alternate means of transportation.

Caltrans Strategic Highway Safety Plan Challenges, Goals, and Strategies Applicable to Pedestrians and Bicyclists on San Pablo Avenue

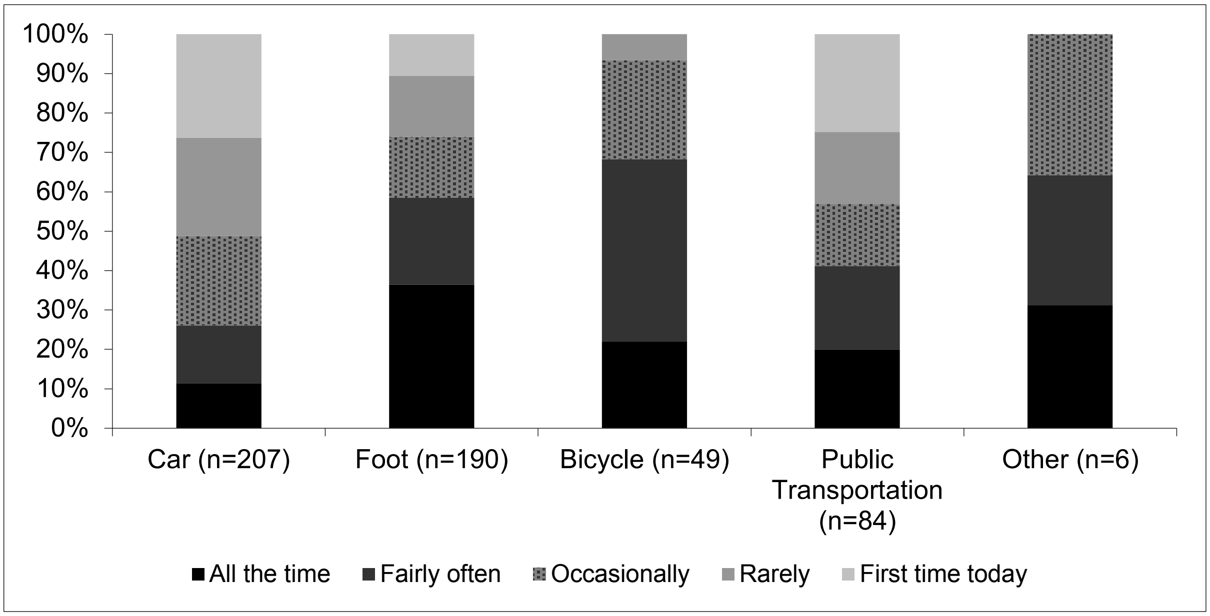
Challenge	Goal	Strategy
7: *Improve Intersection and Interchange Safety for Roadway Users*	By 2010, reduce the number of intersection crash fatalities by 15 percent from their 2004 level.	3. Increase enforcement at and near intersections.
		4. Improve the visibility of and at intersections (illumination, marking, and advanced warning).
		5. Improve the design of traffic control devices.
		7. Improve roadway design at intersections.

8: *Make Walking and Street Crossing Safer*	By 2010, reduce the number of pedestrian fatalities attributed to vehicle collisions by 25 percent from their 2000 level.[10]	2. Enhance the enforcement of violations of pedestrian law by pedestrians and motorists.
8. Make Walking and Street Crossing Safer	By 2010, reduce the number of pedestrian fatalities attributed to vehicle collisions by 25 percent from their 2000 level.	3. Educate all roadway users regarding the rights and responsibilities of pedestrians.
		4. Promote and improve roadway safety infrastructure for pedestrians including the use of advanced technology.
		5. Improve the visibility of pedestrians on the roadway.
		6. Improve the safety of pedestrians traveling to and from schools.
		9. Consider pedestrian needs in all roadway and transit projects.
13: Improve Bicycling Safety	By 2010, reduce the number of bicycle roadway fatalities by 25 percent from their 2000 level.[11]	3. Enhance the enforcement of bicyclist and motorist roadway laws.
		4. Educate all roadway users regarding the rights and responsibilities of bicyclists.
		5. Promote and improve roadway safety infrastructure for bicyclist use.
		6. Improve the visibility of bicyclists on the roadway.
		7. Improve the safety of bicyclists traveling to and from schools, utilizing education, encouragement, enforcement and engineering techniques.

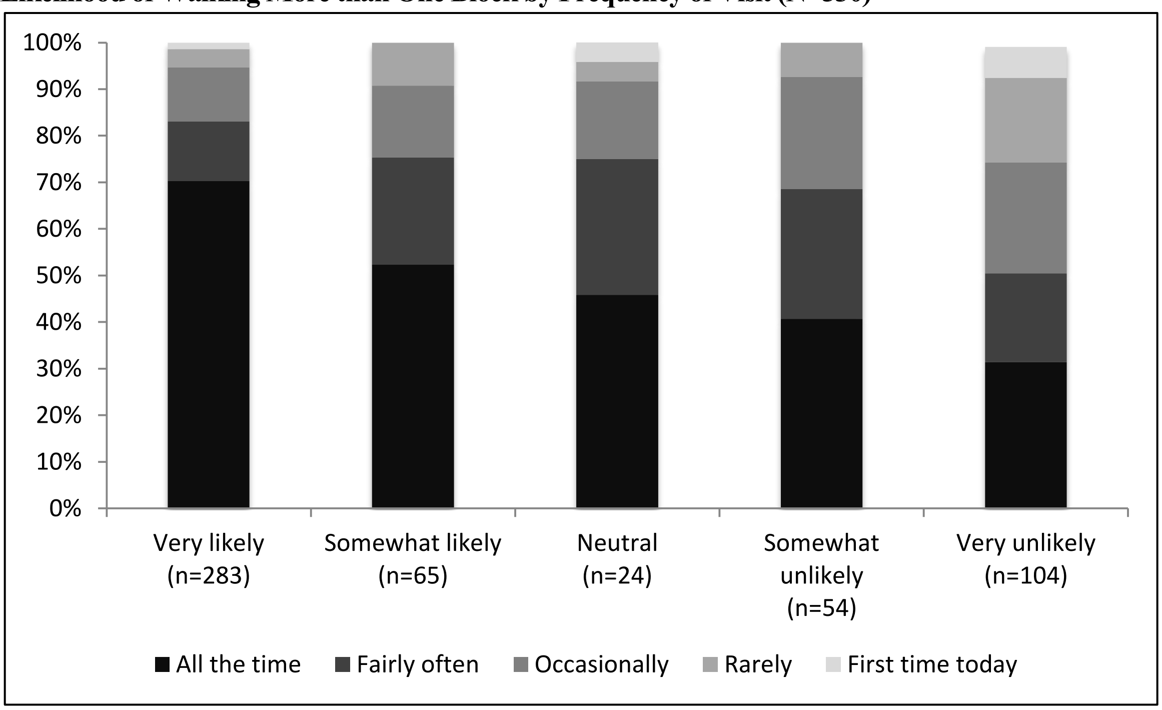
[10] This goal was established in the legislative report *California Blueprint for Bicycling and Walking*, and assumes that the Blueprint's mobility goal of a 50% increase in pedestrian trips by 2010 will also be achieved.
[11] This goal was established in the legislative report *California Blueprint for Bicycling and Walking*, and assumes that the Blueprint's mobility goal of a 50% increase in bicycling trips by 2010 will also be achieved.

Appendix G: Figures from the San Pablo Avenue Pedestrian and Bicyclist Intercept Survey

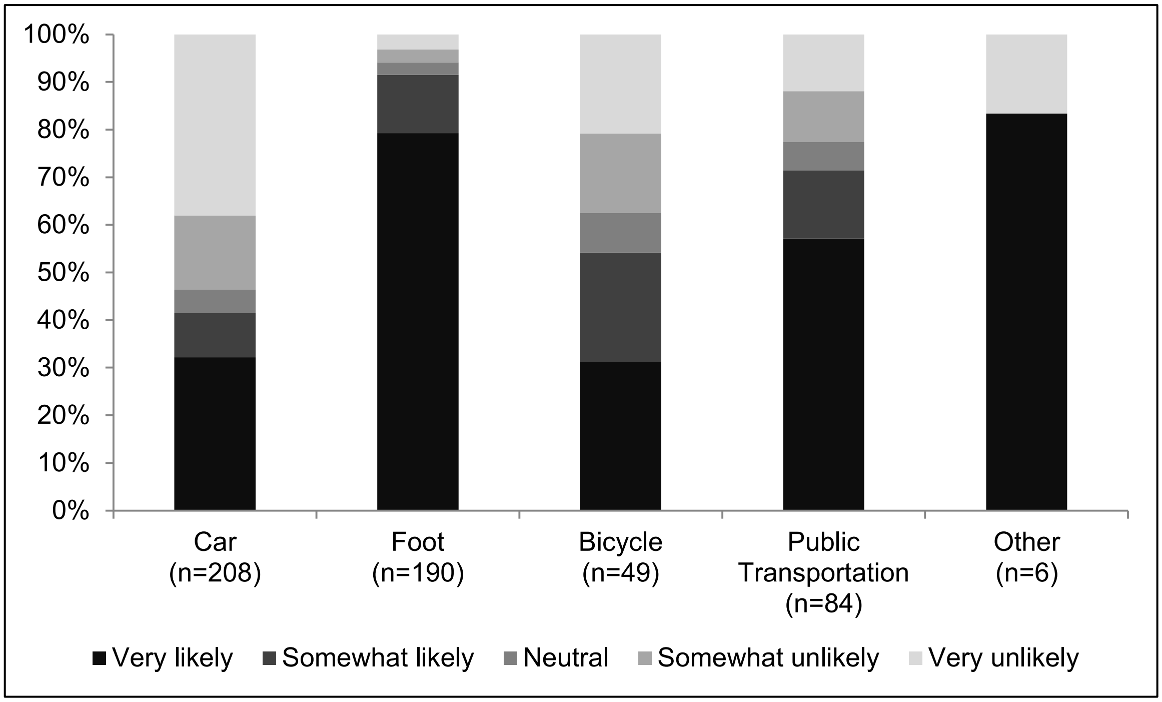
Arrival Mode by Frequency of Visit (N=536)



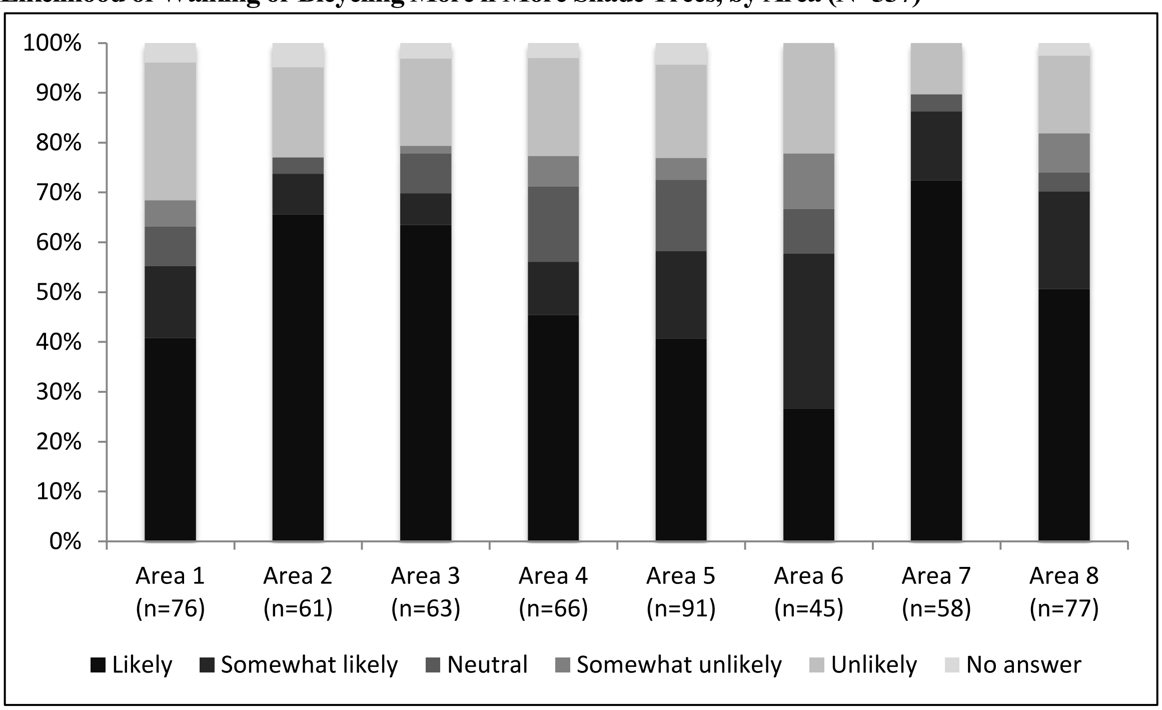
Likelihood of Walking More than One Block by Frequency of Visit (N=530)



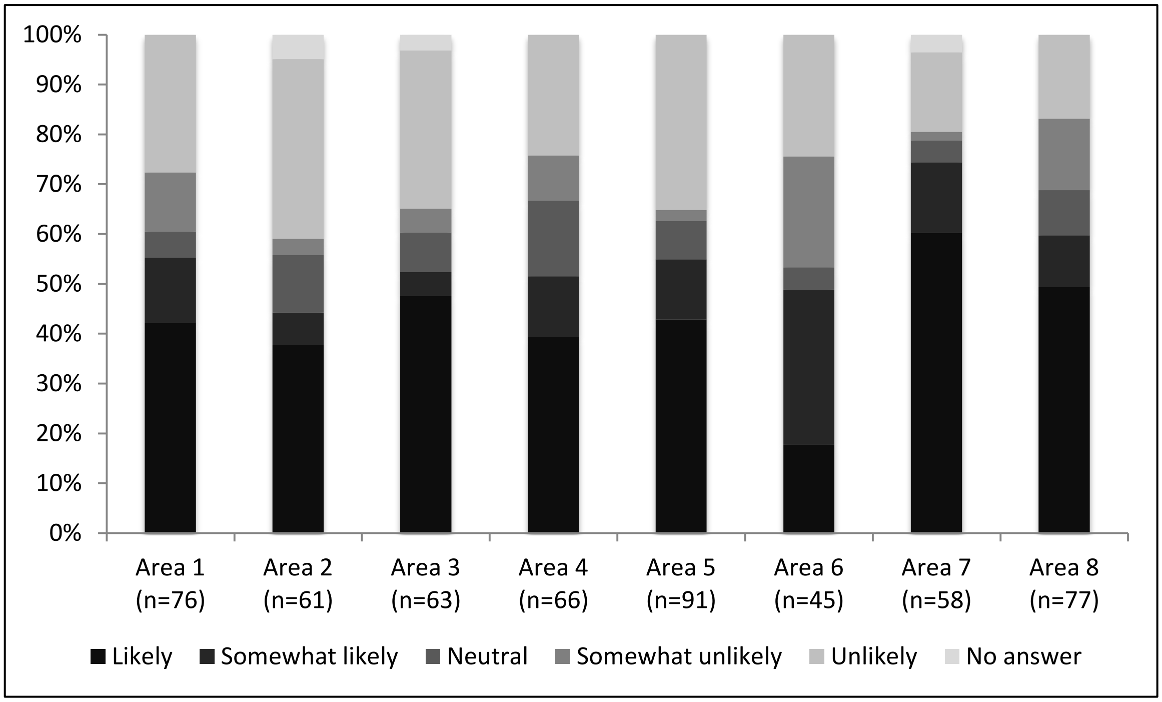
Likelihood of Walking More than One Block by Mode of Arrival (N=536)



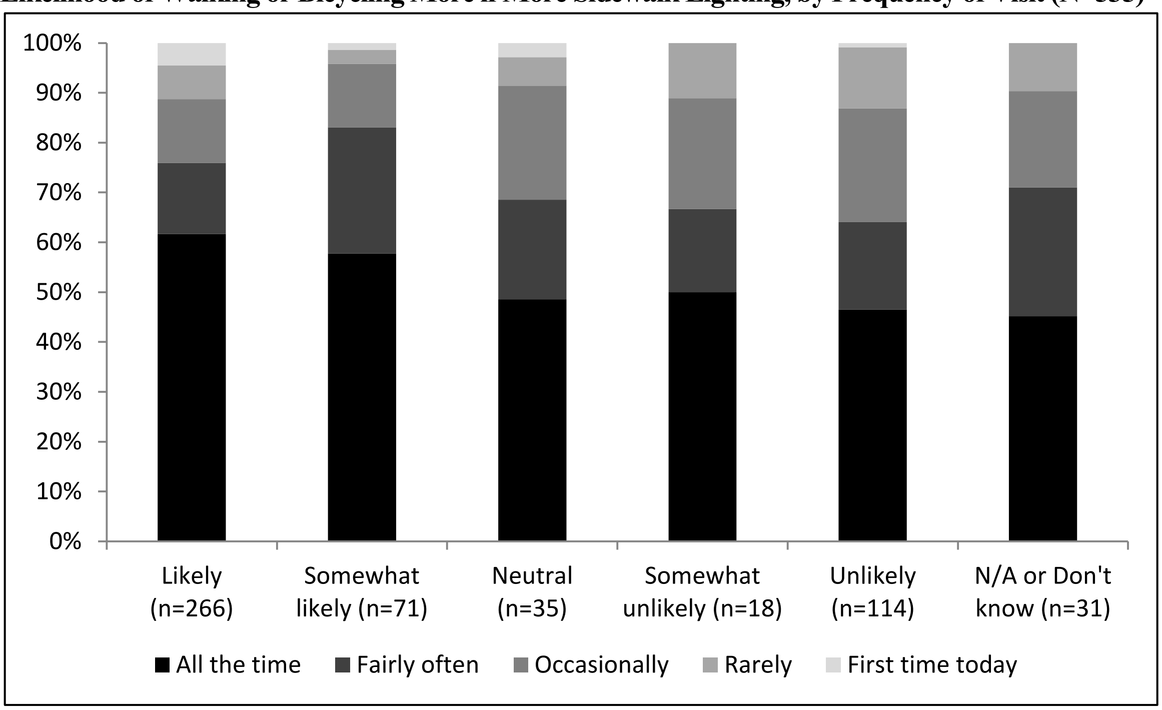
Likelihood of Walking or Bicycling More if More Shade Trees, by Area (N=537)



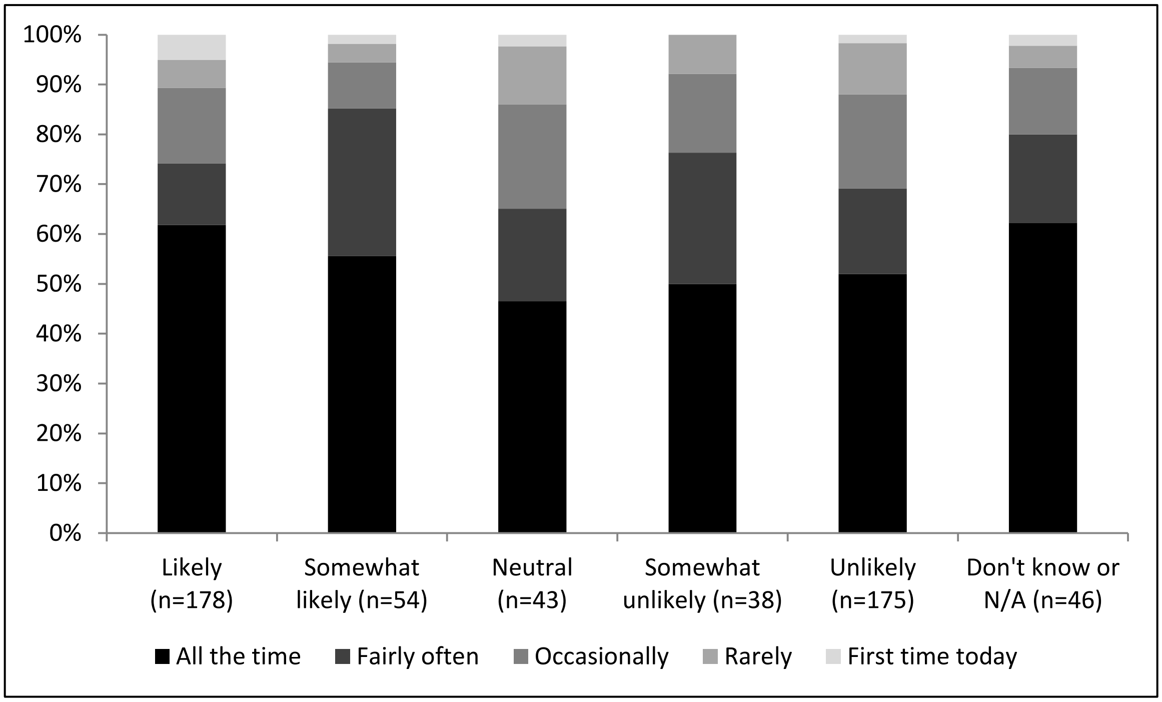
Likelihood of Walking or Bicycling More if More Landscaping, by Area (N=537)



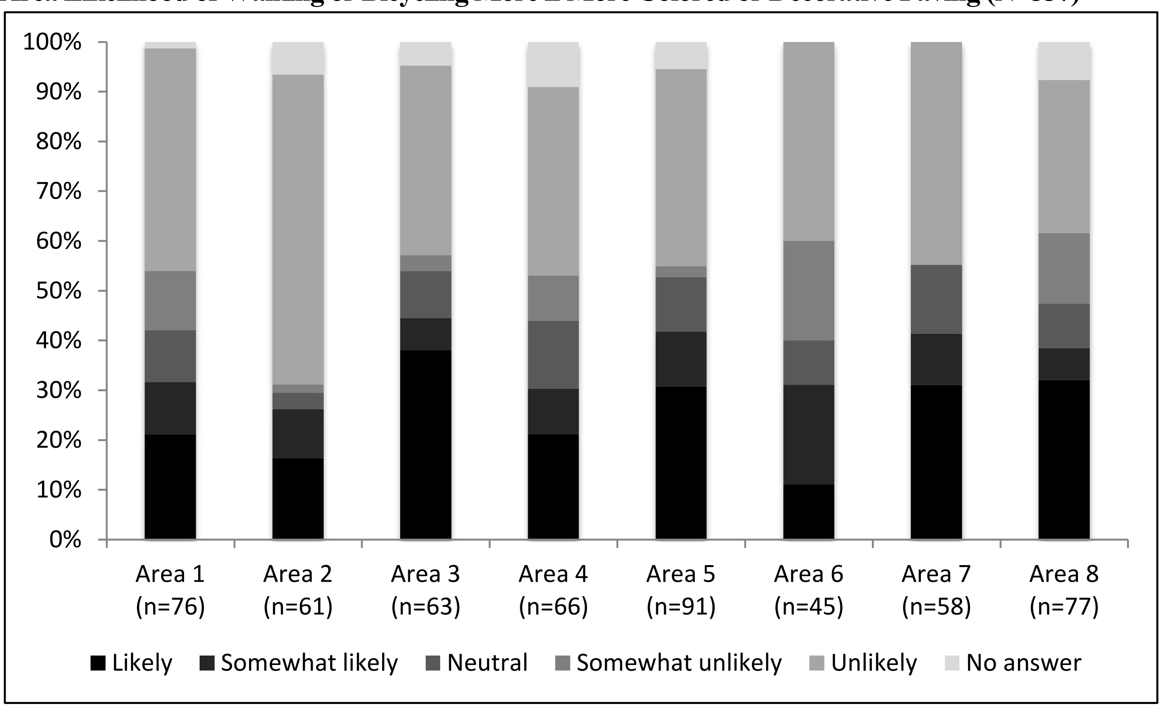
Likelihood of Walking or Bicycling More if More Sidewalk Lighting, by Frequency of Visit (N=535)



