



RWcmoves

A comprehensive assessment of transportation within Redwood City.



ACKNOWLEDGEMENTS

Forthcoming

FEHR & PEERS

with:

CDM Smith

Bottomley Design & Planning

Silvani Transportation Consulting



FEHR & PEERS

Table of Contents

Chapter 1: The City’s Envisioned Future	10
RWCmoves Vision	11
Citywide Transportation Plan Goals	11
RWCmoves Report Organization	13
Chapter 2: Where Are We Starting From (Existing Conditions)	14
Walking in Redwood City	16
Bicycling in Redwood City	18
Using Transit in Redwood City	22
Driving in Redwood City.....	24
Advancing Technologies.....	28
Chapter 3: Moving Ahead (Community Engagement).....	30
What We Heard – Key Takeaways	31
Chapter 4: Reaching Our Destination (Proposed Transportation Program)	36
Project Categories	37
Performance Measures and Prioritization Process	63
Generalized Project Costs	68
Tier 1 Projects and Programs	69
Signature Projects and Programs.....	74
Chapter 5: Where Do We Go From Here? (Action Plan/Implementation).....	76
Modified General Plan Policies and Programs.....	76
Street Typologies and Transportation Engineering Standards and Design Guidelines	79
Network Concept Maps	88
Ongoing Performance Monitoring	93
Implementation Actions	96



List of Figures

Figure 1: Mode Split Survey of Redwood City Apartments and Homes	15
Figure 2: Mode Split Survey of Redwood City Offices	15
Figure 3: Walking in Redwood City	17
Figure 4: Biking in Redwood City	21
Figure 5: Using Transit in Redwood City	23
Figure 6: Driving in Redwood City	25
Figure 7: Average Vehicle Delay in Redwood City	26
Figure 8: Zip Code Where Survey Respondent Live, Work or Go to School	31
Figure 9: Comparison of Survey Respondent's Stated Ethnicity to American Community Survey, 2011-2015	32
Figure 10: Reaching Out to the Community	33
Figure 11: Division of Project List by Category	38
Figure 12: Active Transportation Corridor Projects	39
Figure 13: Complete Street Corridors and Placemaking Projects	47
Figure 14: Transit Access and Service Enhancement Projects	50
Figure 15: Roadway Congestion and Delay Improvement Projects	52
Figure 16: Network Gap Closure, Connectivity and Safety Projects	56
Figure 17: Division of Project List by Order of Magnitude Cost	68
Figure 18: Proposed Street Typologies Network	90
Figure 19: Proposed Bicycle Backbone Network	91
Figure 20: Proposed Truck Routes	92

List of Tables

Table 1: Feedback Summary from Other Outreach Events 34

Table 2: RWCmoves Tier 1 Projects 70

Table 3: RWCmoves Signature Projects and Programs.....75

Table 4: Recommended General Plan Policy Amendments77

Table 5: Recommended General Plan Implementation Program Amendments.....78

Table 6: Recommended Design Guidelines by Street Typologies.....87

Table 7: Redwood City Transportation Monitoring Program Strategy 96

Appendices

Appendix A: Existing Conditions Report

Appendix B: Project Performance Measures, Prioritization Process and Results

Appendix C: Outreach/Survey Details

Appendix D: Mapping Results

Appendix E: Transportation Demand Management (TDM) Plan *(to be added)*

Appendix F: Transportation Analysis (TA) Guidelines *(to be added)*



Chapter One

1

The City's Envisioned Future

Redwood City's General Plan, adopted in 2010, outlines a bold vision for transportation in Redwood City. The General Plan differed significantly from earlier plans by shifting the focus of transportation in the City from automobile travel to one that embraced transportation in all forms – walking, bicycling, riding transit, and other modes – as well as travel by private automobile.

In the years following adoption of the General Plan, the City has undergone substantial change. Local and regional development growth and increases in population have worsened congestion and increasingly affected neighborhoods. Caltrain ridership in Redwood City has nearly doubled in the last 5 years. Bicycle travel in the City is also at an all-time high. In response to this, in late 2016, Redwood City began development of its first-ever Citywide Transportation Plan.

The Citywide Transportation Plan, known as RWCmoves, establishes a new vision for transportation that builds on the foundation of the General Plan, as well as other recent City documents like the 2015 Strategic Plan. The Plan recognizes that by providing a robust transportation network for all travel modes, the City can most effectively address congestion and limit neighborhood cut-through traffic. RWCmoves also reflects a major community engagement process in the development of Citywide Transportation Plan.

RWCmoves Vision

The vision for the Citywide Transportation Plan tiers off the goals established in the City's General Plan. The General Plan envisions a City with a balanced, multimodal transportation network that accommodates all users. However, RWCmoves goes beyond the General Plan in recognition of the importance of improving transportation options in the City. As a result, the guiding vision for RWCmoves is to:

Promote the best travel experience possible for everyone in Redwood City by creating and maintaining a multimodal, safe, and accessible transportation network.

The vision allows the City to address increased traffic congestion in Redwood City and proactively manage its transportation network.

As part of RWCmoves, the City identifies and prioritizes the types of projects and programs that most enhance transportation safety, mobility, equity, and access for everyone traveling in Redwood City.

Citywide Transportation Plan Goals

Several goals support the RWCmoves vision of promoting mobility for all. In no particular order, the goals for RWCmoves are described below:

- | | |
|---------------|--|
| Goal 1 | Create a walking and bicycling-friendly community that provides a balanced, convenient and safe transportation system |
| Goal 2 | Provide seamless connections and improved street access to all areas within the City, but especially along mixed-use corridors designated in the General Plan and Citywide Transportation Plan |
| Goal 3 | Embrace innovation in all forms of emerging technologies, especially in ways to creatively manage congestion and the transportation system |
| Goal 4 | Achieve a mode split target of over 50% of all trips being by non-driving modes by 2040; most remaining automobile trips should be zero emission trips |
| Goal 5 | Invest in projects that support a resilient, equitable and sustainable transportation system |

The intent of these goals is to inform the choice of performance measures that will be used to identify and prioritize projects in the Citywide Transportation Plan. Performance measures are described in detail in Chapter 4 of this document.

What does it mean to be multimodal?

Multimodal means recognizing the importance of all people traveling on the street regardless of whether they are walking, biking, taking transit, driving, or traveling by any other means.

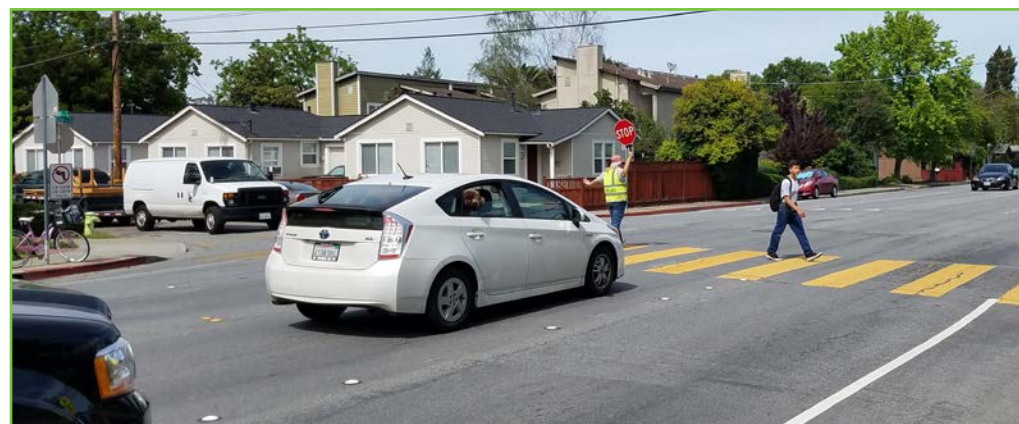


RWCmoves Report Organization

This document is organized into several chapters, each describing different elements of the Plan development and project prioritization process:

- **Chapter 1: The City's Envisioned Future:** This chapter introduces RWCmoves, and presents the vision and goals for the Plan.
- **Chapter 2: Where Are We Starting From (Existing Conditions):** This chapter describes the current state of transportation in Redwood City, ranging from existing traffic conditions to the bike network to ridership levels on local and regional transit services.
- **Chapter 3: Moving Ahead (Community Engagement):** This chapter presents an overview of the extensive community engagement process that accompanied the Plan development process.
- **Chapter 4: Reaching Our Destination (Proposed Transportation Program):** This chapter includes the proposed projects and a transportation program that will guide transportation investment in the coming years. It includes detailed descriptions of how transportation projects were identified and how they were evaluated. In addition, it presents an overview of the highest priority projects.
- **Chapter 5: Where Do We Go From Here? (Action Plan/Implementation):** This chapter discusses the process that the City will use to advance and implement projects. It covers topics of design, funding, environmental clearance, and ongoing performance monitoring.

The Citywide Transportation Plan is intended to serve as a guiding document for the City as it seeks to improve transportation in Redwood City. It is primarily a planning and policy document and is not envisioned to approve specific transportation improvement projects or programs. Projects that are advanced under this Plan would need to undergo their own design, environmental review and approval process prior to being implemented.



2

Where Are We Starting From (Existing Conditions)

Redwood City is served by a variety of transportation facilities and services that establish a foundation for a truly multimodal transportation network. The City's streets form the backbone of the transportation system and within this network, walking, bicycling, and transit facilities offer the greatest potential for increased capacity. More specifically, Redwood City has many qualities that make walking and biking an important and accessible mode of travel, including a compact city boundary, level terrain, temperate weather, and numerous destinations within walking and biking distance. Redwood City's existing transportation system helps frame the opportunities to create and maintain a balanced transportation network aimed at further improving mobility and access for all modes.

Travelers in Redwood City use many different forms of transportation. The proportion of travelers taking different modes is referred to as "mode split".

Redwood City's current commute trip mode split based on census data is shown below.



Source: American Community Survey 2011-2015

Commute trips represent only a portion of all trips taken in Redwood City. When considering other trip purposes, such as shopping or recreational trips, there are oftentimes greater proportions of walking and bicycling trips that occur. To better understand how current trip patterns are different between residential and office land uses, person counts were conducted at several residential housing and commercial developments located

throughout Redwood City. Residential housing surveys provided insight into how density of land development and availability of multimodal infrastructure influence the percentage of drive-alone trips versus other multimodal transportation options (see Figure 1).

Comparison of single-family detached housing, suburban apartments, and downtown apartments showed that drive-alone rates are much higher for single-family detached housing than for suburban apartments and downtown apartments. Walking, biking, and transit rates were substantially higher for downtown apartments. This is similar for office developments in Redwood City, where drive alone rates are higher for suburban office than downtown offices, as shown in **Figure 2**.

Figure 1: Mode Split Counts of Redwood City Residential Land Uses

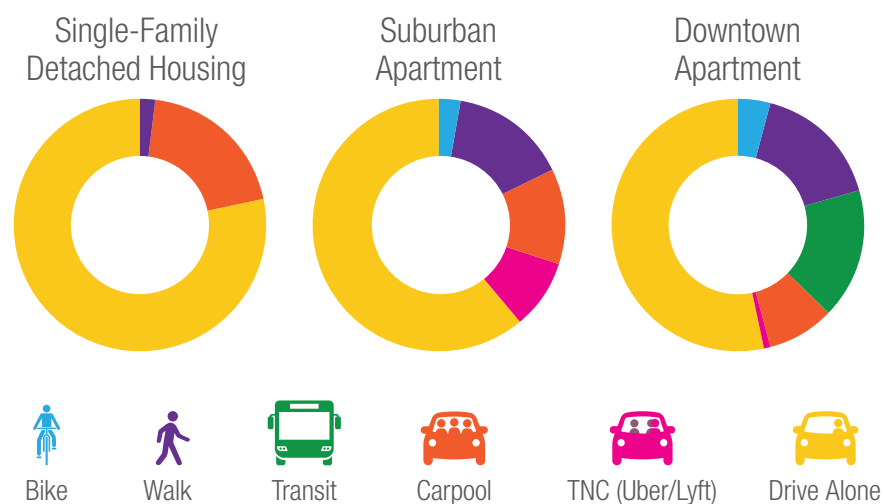
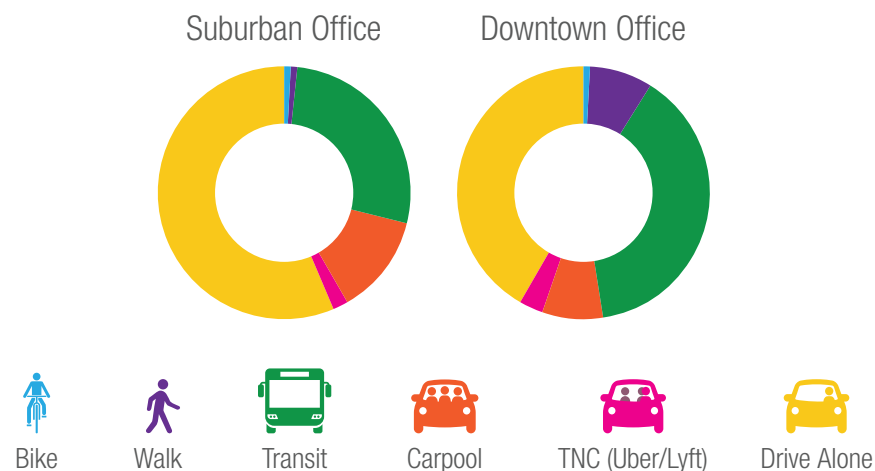


Figure 2: Mode Split Counts of Redwood City Office Developments



Downtown residential developments and offices have more walking, biking and transit use and less drive-alone use since there are more transportation options available as compared to the rest of the City; there is also a greater mix of land uses downtown, which shortens trip length and encourages more non-auto travel options.

The count results of existing Redwood City land uses show that having higher densities, mixing land uses, and investing in multimodal facilities influences how people choose to get around and overall can reduce congestion levels.

Redwood City's existing transportation network is summarized by mode in the following Summary Fact Sheets (**Figure 3** through **Figure 6**), entitled Walking, Biking, Using Transit, and Driving in Redwood City. Each Fact Sheet includes key takeaways related to current conditions, locations of existing facilities/services, travel characteristics such as percent of trips by a given mode and recent collision trends.

Similar to mode split counts, vehicle trip counts were collected to better understand how many vehicle trips are currently being generated at various land uses in Redwood City. A comparison of these counts with the assumptions used to develop the Environmental Impact Reports (EIRs) for Redwood City's General Plan and Downtown Precise Plan, showed that in almost all cases vehicle trips are over-represented compared to what is actually occurring (see **Appendix A**).

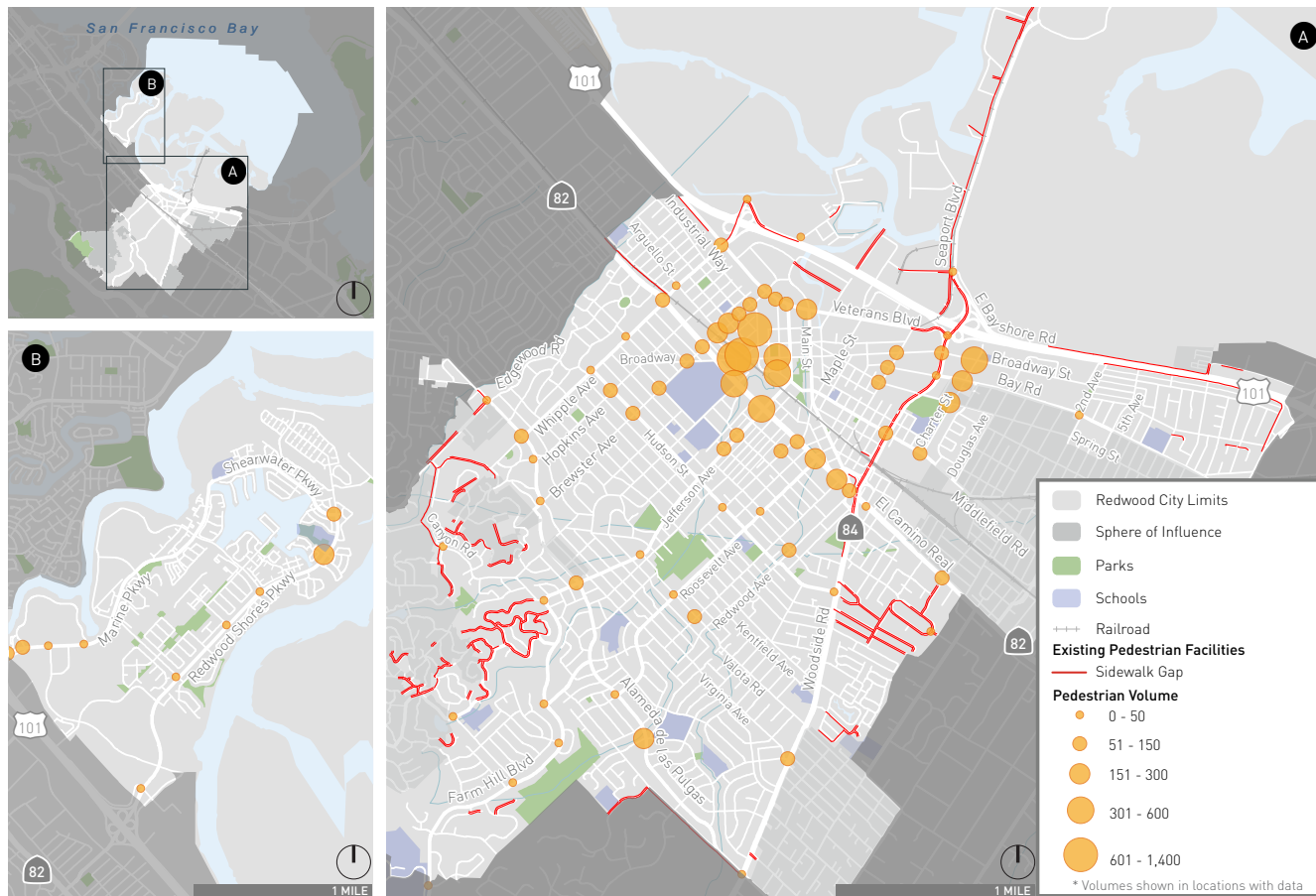
Walking in Redwood City

Walking destinations in Redwood City are connected by a system of on-street sidewalks along all major streets as shown on **Figure 3**. The map on Walking in Redwood City also shows pedestrian volumes at available count locations. Redwood City's downtown is a particularly attractive destination for pedestrians, with many dining, retail, and entertainment destinations. As a result, the highest levels of pedestrian activity are mostly located along Broadway in the Downtown area.

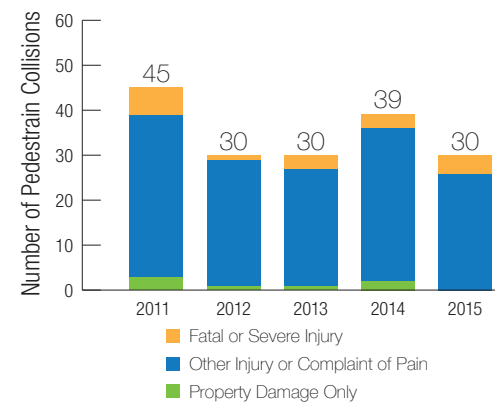
Though Redwood City has a fairly robust sidewalk network, there are opportunities to improve the walking experience, in terms of comfort, convenience, and safety. Potential opportunities to support walking in the City include enhancing crosswalk treatments near schools, in Downtown Redwood City, and near job centers, improving first/last mile pedestrian facilities to provide better access to transit, and enhancing the overall experience of walking along streets through managing traffic speeds, adding landscaping, and implementing pedestrian safety improvements in key locations.

SUMMARY FACT SHEET: Walking in Redwood City

Figure 3: Walking in Redwood City



- 3%** of residents walk to work today
- Sidewalks are provided on **almost all** of RWC streets
- Most walking trips are in **Downtown RWC**
- 4%** of all collisions in RWC involve pedestrians
- Pedestrians account for **33%** of all severe traffic injuries and deaths



Redwood City has many amenities that make walking an important and accessible mode of travel, including level terrain, temperate weather, and numerous destinations that are attractive to walkers.



A **key issue** identified through public outreach is low visibility at pedestrian crossings



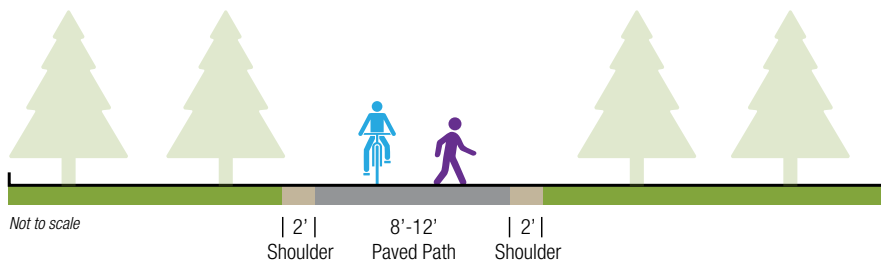
A **key solution** identified through analysis of existing conditions is to enhance pedestrian crossings

Bicycling in Redwood City

The bicycle network in Redwood City provides both dedicated and shared space for vehicles and bicycles. **Figure 4** includes an overview of the existing bicycle network and bicycle volumes in the City. Most bicycle facilities in Redwood City are bicycle routes and bicycle lanes.

SHARED-USE PATH (CLASS I)

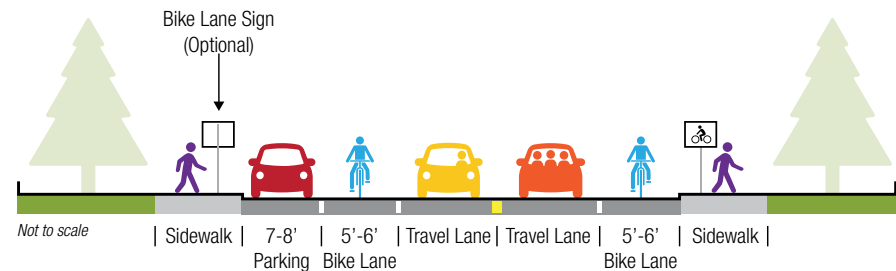
Completely separated right-of-way for exclusive use of bicycles and pedestrians



Shared-Use Paths (Class I) provide a completely separate right-of-way and are designated only for bicycle and pedestrian use. Bike paths serve corridors where there is enough right-of-way, or space, to allow them to be constructed or where on-street facilities are not appropriate due to vehicular volumes, speeds, or other roadway characteristics.

BICYCLE LANE (CLASS II)

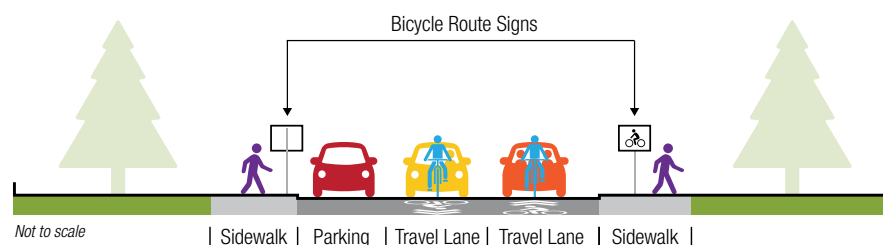
On-street striped lane for one-way bike travel



Bicycle Lanes (Class II) are dedicated lanes for bicyclists generally adjacent to the outer vehicle travel lanes. These lanes have special lane markings, pavement legends, and signage. Bicycle lanes are typically five (5) feet wide. Adjacent vehicle parking and vehicle/pedestrian cross-traffic are permitted.

BICYCLE ROUTE (CLASS III)

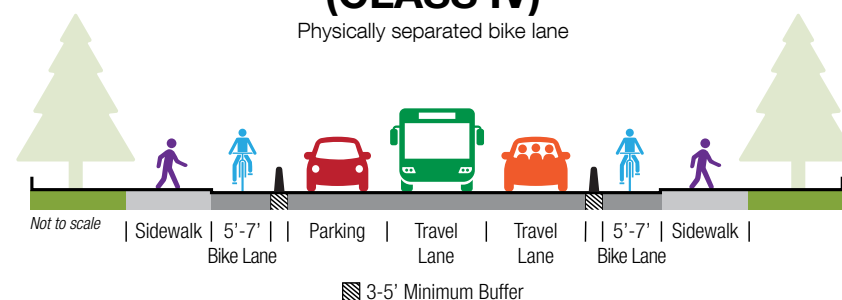
Shared on-street facility



Bicycle Routes (Class III) are designated by signs or pavement markings for shared use with motor vehicles, but have no separated bike right-of-way or lane striping. Bike routes serve either to: a) provide a connection to other bicycle facilities where dedicated facilities are infeasible, or b) designate preferred routes through high-demand corridors.

CYCLE TRACK/SEPARATED BIKEWAY (CLASS IV)

Physically separated bike lane



Cycle Tracks or Separated Bikeways (Class IV) provide a right-of-way designated exclusively for bicycle travel in a roadway and are protected from other vehicle traffic by physical barriers, including, but not limited to flexible posts, raised curbs, or parked cars.

