SUSTAINABLE STREETS
CITY OF SAN MATEO

Final Plan

February 2015

ACKNOWLEDGEMENTS

The Sustainable Streets Plan provides a transformational vision for the future of San Mateo's transportation network. We would like to acknowledge the dedication and collaborative efforts of the community, City staff and the consultant team in the development of this plan.

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TABLE OF CONTENTS

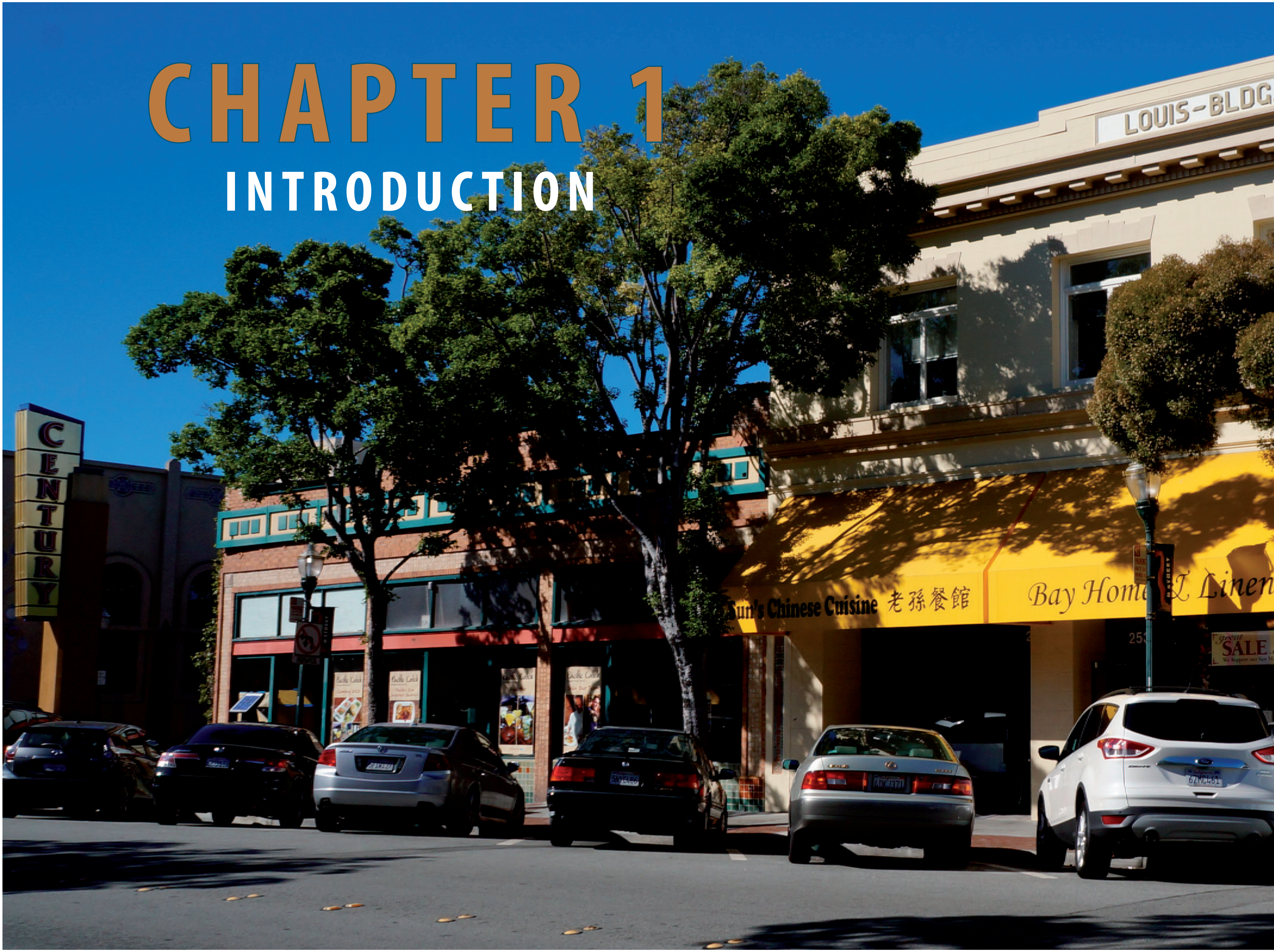
APPENDICES

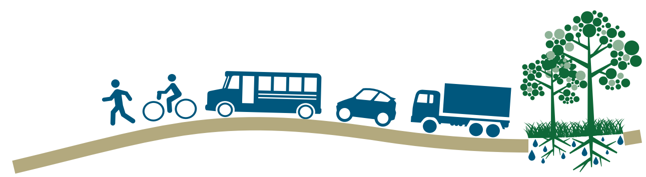
TABLE OF FIGURES

Page

Page

CHAPTER 1
INTRODUCTION





The Sustainable Streets Plan articulates the future vision for San Mateo's streets and transportation network. Its contents cover both policies and processes that help lead the City towards its community, environmental, and economic goals. Chapter 1 provides the foundation for this effort and describes the plan's approach, process of its development, and overview of its contents.

CHAPTER 1: INTRODUCTION

Most Americans are so used to living in a transportation system that is organized around the automobile that they do not even notice the many ways in which prioritizing auto mobility affects their lives. Streets take up 22% of San Mateo's land area (see Figure 1-1). In San Mateo and in cities across the country, most of this valuable public real estate is simply given over to automobiles. The most widely used measures of our transportation system's performance focus on how efficiently it operates for automobiles, prizing projects that minimize congestion and travel time for drivers over those that might move more people more efficiently or increase quality of life by bringing more residences, shops, and restaurants within walking distance. Meanwhile, collisions kill tens of thousands of people on America's roadways every year. The victims include users of all modes, but those traveling on foot or by bicycle are disproportionately represented among those sustaining severe or fatal injuries.

The picture is no different in the City of San Mateo, where everything from administrative details like the way the City classifies its streets to the way most of its streets are designed focuses on what is best for automobiles.

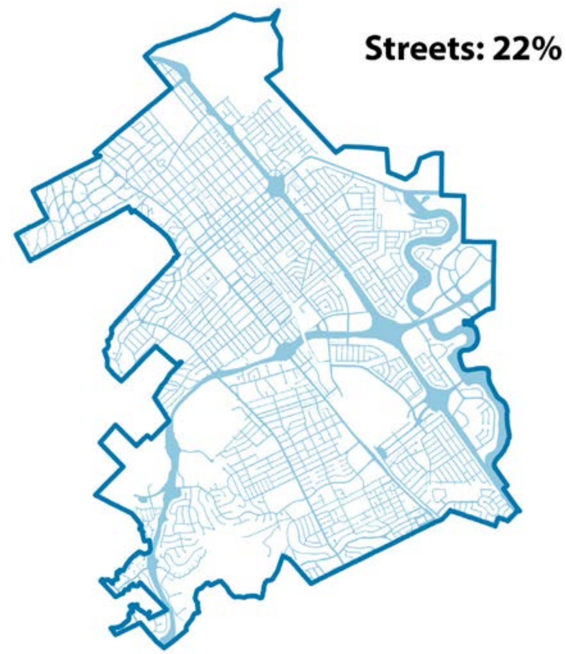
A city that came of age in the era of the automobile, San Mateo has its share of wide roads and high speed interchanges, and local road safety statistics reflect the trends seen nationwide.

In the face of these conditions, Americans are changing the way they live and the way they travel, led by cohorts at opposite ends of the age spectrum. Millennials are choosing to live in vibrant urban places connected to transit, and as a result, they are driving less. Seniors are aging in place in the suburbs, and as they do so, cities are considering cost-effective strategies to address their mobility needs for the years after they are no longer able to drive.

Meanwhile, technology is changing our transportation options, and it promises to further do so in the coming years. Connected devices are allowing people to meet, share, and shop without travelling across town. Carsharing, ridesharing, and online delivery services are allowing people to accomplish daily tasks without using their own vehicles. Over the coming decades, technologies have the potential to change how we get around in ways that are unimaginable today. Driverless technology and, potentially, civilian uses of drones may be just the beginning.

More immediately, change is also coming to the Peninsula's transportation ecosystem. As increasing congestion on the region's freeways and a lack of room or political will to expand them make it unlikely that auto travel will get any more efficient in the coming years. High Speed Rail and Caltrain Electrification will make the Peninsula rail corridor an even more integral part of the area's mobility network.

Figure 1-1 Streets as a Percent of Land Area



Through this Plan, the City of San Mateo is choosing to change its 20th Century transportation system over time to create more vibrant, sustainable, comfortable, safe, and economically productive streets. San Mateo is a great place to live today, but making our transportation system work as well for pedestrians, bicyclists, and transit users as it does for automobiles will help make it an even more complete community, that is healthier, happier, and more ready to meet the challenges and opportunities of the coming decades.

PURPOSE OF THE PLAN

The Sustainable Streets Plan lays out a vision for how our streets might look in the future. They will incorporate the needs of all modes while including environmental features that help manage stormwater, clean the air, and encourage people to linger and connect. It considers the economic impact of streets and their ability to attract both residents and businesses. This plan outlines a vision for using public rights-of-way to serve all users, present and future, and lays out guidelines and policies that will help implement Sustainable Streets over time, and sets a clear implementation plan, identifying funding sources that might be able to support Sustainable Streets projects.

This plan is rooted in the concepts of Complete Streets and Green Streets. It starts with an overview of the benefits of those concepts.

A chapter outlining the Vision, Policies, and Objectives forms the core of the plan. These elements will guide the actions of all relevant City agencies and will lay the groundwork for the City's General Plan Circulation Element. The Design Guidelines chapter helps make the concepts included in the plan operational, laying out clear guidance to planners, engineers, and developers. Finally, the Implementation Plan chapter lays out concrete steps for achieving the City's new vision for streets over time.

Through the planning process, the project team reviewed existing conditions and policies and generated a series of concepts to support implementation of the plan. This work is included in detailed memoranda in the appendix. The most important of these supporting efforts address the following:

» Street Classification System: The way streets are classified is an important part of City policy, forming the lens through which relevant departments and agencies see streets and the basis for plans to adjust them over time. The project team examined the way the City currently classifies its streets, reviewed best practices from across the country, and created a new street classification framework that acknowledges the established connection between transportation and land use.

» Detailed Design Guidelines (Appendix H): San Mateo's streets will not all change at once. Streets are adjusted over time, as parts of the system reach the end of their lifecycles and as development projects place new demands on parts of the network. The detailed design guidelines ensure that no matter what drives changes in the city's street systems, adjustments will be driven by this new vision.

» Transportation System Performance Measures: Like many cities, San Mateo currently judges the transportation implications of changes in the built environment and the impact of transportation projects based on automobile level of service (LOS), which measures vehicle travel time and delay. A proposed new performance measure, vehicle miles traveled per capita, more accurately captures the scale of project effects on the transportation system as a whole. Other supporting metrics are also included.

» Transportation Demand Management (Appendix J): Cities and companies have found ways to reduce congestion and reliance on automobile

WHAT ARE COMPLETE STREETS AND GREEN STREETS?

This plan includes elements of established Complete Streets and Green Streets concepts.

Complete Streets are routinely planned, designed, operated, and maintained with the consideration of the needs and safety of all travelers along and across the entire public right-of-way, including people of all ages and abilities who are walking, driving, bicycling, using transit, traveling with mobility aids, or hauling freight.

Green Streets incorporate environmental features like trees, rain gardens, and infiltration planters to slow the course of runoff and filter it naturally before it reaches major waterways and sensitive plant and animal life.

travel through a combination of incentives and low-cost programs that help make traveling by non-auto modes cheaper, more convenient, and/or more comfortable. The project team made recommendations on the incentives and programs that might work best in San Mateo, given its proximity to many of the Bay Area's job centers and its direct connections to high capacity transit.

SUSTAINABLE STREETS PLAN PROCESS

The San Mateo Sustainable Streets Plan was developed over two years through a host of meetings and working sessions with City staff, a variety of stakeholders, and the general public, in addition to many hours of technical analysis and design work.

The technical work began reviewing the current context of San Mateo streets. The project team conducted a detailed examination of existing City policies, including all elements of the City code that are in any way relevant to streets. The team looked at the City's existing street design guidelines, its street classification system, and the performance metrics it uses to measure transportation outcomes and made recommendations related to all of these items. The team also looked at existing conditions in San Mateo, examining the city's demographic and land use context, its existing transportation system, street widths, and roadway safety statistics.

To guide the formation of the plan and set up efforts to share its underlying concepts, the project team reviewed national Sustainable Streets best practices. In addition, the team did an exhaustive literature review of the potential benefits of the interventions that are part of both concepts.

Public engagement and education were at the heart of the Sustainable Streets planning process. The project team held four community workshops. The first, facilitated in partnership with the National Complete Streets Coalition, kicked off the planning process by sharing the basic tenets of Sustainable Streets concepts and soliciting initial public input. The next three workshops further built community understanding of the ideas driving the plan and gathered input on reports and technical products as they were being developed. The community workshops were accompanied by regular meetings with community stakeholders, including a walking audit of key locations in San Mateo.

The project team gathered broader public feedback through a community survey, distributed via email to several city-administered lists. More than 600 respondents shared their thoughts on San Mateo's existing transportation system and their attitudes toward potential transportation system changes.

Community education was a cornerstone of the planning process. To support this core element, the project team facilitated a series of monthly expert-led discussions at civic and community facilities throughout the city. The so-called Taste and Talk events covered topics including innovative ways to use streets to create vibrant public spaces, transportation and environmental planning fundamentals, the impact of parking policies, links between transportation and public health, and the economic benefits of Sustainable Streets.

Finally, the project team maintained a public website for the duration of the project. The website, www.sustainablestreetssanmateo.com, also included summaries and videos from all Taste and Talk events and a variety of other project materials and links.

San Mateo Sustainable Streets community workshops.

BENEFITS OF SUSTAINABLE STREETS

Sustainable Streets offer wide-ranging benefits over streets designed in conventional ways. By simply making room for non-auto modes, they encourage walking, biking, and transit use, leading to a host of beneficial secondary impacts that range from better air quality to lower rates of obesity. Complete and Green Streets are also more affordable and, in some ways, easier to implement than traditional streets, and they carry economic benefits. This section offers a brief overview of the evidence of these benefits.

WALKING, BIKING AND TRANSIT

About 92% of all trips in the United States are made by automobile, and the average person spends 443 hours in a vehicle each year. To accommodate these trips, street design has traditionally prioritized vehicular traffic over other modes, which has often created an environment that is inhospitable, unattractive, and dangerous to pedestrians and bicyclists.

Complete Streets generally include a number of features that make streets safer and more inviting for walking and bicycling, and by reincorporating the needs of all road users into street design and infrastructure, they have been shown to increase rates of walking and bicycling, ensure accessibility for disabled users, and support connections to transit. Many Complete Streets projects involve enhancing sidewalks and bicycle facilities, and the National Conference of State Legislators found that installing or improving such infrastructure is the most effective policy approach for increasing active transportation. Research has shown that residents are as much as 65% more likely to walk in neighborhoods that have sidewalks, and many recent studies show significant increases in bicycling following the construction of new bicycling infrastructure.

Such improvements can also lead to increases in transit use. For example, King County Metro (Seattle, WA) found that improvements in bicycle infrastructure at and around stations led to substantial increases in bicycle ridership, and other efforts have shown similar results. Of course, linking Complete Streets to transit is not sufficient to ensure high levels of ridership. Such outcomes are also dependent on the quality of the transit service available at newly accessible stations.

While Complete Streets benefit all users, they are an especially critical lifeline for populations that are more dependent on transit, including people who are young, elderly, disabled, or in poverty. It is estimated that more than 500,000 individuals with disabilities almost never leave their homes because they do not have access to reliable public transportation options, and researchers have found that 60% of elderly and disabled residents lack sidewalks between their homes and the nearest bus stop, and fewer than 10% use transit. Another study found that 89% of high-income neighborhoods have adequate sidewalk coverage, compared to 59% of middle-income neighborhoods and only 49% of low-income neighborhoods. Low-income communities are also one-third as likely to have grocery stores or other places to buy healthy food, which leads to residents disproportionately relying on low quality, unhealthy food at local convenience stores and restaurants. In terms of access to jobs and services, only about 25% of low- and middle-skilled jobs are accessible via public transit within 90 minutes for commuters in metropolitan areas, meaning that low-income job seekers may have to spend significant amounts of time and money to reach their jobs. Complete Streets interventions can help ameliorate the conditions that lead to these unjust outcomes.

CONGESTION AND EMISSIONS

Traditional street design has dictated that when vehicle congestion rises, road capacity should expand to accommodate it. However, studies have shown that capacity expansion generates demand— increasing capacity entices people to take additional or longer vehicle trips, which ultimately leads to facilities that are just as congested as they were before expansion. Figure 1-2 illustrates this dynamic, with volumes steadily increasing and leveling off near capacity over time. For example, it takes fewer than five years for additional local roadway capacity to be 90% occupied by new traffic. State highway expansions in California have also shown that new capacity will be about 70% occupied in fewer than five years. In contrast, capacity reductions,

Figure 1-2 Induced Demand

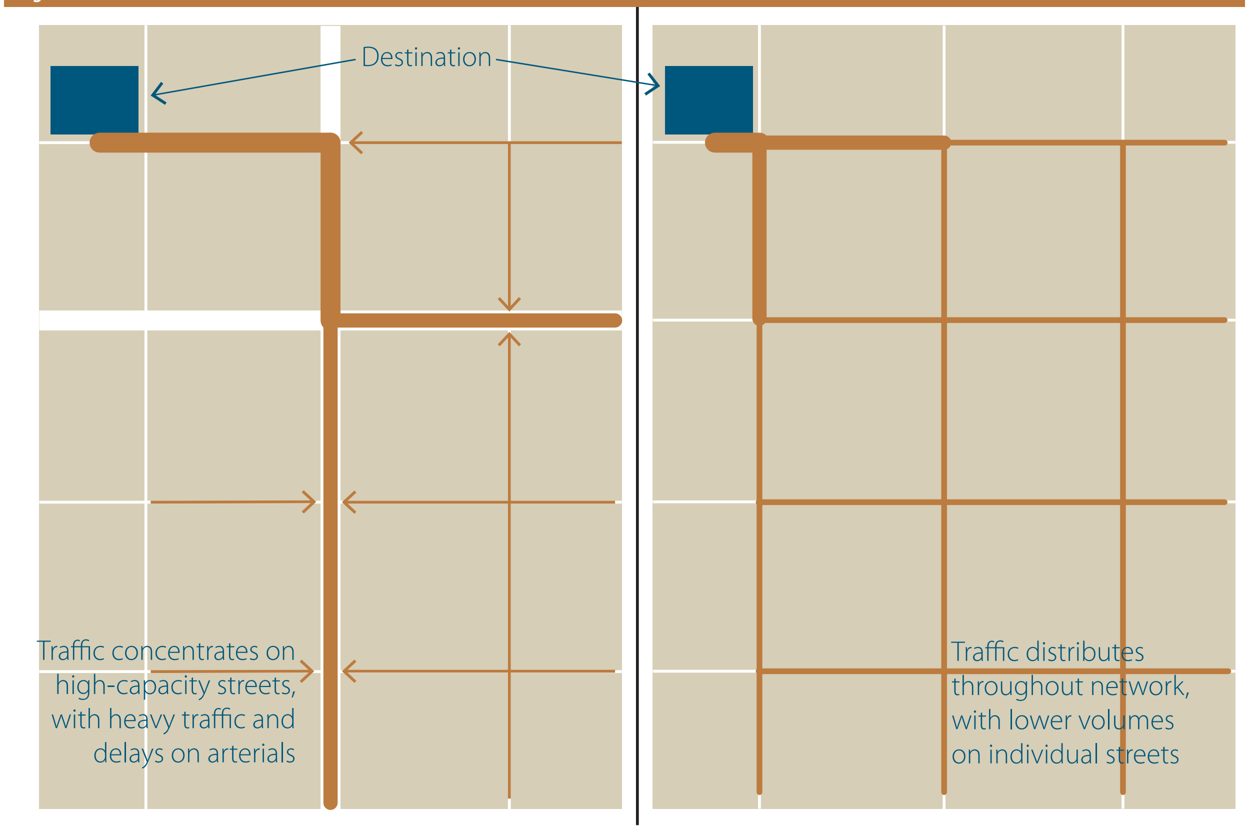
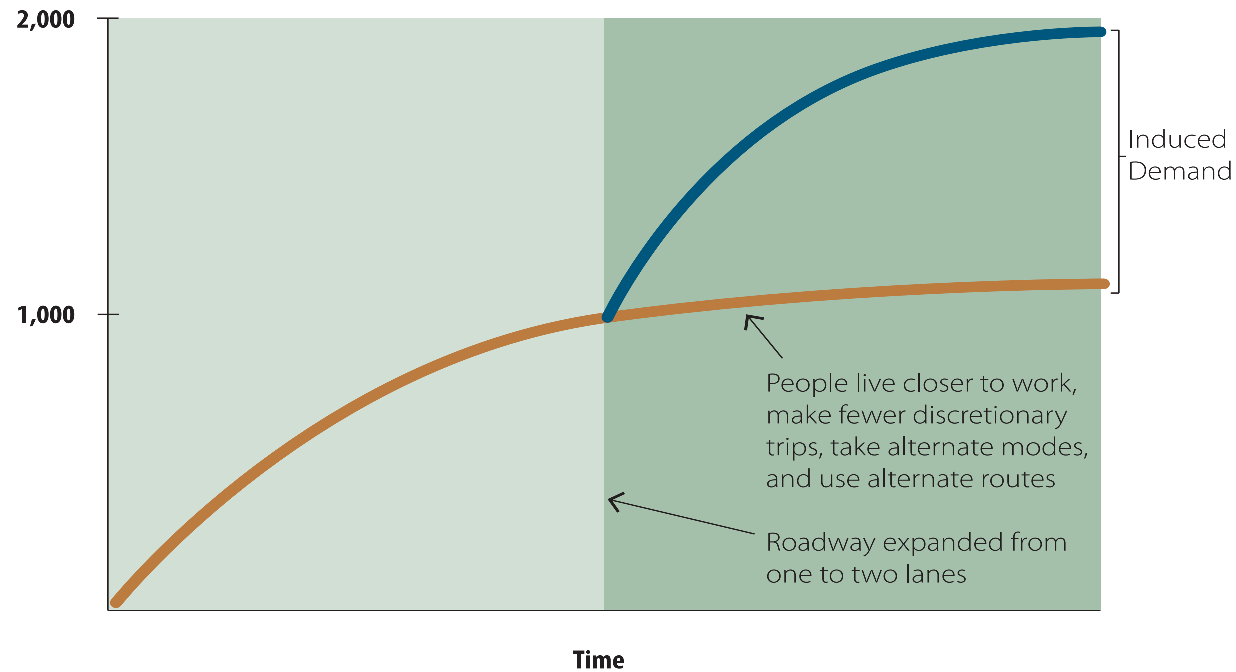


Figure 1-3 Distributing Traffic Through the Street Network



when implemented in a context sensitive manner, can help automobiles better use latent street capacity in the surrounding area and disproportionately reduce automobile trips, encouraging people to switch to more sustainable modes. Figure 1-3 shows the former effect. Whereas high capacity streets tend to draw most traffic in an area, resulting in congestion on main routes but mostly empty nearby streets, road diets on arterials can help spread reasonable volumes across the network, reducing congestion and making more efficient use of the entire street system.

A significant share of daily trips in the United States are quite short: On urban roads, nearly 30% of trips are shorter than one mile and 50% are shorter than three miles. Distances under a mile are easily traveled by foot or bicycle, and yet 72% of these trips are taken by motor vehicles, which occupy significantly more right-of-way space than pedestrians or bikes. By making streets more inviting to bicyclists and pedestrians, especially for short trips, Complete Streets can help make more efficient use of limited available space.

Reducing vehicle trips is a primary strategy for reducing greenhouse gas (GHG) emissions because transportation accounts for 27% of national GHG emissions and 38% of California's GHG emissions. For national GHG emissions between 1990 and 2010, transportation was responsible for 45% of the net increase, making it the single largest contributor.

PUBLIC HEALTH AND TRANSPORTATION

Almost 1/3 of children and adolescents, and 2/3 of adults, are overweight. Just 1/5 of American adults get the recommended amount of daily exercise.

Air pollution causes 40,000 premature deaths every year.

VISION ZERO

"Vision Zero" is the simple idea that any fatalities on our roadways are unacceptable. "Human error" is a fact of life, but if we can design our streets to slow cars down and, in the process, reduce the dangers associated with vehicle travel, we can achieve this vision.

Complete Streets are a valuable part of the climate change mitigation toolbox, as they enable the safer and more widespread use of nearly zero-emission modes like walking and biking and lower emission modes like transit. As an example of this potential impact, biking instead of driving for shorter trips effectively reduces emissions of carbon dioxide by over 90%, creating an overall savings of nearly one pound of CO_2 for every mile. Encouraging a shift to walking or bicycling for trips shorter than a mile can effectively reduce national CO_2 emissions by 12 to 22 million tons per year.

PUBLIC HEALTH IMPACTS

Sustainable Streets can reduce air pollution and encourage people to be more physically active. Each of these direct results can, in turn, lead to positive secondary outcomes, including lower rates of obesity, reduced rates of chronic disease infections, and increased life expectancy.

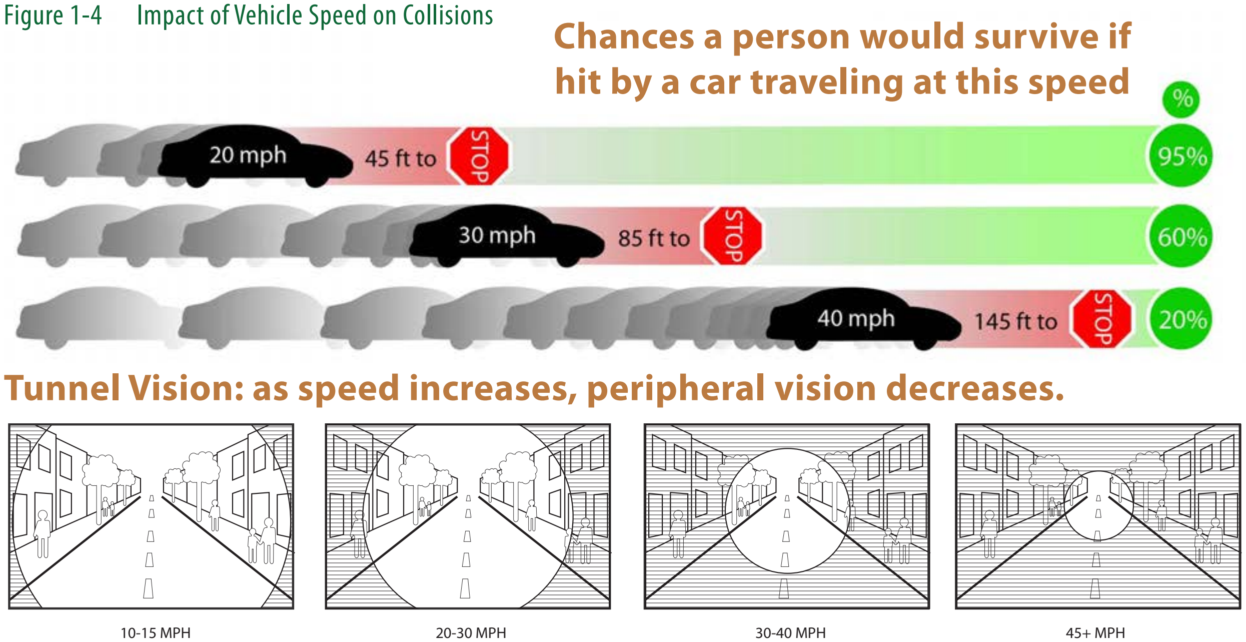
Health leaders recognize Sustainable Streets efforts as contributing to increasing physical activity by improving the built environment. When people have safe places to walk near their homes, they are more likely to meet recommended levels of physical activity. In part because their sedentary lifestyles, more than two-thirds of American adults and almost one-third of children and teens are overweight or obese and are thus at increased risk for a range of health conditions, including diabetes, heart disease, stroke, high blood pressure, high cholesterol, certain cancers, asthma, low self-esteem, reduced academic performance, and depression. Increased physical activity reduces obesity and, thus, the risk of such chronic diseases. According to Get Healthy San Mateo County, the extra walking related to using transit is estimated to save $5,500 per person in a lifetime of health-related costs.

Sustainable Streets policies promote walking, biking, and connections to transit. They can also reduce local vehicle trips and vehicle miles traveled, reducing air pollution and, with it, a host of other poor health outcomes. People who experience chronic exposure to pollution from heavy truck traffic, freeways, and other high traffic arterials face an increased risk of premature death, respiratory diseases, and chronic illnesses. Traffic-related air pollution is linked to asthma, especially among children. This is of particular concern because of the disease's prevalence and debilitating nature. Asthma rates have reached epidemic levels: In the United States, it is now the third leading cause of hospitalization for children younger than 18. Overall, the Environmental Protection Agency estimates that illnesses related to traffic-related air pollution are responsible for more than 40,000 premature deaths annually.

Sustainable Streets policies can help reduce all of these risks. Studies show that bicycle, pedestrian, and transit infrastructure projects that result in fewer people driving and lower vehicle miles travelled (VMT) see an accompanying reduction in traffic-related air pollution.

Sustainable Streets can also improve traffic safety by reducing speeds and making drivers more aware of other roadway users. Urban arterials with Sustainable Street elements—landscaping, enhanced crosswalks, a mix of land uses, narrow lanes, multimodal facilities, posted speeds of 30 miles per hour or less—communicate to drivers that they are expected to

Figure 1-4 Impact of Vehicle Speed on Collisions



Source: *Complete Streets Chicago: Design Guidelines* (2013).

reduce their speed. These streets are associated with lower rates of vehicle collisions and pedestrian/bicyclist injuries than streets without those characteristics. By slowing traffic and improving visibility for pedestrians and bicyclists, Sustainable Streets can also decrease the severity of injuries sustained by bicyclists and pedestrians. A pedestrian hit by a vehicle traveling 20 miles per hour has a 95% chance of surviving, while a pedestrian hit by a vehicle traveling 40 miles per hour has only a 20% chance of surviving (see Figure 1-4). As a result, cities around the country are looking to reduce speeds where pedestrian and bicycles are present. Portland has reduced speeds to 20 miles per hour on many of its neighborhood streets and San Francisco has reduced it to 15 miles per hour in all school zones.

Slowing vehicle speeds is the main prerequisite for achieving one of this Plan's central objectives, eliminating traffic-related fatalities in San Mateo. This concept, called "Vision Zero," is only achievable if the city's roadway network is reconfigured with Sustainable Streets principles in mind. While enforcing speed limits and other traffic laws is important, it will take physical changes that reverse years of efforts to speed up vehicle travel to truly bend the curve in the right direction. Narrowing travel-ways to make room for other modes, increasing pedestrian visibility at intersections, and adding street trees and other vegetation are all ways to remind drivers that they are operating in shared space and should slow down.

SUSTAINABILITY

Green Streets are designed to capture, slow, and treat stormwater runoff. This approach stands in contrast to the traditional approach to stormwater management that uses "grey" infrastructure, designed to expediently collect stormwater runoff from streets through a system of storm drains, pipes, culverts, and storage facilities that eventually dispose of the collected runoff in waterways or treatment facilities. Properly designed Green Streets not only manage stormwater flows and reduce pollutant levels in the water, they also provide an array of additional environmental and economic benefits. Landscaped green infrastructure elements increase biodiversity and create an opportunity for connecting urban open spaces and wildlife habitats through a Green Streets network. In addition, managing stormwater in a manner that citizens can observe – rather than a disposal process that occurs in buried pipes – provides educational benefits and connects people in urban environments with the natural environment. In this process, the perception of stormwater is transformed from a waste product into one of an important resource that sustains tree and other plant life that enrich the everyday environment.

CAPITAL AND OPERATING COSTS

Traditional storm sewer systems are costly to build, expand, upgrade, or retrofit, as well as to operate and maintain. While Green Streets infrastructure improvements on public streets do not completely eliminate the need for grey infrastructure, they are

THE IMPACT OF STREET TREES

Research has shown that street trees help create walkable environments that provide a positive impact to retail sales and rents. One study showed a 3% to 15% increase in home values and 9% to 12% more retail spending as shoppers spend more time in districts with a good canopy of street trees.

more cost-effective, especially in areas where flooding is known to occur due to an undersized storm sewer system and in opportunity areas where future upgrades or retrofits of grey infrastructure are needed. Green Streets are also a viable solution for areas with new development, where the overall capacity of a new storm sewer system can be reduced by combining grey and green infrastructure improvements. Therefore, the amount or proportion of grey to green infrastructure that composes a city's stormwater management system can affect the costs associated with the construction, operations and maintenance, and replacement of that system.

Rather than constructing new, full-scale underground utilities to manage stormwater, green infrastructure can help achieve the same stormwater management goals for less capital investment. While some green infrastructure projects may be more expensive to construct than conventional storm sewers, they often provide valuable economic benefits for a municipality in the long run, by reducing damage from flooding and water and air pollution, increasing land values, and making streets more attractive and safe, which can increase property values. Grey infrastructure projects do not provide the same range of benefits.

Although green infrastructure may need more frequent maintenance, provided by a broader coalition of project partners, the aggregate costs can be less than that required for grey infrastructure, for which repairs and maintenance may be less frequent but much more disruptive and likely more costly.

Green infrastructure also starts to provide immediate incremental benefits from the first rain garden or stormwater planter installed. As a result, this infrastructure lends itself to expansion over time as space and funds become available. Large-scale grey infrastructure projects, on the other hand, are often upgraded or newly constructed in larger increments. This requires major outlays at one time and a process for design and implementation that is time consuming and based on a long time horizon.

ECONOMIC IMPACTS

Sustainable Streets improvements can produce a range of local economic benefits, from higher property value to increases in consumer spending. The aesthetic improvements and reduced flooding that Green Streets yield has been proven to increase nearby property values. Studies show that views and access to trees and vegatation result in improved worker productivity and a $15,000 to $25,000 increase in value for nearby homes and businesses. Investments in bicycle, pedestrian, and transit infrastructure as well as urban design and landscape improvements improvements also correlate with increased property values for nearby residential, office, and commercial uses. This effect has been documented in San Mateo itself.

Studies have shown that neighborhoods with bicycle-, pedestrian-, and transit-friendly environments are much more likely to have high business occupancy rates. Numerous other studies have also documented a correlation between Sustainable Streets investments and increases in consumer spending.

Finally, Complete Streets give people more transportation choices, which can allow them to save significantly on transportation expenses. San Mateo can reasonably expect to reduce vehicle miles driven per weekday by 29,615 trips (or 7.7 million per year) if the Bicycle Master Plan is built out.[1] This would significantly reduce costs to individuals through travel time savings, lower fuel costs, and other auto ownership-related costs.

OVERVIEW OF THE PLAN

The San Mateo Sustainable Streets Plan is organized around a vision for Sustainable Streets and a set of goals, objectives, and policies, detailed in Chapter 2. Chapter 3 gives an overview of the principles that underpin the detailed Design Guidelines included as Appendix H. Chapter 4 provides a detailed plan for implementing the Sustainable Streets Plan vision over the next 20 years. Chapter 5 concludes the plan and looks ahead, noting what it will take to ensure that San Mateo's streets equitably serve all users.

The appendices include more detailed guidance related to aspects of the Plan, as well as the underlying technical work and findings from community engagement activities. They were developed as a series of interim memos throughout the two-year life of the planning process. The appendices are:

» **Appendix A** – National Best Practices: Gives an overview of basic Sustainable Streets concepts and includes detailed case studies that exemplify different aspects of the two concepts and their effective implementation.

» **Appendix B** – Local Conditions: Includes a detailed overview of San Mateo's existing transportation system, an analysis of roadway safety data, a summary of relevant past plans and municipal code sections, a discussion of findings from a walking audit of key streets and intersections, and a brief needs analysis. This appendix also discusses existing and potential future transportation system evaluation processes and metrics.

» **Appendix C** – Benefits Analysis: Provides a detailed literature review sharing the potential benefits of Sustainable Streets strategies.

» **Appendix D** – Street Classifications: Describes San Mateo's current street classification system and shares a potential new classification system.

» **Appendix E** – Street Widths: Analyzes the widths of San Mateo's streets and compares widths and functional characteristics to the existing street classification system.

» **Appendix F** – Level of Service Analysis: Gives a concise overview of the City's main transportation system performance metric, automobile level of service (LOS), and notes the metric's shortcomings. Also provides an overview of a few peer of a few peer cities' alternative approaches, exploring new metrics, and analyzing five parts of San Mateo's street network with the existing and potential new metrics in mind.

» **Appendix G** – Community Survey Results: Details the results of a community survey conducted to understand resident and worker attitudes toward and experiences with San Mateo's street network and potential improvements.

» **Appendix H** – Design Guidelines: Shares detailed street design guidance for City agencies, private developers, and contractors working on San Mateo streets. The guidelines are designed to ensure that Sustainable Streets strategies are implemented incrementally over the course of the next several decades in a context-sensitive way.

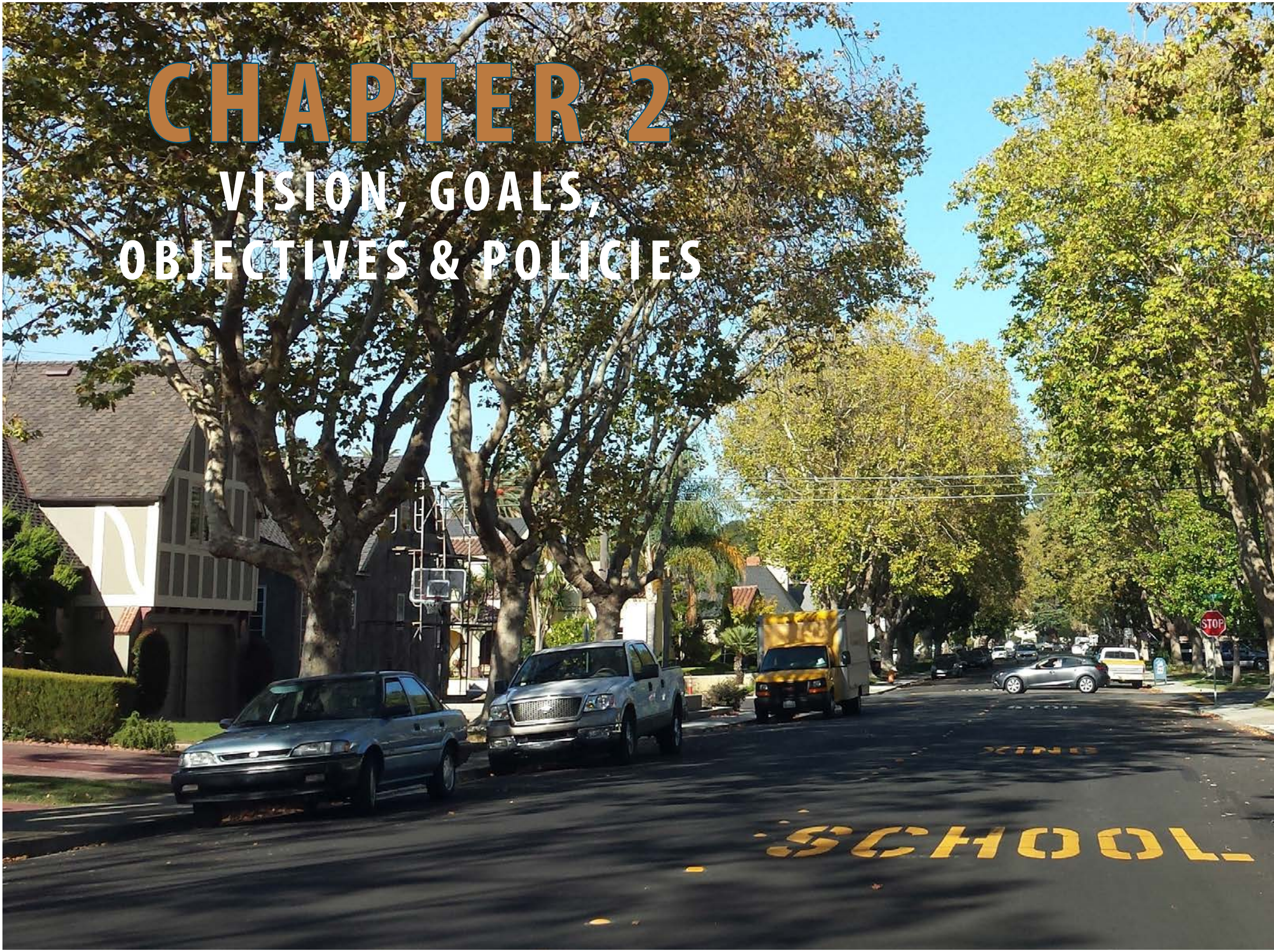
» **Appendix I** – Recommended Projects: Provides plan view drawings of the four focus areas as well as a photo simulation of the El Camino Real vision at 3rd Avenue.

» **Appendix J** – Transportation Demand Management Plan: Gives an overview of relevant current TDM efforts in San Mateo and describes how they might be expanded to cover the whole city, to reduce single-occupant vehicle travel over time.

» **Appendix K** – Funding Opportunities: Shares detailed descriptions of local, state, and federal programs that might be able to fund Sustainable Streets projects.

1. As referenced from the San Mateo Bicycle Master Plan (2011)

CHAPTER 2
VISION, GOALS, OBJECTIVES & POLICIES



“If you don’t know where you are going, you will probably end up somewhere else.”

Lawrence J. Peter

To ensure a solid foundation for the technical guidance within this plan, Chapter 2 clearly defines the City’s aspirations for a safe, sustainable, and healthy transportation network. These visions, goals, objectives and policies establish the direction for the remaining guidance in the plan.

CHAPTER 2: **VISION, GOALS, OBJECTIVES & POLICIES**

VISION

The City of San Mateo envisions a transportation system that is sustainable, safe, and healthy and supports a sense of community and active living, where walking, bicycling, and transit are integral parts of daily life. Furthermore, the City envisions integrating Complete Streets and Green Streets into street designs that are comfortable and convenient for the breadth of travel choices and that improve water quality and reduce other environmental impacts, while creating more vital places that fit with desired community character.

Complete Streets are routinely planned, designed, operated, and maintained with the consideration of the needs and safety of all travelers along and across the entire public right of way. This includes people of all ages and abilities who are walking, bicycling, using transit, traveling with mobility aids, driving vehicles, and driving commercial freight. Green Streets are designed to take further advantage of landscape and urban design elements that enhance the pedestrian experience and also capture, slow, treat, and potentially infiltrate stormwater runoff, while providing an array of additional environmental and economic benefits.

GOALS, OBJECTIVES AND POLICIES

GOAL 1: SAFETY AND VISION ZERO

To ensure that human life and health are paramount and take priority over mobility and other road traffic system objectives, improve safety through the design and maintenance of sidewalks, streets, intersections, and other roadway improvements such as signage, lighting, and landscaping, as well as best practice programs to enhance and improve the overall safety.

Objective 1.A

Eliminate pedestrian- and bicycle-related fatalities and reduce the number of non-fatal pedestrian- and bicycle-related collisions by 50% from 2010 levels by 2020.

Policy 1.A.1

Annually review collision data, including causes, to implement ongoing improvements at intersections and throughout the transportation network.

Policy 1.A.2

Identify opportunities to reduce pedestrian and bicyclist risk by reducing crossing distances and providing protected facilities.

Policy 1.A.3

Develop and implement an enforcement program to encourage safe travel behavior and to reduce aggressive and/or negligent behavior among drivers, bicyclists, and pedestrians.

Objective 1.B

Work to improve walking and bicycling conditions at intersections with the highest rates of collisions.

Policy 1.B.1

Coordinate with Caltrans to provide median refuge islands on El Camino Real.

GOAL 2: MOBILITY

Increase and improve multimodal access to employment centers, residential neighborhoods, community destinations, and recreation opportunities across the City of San Mateo for people of all ages and abilities.

Objective 2.A

Increase the combined bicycle and pedestrian mode share to 30% for trips one mile or shorter by 2020.[2]

Policy 2.A.1

Accommodate the need for multimodal mobility, accessibility, and safety when planning, designing, and developing transportation improvements. Such accommodations could include:

1. Review capital improvement projects to make sure that the needs of non-motorized travelers are considered in planning, programming, design, reconstruction, retrofit, maintenance, construction, operations, and project development activities and products.
2. Accommodate the needs of all travelers through a Complete Streets approach. Complete Streets are roadways designed to facilitate safe, comfortable, and efficient travel for all roadway users.
3. Create and implement an ADA Transition Plan that includes actions such as retrofitting street corners, crossings, and transit stops that do not meet state and federal accessibility standards.

Objective 2.B

Work to eliminate barriers to pedestrian and bicycle travel.

Policy 2.B.1

Identify opportunities to remove barriers and improve or add pedestrian and bicycle crossings of US Highway 101, State Route 82 (El Camino Real), State Route 92, the Caltrain railroad tracks, and major arterials.

Policy 2.B.2

Identify gaps in the pedestrian and bicycle facilities networks and needed improvements to and within key pedestrian activity centers and community areas, and define priorities for eliminating these gaps by making needed improvements.

Policy 2.B.3

Develop and implement a clear and informative pedestrian and bicycle wayfinding signage program.

Policy 2.B.4

Define streetscape guidelines and standards that will increase pedestrian and bicycle safety and comfort while achieving green infrastructure goals and objectives.

Objective 2.C

Work with transit providers to develop high quality pedestrian and bicycle access to transit stops and stations.

Policy 2.C.1

Work with Caltrain and SamTrans to establish appropriate designs for transit stops and station accessways.

Objective 2.D

Regularly evaluate pedestrian, bicycle, and transit activity levels, facilities, and programs.

Policy 2.D.1

Develop and implement an annual evaluation program to count and survey the community on pedestrian, bicycle, and transit facilities and programs.

2. Originally referenced from the City of San Mateo Sustainable Initiatives Plan (2007)

Objective 2.E

T 4: Reduce single occupant vehicle commuting by 20% by 2020.

Policy 2.E.1

Develop and implement transportation demand management (TDM) requirements for new development.

Policy 2.E.2

Encourage the formation of transportation management associations (TMAs) for additional districts in the city.

Policy 2.E.3

Encourage existing larger employers and residential developments to provide information about transportation options and other trip reduction measures.

GOAL 3: INFRASTRUCTURE AND SUPPORT FACILITIES

Maintain and improve the quality, operation, and integrity of multimodal transportation network infrastructure that allows for convenient and direct connections throughout San Mateo. Enhance streets' role in creating public environments that are attractive, functional, and accessible to all people, and ensure that streets incorporate design features that support environmental goals.

Objective 3.A

Allocate street space, including that at the curbside, equitably among all modes.

Policy 3.A.1

Ensure that pedestrians, bicyclists, transit vehicles, and automobiles each have space in the travelway that is appropriate to the street's designated mobility function and land use context, per street typologies and overlays defined in the Sustainable Streets Design Guidelines.

Policy 3.A.2

Adopt the NACTO Urban Street Design Guide and Urban Bikeway Design Guide as a supplement to the Sustainable Streets Design Guidelines and the California Manual for Uniform Traffic Control Devices.

Policy 3.A.3

Allocate curbside space based on the needs of all modes, prioritizing movement and/or space for loading/unloading over vehicle storage where appropriate.

Objective 3.B

Incorporate pedestrian and bicycle facilities and amenities into private and public projects.

Policy 3.B.1

Support and encourage local efforts to require the construction of pedestrian and bicycle facilities and amenities, where warranted, as a condition of approval of new development and major redevelopment projects.

Policy 3.B.2

Facilitate safe pedestrian and bicycle travel through public and private construction zones.

Policy 3.B.3

Establish and maintain Sustainable Streets Design Guidelines that address topics such as sidewalk zones, street corners and street crossings, and green infrastructure landscape and streetscape approaches that support walking and bicycling.

Objective 3.C

Provide well maintained pedestrian and bicycle facilities that are clean, safe, and inviting.

Policy 3.C.1

Provide routine maintenance of pedestrian and bicycle facilities, as funding and priorities allow. Programs to support these maintenance efforts could include:

1. Sidewalk and bicycle facility repair programs, including incentives to property owners to improve adjoining sidewalks beyond any required maintenance.
2. Develop and administer a Pedestrian and Bicycle Service Request Form Program.
3. Create "Adopt a Trail/Streetscape" programs that involve volunteers for trail and streetscape cleanup and other maintenance.

Policy 3.C.2

Work with owners of vacant land adjacent to public walkways to identify beautification opportunities on the vacant property and implement projects, such as landscaping, fencing, and/or art installations.

Objective 3.D

Develop a green infrastructure plan that addresses the design, implementation, and maintenance of landscape and streetscape improvements as an integral part of San Mateo's Sustainable Streets to manage storm water runoff, create a better pedestrian environment, and improve community character.

Policy 3.D.1

Manage stormwater runoff using green infrastructure from 10% of roadway segments citywide and from 20% of roadway segments within the Downtown and PDAs within the city by the year 2050.

Policy 3.D.2

Manage stormwater runoff using green infrastructure along new private development with a street frontage longer than 100 feet.

Policy 3.D.3

Increase the tree canopy along streets in San Mateo by 10% by the year 2050.

Policy 3.D.4

Create design guidance, standards, and best practices for the design of green infrastructure elements in public rights-of-way. Guidance, standards, and best practices should:

1. Be consistent with federal and regional requirements, including those related to water quality, and be integral to city policies that support Sustainable Streets.
2. Be coordinated with the city's:
   - Land use planning and development guidelines and standards and,
   - Other applicable City guidelines and standards.
3. Coordinate with the San Mateo County Green Streets and Parking Lot Guidebook.
4. Define the applicability of tools and techniques to maintain specific conditions with respect to streets' role in the transportation network, their stormwater function, and characteristics of the built and natural context.

Policy 3.D.5

Establish a strategy and work plan for developing a comprehensive interdepartmental Operations and Maintenance Plan that integrates street, landscape, stormwater, and utility operations and maintenance.

Policy 3.D.6

Establish a monitoring program that can inform future changes and modifications to established green infrastructure design guidance, standards, and operations and maintenance practices.

Policy 3.D.7

Maximize the potential to implement green infrastructure by:

1. Reducing or removing administrative, physical, and funding barriers;
2. Setting implementation priorities based on stormwater management and Sustainable Streets needs, as well as the effectiveness of improvements and the ability to identify funding.

3. Taking advantage of opportunities such as grant funding, routine repaving or similar maintenance projects, funding associates with Priority Development Areas, public private partnerships, and other funding opportunities.

Policy 3.D.8

Identify and develop an education program that informs City of San Mateo residents, employers, and employees of the environmental, economic, and place-making benefits of integrating green infrastructure into public rights-of-way.

GOAL 4: PROGRAMS

Increase awareness of the value of pedestrian, bicycle, and transit travel for commute and non-commute trips through encouragement, education, enforcement, and evaluation programs.

Objective 4.A

Establish and enhance a Safe Routes to Schools program that will enable and encourage more students to walk and bicycle to school.

Policy 4.A.1

Work with the school community to identify and develop education and encouragement projects through the Safe Routes to School program. This program could include:

1. Identify Capital Improvement Programs (CIPs), working with the school community.
2. Apply for Safe Routes to School state funding and other grants to construct and implement educational and encouragement programs and capital improvements.
3. Develop and distribute maps that identify suggested routes for children to walk to school.

Objective 4.B

Establish and enhance a Safe Routes for Seniors program that will enable more seniors to walk to services, access transit, and complete other multimodal trips safely and conveniently.

Policy 4.B.1

Work with the senior community to identify and address barriers to increased walking, bicycling, and transit use.

Policy 4.B.2

Identify and develop education and encouragement programs working with seniors through the safe routes for seniors program. This program could include:

1. Identify Capital Improvement Programs (CIPs) working with the senior community, prioritizing access to key senior origin and destination points.
2. Develop senior pedestrian mobility and safety training working through senior centers and senior organizations.

Objective 4.C

Introduce and promote education, encouragement, and outreach for pedestrian, bicycle, and transit programs.

Policy 4.C.1

Support programs that encourage and promote pedestrian, bicycle, and transit travel. These programs could include:

1. A social marketing campaign to promote the benefits of active lifestyles and active transportation, focusing on the role of walking and bicycling in promoting health and lowering obesity.
2. Effective safety programs for adults and youths to educate all road users as to their rights and responsibilities.
3. Information for interested agencies and organizations about education materials and assistance available for encouraging active transportation, such as programs administered by the National Safe Routes to School Partnership.

Objective 4.D

Establish a Safe Routes to Transit program that will facilitate walking and biking to transit.

Policy 4.D.1

Identify and implement Safe Routes to Transit projects.

Objective 4.E

Explore the potential for a Green Infrastructure Steward program that builds interest in street trees, environmental quality, and open space to facilitate the maintenance of green infrastructure in San Mateo.

Policy 4.E.1

As part of Policy 3.C.2's establishment of a strategy and work plan for green infrastructure operations and maintenance, assess the viability of implementing community-based maintenance programs based on case studies from other programs in the U.S.

GOAL 5: EQUITY

Improve pedestrian and bicycle accessibility for all residents through equitable public engagement, service delivery, and capital investments.

Objective 5.A

Assist community members who desire to improve pedestrian and bicycle access to, from, and within their neighborhoods.

Policy 5.A.1

Develop a residential partnership program that enables neighborhoods to identify, prioritize, and implement non-motorized access improvements and green infrastructure.

Objective 5.B

Identify low-income and transit-dependent communities that require pedestrian and bicycle access to, from, and within their neighborhoods.

Policy 5.B.1

Implement non-motorized projects providing access to local services, schools, and transit facilities identified in the North San Mateo Community Based Transportation Plan.

Policy 5.B.2

Improve non-motorized access to facilities that serve low-income and transit-dependent community members.

GOAL 6: IMPLEMENTATION

Implement the Sustainable Streets Plan over the next 20 years.

Objective 6.A

Determine funding needs for expanding and improving Sustainable Streets facilities and programs, and seek funding for those needs.

Policy 6.A.1

Develop a 20-year financial plan and update it every five years.

Policy 6.A.2

Apply for local, state, and federal grants for major Sustainable Streets projects and programs, including Safe Routes to School and Safe Routes to Transit.

Policy 6.A.3

Develop requirements and incentives for private property owners to incorporate pedestrian and bicycle features into new projects.

Policy 6.A.4

Explore partnerships with private and public organizations (e.g., the County of San Mateo Health Department) to fund incentive programs and events that encourage multimodal transportation.

Policy 6.A.5

Identify funding opportunities for stormwater management that can be used to support implementation of multimodal improvements to San Mateo's streets.

Objective 6.B

Incorporate Sustainable Streets projects into the City's Capital Improvement Program (CIP) that will improve the Complete Streets and Green Streets environment in San Mateo and support the City's Sustainable Initiatives Plan.

Policy 6.B.1

Prioritize the top 10 Sustainable Streets Plan projects for inclusion in the CIP.

Policy 6.B.2

Identify dedicated Sustainable Streets project funding by 2020.

Objective 6.C

Ensure Complete Streets and Green Streets efforts are coordinated within the City and with external partners.

Policy 6.C.1

Designate a City Sustainable Streets Coordinator responsible for coordinating multimodal transportation improvement efforts within the City and with external partners, as well as green infrastructure improvements within the public right-of-way. This coordinator will be a regular participant at the City's Development Review Board and will have the authority to comment on private and public development projects as they relate to the implementation of the Sustainable Street Plan's visions, goals, objectives, and policies.

Objective 6.D

Review Sustainable Streets Plan, Pedestrian Master Plan, and Bicycle Master Plan recommendations at regular intervals to ensure they reflect the most current priorities, needs, and opportunities.

Policy 6.D.1

Update the Sustainable Streets Plan, the Pedestrian Master Plan, and the Bicycle Master Plan every five years to identify new facility improvements and programmatic opportunities as the multimodal network develops, assess their feasibility, gauge public support, identify funding sources, and develop implementation strategies.

CHAPTER 3
DESIGN GUIDELINES

"I did then what I knew how to do. Now that I know better, I do better."

Maya Angelou

Street design guidelines across the country have evolved in recent years to ensure a more balanced transportation network that includes pedestrians, cyclists, and transit riders. The Design Guidelines takes these national best practices and distills them into the San Mateo context. This guidance enables streets, existing and new, to be designed to better support the community's goals.

CHAPTER 3: **DESIGN GUIDELINES**

The San Mateo Sustainable Streets Design Guidelines serve as the starting point for the geometric design of streets and related elements in San Mateo. The full Design Guidelines can be found in Appendix H; this chapter highlights the key tenets and overall approach of the Design Guidelines, incorporating City of San Mateo goals and combining them with locally accepted design practices and national best practices. As previously mentioned, streets in San Mateo make up nearly 22% of all city land, and as such, it is critical to use this vital public resource to achieve numerous City goals.

As a proportion of public land, streets are the largest public capital asset and are used by every city resident, visitor, and worker. All streets should be designed to achieve multiple goals.

The Design Guidelines reflect a comprehensive approach to street design and consider streets' transportation function, their role in addressing flows and stormwater runoff water quality, and their potential for creating public places that people desire and enjoy. The Guidelines are intended to be used by municipal and private sector street designers who may be building, reconstructing, and repaving streets within the City of San Mateo. They are intended to provide information, tools, and best practices. The guidance has also been developed to ensure flexibility so a street designer can create plans that reflect local needs and context.

The Design Guidelines have four primary purposes:

1. Establish a framework for the classification of streets (typologies)
2. Establish the framework for special districts or modal priority (overlays)
3. Provide specific geometric design guidance and suggested design elements to correspond with those typologies and overlays
4. Integrate green infrastructure (see below) into the street design process

DESIGN GUIDELINES APPROACH

Previously, street design guidance was largely based on the idea of functional street classification. Functional classification traditionally defined a street as a highway (limited access), arterial, collector, or local road. While this approach provided some differentiation in the design of streets, it did not provide sufficient specificity in the context of a city. The simplistic framework was not sensitive to the variety of urban land use contexts or the different modes that might need to use a street. The San Mateo Sustainable Street Design Guidelines take a different approach and seeks to provide a greater level of guidance to ensure that streets match their intended purposes within the context of the community through a local, city, and regional lens.

GREEN INFRASTRUCTURE DEFINED

The US Environmental Protection Agency describes green infrastructure as a range of natural and built approaches to stormwater management–such as rain gardens, bioretention, and permeable paving–that mimic natural systems by cleaning stormwater and letting it absorb back into the ground.

Green infrastructure strategies for streets can include a connected system of inlets, basins, and outlets for tree planters and other landscaping that allows stormwater to flow into the planting beds and slowly soak into the soil. Green infrastructure could reduce the amount of runoff that enters the traditional piped stormwater system below ground, and could prevent overflows that pollute nearby water bodies. Green infrastructure offers a range of additional environmental, economic, and community benefits, including more walkable streets, reduction of heat island effects, increased property values, and more gathering spaces that benefit residents and customers of local businesses.

The Sustainable Streets Design Guidelines introduce new concepts of Typologies and Overlays to the street design process.

- Typologies: Typologies are a way to classify streets using a combination of a street's transportation and mobility function and its role in serving and being influenced by adjacent land uses.
- Overlays: Overlays include special use networks and exceptions that may require special design treatments due to a specific use (i.e., bicycle priority network) or need (i.e., transit station area).

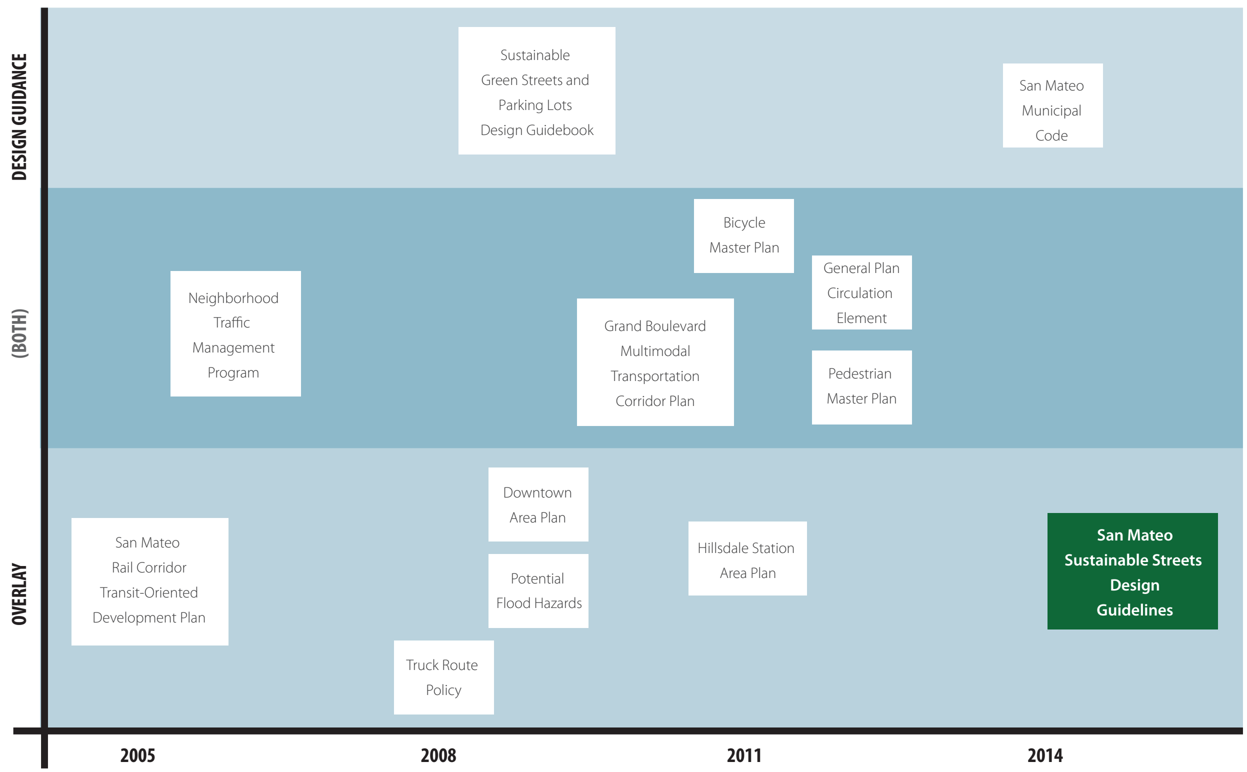
Using this approach, there are now more than 15 different street classifications, as compared to the four in the previous framework. While this may appear to add unnecessary complexity, its primary function is to ensure that different types of streets can be designed and built to meet the numerous types of settings within San Mateo. More information about typologies, overlays, and how they are defined can be found in a later section of this chapter.

In addition, the Design Guidelines integrate green infrastructure into the street delivery process. This approach uses landscape and urban design to capture, slow, treat, and filter stormwater runoff, an approach that can support placemaking and enhance the pedestrian experience. At the same time, green infrastructure also creates economic, community, and environmental benefits by helping create interesting and valued places in which to live and by regenerating and protecting aquatic and other habitats which are critical in the San Francisco Bay Region.

RELATIONSHIP WITH OTHER LOCAL PLANS

The Design Guidelines incorporate information from numerous other existing San Mateo documents including the Bicycle Master Plan and Pedestrian

Figure 3-1 Recent Planning Efforts Contributing to the Design Guidelines Development[3]



3. The El Camino Master Plan (2001) was also consulted as part of this plan design process.

Figure 3-2 Relationship of Various Local Design Manuals and Standards

STREET DESIGN COMPONENTS	SUSTAINABLE STREET DESIGN GUIDELINES	PEDESTRIAN MASTER PLAN	BICYCLE MASTER PLAN	NEIGHBORHOOD TRAFFIC MANAGEMENT PLAN	SUSTAINABLE GREEN STREETS AND PARKING LOTS DESIGN GUIDEBOOK[4]
STREET TYPOLOGIES	●				
OVERLAYS	●	○	○		
GREEN INFRASTRUCTURE	●				○
STREET DESIGN GUIDANCE	●	○	○		○
INTERSECTION DESIGN GUIDANCE	●	○	○	○	○
TRAFFIC CONTROL DEVICES	●	○	○		

Key ● = Primary Guidance ○ = Supplementary Guidance

Master Plan. The Guidelines used the San Mateo County Green Streets and Parking Lots Design Guidebook to guide language and processes incorporating green infrastructure in designs. Figure 3-1 provides a background of the various local plan elements that were used to develop these guidelines and how they informed overlays and design guidance.

Some plan guidance is nearly a decade old, justifying the need for updated design guidelines to meet current best practices. However, some elements of past documents still remain valid today. In situations where there is duplicative information in the Design Guidelines and other existing local documents, the Design Guidelines should take precedence unless specified otherwise in other adopted plans or in City Code.

The Design Guidelines are not the City of San Mateo's first set of design guidance. The City has undertaken numerous related initiatives, including plans that provide design guidance by mode, specific overlay areas, or both. In reality, all of these components fit within the same right-of-way and should be considered holistically. The intent of this document is not to duplicate past efforts. Instead, the Design Guidelines provide overarching guidance on the design of streets from property line to property line and include details from other plans as necessary and provides new guidance when important information gaps exist.

Figure 3-2 provides a reference on how the Design Guidelines should be used in relation to other plans still relevant to street design. These supplementary plans contribute different information to the street design process. Some of them are specific to mode (e.g., bicycles and pedestrians) while others provide specific guidance on green infrastructure elements.

RELATIONSHIP WITH STATE AND FEDERAL GUIDANCE

The Design Guidelines reflect the adopted guidance for streets within the City of San Mateo, including some streets that fall under Caltrans jurisdiction. Even so, streets such as El Camino Real require collaborative effort in the development of final designs. In addition, to ensure consistency with state and federal guidance, design guidelines and policies included within this document are consistent with the 2012 California

4. Also see the San Mateo County Water Pollution Prevent Program: Stormwater Technical Guidance: A Handbook for Developers, Builders, and Project Applicants.

Manual for Uniform Traffic Control Devices (CA MUTCD 2012), as required by the California Vehicle Code.

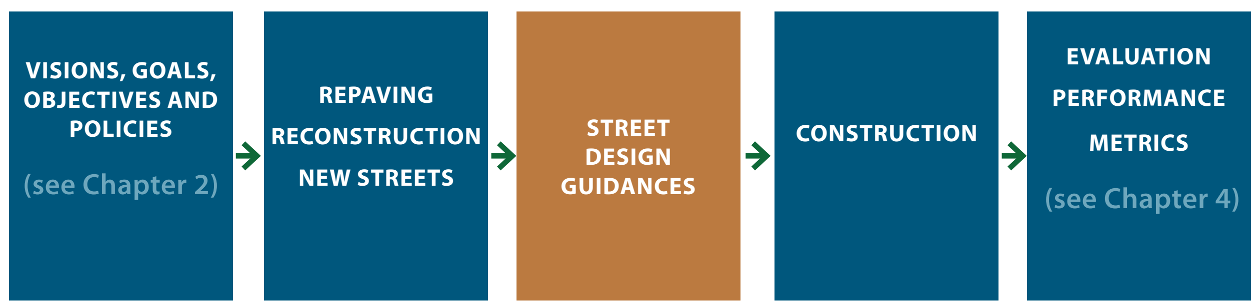
Furthermore, design guidelines and policies are drawn from state and nationally recognized design guidance from the Caltrans, American Association of State Highway and Transportation Officials (AASHTO), and the National Association of City Transportation Officials (NACTO). Streets such as El Camino Real may also consider state guidance such as the Caltrans Main Street Guide which incorporates numerous green infrastructure elements and other design modifications that can better suit the needs of this community thoroughfare.

STREET DELIVERY PROCESS

The process by which streets are "delivered" in the City of San Mateo starts long before one arrives at this Plan or the Design Guidelines. Street design is an iterative process and does not end when construction ends. The City of San Mateo has few opportunities for new streets, with the rare exception of larger developments such as Bay Meadows and streets associated with private developments. Instead, most streets are subject to change when it is time for routine repaving (which provides opportunities for striping changes or reconfiguration) or complete reconstruction (moving curbs).

These design guidelines fit into a small, yet important step in the overall street delivery process, as Figure 3-3 shows. The Guidelines take direction from the City's Visions, Goals, Objectives, and Policies regarding

Figure 3-3 Street Delivery Process Relationship with Street Design Guidelines



streets and the Guidelines are invoked during repaving, reconstruction, and projects that involve new streets. After streets are designed and constructed, it is incumbent upon the City to ensure that they are evaluated with the correct metrics (see Performance Metrics, Chapter 4).

KEY PARTNERS

These process tasks are primarily implemented by the San Mateo Department of Public Works. However, certain elements of the street engage other local partners (Figure 3-4). Here, coordination is critical to ensure that opportunities are not missed to make street improvements in conjunction with other efforts. Similarly, coordination will prevent redundant work and saving public funds. For example, most utilities (electricity, cable and internet, non-drainage specific water lines) are located within the street (beyond the gutter pan of the curb). Because most utility maintenance requires traffic disruptions and some level of street construction, it is best to consider other street reconfiguration or reconstruction needs at the time of such work. Currently, the City of San Mateo has ongoing quarterly coordination with various utility providers whereas other coordination meetings should continue to occur on an as needed basis.

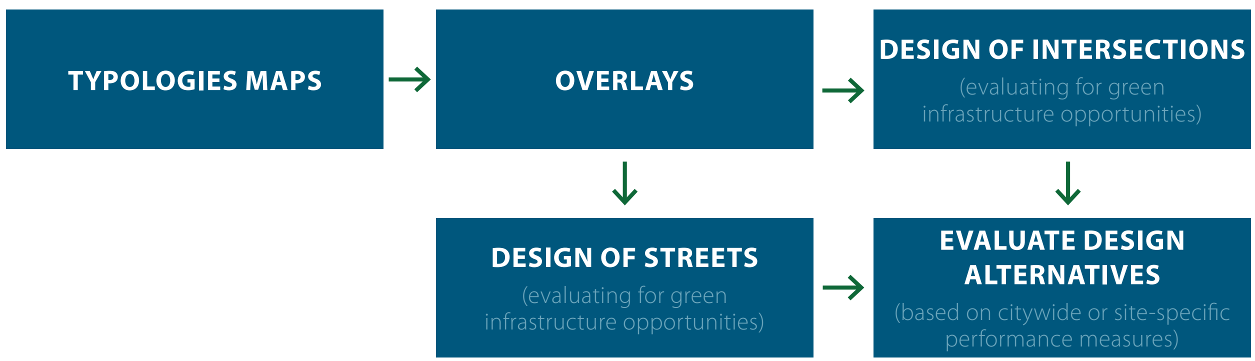
USING THE DESIGN GUIDELINES

The Design Guidelines should be used at the point when a street designer knows the specific location within the city that will be subject to redesign, reconstruction, or construction of a new street. The first step is to reference the Street Typologies map (Figure

Figure 3-4 San Mateo Street Design Partners

STREET ELEMENT	PARTNER	COORDINATION PROTOCOL
Electricity	Pacific Gas and Electric	Quarterly Utility Coordination Meeting
Cable and Internet	Comcast, Astound, U-verse, Others	Quarterly Utility Coordination Meeting
Water Meters and Lines	CalWater	Quarterly Utility Coordination Meeting
City-Maintained Landscaping	San Mateo Parks and Recreation	Internal San Mateo Service/Work Orders
Throughways for Emergency Vehicles	San Mateo Fire Department	As-needed Meetings
State-Owned Streets	Caltrans	As-needed Meetings

Figure 3-5 Street Design Guidance Process



3-8) to determine the specific typology of the street in question. The second step is to determine if any overlays exist for that street. This may involve referencing previous plans as denoted in Figure 3-2.

Based on the street's typology and any specific overlays, one can then use the Design Guidelines to build the street from the "outside-in" based on guidance for different realms of the street (Figure 3-10). For this final step, use the specific guidance for this street's typology and site overlays and evaluate the potential for including green infrastructure.

The Design Guidelines also provide overall design principles and design elements associated with intersections and traffic control devices. Intersections themselves are not necessarily associated with a specific typology. However, overlays should influence design elements associated with intersections and traffic control devices.

These steps are outlined in a simplified format in Figure 3-5.

DESIGN GUIDELINES FRAMEWORK

This section provides additional detail on the street typologies and overlays that are foundational elements of the Design Guidelines.

TYPOLOGIES

A typology is the study of types and the characterization of a set of similar items in order to classify them and differentiate between them. Applied to streets, typologies can help one understand the form, utility, and use. Street typologies are helpful in categorizing the policy implementation while reflecting local context. An essential tension on every street is where it fits as a link in a larger network and within the place that surrounds it. Both of these elements are part of a street's typology.

Most streets have a travel component – they link to the larger transportation network. This might be in the form of a six-lane arterial or a narrow alley. Most streets also have a local, context-based place component – they are important parts of the places in which we live, work, and play, be it in the form of a residential cul-de-sac or a regional connector like El Camino Real. Street typologies in the Sustainable Streets Plan are based on the street types and context. Figure 3-6 provides a description of all of the proposed street typologies based on a set of contexts (rows) and street types (columns).

Figure 3-6 Proposed Streets and Context Categories

		STREET TYPE					
		EL CAMINO REAL[5]	MAJOR CONNECTOR	MINOR CONNECTOR	ACCESS	ALLEY	PATH
CONTEXT	Downtown	Downtown El Camino Real	Downtown Connector		--	Downtown Alley	Walkway
	Commercial/ Mixed-Use[6]	Mixed-Use El Camino Real	Mixed-Use Connector		Mixed-Use Access	Mixed-Use Alley	Walkway
	Neighborhood	Neighborhood El Camino Real	Neighborhood Major Connector	Neighborhood Minor Connector	Neighborhood Access	Neighborhood Alley	Walkway
	Industrial	--	Industrial Connector		Industrial Access	--	Walkway
	Park	--	Parkway Connector	--	Park Access	--	Shared-Use Path

5. This document considers El Camino Real its own street type, giving it unique characteristics as compared to other streets in San Mateo. Guidance for El Camino Real shall also reference the design guidance and elements as described in the Grand Boulevard Multimodal Transportation Corridor Plan.

6. Commercial/Mixed-Use context may include a gradient between land uses that are strictly commercial and others where both residential and commercial buildings exist together. There is minimal difference in terms of street design between these categories. However, strictly commercial uses are likely to generate larger volumes of pedestrian traffic. Thus, street geometries and amenities for pedestrians should be expanded for pedestrians in these scenarios.

Street Typologies and Federal Guidance on Functional Classification

Functional classification is required by the Federal Highway Administration for projects receiving federal funds. This system is primarily auto-centric and does not take into consideration local context, land use, or built form. The street types presented in this document are an alternative to traditional functional classification. To ensure that San Mateo is still eligible for federal transportation funds, Figure 3-7 converts street types into FHWA functional classification terminology. Alleys and paths do not have FHWA functional classification equivalents.

Figure 3-7 Relationship between Street Types and Existing FHWA Classifications

	ARTERIAL	COLLECTOR	LOCAL
EL CAMINO REAL	●		
MAJOR CONNECTOR	●	●	
MINOR CONNECTOR		●	
ACCESS			●

Figure 3-8 shows the City of San Mateo street network and its street typologies. Use this map with the Design Guidelines as street width guidance is provided with respect to a street's typology.

OVERLAYS

Some uses are independent of a street's normal form and function, like routes for emergency vehicles and freight trucks, streets adjacent to major transit stations, and bicycle priority streets. These uses are not necessarily types, so they are classified as overlays. Overlays also describe a street's multi-modality. For example, a street with high-frequency transit would be a connector street for transit, but the roadway might serve more of an access function. The same holds true for a multi-way boulevard, which serves as a bicycle priority street and a truck route while fulfilling both connector and access functions for autos.

Overlays do not dictate the specific design of a street but encourage design flexibility to better serve the purpose of the overlay. Overlays are also a means for providing modal priority. As an example, access streets that fall under a bicycle priority overlay should prioritize bicycle treatments along the street's length and at intersections to support the overall bicycle priority network. Similarity, freight routes may require additional width and design exceptions at intersections to accommodate large volumes of trucks and wide turning movements.

Transportation Overlays

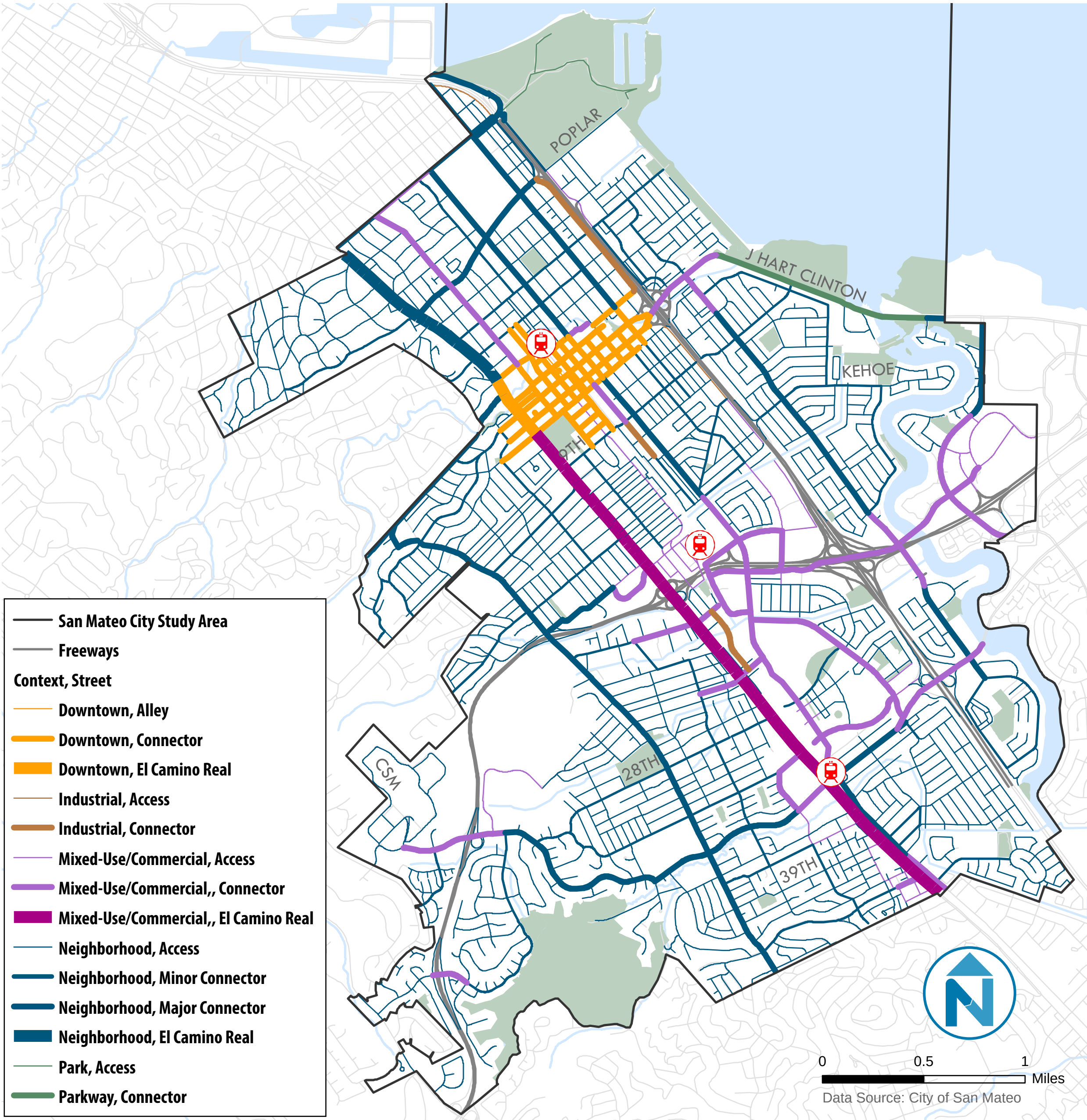
Figure 3-9 presents a summary of the overlays that should be considered in the development and design of streets in San Mateo. The figure describes the purpose of the overlay, potential associated design modifications, alternative performance metrics, and associated documentation that spatially defines the overlay network. In addition, alternative performance metrics are provided as mechanisms to evaluate the street-level performance of the street under that overlay. Metrics evaluating a transit priority street should consider its ability to reduce delays for transit riders and increase ridership as measures of success. Additional overlay-specific guidance on design modifications can be found in the full version of the Design Guidelines (Appendix H).

Additional detail about this work can be found in the full Design Guidelines. While some of the above information or data is readily available, other information is not yet available. However, the San Francisco Estuary Institute recently developed an initial framework and method for using data to assist in the process of identifying locations where green infrastructure is appropriate and feasible. Please note that the results of this work, presented in Appendix H.2, do not reflect the potential future conditions created by implementation of the Sustainable Streets Plan. Additional analysis and data layers similar to the ones discussed above will be needed to more fully assess the feasibility of green infrastructure in the City of San Mateo.

Green Infrastructure Overlays

While some of the overlays discussed above inform the selection, design, and implementation prioritization of green infrastructure elements, additional context is needed to determine the best use of these tools. Figure 3-9 provides evaluation steps to determine the criteria and factors in selecting green infrastructure.

Figure 3-8 San Mateo Street Typologies



Data Source: City of San Mateo

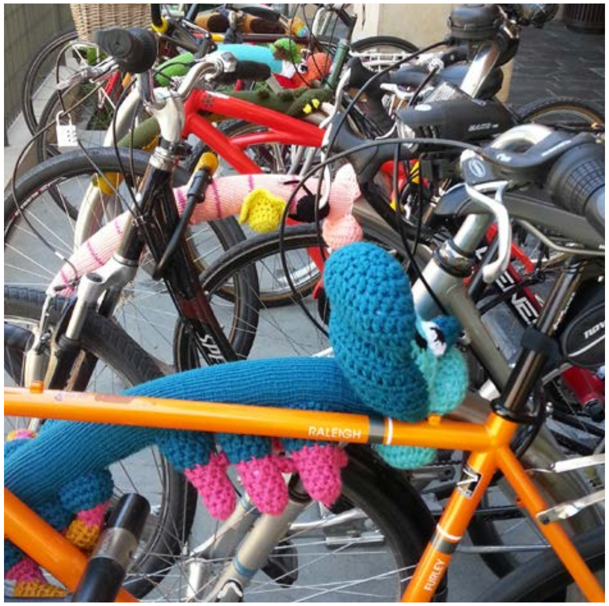


Figure 3-9 Green Infrastructure Evaluation Process

1 IDENTIFY APPLICABLE STREET TYPE, OVERLAYS AND OTHER CATEGORIES

- Street type
- Overlay
- Safe Routes to School, Specific or Area Plans, Priority Development Area

2 IDENTIFY ENVIRONMENTAL CONTEXT

- Underlying soil and hydrology conditions (feasibility of infiltration, groundwater recharge)
- Pollutant Management (surface and subsurface)
- Tree Canopy
- Localized Flooding
- Others Conditions (use Environmental Context Check List - see Appendix H.2)
- Location within a watershed or proximity to Bay

3 IDENTIFY BUILT CONTEXT AND CONSTRAINTS

- Adjacent land use and built context
- On-street parking
- Drainage patterns (including tributary areas that may concentrate flows within the right-of-way)
- Location and capacity of existing stormwater utilities (lines and inlets)
- Longitudinal and cross-slopes
- Potential conflicts with underground utilities, drain inlets, fire hydrants, driveways

4 SELECT COMPLETE AND GREEN STREETS ELEMENTS

- Set Complete Streets and Green Streets goals for the project in question
- Select appropriate Complete Streets and Green Streets Elements (including green infrastrcuture and general landscape elements)
- Strive for close integration of Complete Streets and Green Street Elements

5 DETAIL DESIGN OF GREEN INFRASTRUCTURE ELEMENTS

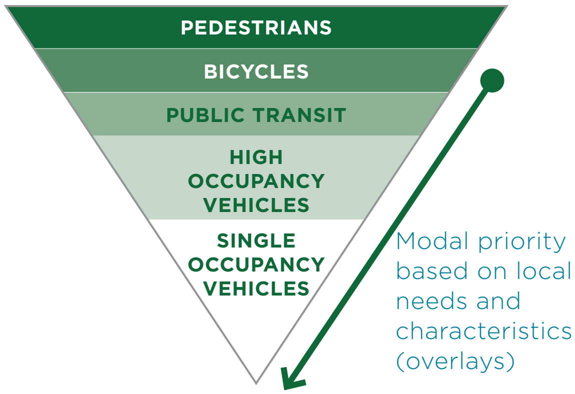
- Minimize project's impervious surfaces
- Maximize and design landscape based components as appropriate to site context
- Size and design green infrastructure features for site context following provided design guidance*
- Return to Step 4 to evaluate other Green Street elements if unforeseen issues arise

Figure 3-10 Street Design Guideline Overlays

OVERLAY	PURPOSE	EXAMPLE DESIGN MODIFICATIONS	ALTERNATIVE PERFORMANCE METRICS[4]	DOCUMENTATION
Pedestrian Greenway Streets	Prioritize pedestrian safety and comfort	Reduced crossing distances and emphasis on pedestrian crossing enhancements Street trees and plantings Maximum sidewalk widths	Minimizing pedestrian delay at intersections	San Mateo Pedestrian Master Plan (see Greenways Map)
Suggested Routes to Schools	Prioritize pedestrian and bicycle safety along designated pedestrian and bicycle routes	Reduced crossing distances and emphasis on pedestrian crossing enhancements Bicycle lanes Cycletracks	Walking and biking mode share to selected San Mateo schools	San Mateo – Foster City Suggested Routes to Schools Maps
Transit Streets	Prioritize transit speed and schedule reliability	Lane width guidance Reduced crossing distances Transit speed improvement projects (transit lanes and intersection treatments) Bus stop placement priority	Persons per Lane Hour (maximize) Transit Vehicle Delay (minimize)	Most recent SamTrans Service Plan
Bicycle Priority Streets	Prioritize bicycle safety and comfort	On-street bicycle treatments Intersection bicycle treatments (See Flexible Zone, Intersections)	Bicycle facility expansion (sustained increase) Bicycle compliance to traffic controls (increase)	San Mateo Bicycle Master Plan – Recommended Bikeway Network (Chapter 5, page 5-2)
Downtown San Mateo	Specific designs for additional pedestrians, density, etc. around station areas	Reduced crossing distances Pedestrian lighting Traffic calming and other safety countermeasures Accommodate additional pedestrian amenities and street furniture	Minimizing pedestrian delay at intersections	Downtown Area Plan
Freight Routes	Design routes suitable for goods movement	Corner radii that accommodate trucks Lane width of 11 or 12 feet	N/A	Adopted Truck Route Policy (Recommended Truck Routes, Page 28) with exception of 5th Avenue between Humboldt and Amphlett
Caltrain Station Areas	Specific designs for additional pedestrians, density, etc. around station areas	Reduced crossing distances Traffic calming and other safety countermeasures Maximize access pathways to station	Matching All Pedestrian Desire Lines Pedestrian compliance to traffic controls (increase)	Rail Corridor Transit-Oriented Development Plan Hillsdale Station Area Plan
Emergency Primary Response Routes	Ensure emergency vehicles have access to a network to minimize response times.	Signal priority for emergency vehicles Rollable medians	N/A	Neighborhood Traffic Management Program

DESIGN GUIDANCE PRINCIPLES

The full Design Guidelines provide additional detail on how to design streets in San Mateo. However, all of it is guided by key principles related to streets, intersections, signals, and green infrastructure. These principles are summarized below.



Street Principles

Streets in San Mateo shall be designed with the following principles in mind.

» Pedestrians are the top priority: Every trip in San Mateo begins and ends with walking. Thus, all street designs should prioritize pedestrian movement first. This must include designing for a range of pedestrians, from healthy young adults to elderly residents using a mobility device. Other modes should recieve relative priority based on cost effectiveness, space efficiency, level of vulnerability, and environmental impact. Bicyclists should be given second priority, followed by transit vehicles, high-occupancy vehicles, and single-occupancy vehicles.

» Local priorities above regional needs: Unless specifically stated otherwise, all streets in San Mateo shall place local access needs above regional mobility needs. Examples include streets that support local commerce, placemaking, and pedestrian and bicycle safety.

» Accommodation for all users: Excluding freeways, all streets shall accommodate all types of users, including pedestrians and cyclists. In some cases, overlays will specify streets that should maintain special priority for one type of user over others.

» Safety through design (reducing injuries and fatalities): Streets shall be designed to reduce all types of transportation-related injuries and fatalities. Street designs shall consider past injury data and appropriate countermeasures to prevent collisions in the future.

» Action, observation, improvement: Street improvements do not need to be permanent. A pilot project approach that allows for the temporary testing of street improvements should be considered to help develop street improvements that produce measureable benefits and achieve desired outcomes.

» Sustainable Streets include Green Streets: Green Streets infrastructure shall be included as an integral part of San Mateo's street design process and management of stormwater.[7]

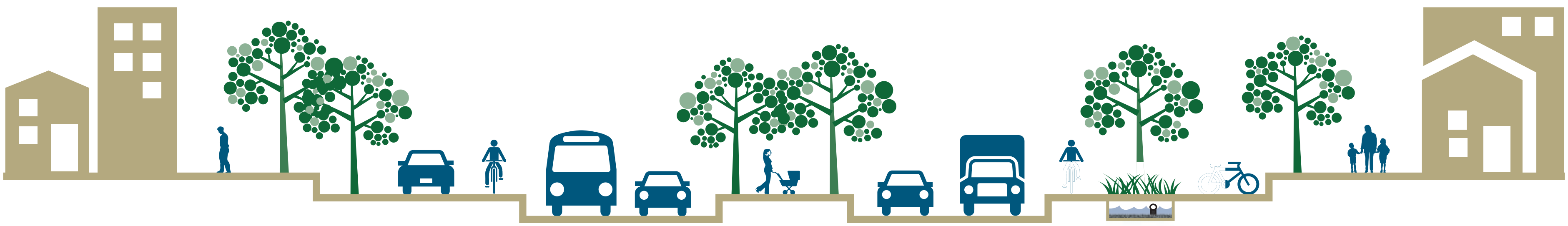
» Design proactively, not reactively: Street designs should be approached from a standpoint of "how should this street function?" as compared to "how will this street function given existing conditions?" As an example, streets should be designed with a preferred speed or volume, rather than of simply accepting existing conditions.

» Figure 3-10 illustrates the various "realms" or portions of the street and their respective potential elements. These guidelines provide geometries for the maximum, target, and constrained widths of each of these realms. Various elements of each of these realms are described in further detail in the full Design Guidelines.

In the street design process, several portions of the street must compete for limited right-of-way. In San Mateo, streets should be designed with an "outside-in" strategy that places priority on non-motorized users in the pedestrian realm, unless within a special overlay that prioritizes other modes of travel. All realms should place focus on green infrastructure when possible,

7. Additional green infrastructure design principles can be found in the San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook.

Figure 3-11 Realms of the Street



PEDESTRIAN	FLEXIBLE	TRAVEL	TRAVEL	TRAVEL	FLEXIBLE	PEDESTRIAN
Door Zone	Curbs	Transit Lanes	Landscaping	Transit Lanes	Curbs	Door Zone
Yards	Curb Extensions	Travel Lanes	Street Trees	Travel Lanes	Curb Extensions	Yards
Building Setbacks	Bicycle Lanes	Bicycle Lanes	Green Infrastructure	Bicycle Lanes	Bicycle Lanes	Building Setbacks
Walkways	Cycle Tracks	Green Infrastructure	Pedestrian Refuges	Green Infrastructure	Cycle Tracks	Walkways
Street Trees	Street Trees		Stroller and/or wheelchair crossing		Street Trees	Street Trees
Green Infrastructure	Green Infrastructure		Turn Lanes		Green Infrastructure	Green Infrastructure
Sidewalk Furniture	Parking				Parking	Sidewalk Furniture
Driveways	Turn Lanes				Turn Lanes	Driveways

as opportunities for ecological performance exist in all parts of a street's cross section.

Intersection Principles

Intersections are the decision points for all modes of travel, and they are also the locations at which the vast majority of collisions occur. The Design Guidelines are not able to provide specific guidance on every intersection, given the vast complexities and variables at play. However, they provide overarching principles that should be followed to generally improve overall safety for all users and reduce intersection complexity and opportunity for error. Intersections in San Mateo shall be designed with the following principles in mind.

» Make Intersections Compact and Simple: Compact intersections reduce pedestrian crossing distances and minimize opportunities for errant traffic movements, which increase opportunities for collisions. Skewed or multi-leg intersections introduce high turning speeds and unusual conflicts. Such intersections should be realigned whenever possible. Intersections that cater to high volumes of freight traffic should be designed to safely accommodate those vehicles. Consider strategies such as relocating stop bars before expanding the size of an intersection.

» Analyze Intersections as a Network: San Mateo's street grid provides a robust and redundant traffic network. Thus, intersections and intersection improvements should be analyzed in the context of the street network, not in isolation.

» Design Intersections Using Space and Time: Geometrics (space) and signalization (time) should be used in tandem to create intersections that support safe operations for all users. Whenever possible, increases in roadway capacity at intersections should be accomplished by operational techniques first and geometric expansion only if necessary.

» Build for the Present, Accommodate the Future: Building excess capacity induces additional travel demand; thus, intersection capacity should be based on tolerable congestion levels versus assumed growth in congestion.

» Manage Speed Through Intersections: Intersections are shared spaces and are the location of most collisions. As a result, speeds (especially turning speeds) should be managed through design and signal timing.

» Minimize Delay for All Modes: Signal phasing should minimize delay for all modes, rather than favoring one mode over all others.

» Integrate Green Infrastructure: Stormwater management is key at intersections as this is usually where existing storm drainage infrastructure, such as inlets, are located and that curb extensions installed to narrow crossing distances can cost-effectively double as green infrastructure features.[8]

Traffic Signal Principles

The operation and performance of the street is a close marriage between the physical design and the use of traffic control devices (e.g. signs, markings, and signals). This section outlines several general principles for traffic signals in San Mateo.

» Signal timings will be different during off-peak hours than they are during peak hours, to manage automobile speeds when congestion does not mediate traffic flow.

» Fixed-time signals are preferred over actuated signals.

» Both signal phases and cycle lengths should be kept to as short as possible.

» Pedestrian countdown signals shall be installed at all new or upgraded signals.

» All signals shall use a pedestrian walking speed of 3.5 feet per second for calculating the pedestrian clearance interval (for additional information, please see Signal Timing A.25 (Signal Timing). Areas near schools and senior living facilities should use a slower speed of 2.8 feet/second.

» Signals on a corridor should be timed and synchronized based on their modal priority (e.g., signals in bicycle priority networks should be timed to a travel speed of 12 to 16 mph).

» The inclusion of green infrastructure evaluation in the street delivery process is relatively new. As such, it warrants additional guidance on when a Green Streets assessment should occur and tools such an assessment should use.

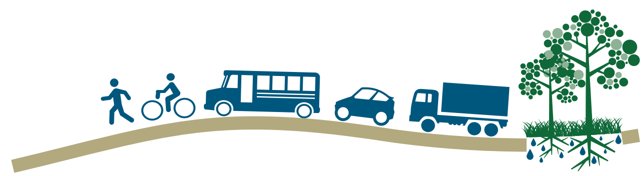
8. Additional green infrastructure design principles can be found in the San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook.

CONCLUSIONS

This chapter shared the principles that guide the full Sustainable Streets Design Guidelines (Appendix H), which aim to provide best practices and share detailed guidance on the design of streets in San Mateo. The guidelines are not, however, intended to prescribe the optimal design solution for every possible street permutation. It is up to the designer to extract relevant elements from this and other approved documents to design streets that include the right mix of geometries and street elements that meet the unique needs of a given street and context.

CHAPTER 4

IMPLEMENTATION PLAN



"Great things are done by a series of small things brought together."

Vincent Van Gogh

Many goals within this plan are audacious and will take years to realize. However, some projects have the possibility for earlier implementation and can begin the momentum of change within the city's streets. This chapter highlights some of those projects and provides visual imagery of potential outcomes.

CHAPTER 4: **IMPLEMENTATION PLAN**

This chapter shares an roadmap for implementing for the Sustainable Streets Plan, including projects recommended for implementation within the next few years (such as North San Mateo Drive and South Grant Street), projects that are part of a longer term vision (such as El Camino Real improvements), and programmatic recommendations. It concludes with a review of performance metrics to gauge implementation success and potential sources of funding for Plan implementation.

RECOMMENDED PROJECTS

Recommended projects include:

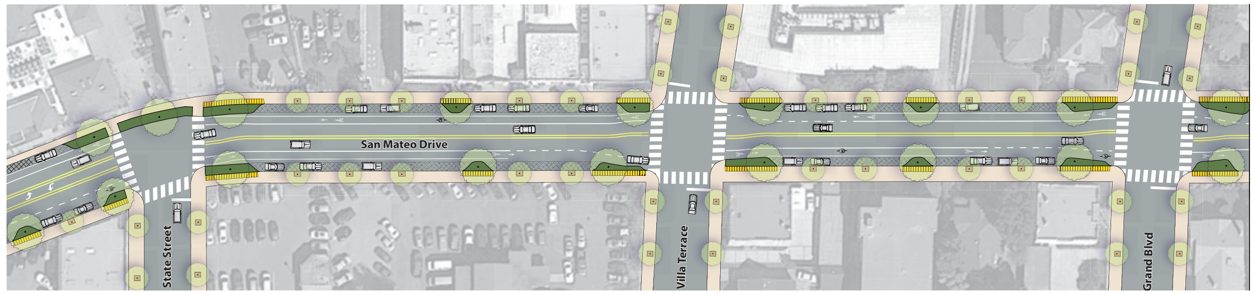
» North San Mateo Drive between Peninsula Avenue and Tilton Avenue, for immediate implementation once construction documents and associated reviews are completed

» South Grant Street between 5th Avenue and 10th Avenue, for immediate implementation once construction documents and associated reviews are completed

» El Camino Real, as a future vision for further study

More detail on each recommended project is included below.

Figure 4-1 Portion of North San Mateo Drive Improvements between Poplar Ave and Santa Inez



Source: Community Design and Architecture

NORTH SAN MATEO DRIVE

North San Mateo Drive between Peninsula Avenue and Tilton Avenue is currently a three- to four-lane street connecting downtown San Mateo and Burlingame. On-street parking is provided on both sides of the street throughout the corridor. As part of the Bicycle Master Plan and the Countywide Bicycle and Pedestrian Master Plan, North San Mateo Drive is identified as the North-South County route and, as such, selected for Class II bicycle lanes.

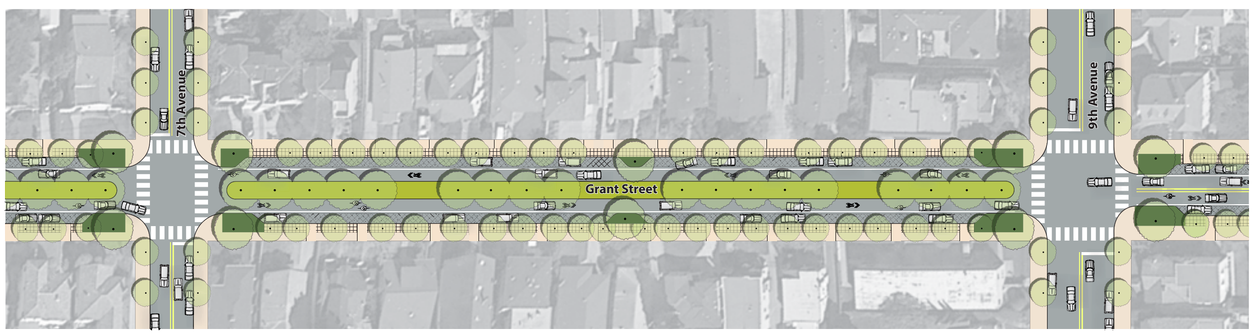
This Plan recommends that the segment receive a road diet, bringing it from four lanes to two lanes plus a mixture of two-way left turn lanes and left turn pockets between Peninsula Avenue and Poplar Avenue. Between Poplar Avenue and Tilton Avenue, the current configuration would drop from two lanes and a turn lane to two lanes. Given that there are both retail uses and (medical) offices along the corridor, on-street parking would be maintained on both sides of the street. Isolated Green Streets opportunities would be provided throughout the corridor through the addition of landscaped curb extensions, islands, and mid-block bulb outs. Six-foot bicycle lanes would be provided between the parking lane and the travel lane to encourage use of the corridor as a north-south bikeway, connecting downtown with developing and existing residential areas in northern San Mateo as well as Burlingame. Curb extensions would be installed at several intersections to reduce pedestrian crossing distances and vehicular speeds. At intersections, high visibility crosswalks would be installed (also referred to as Continental Crosswalks) to further improve pedestrian safety and driver awareness. While the number of vehicular lanes would decrease, capacity is sufficient for current and anticipated traffic volumes. See Figure 4-1 for a partial view of the North San Mateo Drive project and Appendix I for a full view of the improvements and Green Streets opportunities.

SOUTH GRANT STREET

South Grant Street is a north-south residential street, connecting San Mateo Village and SR 92 with US 101 and the northern parts of San Mateo. It currently has very wide travel lanes and narrow sidewalks between 5th and 9th Avenues, though lanes narrow and sidewalks expand between 9th Avenue and 10th Avenue. Parking is provided on both sides of the street throughout the area. South of 10th Avenue, a landscaped median separating the two travel lanes significantly changes the street's character. The blocks between 5th Avenue and 10th Avenue are proposed to receive similar treatment, with several Green Streets opportunities, such as mid-block bulb outs, curb extensions at intersections, and linked tree wells on both sides of the street. In addition, a wide landscaped median would be constructed between 5th and 9th Avenues. On-street parking would be maintained, and permeable paving, another Green Streets opportunity, would be used in the parking lanes throughout the corridor.

Shared lane marking stencils (also called bike "sharrows") would be placed in the travel lanes to acknowledge that Grant Street is a proposed Class III bike route. Other traffic calming elements would help increase safety for all modes. Specifically, curb extensions would be installed at intersections to reduce pedestrian crossing distances and in mid-block locations to help slow vehicular traffic. The travel lanes in both directions would be shared with vehicles and bicycles, and stop signs would be removed along Grant Street at intersections to promote slow flow of bicyclists and vehicles alike. All intersections will receive high visibility pedestrian crossing treatments.

Figure 4-2 Portion of South Grant Street Improvements between 5th and 7th Avenues



Source: Community Design and Architecture

See Figure 4-2 for a partial view of the South Grant Street project and Appendix I for a full view of the proposed improvements and Green Streets opportunities.

EL CAMINO REAL

While the Sustainable Streets recommendations for North San Mateo Drive and South Grant Street represent immediately implementable projects, recommendations for El Camino Real represent a longer-term vision for further review and study. This plan, while rooted in Sustainable Streets best practices, is at a conceptual stage and still needs to be vetted with various local, regional, and state agencies and the community. At the moment, Caltrans and the City of San Mateo are engaged in a design project to improve El Camino Real's interchange with SR 92 (the Interchange Improvement Project). The most recent design iterations include options for Class II bike lanes or cycle tracks under SR 92. This redesign project and the Sustainable Streets Plan process informed the below described visions, which focus on two segments of El Camino Real, between 2nd Avenue and 9th Avenue and between 20th Avenue and 25th Avenue.

The overall vision proposed for El Camino Real is a more balanced and Complete Street, improving bicyclist and pedestrian safety and accessibility while still accommodating current and anticipated levels of vehicular travel, transit, and parking.

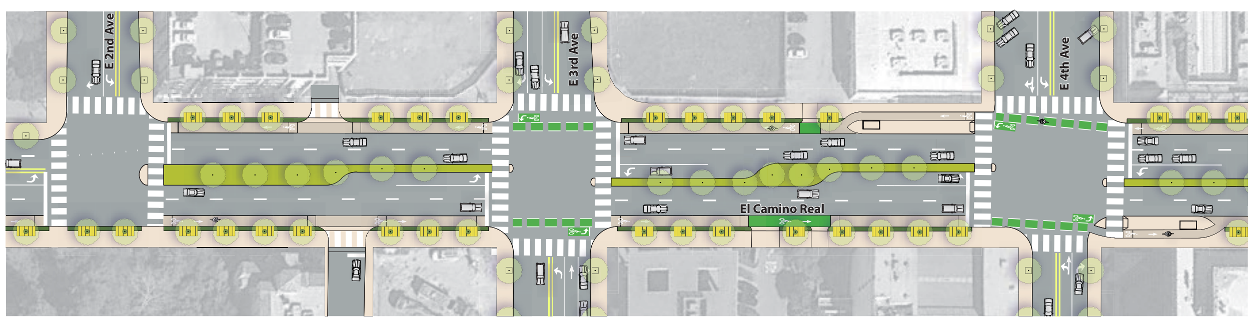
2nd Avenue to 9th Avenue

A road diet would transform El Camino Real between 2nd Avenue and 9th Avenue by reducing the number of travel lanes from six to four, with left-turn lanes at key intersections. The new configuration would include two travel lanes in each direction and a new landscaped median. This would extend the configuration that is currently present north of 2nd Avenue all the way to 9th Avenue. It would transform El Camino Real from a perceived and real barrier to an inviting downtown gateway that connects Central Park with the public library and other destinations in the area. This project could also become a catalyst for the successful redevelopment of the three vacant parcels at 3rd Avenue. As such, it should be considered a vision that could quickly lead to a final and preferred design and be ready for implementation.

- In the proposed design, sidewalks would be expanded to 15 feet between 2nd Avenue and 5th Avenue to provide space for street trees and Green Street treatments. Raised one-way cycle tracks on both sides of the street would enhance the bicycling experience between these streets. Along Central Park, between 5th Avenue and 9th Avenue, the sidewalks would be 10 feet wide and separated from traffic by a parking-buffered street-level cycle track on each side of the road. A wider tree-lined median would be added to enhance the connection to the park.
- All intersections would receive high visibility crosswalks, pedestrian refuge islands, and managed conflict points (intersections and driveways) between cars and bicycles, including green transverse pavement markings, stop-control devices, and high-visibility signage. Intersection treatments would also include no right turns on red, a separate or leading bicycle/pedestrian signal phase, and two-stage left turn bike boxes, where applicable. Where sidewalks cross alleys, such as at Arroyo Court and Mission Drive, the roadbed would be raised to ensure that entering and exiting vehicles crossing those sidewalks move at a slow speed. The intersection at El Camino Real and 9th Avenue is adjacent to St Matthews Catholic School and would therefore have yellow high-visibility continental crosswalks. A mid-block pedestrian crossing is proposed at Mission Drive and one of the well-used park entrances. In order to ensure safe crossings, drivers would be notified far in advance when the crosswalk is in use through rectangular rapid flashing beacons or hawk signal treatment along with advance yield lines.
- Consolidated transit boarding islands would be installed with improved and expanded shelters in the 4th to 9th Avenue segment. Where cycle tracks exist, new cycle track curb cuts would be installed, with the cycle tracks running behind the transit boarding islands. This provides a safe and separated operation between transit vehicle loading, bicycles, and pedestrians at the transit stop.

Incorporating future development with the Sustainable Streets vision for El Camino Real in downtown, new mixed use buildings would meet the street, activating sidewalks and increasing pedestrian activity. The result would be a multimodal, sustainable, and vibrant El Camino Real that safely accommodates all modes of travel and encourages residents and visitors alike to linger and enjoy the street and its attractions in downtown. See Figures 4-4 and 4-5 for conceptual representations of the future El Camino Real at 3rd Avenue. Please note that the future buildings in these figures are representative and not the actual proposed buildings. Appendix I includes additional images of the simulation.

Figure 4-3 Portion of El Camino Real Vision between 2nd Avenue and 4th Avenue (Similar Treatments through 9th Avenue)



Source: Community Design and Architecture

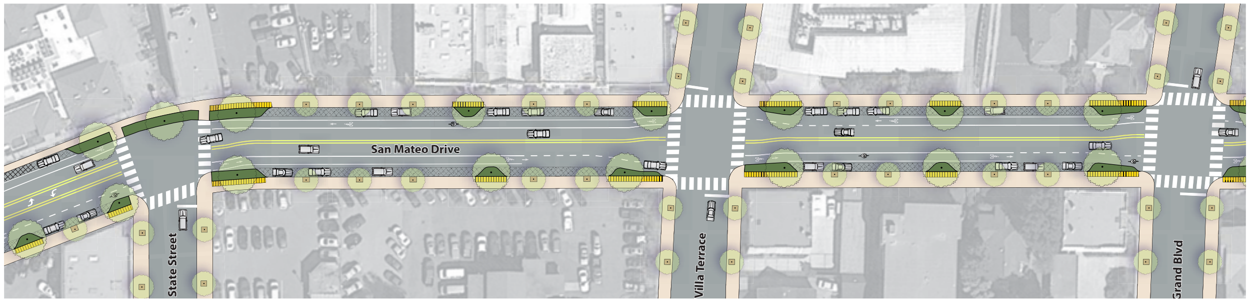
Figure 4-4 View of El Camino Real Looking South Toward 3rd Avenue (Left: Current, Right: Vision)

Source: Urban Advantage

Figure 4-5 View of El Camino Real Looking North Toward 3rd Avenue (Left: Current, Right: Vision)

Source: Urban Advantage

Figure 4-6 Portion of El Camino Real Vision between 24th Avenue and 25th Avenue



Source: Community Design and Architecture

20th Avenue to 25th Avenue

Caltrans' proposed modification to the SR 92 and El Camino Real interchange would reduce traffic congestion, weaving, and queuing spillback at the interchange on and off ramps. Current designs of the project also include bicycle facilities along El Camino Real under SR 92. As such, the design proposed below as part of the Sustainable Streets Plan process includes bicycle facilities connecting under SR 92 with 25th Avenue, an important east-west bicycle route. In the long term, bicycle facilities could be implemented all the way from downtown to 25th Avenue, using a similar configuration as this project or the design along Central Park, depending on the width of each block.

Figure 4-6 illustrates that the vision for the segment between 20th Avenue and 25th Avenue would see its six travel lanes reduced to four, with left-turn lanes at key intersections. The new configuration would include two travel lanes in each direction and a new landscaped median, plus buffered bicycle lanes.

All intersections would receive high visibility crosswalks, pedestrian refuge islands, and managed conflict points (intersections and driveways) between cars and bicycles, including green pavement markings, stop-control devices, and high-visibility signage. Intersection treatments would also include no right turns on red, a separate or leading bicycle/pedestrian signal phase, and two-stage left turn bike boxes, where applicable.

A new midblock crossing would be installed at 22nd Avenue, complete with rectangular rapid flash beacons or a HAWK signal as well advance yield lines, which encourage drivers to yield to pedestrians in the crosswalk and promote visibility between pedestrians and motorists. This crosswalk completes a connection for pedestrians where there are long segments between signalized intersections without recommended locations to cross El Camino Real. At alleys such as Lodato Avenue (between 20th and 22nd Avenues), raised crosswalks would prioritize pedestrian travel.

A wider median would provide landscaping opportunities and safety benefits. Consolidating the left turns and U-turns at the 20th and 25th Avenue intersections would eliminate conflicts with left-turning vehicles. At 22nd Avenue, this would also improve the crossing conditions for pedestrians. Since there are no signals between 20th Avenue and 25th Avenue and the distance is only three-tenths of a mile, vehicles desiring to make a left turn or u-turn between those blocks would not see their travel times increase significantly.

RECOMMENDED PROGRAMS

Sustainable Streets programs recommended by this Plan include:

- Adoption of a Vision Zero policy, seeking to end traffic deaths and injuries on San Mateo's streets
- A new development review process and fee based around transportation performance metrics that are more in line with Plan goals
- A new citywide Transportation Demand Management Plan, requiring new development to include trip reduction programs and incentives
- Efforts to institutionalize Sustainable Streets in City agencies
- A Sustainable Streets education program
- Existing Program Revisions: Residential Parking Permit Program and Neighborhood Traffic Management Program

More detail on each recommended project is included below.

VISION ZERO

Vision Zero is the simple idea that "no loss of life is acceptable[9] on a community's roadways, and it is organized around the suggestion that humans are, by nature, fallible creatures that are not made to travel at high speeds.

Since the advent of the automobile, our transportation system has been designed to allow automobiles to travel as fast, and with as few obstructions, as possible. Even with efforts to make high speed vehicle travel safe, fatalities and injuries have steadily increased over time, and roadway collisions now kill or injure millions of people around the world every year. Vision Zero recognizes that no matter how many physical barriers we put up, high speed automobile travel is inherently unsafe. Instead of pinning most of the responsibility for this fact on roadway users, it places the responsibility on designers, who must calm traffic and return other modes to prominence in our street network to reduce traffic and slow auto speeds. This will, in turn, reduce injuries and eradicate fatalities.

The idea first took root in Sweden, but it came to prominence in the United States in 2013, when New York City formally adopted a Vision Zero policy. San Francisco adopted Vision Zero in early 2014, after a series of tragic pedestrian deaths on city roads.

Vision Zero is ambitious, but it represents the apotheosis of the Complete Streets concept. Designing streets for all users and making streets as safe as possible for people of all ambulatory abilities are fundamental concepts of both Complete Streets and Vision Zero. As such, the San Mateo Sustainable Streets Plan includes the Vision Zero concept among its policy goals (see Goal 1 in Chapter 2).

TRANSPORTATION AND PRIVATE DEVELOPMENT

Like most cities across the country, San Mateo's efforts to understand the transportation-related impacts of development have exclusively focused on automobiles. San Mateo uses automobile level of service (LOS) to understand how automobile trips associated with new developments will affect congestion in the surrounding area. This metric is flawed for a variety

9. "The Vision Zero." An Initiative of the Swedish Government and Swedish Industry. Retrieved from http://www.visionzeroinitiative.com/en/Concept/ on 10/7/14.

of reasons, and at a fundamental level, its use runs contrary to the goals and objectives of the Sustainable Street Plan. As such, the Plan recommends that the City adopt vehicle miles traveled (VMT) per capita as its main transportation impact metric and use it to determine developers' fair share contributions to a new Sustainable Streets Fee.

Automobile LOS measures vehicle travel time and delay in a particular corridor or at a particular intersection, rating the results on an A (abundant capacity) to F (volumes exceed capacity) scale. Most cities in the United States use LOS to measure the transportation impacts of development, and in California, LOS analysis is currently embedded in the state's environmental review law, the California Environmental Quality Act, though legislation recently directed the state's Office of Planning and Research (OPR) to replace it with a better metric. Because of the way LOS has been incorporated in the law, it often makes the developments that are most environmentally friendly from a transportation perspective – dense developments in the middle of cities – harder to build than those built on greenfields.

LOS analysis is also typically quite costly, and because it only looks at the conditions faced by one mode, efforts to mitigate development impacts generally revolve around strategies thought to improve conditions for vehicles, often at the expense of other modes. These strategies generally include widening roads or adding dedicated turn lanes to increase auto capacity or restricting the movements of other modes to reduce barriers to higher speed vehicle travel. They also generally fail to mitigate congestion, instead inducing new auto trips until roadway conditions once again reach a congested equilibrium.

Recognizing these and other shortcomings, the State of California is in the process of replacing LOS with another transportation impact metric in the state's environmental review process. State Senate Bill 743 instructed the state's Office of Planning and Research to recommend a different transportation impact metric for infill areas that will be phased into statewide use by 2016. As of the time of this writing, OPR had released a set of draft recommendations that would advise cities to replace LOS with VMT per capita in their CEQA analyses. While OPR makes clear that cities will still be allowed to use LOS in other analyses, its recommendation that cities use a different metric in environmental review speaks volumes about its value in helping cities comprehensively measure transportation conditions.

Following the state's lead, this plan recommends that the City of San Mateo use VMT per capita, rather than LOS, in its development and environmental review processes. VMT per capita measures the amount of vehicle travel generated by a given development while controlling for the size of the development. The more per capita auto trips a development generates, and the longer those trips are, the more the development contributes to a host of vehicle travel related byproducts, including air pollution, area-wide congestion, delay for other modes, wear and tear on roadways, and safety hazards for non-motorized travelers. Furthermore, projects located on the fringe of a city, far from transit services, are likely to generate more VMT per capita than those in places like downtown San Mateo, and in turn, require more significant transportation-related mitigations.

Given the City's stated goals, it makes more sense for developers to focus on mitigating VMT that their projects generate broadly than on problems with congestion at intersections in the immediate vicinity. Whereas efforts to reduce congestion at nearby intersections usually involve removing barriers to faster automobile travel or widening roadways, efforts to mitigate high levels of VMT per capita might more logically mean funding better facilities for non-auto modes, implementing TDM programs to encourage a project's residents and workers to take longer trips by other modes than driving, or other similar multimodal strategies. The latter set of projects is much more in line with the City's broad goals and with the vision, goals, and objectives laid out in the San Mateo Sustainable Streets Plan.

Sustainable Streets Fee

San Mateo currently collects a Transportation Improvement Fee from developers as one way to ensure that they pay their fair share for development-related impacts on the transportation system. The size of a given project's fee is based exclusively on its impact on congestion, measured using LOS, and the vast majority of the proceeds go toward roadway-related projects. The San Mateo Sustainable Streets Plan recommends

that the City replace the program with a Sustainable Streets Fee that would fund a wider array of projects, with a focus on those that support the goals of the Plan by improving conditions for all modes.

Per San Mateo's 2010 General Plan, the City periodically engages in a mathematical modeling exercise to project the amount of traffic anticipated citywide and LOS projected at key intersections based on anticipated development over an approximately two-decade period. In its Traffic Mitigation Report, last updated in 2008, the City also lists projects that it believes would mitigate the traffic generated by projected new developments and calculates a total capital cost for these projects, a portion of which is to be divided among developments as they come online over the course of the report's time horizon. In the development review process, congestion-related impacts of specific developments are calculated and individual projects' improvement fees are determined based on the result.

In the 2008 report, projects included improvements to the interchange at SR 92 and El Camino Real, roadway widening projects for 3rd and 4th Avenue, Caltrain grade separations, signal and intersection modifications, and other projects. More than two-thirds of the projected $35 million in fee proceeds would go toward projects whose benefits accrue almost exclusively to automobiles, and in addition, private vehicles would also reap most of the benefits of $12 million set aside for Caltrain grade separation projects. Meanwhile, the update dedicates just $250,000—less than 1%—to bike and pedestrian projects.

The proposed Sustainable Streets Fee would be calculated based on a project's broader impacts on the transportation system. The metric used to quantify a given project's share of the fee will need detailed study, but it could be based on projections of the development's automobile trips generated, total trips generated, total vehicle miles traveled, or another metric. The portfolio of projects the fee funds would be more evenly divided among modes. The Sustainable Streets Plan has identified a variety of project types that might be good candidates for Sustainable Streets Fee funding, including Complete Streets and Green Streets improvements, transit infrastructure enhancements, and other projects that facilitate the development of a more balanced and safer transportation system.

To work out the details, the Sustainable Streets Fee will need a detailed study, but its goals should be guided by those laid out in this Plan.

CITYWIDE TRANSPORTATION DEMAND MANAGEMENT PLAN

Transportation demand management (TDM) programs are intended to reduce vehicle trips and parking demand by promoting the use of a variety of transportation options, shifting travel by mode and time of day to take advantage of available capacity, reducing crowding and congestion. By implementing TDM programs, municipalities and private entities can use available transportation resources more efficiently. These programs can include a wide variety of measures such as shuttle services, transit pass subsidies, improved access to transit, park and ride facilities, and improved bicycle and pedestrian amenities, among others. TDM strategies carefully manage transportation resources through incentives, employer regulation, communication, marketing, and other techniques.

The proposed Citywide TDM Plan would extend TDM requirements of varying degrees and for certain development types and densities across all parcels within city limits. More stringent requirements are proposed for certain focus areas, including:

» Tier I:
  - Parcels within the Downtown Area Plan boundaries
  - Parcels within the Rail Corridor Plan boundaries
» Tier II:
  - Parcels within a half mile of a Caltrain station (Burlingame, San Mateo Downtown, Hayward Park, and Hillsdale)
  - Parcels within a half mile of El Camino Real, which is defined as the El Camino Real Priority Development Area (PDA)
  - Parcels within the Hillsdale Station Area Plan boundaries

These areas are mapped in Figure 4-8. The portions of the city that are outside of the Tier I and II area boundaries would be subject to citywide requirements, as detailed below:

» Tier I: Projects within the Tier I boundary would be required to, at a minimum, meet the TDM requirements of the Rail Corridor Plan. These include:
  - A 25% trip reduction target
  - TMA participation
  - Submission of a trip reduction and parking management plan with new development applications
  - An annual monitoring plan
» Tier II: Projects within the Tier II boundary would be subject to the following requirements:[10]
  - A 15% trip reduction target
  - Submission of a trip reduction and parking management Plan with new development applications
  - An annual monitoring plan
» Tier III: Citywide requirements would apply to all new development within City limits and outside of Tier I and II boundaries that include either more than six residential units or more than 10,000 square feet of commercial space. A trip reduction target of 10% is recommended for the citywide requirement. A monitoring plan should also be recommended, but not required. While Tier I and II requirements include both programmatic and physical TDM measures, citywide requirements would only include physical measures, as listed in Appendix J.

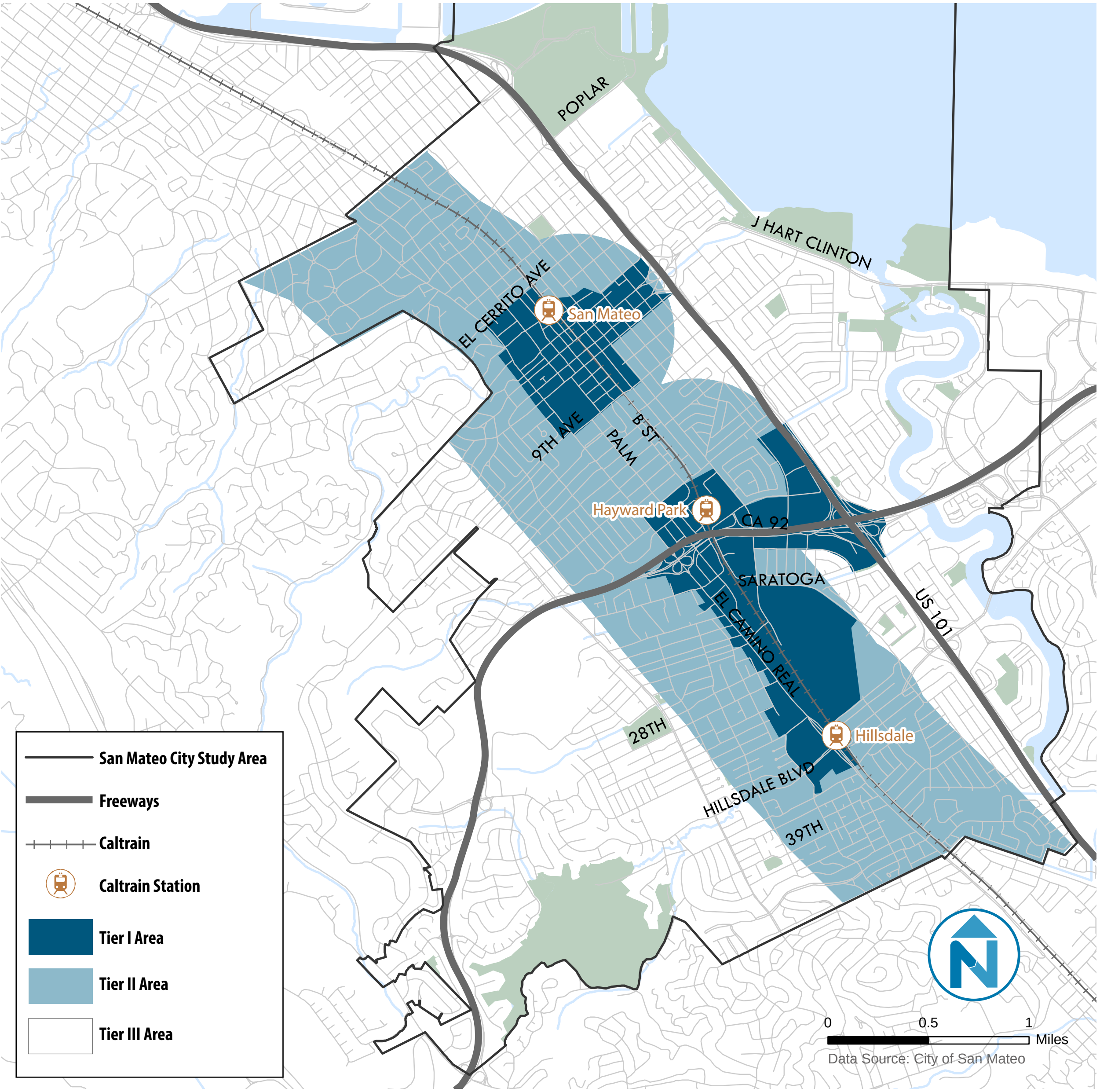
It is recommended that the zoning code provide a list of potential TDM strategies that new developments can employ to achieve trip reduction targets. Developers would be free to choose from this menu of potential TDM programs in their effort to achieve the trip reduction target. Tier I and Tier II projects (both residential and commercial), however, would be required to include the following TDM programs:

» Carshare parking in the development's parking facility
» Reduced parking ratios tailored to the development's location
» All parking spaces provided to residents beyond the first space per unit should be offered at a cost (market rate) and included as a separate line item from the unit price or monthly rent

Appendix J of this document contains more information of the proposed citywide TDM Program, including a recommended TDM program and strategy options and potential citywide zoning code language.