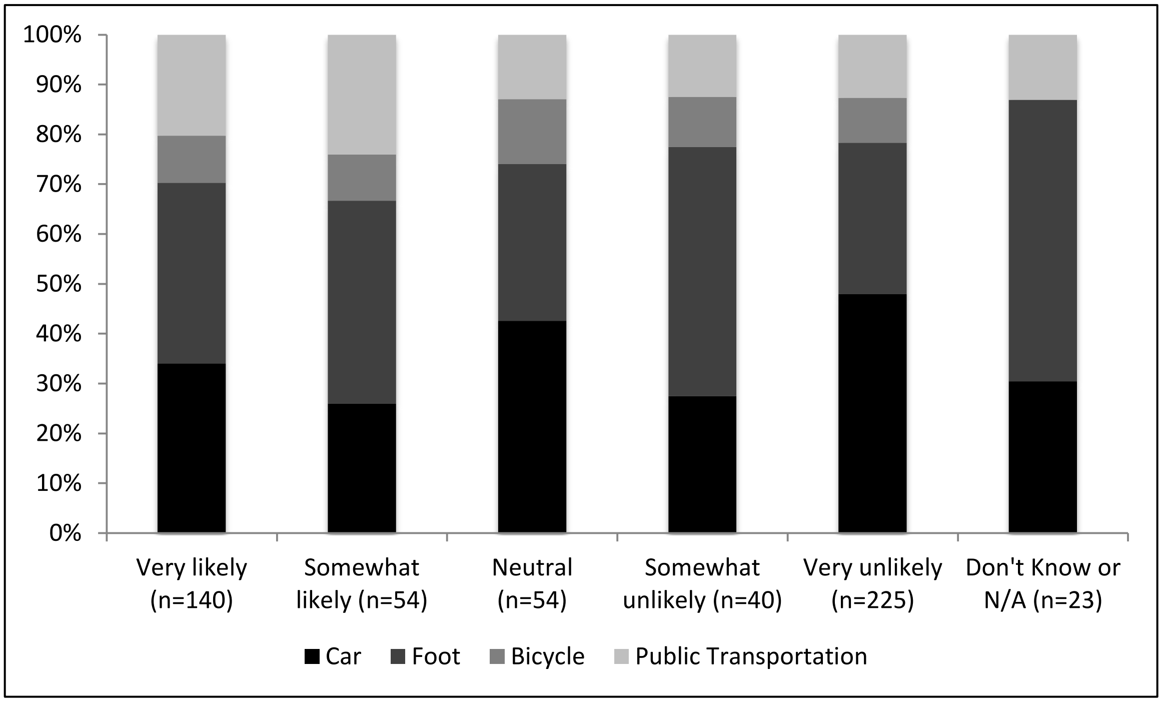
Likelihood of Walking or Bicycling More if More Curb Extensions, by Frequency of Visit (N=533)



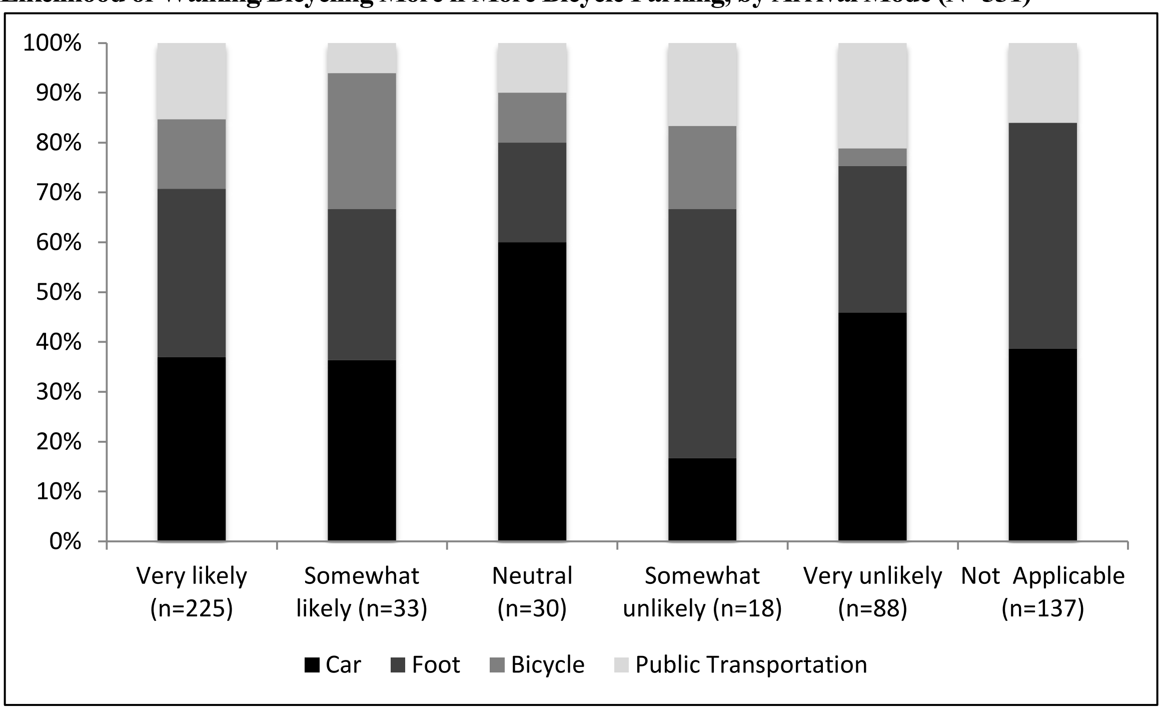
Area Likelihood of Walking or Bicycling More if More Colored or Decorative Paving (N=537)



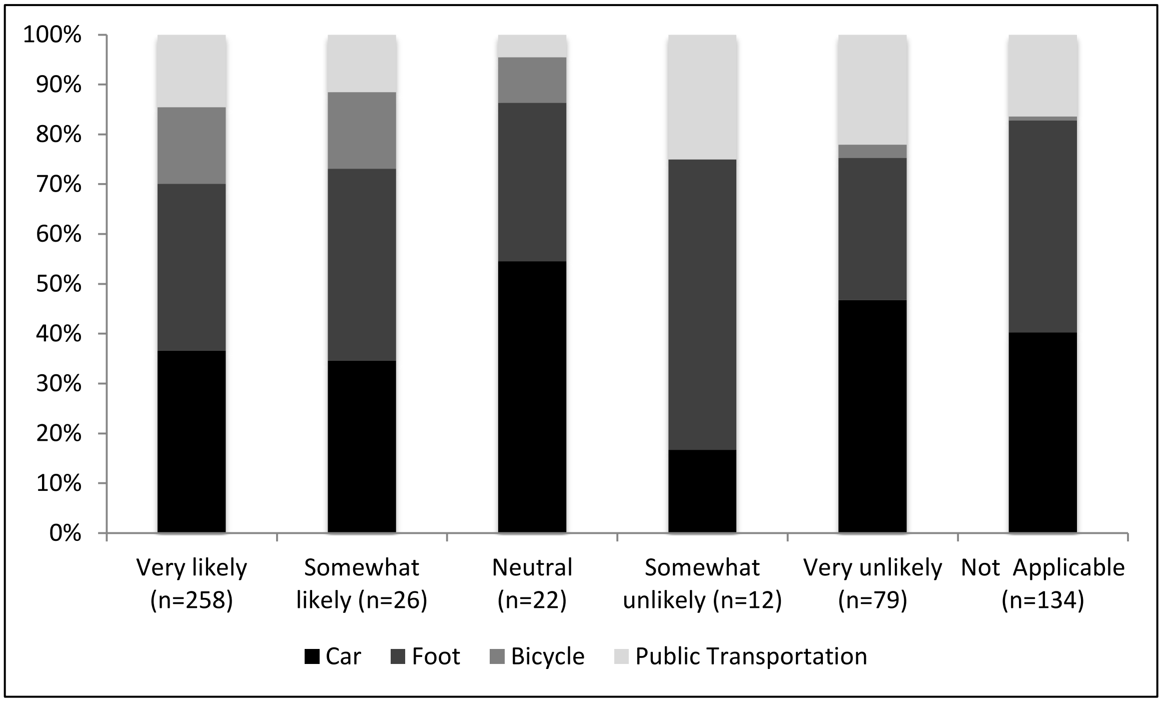
Likelihood of Walking or Biking More if More Colored or Decorative Paving, by Arrival Mode (N=537)



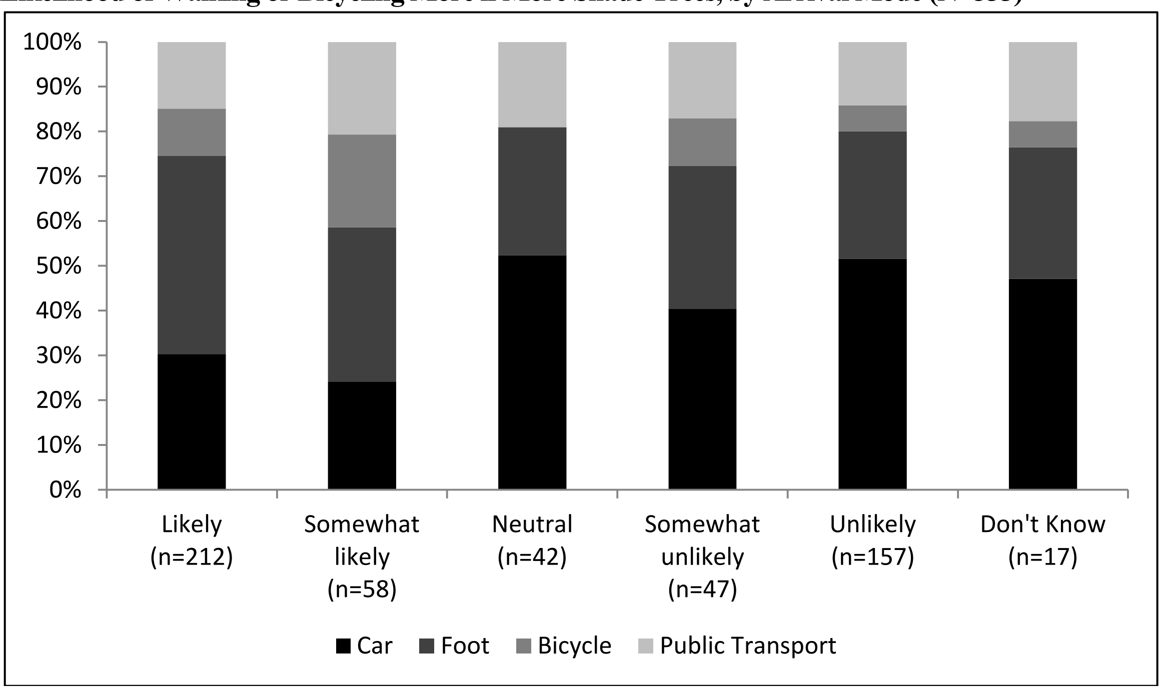
Likelihood of Walking/Bicycling More if More Bicycle Parking, by Arrival Mode (N=531)



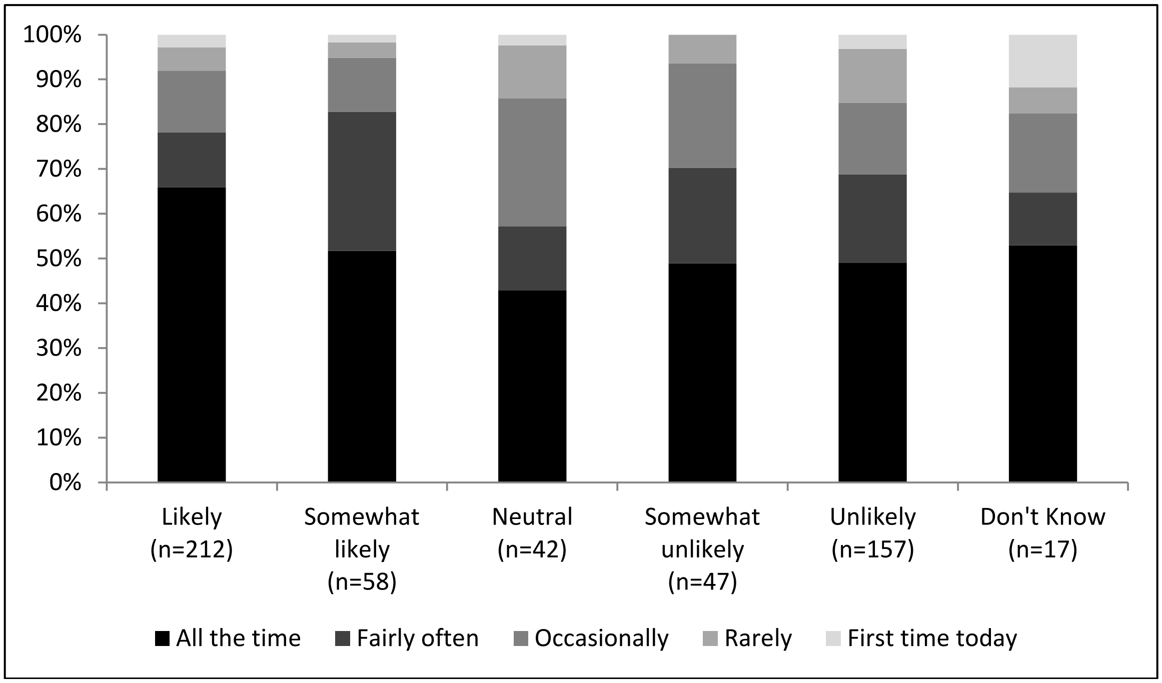
Likelihood of Walking/Bicycling More if More Bicycle Lanes, by Arrival Mode (N=531)



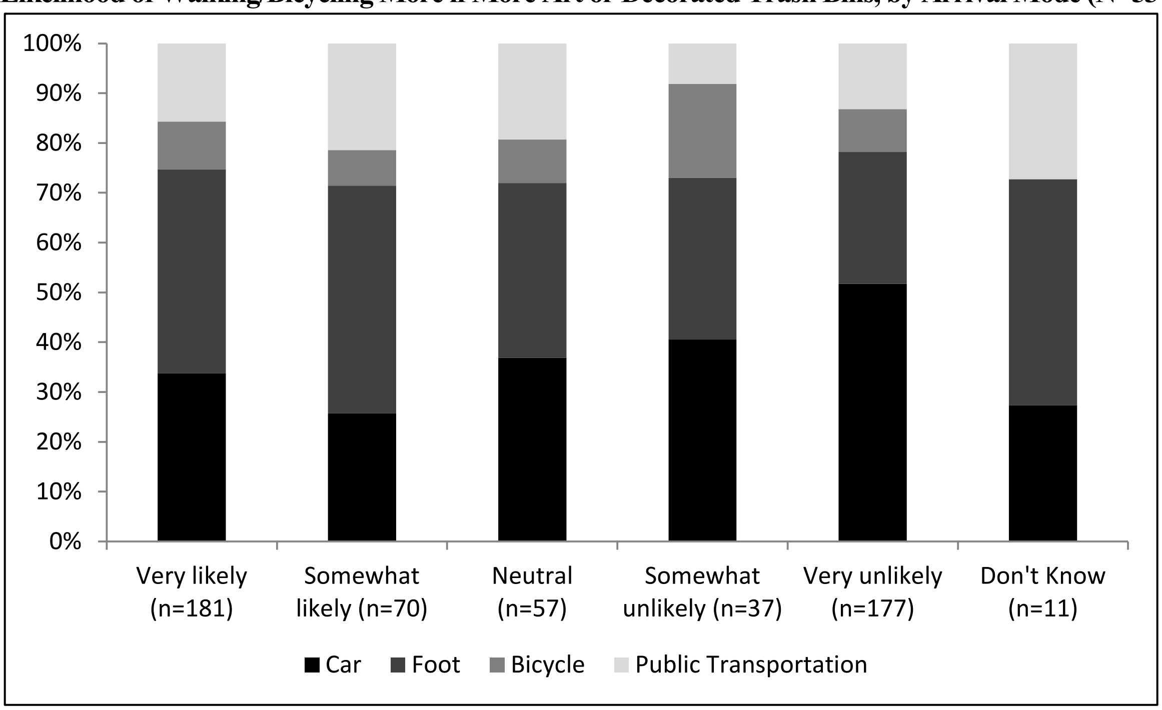
Likelihood of Walking or Bicycling More if More Shade Trees, by Arrival Mode (N=533)



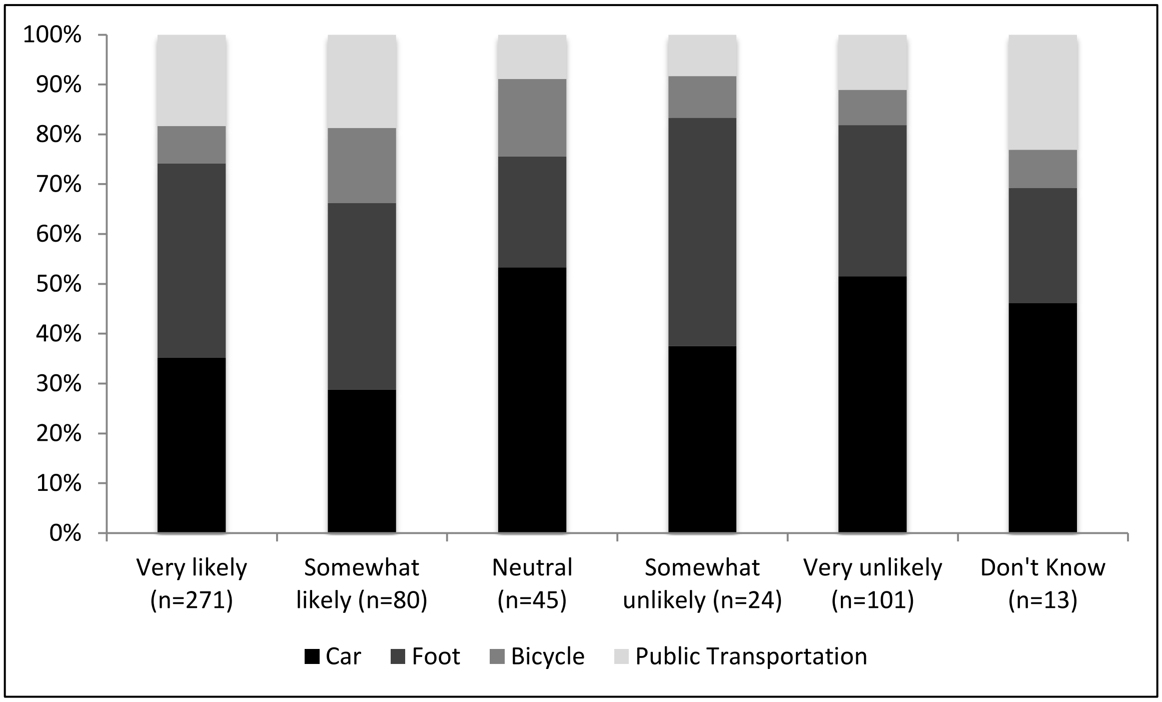
Likelihood of Walking or Bicycling More if More Shade Trees, by Frequency of Visit (N=533)



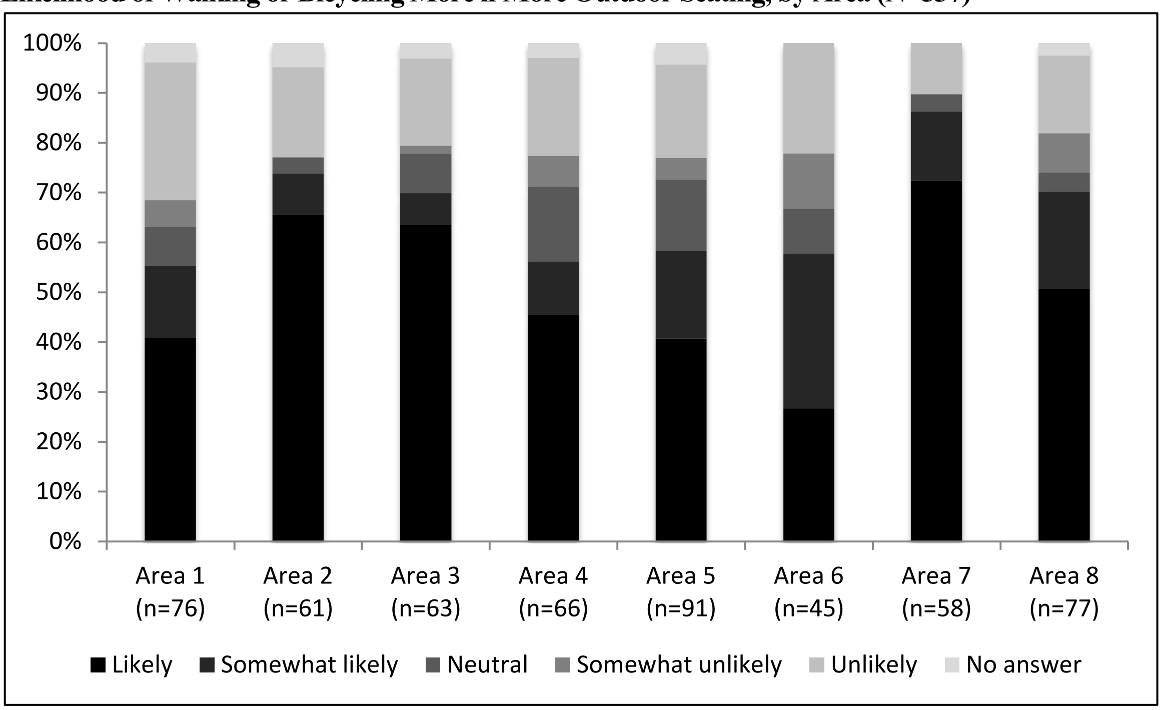
Likelihood of Walking/Bicycling More if More Art or Decorated Trash Bins, by Arrival Mode (N=537)



Likelihood of Walking or Bicycling More if More Outdoor Seating, by Arrival Mode (N=534)

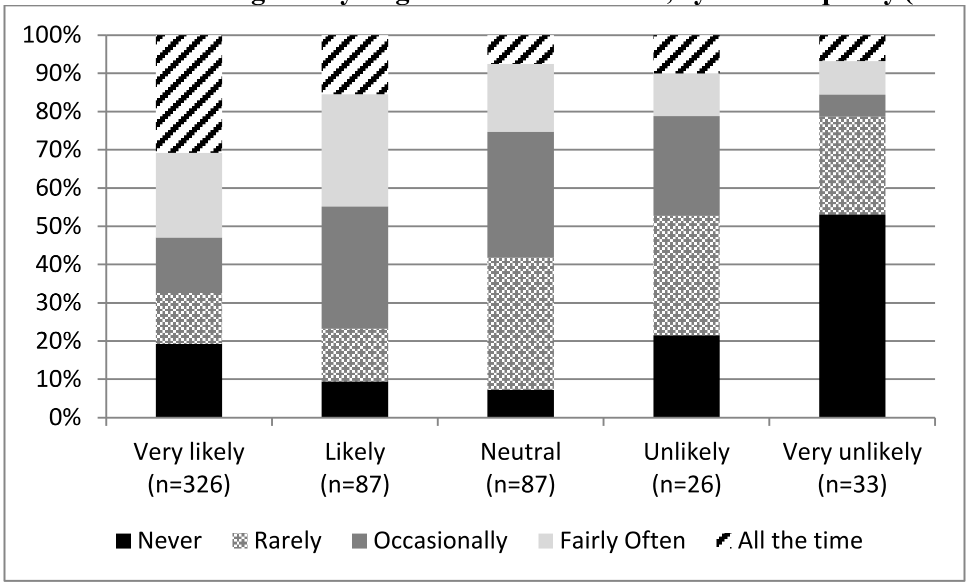


Likelihood of Walking or Bicycling More if More Outdoor Seating, by Area (N=537)

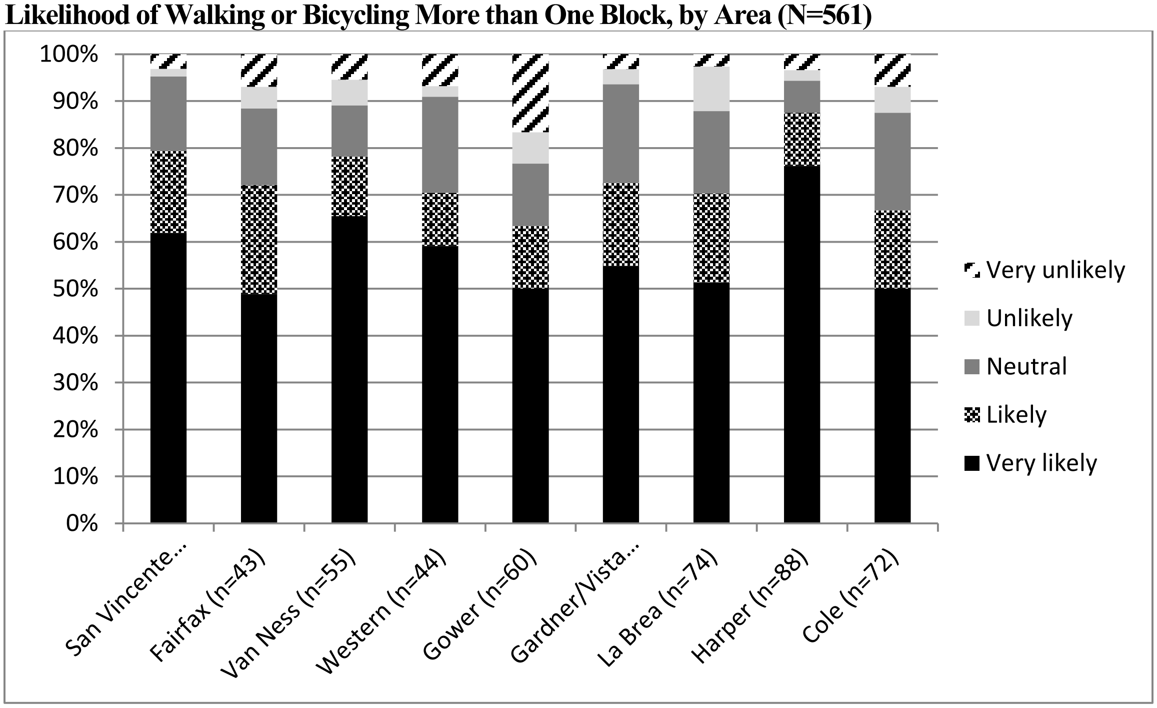


Appendix H: Figures from the Santa Monica Boulevard Pedestrian and Bicyclist Intercept Survey