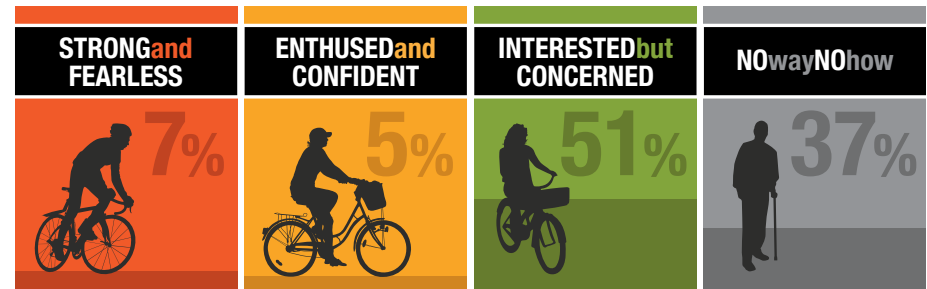
Types of Bicyclists

Most people are willing to ride bicycles for recreation, particularly on paths that are separated from vehicle traffic. People differ substantially, however, in their willingness to use bicycles for transportation. The Portland (OR) Bureau of Transportation has developed a typology of transportation cyclists which divides the adult population into four groups:

- **Strong and Fearless:** People who will ride regardless of roadway conditions, and who are willing to use streets with high traffic volumes and/or speeds, and who do not necessarily prefer to use dedicated facilities such as bicycle lanes. Strong and fearless riders comprise 5 to 10 percent of the adult population;
- **Enthusied and Confident:** These bicycle riders will share street space with automobiles, especially if traffic speeds are slow and volumes are low, but prefer to use dedicated facilities such as bike lanes, bike paths, and cycle tracks. Enthusied and confident riders make up approximately 5 to 10 percent of the population;
- **Interested but Concerned:** These people are unwilling to ride on streets with high volumes or speeds of vehicle traffic, even if a bike lane is provided. They may bicycle within their neighborhoods but are unlikely to commute to work via bicycle or to ride for longer distances. Interested but concerned riders may comprise up to 50 to 60 percent of the population;

- **No Way, No How:** These people are not willing, not able, or very uncomfortable riding bicycles for transportation, even on a completely separated bike path. They make up approximately one-third of the population.

THE FOUR TYPES OF BICYCLISTS

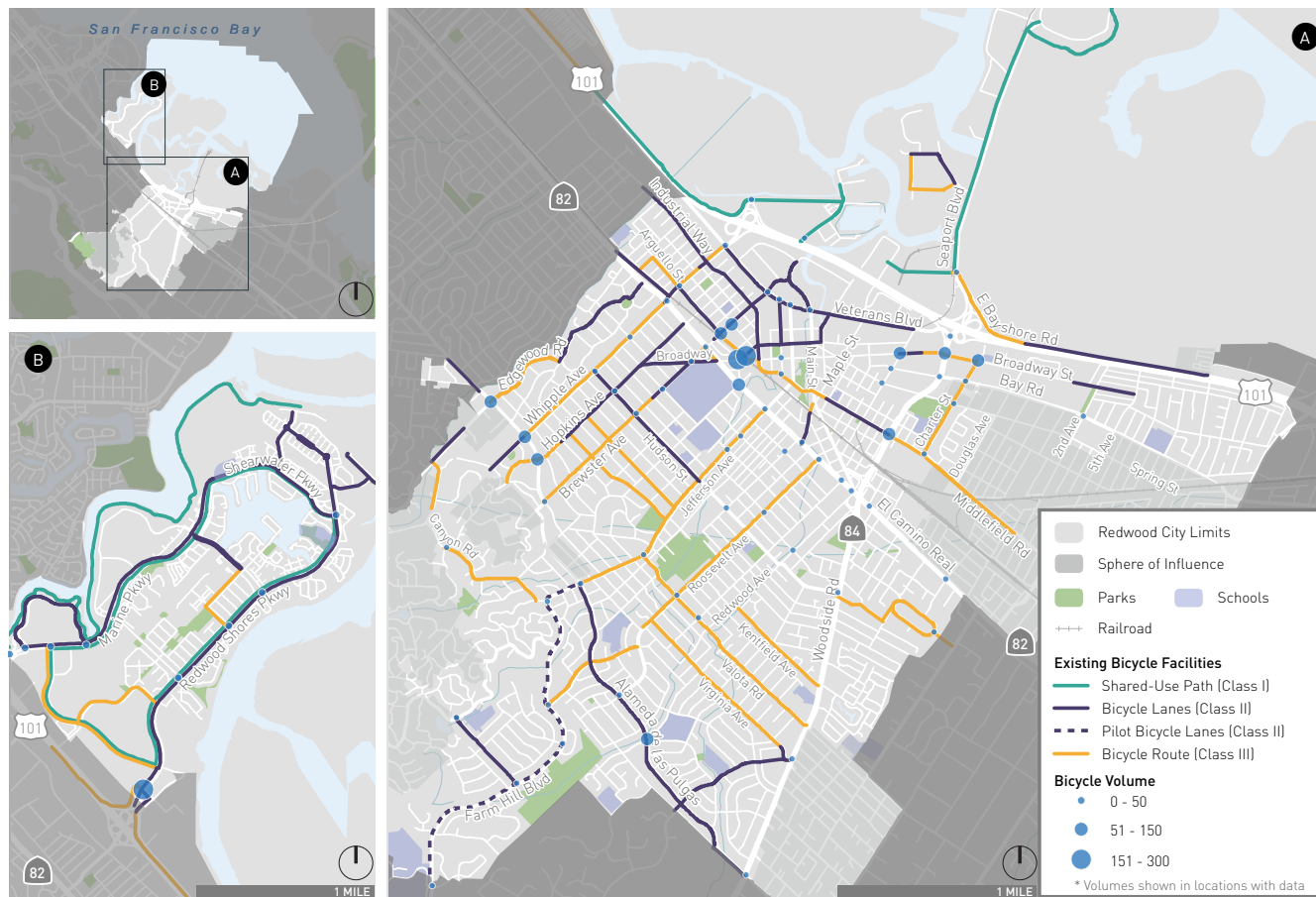


Source: Dill, Jennifer and McNeil, Nathan, 2016. *Revisiting the Four Types of Cyclists*

The City's existing bicycle commute mode share is two percent, which indicates that the streets in Redwood City and in adjacent cities currently may not serve the "interested but concerned" riders. Improvements to bicycle facilities and traffic calming may help encourage a larger share of the population to ride bicycles for transportation. There is, therefore, great opportunity to build out the City's bicycle network to be comfortable for all bicyclists, including the "interested but concerned" population who would bike if enhanced bicycle facilities (Class I and IV) provided connection to and from schools, downtown Redwood City, neighborhoods, and job centers.

SUMMARY FACT SHEET: **Bicycling in Redwood City**

Figure 4: Biking in Redwood City



2% of residents bike to work today



Bike lanes or routes are provided on **over 25%** of RWC streets



Most bicycle trips are in Downtown RWC and along Broadway, Brewster, and Alameda



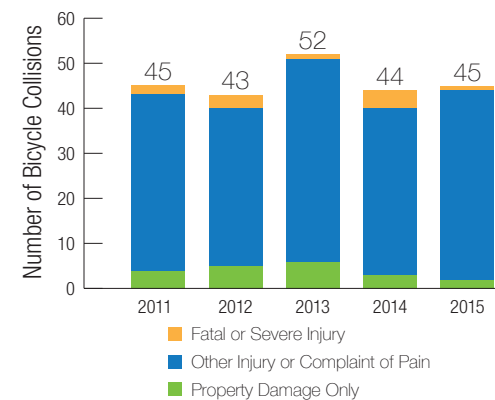
Over 15% of survey respondents stated they would be interested in biking to work if better facilities were available



5% of all collisions in RWC involve bicyclists



Bicyclists account for **21%** of severe traffic injuries and deaths



The bicycle network is an important piece of the transportation network in Redwood City. The bike network should meet the needs of all cyclists: casual recreational riders, commuters, transportationists, and enthusiasts.



A **key issue** identified through community outreach is the need for more bicycle facilities that "everyday riders" are comfortable using.



A **key solution** identified through analysis of existing conditions is to develop a citywide bicycle network that provides low stress connectivity.



Using Transit in Redwood City

Caltrain and SamTrans provide transit service in Redwood City and surrounding communities. Caltrain operates 76 daily trains during the weekdays that serve Redwood City, and SamTrans currently operates 18 bus routes in the City. Caltrain operates express “Baby Bullet” service to San Francisco and San Jose, providing important regional transit access for Redwood City residents and employees alike. Redwood City Transit Center, the City’s main bus transit hub, is located adjacent to the Redwood City Station.

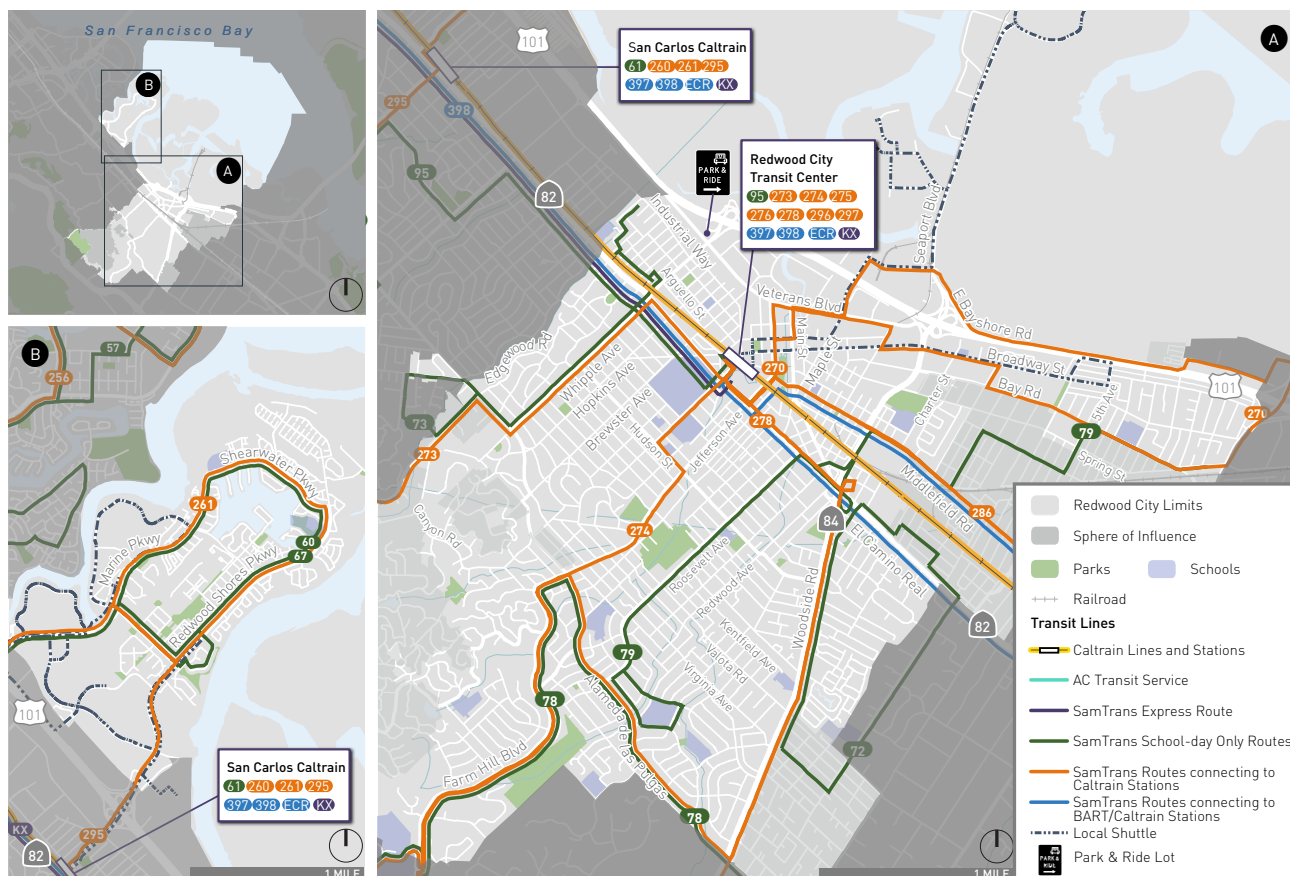
In addition to public bus and rail transit, a local shuttle network provides service from Caltrain to employment centers around Redwood City. A senior shuttle provides seniors with transport through the Veterans Memorial Senior Center from Casa de Redwood, Redwood Plaza Village, and seniors’

homes to Downtown Redwood City several times per week. Some area employers, such as Electronic Arts, Facebook, and Google, also operate private bus services for their employees that work or live in Redwood City. Existing transit services, including SamTrans bus routes, the Redwood City Station, and the shuttle network are shown on **Figure 5**.

Although Redwood City’s transit network does provide regional and local access, increasing transit frequency of service and comfort of transit stops and stations are opportunities to improve ridership and the overall quality of the transit system.

SUMMARY FACT SHEET: Using Transit in Redwood City

Figure 5: Using Transit in Redwood City



Redwood City aims to create easier access to all types of transit. RWC is working to influence this through land use and zoning decisions, increasing connectivity for pedestrians, bicyclists, and drivers, and improving traffic operations within key corridors to facilitate bus headways.



A **key issue** identified through community outreach is that transit service serving local roadways, neighborhoods, and schools could be improved



A **key solution** identified through existing conditions analysis is the opportunity to support enhanced transit service and reliability that provide connection with neighborhoods and schools



5% of residents take transit to work today



Caltrain averaged **over 3,800** boardings each weekday in 2016



Caltrain ridership increased by nearly **20%** from 2015 to 2016



Over 20% of survey respondents stated they would be interested in commuting by public transit



Over 10% of survey respondents stated they would be interested in commuting by local shuttle



Local shuttle network ridership is **over 2,500** riders per month and provides connection for job centers to Caltrain stations



Over 1,100 riders use the Senior Center shuttle per week

DAILY CALTRAIN RIDERS IN RWC



POPULATION GROWTH





Driving in Redwood City

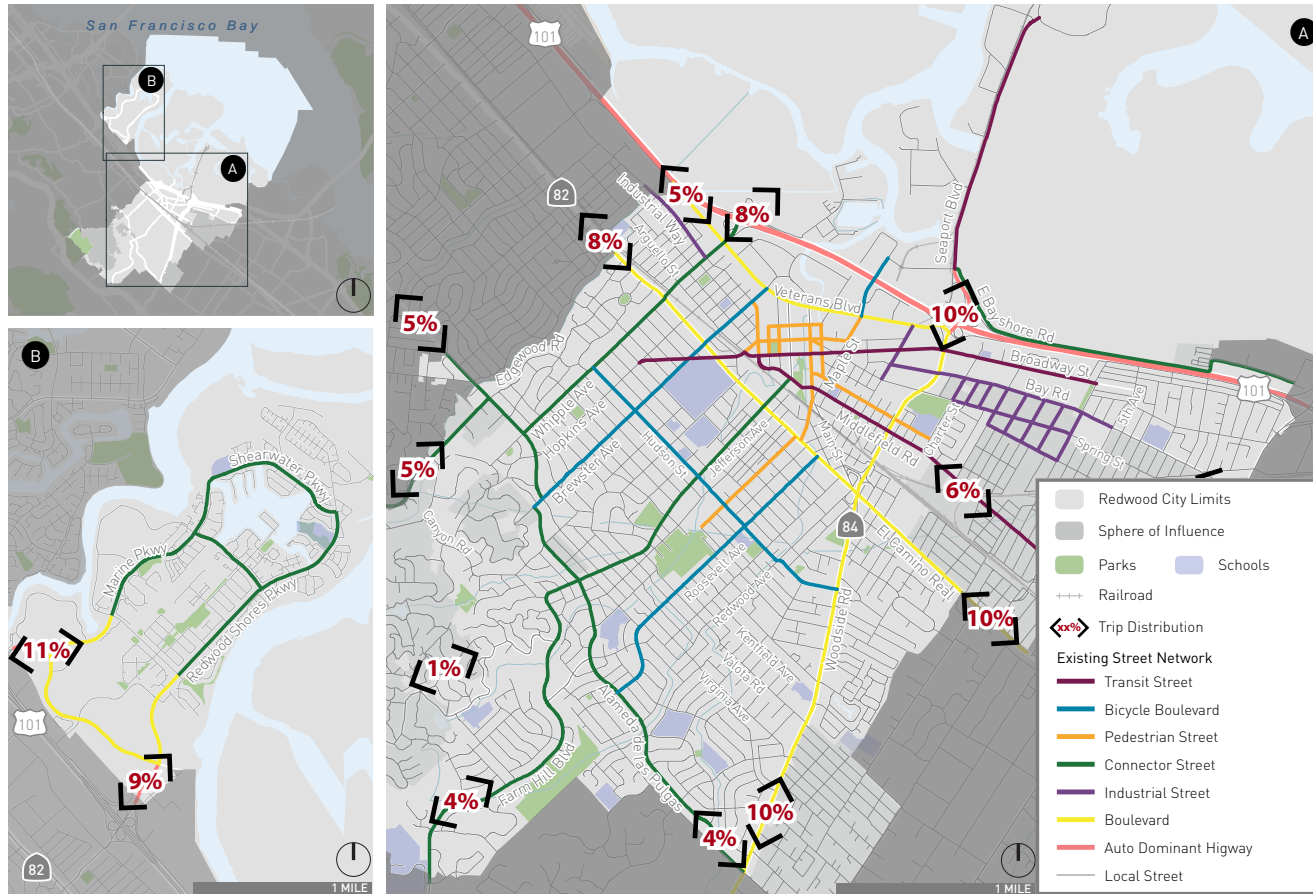
Redwood City has a street network that provides local and regional roadway connections. Streets are classified as transit streets, bicycle boulevards, pedestrian streets, connector streets, industrial streets, boulevards, auto dominated highways, and local streets in the General Plan. Although some of Redwood City's street network is in a grid-pattern, vehicular traffic often is channelized to specific streets because many streets do not provide direct connections to regional destinations, as shown on **Figure 6**.

Vehicle Circulation, Congestion and Cut-Through Traffic

As traffic volumes have increased in the City, so has traffic congestion. Major corridors in the City, including Woodside Road and El Camino Real, regularly experience traffic congestion during weekday peaks. While some congestion is the result of local trips, there are also major regional traffic patterns that affect congestion in Redwood City as well as throughout the Bay Area. US 101 and Interstate (I) 280 are two major highways that provide connections between Redwood City and many other places in the San Francisco Peninsula and beyond. Due to their regional significance, US 101 and I-280 are used by many people during their morning and evening commutes, and typically become congested.

Residents of Redwood City have expressed concerns with challenging vehicular circulation, specifically with highly congested corridors and in some cases, traffic cut-through on residential neighborhood streets. Increases in vehicle congestion on higher volume streets can lead to more cut-through traffic, as travelers, often directed by mapping applications like Waze, seek less congested routes through residential neighborhoods. Redwood City is committed to pursuing programs that discourage cut-through behavior by implementing traffic calming strategies to encourage safer and more responsible driving at lower travel speeds.

Figure 6: Driving in Redwood City



73% of residents drive alone and **10%** of residents carpool to work today



Some downtown RWC roads have traffic slowdowns in the AM and PM peak hours



RWC mitigates neighborhood cut-through traffic by actively responding to requests and prioritizing **traffic calming measures**



Downtown parking supply is able to successfully accommodate the **parking demand** generated by use of downtown business & amenities



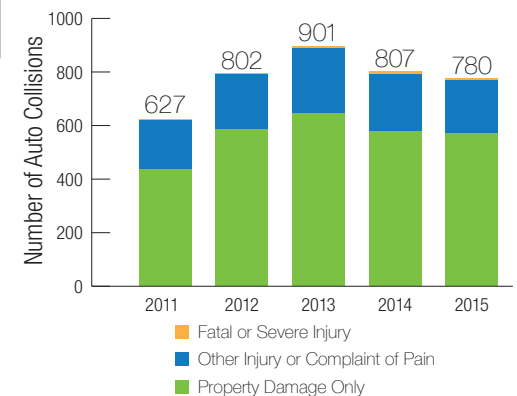
Auto-only collisions make up **over 90%** of all RWC collisions



Less than 1% of auto-only collisions resulted in a severe injury or death



Almost 80% of RWC auto-only collisions result in property damage only



Redwood City's fully developed street system allows easy movement within the City, while several larger roadways link the community to the region. The City is focused on maintaining vehicular access as it works toward a more balanced mode split with pedestrians, bicyclists, and transit.



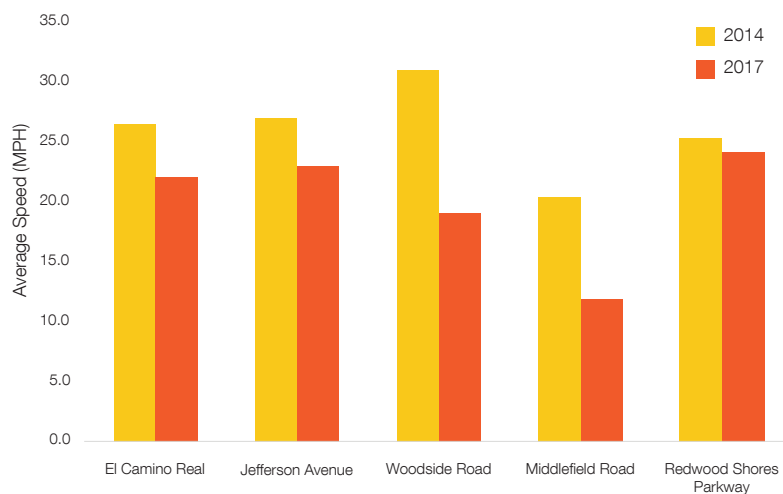
Key issues identified through community outreach are increased congestion and high vehicle speeds along residential streets



A **key solution** identified through existing conditions analysis are increased traffic calming measures to reduce traffic speeds and volumes on neighborhood streets



Figure 7: Average Vehicle Speed



Congestion Trends

Speeds are a direct indicator of congestion levels. INRIX speed data on key streets in Redwood City were compared between 2014 and 2017, shown in **Figure 7**. Overall, the data shows that speeds have decreased by approximately 15 to 20 percent on El Camino Real and Jefferson Avenue, and more drastically, by approximately 40 percent on Woodside Road and Middlefield Road. Speeds have decreased slightly, by 5 percent, on Redwood Shores Parkway. Decreased speeds are a result of an increase in vehicle volumes on Redwood City streets. This trend will likely continue as more growth occurs in the City and surrounding jurisdictions, unless road capacity is managed by shifting travel behavior from drive alone trips to walking, biking, using transit and carpooling, or trips are shortened through more dense, mixed-use development.

Parking

Parking demand is high in Redwood City in both the downtown area and in some residential neighborhoods.

Parking demand in the downtown area is driven by a concentration of popular destinations and a variety of activities. In the Downtown, on-street parking is available on most blocks and public parking is available in several garages and lots. Downtown parking demand is high at lunchtime on weekdays and during evenings and on Saturdays. In 2005, the City approved a progressive parking policy that allows for downtown parking rates to be adjusted as needed. Since then, the City has monitored parking demand and supply, and made changes to its parking policies to better manage its facilities. Changes include on-street meter rates and off-street parking fees, and growth of permit programs. The Marshall Garage, the Main Street Lot, and the Sequoia Station Garage have monthly permits available for downtown employees, residents, or other regular visitors. Additional parking meter program details are included in Appendix A. The City has successfully managed parking based on the goals of the 2005 plan. Changing land uses and popular Downtown events require ongoing monitoring, adjustments, and coordination. Intensified use of older buildings, which may have fewer or no parking spaces, can make it more difficult to find convenient parking for workers and visitors to downtown.

The revenue generated from the metered parking program increased from approximately \$1.3 million to \$2.4 million from FY 2012-2013 to FY 2015-2016. Downtown core parking fees and Marshall permit costs were increased in August 2014, likely accounting for much of the revenue increase over the few year period. During this same time period, the overall budget for the City's parking fund increased from \$2 million to \$2.4 million—each year, the amount of money required from the general fund to make up for the difference between budget and revenue decreased.

Parking in Redwood City's residential neighborhoods is also managed by the City, through a Residential Parking Permit (RPP) Program. There are currently two active permit areas: Permit Area A located southwest of downtown, and Permit Area S located southeast of downtown around Sequoia High School shown in Figure A-40. In these RPP areas, the time limit for vehicles parked on the street without a permit is 2 hours. Residents can obtain a permit for free by providing proof that they live in a permit area. There are 506 permits issued in Area A, and Area S has 60 permits issued. Parking supply in high density residential neighborhoods is available on street and off street (e.g., on driveways and in parking garages). High demand for on-street parking is possibly due to garages being used for storage rather than parking, commercial vehicles parking on the street, storing vehicles on-street, or residents owning more vehicles than can be parked in thier garage.



Advancing Technologies

Technology and innovation developments, including Transportation Network Companies (TNCs) such as Uber and Lyft, and robot delivery are increasingly changing travel behavior locally in Redwood City and regionally in the Bay Area. These advancing technologies have begun to result in new transportation issues, but they also could provide opportunities to improve mobility in Redwood City. Automated vehicles (AVs), though currently not in use in Redwood City, will also likely affect transportation in the City and regionally when implemented. Addressing how these technologies are currently affecting the transportation system, and anticipating how future technological developments will alter the transportation system further is an important focus of RWCmoves. Key transportation technologies are discussed below.

Transportation Network Companies (TNCs)

TNCs provide point-to-point rides through smart phone interfaces with integrated payment systems. Lyft and Uber are two of the key players in the TNC industry. Though some expect TNCs reduce vehicular miles traveled (VMT) and automobile ownership rates, the convenience and relatively low cost of TNCs could instead induce additional travel or shift trips away from low-impact transit, bicycling or walking modes. Redwood City allows TNCs to operate in the City; though impacts are currently not measured on a citywide or regional basis. Due to the increased usage currently observed in Redwood City, TNCs are most likely already decreasing parking demand, changing commute patterns by providing people with another choice in travel, and affecting curbside loading and unloading conditions. These effects are likely to become more pronounced if TNC travel becomes more popular.



Robot Delivery

Redwood City approved a pilot program in late 2016 to allow the use of autonomous robots, or Personal Delivery Devices (PDD), through Starship Technologies Inc., a London based company that provides autonomous delivery robots. The PDDs are permitted to use sidewalks and streets to deliver food, groceries, and packages and can carry approximately three-grocery bags worth of goods. A human controller currently follows all PDD trips. The pilot program has not published conclusions to the public.

