

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.

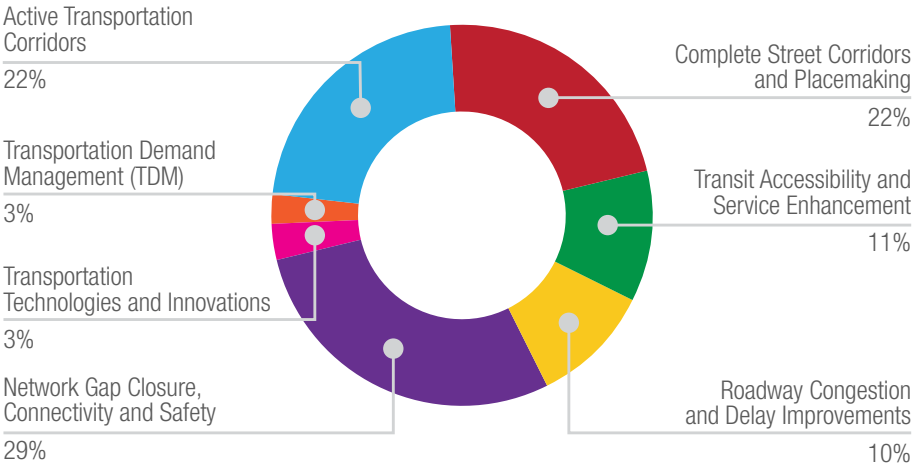
Project Categories

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

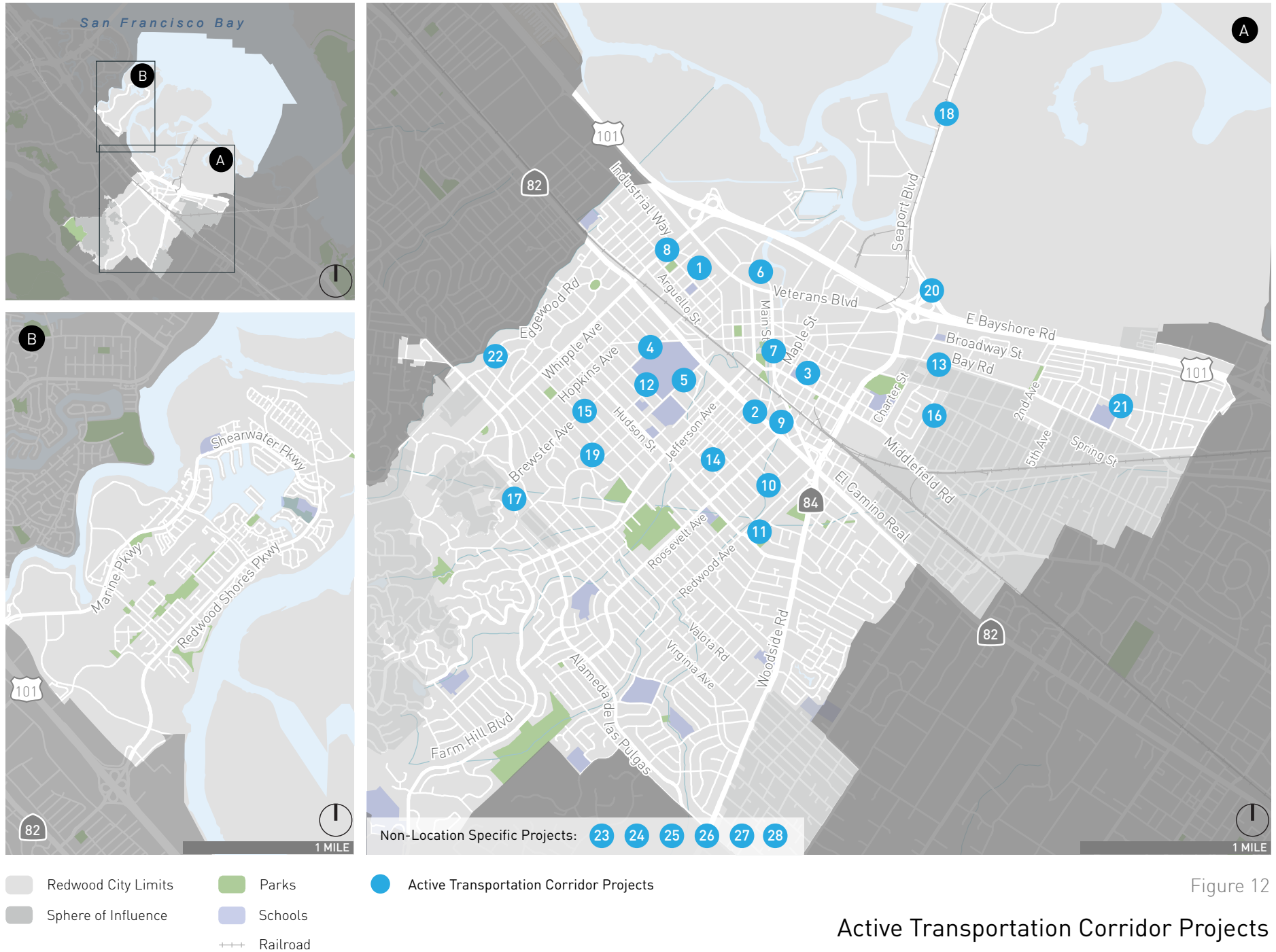


Figure 12

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:

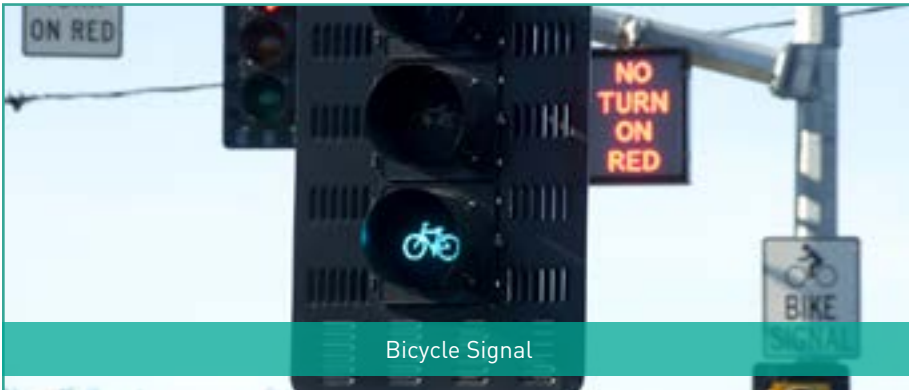
- **Pedestrian Hybrid Beacon (aka HAWK Signal):** Pedestrian Hybrid Beacons (PHBs), also known as High Intensity Activated Crosswalk (HAWK) Signals, are pedestrian-actuated signals that combine a beacon flasher and a traffic control signal. When actuated, PHBs displays a yellow (warning) indication followed 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.