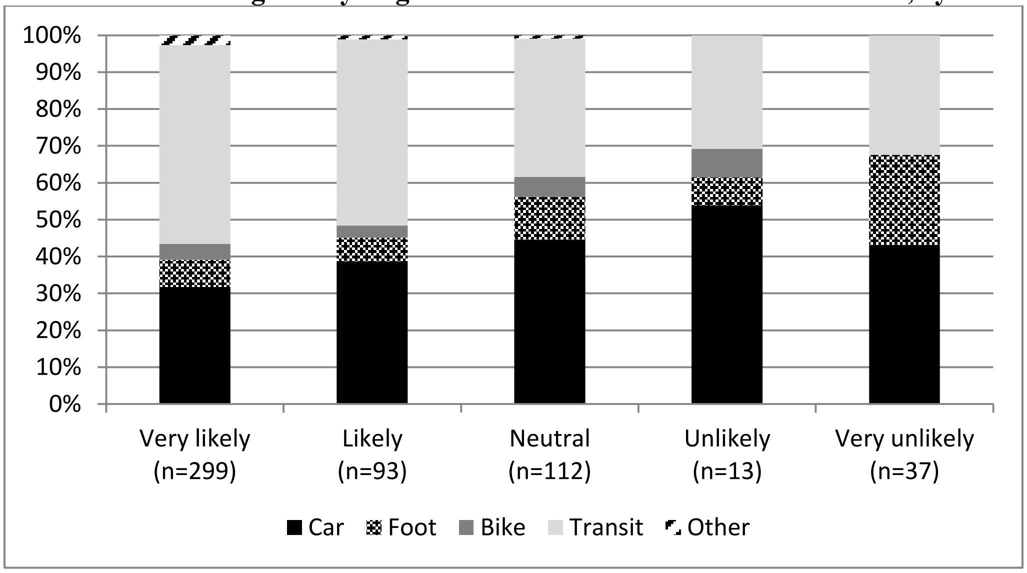
Likelihood of Walking or Bicycling More than One Block, by Visit Frequency (N=559)



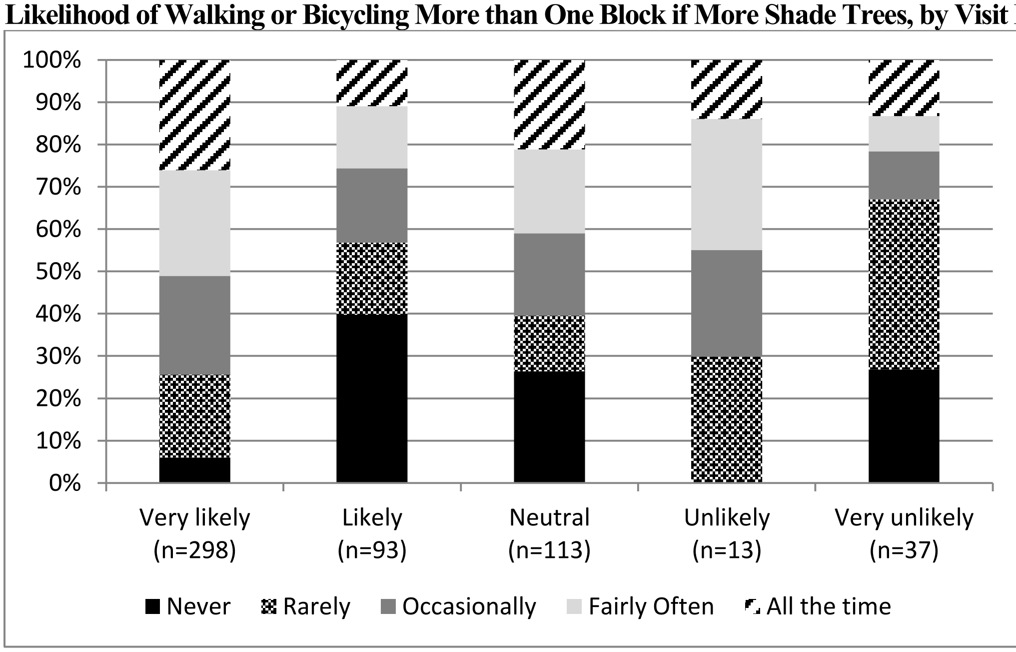
Likelihood of Walking or Bicycling More than One Block, by Area (N=561)



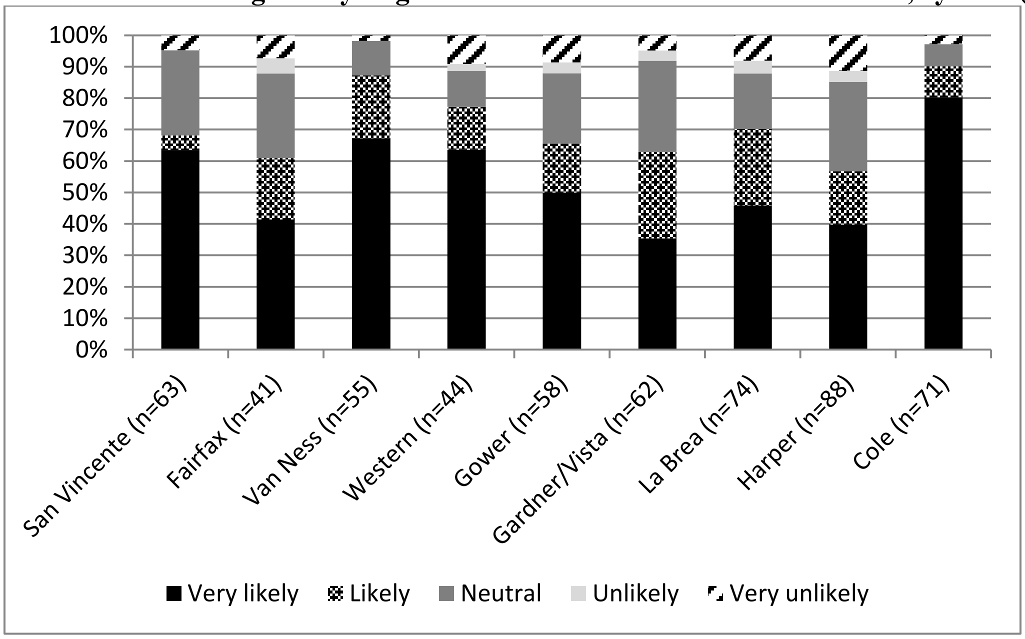
Likelihood of Walking or Bicycling More than One Block if More Shade Trees, by Usual Mode (N=554)



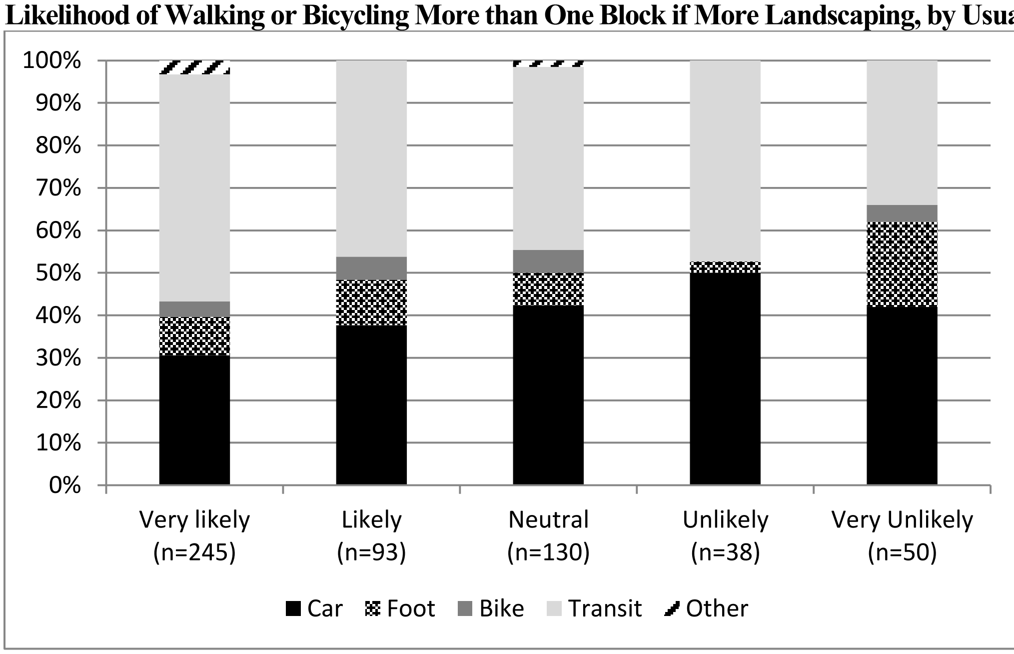
Likelihood of Walking or Bicycling More than One Block if More Shade Trees, by Visit Frequency (N=554)



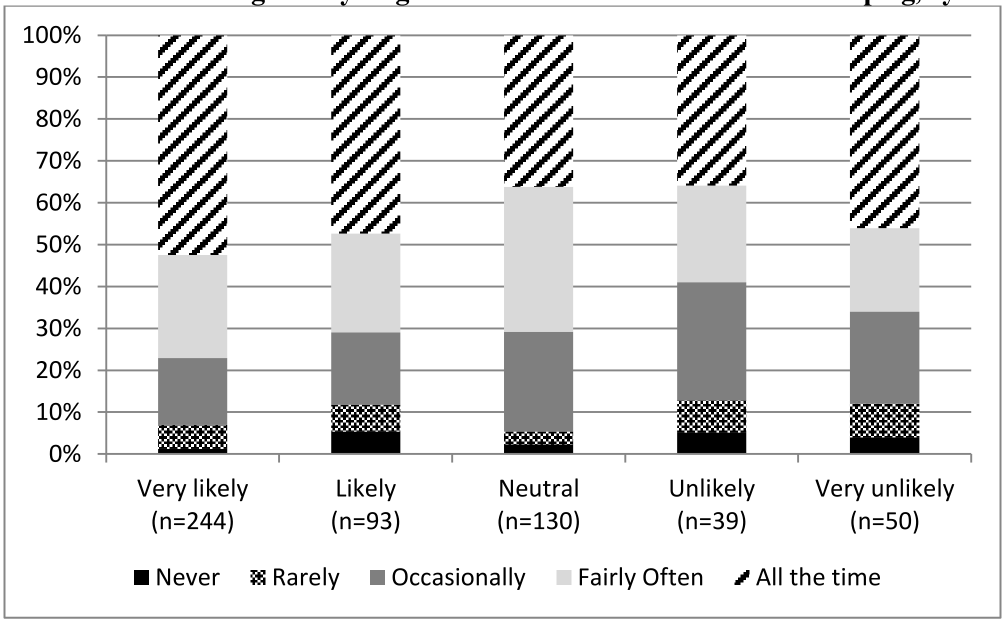
Likelihood of Walking or Bicycling More than One Block if More Shade Trees, by Area (N=556)



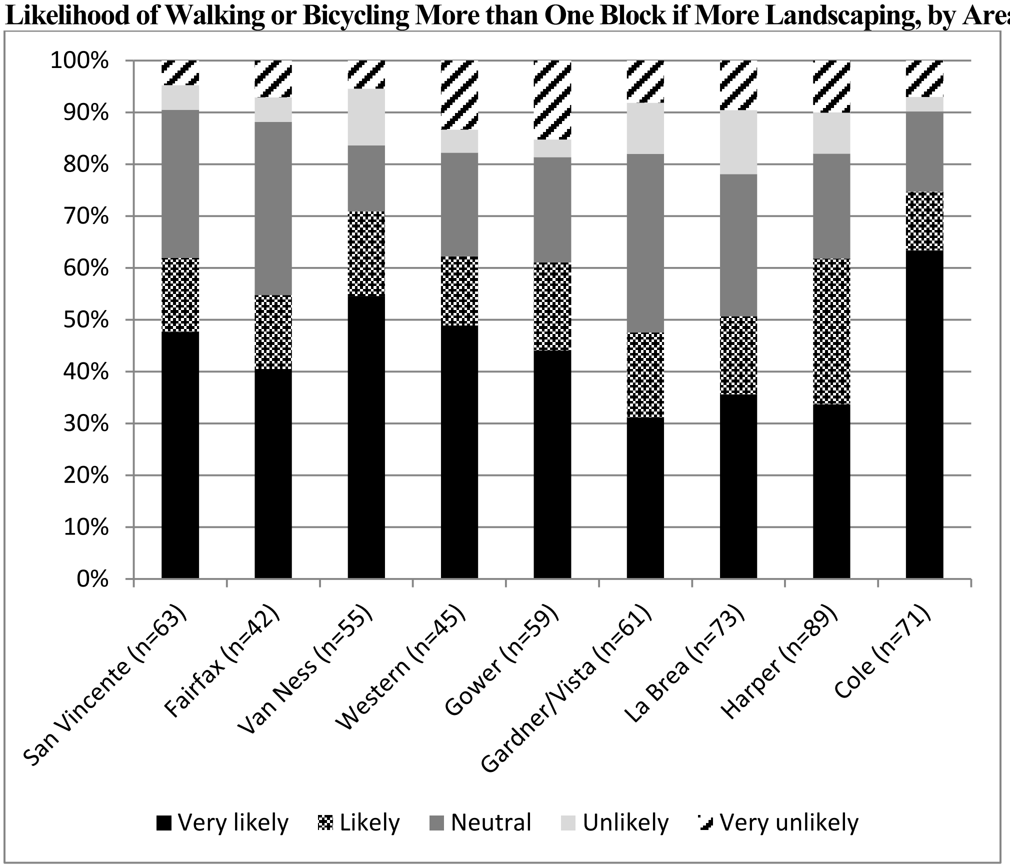
Likelihood of Walking or Bicycling More than One Block if More Landscaping, by Usual Mode (N=556)



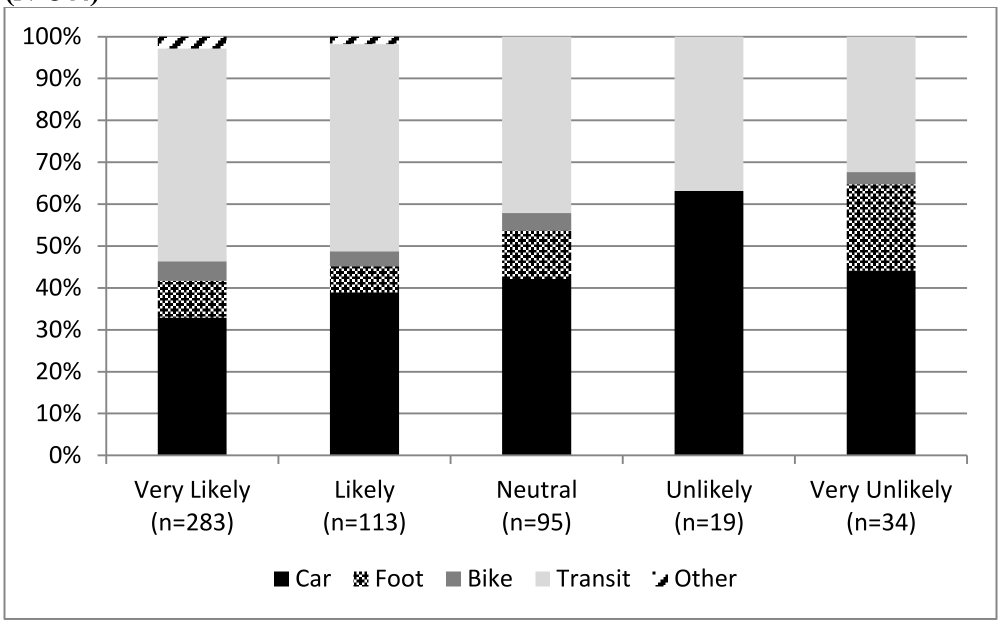
Likelihood of Walking or Bicycling More than One Block if More Landscaping, by Visit Frequency (N=556)



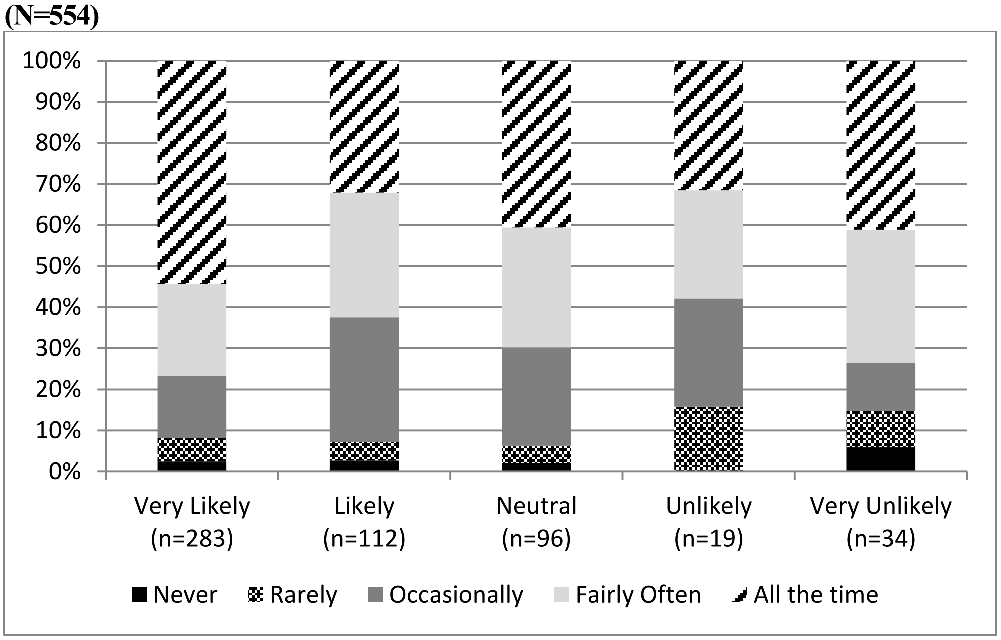
Likelihood of Walking or Bicycling More than One Block if More Landscaping, by Area (N=558)



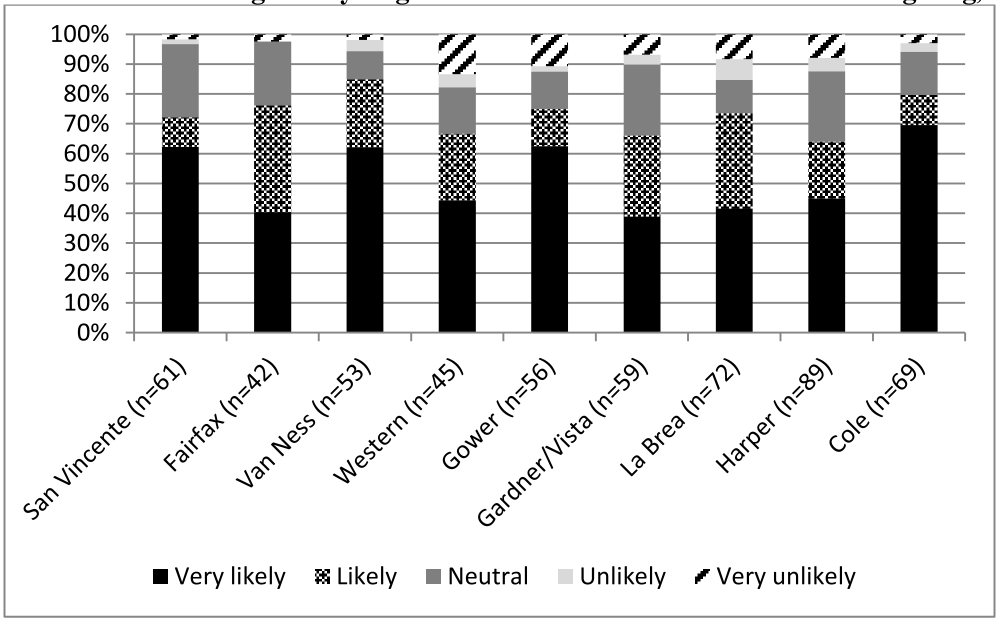
Likelihood of Walking or Bicycling More than One Block if More Sidewalk Lighting, by Usual Mode (N=544)



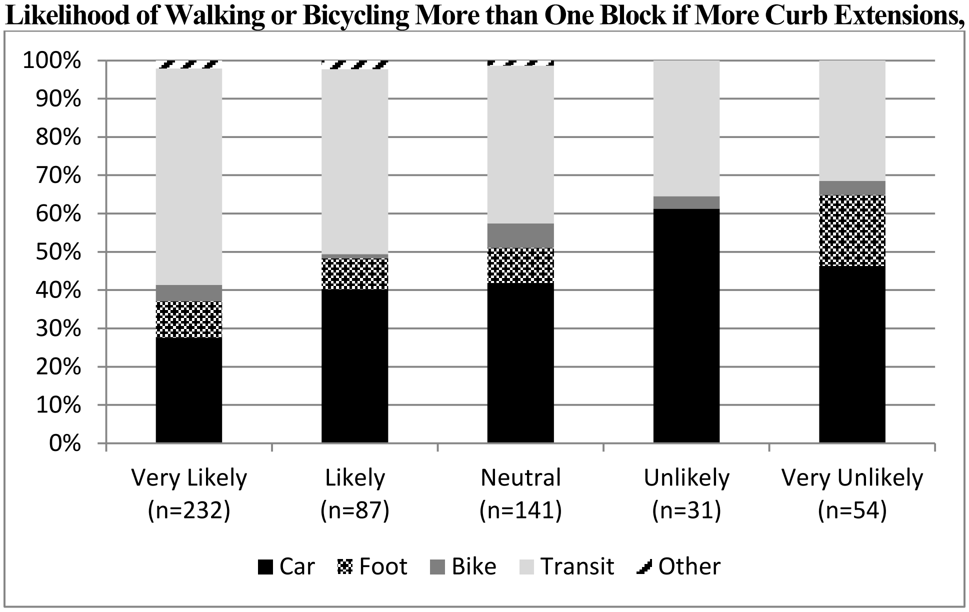
Likelihood of Walking or Bicycling More than One Block if More Sidewalk Lighting, by Visit Frequency (N=554)



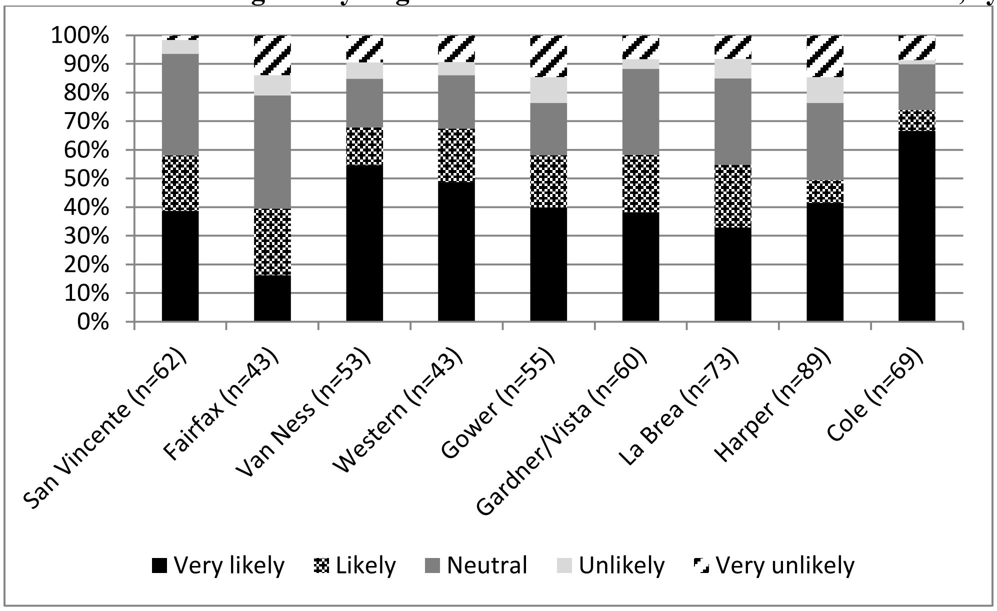
Likelihood of Walking or Bicycling More than One Block if More Sidewalk Lighting, by Area (N=546)