10. If the development falls within a plan area with more stringent trip reduction targets (such as the Station Park Green Specific Plan), the more stringent requirements would supersede the Tier II requirements.

Figure 4-7 TDM Plan Focus Area Boundaries



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

PARKING REQUIREMENTS

Cities have been using minimum parking requirements for decades as a means to try to ensure that adequate parking is available for a given land use's projected parking demand. Minimum parking requirements, however, have emerged as one of the biggest obstacles to many cities' efforts to encourage new residential and commercial development in downtown areas, and they ultimately undermine many cities' efforts to create attractive, vibrant, and walkable communities and corridors. More specifically, minimum parking requirements have been shown to:

» Create an "oversupply" of parking in almost all mixed-use and walkable districts

» Devalue the true "costs" of parking to drivers, thereby creating an incentive to drive, which results in more local congestion and vehicle emissions

» Require tremendous amounts of land, thereby degrading the physical environment and affecting a community's urban form, design, and aesthetics

» Limit cities' ability to do urban "infill" projects or adaptively reuse historic structures

» Make projects more expensive and reduce overall profitability

Therefore, the ultimate goal of eliminating minimum parking requirements is to remove barriers to new development and renovation of existing buildings, while creating a healthy market for parking where parking spaces are bought, sold, rented, and leased like any other commodity.

The City should consider either reducing or eliminating minimum parking requirements in the Tier I and Tier II TDM focus areas. Supplementing this with maximum parking limits in these two tiers, where developable land is most at a premium, could help further ensure that parking is not oversupplied in the areas in which the City most wants to cultivate walkable urbanism. In general, requirements should be flexible and tailored to specific project contexts. Additionally, for projects that do not charge for parking, all parking spaces provided to residents beyond the first space per unit should be at market rate and included as a separate line item from the unit price or monthly rent.

INSTITUTIONALIZATION OF SUSTAINABLE STREETS

Various strategies are needed to institutionalize Sustainable Streets practices. These strategies include revisions to specific items in the Municipal Code and the passage of a Complete Streets Ordinance. They also include the adoption of a new street classification system, street design guidelines, methodologies for traffic modeling, and project evaluation metrics and practices.

City staff training on all of these issues, in addition to Sustainable Streets planning, design, and implementation, is needed to institutionalize Sustainable Streets practices. Staff training could also include new multimodal data collection techniques as well as better reporting of collisions and the factors contributing to crashes.

In addition, street improvements do not need to be permanent. A pilot project approach that allows for the temporary testing of street improvements should be considered to help develop street improvements that produce measureable benefits and achieve desired outcomes while educating involved stakeholders.

SUSTAINABLE STREETS EDUCATION PROGRAM

San Mateo could benefit from both staff and public educational programs. Public education, specifically around urban bicycling, would help reduce on-street conflicts and encourage more biking and walking. This approach would be strengthened by educating the personnel involved in implementing Sustainable Streets strategies, including police and emergency responders, traffic engineers, and public works staff. Staff education will empower individuals and agencies to sustain the efforts described in this Plan.

EXISTING PROGRAM REVISIONS

Two existing programs that would require updates as a result of this Plan include the Neighborhood Traffic Management Program and the Residential Parking Permit Program. It is recommended that both of these plans be reviewed and updated to reflect the goals and framework outlined as part of this document.

The Neighborhood Traffic Management Plan requires update language to specify where and when traffic calming strategies may be applicable. In addition, these strategies may need to be updated based on the tools outlined in the Design Guidelines section of this Plan. The Residential Parking Permit Program should be updated to ensure that new parking policies as defined in this Plan can be implemented effectively and do not result in unintended outcomes such as spillover parking impacts within San Mateo's neighborhoods.

PERFORMANCE METRICS

A critical function of this Plan is to establish the City's strategy for monitoring and measuring how well it carries out Plan projects, goals, and policies, based on a set of indicators or targets.

As noted above, San Mateo has traditionally relied on peak hour vehicle LOS at intersections as the measure of transportation system performance. This Plan presents a strategy to measure multimodal system performance to consider new mobility priorities, and to more effectively balance the needs of all travel modes. New indicators include shifts from drive-alone trips to other travel modes and per capita measurements of greenhouse gas emissions and vehicle miles traveled. Performance could also be measured by carrying out programmatic recommendations identified in this Plan, such as the Vision Zero policy and new Citywide TDM Plan.

Figure 4-8 Citywide Performance Metrics and Associated Targets

PERFORMANCE METRIC	TARGET
Citywide combined bicycle and pedestrian mode share for trips of one mile or shorter	30% by 2020
Single occupant commuting	20% reduction by 2020
Number of pedestrian and bicycle related collisions	50% reduction by 2020
Number of pedestrian and bicycle fatalities	Downward trend
Total roadway crashes and injuries from all roadway crashes	Downward trend
Ratio of bicycle facility miles to road miles	Upward trend
Linear feet of sidewalks	Upward trend
VMT per capita	Downward trend
Total transportation-related GHG emissions per capita	Downward trend
Travel time for the following corridors and modes: » El Camino Real from Peninsula Avenue to 42nd Avenue (auto, transit, bicycle) » Alameda de las Pulgas from Crystal Springs Road to 42nd Avenue (auto, transit, bicycle) » 3rd Avenue from Norfolk Street to El Camino Real (auto, transit, bicycle) » 4th Avenue from El Camino Real to Norfolk Street (auto, transit, bicycle) » Hillsdale Boulevard from Alameda de las Pulgas to Norfolk Street (auto, transit, bicycle) » Norfolk Boulevard from 3rd Avenue to Hillsdale Boulevard (auto, transit, bicycle)	Maintained travel time for auto, reduced travel time for transit and bicycle
Average vehicle occupancy	Upward trend
Roadway segments using green infrastructure to manage storm water runoff (as a percent of the total network in the city)	Upward trend
Roadway segments using green infrastructure to manage storm water runoff (as a percent of the total network) in Downtown and PDAs	Upward trend
Tree canopy along streets in San Mateo	Upward trend
Sales revenue per square foot in Downtown	Upward trend

Performance metrics included in this Plan are of three types:

- Citywide performance metrics, measuring citywide trends related to sustainable transportation
- Development performance metrics, measuring the multimodal success and impacts of new development projects
- Corridor performance metrics, measuring multimodal performance of new Sustainable Streets projects on a corridor level

Taken together, these performance measures consider a balanced range of solutions to unfavorable conditions, instead of focusing solely on vehicular carrying capacity, yielding a better understanding of the quality of the city's multimodal transportation facilities and the ways to improve overall system performance.

CITYWIDE PERFORMANCE METRICS

On a citywide scale, the Sustainable Streets Plan envisions a transportation system that supports the City's goals for sustainability, safe and healthy transportation, active living, and a sense of community where walking, bicycling, and transit are integral parts of daily life. As such, citywide performance metrics include rates of walking and biking, the number of collisions involving bicyclists and pedestrians, and per capita VMT and Greenhouse Gas (GHG) emissions. A complete list of performance metrics measuring citywide trends related to sustainable transportation, as well as potential targets, are included in Figure 4-8.

Corridor Performance Metrics

Certain before-and-after comparisons of complete/sustainable/Green Streets projects are also important metrics to use when measuring success. Potential metrics for street performance before and after project implementation are included in Figure 4-9.

Figure 4-9 Corridor Performance Metrics

MODE	POTENTIAL PERFORMANCE METRICS
Automobile	Average travel time
Transit	Peak travel time Average peak period speed compared to free-flow speed Average person delay
Bicycle	Provision of dedicated facilities Peak travel time Bicycle LOS based upon level of dedicated facility in comparison to automobile speeds
Pedestrian	ADA compliance (pass/fail) Available sidewalk width (minimum standard TBD) Percentage of sidewalk width compared to overall street width (minimum standard TBD) Prescribed sidewalk width according to number of travel lanes (minimum standard TBD) Average pedestrian crossing delay Block lengths Availability of safety infrastructure (flashing beacons, median refuges, advance yield lines, etc.)
Green Streets	Provision of Green Streets and general landscape features
Other	Retail sales along corridor Speed limit compliance

Development Performance Metrics

For new development, performance metrics seek to evaluate the multimodal impacts of new development, including car use and development-specific VMT and GHG emissions per capita. A complete list of performance metrics measuring development performance trends related to sustainable transportation are included in Figure 4-10.

Figure 4-10 Development Performance Metrics

PERFORMANCE METRICS
VMT per capita
Total transportation-related GHG emissions per capita
Vehicles per unit/household
Square footage of provided green infrastructure in the public right-of-way for projects with a street frontage of 100' linear feet or more

FUNDING SOURCES

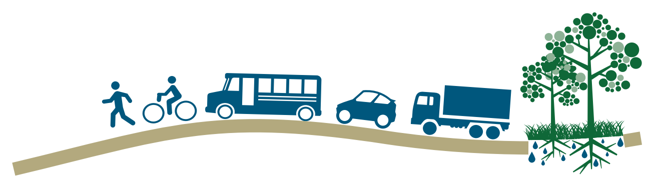
The City of San Mateo could draw on a variety of programs at the local, state, and federal levels to help support this plan. Appendix K provides detailed descriptions of all manner of potential funding sources, but several have particular potential.

- The City of San Mateo Capital Improvement Program: The City's plan for funding capital improvements of all kinds often prominently features roads, bridges, and related infrastructure.
- Active Transportation Program: A new state-level program that combines state and federal funding for bicycle and pedestrian infrastructure and programs.
- Sustainable Streets Fee: The replacement for San Mateo's existing Transportation Improvement Fee program recommended by this plan. The fee could channel significant money from development projects toward Sustainable Streets improvements.
- County Measure M Vehicle Registration Fee and County Measure A Sales Tax: County-level programs that provide funding exclusively for transportation-related projects and operations costs. Both voter-approved programs will be in place into the 2030s.
- One Bay Area Grant Program: A competitive grant program administered by the Bay Area's regional transportation planning agency, the Metropolitan Transportation Commission, to support regional goals of concentrating development in areas that are transit-accessible, walkable, and bikeable.

The appendix includes detailed descriptions of all of these programs and a variety of other potential funding sources.

CHAPTER 5

MOVING FORWARD



"If everyone is moving forward together, then success takes care of itself."

Henry Ford

CHAPTER 5: **MOVING FORWARD**

The San Mateo Sustainable Streets Plan provides a variety of strategies for ensuring that the backbone of the city's transportation system – its streets – serves more than just automobiles. The Plan has laid out a 21st Century vision for San Mateo's roadways that incorporates the needs of all users and all modes and maximizes their social and environmental benefits. It is the result of two years of community discussions, research, technical analysis, and concept development, and it ushers in a new era in the way the City plans, funds, builds, and maintains a public asset that takes up 22% of the city's land area.

The work to make San Mateo's streets more sustainable is just beginning. Making the vision outlined in this document come to life will require cooperative efforts of people throughout City departments and other local and regional agencies, help from private developers and companies, and ongoing participation from the city's residents and workers. Discussions, started through this effort, about what residents and other stakeholders want their transportation system to look like must continue, and everyone who had a hand in this Plan must work hard to ensure that, over time, San Mateo's streets become safer and more comfortable for everyone and environmentally and fiscally more sustainable.

City agencies will begin implementing this vision immediately, but the Plan is designed to gradually transform San Mateo's transportation system over the next several decades. The City will maximize all manner of street-related infrastructure projects—from road repaving to utility replacement projects—to make changes. Coupled with the project impact fees related to development, these efforts will make the vision come to life.


art

SUSTAINABLE STREETS
CITY OF SAN MATEO

FINAL Appendices February 2015

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TABLE OF CONTENTS

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Appendix A

Complete Streets Best Practices Review

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MEMORANDUM

To: Ken Chin, City of San Mateo

From: San Mateo Sustainable Streets Project Team

Date: September 30, 2014

Subject: San Mateo Sustainable Streets Plan: Tech Memo 2.1 – Complete Streets Best Practices Review

INTRODUCTION

The concept of Complete Streets fundamentally redefines what a street is intended to do, the goals a transportation agency should meet, and how a community should spend its transportation money. The Complete Streets approach breaks down the traditional separation between highways, transit, biking, and walking, and instead focuses on the desired outcomes of a transportation system that supports the safe use of roadways for everyone. This document is intended to introduce the concept of Complete Streets, showcase its potential for positive impacts on transportation and public health in San Mateo, and highlight best practices of Complete Streets implementation from across the country.

Complete Streets policies formalize a community's intent to plan, design, operate, and maintain streets so they are safe and accessible for users of all ages and abilities. Policies direct decision-makers to consistently fund, plan, design, and construct community streets to accommodate all anticipated users, including pedestrians, bicyclists, public transit users, motorists, and freight vehicles.

The concept of Complete Streets is simple and inspiring, but the best policies do more than merely affirm support for complete streets. Ideal policies define a vision, provide clear direction and intent, complement community needs, and grant the flexibility in design and approach necessary to secure an effective Complete Streets process and outcome. The National Complete Streets Coalition (NCSC), a national organization dedicated to the adoption of effective Complete Streets policies, promotes a comprehensive policy model that includes 10 elements:

» **Vision and intent**: The policy outlines a vision for how and why the community wants to complete its streets.

WHAT ARE COMPLETE STREETS?

Complete Streets are routinely planned, designed, operated, and maintained with the consideration of the needs and safety of all travelers along and across the entire public right-of-way.

This includes people of all ages and abilities who are walking; driving vehicles such as cars, trucks, motorcycles, or buses; bicycling; using transit; traveling with mobility aids; and hauling freight.

Every street and its environs are different, but while the physical manifestations of this principle will change based on the local context, providing for all users is a core tenet of Complete Streets.

- **All users and modes**: The policy specifies that "all users" includes people of all ages and abilities, who are traveling via foot, bicycle, public transportation, trucks, automobiles, and other travel modes important to a particular community, such as horseback or golf carts.
- **All projects and phases**: Both new and retrofit projects are subject to the policy; all phases including scoping, funding, planning, design, maintenance, repair, and operations activities are considered opportunities for achieving complete streets.
- **Clear, accountable exceptions**: Any exceptions are limited, specified, and must be approved by a high-level official.
- **Network**: The policy encourages street connectivity and directs the creation of comprehensive, integrated, and connected networks for travel by all modes.
- **Jurisdiction**: All other stakeholder agencies can clearly understand the policy and may be involved in the process.
- **Design**: The policy recommends the latest and best design criteria and guidelines, while recognizing the need for flexibility in balancing user needs.
- **Context sensitivity**: Community context is considered in planning and design solutions.
- **Performance measures**: Performance standards with measurable outcomes are included.
- **Implementation next steps**: Specific next steps for implementing the policy are described.

NCSC's *Complete Streets Local Policy Workbook*[1] further explains each of the 10 elements and the questions communities such as San Mateo should ask in considering how to develop the best policy for local needs.

PUBLIC HEALTH IMPACTS

Beyond transportation impacts, complete streets can have a significant positive effect on a community's health. Complete streets provide opportunities for active living, which can reduce the risk of obesity. In addition, complete streets provide a transportation network that can incentivize human-powered trips, potentially reducing airborne emissions and improving air quality. A lack of complete streets infrastructure, on the other hand, is linked to unhealthy environments where people are exposed to greater risks for collisions and exposure to poor air quality, both of which are detrimental to health. This section provides a general overview of health issues related to safety, obesity, and lung disease. It also provides a snapshot of local health data gleaned from the San Mateo County Health Department and other sources.

SAN MATEO HEALTH STATISTICS

- Heart disease and strokes are two of the five leading causes of death in the City of San Mateo.
- The City of San Mateo has higher rates of diabetes (9.9 per 10,000 people) and heart disease (61.5 per 10,000) than the national average.
- Respiratory diseases are among the five leading causes of death for the City of San Mateo.

Pedestrian and Bicyclist Safety

Streets that aren't designed for all users create dangerous conditions for pedestrians, bicyclists, and public transportation users – particularly children, older adults, and people with disabilities.[2] Over 20% of traffic-related fatalities in California involved bicyclists or pedestrians,[3] with children and older adults at greatest risk.[4]

Many pedestrian and bicycle injuries and fatalities can be prevented or made less severe by street improvements such as sidewalks, buffers, redesigned intersections, improved crossings, traffic calming measures, and bikeways. This is particularly important in low-income communities that are more likely to lack the amenities necessary to make walking and bicycling feasible, safe, or comfortable.[5] For example, according to a national study from 2010, 89% of high-income neighborhoods have adequate sidewalk coverage, compared to 59% of middle-income neighborhoods and only 49% of low-income neighborhoods. The same pattern can be seen for other types of infrastructure: 13% of high-income communities versus 7% of low-income communities have marked crosswalks, while 8% of high-income communities had traffic calming compared to 3% of low-income communities.[6]

SAN MATEO PEDESTRIAN AND BICYCLE SAFETY STATISTICS

- The City of San Mateo shows higher crash rates when compared to neighboring cities in San Mateo County. In 2010, almost half of pedestrian fatalities in the county occurred in the City of San Mateo (2 of every 5).
- In 2010, the City of San Mateo had the second highest incidence of pedestrian-involved injuries in the county (40 injuries). Between 2008 and 2010 there were 3.2 emergency room visits for pedestrian injuries per 10,000 city residents
- In 2010, the City of San Mateo had the second highest incidence of bicycle-involved injuries in the county (36 cases).

These conditions contribute to higher rates of traffic crashes and fatalities in lower-income communities. Nationally, the number of pedestrians injured in the poorest census tracts is more than six times higher than in the wealthiest census tracts.[7] The story is similar for cyclists – the number of injuries is almost four times greater in poor areas than in wealthy areas.[8] Neighborhoods that feel unsafe – because of dangerous traffic conditions or high crime rates, both of which are more prevalent in low-income communities – also act as a deterrent to biking, walking, and other outdoor physical activities, preventing people from making all but the most essential trips.[9]

OBESITY AND PHYSICAL ACTIVITY

Physical activity and exercise are keys to overall well-being. Research shows that for every additional hour per day that an adult spends in a car, his or her risk of obesity increases by 6%.[10]

Almost a third of children and adolescents, and two-thirds of adults, are overweight.[11] Over the past four decades, obesity rates have soared for all age groups, doubling among preschoolers and increasing nearly fivefold among children ages 6 to 11.[12] These statistics are especially troubling because obesity is linked to other chronic diseases such as diabetes, heart disease, and asthma to name a few.[13,14] While the proportion of adults (ages 18 and over) getting the recommended amount of exercise has steadily grown from 15.1% to 20.4% between 2000 and 2010[15], a large number of children and adults are still living sedentary lives.

Complete streets, combined with compact and mixed-use development strategies, expand transportation options to include walking, bicycling, or taking public transit for errands, recreational purposes, or for commuting to and from work or school. The availability of these options is critical for the 35% of Californians who do not drive.[16]

AIR POLLUTION

Air pollution from traffic is linked to the development of a variety of illnesses, such as asthma and other respiratory diseases, coronary heart disease, and cancer.[17, 18, 19] It can also inhibit or prevent physical activity and exacerbate chronic conditions by, for example, triggering acute asthma attacks. The EPA estimates that illnesses caused by transportation-related air pollution are responsible for more than 40,000 premature deaths annually.[20]

Communities with higher concentrations of low-income individuals and people of color are more likely to be exposed to unhealthy conditions, such as environmental pollution, dangerous traffic patterns, neighborhood crime, low-quality housing, and high concentrations of fast food outlets and liquor stores.[21] Conversely, they are less likely to have access to local resources that promote health, such as good schools, stable employment, affordable health care, safe parks and recreational spaces, places to buy healthy food, and meaningful opportunities for civic engagement.[22]

HEALTH SNAPSHOT

Data collected by San Mateo County Health shows that:

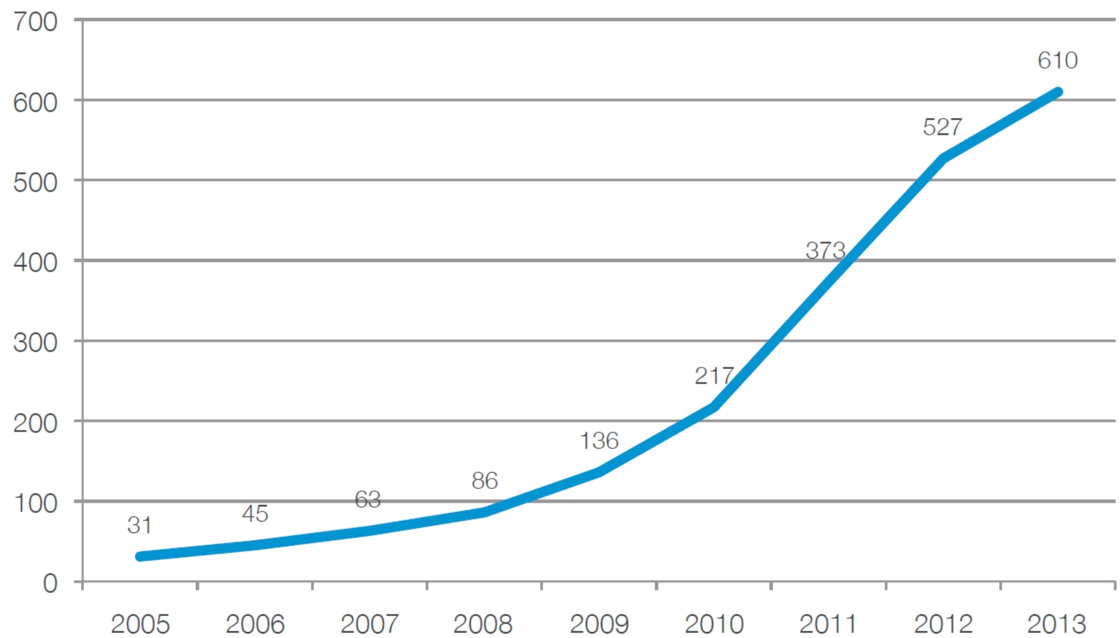
- The City of San Mateo shows higher crash rates when compared to neighboring cities in San Mateo County. Almost half of pedestrian fatalities in the county occurred in the city of San Mateo (2 of every 5).
- In 2010, the City of San Mateo had the second highest incidence of injuries from pedestrian-involved collisions in the county (40 injuries). Between 2008 and 2010 there were 3.2 emergency room visits for pedestrian injuries per 10,000 city residents.
- In 2010, the City of San Mateo had the second highest incidence of bicycle-involved injuries in the county (36 cases).
- Heart disease and strokes are among the five leading causes of death for the City of San Mateo.
- The City of San Mateo has higher rates of diabetes (9.9 per 10,000 people) and heart disease (61.5 per 10,000) than national averages.
- Chronic lower respiratory disease, lung cancer, and pneumonia are all linked to air pollution. Respiratory diseases are among the five leading causes of death for the City of San Mateo.

Additionally, data compiled by UC Berkeley's Safe Transportation and Research Education Center (SafeTREC) on the City of San Mateo shows that there are higher concentrations of pedestrian and bicycle collisions around schools in the following neighborhoods: Glendale Village / Hillsdale; Sunnybrae; and Bowie Estate.[23] Collisions occur with greater frequency along major transportation corridors such as 3rd Street and El Camino Boulevard.

COMPLETE STREETS POLICY ADVANCEMENTS

Communities are adopting Complete Streets policies on a larger scale than ever before. In 2013, more than 80 communities adopted Complete Streets policies. Policies are now in place in 610 jurisdictions nationwide, including 27 states, the Commonwealth of Puerto Rico and the District of Columbia; 51 regional planning organizations; 48 counties; and 482 municipalities of all sizes. These laws, resolutions, executive orders, policies, and planning and design documents encourage and provide safe access to destinations for everyone, regardless of age, ability, income, ethnicity, or mode choice. For a full list of policies, see the Complete Streets policy atlas available on NCSC's website.[24]

FIGURE A- 1 NUMBER OF COMPLETE STREETS POLICIES NATIONWIDE, 2005-2013



Source: National Complete Streets Coalition (2014)

An annual report on the quality of adopted Complete Streets policies is issued by the National Complete Streets Coalition.[25] Policies from across the country have scored well in these reports, including many from California communities. Baldwin Park's Complete Streets Policy[26] is the second highest scoring of all policies adopted at any level to date, and policies in Hermosa Beach[27] and Huntington Park[28] are in the top ten. An ordinance adopted by the City of Indianapolis[29] in 2012 received the highest score. Additional information about the Indianapolis policy can be found in the "Successful Implementation" section below.

Complete Streets policies are most effective when they are developed through an inclusive, cooperative approach. Decision-makers and community stakeholders, such as elected officials, should focus on redefining the goals of a transportation network in broad terms, rather than attempting to force specific changes through an enforcement mechanism. Transportation professionals should be tasked with working through the details.

The most powerful Complete Streets policies state their intent – to develop a transportation system that supports safe use of all modes – clearly and directly. Legislation focused on defining the specific infrastructure elements needed to create a "complete street" can be problematic. This framing perpetuates the separation of modes and the perception that a road for cars is fundamentally different from a road for other users, that only some roads should be "complete," and that non-vehicular users require separate funding sources.

ACHIEVING SUCCESSFUL IMPLEMENTATION

Putting in place comprehensive policies is the first step to creating complete streets. The day-to-day decisions a transportation agency and community leaders make with regard to funding, planning, design, maintenance, and operations should be aligned to the goals of that adopted policy. The National Complete Streets Coalition has grouped these steps into five categories of action:

» **Planning for implementation**: Assessing current procedures and activities and planning for the full implementation of complete streets
» **Changing procedure and process**: Updating documents, plans, and processes used in transportation decision-making, from scoping and funding to construction and maintenance, and creating new ones if necessary
» **Reviewing and updating design guidance**: Updating or adopting new design guidance and standards to reflect current best practices in providing multimodal mobility
» **Offering training and educational opportunities**: Providing ongoing support to transportation professionals, other relevant agency staff, community leaders, and the general public so that they understand the Complete Streets approach, the new processes and partnerships it requires, and the potential new outcomes from the transportation system
» **Measuring performance**: Creating or modifying existing metrics to measure success in accommodating all users on the project and network levels

A conscious implementation process identifies all the systems, routines, silos, and assumptions that, together, have created the current transportation system. Communities have found it easier to understand the world of possible activities by assessing and understanding the current procedures and processes, planning for clear next steps, and establishing a person or group of people who can help guide implementation efforts within and across departments and agencies. Communities as distant as Kauai, Hawaii,[30] Lawrence, Kansas,[31] and Hennepin County, Minnesota[32] have active, interagency working groups to guide their Complete Streets activities. In other communities, individuals within agencies coordinate the Complete Streets activities of many stakeholder departments.

While policy-adoption efforts and photographs of streets enjoyed by many types of people are the most visible hallmarks of Complete Streets, the term is best understood as a process and procedure change. Changing the way transportation decisions are made on a day-to-day basis is challenging but essential. It first means breaking down barriers between departments and even between specific roles within a department. Simply bringing the right people together to discuss projects in light of Complete Streets is an important procedural step. Project-level teams that bring together many departments or agencies can also be influential in ensuring major work is completed in a way that is consistent with the spirit of a Complete Streets policy. Chicago recently revamped the internal structure of its Department of Transportation to break down barriers between departments and streamline its project-development process (described below).[33]

New project-delivery systems are often the most direct way to ensure Complete Streets outcomes. Several cities use comprehensive processes that begin with a broader look at transportation and land use needs, then move toward design specifics, while also understanding the various tradeoffs between investments in various modes and facilities. Charlotte's *Urban Streets Design Guidelines*[34] describe this type of planning and design process. Some communities have found detailed checklists helpful in collecting and sharing information between departments; some of the best are in use in Seattle[35] and Philadelphia.[36]

A major component in institutionalizing a Complete Streets approach is reviewing and updating street design guides – and even adopting new ones. Flexible manuals and guides can empower planners and engineers to develop design solutions that balance the needs of many users and support the surrounding neighborhood. The most innovative new manuals go beyond cross-sections to create new ways to tackle the connection between land use and transportation needs. New guidelines are in place in Boston,[37] New York,[38] Chicago,[39] Philadelphia,[40] Nashville,[41] San Francisco,[42] and many smaller communities. Cities either utilize state and national guidance to augment their own standards or refer to external tools exclusively. New model design guides, including the *Model Design Manual for Living Streets*[43] and *Complete Streets, Complete Networks*[44] are available for use in communities around the country, allowing them to adapt elements of best-practice designs or to adopt the guides as is. The *Model Design Manual for Living Streets* has been adapted for use in communities as varied as the Las Vegas-area Regional Transportation Commission[45] and Broward County, Florida.[46] Cities must also modify subdivision codes and zoning ordinances to match city-specific design guides, as done in Charlotte,[47] or otherwise require compliance in the review process for privately initiated additions and changes to a community's transportation system.

A successful Complete Streets initiative requires ongoing education and training, and it is about far more than changing design standards to simply incorporate bicycling and walking facilities into road projects. Planners, engineers, consultants, and other agencies need a thorough understanding of new procedures. Elected officials and non-transportation department heads need ongoing engagement to understand how general policy goals will be translated into physical changes to streets. Most importantly, continual dialogues with the public about what they want out of their streets, and what is happening so far, is essential for implementation to be successful. Temporary demonstration projects, such as the Better Block concept[48], and public events such as Open Streets[49] allow everyone to experience what streets could be like if envisioned differently.

Finally, a community must create and use new performance measures for transportation projects and for the transportation system as a whole. The average person will not say that her dream for the community is a network of streets with an automobile Level of Service (LOS) of A. She is more likely to say that she wants safe streets that support local businesses and make it easy to get from one place to another. She may also want a community that is healthier and with better air quality. These are metrics that a community can understand and support. Over-reliance on traditional measures like LOS can impede a community's efforts to meet any of these preferences. The City of San Mateo must decide on new performance measures that meet community goals and create transportation projects to match.

There are relatively easy ways to demonstrate the success of Complete Streets policies. Communities can measure progress by simply counting the facilities they are building, such as blocks of new or repaired sidewalks, number of bus stops with shelters, miles of new bikeways, number of new pedestrian countdown signals, number of repaired curb ramps, and number of repainted crosswalks. Tracking such facilities demonstrates that the community is making on-the-ground changes each year. Many communities are also working to track metrics such as changes in crashes and injuries, the number of people traveling well above the speed limit, on-street parking utilization, the number of people biking and walking, and user satisfaction. Such information can be tracked on a project level and on a system level. Once a community has established transportation-oriented performance measures, transportation staff can work with other agencies and departments to link them to larger goals such as long-term changes to public health, economic growth, and the physical environment.

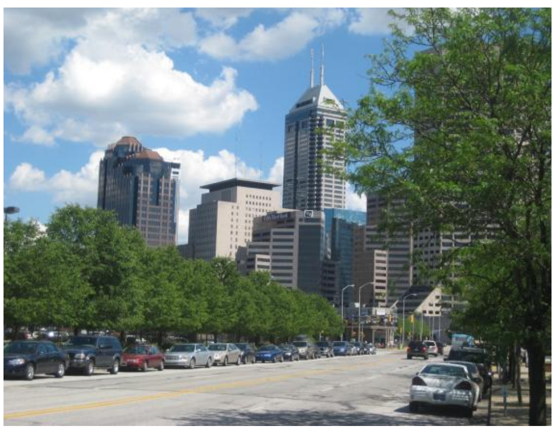
If packaged and made publicly available each year, this information can add to a community's efforts in improving education and awareness of Complete Streets. As an example, Seattle's Department of Transportation reports regularly on their Complete Streets progress.[50]

NATIONAL CASE STUDIES

The following three examples include major cities across the United States that have taken significant efforts to adopt and implement Complete Streets policies and programs.

INDIANAPOLIS

Featured best practices: design flexibility, context-sensitive solutions, specific performance measures, limited policy exceptions, clear structure, and collaboration between agencies and stakeholders



Source: Flickr User nichcollins

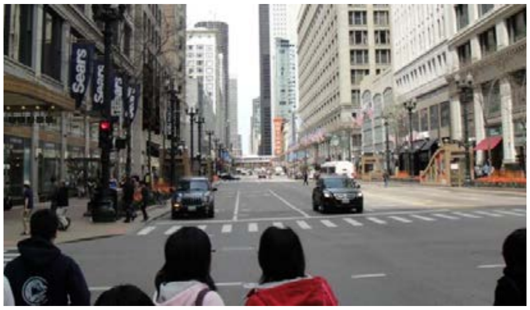
Indianapolis adopted a Complete Streets Ordinance in 2012, which recently received NCSC's highest score among new Complete Streets policies. It was the result of a multi-year awareness campaign, including workshops and months of developing a policy based on national best practices. The Indianapolis team focused on including a wide range of users and other stakeholders ("pedestrians, bicyclists, users of mass transit, people of all ages and abilities, motorists, emergency responders, freight providers and adjacent land uses") and project types. Exceptions to the policy are clear and specific; the City's Director of Public Works is the sole granter of those exceptions.

In its ordinance, Indianapolis recognized the need to build an integrated, connected network for all modes and that private developers and other transportation agencies must work collaboratively with the city to achieve that end. Within Indianapolis' policy, transportation professionals are given flexibility in planning and designing streets so that they are appropriate to the community and aligned with "the best and latest design standards." Specific performance measures are named, and the policy calls for quarterly reporting on achievements. To ensure successful implementation, the ordinance identifies the city's next steps and requires that annual reports on implementation progress be made to the City-County Council.

CHICAGO

Featured best practices: prioritized focus on non-motorized modes, clear "top-down" Complete Streets project design and delivery process, context-sensitive solutions

In 2013, the Chicago Department of Transportation (CDOT) introduced a comprehensive set of design guidelines to support its Complete Streets policy. The CDOT Complete Streets Design Guidelines established a pedestrian-first approach to all transportation projects and programs and investigated the process by which transportation projects



Source: Nelson\Nygaard

are scoped, designed, and delivered. The design of Chicago's streets now takes greater input from elements beyond mobility needs and includes elements such as land use and modal priority in addition to standard engineering practice.

The delivery process for a CDOT project is outlined in six stages:

- **Project Selection**: Identify and promote projects that advance complete streets.
- **Scoping**: Address all modes while considering land use and roadway context, through project research, site visits, and assembled data, maps, and other analysis.
- **Design**: Address objectives defined during scoping by drafting alternatives, reviewing private-development designs, evaluating impacts, and obtaining feedback and necessary approvals.
- **Construction**: Ensure projects are built as designed and consider impacts on modal components and objectives when designs must be changed
- **Measurement**: Measure the effectiveness of the complete street, considering safety, mode share, process efficiency, health, transit consistency, economic factors, and sustainability.
- **Maintenance**: Ensure all modes are accommodated through the lifespan of the project by identifying maintenance needs, establishing maintenance and replacement cycles, dedicating funding, identifying Complete Streets needs during maintenance, and incorporating sustainable practices.

As part of the refined project delivery process, CDOT engages public stakeholders, other city departments, and external agencies at several points in the process. The Design Guidelines and the policies within the Complete Streets policy reflect a major change in how Chicago delivers streets. More importantly, it reflects the City's commitment to institutional change for an existing process that was producing streets that did not meet the City's transportation needs.

NEW YORK CITY

Featured best practices: clear Complete Streets policy goals, strong emphasis on safety and mobility for all modes, extensive catalog of engineering and design solutions

Source: Flickr User nichcollins

In 2008, the New York City Department of Transportation (NYCDOT) introduced its strategic plan, *Sustainable Streets*, which included a Complete Streets design policy. One of the key goals included in the plan was adopting design standards that focused on improving the safety and quality of pedestrian facilities across all types of roadways. The policies within the plan aim at road reconstruction projects as well as new initiatives for grand boulevards in important commercial districts.

NYCDOT expanded upon *Sustainable Streets* in 2009, with the release of its world-class *Street Design Manual*. This manual is a detailed set of clearly defined guidelines for designing new streetscapes throughout New York City. It provides resources for streamlining design and review processes for projects and acts as a supplement to mainstay engineering standards like the *Manual on Uniform Traffic Control Devices* (MUTCD) and AASHTO *Policy on Geometric Design of Highways and Streets* ("Green Book").

The *Street Design Manual* describes seven Complete Streets project goals that are meant to shape the delivery and implementation process:

» **Design for Safety**: Prioritize safety for all users, design streets for slower speeds when used primarily for local trips, and continuously assess the value of new, innovative safety treatments.

» **Design for Access and Mobility**: Maximize accessibility for pedestrians, bicyclists, and transit riders, while ensuring access for trucks and emergency vehicles.

» **Design for Context**: Preserve the history and character of neighborhoods, enhance connectivity to neighboring land uses, emphasize traffic calming and green design on local streets, and ensure a balance between modes on larger throughways.

» **Design for Livability**: Expand open public spaces and seating and encourage the use of physically active modes through street design.

» **Design for Sustainability**: Collaborate with other agencies to evaluate new, innovative building materials, and expand vegetation and tree-canopy cover.

» **Design for Visual Excellence**: Strengthen the harmony and beauty of streetscapes with the consistent use of materials and design, and encourage long-term durability and maintenance.

» **Design for Cost-Effectiveness**: Consider projects' lifecycle benefits and costs, and streamline the design-review process for clarity and consistency.

Each of these project goals are supported by detailed planning and engineering chapters that thoroughly cover options for roadway geometry, construction materials, lighting, and street furniture.

CALIFORNIA CASE STUDIES

In contrast with case studies from around the country, this section focuses on Complete Streets policies that have been adapted to the unique environs and regulations within California. The case studies in this section are grouped by their respective Complete Streets strengths but all highlight recent adoption of effective Complete Streets policies.

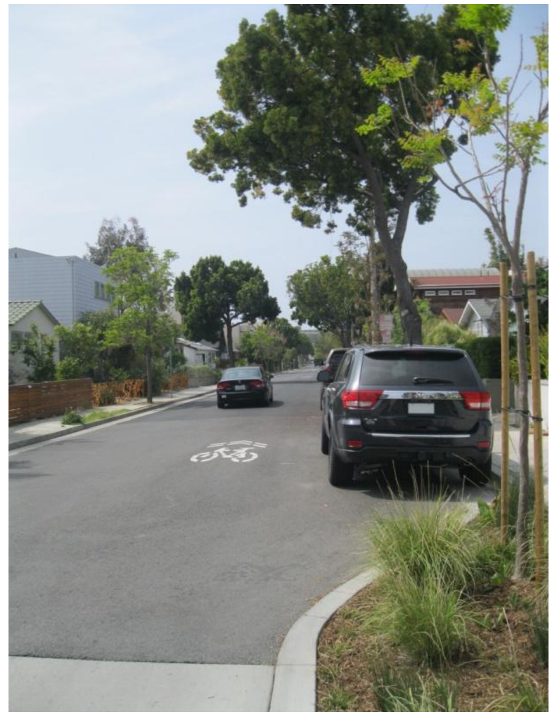
CLEAR AND COMPREHENSIVE

The National Complete Streets Coalition sets the standard for complete streets across the nation by identifying 10 key components of good Complete Streets policy. The communities profiled below include key components identified by NCSC, including: consideration of all users including pedestrians and bicyclists; applicability to all stages of a project from design to operations; and connectivity across different modes.

Baldwin Park, CA

Featured best practices: design guidelines, clearly delegates responsibility to relevant public agencies and provides actionable next steps, and promotes integrated, multimodal street network.

The City of Baldwin Park adopted a Complete Streets Policy in July 2011. Soon after, the National Complete Streets Coalition recognized the City for having the most comprehensive Complete Streets policy in the country.[51]



Located east of Downtown Los Angeles, within Los Angeles County, Baldwin Park has a population of about 75,000 residents. A vast majority of the city's residents are Latino (80.1%) or Asian (13.9%). The median household income in Baldwin Park is $50,346, compared to the $55,475 median household income for the county as a whole.[52]

According to American Community Survey data (2006-2010), 73.3% of working residents in Baldwin Park drive to work alone, approximately 15% carpool, 4.4% use public transportation, and about 3% bike or walk to work.[53] Overall, transportation data suggests that walking and biking are not the first and easiest options for residents. While barriers to active transportation exist, the city's Complete Streets policy is a powerful step toward promoting walking and bicycling, thereby improving health and safety in Baldwin Park.

What Makes Baldwin Park Stand Out?

Baldwin Park's Complete Streets policy is very comprehensive, incorporating all the 10 elements recommended by the National Complete Streets Coalition.[54] Notable components of Baldwin Park's Complete Streets policy are:

» **Calls for design guidelines**: Complete Street policies should explicitly include design guidelines that: (1) provide clear, proven criteria and instruction for developing and building complete streets, and (2) ensure design flexibility, especially in terms of recognizing and adapting to unique community needs and challenges. Baldwin Park's Complete Streets policy does both of these things by stating:

> ….[It] is the city of Baldwin Park's policy to:
>
> (A) Adopt new Complete Street Guidelines to guide the planning, funding, design, construction, operation, and maintenance of new and modified streets in Baldwin Park while remaining flexible to the unique circumstances of different streets where sound engineering and planning judgment will produce context sensitive designs.
>
> (C) Provide well designed pedestrian accommodations on all streets and crossings. Pedestrian accommodations can take numerous forms, including but not limited to traffic signals, roundabouts, bulb-outs, curb extensions, sidewalks, buffer zones (the area between the traveled way and sidewalk), shared-use pathways, and perpendicular cub ramps, among others.

In 2012, Baldwin Park followed through on this element of their Complete Streets Policy by adopting a customized version of the *Model Design Manual for Living Streets*.[43]

» **Includes explicit provisions:** Setting clear expectations for compliance is key to good policy. Baldwin Parks' policy explicitly calls out the various departments expected to comply with the policy. The policy also names external partners, such as county transportation agencies, effectively linking local Complete Streets efforts to broader regional processes. In its section on jurisdiction, Baldwin Park explicitly names the scope of the policy's applicability, relevant local public agencies, and city wide expectations:

> (A) This Complete Street policy is intended to cover all development and redevelopment in the public domain and all street improvement assessment districts within Baldwin Park, but will also focus on regional connectivity.
>
> (B) Every City Department including Administration, Public Works, Community Development, Recreation and Community Services and Police, will follow the policy.
>
> (C) The city requires all developers and builders to obtain and comply with the City's standards.
>
> (D) The city will work closely with Los Angeles County, Caltrans, the Los Angeles County Metropolitan Authority, the Southern California Association of Governments to promote compliance.

» **Promotes street network connectivity:** A Complete Streets policy should promote an integrated, multimodal street network. Baldwin Park effectively does this while highlighting community uses that are key targets for active transportation:

> (A) The City of Baldwin Park will design, operate, and maintain a transportation network that provides a connected network of facilities accommodating all modes of travel.
>
> (B) The City will actively look for opportunities to repurpose rights-of-way to enhance connectivity for pedestrians, bicyclists, and transit.
>
> (C) The City will focus on non-motorized connectivity improvements to services, schools, parks, civic uses, regional connections, and commercial uses.
>
> (D) The City will require large new developments and redevelopment projects to provide interconnected street networks with small blocks.

Rancho Cucamonga, CA

Featured best practices: clear definitions of key terms and inclusion of performance measures, clear scope, and public agency involvement.

In December 2012 Rancho Cucamonga approved city ordinance No. 857, the City's Complete Streets Policy. Rancho Cucamonga was included as one of the nation's top 10 Complete Streets policies as part of Smart Growth America's 2012 policy review.[55]

Located in San Bernardino County, Rancho Cucamonga has a population of 165,269 residents. The City is predominantly White (42.7%) and Hispanic (34.9%) with a smaller population of Asians (10.1%), and African Americans (8.8%).[56] The median household income in Rancho Cucamonga is $77,871[57] compared to the median household income of $55,845 in San Bernardino County.[58]

According to American Community Survey data (2006-2010), 82.3% of working residents in Rancho Cucamonga drive to work alone, approximately 10% carpool, 1.8% use public transportation, and about 1.4% bike to work.

What Makes Rancho Cucamonga Stand Out?

Rancho Cucamonga's ordinance contains an extensive set of performance measures to evaluate the success of its Complete Streets policy. A number of performance measures specifically address some of the health issues discussed earlier in this research memo. In addition, the Complete Streets ordinance calls for an annual report, which is important to tracking the City's progress in implementing complete streets. Notable sections of the ordinance are:

» **Includes a comprehensive set of performance measures.** Clear project goals and performance measures are required to evaluate the extent to which local street infrastructure meets all users' needs. Rancho Cucamonga comprehensively evaluates the efficacy of its Complete Streets policy with the following performance measures:

- Total miles of on-street bikeways defined by streets with clearly marked or signed bicycle accommodation
- Total miles of streets with pedestrian accommodation
- Number of missing or non-compliant curb ramps along City streets
- Number of new trees planted along City streets
- Number and severity of pedestrian-vehicle and bicycle-vehicle crashes
- Number of pedestrian-vehicle and bicycle-vehicle fatalities
- Track "Fitnessgram" data of students in Rancho Cucamonga
- Comprehensive citywide sidewalk inventory
- Sales tax revenue
- Total miles of pedestrian trails throughout the City
- Number of truncated domes on sidewalks to support visually impaired residents
- Amount of air pollution (in tons) caused by automobiles

» **Requires reporting.** A summary of annual activities and exemptions granted is key to tracking progress in achieving Complete Streets policy and ensures public accountability and oversight. The policy states about reporting on infrastructure required for safe travel:

> The City Engineer will provide an annual report to the City Council listing the public and private street projects undertaken in the past year and briefly summarizing the Complete Streets Infrastructure used in those projects and, if applicable, the basis for excluding Complete Streets Infrastructure from those projects.

» **Requires consistency across other plans and policies.** Consistency with related plans and policies is key to integrating complete streets as part of all future development within a community. The policy includes the following provisions regarding consistency of infrastructure for safe travel:

> The Planning Department and Engineering Services Department shall review existing plans, zoning, and subdivision codes, laws, procedures, rules, regulations, guidelines, programs, templates, and design manuals

including the Trail Implementation Plan, Development Code, General Plan, Standard Drawings for Public Improvements, and Standard Conditions to ensure consistency with the General Plan.

The Engineering Services Department shall coordinate design guidelines with street classifications and revise them to include Complete Streets Infrastructure, such as bicycle lanes, sidewalks, streets crossings, and planting strips. Such revisions may be coordinated with revisions to the Development Code, Trail Implementation Plan, Development Code, General Plan, Standard Drawings for Public Improvements, and Standard Conditions.

EFFECTIVE IMPLEMENTATION

While policies set the stage for complete streets in the City of San Mateo, they represent one layer of actions the City can take. Other important issues to address are enforcement and implementing standards and regulations. The following case studies on Larkspur and the model MTC Complete Streets resolution present examples of enforcement and implementation.

Larkspur, CA

Featured best practices: advocacy and engagement, public health language, infrastructure planning and implementation, and context-sensitive solutions

In January 2013, the City of Larkspur became the most recent Marin County municipality to adopt a Complete Streets Policy[59]. Resolution 72/12 complies with the California Complete Streets Act of 2008 (AB1358) and qualifies Larkspur for One Bay Area Grant (OBAG) Complete Streets funding.

Larkspur is a city of about 12,000 people in Southeast Marin County, close to the San Francisco Bay and major commuting corridors to San Francisco and to East Bay cities. Larkspur's population is 86.5% White, 7.7% Latino, 4.7 % Asian, and 1.6% Black,[60] with a median income of $86,000. More than 90% of households own at least one car, about 2% of residents in Larkspur walk to work, and about 10% take public transit.[61]

The city is a hub for regional transit: The Larkspur Ferry Terminal is the main facility serving ferry commuters between Marin and downtown San Francisco. Two major roadways, Sir Francis Drake Boulevard and Redwood Highway, pass near the ferry terminal and through the northern part of the city. Regional off-street bike trails run through the city, including Marin County Bicycle Route 20, which winds along Corte Madera Creek. The downtown is flat with some bicycle infrastructure and good sidewalks. Bicycle counts conducted in downtown Larkspur in 1999 and 2007 show an increase in recreational riders; there is insufficient data to determine the number of bike commuters.[62] Many of the residential streets are hilly and somewhat narrow and lack sidewalks.

What Makes Larkspur Stand Out?

Active transportation advocacy has a strong history in Marin County, and the regional advocacy organizations Walk-Bike Marin and the Marin County Bicycle Coalition are active in Larkspur. Various projects to improve bicycle and pedestrian access to major transportation nodes were underway before the Complete Streets Policy was passed. For example, the 2001 Marin County Pedestrian and Bicycle Plan identified 25 of the most important projects in the County, including improved bicycle and pedestrian access to the Larkspur Ferry Terminal, which is scheduled for completion in 2014.

The work of City officials, regional transportation agencies, and advocacy groups laid the groundwork for the Complete Streets policy, which passed the City Council unanimously[63] and reflects the city's and the region's commitments to Complete Streets principles. The policy introduces a methodology for anticipating and addressing the needs of all road users in future transportation projects and sustaining investments in active mobility.

In their annual Complete Streets Policy Analysis Report, The NCSC evaluated Larkspur's policy on ten criteria, giving it a rating of 71.2 out of 100. The City's policy reflects standard best practices, including a clause requiring all projects, at all phases, to consider Complete Streets principles:

> **A.4. All Infrastructure Projects and Phases**. …It shall be incorporated into all planning, funding, design, approval, and implementation processes for any construction, reconstruction, retrofit, maintenance, operations, alteration, or repair of streets (including streets, roads, highways, bridges, and other portions of the transportation system)…

The ordinance also ensures the Complete Streets practices cut across all city departments:

> **A.3. Complete Streets Routinely Addressed by All Departments.** The City shall work towards making Complete Streets practices a routine part of everyday operations, approach every relevant project, program, and practice as an opportunity to improve streets.

The Larkspur ordinance calls for infrastructure to align with the needs of a particular street or neighborhood:

> **A.2. Context Sensitivity**...the City shall maintain sensitivity to local conditions and needs in both residential and commercial neighborhoods

The Larkspur ordinance touches on all the important aspects of Complete Streets policy; going as far as to build on the Federal Highway Administration's recommended exceptions by adding a few that reflect the local context; for example, Section C.2.d., "Topographic constraints and narrow right-of-way widths make the addition of safe pedestrian and bicycle ways financially prohibitive and logistically difficult."

Larkspur has developed a strong policy on the heels of concerted advocacy and partnership efforts. The policy establishes a foundational set of principles and practices that all city agencies can use to create safe, comfortable, and convenient travel for all users.

Complete Streets Case Study: Bay Area Region

Cities across the Bay Area have started adopting Complete Streets policies, in large part as a response to requirements from regional and county transportation authorities, including the Metropolitan Transportation Commission (MTC) and the Alameda County Transportation Commission (Alameda CTC). Although the MTC and Alameda CTC do not possess direct authority to implement Complete Streets policies in local cities, they have effectively promoted the adoption of policies through the use of incentives.

For example, in order to be eligible for One Bay Area Grant funds MTC requires members to take one of two actions: (a) adopt the recommended model resolution or a stronger version or (b) have a general plan that is compliant with California's Complete Streets Act of 2008. This has effectively increased the number of communities working to adopt Complete Streets policies.

Alameda CTC, on the other hand, requires all local jurisdictions receiving transportation sales tax funding to adopt a Complete Streets policy by June 2013. Consequently, all cities but Fremont have adopted Complete Streets resolutions as of April 2013.

Model resolutions for both MTC and Alameda CTC are based on the Bay Area Model Resolution. To ensure that the recommended resolution was politically feasible for a broader range of communities, MTC decided to eliminate certain provisions around exemptions. Similarly, the Alameda CTC model resolution does not contain recommended exemption provisions.

PEDESTRIAN AND BICYCLE FRIENDLY CODES

To ensure that Complete Streets policies can be effectively implemented, standards and regulations affecting the built environment, such as design guidelines or zoning regulations, should be consistent with Complete Streets principles.

The following code examples highlight some design elements that are important to ensure safe and comfortable pedestrian environments. These examples closely mirror the preferred improvements identified by San Mateo community members as part of the Pedestrian Master Plan planning process. The highest-ranked improvements are as follows: lighting, crosswalks, street trees, and traffic calming.

- **Pedestrian-Scale Lighting.** Lighting specifically designed for pedestrian safety and comfort is sorely needed in many communities, to address actual personal and traffic safety concerns, as well as to increase the perception of safety and encourage use of an area after dark.

  Pedestrian-scale lighting differs from standard road lighting in a variety of ways. Such lighting is typically closer to the ground, spaced together closely to provide an even level of lighting of the sidewalk instead of alternating bright and dark spots. Pedestrian-oriented lighting also usually features a white light, rather than yellow, as white is more inviting to pedestrians. As a further benefit, human-scale lighting, like other street furniture, alerts drivers to the presence of pedestrians in an area.

  To enhance pedestrian, bicycle, and transit connectivity for new development, Redwood City's Zoning Code[64] calls for pedestrian-scale lighting, among other pedestrian amenities. The Zoning Code specifically calls out the need to provide this type of lighting in the interest of public safety and specifies that lighting should be low-mounted and downward-casting.

- **Traffic Calming.** For decades, streets have been designed with the primary goal of moving cars as quickly as possible. But high-speed driving environments increase the number of collisions and the severity of injuries, for both motorists and pedestrians.

  Reducing vehicle speed is crucial not only for pedestrian safety, but also for the livability and social and recreational functions of a street. To reduce traffic speed and increase pedestrian visibility, communities can implement a variety of traffic calming treatments with the intent of slowing traffic to a safe speed. Such strategies may include roundabouts, medians, speed humps, traffic diverters, narrower traffic lanes, and curb extensions.

  The City of San Diego utilized a combination of traffic calming strategies in an effort to slow down traffic and reduce traffic-safety hazards. Improvements to La Jolla Boulevard in the Bird Rock neighborhood included roundabouts, medians, pedestrian crossings, plazas, and the installation of diagonal parking. These traffic-calming improvements have been widely acknowledged to have accomplished their goal of slowing traffic (from 42 mph to 20 mph) while achieving health co-benefits, including noise reduction and increased livability and economic activity.

» **Street Trees.** Placed between the street and the sidewalk, street trees provide a physical and psychological barrier between vehicles and pedestrians. When properly spaced, trees offer a continuous canopy of shade that adds to pedestrian comfort and physical well-being, especially in warm climates. They give a sidewalk a sense of security and enclosure, add natural color and beauty, mitigate storm-water runoff, and improve air quality.

Urban forestry projects can also qualify as carbon offset credits in California's cap and trade market if certain requirements are met, such as a 100-year lifespan for the trees and an average spacing of at least 16 feet. Shade trees can thereby raise some money for local governments at the same time as they mitigate greenhouse gas emissions.

Palo Alto's Zoning Code[65] calls for the provision of streetscape amenities such as street trees, bulbouts, and landscape elements to promote a pedestrian- and bicycle-friendly environment. The City's context-based design criteria also call for other elements that are important to an environment conducive to active transportation, including ground-floor uses, climate protection (e.g. covered waiting areas and awnings), and bicycle amenities (e.g. dedicated bike lanes and parking).

» **Street Furniture.** Public benches and seating where pedestrians can rest, meet a friend, or wait for transit can help create pedestrian-supportive streets that encourage people to use public open spaces. Other types of street furniture (such as drinking fountains and trash cans) can also contribute markedly to the comfort and character of an area for pedestrians. Seating areas should include amenities such as shade trees, shelter, attractive lighting, and informational signage.

To avoid visual clutter and pedestrian obstruction, street furniture should be grouped at specific intervals along the street so that the clusters of furniture can function as pedestrian rest stops and potential gathering areas without impeding pedestrian movement or creating visual "blind spots" that contribute to traffic-safety issues or fear of crime.

San Diego's[66] street-furniture code language focuses on benches and their appearance, requiring that benches be wood or iron instead of plastic and prohibiting advertisements on benches located in the right-of-way. The code also requires that street furniture not intrude into the pedestrian zone of sidewalk and regulates the positioning of benches to allow socializing and people-watching.

» **Bicycle parking.** Providing a comprehensive infrastructure—including bicycle parking—is key to cultivating bicycle friendly communities across the country. A survey conducted by the New York City Planning Department (2006) found that the two most-often-cited barriers to bicycle commuting are traffic and a lack of safe bike parking or storage.

The City of San Francisco is currently reviewing its bicycle parking requirements. Under the most recent proposal, the City's General Plan would be modified and the policy would apply to new construction and expansions of all types across the City. City-owned and leased buildings and parking garages would also be required to be retrofitted to conform to the new policies. In general, these policy changes would increase the amount of secure bicycle parking required. In addition, residential buildings with more than four units would be required to provide at least one secure bicycle parking space per unit. Smaller buildings would be required to provide a minimum amount of indoor storage area.

» **Bikeways.** Infrastructure designed and located specifically for pedestrian and cyclist use is important to ensure accessible, safe, and comfortable travel, especially on highly trafficked thoroughfares. Bicycle infrastructure can take the form of paths, bike lanes, cycle tracks, or shared roadways; all of which are appropriate under different circumstances. Factors could include traffic volume, speed, existing right-of-way, and on-street parking.

Long Beach has implemented a number of programs that have increased active transportation in the City. For example, in 2011 the City installed cycle tracks along two streets, Broadway and Third. These one-way, physically separated bikeways have already helped create safer pedestrian and bicycle environments; evaluations show that bicycle and vehicle crashes have decreased at the rate of 80% and 50%, respectively. The cycle tracks were accompanied by the installation of bicycle signals and the use of colored pavement at complex intersections.

The City of San Mateo has an opportunity to build on the experiences of these highlighted case studies by crafting a policy that goes beyond standard best practices.

ADDITIONAL RESOURCES

The following resources on Complete Streets and related land use strategies may assist the City in future Complete Streets planning efforts:

» **National Complete Streets Coalition**
The NCSC has a wealth of resources related to the development and implementation of Complete Streets policies from across the United States. For additional information, please consult the NCSC here:
http://www.smartgrowthamerica.org/complete-streets

» **Complete Streets Resources**
ChangeLab Solutions has developed a comprehensive set of model laws and policies for California communities interested in developing or implementing complete streets. Resources available via this link:
http://changelabsolutions.org/publications/CA-complete-streets-policies

» **Bay Area Model Complete Streets Resolution**
http://changelabsolutions.org/publications/MTC-complete_streets

» For a more comprehensive selection of example of pedestrian and bicycle friendly zoning and subdivision elements from across the country, please consult the **Pedestrian Friendly Codes** resource at:
http://changelabsolutions.org/childhood-obesity/pedestrian-friendly-code

» The Los Angeles County Department of Public Health partnered with UCLA to develop the **Model Design Manual for Living Streets**. The manual comprehensively addresses design elements from sidewalks to roundabouts and is available at: http://www.modelstreetdesignmanual.com/

» In addition to chronic disease data, the San Mateo County Health Department has developed a resource intended to help planners and decision-makers create and implement health-supportive policies. Entitled "Building Health Into San Mateo Cities," the toolkit includes tools and policies for creating healthy and active communities. The toolkit is available at: http://bit.ly/131offz

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[1] http://www.smartgrowthamerica.org/documents/cs/resources/cs-policyworkbook.pdf

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APPENDIX B

Local Documentation & Existing Conditions Review

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MEMORANDUM

To: Ken Chin, City of San Mateo

From: San Mateo Sustainable Streets Project Team

Date: September 30, 2014

Subject: San Mateo Sustainable Streets Plan: Tech Memo 2.2 – Local Documentation and Existing Conditions Review

INTRODUCTION

The primary goal of this memorandum is to create a shared understanding of the policy framework for streets in San Mateo and establish a strong foundation for the Sustainable Streets Plan. The memorandum provides an overview of existing San Mateo planning documents and policies, with each document briefly summarized and the most relevant sections related to streets highlighted. In addition, this memorandum includes a comprehensive summary of key sections and language within the city municipal code related to streets. Finally, an initial existing conditions analysis related to demographics, travel behavior, and collisions on city streets is included.

SETTING AND LAND USE

LOCAL CONTEXT

The project area for the Sustainable Streets Plan is the entire City of San Mateo transportation and circulation network, including all local, collector, and arterial roadways and their adjacent public right-of-way, the rail corridor, and multi-use paths. Much of San Mateo is currently dominated by the automobile, and the city is bisected by U.S. Highway 101 and State Route (S.R.) 92 (J. Arthur Younger Freeway). Additionally, S.R. 82 (El Camino Real) travels in a north-south direction directly through the middle of the city. Caltrain operates three stations in San Mateo along the railroad corridor, and SamTrans operates 12 routes in the city with major transit stops at the Hillsdale Shopping Center and the Downtown Caltrain Station. The circulation network includes more than 192 miles of paved streets, 360 miles of paved sidewalks, and 39 miles of bikeways. Figure B-1 illustrates San Mateo's landmarks and current street classifications.

The city's land uses are predominately residential, with single family and multifamily uses comprising nearly half of the City's land area, as illustrated in Figure B-2. Most future development is expected to take place in the transit-oriented development (TOD) rail corridor area. Currently, the City has a number of TOD projects in the pipeline, including the Bay Meadows Phase II development, adjacent to the Hillsdale Caltrain Station, and Station Park Green, adjacent to the Hayward Park Caltrain Station. In addition, higher-density housing as well as affordable housing have recently been built and are currently being built in various TOD areas in the city. All of these developments consider additional modes of transportation, but they are still developed largely for automobile travel.

There are number of future projects that will have an impact on the City's transportation and circulation network, including High Speed Rail, the potential closure of the Hayward Park Caltrain Station (or more frequent service through electrification of the Caltrain corridor), redevelopment of the S.R. 92/S.R. 82 El Camino Real interchange, and future pedestrian/bicycle freeway overcrossings. There are also plans in place to expand and upgrade the existing bicycle and pedestrian networks.

San Mateo has a land area of approximately 12.5 square miles. It is an infill city, predominately built out with very little developable land. The development of the city dates back to the 1850s, with the establishment of a stagecoach stop along the Old County Road (El Camino Real, S.R. 82). The center of city activity shifted to the area along 3rd Avenue and B Street with the advent of the railroad in the 1860s. The city was incorporated in 1894 and remained a relatively small community with a very rural character until the 1940s. Following World War II, the city experienced significant growth and the automobile began to dominate the circulation system.

B Street at 3rd Avenue, Downtown San Mateo
Source: Nelson\Nygaard

Today, San Mateo's downtown core is centered on the 3rd and 4th Avenue corridors just west of the San Mateo Caltrain station. It is a well-defined commercial district with short blocks, tree-lined streets, and active storefronts.

MULTIMODAL CONNECTIONS

REGIONAL AND LOCAL TRANSIT

Caltrain connects San Mateo – via the San Mateo, Hayward Park, and Hillsdale Stations – to San Francisco in the north and points south along the Peninsula. "Baby Bullet" trains – or express service – serve San Mateo with six morning and two afternoon/evening northbound trains and two morning and six afternoon/evening southbound trains.[1] Additional peak-period trains provide limited-stop service as well. Trains run every hour during off-peak periods.

On-street transit service in San Mateo is provided by SamTrans, which operates numerous local and express services within San Mateo and across county lines. The agency provides its most frequent transit service along El Camino Real and Alameda de las Pulgas.

BICYCLE NETWORK

The Bicycle Master Plan was completed in 2011. The plan calls for 36 miles of new facilities, , only a small portion of city streets have bicycle lanes. The future bicycle network would significantly expand the bicycle network mainly through the creation of new signed routes.

FIGURE B- 1 LANDMARKS AND TRANSPORTATION CONTEXT

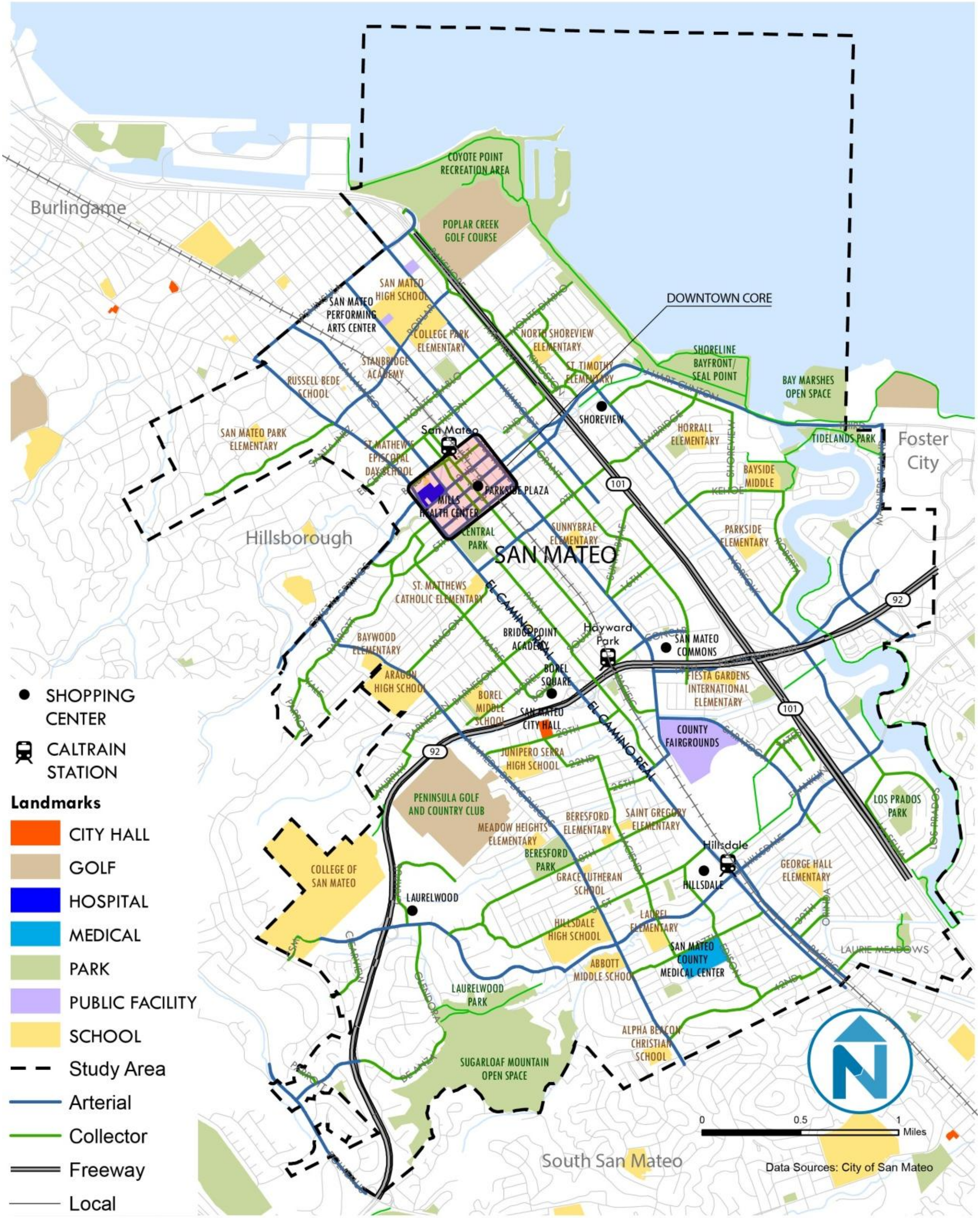
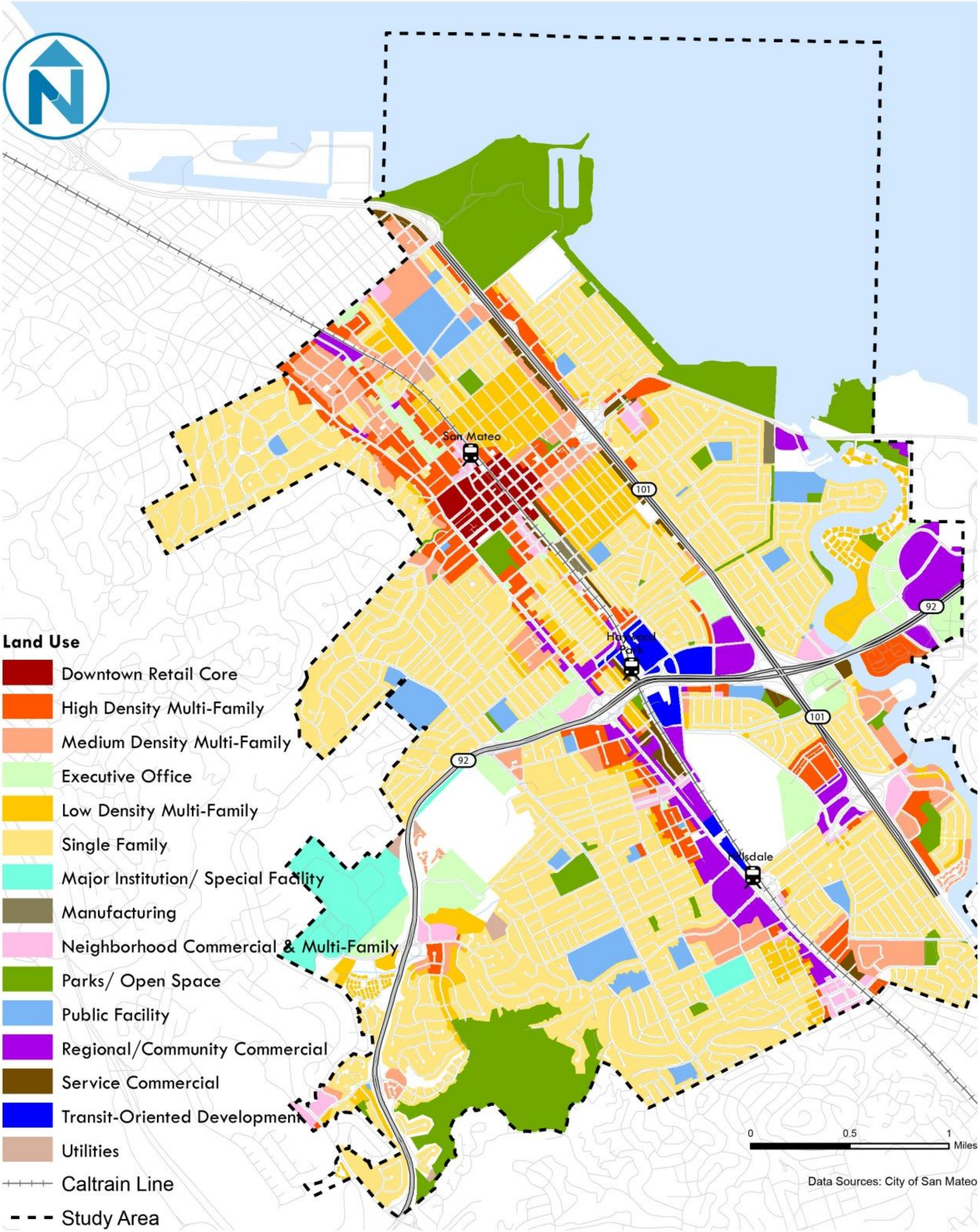


FIGURE B- 2 EXISTING SAN MATEO LAND USE



PEDESTRIAN FACILITIES

The majority of San Mateo streets currently have functional sidewalks. There are also several trails and multi-use paths throughout the city. The vast majority of streets in the city have vertical curbs that prevent vehicles from mounting the sidewalk. However, several residential neighborhoods feature "rolled" curbs that can be mounted by a vehicle. This behavior constrains the sidewalk width, reduces walkability, and often causes blockage of the sidewalk for people in wheelchairs and with children. It also leaves more of the street width for moving motor vehicles, which can increase driving speeds on these residential streets.

The Pedestrian Master Plan, adopted in 2012, recommends converting rolled curbs to vertical curbs during roadway reconstruction projects. The Plan also proposes a "greenway" network of pedestrian-friendly streets throughout San Mateo, which it also proposes should use vertical curbs. In cases where converting to vertical curbs is deemed infeasible due to roadway-width constraints, a "shared street" is an alternative design that could improve conditions for pedestrians.[2]

The Pedestrian Master Plan also identifies locations where pedestrians are likely to be present in greater volumes: near schools, civic buildings, parks, shopping, transit stops, and event spaces. The Pedestrian Master Plan calls for almost $57 million in pedestrian improvements, including the installation of pedestrian-scale lighting and high-visibility crosswalks, among many other items. The Plan includes a list of discrete priority projects and their locations.

FREIGHT NETWORK

Freight and goods movement is critical for a city's daily function. Single-unit trucks and tractor-trailers carry goods to retailers and commercial businesses on a daily basis. San Mateo's existing freight network roughly coincides with the major arterial street network in San Mateo.

GREEN INFRASTRUCTURE

San Mateo is currently participating in the Green Plan Bay Area project, which is a partnership between the San Francisco Estuary Partnership, San Francisco Estuary Institute, and several Bay Area municipalities that is slated to run from August 2013 to December 2015. The project will develop spatial tools to be used by municipalities for planning. The outcome will be a plan for green infrastructure and low-impact development that will complement the Sustainable Streets Plan.[3]

MULTIMODAL INTEGRATION

Increasing connections between modal networks enhances local and regional connectivity. Currently, the city's bicycle network provides strong connections to the Hayward Park and Hillsdale Caltrain Stations and less direct connectivity from the San Mateo Station, though this station is well-connected to pedestrian infrastructure and low-speed streets given its proximity to downtown. SamTrans routes provide connections to both BART and Caltrain from locations throughout the city. The City has not completed a comprehensive study on pedestrian access to transit; however, in the Equity Analysis for the recently completed SamTrans Service Plan, the agency states that "care was taken to maintain passengers' access within a quarter-mile walk-shed of the SamTrans network."[4]

While freight functions are critical, the physical needs of freight vehicles can often conflict with other community goals such as pedestrian safety or ensuring lower volumes on neighborhood streets. Generally speaking, freight truck routes currently avoid streets with high bicycle and pedestrian volumes, and municipal code section 11.28.010 strictly prohibits freight vehicles (including garbage trucks and fuel trucks) downtown between 10 a.m. and 6 p.m.

DEMOGRAPHICS AND KEY TRAVEL BEHAVIOR

This section provides an assessment of existing conditions related to demographics and key travel behavior in the city of San Mateo. Included is information related to population, housing tenure, race and ethnicity, age, journey to work, and vehicle ownership. Also included is an analysis of injury collisions within the city over the past five years. All of this information will be particularly useful in identifying key trends and issues which will inform the final Sustainable Streets Plan.

DEMOGRAPHICS

Population

In 2011, there were an estimated 95,957 people living in the city of San Mateo, comprising roughly 13% of San Mateo County's total population. The city of San Mateo is a focal point of population growth in the county, as the city has experienced faster population growth than the county as a whole (Figure B-3).

FIGURE B- 3 TOTAL POPULATION GROWTH OF THE CITY AND COUNTY, 2000-2011

	2000 POPULATION	2011 POPULATION	CHANGE
City of San Mateo	92,372	95,957	+ 3.9%
San Mateo County	707,161	711,622	+ 0.6%

Source: 2007-2011 ACS, B01001; US Census 2000, SF 3

Housing Tenure

As of 2011, there were an estimated 37,439 housing units in the city of San Mateo, which constituted approximately 15% of all housing units in the county. As shown in Figure B-4, the majority of housing units (54%) were owner-occupied. This is relatively consistent with the housing tenure distribution in all of San Mateo County, with the city having a slightly larger share of renters. As discussed below, this finding is significant because renter-occupied units tend to have lower vehicle ownership rates than owner-occupied units.

FIGURE B- 4 HOUSING TENURE OF THE CITY AND COUNTY, 2011

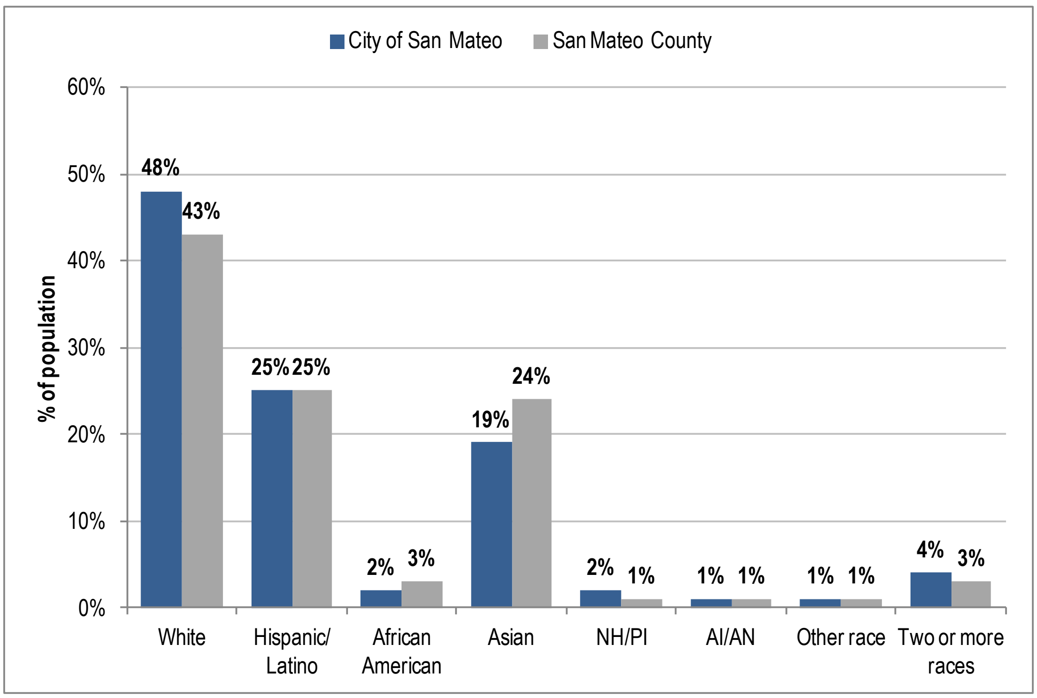
OCCUPIED HOUSING UNITS	CITY OF SAN MATEO	SAN MATEO COUNTY
Owner-occupied	20,071 (54%)	154,127 (60%)
Renter-occupied	17,368 (46%)	102,296 (40%)
Total	**37,439**	**256,423**

Source: 2007-2011 ACS, B25003

Race and Ethnicity

The largest racial group in the city of San Mateo in 2011 was White, at 48% of the population. As shown in Figure B-5, the second largest group is Hispanic or Latino at 25%, with Asian third at 19%. All other racial groups comprised the remaining 8% of the city's population. The city features nearly identical diversity when compared to San Mateo County as a whole, with the exception of having a larger percentage of White residents and a smaller percentage of Asian residents.

FIGURE B- 5 RACE AND ETHNICITY OF THE CITY AND COUNTY, 2011

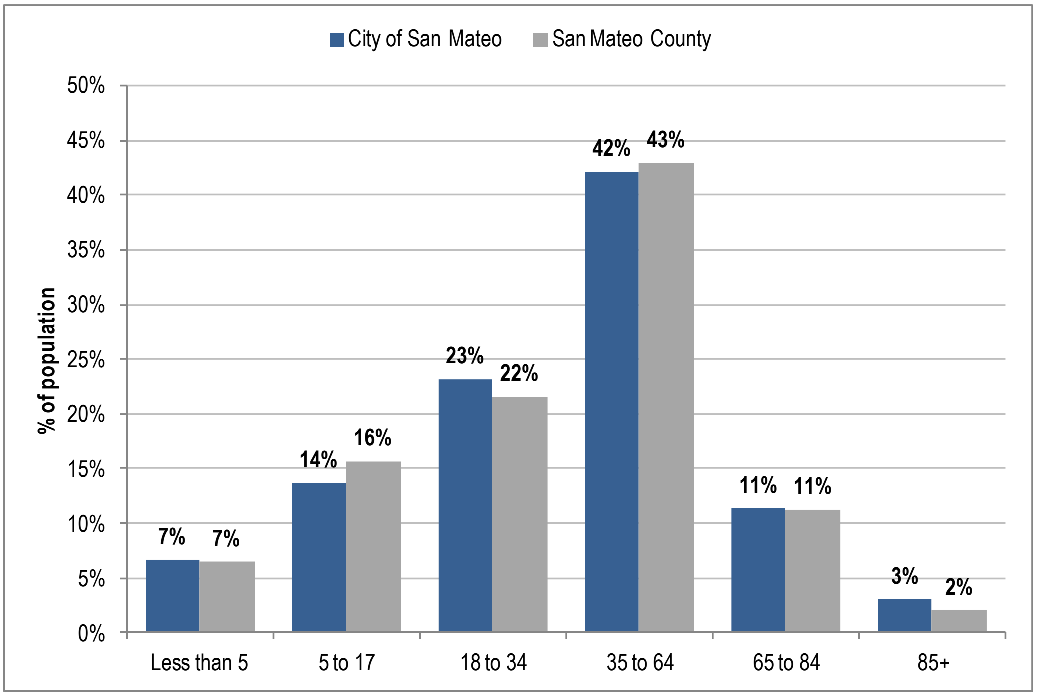


Source: 2007-2011 ACS, B03002

Age Distribution

The age distribution for the city and county of San Mateo is nearly identical (Figure B-6). There is only a slightly higher percentage of youth (less than 18 years of age) in the county overall. The city has a slightly higher percentage of people older than 65. Compared to national averages, both the city and county feature lower percentages of young people and higher percentages of those in the 18 to 34 and over 85 age groups.

FIGURE B- 6 POPULATION AGE DISTRIBUTIONS OF THE CITY AND COUNTY, 2011



Source: 2007-2011 ACS, B01001

TRAVEL CHARACTERISTICS

Commute Mode Split

As of 2011, more than 70% of the City of San Mateo's residents commuted by driving alone, as shown in Figure B-7. About 11% of workers carpooled to work, and slightly less than 8% took public transit or a taxi to work. Walking and biking comprised a total of 5% of work trips. The mode splits for the city and the county were virtually identical.

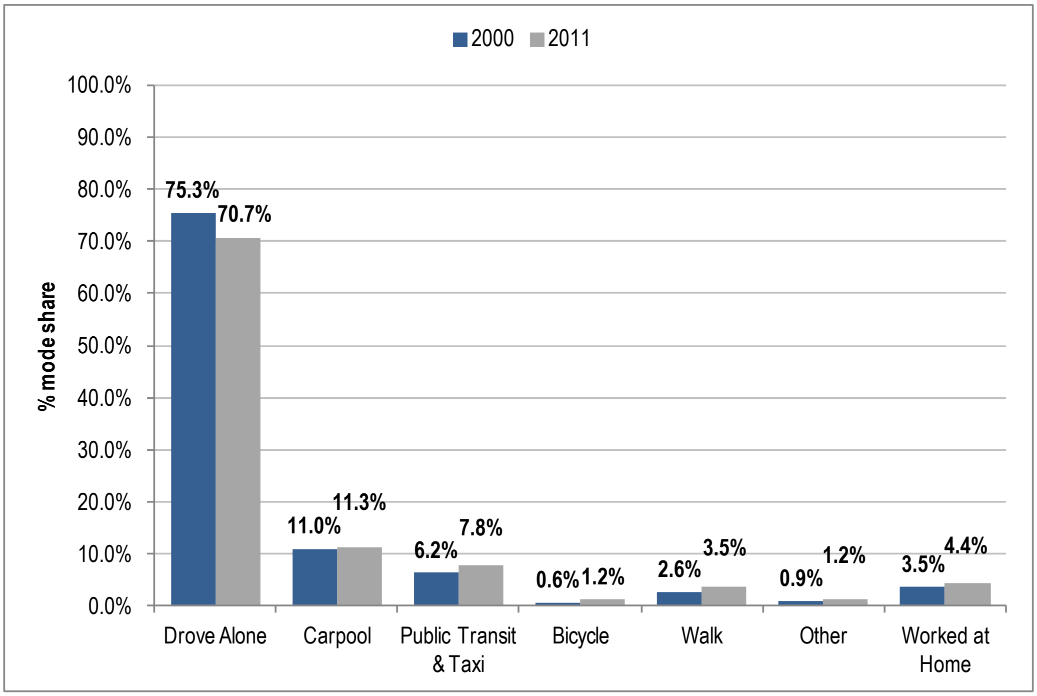
FIGURE B- 7 JOURNEY TO WORK, CITY VS. COUNTY

Mode Share	City of San Mateo	San Mateo County
Drove Alone	**70.7%**	**70.6%**
Carpool	**11.3%**	**11.0%**
Public Transit & Taxi	**7.8%**	**8.4%**
Bicycle	**1.2%**	**1.2%**
Walk	**3.5%**	**2.7%**
Other	**1.2%**	**1.1%**
Worked at Home	**4.4%**	**5.0%**

Source: 2007-2011 ACS, B08301

Figure B-8 documents changes in commute-mode-split data between 2000 and 2011. Over the past decade, the share of people driving alone to work has decreased (-6%), while the share of people carpooling (+3%), taking transit (+26%), biking (+106%), and walking (+37%) have all increased.

FIGURE B- 8 JOURNEY TO WORK, 2000 VS. 2011



Source: 2007-2011 ACS, B08301; 2000 Census, P30

Vehicle Ownership

Approximately 3% of owner-occupied households and 12% of renter-occupied households in the city of San Mateo did not have access to a vehicle in 2011. This represents a total of 5,098 households. For both the city and county, owner-occupied households tended to have two or more vehicles available, while renter-occupied households tended to have one or two vehicles available. The breakdown of vehicle availability was fairly consistent between the city and county of San Mateo (Figure B-9).

FIGURE B- 9 VEHICLE OWNERSHIP BY HOUSING TENURE OF THE CITY AND COUNTY, 2011

VEHICLE AVAILABILITY	CITY OF SAN MATEO		SAN MATEO COUNTY	
	Owner-occupied	Renter-occupied	Owner-occupied	Renter-occupied
No vehicle	3%	12%	3%	10%
One vehicle	26%	46%	22%	45%
Two vehicles	41%	33%	43%	34%
Three or more vehicles	29%	9%	32%	11%

Source: 2007-2011 ACS, B25044

The average vehicle ownership by housing tenure (Figure B-10) provides further insight about the vehicle ownership of a typical household in the city and county. The city of San Mateo features slightly lower vehicle ownership than the county as a whole but remains similar overall.

FIGURE B- 10 VEHICLE OWNERSHIP BY HOUSING TENURE, 2011

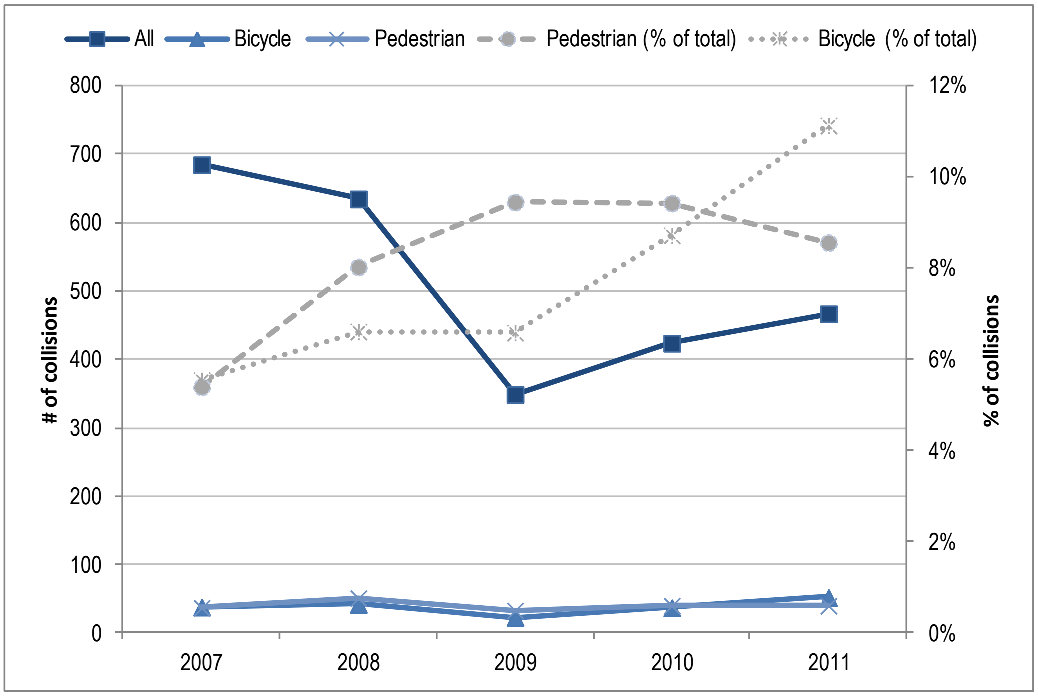
HOUSING TENURE	CITY OF SAN MATEO	SAN MATEO COUNTY
Owner-occupied	1.95	2.04
Renter-occupied	1.39	1.46
Total	**1.69**	**1.81**

Source: 2007-2011 ACS, B25003

COLLISIONS

The Statewide Integrated Traffic Records System (SWITRS) tracks collisions for all of California[5]. According to this database, there were a total of 2,560 collisions in the city of San Mateo between 2007 and 2011[6], with 467 of those occurring in 2011. Figure B-11 shows the trend in crashes over this five year period. Between 2007 and 2011, as total crashes trended downward, the share of all collisions involving bicycles significantly increased. However, as described above in the Commute Mode Split section, the amount of bicycling to work has also increased significantly, and this likely contributed to the higher share of bicycle collisions.

FIGURE B- 11 COLLISION TRENDS IN SAN MATEO, 2007-2011



Locations

Most collisions in San Mateo between 2007 and 2011 occurred along U.S. 101 or were clustered around arterial streets where traffic volumes are the highest (Figure B- 13). Aside from U.S. 101, the streets with the largest numbers of collisions were S.R. 82/ El Camino Real, Hillsdale Boulevard, and South Delaware Street. Collisions were also common at the U.S. 101 interchanges.

The segment of El Camino Real within San Mateo averaged 107 collisions per mile over this five year period and about 92 collisions per year. Approximately 46% of these collisions occurred at intersections.

The intersections at which collisions were most common did not always coincide with the highest collision corridors. East Hillsdale Boulevard at U.S. 101 had the most collisions (12) of any San Mateo intersection between 2007 and 2011. South Delaware Street at 2nd Avenue and East Poplar Avenue at North Idaho Street were the two intersections with the next highest numbers of collisions, with seven and four collisions, respectively.

Collisions involving bicycles and pedestrians are shown in Figure B- 14 and Figure B- 15, respectively. It is hard to determine common collision locations for bicycle and pedestrian collisions, due to the relatively small sample size. Therefore, for pedestrian and bicycle collisions, it may be more useful to identify common collision corridors or areas. There is a clear concentration of both bicycle and pedestrian collisions in downtown San Mateo, most likely due to bicycle and pedestrian travel being heaviest in downtown. El Camino Real is the one clearly identifiable corridor for high numbers of pedestrian collisions and, to a lesser degree, bicycle collisions.

Primary Collision Factor

The primary factors that led to collisions over this five year period are highlighted in Figure B-12. Violations involving turning movements and required signals accounted for more than one fifth of collisions. Speed was the second most common collision factor at almost 15%, while driving under the influence was the primary factor in about 11% of collisions.

FIGURE B- 12 TOP 5 PRIMARY COLLISION FACTOR VIOLATIONS

PRIMARY COLLISION FACTOR	% OF COLLISIONS (2007-2011)
Turning Movements and Required Signals	20.5%
Basic Speed Law	14.8%
DUI (alcohol or drugs)	11.4%
Improper Starting or Backing	6.9%
Stop Sign Intersections	4.4%

A closer look at the three corridors with the most collisions reveals specific challenges to each context. Speed was the key factor in a plurality of collisions along El Camino Real and Hillsdale Boulevard. However, along South Delaware Street, failure to stop at red lights and use signals while turning were the most common factors.

FIGURE B- 13 ALL COLLISIONS 2007-2011

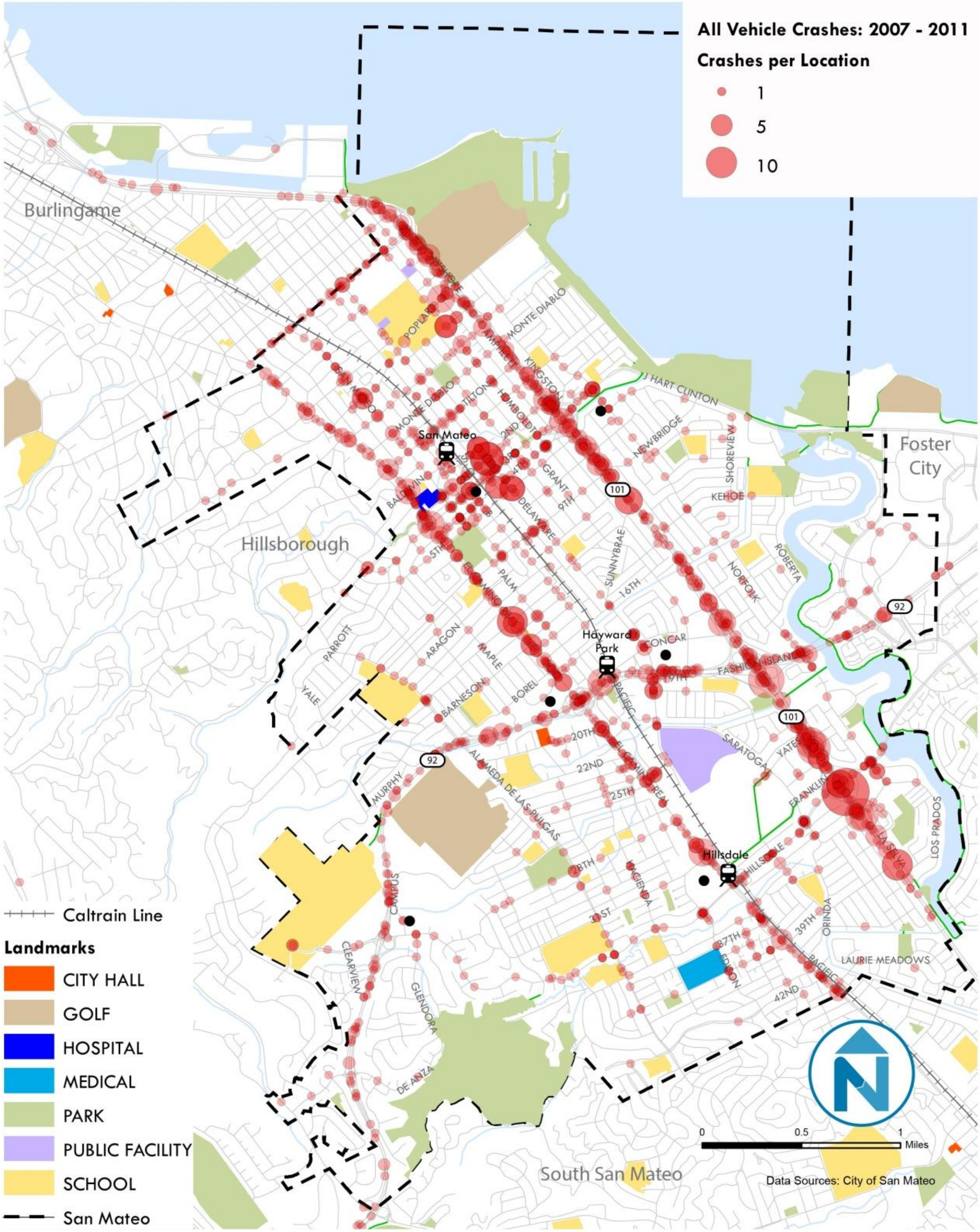


FIGURE B- 14 BICYCLE COLLISIONS 2007-2011

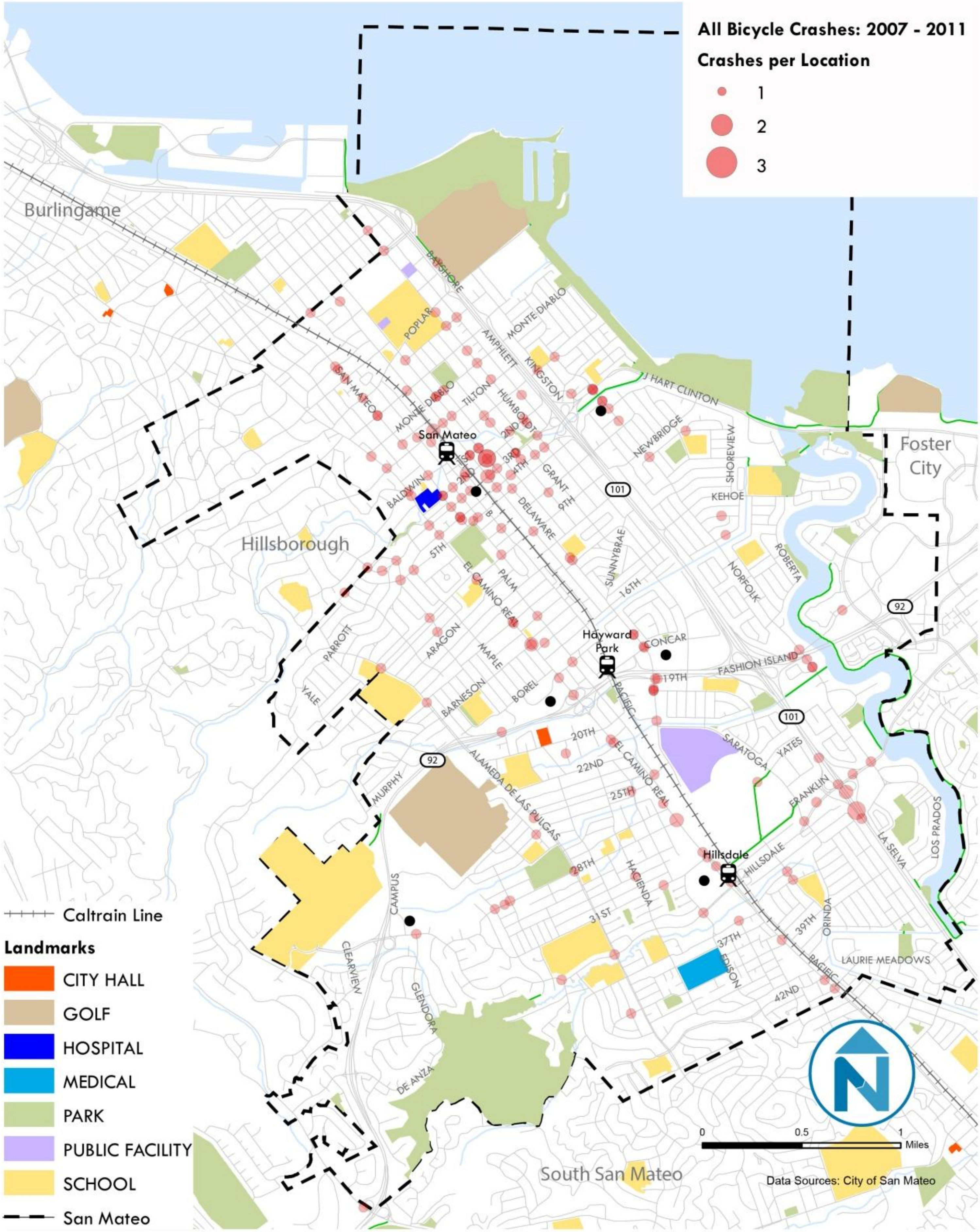
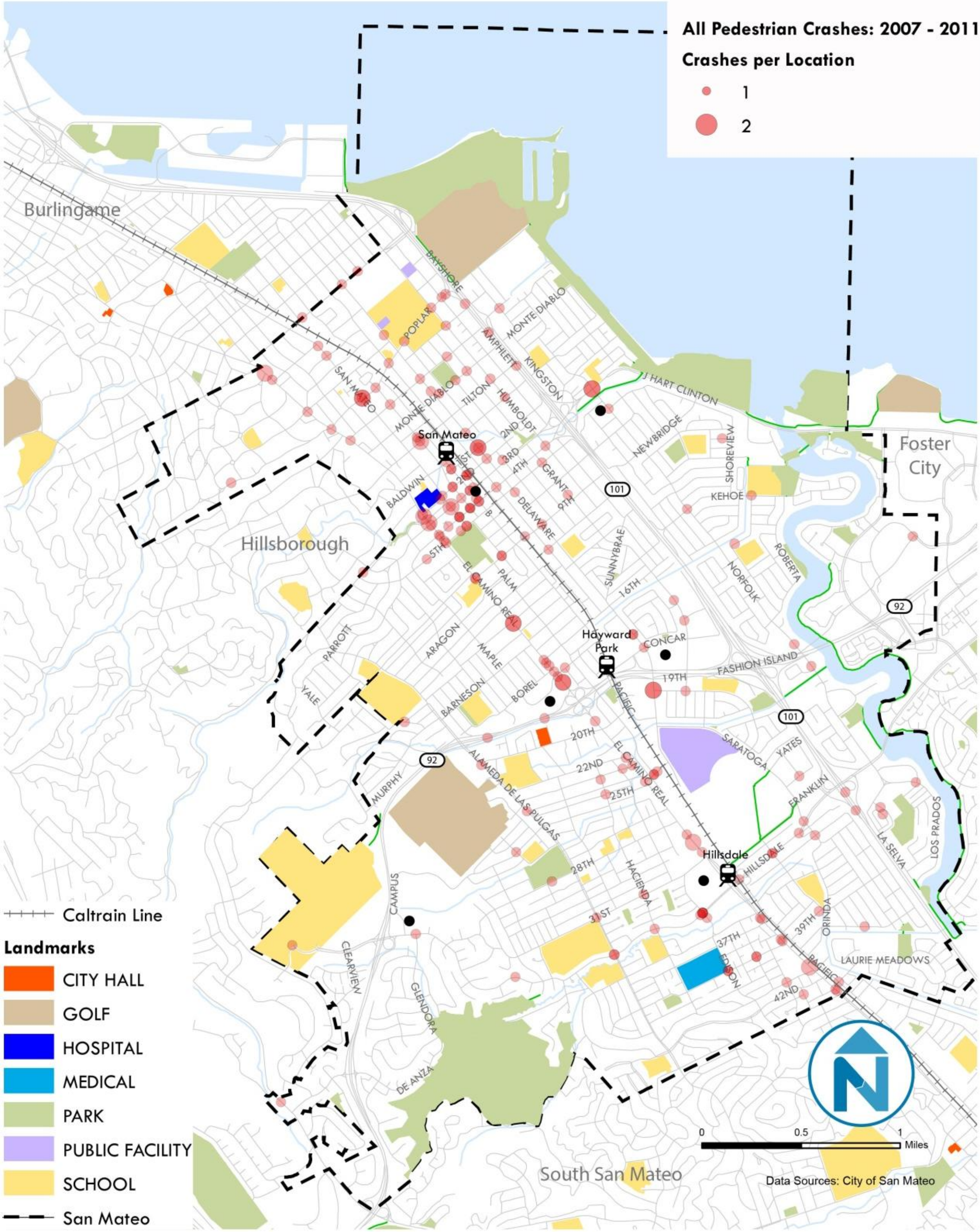


FIGURE B- 15 PEDESTRIAN COLLISIONS 2007-2011



Collision Types

Sideswipe collisions were the most common type of collision (25%) recorded over the 2007-2011 time period, as shown in Figure B-16. Sideswipe, rear end, and broadside collisions each made up more than 20% of all collisions, and together, these three types represented more than 70% of collisions.

FIGURE B- 16 MOST COMMON COLLISION TYPE

COLLISION TYPE	% OF COLLISIONS (2007-2011)
Sideswipe	25.2%
Rear end	23.1%
Broadside	22.9%
Hit Object	11.3%
Vehicle + Pedestrian	7.5%

Vehicle Involvement

Between 2007 and 2011, there were 201 (7.9%) collisions involving pedestrians and 192 (7.5%) involving bicyclists.[7] Bicyclists were listed as at fault in approximately two-thirds of bicycle-involved collisions in this time period. In pedestrian collisions, passenger cars were most commonly at fault (57%).

Roughly 47% of collisions involving bicyclists occurred at intersections, with clusters of incidents along South Delaware Street at Charles Lane and at 2nd Avenue, S.R. 82/El Camino Real at Barneson Avenue, and 3rd Avenue between Norfolk and El Camino Real. Along Delaware Street and El Camino Real, failure to stop at a red light and driving on the wrong side of the road were the most common violations leading to bicycle-involved collisions.

Roughly 39% of collisions involving pedestrians occurred at intersections, with notable clusters along S.R. 82/El Camino Real at 3rd and 5th Avenues and at several intersections along South Delaware Street. In these locations, the most common violation was failure to yield right-of-way at crosswalks.

Collision Severity

SWITRS categorizes collisions according to their severity. There were 70 fatal and severe injury collisions in San Mateo between 2007 and 2011, or 3% of all collisions.

Collisions involving vulnerable street users (bicyclists and pedestrians) were three to six times as likely to be fatal or severe. For bicycle collisions, almost 10% were fatal or severe and these were most frequently broadsides. These 19 collisions were not clustered at any particular intersection, though a plurality were on Hillsdale Boulevard, 2nd Avenue, or El Camino Real. Fatal or severe pedestrian collisions accounted for more than 17% of all pedestrian collisions (35 of 201 total). One fatal and one severe injury collision occurred at the El Camino Real/Bovet Road intersection. In general, these 35 collisions tended to occur along El Camino Real, Delaware Street, San Mateo Drive, 4th Avenue, and Edison Street.

Bicycle and Pedestrian Collisions per Mile on El Camino Real

The Grand Boulevard Initiative examined crashes per mile on El Camino Real in cities throughout San Mateo County. The city of San Mateo had one of the lowest rates of pedestrian and bicycle crashes per mile on El Camino, and this metric also had a decreasing trend between the 2002-2005 and 2007-2010 periods. There was an average of about 2.75 pedestrian crashes per mile on El Camino Real in the city between 2002 and 2005 and about 1.75 between 2007 and 2010. For bicycle crashes, the average decreased from about 2.5 to 1.75 on average (Grand Boulevard Initiative 2011).[8]

Despite performing well in crash rates along El Camino Real relative to other cities, the city of San Mateo has higher overall rates of pedestrian and bicycle crashes than neighboring cities. These statistics are highlighted in the Public Health Impacts section of the Task 2.1 - Best Practices Review memo (Appendix A).

STREET NETWORK NEEDS

WALKING AUDIT

A walking audit of the San Mateo street network was conducted on January 14, 2014 to identify needs across the city. Key corridors examined during this audit included El Camino Real, Concar Drive, Saratoga Drive, 17th Avenue, 20th Avenue, and 25th Avenue.

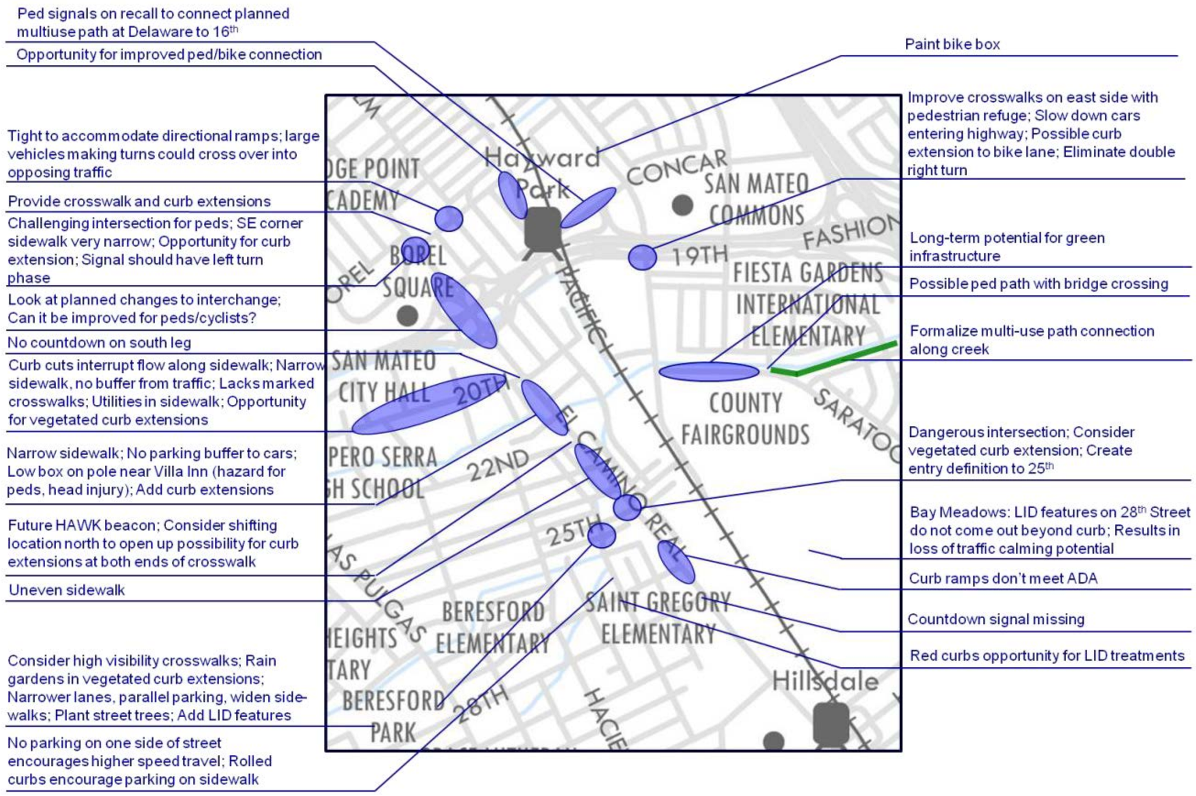
Along El Camino Real, noted issues included the need for wider sidewalks, curb extensions, parking buffers, improved ADA clearance, vegetation, better signal phasing for pedestrians, and improved non-motorized access at the interchange with Highway 92.

Concar Drive currently does not function well from a pedestrian perspective, and there is a need for pedestrian signals to provide connections to a planned multiuse path. Opportunities also exist along Saratoga Drive for more green infrastructure and better connections to a creek-side multiuse trail.

Along streets such as 20th Avenue, identified needs included wider sidewalks, buffering from traffic, better crosswalk marking, curb extensions, and removal of utilities and other poles from the sidewalk clearance area.

These and other issues are illustrated in Figure B- 17.

FIGURE B- 17 WALKING AUDIT FINDINGS



COMMUNITY-IDENTIFIED NEEDS

Community input on the Sustainable Streets Plan was gathered through two methods: a community survey and public workshops. In each case, San Mateo residents and employees were asked to identify community needs conceptually and at specific locations.

Community Survey

The results of the community survey, which was administered via email between September and November 2013, illustrate the general support of San Mateo residents in bringing more of the city's streets in line with Complete Streets principles. While 43% of respondents were unfamiliar with the term Complete Streets, more than two-thirds of respondents agreed that streets should be friendly to all modes and that they should be designed using green principles, and almost 80% would support a Complete Streets Ordinance for San Mateo. Strong multimodal support was also demonstrated by response to a question about transportation budgets; respondents would dedicate an average of $66 out of a $100 budget to non-auto modes.

Respondents identified several concerns about streets. The top needs identified included addressing vehicle congestion and traffic issues, providing more safe and convenient bike lanes, and providing more sidewalk amenities (such as benches, street furniture, art, etc.). Respondents also suggested several specific street infrastructure improvements, including:

» High-visibility crosswalks

» Road pavement improvements and maintenance
» Curb ramps
» Street lighting
» Street trees and landscaping
» Bicycle lane striping
» Trail/path improvements
» Stormwater management
» Bicycle parking

Generally, the community prioritized bicycle, pedestrian, and transit improvements over road-expansion projects and supported the replacement of a small number of vehicle parking spaces with 10 to 20 on-street bicycle parking spaces. They responded that high-volume vehicle streets as well as streets with high volumes of bicycle and pedestrian traffic should get the first priority for infrastructure improvements. Most of the locations that received less support for priority investment, such as areas near employment centers or transit corridors, overlap with the high-vehicle, high-pedestrian, and high-bicycle-volume locations.

Respondents were somewhat representative of San Mateo residents as a whole. They had a slightly higher tendency than residents overall to take transit or bike to work or to work from home. Despite this potential bias toward sustainable transportation choices, 35% of respondents would drive alone for trips under one mile, and respondents were much more likely to own two or more vehicles than the population as a whole. The respondent population was also less economically and ethnically diverse than the whole San Mateo residential population. However, because the survey underrepresented groups that might benefit most from sustainable streets—households with low or no access to private vehicles, low incomes, and racial/ethnic-minority backgrounds—support for Complete Streets interventions might be higher than the survey indicates.

Workshop

In addition to a series of "Taste and Talk" events, where attendees were exposed to educational presentations about sustainability and transportation, a Community Design Workshop was held in September 2013 to gather direct feedback from the community. People who came to the workshop offered thoughts on project goals and objectives as well as concerns about specific locations in San Mateo's street network. Their recommendations included:

» Pedestrian improvements such as adding or improving crosswalks, providing ADA access and pedestrian lights
» Bicycle improvements such as bike lanes, bike paths, and maintenance of bike routes
» Non-motorized access opportunities across railroad lines, arterials, and the freeway
» Streetscape improvements such as curb extensions and gateway treatments in downtown and median shade trees along El Camino Real
» Speed controls such as speed bumps and other traffic-calming strategies
» Other geometric changes such as lane restriping, roundabouts, and road reconfiguration

Generally, traffic-calming needs are spot-specific and focused in the downtown area, while bicycle and pedestrian improvements are needed throughout San Mateo, reflecting the networked nature of those types of infrastructure.

Additionally, people communicated a consistent need for bicycle and pedestrian access improvements near freeway interchanges and near the railroad tracks.

Two unique community recommendations were for gateway treatments leading into downtown and intelligent parking systems to alleviate circling for parking. People also communicated a desire for road diets and support for parking restrictions.

Figure B-18 and Figure B-19 illustrate attendees' feedback regarding bicycle and pedestrian and traffic-calming needs.

FIGURE B- 18 BICYCLE AND PEDESTRIAN COMMUNITY FEEDBACK

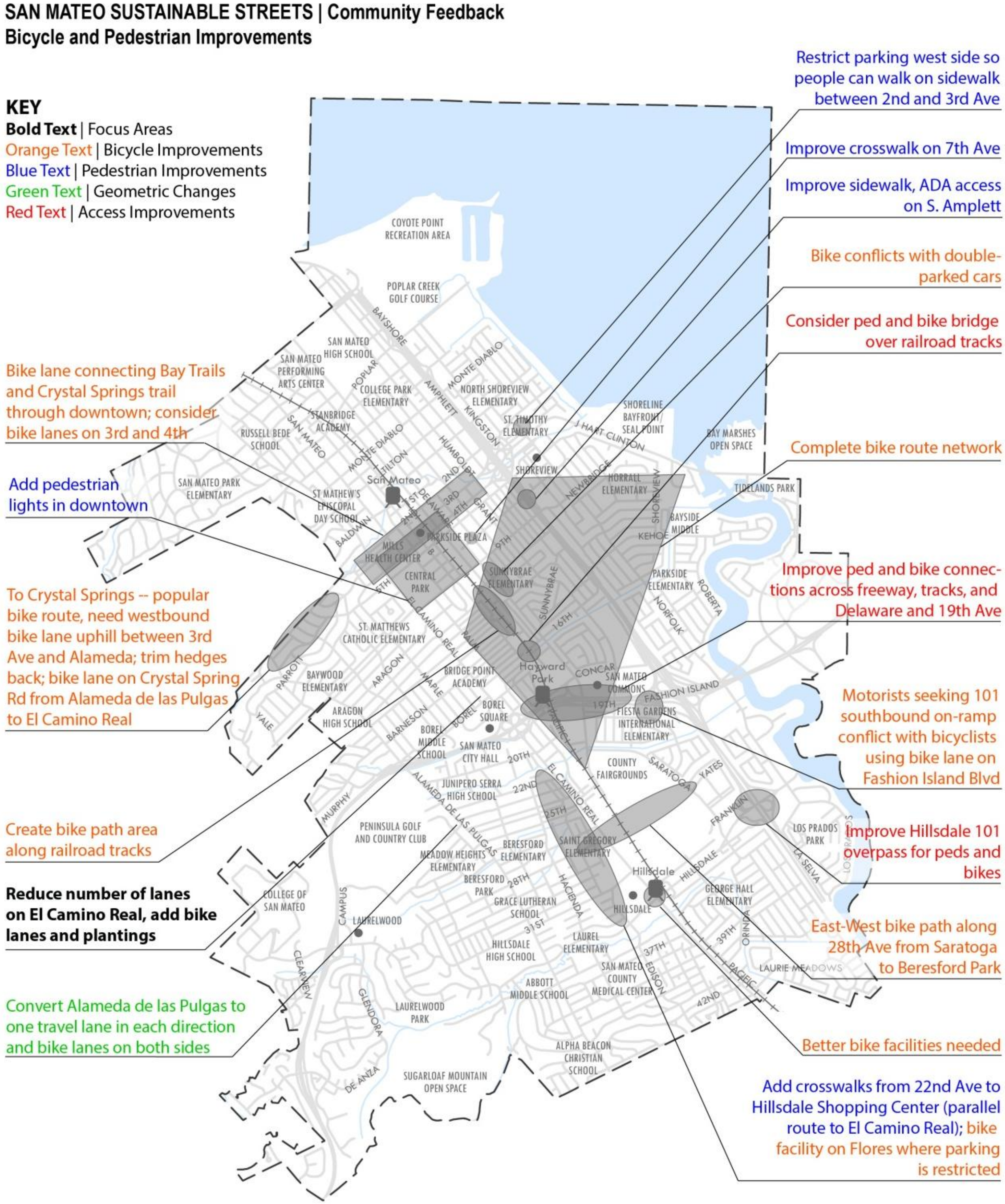
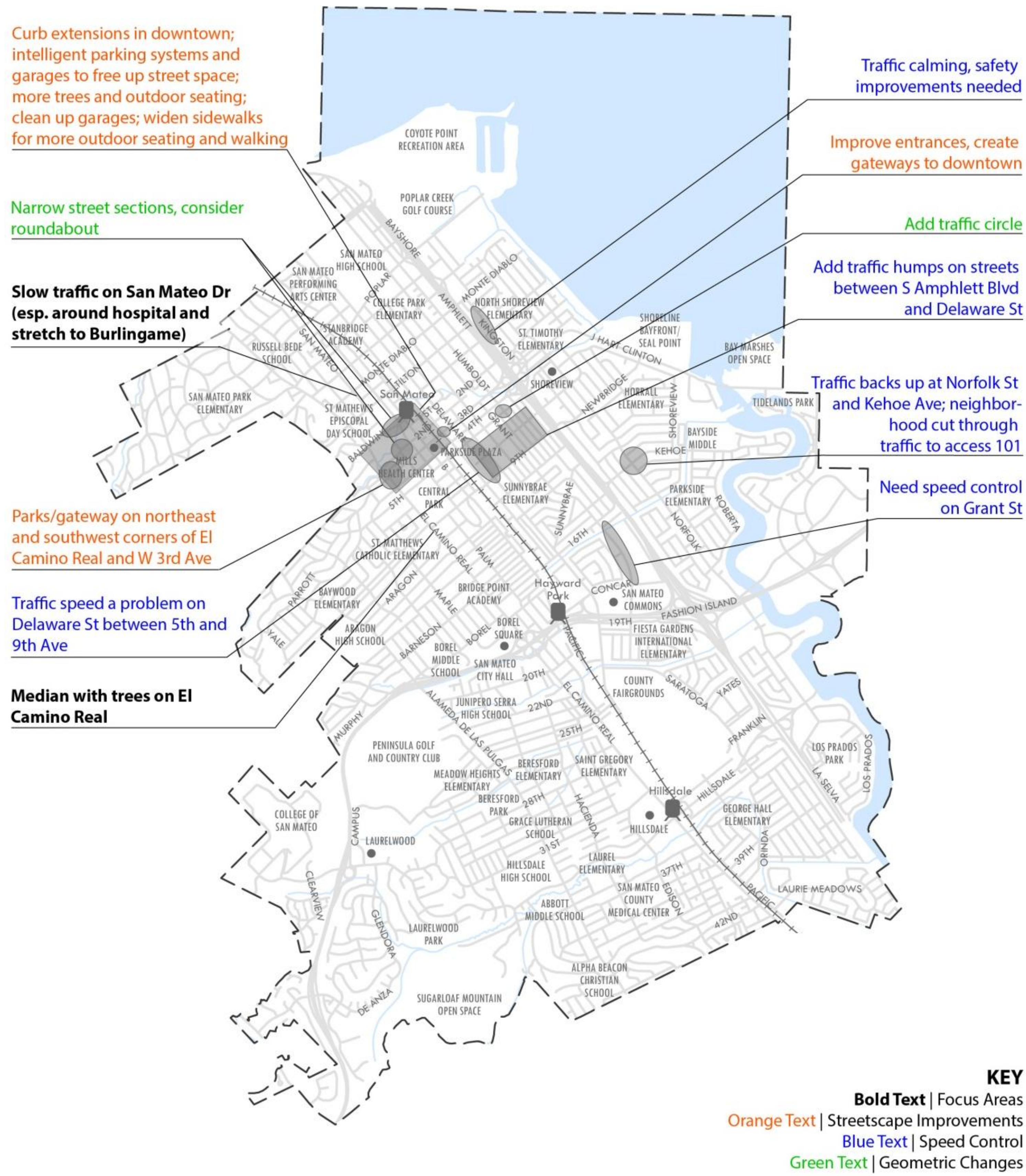


FIGURE B- 19 TRAFFIC CALMING COMMUNITY FEEDBACK

SAN MATEO SUSTAINABLE STREETS | Community Feedback
Traffic Calming Improvements



ADOPTED PLANS

There are four major San Mateo plans that influence the direction of the San Mateo Sustainable Streets planning process: Vision 2030 (the General Plan), the Sustainable Initiatives Plan, the Pedestrian Master Plan, and the Bicycle Master Plan. Each of these plans sets a high level vision for the future of San Mateo and its streets. Figure B-20 presents a summary of relevant guidance from each of these plans.