Possible benefits of the continuation of this program in Redwood City could include reduced roadway congestion, improved safety due to fewer conflicts between delivery vehicles and other modes, reduced roadway maintenance costs, and reduced greenhouse gas emissions. Possible limitations could include limits on package weights, overcrowding of sidewalk space, and potential conflicts with pedestrians, especially people with low vision. RWCmoves seeks to identify the new technologies that will likely affect goods movements in the future and includes actions the City can take to maximize the benefits while minimizing potential negative effects.

Automated Vehicles (AVs)

Though not commonly seen in Redwood City today, automated vehicles (AVs) will likely affect the transportation system in the near future. AVs are capable of sensing their own environments in order to perform at least some aspects of safety-critical control without direct human input. Many industry professionals believe that shifting to AVs will offer some transportation benefits, including improved traffic flow, fewer traffic collisions, and enhanced mobility for vulnerable users. The potential of AVs is that travelers would no longer be concerned with traffic congestion, needing to find parking, and the financial and environmental costs associated with traffic and driving. However, the convenience of AVs could also result in more miles traveled if riders tolerate longer commutes, or if AVs make “deadhead” trips to look for new riders or cheap parking or are used to run errands. RWCmoves acknowledges AVs will likely need to be planned for and regulated based on the community values and provides the initial steps for how Redwood City can start proactively preparing for AVs.



3

Moving Ahead (Community Engagement)

Community engagement provided an exciting opportunity to engage Redwood City residents, workers, and business owners – people who walk, bike, take transit, and drive in the City – and to understand how their experience could not only be improved but how quality of life could be transformed with a great transportation system. Public outreach to develop RWCmoves incorporated a multifaceted outreach approach aimed at engaging the broadest cross-section of the community. This approach included the following.

- **A project website with an interactive web map** provided the public opportunities to use a web map to note specific areas that were either challenging or provided positive transportation experiences. The website and web map were developed in both Spanish and English.
- **Community “Pop-Up” events** were held to garner widespread interest in the project and encourage residents to provide input directly or through the web map.

- **Walking “audits”** with City staff provided the opportunity to receive input and discuss roadway improvement options at key roadway and intersection locations that are emblematic of common issues found in the City.
- **Focus groups** were held with key stakeholders and allowed for a more in-depth discussion of issues, opportunities, and feasibility for mobility improvements, and to measure public interest and willingness to use alternative modes of travel.
- **Social media/website updates** of fresh and branded material were released weekly to garner interest for the release of the public review draft of the Draft Plan.
- **Public workshops** will be held in conjunction with release of the Draft RWCmoves plan to provide information about the plan elements and to collect feedback on the list of projects and policy recommendations.

What We Heard – Key Takeaways

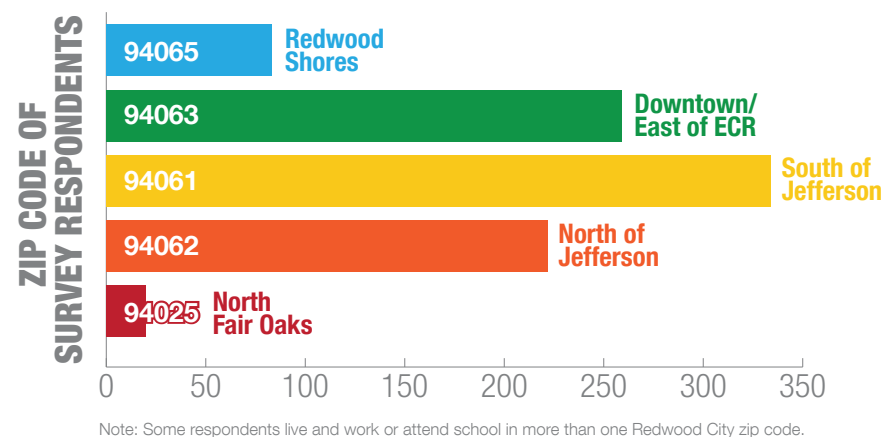
Reaching Out to the Community

The RWCmoves project website included an interactive web map to gather detailed information about where in Redwood City people live, work, and go to school. The survey was open from March through July 2017. Over 800 responses were received, and respondents identified over 2,000 locations in the City that have some sort of transportation issue or opportunity.

Characteristics of the respondents are representative of Redwood City as a whole - respondents represented residents, employees, or students of every zip code of Redwood City, all ages, men, and women, and all ethnic backgrounds. Over 65 percent of respondents live in, approximately 30 percent work or go to school in, and approximately 3 percent are visitors of Redwood City.

Respondents were also asked where they work or attend school by zip code. The highest percentage of responses were for zip code 94061 (South of Jefferson Avenue). Other zip codes that were well represented include 94063 (Downtown/East of El Camino Real), 94062 (north of Jefferson Avenue), and 94065 (Redwood Shores). A small percentage of respondents listed 94025 (North Fair Oaks). This is shown below in **Figure 8**.

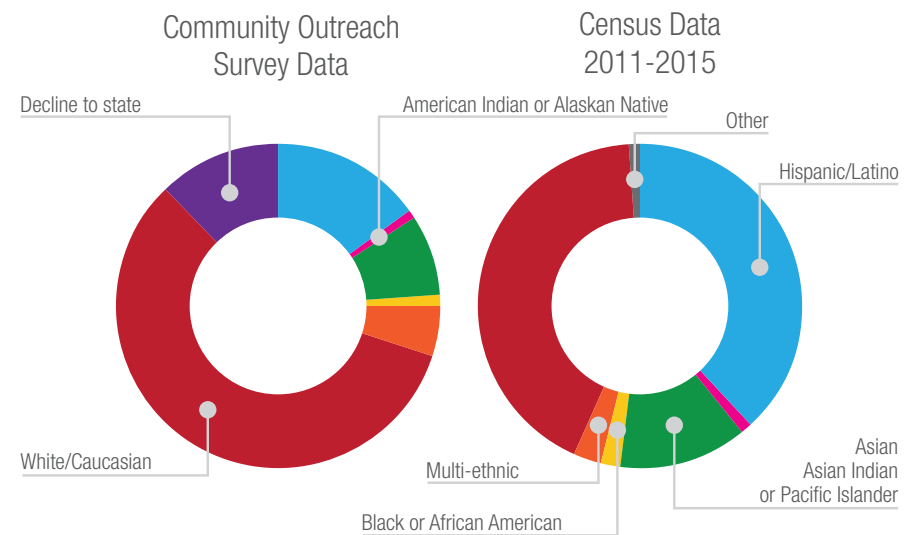
Figure 8: Zip Code Where Survey Respondent Live, Work or Go to School





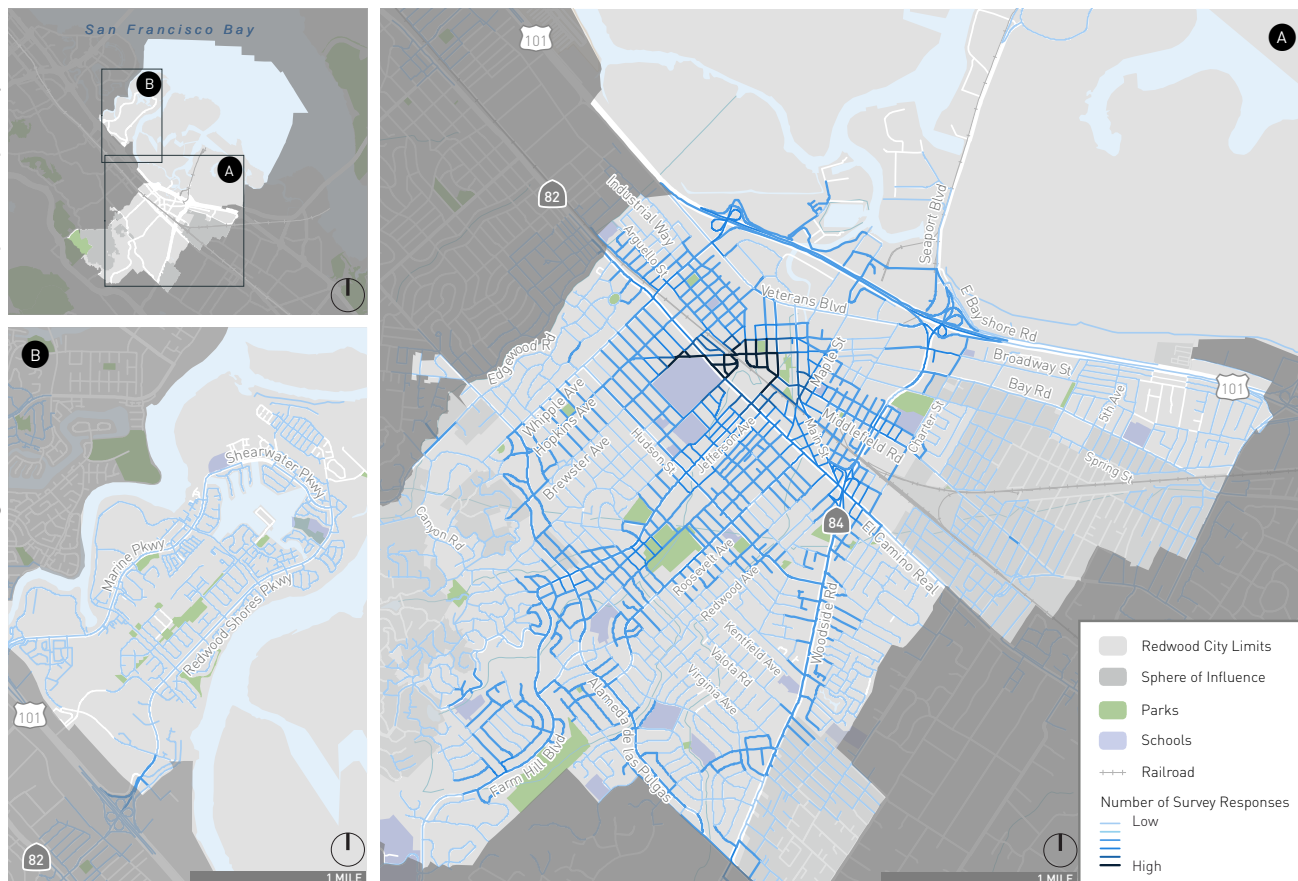
Seven percent of respondents took the survey in Spanish, and the stated ethnicity of respondents approximately reflects American Community Survey 2011-2015 census data, as shown in **Figure 9** below.

Figure 9: Comparison of Survey Respondent's Ethnicity to Census Data.



Key takeaways from the web map survey are shown on **Figure 10**. The survey provided invaluable insight into the highlights and needs of the City's transportation system. The map on **Figure 10** shows density of comments placed by survey respondents from low to high. In general, higher density parts of the City, such as Downtown, El Camino Real, Woodside/Broadway, and along major connector streets received more comments than residential parts of the City.

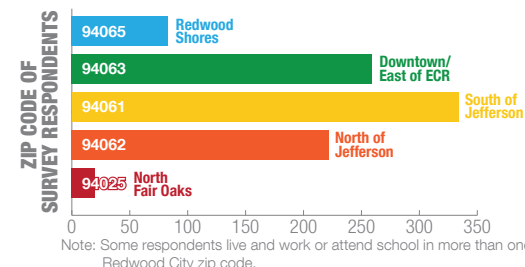
Figure 10: Reaching Out to the Community: Survey Responses



Community engagement provided an exciting opportunity to engage residents, workers and business owners – people who walk, bike, take transit and drive in the City – and to understand how their experience could not only be improved but how quality of life could be transformed with a great transportation system.

- Over 1,000** visited the site, **800** provided **2,040** map responses
- Respondents placed **1,530** negative pins and **~500** positive pins
- Over 65%** live in, **~30%** work or go to school in, and **~3%** are visitors to RWC
- Over 70%** stated they would be interested in commuting by a different mode if better infrastructure were available
- Biking, public transit, and private bus/shuttle** were listed as preferred alternate commute modes
- New or improved infrastructure was requested:
 - 365** responses for pedestrian facilities
 - 360** responses for auto facilities
 - 350** responses for bicycle facilities
 - 210** responses for transit service
- Positive pins were placed most frequently for walking and biking
- Negative pins were placed most frequently for biking and driving

Downtown RWC, El Camino Real, and Woodside/Broadway received the most comments



Feedback received from additional community outreach events for RWCmoves, including pop up events, a walking audit, and focus groups is shown in Table 1. Participants were asked which facilities or aspects of the transportation system in Redwood City they were happy with, concerned with, and would like to see more of.

Overall, feedback from outreach events indicated that across the community, there is interest in Redwood City’s transportation to be more walking, biking, and transit friendly while also maintaining and improving vehicular access. There was also a particular focus on making schools safer and easier to access by all modes, and improving connections to and from Downtown Redwood City and Redwood Shores.

Table 1: Feedback Summary from Other Outreach Events

Outreach Type	Venue/Forum	No. of Participants	Community Feedback	
Pop Up Event	Redwood City Farmers Market patrons	~100	Participants were pleased with...	Downtown Redwood City being walkable and easily bikeable
			Participants would like to see...	More coordination between schools and transit agencies; bus schedules aligning better with extra-curricular activities
				More bicycle and pedestrian only streets
				Congestion along key roadways connecting with US 101 and I-280
	Fair Oaks Community Center members	25	Participants were concerned with...	Lack of bicycle parking in Downtown RWC
				Regular commute traffic often blocking driveways
				Cut-through traffic on residential streets
				Congestion and lack of vehicle parking in Downtown RWC
Walking Audit	City staff, Police Department representatives	15	Participants were pleased with...	Opportunities to connect existing bicycle facilities
			Participants would like to see...	Pedestrian and bicycle facilities improvements
				Traffic calming measures to slow speeds
				Landscaping and beautification
				Safety of school crossings

Outreach Type	Venue/Forum	No. of Participants	Community Feedback	
Focus Group	Businesses & Merchants, Chamber of Commerce	6-10	Participants were pleased with...	Increased pedestrian and bicycle activity in downtown RWC
				Parking availability in downtown RWC
			Seniors, Fun After 50 Group, Veterans Memorial Senior Center	30-40
	Increased accommodations for high bicycle and pedestrian activity in Downtown RWC			
	Green bike lanes, pedestrian scrambles, separated walkway and bikeways, wayfinding			
	Traffic signal coordination and priorities and street lighting			
	Shuttle style service to Downtown RWC			
	Complete Streets Advisory Committee	6-10	A comprehensive bicycle network	
			A refined transit network throughout the City	
			Improved access and circulation at Redwood City Station to accommodate future increases in transit demand	
	Transit Agencies	6-10	Opportunities to connect different forms of transit, including buses, rail, on-demand transit, shuttles, streetcars and access to ferries and the Dumbarton corridor in Downtown RWC	
Participants were concerned with...			Congestion and lack of vehicle parking in Downtown RWC	

Source: Fehr & Peers, 2017.

4

Reaching Our Destination (Proposed Transportation Program)

The findings from existing conditions and the feedback received from the community outreach were used to develop the proposed transportation program described in this Chapter. The transportation program is a coordinated series of actions Redwood City will follow to prioritize transportation projects to guide future transportation investments in Redwood City.

As part of its transportation program, Redwood City developed a prioritization process that evaluates and tracks projects according to a series of performance measures. Transportation performance measures are used to assess the current performance of Redwood City's transportation system, demonstrate the value of multimodal transportation projects, prioritize and inform investments, and help monitor change over time.

RWCmoves evaluated a list of transportation projects and programs that are currently in progress or previously identified, as well as new projects and programs that emerged through the Plan development process. Projects were prioritized based on the extent to which they improve performance of the transportation system. Tier 1 and Signature Projects make up the top scoring projects based on the evaluation process. For more detailed information on the project prioritization process and results, see **Appendix B**.

RWCmoves supports development of an updated multimodal Transportation Impact Fee (TIF) program for Redwood City that would incorporate high-priority transportation projects and programs. TIF programs provide funding for planning and construction of transportation projects needed to support traffic generated by new development. Redwood City's TIF program would generate funding for high-priority project development and construction, such as Tier 1 projects, select Tier 2 projects, and expected locally-funded portions of Signature Projects.

Project Categories

RWCmoves includes previously identified transportation projects and programs as well as a number of new projects and programs. New projects and programs were developed from community member and stakeholder input, as well as through the analysis of existing conditions and opportunities. Some new projects are entirely new efforts, while others are modifications of previously identified projects and programs. Based on their primary characteristics, the list of projects (see Appendix B) are organized into the following seven project categories:

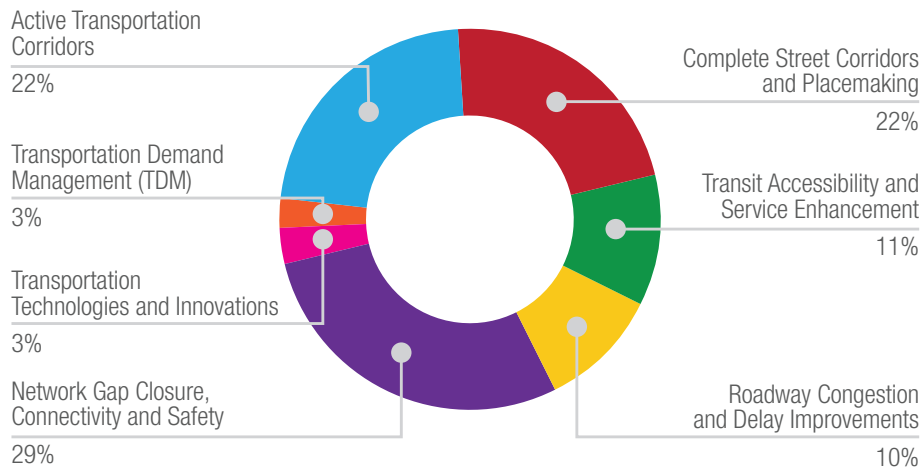
- Active Transportation Corridors
- Complete Street Corridors and Placemaking
- Transit Access and Service Enhancements
- Roadway Congestion and Delay Improvements
- Network Gap Closure, Connectivity and Safety
- Transportation Technologies and Innovations
- Transportation Demand Management (TDM)

There are about 130 total projects included in the Plan prioritization process.

Figure 11 presents the proportion of projects within each project category.

The remainder of this section provides detailed descriptions of each project category and improvement measures that could be considered as part or all of a project.

Figure 11: Division of Project List by Category



Source: Fehr & Peers, 2017.

Category 1: Active Transportation Corridors

Active transportation is any self-propelled, human-powered mode of transportation, such as bicycling or walking. Safer and more comfortable corridors encourage the use of active transportation, which can improve a person's overall health. Projects labeled as Active Transportation Corridors provide convenient connections for cyclists and pedestrians along corridors throughout the City and can enhance safety. These types of projects include new or improved bicycle facilities, new or improved walking facilities, and better access to transit for active travel modes. Improved street design (wider sidewalks, low-stress bike routes, street trees, street lighting, and better access to transit) increases both the utilization of active transportation modes and spurs community interaction, which can in turn improve the health of the City's residents and increase economic activity.

Figure 12 shows the general locations of the Active Transportation Corridor projects included in the Plan.

Figure 12: Active Transportation Corridor Projects

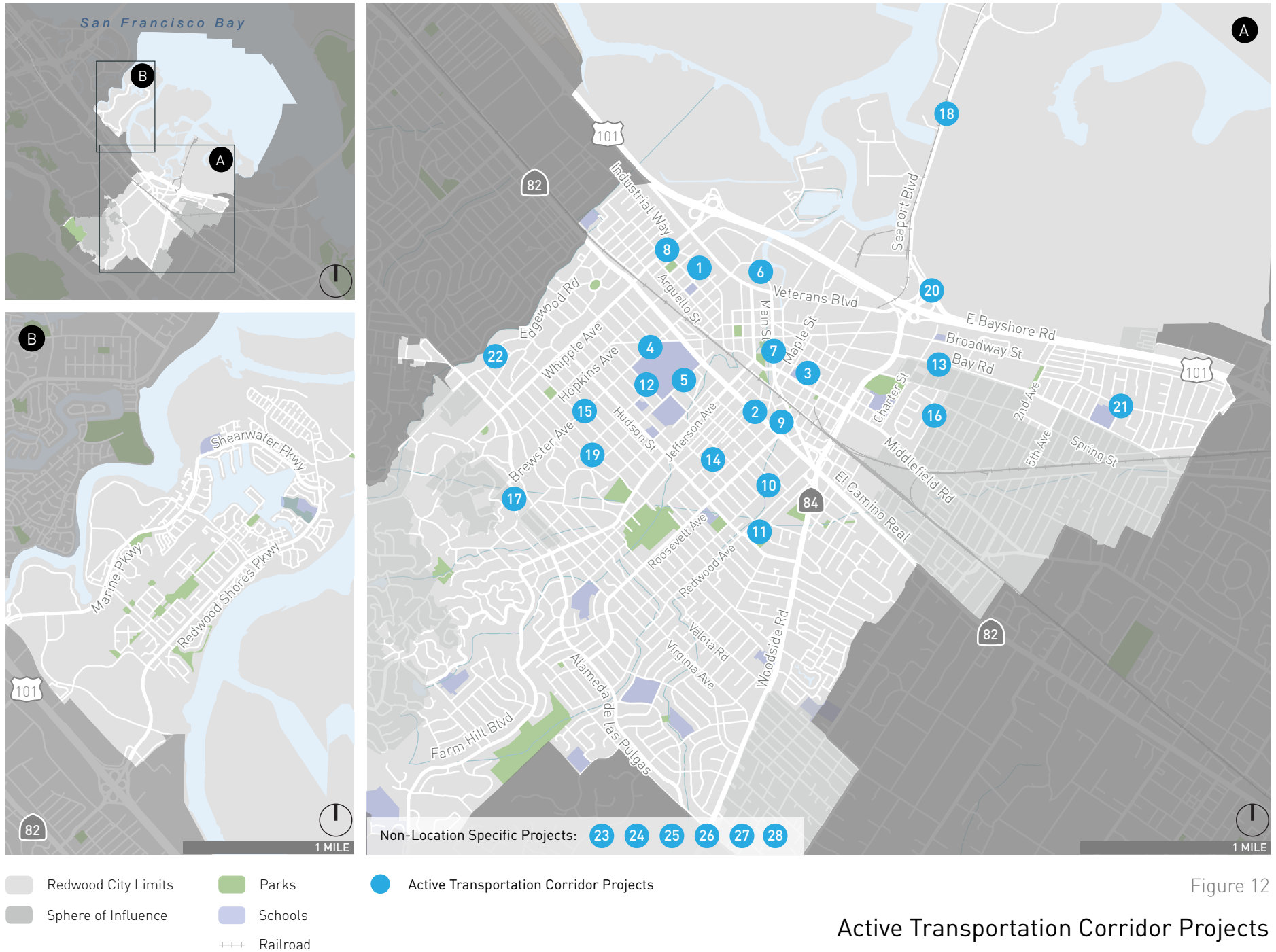


Figure 12

Active Transportation Corridor Projects



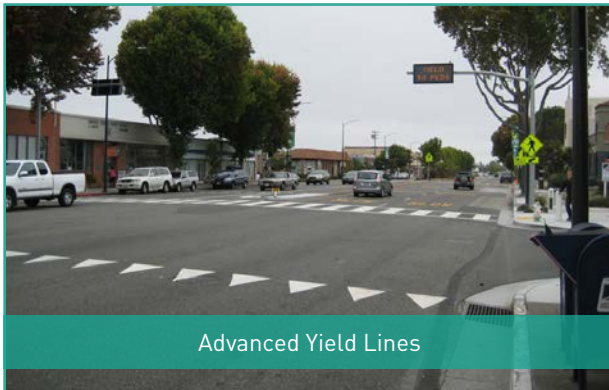
Pedestrian Hybrid Beacon (HAWK Signal)



Rectangular Rapid Flash Beacon
(aka Lighted Crosswalk)



High-Visibility Signs and Crosswalks



Advanced Yield Lines



Lane Reduction (aka Lane Reconfiguration)



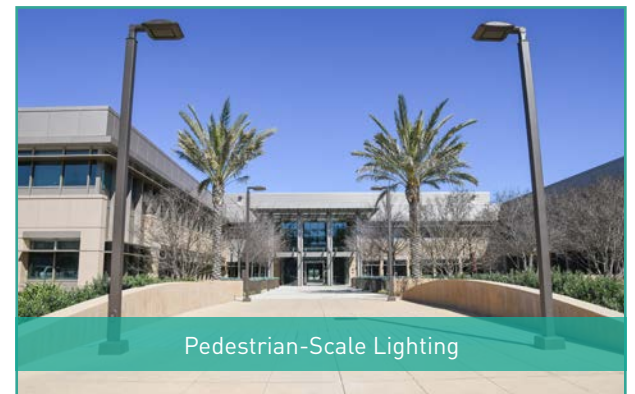
Median Refuge Island



Curb Extension



Reduced Curb Radii



Pedestrian-Scale Lighting

Pedestrian Improvement Measures

Examples of pedestrian improvements that can improve the safety, comfort, and convenience of people who choose to walk include:

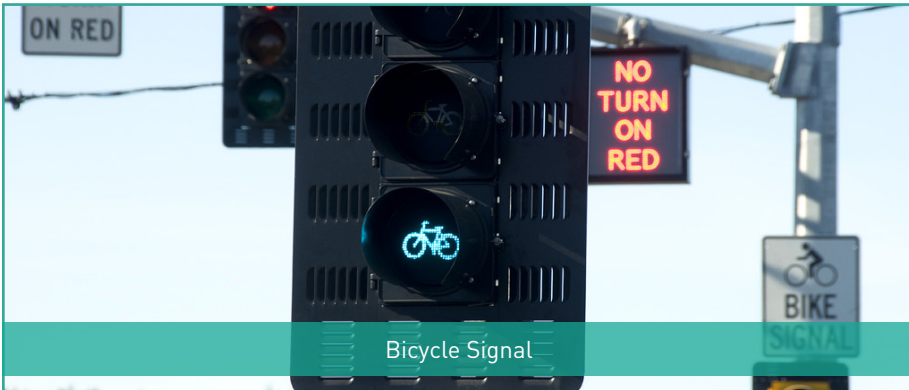
- **Pedestrian Hybrid Beacon (aka HAWK Signal):** Pedestrian Hybrid Beacons (PHBs), also known as High Intensity Activated Crosswalk (HAWK) Signals, are pedestrian-actuated signals that combine a beacon flasher and a traffic control signal. When actuated, PHBs displays a yellow (warning) indication followed by a solid red light. During pedestrian clearance, the driver sees a flashing red “wig-wag” pattern until the clearance interval has ended and the signal goes dark.
- **Rectangular Rapid Flash Beacon (Stutter Flash):** Rapid flashing LED lamps are installed on overhead signs, in advance of the crosswalk or at the crosswalk. The beacons may be push-button activated or activated with passive pedestrian detection.
- **High-Visibility Signs and Crosswalks:** High-visibility markings include a family of crosswalk striping styles including the “ladder” style. High-visibility fluorescent yellow green signs are posted at crossings to increase the visibility of a pedestrian crossings.
- **Advanced Yield Lines:** Standard white yield limit lines and “shark’s teeth” are placed in advance of marked, uncontrolled crosswalks.
- **Lane Reduction (aka Lane Reconfiguration):** Lane reductions replace the existing number of vehicle travel lanes with a combination of wider sidewalks, bicycle lanes, vehicle parking, or converting parallel parking to angled or perpendicular parking.
- **Median Refuge Island:** Raised islands are placed in the center of a street, separating opposing lanes of traffic, and have cutouts along the pedestrian path.
- **Curb Extension:** Curb extension, also known as a pedestrian bulb-out, is a traffic-calming measure meant to slow traffic and increase driver awareness of pedestrians.
- **Reduced Curb Radii:** The radius of a curb can be reduced to require motorists to make a tighter turn. It consists of an extension of the curb into the street, making the pedestrian space (sidewalk) wider.
- **Pedestrian-Scale Lighting:** Pedestrian-scale light fixtures range in height between 12 and 18 feet (to light source) and can be stand-alone or attached to taller street light fixtures (ideally of the same style).