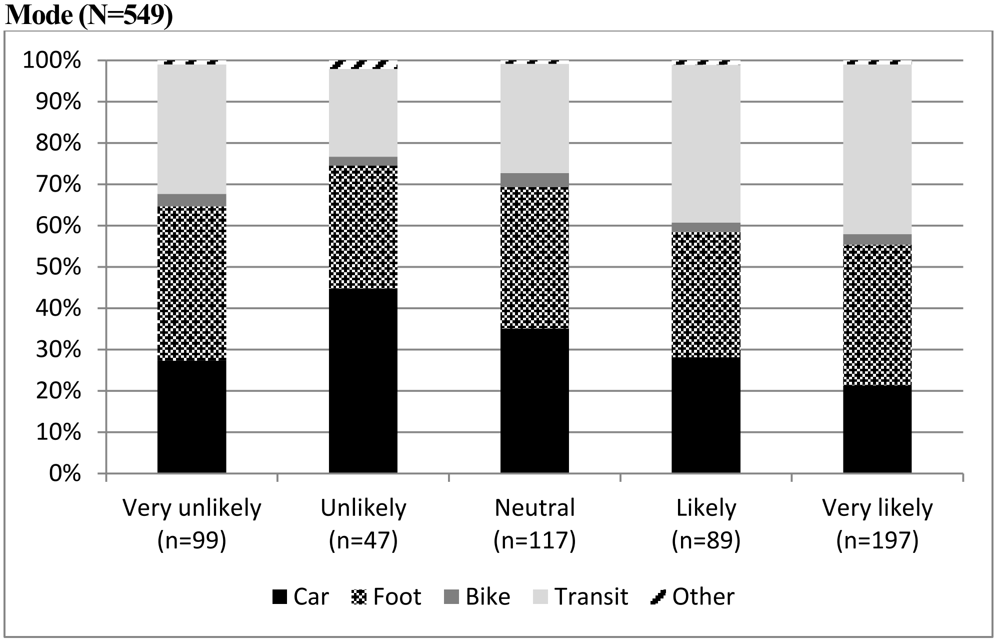
Likelihood of Walking or Bicycling More than One Block if More Curb Extensions, by Usual Mode (N=545)



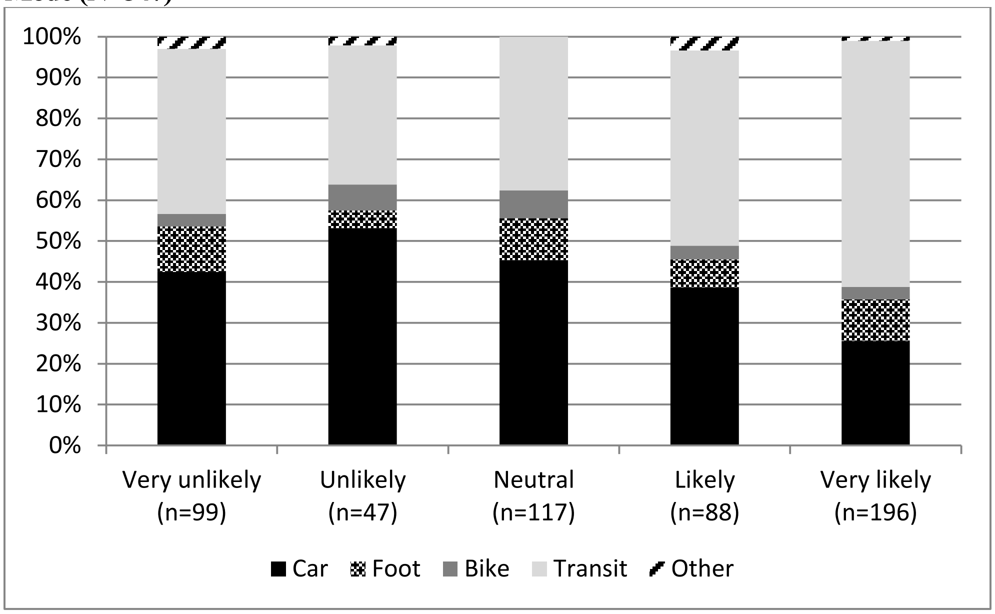
Likelihood of Walking or Bicycling More than One Block if More Curb Extensions, by Area (N=547)



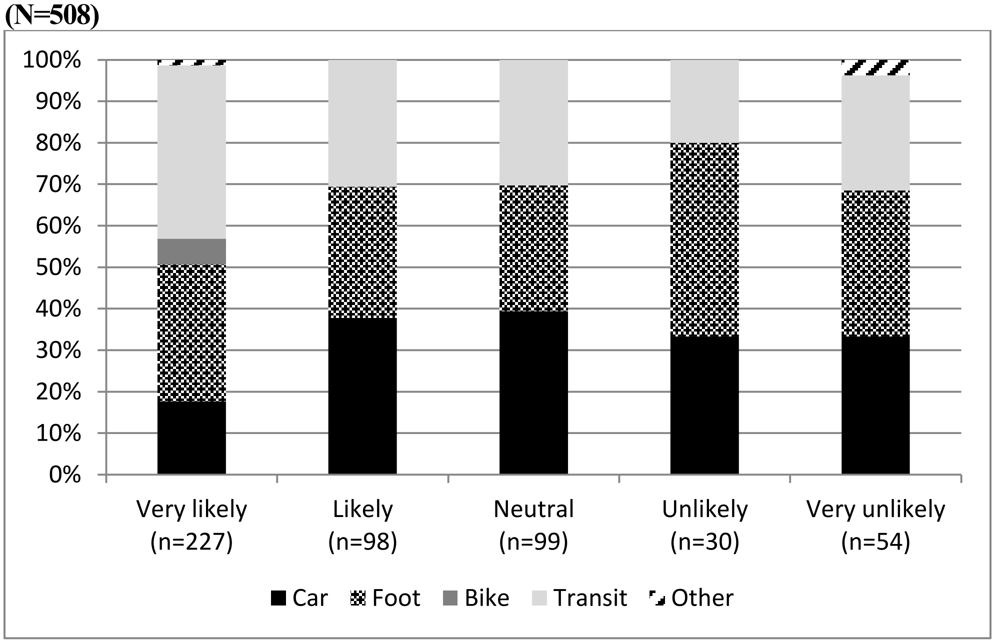
Likelihood of Walking or Bicycling More than One Block if More Colored/Decorative Paving, by Arrival Mode (N=549)



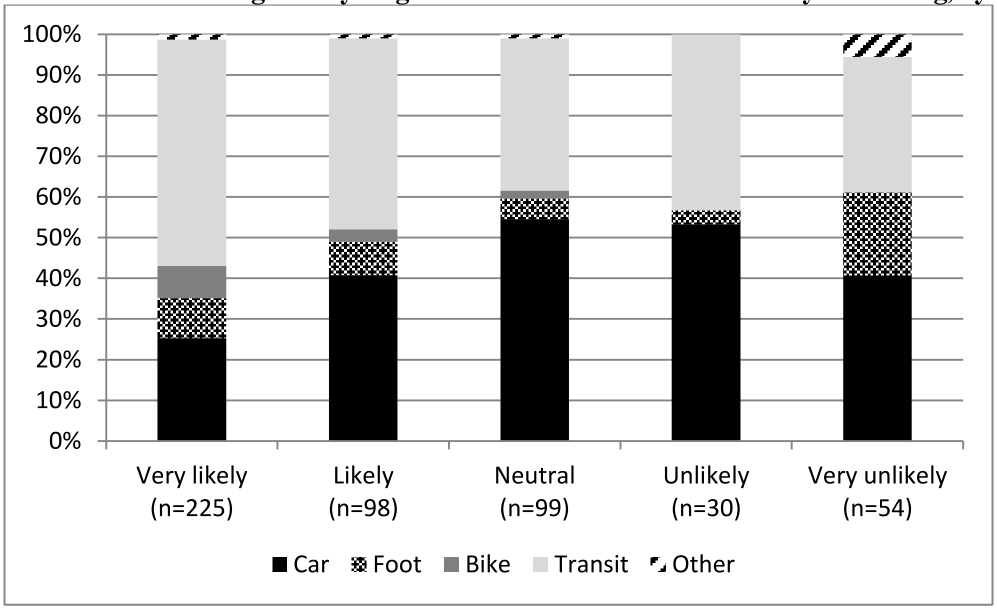
Likelihood of Walking or Bicycling More than One Block if More Colored/Decorative Paving, by Usual Mode (N=547)



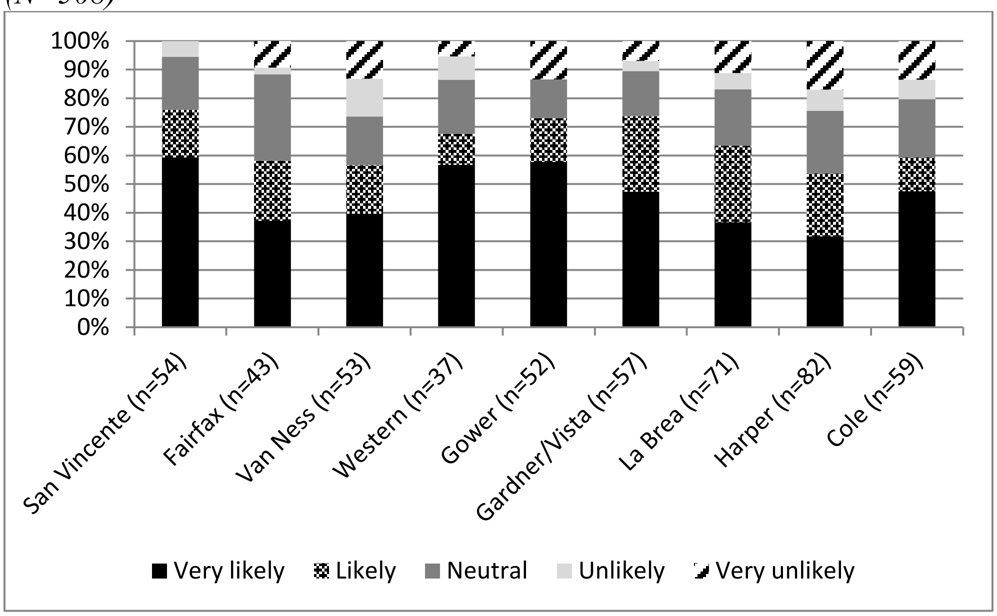
Likelihood of Walking or Bicycling More than One Block if More Bicycle Parking, by Arrival Mode (N=508)



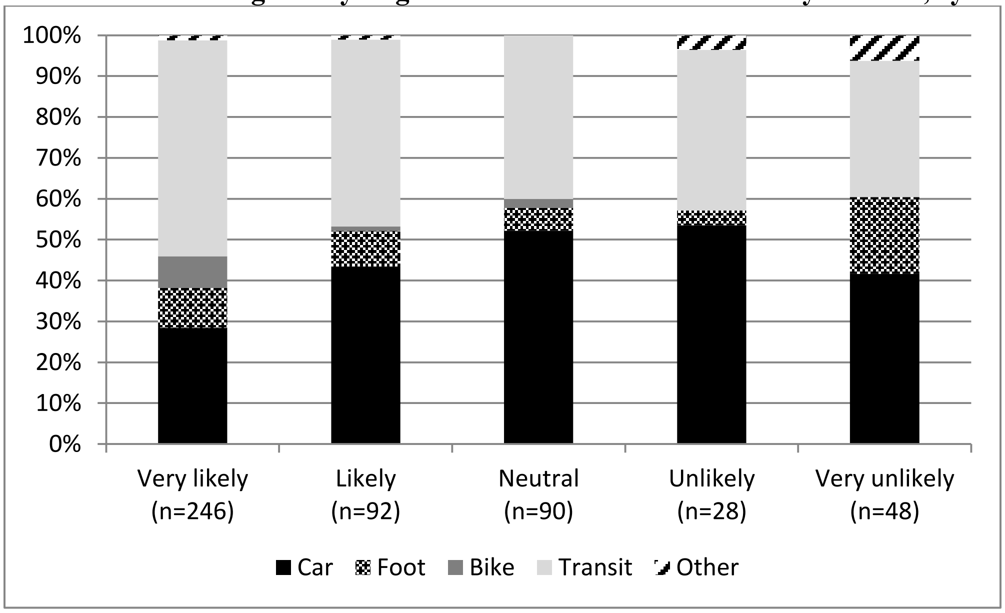
Likelihood of Walking or Bicycling More than One Block if More Bicycle Parking, by Usual Mode (N=506)



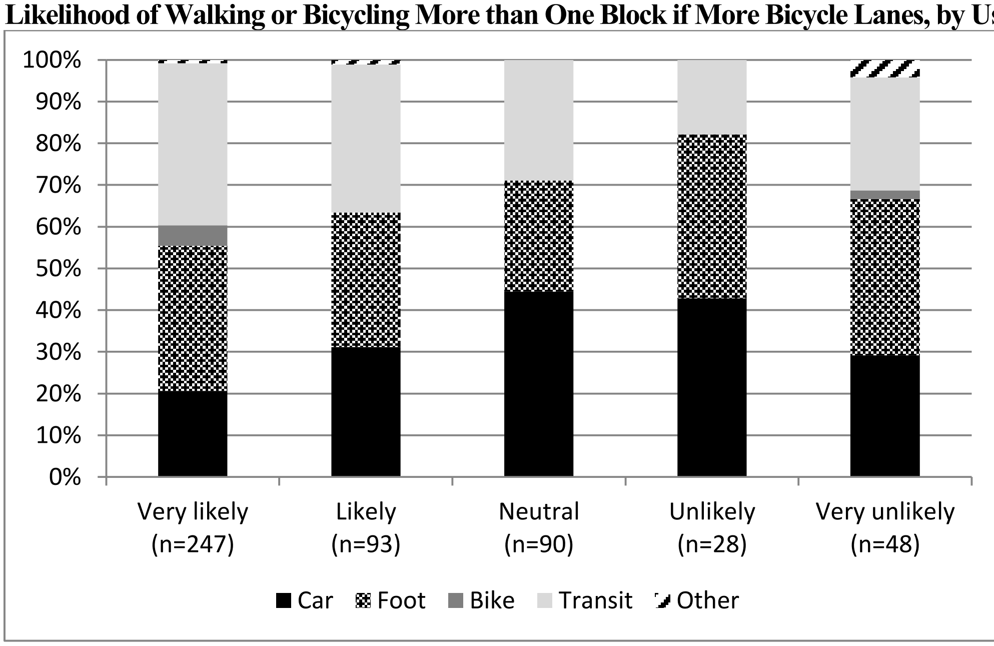
Likelihood of Walking or Bicycling More than One Block if More Bicycle Parking, by Area (N=508)



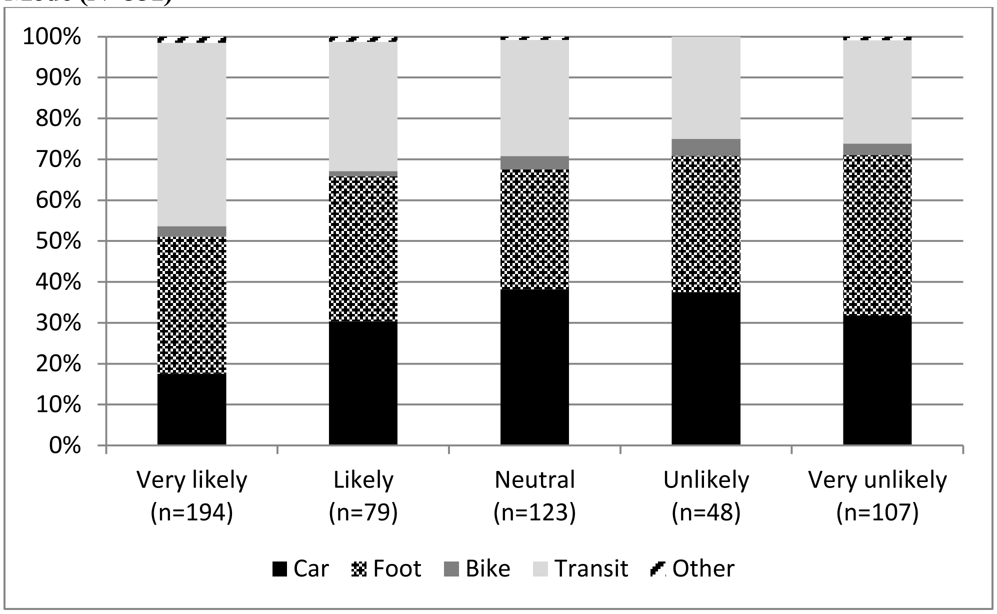
Likelihood of Walking or Bicycling More than One Block if More Bicycle Lanes, by Arrival Mode (N=504)



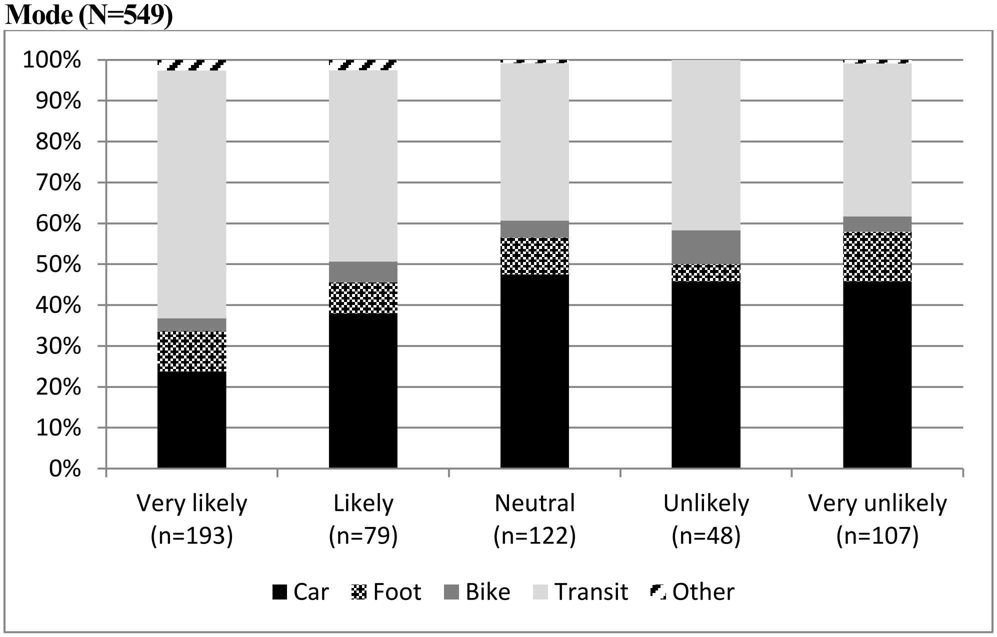
Likelihood of Walking or Bicycling More than One Block if More Bicycle Lanes, by Usual Mode (N=506)



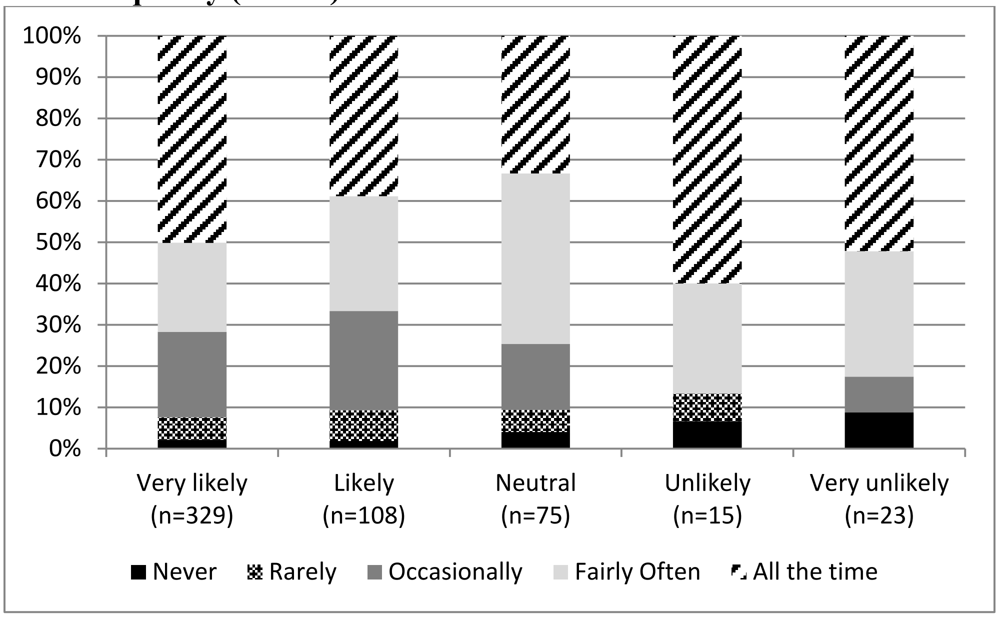
Likelihood of Walking or Bicycling More than One Block if More Art or Decorated Trash Bins, by Arrival Mode (N=551)



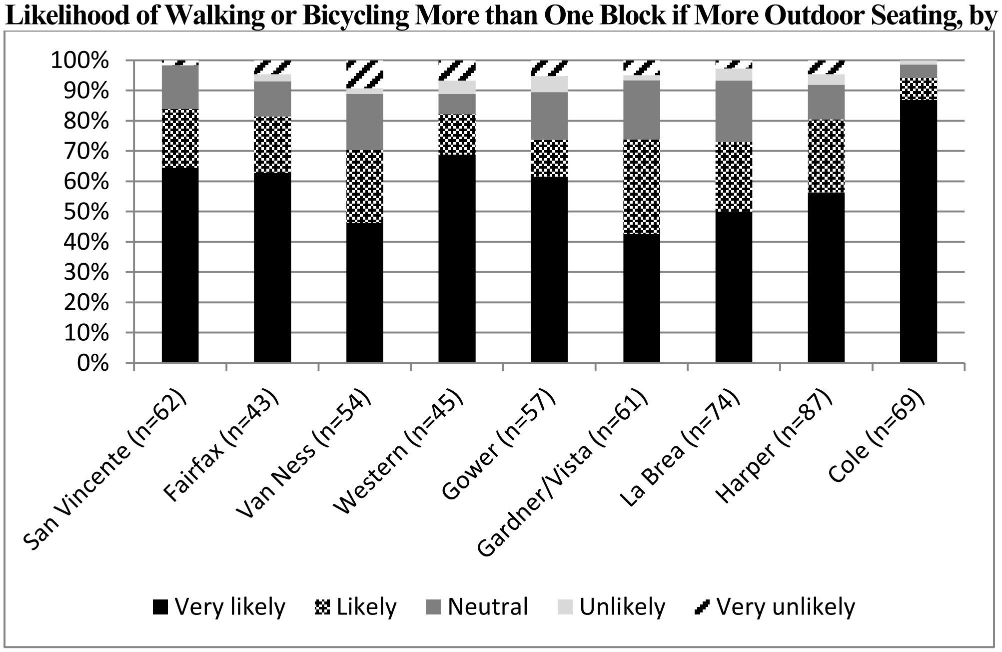
Likelihood of Walking or Bicycling More than One Block if More Art or Decorated Trash Bins, by Usual Mode (N=549)



Likelihood of Walking or Bicycling More than One Block if More Outdoor Seating, by Visit Frequency (N=550)



Likelihood of Walking or Bicycling More than One Block if More Outdoor Seating, by Area (N=552)



Appendix I. Final Intersection List and Post Miles for Santa Monica Boulevard

Finalized List of Intersections and Corresponding Post Mile		
Intersection Name	Intersection ID	Post Mile
SANTA MONICA BLVD AND NEMO ST/WILLEY LANE/ALMONT	2	7.871
SANTA MONICA BLVD & RAMAGE ST/N LA PEER DR	4	7.941
SANTA MONICA BLVD & N ROBERTSON BLVD	6	8.041
SANTA MONICA BLVD & HILLDALE AVE	7	8.101
SANTA MONICA BLVD & N SAN VICENTE BLVD	8	8.151
SANTA MONICA BLVD & LARRABEE ST	9	8.211
SANTA MONICA BLVD & PALM AVE	10	8.241
SANTA MONICA BLVD & HANCOCK AVE	11	8.341
SANTA MONICA BLVD & HUNTLEY DR	12	8.401
SANTA MONICA BLVD & WESTBOURNE DR (NORTH and SOUTH)	13	8.461
SANTA MONICA BLVD & WESTMOUNT DR	15	8.511
SANTA MONICA BLVD & W KNOLL DR (SOUTH)	16	8.605
SANTA MONICA BLVD & W KNOLL DR (NORTH)	17	8.65
SANTA MONICA BLVD & LA CIENEGA BLVD	18	8.69
SANTA MONICA BLVD & N ALFRED ST	19	8.761
SANTA MONICA BLVD & N CROFT AVE/HOLLOWAY DR	20	8.792
SANTA MONICA BLVD & OLIVE DR	21	8.846
SANTA MONICA BLVD & N ORLANDO AVE	22	8.9
SANTA MONICA BLVD & N KINGS RD (NORTH)	23	8.92
SANTA MONICA BLVD & N KINGS RD (SOUTH)/N FLORES ST	24	8.985
SANTA MONICA BLVD & N SWEETZER AVE	26	9.061
SANTA MONICA BLVD & N HARPER AVE (SOUTH and NORTH)	27	9.135
SANTA MONICA BLVD & N LA JOLLA AVE	29	9.191
SANTA MONICA BLVD & HAVENHURST DR (NORTH)	30	9.251
SANTA MONICA BLVD & HAVENHURST DR (SOUTH)	31	9.251
SANTA MONICA BLVD & N CRESCENT HEIGHTS BLVD	32	9.311
SANTA MONICA BLVD & N LAUREL AVE (SOUTH)	33	9.391
SANTA MONICA BLVD & N LAUREL AVE (NORTH)	34	9.391
SANTA MONICA BLVD & N EDINBURGH AVE	35	9.441
SANTA MONICA BLVD & N HAYWORTH AVE (NORTH and SOUTH)	36	9.48
SANTA MONICA BLVD & N FAIRFAX AVE	38	9.571
SANTA MONICA BLVD & N ORANGE GROVE AVE (SOUTH and NORTH)	39	9.635
SANTA MONICA BLVD & N OGDEN DR (SOUTH and NORTH)	41	9.701
SANTA MONICA BLVD & N GENESEE AVE (SOUTH and NORTH)	43	9.761
SANTA MONICA BLVD & N SPAULDING AVE (SOUTH)	45	9.811
SANTA MONICA BLVD & N SPAULDING AVE (NORTH)/N STANLEY AVE	46	9.861