FIGURE B- 20 RELEVANT GUIDANCE FROM RECENTLY ADOPTED PLANS

PLAN	PURPOSE	GUIDANCE
Vision 2030 (General Plan)	Guides the long-term physical development of the city	**Circulation:** Use context-specific performance metrics for streets; pace roadway improvements with on-going development; establish a TDM program for downtown and for large developments; increase bus ridership; develop and maintain comprehensive bicycle and pedestrian networks; maintain sidewalk accessibility for all pedestrians **Conservation:** Meet Environmental Protection Agency water quality standards; adopt low-impact design principles and encourage open spaces, trail systems, scenic roadways, and street trees; manage and operate public infrastructure in an environmentally, socially, and economically sustainable way **Safety:** Maintain evacuation routes; mitigate flood risks to life and property damage **Noise:** Mitigate traffic and railroad noise
Sustainable Initiatives Plan	Sets climate-change and built-environment goals that relate to the behavior of the general public (as opposed to the Climate Action Plan, which addresses City activities)	**Climate Change:** Reduce greenhouse gas emissions and monitor progress annually **General Plan:** Integrate transportation and land use **Transportation:** Increase bicycle and pedestrian mode share; reduce single-occupant vehicle usage; develop baseline metrics and evaluate progress **Suburban Forest:** Expand the suburban forest **Water:** Promote water-reduction strategies **Public Outreach and Communication:** Develop a campaign to encourage sustainable behavior related to energy, water, and transportation
Pedestrian Master Plan	To fulfill General Plan Policy C4.4, which calls for the development of a pedestrian master plan	**Vision:** "A continuous pedestrian network that supports active living, provides for safe and healthy transportation, and enables people of all ages and abilities to access jobs, recreation, school, shopping, and transit by foot as a part of daily life." **Recommendations:** Create a Greenway Pedestrian Corridor Network and a Flexible Zone Parklet Pilot Program; implement intersection and segment-specific improvements; update zoning
Bicycle Master Plan	To fulfill General Plan Policy C4.1, which calls for the development of a bicycle master plan	**Vision:** "A transportation system that supports the City's goals for sustainability, active living, and a sense of community where bicycling is an integral part of daily life." **Recommendations:** Pursue a Complete Streets policy; implement

PLAN	PURPOSE	GUIDANCE
		the proposed bicycle network projects and parking facilities; ensure right-of-way is preserved for bicyclists through an effective development review process; revise the Vehicle and Traffic Code and Zoning Code to be more bicycle-friendly; implement bicycle wayfinding

Other plans and programs that have been used to inform the recommendations of this Plan include the Neighborhood Traffic Management Program, the Grand Boulevard Initiative, Designing El Camino Real as a Complete Street, the San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook, the San Mateo Rail Corridor Transit-Oriented Development Plan, the San Mateo County Comprehensive Bicycle and Pedestrian Plan, the Hillsdale Station Area Plan, Aging Well in San Mateo, and the 2012 California Manual on Uniform Traffic Control Devices.

All of these plans and programs are further described below.

GENERAL PLAN – "VISION 2030"

Vision 2030[9], San Mateo's General Plan, guides the long-term physical development of the city and was updated in 2010. The General Plan includes the seven state-mandated elements: land use, circulation, housing, urban design, conservation, safety, and noise. Each element contains a set of goals, objectives, and implementable policies.

The circulation, conservation, safety, and noise elements pertain to the Sustainable Streets planning effort. The section below summarizes the relevant policy directions included in each of these elements.

Circulation

» Design and regulate streets according to their functional classification; this includes minimizing traffic volumes and speeds on neighborhood streets and minimizing curb cuts on arterial streets

» Adopt Level of Service (LOS) as a performance metric for streets. The lowest allowable level of service for all intersections is mid-LOS D

» Enact a transportation-fee ordinance to require developers to pay for both on- and off-site transportation improvements, where applicable

» Prioritize roadway improvements to correlate with the pace of development and balance the needs of all street users when designing intersection improvements

» Establish a TDM program for Downtown and the rail corridor and require developments that add more than 100 peak-hour trips to prepare a TDM program

» Increase bus ridership and encourage Caltrain use through service and access improvements

» Support the grade separation of rail

» Develop and maintain a comprehensive bicycle and pedestrian circulation network

» Require developments to provide sidewalks and wheelchair ramps and to site street furniture to allow for wheelchair and pedestrian flow

» Implement the transportation objectives of the Sustainable Initiatives Plan that cover increasing the use of sustainable modes and evaluating progress (summarized below)

Conservation

» Ensure no negative hydrological impacts from improvements to creeks and waterways
» At a minimum, meet Environmental Protection Agency water-quality standards
» Adopt low-impact design principles and encourage the provision of open spaces, trail systems, scenic roadways, and street trees
» Protect heritage trees and require replacement planting when removal is necessary
» Promote public awareness and education on conservation issues
» Manage and operate public infrastructure in an environmentally, socially, and economically sustainable way

Safety

» Mitigate risks to life and property damage from floods
  - Assure San Mateo's seven watershed areas are capable of draining and conveying water during a typical storm event
  - Consider programs for creek maintenance, education, and enforcement

» Minimize risks to life, environment, and property through emergency preparedness
  - Maintain evacuation routes on arterial streets as identified in General Plan Figure C-1: Street Classification

Noise

» Minimize unnecessary, annoying, or unhealthful noise
» Mitigate traffic (especially along U.S. 101 and S.R. 92) and railroad noise by installing sound walls and open-space buffers where applicable

SUSTAINABLE INITIATIVES PLAN

The Sustainable Initiatives Plan[10] (SIP) is included as Appendix K to the 2030 General Plan. It was developed by the Sustainability Advisory Committee in 2007 and makes recommendations for local and regional action on several aspects of sustainability. Figure B- 21 outlines the recommendations related to the Sustainable Streets Plan.

FIGURE B- 21 SUSTAINABLE INITIATIVES PLAN RECOMMENDATIONS

SECTOR	RECOMMENDATIONS
Climate Change	Reduce greenhouse gas (GHG) emissions each year and monitor progress
General Plan	Incorporate sustainability principles into the Circulation Element; strengthen water conservation objectives; integrate transportation and land use
Transportation	Increase bicycle and pedestrian mode share; reduce single occupant automobile usage; reduce single purpose school trips; develop baseline measures to evaluate progress
Built Environment	Develop a voluntary-to-permanent program to require LEED silver standards for new developments and buildings
Suburban Forest	Expand the suburban forest
Water	Promote water reduction strategies; evaluate potential water-recycling uses
Public Outreach & Communication	Create an informational campaign to spark behavior change related to energy, water, and transportation

PEDESTRIAN MASTER PLAN

The San Mateo Citywide Pedestrian Master Plan[11] uses the General Plan and Sustainable Initiatives Plan as its main guiding documents. It fulfills Policy C 4.4 of the General Plan, which calls for the development of a pedestrian master plan.

The plan presents six conceptual goals to achieve this vision: mobility, safety, infrastructure and support facilities, programs, equity, and implementation. The following Plan elements and recommendations relate to the Sustainable Streets planning effort:

PEDESTRIAN MASTER PLAN VISION

"A continuous pedestrian network that supports active living, provides for safe and healthy transportation, and enables people of all ages and abilities to access jobs, recreation, school, shopping, and transit by foot as a part of daily life."

» Identify a Greenway Pedestrian Corridor Network including major infrastructure, intersection, and crossing improvements

» Implement a Flexible Zone Parklet Pilot Program, pedestrian scale lighting, high visibility crosswalks, and other pedestrian amenities (detailed design and location provided)

» Use provided network maps and tables listing locations for specific improvements (most of which include high-visibility crosswalks, pedestrian-scale lighting, and signal timing changes)

» Priority locations with $1 million or more in recommended improvements including intersections with and/or segments of:

- 20th Avenue
- 37th Avenue
- 3rd Avenue
- 4th Avenue
- Alameda de Las Pulgas
- Delaware Street
- El Camino Real
- Hillsdale Boulevard
- Humboldt Street
- Monte Diablo Avenue

- Norfolk Street
- Palm Ave
- Poplar Ave
- San Mateo Drive

» Use proposed revised zoning-code language to:

- Require more open space in the Central Business District
- Prohibit parking on the sidewalk
- Limit the extension of tree branches into sidewalk space
- Permit additional sidewalk seating at restaurants
- Limiting the requirements for off-street parking and loading where outdoor restaurant seating and/or merchandise displays are provided

BICYCLE MASTER PLAN

BICYCLE MASTER PLAN VISION

"A transportation system that supports the City's goals for sustainability, active living, and a sense of community where bicycling is an integral part of daily life."

Like the Pedestrian Plan, San Mateo's Bicycle Master Plan[12] uses the General Plan and Sustainable Initiatives Plan as its main guiding documents. It fulfills General Plan Policy C 4.1, which calls for the development of such a plan.

The Bicycle Master Plan adopts General Plan Figure C-5 (see Figure B-22) as the recommended future bicycle network, which includes specific bicycle facility types and their locations. Seven overarching goals guide the plan, the first two of which are taken directly from the SIP and the General Plan. These goals cover the development and maintenance of comprehensive bicycle and pedestrian networks, increasing bicycle and pedestrian mode share, the provision of support facilities for bicyclists (e.g. bicycle parking) and related education, encouragement, evaluation, and enforcement programs, and "timely and efficient" implementation of bicycle-network expansions.

Specific recommendations that should be considered in the Sustainable Streets planning effort include:

» Implement proposed bicycle network and parking facilities using the project list in the plan

» Pursue a Complete Streets Policy that:13

- Specifies 'all users' as pedestrians, bicyclists, transit vehicles and users, and motorists of all ages and abilities
- Aims to create a comprehensive, integrated, connected network
- Recognizes the need for flexibility and directs that solutions fit within each individual context
- Is adoptable by all agencies to cover all roads
- Applies to design, planning, maintenance, and operations of new and retrofit projects
- Specifies any exceptions and sets a clear procedure for high-level approval
- Directs the use of the latest and best design standards

- Establishes performance measures with measurable outcomes

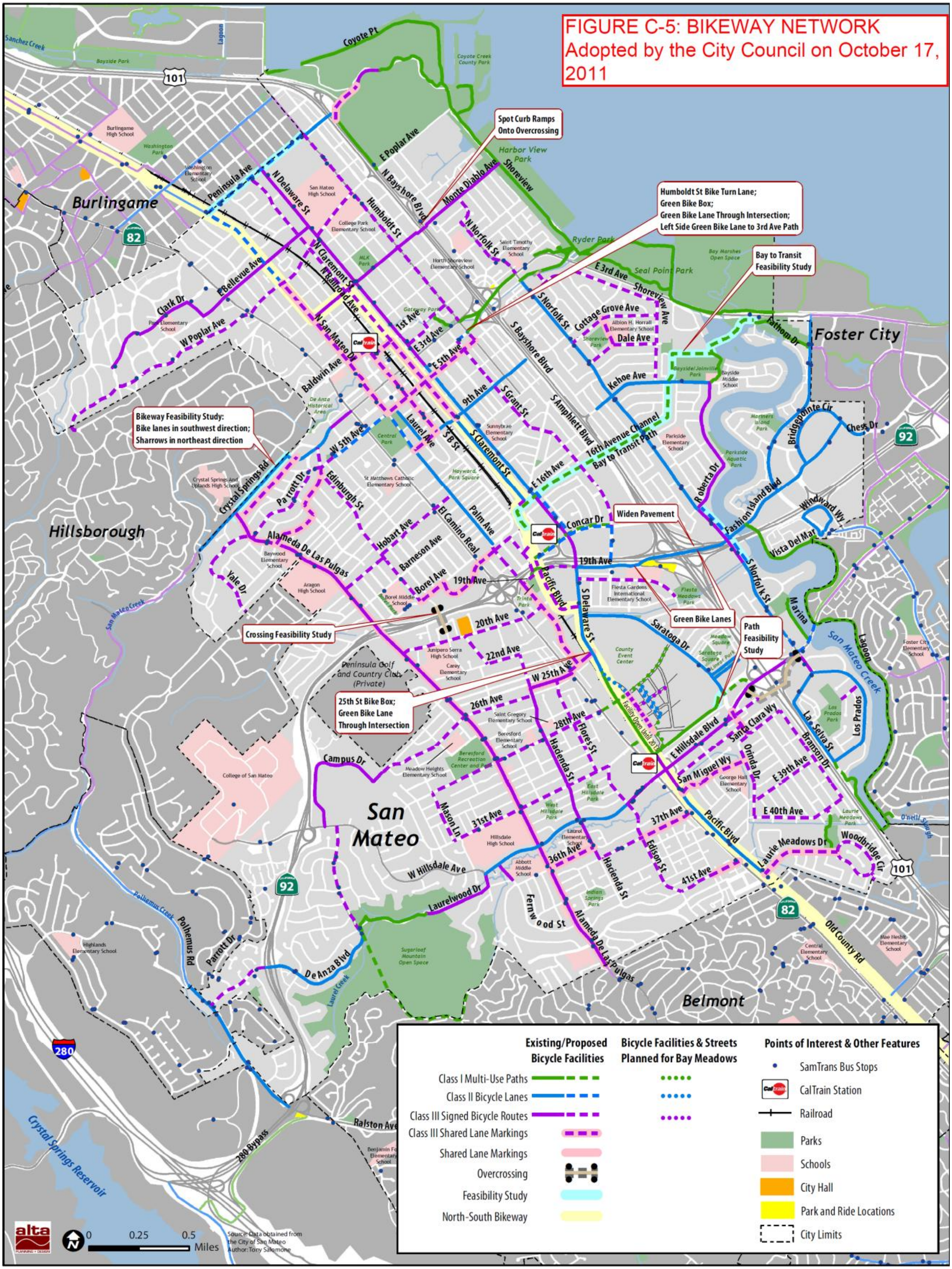
» Establish an "effective review process" to ensure that the City purchases and developers set aside the General Plan-required right-of-way for the bicycle network

» Revise the Vehicle and Traffic Code and Zoning Code to be more bicycle-friendly:

- San Mateo Vehicles and Traffic Code 11.56.100, Riding – On Roadway or Sidewalk: revise to conform with California Vehicle Code Section 21202
- San Mateo Zoning Code 27.64.080, Use of Parking and Garage Facilities: revise to allow residential and off-street parking and garage facilities to be used for bicycle parking

» Implement bicycle wayfinding signage using designs in the Plan

FIGURE B- 22 SAN MATEO GENERAL PLAN FIGURE C-5: BIKEWAY NETWORK



DOWNTOWN AREA PLAN

» Adopted in 2009, the San Mateo Downtown Area Plan [14] covers a geographic area of approximately 70 city blocks, bounded by El Camino Real, Tilton Avenue, San Mateo Creek, U.S. 101, 5th Avenue from U.S. 101 to Delaware, and Ninth Avenue from Delaware to El Camino Real. It includes seven sub-areas with distinct characters and needs.[15]

Eight goals guide the plan toward achieving this vision, five of which directly relate to the Sustainable Streets planning effort. Specific policies and actions are proposed within each goal.

DOWNTOWN AREA PLAN VISION

"Downtown San Mateo provides for a pedestrian-friendly environment lending to its charm as a traditional center of the community. In the next years, the blend of historic buildings and new development will provide for a mix of retail, entertainment, and housing opportunities. Central Park will provide a unique opportunity as an open space, recreational, and cultural resource for the downtown, as well as the entire community. The downtown will remain a focal point of the community, both as a reminder of its historic heritage, and as a harbinger of San Mateo's role as the pre-eminent City in San Mateo County."

» Enhance Downtown's role as the City Center and maintain its unique sense of place

» Enhance the Downtown's pedestrian environment and enhance the safety and attractiveness of Downtown

» Ensure adequate parking to meet expected needs, enhance the quality of the parking environment, and improve public perceptions about parking availability

» Facilitate ease of access without impacting Downtown's character and sense of place

» Support sustainable initiatives in Downtown

The immediate priorities include the establishment of a public plaza, the completion of 4th Avenue pedestrian improvements, the implementation of a new financing mechanism for Downtown parking, the creation of an improvement district to fund Downtown improvements and maintenance, and support for sustainable transportation initiatives.

NEIGHBORHOOD TRAFFIC MANAGEMENT PROGRAM

The San Mateo Neighborhood Traffic Management Program (TMP),[16] adopted in 2006, sets the City's traffic-calming policy and presents a program of traffic-impact mitigation using the "three E's" – education, enforcement, and engineering. The overarching goal is to make residential streets as quiet and safe as possible. It serves to implement two specific General Plan policies: minimizing traffic diversion (General Plan Policy C 1.1) and protecting local streets (General Plan Policy 1.3).[17]

The TMP is a policy document that creates a framework for traffic-calming improvements. Two categories of improvements are defined, as shown in Figure B-23. "Step 1" measures can be implemented on any city street, while "Step 2" measures alter traffic patterns and, therefore, need review and approval from the Public Works Commission. Approved Step 1 and Step 2 measures are the only measures to be used on San Mateo streets.

FIGURE B- 23 APPROVED TRAFFIC CALMING TOOLBOX

STEP 1 MEASURES	STEP 2 MEASURES
Community Outreach/Education	Stop Signs
Police Enforcement of Speed Limits	Turn Restriction Signs
Speed Display Units	Curb Extensions
High Visibility Crosswalks	Speed Cushions & Raised Surfaces
Speed Limit Signs and Legends	Roundabouts & Traffic Circles
Narrow Lane Striping	Median Barriers
	One-Way Street Conversions

Citizens initiate the traffic-calming process through a request to the Public Works Department. After it is reviewed, Step 1 improvements can be implemented accordingly. The City then monitors conditions to determine if traffic-calming thresholds are met. If they are, the City commences a neighborhood-support process while evaluating other neighborhood streets for Step 2 criteria. The neighborhood-support process requires a resident petition and the support of the local homeowners or neighborhood association(s).

Generally, Step 2 measures can only be implemented where a street is not a General Plan collector or arterial, an emergency-response route, or a bus or truck route. The street must have an appropriate location for the device to be installed; a majority of impacted residents and businesses must support the measure(s); and the measure must not cause undue traffic diversions to other neighborhood streets.

OTHER RELEVANT PLANS

Grand Boulevard Initiative – Multimodal Transportation Corridor Plan

The Grand Boulevard Initiative[18] is a multijurisdictional planning process to reshape the El Camino Corridor into a "place for residents to work, live, shop, and play, creating links between communities that promote walking and transit and an improved quality of life."[19] The Grand Boulevard Initiative examines existing conditions and proposed improvements in detail. It sets forth a multimodal access strategy, street design guidelines, recommendations for future transit service, and policy options for overall operations and management of the corridor.

The four key objectives of multimodal access are as follows:

» Create space within the right-of-way for multiple travel modes

» Provide the facilities needed to promote multimodal travel

» Differentiate mobility policies to reflect corridor-development policies

» Apply Grand Boulevard Initiative-based performance measures in project planning and evaluation

Designing El Camino Real as a Complete Street

Designing El Camino Real as a Complete Street[20] is a project funded by a TIGER II Planning Grant to design four model segments of the corridor. It is meant to test the complete streets design process outlined in the Grand Boulevard Initiative Multimodal Transportation Corridor Plan. It looks at segments of El Camino Real in Daly City, South San

Francisco, San Bruno, and San Carlos. Outcomes from these pilot projects will likely impact future efforts in San Mateo. The project is expected to be complete in the summer of 2013.

San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook

This guidebook[21] "provides designers, builders, municipal staff, and other interested groups practical and state-of-the-art information on creating low-impact-development roadways and parking lots within San Mateo County" (Nevue Ngan Associates, Sherwood Design Engineers 2009).[22] It is guided by three sustainable stormwater-management design principles:

» Manage stormwater at the source and on the surface. As soon as rainfall lands on a street or parking lot, allow it to infiltrate into the ground or provide surface flow to nearby landscaping.

» Use plants and soil to absorb, slow, filter, and cleanse runoff. Let nature do its work.

» Design stormwater facilities that are simple, cost-effective and enhance community aesthetics. Stormwater facilities can be beautiful!

The guidebook does not prescribe solutions at specific locations, but rather defines five typologies and presents the best stormwater facilities for those types. They are: low-density residential, high-density residential, commercial main streets, arterials and boulevards, and parking lots.

San Mateo Rail Corridor Transit-Oriented Development Plan

Adopted in 2005, this plan[23] addresses development within a half-mile radius of the Hillsdale and Hayward Park Caltrain station areas. The policies and objectives of this plan are to:

» Increase multimodal accessibility to these station areas, enhancing the appeal of transit

» Concentrate transit-oriented development (TOD) in these station areas

» Encourage higher intensity land uses that synergize well with transit

» Maintain and improve development for existing residents and businesses

The Rail Corridor TOD Plan includes circulation and land-use components, design guidelines to protect and enhance the character of station-area communities, and a phased implementation plan.

San Mateo County Comprehensive Bicycle and Pedestrian Plan

The 2011 San Mateo County Comprehensive Bicycle and Pedestrian Plan[24] designates Pedestrian Focus Areas and a Countywide Bikeway Network. The Plan recommends two county bikeways through the city of San Mateo (the "Bay Trail" and the "North-South Bikeway"). It also recommends focusing pedestrian enhancements around El Camino Real and the Caltrain corridor through San Mateo.

Hillsdale Station Area Plan

San Mateo has one Caltrain Station Area Plan, which covers Hillsdale.[25] Adopted in 2011, the plan "establishes criteria for new mixed-use developments and encourages shared parking with Caltrain users, facilitates the establishment of a new transportation hub for Caltrain and other mass transit services, and plans for new pedestrian/bicycle access connections from west of El Camino Real to the station area."[26]

Aging Well in San Mateo

Aging Well,[27] a report on the needs of people over 50 in San Mateo, "helps guide the development of strategies, policies, and programs for both the City government and the larger community to establish San Mateo as an aging friendly community." Among other things, it addresses the issue of maintaining the mobility of aging adults, especially for those who cannot drive.

2012 California Manual on Uniform Traffic Control Devices (MUTCD)

The California MUTCD[28] incorporates the Federal MUTCD and governs the design, application, and placement of all traffic-control devices in California.[29] Any deviations from the MUTCD require an official request to experiment.[30]

EVALUATION AND INSTITUTIONALIZATION

The ongoing evaluation and communication of San Mateo's performance, whether related to its street network or its adopted plans and policies, encourages progress through accountability. Institutionalization is the practice of formalizing evaluation and Complete Streets principles into the planning processes of a city or agency. This section discusses gaps in San Mateo's current complete streets evaluation and institutionalization framework.

LEVEL OF SERVICE (LOS)

What gets measured determines what gets built. In San Mateo, the performance of streets and intersections is currently measured exclusively in terms of mobility and delay for motorists.

The City uses a level of service (LOS) approach as outlined in the 2000 Highway Capacity Manual (HCM 2000). LOS is a roadway and intersection rating system using letter grades from A (abundant capacity) to F (at or above capacity). It is used both to measure network performance and also as a development-review standard.

The City's threshold is LOS D, which means that streets and development-related upgrades are designed to maintain average motor vehicle delays to of 35–55 seconds or less at signalized intersections and 25–35 seconds at un-signalized intersections. For motorists, this translates into the level of delay that allows all cars to clear an intersection within one signal phase.[31] The Municipal Code and other City Ordinances include similar standards—mid-LOS D and a maximum average delay of 45 seconds—for all street segments and intersections within the city (see General Plan Circulation Policy C2.1; Municipal code §27.13.040 (b); Municipal code § 27.13.030; Ordinance 2009-7 §10).[32]

HCM 2000 has LOS standards for transit, though this has not been used in San Mateo (and is not used in most other cities). Likewise, the city has no LOS standards for bicyclists or pedestrians.

Transportation scholars and expert planners increasingly agree that using LOS solely to reflect the ease of vehicular movement marginalizes the mobility needs of pedestrians and bicyclists and undervalues design elements that promote vibrant city streets. Moreover, this automobile-focused evaluation of streets weakens the ability to shift traffic onto other modes and incentivizes the widening of streets.

In an effort to provide a more comprehensive evaluation of multimodal mobility, the 2010 Highway Capacity Manual dedicates a chapter to urban street facilities and couples LOS standards for automobiles with LOS standards for pedestrians, bicyclists, and transit users. Some of the ways in which the HCM recommends measuring LOS for non-automobile modes reflect a traffic engineering approach that does not work well for other modes. For example, pedestrian LOS from HCM 2000 assumed that pedestrian performance is better in places that are devoid of other pedestrians because it improves the speed at which people can walk and minimizes their chances of colliding with other pedestrians. The updated pedestrian LOS in HCM 2010 does not make this error, but it still fails to reflect the importance of safety, block length, building form, and street frontage on pedestrian satisfaction. Because of these and other inadequacies, several cities have embarked on creating their own Multimodal LOS (MMLOS) methodologies and standards.

A dynamic and multimodal evaluation framework for street design is necessary to optimize the versatile functions of a city's street network. San Mateo's LOS standards have a narrow view of what constitutes quality transportation. Since transit, pedestrian, and bicycle performance is not measured or incentivized within the city's approach to measuring transportation quality, some streets are not performing well for these modes. Driving is still the dominant way for people to get around, users of non-auto modes sometimes experience inconvenient and hostile conditions, and pedestrians and bicyclists are injured and killed at a rate that is many times higher than that of motorists. Furthermore, by overlooking the fact that streets themselves are places, the current approach undermines efforts to boost the vibrancy and desirability of the city.

In order to ensure that the city and its streets are designed to be vibrant, accessible, and efficient for all road users, there is a need for the City of San Mateo to alter its current LOS standards so that they reward sustainable street designs that incorporate the needs not just of automobiles, but also of pedestrians, bicyclists, and transit users. The new LOS standards should also clearly explain how to prioritize among modes or solutions where there are competing needs along the same street segment or at the same intersection.

SUSTAINABLE INITIATIVES PLAN EVALUATION RECOMMENDATIONS

Evaluation also includes tracking progress on adopted city goals and policies. The following complete streets-related evaluation recommendations were made in the Sustainable Initiatives Plan, which is Appendix K to the 2030 General Plan.

> T7: Develop baseline data and methodology to be used to evaluate progress in achieving the transportation recommendations
>
> S1: Maintain sufficiently frequent reviews of the Sustainable Initiatives Plan to ensure its continuing implementation, usefulness, and appropriately strong goals

The City has started to conduct pedestrian and bicycle counts, and this information will be important for subsequent efforts to implement new MMLOS standards. MMLOS analysis and green-street design should be considered elements of both circulation and sustainability within the City of San Mateo.

MUNICIPAL CODE

The Municipal Code establishes local laws that govern the City of San Mateo. It regulates both the current use of the public realm and how public infrastructure must change in response to urban development. The following code titles were reviewed in detail to find elements of the code that either work against Complete Streets ideals or slow their progress: Health and Sanitation, Vehicles and Traffic, Parks and Recreation, Streets and Sidewalks, Building and Construction, Transportation System Management, Signs, and Subdivisions.

The full list of codes recommended for review is provided at the end of this document. Generally, elements of the code that need to be revisited to institutionalize sustainable streets principles include:

- » Policy surrounding traffic calming
- » Allowed uses of downtown streets
- » On-street parking alignment and design
- » Parking meter placement
- » Allowed uses of meter revenue
- » Bicycle licenses
- » Bicycle parking
- » Allowable uses for public parks and open space
- » Sidewalk maintenance
- » Transportation System Management programs
- » New street design

Additionally, San Mateo currently does not have a Complete Streets Ordinance.

STREET CLASSIFICATION

Street classification is another aspect of how sustainable streets principles are—or are not—institutionalized by a city. Most cities use a classification system to divide streets into categories with associated design standards. Traditionally, these design standards are vehicle-oriented and do not take into consideration other uses of the street such as public space or non-motorized mobility.

Today, San Mateo has a built environment that is composed of streets that serve different functions and a street classification system that only considers access and mobility functions of streets. For example, roads that are classified as arterials are evaluated and designed to prioritize mobility—specifically private vehicular movements—whereas local streets are supposed to provide access to housing and local services. In the case of roads like El Camino Real and Hillsdale Boulevard, which have a combination of seemingly conflicting uses (residential, retail, commercial, and high traffic volumes), their current designation as arterials tends to undermine their access function and their multimodal performance. It also undermines the quality of the street design, making them less vibrant and attractive urban places.

A new classification system will not change the form or function of streets overnight. However, as streets are repaved and upgraded, the new street classification system allows them to evolve to better meet the needs of the community and the vision of the Sustainable Streets Plan.

STAFF EDUCATION

Lastly, the institutionalization of sustainable streets cannot happen if city and agency staff members are not trained to plan, design, and implement them.[33]

Specific staff training is required to communicate new approaches in relation to multimodal data collection, collision incident reporting, traffic modeling and MMLOS, project evaluation and prioritization, street design standards, and standard design and construction procedures.

CONCLUSIONS

To achieve the Sustainable Streets Plan vision in San Mateo, the gaps between existing and desired conditions in infrastructure, evaluation, institutionalization, and education must be addressed. These needs are summarized below.

INFRASTRUCTURE

Bicyclists and pedestrians are injured and killed in traffic collisions at a rate that is many times higher than that of motorists within the City of San Mateo. The bicycle network is incomplete and has specific gaps near schools, across El Camino Real and U.S. 101 (especially near the Hillsdale/Norfolk intersection and at Highway 92), throughout downtown, and along Hillsdale Boulevard and South Delaware Street. The unsafe conditions and incomplete bicycle network jeopardize the safety of bicyclists and may contribute to irregular behaviors such as riding in a counterflow direction.

For pedestrians, safety enhancements are especially needed downtown, but they are also needed at El Camino Real crossings. Traffic calming could improve both safety and the walking experience downtown, in neighborhoods near downtown, and along San Mateo Drive.

INSTITUTIONALIZATION

Various strategies are needed to institutionalize Complete Streets and sustainability practices. These strategies include revisions to specific items in the municipal code and the addition of a Complete Streets Ordinance. They also include the adoption of a new street classification system, street design guidelines methodologies for traffic modeling, and project evaluation.

Staff training on all of these issues, in addition to Complete Streets planning, design, and implementation, is needed to institutionalize Complete Streets and sustainability practices. Staff training could also encompass new multimodal data collection techniques as well as better reporting of collisions and the factors contributing to crashes.

EDUCATION

Both internal and public educational programs are needed. Public education, specifically around urban bicycling, will help reduce on-street conflicts and encourage more biking and walking. This approach would be strengthened by educating personnel involved in implementing sustainable-streets strategies, including police and emergency responders, traffic engineers, and public works staff. Staff education will empower individuals and agencies to sustain the efforts described in this plan.

EVALUATION

New performance standards, beyond the current use of auto-oriented LOS, are needed. With new performance standards, remedies for infrastructure gaps along streets like El Camino Real, San Mateo Drive, J Hart Clinton Drive, and Concar Drive could be designed and effectively evaluated to achieve Sustainable Streets Plan goals. Lastly, the continued tracking and evaluation of the plan's goals and new performance standards are needed in order to sustain the current emphasis on Complete Streets principles.

MUNICIPAL CODE

The Municipal Code establishes local laws that govern the city of San Mateo. City staff provided an initial list of code titles that necessitated further review for the Sustainable Streets planning effort. From this list, the project team identified those sections most relevant and/or most in need of further review. In addition, the Bicycle and Pedestrian

Master Plans previously recommended several changes to the municipal code, most of which have already been incorporated into the zoning code, including:

» Allow residential and off-street parking and garage facilities to be used for bicycle parking (Section 27.64.080)

» Require more open space in the Central Business District (Section 27.38.090)

» Prohibit parking on the sidewalk (Section 27.64.023)

» Limit the extension of tree branches into sidewalk space (Section 27.84.050)

» Permit additional sidewalk seating at restaurants (Chapter 27.87)

» Limit the requirements for off-street parking and loading where outdoor restaurant seating and/or merchandise display are provided (Section 27.87.040)

One of the Bicycle Plan recommendations, revising Section 11.56.100 (sidewalk riding) to comply with California Vehicle Code 21202, remains to be implemented.

Figure B-24 presents the remaining sections that warrant further review. Items marked in bold will be particularly relevant in crafting recommendations for the Sustainable Streets Plan.

FIGURE B- 24 SAN MATEO MUNICIPAL CODE SUMMARY - SECTIONS RELATED TO SUSTAINABLE AND COMPLETE STREETS[34]

TITLE	SECTION		DESCRIPTION	RELEVANT LANGUAGE
Health and Sanitation	7.39.120	7.39.120 REDUCTION OF POLLUTANTS IN STORMWATER.	Deals with the requirement for land owners to take measures to reduce water pollutants in the storm drain system. One of the green streets concepts' main purposes is to reduce pollutants in stormwater runoff.	Owners of parking lots and structures must clean the surfaces as frequently and thoroughly as practicable "in a manner that does not result in discharge of pollutants to the City storm drain system."
Health and Sanitation	7.39.130	7.39.130 WATERCOURSE PROTECTION.	Deals with property owners' (and lessors') requirements for protecting waterways on their property. One of the green streets concepts' main purposes is to protect waterways.	Every property owner or lessor must maintain and protect waterways on their property, which includes a requirement not to remove healthy bank vegetation. A permit from the Director of Public Works must be issued to develop within 30 feet of the center line of a creek or 20 feet from the top of its bank or to modify the natural flow of a waterway.
Health and Sanitation	7.39.240	7.39.240 ALTERATIONS TO STORM DRAIN SYSTEM.	Deals with permit requirements to make adjustments to storm drains. Applicable due to the potential for the Sustainable Streets Plan to recommend changes to street drainage systems.	"It is unlawful for any person to alter any City storm drain line, pump, or other fixture without the written permission of the Director of Public Works."
Vehicles and Traffic	**11.08.030**	**11.08.030 CENTRAL TRAFFIC DISTRICT.**	**Defines the boundaries of the central traffic district. Applicable due to the unique nature and context of this area.**	**The "Central traffic district" is bordered to the west by El Camino Real, to the north by Baldwin Avenue and its extension easterly to Delaware Street, to the east by the easterly line of Delaware Street, and to the south by the southerly line of Fifth Avenue.**

TITLE	SECTION		DESCRIPTION	RELEVANT LANGUAGE
Vehicles and Traffic	11.16.010	11.16.010 PROHIBITED LEFT TURN—SIGNS.	Deals with the installation and maintenance of prohibited left turn signs. Applicable regarding street design guidelines, traffic flow, and pedestrian safety.	Implementation of left turn prohibitions must be approved by City Manager. They may be permitted where there are threats to traffic congestion or hazard, and may prohibit turns during all or certain hours as long as this is marked on the signage.
Vehicles and Traffic	**11.16.050**	**11.16.050 STOP SIGN INSTALLATION OR REMOVAL.**	**Deals with requirements for stop sign installation and removal. Applicable for the process of establishing traffic calmed areas and changing traffic controls on streets.**	**The Director of Public Works must approve an intersection for stop sign installation through determination that the requirements of San Mateo's Stop Sign Policy & Procedures are met. The Director must approve removal through determination that the requirements of San Mateo's Stop Sign Policy & Procedures are no longer met.**
Vehicles and Traffic	11.20.040	11.20.040 SIGNS REQUIRED.	Deals with enforcement of traffic control devices. Applicable to the analysis and establishment of street design guidelines.	Signage and markings must be present and sufficiently legible in order for enforcement of traffic control devices to occur.
Vehicles and Traffic	11.24.010	11.24.010 SIGNS REQUIRED.	Deals with enforcement of one-way streets and alleys. Applicable to the analysis and establishment of street design guidelines.	One-way signs must be placed at every intersection where movement of traffic in the opposite direction has been prohibited.
Vehicles and Traffic	**11.28.010**	**11.28.010 CENTRAL TRAFFIC DISTRICT—PROHIBITED VEHICLES.**	**Identifies vehicles not allowed in the central traffic district at certain times of day. Applicable due to its effects on traffic flow and type on certain San Mateo streets.**	**Between 10 a.m. and 6 p.m., no freight vehicles, including those carrying garbage or crude or fuel oil, may pass through the central traffic district.**
Vehicles and Traffic	11.28.032	11.28.032 TRUCK ROUTES.	Establishes a truck weight limit for San Mateo streets. Affects the ability to alter, redesign, or reorient certain San Mateo streets.	No vehicle in excess of five tons shall operate on San Mateo streets except those specified as truck routes.

TITLE	SECTION		DESCRIPTION	RELEVANT LANGUAGE
Vehicles and Traffic	**11.28.080**	**11.28.080 SKATEBOARDS AND BICYCLES.**	**Deals with restrictions on skateboards, in-line skates, and bicycles within the central traffic district. Applicable due to Sustainable Streets' focus on alternative modes of transportation.**	**No skateboards or in-line skates are allowed to be operated on any public street, alleyway, or sidewalk within the central traffic district where signage indicates. Bicycles cannot be operated on the inclined surfaces of city parking structures except where necessary to park a bicycle.**
Vehicles and Traffic	**11.28.090**	**11.28.090 SKATEBOARDS AND IN-LINE SKATES IN 42ND AVENUE AREA.**	**Deals with restrictions on skateboards and in-line skates in the 42nd Avenue area. Applicable due to Sustainable Streets' focus on alternative modes of transportation.**	**Skateboards and in-line skates are not allowed to be operated in the area bounded by 43rd Avenue, Olympic Avenue, Picadilly Lane, 41st Avenue, and El Camino Real within San Mateo where signage indicates this restriction.**
Vehicles and Traffic	11.32.120	11.32.120 RESIDENTIAL PARKING PERMIT POLICIES AND PROCEDURES.	Establishes that residential parking programs are authorized for use in San Mateo. Applicable due to the potential for the Sustainable Streets Plan to make recommendations regarding parking in residential areas.	The Director of Public Works may propose policies and procedures for specific implementations of residential parking programs, which must be reviewed by the Public Works Commission before City Council can adopt.
Vehicles and Traffic	**11.36.010**	**11.36.010 PARALLEL PARKING.**	**Deals with parking alignments. Applicable due to the potential for the Sustainable Streets Plan to make recommendations regarding parking.**	**The City Manager has designated certain locations where angled parking is allowed (with signage and markings). There are several locations where, by resolution, parking on the left side of a road way is explicitly allowed. Otherwise, parking must be parallel to the curb and in the direction of the flow of traffic.**

TITLE	SECTION		DESCRIPTION	RELEVANT LANGUAGE
Vehicles and Traffic	**11.36.020**	**11.36.020 ANGLE PARKING.**	**Deals with parking alignments and specifically has implications for back-in angled parking. Applicable due to the potential for the Sustainable Streets Plan to make recommendations regarding parking.**	**Where the City Manager has designated angled parking, the front wheel of the vehicle must be aligned no more than 18 inches from the curb and vehicles must be positioned with the front of the vehicle to the curb.**
Vehicles and Traffic	**11.36.030**	**11.36.030 SPECIAL MANNER OF PARKING ON CERTAIN STREETS.**	**Deals with the authority of the City Council to establish special parking alignments on certain streets. Applicable due to the potential for the Sustainable Streets Plan to make recommendations regarding parking.**	**Establishes that the City Council may designate certain streets for special parking arrangements that differ from 11.36.010 or 11.36.020.**
Vehicles and Traffic	11.40.035	11.40.035 PARKING PROHIBITED ON CERTAIN PUBLIC PROPERTY.	Deals with parking regulations on City property. Applicable due to the potential for the Sustainable Streets Plan to make recommendations regarding parking.	Parking is prohibited on any City property (including unpaved areas) unless explicitly marked and signed for parking.
Vehicles and Traffic	11.40.055	11.40.055 PARKING PROHIBITED FOR STREET CLEANING.	Deals with the authority to prohibit parking due to street cleaning. Applicable due to complete and green streets' relation to parking (street design) and street cleaning (water pollutant prevention).	The City Manager designates certain days between certain hours where parking is prohibited and marks these areas by signage.

TITLE	SECTION		DESCRIPTION	RELEVANT LANGUAGE
Vehicles and Traffic	**11.44.120**	**11.44.120 LOCATION.**	**Deals with the required placement of parking meters relative to designated parking spaces; has implications for multi-space meters. Applicable due to the potential for the Sustainable Streets Plan to make recommendations regarding parking management.**	**Each metered parking space must be accompanied by an individual parking meter immediately adjacent to the space.**
Vehicles and Traffic	**11.44.130**	**11.44.130 CURB MARKINGS.**	**Deals with the required markings for parking meters. Applicable due to the potential for the Sustainable Streets Plan to make recommendations regarding parking alignment and management.**	**Metered parking must be delineated for individual spaces corresponding to each meter.**
Vehicles and Traffic	11.44.140	11.44.140 PARALLEL PARKING.	Deals with the required placement of parking meters at parallel parking spaces. Implications for recommendations related to parking alignments.	Metered parking spaces must orient the meter at the front of the parking space and vehicles must park with the front of the vehicle adjacent to the meter.
Vehicles and Traffic	**11.44.210**	**11.44.210 USE OF FEES.**	**Deals with the required use of fees collected through parking meters. Applicable due to the potential to use parking fees for improvements such as complete and green streets projects.**	**Parking meter fees must be spent on traffic control and regulation, supervision of metered parking, the purchase and installation of such meters, and the operation, maintenance and improvement of parking garages within the parking district.**

TITLE	SECTION		DESCRIPTION	RELEVANT LANGUAGE
Vehicles and Traffic	11.48.070	11.48.070 BUS ZONES.	Deals with the authority to establish bus zones and their size, position, and markings. Applicable in relation to street design guidelines.	The City Manager has the authority to establish bus zones. Buses cannot be more than 50 feet in length unless specifically approved by the City Manager. Bus zones cannot be placed opposite and to the right of a safety zone and must be marked with stenciled "bus zone" and "no standing" markings.
Vehicles and Traffic	**11.56.010**	**11.56.010 LICENSE—REQUIRED—DEFINITION.**	**Deals with the requirement for all bicyclists riding in San Mateo to have a City-issued bicycle license. Applicable due to requirements' potential to inhibit the use of bicycles in San Mateo.**	**"No person shall operate or use a bicycle upon any of the streets, alleys, or public highways of the City without first obtaining from the City a license to do so."**
Vehicles and Traffic	**11.56.100**	**11.56.100 RIDING—ON ROADWAY OR SIDEWALK.**	**Deals with bicycle operating laws. Potentially relevant to how existing San Mateo policies may discourage bicycle ridership.**	**Any person riding a bicycle slower than the normal speed of traffic "shall ride as close as practicable to the right-hand curb or edge of the roadway" except to overtake or pass a vehicle, when preparing for a left turn, or "when reasonably to avoid conditions...that make it unsafe to continue along the right-hand curb." It is unlawful to ride a bicycle upon any sidewalk.**
Vehicles and Traffic	11.56.140	11.56.140 TRAFFIC SIGNS AND SIGNALS.	Deals with bicycle traffic laws. Applicable due to the policy's potential impacts on bicycle ridership and operation as well as the design of facilities.	"Every person riding and operating a bicycle shall obey all traffic signals and signs, and before making turns shall give the same signals that are required of operators of motor vehicles."
Vehicles and Traffic	**11.56.160**	**11.56.160 PARKING.**	**Deals with bicycle parking. Applicable due to Sustainable Streets Plan work related to the design and location of bicycle parking facilities.**	**The City Manager shall provide "suitable racks" in business districts or other locations where temporary stopping is likely. Bicycles left lying on the sidewalk may be impounded by the police.**

TITLE	SECTION		DESCRIPTION	RELEVANT LANGUAGE
Parks and Recreation	**13.30.040**	**13.30.040 PUBLIC WORKS USES.**	**Deals with allowable uses for public parks and open spaces. An important element of complete and green streets is small parks and public open spaces along streets. This code may affect allowable uses in potential mini parks, plazas, or parklets.**	**City Council establishes an ordinance of dedication for every park and open space. This ordinance cannot prevent that dedicated area, or any public street, from being used for something that is in the public interest or is itself a park, playground, recreation facility, open space, or water management device (such as marshes or flow lands).**
Streets and Sidewalks	17.08.150	17.08.150 PARKING METER REMOVAL AND REPLACEMENT.	Deals with parking-meter removal fees. Applicable due to the project's potential to make recommendations regarding parking location and design. May affect the management and operation of mini parks or parklets.	Anyone who applies to have a meter removed is responsible for removal and replacement as well as any lost meter revenue (charged at the perimeter rate established by City Council).
Streets and Sidewalks	**17.12.080**	**17.12.080 NEWS DISPENSER STANDARDS AND DESIGN.**	**Deals with the required design standards for news dispensers. Relevant due to the public realm aspect of the Sustainable Streets project. Changes may be necessary to ensure placement of news dispensers outside of the pedestrian zone.**	**Freestanding news racks may be any color but must be one of several standard styles and be no larger than 50" in height, 30" width and 24" in depth. Modular news racks must be Sho-Rack standard green and one of several standard styles. Where there are five or more news racks within 50 lineal feet of each other, they must be replaced by modular news racks at the expense of the owner of such news racks.**
Streets and Sidewalks	**17.16.020**	**17.16.020 WALK THICKNESS—GRADE.**	**Deals with the requirements for driveway design at sidewalk intersections. Relevant for Sustainable Streets street-design guidelines.**	**Driveways that cross sidewalks must be rough finished for at least eight lineal feet and must be at least four inches thick. The driveway must extend to the roadway side of the curb line flush with the sidewalk and then gradually descend in grade to meet the crown of a finished roadway.**

TITLE	SECTION		DESCRIPTION	RELEVANT LANGUAGE
Streets and Sidewalks	**17.24.030**	**17.24.030 OWNERS OF FRONTAGE RESPONSIBLE FOR REPAIR.**	**Deals with who is responsible for the maintenance of sidewalks. Applicable due to the potential to improve, alter, or redesign sidewalks in several areas of San Mateo.**	**Property owners are responsible for maintaining sidewalks in front of their property "in a safe non-dangerous condition." They must do this with or without City notification.**
Streets and Sidewalks	**17.24.160**	**17.24.160 REVOLVING FUND.**	**Deals with sidewalk-repair funding. Applicable as it deals with the City's ability to fund sidewalk projects.**	**The City establishes a revolving fund, which is replenished by appropriation or moneys paid or collected for sidewalk maintenance, to fund sidewalk repairs where property owners request the City perform the required maintenance.**
Streets and Sidewalks	17.32.010	17.32.010 RESTRICTION ON EXCAVATIONS.	Deals with restrictions on excavations in recently renovated rights of way. Applicable if the Sustainable Streets Plan makes specific recommendations regarding street redesigns on newly renovated streets, sidewalks, or paths.	The Public Works Director may allow for excavation in newly renovated (within three years) public rights-of-way if deemed in the best interest of the general public.
Building and Construction	**23.60.100**	**23.60.100 ARTWORK ON PUBLIC PROPERTY.**	**Explains the process for acquiring and purchasing artwork for public property. Applicable due to the potential use of public artwork on proposed Sustainable Streets corridors.**	**Annually, the City Arts Committee submits a public art plan to City Council including funds raised and funds needed. City Council must also approve the purchase of any artwork to be placed on public property.**

TITLE	SECTION		DESCRIPTION	RELEVANT LANGUAGE
Transportation System Management	24.01.020	24.01.020 GOALS AND OBJECTIVES.	Establishes the goals and objectives of the Transportation System Management employer program. Applicable as these goals and objectives will inform the Sustainable Streets planning effort.	The four goals of the TSM program are (1) assure existing and future employers implement TSM traffic mitigation measures, (2) encourage coordination between public and private sector regarding transportation programs, (3) increase public awareness about alternatives to single occupant vehicle trips, and (4) reduce traffic impacts within the City through fewer automobile trips, lower parking demand, and total vehicle miles per person commuting.
Transportation System Management	24.01.040	24.01.040 TSM COORDINATOR.	Deals with the duties of a Transportation System Management Coordinator. Applicable due to the TSM Coordinator's central role in encouraging sustainable transportation.	A TSM Coordinator shall serve on the staff of the Joint Powers Authority and have duties related to providing commute alternatives, encouraging employers to participate in TSM programs, and evaluating progress.
Transportation System Management	**24.01.050**	**24.01.050 TSM REQUIREMENTS.**	**Deals with the requirements of San Mateo County employers regarding TSM efforts. Applicable due to these programs' central role in encouraging sustainable transportation choices.**	**All "regional employers" within San Mateo County must conform to the Bay Area Air Quality Mitigation District's employer-based trip reduction requirements. Any employer with 25 or more employees is encouraged to participate in TSM programs and promote alternative transportation options to employees.**

TITLE	SECTION		DESCRIPTION	RELEVANT LANGUAGE
Signs	**25.04.020**	**25.04.020 RESTRICTIONS APPLICABLE TO SIGNS ON PUBLIC PROPERTY.**	**Deals with dimension and placements restrictions for signs on public property. Applicable due to the potential for the Sustainable Streets planning effort to make recommendations on public signage including wayfinding and also because the guideline requiring a 36-inch- wide path of travel is lower than the forthcoming standards from the federal government.**	**Signs must be less than 36" in height and six square feet in area. Signs cannot be placed within 50 feet of one another except at intersections, where up to four are allowed. They must be anchored and cannot be within the median of any street or attached to any utilities (including poles). Signs must be placed to maintain a 36"-wide path of travel on sidewalks and cannot obstruct ramps. Lastly, no sign can be placed on public property within the area bounded by Baldwin Avenue, Railroad Avenue, 5th Avenue, and El Camino Real.**
Subdivisions	26.16.040	26.16.040 STREET PLANTINGS.	References the Street Tree Master Plan. Applicable due to street trees' function as a stormwater-management device and element of complete streets design.	All plantings in the street right-of-way must comply with the Street Tree Master Plan and be designed and installed with traffic and pedestrian safety in mind.
Subdivisions	26.16.060	26.16.060 OPEN SPACE EASEMENTS.	Allows the City to require open-space easements within proposed subdivisions. Applicable due to the potential to use open-space easements to encourage mini parks and open spaces.	The City may require open-space easements on subdivision for the purpose of protecting natural vegetation, preserving views or amenities, preserving open spaces that are integral to the overall approved plan, or preventing drainage and erosion problems. The City may also control the amount and character of permitted improvements within the easement.
Subdivisions	26.28.040	26.28.040 PAVEMENT WIDTH DEFINED.	Defines pavement width. Applicable to street design guidelines.	Pavement width means the width measured from curb face to curb face.
Subdivisions	26.28.050	26.28.050 GRADES, CURVES AND SIGHT DISTANCES.	Establishes the authority of the City Engineer to approve street grades, curves, and sight distances. Applicable to street design guidelines.	The City Engineer reviews grades, curves, and sight distances to ensure safety of vehicles and pedestrians while minimizing grading to the maximum extent feasible.

TITLE	SECTION		DESCRIPTION	RELEVANT LANGUAGE
Subdivisions	**26.28.070**	**26.28.070 STREET PATTERN.**	**Establishes seven principles for street patterns in subdivisions. Applicable to street design guidelines, especially as they relate to future development.**	**Major arterials and collectors should be continuous and align with existing or planned connecting streets. Proposed streets shall be extended to the edge of the property for enhanced traffic circulation and coordination with other existing or planned developments. The City Engineer must approve the dimensions of any cul-de-sac. At any dead-end street, a one-foot strip the width of the street at its terminus shall be deeded to the City pending extension to another development. Proposed streets should intersect at 90 degrees but in no case less than 75 degrees. Straight and long residential streets, streets with steep grades, and/or streets that require excessive grading shall be avoided.**
Subdivisions	26.28.090	26.28.090 PEDESTRIAN PATHWAYS.	Establishes that the dedication and development of pedestrian paths on subdivisions may be required. Applicable to street design guidelines.	At the option of the City, pedestrian easements may be combined with other easements or rights-of-way when such easements comply with the purposes of this title.
Subdivisions	26.36.010	26.36.010 GENERAL REQUIREMENTS.	Deals with drainage requirements on subdivisions (subject to approved design standards and specifications). Applicable to the discussion of green streets within the Sustainable Streets planning effort.	Drainage and drainage structures must protect lots and streets from flood hazard, shall be to the street frontage, and shall not connect to the sanitary sewerage system.

[1] Caltrain weekday schedule as of November 2013.
[2] A shared street, or "woonerf," is a street design where motorists, bicyclists, pedestrians, and other street users share the street without boundaries such as lane lines or curbs. They are typically installed in residential settings and on minor streets.
[3] http://www.sfestuary.org/wp-content/uploads/2013/09/Green-Plan-Bay-Area-Kickoff-Meeting-Minutes-9-19-13.pdf
[4] http://www.samtrans.com/Assets/_SSP/D-SamTrans+SSP+Title+VI+Equity+Analysis+FINAL.pdf
[5] Only includes reported injury collisions. The actual number of collisions, including property damage collisions and unreported collisions, is much higher.
[6] Only the most recent five years of data were analyzed because this allows for the identification of collision trends within a reasonable time period. Beyond five years it is likely that road conditions will have changed substantially.
[7] SWITRS uses two fields to describe pedestrian collisions. The summary in Figure B- 16 describes pedestrian crashes classified as a vehicle-pedestrian collision type (7.5% of the total). A higher share (7.9%) of all crashes involved a pedestrian because this metric includes pedestrian conflicts classified as other collision types (broadside, for example).
[8] "Grand Boulevard Initiative." November 2011. http://www.grandboulevard.net/images/stories/GBI-Documents/ExistingConditions2011/gbi_existing_conditions_final_.pdf (accessed May 21, 2013).
[9] 2030 General Plan – "Vision 2030." http://www.cityofsanmateo.org/index.aspx?NID=2021
[10] City of San Mateo Sustainable Initiatives Plan. http://www.cityofsanmateo.org/DocumentCenter/Home/View/293
[11] City of San Mateo Citywide Pedestrian Master Plan. http://www.cityofsanmateo.org/index.aspx?NID=2218
[12] City of San Mateo Bicycle Master Plan. http://www.cityofsanmateo.org/index.aspx?nid=2474
[13] See p. 5-19 to 5-20 of the San Mateo Bicycle Master Plan.
[14] City of San Mateo Downtown Area Plan. http://www.cityofsanmateo.org/index.aspx?nid=1894
[15] City of San Mateo Downtown Area Plan. San Mateo, CA: City of San Mateo, 2009.
[16] City of San Mateo Neighborhood Traffic Management Program. http://www.cityofsanmateo.org/index.aspx?NID=2122
[17] Gary Heap and Hexagon Transportation Consultants, Inc. City of San Mateo Neighborhood Traffic Management Program. San Mateo: City of San Mateo, 2006.
[18] Grand Boulevard Multimodal Transportation Corridor Plan. http://www.grandboulevard.net/projects/multi-modal-corridor-plan.html
[19] Grand Boulevard Initiative Task Force. "Grand Boulevard Multimodal Transportation Corridor Plan." 2010.
[20] Grand Boulevard Initiative Complete Streets Program. http://www.grandboulevard.net/projects/complete-streets.html
[21] San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook. http://www.flowstobay.org/ms_sustainable_guidebook.php
[22] Nevue Ngan Associates, Sherwood Design Engineers. San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook. San Mateo County: San Mateo Countywide Water Pollution Prevention Program , 2009.
[23] San Mateo Rail Corridor Transit-Oriented Development Plan. http://www.cityofsanmateo.org/index.aspx?NID=1112
[24] San Mateo County Comprehensive Bicycle and Pedestrian Plan 2011. http://www.ccag.ca.gov/CBPP_2011.html

[25] Hillsdale Station Area Plan. http://www.cityofsanmateo.org/index.aspx?NID=1945
[26] Grand Boulevard Initiative Existing Conditions. http://www.grandboulevard.net/images/stories/GBI-Documents/ExistingConditions2011/gbi_existing_conditions_final_.pdf
[27] Aging Well, San Mateo. http://www.cityofsanmateo.org/DocumentCenter/View/37151
[28] 2012 California Manual on Uniform Traffic Control Devices. http://www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/pdf/camutcd2012/CAMUTCD2012.pdf
[29] Caltrans. "California Department of Transportation." California Manual on Uniform Traffic Control Devices. 2012. http://www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/pdf/camutcd2012/CAMUTCD2012.pdf (accessed May 2, 2013).
[30] Administration, Federal Highway. *Experimentations - Knowledge - FHWA MUTCD.* September 13, 2012. http://mutcd.fhwa.dot.gov/condexper.htm (accessed May 2, 2013).
[31] "Long-Term Citywide Transportation Planning." City of San Mateo. San Mateo. Web. 29 Jan 2014. <http://www.cityofsanmateo.org/index.aspx?NID=2125>.
[32] In some places it is incorrectly defined as an average delay of 0,45 seconds instead of 45 seconds.
[33] John LaPlante, P.E. and Barbara McCann. (2008). Complete Streets: We Can Get There from Here. Available at http://www.smartgrowthamerica.org/documents/cs/resources/cs-ite-may08.pdf.
[34] Sections marked in bold will be examined in more detail in the recommendations phase.

APPENDIX C

Sustainable Streets Benefits & Costs

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MEMORANDUM

To: Ken Chin, City of San Mateo

From: San Mateo Sustainable Streets Project Team

Date: October 1, 2014

Subject: San Mateo Sustainable Streets Plan: Tech Memo 2.3 – Sustainable Streets Benefits & Costs

INTRODUCTION

This memorandum presents an analysis of benefits and costs of Complete Streets and Green Streets planning, design, and implementation in contrast to conventional street design and planning. The information provided has been distilled from academic research, case studies, health-risk assessments, and sample projects. This memorandum is intended to provide a baseline level of information for the Sustainable Streets Plan and will serve to inform planning efforts for the duration of the project. Benefits are identified in the following categories:

» Walking, biking, and transit

» Community health impacts

» Congestion and emissions

» Green streets and sustainability

» Capital and operating costs

» Economic impacts

Of particular importance are the sample metrics identified for each category of benefits, which provide a starting point for further discussion about the adoption of performance metrics appropriate for the City of San Mateo.

WALKING, BICYCLING, AND TRANSIT

INCREASES IN WALKING AND BIKING; BETTER NETWORK CONNECTIVITY

About 92% of all trips in the United States are made by automobile, and the average person spends 443 hours in a vehicle each year.[1] To accommodate these trips, street design has traditionally prioritized vehicular traffic over other modes, which has often created an environment that is inhospitable, unattractive, and dangerous to pedestrians and bicyclists. By contrast, emerging Complete Streets best practices feature shorter, connected blocks, enhanced crossings, traffic calming, and landscaping, which improve safety and make the environment more inviting for walking and bicycling.

Increased Mobility and Access

People who do not drive, or choose not to, often find their mobility significantly limited as a result of poorly designed pedestrian and bicycling infrastructure, which can also impact access to transit services. By reincorporating the needs of all road users into street design and infrastructure, Complete Streets best practices can increase rates of walking and bicycling, ensure accessibility for disabled users, and support connections to transit.[2]

Improved Infrastructure for Increased Active Transportation

The National Conference of State Legislators found that the most effective policy approach for increasing active transportation is the development of sidewalks and bicycle facilities. Research has shown that residents are as much as 65% more likely to walk in neighborhoods that have sidewalks.[3,4] Many recent studies also point to the significant rise in bicycling following the construction of new bicycling infrastructure.[5] For example, the share of bicycle commuters doubled in Portland following a 215% increase in the extent of the bicycle network, and overall bike trips rose 210%.[6]

Sample Non-motorized Travel and Connectivity Metrics

Figure C-1 provides a summary of potential metrics that can be used to measure multimodal use and connectivity.

FIGURE C-1 SAMPLE METRICS FOR NON-MOTORIZED TRAVEL AND CONNECTIVITY

PERFORMANCE METRIC	EASE OF DATA COLLECTION	DESCRIPTION
Percent of all trips made by walking, biking, or transit	Medium	The metric captures the extent to which all residents actively travel in and around their community.
Share of people bicycling, walking, and taking transit to work	Easy	The U.S. Census uses "means of transportation to work" to document the modes of transportation for workers 16 and older.
Ratio of bicycle facility miles to road miles	Medium	This metric captures the proportion of available bicycling infrastructure in a particular place.
Linear feet of sidewalks, or total miles of pedestrian accommodation	Medium	The continuity of sidewalk infrastructure is an important measure of pedestrian accessibility. Comparing the total mileage of sidewalks from one year to another quantifies progress. Measuring the "linear feet" of sidewalks (sidewalks that create a continuous path) also reflects the overall connectivity and accessibility of the pedestrian infrastructure.
PEQI (Pedestrian Environmental Quality Index) score	Difficult	PEQI provides a comprehensive depiction of the quality and accessibility of the local pedestrian environment at each intersection surveyed. PEQI can be targeted to problem or priority areas (e.g. street design, safety).
BEQI (Bicycle Environmental Quality Index) score	Difficult	BEQI quantitatively evaluates the quality and accessibility of the local bike infrastructure. BEQI can focus on particular problem or priority areas.
Bicycle Compatibility Index (BCI)	Difficult	Methodology developed for urban and suburban roadway segments. Incorporates variables that bicyclists typically use to assess the "bicycle friendliness" of a roadway (e.g., curb-lane

PERFORMANCE METRIC	EASE OF DATA COLLECTION	DESCRIPTION
		width, traffic volumes, and vehicle speeds). Allows for the evaluation of existing facilities in order to determine what improvements may be required and to determine the geometric and operational requirements for new facilities.
Number of curb extensions or curb ramps	Medium	Curb extensions (also called bulb-outs or neckdowns) extend the sidewalk in order to reduce pedestrian crossing distances at key locations like crosswalks. Curb ramps improve pedestrian and wheelchair accessibility by providing ramps at street corners. Increases in either or both of these street improvements are a helpful way to track progress in promoting street accessibility.
New crosswalk or intersection improvements	Medium	New crosswalk or intersections improvements bolster and enhance the quality and accessibility of the local street network.

INCREASED ACCESS TO TRANSIT

In addition to enabling and encouraging higher rates of walking and biking, complete streets increase transportation accessibility more broadly by making it easier for people to access a range of destinations without driving. When paired with robust transit infrastructure, complete streets can connect people to key goods and services across an entire region. A summary of these benefits is provided below.

Increased Transit Access and Ridership

Planning for transit, bicycle, and pedestrian infrastructure may occur at different agencies and/or across jurisdictions. Consequently, these modes of travel are often poorly integrated and offer inconsistent connections. Building safe, comfortable walking and bicycling infrastructure can result in increased access to transit stops and make the first and last miles of a journey that involves transit easier and more convenient, ultimately bolstering ridership and supporting the viability of public transportation systems.

Communities that are implementing strategies to increase biking and walking to transit through master plans, safe routes to transit programs, and other initiatives are starting to see tangible benefits. For example, Seattle's METRO system found that improvements in bicycle infrastructure at and around stations led to substantial increases in bicycle ridership.[7] The Bay Area's Safe Routes to Transit Program is a regional program that has funded a range of innovative safety, multimodal-integration, and accessibility projects, such as bike/pedestrian route improvements, bike stations, car sharing, and traffic calming.[8]

Greater Access to Daily Necessities

Complete streets help ensure that people can bike, walk, and take transit to access daily necessities. Research indicates that people are typically willing to walk to destinations within ¼ or ½ mile, bike to destinations within two miles, and ride transit to places within five miles – provided there is safe, comfortable, and convenient infrastructure in place.[9,10] Currently, about 69% of vehicle trips are shorter than two miles, suggesting that there is considerable latent demand for biking, walking, and transit.[11] Strengthening multimodal connections, improving safety, and planning for "complete communities" with a diverse range of land uses can encourage people to make the switch to active transportation modes.

It is important to note that linking complete streets to transit is not sufficient to ensure high levels of ridership – to make transit a viable option, it is critical to plan for high quality service. As an example of why this is important, research shows that over 75% of jobs in the top 100 metropolitan areas are in neighborhoods served by transit, yet residents can reach only about 30% of these jobs within a 90-minute transit commute.[12]

Increased Mobility for Transit-Dependent Populations

While complete streets benefit all users, they are an especially critical lifeline for people who are transit-dependent and less likely to drive, such as young, elderly, disabled, and low-income populations.[13] In many instances, transit-dependent individuals are affected by the double threat of poor access to bike, pedestrian, and transit facilities and poor access to neighborhood services. These groups can face difficult choices when employment and services are too far away or access to them is unsafe by bike or on foot and there are no convenient transit routes. For example, it is estimated that more than 500,000 individuals with disabilities almost never leave their homes because they do not have access to reliable public transportation options.[14]

Researchers have also found that 60% of elderly and disabled residents lack sidewalks between their homes and the nearest bus stop, and fewer than 10% use transit.[15] Another study found that 89% of high-income neighborhoods have adequate sidewalk coverage, compared to 59% of middle-income neighborhoods and only 49% of low-income neighborhoods.[16] Low-income communities are also one-third as likely to have grocery stores or other places to buy healthy food, which causes residents relying on low-quality, unhealthy food at local convenience stores and restaurants.[17,18]

In terms of access to jobs and services, only about 25% of low- and middle-skilled jobs are accessible via public transit within 90 minutes for commuters in metropolitan areas, meaning that low-income job seekers may have to spend significant amounts of time and money to reach their jobs.[19]

Providing transit-dependent users with safe and convenient bike, pedestrian, and transit facilities can ensure that all people have access to economic opportunities, services, retail, and other necessities critical to health and livability.

Sample Transit Accessibility Metrics

Figure C-2 provides a summary of potential metrics that can be used to measure transit accessibility.

FIGURE C- 2 SAMPLE METRICS FOR TRANSIT ACCESSIBILITY

PERFORMANCE METRIC	EASE OF DATA COLLECTION	DESCRIPTION
Access to public services essential for daily needs	Medium	This measure determines the completeness (in terms of convenient access to essential services) and walkability (within 1/2 mile distance) of local areas.
Percent of transit stops accessible via sidewalks and curb ramps	Medium	The extent to which local transit stops are near safe and accessible street infrastructure is an illustrative way to measure street-network quality and progress.
Percent of population (including transit dependent) located within 1/2 mile of a regional bus/rail/ferry & 1/4 mile local bus/light rail	Medium	The Healthy Communities Data and Indicator Project (HCI), recommends this measure as a tool for evaluating the ability of street infrastructure to improve basic needs.

COMMUNITY HEALTH IMPACTS

INCREASED PHYSICAL ACTIVITY

Higher rates of walking and bicycling translate directly to improved health outcomes and decreased risk of chronic disease, especially obesity. This is particularly important in neighborhoods with limited access to recreational facilities, low rates of vehicle ownership, or poor walkability. Some of the ways in which complete streets can improve health outcomes are noted below.

Increased Physical Activity by Improving the Built Environment

Complete Streets efforts are recognized by health leaders as contributing to increasing physical activity by improving the built environment.[20] When people have safe places to walk near their home, they are more likely to meet recommended levels of physical activity.[21] For example, one walkability study found that residents of walkable neighborhoods did 35-45 more minutes of "moderate intensity physical activity" every week than did similar people in neighborhoods with low walkability.[22] According to "Get Healthy San Mateo County," the extra walking related to using transit is estimated to save $5,500 per person in a lifetime of health-related costs.[23]

Increasing physical activity can reverse adverse impacts of a sedentary lifestyle, including diabetes, heart disease, stroke, high blood pressure, high cholesterol, certain cancers, asthma, low self-esteem, reduced academic performance, and depression.[24]

Reduced Risk for Chronic Diseases

More than two thirds of American adults and almost one third of children and teens are overweight or obese and are thus at increased risk for a range of health conditions, such as heart disease and diabetes.[25] Increased physical activity reduces the risk of such chronic diseases. A study of Atlanta residents found that people who lived in the most walkable neighborhoods were 35% less likely to be obese than those living in the least walkable areas.[26] Another study found that for every hour spent each day in a vehicle, a person's risk of being obese increased 6%, while obesity risk decreased 5% for every hour walked each day.[27]

By making walking a viable travel option, complete streets also helps decrease the risk other chronic diseases. According to one transportation model in the Bay Area, a 15% active transportation mode share would reduce the burden of heart disease by 14%, dementia and depression by 6-7%, and breast and colon cancer by 5%.[28]

Sample Physical Activity Metrics

Figure C-3 provides a summary of potential metrics that can be used to measure physical activity.

FIGURE C- 3 SAMPLE METRICS FOR PHYSICAL ACTIVITY

PERFORMANCE METRIC	EASE OF DATA COLLECTION	DESCRIPTION
Student physical activity	Medium	Fitnessgram data (suggested aerobic, weight, and strength fitness levels) or the percentage of local students meeting national physical-activity guidelines (e.g. children and adolescents should engage in 60 minutes or more of physical activity daily) are a direct means of evaluating the physical activity benefits of street infrastructure.
Rate of children walking or bicycling to school	Easy	Number or share of students who walk or bike to school.
Time spent walking or biking	Difficult	This indicator quantifies the amount of time residents spent walking or biking daily on "utilitarian/non-leisure" trips. Tracking the increase in the time spent walking or biking by local residents illustrates the benefits of improved street infrastructure.
Incidence of disease	Medium	Rates of chronic disease within a municipality

REDUCED EXPOSURE TO AIR POLLUTION

There is increasing evidence of the link between traffic-related air pollution and poor health. People who experience chronic exposure to pollution from heavy truck traffic, freeways, and other high-traffic arterials face an increased risk of premature death, respiratory diseases, and chronic illnesses.[29]

Complete Streets policies that promote walking, biking, and connections to transit can reduce the number of local vehicle trips and vehicle miles traveled, thus reducing regional air pollution. Some of complete streets efforts' potential impacts on health are noted below.

Reduced Air Pollution from Lower VMT and Shifts in Mode Splits

When bicycle, pedestrian, and transit infrastructure results in fewer people driving and lower vehicle miles travelled (VMT), there is an accompanying reduction in traffic-related air pollution. One study estimates that a 5% increase in neighborhood walkability is associated with a 6.5% decrease in VMT, a 5.6% reduction in nitrogen dioxide (NO_2) emissions, and 5.5% reduction in volatile organic compound (VOC) emissions.[30] An added benefit of lower VMT is lower overall congestion, further reducing air pollution from idling vehicles and making the transportation system work better for everyone. For instance, when the national average of VMT dropped by 3.6%, congestion dropped 30% in the nation's 100 most congested areas.[31]

Lower Rates of Respiratory Diseases and other Chronic Illnesses

Air pollution from vehicle traffic is linked to the development of a variety of poor health outcomes, such as reduced life expectancy, asthma, coronary artery disease, and cancer.[32,33,34] It can also discourage physical activity and exacerbate chronic conditions.[35]

Asthma, particularly among children, is of particular concern because of increasing evidence linking traffic air pollution with disease onset, as well as the prevalence and debilitating nature of the disease. Asthma rates have reached epidemic levels, both in the United States and internationally. In the United States, the prevalence of asthma among children rose from 3.6% in 1980 to 9.5% (representing over 7 million children) in 2009. Asthma is now the third leading cause of hospitalization for children younger than 18.[36, 37]

Increased Life Expectancy

The Environmental Protection Agency estimates that illnesses due to traffic-related air pollution are responsible for more than 40,000 premature deaths annually.[38] For this reason, some development standards recommend that communities avoid locating sensitive land uses like schools, housing, nursing homes, and childcare facilities near busy roads and freeways. For example, the California Air Resources Board recommends a buffer of 500 feet.[39]

Sample Air Pollution Metrics

Figure C-4 provides a summary of potential metrics that can be used to measure air pollution.

FIGURE C-4 SAMPLE METRICS FOR AIR POLLUTION

PERFORMANCE METRIC	EASE OF DATA COLLECTION	DESCRIPTION
Amount of air pollution (in tons) caused by automobiles	Easy to Difficult depending on availability of appropriate planning model	This measure connects street infrastructure with (automobile-related) air pollution. The most relevant air pollution data would be based on local city planning models. If this data is not locally collected, ambient air pollution data from the Air Quality Board is suitable. Rancho Cucamonga's Complete Streets policy, which uses auto-related air quality as a key metric, has been rated as one of the nation's most comprehensive.
Proportion of the population living in an area with 10 ug/m3 or higher PM 2.5 concentration	Easy to Difficult depending on availability of appropriate planning model	San Francisco uses the 10 ug/m3 PM 2.5 threshold as a measure of local air quality. Due to sound science showing a connection between PM 2.5 and adverse health outcomes, this indicator is a sophisticated approach to determining the air-quality benefits of a complete streets policy.
Chronic lower respiratory disease deaths	Medium	Number of deaths resulting from chronic lower respiratory diseases.
Asthma ER visits	Medium	Number of ER visits resulting from asthma.

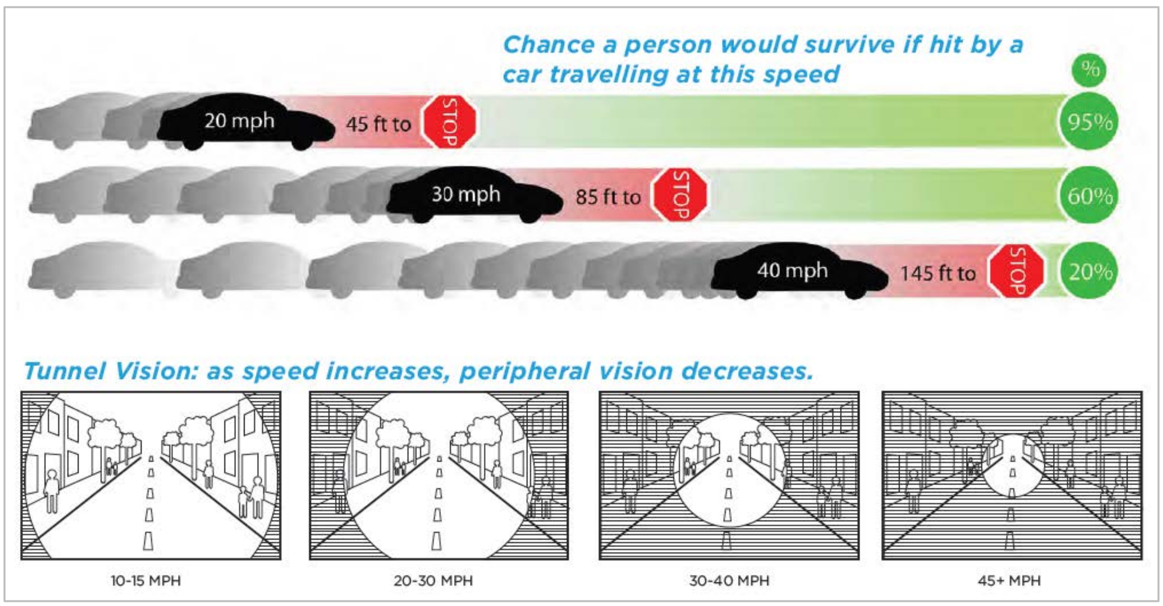
IMPROVED SAFETY

Complete streets can improve overall traffic safety by reducing speeds and making drivers more aware of other roadway users. Urban arterial roads with Complete Street elements—landscaping, enhanced crosswalks, a mix of land uses, narrow lanes, multimodal facilities, posted speeds of 30 mph or less—communicate to drivers the expectation of lower driving speeds. These streets are associated with lower rates of vehicle collisions and pedestrian/bicyclist injuries than streets without those characteristics.[40]

Decreased Severity of Injuries from Collisions

By slowing traffic and improving visibility for pedestrians and bicyclists, complete streets can decrease the severity of injuries sustained by bicyclists and pedestrians during traffic collisions.[41] As shown in Figure C-5, a pedestrian hit by a vehicle traveling 20 miles per hour mph has a 95% chance of surviving, while a pedestrian hit by a vehicle traveling 40 miles per hour has only a 20% chance of surviving.

FIGURE C- 5 IMPACT OF VEHICLE SPEED ON COLLISIONS[42]



Reduced Incidence of Collisions

Complete Streets policies that focus on areas with high pedestrian collision rates can help more quickly fix these areas while increasing overall opportunities for physical activity and mobility. Research indicates that narrower streets slow traffic and lower vehicle speeds reduce the incidence of crashes. As illustrated in Figure C-5, when traveling slower, drivers are able to perceive more of the activity around them and bring their vehicles to a stop in a shorter distance. A study of traffic collision reports in Longmont, Colorado found that street width has the highest correlation with collision rates. The safest streets in Longmont are 24 feet wide, while the most dangerous are 36 feet wide (which is typical of new subdivisions).[43]

Traffic calming in residential neighborhoods has been shown to reduce the number of collisions overall by an average of 15%.[44] Bicycle safety studies show that the addition of well-designed, on-street bicycle lanes reduces the incidence of collisions by approximately 50%.

Finally, raised medians and islands can increase safety for all road users, most significantly for pedestrians who are crossing streets. In fact, he presence of a raised median (or raised crossing island) was associated with a significantly lower pedestrian crash rate at multi-lane sites with both marked and unmarked crosswalks.[45]

Sample Safety Metrics

Figure C-6 provides a summary of potential metrics that can be used to measure safety.

FIGURE C- 6 SAMPLE METRICS FOR SAFETY

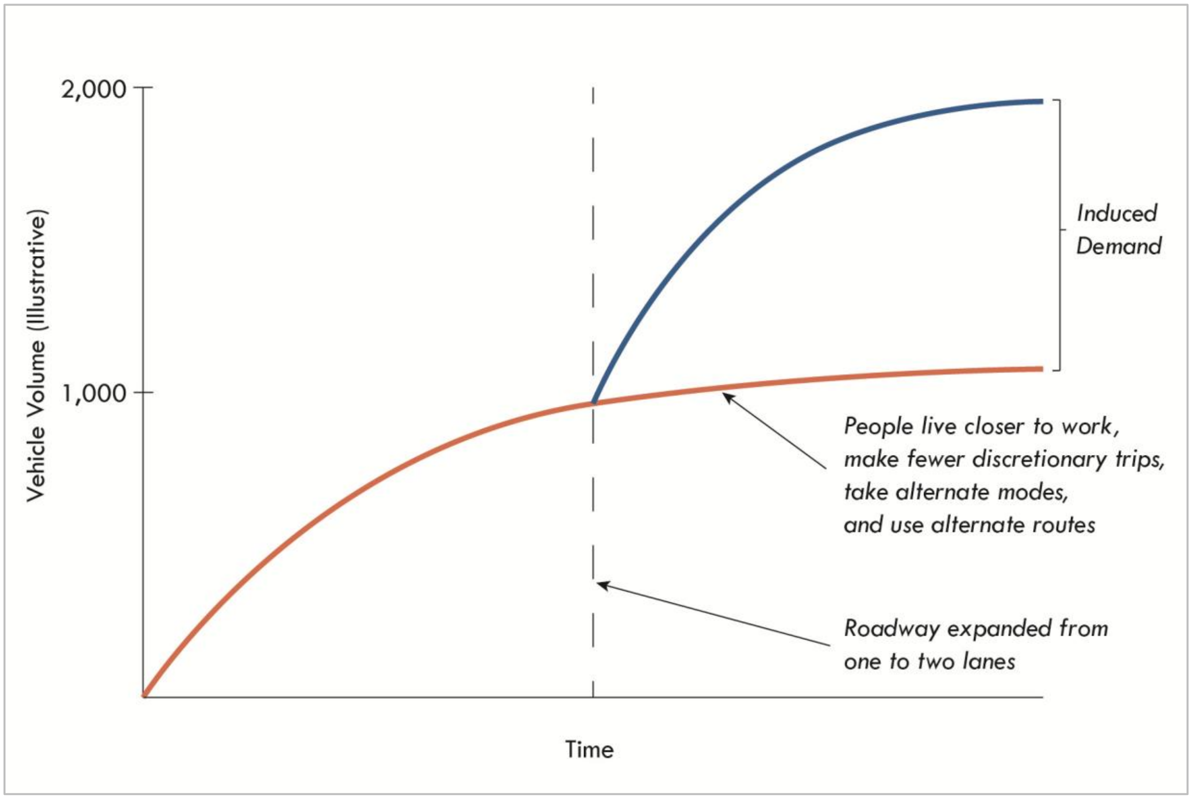
PERFORMANCE METRIC	EASE OF DATA COLLECTION	DESCRIPTION
Bicycle and pedestrian collisions	Easy	Percent reduction in bicycle and pedestrian collisions by a given year.
Number and severity of collisions	Easy	Number and level of collision severity.
Number of fatalities	Easy	Number of bicycle and pedestrian fatalities.
Accessible street improvements	Medium	Intersections or street segments with accessible street infrastructure (countdown signals or truncated domes).
Perceived safety and security	Medium	Proportion of residents who feel safe (traffic safety and personal security) on their city or neighborhood streets.
Low-speed streets	Medium	Proportion of residential streets with a 20 mph (or lower) speed limit.
Speed limit compliance	Difficult	Percent of drivers exceeding the speed limit by 5 mph or more.
Distribution of pedestrian/bike fatalities relative to "vulnerable" populations	Medium	This measure (which ranks districts by their level of resident vulnerability and compares vulnerability with the location of fatal collisions) is a useful method for assessing the safety and equity benefits of street infrastructure.

CONGESTION AND EMISSIONS

REDUCED TRAFFIC CONGESTION AND REDUCED NEED TO WIDEN ROADS

Traditional street design has dictated that when vehicle congestion rises, road capacity should expand to accommodate it. However, studies have shown that capacity expansion generates demand— increasing capacity entices people to take additional or longer vehicle trips (Figure C-7). For example, it takes fewer than five years for additional local roadway capacity to be 90% occupied by new traffic. State highway expansions in California have also shown that new capacity will be about 70% occupied in fewer than five years.[46]

FIGURE C- 7 ROAD CAPACITY AND LATENT DEMAND[47]

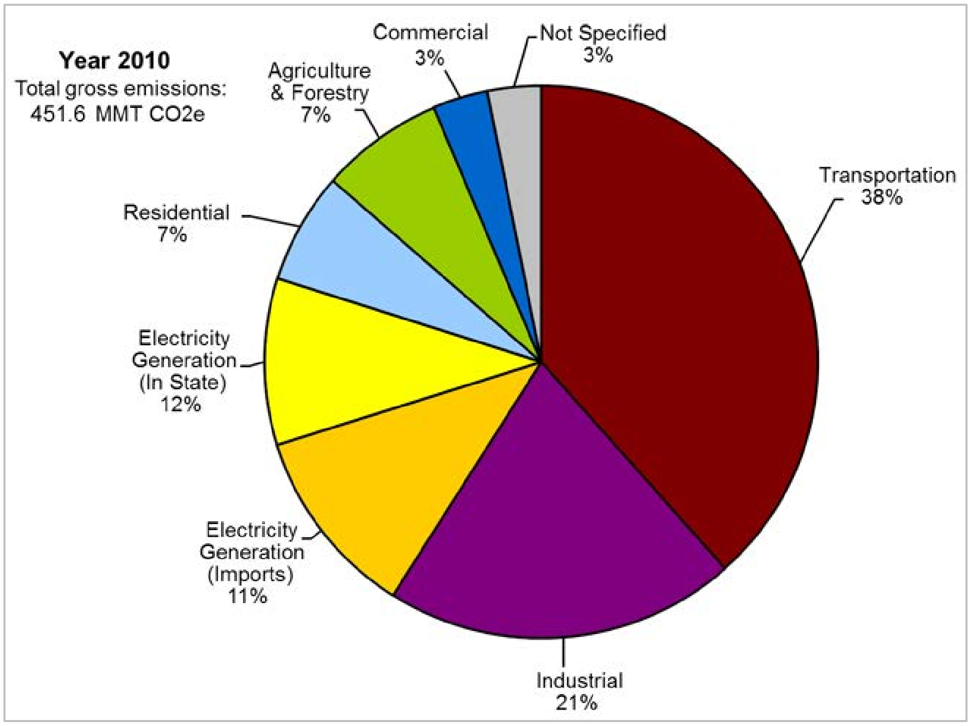


A significant portion of daily trips in the United States are quite short—on urban roads, nearly 30% of trips are shorter than one mile and 50% are shorter than three miles,[48] while nearly 30% of trips on rural roads are shorter than two miles.[49] Distances under a mile are easily traveled by foot or bicycle, and yet 72% of these trips are taken by motor vehicles, which occupy significantly more right-of-way space than cars or bikes.[50] Complete streets can safely accommodate pedestrians, cyclists, and transit riders in a way that accommodates travel demand, especially short trips, more effectively in limited available space. This design approach can also bring greater efficiency for drivers than adding capacity alone. For example, widening a road can increase average vehicle delay through a corridor because of the need for longer pedestrian clearance time at intersections.

REDUCED GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE IMPACT

Reducing vehicle trips is a primary strategy for reducing greenhouse gas (GHG) emissions, especially since transportation accounts for 27% of national GHG emissions and 38% of California's GHG emissions (Figure C-8). For national GHG emissions between 1990 and 2010, transportation was responsible for 45% of the net increase, making it the single largest contributor.[51]

FIGURE C- 8 2010 CALIFORNIA GHG EMISSIONS BY SECTOR[52]



Complete streets are a valuable part of the climate change mitigation toolbox, as they enable the safer and more widespread use of nearly zero-emission modes like walking and biking and lower-emission modes like transit. As an example of this potential impact, biking instead of driving for shorter trips effectively reduces emissions of carbon dioxide by over 90%,[53] creating an overall savings of nearly one pound of CO2 for every mile.[54]Encouraging a modal shift to walking or bicycling for short trips under a mile can effectively reduce national CO2 emissions by 12 to 22 million tons per year.[55]

Sample Congestion and Emissions Metrics

Figure C-9 provides a summary of potential metrics that can be used to measure congestion and emissions.

FIGURE C- 9 SAMPLE METRICS FOR CONGESTION AND EMISSIONS

PERFORMANCE METRIC	EASE OF DATA COLLECTION	DESCRIPTION
Mode share	Easy	Percent reduction in drive-alone mode share.
Vehicle trips per capita	Medium	Percent reduction in daily vehicle trips per capita.
VMT per capita	Medium	Reduction in per capita daily VMT by "X" percent from baseline levels.
Level of Service (LOS)	Medium	Number of intersections and/or road segments exceeding LOS thresholds.
Multimodal Level of	Difficult	Number of intersections and/or road segments exceeding MMLOS

PERFORMANCE METRIC	EASE OF DATA COLLECTION	DESCRIPTION
Service (MMLOS)		thresholds.
Pedestrian Level of Service (PLOS)	Medium	Delay for pedestrians at signals shall not exceed "X" seconds. Minimum peak-hour sidewalk pedestrian LOS should be B.
Per capita GHG emissions	Medium	Metric tons of $C0_2$ (MT $C0_2$) emitted per capita.
GHG emissions	Medium	Current-year emissions (MT CO_2) as a percent of baseline year.

GREEN STREETS AND SUSTAINABILITY

THE IMPORTANCE OF A GREEN SYSTEM

The positive impacts of Green Streets improvements on public streets can be maximized if the locations and types of the improvements are determined through a watershed-based approach. This means that green infrastructure that is located without a deeper understanding of the underlying watershed or watersheds will likely be less effective than a network of Green Streets strategically targeted at areas where flooding occurs, where connections to natural bodies of water can be made, and where the connections to other open spaces can create additional benefits for wildlife.

This does not mean that opportunities for independent locations or shorter segments should not be taken advantage of, as more isolated Green Streets improvements can still be very effective from a functional and environmental perspective and as pilot projects.

This section provides an overview of the benefits of streetscapes that incorporate "green" elements. Green streets are designed to capture, slow, treat, and potentially infiltrate stormwater runoff. This approach stands in contrast to the traditional approach to stormwater management that uses "grey" infrastructure designed to expediently collect stormwater runoff from streets through a system of storm drains, pipes, culverts, and storage facilities that eventually dispose the collected runoff into waterways or treatment facilities.

Properly designed Green Streets improvements can accomplish the most basic goal of improved stormwater management—moving stormwater through the urban watershed and reducing pollutant levels in the water—while providing an array of additional environmental and economic benefits not achieved by grey infrastructure alone.

ECONOMIC COSTS AND BENEFITS

Traditional storm sewer systems are costly to build, expand, upgrade, or retrofit, as well as to operate and maintain. While Green Streets infrastructure improvements on public streets do not completely eliminate the need for grey infrastructure, they are more cost-effective, especially in areas where flooding is known to occur due to an undersized storm-sewer system and in opportunity areas where future upgrades or retrofits of grey infrastructure are needed. Green Streets are also a viable solution where new development is built and the overall capacity of a new storm-sewer system can be reduced by combining grey and green infrastructure improvements. Therefore, the amount or proportion of grey to green infrastructure that composes a city's stormwater management system can affect the costs associated with the construction, operations and maintenance, and replacement, of that system.[56]

Reduced Capital Costs

Green infrastructure projects can supplant more costly grey infrastructure equipment and installation. Rather than constructing new, full-scale underground utilities to manage stormwater, green infrastructure can help achieve the same stormwater-management goals for less capital investment. While some green infrastructure projects may be more expensive to construct than conventional storm sewers, they often provide valuable economic benefits for a municipality in the long run, by reducing damage from flooding and water and air pollution, increasing land values, and making streets more attractive, which can increase property values. Grey infrastructure projects do not provide the same range of benefits.

"Putting green infrastructure into practice requires a change not just in systems but in our approach to operations and maintenance of stormwater systems. Properly functioning green infrastructure practices are premised on using natural processes rather than built systems, which requires a shift away from capital-intensive, infrequent maintenance to less-invasive tasks that may be more frequent but less expensive overall. As grey infrastructure systems require increased operations and maintenance over time as equipment and materials wear down, green infrastructure practices are designed to increase in resilience and function as vegetation matures and adapts to local resource cycles."

Banking on Green: A Look at How Green Infrastructure Can Save Municipalities Money and Provide Economic Benefits

Reduced Operations and Maintenance Costs

While green infrastructure operations and maintenance may need to be provided more frequently and by a broader coalition of project partners, the aggregate costs can be less than that required for grey infrastructure operations, for which repairs and maintenance may be less frequent but much more disruptive and likely more costly.[57]

Green infrastructure is based on natural processes and materials, which grow stronger and more effective with time, as plants and root systems mature. Conversely, grey infrastructure systems typically deteriorate with age, eventually requiring costly comprehensive replacement or refurbishing. This is not to say that all green infrastructure has minimal lifetime replacement costs. For example, it is anticipated that some porous asphalt installations will require replacement when they can no longer be effectively cleaned to maintain adequate percolation rates. Likewise, components of grey infrastructure systems can be replaced in isolation, such as drain inlets that filter out sediment and pollutants.

Nevertheless, the addition of green infrastructure features to streets in a given area will add to the maintenance burden. In most cities, the Parks and Recreation Department carries out the landscape maintenance for landscaping in the public realm, while the maintenance of the storm sewer system is the responsibility of the Public Works Department. As the balance between green and grey infrastructure is changed, the budgets available to both departments for maintaining the respective type of infrastructure will also require rebalancing. Cities may need to consider new approaches in covering the cost for maintaining Green Streets improvements, such as maintenance districts or private initiatives.

PUBLIC-PRIVATE MAINTENANCE AGREEMENTS

It may be possible for a city and development community to work together to achieve cost-effective management of green infrastructure. Fort Collins, Colorado has worked with property owners to share the responsibility for maintaining green infrastructure that is installed in the adjacent public right-of-way. Washington, D.C. is developing a similar strategy. The Philadelphia Water Department and other partners have worked together to develop pilot recommendations for property owners along American Street to pay into a fund for the construction and maintenance of regional-serving Green Street stormwater management infrastructure within the adjacent right-of-way, in lieu of paying for expensive on-site stormwater management.

The aesthetic improvements and reduced flooding that green streets yield has been proven to increase the value of property.[58] Studies have shown improved productivity of workers and a $15,000 to $25,000 increase in home or business value for locations with views and access to trees and vegetation. Additionally, preference studies have shown increases in customers' "willingness to pay" for consumer goods from urban retailers in districts with trees and landscaping.[59]

SOCIAL BENEFITS

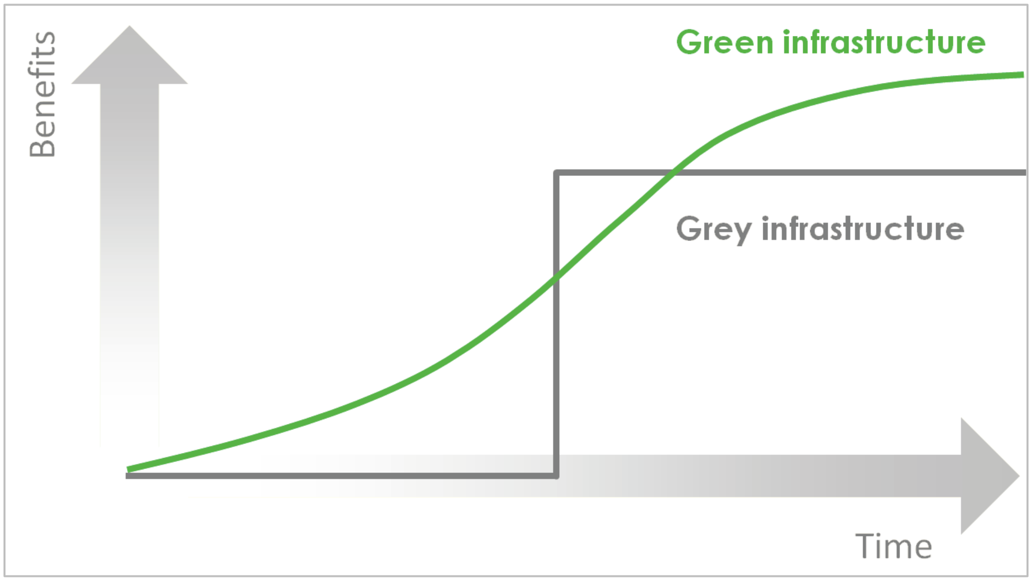
Compared with exclusively grey-infrastructure-based stormwater management systems, Green Streets practices create aesthetically pleasing streetscape improvements that are a benefit to the community. These elements make streets more enjoyable and safer for pedestrians and bicyclists. In general, a pleasing streetscape that invites residents' participation in active transportation can improve health outcomes.

In addition, managing stormwater in a manner that citizens can physically observe provides educational benefits and connects people in urban environments more directly with the natural environment. In this process, the perception of stormwater is transformed from a waste product into one of an important resource that sustains trees and other plant life, enriching the everyday environment.

BENEFITS OF A MULTI-PART SYSTEM

Green infrastructure starts to provide immediate incremental benefits from the first rain garden or stormwater planter installed. As a result, this infrastructure lends itself to expansion over time as space and funds become available. Large-scale grey infrastructure projects on the other hand are often upgraded or newly constructed in larger increments, requiring major outlays in resources at one time and a process for design and implementation that is time consuming and based on a long time horizon. This distinct difference in phasing is shown in Figure C-10.

FIGURE C- 10 PHASING OF GREEN VS. GREY INFRASTRUCTURE BENEFITS[60]



BENEFITS OF A SYSTEM BASED ON PUBLIC STREETS

Green infrastructure is implemented in the public right-of-way, which is under the control of the municipality. Public streets typically compose 20% to 30% of a city's land area and are almost exclusively impervious, making them ideal candidates for implementing effective stormwater-management strategies at the source of a large percentage of a city's stormwater runoff.

Sample Sustainability Metrics for Green Streets

Figure C-11 provides a summary of potential metrics that can be used to measure the sustainability benefits of green streets.

FIGURE C- 11 SAMPLE METRICS FOR GREEN STREETS SUSTAINABILITY

PERFORMANCE METRIC	EASE OF DATA COLLECTION	DESCRIPTION
Flooding	Medium	Amount of stormwater that collects in a given location during a storm event and/or high tide
Stormwater Volume and Flow Rate	Medium	Stormwater volume and flow rate at key points in the system
Irrigation Demand	Medium	Volume of water used for irrigation of plants
Water Quality	Difficult	The amount of litter, sediment and pollutants in receiving waterways
Heat-Island Effect	Difficult	Air temperature
Water Temperature	Difficult	Temperature of water runoff entering receiving waterways
Carbon Footprint	Medium	Amount of carbon sequestered by landscaping
Public Education	Difficult	Public understanding of water cycle and natural systems/natural

PERFORMANCE METRIC	EASE OF DATA COLLECTION	DESCRIPTION
		environment
Capital Costs	Medium	Cost to build, expand, upgrade, or retrofit stormwater infrastructure (grey and green)
Operations and Maintenance Costs	Difficult	Cost to operate and maintain stormwater infrastructure (grey and green)
Infrastructure Replacement Costs	Difficult	Cost to replace aging/failing stormwater infrastructure (grey and green)

CAPITAL AND OPERATING COSTS

Complete streets are emerging as an integral part of an overall development strategy that can generate significant savings in municipal budgets. When used in conjunction with other smart-growth strategies for development, studies have shown savings of 38% to 50% in upfront infrastructure costs and 10% in ongoing delivery of services for municipal budgets. At the same time, such strategies can help strengthen the tax base and generate 10 times more revenue than seen with typical suburban development strategies.[61]

STREET DESIGN

The financial savings from complete streets starts with the design process—if the needs of pedestrians, bicyclists, and the disabled are considered at the very beginning of this process, an agency can save itself a considerable amount of money and liability over the long-term.

For example, the Washington State Department of Transportation found that implementing a design process for its projects that focused on highways being rehabilitated as "Main Streets" would save an average of $9 million, or 30%, of budget per project. This new design process produced savings through schedule, scope, and budget changes, while incorporating better sidewalks, safe pedestrian crossings, parking management, and other features.[62]

The City of Colorado Springs has added to its bicycle network by using its existing maintenance and repaving budget to restripe existing four-lane undivided streets to provide a three-lane cross section and bike lanes. Considering that 7% to 10% of the city's roadway network is repaved each year, this has become a cost-effective way of implementing complete streets features without necessarily introducing a separate budget item.[63]

UPFRONT CONSTRUCTION COSTS AND LONG-TERM MAINTENANCE

Complete Streets projects are able to realize significant cost savings in construction and maintenance through the nature of their design improvements. Projects like road diets result in less pavement wear by reducing the number of auto lanes and shifting space to less intensive uses like bike lanes, buffers, and parking. Furthermore, new road projects can utilize narrower roadways from the start, directly corresponding with lower costs for pavement, other construction material, and potentially costly right-of-way problems.

Several measures that increase safety, accessibility, and comfort for pedestrians can be implemented with low upfront costs and may reduce long-term maintenance costs. For example, curb extensions (bulbouts) in parking lanes are simple improvements that increase visibility of pedestrians at intersection corners and can shorten pedestrian crossing distances. This may reduce the duration of the pedestrian clearance time at signals, and thus increase both automobile and pedestrian accessibility and mobility.[64] Medians reduce the amount of paved surface and provide room for landscaping. The Florida Department of Transportation found that over the long term, it is cheaper to maintain a landscaped median than an asphalt center turn lane.

In Wisconsin, the Brown County Highway Department compared two design alternatives for three intersections in the City of Howard, one using conventional four-lane signalized arterials and the other consisting of three-lane streets and two-lane boulevards with roundabouts. After analyzing each alternative, the second alternative had a savings of $523,000, or 52% in total construction costs for all three intersections. These savings came from lower requirements of pavement, right-of-way, and electricity, as well as zero requirements for installation or maintenance of traffic signal components (loop detectors, lights, and mast heads).[65]

SAMPLE CAPITAL AND OPERATING COST METRICS

Figure C-12 provides a summary of potential metrics that can be used to measure capital and operating costs.

FIGURE C- 12 SAMPLE METRICS FOR CAPITAL AND OPERATING COSTS

PERFORMANCE METRIC	EASE OF DATA COLLECTION	DESCRIPTION
Budget performance	Easy	Share of municipal budget allocated to construction of new facilities and maintenance of existing facilities
Projects implemented	Easy	Number of complete streets projects implemented per year
Maintenance schedule	Easy	Number of delayed operations and maintenance projects
Number of "piggy-backed" projects	Easy	Number of projects where bicycle facilities or pedestrian enhancements were added to other projects such as resurfacing, utility, or other projects.
Bike lanes added via resurfacing	Easy	Miles of bike lanes added during resurfacing projects each year.

ECONOMIC IMPACTS

The economic impacts of Complete Streets projects are well documented. These impacts are summarized below in five categories: consumer spending, property value, business benefits, individual transportation costs, and perceptions of complete streets.

CONSUMER SPENDING

Large increases in consumer spending correlate to specific Complete Streets and Green Streets investments.

» "Tourists coming to Vermont to walk and bicycle in the scenic, human-scale towns and compact, pedestrian-friendly town centers have proved to be an economic boon. In 1992, an estimated 32,500 visiting cyclists spent $13.1 million in Vermont – about twice the amount of money generated by Vermont's maple syrup producers in a good year."[66]

» As shown in Figure C-13, a 2012 study done by the New York City Department of Transportation documents several consumer spending impacts of recent Complete Streets projects in New York.

FIGURE C- 13 CONSUMER SPENDING IMPACTS FROM COMPLETE STREETS IMPROVEMENTS IN NEW YORK CITY[67]

COMPLETE STREETS IMPROVEMENT	DOCUMENTED EFFECT
8th/9th Avenue (Manhattan) cycle track	Up to a 49% increase in retail sales
Pearl Street (Brooklyn) conversion of underutilized parking to plaza space	172% increase in retail sales
Pearl Street (Manhattan) conversion of parking lane to on-street seating	Businesses fronting the new seating area saw a 14% increase in sales
Fordham Road (Bronx) new rapid bus transit line and associated street improvements	71% increase in sales at businesses along the corridor

» "Visitors who would come [to Prince Street in New York City] more often with a reallocation of space from parking to pedestrians spend about five times as much money in the neighborhood as do visitors who would come less often."68

» Bicycle parking is more space-efficient than automobile parking. One study finds that each square meter of bicycle parking generated $31 per hour, whereas each square meter of automobile parking generated only $6 per hour.69

» A University of Washington study finds that people are willing to pay about 11% more for goods in landscaped business districts than in non-landscaped districts (and up to 50% for convenience goods).70

» A recent study71 of East Village shoppers in New York City finds:

- "Aggregate weekly spending by public-transit and non-motorized transportation users account for 95 percent of retail dollars spent in the study area."
- "People on bike and foot spend the most per capita per week, $163 and $158, respectively, at local businesses."

PROPERTY VALUES

Residential, office, and commercial property values benefit from nearby investments in bicycle, pedestrian, and transit infrastructure as well as urban design and landscape improvements. This effect has been documented in San Mateo itself.

» The City of San Mateo reviewed several studies for the Bicycle Master Plan and found that home prices near trails are higher than home prices farther away from them.72

» Smart Growth America studied several development types in Nashville. They found that The Gulch – a 76-acre mixed-use, compact housing development with 4,500 housing units and six million square feet of office space – had the biggest economic benefit to the City. The development generates $3,370 in public revenue per unit (or $115,720 in net revenue per acre) annually in the form of property taxes, sales taxes, and other recurring revenues.73

» "In a typical market, an additional one point increase in Walk Score was associated with between a $700 and $3,000 increase in home values."74

» Figure C-14 shows differences in property values in places with a Walk Score of 80 versus a Walk Score of 20.

FIGURE C- 14 PROPERTY VALUE IMPROVEMENTS WITH WALK SCORES OF 80 VS. 20[75]

PROPERTY TYPE	MARKET VALUE	NET OPERATING INCOME	APPRECIATION PER QUARTER
Office	+54%	+42%	1.92%
Retail	+54%	+42%	--
Apartments	+6%	--	--

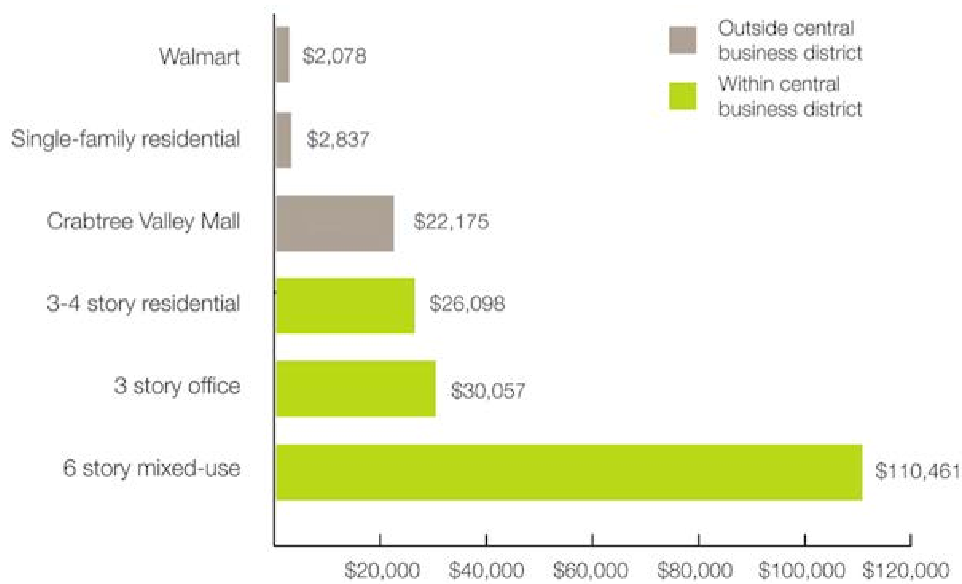
» "Office, retail, and apartment values increased by 1-9% for each 10-point Walk Score increase."76

» Residential property values are higher in walkable neighborhoods:

- Residential property values are 5.2% higher in more walkable London neighborhoods77
- House values are 15.5% higher in walkable neighborhoods than in non-walkable areas, all else equal.78
- Property values are 11% higher in New Urbanist neighborhoods than in conventional, auto-dependent neighborhoods.79

» Mixed-use, walkable development generates 10 times higher property tax yields than more suburban development patterns. Figure C-15 shows findings from a study documenting tax yields from different types of development in Raleigh, North Carolina.

FIGURE C- 15 MUNICIPAL PROPERTY TAX YIELD PER ACRE, RALEIGH, NC[80]



BUSINESS BENEFITS

Neighborhoods with bicycle-, pedestrian-, and transit-friendly environments are much more likely to have high business-occupancy rates. Businesses benefit from higher worker productivity.

» Figure C-16 summarizes findings of a 2012 study conducted by the New York City Department of Transportation on commercial vacancies.

FIGURE C- 16 COMMERCIAL VACANCY IMPACTS FROM COMPLETE STREETS IMPROVEMENTS NEW YORK CITY[81]

COMPLETE STREETS IMPROVEMENT	DOCUMENTED EFFECT
1st/2nd Avenue (Manhattan) dedicated bus and bike lanes	47% fewer commercial vacancies
8th/9th Avenue (Manhattan) protected bicycle lane	49% fewer commercial vacancies

- » Occupancy rates of office buildings are positively affected by landscaping amenities, which have a higher correlation with occupancy than direct access to arterial routes.82
- » Businesses whose employees bicycle more often or further than others benefit from higher employee productivity. On average, employees who bicycle to work are absent fewer days than those who do not.83
- » The addition of bicycle lanes on Broad Street in Memphis is associated with the addition of 16 new businesses, 29 property renovations, and 40,000 visitors to the Arts Walk event.84
- » An oft-cited study of the economic impacts of bicycle investments in North Carolina's Outer Banks finds that 1,400 jobs are supported annually through bicyclist expenditures. The overall estimate of annual economic impact of bicyclists in the region is at least $60 million.85
- » National data indicates that infrastructure projects specific to cycling generate 11.4 jobs per $1 million spent. By contrast, traditional road projects like repaving or widening generate only 7.8 jobs per $1 million spent.86
- » A cost-benefit analysis indicates that every dollar spent on bicycle networks yields $4-5 in benefits (including security, health effects, and reduced costs of motorized traffic).87

INDIVIDUALS' TRANSPORTATION COSTS

When people have transportation choices, they can save significantly on transportation expenses.

- » San Mateo can reasonably expect to reduce vehicle miles driven per weekday by 29,615 trips (or 7.7 million per year) if the Bikeways Master Plan is built out.88 This would significantly reduce the cost to individuals through travel time savings, lower fuel costs, and other auto ownership-related costs.
- » "Shifting from automobile to non-motorized travel is estimated to provide parking savings of $2-4 per urban-peak trip (a typical commute has $4-8 per day parking costs), $1-3 per urban off-peak trip, and about $1 per rural trip."89
- » A national study of transportation expenses reveals that people living in areas with sprawling characteristics have fewer transportation options and therefore spend an average of $1,300 more per year on transportation than people in non-sprawling areas.90

POSITIVE PERCEPTIONS OF COMPLETE STREETS

Businesses and residents across the county strongly support complete streets.

- » "We really have to look at bicycling as a viable and important part of the transportation network and not just a recreational pursuit. [San Mateo County] needs to take more of a leadership role to publicize bike routes and get cities to work together to construct practical bicycle infrastructure so that people can get to work more easily." – San Mateo County Supervisor Dave Pine on Bike to Work Day 2013.91
- » "We all know that change is hard, but 70% of our respondents think that the bike lane is going in the right direction." New York City Council Member Gale Brewer conducted a survey of people in the Upper West Side

neighborhood after installation of once-disputed bicycle and pedestrian safety improvements on Columbus Avenue. The street redesign was found to reduce crashes by 34%. Of those surveyed, including merchants who originally opposed the design, 73% thought the changes improved the street.92

» A 2003 study of merchants on Valencia Street in San Francisco found that 65% of merchants think traffic calming improvements improved business and sales and 65% also would support more traffic calming measures on the corridor.93

» "The [bike] lanes slowed down traffic and people started noticing the businesses more. Our business revenues have grown on average 30% per year – yes, an art-related business in a tough economy." – Pat Brown, co-owner of T Clifton Gallery on Broad Avenue in Memphis.94

» "[Adding bike lanes] was probably one of the best things to happen for my business." – Katelynn Meadows, owner of Sweetly on Broad Avenue in Memphis.95

SAMPLE ECONOMIC IMPACT METRICS

Figure C-17 provides a summary of potential metrics that can be used to measure the economic impacts of projects.

FIGURE C- 17 SAMPLE METRICS FOR ECONOMIC IMPACTS

Performance Metric	Ease of Data Collection	Description
Retail sales	Easy	Amount of retail sales for adjacent businesses.
Commercial or retail vacancy rate	Easy	Percent of vacant square feet of commercial or retail space.
Property values	Easy	Assessed property value.
Property tax yield	Easy	Property tax yield per acre.
Level of spending by mode	Difficult	Per capita spending level by mode of travel.
Transportation costs	Difficult	Per capita or household share of income spent on transportation.
Business satisfaction	Medium	Level of support by business owners (pre- vs. post-project).
Resident satisfaction	Medium	Level of support by residents (pre- vs. post-project).

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APPENDIX D

Street Classification System Review

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MEMORANDUM

To: Ken Chin, City of San Mateo

From: San Mateo Sustainable Streets Project Team

Date: October 2, 2014

Subject: San Mateo Sustainable Streets Plan: Tech Memo 2.4 – Street Classification System Review

INTRODUCTION

The intent of this memorandum is threefold. First, it provides a summary of the existing street classification system used in San Mateo. Second, it highlights contextual characteristics and unique elements of the city that may be included in a future classification system. Finally, it presents street classification examples from peer cities around the United States.

BACKGROUND

City streets are complex places with a variety of users using the space in different ways. In many cities, streets are in fact the largest form of publicly owned space and provide a significant opportunity to help achieve local goals aside from vehicular mobility, such as for place making and the accommodation of a broad range of pedestrian activities.

Most cities have a classification system to divide streets into categories with associated design standards. Traditionally, these design standards are vehicle-oriented and do not take into consideration other uses of the street such as public space or non-motorized mobility. The practice of classifying streets has traditionally included a functional classification (FC). According to the Federal Highway Administration (FHWA), FC is an ordering system that defines "the part that any particular road or street should play in serving the flow of trips through a highway network."[1] FC categorizes streets based on their ability to 1) move traffic, and 2) provide access to adjacent properties. Typical FC street types include "local" streets, medium-sized "collectors," and highway-type "arterials." While this classification system helps define the roles streets play in the movement of vehicles, it does not reflect the multi-faceted needs of an urban context.

In contrast, a street typology that reflects urban needs considers all modes, variations in the urban and natural context of streets, and changes in the available right-of-way along their length. This includes streets that are adjacent to major transit hubs or streets that can include green infrastructure to meet stormwater management, street beautification, and economic development goals. The classification system should reflect existing uses and established community goals to reveal the gap between what the street is and what it could be. Urban-focused classification characteristics typically include:

- All modes of transportation – e.g. pedestrian, bicycling and other active transportation, transit, auto, freight, and emergency vehicles, including prioritization of one or more modes
- Land use – e.g. residential, neighborhood or regional commercial, mixed-use, downtown, (light) industrial, park and open space, education, and recreational
- Street operations – loading/unloading, sanitation and trash pickup, street construction, and emergency access
- Community goals and performance measures – safety, economic development, public health, preservation of natural/historic resources, and sustainability

EXISTING STREET CLASSIFICATION

The City of San Mateo currently classifies its streets under four categories. This includes:

- Freeways
- Arterials
- Collectors
- Local Streets

These classifications are consistent with guidance provided by the FHWA and are similar to the classifications many cities around California have. Each of these classifications and their definitions as provided by the City of San Mateo[2] are described below. Definitions taken directly from city text are shown in *italics*. Brief examples of the largest street classifications (freeways and arterials) and their respective circulation impacts are also provided.

FREEWAYS

Freeways route traffic through the community and are characterized by large traffic volumes and [limited-access] high speed travel. There are two freeways in San Mateo: US Highway 101 (Bayshore Freeway) and State Route (SR) 92 (J. Arthur Younger Freeway). Interstate 280 also provides regional access to the community and is located just west of the city's sphere of influence. Typical freeways in San Mateo are 6-10 lanes wide and carry 120,000-250,000 vehicles per day.

Past planning has encouraged the concentration of large-scale commercial development close to freeway ramps so that regional traffic is not routed through the community. The SR 92 corridor, for example, contains several high intensity commercial centers with good freeway access and relative isolation from residential neighborhoods.

US Highway 101 (Bayshore Freeway)

US Highway 101 is the larger of two freeway corridors serving San Mateo. Located on the eastern side of the city, US 101 is an eight-lane, north-south facility that provides primary access to San Francisco in the northbound direction, San Jose in the southbound direction, and the many Peninsula cities between them. The highway is a major conduit of traffic through San Mateo, carrying an average daily traffic (ADT) volume of between 226,000 and 251,000 vehicles per day in 2011.[3]

US Highway 101 features a limited number of access points to local streets in the city, including interchanges at Peninsula Avenue and Poplar Avenue in the north, 3rd/4th Avenues in central San Mateo, and Hillsdale Boulevard in the south. The 3rd/4th Avenue and Hillsdale Boulevard interchanges are illustrated in Figures D-1 and D-2. Improvements to these interchanges in recent years have diverted traffic away from local roads onto the freeway.[4]

FIGURE D- 2 US 101 AND 3RD/4TH AVE INTERCHANGE

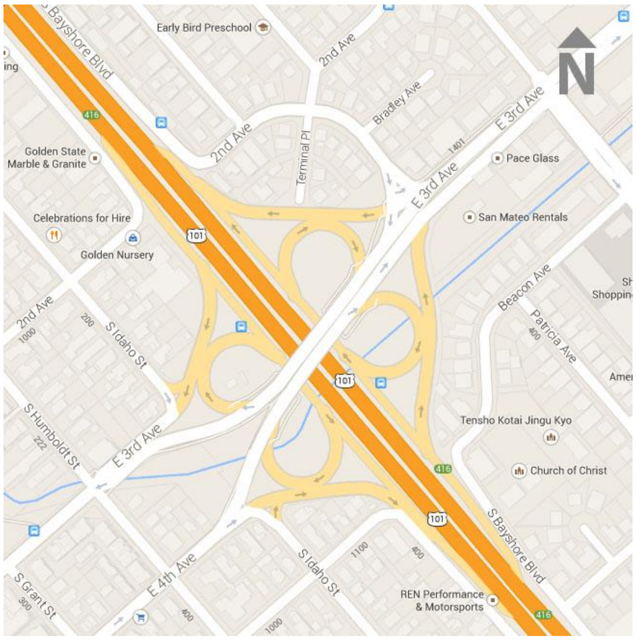
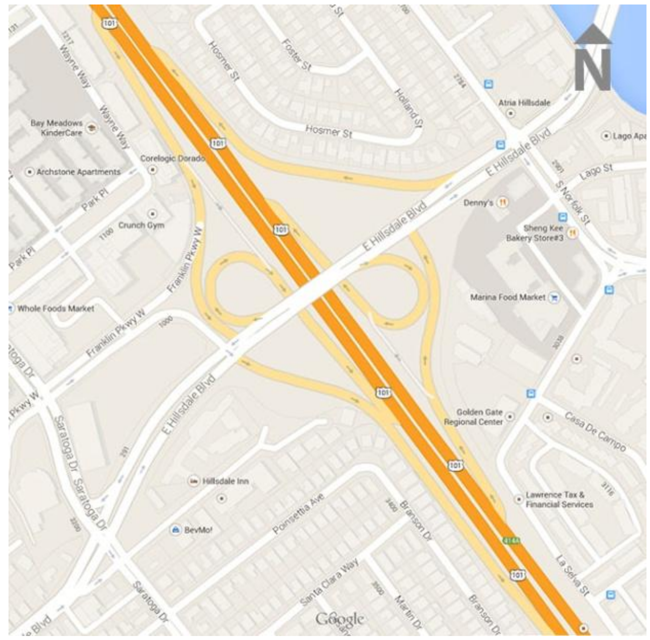


FIGURE D- 1 US 101 AND E HILLSDALE BLVD INTERCHANGE



Source: Google Maps

STATE ROUTE 92 (J. ARTHUR YOUNGER FREEWAY)

SR 92 is the second major freeway in San Mateo, bisecting the northern and southern halves of the city. SR 92 is a four-lane, east-west facility that in the eastbound direction connects San Mateo to the East Bay via the San Mateo Bridge, and in the westbound direction to Interstate 280, another major Peninsula freeway.

SR 92 has an interchange with US 101 in southeastern San Mateo. In 2011, the freeway carried an approximate ADT of 150,000 vehicles per day east of the interchange, and between 80,000 and 115,000 vehicles per day west of it. Similar to US 101, SR 92 features a limited number of interfaces with local streets. To the west of its US 101 interchange, SR 92 has key interchanges with Delaware Street, SR 82 El Camino Real, Alameda De Las Pulgas, Hillsdale Boulevard, De Anza Boulevard, and Ralston Avenue.[4,5]

ARTERIALS

Arterials link adjacent cities with San Mateo as well as residential and commercial districts, and serve shorter through-traffic needs. Due to the heavier traffic on arterials, adjacent land uses are intended to be a mix of commercial and multi-family residential, as seen along El Camino Real and San Mateo Drive. In San Mateo, however, many arterials are located in single-family neighborhoods. Examples include portions of Hillsdale Boulevard, Norfolk Street, and Alameda de las Pulgas. Streets that compose downtown San Mateo are primarily classified as arterial streets. Typical arterials in San Mateo are 2-6 lanes wide and carry 10,000-50,000 vehicles per day.

Traditionally, arterial streets serve a primary function of moving relatively high volumes of traffic. In San Mateo, however, established patterns of development have created driveways along most arterials. While the Land Use Element retains established single-family neighborhoods along many arterials, traffic is expected to increase on these roadways in the future.

State Route 82 (El Camino Real)

State Route 82, better known as El Camino Real, serves as a major regional arterial that runs north-south through the center of San Mateo. El Camino Real is a four- to six-lane facility that is highly integrated with local roads and is flanked by both commercial and residential development.

The arterial widens from four to six lanes at Crystal Springs Road, transitioning from a primarily residential area north of the intersection into downtown San Mateo. The northern portion of El Camino Real has an ADT of 29,000 vehicles per day[6], and this particular intersection was identified in the *San Mateo 2030 General Plan* as one of three in the city that will need improvements to maintain level-of-service standards with anticipated development levels.

To the south, 3rd Avenue serves as a feeder road to El Camino Real directly from US 101 (and vice versa with 4th Avenue further south). The ADT for El Camino Real increases to 32,000 vehicles per day at this intersection with 3rd Avenue.

El Camino Real has a major grade-separated interchange with SR 92 in the center of San Mateo, at which the ADT of the arterial increases to between 41,000 and 50,000 vehicles per day.

Further south in the city, El Camino Real has another grade-separated interchange with Hillsdale Boulevard. These two arterials converge at the Hillsdale Shopping Center and Hillsdale Caltrain station, channeling traffic to and from these and other locations. The ADT for El Camino Real at this intersection is approximately 36,000 vehicles per day.[7]

COLLECTORS

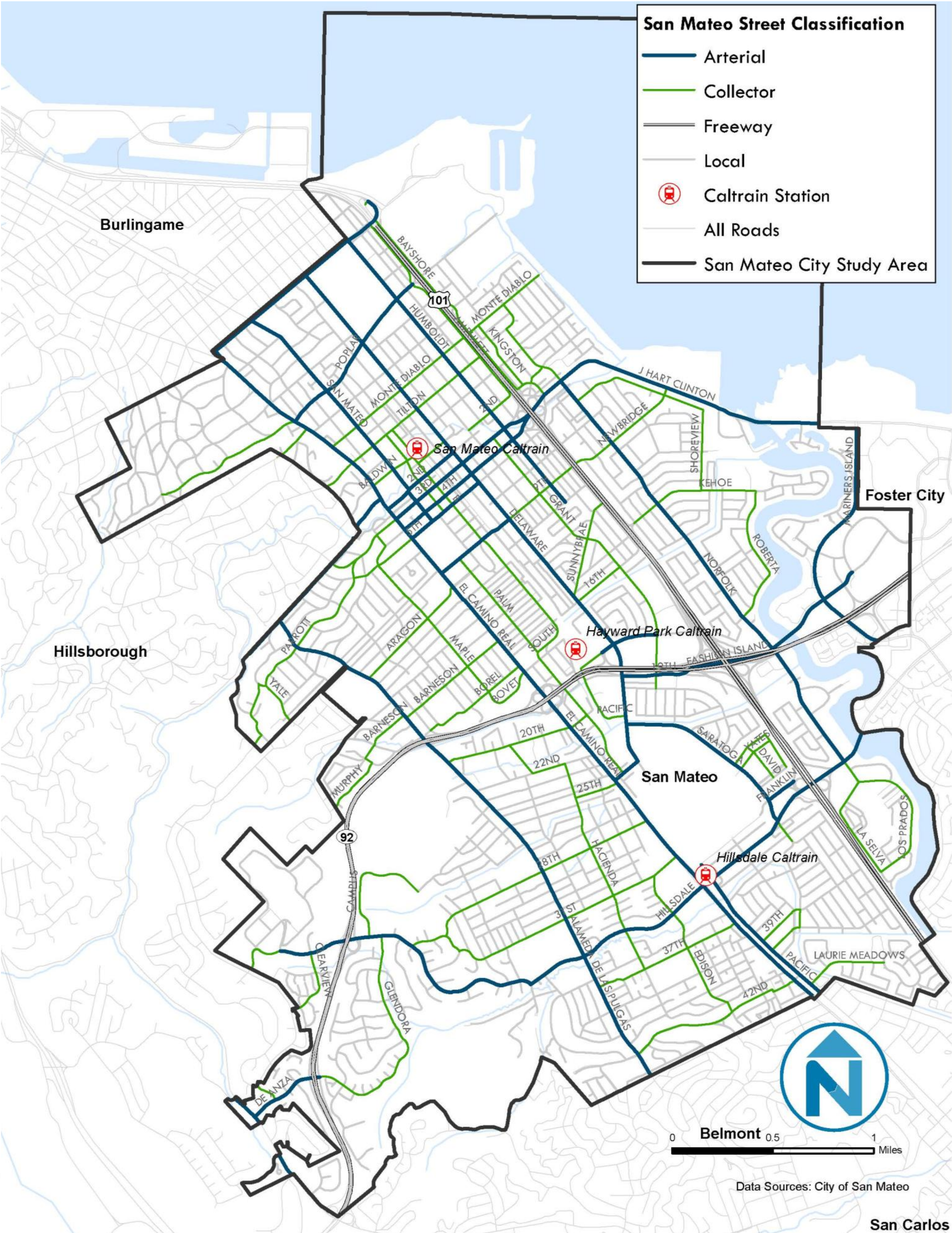
Collector streets link neighborhoods to arterials and are not intended for through traffic, but are nonetheless intended to move traffic in an efficient manner. Traditionally, collectors are designed to avoid forming a continuous system, preventing drivers from using them as convenient substitutes to arterials. Examples of collector streets include Monte Diablo Avenue, Grant Street, B Street, 20th Avenue, 28th Avenue, 31st Avenue, and Glendora Drive/De Anza Boulevard. In San Mateo, as drivers avoid congested thoroughfares, traffic diversion onto collectors has increasingly impacted neighborhoods close to such major arterials as El Camino Real and Hillsdale Boulevard.[8] In San Mateo, typical collector streets are between 2-4 lanes and carry 1,000-10,000 vehicles per day.