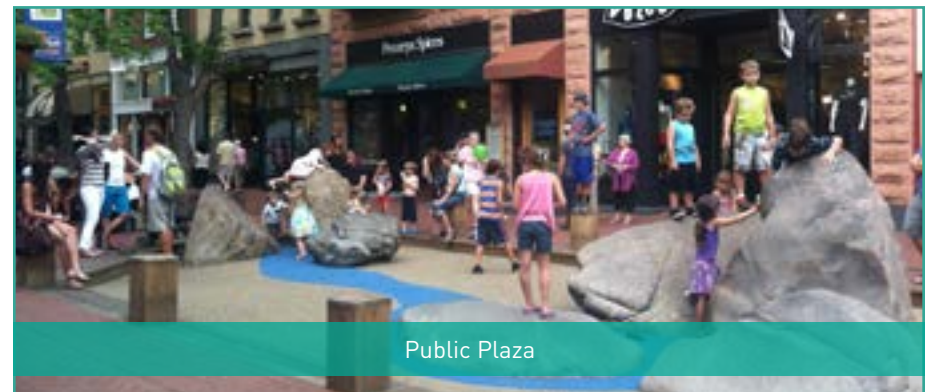
- **Public Plaza:** A plaza is an open public space that serves as a place where people gather, such as a city square.
- **Paseo:** A paseo, also known as a promenade, is a public place or path designed for walking.
- **Shared Space:** Shared space is a street design that minimizes the separation of 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.