SANTA MONICA BLVD & N CURSON AVE (SOUTH and NORTH)	48	9.945
SANTA MONICA BLVD & SIERRA BONITA AVE	50	9.991
SANTA MONICA BLVD & N GARDNER ST (SOUTH)	51	10.051
SANTA MONICA BLVD & N VISTA ST (SOUTH)/GARDNER ST (NORTH)	52	10.085
SANTA MONICA BLVD & N VISTA ST (NORTH)	53	10.131
SANTA MONICA BLVD & N MARTEL AVE	54	10.165
SANTA MONICA BLVD & N FULLER AVE (NORTH and SOUTH)	55	10.245
SANTA MONICA BLVD & GREENACRE AVE	57	10.291
SANTA MONICA BLVD & N POINSETTA PL (SOUTH)	58	10.311
SANTA MONICA BLVD & POINSETTA DR	59	10.341
SANTA MONICA BLVD & N POINSETTA PL (NORTH)	60	10.391
SANTA MONICA BLVD & N FORMOSA AVE	61	10.461
SANTA MONICA BLVD & N DETROIT ST	62	10.521
SANTA MONICA BLVD & N LA BREA AVE	63	10.58
SANTA MONICA BLVD & N SYCAMORE AVE	64	10.651
SANTA MONICA BLVD & N ORANGE DR	65	10.721
SANTA MONICA BLVD & N MANSFIELD AVE	66	10.781
SANTA MONICA BLVD & N CITRUS AVE	67	10.821
SANTA MONICA BLVD & N HIGHLAND AVE (SR 170)	68	10.896
SANTA MONICA BLVD & N MCCADDEN PL	69	10.961
SANTA MONICA BLVD & N LAS PALMAS AVE	70	11.021
SANTA MONICA BLVD & SEWARD ST	71	11.201
SANTA MONICA BLVD & N HUDSON AVE (NORTH)	72	11.251
SANTA MONICA BLVD & N HUDSON AVE (SOUTH)	72	11.251
SANTA MONICA BLVD & WILCOX PL	74	11.331
SANTA MONICA BLVD & WILCOX AVE	75	11.301
SANTA MONICA BLVD & COLE AVE	76	11.391
SANTA MONICA BLVD & N CAHUENGA BLVD	77	11.451
SANTA MONICA BLVD & LILLIAN WAY	78	11.511
SANTA MONICA BLVD & VINE ST	79	11.581
SANTA MONICA BLVD & N EL CENTRO AVE	80	11.711
SANTA MONICA BLVD & LODI PL	81	11.761
SANTA MONICA BLVD & N GOWER ST	82	11.831
SANTA MONICA BLVD & N BEACHWOOD DR	83	11.901
SANTA MONICA BLVD & GORDON ST	84	11.961
SANTA MONICA BLVD & TAMARIND AVE	85	12.021
SANTA MONICA BLVD & N BRONSON AVE	86	12.081
SANTA MONICA BLVD & N VAN NESS AVE	87	12.211
SANTA MONICA BLVD & N RIDGEWOOD PL	88	12.271
SANTA MONICA BLVD & N WILTON PL	89	12.32
SANTA MONICA BLVD & ST ANDREWS PL (SOUTH and NORTH)	90	12.43

SANTA MONICA BLVD & N WESTERN AVE	92	12.58
SANTA MONICA BLVD & FLEMISH LN	93	12.621
SANTA MONICA BLVD & N OXFORD AVE (SOUTH)	94	12.661

Appendix J. Summary of Injury and Fatality Information for Santa Monica Boulevard

Santa Monica Boulevard Intersection*, SWITRS 2001-2010

ID	Number pedestrian victims	Number motor vehicle injury/fatal crashes	Number bicycle victims
Nemo / Willey / Almont	2	6	1
Ramage / La Peer	4	10	3
Robertson	22	24	1
Hilldale	6	10	3
San Vicente	13	22	1
Larrabee	3	6	1
Palm	6	12	4
Hancock	9	18	1
Huntley	3	4	0
Westbourne	2	10	4
Westmount	13	17	5
Knoll (south)	7	12	3
Knoll (north)	1	6	0
La Cienega	6	49	5
Alfred	2	3	1
Croft / Holloway	4	10	2
Olive	0	1	1
Orlando	0	2	3
Kings (north)	0	0	0
Kings (south) / Flores	9	17	10
Sweetzer	3	15	1
Harper	1	4	3
La Jolla	2	5	0
Havenhurst (north)	0	2	0
Havenhurst (south)	3	0	2
Crescent Heights	7	30	2
Laurel (south)	11	8	2
Laurel (north)	0	0	0
Edinburgh	3	3	1
Hayworth	12	10	0
Fairfax	14	59	3
Orange Grove	15	4	1
Ogden	8	9	3
Genesee	2	4	0
Spaulding (south)	4	7	0
Spaulding (north)	1	9	0
Curson	15	5	1
Sierra Bonita	1	5	1
Gardner (south)	2	13	0
Vista / Gardner (north)	1	8	0

ID	Number pedestrian victims	Number motor vehicle injury/fatal crashes	Number bicycle victims
Vista (north)	0	1	1
Martel	3	8	2
Fuller	4	20	4
Greenacre	5	2	1
Poinsettia Pl (south)	6	9	2
Poinsettia Dr	1	5	1
Poinsettia Pl (north)	0	0	0
Formosa	7	16	3
Detroit	2	6	0
La Brea	13	43	5
Sycamore	4	19	1
Orange	3	24	4
Mansfield	2	12	3
Citrus	0	2	0
Highland / State Hwy 170	15	77	3
McFadden	4	15	1
Las Palmas	9	56	5
Seward	8	20	2
Hudson (north)	1	1	0
Hudson (south)	2	3	1
Wilcox Pl	2	6	1
Wilcox Av	10	25	3
Cole	5	14	3
Cahuenga	10	52	5
Lillian	2	7	2
Vine	8	77	8
El Centro	3	36	4
Lodi	0	10	1
Gower	3	42	6
Beachwood	0	10	2
Gordon	5	8	2
Tamarind	6	10	3
Bronson	6	28	7
Van Ness	7	36	3
Ridgewood	2	6	0
Wilton	15	71	4
St Andrews	17	24	4
Western	20	70	5
Flemish	0	8	2
Oxford (south)	3	27	7

Appendix K: Codebook for Variable Names for Santa Monica Boulevard

Variable name	Short description	Description
ABANDONED_ANY	abandoned building (yes vs. no)	Indicates 1 or more abandoned buildings on both blocks
ADDTL_PEDS	Additional signs for peds	Are there additional signs for pedestrians (yes vs. no)
ADV_YIELD_EITH	Presence of advanced yield lanes	Indicates presence of 1 or more advanced yield lines at the intersection (yes vs. no)
AVE_PCTSWA	Average percent of ADA sidewalks	Average percent of sidewalks that are ADA both blocks
AVE_PCTSWFB	Average percent of sidewalks in fair or better condition	Average percent of sidewalks in fair or better condition both blocks
AVE_XWALK_MAIN	Average length to cross SMB (intersection)	Average length peds have to cross to cross SMB (based on intersection)
AVE_XWALK_OTHER	Average length of side street (ft)	Average length peds have to cross to cross side street (feet)
BBOLLARDS	Number of bollards	Number of bollards on both blocks
BBUS_STP	Number of bus stops	Number of bus stops on both blocks
BDRWY_C	Number of commercial driveways	Number of commercial driveways on both blocks
BDRWY_R	Number of residential driveways	Number of residential driveways on both blocks
BINDUSTR	Number of industries	Number of industrial enterprises on both blocks
BKPKG_BOTH	Number of bike parking spots	Number of bike parking spots on both blocks
BNEWSPAPER	Number of newspaper racks	Number of newspaper racks on both blocks
bshtreeblk	Number of shade trees	Number of trees that provide shade coverage on both blocks
btreeblk	Number of trees	Number of trees on both blocks
BTREEGRATES	Number of tree grates	Number of tree grates on both blocks
CONSTRUCTION_ANY	Construction (yes vs. no)	Indicates any construction on either block
CROSSWALK	Number of marked crosswalks	Number of marked crosswalks
GRAFFITI_ANY	Graffiti (yes vs. no)	Indicates any graffiti either block
ind_la	LA vs. West Hollywood	Indicates LA vs. West Hollywood
INT_PED_FEAT	Ped features (yes vs. no)	Indicates intersection has 1 or more ped features
INTERSECTION_TC	Number of traffic calming features	Number of intersection traffic calming features
LADDER_XW	Number of ladder crosswalks	Number of ladder crosswalks
LIGHT_BOTHSIDES	Ped scale lighting	Ped scale lighting on both blocks (0= none, 1= 1 block, 2= 2 blocks)
LITTER_ANY	Litter (yes vs. no)	Any litter on either block

lnaadt_10y	10 year AADT on SMB	Log of 10 year AADT on SMB extrapolated (Source: tube counts)
lnpedvol	Pedestrian volume	Log of modeled pedestrian volume
LSCP_BULBOUTS	Landscaped bulb-outs	Landscaped bulb-outs on either block (yes vs. no)
LT_INTERSECTION	Left turn lane	Indicates 1 or more left turn lane at the intersection (yes vs. no)
MED_LSCP_EITH	Median landscaped (yes vs. no)	Indicates median landscaped on either block (yes vs. no)
NO_LEGS	Number of intersection legs	Number of intersection legs
NUMB_VEH_L	Number of vehicle lanes	Number of vehicle lanes
OFFSET	Offset intersection	Indicates intersection is offset (yes vs. no)
pct_alc	Percent alcohol	Percent of intersection injuries or crashes that involved alcohol (Source: SWITRS)
PCT_CORNERADA	Percent of corners that are ADA	Percent of corners with ADA features
PCT_TRUCK	Percent trucks	Percent of traffic that are trucks extrapolated (Source: tube counts)
PEDSIG_W_CNTDN	Ped countdown signal	Indicates pedestrian countdown signal at any intersection leg (yes vs. no)
PEQI_XW	Number of regularly marked crosswalks	Number of regularly marked crosswalks
REG_LSCP_EITH	Regular median landscaping (yes vs. no)	Regular median landscaping present on either block
spd_85perc	Speed 85^{th} percentile	Speed 85^{th} percentile extrapolated (Source: speed surveys)
SPD_TUBE	Extrapolated vehicle speed from speed tubes (mph)	Motor vehicle speed extrapolated from speed tubes at survey locations (miles per hour)
TRAFFIC_SIGNAL	Signalized intersection	Intersection is signalized (yes vs. no)
VEHSPD_BEF_AFT	Vehicle speed posted	Vehicle speed is posted on either block (yes vs. no)
xstclass	Cross street classification	Cross street classification (1= minor, 2= major)
XW_3OR4	3 or 4+ crosswalks	At least 3 or 4 crosswalks at the intersection (yes vs. no)
XW_CSS	Number of context sensitive crosswalks	Number of intersection legs/crosswalks with context sensitive materials

Appendix L: Bivariate Tables from Phase III Crash Analysis

San Pablo Avenue: Bike Model

Bivariate negative binomial regression of bicyclist victims* (for characteristics *p*<0.20), SWITRS SPA 1997-2007

Parameter	Coefficient	StdErr	95% Confidence Interval		ProbChiSq
xstclass	1.0160	0.2427	0.5403	1.4917	<.0001
stpkg_both	-0.3475	0.1443	-0.6303	-0.0647	0.0160
stpkg_eith	-0.4624	0.2596	-0.9712	0.0463	0.0748
pmbk_eith	0.7230	0.4687	-0.1955	1.6415	0.1229
ave_pvmt	0.6789	0.2813	0.1276	1.2301	0.0158
bkpkg_both	0.0393	0.0200	0.0000	0.0785	0.0497
bksign_eith	0.5521	0.3265	-0.0878	1.1920	0.0909
pct_cornerada	0.0311	0.0052	0.0209	0.0414	<.0001
lt_intersection	0.8550	0.2447	0.3755	1.3345	0.0005
med_lscp_both	0.5657	0.2266	0.1216	1.0099	0.0125
med_pass	0.4366	0.2410	-0.0357	0.9089	0.0700
trash_both	0.8573	0.2164	0.4331	1.2814	<.0001
trash_either	0.7405	0.3188	0.1157	1.3653	0.0202
ave_trash	0.5575	0.1973	0.1708	0.9443	0.0047
ladder_xw	0.4364	0.1061	0.2285	0.6443	<.0001
crosswalk	0.6636	0.1145	0.4393	0.8880	<.0001
xw_3or4	0.9747	0.2440	0.4964	1.4530	<.0001
pedsig_w_cntdn	1.1700	0.2812	0.6188	1.7212	<.0001
traffic_signal	0.7955	0.2181	0.3680	1.2230	0.0003
addtl_pedsigns	-1.0849	0.4403	-1.9478	-0.2220	0.0137
spd_lmt	4.5763	0.0000	4.5763	4.5763	.
ave_sw_width_ov	0.5122	0.3698	-0.2126	1.2370	0.1660

Parameter	Coefficient	StdErr	95% Confidence Interval		ProbChiSq
construction_an	0.4267	0.2657	-0.0941	0.9475	0.1083
graffiti_any	-0.4793	0.2779	-1.0239	0.0653	0.0845
seating_any	0.7828	0.2583	0.2764	1.2891	0.0024
blocklengths_cn	0.0013	0.0005	0.0003	0.0022	0.0075
no_legs	1.0649	0.1996	0.6737	1.4562	<.0001
bbus_stp	0.5330	0.1162	0.3052	0.7607	<.0001
bnewspaper	0.3071	0.1420	0.0288	0.5854	0.0306
driveways_both	0.0664	0.0161	0.0349	0.0980	<.0001
lscp_bulbouts	0.0000	0.0000	0.0000	0.0000	.
int_ped_feat	0.7943	0.2423	0.3194	1.2692	0.0010
ave_xwalk_other	0.0132	0.0063	0.0009	0.0255	0.0347
spd_85perc	0.1908	0.0999	-0.0050	0.3867	0.0561
pct_compst	0.0000	0.0000	0.0000	0.0000	.
retail_6_both	1.2162	0.2702	0.6866	1.7459	<.0001
gardens_bothsid	0.3197	0.2395	-0.1498	0.7892	0.1820
reg_trees_boths	0.7409	0.3630	0.0294	1.4525	0.0413
ln_veh_vol	-1.9020	1.2423	-4.3368	0.5328	0.1257

Santa Monica Boulevard: Pedestrian Model

Bivariate negative binomial regression of pedestrian victims* (for characteristics $p<0.20$), SWITRS SMB 2001-2010

Parameter	Coeff	SE	95% CI		*P*-value
Alcohol: Percent of intersection crashes that involved alcohol	0.028	0.012	0.005	0.052	<0.05
Landuse: Number of auto-centered land use/establishments for the 4 surrounding blocks	-0.093	0.046	-0.183	-0.002	<0.05
Newspaper racks: Number of 4 surrounding blocks that have at least 1	0.345	0.152	0.047	0.642	<0.05
Trash cans: Average number of trash can per segment for the 4 surrounding blocks	0.412	0.150	0.118	0.706	<0.01
Bike parking: Number of bike parking spaces on the 4 surrounding blocks	0.065	0.027	0.012	0.119	<0.05
ADA: Percent of corners with ADA features	0.019	0.004	0.011	0.026	<0.0001
Crossings: Average crossing length for SMB	0.014	0.009	-0.003	0.030	0.11
Crosswalks					
Number of marked crosswalks	0.354	0.068	0.219	0.488	<0.0001
Number of regular marked crosswalks	0.214	0.060	0.097	0.331	<0.001
At least 3 or 4 crosswalks at the intersection (yes vs. no)	0.768	0.212	0.353	1.183	<0.001
Number of context sensitive crosswalks	0.914	0.354	0.220	1.608	<0.01
Intersection ped features**	1.034	0.194	0.653	1.415	<0.0001
Pedestrian countdown: Number of intersection legs with pedestrian countdown signal	0.761	0.237	0.297	1.225	<0.01
Log pedestrian crossing volume	0.582	0.152	0.284	0.880	<0.001
Bus stops – number of 4 surrounding blocks that have at least 1	0.225	0.123	-0.015	0.466	0.07
Residential driveways: Number of residential driveways on the 4 surrounding blocks	1.301	0.636	0.055	2.546	<0.05
Number of vehicle lanes	0.332	0.184	-0.029	0.693	0.07
Left turn at intersection	0.509	0.228	0.062	0.955	<0.05
Number of legs	0.976	0.198	0.589	1.363	<0.0001
Traffic volume: cross street volume classification	0.854	0.260	0.344	1.364	<0.01
Average crossing length side street	0.020	0.006	0.008	0.032	<0.01

Santa Monica Boulevard: Motor Vehicle Model

Bivariate negative binomial regression of motor vehicle occupant injury crashes* (for characteristics $p<0.20$), SWITRS SMB 2001-2010

Parameter	Coeff	SE	95% CI		*P*-value
pct_alc	**0.021**	**0.015**	**-.009**	**0.051**	**0.16**
ABANDONED_	0.677	0.292	0.103	1.250	0.02
BINDUSTR	0.234	0.104	0.030	0.438	0.02
bshtreeblk	-3.71	1.087	-5.85	-1.58	0.00
btreeblk	-3.62	1.068	-5.72	-1.53	0.00
BNEWSPAPER	0.632	0.167	0.305	0.959	0.00
CONSTRUCTI	0.593	0.327	-.048	1.233	0.07
LITTER_ANY	0.559	0.296	-.021	1.140	0.06
MED_LSCP_E	-0.328	0.242	-.801	0.146	0.18
GRAFFITI_A	1.275	0.708	-.114	2.663	0.07
REG_LSCP_E	-0.328	0.242	-.801	0.146	0.18
LSCP_BULBO	-1.13	0.777	-2.66	0.388	0.14
BTREEGRATE	-0.212	0.138	-.483	0.058	0.12
BKPKG_BOTH	0.051	0.031	-.010	0.112	0.10
PCT_CORNER	0.027	0.003	0.020	0.033	0.00
AVE_PCTSWA	-0.030	0.021	-.072	0.011	0.15
AVE_PCTSWF	-0.089	0.038	-.165	-.014	0.02
ADDTL_PEDS	-0.437	0.254	-.935	0.061	0.09
AVE_XWALK_	0.013	0.009	-.004	0.030	0.14
BBOLLARDS	-0.335	0.149	-.627	-.042	0.02
CROSSWALK	0.415	0.059	0.299	0.530	0.00
INT_PED_FE	1.095	0.203	0.696	1.493	0.00
LADDER_XW	-0.234	0.079	-.388	-.080	0.00
LIGHT_BOTH	-0.478	0.252	-.973	0.016	0.06
PEDSIG_W_C	1.449	0.204	1.049	1.850	0.00
PEQI_XW	0.399	0.049	0.303	0.495	0.00
XW_3OR4	1.323	0.192	0.948	1.699	0.00
XW_CSS	0.925	0.389	0.164	1.687	0.02
lnpedvol	0.675	0.173	0.336	1.014	0.00
PCT_TRUCK	15.25	5.688	4.099	26.40	0.01
ADV_YIELD_	-0.516	0.226	-.959	-.072	0.02
BBUS_STP	0.299	0.131	0.043	0.556	0.02
BDRWY_C	0.068	0.027	0.014	0.121	0.01
BDRWY_R	1.075	0.717	-.329	2.480	0.13
NUMB_VEH_L	0.452	0.188	0.083	0.821	0.02
VEHSPD_BEF	0.345	0.230	-.106	0.796	0.13
spd_85perc	0.166	0.084	0.002	0.330	0.05
INTERSECTI	-.584	0.137	-.852	-.317	0.00
LT_INTERSE	0.971	0.223	0.535	1.408	0.00
SPD_TUBE	0.135	0.084	-.029	0.300	0.11
NO_LEGS	1.337	0.188	0.968	1.706	0.00
OFFSET	-.578	0.314	-1.19	0.037	0.07
lnaadt_10y	-2.993	1.14	-5.225	-0.76	<0.01

Parameter	Coeff	SE	95% CI		*P*-value
xstclass	1.331	0.252	0.838	1.825	0.00
AVE_XWALK_	0.039	0.006	0.027	0.051	0.00
TRAFFIC_SI	1.382	0.183	1.023	1.740	0.00
ind_la	0.964	0.213	0.545	1.382	0.00

Santa Monica Boulevard: Bicycle Model

Bivariate negative binomial regression of bicycle injury crashes* (for characteristics p<0.20), SWITRS SMB 2001-2010

Parameter	Coefficient Estimate	StdErr	95% Confidence Interval		P-Value
BINDUSTR	0.2361	0.0783	0.0827	0.3896	0.0026
bshtreeblk	-2.3640	1.2800	-4.8727	0.1448	0.0648
btreeblk	-2.3121	1.2666	-4.7945	0.1703	0.0679
BNEWSPAPER	0.3658	0.1417	0.0882	0.6435	0.0098
LITTER_ANY	0.4814	0.2501	-0.0087	0.9715	0.0542
GRAFFITI_A	1.0245	0.5308	-0.0158	2.0648	0.0536
BKPKG_BOTH	0.0578	0.0225	0.0136	0.1019	0.0103
BPKG_GRG	0.4879	0.3571	-0.2120	1.1879	0.1718
lnbikvol	0.9990	0.6663	-0.3069	2.3050	0.1338
PCT_CORNER	0.0146	0.0037	0.0074	0.0219	<.0001
AVE_PCTSWF	-0.0486	0.0331	-0.1135	0.0163	0.1424
CROSSWALK	0.1879	0.0675	0.0556	0.3201	0.0054
INT_PED_FE	0.5966	0.2010	0.2026	0.9905	0.0030
LADDER_XW	-0.1199	0.0862	-0.2887	0.0490	0.1642
LIGHT_BOTH	-0.4213	0.2133	-0.8394	-0.0033	0.0482
PEDSIG_W_C	0.8982	0.1908	0.5243	1.2721	<.0001
PEQI_XW	0.1874	0.0545	0.0806	0.2941	0.0006
XW_3OR4	0.5746	0.2015	0.1796	0.9696	0.0044
lnpedvol	0.3064	0.1620	-0.0112	0.6239	0.0586
PCT_TRUCK	13.5465	4.5376	4.6529	22.4400	0.0028
ADV_YIELD_	-0.3510	0.2060	-0.7547	0.0528	0.0884
BDRWY_C	0.0379	0.0230	-0.0073	0.0830	0.1002
NUMB_VEH_L	0.4099	0.1654	0.0857	0.7340	0.0132
spd_85perc	0.2402	0.0743	0.0946	0.3859	0.0012
INTERSECTI	-0.2766	0.1468	-0.5645	0.0112	0.0596
LT_INTERSE	0.4447	0.2194	0.0146	0.8747	0.0427
SPD_TUBE	0.1887	0.0817	0.0285	0.3489	0.0210
MED_BOTH	0.6921	0.4716	-0.2322	1.6165	0.1422
NO_LEGS	0.6690	0.1990	0.2790	1.0591	0.0008
lnaadt_10y	-2.0292	0.9679	-3.9263	-0.1321	0.0360
xstclass	0.5672	0.2439	0.0892	1.0452	0.0200
AVE_XWALK_	0.0196	0.0057	0.0084	0.0308	0.0006
ind_la	0.6137	0.1979	0.2258	1.0016	0.0019