Enhanced Bicycle Lane



Cycle Track



Bicycle Signal



Protected Intersection



Bicycle Boulevard



Supportive Bicycle Facilities (example: bike locker)

Bicycle Improvement Measures

Bicycle improvements that increase the safety, comfort, and convenience of people who choose to bike include:

- **Bicycle Backbone Network:** A bicycle backbone network is a system of low-stress bicycle routes that provide safe and convenient and connections throughout the City. Low-stress bicycle routes include a network of bicycle boulevards, buffered bike lanes, and cycle tracks (see definitions below) that provided designated spaces for cyclists away from streets with high vehicle volumes (3,000 vehicles per day maximum) and high vehicle speeds (above 25 mph).
- **Enhanced Bicycle Lane:** Bicycle lanes are a portion of the street that are designated by signage, striping, and pavement markings for use of bicyclists. Bicycle lanes are most appropriate on streets with more than 3,000 vehicles per day and with posted speed limits greater than 25 mph. On streets with high vehicle volumes, truck traffic, high parking turnover, or speed limits greater than 35 mph, bicycle lanes can be enhanced to further separate vehicles from bicyclists. Bicycle lanes can be enhanced by adding a painted, landscaped buffer or parking-protected buffer.
- **Bicycle Signal:** Bicycle signals are traffic control devices that should only be used at existing traffic signals or hybrid beacons. Bicycle signals generally provide additional guidance for cyclists at intersections where their needs may differ from other road users. For example, bicycle signal phases, bicycle only movements, and lead bicycle intervals at signalized intersections.
- **Bicycle Boulevard:** Bicycle boulevards, also known as greenways, are streets with low traffic volumes and speeds that are designed to accommodate bicycle travel as a priority. Many local streets with low vehicle speeds and volumes are already conducive to safe bicycling environments. These types of streets can be enhanced with a range of treatments to create bicycle boulevards. Bicycle boulevards can provide direct access to destinations, slow motor vehicle speeds, reduce motor vehicle volumes, reduce bicyclist delay, provide safe and convenient crossings, and enhance surrounding environments.
- **Cycle Track:** Cycle tracks, often referred to as Class IV bicycle facilities, are bike facilities that physically separated from motor vehicle traffic and from the sidewalk. Cycle tracks can be designed as one-way protected or two-way cycle tracks, and can be at street level, sidewalk level, or at an intermediate level. Cycle tracks are most appropriate on streets that could cause many bicyclists to feel stress from factors such as high vehicle speeds, high vehicle volumes, multiple vehicle travel lanes, high parking turnover. They can also be considered on streets with high bicycle volumes and at locations where special considerations should be given, like near transit stops to manage bicycle and pedestrian conflicts.
- **Protected Intersection:** Protected intersections use a combination of design elements to create safe and comfortable conditions for bicyclists and pedestrians. Protected intersection design elements can include: high quality bicycle waiting areas at corners, colored pavement to guide bicycle travel paths, and narrowed intersections with small curb radii to reduce vehicle-turning speeds. Protected intersections slow turning vehicles, provide good sight lines for all users, and shorten bicycle and pedestrian crossing distances.
- **Supportive Bicycle Facilities:** Supportive facilities include bicycle racks, bicycle lockers, bicycle fix-it stations, and other features that make it easier for people to use a bicycle as a common mode of travel. These types of facilities should be located at locations with high demand and in areas that are most convenient for cyclists.

Category 2: Complete Street Corridors and Placemaking

California's Complete Streets Act (AB 1358) was signed into law in 2008 and mandates that "complete street" policies and standards be incorporated into City General Plans. The "complete street" concept recognizes that transportation corridors have multiple users with different abilities and mode preferences (e.g., pedestrians, bicyclists, transit riders, and drivers) that need to be accommodated. An effective transportation system allows for the use of multiple modes and offers a variety of travel options for people to move around in ways that best suit them. Complete street corridor projects can make streets safer, more comfortable and convenient for people using all travel modes. Specific improvements that could be considered as part of complete street corridor projects include the placemaking improvements listed below as well as improvements discussed in other sections, including Active Transportation Corridors, Transit Access and Service Enhancements, and Roadway Congestion and Delay Improvements.

Not only do public streets facilitate the movement of people and goods, they provide "places" for people to congregate, sit, watch, and interact. Creating vibrant and welcoming public spaces for people to live, work, and play is known as "placemaking." Placemaking improves spaces where people

gather, such as streets and sidewalks, in order to generate greater activity and interaction between people. As the City continues to expand and invest in its infrastructure, improvements must also be made to enhance the streetscape realm, creating attractive environments for walking, biking, and transit to create a balanced transportation system.

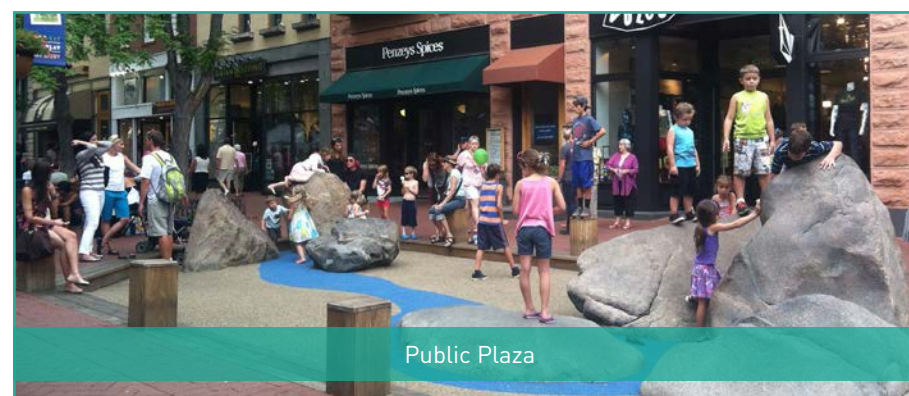
Figure 13 shows the locations of the Complete Street Corridor and Placemaking projects included in the Plan.

Placemaking Improvement Measures

Placemaking improvements that can be used to enhance the streetscape and encourage activity include:

- **Public Art:** Public art can include sculptures, fountains, murals and other forms of art that encourage people to look around and explore their surroundings.
- **Public Seating:** Seating, such as traditional park benches or "parklets," provide comfortable and convenient places for people to sit and rest. Parklets, also known as street seats or curbside seating, are platforms that transform parking spaces into public seating areas and generally incorporate elements of landscaping (see description below) and/or bicycle racks. Parklets can be considered where there are narrow or congested sidewalks, or where local property owners or residents see a need to expand seating capacity in an area.

- **Public Plaza:** A plaza is an open public space that serves as a place where people gather, such as a city square.
- **Paseo:** A paseo, also known as a promenade, is a public place or path designed for walking.
- **Shared Space:** Shared space is a street design that minimizes the separation of bicyclists, pedestrians, and vehicles. This can be done by removing street markings, traffic lights, traffic signs, and curbs. By creating a greater sense of place and making it unclear what travel mode has priority, drivers will reduce their speed, and in turn improve safety for all users.
- **Landscaping:** Landscaping adds to the enjoyment of a place by providing scenery, offering shade, and separating people from moving vehicles on the street. Stormwater management and native vegetation are two common landscaping treatments that help create a sense of place. Stormwater management includes bioswales, permeable pavement, and rain gardens. Native vegetation are plants that are indigenous to the area and provide habitat for wildlife.
- **Wayfinding:** Wayfinding provides information signage about the direction, distance and sometimes travel time by mode to destinations. The signs are designed to create a sense of community, and make the destinations feel more walkable and bikeable.



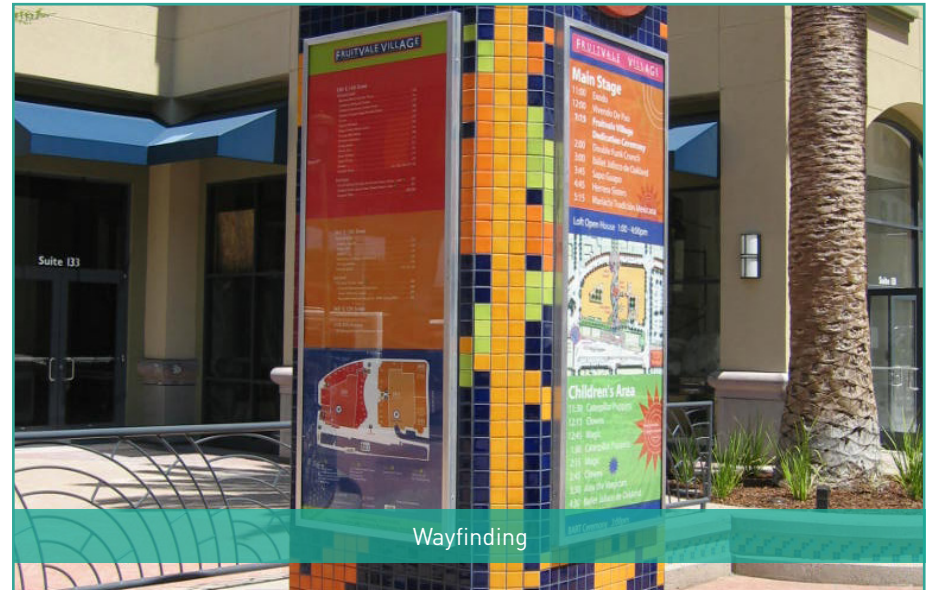
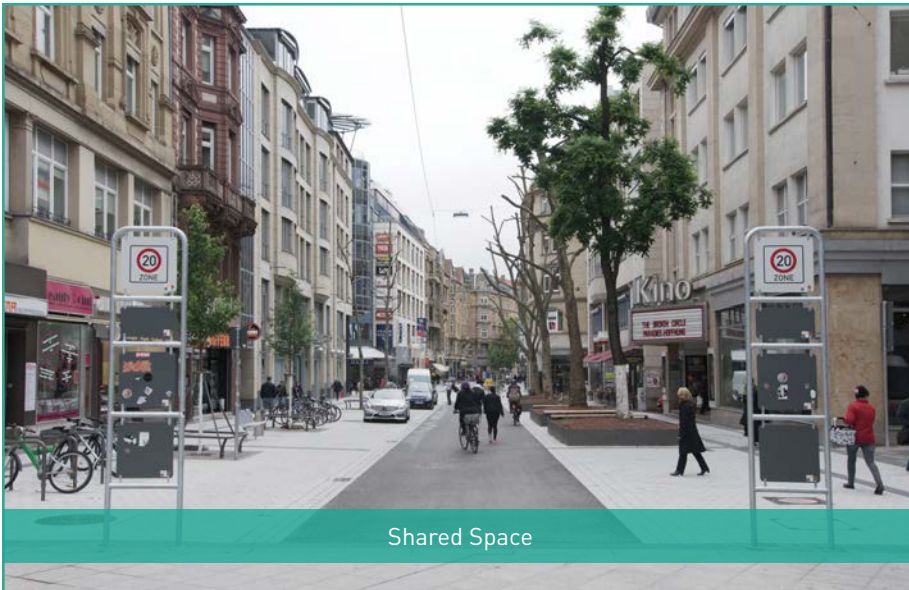
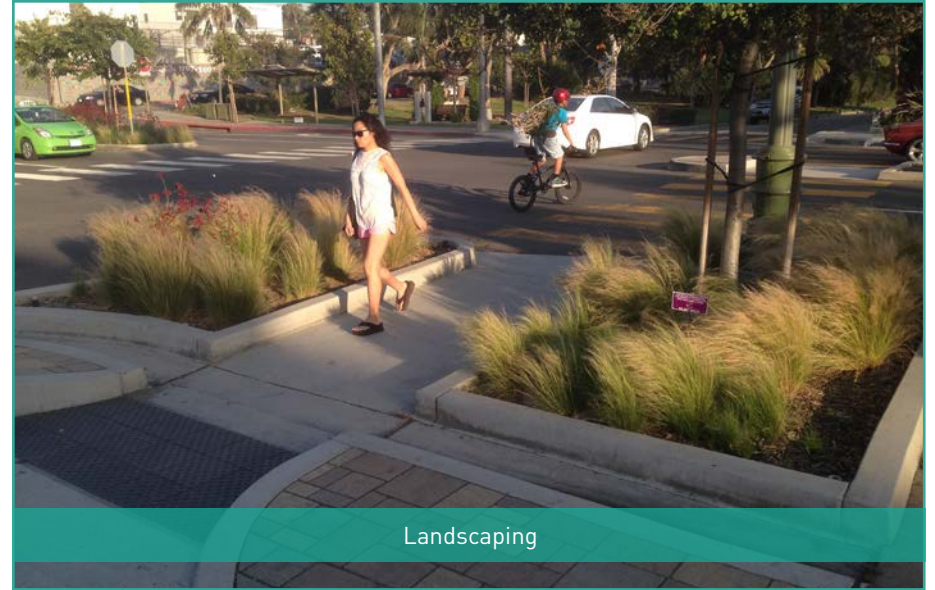
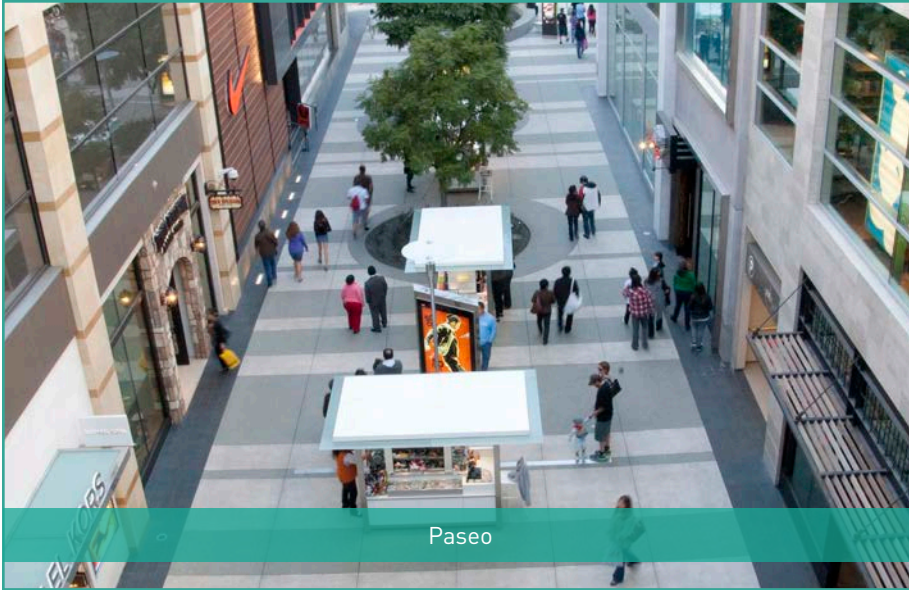


Figure 13: Complete Street Corridors and Placemaking Projects

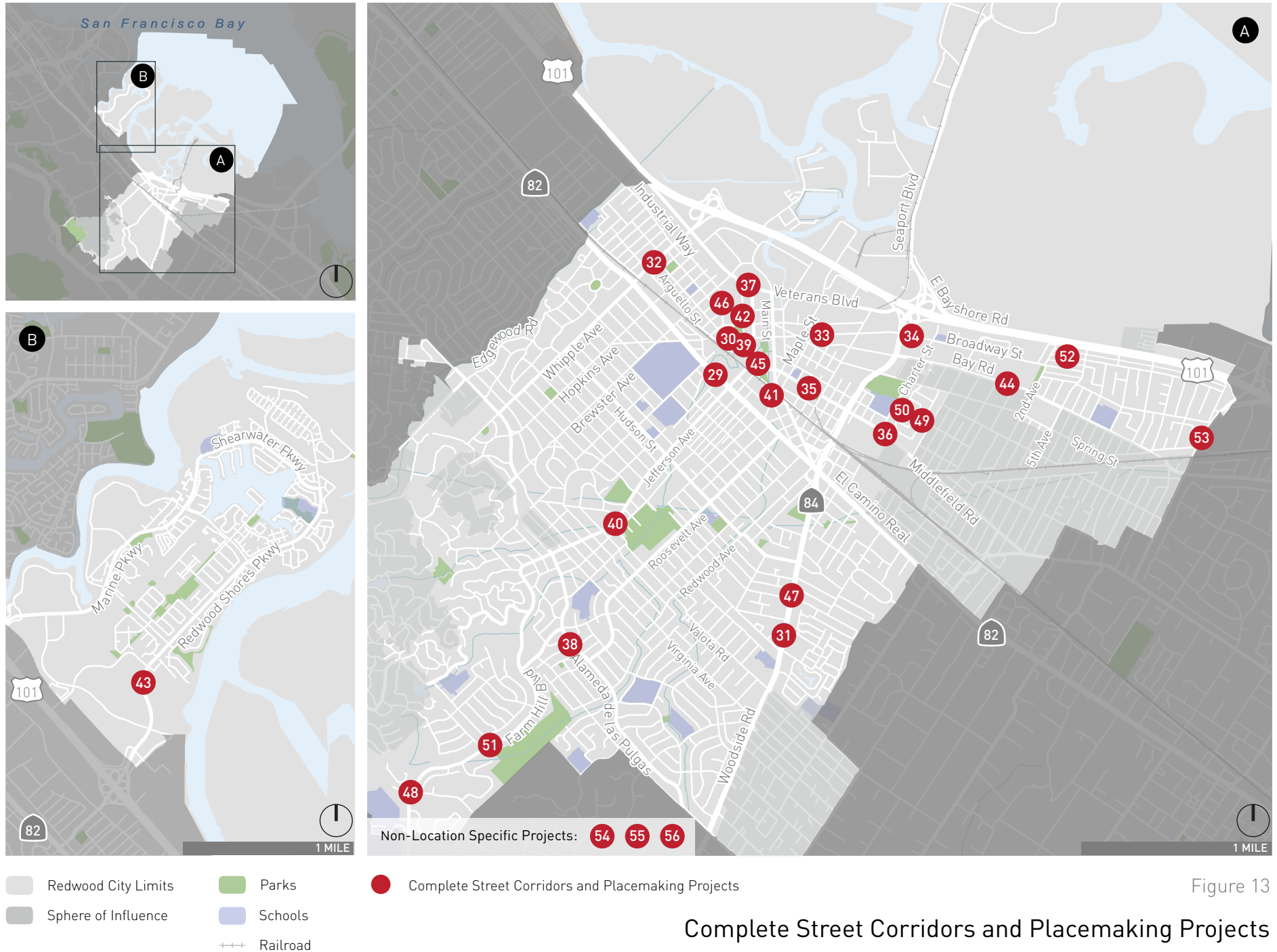


Figure 13

Complete Street Corridors and Placemaking Projects

Category 3: Transit Access and Service Enhancements

Access, performance, convenience, and comfort are key factors for improving the public transportation experience and encouraging new riders. Projects that improve transit access and service seek to enrich the round-trip experience for users of public transportation by improving the transit service directly, or by developing transit-enhanced streets. Transit enhanced streets may receive a number of design elements to improve transit performance and/or the overall user experience for people who walk and take transit. Enhancements may range from streetscape improvements that make walking safer and easier, to transit shelters, or bus priority at intersections. Just as significant, providing reliable and frequent transit service that is convenient and safe, increases roadway capacity by reducing drive-alone trips, shifts more people to transit, and integrates transit access and service investments with the identity of the surrounding street.

Figure 14 shows the locations of the Transit Access and Service Enhancement projects included in the Plan.

Transit Access and Service Enhancement Measures

Several transit service enhancements that can increase multimodal connectivity throughout the City, and improve transit service and reliability for those who choose to take public transit include:

- **Transit Signal Priority (TSP):** TSP technology detects approaching transit vehicles to an intersection and extends green lights or shortens red lights to reduce transit delay. TSPs can increase frequency and reliability throughout the transit network, as well as reduce fuel costs and greenhouse gas emissions.

- **Integrated Passenger Information System:** Integrated passenger information system compiles traveler information from multiple transit providers into one place. Passenger information can include transit schedules and fares, real-time transit vehicle locations with estimated departure/arrival time, and wayfinding signage.
- **Enhanced Transit Stop:** Potential enhancements to transit stops include improved pedestrian access, waiting areas, shelters, seating, bicycle storage facilities, and lighting. These upgrades provide safe, comfortable, and convenient experience for passengers.
- **Demand-Responsive Transit:** Demand-responsive transit (DRT), sometimes referred to as dial-a-ride transit (DART) and flexible transport services, is a form of public transit offering flexible routing and scheduling of small/medium sized vehicles operating between origins and destinations according to passenger needs.
- **Queue Jump Lane:** Queue jump lanes (a transit only lane on the approach to a signalized intersection) allow transit vehicles to bypass traffic queues at signalized intersections. Queue jump lanes increase transit efficiency by reducing delay for buses at signalized intersections.
- **Bus Bulbouts:** Bus bulbouts are sidewalk extensions at transit stops that expand the curb space from the edge of the curb to the travel lane. Bus bulbouts reduce delay by eliminating the need for buses to pull in and out of traffic and they provide more space for amenities (i.e. bus shelters, wayfinding maps, landscaping). Bus bulbouts can also increase safety for riders as they no longer need to enter the street for boarding.
- **Access Improvements:** Access improvements make it easier to walk, bike or drive to transit stops. Examples include enhanced bike lanes, intersection treatments, park-and-ride lots, curb ramps, and crossing signals.