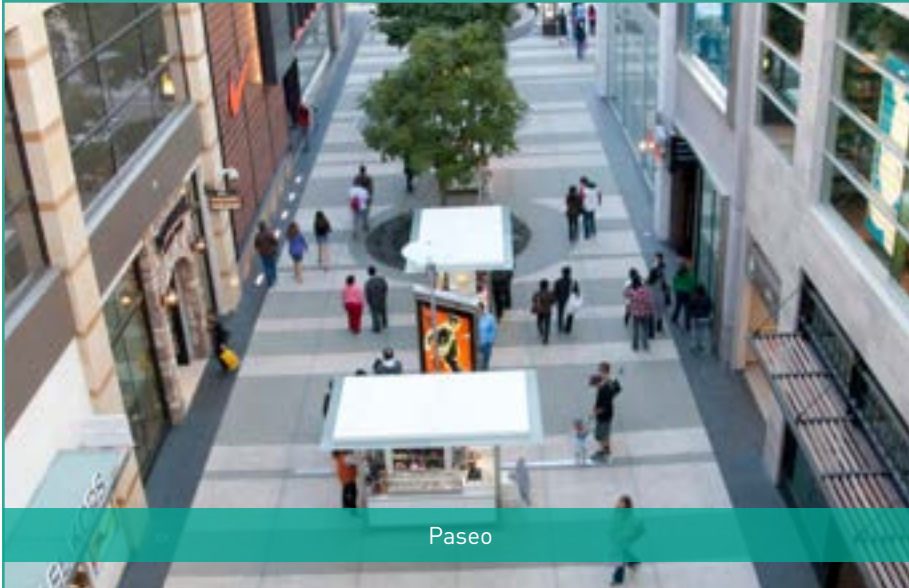
Public Art



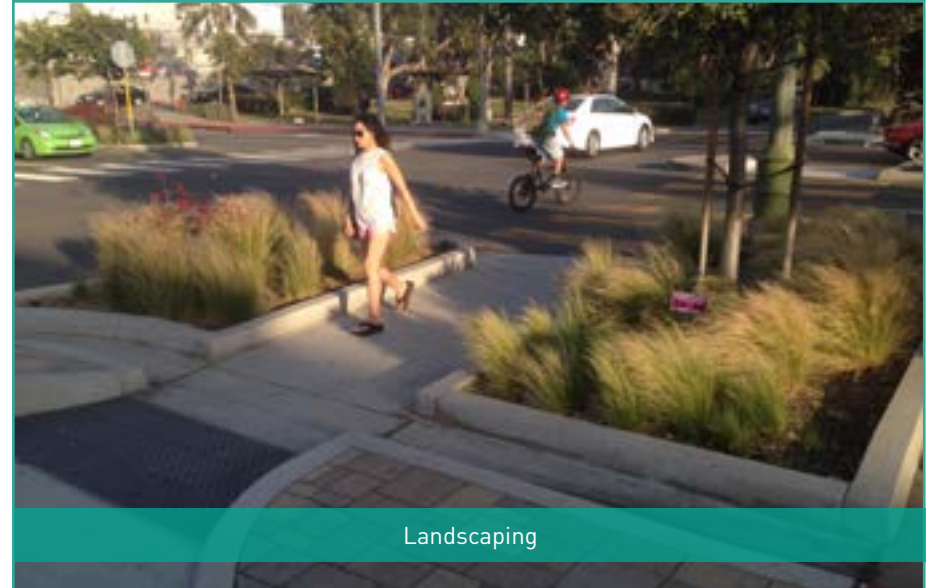
Public Seating



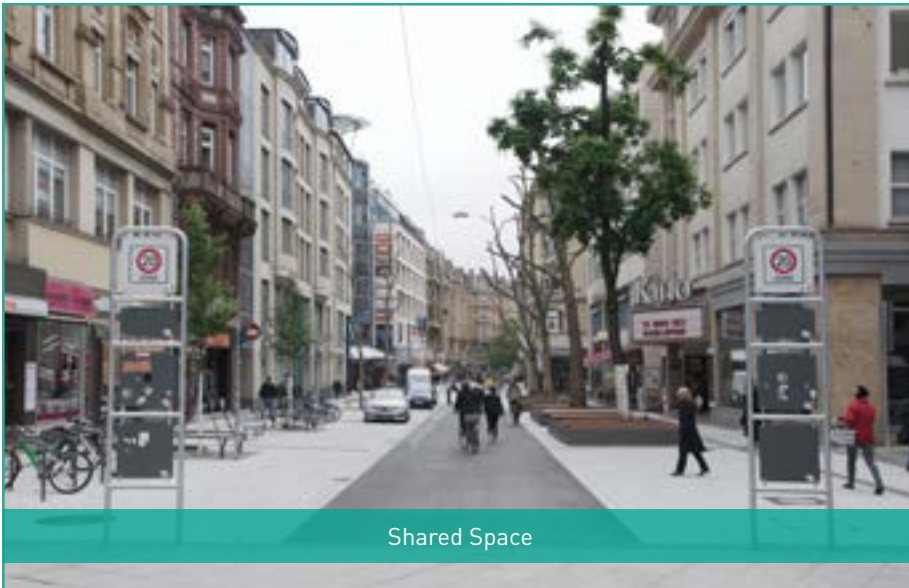
Public Plaza



Paseo



Landscaping



Shared Space



Wayfinding

Figure 13: Complete Street Corridors and Placemaking Projects

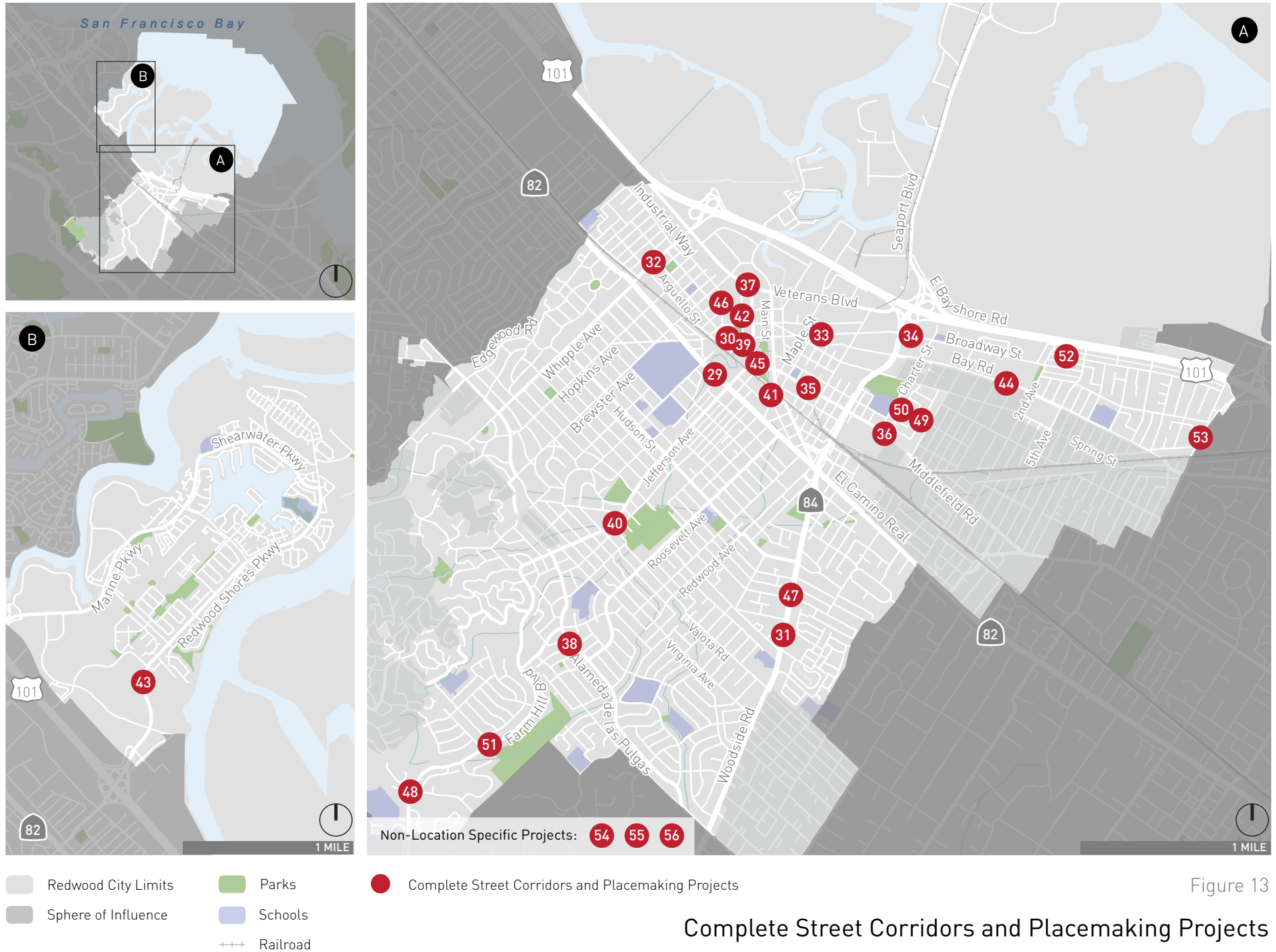


Figure 13

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.