Combined Corridors: Pedestrian Model

Parameter	Coefficient Estimate	StdErr	95% Confidence Interval		P-Value
ln_ped_wkly_vol	0.8201	0.1405	0.5447	1.0955	<.0001
xstclass	0.9274	0.2135	0.5089	1.3459	<.0001
pmbk_eith	0.5574	0.3428	-0.1145	1.2293	0.1040
ave_pvmt	-0.3088	0.0703	-0.4466	-0.1711	<.0001
bkpkg_both	0.0411	0.0200	0.0020	0.0803	0.0396
bksign_eith	0.5536	0.2404	0.0825	1.0248	0.0213
ave_pctswfb	0.0197	0.0108	-0.0014	0.0408	0.0678
xw_css	0.6734	0.3108	0.0644	1.2825	0.0302
pct_cornerada	0.0223	0.0035	0.0155	0.0291	<.0001
avg_medwidth	-0.0737	0.0160	-0.1050	-0.0424	<.0001
lt_intersection	0.6856	0.1858	0.3213	1.0498	0.0002
reg_lscp_eith	-0.4957	0.1826	-0.8536	-0.1378	0.0066
med_lscp_eith	-0.5592	0.1876	-0.9270	-0.1914	0.0029
med_pass	0.7558	0.2153	0.3339	1.1777	0.0004
mbxing_eith	-0.6354	0.3430	-1.3078	0.0369	0.0640
trash_both	0.7530	0.1743	0.4114	1.0946	<.0001
trash_either	1.1807	0.2794	0.6331	1.7283	<.0001
ave_trash	0.6187	0.1354	0.3533	0.8842	<.0001
ladder_xw	0.2863	0.0854	0.1189	0.4537	0.0008
crosswalk	0.2650	0.0682	0.1314	0.3987	0.0001
xw_3or4	0.4916	0.1790	0.1407	0.8425	0.0060
pedsig_w_cntdn	1.0404	0.2243	0.6007	1.4800	<.0001
traffic_signal	0.8795	0.1734	0.5397	1.2193	<.0001
intersection_tc	0.4409	0.1688	0.1099	0.7718	0.0090
numb_veh_lanes	1.0381	0.6747	-0.2843	2.3605	0.1239
vehspd_bef_aft	0.3812	0.1805	0.0274	0.7350	0.0347
spd_lmt	0.1013	0.0335	0.0356	0.1670	0.0025
light_bothsides	0.6839	0.0976	0.4925	0.8753	<.0001
litter_any	-0.5389	0.1790	-0.8897	-0.1881	0.0026
graffiti_any	-0.6110	0.2451	-1.0915	-0.1306	0.0127
pubart_any	0.3543	0.2146	-0.0663	0.7750	0.0987
seating_any	0.8363	0.2083	0.4281	1.2445	<.0001
blocklengths_cn	0.0014	0.0005	0.0004	0.0024	0.0051
no_legs	1.1818	0.1604	0.8675	1.4962	<.0001
bbus_stp	0.4372	0.0992	0.2429	0.6316	<.0001
bnewspaper	0.3391	0.1183	0.1072	0.5710	0.0042
btreegrates	0.1336	0.0953	-0.0532	0.3204	0.1609
int_ped_feat	1.2958	0.1646	0.9733	1.6183	<.0001
ave_xwalk_main	-0.0118	0.0057	-0.0230	-0.0006	0.0392
ave_xwalk_other	0.0216	0.0053	0.0113	0.0319	<.0001
spd_85perc	-0.1685	0.0264	-0.2202	-0.1168	<.0001
pct_compst	0.0083	0.0032	0.0021	0.0146	0.0085
retail_6_both	0.9579	0.1981	0.5697	1.3461	<.0001
gardens_bothsid	-0.3171	0.1803	-0.6705	0.0363	0.0786
ln_bike_vol	0.2774	0.1855	-0.0862	0.6410	0.1349
ln_veh_vol	2.0239	0.7542	0.5456	3.5022	0.0073

Combined Corridors: Motor Vehicle Model

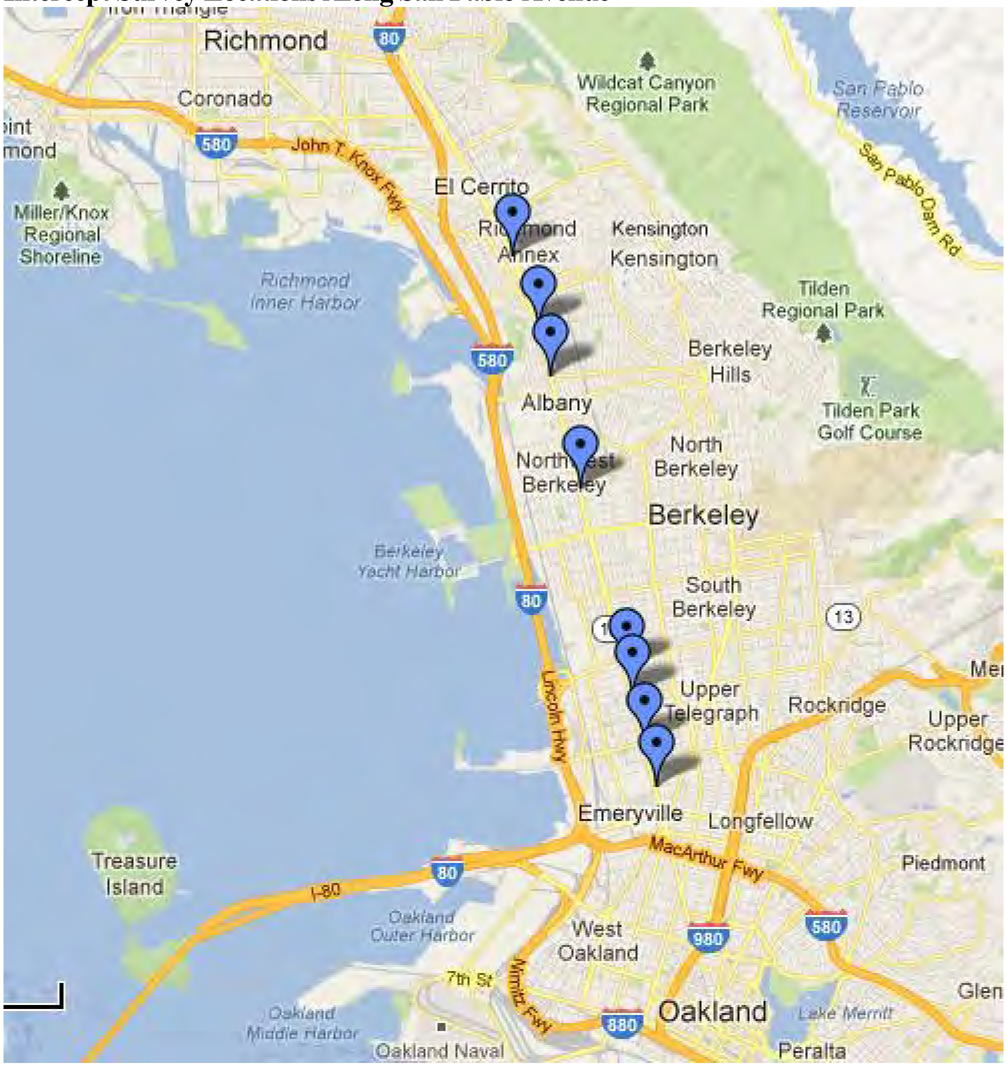
Parameter	Coefficient Estimate	StdErr	95% Confidence Interval		P-Value
ln_ped_wkly_vol	0.4871	0.1204	0.2511	0.7232	<.0001
xstclass	1.2384	0.1546	0.9354	1.5414	<.0001
stpkg_both	-0.2094	0.0944	-0.3945	-0.0243	0.0266
stpkg_eith	-0.3025	0.1812	-0.6576	0.0525	0.0949
pmbk_eith	0.4378	0.2727	-0.0966	0.9723	0.1084
ave_pvmt	-0.1626	0.0598	-0.2799	-0.0454	0.0066
bkpkg_both	0.0458	0.0153	0.0157	0.0758	0.0028
bksign_eith	0.2509	0.1927	-0.1267	0.6285	0.1929
xw_css	0.4831	0.2350	0.0225	0.9438	0.0398
pct_cornerada	0.0287	0.0024	0.0241	0.0334	<.0001
avg_medwidth	-0.0267	0.0124	-0.0510	-0.0024	0.0314
lt_intersection	0.8895	0.1373	0.6203	1.1587	<.0001
reg_lscp_eith	-0.3609	0.1430	-0.6413	-0.0806	0.0116
med_lscp_eith	-0.3221	0.1488	-0.6138	-0.0304	0.0304
med_pass	0.5211	0.1616	0.2043	0.8379	0.0013
trash_both	0.6754	0.1341	0.4126	0.9381	<.0001
trash_either	1.0013	0.1973	0.6146	1.3879	<.0001
ave_trash	0.4300	0.1133	0.2079	0.6521	0.0001
peqi_xw	0.1700	0.0396	0.0923	0.2477	<.0001
ladder_xw	0.1213	0.0619	-0.0000	0.2426	0.0501
crosswalk	0.4080	0.0458	0.3183	0.4978	<.0001
xw_3or4	1.0210	0.1279	0.7704	1.2716	<.0001
pedsig_w_cntdn	1.3415	0.1621	1.0237	1.6592	<.0001
traffic_signal	1.1654	0.1229	0.9244	1.4063	<.0001
intersection_tc	-0.2796	0.1278	-0.5301	-0.0290	0.0288
addtl_pedsigns	-0.4074	0.1843	-0.7686	-0.0462	0.0271
vehspd_bef_aft	0.4991	0.1379	0.2289	0.7693	0.0003
ave_sw_width_ov	0.3167	0.1808	-0.0377	0.6711	0.0799
construction_an	0.3862	0.1775	0.0384	0.7341	0.0295
light_bothsides	0.2450	0.0871	0.0742	0.4158	0.0049
seating_any	0.5800	0.1563	0.2736	0.8864	0.0002
blocklengths_cn	0.0010	0.0004	0.0003	0.0018	0.0047
no_legs	1.1851	0.1118	0.9660	1.4041	<.0001
bbus_stp	0.4378	0.0727	0.2953	0.5804	<.0001
bnewspaper	0.4707	0.0939	0.2867	0.6547	<.0001
bbollards	-0.1894	0.1450	-0.4736	0.0949	0.1916
driveways_both	0.0399	0.0125	0.0154	0.0645	0.0014
int_ped_feat	1.1217	0.1313	0.8644	1.3789	<.0001
ave_xwalk_other	0.0282	0.0042	0.0201	0.0363	<.0001
spd_85perc	-0.0452	0.0224	-0.0892	-0.0012	0.0439
retail_6_both	0.6942	0.1618	0.3772	1.0112	<.0001
reg_trees_boths	-0.2753	0.1592	-0.5873	0.0367	0.0837
ln_bike_vol	0.2585	0.1287	0.0062	0.5107	0.0446

Combined Corridors: Bicycle Model

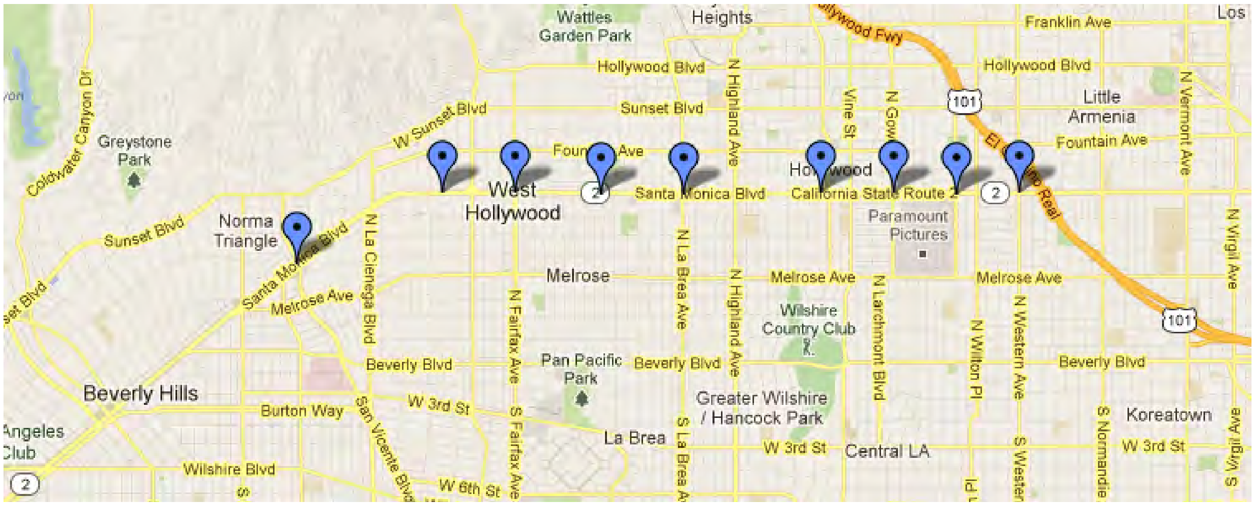
Parameter	Coefficient Estimate	StdErr	95% Confidence Interval		Prob ChiSq
ln_ped_wkly_vol	0.4439	0.1407	0.1682	0.7196	0.0016
xstclass	0.7926	0.1859	0.4283	1.1569	<.0001
ave_pvmt	-0.1402	0.0691	-0.2757	-0.0048	0.0425
bkpkg_both	0.0411	0.0160	0.0098	0.0724	0.0101
bksign_eith	0.3506	0.2164	-0.0735	0.7748	0.1052
pct_cornerada	0.0207	0.0034	0.0141	0.0273	<.0001
avg_medwidth	-0.0281	0.0146	-0.0568	0.0006	0.0547
lt_intersection	0.6400	0.1733	0.3003	0.9798	0.0002
reg_lscp_eith	-0.3235	0.1664	-0.6496	0.0026	0.0519
med_lscp_eith	-0.3874	0.1703	-0.7212	-0.0537	0.0229
med_pass	0.7341	0.2066	0.3292	1.1391	0.0004
trash_both	0.6641	0.1595	0.3515	0.9767	<.0001
trash_either	0.6272	0.2548	0.1278	1.1266	0.0138
ave_trash	0.3004	0.1314	0.0429	0.5580	0.0222
ladder_xw	0.2316	0.0706	0.0931	0.3700	0.0010
crosswalk	0.2334	0.0627	0.1105	0.3564	0.0002
xw_3or4	0.5024	0.1634	0.1821	0.8226	0.0021
pedsig_w_cntdn	1.1423	0.1762	0.7969	1.4877	<.0001
traffic_signal	0.8276	0.1549	0.5239	1.1312	<.0001
spd_lmt	0.0555	0.0326	-0.0084	0.1195	0.0889
ave_sw_width_ov	0.3269	0.2213	-0.1070	0.7607	0.1398
construction_an	0.2695	0.2047	-0.1316	0.6706	0.1879
light_bothsides	0.3422	0.0965	0.1531	0.5313	0.0004
graffiti_any	-0.4687	0.2302	-0.9199	-0.0175	0.0418
seating_any	0.6617	0.1974	0.2748	1.0487	0.0008
blocklengths_cn	0.0012	0.0004	0.0004	0.0020	0.0023
no_legs	0.9615	0.1463	0.6748	1.2482	<.0001
bbus_stp	0.3782	0.0877	0.2062	0.5501	<.0001
bnewspaper	0.2951	0.1079	0.0836	0.5067	0.0063
driveways_both	0.0428	0.0135	0.0164	0.0692	0.0015
int_ped_feat	0.8499	0.1581	0.5401	1.1597	<.0001
ave_xwalk_main	-0.0084	0.0056	-0.0193	0.0025	0.1330
ave_xwalk_other	0.0169	0.0047	0.0077	0.0260	0.0003
spd_85perc	-0.0737	0.0262	-0.1250	-0.0224	0.0049
pct_compst	0.0061	0.0028	0.0007	0.0116	0.0281
retail_6_both	0.8872	0.1702	0.5536	1.2208	<.0001
reg_trees_boths	-0.3758	0.1804	-0.7294	-0.0221	0.0373
ln_bike_vol	0.2742	0.1566	-0.0327	0.5811	0.0799

Appendix M: Intercept Survey Questionnaires

Intercept Survey Locations Along San Pablo Avenue



Intercept Survey Locations Along Santa Monica Boulevard



San Pablo Avenue Pedestrian Safety Survey

Hi, my name is _____ and I am doing a brief survey about improving areas along San Pablo Ave for UC Berkeley and Caltrans. This will take less than 5 minutes and is completely anonymous. You can skip any question you do not want to answer. Okay? Great, thank you. For the purpose of the survey – please consider this 2-block stretch of San Pablo Ave on either side of XX St.

The first questions are about your visit here today.

1. **What is the main purpose for your visit here today? (Do not read - Select ONE)**

❒1 Shopping
❒2 Work in area
❒3 Dining or Drinking
❒4 Personal Errand or Appointment
❒5 Visiting friends in this area
❒6 Gym or other Exercise
❒7 Entertainment – (movie, theatre, music)
❒8 Site-seeing/Tourist attractions
❒9 I live in this area
❒10 Just passing through – (e.g., on way to work, other)
❒11 Other ____________
❒88. Do Not Know
❒99. Asked to skip question

2. **How did you get here today? (Do not read – Select ONE)**

❒1 By Car **(GO to Q2A)**
❒2 By Foot
❒3 By Taxi
❒4 By Bicycle
❒5 By Public transportation
❒6 Other ____________
❒88. Do Not Know
❒99. Asked to skip question

2A. What was the main reason you decided to drive here? (Do not read– Select ONE)

❒1 Distance (I live far away)
❒2 Safety (Not safe to walk here)
❒3 Time (I am in a hurry)
❒4 Parking (Easy, convenient)
❒5 No public transportation option
❒6 Physical limitations
❒7 Convenience (I always drive)
❒10 Other: ____________
❒88. Do Not Know
❒99. Asked to skip question

The next questions are about your opinions about this 2-block stretch of San Pablo Avenue.

3. **Typically, how often do you come to this area? Would you say…**

1---------------2---------------3---------------4---------------5

All the time — Fairly often — Occasionally — Rarely — Never- first time today

❒88. Do Not Know
❒99. Asked to skip question

4. **In general, how likely are you to walk more than one block along this area of San Pablo Avenue when you come here?** Please use a scale where 1 is Very Likely and 5 is Very Unlikely.

1---------------2---------------3---------------4---------------5

Very Likely Neutral Very Unlikely

❒88. Do Not Know ❒99. Asked to skip question

5. **Using the same scale of 1 to 5, how likely is it that you would walk or ride a bike MORE if there were more…**

	LIKELY 1	**2**	**3**	**4**	**UNLIKELY 5**	**DK 8**	**REF 9**	**N/A 10**
a. Trees that provide shade?								
b. Landscaping or other plants?								
c. Medians in the middle of the street?								
d. Sidewalk lights?								
e. Curb extensions at intersections?								
f. Colored or decorative pavement on sidewalk?								
g. Bicycle parking?								
h. Bicycle lanes?								
i. Art or decorated trash bins?								
j. Outdoor cafes or other seating areas?								

6. **Typically, what do you do when you come to this area of San Pablo Avenue? (record verbatim)**

❒88. Do Not Know ❒99. Asked to skip question

7. **What do you like <u>best</u> about this area of San Pablo Avenue? (Do not read – Select ALL)**

- ❐ 1 Good shopping/restaurants
- ❐ 2 Easy to park
- ❐ 3 Close to where I live/work
- ❐ 4 Good lighting
- ❐ 5 Good for walking
- ❐ 6 It is a safe area
- ❐ 88. Do Not Know
- ❐ 7 Pretty/attractive
- ❐ 8 Easy to access via public transit
- ❐ 9 Not a lot of traffic/congestion
- ❐ 10 Lots of trees/plants
- ❐ 11 Good for biking
- ❐ 12 Other ________
- ❐ 99. Asked to skip question

8. **What do you like <u>least</u> about this area of San Pablo Avenue? (Do not read – Select ALL)**

- ❐ 1 Not enough shops/restaurants
- ❐ 2 Difficult to park
- ❐ 3 Far from where I live/work
- ❐ 4 Bad lighting
- ❐ 5 Bad for walking
- ❐ 6 It is an unsafe area
- ❐ 88. Do Not Know
- ❐ 7 Unkempt/Poorly maintained
- ❐ 8 No public transportation
- ❐ 9 A lot of traffic/congestion
- ❐ 10 No trees/plants
- ❐ 11 Bad for biking
- ❐ 12 Other ________
- ❐ 99. Asked to skip question

The next questions are about traffic safety. Please use a scale of 1 to 5, where 1 = very safe and 5 = very unsafe.

9. **When you're walking or riding your bike along this section of San Pablo Avenue, how safe do you feel from traffic?**

	1	2	3	4	5	8	9	10
When you are….	**Very SAFE**				**Very Unsafe**	**DK**	**REF**	**N/A**
a. Walking across the street?								
b. Walking on the sidewalk?								
c. Riding your bike across the street?								
d. Riding your bike on the street?								
e. Coming to the area after dark?								

10. **While walking or riding a bike on this area of San Pablo Avenue has…?**

10a. A motor vehicle almost hit you when you were crossing the street? ❐ 1 Yes ❐ 2 No ❐ 3 NA ❐ 8 DK ❐ 8 Ref

10b. A motor vehicle come too close to you? ❐ 1 Yes ❐ 2 No ❐ 3 NA ❐ 8 DK ❐ 8 Ref

10c. A driver opening a car door almost hit you? ❐ 1 Yes ❐ 2 No ❐ 3 NA ❐ 8 DK ❐ 8 Ref

11.(If YES to any of the above): Were you injured as a result?

❒1 Yes ❒2 No ❒8 DK ❒8 Asked to skip question

12. Are there any street improvements that could be added to help you feel safer from traffic?

Verbatim

13. Are there any street improvements that would encourage you to come to this area more often?

Verbatim

And the last few questions are for statistical purposes only.

14. Are you between?

❒1 18-24
❒2 25-34
❒3 35-44
❒88. Do Not Know
❒4 45-54
❒5 55-70
❒6 70 or older
❒99. Asked to skip question

15. What is your level of education?

❒1 Less than high school
❒2 High school graduate/GED
❒3 Some college
❒88. Do Not Know
❒4 College graduate
❒5 Graduate Degree (Masters, PhD, MBA, etc.)
❒8 Other: ____________________
❒99. Asked to skip question

THANK. Thank you very much for your time. Those are all the questions.

Respondent's gender (DO NOT ASK) ❒1 Male ❒2 Female

Please select race or ethnicity of respondent (to the best of your ability)

- ❒1 Caucasian or White
- ❒2 Hispanic
- ❒3 African-American/Black
- ❒4 Asian
- ❒5 Native American or Alaskan Native
- ❒6 Hawaiian or Pacific Islander
- ❒7 Other: ____________________

Area: _____________________

Interviewer: _____________________ Location: San Pablo & _________________

Time: 7 / 8 / 9 / 10 / 11 / 12 / 1 / 2 / 3 / 4 / 5 / 6 **AM/PM** Date: ______________________

Relevant Notes:

____

____

Santa Monica Boulevard Roadside Design Features Survey

Hi, my name is _____ and I am doing a brief survey about improving areas along Santa Monica Boulevard for UC Berkeley and Caltrans. This will take less than 5 minutes and is completely anonymous. You can skip any question you do not want to answer. Okay? Great, thank you. For the purpose of the survey – please consider this 2-block stretch of Santa Monica Boulevard on either side of XX St.

The first questions are about your visit here today.