LOCAL STREETS

Local streets are designed to serve only adjacent land uses and are intended to protect residents from through-traffic impacts. The majority of San Mateo's street network is composed of local streets. These streets are predominately residential neighborhoods with some exceptions. Local streets traditionally provide limited through access and are within environments that benefit from low operating speeds. Examples of local streets include York Avenue, Guildford Avenue, Delmar Way, Adams Street, and Pasadena Drive.

All street classification types in San Mateo are shown in Figure D-3.

FIGURE D-3 EXISTING STREET CLASSIFICATION IN SAN MATEO



STREET CLASSIFICATION IN CONTEXT

Currently, street classifications in San Mateo are defined based on lane width and capacity to handle daily vehicular traffic. It is unclear if these classifications have taken into consideration other factors that play a large role in how a street is used, including local land uses, level of transit service, use by bicyclists and pedestrians, and use for goods movement (freight). The following figures highlight these other considerations. A future street classification system could reflect some or all of these items. Streets should change as the context around them changes, and they should be classified in a way that meets the varied needs of the variety of local street users, in addition to the local and regional movement of vehicles.

TRAFFIC VOLUMES

Based on existing street-classification definitions, streets are categorized by number of lanes and average daily traffic (ADT).[9] The City of San Mateo's classifications are shown in Figure D-4.

FIGURE D- 4 SAN MATEO STREET CLASSIFICATIONS

ROADWAY TYPE	NUMBER OF LANES	NO. OF DAILY VEHICLES
Freeway	6-10	120,000 – 250,000
Arterial	2-6	10,000 – 50,000
Collector	2-4	1,000 – 10,000
Local	2	500 - 1,000

To understand how classifications align with existing roadway usage, Figure D-6 through Figure D-9 compare existing street classification (arterials, collectors, and local streets) ADT limits to actual recorded daily vehicle traffic. ADT values are the most recent collected by the City of San Mateo. ADT values are, however, not available for the entire city.

LAND USE

Figure D-5 provides a snapshot of local land uses in conjunction with existing street classifications. Currently, it appears that street classifications are not responsive to local land use context. For examples, arterials persist through commercial, residential, park space, and other uses.

FIGURE D- 5 SAN MATEO LAND USE AND STREET CLASSIFICATION

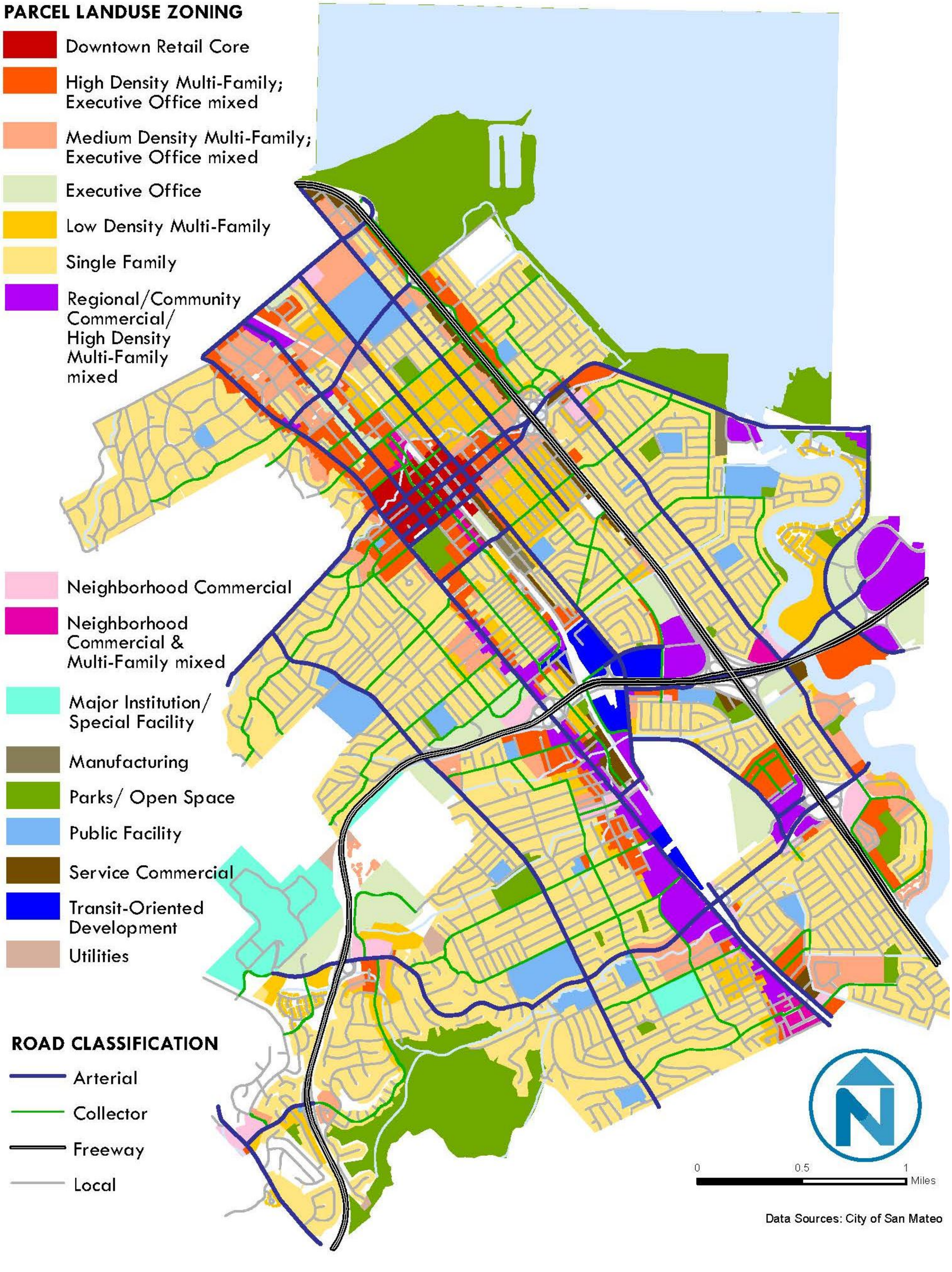
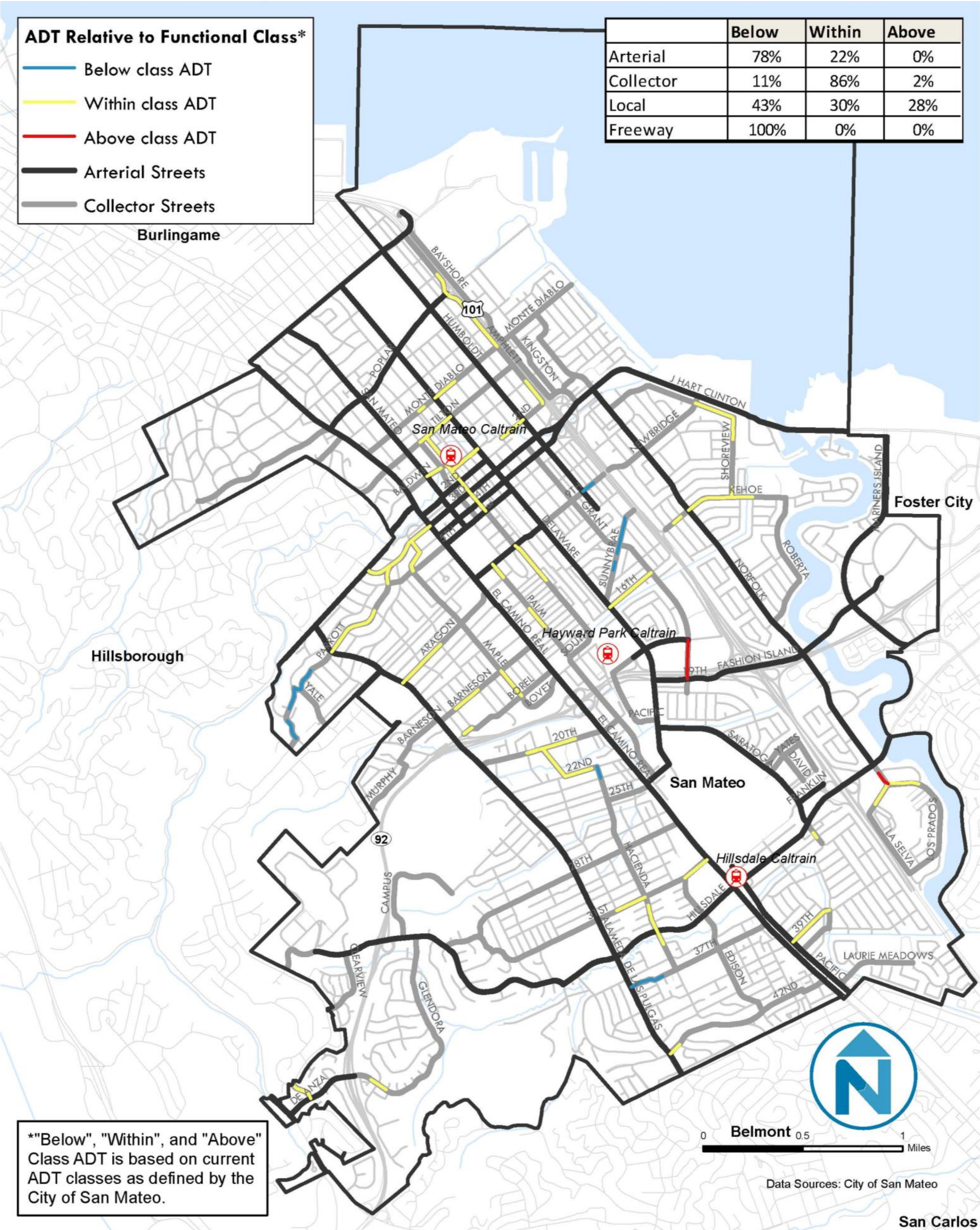
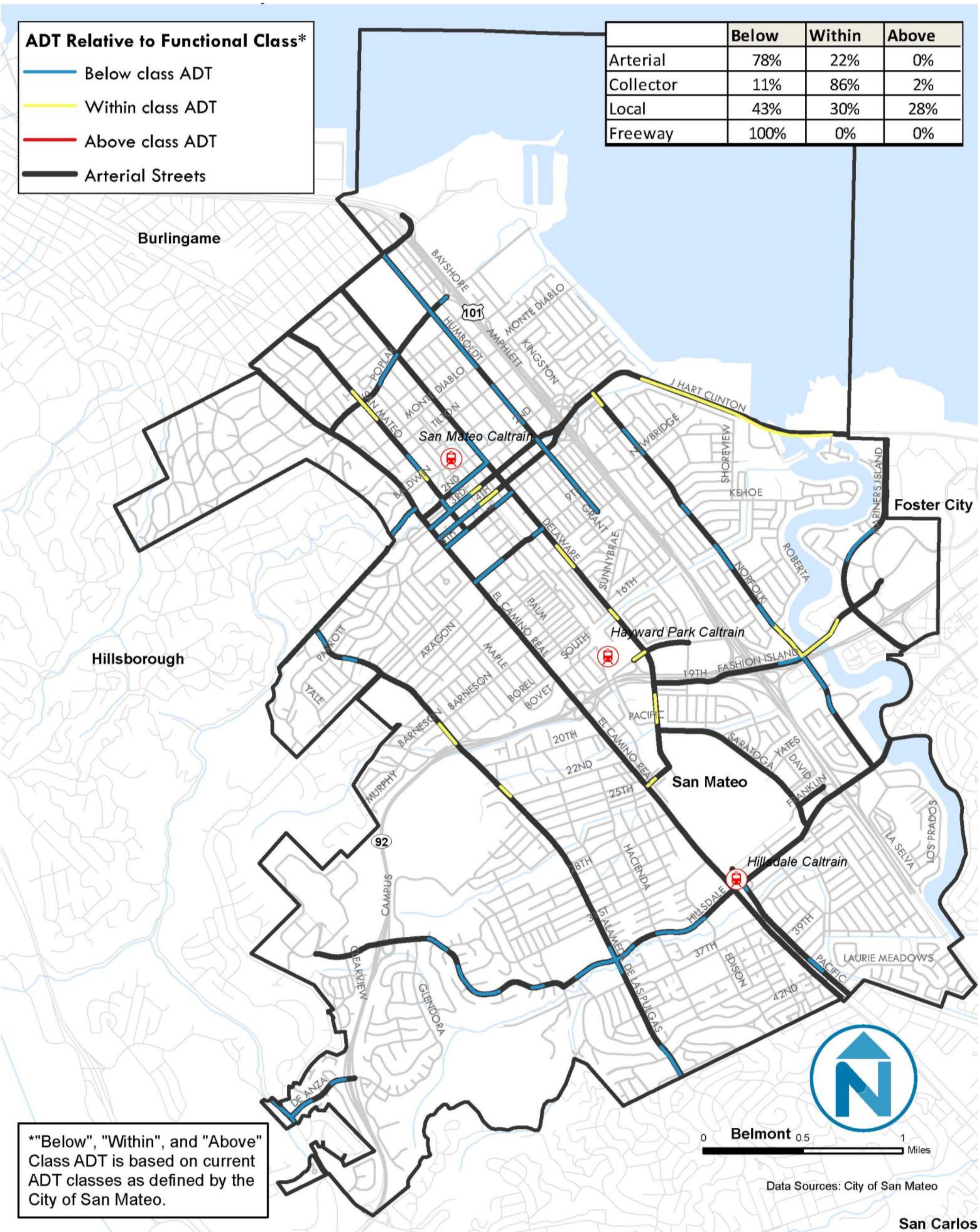


FIGURE D- 6 RECORDED ADT RELATIVE TO STREET CLASSIFICATION – ARTERIAL STREETS



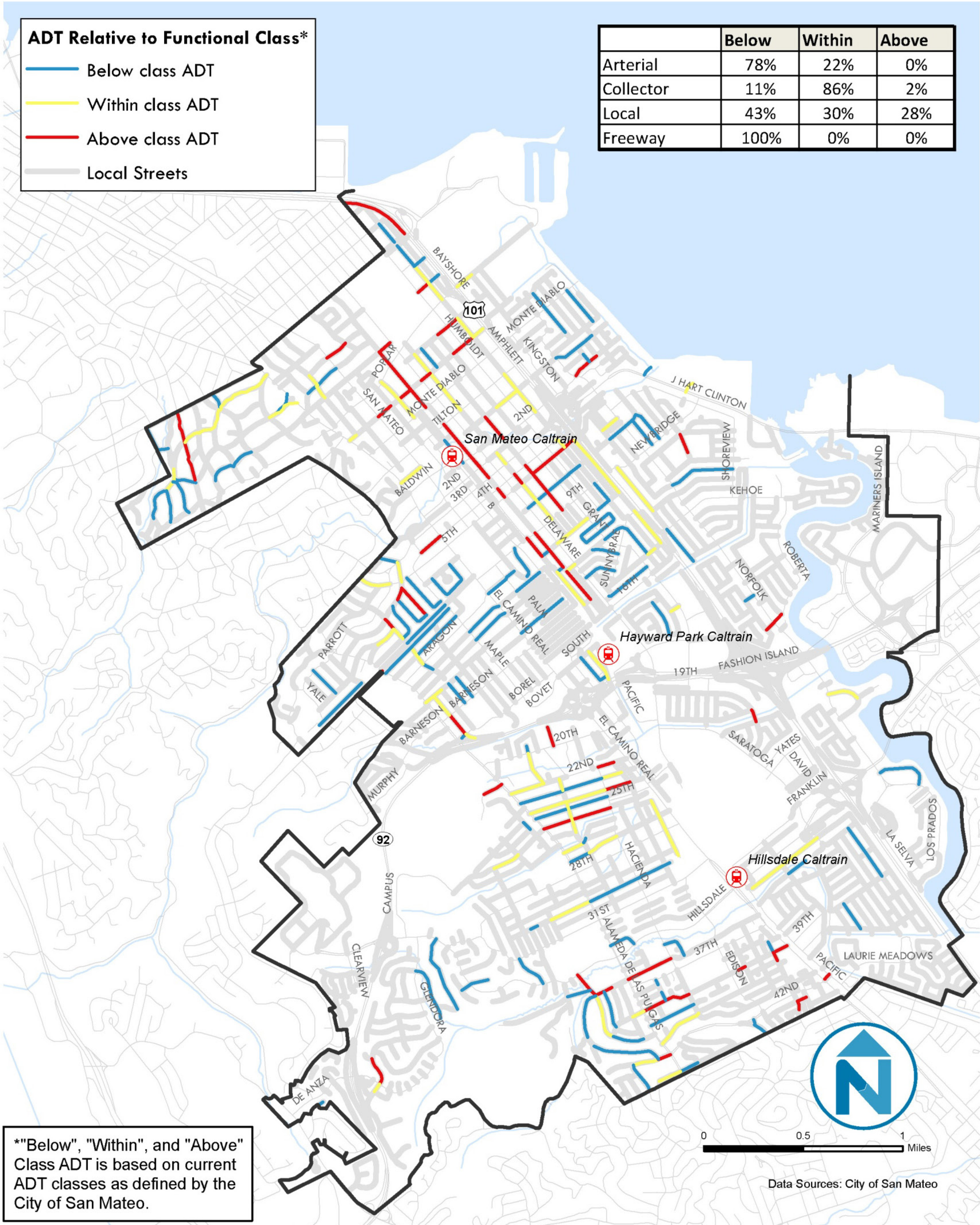
	Below	Within	Above
Arterial	78%	22%	0%
Collector	11%	86%	2%
Local	43%	30%	28%
Freeway	100%	0%	0%

FIGURE D- 7 RECORDED ADT RELATIVE TO STREET CLASSIFICATION – COLLECTOR STREETS



	Below	Within	Above
Arterial	78%	22%	0%
Collector	11%	86%	2%
Local	43%	30%	28%
Freeway	100%	0%	0%

FIGURE D- 8 RECORDED ADT RELATIVE TO STREET CLASSIFICATION – LOCAL STREETS



	Below	Within	Above
Arterial	78%	22%	0%
Collector	11%	86%	2%
Local	43%	30%	28%
Freeway	100%	0%	0%

As shown in Figure D-9, nearly 80% of arterial streets are below the ADT thresholds defined by the city's existing street classification definitions. In addition to reflecting a high percentage of excess capacity on many segments of the city's arterial streets, the figure highlights that nearly 80% of the city's arterials may be classified in a way that accommodates higher traffic volumes than necessary. In practice, this means that in many places, the city has larger and wider streets and, in some cases, roads with faster travel speeds than necessary. This comes with an opportunity cost, preventing other uses of the street such as park space or dedicated lanes for other modes of travel.

FIGURE D- 9 ACTUAL ADT RELATIVE TO STREET CLASSIFICATION LIMITS

	BELOW	WITHIN	ABOVE
Freeway	100%	0%	0%
Arterial	78%	22%	0%
Collector	11%	86%	2%
Local	43%	30%	28%

Source: City of San Mateo. Based on sample of ADT values from throughout the city.

In an urban context, street classification can also consider numerous other factors beyond traffic volume. The following maps compare the existing street classification system to other multimodal networks.

TRANSIT NETWORK

On-street transit service in San Mateo is provided by Samtrans, which operates numerous local and express services. El Camino Real and Alameda de las Pulgas each feature transit lines with the most frequent service in the city, with buses running at least every 15 minutes.

PEDESTRIAN NETWORK

The city recently completed a Pedestrian Master Plan, which outlines locations where pedestrians may be present in greater volumes. Figure D-11 highlights key pedestrian attractors and generators such as schools, civic buildings, parks, shopping, and other event spaces. These types of areas may warrant special street treatments given the high potential volumes of pedestrians walking along or crossing streets. A majority of San Mateo streets have functional sidewalks, but Figure D-12 highlights other elements of the pedestrian network such as trails and multi-use paths and the few local streets where sidewalks do not currently exist.

FigureD- 13 presents the types of curbs that exist on San Mateo's streets. A vast majority of city streets have "vertical" curbs that prevent vehicles from driving onto them. However, numerous neighborhoods feature "rolled" curbs that are easier to mount. While these types of curbs effectively narrow pedestrian space by allowing vehicles to take space on sidewalks, they may provide future flexibility by potentially enabling the city to narrow travel ways or develop *woonerf*-like shared streets, which use a street design approach that allows for the safe mixing of all modes across an entire right-of-way.

The Pedestrian Master Plan identified a "pedestrian-friendly network," called the Greenway Network, throughout San Mateo. This network is highlighted in Figure D-14. The Greenway Network is largely focused in Downtown San Mateo with other key corridors spanning the city.

FIGURE D- 10 TRANSIT FREQUENCY ON SAN MATEO STREETS

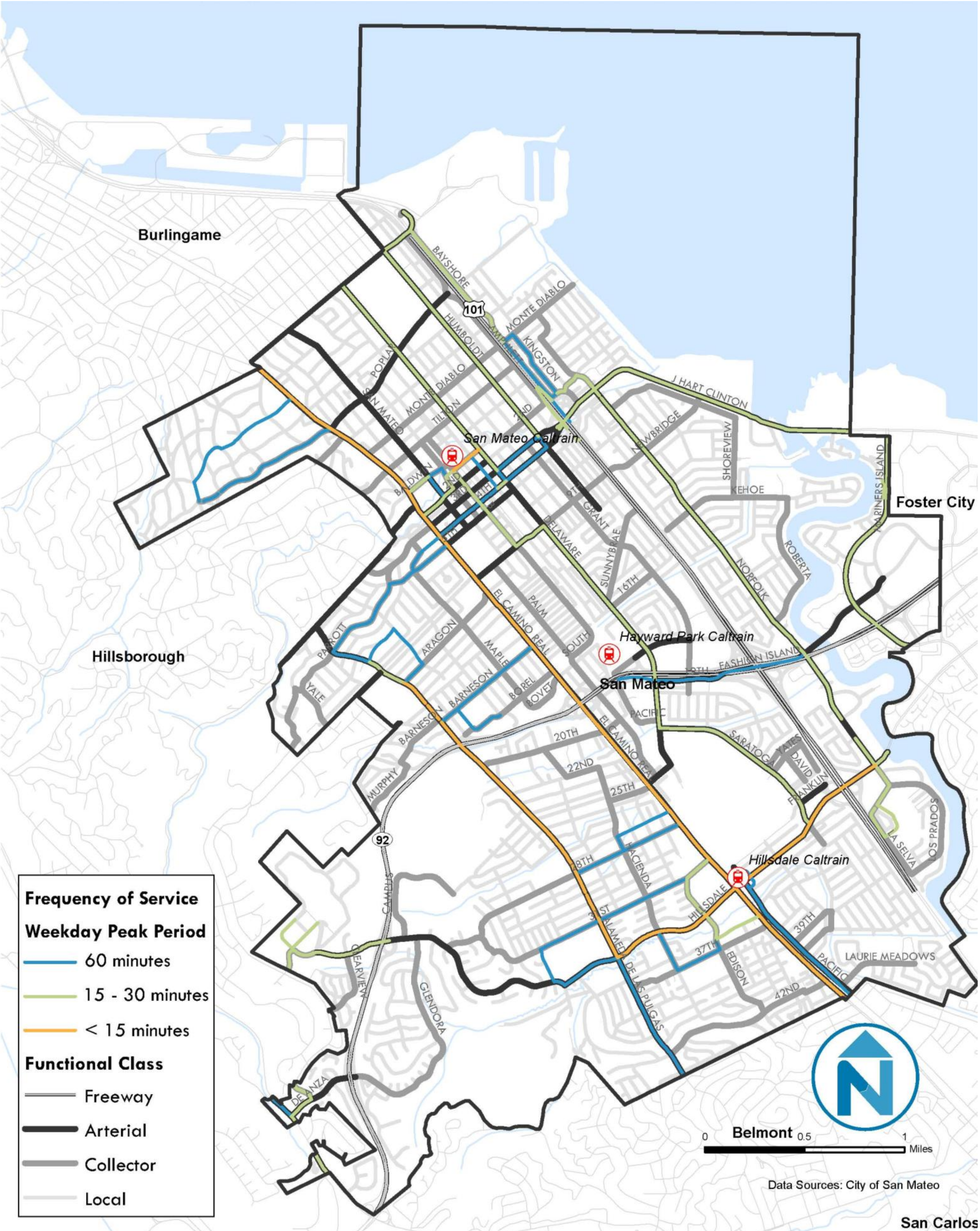
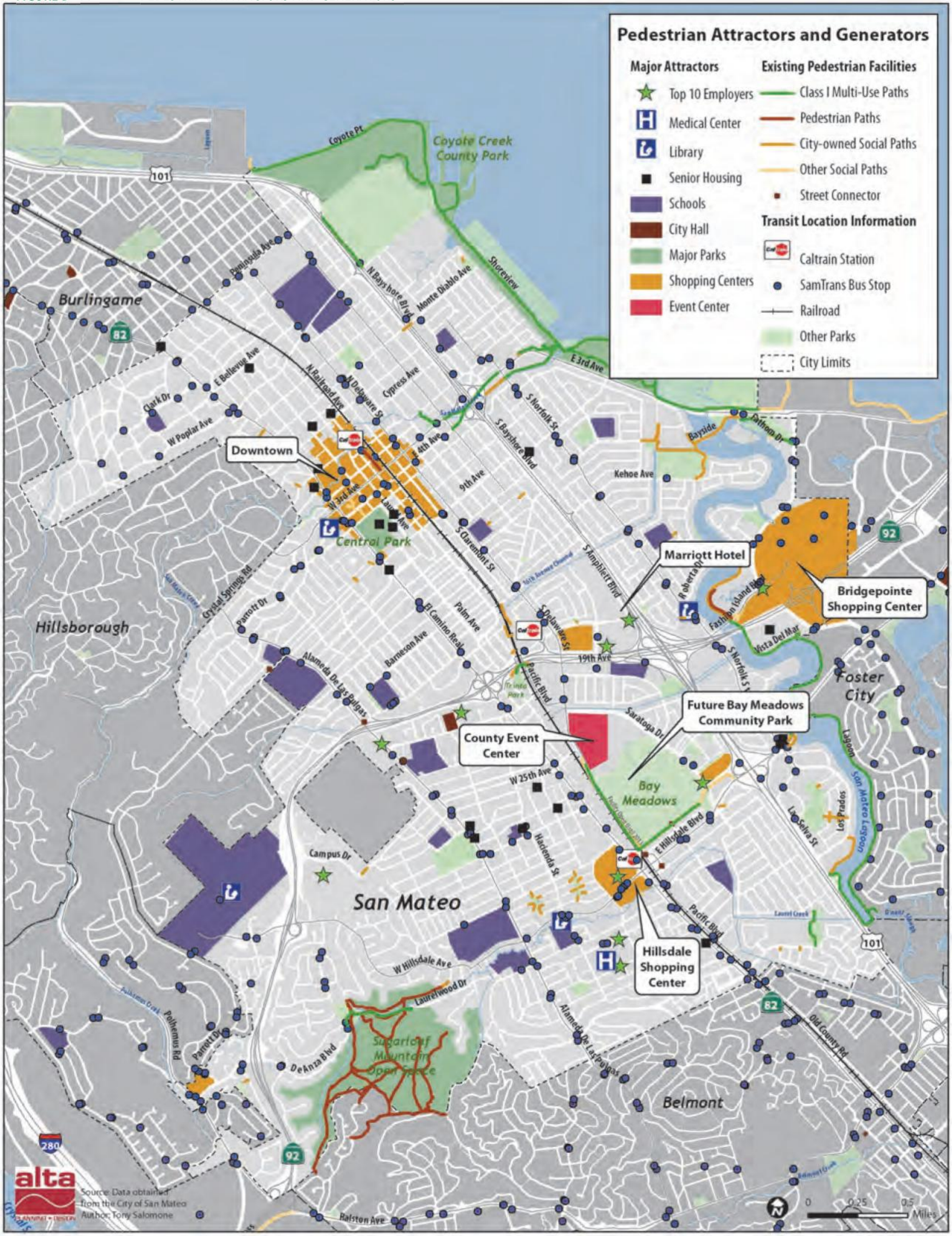
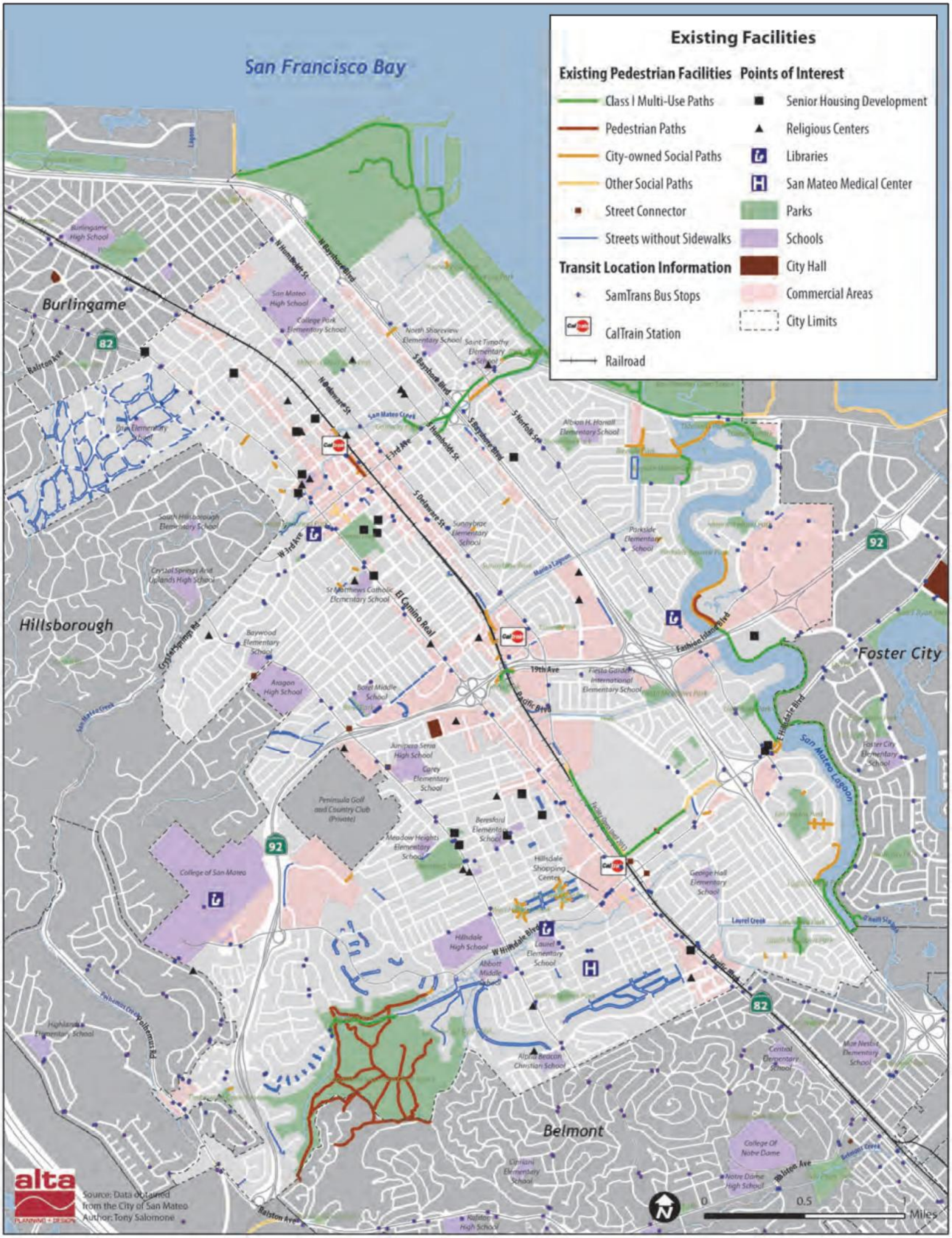


FIGURE D- 11 PEDESTRIAN ATTRACTORS AND GENERATORS



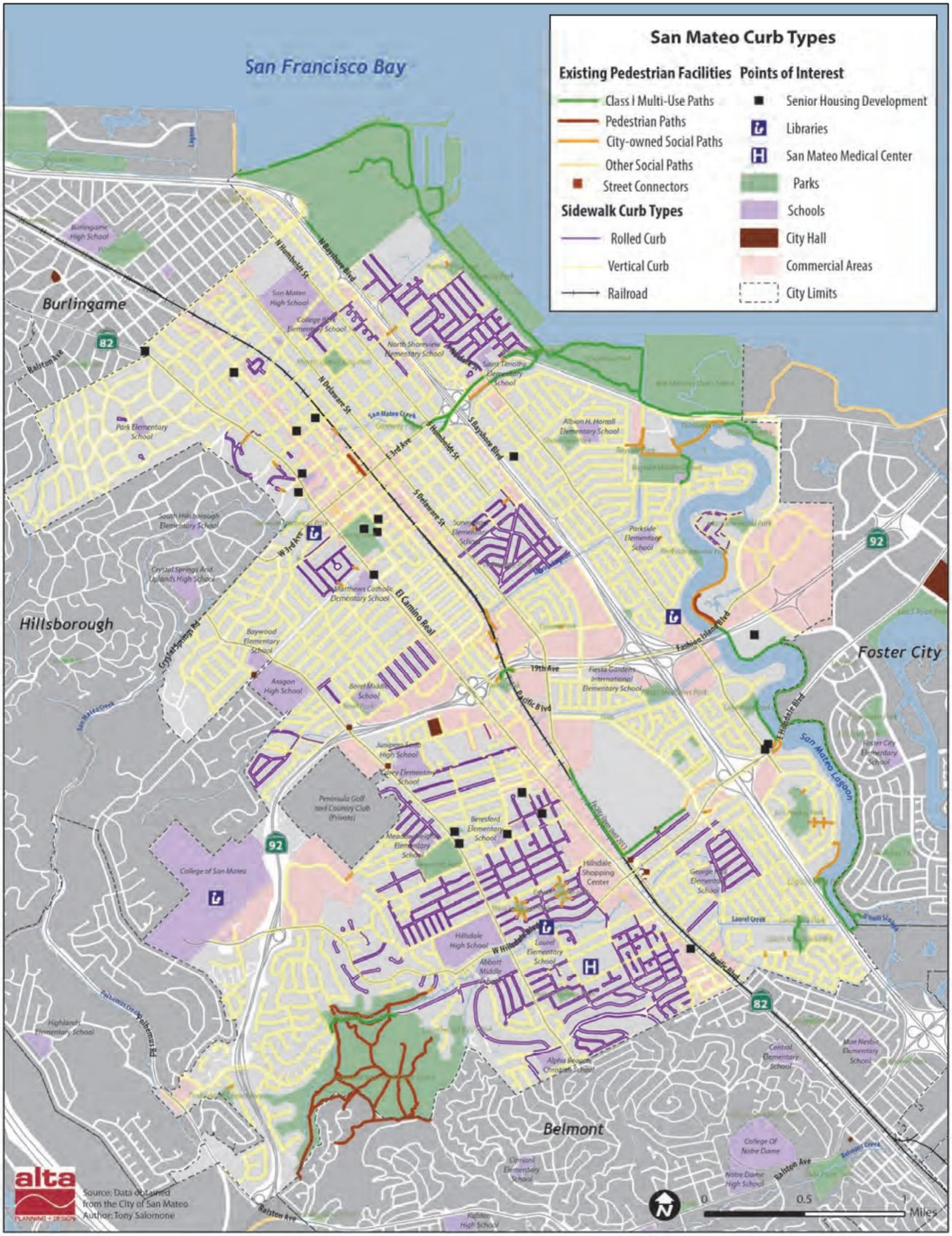
Source: San Mateo Pedestrian Master Plan (2012)

FIGURE D- 12 EXISTING PEDESTRIAN FACILITIES



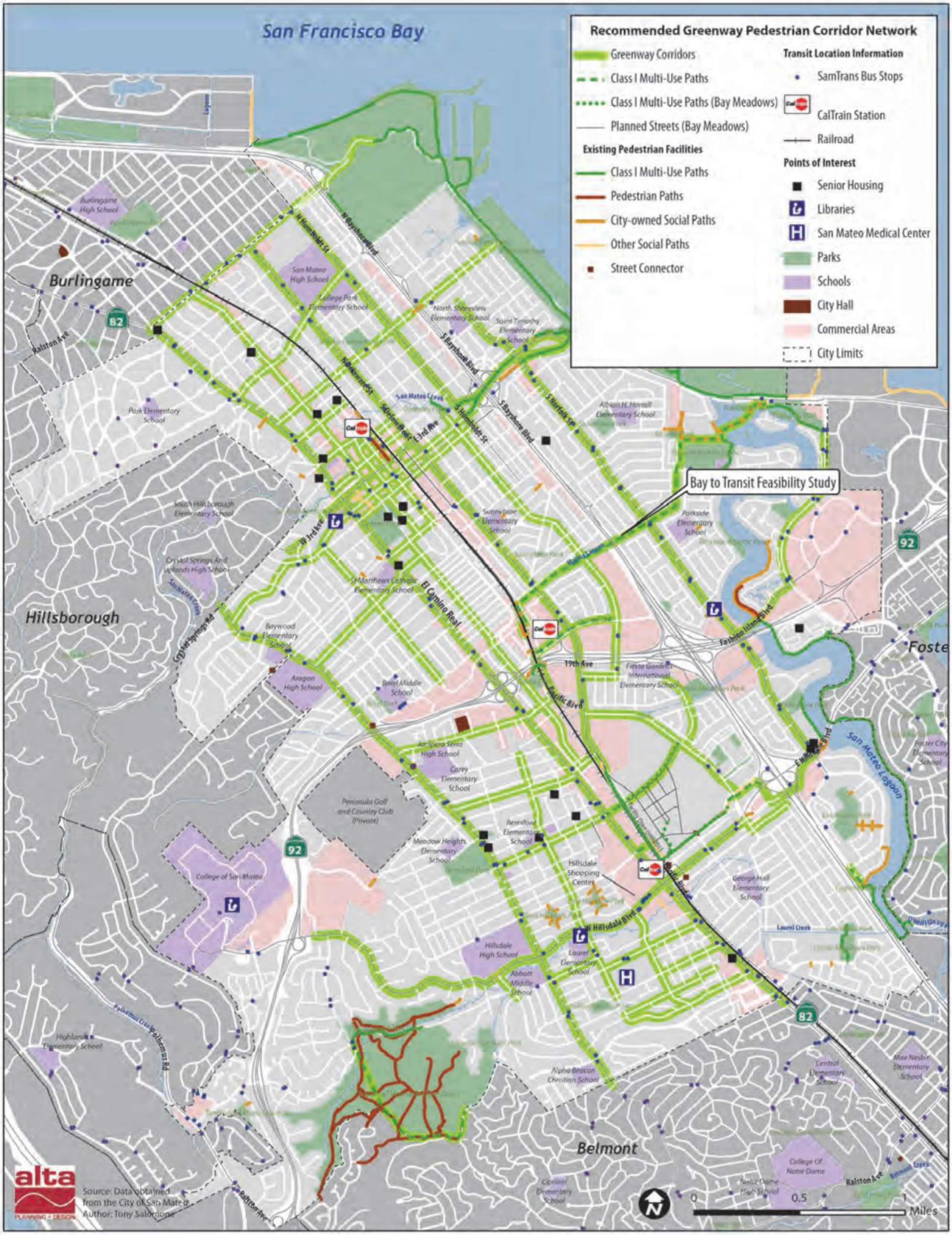
Source: San Mateo Pedestrian Master Plan (2012)

FIGURE D- 13 CURB TYPES



Source: San Mateo Pedestrian Master Plan (2012)

FIGURE D- 14 PROPOSED GREENWAY PEDESTRIAN CORRIDOR NETWORK



Source: San Mateo Pedestrian Master Plan (2012)

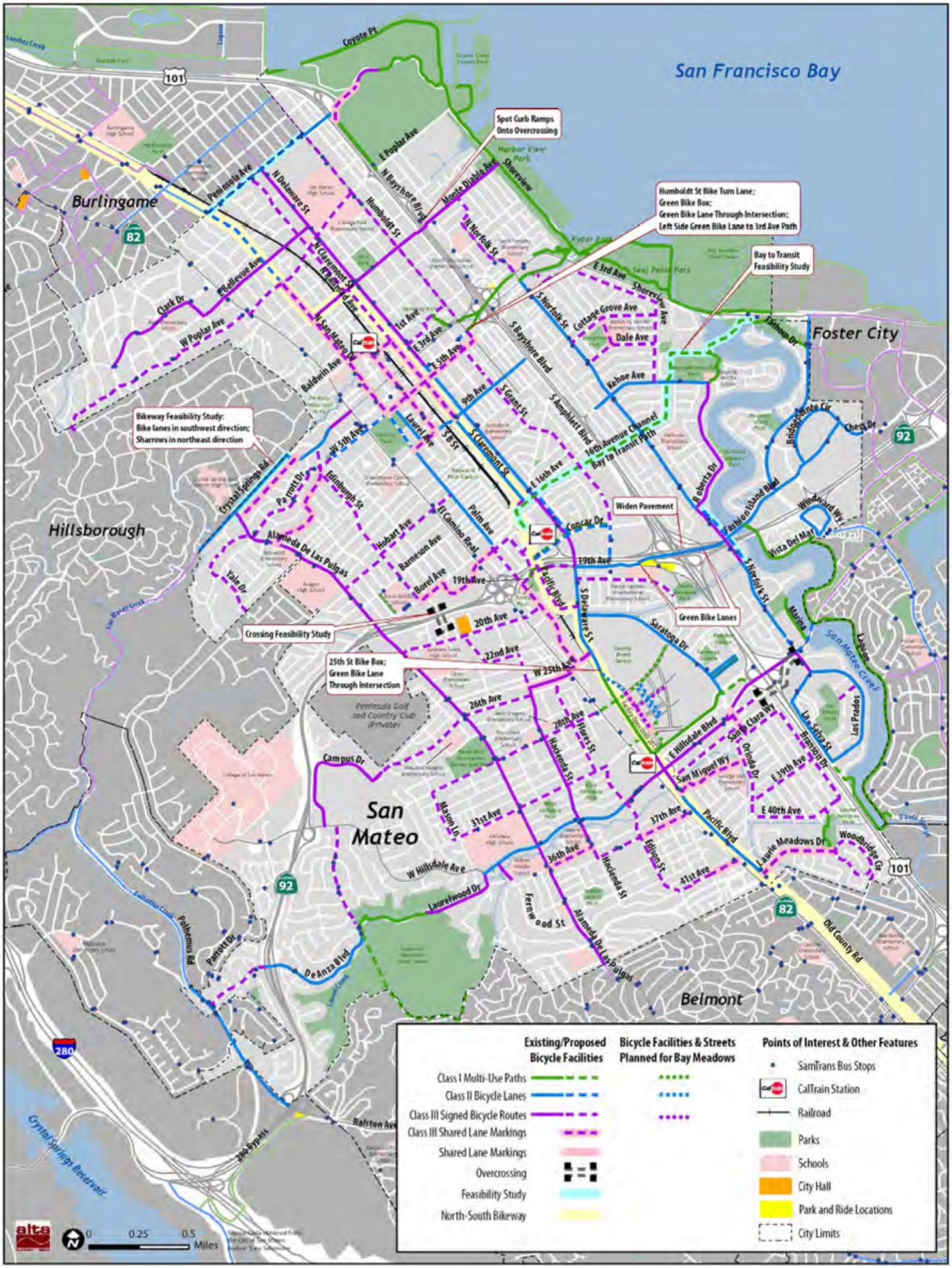
BICYCLE NETWORK

The Bicycle Master Plan was completed in 2011. Figure D-15 highlights the existing San Mateo bicycle network and proposed changes. Currently, only a small portion of city streets have bicycle lanes. The future bicycle network shows significant expansion of the bicycle route network as well as the addition of bicycle lanes on streets without any official facilities today.

FREIGHT NETWORK

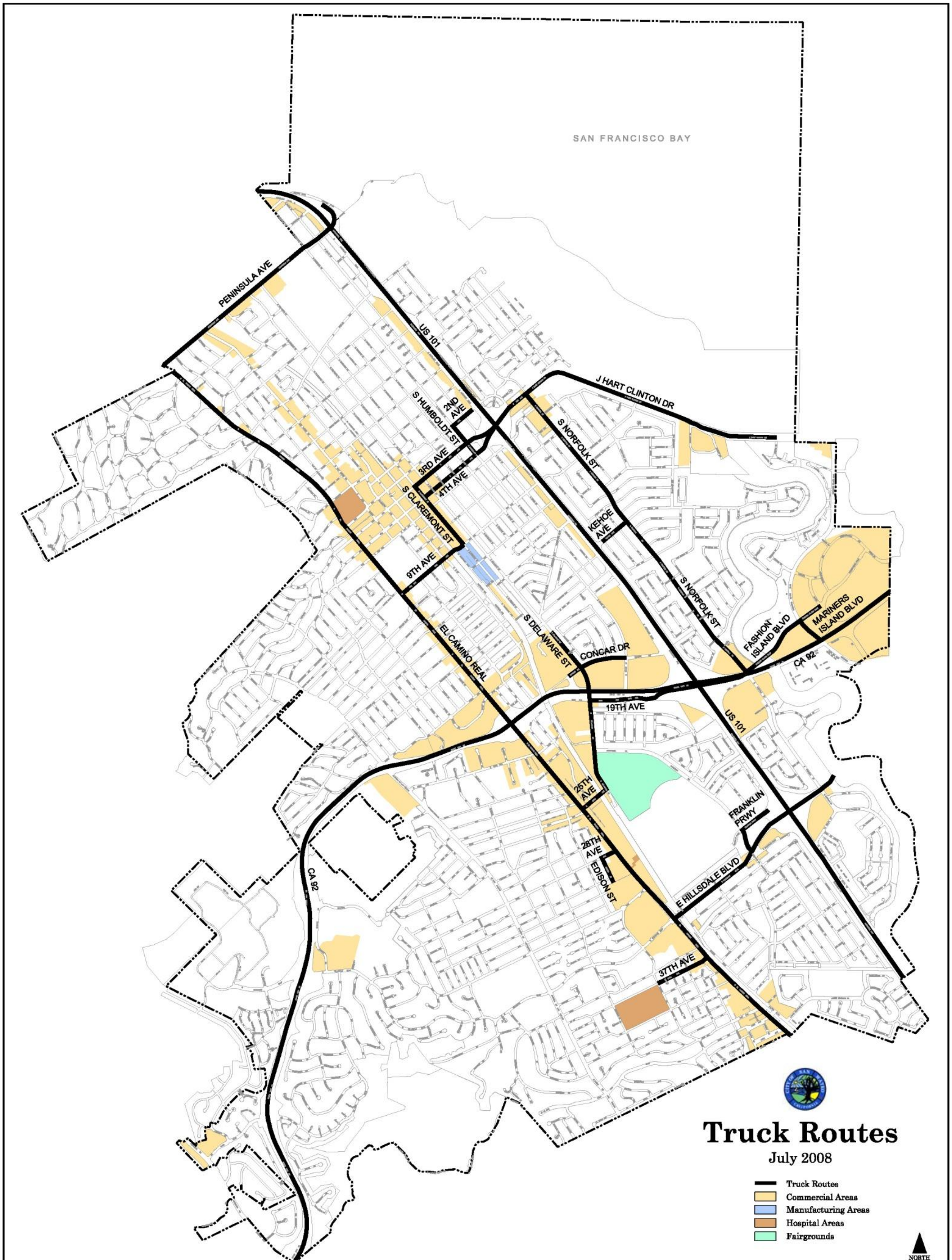
Freight and goods movement is critical for a city's daily function. Delivery trucks and trucks with trailers carry goods to retailers and commercial businesses. While these functions are critical, the physical needs of freight vehicles can often conflict with other community goals such as pedestrian safety or providing lower-volume neighborhood streets. Figure D-16 highlights the existing San Mateo freight network, which roughly coincides with the city's major arterial street network.

FIGURE D- 15 EXISTING AND PROPOSED BICYCLE NETWORK



Source: San Mateo Bicycle Master Plan (2011)

FIGURE D- 16 FREIGHT NETWORK (TRUCK ROUTES)



Source: City of San Mateo (2008)

GREEN STREET CONSIDERATIONS

Green Streets features can be incorporated into streets of any type. As such, a Green Streets overlay can establish a link between appropriate Green Streets best management practices and the established contextual street classification system. As identified by the San Mateo County *Sustainable Green Streets and Parking Lots Design Guidebook*, key Green Streets features include:

» Vegetated Swales (Figure D-17) are long, narrow landscaped depressions, which are primarily used to convey stormwater runoff on the land's surface while also providing water quality treatment.

» Infiltration/Flow-Through Planters (Figure D-18) are narrow, flat-bottomed, often rectangular landscape areas used to treat stormwater runoff. Their distinguishing feature is that the side slopes typically used in swales are replaced with vertical sidewalls, which allow for more storage volume in less space.

» Rain Gardens are large, shallow, vegetated depressions in the landscape that retain stormwater, thereby attenuating peak rainwater flows and overall volume.

» Stormwater Curb Extensions are landscape areas that extend into the street and capture stormwater runoff.

» Green Gutters are very narrow landscape systems along street frontages that capture and slow stormwater flow.

» Pervious Pavement systems allow rainwater to pass through their surface and soak into the underlying ground.

Additional Green Streets features:

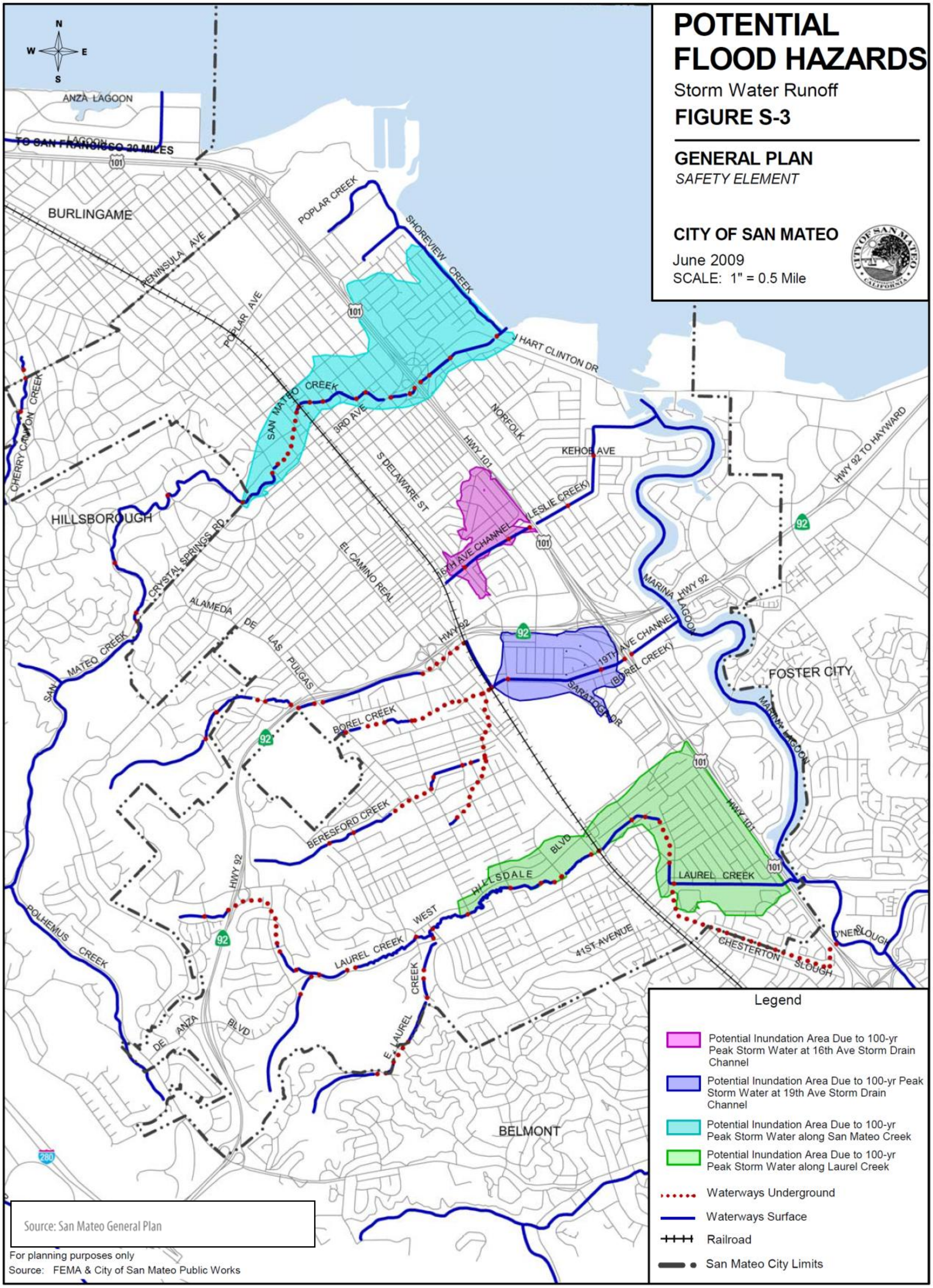
» Linked Tree Wells are similar to infiltration/flow-through planters, but feature underground connections through structural soils to provide larger retention volumes.

» Trees

FIGURE D- 17 VEGETATED SWALE

FIGURE D-18 FLOW-THROUGH PLANTER

Green street treatments may be applicable in sensitive areas of San Mateo such as flood prone areas. Figure D-19 reflects potential Flood Hazard Areas within the city as defined by the General Plan.



Source: San Mateo General Plan

ALTERNATIVE TO "TRADITIONAL" FUNCTIONAL CLASSIFICATION

City streets are complex places in which the traditional classification schemes—whether from a state agency or from the Federal Highway Administration—are generally too limiting to allow for designs capable of achieving placemaking, public health, and economic goals. Such state or federal standards must be adapted to the urban environment so city leaders can make streets an element of the public realm that supports a city's goals and policies. In certain cases, cities may choose to alter a street's classification type to better align with a community's vision for its future.

Updated street design standards should be consistent with citywide goals for safety, economic growth, development, and urban design. These standards should attempt to capture the unique local relationship between the built realm and the surrounding streetscape, encapsulating the varying scales at which motorists, bicyclists, and pedestrians interact with individual corridors as well as the overall street network. This means requiring sidewalks on urban arterials, enhancing the quality of street construction for special districts, and controlling access points to properties to reduce conflicts between driveway traffic and pedestrians.

Even when they are completely updated, however, classification schemes in and of themselves are rarely adequate as a design tool for the variety of situations encountered on city streets. Each project should also be approached with sound case-by-case professional judgment.

As an alternative to using traditional street classification systems, many cities have created their own street classification systems that align with their own street-network vision. This section outlines the experiences of Boston in Massachusetts and Pasadena and Mountain View in California.

BOSTON, MA

Since 2009, the City of Boston has been designing new streets based on its *Boston Complete Streets Guidelines*. Street types in Boston consider community needs, land use context, and the specific visioning process that is part of every redesign project. The following street types have been developed in Boston to reflect its unique values and street goals.

Downtown Commercial Street

The Downtown Commercial Street is designed for application in the downtown commercial core, which consists mostly of mid- to high-rise buildings and features connections to numerous key transit and freeway links. This street type supports the high user volumes, density, and commercial activity in the core, along with its generally shorter blocks and irregular intersections. The primary goals for this type are to achieve the right modal balance between pedestrians, bicycles, and vehicles and respect the spectrum of historic to modern buildings along the street.

Downtown Mixed-Use Street

The Downtown Mixed-Use Street is scaled down from the Downtown Commercial type to serve a wider range of land uses in downtown neighborhoods, including mid-rise residential, retail, office, and entertainment uses. This street type supports similarly high user volumes across multiple modes and emphasizes generating dynamic public spaces through street furniture, outdoor cafes, and plazas.

Neighborhood Main Street

The Neighborhood Main Street is one of the focal points of residential-oriented areas of Boston. It serves a mix of commercial and retail uses that form the local economy for the surrounding neighborhood and provide gathering spaces for local residents. Although this street type often does not extend farther than a few blocks, it is a destination for many local walking, biking, transit, and driving trips. Neighborhood Main Streets are often hubs for bus routes as well as short-term parking and loading zones for businesses. An illustration of this street type is provided in Figure D-20.

FIGURE D- 18 NEIGHBORHOOD MAIN STREET EXAMPLE[10]

Source: Boston Complete Streets Guidelines

Neighborhood Connector Street

A network of Neighborhood Connector Streets forms the mesh between other street types, enabling smooth transitions between streets with varying traffic volumes. They can be single- or multi-lane corridors that emphasize a balance between smooth vehicle and bicycle flows with safe pedestrian crossings and buffered sidewalks. Neighborhood Connectors also provide continuity for walking, biking, and transit routes. The land-use context of this type of street can vary from commercial to residential, and as such, the street design should consider the needs of those who live and work along it.

Neighborhood Residential Street

The Neighborhood Residential Street is designed to contribute to the high quality of life for low- to mid-rise Boston residential neighborhoods. These streets are typically only one to two lanes wide with low volumes and speeds, and they are not intended to be through streets for vehicular traffic. They often feature on-street permit parking for neighborhood residents. Neighborhood Residential Streets place a strong emphasis on safety and space for pedestrians (especially children) as well as clearly defined bike and pedestrian routes to nearby destinations like bus stops and parks.

Industrial Street

Industrial Streets are designed to support industrial and manufacturing businesses that are typically located away from residential, mixed-use, and retail cores. As such, this street type focuses on accommodating higher truck traffic and trucks' wider turn movements. Industrial Streets are designed to connect directly with highways, ports, airports, and other commercial distribution routes. Despite lower pedestrian volumes along these streets, sidewalks and accessibility must also be incorporated into designs.

Shared Streets

Shared Streets are different from other street types in that they allow for pedestrians, bicycles, and vehicles to mix with minimal physical separation. These allow only low vehicle speeds (less than 10 MPH) and are often decoratively paved and lack curbs, with optional bollards to help define edges. Shared Streets gently redirect traffic vertically and horizontally to send physical signals to drivers that they must maintain low speeds, employing raised and narrowed entrances, chicanes, street furniture, and trees.

Parkways

Parkways are designed primarily for vehicle and transit use, typically running four lanes wide alongside open spaces and parks and with few interruptions in traffic flow. As such, Parkways feature higher vehicle speeds, fewer pedestrian crossings, and no on-street parking. This street type often includes curves, trees, and historical elements as a visual framework for the open spaces alongside the roadway.

Boulevards

Boulevards are defined by their grand scale and design for all users. This street type accomplishes this using generously wide medians and amenity zones for sidewalks, significant tree cover, promenades, and other spaces that are visually and socially engaging. Wide medians can flexibly accommodate pedestrians, light-rail lines and stations, and bus rapid-transit services. The Boulevard street type is used to emphasize the civic and historical heritage of a street as well as its mixture of mid- to high-density land uses.[11]

PASADENA, CA

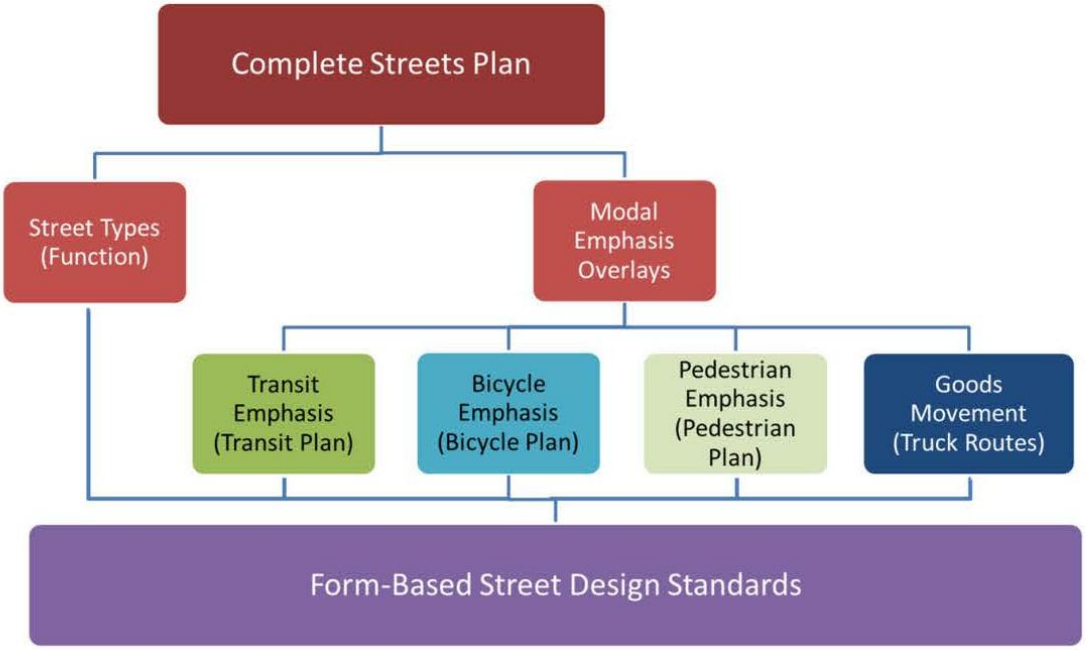
As a part of its current General Plan update, the City of Pasadena is developing a street typology plan that recognizes its roadways in a Complete Streets context. The *Draft Street Types Plan*, released in March 2013, shifts the former design emphasis on vehicular mobility to the mobility of all roadway users.

In contrast to Boston, Pasadena uses two frameworks to define its streets:

- **Function**: Captures the main purpose of a street in terms of connectivity and accessibility needs.
- **Modal Emphasis Overlays**: Captures any special considerations for necessary multimodal connectivity. Detailed Transit, Pedestrian, and Bicycle layers, as well as a designated truck route layer, establish these considerations.

These frameworks are used together to develop streets that meet contextual street requirements (nearby land use) in addition to network-level goals such as providing a citywide freight network.

FIGURE D- 19 FRAMEWORK FOR PASADENA COMPLETE STREETS DESIGN STANDARDS[12]



Source: Pasadena Draft Street Types Plan (2013)

Figure D-21 shows how these components come together as a comprehensive Complete Streets Plan to establish form-based street design standards.

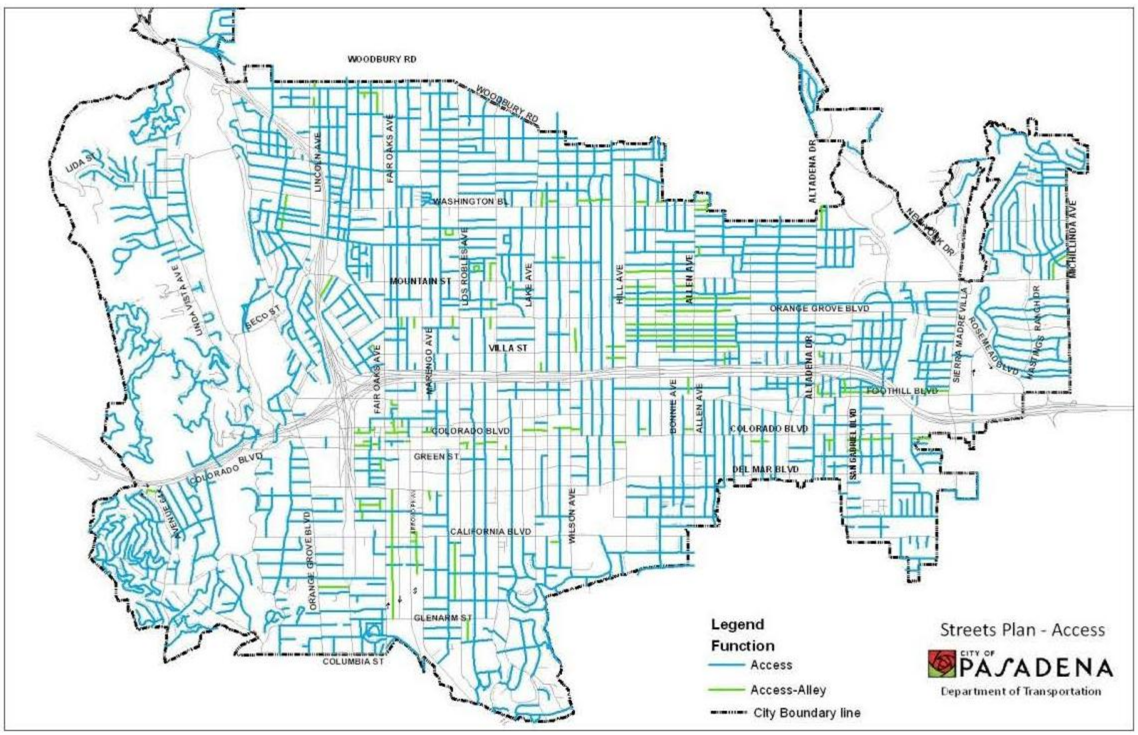
Function

Functions are delineated in terms of the balance between mobility and accessibility. Street types that emphasize mobility are designed to move trips quickly and smoothly through a corridor, while those that emphasize accessibility are designed to maximize access to local land uses. The following functions have been defined for Pasadena's streets.

- **Throughway**: Four to six lane roads used primarily by automobiles, trucks, and buses, and also, to a lesser extent, by pedestrians. Mobility and accessibility are equally important, as throughways also serve adjacent uses.
- **Connector Streets:** Roads that emphasize mobility and enable users to efficiently travel between parts of Pasadena without using the freeway.
  - **Connector-city**: Four lane roads that connect neighborhoods, districts, and destinations across town.
  - **Connector-Neighborhood**: Two- to three-lane roads that connect neighborhoods, districts, and destinations in close proximity to each other.
- **Access Streets**: Two lane roads that primarily connect pedestrians, bicycles, and vehicles to destinations on the same street. These streets serve transit and trucks in certain circumstances, they emphasize accessibility within neighborhoods and districts, and they compose the majority of Pasadena's streets. The Access Streets overlay map is found in Figure D-22.

- **Access-Street**: Typical local destination-serving streets that are wide enough to enable cars traveling in opposite directions to pass each other without having to yield. Access-Streets comprise a majority of Pasadena streets.
- **Access-Yield**: Local destination-serving streets that require passing vehicles to yield to one another due to narrow curb-to-curb widths (fewer than 30 feet with parking on both sides, or 22 feet with parking on one side).
- **Access-Alley**: Streets that primarily create access to the rear of buildings for parking, commercial access, or municipal services. These streets are not designed to be an efficient route for pedestrians, cyclists, other vehicles, or trucks.
- **Access-Shared**: These are streets in which the right-of-way is intended to be shared by all modes of traffic. On these shared streets, bicycles and vehicles travel at very low speeds and yield to pedestrians.

FIGURE D- 20 PASADENA DRAFT STREET TYPES PLAN – FUNCTION: ACCESS STREETS[13]



Source: Pasadena Draft Street Types Plan (2013) Modal Emphasis Overlays

Modal-emphasis overlays provide specific design elements for street types that feature unique design features for transit, bicycle, pedestrian, or freight travel. These overlays serve as summaries of detailed plans for each of these non-automobile modes.

» **Transit**

- **Level 1**: Corridors with high transit-service frequency (more than one bus every five minutes at peak hour). These corridors likely warrant elements like curb extensions and transit signal priority.
- **Level 2**: Corridors with medium transit-service frequency (between six and 16 minutes). These corridors likely warrant curb extensions for bus loading.
- **Level 3**: Corridors with low transit-service frequency (less than one bus every 16 minutes). These corridors likely do not warrant any special design elements, although transit service should be considered in decision-making processes.

» **Bicycle**: Incorporates a single overlay that includes emphasized bikeways, bike lanes, bike routes, enhanced bike routes, and relevant facilities per the Bicycle Plan. Certain emphasized bikeways where bicycle travel is prioritized over vehicle travel are included in the "de-emphasis" overlay described below.

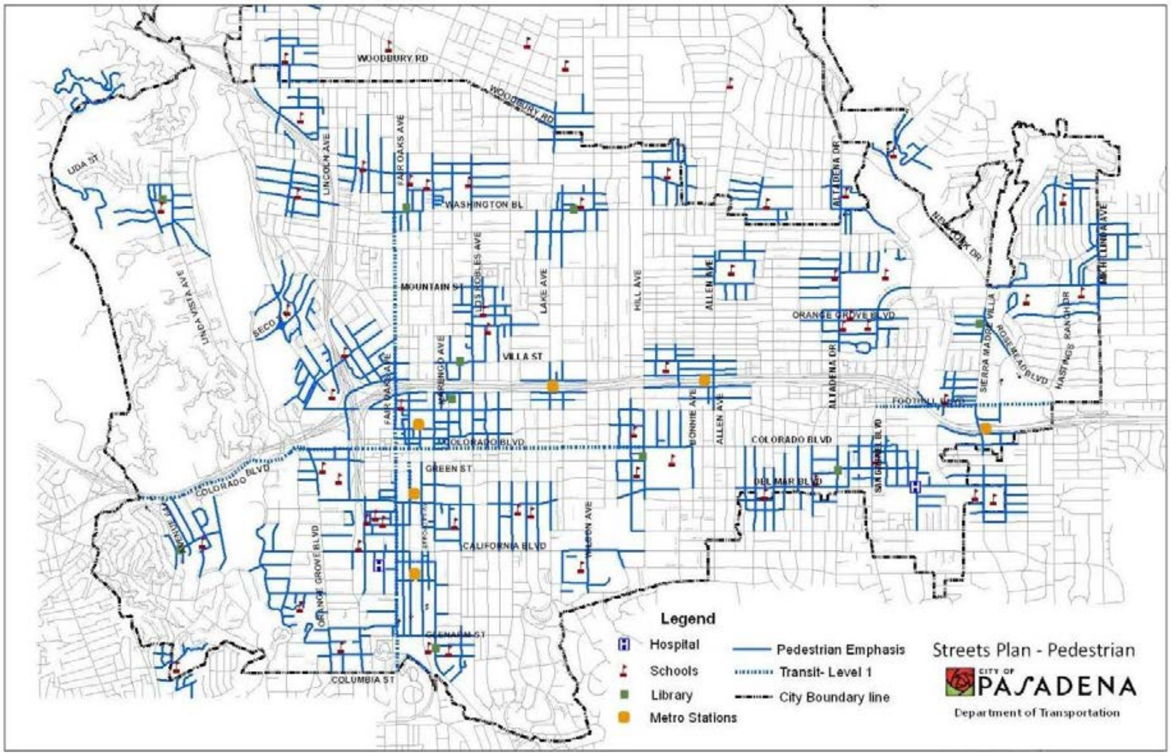
» **Pedestrian**: Streets identified within areas of high pedestrian activity, including those within a designated radius of schools, hospitals, libraries, City Hall, and transit hubs. These streets require additional consideration for wider sidewalks, longer pedestrian crossing times at signalized intersections, curb extensions, and more.

» **De-Emphasis**: These streets de-emphasize vehicular traffic by removing lanes, extending curbs, and other methods to lower volumes and speeds. This overlay includes streets that place emphasis on bicycle routes.

» **Freight**: These are designated truck routes according to existing policy, which require special consideration for turning radii and height clearances.[14]

Figure D-23 provides an example of the pedestrian Modal Emphasis Overlay in Pasadena. Many of these overlay zones are focused around Metro stations, schools, and other public facilities.

FIGURE D- 21 PASADENA DRAFT STREET TYPES PLAN - MODAL EMPHASIS OVERLAYS: PEDESTRIAN



Source: Pasadena Draft Street Types Plan (2013)

MOUNTAIN VIEW, CA

Through the *Mountain View 2030 General Plan*, the City of Mountain View designates street types as a strategy for improving its multimodal transportation network. Each street type individually prioritizes certain travel modes according to land-use context and community input. Mountain View's system includes the following 13 street types:

» **Highway**: Major regional freeways under state jurisdiction with limited access to local roads. Design priority is for vehicles alone.

» **Expressway**: Major regional roadways under county jurisdiction with limited access to local roads. Design priority is for vehicles, with other modes having low priority.

» **Boulevard**: Major arterial road with frequent transit service, serving mixed commercial and retail development. Design priority is for vehicles, transit, and pedestrians, with lower priority given to cyclists.

» **Avenue**: Combination of arterial and collector roads with street trees, serving mixed residential and commercial development. Design priority is balanced between vehicles, pedestrians, cyclists, and transit.

» **Main Street**: Major retail street with a strong emphasis on pedestrian access and experience. Design priority is for pedestrians, with lower priority for vehicles and transit, and lowest priority for cyclists where parallel bike routes exist.

» **Major Retail Street**: Major retail street that maintains a strong pedestrian environment while doubling as an arterial road. Design priority is high for all modes, especially for establishing safe pedestrian crossings while ensuring smooth vehicle flow and access.

» **Downtown Street**: Neighborhood street that serves mixed-use development in a pedestrian-oriented environment. Design priority is for pedestrians and cyclists, with lower priority for vehicles and transit.

» **Flexible Street**: A street in an area of contextual transition that may connect varying land uses and traffic flows. Design priority is for pedestrians and cyclists, with lower priority for vehicles and transit.

» **Residential Collector**: Minor collector street that delivers residential traffic to a significant destination or major roads. Design priority is for pedestrians and cyclists, with low priority for vehicles and transit.

» **Neighborhood Connector**: Minor low-to medium-volume street that connects neighborhoods to each other and distributes trips comfortably to other streets. Design priority is for pedestrians and cyclists.

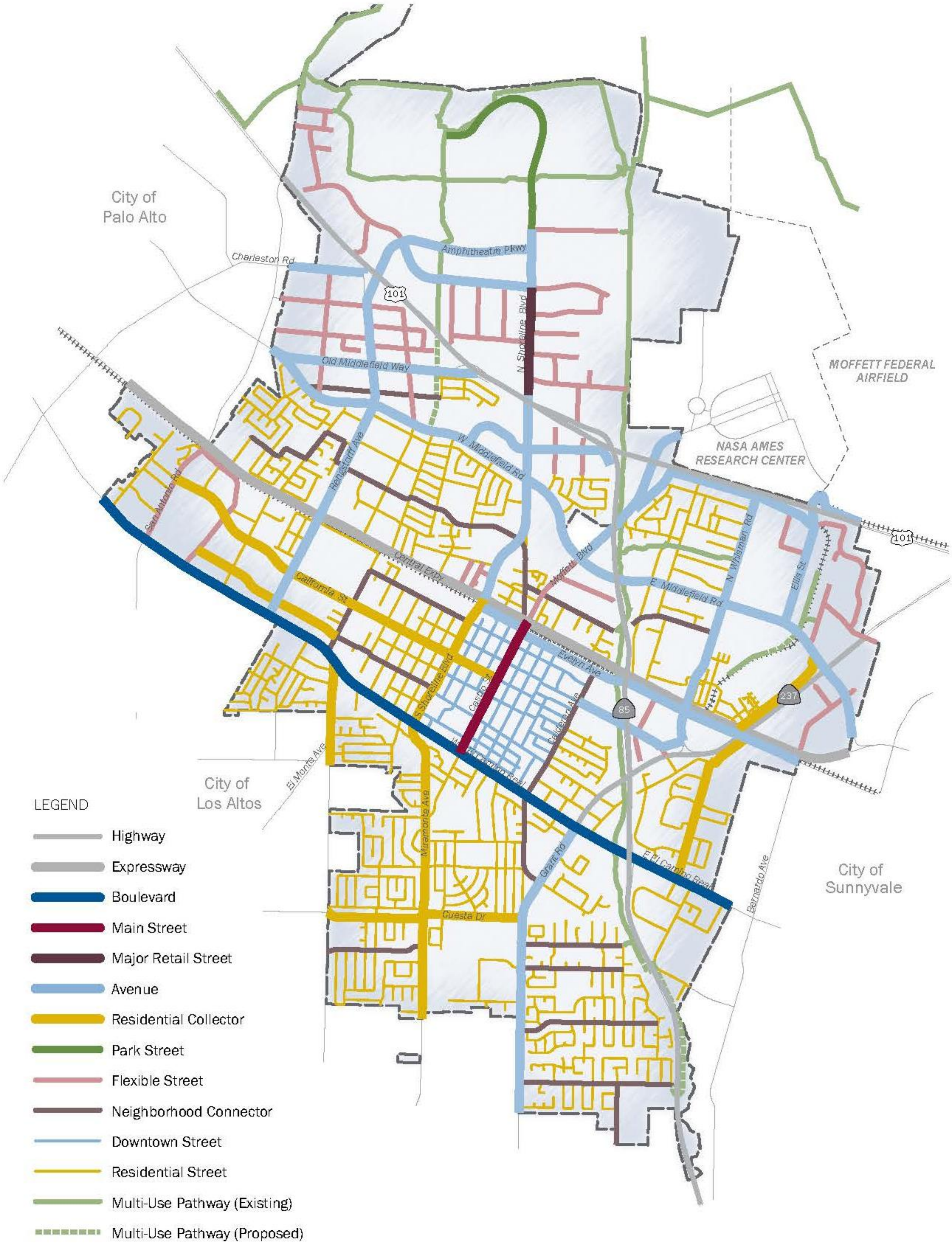
» **Residential Street**: Minor low-volume street that serves residential neighborhoods, where design priority is pedestrian and cyclist safety, along with the encouragement of low vehicle speeds.

» **Park Street**: Minor street with park character that emphasizes landscaped medians and planted trees along the curb. Design priority is given to pedestrians and cyclists.

» **Multi-Use Pathway**: Dedicated pedestrian and bicycle pathway designed to Caltrans minimum standards, with high quality crossings over major roadways. Vehicle access is not allowed.[15]

These street type designations are overlaid on a map of Mountain View's roadway network in Figure D-24.

FIGURE D- 22 MOUNTAIN VIEW STREET TYPOLOGY MAP[16]



Source: Mountain View 2030 General Plan

NEXT STEPS

As part of the San Mateo Sustainable Streets Plan, a new street classification system will be developed that will determine how to best incorporate existing city priorities in tandem with a future vision for streets. Critical factors include the following:

» **What will San Mateo's Streets be in the future?** Today, San Mateo already has a built environment that is composed of streets that serve different functions. A new classification system will not change those streets overnight. However, it will provide an opportunity for those streets to evolve as they are repaved or upgraded to better meet the needs of the community. A critical question will include how many street types are required to summarize the spectrum of San Mateo's future streets.

» **Framework for Classification:** Today, street classification is simply quantified by a street's vehicular capacity. In the future, multiple dimensions of variables will need to be considered for street classifications. Some cities have tackled this challenge by using a combination of streets, context zones, and overlays. This approach may be warranted in San Mateo given the presence of numerous unique districts including Downtown, the Caltrain station areas, and recreational areas along the Bay.

» **Procedures for Implementing Street Classification:** Developing a street classification system and related design standards is only a small step in a larger process of delivering "sustainable" streets. As other design references have mentioned, design variances and exceptions should be a formalized component of delivering streets. Street classification is an important first step but needs to be tied to related procedures. As an example, a street classification that focuses on recreational access may require administrative review from parks and recreation staff. These types of procedural questions should be discussed during the development of a street classification system to ensure classifications will succeed in practice and not simply be a design standard.

» **Development of a Green Streets Network:** The Green Streets Network overlay will serve as a framework for connecting green infrastructure improvements included in the design of San Mateo's streets with underlying existing features and urban contexts. Relevant natural and geographic features that will inform the green streets network include watersheds, waterways, and flood-prone areas, some of which are featured on the General Plan map, Figure 19. Relevant urban contexts include areas where higher levels of pedestrian activity occur or are encouraged, such as residential areas and retail or commercial corridors and districts. The network will also be informed by the availability of right-of-way for the inclusion of green infrastructure elements in light of all functions that need to be met by a given street in the City of San Mateo.

ADDITIONAL EXAMPLES

Figure D-25 provides example street types, context zones, and overlays from numerous cities around the United States. This table is intended to show how different cities interpret and classify streets to meet local needs. Cities like Chicago have a multi-faceted system that takes advantage of street types, context zones, and overlays. While having a three-dimensional strategy to define streets ensures a classification exists for nearly every permutation of street, it may result in confusion due to the high number of options available based on those variables. Yet, a clear conclusion from these national examples is that basic Federal Highway Administration street classification methods are not robust enough to account for the many types of urban streets.

FIGURE D- 23 OTHER EXAMPLE STREET CLASSIFICATION SYSTEMS

	STREET TYPES	CONTEXT	OVERLAY
Charlotte	» Main Streets » Avenues » Boulevards » Parkways » Local Streets		
Chicago	» Thoroughfare » City Connector » Neighborhood Connector » Lane, Alley or Pedestrian Way	» Neighborhood Residential » Neighborhood Mixed Use » District Center or Corridor » Downtown » Institutional or Campus » Industrial » Park or Open Space	» State Route » County Route » Truck Route » Snow Route » Strategic Regional Arterials » Mobility Priority Street » Pedestrian Priority Street » Bicycle Priority Street » Transit Priority Street » Historic Boulevard System » Transit-Oriented System » Transit-Oriented District » Home Zone
Dallas	» Mixed-Use Streets » Commercial Street » Residential Streets » Industrial Streets » Parkways		» Bike Network » Transit Street
Los Angeles	» Boulevard » Avenue » Street » Alley/Lane		
New Haven[17]	» General Street » Boulevard » Slow Street » Pedestrian Only Street		
New York	» General Street		

	STREET TYPES	CONTEXT	OVERLAY
	» Boulevard » Slow Street » Transit Street » Pedestrian Only Street		
Philadelphia	» High-Volume Pedestrian » Civic/Ceremonial Street » Walkable Commercial Corridor » Urban Arterial » Auto-Oriented Commercial/Industrial » Park Road » Scenic Drive » city Neighborhood » Low-Density Residential » Shared Narrow » Local		
San Francisco	» Downtown Commercial » Commercial throughway » Neighborhood Commercial » Downtown residential » Residential throughway » Neighborhood residential » Industrial » Mixed-use » Parkway » Park edge » Multi-way Boulevard » Ceremonial » Alley » Shared public way » Paseo		
Seattle	» Regional Connector » Commercial Connector » Local Connector » Main Street » Mixed Use Street		

	STREET TYPES	CONTEXT	OVERLAY
	» Industrial Access Street » Green Street » Neighborhood Green Street		
San Diego	» Major Streets » Collector Streets » Commercial Streets » Residential Streets » Alleys		

[1] http://www.fhwa.dot.gov/planning/processes/statewide/related/functional_classification/fc02.cfm#tcofc

[2] Information in this section includes definitions from the City of San Mateo General Plan and "Street Classifications" as found online: http://www.cityofsanmateo.org/index.aspx?NID=2101

[3] State of California, Department of Transportation, Traffic Operations Division, Traffic and Vehicle Data Systems Unit: 2011 All Traffic Volumes on CSHS: Route 101, (Sacramento, CA: State of California, 2011). http://traffic-counts.dot.ca.gov/2011all/Route101.html

[4] City of San Mateo City Council, *San Mateo 2030 General Plan*, (San Mateo, CA: City of San Mateo, 2011), III 5-6.

[5] State of California, Department of Transportation, Traffic Operations Division, *Traffic and Vehicle Data Systems Unit: 2011 All Traffic Volumes on CSHS: Routes 92-98*, (Sacramento, CA: State of California, 2011). http://traffic-counts.dot.ca.gov/2011all/Route92-98.html

[6] State of California, Department of Transportation, Traffic Operations Division, Traffic and Vehicle Data Systems Unit: 2011 All Traffic Volumes on CSHS: Route 82, (Sacramento, CA: State of California, 2011). http://traffic-counts.dot.ca.gov/2011all/Route82-86.html

[7] State of California, Department of Transportation, Traffic Operations Division, *Traffic and Vehicle Data Systems Unit: 2011 All Traffic Volumes on CSHS: Routes 82-86*, (Sacramento, CA: State of California, 2011). http://traffic-counts.dot.ca.gov/2011all/Route82-86.html

[8] As referenced in the San Mateo General Plan

[9] http://www.cityofsanmateo.org/index.aspx?NID=2101

[10] City of Boston, Boston Transportation Department, *Boston Complete Streets Guidelines*, (Boston, MA: City of Boston, 2010), 10. http://www.bostoncompletestreets.org/pdf/1/chap1_3_street_types.pdf

[11] *Boston Complete Streets Guidelines*, 7-17.

[12] City of Pasadena, *Draft Pasadena Street Types Plan*, (Pasadena, CA: City of Pasadena, 2013), 2. http://ww2.cityofpasadena.net/planning/meetings/posts/Planningposts/2013/04242013/Pasadena%20Street%20Types%20Plan%20Draft%20(FD).pd

[13] *Draft Pasadena Street Types Plan*, 7.

[14] *Draft Pasadena Street Types Plan*, 2-12.

[15] City of Mountain View City Council, *Mountain View 2030 General Plan*, (Mountain View, CA: City of Mountain View, 2012), 105-107. http://www.mountainview.gov/civica/filebank/blobdload.asp?BlobID=10695

` [16] *Mountain View 2030 General Plan*, 108.

[17] These are typologies in the New Haven Complete Streets Manual. Traditional functional classification is still utilized in this document.

APPENDIX E
Street Width Review

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MEMORANDUM

To: Ken Chin, City of San Mateo

From: San Mateo Sustainable Streets Project Team

Date: October 2, 2014

Subject: San Mateo Sustainable Streets Plan: Tech Memo 2.5 – Street Width Review

INTRODUCTION

Street widths play a vital role in street design as they dictate the level of movement and the number and types of amenities that can be fit into the right-of-way. Narrow streets provide intimate spaces for pedestrians and bicyclists and discourage high-speed traffic. Wider streets can accommodate higher motor-vehicle volumes and can include dedicated space for multiple modes (e.g., transit and bicycle facilities and wide sidewalks). Larger streets can be designed with various elements in order to provide more intimate spaces. Examples include the implementation of road diets and the inclusion of medians, on-street parking, curb extensions, wider sidewalks, and bicycle lanes. Similarly, smaller streets can be reconfigured to meet traffic demands without the need for roadway expansion.

In constrained settings, every inch counts. Travel lanes in these environs should generally be designed to be as narrow as possible, especially where reallocating one to two feet of space can significantly improve operations for bicyclists, buses, or pedestrians.[1] Research has shown that narrower lane widths can effectively decrease auto speeds without decreasing safety, and that wider lanes do not correlate to safer streets.[2] Wider travel lanes also create unwieldy crossing distances for pedestrians at intersections and mid-block crossings.[3]

Based on information provided by the City of San Mateo, this memorandum provides a spatial analysis of the city's street widths. Overlays of existing street classifications, traffic volumes, land uses, and densities are also provided. This information allows for a discussion of optimal street widths for the city based on land-use context, street classification, and emergency-vehicle use. It also highlights locations that provide opportunities for repurposing right-of-way and areas with constrained street widths that can potentially be augmented by adding to the pedestrian realm through easements or during development projects.

CURRENT STREET WIDTH CONDITIONS

Street widths for most streets in the city have been provided based on measurements from pavement edge to pavement edge. This measurement does not include the approximately 18-inch gutter on each side of the street or sidewalks. In addition, the width measurement does not reveal the number of lanes on an existing roadway, and such information would clarify the presence of turning and parking lanes in the right-of-way. A common lane width in San Mateo is 12 feet[4] and can be used as a reference when reviewing the information in this memo.

Figure E-1 presents several descriptive statistics about known street widths in San Mateo based on existing street classifications. As expected, the average street width increases as one ascends to higher-volume street classifications. For each classification, the median street width is well within one standard deviation of the mean width, indicating that there are no significant outliers skewing the average. Based on the above 12-foot-lane rule-of-thumb, most local streets in San Mateo are roughly as wide as two travel lanes, collector streets approximately three travel lanes, and arterials approximately four travel lanes.

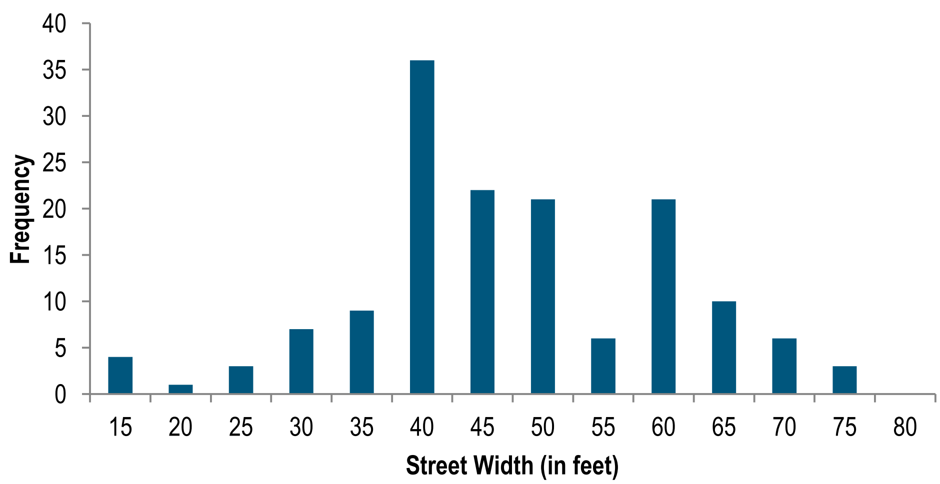
FIGURE E- 1 STREET WIDTH STATISTICS BY CLASSIFICATION

	LOCAL STREETS	COLLECTOR STREETS	ARTERIAL STREETS
Mean	27'10"	34'6"	45'5"
Median	28'0"	32'0"	44'0"
Mode	24'0"	30'0"	50'0"
Std Dev	7'3"	11'0"	13'8"

ARTERIAL STREETS

As discussed in the *Draft Street Classification System Review Memo*, arterial streets, as defined by the City, are intended to connect San Mateo to neighboring cities, are typically 2-6 lanes wide, and carry 10,000-50,000 vehicles per day. Based on a data review (as shown in Figure E-2), the arterials in San Mateo range from 15 to 75 feet wide[5]; the average width is 44 feet. This translates to roughly four through lanes or two through lanes with turning lanes and/or parking.

FIGURE E- 2 ARTERIAL STREET WIDTH FREQUENCY GRAPH

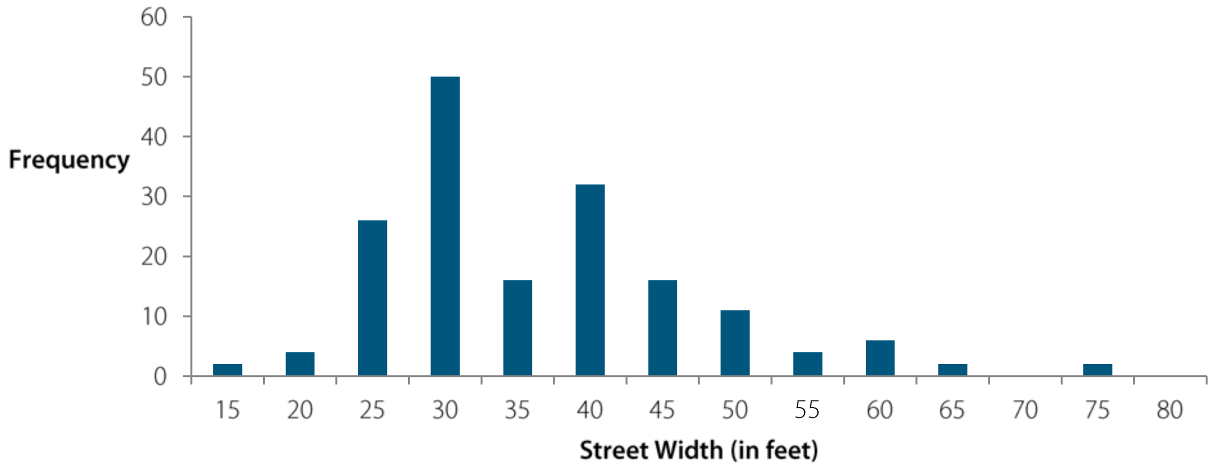


The locations of arterial streets by width in San Mateo are shown in FigureE- 4. As illustrated, the widest streets are those that move traffic across city boundaries or intersect with freeway ramps, including El Camino Real, Hillsdale Boulevard, and East 3rd Avenue.

COLLECTOR STREETS

Collector streets link neighborhoods to arterial streets, and are intended to carry lower traffic volumes: between 1,000 – 10,000 ADT. According to the City's street classifictheyation system, collectors are typically between two and four lanes wide, which translates to roughly 27 to 51 feet in width. As can be seen in Figure E-3, most collectors are between 25 and 40 feet wide, with an average of 32 feet.

FIGURE E- 3   COLLECTOR STREET WIDTH FREQUENCY GRAPH



Collector streets in San Mateo are shown in Figure E-5. These streets are shorter and intersect with arterials and local streets. Saratoga Drive, which is defined as a collector, is much wider than other collector streets. This street is adjacent to the San Mateo County Fairgrounds and has a wide tree-lined median down the center.

FIGURE E- 4 MAP OF ARTERIAL STREET WIDTHS IN SAN MATEO

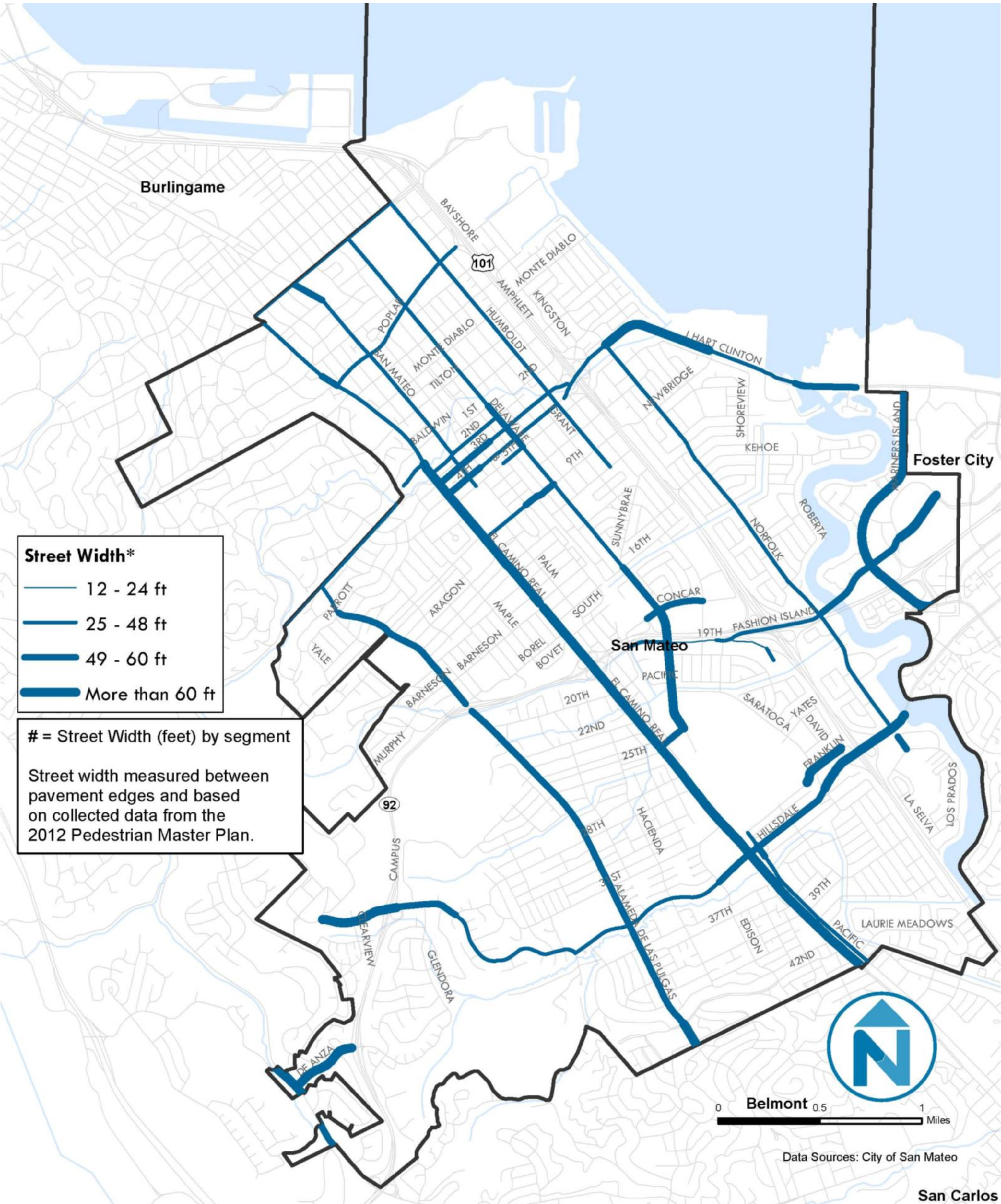
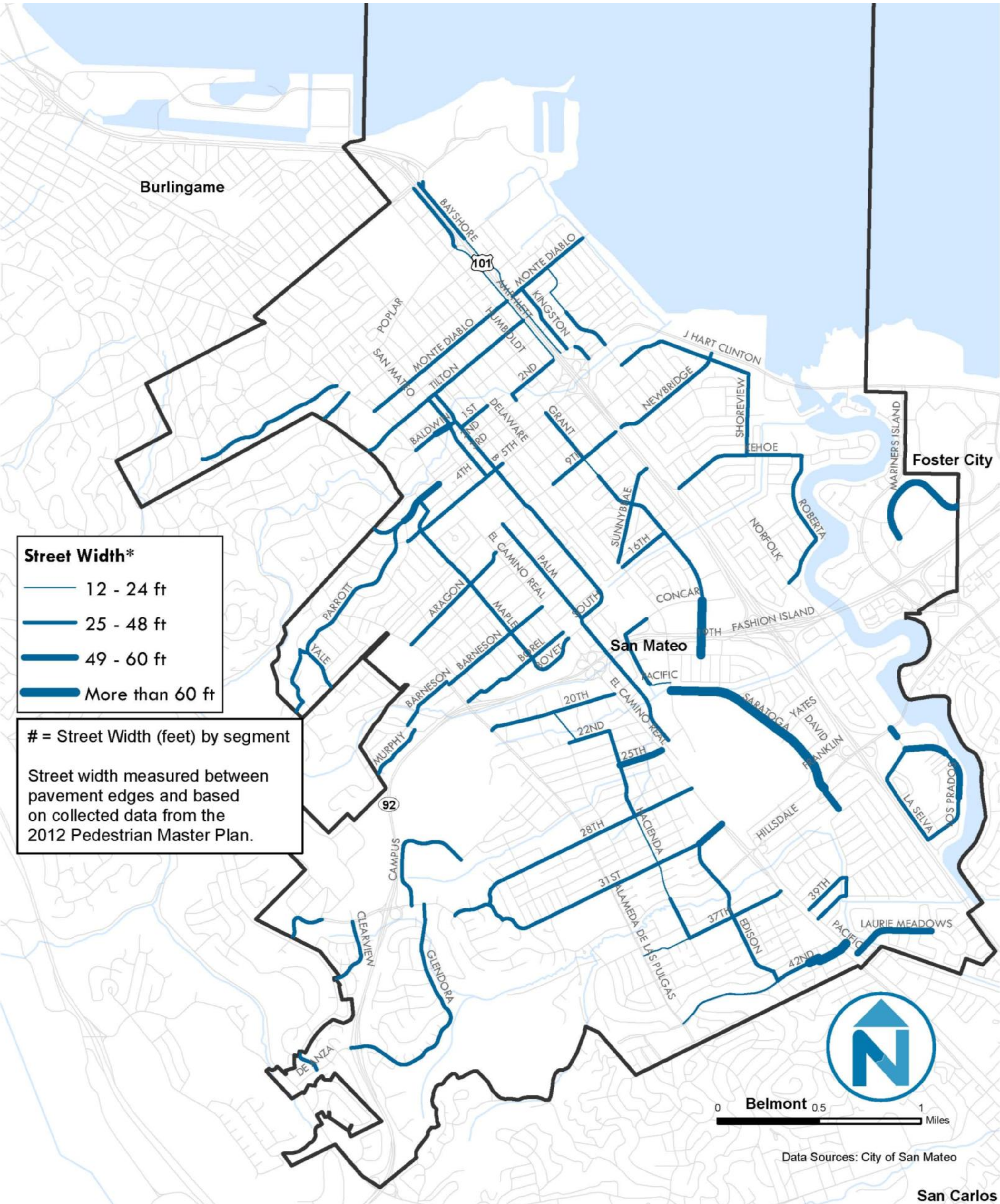


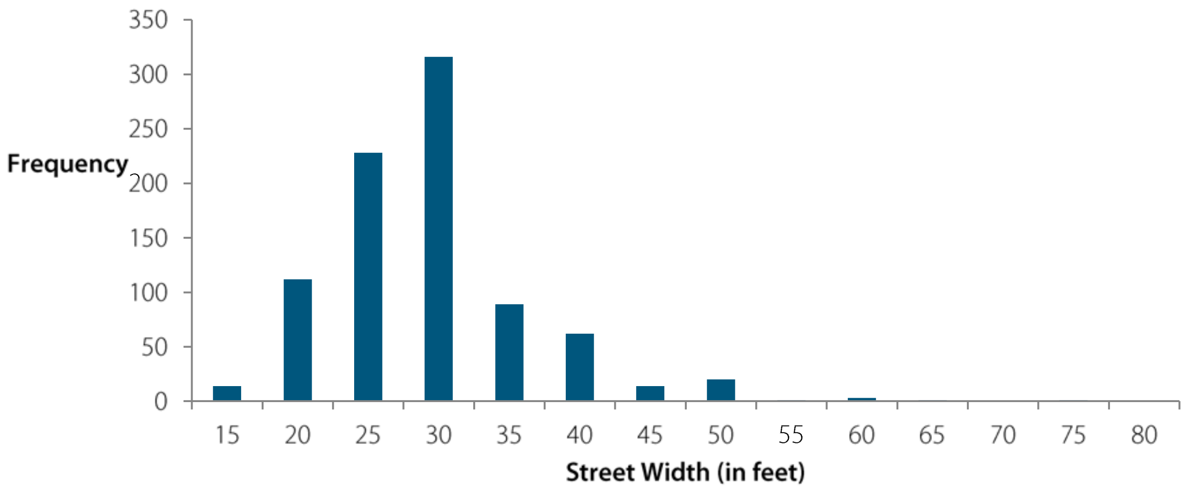
FIGURE E- 5 MAP OF COLLECTOR STREET WIDTHS IN SAN MATEO



LOCAL STREETS

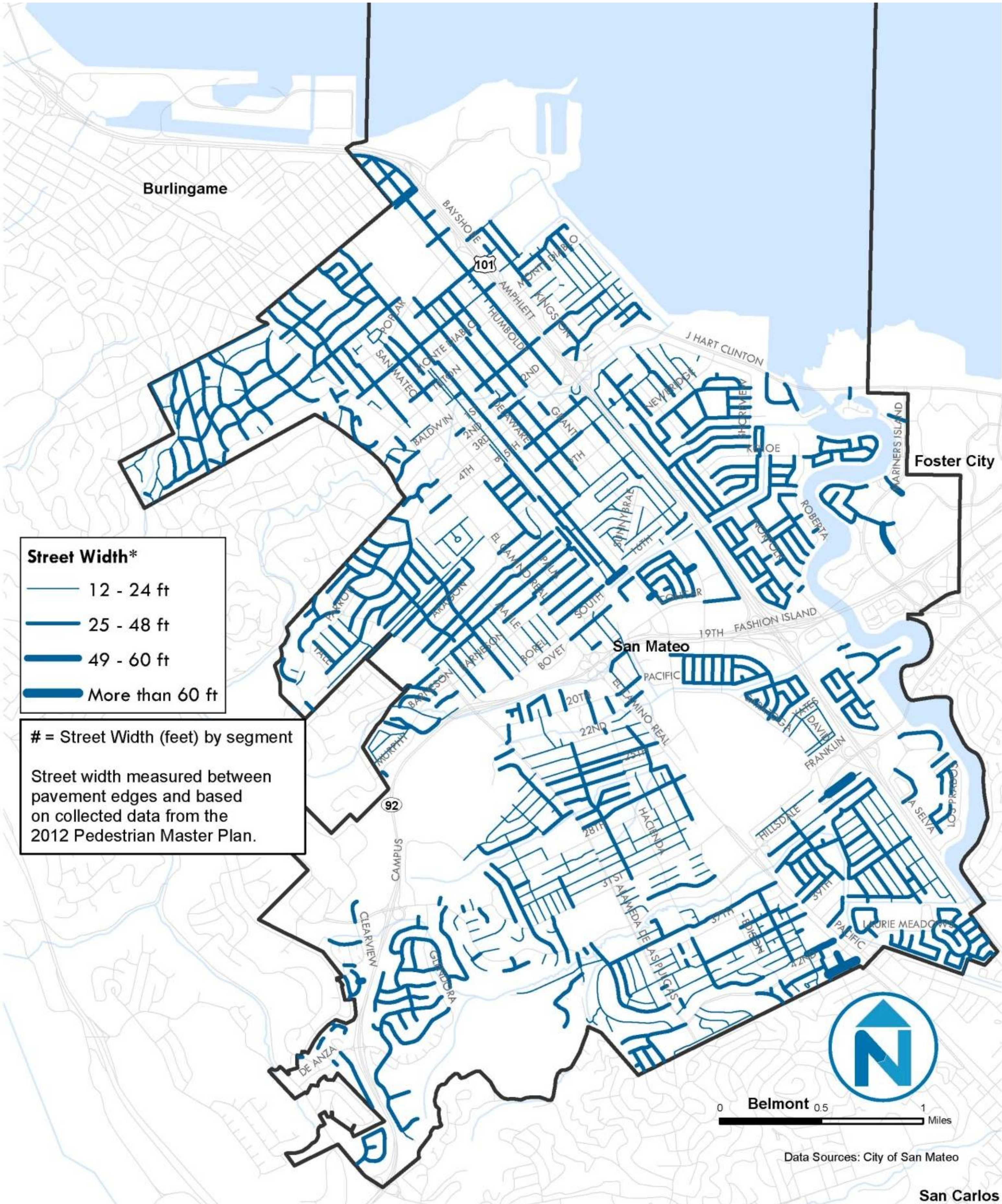
Local streets in San Mateo are typically narrower than collector and arterial streets and are intended to serve adjacent land uses and protect residential areas from through traffic. These streets are generally two lanes wide and carry between 500 and 1,000 vehicles per day. As can be seen in Figure E-6, local streets in San Mateo range between 15 and 75 feet wide. The average width of all local streets in San Mateo is 28 feet, which translates to a two-lane street, possibly with parking on one side or a wide shoulder.

FIGURE E- 6 LOCAL STREET WIDTH FREQUENCY GRAPH



Local streets are present throughout the city, as shown in Figure E-7 below. There are several subdivisions along the east edge and northwest portion of the City with wider local streets.

FIGURE E-7 MAP OF LOCAL STREET WIDTHS IN SAN MATEO



AVERAGE DAILY TRAFFIC AND STREET WIDTH

ARTERIAL STREETS

Arterial streets with and without available average daily traffic (ADT) volumes are illustrated in Figure E-8. Black segments represent arterials with no ADT volumes available; segments in blue, green, yellow, and red are arterials with available ADT volumes. All of the recorded streets (fewer than ¼ of all arterials) have ADT levels below or within the listed functional class defined by the City for arterials (10,000 to 50,000 ADT). When comparing this data with street widths, streets with excessive width and low ADT are easily identified. As the figure shows, there are several arterials in the southern part of the city that are wider than 48 feet and have ADTs lower than 10,000. These streets include De Anza Boulevard, Alameda De Las Pulgas, and West Hillsdale Boulevard.

COLLECTOR STREETS

The city's collector street widths with corresponding ADT values are shown in Figure E-9. Gray segments represent collectors with no ADT volumes available; segments in blue, green, yellow, and red are collectors with available ADT volumes. A majority of collectors are between 25 and 48 feet, with an ADT that falls within the city's defined functional class (1,000 to 10,000 ADT). It is also important to note that there are several streets defined as "collectors" with less than 1,000 ADT, including Sunnybrae Boulevard and Parrott Drive. One collector-street segment shown in red in the figure is South Grant Street. The segment's high levels of traffic may be explained by the segment's need to carry the burden of freeway traffic entering and exiting Highway 92, hence its high levels of traffic. The other segment shown in red is South Norfolk Street. This segment is the only point of access for numerous residences that are adjacent to Los Prados Park.

LOCAL STREETS

Local streets in San Mateo are intended to only serve adjacent land uses, and are expected to carry between 500 and 1,000 vehicles per day. Street widths and known ADTs for local streets are shown in Figure E-10. Gray segments represent local streets with no ADT volumes available; segments in blue, green, yellow, and red represent local streets with available ADT volumes. There are a number of streets that carry more than 1,000 ADT, but none appear excessively wide or narrow.

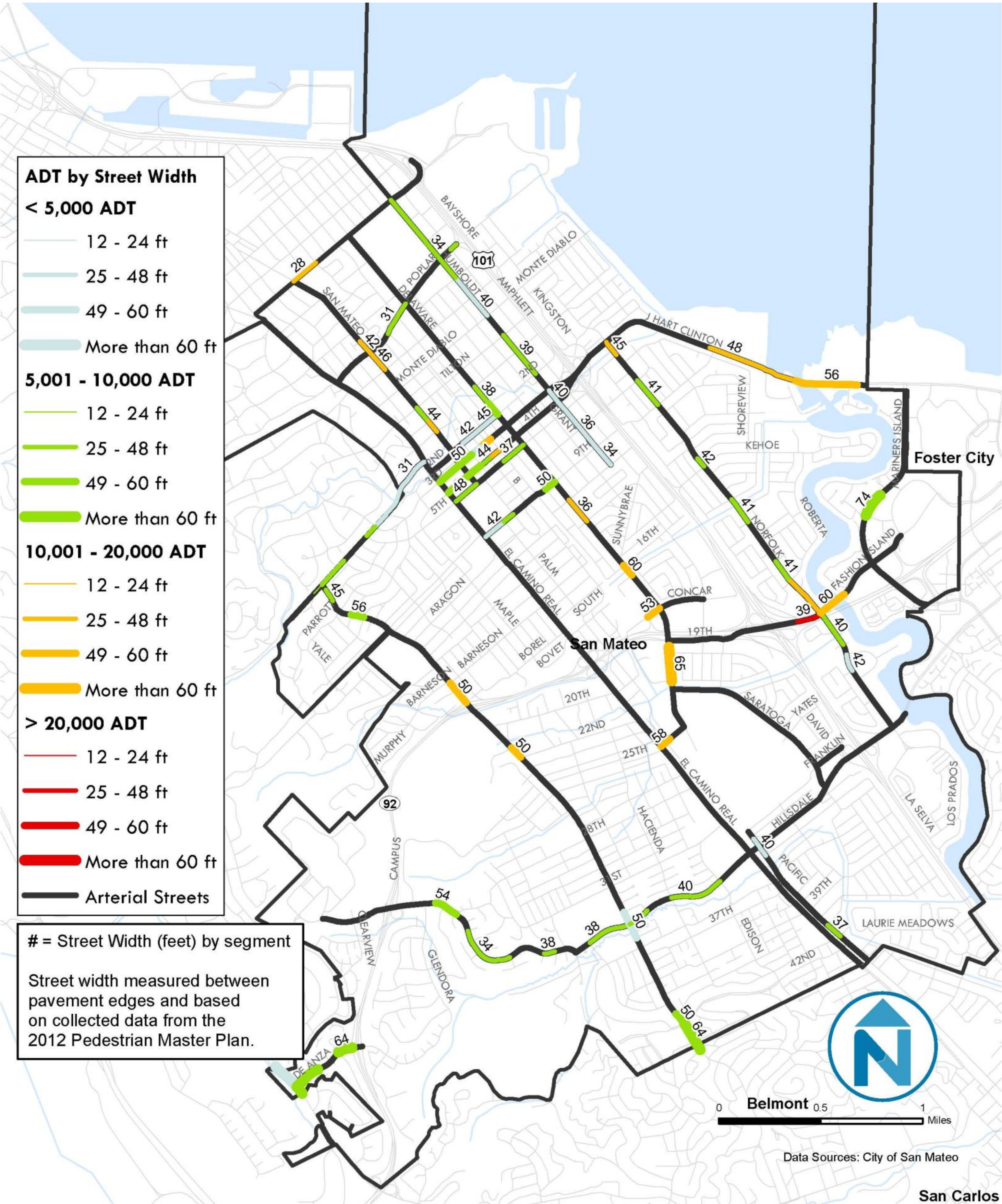

ADT by Street Width
< 5,000 ADT
12 - 24 ft
25 - 48 ft
49 - 60 ft
More than 60 ft
5,001 - 10,000 ADT
12 - 24 ft
25 - 48 ft
49 - 60 ft
More than 60 ft
10,001 - 20,000 ADT
12 - 24 ft
25 - 48 ft
49 - 60 ft
More than 60 ft
> 20,000 ADT
12 - 24 ft
25 - 48 ft
49 - 60 ft
More than 60 ft
Arterial Streets
= Street Width (feet) by segment
Street width measured between pavement edges and based on collected data from the 2012 Pedestrian Master Plan.
San Mateo
Foster City
Belmont
San Carlos
0 0.5 1 Miles
Data Sources: City of San Mateo
BAYSHORE
101
MONTE DIABLO
AMPHLETT
KINGSTON
HUMBOLDT
POPLAR
DELAWARE
SAN MATEO
TILTON
J HART CLINTON
SHOREVIEW
KEHOE
MARINERS ISLAND
ROBERTA
NORFOLK
FASHION ISLAND
SUNNYBRAE
16TH
CONCAR
19TH
EL CAMINO REAL
PALM
SOUTH
ARAGON
MAPLE
BARNESON
BOREL
BOVET
PARROTT
YALE
20TH
22ND
25TH
SARATOGA
YATES
DAVID
FRANKLIN
MURPHY
92
CAMPUS
HACIENDA
HILLSDALE
PACIFIC
39TH
LA SELVA
LOS PRADOS
LAURIE MEADOWS
37TH
EDISON
42ND
CLEARVIEW
GLENDORA
DE ANZA
GRANT
9TH
4TH
5TH
2ND

FIGURE E- 9 MAP OF COLLECTOR STREET WIDTH AND ADT IN SAN MATEO

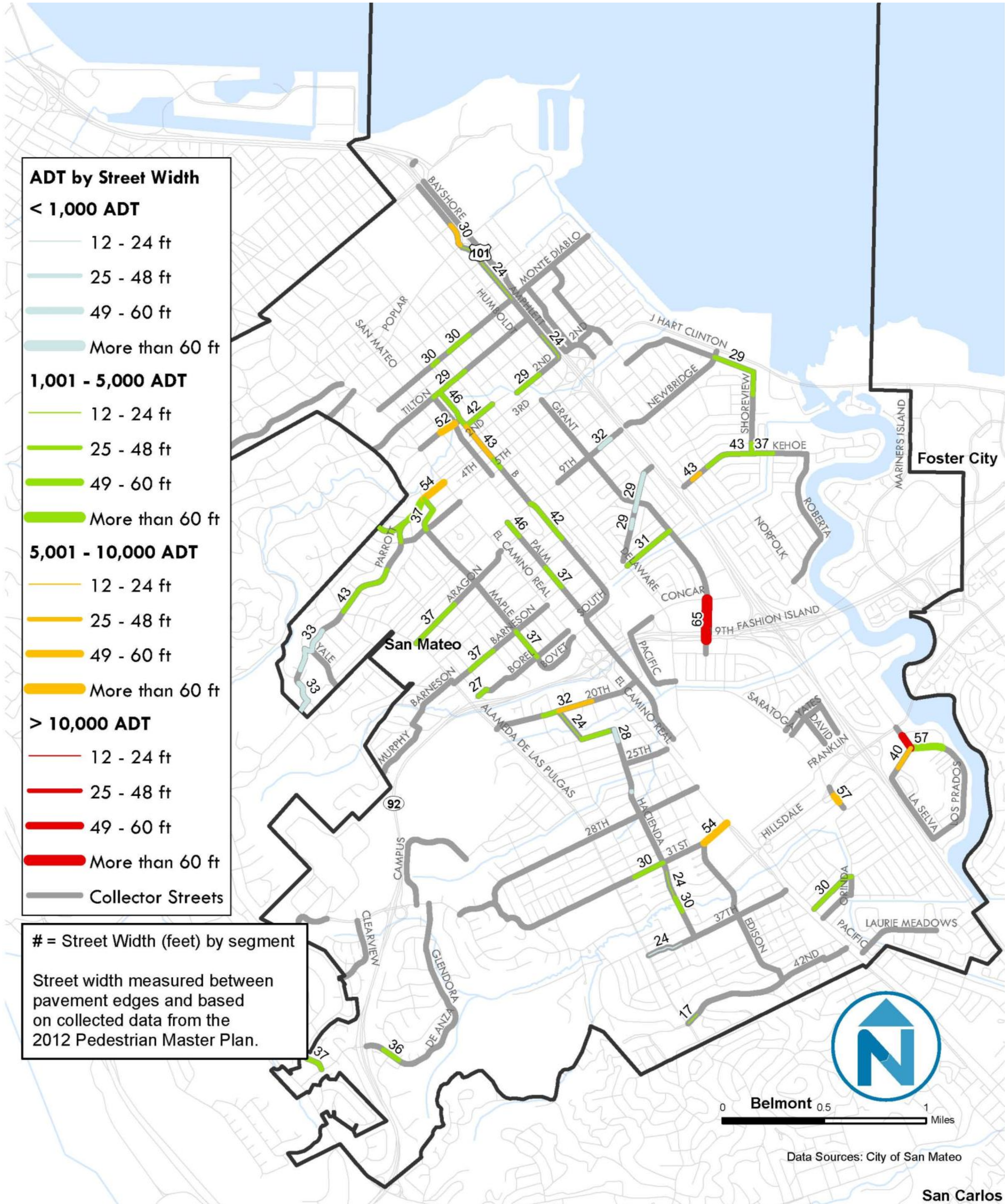
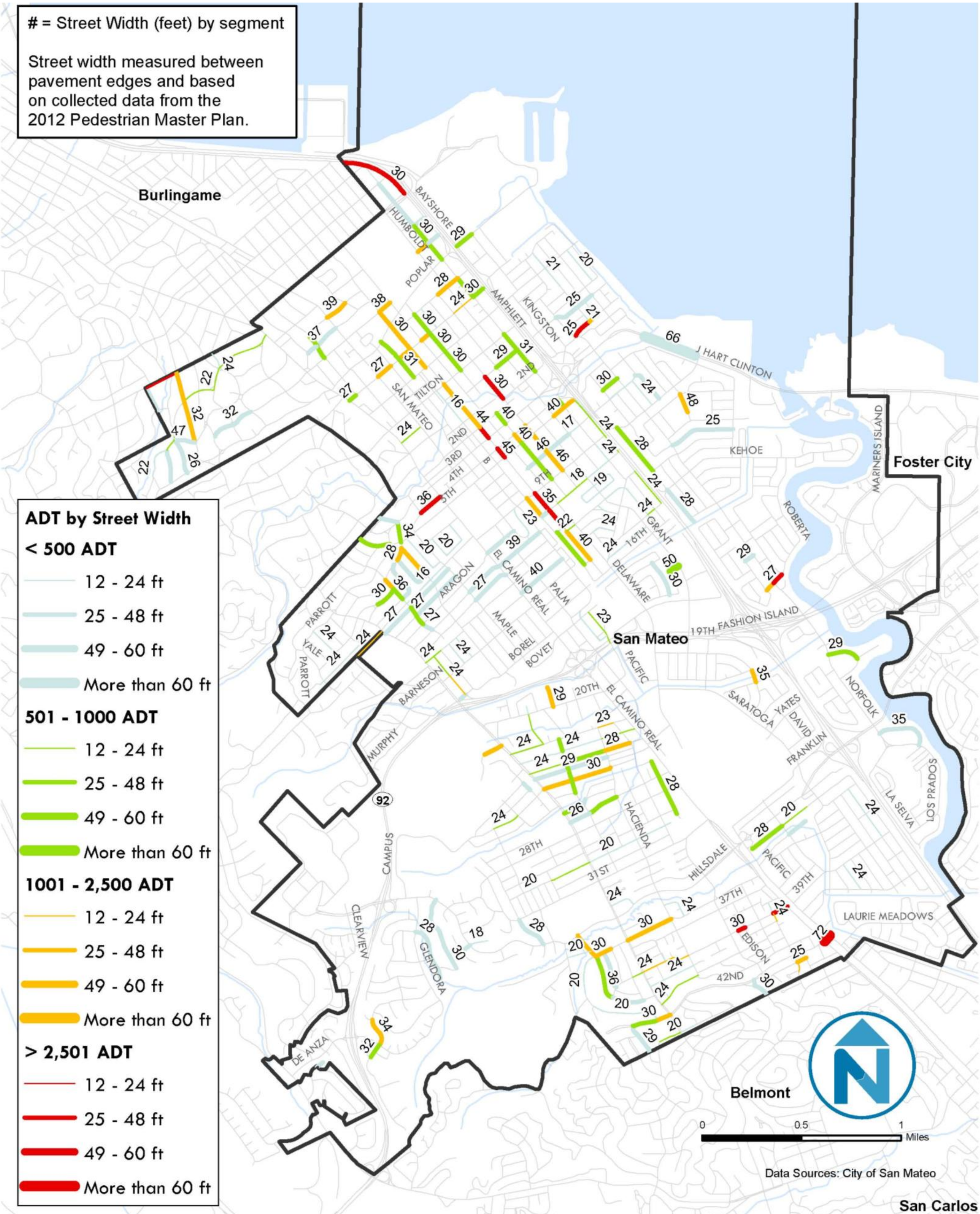


FIGURE E- 10 MAP OF LOCAL STREET WIDTH AND ADT IN SAN MATEO



LAND USE

Figure E-11 provides an overlay of street widths with the city's land use designations. As the figure shows, street widths are not consistent across the low density, single family residential portions of the city. Neighborhoods such as Baywood-Aragon, slightly west of the central part of the city, and East San Mateo have much wider streets than residential areas in the south, around Hillsdale and South San Mateo. As one might expect, there are also wider streets in the commercial and retail core of the city.

CURB TYPES

The City of San Mateo has a mix of straight curbs and rolled curbs. While downtown San Mateo has mostly straight curbs, there are several neighborhood areas with rolled curbs, as illustrated in Figure E-12. Rolled curbs create a more suburban environment and are cheaper to install, and while they often encourage a more shared street environment, it is easier for drivers to park on the sidewalk, reducing dedicated pedestrian space. Rolled curbs are present in several pockets of the city: in central San Mateo around Sunnybrae Park; in North Central San Mateo around Harbor View Park; and in many parts of South San Mateo/Sugarloaf, around San Mateo Medical Center and Hillsdale High School. The historical importance or prioritization of rolled versus straight curbs in San Mateo is not known at this time.