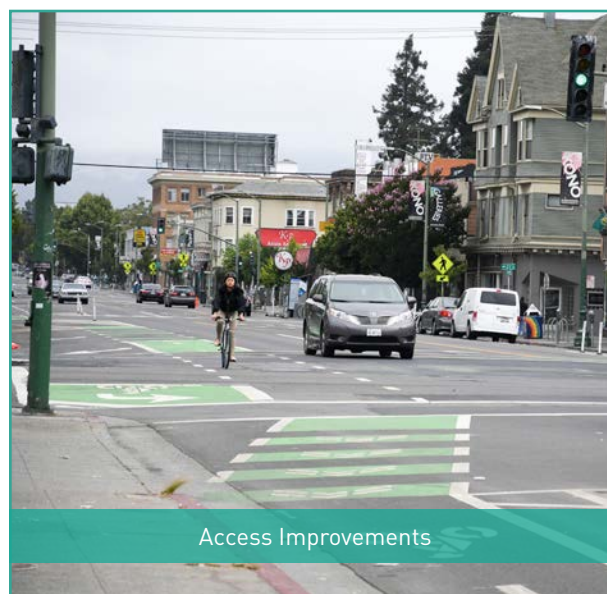
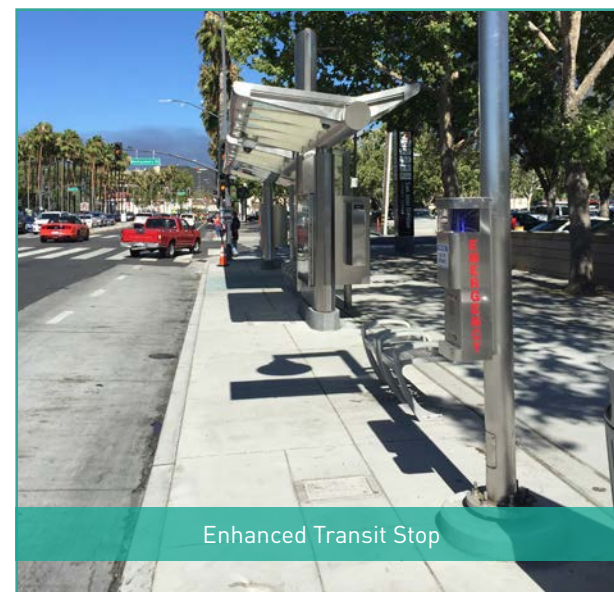


Figure 14: Transit Access and Service Enhancement Projects

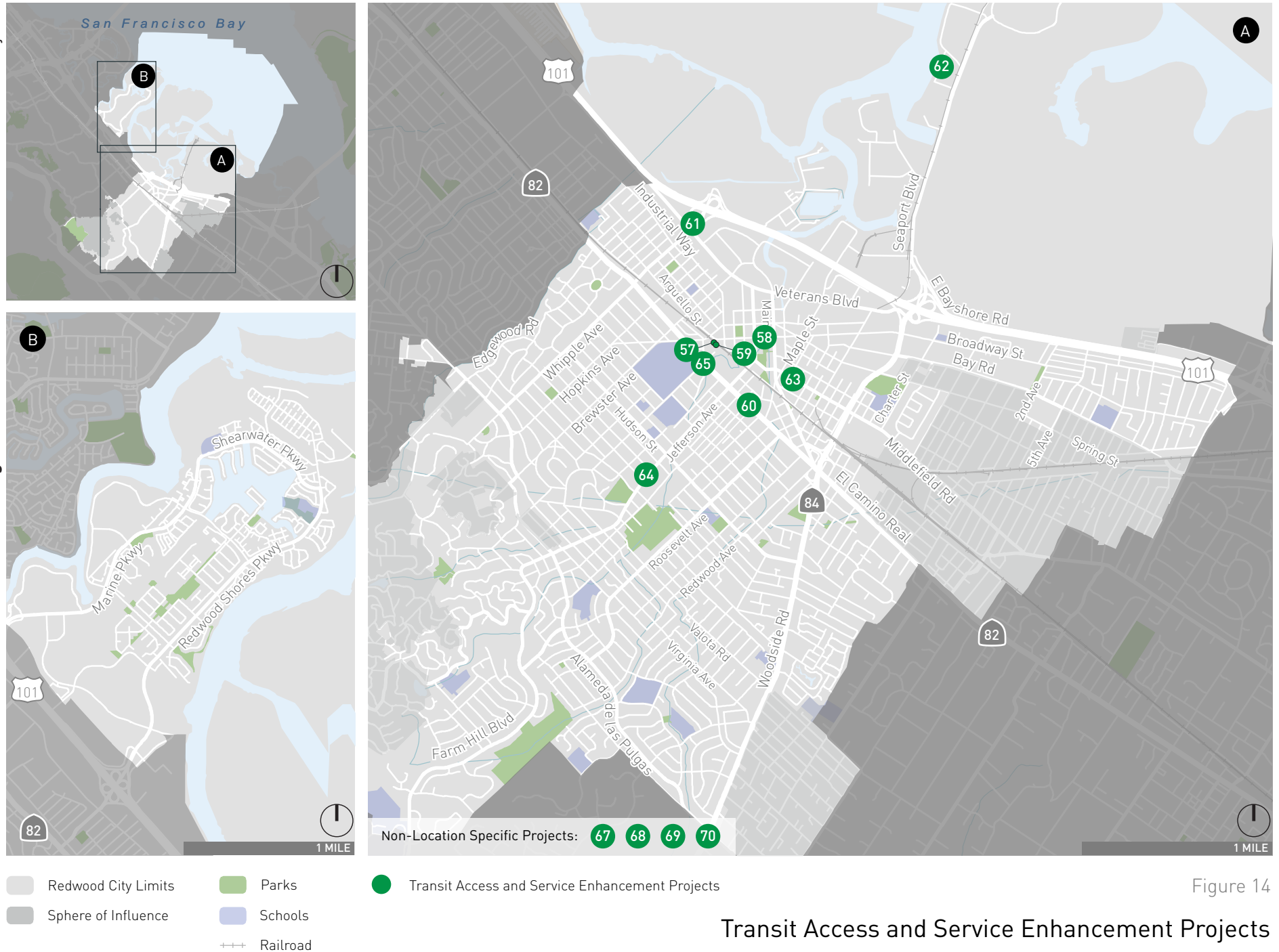


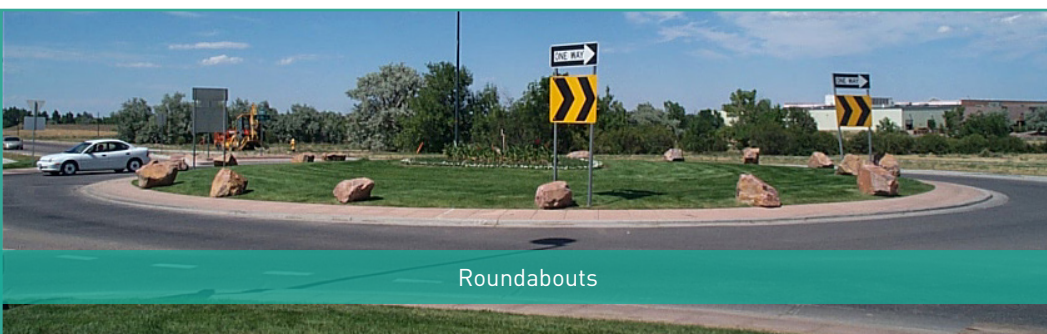
Figure 14

Transit Access and Service Enhancement Projects

Category 4: Roadway Congestion and Delay Improvements

Areas with high employment activity, such as Downtown, Redwood Shores, Pacific Shores, and major streets that serve regional commuters, like Woodside Road and El Camino Real, experience greater-than-average levels of peak period congestion. Additionally, congestion is the greatest when both work commute and school trips peak, though only occurring for about 20 minutes on mornings when schools are in session. These congestion and delay improvements include considerations for school traffic. In addition to the multimodal improvements identified, enhancements to directly reduce vehicle congestion and delay will improve the overall experience for all users. Enhancements may range from traffic flow improvements and turn-restrictions to make vehicles travel more efficiently along a corridor, to major intersection and interchange treatments. Improved transit access and service, TDM programs, and active transportation projects, increase person throughput and proactively help manage traffic congestion and reduce neighborhood cut-through traffic.

Figure 15 shows the locations of the Roadway Congestion and Delay Improvement projects included in the Plan.



Roundabouts

Congestion and Delay Improvement Measures

Congestion and delay improvements, which can minimize environmental impacts, include:

- **Adaptive Signal Timing:** Adaptive signal timing is a specialized form of signal timing that dynamically adjusts signal cycles and phasing in response to real-time traffic conditions. It is most effective on heavily traveled corridors to reduce delays for all modes, including transit. Adaptive signal timing can reduce levels of congestion along a major street corridor, which benefits private automobiles and transit.
- **Signal Coordination:** Coordinated signal timing manages the movement and speed of vehicles to increase vehicle throughput. Coordinated signal timing should be considered along corridors with closely spaced signalized intersections (1/4 mile or less), and where there is a desire for a seamless flow of traffic or steady speed progression along a corridor. Signal coordination also provides the opportunity to monitor congestion and adjust signal timings through a central traffic management center.
- **Roundabouts:** Roundabouts accommodate high traffic levels in a way that can be more efficient and safer than standard signals. Installing roundabouts could reduce congestion and increase safety for all modes. Roundabouts should be considered at a wide range of intersections, but perform best at intersections with similar traffic volumes in all directions, and at intersections with heavy left turning movements.
- **School Transportation Programs:** The City should coordinate with schools to reduce congestion during peak times. For example, staggered school start times, school-focused transit, and safe routes to school programs can reduce vehicle travel during peak times.

Figure 15: Roadway Congestion and Delay Improvement Projects

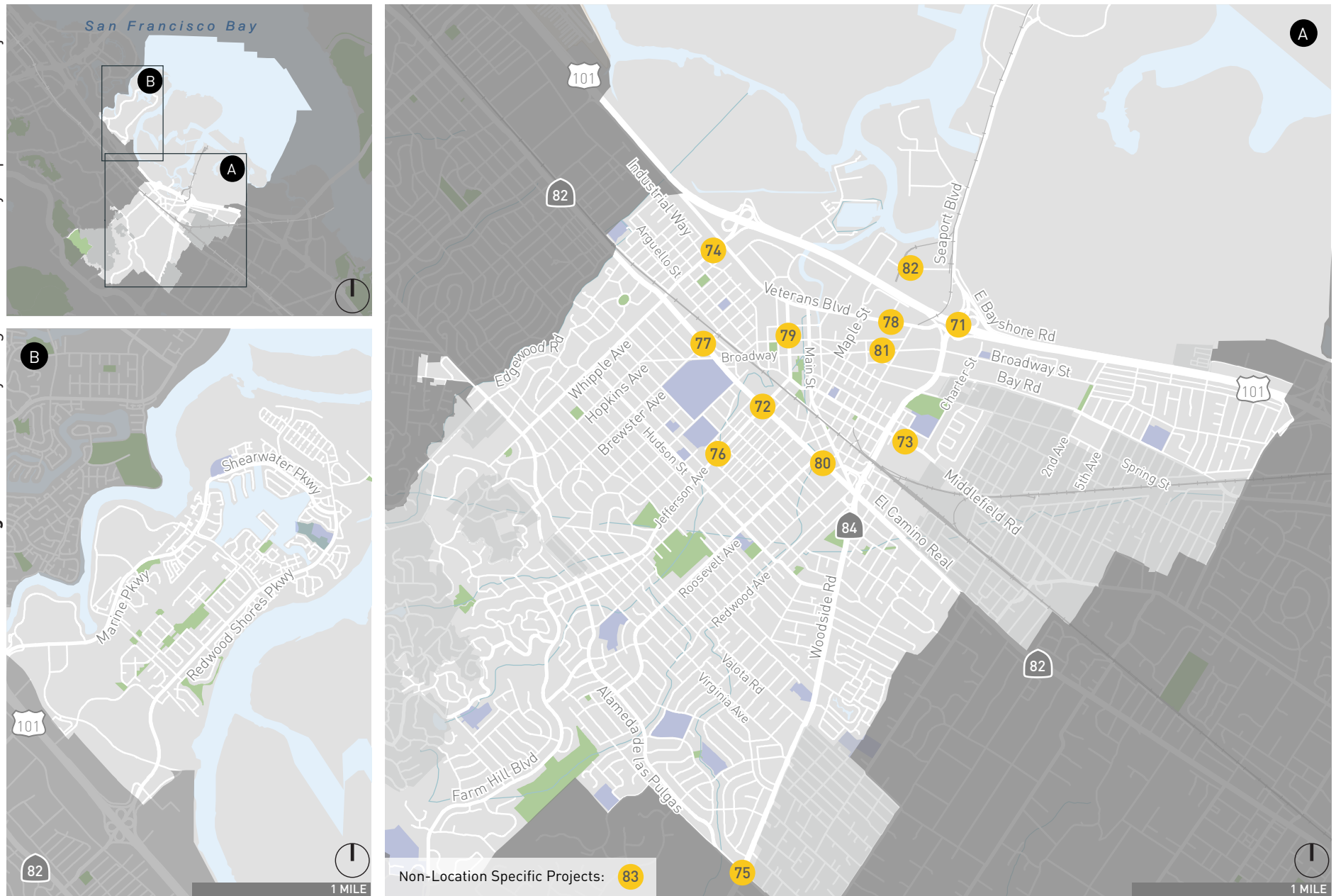


Figure 15

Roadway Congestion and Delay Improvement Projects



Category 5: Network Gap Closure, Connectivity and Safety

Safety ranks as a top priority for many in Redwood City and is an important factor in creating a multimodal and accessible transportation network. Streets that are safe and stress-free are suitable for all ages and all modes of travel. In terms of transportation, concerns for physical safety stem from traffic speeds and volumes, conflict between different modes of travel, and a lack of dedicated infrastructure. With active modes of transportation becoming part of more people's everyday behavior, connectivity and safety measures must take into account the most vulnerable users – people walking

and riding bikes. Enhancements may range from bicycle and pedestrian crossings across major barriers, such as US 101 and the railroad tracks, and safe routes to school programs to make walking safer and easier for children. These projects and programs can reduce congestion by making it easier and safer for people to make trips by non-driving modes.

Figure 16 shows the locations of the Network Gap Closure, Connectivity, and Safety projects included in the Plan.

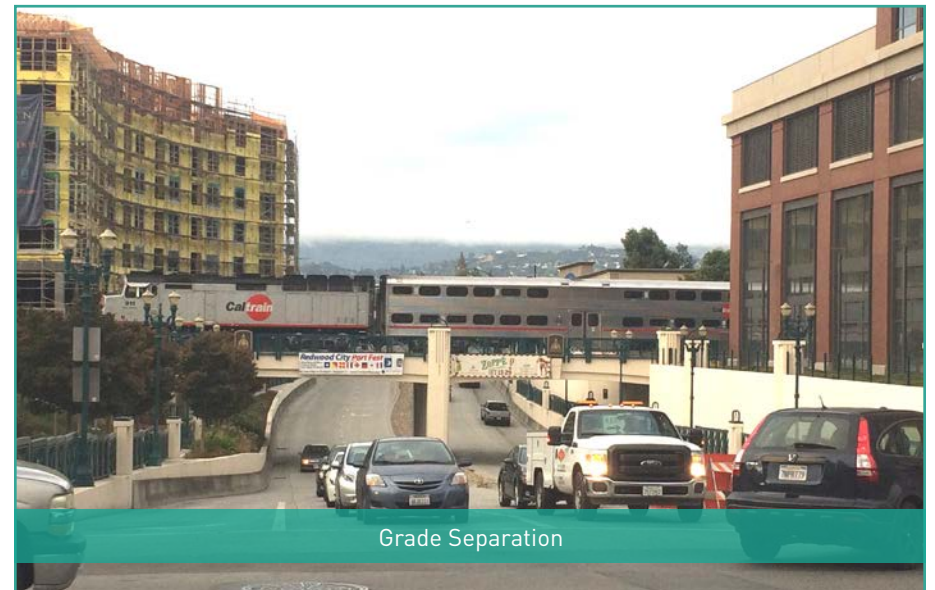
Network Gap Closure and Connectivity Measures

Several measures that close gaps and improve connectivity in the network include:

- **Connection to Popular Destinations:** Providing bicyclists and pedestrians with convenient access to points of interest, such as schools, transit, parks, neighborhoods, and landmarks, enhances access to these popular destinations, promotes active transportation and reduces travel by vehicle.
- **Connection to Regional Trail Network:** Regional trail networks provide bicyclists and pedestrians with a low-stress travel route. Providing better access to regional trails promotes non-auto travel modes for people who choose to walk or bike and increases recreational opportunities.
- **New or Improved Street Connection:** Developing new or improved street connections increase access to destinations by expanding the potential number of routes. If implemented with active travel modes in mind, new or improved street connections can also encourage people to walk or bike by creating alternative routes that are safer or more convenient.
- **Grade Separation:** Grade separation is the process of aligning two or more travel routes, such as streets, railroad tracks, bike paths, or footpaths, at different heights (grades) so that they do not disrupt other intersecting modes of travel. Overpasses (bridges), underpasses (tunnels), or combinations of both are used for grade separations.



Connection to Regional Trail Network



Grade Separation

Safety Measures and Programs

Several measures that can increase the safety and comfort for all travel modes along streets in the City include:

- **Safe Routes to School Program:** Safe routes to school programs increase the safety and convenience of children traveling to and from school. These programs create more opportunities for children to walk or bike to school, which could have a secondary benefit of decreasing vehicle trips.
- **High Injury Networks (HIN):** Vision Zero is an approach to street safety where no loss of life is acceptable. As part of advancing Vision Zero in the City, High Injury Networks are the intersections, blocks, corridors, or community-wide locations with the highest safety issues. The HIN locations are determined using observed collision data and anticipated collision risk, and are used for recommending, designing, and funding safety countermeasures.
- **Leading Pedestrian Intervals (LPI):** A Leading Pedestrian Interval typically provides pedestrians crossing an intersection with a 3-7 second head start over vehicles traveling in the same direction. LPIs improve the visibility of pedestrians and enhance their right-of-way over turning vehicles, especially at locations with a history of pedestrian and vehicle conflicts.

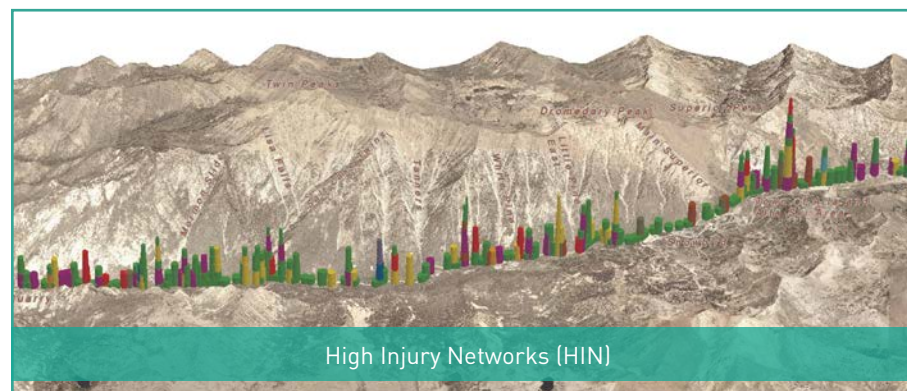


Figure 16: Network Gap Closure, Connectivity and Safety Projects

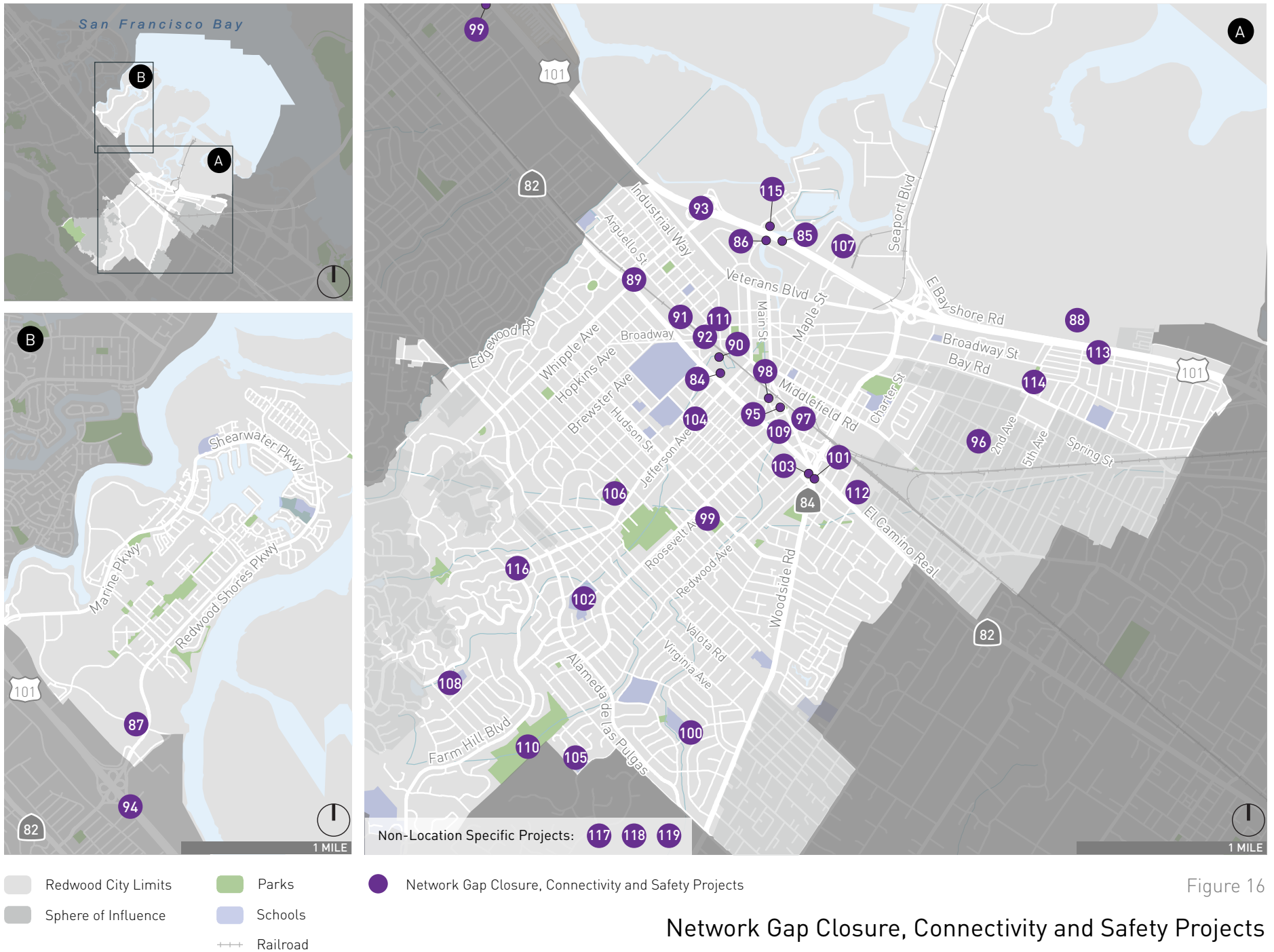


Figure 16

Network Gap Closure, Connectivity and Safety Projects



Category 6: Transportation Technologies and Innovations

Technology is dramatically altering travel behavior and peoples' relationship with streets. Increasingly, TNCs and ridematching services are using mobile technology to connect ordinary drivers with passengers needing a ride, while carsharing companies provide easy, short-term access to a private car. These innovations offer a convenient and cost-effective alternative to buying and

owning a car. In the future, AV technology may remove the need for human drivers. AVs will need to be properly managed and accommodated as they are released and become more widely used on public streets. Proactively working to develop strategies for all new types of innovations will help maximize the benefits of these new technologies for the City.



Electric Vehicle (EV) Strategy



Goods Delivery Strategy



Automated Vehicle (AV) Strategy



Curbspace Management Strategy

Transportation Technologies and Innovations Strategies

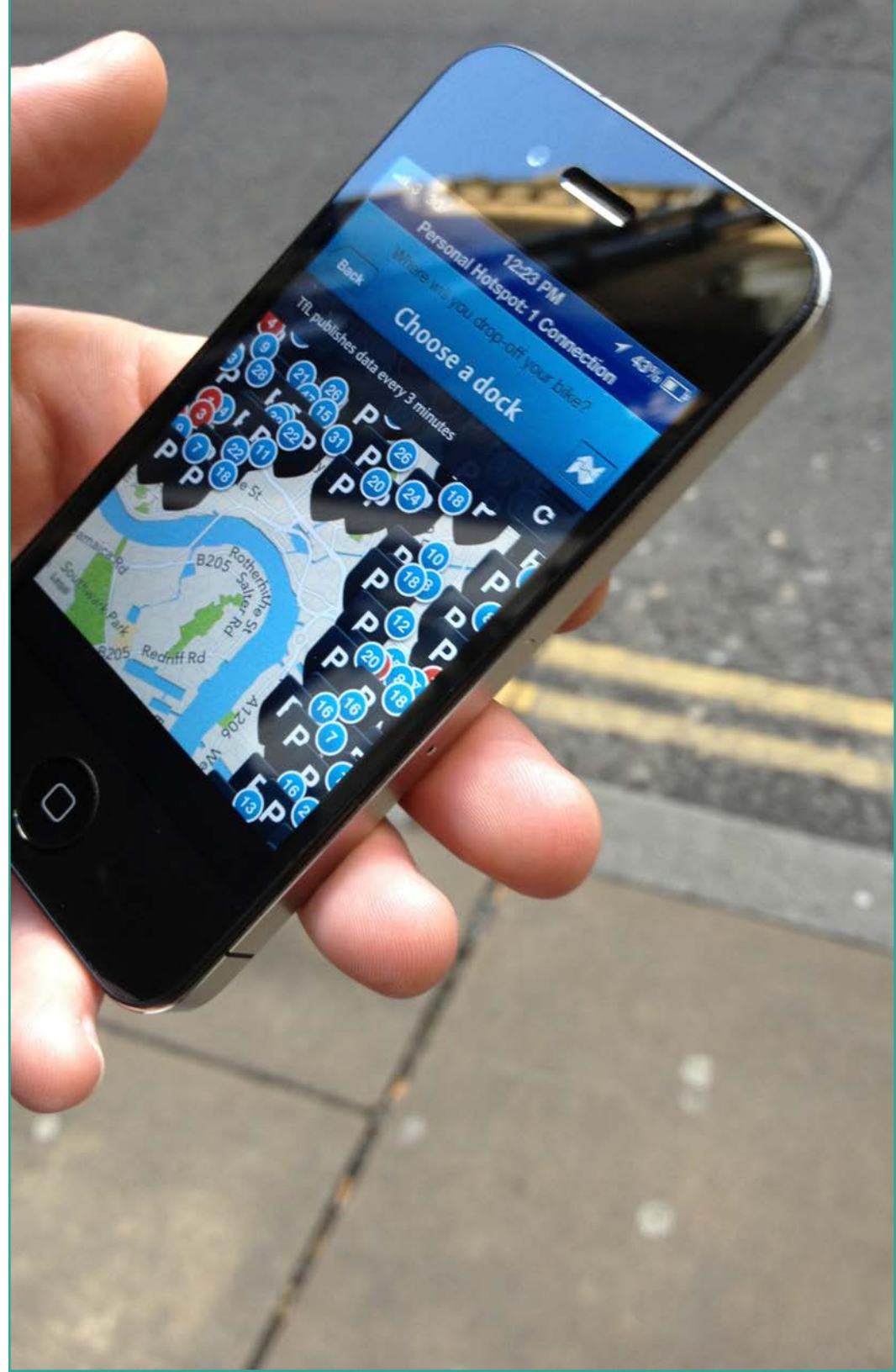
Projects and programs related to transportation technologies and innovations include:

- **Electric Vehicle (EV) Strategy:** Electric vehicle (EV) is a term used to describe any car that runs on battery power that is rechargeable from the electricity grid. Developing strategies that support, educate, and encourage more EV usage in the City will help reduce the environmental impacts of vehicle travel.
- **Automated Vehicle (AV) Strategy:** A citywide AV strategy proactively manages the new technology before it becomes available on public streets. This includes, but is not limited to, developing an AV policy, designating routes or areas where AVs can or cannot operate, adopting rules to govern parking and pick-up/drop-off areas, and managing curb space. AVs, while emerging quickly, are still relatively new to the transportation field, making it difficult to determine how and where the technology will be used.
- **Goods Delivery Strategy:** Goods delivery typically refers to the process of delivering goods to predefined locations. A goods delivery strategy will regulate automated delivery services, such as robotic deliveries, and typical goods delivery systems through a proactive designation of loading/unloading zones and enforcement. A comprehensive goods delivery strategy will not only address current delivery systems but also emerging technologies like automated delivery drones, which are unmanned aerial vehicles (UAVs) that can deliver lightweight packages to local destinations.
- **Curbspace Management Strategy:** Locations for designated pick-up and drop-off curb space for private shuttle services, such as employer shuttles, and shared ride services, like Lyft, could be determined by current demand and expected future need. Curb space located adjacent to popular designations, like downtown and Redwood City Station, could also be effectively managed through strategies in flexible or scheduled use.