16. **Typically, what do you do when you come to this area of Santa Monica Boulevard? (record verbatim)**

- ❐ 1 Shopping
- ❐ 2 Work in area
- ❐ 3 Dining or Drinking
- ❐ 4 Personal Errand or Appointment
- ❐ 5 Visiting friends in this area
- ❐ 6 Gym or other Exercise
- ❐ 7 Entertainment – (movie, theatre, music)
- ❐ 8 Site-seeing/Tourist attractions
- ❐ 9 I live in this area
- ❐ 10 Just passing through – (e.g., on way to work, other)
- ❐ 11 Record verbatim ____

____

17. **How did you get here today? (Do not read – Select ONE)**

- ❐ 1 By Car **(GO to Q2A)**
- ❐ 2 By Foot
- ❐ 3 By Taxi
- ❐ 88. Don't know
- ❐ 4 By Bicycle
- ❐ 5 By Public transportation
- ❐ 6 Other ______________________
- ❐ 99. Skip

2A. What was the main reason you decided to drive here? (Do not read– Select ONE)

- ❐ 1 Distance (I live far away)
- ❐ 2 Safety (not safe to walk here)
- ❐ 3 Time (I am in a hurry)
- ❐ 4 Parking (Easy, convenient)
- ❐ 88. Don't know
- ❐ 5 No public transportation option
- ❐ 6 Physical limitations
- ❐ 7 Convenience (I always drive)
- ❐ 8 Other: __________________
- ❐ 99. Skip

18. **How do you most often get around the city? (Do not read – Select ONE)**

- ❐ 1 Car
- ❐ 2 Walk
- ❐ 3 Taxi
- ❐ 88. Don't know
- ❐ 4 Bicycle
- ❐ 5 Public transportation
- ❐ 6 Other ______________________
- ❐ 99. Skip

19. **Typically, how often do you come to this this 2-block stretch of Santa Monica Boulevard? Would you say…**

❒1 Never- first time today ❒2 Rarely ❒3 Occasionally ❒4 Fairly often ❒5 All the time

❒88. Don't know ❒99. Skip

20. **In general, how likely are you to walk more than one block along this area of Santa Monica Boulevard when you come here?** Please use a scale where 1 is Very Unlikely and 5 is Very Likely

1--------------2--------------3--------------4--------------5

Very Unlikely Neutral Very Likely

❒88. Don't know ❒99. Skip

21. **Using the same scale where 1 is "Very Unlikely" and 5 is "Very Likely", how likely is it that you would walk or ride a bike MORE along this stretch of Santa Monica Boulevard if there were more…**

	Very UNLIKELY 1	**2**	**3**	**4**	**Very LIKELY 5**	**DK 8**	**Skip 9**	**N/A 10**
a. Trees that provide shade?	1	2	3	4	5	DK	Skip	N/A
b. Other plants near the sidewalk?	1	2	3	4	5	DK	Skip	N/A
c. Landscaped street medians?	1	2	3	4	5	DK	Skip	N/A
d. Lighting on the sidewalks?	1	2	3	4	5	DK	Skip	N/A
e. Widened sidewalks at intersections?	1	2	3	4	5	DK	Skip	N/A
f. Colored or decorative sidewalk pavement?	1	2	3	4	5	DK	Skip	N/A
g. Bicycle parking?	1	2	3	4	5	DK	Skip	N/A
h. Bicycle lanes?	1	2	3	4	5	DK	Skip	N/A
i. Art or decorated trash bins?	1	2	3	4	5	DK	Skip	N/A
j. Outdoor cafes or other seating areas?	1	2	3	4	5	DK	Skip	N/A

22. **What do you like <u>best</u> about this area of Santa Monica Boulevard? (Do not read – Select ALL)**

- ❒1 Good shopping/restaurants
- ❒2 Easy to park
- ❒3 Close to where I live/work
- ❒4 Good lighting
- ❒5 Good for walking
- ❒6 It is a safe area
- ❒88. Don't know
- ❒7 Pretty/attractive
- ❒8 Easy to access via public transit
- ❒9 Not a lot of traffic/congestion
- ❒10 Lots of trees/plants
- ❒11 Good for biking
- ❒12 Other ____________
- ❒99. Skip

23. **What do you like <u>least</u> about this area of Santa Monica Boulevard? (Do not read – Select ALL)**

- ❒1 Not enough shops/restaurants
- ❒2 Difficult to park
- ❒3 Far from where I live/work
- ❒4 Bad lighting
- ❒5 Bad for walking
- ❒6 It is an unsafe area
- ❒88. Don't know
- ❒7 Unkempt/Poorly maintained
- ❒8 Difficult to access public transportation
- ❒9 A lot of traffic/congestion
- ❒10 No trees/plants
- ❒11 Bad for biking
- ❒12 Other ____________
- ❒99. Skip

24. **When you're walking or riding your bike along this section of Santa Monica Boulevard, how safe do you feel from crime using a scale of 1 to 5, where 1 is "Very Unsafe" and 5 is "Very safe"?**

How safe do you feel…	**Very UNSAFE**				**Very SAFE**	**DK**	**REF**	**N/A**
a. During the day?	1	2	3	4	5	**8**	**9**	**10**
b. At night?	1	2	3	4	5	**8**	**9**	**10**

25. **When you're walking or riding your bike along this section of Santa Monica Boulevard, how safe do you feel from traffic? On a scale from one to five where 1 is "Very Unsafe" and 5 is "Very safe"?**

How safe do you feel when you are…	**Very UNSAFE**				**Very SAFE**	**DK**	**REF**	**N/A**
a. Walking across the street?	1	2	3	4	5	**8**	**9**	**10**
b. Walking on the sidewalk?	1	2	3	4	5	**8**	**9**	**10**
c. Riding your bike across the street?	1	2	3	4	5	**8**	**9**	**10**
d. Riding your bike on the street?	1	2	3	4	5	**8**	**9**	**10**
e. Coming to the area after dark?	1	2	3	4	5	**8**	**9**	**10**

26. **While walking or riding a bike on this area of Santa Monica Boulevard has…?**

11a. A motor vehicle almost hit you when you were crossing the street? ❒1 Yes ❒2 No ❒8 DK ❒8 Skip

11b. A motor vehicle come too close to you? ❒1 Yes ❒2 No ❒8 DK ❒8 Skip

11c. A driver opening a car door almost hit you? ❒1 Yes ❒2 No ❒8 DK ❒8 Skip

(If YES to any of the above): Were you injured as a result?

❒1 Yes ❒2 No ❒8 DK ❒8 Skip

27. **Are there any street improvements that could be added to help you feel safer from traffic?**

Record Verbatim ____

____

28. **Are there any street improvements that would encourage you to come to this area more often?**

Record Verbatim ____

____

And the last few questions are for statistical purposes only.

29. **Are you between?**

❒1 18-24
❒2 25-34
❒3 35-44
❒88. Don't know
❒4 45-54
❒5 55-70
❒6 70 or older
❒99. Skip

30. **What is your level of education?**

❒1 Less than high school
❒2 High school graduate/GED
❒3 Some college
❒88. Don't know
❒4 College graduate
❒5 Graduate Degree (Masters, PhD, MBA, etc.)
❒8 Other: ________________
❒99. Skip

Thank you very much for your time. Those are all the questions I have for you.

____

Respondent's gender (To the best of your ability. DO NOT ASK) ❐1 Male
❐2 Female

Please select race or ethnicity of respondent (to the best of your ability)

❐1 Caucasian or White
❐2 Hispanic
❐3 African-American/Black
❐4 Asian
❐5 Native American or Alaskan Native
❐6 Hawaiian or Pacific Islander
❐7 Other: ____________________

Area: ____________________

Interviewer: ____________________ Location: Santa Monica Blvd & ________________

Time: 7 / 8 / 9 / 10 / 11 / 12 / 1 / 2 / 3 / 4 / 5 / 6 **AM/PM** Date: _____________________

Relevant Notes:
____

Appendix N: “Before” Data for Highway 82 in San Jose

Pedestrian and Bicycle Counts

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

16285 SW 85th Ave, Ste 302
Tigard, OR 97224
503-620-4242
www.qualitycounts.net

Site Code: 10828401
Location: Bush St - The Alameda
Date: 10/9/2012

	SB Crosswalk (North Leg)		WB Crosswalk (East Leg)		NB Crosswalk (South Leg)		EB Crosswalk (West Leg)	
	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker
2:00 PM	0	0	0	0	2	1	0	0
2:05 PM	0	0	0	0	2	0	0	0
2:10 PM	0	0	1	0	3	0	0	2
2:15 PM	0	0	0	0	1	0	0	0
2:20 PM	0	0	0	0	2	1	0	0
2:25 PM	0	0	0	0	1	0	0	0
2:30 PM	0	0	0	0	4	0	0	0
2:35 PM	0	0	0	0	1	0	0	0
2:40 PM	0	0	0	0	1	0	0	0
2:45 PM	0	0	0	0	0	0	0	0
2:50 PM	0	0	2	0	5	0	0	0
2:55 PM	0	0	0	0	1	0	0	0
3:00 PM	0	0	1	0	1	0	0	0
3:05 PM	0	0	0	0	0	0	0	0
3:10 PM	0	0	0	0	1	0	0	0
3:15 PM	0	0	0	0	2	0	0	0
3:20 PM	0	0	0	1	0	0	0	0
3:25 PM	0	0	0	0	1	0	0	0
3:30 PM	0	0	0	0	7	0	0	0
3:35 PM	0	0	0	0	4	0	0	0
3:40 PM	0	0	0	0	1	0	0	0
3:45 PM	0	0	1	0	2	0	0	0
3:50 PM	3	0	0	0	0	0	0	0
3:55 PM	3	0	0	0	0	0	0	0
4:00 PM	2	0	0	0	0	0	2	0
4:05 PM	7	0	0	0	0	0	1	1
4:10 PM	2	0	0	0	0	0	0	1
4:15 PM	2	0	0	0	0	0	0	0
4:20 PM	3	2	0	0	0	0	1	0
4:25 PM	1	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0
4:35 PM	0	0	0	0	0	0	1	1
4:40 PM	3	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0
4:50 PM	3	0	0	0	0	0	0	0
4:55 PM	2	0	0	0	0	0	0	0
5:00 PM	4	0	0	0	0	0	1	0
5:05 PM	3	0	0	0	0	0	0	0
5:10 PM	3	0	0	0	0	0	0	0
5:15 PM	4	0	0	0	0	0	2	0
5:20 PM	2	1	0	0	0	0	3	0
5:25 PM	3	0	0	0	1	0	1	0
5:30 PM	3	0	0	0	0	0	0	0
5:35 PM	5	0	0	0	0	0	0	0
5:40 PM	6	0	0	0	0	0	1	1
5:45 PM	1	0	0	0	0	0	1	0
5:50 PM	6	0	0	0	0	0	0	0
5:55 PM	1	0	0	0	0	0	1	0
Totals	72	3	5	1	43	2	15	6

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

16285 SW 85th Ave, Ste 302
Tigard, OR 97224
503-620-4242
www.qualitycounts.net

Site Code: 10828402
Location: Rhodes Ct - The Alameda
Date: 10/9/2012

	SB Crosswalk (North Leg)		WB Crosswalk (East Leg)		NB Crosswalk (South Leg)		EB Crosswalk (West Leg)	
	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker
2:00 PM	3	0	0	0	0	0	0	0
2:05 PM	3	0	0	0	0	0	1	0
2:10 PM	3	0	0	0	0	0	0	0
2:15 PM	3	0	0	0	0	0	0	0
2:20 PM	2	0	0	0	0	0	0	0
2:25 PM	3	0	0	0	0	0	0	0
2:30 PM	3	0	0	0	0	0	0	0
2:35 PM	8	0	1	0	0	0	0	0
2:40 PM	6	0	0	0	0	0	0	0
2:45 PM	5	0	0	0	0	0	0	0
2:50 PM	4	0	0	0	0	0	0	0
2:55 PM	7	0	0	0	0	0	0	0
3:00 PM	5	0	0	0	0	0	0	0
3:05 PM	18	0	0	0	0	0	0	0
3:10 PM	2	0	0	0	0	0	0	0
3:15 PM	13	0	0	0	0	0	0	3
3:20 PM	4	0	0	0	0	0	0	0
3:25 PM	5	0	1	0	0	0	0	0
3:30 PM	9	0	0	0	0	0	0	0
3:35 PM	1	0	0	0	0	0	1	0
3:40 PM	3	0	0	0	0	0	0	0
3:45 PM	3	0	0	0	0	0	0	0
3:50 PM	5	0	0	0	0	0	0	0
3:55 PM	0	0	0	0	0	0	0	3
4:00 PM	3	0	0	0	0	0	0	0
4:05 PM	1	0	0	0	0	0	0	0
4:10 PM	0	0	0	0	0	0	0	0
4:15 PM	5	0	0	0	0	0	0	0
4:20 PM	4	0	0	0	0	0	0	0
4:25 PM	2	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0
4:35 PM	0	0	0	0	0	0	0	0
4:40 PM	4	0	2	0	0	0	1	0
4:45 PM	3	0	0	0	0	0	0	0
4:50 PM	2	0	0	0	0	0	0	0
4:55 PM	2	0	0	0	0	0	0	0
5:00 PM	10	0	0	0	0	0	0	0
5:05 PM	9	1	0	0	0	0	0	0
5:10 PM	4	0	0	0	0	0	0	0
5:15 PM	7	0	0	0	0	0	0	0
5:20 PM	5	0	0	0	0	0	1	0
5:25 PM	2	0	1	0	0	0	0	0
5:30 PM	1	0	0	0	0	0	0	0
5:35 PM	1	0	0	1	0	0	0	0
5:40 PM	0	0	0	0	0	0	0	0
5:45 PM	7	0	0	0	0	0	0	0
5:50 PM	4	0	0	1	0	0	0	0
5:55 PM	5	0	0	0	0	0	0	0
Totals	199	1	5	2	0	0	4	6

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES
16285 SW 85th Ave, Ste 302
Tigard, OR 97224
503-620-4242
www.qualitycounts.net

Site Code: 10828403
Location: Race St - The Alameda
Date: 10/9/2012

	SB Crosswalk (North Leg)		WB Crosswalk (East Leg)		NB Crosswalk (South Leg)		EB Crosswalk (West Leg)	
	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker
2:00 PM	0	0	1	0	0	0	0	0
2:05 PM	0	0	3	0	3	0	0	0
2:10 PM	0	0	1	1	2	0	4	0
2:15 PM	0	0	0	0	1	0	6	0
2:20 PM	0	0	2	0	1	0	3	0
2:25 PM	0	0	4	0	0	0	0	0
2:30 PM	0	0	0	0	1	0	0	0
2:35 PM	0	0	1	0	1	0	2	0
2:40 PM	0	0	3	0	2	0	3	0
2:45 PM	0	0	1	0	3	1	2	0
2:50 PM	0	0	2	0	1	0	0	1
2:55 PM	0	0	0	0	3	0	3	0
3:00 PM	0	0	2	0	2	1	3	0
3:05 PM	0	0	9	0	2	1	4	0
3:10 PM	0	0	0	0	5	0	2	4
3:15 PM	0	0	1	0	1	0	0	0
3:20 PM	0	0	2	0	5	2	6	1
3:25 PM	0	0	3	0	0	2	5	0
3:30 PM	0	0	1	0	1	1	3	0
3:35 PM	0	0	0	0	2	1	2	0
3:40 PM	0	0	2	0	1	1	1	2
3:45 PM	0	0	5	0	0	0	1	2
3:50 PM	0	0	6	0	1	0	2	2
3:55 PM	0	0	0	0	4	0	2	4
4:00 PM	0	0	1	0	0	1	2	0
4:05 PM	0	0	1	0	0	0	0	1
4:10 PM	0	0	2	0	0	0	0	0
4:15 PM	0	0	1	0	1	0	4	0
4:20 PM	0	0	2	0	1	0	0	0
4:25 PM	0	0	1	0	1	0	4	1
4:30 PM	0	0	2	0	0	0	4	0
4:35 PM	0	0	7	0	0	0	4	0
4:40 PM	0	0	2	0	2	1	3	0
4:45 PM	0	1	2	0	4	0	4	0
4:50 PM	0	0	2	0	3	0	5	0
4:55 PM	0	0	1	0	1	0	3	0
5:00 PM	0	0	1	0	1	0	3	0
5:05 PM	0	0	0	0	1	1	0	1
5:10 PM	0	0	0	0	2	0	0	1
5:15 PM	0	0	3	0	2	2	4	0
5:20 PM	0	0	0	1	1	0	1	1
5:25 PM	0	0	2	0	1	1	1	1
5:30 PM	0	0	0	1	2	2	3	0
5:35 PM	0	0	0	1	0	0	1	0
5:40 PM	0	0	2	0	3	2	5	0
5:45 PM	0	0	5	1	3	0	1	0
5:50 PM	0	0	2	0	2	0	3	0
5:55 PM	0	0	1	0	0	0	1	0
Totals	0	1	89	5	73	20	110	22

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

16285 SW 85th Ave, Ste 302
Tigard, OR 97224

503-620-4242
www.qualitycounts.net

Site Code: 10828404
Location: The Alameda - Magnolia Ave/Pershing Ave
Date: 10/9/2012

	SB Crosswalk (North Leg)		WB Crosswalk (East Leg)		NB Crosswalk (South Leg)		EB Crosswalk (West Leg)	
	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker
2:00 PM	0	0	3	0	1	0	4	0
2:05 PM	0	0	1	0	0	0	4	0
2:10 PM	0	0	2	0	1	0	1	0
2:15 PM	0	0	1	0	0	0	6	0
2:20 PM	0	0	0	0	0	0	1	0
2:25 PM	0	0	1	0	1	0	1	0
2:30 PM	0	0	0	0	1	1	2	0
2:35 PM	0	0	1	1	1	0	4	0
2:40 PM	0	0	1	0	2	0	0	0
2:45 PM	0	0	2	0	4	0	5	0
2:50 PM	0	0	0	0	0	0	5	0
2:55 PM	0	0	4	0	0	1	2	0
3:00 PM	0	0	3	0	0	1	1	0
3:05 PM	0	0	2	0	1	0	7	0
3:10 PM	0	0	1	0	1	0	0	0
3:15 PM	0	0	1	0	0	0	1	0
3:20 PM	0	0	0	0	2	0	2	0
3:25 PM	0	0	0	0	1	0	4	0
3:30 PM	0	0	4	0	0	0	12	0
3:35 PM	0	0	5	0	0	0	2	0
3:40 PM	0	0	1	0	1	0	1	0
3:45 PM	0	0	5	0	1	0	3	0
3:50 PM	0	0	5	0	2	0	1	0
3:55 PM	0	0	0	0	3	0	2	0
4:00 PM	0	0	4	0	0	0	3	0
4:05 PM	0	0	4	0	4	0	0	0
4:10 PM	0	0	2	0	2	0	0	0
4:15 PM	0	0	2	0	2	0	4	0
4:20 PM	0	0	4	0	1	0	2	0
4:25 PM	0	0	1	0	0	0	0	0
4:30 PM	0	0	2	0	2	0	6	0
4:35 PM	0	0	7	0	1	1	9	0
4:40 PM	0	0	5	0	1	0	1	0
4:45 PM	0	0	2	0	0	1	2	0
4:50 PM	0	0	8	0	2	0	2	0
4:55 PM	0	0	1	0	0	0	2	0
5:00 PM	0	0	4	0	0	0	1	0
5:05 PM	0	1	0	0	1	0	0	0
5:10 PM	0	0	5	0	2	0	1	0
5:15 PM	0	0	0	0	1	0	3	1
5:20 PM	0	0	3	0	4	0	5	0
5:25 PM	0	0	6	0	1	0	1	0
5:30 PM	0	0	3	0	0	0	1	0
5:35 PM	0	1	1	0	0	0	5	0
5:40 PM	0	0	7	0	0	0	3	0
5:45 PM	0	0	4	0	0	1	2	0
5:50 PM	0	0	2	0	0	0	3	0
5:55 PM	0	0	1	0	1	0	3	0
Totals	0	2	121	1	48	6	130	1

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

16285 SW 85th Ave, Ste 302
Tigard, OR 97224
503-620-4242
www.qualitycounts.net

Site Code: 10828405
Location: The Alameda - Randol Ave
Date: 10/9/2012

	SB Crosswalk (North Leg)		WB Crosswalk (East Leg)		NB Crosswalk (South Leg)		EB Crosswalk (West Leg)	
	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker
2:00 PM	0	0	0	0	0	0	2	1
2:05 PM	1	0	0	0	0	0	0	1
2:10 PM	1	0	0	0	0	0	3	0
2:15 PM	0	0	0	0	0	0	1	0
2:20 PM	0	0	0	0	0	0	0	0
2:25 PM	1	0	0	0	0	0	1	0
2:30 PM	0	0	0	0	0	0	0	0
2:35 PM	0	0	0	0	0	0	1	0
2:40 PM	0	0	0	0	0	0	3	0
2:45 PM	0	0	0	0	0	0	1	0
2:50 PM	1	0	0	0	0	0	5	0
2:55 PM	2	0	0	0	0	0	2	0
3:00 PM	0	0	0	0	0	0	0	0
3:05 PM	0	0	0	0	0	0	0	0
3:10 PM	0	0	0	0	0	0	0	0
3:15 PM	3	0	0	0	0	0	0	0
3:20 PM	0	0	0	0	0	0	1	0
3:25 PM	0	0	0	0	0	0	0	0
3:30 PM	2	0	0	0	0	0	9	2
3:35 PM	0	0	0	0	0	0	2	0
3:40 PM	0	0	0	0	0	0	2	0
3:45 PM	0	0	0	0	0	0	5	1
3:50 PM	0	0	0	0	0	0	1	0
3:55 PM	0	0	0	0	0	0	3	0
4:00 PM	2	0	0	0	0	0	0	0
4:05 PM	0	0	0	0	0	0	0	0
4:10 PM	2	0	0	0	0	0	1	0
4:15 PM	2	0	0	0	0	0	0	0
4:20 PM	0	0	0	0	0	0	4	0
4:25 PM	0	0	0	0	0	0	5	0
4:30 PM	2	0	0	0	0	0	2	0
4:35 PM	0	0	0	0	0	0	5	0
4:40 PM	2	0	0	0	0	0	3	0
4:45 PM	0	0	0	0	0	0	0	0
4:50 PM	0	0	0	0	0	0	0	0
4:55 PM	0	0	0	0	0	0	2	0
5:00 PM	0	0	0	0	0	0	2	0
5:05 PM	0	0	2	0	0	0	4	2
5:10 PM	0	0	4	0	0	0	0	0
5:15 PM	0	0	4	0	0	0	1	0
5:20 PM	1	0	3	0	0	0	1	0
5:25 PM	0	0	2	0	0	0	1	0
5:30 PM	3	0	3	0	0	0	2	1
5:35 PM	0	0	2	0	0	0	1	0
5:40 PM	1	0	6	0	0	0	3	0
5:45 PM	0	0	2	0	0	0	2	1
5:50 PM	0	0	0	0	0	0	4	0
5:55 PM	0	0	4	0	0	0	1	0
Totals	26	0	32	0	0	0	86	9

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

16285 SW 85th Ave, Ste 302
Tigard, OR 97224
503-620-4242
www.qualitycounts.net

Site Code: 10828406
Location: The Alameda - Hedding St
Date: 10/9/2012

	SB Crosswalk (North Leg)		WB Crosswalk (East Leg)		NB Crosswalk (South Leg)		EB Crosswalk (West Leg)	
	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker	In Crosswalk	Jaywalker
2:00 PM	0	0	1	0	1	0	1	0
2:05 PM	1	0	1	0	1	0	1	0
2:10 PM	0	0	0	0	0	0	1	0
2:15 PM	1	0	1	0	1	0	0	0
2:20 PM	0	0	0	0	0	0	0	0
2:25 PM	0	0	0	0	0	0	0	0
2:30 PM	0	0	1	0	0	0	1	0
2:35 PM	0	0	0	0	1	0	0	0
2:40 PM	0	0	1	0	1	0	0	0
2:45 PM	0	0	0	0	0	0	0	0
2:50 PM	0	0	0	0	0	0	0	0
2:55 PM	0	0	2	0	2	0	3	0
3:00 PM	0	0	0	0	3	0	0	0
3:05 PM	0	0	1	0	3	0	2	0
3:10 PM	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0
3:20 PM	1	0	0	0	0	0	1	0
3:25 PM	0	0	1	0	1	0	2	0
3:30 PM	2	0	3	0	3	0	2	0
3:35 PM	0	0	3	0	0	0	0	0
3:40 PM	2	0	3	0	0	0	2	0
3:45 PM	0	0	0	0	1	0	3	0
3:50 PM	0	0	0	0	1	0	3	0
3:55 PM	0	0	0	0	0	0	0	0
4:00 PM	0	0	0	0	2	0	2	0
4:05 PM	0	0	0	0	0	0	0	0
4:10 PM	4	0	0	0	1	0	2	0
4:15 PM	0	0	0	0	2	0	1	0
4:20 PM	0	0	3	0	0	0	0	0
4:25 PM	1	0	1	0	1	0	0	0
4:30 PM	1	0	1	0	0	0	0	0
4:35 PM	0	0	0	0	0	0	0	0
4:40 PM	1	0	1	0	1	0	1	0
4:45 PM	1	0	1	0	0	0	1	0
4:50 PM	0	0	1	0	0	0	0	0
4:55 PM	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	2	0
5:05 PM	2	0	3	0	1	0	3	0
5:10 PM	3	0	0	0	1	0	4	0
5:15 PM	2	0	1	0	0	0	3	0
5:20 PM	1	0	0	0	0	0	1	0
5:25 PM	0	0	0	0	0	0	0	0
5:30 PM	2	0	3	0	0	0	2	0
5:35 PM	1	0	1	0	0	0	0	0
5:40 PM	0	0	1	0	3	0	2	0
5:45 PM	1	0	1	0	2	0	0	0
5:50 PM	1	0	1	0	0	0	1	0
5:55 PM	0	0	4	1	2	0	1	0
Totals	28	0	41	1	35	0	48	0