Transit Signal Priority (TSP)



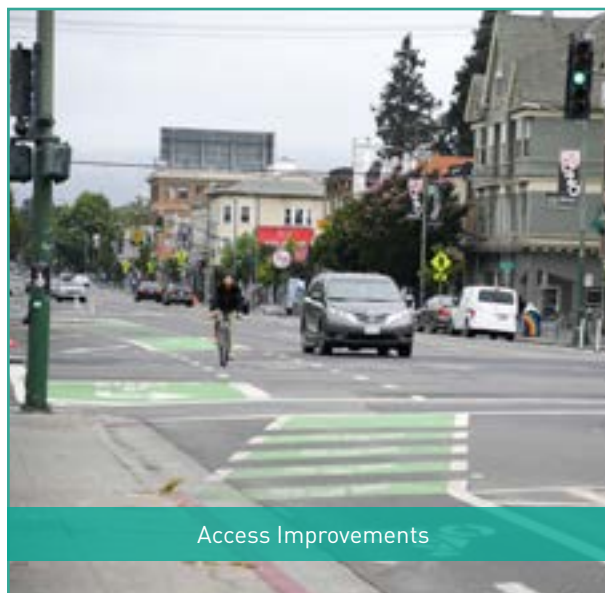
Integrated Passenger Information System



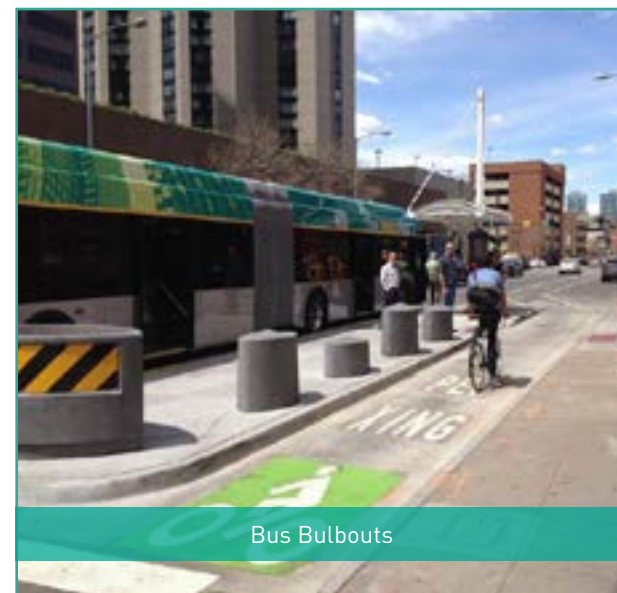
Enhanced Transit Stop



Demand-Responsive Transit



Access Improvements



Bus Bulbouts

Figure 14: Transit Access and Service Enhancement Projects

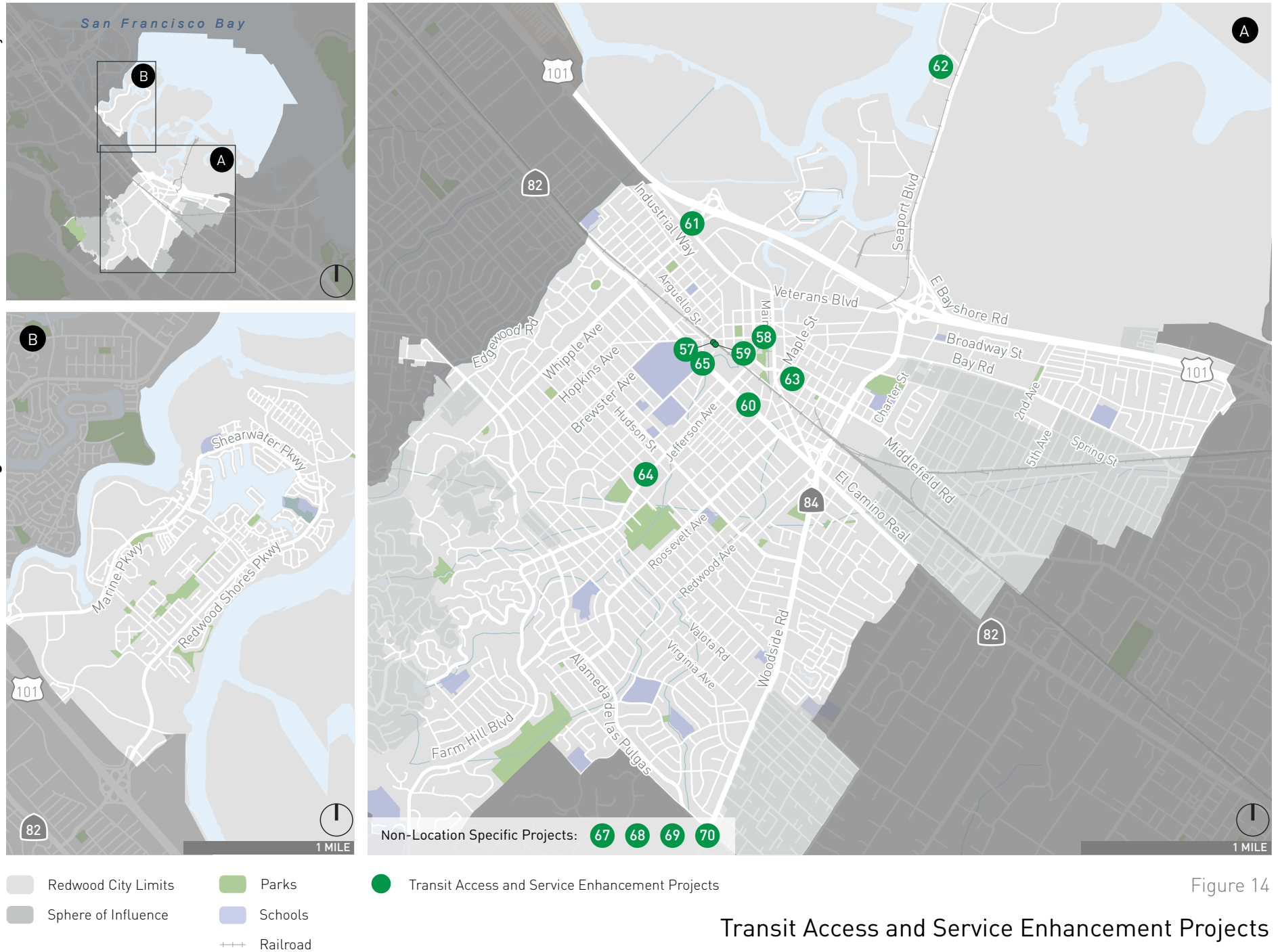


Figure 14

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.