Category 7: Transportation Demand Management (TDM)

In Redwood City, 73 percent of residents commute by driving alone. Drive-alone rates add to severe delays and traffic congestion, among other problems. A variety of programs and strategies, which are collectively referred to as Transportation Demand Management (TDM), influence long-term travel behavior and can reduce the percentage of commuters who drive alone. This is accomplished by providing attractive alternatives to driving alone, raising awareness of these alternatives, and by providing incentives to use them.

Per the Bay Area Air Quality Management District, all employers with 50 or more employees are required to offer commuter benefits and participate in the Bay Area Commuter Benefits Program. Building off of this, the City is developing a TDM Plan to reduce the number of residents and employees who drive alone to work. The TDM Plan will also include a framework for establishing a Transportation Management Association (TMA), which is a member-controlled, non-profit organization that provides transportation services within a specific area. The proposed TDM Plan is attached in **Appendix E**.





Shuttle Service



Rideshare/Carshare



Bikeshare



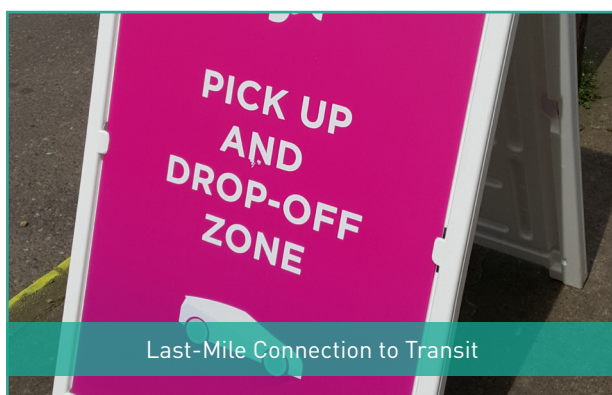
Carpool/Vanpool



Guaranteed Ride Home



Bicycle Facilities



Last-Mile Connection to Transit



Reduced Parking



Paid Parking

TDM Measures

TDM programs and strategies to reduce dependence on single-occupancy vehicles include:

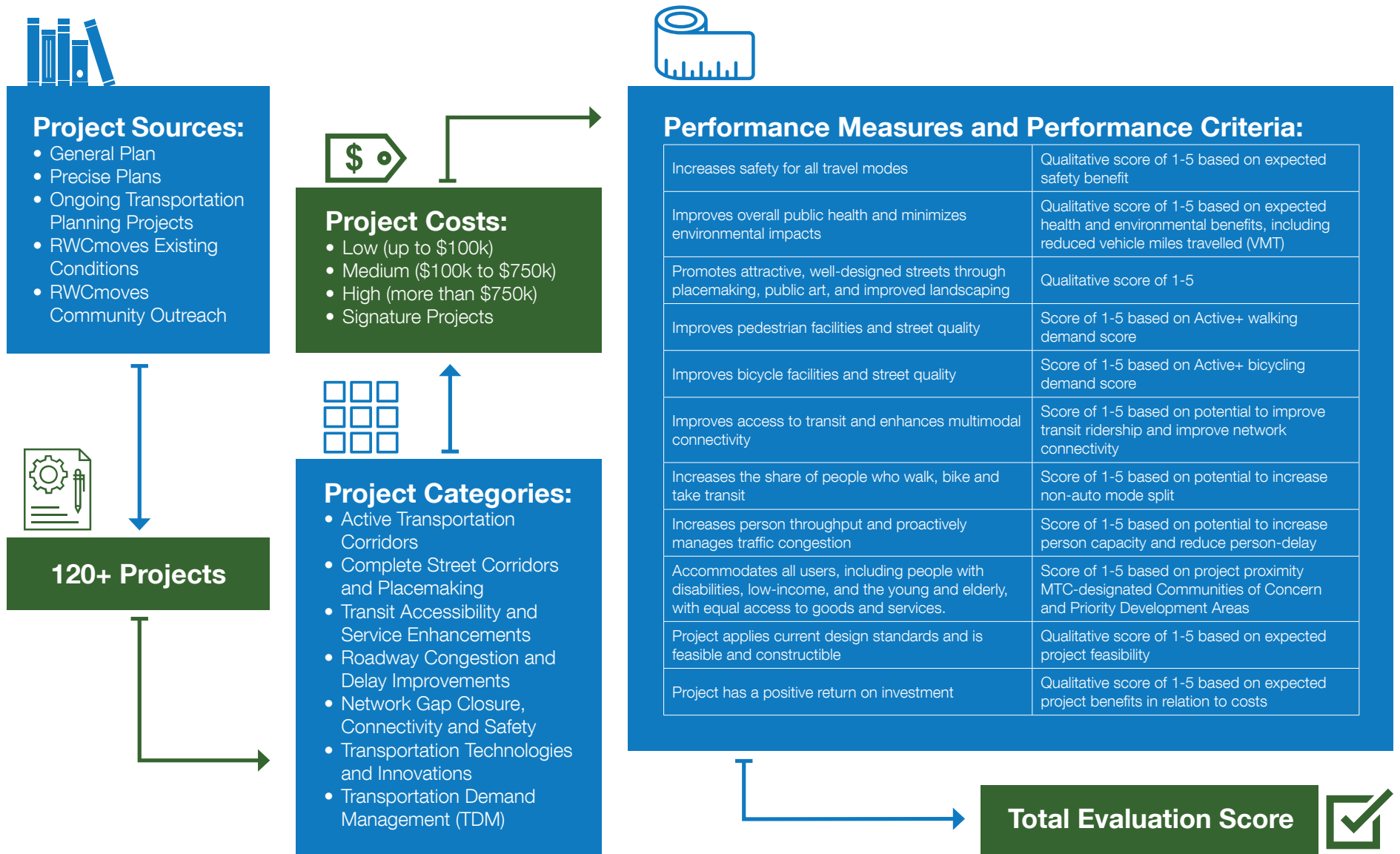
- **Guaranteed Ride Home:** People who choose to use transit, carpools, or vanpools are guaranteed a ride home by their employer in case of emergency or if they need to work late, which helps to reduce concerns about not having a car at work.
- **Shuttle Service:** Operation of a shuttle service to nearby rail and transit stations and possibly to midday destinations makes it easier for people to use transit to get to work.
- **Rideshare/Carshare:** People who bike or walk or use transit, carpools, or vanpools can hail a rideshare vehicle or utilize a carshare vehicle located nearby, which helps to reduce concerns and inconveniences of not having a vehicle.
- **Bikeshare:** Bikeshare is a program that allows users to pick up bicycles at one location and return it to another location within the service area. A bikeshare program provides people with bicycles and potentially bicycle helmets that can help eliminate trips made by car during the day.
- **Carpool/Vanpool:** Ride-matching programs help carpools and vanpools to form by matching drivers and passengers and providing preferential parking. These programs reduce congestion by increasing the number of people in vehicles.
- **Bicycle Facilities (Infrastructure Improvements/Parking):** Improving bicycle infrastructure by filling in gaps in the network, upgrading existing facilities, and creating a low-stress bicycle network, providing bike parking, or installing wayfinding signage helps support bicycle riders and encourages more people to travel by bicycle.
- **Last-Mile Connection to Transit:** Shuttles or rideshare services, like Lyft, can be used as a last-mile strategy to get a group of people from a major transit stop to the employer location or home, making it easier for people to use transit even if they don't live or work close to a transit station or stop.
- **Flexible Work Hours:** Employees set or modify their arrival and departure times, which can provide the flexibility people need to use alternative modes.
- **Telecommuting:** Telecommuting allows employees to work from home or other locations, including coffee shops, co-working spaces, and libraries, via telephone, email, and on-line meetings. Telecommuting reduces trips made to an employer site.
- **Reduced Parking:** When combined with companion TDM measures, reduced parking discourages drive-alone commuting by limiting parking options.
- **Paid Parking:** Charging money for parking requires the user to consider the cost of driving, which includes parking, and will encourage people to use an alternative mode to driving alone.

Performance Measures and Prioritization Process

Redwood City's transportation investments were prioritized through an assessment of relevant and preferred performance measures. Performance measures were developed based on the City's Strategic Plan, input from the City and community members, Fehr & Peers' Active Transportation Performance Measures manual, and comparable cities' transportation system performance measures. The prioritization process assigns each project a score (1 to 5) based on the project's ability to help achieve each performance measure. Projects with the highest scores are projects that will have the greatest impact in achieving the City's long-term mobility goals.



PERFORMANCE MEASURES AND PRIORITIZATION PROCESS



Projects are rated on the following 11 performance measures:

- Increases safety for all travel modes
- Improves overall public health and minimizes environmental impacts
- Promotes attractive, well-designed streets through placemaking, public art, and improved landscaping
- Improves pedestrian facilities and street quality
- Improves bicycle facilities and street quality
- Improves access to transit and enhances multimodal connectivity
- Increases the share of people who walk, bike and take transit
- Increases person throughput and proactively manages traffic congestion
- Accommodates all users, including people with disabilities, low-income, and the young and elderly, with equal access to goods and services.
- Project applies current design standards and is feasible and constructible
- Project has a positive return on investment

The remainder of this section defines each performance measure that Redwood City will use to prioritize projects. In addition, the performance measures will also monitor the performance of the overall transportation system over time. The process for updating project rankings every 2-3 years is included in **Chapter 5**.

Performance Measure 1: Increases Safety for All Travel Modes

Projects are measured on their expected safety benefit for all travel modes. Safety ranks as a top priority for many in Redwood City and is an important factor in creating a sustainable transportation network. Vision Zero, adopted by many cities around the world, is an approach to street safety that aims to achieve a transportation system with no fatalities or serious injuries. Redwood City has not adopted an official Vision Zero policy, but will continue to evaluate safety for all modes by tracking collisions and the details surrounding them, including where they occurred, when they occurred, who was involved, and what precipitating actions led to the crash. The frequency of severe collisions or collisions involving vulnerable populations, such as children and seniors, will also be monitored. Redwood City will also consider the risk of future collisions in evaluating projects by assessing surrounding built environment and traffic conditions. Anticipated collision risk or severity reduction is often determined based on vehicle volumes and speed, as well as the frequency with which a pedestrian or bicyclist interacts with vehicles. Projects that improve safety for all travel modes will receive a higher score under this performance measure.

Performance Measure 2: Improves Overall Public Health and Minimizes Environmental Impacts

Projects are measured based on a project's potential to increase health and environmental benefits, and its potential to reduce vehicle miles traveled (VMT). Transportation projects and programs have the ability to influence public health outcomes through their effects on individual activity and the natural environment. Active transportation investments can promote

healthier lifestyles through increased access to physical activity and reduced exposure to pollutants. Redwood City can measure environmental impacts by tracking the average VMT by City residents. The California Governor's Office of Planning and Research (OPR) will soon require projects to assess a project's impact on the City's VMT. Projects that minimize the environmental impacts of transportation per capita will receive a higher score under this performance measure.

Performance Measure 3: Promotes Attractive, Well-Designed Streets through Placemaking, Public Art, and Improved Landscaping

Projects are measured based on a project's contribution to improved urban design and placemaking. Redwood City wants to create vibrant and welcoming public spaces for people to live, work, and play through transportation projects and programs. When located in public spaces, public art and events can serve as attractions that residents and visitors gather around. These relate to active transportation and the need for attractive and well-designed streets because many visitors arrive on foot or by bicycle and take part in the festivities by walking around. Projects that promote attractive and well-designed streets for people will receive a higher score under this measure.

Performance Measure 4: Improves Pedestrian Facilities and Street Quality

The quality of Redwood City's walking network is another measure by which the City assesses the transportation system performance. Projects that include pedestrian enhancements are measured based on the walking potential in a particular project location. Pedestrian projects are evaluated based on the Fehr & Peers' Active+ walking demand score in the City (see

Appendix B). The Active+ tool reports Redwood City's pedestrian demand using a geographic interface system (GIS) analysis. The pedestrian demand analysis considers existing activity levels (using Census Data), important attractors (transit, commercial corridors and districts, regional attractions, and major schools, employers and services), existing infrastructure support, and deficiencies (barriers and gaps, lack of facilities, collision rates). The Active+ tool assesses various geographic areas (i.e. street segments, intersections) in terms of their intrinsic potential to attract a specific level of walking activity. Using this approach, projects with higher walking potential in a particular project location will receive a higher score.

Performance Measure 5: Improves Bicycle Facilities and Street Quality

The quality of Redwood City's bicycle network is a measure by which the City assesses the transportation system performance. Projects that include bicycle enhancements are measured based on the biking potential in a particular project location. Pedestrian projects are evaluated based on the Fehr & Peers' Active+ biking demand score in the City (see **Appendix B**). The Active+ tool reports Redwood City's bicycle demand using a GIS analysis. The bicycle demand analysis considers existing activity levels (using Census Data), important attractors (transit, commercial corridors and districts, regional attractions, and major schools, employers and services), existing infrastructure support, and deficiencies (barriers and gaps, lack of facilities, collision rates). The Active+ tool assesses various geographic areas (i.e. street segments, intersections) in terms of their intrinsic potential to attract a specific level of bicycling activity. Using this approach, projects with higher biking potential in a particular project location will receive a higher score.

Performance Measure 6:

Improves Access to Transit and Enhances Multimodal Connectivity

Evaluating pedestrian and bicycle access to transit and amenities near transit stations (first/last three-mile access) is a measure by which the City assess the transportation system performance. Identifying gaps in the multimodal transportation system helps prioritize those opportunities to improve connectivity throughout the City. The extent to which projects close gaps in the existing multimodal network, accommodate first/last three-mile access to transit, and provide links to existing trails or other facilities can also be tracked over time. Projects with the potential to increase transit ridership and improve multimodal network connectivity will receive a higher score under this measure.

Performance Measure 7:

Increases the Share of People Who Walk, Bike and Take Transit

Mode split is an indicator of the presence and quality of bicycle, pedestrian, transit, and vehicular networks in Redwood City. Tracking travel behavior through overall volumes, ridership, and mode split in the City will be used to generate system-wide vehicle, bicycle, and pedestrian miles travelled over time. The City will incorporate mode split data into the evaluation process in order to identify multimodal projects and invest in opportunities to encourage non-auto travel modes. Under this approach, projects with the potential to increase non-auto mode splits will receive a higher score.

Performance Measure 8:

Increases Person Throughput and Proactively Manages Traffic Congestion

Vehicular level-of-service (LOS) is often used to assess vehicular mobility. Travel times on key corridors indicates if the City is proactively managing traffic congestion. Redwood City can also work towards increasing person throughput by tracking pedestrian, bicyclist, transit and vehicular throughput and delay at key hotspots. Projects with the potential to increase person capacity and reduce person-delay will receive a higher score under this measure.

Performance Measure 9:

Accommodates All Users, Including People with Disabilities, Low-Income, and the Young and Elderly, with Equal Access to Goods and Services

Access to transportation options is not equal across all populations. Data from MTC-designated Communities of Concern (CoC) and Priority Development Areas (PDA) are used as a metric for evaluating equity. Communities of Concern are identified by census tract according to eight disadvantage factors: minority and low-income residents, non-English language speaking and zero-car households, seniors age 75+, persons with a disability, single-parent households, and cost-burdened renters. Using this approach, scoring for equity would be based on a project's location within a CoC and/or a PDA (see **Appendix B**).

Performance Measure 10:

Project Applies Current Design Standards and is Feasible and Constructible

In keeping with the state of the practice, all improvements should apply design standards that are current at the time of the implementation. Furthermore, the feasibility and constructability of a project are important criteria to consider, because if the project or program is infeasible or difficult to construct, then it will be difficult to implement. Project feasibility can be related to right-of-way constraints, jurisdictional responsibilities, costs, and other considerations. Projects are scored based on the expected project feasibility and compliance with current standards.

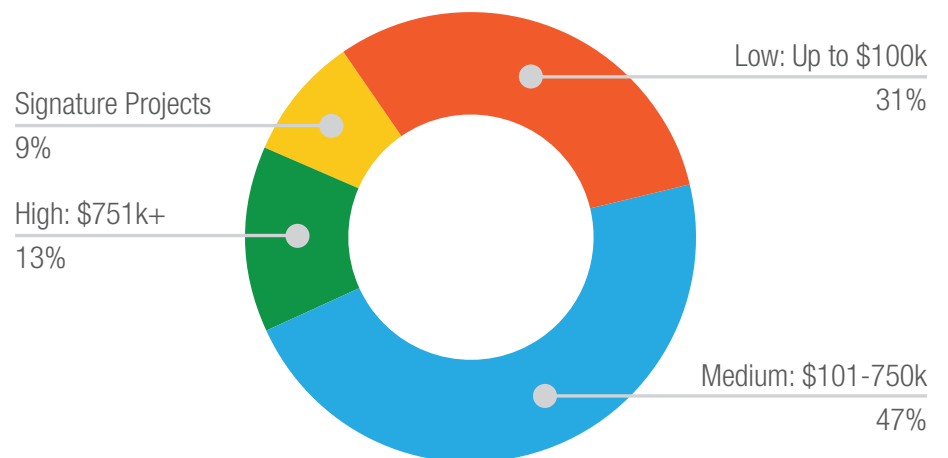
Performance Measure 11: Project has a Positive Return on Investment

Projects are evaluated on whether they will provide a positive return on investment. Project costs and benefits are qualitative estimates based on project descriptions. A future cost-benefit analysis would be required for each project to more-accurately determine expected return on investment. Under this measure, the expected project costs are weighted against project benefits. Projects with more benefits in relation to costs receive a higher score.

Generalized Project Costs

Order of magnitude project costs are beneficial in identifying the largest scale transportation improvements and generating a high-level understanding on available funding need to complete the project. Estimated project costs are assigned to each project as low (up to \$100,000), medium (\$100,001 to \$750,000) or high (more than \$750,001), and “Signature Projects,” which are projects that include major changes to infrastructure. **Figure 17** shows the proportion of projects by cost. The majority of projects and programs included as part of RWCmoves are estimated to cost below \$750,000 to implement.

Figure 17: Division of Project List by Order of Magnitude Cost



First Cut of Tier 1 Projects and Programs

Projects with the greatest impact in achieving the City's long-term mobility goals are categorized as "Tier 1 Projects." Tier 1 Projects (as shown in Table 2) are organized into three categories: Top Scoring Projects, Early Investment Projects, and Neighborhood Priority Projects. These subcategories help to ensure projects considered to be Tier 1 received the highest evaluation scores, but also did not exclude projects that can be easily implemented and/or key projects dispersed and equally distributed throughout the City. Key attributes considered for each subcategory are described below.

Top Scoring Projects

Top Scoring Projects are the projects that received the highest evaluation scores of all RWCmoves projects. Top Scoring Projects are all projects scoring at least 48 out of 55 total points possible. RWCmoves includes four Top Scoring Projects.

Early Investment Projects

Early Investment Projects are those scoring at least 30 out of 55 total points, identified to be low in cost (below \$100,000), applies current design standards and are feasible for construction. RWCmoves includes seven Early Investment Projects with scores ranging from 32 to 42.

Neighborhood Priority Projects

Neighborhood Priority Projects are key projects located outside of areas with a lot of activity, such as in a downtown area, that provide benefits to surrounding neighborhoods and the City as a whole. It is common for higher scoring projects to be located near more densely populated areas with better access to pedestrian, bike and transit facilities. To help ensure a more equitable distribution of the City's investments, Neighborhood Priority Projects were separately evaluated within each of the City's zip codes. Each zip code received two to three projects. RWCmoves includes eight Neighborhood Priority Projects with scores ranging from 36 to 41.

Table 2: RWCmoves First Cut of Tier 1 Projects and Programs

Number	Title	Description	Category	Cost Range	Score (Max 55)
Tier 1: Top Scoring Projects					
84	Downtown Precise Plan Implementation: New Downtown Street Connections	Establish plan lines for the following new street segments that would be constructed as redevelopment occurs: New lane parallel to and south of railroad tracks between Broadway and Jefferson Avenue.	Network Gap Closure, Connectivity and Safety	Medium: \$101-750k	50
29	El Camino Real Corridor Plan Implementation - Short and Long Term Project	The El Camino Real Corridor Plan is currently developing a comprehensive plan that consolidates the recently-rezoned areas along El Camino Real and incorporates community benefits, design guidelines, and streetscape improvements to address all users of the corridor. Implementation of short and long term transportation improvements would be covered under this project.	Complete Street Corridors and Placemaking	Medium: \$101-750k	49
23	Bicycle Master Plan	Develop stand alone Bicycle Master Plan for Redwood City. The Bicycle Master Plan would provide a more detailed analysis of existing conditions for bicyclists, and recommend projects and programs aimed specifically at increasing bicycle ridership in the City.	Active Transportation Corridors	Medium: \$101-750k	48
54	Complete Streets Design Guidelines	Develop and regularly apply Redwood City's Complete Streets Design Guidelines. Guidelines would incorporate industry best practices, such as recommendations from the National Association of City Transportation Officials (NACTO), and also be tailored to meet the City's local needs and desires.	Complete Street Corridors and Placemaking	Low: up to \$100k	48
Tier 1: Early Investment Projects					
96	Fair Oaks Community School Safe Routes to School	Support San Mateo County's efforts to implement recommended projects and programs at Fair Oaks Community School from the Redwood City Safe Routes to School Report (2013).	Network Gap Closure, Connectivity and Safety	Low: up to \$100k	42
39	Middlefield Road (between Broadway and Winslow Street, also known as Theatre Way) Corridor Improvements	Develop plans and construct Theatre Way as a permanent pedestrian street.	Complete Street Corridors and Placemaking	Low: up to \$100k	41
118	Crosswalk Program	Develop formal crosswalk program to manage and maintain crosswalks in the City, and identify policies for striping new crosswalks based on citizen requests, pedestrian demand and other City priorities.	Network Gap Closure, Connectivity and Safety	Low: up to \$100k	41

Table 2: RWCmoves First Cut of Tier 1 Projects and Programs

Number	Title	Description	Category	Cost Range	Score (Max 55)
125	On-Street Bicycle Parking Downtown Expansion	Expand on-street bicycle parking in retail areas, near important public facilities, and at various high bicycle demand locations in the Downtown area.	Transportation Demand Management (TDM)	Low: up to \$100k	41
119	Update ADA Transition Plan	Update the City's existing ADA Transition Plan to include all public rights of way and identify prioritization process for improving accessibility of curb ramps and sidewalks.	Network Gap Closure, Connectivity and Safety	Low: up to \$100k	40
69	Transit Access Improvements	Collect inventory, design, and construct accessibility improvements to transit stops throughout Redwood City to meet current ADA requirements.	Transit Accessibility and Service Enhancements	Low: up to \$100k	39
79	Jefferson Avenue Operational Analysis	Evaluate traffic operations on Jefferson Avenue, between Veterans Boulevard and El Camino Real. Design improvements to reduce delays associated with special events, high pedestrian volumes at Broadway/Jefferson Avenue, and exiting the Jefferson Parking Garage while maintaining a high level of safety for people crossing the street.	Roadway Congestion and Delay Improvements	Low: up to \$100k	32
Tier 1: Neighborhood Priority Projects					
94	Holly Street Bicycle and Pedestrian Overcrossing	Support the City of San Carlos' project to construct a bicycle and pedestrian bridge over US 101 at, or near, Holly Street.	Network Gap Closure, Connectivity and Safety	High: \$751k+	43
4	Brewster Avenue Cycle Track	Evaluate, design and install cycle track (Class IV) along Brewster Avenue from Main Street to Fulton.	Active Transportation Corridors	Medium: \$101-750k	41
5	James Street Cycle Track	Design and install cycle track (Class IV) along James between Redwood City Station and proposed bicycle boulevard network at Elwood Street and Duane Street.	Active Transportation Corridors	High: \$751k+	41
38	Alameda de las Pulgas Complete Streets Project	Evaluate and design streetscape improvements to reduce vehicle speeds and to increase safety for people walking along and crossing the street.	Complete Street Corridors and Placemaking	Medium: \$101-750k	41

Table 2: RWCmoves First Cut of Tier 1 Projects and Programs

Number	Title	Description	Category	Cost Range	Score (Max 55)
99	Hawes Community School Safe Routes to School	Design and construct "Medium" priority improvements from the Redwood City Safe Routes to School Report (2013). Improvements include installing high-visibility crosswalks and enhancing curb ramps to meet ADA requirements, upgrading bike parking, and installing roadway signage and striping.	Network Gap Closure, Connectivity and Safety	Medium: \$101-750k	41
100	Massachusetts Avenue Corridor Improvements	Evaluate, design, and install roadway modifications to reduce vehicle speeding and to increase safety for people crossing Massachusetts Avenue, between Woodside Road and Alameda de las Pulgas.	Network Gap Closure, Connectivity and Safety	Low: up to \$100k	41
43	Redwood Shores Parkway Corridor Improvements	<p>Study potential to reduce Redwood Shores Parkway from 6 to 4 lanes, depending on volumes, to accommodate bicycle and pedestrian improvements, such as one-way separated bikeways.</p> <p>Consider PHB-enhanced staggered crossing at Electronic Arts office midblock desire line, in line with footpath (stagger so that pedestrians face traffic).</p> <p>Install marked crosswalks on 4th leg, crossing enhancements and pedestrian refuge islands at Redwood Shores Parkway/Shoreline Drive, Redwood Shores Parkway/Twin Dolphin Drive, and Redwood Shores Parkway/Electronic Arts Drive.</p> <p>Install Class I (potential Class IV) bike path along Redwood Shores Parkway between the Electronic Arts entrance path and Twin Dolphin Drive, and provide connection to nearby Bay Trail.</p> <p>Provide a Class I path and crosswalk enhancements along Twin Dolphin Drive.</p> <p>Consider protected intersections at Redwood Shores Parkway/Twin Dolphins Drive, Redwood Shores Parkway/Electronic Arts Drive, and Redwood Shores Parkway/Shoreline Drive.</p>	Complete Street Corridors and Placemaking	High: \$751k+	37

Table 2: RWCmoves First Cut of Tier 1 Projects and Programs

Number	Title	Description	Category	Cost Range	Score (Max 55)
44	Bay Road and Florence Street Corridor Improvements	<p>Retime signal and install protected signal phasing (eastbound and westbound), and an additional westbound through-lane at Woodside Road/Bay Road.</p> <p>Study feasibility of a single lane roundabout at Bay Road/Charter Street, Bay Road/Fifth Avenue, and Bay Road/Douglas Avenue.</p> <p>Construct a traffic circle at Florence Street/17th Avenue.</p> <p>Install bulb-outs at all corners of Bay Road/Second Avenue.</p> <p>Install east leg high-visibility pedestrian crossing and RRFB at Bay Road/Eighth Avenue.</p> <p>Install Rectangular Rapid Flashing Beacon (RRFB) at east leg crosswalk at Bay Road/Tenth Avenue.</p> <p>Consider proposed road closure at Bay Road/Spring Street.</p> <p>Stripe Class II bike lanes on eastbound Bay Road between Fourth Avenue and 15th Avenue, and on Florence Street between 15th Avenue and 17th Avenue.</p> <p>Install entry welcome signs at Bay Road/Second Avenue and Bay Road/Spring Street (specific location requires City's or County's process of approval).</p>	Complete Street Corridors and Placemaking	Medium: \$101-750k	36

Source: Fehr & Peers, 2017



First Cut of Signature Projects and Programs

Signature Projects include major changes to infrastructure, such as railroad grade separations, redesigned interchanges, or new transit services and stations. These projects represent some of the larger and more complex concepts identified during development of the Plan. RWCmoves includes 11 Signature Projects with scores ranging from 40 to 52, which are listed in **Table 3** along with their project description, category, and cost ranges.