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

16285 SW 85th Ave, Ste 302
Tigard, OR 97224
503-620-4242
www.qualitycounts.net

Site Code: 10828401
Location: Bush St - The Alameda
Date: 10/9/12

Bikes on Road

	SB Right	SB Through	SB Left	WB Right	WB Through	WB Left	NB Right	NB Through	NB Left	EB Right	EB Through	EB Left
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:05 PM	0	0	0	0	1	0	0	0	0	0	0	0
2:10 PM	0	0	0	0	1	0	1	0	0	0	4	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:20 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:25 PM	0	0	0	0	1	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	1	0	1	0	0	0	1	0
2:35 PM	0	0	0	0	2	0	0	0	0	0	0	0
2:40 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	2	0
2:50 PM	0	0	0	0	0	0	0	0	0	0	1	0
2:55 PM	0	0	0	0	0	0	0	0	0	0	2	0
3:00 PM	0	0	0	0	0	0	0	0	0	0	2	0
3:05 PM	0	0	0	0	2	0	0	0	0	0	0	0
3:10 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	1	0	0	0
3:20 PM	0	0	0	0	1	0	0	0	1	0	1	0
3:25 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	1	0	0	0	0	0	1	0
3:35 PM	0	0	0	0	2	0	0	0	0	0	0	0
3:40 PM	0	0	0	0	0	1	0	0	0	0	2	0
3:45 PM	0	0	0	0	2	0	0	0	0	2	0	0
3:50 PM	0	0	0	0	2	0	0	0	0	0	0	0
3:55 PM	0	0	0	0	0	0	0	0	0	0	1	0
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:05 PM	0	0	0	2	0	0	0	0	0	0	1	0
4:10 PM	0	0	0	0	1	0	0	0	0	0	0	3
4:15 PM	0	0	0	0	0	0	0	0	0	0	1	1
4:20 PM	0	0	0	0	0	0	0	0	0	0	1	0
4:25 PM	0	0	0	0	0	0	0	0	0	0	1	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	1	0
4:35 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:40 PM	0	0	0	1	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	1	0
4:50 PM	1	0	0	0	0	0	0	0	0	0	0	0
4:55 PM	0	0	0	0	2	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	2	0	0	0	0	0	0	0
5:05 PM	0	0	0	0	2	0	0	0	0	0	0	0
5:10 PM	0	0	0	0	1	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	1	0	0	0	0	0	0	0
5:20 PM	0	0	0	0	1	0	0	0	0	0	0	0
5:25 PM	0	0	0	0	2	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	3	1
5:35 PM	1	0	1	0	0	0	0	0	0	0	0	0
5:40 PM	0	0	0	0	0	0	0	0	0	0	1	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	2	0
5:50 PM	0	0	0	1	0	0	0	0	0	0	2	0
5:55 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total:	2	0	1	4	28	1	2	0	2	2	31	5

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

16285 SW 85th Ave, Ste 302
Tigard, OR 97224
503-620-4242
www.qualitycounts.net

Site Code: 10828402
Location: Rhodes Ct - The Alameda
Date: 10/9/12

Bikes on Road

	SB Right	SB Through	SB Left	WB Right	WB Through	WB Left	NB Right	NB Through	NB Left	EB Right	EB Through	EB Left
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:05 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:10 PM	0	0	0	0	1	0	0	0	0	0	2	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:20 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:25 PM	0	0	0	0	1	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	1	0	0	0	0	0	0	0
2:35 PM	0	0	0	0	1	0	0	0	0	0	1	0
2:40 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	1	0
2:50 PM	0	0	0	0	0	0	0	0	0	0	2	0
2:55 PM	0	0	0	0	0	0	0	0	0	0	2	0
3:00 PM	0	0	0	0	0	0	0	0	0	0	1	0
3:05 PM	0	0	0	0	1	0	0	0	0	0	0	0
3:10 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:20 PM	0	0	0	0	1	0	0	0	0	0	1	0
3:25 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	3	0	0	0	0	0	0	0
3:35 PM	0	0	0	0	1	0	0	0	0	0	1	0
3:40 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	2	0	0	0	0	0	0	0	0	0
3:50 PM	0	0	0	0	0	0	0	0	0	0	2	0
3:55 PM	0	0	0	0	1	0	0	0	0	0	0	0
4:00 PM	0	0	0	0	0	0	0	0	0	0	1	0
4:05 PM	0	0	0	0	1	0	0	0	0	0	1	0
4:10 PM	0	0	0	0	0	0	0	0	0	0	1	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:20 PM	0	0	0	0	1	0	0	0	0	0	0	0
4:25 PM	0	0	0	0	1	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	1	0	0	0	0	0	0	0
4:35 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:40 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	1	0	0	0	0	0	0	0
4:50 PM	0	0	0	1	0	0	0	0	0	0	0	1
4:55 PM	0	0	0	0	1	0	0	0	0	0	4	0
5:00 PM	0	0	0	0	1	0	0	0	0	0	1	0
5:05 PM	0	0	0	0	0	0	0	0	0	0	2	0
5:10 PM	0	0	0	0	1	0	0	0	0	0	1	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	1	0
5:20 PM	0	0	0	0	0	0	0	0	0	0	1	0
5:25 PM	0	0	0	0	0	0	0	0	0	0	2	0
5:30 PM	0	0	0	0	3	0	0	0	0	0	0	0
5:35 PM	0	0	0	0	1	0	0	0	0	0	0	0
5:40 PM	0	0	0	0	0	0	0	0	0	0	1	0
5:45 PM	0	0	0	1	2	0	0	0	0	0	1	0
5:50 PM	0	0	0	0	2	0	0	0	0	0	1	1
5:55 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total:	0	0	2	2	27	0	0	0	0	0	31	3

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

16285 SW 85th Ave, Ste 302
Tigard, OR 97224
503-620-4242
www.qualitycounts.net

Site Code: 10828403
Location: Race St - The Alameda
Date: 10/9/12

Bikes on Road

	SB Right	SB Through	SB Left	WB Right	WB Through	WB Left	NB Right	NB Through	NB Left	EB Right	EB Through	EB Left
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:05 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:10 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:20 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:25 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:35 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:40 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	2	0	0	0	0	0	1	0
2:50 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:55 PM	0	0	0	0	1	0	0	0	1	0	1	0
3:00 PM	0	2	0	0	0	0	1	0	0	0	0	0
3:05 PM	0	1	0	0	0	0	0	0	0	0	1	0
3:10 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:20 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:25 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	1	0	0	0	0	0
3:35 PM	0	0	0	0	0	0	0	0	0	0	1	0
3:40 PM	0	0	0	0	0	0	0	0	0	0	1	0
3:45 PM	0	1	0	0	0	0	1	0	0	0	2	0
3:50 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:55 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:05 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:10 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	1	0	0	0	0	0	0
4:20 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:25 PM	0	0	0	0	0	0	0	0	0	0	1	0
4:30 PM	0	0	0	0	1	0	0	0	0	0	0	0
4:35 PM	0	1	0	0	0	0	0	0	0	0	0	0
4:40 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	1	0	0	0	0	0	0	0	0	0	0
4:50 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:55 PM	0	1	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:05 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:10 PM	0	0	0	0	0	0	0	2	0	0	0	0
5:15 PM	0	2	0	0	0	0	0	0	0	0	0	0
5:20 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:25 PM	0	3	0	0	0	1	0	0	0	0	0	0
5:30 PM	0	2	0	0	0	0	0	0	0	0	0	0
5:35 PM	0	0	0	0	0	0	1	0	0	0	0	0
5:40 PM	0	1	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:50 PM	0	1	0	0	0	0	0	0	0	0	0	0
5:55 PM	0	1	0	0	0	0	0	0	0	0	0	0
Total:	0	17	0	0	4	2	4	2	1	0	8	0

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

16285 SW 85th Ave, Ste 302
Tigard, OR 97224
503-620-4242
www.qualitycounts.net

Site Code: 10828404
Location: The Alameda - Magnolia Ave/Pershing Ave
Date: 10/9/12

Bikes on Road

	SB Right	SB Through	SB Left	WB Right	WB Through	WB Left	NB Right	NB Through	NB Left	EB Right	EB Through	EB Left
2:00 PM	0	1	0	0	0	0	0	2	0	0	0	0
2:05 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:10 PM	0	1	1	0	0	0	0	0	0	0	0	0
2:15 PM	0	1	0	0	0	0	0	0	0	0	0	0
2:20 PM	0	1	0	0	0	0	0	0	0	0	0	0
2:25 PM	0	1	0	0	0	0	0	2	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	1
2:35 PM	0	2	0	0	0	0	0	6	0	0	0	0
2:40 PM	0	0	0	0	0	0	0	1	0	0	0	0
2:45 PM	0	2	0	0	0	0	0	0	0	0	0	0
2:50 PM	0	0	0	0	1	0	0	2	0	0	0	0
2:55 PM	0	2	0	0	1	1	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:05 PM	0	1	0	0	0	0	0	1	0	0	0	0
3:10 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:20 PM	0	0	0	0	0	0	0	1	0	0	0	1
3:25 PM	0	2	0	0	0	0	0	0	0	0	0	1
3:30 PM	0	0	0	0	0	0	0	1	0	0	0	0
3:35 PM	0	1	0	0	0	0	0	1	0	0	0	0
3:40 PM	0	1	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	5	0	0	0	0	0	0	0	0	0	0
3:50 PM	0	1	0	0	0	0	0	1	0	0	0	0
3:55 PM	0	2	0	0	0	1	0	0	0	0	0	0
4:00 PM	0	0	0	0	0	0	0	2	0	0	0	0
4:05 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:10 PM	0	0	0	0	0	0	0	3	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	2	0	0	0	0
4:20 PM	0	2	0	0	0	0	0	0	0	0	0	0
4:25 PM	0	0	0	0	0	1	0	0	0	0	0	0
4:30 PM	0	1	0	0	0	0	0	2	0	0	0	0
4:35 PM	0	0	0	0	0	0	0	5	0	0	0	0
4:40 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	3	0	0	0	0	0	0	0	0	0	0
4:50 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:55 PM	0	1	0	0	0	0	0	2	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:05 PM	0	5	0	0	0	0	0	2	0	0	0	0
5:10 PM	0	2	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	3	0	0	0	0	0	1	0	0	0	0
5:20 PM	0	2	0	0	0	1	0	1	0	1	0	0
5:25 PM	0	2	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	2	0	0	0	0
5:35 PM	0	0	0	0	0	0	0	1	0	0	0	0
5:40 PM	0	2	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	1	0	0	0	0	0
5:50 PM	0	1	0	0	0	0	0	2	0	0	0	0
5:55 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total:	0	48	1	0	2	4	1	43	0	1	0	3

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

16285 SW 85th Ave, Ste 302
Tigard, OR 97224
503-620-4242
www.qualitycounts.net

Site Code: 10828405
Location: The Alameda - Randol Ave
Date: 10/9/12

Bikes on Road

	SB Right	SB Through	SB Left	WB Right	WB Through	WB Left	NB Right	NB Through	NB Left	EB Right	EB Through	EB Left
2:00 PM	0	0	0	0	0	0	0	1	0	0	0	0
2:05 PM	0	0	0	0	0	0	0	1	0	0	0	0
2:10 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:20 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:25 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:35 PM	0	1	0	0	0	0	0	0	0	0	0	0
2:40 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	1	0	0	0	0	0	0	0	0	0	0
2:50 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:55 PM	0	0	0	0	0	0	0	1	0	0	0	0
3:00 PM	0	2	0	0	0	0	0	0	0	0	0	0
3:05 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:10 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:20 PM	0	0	0	0	0	0	0	1	0	0	0	0
3:25 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:35 PM	0	2	0	0	0	0	0	0	0	0	0	0
3:40 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	1	0	0	0	0	0	0	0	0	0	0
3:50 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:55 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	0	0	0	0	0	0	0	1	0	0	0	0
4:05 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:10 PM	0	0	0	0	0	0	0	2	0	0	0	0
4:15 PM	1	1	0	0	0	0	0	0	0	0	0	0
4:20 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:25 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	2	0	0	0	0
4:35 PM	0	0	0	0	0	0	0	1	0	0	0	0
4:40 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:50 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:55 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	1	0	0	0	0	0	0	0	0	0	0
5:05 PM	0	2	0	0	0	0	0	0	0	0	0	0
5:10 PM	0	2	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	1	0	0	0	0
5:20 PM	0	1	0	0	0	0	0	0	0	0	0	0
5:25 PM	0	2	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	1	0	0	0	0
5:35 PM	0	0	0	0	0	0	0	0	0	1	0	0
5:40 PM	0	1	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:50 PM	0	1	0	0	0	0	0	2	0	0	0	0
5:55 PM	0	1	0	0	0	0	0	0	0	0	0	0
Total:	1	19	0	0	0	0	0	14	0	1	0	0

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

16285 SW 85th Ave, Ste 302
Tigard, OR 97224
503-620-4242
www.qualitycounts.net

Site Code: 10828406
Location: The Alameda - Hedding St
Date: 10/9/12

Bikes on Road

	SB Right	SB Through	SB Left	WB Right	WB Through	WB Left	NB Right	NB Through	NB Left	EB Right	EB Through	EB Left
2:00 PM	0	0	0	0	0	0	1	0	0	0	0	0
2:05 PM	0	0	0	0	0	0	0	1	0	0	0	0
2:10 PM	0	1	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:20 PM	0	0	0	0	1	0	0	1	0	0	0	0
2:25 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:35 PM	0	0	0	0	0	0	0	1	0	0	0	0
2:40 PM	0	1	0	0	1	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	2	0
2:50 PM	0	0	0	0	0	0	0	0	0	0	0	0
2:55 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM	0	1	0	0	0	0	0	0	0	0	0	0
3:05 PM	0	0	0	0	0	0	0	0	0	0	1	0
3:10 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	1	0	0	0	0	0	0	0
3:20 PM	0	0	0	0	3	0	0	1	0	0	0	0
3:25 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:35 PM	0	1	0	1	1	0	0	0	0	0	0	0
3:40 PM	0	3	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:50 PM	0	0	0	0	0	0	0	0	0	0	0	0
3:55 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	0	1	0	0	0	0	0	1	0	0	1	0
4:05 PM	0	0	0	0	1	0	0	0	0	0	0	0
4:10 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	1	0	0	0	1	0	0	0	0	0	0
4:20 PM	0	0	0	0	0	0	0	0	0	0	1	0
4:25 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	1	0	0	0	0	0	1	0	0	0	0
4:35 PM	0	0	0	0	0	0	0	0	0	0	0	0
4:40 PM	0	1	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	1	0	0	0	0	0	0	0	0	0	0
4:50 PM	0	1	0	0	0	0	0	0	0	0	0	0
4:55 PM	1	0	1	0	1	0	0	0	0	0	0	0
5:00 PM	1	0	0	0	1	0	0	0	0	0	0	0
5:05 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:10 PM	0	2	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	2	0	0	0	0	0	0	0
5:20 PM	0	2	0	0	1	0	0	0	0	0	1	0
5:25 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:35 PM	0	1	0	0	0	0	0	1	0	0	1	0
5:40 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	1	0
5:50 PM	0	0	0	0	0	0	0	0	0	0	0	0
5:55 PM	0	0	0	0	0	1	0	0	0	0	0	0
Total:	2	18	1	1	13	2	1	7	0	0	8	0

Intercept Survey Summary

Note: Dataset to be provided to Caltrans in Excel format.

What do you do when you come to this area of HWY 82…

	Frequency	Percent
Shopping	30	15.0%
Work in Area	34	17.0%
Dining or Drinking	23	11.5%
Personal Errand or Appointment	15	7.5%
Visiting Friends in this Area	6	3.0%
Gym or Other Exercise	5	2.5%
Entertainment	3	1.5%
Sightseeing/Tourist Attractions	1	0.5%
I Live in this Area	25	12.5%
Just Passing Through	54	27.0%
Other	4	2.0%
Total	**200**	**100.0%**

How did you get here today?

	Frequency	Percent
By Car	47	33.1%
By Foot	60	42.3%
By Taxi	1	0.7%
By Bicycle	7	4.9%
by Public Transportation	24	16.9%
Other	3	2.1%
Total	**142**	**100.0%**

What was the main reason you decided to drive here?

	Frequency	Percent
Distance (I live far away)	16	35.6%
Safety (Not safe to walk here)	0	0.0%
Time (I am in a hurry)	0	0.0%
Parking (Easy, convenient)	0	0.0%
No Public Transportation Option	5	11.1%
Physical Limitations	2	4.4%
Convenience (I always drive)	18	40.0%
Other	4	8.9%
Total	**45**	**100.0%**

How do you most often get around the city?

	Frequency	Percent
Car	80	56.3%
Walk	17	12.0%
Taxi	1	0.7%
Bicycle	7	4.9%
Public Transportation	36	25.4%
Other	1	0.7%
Total	**142**	**100.0%**

How often do you come to this stretch of HWY 82?

	Frequency	Percent
Never - first time today	2	1.4%
Rarely	7	4.9%
Occasionally	27	19.0%
Fairly often	43	30.3%
All the time	63	44.4%
Total	**142**	**100.0%**

How likely are you to walk more than one block along this area of HWY 82 when you come here?

	Frequency	Percent
Very Unlikely	11	7.7%
Unlikely	5	3.5%
Neutral	12	8.5%
Likely	15	10.6%
Very Likely	99	69.7%
Total	**142**	**100.0%**

How likely is it that you would walk or ride a bike more along this stretch of HWY 82 if there were more…

	Frequency						Percent				
	Very Unlikely 1	Unlikely 2	Neutral 3	Likely 4	Very Likely 5	Total	Very Unlikely	Unlikely	Neutral	Likely	Very Likely
Trees that provide shade?	29	7	34	11	58	139	20.9%	5.0%	24.5%	7.9%	41.7%
Other plans near the sidewalk?	33	7	44	15	43	142	23.2%	4.9%	31.0%	10.6%	30.3%
Landscaped street medians?	36	10	31	15	50	142	25.4%	7.0%	21.8%	10.6%	35.2%
Lighting on the sidewalks?	25	4	22	18	69	138	18.1%	2.9%	15.9%	13.0%	50.0%
Widened sidewalks at intersections?	31	5	39	20	45	140	22.1%	3.6%	27.9%	14.3%	32.1%
Colored or decorative sidewalk pavement?	44	13	39	10	33	139	31.7%	9.4%	28.1%	7.2%	23.7%
Bicycle parking?	31	8	25	18	47	129	24.0%	6.2%	19.4%	14.0%	36.4%
Bicycle lanes?	24	5	21	24	61	135	17.8%	3.7%	15.6%	17.8%	45.2%
Art or decorated trash bins?	43	11	38	12	38	142	30.3%	7.7%	26.8%	8.5%	26.8%
Outdoor cafes or other seating areas?	13	4	23	21	81	142	9.2%	2.8%	16.2%	14.8%	57.0%

What do you like best about this area of HWY 82?

	Frequency	Percent
Good shopping/restaurants	36	19.1%
Easy to park	2	1.1%
Close to where I live/work	23	12.2%
Good lighting	0	0.0%
Good for walking	5	2.7%
It is a safe area	4	2.1%
Pretty/attractive	27	14.4%
Easy to access via public transit	10	5.3%
Not a lot of traffic/congestion	3	1.6%
Lots of tress/plants	19	10.1%
Good for biking	0	0.0%
Other	55	29.3%
Diversity of people and neighborhood	3	1.6%
Total	**188**	**100.0%**

What do you like least about this area of HWY 82?

	Frequency	Percent
Not enough shops/restaurants	13	9.7%
Difficult to park	2	1.5%
Far from where I live/work	1	0.7%
Bad lighting	4	3.0%
Bad for walking	4	3.0%
It is an unsafe area	5	3.7%
Unkempt/poorly maintained	9	6.7%
Difficult to access public transportation	0	0.0%
A lot of traffic/congestion	34	25.4%
No tress/plants	0	0.0%
Bad for biking	4	3.0%
Other	58	43.3%
Total	**134**	**100.0%**

When you're walking or riding your bike along this section of HWY 82, how safe do you feel from crime?

	Frequency									Percent							
	Very Unsafe	Unsafe	Neutral	Safe	Very Safe	Don't Know	REF	N/A	Total	Very Unsafe	Unsafe	Neutral	Safe	Very Safe	Don't Know	REF	N/A
	1	2	3	4	5	8	9	10									
During the day?	0	2	4	42	94	0	0	0	142	0.0%	1.4%	2.8%	29.6%	66.2%	0.0%	0.0%	0.0%
At night?	10	24	35	26	28	0	0	13	136	7.4%	17.6%	25.7%	19.1%	20.6%	0.0%	0.0%	9.6%

When you're walking or riding your bike along this section of HWY82, how safe do you feel from traffic?

	Frequency											Percent										
	Very Unsafe	Unsafe	Neutral	Safe	Very Safe	Don't Know	REF	N/A	Total	Combined Unsafe	Combined Safe	Very Unsafe	Unsafe	Neutral	Safe	Very Safe	Don't Know	REF	N/A	Total	Combined Unsafe	Combined Safe
	1	2	3	4	5	8	9	10														
Walking across the street?	20	23	36	33	30	0	0	0	142	43	63	14.1%	16.2%	25.4%	23.2%	21.1%	0.0%	0.0%	0.0%	100.0%	30.3%	44.4%
Walking on the sidewalk?	3	3	17	33	86	0	0	0	142	6	119	2.1%	2.1%	12.0%	23.2%	60.6%	0.0%	0.0%	0.0%	100.0%	4.2%	83.8%
Riding your bike across the street?	22	17	31	14	15	0	0	37	136	39	29	16.2%	12.5%	22.8%	10.3%	11.0%	0.0%	0.0%	27.2%	100.0%	28.7%	21.3%
Riding your bike on the street?	26	34	20	7	11	0	0	37	135	60	18	19.3%	25.2%	14.8%	5.2%	8.1%	0.0%	0.0%	27.4%	100.0%	44.4%	13.3%
Coming to the area after dark?	21	19	31	22	33	0	0	11	137	40	55	15.3%	13.9%	22.6%	16.1%	24.1%	0.0%	0.0%	8.0%	100.0%	29.2%	40.1%

While walking or riding a bike on this area of HWY 82 has…?

	Frequency				Percent			
	Yes	No	Don't Know/ Skip	Total	Yes	No	Don't Know/ Skip	Total
	1	2	8					
A motor vehicle almost hit you when you were crossing the street?	47	94	0	141	33.3%	66.7%	0.0%	100.0%
A motor vehicle come too close to you?	70	71	0	141	49.6%	50.4%	0.0%	100.0%
A driver opening a car door almost hit you?	12	129	0	141	8.5%	91.5%	0.0%	100.0%

If Yes to any of the above, were you injured as a result?

	Frequency	Percent
Yes	2	2.9%
No	68	97.1%
Total	**70**	**100.0%**

Are there any street improvements that could be added to help you feel safer from traffic?

	Frequency	Percent
No/Nothing	56	31.6%
bike lanes/bike safety	22	12.4%
improved crosswalks	37	20.9%
cameras - yes	0	0.0%
public transit improvements	0	0.0%
decrease speeding	12	6.8%
road maintenance and repair/cleaner streets	11	6.2%
more/better lighting	11	6.2%
crossing guards for kids	0	0.0%
fix/widen sidewalks	4	2.3%
better enforcement of traffic laws	1	0.6%
more/improved traffic lights	4	2.3%
better/more handicap accessibility	0	0.0%
left turn arrows/lanes and longer signals	0	0.0%
improve congestion	1	0.6%
plants/landscaping on sidewalks	0	0.0%
more/wider lanes	0	0.0%
police/security	0	0.0%
roundabouts/medians/barriers	5	2.8%
cameras - no	0	0.0%
improve parking	1	0.6%
improve signage	4	2.3%
driver improvement	2	1.1%
other	6	3.4%
Total	**177**	**100.0%**

Are there any street improvements that could be added to help you feel safer from traffic?

	Frequency	Percent
No/Nothing	73	46.5%
bik lanes/bike parking	2	1.3%
more/improved parking	1	0.6%
cleaner streets/sidewalk/area	5	3.2%
more plants/landscaping/parks	9	5.7%
art/beautification/advertising	8	5.1%
better/more lighting	7	4.5%
curb dogs/doggie bags	0	0.0%
road/sidewalk maintenance, repair	6	3.8%
police/security/cameras	1	0.6%
improve public transit	2	1.3%
more or different entertainment/businesses	19	12.1%
more seating/facilities	1	0.6%
wider sidewalks	0	0.0%
lessen congestion/traffic	0	0.0%
wider streets/add lanes	1	0.6%
people	0	0.0%
more/improve crosswalks	8	5.1%
improve signage	2	1.3%
left and right turn lights	0	0.0%
more handicap friendly	0	0.0%
enforce traffic laws	0	0.0%
medians	2	1.3%
improve/more traffic lights	2	1.3%
other	2	1.3%
slower traffic	6	3.8%
Total	**157**	**100.0%**