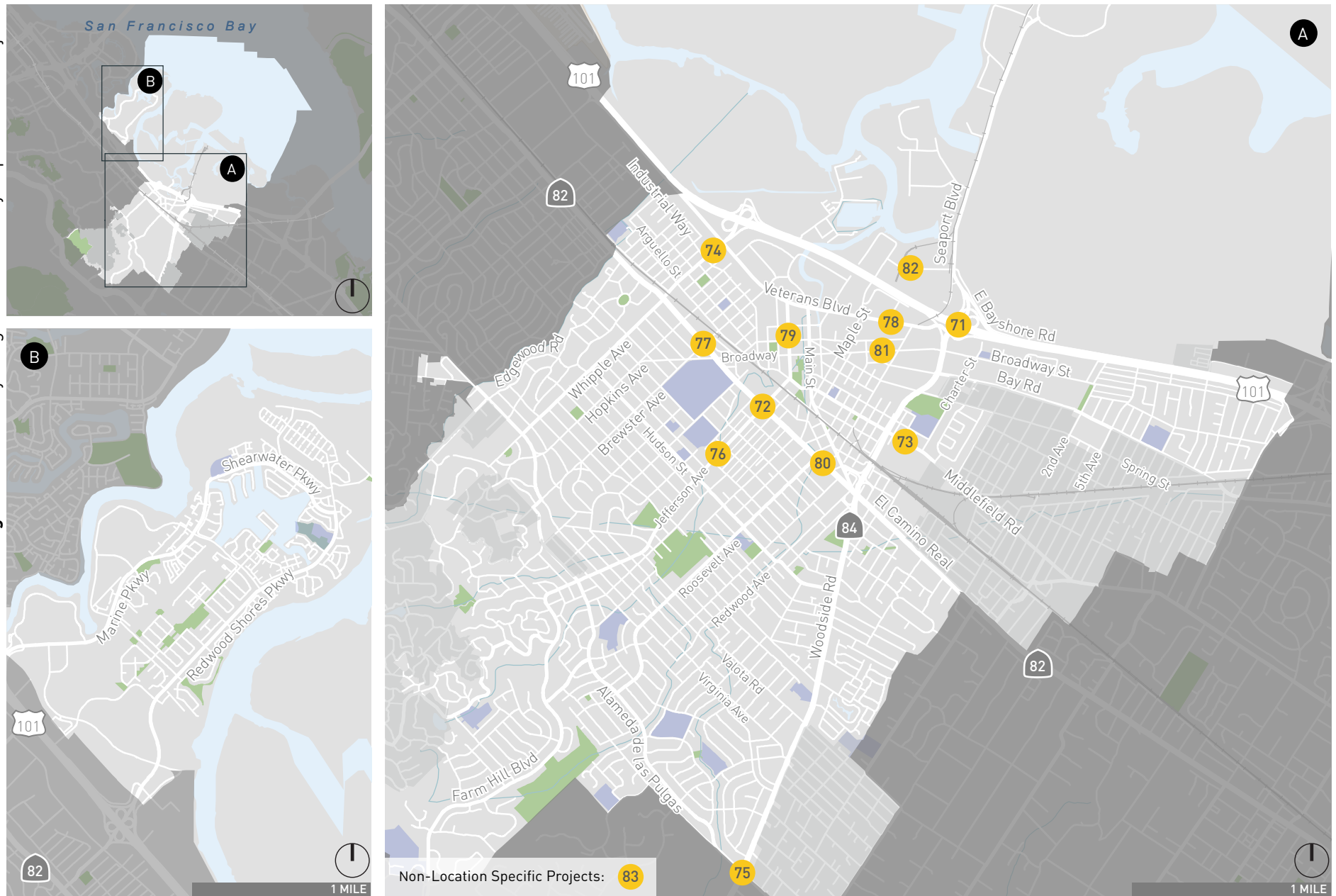
Roundabouts

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



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

- 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.

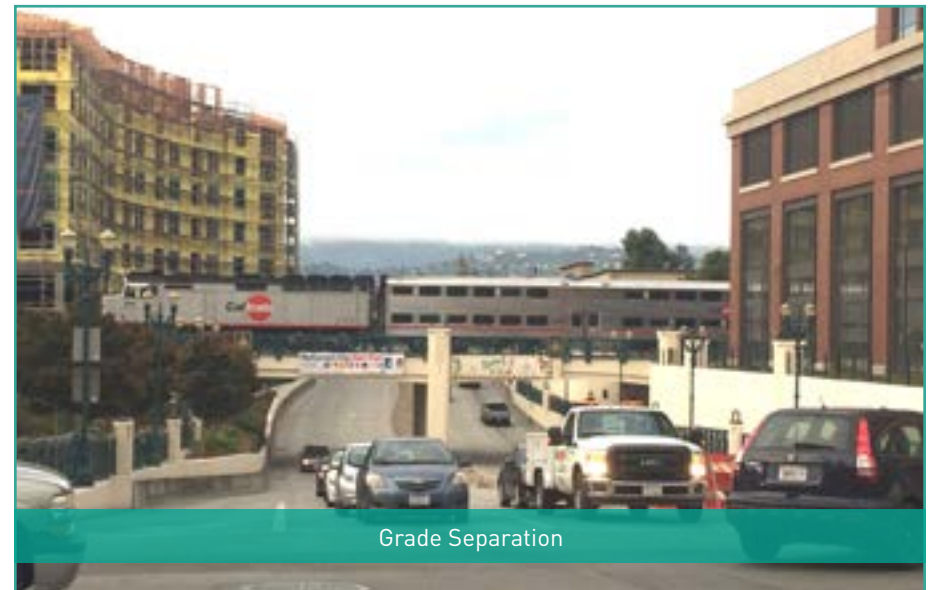
Network Gap Closure and Connectivity Measures

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.