Several Signature Projects support construction for full railroad grade separations at various locations throughout the City. Due to the scale and complexity of these Signature Projects, a feasibility study would be required as a next step by the City to determine each project's practicality and evaluate potential design concepts. RWCmoves recommends two separate feasibility studies be conducted to evaluate options for full railroad grade separation

in the City. The division of scope for these feasibility studies was determined based on a project's location and proximity to adjacent at-grade rail crossings. One feasibility study would review the Whipple Avenue, Brewster Avenue and Marshall Street-Broadway Railroad Grade Separation project locations, while the other would evaluate the Main Street, Chestnut Street and Maple Street Railroad Grade Separation project locations. These railroad grade separation feasibility studies are noted in **Table 3** as the next step towards implementing full grade separations in Redwood City.

Table 3: RWCmoves First Cut of Signature Projects and Programs

#	Project	Description	Next Steps	Category	Cost Range	Evaluation Score
Railroad Grade Separation Signature Projects						
89	Whipple Avenue Railroad Grade Separation	Support construction of Whipple Avenue and railroad grade separation.	Railroad Grade Separation Feasibility Study	Network Gap Closure, Connectivity and Safety	Signature Projects	46
91	Brewster Avenue Railroad Grade Separation	Support construction of Brewster Avenue and railroad grade separation.		Network Gap Closure, Connectivity and Safety	Signature Projects	45
92	Marshall Street - Broadway Railroad Grade Separation	Support construction of Main Street and railroad grade separation.		Network Gap Closure, Connectivity and Safety	Signature Projects	45
95	Main Street Railroad Grade Separation	Support construction of Marshall Street - Broadway and railroad grade separation.	Railroad Grade Separation Feasibility Study	Network Gap Closure, Connectivity and Safety	Signature Projects	42
97	Chestnut Street Railroad Grade Separation	Support construction of Chestnut Street and railroad grade separation.		Network Gap Closure, Connectivity and Safety	Signature Projects	41
98	Maple Street Railroad Grade Separation	Support construction of Maple Street and railroad grade separation.		Network Gap Closure, Connectivity and Safety	Signature Projects	41
Other Signature Projects						
57	Redwood City Transit Center: Implement Short Term Improvements	Design and implement short to medium-term enhancements to the Redwood City Transit Center to improve bus operations and facilitate intermodal transfers. For example, provide long-term bicycle parking, such as a bike station, at Redwood City Transit Center.	Proceed with Project Design	Transit Accessibility and Service Enhancements	Signature Projects	52
58	Broadway Street Streetcar Project: Phase II	The Broadway Streetcar Study is currently assessing the feasibility of a Broadway Streetcar line. Next steps would include completing Environmental Clearance and Engineering Design.		Transit Accessibility and Service Enhancements	Signature Projects	48
59	Long Term Vision for Downtown Transit Center and Redwood City Station	Develop a long term vision and conceptual design for Downtown Transit Center and Redwood City Station that is compatible with proposed rail and Bus Rapid Transit (BRT) service on Dumbarton Corridor.	Conduct Long Term Vision Study	Transit Accessibility and Service Enhancements	Signature Projects	47
71	US 101 and Woodside Road Interchange Improvements	Construct US 101 and Woodside Road interchange improvements.	Secure Funding	Roadway Congestion and Delay Improvements	Signature Projects	44
62	Commuter Ferry Service	Coordinate with San Francisco Water Emergency Transportation Authority (WETA) to design, construct, and operate ferry service. Design and construct ferry service.	Conduct Ferry Service Study	Transit Accessibility and Service Enhancements	Signature Projects	38

Source: Fehr & Peers, 2017

5

Where Do We Go From Here? (Action Plan/Implementation)

To advance RWCmoves' transportation program, the City will need to take several implementation actions. These include General Plan Amendments to align the City's General Plan policies and programs with those identified for RWCmoves. They also include identifying a funding strategy to ensure that the City's vision for its transportation future come to fruition. Within the implementation plan is a recognition that transportation projects, technologies, and funding sources will change over time, and thus the plan should be updated every two to three years to allow the plan to evolve as the City grows.

Modified General Plan Policies and Programs

Redwood City's General Plan lays the groundwork for the Citywide Transportation Plan and generally includes policies and programs that support the vision and goals of RWCmoves. However, some updates to the General Plan will likely be necessary to ensure complete consistency with RWCmoves. **Table 4** below, describes the primary General Plan transportation policies that should be amended as part of RWCmoves to further support its transportation goals. While Table 5 highlights major policies that should be revised, a careful review of all General Plan policies should also be conducted to incorporate any minor edits to fine-tune the policies in the General Plan.

Table 4: Recommended General Plan Policy Amendments

2010 General Plan		Proposed Amendment
Policy Number	Policy Text	
BE-25.3	Support using the concept of complete streets to design, construct, operate, and maintain City and private streets to enable safe, comfortable, and attractive access and travel for pedestrians, bicyclists, motorists, and transit users of all ages, abilities, and preferences.	Support using the Implement a complete streets policy to design, construct, operate, and maintain City and private streets to enable safe, comfortable, and attractive access and travel for pedestrians, bicyclists, motorists, and transit users of all ages, abilities, and preferences.
BE-26.2	Develop and maintain comprehensive master plans for the citywide bicycle and pedestrian networks to identify short- and long-range policies, programs, and improvement projects that will improve walking and bicycling.	Develop and maintain implement a Bicycle Master Plan and Pedestrian Master Plan comprehensive master plans for the citywide bicycle and pedestrian networks to identify short- and long-range policies, programs, and improvement projects that will improve walking and bicycling.
BE-26.11	Prioritize implementation of pedestrian and bicycle improvements near schools, transit, shopping, hospitals, and mixed-use areas with higher pedestrian concentrations.	Prioritize implementation of pedestrian and bicycle improvements near schools, transit, shopping, hospitals, and mixed-use areas with higher pedestrian concentrations <u>by updating the City's pedestrian and bicycle Active+ models every two years.</u>
BE 29.5	Support re-evaluation of the City's Level of Service (LOS) policies for motor vehicle circulation to ensure efficient traffic flow and balance multi-modal mobility goals.	Support re-evaluation of the City's Level of Service (LOS) policies for motor vehicle circulation to ensure efficient traffic flow and balance multi-modal mobility goals.
BE 29.6	Develop a new Level of Service (LOS) policy for Downtown that includes the following components: <ul style="list-style-type: none"> • Emphasis on pedestrian and bicycle access and circulation • Maintenance of appropriate emergency vehicle access and response time • Support for reduced vehicle miles traveled • Considers, but does not deem, auto congestion Downtown to be an impact 	Develop a new Level of Service (LOS) policy for Downtown that includes the following components: <ul style="list-style-type: none"> • Emphasis on pedestrian and bicycle access and circulation • Maintenance of appropriate emergency vehicle access and response time • Support for reduced vehicle miles traveled • Considers, but does not deem, auto congestion Downtown to be an impact
BE 29.NEW	N/A - New Policy to support General Plan and RWCmoves policies.	Mobility Evaluation. Develop new guidelines that effectively evaluate mobility for all modes of transportation. The guidelines should consider the following: <ul style="list-style-type: none"> • <u>Remove minimum vehicular LOS standards (i.e. LOS D) as the primary measure for impact assessment</u> • <u>Evaluate Mode Split Goals and Vehicle Miles Traveled (VMT) to assess mobility in Redwood City.</u> • <u>Only consider vehicle and multimodal LOS operations as a means to evaluate site specific effects of added traffic and to identify potential improvements</u> • <u>Implement the TIA Guidelines in Appendix A to evaluate the project access points, and connectivity to the existing adjacent bicycle, pedestrian, vehicle, and transit facilities.</u>
BE-31.4	Support implementation of a citywide or areawide TDM program.	Support Implementation of a citywide or areawide TDM program and formation of Transportation Management Association (TMA) <u>as outlined in Appendix E.</u>

In addition to the policies, the City's General Plan includes a number of implementing programs to support its policies. Several of the programs would also need to be amended, and new ones would need to be adopted, as part of RWCmoves implementation. The proposed amended and added

programs are outlined in **Table 5**. As with General Plan policies, a careful review of all existing General Plan programs should be conducted to incorporate any minor edits to fine-tune the General Plan's programs.

Table 5: Recommended General Plan Implementation Program Amendments

2010 General Plan		Proposed Amendment
Program Number	Program Text	
BE-39	Transportation Funding Prioritization. Develop an overall policy to prioritize funding and timing for implementing transportation improvements. Consider prioritizing multimodal projects that provide the most benefit to all users. Also, account for other potential funding sources where feasible.	Transportation Funding Prioritization. Develop an overall policy Implement the performance measures for RWCmoves to prioritize funding and timing for implementing transportation improvements. Consider prioritizing multimodal projects that provide the most benefit to all users. Also, account for other potential funding sources where feasible
BE-55	Level of Service Policy Evaluation. Evaluate Redwood City's current Level of Service (LOS) policies for motor vehicle circulation. The evaluation shall consider the following to ensure efficient traffic flow and balance multimodal mobility goals: <ul style="list-style-type: none"> • Maintaining LOS D or better for motor vehicles in all areas of the City, except the Downtown area as defined by the Downtown Precise Plan. In Downtown, no minimum vehicular LOS standard will be maintained but vehicular LOS will be calculated and alternate LOS standards for other travel modes will be established. • Explore other areas of the City where vehicular LOS standard would either be lowered or eliminated. These areas may include gateway intersections providing access into the City, freeway ramps, or along Transit streets including the proposed streetcar corridors. • Consider the effect of potential mitigation measures to improve vehicle LOS on the operations of other travel modes. • Evaluate the potential for elimination of vehicle LOS as the primary measure of impact assessment for developments in parts or the entire City. 	Level of Service Policy Evaluation. Evaluate Redwood City's current Level of Service (LOS) policies for motor vehicle circulation. The evaluation shall consider the following to ensure efficient traffic flow and balance multimodal mobility goals: <ul style="list-style-type: none"> • Maintaining LOS D or better for motor vehicles in all areas of the City, except the Downtown area as defined by the Downtown Precise Plan. In Downtown, no minimum vehicular LOS standard will be maintained but vehicular LOS will be calculated and alternate LOS standards for other travel modes will be established. • Explore other areas of the City where vehicular LOS standard would either be lowered or eliminated. These areas may include gateway intersections providing access into the City, freeway ramps, or along Transit streets including the proposed streetcar corridors. • Consider the effect of potential mitigation measures to improve vehicle LOS on the operations of other travel modes. • Evaluate the potential for elimination of vehicle LOS as the primary measure of impact assessment for developments in parts or the entire City.
New-1	N/A - New Program to support General Plan and RWCmoves policies.	Vision Zero. Adopt a Vision Zero policy and create a Vision Zero Plan to develop a framework to reduce collisions in Redwood City.
New-2	N/A - New Program to support General Plan and RWCmoves policies.	Curbside Management. Develop and implement curbside management strategies to allow for efficient and safe use of TNCs and other on-demand transit services.
New-3	N/A - New Program to support General Plan and RWCmoves policies.	On-Demand Transit Service Pilot Program. Develop and implement an on-demand responsive pilot program with service provided by a TNC vendor.
New-4	N/A - New Program to support General Plan and RWCmoves policies.	Automated Vehicle Management. Develop and implement automated vehicle management strategies to allow and accommodate for automated vehicle technology in ways that provide a net benefit to the public.
New-5	N/A - New Program to support General Plan and RWCmoves policies.	Electric Vehicle Encouragement. Develop and implement electric vehicle (EV) encouragement programs that educate and incentivize and support use of EVs.
New-6	N/A - New Program to support General Plan and RWCmoves policies.	Robot/Drone Delivery. Develop and implement robot and drone delivery management strategies to allow and accommodate for automated delivery technologies in ways that provide a net benefit to the public.

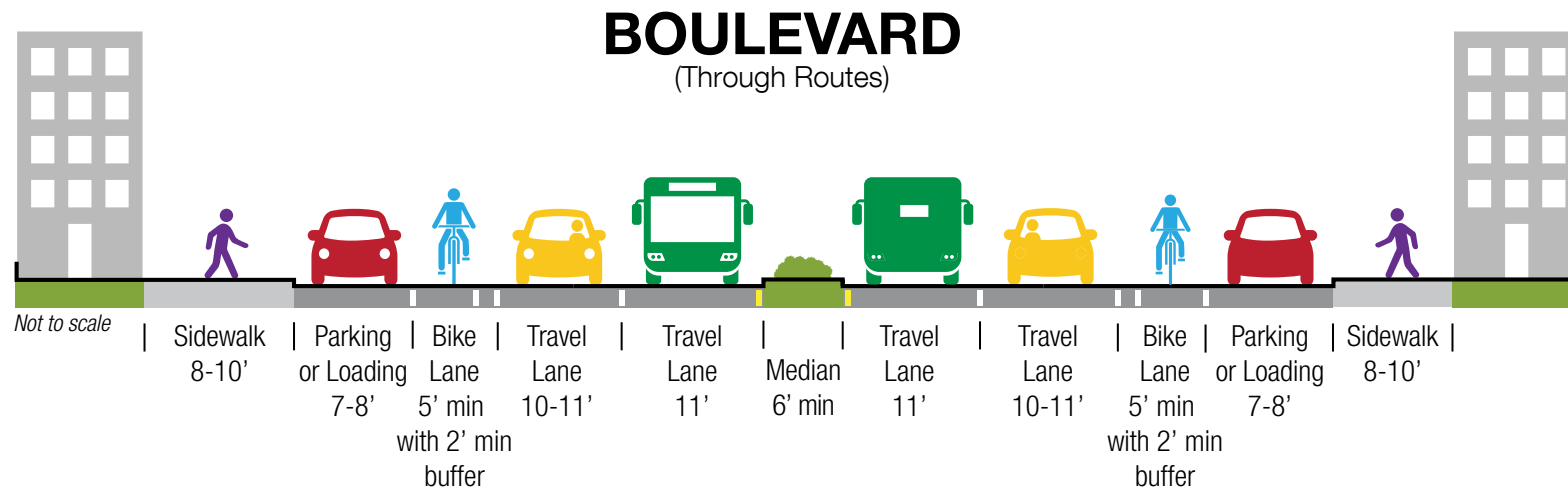


Street Typologies and Transportation Engineering Standards and Design Guidelines

This section provides an update to Redwood City's street typologies and recommends modifications to the City's engineering standards to align with current best practices.

Proposed Street Typology Updates

To ensure a balanced, multi-modal transportation network, the Redwood City General Plan organizes streets and other transportation facilities according to typologies that consider the context and prioritize different travel modes for each street. The following updated street typologies are identified for the City as part of RWCmoves. These updated typologies build upon those identified in the current General Plan, but incorporate elements of the National Association of City Transportation Officials' (NACTO) Urban Street Design Guide, which are based on the principle that streets are public spaces for people as well as roadways for traffic and transportation.



Boulevard

Boulevards are major roadways that typically have four to six travel lanes and accommodate larger vehicle volumes, while providing wide sidewalks and dedicated bike facilities (such as bike lanes and cycle tracks). Creating an inviting corridor for all roadway users, helps to encourage development and increases commercial activity along corridors originally solely developed for cars. These streets serve as primary routes to destinations within the community or beyond the City. As such, Boulevards are focused on ensuring person throughput, not only for cars and trucks, but also for pedestrians and bicyclists.

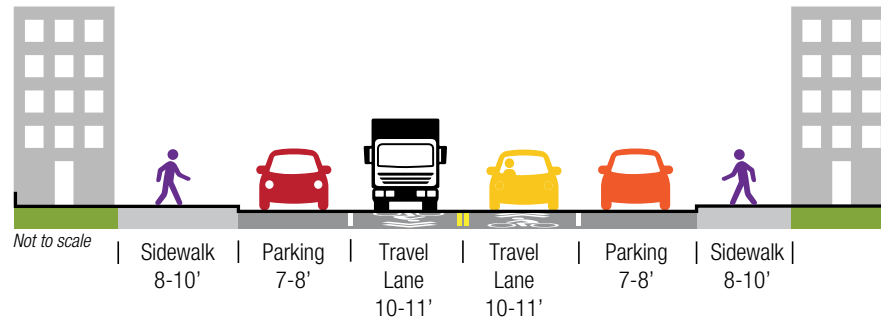
Design elements may include:

- Enhanced bike lanes or cycle tracks, including the use of green paint at potential conflict points
- Using lane striping and narrow lane widths to create the illusion of a more compact corridor, thereby reducing vehicle speeds, collision severity, and increasing safety for all users
- Refuge islands and curb bulbs to reduce crossing distance for people walking and biking
- Raised sidewalks and curb bulbs at crossings of frontage roads
- Speed limits are typically 35mph to maintain vehicle throughput
- Transit priority signal and other features

Example Boulevards include El Camino Real, Veterans Boulevard, and Woodside Road.

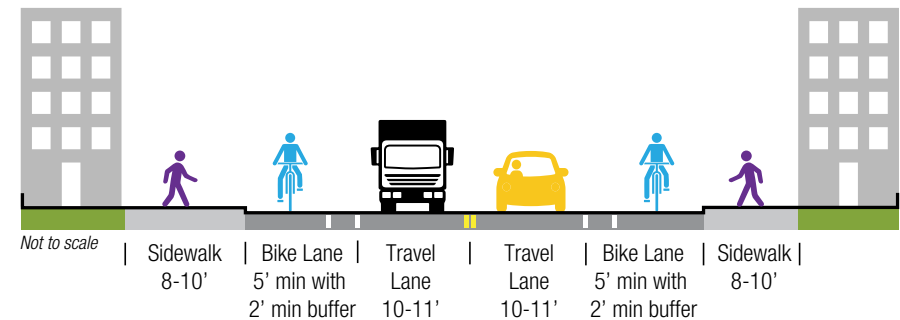
CONNECTOR

(with Parking)



CONNECTOR

(with Bike Lanes)



Connector

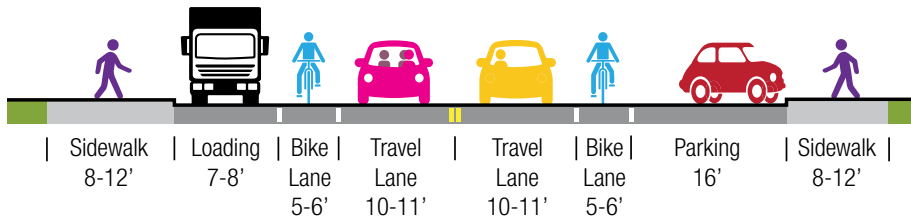
This versatile street type is true multi-purpose right-of-way designed to move vehicles while providing good access for people biking and walking. Connectors generally have two to three travel lanes and provide on-street bicycle facilities or on-street parking, in addition to sidewalks. As right-of-way permits, Connectors may have four travel lanes and/or provide both on-street parking and on-street bicycle facilities. They provide connections to Boulevards or other major through routes in the City.

Design elements may include:

- Accommodations for a wide variety of vehicles
- Using lane striping and narrow lane widths to create the illusion of a more compact corridor, thereby reducing vehicle speeds, collision severity, and increasing safety for all users
- Transit signaling
- Speed limits not to exceed 30mph for safety of people walking and biking
- Landscaping and other street enhancements

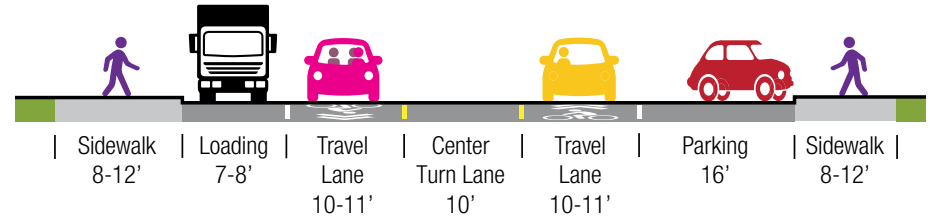
NEIGHBORHOOD MAIN STREET

Loading Zones and Bike Lanes



NEIGHBORHOOD MAIN STREET

Center-turn Lane and Sharrow



Neighborhood Main Street (Downtown Streets)

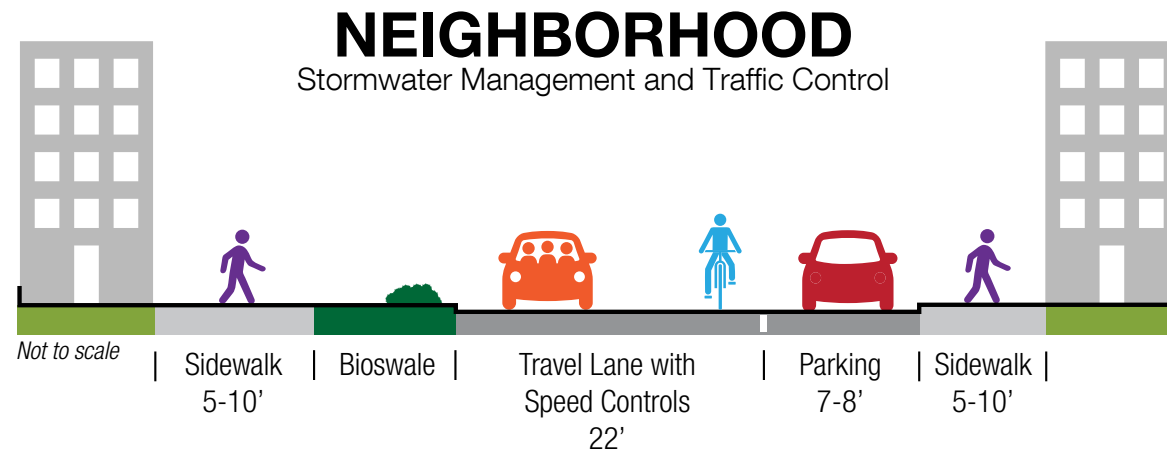
Neighborhood Main Streets are where transportation related to commerce and higher density housing converge into a single corridor where people do business, live, and interact with each other. These streets are typically not used as through routes, but rather serve as destination corridors, with lower traffic speeds, higher pedestrian and bicycle volumes, and frequent turnover of on-street parking. Neighborhood Main Streets have narrower cross-sections that accommodate wider sidewalks and reduced travel lanes (typically two to three travel lanes). Design is focused on providing pedestrian and bicycle access from nearby parking lots/garages and transit centers to the land uses along Neighborhood Main Streets through dedicated facilities, reduced crossing distances, and traffic calming.

Design elements may include:

- Time-limited and/or metered on-street parking to increase parking turnover and ensure availability of parking for business customers

- Pick up/drop off areas and very short-term parking (for example 5 to 15 minutes maximum) for parcel deliveries or TNC usage
- Clear wayfinding to longer-term parking
- On-street commercial loading areas (curbside or in center-turn lane for large vehicles)
- Mid-block speed humps, pinchpoints, or chicanes to reduce vehicle speeds
- Mid-block crosswalks to facilitate accessibility
- Expanded walking spaces and bike lanes
- Parklets, street cafes, and street furniture
- Enhanced landscaping and street trees
- Lower speed limits (20-25mph)

Example Neighborhood Main Streets include Bradford Street, Main Street, Marshall Street, Stambaugh Street, and Winslow Street.