CONCLUSIONS

The width of a street can enable various reconfigurations, depending on the local and network needs of a street. This memo highlights street widths across each of the City's current street classification types. While there are opportunities to make modifications across streets of all widths, the greatest opportunities in San Mateo lie on collector and arterial streets that, in many cases, are overly wide given their vehicular demands. Streets that are within the average range for collectors and arterials (35 to 45 feet on average), could be configured in numerous ways to meet local needs. This may include providing mobility for non-motorized users, traffic calming, or even landscaping and drainage. Street width provides the canvas for street design and, based on the findings in this memo, San Mateo certainly has many opportunities to reconfigure streets to provide space for purposes other than traffic movement.

This memo provides a high-level overview. However, before specific roads can be reconfigured in San Mateo, a more detailed investigation of corridor-level issues beyond traffic volumes is required. Land use, pedestrian crossings, freight traffic, the presence of transit, neighborhood goals, and other factors must be considered.

FIGURE E- 11 MAP OF LAND USE AND STREET WIDTHS IN SAN MATEO

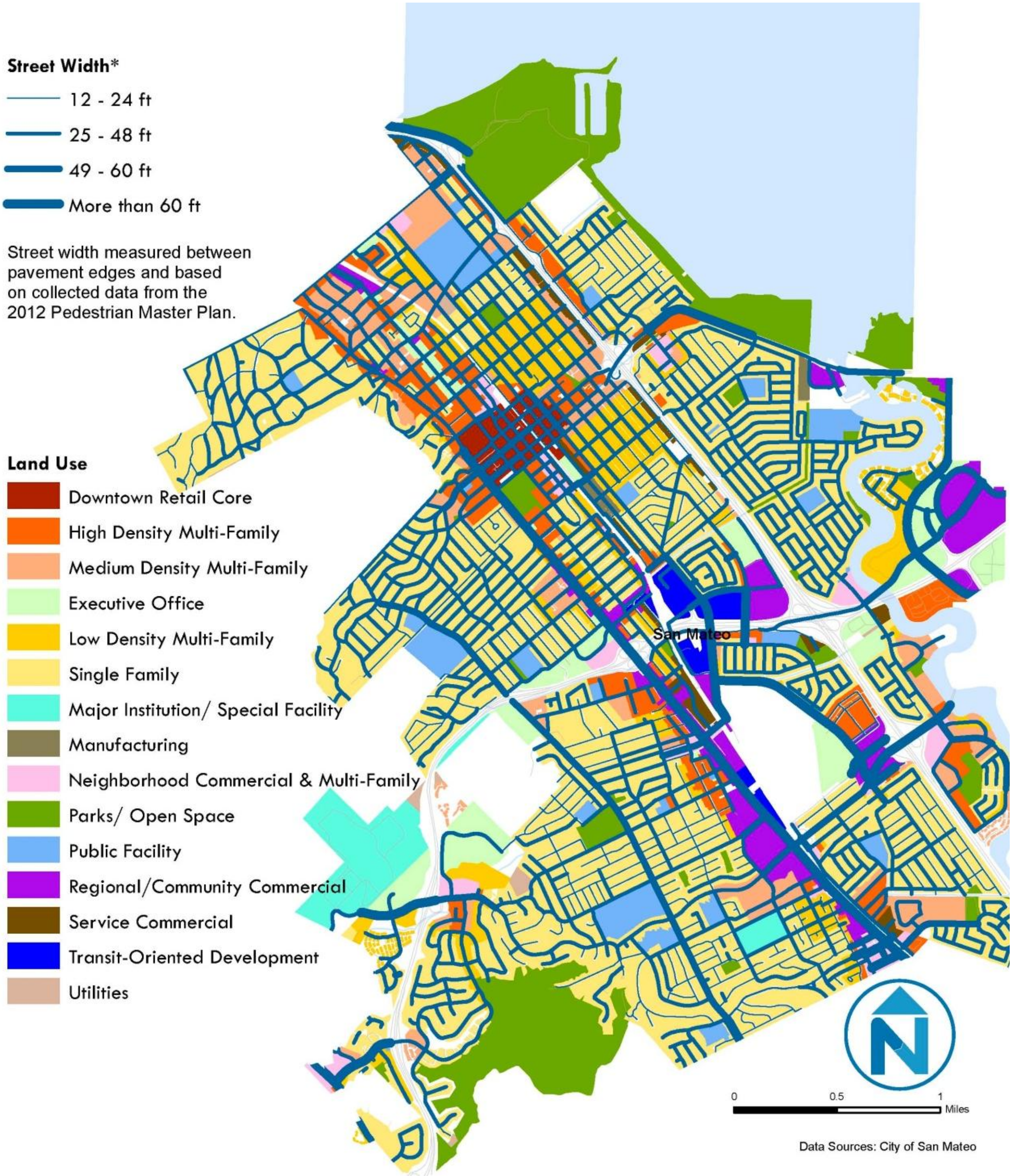
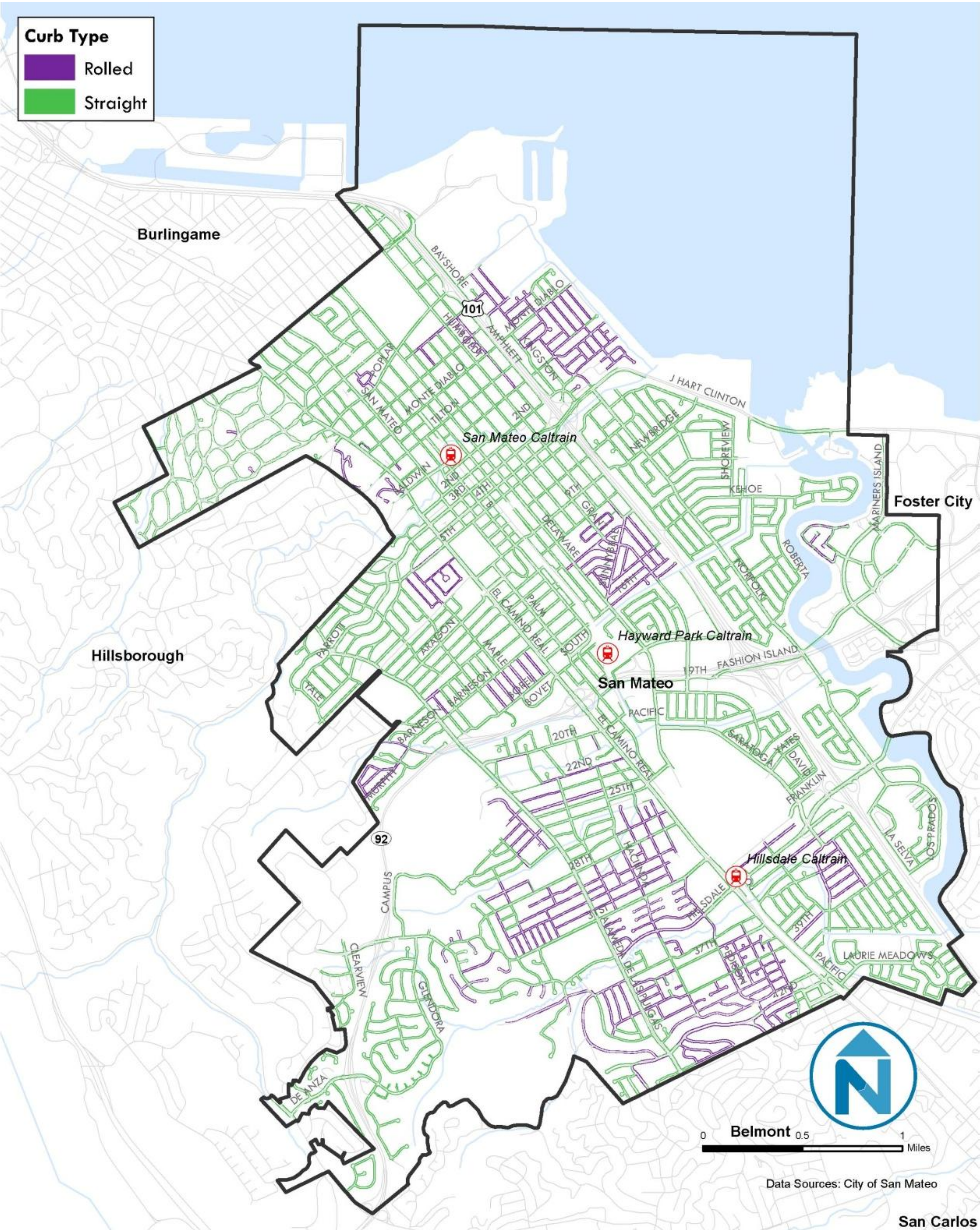


FIGURE E- 12 MAP OF CURB TYPE IN SAN MATEO



[1] As an example, if a four-lane street with 12' lanes can be narrowed to 10' lanes, this results in an additional 8' of right-of-way that could be utilized for other purposes.
[2] Dumbaugh, Eric and Wenhao Li. "Designing for the Safety of Pedestrians, Cyclists, and Motorists in Urban Environments." Journal of the American Planning Association. 19 May 2011. P. 70.
[3] Longer crossing distances not only pose as a pedestrian barrier but also require longer traffic signal cycle times which may have an impact on general traffic circulation.
[4] While 12' lane widths are common in city-settings such as San Mateo, 12' should be considered the absolute maximum. 10'-11' lanes are more suitable for general travel lanes and turning lanes. Parking lanes should be narrower.
[5] The narrowest arterial streets are likely one-lane on or off ramps to San Mateo's limited access freeways.

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APPENDIX F

Level of Service and Multimodal Analysis

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SUSTAINABLE STREETS
CITY OF SAN MATEO

Level of Service and Multimodal Analysis
Oct 2014

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Table of Contents

Table of Figures

Page

CHAPTER 1 : **Introduction**

Cities across the nation are realizing the damaging impact of centering their transportation network performance and development review standards on the automobile. The mantra of "what gets measured gets built" has rung true through decades of focusing transportation performance measures on automobile congestion and pursuing cost-intensive capital projects that temporarily increase roadway capacity but inevitably lead to yet greater automobile congestion. Maintaining a legislative and funding spotlight on vehicular traffic has naturally led to neglect of transit and non-motorized travel, leading to an incomplete transportation system that holds back cities and people from the outcomes they really care about – increased quality of life and economic growth.

Level of service (LOS) is a roadway and intersection rating system using letter grades from A (abundant capacity) to F (at capacity) that measures network performance for its users. For automobiles, LOS can be applied to roadway segments, but this is largely only practical on highways due to the widely varying conditions of city streets. Instead, automobile LOS in cities focuses on vehicle delay and capacity at intersections, which can be forecast into the future and can test changes in geometry or traffic flow. This often occurs with new development projects.

Traditionally, automobile LOS standards have focused exclusively on vehicle delay and travel time, which can have detrimental effects on non-motorized users and on the implementation of Complete Streets. The 2010 Highway Capacity Manual (HCM) provides a multimodal approach, with a chapter dedicated to urban streets that marries level of service standards for automobiles, pedestrians, bicyclists, and transit users. Previously, these modes were outlined in specific, discrete chapters of the HCM. In a community that wishes to prioritize other road users, it is imperative to move away from automobile LOS toward other performance metrics that support a broad array of objectives.

Many cities have taken steps to modify their own LOS standards or adopt appropriate elements of the HCM, including Bay Area cities such as Livermore, San Francisco, San Jose, and Redwood City. Some communities have adopted various forms of Multimodal Level of Service (MMLOS) as their new performance standard. The experience in these cities indicates that the high data requirements and unintended negative consequences of certain types of MMLOS systems limit their utility.

As an important component of the San Mateo Sustainable Street Plan, this memorandum includes a review of other cities' policies on LOS and an evaluation of how MMLOS can be applied in San Mateo. Potential LOS standards and alternative performance metrics for San Mateo are also included. To illustrate how the proposed performance metrics may operate within the city, an analysis of five San Mateo sites has been conducted using existing traffic volume and other data. The analysis utilizes the proposed performance metrics based on both the existing design and a "Complete Streets" design. Animations demonstrate changes in traffic circulation and effects on pedestrian, bicycle, and transit circulation at each site. At the direction of City staff, we can use traditional tools (such as SimTraffic) to animate LOS impacts or show how the pedestrian and bicycle environment would change based on MMLOS analysis.

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CHAPTER 2 : **Peer Review**

To address the shortcomings of automobile LOS, the following communities have adopted new measures that are relevant to San Mateo.

SANTA MONICA, CA

Integrated land use and transportation planning with a goal of no net new evening peak trips and street typologies tied to specific performance metrics

In 2010, the City of Santa Monica adopted the LUCE, its Land Use & Circulation Element. The LUCE set forth bold policies with a goal of generating no net new evening-peak auto trips. It did this by offsetting these trips with improvements for alternative modes and strategically located development. The LUCE significantly changes how the city previously addressed and measured the success of its streets.

First, the city developed new street typologies, which focus on the land use context for each street and the importance of each street to all modes of transportation. The street typology map is shown in Figure 1.

Second, the typology was applied to each street and guidance provided about how to address inevitable tensions among modes, given limited rights-of-way. For example, on the city's transit boulevards, it is now the city's policy to prioritize reductions in transit delay over reductions in vehicle delay. The goal of this policy is to increase the number of people, rather than the number of automobiles, the boulevards can serve. On downtown commercial streets, on-street parking is prioritized, but parking may be removed in order to improve conditions for transit or bicycles. See a sample of the guidelines in Figure 2.

Finally, Santa Monica developed a comprehensive set of transportation performance metrics to measure not only the performance of each mode, but also how the transportation system supports the city's economic development, quality of life, social equity, and other goals included in the LUCE. The full matrix of performance metrics is included in Appendix F.1.[1]

FIGURE F- 1   SANTA MONICA STREET TYPOLOGIES

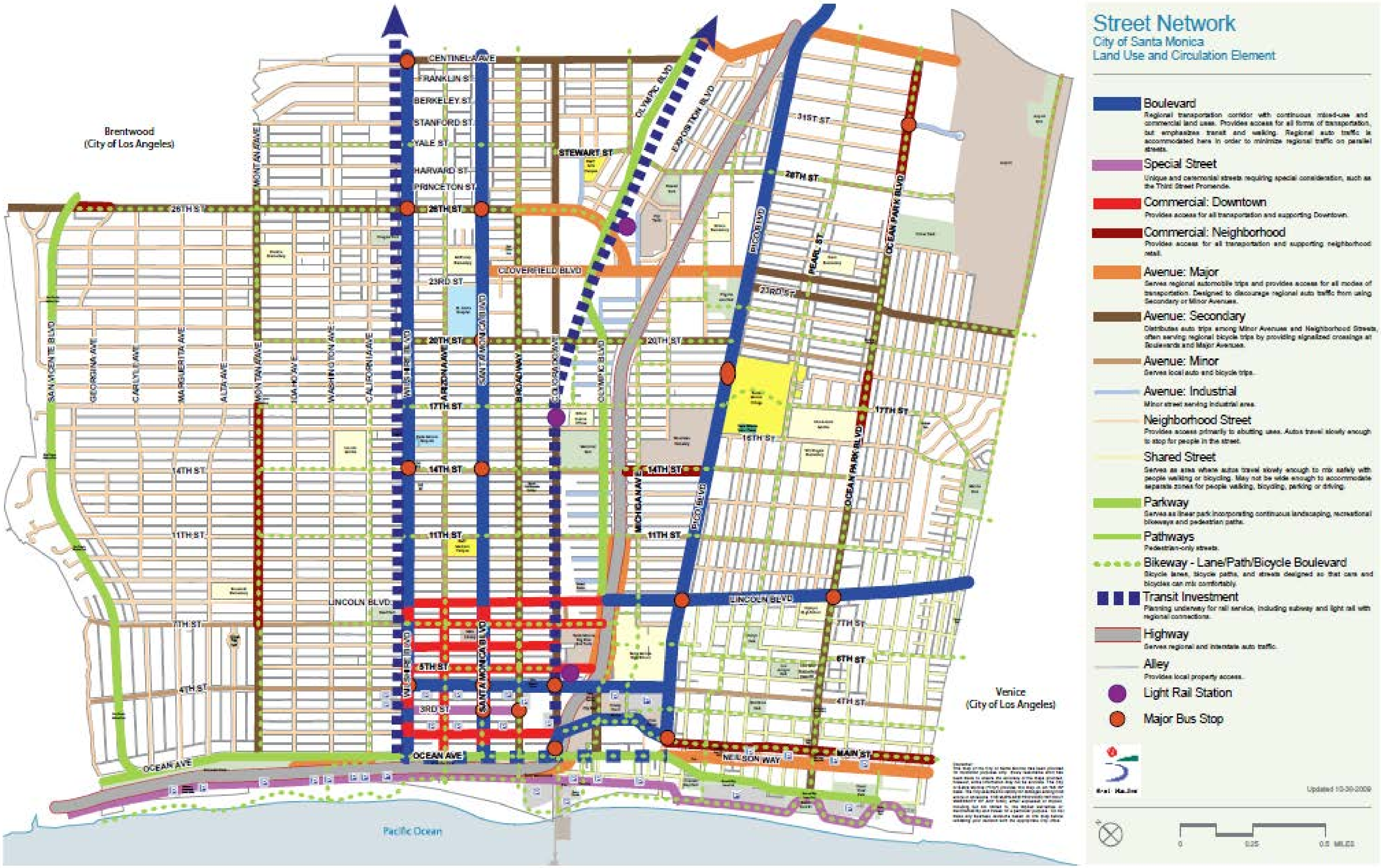


FIGURE F- 2 SANTA MONICA STREET TYPOLOGIES AND PERFORMANCE GUIDELINES

Type	Definition	Guidelines
Boulevard 	Regional transportation corridors with continuous mixed-use and commercial land uses: Provide access for all forms of transportation, but emphasize transit and walking. Regional auto traffic is accommodated here in order to minimize regional traffic on parallel local streets. This refers to the role of transportation on these streets, in comparison to the role these streets play in the overall community.	• Design and manage the transportation network to reduce tension between modes and improve person carrying capacity. • When necessary, remove on-street parking to reduce bus transit delays. • Create dedicated transit lanes and transit queue-jump lanes as necessary to improve person carrying capacity while maintaining acceptable vehicle delay. • Allow property dedication for projects above the base height when necessary to achieve desired sidewalk width and/or turn lanes. • Prioritize reduction of transit delay and the creation of a high-quality walking experience over bicycle lanes on the boulevards.
Commercial: Downtown 	All streets in the Downtown District, except as shown, plus a portion of Lincoln Boulevard. By definition, these streets are very high priority for pedestrians and experience high levels of competition among all modes.	• Prioritize pedestrian environment above all other modes. • Accommodate pedestrian movements in each signal cycle at all legs of all intersections. • Remove parking lanes to reduce transit delay, improve pedestrian quality or provide bicycle lanes, as necessary.
Commercial: Neighborhood 	Streets in neighborhood commercial zones that are not major boulevards.	• Prioritize pedestrian environment above all other modes. • Recognize the importance of on-street parking and only remove it to improve pedestrian quality, such as for corner bulbouts or cafe seating. • Provide space on the sidewalk in the public right-of-way for cafe tables and merchant displays, where practical.

SAN FRANCISCO, CA

Comprehensive alternative to auto LOS through measurements of net new auto trips added citywide per project, coupled with mitigation fees to fund local and countywide transportation improvements

The San Francisco County Transportation Authority and the San Francisco Planning Department are each engaged in efforts to explore and develop the Transportation Sustainability Program (TSP), an alternative system of measuring and mitigating transportation impacts. The TSP is designed to be compliant with the California Environmental Quality Act (CEQA). The new development review process in the TSP is designed to accomplish two primary goals set by the City and County of San Francisco:

1. Change how [the City] evaluate[s] the effects of new development on the transportation system—emphasizing all modes of transportation—under CEQA; and
2. Establish a citywide Transportation Sustainability Fee to offset the cumulative impacts of projects on the City's transportation network.[2]

The City recognized that using an automobile LOS standard for new development generated mitigation measures that disproportionately focused on improving automobile efficiency. This approach directly conflicted with the City's "Transit First" policy, which highlights all other modes—including transit, walking, and biking—as vital to the transportation network's success. In addition to being inferior at demonstrating negative environmental effects, automobile LOS was deemed too resource-intensive for both the Planning Department and development project sponsors.[3]

According to a draft version of the plan, the TSP would replace automobile LOS for intersections by instead measuring the net new auto trips added to the city transportation network by a project. The significance threshold would be one net new automobile trip, as each new trip contributes to network inefficiency, multimodal safety issues, and many forms of environmental pollution in San Francisco. The City is currently in the process of refining the draft and taking into account additional factors and possibly a different metric.

Based on the 2013 draft, impacts would be directly mitigated by a Transportation Sustainability Fee (TSF), a central component of the TSP. The City is preparing a cumulative Environmental Impact Report (EIR) covering 20 years of transportation impacts from projected development. The TSF would assess fees on new development projects based on their respective share of the impact determined by the EIR (e.g. the land use and size of both residential and non-residential projects).

Certain desirable projects would receive credits in the form of reduced or eliminated fees. These projects could include small businesses smaller than 5,000 square feet, projects that build less than the maximum allowed parking based on zoning, affordable housing projects, and residential projects with fewer than 20 dwelling units. Transit, bicycle, and pedestrian projects that do not add vehicle trips would not be considered to have any significant traffic impact and therefore would be exempt from the TSF, even if the projects reduced vehicle capacity in a specific location or corridor.

The City expects the TSF to generate $630 million over 20 years of project development, which would contribute to a larger $1.4 billion expenditure program for local and countywide projects needed to improve transportation management and development. These projects would largely focus on transit improvements, with a share for bicycle, pedestrian, and other programs that promote non-automobile travel.

SAN JOSE, CA

Context-sensitive automobile LOS policy that exempts designated city areas and intersections from LOS standards, while disallowing any mitigation that negatively impacts transit or non-motorized travel

The City of San Jose has focused on building a policy framework to support its vision for targeted, transit-oriented growth and a balanced multimodal transportation network. One of the pillars of this framework is the 2005 Transportation Impact Policy 5-3, designed to evaluate proposed development and mitigation measures from a rich multimodal perspective, set by the City's General Plan. The policy specifically addresses the application of automobile LOS within the context of the City's land use goals:

- All new developments in the City of San Jose must maintain an overall standard of LOS D or better at signalized intersections, unless those intersections qualify for certain exemptions:
  - Area Development Policies: The City established individual policies for specific city areas that address contextual goals and needs, which supersede citywide standards. For example, the Downtown Area General Plan Policy exempts the "Downtown Core Area" from LOS standards, due to the downtown's position as a regional center

for commerce, culture, institutions, and transit. Other area development policies allow temporary deterioration of LOS below citywide standards due to planned intensive development and redevelopment projects.

- Protected Intersections in Special Strategy Areas: The City designated protection for intersections in "Special Strategy Areas," which are specific areas that contain transit-oriented development corridors, station areas, planned communities, or neighborhood business districts. Protected intersections are exempt from citywide LOS standards because they are considered to be built to the maximum auto capacity possible without causing degradation of transit and non-motorized travel. When a project impacts a protected intersection, the developer pays for transportation improvements elsewhere in the city to improve overall network performance.
- Infill Development: Projects of certain land use and size (e.g. retail buildings smaller than 5,000 square feet, single-family detached residential projects with fewer than 15 dwelling units, etc.) are considered to be favorable for City goals and not likely to cause significant deterioration of LOS. As such, related intersections are exempt from traffic impact analysis requirements.

» Citywide, mitigations that are designed to accommodate additional traffic or maintain LOS standards at the expense of other planned or existing transportation facilities are not allowed. Examples of unacceptable impacts include reducing sidewalk widths below city standards, removing bicycle lanes or bus stops, and generating substantial neighborhood cut-through traffic.

Auto-oriented improvements in locations exempted from LOS standards are considered to undermine and impede the development of transit corridors, non-motorized infrastructure, streetscape improvements, and other targeted community development efforts. Context-sensitive LOS standards enable the City of San Jose to grow its citywide multimodal network while promoting greater integration between its diverse land use and transportation goals.[4, 5, 6]

LIVERMORE, CA

Eliminated auto LOS standards in areas like downtown, which features high walkability and opportunities for infill development, and relaxed standards for intersections near freeway interchanges

The City of Livermore's General Plan set a citywide standard for auto LOS at mid-level D, with clear exceptions for certain areas and intersections. Amended in 2009, the Circulation Element specifically eliminates LOS standards in the downtown area and reduces standards to LOS E for specific intersections near or connected to freeway interchanges.

These policy updates are codified in two sections of the General Plan:

> *Goal CIR-4: Maintain relatively free-flowing traffic, except where the City has identified intersections or areas of the City that are exempt from the Citywide standard.*
>
> *Policy P2: There shall be no level of service standard for the Downtown Area.*[7]

The downtown area represents a commercially and culturally vital district where walkability and the encouragement of infill development are considered higher priorities than vehicular circulation efficiency. Simply put, no new development project in downtown Livermore is subject to LOS thresholds. This reduction of standards has enabled pedestrian improvements in downtown Livermore accommodated through reduced lane widths.[8]

PASADENA, CA

Broadened scope of transportation performance analysis from automobile LOS to multimodal LOS, along with additional measures for accessibility, sustainability, and livability

As part of its General Plan update in 2009, the City of Pasadena proposed new policies to align its transportation performance measures with multimodal and Complete Streets outcomes. Pasadena established four new categories of measures: accessibility, sustainability, livability, and user experience. The last category, user experience, focuses on integrating MMLOS components for pedestrians, bicycles, and transit at intersections and along roadway segments. Figure F- 3 summarizes the changes in guidelines.

FIGURE F- 3 EXPANDED METHODS FOR TRANSPORTATION IMPACT ANALYSIS IN PASADENA[9]

Impact Measure	Current Method of Measurement	Proposed Method of Measurement			
		Auto	Pedestrian	Bicycle	Transit
Intersections	Change in auto volume to capacity ratio (Intersection Capacity Utilization)	Change in volume to capacity ratio (ICU)	Change in MMLOS at intersections	(Addressed in Auto measure)	(Addressed in Auto and Pedestrian measures)
Street Segments	Percentage change in daily and peak auto traffic volume	Change in MMLOS (Autos)	Change in MMLOS (Pedestrians)	Change in MMLOS (Bicycles)	Change in MMLOS (Transit)

These MMLOS measures are based on the *National Cooperative Highway Research Program (NCHRP) Report 616: Multimodal Level of Service Analysis for Urban Streets*. Now incorporated into the current *Highway Capacity Manual 2010*, this NCHRP report established MMLOS measures for automobile, pedestrian, bicycle, and transit modes, based on user-perceived LOS ratings and video observations.

MMLOS scores depend on several geometric, signal-timing, and traffic-flow factors. Certain factors have greater influence on MMLOS:

» **Automobile LOS** is primarily determined by:
- Average actual through speed (based on run times and control delay at signals)
- Base free-flow speed (based on median presence, signal progression, speed limit, and segment length)

» **Pedestrian LOS** is primarily determined by:
- Sidewalk width
- Lateral separation between pedestrians and moving vehicles
- Vehicle speed and volume
- Number of traffic lanes crossed at intersections
- Green time for pedestrian walk signal

» **Bicycle LOS** is primarily determined by:

- Presence and width of bicycle lane
- Width of outside vehicle travel lane
- Vehicle speed and volume
- Crossing distance at intersections
- Type of signal control at intersections

» **Transit LOS** is primarily determined by:

- Frequency of service
- Transit speed
- Reliability / on-time percentage
- Bus stop amenities
- Pedestrian access to stops
- Load factors / passengers per seat

It is important to note that for intersections, the City of Pasadena would use the intersection capacity utilization (ICU) method for all measurements except pedestrian MMLOS, per Figure F- 3. For street segments, the City would use MMLOS for all four modes. These measures are most viable for the City of Pasadena due to their applicability to current conditions as well as forecasted conditions for traffic and new development.

The City performed case studies using MMLOS on a mixed-use project and a road-diet project in Pasadena. They found that MMLOS results were comparable to their current ICU approach's results. More importantly, these results quantitatively demonstrated the need for bicycle improvements in the mixed-use project and the negligible impact to automobile LOS in the road-diet project (which included reduced auto travel lanes and new bicycle lanes).

While the General Plan update is still underway as of October 2014, Pasadena has already seen positive results in that the new metrics are able to comprehensively address the multifaceted performance of their Complete Streets.[9, 10, 11]

CAMBRIDGE, MA

Transportation impact studies utilize pedestrian LOS measures and relaxed auto LOS standards along with flexibility to accept excessive auto impacts for projects with strong multimodal improvements

The City of Cambridge requires a transportation impact study for new development projects, to analyze existing transportation infrastructure and potential impacts from the project. Such analysis extends beyond vehicular impacts to include impacts on pedestrians, bicycles, and transit.

City guidelines define a potential impact based on five primary indicators:

» Project vehicle trip generation on weekdays and weekends over a 24-hour period and AM- and PM-peak vehicle trips generated

» Changes in auto and pedestrian LOS at specific signalized intersections

» Increased trip volumes on residential streets

» Increased queue length at specific signalized intersections

» Adequacy of pedestrian and bicycle facilities

The City draws upon parts of the pedestrian LOS methodology from the *Highway Capacity Manual 2000*, which measures the average delay for pedestrians at crossings during the peak hour.

» **Signalized intersection crossing delay** calculations are based on the effective green time for pedestrians and total signal-cycle length

» **Un-signalized intersection crossing delay** is based on the critical gap (minimum time required for a pedestrian to decide to cross), vehicle flow rate, and mean vehicle headway

Guidelines allow auto LOS to degrade to various levels depending on existing conditions, as illustrated in Figure F- 4.

FIGURE F- 4 THRESHOLDS FOR EXCEEDING PROJECT-INDUCED AUTO LOS[12]

Existing	With Project
Auto LOS A	Auto LOS C
Auto LOS B, C	Auto LOS D
Auto LOS D	Auto LOS D or 7% roadway volume increase
Auto LOS E	7% roadway volume increase
Auto LOS F	5% roadway volume increase

Pedestrian LOS, on the other hand, must improve or remain static in with-project conditions compared to existing conditions, as illustrated in Figure F- 5.

FIGURE F- 5 THRESHOLDS FOR EXCEEDING PROJECT-INDUCED PEDESTRIAN LOS[12]

Existing	With Project
Ped LOS A	Ped LOS A
Ped LOS B	Ped LOS B
Ped LOS C	Ped LOS C
Ped LOS D	Ped LOS D or increase of 3 seconds in crossing delay
Ped LOS E, F	Ped LOS D

In addition to LOS standards, pedestrian accessibility is measured in a one-block radius through visual identification of infrastructure improvements and walk-time studies on principal access routes. Bicycle accessibility and safety is measured through identification of intersections with high bicycle volumes or conflicts with vehicles, evaluation of bicycle access to a project site, and adequacy of bicycle parking.

Perhaps some of the most important components of the City's guidelines, however, are the "Special Permit Criteria" allowed by the Planning Board of Cambridge. Certain adverse traffic impacts can be permitted with specific actions and efforts to improve multimodal mode share, safety, and accessibility (e.g. bicycle and pedestrian facility improvements, transportation demand management programs, safety improvements for pedestrians and vehicles at intersections with high crash rates, and more). Special Permit Criteria give the City of Cambridge the capability and flexibility to accept auto LOS degradation for projects that simultaneously improve pedestrian LOS and multimodal infrastructure.[12, 13]

FORT COLLINS, CO

A dedicated multimodal LOS manual establishes performance standards for all modes and seamlessly integrates them into the development review process and transportation impact study guidelines

The City of Fort Collins started incorporating MMLOS methodology into its transportation policy framework starting in the 1990s. The City details pedestrian, bicycle, transit, and automobile LOS measures in its current *Multimodal Transportation Level of Service Manual*, which was first released in 1997 and predates the MMLOS measures formalized in the *Highway Capacity Manual 2010*.

The MMLOS for each mode is determined by a detailed set of factors based on accessibility, safety, capacity, and land-use context. The manual further classifies specific facility and/or activity types for pedestrians, bicycles, and vehicles. The MMLOS standard flexibly accommodates each of these uses:

» **Pedestrian LOS**: Standards for a designated "pedestrian district" location, like a public school, require LOS A across all measured pedestrian factors. A "transit corridor" location would require LOS B across all factors but "visual interest," for which LOS C is acceptable. These factors include:

- *Path directness*: Measured as a ratio of actual distance between destinations using pedestrian paths over the minimum distance using the street grid. This gives LOS benefits to paths that shorten pedestrian walking distances from standard auto-oriented street paths.
- *Sidewalk continuity*: LOS A and B are assigned when pedestrian paths are continuous and integrated with activities along a corridor, with LOS allowed to degrade with greater variability in sidewalk widths, inconsistency in design elements, and gaps in paths.
- *Street crossings*: Intersections with crossings that are signalized, un-signalized (across major and minor streets), and mid-block have specific design elements that contribute to LOS.
- *Visual interest and amenities*: LOS is based on the pedestrian environment, including street furniture and lighting, as well as its compatibility with local architecture.
- *Security features*: High LOS is given to environments with strong lines of sight between pedestrians, adequate police presence, and good street lighting.

» **Bicycle LOS**: Similar to pedestrian LOS, standards vary by context, with LOS A required around public school locations, LOS B around recreation and commercial centers, and LOS C in the rest of the city. Measurement focuses on route connectivity and facility type:

- *Connectivity*: Direct connections to north-south and east-west corridors from significant destinations are given higher LOS while indirect (or lacking) connections contribute to a lower LOS.
- *On-Street Lanes*: Striped, exclusive bike lanes receive greater LOS scores.
- *Off-Street Paths*: Multi-use or bike-only paths separated from the street are given moderate LOS scores.

- *On-Street Route*: Shared auto and bicycle lanes are given lower LOS scores, although not as low as streets that completely lack a bicycle facility.

» **Auto LOS**: Standards use conventional intersection volume-to-capacity ratios, though they depend on street typology and land-use context. The auto LOS system favors access over mobility in commercial corridors and mixed-use districts with a standard of LOS E. This standard is higher in other contexts—for example, local connectors in low-density mixed residential areas have a standard of LOS B. Fort Collins even allows auto LOS F in certain mixed-use districts, as long as congestion can be mitigated through non-motorized or transit travel.

» **Transit LOS**: Standards must be at least LOS B in mixed-use districts and commercial corridors and LOS D in 70% of other city areas. Transit LOS ratings are derived from:

- *Hours of weekday service*: Transit with at least 16 to 18 hours of service is given higher LOS.
- *Weekday frequency of service*: Headways of 15 to 20 minutes or less are given higher LOS.
- *Travel time factor*: Ratios less than or equal to 2 are given higher LOS. The travel-time factor is a ratio of total transit travel time to total automobile travel time (using average peak hour speeds) between destinations.
- *Peak load factor*: Load factors of less than or equal to 1.2 are given higher LOS. The peak load factor is a ratio of passengers on board to available seats.

Furthermore, the City rigorously applies these multimodal LOS standards to its development review process. Transportation impact study guidelines require that all studies include worksheets that address the existing and with-project conditions for each modal LOS; a sample pedestrian LOS worksheet for development review is available in Appendix B. In addition, projects must accommodate travel by all modes to designated priority destinations within a 1,320-foot (1/4 mile) radius of its location. These priority destinations are public schools, recreation sites, and community and neighborhood commercial centers.[14, 15]

ADDITIONAL NOTABLE EXAMPLES

In addition to the case study cities above, several other jurisdictions have made progress in developing unique LOS systems.

WASHINGTON, DC

The District of Columbia Department of Transportation is developing performance measures for designated corridors that go beyond automobile LOS. Economic development is a major focus of the city's Great Streets project, designed to help under-invested corridors achieve better economic health, safer and multimodal transportation, a stronger sense community, protection of historical assets, and sustainable design. Proposed measures include ratings for retail vacancies, property values, people movement, and the use of native plant species.[16]

CHARLOTTE, NC

The Charlotte Department of Transportation developed its own methodology for pedestrian and bicycle LOS in 2007 for analysis of intersection-design impacts. Charlotte employs these measures when auto LOS impacts are identified at an intersection and, sometimes, for connected corridors. Mitigation measures to meet auto LOS measures are not allowed to degrade pedestrian or bicycle LOS. If they might, alternative mitigation measures must be pursued. The Charlotte methodology has been adopted by other cities.[17]

CHAPTER 3 : Potential LOS Standards and Metrics

The application of LOS is useful in many aspects of transportation planning and engineering, but it is generally applied most in two municipal procedures: development review and transportation-system review. This report focuses specifically on the latter. The transportation system review process encompasses corridor and intersection analysis, which helps decision-makers determine system performance relative to City goals and facilitates appropriate action.

METRICS

One of the most important—and difficult—steps in justifying street improvements to decision-makers is the need for quantitative results with clear qualitative meaning. This demands an analytical process that is simultaneously comprehensive, cost-effective to conduct, and simple to understand. Such a delicate balance can be achieved with flexible LOS metrics that are both context-sensitive and aligned to the overarching planning goals of the City.

The primary metrics contributing to the LOS of a street must be capable of broad application across the diverse roles each street plays in the framework of the city. The functionality of a street depends on its typology, significant connections within the larger transportation grid, neighboring land uses, and modal volumes. It is vital to establish mode-specific primary metrics with these contexts in mind:

» **Street Class and Connectivity**: The "arteriality" of a road can be described as how important the road is in terms of the movement of people and goods along it. This is based on the volume of users it serves and its connections to major trip origins, destinations, and other roadways. Metrics for a highly arterial road that delivers highway traffic to the downtown core should focus on supporting automobile through movement. Metrics for a road with low arteriality that connects to a residential or recreational area might focus on pedestrian and bicycle safety and street beautification instead. San Mateo's existing "functional classification" categories of arterial, collector, and l0cal streets can be used to define streets' arteriality.

» **Land Use Context:** Metrics should reflect and reinforce the places that streets support. Neighboring land uses span a wide range, and their needs are often unique. For example, ground-floor retail uses would benefit more significantly from comprehensive pedestrian facilities and on-street parking than would an industrial use. Conversely, an industrial zone would require large curb radii for trucks making frequent turns, which would be a very low priority in a residential area. In residential areas, low motor vehicle speeds and tree cover may be higher priorities than other considerations.

» **Modal Priority:** The modal priority of a road can dictate how important the road is for each mode traveling along it. This means that a major transit corridor with frequent bus service should use metrics that measure timely transit trips or person delay rather than vehicle delay. On a transit-priority street, using an average person delay metric at intersections would be more effective than average vehicle delay, because the latter gives each bus rider roughly 1/40th the significance of a single-occupancy automobile driver (assuming the bus is carrying 40 passengers). Different metrics can be applied to recognize the modal priority of automobiles, bicycles, pedestrians, transit, or any combination of these modes.

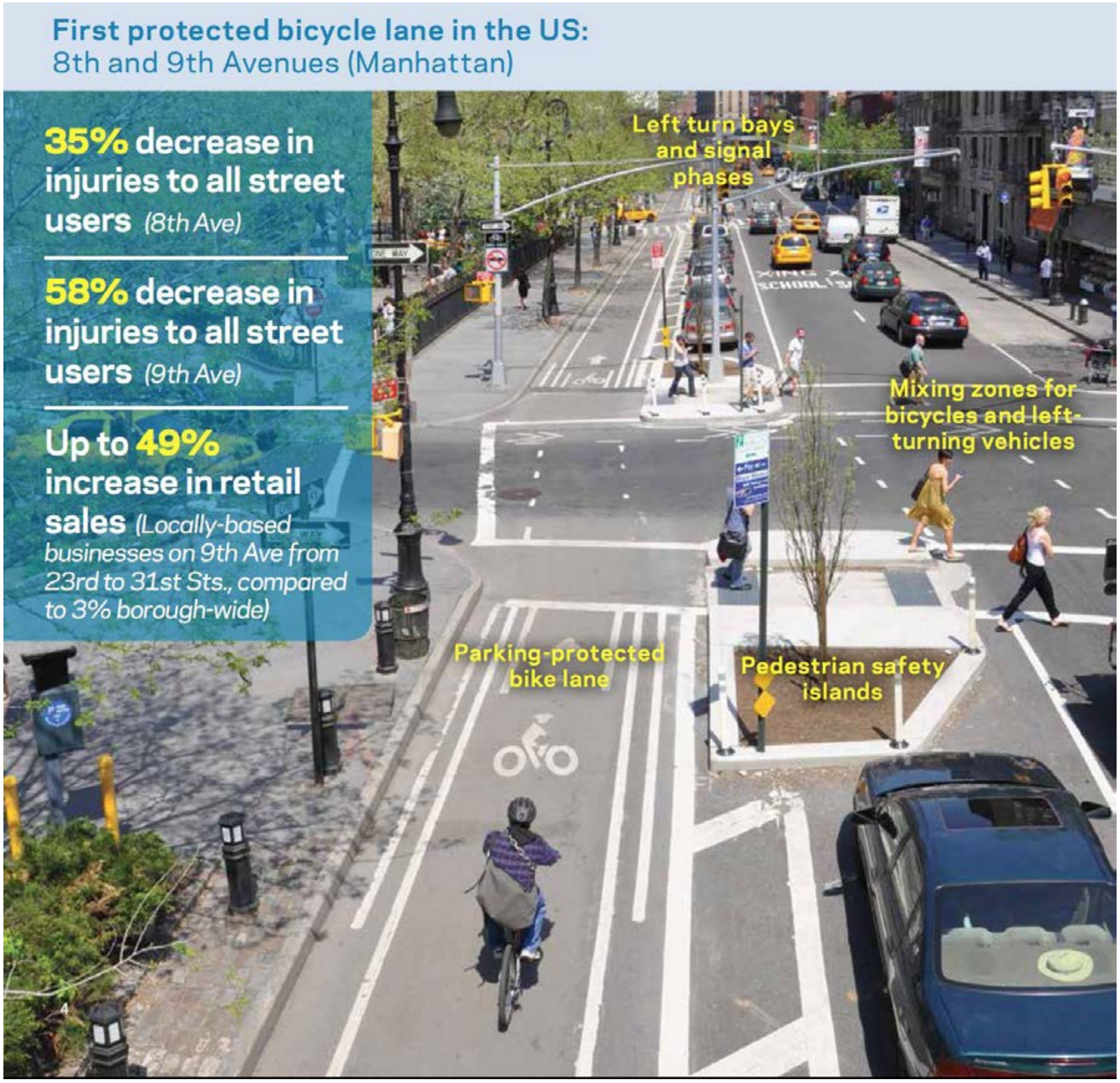
These contexts form a basis for applying LOS metrics to each mode. In the following section, the types and versatile applications of contextual metrics are demonstrated for selected locations in San Mateo.

Having secondary metrics available can be valuable for in-depth analysis and can also simplify comparisons between seemingly identical alternatives. Secondary metrics include indicators that do not speak to economic, social, and environmental success, rather than mobility, such as:

» Employment rates along the corridor
» Commercial vacancy
» Commercial and residential property values
» Incorporation of historical or cultural elements into design
» Landscaping or decorative paving
» Percent of roadway under tree canopy
» Adequacy of stormwater runoff facilities, and more

New York City's publication, *Measuring the Street*, provides an excellent example of using non-mobility measures, such as changes to injuries or retail sales, to judge the success a transportation project, as illustrated in Figure 6. [18] The use of such indicators would be intended for evaluation on a case-by-case basis as needed, rather than system-wide, and are beyond the scope of the following exercises.

FIGURE F- 6 NEW YORK CITY *MEASURING THE STREET* USES NON-MOBILITY METRICS



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CHAPTER 4 : Applying Metrics in San Mateo

San Mateo can learn from the best practices described above and define what is important for each street, focusing on how priorities differ with different street types. The matrix below shows one approach for San Mateo street typologies and associated performance metrics. If this approach is preferred, the next step would be to map the city's streets according to these street types.

FIGURE F- 7 POTENTIAL METRICS BASED ON STREET TYPOLOGY

STREET TYPE	FUNCTION CONTEXT, MODAL PRIORITY & CONNECTIVITY	PERFORMANCE METRICS (TARGET/MINIMUM)					
		AUTO	**TRANSIT**	**BIKE**	**PED**	**FREIGHT**	**PARKING**
Downtown Transit Boulevard	Very important for transit and important for the through movement of autos. Sidewalk-oriented retail requires very high quality sidewalks and good pedestrian crossings. Street should be managed to minimize transit delay. Protected pedestrian crossings should be provided on all legs of all intersections. Sidewalks should have a minimum 12 feet width. *Example: El Camino Real (2nd Ave to 5th Ave)*	C/F	A/D	D/E	A/C	D/F	C/F
Transit Boulevard	Same as Downtown Transit Boulevard, but with less critical need for excellent pedestrian facilities and crossings. On-street parking more important than Downtown Transit Boulevard. *Example: El Camino Real (5th Ave to 42nd Ave)*	B/F	A/D	D/E	B/C	C/E	B/E
Downtown Street	Retail-oriented streets throughout Downtown. These streets designed to carry significant auto volumes, but pedestrian quality is prioritized over auto delay. On-street parking is very important and should only be removed to improve pedestrian, bicycle, or transit service. *Examples: 2nd and 3rd between El Camino and B St. B St between 1st and 5th.*	C/F	B/D Where provided	B/D A/C on bike corridor	A/C	B/C	A/C
Neighborhood Mixed-Use	Smaller, sidewalk-oriented retail streets outside downtown. On-street parking is very important, as is pedestrian quality. *Example: Park Pl*	D/F	C/E Where provided	A/C A/C on bike corridor	A/C	B/C	A/C
Commercial Street	Commercial streets that do not yet have a strong pedestrian orientation. Sidewalks should have a minimum width of 5 feet with a 5-foot landscape separation from travel lane. On-street parking not necessary. *Example: Hillsdale Blvd, Concar Dr*	B/E	C/E, where provided	B/D A/C on bike corridor	B/D	B/C	C/F

STREET TYPE	FUNCTION CONTEXT, MODAL PRIORITY & CONNECTIVITY	PERFORMANCE METRICS (TARGET/MINIMUM)					
		AUTO	**TRANSIT**	**BIKE**	**PED**	**FREIGHT**	**PARKING**
Residential Connector	Residential streets that also function as auto connectors. Sidewalks should have a minimum 5-foot width with a minimum 5-foot landscape separation from travel lane. Street trees essential. Travel speeds should be managed to ensure 85^{th} percentile at or below 25 mph. On-street parking desirable, but may be eliminated to provide better bicycle or pedestrian accommodation. *Example: Alameda de las Pulgas, Norfolk St, Delaware St*	C/F	C/E, where provided	A/C	A/C	C/E	B/E
Local Residential Street	Low-volume residential streets. Highest priority here includes gracious pedestrian accommodation, low traffic speeds, tree canopy, and safe pedestrian crossings. *Examples: Seville Way, Magnolia Dr., Ericson Rd., many others.*	C/E	NA	A/C	A/C	D/F	A/D
Industrial Street	Similar to Commercial Streets but with the added need to accommodate trucks, truck turning movements, and truck loading. *Example: Pacific Blvd at 42^{nd} Ave.*	B/E	C/E, where provided	B/D A/C on bike corridor	B/D	A/C	C/F
Parkway	Streets dominated by landscape character. High priority should be placed on continuous bicycle and pedestrian paths and landscape quality. *Example: J Hart Clinton Dr*	C/E	C/E, where provided	A/A	A/A	C/E	C/F

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CHAPTER 5 : **Analysis of Five San Mateo Locations**

Five locations across San Mateo were identified for in-depth analysis based on their significance to citywide transportation performance as well as their diverse land use contexts and functions. These corridor sections show potential for improvement, as identified collaboratively by the City and Nelson\Nygaard. Value analysis of these improvements, as well as current roadway performance, can be measured using potential primary metrics, explained in detail below.

EL CAMINO REAL BETWEEN 2ND AVENUE AND 5TH AVENUE

EXISTING CONDITIONS

This segment of El Camino Real is located in the heart of downtown San Mateo. It serves as a major arterial road with an average daily traffic volume (ADT) of approximately 32,000 vehicles. Here, El Camino Real forms a nexus of connections to dense, mixed-use development in downtown, surrounding residential areas, and US 101 (via 3rd and 4th Avenues).

In addition to its importance for automobiles, it is a major transit boulevard, with frequent bus service and short headways of 15 minutes. Pedestrian movement is also a high priority. Bicycles are currently a lower priority, due to the availability of parallel bicycle routes and a need to maximize mobility for other modes. However, given the many destinations along El Camino Real, bicycling would become significantly more popular on this road if facilities were provided.

POTENTIAL IMPROVEMENTS

» BRT corridor (2nd to 9th Avenue)

» Signal timing changes (transit signal prioritization to minimize red-light stoppage time, possible queue-jump lane at 2nd Avenue)

» Widening of median for safe pedestrian zone

» Lane-width reduction

» Bicycle facilities

» Curb extensions at certain locations

» Landscaping additions

» Stormwater treatments

» Road diet

POTENTIAL PERFORMANCE METRICS

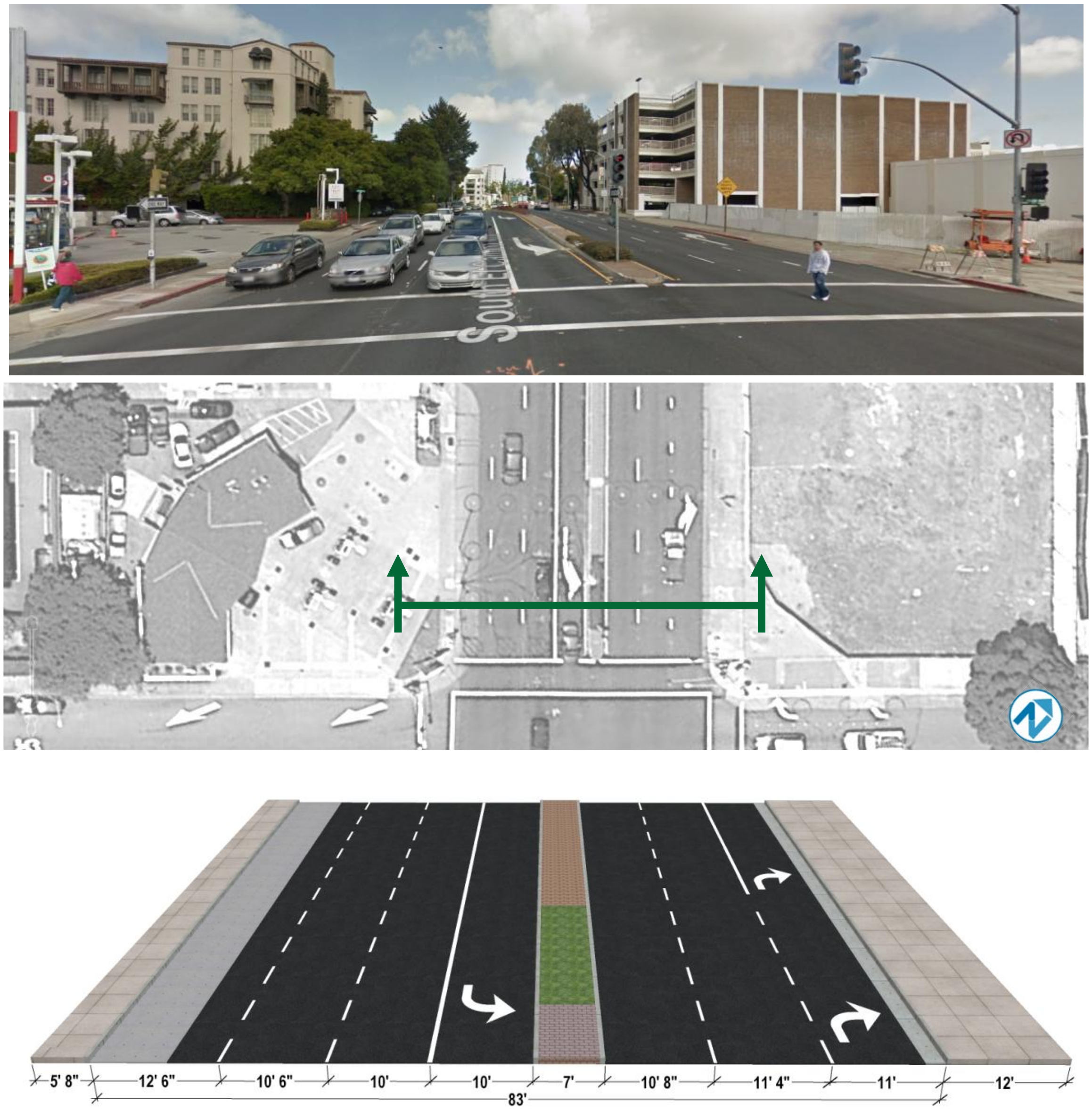
» Auto: For corridor analysis, the average travel time or speed for automobiles in the peak hour (or 2nd peak hour, if peak hour is not practical) would ensure adequate performance for vehicles. Travel time can be modeled using data available in the Hexagon traffic model or empirically measured by comparing peak versus off-peak or free-flow conditions.

» Transit: For corridor analysis, use peak travel time with GPS data from SamTrans, a delay analysis from the latest comprehensive operational analysis (COA), or average speed in the peak hour compared to free-flow speed. For intersection analysis, using average person delay will grant priority to transit over single-occupancy automobiles. Slower buses lower corridor transit capacity, making transit speed the primary indicator of good performance.

» Bicycle: Once it is determined that bicycles are prioritized on El Camino Real, use provision of dedicated bicycle facilities and average travel time (empirical analysis).

» Pedestrian: Use a pass/fail metric for compliance with Americans with Disabilities Act (ADA) standards (which also must be implemented throughout the city). There is inadequate sidewalk width for disabled pedestrians at Arroyo Court, for example. Beyond ADA compliance, additional metrics could focus on available sidewalk width based on a wide minimum standard, a percentage of sidewalk width compared to overall street width, or a prescribed sidewalk width according to number of travel lanes.

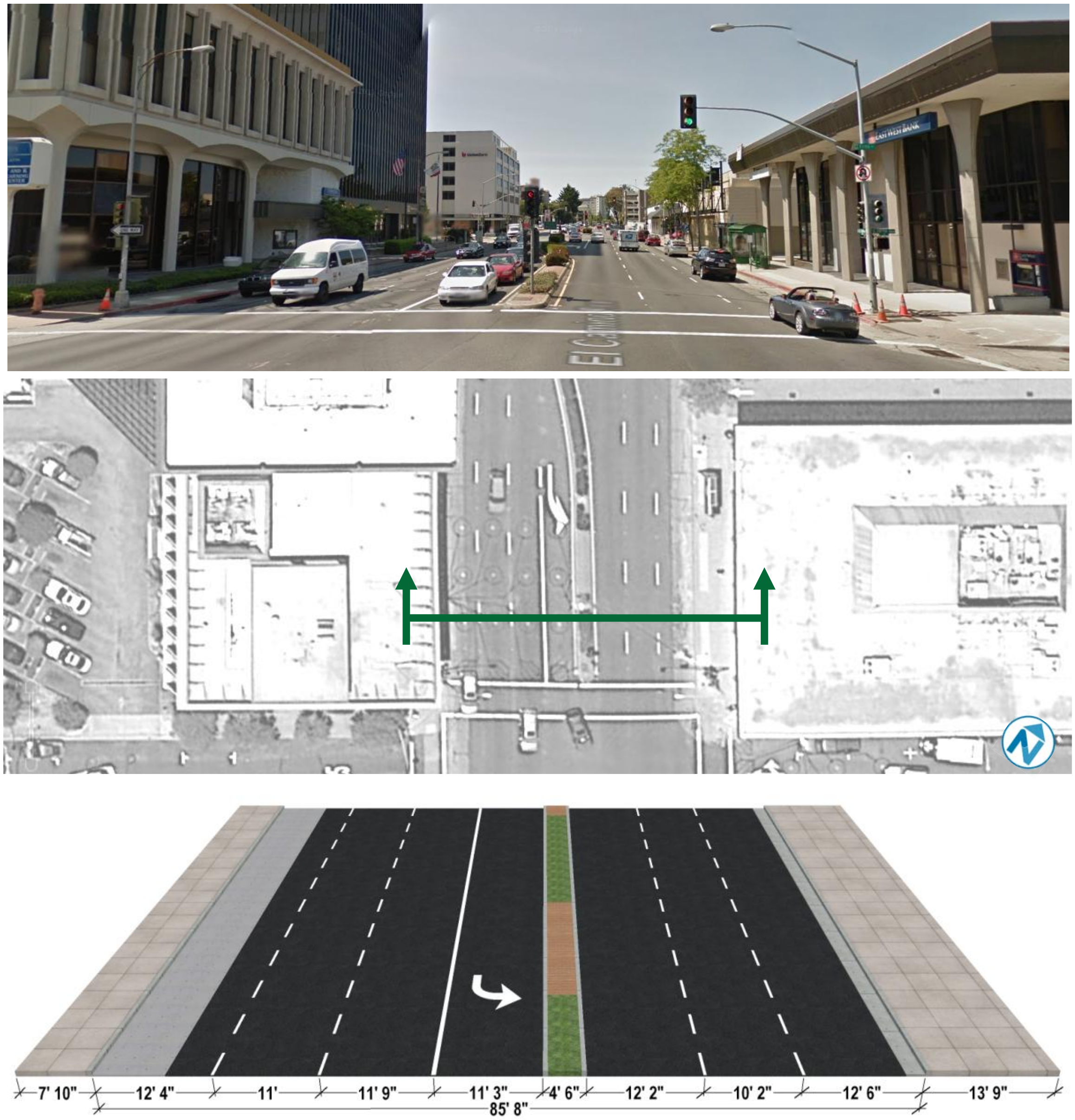
FIGURE F- 8 EXISTING CONDITIONS OF EL CAMINO REAL AT 3RD AVENUE



Street view (top) and geometric measurements (bottom) at the blue cross-section line (middle).

Sources: Google Earth and City of San Mateo.

FIGURE F- 9 EXISTING CONDITIONS OF EL CAMINO REAL AT 5TH AVENUE



Street view (top) and geometric measurements (bottom) at the blue cross-section line (middle).

Sources: Google Earth and City of San Mateo.

RECOMMENDATIONS

North of downtown, El Camino carries only two through lanes in each direction with no left or right turn pockets. San Mateo should work with Caltrans to adjust the travel-lane configuration downtown in order to provide a minimal acceptable pedestrian LOS and to meet its ADA requirements. Given the pedestrian volumes and the need to accommodate the cross slope of driveways, the minimum sidewalk dimension on El Camino should be 12 feet. Where the right-of-way is 100 feet, there are several options for allocating the space, as described below.

Road Diet, Maintain Median, Left and Right Turn Pockets

» Reduce the number of through lanes to two in each direction from 2nd to 5th Avenue, possibly farther

» Pedestrian/bicycle corridor: 13 feet at right turn lanes, 23 feet where there are no right turn lanes

» Travel lanes: 11 feet inside, 11 feet outside

» Left turn lanes: 11 feet

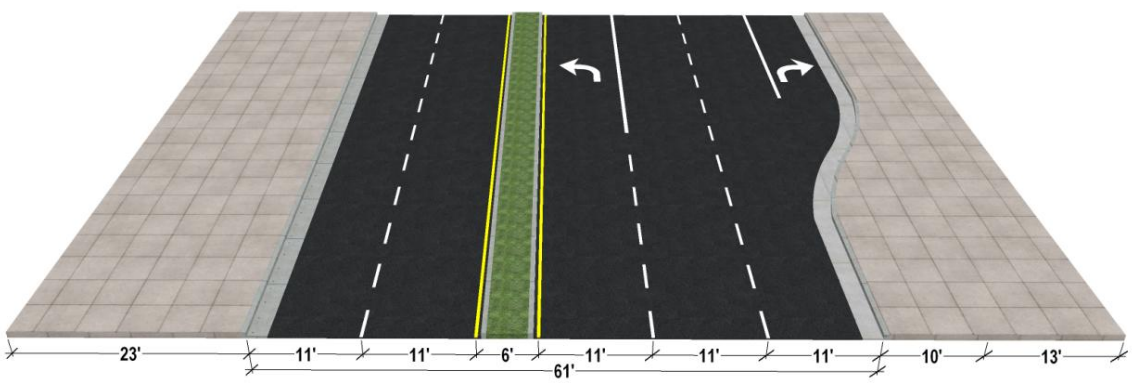
» Pedestrian refuge adjacent to turn pocket: 6 feet

» Provide right turn pockets for high-volume turning movements: 10 feet each

» Install far-side sidewalk bulbouts so the sidewalk width is 23 feet or prioritize bicycle facilities

In addition to these geometric improvements, trees with tree grates should be planted along the curb edge where missing. Countdown pedestrian signals should be installed on all legs of all intersections. During business hours, at intersections where pedestrian volumes are such that pedestrians cross during most cycles, the signals should default to a pedestrian crossing phase on every cycle. Traffic signals should be prioritized to reduce transit delay to the extent practical.

FIGURE F- 10 RECOMMENDED IMPROVEMENTS FOR EL CAMINO REAL, 2ND TO 5TH AVENUE



EL CAMINO REAL BETWEEN 20TH AVENUE AND 25TH AVENUE

EXISTING CONDITIONS

This segment of El Camino Real serves strip-mall style retail with less density than the more urban downtown core to the north. It acts as a major arterial with an ADT of approximately 35,000 to 40,000 vehicles per day. El Camino Real between 20th and 25th Avenues connects the surrounding residential areas to the retail along the segment and funnels traffic to SR 92 and US 101 (via Hillsdale Boulevard).

The modal priority of this segment of El Camino Real should be similar to the northern section, with a strong focus on automobile, transit, and pedestrian movement. Again, bicycle accommodation should be considered in longer-term planning.

POTENTIAL IMPROVEMENTS

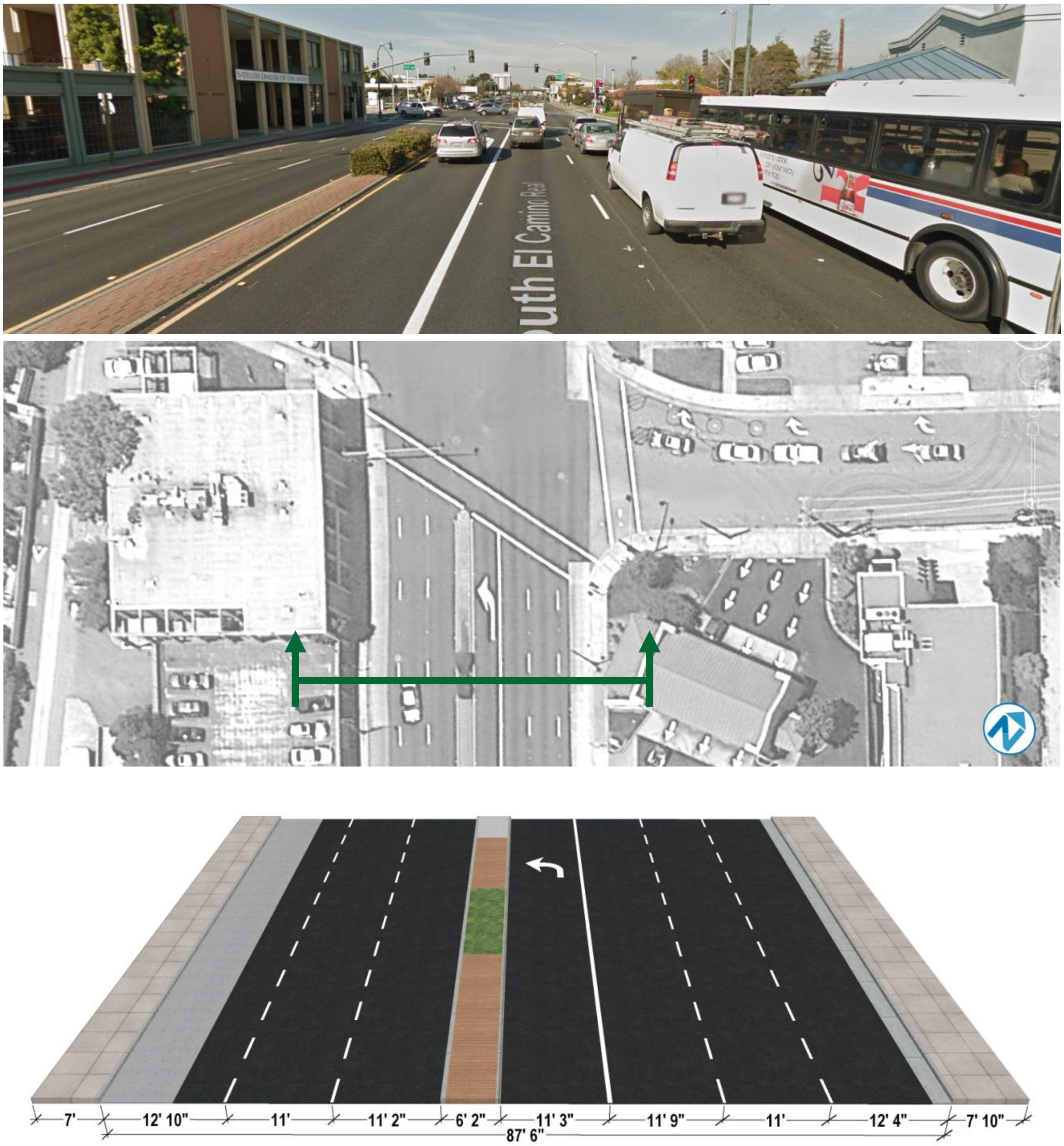
» BRT corridor

- Road diet
- Signal timing changes
- Widening of median for use as pedestrian crossing
- Bicycle facilities
- Lane-width reduction
- Curb extensions
- Landscaping improvements
- Stormwater improvements
- New crosswalk on south side of the 25th Avenue intersection, preferably enabled by intersection geometry changes on the southwest corner

POTENTIAL PERFORMANCE METRICS

- Auto: For corridor analysis, the average travel time or speed for automobiles in the peak hour (or second peak hour, if peak hour is not practical) would ensure adequate performance for vehicles. Travel time can be modeled using data available in the Hexagon traffic model or empirically measured by comparing peak versus off-peak or free-flow conditions.
- Transit: For corridor analysis, use peak travel time with GPS data from SamTrans, delay analysis from the latest COA, or average speed in the peak hour compared to free-flow speed. For intersection analysis, using average person delay will grant priority to transit over single-occupancy automobiles. Slower transit reduces available corridor capacity, making speed the primary indicator for good performance.
- Bicycle: Once it is determined that bicycles are prioritized on El Camino Real, use provision of dedicated bicycle facilities and average travel time (empirical analysis).
- Pedestrian: These metrics will also largely mirror those of the northern El Camino Real section, with a stronger focus on improving un-signalized pedestrian crossings. Metrics should include average pedestrian crossing delay and block lengths, measured from a midblock starting location, as well as availability of flashing beacons, median refuges, lighting, and other safety infrastructure. A pass/fail metric for ADA compliance would be essential. Additional metrics could focus on available sidewalk width, based on a wide minimum standard, a percentage of sidewalk width compared to overall street width, or a prescribed sidewalk width according to number of travel lanes.

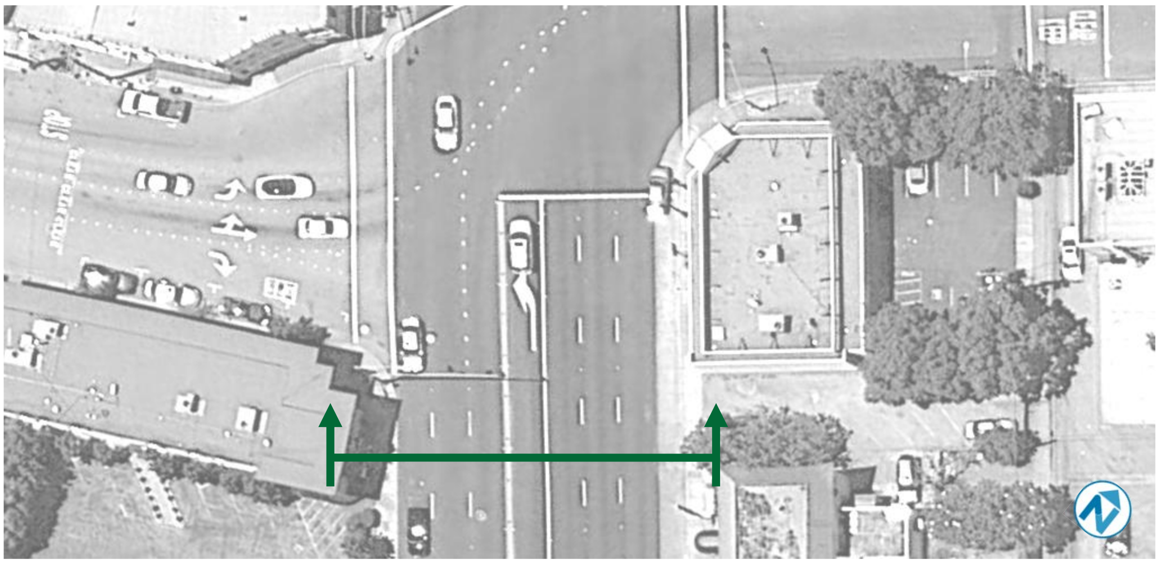
FIGURE F- 11 EXISTING CONDITIONS OF EL CAMINO REAL AT 20TH AVENUE

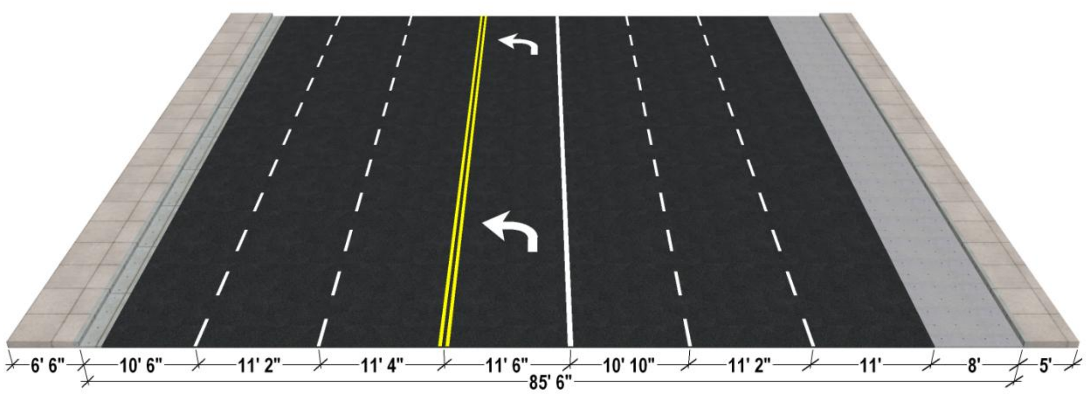


Street view (top) and geometric measurements (bottom) at the blue cross-section line (middle).

Sources: Google Earth and City of San Mateo.

FIGURE F- 12 EXISTING CONDITIONS OF EL CAMINO REAL AT 25TH AVENUE

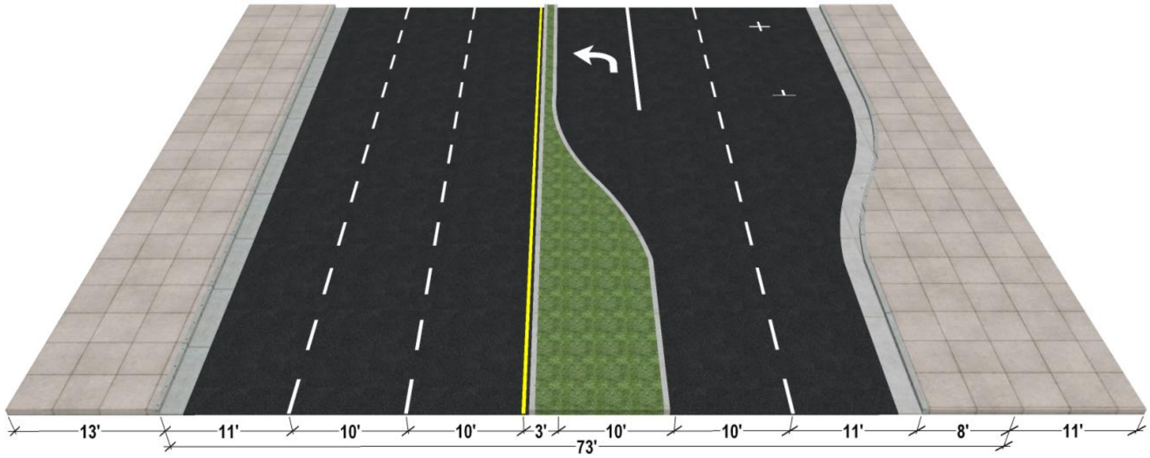




Street view (top) and geometric measurements (bottom) at the blue cross-section line (middle).

Sources: Google Earth and City of San Mateo.

FIGURE F- 13 RECOMMENDED IMPROVEMENTS FOR EL CAMINO REAL, 20TH TO 25TH AVENUE: OPTION A



RECOMMENDATIONS

This segment of El Camino Real suffers similar problems to the segment in downtown, and it has more difficult challenges in some locations. Specifically, sidewalks do not meet minimum requirements or ADA regulations. Moreover, there are no signalized pedestrian crossings in the 0.34 miles between 20th and 25th Avenues, despite the many retail services and employers on both sides of the street. An un-signalized crosswalk is provided at 22nd Avenue, with no special safety measures.

Unlike downtown, on-street parking is more important to the survival of sidewalk-oriented businesses, particularly between 22nd and 25th Avenues.

Option A: South-of-Hillsdale Boulevard Lane Configuration

This option recognizes that this section of El Camino has more travel lanes than the road does near the northern and southern edges of San Mateo. Option A eliminates a travel lane in order to widen sidewalks, consider bicycle facilities, and improve the pedestrian character of the street.

- » Eliminate one northbound travel lane, providing a cross section similar to that of El Camino south of Hillsdale Boulevard, but with a raised median: two northbound lanes, three southbound lanes, and a raised median with left turn lanes at intersections
- » Provide 11-foot outside lanes and 10-foot turn and other through lanes. Caltrans will require a design exception for 10-foot lanes
- » Allocate gained width to widen sidewalks
- » Maintain on-street parking but install bulbouts in the parking lane at corners
- » Move street trees, lighting fixtures, and utility boxes into the parking lane, as is done along University Avenue in Palo Alto

Option B: Virtual Sidewalk Widening

If the sidewalks cannot be widened, their performance can still be improved by taking advantage of the parking lane.

» Move street trees, lighting fixtures, and utility boxes into the parking lane, as is done along University Avenue in Palo Alto

» Install bulbouts in the parking lane at each corner

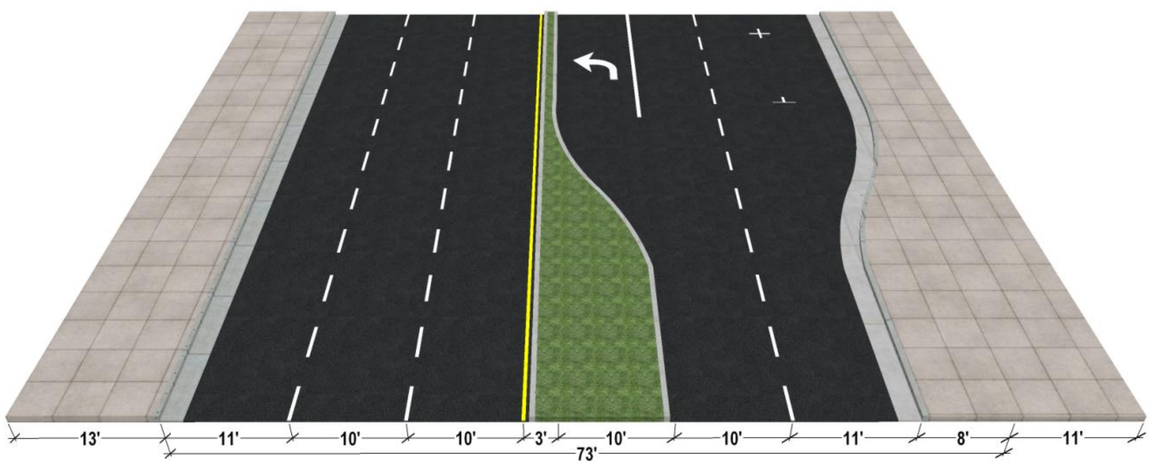
In all cases, the 22nd Avenue crosswalk should be improved with one of the following options:

» A pedestrian hybrid beacon (PHB) (also known as a "HAWK" signal)

» Rectangular rapid flash beacons (RRFBs), with a raised median or island at least six feet wide, and advanced yield lines with associated signs (with option A, the crosswalk could be moved to the north side to provide a wide raised median opposite the northbound left turn lane)

» A signalized intersection

FIGURE F- 14 RECOMMENDED IMPROVEMENTS FOR EL CAMINO REAL, 20TH TO 25TH AVENUE: OPTION A



SAN MATEO DRIVE BETWEEN PENINSULA AVENUE AND POPLAR AVENUE

EXISTING CONDITIONS

Although San Mateo Drive is classified as an arterial in the City of San Mateo's current street classification system, it can be more closely identified as a collector road running through largely residential, light-commercial, and mixed-use development. It connects San Mateo traffic directly to Burlingame (via California Drive) in the north. The ADT for San Mateo Drive is approximately 11,000 to 13,000 vehicles per day.

Bicycle traffic has modal priority on this street as it is one of the primary north-south bike routes in northern San Mateo. Automobile and pedestrian traffic have moderate priority with low to zero priority for transit due to parallel bus service available on El Camino Real.

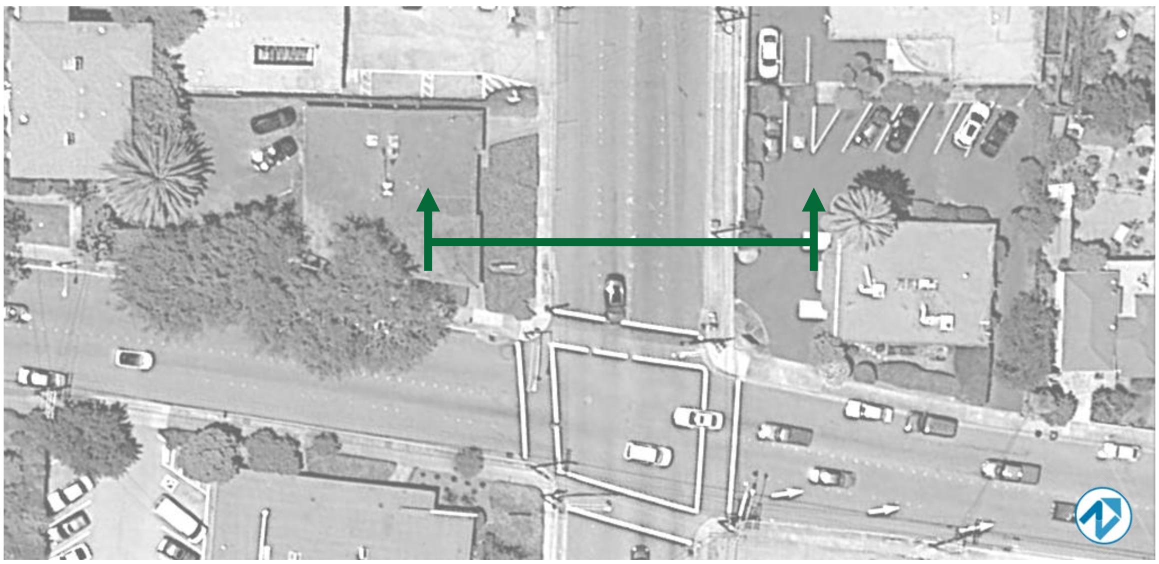
POTENTIAL IMPROVEMENTS

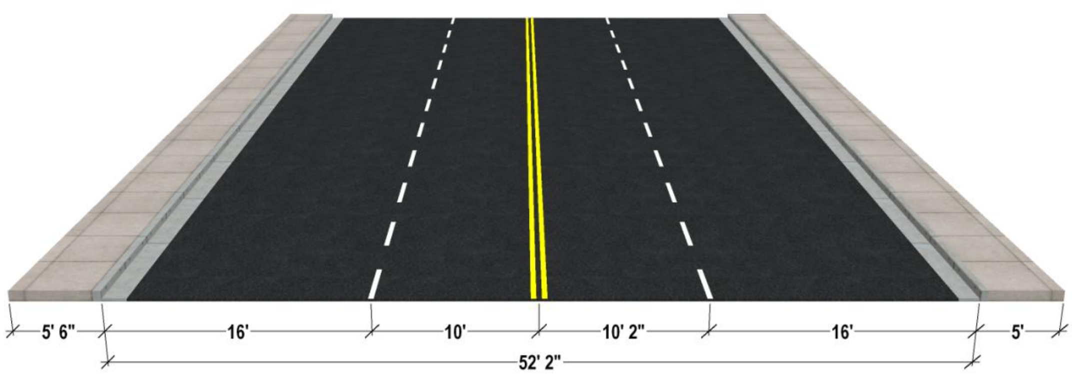
- Road diet, from four to three lanes plus narrower lanes
- More on-street parking
- Bike lanes, possibly double wide on the uphill northbound side, accompanied by shared lane markings on the downhill southbound side
- Curb extensions
- Landscaping improvements
- Stormwater improvements
- New signal with countdown pedestrian signals

POTENTIAL PERFORMANCE METRICS

- **Auto:** For corridor analysis, the average travel time or speed for automobiles in the peak hour (or second peak hour, if peak hour is not practical) would ensure adequate performance for vehicles. Travel time can be modeled using data available in the Hexagon traffic model or empirically measured by comparing peak versus off-peak or free-flow conditions.
- These automobile metrics could have lower minimum standards to cede priority to bicycle or pedestrian LOS as desired.
- **Transit:** Preferably do not collect data or measure transit LOS. At a maximum, base transit LOS on pedestrian and bicycle accessibility to nearby transit stops.
- **Bicycle:** Bicycle LOS should be based on the level of dedicated facility in comparison to proximate automobile speeds. Faster automobile speeds would merit the need for dedicated bicycle lanes or cycle tracks, while lower speeds would make shared lane markings acceptable.
- **Pedestrian:** Metrics should focus on pedestrian crossings, sidewalk width, ADA compliance, and, possibly, street beautification and quality-of-life, due to its proximity to residential areas. The latter metrics would capture aspects such as availability of native trees, percent of walkways under tree canopy, landscaped buffers, or percent of walkways along parking lots, blank walls, and storefronts.

FIGURE F- 15 EXISTING CONDITIONS OF SAN MATEO DRIVE AT POPLAR AVENUE

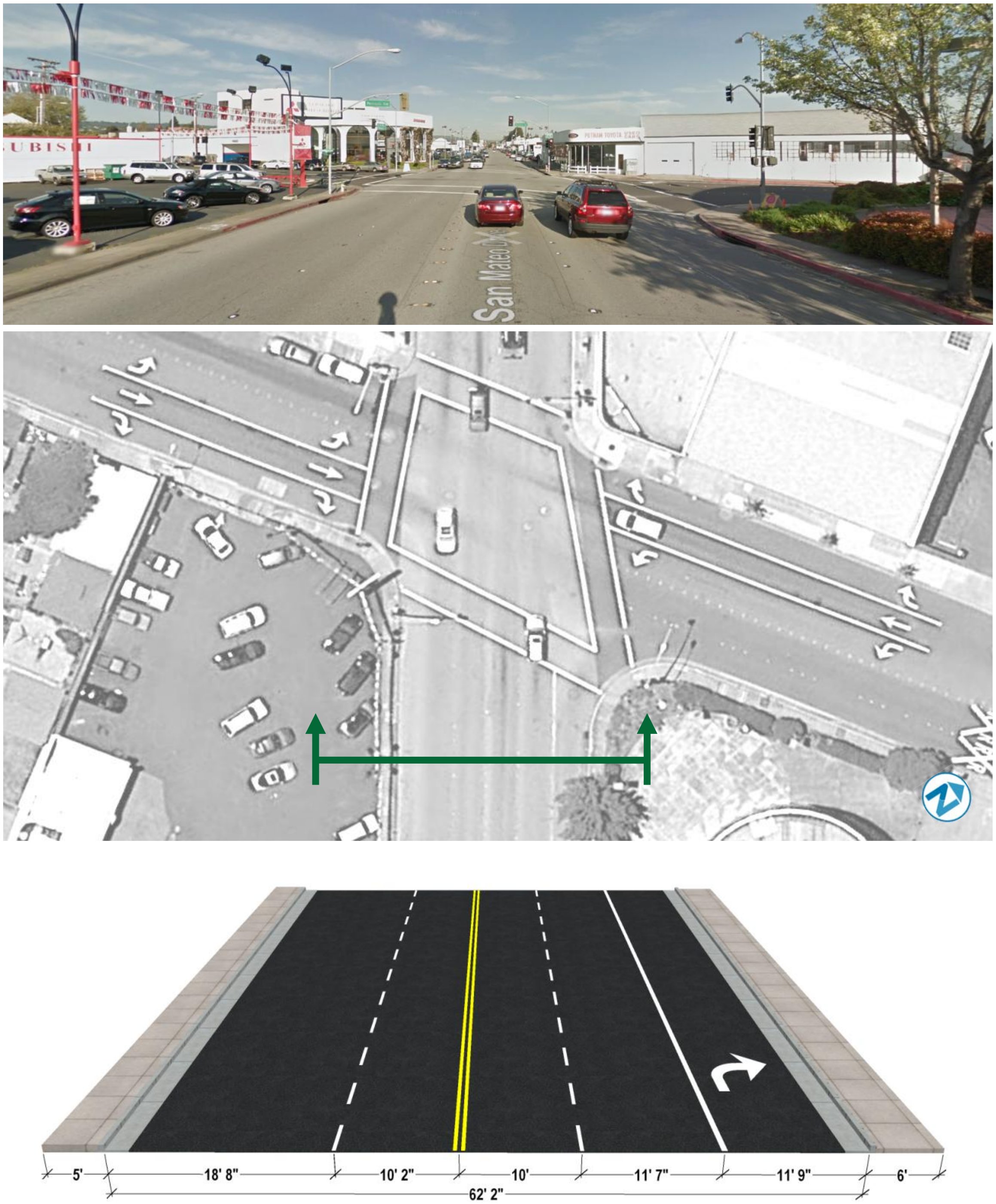




Street view (top) and geometric measurements (bottom) at the blue cross-section line (middle).

Sources: Google Earth and City of San Mateo.

FIGURE F- 16 EXISTING CONDITIONS OF SAN MATEO DRIVE AT PENINSULA AVENUE



Street view (top) and geometric measurements (bottom) at the blue cross-section line (middle).

Sources: Google Earth and City of San Mateo.

RECOMMENDATIONS

San Mateo Drive has low traffic volumes and very narrow travel lanes—including a 7-foot parking lane adjacent to a 9-foot travel lane—which requires more creativity than typical road diet projects.

Option A: Road Diet with Current Sidewalks and Two Parking Lanes

This option keeps the sidewalks the same and continues to provide on-street parking on both sides of the street. On the 52-foot roadway segments, this would generally include:

» One 10-foot travel lane in each direction

» Seven-foot parking lanes adjacent to two-foot buffer, adjacent to a 5-foot bike lane, adjacent to a 2-foot buffer

» Where turn pockets are needed, a short distance of on-street parking would be removed on one side of the street and the bike lane buffers reduced to 2 feet

Option B: Road Diet with Current Sidewalks, a Center Turn Lane, and One Parking Lane

Eliminating one parking lane allows for:

» One 10-foot travel lane in each direction

» One 10-foot two way left turn lane

» One 7-foot parking lane adjacent to a 3-foot buffer, then a 5-foot bike lane

» One 7-foot bike lane

Option C: Wider Sidewalks

Eliminating a parking lane would allow the sidewalk corridor to be widened from 5 to 10 feet, allocated as a 5-foot sidewalk with 5-foot planter strip.

» One 10-foot travel lane in each direction

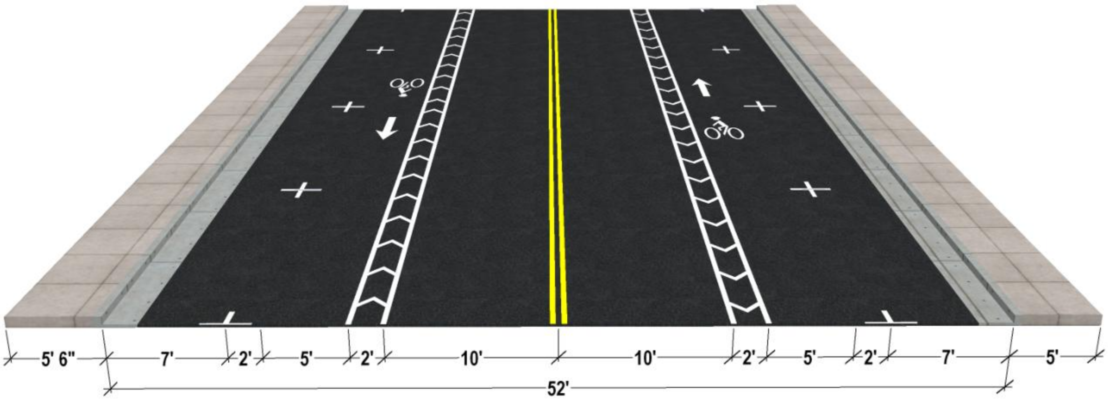
» One 7-foot parking lane adjacent to a 3-foot buffer and a 5-foot bike lane

» One 7-foot bike lane

» Where turn pockets are needed, a short distance of on-street parking and bike lane buffer would be removed and the bike lanes reduced to 5 feet to accommodate 10-foot turn lanes

In all options, the overhead utilities should be moved underground and any remaining utilities, light poles, or street trees relocated to the parking lane.

FIGURE F- 17 RECOMMENDED IMPROVEMENTS FOR SAN MATEO DRIVE, PENINSULA TO POPLAR AVENUES, OPTION A



CONCAR DRIVE BETWEEN PACIFIC BOULEVARD AND GRANT STREET

EXISTING CONDITIONS

Concar Drive is classified as an arterial in the City's current classification system, although it could be considered a collector similar to San Mateo Drive. It is located between a walled-off residential area to the north and a major commercial retail area to the south and west. In this segment, Concar Drive has an off- and on-ramp for westbound SR 92 and collects traffic from Delaware and Grant Streets. In addition, it serves as a connection to SR 92 from central and southern sections of San Mateo (via Pacific Boulevard). The ADT for Concar Drive in this segment is approximately 15,000 vehicles per day.

POTENTIAL IMPROVEMENTS

» Road diet with bike lanes (possibly buffered)

» Class I bicycle path or cycle track on the north side (already approved for the segment between Caltrain and Delaware Street)

» Enhance the midblock crosswalk

» Landscaping improvements

» Stormwater improvements

POTENTIAL PERFORMANCE METRICS

» **Auto:** Automobile priority is very high here. For corridor analysis, the average travel time or speed for automobiles in the peak hour (or second peak hour, if peak hour is not practical) would ensure adequate performance for vehicles. Travel time can be modeled using data available in the Hexagon traffic model or empirically measured by comparing peak versus off-peak or free-flow conditions.

» **Transit**: For corridor analysis, peak travel time with GPS data from SamTrans, delay analysis from latest COA, or average speed in the peak hour compared to free-flow speed. For intersection analysis, using average person delay will grant priority to transit over single-occupancy automobiles. Slower transit reduces available corridor capacity, making speed the primary indicator for good performance.

» **Bicycle:** Moderate to low bicycle priority. Bicycle LOS should be based on the level of dedicated facility in comparison to proximate automobile speeds. Faster automobile speeds would merit dedicated bicycle lanes either through striping or a raised cycle track, while lower speeds would make sharrows acceptable and safe.

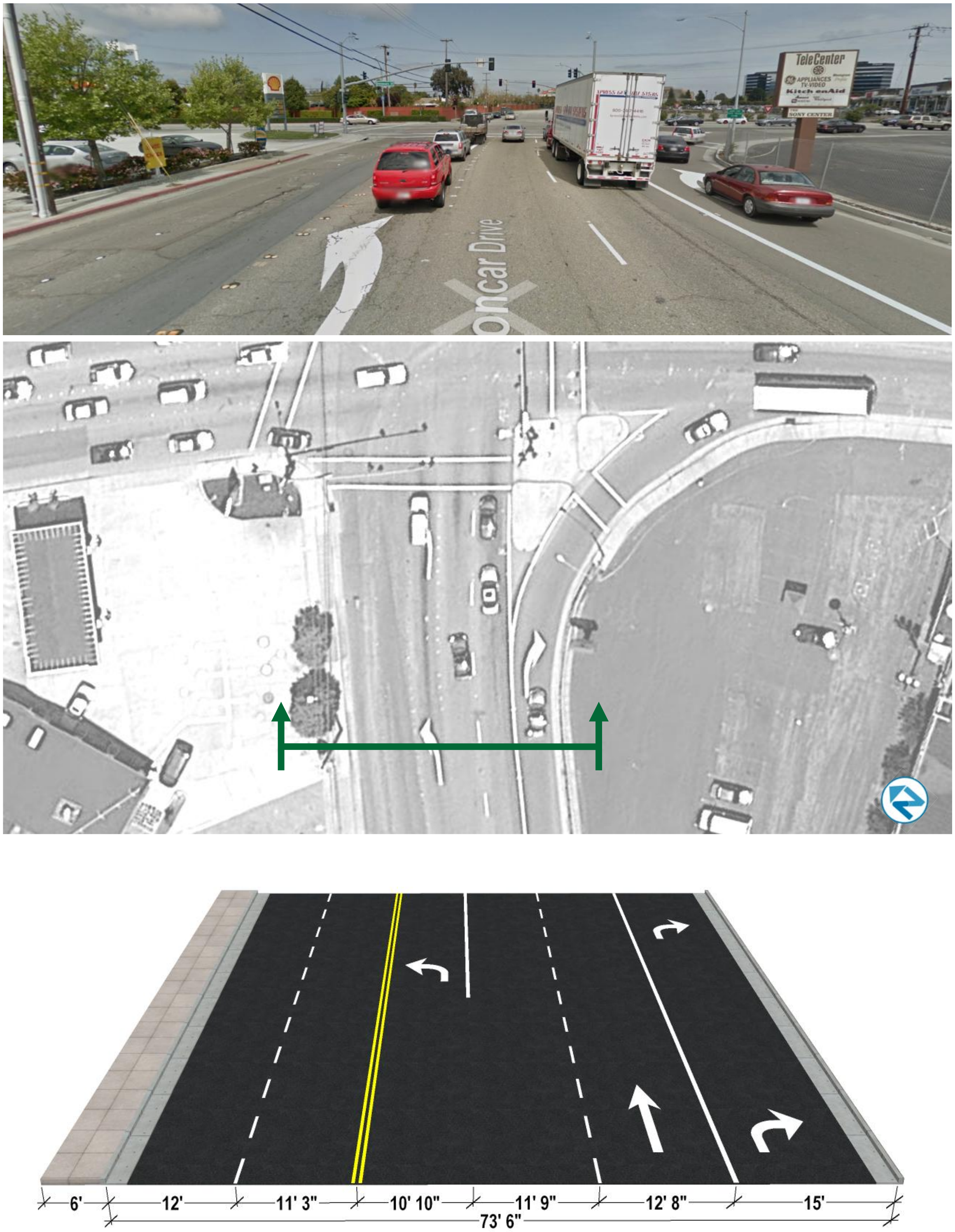
» **Pedestrian:** Pedestrian priority will depend largely on future accessibility changes. Under existing conditions, accessibility is very low, with the only access available through Concar Park. This makes pedestrian LOS a very low priority at the moment, but it could increase in priority with increases in accessibility. These metrics would focus on pedestrian crossings to retail destinations, sidewalk width, and ADA compliance.

FIGURE F- 18 EXISTING CONDITIONS OF CONCAR DRIVE EAST OF DELAWARE STREET

Street view (top) and geometric measurements (bottom) at the blue cross-section line (middle).

Sources: Google Earth and City of San Mateo.

FIGURE F- 19 EXISTING CONDITIONS OF CONCAR DRIVE WEST OF DELAWARE STREET



Street view (top) and geometric measurements (bottom) at the blue cross-section line (middle).

Sources: Google Earth and City of San Mateo.

RECOMMENDATIONS

This segment of Concar is asymmetric—freeway ramps and land uses make it more complex on the south side than the north. It has no need for on-street parking. The preferred option for Concar is a road diet, reducing the roadway to one lane in each direction, with the addition of a raised median with turn pockets at intersections. Given future development plans in the area, a more detailed traffic analysis is necessary to determine the costs and benefits of eliminating traffic lanes and reallocating space to other modes. If it is prudent to maintain the current lane configuration, these lanes can be adjusted per the following.

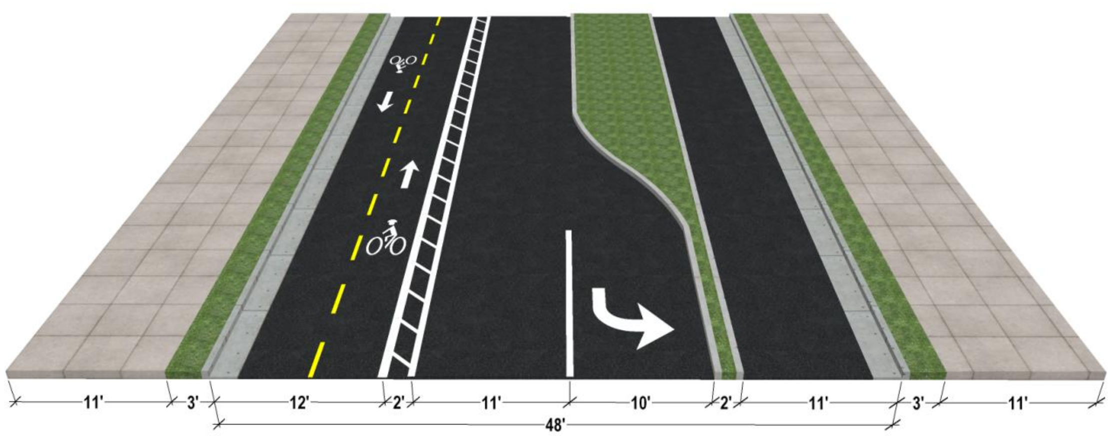
Option A: Road Diet

- 11-foot-wide through lanes
- 12-foot raised median with 10-foot turn lane and 2-foot traffic separator approaching intersections and driveways
- Add a pedestrian island at the mid-block crosswalk and add rectangular rapid flash beacons when the existing in-pavement flashers fail
- On both the 73-foot and 61-foot, 6-inch sections, surplus street width could be used to provide bike lanes and a wider north-side sidewalk, allowing for a two-way cycle track between Pacific and Grant

Option B: Reduced Lane Widths

- 11-foot-wide outside lanes
- 10-foot-wide inside lanes
- 10-foot-wide center turn lane with segments of raised median islands where turn lanes are unnecessary
- 11-foot-wide freeway slip lane west of Delaware
- On both the 73-foot and 61-foot, 6-inch sections, the 10-foot surplus could be allocated to the north-side sidewalk, allowing for a two-way cycle track between Pacific and Grant. The midblock crosswalk should be enhanced with either a pedestrian hybrid beacon or the combination of a pedestrian island, advanced yield lines, and rectangular rapid flash beacons.

FIGURE F- 20 RECOMMENDED IMPROVEMENTS AT CONCAR DRIVE, EAST OF DELAWARE STREET, OPTION A



J HART CLINTON DRIVE BETWEEN NORFOLK STREET AND DETROIT DRIVE

EXISTING CONDITIONS

J Hart Clinton Drive is a major east-west arterial built as a parkway between San Mateo and Foster City. It is bordered by recreational areas and swathes of open space. It has limited access to a walled-off residential area to the south. J Hart Clinton Drive has an ADT of approximately 12,000 to 13,000 vehicles per day. The Bay Trail runs parallel to J Hart Clinton Drive but is less desirable as a bicycle transportation option because it is less direct.

Priority along this roadway is given to automobiles and transit, but the segment has potential to prioritize bicycles and pedestrians.

POTENTIAL IMPROVEMENTS

» Road diet with bike lanes, with fewer and narrower travel lanes or a wide green median (boulevard style)

» On-street parking

» New ped crossing at Newbridge (breaking through the wall)

» Stormwater improvements

POTENTIAL PERFORMANCE METRICS

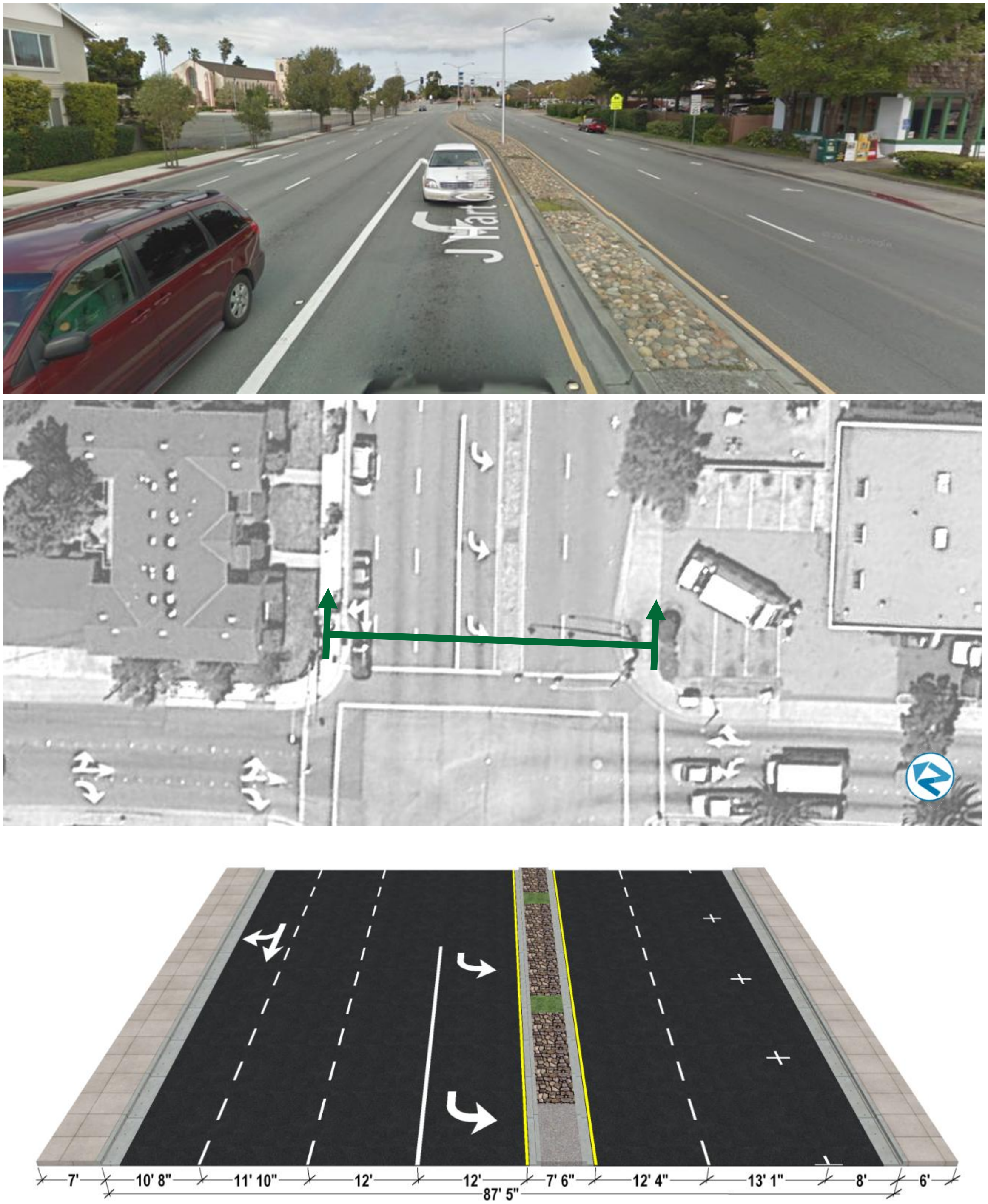
» **Auto:** Automobile priority is very high here. For corridor analysis, the average travel time or speed for automobiles in the peak hour (or second peak hour, if peak hour is not practical) would ensure adequate performance for vehicles. Travel time can be modeled using data available in the Hexagon traffic model or empirically measured by comparing peak versus off-peak or free-flow conditions.

» **Transit:** For corridor analysis, peak travel time with GPS data from SamTrans, delay analysis from latest COA, or average speed at peak hour compared to free-flow speed. There are few intersections along this corridor, making corridor metrics more relevant.

» **Bicycle:** Moderate to high bicycle priority. Bicycle priority is very high between Norfolk and Ryder Court Park, where there is a major gap in an otherwise well-connected bike network. There are paved shoulders in this area, but the pavement surface of the shoulders is in much worse condition than the travel lanes, so they are not fully usable by bicyclists. West of Ryder Court Park, there are parallel paths that somewhat lessen the need for dedicated bike facilities on J Hart Clinton. The paths in Seal Point Park, however, are narrow and shared with joggers. It is possible to convert the waterside auto travel lane into a two-way cycle track, with the landside travel lane transformed into a parking lane to increase accessibility of the park. This would give bicyclists a dedicated facility apart from the recreational area.

» **Pedestrian:** Similar to Concar Drive, pedestrian priority will depend on future accessibility changes. Currently, accessibility is very low along the walled sections on the western side, and there are safety issues with higher vehicle travel speeds than typical residential streets. This makes pedestrian LOS a low priority at the moment, although higher priority could be given with increases in accessibility. New metrics would focus on pedestrian crossings to retail destinations, sidewalk width, and ADA compliance.

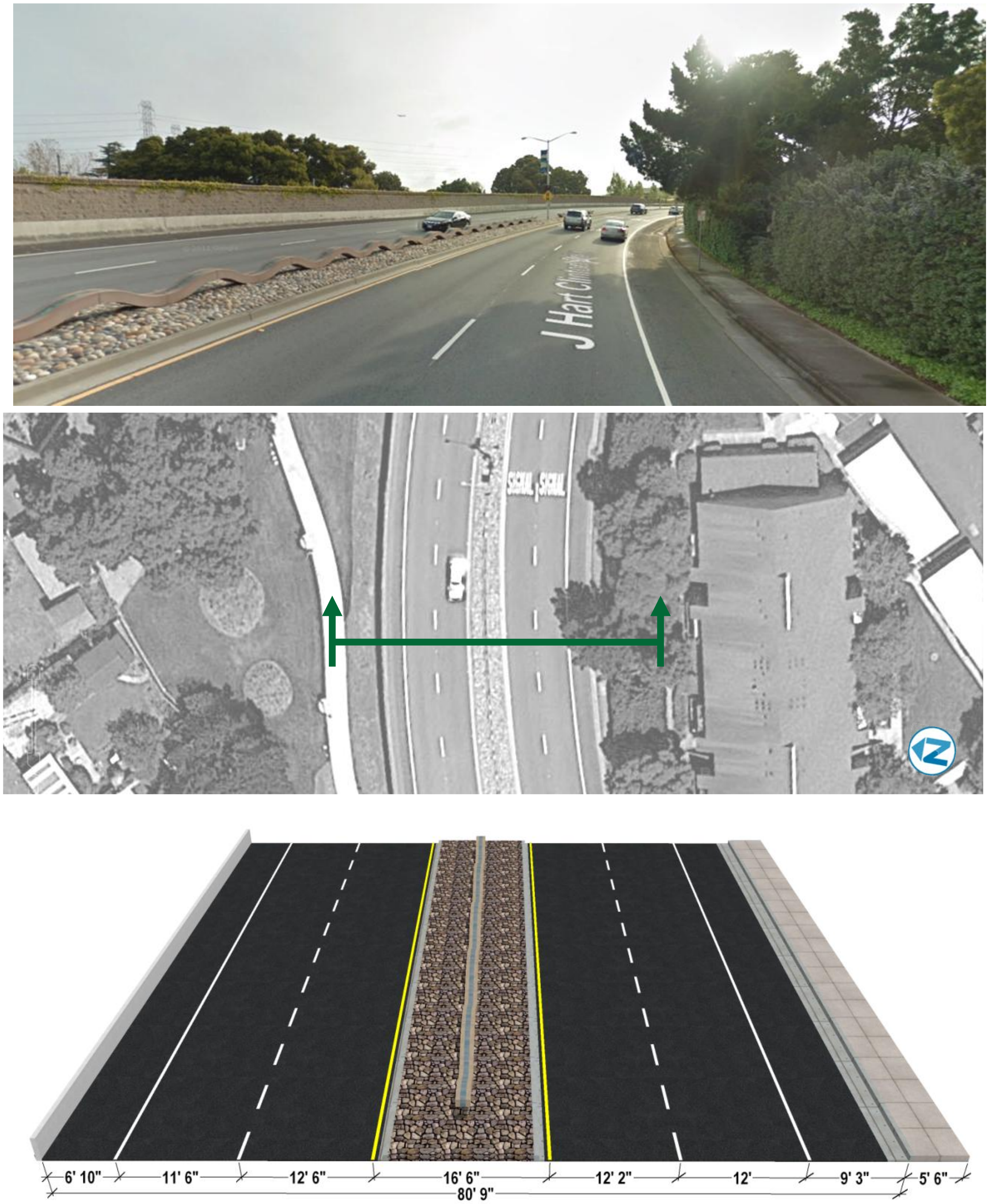
FIGURE F- 21 EXISTING CONDITIONS OF J HART CLINTON DRIVE AT NORFOLK STREET



Street view (top) and geometric measurements (bottom) at the blue cross-section line (middle).

Sources: Google Earth and City of San Mateo.

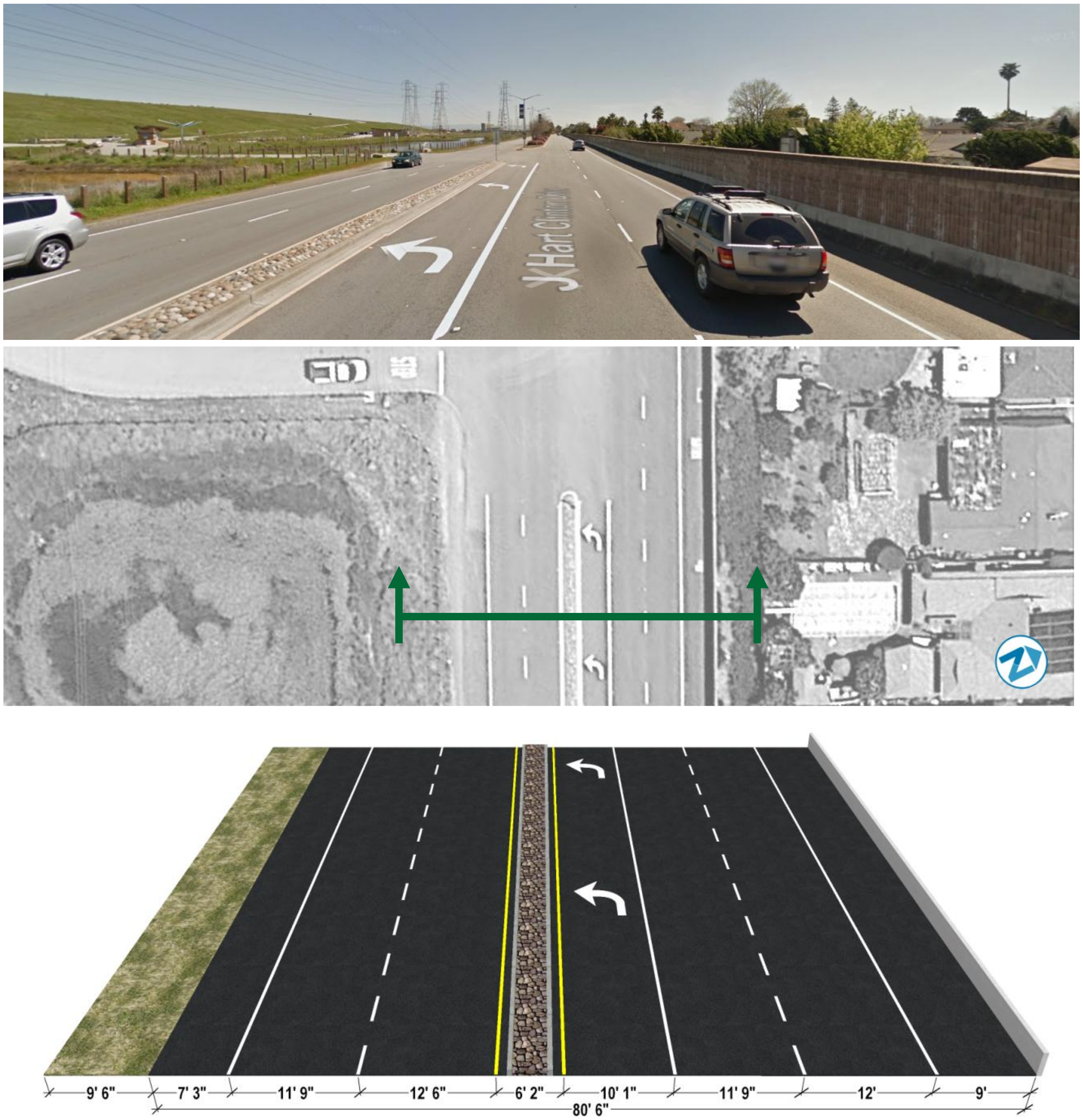
FIGURE F- 22 EXISTING CONDITIONS OF J HART CLINTON DRIVE AT RYDER PARK



Street view (top) and geometric measurements (bottom) at the blue cross-section line (middle).

Sources: Google Earth and City of San Mateo.

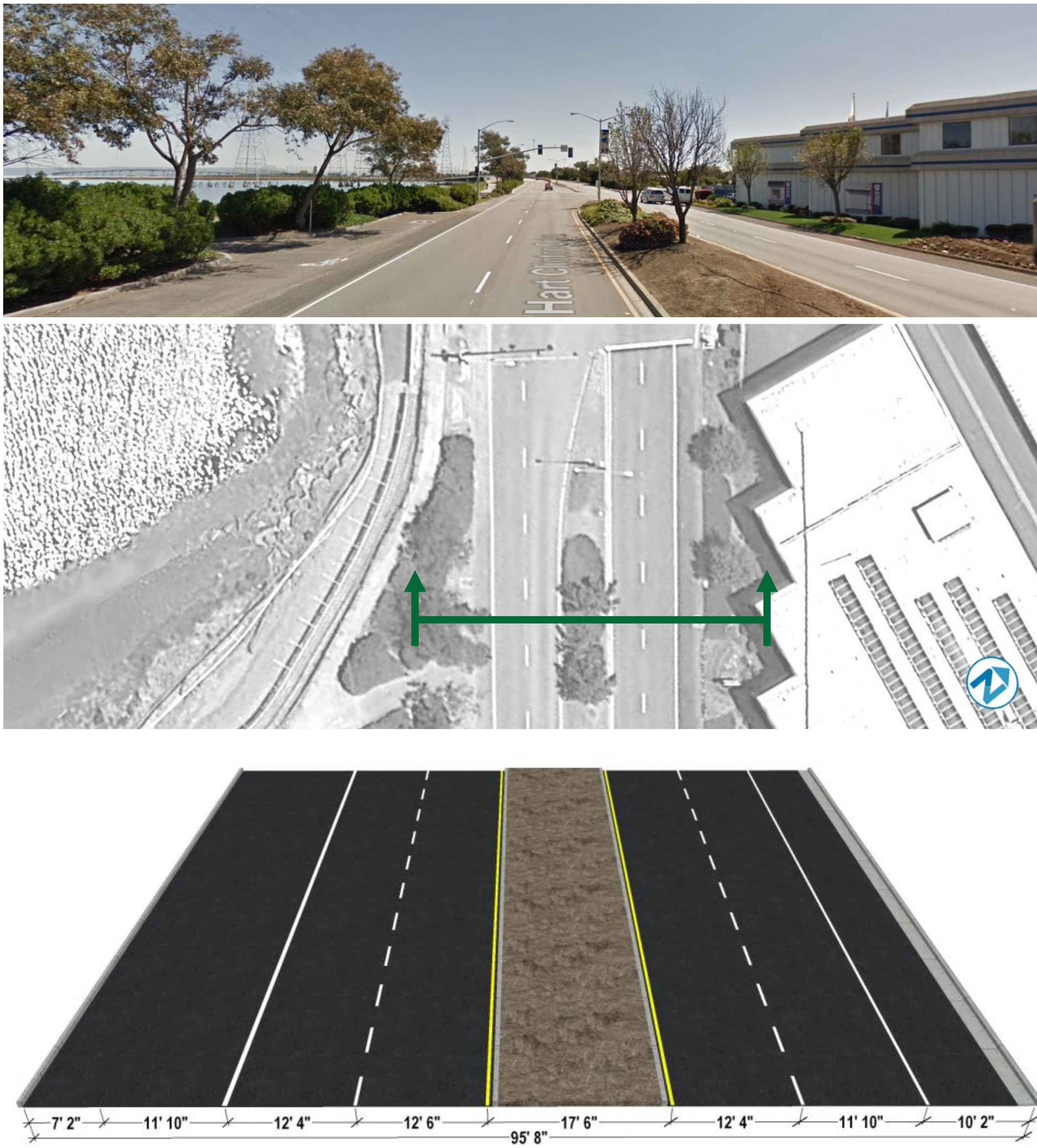
FIGURE F- 23 EXISTING CONDITIONS OF J HART CLINTON DRIVE AT SEAL POINT PARK



Street view (top) and geometric measurements (bottom) at the blue cross-section line (middle).

Sources: Google Earth and City of San Mateo.

FIGURE F- 24 EXISTING CONDITIONS OF J HART CLINTON DRIVE AT DETROIT DRIVE



Street view (top) and geometric measurements (bottom) at the blue cross-section line (middle).

Sources: Google Earth and City of San Mateo.

RECOMMENDATIONS

Option A: Replace Outside Lanes

East of Norfolk, eliminate one westbound travel lane and narrow the remaining travel lanes to 10 feet or 11 feet. This allows the northern sidewalk to be widened by 14 feet and a two-way cycle track to be installed.

West of Norfolk, narrow the travel lanes to 10 to 11 feet in order to install a wider landing for the 3rd Avenue median bridge path. On the northwest corner of the J Hart Clinton/Norfolk intersection, move the curb to the south so the right turn lane begins beyond the intersection, which gives cyclists room to make the transition between paths.

On the south side of the street, consider maintaining two, 10- to 11-foot eastbound travel lanes and the on-street parking lane, but widen the sidewalk between Norfolk and the Creekside Apartments with the surplus lane width.

Continue the two-way cycle track on the north side of the street, eliminating the northernmost travel lane and shoulder. Maintain one 11-foot westbound travel lane.

On the south side of the street, use the existing shoulder as a sidewalk and replace the outside lane with on-street parking to improve access to the park.

Option B: Replace north side of roadway with path and park space

Option B simply makes the south side of the roadway two-way.

Between Church and Norfolk, the street would need to be rebuilt to remove the median and create the appropriate lane transitions to the street west of Norfolk.

Between Church and Detroit, most of the asphalt north of the median could be removed, leaving a 12-foot multiuse path.

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CHAPTER 6 : **Next Steps**

Best practices from California and other U.S. locations demonstrate the City of San Mateo's opportunities to invigorate its approach to sustainable and multimodal transportation network performance analysis. Context-sensitive measures (depending on street typology, connectivity, neighboring land uses, and modal priority) are a highly effective ways to support multimodal transportation in San Mateo as they offer both flexibility and depth. These policies offer the unique opportunity to simultaneously address planning and engineering goals as well as meet the transportation goals set in San Mateo's General Plan.

The analysis and recommendations in this chapter provide initial direction for establishing focus areas for detailed analysis and improvements in the San Mateo Sustainable Streets Plan. Sections of El Camino Real through downtown San Mateo, J Hart Clinton Drive, and San Mateo Drive are good starting points for further analysis and conceptual development. These streets provide complex, differentiated urban environments that would set precedents for similar streets throughout San Mateo.

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Appendix F.1

Santa Monica Proposed Transportation Report Card

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POTENTIAL TRANSPORTATION MEASURES RELATING TO THE 10 PRINCIPLES IN THE CIRCULATION ELEMENT

The chart below lists potential transportation performance measures and their applicability to four key areas (LUCE EIR, Project Review, Corridor Review, and Report Card). In the last column, we also note which measures could be output from a new travel demand model.