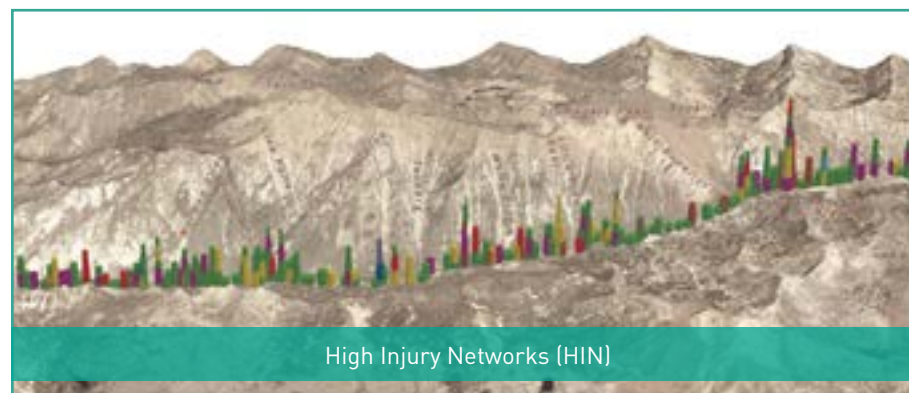


Figure 16: Network Gap Closure, Connectivity and Safety Projects

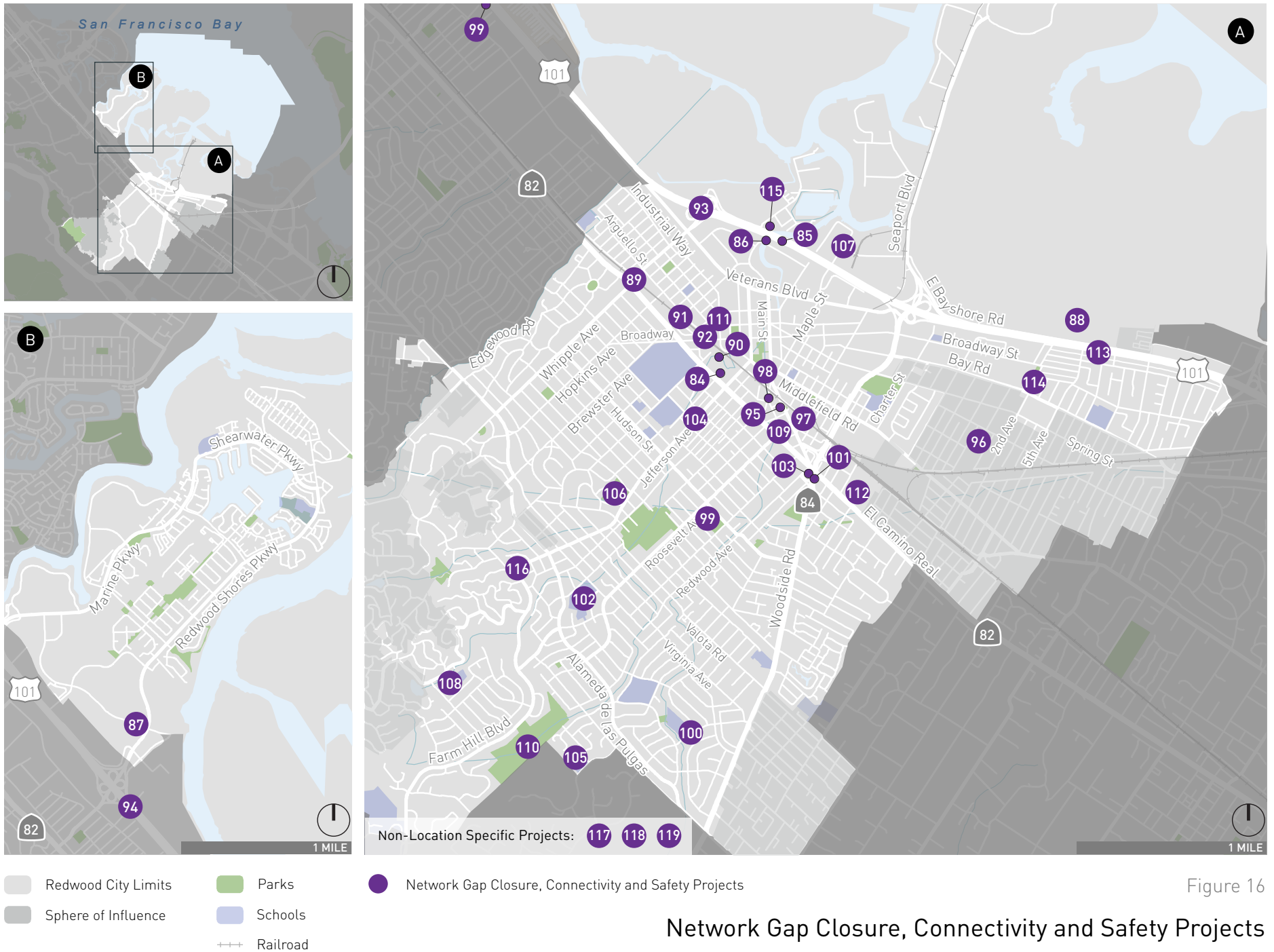


Figure 16

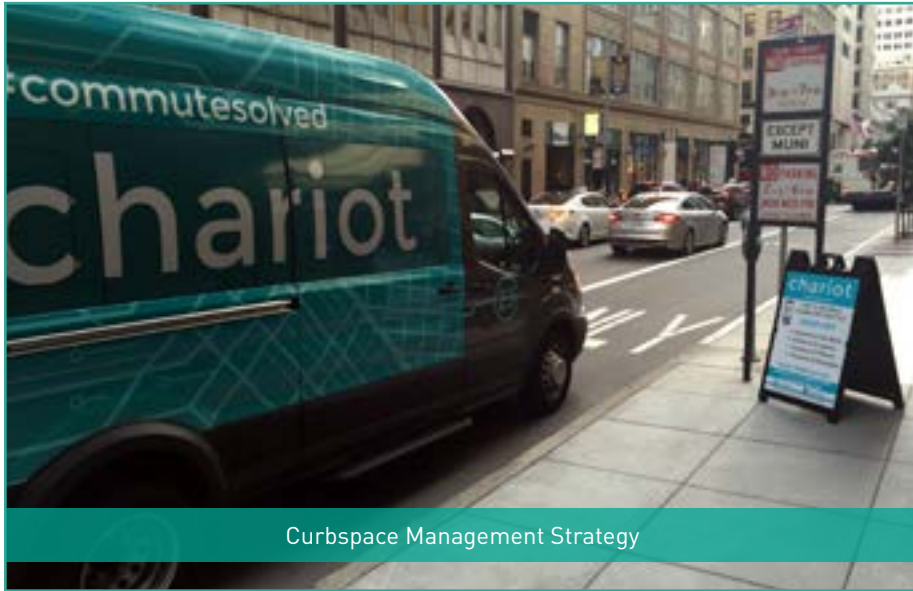
Network Gap Closure, Connectivity and Safety Projects



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.