Neighborhood Street

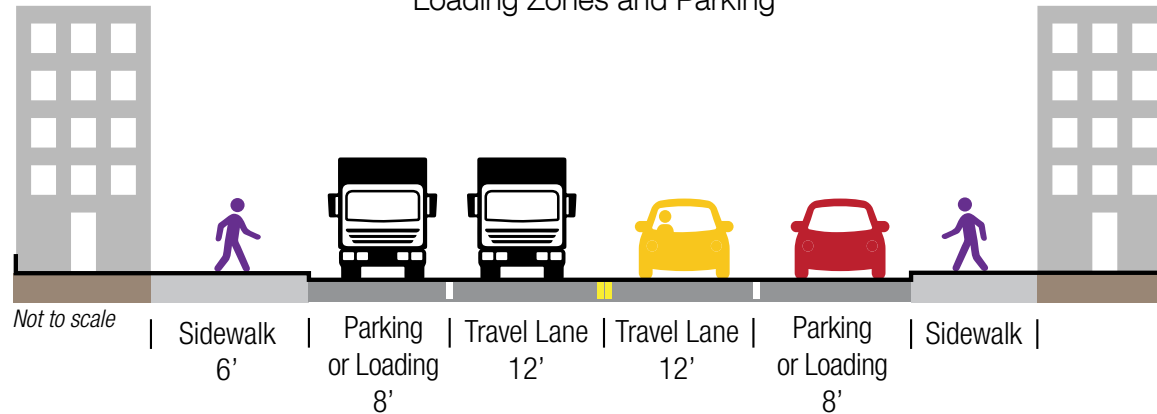
Local streets in residential neighborhoods provide transportation space for people to access their living space, recreational opportunities through play, walking, and biking; and offer public areas for neighbors to gather and interact with each other. Designed properly, a neighborhood street can become the meeting space for a group of residents. In addition, these streets should provide easy and safe access between residential and near-by commercial areas, schools, parks, and community centers. These streets typically have two travel lanes and discourage through traffic through traffic calming.

Design elements may include:

- Using lane striping and narrow lane widths to create the illusion of a more compact corridor, thereby reducing vehicle speeds, collision severity, and increasing safety for all users
- Green stormwater control, infiltration strips, bioswales, and street trees
- Mid-block speed humps, pinchpoints, or chicanes to reduce vehicle speeds
- Traffic circles at intersections to reduce vehicle speeds
- Stop control where appropriate
- Lower speed limits (15 to 25mph)

INDUSTRIAL STREET

Loading Zones and Parking



Industrial Street

Industrial corridors are designed to serve the needs of businesses building and creating products, which requires access by larger and heavier vehicles. Common vehicles often include vans, single unit, and smaller semi-trucks. As industrial areas tend to be spread out, workers often access them by private vehicle but accommodations should be made for those choosing to walk and bike while transit access comes along major corridors. Industrial Streets maintain medium speeds (30 to 35 mph) and have two to four travel lanes, limited bicycle facilities, and standard pedestrian facilities.

Design elements may include:

- Sharrows and speed humps to provide minimal biking facilities while managing speed for people driving
- Thicker pavement sections for increased resiliency against heavy, low-speed vehicles
- Speed limits are typically 30 to 35 mph to maintain vehicle throughput
- Sidewalks on one or both sides to accommodate people walking
- Truck aprons to manage vehicle speed and truck turns
- Layover space for trucks waiting to make deliveries
- Swales and other surface water treatments to reduce pollution and sediments in runoff

Intersection Design

Excess space in intersections encourages people driving to drive at speeds unsuitable to their surroundings. Utilizing excess space, whether by creating a more compact intersection or adding additional amenities, helps reduce vehicle speeds while improving access for all users.

Intersections provide traffic control for vehicular flow and serve as key points for people walking and biking to cross streets. In these places where pedestrians and cyclists cross the vehicle travel space, it is pertinent that those crossing the street are given appropriate priority and visibility to drivers.

Design elements may include:

- Protected intersections where appropriate
- Two aligned/directional curb ramps per crossing (eight total at a four-way intersection)
- Reduced radius curb to encourage slower turning speeds by people driving
- Closing slip lanes and removing “pork-chop” islands to lower speeds and increase visibility for people walking and biking
- Truck aprons to accommodate larger vehicle turns while encouraging drivers in smaller vehicles to treat the corner as a reduced radius curb. This typically takes the form of a 20-35’ radius curb to allow for movements up to WB-50 with an added 15’ radius truck apron to slow passenger vehicles and smaller delivery trucks.
- A large corner radius (35’) should not be used to facilitate large trucks turning from right-hand lane to right-hand lane.
- Restricting right turns in places of high pedestrian volume
- Squaring up intersections to meet at 90-degree angles where possible to reduce crossing distances and vehicle speeds
- Reducing curb radius with paint and flexiposts in lieu of rebuilding curb lines
- Public plazas, temporary spaces, pavement removal, and large street furniture (bollards, planters, etc.) in locations with excess right-of-way at non-square intersections
- Leading pedestrian walk interval. Pedestrian crossings activate 2 seconds before vehicle lanes receive green to give people walking and biking a chance to cross with the full attention of turning drivers.
- Bike boxes and green pavement treatments to delineate space for people biking
- Reduced cycle times to reduce waiting time and frustration for all users
- Pavement treatments for people walking and biking to properly define and delineate spaces
- Raised crosswalks

Proposed Recommendations and Additions to Engineering Standards

The following design guides were used as reference materials: National Association of City Transportation Officials (NACTO) Urban Street Design Guide, NACTO Urban Bike Design Guide, Caltrans Highway Design Manual (HDM), Caltrans Standard Plans, and Caltrans Complete Streets as references to urban design practices.

Redwood City Current Standards

Redwood City's current standards typically reflect those outlined in the Caltrans HDM, Manual on Uniform Traffic Control Devices (MUTCD), or Caltrans Standard Plans and Specifications. Many of the current standards should be updated to reflect more recent guidance that reflects best practices in urban environments.

Industry Standards and Best Practices

Roadway infrastructure in cities is evolving by placing more emphasis on walking, bicycling, transit use on streets, creating streets that are less dominated by cars and more balanced for multiple modes. However, already developed cities present restrictions to the improvement of roads. NACTO provides recommendations on how existing streets can be improved to better accommodate pedestrians and bicyclists, allowing each mode of transportation to flow more smoothly and safely through a corridor. By improving the infrastructure of all modes of transportation, Redwood City may benefit from safer, more inviting corridors for all users.

Industry standards and best practices for this study include designs for lane widths, bike lanes, sidewalk widths, design vehicle, grading, and intersections. Standards and practices for each of these are described below:

- **Lane Widths:** Automobile lane widths are often designed within the context of the surrounding land uses, with narrower width in urban, neighborhood, and collector streets to calm traffic and provide room for improved pedestrian, bicycle, and/or transit facilities.
- **Bike Lanes:** Bike lanes are often used on wider streets or those with medium to high traffic volumes. On routes with more bicycle and/or vehicle traffic, protected bike lanes are used, which have painted or physical separation between travel lanes and bike lanes. Green-painted lanes are also used to better define bike lanes, especially at intersections.
- **Sidewalk Widths:** Wider sidewalks in urban areas or adjacent to streets with wider curb-to-curb width are used to create a friendlier pedestrian environment pedestrian space with amenities, such as benches, trees, and lighting.
- **Design Vehicle:** Current practice defines the design vehicles as delivery truck sized vehicles, which provides more design flexibility.
- **Intersections:** Compact intersections are those that accommodate all modes of transportation, including pedestrians, vehicles, and cyclists. Some features to consider include striped crosswalks, bike boxes, curb extensions and bulb outs, and signal coordination.

Recommended updates to the current Design Guidelines as they relates to each of the street typologies are provided in **Table 6**.

Table 6: Recommended Design Guidelines by Street Typologies

	Boulevard	Neighborhood Main	Connector	Neighborhood	Industrial
Lane width	10-11'	10-11'	10-11'	22'	12'
Bicycle treatments	5' min with 2' min buffer	On street with traffic calming	Multi-use path or adjacent corridor/network	On street with traffic calming	Sharrows with traffic calming
Sidewalk width	8-12'	8-12'	6-10'	6-10'	6'
Design vehicle	BUS-40	SU-30 or DL-23	BUS-40 at major intersections	DL-23	Varies
Example Intersection treatments ¹	Refuge islands, bike boxes, protected intersections	Curb bulbs, community-focused crosswalks, art	Refuge islands, high visibility crosswalks, reduced lane widths	Curb bulbs, traffic circles, raised crosswalks	Truck aprons, 4-way stops

Notes:

1. See intersection section for full list of treatments

Source: CDM Smith, 2017

Network Concept Maps

To ensure a balanced, multi-modal transportation network, the Redwood City General Plan organizes streets and other transportation facilities according to typologies that consider the context and prioritize different travel modes for each street. Together, the typologies provide a layered network of “complete streets” that will accommodate all types of local transportation modes.

These street network typologies should serve to guide future transportation studies and improvements, so that they consider relationships to surrounding land uses, appropriate travel speeds, and the need to accommodate multiple travel modes and various users. One of the goals of this plan is to “create a walking and bicycling-friendly community that provides a balanced, convenient, and safe transportation system.” To support this goal, RWCmoves will strive to implement the transportation network changes illustrated on the following pages.

Figure 18 shows the proposed street typologies network, which builds off those established in the General Plan. **Figure 19** includes the proposed bicycle backbone network, which is in addition to the City’s existing Bikeway Plan. The backbone network recognizes the need to create a low-stress bicycle network that all users of all ages and abilities would be comfortable riding. This backbone network has the potential to create a cohesive, connected bicycle network for all residents to use.

Lastly, **Figure 20** illustrates proposed truck routes in the City. These routes build off the network changes proposed as part of the street typologies and bicycle backbone network. The intent is to guide trucks over three tons to roadways appropriate for through travel and as close as possible to their destination.



Figure 18: Proposed Street Typologies Network

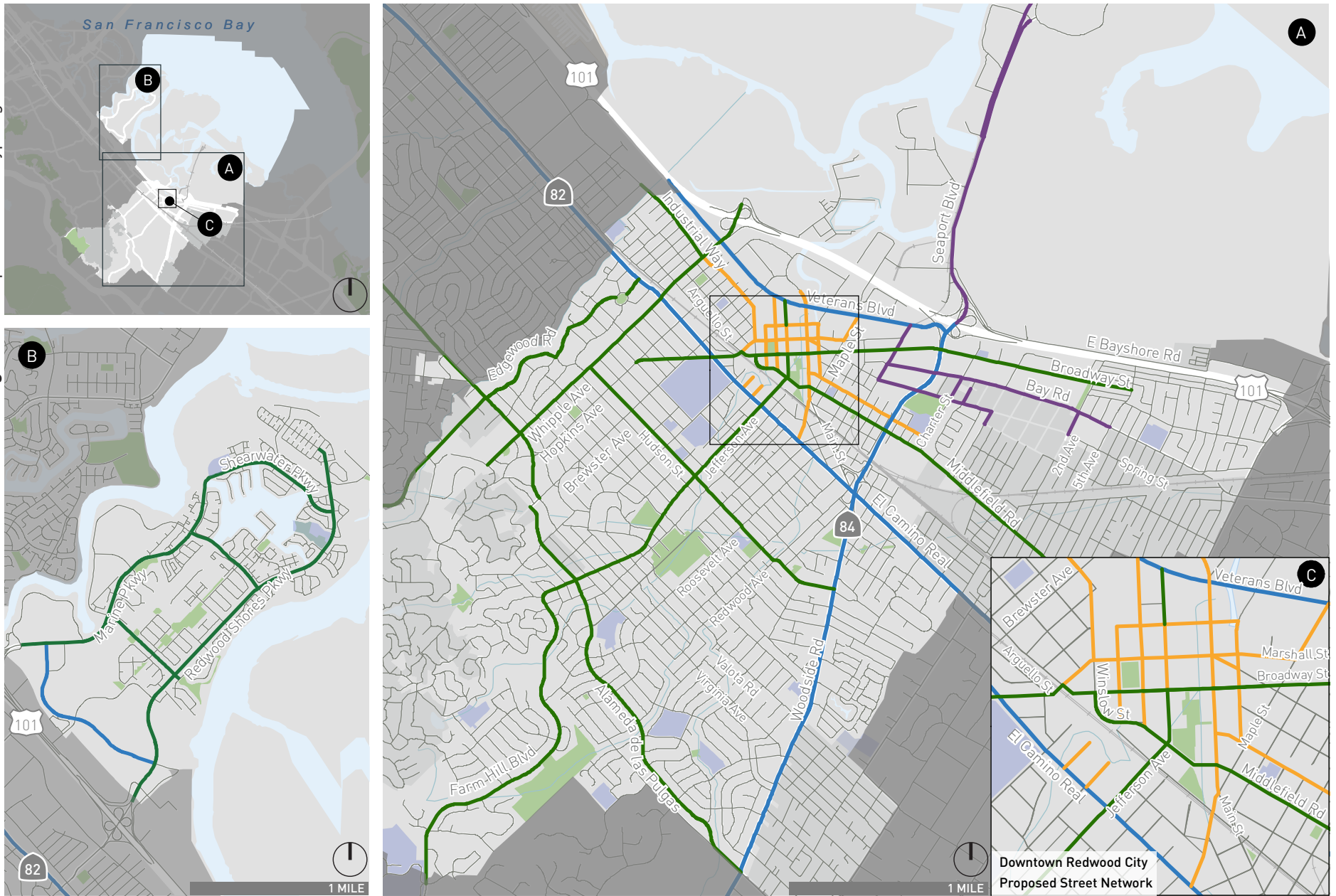
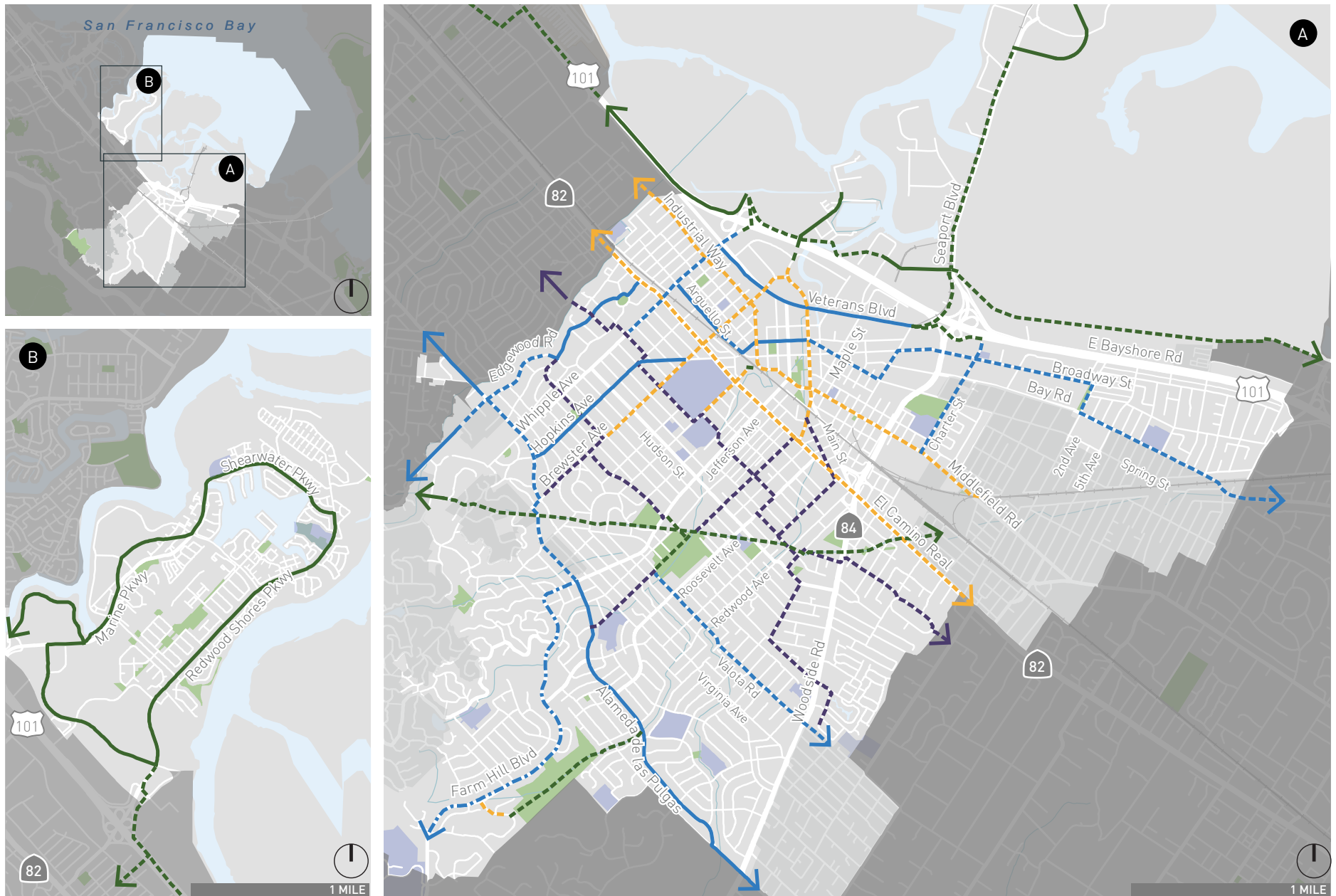


Figure 18

Proposed Street Typologies Network

Figure 19: Proposed Bicycle Backbone Network



- Redwood City Limits
- Sphere of Influence
- Parks
- Schools
- Railroad

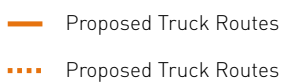
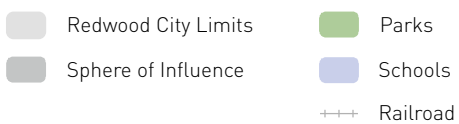
- Existing Bicycle Facilities**
- Class I Bicycle Path
 - Class II Bicycle Lane (Enhanced)
 - Class III Bicycle Route
 - Class IV Cycle Track

- Proposed Bicycle Facilities**
- Class I Bicycle Path
 - Class II Bicycle Lane (Enhanced)
 - Class II Bicycle Lane (Pilot Project)
 - Class III Bicycle Boulevard
 - Class IV Cycle Track

Figure 19

Proposed Bicycle Backbone Network

A map of San Francisco Bay with two study areas, A and B, highlighted. Area A is in the southern part of the bay, and Area B is in the northern part. A compass rose is in the bottom right corner.



Proposed Truck Routes

Ongoing Performance Monitoring

Evaluating the City's success in achieving the vision and goals outlined in this document would be done through regular monitoring. Specifically, the City will establish a transportation system monitoring program for each of performance measures outlined in the previous chapter. **Table 7** summarizes the strategies to evaluate each performance measure. Following the table is a detailed description of the potential monitoring strategies.

Improves Safety for All Travel Modes

Annually, the City should update its collision records with Statewide Integrated Traffic Records System (SWITRS) and Transportation Injury Mapping Systems (TIMS) collision data to monitor trends in:

- Total collisions
- Collisions involving pedestrians
- Collisions involving bicyclists
- Types of collisions
- Fatal and severe injury collisions
- Primary Collision Factors

Success will be measured through reduction in collision rates for each collision metric evaluated. In addition, creating collision heat-maps could be used to understand spatial trends in collisions throughout Redwood City.

Improves the City's Overall Public Health and Minimizes Environmental Impacts

Redwood City can measure environmental impacts by tracking the average vehicle miles traveled (VMT) by City residents and employees. The California Governor's Office of Planning and Research (OPR) will soon require projects to assess a project's impact on the City's VMT. VMT could be measured through the development of a citywide travel demand model or the development of an off-model VMT measurement tool. The City should evaluate VMT every two to three years to measure success of this performance measure.

Table 7: Redwood City Transportation Monitoring Program Strategy

Category	Performance Measure	Monitoring Strategy			
		Monitoring Data	Data Source	Frequency	Level of Effort
Community, Health & Safety Improvements	Improves safety for all travel modes	Collision Data	SWITRS and TIMS	Annually	Low
	Improves the City's overall public health and minimizes environmental impacts	Vehicle Miles Traveled (VMT)	Citywide Model or Off-model tool	Every Two to three Years	High
	Promotes attractive, well-designed streets through placemaking, public art, and improved landscaping	Percent of completed projects that include placemaking, art, improved landscaping	Project descriptions	Every Two to three Years	Low
Transportation Infrastructure and Multimodal Network Improvements	Improves pedestrian facilities and network quality	Pedestrian Counts	Surveys	Annually	Low
		Active+ Walking Demand Score	Census, transit, and land use data	Every Two to three Years	Medium
	Improves bicycle facilities and network quality	Bicycle Counts	Surveys	Annually	Low
		Active+ Bicycle Demand Score	Census, transit, and land use data	Every Two to three Years	Medium
	Improves access to transit and enhances multimodal connectivity throughout the City	Transit Ridership	Caltrain and SamTrans	Annually	Low
	Increases mode split for all non-automobile travel modes	Mode Split Data	Surveys	Every Two to three Years	High
	Increases person throughput and proactively manages traffic congestion	Peak Period Travel Times on Major Corridors (Woodside Road, Middlefield Road, Jefferson/Farm Hill, Whipple)	Travel Time Surveys and volume counts	Annually	Medium
Equity Improvements	Accommodates all users, including disabled, low-income, the young and elderly with access to the transportation system as well as to jobs, services and other destinations	Map Evaluation	Project Location	Every Two to three Years	Low
Feasibility and Constructability	Project applies current design standards and is feasible and constructible	City Review	City Review	Ongoing	Low
	Project has a positive return on investment	Compare project use to original forecasts, compare costs to original estimate	City	Every Two to three Years	Medium

Source: Fehr & Peers, 2017.

Promotes Attractive, Well-Designed Streets Through Placemaking, Public Art, and Improved Landscaping

Annually, the City should assess the percent of completed projects that had between three and five points for this performance measure. The goal would be to meet or exceed a set threshold normalized by project cost.

Improves Pedestrian Facilities & Network Quality

There are two ways in which the City should evaluate its pedestrian facilities and network quality. One is through annual pedestrian counts at set locations through the City. By defining key areas to monitor pedestrian activity, the City over time can monitor increase in pedestrian activity. The assumption is that increased pedestrian network quality will result in increased pedestrian activity.

Additionally, every two to three years, the City should update its Active+ maps and demonstrate a percent increase in network coverage that rates between medium and high pedestrian demand area. The premise is that as pedestrian network quality increases, so will the pedestrian demand.

Improves Bicycle Facilities & Network Quality

There are two ways in which the City should evaluate its bicycle facilities and network quality. One is through annual bicycle counts at set locations through the City. By defining key areas to monitor bicycle activity, the City over time

can monitor increase in bicycle activity. The assumption is that increased bike network quality would result in increased bicycle activity.

Additionally, every two to three years, the City should update its Active+ maps and demonstrate a percent increase in network coverage that rates between medium and high bicycle demand area. The premise is that as bicycle network quality increases, so will the bicycle demand.

Improves Access to Transit and Enhances Multimodal Connectivity throughout the City

A key feature to evaluating access to transit is increases in transit ridership. Annually, the City should collect ridership data from Caltrain and SamTrans to report on ridership trends over time, and compare it to regional trends.

Increases Mode Split for All Non-Automobile Travel Modes

Mode split is an indicator of the presence and quality of bicycle, pedestrian, transit, and vehicular networks in Redwood City. Tracking travel behavior through overall volumes, ridership, and mode split in the City will be used to generate system-wide vehicle, bicycle, and pedestrian miles traveled over time. Mode split data can be collected through surveys at driveways, key gateways into/out of the City, and even residential surveys. The City should monitor success every two to three years.

Increases Person Throughput and Proactively Manages Traffic Congestion

Travel times on key corridors indicates if the City is effectively managing traffic congestion. Redwood City can also work towards increasing person throughput by tracking pedestrian, bicyclist, transit and vehicular throughput and delay along major corridors, including Woodside Road, Middlefield Road, Jefferson Avenue/Farm Hill Boulevard, Whipple Avenue).

Accommodates All Users, Including Disabled, Low-Income, the Young and Elderly with Access to the Transportation System

Annually, the City should assess the percent of completed projects that rank between three and five points for the Equity Score Map included in **Appendix B**. The goals would be to meet or exceed a set threshold normalized by project cost.

Project Applies Current Design Standards and is Feasible and Constructible

In keeping with the state of the practice, all improvements should apply design standards that are current at the time of the implementation. Furthermore, the feasibility and constructability of a project are important criteria for Redwood City to consider, because if the project or program is infeasible or difficult to construct, then it will be difficult to implement. Project feasibility can be related to right-of-way constraints, jurisdictional responsibilities, costs, and other considerations.

Project has a Positive Return on Investment

Projects are also evaluated based on if they will provide a positive return on investment. Under this measure, actual project usage and costs are compared to original forecasts and estimates.

Implementation Actions

The Redwood City Council, with support from City staff, would need to take the following actions to implement the RWCmoves vision along with its supporting goals, policies, programs, and projects:

- Adopt and environmentally clear the RWCmoves Citywide Transportation Plan
- Approve a General Plan Amendment to incorporate RWCmoves recommendations
- Update multimodal Transportation Impact Fee (TIF) program to capture unfunded Tier 1 projects, select Tier 2 projects and expected locally-funded portions of Signature Projects
- Seek local, regional and state grant funding to advance Tier 1 projects to the planning and design stages
- Update RWCmoves Project Priority List every two to three years to reflect additional project needs and priorities
- Monitor performance of transportation system and investment levels annually

These implementation actions will allow the RWCmoves Plan to respond to City's current transportation needs and opportunities, while at the same time recognizing the changing nature of the transportation system. By doing so, the City will be well-positioned to achieve its vision of creating a multimodal, safe and accessible transportation network that provides the best travel experience possible for everyone in Redwood City.