MEASURE	COST/TIME CONSUMPTION[1]	IMPLEMENTATION	LUCE EIR	PROJECT REVIEW	CORRIDOR REVIEW	REPORT CARD	TRAVEL MODEL OUTPUT
MANAGEMENT							
No net new Santa Monica-generated vehicular PM trips	Low to Medium	Use the Emission Reduction Plan survey data to track trips to Santa Monica employers and intercept surveys in neighborhood commercial districts to track residents' and visitors' trips. Evaluate in travel demand model by updating with latest mode split and development activity information.	√	√	√	√	√
Relative auto and transit travel times	Low to Medium	Use Big Blue Bus GPS data to track end-to-end travel times in key corridors such as Lincoln, Wilshire, Pico, and Santa Monica boulevards. Use periodic pilot car surveys to measure corridor travel time by car and establish bus/car time ratios. Use data to calibrate travel demand model, and use model to predict major corridor travel time impacts due to land use and transportation system changes.	√	√	√	√	√

[1] Light – Already being done, Medium – Can be implemented easily, Heavy – Will be cost/time consuming

MEASURE	COST/TIME CONSUMPTION[1]	IMPLEMENTATION	LUCE EIR	PROJECT REVIEW	CORRIDOR REVIEW	REPORT CARD	TRAVEL MODEL OUTPUT
Transit Quality of Service	Medium	Along transit boulevards, use Big Blue Bus data and GIS to track transit Quality of Service, including frequency, crowding, reliability, delay and speed. Establish targets and thresholds that vary by context, such as lower average speed thresholds downtown.		√	√	√	
Transit vs. auto capacity in selected corridors	Medium - Heavy	This measure will be used in corridor studies to analyze how signal timing, transit-only lanes, parking removal, etc., will affect person capacity in the corridor. To convert vehicle delay to person delay, transit vehicles will be weighted by average ridership.			√		
Transit vs. auto capacity in selected intersections	Medium - Heavy	This measure will be used in corridor studies to analyze how signal timing, queue-jump lanes, turning movement restrictions, etc., will affect person capacity in the corridor. To convert vehicle delay to person delay, transit vehicles will be weighted by average ridership.			√		
Corridor person capacity	Medium	This measure will be calculated as the sum of peak hour and average hour person capacity in cars plus buses in key corridors.			√		√
Congestion	Light	The travel demand model will predict and map congestion levels (vehicle delay using HCM methodology) by major roadway intersections . Congestion targets and thresholds will be established according to LUCE policy and compared against model outputs.	√	√?	√?	√	√

MEASURE	COST/TIME CONSUMPTION[1]	IMPLEMENTATION	LUCE EIR	PROJECT REVIEW	CORRIDOR REVIEW	REPORT CARD	TRAVEL MODEL OUTPUT
STREETS							
Sidewalk completeness	Medium	The walking and bicycling demand GIS model will produce an index of walking infrastructure deficiencies. This will serve as the basis for identifying and prioritizing potential improvement locations.		√	√	√	√
Bike facility completeness	Light - Medium	The walking and bicycling demand GIS model will produce an index of bicycling infrastructure deficiencies. This will serve as the basis for identifying and prioritizing potential improvement locations.		√	√	√	√
Bike parking	Light	Track the installation of public bike parking in public or private locations.		√		√	
Signal timing	Medium	Document progress toward completing the City's Intelligent Transportation Systems infrastructure. This indicator includes transit signal priority, traffic signal synchronization, isolated signal optimization, intra-agency coordination, and connectivity to the transportation monitoring center.				√	

MEASURE	COST/TIME CONSUMPTION[1]	IMPLEMENTATION	LUCE EIR	PROJECT REVIEW	CORRIDOR REVIEW	REPORT CARD	TRAVEL MODEL OUTPUT
ENVIRONMENT							
VMT per capita	Heavy	Use the travel demand model to track Vehicle Miles Traveled (VMT) per capita and illustrate in maps per larger districts for Santa Monica trip origins (one map) and Santa Monica trip ends (one map). Track and report the implementation of citywide and project-specific mitigation measures that will bring VMT per capita (for Santa-Monica-generated trips) below ambient conditions or to meet SB 375 or regional targets.	√	√	√	√	√
Carbon footprint (GHG emissions) per capita (for Santa Monica-generated trips)	Medium	Use the travel demand model to track Greenhouse Gas emissions per capita and illustrate in maps larger districts for trip origins (one map) and trip ends (one map). Track and report the implementation of citywide and project-specific mitigation measures that will bring carbon footprint per capita (for Santa Monica-generated trips) below ambient conditions or to meet SB 375 or regional targets.	√	√	√	√	√
City fleet with alternative fuels	Light	The city sustainability report card tracks the Municipal fleet's percentage of alternative fuel vehicles.				√	

MEASURE	COST/TIME CONSUMPTION[1]	IMPLEMENTATION	LUCE EIR	PROJECT REVIEW	CORRIDOR REVIEW	REPORT CARD	TRAVEL MODEL OUTPUT
QUALITY							
Quality of selected recreational transportation facilities	Medium - Heavy	Use intercept surveys of residents using recreational transportation facilities (e.g. San Vicente, the Beach Bike Path and other green corridors) to learn how they perceive the quality of these facilities. Expand on existing perception surveys that are conducted periodically. Continue to conduct this survey every 2-3 years.				√	
Usage by transportation mode	Light - Medium	The TDM Ordinance requires employers to collect commute mode data in the Emission Reduction Plan survey. This process should be automated and streamlined by conducting surveys online, allowing the data to be directly downloaded into reports and the travel demand model. Conduct periodic intercept surveys in neighborhood commercial districts to collect data on shopper trips (residents and visitors). Illustrate the mode split results and AVR per TDM district and/or other predefined areas in Santa Monica.				√	√
Supportive uses in the right location		WalkScore (www.walkscore.com) is a useful tool for measuring the degree to which essential services are available within walking distance from any point in the city. Provided WalkScore continues to be updated or a better tool developed, periodically measure the "completeness" of various locations in the city.		√		√	

MEASURE	COST/TIME CONSUMPTION[1]	IMPLEMENTATION	LUCE EIR	PROJECT REVIEW	CORRIDOR REVIEW	REPORT CARD	TRAVEL MODEL OUTPUT
PUBLIC SPACES							
Public enjoyment	Light	Include question in the intercept survey about public's enjoyment of walking and bicycling in Santa Monica.				√	
HEALTH							
Walk/bike trips per capita	Medium	Use the Emission Reduction Plan survey for work trips and intercept surveys for non-work trips to measure walk and bike trips per capita.				√	
Walk/bike mode share	Medium	Use the Emission Reduction Plan survey for work trips and intercept surveys for non-work trips to measure walk and bike mode share.				√	
Walk/bike trips by children	Medium	Conduct surveys of how children access schools in Santa Monica as part of "Safe Routes to School" programs. Track how mode split varies over time for particular school sites.				√	
AFFORDABILITY/EQUITY							
Household transportation expenditure	Light	Use mode split figures to estimate changes in average annual household transportation expenditures.				√	
Unbundled parking	Light	As data is available from the Planning Department, note number of new housing units where the cost of parking is separated from the cost of housing.				√	

MEASURE	COST/TIME CONSUMPTION[1]	IMPLEMENTATION	LUCE EIR	PROJECT REVIEW	CORRIDOR REVIEW	REPORT CARD	TRAVEL MODEL OUTPUT
Transit availability	Heavy	Conduct GIS analysis to track the share of Santa Monica residents with high quality transit service in walking distance.				√	
Parking cash-out	Light	A question about the number of employees using parking cash-out will be included in the Emission Reduction Plan survey.				√	
ECONOMY							
Parking availability in commercial districts	Light where data tracking is automated; heavy elsewhere	Monitor average availability by district in a GIS parking model. Map data as it becomes available. Some districts, such as Bayside, currently collect data, which can easily be tracked on an annual basis.				√	√
SAFETY							
Crashes	Light to Heavy	Evaluate available data to ascertain causes of traffic crashes and map in GIS.				√	
Injuries	Light to heavy	Evaluate available data to ascertain causes of traffic injuries and map in GIS.				√	
Fatalities	Light to heavy	Evaluate available data to ascertain causes of traffic fatalities and map in GIS.				√	
Walk/bike crashes/injuries/fatalities per usage	Medium	Use the above statistics and divide by mode share factor.				√	
Perception of safety	Light - Medium	The city sustainability report card tracks city residents' general perception of safety, but will be expanded to ask about transportation safety.				√	

Appendix F.2

Sample Pedestrian LOS Worksheet from Fort Collins Multimodal Transportation Level of Service Manual

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project location classification: ____________________ (enter as many as apply)

	description of applicable destination area within 1,320' including address	destination area classification (see text)	level of service (minimum based on project location classification)	directness	continuity	street crossings	visual interest & amenities	security
1			minimum					
			actual					
			proposed					
2			minimum					
			actual					
			proposed					
3			minimum					
			actual					
			proposed					
4			minimum					
			actual					
			proposed					

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Appendix G
Community Survey

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MEMORANDUM

To:	Ken Chin
From:	San Mateo Sustainable Streets Project Team
Date:	October 2, 2014
Subject:	San Mateo Sustainable Streets Plan: Tech Memo 3.4 – Community Survey

INTRODUCTION

This memorandum summarizes survey responses from the San Mateo Sustainable Streets Community Survey and illustrates San Mateo residents' general support of bringing more of the city's streets in line with Complete Streets principles.

The survey was administered online from September 14 through November 22, 2013. A copy of the survey can be found in Appendix B of this document. The City of San Mateo announced the survey to San Mateo residents and workers through several City-administered email lists. The survey garnered 642 total responses, with 563 respondents reaching the final question. Respondents are not very familiar with the Complete Streets concept but a majority is in favor of passing a Complete Streets ordinance. The travel behavior and demographic information collected in the survey is also analyzed to understand how representative the sample was of the city as a whole.

FINDINGS

Support for Sustainable Streets

The survey's first four questions asked respondents how familiar they are with the Complete Streets concept and probed for their opinions on the concept's underlying principles.

While nearly 60% of the sample had at least some familiarity with Complete Streets, those who are not familiar at all with the concept made up the largest group of respondents, as shown in Figure G-1. However, the vast majority of respondents agreed with the idea of designing and building streets that are friendly to all modes, as shown in Figure G-2. Likewise, the vast majority of respondents are in favor of designing streets using green principles, as shown in Figure G- 3.

FIGURE G- 1 QUESTION 1 - FAMILIARITY WITH THE CONCEPT OF COMPLETE STREETS

Question: A "Complete Street" is generally defined as a street that is "designed, built, and operated to enable safe access for all users, including motorists, pedestrians, bicyclists, and transit riders of all ages and abilities." How familiar are you with the concept of "Complete Streets"? (n=642)

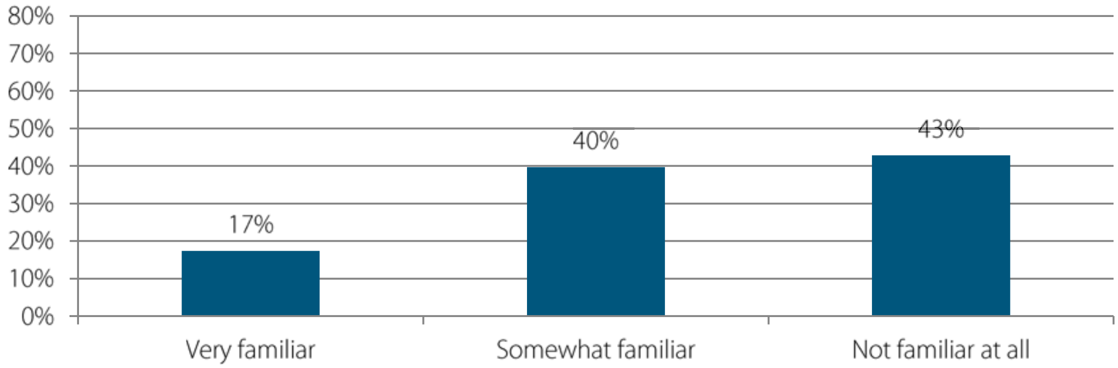


FIGURE G- 2 QUESTION 2 - IMPORTANCE OF STREETS FOR ALL

How important is it to design and build San Mateo's streets so that they are bicycle friendly, walkable, and safe for a wide range of users? (n=642)

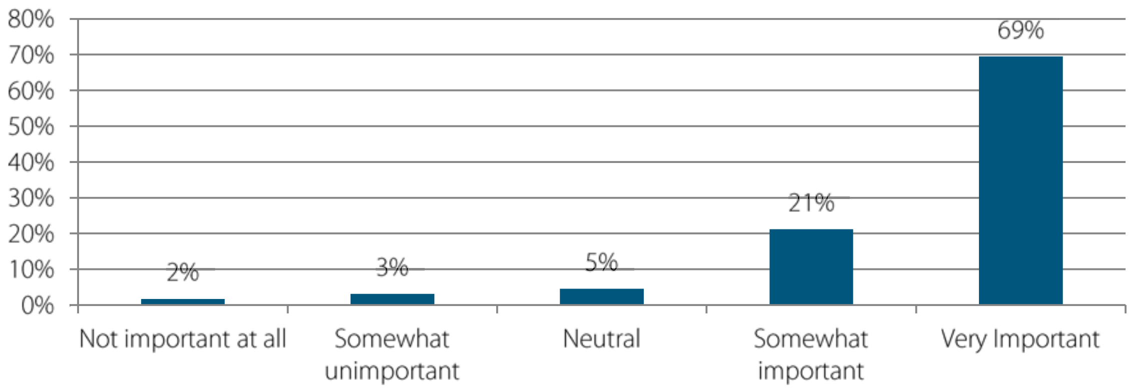
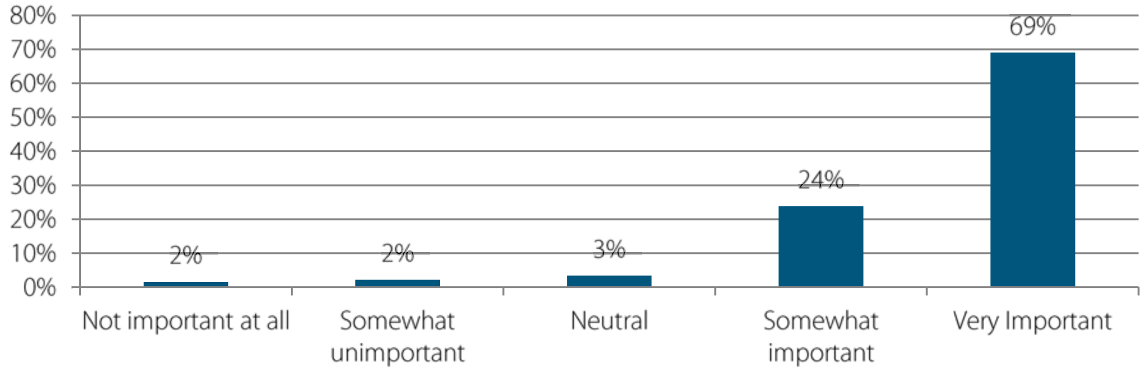


FIGURE G- 3 QUESTION 3 - IMPORTANCE OF ENVIRONMENTALLY SENSITIVE DESIGN

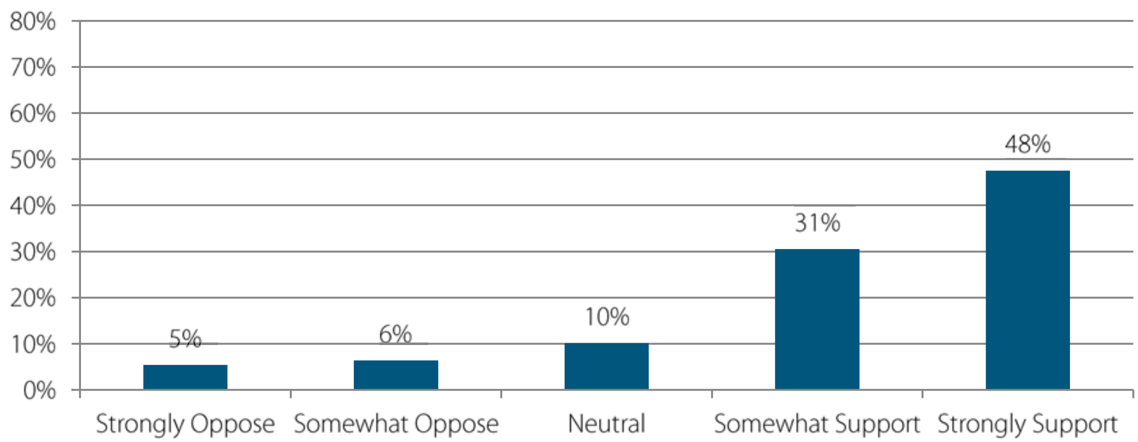
How important is it to design and build San Mateo's streets so that they are sustainable, reduce environmental impacts, and improve water quality through efficient stormwater management? (n=642)



A slightly smaller but still large majority expressed support for a Complete Streets ordinance, as shown in Figure G- 4.

FIGURE G- 4 QUESTION 4 - DEGREE OF SUPPORT FOR A COMPLETE STREETS ORDINANCE

To what degree would you support the adoption of a formal Complete Streets ordinance that would legally require the City of San Mateo to address the needs of all users in the design and construction of transportation projects, and change city development code accordingly? (n=642)



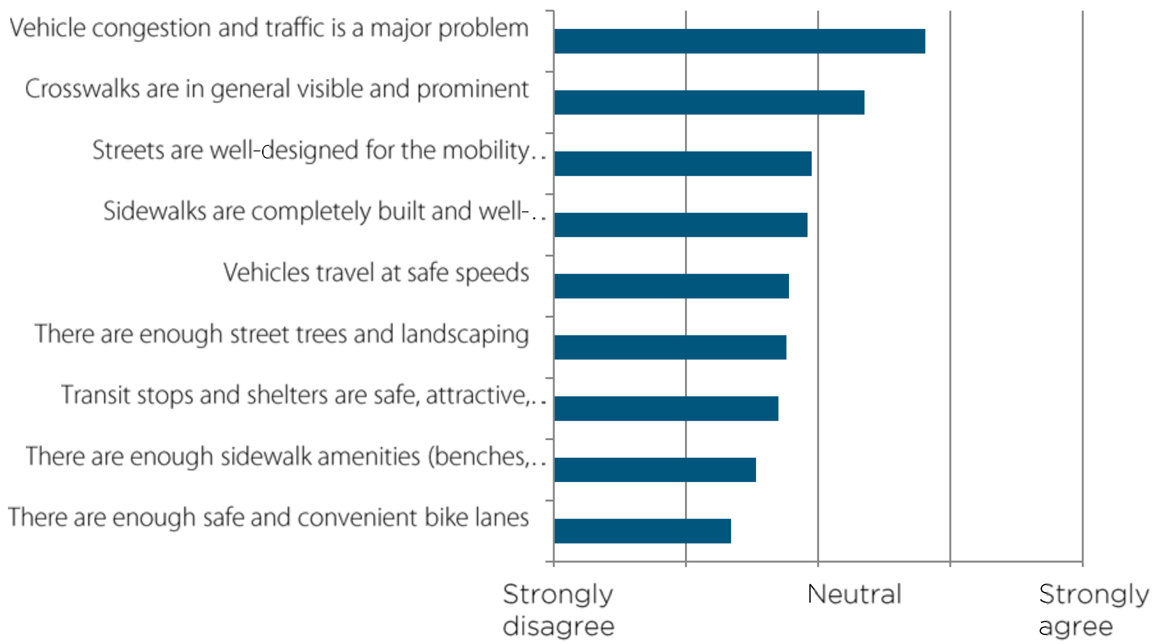
Assessment of Existing Conditions and Preferences

The following five questions asked respondents to share their observations on the city's current transportation infrastructure and their preferences for future investment.

Concerns about vehicle congestion received the strongest agreement, averaging a response of "somewhat agree," and respondents indicated slight disagreement with a statement on the adequacy of the city's bike facilities, as shown in Figure G- 5. Responses to all other statements averaged to approximately "neutral."

FIGURE G- 5 QUESTION 5 - ASSESSMENT OF EXISTING CONDITIONS

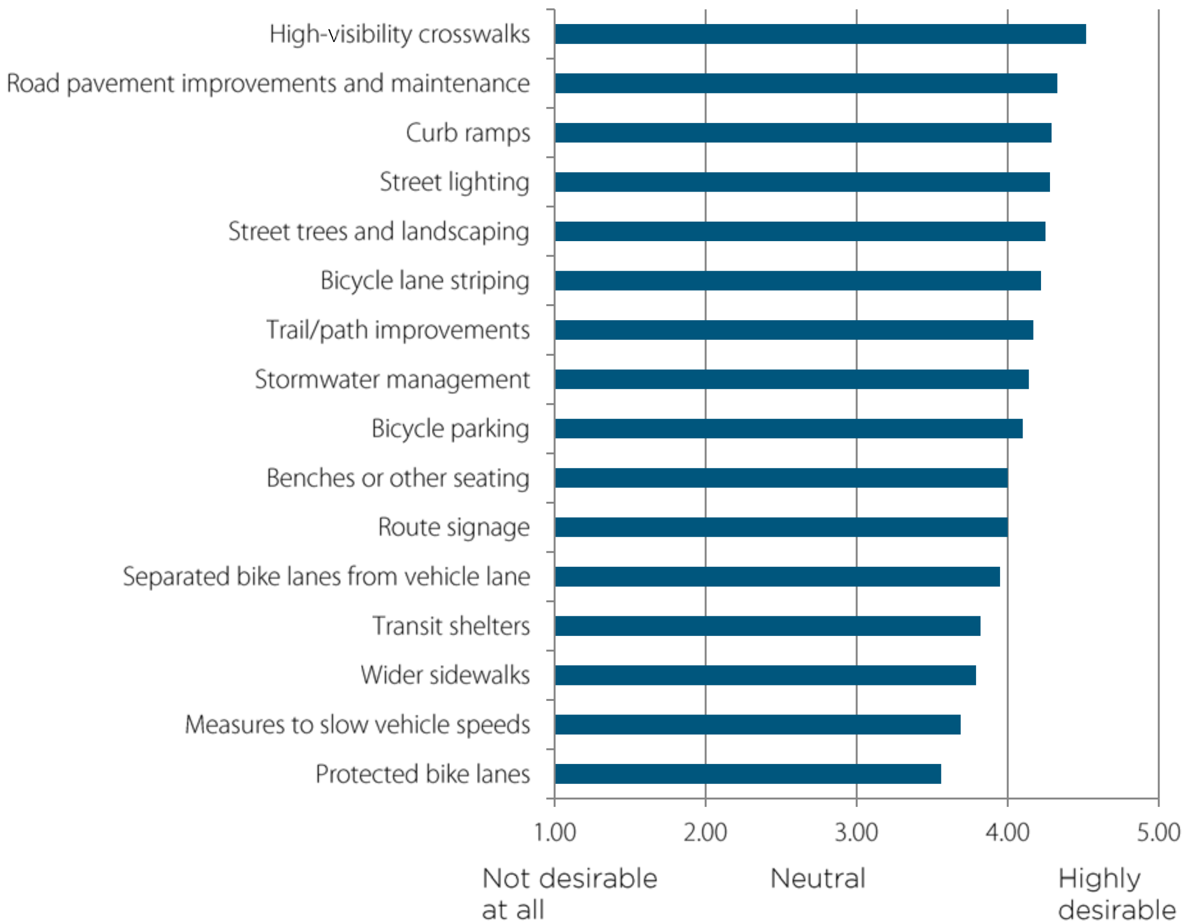
How strongly do you generally agree or disagree with the following statements about current street conditions and design in San Mateo? (average rating) (n=625)



Respondents rated all suggested street-infrastructure improvements as at least somewhat desirable, with the most desired improvements being high-visibility crosswalks, roadway maintenance, curb ramps, street lighting, and street trees and landscaping, see Figure G- 6.

FIGURE G- 6 QUESTION 6 - STREET INFRASTRUCTURE IMPROVEMENT PREFERENCES

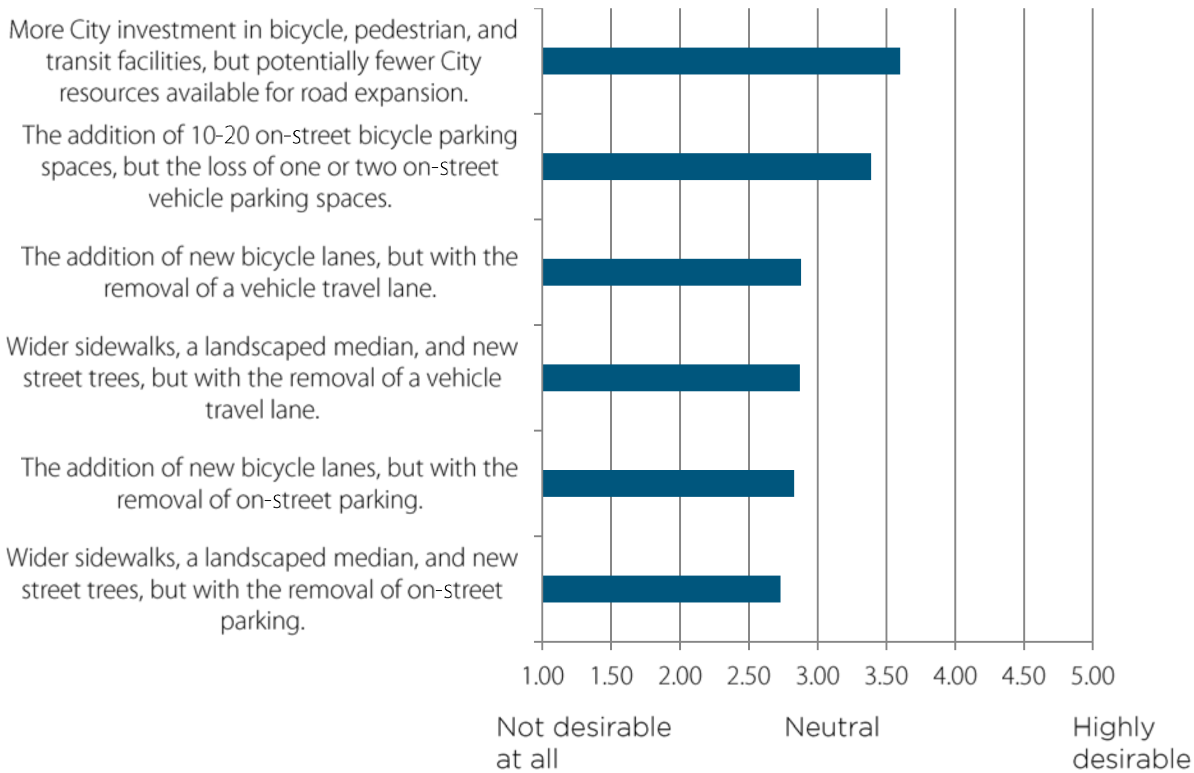
Please rate your preference for the following street-infrastructure improvements. (average rating) (n=611)



In regards to investment tradeoffs (Figure G- 7), respondents expressed the strongest support for investing in bike, pedestrian, and transit facilities at the expense of road expansion. Respondents also indicated some interest in trading a small number of vehicle parking spaces for a larger number of bike parking spaces. Appendix A shows the detailed breakdown of responses to each statement.

FIGURE G- 7 QUESTION 7 - RATING INVESTMENT TRADEOFFS

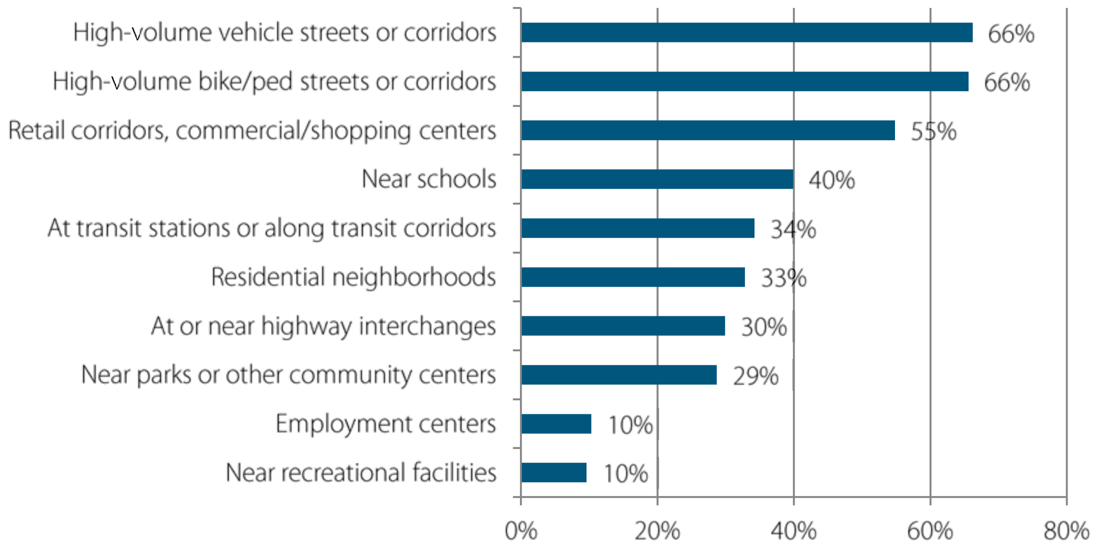
Changes to the City's street network will involve weighing a series of tradeoffs. Please indicate your level of support for each hypothetical scenario based on the described tradeoffs. (average rating) (n=595)



In regard to transportation investment priorities, the majority of respondents indicated interest in investments on high-volume streets for all modes and around shopping areas, as shown in Figure G- 8.

FIGURE G- 8 QUESTION 8 - TRANSPORTATION INVESTMENT PRIORITIES

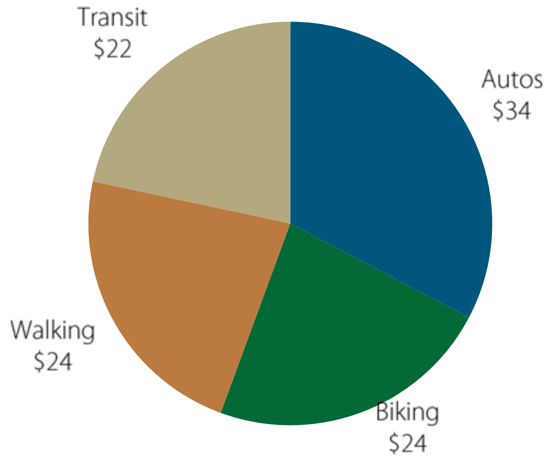
Like all cities, San Mateo has a finite amount of resources. In what location(s) should the City prioritize its efforts to improve its street infrastructure? Select up to 4. (n=582)



Respondents generally favor a larger share of investment in automobile-focused projects, though they on average prefer that a smaller share of investments be made for autos than typical transportation funding allocations by cities nationally and statewide, as shown in Figure G- 9.

FIGURE G- 9 QUESTION 9 - SPLITTING INVESTMENTS BETWEEN MODES

Assume that you are in charge of San Mateo's transportation budget for the coming year. If your total budget for the coming year is $100, how would you split up the $100 to fund projects in the following modes? (n=569)



Respondents' Travel Characteristics

Three questions focused on respondents' travel behavior to understand potential biases in the sample.

Relative to the American Community Survey,[1] the sample slightly under-represented automobile commuters, both drive-alone and carpool, with accompanying overrepresentation for all other modes, see Figure G-10. This could mean that the sample is slightly more aware or in favor of sustainable transportation choices than the population of the city as a whole.

[1] American Community Survey: http://www.census.gov/acs/www/

FIGURE G- 10 MEANS OF TRANSPORTATION TO WORK

What is your PRIMARY mode of travel to work? (n=563)

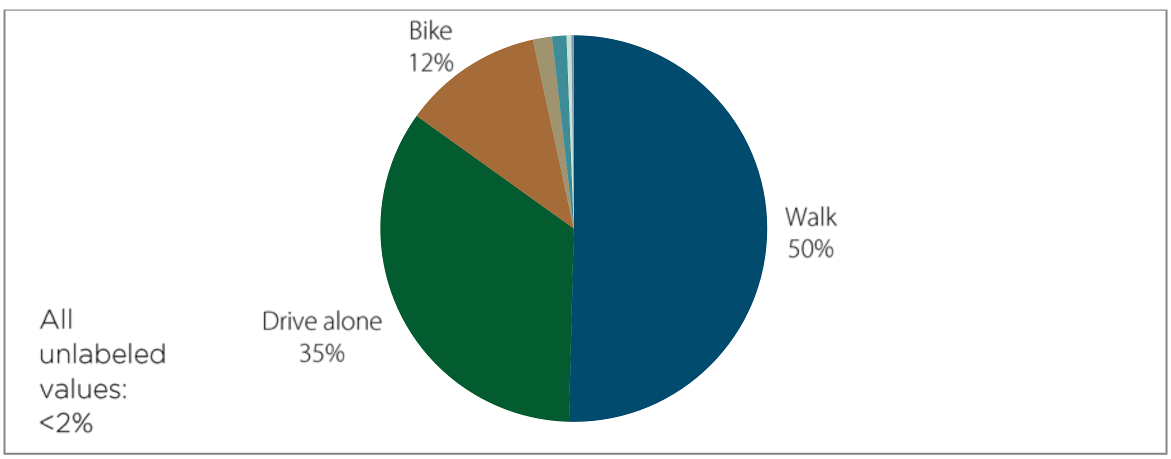
MODE	ALL SURVEY RESPONDENTS	SURVEY RESPONDENTS THAT ARE CURRENTLY EMPLOYED	2010-12 AMERICAN COMMUNITY SURVEY RESPONDENTS
Drive Alone	53%	62%	68%
Carpool	4%	4%	12%
Transit (train, bus, or shuttle)	11%	13%	8%
Walk	3%	4%	4%
Bike	4%	5%	3%
Worked at Home	8%	10%	4%
Other	1%	2%	1%
Not Working	16%	N/A	N/A

Half of the respondents reported that they primarily walk for trips under one mile, while about one third drive and a smaller but sizeable percentage bike, as shown in

Figure G- 11.

FIGURE G- 11 TYPICAL MEANS OF TRANSPORTATION FOR TRIPS UNDER ONE MILE

For trips you make that are less than one mile in length, what is your primary mode of travel? (n=563)



The survey sample seems to have overrepresented households with access to two or more vehicles, as shown in Figure G-12.

FIGURE G- 12 ACCESS TO WORKING AUTOMOBILES

What is the total number of working vehicles owned in your household? Select one. (n=563)

HOUSEHOLD VEHICLE OWNERSHIP	SURVEY SAMPLE	2010-12 AMERICAN COMMUNITY SURVEY
No vehicles	1%	6%
1 vehicle	20%	37%
2 vehicles	55%	39%
3 or more vehicles	24%	18%

Respondents' Demographic Characteristics

Six survey questions asked about respondents' demographic characteristics to understand potential biases in the sample. The survey sample includes more people of white racial/ethnic background, more females, more people in the 18- to 64-year-old age bracket, and more people from the highest income brackets than the city as a whole, according to data from the American Community Survey, as shown in Figures G-14 through G-17.

Most respondents live or work in San Mateo's three main zip codes, and nearly 30% of respondents live and work in the same San Mateo zip code, as shown in Figure G- 13.

FIGURE G- 13 GEOGRAPHIC REPRESENTATION: ZIP CODE

Where do you currently live? (n=563) and Where is your job located (if currently employed) (n=455)? Please enter the 5 digit zip code.

ZIP CODE	HOME	WORK	BOTH
94403	205 (36%)	125 (27%)	66
94402	164 (29%)	64 (14%)	47
94401	113 (20%)	31 (7%)	18
All Others	81 (14%)	235 (52%)	30
Either Home or Work Outside Main Three Zips	N/A	N/A	246

The survey sample underrepresented minors and slightly underrepresented seniors, as shown in Figure G-14.

FIGURE G- 14 AGE

What is your age group? (n=564)

AGE BRACKET	SURVEY SAMPLE	2010-12 AMERICAN COMMUNITY SURVEY
Younger than 18	<1%	20%
18 to 64	88%	65%
Older than 65	12%	15%

Note: Percentages may not add to 100% because of rounding.

The survey sample was more weighted toward females than the city as a whole, as shown in Figure G- 15.

FIGURE G- 15 GENDER

What is your gender? (n=564)

GENDER	SURVEY SAMPLE	2010-12 AMERICAN COMMUNITY SURVEY
Male	38%	49%
Female	62%	51%

White respondents were overrepresented in the survey, and most other racial/ethnic groups were underrepresented, as shown in Figure G- 16.

FIGURE G- 16 RACE/ETHNICITY

What is your race or ethnicity? (n=564)

RACE/ETHNICITY	SURVEY SAMPLE	2010-12 AMERICAN COMMUNITY SURVEY
White	74%	47%
Asian	11%	18%
Hispanic/Latino	4%	27%
Native Hawaiian or Other Pacific	1%	2%
American Indian and Alaska Native	0%	0%
Other Race/Ethnicity	3%	0%
Two or More Races/Ethnicities	7%	4%

Note: American Community Survey Hispanic/Latino figure includes anyone of Hispanic/Latino origin, it does exclusively reflect the number of people who identify primarily as Hispanic/Latino.

The survey sample included an overrepresentation of high-income households and an underrepresentation of lower-income households, as shown in Figure G- 17.

FIGURE G- 17 HOUSEHOLD INCOME

What is your gross household income? (n=564)

INCOME BRACKET	SURVEY SAMPLE	2010-12 AMERICAN COMMUNITY SURVEY
Less than $49,999	8%	28%
$50,000 to $74,999	11%	17%
$75,000 to $99,999	14%	14%
$100,000 to $149,999	26%	19%
$150,000 or more	41%	22%

CONCLUSION

Though the survey slightly oversampled people who might be more predisposed to support interventions that improve conditions for non-auto modes, the large majority of respondents who favor Complete Streets interventions indicates that interest in creating safer, more comfortable, and more environmentally friendly streets cuts across users of all modes. Respondents showed interest in a transportation investment portfolio that more evenly addresses all transportation-system users, and they showed concern about traffic congestion and safety issues for non-motorized travelers. The survey underrepresented groups that might benefit most from sustainable streets—households with low or no access to private vehicles, low incomes, and racial/ethnic-minority backgrounds—indicating that support for Complete Streets interventions might be even stronger than the survey indicates.

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APPENDIX G.1

Details for Question 7

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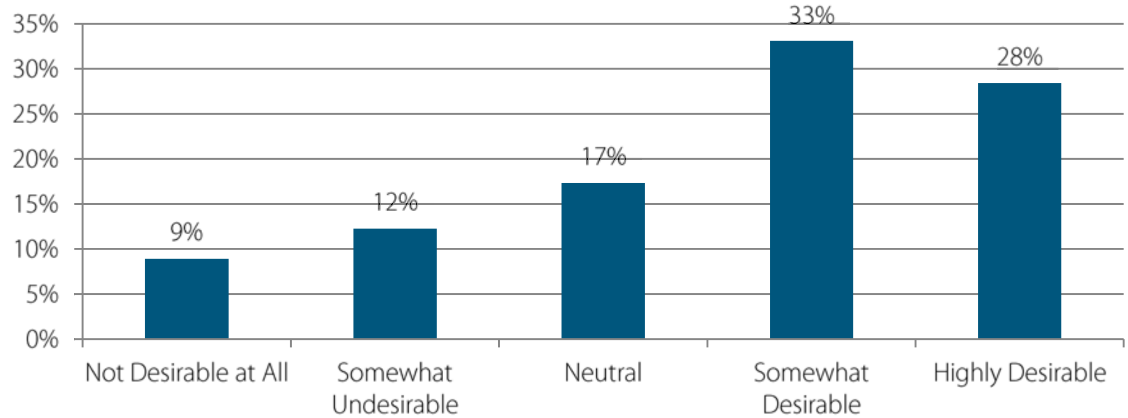
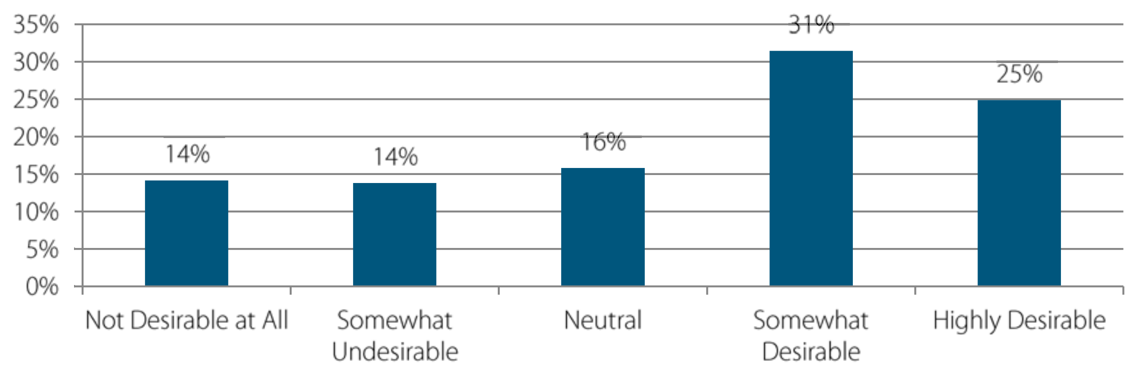
This appendix includes a detailed breakdown of responses to each statement for Question 7: Changes to the City's street network will involve weighing a series of tradeoffs. Please indicate your level of support for each hypothetical scenario based on the described tradeoffs.

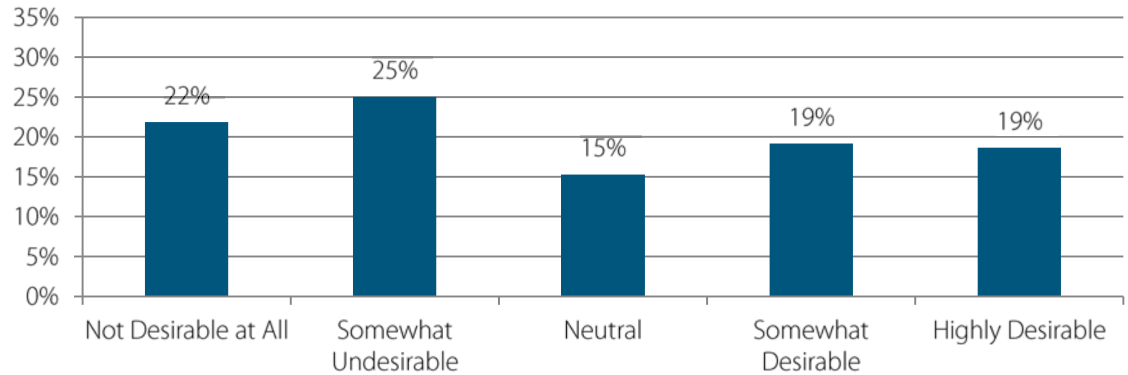
More City investment in bicycle, pedestrian, and transit facilities, but potentially fewer City resources available for road expansion. (n=595)



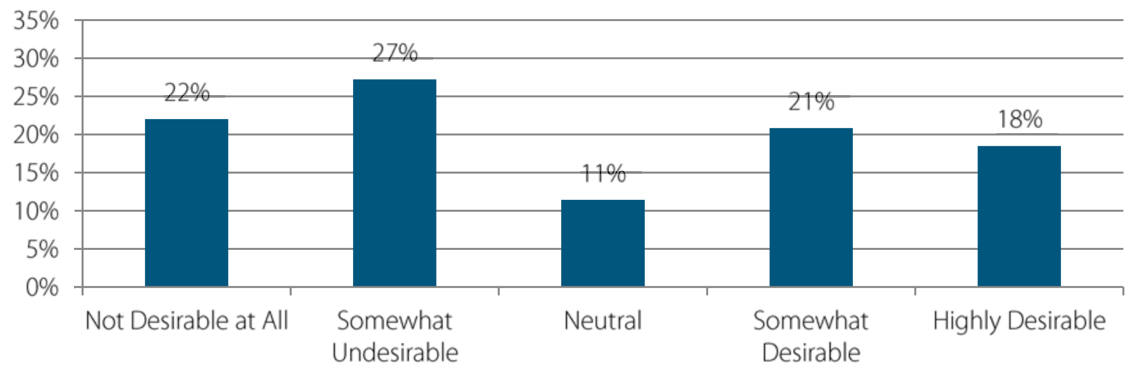
The addition of 10-20 on-street bicycle parking spaces, but the loss of one or two on-street vehicle parking spaces. (n=595)



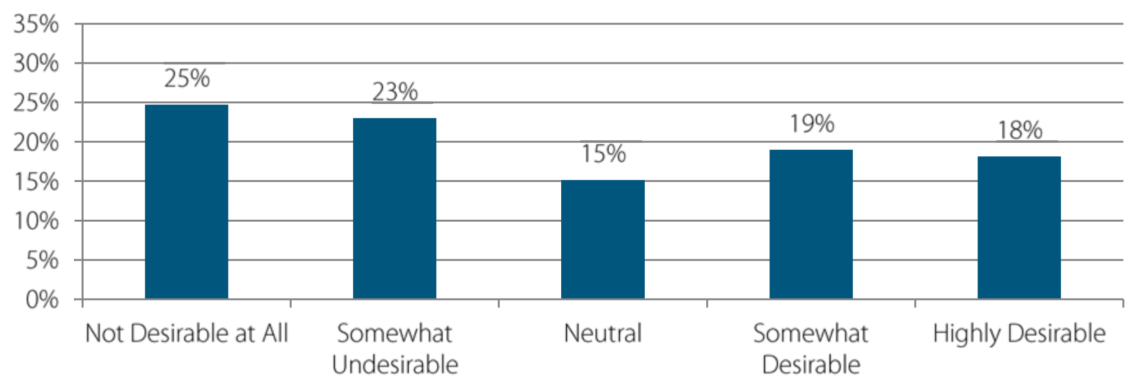
The addition of new bicycle lanes, but with the removal of a vehicle travel lane. (n=595)



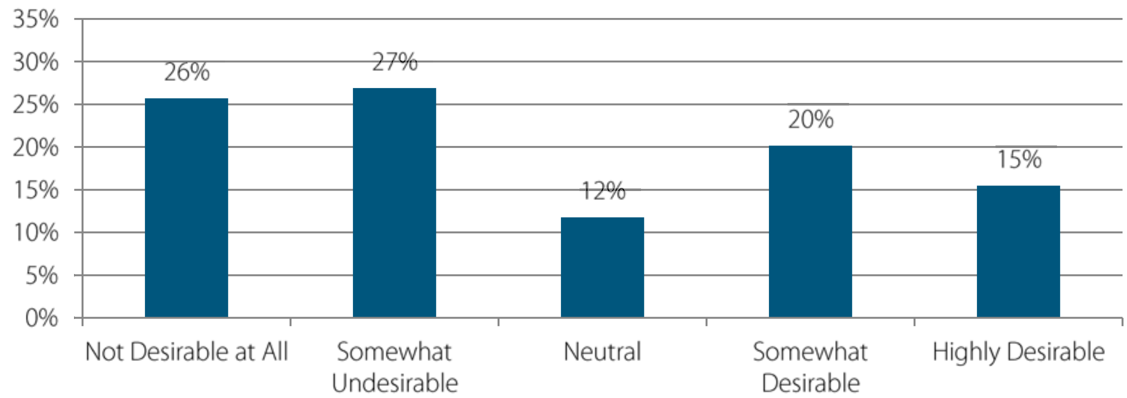
Wider sidewalks, a landscaped median, and new street trees, but with the removal of a vehicle travel lane. (n=595)



The addition of new bicycle lanes, but with the removal of on-street parking. (n=595)



Wider sidewalks, a landscaped median, and new street trees, but with the removal of on-street parking. (n=595)



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Appendix G.2

Survey Questionnaire

(On the following pages)

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San Mateo Sustainable Streets - Community Survey

The City of San Mateo is developing a Sustainable Streets Plan, which will guide policy choices and shape the future design of streets and transportation infrastructure in the city. Much of San Mateo is already built up, so the Sustainable Streets Plan and its principles will mostly apply when an existing street needs new paving, striping or utility improvements.

This survey should take approximately 5-7 minutes to complete. All responses are confidential and will only be used for internal purposes. Your input is critical to ensuring that the Plan meets community needs and addresses key issues.

As a token of our appreciation, you will have the chance to win one of five $20 BikeLink Cards for our new electronic bike lockers in downtown (currently in operation) and at the Hillsdale and Hayward Park Caltrain Stations (in operation by late September). Cards will be awarded at random to people who complete the survey.

1. A "Complete Street" is generally defined as a street that is "designed, built, and operated to enable safe access for all users, including motorists, pedestrians, bicyclists, and transit riders of all ages and abilities."

How familiar are you with the concept of "Complete Streets"?

- ○ Very familiar
- ○ Somewhat familiar
- ○ Not familiar at all

2. How important is it to design and build San Mateo's streets so that they are bicycle friendly, walkable, and safe for a wide range of users?

Not important at all	Somewhat unimportant	Neutral	Somewhat important	Very Important
○	○	○	○	○

3. How important is it to design and build San Mateo's streets so that they are sustainable, reduce environmental impacts, and improve water quality through efficient stormwater management?

Not important at all	Somewhat unimportant	Neutral	Somewhat important	Very Important
○	○	○	○	○

4. To what degree would you support the adoption of a formal Complete Streets ordinance that would legally require the City of San Mateo to address the needs of all users in the design and construction of transportation projects, and change city development code accordingly?

Strongly Oppose	Somewhat Oppose	Neutral	Somewhat Support	Strongly Support
○	○	○	○	○

5. How strongly do you generally agree or disagree with the following statements about current street conditions and design in San Mateo?

	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
Vehicles travel at safe speeds	◌	◌	◌	◌	◌
Sidewalks are completely built and well-connected	◌	◌	◌	◌	◌
Crosswalks are in general visible and prominent	◌	◌	◌	◌	◌
Streets are well-designed for the mobility impaired	◌	◌	◌	◌	◌
There are enough safe and convenient bike lanes	◌	◌	◌	◌	◌
Vehicle congestion and traffic is a major problem	◌	◌	◌	◌	◌
There are enough street trees and landscaping	◌	◌	◌	◌	◌
Transit stops and shelters are safe, attractive, and offer protection from the weather	◌	◌	◌	◌	◌
There are enough sidewalk amenities (benches, street furniture, art, etc.)	◌	◌	◌	◌	◌

6. Please rate your preference for the following street infrastructure improvements.

	Not desirable at all	Somewhat undesirable	Neutral	Somewhat desirable	Highly Desirable
Wider sidewalks	◯	◯	◯	◯	◯

	Not desirable at all	Somewhat undesirable	Neutral	Somewhat desirable	Highly Desirable
Bicycle lane striping	◯	◯	◯	◯	◯

(source: fabb-bikes.org)

	Not desirable at all	Somewhat undesirable	Neutral	Somewhat desirable	Highly Desirable
Separated bike lanes from vehicle lane	◯	◯	◯	◯	◯

(source: seattle.gov)

	Not desirable at all	Somewhat undesirable	Neutral	Somewhat desirable	Highly Desirable
Protected bike lanes	◯	◯	◯	◯	◯

(source: Paul Kruger)

	Not desirable at all	Somewhat undesirable	Neutral	Somewhat desirable	Highly Desirable
Bicycle parking	◯	◯	◯	◯	◯

Trail/path improvements

(source: americantrails.org)

High-visibility crosswalks

(source: drusilla.hsrc.unc.edu)

Curb ramps

Route signage

Street lighting

Transit shelters

Street trees and landscaping

Stormwater management (permeable paving, bioswales, etc.)

(source: CD+A)

Benches or other seating

Measures to slow vehicle speeds

(source: stocktongov.com)

Road pavement improvements and maintenance

(source: iowaenvironmentalfocus.files.wordpress.com)

7. Changes to the City's street network will involve weighing a series of tradeoffs. Please indicate your level of support for each hypothetical scenario based on the described tradeoffs.

	Not desirable at all	Somewhat undesirable	Neutral	Somewhat desirable	Highly Desirable
More City investment in bicycle, pedestrian, and transit facilities, but potentially fewer City resources available for road expansion.	○	○	○	○	○
Wider sidewalks, a landscaped median, and new street trees, but with the removal of a vehicle travel lane.	○	○	○	○	○
Wider sidewalks, a landscaped median, and new street trees, but with the removal of on-street parking.	○	○	○	○	○
The addition of new bicycle lanes, but with the removal of a vehicle travel lane.	○	○	○	○	○
The addition of new bicycle lanes, but with the removal of on-street parking.	○	○	○	○	○
The addition of 10-20 on-street bicycle parking spaces, but the loss of one or two on-street vehicle parking spaces.	○	○	○	○	○

8. Like all cities, San Mateo has a finite amount of resources. In what location(s) should the City prioritize its efforts to improve its street infrastructure? SELECT UP TO FOUR.

- ☐ At transit stations or along transit corridors
- ☐ Employment centers
- ☐ High-volume bicycle/pedestrian streets or corridors
- ☐ At or near highway interchanges
- ☐ High-volume vehicle streets or corridors
- ☐ Near recreational facilities
- ☐ Residential neighborhoods
- ☐ Near parks or other community centers
- ☐ Retail corridors, commercial/shopping centers
- ☐ Near schools

9. Assume that you are in charge of San Mateo's transportation budget for the coming year. If your total budget for the coming year is $100, how would you split up the $100 to fund projects in the following modes?

Autos

Biking

Walking

Transit

10. Where do you currently live?

Street (e.g. 1st Street):

Closest Cross Street (e.g. 2nd Avenue):

ZIP Code:

11. Where is your job located (if currently employed)? Please enter the 5 digit zip code.

12. What is your age group?

- Less than 18
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- 75+

13. What is your gross household income?

- Less than $49,999
- $50,000 to $74,999
- $75,000 to $99,999
- $100,000 to $149,999
- $150,000 or more

14. What is your gender?

- Male
- Female

15. What is your race or ethnicity?

- White
- Hispanic or Latino
- Black or African American
- Asian
- American Indian and Alaska Native
- Native Hawaiian and other Pacific Islander
- Other race/ethnicity
- Two or more races/ethnicities

16. What is your PRIMARY mode of travel to work?

- Drive alone
- Carpool
- Transit (train, bus or shuttle)
- Walk
- Bike
- Dropped off
- Taxi
- Motorcycle/scooter
- Work at home
- Do not work
- Retired
- Stay at home parent

17. For trips you make that are less than one mile in length, what is your PRIMARY mode of travel?

- Drive alone
- Carpool
- Transit (train, bus or shuttle)
- Walk
- Bike
- Dropped off
- Taxi
- Motorcycle/scooter
- Do not make trips less than 1 mile

18. What is the total number of working vehicles owned in your household? Select one.

- Zero
- One
- Two
- Three or more

19. The City will be developing the Sustainable Streets Plan over the next year and will be hosting several community events and workshops. If you would like to stay involved, please provide your email address below.

20. Please enter any other comments below:

21. If you would like to participate in the drawing for one of five $20 BikeLink Cards for our new electronic bike lockers in downtown, please provide your contact information below. This information will be treated separately from the analysis of the reponses and will not be shared or used for any sales or marketing efforts by any organization.

Name:

Phone:

Address:

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APPENDIX H

Design Guidelines

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SUSTAINABLE STREETS

CITY OF SAN MATEO

Design Guidelines February 2015

Cover image provided by Urban Advantage

All photos courtesy of Nelson\Nygaard unless otherwise noted

TABLE OF CONTENTS

APPENDICES

TABLE OF FIGURES

CHAPTER 1 : **INTRODUCTION**

INTENT AND PURPOSE

The Sustainable Street Design Guidelines are a technical extension of the Sustainable Streets Plan and serve as the starting point for the geometric design of streets and related elements in San Mateo. It incorporates existing goals for the City of San Mateo and combines them with existing local accepted design guidelines and national best practices. It reflects a comprehensive approach to street design and considers both the transportation function of the street in addition to its stormwater management role. These guidelines are intended to be used by municipal or private sector street designers who may be building, reconstructing, or repaving streets within the City of San Mateo. Guidance provides information, tools and best practices to inform the design of streets while ensuring flexibility so that a street designer can create plans to meet the unique context of the City of San Mateo.

A NEW WAY TO DESIGN STREETS

Previously, street design guidance was largely based on the idea of street functional classification. Functional classification traditionally defined a street as a highway (limited-access), arterial, collector, or local. While this approach provided some differentiation in the design of streets, it is not sensitive to local context and does not take into consideration other important factors such as land use, prioritized inclusion of transit, bicycle and pedestrian facilities, or the role a street plays in local commerce. The Design Guidelines take a different approach and seeks to provide a greater level of direction to ensure streets match their intended purposes within the context of the community through a local, city, and regional lens. The Design Guidelines introduce three new concepts of green infrastructure, typologies and overlays to the local street design process.

» **Green Infrastructure** takes advantage of landscape and urban design components of streets by utilizing various elements to capture, slow, and treat stormwater runoff; this approach can support placemaking and enhance the pedestrian experience. At the same time, green infrastructure also creates economic, community, and environmental benefits through the creation of interesting and valued places to live in and the creation and protection of aquatic and other habitats which are critical in the San Francisco Bay Region.

» **Typologies**: Typologies are a way to classify streets using a combination of a street's transportation and mobility function in addition to its role serving and being influenced by adjacent land uses.

» **Overlays:** Overlays include special-use networks and exceptions that may require special design treatments due to a specific use (i.e., bicycle priority network) or need (i.e., transit station area).

Using this approach of defining streets, there are now over fifteen different types of street classifications as compared to the previous four. While this may appear to add complexity, its primary function is to ensure that different types of streets can be designed and constructed that meet the numerous environs within San Mateo. More information about green infrastructure, typologies, and overlays can be found in later sections.

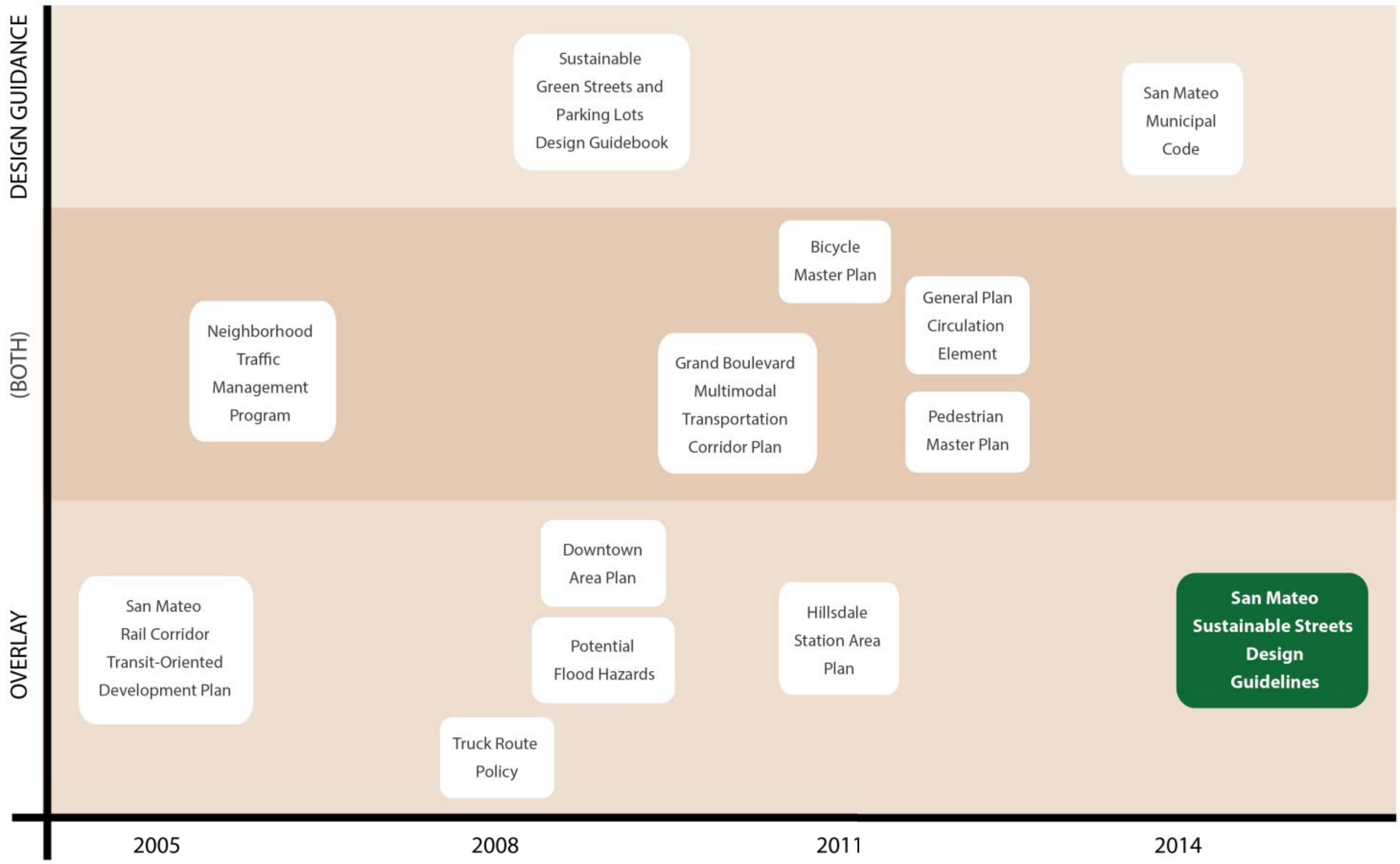
RELATIONSHIP WITH OTHER LOCAL PLANS

The Design Guidelines incorporate information from numerous other existing San Mateo documents including the *Bicycle Master Plan*, *Pedestrian Master Plan*, and other local planning efforts that relate to the design of streets. This includes green infrastructure elements, which previously were not part of the street design process in San Mateo. The *San Mateo County*

Green Streets and Parking Lots Design Guidebook was used to guide language and processes around green infrastructure within these guidelines. Figure 1-1 provides a background of the various plan elements that were used to form these guidelines and their contributions to informing overlays or direct design guidance.

Some guidance is nearly a decade old, justifying the need for updated design guidelines to meet current best practices. However, some elements of past documents still remain relevant and valid today. In situations where there is duplicative information in both the Sustainable Streets Design Guidelines and other existing local documents, these Design Guidelines should take precedence unless specified otherwise in this document or within City Code.

FIGURE 1-1 RECENT PLANNING EFFORTS CONTRIBUTING THE DESIGN GUIDELINES DEVELOPMENT[1]



[1] The El Camino Master Plan (2001) was also consulted as part of this plan design process.

The Sustainable Streets Design Guidelines are not the City of San Mateo's first set of design guidance. Numerous initiatives have been undertaken over the past decade, including plans that provide design guidance by mode, specific overlay areas, or both. The intent of this document is not to duplicate past efforts, but instead, to point to the best respective information on designing streets in San Mateo and provide new information when necessary.

These planning efforts contribute different information to the street design process. Some of them are specific to mode (bicycles, pedestrians) while others provide specific guidance on green infrastructure elements. In reality, all of these components fit within the same right-of-way and should be considered holistically. The Design Guidelines provides overarching guidance on the design of streets from property line to property line and includes details from other plans as necessary and provides new guidance when important information gaps exist. Figure 1-2 references how the Sustainable Streets Design Guidelines relates to other recent street design guidance and related local plans. In general, the Design Guidelines provide the primary guidance with respect to all components of street design. However, the plan heavily leans upon existing plans for supplementary information or additional detail.

FIGURE 1-2 RELATIONSHIP OF VARIOUS SAN MATEO STREET GUIDELINES AND STANDARDS

STREET DESIGN COMPONENTS	SUSTAINABLE STREET DESIGN GUIDELINES	PEDESTRIAN MASTER PLAN	BICYCLE MASTER PLAN	NEIGHBORHOOD TRAFFIC MANAGEMENT PLAN	SAN MATEO COUNTY SUSTAINABLE GREEN STREETS AND PARKING LOTS DESIGN GUIDEBOOK[2]
Street Typologies	●				
Overlays	●	○	○		
Green Infrastructure	●				○
Street Design Guidance	●	○	○		○
Intersection Design Guidance	●	○	○	○	○
Traffic Control Devices	●	○	○		

Key: ● = Primary Guidance ○ = Supplementary Guidance

[2] Also see the San Mateo County Water Pollution Prevent Program: Stormwater Technical Guidance: A Handbook for Developers, Builders, and Project Applicants.

RELATIONSHIP WITH STATE AND FEDERAL GUIDANCE

The Design Guidelines reflect the adopted guidance for streets within the City of San Mateo, including some streets that fall under Caltrans jurisdiction. Even so, streets such as El Camino Real require a collaborative effort in the development of final designs. In addition, to ensure consistency with state and federal guidance, design guidelines and policies included within this document are consistent with the 2012 California Manual for Uniform Traffic Control Devices (CA MUTCD 2012), as required by the California Vehicle Code. Furthermore, design guidelines and policies are drawn from state and nationally recognized design guidance from the Caltrans, the American Association of State Highway and Transportation Officials (AASHTO), and the National Association of City Transportation Officials (NACTO). Streets such as El Camino Real may also consider state guidance such as the *Caltrans Main Street Guide* which incorporates numerous green infrastructure elements and other design modifications that can better suit the needs of this community thoroughfare.

GREEN INFRASTRUCTURE

The direct integration of green infrastructure into the street design process makes these Design Guidelines unique. Green infrastructure elements take advantage of streets by utilizing various elements to capture, slow, and treat stormwater runoff. This approach can also support placemaking in the public realm, enhance the overall pedestrian experience and create economic, community, and environmental benefits.

GREEN INFRASTRUCTURE PRINCIPLES

The following design principles for green streets are taken from the San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook:

» "Manage stormwater at the source and on the surface. As soon as rainfall lands on a street or parking lot, allow it to infiltrate into the ground or provide surface flow to nearby landscaping."

» "Use plants and soil to absorb, slow, filter, and cleanse runoff. Let nature do its work."

» "Design stormwater facilities that are simple, cost-effective and enhance community aesthetics. Stormwater facilities can be beautiful!"

In addition, it is the City of San Mateo's intent that green infrastructure will:

» Be designed to complement and improve the linkages between the built and natural environments through functional and aesthetic design decisions, such as plant selection and design details.

» Give consideration to climate change and the ability for Green Streets to maximize beneficial use of stormwater to offset potable water usage, recharge groundwater, and supply local creeks.

- Provide fiscal efficiencies in the capital, operations, and maintenance of landscaping and storm water systems, as implementation of green infrastructure serves multiple purposes.

The Design Guidelines suggest that every project that includes the design or redesign of a street, street realm, or intersection should consider the potential for including applicable green infrastructure and general landscape elements. Additional detail about green infrastructure and general landscape elements can be found in Chapter 5.

STREET TYPOLOGIES

Typology is the study of types and the characterization of a set of similar items in order to classify and differentiate. Applied to streets, typology can help one understand form, utility, and use. It is important to develop a typology for streets in order to systematize implementation. An essential tension on every street is where it fits on the *link* and *place* spectrum, both of which compose a street's typology. Most streets have a travel component, linking to the larger transportation network. This might be in the form of a six-lane arterial or a narrow alley. Most streets also have a local, context-based place component – they are the places where we live, work, and play. This might be in the form of a residential cul-de-sac or a regional connector like El Camino Real.

LINK (STREET TYPE)

Classifying the link (street type) aspect of a street's typology is fairly straight-forward. At one end of the range are local streets with very little through function. These would be alleys, cul-de-sacs, and narrow lanes. At the other end are travel streets where the ability to move people and goods long distances with little delay is the priority. The Federal Highway Administration's Functional Classification system of local, collector, and arterial has generally been the starting point; however, it was developed to guide decision-making related to motor vehicle traffic. This type of classification system has been the standard in San Mateo to date.

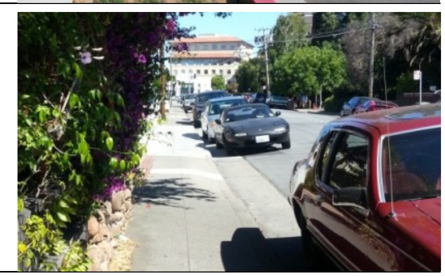
Figure 1-3 presents a description of the various street types defined for the City of San Mateo. Six street types were selected that reflect the full range of street functions from regional-serving arterials to the smallest alleys for utility purposes or pedestrian and bicycle paths. These street types represent the full range of potential paths that someone in San Mateo would use to travel across town or across the region.

GREEN INFRASTRUCTURE DEFINED

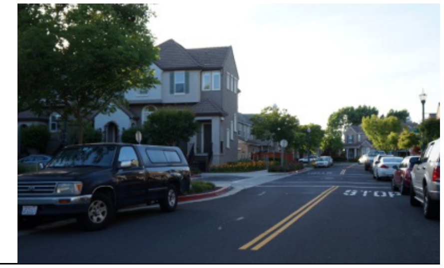
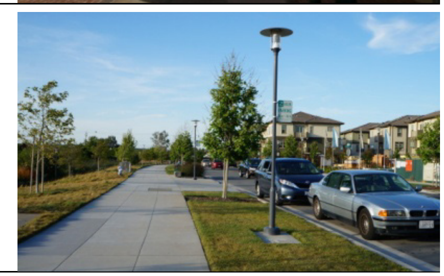
The US Environmental Protection Agency describes green infrastructure as a range of natural and built approaches to stormwater management–such as rain gardens, bioretention, and permeable paving–that mimic natural systems by cleaning stormwater and letting it absorb back into the ground.

Green infrastructure strategies for streets can include a connected system of inlets, basins, and outlets for tree planters and other landscaping that allows stormwater to flow into the planting beds and slowly soak into the soil. Green infrastructure could reduce the amount of runoff that enters the traditional piped stormwater system below ground, and could prevent overflows that pollute nearby water bodies. Green infrastructure offers a range of additional environmental, economic, and community benefits, including more walkable streets, reduction of heat island effects, increased property values, and more gathering spaces that benefit residents and customers of local businesses.

FIGURE 1-3 STREET DESIGN GUIDELINES STREET TYPES

STREET TYPE	DESCRIPTION	FHWA CLASSIFICATION EQUIVALENT	CHARACTERISTICS	EXAMPLES	PHOTOS
El Camino Real	El Camino Real (State Route 82) is its own street classification given its unique role as a major regional street that runs north-south through the central spine of San Mateo.	Arterial	» 4+ Lanes » 35 mph speed limit » ADT[3] ~ 20k and higher	El Camino Real	
Major Connectors*	Major Connectors have regional or citywide importance. These streets may have medians and a variety of elements within their cross section.	Arterial or Collector	» 2-4 Lanes » 25-35 mph speed limit » ADT 5-25k	Delaware Street, Hillsdale Boulevard, Alameda De Las Pulgas	
Minor Connectors*	Minor Connectors are streets with citywide importance. These streets typically are "neighborhood main streets" or feeder streets to larger roadways.	Collector	» 1-3 Lanes » 20-30 mph speed limit » ADT 3-15k	28th Avenue	

[3] Average Daily Traffic

STREET TYPE	DESCRIPTION	FHWA CLASSIFICATION EQUIVALENT	CHARACTERISTICS	EXAMPLES	PHOTOS
Access	Access streets primarily serve local homes or businesses.	Local	» 1-2 Lanes » 25 mph speed limit » ADT < 6k	12th Avenue	
Alleys	Alleys primarily provide local access for service functions (trash pickup, deliveries, etc.). There are relatively few alleys in San Mateo.	-	» 1 Lane » 5-10 speed limit	Main Street (Downtown)	
Paths	Paths are defined as multi-use paths in park settings.	-	» Shared-use path » 10-15 mph speed limit (cyclists)	Bay Trail	

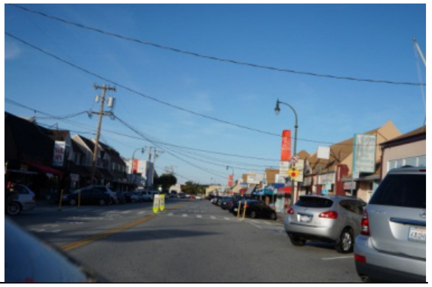
* Major and Minor Connectors only apply to streets within a neighborhood context. In other contexts, a more general "Connector" term is used and its characteristics fall within the ranges defined by Major and Minor Connectors

** Establishing speed limits in the state of California is based on regulations outlined by the California Vehicle Code. The speed limits recommended in this document are grounded in an interest to provide a safe environment for pedestrians and cyclists within and adjacent to the street.

CONTEXT

Classifying the place (context) aspect of a street is somewhat more challenging in that the methodologies are less developed. Absent other information, land use is a reasonable proxy for a street's place. Residential, commercial, and industrial uses are usually represented by common forms, such as the single-family house, warehouse, or office building. Both land use and building form are means to help classify a place. Land use is somewhat less successful in capturing the variety of building stock on a typical city street, especially ones that pre-date zoning. For example, commercial land use could be a suburban strip mall, pedestrian-oriented retail buildings adjacent to the sidewalk, or a corner store. Similarly a particular building type could house a number of uses. A downtown building may be residential or commercial. The physical form of a big box store with its parking lot and a warehouse is almost the same. Building form is the clearest indication of a street's location on the place spectrum. A few basic forms are residential, mixed-use, commercial center, downtown, institutional/campus, industrial, and parks. *Residential* is typically detached houses. *Mixed-use* is apartment buildings and lofts. *Commercial* can be neighborhood shopping centers to commercial focal areas. *Downtown* is large buildings directly adjacent to the street. Figure 1-4 presents a description of the five contexts that summarize City of San Mateo. These include levels of density as intense as downtown San Mateo to recreational spaces such as Coyote Point.

FIGURE 1-4 STREET DESIGN GUIDELINES CONTEXT

CONTEXT TYPE	DESCRIPTION	EXAMPLES	PHOTOS
Downtown	Downtown San Mateo – boundaries are as defined by the *Downtown San Mateo Specific Area Plan*	Downtown San Mateo	
Commercial/Mixed-Use	Refers primarily to areas with a mix of retail and residential land uses, or predominantly commercial areas (retail)	25th Avenue, 42nd Avenue	
Neighborhood	Refers primarily to areas with predominately residential land uses	San Mateo Village, Sunnybrae, Beresford neighborhood streets	

CONTEXT TYPE	DESCRIPTION	EXAMPLES	PHOTOS
Industrial	Refers primarily to areas with predominately industrial land uses (manufacturing, warehouse or similar)	Frontage roads along US 101 (Amphlett Blvd)	
Parks	Recreational areas	Coyote Point (County of San Mateo)	

STREET TYPOLOGY CATEGORIES

Figure 1-5 outlines street typologies based on the six street types and five contexts previously described. Each of the typologies outlined below exhibit transportation characteristics that are in some respects similar and others unique. The Design Guidelines provide guidance for design geometries and corresponding design elements for each of these typologies.

FIGURE 1-5 PROPOSED STREETS AND CONTEXT CATEGORIES

<table>
<tr><th colspan="8">STREET TYPE</th></tr>
<tr><th></th><th></th><th>EL CAMINO REAL[4]</th><th>MAJOR CONNECTOR</th><th>MINOR CONNECTOR</th><th>ACCESS</th><th>ALLEY</th><th>PATH</th></tr>
<tr><td rowspan="5">Context</td><td>Downtown</td><td>Downtown El Camino Real</td><td colspan="2">Downtown Connector</td><td>-</td><td>Downtown Alley</td><td>Walkway</td></tr>
<tr><td>Commercial/ Mixed-Use[5]</td><td>Mixed-Use El Camino Real</td><td colspan="2">Mixed-Use Connector</td><td>Mixed-Use Access</td><td>Mixed-Use Alley</td><td>Walkway</td></tr>
<tr><td>Neighborhood</td><td>Neighborhood El Camino Real</td><td>Neighborhood Major Connector</td><td>Neighborhood Minor Connector</td><td>Neighborhood Access</td><td>Neighborhood Alley</td><td>Neighborhood El Camino Real</td></tr>
<tr><td>Industrial</td><td>-</td><td colspan="2">Industrial Connector</td><td>Industrial Access</td><td>-</td><td>Walkway</td></tr>
<tr><td>Park</td><td>-</td><td>Parkway Connector</td><td>-</td><td>Park Access</td><td>-</td><td>-</td></tr>
</table>

[4] This document considers El Camino Real its own street type, giving it unique characteristics as compared to other streets in San Mateo. Guidance for El Camino Real shall also reference the design guidance and elements as described in the Grand Boulevard Multimodal Transportation Corridor Plan.

[5] Commercial/Mixed-Use context may include a gradient between land uses that are strictly commercial and others where both residential and commercial buildings exist together. There is minimal difference in terms of street design between these categories. However, strictly commercial uses are likely to generate larger volumes of pedestrian traffic. Thus, street geometries and amenities for pedestrians should be expanded for pedestrians in these scenarios.

Street Typologies and Federal Guidance on Functional Classification

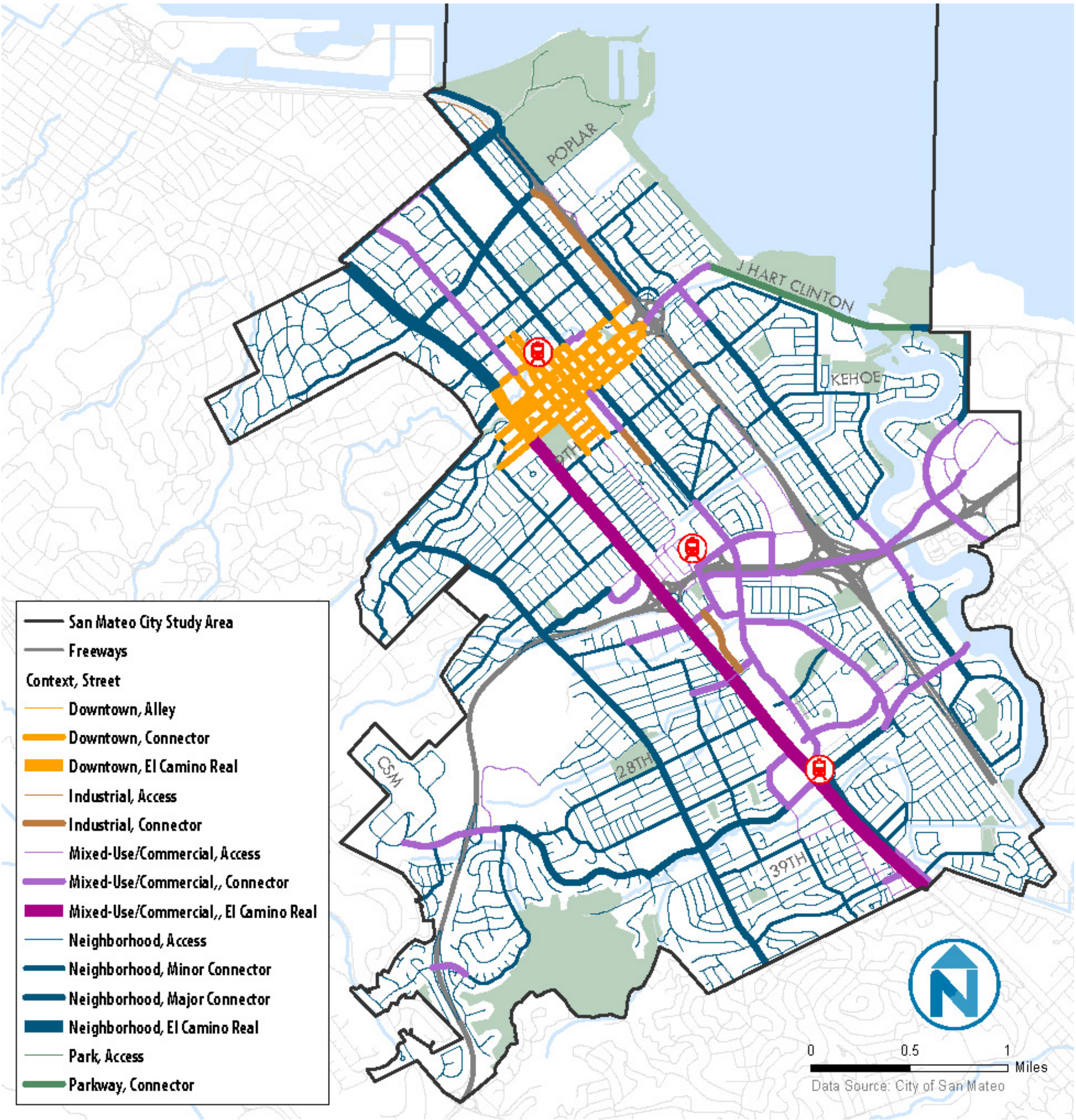
Functional classification is required by the Federal Highway Administration (FHWA) for projects that use federal funds. This system is primarily auto-centric and does not take into consideration local context, land-use, or built form. The street types presented in this document are an alternative to traditional functional classification. To ensure that the City is still eligible for federal transportation funds, Figure 1-6 converts the proposed street typologies into FHWA functional classification terminology. Alleys and paths do not require FHWA functional classification equivalents.

Figure 1-7 shows the City of San Mateo street network and its respective street typologies. Use this map with the Design Guidelines, as street width guidance is provided with respect to a street's typology. This map should also be updated periodically to reflect changing conditions within the City such as new development.

FIGURE 1-6 RELATIONSHIP BETWEEN STREET TYPES AND EXISTING FHWA CLASSIFICATIONS

	ARTERIAL	COLLECTOR	LOCAL
El Camino Real	●		
Major Connector	●	●	
Minor Connector		●	
Access			●

FIGURE 1-7 SAN MATEO STREET TYPOLOGIES



STREET OVERLAYS

Some uses are independent of a street's normal form and function, like routes for emergency vehicles and freight trucks, streets adjacent to major transit stations, and bicycle priority streets. These uses are not necessarily types, so they are classified as overlays. Overlays also describe a street's multi-modality. For example a street with high-frequency transit would be a connector street for transit, but the roadway might serve more of an access function. The same holds for a multi-way boulevard, which serves both connector and access functions for autos, a bicycle-priority street, and a truck route.

Overlays do not dictate the specific design of a street, but encourage design flexibility to better serve the purpose of the overlay. Overlays are also a means to provide modal priority. As an example, access streets that fall under a bicycle priority overlay should prioritize bicycle treatments along the street’s length and at intersections to support the overall bicycle priority network. Similarity, freight routes may require additional width and design exceptions at intersections to accommodate large volumes of trucks and wide turning movements.

TRANSPORTATION OVERLAYS

Figure 1-8 presents a summary of overlays to be considered in the development and design of streets in San Mateo. The figure describes the purpose of the overlay, potential associated design modifications, alternative performance metrics, and documentation that spatially defines the overlay. Example alternative performance metrics are provided as tools to evaluate the performance of the street under that overlay.

Figure 1-9 provides an example of the Pedestrian Greenway Streets overlay which should prioritize pedestrian safety and comfort. Additional overlay-specific guidance on design modifications can be found in later sections.

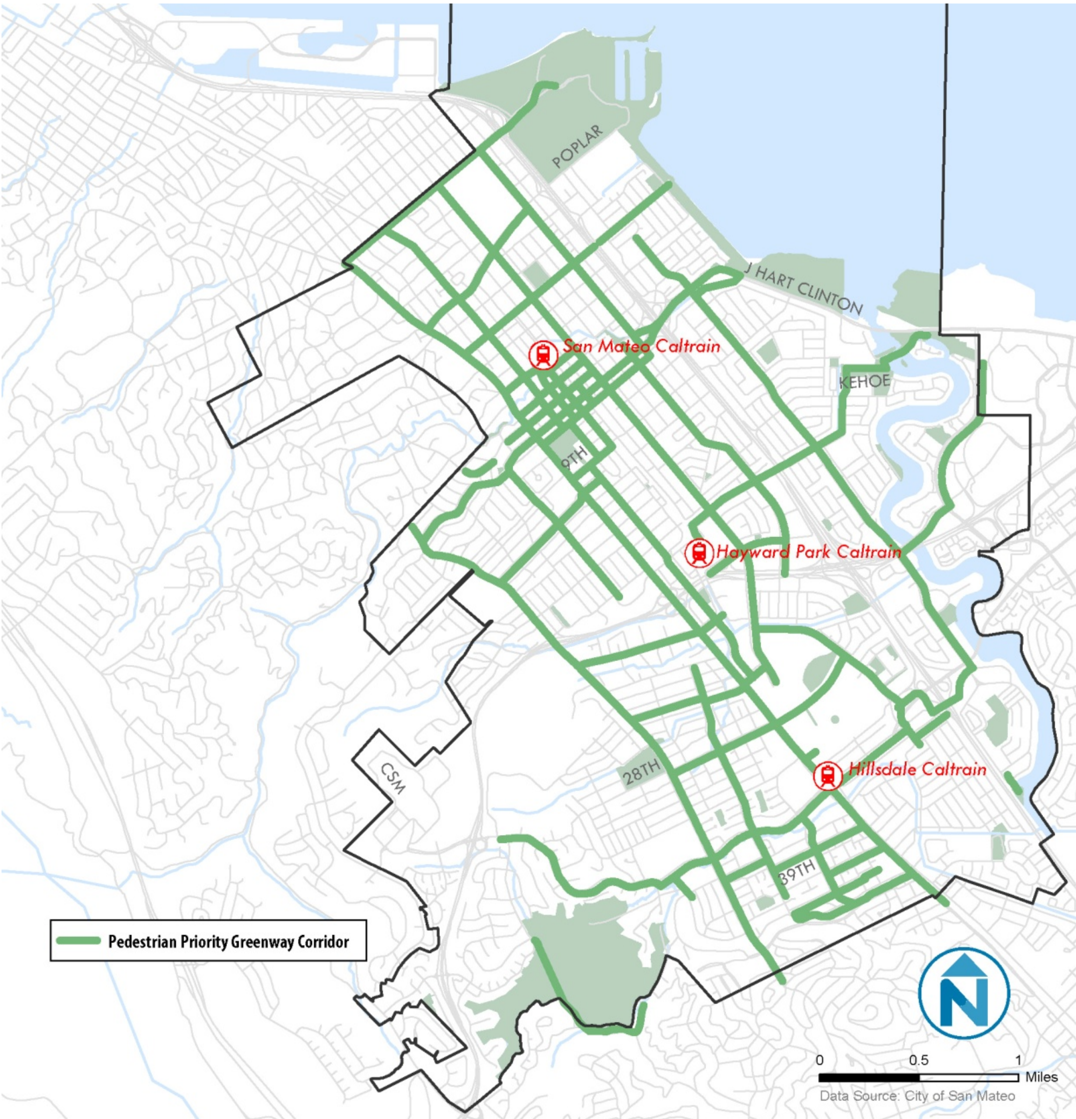
FIGURE 1-8 STREET DESIGN GUIDELINES OVERLAYS

OVERLAY	PURPOSE	EXAMPLE DESIGN MODIFICATIONS	ALTERNATIVE PERFORMANCE METRICS[6]	DOCUMENTATION
Pedestrian Greenway Streets	Prioritize pedestrian safety and comfort	Reduced crossing distances and emphasis on pedestrian crossing enhancements Street trees and plantings Maximum sidewalk widths	Minimizing pedestrian delay at intersections	*San Mateo Pedestrian Master Plan* (see Greenways Map)
Suggested Routes to Schools	Prioritize pedestrian and bicycle safety along designated pedestrian and bicycle routes	Reduced crossing distances and emphasis on pedestrian-crossing enhancements Bicycle lanes Cycletracks	Walking and biking mode share to selected San Mateo schools	San Mateo – Foster City Suggested Routes to Schools Maps
Bicycle Priority Streets	Prioritize bicycle safety and comfort	On-street bicycle treatments Intersection bicycle treatments (See Flexible realm, Intersections)	Bicycle facility expansion (sustained increase) Bicycle compliance to traffic controls (increase)	*San Mateo Bicycle Master Plan* – Recommended Bikeway Network (Chapter 5, page 5-2)
Transit Streets	Prioritize transit speed and schedule reliability	Lane width guidance Reduced crossing distances Transit speed improvement projects (transit lanes and intersection treatments) Bus stop placement priority	Persons per Lane Hour (maximize) Transit Vehicle Delay (minimize)	Most recent SamTrans Service Plan

[6] The performance metrics described here are at a corridor or street level. City level performance measures with respect to streets are described in the San Mateo Sustainable Streets Plan.

OVERLAY	PURPOSE	EXAMPLE DESIGN MODIFICATIONS	ALTERNATIVE PERFORMANCE METRICS[6]	DOCUMENTATION
Freight Routes	Design routes suitable for goods movement	Corner radii that accommodate trucks Lane width of 11 or 12 feet	N/A	Adopted Truck Route Policy (Recommended Truck Routes, Page 28) with exception of 5th Avenue between Humboldt and Amphlett
Caltrain Station Areas	Specific designs for additional pedestrians, density, etc. around station areas	Reduced crossing distances Traffic calming and other safety countermeasures Maximize access pathways to station	Matching All Pedestrian Desire Lines Pedestrian compliance to traffic controls (increase)	*Rail Corridor Transit-Oriented Development Plan* *Hillsdale Station Area Plan*
Downtown San Mateo	Specific designs for additional pedestrians, density, etc. around station areas	Reduced crossing distances Pedestrian lighting Traffic calming and other safety countermeasures Accommodate additional pedestrian amenities and street furniture	Sales Tax Receipts Total Multimodal Trips	*Downtown Area Plan*
Emergency Primary Response Routes	Ensure emergency vehicles have access to a network to minimize response times.	Signal priority for emergency vehicles Rollable medians	N/A	Neighborhood Traffic Management Program

FIGURE 1-9 PEDESTRIAN GREENWAY OVERLAY



GREEN INFRASTRUCTURE

While some of the overlays inform the selection, design and implementation prioritization of Green Streets elements, additional context information is needed to support the detailed design process for both green infrastructure and general landscape elements. The desired environmental and built context information to design green infrastructure includes:

Environmental Context

- **Soil and Hydrology:** Detailed information about the soil and hydrology conditions in order to assess the feasibility of infiltration of stormwater runoff from a green infrastructure feature into the underlying soil. The same information allows an assessment of the feasibility of groundwater recharge.
- **Tree Canopy:** An understanding of the presence and distribution of the existing tree canopy provides an opportunity to the street designer to include trees in general landscaping and green infrastructure feature in a contextual fashion. For instance, where some street trees already exist new ones can be added to complete a row of trees. In areas where no street trees currently exist, a well-designed combination of green infrastructure and general landscape element that include trees, can establish new rows of street trees extending along the entire length of a block.
- **General Landscaping:** Similar to tree canopy, an understanding of the presence and distribution of general landscaping provides an opportunity to place green infrastructure features or additional general landscaping in a contextual fashion. For instance, where areas of general landscaping currently exist, additional general landscaping and green infrastructure elements may be added or integrated in order to meet stormwater management goals or enhance the pedestrian experience in a given area.
- **Pollutant Management:**
  - Surface: There is a spectrum of pollutants that can be present in surface flows ranging from ubiquitous trash and suspended solids that can reduce the ability of the green infrastructure element to function to a range of chemical pollutants (i.e.; oils, pesticides, etc.). Some of these can be bio-remediated and some cannot. In the most extreme cases, these pollutants may result in green infrastructure not being an acceptable approach to stormwater management. In most cases if particular pollutants are present, this could affect the selection of appropriate green infrastructure elements, design details, maintenance and monitoring regimens, or other aspects of implementation.
  - Subsurface: The infiltration of water from green infrastructure can increase the potential for subsurface pollution to migrate more quickly by increasing groundwater flows, which in general is undesirable. If subsurface pollutant concentrations could be affected by green infrastructure infiltration design details should be implemented to avoid infiltration, such as use of under drains, impervious liners, or other means. This may impact the financial feasibility of green infrastructure construction and maintenance.
- **Areas of Localized Flooding:** This information can be used to target the mitigating use of green infrastructure features to areas where localized flooding occurs. In combination with information about the presence and capacity of existing stormwater utilities it can also be used for the proper sizing of these features.
- **Condition of Adjacent Water Bodies:** In areas without stormwater utilities it may be desirable to connect green infrastructure elements to

adjacent bodies of water, such as creeks, lagoons or the Bay. However, if information about the water quality in these bodies of water indicates levels of concern with respect to pollutants, pathogens, and bacteria, then green infrastructure elements should not be connected to them if the possibility exists that insufficiently treated stormwater runoff from the feature could negatively impact the water quality of the adjacent body
of water.

» **Sea Level Rise and Storm Surge Influence**: The mapping of areas where future sea level rise and storm surges may occur is important for the detailed design of green infrastructure features, but this can likely be avoided through proper plant species selection, such as plants that can tolerate temporary saltwater inundation. Understanding areas potentially affected by storm surges warrants uses of green infrastructure features that can mediate flooding issues through a reduction/spread of peak flows and/or are designed to provide additional capacity to help contain storm water surges.

Built Context

» **On-Street Parking:** Mapping of the presence or absence of on-street parking is a critical measure for the potential space available for green infrastructure elements in the Flexible Realm (see below for further explanation of the term), such as stormwater curb-extensions in corner or mid-block locations.

» **Location and Capacity of Existing Stormwater Utilities:** Detailed information about the location and capacity of the existing storm sewer system (storm sewer lines and drain inlets) is critical for the process of locating and detailing green infrastructure elements. Storm sewer lines present the opportunity for connecting underdrains associated with certain green infrastructure elements. Where sewer lines are not present, green infrastructure features need to be carefully designed to function without and underdrain. If water quality and flow volumes can be made appropriate, green infrastructure can be connected to natural bodies of water such as creeks, ponds, lagoons or the Bay.

» **Drainage Patterns and Tributary Drainage Areas**: Information about the larger drainage pattern of an area and its tributary drainage subareas that may concentrate flows within the right-of-way is critical to the successful design of green infrastructure as this information co-determines the size of the green infrastructure elements or series of elements needed to capture, slow and/or treat the runoff from the street or a portion of the street.

» **Land Use and Adjacent Building Frontage (pedestrian and other activity):** Understanding land uses and building frontage types along a street is important for the detailed design of these local green infrastructure treatments. Green infrastructure design characteristics informed by this local context include the detailing of hardscape elements such as planter walls (height, visual detailing, color) or pavement (combination of types; patterns; color), and plant selection (plant height relative to pedestrians, bicyclists, drivers, and signs; flowering; deciduous vs. evergreen, etc.).

» **Longitudinal and Cross-slopes**: Survey information about the longitudinal slope and cross-slope of a street or site is important for determining the best location of a green infrastructure feature as stormwater runoff needs to reach the feature largely following already established grades.

» **Underground Utilities / Drain Inlets / Fire Hydrants / Driveways:** Mapping of underground (but also above-ground) utilities, drain inlets, fire hydrants, driveways and other features that are expensive to move is important in order to avoid targeting locations for green infrastructure elements that are in direct conflict with one or more of these features. Not every identified conflict makes a green infrastructure element infeasible, but it potentially makes implementation more costly. For this reason, a careful advance assessment of potential conflicts allows the designer to identify alternate locations or to consider creative design solutions.

» **Feasibility of Passive or Active Water Harvesting:** The feasibility of water harvesting – the practice of using stormwater runoff to irrigate landscape – can provide benefits, but needs to be carefully considered in light of its potential costs.

At the simplest level, any green infrastructure that includes landscape harvests the runoff to irrigate the landscape in the feature itself. This reduces irrigation needs even if the infrastructure does not provide water quality or other benefits.

Active water harvesting is more costly as it requires the storage of runoff in a cistern and use of a pump to use the stored water to irrigate landscape when it is not raining. If water from rainwater flows can be stored at a higher elevation it may be feasible to use passive water harvesting without a pumping system (i.e.; run off within an adjacent public or private property at a higher elevation than the street, or in hilly areas within the street at a higher elevation than where the water is applied).

At various stages of the street planning and design process, many of the factors listed above inform the selection, location, sizing, and design character of a given green infrastructure feature as well as general landscape element. As part of this process, the street designer should evaluate all relevant information that is available or can be generated without excessive cost to assess existing site conditions that may influence the design, selection and prioritization of green infrastructure elements. See Chapter 6 for a summary checklist of the key environmental and built factors that should be considered in assessing the layers of information listed above. Please also refer to Chapter 5 for additional discussions of stormwater management functions, and the environmental and built context relevant to the design of Green Streets.

Detailed information describing the data in this section may or may not be readily available. However, recent work by the San Francisco Estuary Institute (SFEI) has developed an initial framework and method for how data can be used to assist the process of identifying locations where green infrastructure is appropriate and feasible. Please note that the results of this work, presented in Appendix H.2, do not reflect the potential future conditions created by implementation of the Sustainable Streets Plan. Additional analysis and data layers similar to the ones discussed above will be needed to more fully assess the feasibility of green infrastructure in the City of San Mateo.

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CHAPTER 2 : **HOW TO USE THE DESIGN GUIDELINES**

The Design Guidelines fit into a small, yet important step in the overall street delivery process, as Figure 2-1 shows. The Guidelines take direction from the City's Visions, Goals, Objectives, and Policies regarding streets and are invoked during repaving, reconstruction, or projects that involve new streets. After streets are designed and constructed, it is incumbent upon the City to ensure that they are evaluated with the correct metrics (see Sustainable Streets Plan, Performance Metrics, Chapter 4) to achieve overall community goals.

DESIGN GUIDELINES APPROACH

The Design Guidelines are intended to provide best practices and sound guidance in the design of streets in San Mateo. They are not intended to prescribe a uniform and optimal design solution for every possible street permutation. It is up to the designer to extract relevant elements from this and other approved documents to design streets that include the right mix of geometries and street elements that meet the unique needs of the street.

The design guidelines provide the following three types of information:

» **Principles**: General design guidance that provides, at a high level, intent and goals for streets in San Mateo

» **Geometries:** Specific design dimensions, associated with cross-section width

» **Elements**: Dimensions and design guidance on specific elements that are along the street, at intersections, or both

FIGURE 2-1 STREET DELIVERY PROCESS RELATIONSHIP WITH STREET DESIGN GUIDELINES

THE STREET REALM

The Design Guidelines divide the street into three component parts: the pedestrian realm, flexible realm, and the travel realm (including the median). These are not intended to define a strict segregation of the street, but are to be used as a tool to understand how streets are assembled. The pedestrian realm should prioritize pedestrians and their needs (sidewalks, street furniture, etc.); the travel realm is where vehicles operate (bikes, transit, automobiles); and the flexible realm provides elements that cater to both.

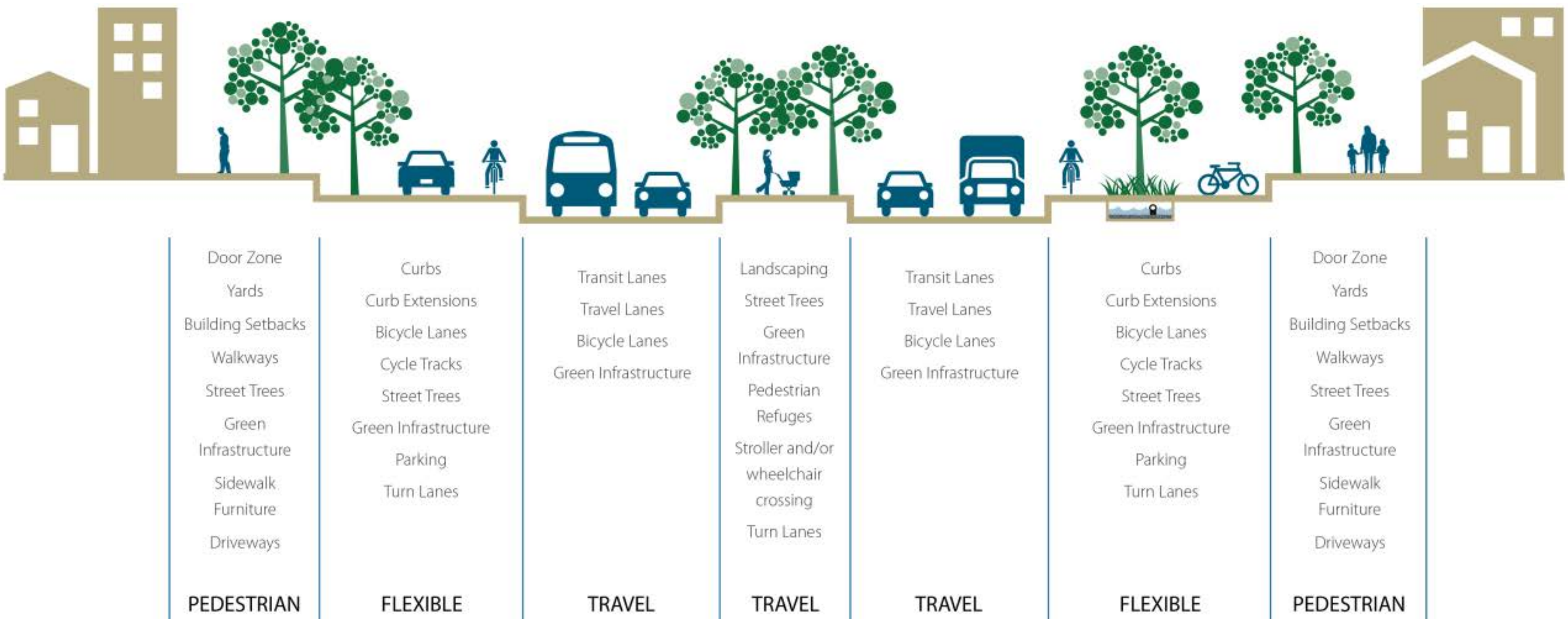
In the street design process, these realms must compete for limited right-of-way and should be designed with an "outside-in" strategy that places priority on non-motorized users in the pedestrian realm first, unless within a special overlay zone that prioritizes other modes of travel. All zones should place emphasis on green infrastructure, as opportunities for ecological performance exist throughout all parts of the cross-section, and include the space above and beneath the surfaces of the streets.

Figure 2-2 illustrates the various realms of the street and their potential elements. These guidelines provide geometries for the maximum, target, and constrained widths of each of these realms and various elements within each of these realms will be described in further detail.

REALLOCATION OF THE STREET

Street cross-section configurations are not intended to be permanent and may need to change over time based on changing local environs or demographic shifts. Reallocation of the street may come at key points of a street's life including repaving and reconstruction. Repaving typically does not involve the movement of curb lines. However, repaving offers opportunities to shift the zones of the street using striping and other strategies. Street reconstruction (or significant utility work) provides opportunities to conduct more significant change to the street such as moving curb lines, or adding or changing the nature of stormwater drainage on the street through the use of green infrastructure elements.

FIGURE 2-2 REALMS OF THE STREET



THE STREET DESIGN PROCESS

The Design Guidelines should be referenced when a street designer knows the specific location within the City that is subject to redesign, reconstruction, or in a rare case of a new street. The first step is to reference the Street Typologies map (Figure 1-7) to determine the specific typology of the street in question. The second step is to determine if any overlays exist for that street segment or intersection. This may involve referencing previous plans (Figure 1-8) or gathering other available relevant data. Based on the street's typology and any specific overlays, one can then use the Design Guidelines to assemble the street based on guidance for each of the different realms (Figure 2-2). This final step should be influenced by the specific guidance based on the street's typology, street overlays and must evaluate the potential of inclusion of green infrastructure within the design. The Design Guidelines also provide overall design principles and design elements associated with intersections and traffic control devices. Intersections and traffic control devices themselves are not necessarily associated with a specific typology. However, overlays should influence design elements associated facilities. The street design process is generalized in Figure 2-3.

FIGURE 2-3 STREET DESIGN PROCESS

A fundamental element of the Design Guidelines is the inclusion of green infrastructure in the street design process. As part of design of all streets and intersections, the designer should evaluate if green infrastructure can be included in design elements or as part of the street surface itself. The evaluation of green infrastructure opportunities comes after the street typology and any overlays have been identified. The street typology and overlays provide geometric guidelines, modal hierarchy and will define any other specific criteria within the design process. Figure 2-4 provides an overview of the process of selecting specific green infrastructure elements, and general landscape elements, from the range of design choices. In this process, the street designers must be aware of goals related to the management of stormwater flows and water quality, the built and environmental context, and transportation function of the street (see Chapter 5 for more information).

FIGURE 2-4 GREEN INFRASTRUCTURE EVALUATION PROCESS

1 IDENTIFY APPLICABLE STREET TYPE, OVERLAYS AND OTHER CATEGORIES

- Street type
- Overlay
- Safe Routes to School, Specific or Area Plans, Priority Development Area

2 IDENTIFY ENVIRONMENTAL CONTEXT

- Underlying soil and hydrology conditions (feasibility of infiltration, groundwater recharge)
- Pollutant Management (surface and subsurface)
- Tree Canopy
- Localized Flooding
- Others Conditions (use Environmental Context Check List - see Appendix H.2)
- Location within a watershed or proximity to Bay

3 IDENTIFY BUILT CONTEXT AND CONSTRAINTS

- Adjacent land use and built context
- On-street parking
- Drainage patterns (including tributary areas that may concentrate flows within the right-of-way)
- Location and capacity of existing stormwater utilities (lines and inlets)
- Longitudinal and cross-slopes
- Potential conflicts with underground utilities, drain inlets, fire hydrants, driveways

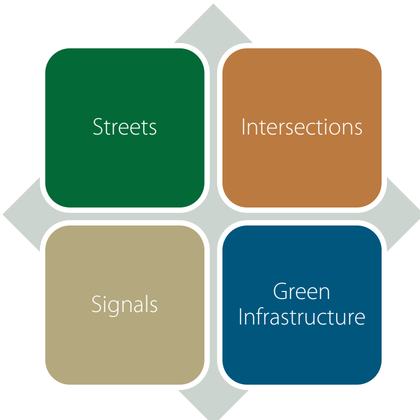
4 SELECT COMPLETE AND GREEN STREETS ELEMENTS

- Set Complete Streets and Green Streets goals for the project in question
- Select appropriate Complete Streets and Green Streets Elements (including green infrastrcuture and general landscape elements)
- Strive for close integration of Complete Streets and Green Street Elements

5 DETAIL DESIGN OF GREEN INFRASTRUCTURE ELEMENTS

- Minimize project's impervious surfaces
- Maximize and design landscape based components as appropriate to site context
- Size and design green infrastructure features for site context following provided design guidance *
- Return to Step 4 to evaluate other Green Street elements if unforeseen issues arise

DESIGN GUIDANCE



The contents of the Design Guidelines are organized by streets, intersections, signals, and green infrastructure. Chapter 3 "Along the Street" provides guidance based on the three street realms including the pedestrian realm, flexible realm and the travel realm. This chapter also provides guidance on special street types such as yield streets or shared spaces. Guidance on intersections and signals are included in Chapter 4. Finally, detailed guidance on various green infrastructure elements is provided in Chapter 5. While the chapters themselves are ordered in this manner, they are not intended to be used sequentially. Instead, it is presumed that frequent cross referencing is necessary, particularly for the green infrastructure chapter.

KEY PARTNERS

The steps in the street delivery process are primarily implemented by the San Mateo Department of Public Works. However, certain elements of the street engage other local partners (Figure 2-5). Here, coordination is critical to ensure that opportunities are not missed to make street improvements in conjunction with other efforts. Similarly, coordination will prevent redundant work, saving public funds. For example, most utilities (electricity, cable and internet, non-drainage specific water lines) are located within the street (beyond the gutter pan of the curb).

Because most utility maintenance requires traffic disruptions and some level of street construction, it is best to consider other street reconfiguration or reconstruction needs at the time of such work. Currently, the City of San Mateo has ongoing quarterly coordination with various utility providers whereas other coordination meetings should continue to occur on an as-needed basis.

FIGURE 2-5 SAN MATEO STREET DESIGN PARTNERS

STREET ELEMENT	PARTNER	COORDINATION PROTOCOL
Electricity	Pacific Gas and Electric	Quarterly Utility Coordination Meeting
Cable and Internet	Comcast, Astound, U-verse, Others	Quarterly Utility Coordination Meeting
Water Meters and Lines	CalWater	Quarterly Utility Coordination Meeting
City-maintained Landscaping	San Mateo Parks and Recreation	Internal San Mateo Service/Work Orders
Throughways for Emergency Vehicles	San Mateo Fire Department	As-needed Meetings
State-owned Streets	Caltrans	As-needed Meetings

CHAPTER 3 : **DESIGN GUIDANCE – ALONG THE STREET**

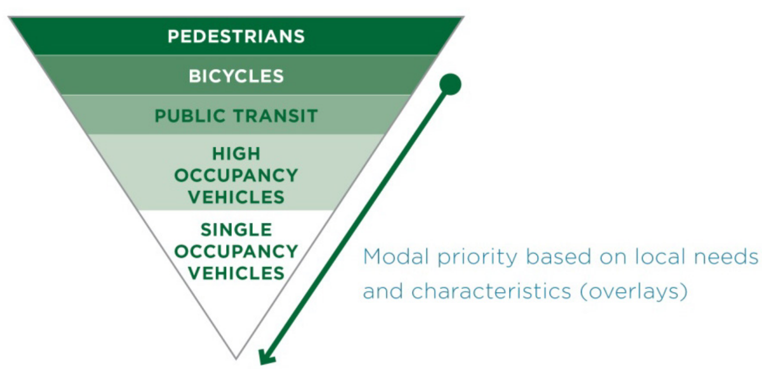
This chapter focuses on linear portions of streets (between intersections) and provides guidance on cross-section geometries based on a street's typology and local context. In addition, the chapter outlines the applicability of various green infrastructure and other transportation-specific elements that may be applied along the street. Guidance on street furniture and lighting (applicable to streets and intersections) can be found in Chapter 6.

DESIGN PRINCIPLES

Streets in San Mateo shall be designed with the following principles in mind.

» **Pedestrians are the Top Priority:** Every trip in San Mateo begins and ends with walking. Thus, all street designs should prioritize pedestrian movement first. This must include designing for a range of pedestrians, from healthy young adults to elderly residents using a mobility device. This is reflected in Figure 3-1.

FIGURE 3-1 STANDARD MODAL PRIORITY FOR STREETS



» **Local priorities above regional needs:** Unless specifically stated otherwise, all streets in San Mateo shall place local access needs above regional mobility needs. Examples include streets that support local commerce, placemaking, and pedestrian and bicycle safety.

» **Accommodation for all users**: Excluding freeways, all streets shall accommodate all types of users, including pedestrians and cyclists. In some cases, overlays will specify streets that should maintain special priority for one type of user over others.

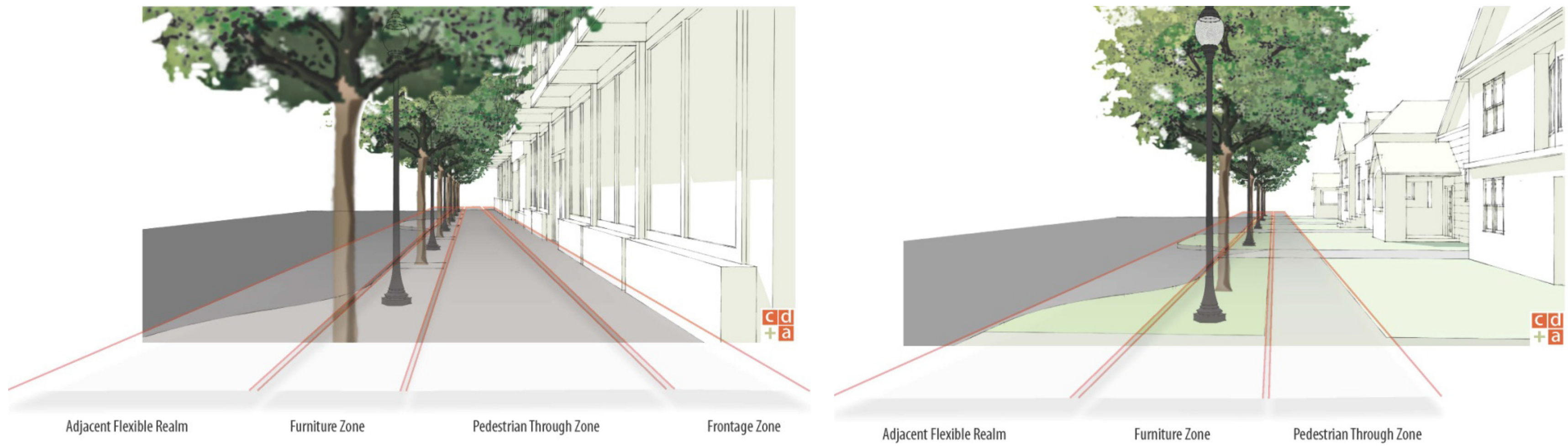
» **Safety through design (reducing injuries and fatalities):** Streets shall be designed to reduce all types of transportation-related injuries and fatalities. Street designs shall consider past injury data and appropriate countermeasures to prevent collisions in the future.

» **Action, observation, improvement:** Street improvements do not need to be permanent. A pilot-project approach that allows for the temporary testing of street improvements should be considered to help develop street improvements that produce measureable benefits and achieve desired outcomes.

» **Sustainable Streets include Green Streets:** Green Streets infrastructure shall be included as an integral part of San Mateo's street-design process and management of stormwater.

» **Design proactively, not reactively:** Street designs should be approached from a standpoint of "how should this street function?" as compared to "how will this street function given existing conditions?" As an example, streets should be designed with a preferred speed or volume, rather than of simply accepting existing conditions.

FIGURE 3-2 PEDESTRIAN REALM IN COMMERCIAL AND RESIDENTIAL CONTEXTS



Source: CD+A

PEDESTRIAN REALM[7]

The pedestrian realm includes more than where a concrete sidewalk is present, but the entire width from the curb or road edge to the property line. The pedestrian realm is divided into three additional sub-zones known as the frontage zone, pedestrian through zone and the furniture zone as shown in Figure 3-2.

Generally speaking, pedestrian facilities should always be installed on both sides of the street, except in applications where people are expected in the street (aka shared space) such as a residential cul-de-sac, park, or commercial pedestrian mall that has occasional service traffic. In addition, when installing new pedestrian facilities or upgrading existing ones, the City must ensure compliance with the Americans with Disabilities Act (ADA). All design standards in this section meet or exceed ADA.

FRONTAGE ZONE

The *frontage zone* is the space between property line and the edge of the pedestrian through zone. The frontage zone might contain shop displays, restaurant seating, merchandise for sale, or landscaping. The "shy distance" from buildings and space for open building doors should also be included in the frontage zone. In areas with lower densities such as single family homes, the frontage zone is typically narrow since property lines (and typically

[7] The Pedestrian Zone and its subzones are consistent with the *Pedestrian Master Plan*'s "Sidewalk Zones." However, cross section dimensions in this document shall supersede those in the *Pedestrian Master Plan*.

lawns) come up to the sidewalk. A minimum frontage zone width of one (1') foot is recommended to provide a setback to fences and other elements placed on property lines, and to allow easy maintenance of the sidewalk.

PEDESTRIAN THROUGH ZONE

The *pedestrian through zone* is the place for pedestrian travel. It should be completely free of obstacles and protruding objects, and should be a minimum of five (5') feet wide. This provides enough space for two pedestrians to walk comfortably side by side. In commercial (downtown and mixed-use) contexts, the pedestrian through zone should be at minimum (6') feet wide. The pedestrian through zone should never be less than four (4')[8] feet, even at pinch points; this is the width required to meet ADA guidelines for the "pedestrian access route." Street furniture or poles associated with signs or signals should not be placed in through zone.[9]

FIGURE 3-3 EXAMPLES OF ZONES OF THE PEDESTRIAN REALM

FRONTAGE ZONE

Space for sidewalk cafes, awnings, vendors, doorway openings. On streets with front lawns without fences, the frontage zone is effectively zero. However, some space (up to 1') should remain to ensure easy maintenance (cleaning, resurfacing) of the pedestrian through zone.

PEDESTRIAN THROUGH ZONE

Space for pedestrian travel. Should be clear of obstructions, similar to a roadway, and maintain a direct, straight path.

FURNITURE ZONE

Paved or planted area for pedestrian amenities, trees, or street infrastructure (fire hydrant, signs, utilities).

Photo Sources: CD+A

[8] Current ADA standards require three (3') feet, but draft guidelines (future standards) require four (4') feet.

[9] Full text of ADA can be found at: http://www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way

FURNITURE ZONE

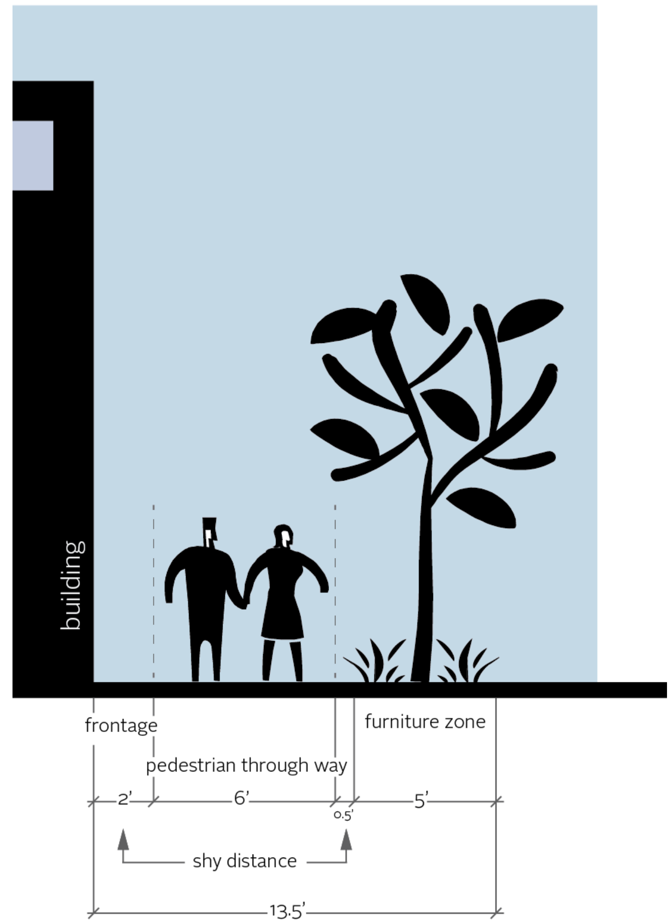
The *furniture zone* is where pedestrian amenities and street infrastructure are placed. This zone can be paved or planted and is often an area of opportunity for stormwater management treatments. When right-of-way is available, this zone should be increased beyond the standard size and when on-street parking is present it also provides space for opening vehicle doors. In areas with high pedestrian traffic, this zone may need to facilitate a greater magnitude of street furniture such as bicycle and newspaper racks, trash bins, and pedestrian scale street lighting. In other areas, this zone may simply serve as a buffer from travel lanes when no on-street parking is present. Also see furnishings in the *Pedestrian Master Plan* and Chapter 6 of this document.

PEDESTRIAN REALM GEOMETRIES

Selecting widths for the pedestrian realm and its subzones (frontage, pedestrian through, and furniture zone) requires compromises based on the total available width and the priorities of the street. For example, streets with street trees require additional furniture zone width to accommodate the tree bulb, whether under a tree grate or landscaped, to allow for healthy tree growth. The extent of the additional width to accommodate street trees may be reduced through use of tree grates, extending the landscape area with curb extensions into the parking lane, or structural soils to support healthy tree roots. Alternatively, streets with sidewalk cafes or retail shops may require a larger frontage area to accommodate those uses.

Figure 3-5 provides target, constrained (minimum), and maximum dimensions for various elements that fall within the pedestrian realm based on the street type and local context.

FIGURE 3-4 PEDESTRIAN REALM EXAMPLE



Assembling the pedestrian realm must weigh factors of estimated pedestrian volumes and context of the street (e.g., street cafes, need for bicycle racks, street trees) while attempting to maintain the target width of the pedestrian through zone

FIGURE 3-5 PEDESTRIAN REALM DIMENSIONS (IN FEET)

		EL CAMINO REAL			MAJOR AND MINOR CONNECTORS			ACCESS		
ZONE		FRONTAGE	PEDESTRIAN THROUGH	FURNITURE	FRONTAGE	PEDESTRIAN THROUGH	FURNITURE	FRONTAGE	PEDESTRIAN THROUGH	FURNITURE
Downtown	Target	3	8	6	3	12	6	-	-	-
	Maximum	8	no maximum	10	8	no maximum	10	-	-	-
	Constrained	1	6	4	1	8	4	-	-	-
Commercial / Mixed-Use	Target	3	8	6	3	8	6	1	6	6
	Maximum	5	12	10	5	12	10	2	8	8
	Constrained	1	5	4	1	6	4	1	5	4
Neighborhood (Major Connector)	Target	-	-	-	1	6	6	-	-	-
	Maximum	-	-	-	2	10	6	-	-	-
	Constrained	-	-	-	0	5	4	-	-	-
Neighborhood (Minor Connector)	Target	-	-	-	1	5	5	-	-	-
	Maximum	-	-	-	2	6	6	-	-	-
	Constrained	-	-	-	0	5	2	-	-	-
Neighborhood	Target	1	6	8	-	-	-	1	5	5
	Maximum		10	12	-	-	-	1	6	8
	Constrained	0	4	4	-	-	-	0	5	2
Industrial	Target	1	6	6	1	6	6	1	5	5
	Maximum	3	9	10	3	9	8	4	6	8
	Constrained	1	4	4	1	5	4	0	5	2
Park	Target	1	10	8	1	8	10	1	6	6
	Maximum	2	12	-	2	10	12	2	10	10
	Constrained	0	5	4	0	5	4	0	5	4

Additional Guidance:

- » Sidewalk zones should be designed to provide a straight path of travel for the pedestrian. Thus, through zone widths should not frequently vary along the same block face.
- » The furniture zone should ensure regular access between the pedestrian through zone and the street (e.g., street furniture should not impose a consistent barrier)

Note: The dimensions referenced in this table are generally consistent with those found in the *San Mateo Pedestrian Master Plan*.

PEDESTRIAN REALM ELEMENTS

Along the street, the pedestrian realm will primarily house green infrastructure, street furniture associated with amenities for pedestrians, and street-associated utilities such as lamp posts and fire hydrants. Note that some green infrastructure elements may be placed in more than one realm of the street.

Green Infrastructure and General Landscape Integration

The pedestrian realm offers a broad range of opportunities for the integration of green infrastructure, ranging from vegetated swales in residential areas to infiltration / flow-through planters in commercial areas. Intersections offer significant opportunities for the integration of green infrastructure and general landscaping in addition to those along the street. However, green infrastructure at these locations needs to be sensitive to safety and maintaining visibility for pedestrians, cyclists and vehicles navigating the intersection. See Chapter 5 for more detailed guidance.

Figure 3-6 provides an overview of the applicability for specific green infrastructure and general landscape elements that can be applied within the pedestrian realm. See Chapter 5 for more detailed green infrastructure guidance.

FIGURE 3-6 PEDESTRIAN REALM GREEN INFRASTRUCTURE AND LANDSCAPING APPLICABILITY

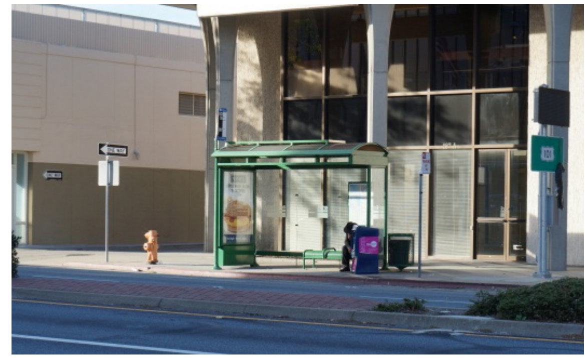
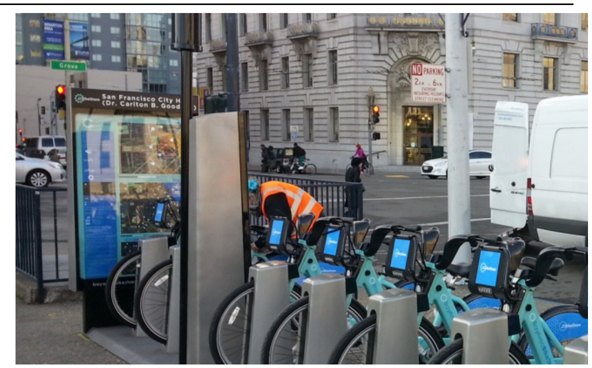
		PEDESTRIAN REALM ELEMENTS				
	ELEMENTS/CONTEXT	DOWNTOWN	COMMERCIAL/MIXED USE	NEIGHBORHOOD	INDUSTRIAL	PARK
Green Infrastructure	Vegetated Swale			●	●	●
	Tree Wells[10]	●	●	●	●	●
	Rain Gardens	●	●	●	●	●
	Infiltration / Flow-Through Planters	●	●	●	●	●
	Pervious/Permeable Paving	●	●	●	●	●
Landscaping	Street trees	●	●	●	●	●
	Understory plantings	●	●	●	●	●
	Container planters	●	●	●	●	●

[10] Includes Individual Stormwater Trees and Linked Tree Wells

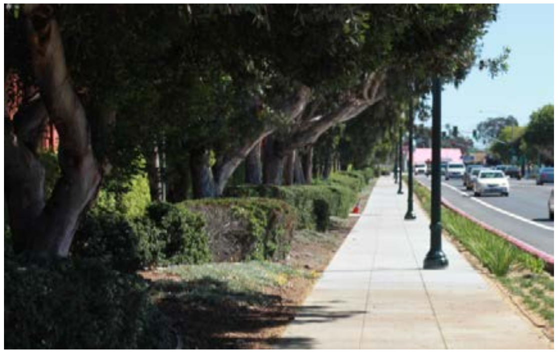
Transportation Elements Integration

Figure 3-7 provides an overview of various transportation related elements that may be considered as part of the pedestrian realm, along with guidance on usage and placement. Guidance on other pedestrian realm elements such as street furniture and pedestrian-scale lighting can be found in Chapter 6.