Transportation Technologies and Innovations Strategies

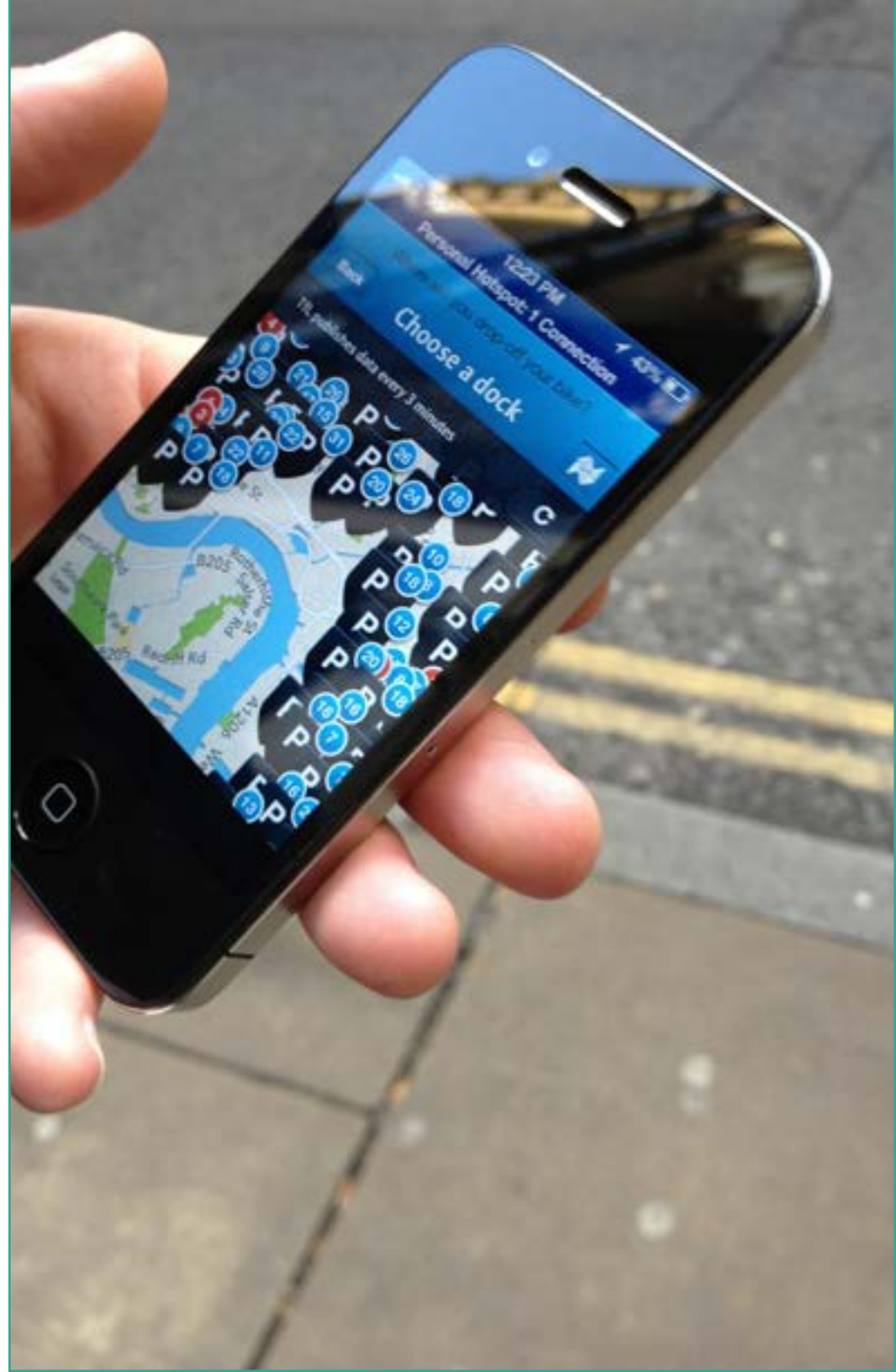
Projects and programs related to transportation technologies and innovations include:

- **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



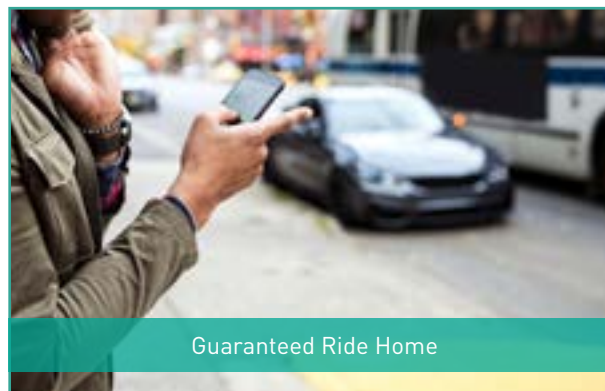
Rideshare/Carshare



Bikeshare



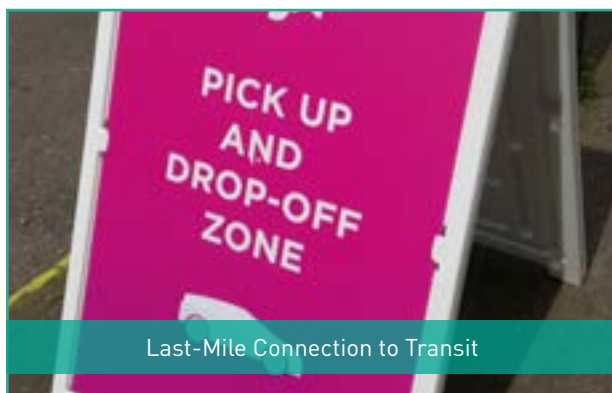
Carpool/Vanpool



Guaranteed Ride Home



Bicycle Facilities



Last-Mile Connection to Transit



Reduced Parking



Paid Parking

TDM Measures

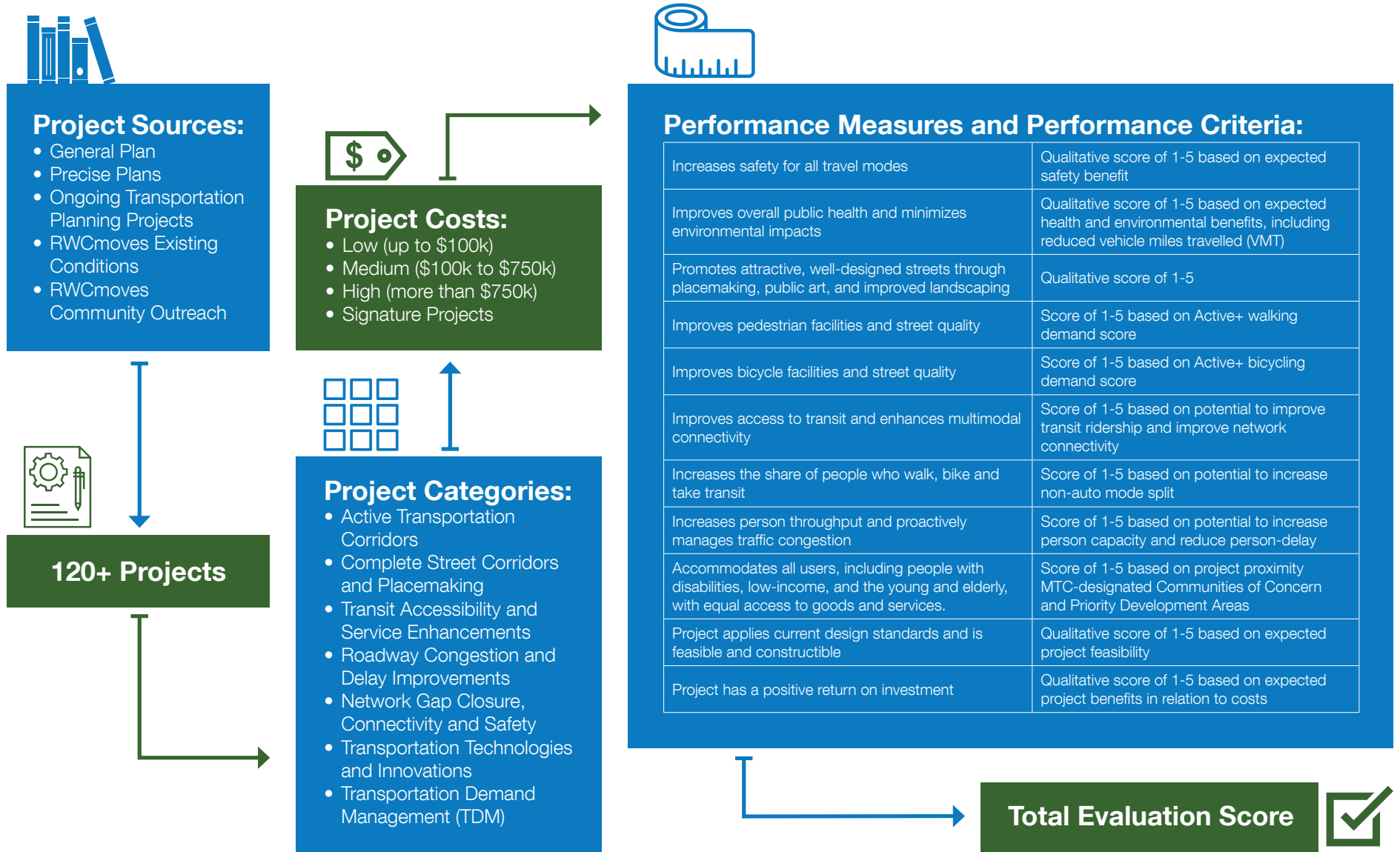
TDM programs and strategies to reduce dependence on single-occupancy vehicles include:

- **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.





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.

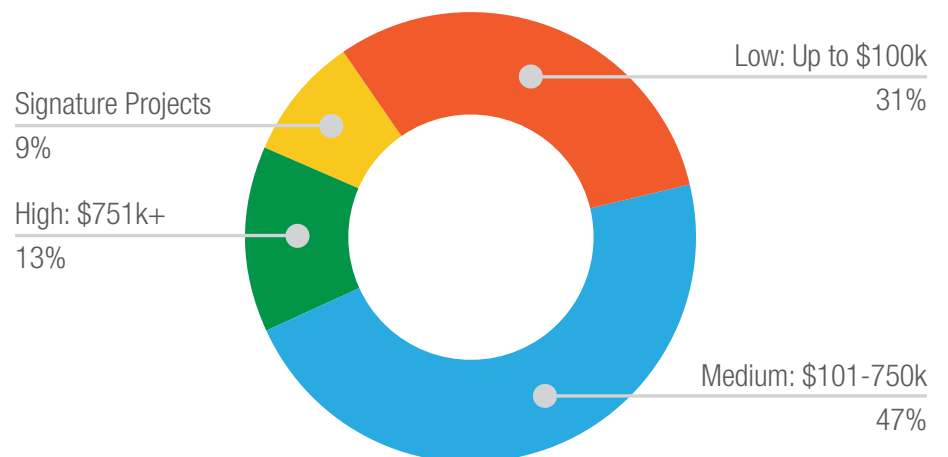
Performance Measure 11: Project has a Positive Return on Investment

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