FIGURE 3-7 PEDESTRIAN REALM ELEMENTS

ELEMENT	DESCRIPTION	GUIDANCE	PHOTOS
Transit Shelters	Transit shelters provide protection from sun, wind and rain while offering a location to post relevant transit information (real time arrival times, maps). Shelters should be prioritized at high ridership locations and must ensure a path of travel within the pedestrian realm.	» Place in accordance with transit agency bus shelter and design guidelines; shelters should not block the path of travel » Provision of shelters should be based on estimated transit ridership at the location[11] » Consider special paving treatments at transit stop locations to delineate the passenger environment from regular pedestrian circulation areas » Choose subtle treatments, such as scoring patterns, as bus stops may be moved from time to time	
Bicycle Share Pods	Bay Area Bike Share docking stations or "pods" provide access to the bike share network. Currently, there are no bike share pods in San Mateo. However, it is a likely expansion City for the bike share network in the future.	» Place in way that discourages riding on the sidewalk and allows users to safety dock/undock bicycles without being in the path of motor vehicle traffic	

[11] Transit shelters should only be placed if other basic transit amenities are already in place (bus stop signage, lighting, level boarding surface, safe sidewalk access)

ELEMENT	DESCRIPTION	GUIDANCE	PHOTOS
Utilities, street lighting, signs, and other necessary obstacles	Power and telephone transmission poles, street light poles, fire hydrants, sign posts, parking meters or pay stations, and other elements that may block the path of travel.	» Street lighting should be pedestrian scale » All poles should be outside of the path of travel, usually in the furniture zone, but may also sometimes exist in the frontage zone	
Pedestrian Furniture (mailboxes, trash receptacles, newspaper racks)	Important pedestrian-serving amenities include benches, mailboxes, trash receptacles, newspaper racks, and drinking fountains. These types of amenities should be logically placed to meet demand and should not obstruct the path of travel along the sidewalk.	» Should be placed in the frontage zone or furniture zone at locations that allow easy access for users and for daily upkeep and operational purposes For additional guidance on the placement and use of pedestrian furniture, see street furniture guidance in Chapter 6.	

ELEMENT	DESCRIPTION	GUIDANCE	PHOTOS
Bicycle Racks	Providing secure locations for bicycle parking is an important component of a multimodal transportation network. Without parking, cyclists are able to reach their destinations, but may not be able to park and lock their bikes, or will lock them to other fixed upright structures, potentially blocking foot traffic. Quantity of parking should be based on estimated demand. High levels of demand may warrant additional bicycle parking capacity through the use of bike corrals or bicycle stacking mechanisms.	» Should be placed in locations that provide visibility (security) and adequate space for bicycles to be secured without difficulty » Placed in an orientation that accommodates the full size of the bicycle without blocking the path of travel For further guidance: *City of San Mateo Pedestrian Master Plan* (A.36 Bike Rack) or *Streetscape Master Plan*	
Shared Spaces	Shared spaces include streets or portions of streets that are considered to be shared by pedestrians, bicyclists, and vehicles. Shared spaces may fall into the pedestrian, flexible, or travel realms.	» Shared spaces are suitable for low-volume streets with vehicle speeds no greater than 10 mph » May be curbless to promote a pedestrian-friendly environment » Can be used in both commercial and residential contexts For additional information, please see the *NACTO Urban Street Design Guide* – Shared Streets or the proceeding Travel Realm section or the Shared Spaces portion of these guidelines (travel realm)	

Photo Sources: CD+A and Nelson\Nygaard

Figure 3-8 describes guidance and design modifications based on specific overlays that may influence the pedestrian realm.

FIGURE 3-8 INFLUENCE OF OVERLAYS ON PEDESTRIAN REALM GEOMETRIES

OVERLAY	GUIDANCE	DESIGN MODIFICATIONS
Pedestrian Greenway or Suggested Routes to Schools	Prioritize pedestrian safety and comfort and high quality pedestrian connections. The City should also consider additional street trees, planting, wide sidewalks and public art on these corridors. (See *Pedestrian Master Plan* Chapter 5.1)	» Reduced crossing distances and emphasis on pedestrian crossing enhancements » Street trees and plantings » Maximum sidewalk widths
Transit Streets	On transit-priority streets, the pedestrian realm should ensure ample width near bus stops for transit shelters, bus stop signage, and capacity for waiting riders.	» Maximize width of pedestrian realm to accommodate transit shelters (when warranted based on stop level ridership)
Bicycle Priority Streets or Suggested Routes to Schools	Bicycle priority streets may require additional bicycle parking (bicycle racks) within the furniture zone. (See *Bicycle Master Plan*, Chapter 5)	» Provide furniture zone width that accommodates bicycle parking (bicycle racks)
Freight Routes	Freight routes are designed to accommodate larger vehicles; however this does not mean that pedestrians are not present.	» No unique design modifications
Caltrain Station Areas	Similar to transit streets, areas surrounding rail stations should expect higher numbers of pedestrians. As a result, pedestrian through zones should be maximized and space for street furniture should be accommodated.	» Maximize pathways and through zones to station » Maximize space for street furniture
Downtown San Mateo	Downtown San Mateo is expected to have the large volumes of pedestrians. Different from areas around transit stations, Downtown should accommodate pedestrians walking at different paces (e.g., window shoppers versus commuters) and have ample pedestrian amenities (benches, newspaper racks, etc.).	» Maximize width of through zones » Maximize space in furniture zone for street furniture and landscaping
Emergency Primary Response Routes	No impact on the pedestrian realm.	N/A

FLEXIBLE REALM

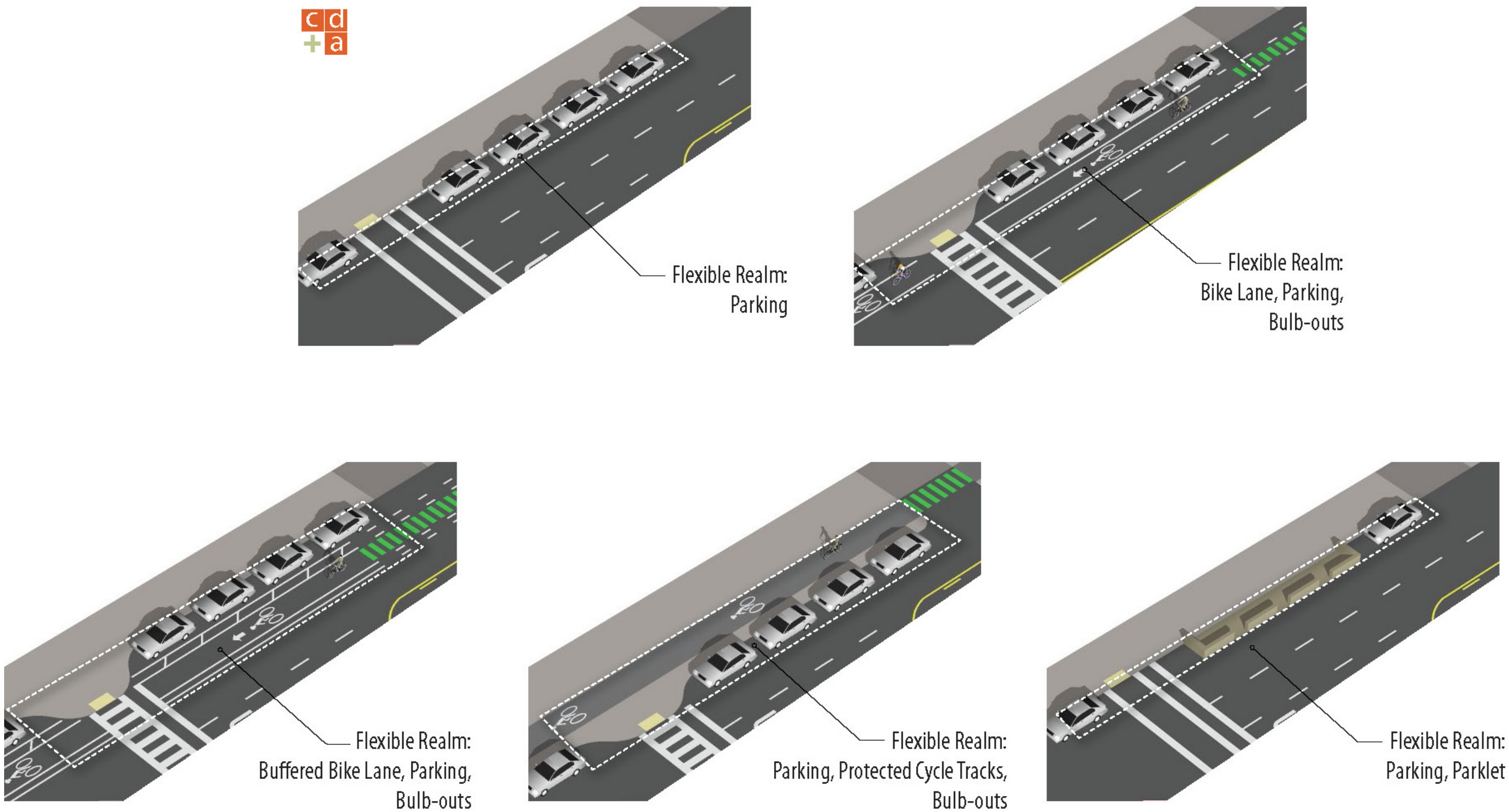
The flexible realm refers to the area between the walkway and roadway. This area accommodates many elements of both driving and walking. It is also the primary place for cycling. In addition to green infrastructure opportunities, the flexible realm typically includes the following key transportation elements along its length:

- **Curbs:** Curbs primarily exist to prevent water and cars from encroaching into the pedestrian realm. Pedestrians must traverse the curb to get from the street to the sidewalk, so providing curb ramps or other transitions is critical to accessibility for people using assistive devices. Curbs may be designed in a way to incorporate green infrastructure or be flush as in a shared space environment. The curb itself is typically just half a foot wide not including the gutter. Common gutter widths are 1', 1.5', and 2'. On-street parking and even bike lane widths can include the gutter width.[12]
- **Bicycle Facilities:** Locating and designing bicycle facilities are often a difficult challenge in street design because cyclists share operational characteristics with both pedestrians and motorists. A high quality facility will separate cyclists from autos, and minimize conflicts between pedestrians and faster moving cyclists. It will provide a direct connection for fast riders, and a leisurely ride for everyone else depending on the overall bicycle volumes. In some situations this may require duplicate facilities on individual streets, e.g. a marked shared lane and a cycle track, or a wide buffered bike lane. For purposes of this guidance, all dedicated bicycle facilities (bicycle lanes, cycletracks, etc.) are considered part of the flexible realm.
- **On-street parking** can be a positive or negative asset for users of the street. On one hand, on-street parking supports storefront retail, slows moving traffic, and protects people on the sidewalk from errant drivers. On the other hand, each parking space is valuable real estate that can be used for curb extensions, bus shelters, bicycle parking, trees, rain gardens, bus lanes, and more. Parking also creates challenges for bicyclists, including conflicts during parking maneuvers and dooring hazards. On-street parking can take various forms including typical parallel parking, diagonal parking (back-in or front-in), or perpendicular parking.
- If used, on-street parking should be clearly designed to not appear as part of the vehicular travel way. This can be accomplished by including curb extensions (so the travel way remains visually narrower where there is no parking), and paving the parking area differently than the travel lanes (concrete or pavers, not asphalt). In addition, project managers are encouraged to explore opportunities to organize parking with street trees, bus stops, and other elements in the flexible realm. In no circumstance should on-street parking be designed in a way where it may be misunderstood as part of the traveled way. Within the flexible realm, parking lanes are typically 7' in residential areas and 8' in commercial areas.
- **Right Turns**: Right turn lanes that align with a parking lane are considered in the flexible realm. The decision to place moving traffic adjacent to the curb (and pedestrian realm) should be balanced with capacity needs for right turning vehicles. Potential merge and turning conflicts with right turns and bicycle facilities should be closely analyzed as right turns by vehicles are among the most frequent causes of bicycle collisions.

[12] Utilizing the gutter pan as part of the width of a bicycle facility should be avoided whenever possible.

The flexible realm can be filled with numerous types of elements serving different types of population. When determining usage for the flexible realm, one must consider the role of the street in the larger transportation network and the local context of the street. Figure 3-9 provides examples of the flexible realm being configured in five different ways, each providing a different local and network benefit.

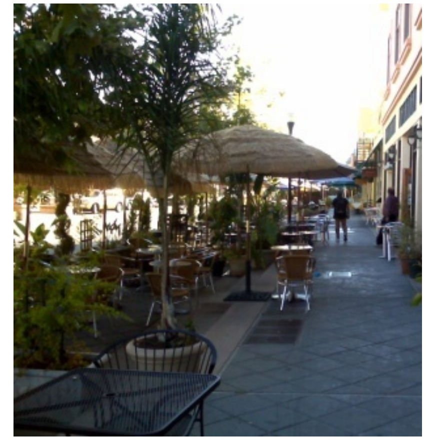
FIGURE 3-9 FLEXIBLE REALM IN CONTEXT



The flexible realm can include various street elements based on the needs of the street and the local land uses.

Source CD+A

FIGURE 3-10 EXAMPLES OF FLEXIBLE REALM USES

MOBILITY	REDUCTION OF CROSSWALK DISTANCES	PARKING	EXPANSION OF PEDESTRIAN REALM
		 	

FLEXIBLE REALM GEOMETRIES

Figure 3-11 provides target, constrained (minimum) and maximum dimensions for various elements that fall within the flexible realm.

FIGURE 3-11 FLEXIBLE REALM GEOMETRIES

		EL CAMINO REAL		MAJOR AND MINOR CONNECTORS		ACCESS
		PARKING AREA	BICYCLE LANE[1]	PARKING AREA	BICYCLE LANE[1]	PARKING AREA
Downtown	Target	8	7	8	6	-
	Maximum	18[2]	8	18[2]	7	-
	Constrained	7	6	7	5	-
Mixed-Use	Target	8	7	8	6	8
	Maximum	18[2]	8	18[2]	7	8
	Constrained	7	6	7	5	7
Neighborhood (Major Connector)	Target	-	-	8	6	-
	Maximum	-	-	8	7	-
	Constrained	-	-	7	5	-
Neighborhood (Minor Connector)	Target	-	-	7	6	-
	Maximum	-	-	8	7	-
	Constrained	-	-	7	7	-
Neighborhood	Target	7	7	-	-	7
	Maximum	8	8	-	-	8
	Constrained	7	6	-	-	7
Industrial	Target	10	7	10	6	8
	Maximum	10	8	10	8	10
	Constrained	8	6	8	5	7
Park	Target	7	7	7	7	7
	Maximum	8	8	8	8	8
	Constrained	7	6	7	5	7

Notes:

1. These bicycle lane widths are for standard bike lanes. A portion of this width may be used to provide a marked buffer between the parking lane and the bike lane. Where gutters are used, the clear width of a bike lane between the edge of the gutter and the center of the bicycle lane should be four feet minimum, or as narrow as three feet in constrained areas for a retrofit project. Where buffered bike lanes, double bike lanes, or cycle tracks are provided, three to five feet of additional width should be provided to allow for overtaking and/or painted buffers or curbed separators.

2. Eighteen feet is the maximum dimension for diagonal parking, as it is the necessary width for 60°, front-in diagonal parking. Flatter angles and back-in parking can be implemented with narrower parking lanes.

FLEXIBLE REALM ELEMENTS

Along the street, various elements may exist within the flexible realm including facilities designed for vehicles, cyclists, pedestrians, or all three at the same time (shared spaces). This section describes the various elements that may exist within the flexible realm.

Green Infrastructure and General Landscape Integration

The Flexible Realm offers a range of opportunities for the integration of green infrastructure and includes both landscaped features, such as stormwater trees and stormwater curb extensions as well as hardscape solutions, such as permeable/porous paving. Figure 3-12 provides an overview of the applicability for specific green infrastructure and general landscape elements that can be applied within the Flexible Realm. See Chapter 5 for more detailed guidance.

FIGURE 3-12 FLEXIBLE REALM GREEN INFRASTRUCTURE APPLICABILITY

	FLEXIBLE REALM				
ELEMENTS / CONTEXT	DOWNTOWN	MIXED-USE	NEIGHBORHOOD	INDUSTRIAL	PARKS
Tree Wells[13]	●	●	●	●	●
Stormwater Curb Extensions	●	●	●	●	●
Pervious/Permeable Paving	●	●	●	●	●
Street Trees	●	●	●	●	●
Understory Plantings	●	●	●	●	●
Container Planters	●	●	●	●	●

[13] Includes Individual Stormwater Trees and Linked Tree Wells

Transportation Elements Integration

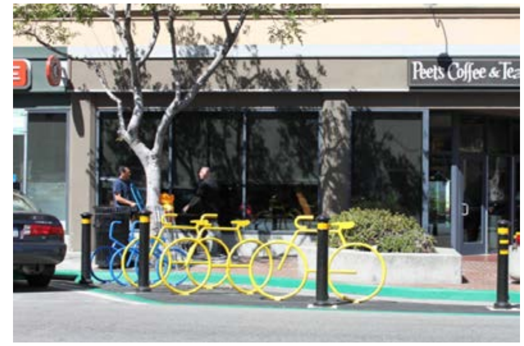
Figure 3-13 provides an overview of various transportation elements that may be considered as part of the flexible realm. Guidance on usage and placement is also provided.

FIGURE 3-13 FLEXIBLE REALM ELEMENTS

ELEMENT	DESCRIPTION	GUIDANCE	PHOTOS
		EXPANSION OF PEDESTRIAN REALM	
Parklets	Parklets are extensions of the sidewalk that are open to the public and typically have street furniture such as benches and tables. It commonly fits within the space of several (2-3) on-street parking spaces. In some cities, parklets are privately owned and maintained, but are permitted through a City process. In other cities, parklets are privately constructed and maintained, but are available for public use.	» The location of parklets is typically generated by private sector demand. However, parklets must not degrade street safety. » Should not be placed in a manner that impedes visibility at street corners nor should they be placed in a way that creates conflicts between parklet users and passing vehicles For additional information and design guidance please use the following resources: *Pedestrian Master Plan* Appendix A.18, A.19 (Flex Use Space Parklets) – includes materials *NACTO Urban Street Design Guide* (Interim Design Strategies) *SF Pavement to Parks Parklet Manual*	

ELEMENT	DESCRIPTION	GUIDANCE	PHOTOS
Curb Extensions (Bulb outs)	Curb extensions along the street provide a variety of benefits. When used at intersections or at a mid-block crossing, curb extensions reduce the crossing distance and improve sight lines between pedestrians and motorists. In addition, curb extensions serve as an expansion of the pedestrian realm or furniture zone allowing for street furniture, trees, or other amenities. Curb extensions can also function as bus bulbs, providing additional capacity for waiting passengers and reducing transit dwell times.	» Mid-block curb extensions can be used when further delineation of on-street parking is necessary or in the presence of a mid-block crosswalk to reduce crossing distance and improve visibility » Curb extensions used at intersections (bulb outs, bus bulbs) are discussed in the intersections section. For further guidance: See *NACTO Urban Street Design Guide* (Street Design Elements – Pinchpoint)	
		BICYCLE FACILITIES	
Bicycle Lanes	Bicycle lanes provide exclusive use of a portion of the roadway for cyclists and are demarcated through pavement markings. Bicycle lanes typically operate in the same direction as vehicle traffic. However, contra-flow bicycle lanes can also be used to aid the overall connectivity of the bicycle network. Typically, bicycle lanes exist on the outside (rightmost) portion of the street next to the travel lanes. However, left-side bicycle lanes may be applied on one-way streets as well.	» Bicycle lane width should vary based on the expected volume of cyclists and shall be no less than 5' Further guidance for bicycle lane design can be found here: *NACTO Urban Bikeway Design Guide* (Bike Lanes) *City of San Mateo Bicycle Master Plan* (A.5 Bike Lanes)	

ELEMENT	DESCRIPTION	GUIDANCE	PHOTOS
Buffered Bicycle Lanes	Buffered bicycle lanes have similar characteristics as conventional bicycle lanes, but have a marked buffer space between the bike lane and the adjacent vehicle travel lane (separation from moving traffic) or parking lane (separation from vehicle door zone).	» Buffered bicycle lanes can be used in any locations in place of a conventional bicycle lane » Streets with higher travel speeds, volumes, or truck traffic may be especially good candidate locations for buffered bicycle lanes » A buffered bicycle lane can be used to replace a travel lane when applicable For further guidance: *NACTO Urban Bikeway Design Guide* (Buffered Bicycle Lanes) *City of San Mateo Bicycle Master Plan* (A.6.6 Buffered Bike Lanes)	
Cycle Tracks (Protected Bicycle Lanes)	Cycle tracks are dedicated bicycle facilities that are physically separated from motor vehicle travel lanes, parking lanes, and sidewalks. In situations where on-street parking is allowed, cycle tracks are located to the curb-side of the parking (in contrast to bike *lanes*). Cycle tracks offer a higher level of comfort than bike lanes and are attractive to a wider spectrum of the public. However, the physical separation complicates designs at intersections and driveways.	» Cycle tracks may be one-way or two-way, and may be at street level, at sidewalk level, or at an intermediate level » They should be separated from motor vehicle traffic by a curb, a median, bollards, or on-street parking » At signalized intersections it is often necessary to signalize through bicycle movements separately from motor vehicle right turn movements For further guidance: *NACTO Urban Bikeway Design Guide* (Cycle Tracks)	

ELEMENT	DESCRIPTION	GUIDANCE	PHOTOS
Bicycle Corrals	Bicycle corrals are on-street bicycle parking facilities that typically replace one or more vehicle parking spaces.	» Should be placed in locations with high trip generation and where there is a likelihood of large volumes of bicycles » Bicycle corrals may be used at intersections as long as they do not block sightlines of pedestrians and vehicles For further guidance: See *NACTO Urban Bikeway Design Guide* (Interim Design Strategies)	
		PARKING	
Car Parking	Parking serves local residents, visitors, and businesses for short-term (high turnover) and longer stays. Parking provides some benefits but also requires a substantial amount of space within the flexible realm that may be used for other uses (as described here).	» On-street parking should be provided in downtown and mixed-use districts. However, all spaces should be evaluated based on competing needs for the space » Parking should be no greater than 8' wide in these districts. In residential areas where on-street parking is available, it should be no greater than 7' wide and should not impede flow of the sidewalk. Exceptions include angled parking as shown at right » Back-in angled parking should also be considered as an alternative to nose-in angled parking	

ELEMENT	DESCRIPTION	GUIDANCE	PHOTOS
		OTHER	
Shared Spaces	Shared spaces include streets or portions of streets that are considered to be shared by pedestrians, bicyclists, and vehicles. Shared spaces may fall into the pedestrian, flexible, or travel realms.	» Shared streets are suitable for low-volume streets with vehicle speeds no greater than 10 mph and may be curbless to promote a pedestrian-friendly environment » Shared streets can be used in both commercial and residential contexts For additional information, please see the *NACTO Urban Street Design Guide* – Shared Streets or the proceeding Travel Realm section	
Other	Additional information about the following flexible elements can be found in the *San Mateo Bicycle Master Plan* Design Guidance - Appendix A and the *NACTO Urban Bikeway Design Guide*. » Colored Bicycle Lanes » Use of manholes and drainage grates when bicycle facilities are present » Bicycle access during construction activities		

OVERLAYS

Figure 3-14 describes guidance and design modifications based on specific overlays that may influence the flexible realm.

FIGURE 3-14 INFLUENCE OF OVERLAYS ON THE FLEXIBLE REALM

OVERLAY	GUIDANCE	DESIGN MODIFICATIONS
Pedestrian Greenway or Suggested Routes to Schools	Prioritize pedestrian safety and comfort and high quality pedestrian connections. The City should also consider additional street trees, planting, wide sidewalks and public art on these corridors through extensions of the sidewalk into the flexible realm. (See *Pedestrian Master Plan* Chapter 5.1)	» Reduced crossing distances and emphasis on pedestrian crossing enhancements » Use of curb extensions and parklets to enhance pedestrian experience
Transit Streets	Transit streets with heavy pedestrian volumes and frequent bus service should consider the use of bus bulbs (at mid-block stops and intersection stops) to increase the available space for transit amenities and for the operational benefits of bus bulbs for transit operations (reducing time transit delay associated with merging back into traffic).	» Priority on curb extensions at intersections and near bus stops (when bus volumes dictate need)
Bicycle Priority Streets or Suggested Routes to Schools	Bicycle priority streets should have a level of bicycle facility investment equivalent to the estimated bicycle volumes. It should be assumed that users of all ages and abilities would use a bicycle priority street.	» On-street or separated bicycle facilities » If both parking and on-street bicycle facilities exist, special attention must be given to minimize risk of "dooring" and hazards associated with cars merging through a bicycle facility to park
Freight Routes	No specific guidance for freight overlay.	» No design modifications
Rail Corridor Plan Station Area	Areas surrounding rail stations should expect higher quantities of pedestrians and cyclists going to and from the station. Thus, an emphasis should be placed on access safety such as safe bicycle facilities and curb extensions for purposes of reducing crossing distances and providing bus bulbs for transit vehicles that may be picking up or dropping off in the vicinity of the station.	» Maximize safe access to and through zones to station » Use strategies to expand pedestrian realm to facilitate higher volumes of pedestrians
Downtown San Mateo	Downtown San Mateo is likely to require both on-street parking (vehicle and bicycle parking) to facilitate merchant activity and expansion of pedestrian areas (such as parklets) to provide space those who may not be walking for mobility but for pleasure.	» Design to accommodate on-street parking and use of elements such as parklets
Emergency Primary Response Routes	No impact on the flexible realm.	» N/A

TRAVEL REALM

Travel lanes are for use by all vehicles, motorized and not. The number and width of lanes should be minimized to the extent possible so that the space can be given over to other modes or landscaping. The travel realm also includes the potential of a median (El Camino Real, Connectors) in the center of the roadway, which can serve as pedestrian refuge space and area for green infrastructure. Typically, the travel realm has two primary uses:

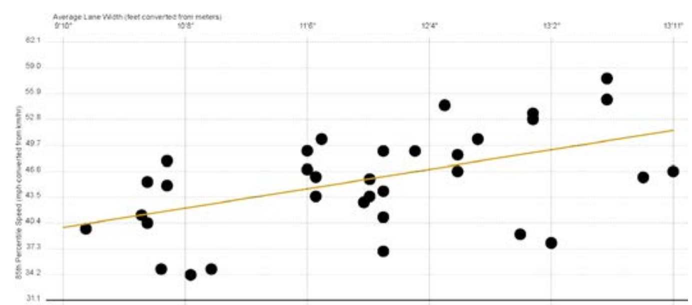
» Vehicle Travel: Travel lanes in San Mateo may range from one to three lanes per direction and should be minimized to the extent possible. For most streets, travel lanes should be 10 feet wide. On bus routes or where truck volumes are high, travel lanes should be 11 feet wide. Travel lanes greater than 11 feet must have special approval from the San Mateo Public Works Commission. Exceptions include industrial streets and streets that have adjacent perpendicular or diagonal parking, outside lanes with high volumes of truck or transit vehicles, or lanes with shared use bicycle markings (sharrows).

Narrower travel lanes facilitate shorter pedestrian crossing distances, reduce the speeding potential, and retain space in the cross-section for other uses of the street. Travel lanes less than 10 feet may be applicable in areas where low-speeds are desired such as yield streets or shared streets (see page 3-31).

» Raised medians / pedestrian refuges: Raised medians within the travel realm provide opportunities for landscaping, street trees, and two-stage pedestrian crossings. Medians that are associated with a pedestrian crossing must be at least 6 feet wide, in order to accommodate a bicycle, a person using a mobility device, or a person pushing a stroller or cart. Medians also provide access control, preventing left turning movements into driveways, which has capacity benefits and improves safety for all users. A median of any width provides this access control purpose, but a median of 10 to 16 feet makes it possible provide left turn lanes approaching intersections or driveways where left turns are desired. If the median is at least 6 feet wide, a median nose can be placed adjacent to the left turn lane, maintaining access control except at the intersection or driveway.

Figure 3-16 provides examples of uses of the travel realm.

FIGURE 3-15 WHY NARROW LANES? THE RELATIONSHIP BETWEEN LANE WIDTH AND TRAVEL SPEED



Why narrower streets? Research shows a relationship between lane width and observed travel speed. "When lane widths are one meter (3'3") greater, speeds are predicted to be 15 km/h (9.3 mph) faster." In places like San Mateo, higher speeds increase the likelihood of transportation related fatalities, especially for non-motorized users. Similarly, studies in urban and suburban settings have found no general indication that the use of lanes narrower than 3.6 m (12 feet) on urban and suburban arterials increases crash frequencies

Source: Fitzpatrick, Kay, Paul Carlson, Marcus Brewer, and Mark Wooldridge, 2000. Design Factors That Affect Driver Speed on Suburban Street. Transportation Research Record 1751: 18-25. And Potts, Ingrid, Douglas Harwood and Karen Richard. 2007. Relationship of Lane Width to Safety for Urban and Suburban Arterials. Transportation Research Board.

FIGURE 3-16 EXAMPLE USES OF THE TRAVEL REALM

Vehicle Travel

Medians and Pedestrian Refuges

TRAVEL REALM GEOMETRIES

Figure 3-17 provides target, constrained (minimum) and maximum dimensions for various elements that fall within the travel realm. In addition, access and alleys may be designed as yield streets or shared spaces which have additional flexibility beyond the geometries listed here.

FIGURE 3-17 TRAVEL REALM GEOMETRIES

		EL CAMINO REAL		MAJOR AND MINOR CONNECTORS		ACCESS[14]	ALLEY[13]
		VEHICLE LANES	MEDIAN	VEHICLE LANES	MEDIAN	VEHICLE LANES	VEHICLE LANES
Downtown	Target	10	12	10	10	-	10
	Maximum	11	20	11	18	-	10
	Constrained	10	6	10	6	-	9
Mixed-Use	Target	11	12	10	10	10	10
	Maximum	11	18	11	16	11	10
	Constrained	10	6	10	6	9	9
Neighborhood (Major Connector)	Target	-	-	10	10	-	-
	Maximum	-	-	11	16	-	-
	Constrained	-	-	10	6	-	-
Neighborhood (Minor Connector)	Target	-	-	10	-	-	-
	Maximum	-	-	11	-	-	-
	Constrained	-	-	9	-	-	-
Neighborhood	Target	10	12	-	-	10[1]	9
	Maximum	11	16	-	-	11[1]	10
	Constrained	10	6	-	-	9[1]	9
Industrial	Target	11	12	10	6	11	-
	Maximum	14	18	14	18	14	-
	Constrained	11	6	10	6	10	-
Park	Target	10	10	10	8	10	-
	Maximum	11	20	11	16	11	-
	Constrained	10	6	10	6	9	-

Note 1: For access streets in neighborhoods, where parking densities are low or there are frequent driveways or other areas that prevent curb parking, a "yield" street can be formed by including a single lane of at least 16 feet in width. (See the Street Variants section for more information about yield streets).

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[14] Access and Alley streets can be designed as "Shared Spaces" or "Yield Streets".
[13] Can be located on medians within the travel realm.

TRAVEL REALM ELEMENTS

The travel realm includes general vehicle travel lanes, turning lanes, medians and special travel lanes such as transit lanes.

Green Infrastructure and General Landscape Integration

The travel realm offers some opportunities for the integration of green infrastructure, mainly in the form of pervious/permeable paving and green gutters on streets without parking. However, additional opportunities exist on streets with medians where general landscaping can be applied. NOTE: In streets with existing medians or where new medians can be built as part of a "road diet", it may be possible to direct stormwater runoff from the roadway toward the median, where green infrastructure elements such as vegetated swales, green gutters or infiltration planters can be integrated into the design of the median (see pages 92 and 93 of the *San Mateo County Green Streets and Parking Lots Design Guidebook* for additional details). Figure 3-18 provides an overview of the applicability for specific green infrastructure and general landscape elements that can be applied within the travel realm. See Chapter 5 for more detailed guidance.

FIGURE 3-18 GREEN STREETS ELEMENTS APPLICABILITY IN TRAVEL REALM

ELEMENTS / CONTEXT:	DOWNTOWN	MIXED-USE	NEIGHBORHOOD	INDUSTRIAL	PARKS
Green Gutters	●	●	●		●
Pervious/Permeable Paving	●	●	●	●	●
Street Trees	●[15]	●[12]	●[12]	●[12]	●[12]
Understory Plantings	●[12]	●[12]	●[12]	●[12]	●[12]
Container Planters	●[12]	●[12]	●[12]	●[12]	●[12]

[12] Access and Alley streets can be designed as "Shared Spaces" or "Yield Streets".

[15] Can be located on medians within the travel realm.

Transportation Elements Integration

Figure 3-19 provides an overview of various transportation elements that may be considered as part of the flexible realm. Guidance on usage and placement is also provided.

FIGURE 3-19 TRAVEL REALM ELEMENTS

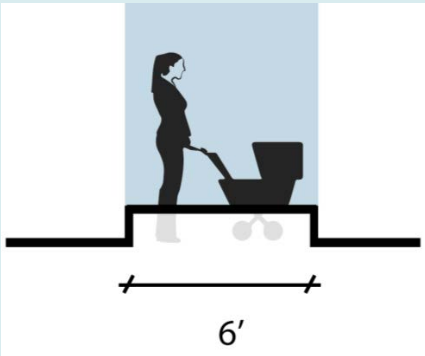
ELEMENT	DESCRIPTION	GUIDANCE	PHOTOS
Transit Lanes (Center or Side-running)	Transit-only lanes currently do not exist in San Mateo but are shown elsewhere to provide 5-25% reduction in travel times for transit vehicles in congested corridors. Side Running: A curb lane would be reserved for exclusive use by buses. It may also be used for general-purpose traffic right-turn movements onto cross streets and for access to adjacent properties. This treatment would speed bus travel times. Center running: A median lane would be reserved for exclusive use by buses. This treatment would speed bus travel times.	» Transit lanes should be applied on corridors with high-frequency transit service or multiple routes serving one street » Transit lanes should be no narrower than 10 feet and should be implemented in conjunction with transit-preferential signals For further guidance: *NACTO Urban Street Design Guide* (Street Design Elements – Transit Streets)	
Travel Lanes	Travel lanes refer to lanes available for general traffic use.	» In general, the total number of travel lanes should be minimized in order to accommodate other users of the street » Any lane widths greater than 11 feet require Public Works Commission approval » Exceptions include industrial streets and streets that have adjacent perpendicular or diagonal parking, outside lanes with high volumes of truck or transit vehicles, or lanes with shared use bicycle markings (sharrows)	

ELEMENT	DESCRIPTION	GUIDANCE	PHOTOS
Bicycle Shared Roadways	Shared roadways (traditionally Class III Bikeways) are those known to have lower traffic volumes, lower traffic speeds (less than 25 mph), and/or design controls that are intended to improve the ease and comfort of cyclists. Shared roadways may be marked with shared lane markings to indicate the presence of cyclists and encourage better bicyclist and motorist behavior. Other signs such as the "Bicycles May Use Full Lane" sign may also be used (CA MUTCD R4-11). Bicycle Boulevards are a special type of shared roadway, where a low-volume, low-speed street is prioritized for bicycles.	» Shared roadways should generally be applied when a low speed differential exists between cyclists and motorists (posted speeds less than 25 miles per hour) » Other potential applications include downhill roadway segments or streets where traffic signalization (timed signals for 12-16 mph) is used to control speed For further guidance: *NACTO Urban Bikeway Design Guide* (Shared Lane Markings, Bike Route Wayfinding) *City of San Mateo Bicycle Master Plan* (A.6.2, A.6.3 Bike Routes) Bicycle Boulevards are typically applied to local access streets by modifying intersection traffic controls, providing enhancements to assist bicyclists with crossing busy streets, and implementing features to discourage through motor vehicle traffic. *AASHTO Guide for the Development of Bicycle Facilities* (4.10 Bicycle Boulevards)	

ELEMENT	DESCRIPTION	GUIDANCE	PHOTOS
Turn Lanes	Turn lanes may be used on El Camino Real and connector streets to shift both right- and left-turning vehicles out of through travel lanes. On two-way streets, left turn lanes can have a significant impact on traffic capacity and safety by providing a place for a left-turning motorist or bicyclist to yield to oncoming traffic or to wait for a signal phase outside the through travel lanes. Right turn lanes and left turn lanes on one-way streets allow for deceleration on higher-speed roadways, and can have modest increases in capacity at controlled approaches to intersections.	Left Turn Lanes: » On multi-lane roads, allowing unprotected left turn movements without left turn lanes is not recommended, due to safety concerns. Traffic operations should be analyzed to determine whether left turn lanes should be provided. » Left turn lanes should typically be 10 feet wide, or 11 feet if buses or trucks will frequently be making left turns » Left turn lanes can be provided on roads with raised medians at least 10 feet wide, by dropping or narrowing the median approaching left turn locations » At other locations, left turn lanes can be provided by eliminating or reducing the width of other cross section elements at intersections Right Turn Lanes: » Right turn (deceleration) lanes (and left turn lanes on one-way streets) should be used sparingly and in conjunction with measures that reduce corner radii (see intersections) » Special considerations must be given for turning lanes that cross a bicycle facility (bicycle lane) For further guidance: NACTO Bikeway Design Guide (Intersections – Through Bike Lanes and Combined Bike Lane/Turn Lane)	

ELEMENT	DESCRIPTION	GUIDANCE	PHOTOS
Median Islands / Mid-block Crossings	Median islands provide access control, shorten the pedestrian crossing, and provide a refuge for slower pedestrians. Medians can run down the length of the road or can be added as crossing islands, and can be used at intersections or midblock.	» At mid-block crossings of four lanes or wider, a median island should be used to provide pedestrian refuge » Medians should be at least 6 feet wide to accommodate users waiting with carts or strollers For additional information regarding the application of mid-block crossing median islands, refer to the following guidance: *San Mateo Pedestrian Master Plan* (A.17 – Pedestrian Refuge Island and A.24 Crossing Beacons) *NACTO Urban Street Design Guide* (Intersection Design Elements – Pedestrian Safety Islands)	
Other Speed Management Techniques (Traffic Calming)	Traffic calming strategies and interventions (chicanes, speed cushions, lane narrowing) can be used within San Mateo per the Neighborhood Traffic Management Program guidelines to help ensure safe speeds on neighborhood and mixed-use streets.	» Traffic calming strategies should be applied per the Neighborhood Traffic Management Program process » Strategies in that document in addition to guidance in the NACTO Urban Street Design Guide can be applied to help physically enforce target speeds » Vertical deflection (such as speed tables or speed cushions) should be developed in coordination with the San Mateo Fire Department For further guidance: *NACTO Urban Street Design Guide* (Curb Extensions, Speed Reduction Mechanisms)	

USE OF MEDIAN ISLANDS



Medians serve as important refuges for pedestrians to wait when crossing the street. These refuges must be at least 6 feet wide to safely accommodate a bicycle or a person with a stroller or other cart when waiting.

Medians can become places with the addition of seating and landscaping

OVERLAYS

Figure 3-20 describes guidance and design modifications based on specific overlays that may influence the Travel Realm.

FIGURE 3-20 INFLUENCE OF OVERLAYS ON THE TRAVEL REALM

OVERLAY	GUIDANCE	DESIGN MODIFICATIONS
Transit Streets	Transit streets will likely have a higher volume and frequency of buses. As such the travel realm should be designed to accommodate those vehicles, and ensure their schedule reliability when possible.	» Transit streets may require lane widths up to 11 feet to accommodate bus volumes » "Inside" travel lanes should be reduced to reduce crosswalk distances. Outside lanes (where buses typically travel) should remain at 11 feet or less » Transit-only lanes should be considered within segments to maintain travel time reliability for transit
Bicycle Priority Streets or Suggested Routes to Schools	In situations where a dedicated bicycle facility may not possible, larger lane widths may be used in association with shared lane markings and speed control devices. However, dedicated facilities are preferred on bicycle priority streets. Alternatively, there are multiple travel lanes, a road diet (conversion of four-lane to two lane with two-way left turn lane) or replacing the outside lane with a bicycle facility may be appropriate.	» See design guidance for "Bicycle Shared Roadways" » Traffic calming or speed control strategies should be employed to ensure safe speeds if cyclists will be utilizing the travel realm » If a road diet is employed, excess through lane space can be converted to bicycle facilities and/or two-way center left turn lanes
Freight Routes	Freight streets may require lane widths greater than 11 feet. A determination must be made based on the volume and frequency of larger vehicles.	» Larger lane widths (greater than 11 feet) may be necessary to accommodate higher volumes of trucks with trailers
Rail Corridor Plan Station Area	Travel realm should consider the high number of pedestrians and cyclists that may be present near station areas.	» Minimize lane widths to reduce intersection crossing distances
Downtown San Mateo	Within downtown, vehicle speeds should be slower, given the presence of large volumes of pedestrians and cars pulling in and out of parking spaces.	» Minimize lane widths to reduce intersection crossing distances » Reduce speeds using traffic calming to ensure safety » Employ medians and mid-block crossings to facilitate varied pedestrian desire lines
Emergency Primary Response Routes	Emergency vehicles will predominately be using the travel realm as part of their emergency response route.	» Ensure elements such as medians and traffic calming are compatible with emergency response routes. This may include rollable curbs or truck aprons to ensure fire apparatus with larger turning radii are not inhibited

STREET VARIANTS

Streets in the **Access** and **Alley** category have lower traffic volumes and reduced travel speeds as compared to other street categories. As a result, these streets would be suitable for street design standards that limit vehicular speeds through design. Two examples of street design variants include:

- **Yield Streets:** Yield streets are designed to allow two-way circulation, but are narrow enough so that vehicles must yield to one another to pass. On a yield street, when two vehicles approach each other from opposite directions, one vehicle needs to pull into a gap in parking in order to let the other vehicle pass. Yield streets can be applied in locations with low traffic volumes and gaps in parking lanes created by driveways, fire hydrants, or general low parking density.

A yield street should be wide enough to accommodate two cars to pass side-by-side in some sections, but should be generally constrained to encourage slower travel speeds. As an example, a yield street may include elements like "neck-downs", or one to two adjacent or staggered curb extensions that limit the travel way (in both directions) to as little as 16 feet, forcing oncoming traffic to yield to each other. Yield street "pinch points" should be used as needed to control speed as to not unduly constrict mobility on the street or inhibit the movement of larger vehicles on residential streets such as garbage trucks or fire apparatus.

- **Shared Space:** Shared spaces include streets or portions of streets that are considered to be shared by pedestrians, bicyclists, and vehicles. Shared streets are suitable for low-volume streets with vehicle speeds no greater than 10 mph and may be curbless to promote a pedestrian-friendly environment. Shared streets can be used in both commercial and residential contexts. For additional information, please see the *NACTO Urban Street Design Guide* – Shared Streets.

Low-volume residential streets and many of the rolled curb neighborhood streets in San Mateo may be candidates for these types of street variants.

FIGURE 3-21 EXAMPLES OF SHARED SPACE IN SEATTLE, WA

Bell Street in Seattle, WA's Belltown District is a single-plane shared street that also accommodates transit vehicles.

SPECIAL DESIGN CONSIDERATIONS

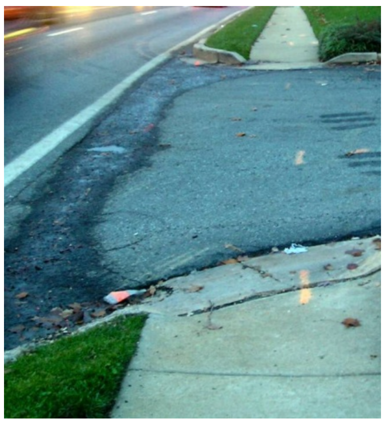
The guidance in the following section is applicable in specific situations in San Mateo.

Driveway Design

Driveways provide access to local land uses but also reduce the continuity of the sidewalk and increase the opportunities for pedestrian collisions. For all street contexts except access streets, driveways should be consolidated as much as possible. Where driveways do exist, the sidewalk should continue across the driveway at its normal level to provide a level plane for pedestrians. In addition, the addition of medians may help manage left turns into driveways (from opposing lanes of traffic).

At driveways with high vehicle volumes, adjacent parking parallel parking spaces may be considered for removal to improve sightlines.

FIGURE 3-22 POOR DRIVEWAY DESIGN

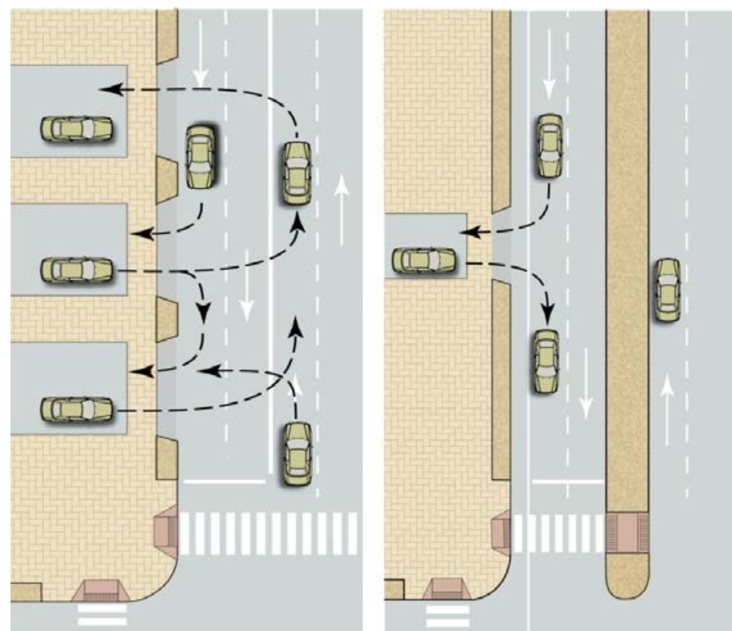


Private driveways and alleys should not require a curb ramp. Instead, they should be flush with the sidewalk

FIGURE 3-23 DESIRED DRIVEWAY DESIGN

This driveway ramps up to sidewalk level and uses sidewalk material (however, lacks proper truncated domes demarcating the traveled way)

FIGURE 3-24 DRIVEWAY MANAGEMENT



When possible, driveway access should be consolidated to reduce the number of curb cuts

Rolled Curbs

Some residential portions of San Mateo currently have rolled curbs instead of vertical curbs. Rolled curbs provide an initial advantage in that new driveways along the street do not require cutting the curb. However, rolled curbs do not provide a strong delineation between the street and the sidewalk, thus they facilitate vehicle parking on the sidewalk. During new development or reconstruction, rolled curbs should be converted to traditional vertical curbs (exceptions are shared streets).

FIGURE 3-25 ROLLED CURBS IN SAN MATEO

Rolled curbs often encourage parking on the sidewalk and in many situations, are used in place of the sidewalk altogether. Rolled curbs should be replaced with vertical curbs and sidewalks during reconstruction projects.

Opportunity Sites

Paved areas not specifically used as part of the travel realm should be considered an opportunity site. In some situations, these spaces could be converted into curb extensions or could be used to reduce crossing distances at mid-block crossings. If the opportunity site does not provide enough space for a permanent modification, the area should be striped to size the traveled way to the correct lane width.

FIGURE 3-26 OPPORTUNITIES FOR CURB STRIPING

Excess pavement should be treated as opportunity sites for curb extensions, green infrastructure, or lane narrowing (shown above).

CHAPTER 4 : **INTERSECTIONS**

Intersections are the decision points for all modes of travel – and are also the locations at which the vast majority of collisions occur. These Design Guidelines are not able to provide specific guidance at every intersection given the vast complexities and variables at play. However, they provide overarching principles that should be followed to generally improve overall safety for all users and reduce intersection complexity (and opportunity for error).

DESIGN PRINCIPLES

Intersections are the locations where users make decisions and are ultimately spaces shared by all users. As a result, they are locations where collisions and conflicts occur most often. Given the complexities associated with intersection design, formulaic design standards cannot be applied as they might be in the *Along the Street* section of this guide. However, several overarching principles and guidance on critical intersection design issues can be applied to ensure that intersections operate safely and achieve goals of the Sustainable Streets Plan. Intersections in San Mateo shall be designed with the following principles in mind.

» **Make Intersections Compact and Simple:** Compact intersections reduce pedestrian crossing distances and minimize opportunities for errant traffic movements, which increase opportunities for collisions. Skewed or multi-leg intersections introduce high turning speeds and unusual conflicts. Such intersections should be realigned whenever possible. Intersections that cater to high volumes of freight traffic should be designed to safety accommodate those vehicles. Consider strategies such as relocating stop bars before expanding the size of an intersection.

» **Analyze Intersections as a Network:** San Mateo's street grid provides a robust and redundant traffic network. Thus, intersections and intersection improvements should be analyzed in the context of the street network, not in isolation.

» **Design Intersections Using Space and Time:** Geometrics (space) and signalization (time) should be used in tandem to create intersections that support safe operations for all users. Whenever possible, increases in roadway capacity at intersections should be accomplished by operational techniques first and geometric expansion only if necessary.

» **Build for the Present, Accommodate the Future:** Building excess capacity induces additional travel demand; thus, intersection capacity should be based on tolerable congestion levels versus assumed growth in congestion.

» **Manage Speed Through Intersections**: Intersections are shared spaces and are the location of most collisions. As a result, speeds (especially turning speeds) should be managed through design and signal timing.

» **Minimize Delay for All Modes:** Signal phasing should minimize delay for all modes, rather than favoring one mode over all others

» **Integrate Green Infrastructure:** Stormwater management is key at intersections as this is usually where existing storm drainage infrastructure, such as inlets, are located and that curb extensions installed to narrow crossing distances can cost-effectively double as green infrastructure features

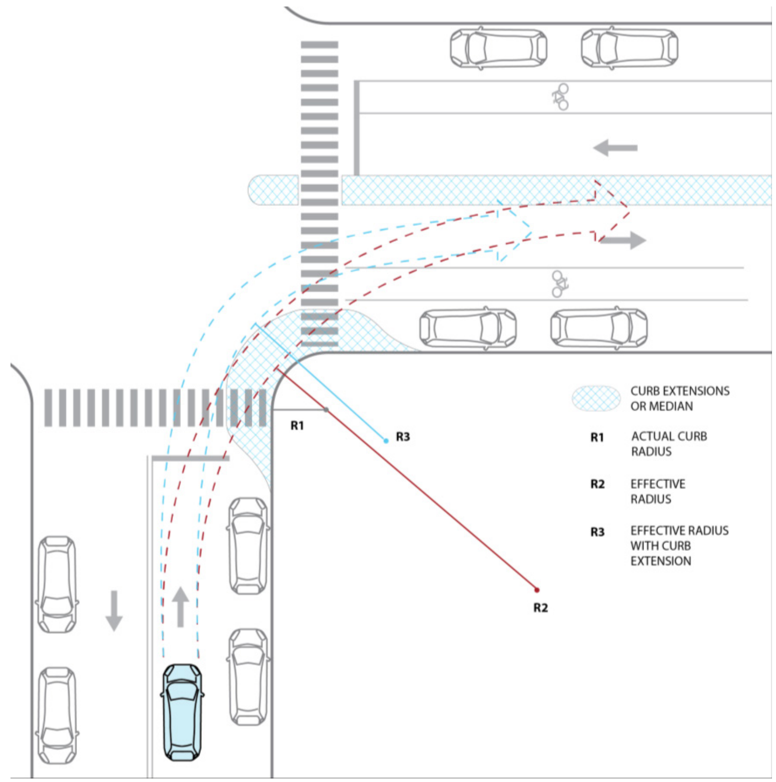
CRITICAL DESIGN ISSUES

CORNER DESIGN

Corner design is critical to Complete Streets, as it affects driver turning speeds, pedestrian crosswalk placement and length, and sight lines. Turning radius is the path of a vehicle's wheels, and curb radius is the actual radius of the curb. Corner design is dictated by the design vehicle used to create an intersection. San Mateo should use the smallest design vehicle that frequently turns at an intersection to keep intersections compact. There are several ways to minimize turning speeds through corner design:

- Limit passenger vehicle turning speeds to 15 mph by restricting their actual turning radius. This is accomplished by restricting the effective turning radii via smaller corner radii, curb extensions and medians.
- Do not use a larger design vehicle than necessary. For neighborhood streets in San Mateo, the DL-23 design vehicle (like a FedEx or UPS truck) should be used as the design vehicle. The SU-30 design vehicle may be used on Major Connectors and El Camino Real. Larger design vehicles may only be used if on a freight overlay or transit routes. Other exceptions may include routes that are designated as Emergency Primary Response Routes.
- Where there are multiple receiving lanes, allow the design vehicle to turn into all receiving lanes
- Infrequent truck traffic (including fire apparatus) can swing into opposing lanes to make turns, and can be paired with a recessed stop line
- Use curb extensions to reduce the effective radius further than can be done by simply reducing the actual corner radius.

FIGURE 4-1 TURNING RADIUS EXAMPLE



Corner speed can be managed through the use of intersection design treatments such as curb extensions and medians.

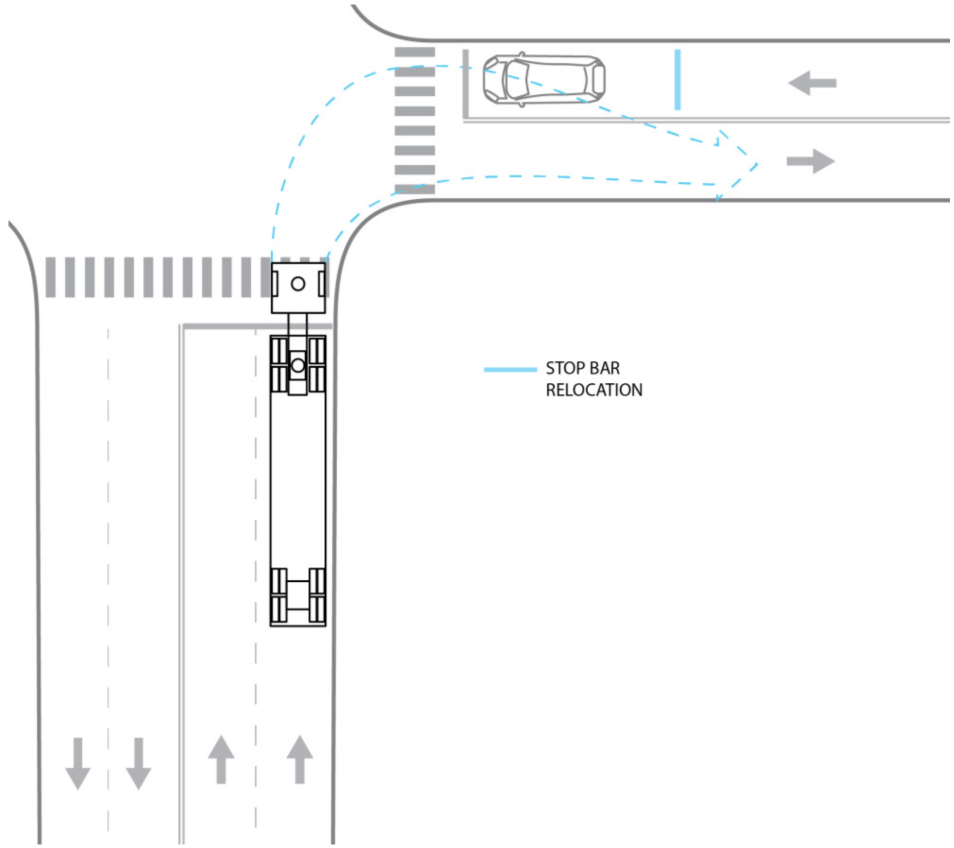
The formula for calculating turning speed is R = V2 / 15 (.01 E + F) where:

- R is centerline turning radius (effective)
- V is speed in miles per hour (mph)
- E is super-elevation. This is assumed to be zero in urban conditions.
- F is side friction factor

V (mph)	E	F	R (ft)
10	0	0.38	18[1]
15	0	0.32	47
20	0	0.27	99

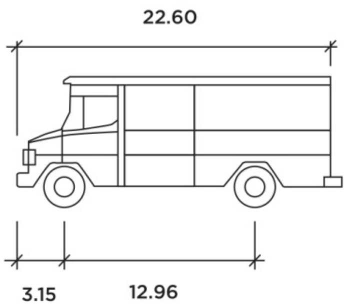
Source: AASHTO. *A Policy on Geometric Design of Highways and Streets. 2011. Formula 3-8.*

FIGURE 4-2 ACCOMODATING LARGER VEHICLES AT INTERSECTIONS



Relocating the stop bar is a simple strategy to maintain a smaller curb radii while accommodating larger vehicle.

FIGURE 4-3 URBAN DELIVERY TRUCK DESIGN VEHICLE



O2	feet
Width	: 7.12
Track	: 7.12
Lock to Lock time	: 6.0
Steering Angle	: 42.0

Urban deliveries are frequently accommodated through smaller vehicles such as delivery trucks (DL-23).

FIGURE 4-4 MANAGING SLIP LANES

As an interim step to modify slip lanes, markings can be used as a way to reduce excess pavement and encourage lower turning speeds

With the above design guidance in mind, San Mateo's streets should generally use a corner radius of 5 feet to 10 feet. Exceptions may include streets as part of a freight overlay, streets that cannot accommodate trucks by using multiple receiving lanes or opposing lanes, or streets as part of a Emergency Primary Response Route that must accommodate larger fire apparatus. Where curb extensions are used or where there is no parking lane or bike lane, the corner radius may need to be larger to accommodate the design vehicle.

Slip lanes (pork chop islands) accommodating right turns are mitigation measures for locations where large radii are necessary to turn large trucks, or at skewed intersections. Their use is not encouraged; however a well-designed slip lane is superior to an expanse of asphalt. If slip lanes do exist, excess width should be striped off as an interim step.

CROSSWALKS

Crosswalks are the portion of the roadway designated for pedestrian use while crossing the street. At intersections, crosswalks legally exist whether they are marked or not and crossings can take place at an intersection or midblock. However, at intersections pedestrians are exposed to turning vehicles as well as through vehicles. The design of all intersections and crossings should seek to minimize exposure distance and time. Specific guidance related to crosswalks includes:

» Crosswalks should be aligned with pedestrian desire lines at intersections (aligned with sidewalk)[16]

» Crosswalks alone do not ensure pedestrian safety; on multi-lane roads with vehicle volumes higher than 15,000 vehicles per day, crosswalks must include treatments such as pedestrian refuges or other pedestrian safety mitigations

» Crosswalks located where speeds are 40 mph or greater should be evaluated for installation of traffic signals or pedestrian hybrid beacons (Rectangular Rapid Flash Beacons (RRFBs) or High-Intensity Activated Crosswalk (HAWK))

» Advanced yield lines should be used at unsignalized marked crosswalks with more than one lane in either direction

[16] In locations with a high level of pedestrian activity, a tracking survey may be a useful tool to design crosswalk facilities that meet pedestrian desire lines.

- Curb extensions should be considered as part of any intersection or mid-block crosswalk design on streets with on-street parking. Curb extensions reduce crossing distances and may also offer opportunities as rain gardens.
- Raised medians are the most effective treatment to improve pedestrian safety and ease of crossing at unsignalized locations; medians should be installed wherever possible at designated crosswalks or where pedestrians simply choose to cross. At intersections, a median "tip" should be used to prevent turning drivers from using the crosswalk as part of the effective turning area.

Special Crosswalk Treatments

- "Continental" crosswalks are preferred over traditional crosswalk markings
- Raised crosswalks or raised intersections (speed tables) may be considered at streets with lower traffic volumes or along the pedestrian priority network or suggested routes to school network. However, they should not be applied on frequent transit routes.
- Consider special paving treatments, such as unit concrete pavers, bricks, textured and colored concrete, stamped asphalt, or concrete, to identify the crosswalk as part of the pedestrian circulation space. (See Pavements and Materials Chapter 6)
- Consider special paving treatments in crosswalks and median refuges at intersections to further enhance the neighborhood, district, or node identity already established by other streetscape elements. (See Pavements and Materials Chapter 6)
- Special paving treatments should not be considered a substitute for standard or high-visibility crosswalk markings required by City or Caltrans standards
- Select special paving for crosswalk applications considering the wear and tear caused by vehicles crossing the paving

For additional guidance associated with crosswalks at intersections, see the *Pedestrian Master Plan* Appendix A and *NACTO Urban Street Design Guide* (Crossings and Crosswalks).

FIGURE 4-5 KEY CROSSWALK ELEMENTS

A well designed crosswalk includes several elements that promote pedestrian safety through visibility, separating conflicts and reducing the potential of high speeds through the crosswalk during turning movements.

CURB RAMPS

Curb ramps benefit many users, including people using wheelchairs or other assistive devices, people pushing strollers or luggage, and children on bicycles. For additional information regarding curb ramps, see *Pedestrian Master Plan* Appendix A.11 (Curb Ramps).

RIGHT TURN LANES

Turn lane geometries are described under the flexible realm. However, generally, dedicated right turn lanes should be avoided as they increase the width of the roadway at intersections and can propagate increased speeds as a vehicle enters a right turn at the intersection. If right turn lanes are used, they should be designed to manage turn speeds through the turn.

ON AND OFF RAMPS

San Mateo has several limited access freeways and numerous on- and off-ramps connected to its street grid. Interfaces to these freeways must be designed to ensure that vehicles leaving or entering the city street grid are doing so at a controlled speed. In addition, pedestrian crosswalks across ramps must be designed to ensure visibility of both the driver and pedestrian. Thus, crosswalks should not be designed in a way that requires a pedestrian to look over his shoulder to see an oncoming vehicle. Similarly, a driver should not approach a crosswalk while rounding a ramp curve.

Additional guidance for on- and off-ramp design can be found in the *San Mateo Bicycle Plan* (A.7.5 and A.7.6).

TRANSIT INTEGRATION

Investments in street improvements can help a community like San Mateo most effectively use local on-street transit services. Transit priority streets have not been formally defined within San Mateo. However, any street with transit frequencies of 15 minutes or less (such as SamTrans route ECR) may warrant street improvements that benefit transit. Intersections provide unique opportunities for transit enhancements as transit stops are often located at intersections, and delays associated with queued traffic at signals and merging back into traffic at bus stops also occur at intersections. The following are specific elements that may be applied to enhance transit experience and reduce transit delay near intersections.

Figure 4-6 describes various elements that impact transit performance near intersections.

FIGURE 4-6 TRANSIT INTEGRATION ELEMENTS

GUIDANCE	DESCRIPTION	REFERENCE	PHOTOS
Bus Stop Placement	Bus stops can be placed either near or far-side of an intersection and in some instances, mid-block	Generally, bus stops at signalized intersections and on uncontrolled legs of intersections should be placed at the far side of the intersection. Bus stops on intersection legs controlled by stop signs can be placed near side (to reduce delay). Other considerations for bus-stop placement include: » Proximity to major pedestrian generators or sensitive populations (seniors, hospitals) » Circulation or other factors limit possible locations of the bus stop » Factors that prevent safe usage of the bus stop (including crossing the street) » Every bus stop is a location where pedestrians will cross the street, and should be designed accordingly » Additional guidance can be found in the *NACTO Urban Street Design Guide* – Street Design Elements – Bus Stops	
Queue Jump Lanes	At signalized intersections, a bus is provided with a lane, adjacent to general-purpose traffic, and an advance green signal indication to bypass congested areas. Buses "jump" the queue of waiting cars.	» Should be used only when a dedicated lane would provide benefit based on length of queues » Transit signal priority or Leading Transit Interval (see Signals) makes queue jump lanes more effective	

GUIDANCE	DESCRIPTION	REFERENCE	PHOTOS
Bus Bulbs (Curb Extensions)	Bus bulbs at bus stops (at the intersection) provide additional queue capacity for passengers waiting for the bus and prevent buses from getting "trapped" by passing vehicles, unable to return to the flow of traffic.	» Only applicable where on-street parking exists » Impacts to traffic flow must be considered (bus stopping delays vehicle flow) Additional guidance can be found in the *NACTO Urban Street Design Guide – Street Design Elements*	

BICYCLE INTEGRATION

Intersections frequently present challenging conflict points between pedestrians and bicyclists. Intersection design in San Mateo should strive to reduce conflicts by providing space for bicyclists at intersections through dedicated bicycle facilities and circulation designs that promote bicyclist visibility by motorists. The *San Mateo Bicycle Master Plan* (Appendix A.7) provides specific intersection and interchange design elements for cyclists. These design strategies in combination with those found in the *NACTO Urban Bikeway Design Guide* are applicable to intersections in San Mateo. These types of design strategies should be prioritized on streets within a bicycle overlay. All street designs should assume that bicyclists will be present. Additional specific guidance for inclusion of cyclists at intersection includes the following:

» Keep intersections compact and avoid complex or skewed intersections, as these increase exposure distance for cyclists, and degrade sight lines between motorists and bicyclists

» Avoid unusual conflicts between bicyclists and motorists at intersections

» Bicycle movements through intersections should be predictable and visible; the path that bicyclists take through intersections should normally be similar to that of motorists, to match driver expectation

» Provide detection for bicyclists in all travel lanes at signalized intersections, as required by the California MUTCD

» Use merging areas and mixing zones to avoid right or left hook type conflicts at intersections

» Avoid free-flow vehicle movements crossing bike lanes (e.g. slip ramps)

PROTECTED BICYCLE INTERSECTIONS

At locations where two major bicycle thoroughfares cross, high volumes of bicycle through and turning movements, intersections may warrant enhancements to further reduce opportunities for vehicle-bicycle conflicts. While the idea of "protected bicycle intersections" has been explored here in the United States, it has not been fully implemented domestically. However, the general design concept is to use a combination of protected (curb-separated) bicycle lanes, queue areas and protected bicycle signal phasing to reduce potential for bicycle-vehicle conflicts.

The full concept of a protected intersection includes static elements and signal phasing to achieve the desired result. A video example of this in operation can be found online.[17] While this design is merely conceptual, various elements within the concept could also be implemented independently to achieve similar effects. Elements include protected bicycle signal phases, two-stage left turn boxes, and wrap-behind bicycle lanes (where the bicycle lane travels behind the bus stop to avoid conflicts with transit vehicles) to reduce conflicts with transit vehicles at bus stops.

GREEN INFRASTRUCTURE AND GENERAL LANDSCAPE INTEGRATION

Intersections offer significant opportunities for the integration of green infrastructure and general landscaping in addition to those along the street. However, green infrastructure at these locations needs to be sensitive to safety and maintaining visibility for pedestrians, cyclists and vehicles navigating the intersection. Figure 4-7 provides an overview of the applicability for specific green infrastructure and general landscape elements that can be applied at intersections. See Chapter 5 for more detailed guidance.

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[17] Protected Intersections. As written by Nick Falbo
http://www.protectedintersection.com

FIGURE 4-7 GREEN INFRASTRUCTURE APPLICABILITY AT INTERSECTIONS

	INTERSECTIONS				
ELEMENTS / CONTEXT	DOWNTOWN	MIXED-USE	NEIGHBORHOOD	INDUSTRIAL	PARKS
Stormwater Trees[18]	●	●	●	●	●
Rain Gardens[19]	●	●	●	●	●
Stormwater Curb Extensions	●	●	●	●	●
Pervious/Permeable Paving	●	●	●	●	●
Street Trees[20]	●	●	●	●	●
Understory Plantings	●	●	●	●	●
Container Planters	●	●	●	●	●

[18] Includes individual stormwater trees and linked tree wells.
[19] Left-over" spaces, i.e. triangular spaces where streets meet at an angle.
[20] Can be located within landscaped areas of roundabouts within intersections.

TRAFFIC CONTROL DEVICES

The operation and performance of the street is a close marriage between the physical design and the use of traffic control devices (e.g. signs, markings, and signals). This section outlines several general principles for traffic control devices in San Mateo.

SIGNAL PRINCIPLES

The following principles will be used to guide signal design in San Mateo:

- Signal timings will be different during off-peak hours than they are during peak hours, to manage automobile speeds when congestion does not mediate traffic flow
- Fixed-time signals are preferred over actuated signals
- Both signal phases and cycle lengths should be kept to as short as possible
- Pedestrian countdown signals shall be installed at all new or upgraded signals
- All signals shall utilize a pedestrian walking speed of 3.5 feet per second for calculating the pedestrian clearance interval (for additional information, please see Signal Timing A.25 (Signal Timing). Areas near schools and senior living facilities should use a slower speed of 2.8 feet/second.
- Signals on a corridor should be timed and synchronized based on their modal priority (e.g., signals in bicycle priority networks should be timed to a travel speed of 12 to 16 mph)

LEADING INTERVALS

Leading intervals (signal priority for specific modes) help provide safety for pedestrians and bicyclists and reduce delay for transit vehicles. Leading pedestrian intervals should be installed per the *Pedestrian Master Plan* and at other intersections where significant conflicts are noted between pedestrians and turning vehicles. Leading bicycle intervals (using bicycle signal heads, see below) should be applied along existing bicycle facilities where there are high bicycle volumes and right turn conflicts are likely. In addition, at any location where leading pedestrian intervals are applied, leading bicycle intervals can be applied, in order to give priority to bicyclists over motorists. Leading transit leading intervals should only be applied in conjunction with queue jump lanes where transit must merge back into traffic and where transit frequencies are high enough to warrant a special signal phase for transit.

TURNING MOVEMENTS

Collisions between vehicles and other modes are frequently are associated with turning movements. To reduce the likelihood of these occurrences, the following guidance is provided in association with turning movements.

- At locations where left turn crashes are occurring between motorists and pedestrians, bicyclists, or other motorists, protected left turn phases (left turn arrows) should be implemented
- Protected turning movements (left or right turn arrows) should be "lagging" instead of "leading". A lagging turn signal allows for pedestrians to enter the crosswalk (and be seen) before a vehicle turn is initiated.
- In downtown areas and other areas with high levels of pedestrians (i.e., schools, areas adjacent to Caltrain station), turns on red should be prohibited at locations where there is crash history between pedestrians and vehicles turning right on red. In addition, prohibition of turns on red should be considered at locations where vehicles

commonly encroach on pedestrian crosswalks in areas with high levels of pedestrians.

BICYCLE SIGNALS

Bicycle signal heads are used to indicate bicycle-only signal phases and leading bicycle intervals at signalized intersections with a high volume of bicycle traffic and bicycle lanes, paths, or cycle tracks. Bicycle signal heads typically display a bicycle symbol for each color, although circular indications may be used at locations where motorists can't see the signals, and arrows may be necessary at locations where bicycle turning movements need to be signalized. Bicycle signals are designed to reduce conflicts by separating the movements of bicycle traffic from motor vehicle traffic.

When Bicycle Signals are Applicable:

- Where a stand-alone bike path or multi-use path crosses a street
- To split signal phases at intersections where a predominant bicycle movement conflicts with a motor vehicle movement (e.g., a through bicycle movement on a cycle track conflicting with a right turn motor vehicle movement)
- At intersections with contra-flow bicycle movements that otherwise would have no signal indication
- At complex intersections that may otherwise be difficult for bicyclists to navigate
- At intersections with high numbers of bicycle/motor vehicle crashes that are preventable by bicycle signals

Design Guidance

- Signal heads must be clearly visible to oncoming bicyclists
- If the bicycle signal is not programmed into each signal cycle, bicycle signal heads must be actuated, preferably through automatic detection via video or loop detectors; manual pushbuttons may be used as an alternative, when automated detection is impractical
- If the bicycle signal separates bicycle movements from motor vehicle turning movements, signs shall be installed to prohibit right turns on red

FIGURE 4-8 BICYCLE SIGNAL WITH "BLACK OUT" BOX

A bicycle signal here is used to separate vehicle right turn movements from bicycle through movements

ROUNDABOUTS

In certain situations, roundabouts may offer an alternative to traditional intersections. Roundabouts, defined as circular intersections, using yield signs as the means of traffic control traffic are used in numerous US cities. While roundabouts offer traffic flow benefits (uninterrupted flow, reduced vehicle conflict points due to turns, forced speed reductions) they also can pose challenges for non-motorized users. For example, pedestrians may find roundabouts challenging to cross as gaps in traffic may not exist or they may find that vehicles are less likely to yield to a pedestrian as they approach a roundabout. In addition, due to the location of roundabout crosswalks, it is likely that the pedestrian will be taken out of their path of travel "desire line" to cross the roundabout. Similarly, bicycles may find roundabouts difficult to navigate as they inherently must "take the lane" to avoid right hook collisions.

In the context of the City of San Mateo, another consideration is the physical space that might be required by roundabouts as compared to traditional interactions. Roundabouts require "splitter' islands to help deflect traffic away from the center island. Larger vehicles that have wider turning radius also may not be able to navigate around a small-radius center island. However, a center island could be designed to be fully mountable by larger vehicles.

The Design Guidelines suggest that only "mini-roundabouts or single-lane roundabouts" (as defined by *NCHRP Report 672, Roundabouts: An Informational Guide*) be considered in the City of San Mateo as a secondary choice to traditional intersections. Major considerations when determining if roundabouts are an appropriate traffic control device include traffic volumes, target travel speeds, and relevant pedestrian and bicycle overlays. The entry speed of a roundabout should not exceed 15 mph.

OVERLAYS AND INTERSECTIONS

Similar to other portions of the street, the design of intersections should also respond to specific priorities as defined through the use over overlays. Figure 4-8 describes various design or traffic control modifications should be considered modifications in the design and construction of intersections under specific overlay areas.

FIGURE 4-9 INFLUENCE OF OVERLAYS ON INTERSECTION DESIGN

OVERLAY	GUIDANCE	DESIGN OR TRAFFIC CONTROL MODIFICATIONS
Transit Streets	Intersections are the primary locations for bus stops, passengers, and potential bus stop delay. As such, strategies should be employed to minimize transit delay (boarding, signal, or merging delays) and ensure safety for pedestrians that will be present crossing the street.	» Queue jump lanes or allowing buses to use right-turn lanes for through movements » Transit-signal priority or transit leading intervals (when transit queue jump lanes are present or merging delays typically occur) » Curb extensions / bus bulbs to expand capacity for waiting bus riders and to reduce merge delay
Bicycle Priority Streets	Bicycles are highly vulnerable at intersections due to turning vehicle movements. Bicycle turning and through movements should be documented and specific elements should be applied to accommodate these movements safely.	» Bicycle-specific elements (turn boxes, leading bicycle intervals, etc) – See *NACTO Urban Bikeway Design Guide* and *San Mateo Bicycle Plan* – Design Guidance
Freight Routes	Intersections on the freight network may require high-volumes of truck turns. The intersection may require special treatments to accommodate the associated larger turning radii of these types of vehicles.	» "Rollable" treatments such as median "tips", curb extensions, and similar to ensure slower turning speed for vehicles while accommodating larger trucks[21] » Relocation of stop bars or other restriping strategies should be employed to accommodate larger turning radii while striving to not increase the size of the intersection
Rail Corridor Plan Station Area Downtown San Mateo	Intersection areas should consider the high number of pedestrians and cyclists that may be present near station areas and Downtown.	» Short signal cycle times enable pedestrians to have more frequent opportunities to cross streets to access the rail stations and Downtown destinations » Generally, any improvements at the intersections should be employed to enhance pedestrian safety » Leading pedestrian intervals should be employed in locations
Emergency Primary Response Routes	Emergency vehicles will predominately be using the travel realm as part of their emergency response route.	» Signal priority should be given to emergency vehicles if infrastructure exists

[21] Special caution should be given to using rollable treatments at intersections. Pedestrians should not be encouraged to stand in rollable areas. However, they should be designed to discourage vehicle traffic.

CHAPTER 5 : **GREEN INFRASTRUCTURE**

The Sustainable Streets Plan promotes the direct integration of green infrastructure – and other general landscape improvements – into the street design process in order to take full advantage of landscape and hardscape elements that can capture, slow, and treat stormwater runoff. This approach generates additional benefits with respect to placemaking in the public realm, enhancement of the overall pedestrian experience and economic and community vitality as well as environmental benefits.

The inclusion of green infrastructure in the street design and delivery process is relatively new but has proven successful in cities around the country, such as Washington D.C., Portland, Oregon, and Philadelphia, Pennsylvania. Figure 5-1 provides an overview of the steps involved in the assessment of site conditions and selection of location-appropriate green infrastructure as part of the street delivery process. Additional guidance on strategies and green infrastructure elements can be found throughout the full Design Guidelines.

Key aspects of the process are the understanding of how green infrastructure elements and features can manage the flow, including the volume and speed of that flow, and water quality of stormwater runoff that is concentrated on public streets (see Managing Flow and Water Quality below). In addition, it is critical for the street designer to understand the environmental and built context within which a Green Street and its general landscape and green infrastructure elements are implemented (see Responding to Environmental and Built Context below). Please also refer to the additional discussion of design characteristics related to the built and environmental context in Chapter 1.

FIGURE 5-1 GREEN INFRASTRUCTURE EVALUATION PROCESS

1 IDENTIFY APPLICABLE STREET TYPE, OVERLAYS AND OTHER CATEGORIES

- » Street type
- » Overlay
- » Safe Routes to School, Specific or Area Plans, Priority Development Area

2 IDENTIFY ENVIRONMENTAL CONTEXT

- » Underlying soil and hydrology conditions (feasibility of infiltration, groundwater recharge)
- » Pollutant Management (surface and subsurface)
- » Tree Canopy
- » Localized Flooding
- » Others Conditions (use Environmental Context Check List - see Appendix H.2)
- » Location within a watershed or proximity to Bay

3 IDENTIFY BUILT CONTEXT AND CONSTRAINTS

- » Adjacent land use and built context
- » On-street parking
- » Drainage patterns (including tributary areas that may concentrate flows within the right-of-way)
- » Location and capacity of existing stormwater utilities (lines and inlets)
- » Longitudinal and cross-slopes
- » Potential conflicts with underground utilities, drain inlets, fire hydrants, driveways

4 SELECT COMPLETE AND GREEN STREETS ELEMENTS

- » Set Complete Streets and Green Streets goals for the project in question
- » Select appropriate Complete Streets and Green Streets Elements (including green infrastrcuture and general landscape elements)
- » Strive for close integration of Complete Streets and Green Street Elements

5 DETAIL DESIGN OF GREEN INFRASTRUCTURE ELEMENTS

- » Minimize project's impervious surfaces
- » Maximize and design landscape based components as appropriate to site context
- » Size and design green infrastructure features for site context following provided design guidance *
- » Return to Step 4 to evaluate other Green Street elements if unforeseen issues arise

MANAGING FLOW AND WATER QUALITY

Traditional urban stormwater management systems are based on the primary goal of fast evacuation of runoff flows shortly after a rainfall event. This approach results in the rapid concentration of stormwater runoff through a system of "grey" infrastructure that include vast surfaces of impervious surfaces, ditches, gutters, inlets, pipes, and storm sewers. In areas where water volumes overwhelm the capacity of the system, this can lead to flooding.

As runoff flows across a broad range of impervious surfaces, including roadways, this type of stormwater management also collects and concentrates debris, sediments, and contaminants, such as oils and other pollutants. At the eventual point of discharge or infiltration, the material and pollutants impact the quality of local creeks, the San Francisco Bay, and ultimately the Pacific Ocean.

Sustainable streets treat stormwater runoff as a resource and not as "waste" that needs to be disposed of as quickly as possible. Instead they include a variety of features that:

- Slow peak flow rates and reduce the volume of stormwater runoff that reaches creeks and other water bodies by reducing and disconnecting impervious surface areas, intercepting rainfall on tree canopies and other planting areas, promoting the infiltration of stormwater into the underlying soil, and the uptake of water into plants.
- Improve water quality of stormwater runoff that reaches creeks and other water bodies by disconnecting pollution-generating impervious surface areas, facilitating the settling of particles through increased roughness and reduced velocity, filtering through plant and soil media as well as microbial action of soil microbes, and the uptake of pollutants into plants.
- Green Streets improvements may range from the simple reduction of impervious surfaces within the right-of-way, to the planting of street trees and other plants in traditional landscape area. Green infrastructure may also include features that specifically are designed to effectively slow, pond, and infiltrate as well as remove pollutants from stormwater runoff.
- To successfully integrate green infrastructure into streets, it is critical to understand the specific functions that different Green Street elements offer. These functions need to be understood in the context of environmental and planning context of a given street or site. The following are the key functions of green infrastructure that should be considered on a location specific basis during the design or redesign of every street in San Mateo.
- **Infiltration:** The process or rate at which water percolates into the ground. Infiltration is an important function of green infrastructure designed to collect runoff and allow it to flow through the ground for treatment. For selection of the appropriate green infrastructure feature, the infiltration capacity of soils underneath a given infrastructure feature should be verified on a site-by-site basis.
- **(Bio)Retention:** The absorption of stormwater in soil media and vegetation (bioretention) located in retention areas designed to allow temporary storage of runoff and – where possible – infiltration of water into the ground. This process goes along with a slowing of peak flows and movement of stormwater as it passes through soil and vegetation in the retention area.
- **Pollutant Removal:** Removal of solid (particulate) matter and pollutants from water by means of porous media such as sand and soil as well as through microbial action associated with soil microbes. Where vegetation is present, some pollutants are absorbed by plant roots as well as bound to plant surfaces.

» **Interception:** The process of precipitation temporarily adhering to trees and plants before reaching the ground, leading to a slight delay in the concentration of flows and some level of evaporation and thus reduction in the amount of stormwater runoff.

RESPONDING TO BUILT AND ENVIRONMENTAL CONTEXT

A range of Green Streets elements are available and appropriate for use within the street right of way, allowing the street designer to select individual or combinations of general landscape and green infrastructure functions and benefits most appropriate to a given set of local conditions. Examples include stormwater management needs, soil and hydrological conditions, urban design context, and multimodal transportation needs. For instance, the use of vegetated swales is most appropriate in residential contexts along streets that do not exceed 5% longitudinal grade and where a relatively continuous landscape strip can be provided between the street and the sidewalk. In situations where these conditions are not met, a different green infrastructure element should be selected.

RESPONDING TO BUILT CONTEXT

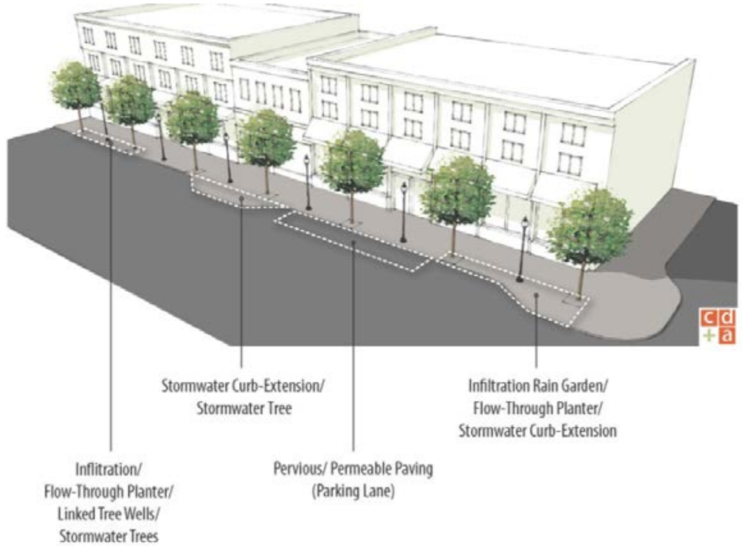
It is important that specific design characteristics of the applicable selected green infrastructure element, be detailed to support the existing or planned residential, commercial mixed-use, civic or other context along the street and at its location. Design characteristics related to the built context include the detailing of hardscape elements such as planter walls (height, visual detailing, color) or pavement (combination of types; patterns; color), and plant selection (plant height relative to pedestrians, bicyclists, drivers, and signs, etc.).

The width of a green infrastructure element plays a critical role in the street design process as the width available to accommodate a given element is bound to vary depending on other criteria, such as overall right-of-way width and the multimodal transportation elements that need to be accommodated. This means that the minimum and preferred widths dictated by functional aspects of a green infrastructure element need to be closely examined and interpreted in the context of a specific site.[22]

Figure 5-2 highlights examples of locations for green infrastructure (to be described in greater detail in later sections) in mixed-use and neighborhood land use contexts.

[22] Refer to *San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook and C3. Stormwater Technical Guidelines* for more information on minimum and preferred dimensions.

FIGURE 5-2 GREEN INFRASTRUCTURE IN COMMERICIAL AND NEIGHBORHOOD CONTEXTS



Source CD+A

RESPONDING TO ENVIRONMENTAL CONTEXT

Similar to the built context, green infrastructure elements need to be selected with a thorough understanding of a given area's underlying environmental conditions. This includes understanding the surrounding watershed and location-specific topography, the relative location to nearby creeks and other waterways as well as the San Francisco Bay and relationship to flood and/or tidal inundation zones. In addition, consideration needs to be given to the underlying soil and hydrological conditions, such as the percolation rate of the soil or the height of the water table, to the presence of areas that experience localized flooding, and the presence of pollutants in surface runoff and in subsurface conditions. As discussed in Chapter 1, all of this information is desirable for locating and designing green infrastructure elements – but not always available. The City of San Mateo is continuing to expand its database and has partnered with the San Francisco Estuary Institute (SFEI) to further explore the use of SFEI's GreenPLan-IT, a GIS-based modeling tool developed by SFEI to identify, rank and map the locations of sites with potential for green infrastructure.

Designers should also seek and pursue opportunities to connect green infrastructure elements to natural waterways, such as creeks, lagoons or the Bay wherever this is supported by an assessment of the water quality of the runoff conveyed to these waterways from the green infrastructure features (or series of features) and the water quality and other conditions of the receiving body of water.

Finally, consideration should be given to the opportunity to increase the City of San Mateo's tree canopy cover along street segments for which green infrastructure elements are being implemented. While green infrastructure features can be designed with and without tress, the inclusion of trees provides additional benefits, such as shade, an incremental reduction in the urban heat island effect and the sequestering of carbon as well as benefits related to pedestrian comfort and streetscape aesthetics. Because green infrastructure features may not be present along an entire block length, street designers should consider using supplemental standard street trees between green infrastructure locations that complete the row of street trees on a given block. In addition, in situations where green infrastructure may not be feasible given the constraints of a particular street project, planting of additional street trees is encouraged because of the benefits that street trees provide.

GREEN INFRASTRUCTURE ELEMENTS

Green Street stormwater management and water quality treatments can be achieved through use of a variety of design elements. Depending on the underlying soil conditions, these elements can either infiltrate storm runoff into the soil to and in some cases recharge ground water, or they can be designed with an underdrain system to provide detention of runoff for a short period of time before it is released into to the local storm or storm sewer system. The latter approach is typically used in areas with poorly draining soils, contaminated soils, high groundwater conditions, or other times when infiltration is not desirable. Both methods catch debris and remove sediments and pollutants before the runoff waters enter the groundwater or utility system. The following are more common green infrastructure elements that can be integrated into sustainable streets.

NOTE: Only vegetated swales with a soil base that allows for filtration and infiltration should be considered a green infrastructure element. Linear, grassy swales or depressions that just convey water do not qualify as green infrastructure.

Figure 5-3 provides an overview of stormwater functions provided by the green infrastructure elements included in this guidance.

FIGURE 5-3 GREEN INFRASTRUCTURE FUNCTION TABLE

	ELEMENTS	INFILTRATION[1]	POLLUTANT REMOVAL	(BIO)RETENTION	INTERCEPTION
Green Infrastructure	Vegetated Swale	○[23]	●	●	●/○[24]
	Tree Wells[25]	○[20]	○	●	●
	Rain Gardens	●[20]	●	●	●/○[21]
	Stormwater Curb Extensions	●[20]	●	●	●/○[21]
	Flow-Through Planters	●[20]	●	●	●/○[21]
	Green Gutters		●	○	○
	Pervious/Permeable Paving	●[20]			
Landscaping	Street Trees	●[20]			●
	Understory Plantings	●[20]	●		○
	Container Planters			○	○

Key: ● Primary Function ○ Secondary Function

Please refer to the Sidewalk Realm, Flexible Realm, Travel Realm and Intersection sections of this document for tables that indicate the applicability of an element to the respective area of the street.

[23] Where site-specific percolation tests have confirmed that an infiltration rate of 0.5”/hour is realistic

[24] Primary function if trees are included

[25] Function of tree well depends on type: Individual stormwater trees or linked tree wells

FIGURE 5-4 VEGETATED SWALES

Source: Abby Hall, EPA

VEGETATED SWALES

"Vegetated swales are long, narrow landscaped depressions, with a slight longitudinal slope. As water flows through a vegetated swale, it is slowed by the interaction with plants and soil, allowing sediments and associated pollutants to settle out. Some water soaks into the soil and is taken up by plants, and some may infiltrate further if native soils are well drained. The remaining water that continues to flow downstream travels more slowly than it would through pipes in a traditional stormwater conveyance system. Vegetated swales are typically built very shallow and contain runoff that is only a few of inches deep." (Source: *San Mateo County Green Streets and Parking Lots Design Guidebook*).

General Guidelines

» Apply on streets where relatively long, uninterrupted stretches of vegetated swale with appropriate depth for infiltration and filtration can be constructed. Residential streets with narrow lots and frequent driveways are poor candidates, as are other more urbanized areas of the City.

» Use vegetated swales on relatively flat sites as well as steeper conditions up to 5% longitudinal slope. Use of check dams and/or rockeries may allow for use on steeper slopes.

» Address infrequent driveways through driveway crossings that bridge the swale or include a pipe connection between adjacent swale segments

» Select taller plants up to 3 feet in height where a stronger buffer between moving traffic and pedestrian realm is desired (i.e. along streets without on-street parking or streets with higher traffic volumes, such as Major Collectors). Reduce plant height to 30 inches max. near intersections and at pedestrian crossings.

» In locations where soil conditions do not allow infiltration, an underdrain connected to the storm sewer should be provided to avoid the over saturation of soils

» Emphasize flowering plants along streets in residential contexts, the downtown, at commercial nodes and along streets categorized in the *Pedestrian Master Plan* as "Walking Streets."

» For further guidance see: *San Mateo County Green Streets and Parking Lots Design Guidebook* and C3. Stormwater Technical Guidance.[26]

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[26] San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) C.3 Stormwater Technical Guidance

Guidelines Specific to Pedestrian Realm

- Where on-street parking is located adjacent to vegetated swales, a level strip of 18-inch minimum width (24 inches preferred) should be placed along the roadway edge to provide space for door swings and passengers exiting on the passenger side of parked cars, depending upon frequency of use and character of built context this strip may or may not be paved.
- Boardwalk-type crossings across the swale can be used to provide connections between the sidewalk and parking spaces along the street
- Layout of vegetated swales requires close coordination with placement and consideration of light fixtures, signs and other elements typically located in the furniture zone

TREE WELLS – STORMWATER TREES

A stormwater tree is a street tree planted in a tree well that is designed to manage and treat stormwater runoff. The top of the planting medium in the tree well is placed lower than the adjacent street's gutter, allowing stormwater runoff to enter the tree well through an inlet. Runoff from the adjacent sidewalk can flow directly into the tree well. Multiple stormwater tree wells can be designed to form a linked tree well feature (see linked tree wells below). The captured runoff will either infiltrate into the soil at the bottom of the tree well or exit the well through an underdrain that is connected to the storm drain network.

FIGURE 5-5 STORMWATER TREES

Source: City of Philadelphia

General Guidelines

- Stormwater trees should be considered supplements to other, more expansive stormwater infrastructure elements or in locations where no other green streets elements can be used
- Detail the tree well for stormwater trees so that infiltration occurs at the bottom of the tree pit or use an underdrain to allow for drainage when the soil medium's holding capacity for runoff is exceeded
- Include provisions for the regular maintenance of pipes and inlets to address the accumulation of sediments, debris, and pollutants
- Consider using of "Silva Cells" or other commercially available structural systems that allow for the placement of less compacted soil and stormwater storage media under new sidewalk surfaces that provide improved growing conditions for trees and stormwater management functions while not narrowing the space for pedestrian circulation
- For further guidance see: *San Mateo County Green Streets and Parking Lots Design Guidebook* and C3. Stormwater Technical Guidance

Guidelines Specific to Pedestrian Realm

- Stormwater trees are the most versatile green infrastructure element as they can be fit into most pedestrian realm conditions where regular street trees can be provided. However, their capacity for stormwater management functions is limited due to their relative small scale.
- Carefully detail curb inlets and covers of channels that direct runoff to stormwater tree wells so as to account for pedestrian circulation that may occur between curb and tree well.

Guidelines Specific to Flexible Realm

- Consider stormwater curb extensions as in-between-"islands" for stretches of on-street parking. Where stormwater trees are located in parking lane, place trees between parking spaces
- The geometric design of curb extensions should follow the guidance provided in other sections of this document
- Stormwater tree wells should never protrude beyond the roadway-side edge of the flexible realm (into an adjacent travel or bicycle lane)
- The edges of the tree well should be delineated by a curb (with inlets for runoff collection similar to those in stormwater curb extensions) or by bollards or other vertical elements that protect the tree from impacts by parking or maneuvering vehicles
- Place all stormwater trees in the flexible realm at regular intervals along the length of a block. See also general guidance for location and spacing of street trees, in the General Landscaping section below.
- Where other street trees exist or are planned in the furniture zone of the adjacent pedestrian realm, closely coordinate placement and species selection of trees in flexible and pedestrian realms

Guidelines Specific to Intersections

- Street trees located within the intersection area should be located to avoid blocking sightlines to ensure safety
- Stormwater trees can be used as the sole stormwater element in regular corner curb extensions where these have to be kept to a minimum dimension and do not allow for the use of other green infrastructure elements
- Consider stormwater trees in regular corner curb extensions as possible end-brackets to stretches of on-street parking in the flexible realm

» Also see street trees in the General Landscaping section below

TREE WELLS – LINKED TREE WELLS

Linked tree wells are elements that link together a series of stormwater trees. A linked tree wells feature consists of a subsurface trench that is filled with a soil mix that simultaneously supports tree health as well as storage and conveyance of stormwater runoff; this may include using commercially available structural support systems to reduce potential for soil compaction. Portions of the subsurface trench may be located under surfaces in the pedestrian and flexible realm that are paved with regular asphalt or concrete or permeable or porous pavement (see Permeable/Pervious Pavement section below).

Linked tree wells manage stormwater runoff and water quality by allowing runoff from the street and sidewalk to flow into the subsurface trench through curb (or other types of) inlets; where tree wells are landscaped there is also the potential for a water quality benefit. Stormwater is retained in the soil or other storage media in the trench where it is used to irrigate the trees and left for slow infiltrating through the trench bottom. Where infiltration capacity is limited or the storage capacity of the trench is exceeded, the linked tree well system can be connected to the storm drain network through an underdrain. At the surface, the tree locations may take the form of a continuous planting area or appear as individual tree wells. Linked tree wells may be constructed using commercially available structural soils, structural systems or cells that allow for the placement of less compacted planting, and stormwater storage media under new sidewalk surfaces.

FIGURE 5-6 LINKED TREE WELLS

Source: CD+A

General Guidelines

- See stormwater tree guidance above
- Include provisions for the regular maintenance of pipes and inlets in order to address the accumulation of sediments, debris, and pollutants
- In locations where soil conditions do not allow infiltration use an underdrain to allow for drainage when the holding capacity for runoff in the soil medium of the linked tree well system is exceeded
- For guidance on a system of linked tree wells often referred to as Stormwater Tree Trench see Caltrans' Low Impact Development (LID) webpage at http://www.dot.ca.gov/hq/LandArch/ec/lid/lid-sidewalk-stormwater-tree-trench-new.htm.
- For further guidance see: *San Mateo County Green Streets and Parking Lots Design Guidebook* and C3. *Stormwater Technical Guidance*.

Guidelines Specific to Pedestrian Realm

- Where on-street parking is located adjacent to linked tree wells, a paved strip of 18-inch minimum width (24 inches preferred) should be placed along the roadway edge to provide space for door swings and passengers exiting on the passenger side of parked cars
- Linked tree wells may also extend into the parking lane and can be combined with the use of permeable paving in the parking lane, see stormwater tree guidance above for related guidelines
- Where no on-street parking is present, linked tree wells can be placed adjacent to the back of curb

RAIN GARDENS

The *San Mateo County Green Streets and Parking Lots Design Guidebook* defines rain gardens as "shallow, vegetated depressions in the landscape" that can be of "any size or shape, and are often molded to fit in 'leftover' spaces in parking lots, along street frontages, and in situations where streets intersect at odd angles." Rain gardens are referred to as bioretention areas in the C.3 *Stormwater Technical Guidance*.

Rain gardens retain stormwater, thereby reducing and delaying peak flows as well as overall volume. Depending on the capacity of the native soil, they can also allow for infiltration. Although rain gardens can share certain characteristics with linear swales and planters (they can be designed with vertical curbs or side slopes), they differ from swales in that their primary function is the maximum storage of runoff and not conveyance. The City of San Mateo's sustainable streets guidance reinforces the flexibility of the rain garden concept in terms of size and applicability with the goal of retaining and detaining stormwater as ubiquitous as feasible and maintainable within the City's streets. Rain gardens of all shapes and sizes are an important part of achieving this goal.

General Guidelines

- Consider rain gardens in leftover spaces within the street right-of-way
- Use the Rain Gardens to celebrate and make visible the stormwater management function of this and other green infrastructure elements
- Design rain gardens with a flat bottom to maximize their storage potential for stormwater
- Depending on the infiltration capacity of the native soil under the rain garden, an underdrain system may be needed

Guidelines Specific to Intersections

- Consider rain gardens in leftover spaces located in or adjacent to intersections and particularly at skewed intersections
- Integrate the design of rain gardens at intersections with that of other green infrastructure and landscape elements in the area

- Consider the integration of rain gardens into roundabouts by guiding stormwater runoff to the center of the roundabout
- For further guidance see: *San Mateo County Green Streets and Parking Lots Design Guidebook* and C3. *Stormwater Technical Guidance*

STORMWATER CURB EXTENSIONS

The *San Mateo County Green Streets and Parking Lots Design Guidebook* defines stormwater curb extensions as landscaped "areas that extend into the street and capture stormwater runoff. Conventional curb extensions (a.k.a. bulb outs, chokers, chicanes) are commonly used to increase pedestrian safety and help calm traffic. A stormwater curb extension shares these attributes plus adds a stormwater benefit by allowing water to flow into the landscape space." The City of San Mateo's sustainable streets guidance sees the primary function of stormwater curb extensions being rain gardens, although where space and other conditions allow they can be part of a vegetated swale system or other green infrastructure system.

General Guidelines

- Stormwater curb extensions are well suited to retrofit situations due to their relatively low cost and versatility in terms of shape and other design details
- Applicable to residential and commercial contexts
- Consider where on-street parking is underutilized or sections of curb-adjacent roadway are hatched or otherwise excluded from parking or vehicle related use
- The length of curb extensions should be determined by balancing the need for parking with that for stormwater management and desired design character of the street
- Include provisions for the regular maintenance of pipes and inlets in order to address the accumulation of sediments, debris, and pollutants
- In locations where soil conditions do not allow infiltration, an underdrain connected to the storm sewer should be provided to avoid over saturation of soils
- Where other street trees exist or are planned in the furniture zone of the adjacent pedestrian realm, closely coordinate the placement of trees in the flexible and pedestrian realms
- Where space is constrained, the capacity of the green infrastructure can be increase, while maintaining space for pedestrian activity by using grating or boardwalks to span over portions of the green infrastructure. Also, the use of commercially available structural support systems can be used to allow the green infrastructure soils to extend under adjacent paving.
- Also see: *San Mateo County Green Streets and Parking Lots Design Guidebook* and C3. *Stormwater Technical Guidance*

Guidelines Specific to Flexible Realm[27]

- Consider stormwater curb extensions as in-between-"islands" for stretches of parallel or angled on-street parking
- Stormwater curb extensions can also include some paved area to allow for expansion of sidewalk activity, particularly in active mixed use areas; these can accommodate activities that might otherwise occur on a parklet
- The geometric design of curb extensions should follow the guidance provided in other sections of this document

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[27] Stormwater Curb Extensions located at street corners are covered in the Intersection section of these guidelines.

- Select plants that are tall enough to protrude well beyond the top of the curb
- Where stormwater curb extensions are located adjacent to a mid-block crossing, select plants to not exceed 30 inches in height in order to maintain visibility of pedestrians about to enter the crosswalk
- Where other street trees exist or are planned in the furniture zone of the adjacent pedestrian realm, closely coordinate placement and species selection of trees in interstitial and pedestrian realms
- Where used as “islands” between stretches of angled parking, include a minimum 18-inch wide (24-inch preferred) paved area along the edges of the curb extension to allow for door swings and passengers that exit parked vehicles
- Care should be taken in the design and construction of inlets and grade within the curb extension to ensure proper capture and distribution of street run off within the rain garden; this is particularly an issue where the street has a “high crown” (i.e.; a steeper slope from the curb and gutter to the center of the street)

FIGURE 5-7 STORMWATER CURB EXTENSIONS

Source: Kevin Perry, City of Portland

Source: Dave Elkin, City of Portland

Guidelines Specific to Intersections

The geometric design of corner curb extensions should follow the guidance provided in other sections of this document.

- When planting areas in stormwater curb extensions are located adjacent to curb ramps and where pedestrians enter a crosswalk, select plants to not exceed 30 inches in height in order to maintain visibility of pedestrians about to enter the crosswalk
- Where other street trees exist or are planned in the furniture zone of the adjacent pedestrian realm, closely coordinate the placement of trees in the flexible and pedestrian realms
- Design stormwater curb extensions at intersections to complement that of stormwater curb extensions located in the flexible realm
- Also refer to *City of San Mateo Pedestrian Master Plan* and its guidance on the design of pedestrian facilities at intersections

INFILTRATION AND FLOW-THROUGH PLANTERS

The *San Mateo County Green Streets and Parking Lots Design Guidebook* defines flow-through planters as "narrow, flat-bottomed, often rectangular, landscape areas used to treat stormwater runoff. Their most distinguishing feature is that the side slopes typically used in swales are replaced with vertical sidewalls. This allows for more storage volume in less space."

There are two types of planters used for stormwater management: infiltration and flow-through planters. Infiltration planters depend on native soil conditions that allow runoff to soak into the underlying soil. Flow-through planters are completely contained systems that allow runoff to soak through the planter's imported soil bed and then into an underdrain or overflow system that captures water beyond the system's capacity. In the nomenclature used for the City of San Mateo's Sustainable Streets guidance, flow-through planters provide flexibility in terms of the focus of their function within the stormwater system.

FIGURE 5-8 FLOW-THROUGH PLANTERS

Source: Kevin Robert Perry, City of Portland

General Guidelines

- For further guidance see: *San Mateo County Green Streets and Parking Lots Design Guidebook* and C3. *Stormwater Technical Guidance* as well as Caltrans' *Low Impact Development (LID)* webpage at http://www.dot.ca.gov/hq/LandArch/ec/lid/lid-sidewalk-stormwater-planter-new.htm

Guidelines Specific to Pedestrian Realm

- Where on-street parking is located adjacent to flow-through planters, a paved strip of 18-inch minimum width (24 inches preferred) should be placed along the roadway edge to provide space for door swings and passengers exiting on the passenger side of parked cars
- Where no on-street parking is present, linked tree wells can be placed adjacent to the back of curb
- Closely coordinate connections between the through zone and the paved strip with the beginning/end of on-street parking stalls
- Connections between through zone and the paved strip should have a clear minimum width of 4 feet (5 feet preferred). Increase width where light fixtures signage seating or other street furniture need to be integrated.
- Select plants that are tall enough to protrude well beyond the upper edge of the planter walls
- Also refer to *City of San Mateo Pedestrian Master Plan* and its guidance on the design of sidewalks

FIGURE 5-9 GREEN GUTTERS

Source: Kevin Robert Perry, City of Portland

The San Mateo County Green Streets and Parking Lots Design Guidebook defines green gutters as "very narrow, landscape systems along street frontages that capture and slow stormwater flow. Typically less than 3 feet wide, green gutters most resemble flow-through planters in that they are confined by vertical curbs and have a flat-bottom profile. Unlike these, however, green gutters are designed to be very shallow with little or no water retention. While infiltration of stormwater is a possibility, the primary purpose of using green gutters is to provide a site design measure using strip of landscaping to help filter out pollutants and slow the flow of water." Green gutters help address the City of San Mateo's goals for creating a sustainable streets system that provides multiple opportunities for stormwater management, the ubiquitous approach mentioned above.

General Guidelines

- » Green gutters are only appropriate for curbed streets without on-street parking
- » Green gutters should be considered as one of several green infrastructure tools to meet *C3. Stormwater Technical Guidance* requirements.
- » Where appropriate green gutters can also be used in retrofit projects that do not trigger C3. compliance
- » Consider green gutters where excessively wide curbside lanes or shoulder space can be narrowed to accommodate the feature
- » Also see: *San Mateo County Green Streets and Parking Lots Design Guidebook and C3. Stormwater Technical Guidance*

Guidelines Specific to Travel Realm

- » Unlike what may occur with a paved gutter, the width of a green gutter should not be included within the dimension of an adjacent travel lane or bicycle lane
- » The green gutter width should not be included in the measurement of pedestrian buffer width for an adjacent sidewalk, unless plants are tall enough to extend at least 1 foot above the top of the adjacent curb

PERVIOUS/PERMEABLE PAVING

Permeable paving treatments allow for stormwater to pass around the pavement material and into the subgrade under the pavement system, such as various interlocking pavers with a gap, usually 1/4 to 1/8 inch, filled with a crushed aggregate. Pervious paving allows stormwater to pass through gaps that are within the pavement material itself, such as pervious asphalt or concrete, and pre-manufactured pervious unit pavers. Similar to other green infrastructure elements discussed previously, depending upon soils and other considerations, stormwater that passes into the subgrade can either be infiltrated into existing underlying soils or retained to slow run off and passed into the storm drain system via an underdrain. Permeable paving typically provides minimal water quality benefits through the filtering of larger debris and some sediments and other solids, while pervious systems can provide more filtering. Still, the primary function of these pavement techniques is to retain and/or infiltrate stormwater.

General Guidelines

- » Permeable and pervious unit concrete pavers can provide a stormwater management function and aesthetic appeal and should be used where an enhanced pavement design treatment is desired (also see Pavement Materials and Treatment section below). Pervious asphalt and poured-in-place pervious concrete provide a stormwater management function but do not generally contribute to the enhancement of the streetscape or site.
- » Permeable and pervious paving is appropriate for use in seating and walking areas of the pedestrian realm, corner and mid-block curb

extensions as well as raised median areas wide enough for pedestrian use or where a paved maintenance band along landscaped median areas is desired

» Permeable and pervious paving may also be appropriate for use in parking lanes (but not where parking lanes temporarily double as travel lanes), and low-volume/low-speed roadways, such as alleys, shared streets, and access streets

» Permeable and pervious paving are not suitable for streets with high traffic volumes or speeds and for truck routes. Generally, permeable or pervious paving should not be used:
  - For travel lanes of streets classified as El Camino Real or Connector;
  - For concrete bus pads;
  - On sloped areas or steep hillsides with slopes greater than 20%;
  - In areas with contaminated soils;
  - In areas over new or existing compacted fill;
  - Areas with shallow groundwater or seasonal high groundwater;
  - Within 20 feet of basements located under sidewalks (where these receive runoff); or
  - Within 50 feet of domestic water wells (where these receive runoff).

» Combine the use of permeable or pervious pavement with landscape based green infrastructure whenever feasible

» Use permeable or pervious paving without underdrain only in locations where soil tests have confirmed a minimum infiltration rate of 0.5 inches per hour. In all other locations an underdrain will have to be used for in order to achieve proper drainage of the permeable/porous pavement system.

» Develop proper maintenance procedures for areas surfaced with permeable or pervious pavement prior to installation

» Surfaces paved with permeable or pervious paving must be compliant with applicable ADA and California Building Code (Chapter 11.B) standards and guidelines, and not cause tripping hazards or excessive vibration for persons traveling in wheelchairs

» Also see: *San Mateo County Green Streets and Parking Lots Design Guidebook and C3. Stormwater Technical Guidance* as well as Caltrans' *Low Impact Development (LID)* webpage at http://www.dot.ca.gov/hq/LandArch/ec/lid/lid-permeable-paving-new.htm.

Guidelines Specific to Pedestrian Realm

» Care should be taken in selecting pervious or permeable paving, and in the design and sizing of joints between pavers based on level of pedestrian activity and potential for heels getting stuck in joints as well as potential for joints to affect comfort of wheelchair users. For example, pervious pavers or pervious concrete is desirable within the through zone of the sidewalk.

» Within the furniture zone when linked tree wells, stormwater trees or flow-through planters are being used, pervious or permeable paving should be used for areas for those who are moving between parked vehicles and the through zone of the sidewalk

» Where paving is used only in the furnishing zone select a color or texture for the permeable paving that is distinct from paving in the remainder of the pedestrian realm. This will visually highlight the stormwater function of this area and distinguish its function from the other zones.

» Where the furniture zone is constrained in their width to allow for either healthy tree root growth or for effective use as a subgrade trench for green infrastructure purposes the structural soil or other subgrade treatment can be extended under the through zone and/or into the flexible realm; in these cases pervious or permeable paving could be used above the subgrade trench area.

» For further guidance see: *San Mateo County Green Streets and parking Lots Design Guidebook* and C3. Stormwater Technical Guidance as well as the *Pedestrian Master Plan*.

Guidelines Specific to Flexible Realm

» Pervious and permeable paving in the flexible realm may be applied to any surface area that falls into this area of the street

» Paving should be in a color that is distinct from that of the asphalt or concrete in the adjacent travel realm. This will visually distinguish this area from areas dedicated to moving traffic and contribute to visually narrowing the overall width of the curb-to-curb surface area.

» Where the flexible realm is likely to have a higher level of pedestrian activity (e.g.; planned to be used as a flexible "plaza" space or where parking has a higher turnover rate) care should be taken in selecting pervious or permeable paving, and in the design and sizing of joints between pavers to create a smoother but pervious or permeable surface

Guidelines Specific to Travel Realm

» Pervious and permeable paving in the travel realm is only appropriate for shared streets, alleys, and access streets with low speed and low traffic volume

» Use paving in alleys and shared streets to visually emphasize that the space is shared between pedestrians, bicyclists and vehicles

» In shared spaces, paving patterns, texture and color contrast should be used to delineate the location of places within the shared street design that are designated for parking, playing, and sitting, as well as and landscaping

Guidelines Specific to Intersections

» Integrate the design of pervious and permeable pavement areas at intersections with that of other paved areas in the pedestrian realm and in crosswalks

FIGURE 5-10 PERVIOUS/PERMEABLE PAVING

GREEN INFRASTRUCTURE DETAILS

The environmental and built contextual factors that need to be taken into account when locating and designing green infrastructure elements have been discussed in previous sections of these guidelines. In addition, there are a number of technical design details that need to be considered. The following paragraphs highlight the importance of two of these details because they are fundamental to the process of locating and designing green infrastructure elements: the sizing of green infrastructure elements and the use of underdrains.

Additional design details not discussed here include dealing with steep topography, dealing with utilities, capturing and conveying surface runoff, choosing appropriate plant material, and soil preparation and grading. Please refer to the *San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook* for a more in-depth discussion of these topics.

SIZING GREEN INFRASTRUCTURE ELEMENTS

The sizing of green infrastructure features requires calculation of the overall volume of runoff that collects in the tributary area from which stormwater flows to a given green infrastructure feature. These calculations also inform the capacity needed for green infrastructure elements to capture, store, and treat the stormwater runoff that flows to the elements from the tributary area. It is important to note that the runoff concentrated in streets more often than not includes stormwater from areas located outside of the public right-of-way.

The *San Mateo County C.3 Technical Guidelines* provide a rule of thumb that can be used prior to engaging in more detailed runoff and capacity calculations. According to this rule of thumb the dedicated landscape space for green infrastructure should be 4% of the total impervious catchment area. However, there are many factors that need to be considered to determine the specific size of a given green infrastructure element, including soil properties, the selected type of green infrastructure element and whether or not the project includes the element is subject to San Mateo County's C.3 requirements.

The *San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook* further explains that the 4% rule is based on percolation rates of 5-10 inches/hour and that soil amendments may need to be used to help achieving this rate of percolation if the native soil falls outside of the 5-10 inches/hour range. For green infrastructure elements that need to meet C.3 stormwater requirements, the use of soil amendments typically also means that it is necessary to construct the element with an underdrain in order to maintain capacity throughout the duration of a storm event.

For a complete discussion of how to size green infrastructure elements, please refer to Section 5.0 – "The Sizing of Stormwater Facilities" in the *San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook* and the detailed technical guidance and requirements provided in the *San Mateo County C.3 Technical Guidelines*.

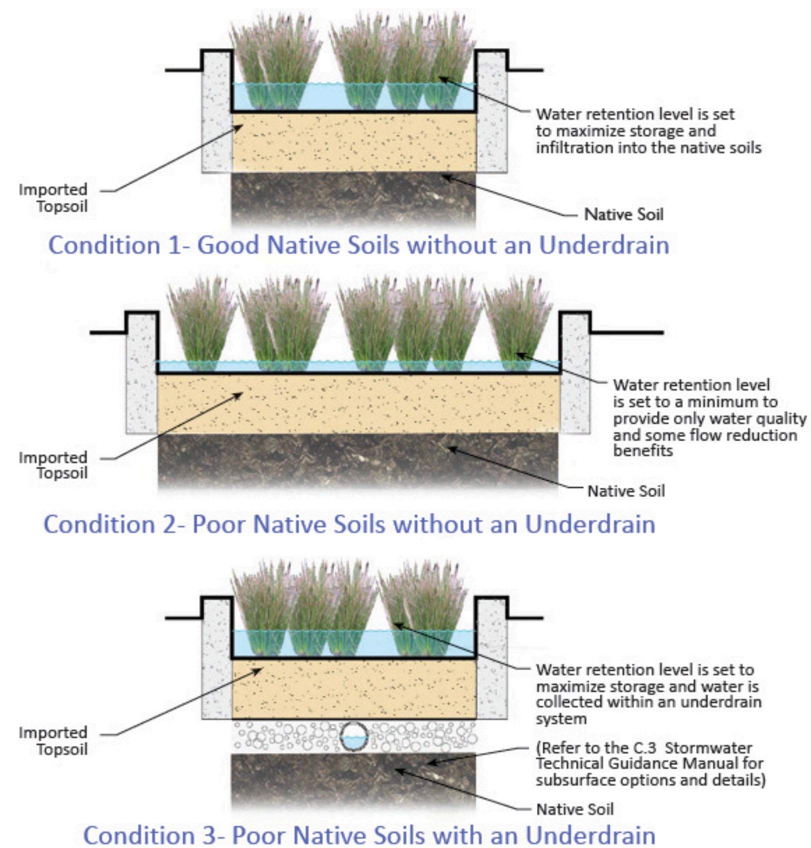
GREEN INFRASTRUCTURE ELEMENTS WITH VERSUS WITHOUT AN UNDERDRAIN

In general, it is desirable to build green infrastructure elements so as to include infiltration into the underlying soil whenever this goal is supported by the underlying hydraulic and soil conditions. Based on information contained in *the San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook*, the K-values (the hydraulic conductivity or the water's capacity to percolate through the soil) are low in the flatter parts of San Mateo County (which includes the majority of the City of San Mateo). This means that it is important to conduct site-specific tests that establish the percolation rate at a given location in order to determine whether infiltration is a realistic goal. The underlying soil and hydrological conditions also determine if an underdrain has to be included in the design of a given green infrastructure element in order to meet San Mateo County's C.3 stormwater requirements. Figure 5-11 from the *San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook* illustrates different examples of the relationship between soil infiltration rates and the need for an underdrain.

In areas of the City of San Mateo where poor soils require the use of soil amendments and underdrains in order to meet C.3 stormwater requirements (Figure 5-11 bottom example) connection points for underdrains to existing storm sewers need to be identified. Where soils with poor infiltration rates coincide with areas where no storm sewers or natural bodies of water are available for the connection of an underdrain, green infrastructure features need to be constructed following the middle example in Figure 5-11. While likely not being able to meet C.3 stormwater requirements, this type of construction still provides significant benefits, including slowed peak flows of runoff, the uptake of stormwater by plants, some level of water quality treatment and the potential infiltration of small amounts of water into the underlying soil.

For a complete discussion of whether or not an underdrain is required, please refer to Section 5.5 – "Dealing with Poor Soils" the *San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook* and the detailed technical guidance and requirements provided in the *San Mateo County C.3 Technical Guidelines.*

FIGURE 5-11 USAGE OF UNDERDRAINS



Source: San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook

GENERAL LANDSCAPING ELEMENTS

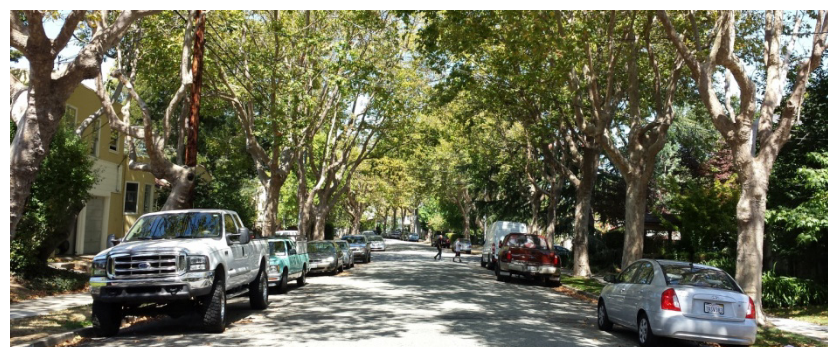
Landscape elements, especially trees, are important features in the pedestrian realm of sustainable streets and greatly contribute to establishing the character of individual districts or individual streets. Trees add soft textures and colors, provide shade from the sun, act as a windbreak, and create a positive sense of spatial enclosure for pedestrians. Along with light fixtures, street trees establish the basic rhythm of any streetscape design for a given street. Research has show that street trees help create walkable environments that provide a positive impact to retail sales and rents; 3 to 15% increase in home values and 9 to 12% more retail spending as shoppers spend more time in districts with a good canopy of street trees.[28]

STREET TREES

General Guidelines

- Trees should be selected to create a visual distinction between streets that serve predominantly residential, mixed-use, or industrial uses, as well as defining different neighborhoods and districts in San Mateo. This can provide drivers with an additional "clue" of the type of environment they are passing through and cause them to adjust their driving behavior and travel speed accordingly.
- Street trees should be used to complement street lighting, street furniture, and other amenities in creating a distinct design character for the downtown, residential neighborhoods, or mixed-use districts or individual streets with a main street character or designations such as Walking Street or Transit Streets
- Trees should be accommodated in individual tree wells or along with other landscaping in continuous landscape strips, green infrastructure elements located in the pedestrian, flexible or travel realms of the street or at intersections
- Tree wells may or may not include additional landscape planting depending upon context and the type of green infrastructure functions that are being served
- Street trees should typically be planted between 20 to 30 feet on-center, depending upon species and the desired canopy coverage
- Street tree selection, placement, and maintenance should be closely coordinated with the placement and design characteristics of street light fixtures to avoid conflicts between tree canopies and street lighting
- The ends of rows of trees should be planted as close as possible to pedestrian crossings. This practice must be balanced with required sight distances and clear view of traffic lights.

FIGURE 5-12 STREET TREES



[28] Source: *Public Response to the Urban Forest in Inner-City Business Districts* by Kathleen L. Wolf, Journal of Arboriculture 29(3), May 2003.

» Trees should be planted in species-appropriate soil volumes to increase tree health and vitality. Consider the use of structural soil or structural systems (such as Silva Cells) that support tree health in constrained conditions.

» The tree selection process should give strong consideration to guidance provided by the Bay-Friendly Landscaping Guidelines as published by www.StopWaste.org

UNDERSTORY PLANTINGS

Understory plantings include any landscape strips or areas located in the furniture zone, curb extensions, medians or center islands of roundabouts or mini-traffic circles as well as landscaping within tree wells. In all of these areas, understory plantings further green the streetscape and enhance the street environment for all users, but especially pedestrians. Longer stretches of understory plantings in the furniture zone is most appropriate where on-street parking is not present or where pedestrian traffic between parked cars and the sidewalk is only infrequent or where a paved connection can be provided between the sidewalk and parked cars. Understory plantings add to the aesthetic, economic, habitat, and ecological value of streetscapes and contribute to the reduction of impervious areas and surface runoff and naturally treat stormwater through biofiltration.

General Guidelines

» In the furniture zone use understory plantings to provide a buffer between the pedestrian realm and the street to enhance pedestrian comfort

» Planting strips should be a minimum of 3 feet wide. Where trees are to be directly incorporated into the planting area, the minimum width should be 4 feet unless additional space is provided at all tree locations. Planting strips of less than 3 feet width are only appropriate where they are used to grow narrow plants or vines adjacent to buildings or other structures. Narrow planting areas should be protected from compaction by footsteps by providing a vertical curb or other edging between the landscape and the walkway.

» Plant material for understory landscape areas should complement the selected tree species and street furniture to further enhance the desired visual distinction between streets that serve predominantly residential, mixed-use, or industrial uses. This can provide drivers with an additional “clue” of the type of environment they are passing through and cause them to adjust their driving behavior and travel speed accordingly.

» Plant material should be selected to account for the growing and climatic conditions of urban environments with respect to drought tolerance and hardiness. The plant selection process should give strong consideration to guidance provided by the Bay-Friendly Landscaping Guidelines as published by StopWaste.org.

» See *San Mateo Pedestrian Master Plan* for further guidance about understory landscaping in the pedestrian realm

FIGURE 5-13 UNDERSTORY PLANTINGS

Source: Thomas Kronemeyer, CD+A

TREES AND UNDERSTORY PLANTING IN MEDIANS

Trees and other landscaping in raised medians can greatly enhance the aesthetic appearance of a street and help to visually break up the scale of streets with wide cross sections. They compliment the speed management function of medians. Where the adjacent roadway slopes toward or can be sloped toward a median, consider configuring the median landscaping as a green infrastructure element, such as a vegetated swale or linked tree wells.

General Guidelines

» Consider street trees for medians of a curb-to-curb width of 6 feet and wider (except for Caltrans controlled right-of-ways where horizontal clearances identified in the Highway Design Manual have to be observed or exceptions must be granted)

» For medians of up to 8 feet, select trees with columnar crowns that will not grow into adjacent travel lanes OR canopy trees whose crowns can be limbed up to provide the required vertical clearance above adjacent travel lanes between the roadway surface and the lowest branches

» Trees in medians should maintain a minimum horizontal clearance of 18 inches between the edge of the tree trunk and the face of median curb and be pruned to maintain applicable sight distances at signalized and unsignalized intersections

» Understory plantings near pedestrian refuges in medians should not exceed 30 inches in height

» For further guidance on general design of landscaped medians see: *ITE Recommended Practice – Designing Urban Thoroughfares: A Context Sensitive Approach (Trees and Landscaping in Medians*)

» For further guidance on the design of a median as stormwater feature see example in: *San Mateo County Green Streets and parking Lots Design Guidebook*, p. 78

FIGURE 5-14 MEDIAN STREET TREES

Source: CD+A

FIGURE 5-15 ROUNDABOUT PLANTINGS

CONTAINER PLANTS

Container plants include trees and other plants grown in various types of planters, including hanging baskets or "living walls," whose soil is not directly connected to the ground. A series of planter boxes or large-scale planters with substantial plantings can provide a buffer between the roadway and pedestrian realm, which contributes to a more comfortable pedestrian environment. Container plants also provide a limited stormwater management benefit in that the soil volume temporarily stores rain water that directly falls on to the planter area and that the some of the water is used by the plants.

General Guidelines

» Consider container plants and planter boxes as supplemental rather than primary landscape elements because of the increased maintenance needs and watering needs associated with this type of planting

» Use container plants and planter boxes in locations where conditions in the pedestrian realm do not support planting in the ground. Such conditions include adverse soil conditions, lack of sufficient spaces, conflicts with major utilities or basements under the sidewalk.

» Along streets with downtown and mixed-use contexts, consider using container plants and planter boxes to delineate frontage and furnishing zone areas dedicated to informal public or café seating maintained by adjacent businesses

» Allow container plants in the frontage and furniture zones as supplemental architectural elements along all street types and contexts, particularly where these are used to provide added legibility to the location of main building entrances or to integrate with seating in a large-scale planter

» Container plants and planter boxes can be used as part of the buffer between a protected bicycle lane and a parking or traffic lane, can be used in the flexible realm as part of the flexible use of parking lanes for pedestrian use, and they can be a part of interim lower cost improvements using paint and planters to define curb extensions, pedestrian refuges, and other elements of Complete Streets

» Planters should not protrude into the through zone and should never reduce the clear width of this zone to less than 4 feet

» The spacing of planter boxes or large scale planters in the furniture zone should be coordinated with the basic rhythm established by street trees and light fixtures

» In the flexible realm, container plants and planter boxes can be used to great effect to delineate and buffer temporary seating or dining areas in the parking lane or as a design element integrated into a "parklet"

» Planters or planter boxes should be constructed of durable materials that complement the overall design aesthetic of the street. Materials should be resistant to vandalism and damage from motor vehicles where they are placed in proximity to vehicular circulation areas.

» Where feasible, an irrigation system should be provided to all contained plants

» Opportunities for incorporating seating into the larger constructed planters are encouraged

» Encourage the use of "Living Walls"—with plants growing from planters onto screens or other structural systems attached to the exterior walls of buildings—where these enliven the streetscape by covering otherwise unsightly blank walls. Living walls can support other green infrastructure by remediating water pollution and attenuating peak stormwater runoff.

» Consider planted hanging baskets—hung from light fixtures or buildings—only for streets or street segments where their consistent maintenance is funded by a community benefit district (CBD) or along street blocks with civic or ceremonial importance. Carefully select plants for drought tolerance to reduce maintenance and watering needs of hanging baskets.

» Plant material for planters, planter boxes or hanging baskets should be selected to account for the growing and climatic conditions of urban environments with respect to drought tolerance and hardiness as well as required maintenance

Opportunity Sites

Furniture or frontage zone of pedestrian realm; integrated into "parklets" located in the flexible realm.

FIGURE 5-16 CONTAINER PLANTS

Source: CD+A

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CHAPTER 6 : **OTHER STREETSCAPE ELEMENTS**

STREET FURNITURE

Pedestrian supportive environments are fundamentally about comfort, interest, and identity. While the general landscaping and green infrastructure elements discussed above provide a significant contribution toward creating such pedestrian-supportive environments, the inclusion of street furniture in a street's design can create a significant level of "value added." Street furniture can help to create a pedestrian realm that is comfortable and interesting for people to use and therefore invites walking as an activity and mode of travel.

Pedestrian-oriented improvements that enrich the walking experience by adding functionality and visual interest to the pedestrian realm include: public seating, trash and recycling receptacles, news racks, bicycle parking, bollards, wayfinding signs, and district or neighborhood gateway features. Pedestrian-scale lighting, which also plays an important functional and aesthetic role in the design pedestrian-supportive environments and is also located in the furniture zone, is discussed in a separate section below.

General Guidelines

» See Figure 6-2 for an overview of street furniture for different street types and built contexts

» All public street furniture should be located in the furniture zone or curb extensions in the flexible realm. Any vertical objects exceeding 3 feet in height should be set back from the face of curb by 18 inches.

» Amenities along streets within a defined district or along a particular street for which a streetscape plan exists should be selected to form a coherent group of amenities coordinated in style and color so as to visually reinforce the desired street and district identity

» Street furniture placement should be closely coordinated with the design of green infrastructure features discussed elsewhere in this document; for example, coordination of parking stall striping and breaks between stormwater planters for pedestrian circulation between parking and the sidewalk through zone

» The placement of amenities should never reduce the clear width of a sidewalk's or path's through zone to less than four feet, see Figure 3-5 for the target, maximum, and minimum clear through zones for different street and context types. All street furniture, way-finding signs, and other amenities should comply with applicable ADA requirements

» All street furniture and other amenities should be made of durable, high quality materials and allow for cleaning and graffiti removal with reasonable effort

» Consider seat walls and seating incorporated into buildings, landscape features, and stormwater planters, as an alternative to freestanding benches

» Also see the *San Mateo Pedestrian Master Plan* and potentially applicable City of San Mateo planning documents such as the *Downtown Area Plan*, or specific plans that may contain references to selected street furniture or custom streetscape features or treatments

FIGURE 6-1 STREET FURNITURE IN SAN MATEO

FIGURE 6-2 STREET FURNITURE BY STREET TYPE AND OVERLAY[29]

ELEMENT	TRASH/RECYCLING RECEPTACLES					SEATING					WAYFINDING IMPROVEMENTS				
STREET TYPE / CONTEXT	DNTN	MX	NEIGH	IND	PARK	DNTN	MX	NEIGH	IND	PARK	DNTN	MX	NEIGH	IND	PARK
El Camino Real[30]	Yes	Yes	Optional	n/a	n/a	Optional	Optional	No	n/a	n/a	Yes	Yes	Optional	n/a	n/a
Major Connector	Yes	Yes	No	No	Yes	Yes	Optional	No	No	Yes	Yes	Optional	Optional	No	Optional
Minor Connector	n/a	n/a	No	n/a	Yes	n/a	n/a	No	n/a	Yes	n/a	n/a	Optional	n/a	Optional
Access	Yes	Yes	No	No	Yes	Optional	Optional	No	No	Yes	Yes	Optional	Optional	No	Optional
Alley	No	n/a	n/a	n/a	n/a	Optional	n/a	n/a	n/a	n/a	Yes	n/a	n/a	n/a	n/a
Path	Optional	Optional	Optional	No	Yes	Optional	Optional	Optional	No	Yes	Optional	Optional	Optional	Optional	Optional
OVERLAY															
Transit Streets	Integrated into transit stop					Integrated into transit stop					Integrated into transit stop				
Biking Streets	As per Street Type guidance above					As per Street Type guidance above					Per Bicycle Master Plan				
Walking Streets	Yes	Yes	Optional	No	Yes	Yes	Yes	Optional	Optional	Yes	Yes and per other City Plans				
Freight Routes	As per Street Type guidance above					As per Street Type guidance above					Freight Route Signage				
Shared Spaces	Yes					Yes					Optional – per site design and other City Plans				
Rail Corridor Plan Station Area	Per Streetscape Master Plan called for in the Rail Corridor TOD Plan					Per Streetscape Master Plan called for in the Rail Corridor TOD Plan					Per Streetscape Master Plan called for in the Rail Corridor TOD Plan				
Downtown San Mateo Station Area	Per Streetscape Master Plan called for in the Rail Corridor TOD Plan					Per Streetscape Master Plan called for in the Rail Corridor TOD Plan					Per Streetscape Master Plan called for in the Rail Corridor TOD Plan				

Key: DNTN= Downtown MX= Mix-use NEIGH= Neighborhood IND= Industrial PARK=Parks

[29] The street furniture denoted here is described in greater detail in the *San Mateo Pedestrian Master Plan* and *Bicycle Master Plan* (Materials and Furnishings)

[30] Or per *El Camino Real Master Plan*

ELEMENT	TREE GRATES					NEWSRACKS					BOLLARDS					PEDESTRIAN SCALE LIGHTING				
STREET TYPE / CONTEXT	DNTN	MX	NEIGH	IND	PARK	DNTN	MX	NEIGH	IND	PARK	DNTN	MX	NEIGH	IND	PARK	DNTN	MX	NEIGH	IND	PARK
El Camino Real[29]	Yes	Yes	Yes	n/a	n/a	Consolidate into multi-unit racks, locate away from clear paths of travel			n/a	n/a	In wide median pedestrian refuges			n/a	n/a	Yes				
Major Connector	Yes	Yes	Where needed to maintain recommended Through Zone width			Consolidate into multi-unit racks, locate away from clear paths of travel					In wide median pedestrian refuges					Yes, on segments that are part of Walking Street				
Minor Connector	n/a	n/a	Where needed	n/a	Where needed						Where curbless green infrastructure elements are used					n/a	n/a	Optional	n/a	Optional
Access	Yes	Where needed to maintain recommended Through Zone width				Consolidate into multi-unit racks, locate away from clear paths of travel		Discourage	Away from paths of travel	Discourage	Where curbless green infrastructure elements are used					Yes	Yes	Optional	Optional	Optional
Alley	Optional	n/a	n/a	n/a	n/a	Discourage	n/a	n/a	n/a	n/a	Optional	n/a	n/a	n/a	n/a	Yes	n/a	n/a	n/a	n/a
Path	No					Discourage	Discourage	Discourage	Discourage	Discourage	In locations where vehicles need to be discouraged from entering path					Yes				
OVERLAY																				
Transit Streets	Where needed to maintain recommended Through Zone width					Consolidate into multi-unit racks, locate away from boarding /alighting and circulation areas					As per Street Type guidance above					Yes				
Biking Streets	As per Street Type guidance above					As per Street Type guidance above					As per Street Type guidance above					As per Street Type guidance above				
Walking Streets	Where needed to maintain recommended Through Zone width					Consolidate into multi-unit racks, locate away from clear paths of travel					As per Street Type guidance above					Yes				
Freight Routes	As per Street Type guidance above					As per Street Type guidance above					As per Street Type guidance above					As per Street Type guidance above				
Shared Spaces	Optional – per site design					Consolidate into multi-unit racks, locate away from clear paths of travel					Optional – per site design					Yes – per site design				
Rail Corridor Plan Station Area	Per Streetscape Master Plan called for in the Rail Corridor TOD Plan					Per Streetscape Master Plan called for in the Rail Corridor TOD Plan					Per Streetscape Master Plan called for in the Rail Corridor TOD Plan					Per Streetscape Master Plan called for in the Rail Corridor TOD Plan				
Downtown San Mateo Station Area	Per Streetscape Master Plan called for in the Rail Corridor TOD Plan					Per Streetscape Master Plan called for in the Rail Corridor TOD Plan					Per Streetscape Master Plan called for in the Rail Corridor TOD Plan					Per Streetscape Master Plan called for in the Rail Corridor TOD Plan				

Key: DNTN= Downtown MX= Mix-use NEIGH= Neighborhood IND= Industrial PARK=Parks

LIGHTING

Quality lighting helps create a positive streetscape or district character both during the day and at night. Street lighting also increases the sense of safety for all users of a street. By day, the physical presence of light fixtures, in combination with street trees, establishes a rhythm along the street that provides a reference point for pedestrian movement through space. At night, appropriately bright and even light distributed by a system of pedestrian-scaled light fixtures defines the visual nighttime experience of a streetscape or path, plaza, and park.

General Guidelines:

» Appropriate roadway and pedestrian-scale lighting should be provided on all streets and paths in accordance with the guidelines in this section and with applicable City Standards

» Pedestrian-related design characteristics such as human scale, slow speed, frequent stopping and standing should be taken into account during the fixture selection process as well as a light fixtures' day and nighttime design characteristics

» Light fixtures along streets should be located in the furniture zone or corner curb extensions. Light fixtures along paths should be placed outside of the portion of the path identified as the pedestrian through zone.

» Where medians are present, light fixtures may be located in a combination of curbside and median locations

» Light fixtures should efficiently direct light to the desired area of the roadway, sidewalk, or path, avoiding excessive glare, the shedding of light onto adjacent private properties, and sky glow

» The preferred height of pedestrian-scale light fixtures is between 12 and 15 feet in height (to light source)

» The use of light fixtures with light sources at heights of 20 feet or more should be limited to locations where the required lighting levels cannot be met by solely using pedestrian-scale fixtures. The use of "cobra head" fixtures should be avoided to the extent feasible

» Fixtures may be staggered or placed across from one another on both sides of the street depending on lighting and uniformity requirements

» Light fixtures should be spaced with as consistent a rhythm, as feasible

» Light fixture and tree spacing should be closely coordinated to avoid that tree canopies block the light emitted by a fixture

» In mixed-use and commercial environments that include restaurants, theaters, or other uses frequented during evening hours appropriate lighting should be designed to enhance the access to and experience of activities into the night

» Use City of San Mateo standard pedestrian-scale and roadway light fixtures and/or fixtures identified in already established or planned streetscape standards for specific streets or districts. Light fixture should be coordinated in style and color with other streetscape design elements used along the same street or street segment or in the same district as where the fixture is placed.

» In the Downtown context area consider using banner arms and banners attached to light poles to further the Downtown's identity

» For further guidance on desirable crosswalk lighting levels see: Illuminating Engineering Society of North America (IESNA) ANSI-IESNA RP-8-00, "Roadway Lighting," P. 15). For guidance on the lighting of mid-block crossings see FHWA HT-08-053 – The Information Report on Lighting Design for Mid-block Crosswalks.

» Also refer to *Pedestrian Master Plan* for additional guidance

FIGURE 6-3 LIGHTING OPTIONS

Source: CD+A

PAVEMENT MATERIALS AND TREATMENTS

Asphalt and concrete are standard paving materials for surfaces used in street and sidewalk construction. These materials can be supplemented with the use of additional materials or non-standard treatments of asphalt and concrete where specific aesthetic and functional goals need to be achieved. Standard materials are proven to meet the performance criteria for vehicle and pedestrian circulation, on the other hand non-standard paving treatments can give visual emphasis to non-motorized circulation areas and crosswalks, provide a stronger sense of place, and add visual variety to the streetscape.

Non-standard paving materials and treatments can include a range of options, such as natural stone pavers, unit concrete pavers, bricks, textured and colored concrete, stamped asphalt, and concrete whose surface has been given a special finish. Beyond providing an aesthetic enhancement, paving can also contribute to stormwater management when it is executed in the form of pervious or permeable paving. See Pervious/Permeable Paving section above for guidance on this type of paving.

General Guidelines

» Sidewalks should be constructed using the City of San Mateo standard concrete paving and scoring (also see *Pedestrian Master Plan*)

» In addition, special paving materials and treatments may be considered for the following:
  - Pedestrian crossings, especially at important civic locations, neighborhood commercial areas or nodes, and other special districts;
  - Mid-block and raised pedestrian crossings;
  - Pedestrian refuges in medians and traffic islands;
  - Shared streets or pedestrian-only streets;
  - Flexible space in parking lanes;
  - Curb extensions;
  - Furniture zone of sidewalks;
  - Driveways;
  - Transit stop areas, including curb extensions and medians used as transit stops; and
  - Around gateways and other special places

» When designing streets in the downtown area, pavement material and treatment selection should consider policies and concepts for subareas and streets addressed in the *Downtown Area Plan*

» Wherever special paving materials, treatments, or scoring are used, they should be applied for at least a full city block in order to achieve design consistency and efficiency in maintenance. Exceptions to this approach may be made where special paving is being used to visually emphasize smaller-scale elements such as transit stops, park frontages, plazas, civic building entries, or other site-specific paved areas.

» In general, select paving materials that are low in maintenance and meet the performance criteria for durability, load bearing capacity, and slip resistance applicable to the location of application

» When selecting paving materials and treatments for application in the street right-of-way, particular attention has to be given to accessibility and comfort related considerations. Paving materials and treatments must meet all applicable accessibility standards and guidelines described in the most recent version of the Americans with Disabilities Act (ADA) and the California Building Code (Chapter 11.B). Also see San Mateo Public Works standard engineering specifications and details for sidewalk, roadway, and curb ramp construction.

» Many paving materials, sealants, coatings, traffic markings, and other products include components that are harmful to the natural environment. When selecting paving materials consideration should be given to using materials that limit or eliminate the use of such harmful components, are regionally harvested, have recycled content and are rapidly renewable.

Guidelines Specific to the Flexible Realm

» Consider the use of contrasting paving materials in the flexible realm to visually distinguish this area from the adjacent asphalt surface and to visually narrow the space used by moving traffic

» Use contrasting paving materials to delineate areas of shared use located in the flexible realm. The latter applies to designs that allow for the temporary or scheduled use (i.e. certain times of day or on weekends) of a parking lane for restaurant seating, vending stalls or other types of uses that involve pedestrian circulation into the flexible realm.

» Use color and/or texture contrasts in paving materials in the flexible realm to achieve the desired effects

» Consider the use of permeable or porous pavement in the flexible realm.

Guidelines Specific to Intersections

At intersections, special paving treatments are appropriate in corner curb extensions, crosswalks, pedestrian median refuges, and curb extensions associated with bus stops.

» Use special paving treatments, such as unit concrete pavers, bricks, textured and colored concrete, stamped asphalt, or concrete, to identify the crosswalk as part of the pedestrian circulations space

» Use special paving treatments in crosswalks and median refuges at intersections to further enhance the neighborhood, district or node identity already established by other streetscape elements

» Select special paving for crosswalk applications considering the wear and tear caused by vehicles crossing the paving

» The paving should be designed and installed to maintain the desired visual and textural appearance

- Special paving treatments should not be considered a substitute for standard or high-visibility crosswalk markings required by City or Caltrans standards
- Integrate the design of pavement treatments in intersection areas with that of other paved areas in the pedestrian realm and in crosswalks
- Consider special paving treatments at transit stop locations to delineate the passenger environment from regular pedestrian circulation areas. Choose subtle treatments, such as scoring patterns as bus stops may be moved from time to time, leaving the pavement treatment in the old location.

FIGURE 6-4 PAVEMENT MATERIALS AND TREATMENTS

APPENDIX H.1

GREEN INFRASTRUCTURE CONSIDERATIONS

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As discussed in Chapter 1, the street design process includes steps that require the evaluation of site conditions for applicable green infrastructure elements. The street designer should evaluate all relevant information that is available or can be generated without excessive cost to assess existing site conditions that may inform the selection, design and prioritization of green infrastructure elements. Figure H.1.1 provides a summary checklist of key environmental and built factors that should be considered in the context of assessing the layers of information discussed in Chapter 1. Note: Some of the data desired for a complete evaluation of site conditions may not be readily available.

FIGURE H1. 1 ENVIRONMENTAL AND BUILT FACTORS CHECKLIST

ENVIRONMENTAL CONTEXT CRITERIA	
Groundwater Recharge (Soil and Hydrology)	**Do the underlying soil and hydrology conditions support the infiltration of stormwater for groundwater recharge?** Where underlying soil and hydrology conditions support infiltration, maximize infiltration and groundwater recharge through careful selection of proper construction details for green infrastructure features. Do not pursue groundwater recharge where stormwater runoff is polluted beyond the combined treatment capacity of the green infrastructure element and native soils above the water table or where contaminated soils are present within or nearby the street right of way.
Tree Canopy	**Are there existing street trees? If yes, what is the health and condition of street trees?** Check for existing street tree canopy along the street or block. Include street trees in green infrastructure elements if street trees already exist along street or are proposed in existing plans or ordinances applicable to the street.
General Landscaping	**Are there landscaped areas within the public right-of-way?** Check for their extent and landscape character to determine if more general landscaping and/or green infrastructure elements can be added or integrated in order to meet stormwater management goals or enhance the pedestrian experience along a pedestrian priority route.
Surface Flow Pollutant Management	**Are unusual pollutants present or likely to be present in surface flows?** There is a spectrum of pollutants that can be present in surface flows in green infrastructure, ranging from ubiquitous trash and suspended solids that can reduce the ability of the green infrastructure element to function to a range of chemical pollutants (i.e.; oils, pesticides, etc.). Some of these can be bio-remediated and some cannot. In the most extreme cases, these pollutants may result in green infrastructure not being an acceptable approach to stormwater management, while in most cases if particular pollutants are present this could affect the selection of appropriate green infrastructure elements, design details, maintenance and monitoring regimens, or other aspects of implementation.
Subsurface Pollutant Management	**Are there subsurface pollutants present within the right of way or in adjacent areas that could be affected by infiltration of water from green infrastructure?** Infiltration of water from green infrastructure can increase the potential for subsurface pollution to migrate more quickly by increasing groundwater flows, and in general this is undesirable. If subsurface pollutant concentrations could be affected by green infrastructure infiltration design details should be implemented to avoid infiltration, such as use of under drains, impervious liners, or other means. This may impact the financial feasibility of green infrastructure construction and maintenance.
Localized Flooding	**Does localized flooding occur in the area?** If so, consider and carefully select green infrastructure features that can mediate flooding issues trough a reduction/spread of peak flows, infiltration where feasible.

ENVIRONMENTAL CONTEXT CRITERIA	
Condition Of Adjacent Water Bodies	**Are there potential connection points to adjacent bodies of water, such as creeks or lagoons? What are conditions in respect to levels of contamination with pollutants, pathogens, and bacteria?** Do not direct insufficiently treated stormwater runoff to existing adjacent bodies of water if doing so would negatively impact the water quality in these bodies of water.
Sea Level Rise And Storm Surge Influence Areas	**Is location of green infrastructure feature subject to tidal flooding or potential future sea level rise?** Tidal flooding may kill the landscape in green infrastructure features. This can likely be avoided through proper plant species selection, such as plants that can tolerate temporary saltwater inundation. Consider using green infrastructure features that can mediate flooding issues through a reduction/spread of peak flows and/or are designed with additional capacity to help contain storm water surge.

BUILT CONTEXT CRITERIA	
On-Street Parking	**Is there on-street parking in the existing condition and in the planned improvements to the street? Is it parallel or angled?** Where on-street parking is present it presents unique opportunities for specific types of green infrastructure, such as corner or mid-block bulbouts of the pedestrian realm and planters into the parking lane, and similarly tree wells or landscaped areas can be provided in the parking lane either separate or continuous with landscape areas in the pedestrian realm. In areas where the pedestrian realm is narrow or otherwise constrained, green infrastructure may be most feasible within the parking lane. Careful layout of parking and access management improvements to reduce driveways can help to reduce the potential of parking space reductions.
Existing Stormwater Utilities	**Is stormwater sewer system present or planned as part of the street improvement? Is its capacity constrained or does it have other limitations?** If an existing system is not present, carefully select green infrastructure features that can provide benefits such as water harvesting, reduction/spread of peak flows, and infiltration where feasible. If water quality and flow volumes can be made appropriate, explore connecting green infrastructure to natural bodies of water such as creeks, ponds, lagoons or the Bay.
Drainage Patterns and Tributary Drainage Areas	**What is the overall drainage pattern in the vicinity of a proposed green infrastructure element? What are the locations and sizes of all tributary drainage subareas?** Obtain the most current information about the larger drainage pattern of an area and its tributary drainage subareas that may concentrate flows within the right-of-way. Note that some of the tributary areas may be in part or entirely located on adjacent private property. This information is critical to the successful design of green infrastructure as it co-determines the size of the green infrastructure elements or series of elements needed to capture, slow and/or treat the runoff from the street or a portion of the street.
Land Use and Adjacent Building Frontage	**What land uses are located along the street for which green infrastructure elements are proposed?** Map land uses and building frontage types along a street where green infrastructure elements are to be located. Use the information to inform the detail design of green infrastructure elements, so that they can support the existing or planned residential, commercial mixed-use, civic or other context created by the combination of land use, building frontage, and associated pedestrian realm activities. Green infrastructure design characteristics informed by this context include the detailing of hardscape elements such as planter walls (height, visual detailing, color) or pavement (combination of types; patterns; color), and plant selection (plant height relative to pedestrians, bicyclists, drivers, and signs; flowering; deciduous vs. evergreen, etc.).
Longitudinal and Cross Slopes	**What are the longitudinal and cross slopes of the areas where green infrastructure elements are proposed?** Obtaining a reliable topographic survey, including information about the longitudinal and cross slopes of a street or site where green infrastructure is proposed, is important for determining the best location for a given green infrastructure element as stormwater runoff needs to reach the feature largely following already established grades.

BUILT CONTEXT CRITERIA	
Underground Utilities / Drain Inlets / Fire Hydrants / Driveways	**What other infrastructure might there be that could have an impact on the implementation of green infrastructure?** Mapping of underground (but also above-ground) utilities, drain inlets, fire hydrants, driveways and other features that are expensive to move is important in order to avoid targeting locations for green infrastructure elements that are in direct conflict with one or more of these features. Not every identified conflict makes a green infrastructure element infeasible, but it potentially makes implementation more costly. For this reason, a careful advance assessment of potential conflicts allows the designer to identify alternate locations or to consider creative design solutions.
Water Harvesting (Capture And Use Of Stormwater)	**Does the project provide the opportunity "active" or "passive" water harvesting?** Water harvesting is the practice of using stormwater runoff to irrigate landscape. At the simplest level, any green infrastructure that includes landscape harvests the runoff to irrigate the landscape in the green infrastructure feature. Active water harvesting is more costly as it requires the storage of runoff in a cistern and use of a pump to use the stored water to irrigate landscape when it is not raining. If water from rainwater flows can be stored at a higher elevation it may be feasible to use passive water harvesting without a pumping system (i.e.; run off within an adjacent public or private property at a higher elevation than the street, or in hilly areas within the street at a higher elevation than where the water is applied).

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APPENDIX H.2

SAN FRANCISCO BAY ESTUARY INSTITUTE MEMO

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SAN FRANCISCO ESTUARY INSTITUTE
4911 Central Avenue, Richmond, CA 94804 • p 510-746-7334 • f 510-746-7300 www.sfei.org

Tuesday, October 07, 2014

TO: City of San Mateo
FR: San Francisco Estuary Institute
RE: Memo for City of San Mateo Sustainable Streets Plan

Background

Green Infrastructure is a highly effective stormwater management technique for reducing runoff and contaminant loads from urban and developed areas. The City of San Mateo will be incorporating Green Infrastructure into its Complete Streets program, which will be one of the drivers for the City's Sustainable Streets Plan. GreenPlan-IT, a GIS and modeling tool developed by San Francisco Estuary Institute, is being piloted by the City to help identify the optimal combination of Green Infrastructure features and sites for achieving predetermined and desirable outcomes at the watershed scale.

How does GreenPlan-IT Work?

GreenPlan-IT has an Arc-GIS based site locator module to identify, rank, and map potential Green Infrastructure locations, a hydrologic and water quality module that quantifies reductions in stormwater and associated pollutants, and an optimization module that uses cost-benefit analyses to identify the best combinations of Green Infrastructure types and sites within a watershed for achieving load reduction goals.

City of San Mateo's Involvement

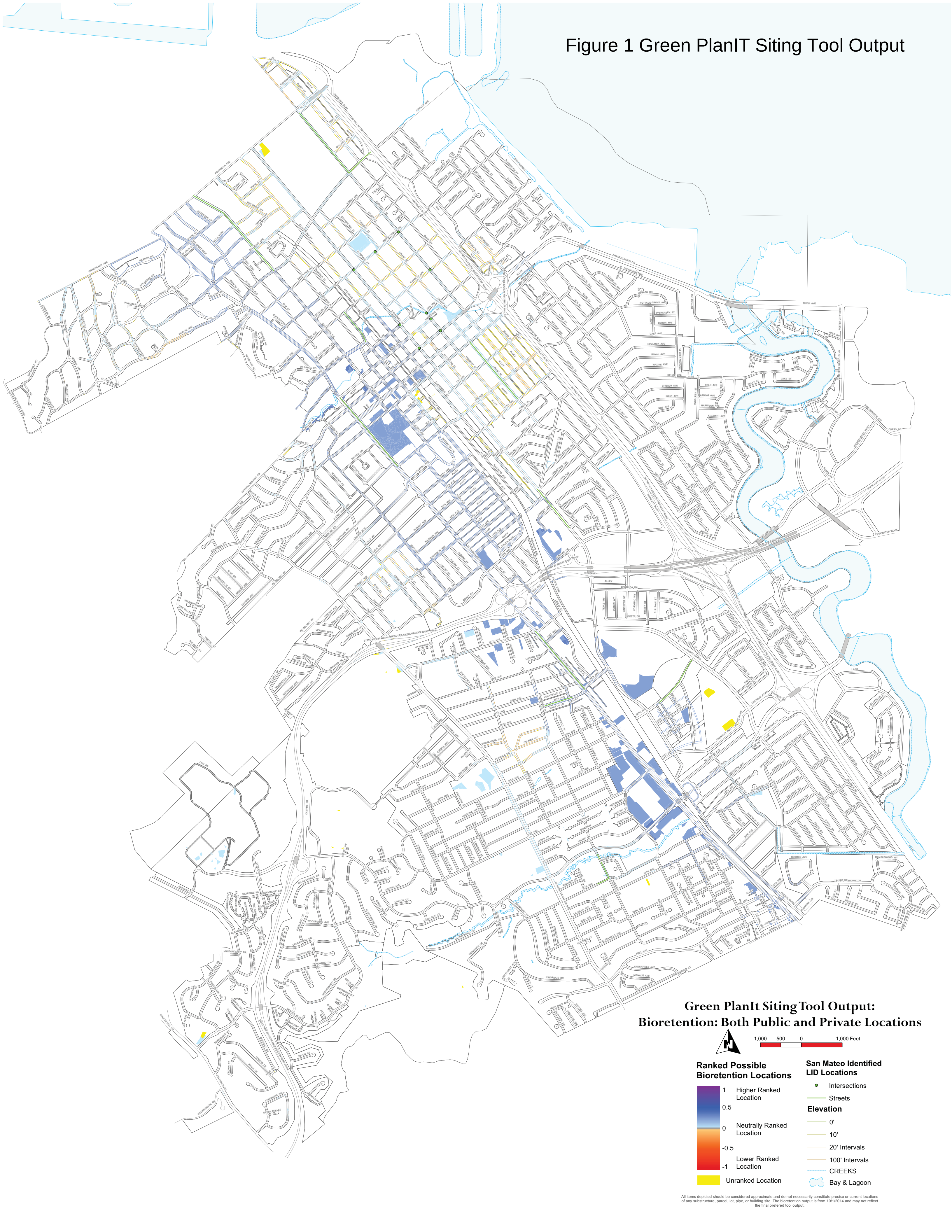
The City of San Mateo is a Green Plan-IT partner and assisted in the development of the pilot site locator tool. The City provided SFEI with the following GIS data layers as inputs for the tool: street centerlines, StreetSaver data, sidewalks, facilities, pedestrian trails, potential pedestrian trails, street tree locations, stormdrain lines, catch basins, fire running lanes, San Mateo Greenway Network, lagoons, streams, lakes, schools, libraries, city hall, parks, and City-owned parcels. Regional data layers included: Bay Area Priority Development Areas, CARI Wetlands, Open Street Maps (OSM) parking lots, OSM Parks, California Protected Areas, and regional bike facilities). San Mateo staff also participated in several discussions with SFEI to prioritize the data layers, which is the mechanism for calculating site priority rankings. Priority Development Areas were the most highly weighted data layer since this is an area slated for future emphasis in the city. Data layers associated with future funding opportunities were also weighted more heavily. The site locator tool has end-user flexibility with access to the tool's engine resulting in an iterative tool that can be fine-tuned as additional local data, with better resolution, become available.

GreenPlan-IT Outputs

Based on City prioritization, the site locator tool identified 18 acres of City-owned property or right-of-way as highly ranked locations for potential Green Infrastructure implementation, 113 acres as moderately ranked, and 11 acres as lower ranked locations. In total, 142 acres were identified as feasible locations for Green Infrastructure. These locations are shown Figure 1 and are distinguished by color gradations according to the legend scale. The tool also produced feasible Green Infrastructure locations for privately owned property.

Recommended Next Steps: City staff can now use toolkit outputs in combination with other local knowledge such as flood prone areas, areas for redevelopment, and educational opportunities as a step in identifying optimized Green Infrastructure placement. The site locator tool outputs will be incorporated into San Mateo's Sustainable Streets Plan as an important facet of the City's vision and planning. By managing runoff close to its source through smart Green Infrastructure placement, we can enhance the local environment, protect public health, and improve community livability.

Figure 1 Green PlanIT Siting Tool Output



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Appendix I

Recommended Projects

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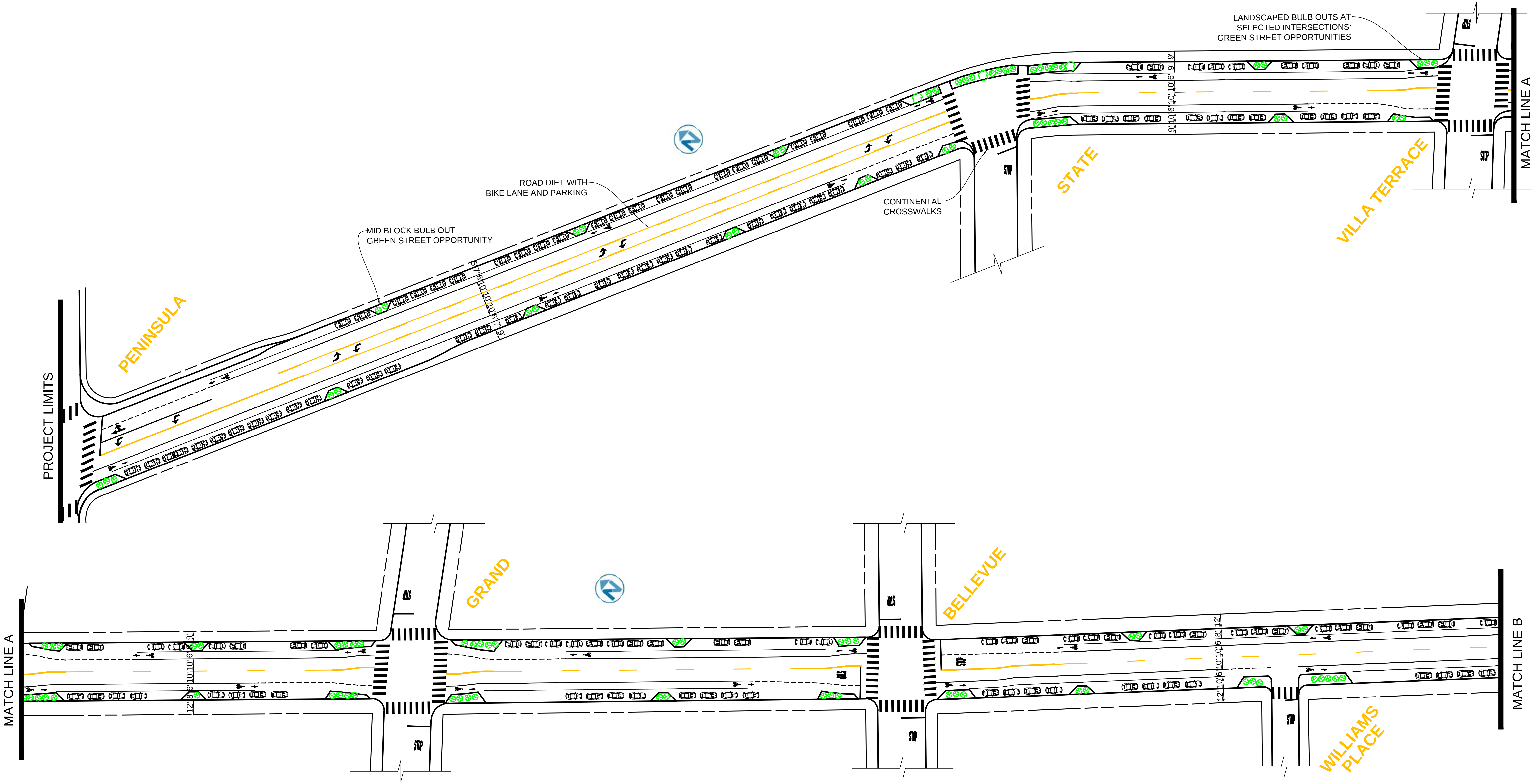
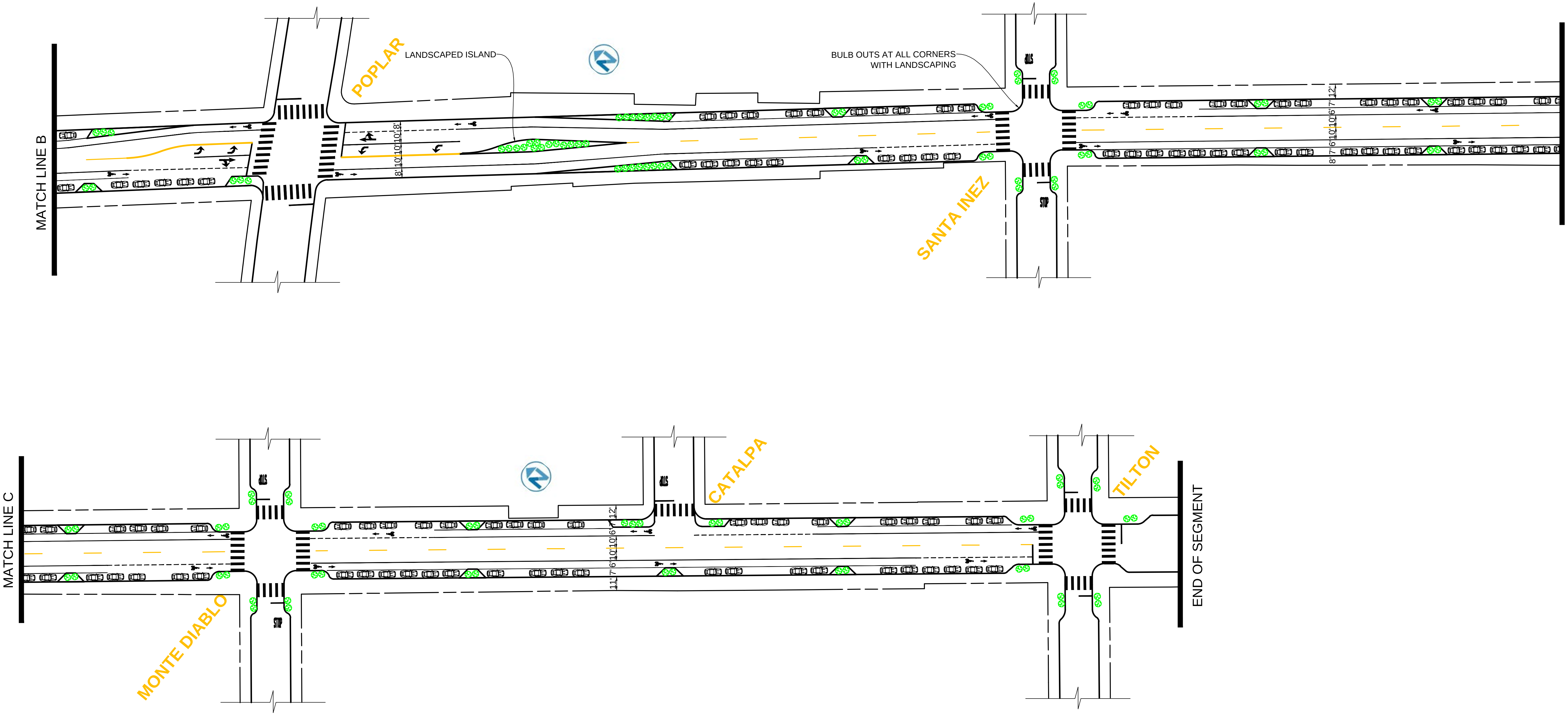
SAN MATEO DR - PENINSULA AVE TO TILTON AVE
DRAFT 10-6-14
CONCEPTUAL- NOT FOR CONSTRUCTION



NELSON NYGAARD

SAN MATEO DR - PENINSULA AVE TO TILTON AVE
DRAFT 10-6-14
CONCEPTUAL- NOT FOR CONSTRUCTION

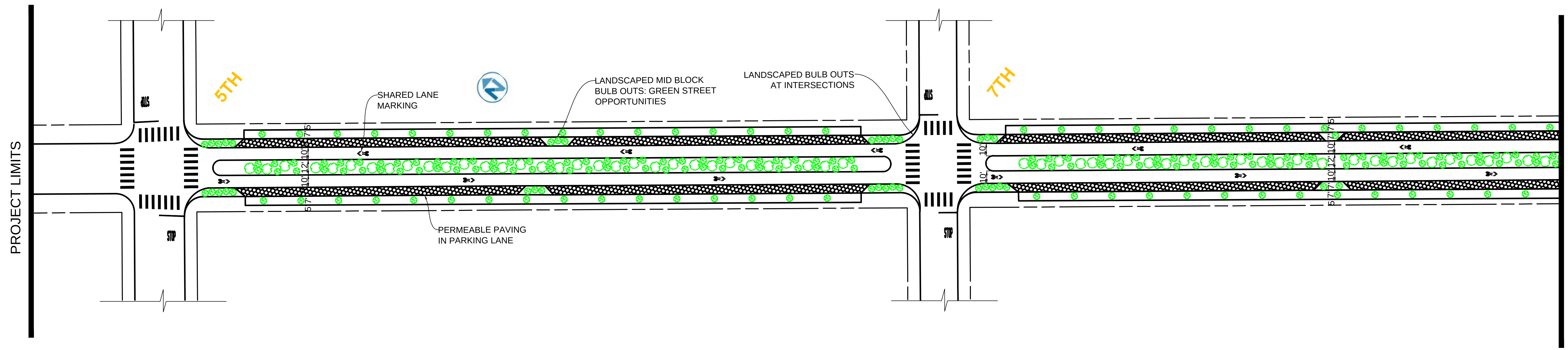


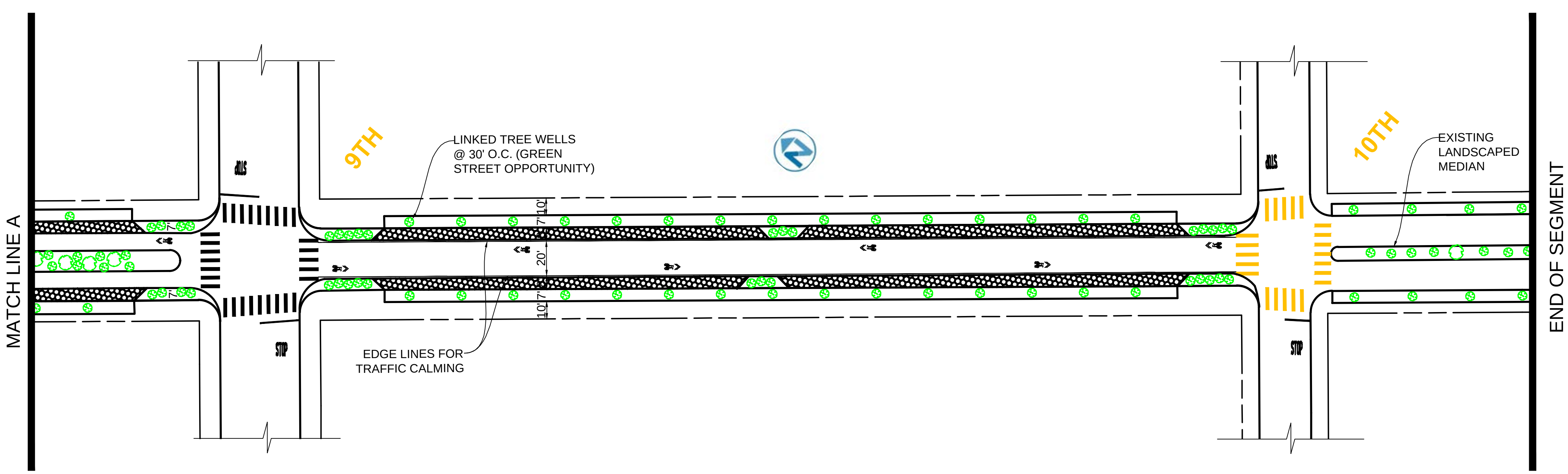
NELSON NYGAARD

GRANT ST - 5TH AVE TO 10TH AVE

DRAFT 10-6-14

CONCEPTUAL- NOT FOR CONSTRUCTION





NELSON NYGAARD

EL CAMINO REAL - 2ND AVE TO 9TH AVE
DRAFT 9-18-14
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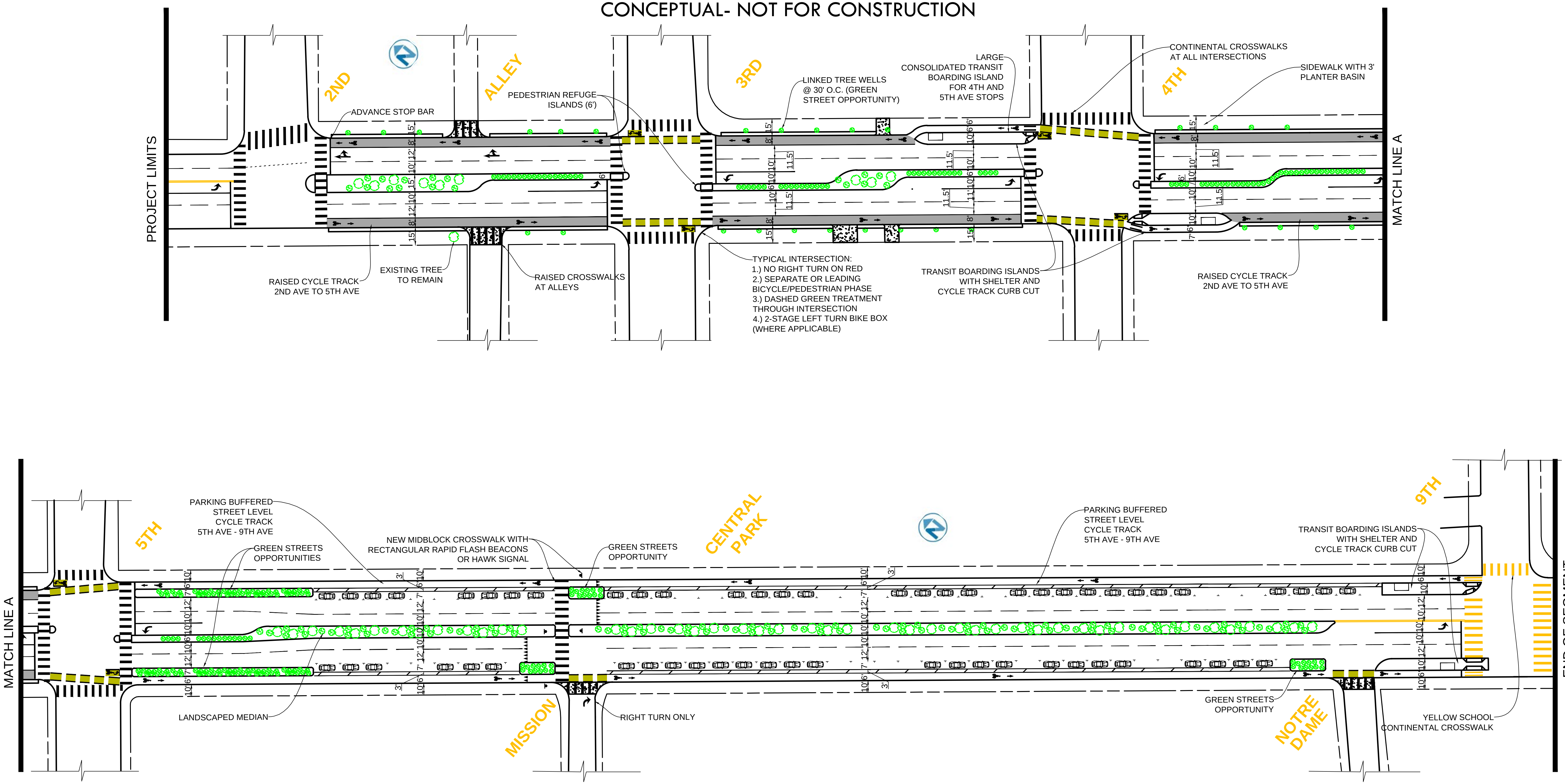
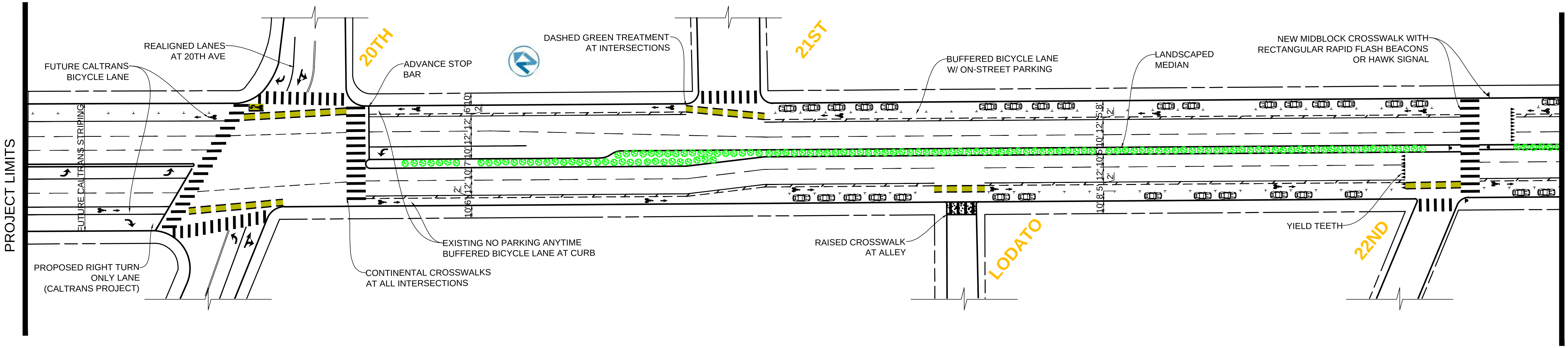


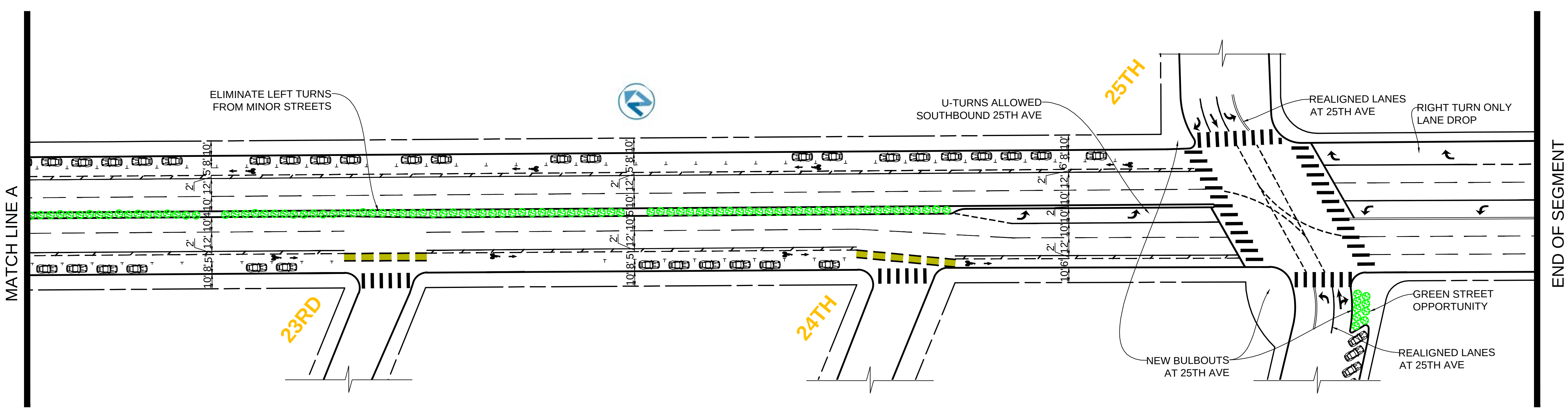
SCALE = 1:20

NELSON NYGAARD

EL CAMINO REAL - 20TH AVE TO 25TH AVE
DRAFT 9-30-14

CONCEPTUAL- NOT FOR CONSTRUCTION





NELSON NYGAARD

San Mateo Drive Preferred Alternative

Illustrative Sustainable Streets Concept

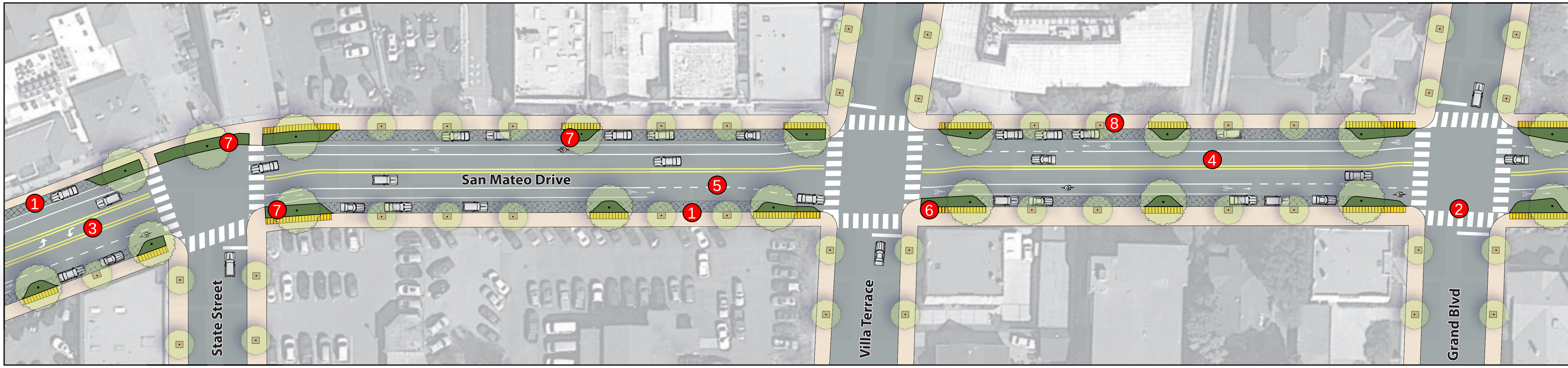


Image source: Google, Inc.

LEGEND

Permeable paving at street | Boardwalk | Green infrastructure | Common landscape

FEET 0 5 10 20 40 80

1. Opportunity for use of permeable or porous pavement:
   - In flexible realm (parking lane)
   - In furniture zone
   - See Design Guidelines, page 5-17 for specific guidance
2. Continential crosswalks provide higher visibility to vehicles as compared to alternatives
3. "Road diet" conversion includes bicycle lanes, travel lanes, and center two-way left turn lane
4. Lane widths should be no greater than 11' wide. See Design Guidelines, page 3-27 for specific guidance.
5. Right turn "mixing zones" promote cyclist visibility for turning vehicles
6. Opportunity for corner curb extension:
   - Shortens crossing distance
   - Can accommodate bicycle parking or other furnishings
   - Corner radii reduced to promote slower turning speeds
7. Opportunity for stormwater curb extensions:
   - Where runoff from street can be captured in downslope locations
   - Use general lansdscaping where only insignificant amounts of runoff can be captured
   - With "boardwalk" design treatment that expands pedestrian zone over stormwater treatment area
   - See Design Guidelines, Page 5-13
8. Furniture zone:
   - Opportunity for general landscaping (street trees)
   - Stormwater trees or linked tree wells.See *Furniture Zone* Page 3-4 for specific guidance

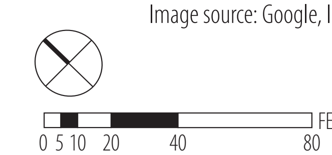
* Final determination of locations suitable for green infrastructure is pending more detailed topographic, soil, and other information.

Grant Street Preferred Alternative

Illustrative Sustainable Streets Concept

Image source: Google, Inc.

LEGEND

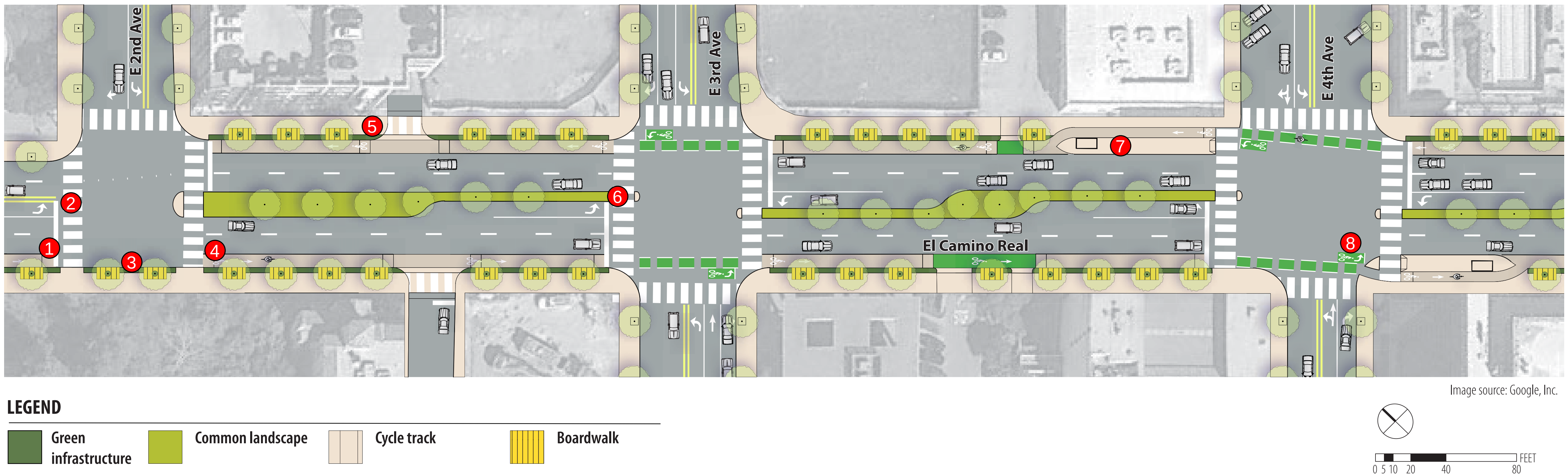


1. Opportunity for use of permeable or porous pavement:
   - In flexible realm (parking lane)
   - In furniture zone
   - See Design Guidelines, page 5-17 for specific guidance
2. Provide advance stop bar to increase pedestrian safety at crosswalks
3. Crosswalks should always align with the pedestrian path of travel and include directional curb ramps whenever feasible (not shown)
4. Lane widths should be no greater than 11' wide. See Design Guidelines, page 3-27 for specific guidance.
5. Reduced curb turning radius encourages turning speeds of no greater than 15 mph
6. Opportunity for corner curb extension
   - Shortens crossing distance
   - Can accommodate bicycle parking or other furnishings
   - See Design Guidelines, Chapter 4: Intersections
7. Opportunity for stormwater curb extensions
   - Where runoff from street can be captured in downslope locations
   - Use general lansdscaping where only insignificant amounts of runoff can be captured
   - Use with "boardwalk" design treatment that expands pedestrian zone over stormwater treatment area
   - See Design Guidelines, Page 5-13
8. Furniture Zone:
   - Opportunity for general landscaping (street trees)
   - Stormwater trees or linked tree wells.
   - See *Furniture Zone* Page 3-4 for specific guidance.
9. New median reduces the amount of impervious surface and increases the landscaped areas that can intercept and absorb rainfall
10. Major intersections provide the potential to use advanced stop bars and bicycle boxes for increased bicycle visibility and to aid bicycle left turns
11. Shared bicycle lane markings (sharrows) alerts motorists and cyclists that the street is a bicycle route.

* Final determination of locations suitable for green infrastructure is pending more detailed topographic, soil, and other information.

El Camino Real - East 2nd Ave to East 4th Ave Preferred Alternative

Illustrative Sustainable Streets Concept



1. Provide advance stop bar to increase pedestrian safety at crosswalks

2. Crosswalks should always align with the pedestrian path of travel and include directional curb ramps whenever feasible (not shown)

3. Opportunity for Flow-Through Planters:
   - Where runoff from the sidewalk can be captured
   - Where runoff from the roadway can be captured if inlets and cross drains are integrated into the cycletrack

4. An 8′ cycletrack increases bicycle visibility and safety for riders on both sides of the street. Cycletrack guidance is currently provided in NACTO Bikeway Design guidance, Caltrans guidance will be available January 2015.

5. Expanded 15 foot sidewalks provide a more comfortable pedestrian experience with street trees and other street furniture

6. Pedestrian refuge islands break the crosswalk into two shorter crossing distances for those who need extra time crossing the street. Median “nose” also helps protect crossing pedestrians from turning traffic.

7. Boarding islands are placed in front of the cycletrack to reduce bus/bicycle conflicts and placed adjacent to the travel lane to reduce transit delays (to speed up transit merging into traffic)

8. 2-stage left turn boxes ensure cyclists can have a safe way to make left turns on busy streets with multiple lanes.

*Final determination of locations suitable for green infrastructure is pending more detailed topographic, soil, and other information.

El Camino Real Preferred Alternative

Illustrative Sustainable Streets Concept

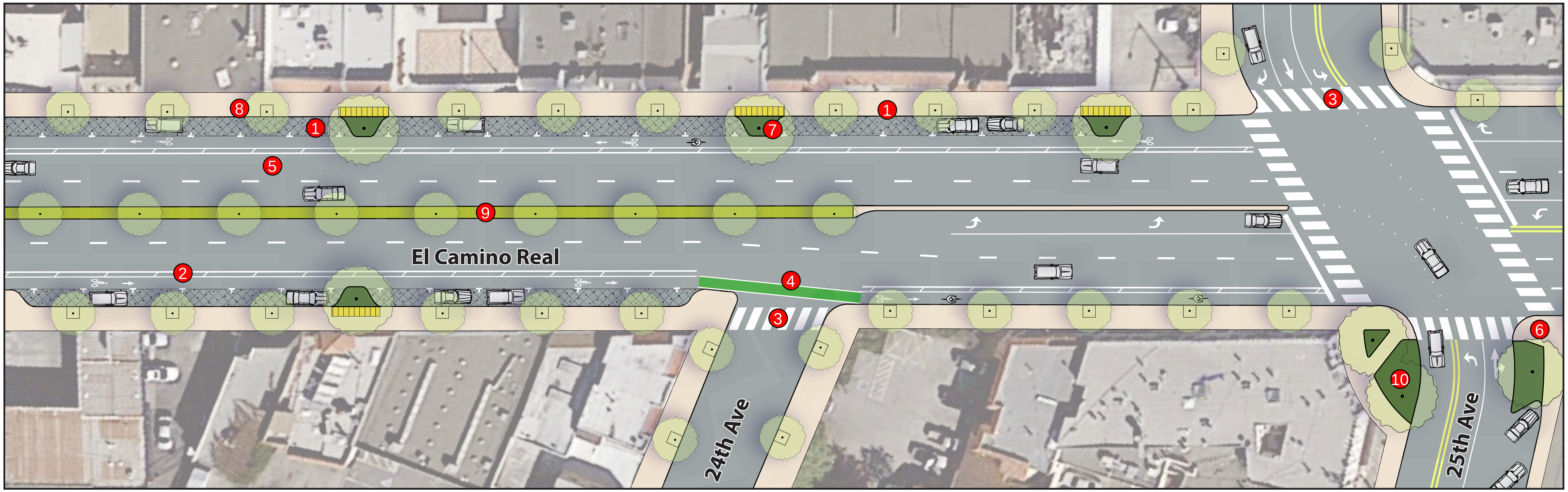


Image source: Google, Inc.

FEET 0 5 10 20 40 80

LEGEND

- Permeable paving at street
- Green infrastructure
- Common landscape
- Boardwalk

1. Opportunity for use of permeable or porous pavement:
   - In flexible realm (parking lane)
   - In furniture zone
   - See Design Guidelines, page 5-17 for specific guidance
2. Bicycle lane buffer increases safety for cyclists traveling along El Camino Real
3. Crosswalks should always align with the pedestrian path of travel and include directional curb ramps whenever feasible (not shown)
4. Green bicycle lanes help guide cyclists across the the intersection and provides awareness of the bicycle lane for right turning vehicles
5. Lane widths should be no greater than 11' wide. See Design Guidelines, page 3-27 for specific guidance. Here, an wider outside lane is provided for trucks and transit vehicles.
6. Opportunity for corner curb extension:
   - Shortens crossing distance
   - Can accommodate bicycle parking or other furnishings
   - Corner radii reduced to promote slower turning speeds
7. Opportunity for stormwater curb extension:
   - Can be placed within the flexible realm (bewteen parked vehicles)
   - Use general lansdscaping where only insignificant amounts of runoff can be captured
   - With "boardwalk" design treatment that expands pedestrian zone over stormwater treatment area
   - See Design Guidelines, Page 5-13
8. Furniture zone:
   - Opportunity for general landscaping (street trees)
   - Stormwater trees or linked tree wells.
   - See *Furniture Zone* Page 3-4 for specific guidance
9. New median reduces the amount of impervious surface and increases the landscaped areas that can intercept and absorb rainfall
10. Opportunity for rain garden or general landscaping as well as entry monument for 25th Avenue

* Final determination of locations suitable for green infrastructure is pending more detailed topographic, soil, and other information.

1/8/2015

UrbanAdvantage

Steve Price, 510 486-0427
www.urban-advantage.com

San Mateo, CA

El Camino Real and 3rd Avenue looking south

San Mateo, CA

El Camino Real and 3rd Avenue looking south

San Mateo, CA

El Camino Real and 3rd Avenue looking south

San Mateo, CA

El Camino Real and 3rd Avenue looking south

San Mateo, CA

El Camino Real and 3rd Avenue looking south

San Mateo, CA

El Camino Real and 3rd Avenue looking south

Appendix J

TDM Plan

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MEMORANDUM

To: Ken Chin

From: San Mateo Sustainable Streets Project Team

Date: September 30, 2014

Subject: San Mateo Sustainable Streets Plan: Tech Memo 4.4 – Citywide Transportation Demand Management Plan

INTRODUCTION

As part of the San Mateo Sustainable Streets Plan project, Nelson\Nygaard has been tasked with establishing a Citywide Transportation Demand Management (TDM) Plan to supplement the other components of the Plan. This memorandum presents a high-level overview of the City's existing trip reduction plans and requirements, as well as potential programs and strategies to include in the citywide program and a potential program structure and language.

TDM programs are intended to reduce vehicle trips and parking demand by promoting the use of non-single-occupancy-vehicle transportation options, shifting travel by mode and time of day to take advantage of available capacity and reduce system crowding and congestion. By implementing TDM programs, municipalities and private entities can use available transportation resources more efficiently. These programs can include a wide variety of measures, including shuttle services, transit pass subsidies, improved access to transit, park and ride facilities, and improved bicycle and pedestrian amenities, among others. TDM strategies carefully manage transportation resources through incentives, employer regulation, communication, marketing, and other techniques.

EXISTING PLANS AND REQUIREMENTS

SAN MATEO RAIL CORRIDOR TRANSIT ORIENTED DEVELOPMENT PLAN

The San Mateo Rail Corridor Transit Oriented Development Plan was adopted by City Council in 2005. It includes a TDM component to ensure that new development within the Corridor Plan's TOD zones minimizes automobile impacts within the city. The program includes the following elements:

» Establishment of a corridor-wide trip reduction goal

» Establishment of a Transportation Management Association (TMA) with membership requirements

» Requirement for single-occupant vehicle trip reduction goals for individual projects

» Definition of a range of TDM measures to achieve trip reduction goals

» Requirements for ongoing monitoring to ensure compliance, and the actions to be taken for non-compliance

The Plan includes a list of potential TDM measures from which developments are free to choose, offering flexibility for achieving trip reduction targets and ensuring TDM measures are well suited to the specific project context. The TDM measures listed in the plan include:

» Non-residential market-rate parking permit systems and parking cash-out programs
» Market-rate residential parking charges
» Transit pass subsidies for employees or residents
» On-site car-sharing programs
» Residential permit parking
» Preferential HOV parking and carpool promotion and coordination
» Bicycle parking, commuter facilities including locker rooms and showers, and promotional programs
» Participation in the Peninsula Traffic Congestion Relief Alliance's Guaranteed Ride Home Program
» Compressed work week, flex time, or telecommuting

The overall goal of the program is to reduce new vehicle trips by 25% within the corridor. It also includes the formation of a corridor-specific TMA, participation in which will be required for all new development within the TOD zones of the Plan and strongly encouraged for development within the broader Plan area. Other requirements of the program include:

» Submission of a trip reduction and parking management plan with new development applications
» Establishment in conditions of approval of:
  - Both short- and long-term trip generation thresholds
  - Minimum and maximum parking standards
  - A monitoring plan
» An annual report completed by the TMA tracking compliance and program changes

HILLSDALE STATION AREA PLAN

The Hillsdale Station Area Plan, adopted by City Council in 2011, extends the TDM requirements of the Corridor Plan to all new development within the Station Area Plan boundaries, including the 25% trip reduction target, required membership in the TMA, the completion of a trip reduction and management plan, and the establishment of a monitoring program.

SPECIFIC PLANS

Bay Meadows (Phase II)

The conditions of approval for the Bay Meadows Specific Plan (2005) include the following TDM-related components:

» A TDM program that is active for the occupied life of the development
» Membership in the TMA
» Annual monitoring
» Goals of reducing automobile trips by 10% (short-term), 16% (mid-term), and 25% (long-term)

The TDM program must be implemented using a selection of programs from the Corridor Plan and the City/County Association of Governments (C/CAG).

Station Park Green

The conditions of approval for the Station Park Green Specific Plan (2011) include the following TDM-related components:

» A TDM program, on-going for the occupied life of the development

» A vehicle trip cap

» Membership in the TMA

» Annual monitoring

» Goals of a 25% reduction (short-term) and 26% to 36% reduction in trips (long-term)

DOWNTOWN AREA PLAN

The Downtown Area Plan (2009) includes policies to require TDM measure implementation for projects anticipated to generate significant parking and traffic impacts. Listed measures include ridesharing, work pattern changes, transit use, preferential parking controls, and improvements to the pedestrian and bicycle environment. While TDM programs are required for significant projects, the Plan also encourages TDM opportunities for smaller scale projects.

The Downtown Area Plan also includes the policy to develop a Downtown TMA, whose role would be to provide support and oversight regarding downtown transportation opportunities, working to encourage the use of transit, walking, and bicycling and to reduce the use of single-occupant vehicles.

DOWNTOWN PARKING PROGRAM

The Downtown Parking Program, approved in April 2014, recommends the development of a comprehensive TDM program for the downtown area that complements recommendations in the parking plan. TDM recommendations listed in the parking program include:

» Near-Term Recommendations (0 – 18 months):

- Creation of a TDM technical advisory committee in tandem with the formation of the Downtown TMA (as recommended by the Downtown Area Plan) to foster the development of the downtown TDM program
- Continual collection of employee, customer, and commuter mode split data
- Development of a short-term TDM plan, including a review of applicable strategies, revenues, and expenses
- A comprehensive review of the current TDM program, with the suggestion that when overall downtown parking occupancies surpass 85%, the City should direct more financial resources to TDM planning and programs
- The creation of links between TDM goals and objectives and the San Mateo Parking Management Program, such as encouraging walkability to and from lesser utilized parking lots, shifting some parking demand from certain groups (commuters and employees) to alternative modes, etc.

» Mid-Term Recommendations (36 months):

- Development of a long-term TDM plan, including a plan for reinvesting a portion of parking revenues into TDM programs (system improvements, incentives, marketing, wayfinding, etc.)
- Development of an evaluation program, maximizing mobility, access, and efficiency
- Analysis and potential revision of downtown parking requirements to more realistically reflect downtown parking demand and incorporate the benefits of TDM programs

PROGRAMS, STRATEGIES, AND STRUCTURE

As proposed by Nelson\Nygaard, the Citywide TDM plan would extend TDM requirements, to varying degrees and for certain development types and densities, across the whole city. More stringent requirements are proposed for certain focus areas, including:

» Tier I:

- Parcels within the Downtown Area Plan boundaries
- Parcels within the Rail Corridor Plan boundaries

» Tier II:

- Parcels within a half mile of a Caltrain station (Burlingame, San Mateo Downtown, Hayward Park, and Hillsdale)
- Parcels within a half mile of El Camino Real, which is defined as the El Camino Real Priority Development Area (PDA)
- Parcels within the Hillsdale Station Area Plan boundaries

These areas are mapped in Figure J-1. The portions of the City that are outside of the Tier I and II boundaries would be subject to citywide requirements, as detailed below.

TIER I REQUIREMENTS

Projects within the Tier I boundary would be required to, at a minimum, meet the TDM requirements of the Rail Corridor Plan. These include:

» A 25% trip reduction target

» TMA participation

» Submission of a Trip Reduction and Parking Management Plan with new development applications

» An annual Monitoring Plan

TIER II REQUIREMENTS

Projects within the Tier II boundary would be subject to the following requirements:

» A 15% trip reduction target

» Submission of a Trip Reduction and Parking Management Plan with new development applications

» An annual Monitoring Plan

If the development falls within a plan area with more stringent trip reduction targets (such as the Station Park Green Specific Plan), the more stringent requirements would supersede the Tier II requirements.

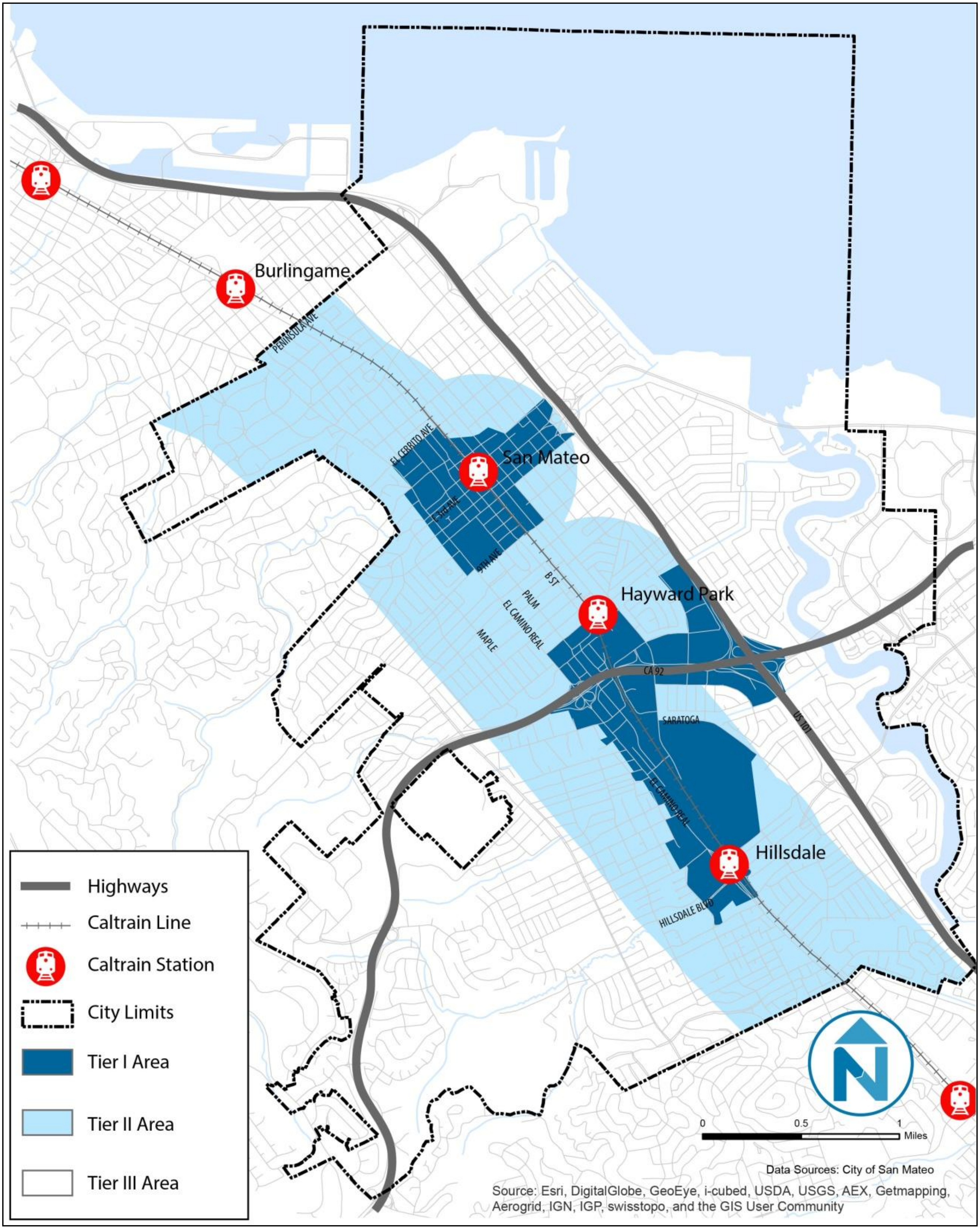
CITYWIDE REQUIREMENTS

Citywide requirements would apply to all new developments within City limits and outside of Tier I and II boundaries that meet the following requirements:

- Residential: larger than six units
- Commercial: larger than 10,000 square feet

A trip reduction target of 10% is recommended for the citywide requirement. A monitoring plan should also be recommended but not required. While focus area requirements include both programmatic and physical TDM measures, citywide requirements would only include physical measures, as listed in the preceding section.

FIGURE J- 1 SAN MATEO TDM PLAN FOCUS AREA BOUNDARIES



PROGRAMS AND STRATEGIES

It is recommended that the zoning code provide a list of potential TDM strategies that new developments can employ to achieve trip reduction targets. This list should be included as a separate section in the zoning code so it can be easily amended as new and improved TDM technologies and strategies emerge. Developers would be free to choose from this menu of potential TDM programs in their effort to achieve the trip reduction target. Tier I and Tier II projects (both residential and commercial), however, would be required to include the following TDM programs:

» Carshare parking in the development's parking facility

» Reduced parking ratios tailored to the development's location

» All parking spaces provided to residents beyond the first space per unit should be offered at a cost (market rate) and included as a separate line item from the unit price or monthly rent

Potential TDM programs could include the following (see Figure J- 2 for a matrix of options):

» Physical Measures (all Tiers):
  - Carshare parking in the development's parking facility
  - Shuttle service
  - Neighborhood-serving retail
  - Secure on-site bicycle storage provided free of charge
  - On-site self-service bicycle repair materials or shop
  - Showers and changing rooms
  - Transportation information kiosk, marketing, and welcome packets
  - Improved transit stops
  - Safety and security systems for pedestrians and bicyclists
  - On-site fitness center
  - Reduced parking ratios tailored to the development's location
  - Doubling of required bike parking spaces
  - The provision of a bike sharing pod1

» Programmatic Measures (Tiers I and II):
  - First-class telecommuting opportunities, flex time, and/or compressed work week opportunities
  - Unbundled parking
  - Market-rate residential parking charges
  - Non-residential market rate parking permit systems and parking cash-out programs
  - Shared parking
  - Transit pass subsidies
  - On-site transportation outreach coordinator
  - On-site sales of Clipper Cards
  - On-site sales of BikeLink Cards

- Preferential parking for carpoolers and vanpoolers, and promotion/coordination
- Participation in the Peninsula Traffic Congestion Relief Alliance's Guaranteed Ride Home Program

FIGURE J- 2 MATRIX OF TDM MEASURE OPTIONS, BY TYPE

	PHYSICAL MEASURES		PROGRAMMATIC MEASURES
All Tiers	Carsharing*	Tiers I and II Only	Telecommuting Opportunities
	Shuttle Services		Unbundled Parking*
	Neighborhood-Serving Retail		Market-Rate Residential Parking Charges
	Secure and Free Bicycle Storage		Non-Residential Market-Rate Parking Permit Systems and Cash Out
	On-Site Bike Shop		Shared Parking
	Showers and Changing Rooms		Transit Pass Subsidies
	Transportation Information Kiosk		On-Site Transportation Outreach Coordinator
	Improved Transit Stop		On-Site Sales of Clipper Cards
	Safey/Security Systems for Bicyclists and Pedestrians		On-Site Sales of BikeLink Cards
	On-site Fitness Center		Preferential Parking for Carpoolers and Vanpoolers
	Reduced Parking Ratios*		Participation in the Peninsula Traffic Congestion Relief Alliance's Guaranteed Ride Home Program
	Doubling of Required Bike Parking Spaces		
	Bike Sharing Pod		

*Required for Tiers I and II

Developments that are proposed for parcels within Tiers I and II should be required to submit monitoring plans, the components of which should include:

» Annual parking occupancy counts

» An annual mode split survey with required participation targets (100% if <10 employees or residents, 50% if 10 to 50 employees or residents, 30% if more than 50 employees or residents)

» Hose counts or cordon counts

Trip reduction monitoring can be done in a variety of ways, such as annual surveys, driveway counts, cordon counts, or monitoring of key intersection volumes. The method selected should be appropriate to the specific development. For example, a smaller project might use driveway counts and could even be required to install permanent counting loops at its driveway for easy data collection. A district-scale development might be required to put together a more robust monitoring plan that could include monitoring of key intersections, sample counts at project driveways, or cordon counts.

POTENTIAL CITYWIDE ZONING LANGUAGE

The goal of the Citywide TDM Plan is to create a TDM requirement as part of the City's zoning code. The following draft language represents a starting point for City consideration.

GENERAL TDM ORDINANCE

Section X.XX Citywide TDM Ordinance

X.XX.01 Purpose and Intent

The purpose of this section is to mitigate the traffic, transportation, and related impacts of new development through the requirement that an appropriate Trip Reduction and Parking Management Plan for such uses be prepared and implemented. Transportation Demand Management (TDM) programs are intended to reduce vehicle trips and parking demand by promoting the use of multimodal transportation options, shifting travel by mode and time of day to take advantage of available capacity and reduce system crowding and congestion. By implementing TDM programs, municipalities and private entities can use available transportation resources more efficiently and achieve environmental, public health, and quality of life goals. More specifically, the intent of the Trip Reduction and Parking Management Plan is to reduce single occupancy vehicle trips by:

» Encouraging other forms of travel, including transit use, ridesharing, walking, and bicycling using site-specific controls and conditions;

» Leveraging and sharing existing and future plans and conditions in neighboring uses;

» A combination of additional measures, all in coordination with the city's overall TDM program.

X.XX.02 Conditions and Requirements for Developer TDM Program Plans

The Citywide TDM requirements will apply to the following types of projects:

1. Multi-family residential developments that have more than six units
2. Mixed-used developments with six or more residential units, or 10,000 square feet or more of non-residential use
3. All non-residential projects larger than 10,000 square feet

Requirements associated with the TDM focus areas will apply to the following types of projects:

» Projects that meet the criteria for the Citywide TDM requirements but also lie within the TDM focus area zones (Tiers I and II).

See Figure X for a map of Tier boundaries.

<u>Citywide Requirements:</u>

A trip reduction target of 10% is required for areas outside the focus area boundaries. A monitoring plan is recommended, but not required. Trip reduction targets can be achieved by implementing any set of the physical TDM strategies listed in X.XX.03.

<u>Focus Area Requirements:</u>

All projects within the Tier I TDM focus area shall be consistent with the provisions of Rail Corridor Plan Chapter 7 (G) TDM, including participation in a Transportation Management Association (TMA), a 25% trip reduction target, and commitment to a monitoring program. All planning application submittals shall include a trip reduction and parking management plan. This plan shall include recommended trip reduction and parking reduction measures. These recommendations shall include a definition of appropriate trip generation thresholds for the project.

The trip reduction and parking management plan shall be designed to minimize the amount of parking demand associated with the project and reduce single-occupant vehicle trips in and around San Mateo. The plan shall be based on the following facts, projections, and commitments:

1. Facts and Projections:
   - Project description, including the nature of development and property use;
   - Site plan identifying conditions that affect commute travel, such as proximity of project to public transit and other non-single-occupant vehicle facilities, availability of and accessibility to offsite parking spaces that could serve the project, and the type and number of patrons/users of a proposed parking supply.
   - Number of vehicle trips expected to be generated by the project and description of measures to reduce associated traffic impacts on San Mateo streets; and
   - Other factors published by the Planning Director.
2. Commitments:
   - Commitment to implement vehicle trip reduction measures to achieve a 25% trip reduction target via some or all of the strategies listed in X.XX.03.
   - Commitment to providing a stable source of funding for the projects TDM programs.
   - Commitment to monitoring the success of the TDM program.
   - Commitment to maintain TDM management compliance for the life of a project, even in the event of a change of ownership.
   - Commitment and identification of consequences for non-performance.

For the purposes of determining whether applicable developments are complying with the provisions of this chapter, the City shall monitor compliance in a manner it deems appropriate and reasonable. Monitoring mechanisms include, but are not limited to the following:

1. Review and approval of site plan development permits
2. Before the issuance of a certificate of use and occupancy
3. In response to complaints
4. Annually

Trip reduction monitoring can be done in a variety of ways such as annual surveys, driveway counts, cordon counts, or monitoring of key intersection volumes. The method selected should be appropriate to the specific development. For example, a smaller project might use driveway counts and could even be required to install permanent counting loops at its driveway for easy data collection. In comparison, district-scale developments would be required to have a more robust monitoring plan that could include monitoring of key intersections, sample counts at project driveways, or cordon counts.

All projects within the Tier II TDM focus area shall be subject to the same requirements of the Tier I area, except for the trip reduction target, which shall be 15%.

Tier I and Tier II projects (both residential and commercial) are required to include the following TDM programs:

» Carshare parking in the development's parking facility

» Reduced parking ratios tailored to the development's location

» All parking spaces provided to residents beyond the first space per unit should be offered at a cost (market rate) and included as a separate line item from the unit price or monthly rent

TDM STRATEGY LIST

X.XX.03 TDM Strategy List

For the purposes of meeting both the citywide and focus area requirements, new development projects should make the commitment to implement vehicle trip reduction measures including some or all of the following:

» Physical Measures (all Tiers):

- Carsharing
- Shuttle service
- Neighborhood-serving retail
- Secure on-site bicycle storage provided free of charge
- On-site self-service bicycle repair shop
- Showers and changing rooms
- Transportation information kiosk, marketing, and welcome packets
- Improved transit stop
- Safety and security systems for pedestrians and bicyclists
- On-site fitness center
- Reduced parking ratios
- Doubling of required bike parking spaces
- The provision of a bike sharing pod2

» Programmatic Measures (Tiers I and II):

- First-class telecommuting opportunities, flex time, and/or compressed work week opportunities
- Unbundled parking
- Market-rate residential parking charges
- Non-residential market-rate parking permit systems and parking cash-out programs
- Shared parking
- Transit pass subsidies
- On-site transportation outreach coordinator
- On-site sales of Clipper Cards
- On-site sales of BikeLink Cards
- Preferential parking for carpoolers and vanpoolers, and ridematching promotion/coordination

- Participation in the Peninsula Traffic Congestion Relief Alliance's Guaranteed Ride Home Program

This list will be updated periodically with additional or replacement strategies.

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[1] Applicants should identify a "reserve area" accessible for bicycle sharing station within the project property, with the dimensions of approximately 40 feet x 6 feet, not including an accessible area around the station. If a location cannot be reserved for the bike share kiosk, then the project should not claim to participate in the program and assume credits for such. Locating a bike share on public right-of-way near the project does not count.

[2] Applicants should identify a "reserve area" accessible for bicycle sharing station within the project property, with the dimensions of approximately 40 feet by 6 feet, not including an accessible area around the station. If a location cannot be reserved for the bike-share kiosk, then the project should not claim to participate in the program and assume credits for such. Locating a bike-share kiosk on public right-of-way near the project does not count.

APPENDIX K

Funding

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MEMORANDUM

To: Ken Chin

From: San Mateo Sustainable Streets Project Team

Date: September 30, 2014

Subject: San Mateo Sustainable Streets Plan: Tech Memo 4.8 – Funding Sources

INTRODUCTION

This memorandum describes potential revenue sources to plan, design, construct, and retrofit streets as described in the San Mateo Sustainable Streets Plan. Many projects and programs will require multiple funding streams. This memorandum covers federal, state, regional, and local sources (a number of which the City is already utilizing), as well as some potential non-traditional resources that could help bring the community's vision for sustainable streets from concept to implementation.

Among the programs detailed in the memo, the most promising include:

» San Mateo's Capital Improvement Program: The City's plan for funding capital improvements of all kinds.

» Active Transportation Program: A state program funded by both state and federal allocations for pedestrian- and bicycle-related projects and programs.

» Sustainable Streets Fee: A new fee tied to development-related transportation impacts, the Sustainable Streets Fee will be recommended as part of the Sustainable Streets Plan to replace the City's existing Traffic Impact Fee.

RESOURCES IDENTIFIED IN THE FIVE-YEAR CAPITAL IMPROVEMENT PROGRAM (CIP)

A review of the City of San Mateo "Five-Year Capital Improvement Program, Fiscal Years 2014-15 to 2018-19," reveals the City's capacity for and adeptness at securing and programming funds that might be leveraged to implement sustainable streets as defined in the Plan.

FIGURE K- 1 CITYWIDE FIVE-YEAR CIP FOR 2014-2019

	2014-15	2015-16	2016-17	2017-18	2018-19	5-Yr CIP Total
Sewer	32,401,158	54,605,000	89,091,000	64,172,000	91,484,000	331,753,158
Streets	6,358,305	7,235,878	6,570,000	6,500,000	6,500,000	33,164,183
Storm Drains	960,000	545,000	815,000	545,000	-	2,865,000
Parks	3,347,017	335,000	2,120,000	2,680,000	2,485,000	10,967,017
Bikeway/ Pedestrian	2,601,083	1,035,000	910,000	260,000	260,000	5,066,083
Bridges	4,430,000	50,000	50,000	50,000	50,000	4,630,000
Street Lights	665,555	-	260,000	-	-	925,555
Utility Undergrounding	400,000	-	-	-	-	400,000
Traffic	150,000	150,000	-	-	-	300,000
Buildings (a)	4,186,181	410,000	410,000	410,000	410,000	5,826,181
Other City Projects (a)	575,693	150,000	135,000	100,000	100,000	1,060,693
Total 5-Year CIP	56,074,992	64,515,878	100,361,000	74,717,000	101,289,000	396,957,870

(a) These categories project funding do not include sewer-related (other) capital projects, which are included in the Sewer category above.

Some noteworthy sustainable streets funding issues and opportunities related to the Five-Year CIP are below.

» *Street Rehabilitation and Improvement Capital Projects.* The CIP shows an estimated $34 million cost to repair 19 miles of failed or failing streets in 2013. Based on this estimate, the 2014-2019 CIP includes street reconstruction and rehabilitation at roughly $6.5 million per year for the next five years, for a total of $33.2 million. The streets in need of repair are referred to as failed streets, and the types of repair that are approved in this category include, but are now limited to, repaving and reconstruction of both streets and sidewalks, new wheelchair ramps, signage, and striping. At the February 10, 2014 City Council Priorities and Goals session, a list of major capital needs was presented that included the rehabilitation of these streets.

  To address the $34 million funding gap for these street projects, the Council directed staff to explore the viability of a local tax for street infrastructure. With such a tax, the City would have the opportunity to issue municipal bonds. The bond proceeds would be used to eliminate the City's failed-streets funding gap, and the local tax revenue would become the pledge for annual debt-service repayment over the life of the bonds. Whether or not a local tax is adopted, there will be an opportunity over time to integrate sustainable streets design changes as part of each street rehabilitation and reconstruction project.

» *Stormwater/Flood Control Renovation and Rehabilitation Capital Projects.* The City relies on an aging wastewater collection system that has resulted in sanitary sewer overflows (SSOs). During significant rain events, added stormwater flows exceed the capacity of the sewer system and result in overflows of diluted—but untreated—sewage into streets and storm drains, which eventually flow to creeks and the Bay.

  In 2009, the San Francisco Bay Regional Water Quality Board issued a Cease and Desist Order to the City of San Mateo, mandating the elimination of waste discharges and requiring that specific actions be taken by the City and two of its subregional partners to correct conditions that cause SSOs. Funding for stormwater and flood control system operation and maintenance is very limited and the capital repair and replacement needs have been estimated to be approximately $85 million.

  At the February 10, 2014 City Council Priorities and Goals session, a list of major capital needs was presented, including addressing stormwater funding needs to remove North Shoreview from the FEMA Flood Map. To address the funding needs, the Council directed staff to explore the viability of a local tax for stormwater infrastructure needs that could be used as a revenue pledge for future municipal bond issuances.

Should a tax and bond measure be adopted, or should other revenue strategies be devised to address stormwater runoff compliance, the City should consider allocating funds to install low-impact designs to reduce runoff and improve water quality. The City may wish to create an explicit "green infrastructure" line item in the budget that integrates revenue from multiple sources.

» *Bikeway and Pedestrian Walkway Capital Projects.* A total of $5.06 million is planned for bikeway and pedestrian walkway projects, of which $2.6 million are budgeted for Fiscal Year (FY) 2014-15, $1.03 million in 2015-16, and $910,000 in 2016-17. Of the total, $1.8 million is planned for the citywide sidewalk-repair program, $1.05 million for the Hillsdale Pedestrian/Bicyclist Bridge across U.S. 101, and $935,000 for citywide bike/pedestrian path improvements.

  Of the total $5.06 million over the next 5 years, $1.55 million (31%) is funded by the General Fund, $1.025 million (20%) by the Measure A half-cent sales tax, $1.0 million (20%) by Community Development Block Grant (CDBG) funding, and $875,000 (17%) by the County Transportation Authority grant. Additional funding sources include sidewalk repair grants, Transportation Development Act (TDA) grants, traffic impact fees, and a grant from the Peninsula Traffic Congestion Relief Alliance.

» *Street Lights and Utility Undergrounding Capital Projects.* Citywide street light rehabilitation and maintenance projects will need $665,555 in 2014-15 and $260,000 in 2016-17, funded by the General Fund. The 25th Avenue utility undergrounding project is planned for completion in 2014-15 at a cost of $400,000; it is funded by Measure A half-cent sales tax revenue.

  Adequate street lighting is essential for personal security, street-crossing safety, and nighttime pedestrian and bicycle activity. In addition, utility undergrounding provides an important opportunity for creating additional space for pedestrian, bicycle, and greening enhancements by eliminating above-ground poles and wires.

» *Traffic Capital Projects.* A total of $300,000 is planned for traffic-calming projects throughout the City, with $150,000 budgeted for each of 2014-15 and 2015-16. Traffic impact fees will fund these planned projects.

» *Citywide Tree Trimming and Planting.* Citywide tree trimming is funded at $100,000 for 2014-15. The total is in addition to $200,000 for tree planting and $100,000 for a Parks and Recreation Department access system. Maintaining and identifying sources to increase spending levels on street tree planting and maintenance will be an important step in increasing the City's capacity to enhance the pedestrian environment, reduce runoff, and improve water quality through green infrastructure elements.

The City is already using a number of revenue sources for multimodal transportation improvements and stormwater management, and these represent potential ongoing sources for implementing sustainable streets. Each funding source, described below, should be reviewed for consistency with the goals and objectives of the Sustainable Streets Plan. Some of the sources offer opportunities to leverage existing funding to implement Plan recommendations.

GENERAL FUND

General Fund revenue is mainly derived from tax revenues including the property tax, franchise tax, and sales/use tax and is used to pay for basic municipal services such as police, fire, and public works. Because there are relatively few restrictions on the use of these funds, they are in high demand for numerous government services, especially public safety. The City's General Fund allocates annual funding for basic preventative street maintenance. Routine inclusion of low- or no-cost traffic calming, pedestrian, and bicycle improvements (e.g., restriping of travel lanes, bike lanes, and crosswalks) should be considered in concert with standard General Fund repaving and other maintenance projects.

In addition, the City has transferred funds from the General Fund in recent years and allocated transfers in future years to help fund street-reconstruction projects, sidewalk repair, bike/pedestrian path improvements, and stormwater and flood control.

COMMUNITY DEVELOPMENT BLOCK GRANTS

The Federal Community Development Block Grants (CDBG) program provides annual grants on a formula basis to entitled cities and counties to develop vibrant urban communities. The program promotes housing and a quality of life by expanding economic opportunities, principally for low- and moderate-income persons. The U.S. Department of Housing and Urban Development (HUD) determines the amount of each entitlement grant by a statutory formula that uses objective measures of community needs including: poverty rate, population, housing overcrowding, housing-stock age, and how much an area's population growth has lagged in relation to other metropolitan areas. The City of San Mateo is an entitlement grantee and administers the CDBG citywide for the benefit of low- and moderate-income residents in the areas of housing, public improvements, parks, and human services.

Currently, the City devotes a portion of its CDBG funding to sidewalk and street reconstruction, which upgrades and reconstructs sidewalks and streets in the CDBG focus areas that are determined to be unsafe. Projects include the installation of accessible curb cuts that meet current code. Specific sidewalk and street locations to be repaired are selected based on severity of damage and volume of pedestrians and vehicles. Program funding is allocated annually since the demand for repair always exceeds the funding. A total of $565,000 is proposed for the 2010-15 period.

Online resources:

http://www.cityofsanmateo.org/index.aspx?NID=1092

http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/entitlement

STATE FUEL EXCISE TAX

The state imposes a 39.5-cent-per-gallon tax on gasoline. These funds are apportioned to cities and counties primarily based on population. Local gas tax revenues must be spent on public street research, planning, construction, improvement, and maintenance of public streets, highways, and mass transit. The City uses money from the tax to fund eligible projects and programs relating to the City's road system and street maintenance activities according to prioritized need.

COUNTY MEASURE M VEHICLE REGISTRATION FEE

Measure M is a vehicle registration fee that was approved by San Mateo County voters in 2010. It adds $10 to the fees associated with registering a vehicle in the county. At the time of passage, the new fee was expected to generate $6.7 million per year. Collection of the fee began in May 2011 and will continue for 25 years.

The City/County Association of Governments of San Mateo County manages the fee and related programs. Half of the net proceeds are allocated to cities and the County for local streets and roads (pavement resurfacing, pothole repair, signs and striping, traffic signals, street sweeping, storm-inlet cleaning, and local shuttles), and the other half is used for Countywide Transportation Programs such as transit operations, regional traffic congestion management, water pollution prevention, and Safe Routes to School programs.

Funds for local streets and roads are allocated every other year to jurisdictions to reimburse expenditures. In FY 2011-12, approximately 70% of the total allocation was spent on street resurfacing and congestion management projects and the remaining 30% used to reimburse street sweeping, storm drain inlet cleaning, Municipal Regional Permit compliance (regulation of stormwater runoff water quality and flow impacts), and other activities.

Online resources:
http://ballotpedia.org/San_Mateo_County_Vehicle_Registration_Fee,_Measure_M_%28November_2010%29

http://www.ccag.ca.gov/pdf/Studies/Final%202011%20CMP_Nov11.pdf

TRAFFIC IMPACT FEES

The City's 2008 Traffic Mitigation Report Update (2009) includes land use and traffic forecasts for 2025, intersection levels of service, recommended transportation improvements, cost estimates, and a calculation of likely traffic impact fee proceeds. The list of transportation improvements includes freeways and interchanges, city intersections, new signal installations, transit improvements, and neighborhood traffic calming. For some of the larger transportation improvements, the impact fee covers only a portion of the cost. The impact fee program is updated annually to renew the commitment to the long-range improvements.

As recommended in the Sustainable Streets Plan, the City of San Mateo will consider replacing the Traffic Impact Fee with a Sustainable Streets Fee, which would focus more specifically on the funding of sustainable streets, including multimodal initiatives and green infrastructure.

MEASURE A SALES TAX

San Mateo County Voters approved Measure A in 1988, increasing local sales tax by one-half of one percent for transportation improvements. The measure's 2004 reauthorization extended it through 2033. The San Mateo County Transportation Authority (TA) administers the proceeds to fund a broad spectrum of transportation-related projects and programs.

Funding from several of the Measure A programs is distributed through a call-for-projects process. These include transit/local shuttles, pedestrian, bicycle, and highway funds. Through these specific calls for projects, eligible sponsors submit applications, which are evaluated and prioritized based on established criteria. The recommended allocations are presented to the TA Board of Directors for approval. Calls for projects generally are held every two years and are specific for each funding program.

Online resources: http://www.smcta.com/

http://www.smcta.com/Projects/Call_for_Projects/BikePedFY14-15.html

TRANSPORTATION DEVELOPMENT ACT

The Transportation Development Act (TDA) provides two sources of funding:

1. Local Transportation Fund (LTF), which is derived from a quarter-cent of the general sales tax collected statewide
2. State Transit Assistance Fund (STA), which is derived from the statewide sales tax on diesel fuel

The TDA funds a wide variety of transportation programs, including planning and program activities, pedestrian and bicycle facilities, community transit services, public transportation, and bus and rail projects. Funds are allocated to areas of each county based on population, taxable sales, and transit performance.

The State Board of Equalization returns the general sales tax revenues to each county's LTF on an annual basis, based on sales tax collected in each county. The STA funds are appropriated by the Legislature to the State Controller's Office. That Office then allocates the tax revenue, by formula, to planning agencies and other selected agencies. Statute requires that half of STA funds be allocated according to population and half be allocated according to operator revenues from the prior fiscal year.

TDA Article 3 funds pedestrian and bicycle projects. The Metropolitan Transportation Commission (MTC), the transportation planning, financing, and coordinating agency for the nine-county San Francisco Bay Area, estimates allocating $821,970 for FY 2014-15.

The San Mateo City/County Association of Governments (C/CAG) develops a list of TDA Article 3 projects for San Mateo County through a competitive process and then distributes funding from MTC to local agencies. Eligible pedestrian and bicycle projects include: construction and engineering for capital projects, bikeway maintenance, bicycle safety education programs (up to 5% of funds), and comprehensive pedestrian and bicycle facility plan development. Cities and counties can only apply for funding to develop or update pedestrian and bicycle plans once every five years. TDA funds may be used to meet local match requirements for federal funding sources. Two percent of the total TDA apportionment is available for bicycle and pedestrian funding.

Online resource: http://www.mtc.ca.gov/funding/STA-TDA/

PENINSULA TRAFFIC CONGESTION AND RELIEF ALLIANCE

The Peninsula Traffic Congestion and Relief Alliance is San Mateo County's transportation demand management agency. The Alliance's mission is to reduce the number of single-occupancy vehicles traveling to, within, and through San Mateo County, reducing congestion and vehicle emissions to improve air quality. The Alliance is funded by C/CAG, the San Mateo County TA, the Bay Area Air Quality Management District, and the MTC.

The Alliance provides small grants and cash incentives that allow communities and employers to provide commuter benefits that encourage transit use, walking, and biking. Programs include shuttle program assistance, Emergency Ride Home, carpool and vanpool incentive programs, free transit tickets, the Bicycle Parking Incentive Program (to reimburse employers for 50% of the cost of bicycle parking, up to $500 per unit), and the Bicycle and Pedestrian Safety Program.

Online resource: www.commute.org

FEDERAL, STATE, REGIONAL, AND OTHER LOCAL RESOURCES

SURFACE TRANSPORTATION PROGRAM AND CONGESTION MITIGATION AND AIR QUALITY IMPROVEMENT PROGRAM

Approximately every six years, the U.S. Congress adopts a surface transportation act that sets the federal government's funding priorities for highways, streets, roads, transit, and other transportation-related projects. The most recent surface transportation act, called Moving Ahead for Progress in the 21st Century (MAP-21), was enacted in July 2012 and, for the most part, simply restructured and consolidated a number of previous programs. The majority of MAP-21 funding flows to the state departments of transportation, so Caltrans administers must of these funds. However, Caltrans distributes a significant portion of funding related to two MAP-21 programs—the Surface Transportation Program (STP) and the Congestion Mitigation & Air Quality Improvement Program (CMAQ)—to regional planning agencies to be used at their discretion, subject to federal regulations. MTC develops and administers the funds from these programs to target Bay Area transportation needs according to the priorities of the Bay Area's regional transportation plan, Plan Bay Area.

MTC recently committed $795 million in STP/CMAQ funds for federal fiscal years 2012-13 through 2015-16. Of the total, $475 million is funding the continuation of existing regional programs and $320 million was distributed to county congestion management agencies (CMAs), to be spent based on local priorities. The latter funding pot includes a new competitive grant program called the One Bay Area Grant (OBAG) program. This funding source is described in further detail below.

One Bay Area Grant Program

OBAG aims to fund a variety of multimodal transportation objectives. Each county CMA can direct OBAG funds toward projects that meet the eligibility requirements of any one of the following six transportation improvement categories:

» Local Streets and Roads Preservation

» Bicycle and Pedestrian Improvements

» Transportation for Livable Communities

» Safe Routes to School

» Priority Conservation Areas

» CMA Planning Activities

Additional eligibility requirements include:

» *Priority Development Investment Minimums.* The CMAs in larger counties, which include San Mateo County, must direct at least 70% of their OBAG investments to Priority Development Areas (PDAs), locally identified infill development opportunity areas within existing communities. PDAs are generally transit-accessible, bicycle- and pedestrian-friendly areas of at least 100 acres where there is a local commitment to developing more housing, amenities, and services to meet the everyday needs of residents. Half-mile corridors around El Camino Real and Downtown San Mateo together form a PDA.

» *Complete Streets Policy Resolution.* Aside from meeting the guidelines included in MTC's Complete Streets Policy, a jurisdiction must have adopted a Complete Streets resolution by June 30, 2013. A jurisdiction can also meet this requirement through a general plan that complies with the California Complete Streets Act of 2008.

» *Regional Housing Needs Allocation (RHNA) Compliant General Plan.* A jurisdiction is required to have its general plan housing element adopted and certified by the State Department of Housing and Community Development for the 2007-14 RHNA prior to January 31, 2013. Jurisdictions may request a time extension for certification under certain circumstances in order to retain eligibility.

C/CAG secured a total of $26.5 million for FY 2012-13 through 2015-16. To date, the City of San Mateo has received a Local Streets and Roads Preservation grant of $270,000 for rehabilitation of Monte Diablo Avenue, a $1 million Transportation for Livable Communities grant for pedestrian improvements in the North Central area, and a $368,000 Transportation for Livable Communities Grant for Citywide crosswalk improvements.

Online resources: http://onebayarea.org/regional-initiatives/one-bay-area-grants.html

http://www.mtc.ca.gov/funding/onebayarea/

HIGHWAY SAFETY IMPROVEMENT PROGRAM

The Highway Safety Improvement Program (HSIP) is a core federal aid program that aims to significantly reduce fatalities and serious injuries on public roads, with a focus on infrastructure projects with nationally recognized crash reduction factors. Caltrans' Division of Local Assistance manages California's share of HSIP funds. Local HSIP projects must be identified on the basis of crash experience, crash potential, crash rate, or other data-supported means.

HSIP funds are eligible for work that corrects or improves user safety on any public road or publicly owned bicycle or pedestrian pathway or trail, or on tribal lands for general use of tribal members.

A wide variety of pedestrian, bicycle, and motor vehicle traffic safety projects are eligible for funding and can include non-infrastructure elements (engineering, education, enforcement, and emergency medical services). To be eligible, a specific safety problem must be identified and the proposed countermeasure must correct or substantially improve the condition. All proposed projects must lead to the construction of safety improvements. The project must also be consistent with California's Strategic Highway Safety Plan.

Non-safety-related items (such as landscaping and context-sensitive solution features) may be included in an HSIP project, but they are considered incidental to the overall project and shall not exceed 10% of a project's construction costs. The local agency is responsible for all incidental work costs that exceed 10% of the construction costs.

As of April 2014, Caltrans expects the next HSIP Call for Projects (Cycle 7) to be announced in spring of 2015. In the meantime, Caltrans is encouraging local agencies to start early by analyzing the safety of their roadway network so they are ready to respond to Cycle 7.

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

http://www.dot.ca.gov/hq/LocalPrograms/HSIP/prepare_now.htm

ACTIVE TRANSPORTATION PROGRAM

The Active Transportation Program was established by State legislation signed into law in September 2013. It provides a single source of funding for bicycle and pedestrian ("active transportation") infrastructure and non-infrastructure projects. It consolidates several federal and state sources that were previously administered and distributed under separate programs. These include:

- Federal level: Transportation Alternatives Program, which includes the Recreational Trails Program and Safe Routes to School program
- State level: Bicycle Transportation Account, Environmental Enhancement and Mitigation Program (partially), and California's state-funded Safe Routes to School program

The State of California has allotted $1.0 billion towards active transportation in three cycles. The first cycle was awarded in August, 2014 and spans two years (2014-15 and 2015-16). The total budget for those awarded projects was $368 million and is divided between statewide projects (50%), small urban and rural projects (10%), and MPO projects (40%). At least 25% of overall program funds will benefit disadvantaged communities during each program cycle.

The next cycle is coming up in the spring of 2015, at which point an additional $330 million will be made available.

Online resources: http://www.dot.ca.gov/hq/LocalPrograms/atp/index.html

STATE HIGHWAY OPERATION AND PROTECTION PLAN

Caltrans manages the State Highway Operations and Protection Program (SHOPP) to maintain and preserve the state highway system and its supporting bridges. It provides money for pavement rehabilitation, highway operations, and safety improvements on state highways and bridges. Projects typically fall into the following categories: collision reduction, major damage restoration, bridge preservation, roadway preservation, roadside preservation, mobility enhancement, and preservation of other transportation facilities related to the state highway system. In the past, some SHOPP funds have been used for pedestrian projects, including curb ramps, overcrossings, paths, sidewalks, and signal upgrades to meet Americans with Disabilities Act (ADA) guidelines. Jurisdictions work with Caltrans' districts to have projects placed on the SHOPP list. Funding available through the program was reduced to $6.75 billion for the most recent SHOPP funding cycle, FY 2010-11 through 2013-14. Past project awards have ranged from approximately $140,000 to $4.68 million.

Online resource: www.dot.ca.gov/hq/transprog/shopp.htm

OFFICE OF TRAFFIC SAFETY GRANTS

California Office of Traffic Safety (OTS) Grants are used to establish new traffic safety programs, expand ongoing programs, or address deficiencies in current programs. Eligible grantees are governmental agencies, state colleges, state universities, local city and county government agencies, school districts, fire departments, and public emergency services providers. Grant funding cannot replace existing program expenditures, nor can traffic safety funds be used for program maintenance, research, rehabilitation, or construction. Grants are awarded on a competitive basis, and priority is given to agencies with the greatest need. Evaluation criteria to assess need include potential traffic safety impact, collision statistics and rankings, the seriousness of problems, and performance on previous OTS grants. The 2014 California application deadline was January 31, 2014. There is no cap on the amount requested, but all items in an application must be justified to meet the objectives of the proposal.

Online resource: http://www.ots.ca.gov/Grants/Apply/default.asp

TRANSPORTATION FUND FOR CLEAN AIR

The Transportation Fund for Clean Air (TFCA) is a grant program funded by a $4 surcharge on motor vehicles registered in the Bay Area. The surcharge generates approximately $22 million per year.

TFCA provides grants for implementing the cost-effective projects to decrease motor vehicle emissions, and thereby improve air quality, in the Bay Area. Projects must be consistent with the 1988 California Clean Air Act and the Bay Area Ozone Strategy.

Funds are administered through the Regional Fund and the County Program Manager Fund. The Regional Fund receives about 60% of the TFCA revenues and is administered directly by the Bay Area Air Quality Management District. The Program Manager Fund distributes approximately 40% of TFCA revenues and is administered in coordination with the Bay Area's nine CMAs.

The TFCA program can fund a wide range of projects, including: the purchase or lease of clean-air vehicles; shuttle and feeder bus service to train stations; ridesharing programs to encourage carpool and transit use; bicycle facility improvements such as bike lanes, bicycle racks, and lockers; arterial-management improvements to improve traffic flow on major streets; smart growth projects; and projects that make transit information more available.

Public agencies may apply for all project categories either directly through the Air District or through the County Program Manager Fund, via the relevant CMA.

Online resource: http://www.baaqmd.gov/Divisions/Strategic-Incentives/Funding-Sources/TFCA.aspx

CALTRANS SUSTAINABLE TRANSPORTATION PLANNING GRANT PROGRAM

In 2014, the Sustainable Communities Transportation Planning Grant Program replaced the program that included Environmental Justice, Community-Based, and Transit Planning grants. These areas will remain eligible in a new format under this new program, which will also fund transportation planning projects that identify and address mobility deficiencies in the multimodal transportation system, encourage stakeholder collaboration, actively engage the public, integrate Smart Mobility 2010 concepts, result in system improvements, and achieve the Caltrans mission and overarching objectives.

Metropolitan Planning Organizations, Regional Transportation Planning Agencies, local transit agencies, cities, counties, and tribal governments can apply as primary recipients, with local transit agencies, universities, community colleges, tribal governments, cities and counties, community-based organizations, non-profit organizations, and other public entities as sub-recipients.

The grant program's estimated budget is $8.3 million ($2.8 million from Federal Transit Administration Section 5304 funds and $5.5 million from the State Highway Account).Grant winners will be required to secure a local match of 11.47% for each project.

The application deadline for the first call for applications was October 31, 2014.

Online resource: http://www.dot.ca.gov/hq/tpp/gants.html

CALIFORNIA GLOBAL WARMING SOLUTIONS ACT OF 2006: GREENHOUSE GAS REDUCTION FUND

The Global Warming Solutions Act of 2006 created the Greenhouse Gas (GHG) Reduction Fund, which is intended to provide money for a variety of projects that help reduce climate change impacts.

Between 10 and 25% of the money available through the fund is to be targeted toward disadvantaged communities, as identified by the California Environmental Protection Agency (EPA) based on geographic, socioeconomic, public health, and environmental-hazard criteria.

Another portion is dedicated to a Sustainable Communities and Clean Transportation investment category. The current Cap and Trade Expenditure Plan includes $130 million to support the implementation of sustainable communities strategies (as required by Chapter 728 of SB 375) and other GHG-reduction policies. Coordinated by the Strategic Growth Council, funds will be used to reduce GHG emissions by increasing transit ridership, walking and biking, affordable housing near transit stations, and local planning that promotes infill development and reduces vehicle miles traveled. In this process, projects that benefit disadvantaged communities will be given priority.

Additional funding categories in the expenditure plan include modernizing the state's rail system, including high-speed rail and public transit; increasing energy, water, and agricultural efficiency; restoring forests in both urban and rural settings; and creating incentives for new or expanded recycling programs.

The expenditure plan permanently allocates 60% of future funds available through the Cap and Trade program to public transit, affordable housing, sustainable communities, and high-speed rail.

Online resource: http://sgc.ca.gov/m_grants.php

AFFORDABLE HOUSING AND SUSTAINABLE COMMUNITIES PROGRAM

The Strategic Growth Council's Affordable Housing and Sustainable Communities Program is under development at the time of this writing. A call for proposals is expected in January 2015. Approximately $120 million will be available for funding in FY 2014-15.

As currently described, the program will fund land use, housing, transportation, and land-preservation projects to support infill and compact development that reduces GHG emissions. These projects facilitate GHG reduction by reducing land conversion and by improving mobility options and increasing infill development, which decrease vehicle miles traveled.

Projects can also support related and coordinated public policy objectives, including:

» Reducing air pollution
» Improving conditions in disadvantaged communities
» Supporting or improving public health

» Improving connectivity and accessibility to jobs, housing, and services
» Increasing options for mobility, including active transportation
» Increasing transit ridership
» Preserving and developing affordable housing for lower income households
» Protecting agricultural lands to support infill development

Eligible projects for funding include:

» *Affordable Housing*: affordable housing projects that support infill and compact development
» *Transit:* capital projects and programs supporting transit ridership
» *Active Transportation*: capital projects that qualify under the Active Transportation Program, including pedestrian and bicycle facilities and supportive infrastructure such as connectivity to transit stations
» *Non-Infrastructure-Related Active Transportation:* projects that qualify under the Active Transportation Program, including activities that encourage active transportation goals conducted in conjunction with infrastructure-improvement projects
» *Transit-oriented Development:* projects, including affordable housing and infrastructure at or near transit stations that connect those developments to transit stations
» *Complete Streets:* capital projects that implement local Complete Streets programs
» *Other GHG and Criteria Air Pollutant Reduction:* projects or programs designed to reduce GHG emissions and other criteria air pollutants by reducing automobile trips and vehicle miles traveled within a community
» *Strategic Agricultural Easements on Urban/Rural Fringe:* acquisition of easements or other approaches or tools that protect agricultural lands that are under pressure of being converted to nonagricultural uses, particularly those adjacent to areas most at risk of urban or suburban sprawl or those of special environmental significance
» *Sustainable Communities Strategy (SCS) Implementation Plans:* planning to support implementation of an SCS, including implementation of local plans supporting GHG-emissions-reduction efforts and promoting infill and compact development

Half of the funds must go toward projects aimed at preserving and developing affordable housing and the other half must go to disadvantaged communities as identified by the California EPA.

In addition, projects must:

1. Demonstrate how they will reduce GHG emissions
2. Demonstrate consistency with state planning priorities pursuant to Government Code 65041.1
3. Implement an SCS or other regional plan to reduce GHG emissions

Project scoring criteria will also support co-benefits beyond the reduction of GHG emissions, including: maximizing economic, environmental, and public health benefits; improving air quality; reducing energy consumption, criteria pollutants, water consumption, greenfield land consumption, commute times, and public costs; supporting economic growth, workforce-development, civic partnerships, and stakeholder engagement; and protecting or improving public health.

Program funding guidelines are currently being developed with opportunity for comments and input.

Online resource: http://sgc.ca.gov/s_affordablehousingandsustainablecommunitiesprogram.php

GET HEALTHY SAN MATEO COUNTY COMMUNITY IMPLEMENTATION

San Mateo County awards roughly $100,000 to $150,000 annually in Community Implementation Funding to community and faith-based organizations, non-profits, cities, and schools in the county for place-based primary prevention and health equity efforts. The program focuses on making the "healthy choice the easy choice" and funds projects that promote access to healthy foods and beverages, healthy places and active transportation, and school wellness. The projects should also benefit priority populations including low-income neighborhoods with limited access to healthy foods and physical activity opportunities, communities of color with high rates of obesity and preventable health issues; and seniors, children, and people with disabilities who face challenges to healthful living. For 2015, requests for proposals are due September 25 and are awarded for the following calendar year.

Online resource: http://www.gethealthysmc.org/ImplementationFunding

CLEAN WATER STATE REVOLVING FUND (CWSRF)

Through the Clean Water State Revolving Fund (CWSRF) program, a state can maintain revolving loan funds to provide an independent and permanent source of low-cost financing for a wide range of water quality infrastructure projects. Funds to establish or capitalize the CWSRF programs are provided through federal grants and state matching funds (equal to 20% of federal government grants). CWSRF monies are loaned to communities, and loan repayments are recycled back into the program to fund additional water quality protection projects.

The CWSRFs fund a wide range of water quality projects, including all types of nonpoint source, watershed protection or restoration, and estuary management projects, as well as more traditional municipal wastewater treatment projects. The CWSRF can fund the capital costs of water quality improvements. Capital costs include traditional infrastructure expenditures (such as pipes, pumps, and treatment plants), as well as unconventional infrastructure costs (like land conservation, tree plantings, equipment purchases, planning and design, environmental cleanups, and the development and initial delivery of environmental education programs). However, the CWSRF cannot fund the operation and maintenance costs of a project.

Through the Green Project Reserve, the CWSRFs also target critical green infrastructure. The Green Project Reserve requires all Clean Water State Revolving Fund (CWSRF) programs to direct a portion of their capitalization grant toward projects that address green infrastructure, water efficiency, energy efficiency, or other environmentally innovative activities. This makes CWSRFs an excellent water quality financing source for communities.

Green infrastructure projects located within a community that is regulated under the National Pollutant Discharge Elimination System stormwater program–like San Mateo–must abide by the program's requirements.

Online resources: http://water.epa.gov/grants_funding/cwsrf/basics.cfm

http://water.epa.gov/grants_funding/cwsrf/cwsrf_index.cfm

SAN FRANCISCO BAY WATER QUALITY IMPROVEMENT FUND

The California EPA manages a competitive grant program to support projects that protect and restore the San Francisco Bay. This grant program, known as the San Francisco Bay Water Quality Improvement Fund was initiated in

2008. The Fund has invested more than $32 million in 53 projects through 25 grant awards. These projects include 71 partners who are contributing an additional $105 million to restore wetlands and watersheds and reduce polluted runoff.

Online resource: http://www2.epa.gov/sfbay-delta/sf-bay-water-quality-improvement-fund

OTHER WATER QUALITY FUNDING RESOURCES

San Francisco Bay Joint Venture Funding Opportunities List

San Francisco Bay Joint Venture, an association of local agencies and private organizations that are interested in wetlands protection, maintains an online listing of funding sources, some of which could help support sustainable streets implementation.

Online resource: http://www.sfbayjv.org/funding-list.php

State Department of Water Resources Grant Program

The State Department of Water Resources provides funding through its Integrated Regional Water Management Grant Program. This program may provide funding to help implement sustainable streets strategies.

Online resource: http://www.water.ca.gov/irwm/grants/

Cal Fire Urban & Community Forestry Grants

The California Department of Forestry and Fire Protection's Urban Forestry Program provides grant opportunities for urban greening, urban forestry planning, management, and tree planting programs.

Online resource: http://www.fire.ca.gov/resource_mgt/resource_mgt_urbanforestry.php

California Conservation Corps

The California Conservation Corps (CCC) is a public service program that occasionally provides assistance on construction projects. The CCC may be written into grant applications as a project partner. In order to utilize CCC labor, project sites must be on public land or be publicly accessible. CCC labor will not perform regular maintenance but will perform annual maintenance, such as the opening of trails in the spring.

Online resource: http://www.ccc.ca.gov/

California Business Transportation and Housing Agency Infrastructure State Revolving Fund Program

The Business Transportation and Housing Agency administers a revolving loan fund for local governments to finance infrastructure improvements. Available loans range from $250,000 up to $10 million, with terms of up to 30 years for a broad range of projects. Interest rates for the month of November 2012 were at lows of 2.02% for 20-year loans and 2.29% for 30-year loans. Eligible applicants include cities, counties, special districts, assessment districts, and joint powers authorities. Eligible projects include city streets, county highways, state highways, drainage, water supply and flood control, educational facilities, environmental mitigation measures, parks and recreational features, port facilities, public transit, sewage collection and treatment, solid waste collection and disposal, water treatment distribution, defense conversion, public safety facilities, and power and communication facilities.

Online resource: http://www.ibank.ca.gov/infrastructure_loans.htm

Infrastructure Financing District

Infrastructure financing districts (IFDs) allow cities and counties to pay for public works projects by diverting an increment of property tax revenues from the general fund for up to 30 years. IFDs are a form of tax increment financing based on the idea that public enhancements should cause property values to rise in the surrounding area, generating higher property tax revenues. IFDs can issue bonds secured by expected future property taxes to fund upfront infrastructure development costs. IFD funds can be used to finance the construction of and improvements to highways, transit, water and sewer systems, flood control systems, childcare facilities, libraries, parks, and solid waste facilities. IFDs cannot pay for maintenance, repairs, operating costs, and services.

To form an IFD, the City must develop an infrastructure plan, send copies to every landowner, consult with other local governments, and hold a public hearing. Every local agency that contributes its property tax increment revenue to the IFD must approve the plan. Schools cannot shift their property tax increment revenues to the IFD. Once the other local officials approve, the County must get the approval of the voters in the IFD area to: form the IFD (requires two-thirds voter approval), issue bonds (requires two-thirds voter approval), and set the IFD's appropriations limit (requires majority voter approval).

Private Development Capital Improvements

New infill development, property and building renovations and expansions, and other construction projects often require public right-of-way improvements, which could provide a revenue source to help implement sustainable streets. To ensure that right-of-way construction projects provide facilities where needed and feasible, it is important that an effective review process be in place so streets, sidewalks, and other related public spaces meet the City's standards and guidelines for the development of pedestrian, bicycle, transit, and stormwater management facilities. The Sustainable Streets Plan includes guidelines for the development of facilities that would apply to new developments meeting certain minimum criteria.

PeopleForBikes Community Grant Program

PeopleForBikes accepts grant applications from city or county agencies or departments, state or federal agencies working locally, or non-profit organizations with a focus on bicycling, active transportation, and community development. Grants of up to $10,000 are awarded with a minimum 50% match to organizations and agencies seeking to support facility and advocacy efforts. Eligible projects include bike paths, trails, and bridges, mountain bike facilities, end-of-trip facilities, and BMX facilities.

Online resource: http://www.peopleforbikes.org/pages/community-grants

Volunteer, Public-Private Partnerships, and Donations

Bicycle racks have been installed in downtown San Mateo through private donations. Local schools or community groups could use the bikeway projects as a project for the year, possibly working with a local designer or engineer. Work parties could be formed to help clear right-of-way where needed. A local construction company could donate